

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

## **Test Overview**

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

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

## Test Procedure Used

KDB 971168 D01 v02r02 - Section 6.0

## Test Settings

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

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

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

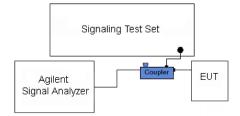


Figure 7-3. Test Instrument & Measurement Setup

## Test Notes

Per 22.917(b) 24.238(a) 27.53(h) in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions limit. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

Per 27.53(g) for operations in the 698-746 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

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🦲 Keysight Spectrum Analyzer - Swept SA					
XX RL RF 50Ω AC	CORREC PNO: Wide	SENSE:INT Trig: Free Run Atten: 36 dB	ALIGN AUTO #Avg Type: RMS	02:05:27 PM Jan 27, 2017 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A NNNNN	Frequency
10 dB/div Ref 25.00 dBm		Allen. oo dB	Mł	r1 698.000 MHz -30.23 dBm	Auto Tune
15.0					Center Freq 698.000000 MHz
-5.00					Start Freq 696.000000 MHz
-15.0		1		DL1 -13.00 dBm	<b>Stop Freq</b> 700.000000 MHz
-35.0	· ······	- Arrow			CF Step 400.000 kHz <u>Auto</u> Mar
-55.0					Freq Offset 0 Hz
-65.0					Scale Type
Center 698.000 MHz #Res BW 100 kHz	#VBW :	300 kHz	Sweep	Span 4.000 MHz 1.000 ms (1001 pts)	Log <u>Lin</u>
MSG			STATU	JS	

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



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

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Keysight Spectrum Analyzer - Swept SA     RL RF 50 Ω AC CORREC SENSE:INT ALIGN AUTO 02:02:06 PM Jan 27, 201											
XV RL	RF 50 \$	2 AC	CORREC	SEN	SE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRACE	1 2 3 4 5 6	F	requency
			PNO: Wide G	Trig: Free Atten: 36			Mki	DET			Auto Tune
10 dB/div Log	Ref 25.00	dBm						-29.3	5 dBm		
15.0									~~~~		Center Freq 3.000000 MHz
-5.00										69	Start Freq 5.000000 MHz
-15.0								D	L1 -13.00 dBm	70	Stop Freq
-35.0		~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			·····	and the second s				CF Step 400.000 kH
-45.0										<u>Auto</u>	Mar Freq Offse
-55.0											0 Ha
											Scale Type
Center 698 #Res BW 1			#VBV	V 300 kHz			Sweep 1	Span 4.0 .000 ms (1	000 MHz 001 pts)	Log	Lin
MSG							STATUS				

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



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

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🔤 Keysight Spectrum Analy	zer - Swept SA					
LX/RL RF	50 Ω AC	CORREC	SENSE:INT	ALIGN AU #Avg Type: RMS	TO 01:58:07 PM Jan 27, 2017 TRACE 1 2 3 4 5 6	Frequency
		PNO: Wide 🖵 IFGain:Low	Trig: Free Run Atten: 36 dB	ming type. tuno	TYPE A WWWW DET A NNNN	
10 dB/div Ref 25	i.00 dBm			N	/kr1 697.992 MHz -31.60 dBm	Auto Tune
209			Ĭ			Center Freq
15.0						698.000000 MHz
5.00						
						Start Fred 696.000000 MHz
-5.00						696.000000 MH2
-15.0					DL1 -13.00 dBm	Stop Fred
					h	700.000000 MH:
-25.0			1			
-35.0	~~~~~					CF Step 400.000 kH
-45.0						<u>Auto</u> Mar
45.0						Freq Offset
-55.0						0 Hz
-65.0						
						Scale Type
Center 698.000 N					Span 4.000 MHz	Log <u>Lir</u>
#Res BW 100 kH	z	#VBW	300 kHz		1.000 ms (1001 pts)	
MSG				ST	ATUS	

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



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

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	ectrum Analyze	er - Swept S	5A										
LXU RL	RF	50 Ω A		ORREC	le 🕟	Trig: Free		#Avg Ty	ALIGN AUTO pe: RMS	TRAC	M Jan 27, 2017 E <b>1 2 3 4 5 6</b> E A WWWWW T A N N N N N	F	requency
10 dB/div Log	Ref 25.	.00 dBr		FGain:Lo	bw_	Atten: 36	dB		Mk	r1 697.9			Auto Tune
15.0													Center Freq B.000000 MHz
-5.00											·····	69	Start Fred 4.000000 MH2
-15.0							.1				DL1 -13.00 dBm	70	Stop Fred 2.000000 MH:
-35.0	~~~~~	~~~~	~~~~~	~~~~		~~~~~						<u>Auto</u>	CF Step 800.000 kH Mar
-55.0													Freq Offse 0 H
-65.0													Scale Type
Center 69 #Res BW				#	VBW	300 kHz			Sweep ′	Span 8 1.000 ms (	.000 MHz 1001 pts)	Log	Lin
MSG									STATU	s			

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



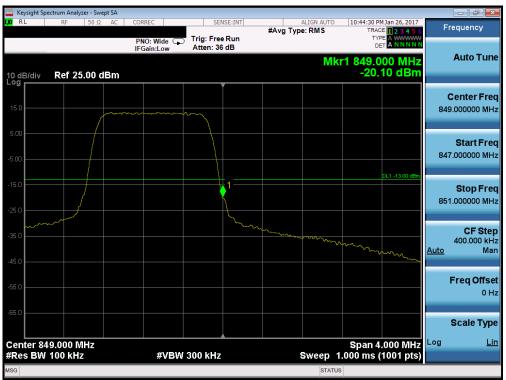
Plot 7-84. Upper Band Edge Plot (Band 12 – 10.0MHz QPSK – RB Size 50)

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Image: Non-State of the second seco		trum Analyzer								_	
Instruction         Mikr1 824,000 MHz -18.86 dBm         Auto Tu           100         B/div         Ref 25.00 dBm         -18.86 dBm         Center Fill           500	XI RL	RF 5	ΟΩ AC		Trig: Free	Run		TRAC	E 1 2 3 4 5 6	F	requency
15.0       Center Fill         500       Center Fill         -500       Fil	10 dB/div	Ref 25.0	0 dBm	IFGain:Low	Atten: 36	dB	Mk				Auto Tune
Start Fi           -500         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td> </td><td></td><td></td><td></td><td>Center Fred 4.000000 MH:</td></td<>							 				Center Fred 4.000000 MH:
1150       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1										82:	Start Free 2.000000 MH
33.0     400.000 Hz       45.0     400.000 Hz       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0       65.0     55.0						í1			DL1 -13.00 dBm	82	<b>Stop Fre</b> 5.000000 MH
55.0 Freq Off 65.0 Scale Ty Center 824.000 MHz Span 4.000 MHz	_ ~ ~ ~		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	www.				· · · ·	how	<u>Auto</u>	CF Ste 400.000 kH Ma
Center 824.000 MHz Span 4.000 MHz Log											FreqOffso 0⊦
	65.0										Scale Typ
#Res BW 100 kHz #VBW 300 kHz Sweep 1.000 ms (1001 pts)	Center 824 ≇Res BW 1	.000 MH 100 kHz	Z	#VB\	N 300 kHz		Sweep 1	Span 4 .000 ms (	.000 101112	Log	Li

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



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

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	ctrum Analyzer -	Swept SA									
LXI RL	RF 50	Ω AC	CORREC	SENSE		Avg Type	LIGN AUTO	10:36:34 PM TRAC	Jan 26, 2017	F	requency
			PNO: Wide 🖵 IFGain:Low	Trig: Free R Atten: 36 d	un				E 1 2 3 4 5 6 E A WWWW T A N N N N N		
10 dB/div Log	Ref 25.00	) dBm					Mkı	1 824.0 -19.1	00 MHz 70 dBm		Auto Tune
15.0				Ĭ		~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	مررمیمیم			<b>Center Freq</b> 4.000000 MHz
-5.00				/						82:	Start Fred 2.000000 MH2
-15.0				1					DL1 -13.00 dBm	82	<b>Stop Fred</b> 6.000000 MH;
-35.0			~~~~~							<u>Auto</u>	CF Step 400.000 kH Mar
-55.0											Freq Offse 0 H
-65.0											Scale Type
Center 824 #Res BW		2	#VBW	300 kHz		9	weep 1	Span 4. .000 ms (	000 MHz 1001 pts)	Log	Lin
MSG							STATUS				

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



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

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	ctrum Analyzer - S											
LXI RL	RF 50	Ω AC	CORREC		SENSE	:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	M Jan 26, 2017 E <mark>1 2 3 4 5 6</mark>	F	requency
			PNO: Wide IFGain:Lov		ig: Free R ten: 36 d		• //		TYI Di			
10 dB/div Log	Ref 25.00	dBm						Mk	r1 823.9 -23.	80 MHz 47 dBm		Auto Tune
					Ĭ							Center Fred
15.0											82	4.000000 MH:
5.00												Start Free
-5.00						$\neg$				DL1 -13.00 dBm	82	2.000000 MH:
-15.0					1	<u> </u>				DE1 -13.00 0Bm		Stop Free
-25.0											82	6.000000 MHz
-35.0	~~~~~	~~~~										CF Step 400.000 kH
-45.0											<u>Auto</u>	Mar
-55.0												Freq Offse
-65.0												0 H:
00.0												Scale Type
Center 824 #Res BW	4.000 MHz 100 kHz		#V	'BW 300	) kHz_			Sweep_1	Span 4 .000 ms (	.000 MHz 1001 pts)	Log	<u>Lir</u>
ISG								STATUS				

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



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

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X/RL	RF 5											
		50Ω AC	CORREC	<b>.</b>	SEN		#Avg Typ	ALIGN AUTO e: RMS	10:29:29 PM Jar TRACE	23456	F	requency
10 dB/div	Ref 25.0	0 dBm	PNO: Wid IFGain:Lo		Atten: 36			Mki	DET A 1 824.000 -27.98	MHz dBm		Auto Tune
15.0												Center Fred 1.000000 MH
-5.00							·····				820	Start Fred 0.000000 MH2
-15.0						1				-13.00 dBm	828	Stop Fred 3.000000 MH;
-35.0		~~~~	~~~~~		~~~~~~						<u>Auto</u>	CF Step 800.000 kH Mar
55.0												Freq Offse 0 H
-65.0												Scale Type
Center 82 #Res BW		z	#	VBW 30	10 kHz			Sweep 1	Span 8.00 .000 ms (10		Log	Lir
//SG								STATUS				

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

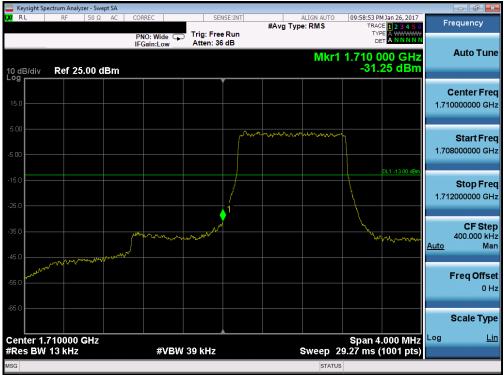


Plot 7-92. Upper Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

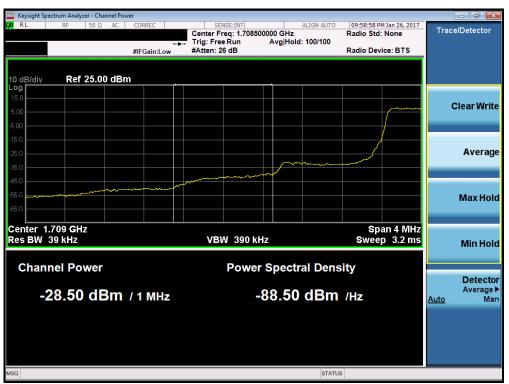
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Plot 7-93. Lower Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)



