

## 7.4 Band Edge Emissions at Antenna Terminal §2.1051 §22.917(a) §24.238(a) §27.53(c) §27.53(g) §27.53(h) §27.53(m)

### **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 for Band 7 is as noted in the Test Notes on the following page.

# 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 v02r02 - 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 for continuous emissions, max hold for pulse emissions
- 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.

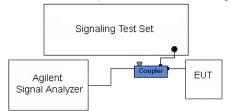


Figure 7-3. Test Instrument & Measurement Setup

#### Test Notes

Per 22.917(b) 24.238(a) 27.53(h) 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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Per 27.53(g) for operations in the 698-746 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit. Per 27.53(c.5) for operations in the 776-788 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit. For all plots showing emissions in the 763 – 775MHz and 793 – 805MHz band, the FCC limit per 27.53(c.4) is 65 + 10log<sub>10</sub>(P) = -35dBm in a 6.25kHz bandwidth.

Per 27.53(m) for operations in the BRS/EBS bands, the attenuation factor shall be not less than  $40 + 10 \log (P) dB$  on all frequencies between the channel edge and 5 megahertz from the channel edge,  $43 + 10 \log (P) dB$  on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth. In addition, the attenuation factor shall not be less that  $43 + 10 \log (P) dB$  on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz.

For some of the extended band edge plots, the VBW is slightly lesser than what should have been used. However, this deviation does not create any noticeable difference to the data provided.



Plot 7-101. Lower Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

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	oectrum Analyzer - S										
LXI RL	RF 50	Ω AC	CORREC		SE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	Apr11, 2017	Fi	requency
			PNO: Wide G	Trig: Free Atten: 36				TYP			
							Mk	r1 716.0	00 MHz 21 dBm		Auto Tune
10 dB/div Log	Ref 25.00	dBm						-16.:	21 dBm		
											Center Freq
15.0											6.000000 MHz
5.00			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m							
5.00											Start Freq
-5.00										714	4.000000 MHz
					1				DL1 -13.00 dBm		
-15.0					~~~~						Stop Freq
-25.0					-~~(	Mr.				718	3.000000 MHz
						~~~	h				
-35.0							41	0.000			CF Step 400.000 kHz
-45.0									my	<u>Auto</u>	Man
-40.0											
-55.0											Freq Offset 0 Hz
											0112
-65.0											Scale Type
	16.000 MHz 100 kHz		#VBM	300 kHz			Sween 1	Span 4	.000 MHz 1001 pts)	Log	<u>Lin</u>
MSG			<i></i>	500 KHZ			STATUS		roor pts)		
										_	

Plot 7-102. Upper Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)



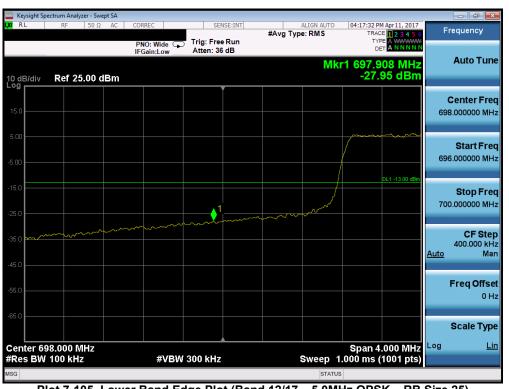
Plot 7-103. Lower Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

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	pectrum Analyz												
XV RL	RF	50Ω A		ORREC		SE	NSE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	M Apr 11, 2017 DE <b>1 2 3 4 5</b> 6 PE A WWWWW T A N N N N N	F	requency
10 dB/div	Ref 25	.00 dBr	1	Gain:Low	, <b>•</b>	Atten: 3			Mk	r1 716.0	00 MHz 49 dBm		Auto Tune
15.0													Center Fre 6.000000 MH
5.00											DL1 -13.00 dBm	71	Start Fre 4.000000 MH
-15.0						ł	1	~~ <u>~</u> ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		······································		71	<b>Stop Fre</b> 3.000000 МН
45.0											to many	<u>Auto</u>	<b>CF Ste</b> 400.000 kH Ma
55.0													Freq Offs 0 F
65.0													Scale Typ
Center 7 Res BW	16.000 M / 100 kHz	Hz		#V	BW :	300 kHz			Sweep 1	Span 4 .000 ms (	.000 MHz 1001 pts)	Log	Li
MSG									STATUS	3			

Plot 7-104. Upper Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)



Plot 7-105. Lower Band Edge Plot (Band 12/17 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	ectrum Analyzer - Sw									
XI RL	RF 50 Ω	AC	CORREC			g Type: RMS	04:19:16 PM TRACE TYPE	123456	Fr	requency
10 dB/div	Ref 25.00	dBm	PNO: Wide G	Atten: 36 o		Mk	r1 716.00	04 MHz 6 dBm		Auto Tune
15.0										Center Freq 5.000000 MHz
-5.00								DL1 -13.00 dBm	714	Start Fred 0.000000 MHz
-15.0					1	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		718	Stop Freq 8.000000 MHz
45.0									<u>Auto</u>	CF Step 400.000 kH: Mar
55.0									-	Freq Offse 0 H
-65.0										Scale Type
Center 71 #Res BW	6.000 MHz 100 kHz		#VBW	/ 300 kHz		Sweep 1	Span 4. I.000 ms (1	000 10112	Log	Lin
ISG						STATU	s			

Plot 7-106. Upper Band Edge Plot (Band 12/17 – 5.0MHz QPSK – RB Size 25)



Plot 7-107. Lower Band Edge Plot (Band 12/17 – 10.0MHz QPSK – RB Size 50)

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		zer - Swept SA										
X/RL	RF	50 Ω AC	CORR	EC	SE	NSE:INT	#Avg Typ	ALIGN AUTO	TRAC	M Apr 11, 2017 E <b>1 2 3 4 5 6</b>	F	requency
			PNC IFGa	):Wide 🖵 ain:Low	Trig: Fre Atten: 3				TYF De			
10 dB/div Log	Ref 25	.00 dBm	n					Mk	r1 716.0 -27.	00 MHz 41 dBm		Auto Tun
15.0												Center Fre 6.000000 MH
5.00												
~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~	~~~~		$\sim$						71	Start Fre 2.000000 MH
-5.00										DL1 -13.00 dBm		
15.0						1					72	Stop Fre
25.0					- Joe	<b>*</b>	h					
35.0									~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	<u>Auto</u>	CF Ste 800.000 kH Ma
45.0												
55.0												Freq Offs 0 H
65.0												Scale Typ
Center 71	6.000 M	Hz							Span 8	.000 MHz	Log	Li
Res BW				#VBW	300 kHz	2		Sweep 1	.000 ms (	1001 pts)		
SG								STATUS	;			

Plot 7-108. Upper Band Edge Plot (Band 12/17 – 10.0MHz QPSK – RB Size 50)



Plot 7-109. Lower Band Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

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	ectrum Analyzer -	Swept SA									- 6 ×
(IRL	RF 5	0Ω DC	CORREC	SENS	Run	#Avg Type	ALIGN AUTO e: RMS	TRAC	Apr 12, 2017 E 1 2 3 4 5 6 E M WWWW A N N N N N	Fr	equency
0 dB/div	Ref 25.0	0 dBm	IFGain:Low	Atten: 36 c	В		Mkı	1 774.9	88 MHz 82 dBm		Auto Tun
15.0											Center Fre 0.000000 MH
5.00										763	Start Fre 0.000000 MH
25.0										775	Stop Fre
15.0									DL1 -35.00 dBm	1 <u>Auto</u>	CF Ste .200000 MH Ma
i5.0									1.		F <b>req Offs</b> 0 I
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tart 763. Res BW	000 MHz 6.2 kHz		#VBW	30 kHz			#Sweep	Stop 775. 1.000 s (	.000 MHz 1001 pts)	Lug	L
ŝG							STATUS				

Plot 7-110. Lower Emission Mask Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)



Plot 7-111. Upper Band Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

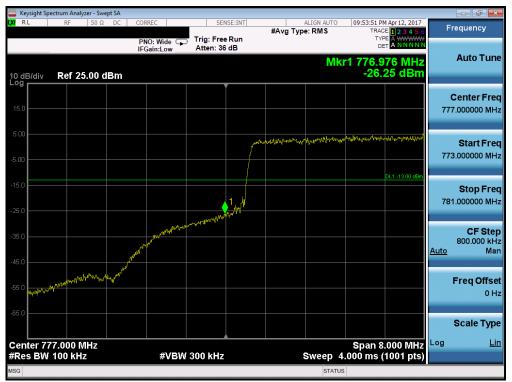
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🔤 Keysight Spe	ectrum Analyzer - S	Swept SA									
LXU RL	RF 50		ORREC	Trig: Fre		#Avg Typ	ALIGN AUTO e: RMS	TRAC	M Apr 12, 2017 E 1 2 3 4 5 6 E M WWWWW T A N N N N N	F	requency
10 dB/div	Ref 25.00		FGain:Low	Atten: 36	6 dB		Mki	r1 804.5	32 MHz 18 dBm		Auto Tune
15.0											Center Freq 9.000000 MHz
-5.00										793	Start Freq 3.000000 MHz
-15.0										80	<b>Stop Fred</b> 5.000000 MHz
-35.0									DL1 -35.00 dBm	<u>Auto</u>	<b>CF Step</b> 1.200000 MH Mar
-45.0									1		Freq Offset 0 Hz
	uninproduction	ng paga ang ang ang ang ang ang ang ang ang	m <b>y</b> ndonyy <sub>llo</sub> ytu	ady/Nept-Addressa	<b>wike</b> molyouth	and the physical of					Scale Type
Start 793. #Res BW			#VBW	/ 30 kHz			#Sweep	Stop 805 1.000 s (	.000 MHz 1001 pts)	Log	Lir
MSG							STATUS				

Plot 7-112. Upper Emission Mask Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)



Plot 7-113. Lower Band Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

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	ectrum Analyzer -	Swept SA									
X/RL	RF 5	DΩ DC	CORREC	Trig: Free		#Avg Typ	ALIGN AUTO e: RMS	TRAC	M Apr 12, 2017 E 1 2 3 4 5 6 E M WWWWW A N N N N N	Fr	equency
10 dB/div	Ref 25.0	0 dBm	IFGain:Low	Atten: 36	dB		Mkı	1 775.0	00 MHz 63 dBm		Auto Tune
15.0											Center Fre 0.000000 MH
5.00										763	Start Fre 3.000000 MH
25.0										775	<b>Stop Fre</b> 5.000000 MH
45.0									DL1 -35.00 dBm	Auto <sup>1</sup>	<b>CF Ste</b> 1.200000 MH Ma
55.0									1. Harvary Marvel		Freq Offs 0 ⊦
		humhnig	un painten and a second	ntentor the production	shabatahalay	n polon ku skol dhe polon		alequilly to help of		Log	Scale Typ
Res BW	000 MHz 6.2 kHz		#VB	N 30 kHz			#Sweep	stop 775 1.000 s (	.000 MHz 1001 pts)	209	
SG							STATUS				

Plot 7-114. Lower Emission Mask Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)



Plot 7-115. Upper Band Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

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🔤 Keysight Spe	ectrum Analyzer - S	Swept SA									
X/RL	RF 50		DRREC	Trig: Fre		#Avg Typ	ALIGN AUTO e: RMS	TRAC	M Apr 12, 2017 E 1 2 3 4 5 6 E M WWWWW	F	requency
10 dB/div	Ref 25.00	I	FGain:Low	Atten: 36	∂ dB		Mk	r1 793.1	44 MHz 12 dBm		Auto Tune
15.0											Center Fred 9.000000 MHz
-5.00										79	Start Fred 3.000000 MH;
-15.0										80	<b>Stop Fred</b> 5.000000 MH:
-35.0									DL1 -35.00 dBm	<u>Auto</u>	CF Step 1.200000 MH Mar
-45.0											Freq Offse
	mwm/whenhalulada	Hhleworkelled	eftin, octomperieflare	ala,Mhanmpph	MANA PARA	Nagualiya Wikashukyiky					Scale Type
Start 793. #Res BW			#VBW	/ 30 kHz			#Sweep	Stop 805 1.000 s (	.000 MHz 1001 pts)	Log	<u>Lir</u>
//SG							STATUS	3			

Plot 7-116. Upper Emission Mask Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)



Plot 7-117. Lower Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

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	pectrum Analyze		ot SA										
LXI RL	RF	50 Ω	AC	CORREC			NSE:INT	#Avg Typ	ALIGN AUTO	TRA	M Apr 11, 2017	F	requency
10 dB/div Log	Ref 25.	00 di	Bm	PNO: V IFGain:	Vide 🕞	Atten: 3	6 dB		Mk	r1 849.0	000 MHz 35 dBm		Auto Tune
15.0				~~~~									Center Freq 9.000000 MHz
-5.00											DL1 -13.00 dBm	84	Start Fred 7.000000 MH:
-15.0	hand	<i>}</i>					1	M				85	Stop Fred 1.000000 MH:
-35.0								M.	huma	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		<u>Auto</u>	CF Step 400.000 kH Mar
-55.0													Freq Offse 0 H
-65.0													Scale Type
	49.000 Mi / 100 kHz	ΙZ			#VBW	300 kHz	:		Sweep 1	Span 4 .000 ms	.000 MHz (1001 pts)	Log	<u>Lir</u>
MSG									STATU	S			

Plot 7-118. Upper Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)



Plot 7-119. Lower Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

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	pectrum Analy:											
<mark>(</mark> RL	RF	50 Ω AC		C   Wide 😱	SEN		#Avg Typ	ALIGN AUTO	TRAC	M Apr 11, 2017 E 1 2 3 4 5 6 PE A WWWW A N N N N N	F	requency
0 dB/div	Ref 25	.00 dBm	IFGai	n:Low	Atten: 36			Mk	r1 849.0	00 MHz 42 dBm		Auto Tun
15.0												<b>Center Fre</b> 9.000000 МН
5.00											847	Start Fre
25.0						1				DL1 -13.00 dBm	851	Stop Fre
5.0						~~~~			~~~~~	m	<u>Auto</u>	<b>CF St</b> e 400.000 kl Mi
5.0												Freq Offs 0
5.0												Scale Ty
	49.000 M / 100 kHz			#VBW	300 kHz			Sweep 1	Span 4 .000 ms (	.000 MHz 1001 pts)	Log	L
G								STATU	5			

