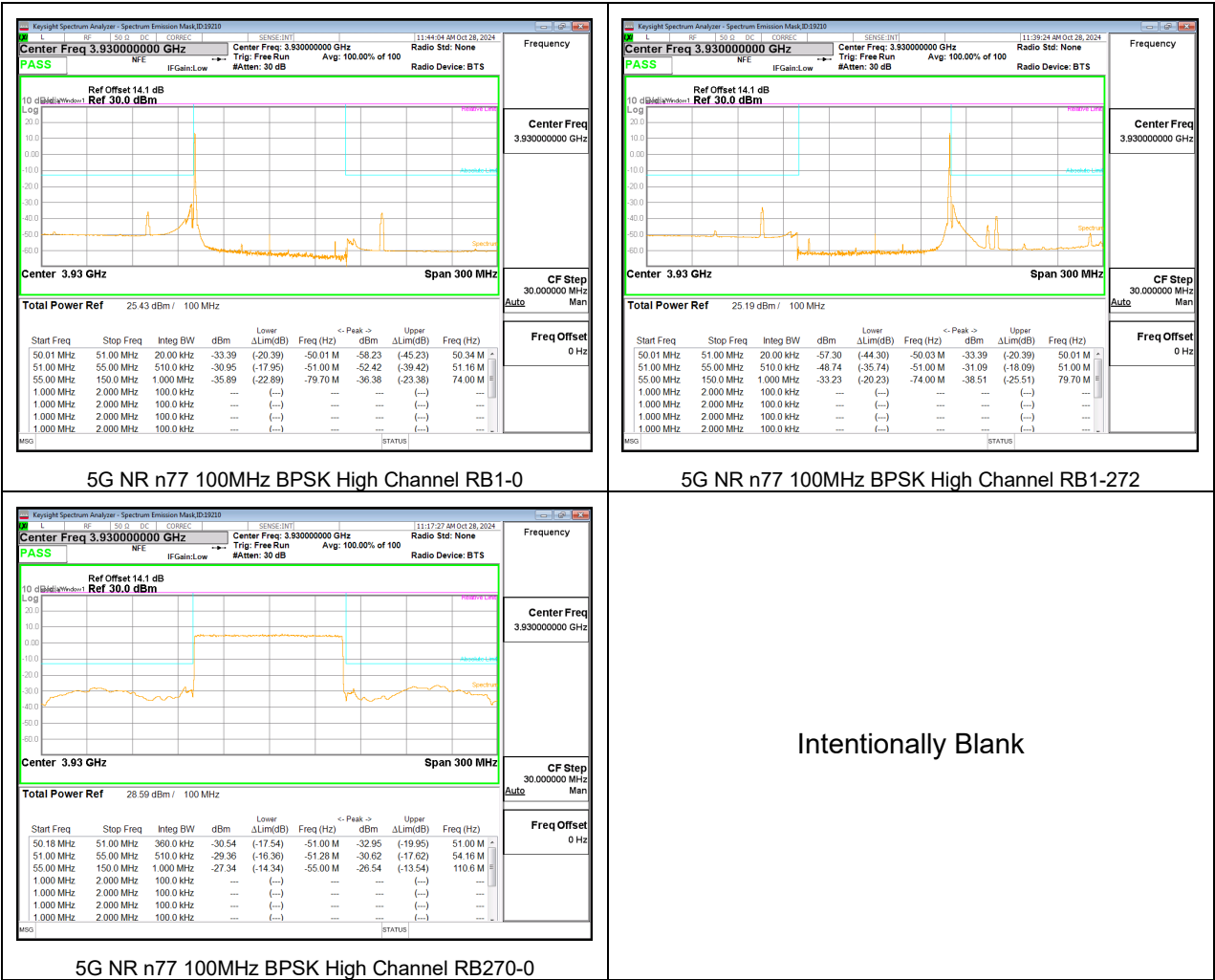






9.3. OUT OF BAND EMISSIONS

TEST PROCEDURE

The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

For each out of band emissions measurement:

- Set display line at -13 dBm, -25dBm and -40dBm according to the band Limit
- Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.
(NOTE: Worst case set RBW/VBW to 1MHz/3MHz)

RESULTS

QPSK with 1RB is the highest power and PSD to all bandwidth. 1RB has the same frequency and power to all bandwidth. Therefore, QPSK with 1RB and wider bandwidths results are reported as worst case for LTE bands.

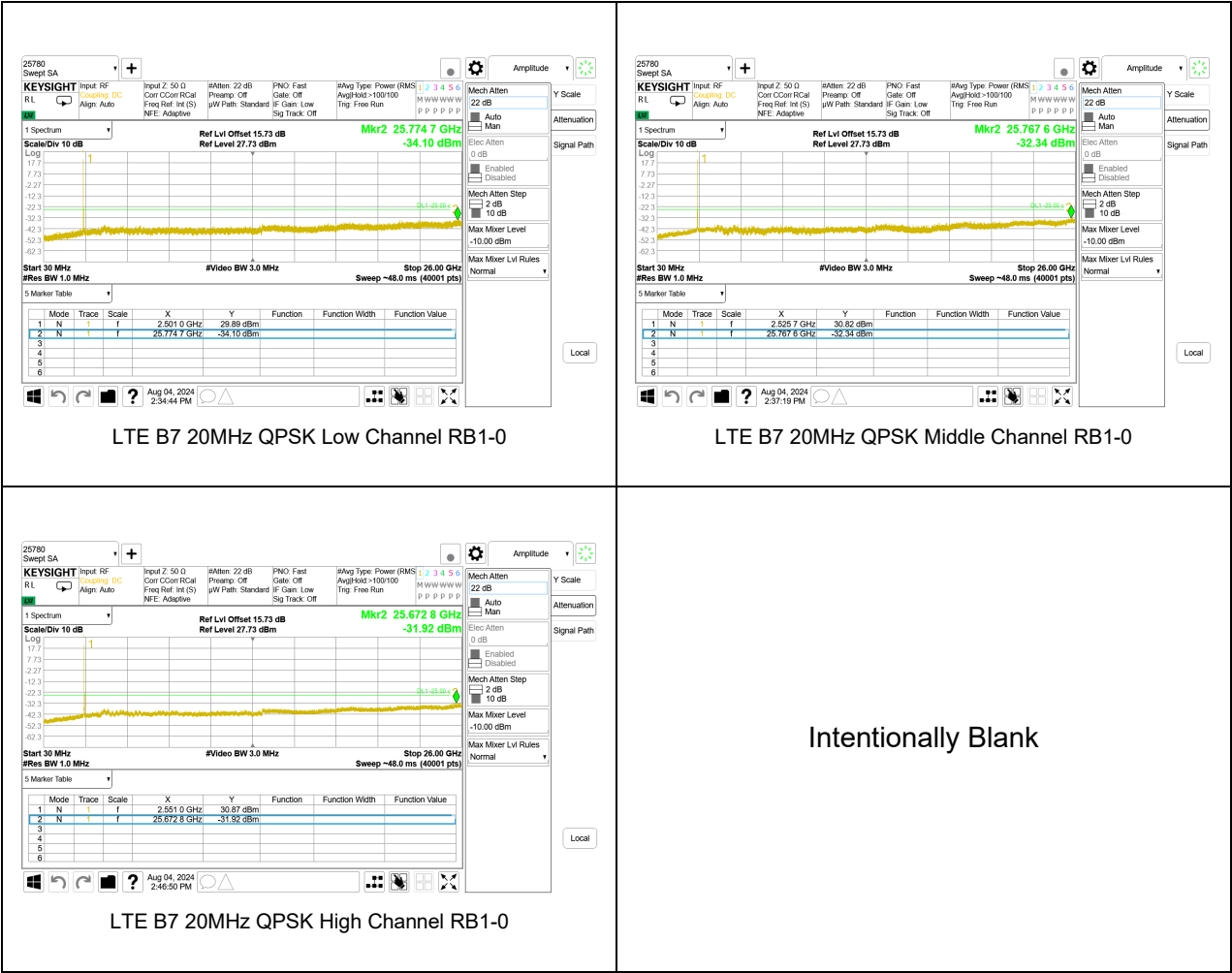
BPSK with 1RB is the highest power and PSD to all bandwidth. 1RB has the same frequency and power to all bandwidth. Therefore, BPSK with 1RB and wider bandwidths results are reported as worst case for 5G NRs.