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

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	ectrum Analyzer -	Swept SA										
X/RL	RF 5	DΩ AC	CORREC			ISE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	1 Jan 26, 2017 E <mark>1 2 3 4 5 6</mark>	Fr	equency
			PNO: W IFGain:I		Trig: Free Atten: 36				TYF DE			Auto Tune
10 dB/div Log	Ref 25.0	0 dBm						Mkr1	1.755 0 -31.	00 GHz 09 dBm		Auto Tune
15.0												Center Fred 5000000 GHz
5.00												
-5.00		- for more	www.w	* YAJA AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA							1.75	Start Free 3000000 GH:
-15.0		}								DL1 -13.00 dBm		Stop Free
-25.0	/					1					1.75	7000000 GH
-35.0	all and a start an					Jun bol nor i						CF Step 400.000 kH
45.0						- 1000	Manalahara	hund			<u>Auto</u>	Ma
-55.0									ᠰᡗᡅᠰᠰᡧᡟᡟᢇᠬ	the work		Freq Offse
-65.0												
	7.5000 01										Log	Scale Type
center 1. #Res BW	755000 GH 13 kHz	Z	;	#VBW 3	9 kHz			Sweep 2	span 4 9.27 ms (	.000 MHz 1001 pts)	LUg	
ISG								STATUS	3			

Plot 7-95. Upper Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)



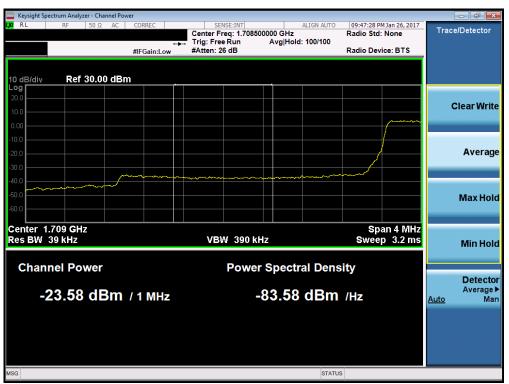
Plot 7-96. Upper Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

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	ectrum Analyze	er - Swept S	SA										
XI RL	RF	50 Ω /	AC C	ORREC		SE	NSE:INT	# 7	ALIGN AUTO	09:47:22 PM J		F	requency
			I	P <mark>NO: W</mark> i FGain:L	de 🖵 ow	Trig: Fre Atten: 3		#Avg i		TYPE DET	123456 A WWWWW A NNNNN		
10 dB/div Log	Ref 25.	00 dB	m						Mkr1	1.710 00 -29.2	0 GHz 1 dBm		Auto Tune
15.0													Center Fred 0000000 GHz
-5.00									~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		.1 -13.00 dBm	1.70	Start Fred 8000000 GHz
-15.0							1					1.71	Stop Fred 2000000 GHz
-35.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		-	,	·····						<u>Auto</u>	CF Step 400.000 kH Mar
55.0													Freq Offse 0 H
-65.0													Scale Type
Center 1. #Res BW		Hz		#	VBW	91 kHz			Sweep 5	Span 4.0 533 ms (1	00 Mil 12	Log	Lir
ISG									STATU				

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



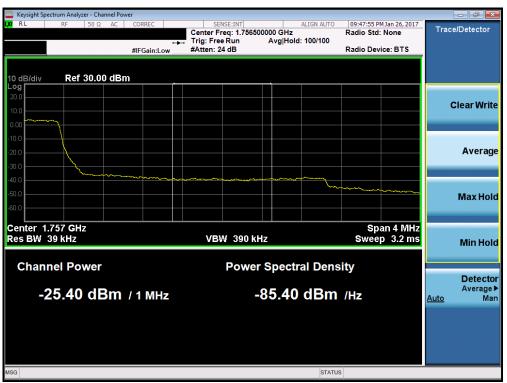
Plot 7-98. Lower Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

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	ectrum Analyzer	- Swept SA									
LX/IRL	RF	50Ω AC	CORREC		SE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	1 Jan 26, 2017 E <mark>1 2 3 4 5 6</mark> E A WWWWW	F	requency
10 dB/div Log r	Ref 25.0	00 dBm	PNO: Wide G IFGain:Low	Atten: 36			Mkr1	DE 1.755 0	00 GHz 45 dBm		Auto Tune
15.0											Center Fred 5000000 GHz
-5.00	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~							1.75	Start Free 3000000 GH
-15.0					1				DL1 -13.00 dBm	1.75	<b>Stop Fred</b> 7000000 GHz
-35.0					h	mm	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	man	<u>Auto</u>	CF Step 400.000 kH Mar
.55.0											Freq Offse 0 H
-65.0											Scale Type
Center 1.7 #Res BW		Hz	#VB\	N 91 kHz			Sweep 5	Span 4 .533 ms (	.000 MHz 1001 pts)	Log	Lir
MSG							STATUS				

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



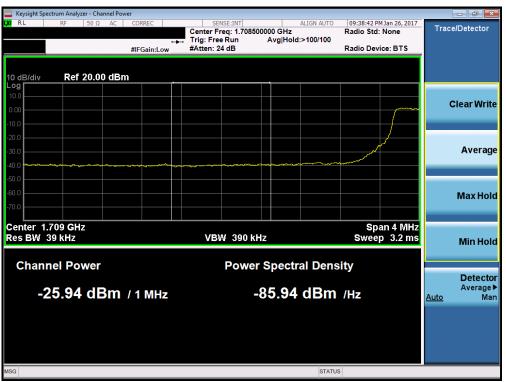
Plot 7-100. Upper Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🔁 LG	Approved by: Quality Manager
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	ectrum Analyzei	- Swept SA					
XI RL	RF	50 Ω AC	CORREC	SENSE:INT	ALIGN AUTO #Avg Type: RMS	09:38:01 PM Jan 26, 2017	Frequency
			PNO: Wide 🕞	Trig: Free Run Atten: 36 dB		TRACE 123456 TYPE A WWWW DET A NNNNN	
10 dB/div Log	Ref 25.0	00 dBm			Mkr	1 1.710 000 GHz -28.98 dBm	Auto Tune
15.0							Center Freq 1.710000000 GHz
-5.00							Start Freq 1.708000000 GHz
-15.0				1		DL1 -13.00 dBm	<b>Stop Freq</b> 1.712000000 GHz
-35.0	~~~~~	·····		~~~~~			CF Step 400.000 kHz <u>Auto</u> Mar
-55.0							Freq Offse 0 H:
-65.0							Scale Type
Center 1. #Res BW	710000 G 51 kHz	Hz	#VBW	160 kHz	Sweep	Span 4.000 MHz 1.933 ms (1001 pts)	Log <u>Lin</u>
MSG					STAT	US	

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



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

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager
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	trum Analyzer:	- Swept SA									
X/RL	RF	50Ω AC	CORREC PNO: Wide IFGain:Low			#Avg Typ	ALIGN AUTO De: RMS	TRACI	Jan 26, 2017 <b>1</b> 2 3 4 5 6 A WWWWW A NNNNN	Fi	requency
10 dB/div Log	Ref 25.0	00 dBm					Mkr1	1.755 0 -30.1	08 GHz I4 dBm		Auto Tune
15.0											Center Fred 5000000 GH:
-5.00		~~~~~	~~~~~							1.75	Start Free 3000000 GH
-15.0					.1				DL1 -13.00 dBm	1.75	<b>Stop Fre</b> 7000000 GH
.35.0						~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~	<u>Auto</u>	CF Ste 400.000 kH Ma
55.0											FreqOffse 0⊦
65.0											Scale Typ
Center 1.7 Res BW :		Hz	#VBV	V 160 kHz			Sweep 1	Span 4. .933 ms ('		Log	Li
ISG							STATUS	3			

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



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

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager
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🔤 Keysight Spectrum Analyz						- ē ×
X RL RF	50 Ω AC	CORREC	SENSE:INT	ALIGN AUTO #Avg Type: RMS	09:13:16 PM Jan 26, 2017 TRACE 1 2 3 4 5 6	Frequency
	66 JB	PNO: Wide 🖵 IFGain:Low	Trig: Free Run Atten: 36 dB	Mkr1	1.709 992 GHz -32.11 dBm	Auto Tune
10 dB/div Ref 25	.00 dBm		Ť		-32.11 UBIII	
15.0						Center Free 1.710000000 GH
5.00				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Start Fre 1.706000000 GH
-5.00					DL1 -13.00 dBm	1.708000000 GH
-15.0						<b>Stop Fre</b> 1.714000000 GH
35.0	~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	1,7			<b>CF Ste</b> j 800.000 kH <u>Auto</u> Ma
45.0						Freq Offse
65.0						0 H
Center 1.710000 (	GHz	#\/B\M	200 kHz	<u> </u>		Scale Typ
#Res BW 100 kHz		#VBW	300 kHz	Sweep 1	.000 ms (1001 pts)	

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

Keysight Spectrum Analyzer - Swept SA					
<b>LX/</b> RL RF 50Ω AC	CORREC	SENSE:INT	ALIGN AUTO #Avg Type: RMS	09:13:31 PM Jan 26, 2017 TRACE 1 2 3 4 5 6	Frequency
		: Free Run en: 36 dB	• ,	TYPE A WWWW DET A NNNNN	
10 dB/div Ref 25.00 dBm			Mkr1	1.709 000 GHz -24.56 dBm	Auto Tune
15.0					Center Freq 1.707000000 GHz
-5.00				DL1 -13.00 dBm	Start Freq 1.705000000 GHz
-15.0				11	<b>Stop Freq</b> 1.709000000 GHz
-35.0					CF Step 400.000 kHz <u>Auto</u> Man
-55.0					Freq Offset 0 Hz
-65.0					Scale Type
Center 1.707000 GHz #Res BW 1.0 MHz	#VBW 3.0 I	//Hz	Sweep 1	Span 4.000 MHz .000 ms (1001 pts)	Log <u>Lin</u>
MSG			STATUS		

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

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🔁 LG	Approved by: Quality Manager
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🚾 Keysight Spectrum Analyzer - Swept SA 🚽				
XIRL RF 50Ω AC	PNO: Wide Trig: Free Ru	#Avg Type: RMS	09:14:56 PM Jan 26, 2017 TRACE 1 2 3 4 5 6 TYPE A WWWWW DET A N N N N N	Frequency
10 dB/div Ref 25.00 dBm	IFGain:Low Atten: 36 dB	Mkr'	1 1.755 000 GHz -33.33 dBm	Auto Tune
15.0				<b>Center Freq</b> 1.755000000 GHz
5.00				Start Fred 1.751000000 GH:
-15.0			DL1 -13.00 dBm	Stop Free 1.759000000 GH:
-35.0		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		<b>CF Stej</b> 800.000 kH <u>Auto</u> Ma
55.0				Freq Offse 0 H
-65.0				Scale Type
Center 1.755000 GHz #Res BW 100 kHz	#VBW 300 kHz	Sweep	Span 8.000 MHz 1.000 ms (1001 pts)	Log <u>Lir</u>
MSG		STATU	IS	

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

	ctrum Analyzer - Swept SA					
X RL	RF 50Ω AC	PNO: Fast ↔→	SENSE:INT	#Avg Type: RMS	09:15:08 PM Jan 26, 2017 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A NNNNN	Frequency
10 dB/div	Ref 25.00 dBm	IFGall.LOw	Autom of up	Mkr1	1.756 000 GHz -26.16 dBm	Auto Tune
15.0						Center Freq 1.758000000 GHz
5.00						Start Fred 1.756000000 GHz
-15.0					DL1 -13.00 dBm	<b>Stop Fred</b> 1.760000000 GH;
45.0		**************************************			an a	CF Stej 400.000 kH <u>Auto</u> Ma
55.0						Freq Offse 0 H
-65.0						Scale Type
Center 1.7 #Res BW	758000 GHz 1.0 MHz	#VBW	3.0 MHz	Sweep 7	Span 4.000 MHz 1.000 ms (1001 pts)	
ISG				STATU	S	

