

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.

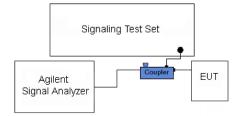


Figure 7-3. Test Instrument & Measurement Setup

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				
X RL RF 5(ΩΩ AC CORREC PNO:Wide ↔ IFGain:Low	SENSE:INT Trig: Free Run Atten: 36 dB	ALIGN AUTO #Avg Type: RMS	11:47:59 PM Mar 16, 2017 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A NNNNN	Frequency
10 dB/div Ref 25.00	0 dBm		Mk	r1 697.984 MHz -36.30 dBm	Auto Tun
15.0				m	Center Fre 698.000000 MH
5.00					Start Fre 696.000000 M⊦
-15.0			m	DL1 -13.00 dBm	Stop Fre 700.000000 M⊦
35.0		1			CF Ste 400.000 kł <u>Auto</u> Ma
55.0					Freq Offs 0 H
65.0					Scale Typ
Center 698.000 MHz #Res BW 100 kHz		300 kHz	Sweep 1	Span 4.000 MHz .000 ms (1001 pts)	Log <u>L</u> i
ISG			STATUS	6	

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



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

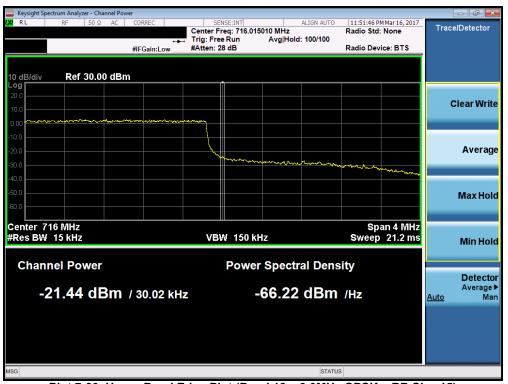
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	ectrum Analyzer - Swept SA	Ą				
<mark>0</mark> RL	RF 50 Ω Α(C CORREC PNO: Wide ↔ IFGain:Low	SENSE:INT Trig: Free Run Atten: 36 dB	ALIGN AUTO #Avg Type: RMS	11:50:07 PM Mar 16, 2017 TRACE 1 2 3 4 5 6 TYPE A WWWWW DET A NNNNN	Frequency
0 dB/div	Ref 25.00 dBn	n		Mk	1 697.956 MHz -23.64 dBm	Auto Tur
15.0					······	Center Fre 698.000000 MH
i.00					DL1 -13.00 dBm	Start Fre 696.000000 Mi
25.0			1			Stop Fro 700.000000 Mi
5.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~					CF St e 400.000 k <u>Auto</u> M
5.0						Freq Offs 0
	98.000 MHz				Span 4.000 MHz	Scale Typ
Res BW	100 kHz	#VBW	300 kHz	Sweep 1	.000 ms (1001 pts)	

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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	ectrum Analyzer - Swept SA					
<mark>XI</mark> RL	RF 50Ω AC	CORREC PNO: Wide ↔→→ IFGain:Low	SENSE:INT Trig: Free Run Atten: 36 dB	ALIGN AUTO #Avg Type: RMS	11:56:30 PM Mar 16, 2017 TRACE 2 3 4 5 6 TYPE A WWWW DET A NNNNN	Frequency
10 dB/div Log	Ref 25.00 dBm			Mk	r1 698.000 MHz -25.270 dBm	Auto Tune
15.0						Center Free 698.000000 MH
-5.00						Start Free 696.000000 MH
-15.0			1		DL1 -13.00 dBm	Stop Fre 700.000000 MH
35.0		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~				CF Ste 400.000 k⊦ <u>Auto</u> Ma
45.0 55.0						Freq Offso 0 H
-65.0						Scale Typ
#Res BW	8.000 MHz 100 kHz	#VBW	300 kHz		Span 4.000 MHz .000 ms (1001 pts)	Log <u>Li</u>
ISG				STATU	S	





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

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	ectrum Analyzer - Swept S	A				
XI RL	RF 50 Ω A	C CORREC PNO: Wide ↔ IFGain:Low	SENSE:INT Trig: Free Run Atten: 36 dB	ALIGN AUTO #Avg Type: RMS	12:01:51 AM Mar 17, 2017 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A N N N N N	Frequency
0 dB/div	Ref 25.00 dBr		Atten: 00 db	Mk	r1 698.000 MHz -28.602 dBm	Auto Tun
15.0						Center Fre 698.000000 M⊦
5.00						Start Fre 694.000000 MH
25.0			1		DL1 -13.00 dBm	Stop Fre 702.000000 Mi
15.0 ~~~~		n				CF Ste 800.000 ki <u>Auto</u> M
5.0						Freq Offs 0
	98.000 MHz		200 kli		Span 8.000 MHz	Scale Typ
	100 kHz	#VBW	300 kHz	Sweep	1.000 ms (1001 pts)	





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

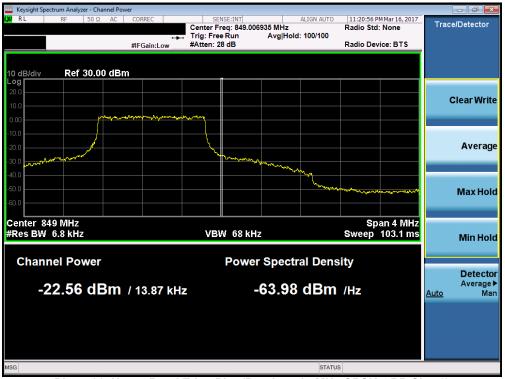
FCC ID: ZNFM255		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	pectrum Analyze			000055	_		105 MIT					-	
RL	RF	50 Ω	AC	CORREC			NSE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	M Mar 16, 2017	F	requency
				PNO: W IFGain:	ide ↔ ₋ow	Trig: Fre Atten: 36				DI			
0 dB/div .og	Ref 25.	00 dE	3m						Mk	r1 824.0 -16.2	00 MHz 68 dBm		Auto Tur
15.0							~~~			<u></u>			Center Fre 4.000000 MF
5.00												82	Start Fre 2.000000 Mi
25.0							1				DL1 -13.00 dBm	82	Stop Fre 6.000000 Mi
35.0 	~~~~~	~~~~	\sim								· · ·	<u>Auto</u>	CF Ste 400.000 kl M
5.0													Freq Offs 0
5.0													Scale Typ
	24.000 MI 100 kHz	lz			≠vB₩	300 kHz			Sweep 1	Span 4 .000 ms (.000 MHz (1001 pts)	Log	L
SG									STATUS	3			

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)

FCC ID: ZNFM255		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	Spectrum Analyze										
LXI RL	RF	50 Ω AC	CORREC	SEN	ISE:INT	#Avg Typ	ALIGN AUTO e: RMS		M Mar 16, 2017	F	requency
			PNO: Wide ++- IFGain:Low	Trig: Free Atten: 36				TYI Di			Auto Tune
10 dB/div Log	Ref 25.0	00 dBm					Mk	r1 824.0 -19.2	00 MHz 19 dBm		Auto Tulle
											Center Freq
15.0					~~~			^		82	4.000000 MHz
5.00											Start Freq
-5.00					/					82	2.000000 MHz
-15.0					/				DL1 -13.00 dBm		
				2						82	Stop Freq 6.000000 MHz
-25.0				~~~~							
-35.0	~~~~~										CF Step 400.000 kHz
-45.0										<u>Auto</u>	Man
-55.0											Freq Offset
											0 Hz
-65.0											Scale Type
	324.000 MH	iz						Span 4	.000 MHz	Log	Lin
#Res BV	V 100 kHz		#VBW	300 kHz			Sweep 1	.000 ms (1001 pts)		
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)

FCC ID: ZNFM255		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	ctrum Analyzer - Swept SA					
XI RL	RF 50 Ω AC	CORREC	SENSE:INT	ALIGN AUTO #Avg Type: RMS	11:30:14 PM Mar 16, 2017 TRACE 1 2 3 4 5 6 TYPE A WWWW	Frequency
10 dB/div Log	Ref 25.00 dBm	IFGain:Low	Atten: 36 dB	Mk	r1 823.992 MHz -24.77 dBm	Auto Tune
15.0						Center Fre 824.000000 MH
5.00						Start Fre 822.000000 MH
.15.0			1		DL1 -13.00 dBm	Stop Fre 826.000000 M⊢
35.0 <mark></mark>	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		n m			CF Ste 400.000 kH <u>Auto</u> Ma
55.0						Freq Offs 0 H
65.0						Scale Typ
Center 82∉ ≇Res BW	4.000 MHz 100 kHz	#VBW	300 kHz	Sweep 7	Span 4.000 MHz 1.000 ms (1001 pts)	Log <u>Li</u>
ISG				STATU	s	

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)

FCC ID: ZNFM255	PCTEST	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	ectrum Analyzer -							
L <mark>XI</mark> RL	RF 50	Ω AC	CORREC	SENSE:INT	#Avg Typ	ALIGN AUTO	11:38:49 PM Mar 16, 2017 TRACE 1 2 3 4 5 6	Frequency
			PNO: Wide	Trig: Free Run Atten: 36 dB				
10 dB/div Log	Ref 25.00) dBm				Mk	r1 823.928 MHz -30.20 dBm	Auto Tune
15.0								Center Freq 824.000000 MHz
-5.00					~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			Start Freq 820.000000 MHz
-15.0				1			DL1 -13.00 dBm	Stop Fred 828.000000 MHz
-35.0	~~~~~			~~~~~				CF Step 800.000 kHz <u>Auto</u> Mar
-55.0								Freq Offse 0 Ha
								Scale Type
Center 82 #Res BW	4.000 MHz 100 kHz		#VBW			Sweep 1	Span 8.000 MHz .000 ms (1001 pts)	Log <u>Lir</u>
MSG						STATUS	3	
			D 15		15 4			50)