Plot 7-120. Upper Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)



Plot 7-121. Lower Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

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	pectrum Ana		t SA										
K <mark>U</mark> RL	RF	50 Ω	AC	CORREC			NSE:INT	#Avg Typ	ALIGN AUTO	TRAC	M Apr 11, 2017 CE 1 2 3 4 5 6	F	requency
				PNO: W IFGain:	/ide 🖵 Low	Trig: Fre Atten: 3							Auto Tun
I0 dB/div	Ref 2	5.00 dE	3m						IVIE	(r1 849.0 -24.	00 MHz 00 dBm		Auto Full
							Ĭ						Center Fre
15.0												84	9.000000 MH
5.00	<u></u>	~~~~~	~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~	~							Start Fre
5.00												84	7.000000 MH
5.0											DL1 -13.00 dBm		Stop Fre
25.0						La Carta	1					85	1.000000 MI
							how	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			·····		CF Ste
5.0												Auto	400.000 k
15.0													
5.0													Freq Offs
5.0													
													Scale Typ
	49.000 l / 100 kH				#VBW	300 kHz			Sweep	Span 4 1.000 ms (	.000 MHz (1001 pts)	Log	L
G									STATU				

Plot 7-122. Upper Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)



Plot 7-123. Lower Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

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	ectrum Analyzer -						
XI RL	RF 5	0Ω AC	CORREC	SENSE:INT	ALIGN AUT #Avg Type: RMS	04:03:43 PM Apr11, 2017 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A N N N N N	Frequency
10 dB/div	Ref 25.0	0 dBm	IFGain:Low	Atten: 36 dB	N	lkr1 849.016 MHz -29.24 dBm	Auto Tune
15.0							Center Fred 849.000000 MH:
-5.00		~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			DL1 -13.00 dBm	Start Free 845.000000 MH
-15.0				1_			Stop Free 853.000000 MH
-45.0					~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	<b>CF Stej</b> 800.000 kH <u>Auto</u> Ma
55.0							Freq Offse 0 H
65.0							Scale Type
Center 84 #Res BW	9.000 MH; 100 kHz	Z	#VBW	/ 300 kHz	Sweep	Span 8.000 MHz 1.000 ms (1001 pts)	Log <u>Lir</u>
MSG					ST	ATUS	

Plot 7-124. Upper Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

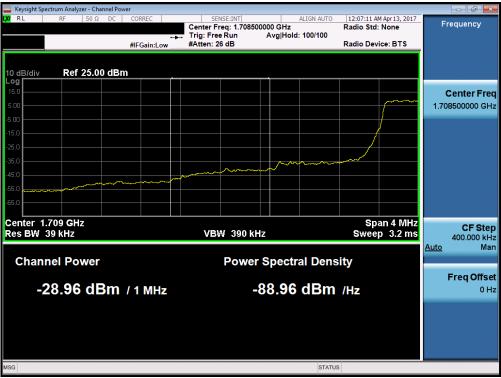


Plot 7-125. Lower Band Edge Plot (Band 4/66 – 1.4MHz QPSK – RB Size 6)

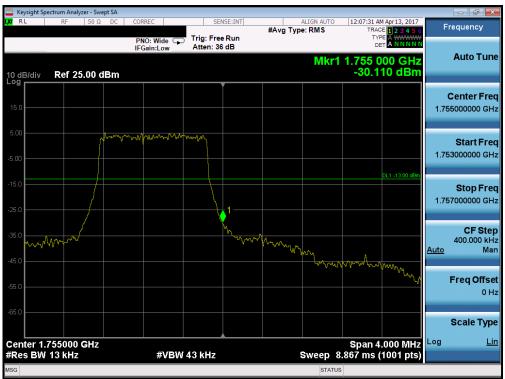
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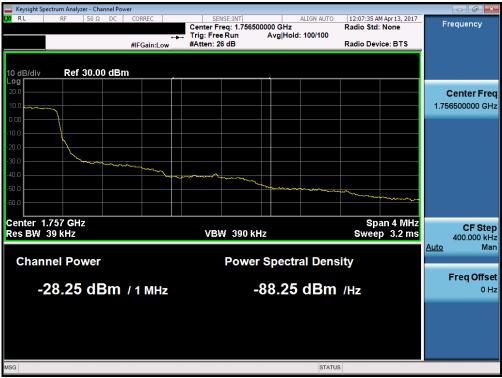
Plot 7-126. Lower Extended Band Edge Plot (Band 4/66– 1.4MHz QPSK – RB Size 6)



Plot 7-127. Upper Band Edge Plot (Band 4/66– 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dega 91 of 149	
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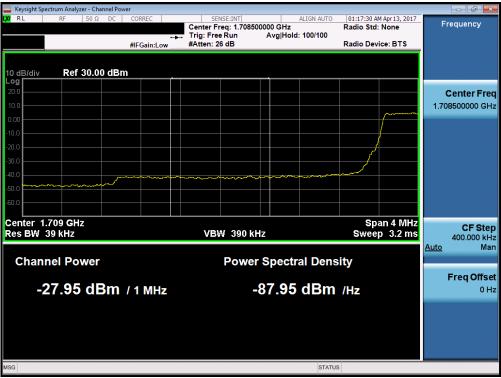
Plot 7-128. Upper Extended Band Edge Plot (Band 4/66– 1.4MHz QPSK – RB Size 6)



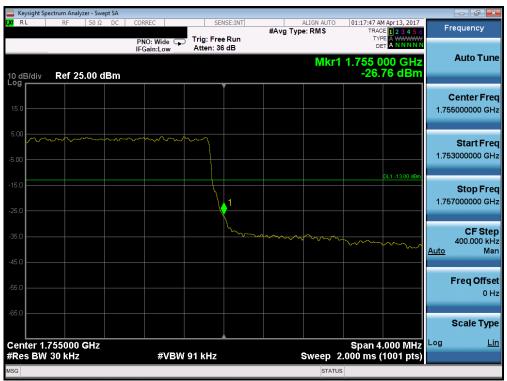
Plot 7-129. Lower Band Edge Plot (Band 4/66– 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dega 92 of 149	
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Plot 7-130. Lower Extended Band Edge Plot (Band 4/66– 3.0MHz QPSK – RB Size 15)



Plot 7-131. Upper Band Edge Plot (Band 4/66- 3.0MHz QPSK - RB Size 15)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dega 92 of 149	
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Plot 7-132. Upper Extended Band Edge Plot (Band 4/66– 3.0MHz QPSK – RB Size 15)



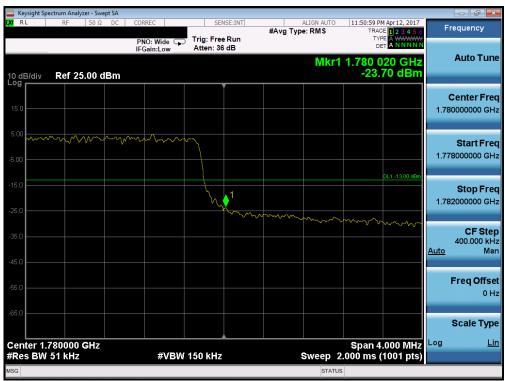
Plot 7-133. Lower Band Edge Plot (Band 4/66 - 5.0MHz QPSK - RB Size 25)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager		
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Plot 7-134. Lower Extended Band Edge Plot (Band 4/66 – 5.0MHz QPSK – RB Size 25)



Plot 7-135. Upper Band Edge Plot (Band 4/66 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dege 95 of 149
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Plot 7-136. Upper Extended Band Edge Plot (Band 4/66 – 5.0MHz QPSK – RB Size 25)



Plot 7-137. Lower Band Edge Plot (Band 4/66 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 96 of 149	
1M1704040134-03-R1.ZNF	3/29-4/17/2017	Portable Handset		Page 86 of 148	
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	ectrum Analyze												
X/RL	RF	50 Ω	DC	CORREC			NSE:INT	#Avg Ty	ALIGN AUTO De: RMS	TRAC	M Apr 12, 2017 CE 1 2 3 4 5 6 PE A WWWWW	F	requency
10 dB/div Log r	Ref 25.	00 di	3m	PNO: W IFGain:L	ide ↔→ .ow	Trig: Free Atten: 36			Mkr	DI 1 1.708 9			Auto Tune
15.0													Center Fred 07000000 GH:
-5.00												1.70	Start Free
-15.0											DL1 -13.00 dBm	1.70	<b>Stop Fred</b> 09000000 GH:
-35.0	والاقترحية فأجواهر من	<u>chienna</u> ge	pul pugaba	and the second second	ada <sub>n t</sub> ata fi	يحطفا ودريوه ساوطرة	an fan fan fan fan fan fan fan fan fan f	ally - y has - Inthe	a.M.M. ath <sup>h</sup> aniwag	angungah kapingga ka	to a real of a for the form	<u>Auto</u>	CF Ster 400.000 kH Mar
55.0													Freq Offse 0 H
65.0													Scale Type
Center 1.7 #Res BW					≠VBW_	3.0 MHz			Sweep	Span 4 2.000 ms (	.000 MHz 1001 pts)	Log	Lir
ISG									STATU				

Plot 7-138. Lower Extended Band Edge Plot (Band 4/66 – 10.0MHz QPSK – RB Size 50)



Plot 7-139. Upper Band Edge Plot (Band 4/66 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dega 97 of 149	
1M1704040134-03-R1.ZNF	3/29-4/17/2017	Portable Handset		Page 87 of 148	
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	ectrum Analy	zer - Swept	t SA										
X/RL	RF	50 Ω	DC	CORREC			ISE:INT	#Avg Typ	ALIGN AUTO	TRAC	M Apr 12, 2017 E 1 2 3 4 5 6 E A WWWWW	F	requency
10 dB/div	Ref 25	.00 dE		PNO: Wi IFGain:L		Atten: 36	dB		Mkr1	DI 1.781 0			Auto Tune
- <b>og</b>													Center Fred 33000000 GH:
-5.00												1.78	Start Free 31000000 GH:
-15.0 1	f. Ang	NP-11-grandings	na an			maturananan	-solutions	Art of the property and the	-	n Andrewski and	DL1 -13.00 dBm	1.78	<b>Stop Fred</b> 35000000 GH:
35.0												<u>Auto</u>	CF Stej 400.000 kH Ma
55.0													Freq Offse 0 H
-65.0													Scale Type
Center 1. #Res BW				#	VBW	3.0 MHz			Sweep 2	Span 4 2.000 ms (	.000 MHz 1001 pts)	Log	Lir
ISG									STATU	s			

Plot 7-140. Upper Extended Band Edge Plot (Band 4/66 – 10.0MHz QPSK – RB Size 50)



Plot 7-141. Lower Band Edge Plot (Band 4/66 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Daga 99 of 149	
1M1704040134-03-R1.ZNF	3/29-4/17/2017	Portable Handset		Page 88 of 148	
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	ectrum Analyzer -	Swept SA									
XI RL	RF 5	0Ω DC	CORREC		SENSE:INT	#Avg Typ	ALIGN AUTO		Apr12, 2017	F	requency
			PNO: W IFGain:L		: Free Run en: 36 dB			TYF DE			
10 dB/div Log	Ref 25.0	0 dBm					Mkr1	1.707 9 -32.	48 GHz 31 dBm		Auto Tune
15.0											<b>Center Freq</b> 7000000 GHz
-5.00										1.70	Start Freq 5000000 GHz
-15.0									DL1 -13.00 dBm	1.70	<b>Stop Freq</b> 9000000 GHz
-35.0	Mary and Annual Annual Street	يوريونونيو المح <sup>ير</sup>	gant parta	-ge-g <sub>igt</sub> -Corport-St-St-S	and the second	ler veler menter ber ander		<sup>an</sup> mile-reprinteration and by	a de la constraint de la c	<u>Auto</u>	<b>CF Step</b> 400.000 kHz Man
-55.0											Freq Offset 0 Hz
-65.0											Scale Type
Center 1.7		lz					<b>.</b>	Span 4		Log	Lin
#Res BW	1.0 MHz		7	<b>≇VBW 3.0</b> ∣	VIHZ		Sweep 2	2.000 ms (	1001 pts)		
							STATU				

Plot 7-142. Lower Extended Band Edge Plot (Band 4/66 – 15.0MHz QPSK – RB Size 75)



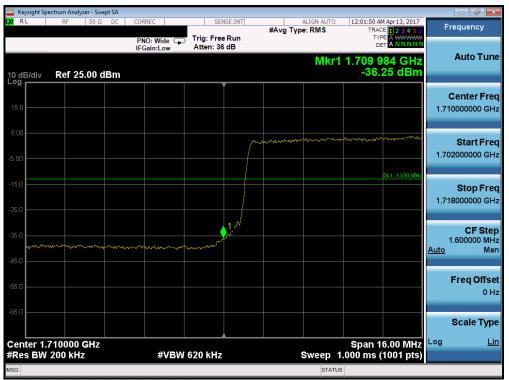
Plot 7-143. Upper Band Edge Plot (Band 4/66 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 89 of 148
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Keysight													
X/RL	RF	50 Ω	DC	CORREC		SEN	NSE:INT	#Avg Typ	ALIGN AUTO	TRAC	M Apr 12, 2017 DE <b>1 2 3 4 5 6</b> DE A WWWWW	F	requency
10 dB/div	/ Ref	25.00 c	1Bm	PNO: W IFGain:I	ide ↔ _ow	Atten: 36			Mkr	DI 1 1.781 1			Auto Tune
15.0													Center Freq 83000000 GHz
-5.00												1.78	Start Freq 31000000 GHz
-15.0	1	adrahaa (ng)anna agust	r j	نىر ۋەرەت بەرە قەرەمەي		n Malanna fas Branna Lagran fra	an and a start of the start of		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	5-4-17-1-18-17-17-18-1-17-18-1-1-18-18-1-18-18-18-18-18-18-18-18-	<u>DL1 -13.00 dBm</u>	1.78	<b>Stop Fred</b> 35000000 GHz
-35.0												<u>Auto</u>	CF Step 400.000 kH Mar
-55.0													Freq Offse 0 H:
-65.0													Scale Type
Center #Res B					#VBW	3.0 MHz			Sweep	Span 4 2.000 ms (	.000 MHz 1001 pts)	Log	Lin
MSG									STATU	JS			

