

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

### **Test Overview**

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

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

### Test Procedure Used

KDB 971168 D01 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 > 1% of the emission bandwidth
- 4. VBW <u>></u> 3 x RBW
- 5. Detector = RMS
- 6. Number of sweep points  $\geq$  2 x Span/RBW
- 7. Trace mode = trace average
- 8. Sweep time = auto couple
- 9. The trace was allowed to stabilize

### <u>Test Setup</u>

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

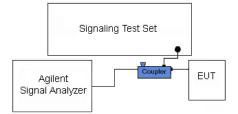


Figure 7-3. Test Instrument & Measurement Setup

### 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.

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.

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	ctrum Analyz												
RL	RF	50 Ω	DC	CORREC			SENSE:INT	#Avg Ty	ALIGN AUTO	TRA	M Nov 10, 2016	F	requency
		N	FE	PNO: W IFGain:	/ide ⊂⊾ Low	Trig: F Atten:	ree Run 36 dB			TY D			
0 dB/div	Ref 25.	.00 dE	3m						Mk	r1 698.0 -36.	00 MHz 00 dBm		Auto Tur
15.0										mathematic	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		<b>Center Fre</b> 8.000000 Mi
5.00												69	<b>Start Fr</b> 6.000000 M
5.0											DL1 -13.00 dBm	70	<b>Stop Fr</b> 0.000000 M
5.0				a Mart	- Anna	-	1 ~~~	~~~~~~				<u>Auto</u>	CF St 400.000 k N
5.0	m	~~~~w	***										Freq Offs 0
5.0													Scale Ty
enter 69 Res BW					#VBW	300 kH	lz		Sweep :	Span 4 2.000 ms (	.000 MHz (1001 pts)	Log	ļ
G									STATU				

Plot 7-77. Lower Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)



Plot 7-78. Upper Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

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	ectrum Analyzer -	Swept SA						
X/RL	RF 50	Ω DC	CORREC	SENSE:INT	#Avg Typ	ALIGN AUTO e: RMS	09:33:50 PM Nov 10, 2016 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A N N N N	Frequency
10 dB/div Log	Ref 25.00		IFGain:Low	Atten: 36 dB		Mkı	r1 697.916 MHz -32.76 dBm	Auto Tune
15.0								Center Freq 698.000000 MHz
-5.00								Start Frec 696.000000 MHz
25.0							DL1 -13.00 dBm	Stop Free 700.000000 MH:
35.0	www.	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	and the second	berne war	www.so.www.www.www.			CF Stej 400.000 kH <u>Auto</u> Ma
55.0								<b>Freq Offse</b> 0 H
-65.0	98.000 MHz						Spap 4 000 MHz	Scale Type
#Res BW			#VBW	300 kHz			Span 4.000 MHz .000 ms (1001 pts)	
SG						STATUS		

Plot 7-79. Lower Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)



Plot 7-80. Upper Band Edge Plot (Band 12 - 3.0MHz QPSK - RB Size 15)

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					/zer - Swept SA	2h	
#Avg Type: RMS TRACE 123456 Frequency	09:49:42 PM Nov 10, 2016 TRACE 1 2 3 4 5 6	ALIGN AUTO #Avg Type: RMS	SENSE:INT	CORREC	50 Ω DC	RF	X/ RL
IPGalli.Low / Altern. of dB				PNO: Wide 😱 IFGain:Low	NFE		
WIKI 1 697.848 MHZ	r1 697.848 MHz -35.56 dBm	Mk			5.00 dBm	div Ref 2	10 dB. Log r
Center Fre			Ĭ				
698.00000 MH							15.0
Start Fre	man						5.00
696.000000 MH							-5.00
DL1 -13.00 dBm	DL1 -13.00 dBm						-15.0
Stop Fre   700.000000 MH							
			<b>1</b>				-25.0
CF Ste 400.000 kH		an and a second se	· · · · · · · · · · · · · · · · · · ·	mon market well	m	m	-35.0
							-45.0
Freq Offse							-55.0
							-65.0
Scale Typ							-03:0
Span 4.000 MHz	Span 4.000 MHz	<b>O</b>		#\/D\//	ЛНz	er 698.000	Cent
#VBW 300 kHz Sweep 2.000 ms (1001 pts)			300 KHZ	#VBW	2	BW 100 kH	#Res

Plot 7-81. Lower Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)



Plot 7-82. Upper Band Edge Plot (Band 12 – 5.0MHz QPSK – RB Size 25)

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🔤 Keysight Sp	ectrum Analyzer -	Swept SA							
LXI RL	RF 50	Ω DC	CORREC	SENSE:IN	T #Avg Typ	ALIGN AUTO	09:55:38 PM Nov 10, 2016 TRACE 1 2 3 4 5 6	Frequ	ency
		NFE	PNO: Wide 😱 IFGain:Low	Trig: Free Run Atten: 36 dB		e. Kiilo		_	_
10 dB/div Log	Ref 25.00	) dBm				Mk	r1 697.864 MHz -38.07 dBm	Au	to Tune
15.0									<b>ter Freq</b> 0000 MHz
-5.00						feel for any all and	0L1 -13 00 dBm		<b>art Freq</b> 0000 MHz
-15.0									op Freq 0000 MHz
-35.0	an Mythe Wark	man	and the second	1 wynyter y fer menu					CF Step 0.000 kHz Man
-55.0								Fre	<b>q Offset</b> 0 Hz
-65.0									ale Type
	98.000 MHz		-41 (1314)	200 60-		0	Span 8.000 MHz	Log	Lin
#Res BW	TUU KHZ		#VBW	300 kHz			.000 ms (1001 pts)		
MSG						STATUS			

Plot 7-83. Lower Band Edge Plot (Band 12 – 10.0MHz QPSK – RB Size 50)



Plot 7-84. Upper Band Edge Plot (Band 12 – 10.0MHz QPSK – RB Size 50)

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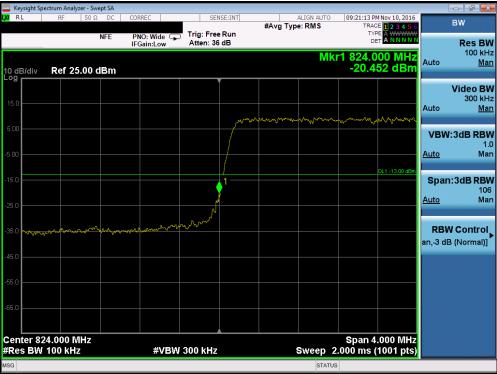
Plot 7-85. Lower Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)



Plot 7-86. Upper Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

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Plot 7-87. Lower Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)



Plot 7-88. Upper Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

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	ctrum Analyzer -										
LXI RL	RF 50	Ω DC	CORREC	Trig: Free		#Avg Typ	ALIGN AUTO e: RMS	TRAC	4 Nov 10, 2016 E 1 2 3 4 5 6 E A WWWW T A N N N N N	F	requency
10 dB/div Log	Ref 25.00	) dBm	IFGain:Low	Atten: 36	dB		Mk	1 824.0	00 MHz 65 dBm		Auto Tune
15.0											Center Freq 4.000000 MHz
-5.00						munn	um		her and the second s	82	Start Freq 2.000000 MHz
-15.0					1				DL1 -13.00 dBm	82	Stop Freq 6.000000 MHz
-35.0	and and a second second	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	www.anne	www.						<u>Auto</u>	CF Step 400.000 kHz Mar
-55.0											Freq Offset 0 Hz
-65.0											Scale Type
Center 824 #Res BW			#VBW	300 kHz	·		Sweep 2	Span 4. .000 ms (	.000 MHz 1001 pts)	Log	Lin
MSG							STATUS				

Plot 7-89. Lower Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)



Plot 7-90. Upper Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

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Plot 7-91. Lower Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)



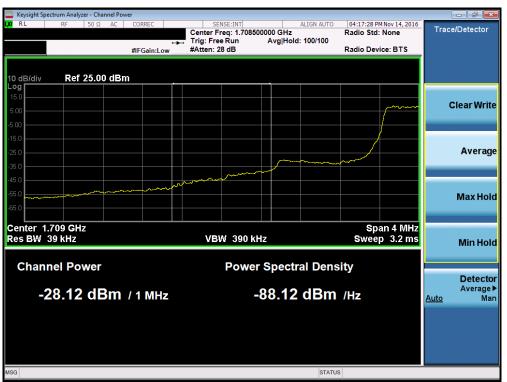
Plot 7-92. Upper Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	<b>Reviewed by:</b> Quality Manager
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Plot 7-93. Lower Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)



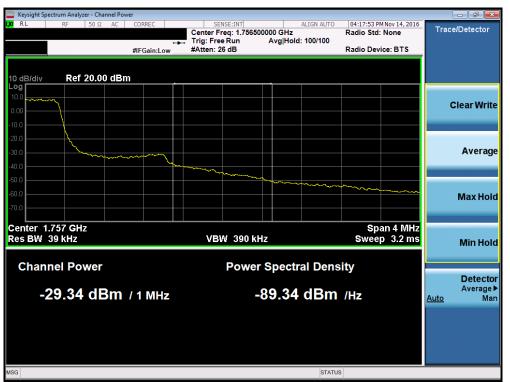
Plot 7-94. Lower Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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Plot 7-95. Upper Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)



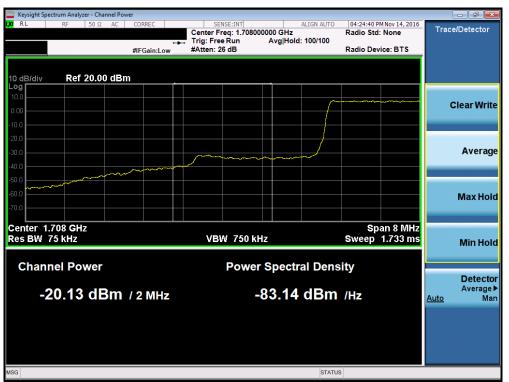
Plot 7-96. Upper Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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	ectrum Analy	zer - Swept	: SA										
XI RL	RF	50 Ω	AC (	CORREC		SEI	ISE:INT	#A T.	ALIGN AUTO		Nov 14, 2016	F	requency
				PNO: Wi IFGain:L	de 🖵 ow	Trig: Free Atten: 36		#Avg Ty	pe: RWS	TYP	E 1 2 3 4 5 6 E A WWWWW T A N N N N N		
10 dB/div Log	Ref 2	5.00 dE	3m						Mkr1	1.710 0 -28.0	00 GHz 02 dBm		Auto Tune
15.0													Center Free 0000000 GH
5.00							$\int$	· · · · · · · · · · · · · · · · · · ·	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	horm		1.70	<b>Start Fre</b> 8000000 GH
25.0						(	,1				DL1 -13.00 dBm	1.71	<b>Stop Fre</b> 2000000 GH
45.0	Munage	u, mir	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~						<u>Auto</u>	CF Ste 400.000 k⊢ Ma
55.0													Freq Offso 0 ⊦
65.0													Scale Typ
Center 1. #Res BW		GHz		#	VBW	91 kHz			Sweep 5	Span 4. .533 ms (	000 10112	Log	Lii
ISG									STATUS	6			

Plot 7-97. Lower Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)



