



Plot 7-87. Conducted Spurious Plot (NR Band n2 - 20.0MHz - 1RB - Mid Channel - Ant M3)

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7.5 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 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 $43 + 10 \log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

Test Procedure Used

ANSI C63.26-2015 - Section 5.7.3

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 \geq 3 x RBW
- 5. Detector = RMS
- 6. Number of sweep points $\geq 2 \times \text{Span/RBW}$
- 7. Trace mode = trace average for continuous emissions, max hold for pulse emissions
- 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 7-4. Test Instrument & Measurement Setup

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Test Notes

- 1. Per 24.238(b) and RSS-133(6.5), 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.
- 2. For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) 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.

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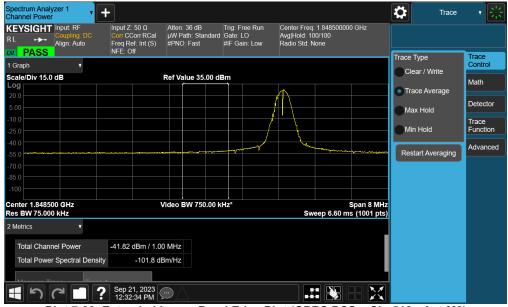
GSM/GPRS PCS – Ant M2

Mode	Bandwidth	Channel	Test Case	Level [dBm]	Lim it [dBm]	Margin [dB]
		Low	Band Edge	-19.87	-13	-6.87
GSM-PCS	250k Hz	Low	Extended	-41.82	-13	-28.82
		High	Band Edge	-18.68	-13	-5.68
		High	Extended	-41.56	-13	-28.56

Table 7-9. Band Edge Test Results – Ant M2



Plot 7-88. Lower Band Edge Plot (GPRS PCS - Ch. 512 - Ant M2)



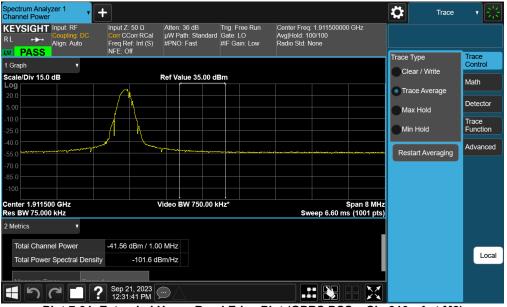
Plot 7-89. Extended Lower Band Edge Plot (GPRS PCS - Ch. 512 - Ant M2)

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Plot 7-90. Upper Band Edge Plot (GPRS PCS - Ch. 910 - Ant M2)



Plot 7-91. Extended Upper Band Edge Plot (GPRS PCS – Ch. 910 - Ant M2)

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WCDMA PCS – Ant M2

Mode	Bandwidth	Channel	Test Case	Level [dBm]	Lim it [dBm]	Margin [dB]
WCDMA-PCS	5 MHz	Low	Band Edge	-21.18	-13	-8.18
		Low	Extended	-14.18	-13	-1.18
		High	Band Edge	-23.33	-13	-10.33
		High	Extended	-15.07	-13	-2.07

Table 7-10. Band Edge Test Results – Ant M2



Plot 7-92. Lower Band Edge Plot (WCDMA PCS - Ch. 9262 - Ant M2)



Plot 7-93. Extended Lower Band Edge Plot (WCDMA PCS – Ch. 9262 - Ant M2)

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Plot 7-94. Upper Band Edge Plot (WCDMA PCS - Ch. 9538 - Ant M2)

IFE: Off	IF Gain: Low Sig Track: Off	ee Run A WW WW W ANNNN	1.913000000 GHz
Ref Level 25.00 dE		lkr1 1.911 000 GHz -15.071 dBm	
			Full Span Start Freq
			1.911000000 GHz Stop Freq 1.915000000 GHz
na star and a star and a star and a star and a star a star and a star	ever commences	and a far a start of the second start and the second start of the	AUTO TUNE CF Step
			400.000 kHz Auto Man
			Freq Offset 0 Hz X Axis Scale
		Ref Level 25.00 dBm	Ref Level 25.00 dBm -15.071 dBm

Plot 7-95. Extended Upper Band Edge Plot (WCDMA PCS - Ch. 9538 - Ant M2)

