4.4 Occupied Bandwidth Measurement

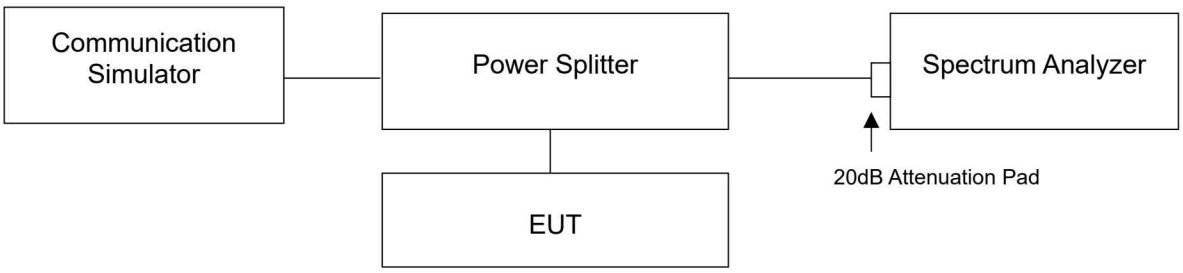
4.4.1 Test Procedure

For the 26dBc bandwidth measurement method, please refer to section 5.4.3 of ANSI C63.26.

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.
b) The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.
c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
d) The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target "−X dB" requirement, i.e., if the requirement calls for measuring the −26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.
e) Set spectrum analyzer detection mode to peak, and the trace mode to max hold.
f) Determine the following reference values: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
g) Determine the "−X dB amplitude" as equal to (Reference Value − X). Alternatively, this calculation can be performed on the spectrum analyzer using the delta-marker measurement function.
h) Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the "−X dB amplitude" determined in step f). If a marker is below this "−X dB amplitude" value it should be as close as possible to this value. The OBW is the positive frequency difference between the two markers.
i) The OBW shall be reported by providing plot(s) of the measuring instrument display, to include markers depicting the relevant frequency and amplitude information (e.g., marker table). The frequency and amplitude axis and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

For the occupied bandwidth measurement method, please refer to section 5.4.4 of ANSI C63.26.

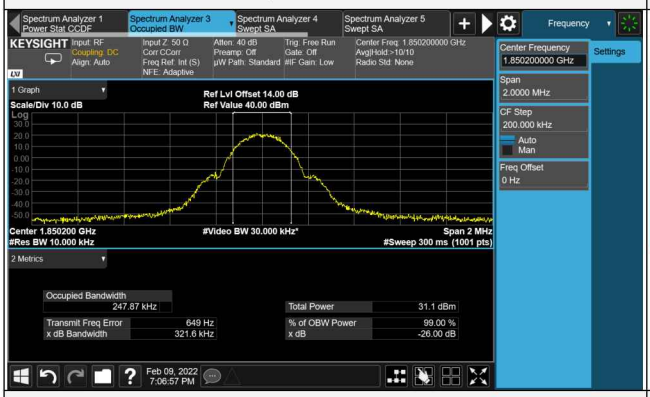
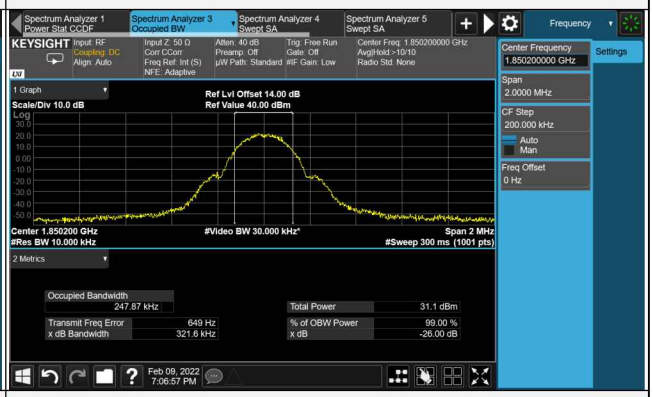
4.4.2 Test Setup



4.4.3 Test Result

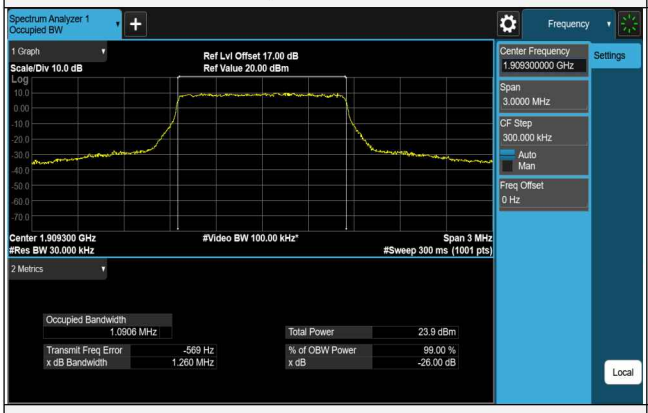
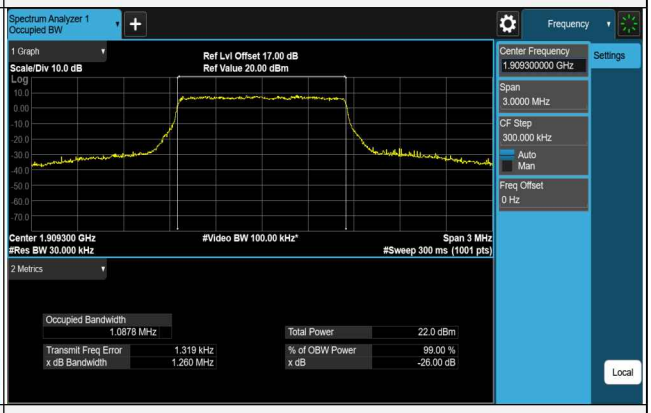
GPRS, EDGE

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (kHz)	26dB Bandwidth (kHz)
GPRS	512	1850.2	246.41	319.10
GPRS	661	1880	246.49	317.20
GPRS	810	1909.8	245.56	318.10
EDGE	512	1850.2	247.87	321.60
EDGE	661	1880	247.00	318.50
EDGE	810	1909.8	245.13	311.60

