

PCTEST ENGINEERING LABORATORY, INC.

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# MEASUREMENT REPORT

LTE

#### **Applicant Name:**

LG Electronics USA, Inc. 1000 Sylvan Avenue Englewood Cliffs, NJ 07632 United States Date of Testing: Oct. 30, 2018 - Nov. 12, 2018 Test Site/Location: PCTEST Lab. Columbia, MD, USA Test Report Serial No.: 1M1810290199-05.ZNF

# FCC ID:

## ZNFX212TA

APPLICANT:

# LG Electronics USA, Inc.

Application Type: Model: Additional Model(s): EUT Type: FCC Classification: FCC Rule Part(s): Test Procedure(s): Class II Permissive Change: Original Grant Date: Class II Permissive Change LM-X220MA LMX220MA, X220MA Portable Handset PCS Licensed Transmitter Held to Ear (PCE) 22 & 24 ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01 Please see FCC change document March 28, 2018

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 §2.947. 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.





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# MEASUREMENT REPORT FCC Part 22 & 24



			EF	Rb	EI	RP		
Mode	FCC Rule Part	Tx Frequency (MHz)	Max. Power (W)	Max. Power (dBm)	Max. Power (W)	Max. Power (dBm)	Emission Designator	Modulation
LTE Band 26	22H	824.7 - 848.3	0.177	22.49	0.291	24.64	1M11G7D	QPSK
LTE Band 26	22H	824.7 - 848.3	0.145	21.60	0.237	23.75	1M10W7D	16QAM
LTE Band 26	22H	825.5 - 847.5	0.188	22.73	0.308	24.88	2M72G7D	QPSK
LTE Band 26	22H	825.5 - 847.5	0.135	21.31	0.222	23.46	2M72W7D	16QAM
LTE Band 26	22H	826.5 - 846.5	0.170	22.30	0.279	24.45	4M57G7D	QPSK
LTE Band 26	22H	826.5 - 846.5	0.139	21.43	0.228	23.58	4M54W7D	16QAM
LTE Band 26	22H	829 - 844	0.181	22.57	0.296	24.72	9M05G7D	QPSK
LTE Band 26	22H	829 - 844	0.154	21.87	0.252	24.02	9M04W7D	16QAM
LTE Band 26	22H	831.5 - 841.5	0.170	22.31	0.279	24.46	13M5G7D	QPSK
LTE Band 26	22H	831.5 - 841.5	0.155	21.90	0.254	24.05	13M5W7D	16QAM

### EUT Overview (<1GHz)

Mode	FCC Rule Part	Tx Frequency (MHz)	EI Max. Power (W)	RP Max. Power (dBm)	Emission Designator	Modulation
LTE Band 25	24E	1850.7 - 1914.3	0.421	26.24	1M10G7D	QPSK
LTE Band 25	24E	1850.7 - 1914.3	0.344	25.37	1M11W7D	16QAM
LTE Band 25	24E	1851.5 - 1913.5	0.350	25.44	2M72G7D	QPSK
LTE Band 25	24E	1851.5 - 1913.5	0.297	24.73	2M71W7D	16QAM
LTE Band 25	24E	1852.5 - 1912.5	0.352	25.47	4M55G7D	QPSK
LTE Band 25	24E	1852.5 - 1912.5	0.284	24.53	4M54W7D	16QAM
LTE Band 25	24E	1855 - 1910	0.338	25.29	9M01G7D	QPSK
LTE Band 25	24E	1855 - 1910	0.275	24.39	8M97W7D	16QAM
LTE Band 25	24E	1857.5 - 1907.5	0.349	25.43	13M5G7D	QPSK
LTE Band 25	24E	1857.5 - 1907.5	0.323	25.10	13M5W7D	16QAM
LTE Band 25	24E	1860 - 1905	0.349	25.43	17M9G7D	QPSK
LTE Band 25	24E	1860 - 1905	0.287	24.57	17M9W7D	16QAM

EUT Overview (>1GHz)

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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 Innovation, Science and Economic Development Canada.

## 1.2 PCTEST Test Location

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility located at 7185 Oakland Mills Road, Columbia, MD 21046. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014.

### 1.3 Test Facility / Accreditations

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

- PCTEST is an ISO 17025-2005 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISED Standards (RSS).
- PCTEST facility is a registered (2451B) test laboratory with the site description on file with ISED.

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# 2.0 PRODUCT INFORMATION

## 2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Portable Handset FCC ID: ZNFX212TA**. The test data contained in this report pertains only to the emissions due to the EUT's LTE function.

**Test Device Serial No.:** 02587, 02785

## 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 UNII, Bluetooth (1x, EDR, LE)

## 2.3 Test Configuration

The EUT was tested per the guidance of ANSI/TIA-603-E-2016 and KDB 971168 D01 v03r01. See Section 7.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

## 2.4 EMI Suppression Device(s)/Modifications

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

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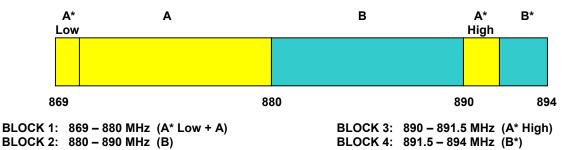


# 3.0 DESCRIPTION OF TESTS

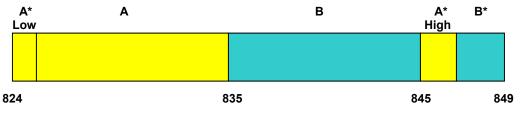
## 3.1 Measurement Procedure

The measurement procedures described in the document titled "Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards" (ANSI/TIA-603-E-2016) and "Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission Systems" (KDB 971168 D01 v03r01) were used in the measurement of the EUT.

## 3.2 Cellular - Base Frequency Blocks



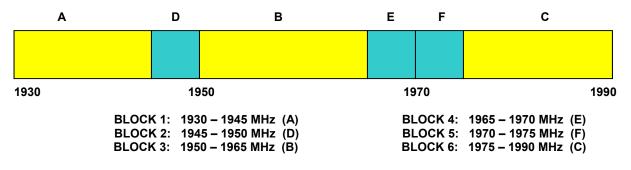
## 3.3 Cellular - Mobile Frequency Blocks



BLOCK 1: 824 – 835 MHz (A\* Low + A) BLOCK 2: 835 – 845 MHz (B)

BLOCK 3:	845 – 846.5 MHz	(A* Hiah)
	846.5 – 849 MHz	• • /
BLUCK 4.	040.5 - 049 WINZ	(

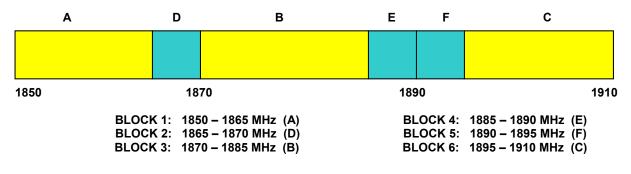
## 3.4 PCS - Base Frequency Blocks



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## 3.5 PCS - Mobile Frequency Blocks



## 3.6 Radiated Power and Radiated Spurious 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. 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. For measurements below 1GHz, the absorbers are removed. A raised turntable is used for radiated measurement. The turn table 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. An 80cm tall test table made of Styrodur is placed on top of the turn table. A Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

The equipment under test was transmitting while connected to its integral antenna and is placed on a turntable 3 meters from the receive antenna. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer. Radiated power levels are also investigated with the receive antenna horizontally and vertically polarized. The maximized power level is recorded using the spectrum analyzer "Channel Power" function with the integration band set to the emissions' occupied bandwidth, a RMS detector, RBW = 100kHz, VBW = 300kHz, and a 1 second sweep time over a minimum of 10 sweeps, per the guidelines of KDB 971168 D01 v03r01.