Plot 7-144. Upper Extended Band Edge Plot (Band 4/66 – 15.0MHz QPSK – RB Size 75)



Plot 7-145. Lower Band Edge Plot (Band 4/66 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 00 of 149
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	ectrum Analy	/zer - Swej	pt SA										
X/RL	RF	50 Ω	DC	CORREC			VSE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	M Apr 13, 2017 CE 1 2 3 4 5 6	F	requency
10 dB/div	Ref 2	5.00 d	Bm	PNO: W IFGain:	Vide ↔ Low	Trig: Free Atten: 36			Mkr1	1.705 7	<sup>™</sup> A NN NN N 40 GHz 34 dBm		Auto Tune
15.0													Center Freq 07000000 GHz
-5.00												1.70	Start Free
-15.0		1									DL1 -13.00 dBm	1.70	<b>Stop Fred</b> 09000000 GH:
-35.0	ىنىيەرلەرلەرلەرلەر مەربىيەرلەرلەرلەرلەرلىرىيەرلەرلىرىيەرلەرلىرىيەرلەرلىرىيەرلىرىيەرلىرىيەرلىرىيەرلىرىيەرلىرىيەر	halmografino	niahunHorg	a <sup>n a</sup> r an	~&Aylershow	resuri Maser M <sup>a</sup> ra	n stifter an earling an a	<b>น</b> ี้ ระสางการรัฐ <sub>มอง</sub> ประช	ประกัทยาวรายให้สารระ	(47)-38 <sup>2,14</sup> 80-4874,682-4478)	-mutrilineedlesends	<u>Auto</u>	CF Step 400.000 kH Mar
-55.0													Freq Offse 0 H
-65.0													Scale Type
Center 1. #Res BW					#VBW	3.0 MHz			Sweep_2	Span 4 2.000 ms (	.000 MHz 1001 pts)	Log	Lin
ISG									STATU				

Plot 7-146. Lower Extended Band Edge Plot (Band 4/66 – 20.0MHz QPSK – RB Size 100)



Plot 7-147. Upper Band Edge Plot (Band 4/66 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 91 of 148
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	t Spectrum A	nalyzer - Sw	ept SA										
X/RL	RF	50 Ω	DC	CORREC			ISE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	M Apr 13, 2017 CE 1 2 3 4 5 6	F	requency
10 dB/div	Bof	25.00 (	- Bro	PNO: W IFGain:1	lide ↔→ _ow	Trig: Free Atten: 36			Mkr	1.782 0	36 GHz 91 dBm		Auto Tune
		23.00 (				, ,							Center Fred 33000000 GH2
-5.00											DL1 -13.00 dBm	1.78	Start Free 31000000 GHz
-15.0	suda ny taonina ny taona 1	un value and and a start of		1	ana yang mada da	age-she-slarmyrye	Nertungen av Altan	Ast minglind managed and m		adarafiserin adarasa ana	0L1 -13.00 00m	1.78	Stop Fred 35000000 GH2
-35.0												<u>Auto</u>	CF Step 400.000 kH: Mar
-55.0													Freq Offse 0 H:
-65.0													Scale Type
	1.78300 W 1.0 N			į	#VBW :	3.0 MHz			Sweep 2	Span 4 2.000 ms (	.000 MHz 1001 pts)	Log	Lin
MSG									STATU	s			

Plot 7-148. Upper Extended Band Edge Plot (Band 4/66 – 20.0MHz QPSK – RB Size 100)

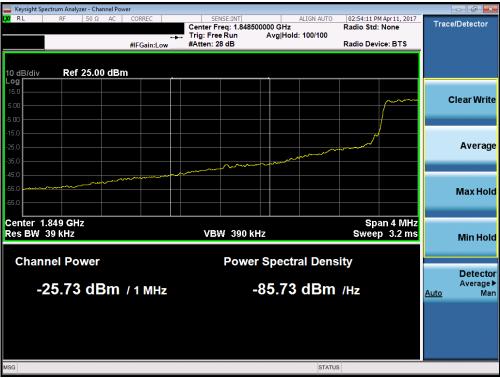


Plot 7-149. Lower Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

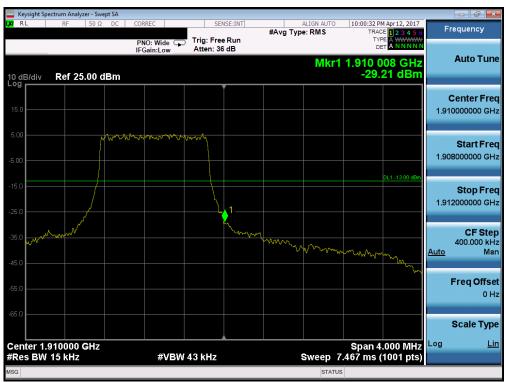
FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 02 of 149
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<sup>03/24/2017</sup> 





Plot 7-150. Lower Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

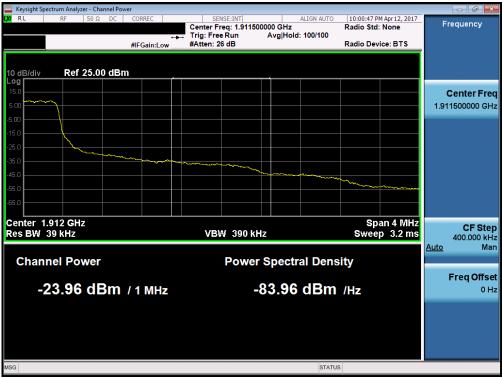


Plot 7-151. Upper Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

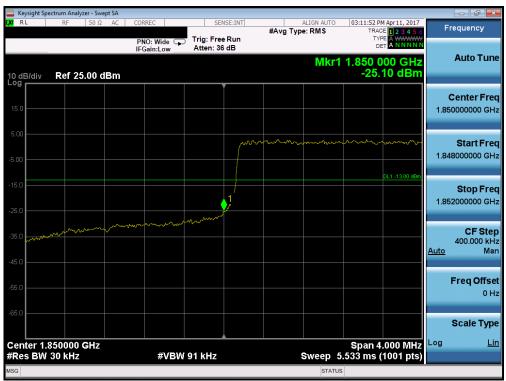
FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 02 of 149
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<sup>03/24/2017</sup> 





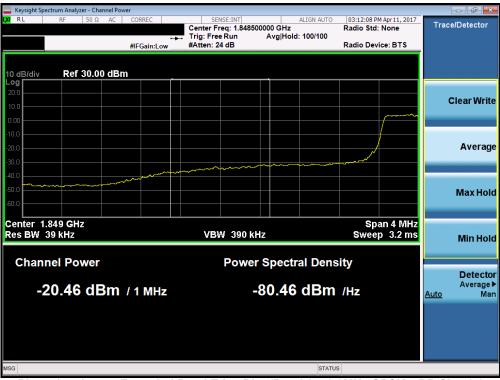
Plot 7-152. Upper Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)



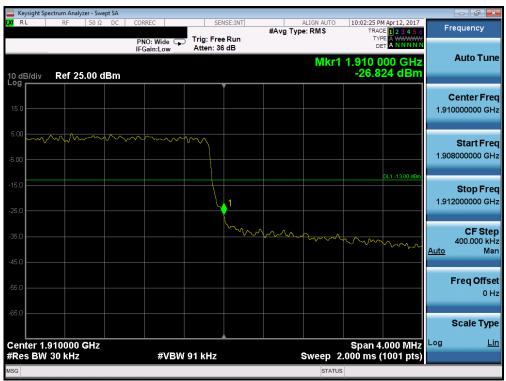
Plot 7-153. Lower Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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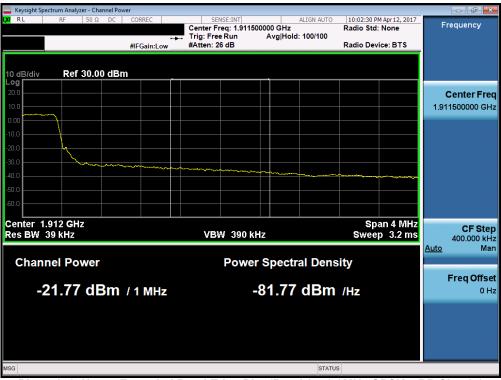
Plot 7-154. Lower Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)



Plot 7-155. Upper Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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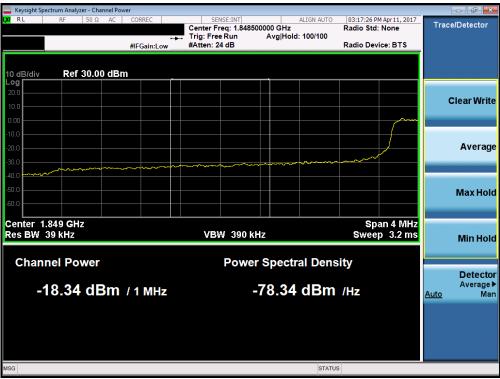
Plot 7-156. Upper Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)



Plot 7-157. Lower Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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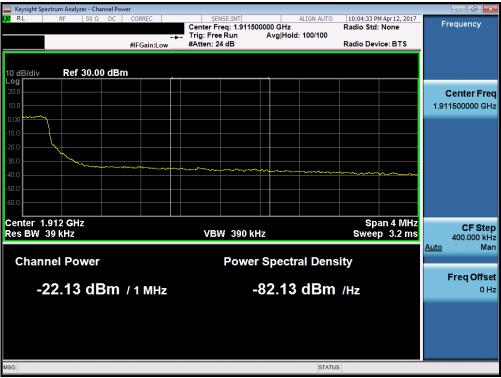
Plot 7-158. Lower Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)



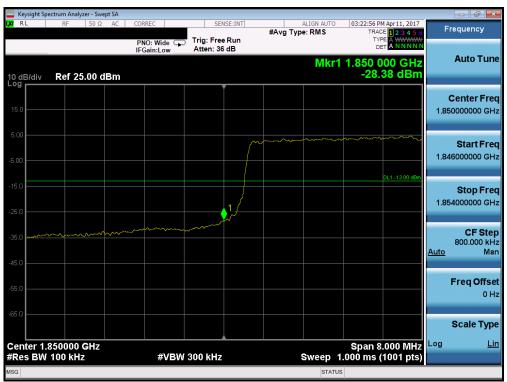
Plot 7-159. Upper Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 07 of 149
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Plot 7-160. Upper Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)



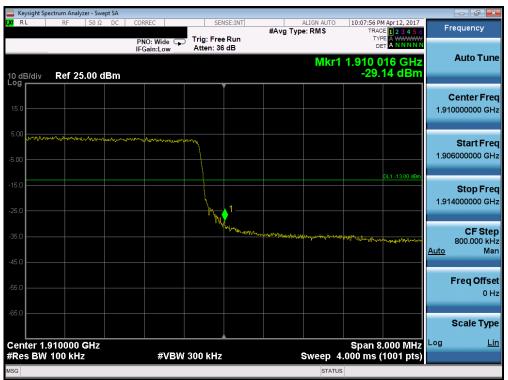
Plot 7-161. Lower Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 98 of 148
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	ectrum Analyzer										- 6 ×
XI RL	RF	50 Ω AC	CORREC		SE:INT Run	#Avg Typ	ALIGN AUTO e: RMS	TRAC	M Apr 11, 2017 CE 1 2 3 4 5 6 PE A WWWW	F	requency
10 dB/div	Ref 25.0	00 dBm	IFGain:Low	Atten: 36			Mkr1	1.848 9	96 GHz 49 dBm		Auto Tune
15.0											Center Fre 17000000 GH
5.00										1.84	<b>Start Fre</b> 15000000 GH
25.0	Manufalleration			1/17/17/19/19-19-19/14/10-19	angs-en-minhama.cov	And the second	an a		DL1 -13.00 dBm 1 Manu-1	1.84	<b>Stop Fre</b> 19000000 GH
35.0										<u>Auto</u>	<b>CF Ste</b> 400.000 kH Ma
i5.0											Freq Offs 0 H
65.0											Scale Typ
enter 1.8 Res BW	847000 G 1.0 MHz	Hz	#VBV	/ 3.0 MHz			Sweep 1	Span 4 .000 ms (	.000 MHz (1001 pts)	Log	L
SG							STATU	S			

Plot 7-162. Lower Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)



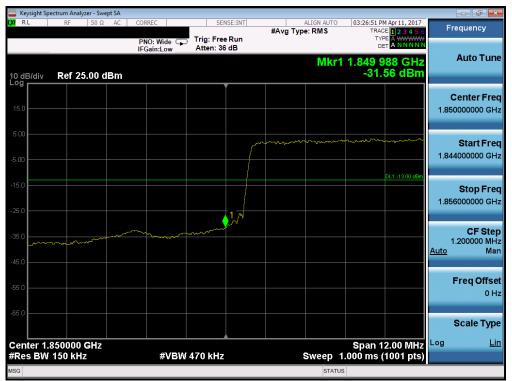
Plot 7-163. Upper Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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🔤 Keysight :	Spectrum Anal	/zer - Swept S/	A										
l <mark>XI</mark> RL	RF	50 Ω D	C COF	RREC		SEN	SE:INT	#Avg Ty	ALIGN AUTO		M Apr 12, 2017 CE <b>1 2 3 4 5 6</b>	F	requency
			PI IF(	NO: Wide Gain:Low		g: Free ten: 36		#///9/191		TY D			
10 dB/div Log	Ref 2	5.00 dBn	n						Mkr	1 1.911 ( -23.	016 GHz 20 dBm		Auto Tune
15.0													<b>Center Freq</b> 3000000 GHz
-5.00												1.91	Start Freq 1000000 GHz
-15.0	****	ويوري ورويد ورويد ورويد	ปาราปารคาสาม	an mangana ang	rttmy fututions	with when we	ndlahurenen ogen-en	marigurgetaging	""	**Weightfield and after two	DL1 -13.00 dBm	1.91	Stop Freq
-35.0												<u>Auto</u>	<b>CF Step</b> 400.000 kHz Man
-55.0													Freq Offset 0 Hz
-65.0													Scale Type
	1.913000 N 1.0 MH			#VE	3W 3.0	MHz			Sweep	Span 4 2.000 ms	.000 MHz (1001 pts)	Log	<u>Lin</u>
MSG									STATU	JS			

