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TEST REPORT

FCC Test for RF4422d-D1A

APPLICANT
SAMSUNG Electronics Co., Ltd.

REPORT NO.
HCT-RF-2006-FC046

DATE OF ISSUE
25 June 2020

Tested by
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TEST REPORT
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RF4422d-D1A

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Additional Model
-

Applicant	**SAMSUNG Electronics Co., Ltd.** 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
EUT Type	RRU(RF4422d)
Model Name	RF4422d-D1A
FCC ID	A3LRF4422D-D1A
Date of Test	February 10, 2020 ~ March 12, 2020
FCC Rule Parts:	CFR 47 Part 2, Part 22, Part 27

The result shown in this test report refer only to the sample(s) tested unless otherwise stated.
This test results were applied only to the test methods required by the standard.

REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	June 25, 2020	Initial Release

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC Rules under normal use and maintenance.

CONTENTS

1. GENERAL INFORMATION

1.1. APPLICANT INFORMATION

Company Name	Samsung Electronics Co., Ltd.
Company Address	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea

1.2. PRODUCT INFORMATION

<table>
<tr><td>EUT Type</td><td>RRU(RF4422d)</td></tr>
<tr><td>EUT Serial Number</td><td>S616415623</td></tr>
<tr><td>Power Supply</td><td>-48 VDC</td></tr>
<tr><td>Channel Bandwidths&
Output Power</td><td>Port 0, 1, 2, 3 : LTE Band 29, 5G NR n5
LTE Band 29: 5 MHz, 1 Carrier: 20 W/path, Total: 80 W
LTE Band 29: 10 MHz, 1 Carrier: 25 W/path, Total: 100 W
5G NR n5: 5 MHz 1 Carrier: 40 W/path, Total: 160 W</td></tr>
<tr><td>Frequency Range</td><td>B29: 718 ~ 728 MHz
5G NR n5: 869 ~ 894 MHz</td></tr>
<tr><td>Emission Designator</td><td>
<table>
<tr><th rowspan="2">Mode</th><th rowspan="2">Tx Frequency (MHz)</th><th rowspan="2">Bandwidth</th><th colspan="4">Emission Designator</th></tr>
<tr><th>BPSK (F9W)</th><th>QPSK (G7D)</th><th>16QAM/64QAM (W7D)</th><th>256QAM (W7D)</th></tr>
<tr><td rowspan="2">LTE Band 29</td><td rowspan="2">718 ~ 728</td><td>5 MHz</td><td>-</td><td>4M52G7D</td><td>4M53W7D</td><td>4M52W7D</td></tr>
<tr><td>10 MHz</td><td>-</td><td>9M01G7D</td><td>9M05W7D</td><td>9M01W7D</td></tr>
</table>
<table>
<tr><th rowspan="2">Mode</th><th rowspan="2">Tx Frequency (MHz)</th><th rowspan="2">Bandwidth</th><th colspan="4">Emission Designator</th></tr>
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<tr><td>5G NR</td><td>869 ~ 894</td><td>5 MHz</td><td>-</td><td>4M53G7D</td><td>4M53W7D</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Modulation Type</td><td>QPSK, 16QAM, 64QAM, 256QAM</td></tr>
</table>

1.3. TEST INFORMATION

FCC Rule Parts	CFR 47 Part 2, Part 22, Part 27
Measurement standards	ANSI C63.26-2015, KDB 662911 D01 v02r01, KDB 971168
Place of Test	HCT CO., LTD. 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

2. FACILITIES AND ACCREDITATIONS

2.1. FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA.
The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22.
Detailed description of test facility was submitted to the Commission and accepted dated April 02, 2018 (Registration Number: KR0032).

2.2. EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.
Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.
All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

3. TEST SPECIFICATIONS

3.1. STANDARDS

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 2, Part 22, Part 27

Description	Reference	Results
RF Output Power	§ 2.1046, § 22.913, § 27.50(c)	Compliant
Occupied Bandwidth	§ 2.1049	Compliant
Unwanted Conducted Emissions	§ 2.1051, § 22.917, § 27.53(g)	Compliant
Radiated Emissions	§ 2.1053, § 22.917, § 27.53	Compliant
Frequency Stability	§ 2.1055, § 22.355, § 27.54	Compliant

3.2. ADDITIONAL DESCRIPTIONS ABOUT TEST

- The EUT was operated in a manner representative of the typical usage of the equipment.
- During all testing, system components were manipulated within the confines of typical usage to maximize each emission.
- All LTE modulation types (QPSK, 16QAM, 64QAM, 256QAM) supported by the EUT have been tested.
- The dummy loads were connected to the RF output ports for radiated spurious emission testing.
- The tests results in plots are already including the actual value of loss for the attenuator and cable combination. Please check correction factors below table.

Correction factor table			
Frequency (MHz)	Factor (dB)	Frequency (MHz)	Factor (dB)
500	28.73	2200	29.93
600	28.84	2300	29.98
700	29.03	2400	30.03
800	29.04	2500	30.00
900	29.15	2600	30.05
1000	29.22	2700	30.08
1100	29.35	2800	30.09
1200	29.43	2900	30.26
1300	29.38	3000	30.32
1400	29.54	4000	31.06
1500	29.51	5000	31.58
1600	29.61	6000	32.27
1700	29.59	7000	33.30
1800	29.79	8000	33.23
1900	29.85	9000	34.12
2000	29.93	10000	34.50
2100	29.94	-	-

3.3. MAXIMUM MEASUREMENTUNCERTAINTY

The value of the measurement uncertainty for the measurement of each parameter.

Coverage factor k = 2, Confidence levels of 95 %

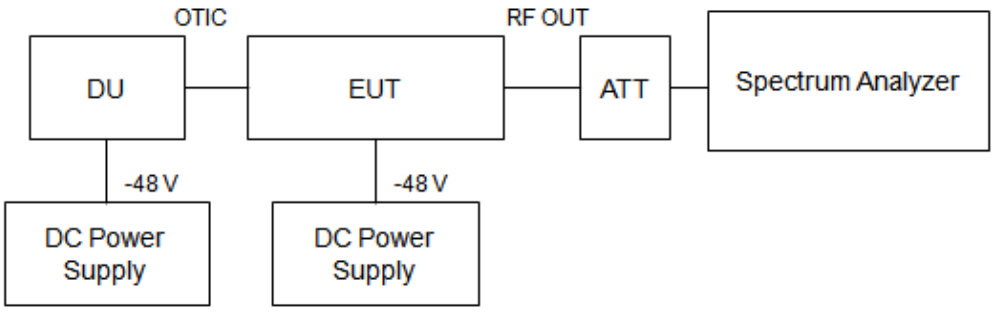
Description	Condition	Uncertainty
RF Output Power	-	± 0.72 dB
Occupied Bandwidth	OBW ≤ 20 MHz	± 52 kHz
Unwanted Conducted Emissions	-	± 1.08 dB
Radiated Emissions	f ≤ 1 GHz f > 1 GHz	± 4.80 dB ± 6.07 dB
Frequency Stability	-	± 1.22 x 10^{-6}

