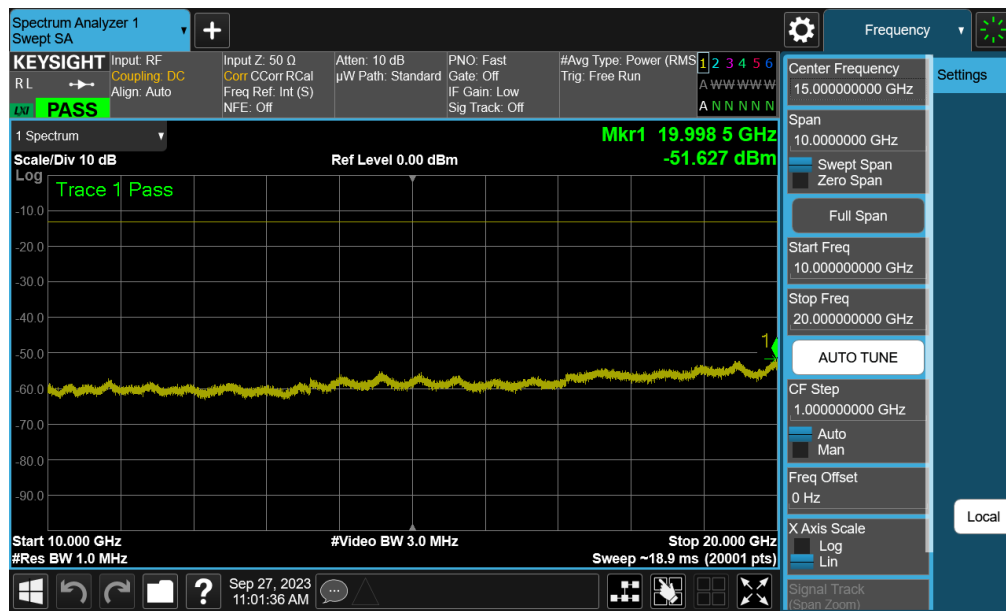




Plot 7-87. Conducted Spurious Plot (NR Band n2 - 20.0MHz - 1RB - Mid Channel - Ant M3)

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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. $RBW \geq 1\%$ of the emission bandwidth
4. $VBW \geq 3 \times RBW$
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.

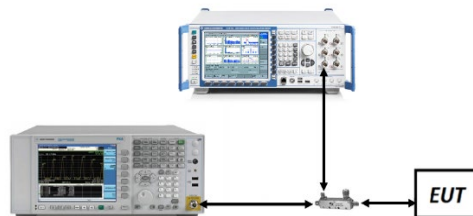


Figure 7-4. Test Instrument & Measurement Setup

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Test Notes

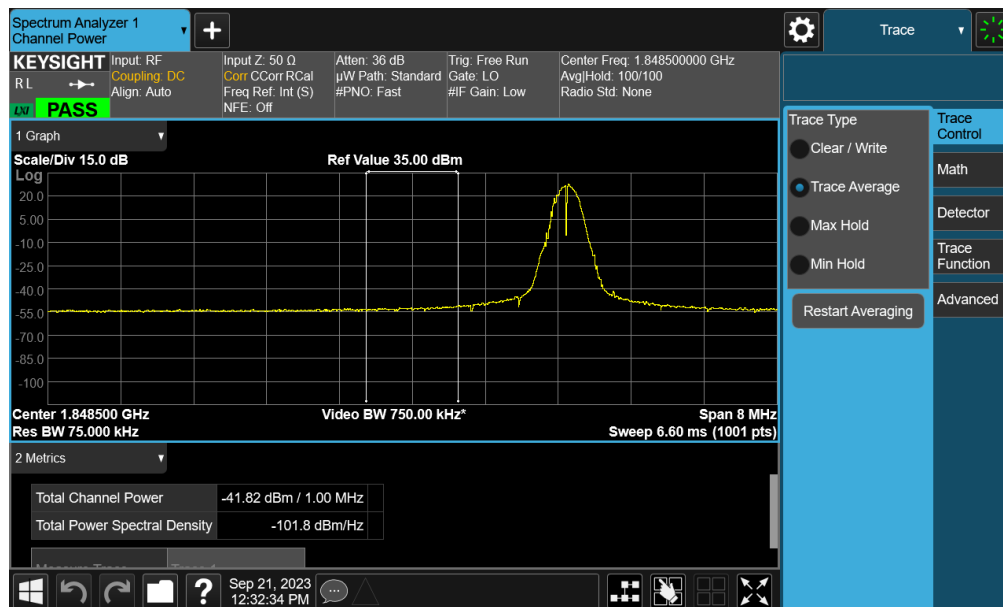
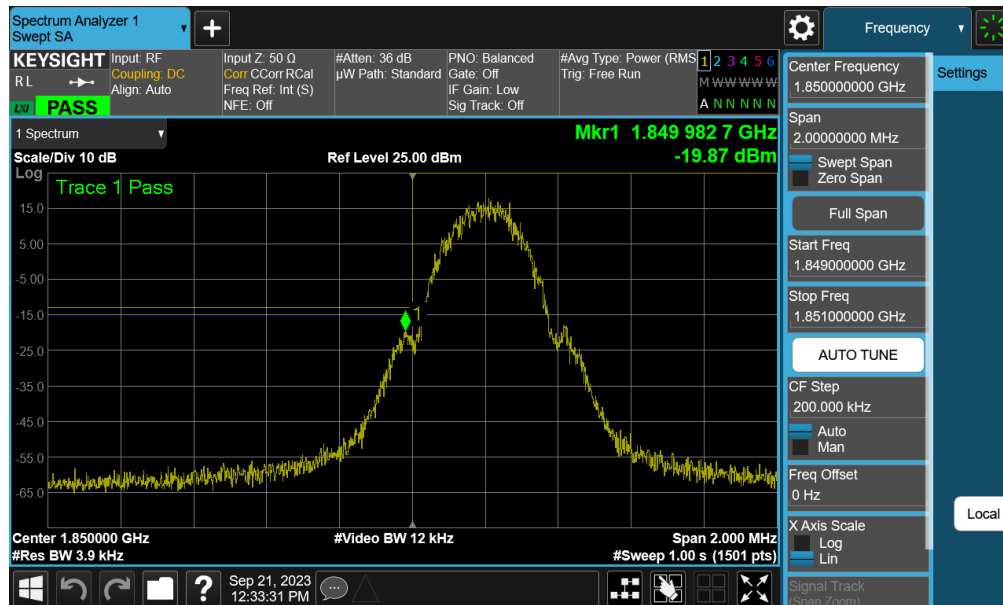
1. Per 24.238(b) and RSS-133(6.5), in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions 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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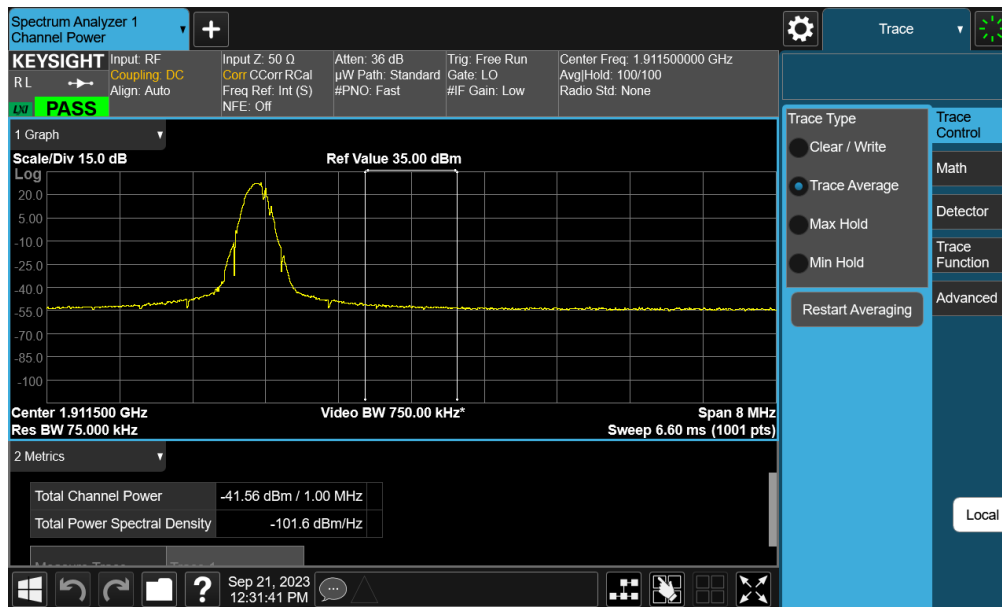
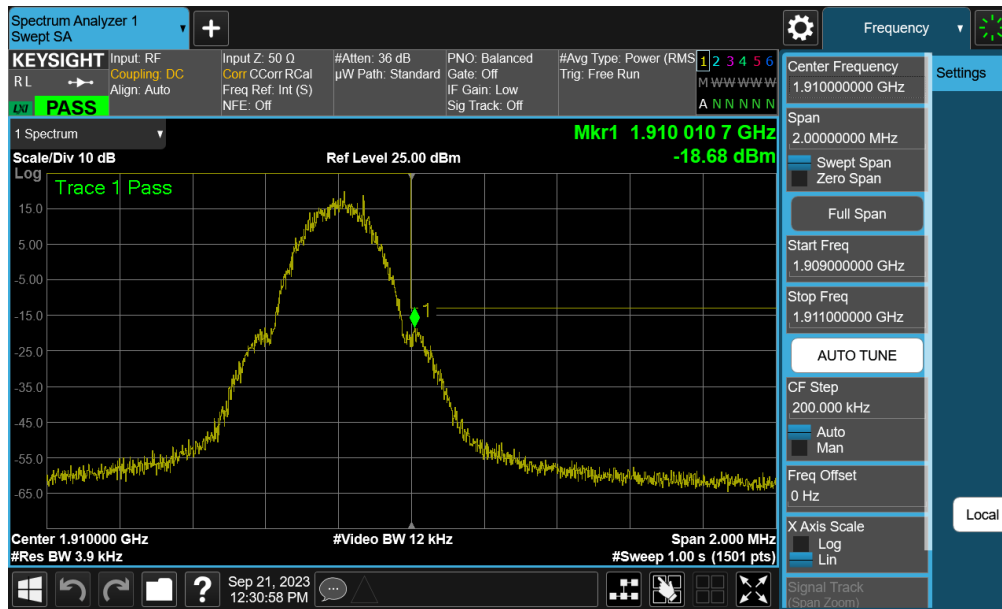
GSM/GPRS PCS – Ant M2

