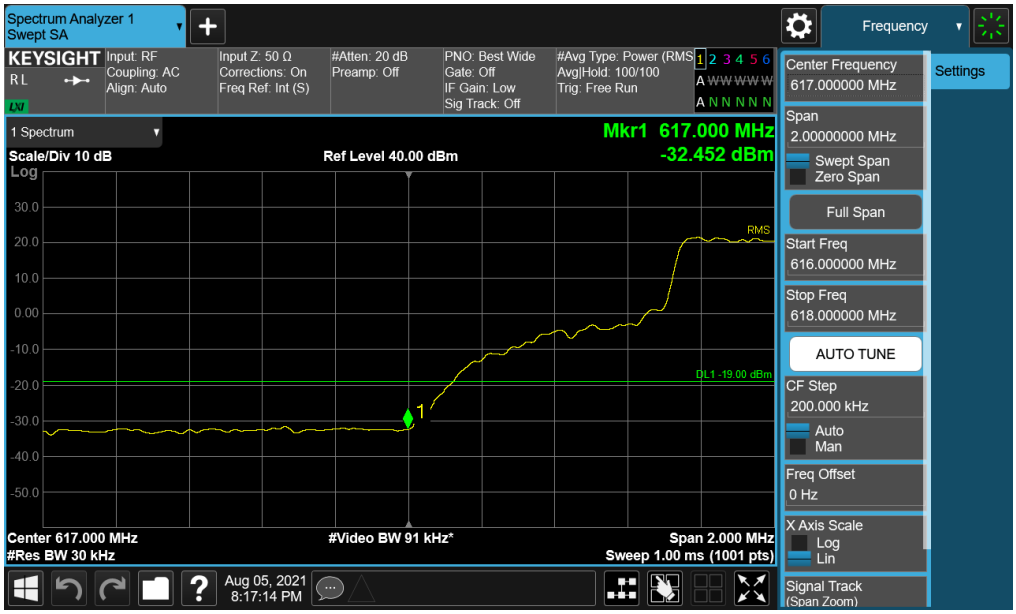
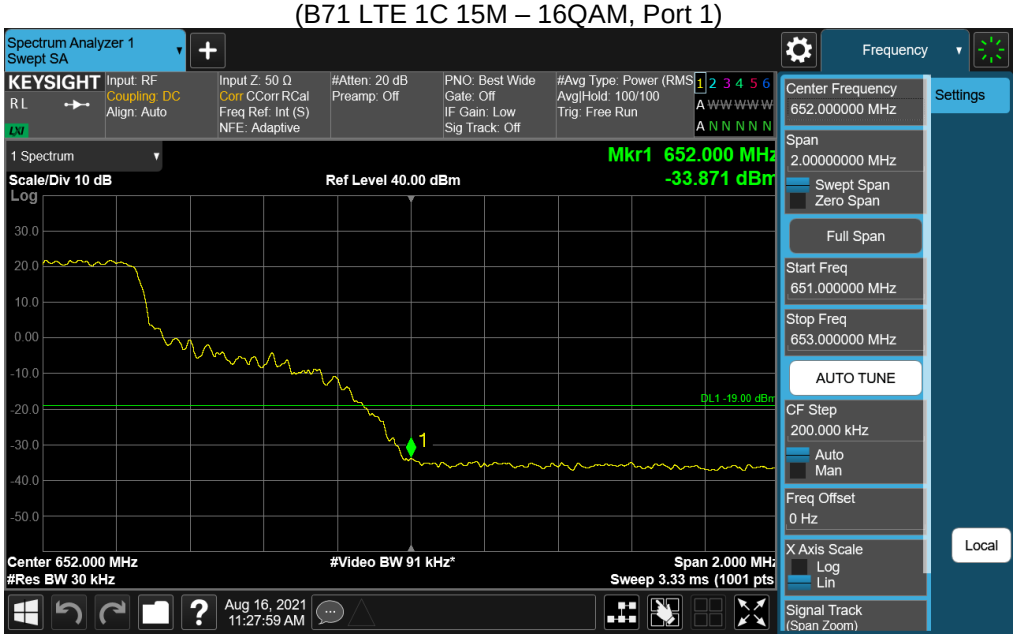


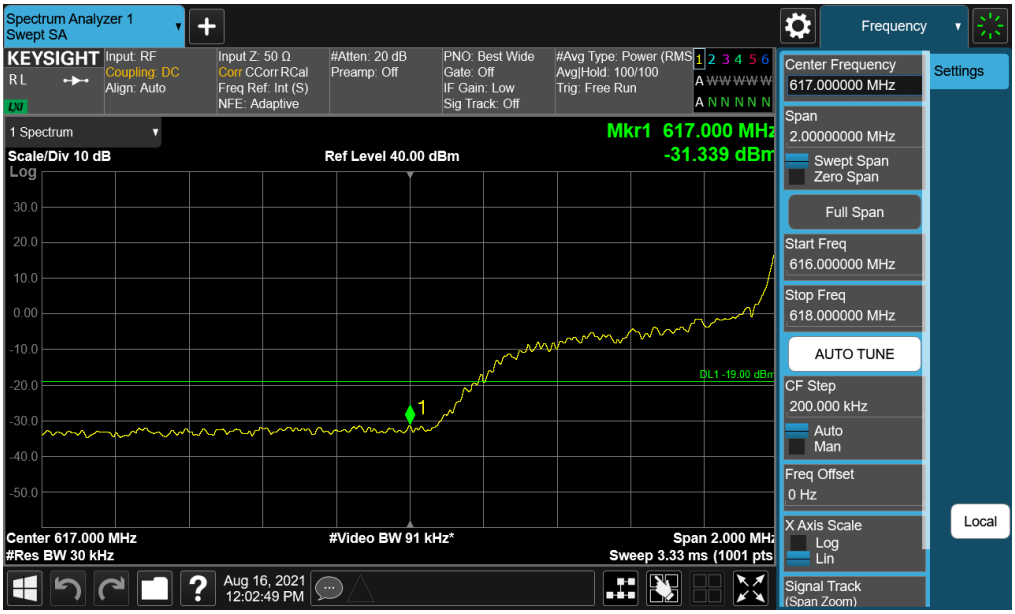
Plot 7-72. Lower Band Edge Emission Plot
(B71 LTE 1C 15M – 16QAM, Port 1)



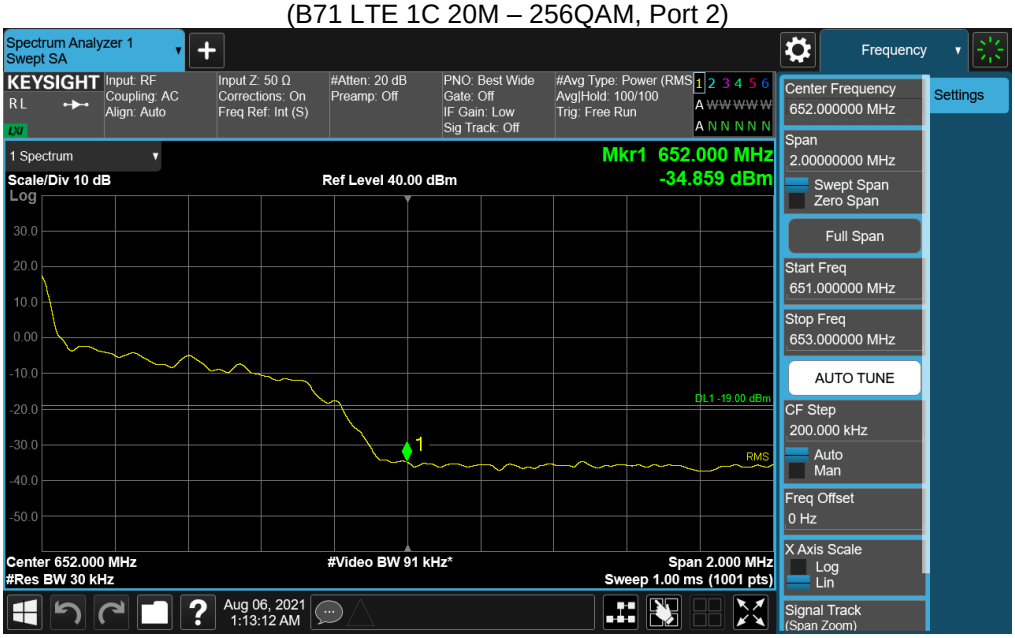
Plot 7-73. Upper Band Edge Emission Plot
(B71 LTE 1C 15M – 64QAM, Port 2)

Ch.	Port #	Max. Value (dBm)				Limit (dBm)
		QPSK	16QAM	64QAM	256QAM	
Low	0	-32.56	-32.55	-33.01	-33.72	-19.0
	1	-31.75	-33.09	-32.68	-31.98	-19.0
	2	-33.33	-31.39	-31.63	**-31.34**	-19.0
	3	-33.78	-34.62	-34.21	-32.92	-19.0
High	0	-36.57	**-34.86**	-36.48	-36.19	-19.0
	1	-35.56	-35.40	-36.92	-35.61	-19.0
	2	-36.29	-36.73	-36.24	-35.83	-19.0
	3	-37.23	-36.96	-36.28	-36.23	-19.0

Table 7-27. Band Edge Emission Summary Data
(B71 LTE 1C 20M)



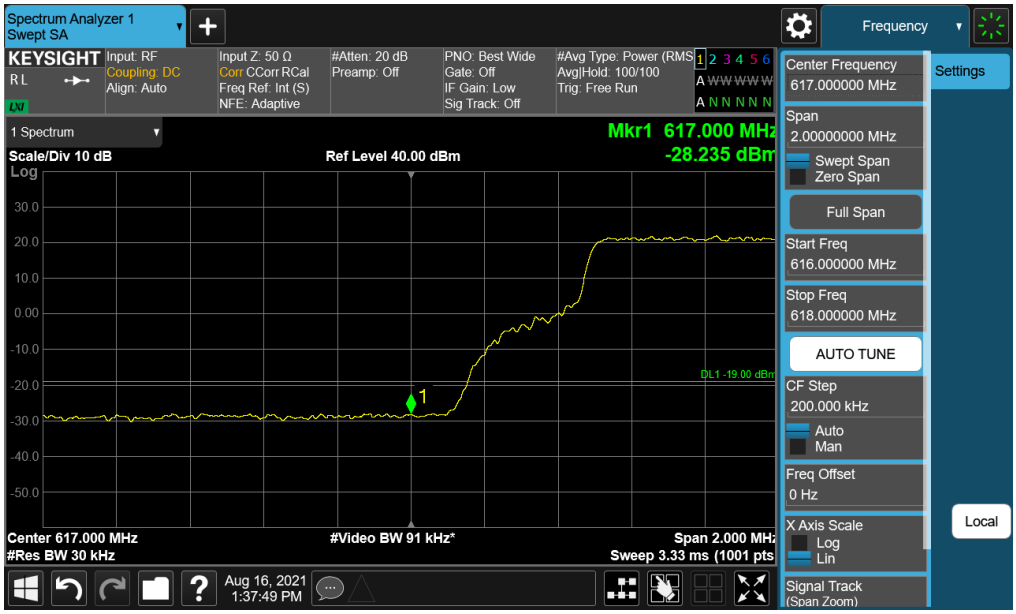
Plot 7-74. Lower Band Edge Emission Plot
(B71 LTE 1C 20M – 256QAM, Port 2)



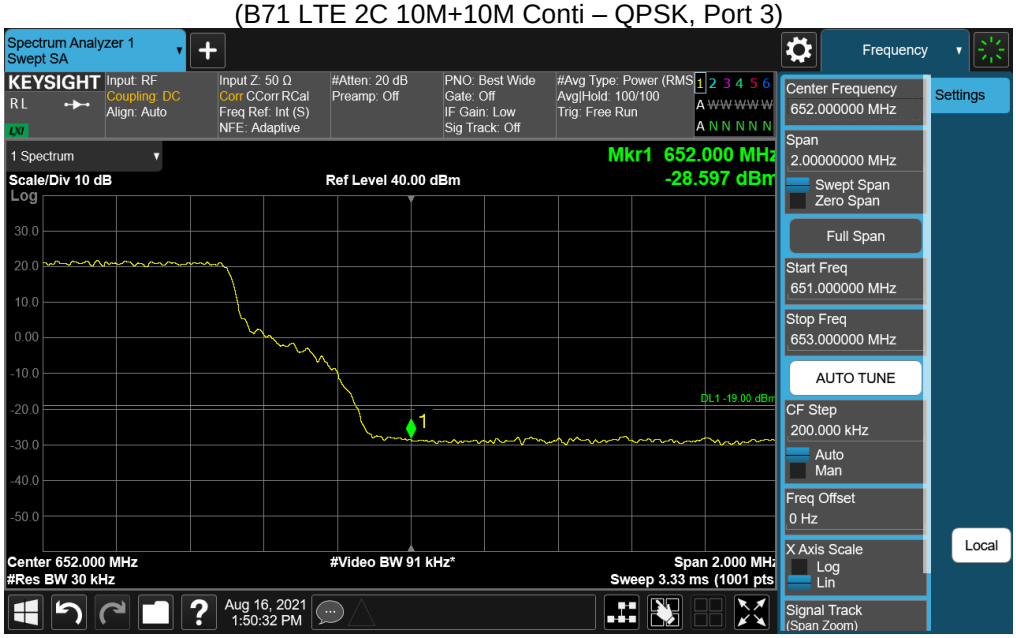
Plot 7-75. Upper Band Edge Emission Plot
(B71 LTE 1C 20M – 16QAM, Port 0)