9.3.1. LTE BAND 7 AND 5G NR n7

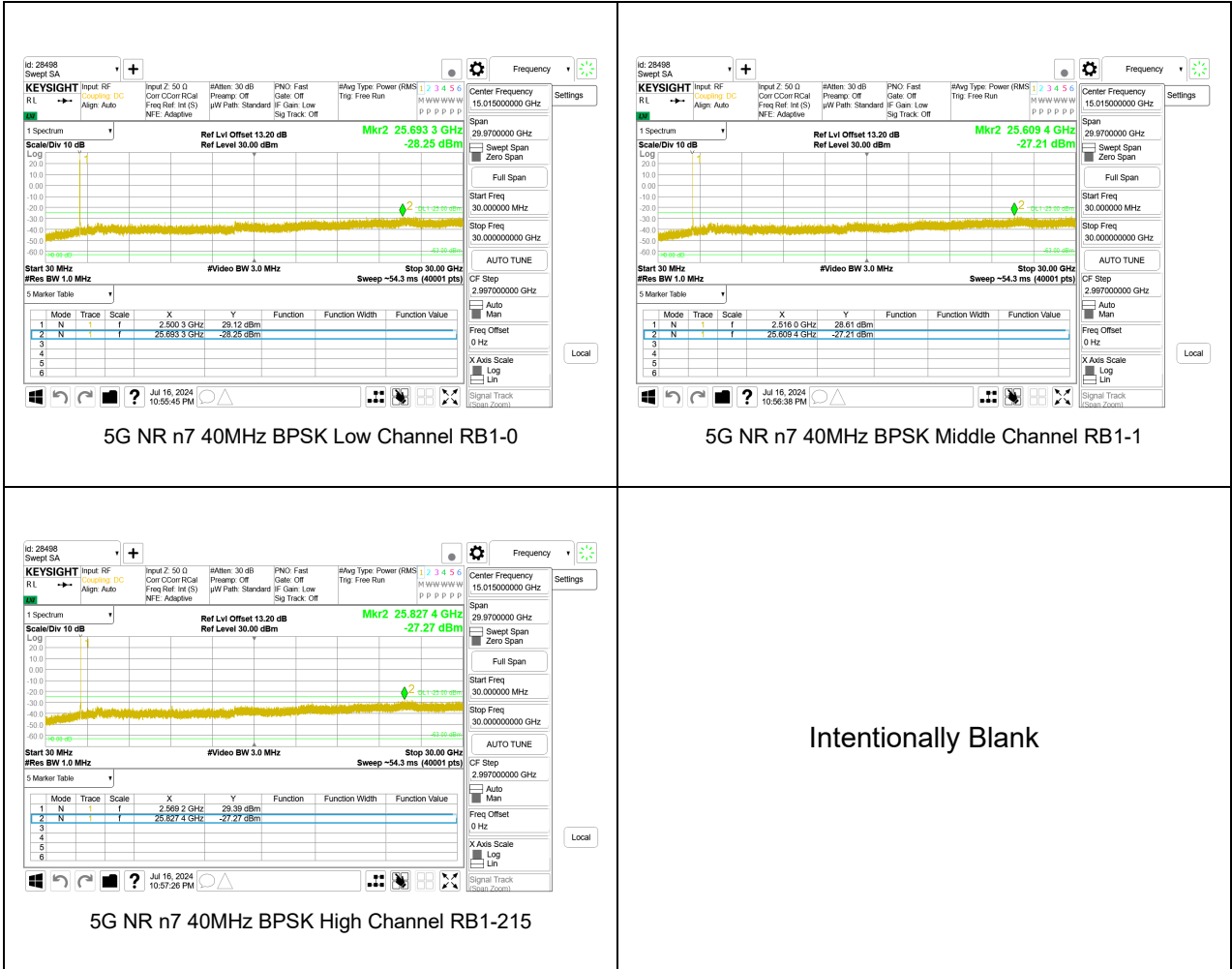
LIMITS

FCC: §27.53 (m)
The minimum permissible attenuation level of any spurious emissions is 55 + 10 log (P) dB where transmitting power (P) in Watts.