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

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager					
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	ectrum Analy:	zer - Swept SA	4									
LXI RL	RF	50 Ω A	C CO	RREC	SE	NSE:INT	#Avg Typ	ALIGN AUTO	09:20:34 PM	Jan 26, 2017 1 2 3 4 5 6	Fr	equency
			P IF	NO:Wide G Gain:Low	Trig: Fre Atten: 3		#718 JP		TYPE DET	A WWWWW A N N N N N		
10 dB/div Log	Ref 25	.00 dBn	n					Mkr1	1.709 98 -33.9	88 GHz 0 dBm		Auto Tune
15.0												Center Freq 0000000 GHz
-5.00						$\int$	1 minut		~~~~~	~~~~~	1.70	Start Freq 4000000 GHz
-15.0										L1 -13.00 dBm	1.71	Stop Freq 6000000 GHz
-35.0	~~~~~	~~~~	uns er	Mum	mmm	1./					1 <u>Auto</u>	<b>CF Step</b> .200000 MHz Mar
-45.0												Freq Offse 0 H;
-65.0												Scale Type
Center 1. #Res BW				#VB۱	N 470 kHz			Sweep 1	Span 12 .000 ms (1	.00 MHz 001 pts)	Log	Lin
MSG								STATUS				

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

	ım Analyzer - Swept SA					
LXU RL	RF 50 Ω AC	CORREC	SENSE:INT	ALIGN AUTO #Avg Type: RMS	09:20:48 PM Jan 26, 2017 TRACE 1 2 3 4 5 6 TYPE A WWWW	Frequency
10 dB/div	Ref 25.00 dBm	IFGain:Low	Atten: 36 dB	Mkr1	DET A NNNNN 1.707 992 GHz -28.28 dBm	Auto Tune
15.0						Center Freq 1.707000000 GHz
-5.00						<b>Start Freq</b> 1.705000000 GHz
-15.0				11	DL1 -13.00 dBm	<b>Stop Freq</b> 1.709000000 GHz
-35.0		u-fu-gr_ "+680+ γ/−9780+89β6	#2,~~+, #***#******			CF Step 400.000 kHz <u>Auto</u> Man
-55.0						Freq Offset 0 Hz
-65.0						Scale Type
Center 1.70 #Res BW 1.0		#VBW	3.0 MHz	Sweep 7	Span 4.000 MHz 1.000 ms (1001 pts)	Log <u>Lin</u>
MSG				STATU	s	

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

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🔁 LG	Approved by: Quality Manager
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Keysight Spectrum Analyzer - Swept S	A			
<b>Χί RL</b> RF 50Ω Α	C CORREC SE PNO: Wide Trig: Fre IFGain:Low Atten: 30			Frequency
10 dB/div Ref 25.00 dBr	i dament		kr1 1.755 000 GHz -33.89 dBm	Auto Tune
15.0				<b>Center Fred</b> 1.755000000 GH;
5.00				Start Free 1.749000000 GH
-15.0			DL1 -13.00 dBm	<b>Stop Fre</b> 1.761000000 GH
45.0			umann	<b>CF Ste</b> 1.200000 MH <u>Auto</u> Ma
55.0				Freq Offse 0 H
65.0				Scale Typ
Center 1.755000 GHz #Res BW 150 kHz	#VBW 470 kHz	Swee	Span 12.00 MHz p 1.000 ms (1001 pts)	Log <u>Lir</u>
ASG		5	STATUS	

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

Keysight Spectrum Analyzer - Swept	SA				
<b>χύ</b> R L RF 50 Ω	AC CORREC PNO: Fast +++ IFGain:Low	SENSE:INT Trig: Free Run Atten: 36 dB	ALIGN AUTO #Avg Type: RMS	09:21:40 PM Jan 26, 2017 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A NNNNN	Frequency
10 dB/div Ref 25.00 dB		Allen oo ub	Mkr1	1.756 020 GHz -30.27 dBm	Auto Tune
15.0					Center Freq 1.758000000 GHz
-5.00					Start Freq 1.756000000 GHz
-15.0 -25.0 <mark>~ 1</mark>				DL1 -13.00 dBm	<b>Stop Freq</b> 1.760000000 GHz
-35.0		hann an		anahanhalanatara terretara kanatikananga penselagi	CF Step 400.000 kHz <u>Auto</u> Man
-55.0					<b>Freq Offset</b> 0 Hz
-65.0					Scale Type
Center 1.758000 GHz #Res BW 1.0 MHz	#VBW :	3.0 MHz	Sweep 1	Span 4.000 MHz .000 ms (1001 pts)	Log <u>Lin</u>
MSG			STATUS	\$	

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

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
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	ectrum Analy		t SA											
L <mark>XI</mark> RL	RF	50 Ω	AC	CORREC		SE	NSE:INT		#Avg Type	ALIGN AUTO		M Jan 26, 2017 CE <b>1 2 3 4 5 6</b>	F	requency
				PNO: F IFGain:I	ast ⊊⊃ Low	Trig: Fre Atten: 3					נד			
10 dB/div Log	Ref 25	5.00 dl	Зm							Mkr1	1.710 -34	000 GHz .68 dBm		Auto Tune
							Ĭ							Center Fred
15.0													1.71	0000000 GH:
5.00									~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	man and the	mm	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		Start Free
-5.00								$\vdash$					1.70	2000000 GHz
-15.0												DL1 -13.00 dBm		Stop Free
-25.0													1.71	8000000 GH
							1.1							CF Ster
-35.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Mar	v	~~~~~	John Marker							Auto	1.600000 MHz Mar
-45.0														
-55.0														Freq Offse 0 Hi
-65.0														
														Scale Type
Center 1. #Res BW					#VBW	620 kHz	2			Sweep 1	Span 000 ms	16.00 MHz (1001 pts)	Log	Lir
MSG										STATUS				

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

	ctrum Analyzer - Swept SA					
LXU RL	RF 50 Ω AC	CORREC	SENSE:INT	ALIGN AUTO #Avg Type: RMS	09:27:23 PM Jan 26, 2017 TRACE 1 2 3 4 5 6 TYPE A WWWWW DET A N N N N N	Frequency
10 dB/div Log	Ref 25.00 dBm	IFGain:Low	Atten: 36 dB	Mkr1	1.708 828 GHz -28.43 dBm	Auto Tune
15.0						Center Freq 1.707000000 GHz
-5.00						Start Freq 1.705000000 GHz
-15.0					DL1 -13.00 dBm	<b>Stop Freq</b> 1.709000000 GHz
-35.0		600-0-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-			www.www.www.www.www.www.	<b>CF Step</b> 400.000 kHz <u>Auto</u> Man
-55.0						<b>Freq Offset</b> 0 Hz
-65.0						Scale Type
Center 1.7 #Res BW	'07000 GHz 1.0 MHz	#VBW	3.0 MHz	Sweep 1	Span 4.000 MHz .000 ms (1001 pts)	Log <u>Lin</u>
MSG				STATUS	3	

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

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	ctrum Analyzer -	Swept SA								[	
RL	RF 5	DΩ AC	CORREC PNO: Fast			#Avg Typ	ALIGN AUTO e: RMS	TRAC	I Jan 26, 2017 E 1 2 3 4 5 6 E A WWWWW A N N N N N	Fre	quency
10 dB/div	Ref 25.0	0 dBm	IFGain:Low	Atten: 30	ub.		Mkr1	1.755 0 -35.0	16 GHz 02 dBm		Auto Tune
15.0											enter Fred 000000 GH2
-5.00	n te Manana	~~~~~~	~~~~V~L~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~							Start Fred 000000 GH:
-15.0									DL1 -13.00 dBm	1.763	<b>Stop Fred</b> 000000 GH:
35.0				W	1	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	1. <u>Auto</u>	CF Stej 600000 MH Ma
55.0										F	r <b>eq Offs</b> e 0 H
-65.0											Scale Type
Center 1.7 #Res BW ∶		IZ	#VBW	620 kHz			Sweep 1	Span 1) () 000 ms.	6.00 MHz 1001 pts)	Log	<u>Lir</u>
//SG							STATUS				

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

	trum Analyzer - Swept SA					
RL	RF 50 Ω AC	CORREC PNO: Fast ↔ IFGain:Low	Trig: Free Run Atten: 36 dB	ALIGN AUTO	09:27:51 PM Jan 26, 2017 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A NNNN	Frequency
0 dB/div	Ref 25.00 dBm			Mkr1	1.756 032 GHz -31.80 dBm	Auto Tun
15.0						Center Fre 1.758000000 GH
5.00						Start Fre 1.756000000 G⊦
5.0					DL1 -13.00 dBm	Stop Fre 1.760000000 G⊦
5.0	99]-0 <sup>-499</sup> -99499-9949-9949-9949-9949-9949-99	and production and the second s	dagaran yang sang sang sang sang sang sang sang s	nd na	<u>n</u>	CF Ste 400.000 kH <u>Auto</u> Ma
5.0						Freq Offs 0 F
65.0	58000 GHz				Span 4.000 MHz	Scale Typ
Res BW 1		#VBV	/ 3.0 MHz	Sweep 7	1.000 ms (1001 pts)	
G				STATU	S	

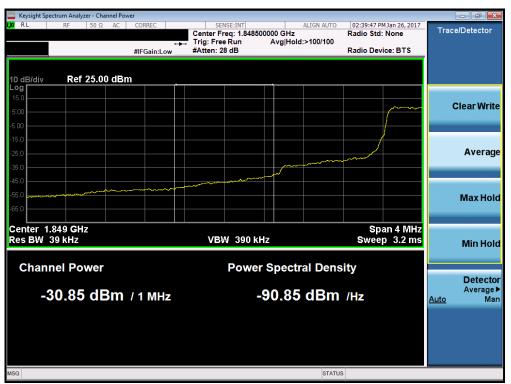
Plot 7-116. Upper Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
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Plot 7-117. Lower Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)



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

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
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Plot 7-119. Upper Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)



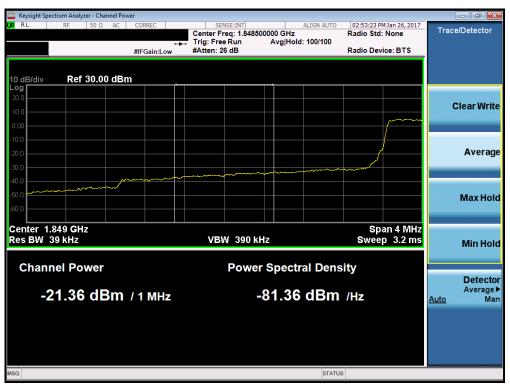
Plot 7-120. Upper Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🔁 LG	Approved by: Quality Manager	
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	ectrum Analyze	er - Swept SA									
LXI RL	RF	50 Ω AC	CORREC	SEN	SE:INT	#Avg Typ	ALIGN AUTO e: RMS	02:53:18 PM TRACE	Jan 26, 2017 1 2 3 4 5 6	F	requency
			PNO: Wide G	Trig: Free Atten: 36		0 ,1		TYPE DE1	A WWWWW A NNNNN		Auto Tune
10 dB/div Log	Ref 25.	00 dBm					Mkr1	1.850 0 -27.8	00 GHz 36 dBm		Auto Tune
15.0											<b>Center Freq</b> 0000000 GHz
-5.00						~~~~~~	Mr Arwork	, and the second s	DL1 -13.00 dBm	1.84	Start Freq 8000000 GHz
-15.0					,1				JET -13.00 (abril	1.85	Stop Freq 2000000 GHz
-35.0	,	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		m						<u>Auto</u>	CF Step 400.000 kHz Mar
-55.0											Freq Offse 0 Ha
-65.0											Scale Type
Center 1.		Hz						Span 4.	000 MHz	Log	Lir
#Res BW	30 KHZ		#VBW	91 kHz			Sweep 5	.533 ms (1	iuut pts)		
130							STATUS				