Spectrum Plot of Worst Value	
Occupied bandwidth	26dB Bandwidth
	
EDGE CH 512 (1850.2MHz)	EDGE CH 512 (1850.2MHz)

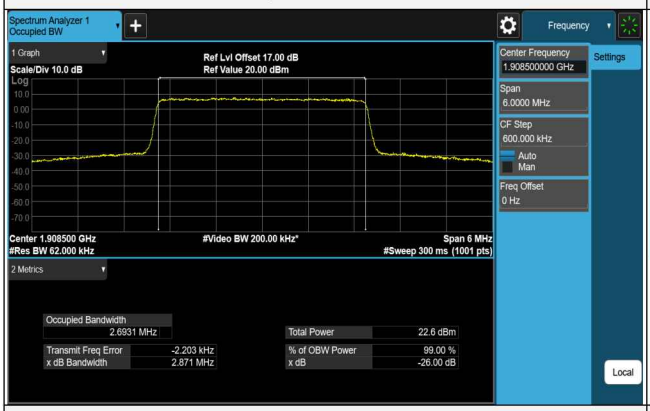
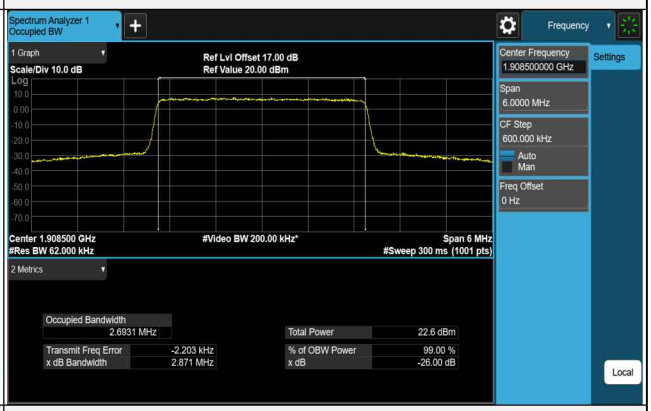
LTE Band 2 (Channel Bandwidth 1.4MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	18607	1850.7	1.0866	1.258
QPSK	18900	1880	1.0900	1.257
QPSK	19193	1909.3	1.0906	1.260
16QAM	18607	1850.7	1.0876	1.253
16QAM	18900	1880	1.0887	1.251
16QAM	19193	1909.3	1.0880	1.258
64QAM	18607	1850.7	1.0871	1.252
64QAM	18900	1880	1.0880	1.257
64QAM	19193	1909.3	1.0878	1.260

Spectrum Plot of Worst Value	
Occupied bandwidth	26dB Bandwidth
	
QPSK CH 19193 (1909.3MHz)	64QAM CH 19193 (1909.3MHz)

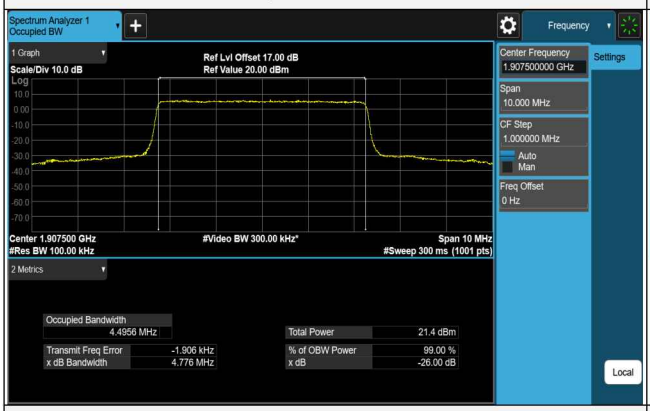
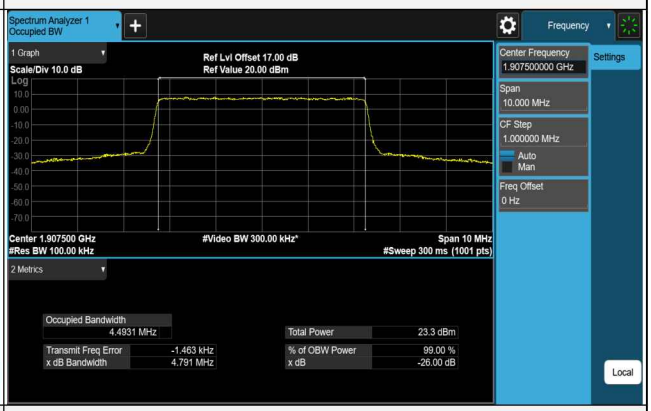
LTE Band 2 (Channel Bandwidth 3MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	18615	1851.5	2.6923	2.866
QPSK	18900	1880	2.6910	2.869
QPSK	19185	1908.5	2.6930	2.866
16QAM	18615	1851.5	2.6921	2.864
16QAM	18900	1880	2.6919	2.868
16QAM	19185	1908.5	2.6931	2.871
64QAM	18615	1851.5	2.6913	2.860
64QAM	18900	1880	2.6921	2.862
64QAM	19185	1908.5	2.6919	2.864

Spectrum Plot of Worst Value	
Occupied bandwidth	26dB Bandwidth
	
16QAM CH 19185 (1908.5MHz)	16QAM CH 19185 (1908.5MHz)

