Test Results:

Tabular data of Input / Output Power and Gain

Test Band	Link	Signal	f_0 Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
BRS/EBS LTE 20M	Downlink	LTE 20 MHz	2 562.70	-19.64	42.84	62.50
BRS/EBS 5G NR		NR 40M	2 557.95	-19.63	42.86	62.88
		NR 60M	2 562.70	-19.61	42.19	61.80

Tabular data of Input / 3 dB above AGC threshold Output Power and Gain

Test Band	Link	Signal	f_0 Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
BRS/EBS LTE 20M	Downlink	LTE 20 MHz	2 562.70	-19.64	42.85	62.49
BRS/EBS 5G NR		NR 40M	2 557.95	-19.63	42.68	62.31
		NR 60M	2 562.70	-19.61	41.83	61.44

5.5. OUT-OF-BAND/OUT-OF-BLOCK EMISSIONS AND SPURIOUS EMISSIONS

Test Requirements:

§ 2.1051 Measurements required: Spurious emissions at antenna terminals.

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

§ 27.53 Emission limits.

(m) For BRS and EBS stations, the power of any emissions outside the licensee's frequency bands of operation shall be attenuated below the transmitter power (P) measured in watts in accordance with the standards below. If a licensee has multiple contiguous channels, out-of-band emissions shall be measured from the upper and lower edges of the contiguous channels.

(2) For digital base stations, the attenuation shall be not less than 43 + 10 log (P) dB, unless a documented interference complaint is received from an adjacent channel licensee with an overlapping Geographic Service Area. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS No. 1 on the same terms and conditions as adjacent channel BRS or EBS licensees. Provided that a documented interference complaint cannot be mutually resolved between the parties prior to the applicable deadline, then the following additional attenuation requirements shall apply:

(i) If a pre-existing base station suffers harmful interference from emissions caused by a new or modified base station located 1.5 km or more away, within 24 hours of the receipt of a documented interference complaint the licensee of the new or modified base station must attenuate its emissions by at least 67 +10 log (P) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block and shall immediately notify the complaining licensee upon implementation of the additional attenuation. No later than 60 days after the implementation of such additional attenuation, the licensee of the complaining base station must attenuate its base station emissions by at least 67 +10 log (P) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the new or modified base station.

(ii) If a pre-existing base station suffers harmful interference from emissions caused by a new or modified base station located less than 1.5 km away, within 24 hours of receipt of a documented interference complaint the licensee of the new or modified base station must attenuate its emissions by at least 67 +10 log (P)−20 log (Dkm/1.5) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the complaining licensee, or if both base stations are co-located, limit its undesired signal level at the pre-existing base station receiver(s) to no more than −107 dBm measured in a 5.5 megahertz bandwidth and shall immediately notify the complaining licensee upon such reduction in the undesired signal level. No later than 60 days after such reduction in the undesired signal level, the complaining licensee must attenuate its base station emissions by at least 67 +10 log (P) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the new or modified base station.

(iii) If a new or modified base station suffers harmful interference from emissions caused by a pre-existing base station located 1.5 km or more away, within 60 days of receipt of a documented interference complaint the licensee of each base station must attenuate its base station emissions by at least 67 +10 log (P) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the other licensee.

(iv) If a new or modified base station suffers harmful interference from emissions caused by a pre-existing base station located less than 1.5 km away, within 60 days of receipt of a documented interference complaint: (a) The licensee of the new or modified base station must attenuate its OOBE by at least 67 +10 log (P)−20 log

(Dkm/1.5) measured 3 megahertz above or below, from the channel edge of its frequency block of the other licensee, or if the base stations are co-located, limit its undesired signal level at the other base station receiver(s) to no more than －107 dBm measured in a 5.5-megahertz bandwidth; and (b) the licensee causing the interference must attenuate its emissions by at least 67 +10 log (P) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the new or modified base station.
(v) For all fixed digital user stations, the attenuation factor shall be not less than 43 +10 log (P) dB at the channel edge.

Test Procedures:
Measurements were in accordance with the test methods section 3.6 of KDB 935210 D05 v01r03.

Spurious emissions shall be measured using a single test signal sequentially tuned to the low, middle, and high channels or frequencies within each authorized frequency band of operation.
Out-of-band/out-of-block emissions (including intermodulation products) shall be measured under each of the following two stimulus conditions:
a) two adjacent test signals sequentially tuned to the lower and upper frequency band/block edges;
b) a single test signal, sequentially tuned to the lowest and highest frequencies or channels within the frequency band/block under examination.
NOTE—Single-channel boosters that cannot accommodate two simultaneous signals within the passband may be excluded from the test stipulated in step a).

3.6.2 Out-of-band/out-of-block emissions conducted measurements
a) Connect a signal generator to the input of the EUT.

If the signal generator is not capable of generating two modulated carriers simultaneously, then two discrete signal generators can be connected with an appropriate combining network to support this two-signal test.

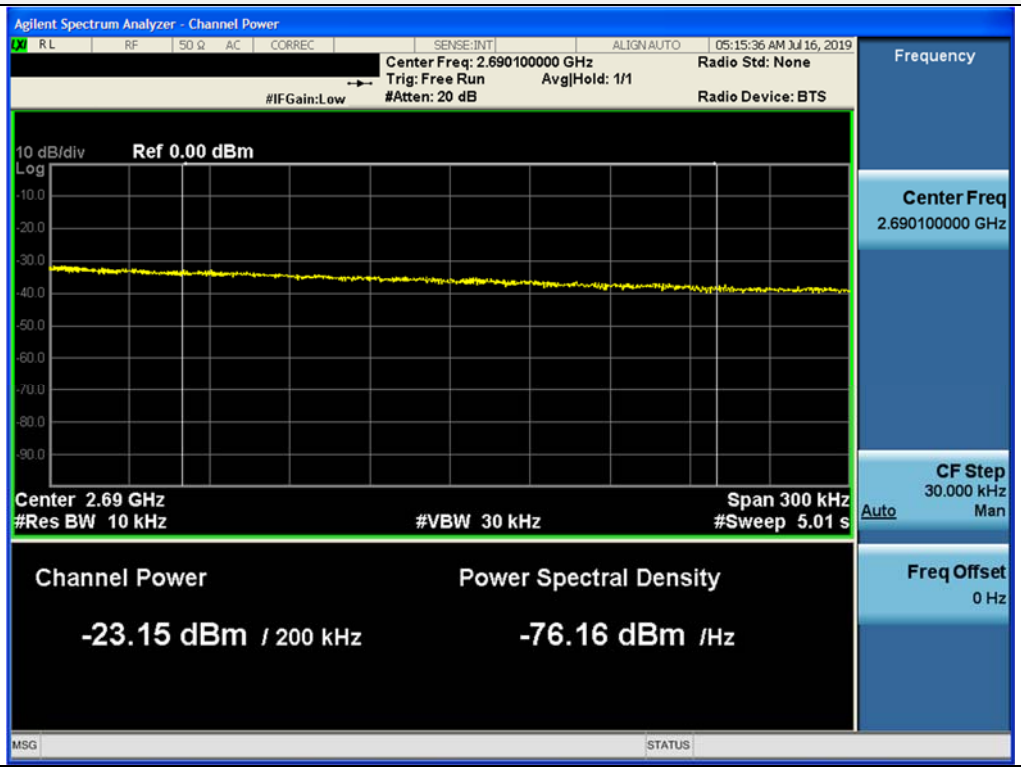
b) Set the signal generator to produce two AWGN signals as previously described.
c) Set the center frequencies such that the AWGN signals occupy adjacent channels, as defined by industry standards such as 3GPP or 3GPP2, at the upper edge of the frequency band or block under test.
d) Set the composite power levels such that the input signal is just below the AGC threshold, but not more than 0.5 dB below. The composite power can be measured using the procedures provided in KDB Publication 971168, but it will be necessary to expand the power integration bandwidth so as to include both of the transmit channels.
e) Connect a spectrum analyzer to the output of the EUT using appropriate attenuation as necessary.
f) Set the RBW = reference bandwidth in the applicable rule section for the supported frequency band.
g) Set the VBW = 3 × RBW.
h) Set the detector to power averaging (rms) detector.
i) Set the Sweep time = auto-couple.
j) Set the spectrum analyzer start frequency to the upper block edge frequency, and the stop frequency to the upper block edge frequency plus 300 kHz or 3 MHz, for frequencies below and above 1 GHz, respectively.
k) Trace average at least 100 traces in power averaging (rms) mode.
l) Use the marker function to find the maximum power level.
m) Capture the spectrum analyzer trace of the power level for inclusion in the test report.
n) Repeat steps k) to m) with the composite input power level set to 3 dB above the AGC threshold.
o) Reset the frequencies of the input signals to the lower edge of the frequency block or band under test.
p) Reset the spectrum analyzer start frequency to the lower block edge frequency minus 300 kHz or 3 MHz, for frequencies below and above 1 GHz, respectively, and the stop frequency to the lower band or block edge frequency.

q) Repeat steps k) to n).
r) Repeat steps a) to q) with the signal generator configured for a single test signal tuned as close as possible to the block edges.
s) Repeat steps a) to r) with the narrowband test signal.
t) Repeat steps a) to s) for all authorized frequency bands or blocks used by the EUT.