3.4. STANDARDS ENVIRONMENTAL TEST CONDITIONS

Temperature :	+15 °C to +35 °C
Relative humidity:	30 % to 60 %
Air pressure	860 mbar to 1 060 mbar

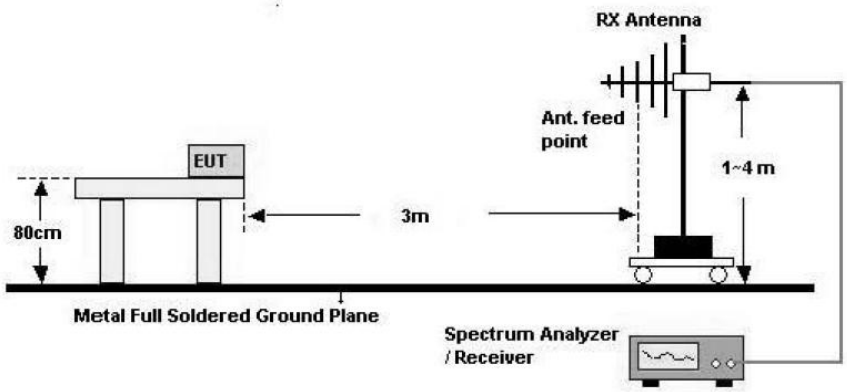
3.5. TEST DIAGRAMS

Conducted Test

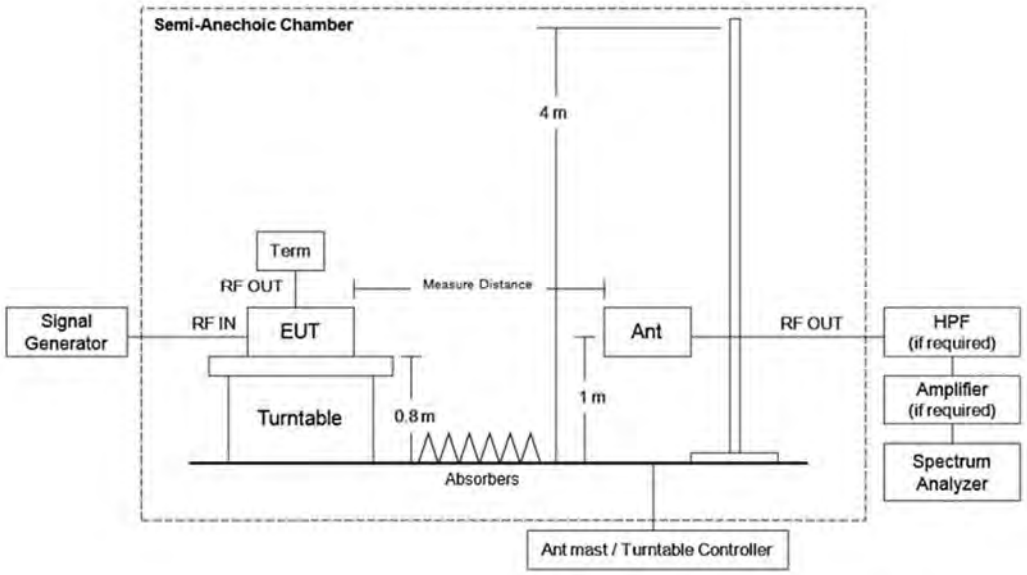


Radiated Test

30 MHz ~ 1 GHz

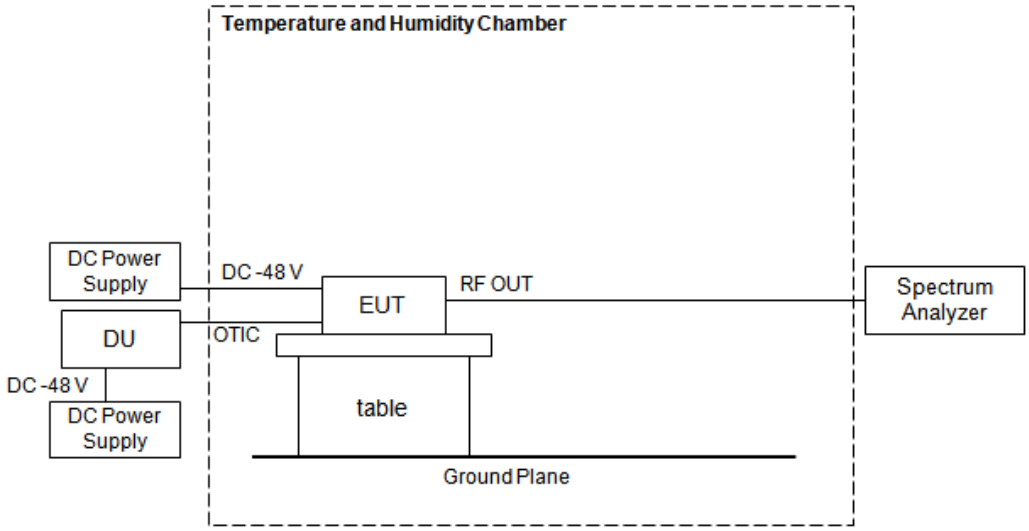


Above 1 GHz



※ EUT position is adopted by placement of floor-standing refer to section 5.5.2.3.2 of ANSI C63.26-2015

Frequency Stability



Note:

- All modulations(QPSK, 16QAM, 64QAM, 256QAM) were investigated and the worst case configuration channel results are reported.

