

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)

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

Test Setup

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

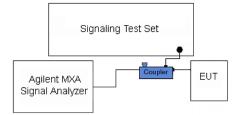


Figure 7-3. Test Instrument & Measurement Setup

Test Notes

Per 22.917(b), 24.238(a), 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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Test Report S/N:	Test Dates:	EUT Type:		Dama CD of 140			
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 62 of 143			
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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 $65 + 10log_{10}(P) = -35dBm$ in a 6.25kHz bandwidth.



Plot 7-93. Lower Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dege C2 of 142
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 63 of 143
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Keysight Spectre		wept SA									
LXI RL	RF 50	Ω AC	CORREC		SENSE:INT		ALIGN AUTO		May 20, 2016	E	equency
			PNO: Wid IFGain:Lo		g: Free Run en: 36 dB	#Avg Ty		TYP DE	1 2 3 4 5 6 E A WWWW T A N N N N N		
10 dB/div	Ref 25.00	dBm					Mł	(r1 697.8 -33.(08 MHz 50 dBm		Auto Tune
15.0											Center Freq 5.900000 MHz
-5.00										693	Start Freq 9.900000 MHz
-15.0									-13.00 dBm	697	Stop Freq 900000 MHz
-35.0										<u>Auto</u>	CF Step 400.000 kHz Man
-45.0			~~~~				······				Freq Offset 0 Hz
-65.0											Scale Type
Center 695. #Res BW 10			#\	/BW 300	kHz		Sweep	Span 4. 1.000 ms (000 MHz 1001 pts)	Log	<u>Lin</u>
MSG							STATU	JS			

Plot 7-94. Lower Extended Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)



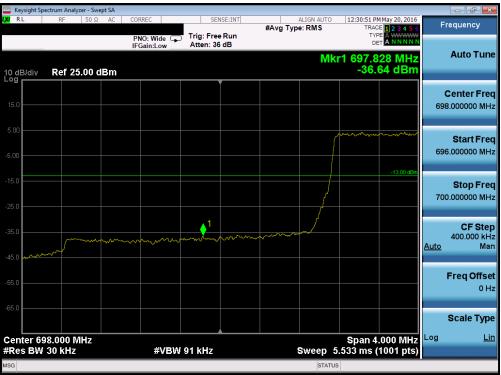
Plot 7-95. Upper Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

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Test Report S/N:	Test Dates:	EUT Type:		Page 64 of 143
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 64 01 143
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	ectrum Analyzer -									_	
X/RL	RF 50	Ω AC	CORREC			#Avg Typ	ALIGN AUTO e: RMS	TRAC TYP	May 20, 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: 30	uв		Mł	(r1 716.3			Auto Tune
15.0											Center Fred 3.100000 MH:
5.00										710	Start Fre 6.100000 MH
25.0	1	~							-13.00 dBm	720	Stop Fre 0.100000 МН
35.0		- Vor	m	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~						<u>Auto</u>	CF Ste 400.000 kH Ma
45.0 <u></u>				\	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	·····		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		Freq Offse 0 ⊦
65.0											Scale Typ
	18.100 MHz 100 kHz	2	#VBW	300 kHz			Sweep	Span 4 1.000 ms (.000 MHz 1001 pts)	Log	<u>Li</u>
ISG							STATU	JS			

Plot 7-96. Upper Extended Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)



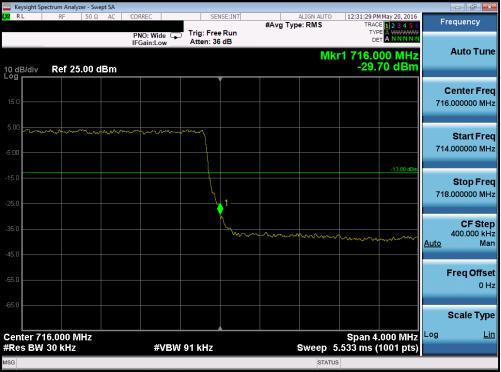
Plot 7-97. Lower Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dere CE of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 65 of 143
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	ectrum Analy												
<mark>0</mark> RL	RF	50 Ω	AC	CORREC		SEI	NSE:INT		ALIGN AUTO		PM May 20, 2016	F	requency
				PNO: W IFGain:	lide ↔→ _ow	Trig: Fre Atten: 36		#Avg I	ype: RMS	T	CE 1 2 3 4 5 6 (PE A WWWWW DET A NNNNN		
0 dB/div	Ref 25	i.00 d	Bm						MI	kr1 697. -31	756 MHz .80 dBm		Auto Tun
15.0													Center Fre 5.900000 MH
5.00												69	Start Fre 3.900000 MH
25.0											-13.00 dBm	69	Stop Fre 7.900000 M⊦
15.0								s.	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		<u>Auto</u>	CF Ste 400.000 kH Ma
55.0 		~~~	~~~	~~~~									Freq Offs 0 ⊦
5.0													Scale Typ
enter 69 Res BW					#VBW	300 kHz			Sweep	Span 4 1.000 ms	4.000 MHz (1001 pts)	Log	Ľ
SG									STAT	IIS SI			

Plot 7-98. Lower Extended Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)



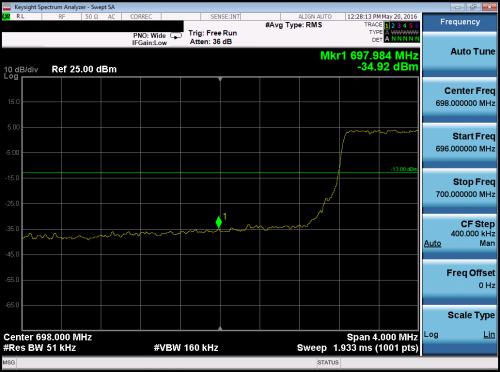
Plot 7-99. Upper Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Deep CC of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 66 of 143
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	ectrum Analyzer - Swe	ept SA								
XI RL	RF 50 Ω		ORREC PNO:Wide ↔ FGain:Low		#Avg Typ	ALIGN AUTO e: RMS	TRAC	MMay 20, 2016 E 1 2 3 4 5 6 E A WWWWW A N N N N N	Fr	requency
10 dB/div Log	Ref 25.00 d		FGain:Low	Atten: or		Mk	1 716.1 -29.	00 MHz 89 dBm		Auto Tune
15.0										Center Fred 3.100000 MH2
5.00									716	Start Free 5.100000 MH
15.0 25.0 <mark>- 1</mark> —								-13.00 dBm	720	Stop Fre 0.100000 MH
35.0 	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		~~~~~			~~~~~		March 1	<u>Auto</u>	CF Ste 400.000 k⊢ Ma
55.0										Freq Offse 0 H
	18.100 MHz 100 kHz		#VBM	/ 300 kHz		Sween 1	Span 4	.000 MHz 1001 pts)	Log	Scale Type Lii
SG						STATUS	-			

Plot 7-100. Upper Extended Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)