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



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

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🔁 LG	Approved by: Quality Manager		
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PNO: Wide         Trig: Free Run Atten: 36 dB         #Avg Type: RMS         Trace Det         23.4 St Det         Auto T           10 dE/div         Ref 25.00 dBm         -28.37 dBm         -28.37 dBm         -28.37 dBm         -19.000000           500	Keysight Spectrum Analyzer - Swept SA					
Mkr1 1.910 000 GHz Auto T Auto T Auto T Center F 1.9100000 500 500 500 500 500 500 50	C RL RF 50 Ω AC	PNO: Wide 🗔	Trig: Free Run		TRACE 1 2 3 4 5 6 TYPE A WWWW	Frequency
15.0       Image: Center F         15.0       Image: Center F         5.00       Image: Center <t< th=""><th>0 dB/div Ref 25.00 dBn</th><th></th><th></th><th>Mkr1</th><th>1.910 000 GHz -28.37 dBm</th><th>Auto Tun</th></t<>	0 dB/div Ref 25.00 dBn			Mkr1	1.910 000 GHz -28.37 dBm	Auto Tun
Start F           500         0.1.1.300.484           150         0.1.1.300.484           250         0.1.1.1.300.484           250         0.1.1.1.300.484           250         0.1.1.1.300.484           250         0.1.1.1.300.484           250         0.1.1.1.300.484           250         0.1.1.1.300.484           250         0.1.1.1.300.484           250         0.1.1.1.300.484           250         0.1.1.1.300.484           250         0.1.1.1.300.484           250         0.1.1.1.300.484           250         0.1.1.1.300.484           250         0.1.1.1.300.484           250         0.1.1.1.300.484           250         0.1.1.1.300.484           250         0.1.1.1.300.484           250         0.1.1.1.300.484           250         0.1.1.1.300.484           250         0.1.1.1.300.484           250         0.1.1.1.300.484           250         0.1.1.1.300.484           250         0.1.1.1.300.484           250         0.1.1.1.300.484           250         0.1.1.1.300.484           250         0.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1						Center Fre 1.910000000 G⊦
5.0 5.0 1.91200000 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0		······································				Start Fre 1.908000000 GH
400.000 Auto 400.000 Freq Of 50 50 50 50 50 50 50 50 50 50					DL1 -13.00 dBm	<b>Stop Fre</b> 1.912000000 GF
50 50 60 enter 1.910000 GHz Span 4.000 MHz Log			hunce		men market and a second s	<b>CF Ste</b> 400.000 kl <u>Auto</u> M
enter 1.910000 GHz Scale T						Freq Offs 0 1
enter 1.910000 GHz Span 4.000 MHz Log Res BW 30 kHz Sweep 5 533 ms (1001 nts)						Scale Typ
	enter 1.910000 GHz Res BW 30 kHz	#VBW	91 kHz	Sweep 5	Span 4.000 MHz .533 ms (1001 pts)	Log <u>L</u>

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



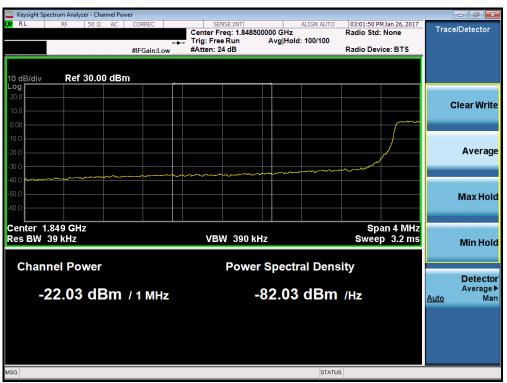
Plot 7-124. Upper Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager			
Test Report S/N:	Test Dates:	EUT Type:		Dega 70 of 117			
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	ectrum Analyze										
X/RL	RF	50 Ω AC	CORREC		SENSE:INT	A #Avg Type	LIGN AUTO	03:01:44 PMJ TRACE	123456	Fr	equency
			PNO: Wid IFGain:Lo		Free Run n: 36 dB			TYPE DET	A WWWWW A N N N N N		
10 dB/div	Ref 25	00 dBm					Mkr1	1.850 00	0 GHz 2 dBm		Auto Tune
					Ţ						
15.0											Center Fred
										1.00	
5.00						~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~				Start Free
-5.00										1.84	8000000 GHz
0.00								DI	L1 -13.00 dBm		
-15.0											Stop Fred
-25.0					1/					1.85	2000000 GHz
-23.0					~~~~						
35.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~									CF Step 400.000 kH:
-45.0										<u>Auto</u>	Mar
-45.0											_
-55.0										l	Freq Offset 0 Hz
											- OTH
-65.0											Scale Type
Center 1.3	250000 0	·U-						Span 4.0		Log	Lin
#Res BW	51 kHz	ΠZ	#\	/BW 160 k	Hz	s	weep 1	span 4.0 933 ms (1)	001 pts)		
ISG							STATUS				

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



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

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager		
Test Report S/N:	Test Dates:	EUT Type:		Dego 70 of 117		
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PNO: Wide         Trig: Free Run Arten: 36 dB         #Avg Type: RMS         Trace         Processes         Auto Tu           10 dB/div         Ref 25.00 dBm         -28.90 dBm         -28.90 dBm         -28.90 dBm         -11.91000000 d           5.00	Keysight Spectrum Analyzer - Swep	pt SA				
Miki T 1.910 008 CGF/2       -28.90 dBm         100 dB/div       Ref 25.00 dBm       -28.90 dBm         150 d	<b>X RL</b> RF 50 Ω	PNO: Wide 🔾	Trig: Free Run		TRACE 1 2 3 4 5 6	
15.0       Center F.         15.0       Center F.         5.00       DL1.130.0484         15.0       DL1.130.0484         10.0       DL1.130.0484         400.0001       DL1.130.0484         400.0001       DL1.100.0484         400.0001       DL1.100.0484         50.0       DL1.0484         50.0       DL1.0494         50.0       DL1.0494 <th></th> <th>Bm</th> <th></th> <th>Mkr1</th> <th>1.910 008 GHz -28.90 dBm</th> <th>Auto Tun</th>		Bm		Mkr1	1.910 008 GHz -28.90 dBm	Auto Tun
Start Fi           5.00         0.11.13.00.06H           15.0         0.11.13.00.06H           35.0         0           35.0         0           4500         0           5500         0           5600         0           5600         0           5600         0           5600         0           5600         0           5600         0           5600         0           5600         0           5600         0           5600         0           5600         0           5600         0           5600         0           5600         0           5600         0           5600         0           5600         0           5600         0           5600         0           5600         0           5600         0           5600         0           5600         0           5600         0           5600         0           5700         0           5700         0	15.0					Center Free 1.910000000 GH
15.0       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~				<b>Start Fre</b> 1.908000000 GH
45.0 45.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0 55.0			1			<b>Stop Fre</b> 1.912000000 GH
55.0 Freq Off 55.0 Scale Ty Center 1.910000 GHz Span 4.000 MHz					~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	CF Ste 400.000 kH <u>Auto</u> Ma
Center 1.910000 GHz Scale Ty						Freq Offs 0 F
						Scale Typ
sg status	Res BW 51 kHz	#VBW	160 kHz	-	.933 ms (1001 pts)	Log <u>L</u>

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



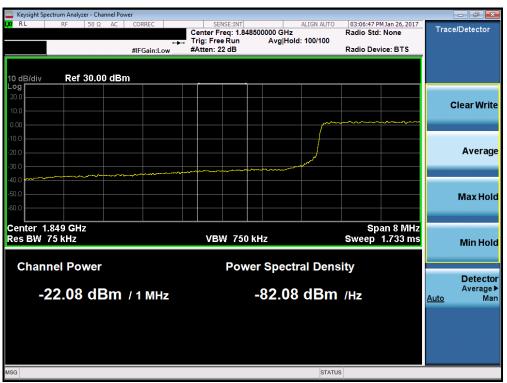
Plot 7-128. Upper Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager		
Test Report S/N:	Test Dates:	EUT Type:		Dego 90 of 117		
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	ectrum Analyzer - S						@ <b>-</b> ×
X/RL	RF 50 9	Ω AC	CORREC	SENSE:INT	ALIGN AUTO #Avg Type: RMS	03:06:41 PM Jan 26, 2017 TRACE 1 2 3 4 5 6	Frequency
			PNO: Wide 🕞 IFGain:Low	Trig: Free Run Atten: 36 dB		DET A WWWWW	
10 dB/div Log	Ref 25.00	dBm			Mkr1	1.850 000 GHz -29.58 dBm	Auto Tun
15.0							Center Fre 1.850000000 GH
5.00						DL1 -13.00 dBm	<b>Start Fre</b> 1.846000000 GH
25.0				1			<b>Stop Fre</b> 1.854000000 GH
45.0							CF Ste 800.000 kH <u>Auto</u> Ma
55.0							Freq Offs 0 F
65.0							Scale Typ
enter 1.3 Res BW	850000 GHz 100 kHz	2	#VBW	300 kHz	Sweep 1	Span 8.000 MHz .000 ms (1001 pts)	Log <u>L</u>
SG					STATU		

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



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

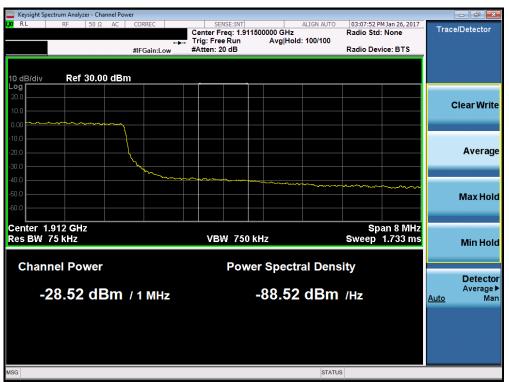
FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager			
Test Report S/N:	Test Dates:	EUT Type:		Daga 91 of 117			
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PNO: Wide Trig: Free Run Atten: 36 dB Mkr1 1.910 056 GHz -33.06 dBm Center 1.9100000 GHz Span 8.000 MHz Center 1.910000 GHz Span 8.000 MHz	Keysight Spectrum Analyzer - Swept	t SA				
Mikr1 1.910 056 GHz       Auto T         10 dB/div       Ref 25.00 dBm       -33.06 dBm         10 dB/div       Ref 25.00 dBm       Center 1         10 dB/div       Center 1       Center 1         10 dB/div       Ce	<b>X/</b> RL RF 50 Ω	PNO: Wide 🕞 Tri	g: Free Run		TRACE 1 2 3 4 5 6	Frequency
15.0	10 dB/div Ref 25.00 dE	in Guin. Low	ten. 30 dB	Mkr1	1.910 056 GHz -33.06 dBm	Auto Tune
-500         0         0         0         0         1.906000000           -150         0         0         0         1.906000000         Stop I           -250         0         0         1.914000000         Stop I         1.914000000           -360         0         0         0         Stop I         1.914000000           -450         0         0         0         Freq O           -650         0         0         0         Freq O           -650         0         0         0         Stal I           -650         0         0         0         0         Stal I         Stal I           -650         0         0         0         0         Stal I         Stal I           -650         0         0         0         0         Stal I         Stal I						Center Fred 1.910000000 GH:
15.0       Stop         250       1.91400000         360       CF 5         450       Freq O         660       Stop         660       Stop         660       Span 8.000 MHz						Start Free 1.906000000 GH
3300         Auto         800.000           450         Auto         800.000           550         Freq O         Freq O           650         Span 8.000 MHz         Log					DL1 -13.00 dbm	<b>Stop Fre</b> 1.914000000 GH
55.0 Freq O 55.0 Scale 1 Center 1.910000 GHz Span 8.000 MHz			1		·····	CF Ste 800.000 kH <u>Auto</u> Ma
Center 1.910000 GHz Scale T						Freq Offse 0 ⊢
	65.0					Scale Typ
#Res BW 100 kHz         #VBW 300 kHz         Sweep 1.000 ms (1001 pts)           sg         status	Res BW 100 kHz	#VBW 300	) kHz	-	.000 ms (1001 pts)	Log <u>Li</u>