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



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

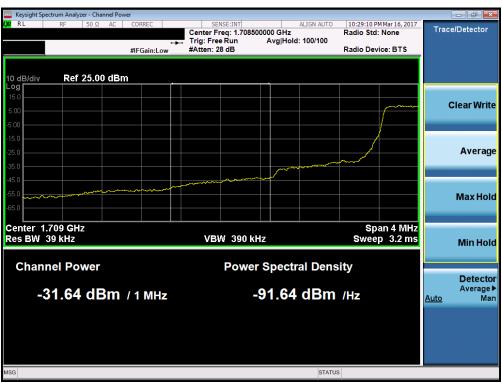
FCC ID: ZNFM255	PCTEST	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	ectrum Analyze	er - Swept SA									
LXI RL	RF	50 Ω AC	CORREC		NSE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	M Mar 16, 2017 CE 1 2 3 4 5 6	F	requency
			PNO: Wide IFGain:Low	Atten: 3				TYI Di			
10 dB/div	Def 25	00 dBm					Mkr1	1.710 0	00 GHz 02 dBm		Auto Tune
	KCI 23.				Ť						
15.0											Center Fred
										1.7	1000000 GH2
5.00					parterior	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	www.www.ww	٩			Start Fred
-5.00										1.70	3000000 GH
-3.00									DL1 -13.00 dBm		
-15.0								4	001-13.00 00m		Stop Free
					1					1.71	2000000 GH
-25.0					, '			٦ ل			
-35.0				Mon				"hours	W WWW		CF Step 400.000 kH
			monter	mont					"have	<u>Auto</u>	Mar
-45.0	man	Mr. War	1								
-55.0 Turner	man son .										Freq Offse
											0 H:
-65.0											Scale Type
Center 1. #Res BW	710000 G 13 kHz	iHz	#VI	BW 43 kHz			Sween 2	Span 4 9.07 ms (.000 MHz (1001 pts)	Log	Lir
ISG	1.911112						STATUS		noor pito)		
	D1.4 5										

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



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

FCC ID: ZNFM255	CALEST.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Plot 7-95. Upper Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)



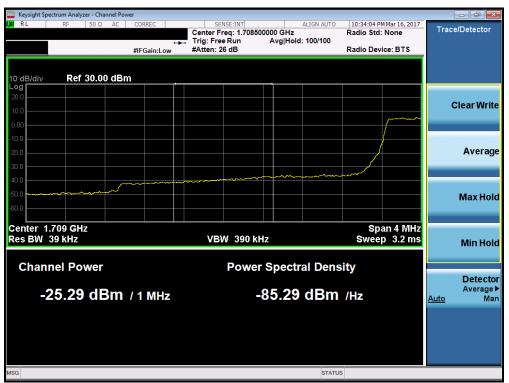
Plot 7-96. Upper Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFM255		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
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	ectrum Analyze	r - Swept SA	A									
XI RL	RF	50 Ω A	C COR	REC	SE	NSE:INT		ALIGN AUTO	10:33:49 PM		E	requency
				O: Wide ↔ ain:Low	Trig: Fre Atten: 36		#Avg Typ		TYPI DE	1 2 3 4 5 6 A WWWWW A N N N N N		
10 dB/div Log	Ref 25.0	00 dBn	n					Mkr1	1.710 0 -27.95	00 GHz 54 dBm		Auto Tune
15.0												Center Freq 0000000 GHz
-5.00							n www.	······································			1.70	Start Fred 8000000 GH:
-15.0					,	1				0L1 -13.00 dBm	1.71	Stop Fred 2000000 GH:
35.0 	www.www	~~~~		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	mound						<u>Auto</u>	CF Stej 400.000 kH Ma
55.0												Freq Offse 0 H
-65.0												Scale Type
Center 1. #Res BW	710000 G 30 kHz	Hz		#VBV	V 91 kHz			Sweep 5	Span 4. 533 ms (1	000 MHz 1001 pts)	Log	<u>Lir</u>
/ISG								STATUS	3			

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



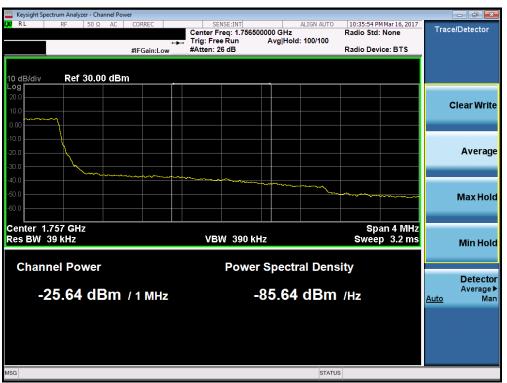
Plot 7-98. Lower Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFM255	PCTEST	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	ctrum Analyze										- 6 -
RL	RF	50Ω AC	CORREC PNO: Wide ↔	Trig: Free		#Avg Typ	ALIGN AUTO De: RMS	TYPE	lar 16, 2017 1 2 3 4 5 6 A WWWWW A N N N N N	Fr	equency
0 dB/div	Ref 25.0	00 dBm	IFGain:Low	Atten: 36	dB		Mkr1	1.755 00 -28.88	0 GHz		Auto Tur
5.0											enter Fre
.00	Constrainty and	www.www.	M~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~							1.753	Start Fr 8000000 G
5.0					,1				L1 -13.00 dBm	1.757	Stop Fr 000000 G
5.0					han wanton	-	m	······································	~~~~~	<u>Auto</u>	CF St 400.000 k M
5.0										F	F req Offs 0
5.0											Scale Ty
enter 1.7 Res BW	755000 G 30 kHz	Hz	#VB\	N 91 kHz			Sweep 5	Span 4.0 .533 ms (1		Log	Ĺ
G							STATUS				

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



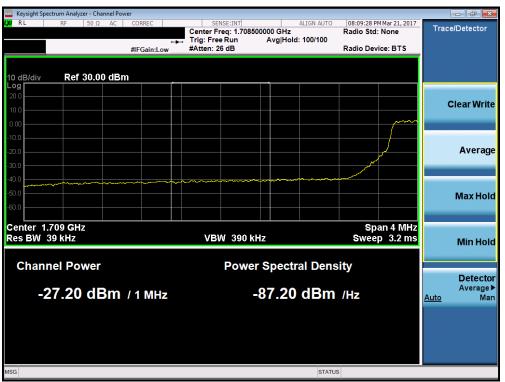
Plot 7-100. Upper Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFM255	PCTEST	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Plot 7-101. Lower Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)



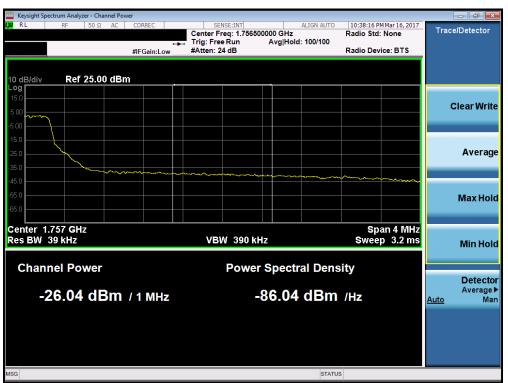
Plot 7-102. Lower Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFM255	PCTEST	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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		zer - Swept SA										
RL	RF	50 Ω AC	CORREC		SE	NSE:INT		ALIGN AUTO		M Mar 16, 2017	Er	equency
			PNO: V IFGain:	Vide ↔ Low	Trig: Fre Atten: 36		#Avg Ty	/pe: RMS	TY D	DE 1 2 3 4 5 6 PE A WWWW ET A NNNNN		
0 dB/div	Ref 25	i.00 dBm	1					Mkr1	1.755 (-28.5	000 GHz 63 dBm		Auto Tun
15.0												Center Fre 5000000 G⊦
5.00	~~~~~	~~~~~		,							1.75	Start Fre 3000000 GH
25.0					- l	1				DL1 -13.00 dBm	1.75	Stop Fre 7000000 GH
35.0						han have		~~~~~	·	·^~~~	Auto	CF Ste 400.000 kł Ma
i5.0											1	F req Offs 0 I
65.0												Scale Typ
enter 1. Res BW		GHz		#VBW	160 kHz			Sweep ′	Span 4 1.933 ms	.000 MHz (1001 pts)	Log	L
SG								STATU	s			

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



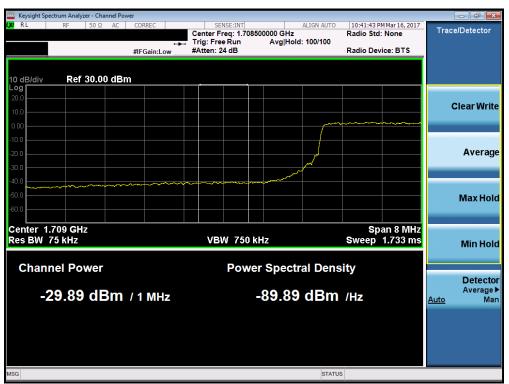
Plot 7-104. Upper Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFM255		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	ctrum Analyzer											
X/RL	RF	50 Ω AC	CORREC		SEI	NSE:INT	#Avg Typ	ALIGN AUTO	10:41:33 PM	Mar 16, 2017	F	equency
			PNO: W IFGain:L	de ↔→ ow	Trig: Fre Atten: 36		#A18 13	e. King	TYP	A WWWWW A NNNNN		
10 dB/div Log	Ref 25.0	00 dBm						Mkr1	1.710 0 -31.74	00 GHz I9 dBm		Auto Tune
15.0												Center Fred 0000000 GH
5.00						ſ	······	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		DL1 -13.00 dBm	1.70	Start Fre 6000000 GH
-15.0						1				521-10.00 dbm	1.71	Stop Fre 4000000 GH
35.0	~~~~~~		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~	~~~~~~	jîv 					<u>Auto</u>	CF Ste 800.000 kH Ma
55.0												FreqOffse 0⊦
-65.0												Scale Typ
Center 1.7 Res BW	710000 G 100 kHz	Hz	#	VBW :	300 kHz			Sweep_1	Span 8. .000 ms (1	000 1911 12	Log	Li
ISG								STATUS				

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



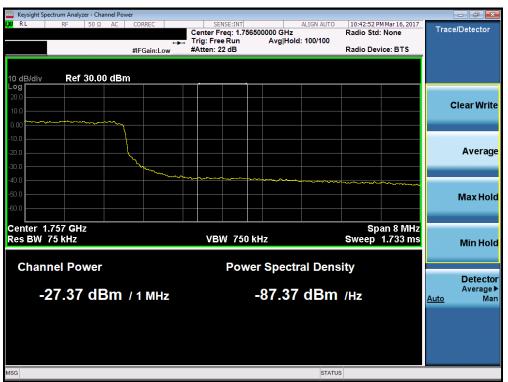
Plot 7-106. Lower Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFM255	PCTEST	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 60 of 117
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	ectrum Analyzer								
XI RL	RF	50Ω AC	CORREC	SENSE:		ALIGN AUTO	10:42:39 PM Mar 16, TRACE 1 2 3		Frequency
			PNO: Wide + IFGain:Low	Trig: Free Ru Atten: 36 dE	in		DET A WA		
10 dB/div Log	Ref 25.0	0 dBm				Mkr1	1.755 000 0 -30.780 d	iHz Bm	Auto Tune
15.0								1.7	Center Fred 755000000 GH:
-5.00		~~~~~	·····						Start Fred 751000000 GH:
-15.0							DL1 -13.0		Stop Fre 759000000 GH
-35.0							·····	~~~ <u>Auto</u>	CF Stej 800.000 kH Ma
45.0 <u></u> 55.0 <u></u>									Freq Offse 0 H
65.0									Scale Typ
Center 1.7 #Res BW	755000 GI 100 kHz	Hz	#VB	W 300 kHz		Sweep 1	Span 8.000 l .000 ms (1001	VIHz ^{Log} pts)	<u>Li</u>
ISG						STATUS			