Mode	Bandwidth	Channel	Test Case	Level [dBm]	Lim it [dBm]	Margin [dB]
GSM-PCS	250k Hz	Low	Band Edge	-19.87	-13	-6.87
		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



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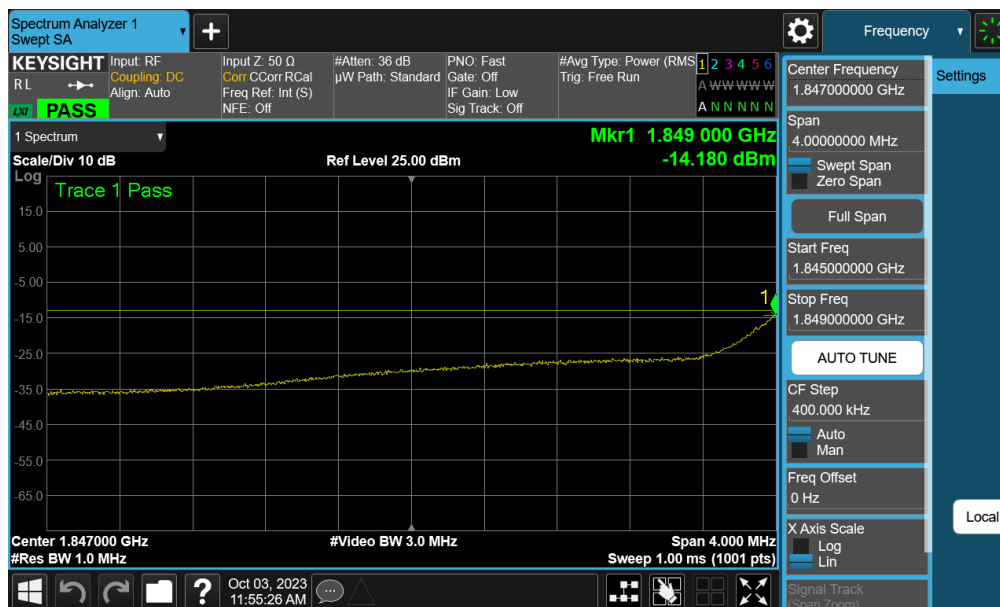
WCDMA PCS – Ant M2

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)



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

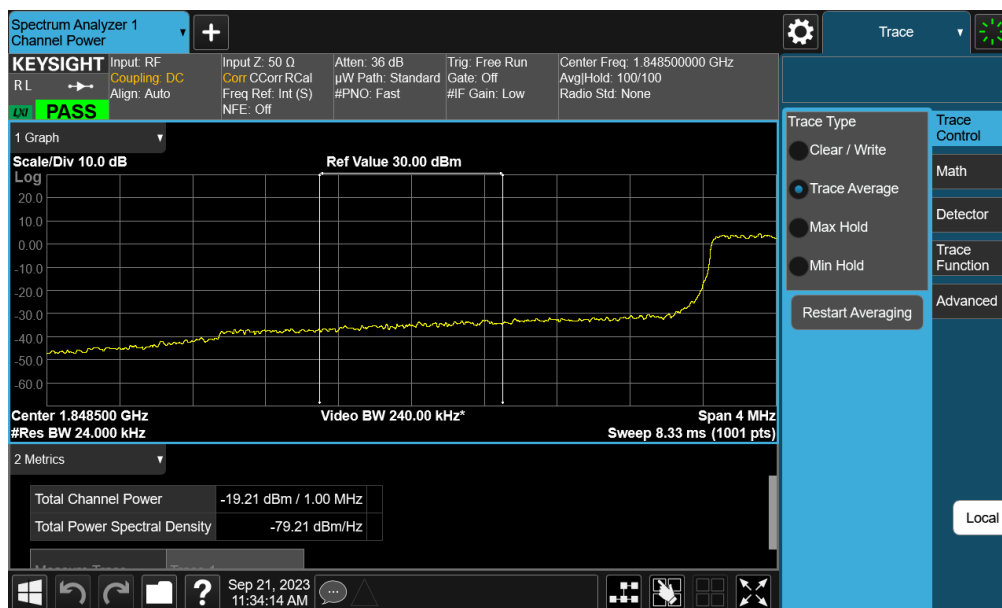
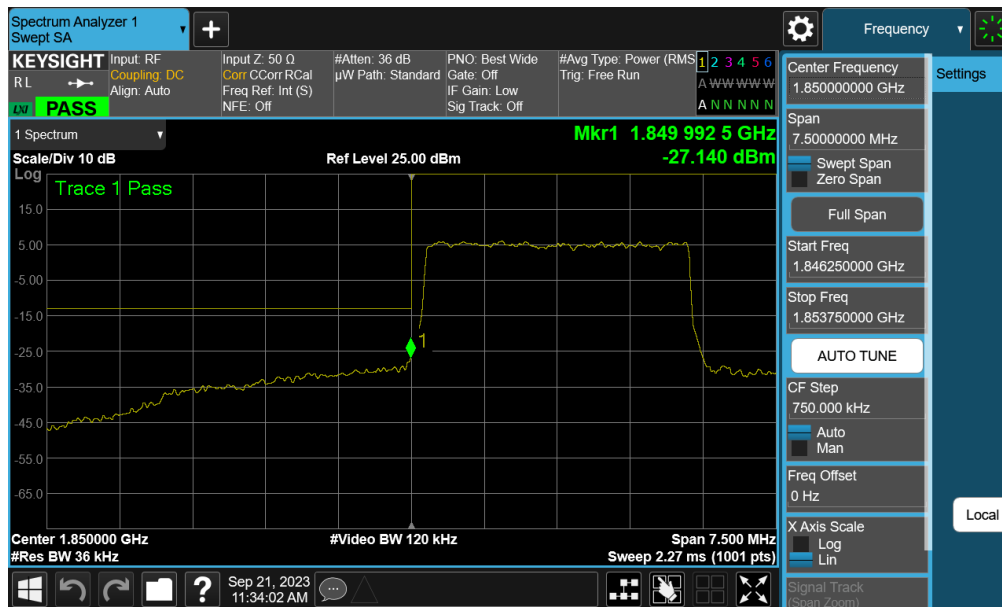
FCC ID: A3LSMA156U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
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LTE Band 25/2 – Ant M2

Mode	Bandwidth	Channel	Test Case	Level [dBm]	Limit [dBm]	Margin [dB]
LTE-B25-2	20 MHz	Low	Band Edge	-32.79	-13	-19.79
		Low	Extended	-25.42	-13	-12.42
		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
	15 MHz	Low	Band Edge	-29.43	-13	-16.43
		Low	Extended	-22.41	-13	-9.41
		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
	10 MHz	Low	Band Edge	-29.16	-13	-16.16
		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
	5 MHz	Low	Band Edge	-26.97	-13	-13.97
		Low	Extended	-19.46	-13	-6.46
		High LB2	Band Edge	-28.80	-13	-15.80
		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
	3 MHz	Low	Band Edge	-27.14	-13	-14.14
		Low	Extended	-19.21	-13	-6.21
		High LB2	Band Edge	-29.82	-13	-16.81
		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
	1.4 MHz	Low	Band Edge	-27.33	-13	-14.33
		Low	Extended	-29.77	-13	-16.77
		High LB2	Band Edge	-30.31	-13	-17.31
		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 7-11. Band Edge Test Results – Ant M2