Ch.	Port #	Max. Value (dBm)	Limit (dBm)
Low	0	-29.03	-19.0
	1	-30.08	-19.0
	2	-29.99	-19.0
	3	**-28.24**	-19.0
High	0	-32.06	-19.0
	1	**-28.60**	-19.0
	2	-29.79	-19.0
	3	-31.22	-19.0

Table 7-28. Band Edge Emission Summary Data (B71 LTE 2C 10M+10M Conti)



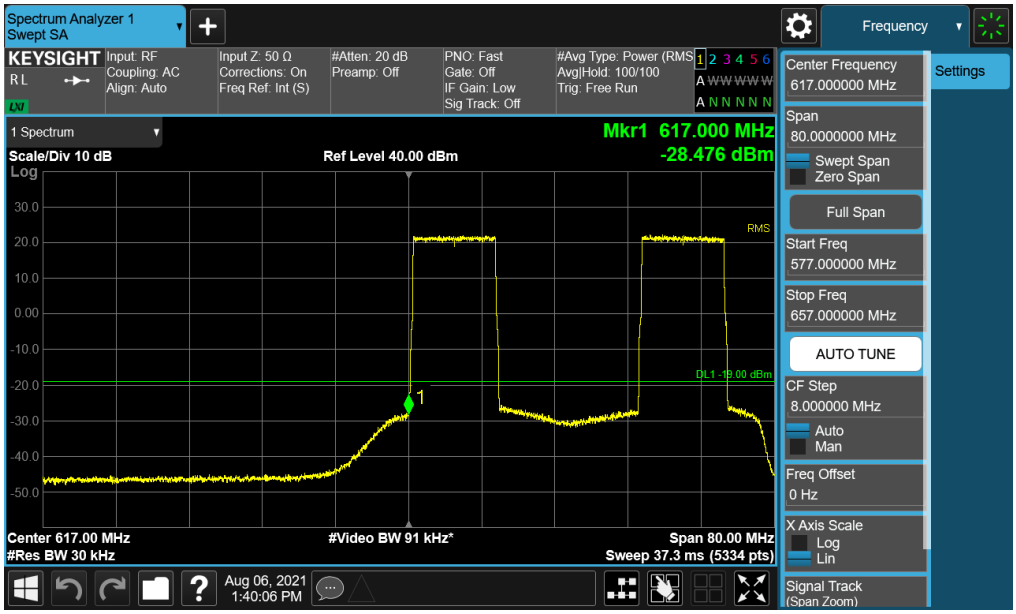
Plot 7-76. Lower Band Edge Emission Plot
(B71 LTE 2C 10M+10M Conti – QPSK, Port 3)



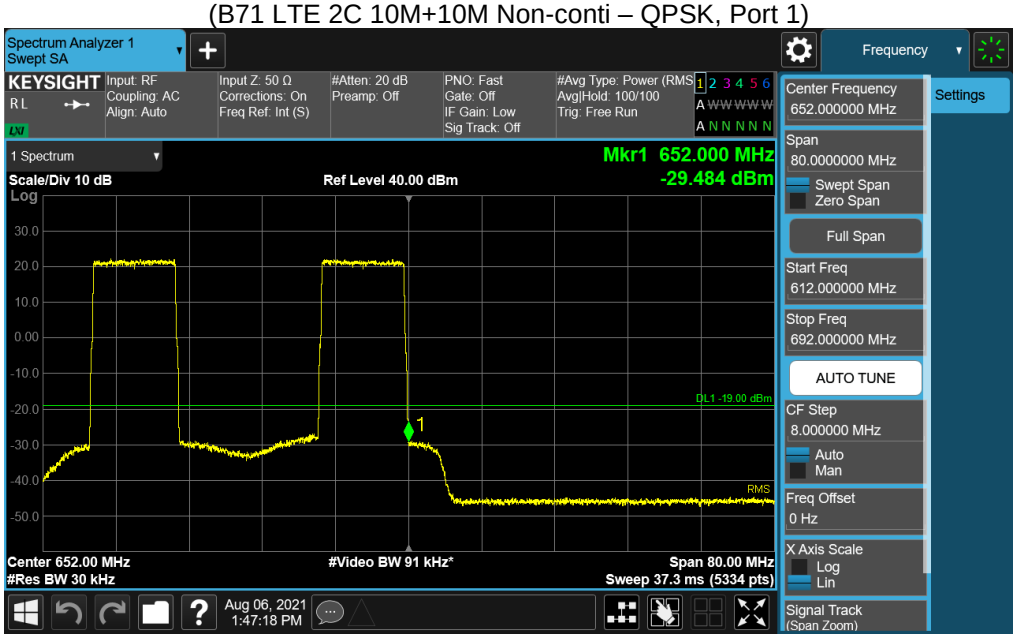
Plot 7-77. Upper Band Edge Emission Plot
(B71 LTE 2C 10M+10M Conti – QPSK, Port 1)

Ch.	Port #	Max. Value (dBm)	Limit (dBm)
Low	0	-30.63	-19.0
	1	**-28.48**	-19.0
	2	-29.51	-19.0
	3	-28.75	-19.0
High	0	-31.48	-19.0
	1	**-29.48**	-19.0
	2	-31.44	-19.0
	3	-31.34	-19.0

Table 7-29. Band Edge Emission Summary Data (B71 LTE 2C 10M+10M Non-conti)



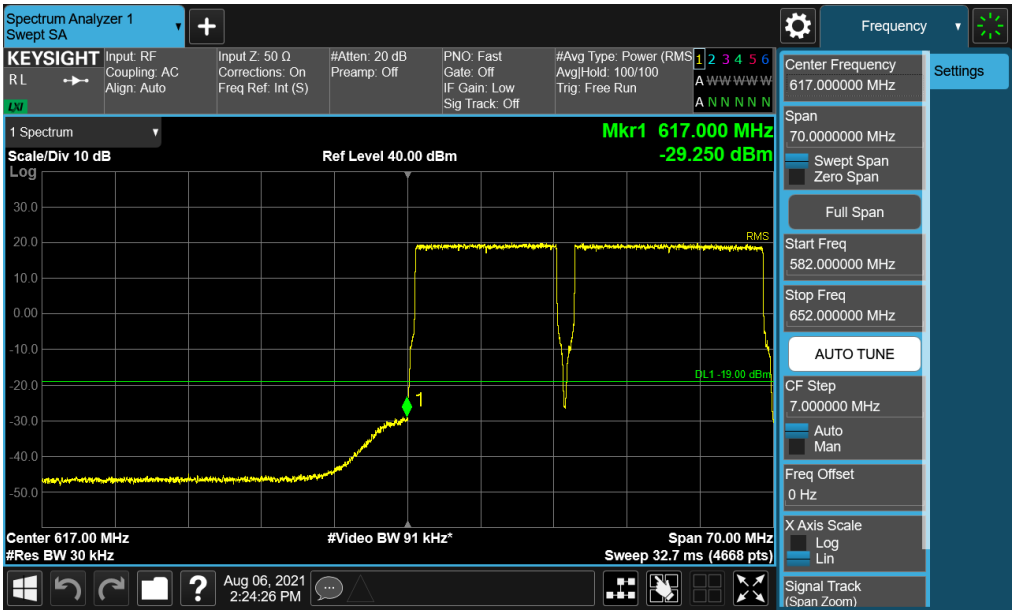
Plot 7-78. Lower Band Edge Emission Plot
(B71 LTE 2C 10M+10M Non-conti – QPSK, Port 1)



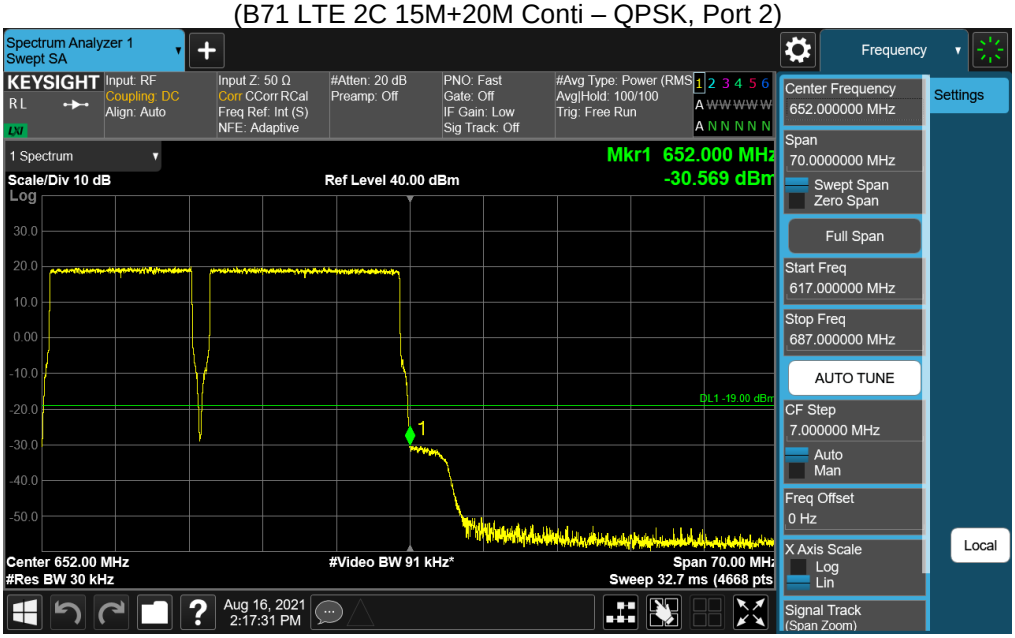
Plot 7-79. Upper Band Edge Emission Plot
(B71 LTE 2C 10M+10M Non-conti – QPSK, Port 1)

Ch.	Port #	Max. Value (dBm)	Limit (dBm)
Low	0	-32.36	-19.0
	1	-31.12	-19.0
	2	**-29.25**	-19.0
	3	-30.68	-19.0
High	0	-31.05	-19.0
	1	-30.90	-19.0
	2	**-30.57**	-19.0
	3	-32.76	-19.0

Table 7-30. Band Edge Emission Summary Data (B71 LTE 2C 15M+20M Conti)



Plot 7-80. Lower Band Edge Emission Plot
(B71 LTE 2C 15M+20M Conti – QPSK, Port 2)

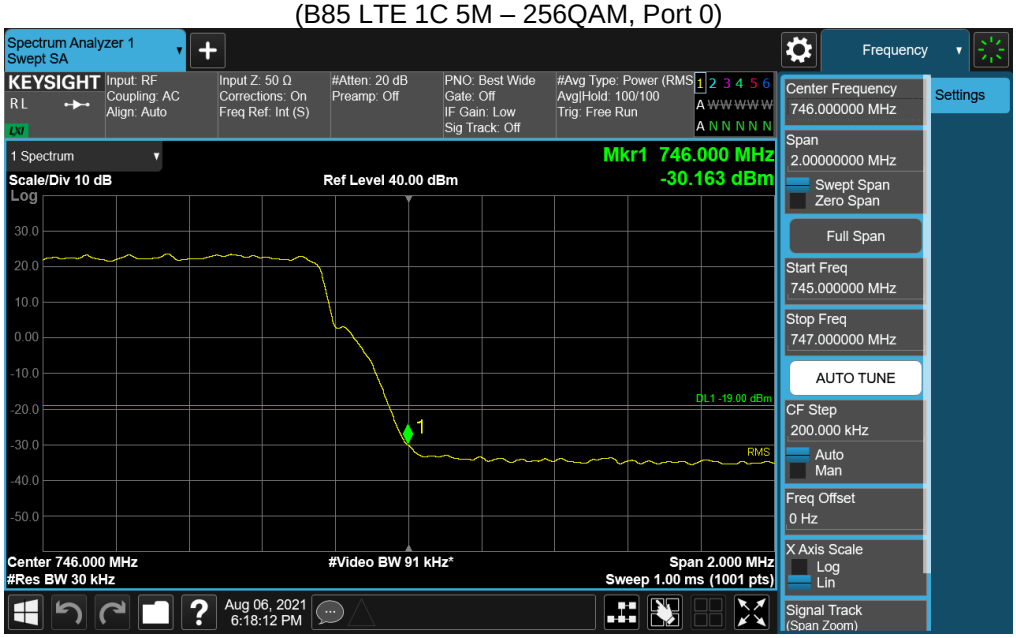


Plot 7-81. Upper Band Edge Emission Plot
(B71 LTE 2C 15M+20M Conti – QPSK, Port 2)

