A.3 Spurious Emissions at Band Edge

A.3.1 Reference
FCC CFR 47 Part 2, Clause 2.1051
FCC CFR 47 Part 24, Clause 24.238 (b)
RSS-133, Clause 6.5

A.3.2 Method of measurement
The 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 + 10log(P) dB.

For MIMO mode configurations, the limit was adjusted with a correction of -6.02dB [10Log4] by using the Measure and Add 10Log(N) dB technique according to FCC KDB 662911 D01 Multiple Transmitter Output accounting for simultaneous transmission from antenna ports RF A,B,C and D.

According to FCC rules, 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 and a RBW of 1MHz for measurements of emissions > 1MHz away from the band edges. The limit was adjusted with -2.22dB [10Log(30/50)] to compensate for the reduce measurement bandwidth 30KHz for emission in the 1MHz immediately outside and adjacent to the frequency block for WCDMA. The limit was adjusted with -2.22dB [10Log(30/50)] to compensate for the reduce measurement bandwidth 30KHz for emission in the 1MHz immediately outside and adjacent to the frequency block for LTE(5.0MHz).

The limit was adjusted with -13.01dB [10Log(50/1000)] to compensate for the reduce measurement bandwidth 50KHz for emission more than 1MHz away from the band edges. For MIMO mode, the limit of -32.03dBm was used for emission more than 1MHz away from the band edges. For Non-MIMO mode, the limit of -26.01dBm was used for emission more than 1MHz away from the band edges. Spectrum analyser detector was set as RMS.

A.3.3 Measurement limit
The 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 + 10log(P) dB.

A.3.4 Measurement result

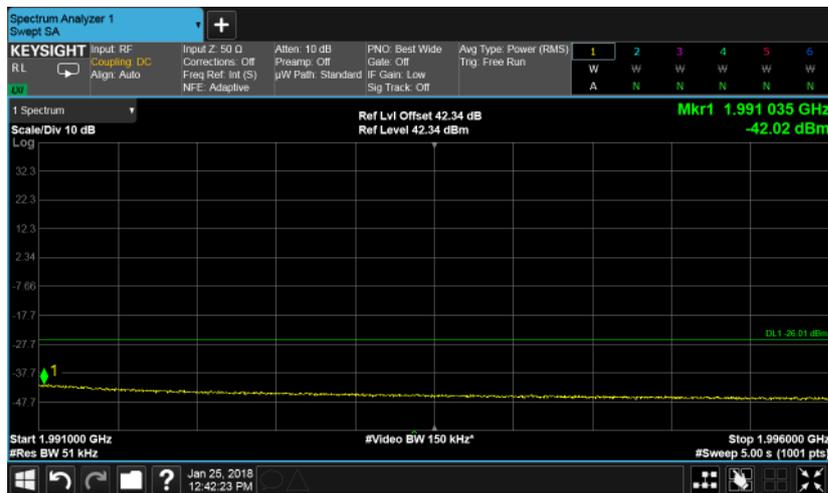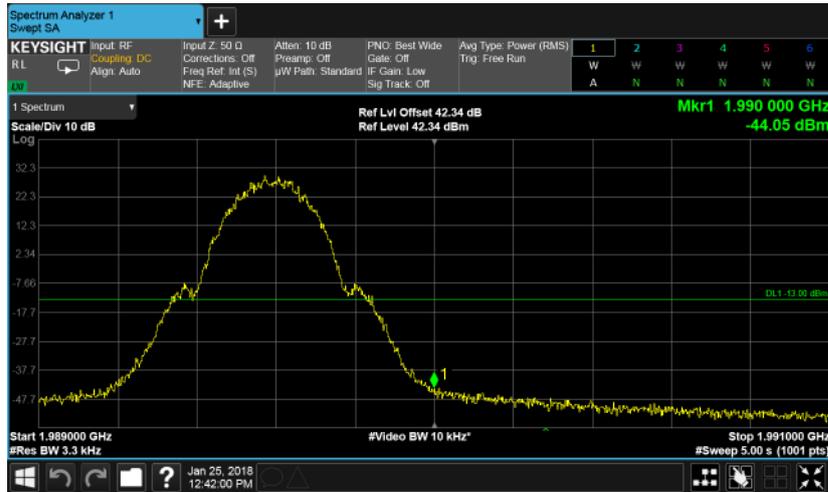Configuration GSM-1C, GMSK

Band Edge Frequency	Channel Bandwidth	RBW (KHz)	Limit (dBm)
Channel Position B 1930.0MHz	250KHz	3.3	-13.00
Channel Position T 1990.0MHz	250KHz	3.3	-13.00