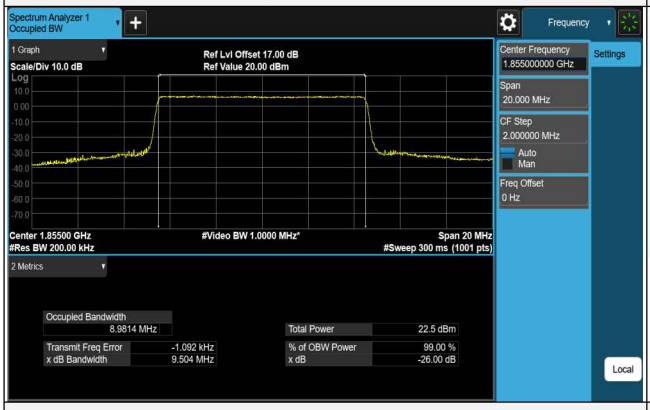
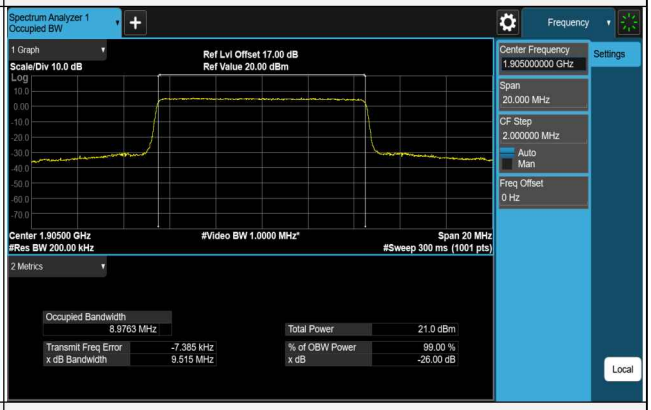
LTE Band 2 (Channel Bandwidth 5MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	18625	1852.5	4.4899	4.769
QPSK	18900	1880	4.4918	4.771
QPSK	19175	1907.5	4.4931	4.791
16QAM	18625	1852.5	4.4893	4.770
16QAM	18900	1880	4.4918	4.769
16QAM	19175	1907.5	4.4917	4.764
64QAM	18625	1852.5	4.4937	4.778
64QAM	18900	1880	4.4934	4.786
64QAM	19175	1907.5	4.4956	4.776

Spectrum Plot of Worst Value	
Occupied bandwidth	26dB Bandwidth
	
64QAM CH 19175 (1907.5MHz)	QPSK CH 19175 (1907.5MHz)

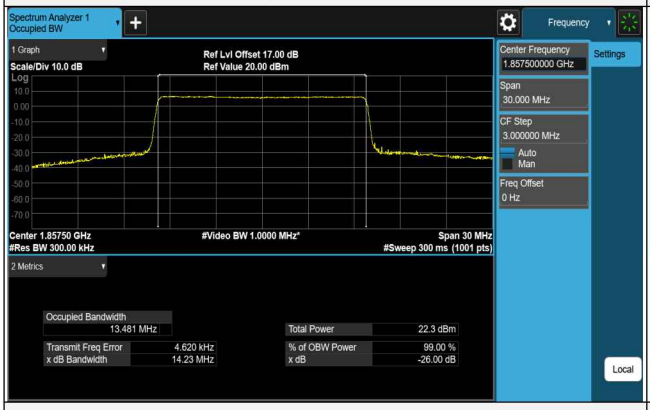
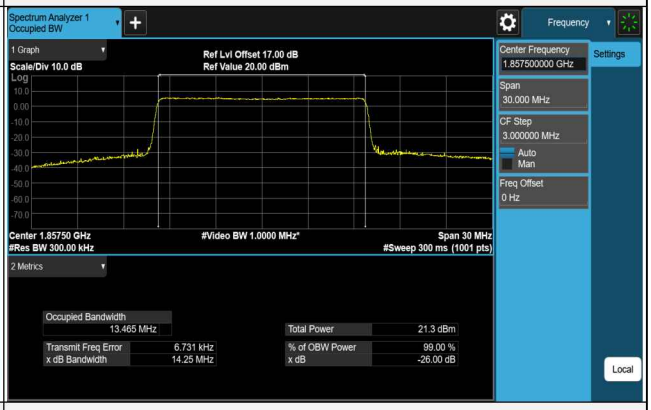
LTE Band 2 (Channel Bandwidth 10MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	18650	1855	8.9814	9.504
QPSK	18900	1880	8.9792	9.497
QPSK	19150	1905	8.9772	9.495
16QAM	18650	1855	8.9758	9.505
16QAM	18900	1880	8.9791	9.498
16QAM	19150	1905	8.9708	9.502
64QAM	18650	1855	8.9794	9.509
64QAM	18900	1880	8.9779	9.501
64QAM	19150	1905	8.9763	9.515

Spectrum Plot of Worst Value	
Occupied bandwidth	26dB Bandwidth
	
QPSK CH 18650 (1855MHz)	64QAM CH 19150 (1905MHz)

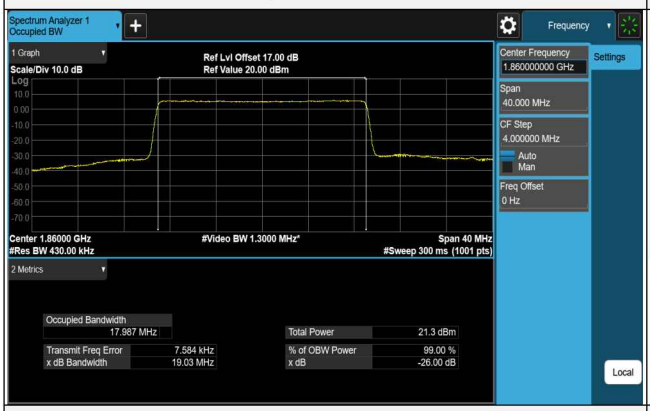
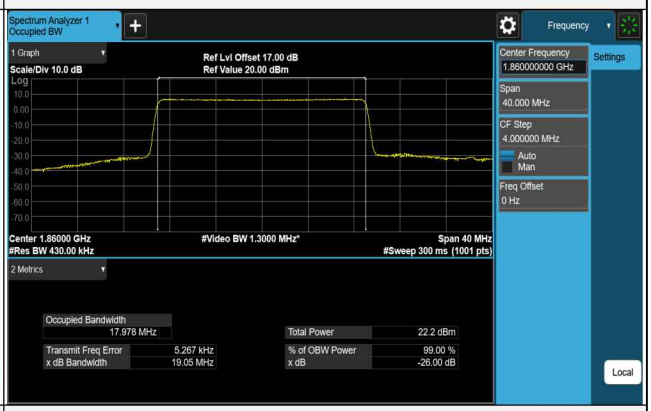
LTE Band 2 (Channel Bandwidth 15MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	18675	1857.5	13.481	14.23
QPSK	18900	1880	13.459	14.22
QPSK	19125	1902.5	13.460	14.22
16QAM	18675	1857.5	13.465	14.25
16QAM	18900	1880	13.453	14.21
16QAM	19125	1902.5	13.444	14.22
64QAM	18675	1857.5	13.461	14.23
64QAM	18900	1880	13.448	14.22
64QAM	19125	1902.5	13.440	14.22