Ch.	Port #	Max. Value (dBm)				Limit (dBm)
		QPSK	16QAM	64QAM	256QAM	
Low	0	-30.30	-32.48	-32.11	**-30.14**	-19.0
	1	-30.20	-32.14	-30.39	-31.01	-19.0
	2	-32.22	-32.55	-32.88	-33.23	-19.0
	3	-31.72	-31.17	-31.65	-30.99	-19.0
High	0	-31.03	-31.19	-31.42	**-30.16**	-19.0
	1	-31.15	-30.50	-31.89	-31.48	-19.0
	2	-30.58	-31.49	-30.93	-32.19	-19.0
	3	-32.52	-31.16	-31.71	-31.48	-19.0

Table 7-31. Band Edge Emission Summary Data
(B85 LTE 1C 5M)

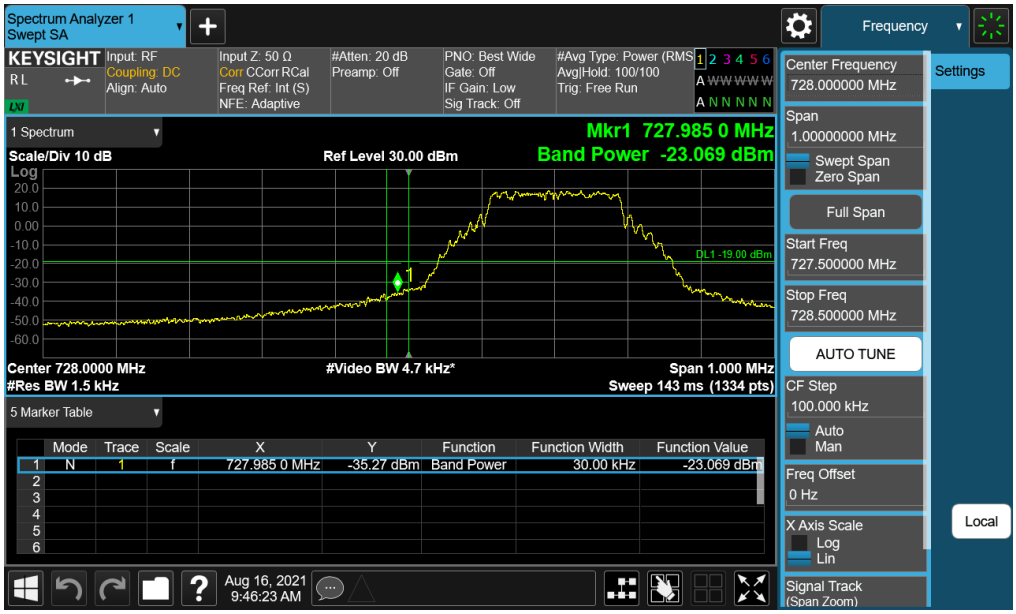
Plot 7-82. Lower Band Edge Emission Plot
(B85 LTE 1C 5M – 256QAM, Port 0)



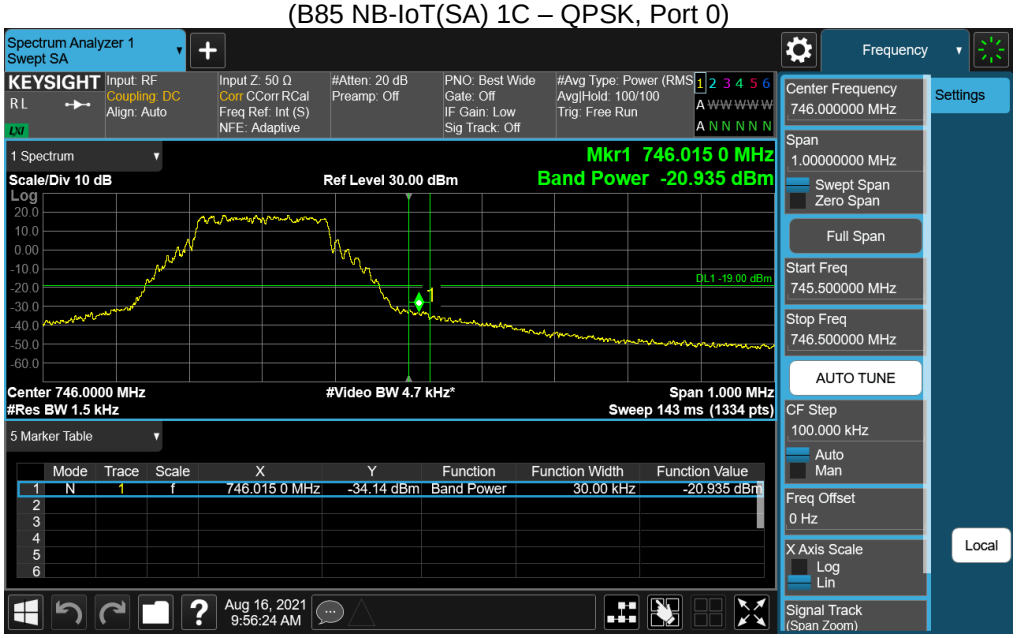
Plot 7-83. Upper Band Edge Emission Plot
(B85 LTE 1C 5M – 256QAM, Port 0)

Ch.	Port #	Max. Value (dBm)	Limit (dBm)
		QPSK	
Low	0	**-23.07**	-19.0
	1	-24.34	-19.0
	2	-23.90	-19.0
	3	-24.42	-19.0
High	0	-22.62	-19.0
	1	**-20.94**	-19.0
	2	-20.98	-19.0
	3	-20.99	-19.0

Table 7-32. Band Edge Emission Summary Data (B85 NB-IoT(SA) 1C)



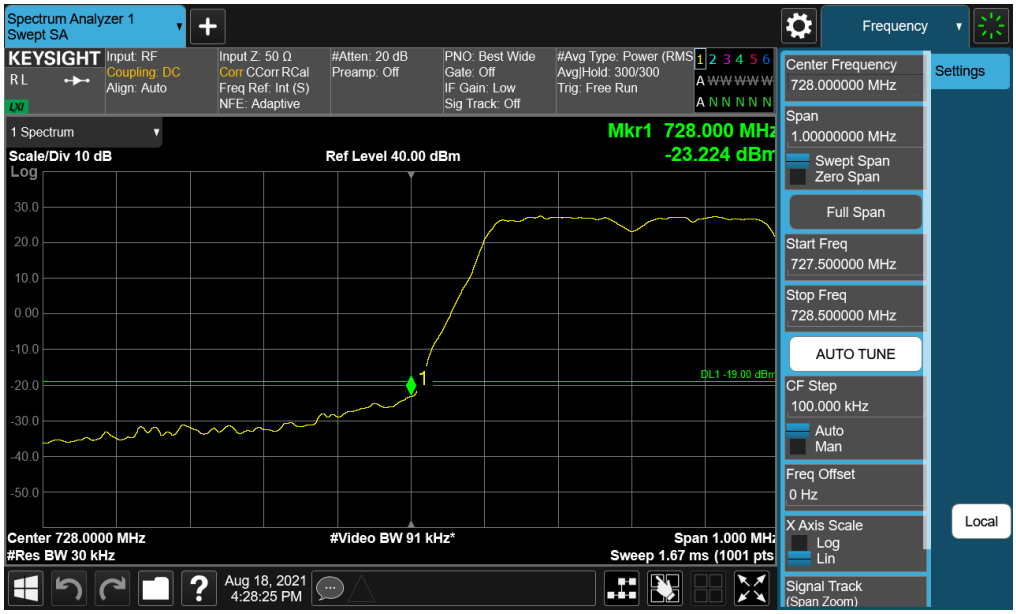
Plot 7-84. Lower Band Edge Emission Plot
(B85 NB-IoT(SA) 1C – QPSK, Port 0)



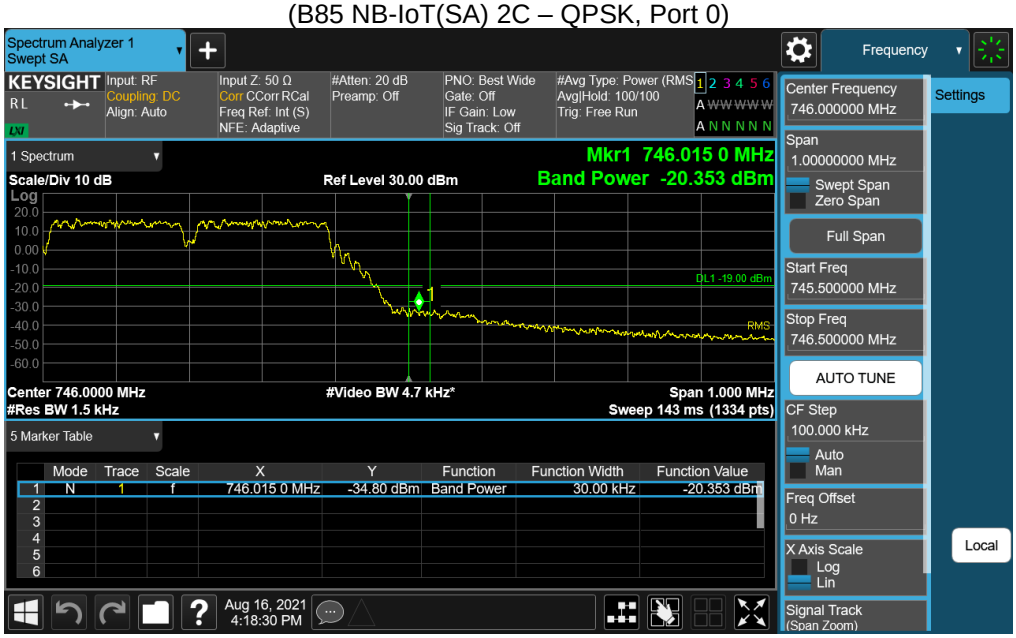
Plot 7-85. Upper Band Edge Emission Plot
(B85 NB-IoT(SA) 1C – QPSK, Port 1)

Ch.	Port #	Max. Value (dBm)	Limit (dBm)
		QPSK	
Low	0	**-23.22**	-19.0
	1	-25.05	-19.0
	2	-25.23	-19.0
	3	-24.79	-19.0
High	0	**-20.35**	-19.0
	1	-23.69	-19.0
	2	-20.99	-19.0
	3	-23.95	-19.0

Table 7-33. Band Edge Emission Summary Data (B85 NB-IoT(SA) 2C)



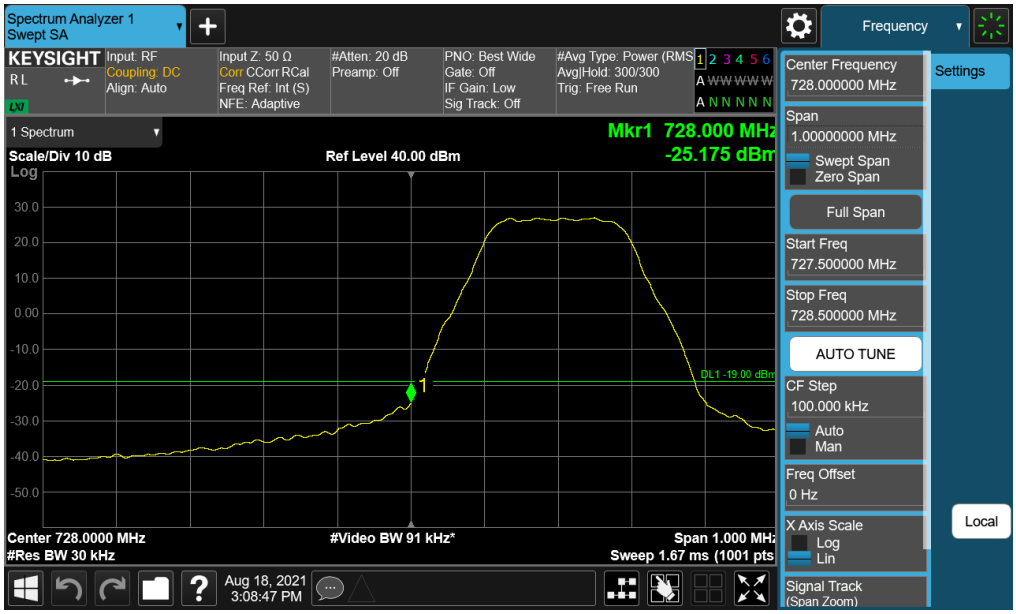
Plot 7-86. Lower Band Edge Emission Plot
(B85 NB-IoT(SA) 2C – QPSK, Port 0)