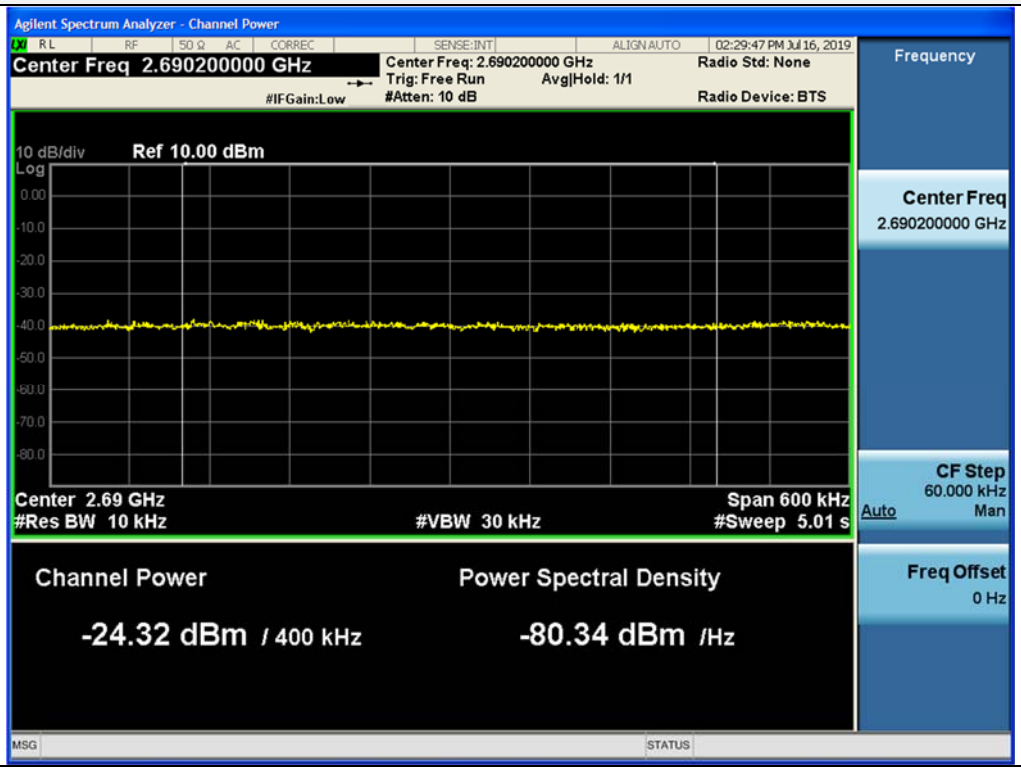
3.6.3 Spurious emissions conducted measurements
a) Connect a signal generator to the input of the EUT.
b) Set the signal generator to produce the broadband test signal as previously described.
c) Set the center frequency of the test signal to the lowest available channel within the frequency band or block.
d) Set the EUT input power to a level that is just below the AGC threshold, but not more than 0.5 dB below.
e) Connect a spectrum analyzer to the output of the EUT using appropriate attenuation as necessary.
f) Set the RBW = reference bandwidth in the applicable rule section for the supported frequency band of operation.
g) Set the VBW ≥ 3 × RBW.
h) Set the Sweep time = auto-couple.
i) Set the spectrum analyzer start frequency to the lowest RF signal generated in the equipment, without going below 9 kHz, and the stop frequency to the lower band/block edge frequency minus 100 kHz or 1 MHz, as specified in the applicable rule part.
The number of measurement points in each sweep must be ≥ (2 × span/RBW), which may require that the measurement range defined by the start and stop frequencies be subdivided, depending on the available number of measurement points provided by the spectrum analyzer.
j) Select the power averaging (rms) detector function.
k) Trace average at least 10 traces in power averaging (rms) mode.
l) Use the peak marker function to identify the highest amplitude level over each measured frequency range. Record the frequency and amplitude and capture a plot for inclusion in the test report.
m) Reset the spectrum analyzer start frequency to the upper band/block edge frequency plus 100 kHz or 1 MHz, as specified in the applicable rule part, and the spectrum analyzer stop frequency to 10 times the highest frequency of the fundamental emission. The number of measurement points in each sweep must be ≥ (2 × span/RBW), which may require that the measurement range defined by the start and stop frequencies be subdivided, depending on the available number of measurement points provided by the spectrum analyzer.
n) Trace average at least 10 traces in power averaging (rms) mode.
o) Use the peak marker function to identify the highest amplitude level over each of the measured frequency ranges. Record the frequency and amplitude and capture a plot for inclusion in the test report; also provide tabular data, if required.
p) Repeat steps i) to o) with the input test signals firstly tuned to a middle band/block frequency/channel, and then tuned to a high band/block frequency/channel.
q) Repeat steps b) to p) with the narrowband test signal.
r) Repeat steps b) to q) for all authorized frequency bands/blocks used by the EUT.

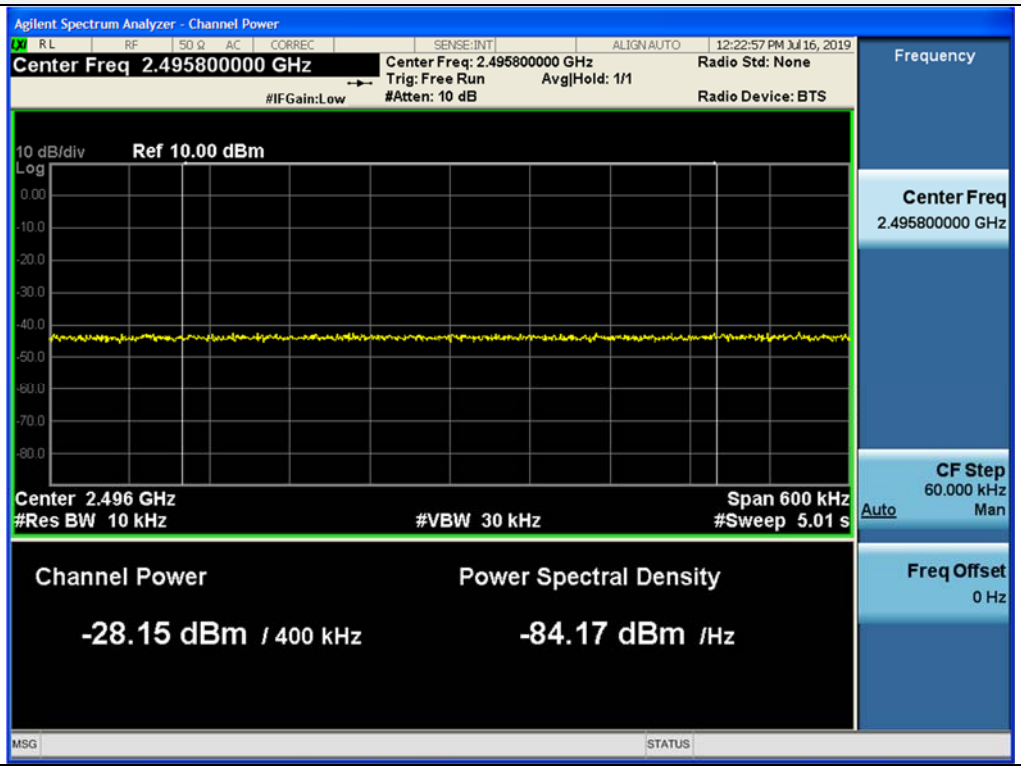
Note1. *In 9 kHz-150 kHz and 150 kHz-30 MHz bands, RBW was reduced to 0.1 % and 1 % of the reference bandwidth for measuring unwanted emission level (typically, 1 MHz if the authorized frequency band is above 1 GHz) and power was integrated.(1% = +30 dB, 10% = +20 dB)*

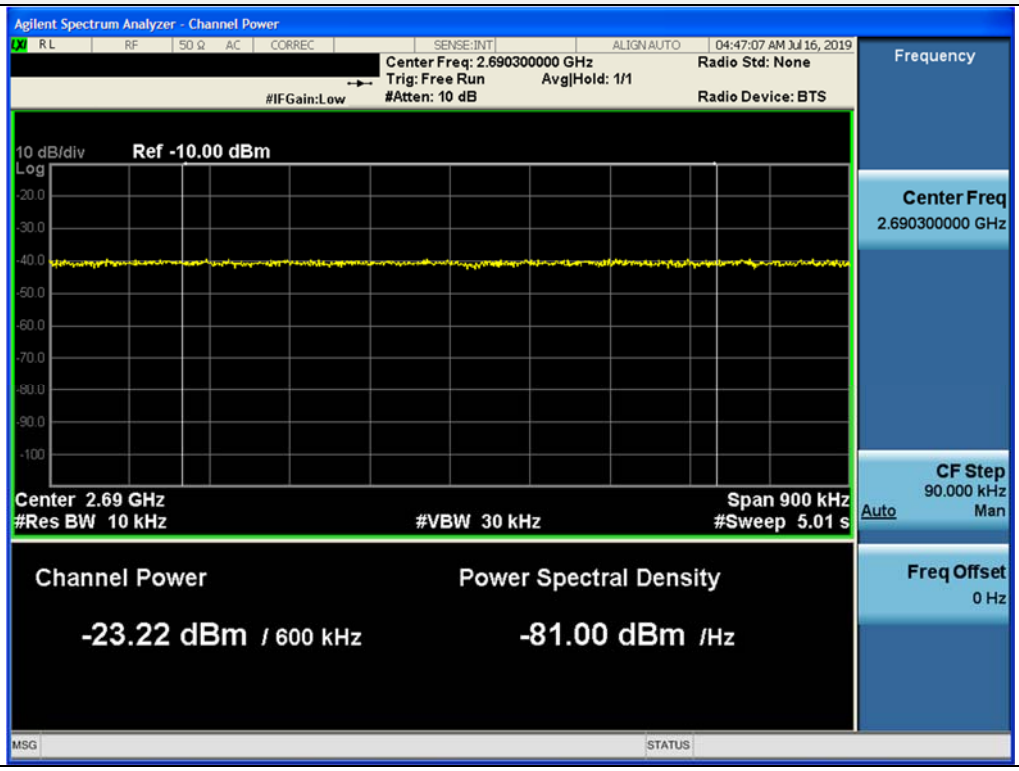
Test Results: Plot data of Out-of-band/out-of-block emissions