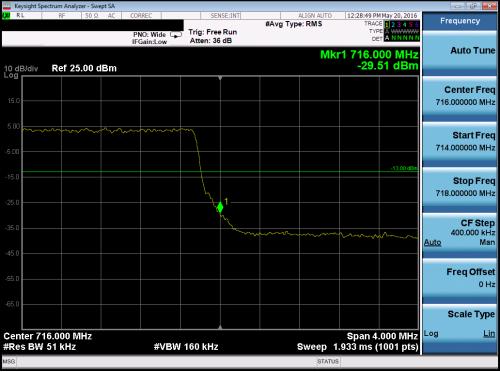
Plot 7-101. Lower Band Edge Plot (Band 12/17 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dere C7 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 67 of 143
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Keysight Spectrum Analyzer - Swept	t SA				
LXI RE 50 Ω	AC CORREC	SENSE:INT	ALIGN AUTO #Avg Type: RMS	12:28:24 PM May 20, 2016 TRACE 1 2 3 4 5 6	Frequency
	PNO: Wide ↔ IFGain:Low	Trig: Free Run Atten: 36 dB	-	DET A WWWWW	
10 dB/div Ref 25.00 dE	3m		Mk	r1 697.708 MHz -32.39 dBm	Auto Tune
		ľ			Center Freq
15.0					695.900000 MHz
5.00					Start Fred
-5.00					693.900000 MHz
-15.0				-13.00 dBm	Stop Fred
-25.0					697.900000 MH
-35.0					CF Step
	~~~~~~				400.000 kHz <u>Auto</u> Mar
45.0					
-55.0					Freq Offset 0 Hz
-65.0					
					Scale Type
Center 695.900 MHz #Res BW 100 kHz	#VBW	300 kHz	Sweep 1	Span 4.000 MHz .000 ms (1001 pts)	Log <u>Lin</u>
MSG			STATUS	3	

Plot 7-102. Lower Extended Band Edge Plot (Band 12/17 – 5.0MHz QPSK – RB Size 25)



Plot 7-103. Upper Band Edge Plot (Band 12/17 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dere C0 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 68 of 143
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🔤 Keysight Spectrum Analyzer - S	wept SA					
LXV RL RF 50	Ω AC	CORREC	SENSE:INT	ALIGN AUTO #Avg Type: RMS	12:28:57 PM May 20, 2016 TRACE 1 2 3 4 5 6 TYPE A WWWWW DET A NNNNN	Frequency
10 dB/div Ref 25.00	dBm	IFGain:Low	Atten: 36 dB	MI	kr1 716.112 MHz -29.43 dBm	Auto Tune
15.0						Center Freq 718.100000 MHz
-5.00						Start Fred 716.100000 MHz
-15.0 -25.0 <mark>4</mark> 1					-13.00 dBm	Stop Free 720.100000 MH:
-35.0	<u> </u>	ممرمحرم	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	CF Step 400.000 kH Auto Mar
55.0						Freq Offse 0 H
-65.0						Scale Type
Center 718.100 MHz #Res BW 100 kHz		#VBW	300 kHz	Sweep	Span 4.000 MHz 1.000 ms (1001 pts)	Log <u>Lin</u>
MSG				STAT	US	

Plot 7-104. Upper Extended Band Edge Plot (Band 12/17 – 5.0MHz QPSK – RB Size 25)



Plot 7-105. Lower Band Edge Plot (Band 12/17 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dere CO of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 69 of 143
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🔤 Keysight Spectrum Analyzer - Swej	pt SA				
<b>LX/RL</b> RF 50 Ω	AC CORREC	SENSE:INT	ALIGN AUTO #Avg Type: RMS	12:25:33 PM May 20, 2016 TRACE 1 2 3 4 5 6	Frequency
	PNO: Wide ↔ IFGain:Low	Trig: Free Run Atten: 36 dB	#Avg Type. Kwa		
10 dB/div Ref 25.00 d	Bm		Mki	r1 697.880 MHz -31.38 dBm	Auto Tune
15.0					Center Freq 695.900000 MHz
-5.00					Start Freq 693.900000 MHz
-15.0				-13.00 dBm	<b>Stop Freq</b> 697.900000 MHz
-35.0				·····	CF Step 400.000 kHz Auto Mar
-45.0					
-55.0					Freq Offsel 0 Hz
-65.0					Scale Type
Center 695.900 MHz #Res BW 100 kHz	#VBW	300 kHz	Sweep 1	Span 4.000 MHz .000 ms (1001 pts)	Log <u>Lin</u>
MSG			STATUS	6	

Plot 7-106. Lower Extended Band Edge Plot (Band 12/17 – 10.0MHz QPSK – RB Size 50)



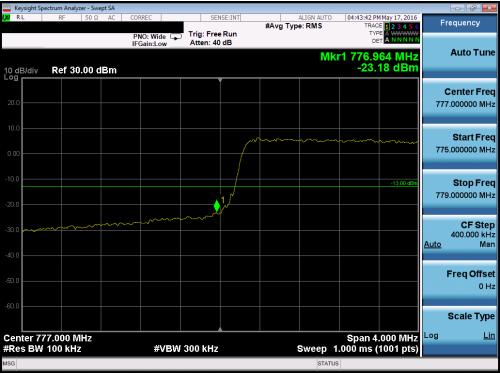
Plot 7-107. Upper Band Edge Plot (Band 12/17 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 70 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 70 of 143
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🚾 Keysight Spectrum Analyzer - Swept SA 🚽					
XIRL RF 50Ω AC	CORREC SI PNO: Wide ↔→ Trig: Fro IFGain:Low Atten: 3	e Run	ALIGN AUTO #Avg Type: RMS	12:26:44 PM May 20, 2016 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A NNNNN	Frequency
10 dB/div Ref 25.00 dBm			Mk	1 716.100 MHz -32.12 dBm	Auto Tune
15.0					Center Freq 718.100000 MHz
-5.00					Start Freq 716.100000 MHz
.15.0				-13.00 dBm	Stop Free 720.100000 MH;
35.0	· Autor many	·······		······	CF Step 400.000 kH: <u>Auto</u> Mar
55.0					<b>Freq Offse</b> 0 H:
.65.0					Scale Type
Center 718.100 MHz #Res BW 100 kHz	#VBW 300 kH:	Z	Sweep 1	Span 4.000 MHz .000 ms (1001 pts)	
ISG			STATUS		

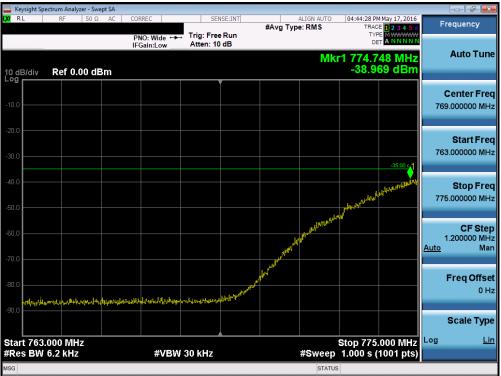
Plot 7-108. Upper Extended Band Edge Plot (Band 12 /17- 10.0MHz QPSK - RB Size 50)



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

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 71 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 71 of 143
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Plot 7-110. Lower Emission Mask Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)



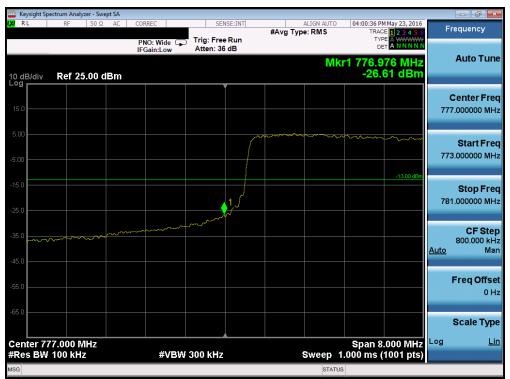
Plot 7-111. Upper Band Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dece 70 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 72 of 143
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	ectrum Analyz												
URL	RF	50 Ω	AC	CORREC		SE	NSE:INT		ALIGN AUTO		M May 17, 2016	Er	equency
	_			PNO: V IFGain:	Vide ↔→→ Low	Trig: Fre Atten: 10		#Avg Typ	e:RMS	TYP	E 1 2 3 4 5 6 E M WWWW A N N N N N		
I0 dB/div	Ref 0.0	00 dB	m						Mk	r1 793.0 -63.	48 MHz 27 dBm		Auto Tun
10.0													Center Fre
30.0											-35.00 dBm	793	Start Fre
40.0 50.0												805	Stop Fre .000000 M⊦
60.0 <mark>¹ ^{Тара}ни</mark>	Wandy Low											1 <u>Auto</u>	CF Ste .200000 MH Ma
80.0	War Martin Martin	Uhay Withmay	m why	1000 Carlor	hard yet white	and the state of the second	IN STARY OF THE PART	Lafel maligner algories	mithianhunsel	marthreamhrough	Warmanad	I	FreqOffso 0⊦
90.0													Scale Typ
tart 793. Res BW	.000 MH 6.2 kHz	Z			#VBW	30 kHz			#Sweep	Stop 805 1.000 s (	.000 MHz 1001 pts)	Log	Ľ
SG									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)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dece 70 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 73 of 143
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L <mark>XI</mark> RL	RF 5	OΩ AC	CORREC	SEN	ISE:INT	#Avg Typ	ALIGN AUTO		M May 23, 2016	Freque	ncy
			PNO: Wide ↔ IFGain:Low	Trig: Free Atten: 36		**** <b>8</b> 13P		TYP			_
10 dB/div	Ref 25.0	0 dBm					Mk	r1 775.0 -42.	00 MHz 61 dBm	Aut	o Tune
15.0										Cento 769.0000	er Freq 000 MHz
-5.00										<b>Sta</b> 763.0000	I <b>rt Freq</b> DOO MHz
-15.0										<b>Sto</b> 775.0000	<b>p Freq</b> 000 MHz
-35.0									-35.00 dBm 1		F Step 000 MH: Mar
-55.0							Martin	WARMAN	Nderl alfans a J	Freq	I <b>Offsel</b> 0 Hz
-65.0 <b>  4,4,4,4</b>	ijdernati den det felsen	and an article in	Hower the the second	anna ann ann ann ann ann ann ann ann an	osteratofficerendelje						е Туре
	.000 MHz		#\/B\M	20 645			# <b>O</b> uvo on	Stop 775	.000 MHz	Log	Lin
#Res BW	0.2 KHZ		#vBW	30 kHz			#Sweep		1001 pts)		
30							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)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 74 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 74 of 143
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	pectrum Ana												- 6 <b>-</b>
<mark>(</mark> RL	RF	50 Ω	AC	CORREC		SEN	ISE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	M May 23, 2016	Fr	equency
	_			PNO: Wid IFGain:Lo		rig: Free tten: 36		• //		TYF DE			A
0 dB/div	Ref 2	25.00 d	Bm						Mk	r1 793.2 -56.	204 MHz 38 dBm		Auto Tun
. ^{og}												C	Center Fre
15.0													.000000 MH
r 00													
5.00													Start Fre
5.00												793	.000000 MH
15.0													Stop Fre
25.0												805	.000000 MH
											-35.00 dBm		CF Ste
35.0											-33.00 0.00		.200000 MI
\$5.0												<u>Auto</u>	Ma
<b>1</b>													Freq Offs
5.0	Handahadad	internet and											01