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



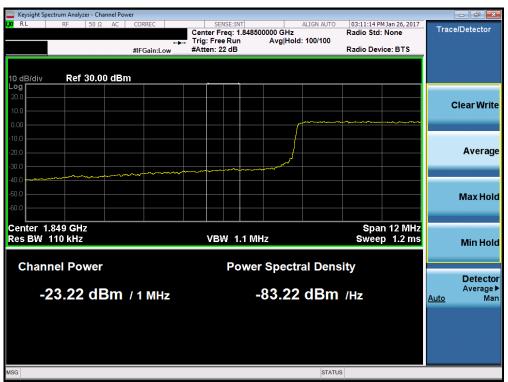
Plot 7-132. Upper Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager			
Test Report S/N:	Test Dates:	EUT Type:		Dego 92 of 117			
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🔤 Keysight Sp	ectrum Analyzer -	Swept SA					
XI RL	RF 5	OΩ AC	CORREC	SENSE:INT	ALIGN AUTO #Avg Type: RMS	03:11:09 PM Jan 26, 2017 TRACE 1 2 3 4 5 6	Frequency
			PNO: Wide 🕞 IFGain:Low	Trig: Free Run Atten: 36 dB		DET A WWWWWW DET A NNNNN	
10 dB/div Log	Ref 25.0	0 dBm			Mkr	1 1.849 964 GHz -29.81 dBm	Auto Tune
15.0							Center Freq 1.850000000 GHz
-5.00						DL1 -13.00 dBm	Start Freq 1.844000000 GHz
-15.0				1		UL - 13.00 dbri	<b>Stop Fred</b> 1.856000000 GH
-35.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	······································			CF Step 1.200000 MH; <u>Auto</u> Mar
-55.0							Freq Offse 0 H:
-65.0							Scale Type
Center 1. #Res BW	850000 GH 150 kHz	iz	#VBW	470 kHz	Sweep	Span 12.00 MHz 1.000 ms (1001 pts)	Log <u>Lir</u>
//SG					STATL	JS	

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



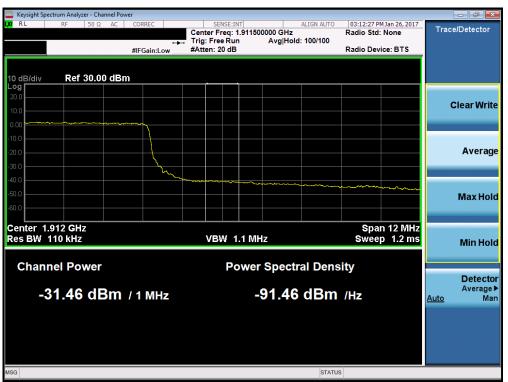
Plot 7-134. Lower Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🔁 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dego 92 of 117	
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	rum Analyzer -	Swept SA									
RL	RF 50	Ω ΑC	CORREC PNO: Wide			#Avg Typ	ALIGN AUTO e: RMS	TRAC	1 Jan 26, 2017 E <b>1 2 3 4 5 6</b> E A WWWW T A N N N N N	Fr	requency
10 dB/div Log	Ref 25.00	) dBm	IFGain:Low	Atten: 30	ub		Mkr1	1.910 0 -34.4	00 GHz 47 dBm		Auto Tune
15.0											Center Fred 0000000 GH2
5.00	~~~~~	~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~							1.90	Start Free 4000000 GH
-15.0									DL1 -13.00 dBm	1.91	<b>Stop Free</b> 6000000 GH
35.0				N. M.	1	www.	um	·····		1 <u>Auto</u>	CF Stej .200000 MH Ma
45.0 <u> </u>											Freq Offse 0 H
65.0											Scale Typ
Center 1.9′ #Res BW 1		Z	#VBW	470 kHz				.000 ms (	2.00 MHz 1001 pts)	Log	Lii
ISG							STATUS	6			

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



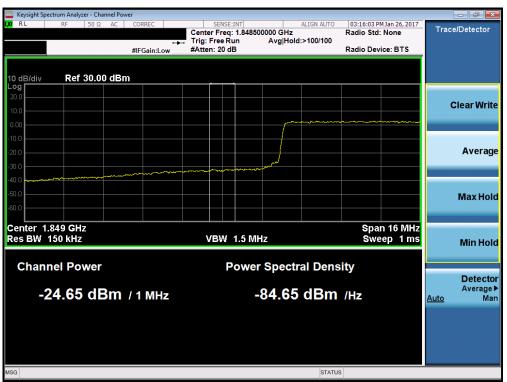
Plot 7-136. Upper Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🔁 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dego 94 of 117	
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😐 Keysight Sp	ectrum Analyzer - S	Swept SA									- 0 ×
XI RL	RF 50	Ω AC	CORREC	SEN	SE:INT	#Avg Typ	ALIGN AUTO	03:15:59 PM Ja TRACE	an 26, 2017 1 2 3 4 5 6	Fr	equency
			PNO: Fast G	Trig: Free Atten: 36		#Avg typ		TYPE DET	A WWWWW A NNNNN		
10 dB/div Log	Ref 25.00	dBm					Mkr1	1.850 00 -29.8	0 GHz 3 dBm		Auto Tune
15.0											Center Fred
-5.00						montan	and the second		1 -13.00 dBm	1.842	Start Free 2000000 GH:
-15.0					1				1 - 13.00 dBni	1.858	<b>Stop Fred</b> 3000000 GH:
-35.0	www.		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		<sup>م</sup> مر					1 <u>Auto</u>	<b>CF Stej</b> .600000 MH Ma
55.0										1	F <b>req Offse</b> 0 H
-65.0										:	Scale Type
Center 1. #Res BW	850000 GH 200 kHz	Z	#VBM	/ 620 kHz			Sweep 1	Span 16. .000 ms (10	00 MHz 001 pts)	Log	<u>Lir</u>
MSG							STATUS				

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



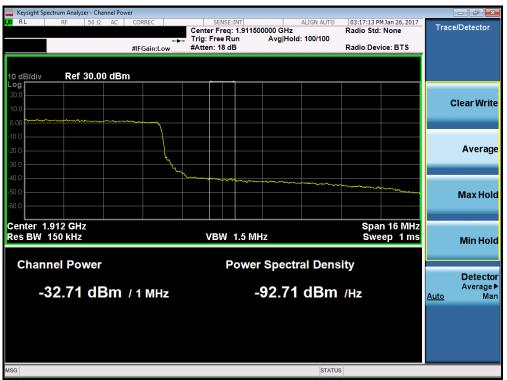
Plot 7-138. Lower Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🔁 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dego 95 of 117
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	ectrum Analyzer - S	wept SA									
X/RL	RF 50	Ω AC	CORREC	SEN	SE:INT	#Avg Typ	ALIGN AUTO	03:17:08 PM	I Jan 26, 2017	Fr	equency
			PNO: Fast G	Trig: Free Atten: 36		#///g / yp			E 1 2 3 4 5 6 E A WWWWW T A NNNNN		
10 dB/div Log	Ref 25.00	dBm					Mkr1	1.910 0 -36.3	00 GHz 33 dBm		Auto Tune
15.0											Center Fred 0000000 GHz
-5.00	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Notoning	head have been	~~					DL1 -13.00 dBm	1.90	Start Fred 2000000 GHz
-15.0										1.91	Stop Free 8000000 GH:
-35.0				4. Way	1	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	*****	wanner	manantar	1 <u>Auto</u>	CF Step .600000 MH Mar
55.0											F <b>req Offse</b> 0 H
-65.0											Scale Type
Center 1.9 #Res BW	910000 GHz 200 kHz	2	#VBW	620 kHz			Sweep 1	Span 1 .000 ms (	6.00 MHz 1001 pts)	Log	Lir
MSG							STATUS				

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



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

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
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# 7.5 Peak-Average Ratio §24.232(d)

# **Test Overview**

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

# Test Procedure Used

KDB 971168 D01 v02r02 - Section 5.7.1

# Test Settings

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

# Test Setup

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

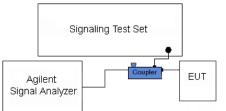


Figure 7-4. Test Instrument & Measurement Setup

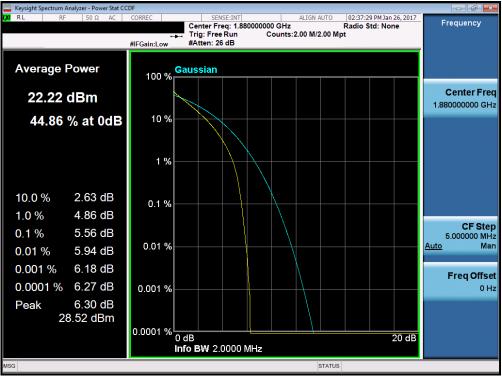
# Test Notes

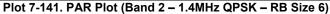
None.

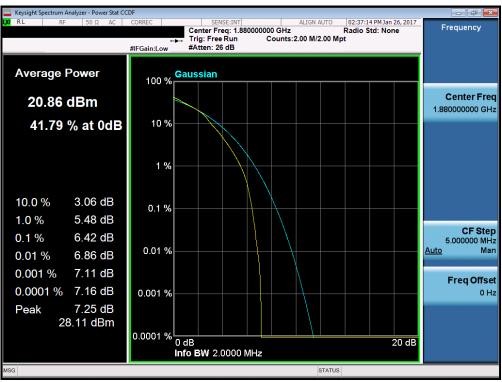
FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
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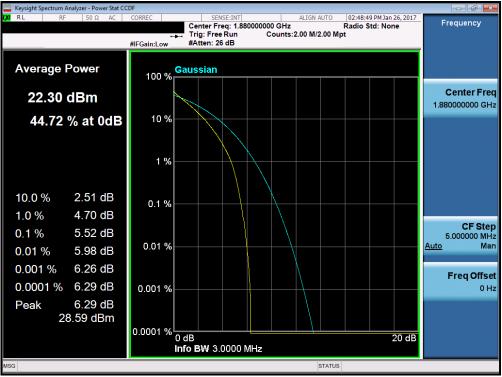


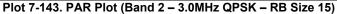


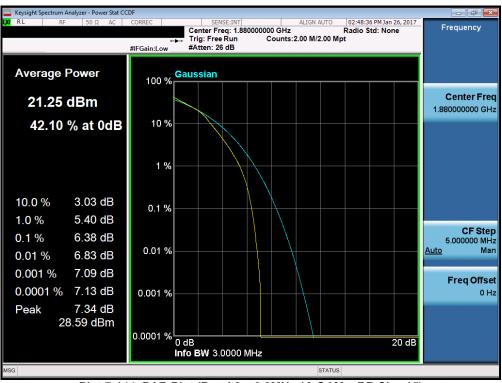
Plot 7-142. PAR Plot (Band 2 – 1.4MHz 16-QAM – RB Size 6)

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🔁 LG	Approved by: Quality Manager	
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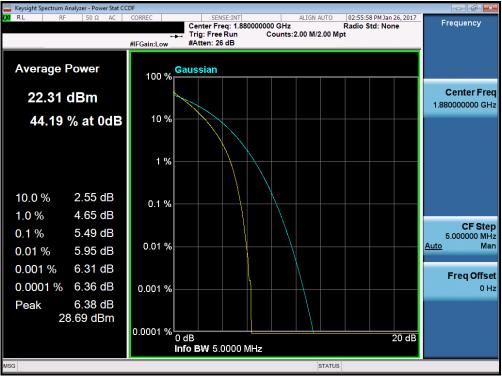


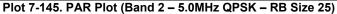


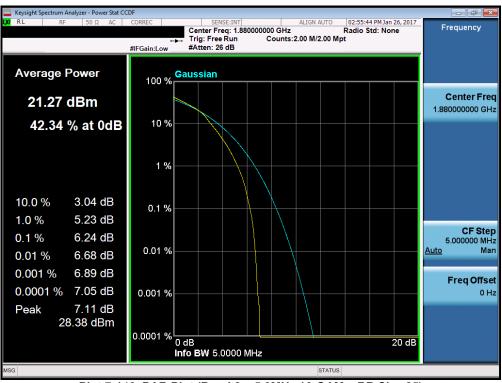
Plot 7-144. PAR Plot (Band 2 – 3.0MHz 16-QAM – RB Size 15)