Plot 7-164. Upper Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)



Plot 7-165. Lower Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 100 of 149
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	pectrum Analyzer						
X/RL	RF	50Ω AC	CORREC	SENSE:INT	ALIGN AUTO #Avg Type: RMS	03:27:01 PM Apr 11, 2017	Frequency
	_		PNO: Fast ↔→→ IFGain:Low	Trig: Free Run Atten: 36 dB	with grype. tune	TRACE 1 2 3 4 5 6 TYPE A WWWW DET A NNNN	
10 dB/div Log	Ref 25.0	00 dBm			Mkı	1 1.847 244 GHz -25.28 dBm	Auto Tune
15.0							Center Freq 1.847000000 GHz
-5.00							<b>Start Freq</b> 1.845000000 GHz
-15.0			an - dad a confight production of the	non-singer and the most	1	DL1 -13.00 dBm	<b>Stop Fred</b> 1.849000000 GHz
-35.0	~~~}~~						CF Step 400.000 kHz <u>Auto</u> Mar
-55.0							Freq Offse 0 H:
-65.0							Scale Type
	.847000 G	Hz				Span 4.000 MHz	Log <u>Lin</u>
#Res B₩	/ 1.0 MHz		#VBW	3.0 MHz	Sweep	1.000 ms (1001 pts)	
ISG					STAT	rus	

Plot 7-166. Lower Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)



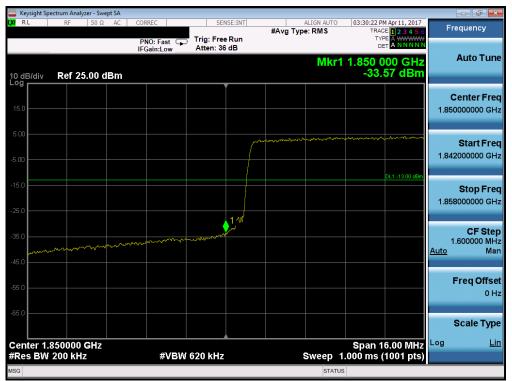
Plot 7-167. Upper Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
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	ctrum Analyzer -										- • ×
X/RL	RF 50	Ω AC	CORREC		BE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	Apr11, 2017 E 1 2 3 4 5 6 E A WWWWW	F	requency
10 dB/div	Ref 25.0	0 dBm	IFGain:Low	Atten: 36 o			Mkr1	DE 1.911 0			Auto Tune
15.0											Center Fre 3000000 GH
5.00										1.91	<b>Start Fre</b> 1000000 GH
15.0 25.0 <mark>1</mark> —									DL1 -13.00 dBm	1.91	<b>Stop Fre</b> 5000000 G⊦
15.0		******	And a state of the		An and the second se		**************************************	,-3350N-,-5,,-,	n Tyriffin an Ulynn y Jon	<u>Auto</u>	<b>CF Ste</b> 400.000 kH Ma
5.0											Freq Offs 0 H
65.0											Scale Typ
enter 1.9 Res BW	13000 GH 1.0 MHz	Z	#VBV	/ 3.0 MHz			Sweep 1	Span 4. .000 ms (	.000 MHz 1001 pts)	Log	Li
SG							STATUS	3			

Plot 7-168. Upper Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)



Plot 7-169. Lower Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 102 of 149
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PNO: Fast  →→  Trig: Free Run Atten: 36 dB  #Avg Type: RMS  Trice Tree Past Store Frequency    0 dB/div  Ref 25.00 dBm  -28.33 dBm  Center Frequency    0 dB/div  Ref 25.00 dBm  -28.33 dBm  Center Frequency    0 dB/div  Ref 25.00 dBm  -28.33 dBm  Center Frequency    0 dB/div  Ref 25.00 dBm  -28.33 dBm  Center Frequency    0 dB/div  Ref 25.00 dBm  -28.33 dBm  Center Frequency    0 dB/div  Ref 25.00 dBm  -28.33 dBm  Center Frequency    0 dB/div  Ref 25.00 dBm  -28.33 dBm  Center Frequency    0 dB/div  Ref 25.00 dBm  -28.33 dBm  Center Frequency    0 dB/div  Ref 25.00 dBm  -28.33 dBm  Center Frequency    0 dB/div  Ref 25.00 dBm  -28.33 dBm  Center Frequency    0 dB/div  Ref 25.00 dBm  -28.33 dBm  Center Frequency    1 dB/000000 GHz  Ref 25.00 dBm  -28.33 dBm  Center Frequency    1 dB/000000 GHz  Ref 25.00 dBm  -28.33 dBm  Ref 25.00 dBm  -28.33 dBm    1 dB/000000 GHz  Ref 25.00 dBm  -28.33 dBm  -28.33 dBm	🔤 Keysight Sp	ectrum Analyzer -	- Swept SA							
Atten: 36 dB Mkr1 1.848 804 GHz -28.33 dBm Center Freq 1.84700000 GHz CF Step Freq Offset 0 dE Value Center 1.847000 GHz Res BW 1.0 MHz #VBW 3.0 MHz Sweep 1.000 ms (1001 pts) Atten: 36 dB Mkr1 1.848 804 GHz -28.33 dBm Auto Tune Auto Tune Auto Tune Auto Tune Auto Tune Center Freq 1.84500000 GHz Scale Type	X/RL	RF 5	0Ω AC			#Avg T		TRACE 1 2 3 4 5 (		requency
og							Mkr1	1.848 804 GHz		Auto Tune
100  1000  100  100	10 dB/div Log	Ref 25.0	0 dBm					-28.33 dBm		
Start Free Start Free Start Free Start Free Start Free 1.84500000 GHz Start Free 1.84500000 GHz Start Free 1.84900000 GHz Start Free 1.849000000 GHz Start Free 1.84900000 GHz Start Free 1.8490000 GHz Start Free 1.84900000 GHz Start Free 1.849000000 GHz Start Free 1.84900000 GHz Start Fre	15.0									
5.0  Stop Freq 1.84900000 GHz    5.0  Stop Freq 1.8490000 GHz    5.0  Stop Freq 1.8490000 GHz    5.0  Stop Freq 1.84900000 GHz    5.0  Stop Freq 1.84900000 GHz    5.0  Stop Freq 1.900 GHz    5.0  Stop Freq 1.900 GHz <td< td=""><td>-5.00</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1.84</td><td>Start Freq 15000000 GHz</td></td<>	-5.00								1.84	Start Freq 15000000 GHz
Auto 400.000 kHz Auto Mar Auto Mar Freq Offset 0 Hz Scale Type Log Lin Res BW 1.0 MHz #VBW 3.0 MHz Sweep 1.000 ms (1001 pts)	-15.0							DL1 -13.00 dBm	1.84	Stop Freq 19000000 GHz
Freq Offse Prenter 1.847000 GHz Res BW 1.0 MHz #VBW 3.0 MHz Sweep 1.000 ms (1001 pts)	-35.0	nnif Uligensi og Althurge af generige	ekatura (konglera (konglera)	ง <sub>เป็</sub> มใจเพื่อสร้างข้างที่ 1	and generation of the second	an a	and den with the particular parti	an the part of the second s	<u>Auto</u>	400.000 kHz
enter 1.847000 GHz Res BW 1.0 MHz #VBW 3.0 MHz Sweep 1.000 ms (1001 pts)	-43.0									-
Res BW 1.0 MHz #VBW 3.0 MHz Sweep 1.000 ms (1001 pts)	-65.0									Scale Type
			lz	#\/D\\	2.0 MU		Sumar-4	Span 4.000 MHz	Log	Lin
	#Res BW	1.0 MHZ		#VBW	3.0 MHZ		Sweep 1			

Plot 7-170. Lower Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 7-171. Upper Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

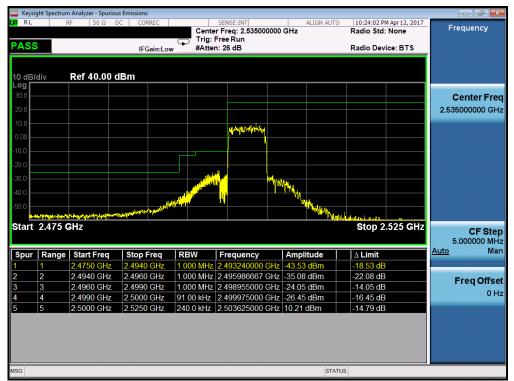
FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Degra 102 of 149
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	pectrum Analyzer	- Swept SA									
X/RL	RF 5	0Ω DC	CORREC		SE:INT	#Avg Type	ALIGN AUTO e: RMS	TRAC	Apr 12, 2017	F	requency
10 dB/div	Ref 25.0	0 dBm	PNO: Wide ← IFGain:Low	➡ Trig: Free Atten: 36			Mkr1	DE	64 GHz 51 dBm		Auto Tune
15.0											Center Free 3000000 GH
5.00									DL1 -13.00 dBm	1.91	Start Fre 1000000 GH
-15.0	Ja-gangdin Lang participant	1	Louise a warden	يو بالإفاد المراجع الم	when the second		All of the state o		Inter Anathal Martham	1.91	<b>Stop Fre</b> 5000000 GH
45.0										<u>Auto</u>	CF Ste 400.000 kH Ma
55.0											Freq Offs 0 H
65.0											Scale Typ
	.913000 GH 1.0 MHz	łz	#VB	W 3.0 MHz			Sween 2	Span 4.	.000 MHz 1001 pts)	Log	Li
ISG			<i>"</i> • D				STATUS		1001 (10)		

Plot 7-172. Upper Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 7-173. Lower ACP Plot (Band 7 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	Jht Spectrum	Analyzer - Spuri F 50 Ω		ions CORREC		SENSE:INT		10:24:19 PM A		
RL ASS		F   50 Ω	DC	IFGain:L	Trig:	er Freq: 2.53500000 Free Run en: 26 dB	0 GHz	Radio Std: N	lone	Frequency
0 dB/d	div	Ref 40.00	dBm							
0.0 20.0										Center Fre 2.535000000 GH
0.0 1.00					and the second s	******				
0.0										
30.0				N						
		· · · · · · · · · · · · · · · · · · ·	AN AN AN	wur.			hlungi unit an			
-	NU CONTRACTOR	Marthan 1						and a fundamental short of the	AND	
tart :	2.545 G	hundrenne (Mile GHZ						Stop 2.5	95 GHz	CF Ste 5.000000 MH
tart	2.545 G	Start Freq		p Freq	RBW	Frequency	Amplitude	Stop 2.5		5.000000 MH
tart	2.545 G	HZ	Sto	p Freq 700 GHz			Amplitude			5.000000 MH
iart Spur	2.545 G Range	HZ Start Freq	Sto 2.57		1.000 MHz	Frequency	Amplitude z 15.35 dBm	∆ Limit		5.000000 MH <u>Auto</u> Ma
Spur	2.545 G Range	SHZ Start Freq 2.5450 GHz	Sto 2.57	00 GHz	1.000 MHz 91.00 kHz	Frequency 2.568208333 GH	Amplitude z 15.35 dBm z -19.73 dBm	∆ Limit -9.649 dB		5.000000 MH <u>Auto</u> Ma Freq Offs
Spur	2.545 G Range 1 2 3 4	<b>Start Freq</b> 2.5450 GHz 2.5700 GHz 2.5710 GHz 2.5750 GHz	<b>Sto</b> 2.57 2.57 2.57 2.57	700 GHz 710 GHz 750 GHz 760 GHz	1.000 MHz 91.00 kHz 1.000 MHz 1.000 MHz	Frequency      2.568208333 GHz      2.570313333 GHz      2.571386667 GHz      2.575041667 GHz	Amplitude      z    15.35 dBm      z    -19.73 dBm      z    -17.80 dBm      z    -38.68 dBm	Δ Limit -9.649 dB -9.729 dB -7.802 dB -25.68 dB		5.000000 MH <u>Auto</u> Ma
Spur	2.545 G Range 1 2 3 4	<b>Start Freq</b> 2.5450 GHz 2.5700 GHz 2.5710 GHz	<b>Sto</b> 2.57 2.57 2.57	7 <mark>00 GHz</mark> 710 GHz 750 GHz	1.000 MHz 91.00 kHz 1.000 MHz	Frequency      2.568208333 GHz      2.570313333 GHz      2.571386667 GHz	Amplitude      z    15.35 dBm      z    -19.73 dBm      z    -17.80 dBm	Δ Limit -9.649 dB -9.729 dB -7.802 dB -25.68 dB		5.000000 <u>Auto</u> Freq Ot
Spur	2.545 G Range 1 2 3 4	<b>Start Freq</b> 2.5450 GHz 2.5700 GHz 2.5710 GHz	<b>Sto</b> 2.57 2.57 2.57 2.57	7 <mark>00 GHz</mark> 710 GHz 750 GHz	1.000 MHz 91.00 kHz 1.000 MHz 1.000 MHz	Frequency      2.568208333 GHz      2.570313333 GHz      2.571386667 GHz	Amplitude      z    15.35 dBm      z    -19.73 dBm      z    -17.80 dBm      z    -38.68 dBm	Δ Limit -9.649 dB -9.729 dB -7.802 dB		5.000000 M <u>Auto</u> M Freq Offs

Plot 7-174. Upper ACP Plot (Band 7 – 5.0MHz QPSK – RB Size 25)



Plot 7-175. Lower ACP Plot (Band 7 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Plot 7-176. Upper ACP Plot (Band 7 – 10.0MHz QPSK – RB Size 50)