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



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

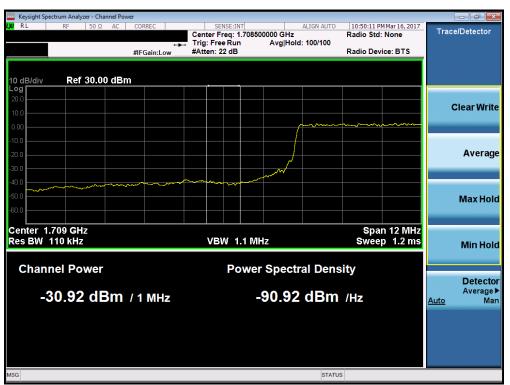
FCC ID: ZNFM255		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 70 of 117
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	ectrum Analyzer - S	wept SA									- 6 ×
LXI RL	RF 50 9	Ω AC CC	RREC	SENS	E:INT	A #Avg Type	LIGN AUTO	10:49:56 PM	Mar 16, 2017	Fre	equency
			NO: Wide ↔ Gain:Low	Trig: Free Atten: 36		#Avg Type		TYPE	A WWWWW A N N N N N		
10 dB/div Log	Ref 25.00	dBm					Mkr1	1.710 00	00 GHz 2 dBm		Auto Tune
15.0											enter Freq
-5.00					ſ	~~~~~~	an when the	~~~~~	L1 -13.00 dBm	1.704	Start Fred
-15.0					1 1					1.716	Stop Fred 5000000 GHz
-35.0	www.www	~~~~~~~~~~~	www	www.						1 <u>Auto</u>	CF Step 200000 MH2 Mar
-55.0										F	F req Offse 0 Ha
-65.0										;	Scale Type
	710000 GHz	4	41\(D)M	470 kHz			huroon 1	Span 12	.00 191112	Log	Lir
#Res BW	150 KHZ		#VBW	470 kHz		5	status	.000 ms (1	oor pis)		
							0				

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



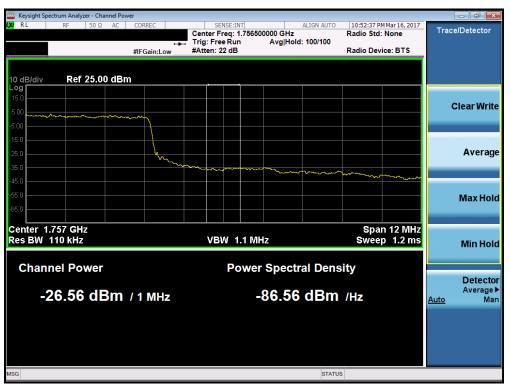
Plot 7-110. Lower Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFM255	PCTEST	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dego 71 of 117
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	ectrum Analyzer - Swe										d X
KI RL	RF 50 Ω	AC	CORREC	SEN	ISE:INT	#Avg Typ	ALIGN AUTO	10:52:15 PM M	ar 16, 2017	Freque	ncy
			PNO: Wide	Trig: Free Atten: 36				TYPE			_
10 dB/div	Ref 25.00 c	lBm					Mkr1	1.755 01 -30.10	2 GHz) dBm	Aut	o Tune
- og 15.0										Cent 1.755000	er Free 000 GH
5.00	y		*****	~						Sta 1.749000	rt Fre 000 GH
-15.0					.1				1 -13.00 dBm	Sto 1.761000	op Fre 000 GH
35.0				<u> </u>				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		F Ste 000 MH Ma
55.0										Frec	Offse 0 H
65.0										Sca	le Typ
enter 1.7 Res BW	755000 GHz 150 kHz		#VBW	470 kHz			Sweep 1	Span 12. .000 ms (10	00 10112	Log	Li
SG							STATUS				

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



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

FCC ID: ZNFM255	CALEST.	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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	ectrum Analyzei	- Swept SA					
XI RL	RF	50 Ω AC	CORREC	SENSE:INT	ALIGN AUTO #Avg Type: RMS	11:01:11 PM Mar 16, 2017 TRACE 1 2 3 4 5 6	Frequency
			PNO: Fast ++ IFGain:Low	Trig: Free Run Atten: 36 dB		DET A NNNNN	
10 dB/div Log	Ref 25.0	00 dBm			Mkr1	1.709 904 GHz -35.80 dBm	Auto Tune
15.0							Center Fred 1.710000000 GH:
-5.00					mmmmmm	DL1 -13.00 dBm	Start Fred 1.702000000 GHz
-15.0							Stop Fred 1.718000000 GH;
-35.0		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	1. / ^P			CF Step 1.600000 MH <u>Auto</u> Mar
-55.0							Freq Offse 0 H
-65.0							Scale Type
Center 1. #Res BW	710000 G 200 kHz	Hz	#VBW	620 kHz	Sweep 1	Span 16.00 MHz I.000 ms (1001 pts)	Log <u>Lir</u>
MSG					STATU	s	

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

PNO: Fast PNO: Fast IFGain:Low Trig: Free Run Arten: 36 dB Mkr1 1.708 936 GHz -32.33 dBm Center Freq 150 500 500 500 500 500 500 500		ectrum Analyzer - Swept SA								
Mikr1 1.708 936 GHz Auto Tune 00 dB/div Ref 25.00 dBm -32.33 dBm 100 Image: Comparison of the second of the s	LXU RL	RF 50 Ω AC	PNO: Fast	Trig: Free Run	#Avg Ty		TRACE TYPE	1 2 3 4 5 6 A WWWWW	Fre	equency
150 Image: Center Freq 1.70700000 GHz 500 Image: Center Freq 1.707000000 GHz 500 Image: Center Freq 1.70700000 GHz 500 Image: Center Freq 1.70500000 GHz 500 Image: Center Freq 1.7050000 GHz 500 Image: Center Freq 1.7050000 GHz 500 Image: Center Freq 1.7050000 GHz 500	10 dB/div	Ref 25.00 dBm	II Gam.Low			Mkr	1 1.708 93 -32.3	6 GHz 3 dBm		Auto Tune
-5.00 Start Freq -5.00 0.11-13.00 dEm -15.00 0.11-13.00 dEm -5.00 0.11-13.00 dEm <tr< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr<>										
150 Stop Freq 250 Stop Freq 360 Stop Freq 450 Stop Freq 400.000 KHz Man Freq Offset O Hz Stop Freq Stop Freq 1.70900000 GHz Stop Freq 1.70900000 GHz<	-5.00								1.705	Start Freq
330.0 400.000 kHz 45.0	-15.0							.1 -13.00 dBm	1.709	Stop Freq
65.0 65.0 65.0 65.0 Center 1.707000 GHz Span 4.000 MHz Log Lin	-35.0	, and the second se	nanaging ayan ku karalan da	๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛	an a	eyelineti Madagenan Malar	Shaf har entry of the second and	-Marsonytolon		CF Step 400.000 kHz Man
Center 1.707000 GHz Scale Type	-45.0								F	F req Offset 0 Hz
	-65.0									Scale Type
			#VBW	3.0 MHz		Sweep	Span 4.0 1.000 ms (1	10 U IVII 12	Log	Lin

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

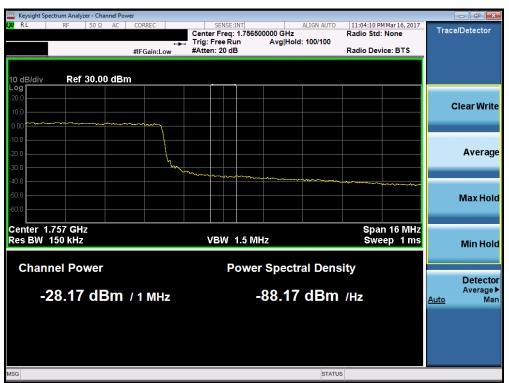
FCC ID: ZNFM255		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 73 of 117
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	ectrum Analyz		SA										
RL	RF	50 Ω	AC	CORREC		SEI	NSE:INT		ALIGN AUTO		M Mar 16, 2017	Fr	equency
				PNO: Fa IFGain:L	ist ↔ ow	Trig: Fre Atten: 36		#Avg Ty	/pe: RMS	TY D	CE 1 2 3 4 5 6 PE A WWWW ET A NNNNN		
0 dB/div og r	Ref 25	.00 dE	sm						Mkr1	1.755 (-31.3	00 GHz 45 dBm		Auto Tun
15.0													Center Fre 5000000 G⊦
5.00 	mm	mm	~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~	\sim					DL1 -13.00 dBm	1.74	Start Fre 7000000 GF
5.0											UL1 -13:00 dBm	1.76	Stop Fre 3000000 GH
5.0						W.	1		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	mann	and when a	Auto	CF Ste .600000 MH Ma
5.0													Freq Offs 0 F
65.0													Scale Typ
enter 1. Res BW	755000 (200 kHz	GHz		#	VBW	620 kHz			Sweep 1	Span 1 .000 ms (6.00 MHz (1001 pts)	Log	L
G									STATUS				

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



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

FCC ID: ZNFM255	CALEST.	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)



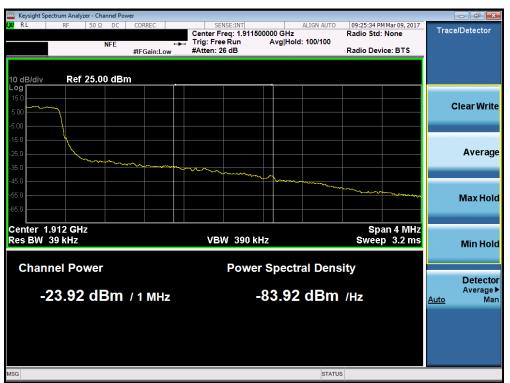
Plot 7-118. Lower Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

