

### 7.4 Band Edge Emissions at Antenna Terminal

#### **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 v03r01 - Section 6.0

#### Test Settings

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

#### Test Setup

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



Figure 7-3. Test Instrument & Measurement Setup

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 57 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 57 01 122
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#### 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.

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 59 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 56 01 122
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Band 12

Keysight Spectrum Analyzer - Swept SA					
<b>LX/</b> RL RF 50Ω DC	CORREC	SENSE:INT	#Avg Type: RMS	05:04:28 PM May 03, 2018 TRACE 1 2 3 4 5 6	Frequency
10 dB/div Ref 25.00 dBm	PNO: Wide 😱	Atten: 36 dB	Mk	r1 697.988 MHz -32.65 dBm	Auto Tune
15.0			/ /	handream	Center Freq 698.000000 MHz
-5.00				Di 1 -13 00 villere	Start Freq 696.000000 MHz
-15.0		1 mm m m	mannen		Stop Freq 700.000000 MHz
-35.0	part and the for the second of	moontmark			CF Step 400.000 kHz <u>Auto</u> Man
-55.0					Freq Offset 0 Hz
-60.0					Scale Type
Center 698.000 MHz #Res BW 100 kHz	#VBW :	300 kHz	Sweep 2	Span 4.000 MHz 2.000 ms (1001 pts)	
MSG			STATU	s	





Plot 7-81. Upper Band Edge Plot (Band 12 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 50 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 59 01 122
© 2018 PCTEST Engineering La	boratory. Inc.	·		V 8.0 04/05/2018



🔤 Keysight Spe	ctrum Analyzer - Sw	vept SA									
LXU RL	RF 50 S	2 DC	CORREC	SEN	ISE:INT	#Avg Typ	e: RMS	05:01:50 P TRAC	M May 03, 2018	F	requency
10 dB/div	Ref 25.00	NFE dBm	PNO: Wide G	Atten: 36	dB		Mł	xr1 698.0 -24.	000 MHz 58 dBm		Auto Tune
15.0										698	Center Freq 3.000000 MHz
-5.00									011 13:00 dBm	696	Start Freq 5.000000 MHz
-15.0				man	1		and			700	Stop Freq 0.000000 MHz
-35.0	North Contraction of the second secon									<u>Auto</u>	CF Step 400.000 kHz Man
-55.0											Freq Offset 0 Hz
-65.0											Scale Type
Center 69 #Res BW	8.000 MHz 100 kHz		#VBW	300 kHz			Sweep :	Span 4 2.000 ms	.000 MHz (1001 pts)	Log	Lin
MSG							STATU	IS			

Plot 7-82. Lower Band Edge Plot (Band 12 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-83. Upper Band Edge Plot (Band 12 - 3.0MHz QPSK - Full RB Configuration)

	C DOTEST	MEASUREMENT REPORT	<b>A</b>	Approved by:
FCC ID: ZNFX410CS	THE PRESENCE CARDANTINA OR	(CERTIFICATION)	LG	Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 60 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 60 01 122
© 2018 PCTEST Engineering La	boratory. Inc.			V 8.0 04/05/2018



Keysight Spe	ctrum Analyzer - Si	wept SA									
LXI RL	RF 50 9	Ω DC	CORREC	SEI	NSE:INT	#Avg Typ	e: RMS	04:59:10 P TRAC	M May 03, 2018	F	requency
10 dB/div	Ref 25.00	dBm	PNO: Wide G	Atten: 36	dB		MI	kr1 697.9 -26.	96 MHz 38 dBm		Auto Tune
15.0								0.000		69	<b>Center Freq</b> B.000000 MHz
-5.00										69	Start Freq 6.000000 MHz
-15.0					1		- and a start	<u>, , , , , , , , , , , , , , , , , , , </u>	DL1 -13.00 dBm	70	Stop Freq 0.000000 MHz
-35.0	p.c.m.m.m.m.m.m.m.m.m.m.m.m.m.m.m.m.m.m.	m								<u>Auto</u>	<b>CF Step</b> 400.000 kHz Man
-55.0											Freq Offset 0 Hz
-65.0											Scale Type
Center 69 #Res BW	8.000 MHz 100 kHz		#VBW	300 kHz			Sweep	Span 4 2.000 ms (	.000 MHz 1001 pts)	Log	Lin
MSG							STAT	US			

Plot 7-84. Lower Band Edge Plot (Band 12 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-85. Upper Band Edge Plot (Band 12 - 5.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 61 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 61 01 122
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🔤 Keysight Sp	ectrum Analyzer - Swept SA					
l <b>XI</b> RL	RF 50Ω DC	CORREC	SENSE:INT	#Avg Type: RMS	04:56:01 PM May 03, 2018 TRACE 1 2 3 4 5 6	Frequency
10 dB/div	NFE Ref 25.00 dBm	PNO: Wide 🖵	Atten: 36 dB	M	Ikr1 697.712 MHz -30.61 dBm	Auto Tune
15.0						Center Freq 698.000000 MHz
-5.00						Start Freq 694.000000 MHz
-15.0			¢1	a for a marked by		<b>Stop Freq</b> 702.000000 MHz
-35.0	an an her style of the state of	Money Andrew Sugar Sugar Sugar	And and a second se			CF Step 800.000 kHz <u>Auto</u> Man
-55.0						Freq Offset 0 Hz
-65.0						Scale Type
Center 69 #Res BW	98.000 MHz 100 kHz	#VBW	300 kHz	Sweep	Span 8.000 MHz 4.000 ms (1001 pts)	Log <u>Lin</u>
MSG				STA	TUS	

Plot 7-86. Lower Band Edge Plot (Band 12 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-87. Upper Band Edge Plot (Band 12 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	💽 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 62 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 62 01 122
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Band 5

Keysight Spectrum Analyzer - Swept SA					
LXX RL RF 50Ω DC	CORREC	SENSE:INT	#Avg Type: RMS	04:21:39 PM May 03, 2018 TRACE 1 2 3 4 5 6	Frequency
NFE 10 dB/div Ref 25.00 dBm	PNO: Wide 🖵 IFGain:Low	Trig: Free Run Atten: 36 dB	М	kr1 824.000 MHz -15.49 dBm	Auto Tune
15.0			ward ward war	× ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	Center Freq 824.000000 MHz
-5.00		1			Start Freq 822.000000 MHz
-15.0	hall way way	www.www		Mine W Manager	Stop Freq 826.000000 MHz
-35.0					CF Step 400.000 kHz <u>Auto</u> Man
-55.0					<b>Freq Offset</b> 0 Hz
-85.0					Scale Type
Center 824.000 MHz #Res BW 100 kHz	#VBW :	300 kHz	Sweep	Span 4.000 MHz 2.000 ms (1001 pts)	Log <u>Lin</u>
MSG			STAT	US	





Plot 7-89. Upper Band Edge Plot (Band 5 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 62 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 63 01 122
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🔤 Keysight Spe	ctrum Analyzer - S	wept SA									
LXI RL	RF 50 9	Ω DC	CORREC	SEI	NSE:INT	#Avg Typ	e: RMS	04:17:32 P	M May 03, 2018	F	requency
10 dB/div	Ref 25.00	NFE	PNO: Wide 🕞 IFGain:Low	Atten: 36	e Run 6 dB		М	kr1 823.9 -18.	80 MHz 05 dBm		Auto Tune
15.0						www.www.ut	mmm	mahar-Mahar	funna	82	<b>Center Freq</b> 4.000000 MHz
-5.00									DI 1 13.00 dBm	82	Start Freq 2.000000 MHz
-15.0		m alb ash	- mp May maller	mahren	1					82	Stop Freq 5.000000 MHz
-35.0	mmlowy									<u>Auto</u>	<b>CF Step</b> 400.000 kHz Man
-55.0											Freq Offset 0 Hz
Center 82	4.000 MHz							Span 4	.000 MHz	Log	Scale Type Lin
#Res BW	100 kHz		#VBW	300 kHz			Sweep	2.000 ms	1001 pts)		
MSG							STAT	rus			





Plot 7-91. Upper Band Edge Plot (Band 5 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 64 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 64 01 122
© 2018 PCTEST Engineering La	horatory Inc			V 8 0 04/05/2018



Keysight Spectrum Analyzer -	Swept SA									
(XI RL RF 5	0Ω DC (	CORREC	SEN	ISE:INT	#Avg Typ	e: RMS	04:14:29 P	M May 03, 2018	Fr	equency
10 dB/div Ref 25.0	NFE 0 dBm	PNO: Wide 😱 IFGain:Low	Atten: 36	dB		Μ	kr1 823.9 -22.	96 MHz 02 dBm		Auto Tune
15.0					freed on the second	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	······	<b>(</b> 824	Center Freq .000000 MHz
-5.00								Di 1 -13 00 dBm	822	Start Freq 2.000000 MHz
-15.0									826	Stop Freq 0000000 MHz
-35.0	, many many many many many many many many		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~						<u>Auto</u>	<b>CF Step</b> 400.000 kHz Man
-55.0									1	F <b>req Offset</b> 0 Hz
-05.0										Scale Type
Center 824.000 MH #Res BW 100 kHz	Z	#VBW	300 kHz			Sweep	Span 4 2.000 ms (	.000 MHz (1001 pts)	Log	Lin
MSG						STAT	rus			