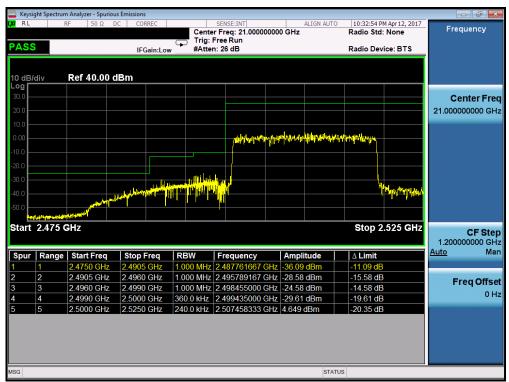
Plot 7-177. Lower ACP Plot (Band 7 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	ght Spectrum									_						
RL ASS		(F 50	Ω (	DC	CORREC	0	Trig:	SENSE:INT er Freq: 2.5350 Free Run	00000		ALIGN AU	то	Radio Std:		Freq	luency
A33	<u> </u>				IFGain	Low	#Atter	n: 26 dB					Radio Devi	ce: BTS		
0 dB/c og <b>[</b>	div	Ref 40	.00	dBm												
															Ce	nter Fre
0.0															2.5350	00000 GH
			1	( <sup>m</sup> rr	where we want	pole viela	wheel the week	M.								
0.0 L			1													
0.0																
	margaret	and the second	c m							in the second						
0.0	<u> </u>									11100	THE REAL PROPERTY AND A	J				
0.0											11*	Yp,	white property his	-		
tart	2.545 0	GHz												.595 GHz	5.0	CF Ste
Spur	Range	Start F	req	Sto	op Free	a  I	RBW	Frequency		Ampli	tude	1	∆ Limit		<u>Auto</u>	Ma
	1	2.5450			700 GH			2.565541667					-15.30 dB			
	2	2.5700			710 GH			2.570611667					-12.36 dB		Fr	eq Offs
	3	2.5710			750 GH			2.572213333				_	-10.97 dB			0+
	4	2.5750			835 GH			2.576481375					-10.18 dB			
	5	2.5835	GHZ	2.5	950 GH	<b>Z</b> 1	.000 MHZ	2.583676475	GHZ	-41.39	d BIIIT		-16.39 dB			
G																
											ST	ATUS				

Plot 7-178. Upper ACP Plot (Band 7 – 15.0MHz QPSK – RB Size 75)



Plot 7-179. Lower ACP Plot (Band 7 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Keysight RL	Spectrum RI	Analyzer - Spur	ious Emiss	sions CORREC		SENSE:INT	ALIGN AUT	0 10:34:28 PM Apr 12, 201	7
PASS		F   50 12	DC	IFGain:Lov	Trig:	r Freq: 21.00000000 Free Run h: 26 dB		Radio Device: BTS	Frequency
10 dB/div _og	,	Ref 40.00	dBm						
30.0 20.0									Center Fre 21.000000000 GH
10.0 0.00 10.0		pro-berran-gauter	el maleur (maleur)	vindia <sub>M</sub> lassan	worknesser	<b>N</b>			
20.0 بهايدر.	ul-ym						Harad Shipe Landson		
40.0 50.0						<u> </u>	· · · · · · · · · · · · · · · · · · ·	Phin magnines (1) and a find a physical dispersion	
Start 2.	.545 G	iHz						Stop 2.595 GH	Z CF Ste 1.200000000 G⊢
Spur   F	Range	Start Freq	Sto	op Freq	RBW	Frequency	Amplitude	∆ Limit	Auto Ma
1		2.5450 GHz		700 GHz		2.559333333 GHz		-15.59 dB	
2		2.5700 GHz		710 GHz		2.570961667 GHz		-12.03 dB	Freq Offs
3		2.5710 GHz		750 GHz		2.573380000 GHz		-9.552 dB	0+
4		2.5750 GHz		879 GHz		2.575968025 GHz		-11.66 dB	UF
5 5		2.5879 GHz	2.5	950 GHz	1.000 MHz	2.588462618 GHz	-44.34 dBm	-19.34 dB	
	_		_				STA	7110	

Plot 7-180. Upper ACP Plot (Band 7 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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# 7.5 Peak-Average Ratio

## Test Overview

A peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

### Test Procedure Used

KDB 971168 D01 v02r02 - Section 5.7.1

### Test Settings

- 1. The signal analyzer's CCDF measurement profile is enabled
- 2. Frequency = carrier center frequency
- 3. Measurement BW > Emission bandwidth of signal
- 4. The signal analyzer was set to collect one million samples to generate the CCDF curve
- 5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms.

### Test Setup

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

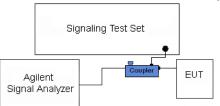


Figure 7-4. Test Instrument & Measurement Setup

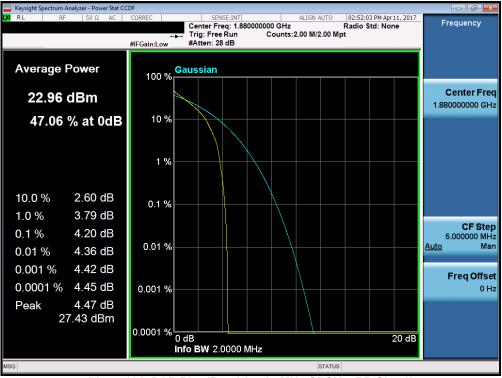
### Test Notes

None.

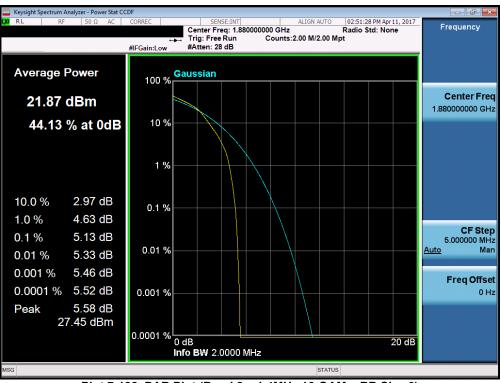
FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Degra 100 of 149
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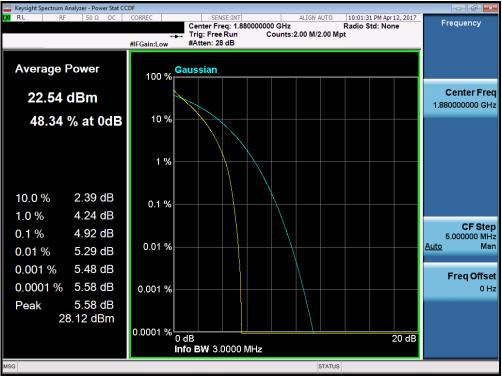
Plot 7-181. PAR Plot (Band 2 – 1.4MHz QPSK – RB Size 6)



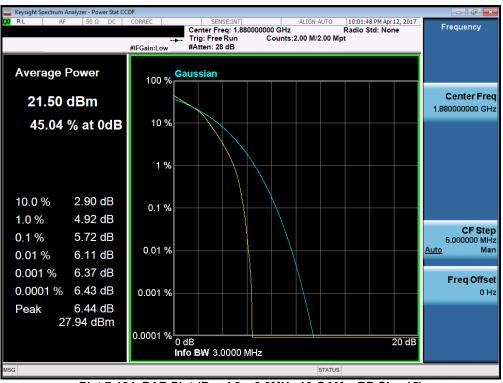
Plot 7-182. PAR Plot (Band 2 - 1.4MHz 16-QAM - RB Size 6)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 110 of 149
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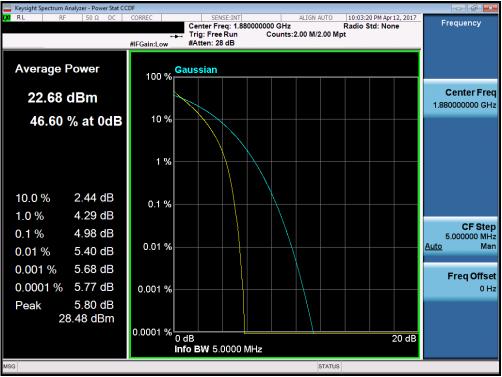
Plot 7-183. PAR Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

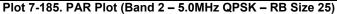


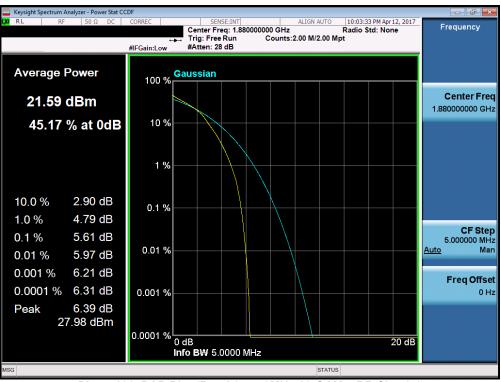
Plot 7-184. PAR Plot (Band 2 - 3.0MHz 16-QAM - RB Size 15)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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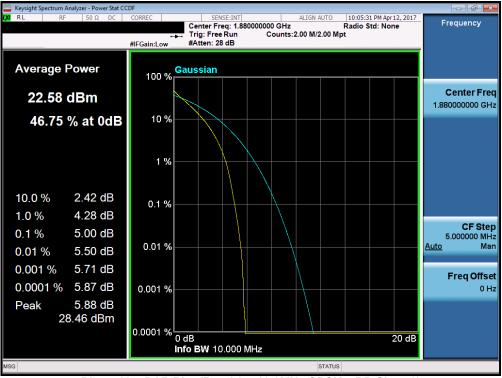


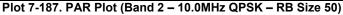


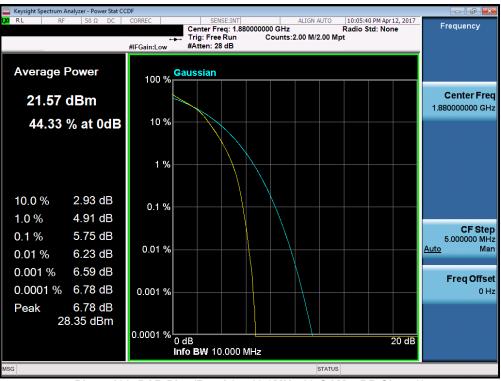
Plot 7-186. PAR Plot (Band 2 - 5.0MHz 16-QAM - RB Size 25)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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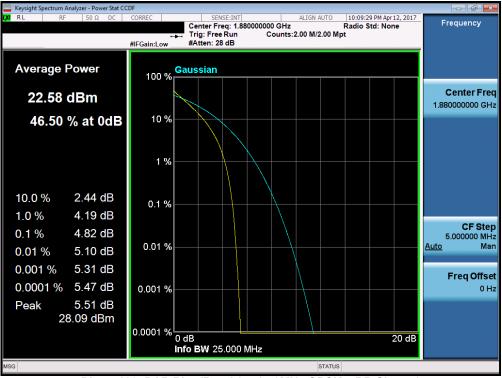




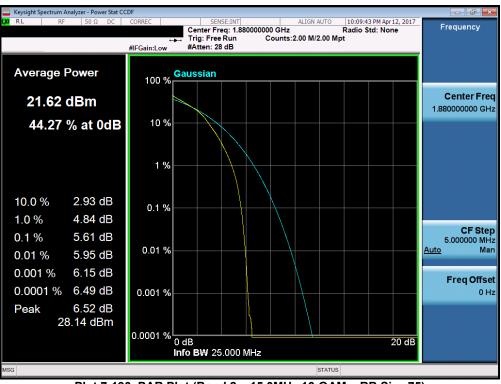
Plot 7-188. PAR Plot (Band 2 - 10.0MHz 16-QAM - RB Size 50)

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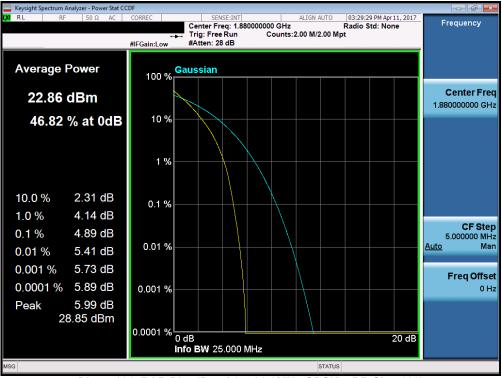
Plot 7-189. PAR Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

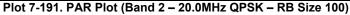


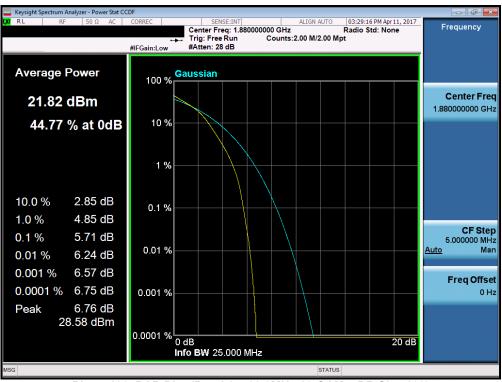
Plot 7-190. PAR Plot (Band 2 - 15.0MHz 16-QAM - RB Size 75)

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Plot 7-192. PAR Plot (Band 2 - 20.0MHz 16-QAM - RB Size 100)

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# 7.6 Radiated Power (ERP/EIRP) §22.913(a.2) §24.232(c.2) §27.50(h.2) §27.50(b.10) §27.50(c.10) §27.50(d.4)

### **Test Overview**

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-D-2010 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

#### Test Procedures Used

KDB 971168 D01 v02r02 - Section 5.2.1

ANSI/TIA-603-D-2010 - Section 2.2.17

### Test Settings

- 1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
- 2. RBW = 1 5% of the expected OBW, not to exceed 1MHz
- 3. VBW  $\geq$  3 x RBW
- 4. Span = 1.5 times the OBW
- 5. No. of sweep points > 2 x span / RBW
- 6. Detector = RMS
- 7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto".
- 8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
- 9. Trace mode = trace averaging (RMS) over 100 sweeps
- 10. The trace was allowed to stabilize

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## Test Setup

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

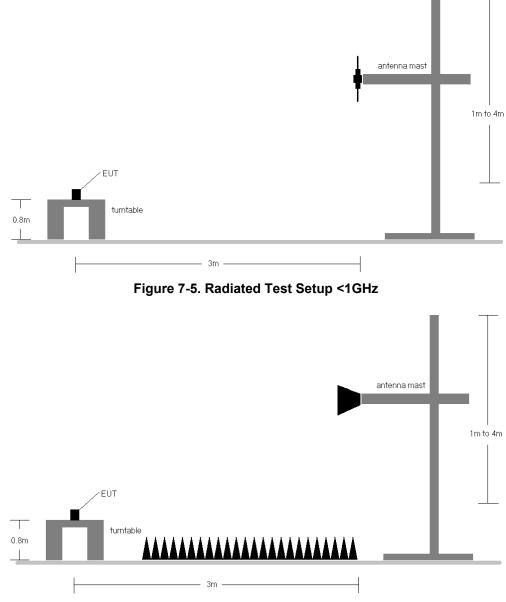


Figure 7-6. Radiated Test Setup >1GHz

#### Test Notes

- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 2) This unit was tested with its standard battery.