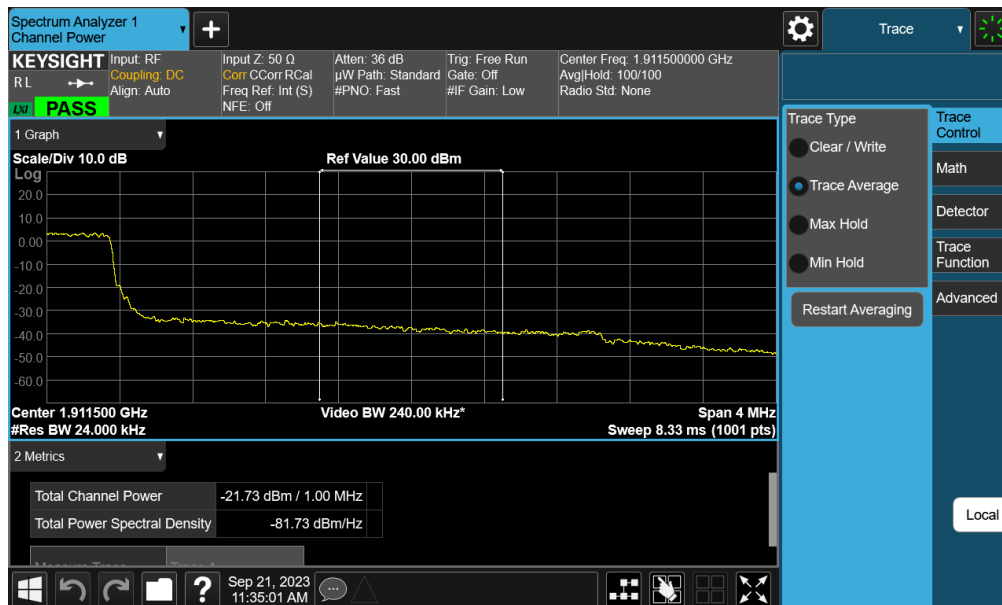
FCC ID: A3LSMA156U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
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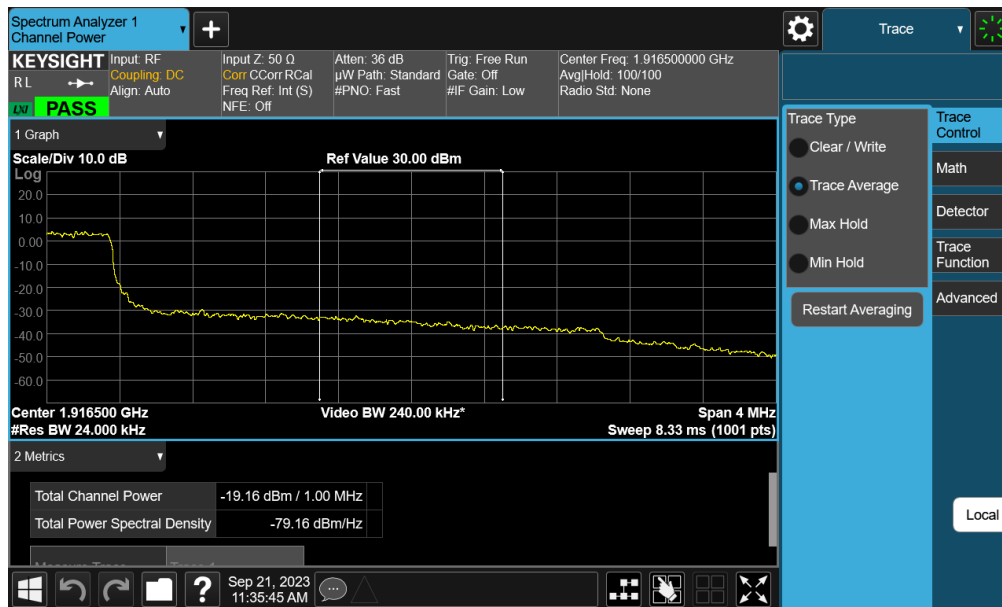
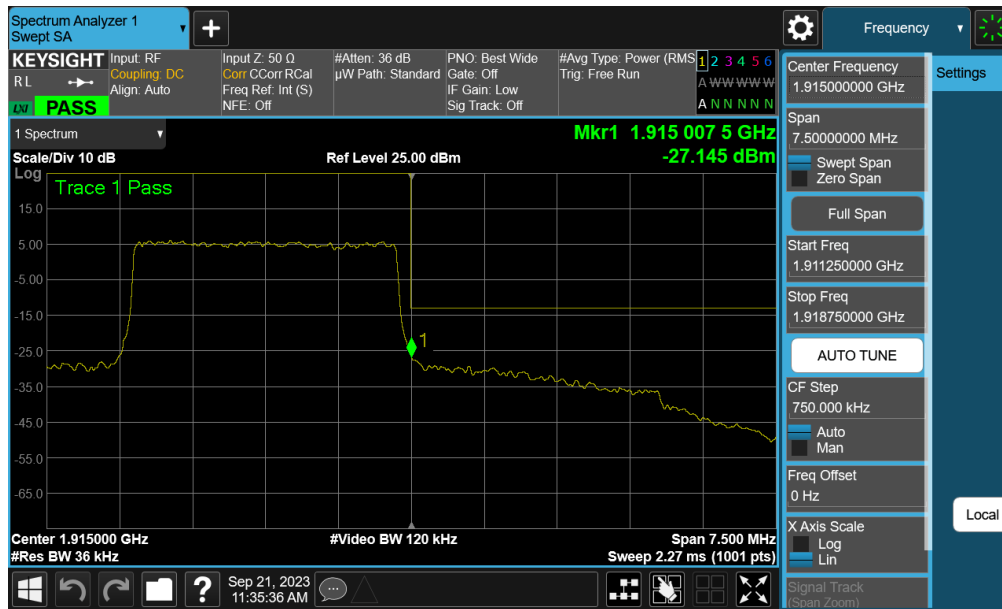


Plot 7-98. Upper Band Edge Plot (LTE Band 2 - 3MHz QPSK – Full RB - Ant M2)



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

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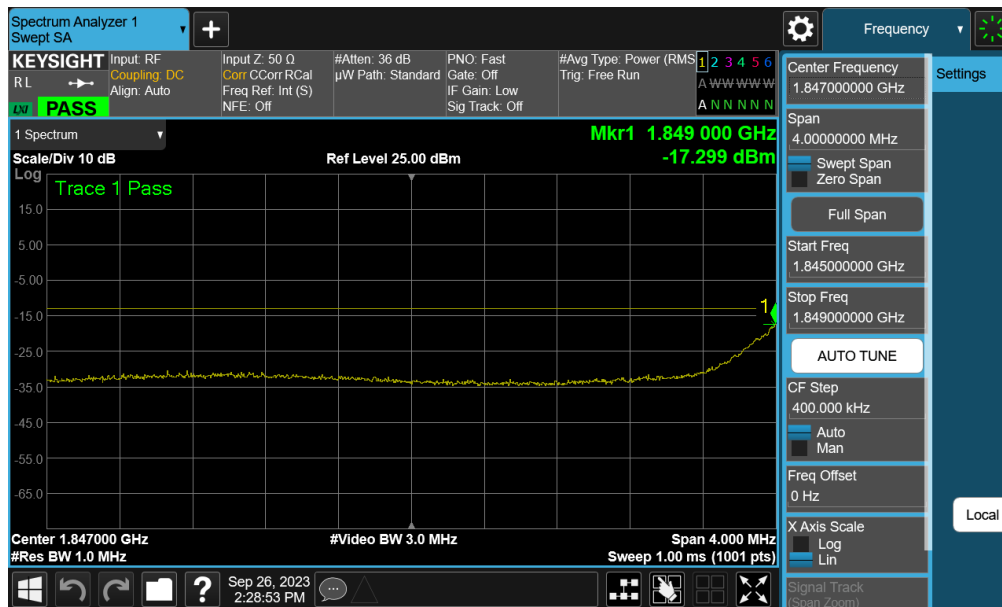
FCC ID: A3LSMA156U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
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NR Band n25/2 – Ant M2