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🔁 LG	Approved by: Quality Manager
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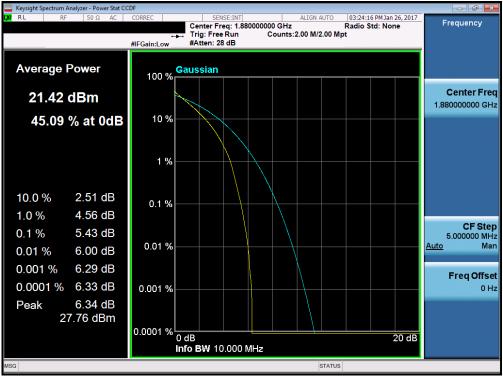




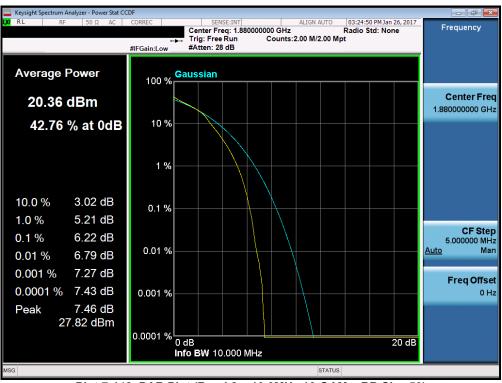
Plot 7-146. PAR Plot (Band 2 - 5.0MHz 16-QAM - RB Size 25)

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🔁 LG	Approved by: Quality Manager
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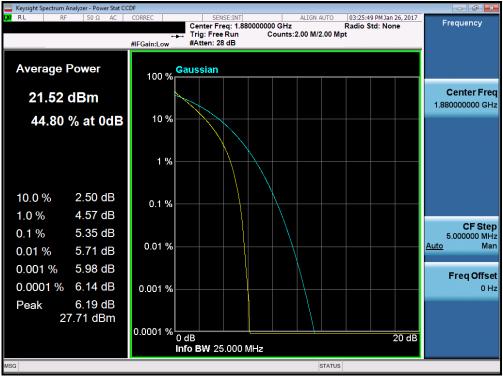




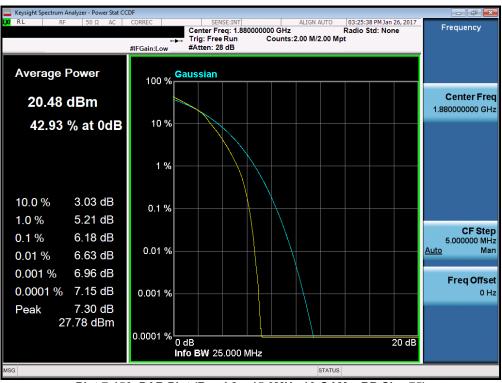
Plot 7-148. PAR Plot (Band 2 - 10.0MHz 16-QAM - RB Size 50)

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🔁 LG	Approved by: Quality Manager
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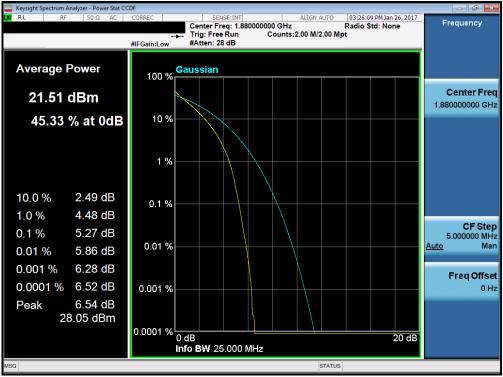


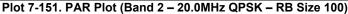


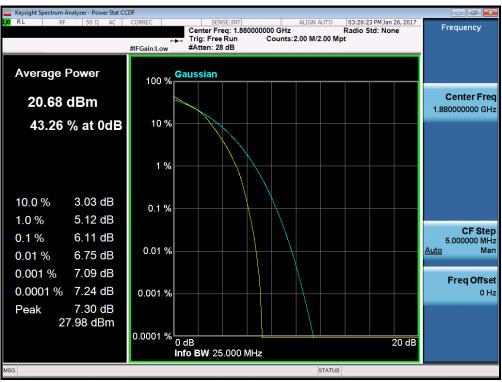
Plot 7-150. PAR Plot (Band 2 - 15.0MHz 16-QAM - RB Size 75)

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🔁 LG	Approved by: Quality Manager
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Plot 7-152. PAR Plot (Band 2 - 20.0MHz 16-QAM - RB Size 100)

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager
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## 7.6 Radiated Power (ERP/EIRP) §22.913(a.2) §24.232(c.2) §27.50(c.10) §27.50(d.4)

### **Test Overview**

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

### Test Procedures Used

KDB 971168 D01 v02r02 - Section 5.2.1

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

### Test Settings

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

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### Test Setup

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

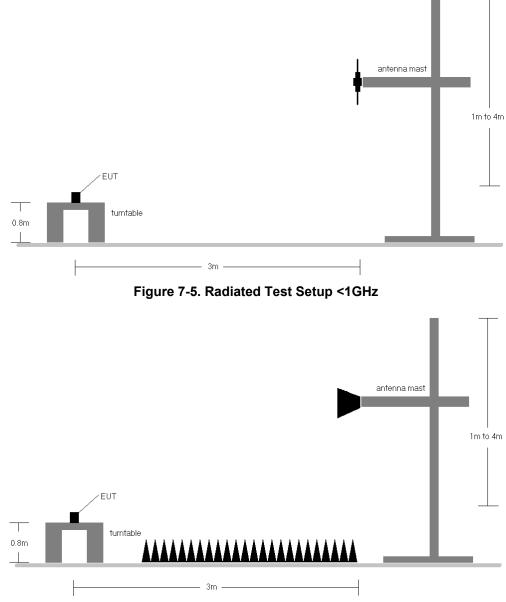


Figure 7-6. Radiated Test Setup >1GHz

#### **Test Notes**

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

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
699.70	1.4	QPSK	V	150	85	1 / 5	17.24	-1.15	16.09	34.77	-18.68
707.50	1.4	QPSK	V	150	81	1 / 0	17.88	-1.18	16.70	34.77	-18.07
715.30	1.4	QPSK	V	150	81	1 / 3	18.47	-1.21	17.26	34.77	-17.51
699.70	1.4	16-QAM	V	150	85	1 / 5	16.37	-1.15	15.22	34.77	-19.55
707.50	1.4	16-QAM	V	150	81	1 / 5	16.61	-1.18	15.43	34.77	-19.34
715.30	1.4	16-QAM	V	150	81	1 / 3	17.11	-1.21	15.90	34.77	-18.87
700.50	3	QPSK	V	150	88	1 / 14	16.76	-1.15	15.61	34.77	-19.16
707.50	3	QPSK	V	150	86	1 / 7	17.42	-1.18	16.24	34.77	-18.53
714.50	3	QPSK	V	150	84	1 / 14	18.36	-1.21	17.15	34.77	-17.62
700.50	3	16-QAM	V	150	88	1 / 14	15.61	-1.15	14.46	34.77	-20.31
707.50	3	16-QAM	V	150	86	1 / 7	16.20	-1.18	15.02	34.77	-19.75
714.50	3	16-QAM	V	150	84	1 / 14	16.82	-1.21	15.61	34.77	-19.16
701.50	5	QPSK	V	150	90	1 / 24	17.56	-1.16	16.40	34.77	-18.37
707.50	5	QPSK	V	150	83	1 / 12	18.49	-1.18	17.31	34.77	-17.46
713.50	5	QPSK	V	150	83	1 / 24	18.63	-1.20	17.43	34.77	-17.35
701.50	5	16-QAM	V	150	90	1 / 24	16.26	-1.16	15.10	34.77	-19.67
707.50	5	16-QAM	V	150	83	1 / 12	16.58	-1.18	15.40	34.77	-19.37
713.50	5	16-QAM	V	150	83	1 / 24	17.00	-1.20	15.80	34.77	-18.98
704.00	10	QPSK	V	150	83	1 / 49	19.14	-1.17	17.97	34.77	-16.80
707.50	10	QPSK	V	150	83	1 / 25	19.20	-1.18	18.02	34.77	-16.75
711.00	10	QPSK	V	150	90	1 / 49	19.74	-1.19	18.55	34.77	-16.23
704.00	10	16-QAM	V	150	83	1 / 49	17.34	-1.17	16.17	34.77	-18.60
707.50	10	16-QAM	V	150	83	1 / 25	17.93	-1.18	16.75	34.77	-18.02
711.00	10	16-QAM	V	150	90	1 / 49	18.31	-1.19	17.12	34.77	-17.66
711.00	10	QPSK	н	150	256	1 / 49	18.84	-0.29	18.55	34.77	-16.22

Table 7-2. ERP Data (Band 12)

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
824.70	1.4	QPSK	Н	150	84	1 / 0	20.72	-0.75	19.97	38.45	-18.48
836.50	1.4	QPSK	Н	150	84	1 / 5	21.41	-0.84	20.57	38.45	-17.88
848.30	1.4	QPSK	Н	150	88	1 / 5	21.76	-0.94	20.82	38.45	-17.63
824.70	1.4	16-QAM	н	150	84	1 / 5	19.53	-0.75	18.78	38.45	-19.67
836.50	1.4	16-QAM	н	150	84	1 / 5	20.30	-0.84	19.46	38.45	-18.99
848.30	1.4	16-QAM	н	150	88	1 / 5	20.47	-0.94	19.53	38.45	-18.92
825.50	3	QPSK	н	150	88	1 / 7	20.41	-0.75	19.66	38.45	-18.80
836.50	3	QPSK	Н	150	86	1 / 14	21.19	-0.84	20.35	38.45	-18.10
847.50	3	QPSK	Н	150	85	1 / 0	21.58	-0.93	20.65	38.45	-17.80
825.50	3	16-QAM	Н	150	88	1 / 7	19.29	-0.75	18.54	38.45	-19.92
836.50	3	16-QAM	Н	150	86	1 / 14	20.07	-0.84	19.23	38.45	-19.22
847.50	3	16-QAM	Н	150	85	1 / 0	20.45	-0.93	19.52	38.45	-18.93
826.50	5	QPSK	Н	150	87	1 / 24	21.56	-0.76	20.80	38.45	-17.65
836.50	5	QPSK	Н	150	87	1 / 24	21.90	-0.84	21.06	38.45	-17.39
846.50	5	QPSK	Н	150	86	1 / 12	22.30	-0.92	21.38	38.45	-17.07
826.50	5	16-QAM	Н	150	87	1 / 24	20.09	-0.76	19.33	38.45	-19.12
836.50	5	16-QAM	Н	150	87	1 / 24	20.68	-0.84	19.84	38.45	-18.61
846.50	5	16-QAM	Н	150	86	1 / 12	21.07	-0.92	20.15	38.45	-18.30
829.00	10	QPSK	Н	150	81	1 / 49	22.49	-0.78	21.71	38.45	-16.74
836.50	10	QPSK	н	150	84	1 / 25	23.07	-0.84	22.23	38.45	-16.22
844.00	10	QPSK	н	150	86	1 / 49	22.95	-0.90	22.05	38.45	-16.40
829.00	10	16-QAM	н	150	81	1 / 49	20.97	-0.78	20.19	38.45	-18.26
836.50	10	16-QAM	н	150	84	1 / 25	21.78	-0.84	20.94	38.45	-17.51
844.00	10	16-QAM	н	150	86	1 / 49	21.91	-0.90	21.01	38.45	-17.44
836.50	10	QPSK	V	150	82	1 / 25	22.18	-1.40	20.78	38.45	-17.67

Table 7-3. ERP Data (Band 5)