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
699.70	1.4	QPSK	Н	121	287	1 / 5	15.21	2.48	17.69	34.77	-17.08
707.50	1.4	QPSK	Н	125	291	1 / 0	15.74	2.56	18.30	34.77	-16.47
715.30	1.4	QPSK	Н	125	287	1 / 0	15.19	2.60	17.79	34.77	-16.99
699.70	1.4	16-QAM	Н	121	287	1 / 5	13.65	2.48	16.13	34.77	-18.64
707.50	1.4	16-QAM	н	125	291	1 / 0	14.69	2.56	17.25	34.77	-17.52
715.30	1.4	16-QAM	Н	125	287	1 / 0	14.02	2.60	16.62	34.77	-18.16
700.50	3	QPSK	Н	152	281	1 / 0	15.40	2.48	17.88	34.77	-16.89
707.50	3	QPSK	н	126	285	1 / 0	15.93	2.56	18.49	34.77	-16.28
714.50	3	QPSK	н	133	293	1 / 0	14.80	2.60	17.40	34.77	-17.37
700.50	3	16-QAM	н	152	281	1 / 0	14.29	2.48	16.77	34.77	-18.00
707.50	3	16-QAM	н	126	285	1 / 0	14.76	2.56	17.32	34.77	-17.45
714.50	3	16-QAM	Н	133	293	1/0	13.19	2.60	15.79	34.77	-18.98

### Table 7-2. ERP Data (Band 12)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
701.50	5	QPSK	н	134	285	1 / 0	15.16	2.49	17.65	34.77	-17.12
707.50	5	QPSK	н	285	284	1 / 0	16.03	2.56	18.59	34.77	-16.18
713.50	5	QPSK	н	291	280	1 / 0	16.22	2.60	18.82	34.77	-15.95
701.50	5	16-QAM	н	134	285	1 / 0	14.08	2.49	16.57	34.77	-18.20
707.50	5	16-QAM	н	285	284	1 / 0	15.18	2.56	17.74	34.77	-17.03
713.50	5	16-QAM	н	291	280	1 / 0	14.95	2.60	17.55	34.77	-17.22
704.00	10	QPSK	н	294	290	1 / 49	15.91	2.51	18.42	34.77	-16.35
707.50	10	QPSK	н	289	295	1 / 49	16.07	2.56	18.63	34.77	-16.14
711.00	10	QPSK	н	296	281	1 / 49	15.98	2.60	18.58	34.77	-16.20
704.00	10	16-QAM	н	294	290	1 / 49	14.97	2.51	17.48	34.77	-17.29
707.50	10	16-QAM	н	289	295	1 / 49	15.20	2.56	17.76	34.77	-17.01
711.00	10	16-QAM	н	296	281	1 / 49	14.90	2.60	17.50	34.77	-17.28
713.50	5	QPSK	V	213	103	1 / 0	15.44	2.60	18.04	34.77	-16.73

# Table 7-3. ERP Data (Band 12/17)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
779.50	5	QPSK	н	100	289	1 / 0	16.28	2.47	18.75	34.77	-16.02
782.00	5	QPSK	н	104	289	1 / 0	15.86	2.54	18.40	34.77	-16.37
784.50	5	QPSK	н	104	296	1 / 0	15.81	2.63	18.44	34.77	-16.33
779.50	5	16-QAM	н	100	289	1 / 0	15.19	2.47	17.66	34.77	-17.11
782.00	5	16-QAM	н	104	289	1 / 0	14.77	2.54	17.31	34.77	-17.46
784.50	5	16-QAM	н	104	296	1 / 0	14.80	2.63	17.43	34.77	-17.34
782.00	10	QPSK	н	100	277	1 / 0	16.28	2.54	18.82	34.77	-15.95
782.00	10	16-QAM	н	100	277	1 / 0	14.67	2.54	17.21	34.77	-17.56
782.00	10	QPSK	V	100	281	1 / 0	15.02	2.54	17.56	34.77	-17.21

Table 7-4. ERP Data (Band 13)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
824.70	1.4	QPSK	н	199	295	1 / 0	14.65	5.51	20.16	38.45	-18.29
836.50	1.4	QPSK	н	202	305	1 / 5	14.99	5.14	20.13	38.45	-18.32
848.30	1.4	QPSK	Н	195	300	1 / 0	14.66	4.68	19.34	38.45	-19.11
824.70	1.4	16-QAM	н	199	295	1 / 0	13.53	5.51	19.04	38.45	-19.41
836.50	1.4	16-QAM	н	202	305	1 / 5	14.11	5.14	19.25	38.45	-19.20
848.30	1.4	16-QAM	н	195	300	1 / 0	13.66	4.68	18.34	38.45	-20.11
825.50	3	QPSK	н	195	300	1 / 14	14.78	5.52	20.30	38.45	-18.15
836.50	3	QPSK	н	206	298	1 / 14	14.87	5.14	20.01	38.45	-18.44
847.50	3	QPSK	н	211	304	1 / 0	14.60	4.67	19.27	38.45	-19.18
825.50	3	16-QAM	н	195	300	1 / 14	13.80	5.52	19.32	38.45	-19.13
836.50	3	16-QAM	н	206	298	1 / 14	13.73	5.14	18.87	38.45	-19.58
847.50	3	16-QAM	н	211	304	1 / 0	13.32	4.67	17.99	38.45	-20.46
826.50	5	QPSK	н	200	300	1 / 24	15.21	5.51	20.72	38.45	-17.73
836.50	5	QPSK	н	199	297	1 / 0	15.07	5.14	20.21	38.45	-18.24
846.50	5	QPSK	н	195	303	1 / 24	14.56	4.66	19.22	38.45	-19.23
826.50	5	16-QAM	н	200	300	1 / 24	14.32	5.51	19.83	38.45	-18.62
836.50	5	16-QAM	н	199	297	1 / 0	13.59	5.14	18.73	38.45	-19.72
846.50	5	16-QAM	н	195	303	1 / 24	13.15	4.66	17.81	38.45	-20.64
829.00	10	QPSK	н	202	300	1 / 49	15.19	5.49	20.68	38.45	-17.77
836.50	10	QPSK	н	200	313	1 / 0	15.20	5.14	20.34	38.45	-18.11
844.00	10	QPSK	н	200	299	1 / 0	14.66	4.70	19.36	38.45	-19.09
829.00	10	16-QAM	н	202	300	1 / 49	13.84	5.49	19.33	38.45	-19.12
836.50	10	16-QAM	н	200	313	1 / 0	14.27	5.14	19.41	38.45	-19.04
844.00	10	16-QAM	н	200	299	1 / 0	13.47	4.70	18.17	38.45	-20.28
826.50	5	QPSK	V	176	103	1 / 0	14.27	5.51	19.78	38.45	-18.67

Table 7-5. ERP Data (Band 5)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	н	133	21	1/0	12.32	9.62	21.94	30.00	-8.06
1745.00	1.4	QPSK	н	126	36	1 / 5	12.07	9.50	21.57	30.00	-8.43
1779.30	1.4	QPSK	н	131	29	1 / 0	11.56	9.38	20.94	30.00	-9.06
1710.70	1.4	16-QAM	н	133	21	1 / 0	11.20	9.62	20.82	30.00	-9.18
1745.00	1.4	16-QAM	н	126	36	1 / 5	10.42	9.50	19.92	30.00	-10.08
1779.30	1.4	16-QAM	н	131	29	1 / 0	10.44	9.38	19.82	30.00	-10.18
1711.50	3	QPSK	н	129	28	1 / 0	12.39	9.62	22.01	30.00	-7.99
1745.00	3	QPSK	н	135	41	1 / 14	11.99	9.50	21.49	30.00	-8.51
1778.50	3	QPSK	н	130	35	1/0	11.60	9.39	20.99	30.00	-9.01
1711.50	3	16-QAM	н	129	28	1 / 0	11.10	9.62	20.72	30.00	-9.28
1745.00	3	16-QAM	н	135	41	1 / 14	10.36	9.50	19.86	30.00	-10.14
1778.50	3	16-QAM	н	130	35	1/0	10.39	9.39	19.78	30.00	-10.22
1712.50	5	QPSK	н	125	14	1/0	12.51	9.61	22.12	30.00	-7.88
1745.00	5	QPSK	н	125	14	1 / 24	12.03	9.50	21.53	30.00	-8.47
1777.50	5	QPSK	н	125	14	1 / 0	11.77	9.39	21.16	30.00	-8.84
1712.50	5	16-QAM	н	125	14	1 / 0	11.14	9.61	20.75	30.00	-9.25
1745.00	5	16-QAM	н	125	14	1 / 24	10.41	9.50	19.91	30.00	-10.09
1777.50	5	16-QAM	н	125	14	1 / 0	10.35	9.39	19.74	30.00	-10.26
1715.00	10	QPSK	н	124	8	1/0	12.06	9.60	21.66	30.00	-8.34
1745.00	10	QPSK	н	126	13	1 / 0	11.82	9.50	21.32	30.00	-8.68
1775.00	10	QPSK	н	127	7	1/0	11.93	9.41	21.34	30.00	-8.66
1715.00	10	16-QAM	н	124	8	1/0	10.69	9.60	20.29	30.00	-9.71
1745.00	10	16-QAM	н	126	13	1/0	10.57	9.50	20.07	30.00	-9.93
1775.00	10	16-QAM	н	127	7	1/0	10.53	9.41	19.94	30.00	-10.06
1717.50	15	QPSK	н	126	12	1/0	11.98	9.58	21.56	30.00	-8.44
1745.00	15	QPSK	н	131	11	1/0	11.88	9.50	21.38	30.00	-8.62
1772.50	15	QPSK	н	136	17	1/0	11.79	9.42	21.21	30.00	-8.79
1717.50	15	16-QAM	н	126	12	1/0	10.53	9.58	20.11	30.00	-9.89
1745.00	15	16-QAM	н	131	11	1/0	10.60	9.50	20.10	30.00	-9.90
1772.50	15	16-QAM	н	136	17	1/0	10.53	9.42	19.95	30.00	-10.05
1720.00	20	QPSK	н	140	8	1/0	11.82	9.57	21.39	30.00	-8.61
1745.00	20	QPSK	н	125	11	1/0	11.79	9.50	21.29	30.00	-8.71
1770.00	20	QPSK	н	133	13	1/0	11.68	9.43	21.11	30.00	-8.89
1720.00	20	16-QAM	н	140	8	1/0	10.61	9.57	20.18	30.00	-9.82
1745.00	20	16-QAM	н	140	11	1/0	10.54	9.50	20.04	30.00	-9.96
1743.00	20	16-QAM	н	133	13	1/0	10.34	9.43	19.89	30.00	-10.11
1110.00	20			100	10	17.0	.00	5.75	13.03	30.00	

# Table 7-6. EIRP Data (Band 4/66)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1850.70	1.4	QPSK	н	100	0	1/3	15.51	9.12	24.63	33.01	-8.38
1880.00	1.4	QPSK	н	100	0	1 / 5	15.80	9.10	24.90	33.01	-8.11
1909.30	1.4	QPSK	н	100	0	1/3	15.81	9.16	24.97	33.01	-8.04
1850.70	1.4	16-QAM	н	100	0	1/3	13.75	9.12	22.87	33.01	-10.14
1880.00	1.4	16-QAM	н	100	0	1 / 5	14.30	9.10	23.40	33.01	-9.61
1909.30	1.4	16-QAM	н	100	0	1 / 3	14.54	9.16	23.70	33.01	-9.31
1851.50	3	QPSK	н	100	0	1 / 0	15.45	9.12	24.57	33.01	-8.44
1880.00	3	QPSK	н	100	0	1 / 0	15.91	9.10	25.01	33.01	-8.00
1908.50	3	QPSK	н	100	0	1 / 7	16.09	9.15	25.24	33.01	-7.77
1851.50	3	16-QAM	н	100	0	1 / 0	13.99	9.12	23.11	33.01	-9.90
1880.00	3	16-QAM	н	100	0	1 / 0	14.40	9.10	23.50	33.01	-9.51
1908.50	3	16-QAM	н	100	0	1 / 7	14.36	9.15	23.51	33.01	-9.50
1852.50	5	QPSK	Н	100	0	1 / 0	15.59	9.12	24.71	33.01	-8.30
1880.00	5	QPSK	н	100	0	1 / 24	15.88	9.10	24.98	33.01	-8.03
1907.50	5	QPSK	н	100	0	1 / 12	16.02	9.15	25.17	33.01	-7.84
1852.50	5	16-QAM	н	100	0	1 / 0	13.58	9.12	22.70	33.01	-10.31
1880.00	5	16-QAM	н	100	0	1 / 24	14.11	9.10	23.21	33.01	-9.80
1907.50	5	16-QAM	н	100	0	1 / 12	14.37	9.15	23.52	33.01	-9.49
1855.00	10	QPSK	н	100	0	1 / 0	15.67	9.12	24.79	33.01	-8.22
1880.00	10	QPSK	н	100	0	1 / 49	15.84	9.10	24.94	33.01	-8.07
1905.00	10	QPSK	н	100	0	1 / 25	16.10	9.13	25.23	33.01	-7.78
1855.00	10	16-QAM	н	100	0	1 / 0	13.68	9.12	22.80	33.01	-10.21
1880.00	10	16-QAM	н	100	0	1 / 49	14.00	9.10	23.10	33.01	-9.91
1905.00	10	16-QAM	Н	100	0	1 / 25	14.26	9.13	23.39	33.01	-9.62
1857.50	15	QPSK	н	100	0	1 / 0	15.55	9.11	24.66	33.01	-8.35
1880.00	15	QPSK	Н	100	0	1 / 74	15.74	9.10	24.84	33.01	-8.17
1902.50	15	QPSK	н	100	0	1 / 37	15.90	9.11	25.01	33.01	-8.00
1857.50	15	16-QAM	Н	100	0	1 / 0	13.42	9.11	22.53	33.01	-10.48
1880.00	15	16-QAM	Н	100	0	1 / 74	13.89	9.10	22.99	33.01	-10.02
1902.50	15	16-QAM	н	100	0	1 / 37	14.20	9.11	23.31	33.01	-9.70
1860.00	20	QPSK	н	100	0	1/0	15.41	9.11	24.52	33.01	-8.49
1880.00	20	QPSK	н	100	0	1 / 99	15.59	9.10	24.69	33.01	-8.32
1900.00	20	QPSK	Н	100	0	1/0	15.85	9.09	24.94	33.01	-8.07
1860.00	20	16-QAM	Н	100	0	1/0	13.48	9.11	22.59	33.01	-10.42
1880.00	20	16-QAM	н	100	0	1 / 99	13.79	9.10	22.89	33.01	-10.12
1900.00	20	16-QAM	Н	100	0	1/0	14.23	9.09	23.32	33.01	-9.69
1908.50	3	QPSK	V	226	135	1/0	13.57	9.15	22.72	33.01	-10.29