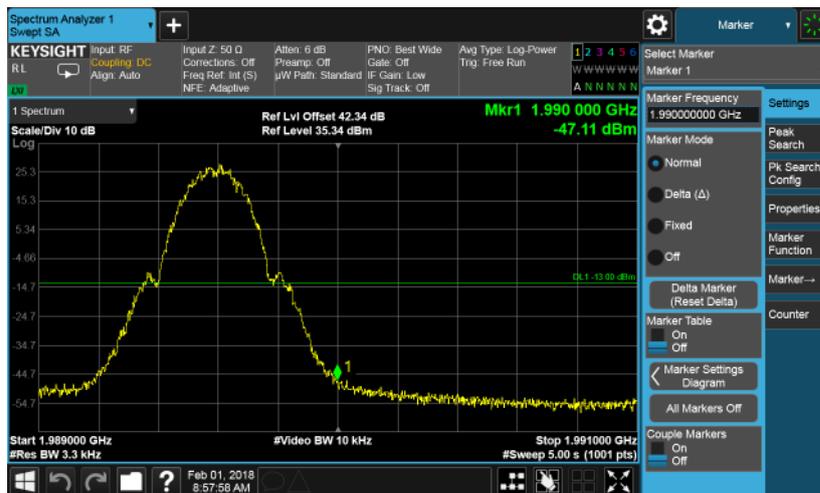Port B, Channel Position B
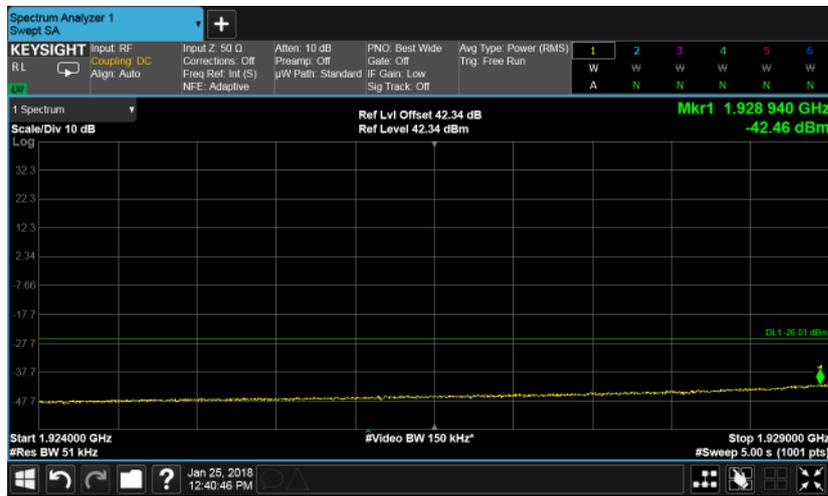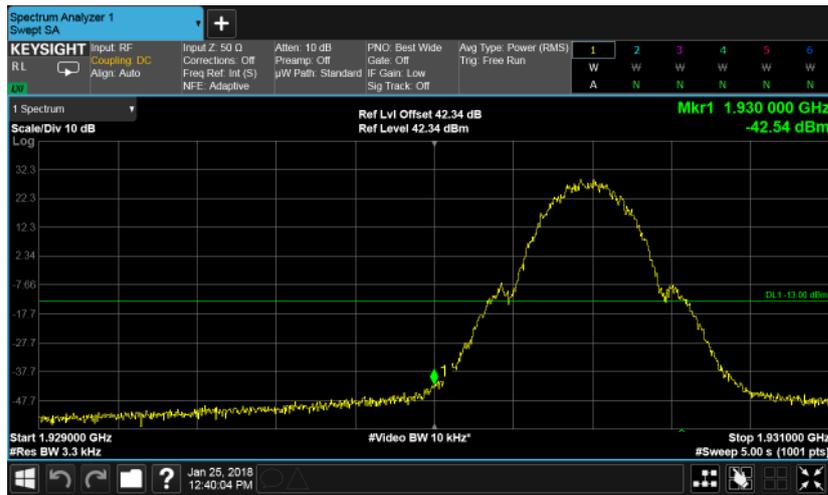
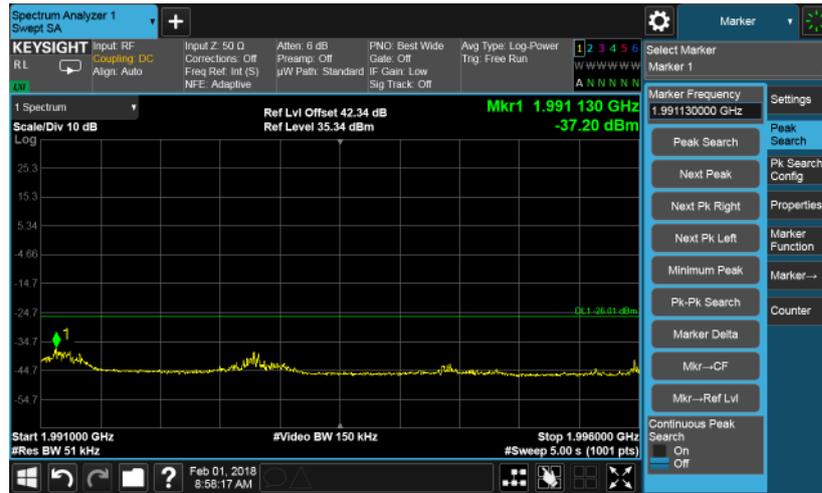Port B, Channel Position T

Configuration GSM-2C-BE, GMSK

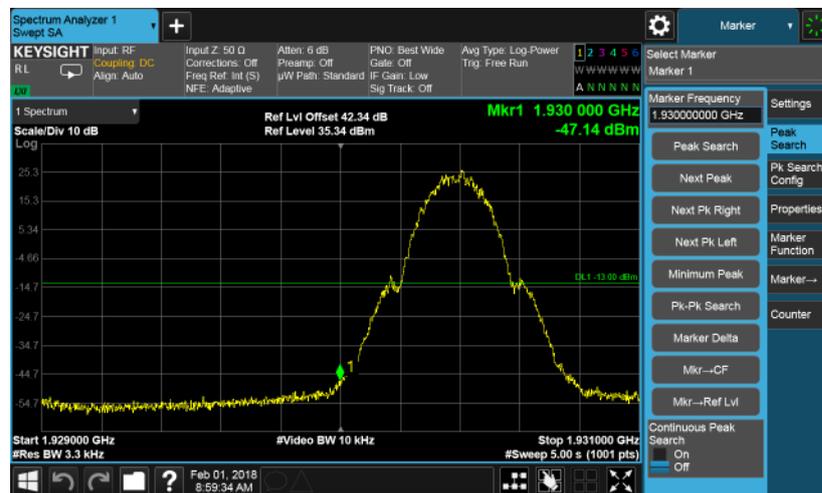| Band Edge Frequency	Channel Bandwidth	RBW (KHz)	Limit (dBm)
Channel Position B 1930.0MHz	250KHz	3.3	-13.00
Channel Position T 1990.0MHz	250KHz	3.3	-13.00