4. TEST EQUIPMENTS

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Agilent	N9020A / Spectrum Analyzer	2019-08-21	Annual	MY46471250
Agilent	N9030B / PXA Signal Analyzer	2020-03-27	Annual	MY55480167
MCLI	FAS-23-20 / Attenuator	2020-01-22	Annual	103756
AGILENT	WA67-30-33 / 30 dB ATTENUATOR	2020-03-06	Annual	WA67-30-33-4
HP	6674A / DC Power Supply	2019-08-11	Annual	3501A00901
KIKUSUI	PWR800L / DC Power Supply	2020-02-19	Annual	RE001149
KIKUSUI	PWR800L / DC Power Supply	2020-03-12	Annual	RE001154
KIKUSUI	PWR800L / DC Power Supply	2019-07-18	Annual	RE002047
Koreae ngineering	KR-1005L / Temperature and Humidity Chamber	2019-11-07	Annual	KRAC05063-3
Innco system	CO3000 / Controller(Antenna mast)	N/A	N/A	CO3000-4p
Innco system	MA4640/800-XP-EP / Antenna Position Tower	N/A	N/A	N/A
Emco	2090 / Controller	N/A	N/A	060520
Ets	Turn Table	N/A	N/A	N/A
Rohde & Schwarz	Loop Antenna	2019-01-18	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	2018-08-31	Biennial	9168-0895
Schwarzbeck	BBHA 9120D / Horn Antenna	2019-06-28	Biennial	9120D-1300
Rohde & Schwarz	FSP / Spectrum Analyzer	2019-09-11	Annual	836650/016
Wainwright Instruments	WHKX10-900-1000-15000-40SS	2019-07-15	Annual	5
CERNEX	CBLU1183540 / Power Amplifier	2019-07-01	Annual	22964

Note:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

5. TEST RESULT

5.1. RF OUTPUT POWER

Test Requirements:

§ 2.1046 Measurements required: RF power output.

(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

(b) For single sideband, independent sideband, and single channel, controlled carrier radiotelephone transmitters the procedure specified in paragraph (a) of this section shall be employed and, in addition, the transmitter shall be modulated during the test as specified and applicable in § 2.1046 (b) (1-5). In all tests, the input level of the modulating signal shall be such as to develop rated peak envelope power or carrier power, as appropriate, for the transmitter.

(c) For measurements conducted pursuant to paragraphs (a) and (b) of this section, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output terminals shall be shown. Under the test conditions specified, no components of the emission spectrum shall exceed the limits specified in the applicable rule parts as necessary for meeting occupied bandwidth or emission limitations.

§ 22.913 Effective radiated power limits.

Licensees in the Cellular Radiotelephone Service are subject to the effective radiated power (ERP) limits and other requirements in this Section. *See also* § 22.169.

(a) *Maximum ERP.* The ERP of transmitters in the Cellular Radiotelephone Service must not exceed the limits in this section.

(1) Except as described in paragraphs (a)(2), (3), and (4) of this section, the ERP of base stations and repeaters must not exceed—

(i) 500 watts per emission; or

(ii) 400 watts/MHz (PSD) per sector.

(2) Except as described in paragraphs (a)(3) and (4) of this section, for systems operating in areas more than 72 kilometers (45 miles) from international borders that:

(i) Are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census; or

(ii) Extend coverage into Unserved Area on a secondary basis (*see* § 22.949), the ERP of base transmitters and repeaters must not exceed—

(A) 1000 watts per emission; or

(B) 800 watts/MHz (PSD) per sector.

(3) Provided that they also comply with paragraphs (b) and (c) of this section, licensees are permitted to operate their base transmitters and repeaters with an ERP greater than 400 watts/MHz (PSD) per sector, up to a maximum ERP of 1000 watts/MHz (PSD) per sector unless they meet the conditions in paragraph (a)(4) of this section.

(4) Provided that they also comply with paragraphs (b) and (c) of this section, licensees of systems operating in areas more

than 72 kilometers (45 miles) from international borders that:

(i) Are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census; or

(ii) Extend coverage into Unserved Area on a secondary basis (*see* § 22.949), are permitted to operate base transmitters and repeaters with an ERP greater than 800 watts/MHz (PSD) per sector, up to a maximum of 2000 watts/MHz (PSD) per sector.

(5) The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

(d) *Power measurement.* Measurement of the ERP of Cellular base transmitters and repeaters must be made using an average power measurement technique. The peak-to-average ratio (PAR) of the transmission must not exceed 13 dB.

§ 27.50 Power limits and duty cycle.

(c) The following power and antenna height requirements apply to stations transmitting in the 600 MHz band and the 698-746 MHz band:

(1) Fixed and base stations transmitting a signal with an emission bandwidth of 1 MHz or less must not exceed an effective radiated power (ERP) of 1000 watts and an antenna height of 305 m height above average terrain (HAAT), except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 1000 watts ERP in accordance with Table 1 of this section;

(2) Fixed and base stations located in a county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, and transmitting a signal with an emission bandwidth of 1 MHz or less must not exceed an ERP of 2000 watts and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 2000 watts ERP in accordance with Table 2 of this section;

(3) Fixed and base stations transmitting a signal with an emission bandwidth greater than 1 MHz must not exceed an ERP of 1000 watts/MHz and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 1000 watts/MHz ERP in accordance with Table 3 of this section;

(4) Fixed and base stations located in a county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, and transmitting a signal with an emission bandwidth greater than 1 MHz must not exceed an ERP of 2000 watts/MHz and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 2000 watts/MHz ERP in accordance with Table 4 of this section;

(5) Licensees, except for licensees operating in the 600 MHz downlink band, seeking to operate a fixed or base station located in a county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, and transmitting a signal at an ERP greater than 1000 watts must:

(i) Coordinate in advance with all licensees authorized to operate in the 698-758 MHz, 775-788, and 805-806 MHz bands within 120 kilometers (75 miles) of the base or fixed station;

(ii) coordinate in advance with all regional planning committees, as identified in § 90.527 of this chapter, with jurisdiction within 120 kilometers (75 miles) of the base or fixed station.

(6) Licensees of fixed or base stations transmitting a signal at an ERP greater than 1000 watts and greater than 1000 watts/MHz must comply with the provisions of paragraph (c)(8) of this section and § 27.55(b), except that licensees of fixed or base stations located in a county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, must comply with the provisions of paragraph (c)(8) of this section and § 27.55(b) only if transmitting a signal at an ERP greater than 2000 watts and greater than 2000 watts/MHz;

Test Procedures:

The measurement is performed in accordance with Section 5.2.4.4.1 of ANSI C63.26.

a) Set span to 2 × to 3 × the OBW.

b) Set RBW = 1 % to 5 % of the OBW.

c) Set VBW ≥ 3 × RBW.

d) Set number of measurement points in sweep ≥ 2 × span / RBW.

e) Sweep time:

1) Set = auto-couple, or

2) Set ≥ [10 × (number of points in sweep) × (transmission symbol period)] for single sweep (automation-compatible) measurement.

f) Detector = power averaging (rms).

g) If the EUT can be configured to transmit continuously, then set the trigger to free run.

h) If the EUT cannot be configured to transmit continuously, then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep. Verify that the sweep time is less than or equal to the transmission burst duration. Time gating can also be used under similar constraints (i.e., configured such that measurement data is collected only during active full-power transmissions).

i) Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over multiple symbols, it can be necessary to increase the number of traces to be averaged above 100 or, if using a manually configured sweep time, increase the sweep time.

j) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band or channel power measurement function, with the band/channel limits set equal to the OBW band edges. If the instrument does not have a band or channel power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

Note:

1) The conducted emission level is measured at each antenna port and then summed mathematically to determine the total emission level from the device.
2) Sum data is in a tolerance of specification provided from manufacturer.
3) The results of the RF output power test shown above the frequency measured values are very small and similar trend for each port, so we are attached only the worst case plot.