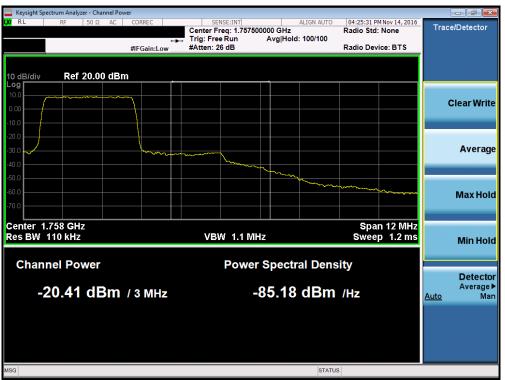
Plot 7-98. Lower Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	<b>Reviewed by:</b> Quality Manager
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	pectrum Analy	/zer - Swep	ot SA										
U RL	RF	50 Ω	AC	CORREC PNO: Wi	ide 🖵	SE Trig: Fre Atten: 3		#Avg Ty	ALIGN AUTO /pe: RMS	TRAC	MNov 14, 2016 E 1 2 3 4 5 6 PE A WWWWW A N N N N N	F	requency
0 dB/div	Ref 2	5.00 di	Bm	IFGalli.L	<u></u>	, then o			Mkr1	1.755 0 -27.	00 GHz 91 dBm		Auto Tun
15.0													Center Fre 5000000 GH
5.00	~~~~	~~~~	~~~~~	w	- Maria	~						1.75	<b>Start Fre</b> 3000000 G⊦
25.0							1				DL1 -13.00 dBm	1.75	<b>Stop Fre</b> 7000000 GH
15.0							- Anno	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	mm	han an a		<u>Auto</u>	CF Ste 400.000 kH Ma
55.0													Freq Offs 0 F
65.0													Scale Typ
	755000 30 kHz			#	VBW	91 kHz			Sweep 5	Span 4 .533 ms (	.000 MHz 1001 pts)	Log	Li
SG									STATUS	3			

Plot 7-99. Upper Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)



Plot 7-100. Upper Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

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	ectrum Analy:	zer - Swep	t SA										
L <mark>XI</mark> RL	RF	50 Ω	AC	CORREC		SEN	ISE:INT	#Avg Ty	ALIGN AUTO		MNov 14, 2016 CE 123456	F	requency
				PNO: Wi IFGain:L	ide 🖵 ow	Trig: Free Atten: 36		#Avg Ty		TY			
10 dB/div Log	Ref 25	i.00 de	3m						Mkr1	1.710 ( -29.	000 GHz 05 dBm		Auto Tune
15.0													Center Freq 0000000 GHz
-5.00							$\int$		~~~~			1.70	Start Freq 8000000 GHz
-15.0							1				DL1 -13.00 dBm	1.71	Stop Freq 2000000 GHz
-35.0	· · · · · · · · · · · · · · · · · · ·		<b>/</b>	~~~~	~~~	~~~/						<u>Auto</u>	<b>CF Step</b> 400.000 kHz Mar
-55.0													Freq Offse 0 H:
-65.0													Scale Type
Center 1. #Res BW		GHz		#	¢VBW	160 kHz			Sweep ′	Span 4 1.933 ms	l.000 MHz (1001 pts)	Log	<u>Lin</u>
MSG									STATU	s			

Plot 7-101. Lower Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)



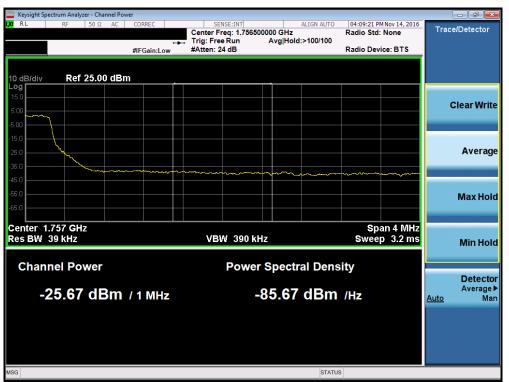
Plot 7-102. Lower Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

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	trum Analyzer -	Swept SA									
XI RL	RF 50	Ω AC	CORREC		SENSE:INT	#A T	ALIGN AUTO		M Nov 14, 2016	Fr	equency
			PNO: Wid IFGain:Lo		g: Free Run ten: 36 dB	#Avg I	ype: RMS	TYI Di	CE 1 2 3 4 5 6 PE A WWWWW ET A N N N N N		
10 dB/div Log	Ref 25.00	) dBm					Mkr	1 1.755 ( -28.	04 GHz 79 dBm		Auto Tune
15.0											<b>Center Freq</b> 5000000 GHz
-5.00	~~~~									1.75	Start Freq 3000000 GHz
-15.0					h h h_1				DL1 -13.00 dBm	1.75	Stop Fred 7000000 GHz
-35.0								·/···		Auto	<b>CF Step</b> 400.000 kHz Mar
-45.0											Freq Offsel 0 Hz
-65.0											Scale Type
Center 1.7 #Res BW 5		z	#	VBW 160	kHz		Sweep	Span 4 1.933 ms (	.000 MHz (1001 pts)	Log	Lin
ISG							STAT	JS			

Plot 7-103. Upper Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)



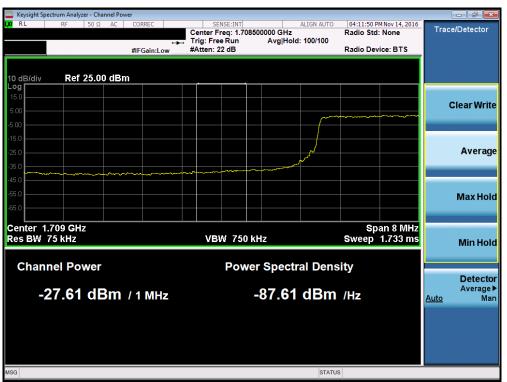
Plot 7-104. Upper Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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🔤 Keysight Spec	ctrum Analyzer - S	wept SA									
LXI RL	RF 50	Ω AC	CORREC	SEN	ISE:INT	#Avg Typ	ALIGN AUTO	04:11:44 PM N		Er	requency
			PNO: Wide ( IFGain:Low	Trig: Free Atten: 36		#Avg Typ		TYPE DET	23456 WWWWW NNNNN		
10 dB/div Log	Ref 25.00	dBm					Mkr1	1.710 00	0 GHz 2 dBm		Auto Tune
15.0											Center Freq 0000000 GHz
-5.00					$\int$		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		~~~~	1.70	Start Freq 6000000 GHz
-15.0									1 -13.00 dBm	1.71	Stop Freq 4000000 GHz
-35.0	~~~~~	~~~~			,1					<u>Auto</u>	CF Step 800.000 kHz Mar
-55.0											Freq Offset 0 Hz
-65.0											Scale Type
Center 1.7 #Res BW 1	10000 GHz 100 kHz	2	#VB	W 300 kHz			Sweep 1	Span 8.0 .000 ms (10		Log	Lin
MSG							STATUS	3			

Plot 7-105. Lower Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)



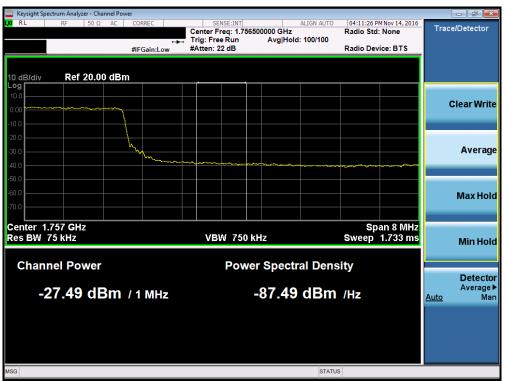
Plot 7-106. Lower Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	<b>Reviewed by:</b> Quality Manager
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	ectrum Analy	zer - Swept S	A									
XI RL	RF	50 Ω A	IC COF	REC	SE	NSE:INT	#Avg Typ	ALIGN AUTO		Nov 14, 2016	F	requency
			PN IFC	IO: Wide Gain:Low	Trig: Fre Atten: 3				TYF			A
10 dB/div Log	Ref 25	.00 dBr	m					Mkr1	1.755 0 -31.4	00 GHz 48 dBm		Auto Tune
15.0												<b>Center Freq</b> 5000000 GHz
-5.00	~~~~~	~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~							1.75	Start Freq 1000000 GHz
-15.0						1				DL1 -13.00 dBm	1.75	Stop Freq 9000000 GHz
-35.0						1	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	·····	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~	<u>Auto</u>	<b>CF Step</b> 800.000 kHz Mar
-40.0												Freq Offset 0 Hz
-65.0												Scale Type
Center 1. #Res BW				#VB	W 300 kHz			Sweep 1	Span 8 .000 ms (	.000 MHz 1001 pts)	Log	Lin
MSG								STATU	3			

Plot 7-107. Upper Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)



Plot 7-108. Upper Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

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🔤 Keysight Spe	ectrum Analyzer	- Swept SA									- 6 ×
LXI RL	RF	50Ω AC	CORREC	SEN	ISE:INT	#Avg Type:	IGN AUTO	04:13:16 PM N	ov 14, 2016	Fre	quency
			PNO: Wide IFGain:Lov	Trig: Free Atten: 36		#Avg Type.		TYPE, DET			
10 dB/div Log	Ref 25.0	00 dBm					Mkr1	1.710 00 -33.84	0 GHz I dBm		Auto Tune
15.0											<b>enter Freq</b> 000000 GHz
-5.00					$\int$		~~~~_	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		1.704	Start Freq 000000 GHz
-15.0					N				1 -13.00 dBm	1.716	Stop Freq 000000 GHz
-35.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	1*					1. <u>Auto</u>	CF Step 200000 MH: Mar
-55.0										F	F <b>req Offse</b> l 0 Hz
-65.0										ę	Scale Type
Center 1.7 #Res BW		Hz	#V	BW 470 kHz		SI	weep 1.	Span 12. 000 ms (10		Log	Lin
MSG							STATUS				

Plot 7-109. Lower Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)



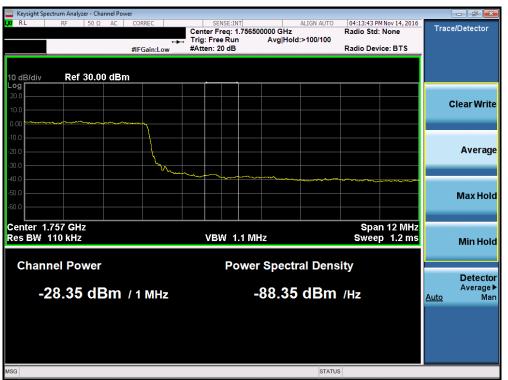
Plot 7-110. Lower Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	<b>Reviewed by:</b> Quality Manager
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	rum Analyzer - Swe	pt SA									
XI RL	RF 50 Ω		CORREC PNO: Wide G			#Avg Typ	ALIGN AUTO e: RMS	TRAC	MNov 14, 2016 E 1 2 3 4 5 6 E A WWWW T A N N N N N	Fi	requency
10 dB/div	Ref 25.00 d		IPGalli.LOW	, tach. o			Mkr1	1.755 0 -33.	36 GHz 04 dBm		Auto Tune
15.0											Center Fred 5000000 GH:
5.00	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	^~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~							1.74	Start Free 9000000 GH
25.0									DL1 -13.00 dBm	1.76	<b>Stop Fre</b> 1000000 GH
45.0				Mar An	-	-monor	·····	hann	*****	Auto	<b>CF Ste</b> I.200000 MH Ma
55.0											Freq Offse 0 H
65.0											Scale Typ
Center 1.75 Res BW 1			#VBV	V 470 kHz			Sweep 1	Span 1 .000 ms (	2.00 MHz 1001 pts)	Log	Lii
ISG							STATUS	;			