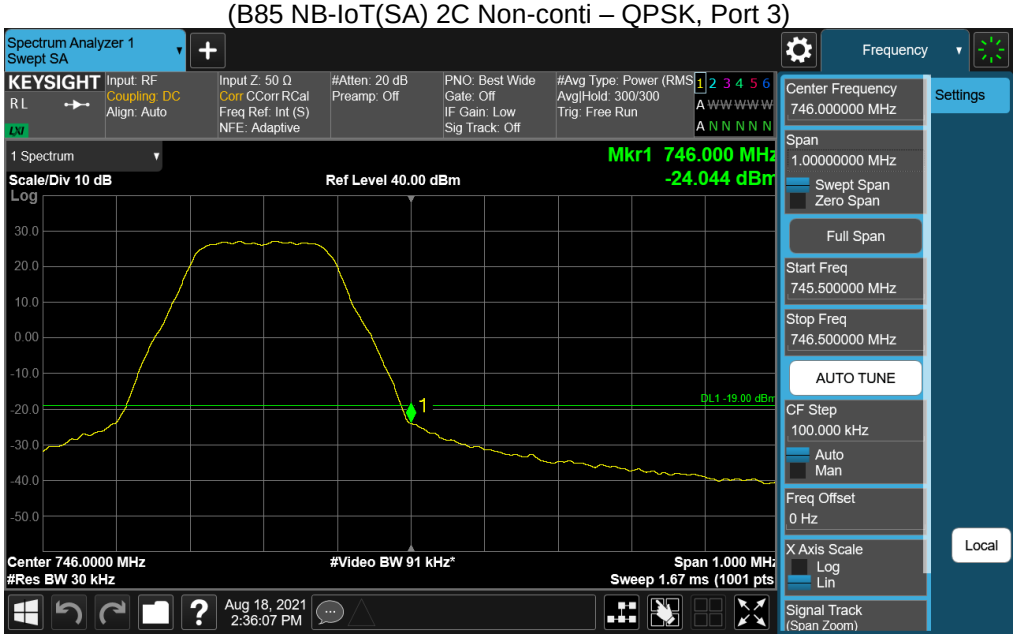
Plot 7-87. Upper Band Edge Emission Plot
(B85 NB-IoT(SA) 2C – QPSK, Port 0)

Ch.	Port #	Max. Value (dBm)	Limit (dBm)
		QPSK	
Low	0	-27.03	-19.0
	1	-26.74	-19.0
	2	-27.12	-19.0
	3	**-25.18**	-19.0
High	0	-25.01	-19.0
	1	**-24.04**	-19.0
	2	-25.37	-19.0
	3	-25.10	-19.0

Table 7-34. Band Edge Emission Summary Data
(B85 NB-IoT(SA) 2C Non-conti)



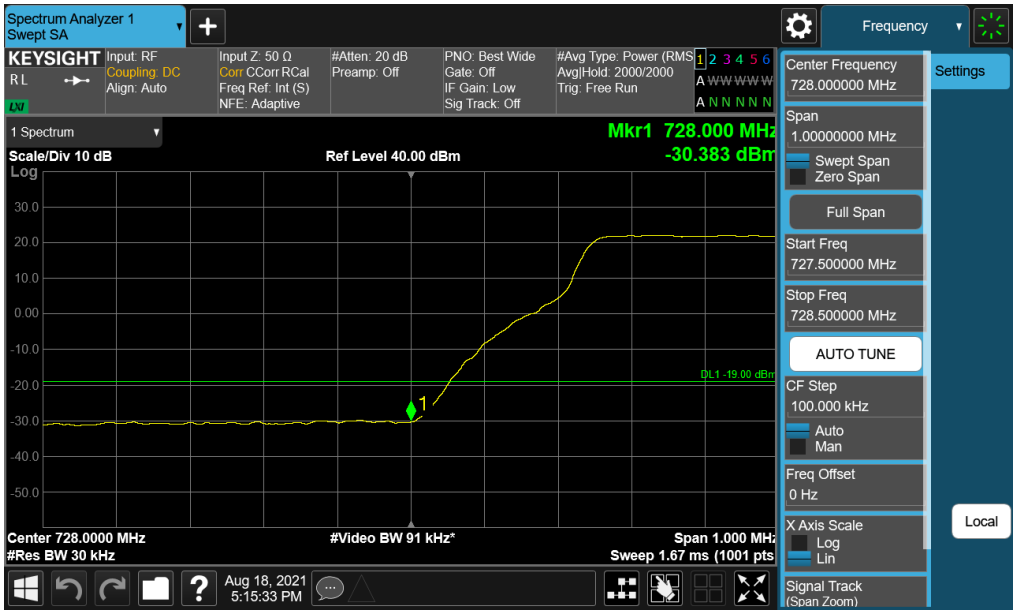
Plot 7-88. Lower Band Edge Emission Plot
(B85 NB-IoT(SA) 2C Non-conti – QPSK, Port 3)



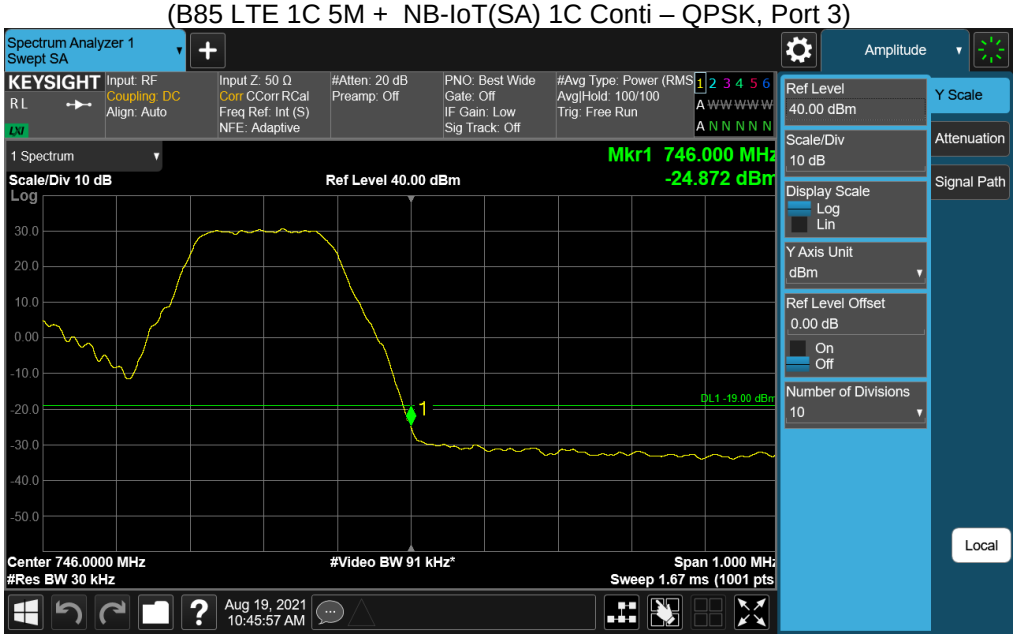
Plot 7-89. Upper Band Edge Emission Plot
(B85 NB-IoT(SA) 2C Non-conti – QPSK, Port 1)

Ch.	Port #	Max. Value (dBm)	Limit (dBm)
		QPSK	
Low	0	-31.73	-19.0
	1	-30.41	-19.0
	2	-32.10	-19.0
	3	**-30.38**	-19.0
High	0	-26.15	-19.0
	1	-24.99	-19.0
	2	**-24.87**	-19.0
	3	-25.14	-19.0

Table 7-35. Band Edge Emission Summary Data (B85 LTE 1C 5M + NB-IoT(SA) 1C Conti)



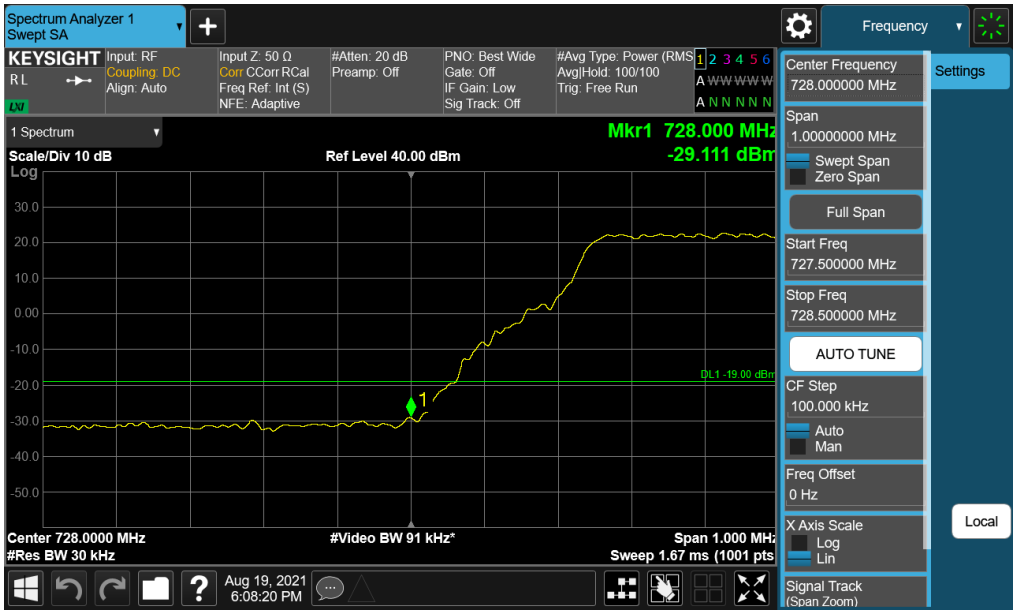
Plot 7-90. Lower Band Edge Emission Plot
(B85 LTE 1C 5M + NB-IoT(SA) 1C Conti – QPSK, Port 3)



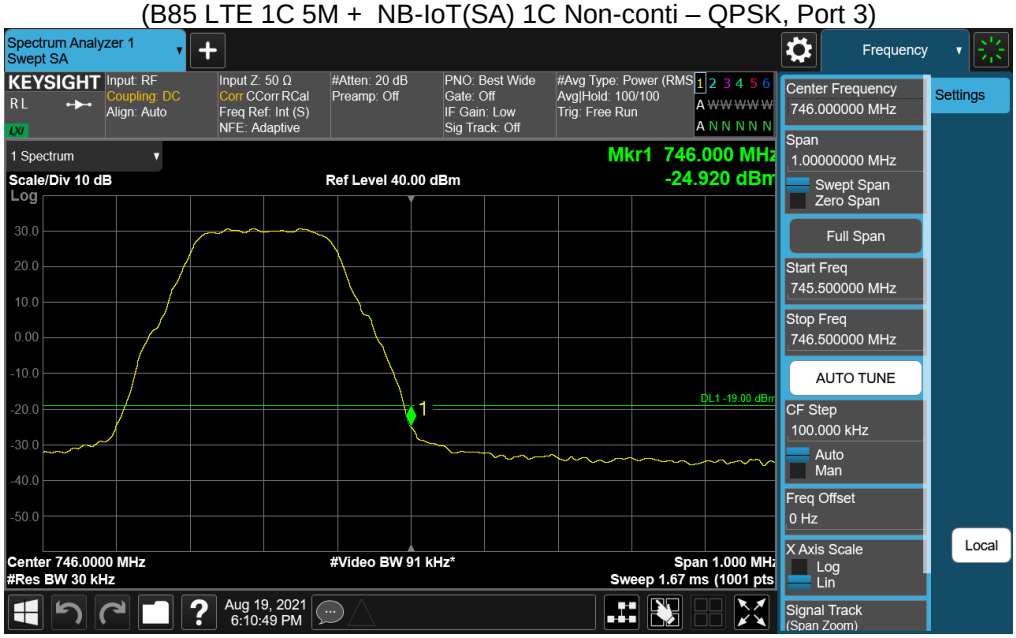
Plot 7-91. Upper Band Edge Emission Plot
(B85 LTE 1C 5M + NB-IoT(SA) 1C Conti – QPSK, Port 2)