Spectrum Plot of Worst Value	
Occupied bandwidth	26dB Bandwidth
	
QPSK CH 18675 (1857.5MHz)	16QAM CH 18675 (1857.5MHz)

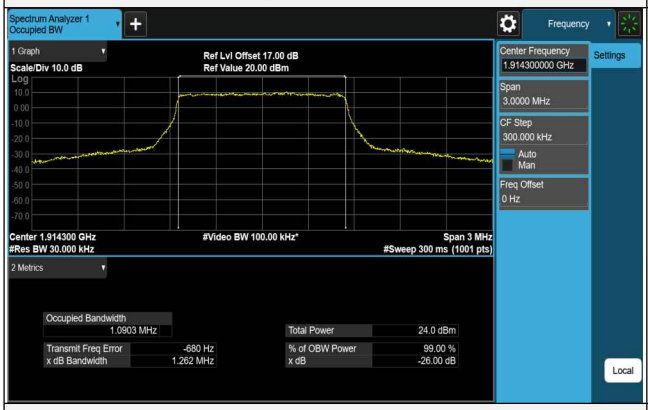
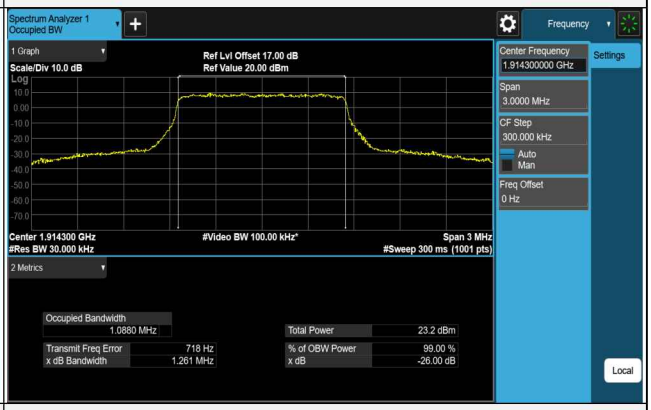
LTE Band 2 (Channel Bandwidth 20MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	18700	1860	17.978	19.05
QPSK	18900	1880	17.939	19.02
QPSK	19100	1900	17.938	19.03
16QAM	18700	1860	17.987	19.03
16QAM	18900	1880	17.945	19.00
16QAM	19100	1900	17.952	19.03
64QAM	18700	1860	17.979	19.04
64QAM	18900	1880	17.940	19.02
64QAM	19100	1900	17.944	19.02

Spectrum Plot of Worst Value	
Occupied bandwidth	26dB Bandwidth
	
16QAM CH 18700 (1860MHz)	QPSK CH 18700 (1860MHz)

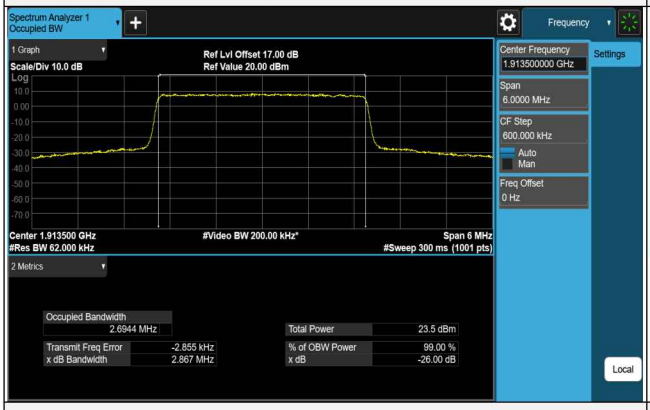
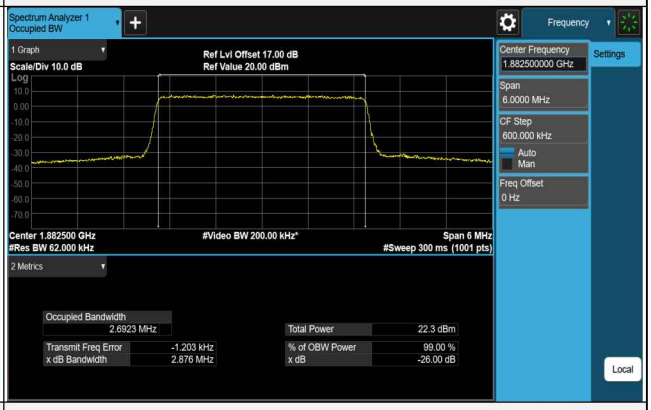
LTE Band 25 (Channel Bandwidth 1.4MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	26047	1850.7	1.0874	1.247
QPSK	26365	1882.5	1.0895	1.258
QPSK	26683	1914.3	1.0903	1.262
16QAM	26047	1850.7	1.0866	1.253
16QAM	26365	1882.5	1.0867	1.252
16QAM	26683	1914.3	1.0880	1.261
64QAM	26047	1850.7	1.0865	1.254
64QAM	26365	1882.5	1.0882	1.259
64QAM	26683	1914.3	1.0876	1.263

Spectrum Plot of Worst Value	
Occupied bandwidth	26dB Bandwidth
	
QPSK CH 26683 (1914.3MHz)	16QAM CH 26683 (1914.3MHz)