FCC ID: ZNFM255	CALEST.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 75 of 117
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	ectrum Analyzer - Swe										
RL	RF 50 Ω		RREC NO: Wide ↔		Run	#Avg Typ	ALIGN AUTO e: RMS	TRAC	M Mar 09, 2017 DE 1 2 3 4 5 6 DE A WWWW	Fr	requency
) dB/div	Ref 25.00 d	IF	Gain:Low	Atten: 36			Mkr1	1.910 0	000 GHz 25 dBm		Auto Tur
5.0											Center Fre
		- Marine	wwwww							1.90	Start Fr 8000000 G
5.0					1				DL1 -13.00 dBm	1.91	Stop Fr 2000000 G
5.0 - MV	hanne				~	human	www	mm	Sonna on o	<u>Auto</u>	CF St 400.000 k M
i.o											Freq Offs 0
5.0	910000 GHz							Snan 4	.000 MHz	Log	Scale Ty
	13 kHz		#VBW	43 kHz			Sweep 8	.867 ms (.000 MH2 (1001 pts)		
G							STATUS				

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: ZNFM255	CALEST.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dego 76 of 117
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		zer - Swept SA	•									
XI RL	RF	50 Ω DC	CORRE	C	SE	NSE:INT		ALIGN AUTO	09:36:54 PM N		Fr	equency
		NFE		Wide ↔ n:Low	Trig: Fre Atten: 36		#Avg Typ	be:RMS	TRACE TYPE DET	123456 A WWWW A N N N N N		
I0 dB/div	Ref 25	i.00 dBn	1					Mkr1	1.850 00 -27.70	0 GHz 3 dBm		Auto Tun
15.0												Center Fre
5.00							~~~~	~_~~		~~~~^	1.84	Start Fre 8000000 G⊦
25.0					(1				.1 -13.00 dBm	1.85	Stop Fre 2000000 G⊦
45.0		~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~						<u>Auto</u>	CF Ste 400.000 kH Ma
55.0											I	Freq Offs 0 ⊦
65.0												Scale Typ
enter 1. Res BW		GHz		#VBW	91 kHz			Sweep 2	Span 4.0 2.000 ms (1	AAA 11112	Log	Li
SG								STATU	S			

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



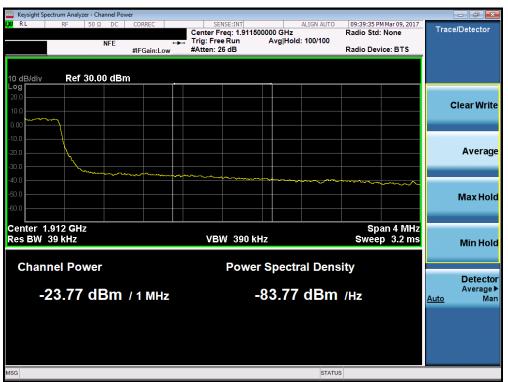
Plot 7-122. Lower Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFM255	CALEST.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 77 of 117
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	ectrum Analy	/zer - Swept SA									- 6 -
RL	RF	50 Ω DC	CORREC	SE	NSE:INT		ALIGN AUTO		M Mar 09, 2017	En	equency
		NFE	PNO: Wide IFGain:Low	↔ Trig: Fre Atten: 3		#Avg Ty	pe: RMS	TVE	E 1 2 3 4 5 6 E A WWWW T A N N N N N		
0 dB/div	Ref 2	5.00 dBm					Mkr1	1.910 0 -28.2	00 GHz 58 dBm		Auto Tun
15.0											enter Fre
5.00	~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~	\longrightarrow						1.908	Start Fre 8000000 GH
25.0					1				DL1 -13.00 dBm	1.912	Stop Fre 2000000 GH
15.0					harry		~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	- Marine Marine Marine Marine Marine	<u>Auto</u>	CF Ste 400.000 kH Ma
55.0										I	F req Offs 0 H
65.0										:	Scale Typ
enter 1. Res BW			#VI	3W 91 kHz			Sweep 2	Span 4 2.000 ms (.000 MHz 1001 pts)	Log	Li
SG							STATU	s			

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



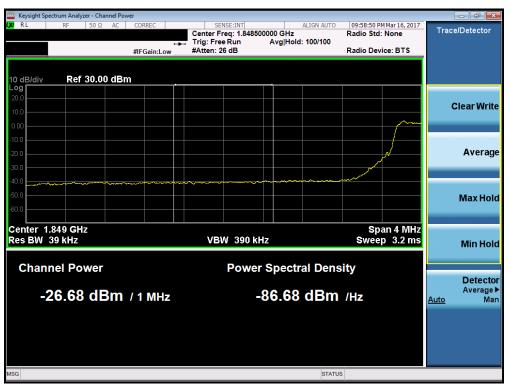
Plot 7-124. Upper Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

FCC ID: ZNFM255	PCTEST	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 79 of 117
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	ectrum Analyze							
LXI RL	RF	50 Ω AC	CORREC	SENSE:I	TT #Avg Typ	ALIGN AUTO	09:57:53 PM Mar 16, 2017	Frequency
			PNO: Wide ↔ IFGain:Low	Trig: Free Run Atten: 40 dB			TRACE 123456 TYPE A WWWWW DET A NNNNN	
10 dB/div Log	Ref 30.	00 dBm				Mkr1	1.850 000 GHz -28.973 dBm	Auto Tune
20.0								Center Freq 1.85000000 GHz
0.00						·	·····	Start Freq 1.848000000 GHz
-10.0							DL1 -13.00 dBm	Stop Freq 1.852000000 GHz
-30.0			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	1				CF Step 400.000 kHz <u>Auto</u> Mar
-50.0								Freq Offset 0 Hz
-60.0								Scale Type
Center 1.8		Hz	-41/1514	460 kll=		0	opun 4.000 minz	Log <u>Lin</u>
#Res BW	51 KHZ		#VBW	160 kHz		-	.933 ms (1001 pts)	
ISG						STATUS		

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



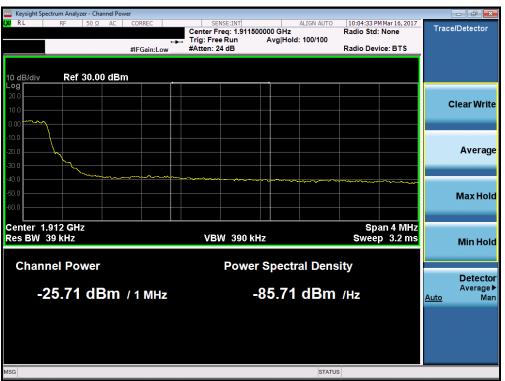
Plot 7-126. Lower Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFM255		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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Keysight Spectrum Analyzer - Swept SA					
RL RF 50 Ω AC	CORREC PNO: Wide ↔→ IFGain:Low	SENSE:INT Trig: Free Run Atten: 36 dB	ALIGN AUTO #Avg Type: RMS	10:03:57 PM Mar 16, 2017 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A NNNNN	Frequency
0 dB/div Ref 25.00 dBm		Anten of up	Mkr1	1.910 000 GHz -27.151 dBm	Auto Tun
15.0					Center Fre 1.910000000 GH
5.00 ~~~~~~~~~~					Start Fre 1.908000000 GF
5.0		h. 1		DL1 -13.00 dBm	Stop Fre 1.912000000 GF
5.0			·····	·····	CF St e 400.000 kl <u>Auto</u> M
5.0					Freq Offs
5.0					Scale Typ
enter 1.910000 GHz Res BW 51 kHz	#VBW 1	60 kHz	Sweep 1	.933 ms (1001 pts)	Log <u>L</u>

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



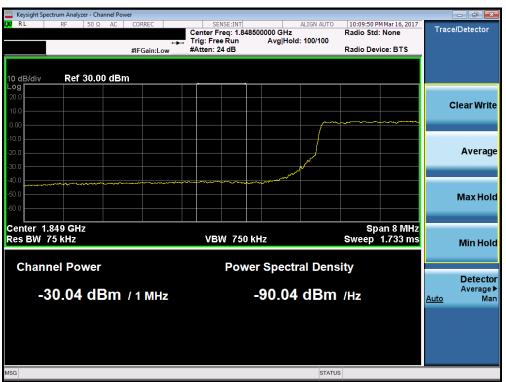
Plot 7-128. Upper Extended Band Edge Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

FCC ID: ZNFM255		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 80 of 117
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Keysight Spectrum Analy	/zer - Swept SA					
X/RL RF	50 Ω AC	CORREC	SENSE:INT	ALIGN AUTO #Avg Type: RMS	10:09:40 PM Mar 16, 2017	Frequency
		PNO: Wide ↔ IFGain:Low	Trig: Free Run Atten: 36 dB		TRACE 1 2 3 4 5 6 TYPE A WWWW DET A NNNNN	
10 dB/div Ref 2	5.00 dBm			Mkr1	1.850 000 GHz -31.991 dBm	Auto Tune
15.0						Center Freq 1.85000000 GHz
-5.00						Start Fred 1.846000000 GHz
-15.0			1		DL1 -13.00 dBm	Stop Fred 1.854000000 GH:
-35.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~				CF Step 800.000 kH: <u>Auto</u> Mar
-55.0						Freq Offse 0 H:
-65.0						Scale Type
Center 1.850000 #Res BW 100 kH		#VBW	300 kHz	Sweep /	Span 8.000 MHz 1.000 ms (1001 pts)	Log <u>Lir</u>
MSG				STATU		

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



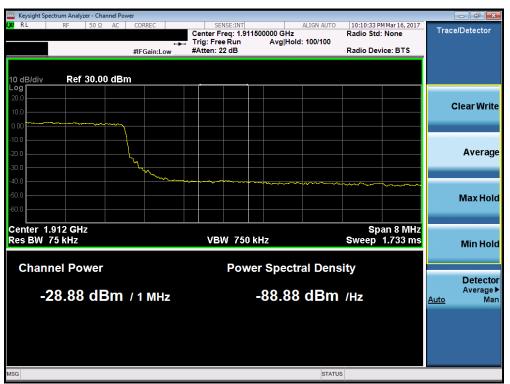
Plot 7-130. Lower Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFM255	PCTEST	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dego 91 of 117
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	ectrum Analyzer - Sw										
KI RL	RF 50 Ω	2 AC	CORREC	SEN	ISE:INT	#Avg Ty	ALIGN AUTO		Mar 16, 2017	Fr	equency
			PNO: Wide ↔ IFGain:Low	Trig: Free Atten: 36		#/\¥9 ! ¥I	Se. King	TYP	AWWWWW		
10 dB/div	Ref 25.00	dBm					Mkr1	1.910 0 -32.51	00 GHz I3 dBm		Auto Tune
- og 15.0											Center Free
5.00			~~~~~	\sim						1.90	Start Fre 5000000 GH
25.0									DL1 -13.00 dBm	1.91	Stop Fre 4000000 GH
35.0				hy	1			·····		<u>Auto</u>	CF Ste 800.000 kH Ma
45.0 55.0 										1	FreqOffse 0⊦
65.0											Scale Typ
Center 1.9 Res BW	910000 GHz 100 kHz		#VBW	300 kHz			Sweep 1	Span 8. .000 ms (′		Log	Li
SG							STATUS	5			