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LTE Band 25/2 – Ant M2

Mode	Bandwidth	Channel	Test Case	Level [dBm]	Limit [dBm]	Margin [dB]
		Low	Band Edge	-32.79	-13	-19.79
		Low	Extended	-25.42	-13	-12.42
	20 MHz	High LB2	Band Edge	-32.65	-13	-19.65
		High LB25	Band Edge	-33.05	-13	-20.05
		High LB2	Extended	-26.19	-13	-13.19
		High LB25	Extended	-26.53	-13	-13.53
		Low	Band Edge	-29.43	-13	-16.43
		Low	Extended	-22.41	-13	-9.41
	15 MHz	High LB2	Band Edge	-30.98	-13	-17.98
		High LB25	Band Edge	-29.04	-13	-16.04
		High LB2	Extended	-24.72	-13	-11.72
		High LB25	Extended	-23.27	-13	-10.27
		Low	Band Edge	-29.16	-13	-16.16
	10 MHz	Low	Extended	-20.16	-13	-7.16
		High LB2	Band Edge	-32.73	-13	-19.73
		High LB25	Band Edge	-29.41	-13	-16.41
		High LB2	Extended	-23.30	-13	-10.30
		High LB25	Extended	-20.88	-13	-7.88
LTE-B25-2		Low	Band Edge	-26.97	-13	-13.97
		Low	Extended	-19.46	-13	-6.46
	E MUL	High LB2	Band Edge	-28.80	-13	-15.80
	5 MHz	High LB25	Band Edge	-27.07	-13	-14.07
		High LB2	Extended	-22.10	-13	-9.10
		High LB25	Extended	-20.20	-13	-7.20
		Low	Band Edge	-27.14	-13	-14.14
		Low	Extended	-19.21	-13	-6.21
	2 MIL	High LB2	Band Edge	-29.82	-13	-16.81
	3 MHz	High LB25	Band Edge	-27.15	-13	-14.15
		High LB2	Extended	-21.73	-13	-8.73
		High LB25	Extended	-19.16	-13	-6.16
		Low	Band Edge	-27.33	-13	-14.33
		Low	Extended	-29.77	-13	-16.77
	1.4 MHz	High LB2	Band Edge	-30.31	-13	-17.31
	1.4 IVIHZ	High LB25	Band Edge	-25.56	-13	-12.56
		High LB2	Extended	-30.29	-13	-17.29
		High LB25	Extended	-28.86	-13	-15.86
	Table	-	Edge Test Res	ulto Ant M	າ	

Table 7-11. Band Edge Test Results – Ant M2

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Plot 7-96. Lower Band Edge Plot (LTE Band 25/2 - 3MHz QPSK - Full RB - Ant M2)

	nput: RF Coupling: DC Jign: Auto	Input Z: 50 Ω Corr CCorr RCal Freq Ref: Int (S) NFE: Off	Atten: 36 dB µW Path: Sta #PNO: Fast	andard Gate:	ree Run Off iin: Low	Center Freq: Avg Hold: 10 Radio Std: N	0/100	0 GHz	Trace	Trace
Graph cale/Div 10.0 d	₹ B		Ref Value 30).00 dBm					Clear / Write	Control
.og									Trace Average	Math
									Max Hold	Detector
0.00								/	Min Hold	Trace Function
					~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			Restart Averaging	Advanced
40.0	www.	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~						
enter 1.848500 Res BW 24.000			Video BW 24	0.00 kHz*		Swe		Span 4 MHz s (1001 pts)		
Metrics	T							,		
Total Channe	l Power	-19.21 dBm / 1.	00 MHz					_		
Total Power S	Spectral Densi	ty -79.21 d	lBm/Hz							Loca
		Sep 21, 2023	\bigcirc							

Plot 7-97. Extended Lower Band Edge Plot (LTE Band 25/2 - 3MHz QPSK – Full RB - Ant M2)

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Plot 7-98. Upper Band Edge Plot (LTE Band 2 - 3MHz QPSK – Full RB - Ant M2)

	Input Z: 50 Ω Corr CCorr RCal	Atten: 36 dB μW Path: Standard		Center Freq: 1.911500000 GHz AvgjHold: 100/100	Trace	' 🚾
Align: Auto VI PASS I Graph Scale/Div 10.0 dB 0 0 0 0 0 0 0 0 0	Freq Ref: Int (S) NFE: Off	#PNO: Fast	#IF Gain: Low	Radio Std: None	Trace Type Clear / Write Trace Average Max Hold Min Hold Restart Averaging	Trace Control Math Detector Trace Function Advanced
Res BW 24.000 KHz Total Channel Power Total Power Spectral Densit	-21.73 dBm / 1.0		H2*	Span 4 Sweep 8.33 ms (1001		Local