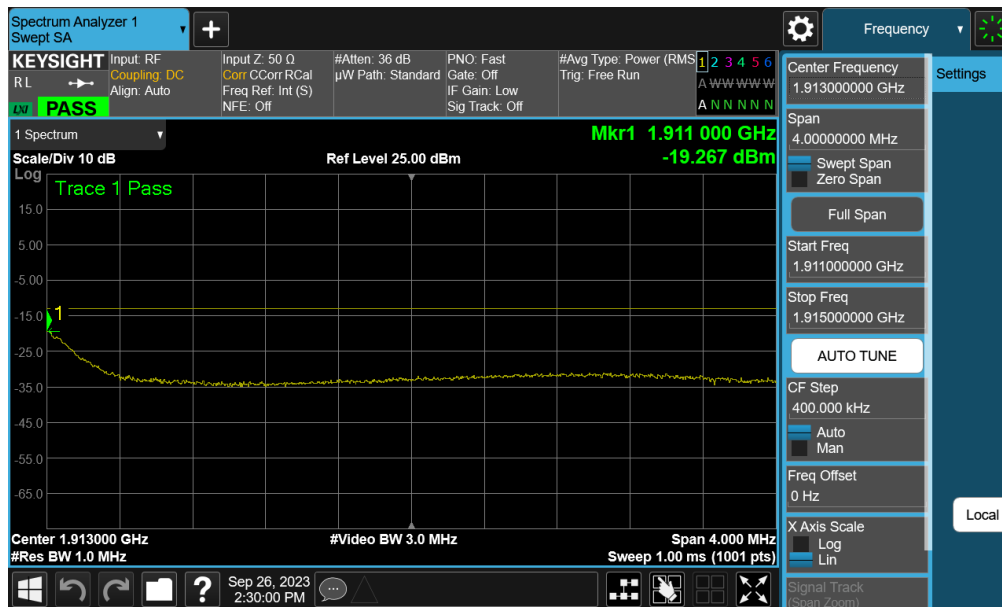
Mode	Bandwidth	Channel	Test Case	Level [dBm]	Limit [dBm]	Margin [dB]
NR-n25-2	40 MHz	Low	Band Edge	-27.18	-13	-14.18
		Low	Extended	-30.21	-13	-17.21
		High NR 2	Band Edge	-27.92	-13	-14.92
		High NR 25	Band Edge	-28.29	-13	-15.29
		High NR 2	Extended	-32.77	-13	-19.77
		High NR 25	Extended	-32.79	-13	-19.79
	30 MHz	Low	Band Edge	-32.84	-13	-19.84
		Low	Extended	-29.16	-13	-16.16
		High NR 2	Band Edge	-33.60	-13	-20.60
		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
	25 MHz	Low	Band Edge	-32.96	-13	-19.96
		Low	Extended	-27.30	-13	-14.30
		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
	20 MHz	Low	Band Edge	-33.20	-13	-20.20
		Low	Extended	-24.92	-13	-11.92
		High NR 2	Band Edge	-35.05	-13	-22.04
		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
	15 MHz	Low	Band Edge	-34.20	-13	-21.20
		Low	Extended	-22.21	-13	-9.21
		High NR 2	Band Edge	-34.78	-13	-21.78
		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
	10 MHz	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
		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
	5 MHz	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
		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

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

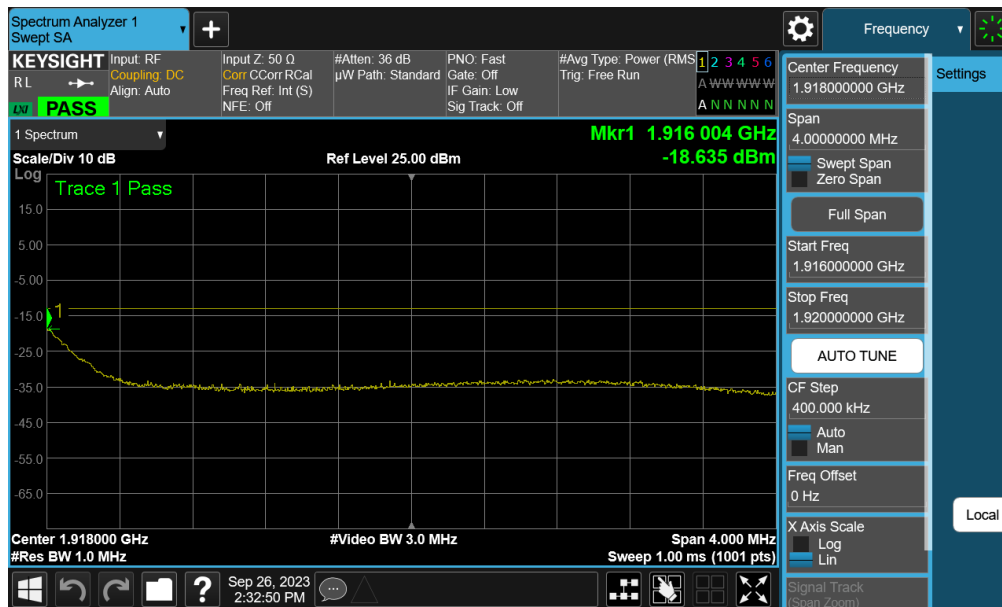
FCC ID: A3LSMA156U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
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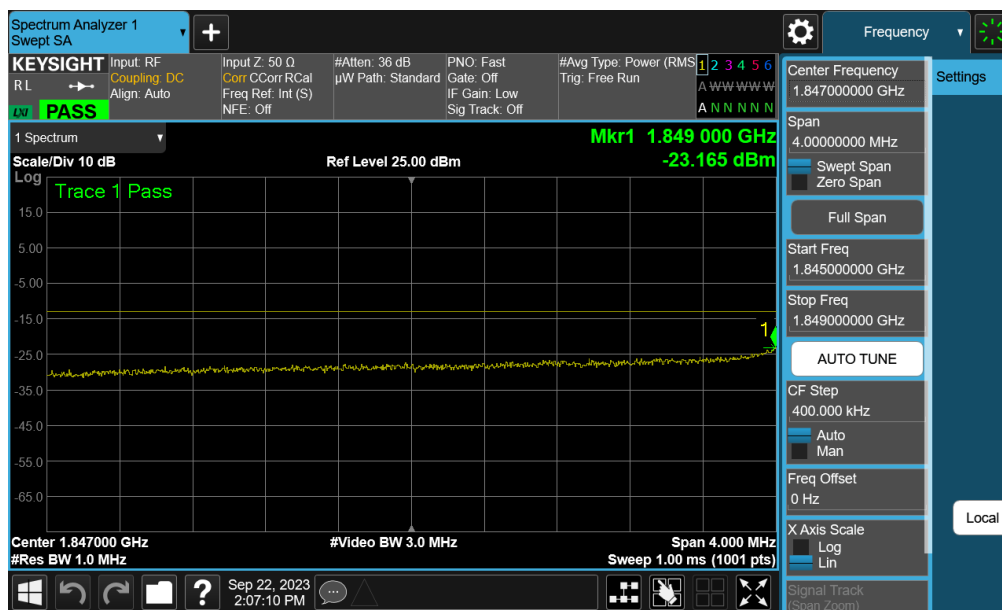
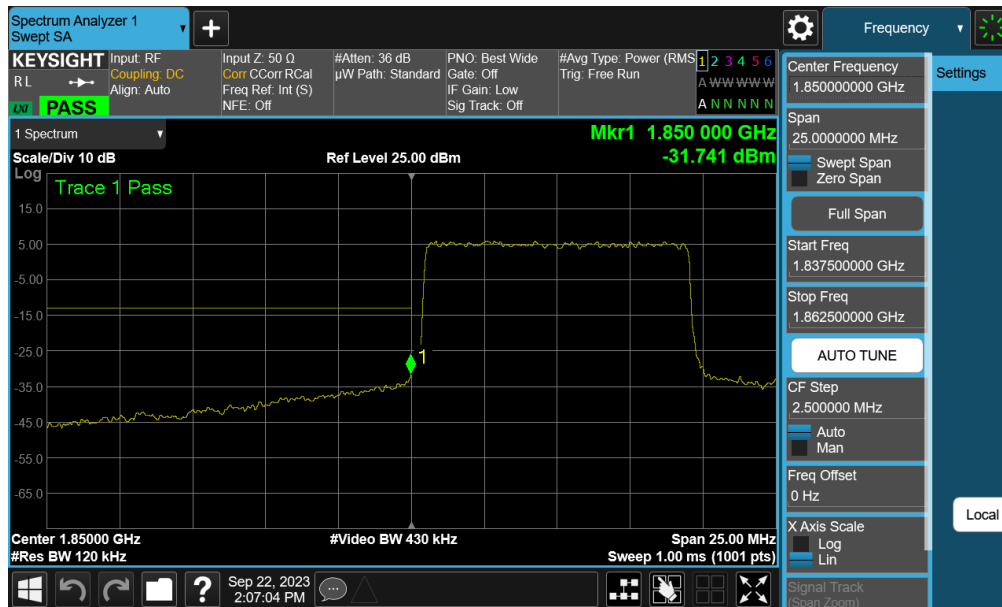
FCC ID: A3LSMA156U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
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LTE Band 25/2 – Ant M3