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



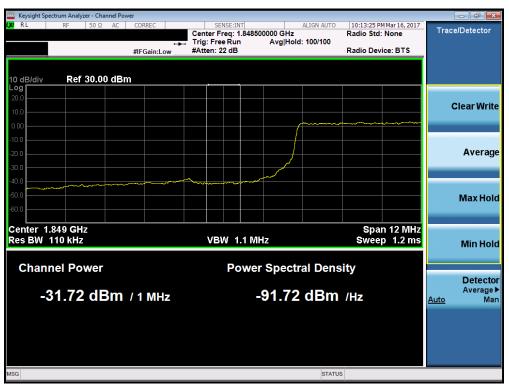
Plot 7-132. Upper Extended Band Edge Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

FCC ID: ZNFM255	PCTEST	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	ectrum Analyzer										
X/RL	RF 5	0Ω AC	CORREC	SEN	ISE:INT	ALI #Avg Type: I	GN AUTO	10:13:14 PM Ma		Fred	uency
			PNO: Wide ← IFGain:Low	Trig: Free Atten: 36	Run dB	#Avg Type.1			23456 WWWWW NNNNN		
10 dB/div Log	Ref 25.0	0 dBm					Mkr1	1.850 000 -33.796) GHz dBm	A	uto Tune
15.0											nter Fred 00000 GHz
-5.00							~~~~~		-13.00 dBm		Start Fred
-15.0									-13.00 dBm		Stop Fred
-35.0	m	~~~~	·····	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	1,' J'					1.20 <u>Auto</u>	CF Step 00000 MH Mar
-55.0										Fr	e q Offse 0 H
-65.0										So	cale Type
	850000 GI 150 kHz	lz	#VB	W 470 kHz		Sv	veep 1.	Span 12.0 000 ms (10	20 1911 12	Log	Lir
ISG							STATUS		/		

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



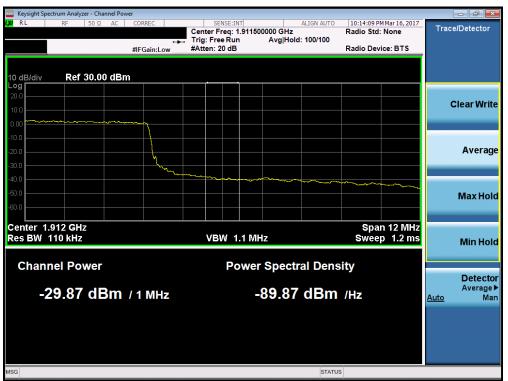
Plot 7-134. Lower Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

FCC ID: ZNFM255		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Keysight Spec										
XI RL	RF	50 Ω AC	CORREC		SENSE:INT	#A T	ALIGN AUTO	10:14:00 PM Ma		Frequency
			PNO: Wid IFGain:Lo		: Free Run en: 36 dB	#Avg I	ype: RMS		2 3 4 5 6 WWWWW N N N N N	
10 dB/div Log	Ref 25.	00 dBm					Mkr1	1.910 276 -33.20	GHz dBm	Auto Tune
15.0										Center Fred 1.910000000 GH;
-5.00	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		~~~						-13.00 dBm	Start Fred 1.904000000 GH:
-15.0					4				-13.00 dBm	Stop Free 1.916000000 GH
35.0					March 1					CF Stej 1.200000 MH <u>Auto</u> Ma
-45.0										Freq Offse 0 H
-65.0										Scale Typ
Center 1.9 #Res BW			#	VBW 470	kHz		Sweep 1	Span 12.0 .000 ms (10	V 19112	Log <u>Li</u>
ISG							STATUS	3		

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)

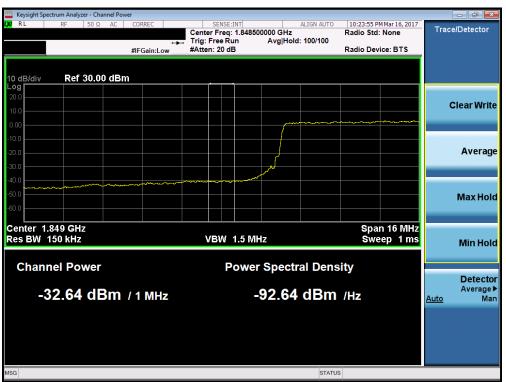
FCC ID: ZNFM255	PCTEST	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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	ectrum Analyzer - S										- 6 - ×
KI RL	RF 50 9	Ω AC	CORREC	SENSE	INT	#Avg Type	ALIGN AUTO	10:23:44 PM M	lar 16, 2017 1 2 3 4 5 6	Fre	equency
			PNO: Fast ++ IFGain:Low	Trig: Free R Atten: 36 d		#A18 1994		TYPE	A WWWWW A NNNNN		
10 dB/div	Ref 25.00	dBm					Mkr1	1.850 00 -35.264	0 GHz 4 dBm		Auto Tun
15.0											enter Fre
5.00						men and a second	han nan an	her way was not and	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	1.842	Start Fre
25.0									1 -13.00 dBm	1.858	Stop Fre 8000000 GH
35.0 15.0		w.m.	m	1 www.www.	1 JAN ⁴					1. <u>Auto</u>	CF Ste 600000 MI Ma
55.0										F	F req Offs 0 I
65.0										5	Scale Typ
enter 1. Res BW	850000 GHz 200 kHz		#VBW	620 kHz			Sweep 1	Span 16. .000 ms (10	00 MHz 001 pts)	Log	L
SG							STATUS				

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



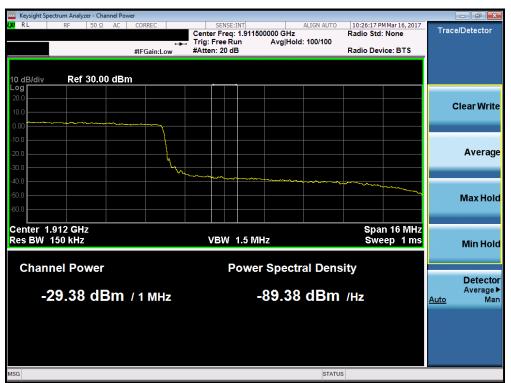
Plot 7-138. Lower Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

FCC ID: ZNFM255		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Keysight Spectrum Analyzer - Swept S	A				
XU RL RF 50ΩA		SENSE:INT	ALIGN AUTO #Avg Type: RMS	10:26:08 PM Mar 16, 2017 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A NNNNN	Frequency
10 dB/div Ref 25.00 dBr	I Guilleow	Atten: 00 dB	Mkr1	1.910 000 GHz -33.457 dBm	Auto Tun
15.0					Center Free 1.910000000 GH
5.00	www.en.				Start Fre 1.902000000 GH
25.0				DL1 -13.00 dBm	Stop Fre 1.918000000 G⊦
35.0		M. 1	and the second se		CF Ste 1.600000 M⊢ <u>Auto</u> Ma
55.0					Freq Offs 0 F
65.0					Scale Typ
Center 1.910000 GHz Res BW 200 kHz	#VBW 6	20 kHz	Sweep 1	Span 16.00 MHz .000 ms (1001 pts)	Log <u>L</u> i
SG			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: ZNFM255		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.

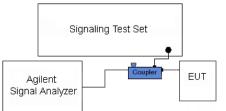


Figure 7-4. Test Instrument & Measurement Setup

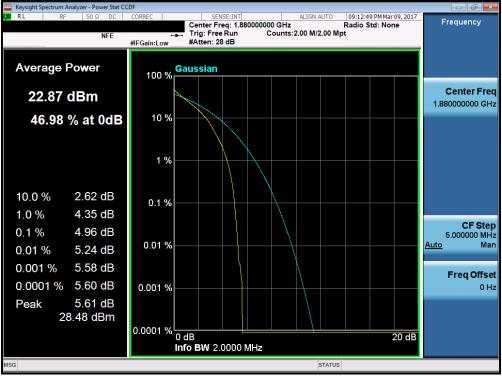
Test Notes

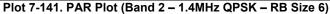
None.

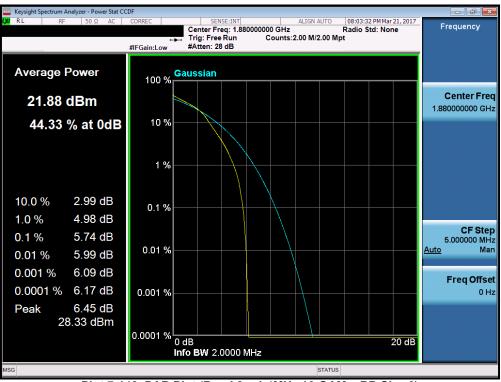
FCC ID: ZNFM255	PCTEST	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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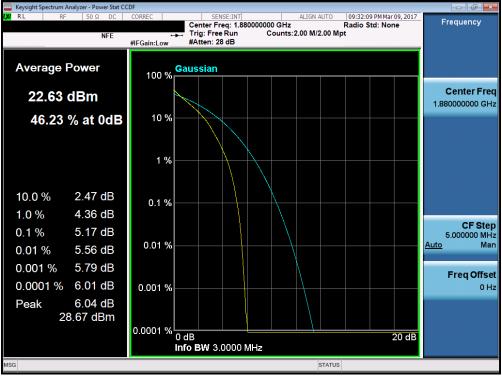




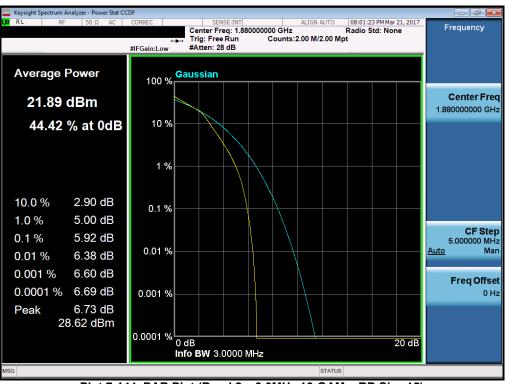
Plot 7-142. PAR Plot (Band 2 – 1.4MHz 16-QAM – RB Size 6)