Plot 7-99. Extended Upper Band Edge Plot (LTE Band 2 - 3MHz QPSK – Full RB - Ant M2)

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Plot 7-100. Upper Band Edge Plot (LTE Band 25 - 3MHz QPSK - Full RB - Ant M2)

EYSIGHT Input: RF L + Align: Auto	Input Z: 50 Ω Corr CCorr RCal Freq Ref: Int (S) NFE: Off	Atten: 36 dB µW Path: Standard #PNO: Fast	Trig: Free Run Gate: Off #IF Gain: Low	Center Freq: 1.91650000 Avg Hold: 100/100 Radio Std: None		е Туре	Trace
Graph v cale/Div 10.0 dB		Ref Value 30.00 d	Bm			c Type Clear / Write	Control
0.0 0.0						irace Average lax Hold	Detector
						fin Hold	Trace Function Advance
0.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	······	Ke	estart Averaging	
0.0 enter 1.916500 GHz tes BW 24.000 kHz		Video BW 240.00 k	Hz*	Sweep 8.33 m	Span 4 MHz is (1001 pts)		
Metrics v							
Total Channel Power Total Power Spectral Dens	-19.16 dBm / 1.0						Loc
1967	Sep 21, 2023 11:35:45 AM	\odot					

Plot 7-101. Extended Upper Band Edge Plot (LTE Band 25 - 3MHz QPSK – Full RB - Ant M2)

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NR Band n25/2 – Ant M2

Mode	Bandwidth	Channel	Test Case	Level	Limit	Margin
				[dBm]	[dBm]	[dB]
		Low	Band Edge	-27.18	-13	-14.18
		Low	Extended	-30.21	-13	-17.21
	40 MHz	High NR 2	Band Edge	-27.92	-13	-14.92
		High NR 25	Band Edge	-28.29	-13	-15.29
		High NR 2	Extended	-32.77	-13	-19.77
		High NR 25	Extended	-32.79	-13	-19.79
		Low	Band Edge	-32.84	-13	-19.84
		Low	Extended	-29.16	-13	-16.16
	30 MHz	High NR 2	Band Edge	-33.60	-13	-20.60
	30 1011 12	High NR 25	Band Edge	-35.07	-13	-22.07
		High NR 2	Extended	-30.46	-13	-17.46
		High NR 25	Extended	-31.54	-13	-18.54
		Low	Band Edge	-32.96	-13	-19.96
		Low	Extended	-27.30	-13	-14.30
	25 MHz	High NR 2	Band Edge	-36.48	-13	-23.47
		High NR 25	Band Edge	-34.56	-13	-21.56
		High NR 2	Extended	-33.40	-13	-20.40
		High NR 25	Extended	-29.21	-13	-16.21
		Low	Band Edge	-33.20	-13	-20.20
		Low	Extended	-24.92	-13	-11.92
	00 MU	High NR 2	Band Edge	-35.05	-13	-22.04
NR-n25-2	20 MHz	High NR 25	Band Edge	-35.13	-13	-22.13
		High NR 2	Extended	-27.22	-13	-14.22
		High NR 25	Extended	-27.31	-13	-14.31
		Low	Band Edge	-34.20	-13	-21.20
		Low	Extended	-22.21	-13	-9.21
	45 5411	High NR 2	Band Edge	-34.78	-13	-21.78
	15 MHz	High NR 25	Band Edge	-33.89	-13	-20.89
		High NR 2	Extended	-22.85	-13	-9.85
		High NR 25	Extended	-23.05	-13	-10.05
		Low	Band Edge	-33.79	-13	-20.79
		Low	Extended	-17.30	-13	-4.30
		High NR 2	Band Edge	-36.68	-13	-23.68
	10 MHz	High NR 25	Band Edge	-35.12	-13	-22.12
		High NR 2	Extended	-19.27	-13	-6.27
		High NR 25	Extended	-18.64	-13	-5.64
		Low	Band Edge	-32.60	-13	-19.60
		Low	Extended	-27.08	-13	-14.08
		High NR 2	Band Edge	-32.69	-13	-19.69
	5 MHz	High NR 25	Band Edge	-32.80	-13	-19.80
		High NR 2	Extended	-27.93	-13	-14.93
		High NR 25	Extended	-27.76	-13	-14.76
		•	dae Teet P		-13 nt M2	-14.70