Plot 7-93. Upper Band Edge Plot (Band 5 - 5.0MHz QPSK - Full RB Configuration)

	C BOTEOT		Approved by:
FCC ID: ZNFX410CS		(CERTIFICATION)	Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 65 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset	Page 65 01 122
© 2018 PCTEST Engineering La	boratory. Inc.	•	V 8.0 04/05/2018



🔤 Keysight Spe	ctrum Analyzer - S	wept SA									
LXI RL	RF 50 9	DC	CORREC	SEN		#Avg Typ	e: RMS	04:10:05 PI TRAC	M May 03, 2018	Fr	equency
10 dB/div	Ref 25.00	dBm	PNO: Wide G	Atten: 36	dB		М	kr1 823.9 -28.	68 MHz 25 dBm		Auto Tune
15.0										<b>(</b> 824	Center Freq .000000 MHz
-5.00						and the second states of the s	- Justinians		DI 1. 12.00 dBm	820	Start Freq 0.000000 MHz
-15.0					1 and				DET -13.00 dbm	828	Stop Freq 0000000 MHz
-35.0	and a second	ar antar and a second	and a for the formation of formation of the second	hand the second s						<u>Auto</u>	<b>CF Step</b> 800.000 kHz Man
-55.0											F <b>req Offset</b> 0 Hz
Center 82	4.000 MHz							Span 8	.000 MHz	Log	Scale Type <u>Lin</u>
#Res BW	100 kHz		#VBW	300 kHz			Sweep	4.000 ms (	1001 pts)		
MSG							STAT	rus			

Plot 7-94. Lower Band Edge Plot (Band 5 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-95. Upper Band Edge Plot (Band 5 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS	PRESENT AND A CAR	MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 66 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 00 01 122
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Band 4



Plot 7-96. Lower Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-97. Lower Extended Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	<b>Approved by:</b> Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 67 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 67 01 122
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🔤 Key	/sight Spectru	ım Analyzer - Sı	wept SA									
L <mark>XI</mark> RI		RF 50 9	DC DC	CORREC	SEI	NSE:INT	#Ava Tvr	e RMS	12:56:35 P	M May 03, 2018	F	requency
			NFE	PNO: Wide 🕞	Trig: Free Atten: 36	e Run 6 dB			TYI DI			
10 dE	3/div R	tef 25.00	dBm					Mkr1	1.755 ( -23.	00 GHz 95 dBm		Auto Tune
15.0											( 1.75	<b>Center Freq</b> 5000000 GHz
5.00 -5.00										011 13:00 dBm	1.75	Start Freq 3000000 GHz
-15.0						1					1.75	<b>Stop Freq</b> 7000000 GHz
-35.0	www.						In Many and	Vhanna	m	And the second s	<u>Auto</u>	CF Step 400.000 kHz Man
-55.0												Freq Offset 0 Hz
-65.0												Scale Type
Cent	ter 1.75	5000 GHz		41 (1914				<b>O</b>	Span 4	.000 MHz	Log	Lin
#Res	5 BW 13	KHZ		#VBW	43 KHZ			sweep a	.807 ms (	1001 pts)		
MSG								STATUS	5			

Plot 7-98. Upper Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-99. Upper Extended Band Edge Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 69 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 66 01 122
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🔤 Keysight Spe	ctrum Analyzer - Sw	ept SA									
LXI RL	RF 50 Ω	DC C	ORREC	SEI	NSE:INT	#Avg Typ	e: RMS	12:59:07 P TRAC	M May 03, 2018	Fi	requency
		NFE	PNO: Wide 🕞 IFGain:Low	Atten: 36	e Run 6 dB			TYI Di			Auto Tuno
10 dB/div	Ref 25.00	dBm					Mkr	1 1.710 ( -24.7	00 GHz 40 dBm		Auto Tune
15.0										( 1.71	<b>Center Freq</b> 0000000 GHz
-5.00						w	~~~~			1.70	Start Freq 8000000 GHz
-15.0					1				DL1 -13.00 dBm	1.71	<b>Stop Freq</b> 2000000 GHz
-35.0	~~~~									<u>Auto</u>	<b>CF Step</b> 400.000 kHz Man
-55.0											Freq Offset 0 Hz
-65.0								0	000 8411-	Log	Scale Type
#Res BW	10000 GHZ 30 kHz		#VBW	91 kHz			Sweep	Span 4 2.000 ms (	(1001 MHz	9	<u></u>
MSG							STAT	US			

Plot 7-100. Lower Band Edge Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-101. Lower Extended Band Edge Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 60 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 69 01 122
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🔤 Keysight Spe	ectrum Analyzer - Swept SA								
L <mark>XI</mark> RL	RF 50 Ω DC	CORREC	SENSE:INT	#Avg Type	RMS	12:59:59 PM TRAC	4 May 03, 2018	Fre	equency
	NFE	PNO: Wide 🖵 IFGain:Low	Trig: Free Run Atten: 36 dB		Mkr	TYF DE			Auto Tune
10 dB/div Log	Ref 25.00 dBm		•			-22.	85 dBm		
15.0								C 1.755	enter Freq 6000000 GHz
-5.00								1.753	Start Freq 3000000 GHz
-15.0							DL1 -13.00 dBm	1.757	<b>Stop Freq</b> 7000000 GHz
-35.0					~~~~~~	·····	<u> </u>	<u>Auto</u>	<b>CF Step</b> 400.000 kHz Man
-45.0								F	F <b>req Offset</b> 0 Hz
-65.0									Scale Type
Center 1.7	755000 GHz	#\/B\M			Swoon	Span 4	.000 MHz	Log	Lin
WKC5 DW	JU KHZ	#VDVV	9 F KHZ		sweep	si ooonins (	roo r pts)		
MSG					STATU	5			

Plot 7-102. Upper Band Edge Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-103. Upper Extended Band Edge Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type: Portable Handset		Page 70 of 122	
1M1804200078-03.ZNF	4/24 - 5/9/2018				
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🔤 Kej	ysight Spe	ctrum A	nalyzer - Sv	vept SA										
<b>l,XI</b> RI	L	RF	50 \$	2 DC	CORRE	EC	SE	NSE:INT	#Avg ]	Type: RMS	01:02:15 P	M May 03, 2018	F	requency
				NFE	PNO IEGa	:Wide 🕞 in:Low	Trig: Fre Atten: 3	e Run 6 dB		,,	TY D	PE A WWWWW ET A N N N N N		
10 dE	3/div	Ref	25.00	dBm	ii du					Mk	r1 1.709 9 -24	996 GHz 67 dBm		Auto Tune
15.0								<b>`</b>					1.7	<b>Center Freq</b> 10000000 GHz
5.00 -5.00									/ nor	~~~~~	water		1.70	Start Freq 08000000 GHz
-15.0								1 N				DL1 -13.00 dBm	1.7	Stop Freq 12000000 GHz
-25.0	~~~	~~>	~~~~	<b>.</b>	~~~	~~~~							<u>Auto</u>	<b>CF Step</b> 400.000 kHz Man
-45.0 -55.0														Freq Offset 0 Hz
-65.0														Scale Type
Cent #Ro	ter 1.7	1000	0 GHz			#\/B\/	1 160 243			Swoon	Span 4	.000 MHz	Log	Lin
MSG	5-844	JEKI	12			#VDV				STA		(1001 pts)		
MSG										STA	105			

Plot 7-104. Lower Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-105. Lower Extended Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type: Portable Handset		Page 71 of 122	
1M1804200078-03.ZNF	4/24 - 5/9/2018				
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🔤 Keysight Spe	ctrum Analyzer - Swep	t SA								
L <mark>XI</mark> RL	RF 50 Ω	DC CORREC	SEN	ISE:INT	#Avg Typ	e: RMS	01:02:51 P	May 03, 2018	Fr	equency
	N	FE PNO: Wide IFGain:Low	Trig: Free Atten: 36	Run dB	- //	Mkr1	TYF DE			Auto Tune
10 dB/div	Ref 25.00 dE	3m					-22.	74 dBm		
									(	Center Freq
15.0									1.75	5000000 GHz
5.00	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~							Otort From
-5.00									1.75	3000000 GHz
0.00								DL1 -13.00 dBm		
-15.0				1						Stop Freq
-25.0				have a second	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~		1.75	7000000 GHz
-35.0										CF Step
									<u>Auto</u>	400.000 kHz Man
-45.0										
-55.0										Freq Offset
.65.0										
										Scale Type
Center 1.7	255000 GHz						Span 4	.000 MHz	Log	Lin
#Res BW	51 kHz	#VI	BW 160 kHz			Sweep 2	.000 ms (	1001 pts)		
MSG						STATUS	5			