Port B, Channel Position B
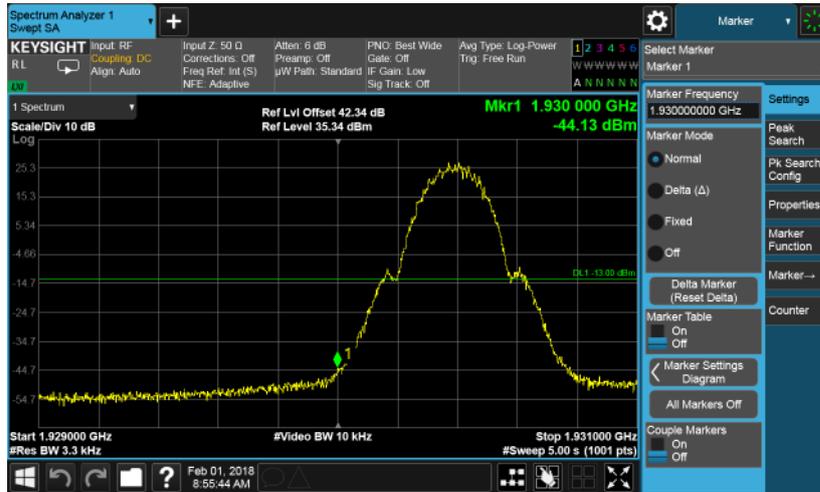
Port B, Channel Position T

Configuration GSM-3C-BE, GMSK

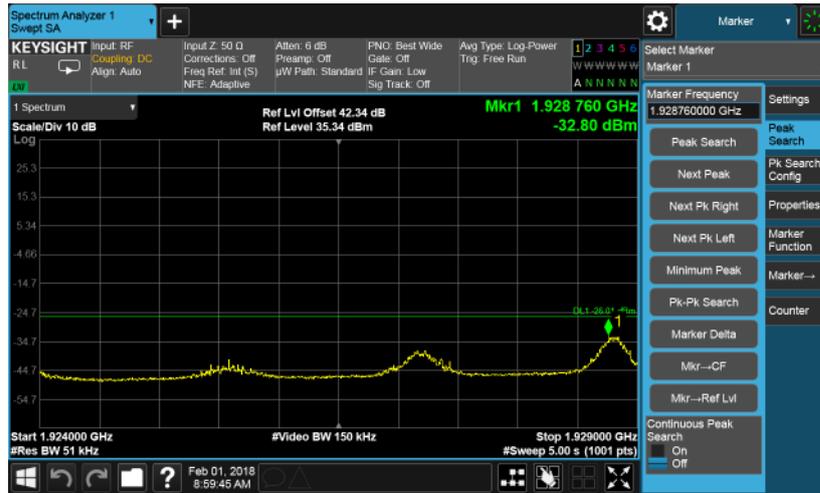| Band Edge Frequency	Channel Bandwidth	RBW (KHz)	Limit (dBm)
Channel Position B 1930.0MHz	250KHz	3.3	-13.00
Channel Position T 1990.0MHz	250KHz	3.3	-13.00

Port B, Channel Position B
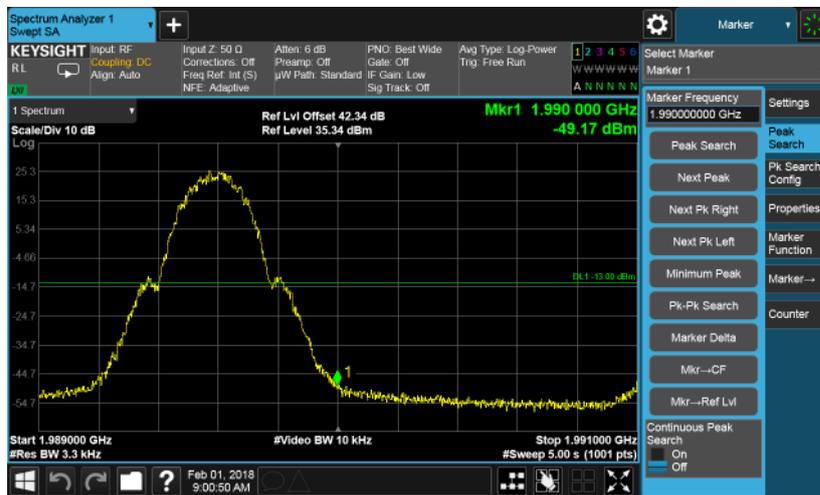
Port B, Channel Position T

Configuration WCDMA-1C

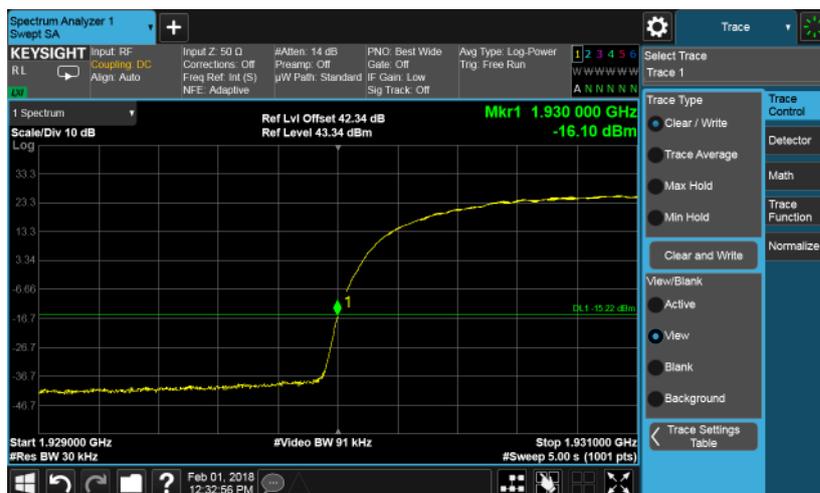| Modulation	Band Edge Frequency	Channel Bandwidth	RBW (KHz)	Limit (dBm)
16QAM	Channel Position B 1930.0MHz	5.0MHz	30	-15.22
	Channel Position T 1995.0MHz	5.0MHz	30	-15.22
64QAM	Channel Position B 1930.0MHz	5.0MHz	30	-15.22
	Channel Position T 1995.0MHz	5.0MHz	30	-15.22