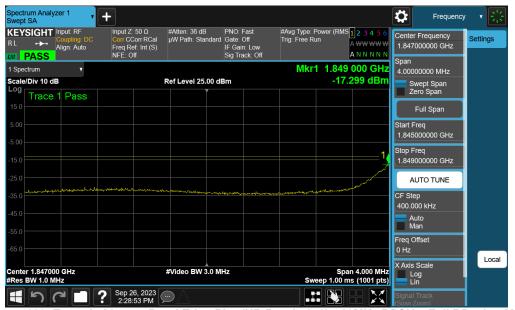
Table 7-12. Band Edge Test Results – Ant M2

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Plot 7-102. Lower Band Edge Plot (NR Band n25/2 - 10MHz QPSK – Full RB - Ant M2)



Plot 7-103. Extended Lower Band Edge Plot (NR Band n25/2 - 10MHz BPSK - Full RB - Ant M2)

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EYSIGHT Input: RF Coupling: DC Align: Auto		ten: 36 dB PNO: Best Wide Path: Standard Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Power (RMS 1 2 3 4 5 Trig: Free Run A WW WW A N N N N	United Prequency Settings
Spectrum v cale/Div 10 dB	Ref	Level 25.00 dBm	Mkr1 1.910 000 GH -36.681 dBr	Z 25.0000000 MHz
Trace 1 Pass	······	~~~		Full Span Start Freq
5.0				1.897500000 GHz Stop Freq 1.922500000 GHz
		1		AUTO TUNE
0.0 mmm		man	man man and a second second	CF Step 2.500000 MHz Auto
				∼ Man Freq Offset 0 Hz
nter 1.91000 GHz es BW 120 kHz	#Vi	deo BW 430 kHz	Span 25.00 MH Sweep 1.00 ms (1001 pt	

Plot 7-104. Upper Band Edge Plot (NR Band n2 - 10MHz BPSK - Full RB - Ant M2)

EYSIGHT Input: RF Coupling: DC Align: Auto		W Path: Standard	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Power (F Trig: Free Run	RMS <mark>123456</mark> A wwwww Annnn	Center Frequency 1.913000000 GHz Span	Settings
Spectrum v cale/Div 10 dB	R	ef Level 25.00 dE	Bm		11 000 GHz 19.267 dBm	4.00000000 MHz Swept Span Zero Span	
5.0 00						Full Span Start Freq	
.00						1.911000000 GHz Stop Freq 1.915000000 GHz	
5.0	at a gal after a sure of the second states	a say and a say	an a		water who have so he	AUTO TUNE	
5.0						400.000 kHz Auto Man	
						Freq Offset 0 Hz X Axis Scale	Loca
enter 1.913000 GHz tes BW 1.0 MHz	# Sep 26, 2023	Video BW 3.0 Mł	Iz		Span 4.000 MHz 00 ms (1001 pts)	Log	

Plot 7-105. Extended Upper Band Edge Plot (NR Band n2 - 10MHz BPSK – Full RB - Ant M2)

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Plot 7-106. Upper Band Edge Plot (NR Band n25 - 10MHz QPSK – Full RB - Ant M2)

EYSIGHT Input: RF L + Align: Auto	Input Ζ: 50 Ω Corr CCorr RCal Freq Ref: Int (S) NFE: Off	#Atten: 36 dB µW Path: Standard	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Pov Trig: Free Run	wer (RMS <mark>1</mark> 23456 A WWWWW ANNNN	1.91000000 GHZ	Settings
Spectrum v cale/Div 10 dB		Ref Level 25.00 dl	Bm	Mkr1	1.916 004 GHz -18.635 dBm	4.00000000 MHz	
5.0 Trace 1 Pass						Full Span	
						Start Freq 1.916000000 GHz	
5.0 1						Stop Freq 1.920000000 GHz	
5.0				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		AUTO TUNE	
5.0	an an an ann ann ann ann ann ann ann an	and the second sec			and and a second and	400.000 kHz	
						Auto Man Freq Offset	
						0 Hz	Loc
nter 1.918000 GHz es BW 1.0 MHz		#Video BW 3.0 M	Hz	Swee	Span 4.000 MHz p 1.00 ms (1001 pts		