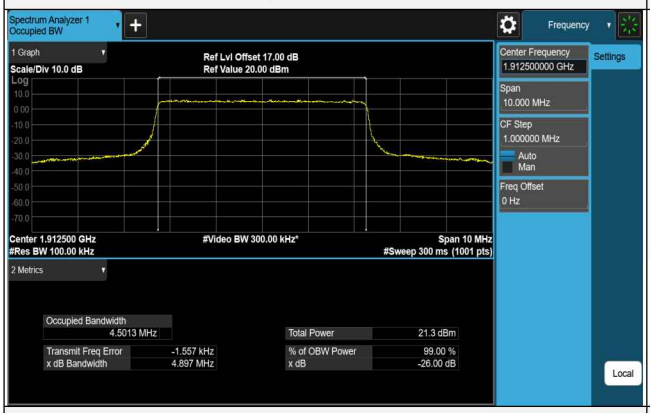
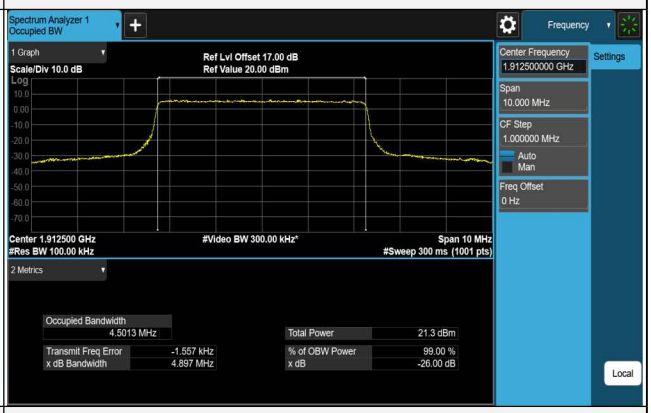
LTE Band 25 (Channel Bandwidth 3MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	26055	1851.5	2.6929	2.867
QPSK	26365	1882.5	2.6938	2.870
QPSK	26675	1913.5	2.6944	2.867
16QAM	26055	1851.5	2.6920	2.866
16QAM	26365	1882.5	2.6923	2.876
16QAM	26675	1913.5	2.6935	2.872
64QAM	26055	1851.5	2.6905	2.865
64QAM	26365	1882.5	2.6937	2.862
64QAM	26675	1913.5	2.6925	2.865

Spectrum Plot of Worst Value	
Occupied bandwidth	26dB Bandwidth
	
QPSK CH 26675 (1913.5MHz)	16QAM CH 26365 (1882.5MHz)

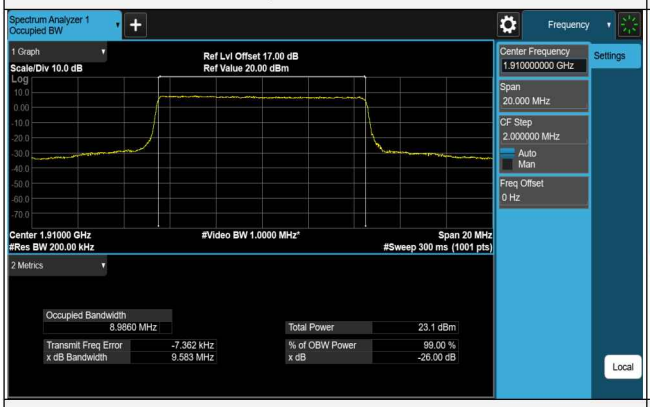
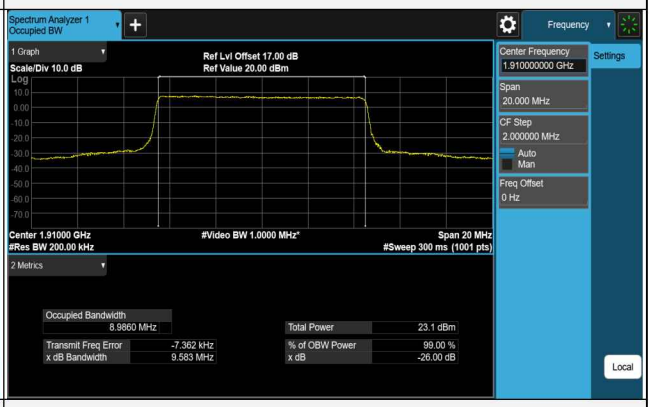
LTE Band 25 (Channel Bandwidth 5MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	26065	1852.5	4.4944	4.870
QPSK	26365	1882.5	4.4954	4.871
QPSK	26665	1912.5	4.5000	4.881
16QAM	26065	1852.5	4.4921	4.880
16QAM	26365	1882.5	4.4915	4.877
16QAM	26665	1912.5	4.4956	4.888
64QAM	26065	1852.5	4.4985	4.873
64QAM	26365	1882.5	4.4988	4.871
64QAM	26665	1912.5	4.5013	4.897

Spectrum Plot of Worst Value	
Occupied bandwidth	26dB Bandwidth
	
64QAM CH 26665 (1912.5MHz)	64QAM CH 26665 (1912.5MHz)

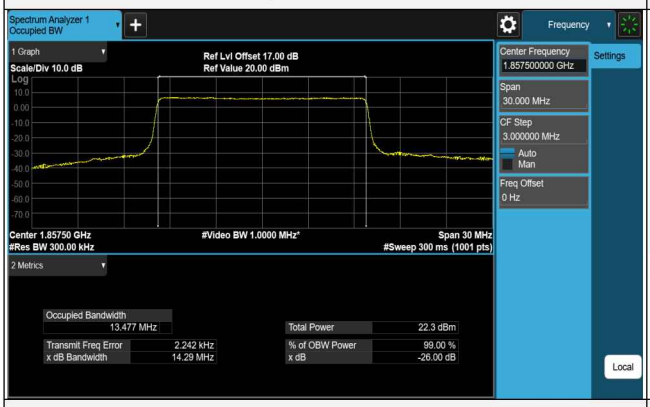
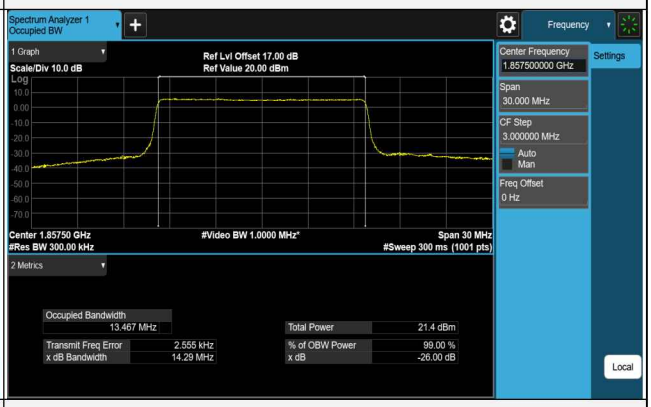
LTE Band 25 (Channel Bandwidth 10MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	26090	1855	8.9833	9.559
QPSK	26365	1882.5	8.9804	9.553
QPSK	26615	1907.5	8.9860	9.583
16QAM	26090	1855	8.9843	9.528
16QAM	26365	1882.5	8.9796	9.529
16QAM	26615	1907.5	8.9838	9.538
64QAM	26090	1855	8.9837	9.557
64QAM	26365	1882.5	8.9813	9.536
64QAM	26615	1907.5	8.9838	9.582