Port B, Channel Position B, 16QAM

Port B, Channel Position T, 16QAM

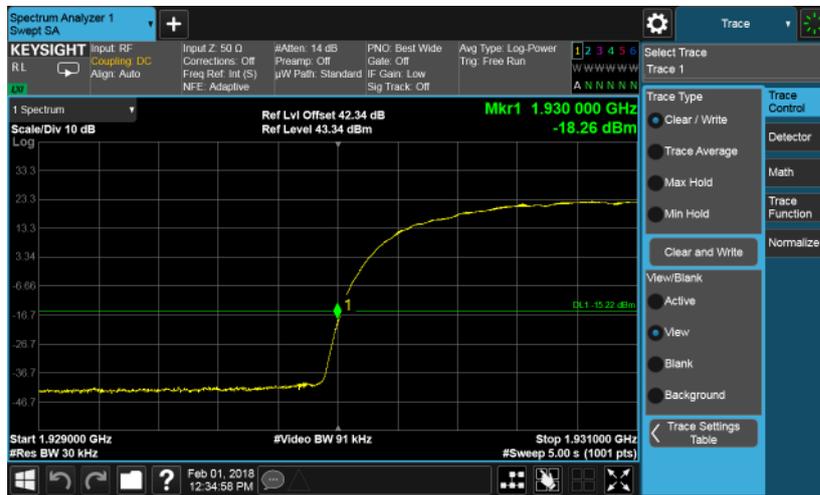

Port B, Channel Position B, 64QAM

Port B, Channel Position T, 64QAM

Configuration WCDMA-2C-BE

Modulation	Band Edge Frequency	Channel Bandwidth	RBW (KHz)	Limit (dBm)
16QAM	Channel Position B 1930.0MHz	5.0MHz	30	-15.22
	Channel Position T 1995.0MHz	5.0MHz	30	-15.22
64QAM	Channel Position B 1930.0MHz	5.0MHz	30	-15.22
	Channel Position T 1995.0MHz	5.0MHz	30	-15.22

Port B, Channel Position B, 16QAM

Port B, Channel Position T, 16QAM

Port B, Channel Position B, 64QAM

Port B, Channel Position T, 64QAM

Configuration LTE-MIMO-1C, QPSK

Band Edge Frequency	Channel Bandwidth	RBW(KHz)	Limit(dBm)
Channel Position B 1930.0MHz	1.4 MHz	13	-19.02
	3.0 MHz	30	-19.02
	5.0 MHz	30	-21.24
	10.0 MHz	100	-19.02
	15.0 MHz	150	-19.02
	20.0 MHz	200	-19.02
Channel Position T 1995.0MHz	1.4 MHz	13	-19.02
	3.0 MHz	30	-19.02
	5.0 MHz	30	-21.24
	10.0 MHz	100	-19.02
	15.0 MHz	150	-19.02
	20.0 MHz	200	-19.02

Port B, Channel Position B, 1.4MHz

Port B, Channel Position T, 1.4MHz
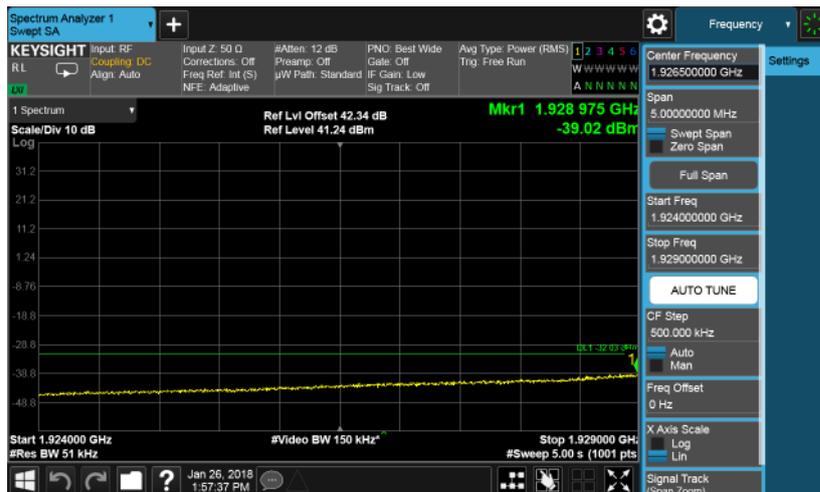
Port B, Channel Position B, 3.0MHz