Plot 7-106. Upper Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-107. Upper Extended Band Edge Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager			
Test Report S/N:	Test Dates:	EUT Type: Portable Handset		Page 72 of 122			
1M1804200078-03.ZNF	4/24 - 5/9/2018						
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🔤 Keysight	t Spectrum Analyzer -	Swept SA									
LXI RL	RF 50	Ω DC	CORREC	SEN	ISE:INT	#Ava Tva	e: RMS	01:06:19 P	M May 03, 2018	F	requency
		NFE	PNO: Wide IFGain:Low	Trig: Free Atten: 36	e Run i dB		Mkr	TYI DI			Auto Tune
10 dB/div Log	Ref 25.00	) dBm						-27.0	75 dBm		
45.0											Center Freq
15.0										1.71	0000000 GHz
5.00					m	and the property of the proper	Mart of Carrows	n an air air dy'r forsko	and a star of the start of the		Start Freq
-5.00										1.70	6000000 GHz
-15.0									DL1 -13.00 dBm		Oton From
					1					1.71	4000000 GHz
-25.0			Harred Are Ball Marrow Anton	and water Maring and	And the second						
-35.0	man and production which which	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~									<b>CF Step</b> 800.000 kHz
-45.0										<u>Auto</u>	Man
-55.0											Freq Offset
											0 Hz
-65.0											Scale Type
Center	1.710000 GH	z		,				Span 8	.000 MHz	Log	Lin
#Res B	W 100 kHz		#VBW	300 kHz			Sweep 4	4.000 ms (	1001 pts)		
MSG							STATU	JS			

Plot 7-108. Lower Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-109. Lower Extended Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS	PCTEST	MEASUREMENT REPORT	LG	Approved by:	
	PHILIPELATING LABORATOAN THE	(CERTIFICATION)		Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 72 of 100	
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 75 01 122	
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🔤 Keysight Spe	ectrum Analyzer - Swept SA					
L <mark>XI</mark> RL	RF 50 Ω D0	CORREC	SENSE:INT	#Ava Type: RMS	01:07:24 PM May 03, 2018 TRACE 1 2 3 4 5 6	Frequency
	NFE	PNO: Wide 🖵 IFGain:Low	Trig: Free Run Atten: 36 dB			Auto Tune
10 dB/div	Ref 25.00 dBn	1		MK	r1 1.755 008 GHz -25.67 dBm	Auto Tune
45.0			Ĭ			Center Freq
15.0						1.755000000 GHz
5.00	Man and a concerned and the second	and the second	- Arrived			Start Freq
-5.00					Di 4, 12:00 dBm	1.751000000 GHz
-15.0						Stop Freq
-25.0			har and harden and	Manata Da G Artadam		1.759000000 GHz
-35.0					and the second s	CF Step 800.000 kHz
-45.0						<u>Auto</u> Man
-55.0						Freq Offset
65.0						0 Hz
-03.0						Scale Type
Center 1.	755000 GHz		A		Span 8.000 MHz	Log <u>Lin</u>
#Res BW	100 kHz	#VBW	300 kHz	Sweep	4.000 ms (1001 pts)	
MSG				STA	TUS	

Plot 7-110. Upper Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-111. Upper Extended Band Edge Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS	PCTEST	MEASUREMENT REPORT	LG	Approved by:	
	PHILIPLEATING CARDAATDAA LINE	(CERTIFICATION)		Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Daga 74 of 100	
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 74 of 122	
© 2018 PCTEST Engineering La	V 8.0 04/05/2018				



🔤 Keysight Spe	ctrum Analyzer - Swept S	A					
L <mark>XI</mark> RL	RF 50 Ω D	C CORREC	SENSE	INT #Ava Tv	pe: RMS	01:14:22 PM May 03, 2018 TRACE 1 2 3 4 5 6	Frequency
	NFE	PNO: Wide IFGain:Low	Trig: Free R Atten: 36 dB	un B			Auto Tuno
10 dB/div	Ref 25.00 dBi	n			Mkr	1.709 532 GHz -28.30 dBm	Auto Tune
45.0							Center Freq
15.0							1.710000000 GHz
5.00				harmon			Start Freq
-5.00							1.704000000 GHz
-15.0						DE1 -13.00 dem	Stop Freq
-25.0				لم کن			1.716000000 GHz
-35.0	······································		man and the				CF Step 1.20000 MHz
-45.0							<u>Auto</u> Man
-55.0							Freq Offset
65.0							0 Hz
-65.01							Scale Type
Center 1.7	'10000 GHz					Span 12.00 MHz	Log <u>Lin</u>
#Res BW	150 kHz	#VBW	470 kHz		Sweep	1.000 ms (1001 pts)	
MSG					STATU	IS	

Plot 7-112. Lower Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-113. Lower Extended Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type: Portable Handset		Page 75 of 122	
1M1804200078-03.ZNF	4/24 - 5/9/2018				
© 2018 PCTEST Engineering La	V 8.0 04/05/2018				



🔤 Keysight Spe	ctrum Analyzer - Swept S	A					- 6
LXI RL	RF 50 Ω D	C CORREC	SENSE:INT	#Ava Tvp	RMS	01:15:00 PM May 03, 2018 TRACE 1 2 3 4 5 6	Frequency
	NFE	E PNO: Wide 🖵 IFGain:Low	Trig: Free Run Atten: 36 dB				
10 dB/div	Ref 25.00 dBi	m			Mkr1	1.755 540 GHz -24.79 dBm	Auto Tune
15.0							Center Freq 1.755000000 GHz
-5.00							<b>Start Freq</b> 1.749000000 GHz
-15.0				1			<b>Stop Freq</b> 1.761000000 GHz
-35.0							<b>CF Step</b> 1.200000 MHz <u>Auto</u> Man
-55.0							<b>Freq Offset</b> 0 Hz
-65.0							Scale Type
Center 1.7	55000 GHz	#\/R\//	170 kHz		Sween	Span 12.00 MHz	
#Res DW	150 KH2	#VDVV	47 U KHZ		sweep	1.000 ms (1001 pts)	
MOG					STATU	0	

Plot 7-114. Upper Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-115. Upper Extended Band Edge Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Daga 76 of 100	
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 76 of 122	
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🔤 Keysight Spe	ectrum Analyzer - S	wept SA									• • • <b>×</b>
()///RL	RF 50	Ω DC	CORREC	SEN		#Avg Typ	e: RMS	01:21:37 PI TRAC	May 03, 2018	Freq	uency
10 dB/div	Ref 25.00	NFE dBm	PNO: Wide IFGain:Low	Atten: 36	dB		Mkr	1 1.709 9 -30.	52 GHz 65 dBm	A	uto Tune
15.0										Cei 1.71000	n <b>ter Freq</b> 00000 GHz
-5.00								and a start of the	DI1-13.00 dBm	<b>S</b> 1.70200	t <b>art Freq</b> 00000 GHz
-15.0					1					S 1.71800	<b>top Freq</b> 00000 GHz
-35.0	water and the	-			y-					1.60 <u>Auto</u>	CF Step 00000 MHz Man
-55.0										Fre	e <b>q Offset</b> 0 Hz
Center 1.7	710000 GH	2						Span 1	6.00 MHz	So	ale Type
#Res BW	200 kHz		#VBW	620 kHz			Sweep	1.000 ms (	1001 pts)		
MSG							STAT	US			

Plot 7-116. Lower Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-117. Lower Extended Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 77 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page // of 122
© 2018 PCTEST Engineering La	boratory, Inc.	·		V 8.0 04/05/2018



🔤 Keysight Spe	ctrum Analyzer - Swept S	A					
LXU RL	RF 50 Ω D	C CORREC	SENSE:I		RMS	01:23:03 PM May 03, 2018 TRACE 1 2 3 4 5 6	Frequency
	NFE	E PNO: Wide 🖵 IFGain:Low	Trig: Free Ru Atten: 36 dB	n		DET A N N N N	
10 dB/div	Ref 25.00 dBr	m			Mkr1	1.755 000 GHz -25.10 dBm	Auto Tune
15.0							Center Freq 1.755000000 GHz
5.00							<b>Start Freq</b> 1.747000000 GHz
-15.0						DL1 -13.00 dBm	<b>Stop Freq</b> 1.763000000 GHz
-35.0					um m	har	CF Step 1.600000 MHz <u>Auto</u> Man
-45.0							<b>Freq Offset</b> 0 Hz
-65.0							Scale Type
Center 1.7	200 KHz	#\/B\M	620 647		woon 1	Span 16.00 MHz	Log <u>Lin</u>
#Res DW	200 KH2	#VDVV	020 KH2		oweep	line (1001 pts)	
MSG					STATU	5	