Per the guidance of ANSI/TIA-603-E-2016, a half-wave dipole is then substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer level previously recorded from the spurious emission from the EUT. The power of the emission is calculated using the following formula:

 $P_{d [dBm]} = P_{g [dBm]} - cable loss [dB] + antenna gain [dBd/dBi]$ 

Where,  $P_d$  is the dipole equivalent power,  $P_g$  is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-wave dipole (dBd) or an isotropic source (dBi). The substitute level is equal to  $P_g [dBm]$  – cable loss [dB].

The calculated  $P_d$  levels are then compared to the absolute spurious emission limit of -13dBm which is equivalent to the required minimum attenuation of 43 + 10log<sub>10</sub>(Power [Watts]).

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# 4.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4-2014. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95% level of confidence. The measurement uncertainty shown below 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
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

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# 5.0 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 C63.5-2017.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	LTx3	LIcensed Transmitter Cable Set	8/23/2018	Annual	8/23/2019	LTx3
Agilent	8648D	(9kHz-4GHz) Signal Generator	11/21/2017	Annual	11/21/2018	3613A00315
Agilent	E5515C	Wireless Communications Test Set	1/29/2016	Triennial	1/29/2019	GB46310798
Agilent	N9038A	MXE EMI Receiver	6/11/2018	Annual	6/11/2019	MY51210133
Agilent	N9030A	PXA Signal Analyzer (44GHz)	5/25/2018	Annual	5/25/2019	MY52350166
Com-Power	PAM-103	Pre-Amplifier (1-1000MHz)	9/17/2018	Annual	9/17/2019	441119
Emco	3115	Horn Antenna (1-18GHz)	3/28/2018	Biennial	3/28/2020	9704-5182
EMCO	3160-09	Small Horn (18 - 26.5GHz)	8/9/2018	Biennial	8/9/2020	135427
Espec	ESX-2CA	Environmental Chamber	3/28/2018	Annual	3/28/2019	17620
Rohde & Schwarz	CMW500	Radio Communication Tester	6/8/2018	Annual	6/8/2019	112347
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	1/24/2018	Annual	1/24/2019	100040
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	5/21/2018	Annual	5/21/2019	100342
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	6/18/2018	Annual	6/18/2019	102134
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Rx	4/30/2018	Biennial	4/30/2020	9105-2404
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Tx	4/30/2018	Biennial	4/30/2020	9105-2403
Seekonk	NC-100	Torque Wrench (8" lb)	5/10/2018	Biennial	5/10/2020	N/A
Sunol	DRH-118	Horn Antenna (1-18GHz)	8/11/2017	Biennial	8/11/2019	A050307
Sunol	DRH-118	Horn Antenna (1-18 GHz)	8/11/2017	Biennial	8/11/2019	A042511
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	4/19/2018	Biennial	4/19/2020	A051107

Table 5-1. Test Equipment

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# 6.0 SAMPLE CALCULATIONS

## **Emission Designator**

#### **QPSK Modulation**

#### Emission Designator = 8M62G7D

LTE BW = 8.62 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

#### **QAM Modulation**

#### Emission Designator = 8M45W7D

LTE BW = 8.45 MHz W = Amplitude/Angle Modulated 7 = Quantized/Digital Info D = Data transmission, telemetry, telecommand

## Spurious Radiated Emission – LTE Band

#### Example: Middle Channel LTE Mode 2<sup>nd</sup> Harmonic (1564 MHz)

The average spectrum analyzer reading at 3 meters with the EUT on the turntable was -81.0 dBm. The gain of the substituted antenna is 8.1 dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of -81.0 dBm on the spectrum analyzer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 1564 MHz. So 6.1 dB is added to the signal generator reading of -30.9 dBm yielding -24.80 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 dBm - (-24.80).

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# 7.0 TEST RESULTS

# 7.1 Summary

Company Name:	LG Electronics USA, Inc.
FCC ID:	ZNFX212TA
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
Mode(s):	<u>LTE</u>

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1049	Occupied Bandwidth	N/A		PASS	Section 7.2
2.1051 2.917(a) 24.238(a)	Out of Band Emissions	> 43 + 10log <sub>10</sub> (P[Watts]) at Band Edge and for all out-of- band emissions			Section 7.3, 7.4
24.232(d)	Peak-Average Ratio	< 13 dB	CONDUCTED		Section 7.5
2.1046	Transmitter Conducted Output Power	N/A			See RF Exposure Report
2.1055 22.355 24.235	Frequency Stability	< 2.5 ppm (Part 22) and fundamental emissions stay within authorized frequency block (Part 24)			Section 7.8

Table 7-1. Summary of Conducted Test Results

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FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
22.913(a)(5)	Effective Radiated Power / Equivalent Isotropic Radiated Power (Band 26)	< 7 Watts max. ERP	RADIATED		Section 7.6
24.232(c)	Equivalent Isotropic Radiated Power (Band 25)	< 2 Watts max. EIRP		PASS	Section 7.6
2.1053 22.917(a) 24.238(a)	Undesirable Emissions	> 43 + 10log <sub>10</sub> (P[Watts]) for all out-of-band emissions			Section 7.7

Table 7-2. Summary of Radiated Test Results

#### Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots (Sections 7.2, 7.3, 7.4, 7.5) were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT 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, attenuators, and couplers.
- 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 "LTE Automation," Version 4.8.
- 5) For operation <1GHz, the EIRP limits in the table above are referenced to the specifications written in the relevant Radio Standards Specifications for Innovation, Science, and Economic Development Canada.

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# 7.2 Occupied Bandwidth §2.1049

#### **Test Overview**

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. All modes of operation were investigated and the worst case configuration results are reported in this section.

#### Test Procedure Used

KDB 971168 D01 v03r01 - Section 4.2

#### **Test Settings**

- 1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
- 2. RBW = 1 5% of the expected OBW
- 3. VBW  $\geq$  3 x RBW
- 4. Detector = Peak
- 5. Trace mode = max hold
- 6. Sweep = auto couple
- 7. The trace was allowed to stabilize
- 8. If necessary, steps 2 7 were repeated after changing the RBW such that it would be within

1-5% of the 99% occupied bandwidth observed in Step 7

#### 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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Plot 7-1. Occupied Bandwidth Plot (Band 26 - 1.4MHz QPSK - Full RB Configuration)



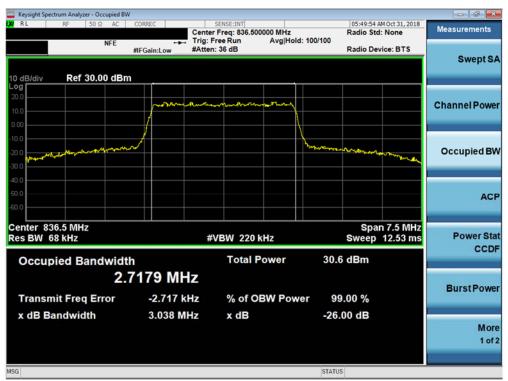
Plot 7-2. Occupied Bandwidth Plot (Band 26 - 1.4MHz 16-QAM - Full RB Configuration)