Port B, Channel Position T, 3.0MHz

Port B, Channel Position B, 5.0MHz

Port B, Channel Position T, 5.0MHz

Port B, Channel Position B, 10.0MHz

Port B, Channel Position T, 10.0MHz

Port B, Channel Position B, 15.0MHz

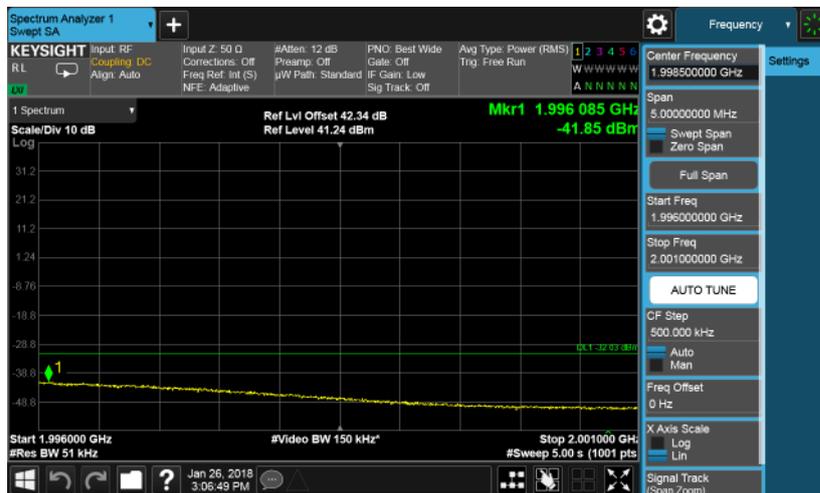

Port B, Channel Position T, 15.0MHz

Port B, Channel Position B, 20.0MHz
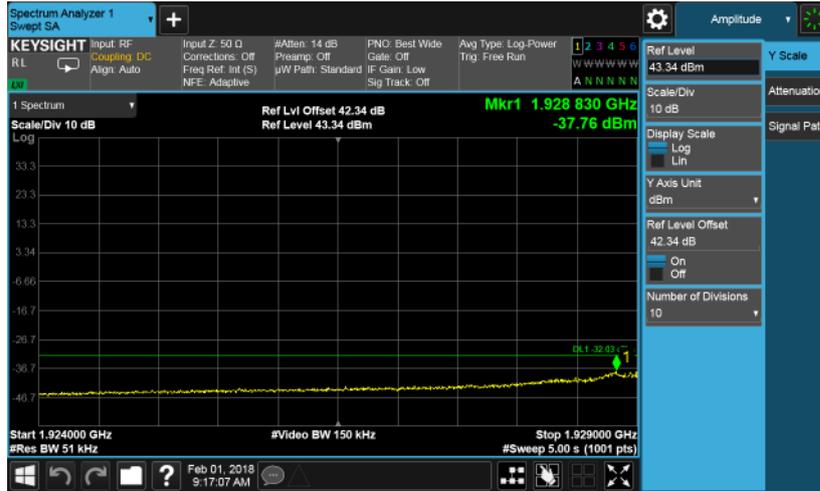
Port B, Channel Position T, 20.0MHz

Configuration LTE-MIMO-2C-BE, QPSK

Band Edge Frequency	Channel Bandwidth	RBW(KHz)	Limit(dBm)
Channel Position B 1930.0MHz	1.4 MHz	13	-19.02
	3.0 MHz	30	-19.02
	5.0 MHz	30	-21.24
	10.0 MHz	100	-19.02
	15.0 MHz	150	-19.02
	20.0 MHz	200	-19.02
Channel Position T 1995.0MHz	1.4 MHz	13	-19.02
	3.0 MHz	30	-19.02
	5.0 MHz	30	-21.24
	10.0 MHz	100	-19.02
	15.0 MHz	150	-19.02
	20.0 MHz	200	-19.02

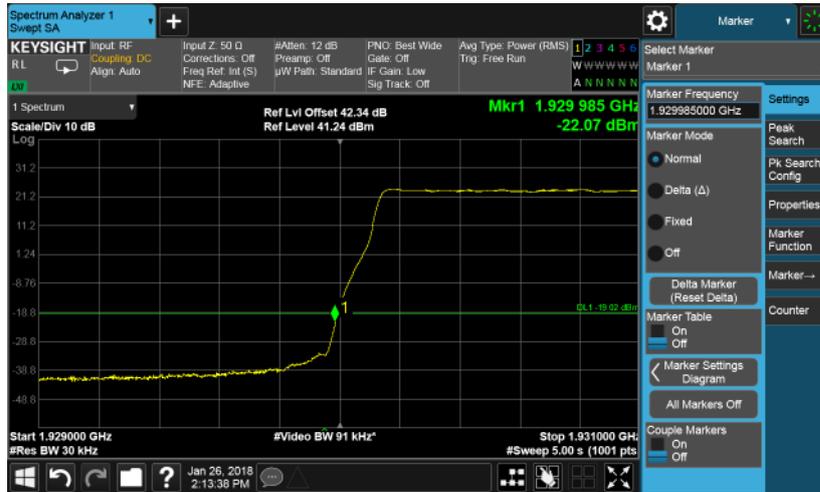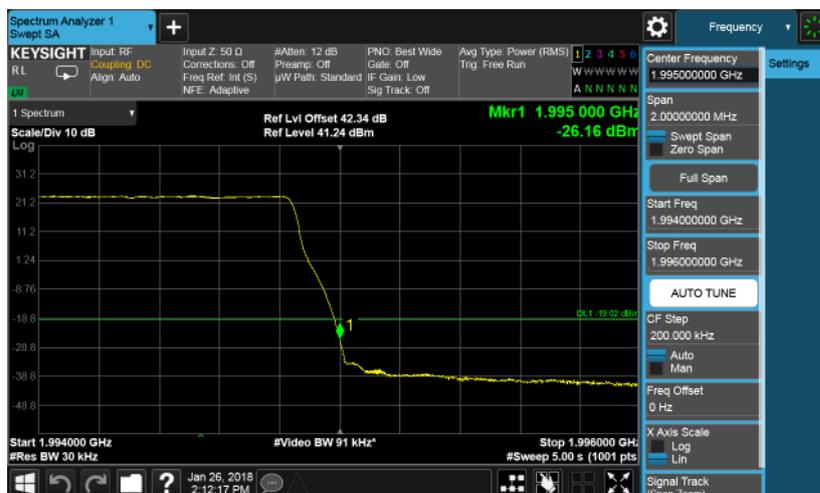Port B, Channel Position B, 1.4MHz