i5.0	· · · · · · · · · · · · · · · · · · ·	-1644)	the walk wal	white white	urywhydow	n Mailain	nd manipulation	White man by the state	Junioren				
									al and a little		a el sed utili etter		Scale Typ
tart 793	3.000 M	Hz								Stop 805	.000 MHz	Log	L
Res BW				#\	VBW 30	kHz			#Sweep	1.000 s (	1001 pts)		
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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Test Report S/N:	Test Dates:	EUT Type:		Dega 75 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 75 of 143
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	um Analyzer - Swe	ept SA									
XI RL	RF 50 Ω	AC	CORREC		SENSE:INT	#Avg Typ	ALIGN AUTO	TRACI	May 20, 2016	Fre	quency
10 dB/div	Ref 25.00 d	lBm	PNO: Wide IFGain:Low				Mk	1 823.0	ANNNNN		Auto Tune
- <b>og</b> 15.0											enter Free DOOOOO MH
5.00											Start Fre
25.0									-13.00 dBm		Stop Fre 000000 M⊢
45.0									1,	Auto	<b>CF Ste</b> 400.000 kH Ma
55.0		~~~~~				~~~~~				F	reqOffse 0⊦
65.0										S	cale Typ
Center 821. Res BW 10			#V	BW 300 KH	łz		Sweep ′	Span 4. 1.000 ms (′	000 MHz 1001 pts)	Log	<u>Li</u>
ISG							STATU	s			

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



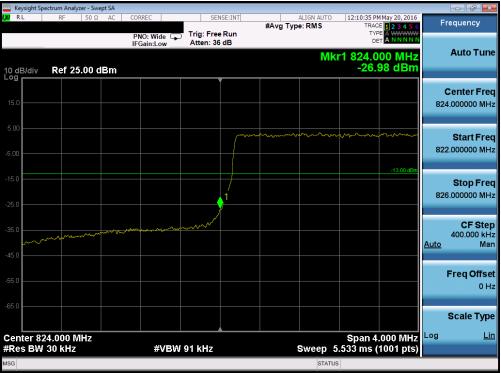
Plot 7-119. Upper Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 70 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 76 of 143
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Keysight Spectrum Analyzer - Swept SA					
M RL RF 50 Ω AC Center Freq 852.000000			ALIGN AUTO g Type: RMS	12:08:48 PM May 20, 2016 TRACE 1 2 3 4 5 6 TYPE A WWWW	Frequency
	IFGain:Low Atten: 36			DET A NNNN	Auto Tune
10 dB/div Ref 25.00 dBm			Mki	1 850.008 MHz -40.99 dBm	Auto Func
209		Ĭ			Center Freq
15.0					852.000000 MHz
5.00					
					Start Freq 850.000000 MHz
-5.00					
-15.0				-13.00 dBm	Stop Freq
-25.0					854.000000 MHz
					CF Step
-35.0 - 1					400.000 kHz
-45.0					<u>Auto</u> Man
	mon	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	<u>.</u>		Freq Offset
-55.0					0 Hz
-65.0					Coole Turne
					Scale Type
Center 852.000 MHz #Res BW 100 kHz	#VBW 300 kHz		Sweep 1	Span 4.000 MHz .000 ms (1001 pts)	Log <u>Lin</u>
MSG			STATUS		

Plot 7-120. Upper Extended Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)



Plot 7-121. Lower Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 77 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 77 of 143
© 2016 PCTEST Engineering	g Laboratory, Inc.			V 3.3



	ectrum Analyz	er - Swep	it SA										
O RL	RF	50 Ω	AC	CORREC		SEI	NSE:INT		ALIGN AUTO		PM May 20, 2016	E	requency
				PNO: W IFGain:L	ide ↔ .ow	Trig: Free Atten: 36		#Avg T	ype: RMS	Т	ACE 1 2 3 4 5 6 YPE A WWWWW DET A NNNNN		
0 dB/div	Ref 25	.00 dl	Зm						M	(r1 822. -29	932 MHz .46 dBm		Auto Tun
15.0													Center Fre 1.000000 M⊦
5.00												819	Start Fre 9.000000 MH
25.0											-13.00 dBm	823	Stop Fre 3.000000 Mi
15.0								~~~~	~~~~~~~~~~~/	·····		<u>Auto</u>	CF Ste 400.000 kł Ma
i5.0		~~~~	~~~~			- 18							Freq Offs 0 F
65.0	21.000 M	U7								Snap	4.000 MHz	Log	Scale Typ
	100 kHz			\$	¢VB₩	300 kHz			Sweep	3pan 1.000 ms	(1001 pts)	_	
SG									STATU	JS			

Plot 7-122. Lower Extended Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)



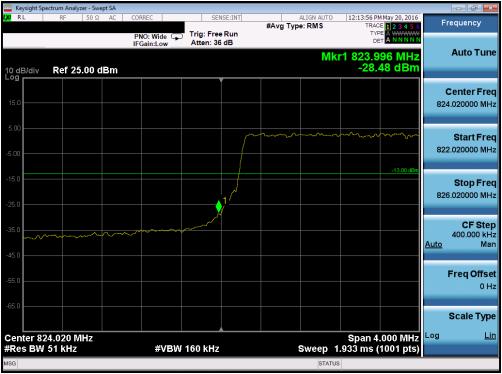
Plot 7-123. Upper Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 70 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 78 of 143
© 2016 PCTEST Engineerin	g Laboratory, Inc.	•		V 3.3



	ectrum Analyzer	- Swept SA									
L <mark>XI</mark> RL	RF	50 Ω AC	CORREC	SENS	E:INT	#Avg Typ	ALIGN AUTO		May 20, 2016	F	requency
			PNO: Wide ↔	. Trig: Free F Atten: 36 d		#Avg Typ	e: RIVIS	TYP	E 1 2 3 4 5 6 E A WWWWW T A N N N N N		
10 dB/div Log	Ref 25.0	00 dBm					Mk	1 850.0 -28.1	04 MHz 10 dBm		Auto Tune
15.0											<b>Center Freq</b> 2.000000 MHz
-5.00										850	Start Freq
-15.0									-13.00 dBm	854	Stop Freq 4.000000 MHz
-35.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Month March							<u>Auto</u>	<b>CF Step</b> 400.000 kHz Man
-45.0					~~~~~				~~~~		Freq Offset
-65.0											Scale Type
Center 85 #Res BW		Iz	#VBW	300 kHz			Sweep 1	Span 4. .000 ms (	.000 MHz 1001 pts)	Log	<u>Lin</u>
MSG							STATUS				

Plot 7-124. Upper Extended Band Edge Plot (Band 5 – Band 5 – 3.0MHz QPSK – RB Size 15)



Plot 7-125. Lower Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 70 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 79 of 143
© 2016 PCTEST Engineerin	g Laboratory, Inc.	-		V 3.3



	ectrum Analyz	er - Swept	t SA										
C RL	RF	50 Ω	AC	CORREC		SE	NSE:INT		ALIGN AUTO		M May 20, 2016	F	requency
				PNO: Wi IFGain:L	de ⊶⊷ ow	Trig: Fre Atten: 3		#Avg 1	ype: RMS	TY	CE 1 2 3 4 5 6 PE A WWWW ET A NNNNN		
0 dB/div	Ref 25	.00 dB	3m						M	kr1 822.9 -32.	976 MHz 94 dBm		Auto Tun
15.0													Center Fre 1.000000 MH
5.00												81	<b>Start Fre</b> 9.000000 MH
25.0											-13.00 dBm	82	Stop Fre 3.000000 M⊦
15.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		~~~~~	~~~~	~~~~		~~~~~	mm	<u>~~</u>	<b>1</b>	<u>Auto</u>	<b>CF Ste</b> 400.000 kH Ma
5.0													Freq Offs 0 F
65.0													Scale Typ
	21.000 M 100 kHz			#	VBW :	300 kHz			Sweep	Span 4 1.000 ms	.000 MHz (1001 pts)	Log	Li
SG									STAT	US			

Plot 7-126. Lower Extended Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)



Plot 7-127. Upper Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dere 00 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 80 of 143
© 2016 PCTEST Engineerin	g Laboratory, Inc.			V 3.3



Keysight Spectrum Analyzer - Swept SA				- 6 <b>-</b>
CIRL RF 50Ω AC	PNO: Wide ↔ Trig: Free Run IFGain:Low Atten: 36 dB	ALIGN AUTO #Avg Type: RMS	12:14:42 PM May 20, 2016 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A N N N N N	Frequency
IO dB/div Ref 25.00 dBm		Mkı	1 850.104 MHz -29.88 dBm	Auto Tune
15.0				Center Free 852.000000 MH
5.00				<b>Start Fre</b> 850.000000 MH
15.0			-13.00 dBm	Stop Fre 854.000000 M⊦
35.0 <b></b>	man and a second			CF Ste 400.000 kH Auto Ma
5.0				Freq Offs 0 ⊦
senter 852.000 MHz			Span 4.000 MHz	Scale Typ
Res BW 100 kHz	#VBW 300 kHz	Sweep 1	.000 ms (1001 pts)	

Plot 7-128. Upper Extended Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)



Plot 7-129. Lower Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 81 of 143
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 81 01 143
© 2016 PCTEST Engineering	g Laboratory, Inc.			V 3.3



	ectrum Analy	zer - Swept SA	•									
K <mark>u</mark> rl	RF	50 Ω AC	CORRE	C	SE	NSE:INT		ALIGN AUTO		M May 20, 2016	En	equency
				:Wide ↔ n:Low	Trig: Fre Atten: 3		#Avg T	ype: RMS	TY	DE 1 2 3 4 5 6 PE A WWWW ET A N N N N N		
I0 dB/div	Ref 25	.00 dBm	n					MI	kr1 822.7 -33.	20 MHz 72 dBm		Auto Tun
15.0												enter Fre .000000 MH
5.00											819	Start Fre
25.0										-13.00 dBm	823	Stop Fre .000000 M⊦
35.0		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	_~~~~	~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		1	<u>Auto</u>	CF Ste 400.000 kH Ma
45.0 <b></b>											P	F <b>req Offs</b> 0 F
65.0												Scale Typ
Center 82 Res BW				#VBW	300 kHz	2		Sweep	Span 4 1.000 ms (	.000 19112	Log	Li
ISG								STAT	US			

Plot 7-130. Lower Extended Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)



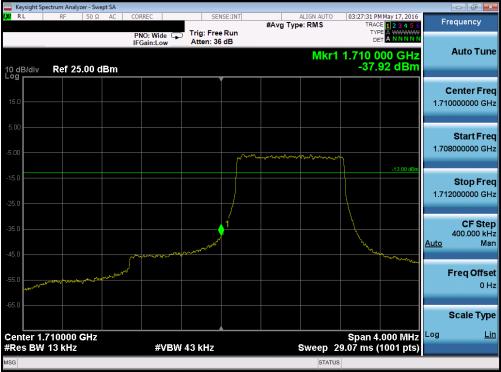
Plot 7-131. Upper Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dere 00 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 82 of 143
© 2016 PCTEST Engineerin	g Laboratory, Inc.			V 3.3