Plot 7-118. Upper Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-119. Upper Extended Band Edge Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 79 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 76 01 122
© 2018 PCTEST Engineering La	boratory, Inc.			V 8.0 04/05/2018



#### Band 2

Keysight Spectrum Analyzer - Swept SA					
<b>LX/ RL</b> RF 50Ω DC	CORREC	SENSE:INT	#Avg Type: RM	11:50:47 AM May 03, 2018 S TRACE 1 2 3 4 5 (	Frequency
NFE 10 dB/div Ref 25.00 dBm	PNO: Wide 🖵 IFGain:Low	Trig: Free Run Atten: 36 dB	Μ	Ikr1 1.850 000 GHz -27.664 dBm	Auto Tune
15.0					Center Freq 1.850000000 GHz
-5.00				DI 1.43.00 (Bit	<b>Start Freq</b> 1.848000000 GHz
-25.0		1			<b>Stop Freq</b> 1.852000000 GHz
-35.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	And and a second s		- hundrad	CF Step 400.000 kHz <u>Auto</u> Man
-55.0					Freq Offset 0 Hz
-65.0					Scale Type
Center 1.850000 GHz #Res BW 13 kHz	#VBW 3	39 kHz	Swee	Span 4.000 MHz ep 9.533 ms (1001 pts)	Log <u>Lin</u>
MSG			5	STATUS	

Plot 7-120. Lower Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-121. Lower Extended Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	C LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dago 70 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 79 01 122
© 2018 PCTEST Engineering La	boratory, Inc.	·		V 8.0 04/05/2018



🔤 Keysight	Spectrum Analyzer - Swept S	A				
L <mark>XI</mark> RL	RF 50 Ω D	C CORREC	SENSE:INT	#Avg Type: RMS	12:00:00 PM May 03, 2018 TRACE 1 2 3 4 5 6	Frequency
10 dB/div	Ref 25.00 dBr	E PNO: Wide G	Atten: 36 dB	Mkr	1 1.910 040 GHz -24.70 dBm	Auto Tune
15.0						Center Freq 1.91000000 GHz
-5.00					DL1 -13.00 dBm	<b>Start Freq</b> 1.908000000 GHz
-15.0	and an and a second		1	Ma		<b>Stop Freq</b> 1.912000000 GHz
-35.0				- monoral and the	Munnun	CF Step 400.000 kHz <u>Auto</u> Man
-55.0						Freq Offset 0 Hz
						Scale Type
Center #Res Bi	1.910000 GHz № 13 kHz	#VBW	39 kHz	Sweep	Span 4.000 MHz 9.533 ms (1001 pts)	Log <u>Lin</u>
MSG				STAT	US	

Plot 7-122. Upper Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-123. Upper Extended Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 90 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 60 01 122
© 2018 PCTEST Engineering La	boratory, Inc.			V 8.0 04/05/2018



🔤 Keysight Spe	ctrum Analyzer - Swept	: SA					
LXU RL	RF 50 Ω	DC CORREC	SENSE	INT #Avg 1	vpe: RMS	12:07:49 PM May 03, 2018 TRACE 1 2 3 4 5 6	Frequency
	NF	FE PNO: Wide ( IFGain:Low	Trig: Free R Atten: 36 dl	un B	,		Auto Tuno
10 dB/div	Ref 25.00 dE	3m			Mkr'	1 1.850 000 GHz -25.738 dBm	Auto Tune
15.0							Center Freq
5.00							1.85000000 GH2
.5.00							<b>Start Freq</b> 1.848000000 GHz
45.0						DL1 -13.00 dBm	
-15.0			¢1	/			<b>Stop Freq</b> 1.852000000 GHz
-20.0							CF Step
-30.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~						400.000 kHz <u>Auto</u> Man
-40.0							Freq Offset
-55.0							0 Hz
-65.0							Scale Type
Center 1.8	50000 GHz					Span 4.000 MHz	Log <u>Lin</u>
#Res BW	30 kHz	#VB	W 91 kHz		Sweep	2.000 ms (1001 pts)	
MSG					STATU	IS	

Plot 7-124. Lower Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-125. Lower Extended Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 91 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page of of 122
© 2018 PCTEST Engineering La	boratory, Inc.	·		V 8.0 04/05/2018



🔤 Keysight Sp	ectrum Analyzer - S	wept SA									
LXI RL	RF 50	Ω DC	CORREC	SEI	NSE:INT	#Avg Tvp	e: RMS	12:09:21 P	M May 03, 2018	F	requency
	<b>B</b> - 6 0 6 00	NFE	PNO: Wide IFGain:Low	Trig: Free Atten: 36	e Run 6 dB	0,1	Mkr	™ □ 1 1.910 ( -24 2	000 GHz		Auto Tune
15.0	Ref 25.00									1.91	<b>Center Freq</b> 10000000 GHz
5.00									DL1 -13.00 dBm	1.90	Start Freq 08000000 GHz
-15.0					1					1.91	Stop Freq 2000000 GHz
-35.0									·····	<u>Auto</u>	<b>CF Step</b> 400.000 kHz Man
-55.0											Freq Offset 0 Hz
Contor 1	010000 CH							Spop		Log	Scale Type
#Res BW	30 kHz		#VBW	91 kHz			Sweep	span 4 2.000 ms	.000 MHz (1001 pt <u>s)</u>	9	
MSG							STAT	US			

Plot 7-126. Upper Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-127. Upper Extended Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dege 92 of 102	
1M1804200078-03.ZNF 4/24 - 5/9/2018 Portable Handset			Page of 01 122		
© 2018 PCTEST Engineering La	V 8.0 04/05/2018				



🔤 Keysight Spo	ectrum Analyzer - S	wept SA									
L <mark>XI</mark> RL	RF 50	Ω DC	CORREC	SEI	ISE:INT	#Ava Tvp	e: RMS	12:12:41 P	M May 03, 2018	F	requency
		NFE	PNO: Wide 🖵 IFGain:Low	Trig: Free Atten: 36	e Run i dB			TY D			
10 dB/div	Ref 25.00	dBm					Mkr	1 1.850 ( -26.	00 GHz 30 dBm		Auto Tune
15.0										1.85	<b>Center Freq</b> 60000000 GHz
5.00						~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	•	~~~~~		1.84	Start Freq 18000000 GHz
-15.0					1				DL1 -13.00 dBm	1.85	Stop Freq
-25.0		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~	كمسم	<u>;</u>						CF Step
-45.0										<u>Auto</u>	Man
-55.0											Freq Offset 0 Hz
Center 1	850000 CH	7						Span	000 MHz	Log	Scale Type Lin
#Res BW	51 kHz	2	#VBW	160 kHz		5	Sweep	2.000 ms (	1001 pts)		
MSG							STAT	US			

Plot 7-128. Lower Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-129. Lower Extended Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dege 92 of 100	
1M1804200078-03.ZNF 4/24 - 5/9/2018 Portable Handset			Page 05 01 122		
© 2018 PCTEST Engineering La	V 8.0 04/05/2018				



🔤 Keysig	ht Spectrum Analyzer - S	Swept SA									
LXI RL	RF 50	ΩDC	CORREC	SEN	ISE:INT	#Ava Tvp	e: RMS	12:13:33 P TRAC	M May 03, 2018	F	requency
		NFE	PNO: Wide 🕞 IFGain:Low	Trig: Free Atten: 36	e Run i dB	0 ,1		TYI Di			
10 dB/d	liv Ref 25.00	dBm					Mkr1	1.910 0 -23.9	00 GHz 81 dBm		Auto Tune
15.0										( 1.91	<b>Center Freq</b> 0000000 GHz
5.00		· · · · ·	<u></u>							1.90	Start Freq 8000000 GHz
-15.0					1				DL1 -13.00 dBm	1.91	Stop Freq 2000000 GHz
-25.0				V		······	·····	·····	~~~~~		CF Step
-45.0 —										<u>Auto</u>	Man
-55.0 —											Freq Offset 0 Hz
-65.0	- 1 010000 011									Log	Scale Type
#Res	1.910000 GH 3W 51 kHz	Z	#VBW	160 kHz			Sweep 2	5pan 4 2.000 ms (	.000 MHz 1001 pts)	LUg	<u>E111</u>
MSG							STATU	IS			

Plot 7-130. Upper Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-131. Upper Extended Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager		
Test Report S/N:	Test Dates:	EUT Type:		Daga 94 of 100		
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 84 of 122		
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🔤 Keysight Spe	ectrum Analyzer - Swep	t SA				
LXI RL	RF 50 Ω	DC CORREC	SENSE:INT	#Avg Type: RMS	12:16:28 PM May 03, 2018 TRACE 1 2 3 4 5 6	Frequency
	N	FE PNO: Wide G IFGain:Low	Trig: Free Run Atten: 36 dB	Mki	TYPE A WWWW DET A NNNNN	Auto Tune
10 dB/div	Ref 25.00 dE	3m			-31.20 dBm	
15.0						Center Freq 1.850000000 GHz
-5.00				he men water a generation	and the second	<b>Start Freq</b> 1.846000000 GHz
-15.0					DL1 -13.00 dBm	<b>Stop Freq</b> 1.854000000 GHz
-35.0	may hyper south of the	go and and the first the grade and the grade and the first the grade and the first the grade and the first term	1 P			CF Step 800.000 kHz Auto Man
-45.0						Freg Offset
-55.0						0 Hz
Contor 4						Scale Type
#Res BW	100 kHz	#VBV	V 300 kHz	Sweep	4.000 ms (1001 pts)	
MSG				STAT	US	