LTE BAND 7



5G NR n7



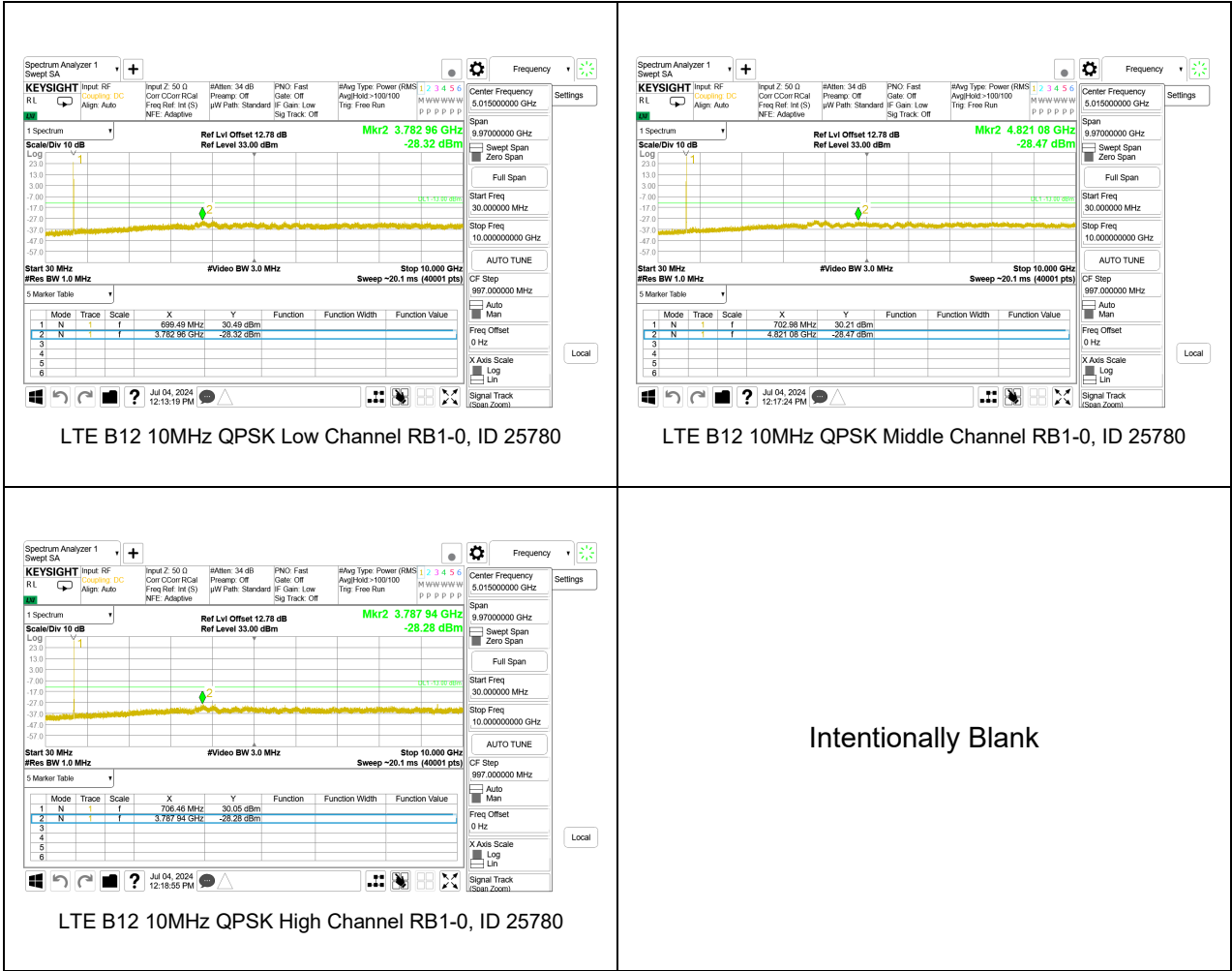
9.3.2. LTE BAND 12 AND 5G NR n12

LIMITS

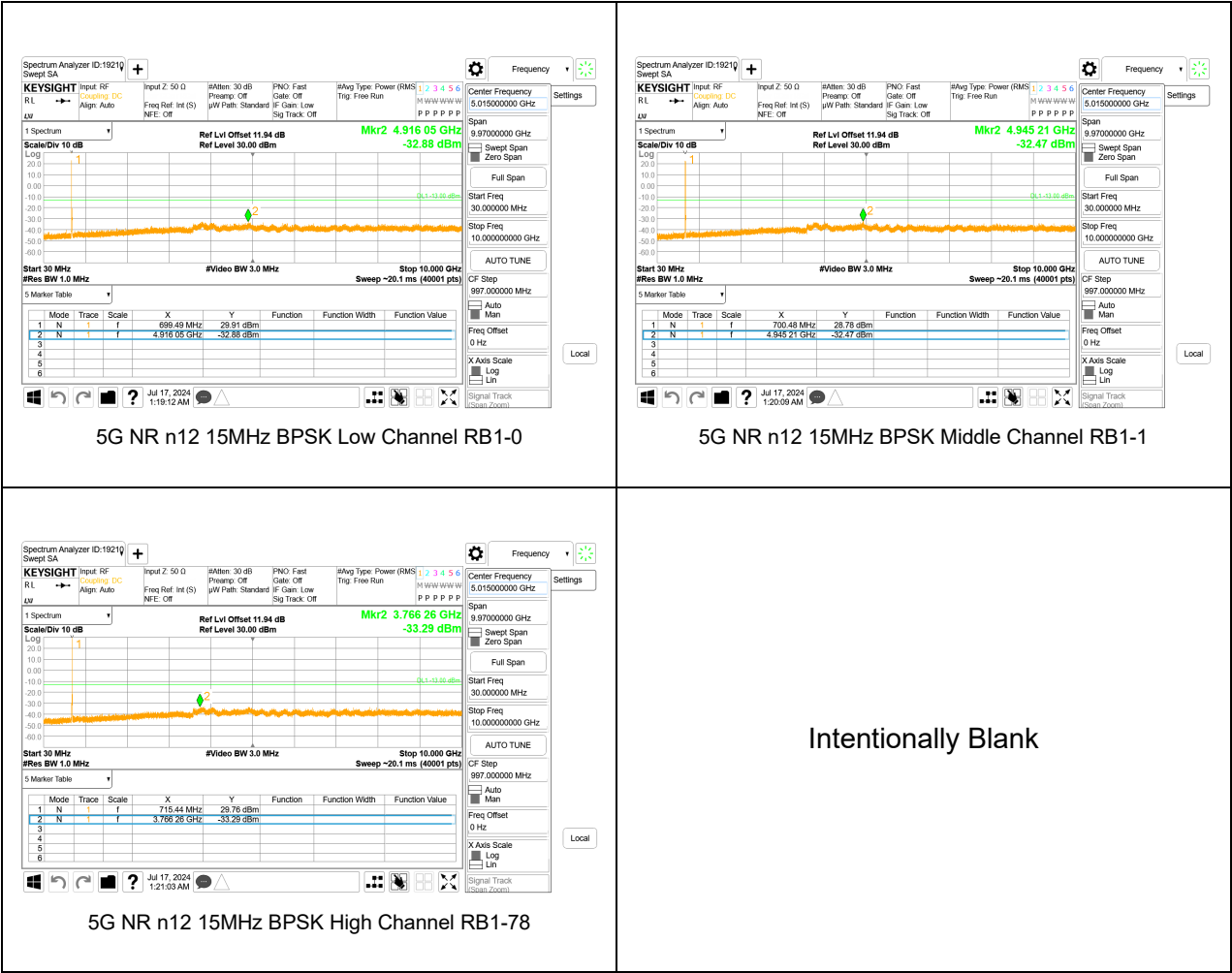
FCC: §27.53 (g)
The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.

The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.

LTE BAND 12



5G NR n12



Spectrum Analyzer ID:1921q
Swept SA

KEYSIGHT
RL
Input RF
Align: Auto
Coupling: DC

Input Z: 50 Ω
Freq Ref Int (S)
NFE: Off

Attenu: 30 dB
Preamp: Off
μW Path: Standard
IF Gain: Low
Sig Track: Off

PKNO: Fast
Gate: Off
IF Gain: Low
Sig Track: Off

AWG Type: Power (RMS)
Trig: Free Run

1 2 3 4 5 6
N W W W W W W
P P P P P P

Center Frequency
5.015000000 GHz

Span
9.970000000 GHz

Start Freq
30.00000000 MHz

Stop Freq
10.000000000 GHz

CF Step
997.0000000 MHz

Auto Tune

Auto Main

Frequency Offset
0 Hz

X Axis Scale
Log

Lin

Signal Track
Zoom

Scale/Div 10 dB
Log
Ref Lvl Offset 11.94 dB
Ref Level 30.00 dBm
Mkr2 4.945 21 GHz
-32.47 dBm
OL1 -13.00 dBm

Start 30 MHz
#Res BW 1.0 MHz
#Video BW 3.0 MHz
Stop 10.000 GHz
Sweep ~20.1 ms (40001 pts)

5 Marker Table

Mode	Trace	Scale	X	Y	Function	Function Width	Function Value
1	N	f	700.48 MHz	28.78 dBm			
2	N	f	4.945 21 GHz	-32.47 dBm			
3							
4							
5							
6							

Jul 17, 2024
1:20:00 AM

5G NR n12 15MHz BPSK Middle Channel RB1-1

Spectrum Analyzer ID:1921q
Swept SA

KEYSIGHT
RL
Input RF
Align: Auto
Coupling: DC

Input Z: 50 Ω
Freq Ref Int (S)
NFE: Off

Attenu: 30 dB
Preamp: Off
μW Path: Standard
IF Gain: Low
Sig Track: Off

PKNO: Fast
Gate: Off
IF Gain: Low
Sig Track: Off

AWG Type: Power (RMS)
Trig: Free Run

1 2 3 4 5 6
N W W W W W W
P P P P P P

Center Frequency
5.015000000 GHz

Span
9.970000000 GHz

Start Freq
30.00000000 MHz

Stop Freq
10.000000000 GHz

CF Step
997.0000000 MHz

Auto Tune

Auto Main

Frequency Offset
0 Hz

X Axis Scale
Log

Lin

Signal Track
Zoom

Scale/Div 10 dB
Log
Ref Lvl Offset 11.94 dB
Ref Level 30.00 dBm
Mkr2 3.766 26 GHz
-33.29 dBm
OL1 -13.00 dBm

Start 30 MHz
#Res BW 1.0 MHz
#Video BW 3.0 MHz
Stop 10.000 GHz
Sweep ~20.1 ms (40001 pts)

5 Marker Table

Mode	Trace	Scale	X	Y	Function	Function Width	Function Value
1	N	f	715.44 MHz	28.76 dBm			
2	N	f	3.766 26 GHz	-33.29 dBm			
3							
4							
5							
6							