Plot 7-111. Upper Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)



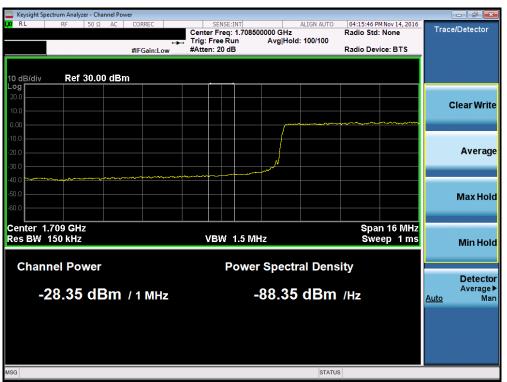
Plot 7-112. Upper Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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	ctrum Analyze	er - Swep	t SA											
X/RL	RF	50 Ω	AC	CORREC		SE	NSE:INT			ALIGN AUTO		M Nov 14, 2016	F	requency
				PNO: Fa	ast Ģ⊃ ow	Trig: Fre Atten: 36		#	Avgiyp		T) [	CE 1 2 3 4 5 6 (PE A WWWW DET A NNNNN		
10 dB/div Log	Ref 25.	00 dE	3m							Mkr1	1.709 -32	984 GHz .81 dBm		Auto Tune
15.0														Center Free 0000000 GH
5.00								- m-m	~~~~~		m		1.70	<b>Start Fre</b> 2000000 GH
25.0												DL1 -13.00 dBm	1.71	<b>Stop Fre</b> 8000000 GH
35.0 	an and the second s	- mm	an the set	Lange Vorde	<del></del>		1						<u>Auto</u>	<b>CF Ste</b> 1.600000 MH Ma
55.0														FreqOffso 0⊦
-65.0														Scale Typ
Center 1.7 Res BW	/10000 G 200 kHz	Hz		#	VBW	620 kHz				Sweep 1	Span .000 ms	16.00 MHz (1001 pts)	Log	Li
ISG										STATUS				

Plot 7-113. Lower Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)



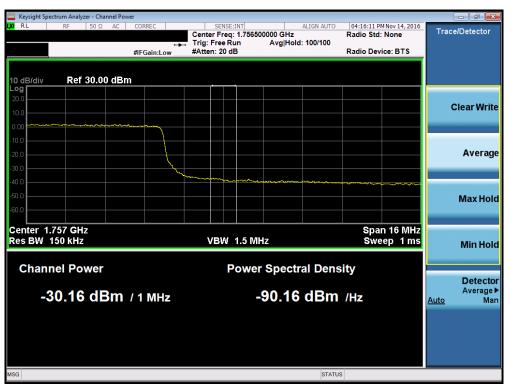
Plot 7-114. Lower Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	<b>Reviewed by:</b> Quality Manager
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	ectrum Analyz	er - Swept	SA										
XI RL	RF	50 Ω	AC (	CORREC		SEI	SE:INT	#Ave T	ALIGN AUTO		PM Nov 14, 2016 CE 1 2 3 4 5 6	Fr	equency
				PNO: Fa IFGain:L	st 🖵 ow	Trig: Free Atten: 36		#Avg 1	ype. Rivis	T	PE A WWWW DET A NNNNN		
10 dB/div Log	Ref 25	.00 dB	m						Mkr1	1.755 -33	064 GHz .48 dBm		Auto Tune
15.0													Center Fred
-5.00	~~~~	~~~~	~~~~~	~~~~~	~~~~~							1.74	Start Fred 7000000 GH;
-15.0											DL1 -13.00 dBm	1.76	Stop Fred
-45.0						AND AND	1	hanking	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	www	-herman har and a start of the	1 <u>Auto</u>	<b>CF Step</b> .600000 MH Mar
55.0												I	F <b>req Offse</b> 0 H
65.0													Scale Type
Center 1. #Res BW				#	VBW	620 kHz			Sweep ′	Span ′ 1.000 ms	16.00 MHz (1001 pts)	Log	Lir
ISG									STATU	s			

Plot 7-115. Upper Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)



Plot 7-116. Upper Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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Plot 7-117. Lower Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)



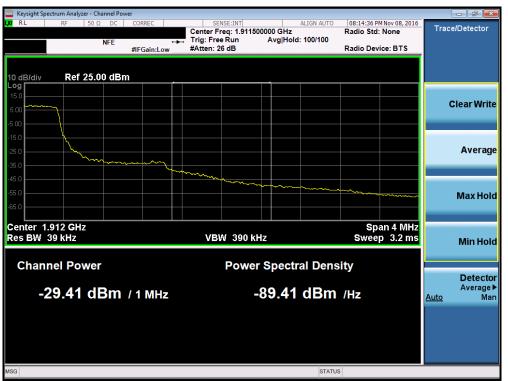
Plot 7-118. Lower Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	<b>Reviewed by:</b> Quality Manager
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Plot 7-119. Upper Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)



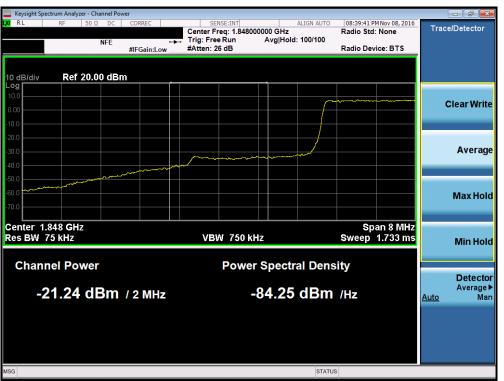
Plot 7-120. Upper Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	<b>Reviewed by:</b> Quality Manager
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		zer - Swept SA								
X/RL	RF	50 Ω DC	CORREC		SENSE:INT	#	ALIGN AUTO	08:16:07 PM Nov 08, 20		requency
		NFE	PNO: Wid IFGain:Lo		: Free Run en: 36 dB	#Avg	Type: RMS	TRACE 1234 TYPE A WWW DET A NNN	WW	
10 dB/div Log	Ref 25	.00 dBm					Mkr1	1.850 000 GH -27.74 dB	z m	Auto Tune
15.0										Center Freq 50000000 GHz
-5.00						~~~~	~~~~~	······		<b>Start Fred</b> 48000000 GHz
-15.0					1			DL1 -13.00 d		<b>Stop Fred</b> 52000000 GH:
35.0	~~~~		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~					Auto	CF Ster 400.000 kH Mar
45.0 55.0										Freq Offse
65.0										Scale Type
Center 1.8 #Res BW		GHz	#1	/BW 91 k	Hz		Sweep 2	Span 4.000 Mi 2.000 ms (1001 pt	lz <sup>Log</sup> s)	Lir
MSG							STATU	S		

Plot 7-121. Lower Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)



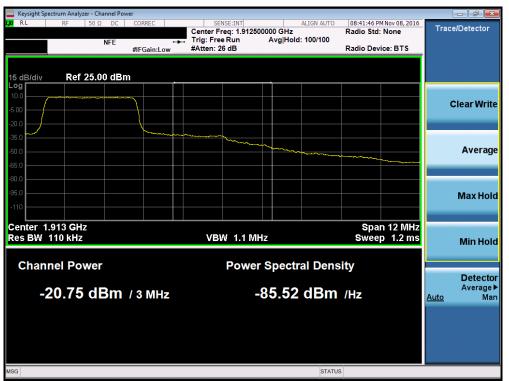
Plot 7-122. Lower Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	<b>Reviewed by:</b> Quality Manager
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	ectrum Anal	/zer - Swept SA										
<mark>(</mark> RL	RF	50 Ω DC	CORREC		SEI	ISE:INT	#Avg Ty	ALIGN AUTO		MNov 08, 2016	F	requency
		NFE	PNO: I IFGain	Wide 🖵 :Low	Trig: Free Atten: 36		#Avg iy	pe. Kiiro	TYP			
0 dB/div	Ref 2	5.00 dBm	1					Mkr1	1.910 0 -27.4	00 GHz 42 dBm		Auto Tun
15.0												Center Fre 0000000 GH
5.00	~~~~	~~~~	~~~~								1.90	<b>Start Fre</b> 8000000 GF
25.0						1				DL1 -13.00 dBm	1.91	<b>Stop Fre</b> 2000000 GH
5.0						ha		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~	www	<u>Auto</u>	<b>CF Ste</b> 400.000 kł Ma
i5.0												Freq Offs 0 F
65.0												Scale Typ
enter 1. Res BW		GHz		#VBW !	91 kHz			Sweep 2	Span 4 .000 ms (	.000 MHz 1001 pts)	Log	L
SG								STATUS				

Plot 7-123. Upper Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)



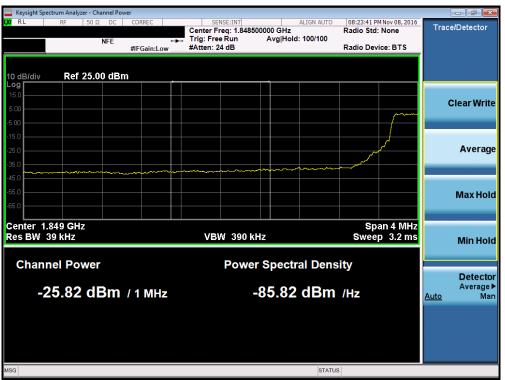
Plot 7-124. Upper Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	<b>Reviewed by:</b> Quality Manager
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🔤 Keysight Sp	ectrum Analyzer - :	Swept SA									
LXI RL	RF 50	Ω DC	CORREC	SENS	E:INT	#Avg Type	ALIGN AUTO		Nov 08, 2016	F	requency
		NFE	PNO: Wide 🕞	Trig: Free F Atten: 36 d		#Avg Type		TYF			
10 dB/div Log	Ref 25.00	) dBm					Mkr1	1.849 9 -28.	84 GHz 85 dBm		Auto Tune
15.0											Center Freq 0000000 GHz
-5.00							~~~~		~~~~~	1.84	Start Freq 8000000 GHz
-15.0					~				DL1 -13.00 dBm	1.85	Stop Freq 2000000 GHz
-35.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~^						<u>Auto</u>	<b>CF Step</b> 400.000 kHz Man
-55.0											Freq Offset 0 Hz
-65.0											Scale Type
Center 1. #Res BW	850000 GH 51 kHz	z	#VBW	160 kHz			Sweep 2	Span 4 2.000 ms (	.000 MHz 1001 pts)	Log	Lin
MSG							STATU	s			

Plot 7-125. Lower Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)