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Plot 7-3. Occupied Bandwidth Plot (Band 26 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-4. Occupied Bandwidth Plot (Band 26 - 3.0MHz 16-QAM - Full RB Configuration)

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RL RF 50 Ω AC	CORREC	SENSE:INT	05:42:58 AM Oct 31, 201	B Measurements
NFE	Trig: F	r Freq: 836.500000 MHz Free Run Avg Hold: 100 n: 36 dB	Radio Std: None /100 Radio Device: BTS	measurements
0 dB/div Ref 30.00 dBn	1			Swept S
og 0.0	punnon	minin		ChannelPowe
0.0				Occupied B
0.0				AC
enter 836.5 MHz es BW 120 kHz	#	VBW 390 kHz	Span 12.5 MH Sweep 1 m	
Occupied Bandwidt 4.	<sup>h</sup> 5719 MHz	Total Power	31.8 dBm	
Transmit Freq Error	-17.404 kHz	% of OBW Power	99.00 %	BurstPow
x dB Bandwidth	5.101 MHz	x dB	-26.00 dB	Mo 1 of
G			STATUS	

Plot 7-5. Occupied Bandwidth Plot (Band 26 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-6. Occupied Bandwidth Plot (Band 26 - 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX212TA		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	🕒 LG	Approved by: Quality Manager	
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RL RF 50 Ω AC	CORREC	SENSE:INT		05:37:26 AM Oct 31,	2018 Measurements
NFE	Trig: F	r Freq: 836.500000 MHz Free Run Avg Ho n: 36 dB	ld:>100/100	Radio Std: None Radio Device: BT	
0 dB/div Ref 30.00 dBm					Swept S
og 0.0 0.0		mon			Channel Powe
0.0	~		hannen	montermotion	Occupied B
0.0					AC
enter 836.5 MHz es BW 240 kHz	#	VBW 750 kHz		Span 25 N Sweep 1	AHz ms Power St
Occupied Bandwidt	<sup>h</sup> 0542 MHz	Total Power	31.8	8 dBm	
Transmit Freq Error	19.180 kHz	% of OBW Pow		9.00 %	BurstPow
x dB Bandwidth	10.13 MHz	x dB	-26.	.00 dB	Moi 1 of
			STATU		

Plot 7-7. Occupied Bandwidth Plot (Band 26 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-8. Occupied Bandwidth Plot (Band 26 - 10.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX212TA		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dego 17 of 79	
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RL RF 50 Ω AC	CORREC	SENSE:INT		35 AM Oct 31, 2018	Measurements
NFE	Trig: F	r Freq: 836.500000 MHz Free Run Avg Hold:> h: 36 dB	100/100	Std: None Device: BTS	
0 dB/div Ref 30.00 dBm					Swept S
og 000		Manager and a second			ChannelPow
0.0 0.0 0.0	-		martenan	~	Occupied B
0.0				June	
80.0					AC
center 836.5 MHz tes BW 360 kHz	#	VBW 1.1 MHz		an 37.5 MHz Sweep 1 ms	Power St CCE
Occupied Bandwidth 13	.501 MHz	Total Power	32.1 dBm		BurstPow
Transmit Freq Error	-4.513 kHz	% of OBW Powe			Buistrow
x dB Bandwidth	14.81 MHz	x dB	-26.00 dB		Mo 1 o
<u>6</u>			STATUS		

Plot 7-9. Occupied Bandwidth Plot (Band 26 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-10. Occupied Bandwidth Plot (Band 26 - 15.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX212TA		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	🕒 LG	Approved by: Quality Manager
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Plot 7-11. Occupied Bandwidth Plot (Band 25 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-12. Occupied Bandwidth Plot (Band 25 - 1.4MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX212TA		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 10 of 79
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Plot 7-13. Occupied Bandwidth Plot (Band 25 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-14. Occupied Bandwidth Plot (Band 25 - 3.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX212TA		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of 79	
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Measurements	04:41:51 AM Oct 31, 2018 Radio Std: None		SENSE:INT Center Freq: 1.8825	CORREC	RF 50 Ω AC	RL
	Radio Device: BTS	Avg Hold: 100/100	Trig: Free Run #Atten: 36 dB	#IFGain:Low	NFE	
Swept S				1	Ref 40.00 dBn	0 dB/div
Channel Pow						og 80.0
		mm	······	f		10.0
Occupied B				1		0.0
	munner	- have			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	0.0
AC						0.0
	Span 12.5 MHz Sweep 1 ms	kHz	#VBW 390			enter 1.8 es BW 12
CCI	8 dBm	Power 32.	Total I	h	oied Bandwidt	Occup
BurstPow			z	5484 MH	4.	
Durotti ott	9.00 %	BW Power 9	Hz % of O	3.223 kł	nit Freq Error	Transm
	.00 dB	-26	Hz x dB	5.077 MI	andwidth	x dB Ba
Мо						

Plot 7-15. Occupied Bandwidth Plot (Band 25 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-16. Occupied Bandwidth Plot (Band 25 - 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX212TA		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	Approved by: Quality Manager		
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				1 0
x dB Bandwidth	10.07 MHz	x dB	-26.00 dB	Mo
9. Transmit Freq Error	0126 MHz 1.615 kHz	% of OBW Power	99.00 %	BurstPow
Occupied Bandwidt		Total Power	32.6 dBm	
enter 1.883 GHz tes BW 240 kHz	#	VBW 750 kHz	Span 25 MHz Sweep 1 ms	
0.0				AC
0.0			and the second second	
0.0				Occupied E
0.0	June	munit		Channel Pow
0 dB/div Ref 40.00 dBn				ChannelDay
	un dunicon	1: 30 dD	Radio Device. B13	Swept
NFE	Trig: F	r Freq: 1.882500000 GHz Free Run Avg Hold: 100 h: 36 dB	Radio Std: None 100 Radio Device: BTS	Measurements

Plot 7-17. Occupied Bandwidth Plot (Band 25 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-18. Occupied Bandwidth Plot (Band 25 - 10.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX212TA		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	Approved by: Quality Manager
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RL RF 50 Ω AC	CORREC	SENSE:INT r Freg: 1.882500000 GHz	02:54:14 AM Oct 31, 2018 Radio Std: None	Measurements
NFE	Trig: F	Free Run Avg Hold: 100 1: 36 dB		
0 dB/div Ref 30.00 dBm				Swept S
•g 20.0	- Andrew and			Channel Pow
0.00			and a for a second s	Occupied B
0.0				AC
enter 1.883 GHz es BW 360 kHz	#	VBW 1.1 MHz	Span 37.5 MHz Sweep 1 ms	
Occupied Bandwidth 13	.463 MHz	Total Power	32.6 dBm	
Transmit Freq Error	-5.296 kHz	% of OBW Power	99.00 %	BurstPow
x dB Bandwidth	14.81 MHz	x dB	-26.00 dB	Mo 1 o
G			STATUS	