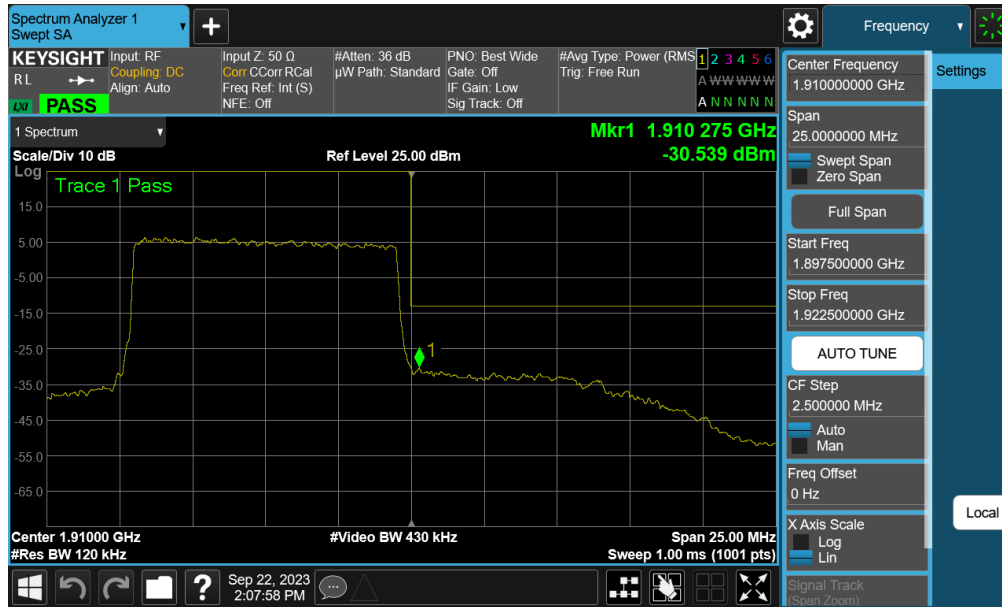
Mode	Bandwidth	Channel	Test Case	Level [dBm]	Limit [dBm]	Margin [dB]
LTE-B25-2	20 MHz	Low	Band Edge	-31.40	-13	-18.40
		Low	Extended	-26.32	-13	-13.32
		High LB2	Band Edge	-27.67	-13	-14.66
		High LB25	Band Edge	-27.99	-13	-14.99
		High LB2	Extended	-23.03	-13	-10.03
		High LB25	Extended	-22.56	-13	-9.56
	15 MHz	Low	Band Edge	-32.42	-13	-19.42
		Low	Extended	-26.13	-13	-13.13
		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
	10 MHz	Low	Band Edge	-31.74	-13	-18.74
		Low	Extended	-23.17	-13	-10.17
		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
		High LB25	Extended	-23.22	-13	-10.22
	5 MHz	Low	Band Edge	-29.88	-13	-16.88
		Low	Extended	-24.82	-13	-11.82
		High LB2	Band Edge	-30.71	-13	-17.71
		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
	3 MHz	Low	Band Edge	-30.98	-13	-17.98
		Low	Extended	-24.30	-13	-11.30
		High LB2	Band Edge	-28.29	-13	-15.29
		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
	1.4 MHz	Low	Band Edge	-28.58	-13	-15.58
		Low	Extended	-24.55	-13	-11.55
		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

Table 7-13. Band Edge Test Results – Ant M3

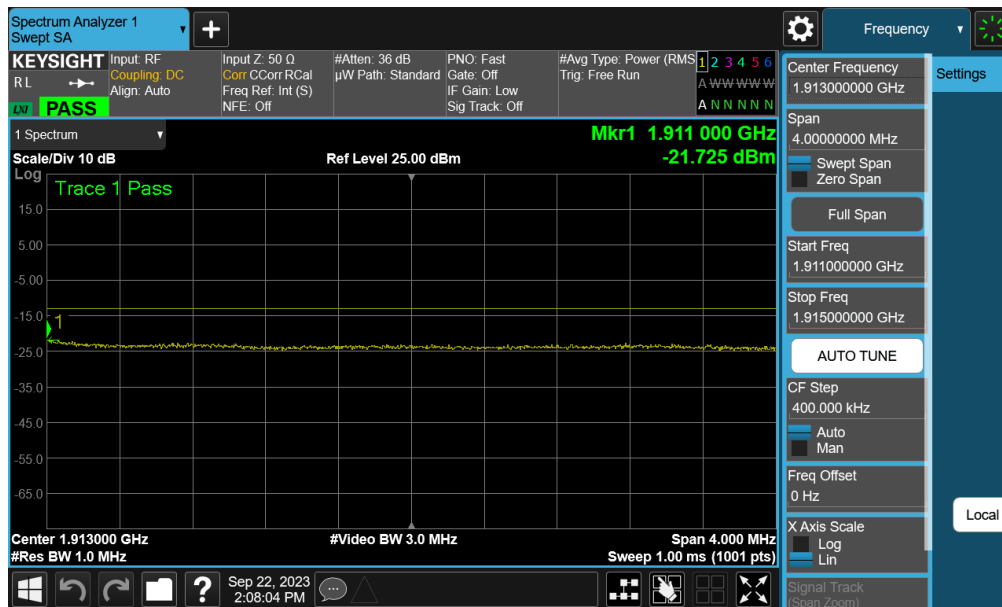
FCC ID: A3LSMA156U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
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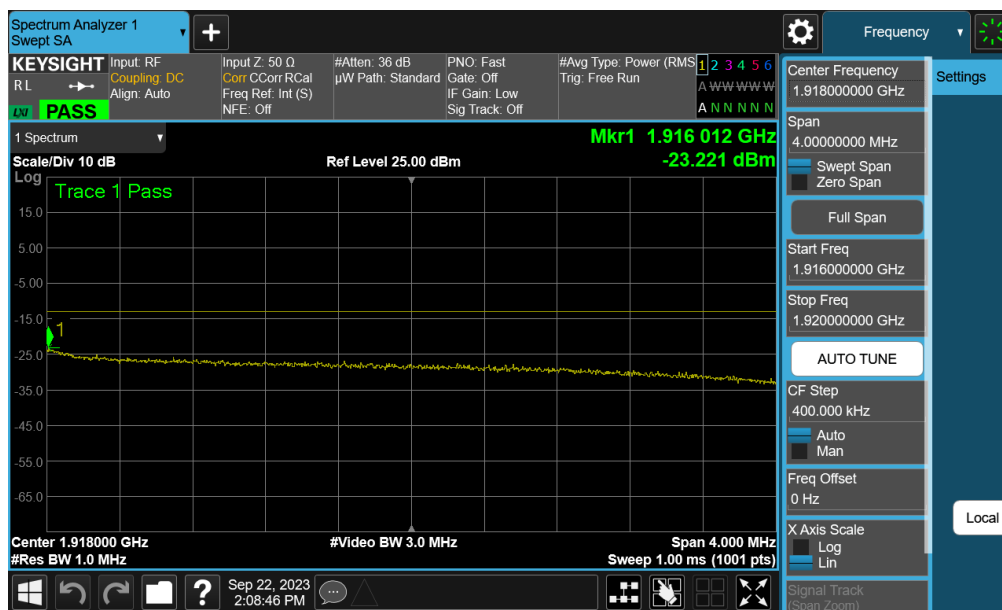
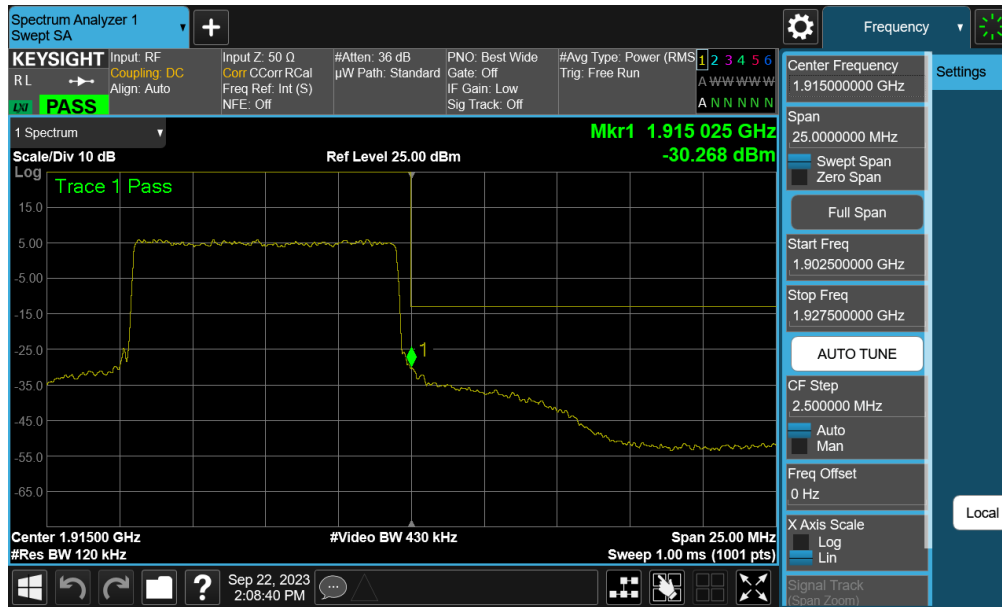


Plot 7-110. Upper Band Edge Plot (LTE Band 2 - 10MHz QPSK – Full RB - Ant M3)