Port B, Channel Position T, 1.4MHz

Port B, Channel Position B, 3.0MHz

Port B, Channel Position T, 3.0MHz

Port B, Channel Position B, 5.0MHz

Port B, Channel Position T, 5.0MHz
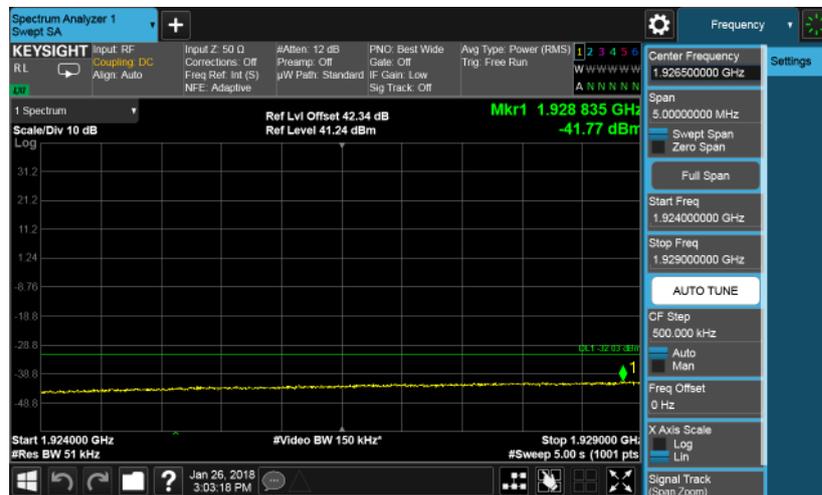

Port B, Channel Position B, 10.0MHz

Port B, Channel Position T, 10.0MHz

Port B, Channel Position B, 15.0MHz

Port B, Channel Position T, 15.0MHz

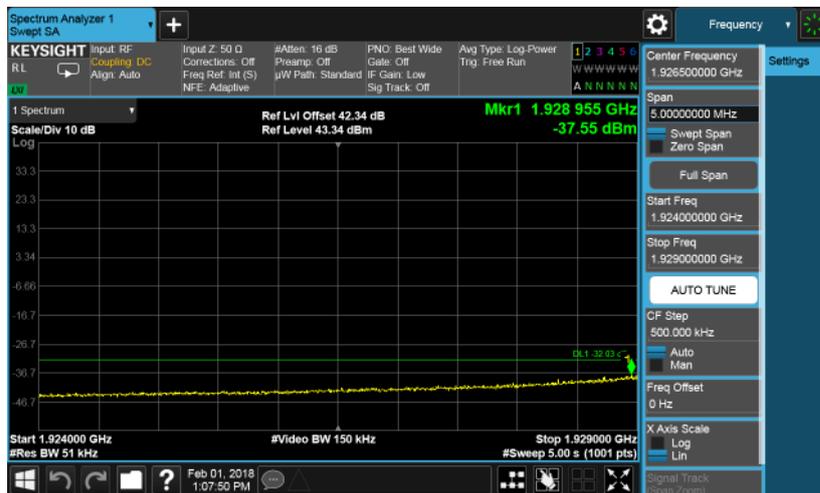Port B, Channel Position B, 20.0MHz

Port B, Channel Position T, 20.0MHz

Configuration NB-IOT-InBand-1C, QPSK

Band Edge Frequency	Channel Bandwidth	RBW(KHz)	Limit(dBm)
Channel Position B 1930.0MHz	5.0 MHz	51	-19.02
	20.0 MHz	200	-19.02
Channel Position T 1995.0MHz	5.0 MHz	51	-19.02
	20.0 MHz	200	-19.02

Port B, Channel Position B, 5.0MHz

Port B, Channel Position T, 5.0MHz
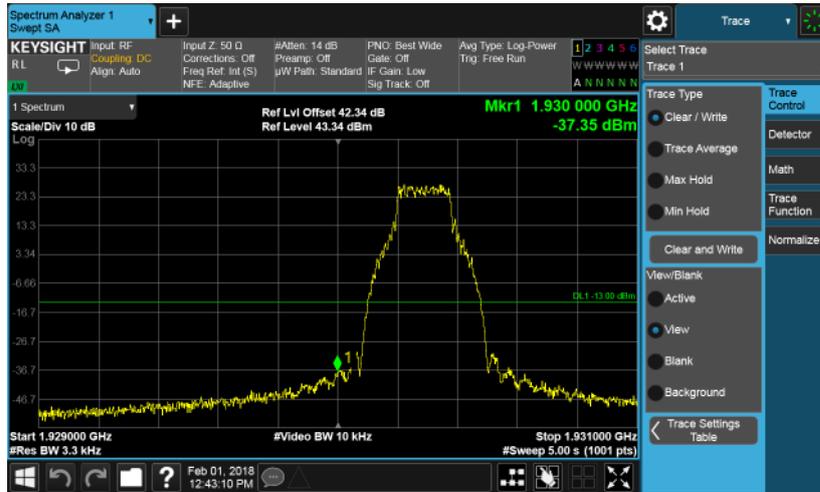
Port B, Channel Position B, 20.0MHz
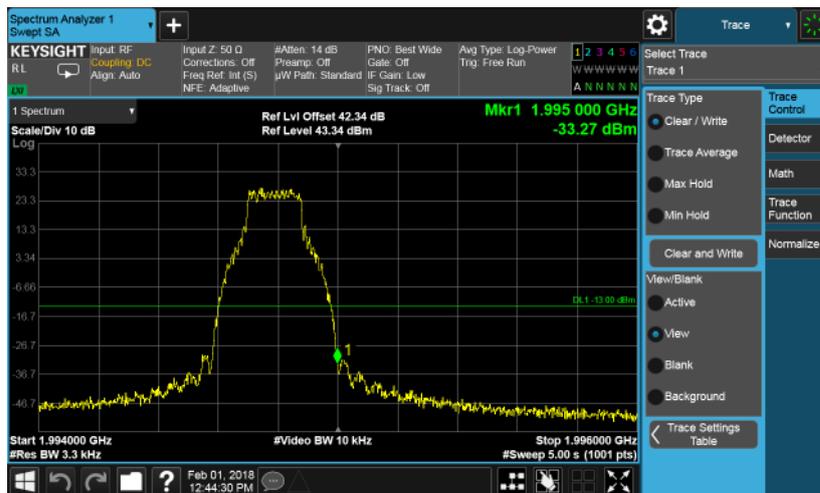
Port B, Channel Position T, 20.0MHz