Plot 7-19. Occupied Bandwidth Plot (Band 25 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-20. Occupied Bandwidth Plot (Band 25 - 15.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX212TA		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	Approved by: Quality Manager							
Test Report S/N:	Test Dates:	EUT Type:	Dego 22 of 79							
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RL RF 50 Ω AC	CORREC	SENSE:INT		M Oct 31, 2018	race/Detector
NFE	Trig: F	r Freq: 1.882500000 GHz Free Run Avg Hold: n: 36 dB	Radio Std: 100/100 Radio Dev	None	Tacendetector
0 dB/div Ref 30.00 dBn					
0.00					Clear Writ
0.0 .0 .0 .0 .0 .0 .0 .0 .0 .0	w		warrantist for more than	mannage	Averaç
0.0					Max Ho
enter 1.883 GHz les BW 470 kHz	#	VBW 1.5 MHz		n 50 MHz ep 1 ms	Min Ho
Occupied Bandwidt 17	<sup>h</sup> /.926 MHz	Total Power	32.9 dBm		Detect
Transmit Freq Error x dB Bandwidth	-13.244 kHz 19.49 MHz	% of OBW Powe x dB	r 99.00 % -26.00 dB	Aut	Peal o <u>M</u> a
G			STATUS		

Plot 7-21. Occupied Bandwidth Plot (Band 25 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-22. Occupied Bandwidth Plot (Band 25 - 20.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX212TA		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	Approved by: Quality Manager							
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# 7.3 Spurious and Harmonic Emissions at Antenna Terminal §2.1051, §2.917(a), 24.238(a)

#### Test Overview

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10<sup>th</sup> harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

# The minimum permissible attenuation level of any spurious emission is $43 + \log_{10}(P_{[Watts]})$ , where P is the transmitter power in Watts.

#### Test Procedure Used

KDB 971168 D01 v03r01 - Section 6.0

#### **Test Settings**

- 1. Start frequency was set to 30MHz and stop frequency was set to at least 10 \* the fundamental frequency (separated into at least two plots per channel)
- 2. Detector = RMS
- 3. Trace mode = trace average
- 4. Sweep time = auto couple
- 5. The trace was allowed to stabilize
- 6. Please see test notes below for RBW and VBW settings

#### 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

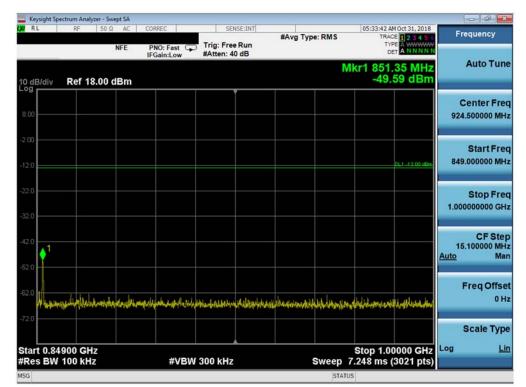
Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than 1 GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

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RL	RF	lyzer - Swe 50 Ω		CORREC			NSE:INT			05:22:22 4	M Oct 31, 2018	
NL.	KP.		NFE	PNO: Fast	Ģ	Trig: Fre #Atten: 4	e Run	#Avg T	ype: RMS	TRAC		Frequency
0 dB/div	Ref 1	8.00 d	Bm						N	/kr1 811 -47.	.45 MHz 68 dBm	Auto Tu
8.00												Center Fr 426.500000 M
12.0											0L1-13.00 dBm	Start Fr 30.000000 M
32.0												Stop Fr 823.000000 M
12.0												CF St 79.300000 M <u>Auto</u> M
52.0 52.0			House			milinge		m inden in	and with Lot	TTANT IN BUT		Freq Offs 0
72.0			ين يظمل <b>م</b>	n an	Add Direct	and the second second			(main a second se	ar Jahan Jula ora		Scale Ty
tart 30. Res BW		Iz		#V	BW	300 kHz			Sweep 3	Stop 8 8.06 ms (1	23.0 MHz 5861 pts)	Log j

Plot 7-23. Conducted Spurious Plot (Band 26 - 15.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



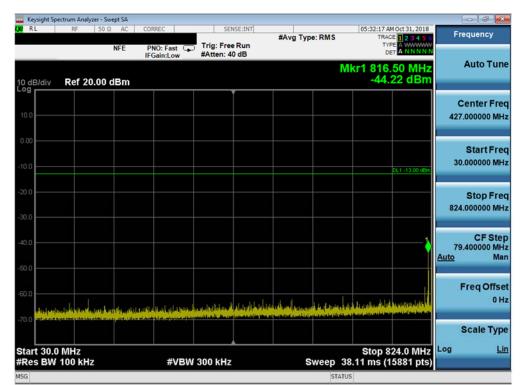
Plot 7-24. Conducted Spurious Plot (Band 26 - 15.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

FCC ID: ZNFX212TA		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	🕒 LG	Approved by: Quality Manager
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RL	pectrum Analyze			0050		CC.TNT			05.05.55			3
KL.	RF	50 Ω /	E P	NO: Fast			#Avg Ty	/pe: RMS	TR	AM Oct 31, 2018 ACE 2 3 4 5 6 YPE A WWWWW DET A NNNNN	Frequen	су
dB/div	Ref 0.00	0 dBm	1						Mkr1 9.90 -39	62 5 GHz .89 dBm	Auto	Tu
										DL1 -13 00 dBm	Center 5.50000000	
).0										1	Start 1.00000000	
).0 ).0		Nur IV	1 III				araa ka maadaa Alfaa da ah	an a	<b>With Wein</b>		Stop 10.00000000	
	and the later of the life of the life of the later of the				prom vi						CF 900.00000 <u>Auto</u>	
.0											FreqC	nto 0
											Scale	
	00 GHz / 1.0 MHz			#VBV	V 3.0 MHz			Sween	Stop 1	0.000 GHz (18001 pts)	Log	
0.0 0.0	mo wiriz				0.0 WITZ			owcep	10.00 1115	root pas)		

Plot 7-25. Conducted Spurious Plot (Band 26 - 15.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



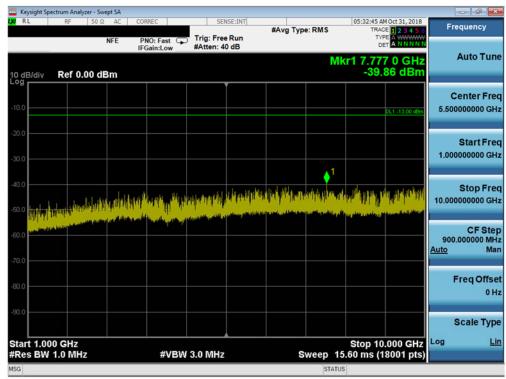
Plot 7-26. Conducted Spurious Plot (Band 26 - 15.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: ZNFX212TA		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	🔁 LG	Approved by: Quality Manager					
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	ectrum Analyzer -					21				00	
KL RL	RF 50	NFE	PNO: Fast	Trig: Free #Atten: 40		#Avg Typ	e: RMS	TRAC TYP	E 1 2 3 4 5 0 E A WWWWWW T A NNNNN	Freq	uency
10 dB/div	Ref 20.00		Guineou				N	lkr1 849. -45.4	80 MHz 47 dBm	A	uto Tune
10.0											nter Fred
•10.00									DL1 -13.00 dBm	100000000000000000000000000000000000000	tart Fred
20.0 30.0											top Fre
40.0										15.10 <u>Auto</u>	CF Ste 00000 MH Ma
60.0	willightereduced	orandir diyilindin	haleshorantelas	kalingebalkali	hardourdshaks	alassalista	hidranovarder	halmannachanna	whenticktein	Fre	eq Offse 0 H
-70.0	900 GHz							Stop 1-00		STAC	ale Type
#Res BW			#VBW	300 kHz				Stop 1.00 7.248 ms (	3021 pts)		
SG							STATU	IS			