Test Results:
Tabular Data of RF output power

B29 LTE Band, 5 MHz 1 Carrier

Ant.	Mod.	Channel	Frequency (MHz)	Measured Value (dBm)	Calculated (W)
0	QPSK	Low	720.50	43.59	22.86
		Middle	723.00	43.59	22.86
		High	725.50	43.66	23.21
	16QAM	Low	720.50	43.74	23.64
		Middle	723.00	43.63	23.05
		High	725.50	43.53	22.54
	64QAM	Low	720.50	43.59	22.83
		Middle	723.00	43.58	22.81
		High	725.50	43.59	22.84
	256QAM	Low	720.50	43.51	22.44
		Middle	723.00	43.61	22.98
		High	725.50	43.73	23.59
1	QPSK	Low	720.50	43.31	21.45
		Middle	723.00	43.55	22.65
		High	725.50	43.58	22.79
	16QAM	Low	720.50	43.42	21.97
		Middle	723.00	43.57	22.75
		High	725.50	43.67	23.27
	64QAM	Low	720.50	43.41	21.94
		Middle	723.00	43.57	22.73
		High	725.50	43.59	22.86
	256QAM	Low	720.50	43.40	21.87
		Middle	723.00	43.60	22.91
		High	725.50	43.56	22.68

Ant.	Mod.	Channel	Frequency (MHz)	Measured Value (dBm)	Calculated (W)
2	QPSK	Low	720.50	43.40	21.89
		Middle	723.00	43.58	22.79
		High	725.50	43.51	22.42
	16QAM	Low	720.50	43.44	22.08
		Middle	723.00	43.59	22.87
		High	725.50	43.64	23.14
	64QAM	Low	720.50	43.41	21.94
		Middle	723.00	43.56	22.70
		High	725.50	43.52	22.48
	256QAM	Low	720.50	43.38	21.76
		Middle	723.00	43.55	22.64
		High	725.50	43.55	22.65
3	QPSK	Low	720.50	43.42	21.97
		Middle	723.00	43.53	22.53
		High	725.50	43.50	22.41
	16QAM	Low	720.50	43.55	22.64
		Middle	723.00	43.59	22.83
		High	725.50	43.58	22.82
	64QAM	Low	720.50	43.45	22.14
		Middle	723.00	43.53	22.53
		High	725.50	43.62	23.03
	256QAM	Low	720.50	43.45	22.12
		Middle	723.00	43.55	22.64
		High	725.50	43.57	22.73

Sum Data of Port 0, Port 1, Port 2 and Port 3

Frequency (MHz)	Output Power			
	QPSK	16QAM	64QAM	256QAM
	W			
720.50	88.17	90.33	88.85	88.18
723.00	90.83	91.49	90.77	91.17
725.50	90.84	91.77	91.21	91.65

B29 LTE Band, 10 MHz 1 Carrier

Ant.	Mod.	Channel	Frequency (MHz)	Measured Value (dBm)	Calculated (W)
0	QPSK	Middle	723.00	44.60	28.82
	16QAM	Middle	723.00	44.59	28.80
	64QAM	Middle	723.00	44.68	29.38
	256QAM	Middle	723.00	44.64	29.08
1	QPSK	Middle	723.00	44.56	28.56
	16QAM	Middle	723.00	44.57	28.62
	64QAM	Middle	723.00	44.55	28.52
	256QAM	Middle	723.00	44.57	28.65
2	QPSK	Middle	723.00	44.54	28.43
	16QAM	Middle	723.00	44.52	28.30
	64QAM	Middle	723.00	44.58	28.73
	256QAM	Middle	723.00	44.53	28.39
3	QPSK	Middle	723.00	44.53	28.37
	16QAM	Middle	723.00	44.53	28.35
	64QAM	Middle	723.00	44.54	28.46
	256QAM	Middle	723.00	44.50	28.20

Sum Data of Port 0, Port 1, Port 2 and Port 3

Frequency (MHz)	Output Power			
	QPSK	16QAM	64QAM	256QAM
	W			
723.00	114.18	114.08	115.09	114.33

5G NR Band, 5 MHz 1 Carrier

Ant.	Mod.	Channel	Frequency (MHz)	Measured Value (dBm)	Calculated (W)
0	QPSK	Low	871.50	46.21	41.78
		Middle	881.50	46.38	43.46
		High	891.50	46.41	43.72
	16QAM	Low	871.50	46.26	42.25
		Middle	881.50	46.24	42.08
		High	891.50	46.32	42.85
	64QAM	Low	871.50	46.37	43.37
		Middle	881.50	46.44	44.01
		High	891.50	46.32	42.83
1	QPSK	Low	871.50	46.27	42.35
		Middle	881.50	46.31	42.80
		High	891.50	46.26	42.23
	16QAM	Low	871.50	46.32	42.84
		Middle	881.50	46.34	43.08
		High	891.50	46.33	42.98
	64QAM	Low	871.50	46.42	43.82
		Middle	881.50	46.46	44.26
		High	891.50	46.46	44.27

Ant.	Mod.	Channel	Frequency (MHz)	Measured Value (dBm)	Calculated (W)
2	QPSK	Low	871.50	46.32	42.84
		Middle	881.50	46.27	42.33
		High	891.50	46.29	42.51
	16QAM	Low	871.50	46.35	43.18
		Middle	881.50	46.14	41.09
		High	891.50	46.17	41.43
	64QAM	Low	871.50	46.29	42.59
		Middle	881.50	46.37	43.37
		High	891.50	46.21	41.81
3	QPSK	Low	871.50	46.33	42.95
		Middle	881.50	46.31	42.72
		High	891.50	46.29	42.58
	16QAM	Low	871.50	46.29	42.52
		Middle	881.50	46.35	43.17
		High	891.50	46.10	40.74
	64QAM	Low	871.50	46.27	42.41
		Middle	881.50	46.33	42.91
		High	891.50	46.21	41.77