Jul 17, 2024
1:21:03 AM

5G NR n12 15MHz BPSK High Channel RB1-78

Intentionally Blank

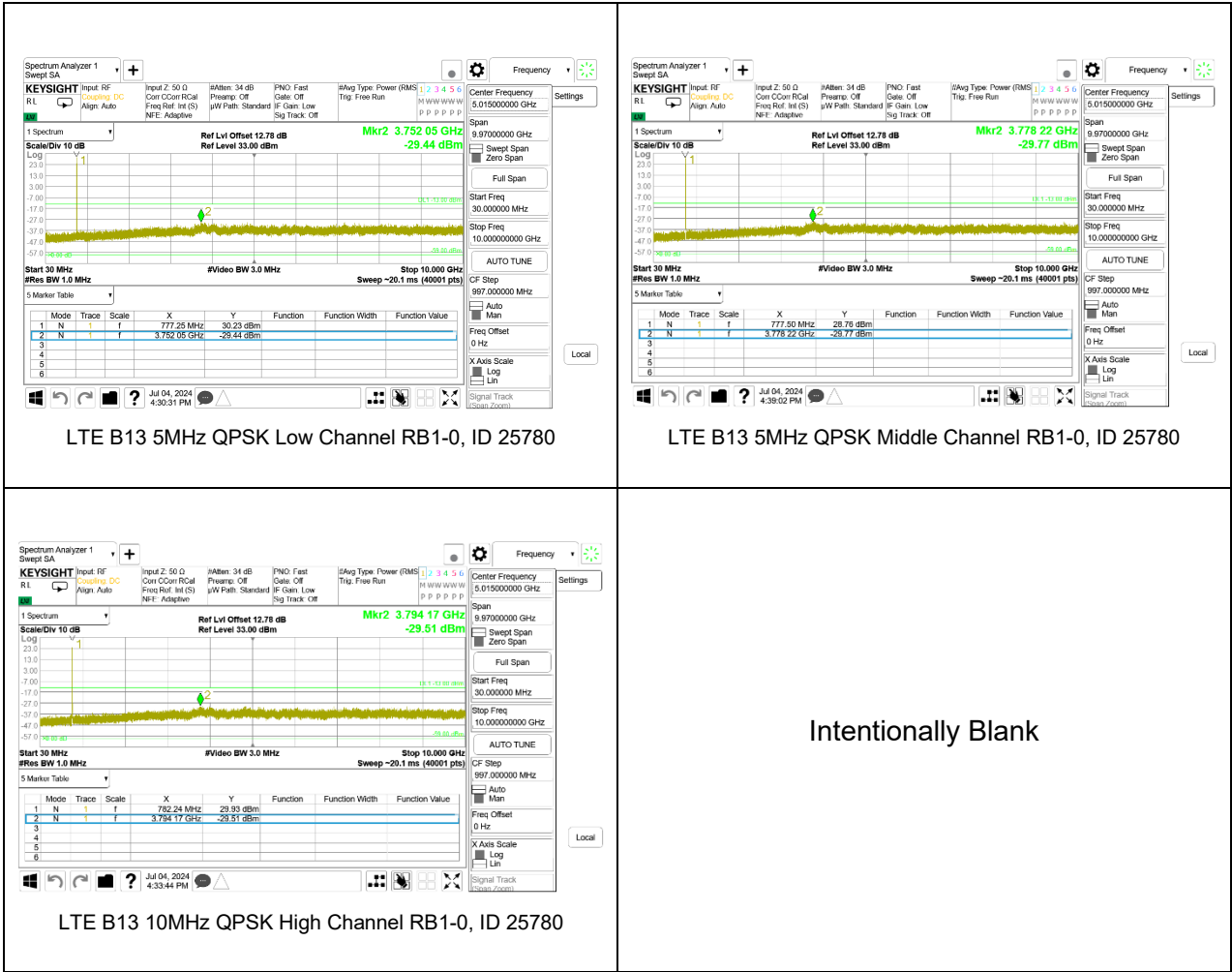
9.3.3. LTE BAND 13

LIMITS

FCC: §27.53 (c), (f)

The minimum permissible attenuation level of any spurious emissions is $43 + 10 \log (P)$ dB where transmitting power (P) in Watts. The band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.

Note: Radiated data in section 10.1.4 confirms a compliance for the emissions in GPS 1559-1610 MHz band were wideband emissions therefore the -40 dBm/MHz limit was used.



Note: Radiated data in section 9.1.6 confirms a compliance with narrowband limits for GPS1559-1610 MHz band.

9.3.4. LTE BAND 14 AND 5G NR n14

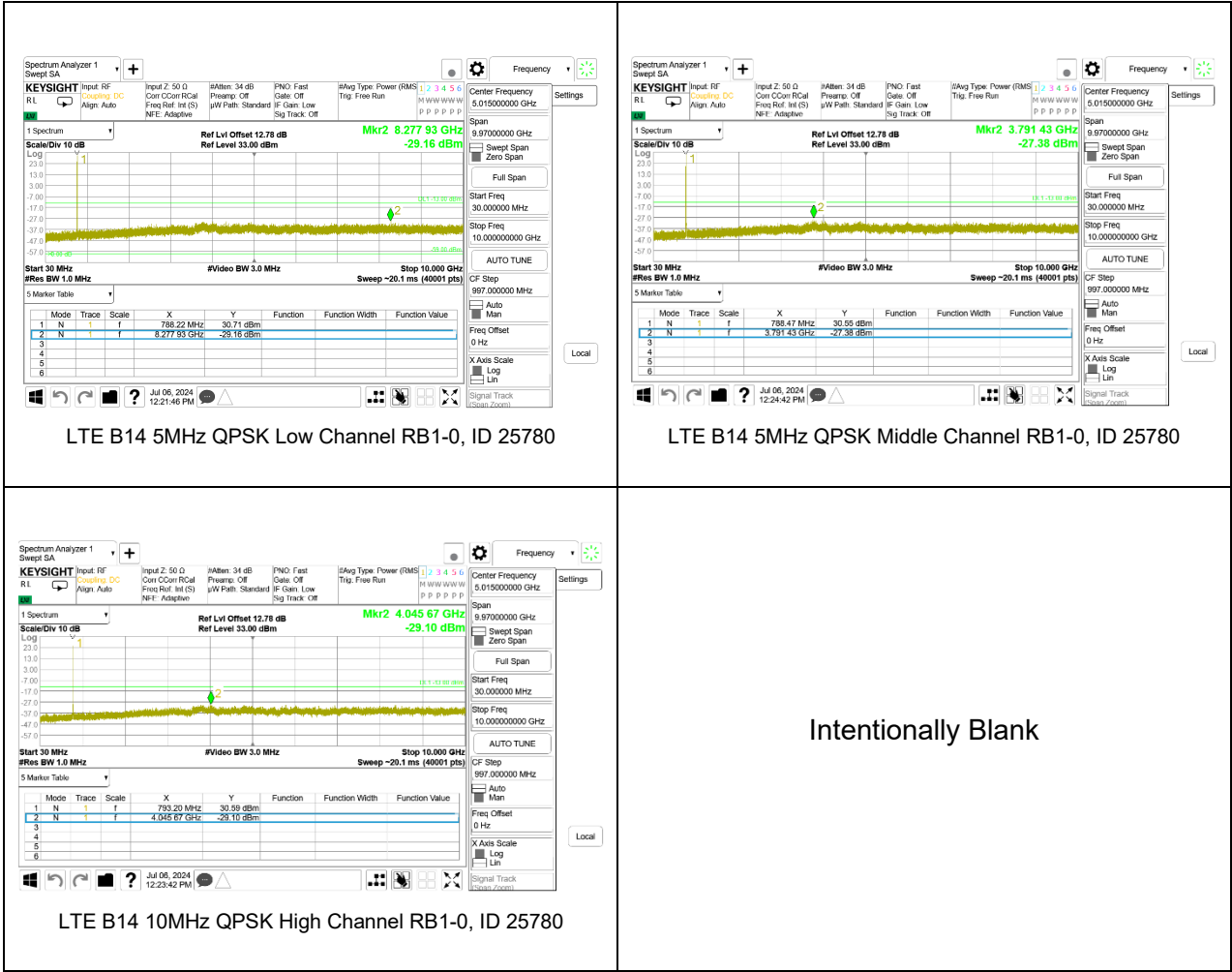
LIMITS

FCC: §90.543 (e), (f)

The minimum permissible attenuation level of any spurious emissions is $43 + 10 \log (P)$ dB where transmitting power (P) in Watts. The band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.