Ch.	Port #	Max. Value (dBm)	Limit (dBm)
		QPSK	
Low	0	-31.31	-19.0
	1	-33.42	-19.0
	2	-33.19	-19.0
	3	**-29.11**	-19.0
High	0	-25.06	-19.0
	1	-26.14	-19.0
	2	-25.38	-19.0
	3	**-24.92**	-19.0

Table 7-36. Band Edge Emission Summary Data
(B85 LTE 1C 5M + NB-IoT(SA) 1C Non-conti)



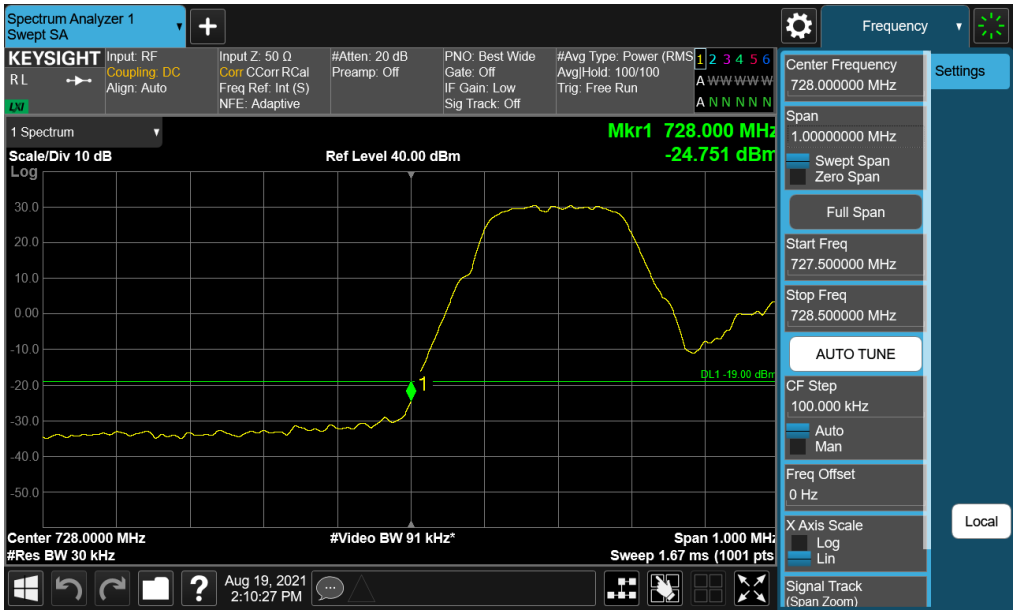
Plot 7-92. Lower Band Edge Emission Plot
(B85 LTE 1C 5M + NB-IoT(SA) 1C Non-conti – QPSK, Port 3)



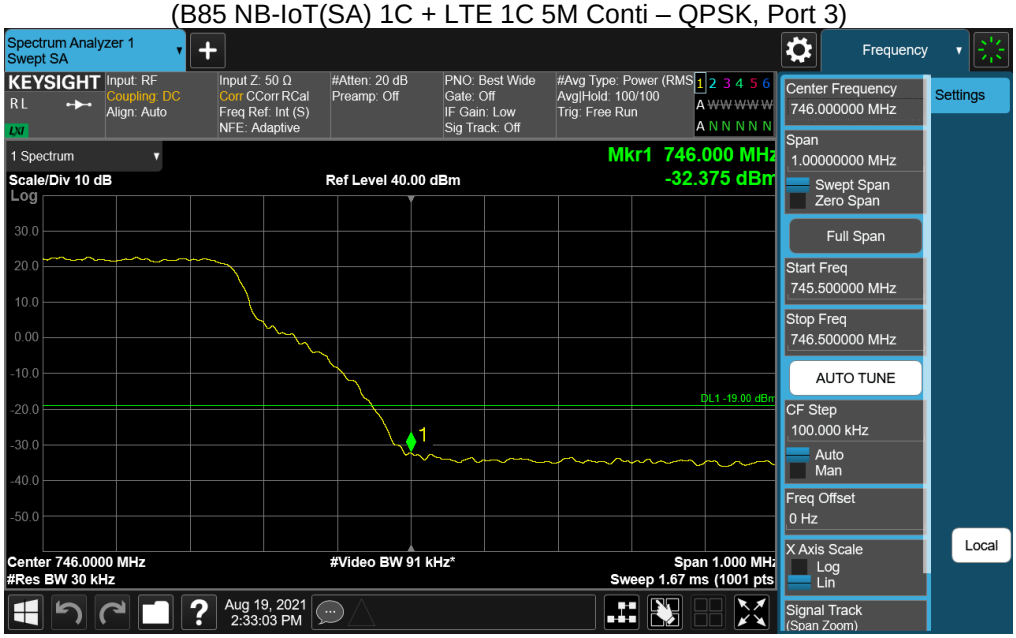
Plot 7-93. Upper Band Edge Emission Plot
(B85 LTE 1C 5M + NB-IoT(SA) 1C Non-conti – QPSK, Port 3)

Ch.	Port #	Max. Value (dBm)	Limit (dBm)
		QPSK	
Low	0	-25.86	-19.0
	1	-26.36	-19.0
	2	-25.73	-19.0
	3	**-24.75**	-19.0
High	0	-32.87	-19.0
	1	-33.50	-19.0
	2	-32.64	-19.0
	3	**-32.38**	-19.0

Table 7-37. Band Edge Emission Summary Data
(B85 NB-IoT(SA) 1C + LTE 1C 5M Conti)



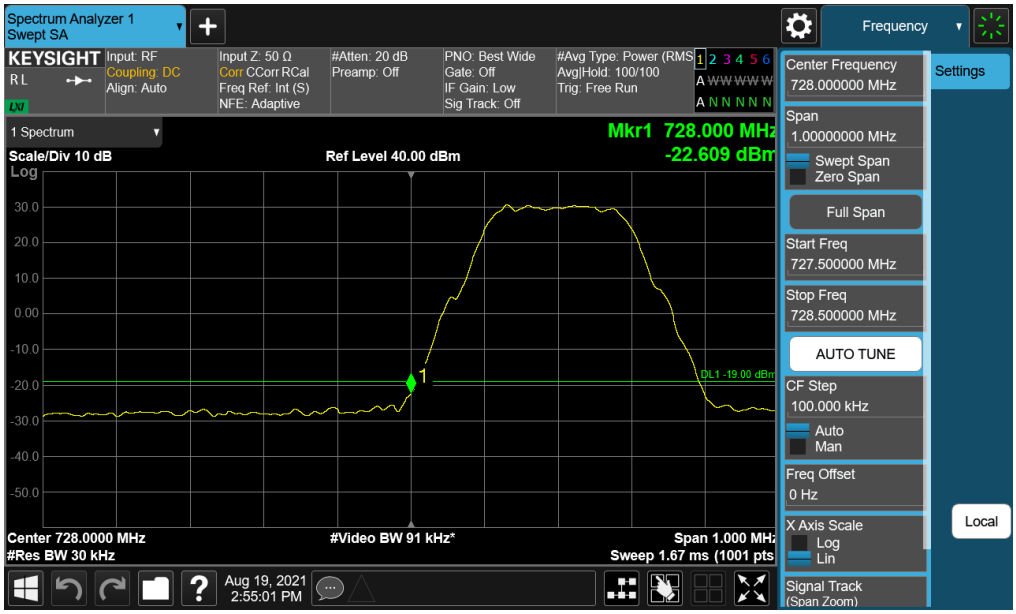
Plot 7-94. Lower Band Edge Emission Plot
(B85 NB-IoT(SA) 1C + LTE 1C 5M Conti – QPSK, Port 3)



Plot 7-95. Upper Band Edge Emission Plot
(B85 NB-IoT(SA) 1C + LTE 1C 5M Conti – QPSK, Port 3)

Ch.	Port #	Max. Value (dBm)	Limit (dBm)
		QPSK	
Low	0	**-22.61**	-19.0
	1	-23.92	-19.0
	2	-25.30	-19.0
	3	-23.89	-19.0
High	0	-31.11	-19.0
	1	-32.77	-19.0
	2	-30.52	-19.0
	3	**-30.16**	-19.0

Table 7-38. Band Edge Emission Summary Data
(B85 NB-IoT(SA) 1C + LTE 1C 5M Non-conti)

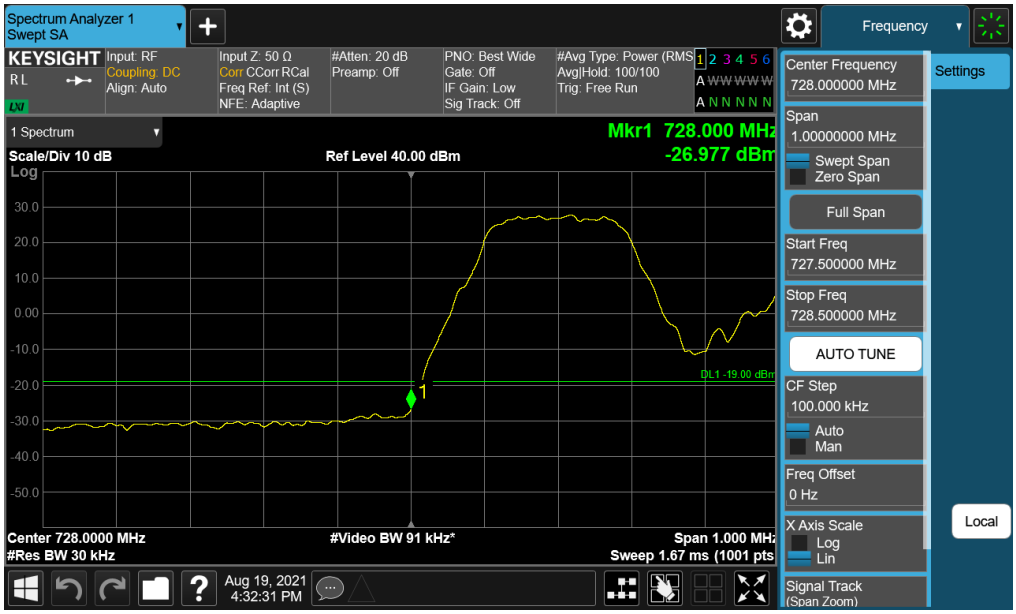


Plot 7-96. Lower Band Edge Emission Plot
(B85 NB-IoT(SA) 1C + LTE 1C 5M Non-conti – QPSK, Port 0)

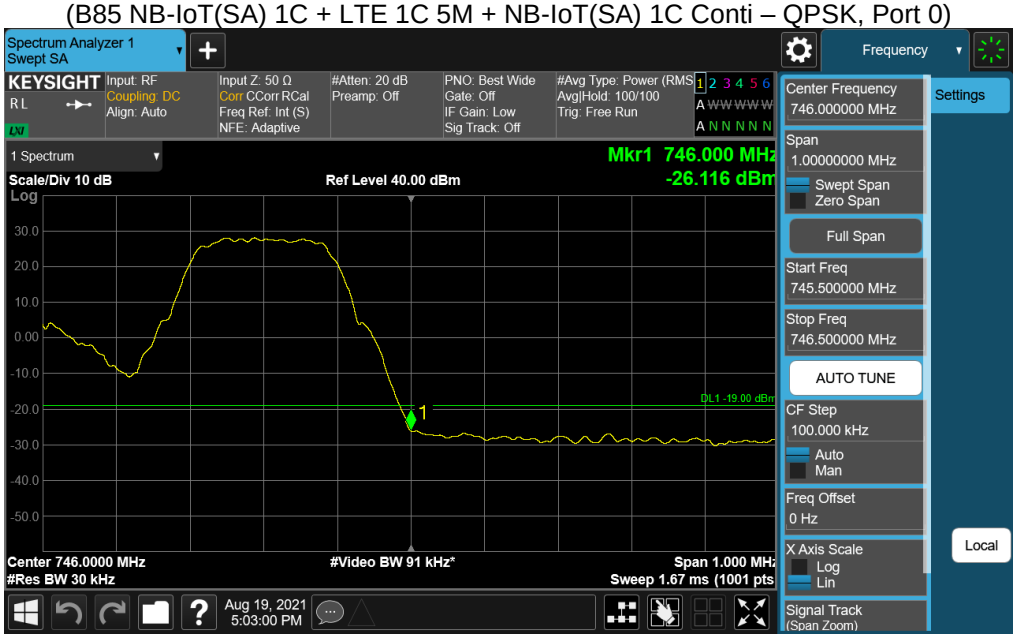
Plot 7-97. Upper Band Edge Emission Plot
(B85 NB-IoT(SA) 1C + LTE 1C 5M Non-conti – QPSK, Port 3)