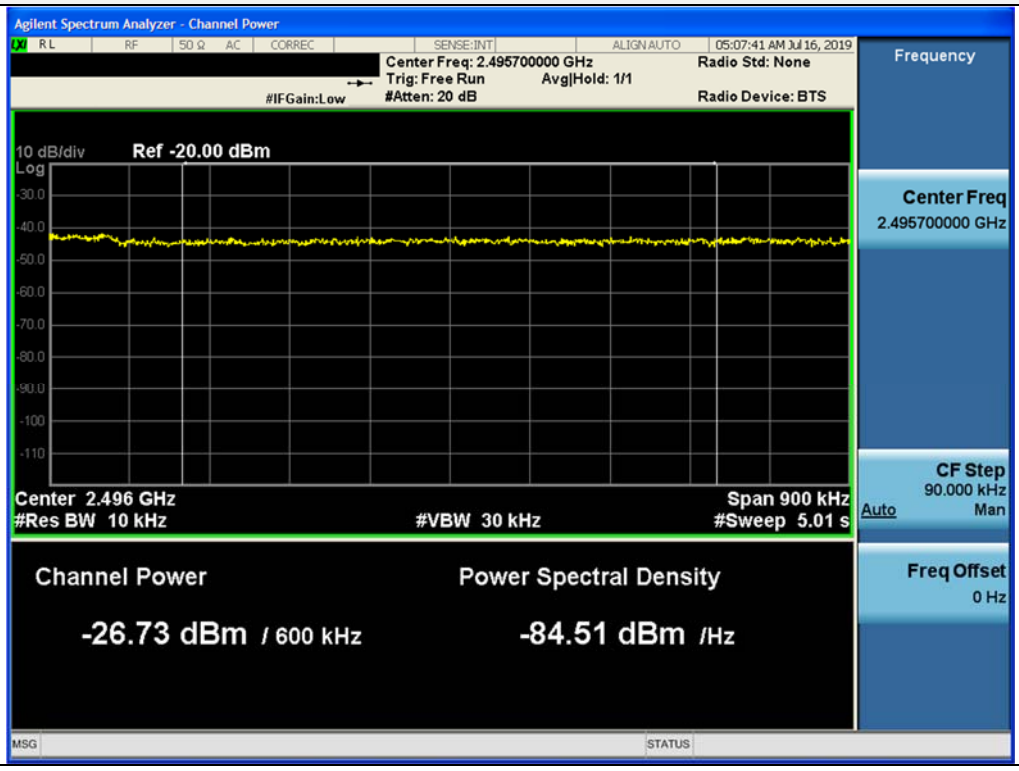
Out-of-band (two adjacent test signals) / BRS/EBS LTE 20M / Downlink / LTE 20 MHz / Upper


Out-of-band (two adjacent test signals) / BRS/EBS LTE 20M / Downlink / LTE 20 MHz / Lower


Out-of-band (two adjacent test signals) / BRS/EBS 5G NR / Downlink / NR 40 MHz / Upper


Out-of-band (two adjacent test signals) / BRS/EBS 5G NR / Downlink / NR 40 MHz / Lower


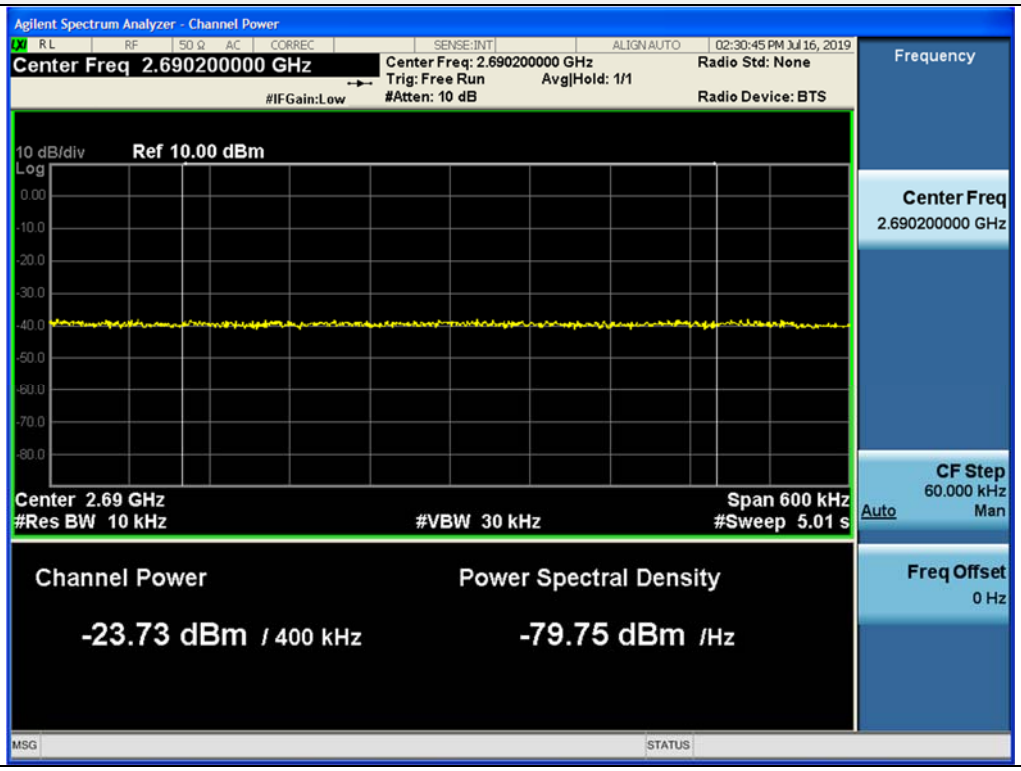
Out-of-band (two adjacent test signals) / BRS/EBS 5G NR / Downlink / NR 60 MHz / Upper


Out-of-band (two adjacent test signals) / BRS/EBS 5G NR / Downlink / NR 60 MHz / Lower


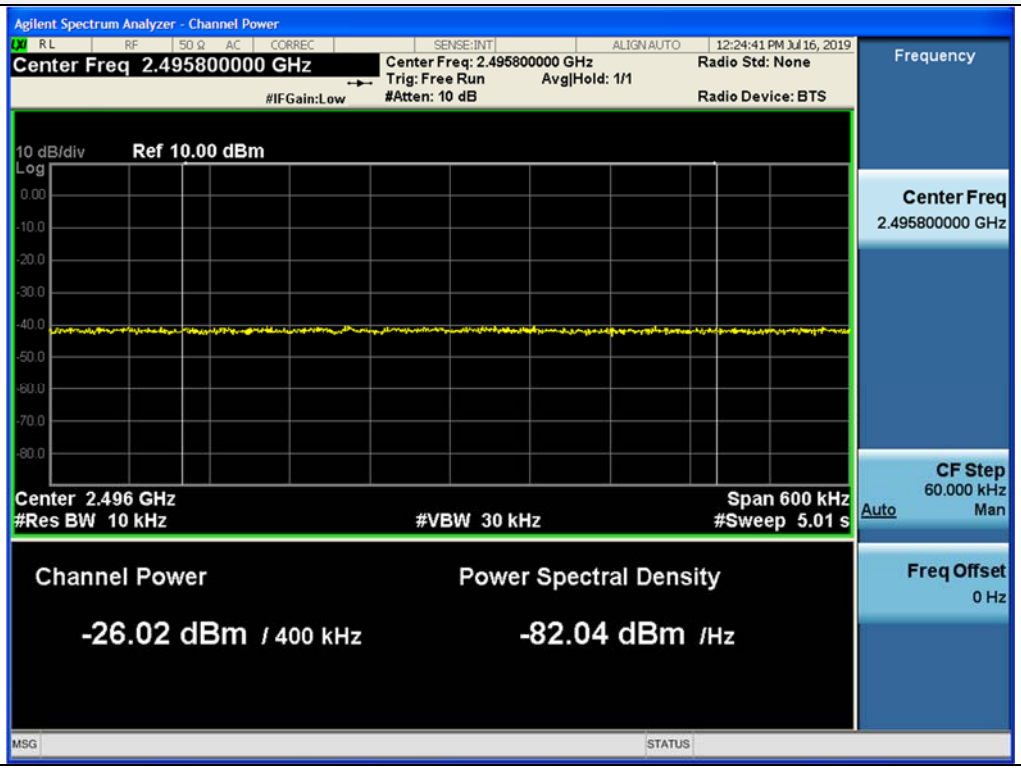
+3 dB above Out-of-band (two adjacent test signals) / BRS/EBS LTE 20M / Downlink / LTE 20 MHz / Upper

+3 dB above Out-of-band (two adjacent test signals) / BRS/EBS LTE 20M / Downlink / LTE 20 MHz / Lower

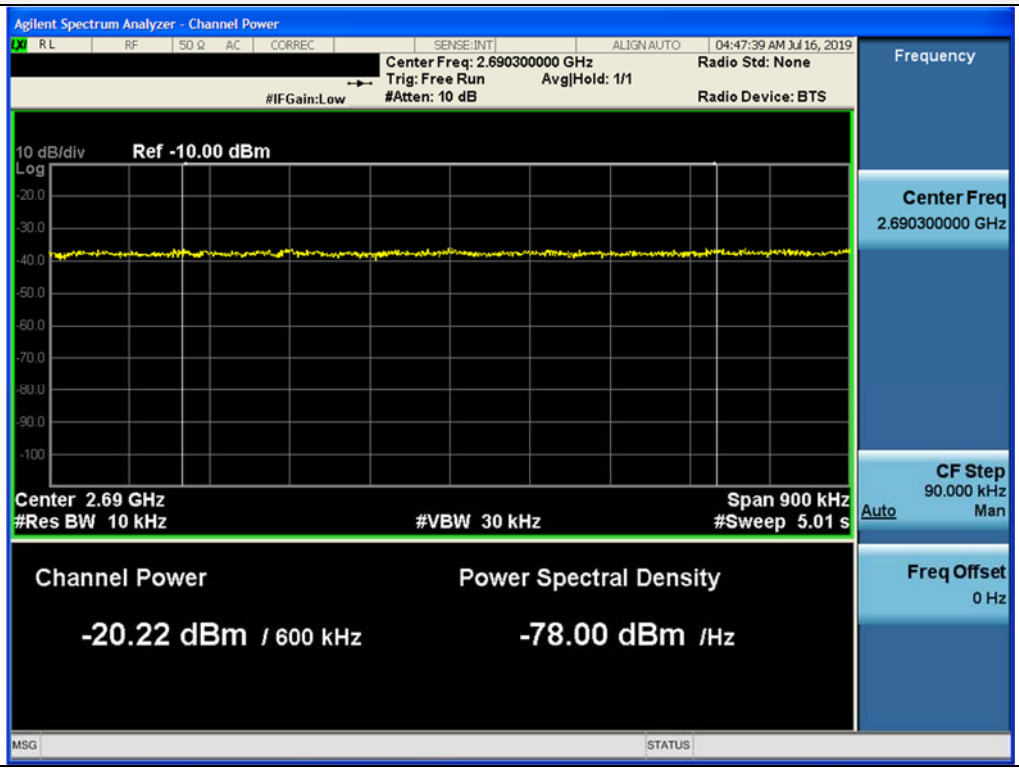
+3 dB above Out-of-band (two adjacent test signals) / BRS/EBS 5G NR / Downlink / NR 40 MHz / Upper