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

FCC ID: A3LSMA156U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
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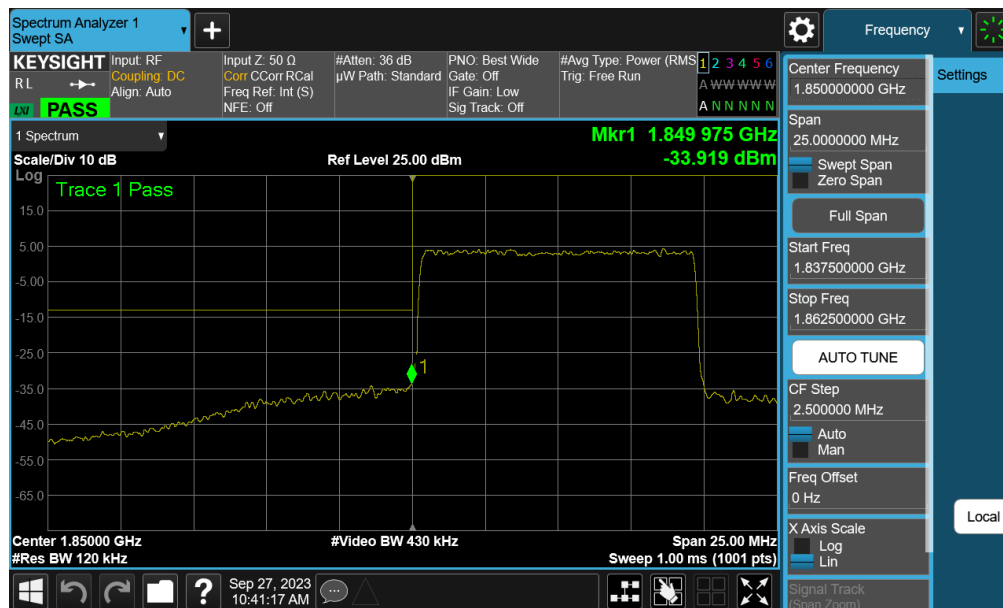


FCC ID: A3LSMA156U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
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NR Band n2 – Ant M3

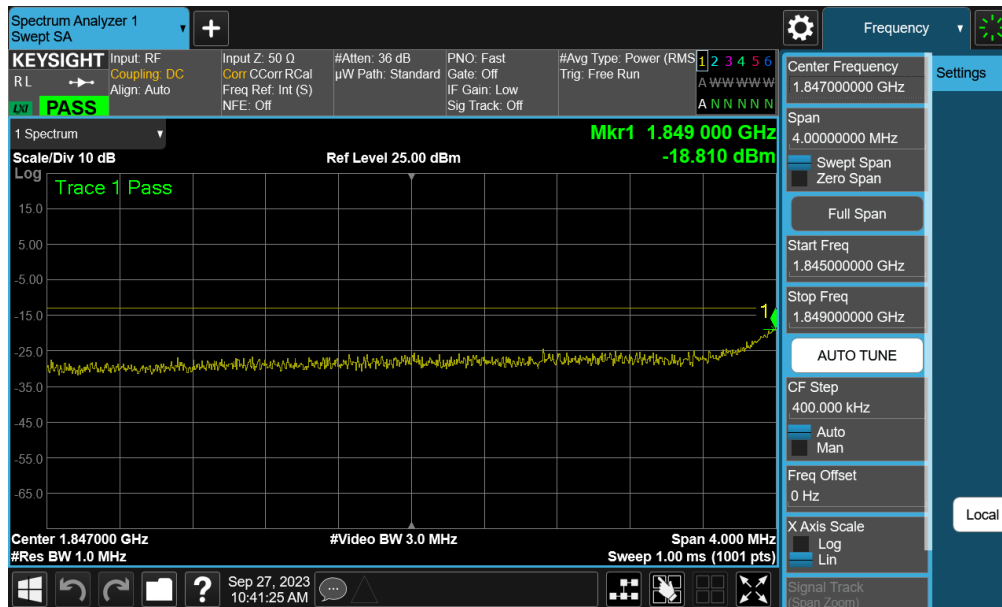
Mode	Bandwidth	Channel	Test Case	Level [dBm]	Lim it [dBm]	Margin [dB]
NR-n2	40 MHz	Low	Band Edge	-27.36	-13	-14.36
		Low	Extended	-30.01	-13	-17.01
		High	Band Edge	-27.33	-13	-14.33
		High	Extended	-30.64	-13	-17.64
	30 MHz	Low	Band Edge	-32.00	-13	-19.00
		Low	Extended	-29.85	-13	-16.85
		High	Band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



Plot 7-114. Lower Band Edge Plot (NR Band n2 - 10MHz QPSK – Full RB - Ant M3)

FCC ID: A3LSMA156U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2309070100-02.A3L	Test Dates: 9/14/2023 – 11/1/2023	EUT Type: Portable Handset	Page 87 of 127

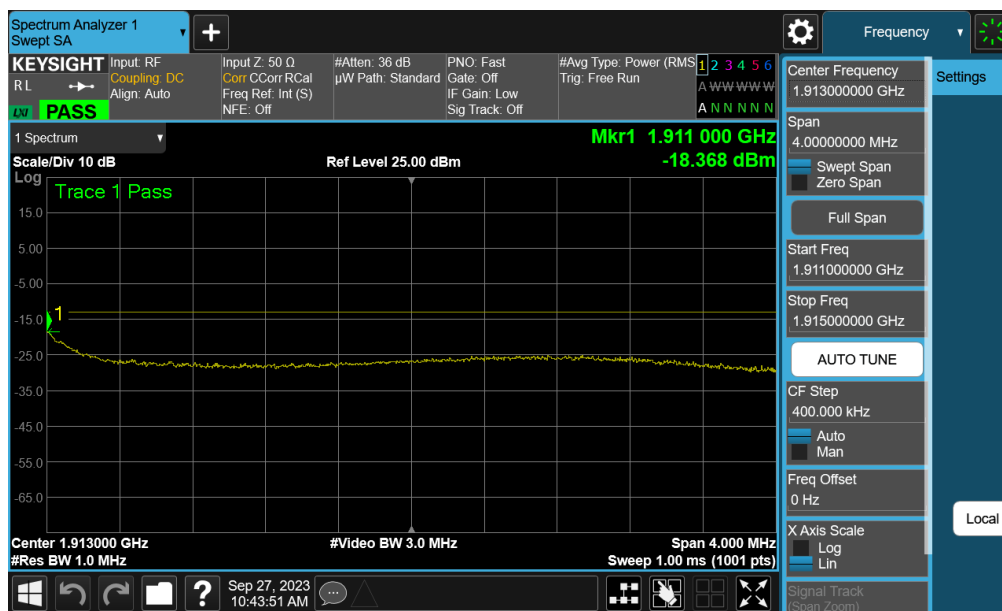


Plot 7-115. Extended Lower Band Edge Plot (NR Band n2 - 10MHz BPSK – Full RB - Ant M3)



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

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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 $\geq$ 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.

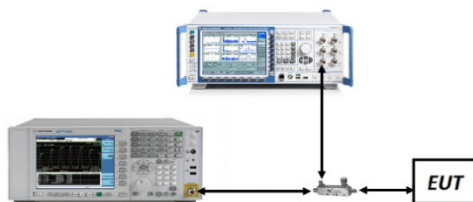


Figure 7-5. Test Instrument & Measurement Setup

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.

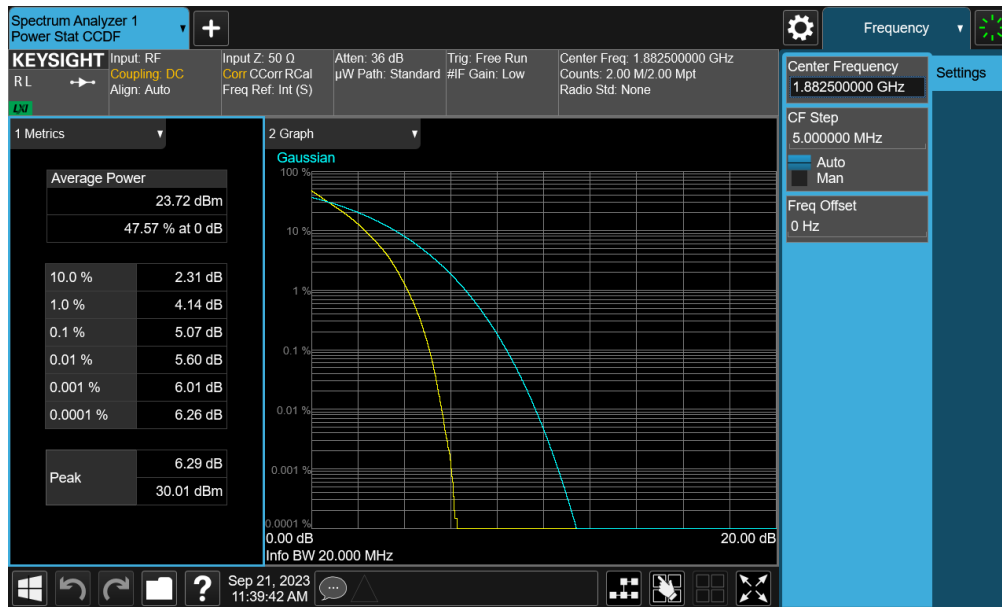
FCC ID: A3LSMA156U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
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Mode	Bandwidth	Modulation	Average Power [dBm]	PAR at 0.1% [dB]	PAR Limit [dB]	Margin [dB]
GSM-PCS	N/A	GMSK	27.86	2.60	13	-10.40
GSM-PCS Edge		8-PSK	23.78	6.77	13	-6.23
WCDMA		read Spectr	24.83	3.06	13	-9.94
LTE-B25-2	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 MHz	QPSK	23.75	5.04	13	-7.96
		256QAM	19.77	6.64	13	-6.36
	5 MHz	QPSK	23.77	5.06	13	-7.94
		256QAM	19.83	6.59	13	-6.41
	3 MHz	QPSK	23.70	5.10	13	-7.90
		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
NR-n25-2	40 MHz	$\pi/2$ BPSK	23.27	5.00	13	-8.00
		QPSK	20.78	8.49	13	-4.51
		256QAM	17.38	8.68	13	-4.32
	30 MHz	$\pi/2$ BPSK	23.45	4.42	13	-8.58
		QPSK	20.96	8.38	13	-4.62
		256QAM	17.50	8.56	13	-4.44
	25 MHz	$\pi/2$ BPSK	23.99	4.70	13	-8.30
		QPSK	21.45	8.37	13	-4.63
		256QAM	18.02	8.74	13	-4.26
	20 MHz	$\pi/2$ BPSK	23.97	4.50	13	-8.50
		QPSK	21.44	8.32	13	-4.68
		256QAM	18.04	8.63	13	-4.37
	15MHz	$\pi/2$ BPSK	23.97	4.56	13	-8.44
		QPSK	21.46	8.51	13	-4.49
		256QAM	18.10	8.69	13	-4.31
	10MHz	$\pi/2$ BPSK	24.00	4.52	13	-8.48
		QPSK	21.52	8.29	13	-4.71
		256QAM	18.08	8.42	13	-4.58
	5MHz	$\pi/2$ BPSK	23.99	4.79	13	-8.21
		QPSK	21.45	8.37	13	-4.63
		256QAM	18.05	8.51	13	-4.49