Keysight Spectrum Analy.	zer - Swept SA					
LXU RL RF	50 Ω AC	CORREC PNO: Wide ↔→→ IFGain:Low	SENSE:INT Trig: Free Run Atten: 36 dB	ALIGN AUTO #Avg Type: RMS	12:21:23 PM May 20, 2016 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A N N N N N	Frequency
10 dB/div Ref 25	.00 dBm	II Gain. Eow		Mk	r1 850.336 MHz -34.17 dBm	Auto Tune
15.0						Center Freq 852.000000 MHz
-5.00						Start Freq 850.000000 MHz
-15.0					-13.00 dBm	<b>Stop Freq</b> 854.000000 MHz
-35.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	····	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	·····	CF Step 400.000 kHz Auto Man
-55.0						<b>Freq Offset</b> 0 Hz
-65.0						Scale Type
Center 852.000 N #Res BW 100 kHz		#VBW	300 kHz		1.000 ms (1001 pts)	Log <u>Lin</u>
MSG				STATU	s	

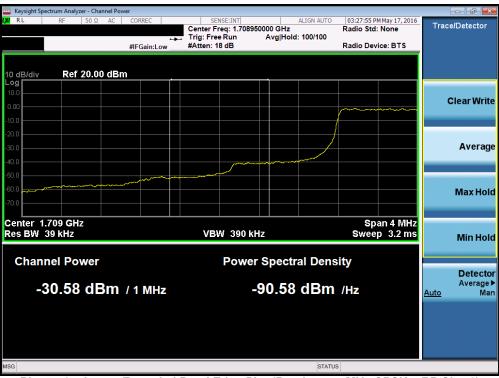
Plot 7-132. Upper Extended Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)



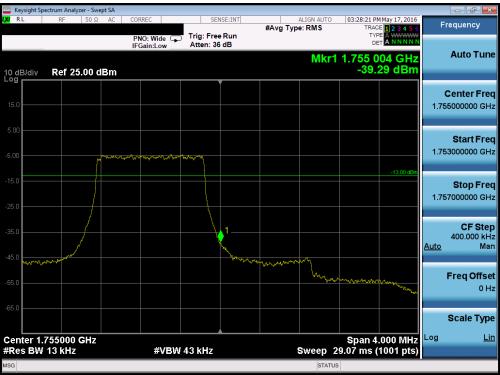
Plot 7-133. Lower Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 02 of 142
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 83 of 143
© 2016 PCTEST Engineerin	g Laboratory, Inc.	-		V 3.3





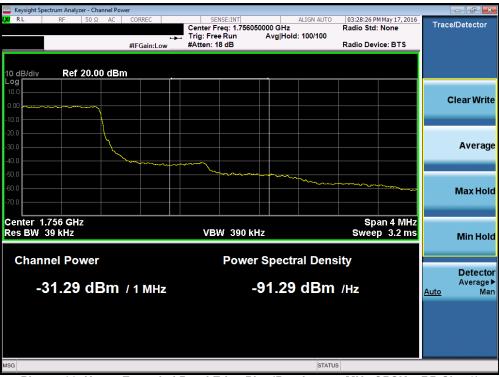
Plot 7-134. Lower Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)



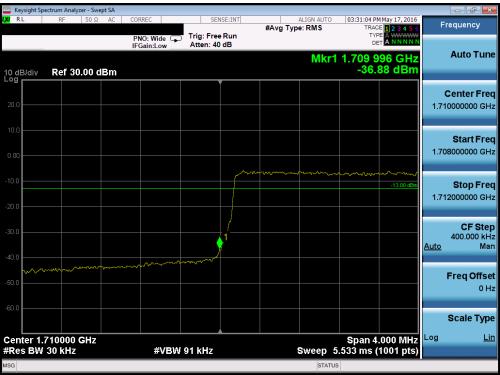
Plot 7-135. Upper Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dege 04 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 84 of 143
© 2016 PCTEST Engineering	g Laboratory, Inc.			V 3.3





Plot 7-136. Upper Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)



Plot 7-137. Lower Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager		
Test Report S/N:	Test Dates:	EUT Type:		Dere 05 of 140		
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 85 of 143		
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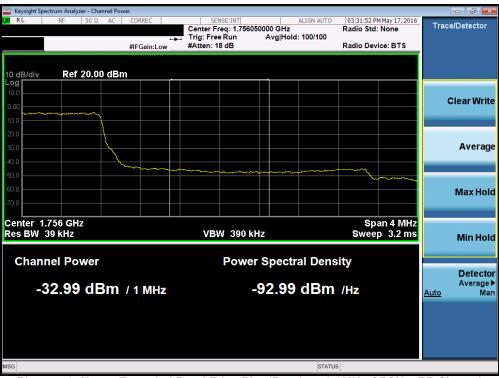
Plot 7-138. Lower Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)



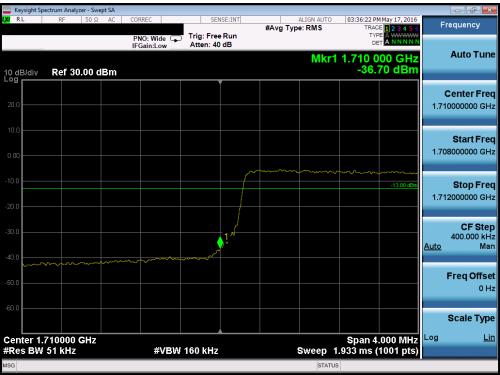
Plot 7-139. Upper Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 90 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 86 of 143
© 2016 PCTEST Engineerin	g Laboratory, Inc.	-		V 3.3





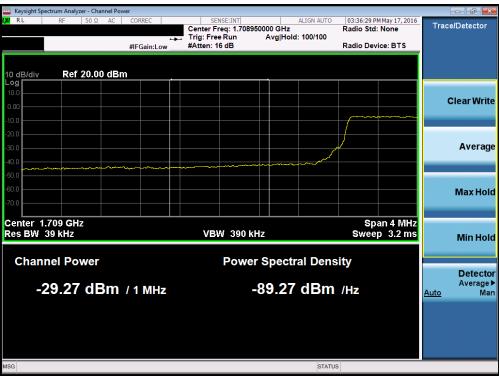
Plot 7-140. Upper Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)



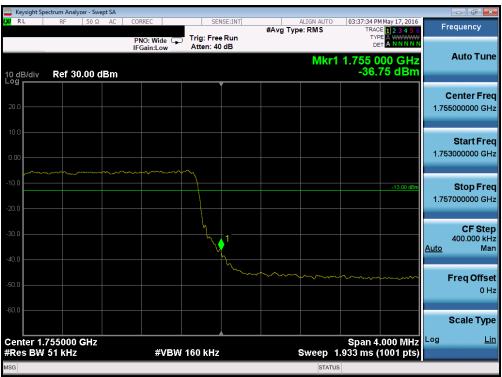
Plot 7-141. Lower Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dece 97 of 142	
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 87 of 143	
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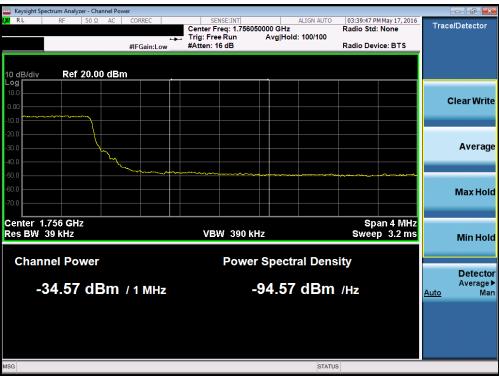
Plot 7-142. Lower Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)



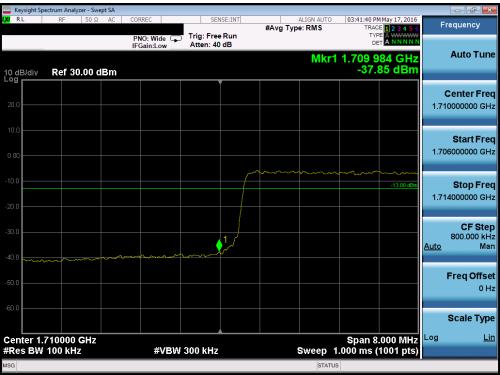
Plot 7-143. Upper Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 00 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 88 of 143
© 2016 PCTEST Engineerin	g Laboratory, Inc.	-		V 3.3





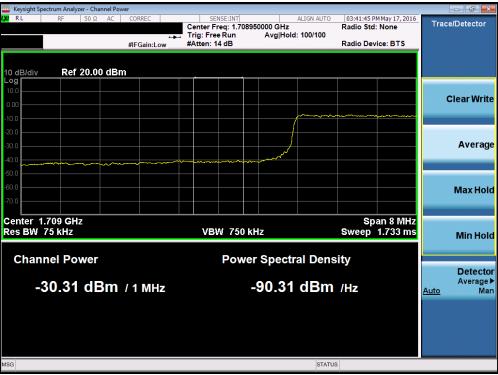
Plot 7-144. Upper Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)



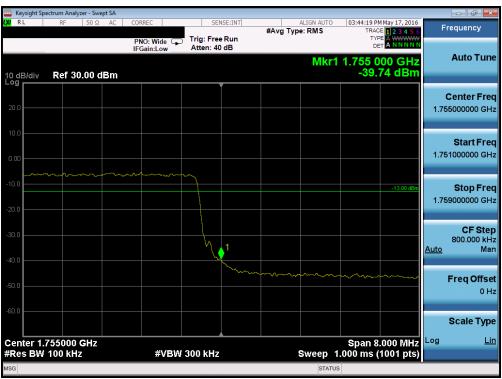
Plot 7-145. Lower Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager		
Test Report S/N:	Test Dates:	EUT Type:		Dega 00 of 140		
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 89 of 143		
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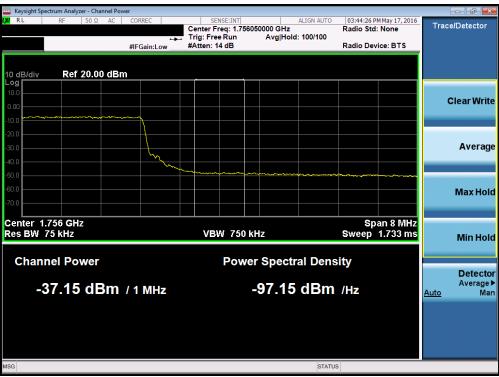
Plot 7-146. Lower Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)



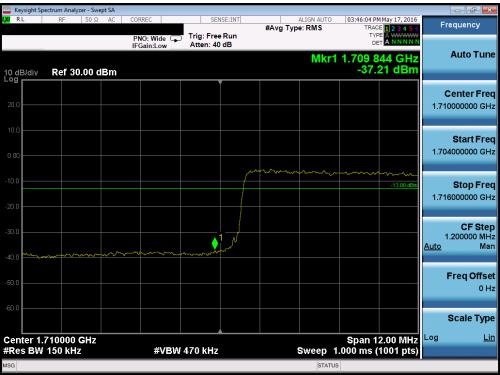
Plot 7-147. Upper Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 00 of 142
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 90 of 143
© 2016 PCTEST Engineering	g Laboratory, Inc.			V 3.3





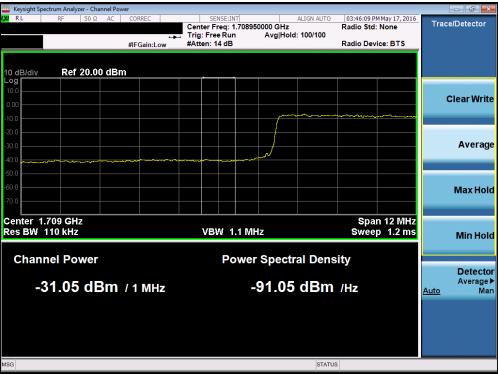
Plot 7-148. Upper Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)



Plot 7-149. Lower Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 01 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 91 of 143
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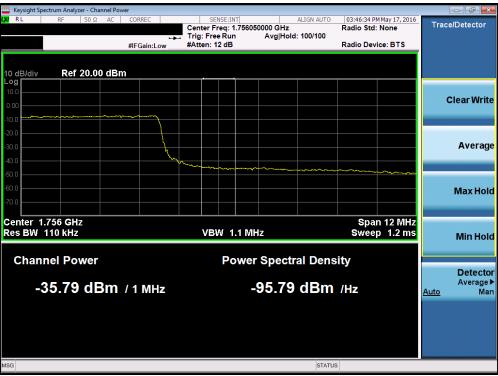
Plot 7-150. Lower Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)



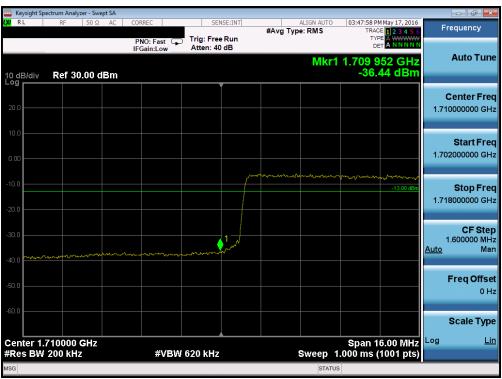
Plot 7-151. Upper Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 00 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 92 of 143
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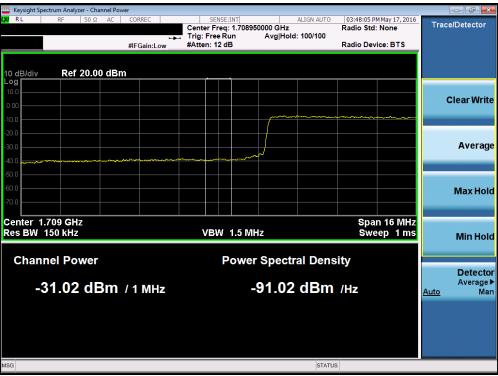
Plot 7-152. Upper Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)



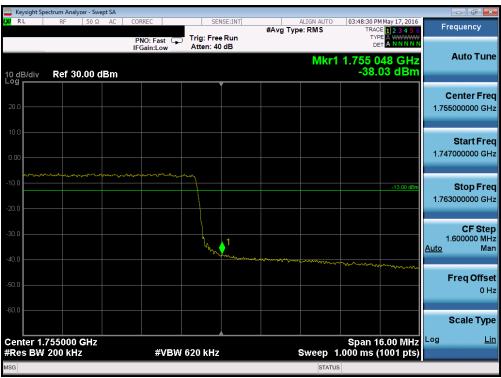
Plot 7-153. Lower Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 02 of 142
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 93 of 143
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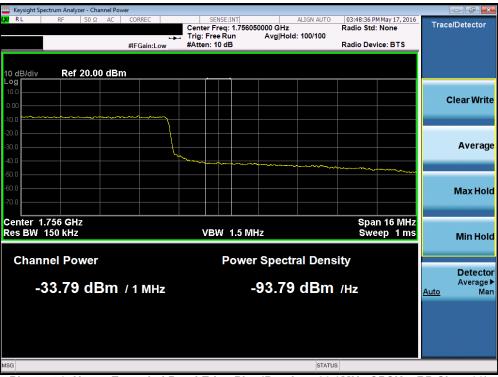
Plot 7-154. Lower Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)



Plot 7-155. Upper Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 94 of 143
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 94 01 143
© 2016 PCTEST Engineering Laboratory, Inc.				





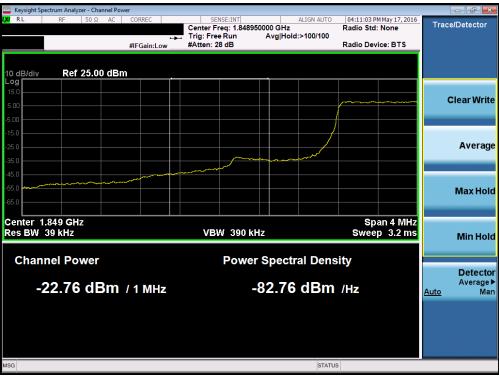
Plot 7-156. Upper Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)



Plot 7-157. Lower Band Edge Plot (Band 2/25 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage OF of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 95 of 143
© 2016 PCTEST Engineering Laboratory, Inc.				





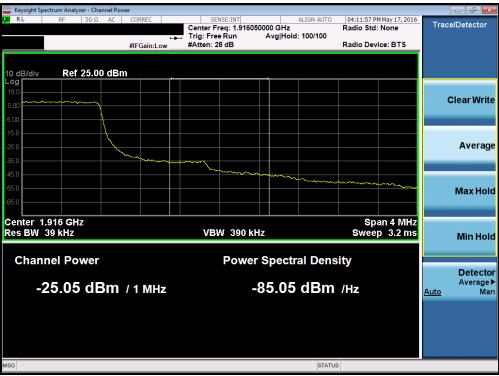
Plot 7-158. Lower Extended Band Edge Plot (Band 2/25 – 1.4MHz QPSK – RB Size 6)



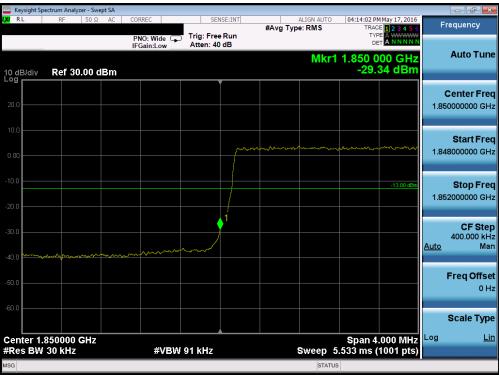
Plot 7-159. Upper Band Edge Plot (Band 2/25 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 00 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 96 of 143
© 2016 PCTEST Engineering Laboratory, Inc.				





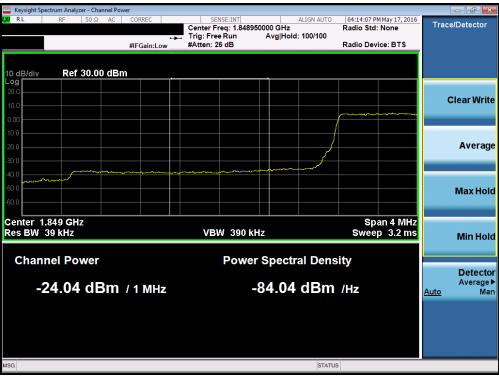
Plot 7-160. Upper Extended Band Edge Plot (Band 2/25 – 1.4MHz QPSK – RB Size 6)



Plot 7-161. Lower Band Edge Plot (Band 2/25 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dere 07 of 142
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 97 of 143
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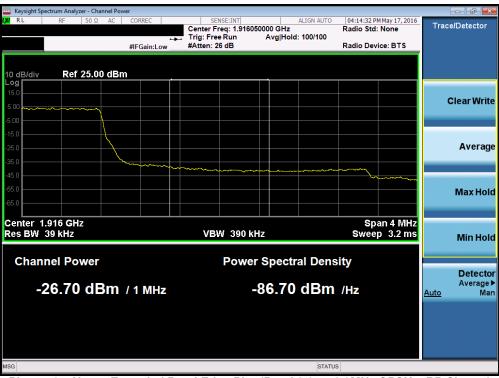
Plot 7-162. Lower Extended Band Edge Plot (Band 2/25 - 3.0MHz QPSK - RB Size 15)



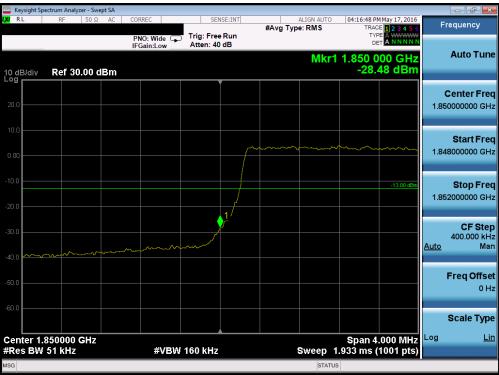
Plot 7-163. Upper Band Edge Plot (Band 2/25 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dere 00 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 98 of 143
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Plot 7-164. Upper Extended Band Edge Plot (Band 2/25 – 3.0MHz QPSK – RB Size 15)



Plot 7-165. Lower Band Edge Plot (Band 2/25 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 00 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 99 of 143
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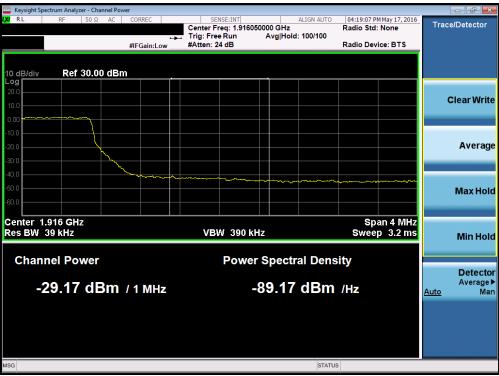
Plot 7-166. Lower Extended Band Edge Plot (Band 2/25 - 5.0MHz QPSK - RB Size 25)



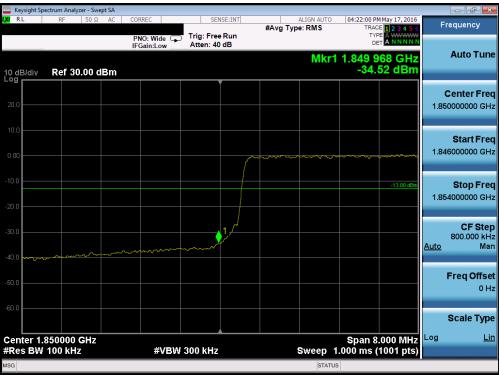
Plot 7-167. Upper Band Edge Plot (Band 2/25 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 100 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 100 of 143
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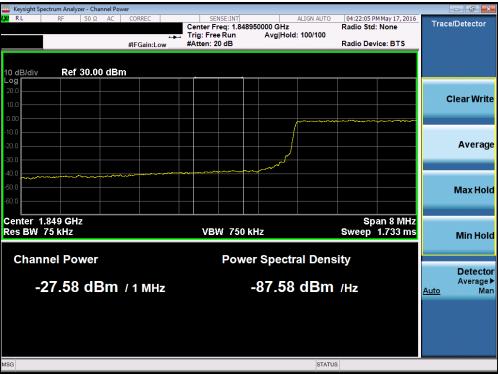
Plot 7-168. Upper Extended Band Edge Plot (Band 2/25 – 5.0MHz QPSK – RB Size 25)



Plot 7-169. Lower Band Edge Plot (Band 2/25 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 101 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 101 of 143