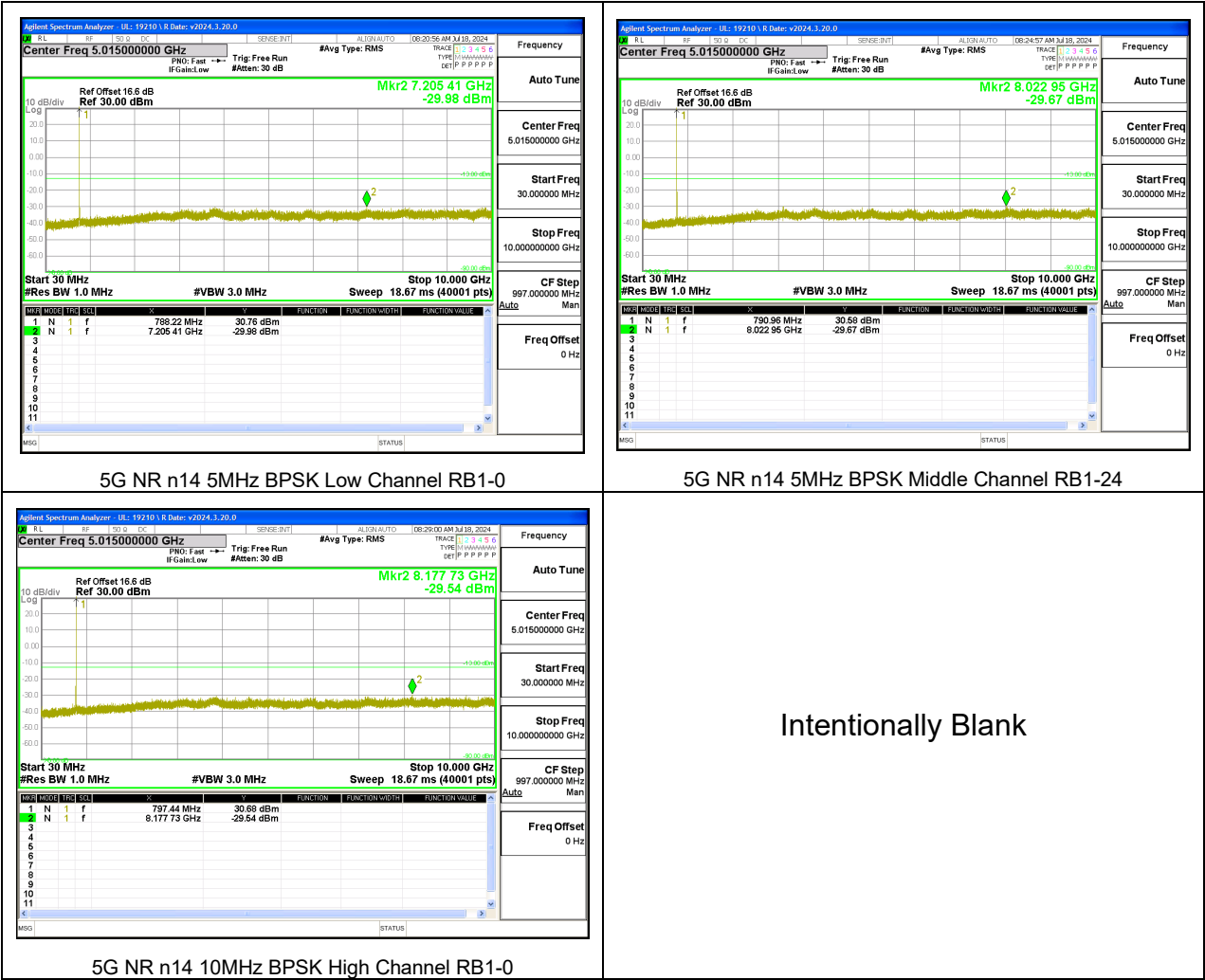
Note: Radiated data in section 10.1.4 confirms a compliance for the emissions in GPS 1559-1610 MHz band were wideband emissions therefore the -40dBm/MHz limit was used.

LTE BAND 14



Note: Radiated data in section 10.1.4 confirms a compliance with narrowband limits for GPS1559-1610 MHz band.

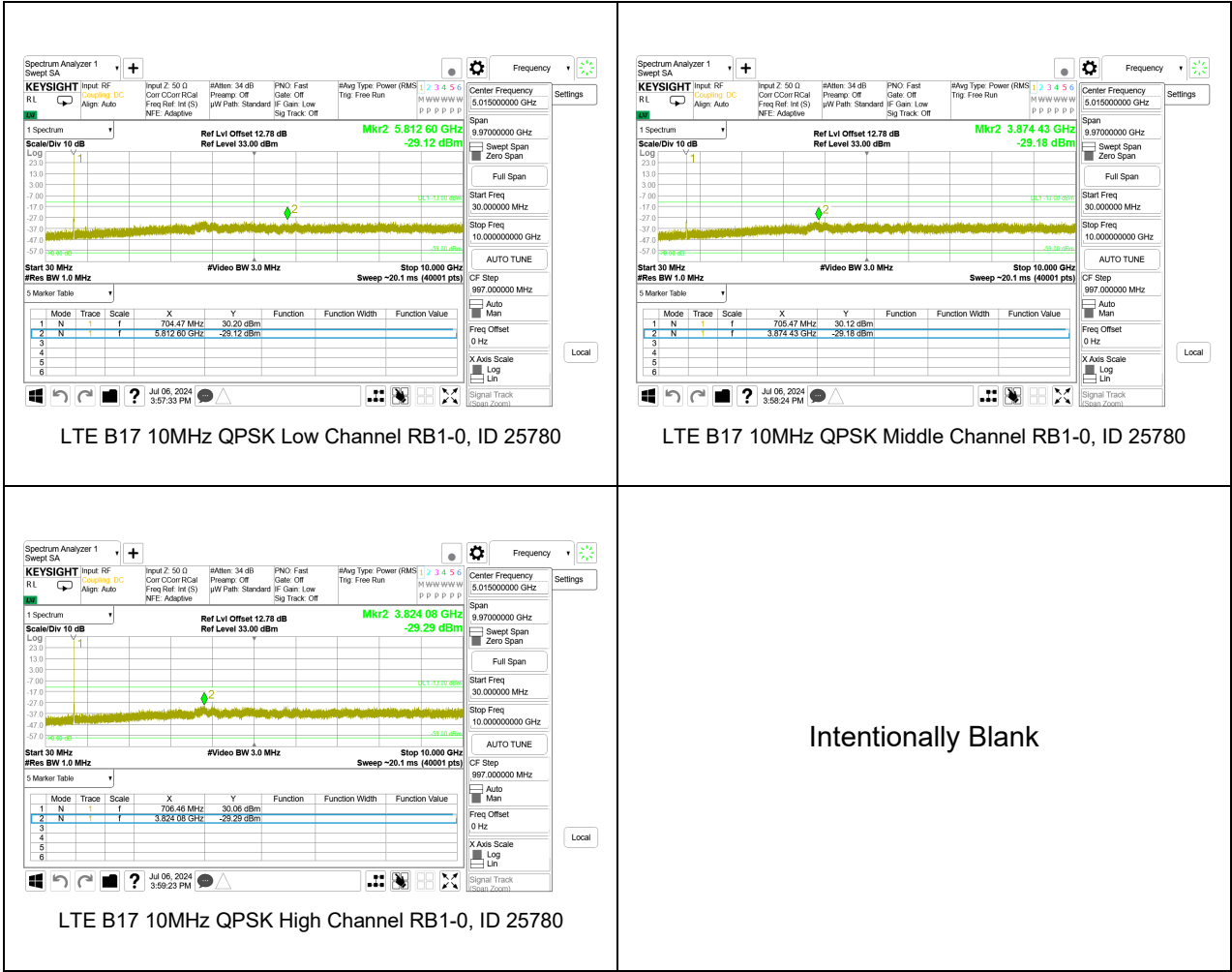
5G NR n14



9.3.5. LTE BAND 17

LIMITS

FCC: \$27.53 (g)
The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.