Sum Data of Port 0, Port 1, Port 2 and Port 3

Frequency (MHz)	Output Power		
	QPSK	16QAM	64QAM
	W		
871.50	169.93	170.78	172.20
881.50	171.30	169.42	174.56
891.50	171.04	168.00	170.68

Plot Data of RF Output Power

Antenna 0 / B29 LTE Band 5 MHz 1 Carrier/ 16QAM / Low


Antenna 1 / B29 LTE Band 5 MHz 1 Carrier / 16QAM / High

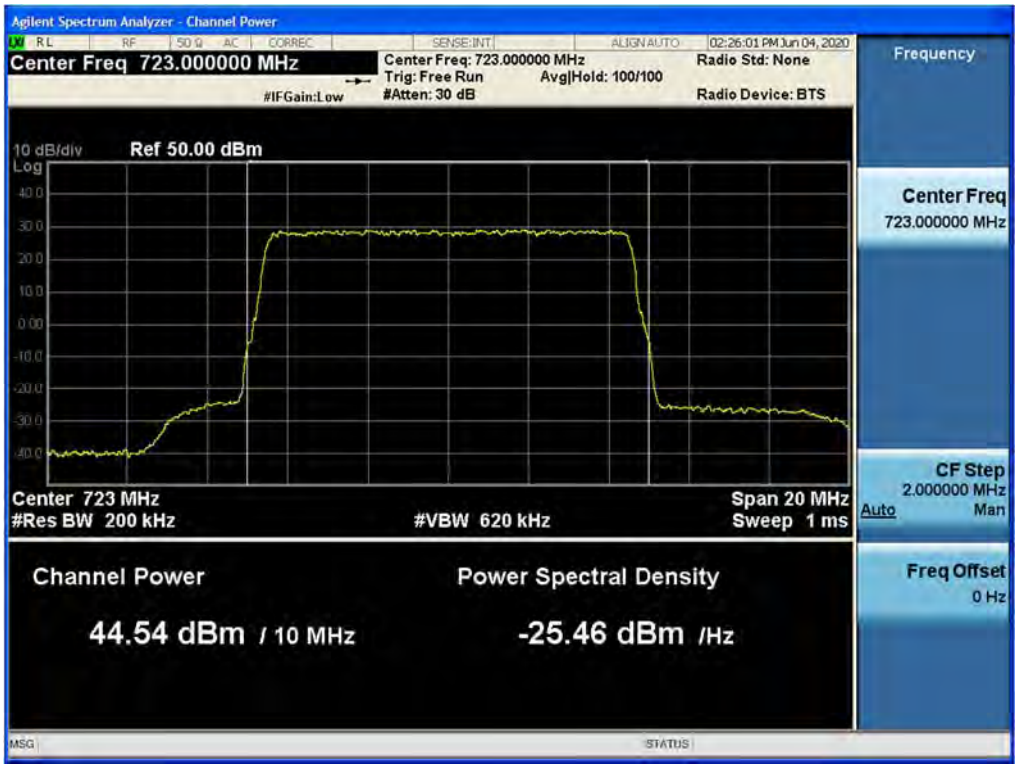

Antenna 2 / B29 LTE Band 5 MHz 1 Carrier / 16QAM / High


Antenna 3 / B29 LTE Band 5 MHz 1 Carrier / 64QAM / High


Antenna 0 / B29 LTE Band 10 MHz 1 Carrier/ 64QAM / Middle

Antenna 1 / B29 LTE Band 10 MHz 1 Carrier / 256QAM / Middle

Antenna 2 / B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle


Antenna 3 / B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle


Antenna 0 / 5G NR Band 5 MHz 1 Carrier/ 64QAM / Middle


Antenna 1 / 5G NR Band 5 MHz 1 Carrier/ 64QAM / High


Antenna 2 / 5G NR Band 5 MHz 1 Carrier/ 64QAM / Middle

Antenna 3 / 5G NR Band 5 MHz 1 Carrier/ 16QAM / Middle

Tabular data of PAPR

B29 LTE Band 5 MHz 1 Carrier

Ant.	Modulation	Channel	Frequency (MHz)	0.1 % PAPR (dB)
0	QPSK	Low	720.50	7.54
		Middle	723.00	7.48
		High	725.50	7.48
	16QAM	Low	720.50	7.53
		Middle	723.00	7.49
		High	725.50	7.50
	64QAM	Low	720.50	7.54
		Middle	723.00	7.50
		High	725.50	7.49
	256QAM	Low	720.50	7.54
		Middle	723.00	7.49
		High	725.50	7.49
1	QPSK	Low	720.50	7.54
		Middle	723.00	7.49
		High	725.50	7.50
	16QAM	Low	720.50	7.54
		Middle	723.00	7.49
		High	725.50	7.48
	64QAM	Low	720.50	7.55
		Middle	723.00	7.50
		High	725.50	7.50
	256QAM	Low	720.50	7.54
		Middle	723.00	7.49
		High	725.50	7.48
2	QPSK	Low	720.50	7.54
		Middle	723.00	7.49
		High	725.50	7.49
	16QAM	Low	720.50	7.53
		Middle	723.00	7.50
		High	725.50	7.53
	64QAM	Low	720.50	7.55
		Middle	723.00	7.49
		High	725.50	7.49
	256QAM	Low	720.50	7.52

Ant.	Modulation	Channel	Frequency (MHz)	0.1 % PAPR (dB)
		Middle	723.00	7.49
		High	725.50	7.49
3	QPSK	Low	720.50	7.54
		Middle	723.00	7.48
		High	725.50	7.50
	16QAM	Low	720.50	7.55
		Middle	723.00	7.49
		High	725.50	7.51
	64QAM	Low	720.50	7.54
		Middle	723.00	7.48
		High	725.50	7.49
	256QAM	Low	720.50	7.54
		Middle	723.00	7.49
		High	725.50	7.50