Ch.	Port #	Max. Value (dBm)	Limit (dBm)
		QPSK	
Low	0	**-26.98**	-19.0
	1	-27.19	-19.0
	2	-28.28	-19.0
	3	-28.56	-19.0
High	0	-27.00	-19.0
	1	-26.68	-19.0
	2	-26.25	-19.0
	3	**-26.12**	-19.0

Table 7-39. Band Edge Emission Summary Data
(B85 NB-IoT(SA) 1C + LTE 1C 5M + NB-IoT(SA) 1C Conti)



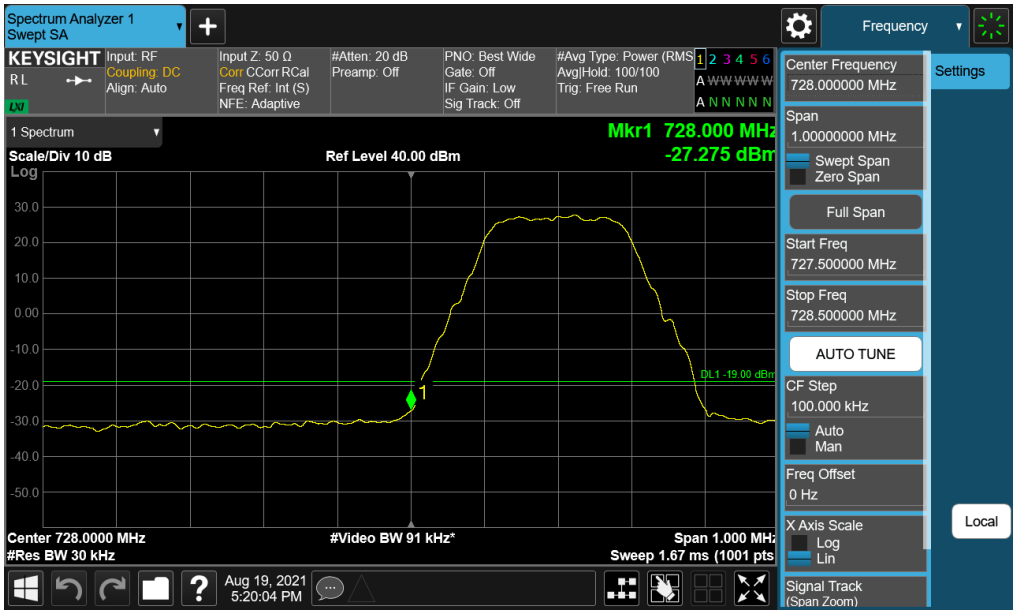
Plot 7-98. Lower Band Edge Emission Plot
(B85 NB-IoT(SA) 1C + LTE 1C 5M + NB-IoT(SA) 1C Conti – QPSK, Port 0)



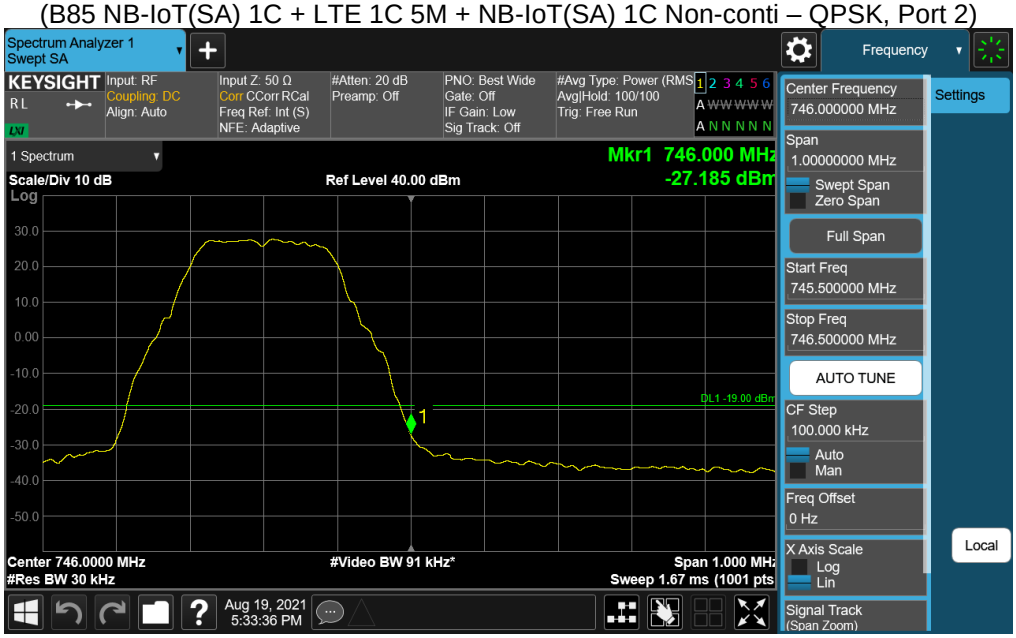
Plot 7-99. Upper Band Edge Emission Plot
(B85 NB-IoT(SA) 1C + LTE 1C 5M + NB-IoT(SA) 1C Conti – QPSK, Port 3)

Ch.	Port #	Max. Value (dBm)	Limit (dBm)
		QPSK	
Low	0	-28.28	-19.0
	1	-28.44	-19.0
	2	**-27.28**	-19.0
	3	-27.37	-19.0
High	0	-28.48	-19.0
	1	-28.54	-19.0
	2	**-27.19**	-19.0
	3	-28.41	-19.0

Table 7-40. Band Edge Emission Summary Data
(B85 NB-IoT(SA) 1C + LTE 1C 5M + NB-IoT(SA) 1C Non-conti)



Plot 7-100. Lower Band Edge Emission Plot
(B85 NB-IoT(SA) 1C + LTE 1C 5M + NB-IoT(SA) 1C Non-conti – QPSK, Port 2)



Plot 7-101. Upper Band Edge Emission Plot
(B85 NB-IoT(SA) 1C + LTE 1C 5M + NB-IoT(SA) 1C Non-conti – QPSK - Port 2)

7.6 Spurious and Harmonic Emissions at Antenna Terminal

§ 2.1051, § 27.53(g)

Test Overview

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. 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.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 6
KDB 662911 D01 v02r01 – Section E)3) Out-of-Band and Spurious Emission Measurements
a) Absolute Emission Limits
iii) Measure and add 10 log(N_{ANT}) dB
ANSI C63.26-2015 – Section 5.7

Test Setting

1. Start frequency was set to 9 kHz and stop frequency was set to at least 10 * the fundamental frequency excluding the frequency range of the band edge measurement.
2. RBW: Please see test notes below.
3. VBW ≥ 3 x RBW
4. Detector = RMS
5. Number of sweep points ≥ 2 x Span/RBW
6. Trace mode = trace average
7. Sweep time = auto couple
8. The trace was allowed to stabilize

Limit

The minimum permissible attenuation level of any spurious emission is 43 + $\log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.
The power of any emission outside of the authorized operating frequency range cannot exeed -13 dBm. The limit is adjusted to -19 dBm [-13 dBm - 10 log (4)] per KDB 662911 D01 v02r01 - section E)3) because the EUT operate as a 4 port MIMO transmitter.

Test Setup

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

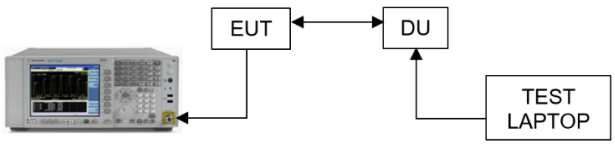


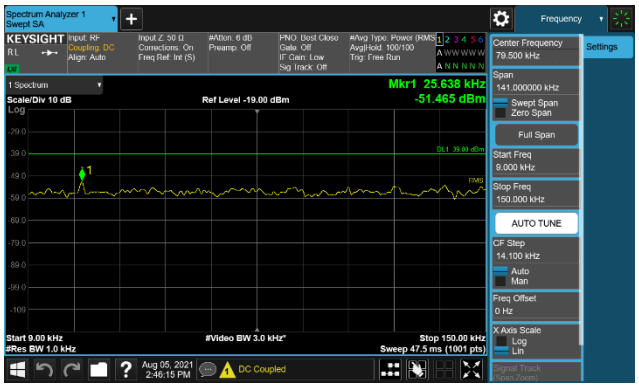
Figure 7-6. Test Instrument & Measurement Setup

Test Notes

1. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.
2. Testing was conducted for all ports but worst port and worst modulation were reported.
3. To increase accuracy, the limit for the 9kHz to 150kHz frequency range was adjusted to -39dBm to correct for a spectrum analyzer RBW of 1kHz versus required RBW of 100kHz [i.e.: -39dBm = -19dBm -10log(100kHz/1kHz)].
   The limit for the 150kHz to 30MHz frequency range was adjusted to -29dBm to correct for a spectrum analyzer RBW of 10kHz versus required RBW of 100kHz [i.e.: -29dBm = -19dBm -10log(100kHz/10kHz)].
   The required limit of -19dBm with a RBW of > 100kHz was used for all other frequency ranges.

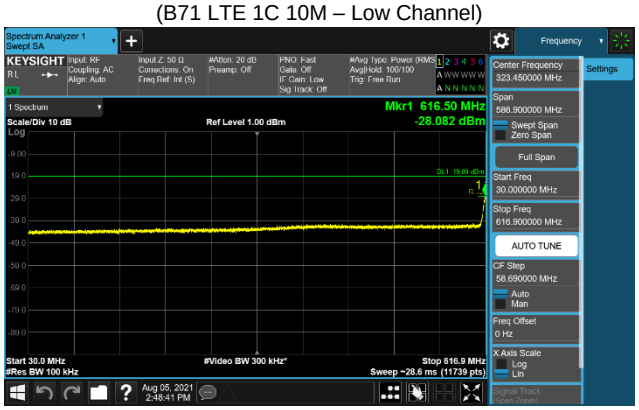
Ch.	Port #	Measurement Range	Level (dBm)	Limit (dBm)
			16QAM	
Low	2	9 kHz to 150 kHz	-51.47	-39.0
		150 kHz to 30 MHz	-40.49	-29.0
		30 MHz to 616.9 MHz	-28.08	-19.0
		652.1 MHz to 1 GHz	-31.64	-19.0
		1 GHz to 8 GHz	-38.14	-19.0
Middle	2	9 kHz to 150 kHz	-51.57	-39.0
		150 kHz to 30 MHz	-39.87	-29.0
		30 MHz to 616.9 MHz	-34.68	-19.0
		652.1 MHz to 1 GHz	-33.04	-19.0
		1 GHz to 8 GHz	-37.72	-19.0
High	1	9 kHz to 150 kHz	-51.42	-39.0
		150 kHz to 30 MHz	-39.77	-29.0
		30 MHz to 616.9 MHz	-33.92	-19.0
		652.1 MHz to 1 GHz	-29.71	-19.0
		1 GHz to 8 GHz	-39.77	-19.0

Table 7-41. Conducted Spurious Emission Summary Data (B71 LTE 1C 10M)

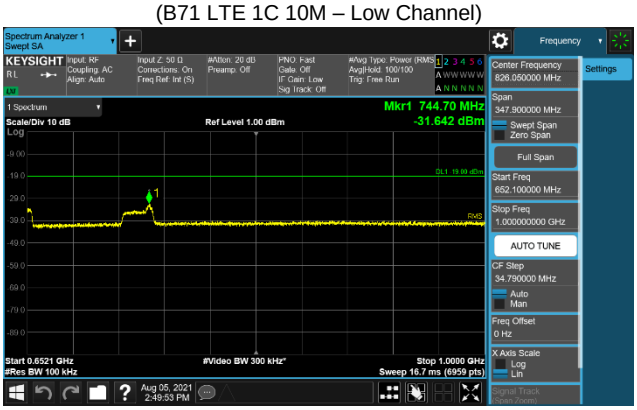


Plot 7-102. Conducted Spurious Emission Plot (9kHz to 150kHz)
(B71 LTE 1C 10M – Low Channel)