Spectrum Plot of Worst Value	
Occupied bandwidth	26dB Bandwidth
	
QPSK CH 26615 (1907.5MHz)	QPSK CH 26615 (1907.5MHz)

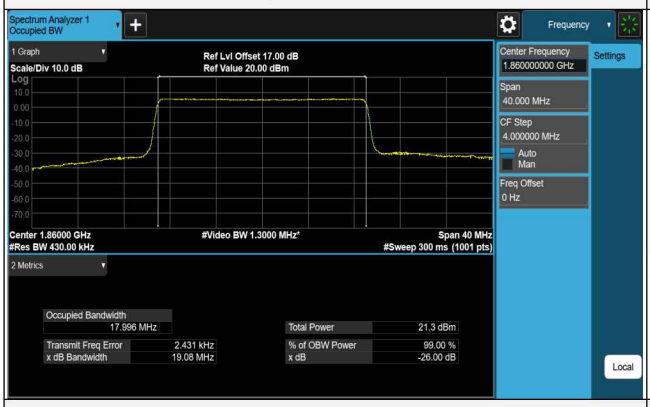
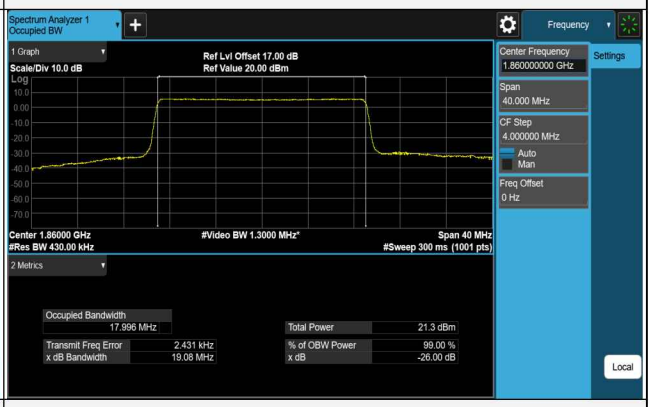
LTE Band 25 (Channel Bandwidth 15MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	26115	1857.5	13.477	14.29
QPSK	26365	1882.5	13.463	14.26
QPSK	26615	1907.5	13.462	14.26
16QAM	26115	1857.5	13.467	14.29
16QAM	26365	1882.5	13.458	14.26
16QAM	26615	1907.5	13.455	14.25
64QAM	26115	1857.5	13.461	14.28
64QAM	26365	1882.5	13.456	14.26
64QAM	26615	1907.5	13.456	14.26

Spectrum Plot of Worst Value	
Occupied bandwidth	26dB Bandwidth
	
QPSK CH 26115 (1857.5MHz)	16QAM CH 26115 (1857.5MHz)

LTE Band 25 (Channel Bandwidth 20MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	26140	1860	17.980	19.07
QPSK	26365	1882.5	17.945	19.04
QPSK	26590	1905	17.930	19.03
16QAM	26140	1860	17.996	19.08
16QAM	26365	1882.5	17.954	19.04
16QAM	26590	1905	17.920	18.97
64QAM	26140	1860	17.979	19.07
64QAM	26365	1882.5	17.953	19.04
64QAM	26590	1905	17.934	19.04

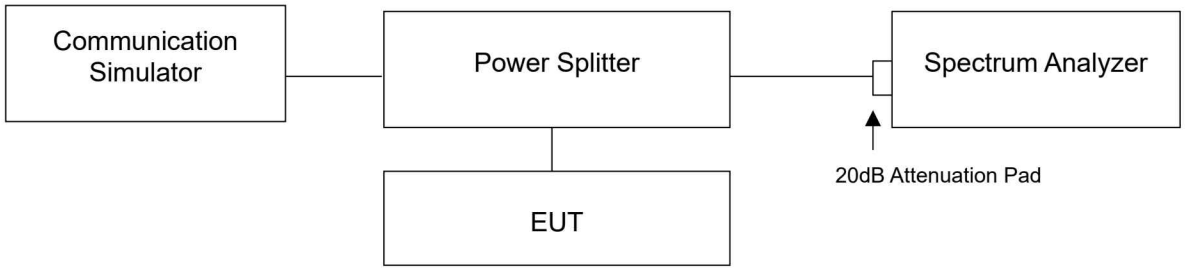
Spectrum Plot of Worst Value	
Occupied bandwidth	26dB Bandwidth
	
16QAM CH 26140 (1860MHz)	16QAM CH 26140 (1860MHz)

4.5 Band Edge Measurement

4.5.1 Limits of Band Edge Measurement

Power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. 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.