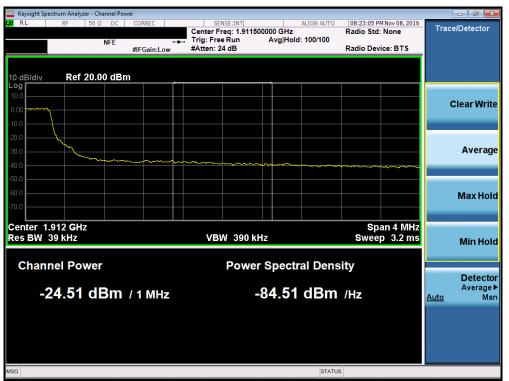
Plot 7-126. Lower Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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	pectrum Anal	yzer - Swept SA									- 6 🔀
K RL	RF	50 Ω DC	CORREC PNO: Wide IFGain:Lov	Trig: Fre		#Avg Tyj	ALIGN AUTO pe: RMS	TYPE	00 08, 2016 2 3 4 5 6 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Fre	quency
0 dB/div	Ref 2	5.00 dBm	IT GUILLED				Mkr1	1.910 000 -28.411	dBm		Auto Tun
15.0											enter Fre 000000 GH
5.00		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~								<b>Start Fre</b> 000000 G⊦
25.0					1			DL1	-13.00 dBm		Stop Fre
15.0								~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m	Auto	CF Ste 400.000 kH Ma
55.0										F	req Offs 0 H
55.0											cale Typ
	.910000 / 51 kHz		#V	'BW 160 kHz			Sweep 2	Span 4.00 000 ms (10.	20 1911 12	Log	L
SG							STATUS				

Plot 7-127. Upper Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)



Plot 7-128. Upper Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	<b>Reviewed by:</b> Quality Manager
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	ectrum Analyzer	- Swept SA						
LXI RL	RF 5	0Ω DC	CORREC	Trig: Free Run	#Avg Ty	ALIGN AUTO	08:26:02 PM Nov 08, 2016 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A N N N N N	Frequency
10 dB/div	Ref 25.0		IFGain:Low	Atten: 36 dB		Mkr1	1.850 000 GHz -32.25 dBm	Auto Tune
15.0								Center Freq 1.85000000 GHz
-5.00					Manhum	ᡪᢛᠧ᠊ᠧᡁᠮ᠁ᡒᢧᠧᢂᡧ᠆ᢇᡁᢪ	مىرىكى ئۇسىر ئىلىسى ئىلىكى ئۇرىكى ئىلىكى ئۇرىكى ئۇرىكى ئۇرىكى ئۇرىكى ئۇرىكى ئۇرىكى ئۇرىكى ئۇرىكى ئۇرىكى ئۇرىكى DL1 -13 00 dBm	<b>Start Freq</b> 1.846000000 GHz
-15.0				1,1				<b>Stop Freq</b> 1.854000000 GHz
-35.0 mmuum -45.0	man - July - mar	-ymyra-mh	My may any considerably the	may more and the				CF Step 800.000 kHz <u>Auto</u> Man
-55.0								<b>Freq Offset</b> 0 Hz
-65.0								Scale Type
Center 1.3 #Res BW	350000 GH 100 kHz	iz	#VBW	300 kHz		Sweep 4	Span 8.000 MHz .000 ms (1001 pts)	
MSG						STATUS	\$	

Plot 7-129. Lower Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

	ectrum Analyzer - Swept SA					
X/RL	RF 50 Ω DC	CORREC	SENSE:INT	ALIGN AUTO	08:26:22 PM Nov 08, 2016	Frequency
Center F	req 1.84700000 NFE	IO GHZ PNO: Wide ↔→ IFGain:Low	Trig: Free Run Atten: 36 dB	#Avg Type: RMS	TRACE 123456 TYPE A WWWW DET A NNNNN	
10 dB/div Log	Ref 25.00 dBm			Mkr1	1.849 000 GHz -24.74 dBm	Auto Tune
15.0						Center Freq 1.847000000 GHz
-5.00					DL1 -13.00 dBm	<b>Start Freq</b> 1.845000000 GHz
-15.0					1.	<b>Stop Freq</b> 1.849000000 GHz
-35.0	apagogo yan ing nadin yang bula	64				<b>CF Step</b> 400.000 kHz <u>Auto</u> Man
-55.0						<b>Freq Offset</b> 0 Hz
-65.0						Scale Type
Center 1. #Res BW	847000 GHz 1.0 MHz	#VBW	3.0 MHz	Sweep 2	Span 4.000 MHz 2.000 ms (1001 pts)	Log <u>Lin</u>
MSG				STATU	s	

Plot 7-130. Lower Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	<b>Reviewed by:</b> Quality Manager
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	t Spectrum A												
KU RL	RF	50 \$	DC NFE	CORREC	ide 🖵	Trig: Free		#Avg Ty	ALIGN AUTO pe: RMS	TRAC	M Nov 08, 2016 DE <b>1 2 3 4 5</b> 6 PE A WWWWW ET A N N N N N	F	requency
0 dB/di	v Ref	25.00	dBm	IFGain:L	ow	Atten: 36	dB		Mkr1	1.910 (	)00 GHz 94 dBm		Auto Tun
15.0													Center Fre 0000000 G⊦
5.00 <b>**</b> 6.00 <b></b>	arter Meneral sys	*****************		ferðun Aungung gefir hannga	1 <b>.49<sup>16</sup> and 4.9</b> –17 (c)							1.90	<b>Start Fre</b> 66000000 GH
5.0							1				DL1 -13.00 dBm	1.91	<b>Stop Fre</b> 4000000 GF
5.0						<b>،</b> ۱	Mark Manana and	in the second states	<u>Mar Constant</u>	and the state of the	and a star freedom for the start of the	<u>Auto</u>	<b>CF Ste</b> 800.000 kH Ma
5.0													Freq Offs 0
i5.0													Scale Typ
	1.91000 W 200 H			;	≠VBW (	620 kHz			Sweep 4	Span 8 .000 ms (	.000 MHz (1001 pts)	Log	L
SG									STATUS	;			

Plot 7-131. Upper Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

	ectrum Analyze	er - Swept SA					
X/RL	RF	50 Ω DC	CORREC	SENSE:INT	ALIGN AUTO	08:34:43 PM Nov 08, 2016	Frequency
		NFE	PNO: Wide ↔↔ IFGain:Low	Trig: Free Run Atten: 36 dB	#Avg Type: RMS	TRACE 1 2 3 4 5 6 TYPE A WWWW DET A NNNN	
10 dB/div Log	Ref 25.	.00 dBm			Mkr1	1.911 040 GHz -24.53 dBm	Auto Tune
15.0							Center Freq 1.913000000 GHz
-5.00						DL1 -13.00 dBm	<b>Start Freq</b> 1.911000000 GHz
-15.0 -25.0	ander <sup>and</sup> Unitedation	Mr. and marker and	ersen ihr ver och haven				<b>Stop Freq</b> 1.915000000 GHz
-35.0			** #**#J3#**Y#¥Y44/##4Y14	สำราหมีและการใน <sub>สา</sub> คณุรักราชีญายังเ	and a second and a s		<b>CF Step</b> 400.000 kHz <u>Auto</u> Man
-55.0							<b>Freq Offset</b> 0 Hz
-65.0							Scale Type
Center 1.9 #Res BW			#VBW	3.0 MHz	Sweep 2	Span 4.000 MHz 2.000 ms (1001 pts)	Log <u>Lin</u>
MSG					STATU	S	

Plot 7-132. Upper Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

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RF 50 Ω C CORREC SENSE:INT ALIGN AUTO 08:30:28 PM Nov 08, 2016 Frequency   NFE PNO: Wide Trig: Free Run Trive: Automatic Section 10, 2016 Trive: Automatic Section 10, 2016 Frequency		08:30:28	ALTON AUTO			0.51		000050	200			
NEE PNO: Wide Trig: Free Run Type A www.www		TR		#Avo	ISE:INT	SEI		CORREC	DC	50 \$	RF	X RL
		Т					/ide ⊊ ∟ow	PNO: W IFGain:l	NFE			
Mkr1 1.850 000 GHz ef 25.00 dBm -33.62 dBm	000 GHz 6.62 dBm	1 1.850 -33	Mkr1						∃Bm	25.00	Ref	10 dB/div
Center F 1.850000000												15.0
Start F 1.844000000		mm										-5.00
Stop F 1.856000000												-15.0
CF S 1.200000 / Auto					1 d	- And and a second s	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~	mm	~~~~	m	-35.0
Freq Off												-45.0
Scale T												-65.0
000 GHz Span 12.00 MHz Log 0 kHz #VBW 470 kHz Sweep 1.000 ms (1001 pts)	12.00 19112	Span 1.000 ms	Sween 1			470 kHz	#VBW					Center #Res Bi
	(1001 pts)											MSG

Plot 7-133. Lower Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)



Plot 7-134. Lower Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

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	ectrum Anal	yzer - Swept SA					
RL	RF	50 Ω DC	CORREC	SENSE:INT	ALIGN AU #Avg Type: RMS	TO 08:31:00 PM Nov 08, 2016 TRACE 1 2 3 4 5 6	Frequency
		NFE	PNO: Wide 🖵 IFGain:Low	Trig: Free Run Atten: 36 dB	#Avg Type. Kills	TYPE A WWWW DET A NNNNN	
0 dB/div	Ref 2	5.00 dBm			MI	r1 1.910 000 GHz -32.74 dBm	Auto Tun
15.0							Center Fre 1.910000000 GH
5.00	un a			~~~			Start Fre 1.904000000 GF
25.0						DL1 -13.00 dBm	<b>Stop Fre</b> 1.916000000 GH
5.0				h 1	m	Martin Martin	CF Ste 1.200000 MH Auto Ma
5.0							Freq Offs 0 F
i5.0							Scale Typ
enter 1. Res BW			#VBW	470 kHz	Swee	Span 12.00 MHz 5 1.000 ms (1001 pts)	Log <u>L</u>
SG						ATUS	

Plot 7-135. Upper Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

	ectrum Analyz										
LXI RL	RF	50 Ω DC	CORREC	SE	NSE:INT	#A T.	ALIGN AUTO		M Nov 08, 2016	F	requency
		NFE	PNO:Wide ← IFGain:Low	Trig: Free Atten: 36		#Avg Ty	pe: RMS	TY D	CE 123456 PE A WWWW ET A NNNNN		
10 dB/div Log	Ref 25	.00 dBm					Mkr1	1.911 ( -26.	)52 GHz 99 dBm		Auto Tune
15.0											<b>Center Freq</b> 13000000 GHz
-5.00										1.9*	Start Freq 1000000 GHz
-15.0									DL1 -13.00 dBm	1.9 <sup>,</sup>	Stop Freq 15000000 GHz
-35.0		alusses your all	grigedicker antisecole Program.	enter and a second s	ter and a second a s	had a second	ere strange of the second	and the second	a wani liku na ka	<u>Auto</u>	<b>CF Step</b> 400.000 kHz Man
-55.0											Freq Offset 0 Hz
-65.0											Scale Type
Center 1. #Res BW			#VB	N 3.0 MHz			Sweep 2	Span 4 2.000 ms (	.000 MHz (1001 pts)	Log	<u>Lin</u>
MSG							STATU	s			