Plot 7-132. Lower Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-133. Lower Extended Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Bage 95 of 122	
1M1804200078-03.ZNF	804200078-03.ZNF 4/24 - 5/9/2018 Portable Handset			Page 65 01 122	
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XX         RL         RF         50 Ω         DC         CORREC         SENSE:INT         12:17:18 PM May 03, 2018         Frequence           #Avg Type: RMS         TRACE         12:34 \$5 6         Trace         12:35 \$100 \$100 \$100 \$100 \$100 \$100 \$100 \$10	У
NFE     PNO: Wide     Ifg: Free Run IFGain:Low     Ifg: Free Run Atten: 36 dB     Det ANNNNN       10 dB/div     Ref 25.00 dBm     -25.59 dBm     Auto	ſune
15.0 Center 15.0 15.0	Freq ) GHz
5.00 CL1-13.00 dBm	Freq ) GHz
-15.0 -25.0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Freq GHz
-35.0 CF 800.00 Auto	Step 0 kHz Man
Freq O	f <b>fset</b> 0 Hz
Scale <sup>2</sup>	Гуре
Center 1.910000 GHz Span 8.000 MHz Cog #Res BW 100 kHz #VBW 300 kHz Sween 4.000 ms (1001 nts)	<u>LII1</u>

Plot 7-134. Upper Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-135. Upper Extended Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 96 of 100	
1M1804200078-03.ZNF 4/24 - 5/9/2018 Portable Handset		Portable Handset		Page 60 01 122	
© 2018 PCTEST Engineering La	V 8.0 04/05/2018				



🔤 Keysight Spe	ctrum Analyzer - S	wept SA									
(X/IRL	RF 50 :	Ω DC	CORREC	SEN	NSE:INT	#Avg Typ	e: RMS	12:19:55 P TRAC	M May 03, 2018	Freque	ency
		NFE	PNO: Wide IFGain:Low	Atten: 36	e Run 6 dB		Mkr	1 1.849 9	28 GHz	Aut	o Tune
10 dB/div	Ref 25.00	dBm		,				-31.	49 aBm		
15.0										Cent 1.850000	e <b>r Freq</b> 000 GHz
5.00						ma	A comment				
-5.00										<b>Sta</b> 1.844000	a <b>rt Freq</b> 000 GHz
-15.0									DL1 -13.00 dBm		-
-25.0										1.856000	000 GHz
					1 m						E Oton
-35.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	www						1.200 <u>Auto</u>	000 MHz Man
43.0										Eros	Offect
-55.0										Fiet	0 Hz
-65.0											
										Sca	Іе Туре
Center 1.8	50000 GHz	2						Span 1	2.00 MHz	Log	Lin
#Res BW	150 kHz		#VBW	470 kHz			Sweep	1.000 ms	1001 pts)		
MSG							STAT	US			

Plot 7-136. Lower Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-137. Lower Extended Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 07 of 100	
1M1804200078-03.ZNF	4/24 - 5/9/2018 Portable Handset			Page or of 122	
© 2018 PCTEST Engineering Lal	V 8.0 04/05/2018				



🔤 Keysight Spo	ectrum Analyzer - Swept SA									- 6 ×
LXU RL	RF 50 Ω DC	CORREC	SENS	E:INT	#Ava Tvp	e: RMS	12:21:05 PI TRAC	M May 03, 2018	Fre	equency
	NFE	PNO: Wide 🖵 IFGain:Low	Trig: Free Atten: 36 d	Run JB	0.91	Mkr	TYF DE 1 1.910 2			Auto Tune
10 dB/div	Ref 25.00 dBm						-24.	73 dBm		
15.0									<b>C</b> 1.910	<b>enter Freq</b> 000000 GHz
5.00		·····	~						1.904	Start Freq 000000 GHz
-15.0				<b>▲</b> 1				DL1 -13.00 dBm	1.916	Stop Freq
-25.0			<u></u>		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	1.	CF Step 200000 MHz
-45.0									<u>Auto</u>	Man Fog Offoot
-55.0										0 Hz
Center 1	910000 GHz						Snap 1	2 00 MHz	<b>t</b> og	Scale Type Lin
#Res BW	150 kHz	#VBW	470 kHz			Sweep	1.000 ms (	1001 pts)		
MSG						STATU	JS			

Plot 7-138. Upper Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-139. Upper Extended Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 00 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 66 01 122
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🔤 Keysight Spe	ectrum Analyzer - Si	wept SA								_	
(X) RL	RF 50 9	Ω DC	CORREC	SEI	NSE:INT	#Avg Typ	e: RMS	12:26:18 P	M May 03, 2018 CE 1 2 3 4 5 6	Frequ	ency
10 dB/div	Ref 25.00	NFE dBm	PNO: Wide G	Atten: 36	dB		Mkr	1 1.850 ( -33.	000 GHz 58 dBm	Au	ito Tune
15.0										Cen 1.850000	<b>ter Freq</b> 0000 GHz
-5.00						~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	- v v w w		Di 1 -13 00 dBm	St 1.842000	<b>art Freq</b> 0000 GHz
-15.0					1					St 1.858000	o <b>p Freq</b> 0000 GHz
-35.0 -45.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	مر <sub>م</sub> ین پر مر						1.600 <u>Auto</u>	CF Step 0000 MHz Man
-55.0										Fre	<b>q Offset</b> 0 Hz
Center 1.	850000 GHz							Span 1	6.00 MHz	Sca Log	ale Type <u>Lin</u>
#Res BW	200 kHz		#VBW	620 kHz			Sweep	1.000 ms	(1001 pts)		
MSG							STAT	US			

Plot 7-140. Lower Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-141. Lower Extended Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 90 of 122
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 69 01 122
© 2018 PCTEST Engineering La	V 8.0 04/05/2018			



🔤 Keysight Spe	ectrum Analyzer - Swept SA						
L <mark>XI</mark> RL	RF 50 Ω DC	CORREC	SENSE:IN	T HAVE TVD	e: RMS	12:27:41 PM May 03, 2018	Frequency
	NFE	PNO: Wide 🖵 IFGain:Low	Trig: Free Run Atten: 36 dB	ייני פייייי		TYPE A WWWWW DET A NNNN	
10 dB/div	Ref 25.00 dBm				Mkr1	1.910 112 GHz -26.50 dBm	Auto Tune
15.0							Center Freq 1.910000000 GHz
-5.00		and the second					<b>Start Freq</b> 1.902000000 GHz
-15.0			1			DLT-13.00 dem	<b>Stop Freq</b> 1.918000000 GHz
-35.0					and the	and when the second	<b>CF Step</b> 1.600000 MHz <u>Auto</u> Man
-55.0							<b>Freq Offset</b> 0 Hz
-65.0							Scale Type
Center 1.	910000 GHz	#\/D\\	600 kHz		Burgon	Span 16.00 MHz	Log <u>Lin</u>
#Res BW	200 KH2	#VBW	020 KHZ		sweep	1.000 ms (1001 pts)	
MSG					STATU	S	

Plot 7-142. Upper Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-143. Upper Extended Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 00 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 90 01 122
© 2018 PCTEST Engineering La	V 8.0 04/05/2018			



### 7.5 Peak-Average Ratio

#### **Test Overview**

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

#### Test Procedure Used

KDB 971168 D01 v03r01 - 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: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 01 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 91 01 122
© 2018 PCTEST Engineering La	V 8.0 04/05/2018			



#### Band 2



Plot 7-144. PAR Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



#### Plot 7-145. PAR Plot (Band 2 - 1.4MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dago 02 of 122
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 92 01 122
© 2018 PCTEST Engineering La	V 8 0 04/05/2018			





Plot 7-146. PAR Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-147. PAR Plot (Band 2 - 3.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dama 00 of 400
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 93 of 122
© 2018 PCTEST Engineering La	V 8.0 04/05/2018			





Plot 7-148. PAR Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-149. PAR Plot (Band 2 - 5.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dama 04 of 400
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 94 of 122
© 2018 PCTEST Engineering La	V 8.0 04/05/2018			





Plot 7-150. PAR Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-151. PAR Plot (Band 2 - 10.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage OF of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 95 01 122
© 2018 PCTEST Engineering La	V 8.0 04/05/2018			