+3 dB above Out-of-band (two adjacent test signals) / BRS/EBS 5G NR / Downlink / NR 40 MHz / Lower

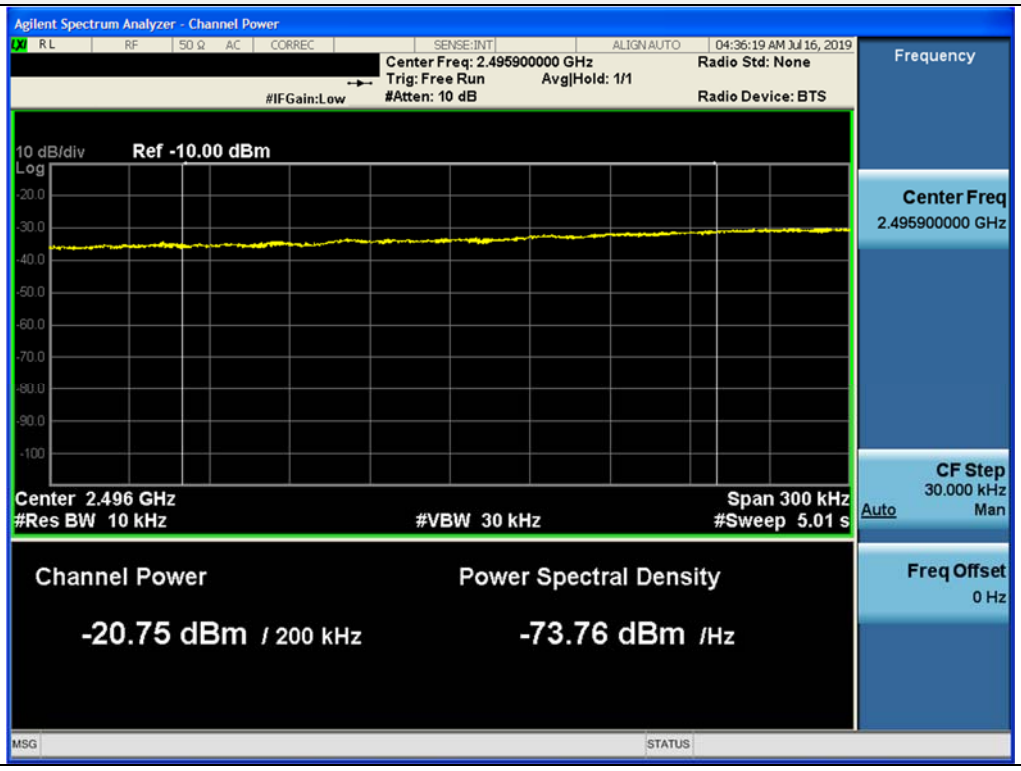


+3 dB above Out-of-band (two adjacent test signals) / BRS/EBS 5G NR / Downlink / NR 60 MHz / Upper

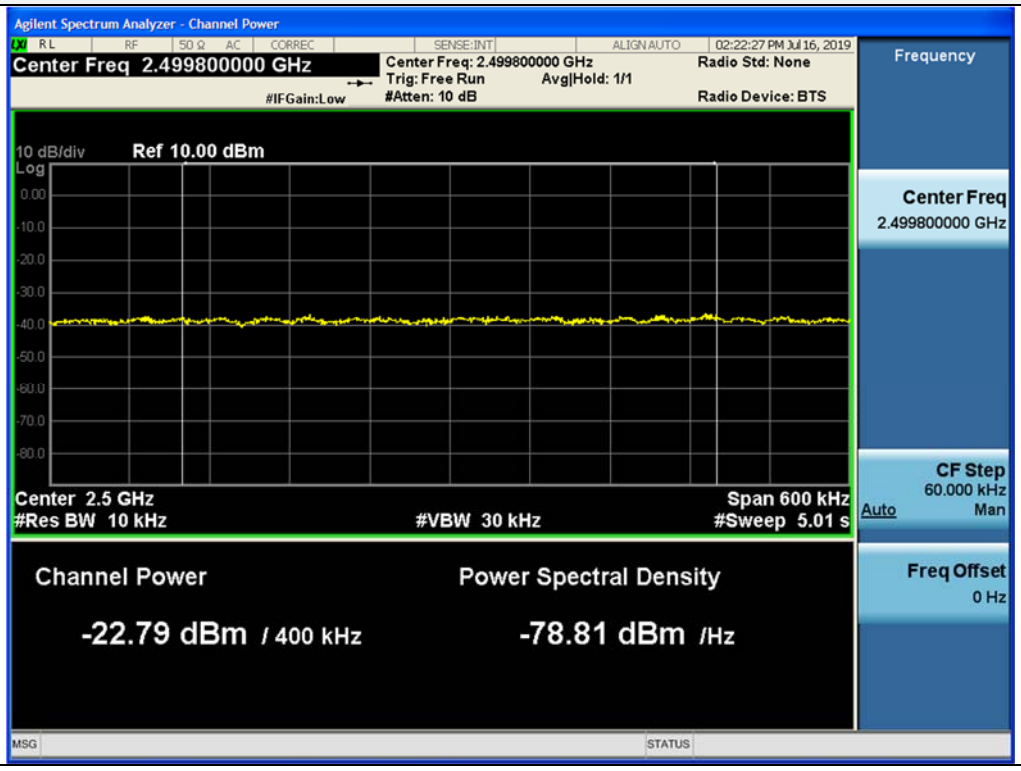


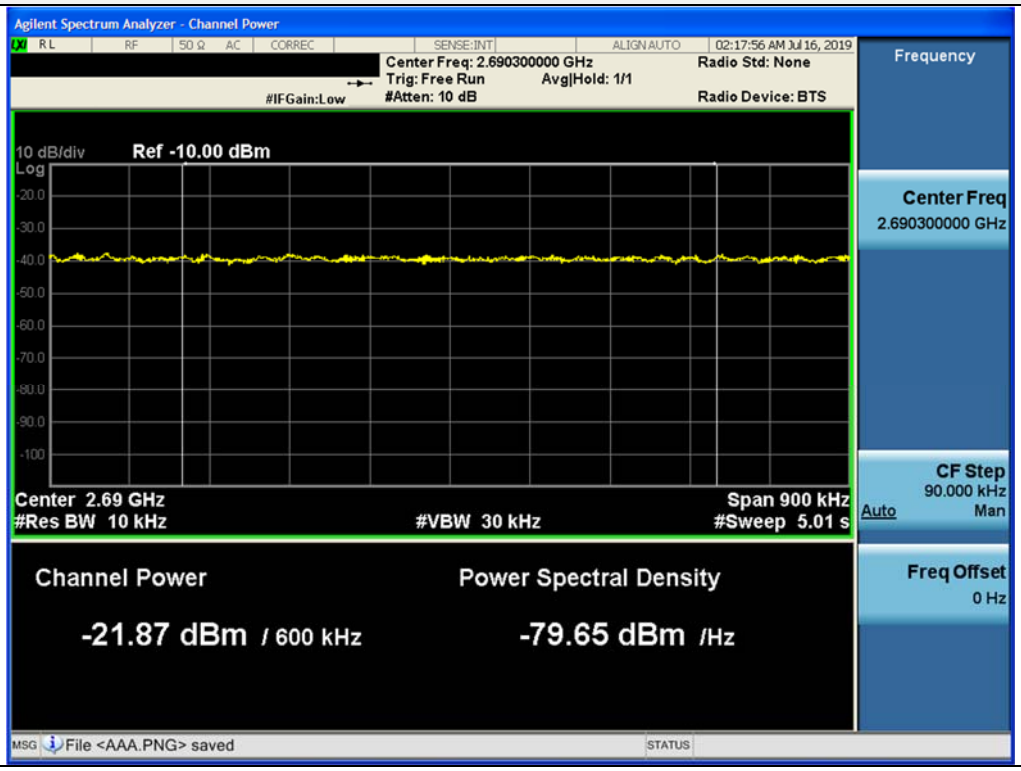
+3 dB above Out-of-band (two adjacent test signals) / BRS/EBS 5G NR / Downlink / NR 60 MHz / Lower

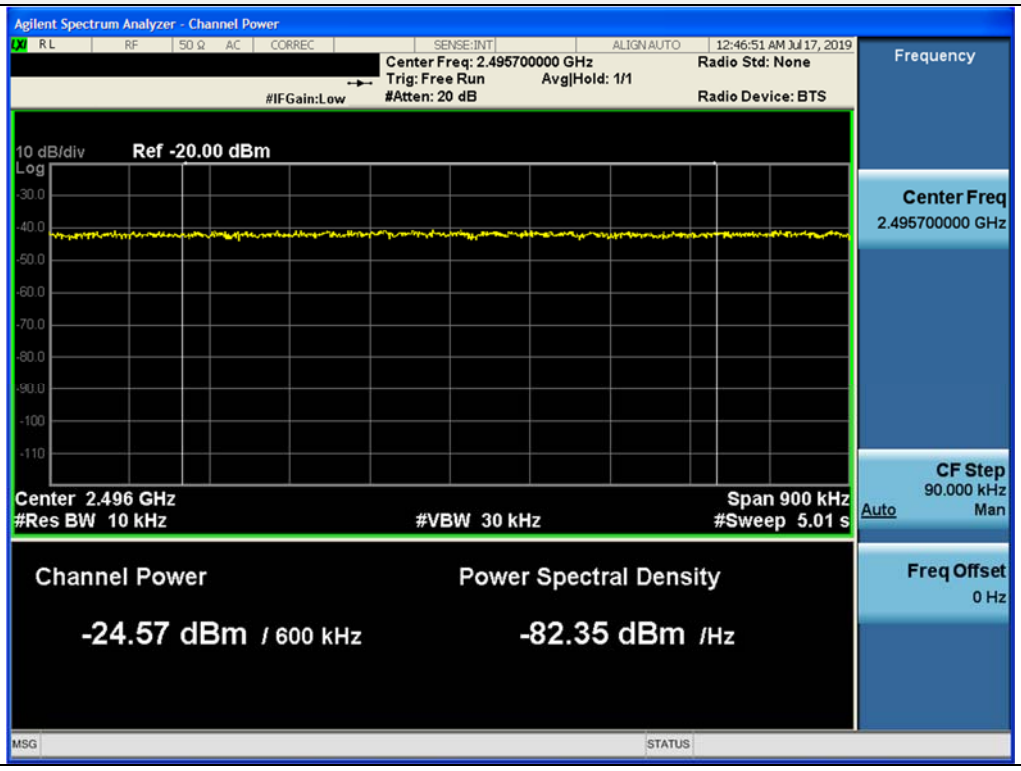
Out-of-band (single test signal) / BRS/EBS LTE 20M / Downlink / LTE 20 MHz / Upper