Plot 7-27. Conducted Spurious Plot (Band 26 - 15.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



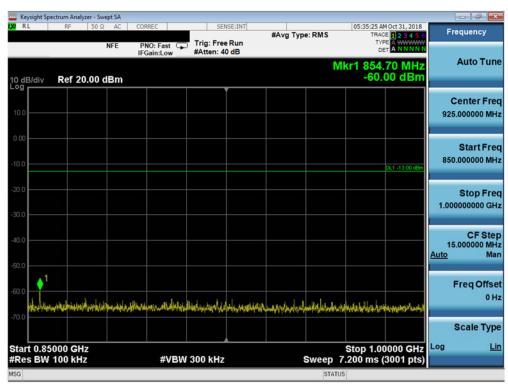
Plot 7-28. Conducted Spurious Plot (Band 26 - 15.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: ZNFX212TA		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	🕒 LG	Approved by: Quality Manager					
Test Report S/N:	Test Dates:	EUT Type:		Dage 29 of 79					
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	ectrum Analyzer - S					20		4/11/11/11/11/11		1	
DU RL	RF 50	NFE P	NO: Fast			#Avg Typ	e: RMS	TRAC	Oct 31, 2018 E 1 2 3 4 5 6 E A WWWWW	Fr	equency
10 dB/div	Ref 20.00		Gain:Low	#Atten: 4				Mkr1 821. -42.	55 MHz 27 dBm		Auto Tune
10.0										001254	Center Freq 2.000000 MHz
-10.0									DL1 -13 00 dBm	30	Start Fred
-20.0 -30.0										824	Stop Fred
-40.0									1	79 <u>Auto</u>	CF Step 400000 MHz Mar
-60.0	a the all all ball on a b	a la suddhe dite	والمتعادية والمتعاد	alapharaaad	Lugia, Albili	. No. 1 Martine	Ingelia				Freq Offsel 0 Hz
-70.0		liger overge at a kirka	distan sandhita juliandi	salah delah taka dilam		in the state of the state of the state		od op bijd oandersoek	24.0.8411-		Scale Type Lin
Start 30.0 #Res BW			#VBW	300 kHz		s	weep	38.11 ms (1	24.0 MHz 5881 pts)	209	<u>Em</u>
MSG							ST4	TUS			

Plot 7-29. Conducted Spurious Plot (Band 26 - 15.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-30. Conducted Spurious Plot (Band 26 - 15.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

FCC ID: ZNFX212TA		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	🕒 LG	Approved by: Quality Manager
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	m Analyzer - Swept SA						0 8 8
RL	RF 50 Ω AC	PNO: Fast	SENSE:IN	#Avg 1	ype: RMS	05:35:37 AM Oct 31, 20 TRACE 2 3 4 TYPE A WWWW DET A N N N	Frequency
10 dB/div R	ef 0.00 dBm	IFGain:Low	#Atten: 40 dB			Mkr1 9.990 5 GH -40.49 dBi	Auto Tune
+10.0						DL1 -13 00 d	Center Free 5.50000000 GH
-20.0							Start Fre 1.000000000 GH
-40.0			ppolinal gradent			Nyrales with a string part of differ that	Stop Fre 10.000000000 GH
-60.0							CF Ste 900.000000 MH <u>Auto</u> Ma
80.0							Freq Offse 0 H
-90.0							Scale Typ
Start 1.000 G #Res BW 1.0		#VBW	3.0 MHz		Sweep	Stop 10.000 GH 15.60 ms (18001 pt	z Log <u>Li</u> S)
MSG					ST	ATUS	

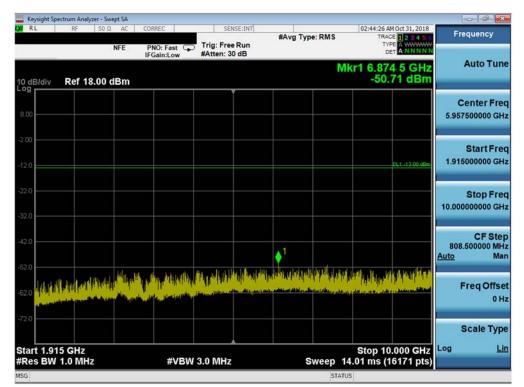
Plot 7-31. Conducted Spurious Plot (Band 26 - 15.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

FCC ID: ZNFX212TA		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	🕒 LG	Approved by: Quality Manager	
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RL	RF	lyzer - Swe 50 Ω		CORREC	SE	NSE:INT			02:44:15 A	MOct 31, 2018	00
			NFE	PNO: Fast IFGain:Low		e Run	#Avg Ty	pe: RMS	TRAC		Frequenc
0 dB/div	Ref 1	8.00 d	Bm					Μ	kr1 1.83 -26.	3 0 GHz 29 dBm	Auto 1
3.00											Center 939.500000
2.00										0L1 -13.00 dBm	Start   30.000000
22.0											Stop   1.849000000
2.0											CF : 181.900000 <u>Auto</u>
and the second second	والعالية والمناه	دېولولولونو کې	scololisi	الاحذار اردر إيراري	le, iieiinelle de laterte faithe	manulhausiale		igt <sub>add</sub> iyadiyadiyadi	lining the state of the state o		Freq O
72.0											Scale
tart 0.03 Res BW				#VI	BW 3.0 MHz			Sweep	Stop 1.8 2.425 ms (	3490 GHz 3639 pts)	Log

Plot 7-32. Conducted Spurious Plot (Band 25 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



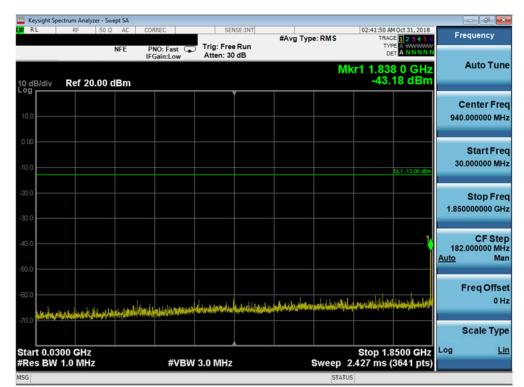
Plot 7-33. Conducted Spurious Plot (Band 25 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

FCC ID: ZNFX212TA		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	🕒 LG	Approved by: Quality Manager
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RL	RF	halyzer - Swe		000000	1		CC.THE	201		02.44.42.49.49.4		00
RL	KF	50 Ω	NFE	PNO: Fa	ist 😱	Trig: Free #Atten: 3		#Avg Ty	/pe: RMS	02:44:43 AM OC TRACE		Frequency
) dB/div	Ref	0.00 dB	m	IFGain:L	ow	#Atten: 3	, ab		N	1kr1 18.888 ( -41.49	GHz	Auto Tur
0.0										OL1	-13.00 dBm	Center Fr 15.00000000 G
0.0												Start Fr 10.000000000 G
0.0		t - s bata		al last a traiti	iku, kan	فلافتك	MAR N.	te da di	r and in	Harrishawar	<b>ALIMA</b>	Stop Fr 20.00000000 G
Ptepp) 0.0 /0000	11 h	an a	Lifter av	s scherdit i			un the te					CF St 1.000000000 G Auto M
).0												Freq Off 0
0.0	000 CI	17								Stop 20.00	0 GHz	Scale Ty
tart 10.												
tart 10. Res BV	V 1.0 M			#	VBW	3.0 MHz			Sweep	25.33 ms (200	01 pts)	