Plot 7-152. PAR Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-153. PAR Plot (Band 2 - 15.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 06 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 96 01 122
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Plot 7-154. PAR Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-155. PAR Plot (Band 2 - 20.0MHz 16-QAM - Full RB Configuration)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 07 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 97 01 122
© 2018 PCTEST Engineering La	V 8.0 04/05/2018			



## 7.6 Radiated Power (ERP/EIRP)

#### Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 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 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 v03r01 - Section 5.2.1

ANSI/TIA-603-E-2016 - Section 2.2.17

#### Test Settings

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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 09 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 96 01 122
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### Test Setup

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



Figure 7-6. Radiated Test Setup >1GHz

### Test Notes

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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager				
Test Report S/N:	Test Dates:	EUT Type:	Daga 00 of 100				
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset	Page 99 01 122				
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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]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
699.70	1.4	QPSK	v	150	5	1/5	21.30	1.10	20.25	0.106	34.77	-14.52	22.40	0.174	36.99	-14.59
707.50	1.4	QPSK	V	150	5	1/5	21.71	1.13	20.69	0.117	34.77	-14.08	22.84	0.192	36.99	-14.15
715.30	1.4	QPSK	V	150	5	1/5	21.91	1.16	20.92	0.124	34.77	-13.85	23.07	0.203	36.99	-13.92
707.50	1.4	16-QAM	V	150	5	1/5	20.72	1.13	19.70	0.093	34.77	-15.07	21.85	0.153	36.99	-15.14
700.50	3	QPSK	V	150	8	1 / 14	21.36	1.10	20.31	0.107	34.77	-14.46	22.46	0.176	36.99	-14.53
707.50	3	QPSK	V	150	8	1 / 14	21.83	1.13	20.81	0.121	34.77	-13.96	22.96	0.198	36.99	-14.03
714.50	3	QPSK	V	150	8	1/0	21.95	1.16	20.96	0.125	34.77	-13.81	23.11	0.205	36.99	-13.88
707.50	3	16-QAM	V	150	8	1 / 14	20.19	1.13	19.17	0.083	34.77	-15.60	21.32	0.136	36.99	-15.67
701.50	5	QPSK	V	150	7	1/0	21.37	1.11	20.33	0.108	34.77	-14.45	22.48	0.177	36.99	-14.51
707.50	5	QPSK	V	150	7	1 / 24	21.42	1.13	20.40	0.110	34.77	-14.37	22.55	0.180	36.99	-14.44
713.50	5	QPSK	V	150	7	1/0	21.87	1.15	20.87	0.122	34.77	-13.90	23.02	0.201	36.99	-13.97
707.50	5	16-QAM	V	150	7	1 / 24	20.20	1.13	19.18	0.083	34.77	-15.59	21.33	0.136	36.99	-15.66
704.00	10	QPSK	V	150	5	1 / 49	21.30	1.12	20.27	0.106	34.77	-14.50	22.42	0.174	36.99	-14.57
707.50	10	QPSK	V	150	5	1 / 49	21.48	1.13	20.46	0.111	34.77	-14.31	22.61	0.182	36.99	-14.38
711.00	10	QPSK	v	150	5	1 / 49	21.77	1.14	20.76	0.119	34.77	-14.01	22.91	0.196	36.99	-14.08
707.50	10	16-QAM	V	150	5	1 / 49	20.48	1.13	19.46	0.088	34.77	-15.31	21.61	0.145	36.99	-15.38
714.50	3	QPSK	н	150	120	1/0	20.79	1.16	19.80	0.095	34.77	-14.97	21.95	0.157	36.99	-15.04

Table 7-3. ERP Data (Band 12)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
824.70	1.4	QPSK	н	150	3	1 / 0	19.90	1.50	19.25	0.084	38.45	-19.20	21.40	0.138	40.61	-19.21
836.50	1.4	QPSK	н	150	3	1 / 0	20.70	1.50	20.05	0.101	38.45	-18.40	22.20	0.166	40.61	-18.41
848.30	1.4	QPSK	Н	150	3	1 / 0	21.35	1.50	20.70	0.117	38.45	-17.75	22.85	0.193	40.61	-17.76
848.30	1.4	16-QAM	н	150	3	1 / 0	20.16	1.50	19.51	0.089	38.45	-18.94	21.66	0.147	40.61	-18.95
825.50	3	QPSK	н	150	3	1 / 0	19.83	1.50	19.18	0.083	38.45	-19.27	21.33	0.136	40.61	-19.28
836.50	3	QPSK	н	150	3	1 / 0	20.40	1.50	19.75	0.094	38.45	-18.70	21.90	0.155	40.61	-18.71
847.50	3	QPSK	н	150	3	1 / 0	21.40	1.50	20.75	0.119	38.45	-17.70	22.90	0.195	40.61	-17.71
847.50	3	16-QAM	н	150	3	1 / 0	20.25	1.50	19.60	0.091	38.45	-18.85	21.75	0.150	40.61	-18.86
826.50	5	QPSK	н	150	359	1 / 0	19.94	1.50	19.29	0.085	38.45	-19.16	21.44	0.139	40.61	-19.17
836.50	5	QPSK	н	150	3	1 / 0	20.44	1.50	19.79	0.095	38.45	-18.66	21.94	0.156	40.61	-18.67
846.50	5	QPSK	н	150	359	1 / 0	20.89	1.50	20.24	0.106	38.45	-18.21	22.39	0.173	40.61	-18.22
846.50	5	16-QAM	н	150	359	1 / 0	19.50	1.50	18.85	0.077	38.45	-19.60	21.00	0.126	40.61	-19.61
829.00	10	QPSK	н	150	5	1/0	20.23	1.50	19.58	0.091	38.45	-18.87	21.73	0.149	40.61	-18.88
836.50	10	QPSK	н	150	343	1/0	20.68	1.50	20.03	0.101	38.45	-18.42	22.18	0.165	40.61	-18.43
844.00	10	QPSK	н	150	0	1 / 0	20.98	1.50	20.33	0.108	38.45	-18.12	22.48	0.177	40.61	-18.13
844.00	10	16-QAM	н	150	0	1/0	19.72	1.50	19.07	0.081	38.45	-19.38	21.22	0.132	40.61	-19.39
847.50	3	QPSK	V	150	358	1/0	20.50	1.50	19.85	0.097	38.45	-18.60	22.00	0.158	40.61	-18.61

#### Table 7-4. ERP Data (Band 5)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dago 100 of 122
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Fage 100 01 122
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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 [Watts]	EIRP Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	Н	118	222	1 / 0	14.96	8.23	23.19	0.208	30.00	-6.81
1732.50	1.4	QPSK	Н	116	43	1 / 0	13.97	8.06	22.03	0.160	30.00	-7.97
1754.30	1.4	QPSK	Н	120	38	1 / 0	13.20	7.90	21.10	0.129	30.00	-8.90
1710.70	1.4	16-QAM	Н	118	222	1 / 0	13.67	8.23	21.90	0.155	30.00	-8.10
1711.50	3	QPSK	Н	118	220	1 / 0	15.03	8.22	23.25	0.211	30.00	-6.75
1732.50	3	QPSK	Н	124	26	1 / 0	14.67	8.06	22.73	0.188	30.00	-7.27
1753.50	3	QPSK	Н	122	31	1 / 0	13.50	7.90	21.40	0.138	30.00	-8.60
1711.50	3	16-QAM	Н	118	220	1 / 0	14.06	8.22	22.28	0.169	30.00	-7.72
1712.50	5	QPSK	Н	122	222	1 / 0	14.68	8.21	22.89	0.195	30.00	-7.11
1732.50	5	QPSK	Н	124	5	1 / 0	14.84	8.06	22.90	0.195	30.00	-7.10
1752.50	5	QPSK	Н	127	33	1 / 0	15.21	7.91	23.12	0.205	30.00	-6.88
1752.50	5	16-QAM	Н	127	33	1 / 0	13.75	7.91	21.66	0.147	30.00	-8.34
1715.00	10	QPSK	Н	117	224	1 / 0	15.25	8.19	23.44	0.221	30.00	-6.56
1732.50	10	QPSK	Н	117	222	1 / 0	14.39	8.06	22.45	0.176	30.00	-7.55
1750.00	10	QPSK	Н	118	37	1 / 0	15.84	7.93	23.77	0.238	30.00	-6.23
1750.00	10	16-QAM	Н	118	37	1 / 0	14.46	7.93	22.39	0.173	30.00	-7.61
1717.50	15	QPSK	Н	124	15	1 / 0	14.58	8.17	22.76	0.189	30.00	-7.24
1732.50	15	QPSK	Н	125	5	1 / 0	14.91	8.06	22.97	0.198	30.00	-7.03
1747.50	15	QPSK	Н	126	5	1 / 0	15.59	7.95	23.54	0.226	30.00	-6.46
1747.50	15	16-QAM	Н	126	5	1 / 0	14.30	7.95	22.25	0.168	30.00	-7.75
1720.00	20	QPSK	Н	128	5	1 / 0	13.82	8.15	21.98	0.158	30.00	-8.02
1732.50	20	QPSK	Н	128	6	1/0	12.70	8.06	20.76	0.119	30.00	-9.24
1745.00	20	QPSK	Н	129	5	1 / 0	14.00	7.97	21.97	0.157	30.00	-8.03
1745.00	20	16-QAM	Н	129	5	1 / 0	13.12	7.97	21.09	0.128	30.00	-8.91
1750.00	10	QPSK	V	110	305	1 / 0	9.91	7.93	17.84	0.061	30.00	-12.16