Plot 7-107. Extended Upper Band Edge Plot (NR Band n25 - 10MHz BPSK - Full RB - Ant M2)

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LTE Band 25/2 – Ant M3

Mode	Bandwidth	Channel	Test Case	Level [dBm]	Limit [dBm]	Margin [dB]
		Low	Band Edge	-31.40	-13	-18.40
		Low	Extended	-26.32	-13	-13.32
	20 MHz	High LB2	Band Edge	-27.67	-13	-14.66
	20 MHZ	High LB25	Band Edge	-27.99	-13	-14.99
		High LB2	Extended	-23.03	-13	-10.03
		High LB25	Extended	-22.56	-13	-9.56
		Low	Band Edge	-32.42	-13	-19.42
		Low	Extended	-26.13	-13	-13.13
	15 MHz	High LB2	Band Edge	-29.66	-13	-16.66
		High LB25	Band Edge	-30.02	-13	-17.02
		High LB2	Extended	-22.33	-13	-9.33
		High LB25	Extended	-23.05	-13	-10.04
		Low	Band Edge	-31.74	-13	-18.74
		Low	Extended	-23.17	-13	-10.17
	10 MHz	High LB2	Band Edge	-30.54	-13	-17.54
		High LB25	Band Edge	-30.27	-13	-17.27
		High LB2	Extended	-21.73	-13	-8.73
LTE-B25-2		High LB25	Extended	-23.22	-13	-10.22
LIE-020-2		Low	Band Edge	-29.88	-13	-16.88
		Low	Extended	-24.82	-13	-11.82
	5 MHz	High LB2	Band Edge	-30.71	-13	-17.71
	SINITZ	High LB25	Band Edge	-30.76	-13	-17.76
		High LB2	Extended	-22.78	-13	-9.78
		High LB25	Extended	-26.10	-13	-13.10
		Low	Band Edge	-30.98	-13	-17.98
		Low	Extended	-24.30	-13	-11.30
	3 MHz	High LB2	Band Edge	-28.29	-13	-15.29
	JIVITZ	High LB25	Band Edge	-30.14	-13	-17.14
		High LB2	Extended	-22.47	-13	-9.47
		High LB25	Extended	-25.28	-13	-12.28
		Low	Band Edge	-28.58	-13	-15.58
		Low	Extended	-24.55	-13	-11.55
	1.4 MHz	High LB2	Band Edge	-28.66	-13	-15.66
		High LB25	Band Edge	-23.41	-13	-10.41
		High LB2	Extended	-22.71	-13	-9.71
		High LB25	Extended	-27.20	-13	-14.20
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Table 7-13. Band Edge Test Results – Ant M3

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Plot 7-108. Lower Band Edge Plot (LTE Band 25/2 - 10MHz QPSK - Full RB - Ant M3)



Plot 7-109. Extended Lower Band Edge Plot (LTE Band 25/2 - 10MHz QPSK - Full RB - Ant M3)

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Plot 7-110. Upper Band Edge Plot (LTE Band 2 - 10MHz QPSK - Full RB - Ant M3)

Spectrum Analyzer 1 Swept SA KEYSIGHT Input: RF R L + Align: Auto	Hoput Ζ: 50 Ω Corr CCorr RCal Freq Ref: Int (S) NFE: Off	#Atten: 36 dB μW Path: Standard	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Powe Trig: Free Run	er (RMS <mark>1</mark> 23456 A WWWWW ANNNN	Center Frequency 1.913000000 GHz Span	Settings
1 Spectrum	I	Ref Level 25.00 dE	3m	Mkr1 1	1.911 000 GHz -21.725 dBm	4.00000000 MHz Swept Span Zero Span	
5.00 Trace 1 Pass						Full Span Start Freq	
5.00						1.911000000 GHz Stop Freq 1.915000000 GHz	
35.0	Martin Martin Construction of the Construction	naam oo ahaa ahaa ahaa ahaa ahaa ahaa aha	alar-gayagaa gada gagaraani	ala di mandra di mana d Mana di mana di	in na hierary and a start a	AUTO TUNE CF Step 400.000 kHz	
55.0						Auto Man Freq Offset	
65.0 Senter 1.913000 GHz Res BW 1.0 MHz		#Video BW 3.0 MI	Hz	Sweep	Span 4.000 MHz 1.00 ms (1001 pts)	0 Hz X Axis Scale Log Lin	Local
	Sep 22, 2023 2:08:04 PM					Signal Track (Span Zoom)	