# Table 7-7. EIRP Data (Band 2)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
2502.50	5	QPSK	н	100	209	1 / 12	13.48	8.42	21.90	33.01	-11.11
2535.00	5	QPSK	н	100	203	1 / 0	13.38	8.50	21.88	33.01	-11.13
2567.50	5	QPSK	н	100	210	1 / 12	13.26	8.59	21.85	33.01	-11.16
2502.50	5	16-QAM	н	100	209	1 / 12	11.73	8.42	20.15	33.01	-12.86
2535.00	5	16-QAM	н	100	203	1 / 0	11.75	8.50	20.25	33.01	-12.76
2567.50	5	16-QAM	н	100	210	1 / 12	11.79	8.59	20.38	33.01	-12.63
2505.00	10	QPSK	н	100	200	1 / 49	13.48	8.42	21.90	33.01	-11.11
2535.00	10	QPSK	н	100	209	1 / 25	13.35	8.50	21.85	33.01	-11.16
2565.00	10	QPSK	н	100	205	1 / 49	12.98	8.58	21.56	33.01	-11.45
2505.00	10	16-QAM	н	100	200	1 / 49	12.39	8.42	20.81	33.01	-12.20
2535.00	10	16-QAM	н	100	209	1 / 25	11.65	8.50	20.15	33.01	-12.86
2565.00	10	16-QAM	н	100	205	1 / 49	11.36	8.58	19.94	33.01	-13.07
2507.50	15	QPSK	н	100	213	1 / 0	13.48	8.43	21.91	33.01	-11.10
2535.00	15	QPSK	н	100	206	1 / 37	13.38	8.50	21.88	33.01	-11.13
2562.50	15	QPSK	н	100	197	1 / 0	13.14	8.57	21.71	33.01	-11.30
2507.50	15	16-QAM	н	100	213	1 / 0	12.56	8.43	20.99	33.01	-12.02
2535.00	15	16-QAM	н	100	206	1 / 37	12.42	8.50	20.92	33.01	-12.09
2562.50	15	16-QAM	н	100	197	1 / 0	12.50	8.57	21.07	33.01	-11.94
2510.00	20	QPSK	н	100	206	1 / 99	13.90	8.44	22.34	33.01	-10.67
2535.00	20	QPSK	н	100	200	1 / 0	13.39	8.50	21.89	33.01	-11.12
2560.00	20	QPSK	н	100	200	1 / 50	13.26	8.57	21.83	33.01	-11.18
2510.00	20	16-QAM	н	100	206	1 / 99	13.20	8.44	21.64	33.01	-11.37
2535.00	20	16-QAM	н	100	200	1 / 0	11.97	8.50	20.47	33.01	-12.54
2560.00	20	16-QAM	н	100	200	1 / 50	12.25	8.57	20.82	33.01	-12.19
2510.00	20	QPSK	V	165	81	1 / 0	12.04	8.44	20.48	33.01	-12.53

Table 7-8. EIRP Data (Band 7)

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# 7.7 Radiated Spurious Emissions Measurements §2.1053 §22.917(a) §24.238(a) §27.53(c) §27.53(f) §27.53(g) §27.53(h) §27.53(m)

### **Test Overview**

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-D-2010 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as peak measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

#### **Test Procedures Used**

KDB 971168 D01 v02r02 - Section 5.8

ANSI/TIA-603-D-2010 - Section 2.2.12

#### **Test Settings**

- 1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
- 2. VBW  $\geq$  3 x RBW
- 3. Span = 1.5 times the OBW
- 4. No. of sweep points > 2 x span / RBW
- 5. Detector = RMS
- 6. Trace mode = Average (Max Hold for pulsed emissions)
- 7. The trace was allowed to stabilize

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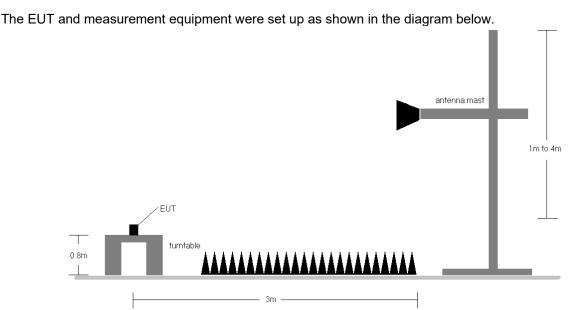


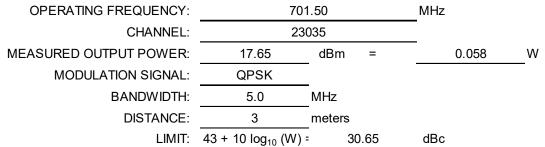
Figure 7-7. Test Instrument & Measurement Setup

#### Test Notes

- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 2) This unit was tested with its standard battery.
- 3) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 4) 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.
- 5) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

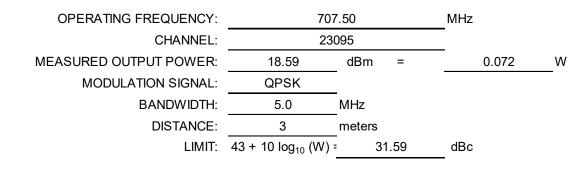
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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1403.00	Н	100	214	-67.25	5.92	-61.33	79.0
2104.50	Н	100	132	-69.43	6.80	-62.63	80.3
2806.00	Н	-	-	-72.18	8.12	-64.06	81.7
3507.50	Н	-	-	-68.80	7.74	-61.05	78.7

Table 7-9. Radiated Spurious Data (Band 12/17 – Low Channel)

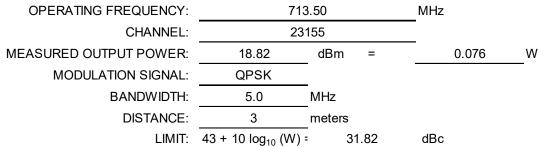


Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1415.00	Н	100	307	-64.56	5.96	-58.59	77.2
2122.50	Н	100	55	-69.98	6.84	-63.13	81.7
2830.00	Н	-	-	-70.89	8.13	-62.76	81.3
3537.50	Н	-	-	-69.12	7.79	-61.33	79.9

Table 7-10. Radiated Spurious Data (Band 12/17 – Mid Channel)

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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1427.00	Н	100	307	-66.93	6.01	-60.92	79.7
2140.50	Н	100	55	-70.25	6.89	-63.36	82.2
2854.00	Н	-	-	-71.75	8.15	-63.60	82.4
3567.50	Н	-	-	-68.25	7.84	-60.41	79.2

Table 7-11. Radiated Spurious Data (Band 12/17 – High Channel)

OPERATING FREQUENCY:	782	2.00	MHz
CHANNEL:	232	230	_
MEASURED OUTPUT POWER:	18.82	dBm =	0.076 W
MODULATION SIGNAL:	QPSK		
BANDWIDTH:	10.0	MHz	
DISTANCE:	3	meters	
LIMIT:	43 + 10 log <sub>10</sub> (W) =	31.82	dBc

Frequency [MHz]	Ant. Pol. [H/V]	Height	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
2346.00	Н	-	-	-71.73	7.00	-64.73	83.6
3128.00	Н	-	-	-68.28	7.21	-61.07	79.9

Table 7-12. Radiated Spurious Data (Band 13 – Mid Channel)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager		
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MODULATION SIGNAL:	QPSK	_
BANDWIDTH:	10.00	MHz
DISTANCE:	3	meters
RROWBAND EMISSION LIMIT:	-50	dBm
WIDEBAND EMISSION LIMIT:	-40	dBm/MHz
		-

[MH7]	Ant. Pol. [H/V]	Height	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Margin [dB]
1564.00	Н	-	-	-74.84	6.41	-68.43	-28.4

Table 7-13. Radiated Spurious Data (Band 13 – 1559-1610MHz Band)

OPERATING FREQUENCY:	826	5.50	MHz
CHANNEL:	204	425	-
MEASURED OUTPUT POWER:	20.72	dBm =	0.118 W
MODULATION SIGNAL:	QPSK		
BANDWIDTH:	5.0	MHz	
DISTANCE:	3	meters	
LIMIT:	43 + 10 log <sub>10</sub> (W) =	33.72	dBc

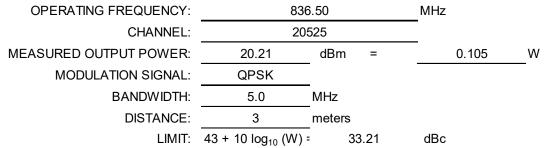
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1653.00	Н	-	-	-72.69	6.28	-66.41	87.1
2479.50	Н	100	265	-66.75	6.84	-59.90	80.6
3306.00	Н	-	-	-66.84	7.14	-59.69	80.4
4132.50	Н	-	-	-66.53	7.74	-58.79	79.5

Table 7-14. Radiated Spurious Data (Band 5 – Low Channel)

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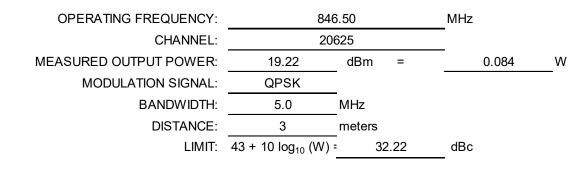
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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1673.00	Н	-	-	-73.73	6.21	-67.52	87.7
2509.50	Н	100	18	-42.76	6.86	-35.90	56.1
3346.00	Н	-	-	-67.47	7.26	-60.20	80.4
4182.50	Н	-	-	-67.06	8.07	-58.99	79.2

Table 7-15. Radiated Spurious Data (Band 5 – Mid Channel)

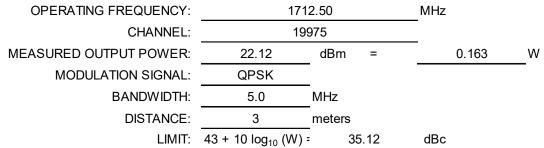


Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1693.00	Н	-	-	-73.93	6.14	-67.79	87.0
2539.50	Н	101	21	-39.13	6.95	-32.18	51.4
3386.00	Н	-	-	-67.81	7.38	-60.43	79.7
4232.50	Н	-	-	-67.96	8.34	-59.63	78.9

Table 7-16. Radiated Spurious Data (Band 5 – High Channel)

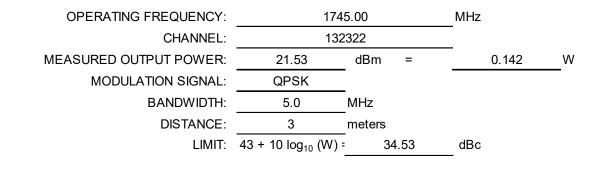
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	quency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
34	425.00	Н	110	21	-53.11	9.65	-43.46	65.6
5	137.50	Н	-	-	-66.85	10.91	-55.94	78.1
6	850.00	Н	-	-	-60.16	10.78	-49.38	71.5

Table 7-17. Radiated Spurious Data (Band 4/66 – Low Channel)



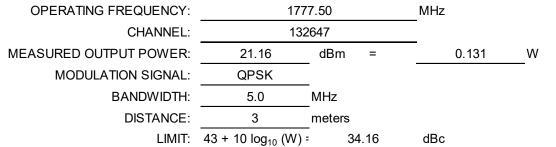
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3490.00	Н	102	67	-59.51	9.77	-49.73	71.3
5235.00	Н	-	-	-66.91	10.81	-56.10	77.6
6980.00	Н	-	-	-60.27	10.89	-49.39	70.9

Table 7-18. Radiated Spurious Data (Band 4/66 – Mid Channel)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3555.00	Н	100	26	-54.40	9.89	-44.52	65.7
5332.50	Н	-	-	-66.35	10.92	-55.42	76.6
7110.00	Н	-	-	-61.02	11.06	-49.96	71.1

Table 7-19. Radiated Spurious Data (Band 4/66 – High Channel)

OPERATING FREQUENCY:	185	1.50	MHz
CHANNEL:	18	615	
MEASURED OUTPUT POWER:	24.57	dBm =	0.286 W
MODULATION SIGNAL:	QPSK	_	
BANDWIDTH:	3.0	MHz	
DISTANCE:	3	meters	
LIMIT:	43 + 10 log <sub>10</sub> (W)	37.57	dBc

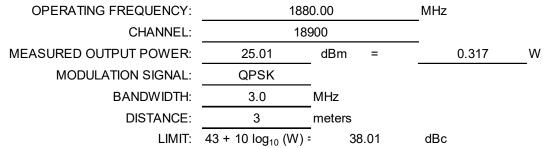
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3703.00	Н	-	-	-68.99	10.02	-58.97	83.5
5554.50	Н	-	-	-66.88	11.19	-55.69	80.3