Plot 7-136. Upper Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	<b>Reviewed by:</b> Quality Manager
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		ctrum Ar	alyzer - Swe	ept SA										
l <b>XI</b> R	L	RF	50 Ω	DC	CORREC		SEI	NSE:INT	 #Avg Typ	ALIGN AUTO		M Nov 08, 2016 CE 1 2 3 4 5 6	F	requency
				NFE	PNO: Wi IFGain:L	ide 🖵 ow	Trig: Free Atten: 36				TY D			A
10 di Log	B/div	Ref	25.00 d	IBm						Mkr1	1.849 9 -34.	984 GHz 85 dBm		Auto Tune
								• 						<b>Center Freq</b> 50000000 GHz
									 ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	harrow		DL1 -13.00 dBm	1.84	Start Freq 42000000 GHz
													1.8	Stop Freq 58000000 GHz
-35.0 -45.0		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	and for the second s	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m	ment	V.M.	1 / <sup>1</sup>					<u>Auto</u>	<b>CF Step</b> 1.600000 MHz Man
-45.0														Freq Offset 0 Hz
														Scale Type
	ter 1.8									_	Span 1	6.00 MHz	Log	<u>Lin</u>
	s BW 2	200 k	ΗZ		#	VBW	620 kHz					(1001 pts)		
MSG										STATU	5			

Plot 7-137. Lower Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

	ctrum Analyzer - Swep									_	
LX/IRL		DC CORRE	:C Wide ⊷⊷	Trig: Free		#Avg Type	RMS	TRAC	M Nov 08, 2016 CE 1 2 3 4 5 6 PE A WWWW	F	requency
		IFGa	in:Low	Atten: 36	dB		Mkr1	1.849 (	00 GHz		Auto Tune
10 dB/div	Ref 25.00 dE	3m						-29.	50 dBm		
15.0											<b>Center Freq</b> 17000000 GHz
-5.00										1.84	Start Freq 15000000 GHz
-3.00									DL1 -13.00 dBm		
-15.0									1	1.84	Stop Freq 19000000 GHz
-35.0	nayaya da naya maya mana mana mana mana mana na kata ana ana ana ana ana ana ana ana ana	abythether of the	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	<b>ୄ୲ଽ୶</b> ଽ୵୶୶ୄ୵୷୶୴	<i>∊∊⋹⋹⋑⋳∊⋏⋴⋛⋠⋖<sup>⋹</sup>⋖</i>	R <sup>a</sup> yvyrgenster <sup>a</sup> ldenste	ىلەر يېرىلىرى بىلىرىكى بىلىكى بىل بىلىكى بىلىكى	angar talang kepada	and the second second	<u>Auto</u>	<b>CF Step</b> 400.000 kHz Man
-45.0											
-55.0											Freq Offset 0 Hz
-65.0											0
											Scale Type
Center 1.8 #Res BW	347000 GHz 1.0 MHz		#VBW :	3.0 MHz		s	Sweep 2	Span 4 .000 ms (	.000 MHz (1001 pts)	Log	<u>Lin</u>
MSG							STATUS				

Plot 7-138. Lower Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	💽 LG	<b>Reviewed by:</b> Quality Manager
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		/zer - Swept SA					
KI RL	RF	50 Ω DC	CORREC	Trig: Free Run Atten: 36 dB	ALIGN AUTO #Avg Type: RMS	08:32:49 PM Nov 08, 2016 TRACE 123456 TYPE A WWWWW DET A NNNN	Frequency
10 dB/div	Ref 2	5.00 dBm	IFGain:Low	Atten: 36 dB	Mkr	1 1.910 096 GHz -33.74 dBm	Auto Tuno
15.0							Center Fred 1.910000000 GH
5.00	~~~~~~	man	m				<b>Start Fre</b> 1.902000000 GH
25.0						DL1 -13.00 dBm	<b>Stop Fre</b> 1.918000000 GH
35.0				1	monter	where where	CF Ste 1.600000 M⊢ <u>Auto</u> Ma
15.0 55.0							Freq Offs 0 F
65.0							Scale Typ
Center 1. Res BW			#VBW	620 kHz	Sweep	Span 16.00 MHz 1.000 ms (1001 pts)	Log <u>Li</u>
SG					STAT	US	

Plot 7-139. Upper Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

	ectrum Analyzer - S	wept SA									
LX/RL	RF 50	ΩDC	CORREC	SEN	SE:INT	#Avg Typ	ALIGN AUTO		M Nov 08, 2016	F	requency
		NFE	PNO: Wide ↔→ IFGain:Low	Trig: Free Atten: 36				TY			
10 dB/div	Ref 25.00	dBm					Mkr1	1.911 ( -27.	)56 GHz 16 dBm		Auto Tune
					·						o
15.0											Center Freq 13000000 GHz
										1.9	13000000 GH2
5.00											
										1.0	Start Freq 11000000 GHz
-5.00										1.9	11000000 GH2
-15.0									DL1 -13.00 dBm		
13.0										1.0	Stop Freq 15000000 GHz
-25.0										1.9	15000000 GHZ
anter and	uning and a second	-hay when	Rywani wana mana mana mana mana mana mana mana	rymatily, when	yre-Wereefwyd	ere there are and the	at the strate of the start	hadalilikovani papagad	with the many		CF Step
-35.0											400.000 kHz
-45.0										<u>Auto</u>	Man
-45.0											
-55.0											Freq Offset
											0 Hz
-65.0											0
											Scale Type
	913000 GH	z						Span 4	.000 MHz	Log	<u>Lin</u>
#Res BW	1.0 MHz		#VBW :	3.0 MHz			Sweep 2	2.000 ms (	(1001 pts)		
MSG							STATU	S			

Plot 7-140. Upper Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	<b>Reviewed by:</b> Quality Manager		
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# 7.5 Peak-Average Ratio §24.232(d)

# 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.

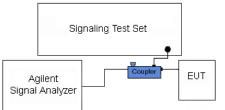


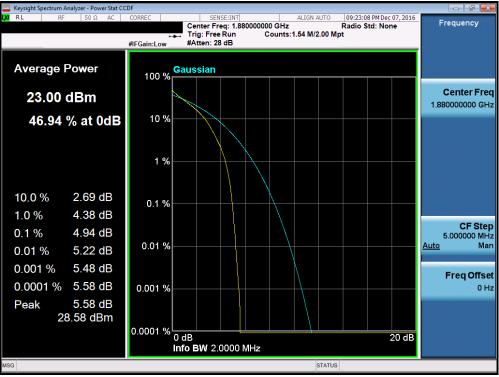
Figure 7-4. Test Instrument & Measurement Setup

# Test Notes

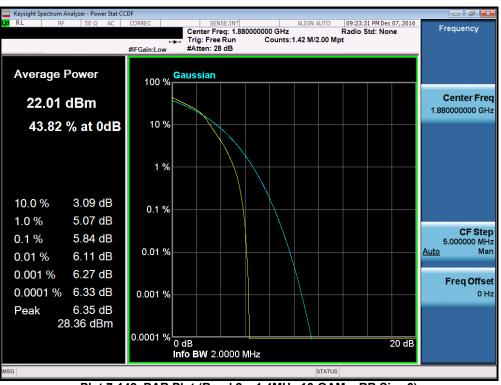
None.

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	<b>Reviewed by:</b> Quality Manager		
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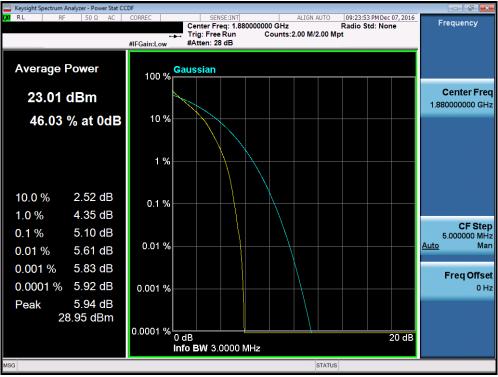
Plot 7-141. PAR Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

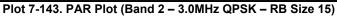


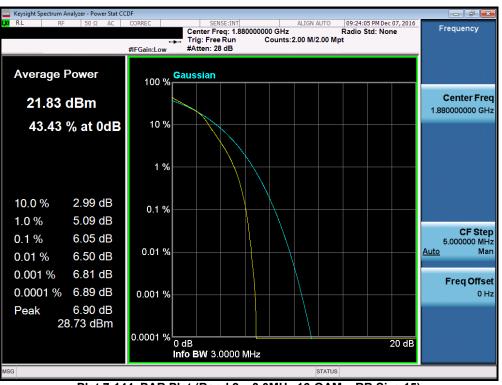
Plot 7-142. PAR Plot (Band 2 – 1.4MHz 16-QAM – RB Size 6)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	<b>Reviewed by:</b> Quality Manager		
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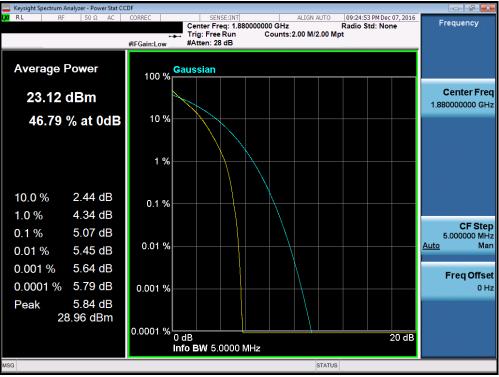


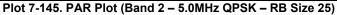


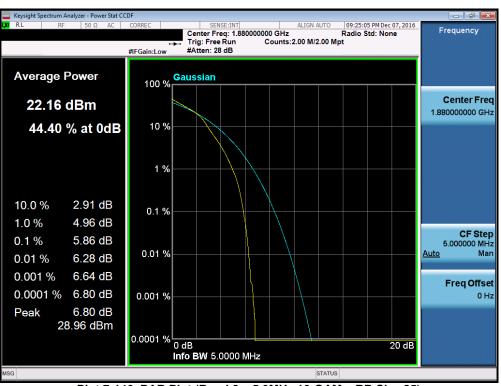
Plot 7-144. PAR Plot (Band 2 – 3.0MHz 16-QAM – RB Size 15)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager		
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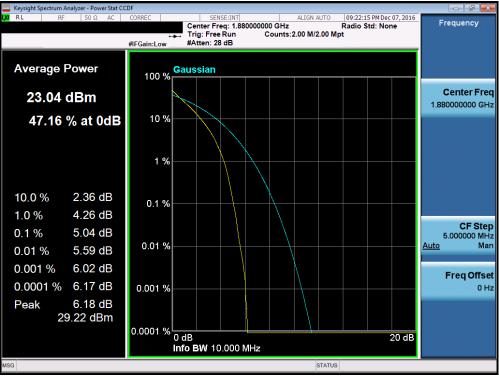


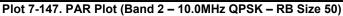


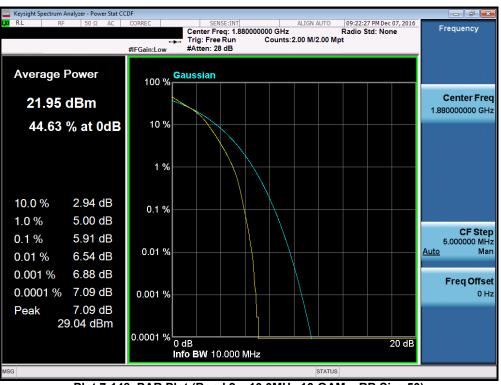
Plot 7-146. PAR Plot (Band 2 - 5.0MHz 16-QAM - RB Size 25)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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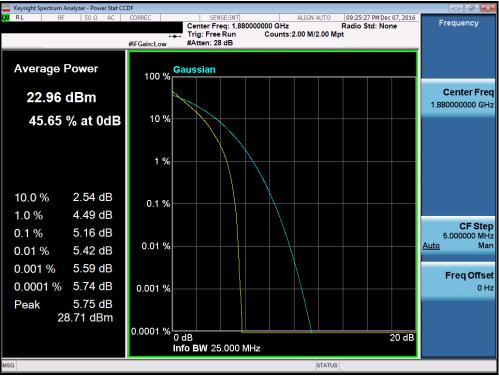