FCC ID: ZNFM255	CALEST.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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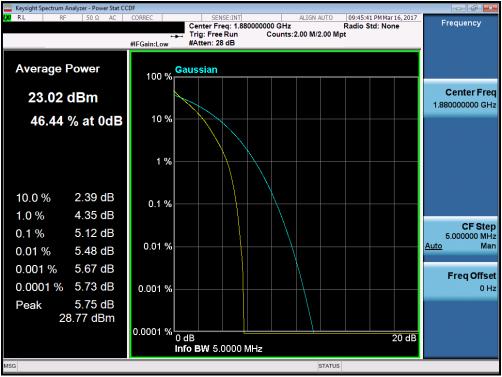
Plot 7-143. PAR Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

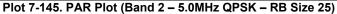


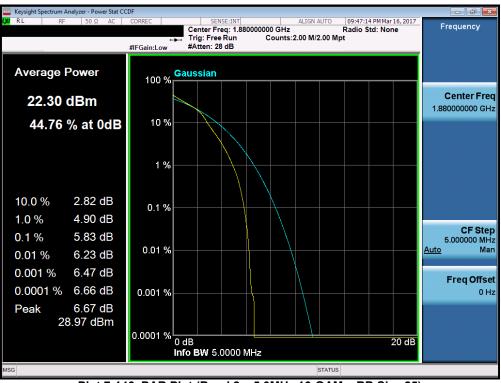
Plot 7-144. PAR Plot (Band 2 - 3.0MHz 16-QAM - RB Size 15)

FCC ID: ZNFM255		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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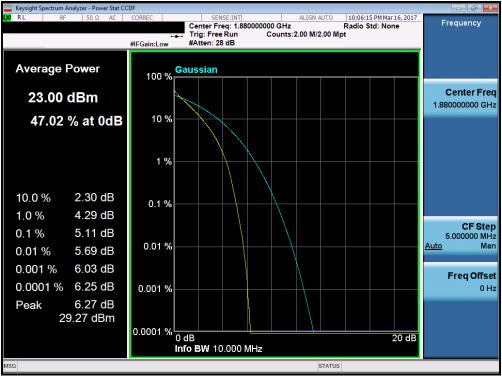




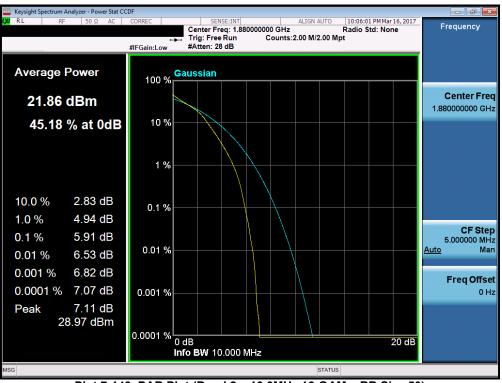
Plot 7-146. PAR Plot (Band 2 - 5.0MHz 16-QAM - RB Size 25)

FCC ID: ZNFM255		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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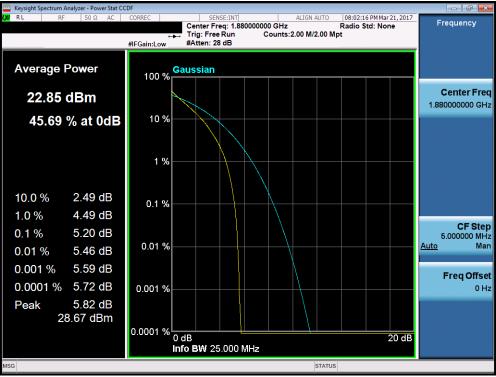




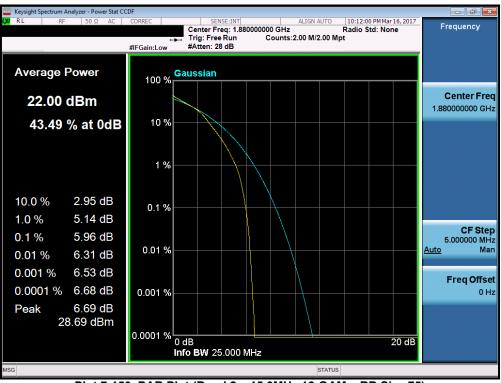
Plot 7-148. PAR Plot (Band 2 - 10.0MHz 16-QAM - RB Size 50)

FCC ID: ZNFM255		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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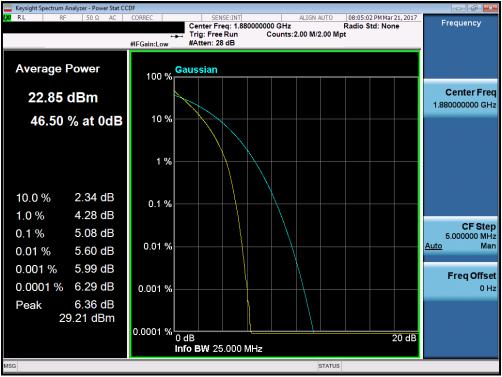


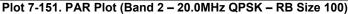


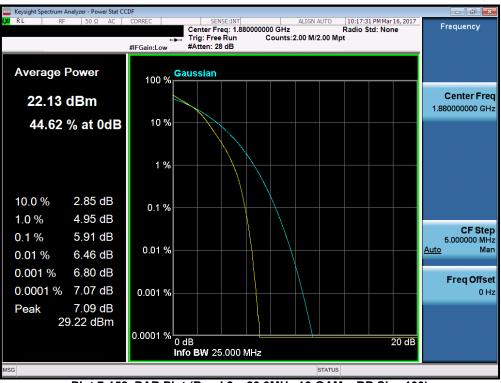
Plot 7-150. PAR Plot (Band 2 - 15.0MHz 16-QAM - RB Size 75)

FCC ID: ZNFM255	CALEST.	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: ZNFM255	CALEST.	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.

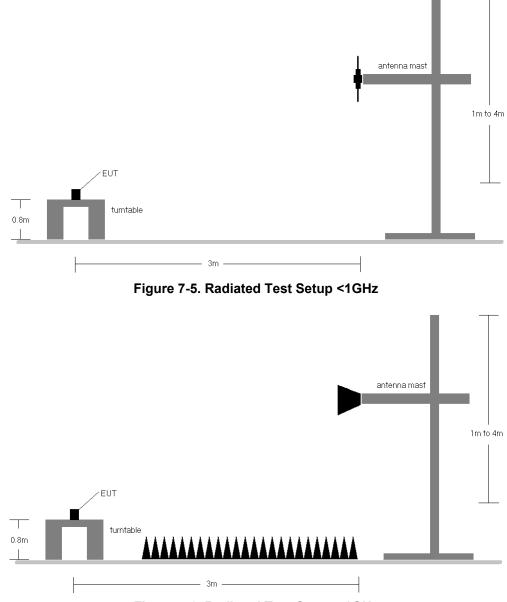


Figure 7-6. Radiated Test Setup >1GHz

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	70	1 / 0	19.91	-1.15	18.76	34.77	-16.01
707.50	1.4	QPSK	V	150	73	1 / 5	20.25	-1.18	19.07	34.77	-15.70
715.30	1.4	QPSK	V	150	37	1 / 5	20.22	-1.21	19.01	34.77	-15.76
707.50	1.4	16-QAM	V	150	73	1 / 5	19.51	-1.18	18.33	34.77	-16.44
700.50	3	QPSK	V	150	65	1 / 14	20.54	-1.15	19.39	34.77	-15.38
707.50	3	QPSK	V	150	35	1 / 0	20.90	-1.18	19.72	34.77	-15.05
714.50	3	QPSK	V	150	54	1 / 14	20.84	-1.21	19.63	34.77	-15.14
707.50	3	16-QAM	V	150	35	1 / 0	20.00	-1.18	18.82	34.77	-15.95
701.50	5	QPSK	V	150	67	1 / 0	21.37	-1.16	20.21	34.77	-14.56
707.50	5	QPSK	V	150	39	1 / 0	21.86	-1.18	20.68	34.77	-14.09
713.50	5	QPSK	V	150	47	1 / 24	21.41	-1.20	20.21	34.77	-14.57
707.50	5	16-QAM	V	150	39	1 / 0	20.73	-1.18	19.55	34.77	-15.22
704.00	10	QPSK	V	150	64	1 / 49	21.52	-1.17	20.35	34.77	-14.42
707.50	10	QPSK	V	150	36	1 / 0	21.50	-1.18	20.32	34.77	-14.45
711.00	10	QPSK	V	150	34	1/0	21.66	-1.19	20.47	34.77	-14.31
711.00	10	16-QAM	V	150	34	1/0	20.83	-1.19	19.64	34.77	-15.14
707.50	5	QPSK	Н	150	167	1/0	20.81	-0.28	20.53	34.77	-14.24

Table 7-2. ERP Data (Band 12)

FCC ID: ZNFM255		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	V	150	43	1 / 0	20.83	-1.45	19.38	38.45	-19.07
836.50	1.4	QPSK	V	150	53	1 / 5	21.52	-1.40	20.12	38.45	-18.33
848.30	1.4	QPSK	V	150	69	1 / 5	21.74	-1.36	20.38	38.45	-18.07
848.30	1.4	16-QAM	V	150	69	1 / 5	20.91	-1.36	19.55	38.45	-18.90
825.50	3	QPSK	V	150	67	1 / 14	21.63	-1.45	20.18	38.45	-18.27
836.50	3	QPSK	V	150	50	1 / 14	22.17	-1.40	20.77	38.45	-17.68
847.50	3	QPSK	V	150	45	1 / 0	22.53	-1.36	21.17	38.45	-17.28
847.50	3	16-QAM	V	150	45	1 / 0	21.67	-1.36	20.31	38.45	-18.14
826.50	5	QPSK	V	150	34	1 / 24	22.71	-1.44	21.27	38.45	-17.18
836.50	5	QPSK	V	150	67	1 / 24	23.22	-1.40	21.82	38.45	-16.63
846.50	5	QPSK	V	150	76	1 / 0	23.16	-1.36	21.80	38.45	-16.65
836.50	5	16-QAM	V	150	67	1 / 24	22.24	-1.40	20.84	38.45	-17.61
829.00	10	QPSK	V	150	39	1 / 49	22.79	-1.43	21.36	38.45	-17.09
836.50	10	QPSK	V	150	35	1 / 49	23.20	-1.40	21.80	38.45	-16.65
844.00	10	QPSK	V	150	67	1 / 49	23.17	-1.37	21.80	38.45	-16.65
836.50	10	16-QAM	V	150	35	1 / 49	22.20	-1.40	20.80	38.45	-17.65
836.50	5	QPSK	н	150	31	1 / 74	21.47	-0.84	20.63	38.45	-17.82