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🔁 LG	Approved by: Quality Manager
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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	V	150	97	1 / 0	19.26	5.65	24.91	30.00	-5.09
1732.50	1.4	QPSK	V	150	93	1/3	18.99	5.41	24.40	30.00	-5.60
1754.30	1.4	QPSK	V	150	93	1 / 5	18.44	5.17	23.61	30.00	-6.39
1710.70	1.4	16-QAM	V	150	97	1 / 0	18.58	5.65	24.23	30.00	-5.77
1732.50	1.4	16-QAM	V	150	93	1/3	17.80	5.41	23.21	30.00	-6.79
1754.30	1.4	16-QAM	V	150	93	1 / 5	17.21	5.17	22.38	30.00	-7.62
1711.50	3	QPSK	V	150	92	1 / 0	18.91	5.64	24.55	30.00	-5.45
1732.50	3	QPSK	V	150	97	1 / 7	18.36	5.41	23.77	30.00	-6.23
1753.50	3	QPSK	V	150	99	1 / 7	18.04	5.18	23.22	30.00	-6.78
1711.50	3	16-QAM	V	150	92	1 / 0	15.93	5.64	21.57	30.00	-8.43
1732.50	3	16-QAM	V	150	97	1 / 7	16.78	5.41	22.19	30.00	-7.81
1753.50	3	16-QAM	V	150	99	1 / 7	16.63	5.18	21.81	30.00	-8.19
1712.50	5	QPSK	V	150	91	1 / 0	19.44	5.63	25.07	30.00	-4.93
1732.50	5	QPSK	V	150	97	1 / 0	19.09	5.41	24.50	30.00	-5.50
1752.50	5	QPSK	v	150	92	1 / 0	18.59	5.19	23.78	30.00	-6.22
1712.50	5	16-QAM	V	150	91	1 / 0	17.83	5.63	23.46	30.00	-6.54
1732.50	5	16-QAM	V	150	97	1 / 0	17.87	5.41	23.28	30.00	-6.72
1752.50	5	16-QAM	V	150	92	1 / 0	17.20	5.19	22.39	30.00	-7.61
1715.00	10	QPSK	v	150	90	1 / 0	20.20	5.60	25.80	30.00	-4.20
1732.50	10	QPSK	v	150	96	1 / 0	19.87	5.41	25.28	30.00	-4.72
1750.00	10	QPSK	V	150	94	1 / 0	19.88	5.22	25.10	30.00	-4.90
1715.00	10	16-QAM	V	150	90	1 / 0	19.10	5.60	24.70	30.00	-5.30
1732.50	10	16-QAM	v	150	96	1 / 0	18.44	5.41	23.85	30.00	-6.15
1750.00	10	16-QAM	v	150	94	1 / 0	18.09	5.22	23.31	30.00	-6.69
1717.50	15	QPSK	V	150	96	1 / 0	20.35	5.57	25.92	30.00	-4.08
1732.50	15	QPSK	V	150	94	1 / 0	20.02	5.41	25.43	30.00	-4.57
1747.50	15	QPSK	V	150	98	1 / 0	19.95	5.24	25.19	30.00	-4.81
1717.50	15	16-QAM	V	150	96	1 / 0	18.97	5.57	24.54	30.00	-5.46
1732.50	15	16-QAM	V	150	94	1 / 0	18.81	5.41	24.22	30.00	-5.78
1747.50	15	16-QAM	V	150	98	1 / 0	18.14	5.24	23.38	30.00	-6.62
1720.00	20	QPSK	v	150	94	1/0	20.20	5.54	25.74	30.00	-4.26
1732.50	20	QPSK	v	150	93	1/0	19.91	5.41	25.32	30.00	-4.68
1745.00	20	QPSK	v	150	98	1/0	19.91	5.27	25.18	30.00	-4.82
1720.00	20	16-QAM	V	150	94	1/0	19.06	5.54	24.60	30.00	-5.40
1732.50	20	16-QAM	V	150	93	1/0	18.74	5.41	24.15	30.00	-5.85
1745.00	20	16-QAM	v	150	98	1/0	18.20	5.27	23.47	30.00	-6.53
1717.50	15	QPSK	н	150	75	1/0	20.11	5.51	25.62	30.00	-4.38

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

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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	V	150	91	1 / 3	19.92	4.79	24.71	33.01	-8.30
1880.00	1.4	QPSK	V	150	95	1/3	20.34	4.84	25.18	33.01	-7.83
1909.30	1.4	QPSK	v	150	88	1 / 0	20.18	4.86	25.04	33.01	-7.97
1850.70	1.4	16-QAM	V	150	91	1 / 3	18.59	4.79	23.38	33.01	-9.63
1880.00	1.4	16-QAM	V	150	95	1/3	19.06	4.84	23.90	33.01	-9.11
1909.30	1.4	16-QAM	V	150	88	1 / 0	19.29	4.86	24.15	33.01	-8.86
1851.50	3	QPSK	V	150	96	1 / 14	18.65	4.79	23.44	33.01	-9.57
1880.00	3	QPSK	V	150	87	1 / 14	18.75	4.84	23.59	33.01	-9.42
1908.50	3	QPSK	V	150	89	1 / 7	18.90	4.86	23.76	33.01	-9.25
1851.50	3	16-QAM	V	150	96	1 / 14	17.59	4.79	22.38	33.01	-10.63
1880.00	3	16-QAM	V	150	87	1 / 14	17.69	4.84	22.53	33.01	-10.48
1908.50	3	16-QAM	V	150	89	1 / 7	17.65	4.86	22.51	33.01	-10.50
1852.50	5	QPSK	V	150	88	1 / 24	19.46	4.79	24.25	33.01	-8.76
1880.00	5	QPSK	V	150	88	1 / 24	20.63	4.84	25.47	33.01	-7.54
1907.50	5	QPSK	V	150	93	1 / 12	21.06	4.87	25.93	33.01	-7.08
1852.50	5	16-QAM	V	150	88	1 / 24	18.86	4.79	23.65	33.01	-9.36
1880.00	5	16-QAM	V	150	88	1 / 24	19.10	4.84	23.94	33.01	-9.07
1907.50	5	16-QAM	V	150	93	1 / 12	19.71	4.87	24.58	33.01	-8.43
1855.00	10	QPSK	V	150	94	1 / 25	21.64	4.80	26.44	33.01	-6.57
1880.00	10	QPSK	V	150	94	1 / 49	21.63	4.84	26.47	33.01	-6.54
1905.00	10	QPSK	V	150	90	1 / 25	21.47	4.87	26.34	33.01	-6.67
1855.00	10	16-QAM	V	150	94	1 / 25	20.07	4.80	24.87	33.01	-8.14
1880.00	10	16-QAM	V	150	94	1 / 49	20.46	4.84	25.30	33.01	-7.71
1905.00	10	16-QAM	V	150	90	1 / 25	20.78	4.87	25.65	33.01	-7.36
1857.50	15	QPSK	V	150	95	1 / 36	21.45	4.80	26.25	33.01	-6.76
1880.00	15	QPSK	V	150	93	1 / 0	21.55	4.84	26.39	33.01	-6.62
1902.50	15	QPSK	V	150	92	1 / 74	21.71	4.88	26.59	33.01	-6.42
1857.50	15	16-QAM	V	150	95	1 / 36	20.12	4.80	24.92	33.01	-8.09
1880.00	15	16-QAM	V	150	93	1 / 0	20.33	4.84	25.17	33.01	-7.84
1902.50	15	16-QAM	V	150	92	1 / 74	20.16	4.88	25.04	33.01	-7.97
1860.00	20	QPSK	V	150	88	1 / 0	21.22	4.81	26.03	33.01	-6.99
1880.00	20	QPSK	V	150	90	1 / 99	21.70	4.84	26.54	33.01	-6.47
1900.00	20	QPSK	V	150	93	1 / 0	21.86	4.88	26.74	33.01	-6.27
1860.00	20	16-QAM	V	150	88	1/0	19.63	4.81	24.44	33.01	-8.58
1880.00	20	16-QAM	V	150	90	1 / 99	20.28	4.84	25.12	33.01	-7.89
1900.00	20	16-QAM	V	150	93	1/0	20.27	4.88	25.15	33.01	-7.86
1900.00	20	QPSK	н	150	103	1 / 0	19.84	4.69	24.53	33.01	-8.48

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

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

### **Test Overview**

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

#### **Test Procedures Used**

KDB 971168 D01 v02r02 - Section 5.8

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

### Test Settings

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

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager		
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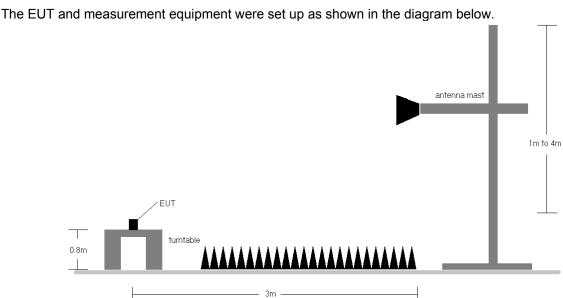


Figure 7-7. Test Instrument & Measurement Setup

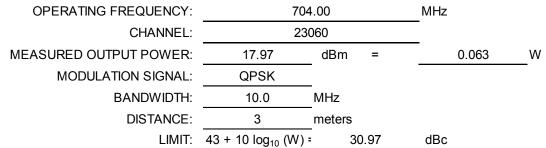
### Test Notes

- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 2) This unit was tested with its standard battery.
- 3) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 4) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.
- 5) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

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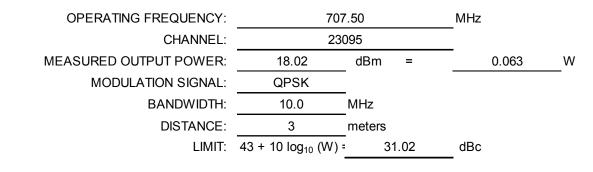
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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1408.00	Н	155	60	-64.06	5.64	-58.42	76.4
2112.00	Н	-	-	-63.90	6.70	-57.20	75.2
2816.00	Н	-	-	-73.06	7.91	-65.15	83.1

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



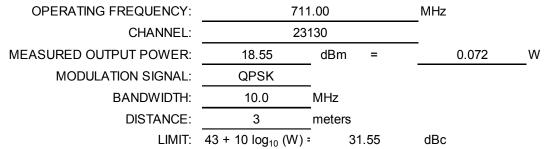
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1415.00	Н	110	200	-66.65	5.69	-60.96	79.0
2122.50	Н	112	210	-64.34	6.75	-57.60	75.6
2830.00	Н	-	-	-72.76	7.90	-64.86	82.9

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

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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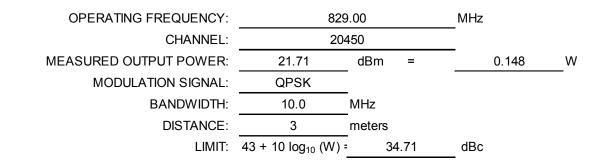
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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1422.00	Н	110	310	-73.39	5.75	-67.64	86.2
2133.00	Н	112	317	-69.71	6.79	-62.92	81.5
2844.00	Н	135	120	-68.86	7.88	-60.98	79.5
3555.00	Н	120	112	-64.95	7.81	-57.13	75.7
4266.00	Н	-	-	-69.34	8.48	-60.87	79.4

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



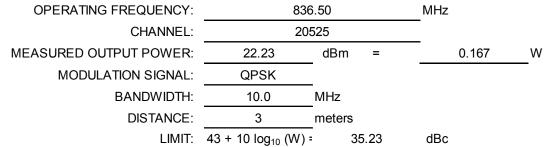
Frequency [MHz]	Ant. Pol. [H/V]	Height	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1658.00	Н	110	240	-73.78	6.70	-67.09	88.8
2487.00	Н	-	-	-72.10	7.58	-64.53	86.2
3316.00	Н	-	-	-69.76	7.42	-62.34	84.0

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

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1673.00	Н	110	277	-69.80	6.70	-63.10	85.3
2509.50	Н	-	-	-73.24	7.63	-65.61	87.8