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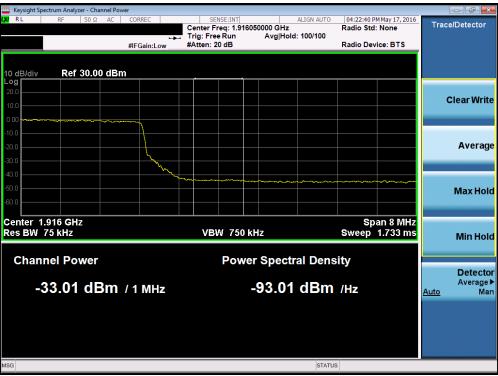
Plot 7-170. Lower Extended Band Edge Plot (Band 2/25 - 10.0MHz QPSK - RB Size 50)



Plot 7-171. Upper Band Edge Plot (Band 2/25 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 100 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 102 of 143
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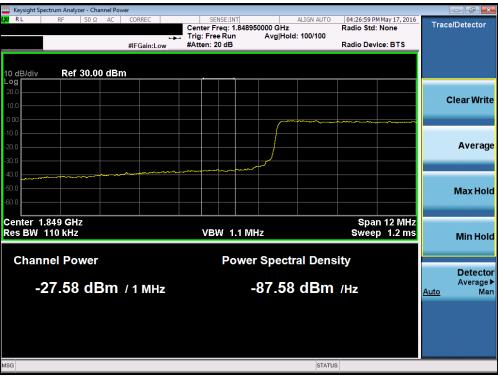
Plot 7-172. Upper Extended Band Edge Plot (Band 2/25 – 10.0MHz QPSK – RB Size 50)



Plot 7-173. Lower Band Edge Plot (Band 2/25 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 100 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 103 of 143
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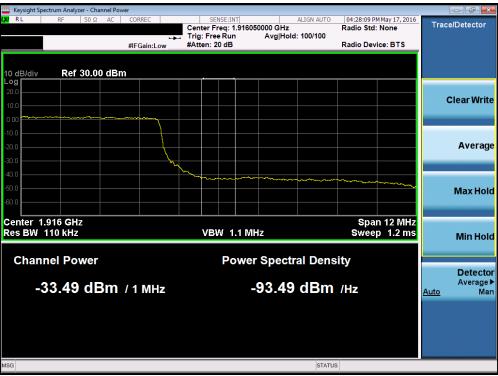
Plot 7-174. Lower Extended Band Edge Plot (Band 2/25 - 15.0MHz QPSK - RB Size 75)



Plot 7-175. Upper Band Edge Plot (Band 2/25 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 104 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 104 of 143
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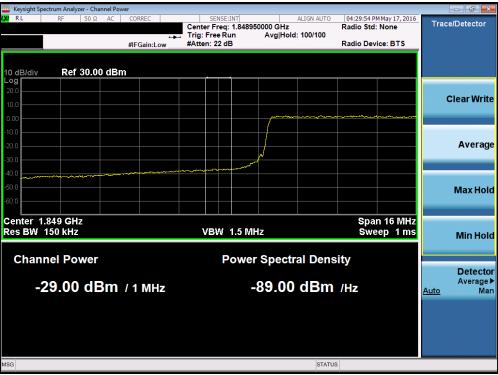
Plot 7-176. Upper Extended Band Edge Plot (Band 2/25 – 15.0MHz QPSK – RB Size 75)



Plot 7-177. Lower Band Edge Plot (Band 2/25 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 105 of 142
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 105 of 143
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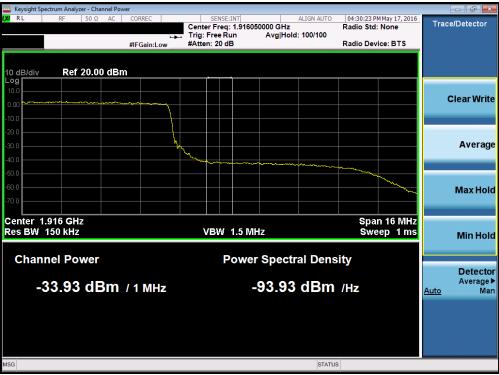
Plot 7-178. Lower Extended Band Edge Plot (Band 2/25 - 20.0MHz QPSK - RB Size 100)



Plot 7-179. Upper Band Edge Plot (Band 2/25 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 100 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 106 of 143
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Plot 7-180. Upper Extended Band Edge Plot (Band 2/25 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 107 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 107 of 143
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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.

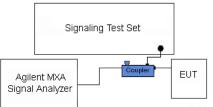


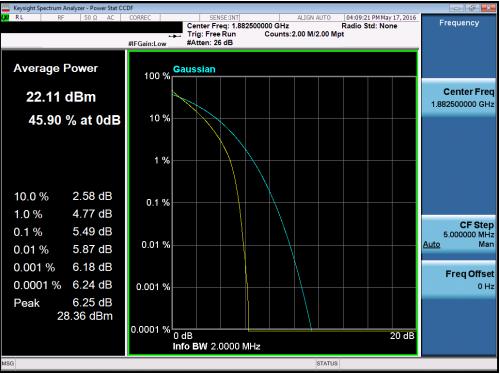
Figure 7-4. Test Instrument & Measurement Setup

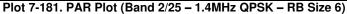
## Test Notes

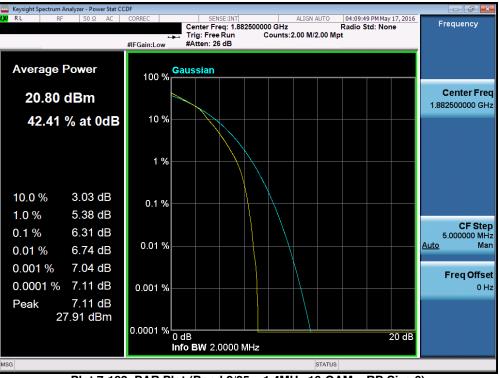
None.

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Page 108 of 143	
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 108 01 143	
© 2016 PCTEST Engineering	2016 PCTEST Engineering Laboratory, Inc.				





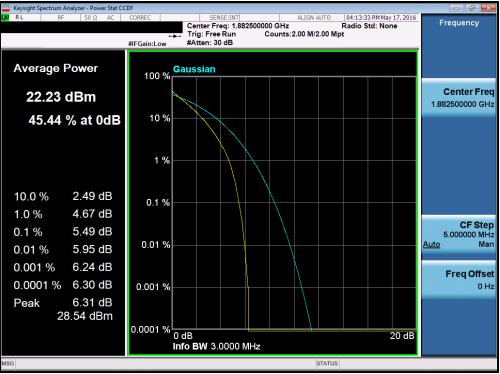




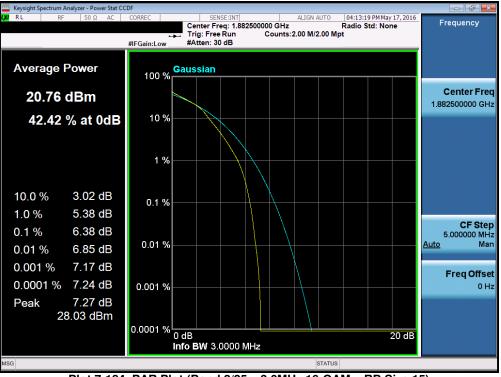
Plot 7-182. PAR Plot (Band 2/25 - 1.4MHz 16-QAM - RB Size 6)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 100 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 109 of 143
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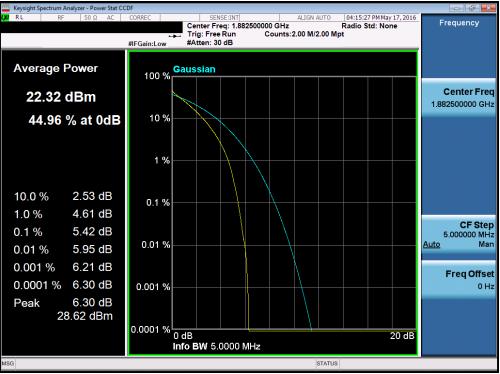
Plot 7-183. PAR Plot (Band 2/25 – 3.0MHz QPSK – RB Size 15)



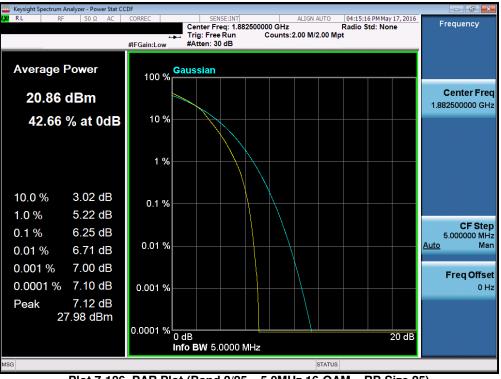
Plot 7-184. PAR Plot (Band 2/25 - 3.0MHz 16-QAM - RB Size 15)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 110 of 142
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 110 of 143
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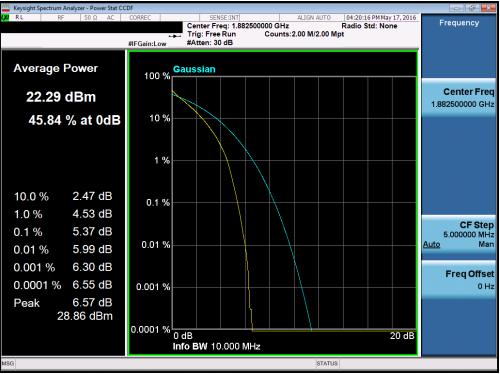
Plot 7-185. PAR Plot (Band 2/25 – 5.0MHz QPSK – RB Size 25)

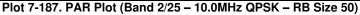


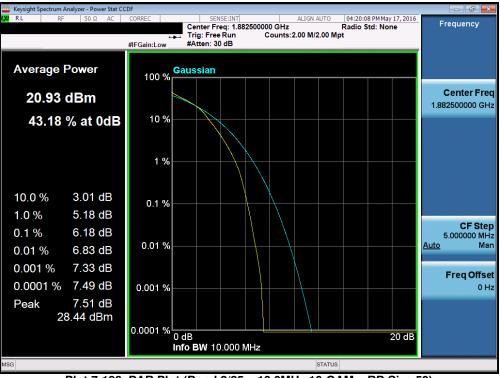
Plot 7-186. PAR Plot (Band 2/25 - 5.0MHz 16-QAM - RB Size 25)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 111 of 142
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 111 of 143
© 2016 PCTEST Engineerin	g Laboratory, Inc.			V 3.3





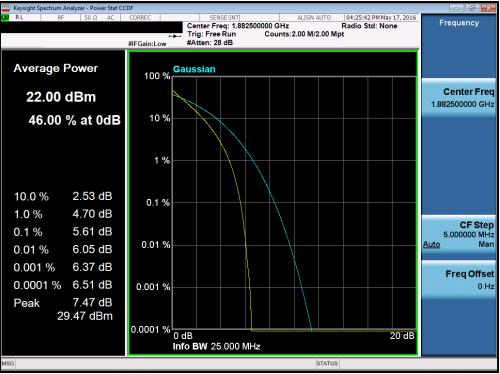


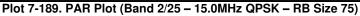


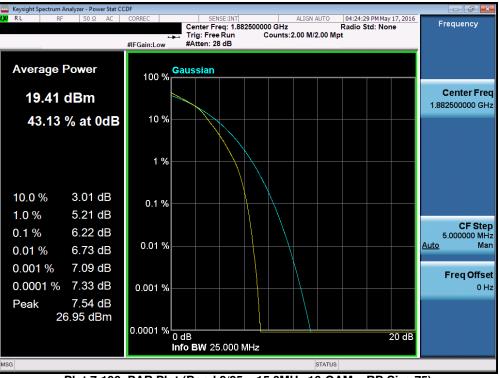
Plot 7-188. PAR Plot (Band 2/25 - 10.0MHz 16-QAM - RB Size 50)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 110 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 112 of 143
© 2016 PCTEST Engineerin	g Laboratory, Inc.			V 3.3





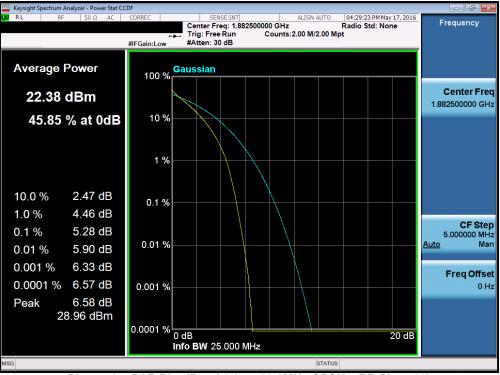


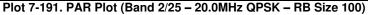


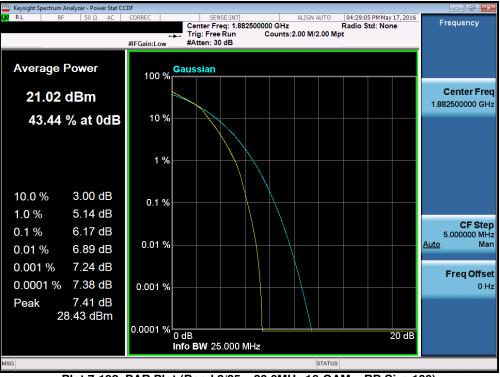
Plot 7-190. PAR Plot (Band 2/25 - 15.0MHz 16-QAM - RB Size 75)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 110 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 113 of 143
© 2016 PCTEST Engineerin	g Laboratory, Inc.	•		V 3.3









Plot 7-192. PAR Plot (Band 2/25 - 20.0MHz 16-QAM - RB Size 100)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 114 of 142
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 114 of 143
© 2016 PCTEST Engineerin	g Laboratory, Inc.			V 3.3



# 7.6 Radiated Power (ERP/EIRP) §22.913(a.2) §24.232(c.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  $\ge$  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

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 115 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset	Page 115 of 143	
© 2016 PCTEST Engineering	Laboratory, Inc.			V 3.3



## Test Setup

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

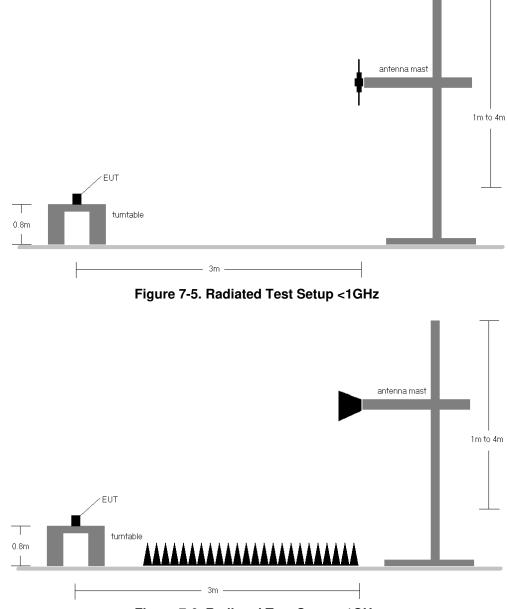


Figure 7-6. Radiated Test Setup >1GHz

## 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: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Demo 110 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 116 of 143
© 2016 PCTEST Engineering	Jaboratory, Inc.			V 3.3



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	264	184	1 / 5	16.07	2.12	18.19	34.77	-16.58
707.50	1.4	QPSK	Н	262	166	1 / 5	16.83	2.31	19.14	34.77	-15.63
715.30	1.4	QPSK	Н	274	187	1 / 5	16.08	2.52	18.60	34.77	-16.17
699.70	1.4	16-QAM	Н	264	184	1 / 5	15.45	2.12	17.57	34.77	-17.20
707.50	1.4	16-QAM	Н	262	166	1 / 5	15.99	2.31	18.30	34.77	-16.47
715.30	1.4	16-QAM	Н	274	187	1 / 5	15.42	2.52	17.94	34.77	-16.83
700.50	3	QPSK	Н	262	178	1 / 0	16.26	2.12	18.38	34.77	-16.39
707.50	3	QPSK	Н	267	193	1 / 14	17.02	2.31	19.33	34.77	-15.44
714.50	3	QPSK	Н	269	188	1 / 0	16.12	2.50	18.62	34.77	-16.15
700.50	3	16-QAM	Н	262	178	1 / 0	15.54	2.12	17.66	34.77	-17.11
707.50	3	16-QAM	Н	267	193	1 / 14	16.18	2.31	18.49	34.77	-16.28
714.50	3	16-QAM	Н	269	188	1 / 0	15.39	2.50	17.89	34.77	-16.88
707.50	3	QPSK	V	208	162	1 / 14	15.32	2.31	17.63	34.77	-17.14

# 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	265	180	1 / 24	16.66	2.15	18.81	34.77	-15.96
707.50	5	QPSK	н	265	189	1 / 24	17.03	2.31	19.34	34.77	-15.43
713.50	5	QPSK	н	241	186	1 / 24	16.62	2.48	19.10	34.77	-15.68
701.50	5	16-QAM	Н	265	180	1 / 24	15.41	2.15	17.56	34.77	-17.21
707.50	5	16-QAM	н	265	189	1 / 24	15.93	2.31	18.24	34.77	-16.53
713.50	5	16-QAM	н	241	186	1 / 24	15.91	2.48	18.39	34.77	-16.39
704.00	10	QPSK	н	265	189	1 / 49	16.50	2.22	18.72	34.77	-16.06
707.50	10	QPSK	н	265	191	1 / 0	15.88	2.31	18.19	34.77	-16.58
711.00	10	QPSK	Н	270	186	1 / 0	16.51	2.41	18.92	34.77	-15.85
704.00	10	16-QAM	н	265	189	1 / 49	15.78	2.22	18.00	34.77	-16.77
707.50	10	16-QAM	Н	265	191	1 / 0	15.04	2.31	17.35	34.77	-17.42
711.00	10	16-QAM	н	270	186	1 / 0	15.69	2.41	18.10	34.77	-16.67

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

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 117 of 143
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 117 01 143
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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	235	356	1 / 24	15.79	4.19	19.98	34.77	-14.79