Configuration NB-IOT-StandAlone-1C, QPSK

Band Edge Frequency	Channel Bandwidth	RBW (KHz)	Limit (dBm)
Channel Position B 1930.0MHz	250KHz	3.3	-13.00
Channel Position T 1995.0MHz	250KHz	3.3	-13.00

Port B, Channel Position B

Port B, Channel Position T
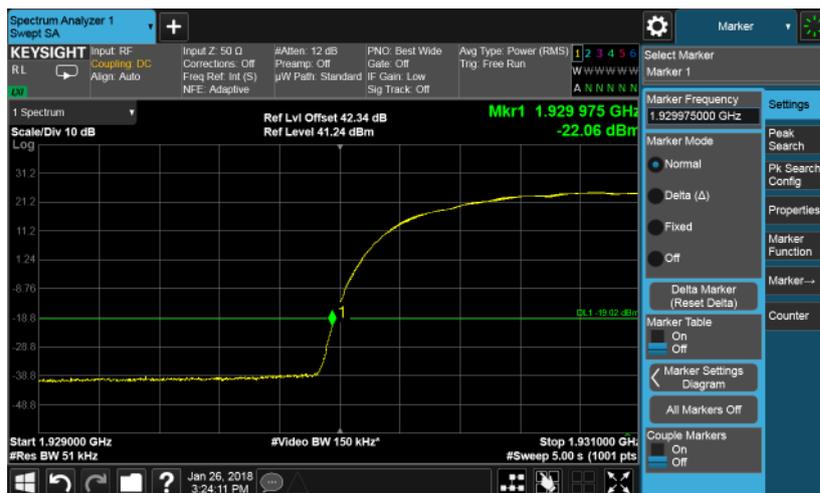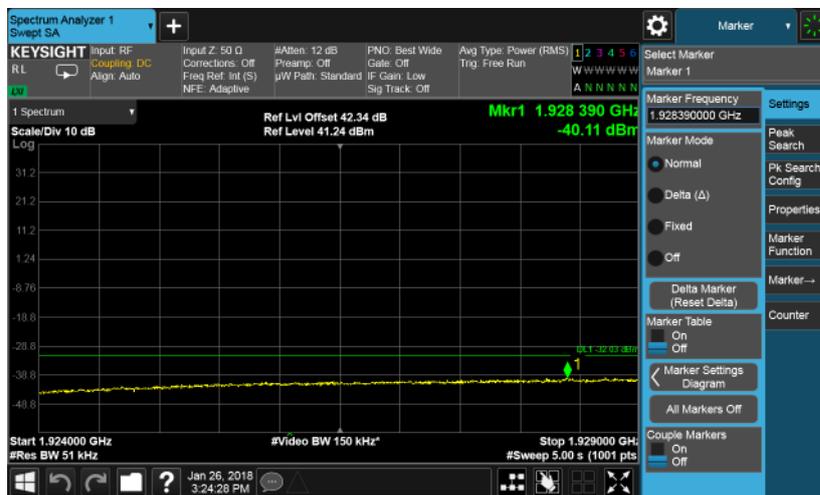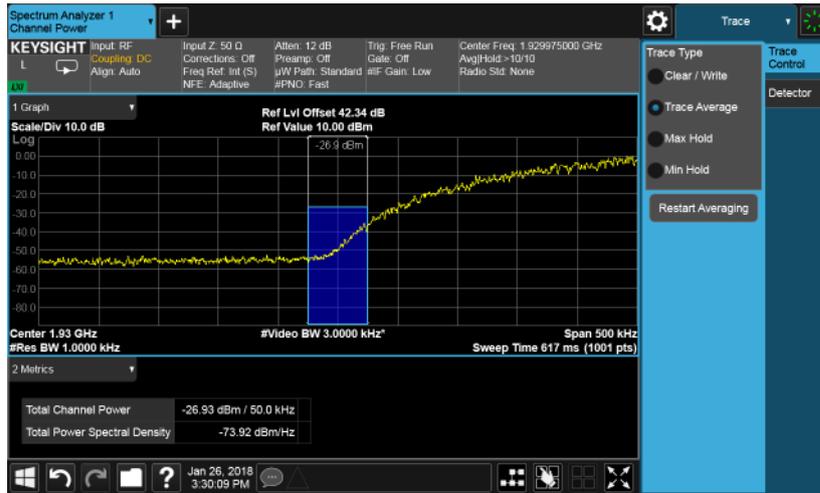
Configuration WCDMA+LTE-MIMO-MC-2-BE (1WCDMA, 16QAM + 1LTE, QPSK)