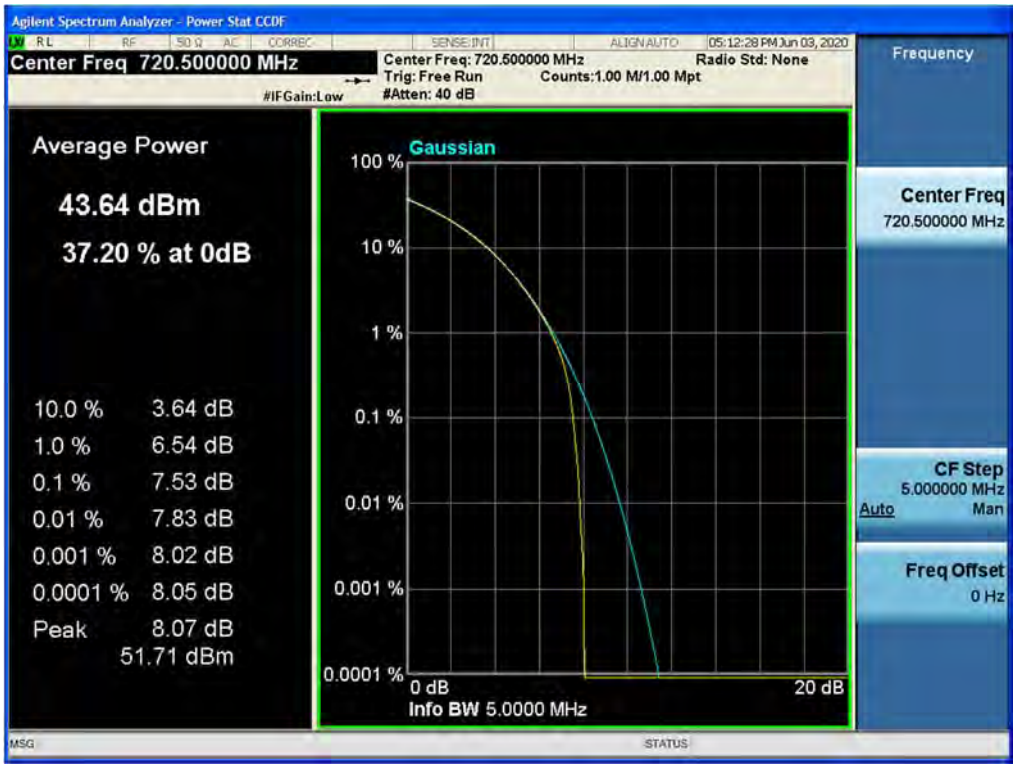
B29 LTE Band 10 MHz 1 Carrier

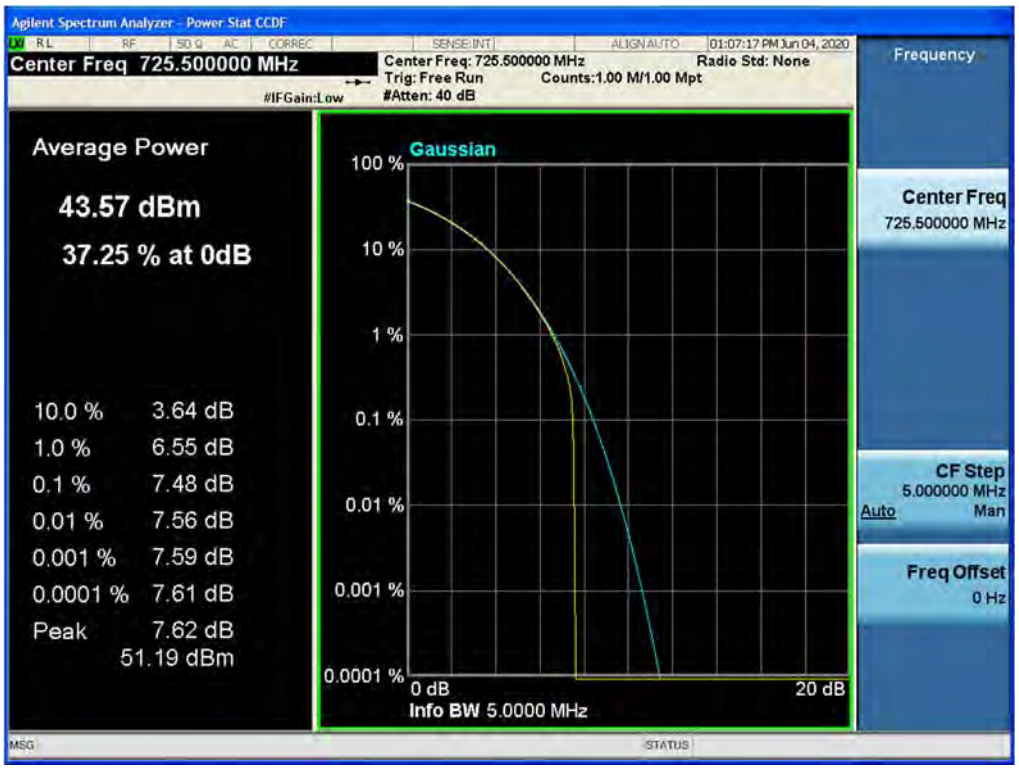
Ant.	Modulation	Channel	Frequency (MHz)	0.1 % PAPR (dB)
0	QPSK	Middle	723.00	7.62
	16QAM	Middle	723.00	7.61
	64QAM	Middle	723.00	7.60
	256QAM	Middle	723.00	7.61
1	QPSK	Middle	723.00	7.63
	16QAM	Middle	723.00	7.62
	64QAM	Middle	723.00	7.62
	256QAM	Middle	723.00	7.62
2	QPSK	Middle	723.00	7.61
	16QAM	Middle	723.00	7.59
	64QAM	Middle	723.00	7.61
	256QAM	Middle	723.00	7.61
3	QPSK	Middle	723.00	7.61
	16QAM	Middle	723.00	7.59
	64QAM	Middle	723.00	7.61
	256QAM	Middle	723.00	7.59