782.00	5	QPSK	Н	235	0	1 / 24	15.85	4.25	20.10	34.77	-14.67
784.50	5	QPSK	Н	235	349	1 / 24	16.01	4.32	20.33	34.77	-14.44
779.50	5	16QAM	Н	235	356	1 / 24	15.05	4.19	19.24	34.77	-15.53
782.00	5	16QAM	Н	235	0	1 / 24	14.82	4.25	19.07	34.77	-15.70
784.50	5	16QAM	Н	235	349	1 / 24	15.02	4.32	19.34	34.77	-15.43
782.00	10	QPSK	Н	235	349	1 / 49	15.76	4.25	20.01	34.77	-14.76
782.00	10	16QAM	Н	235	349	1 / 49	15.17	4.25	19.42	34.77	-15.35

Table 7-4. ERP Data (Band 13)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dego 110 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 118 of 143
© 2016 PCTEST Engineering	Laboratory, Inc.			V 3.3



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	359	193	1 / 5	13.88	5.01	18.89	38.45	-19.56
836.50	1.4	QPSK	Н	294	155	3 / 2	14.51	5.16	19.67	38.45	-18.78
848.30	1.4	QPSK	Н	293	194	1 / 5	14.38	5.30	19.68	38.45	-18.77
824.70	1.4	16-QAM	Н	287	193	1 / 5	13.03	5.01	18.04	38.45	-20.41
836.50	1.4	16-QAM	Н	294	155	3 / 2	13.81	5.16	18.97	38.45	-19.48
848.30	1.4	16-QAM	Н	293	194	1 / 5	13.54	5.30	18.84	38.45	-19.61
825.50	3	QPSK	Н	358	196	1 / 14	14.33	5.02	19.35	38.45	-19.10
836.50	3	QPSK	Н	377	196	1 / 14	14.59	5.16	19.75	38.45	-18.70
847.50	3	QPSK	Н	319	196	1 / 0	14.83	5.29	20.12	38.45	-18.33
825.50	3	16-QAM	Н	358	196	1 / 14	13.59	5.02	18.61	38.45	-19.84
836.50	3	16-QAM	Н	377	196	1 / 14	13.69	5.16	18.85	38.45	-19.60
847.50	3	16-QAM	Н	319	196	1 / 0	13.93	5.29	19.22	38.45	-19.23
826.50	5	QPSK	Н	359	195	1 / 24	14.70	5.03	19.73	38.45	-18.72
836.50	5	QPSK	Н	342	196	1 / 0	15.18	5.16	20.34	38.45	-18.11
846.50	5	QPSK	Н	318	197	1 / 24	14.55	5.28	19.83	38.45	-18.62
826.50	5	16-QAM	Н	359	195	1 / 24	13.66	5.03	18.69	38.45	-19.76
836.50	5	16-QAM	Н	342	196	1 / 0	14.06	5.16	19.22	38.45	-19.23
846.50	5	16-QAM	Н	318	197	1 / 24	13.90	5.28	19.18	38.45	-19.27
829.00	10	QPSK	Н	359	196	1 / 49	14.45	5.06	19.51	38.45	-18.94
836.50	10	QPSK	Н	359	195	1 / 0	14.89	5.16	20.05	38.45	-18.40
844.00	10	QPSK	Н	319	195	1 / 49	14.34	5.25	19.59	38.45	-18.86
829.00	10	16-QAM	Н	359	196	1 / 49	13.81	5.06	18.87	38.45	-19.58
836.50	10	16-QAM	Н	359	195	1 / 49	12.98	5.16	18.14	38.45	-20.31
844.00	10	16-QAM	Н	319	195	1 / 49	13.71	5.25	18.96	38.45	-19.49
836.50	5	QPSK	V	290	196	1 / 0	14.30	5.16	19.46	38.45	-18.99

Table 7-5. ERP Data (Band 5)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 110 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 119 of 143
© 2016 PCTEST Engineering	Laboratory, Inc.	·		V 3.3



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	187	94	1 / 0	13.46	9.66	23.12	30.00	-6.88
1732.50	1.4	QPSK	Н	189	86	1 / 5	13.13	9.61	22.74	30.00	-7.26
1754.30	1.4	QPSK	Н	185	81	3 / 2	12.84	9.57	22.41	30.00	-7.59
1710.70	1.4	16-QAM	Н	187	94	1 / 0	13.35	9.66	23.01	30.00	-6.99
1732.50	1.4	16-QAM	Н	189	86	1 / 5	12.97	9.61	22.58	30.00	-7.42
1754.30	1.4	16-QAM	Н	185	81	3 / 2	12.71	9.57	22.28	30.00	-7.72
1711.50	3	QPSK	Н	186	95	1 / 0	13.55	9.65	23.20	30.00	-6.80
1732.50	3	QPSK	Н	178	90	1 / 14	13.50	9.61	23.11	30.00	-6.89
1753.50	3	QPSK	Н	182	85	1 / 0	13.27	9.57	22.84	30.00	-7.16
1711.50	3	16-QAM	Н	186	95	1 / 0	13.46	9.65	23.11	30.00	-6.89
1732.50	3	16-QAM	Н	178	90	1 / 14	13.33	9.61	22.94	30.00	-7.06
1753.50	3	16-QAM	Н	182	85	1 / 0	13.21	9.57	22.78	30.00	-7.22
1712.50	5	QPSK	Н	132	98	1 / 0	13.37	9.65	23.02	30.00	-6.98
1732.50	5	QPSK	Н	128	92	1 / 0	12.87	9.61	22.48	30.00	-7.52
1752.50	5	QPSK	Н	130	89	1 / 0	12.81	9.57	22.38	30.00	-7.62
1712.50	5	16-QAM	Н	132	98	1 / 0	12.78	9.65	22.43	30.00	-7.57
1732.50	5	16-QAM	Н	128	92	1 / 0	12.45	9.61	22.06	30.00	-7.94
1752.50	5	16-QAM	Н	130	89	1 / 0	12.32	9.57	21.89	30.00	-8.11
1715.00	10	QPSK	Н	132	92	1 / 0	13.21	9.65	22.86	30.00	-7.14
1732.50	10	QPSK	Н	128	88	1 / 0	13.17	9.61	22.78	30.00	-7.22
1750.00	10	QPSK	Н	126	88	1 / 49	13.05	9.58	22.63	30.00	-7.37
1715.00	10	16-QAM	Н	132	92	1 / 0	13.09	9.65	22.74	30.00	-7.26
1732.50	10	16-QAM	Н	128	88	1 / 0	13.09	9.61	22.70	30.00	-7.30
1750.00	10	16-QAM	н	126	88	1 / 49	12.98	9.58	22.56	30.00	-7.44
1717.50	15	QPSK	Н	131	83	1 / 0	13.46	9.64	23.10	30.00	-6.90
1732.50	15	QPSK	Н	131	91	1 / 0	13.65	9.61	23.26	30.00	-6.74
1747.50	15	QPSK	н	131	93	1 / 74	12.58	9.58	22.16	30.00	-7.84
1717.50	15	16-QAM	н	131	83	1 / 0	13.07	9.64	22.71	30.00	-7.29
1732.50	15	16-QAM	н	131	91	1 / 0	13.50	9.61	23.11	30.00	-6.89
1747.50	15	16-QAM	Н	131	93	1 / 74	12.50	9.58	22.08	30.00	-7.92
1720.00	20	QPSK	Н	128	113	1 / 99	11.99	9.64	21.63	30.00	-8.37
1732.50	20	QPSK	Н	121	94	1 / 99	12.70	9.61	22.31	30.00	-7.69
1745.00	20	QPSK	Н	126	97	1 / 99	12.98	9.59	22.57	30.00	-7.43
1720.00	20	16-QAM	н	128	113	1 / 99	11.52	9.64	21.16	30.00	-8.84
1732.50	20	16-QAM	Н	121	94	1 / 99	12.58	9.61	22.19	30.00	-7.81
1745.00	20	16-QAM	н	126	97	1 / 99	12.81	9.59	22.40	30.00	-7.60
1711.50	3	QPSK	v	117	340	1 / 0	11.45	9.65	21.10	30.00	-8.90

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

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 100 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 120 of 143
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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	271	105	1 / 5	16.05	9.35	25.40	33.01	-7.61
1882.50	1.4	QPSK	н	265	97	1 / 0	16.75	9.27	26.02	33.01	-6.99
1914.30	1.4	QPSK	н	263	97	3 / 2	15.24	9.26	24.50	33.01	-8.51
1850.70	1.4	16-QAM	н	271	105	1 / 5	15.90	9.35	25.25	33.01	-7.76
1882.50	1.4	16-QAM	Н	265	97	1 / 5	16.61	9.27	25.88	33.01	-7.13
1914.30	1.4	16-QAM	н	263	97	3 / 2	14.13	9.26	23.39	33.01	-9.62
1851.50	3	QPSK	Н	272	104	1 / 14	16.25	9.35	25.60	33.01	-7.41
1882.50	3	QPSK	н	267	104	15 / 0	17.06	9.27	26.33	33.01	-6.68
1913.50	3	QPSK	Н	263	93	1 / 14	14.81	9.26	24.07	33.01	-8.94
1851.50	3	16-QAM	н	272	104	1 / 14	16.23	9.35	25.58	33.01	-7.43
1882.50	3	16-QAM	н	267	104	15 / 0	16.08	9.27	25.35	33.01	-7.66
1913.50	3	16-QAM	н	263	93	1 / 14	13.86	9.26	23.12	33.01	-9.89
1852.50	5	QPSK	Н	270	106	25 / 0	16.23	9.34	25.57	33.01	-7.44
1882.50	5	QPSK	н	269	100	25 / 0	17.00	9.27	26.27	33.01	-6.74
1912.50	5	QPSK	Н	263	95	25 / 0	14.89	9.26	24.15	33.01	-8.86
1852.50	5	16-QAM	Н	270	106	25 / 0	15.37	9.34	24.71	33.01	-8.30
1882.50	5	16-QAM	Н	269	100	25 / 0	16.14	9.27	25.41	33.01	-7.60
1912.50	5	16-QAM	н	263	95	25 / 0	14.28	9.26	23.54	33.01	-9.47
1855.00	10	QPSK	Н	267	150	50 / 0	15.74	9.34	25.08	33.01	-7.93
1882.50	10	QPSK	н	265	100	1 / 0	16.99	9.27	26.26	33.01	-6.75
1910.00	10	QPSK	н	260	100	1 / 49	14.91	9.25	24.16	33.01	-8.85
1855.00	10	16-QAM	н	267	150	50 / 0	15.73	9.34	25.07	33.01	-7.94
1882.50	10	16-QAM	Н	265	100	1 / 0	16.92	9.27	26.19	33.01	-6.82
1910.00	10	16-QAM	Н	260	100	1 / 49	14.02	9.25	23.27	33.01	-9.74
1857.50	15	QPSK	Н	208	95	1 / 74	14.55	9.33	23.88	33.01	-9.13
1882.50	15	QPSK	н	208	102	1 / 0	15.95	9.27	25.22	33.01	-7.79
1907.50	15	QPSK	Н	201	91	1 / 0	15.36	9.24	24.60	33.01	-8.41
1857.50	15	16-QAM	Н	208	95	1 / 74	14.48	9.33	23.81	33.01	-9.20
1882.50	15	16-QAM	Н	208	102	1 / 0	15.92	9.27	25.19	33.01	-7.82
1907.50	15	16-QAM	Н	201	91	1 / 0	15.66	9.24	24.90	33.01	-8.11
1860.00	20	QPSK	Н	271	99	50 / 25	15.70	9.32	25.02	33.01	-7.99
1882.50	20	QPSK	н	265	98	50 / 25	16.66	9.27	25.93	33.01	-7.08
1905.00	20	QPSK	Н	260	96	1 / 99	15.06	9.24	24.30	33.01	-8.71
1860.00	20	16-QAM	н	271	99	50 / 25	14.61	9.32	23.93	33.01	-9.08
1882.50	20	16-QAM	н	265	98	50 / 25	15.68	9.27	24.95	33.01	-8.06
	20	16-QAM	н	260	96	1 / 99	14.34	9.24	23.58	33.01	-9.43

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 101 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 121 of 143

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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)