Out-of-band (single test signal) / BRS/EBS LTE 20M / Downlink / LTE 20 MHz / Lower


Out-of-band (single test signal) / BRS/EBS 5G NR / Downlink / NR 40 MHz / Upper


Out-of-band (single test signal) / BRS/EBS 5G NR / Downlink / NR 40 MHz / Lower


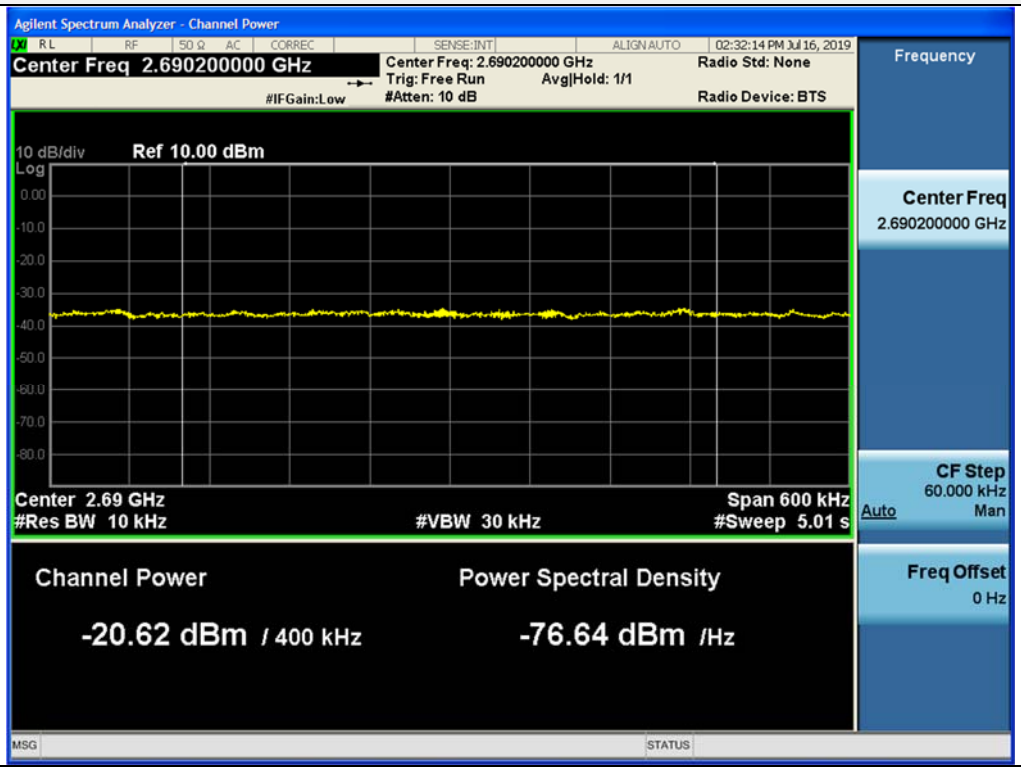
Out-of-band (single test signal) / BRS/EBS 5G NR / Downlink / NR 60 MHz / Upper


Out-of-band (single test signal) / BRS/EBS 5G NR / Downlink / NR 60 MHz / Lower


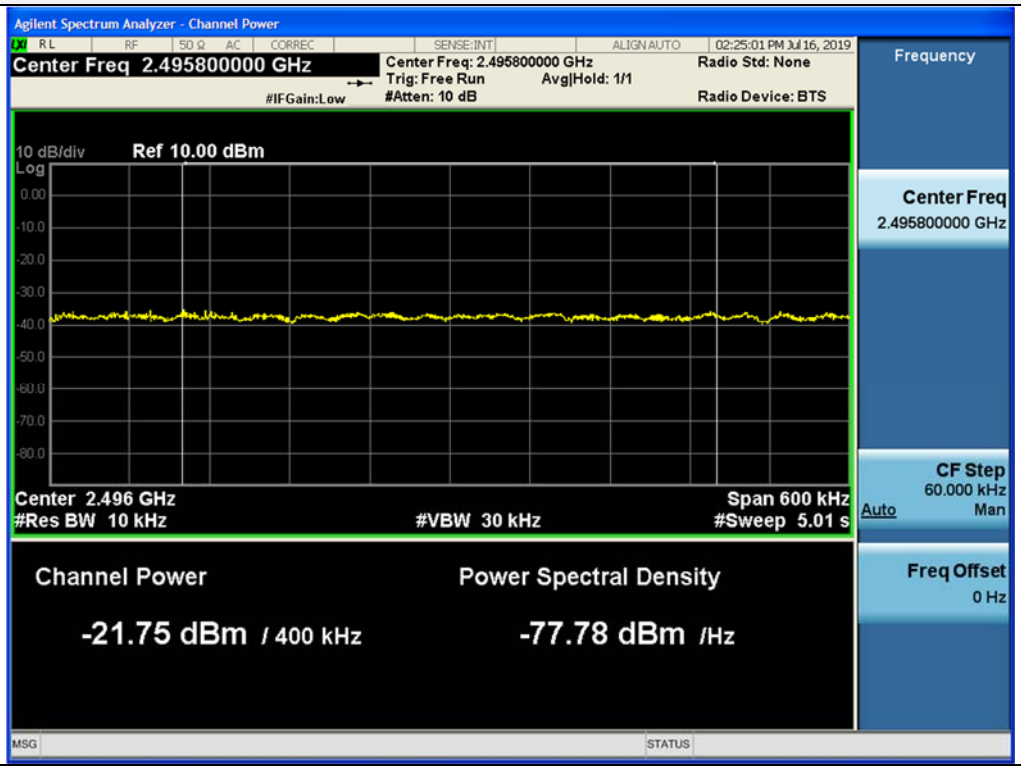
+3 dB above Out-of-band (single test signal) / BRS/EBS LTE 20M / Downlink / LTE 20 MHz / Upper


+3 dB above Out-of-band (single test signal) / BRS/EBS LTE 20M / Downlink / LTE 20 MHz / Lower

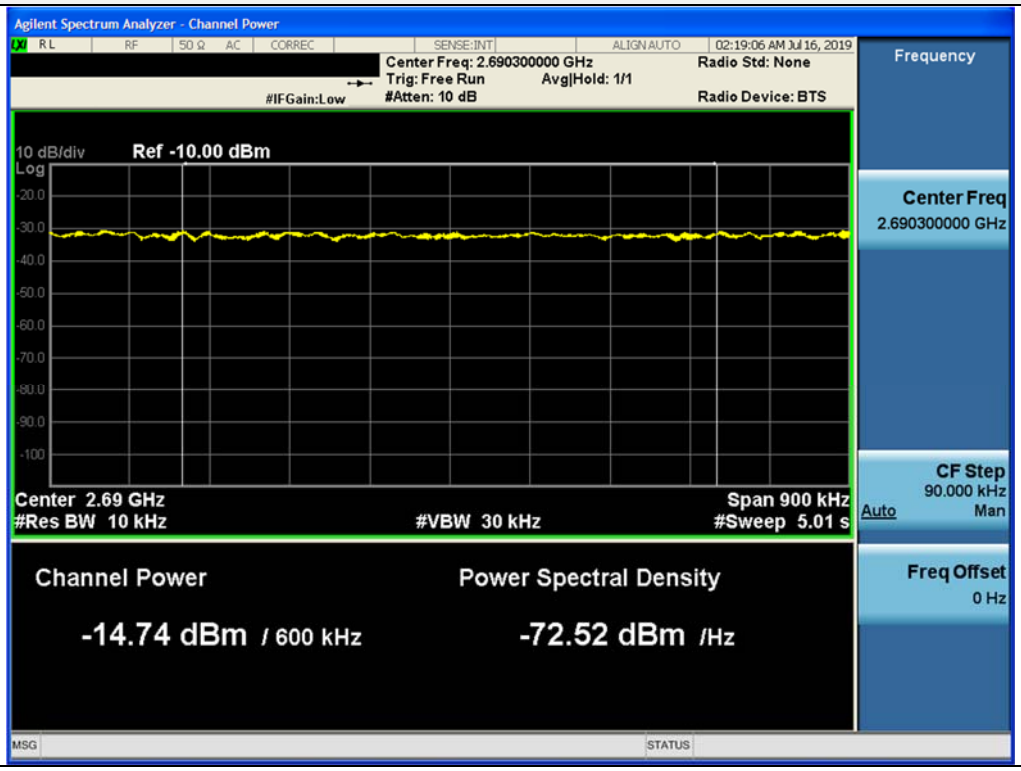

+3 dB above Out-of-band (single test signal) / BRS/EBS 5G NR / Downlink / NR 40 MHz / Upper