4.5.2 Test Setup

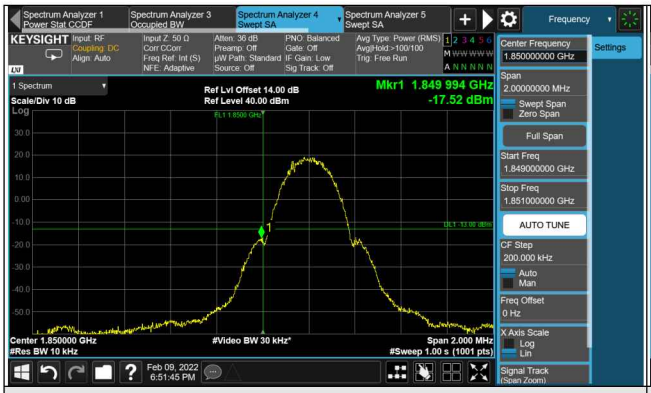


4.5.3 Test Procedures

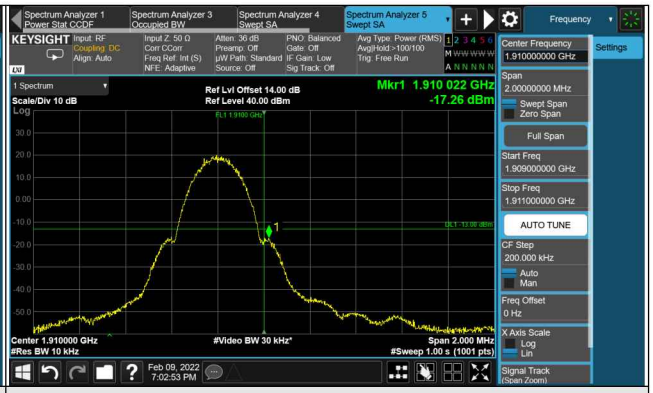
a. All measurements were done at low and high operational frequency range.
b. The center frequency of spectrum is the band edge frequency and span is 2MHz. RB of the spectrum is 10kHz and VB of the spectrum is 30kHz (GPRS / EDGE).
c. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 30kHz and VB of the spectrum is 100kHz (LTE Channel Bandwidth 1.4MHz).
d. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 62kHz and VB of the spectrum is 200kHz (LTE Channel Bandwidth 3MHz).
e. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 100kHz and VB of the spectrum is 300kHz (LTE Channel Bandwidth 5MHz).
f. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 200kHz and VB of the spectrum is 620kHz (LTE Channel Bandwidth 10MHz).
g. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 300kHz and VB of the spectrum is 1MHz (LTE Channel Bandwidth 15MHz).
h. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 430kHz and VB of the spectrum is 1.3MHz (LTE Channel Bandwidth 20MHz).
i. Record the max trace plot into the test report.

4.5.4 Test Results

GPRS

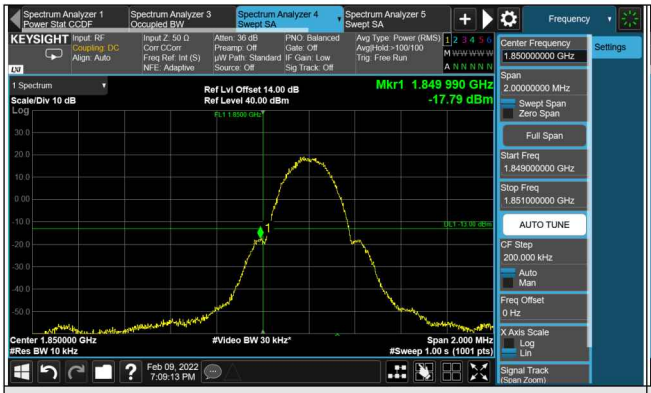


1850.2MHz

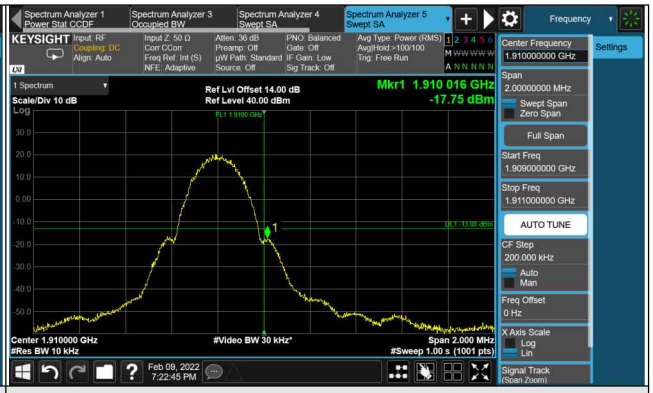


1909.8MHz

EDGE

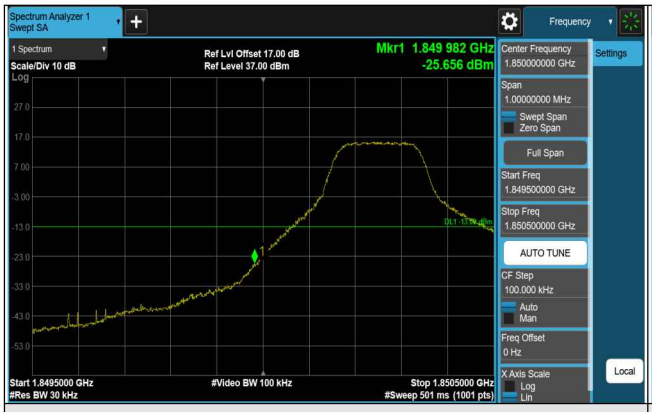


1850.2MHz

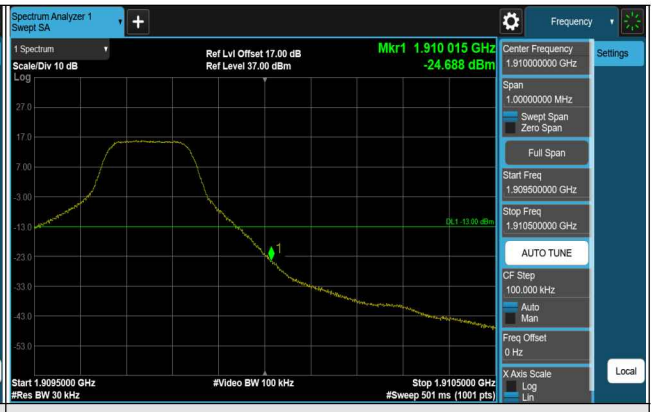


1909.8MHz

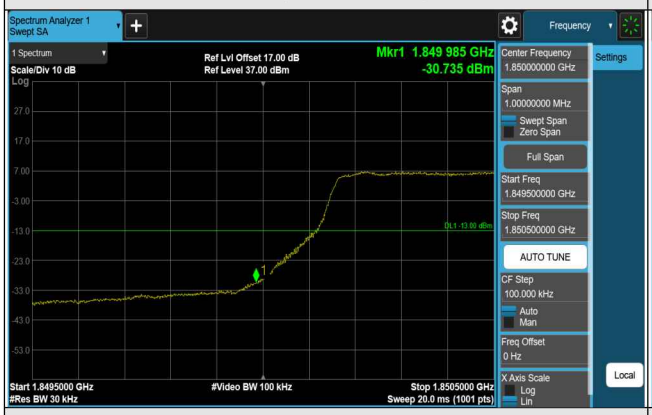
LTE Band 2 (Channel Bandwidth 1.4MHz)