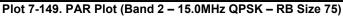


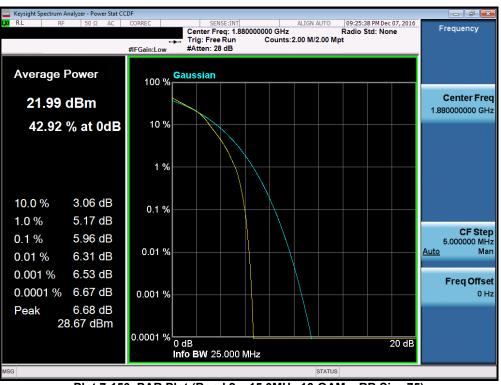
Plot 7-148. PAR Plot (Band 2 - 10.0MHz 16-QAM - RB Size 50)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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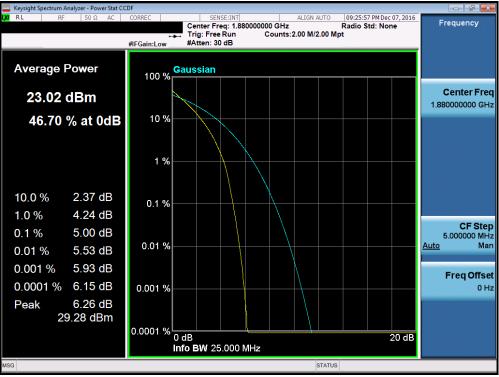




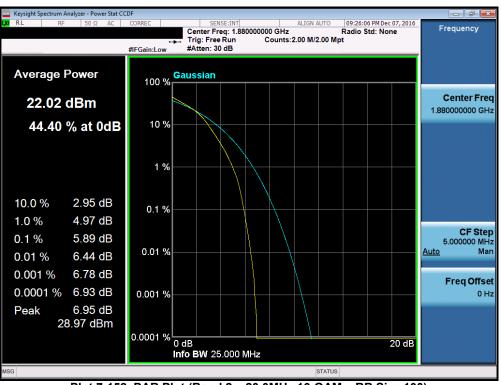
Plot 7-150. PAR Plot (Band 2 - 15.0MHz 16-QAM - RB Size 75)

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Plot 7-151. PAR Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 7-152. PAR Plot (Band 2 – 20.0MHz 16-QAM – RB Size 100)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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## 7.6 Radiated Power (ERP/EIRP) §22.913(a.2) §24.232(c.2) §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  $\geq$  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.

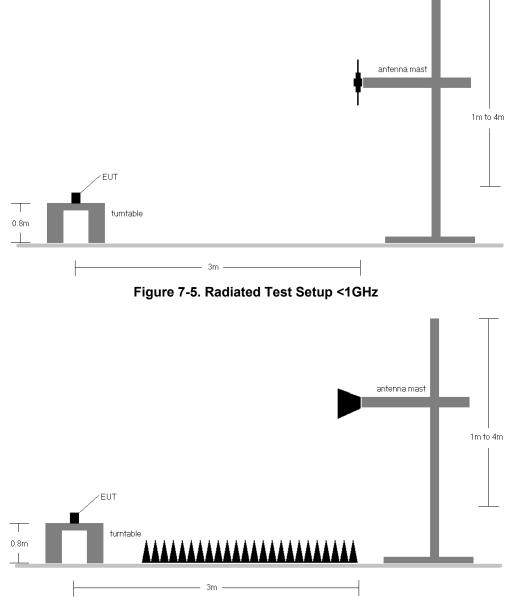


Figure 7-6. Radiated Test Setup >1GHz

#### 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.

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	<b>Reviewed by:</b> 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]
699.70	1.4	QPSK	V	174	315	3 / 2	18.72	2.85	21.57	34.77	-13.20
707.50	1.4	QPSK	V	156	300	3 / 2	19.20	2.88	22.08	34.77	-12.69
715.30	1.4	QPSK	V	152	308	3 / 2	19.72	3.06	22.78	34.77	-11.99
699.70	1.4	16-QAM	V	174	315	3 / 2	17.73	2.85	20.58	34.77	-14.19
707.50	1.4	16-QAM	V	156	300	3 / 2	18.11	2.88	20.99	34.77	-13.78
715.30	1.4	16-QAM	V	152	308	1 / 5	18.82	3.06	21.88	34.77	-12.89
700.50	3	QPSK	V	171	311	1 / 0	18.84	2.72	21.56	34.77	-13.21
707.50	3	QPSK	V	155	311	1 / 0	18.80	2.88	21.68	34.77	-13.09
714.50	3	QPSK	V	154	291	1 / 14	19.27	3.04	22.31	34.77	-12.46
700.50	3	16-QAM	V	171	311	1 / 14	17.59	2.72	20.31	34.77	-14.46
707.50	3	16-QAM	V	155	311	1 / 0	18.12	2.88	21.00	34.77	-13.77
714.50	3	16-QAM	V	154	291	1 / 14	18.57	3.04	21.61	34.77	-13.16
701.50	5	QPSK	V	176	331	1 / 0	18.76	2.75	21.51	34.77	-13.26
707.50	5	QPSK	V	160	335	1 / 0	18.57	2.88	21.45	34.77	-13.32
713.50	5	QPSK	V	155	305	1 / 24	19.59	3.02	22.61	34.77	-12.16
701.50	5	16-QAM	V	176	331	1 / 0	17.54	2.75	20.29	34.77	-14.48
707.50	5	16-QAM	V	160	335	1 / 0	17.58	2.88	20.46	34.77	-14.31
713.50	5	16-QAM	V	155	305	1 / 24	18.68	3.02	21.70	34.77	-13.07
704.00	10	QPSK	V	172	311	1 / 0	18.70	2.80	21.50	34.77	-13.27
707.50	10	QPSK	V	155	298	1 / 49	19.03	2.88	21.91	34.77	-12.86
711.00	10	QPSK	V	153	293	1 / 49	19.62	2.96	22.58	34.77	-12.19
704.00	10	16-QAM	V	172	311	1/0	17.72	2.80	20.52	34.77	-14.25
707.50	10	16-QAM	V	155	298	1 / 49	17.87	2.88	20.75	34.77	-14.02
711.00	10	16-QAM	V	153	293	1 / 49	18.66	2.96	21.62	34.77	-13.15
715.30	1.4	QPSK	н	100	124	75 / 0	17.41	2.52	19.93	34.77	-14.84

Table 7-2. ERP Data (Band 12)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	<b>Reviewed by:</b> 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	376	275	1 / 5	12.84	5.01	17.85	38.45	-20.60
836.50	1.4	QPSK	Н	376	274	1 / 0	12.39	5.16	17.55	38.45	-20.90
848.30	1.4	QPSK	Н	362	275	1 / 5	12.88	5.30	18.18	38.45	-20.27
824.70	1.4	16-QAM	Н	376	275	1 / 0	11.58	5.01	16.59	38.45	-21.86
836.50	1.4	16-QAM	Н	376	274	1 / 5	11.17	5.16	16.33	38.45	-22.12
848.30	1.4	16-QAM	Н	362	275	1 / 0	11.83	5.30	17.13	38.45	-21.32
825.50	3	QPSK	Н	378	275	1 / 0	14.63	5.02	19.65	38.45	-18.80
836.50	3	QPSK	Н	378	280	1 / 14	14.34	5.16	19.50	38.45	-18.95
847.50	3	QPSK	Н	380	277	1 / 14	14.60	5.29	19.89	38.45	-18.56
825.50	3	16-QAM	Н	378	275	1 / 0	13.59	5.02	18.61	38.45	-19.84
836.50	3	16-QAM	Н	378	280	1 / 14	13.46	5.16	18.62	38.45	-19.83
847.50	3	16-QAM	Н	380	277	1 / 14	13.57	5.29	18.86	38.45	-19.59
826.50	5	QPSK	Н	397	281	1 / 0	16.24	5.03	21.27	38.45	-17.18
836.50	5	QPSK	Н	397	277	1 / 0	15.36	5.16	20.52	38.45	-17.93
846.50	5	QPSK	Н	397	280	1 / 24	14.29	5.28	19.57	38.45	-18.88
826.50	5	16-QAM	Н	397	281	1 / 0	15.18	5.03	20.21	38.45	-18.24
836.50	5	16-QAM	Н	397	277	1 / 0	14.17	5.16	19.33	38.45	-19.12
846.50	5	16-QAM	Н	397	280	1 / 24	13.16	5.28	18.44	38.45	-20.01
829.00	10	QPSK	Н	395	295	1 / 0	16.05	5.06	21.11	38.45	-17.34
836.50	10	QPSK	Н	395	296	1 / 0	16.31	5.16	21.47	38.45	-16.98
844.00	10	QPSK	Н	395	294	1 / 0	15.27	5.25	20.52	38.45	-17.93
829.00	10	16-QAM	Н	395	295	1 / 0	14.98	5.06	20.04	38.45	-18.41
836.50	10	16-QAM	Н	395	296	1/0	14.79	5.16	19.95	38.45	-18.50
844.00	10	16-QAM	Н	395	294	1 / 0	14.02	5.25	19.27	38.45	-19.18
836.50	10	QPSK	V	129	259	1 / 0	15.52	5.00	20.52	38.45	-17.93