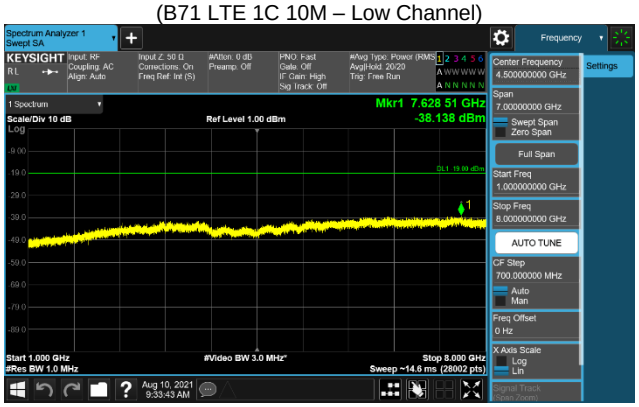
Plot 7-103. Conducted Spurious Emission Plot (150kHz to 30MHz)
(B71 LTE 1C 10M – Low Channel)



Plot 7-104. Conducted Spurious Emission Plot (30MHz to 616.9MHz)
(B71 LTE 1C 10M – Low Channel)



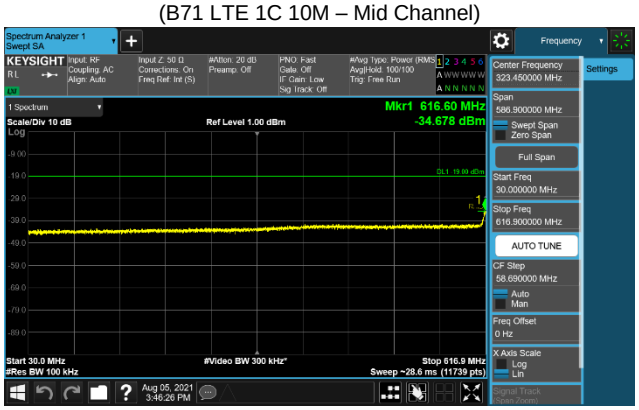
Plot 7-105. Conducted Spurious Emission Plot (652.1MHz to 1GHz)
(B71 LTE 1C 10M – Low Channel)



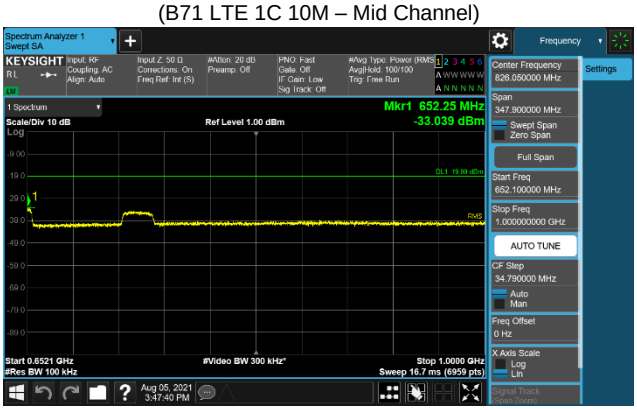
Plot 7-106. Conducted Spurious Emission Plot (1GHz to 8GHz)
(B71 LTE 1C 10M – Low Channel)

Plot 7-107. Conducted Spurious Emission Plot (9kHz to 150kHz)
(B71 LTE 1C 10M – Mid Channel)

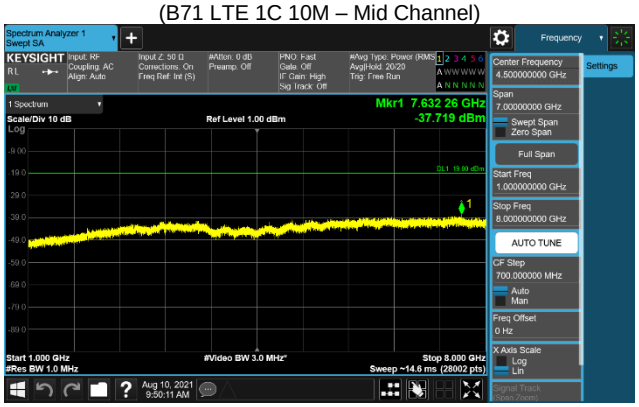
Plot 7-108. Conducted Spurious Emission Plot (150kHz to 30MHz)
(B71 LTE 1C 10M – Mid Channel)



Plot 7-109. Conducted Spurious Emission Plot (30MHz to 616.9MHz)
(B71 LTE 1C 10M – Mid Channel)

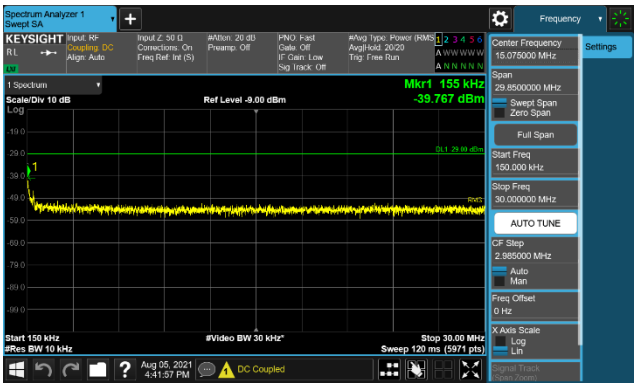


Plot 7-110. Conducted Spurious Emission Plot (652.1MHz to 1GHz)
(B71 LTE 1C 10M – Mid Channel)

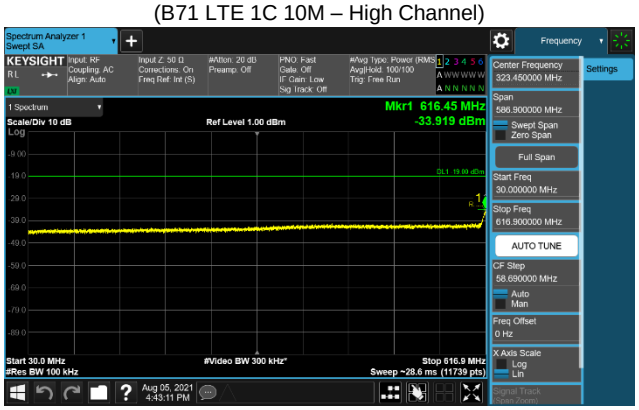


Plot 7-111. Conducted Spurious Emission Plot (1GHz to 8GHz)
(B71 LTE 1C 10M – Mid Channel)

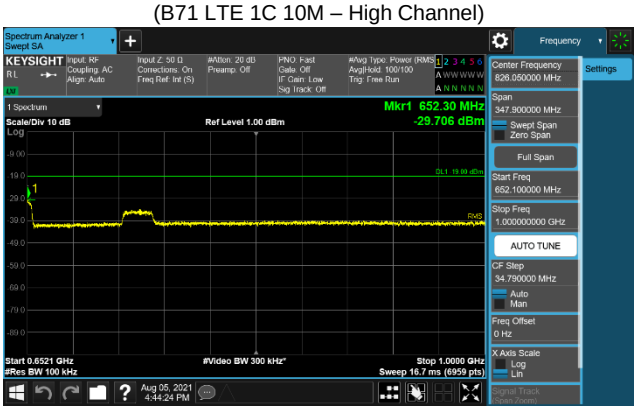
Plot 7-112. Conducted Spurious Emission Plot (9kHz to 150kHz)
(B71 LTE 1C 10M – High Channel)



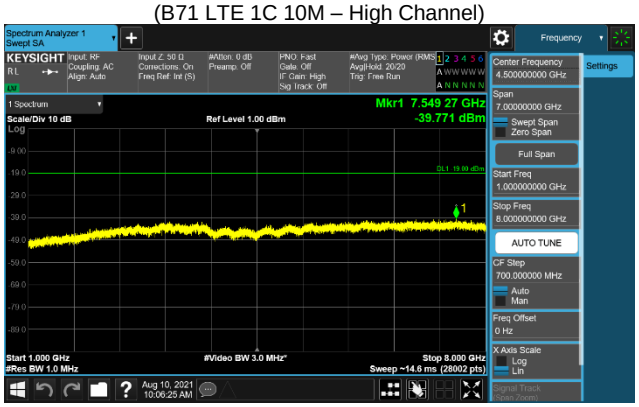
Plot 7-113. Conducted Spurious Emission Plot (150kHz to 30MHz)
(B71 LTE 1C 10M – High Channel)



Plot 7-114. Conducted Spurious Emission Plot (30MHz to 616.9MHz)
(B71 LTE 1C 10M – High Channel)



Plot 7-115. Conducted Spurious Emission Plot (652.1MHz to 1GHz)
(B71 LTE 1C 10M – High Channel)



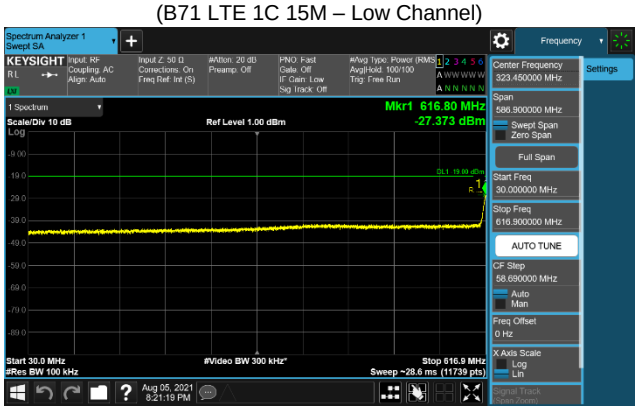
Plot 7-116. Conducted Spurious Emission Plot (1GHz to 8GHz)
(B71 LTE 1C 10M – High Channel)

Ch.	Port #	Measurement Range	Level(dBm)	Limit (dBm)
			16QAM	
Low	2	9 kHz to 150 kHz	-49.13	-39.0
		150 kHz to 30 MHz	-40.33	-29.0
		30 MHz to 616.9 MHz	-27.37	-19.0
		652.1 MHz to 1 GHz	-31.86	-19.0
		1 GHz to 8 GHz	-38.04	-19.0
Middle	3	9 kHz to 150 kHz	-50.26	-39.0
		150 kHz to 30 MHz	-41.32	-29.0
		30 MHz to 616.9 MHz	-33.40	-19.0
		652.1 MHz to 1 GHz	-32.10	-19.0
		1 GHz to 8 GHz	-37.50	-19.0
High	1	9 kHz to 150 kHz	-50.39	-39.0
		150 kHz to 30 MHz	-41.04	-29.0
		30 MHz to 616.9 MHz	-34.33	-19.0
		652.1 MHz to 1 GHz	-29.84	-19.0
		1 GHz to 8 GHz	-39.77	-19.0

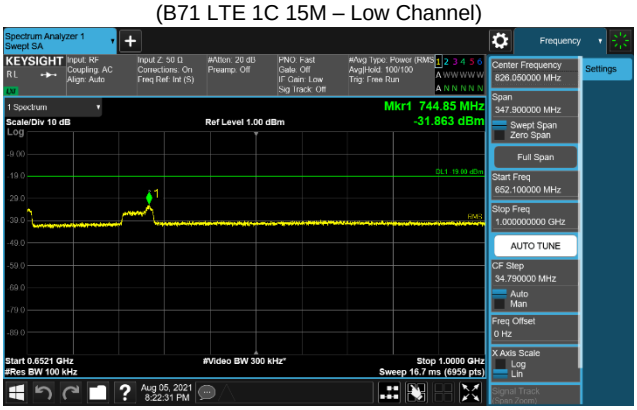
Table 7-42. Conducted Spurious Emission Summary Data (B71 LTE 1C 15M)

Plot 7-117. Conducted Spurious Emission Plot (9kHz to 150kHz)
(B71 LTE 1C 15M – Low Channel)

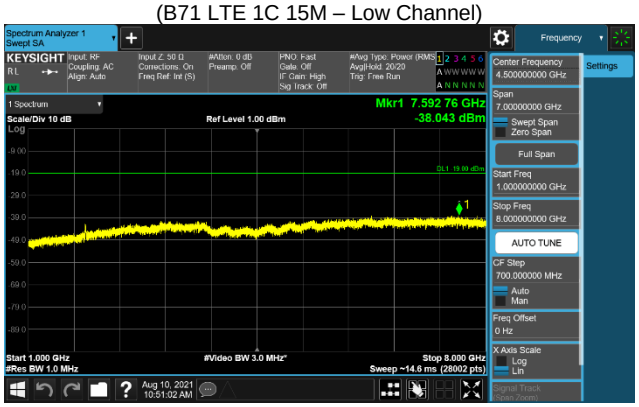
Plot 7-118. Conducted Spurious Emission Plot (150kHz to 30MHz)
(B71 LTE 1C 15M – Low Channel)