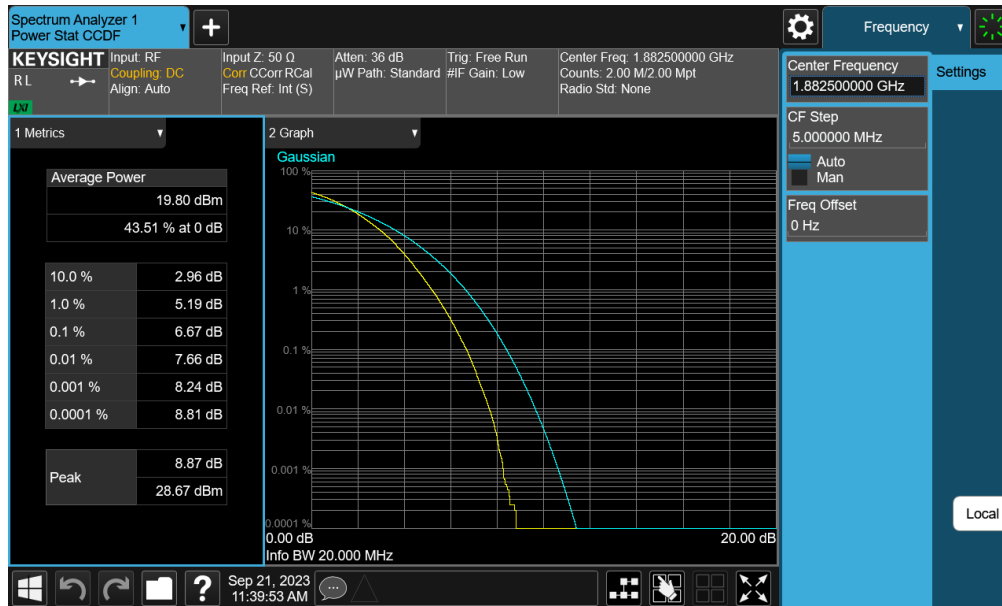
Table 7-15. PAR Test Results – Ant M2

FCC ID: A3LSMA156U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
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LTE Band 25/2 – Ant M2



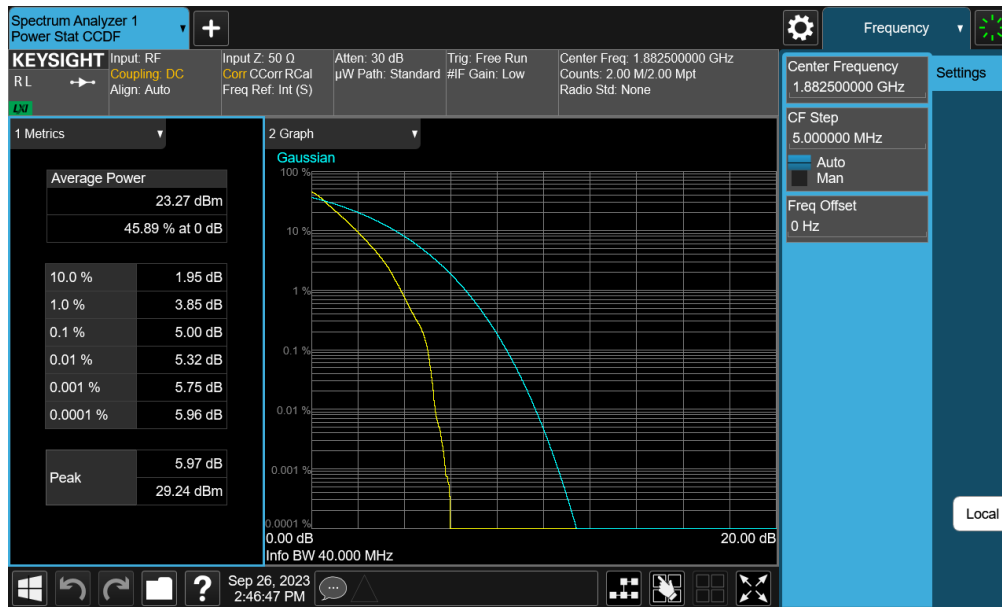
Plot 7-118. PAR Plot (LTE Band 25/2 - 20MHz QPSK - Full RB - Ant M2)



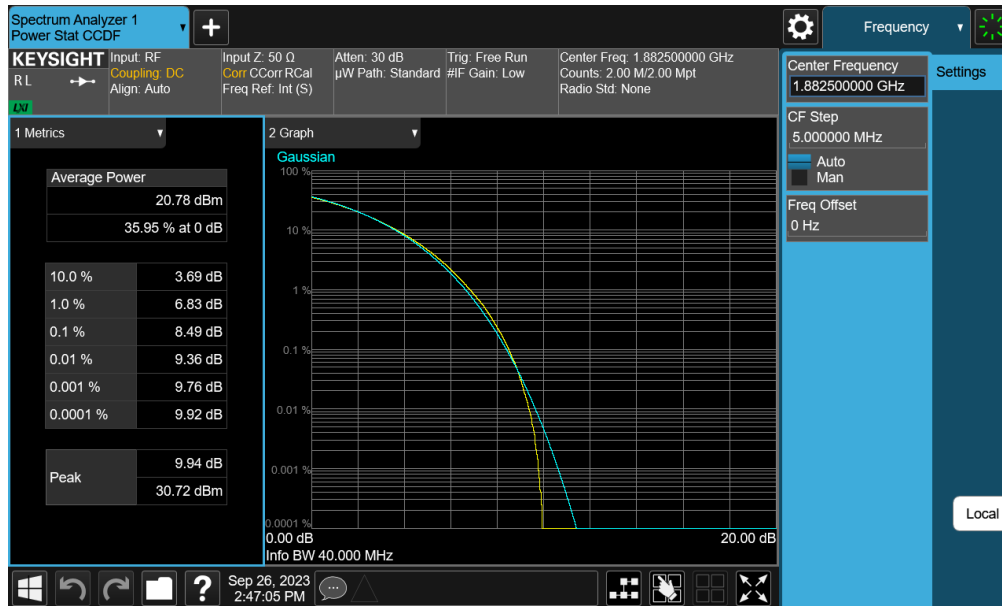
Plot 7-119. PAR Plot (LTE Band 25/2 - 20MHz 256-QAM - Full RB - Ant M2)

FCC ID: A3LSMA156U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
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NR Band n25/2 – Ant M2

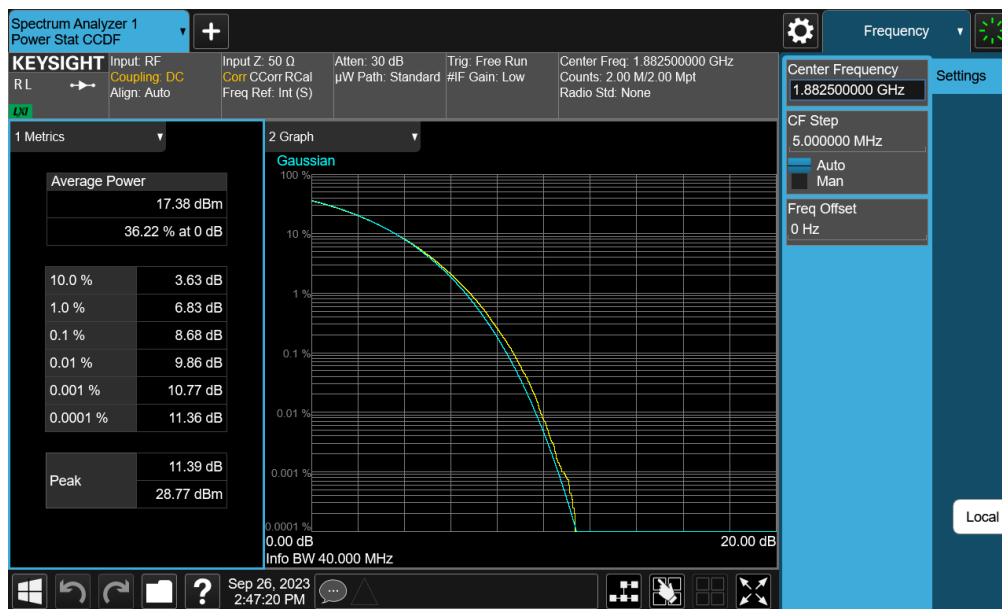


Plot 7-120. PAR Plot (NR Band n25/2 - 40.0MHz DFT-s-OFDM BPSK - Full RB - Ant M2)