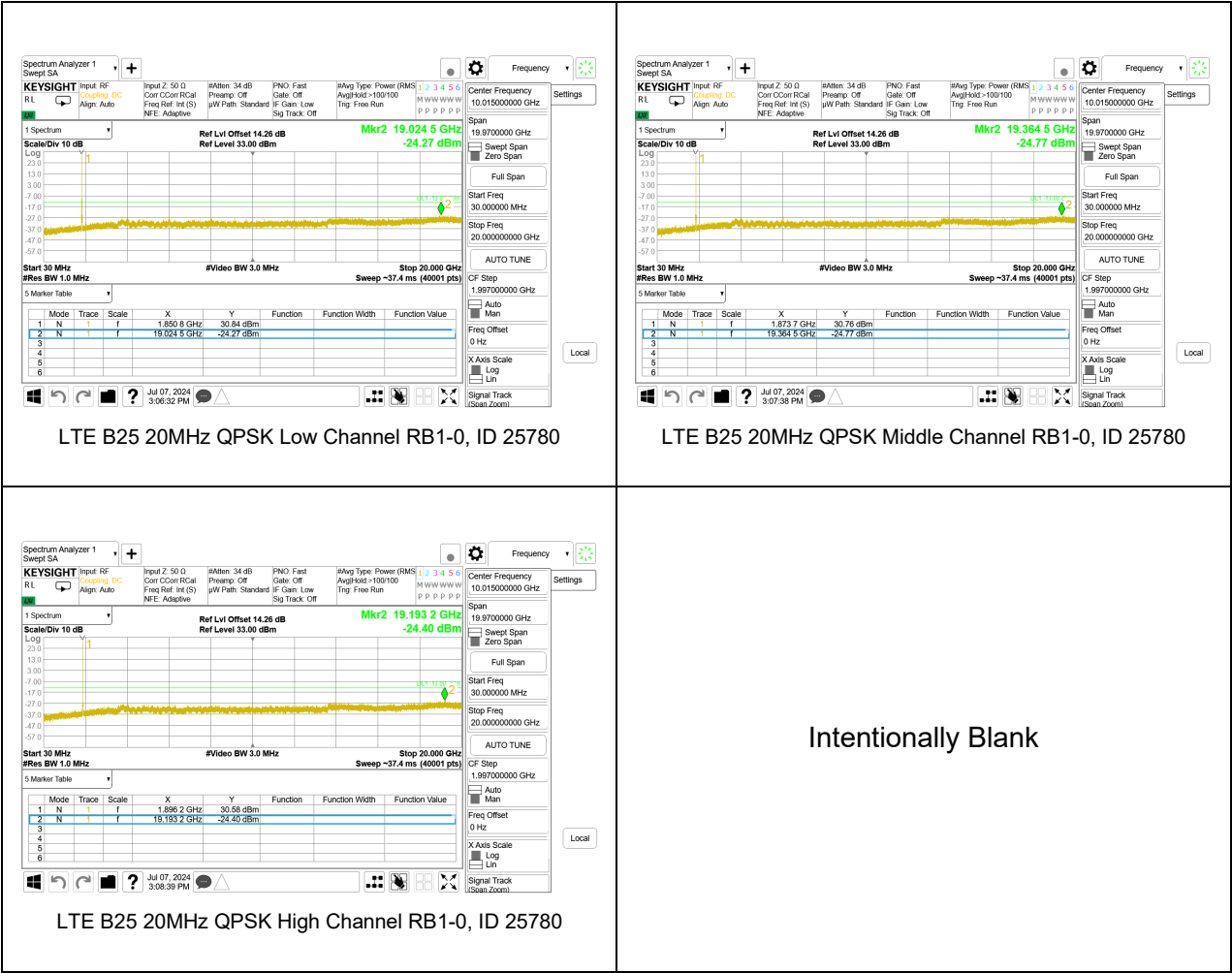


9.3.6. LTE BAND 25 AND 5G NR n25

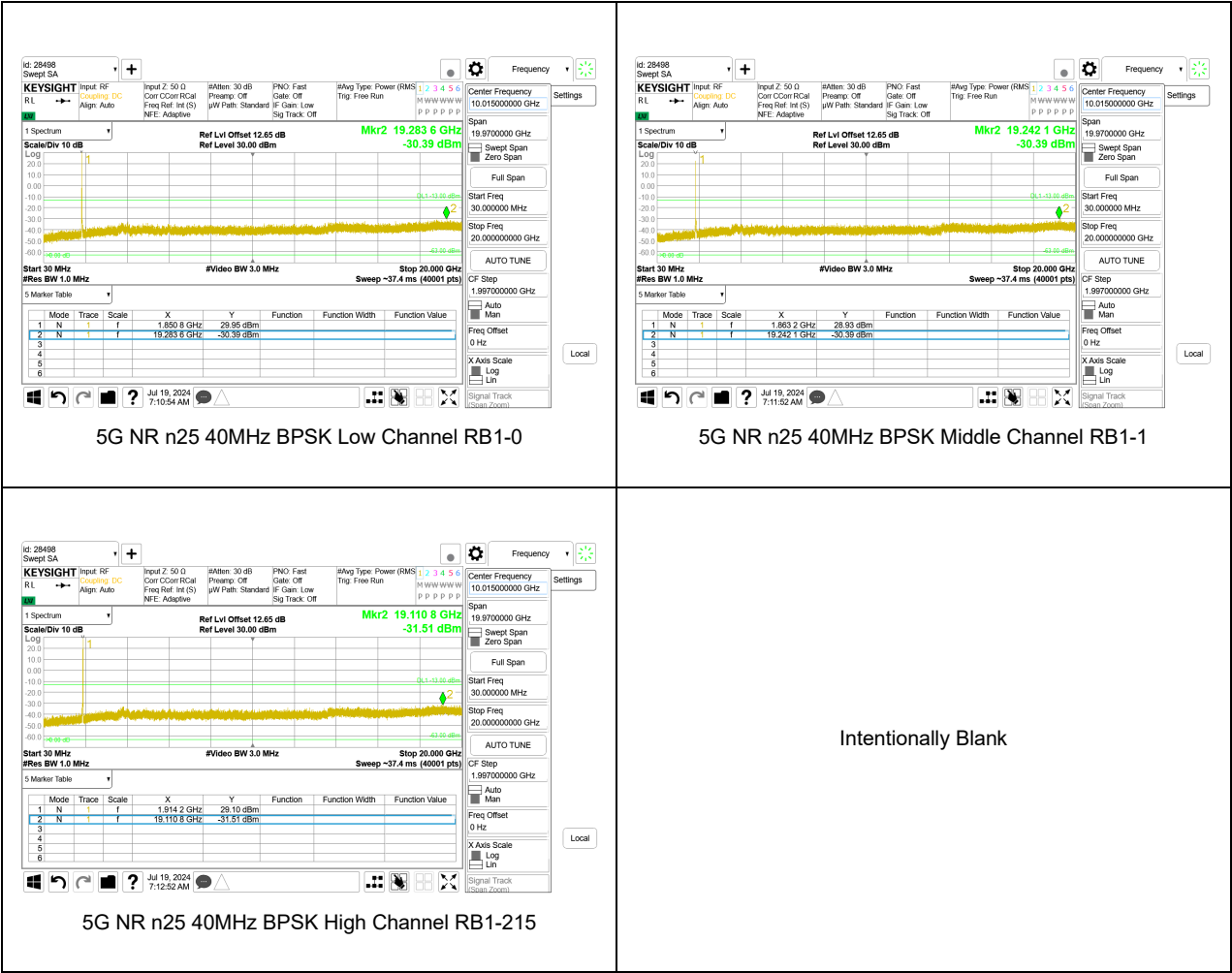
LIMITS

FCC: §24.238 (a)
The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.