Plot 7-119. Conducted Spurious Emission Plot (30MHz to 616.9MHz)
(B71 LTE 1C 15M – Low Channel)



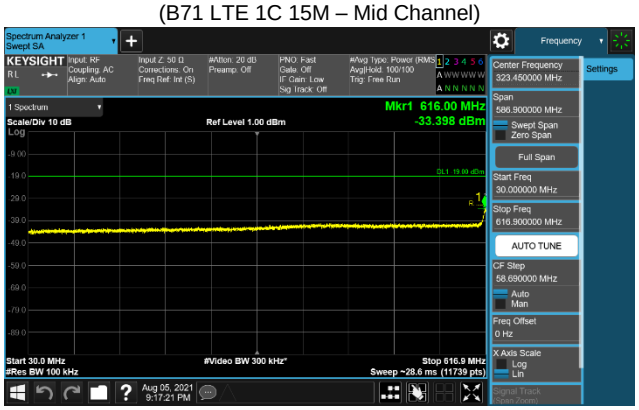
Plot 7-120. Conducted Spurious Emission Plot (652.1MHz to 1GHz)
(B71 LTE 1C 15M – Low Channel)



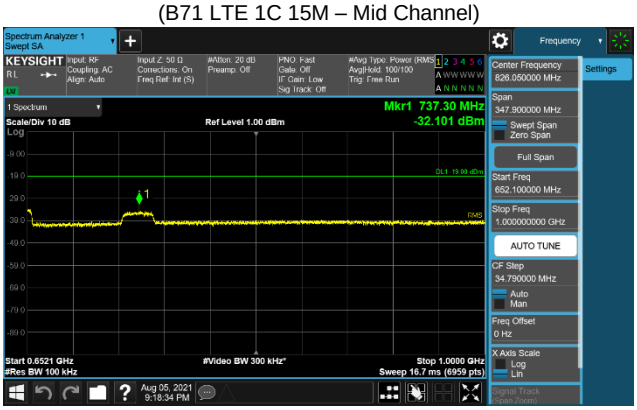
Plot 7-121. Conducted Spurious Emission Plot (1GHz to 8GHz)
(B71 LTE 1C 15M – Low Channel)

Plot 7-122. Conducted Spurious Emission Plot (9kHz to 150kHz)
(B71 LTE 1C 15M – Mid Channel)

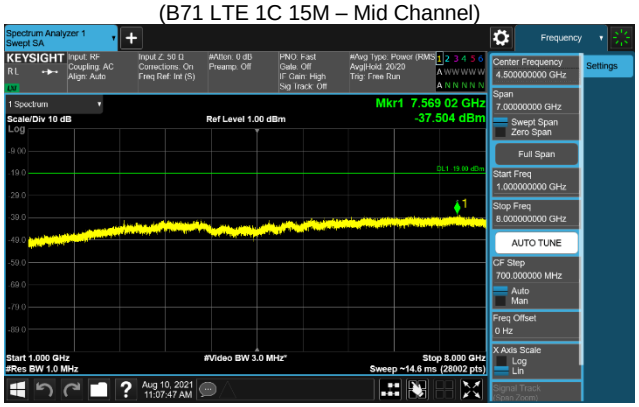
Plot 7-123. Conducted Spurious Emission Plot (150kHz to 30MHz)
(B71 LTE 1C 15M – Mid Channel)



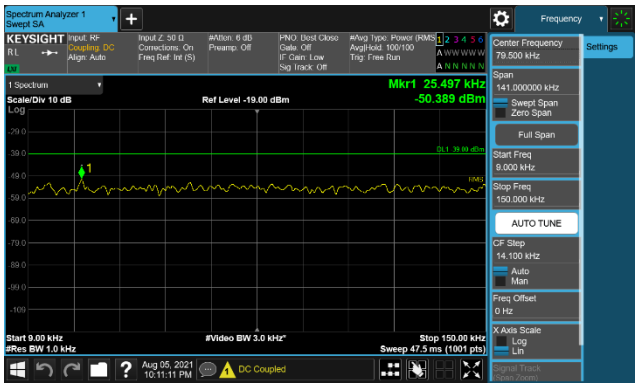
Plot 7-124. Conducted Spurious Emission Plot (30MHz to 616.9MHz)
(B71 LTE 1C 15M – Mid Channel)



Plot 7-125. Conducted Spurious Emission Plot (652.1MHz to 1GHz)
(B71 LTE 1C 15M – Mid Channel)

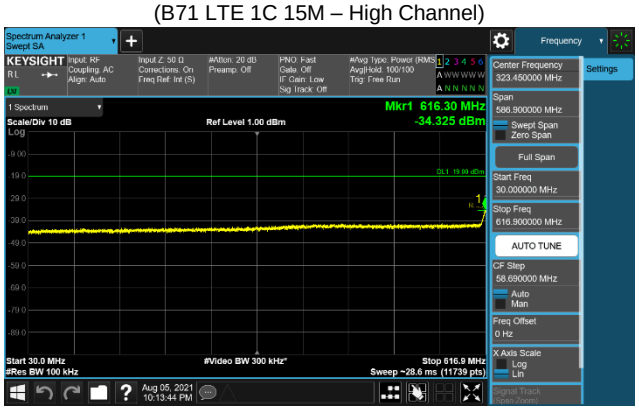


Plot 7-126. Conducted Spurious Emission Plot (1GHz to 8GHz)
(B71 LTE 1C 15M – Mid Channel)

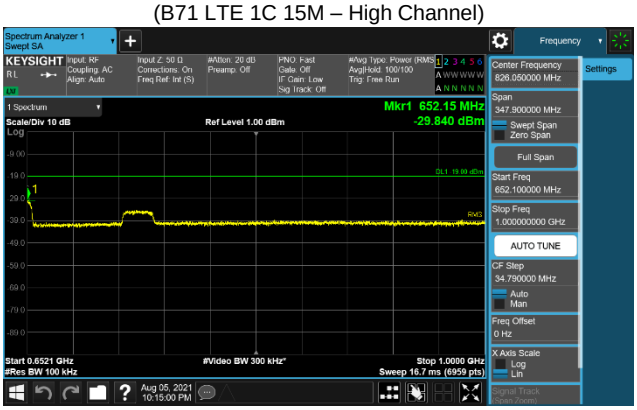


Plot 7-127. Conducted Spurious Emission Plot (9kHz to 150kHz)
(B71 LTE 1C 15M – High Channel)

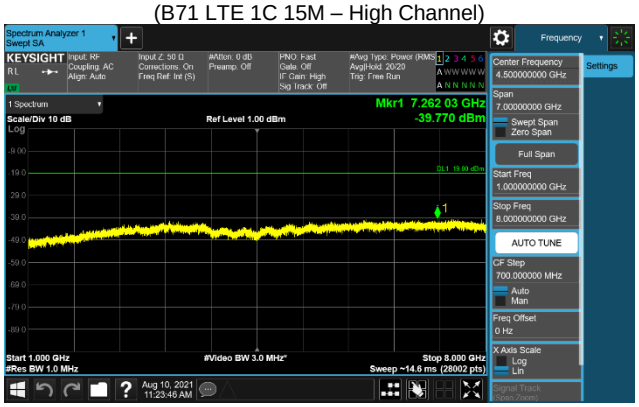
Plot 7-128. Conducted Spurious Emission Plot (150kHz to 30MHz)
(B71 LTE 1C 15M – High Channel)



Plot 7-129. Conducted Spurious Emission Plot (30MHz to 616.9MHz)
(B71 LTE 1C 15M – High Channel)



Plot 7-130. Conducted Spurious Emission Plot (652.1MHz to 1GHz)
(B71 LTE 1C 15M – High Channel)



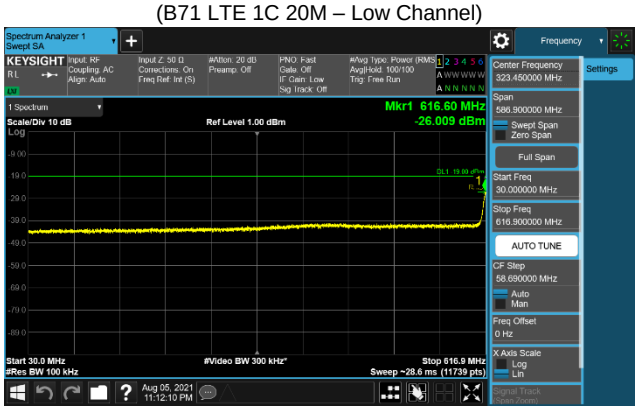
Plot 7-131. Conducted Spurious Emission Plot (1GHz to 8GHz)
(B71 LTE 1C 15M – High Channel)

Ch	Port #	Measurement Range	Level(dBm)	Limit (dBm)
			QPSK	
Low	1	9 kHz to 150 kHz	-49.50	-39.0
		150 kHz to 30 MHz	-40.25	-29.0
		30 MHz to 616.9 MHz	-26.01	-19.0
		652.1 MHz to 1 GHz	-31.99	-19.0
		1 GHz to 8 GHz	-39.64	-19.0
Middle	1	9 kHz to 150 kHz	-49.91	-39.0
		150 kHz to 30 MHz	-39.56	-29.0
		30 MHz to 616.9 MHz	-31.05	-19.0
		652.1 MHz to 1 GHz	-31.69	-19.0
		1 GHz to 8 GHz	-39.66	-19.0
High	0	9 kHz to 150 kHz	-50.60	-39.0
		150 kHz to 30 MHz	-40.06	-29.0
		30 MHz to 616.9 MHz	-34.00	-19.0
		652.1 MHz to 1 GHz	-30.25	-19.0
		1 GHz to 8 GHz	-37.42	-19.0

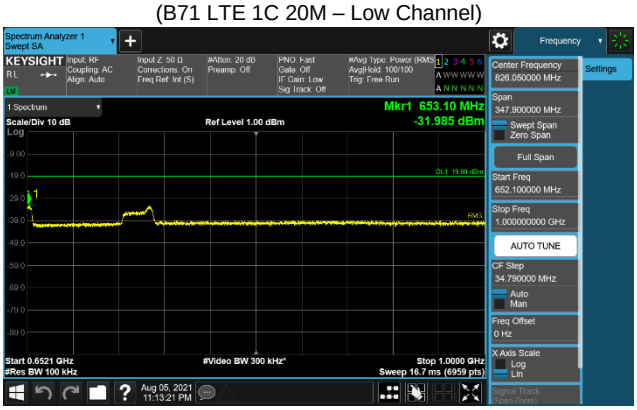
Table 7-43. Conducted Spurious Emission Summary Data (B71 LTE 1C 20M)

Plot 7-132. Conducted Spurious Emission Plot (9kHz to 150kHz)
(B71 LTE 1C 20M – Low Channel)

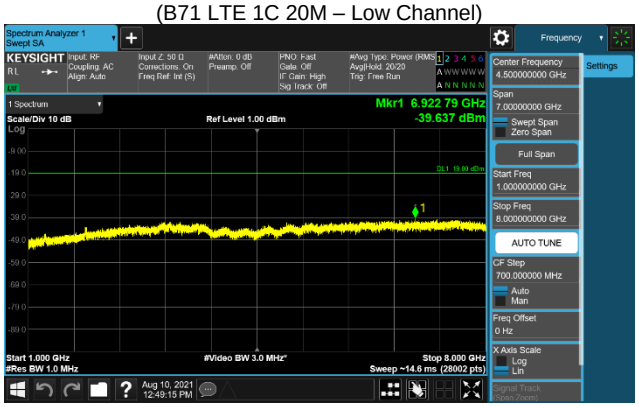
Plot 7-133. Conducted Spurious Emission Plot (150kHz to 30MHz)
(B71 LTE 1C 20M – Low Channel)



Plot 7-134. Conducted Spurious Emission Plot (30MHz to 616.9MHz)
(B71 LTE 1C 20M – Low Channel)



Plot 7-135. Conducted Spurious Emission Plot (652.1MHz to 1GHz)
(B71 LTE 1C 20M – Low Channel)



Plot 7-136. Conducted Spurious Emission Plot (1GHz to 8GHz)
(B71 LTE 1C 20M – Low Channel)