1RB (1850.7MHz)



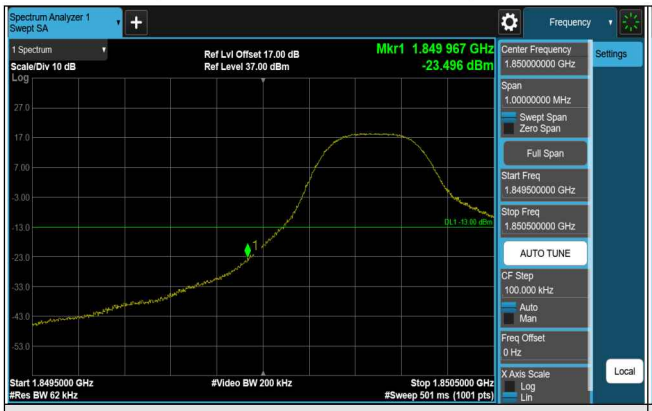
1RB (1909.3MHz)



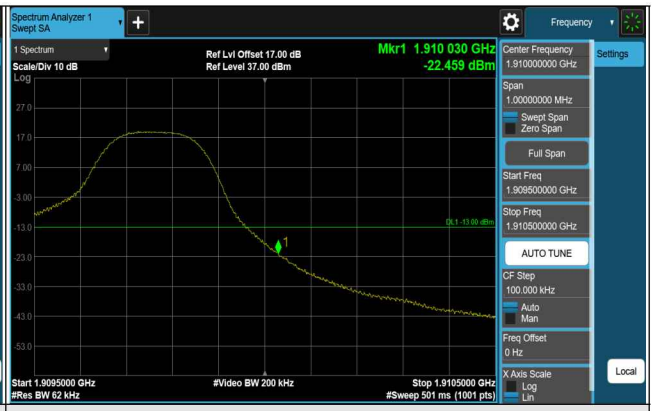
Full (1850.7MHz)

Full (1909.3MHz)

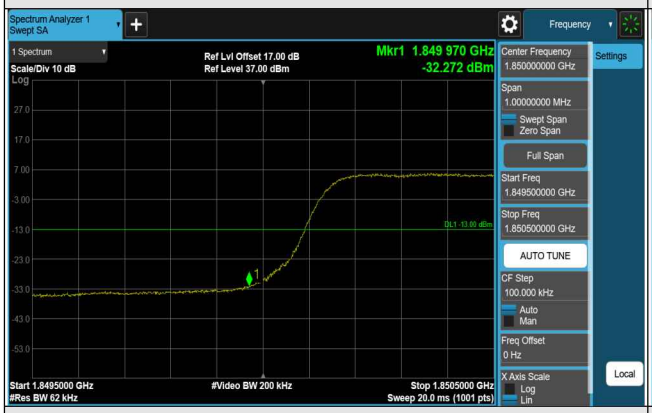
LTE Band 2 (Channel Bandwidth 3MHz)



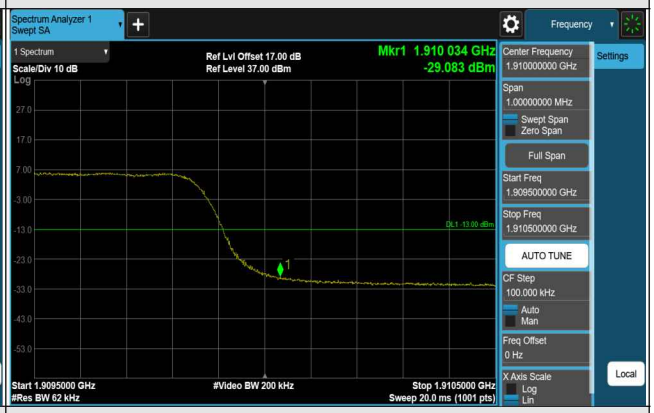
1RB (1851.5MHz)



1RB (1908.5MHz)



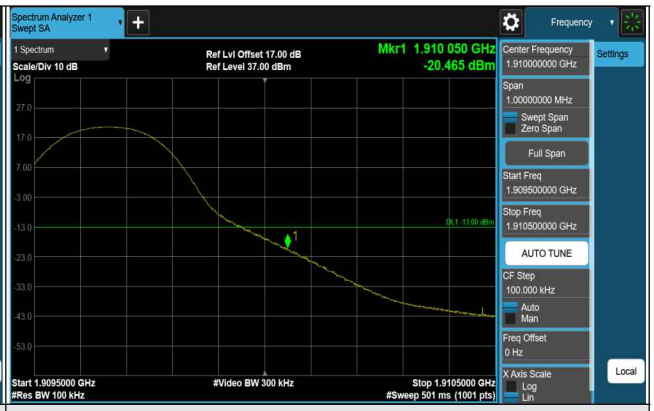
Full (1851.5MHz)



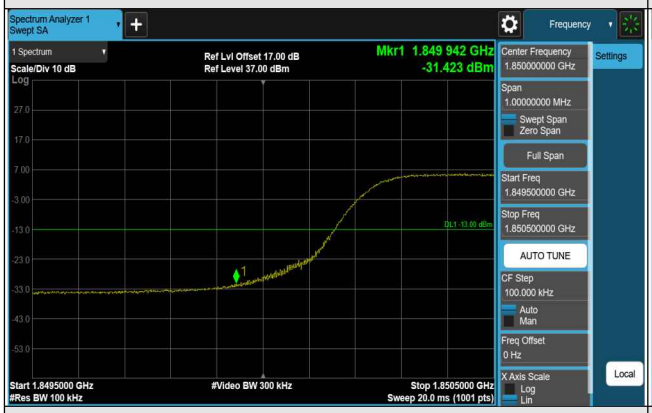
Full (1908.5MHz)

LTE Band 2 (Channel Bandwidth 5MHz)

1RB (1852.5MHz)



1RB (1907.5MHz)



Full (1852.5MHz)

Full (1907.5MHz)