Plot 7-34. Conducted Spurious Plot (Band 25 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



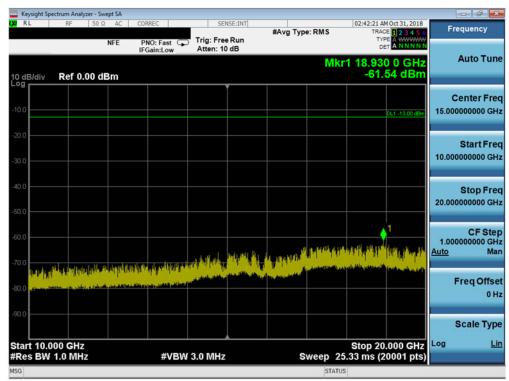
Plot 7-35. Conducted Spurious Plot (Band 25 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: ZNFX212TA		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	🕒 LG	Approved by: Quality Manager	
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Keysight Spectrum Analyzer - Sv			24		
X RL RF 50 S	NFE PNO: Fast	SENSE:INT Trig: Free Run Atten: 30 dB	#Avg Type: RMS	02:42:07 AM Oct 31, 2018 TRACE 2 3 4 5 0 TYPE A WWWWW DET A N N N N N	Frequency
10 dB/div Ref 20.00	IFGain:Low	Atten: 30 dB	M	(r1 9.994 0 GHz -51.55 dBm	Auto Tune
10.0					Center Fred 5.957500000 GHz
•10.0				0L1 -13 00 dBm	Start Free 1.915000000 GH:
-20.0					Stop Free 10.000000000 GH
40.0				t	CF Ste 808.500000 MH <u>Auto</u> Ma
		lur, alia dia katalahanak	a berkinnels staarte die biere stede		Freq Offse 0 H
5tart 1.915 GHz				Stop 10.000 GHz	Scale Type Log <u>Li</u> i
#Res BW 1.0 MHz	#\/B\M	3.0 MHz	Sween 14	.01 ms (16171 pts)	

Plot 7-36. Conducted Spurious Plot (Band 25 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



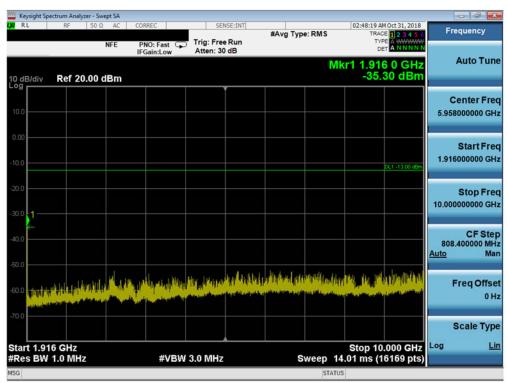
Plot 7-37. Conducted Spurious Plot (Band 25 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

FCC ID: ZNFX212TA		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	🕞 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 22 of 79	
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Keysight Spectrum Analyze			24	(	- 6 <b>- X</b>
KL RF	50 Ω AC CORREC NFE PNO: Fast GIFGain:Low	Trig: Free Run Atten: 30 dB	#Avg Type: RMS	02:47:59 AM Oct 31, 2018 TRACE 1 2 3 4 5 6 TYPE A WWWWW	Frequency
10 dB/div Ref 20.	00 dBm	Atten: 30 db	Mk	r1 1.670 5 GHz -58.57 dBm	Auto Tune
10.0					Center Freq 940.000000 MHz
-10.0				0L1 -13 00 dBm	Start Freq 30.000000 MHz
-20.0					Stop Freq 1.85000000 GHz
-40.0					CF Step 182.000000 MHz <u>Auto</u> Man
-50.0	hander and the state of the second state of th	น <sub>ส</sub> ะปู่ระหรับไม่สารประกัน	تعذيبه فأباد موك أيتنده وتدوي وتراجه والمنية	1 المارية المعرية المعاملة وعالم المالية ال	Freq Offset 0 Hz
Start 0.0300 GHz #Res BW 1.0 MHz		( 3.0 MHz	Swoon 2	Stop 1.8500 GHz	Scale Type Log <u>Lin</u>
#Res BW 1.0 MHZ	#VBV	7 3.0 WIN2	Sweep 2.	.427 ms (3641 pts)	1

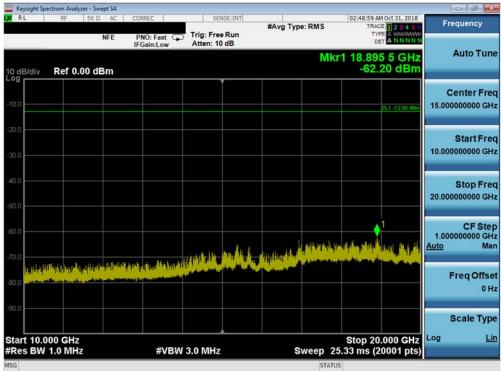
Plot 7-38. Conducted Spurious Plot (Band 25 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-39. Conducted Spurious Plot (Band 25 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

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Plot 7-40. Conducted Spurious Plot (Band 25 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

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#### 7.4 Band Edge Emissions at Antenna Terminal §2.1051, §2.917(a), 24.238(a)

#### Test Overview

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

# The minimum permissible attenuation level of any spurious emission is $43 + \log_{10}(P_{[Watts]})$ , where P is the transmitter power in Watts.

#### **Test Procedure Used**

KDB 971168 D01 v03r01 - Section 6.0

#### Test Settings

- 1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
- 2. Span was set large enough so as to capture all out of band emissions near the band edge
- 3. RBW  $\geq$  1% of the emission bandwidth
- 4. VBW <u>></u> 3 x RBW
- 5. Detector = RMS
- 6. Number of sweep points  $\geq$  2 x Span/RBW
- 7. Trace mode = trace average
- 8. Sweep time = auto couple
- 9. The trace was allowed to stabilize

#### Test Setup

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



Figure 7-3. Test Instrument & Measurement Setup

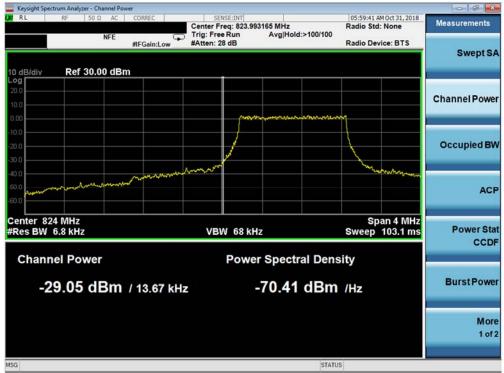
#### **Test Notes**

Per 22.917(b), 24.238(a) in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions limit. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