LTE BAND 25



5G NR n25

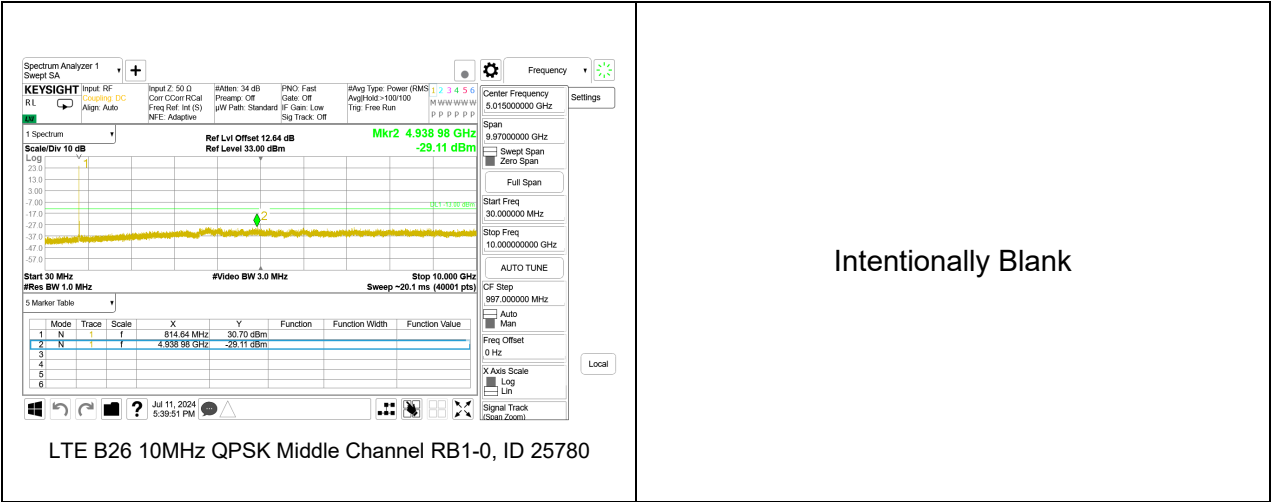


9.3.7. LTE BAND 26 AND 5G NR n26 (FCC PART 90S)

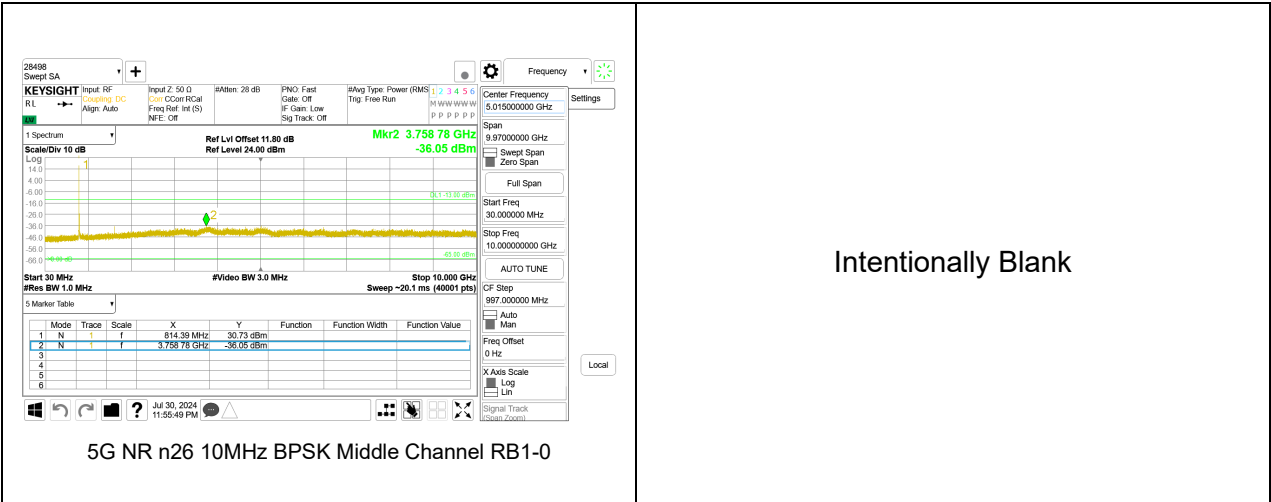
LIMITS

FCC: §90.691
The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.

LTE BAND 26



5G NR n26

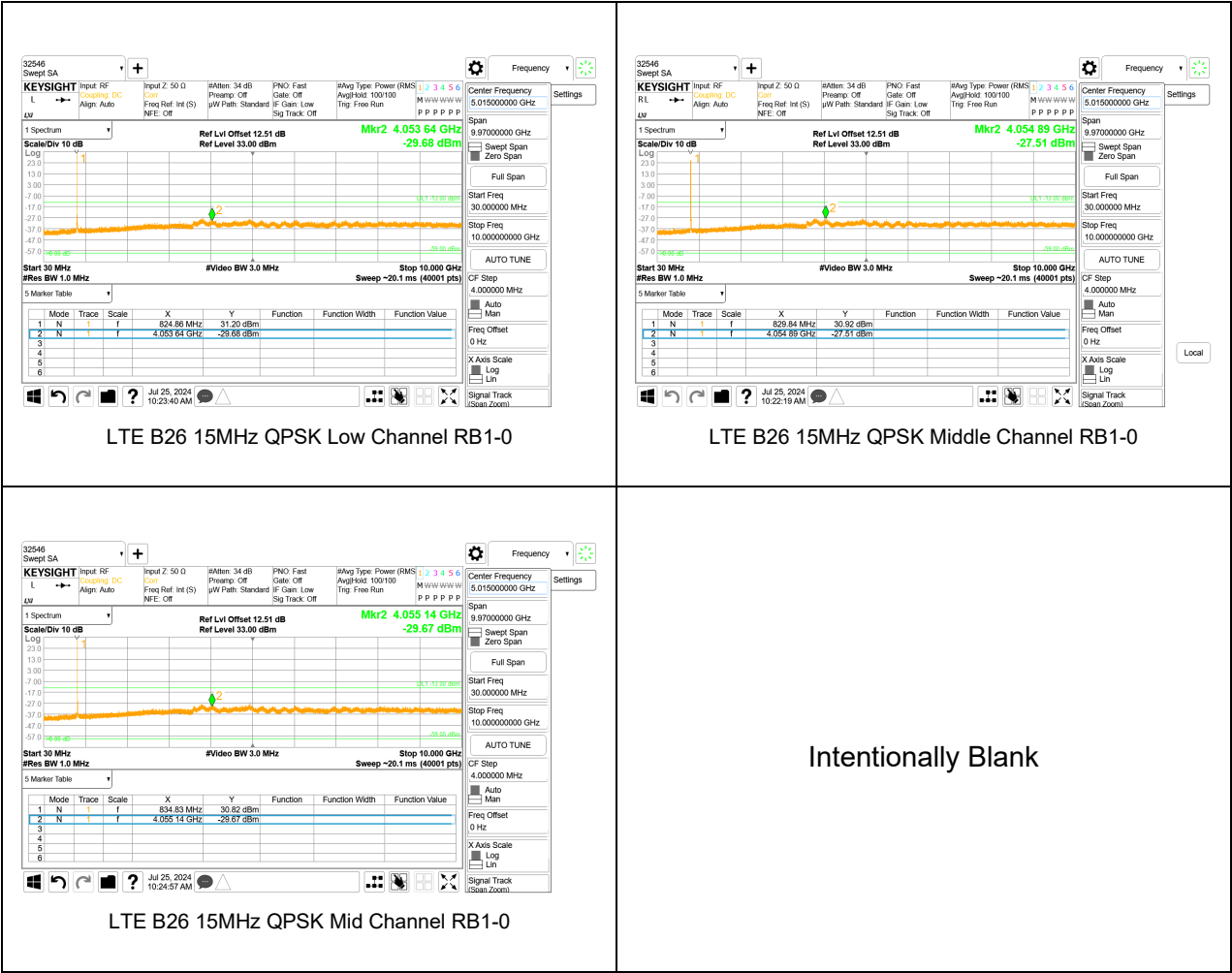


9.3.8. LTE BAND 26 AND 5G NR n26 (FCC PART 22)

LIMITS

FCC: §22.917 (a)
The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.

LTE BAND 26



5G NR n26

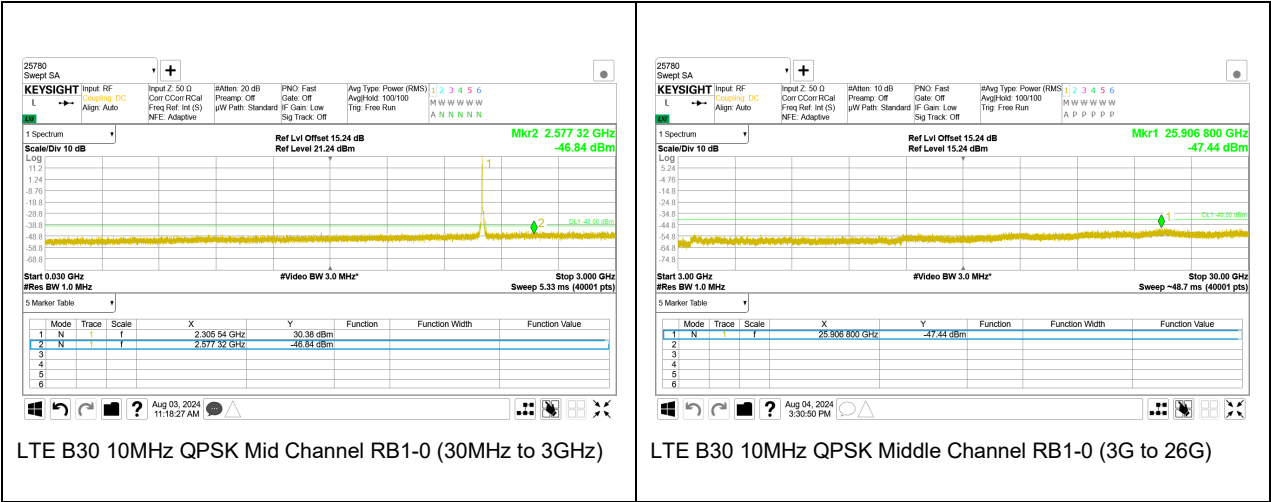


9.3.9. LTE BAND 30 AND 5G NR n30

LIMITS

FCC: §27.53 (a)
The minimum permissible attenuation level of any spurious emissions is 70 + 10 log (P) dB where transmitting power (P) in Watts.