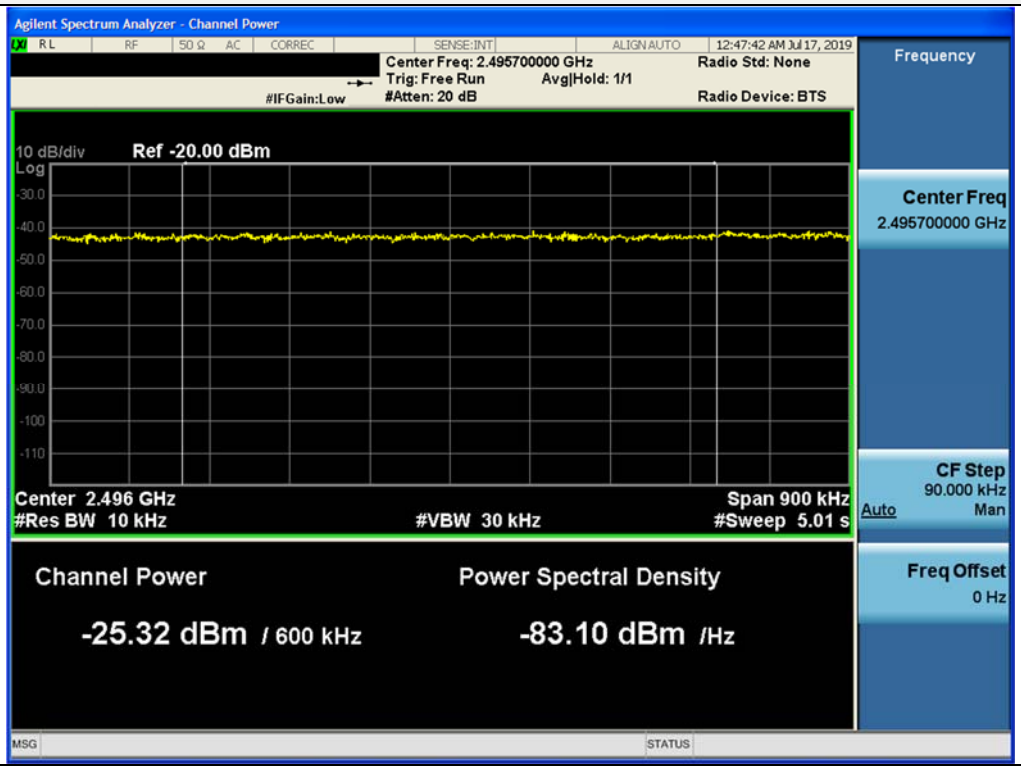
+3 dB above Out-of-band (single test signal) / BRS/EBS 5G NR / Downlink / NR 40 MHz / Lower



+3 dB above Out-of-band (single test signal) / BRS/EBS 5G NR / Downlink / NR 60 MHz / Upper



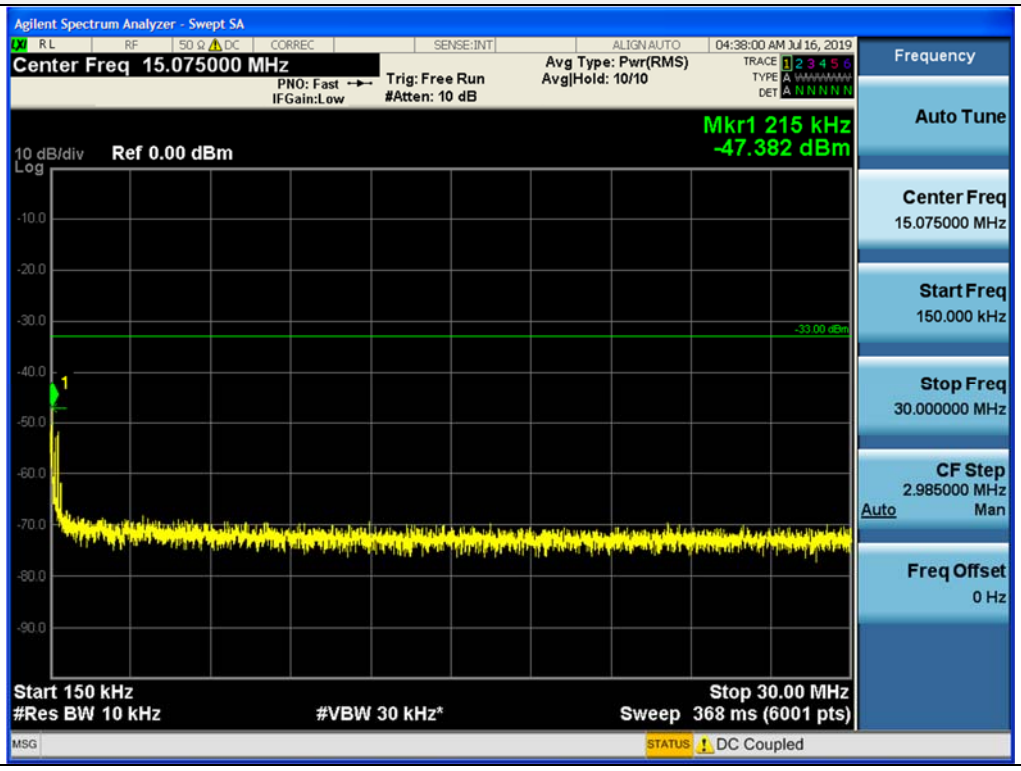
+3 dB above Out-of-band (single test signal) / BRS/EBS 5G NR / Downlink / NR 60 MHz / Lower