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

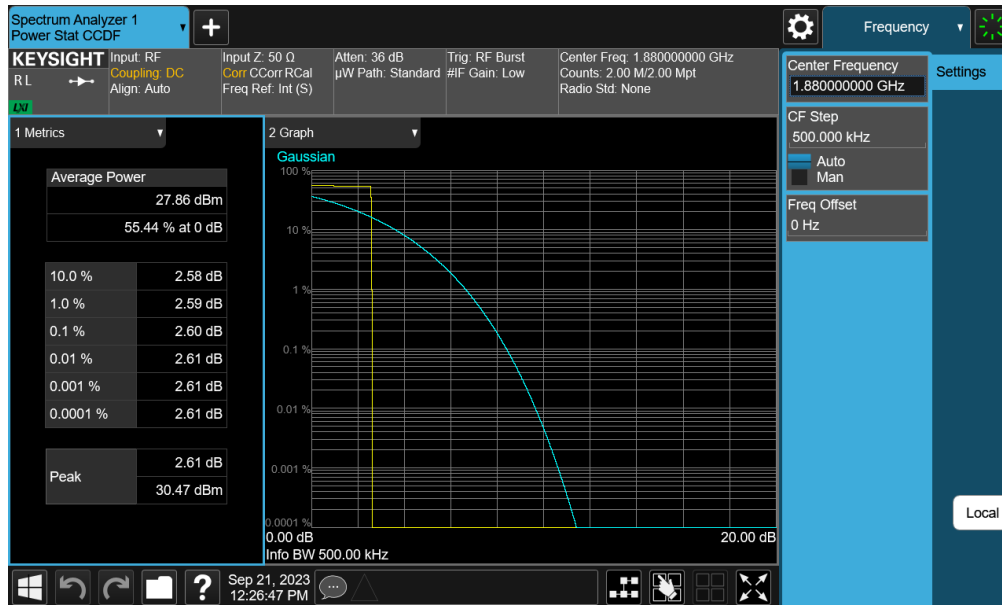
FCC ID: A3LSMA156U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
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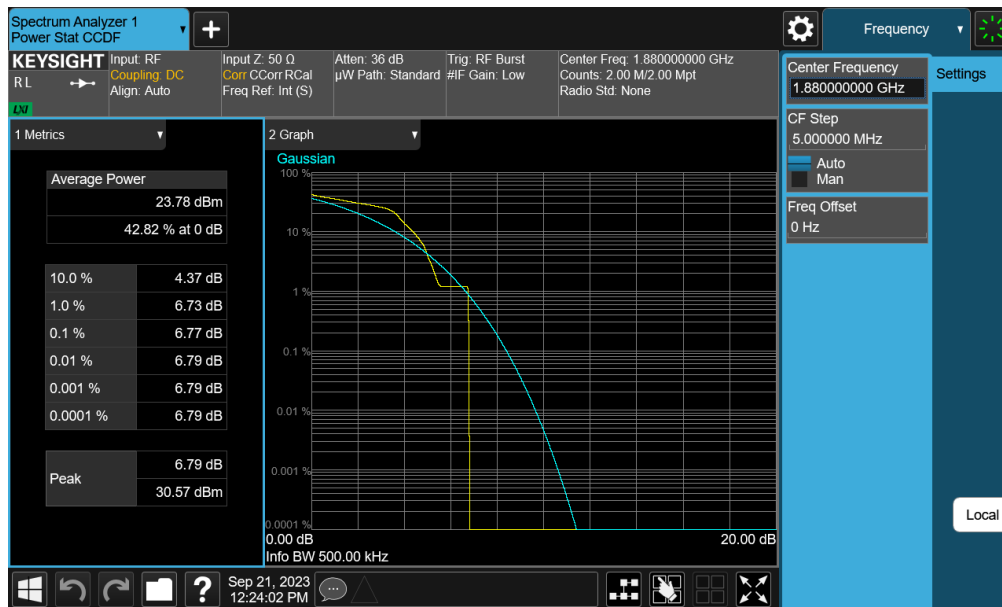
Plot 7-122. PAR Plot (NR Band n25/2 - 40.0MHz CP-OFDM 256-QAM - Full RB - Ant M2)

FCC ID: A3LSMA156U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
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GSM/GPRS PCS – Ant M2



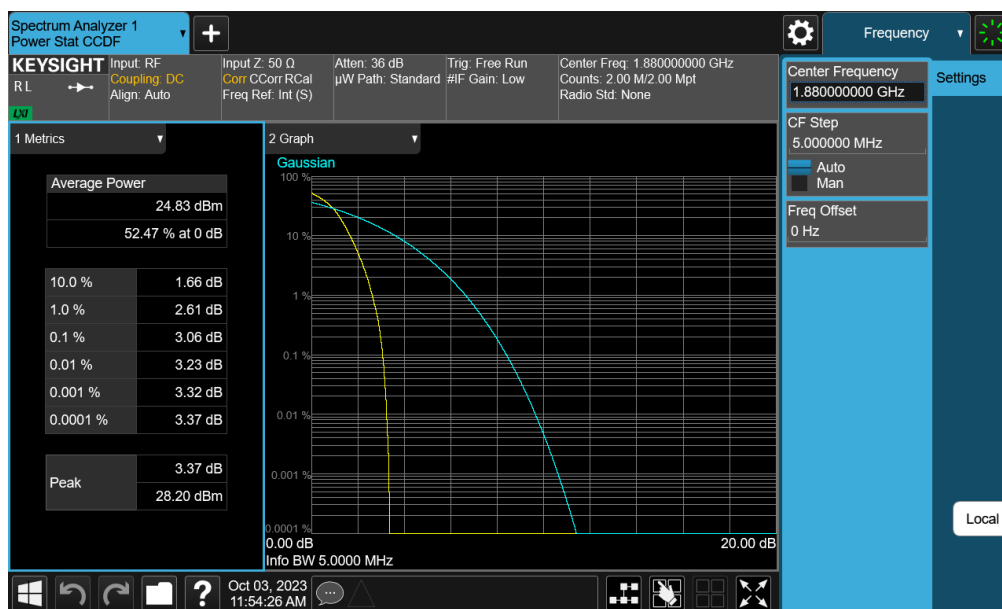
Plot 7-123. PAR Plot (GPRS, Ch. 661 - Ant M2)



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

FCC ID: A3LSMA156U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
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WCDMA PCS – Ant M2



Plot 7-125. PAR Plot (WCDMA, Ch. 9400 - Ant M2)

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Mode	Bandwidth	Modulation	Average Power [dBm]	PAR at 0.1% [dB]	PAR Limit [dB]	Margin [dB]
LTE-B25-2	20 MHz	QPSK	23.68	5.61	13	-7.39
		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
		256QAM	19.72	6.68	13	-6.32
	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
		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
NR-n2	40 MHz	$\pi/2$ BPSK	24.15	4.91	13	-8.09
		QPSK	21.67	8.16	13	-4.84
		256QAM	18.21	8.45	13	-4.55
	30 MHz	$\pi/2$ BPSK	24.21	4.43	13	-8.57
		QPSK	21.70	8.02	13	-4.98
		256QAM	18.20	8.34	13	-4.66
	25 MHz	$\pi/2$ BPSK	24.35	4.64	13	-8.36
		QPSK	21.78	8.03	13	-4.97
		256QAM	18.32	8.49	13	-4.51
	20 MHz	$\pi/2$ BPSK	24.53	4.37	13	-8.63
		QPSK	22.03	8.01	13	-4.99
		256QAM	18.55	8.33	13	-4.67
	15MHz	$\pi/2$ BPSK	24.52	4.38	13	-8.62
		QPSK	22.05	8.20	13	-4.80
		256QAM	18.61	8.39	13	-4.61
	10MHz	$\pi/2$ BPSK	24.56	4.34	13	-8.66
		QPSK	22.07	7.97	13	-5.03
		256QAM	18.59	8.17	13	-4.83
	5MHz	$\pi/2$ BPSK	24.52	4.52	13	-8.48
		QPSK	21.99	8.05	13	-4.95
		256QAM	18.58	8.27	13	-4.73

Table 7-16. PAR Test Results – Ant M3

FCC ID: A3LSMA156U	PART 24 MEASUREMENT REPORT		Approved by: Technical Manager
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