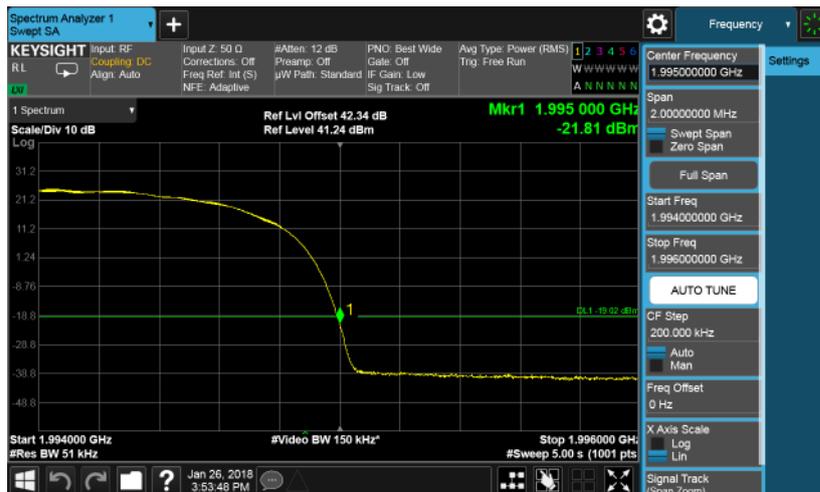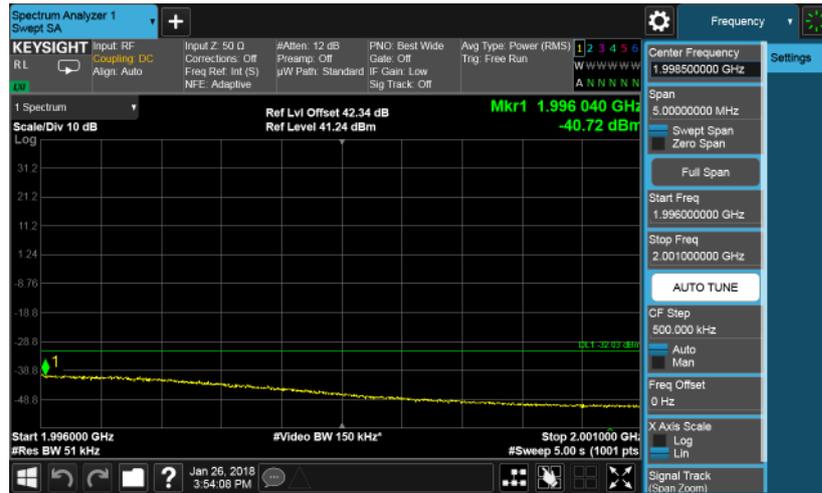| Band Edge Frequency	Channel Bandwidth	RBW (KHz)	Limit (dBm)
Channel Position B 1930.0MHz	(W) 5.0MHz, (L) 5.0 MHz	51	-19.02
	(W) 5.0MHz, (L) 20.0 MHz	51	-19.02
Channel Position T 1995.0MHz	(W) 5.0MHz, (L) 5.0 MHz	51	-19.02
	(W) 5.0MHz, (L) 20.0 MHz	51	-19.02

Port B, Channel Position B, LTE 5.0MHz

The channel power of 50.0KHz for 1929.975MHz is -26.93dBm, which is within the limit of -19.02dBm.

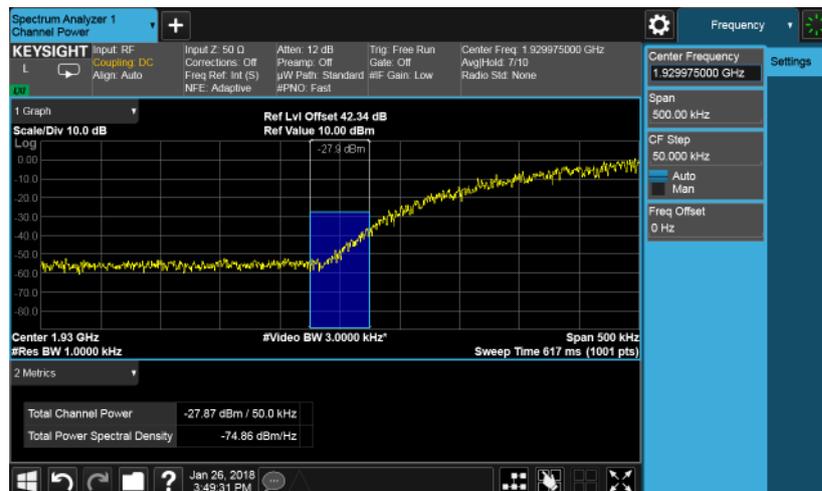Port B, Channel Position T, LTE 5.0MHz
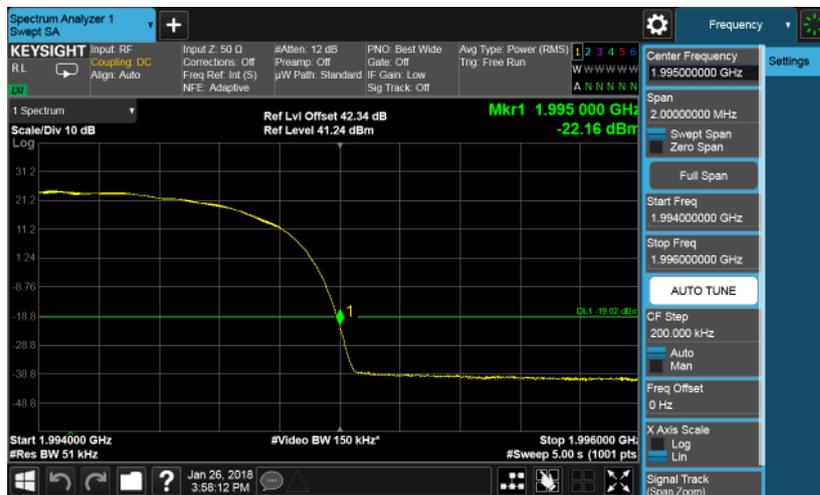
Port B, Channel Position B, LTE 20.0MHz

The channel power of 50.0KHz for 1929.975MHz is -27.87dBm, which is within the limit of -19.02dBm.

Port B, Channel Position T, LTE 20.0MHz

Configuration WCDMA+LTE-MIMO-MC-4-BE (2WCDMA, 16QAM + 1LTE, QPSK)

Band Edge Frequency	Channel Bandwidth	RBW (KHz)	Limit (dBm)
Channel Position B 1930.0MHz	(W) 5.0MHz, (L) 5.0 MHz	51	-19.02
	(W) 5.0MHz, (L) 20.0 MHz	51	-19.02
Channel Position T 1995.0MHz	(W) 5.0MHz, (L) 5.0 MHz	51	-19.02
	(W) 5.0MHz, (L) 20.0 MHz	51	-19.02

Port B, Channel Position B, 5.0MHz

The channel power of 50.0KHz for 1929.975MHz is -28.27dBm, which is within the limit of -19.02dBm.

Port B, Channel Position T, 5.0MHz

Port B, Channel Position B, 20.0MHz

The channel power of 50.0KHz for 1929.975MHz is -28.67dBm, which is within the limit of -19.02dBm.