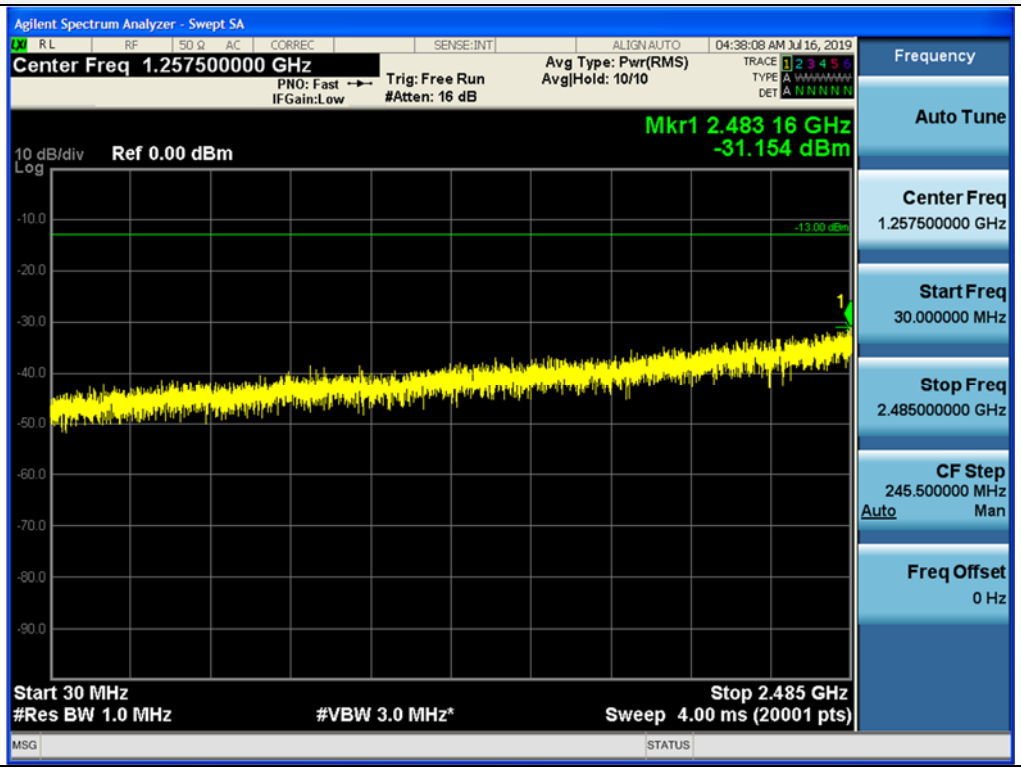


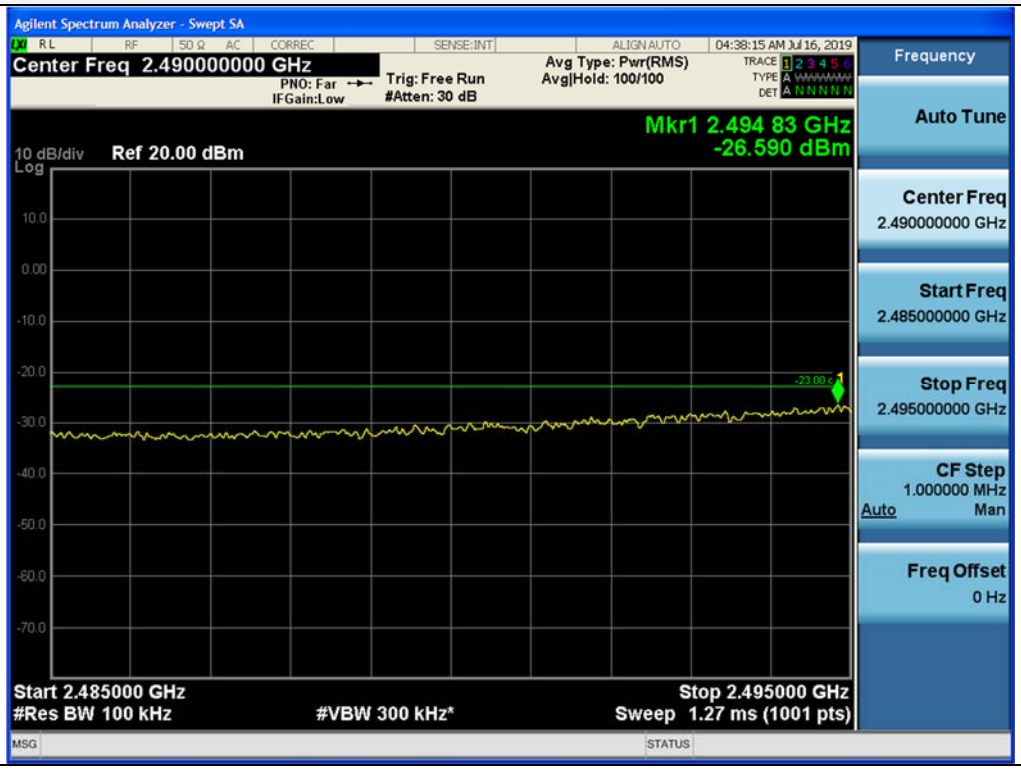
Plot data of Spurious Emissions

Spurious / BRS/EBS LTE 20M / Downlink / LTE 20 MHz / Low / 9 kHz ~ 150 kHz

Spurious / BRS/EBS LTE 20M / Downlink / LTE 20 MHz / Low / 150 kHz ~ 30 MHz

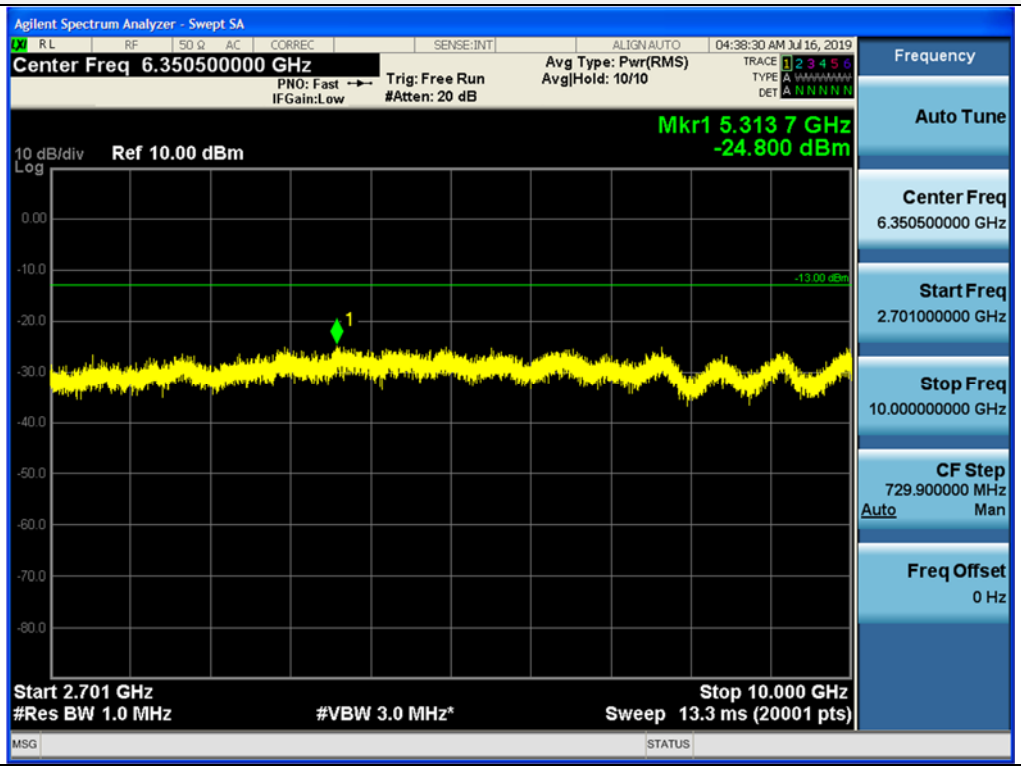


Spurious / BRS/EBS LTE 20M / Downlink / LTE 20 MHz / Low / 30 MHz ~ Low Edge – 10.1 MHz


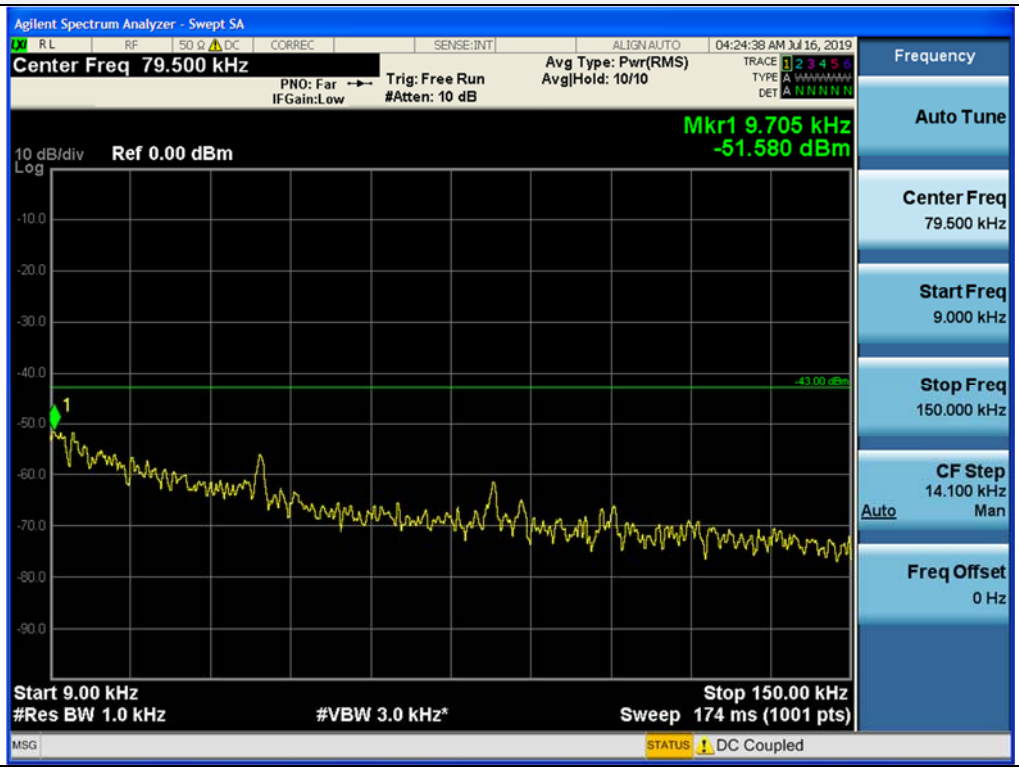
Spurious / BRS/EBS LTE 20M / Downlink / LTE 20 MHz / Low / Low Edge – 10.1 MHz ~ Low Edge – 0.1 MHz


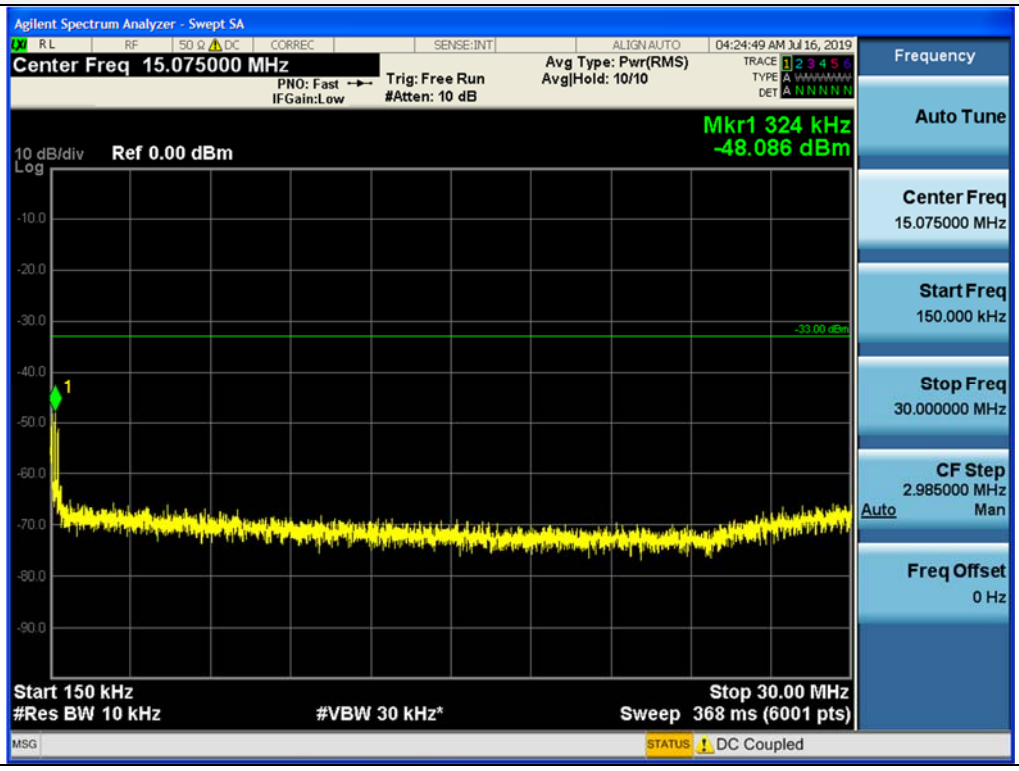
Spurious / BRS/EBS LTE 20M / Downlink / LTE 20 MHz / Low / High Edge + 0.1 MHz ~ High Edge + 10.1 MHz

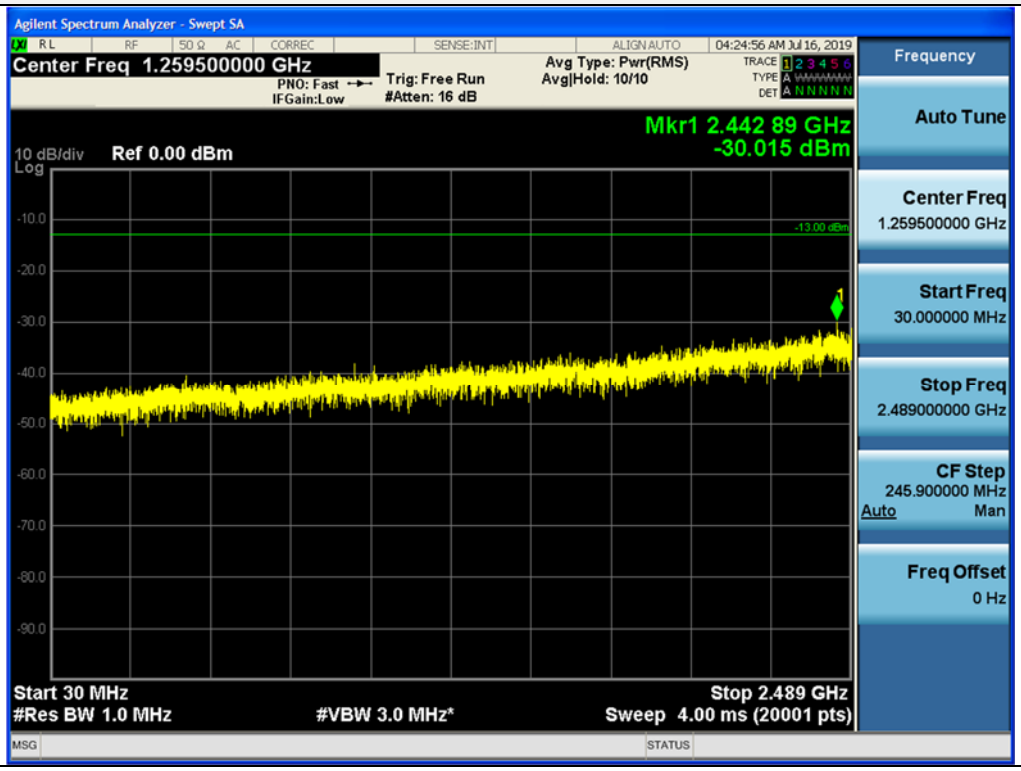
Spurious / BRS/EBS LTE 20M / Downlink / LTE 20 MHz / Low / High Edge + 10.1 MHz ~ 1 GHz