Table 7-5. EIRP Data (Band 4)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 101 of 122
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 101 01 122
© 2018 PCTEST Engineering La	horatory Inc			V 8 0 04/05/2018



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 [Watts]	EIRP Limit [dBm]	Margin [dB]
1850.70	1.4	QPSK	Н	113	7	1/0	13.59	7.71	21.31	0.135	33.01	-11.70
1880.00	1.4	QPSK	Н	113	5	1/0	14.61	7.80	22.41	0.174	33.01	-10.60
1909.30	1.4	QPSK	Н	115	4	1/0	13.85	7.88	21.74	0.149	33.01	-11.27
1880.00	1.4	16-QAM	Н	113	5	1/0	13.52	7.80	21.32	0.136	33.01	-11.69
1851.50	3	QPSK	Н	118	230	1/0	14.44	7.72	22.16	0.164	33.01	-10.85
1880.00	3	QPSK	Н	112	200	1/0	13.75	7.80	21.55	0.143	33.01	-11.46
1908.50	3	QPSK	Н	115	5	1/0	13.73	7.88	21.61	0.145	33.01	-11.40
1851.50	3	16-QAM	Н	118	230	1/0	13.30	7.72	21.02	0.126	33.01	-11.99
1852.50	5	QPSK	Н	112	188	1/0	13.58	7.72	21.30	0.135	33.01	-11.71
1880.00	5	QPSK	Н	114	193	1/0	15.27	7.80	23.07	0.203	33.01	-9.94
1907.50	5	QPSK	Н	146	190	1/0	13.04	7.88	20.92	0.124	33.01	-12.09
1880.00	5	16-QAM	Н	114	193	1/0	14.05	7.80	21.85	0.153	33.01	-11.16
1855.00	10	QPSK	н	117	192	1/0	13.56	7.73	21.29	0.135	33.01	-11.72
1880.00	10	QPSK	Н	111	186	1/0	14.88	7.80	22.68	0.186	33.01	-10.33
1905.00	10	QPSK	Н	117	194	1/0	12.89	7.87	20.77	0.119	33.01	-12.24
1880.00	10	16-QAM	Н	111	186	1/0	13.89	7.80	21.69	0.148	33.01	-11.32
1857.50	15	QPSK	Н	115	5	1/0	13.43	7.73	21.17	0.131	33.01	-11.84
1880.00	15	QPSK	Н	112	3	1/0	14.29	7.80	22.09	0.162	33.01	-10.92
1902.50	15	QPSK	Н	116	5	1/0	14.60	7.87	22.47	0.177	33.01	-10.54
1902.50	15	16-QAM	Н	116	5	1/0	13.79	7.87	21.66	0.147	33.01	-11.35
1860.00	20	QPSK	Н	116	5	1/0	13.42	7.74	21.17	0.131	33.01	-11.85
1880.00	20	QPSK	Н	115	5	1/0	14.20	7.80	22.00	0.159	33.01	-11.01
1900.00	20	QPSK	Н	114	5	1/0	14.64	7.86	22.50	0.178	33.01	-10.51
1900.00	20	16-QAM	Н	114	5	1/0	13.54	7.86	21.40	0.138	33.01	-11.61
1880.00	5	QPSK	V	142	184	1/0	10.84	7.88	18.73	0.075	33.01	-14.28

Table 7-6. EIRP Data (Band 2)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕕 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 102 of 102
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 102 01 122
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### 7.7 Radiated Spurious Emissions Measurements

#### **Test Overview**

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 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.

#### **Test Procedures Used**

KDB 971168 D01 v03r01 - Section 5.8

ANSI/TIA-603-E-2016 - 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: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 102 of 122
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset	Page 103 01 122
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bore sight antenna mast I .5m Urritable & styrofoam block i .5m 3m

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

Figure 7-7. Test Instrument & Measurement Setup

#### Test Notes

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

	1			
FCC ID: THEY 410CS	PCTEST	MEASUREMENT REPORT	( IC	Approved by:
PCC ID. 2NI X41003	AND AND A REPAIR OF ANY	(CERTIFICATION)		Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 104 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 104 01 122
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#### Plot 7-156. Radiated Spurious Plot above 1GHz (Band 12)

OPERATING FREQUENCY:	70	0.50	MHz
CHANNEL:	23		
MODULATION SIGNAL:	QPSK	_	
BANDWIDTH:	3.0	MHz	
DISTANCE:	3	meters	
LIMIT:	-13	dBm	

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]	Margin [dB]
1401.00	V	150	271	-66.96	3.78	-63.18	-50.2
2101.50	V	150	271	-62.91	4.80	-58.11	-45.1
2802.00	V	-	-	-66.70	5.64	-61.06	-48.1
3502.50	V	-	-	-66.47	6.60	-59.87	-46.9
4203.00	V	-	-	-66.97	7.70	-59.27	-46.3

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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 105 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 105 of 122
© 2018 PCTEST Engineering La	boratory. Inc.			V 8.0 04/05/2018





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]	Margin [dB]
1415.00	V	150	275	-66.96	3.90	-63.05	-50.1
2122.50	V	150	271	-62.03	4.78	-57.25	-44.2
2830.00	V	-	-	-66.35	5.73	-60.62	-47.6
3537.50	V	-	-	-66.04	6.54	-59.50	-46.5
4245.00	V	-	-	-65.86	7.75	-58.11	-45.1

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

714.50

23165

MHz

**OPERATING FREQUENCY:** 

CHANNEL:

MODULATION SIGNAL:

BANDWIDTH:

3.0 MHz DISTANCE: 3 meters -13 LIMIT: dBm

QPSK

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]	Margin [dB]
1429.00	V	150	265	-66.46	4.03	-62.43	-49.4
2143.50	V	150	261	-62.11	4.77	-57.35	-44.3
2858.00	V	-	-	-66.22	5.79	-60.43	-47.4
3572.50	V	-	-	-65.93	6.58	-59.35	-46.3
4287.00	V	-	-	-66.78	7.81	-58.97	-46.0

Table 7-9. Radiated Spurious Data (Band 12 – High Channel)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 106 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 106 01 122
© 2018 DCTEST Engineering La	boratory Inc			V 8 0 04/05/2018



#### Plot 7-157. Radiated Spurious Plot above 1GHz (Band 5)

OPERATING FREQUENCY:	82	25.50	MHz
CHANNEL:	2		
MODULATION SIGNAL:	QPSK		
BANDWIDTH:	3.0	MHz	
DISTANCE:	3	meters	
LIMIT:	-13	dBm	

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]	Margin [dB]
1651.00	Н	171	123	-68.80	8.95	-59.86	-46.9
2476.50	Н	111	349	-57.57	9.66	-47.91	-34.9
3302.00	Н	-	-	-75.38	9.58	-65.80	-52.8

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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 107 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 107 of 122
© 2018 PCTEST Engineering La	boratory, Inc.			V 8.0 04/05/2018





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]	Margin [dB]
1673.00	Н	165	188	-68.99	8.95	-60.04	-47.0
2509.50	Н	138	356	-62.07	9.75	-52.32	-39.3
3346.00	Н	-	-	-74.42	9.60	-64.81	-51.8

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

OPERATING FREQUENCY:		7.50 MH:	z
CHANNEL:	20	635	
MODULATION SIGNAL:	QPSK	_	
BANDWIDTH:	3.0	MHz	
DISTANCE:	3	meters	
LIMIT:	-13	dBm	

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]	Margin [dB]
1695.00	Н	164	200	-69.88	8.95	-60.93	-47.9
2542.50	Н	129	344	-60.51	9.74	-50.76	-37.8
3390.00	Н	-	-	-75.44	9.76	-65.68	-52.7

Table 7-12. Radiated Spurious Data (Band 5 – High Channel)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 109 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 106 01 122
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16

#### Plot 7-158. Radiated Spurious Plot above 1GHz (Band 4)

_MHz	5.00	17	OPERATING FREQUENCY:		
_	000	20	CHANNEL:		
	_	QPSK	MODULATION SIGNAL:		
	MHz	10.0	BANDWIDTH:		
	meters	3	DISTANCE:		
	dBm	-13	LIMIT:		