Plot 7-111. Extended Upper Band Edge Plot (LTE Band 2 - 10MHz QPSK - Full RB - Ant M3)

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Plot 7-112. Upper Band Edge Plot (LTE Band 25 - 10MHz QPSK - Full RB - Ant M3)

Swept SA KEYSIGHT Input: RF RL →→ Align: Auto XI	Hoput Z: 50 Ω Corr CCorr RCal Freq Ref: Int (S) NFE: Off HATCH	6 dB PNO: Fast Standard Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Power (RMS 1 2 3 4 5 6 Trig: Free Run A +++++++++++++++++++++++++++++++++++	1.918000000 GHz	ttings
Spectrum v Scale/Div 10 dB	Ref Leve	I 25.00 dBm	Mkr1 1.916 012 GHz -23.221 dBm	1.00000000 11112	
5.00 Trace 1 Pass				Full Span Start Freq	
5.00				1.916000000 GHz Stop Freq 1.920000000 GHz	
	Maganatan and a state and a	Hanna and an and an a guilt be to an	an musicippe and the state of t	AUTO TUNE CF Step 400.000 kHz	
55.0 55.0 55.0				Auto Man Freq Offset	
enter 1.918000 GHz Res BW 1.0 MHz	#Video E	3W 3.0 MHz	Span 4.000 MHz Sweep 1.00 ms (1001 pts		Local
- n c - ?	Sep 22, 2023			Signal Track (Span Zoom)	

Plot 7-113. Extended Upper Band Edge Plot (LTE Band 25 - 10MHz QPSK - Full RB - Ant M3)

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NR Band n2 – Ant M3

Mode	Bandwidth	Channel	Test Case	Level [dBm]	Lim it [dBm]	Margin [dB]
		Low	Band Edge	-27.36	-13	-14.36
	40 MHz	Low	Extended	-30.01	-13	-17.01
	40 10172	High	Band Edge	-27.33	-13	-14.33
		High	Extended	-30.64	-13	-17.64
		Low	Band Edge	-32.00	-13	-19.00
	30 MHz	Low	Extended	-29.85	-13	-16.85
	30 1011 12	High	Band Edge	-33.32	-13	-20.32
		High	Extended	-29.14	-13	-16.14
		Low	Band Edge	-31.46	-13	-18.46
	25 MHz	Low	Extended	-26.30	-13	-13.30
	23 10172	High	Band Edge	-35.44	-13	-22.44
		High	Extended	-28.86	-13	-15.86
		Low	Band Edge	-34.93	-13	-21.93
NR-n2	20 MHz	Low	Extended	-25.00	-13	-12.00
INFX-112		High	Band Edge	-35.11	-13	-22.11
		High	Extended	-27.29	-13	-14.29
		Low	Band Edge	-33.98	-13	-20.98
	15 MHz	Low	Extended	-20.83	-13	-7.83
		High	Band Edge	-34.22	-13	-21.22
	[High	Extended	-23.13	-13	-10.12
		Low	Band Edge	-33.92	-13	-20.92
	10 MHz	Low	Extended	-18.81	-13	-5.81
		High	Band Edge	-33.00	-13	-20.00
		High	Extended	-18.37	-13	-5.37
		Low	Band Edge	-30.53	-13	-17.53
	5 MHz	Low	Extended	-25.75	-13	-12.75
		High	Band Edge	-33.94	-13	-20.94
		High	Extended	-27.17	-13	-14.17

Table 7-14. Band Edge Test Results – Ant M3



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EYSIGHT Input: RF L +++ Coupling: DC Align: Auto	Input Z: 50 Ω #Atten: 36 dB Corr CCorr RCal Freq Ref: Int (S) NFE: Off	PNO: Fast #Avg ndard Gate: Off Trig: IF Gain: Low Sig Track: Off	3 Type: Power (RMS12345 Free Run A WW WW A N N N N	1.847000000 GHz
Spectrum v cale/Div 10 dB	Ref Level 25.	00 dBm	Mkr1 1.849 000 GH -18.810 dBr	Z 4.00000000 MHz
5.0 Trace 1 Pass				Full Span Start Freq 1.845000000 GHz
5.0				Stop Freq 1.849000000 GHz
	utatikikiseren han an a	the advantage of the second second second	whatinglaw Alfrance and	AUTO TUNE CF Step 400.000 kHz
				Auto Man Freq Offset
55.0 enter 1.847000 GHz Res BW 1.0 MHz	#Video BW 3	.0 MHz	Span 4.000 MH Sweep 1.00 ms (1001 pt	