Table 7-3. ERP Data (Band 5)

FCC ID: ZNFM255		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	40	1 / 5	18.50	5.65	24.15	30.00	-5.85
1732.50	1.4	QPSK	V	150	43	1 / 5	18.11	5.41	23.52	30.00	-6.48
1754.30	1.4	QPSK	V	150	56	1 / 5	17.99	5.17	23.16	30.00	-6.84
1710.70	1.4	16-QAM	V	150	40	1 / 5	17.32	5.65	22.97	30.00	-7.03
1711.50	3	QPSK	V	150	38	1 / 14	19.11	5.64	24.75	30.00	-5.25
1732.50	3	QPSK	V	150	46	1 / 0	18.53	5.41	23.94	30.00	-6.06
1753.50	3	QPSK	V	150	50	1 / 0	18.43	5.18	23.61	30.00	-6.39
1711.50	3	16-QAM	V	150	38	1 / 14	17.85	5.64	23.49	30.00	-6.51
1712.50	5	QPSK	V	150	40	1 / 0	19.92	5.63	25.55	30.00	-4.45
1732.50	5	QPSK	V	150	57	1 / 24	19.75	5.41	25.16	30.00	-4.84
1752.50	5	QPSK	V	150	65	1 / 0	19.20	5.19	24.39	30.00	-5.61
1712.50	5	16-QAM	V	150	40	1 / 0	20.00	5.63	25.63	30.00	-4.37
1715.00	10	QPSK	V	150	47	1 / 0	20.00	5.60	25.60	30.00	-4.40
1732.50	10	QPSK	V	150	50	1 / 0	19.42	5.41	24.83	30.00	-5.17
1750.00	10	QPSK	V	150	53	1 / 0	19.66	5.22	24.88	30.00	-5.12
1715.00	10	16-QAM	V	150	47	1 / 0	19.11	5.60	24.71	30.00	-5.29
1717.50	15	QPSK	V	150	34	1 / 0	20.17	5.57	25.74	30.00	-4.26
1732.50	15	QPSK	V	150	48	1 / 0	20.00	5.41	25.41	30.00	-4.59
1747.50	15	QPSK	V	150	67	1 / 0	20.02	5.24	25.26	30.00	-4.74
1717.50	15	16-QAM	V	150	34	1 / 0	19.07	5.57	24.64	30.00	-5.36
1720.00	20	QPSK	V	150	54	1/0	19.93	5.54	25.47	30.00	-4.53
1732.50	20	QPSK	V	150	70	1/0	19.79	5.41	25.20	30.00	-4.80
1745.00	20	QPSK	V	150	72	1/0	20.11	5.27	25.38	30.00	-4.62
1720.00	20	16-QAM	V	150	54	1/0	18.84	5.54	24.38	30.00	-5.62
1717.50	15	QPSK	Н	150	100	1/0	18.84	5.51	24.35	30.00	-5.65

Table 7-4. EIRP Data (Band 4)

FCC ID: ZNFM255		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1850.70	1.4	QPSK	V	150	52	1 / 0	19.45	4.79	24.24	33.01	-8.77
1880.00	1.4	QPSK	V	150	35	1 / 0	19.31	4.84	24.15	33.01	-8.86
1909.30	1.4	QPSK	V	150	24	1 / 0	18.96	4.86	23.82	33.01	-9.19
1880.00	1.4	16-QAM	V	150	35	1 / 0	18.26	4.84	23.10	33.01	-9.91
1851.50	3	QPSK	V	150	34	1 / 14	19.81	4.79	24.60	33.01	-8.41
1880.00	3	QPSK	V	150	52	1 / 14	19.89	4.84	24.73	33.01	-8.28
1908.50	3	QPSK	V	150	42	1 / 14	19.40	4.86	24.26	33.01	-8.75
1908.50	3	16-QAM	V	150	42	1 / 14	19.49	4.86	24.35	33.01	-8.66
1852.50	5	QPSK	V	150	30	1 / 0	20.78	4.79	25.57	33.01	-7.44
1880.00	5	QPSK	V	150	52	1 / 0	20.45	4.84	25.29	33.01	-7.72
1907.50	5	QPSK	V	15	34	1 / 24	20.07	4.87	24.94	33.01	-8.07
1852.50	5	16-QAM	V	150	30	1 / 24	19.56	4.79	24.35	33.01	-8.66
1855.00	10	QPSK	V	150	34	1 / 49	20.90	4.80	25.70	33.01	-7.31
1880.00	10	QPSK	V	150	53	1 / 0	20.51	4.84	25.35	33.01	-7.66
1905.00	10	QPSK	V	150	53	1 / 49	20.38	4.87	25.25	33.01	-7.76
1880.00	10	16-QAM	V	150	53	1 / 0	20.30	4.84	25.14	33.01	-7.87
1857.50	15	QPSK	V	150	35	1 / 74	20.81	4.80	25.61	33.01	-7.40
1880.00	15	QPSK	V	150	35	1 / 0	20.80	4.84	25.64	33.01	-7.37
1902.50	15	QPSK	V	150	43	1 / 0	20.39	4.88	25.27	33.01	-7.74
1857.50	15	16-QAM	V	150	35	1 / 0	19.71	4.80	24.51	33.01	-8.50
1860.00	20	QPSK	V	150	37	1 / 99	19.77	4.81	24.58	33.01	-8.44
1880.00	20	QPSK	V	150	36	1 / 0	20.63	4.84	25.47	33.01	-7.54
1900.00	20	QPSK	V	15	35	1 / 0	20.73	4.88	25.61	33.01	-7.40
1880.00	20	16-QAM	V	150	36	1 / 0	19.52	4.84	24.36	33.01	-8.65
1855.00	10	QPSK	н	150	247	1 / 0	18.80	4.81	23.61	33.01	-9.40

Table 7-5. EIRP Data (Band 2)

FCC ID: ZNFM255		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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7.7 Radiated Spurious Emissions Measurements §2.1053 §22.917(a) §24.238(a) §27.53(g) §27.53(h)

Test Overview

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

Test Procedures Used

KDB 971168 D01 v02r02 - Section 5.8

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

Test Settings

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

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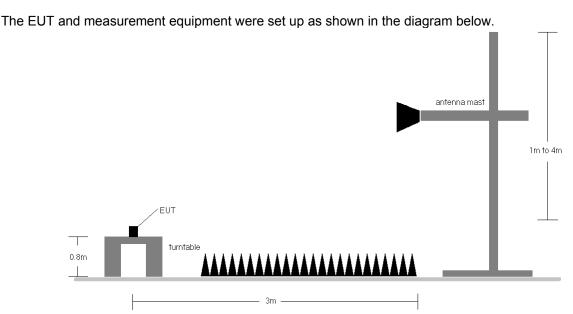


Figure 7-7. Test Instrument & Measurement Setup

Test Notes

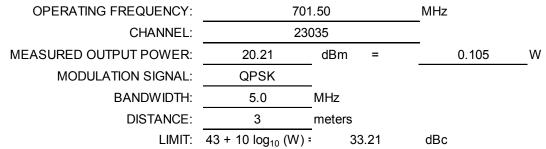
- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 2) This unit was tested with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

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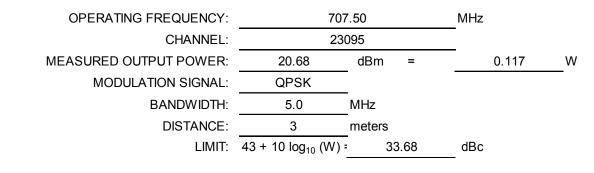
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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1403.00	Н	152	31	-58.77	5.92	-52.85	73.1
2104.50	Н	129	334	-63.37	6.80	-56.57	76.8
2806.00	Н	-	-	-71.44	8.12	-63.32	83.5

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



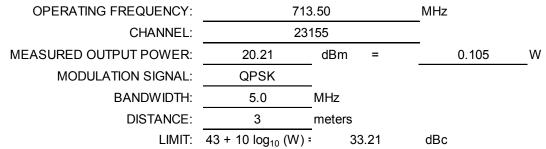
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1415.00	Н	101	36	-60.85	5.96	-54.88	75.6
2122.50	Н	120	340	-61.27	6.84	-54.42	75.1
2830.00	Н	-	-	-71.09	8.13	-62.96	83.6

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

FCC ID: ZNFM255	PCTEST	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager			
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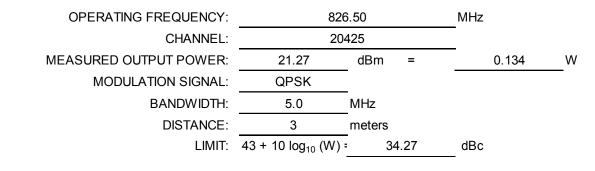
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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1427.00	Н	101	63	-61.11	6.01	-55.10	75.3
2140.50	Н	125	331	-64.24	6.89	-57.35	77.6
2854.00	Н	-	-	-71.21	8.15	-63.06	83.3

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



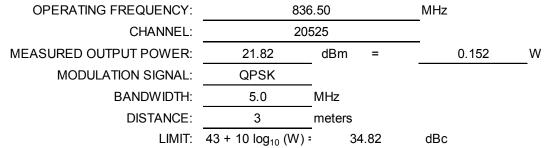
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1653.00	Н	132	324	-66.65	6.28	-60.37	81.6
2479.50	Н	143	33	-69.25	6.84	-62.40	83.7
3306.00	Н	-	-	-67.77	7.14	-60.62	81.9

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

FCC ID: ZNFM255		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager			
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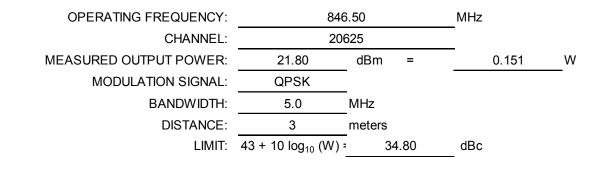
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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1673.00	Н	110	111	-62.08	6.21	-55.87	77.7
2509.50	Н	154	169	-69.50	6.86	-62.64	84.5
3346.00	Н	-	-	-68.03	7.26	-60.76	82.6