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# Band 26



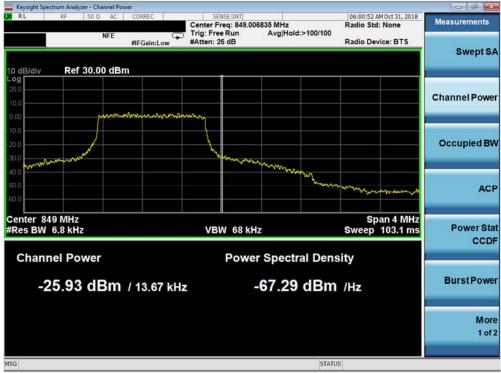
Plot 7-41. Lower Band Edge Plot (Band 26 - 1.4MHz QPSK - Full RB Configuration)



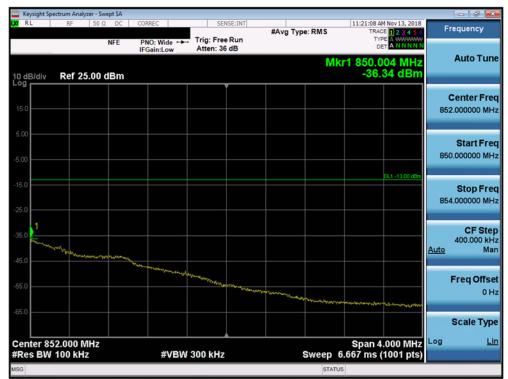
Plot 7-42. Lower Extended Band Edge Plot (Band 26 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: ZNFX212TA		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	🕒 LG	Approved by: Quality Manager
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Plot 7-43. Upper Band Edge Plot (Band 26 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-44. Upper Extended Band Band Edge Plot (Band 26 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: ZNFX212TA		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	🕒 LG	Approved by: Quality Manager
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RL RF 50 1	Ω AC CORREC	OF NOT THE		
		SENSE:INT Center Freq: 823.984845 MHz Trig: Free Run Avg Hold:>100/1	05:52:24 AM Oct 31, 2018 Radio Std: None	Measurements
10 dB/div Ref 30.	NFE #IFGain:Low	#Atten: 28 dB	Radio Device: BTS	Swept SA
20.0 10.0			- mar or - round	Channel Power
-10.0 -20.0 -30.0				Occupied BW
-40.0 -50.0 -60.0				ACP
Center 824 MHz #Res BW 15 kHz		VBW 150 kHz	Span 4 MHz Sweep 21.2 ms	Power Stat CCDF
Channel Powe -28.23 d	r Bm / 30.31 kHz	Power Spectral De -73.04 dB		BurstPower
MSG		c	TATUS	More 1 of 2

Plot 7-45. Lower Band Edge Plot (Band 26 - 3.0MHz QPSK - Full RB Configuration)



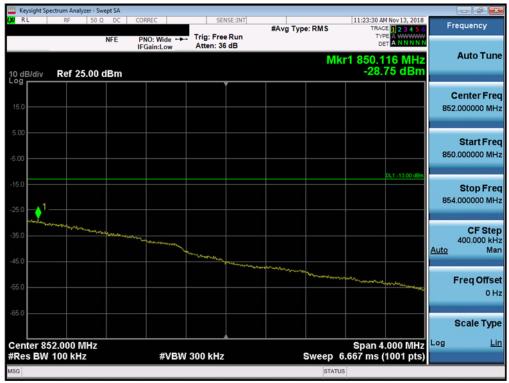
Plot 7-46. Lower Extended Band Edge Plot (Band 26 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX212TA		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	🔁 LG	Approved by: Quality Manager
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RL	RF	50 Ω	AC	CORREC		Center Fre Trig: Free		15155 MHz Avg Hold	:>100/100	05:54:12 A Radio Std	M Oct 31, 2018 : None	Measurements
			NFE	#IFGain	:Low	#Atten: 26		, trainera		Radio Dev	rice: BTS	
0 dB/div	Ref	30.00	) dBn	n								Swept S/
. <b>og</b> 20.0 10.0												ChannelPowe
0.00					~~~~	~~~						
20.0 30.0 40.0												Occupied BV
50.0 50.0												AC
enter 8 Res BW						VBW	150 k	(Hz		Sp Sweep	an 4 MHz 21.2 ms	Power St
Chan	nel Po	wer					Powe	r Spectr	al Dens	sity		
-2	26.54	dB	ßm	/ 30.3	31 kHz	z		-71.35	dBm	/Hz		BurstPowe
												Mor 1 of

Plot 7-47. Upper Band Edge Plot (Band 26 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-48. Upper Extended Band Band Edge Plot (Band 26 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX212TA		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	🕒 LG	Approved by: Quality Manager	
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Keysight Spectrum Analyzer						
RL RF 5	50 Ω AC NFE	CORREC	SENSE:INT	#Avg Type: RMS	05:46:02 AM Oct 31, 2018 TRACE 2 3 4 5 TYPE A WWWWW DET A N N N N N	Frequency
0 dB/div Ref 25.0	00 dBm	IFGain:Low	Atten: 36 dB	M	kr1 824.000 MHz -21.077 dBm	Auto Tun
15.0						Center Fre 824.000000 MH
5.00						Start Fre 822.000000 MH
25.0			and the second second		DL1 -13.00 dBm	Stop Fre 826.000000 MH
5.0	anghgiriyyal ny nadiya	in an				CF Ste 400.000 ki <u>Auto</u> Ma
5.0						Freq Offs 01
55.0 Center 824.000 MH	z				Span 4.000 MHz	Scale Typ
Res BW 150 kHz		#VBW	300 kHz	Sweep	6.667 ms (1001 pts)	
5G				STAT	US	

Plot 7-49. Lower Band Edge Plot (Band 26 - 5.0MHz QPSK - Full RB Configuration)



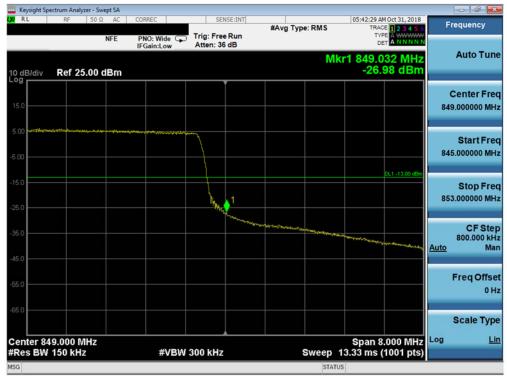
Plot 7-50. Upper Band Edge Plot (Band 26 - 5.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX212TA		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	🕒 LG	Approved by: Quality Manager
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	50 Q AC		SENSE:INT		05:41:14 AM Oct 31, 2018	
	NFE	PNO: Wide 😱 IFGain:Low	Trig: Free Run Atten: 36 dB	#Avg Type: RMS	TRACE 2 3 4 5 6 TYPE A WWWWW DET A N N N N N	Frequency
) dB/div Ref 2	5.00 dBm			M	r1 823.984 MHz -24.96 dBm	Auto Tur
5.0						Center Fre 824.000000 MF
.00					di lang kabang perdokab perfersion sa pang baharan Di 1 - 13 00 dBm	Start Fre 820.000000 Mi
5.0			1			Stop Fro 828.000000 M
5.0	uner la suite and	net to an				CF Ste 800.000 k <u>Auto</u> M
5.0						Freq Offs 0
enter 824.000 f Res BW 150 kH			300 kHz		Span 8.000 MHz 13.33 ms (1001 pts)	Scale Tyj Log <u>L</u>