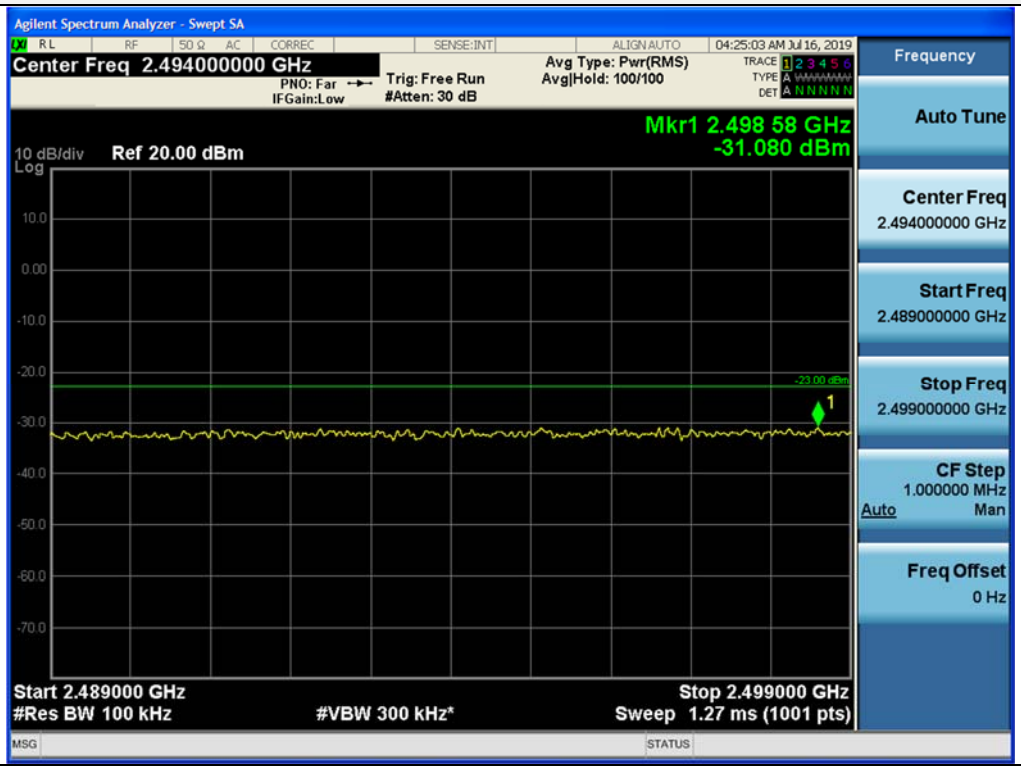


Spurious / BRS/EBS LTE 20M / Downlink / LTE 20 MHz / Low / 1 GHz ~ 10 GHz


Spurious / BRS/EBS LTE 20M / Downlink / LTE 20 MHz / Middle / 9 kHz ~ 150 kHz


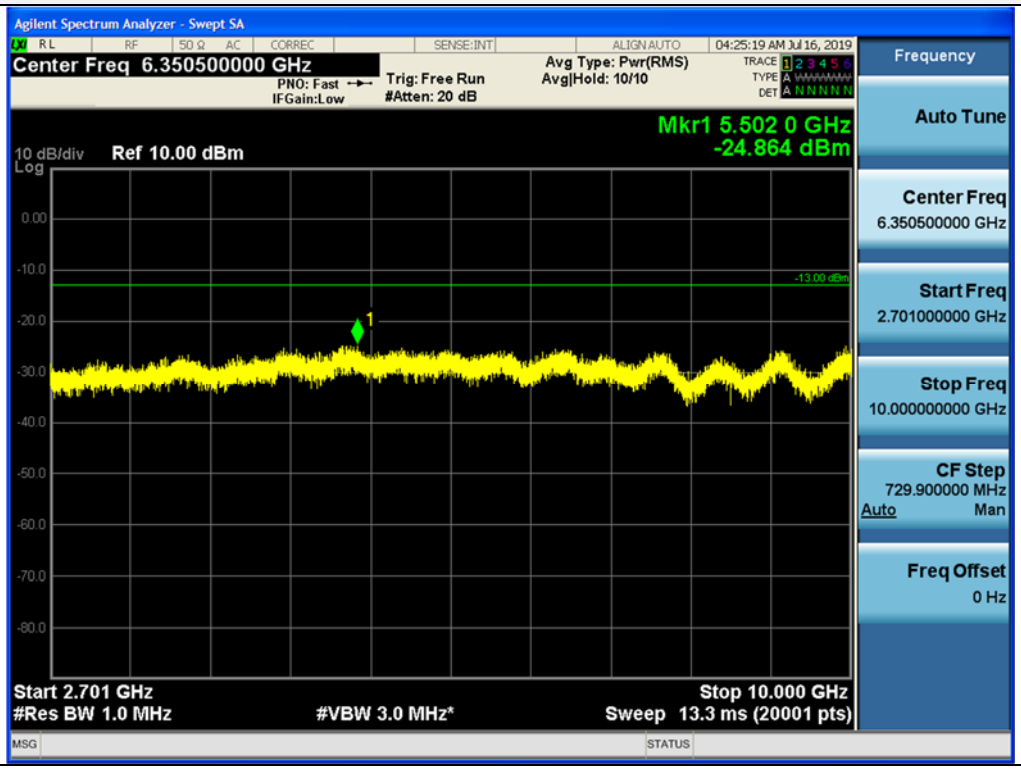
Spurious / BRS/EBS LTE 20M / Downlink / LTE 20 MHz / Middle / 150 kHz ~ 30 MHz


Spurious / BRS/EBS LTE 20M / Downlink / LTE 20 MHz / Middle / 30 MHz ~ Low Edge – 10.1 MHz


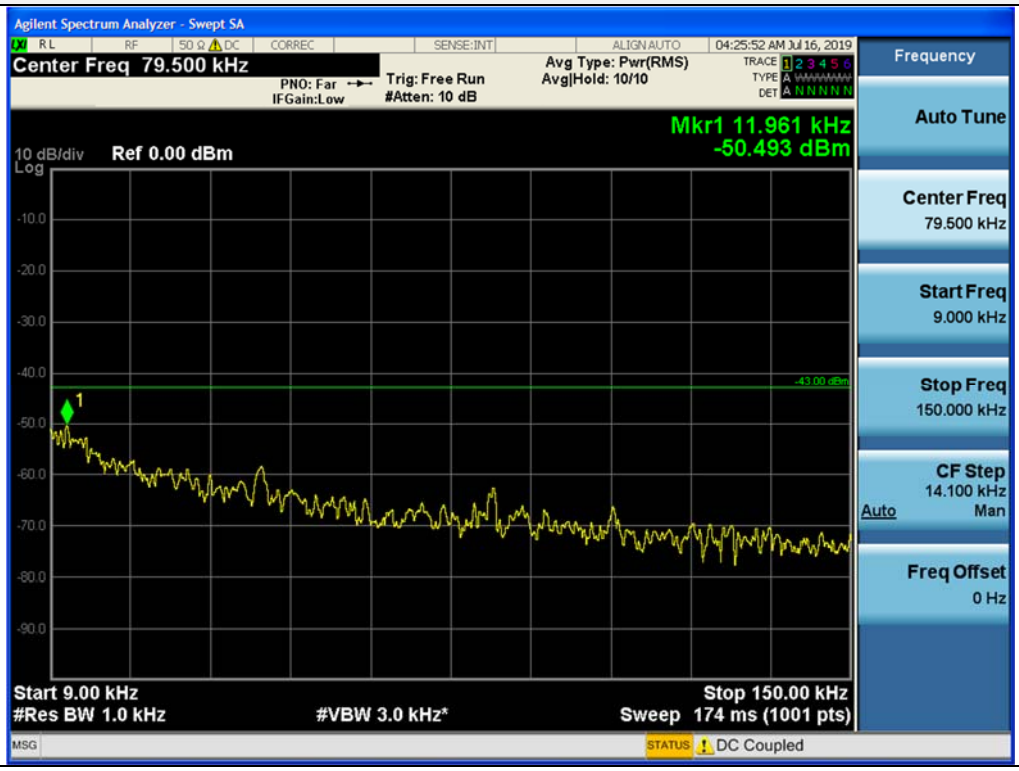
Spurious / BRS/EBS LTE 20M / Downlink / LTE 20 MHz / Middle / Low Edge – 10.1 MHz ~ Low Edge – 0.1 MHz


Spurious / BRS/EBS LTE 20M / Downlink / LTE 20 MHz / Middle / High Edge + 0.1 MHz ~ High Edge + 10.1 MHz

Spurious / BRS/EBS LTE 20M / Downlink / LTE 20 MHz / Middle / High Edge + 10.1 MHz ~ 1 GHz



Spurious / BRS/EBS LTE 20M / Downlink / LTE 20 MHz / Middle / 1 GHz ~ 10 GHz


Spurious / BRS/EBS LTE 20M / Downlink / LTE 20 MHz / High / 9 kHz ~ 150 kHz


Spurious / BRS/EBS LTE 20M / Downlink / LTE 20 MHz / High / 150 kHz ~ 30 MHz