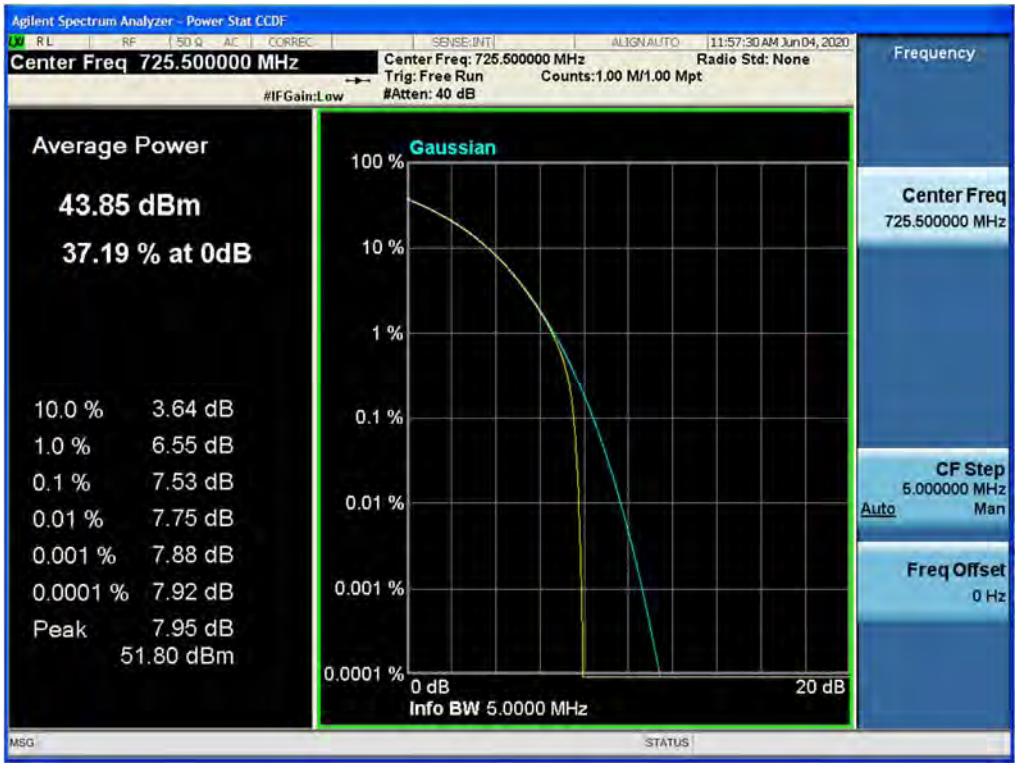
5G NR Band 5 MHz 1 Carrier

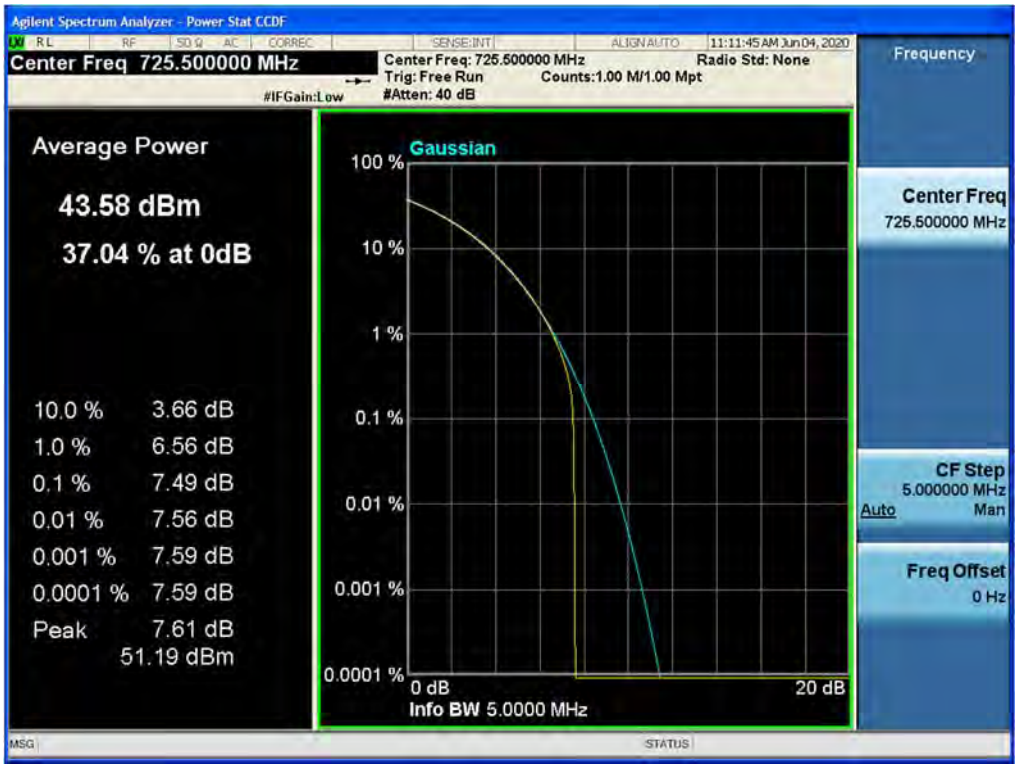
Ant.	Modulation	Channel	Frequency (MHz)	0.1 % PAPR (dB)
0	QPSK	Low	871.50	7.86
		Middle	881.50	7.87
		High	891.50	6.86
	16QAM	Low	871.50	7.94
		Middle	881.50	7.96
		High	891.50	6.94
	64QAM	Low	871.50	7.86
		Middle	881.50	7.89
		High	891.50	6.86
1	QPSK	Low	871.50	6.94
		Middle	881.50	7.85
		High	891.50	7.00
	16QAM	Low	871.50	7.92
		Middle	881.50	7.95
		High	891.50	6.92
	64QAM	Low	871.50	6.87
		Middle	881.50	7.88
		High	891.50	6.84
2	QPSK	Low	871.50	7.53
		Middle	881.50	7.87
		High	891.50	6.85
	16QAM	Low	871.50	7.93
		Middle	881.50	7.96
		High	891.50	6.93
	64QAM	Low	871.50	6.88
		Middle	881.50	7.87
		High	891.50	6.86
3	QPSK	Low	871.50	7.88
		Middle	881.50	7.19
		High	891.50	6.81
	16QAM	Low	871.50	7.94
		Middle	881.50	7.96
		High	891.50	6.93
	64QAM	Low	871.50	7.87
		Middle	881.50	6.84
		High	891.50	6.86