Plot 7-51. Lower Band Edge Plot (Band 26 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-52. Upper Band Edge Plot (Band 26 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX212TA		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	🕒 LG	Approved by: Quality Manager
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F 50Ω AC NFE	PNO: Wide IFGain:Low	SENSE:INT Trig: Free Run Atten: 36 dB	#Avg Tj	ype: RMS Mk	105:34:25 AM Oct 31, 2016 TRACE 23 4 5 TYPE A MININ DET A NINNN r1 823.532 MH; -26.06 dBn	Auto Tune
ef 25.00 dBm		Ť		Mk	r1 823.532 MH -26.06 dBn	
						Center Fre 824.000000 MH
						Start Fre 818.000000 MH
		1			UC1 -13.00 dB	Stop Fre 830.000000 MH
						CF Ste 1.200000 MH Auto Ma
						Freq Offs 0 F
00 MHz					Span 12.00 MH	Scale Typ
kHz	#VBW	470 kHz		Sweep 1	1.000 ms (1001 pts	5)
	00 MHz	D0 MHz	D0 MHz	D0 MHz	D0 MHz #VBW 470 kHz Sweep 1	D0 MHz Span 12.00 MH

Plot 7-53. Lower Band Edge Plot (Band 26 - 15.0MHz QPSK - Full RB Configuration)



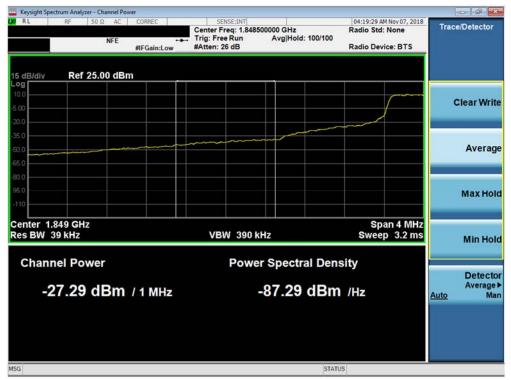
Plot 7-54. Upper Band Edge Plot (Band 26 - 15.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX212TA		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	🕒 LG	Approved by: Quality Manager
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50 Ω AC		SENSE:INT	#Avg Type: RMS	04:19:21 AM Nov 07, 2018 TRACE 12 3 4 5 5 TYPE A DET A NNNNN 1 1.849 996 GHz -23.60 dBm	Frequency Auto Tun
25.00 dBm		Ť	Mkr	1 1.849 996 GHz -23.60 dBm	Auto Tun
					17
					Center Fre 1.85000000 GH
					Start Fr 1.848000000 G
		1		0L1 -13 00 dBm	Stop Fr 1.852000000 G
Aman	mont				CF Sto 400.000 k <u>Auto</u> M
					Freq Offs 0
					Scale Ty
00 GHz Iz	#VBW 5	6 kHz	Sweep	Span 4.000 MHz 6.667 ms (1001 pts)	Log <u>l</u>
	0 GHz Iz	0 GHz	0 GHz	0 GHz #VBW 56 kHz Sweep	0 GHz Span 4.000 MHz

Plot 7-55. Lower Band Edge Plot (Band 25 - 1.4MHz QPSK - Full RB Configuration)



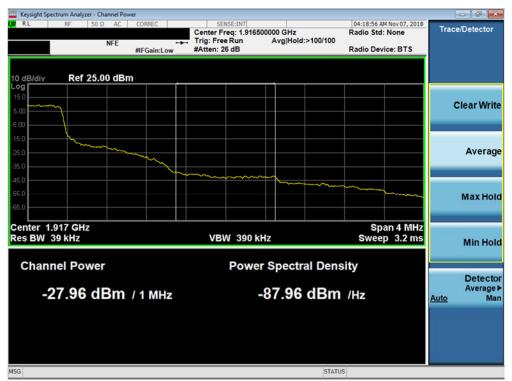
Plot 7-56. Lower Extended Band Edge Plot (Band 25 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: ZNFX212TA		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	🕒 LG	Approved by: Quality Manager	
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Keysight Spectrum Analy						4			- 6 ×
R L RF	50 Ω AC	PNO: Wide	SENSE:INT	#Avg Type	RMS	TRAC	E 2 3 4 5 6 E A WWWWWW		equency
0 dB/div Ref 25	5.00 dBm	IFGain:Low	Atten: 36 dB		Mkr1	1.915 0	23million Constitution a		Auto Tun
og 15.0								A second second	Center Fre 5000000 GF
.00		mananan						1.91	Start Fro
5.0	/		1 mm	M			0L1 -13.00 dBm	1.91	Stop Fr 7000000 G
5.0					Mun	NA		Auto	CF Ste 400.000 k M
5.0						Vanna y			Freq Offs 01
enter 1.915000	GHz					Span 4	.000 MHz	Log	Scale Tyj
Res BW 16 kHz		#VBW	56 kHz	S	Sweep 6	.667 ms (	1001 pts)		
G					STATUS				

Plot 7-57. Upper Band Edge Plot (Band 25 - 1.4MHz QPSK - Full RB Configuration)



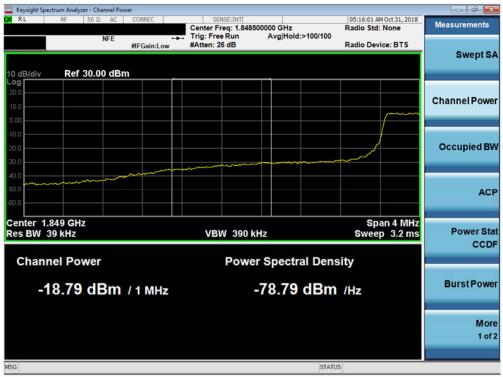
Plot 7-58. Upper Extended Band Edge Plot (Band 25 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: ZNFX212TA		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	🕒 LG	Approved by: Quality Manager
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Keysight Spe													
RL	RF	50 Ω	AC	CORREC		S	ENSE:INT	#A	DIAC		M Oct 31, 2018 CE 1 2 3 4 5 0	F	requency
		NF	E	PNO: W	/ide 🖵 Low	Trig: Fr Atten: 3		#Avg Ty	ре: КМЗ	TY	PE A WWWWW ET A NNNNN		
0 dB/div	Ref 25	.00 dB	3m						Mkr	1 1.850 ( -22.9	000 GHz 151 dBm		Auto Tun
-og 15.0												1000	Center Fre
5.00								and the second sec			0L1 -13.00 dBm	1.84	Start Fre 18000000 GH
25.0						~	21					1.85	Stop Fre
35.0 <b></b>	~~~~	~~~~	~~~~	<u>n</u>	~~~~							Auto	CF Ste 400.000 ki Ma
5.0													Freq Offs 0 I
65.0													Scale Typ
enter 1.8 Res BW	36 kHz	GHz			#VBW	130 kH	7		Sween	Span 4 6.667 ms	.000 MHz	Log	<u>L</u>
nees biv	00 1112					NOU MIL			emcep	0.001 1115	(neor pro)	-	

Plot 7-59. Lower Band Edge Plot (Band 25 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-60. Lower Extended Band Edge Plot (Band 25 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX212TA		MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	🕒 LG	Approved by: Quality Manager	
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