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



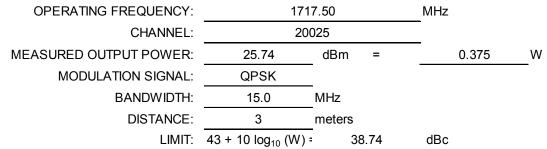
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1693.00	Н	121	24	-60.24	6.14	-54.10	75.9
2539.50	Н	100	176	-68.17	6.95	-61.22	83.0
3386.00	Н	-	-	-68.12	7.38	-60.74	82.5

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

FCC ID: ZNFM255	PCTEST	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager
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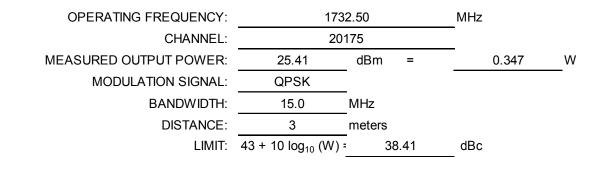
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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3435.00	Н	130	110	-54.64	9.68	-44.96	70.7
5152.50	Н	134	124	-60.98	10.89	-50.09	75.8
6870.00	Н	-	-	-59.16	10.79	-48.37	74.1

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



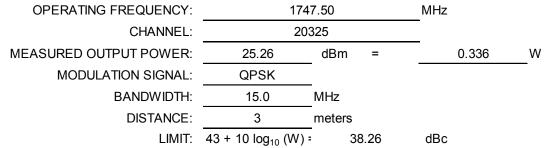
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3465.00	Н	121	101	-58.24	9.77	-48.47	73.9
5197.50	Н	194	346	-66.20	10.81	-55.39	80.8
6930.00	Н	-	-	-58.81	10.89	-47.93	73.3

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

FCC ID: ZNFM255	PCTEST	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3495.00	Н	108	41	-58.48	9.86	-48.62	73.9
5242.50	Н	108	113	-62.01	10.89	-51.12	76.4
6990.00	Н	-	-	-59.67	11.03	-48.65	73.9

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

OPERATING FREQUENCY:	185	5.00	MHz
CHANNEL:	186	650	_
MEASURED OUTPUT POWER:	25.70	dBm =	0.371 W
MODULATION SIGNAL:	QPSK		
BANDWIDTH:	10.0	MHz	
DISTANCE:	3	meters	
LIMIT:	43 + 10 log ₁₀ (W) =	38.70	dBc

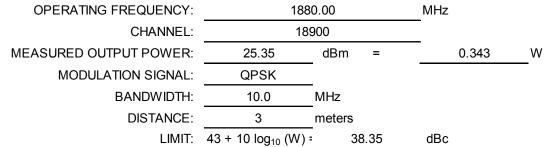
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3710.00	Н	165	104	-56.60	9.99	-46.60	72.3
5565.00	Н	-	-	-66.49	11.21	-55.28	81.0

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

FCC ID: ZNFM255		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager
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Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	[dBc]
3760.00	Н	163	120	-50.20	9.79	-40.41	65.8
5640.00	Н	-	-	-66.49	11.35	-55.14	80.5

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

OPERATING FREQUENCY:	190	5.00	MHz
CHANNEL:	191	150	
MEASURED OUTPUT POWER:	25.25	dBm =	0.335 W
MODULATION SIGNAL:	QPSK	-	
BANDWIDTH:	10.0	MHz	
DISTANCE:	3	meters	
LIMIT:	43 + 10 log ₁₀ (W) =	38.25	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]
3810.00	Н	151	123	-45.42	9.59	-35.83	61.1
5715.00	Н	-	-	-66.18	11.43	-54.75	80.0

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

FCC ID: ZNFM255	PCTEST	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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7.8 Frequency Stability / Temperature Variation §2.1055 §22.355 §24.235 §27.54

Test Overview and Limit

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

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

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

Test Procedure Used

ANSI/TIA-603-D-2010

Test Settings

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

Test Setup

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

Test Notes

None

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Band 12 Frequency Stability Measurements §2.1055 §27.54

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

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	707,499,822	-178	-0.0000252
100 %		- 30	707,499,924	-76	-0.0000107
100 %		- 20	707,500,219	219	0.0000310
100 %		- 10	707,499,821	-179	-0.0000253
100 %		0	707,499,994	-6	-0.0000008
100 %		+ 10	707,499,802	-198	-0.0000280
100 %		+ 20	707,500,278	278	0.0000393
100 %		+ 30	707,499,987	-13	-0.0000018
100 %		+ 40	707,499,895	-105	-0.0000148
100 %		+ 50	707,500,175	175	0.0000247
BATT. ENDPOINT	3.45	+ 20	707,500,087	87	0.0000123

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

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Band 12 Frequency Stability Measurements §2.1055 §27.54

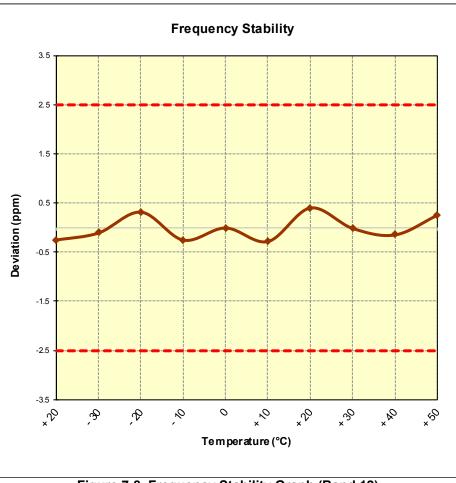


Figure 7-8. Frequency Stability Graph (Band 12)

FCC ID: ZNFM255		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕑 LG	Approved by: Quality Manager
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Band 5 Frequency Stability Measurements §2.1055 §22.355

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

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	836,499,955	-45	-0.0000054
100 %		- 30	836,500,104	104	0.0000124
100 %		- 20	836,499,935	-65	-0.0000078
100 %		- 10	836,499,924	-76	-0.0000091
100 %		0	836,500,046	46	0.0000055
100 %		+ 10	836,499,942	-58	-0.0000069
100 %		+ 20	836,499,743	-257	-0.0000307
100 %		+ 30	836,499,836	-164	-0.0000196
100 %		+ 40	836,500,385	385	0.0000460
100 %		+ 50	836,499,832	-168	-0.0000201
BATT. ENDPOINT	3.45	+ 20	836,500,174	174	0.0000208

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

FCC ID: ZNFM255		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

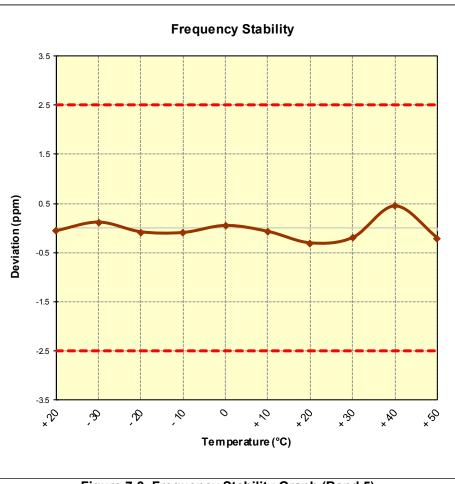


Figure 7-9. Frequency Stability Graph (Band 5)

FCC ID: ZNFM255		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:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,732,500,173	173	0.0000100
100 %		- 30	1,732,499,642	-358	-0.0000207
100 %		- 20	1,732,500,008	8	0.0000005
100 %		- 10	1,732,500,119	119	0.0000069
100 %		0	1,732,500,186	186	0.0000107
100 %		+ 10	1,732,500,285	285	0.0000165
100 %		+ 20	1,732,500,220	220	0.0000127
100 %		+ 30	1,732,500,272	272	0.0000157
100 %		+ 40	1,732,499,795	-205	-0.0000118
100 %		+ 50	1,732,500,112	112	0.0000065
BATT. ENDPOINT	3.45	+ 20	1,732,499,774	-226	-0.0000130

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: ZNFM255		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

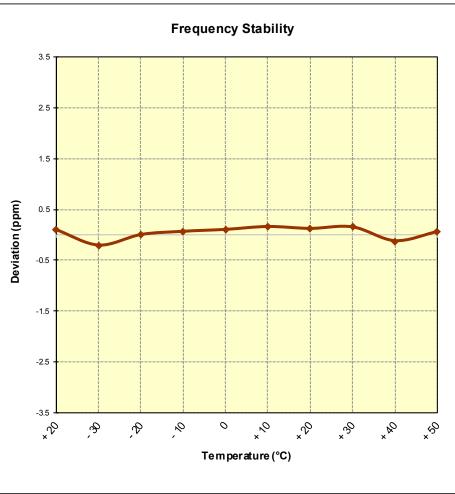


Figure 7-10. Frequency Stability Graph (Band 4)

FCC ID: ZNFM255	PCTEST	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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Band 2 Frequency Stability Measurements §2.1055 §24.235

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

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,880,000,246	246	0.0000131
100 %		- 30	1,879,999,974	-26	-0.0000014
100 %		- 20	1,880,000,154	154	0.0000082
100 %		- 10	1,879,999,912	-88	-0.0000047
100 %		0	1,880,000,157	157	0.0000084
100 %		+ 10	1,880,000,009	9	0.0000005
100 %		+ 20	1,880,000,050	50	0.0000027
100 %		+ 30	1,879,999,821	-179	-0.0000095
100 %		+ 40	1,879,999,982	-18	-0.0000010
100 %		+ 50	1,880,000,098	98	0.0000052
BATT. ENDPOINT	3.45	+ 20	1,879,999,836	-164	-0.000087

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: ZNFM255		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

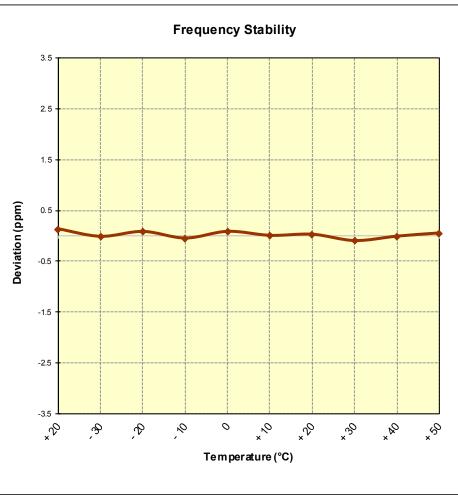


Figure 7-11. Frequency Stability Graph (Band 2)

FCC ID: ZNFM255		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the LG Portable Handset FCC ID: **ZNFM255** complies with all the requirements of Parts 22, 24, & 27 of the FCC rules for LTE operation only.

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