## **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 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 = Peak
- 6. Trace mode = max hold
- 7. The trace was allowed to stabilize

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🔁 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 122 of 143
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Fage 122 01 143
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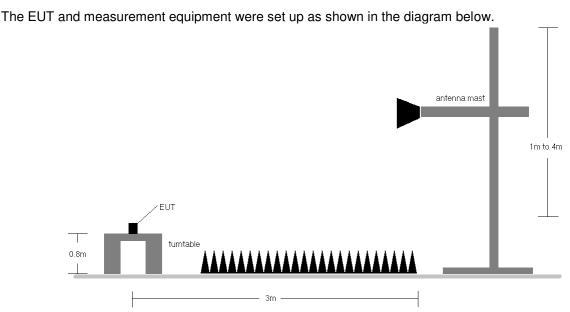


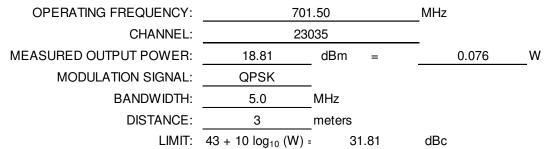
Figure 7-7. Test Instrument & Measurement Setup

## 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.

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager			
Test Report S/N:	Test Dates:	EUT Type:		Demo 100 of 140			
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 123 of 143			
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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	117	-61.82	5.60	-56.22	75.0
2104.50	Н	100	252	-60.65	6.67	-53.98	72.8
2806.00	Н	-	-	-61.78	7.92	-53.86	72.7
3507.50	Н	100	239	-50.94	7.80	-43.13	61.9
4209.00	Н	100	143	-55.05	8.30	-46.75	65.6
4910.50	Н	-	-	-56.44	8.71	-47.73	66.5

Table 7-8. Radiated Spurious Data (Band 12/17 – Low Channel)

OPERATING FREQUENCY: CHANNEL: MEASURED OUTPUT POWER: MODULATION SIGNAL: BANDWIDTH: DISTANCE:

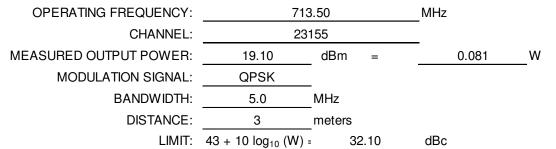
707.50 MHz 23095 19.34 dBm W 0.086 = QPSK 5.0 MHz 3 meters LIMIT: 43 + 10 log₁₀ (W) = 32.34 dBc

Ant. Antenna Turntable Level at Substitute **Spurious** Frequency Emission Level Pol. Height Azimuth Antenna Antenna Gain [dBc] [MHz] [H/V] Terminals [dBm] [dBd] [dBm] [cm] [degree] 1415.00 Н 100 100 -59.68 5.69 -53.99 73.3 2122.50 Н 100 254 -58.80 6.75 -52.05 71.4 -61.49 2830.00 Н --7.90 -53.60 72.9 3537.50 Н 100 347 -51.73 7.81 -43.92 63.3 4245.00 Н 100 -56.10 8.41 -47.69 67.0 143 -47.25 4952.50 Н ---56.00 8.74 66.6

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

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager				
Test Report S/N:	Test Dates:	EUT Type:		Page 124 of 143				
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 124 01 143				
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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	91	-61.81	5.79	-56.02	75.1
2140.50	Н	100	258	-58.02	6.82	-51.20	70.3
2854.00	Н	-	-	-61.83	7.88	-53.95	73.0
3567.50	Н	100	347	-50.57	7.82	-42.76	61.9
4281.00	Н	100	143	-56.52	8.52	-47.99	67.1
4994.50	Н	-	-	-56.37	8.78	-47.59	66.7

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

OPERATING FREQUENCY: CHANNEL: MEASURED OUTPUT POWER: MODULATION SIGNAL: BANDWIDTH: DISTANCE: LIMIT: 43 + 10

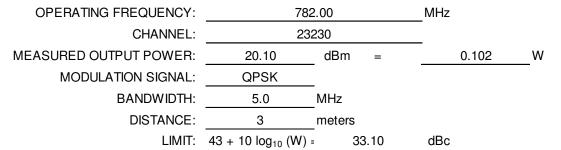
779.50 MHz 23205 19.98 dBm 0.100 W = QPSK 5.0 MHz 3 meters 32.98 LIMIT: 43 + 10 log₁₀ (W) = dBc

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]
2338.50	Н	100	274	-56.46	7.35	-49.11	69.1
3118.00	Н	-	-	-61.21	7.19	-54.02	74.0

Table 7-11. Radiated Spurious Data (Band 13 – Low Channel)

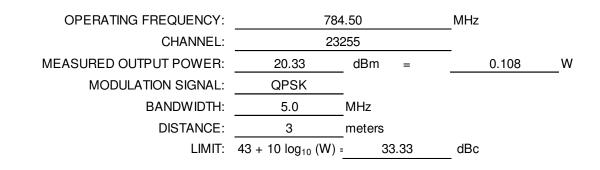
FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dece 105 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 125 of 143
© 2016 PCTEST Engineering	Laboratory, Inc.			V 3.3





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	100	206	-46.35	7.33	-39.02	59.1
3128.00	Н	-	-	-58.53	7.20	-51.33	71.4

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



Frequency [MHz]	Ant. Pol. [H/V]	Height	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
2353.50	Н	100	271	-48.78	7.30	-41.48	61.8
3138.00	Н	-	-	-59.09	7.21	-51.88	72.2

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

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Demo 100 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 126 of 143
© 2016 PCTEST Engineering	Laboratory, Inc.			V 3.3



MODULATION SIGNAL:	QPSK	_
BANDWIDTH:	5.00	MHz
DISTANCE:	3	meters
NARROWBAND EMISSION LIMIT:	-50	dBm
WIDEBAND EMISSION LIMIT:	-40	dBm/MHz
		-

Frequency [MHz]	Ant. Pol. [H/V]	Height	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Margin [dB]
1559.00	Н	100	122	-64.55	6.55	-58.00	-18.0
1564.00	Н	100	224	-64.69	6.57	-58.12	-18.1
1569.00	Н	100	39	-62.97	6.59	-56.39	-16.4

Table 7-14. Radiated Spurious Data (Band 13 – 1559-1610MHz Band)

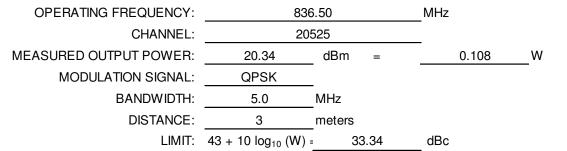
OPERATING FREQUENCY:	826	5.50	MHz
CHANNEL:	204	425	_
MEASURED OUTPUT POWER:	19.73	dBm =	0.094 W
MODULATION SIGNAL:	QPSK		
BANDWIDTH:	5.0	MHz	
DISTANCE:	3	meters	
LIMIT:	43 + 10 log ₁₀ (W) =	32.73	dBc

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	100	91	-63.15	6.70	-56.46	76.2
2479.50	Н	100	270	-57.23	7.54	-49.69	69.4
3306.00	Н	-	-	-58.90	7.38	-51.51	71.2

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

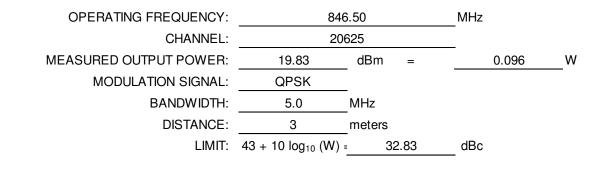
FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dece 107 of 142
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 127 of 143
© 2016 PCTEST Engineering	Laboratory, Inc.			V 3.3





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	100	178	-62.74	6.70	-56.04	76.4
2509.50	Н	100	266	-56.76	7.63	-49.13	69.5
3346.00	Н	-	-	-59.13	7.51	-51.62	72.0

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

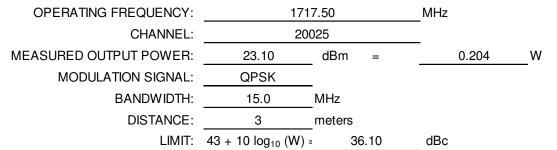


Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1693.00	Н	100	179	-60.92	6.70	-54.22	74.1
2539.50	Н	100	270	-55.37	7.60	-47.77	67.6
3386.00	Н	-	-	-59.57	7.65	-51.92	71.8

Table 7-17. Radiated Spurious Data (Band 5 – High Channel)

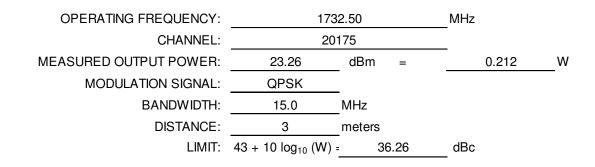
FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Demo 100 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 128 of 143
© 2016 PCTEST Engineering	Laboratory, Inc.	·		V 3.3





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]
3435.00	Н	100	78	-51.25	8.14	-43.11	66.2
5152.50	Н	188	237	-55.43	10.36	-45.06	68.2
6870.00	Н	101	202	-52.53	11.48	-41.06	64.2
8587.50	Н	101	236	-53.17	13.04	-40.12	63.2
10305.00	Н	-	-	-52.01	13.10	-38.90	62.0

Table 7-18. Radiated Spurious Data (Band 4 – Low Channel)

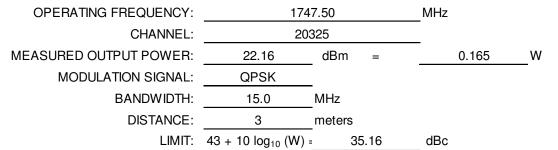


Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3465.00	Н	100	297	-46.15	8.26	-37.89	61.2
5197.50	Н	103	81	-55.52	10.41	-45.10	68.4
6930.00	Н	101	261	-50.71	11.53	-39.18	62.4
8662.50	Н	101	232	-51.69	13.07	-38.62	61.9
10395.00	Н	-	-	-52.64	13.13	-39.51	62.8

Table 7-19. Radiated Spurious Data (Band 4 – Mid Channel)

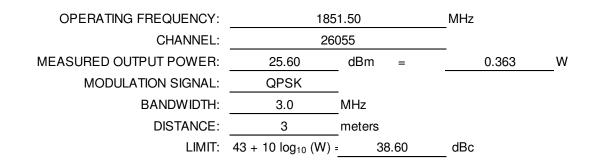
FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Demo 100 of 140	
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 129 of 143	
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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3495.00	Н	100	123	-50.65	8.36	-42.29	64.5
5242.50	Н	101	309	-55.11	10.35	-44.76	66.9
6990.00	Н	100	239	-49.83	11.59	-38.24	60.4
8737.50	Н	117	235	-50.52	13.08	-37.44	59.6
10485.00	Н	-	-	-52.22	12.95	-39.26	61.4

Table 7-20. Radiated Spurious Data (Band 4 – High Channel)

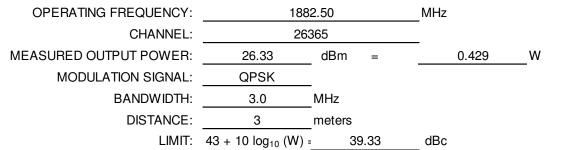


Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3703.00	Н	151	198	-48.26	8.41	-39.85	65.4
5554.50	Н	149	265	-54.05	10.52	-43.54	69.1
7406.00	Н	144	263	-51.46	12.01	-39.45	65.0
9257.50	Н	-	-	-54.12	13.27	-40.86	66.5

 Table 7-21. Radiated Spurious Data (Band 2/25 – Low Channel)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dega 100 of 140	
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 130 of 143	