Table 7-3. ERP Data (Band 5)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	<b>Reviewed by:</b> 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	170	354	1 / 5	12.60	9.66	22.26	30.00	-7.74
1732.50	1.4	QPSK	Н	115	353	3/2	13.80	9.61	23.41	30.00	-6.59
1754.30	1.4	QPSK	Н	100	0	1/5	13.82	9.57	23.39	30.00	-6.61
1710.70	1.4	16-QAM	н	170	354	1/5	11.67	9.66	21.33	30.00	-8.67
1732.50	1.4	16-QAM	Н	115	353	1 / 5	12.87	9.61	22.48	30.00	-7.52
1754.30	1.4	16-QAM	н	100	0	1/5	12.88	9.57	22.45	30.00	-7.55
1711.50	3	QPSK	Н	165	346	1 / 14	11.89	9.65	21.54	30.00	-8.46
1732.50	3	QPSK	н	112	0	1 / 14	13.83	9.61	23.44	30.00	-6.56
1753.50	3	QPSK	н	109	0	1/0	13.75	9.57	23.32	30.00	-6.68
1711.50	3	16-QAM	н	165	346	1 / 14	10.81	9.65	20.46	30.00	-9.54
1732.50	3	16-QAM	н	112	0	1 / 14	12.88	9.61	22.49	30.00	-7.51
1753.50	3	16-QAM	Н	109	0	1 / 14	12.73	9.57	22.30	30.00	-7.70
1712.50	5	QPSK	Н	113	347	1 / 24	11.63	9.65	21.28	30.00	-8.72
1732.50	5	QPSK	Н	109	0	1 / 24	13.77	9.61	23.38	30.00	-6.62
1752.50	5	QPSK	Н	113	347	1 / 24	13.96	9.57	23.53	30.00	-6.47
1712.50	5	16-QAM	Н	113	347	1 / 24	10.60	9.65	20.25	30.00	-9.75
1732.50	5	16-QAM	Н	109	0	1 / 24	12.94	9.61	22.55	30.00	-7.45
1752.50	5	16-QAM	Н	113	347	1 / 24	12.93	9.57	22.50	30.00	-7.50
1715.00	10	QPSK	Н	110	6	1 / 49	13.21	9.65	22.86	30.00	-7.14
1732.50	10	QPSK	Н	110	6	1 / 49	14.21	9.61	23.82	30.00	-6.18
1750.00	10	QPSK	Н	109	350	1 / 49	13.96	9.58	23.54	30.00	-6.46
1715.00	10	16-QAM	Н	110	6	1 / 49	12.17	9.65	21.82	30.00	-8.18
1732.50	10	16-QAM	н	110	6	1 / 49	13.43	9.61	23.04	30.00	-6.96
1750.00	10	16-QAM	Н	109	350	1 / 49	12.92	9.58	22.50	30.00	-7.50
1717.50	15	QPSK	Н	100	0	1 / 74	12.88	9.64	22.52	30.00	-7.48
1732.50	15	QPSK	н	100	0	1 / 74	13.66	9.61	23.27	30.00	-6.73
1747.50	15	QPSK	Н	101	353	1/0	13.88	9.58	23.46	30.00	-6.54
1717.50	15	16-QAM	Н	100	0	1 / 74	11.75	9.64	21.39	30.00	-8.61
1732.50	15	16-QAM	Н	100	0	1 / 74	12.84	9.61	22.45	30.00	-7.55
1747.50	15	16-QAM	Н	101	353	1/0	13.04	9.58	22.62	30.00	-7.38
1720.00	20	QPSK	Н	112	0	1 / 99	12.97	9.64	22.61	30.00	-7.39
1732.50	20	QPSK	Н	112	0	1 / 99	14.04	9.61	23.65	30.00	-6.35
1745.00	20	QPSK	Н	108	348	1/0	14.02	9.59	23.61	30.00	-6.39
1720.00	20	16-QAM	Н	112	0	1 / 99	12.09	9.64	21.73	30.00	-8.27
1732.50	20	16-QAM	Н	112	0	1 / 99	13.26	9.61	22.87	30.00	-7.13
1745.00	20	16-QAM	н	108	348	1/0	12.86	9.59	22.45	30.00	-7.55
1732.50	10	QPSK	V	100	73	1 / 99	12.59	9.53	22.12	30.00	-7.88

## Table 7-4. EIRP Data (Band 4)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	<b>Reviewed by:</b> 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	6	1/5	14.22	9.35	23.57	33.01	-9.44
1880.00	1.4	QPSK	н	100	6	1/5	13.56	9.27	22.83	33.01	-10.18
1909.30	1.4	QPSK	Н	100	24	1/0	12.55	9.25	21.80	33.01	-11.21
1850.70	1.4	16-QAM	Н	100	6	1/5	13.46	9.35	22.81	33.01	-10.20
1880.00	1.4	16-QAM	Н	100	6	1/5	12.54	9.27	21.81	33.01	-11.20
1909.30	1.4	16-QAM	н	100	24	1 / 5	11.87	9.25	21.12	33.01	-11.89
1851.50	3	QPSK	Н	100	355	1 / 0	14.25	9.35	23.60	33.01	-9.41
1880.00	3	QPSK	Н	100	355	1 / 0	13.44	9.27	22.71	33.01	-10.30
1908.50	3	QPSK	Н	100	357	1 / 0	12.66	9.25	21.91	33.01	-11.10
1851.50	3	16-QAM	н	100	355	1 / 0	13.23	9.35	22.58	33.01	-10.43
1880.00	3	16-QAM	н	100	355	1/0	12.26	9.27	21.53	33.01	-11.48
1908.50	3	16-QAM	Н	100	357	1 / 0	11.75	9.25	21.00	33.01	-12.01
1852.50	5	QPSK	Н	100	354	1 / 0	14.24	9.34	23.58	33.01	-9.43
1880.00	5	QPSK	н	100	354	1/0	13.70	9.27	22.97	33.01	-10.04
1907.50	5	QPSK	н	100	354	1/0	12.91	9.24	22.15	33.01	-10.86
1852.50	5	16-QAM	н	100	354	1/0	13.07	9.34	22.41	33.01	-10.60
1880.00	5	16-QAM	Н	100	354	1/0	12.11	9.27	21.38	33.01	-11.63
1907.50	5	16-QAM	н	100	354	1/0	11.78	9.24	21.02	33.01	-11.99
1855.00	10	QPSK	Н	167	341	1 / 49	13.85	9.34	23.19	33.01	-9.82
1880.00	10	QPSK	н	153	343	1 / 49	14.61	9.27	23.88	33.01	-9.13
1905.00	10	QPSK	Н	150	341	1/0	12.56	9.24	21.80	33.01	-11.21
1855.00	10	16-QAM	Н	167	341	1 / 49	13.12	9.34	22.46	33.01	-10.55
1880.00	10	16-QAM	н	153	343	1 / 49	13.34	9.27	22.61	33.01	-10.40
1905.00	10	16-QAM	н	150	341	1/0	11.54	9.24	20.78	33.01	-12.23
1857.50	15	QPSK	Н	165	346	1/0	13.47	9.33	22.80	33.01	-10.21
1880.00	15	QPSK	Н	153	343	1 / 74	14.77	9.27	24.04	33.01	-8.97
1902.50	15	QPSK	н	152	341	1/0	13.07	9.23	22.30	33.01	-10.71
1857.50	15	16-QAM	н	165	346	1/0	12.27	9.33	21.60	33.01	-11.41
1880.00	15	16-QAM	Н	153	343	1 / 74	13.73	9.27	23.00	33.01	-10.01
1902.50	15	16-QAM	н	152	341	1 / 0	11.94	9.23	21.17	33.01	-11.84
1860.00	20	QPSK	Н	162	346	1 / 99	14.15	9.32	23.47	33.01	-9.54
1880.00	20	QPSK	Н	153	345	1 / 99	14.42	9.27	23.69	33.01	-9.32
1900.00	20	QPSK	н	153	342	1/0	13.71	9.22	22.93	33.01	-10.08
1860.00	20	16-QAM	н	162	346	1 / 99	13.26	9.32	22.58	33.01	-10.43
1880.00	20	16-QAM	н	153	345	1/0	13.43	9.27	22.70	33.01	-10.31
1900.00	20	16-QAM	н	153	342	1/0	12.93	9.22	22.15	33.01	-10.86
1880.00	15	QPSK	V	133	62	1/0	13.79	9.27	23.06	33.01	-9.95

## Table 7-5. EIRP Data (Band 2)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	<b>Reviewed by:</b> Quality Manager
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### 7.7 Radiated Spurious Emissions Measurements §2.1053 §22.917(a) §24.238(a) §27.53(g) §27.53(h)

#### **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

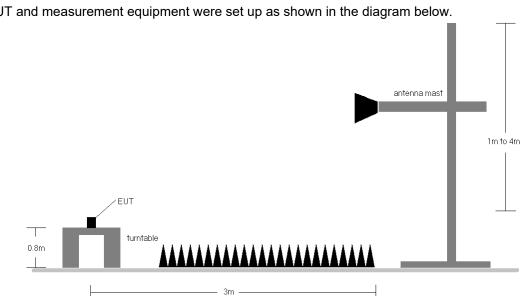
ANSI/TIA-603-D-2010 – Section 2.2.12

#### 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  $\geq$  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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The EUT and measurement equipment were set up as shown in the diagram below.

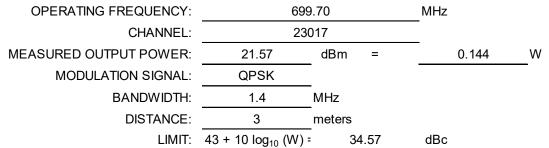
Figure 7-7. Test Instrument & Measurement Setup

### **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.

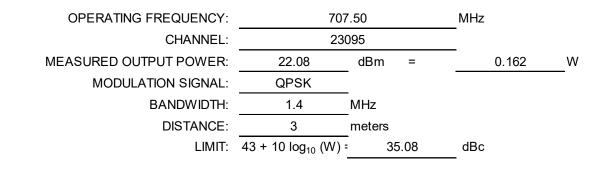
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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1399.40	Н	152	165	-70.57	5.57	-64.99	86.6
2099.10	Н	132	9	-65.60	6.65	-58.95	80.5
2798.80	Н	-	-	-72.96	7.92	-65.04	86.6

Table 7-6. Radiated Spurious Data (Band 12 – Low Channel)

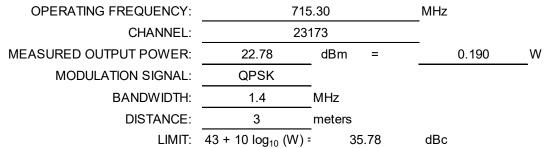


Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1415.00	Н	156	324	-72.45	5.69	-66.75	88.8
2122.50	Н	127	12	-68.75	6.75	-62.00	84.1
2830.00	Н	-	-	-72.85	7.90	-64.95	87.0

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

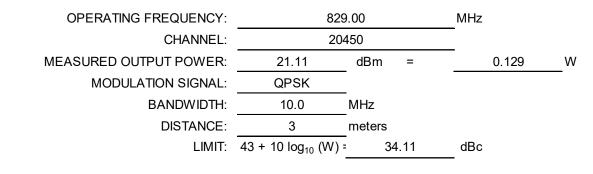
FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	💽 LG	<b>Reviewed by:</b> Quality Manager
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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1430.60	Н	100	157	-66.95	5.82	-61.14	83.9
2145.90	Н	126	8	-67.49	6.84	-60.65	83.4
2861.20	Н	-	-	-72.16	7.87	-64.29	87.1

Table 7-8. Radiated Spurious Data (Band 12 – High Channel)

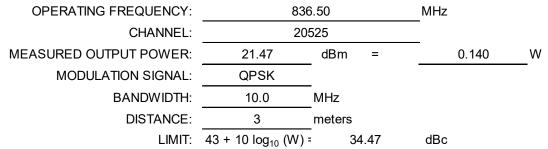


Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1658.00	Н	156	219	-69.24	3.60	-65.65	86.8
2487.00	Н	338	275	-65.92	3.56	-62.36	83.5
3316.00	Н	-	-	-66.47	5.84	-60.63	81.7

Table 7-9. Radiated Spurious Data (Band 5 – Low Channel)

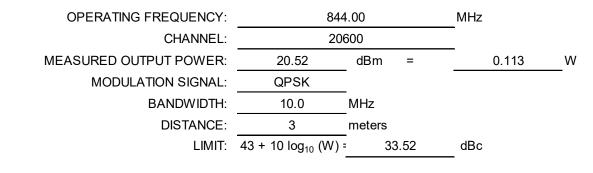
FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	<b>Reviewed by:</b> Quality Manager
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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1673.00	Н	129	347	-68.84	3.52	-65.32	86.8
2509.50	Н	240	189	-65.02	3.59	-61.43	82.9
3346.00	Н	-	-	-66.02	5.87	-60.15	81.6