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]	Margin [dB]
3430.00	Н	178	16	-68.21	9.83	-58.37	-45.4
5145.00	Н	-	-	-72.08	10.69	-61.39	-48.4
6860.00	Н	109	357	-68.59	11.65	-56.94	-43.9
8575.00	Н	-	-	-66.69	11.12	-55.57	-42.6

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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 100 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 109 01 122
© 2018 PCTEST Engineering La	V 8.0 04/05/2018			





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]	Margin [dB]
3465.00	Н	111	44	-68.02	9.88	-58.14	-45.1
5197.50	Н	110	314	-65.47	10.76	-54.72	-41.7
6930.00	Н	111	357	-69.03	11.74	-57.29	-44.3
8662.50	Н	-	-	-66.35	11.02	-55.33	-42.3

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

OPERATING FREQUENCY:	175	MHz	
CHANNEL:	20		
MODULATION SIGNAL:	QPSK	_	
BANDWIDTH:	10.0	MHz	
DISTANCE:	3	meters	
LIMIT:	-13	_dBm	

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]	Margin [dB]
3500.00	Н	110	35	-65.15	9.93	-55.22	-42.2
5250.00	Н	-	-	-71.13	10.72	-60.41	-47.4
7000.00	Н	381	1	-69.59	11.87	-57.73	-44.7
8750.00	Н	-	-	-66.58	10.97	-55.60	-42.6

Table 7-15. Radiated Spurious Data (Band 4 – High Channel)

FCC ID: ZNFX410CS		MEASUREMENT REPORT	I.G.	Approved by:
	V PHILVELATING LABORATIVAS, INC.	(CERTIFICATION)		Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 110 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 110 01 122
© 2018 PCTEST Engineering La	horatory Inc		V 8 0 04/05/2018	



MHz	5.00	18	OPERATING FREQUENCY:
	50	18	CHANNEL:
		QPSK	MODULATION SIGNAL:
	MHz	10.0	BANDWIDTH:
	meters	3	DISTANCE:
	dBm	-13	LIMIT:

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]	Margin [dB]
3710.00	Н	119	31	-56.58	9.55	-47.03	-34.0
5565.00	Н	110	21	-72.12	10.96	-61.16	-48.2
7420.00	Н	-	-	-70.27	10.97	-59.30	-46.3

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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Degs 111 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 111 01 122
© 2018 PCTEST Engineering La	V 8.0 04/05/2018			





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]	Margin [dB]
3760.00	Н	110	41	-57.23	9.37	-47.87	-34.9
5640.00	Н	111	29	-69.49	11.17	-58.32	-45.3
7520.00	Н	-	-	-69.35	11.11	-58.24	-45.2

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

OPERATING FREQUENCY:	190	05.00 MH	z
CHANNEL:	19	150	
MODULATION SIGNAL:	QPSK	_	
BANDWIDTH:	10.0	MHz	
DISTANCE:	3	meters	
LIMIT:	-13	dBm	

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]	Margin [dB]
3810.00	Н	113	17	-52.56	9.29	-43.27	-30.3
5715.00	Н	113	164	-69.44	11.35	-58.10	-45.1
7620.00	Н	-	-	-69.34	11.29	-58.05	-45.0

Table 7-18. Radiated Spurious Data (Band 2 – High Channel)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 110 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 112 01 122
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### 7.8 Frequency Stability / Temperature Variation

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

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-E-2016. The frequency stability of the transmitter is measured by:

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

For Part 22, the frequency stability of the transmitter shall be maintained within  $\pm 0.00025\%$  ( $\pm 2.5$  ppm) of the center frequency. For Part 24, 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-E-2016

#### Test Settings

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

#### Test Setup

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

#### Test Notes

None

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	G	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dama 440 af 400
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 113 of 122
© 2018 PCTEST Engineering La	boratory. Inc.	• •		V 8.0 04/05/2018



### **Band 12 Frequency Stability Measurements**

OPERATING FREQUENCY:	707,500,000	Hz
CHANNEL:	23790	
REFERENCE VOLTAGE:	4.30	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.30	+ 20 (Ref)	707,500,293	293	0.0000414
100 %		- 30	707,500,120	120	0.0000170
100 %		- 20	707,499,921	-79	-0.0000112
100 %		- 10	707,500,005	5	0.0000007
100 %		0	707,500,007	7	0.0000010
100 %		+ 10	707,499,938	-62	-0.0000088
100 %		+ 20	707,500,244	244	0.0000345
100 %		+ 30	707,500,165	165	0.0000233
100 %		+ 40	707,499,712	-288	-0.0000407
100 %		+ 50	707,500,227	227	0.0000321
BATT. ENDPOINT	3.40	+ 20	707,500,149	149	0.0000211

Table 7-19. Frequency Stability Data (Band 12)

#### 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 in-band 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: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		De
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 114 of 122
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Figure 7-8. Frequency Stability Graph (Band 12)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dago 115 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 115 01 122
© 2018 PCTEST Engineering La	boratory, Inc.			V 8.0 04/05/2018



# **Band 5 Frequency Stability Measurements**

OPERATING FREQUENCY:	836,500,000	Hz
CHANNEL:	20525	
REFERENCE VOLTAGE:	4.30	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	<b>ТЕМР</b> (°С)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.30	+ 20 (Ref)	836,500,148	148	0.0000177
100 %		- 30	836,499,939	-61	-0.0000073
100 %		- 20	836,499,898	-102	-0.0000122
100 %		- 10	836,500,138	138	0.0000165
100 %		0	836,499,869	-131	-0.0000157
100 %		+ 10	836,500,022	22	0.0000026
100 %		+ 20	836,500,111	111	0.0000133
100 %		+ 30	836,499,676	-324	-0.0000387
100 %		+ 40	836,500,154	154	0.0000184
100 %		+ 50	836,500,079	79	0.0000094
BATT. ENDPOINT	3.40	+ 20	836,500,001	1	0.0000001

Table 7-20. Frequency Stability Data (Band 5)

FCC ID: ZNFX410CS			LG	Approved by:
		(BERTIN BATION)		Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 116 of 122
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Fage 110 01 122
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# **Band 5 Frequency Stability Measurements**



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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 117 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 117 01 122
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### **Band 4 Frequency Stability Measurements**

OPERATING FREQUENCY:	1,732,500,000	Hz
CHANNEL:	20175	_
REFERENCE VOLTAGE:	4.30	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.30	+ 20 (Ref)	1,732,500,054	54	0.0000031
100 %		- 30	1,732,499,835	-165	-0.0000095
100 %		- 20	1,732,499,988	-12	-0.0000007
100 %		- 10	1,732,500,001	1	0.0000001
100 %		0	1,732,500,320	320	0.0000185
100 %		+ 10	1,732,499,894	-106	-0.0000061
100 %		+ 20	1,732,499,855	-145	-0.0000084
100 %		+ 30	1,732,500,120	120	0.0000069
100 %		+ 40	1,732,500,425	425	0.0000245
100 %		+ 50	1,732,499,943	-57	-0.0000033
BATT. ENDPOINT	3.40	+ 20	1,732,500,280	280	0.0000162

 Table 7-21. 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 in-band 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: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dama 440 af 400
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 118 of 122
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# **Band 4 Frequency Stability Measurements**



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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 110 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 119 01 122
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# **Band 2 Frequency Stability Measurements**

 OPERATING FREQUENCY:
 1,880,000,000
 Hz

 CHANNEL:
 18900
 Hz

 REFERENCE VOLTAGE:
 4.30
 VDC

 DEVIATION LIMIT:
 ± 0.00025 % or 2.5 ppm
 VDC

VOLTAGE (%)	POWER (VDC)	<b>ТЕМР</b> (°С)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.30	+ 20 (Ref)	1,879,999,994	-6	-0.000003
100 %		- 30	1,879,999,987	-13	-0.0000007
100 %		- 20	1,880,000,284	284	0.0000151
100 %		- 10	1,879,999,933	-67	-0.0000036
100 %		0	1,880,000,026	26	0.0000014
100 %		+ 10	1,879,999,970	-30	-0.0000016
100 %		+ 20	1,879,999,912	-88	-0.0000047
100 %		+ 30	1,879,999,824	-176	-0.0000094
100 %		+ 40	1,880,000,467	467	0.0000248
100 %		+ 50	1,880,000,123	123	0.0000065
BATT. ENDPOINT	3.40	+ 20	1,880,000,353	353	0.0000188

Table 7-22. Frequency Stability Data (Band 2)

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 100 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 120 01 122
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# **Band 2 Frequency Stability Measurements**



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

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	🕒 LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type: Portable Handset		Page 121 of 123
1M1804200078-03.ZNF	4/24 - 5/9/2018			
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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: ZNFX410CS** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules for LTE operation only.

FCC ID: ZNFX410CS		MEASUREMENT REPORT (CERTIFICATION)	LG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 100 of 100
1M1804200078-03.ZNF	4/24 - 5/9/2018	Portable Handset		Page 122 01 122
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