LTE BAND 30



5G NR n30

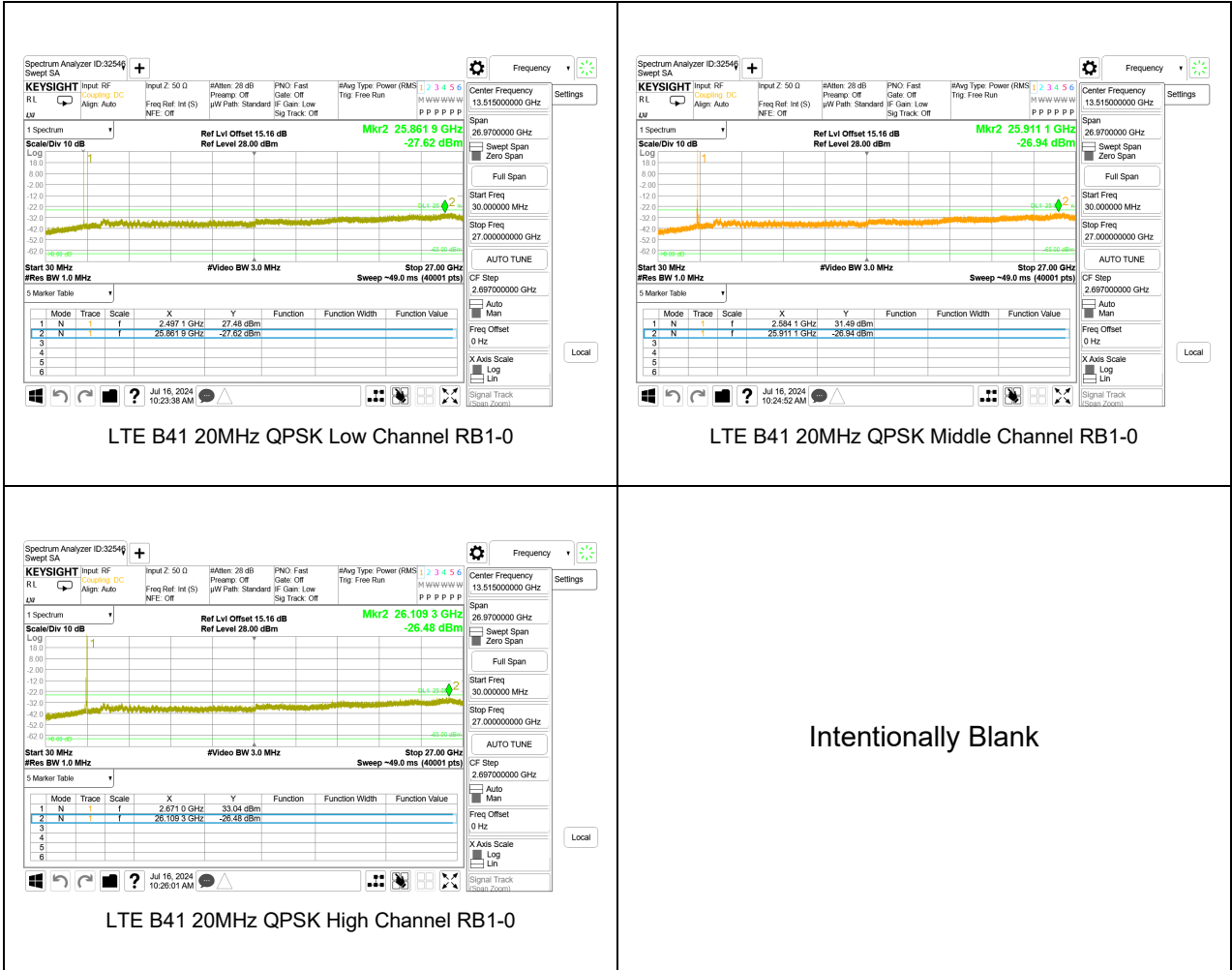


9.3.10. LTE BAND 41 AND 5G NR n41

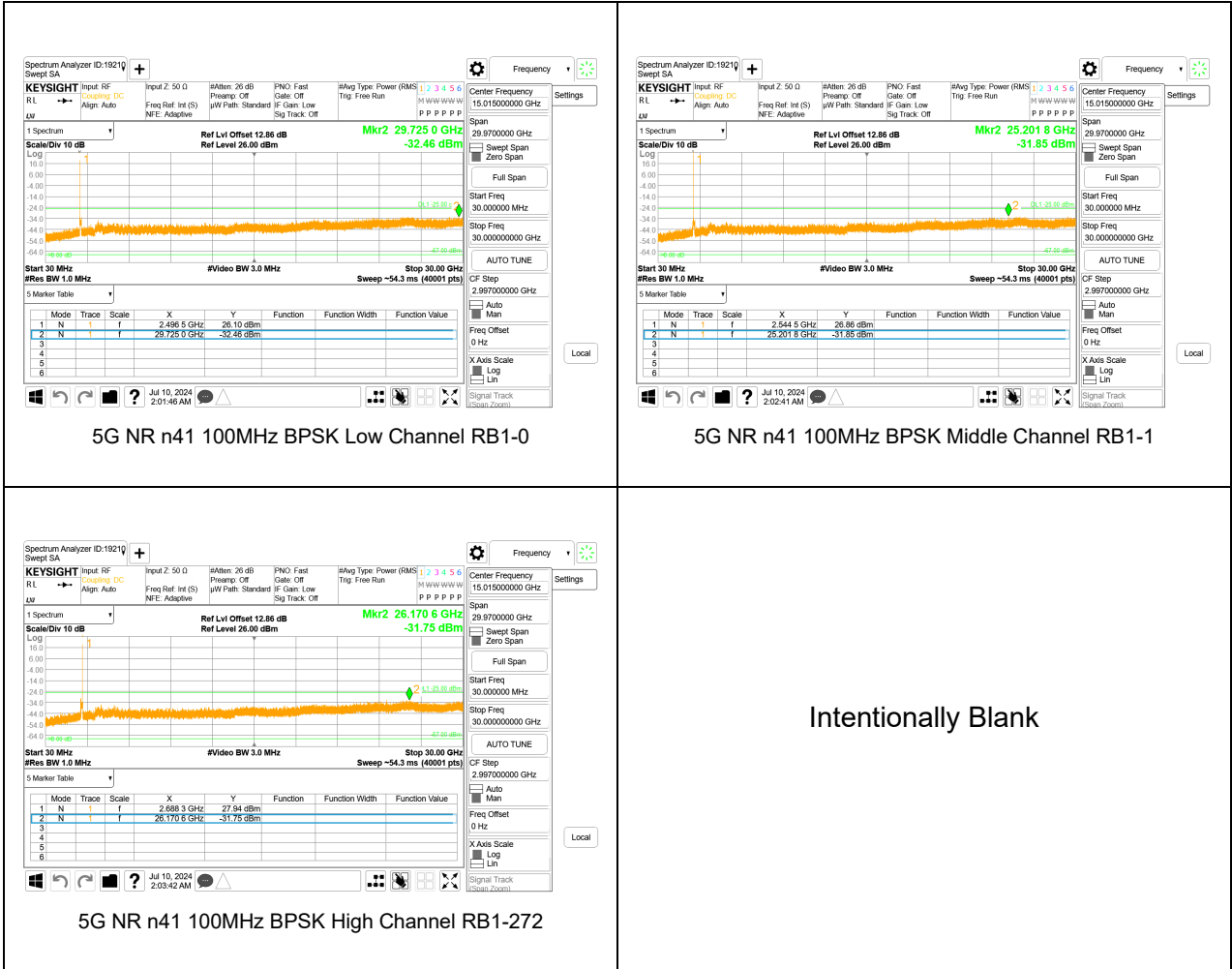
LIMITS

FCC: §27.53 (m)
The minimum permissible attenuation level of any spurious emissions is 55 + 10 log (P) dB where transmitting power (P) in Watts.

LTE BAND 41



5G NR n41



9.3.11. LTE BAND 66 AND 5G NR n66

LIMITS

FCC: §27.53 (h)
The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.

LTE BAND 66