Table 7-10. Radiated Spurious Data (Band 5 – Mid Channel)

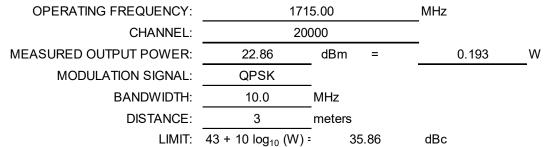


Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1688.00	Н	129	22	-68.48	3.44	-65.04	85.6
2532.00	Н	242	9	-63.43	3.69	-59.74	80.3
3376.00	Н	-	-	-66.00	5.90	-60.09	80.6

Table 7-11. Radiated Spurious Data (Band 5 – High Channel)

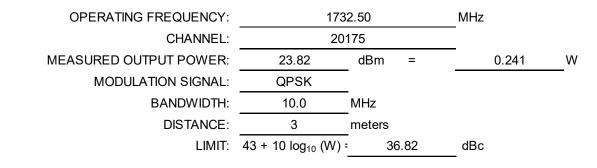
FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	<b>Reviewed by:</b> Quality Manager
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Fi	requency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
	3430.00	Н	100	113	-60.53	9.87	-50.65	73.5
	5145.00	Н	100	85	-59.93	10.75	-49.18	72.0
	6860.00	Н	-	-	-61.61	11.68	-49.92	72.8

Table 7-12. Radiated Spurious Data (Band 4 – Low Channel)

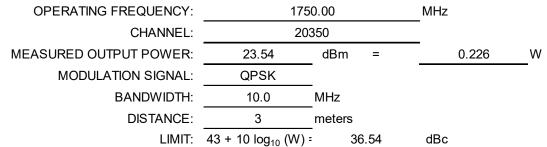


Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3465.00	Н	103	75	-59.57	9.91	-49.66	73.5
5197.50	Н	100	362	-63.00	10.75	-52.26	76.1
6930.00	Н	-	-	-61.95	11.76	-50.19	74.0

Table 7-13. Radiated Spurious Data (Band 4 – Mid Channel)

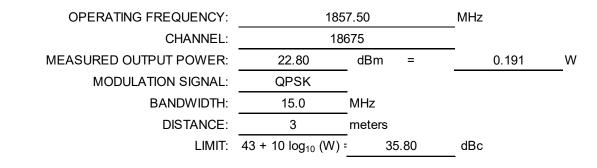
FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	<b>Reviewed by:</b> Quality Manager
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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3500.00	Н	100	75	-59.93	9.95	-49.98	73.5
5250.00	Н	100	82	-61.08	10.71	-50.36	73.9
7000.00	Н	-	-	-61.72	11.84	-49.89	73.4

Table 7-14. Radiated Spurious Data (Band 4 – High Channel)

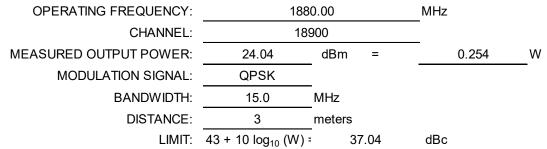


Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3715.00	Н	200	236	-68.35	9.49	-58.86	81.7
5572.50	Н	159	79	-64.07	11.08	-52.99	75.8
7430.00	Н	-	-	-59.62	10.98	-48.64	71.4

Table 7-15. Radiated Spurious Data (Band 2 – Low Channel)

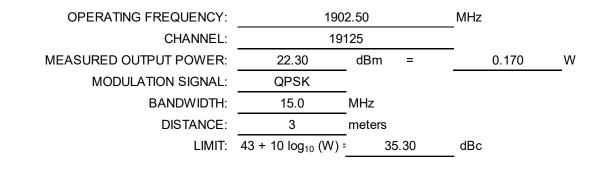
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Frequenc [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3760.00	Н	-	-	-67.84	9.39	-58.46	82.5
5640.00	н	100	83	-66.29	11.22	-55.07	79.1
7520.00	Н	-	-	-59.95	11.10	-48.85	72.9

Table 7-16. Radiated Spurious Data (Band 2 – Mid 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]
3805.00	Н	100	109	-67.50	9.30	-58.20	80.5
5707.50	Н	214	71	-66.05	11.31	-54.74	77.0
7610.00	Н	-	-	-60.00	11.30	-48.69	71.0

Table 7-17. Radiated Spurious Data (Band 2 – High Channel)

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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 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)	707,499,810	-190	-0.0000269
100 %		- 30	707,500,125	125	0.0000177
100 %		- 20	707,500,320	320	0.0000452
100 %		- 10	707,499,925	-75	-0.0000106
100 %		0	707,499,968	-32	-0.0000045
100 %		+ 10	707,500,271	271	0.0000383
100 %		+ 20	707,499,964	-36	-0.0000051
100 %		+ 30	707,499,728	-272	-0.0000384
100 %		+ 40	707,499,699	-301	-0.0000425
100 %		+ 50	707,500,304	304	0.0000430
BATT. ENDPOINT	3.45	+ 20	707,499,866	-134	-0.0000189

Table 7-18. Frequency Stability Data (Band 12)

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# Band 12 Frequency Stability Measurements §2.1055 §27.54

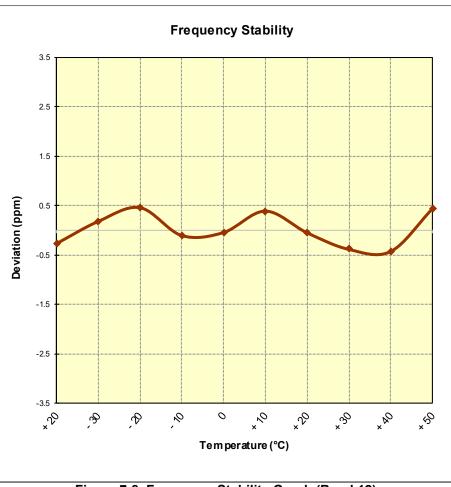


Figure 7-8. Frequency Stability Graph (Band 12)

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# Band 5 Frequency Stability Measurements §22.1055 §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)	836,500,298	298	0.0000356
100 %		- 30	836,500,370	370	0.0000442
100 %		- 20	836,499,810	-190	-0.0000227
100 %		- 10	836,499,584	-416	-0.0000497
100 %		0	836,499,942	-58	-0.0000069
100 %		+ 10	836,500,154	154	0.0000184
100 %		+ 20	836,500,305	305	0.0000365
100 %		+ 30	836,500,151	151	0.0000181
100 %		+ 40	836,500,191	191	0.0000228
100 %		+ 50	836,499,864	-136	-0.0000163
BATT. ENDPOINT	3.45	+ 20	836,500,030	30	0.000036

Table 7-19. Frequency Stability Data (Band 5)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	<b>Reviewed by:</b> Quality Manager
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# Band 5 Frequency Stability Measurements §2.1055 §22.355

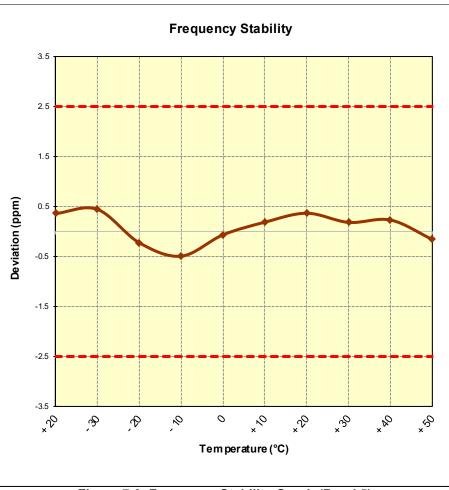


Figure 7-9. Frequency Stability Graph (Band 5)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
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## Band 4 Frequency Stability Measurements §2.1055 §§27.54

OPERATING FREQUENCY:	1,732,500,000	Hz
CHANNEL:	20175	_
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,732,499,695	-305	-0.0000176
100 %		- 30	1,732,500,264	264	0.0000152
100 %		- 20	1,732,499,938	-62	-0.0000036
100 %		- 10	1,732,500,015	15	0.0000009
100 %		0	1,732,499,987	-13	-0.0000008
100 %		+ 10	1,732,500,010	10	0.0000006
100 %		+ 20	1,732,500,244	244	0.0000141
100 %		+ 30	1,732,500,112	112	0.0000065
100 %		+ 40	1,732,499,962	-38	-0.0000022
100 %		+ 50	1,732,500,114	114	0.0000066
BATT. ENDPOINT	3.45	+ 20	1,732,499,978	-22	-0.0000013

Table 7-20. Frequency Stability Data (Band 4)

#### 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 4 Frequency Stability Measurements §2.1055 §§27.54

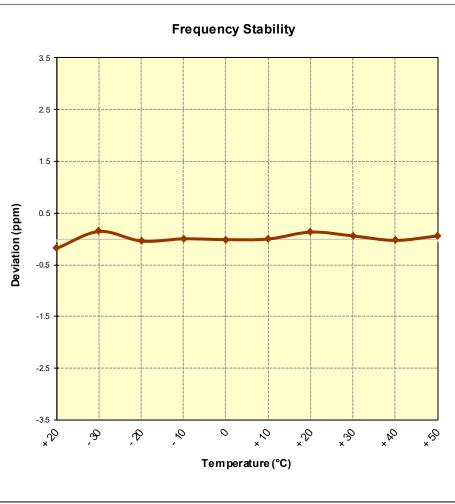


Figure 7-10. Frequency Stability Graph (Band 4)

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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)	1,879,999,859	-141	-0.0000075
100 %		- 30	1,879,999,550	-450	-0.0000239
100 %		- 20	1,879,999,901	-99	-0.0000053
100 %		- 10	1,879,999,677	-323	-0.0000172
100 %		0	1,879,999,827	-173	-0.0000092
100 %		+ 10	1,880,000,392	392	0.0000209
100 %		+ 20	1,880,000,272	272	0.0000145
100 %		+ 30	1,879,999,945	-55	-0.0000029
100 %		+ 40	1,880,000,122	122	0.0000065
100 %		+ 50	1,880,000,355	355	0.0000189
BATT. ENDPOINT	3.45	+ 20	1,880,000,025	25	0.0000013

Table 7-21. 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.

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# Band 2 Frequency Stability Measurements §2.1055 §24.235

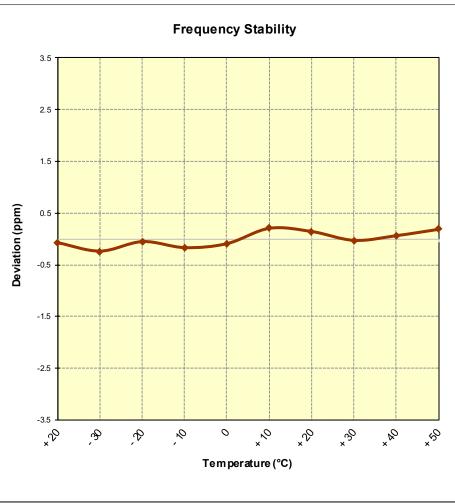


Figure 7-11. Frequency Stability Graph (Band 2)

FCC ID: ZNFL83BL		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed 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: ZNFL83BL** complies with all the requirements of Parts 22, 24, & 27 of the FCC rules for LTE operation only.

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