Plot 7-115. Extended Lower Band Edge Plot (NR Band n2 - 10MHz BPSK – Full RB - Ant M3)



Plot 7-116. Upper Band Edge Plot (NR Band n2 - 10MHz BPSK – Full RB - Ant M3)

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EYSIGHT Input: RF Coupling: DC Align: Auto Align: Auto Align: Auto	Input Ζ: 50 Ω Corr CCorr RCal Freq Ref: Int (S) NFE: Off	µW Path: Standard Ga	NO: Fast ate: Off Gain: Low g Track: Off	#Avg Type: Power (R Trig: Free Run	MS <mark>123456</mark> A WWWWW ANNNNN	Center Frequency 1.913000000 GHz Span	Settings
Spectrum v cale/Div 10 dB		Ref Level 25.00 dBm			11 000 GHz 8.368 dBm	4.00000000 MHz	
Trace 1 Pass 5.0 6.00						Full Span Start Freq 1.911000000 GHz	
50 1						Stop Freq 1.91500000 GHz	
5.0	2,999,				and a free of the second s	CF Step 400.000 kHz	
5.0						Man Freq Offset 0 Hz	Loc
enter 1.913000 GHz Res BW 1.0 MHz		#Video BW 3.0 MHz			5pan 4.000 MHz 0 ms (1001 pts)		

Plot 7-117. Extended Upper Band Edge Plot (NR Band n2 - 10MHz BPSK - Full RB - Ant M3)

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7.6 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.

The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB.

Test Procedure Used

ANSI C63.26-2015 - Section 5.2.3.4

Test Settings

- 1. The signal analyzer's CCDF measurement profile is enabled
- 2. Frequency = carrier center frequency
- 3. Measurement BW ≥ OBW or specified reference bandwidth
- 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. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

Test Setup

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



Figure 7-5. Test Instrument & Measurement Setup

Test Notes

For the QAM modulations, 256QAM was found to have the worst-case peak-to-average ratio so it is the only QAM measurement included in this section.

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Mode	Bandwidth	Modulation	Average Power [dBm]	PAR at 0.1% [dB]	PAR Limit [dB]	Margin [dB]
GSM-PCS		GMSK	27.86	2.60	13	-10.40
GSM-PCS Edge	N/A	8-PSK	23.78	6.77	13	-6.23
WCDMA	1	read Spectr	24.83	3.06	13	-9.94
	20 MHz	QPSK	23.72	5.07	13	-7.93
		256QAM	19.80	6.67	13	-6.33
	15 MHz	QPSK	23.70	5.33	13	-7.67
		256QAM	19.80	6.67	13	-6.33
	10 MH-	QPSK	23.75	5.04	13	-7.96
LTE-B25-2	10 MHz	256QAM	19.77	6.64	13	-6.36
LI E-020-2	E MUL	QPSK	23.77	5.06	13	-7.94
	5 MHz	256QAM	19.83	6.59	13	-6.41
	2 MUL	QPSK	23.70	5.10	13	-7.90
	3 MHz	256QAM	19.77	6.73	13	-6.27
	1.4 MHz	QPSK	23.73	5.53	13	-7.47
		256QAM	19.93	6.92	13	-6.08
	40 MHz	π/2 BPSK	23.27	5.00	13	-8.00
		QPSK	20.78	8.49	13	-4.51
		256QAM	17.38	8.68	13	-4.32
		π/2 BPSK	23.45	4.42	13	-8.58
	30 MHz	QPSK	20.96	8.38	13	-4.62
		256QAM	17.50	8.56	13	-4.44
		π/2 BPSK	23.99	4.70	13	-8.30
	25 MHz	QPSK	21.45	8.37	13	-4.63
		256QAM	18.02	8.74	13	-4.26
		π/2 BPSK	23.97	4.50	13	-8.50
NR-n25-2	20 MHz	QPSK	21.44	8.32	13	-4.68
		256QAM	18.04	8.63	13	-4.37
		π/2 BPSK	23.97	4.56	13	-8.44
	15MHz	QPSK	21.46	8.51	13	-4.49
		256QAM	18.10	8.69	13	-4.31
		π/2 BPSK	24.00	4.52	13	-8.48
	10MHz	QPSK	21.52	8.29	13	-4.71
		256QAM	18.08	8.42	13	-4.58
		π/2 BPSK	23.99	4.79	13	-8.21
	5MHz	QPSK	21.45	8.37	13	-4.63
		256QAM	18.05	8.51	13	-4.49