Table 7-20. Radiated Spurious Data (Band 2 – Low Channel)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager
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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3760.00	Н	-	-	-68.43	9.79	-58.64	83.7
5640.00	Н	-	-	-67.26	11.35	-55.91	80.9

Table 7-21. Radiated Spurious Data (Band 2 – Mid Channel)

OPERATING FREQUENCY:	190	8.50	MHz
CHANNEL:	19	185	
MEASURED OUTPUT POWER:	25.24	dBm =	0.335 W
MODULATION SIGNAL:	QPSK	_	
BANDWIDTH:	3.0	MHz	
DISTANCE:	3	meters	
LIMIT:	43 + 10 log <sub>10</sub> (W)	38.24	dBc

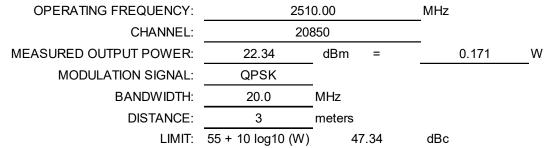
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3817.00	Н	-	-	-67.57	9.57	-58.00	83.2
5725.50	Н	-	-	-66.52	11.43	-55.09	80.3

Table 7-22. Radiated Spurious Data (Band 2 – High Channel)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
5020.00	Н	-	-	-68.30	11.15	-57.15	79.5
7530.00	Н	-	-	-60.20	11.25	-48.95	71.3

Table 7-23. Radiated Spurious Data (Band 7 – Low Channel)

OPERATING FREQUENCY:	253	5.00	MHz
CHANNEL:	21	21100	
MEASURED OUTPUT POWER:	21.89	dBm =	0.155 W
MODULATION SIGNAL:	QPSK		
BANDWIDTH:	20.0	MHz	
DISTANCE:	3	meters	
LIMIT:	55 + 10 log10 (W)	46.89	dBc

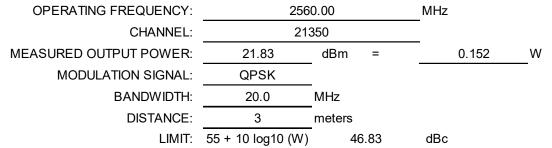
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
5070.00	Н	-	-	-67.39	11.04	-56.35	78.2
7605.00	Н	-	-	-60.48	11.47	-49.01	70.9

Table 7-24. Radiated Spurious Data (Band 7 – Mid Channel)

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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
5120.00	Н	-	-	-67.33	10.94	-56.39	78.2
7680.00	Н	-	-	-61.31	11.54	-49.77	71.6

Table 7-25. Radiated Spurious Data (Band 7 – High Channel)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
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## 7.8 Frequency Stability / Temperature Variation §2.1055 §22.355 §24.235 §27.54

#### **Test Overview and Limit**

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-D-2010. The frequency stability of the transmitter is measured by:

- a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.
- b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

For Part 22, the frequency stability of the transmitter shall be maintained within  $\pm 0.00025\%$  ( $\pm 2.5$  ppm) of the center frequency. For Part 24 and Part 27, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

#### **Test Procedure Used**

ANSI/TIA-603-D-2010

#### Test Settings

- 1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
- 2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
- 3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

#### Test Setup

The EUT was connected via an RF cable to a spectrum analyzer with the EUT placed inside an environmental chamber.

#### Test Notes

None

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# Band 12/17 Frequency Stability Measurements §2.1055 §27.54

OPERATING FREQUENCY:	707,500,000	Hz
CHANNEL:	23790	_
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	707,500,115	115	0.0000163
100 %		- 30	707,499,896	-104	-0.0000147
100 %		- 20	707,500,005	5	0.0000007
100 %		- 10	707,500,213	213	0.0000301
100 %		0	707,499,985	-15	-0.0000021
100 %		+ 10	707,499,990	-10	-0.0000014
100 %		+ 20	707,500,258	258	0.0000365
100 %		+ 30	707,500,330	330	0.0000466
100 %		+ 40	707,500,067	67	0.0000095
100 %		+ 50	707,499,990	-10	-0.0000014
BATT. ENDPOINT	3.45	+ 20	707,500,096	96	0.0000136

Table 7-26. Frequency Stability Data (Band 12/17)

### Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain inband 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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# Band 12/17 Frequency Stability Measurements §2.1055 §27.54

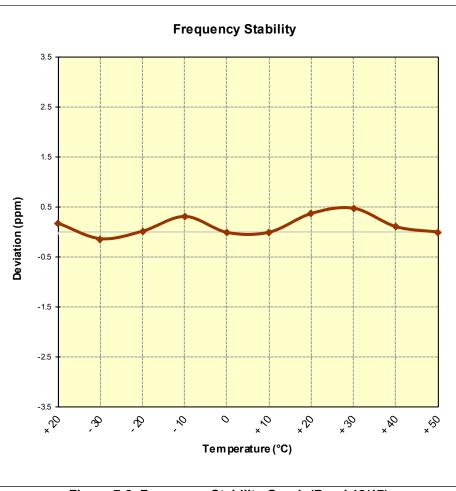


Figure 7-8. Frequency Stability Graph (Band 12/17)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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# Band 13 Frequency Stability Measurements §2.1055 §27.54

OPERATING FREQUENCY:	782,000,000	Hz
CHANNEL:	23230	_
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	782,000,010	10	0.0000013
100 %		- 30	781,999,940	-60	-0.0000077
100 %		- 20	781,999,991	-9	-0.0000012
100 %		- 10	782,000,013	13	0.0000017
100 %		0	781,999,789	-211	-0.0000270
100 %		+ 10	782,000,239	239	0.0000306
100 %		+ 20	781,999,792	-208	-0.0000266
100 %		+ 30	782,000,072	72	0.0000092
100 %		+ 40	782,000,110	110	0.0000141
100 %		+ 50	782,000,282	282	0.0000361
BATT. ENDPOINT	3.45	+ 20	781,999,912	-88	-0.0000113

Table 7-27. Frequency Stability Data (Band 13)

### Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain inband 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.

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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# Band 13 Frequency Stability Measurements §2.1055 §27.54

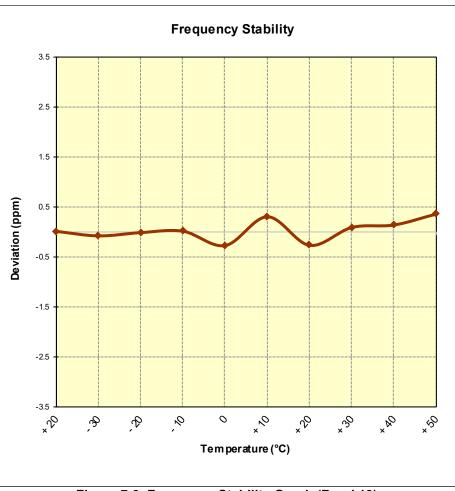


Figure 7-9. Frequency Stability Graph (Band 13)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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# Band 5 Frequency Stability Measurements §2.1055 §22.355

OPERATING FREQUENCY:	836,500,000	Hz
CHANNEL:	20525	_
REFERENCE VOLTAGE:	3.85	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	_

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	836,500,104	104	0.0000124
100 %		- 30	836,500,142	142	0.0000170
100 %		- 20	836,500,083	83	0.0000099
100 %		- 10	836,500,015	15	0.0000018
100 %		0	836,499,927	-73	-0.0000087
100 %		+ 10	836,499,984	-16	-0.0000019
100 %		+ 20	836,499,611	-389	-0.0000465
100 %		+ 30	836,499,771	-229	-0.0000274
100 %		+ 40	836,500,117	117	0.0000140
100 %		+ 50	836,500,167	167	0.0000200
BATT. ENDPOINT	3.45	+ 20	836,500,238	238	0.0000285

Table 7-28. Frequency Stability Data (Band 5)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
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# Band 5 Frequency Stability Measurements §2.1055 §22.355

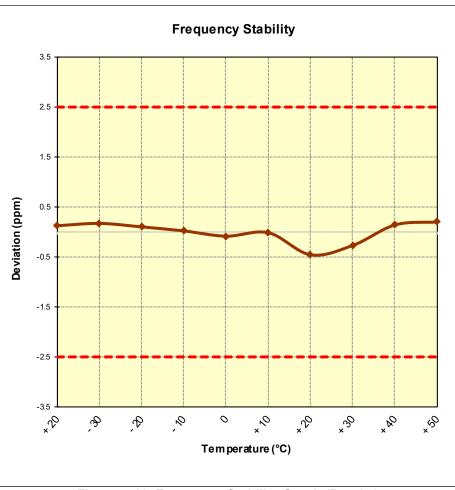


Figure 7-10. Frequency Stability Graph (Band 5)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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# Band 4/66 Frequency Stability Measurements §2.1055 §§27.54

OPERATING FREQUENCY:	1,745,000,000	Hz
CHANNEL:	132322	_
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,744,999,887	-113	-0.0000065
100 %		- 30	1,745,000,011	11	0.0000006
100 %		- 20	1,744,999,833	-167	-0.0000096
100 %		- 10	1,745,000,039	39	0.0000022
100 %		0	1,745,000,116	116	0.0000066
100 %		+ 10	1,745,000,019	19	0.0000011
100 %		+ 20	1,744,999,797	-203	-0.0000116
100 %		+ 30	1,745,000,074	74	0.0000042
100 %		+ 40	1,745,000,083	83	0.0000048
100 %		+ 50	1,745,000,029	29	0.0000017
BATT. ENDPOINT	3.45	+ 20	1,745,000,351	351	0.0000201

Table 7-29. Frequency Stability Data (Band 4/66)

### Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain inband 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.

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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# Band 4/66 Frequency Stability Measurements §2.1055 §§27.54

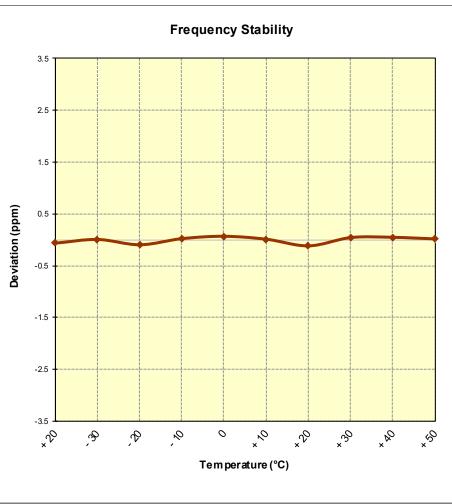


Figure 7-11. Frequency Stability Graph (Band 4/66)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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# Band 2 Frequency Stability Measurements §2.1055 §24.235

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	18900	
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,879,999,742	-258	-0.0000137
100 %		- 30	1,879,999,884	-116	-0.0000062
100 %		- 20	1,880,000,029	29	0.0000015
100 %		- 10	1,879,999,874	-126	-0.0000067
100 %		0	1,880,000,047	47	0.0000025
100 %		+ 10	1,880,000,110	110	0.0000059
100 %		+ 20	1,879,999,557	-443	-0.0000236
100 %		+ 30	1,880,000,130	130	0.0000069
100 %		+ 40	1,879,999,827	-173	-0.0000092
100 %		+ 50	1,879,999,719	-281	-0.0000149
BATT. ENDPOINT	3.45	+ 20	1,879,999,998	-2	-0.0000001

Table 7-30. Frequency Stability Data (Band 2)

### Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain inband 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.

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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# Band 2 Frequency Stability Measurements §2.1055 §24.235

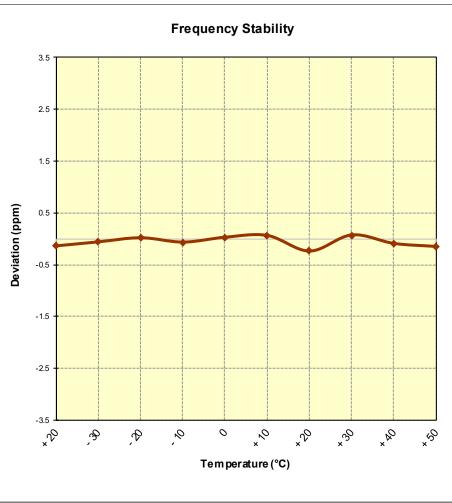


Figure 7-12. Frequency Stability Graph (Band 2)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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# Band 7 Frequency Stability Measurements §2.1055 §27.54

OPERATING FREQUENCY:	2,535,000,000	Hz
CHANNEL:	21100	
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	2,535,000,071	71	0.0000028
100 %		- 30	2,534,999,976	-24	-0.0000009
100 %		- 20	2,534,999,697	-303	-0.0000120
100 %		- 10	2,534,999,827	-173	-0.0000068
100 %		0	2,535,000,193	193	0.0000076
100 %		+ 10	2,535,000,004	4	0.0000002
100 %		+ 20	2,534,999,892	-108	-0.0000043
100 %		+ 30	2,534,999,772	-228	-0.0000090
100 %		+ 40	2,534,999,963	-37	-0.0000015
100 %		+ 50	2,535,000,274	274	0.0000108
BATT. ENDPOINT	3.45	+ 20	2,535,000,143	143	0.0000056

Table 7-31. Frequency Stability Data (Band 7)

### Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain inband 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.

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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# Band 7 Frequency Stability Measurements §2.1055 §27.54

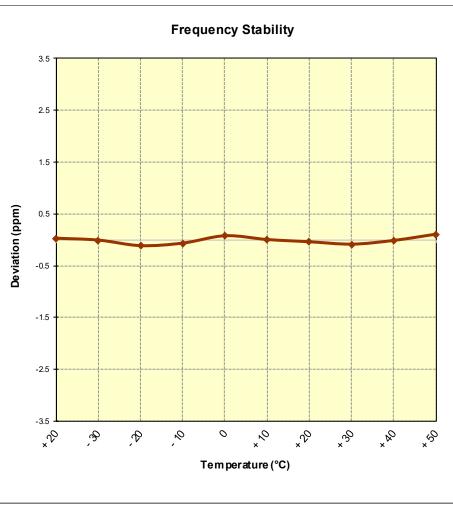


Figure 7-13. Frequency Stability Graph (Band 7)

FCC ID: ZNFM320G		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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# 8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFM320G** complies with all the requirements of Parts 22, 24, & 27 of the FCC rules for LTE operation only.

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