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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]
3765.00	Н	230	192	-52.88	8.66	-44.23	70.6
5647.50	Н	235	243	-54.50	10.62	-43.88	70.2
7530.00	Н	112	236	-52.44	12.06	-40.38	66.7
9412.50	Н	-	-	-54.78	13.24	-41.54	67.9

Table 7-22. Radiated Spurious Data (Band 2/25 – Mid Channel)

OPERATING FREQUENCY: 1913.50 MHz CHANNEL: 26675 dBm MEASURED OUTPUT POWER: 24.07 = 0.255 W MODULATION SIGNAL: QPSK 3.0 BANDWIDTH: MHz DISTANCE: 3 meters LIMIT: 43 + 10 log₁₀ (W) = 37.07 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]
3827.00	Н	101	248	-48.79	8.76	-40.03	64.1
5740.50	Н	101	243	-52.94	10.73	-42.22	66.3
7654.00	Н	100	212	-49.15	12.18	-36.97	61.0
9567.50	Н	-	-	-54.05	13.28	-40.78	64.8

Table 7-23. Radiated Spurious Data (Band 2/25 – High Channel)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dega 101 of 140	
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 131 of 143	
© 2016 PCTEST Engineering Laboratory, Inc.					



## 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

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	LG	Reviewed by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dogo 122 of 142	
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 132 of 143	
© 2016 PCTEST Engineering Laboratory, Inc.					



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

OPERATING FREQUENCY:	707,500,000	Hz
CHANNEL:	23790	<u>.</u>
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	707,500,101	101	0.0000143
100 %		- 30	707,500,326	326	0.0000461
100 %		- 20	707,500,248	248	0.0000351
100 %		- 10	707,500,298	298	0.0000421
100 %		0	707,500,197	197	0.0000278
100 %		+ 10	707,499,779	-221	-0.0000312
100 %		+ 20	707,499,863	-137	-0.0000194
100 %		+ 30	707,500,138	138	0.0000195
100 %		+ 40	707,499,813	-187	-0.0000264
100 %		+ 50	707,500,033	33	0.0000047
BATT. ENDPOINT	3.45	+ 20	707,500,102	102	0.0000144

Table 7-24. 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.

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 100 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 133 of 143
© 2016 PCTEST Engineering	Laboratory, Inc.			V 3.3



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

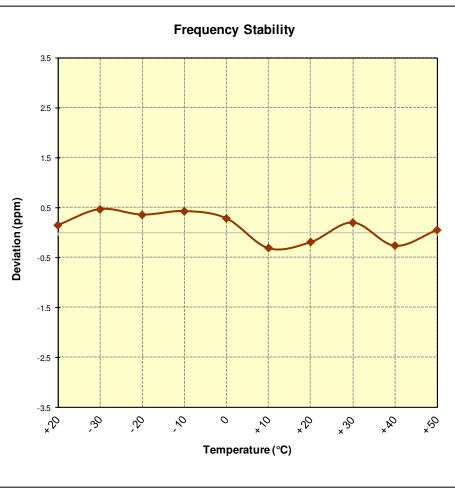


Figure 7-8. Frequency Stability Graph (Band 12/17)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 104 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 134 of 143
© 2016 PCTEST Engineering	Laboratory, Inc.			V 3.3



# Band 13 Frequency Stability Measurements §2.1055 §27.54

OPERATING FREQUENCY:	782,000,000	Hz
CHANNEL:	23230	<u>.</u>
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	782,000,049	49	0.0000063
100 %		- 30	782,000,067	67	0.000086
100 %		- 20	782,000,149	149	0.0000191
100 %		- 10	781,999,886	-114	-0.0000146
100 %		0	782,000,028	28	0.0000036
100 %		+ 10	781,999,909	-91	-0.0000116
100 %		+ 20	782,000,136	136	0.0000174
100 %		+ 30	781,999,659	-341	-0.0000436
100 %		+ 40	781,999,542	-458	-0.0000586
100 %		+ 50	782,000,027	27	0.0000035
BATT. ENDPOINT	3.45	+ 20	781,999,939	-61	-0.0000078

Table 7-25. 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: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 105 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 135 of 143
© 2016 PCTEST Engineering	Laboratory, Inc.			V 3.3



# Band 13 Frequency Stability Measurements §2.1055 §27.54

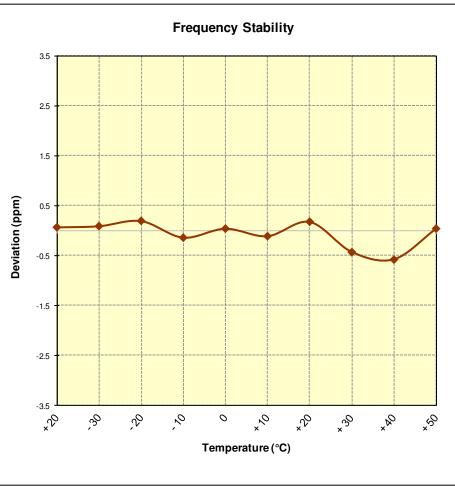


Figure 7-9. Frequency Stability Graph (Band 13)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Demo 100 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 136 of 143
© 2016 PCTEST Engineering	Laboratory, Inc.	·		V 3.3



# 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)	836,499,717	-283	-0.0000338
100 %		- 30	836,499,924	-76	-0.0000091
100 %		- 20	836,500,002	2	0.0000002
100 %		- 10	836,499,800	-200	-0.0000239
100 %		0	836,499,870	-130	-0.0000155
100 %		+ 10	836,500,002	2	0.0000002
100 %		+ 20	836,500,179	179	0.0000214
100 %		+ 30	836,500,259	259	0.0000310
100 %		+ 40	836,500,093	93	0.0000111
100 %		+ 50	836,499,703	-297	-0.0000355
BATT. ENDPOINT	3.45	+ 20	836,500,054	54	0.0000065

Table 7-26. Frequency Stability Data (Band 5)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dece 107 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 137 of 143
© 2016 PCTEST Engineering	Laboratory, Inc.	·		V 3.3



# Band 5 Frequency Stability Measurements §2.1055 §22.355

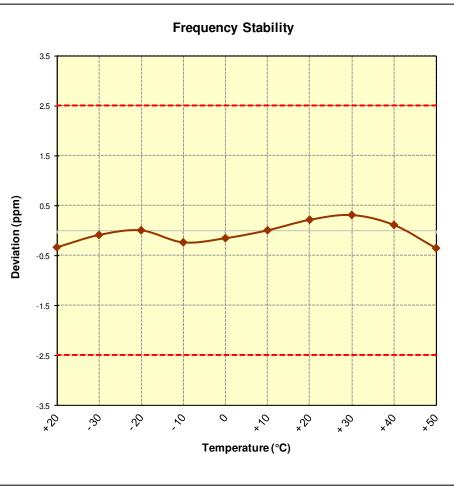


Figure 7-10. Frequency Stability Graph (Band 5)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dege 100 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 138 of 143
© 2016 PCTEST Engineering	Laboratory, Inc.	·		V 3.3



# 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)	1,732,500,305	305	0.0000176
100 %		- 30	1,732,500,302	302	0.0000174
100 %		- 20	1,732,500,192	192	0.0000111
100 %		- 10	1,732,500,230	230	0.0000133
100 %		0	1,732,499,816	-184	-0.0000106
100 %		+ 10	1,732,499,862	-138	-0.0000080
100 %		+ 20	1,732,499,824	-176	-0.0000102
100 %		+ 30	1,732,499,870	-130	-0.0000075
100 %		+ 40	1,732,500,090	90	0.0000052
100 %		+ 50	1,732,499,988	-12	-0.0000007
BATT. ENDPOINT	3.45	+ 20	1,732,499,578	-422	-0.0000244

Table 7-27. 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.

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Demo 100 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 139 of 143
© 2016 PCTEST Engineering Laboratory, Inc.				V 3.3



# Band 4 Frequency Stability Measurements §2.1055 §§27.54

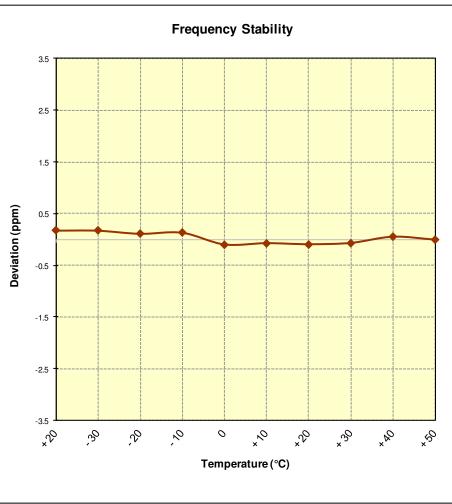


Figure 7-11. Frequency Stability Graph (Band 4)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Demo 140 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 140 of 143
© 2016 PCTEST Engineering Laboratory, Inc.				V 3.3



# Band 2/25 Frequency Stability Measurements §2.1055 §24.235

OPERATING FREQUENCY:	1,882,500,000	Hz
CHANNEL:	26365	_
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,882,500,150	150	0.0000080
100 %		- 30	1,882,499,742	-258	-0.0000137
100 %		- 20	1,882,500,171	171	0.0000091
100 %		- 10	1,882,500,121	121	0.0000064
100 %		0	1,882,499,891	-109	-0.0000058
100 %		+ 10	1,882,499,988	-12	-0.0000006
100 %		+ 20	1,882,500,373	373	0.0000198
100 %		+ 30	1,882,500,125	125	0.0000066
100 %		+ 40	1,882,499,675	-325	-0.0000173
100 %		+ 50	1,882,500,083	83	0.0000044
BATT. ENDPOINT	3.45	+ 20	1,882,499,930	-70	-0.0000037

Table 7-28. Frequency Stability Data (Band 2/25)

## 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: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 141 of 142
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 141 of 143
© 2016 PCTEST Engineering Laboratory, Inc.				V 3.3



# Band 2/25 Frequency Stability Measurements §2.1055 §24.235

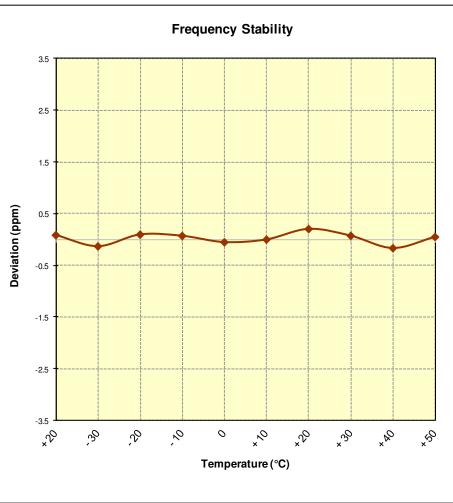


Figure 7-12. Frequency Stability Graph (Band 2/25)

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dego 140 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 142 of 143
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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: ZNFUS610** complies with all the requirements of Parts 22, 24, & 27 of the FCC rules for LTE operation only.

FCC ID: ZNFUS610		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Reviewed by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 140 of 140
0Y1605160919.ZNF	5/16-5/26/2016	Portable Handset		Page 143 of 143
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