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

OPERATING FREQUENCY:	844	.00	MHz
CHANNEL:	206	500	
MEASURED OUTPUT POWER:	22.05	dBm =	0.160 W
MODULATION SIGNAL:	QPSK		
BANDWIDTH:	10.0	MHz	
DISTANCE:	3	meters	
LIMIT:	43 + 10 log <sub>10</sub> (W) =	35.05	dBc

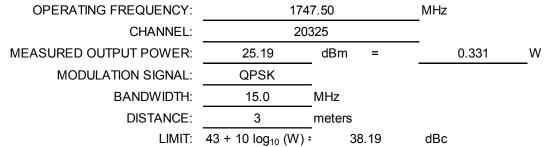
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1688.00	Н	110	252	-71.36	6.70	-64.66	86.7
2532.00	Н	-	-	-71.37	7.61	-63.76	85.8
3376.00	Н	-	-	-70.22	7.61	-62.61	84.7

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

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager
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Frequency [MHz]	Ant. Pol. [H/V]	Height	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3495.00	Н	120	174	-59.95	9.94	-50.01	75.2
5242.50	Н	-	-	-67.92	10.72	-57.20	82.4

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

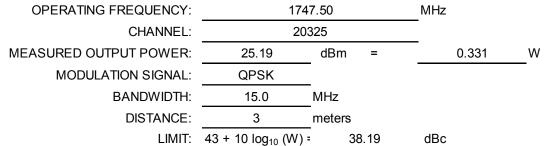
OPERATING FREQUENCY:	173	2.50	MHz
CHANNEL:	201	175	
MEASURED OUTPUT POWER:	25.43	dBm =	0.349 W
MODULATION SIGNAL:	QPSK	_	
BANDWIDTH:	15.0	MHz	
DISTANCE:	3	meters	
LIMIT:	43 + 10 log <sub>10</sub> (W) =	38.43	dBc

Frequency [MHz]	Ant. Pol. [H/V]	Height	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3465.00	Н	110	145	-62.13	9.91	-52.22	77.6
5197.50	Н	-	-	-67.61	10.75	-56.87	82.3

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

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager
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Frequency [MHz]	Ant. Pol. [H/V]	Height	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3495.00	Н	120	174	-59.95	9.94	-50.01	75.2
5242.50	Н	-	-	-67.92	10.72	-57.20	82.4

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

OPERATING FREQUENCY:	1860	0.00	MHz
CHANNEL:	187	700	_
MEASURED OUTPUT POWER:	26.03	dBm =	0.400 W
MODULATION SIGNAL:	QPSK		
BANDWIDTH:	20.0	MHz	
DISTANCE:	3	meters	
LIMIT:	43 + 10 log <sub>10</sub> (W) =	39.03	dBc

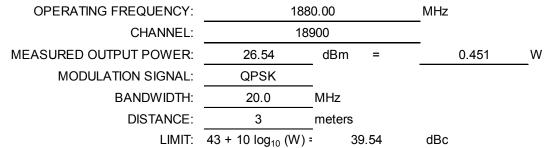
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3720.00	Н	120	310	-51.98	9.48	-42.50	68.5
5580.00	Н	-	-	-68.04	11.11	-56.93	83.0

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

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager			
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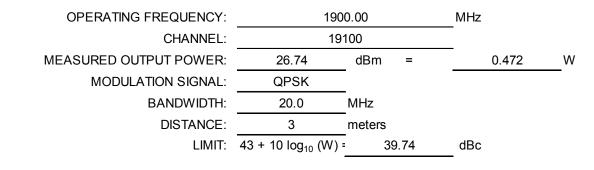
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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3760.00	Н	145	304	-57.91	9.39	-48.53	75.1
5640.00	Н	-	-	-67.53	11.22	-56.31	82.9
7520.00	Н	-	-	-59.67	11.10	-48.56	75.1

Table 7-16. Radiated Spurious Data (Band 2 – Mid Channel)



Frequency [MHz]	Ant. Pol. [H/V]	Height	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3800.00	Н	110	300	-59.28	9.29	-49.99	76.7
5700.00	Н	-	-	-67.62	11.29	-56.33	83.1

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

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager
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#### 7.8 Frequency Stability / Temperature Variation §2.1055 §22.355 §24.235 §27.54

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

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

- Temperature: The temperature is varied from -30°C to +50°C in 10°C increments using an a.) environmental chamber.
- Primary Supply Voltage: The primary supply voltage is varied from 85% to 115% of the nominal b.) 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 ±0.00025% (±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.
- Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

#### Test Setup

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

#### Test Notes

None

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## Band 12 Frequency Stability Measurements §2.1055 §27.54

OPERATING FREQUENCY:	707,500,000	Hz
CHANNEL:	23790	
REFERENCE VOLTAGE:	3.80	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	707,499,975	-25	-0.0000035
100 %		- 30	707,499,987	-13	-0.0000018
100 %		- 20	707,499,963	-37	-0.0000053
100 %		- 10	707,499,816	-184	-0.0000260
100 %		0	707,499,917	-83	-0.0000117
100 %		+ 10	707,499,972	-28	-0.0000040
100 %		+ 20	707,499,845	-155	-0.0000220
100 %		+ 30	707,499,862	-138	-0.0000195
100 %		+ 40	707,499,856	-144	-0.0000203
100 %		+ 50	707,499,998	-2	-0.0000002
BATT. ENDPOINT	3.40	+ 20	707,499,860	-140	-0.0000197

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

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## Band 12 Frequency Stability Measurements §2.1055 §27.54

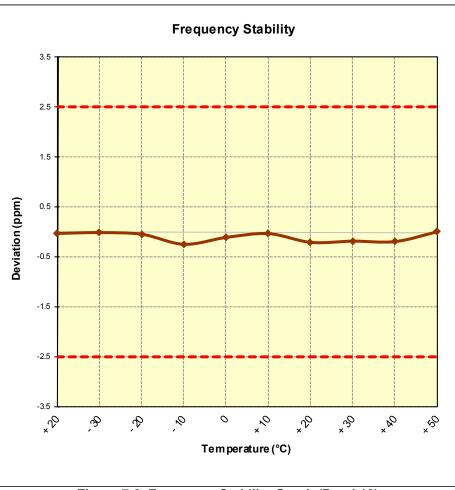


Figure 7-8. Frequency Stability Graph (Band 12)

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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## Band 5 Frequency Stability Measurements §2.1055 §22.355

OPERATING FREQUENCY:	836,500,000	Hz
CHANNEL:	20525	_
REFERENCE VOLTAGE:	3.80	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	_

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	836,499,947	-53	-0.0000063
100 %		- 30	836,499,938	-62	-0.0000075
100 %		- 20	836,499,862	-138	-0.0000165
100 %		- 10	836,499,919	-81	-0.0000097
100 %		0	836,499,984	-16	-0.0000020
100 %		+ 10	836,499,926	-74	-0.0000089
100 %		+ 20	836,499,928	-72	-0.0000086
100 %		+ 30	836,499,923	-77	-0.0000092
100 %		+ 40	836,499,902	-98	-0.0000117
100 %		+ 50	836,499,907	-93	-0.0000111
BATT. ENDPOINT	3.40	+ 20	836,499,996	-4	-0.0000005

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

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager
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## Band 5 Frequency Stability Measurements §2.1055 §22.355

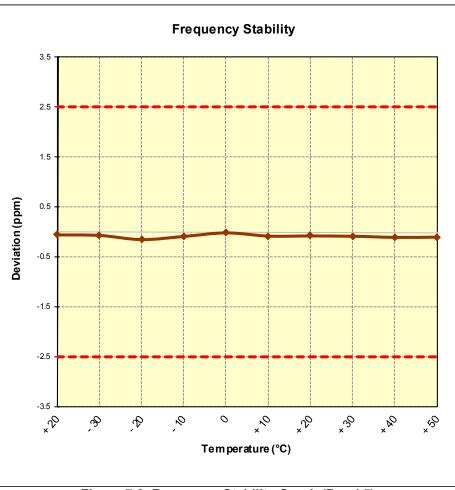


Figure 7-9. Frequency Stability Graph (Band 5)

FCC ID: ZNFAS110	PCTEST	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
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# Band 4 Frequency Stability Measurements §2.1055 §§27.54

OPERATING FREQUENCY:	1,732,500,000	Hz
CHANNEL:	20175	
REFERENCE VOLTAGE:	3.80	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	1,732,499,837	-163	-0.0000094
100 %		- 30	1,732,499,818	-182	-0.0000105
100 %		- 20	1,732,499,812	-188	-0.0000109
100 %		- 10	1,732,499,911	-89	-0.0000051
100 %		0	1,732,499,845	-155	-0.0000089
100 %		+ 10	1,732,499,898	-102	-0.0000059
100 %		+ 20	1,732,499,879	-121	-0.0000070
100 %		+ 30	1,732,499,846	-154	-0.0000089
100 %		+ 40	1,732,499,932	-68	-0.0000039
100 %		+ 50	1,732,499,897	-103	-0.0000059
BATT. ENDPOINT	3.40	+ 20	1,732,499,861	-139	-0.0000080

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

## Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain inband when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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## Band 4 Frequency Stability Measurements §2.1055 §§27.54

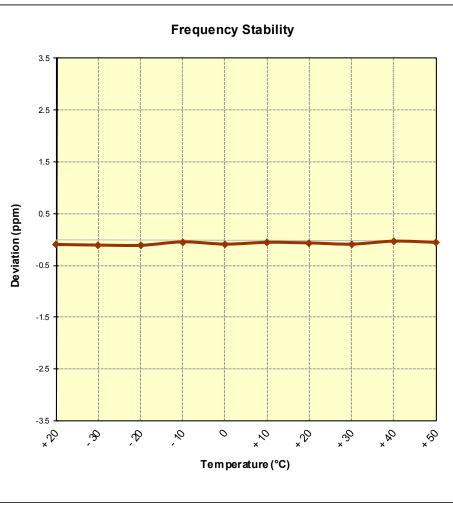


Figure 7-10. Frequency Stability Graph (Band 4)

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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# Band 2 Frequency Stability Measurements §2.1055 §24.235

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	18900	_
REFERENCE VOLTAGE:	3.80	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	1,879,999,849	-151	-0.0000081
100 %		- 30	1,879,999,812	-188	-0.0000100
100 %		- 20	1,879,999,804	-196	-0.0000104
100 %		- 10	1,879,999,969	-31	-0.0000016
100 %		0	1,879,999,891	-109	-0.0000058
100 %		+ 10	1,879,999,961	-39	-0.0000021
100 %		+ 20	1,879,999,900	-100	-0.0000053
100 %		+ 30	1,879,999,944	-56	-0.0000030
100 %		+ 40	1,879,999,811	-189	-0.0000101
100 %		+ 50	1,879,999,959	-41	-0.0000022
BATT. ENDPOINT	3.40	+ 20	1,879,999,871	-129	-0.0000069

Table 7-21. Frequency Stability Data (Band 2)

## Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain inband when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager
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## Band 2 Frequency Stability Measurements §2.1055 §24.235

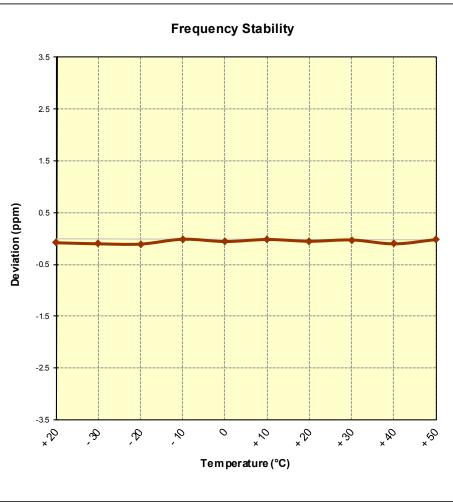


Figure 7-11. Frequency Stability Graph (Band 2)

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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## 8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the LGE Portable Handset FCC ID: ZNFAS110 complies with all the requirements of Parts 22, 24, & 27 of the FCC rules for LTE operation only.

FCC ID: ZNFAS110		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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