Table 7-15. PAR Test Results – Ant M2

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LTE Band 25/2 – Ant M2



Plot 7-118. PAR Plot (LTE Band 25/2 - 20MHz QPSK - Full RB - Ant M2)



Plot 7-119. PAR Plot (LTE Band 25/2 - 20MHz 256-QAM - Full RB - Ant M2)

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NR Band n25/2 – Ant M2



Plot 7-120. PAR Plot (NR Band n25/2 - 40.0MHz DFT-s-OFDM BPSK - Full RB - Ant M2)



Plot 7-121. PAR Plot (NR Band n25/2 - 40.0MHz CP-OFDM QPSK - Full RB - Ant M2)

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Plot 7-122. PAR Plot (NR Band n25/2 - 40.0MHz CP-OFDM 256-QAM - Full RB - Ant M2)

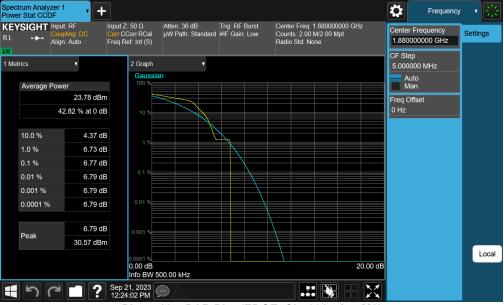
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GSM/GPRS PCS – Ant M2



Plot 7-123. PAR Plot (GPRS, Ch. 661 - Ant M2)



Plot 7-124. PAR Plot (EDGE, Ch. 661 - Ant M2)

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WCDMA PCS – Ant M2



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Mode	Bandwidth	Modulation	Average Power [dBm]	PAR at 0.1% [dB]	PAR Limit [dB]	Margin [dB]
	20 MHz	QPSK	23.68	5.61	13	-7.39
	20 1011 12	256QAM	19.77	6.76	13	-6.24
	15 MHz	QPSK	23.69	5.96	13	-7.04
		256QAM	19.75	6.71	13	-6.29
	10 MHz	QPSK	23.65	5.56	13	-7.44
LTE-B25-2		256QAM	19.72	6.68	13	-6.32
LTE-023-2	5 MHz	QPSK	23.69	5.60	13	-7.40
		256QAM	19.81	6.63	13	-6.37
	3 MHz	QPSK	23.60	5.64	13	-7.36
	3 IVITIZ	256QAM	19.75	6.85	13	-6.15
	1.4 MHz	QPSK	23.72	5.83	13	-7.17
		256QAM	19.86	6.82	13	-6.18
	40 MHz	π/2 BPSK	24.15	4.91	13	-8.09
		QPSK	21.67	8.16	13	-4.84
		256QAM	18.21	8.45	13	-4.55
		π/2 BPSK	24.21	4.43	13	-8.57
	30 MHz	QPSK	21.70	8.02	13	-4.98
		256QAM	18.20	8.34	13	-4.66
		π/2 BPSK	24.35	4.64	13	-8.36
	25 MHz	QPSK	21.78	8.03	13	-4.97
		256QAM	18.32	8.49	13	-4.51
		π/2 BPSK	24.53	4.37	13	-8.63
NR-n2	20 MHz	QPSK	22.03	8.01	13	-4.99
		256QAM	18.55	8.33	13	-4.67
		π/2 BPSK	24.52	4.38	13	-8.62
	15MHz	QPSK	22.05	8.20	13	-4.80
		256QAM	18.61	8.39	13	-4.61
		π/2 BPSK	24.56	4.34	13	-8.66
	10MHz	QPSK	22.07	7.97	13	-5.03
		256QAM	18.59	8.17	13	-4.83
		π/2 BPSK	24.52	4.52	13	-8.48
	5MHz	QPSK	21.99	8.05	13	-4.95
		256QAM	18.58	8.27	13	-4.73

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