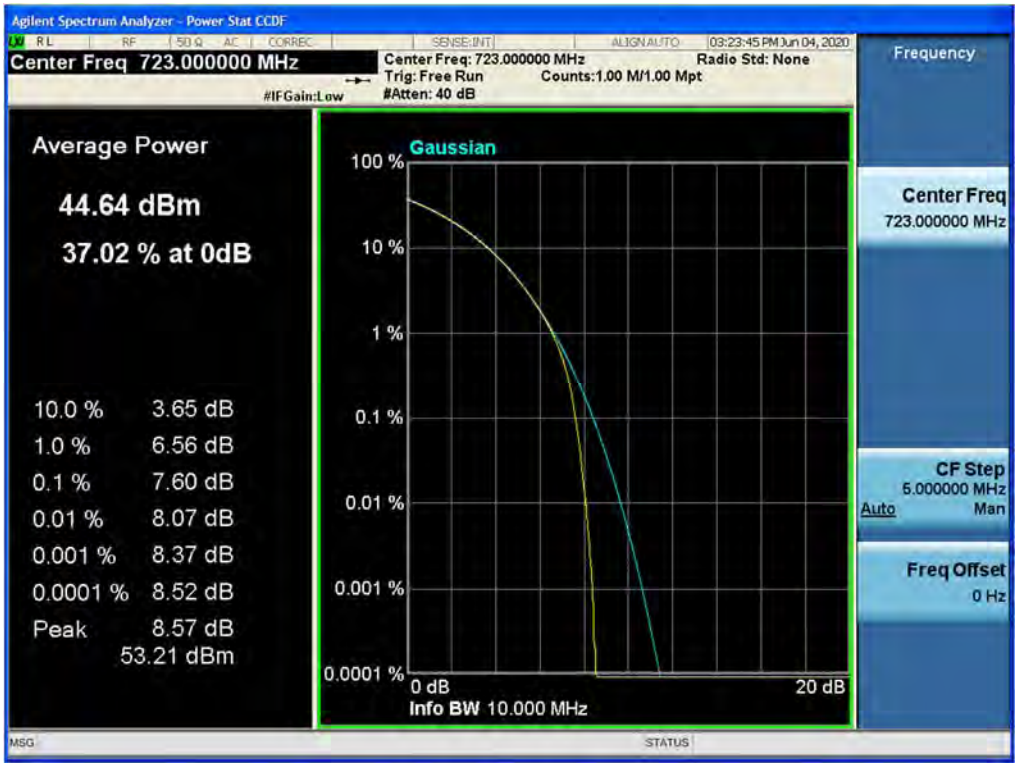
Plot Data of PAPR

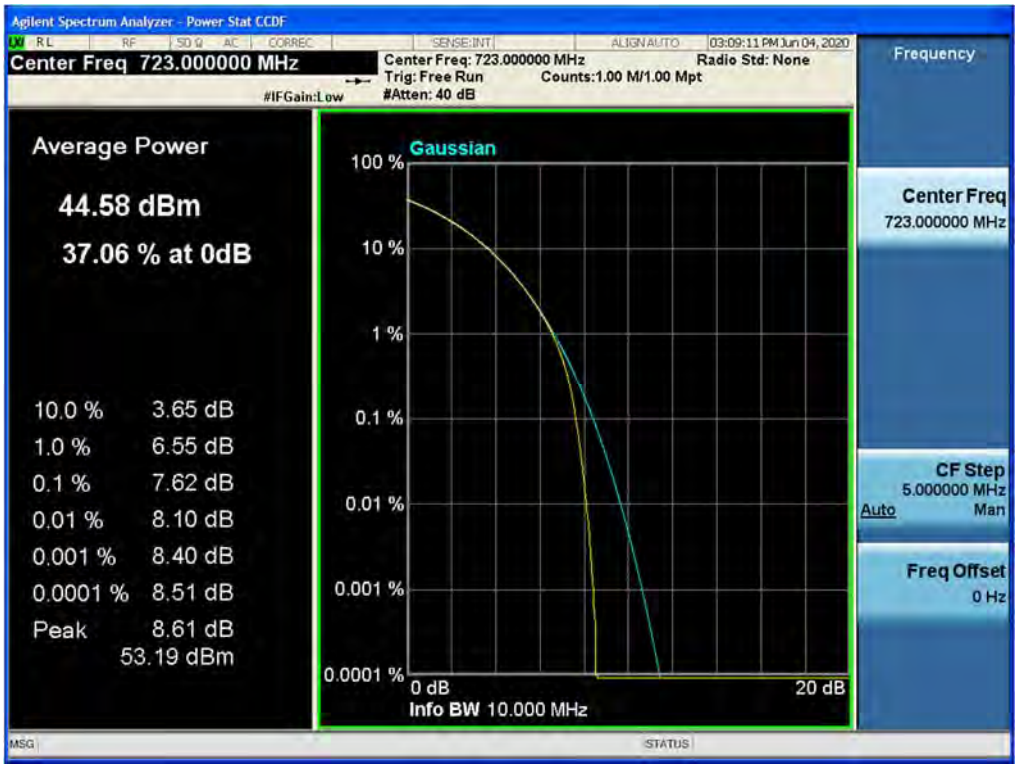
Antenna 0 / B29 LTE Band 5 MHz 1 Carrier/ 16QAM / Low


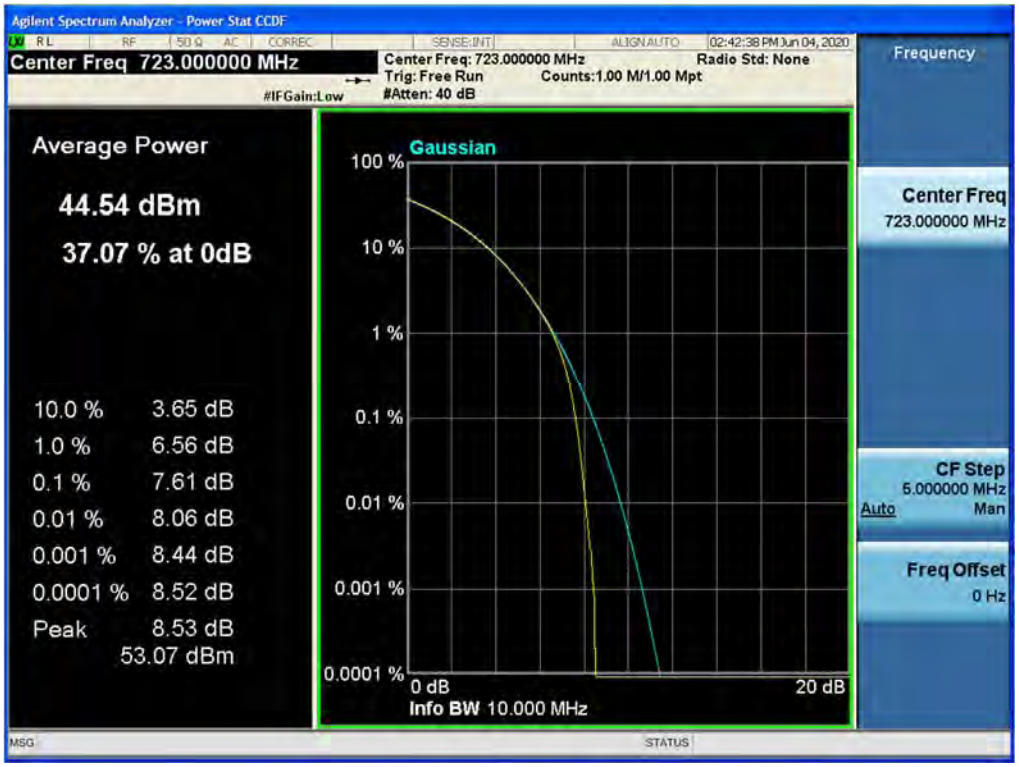
Antenna 1 / B29 LTE Band 5 MHz 1 Carrier / 16QAM / High


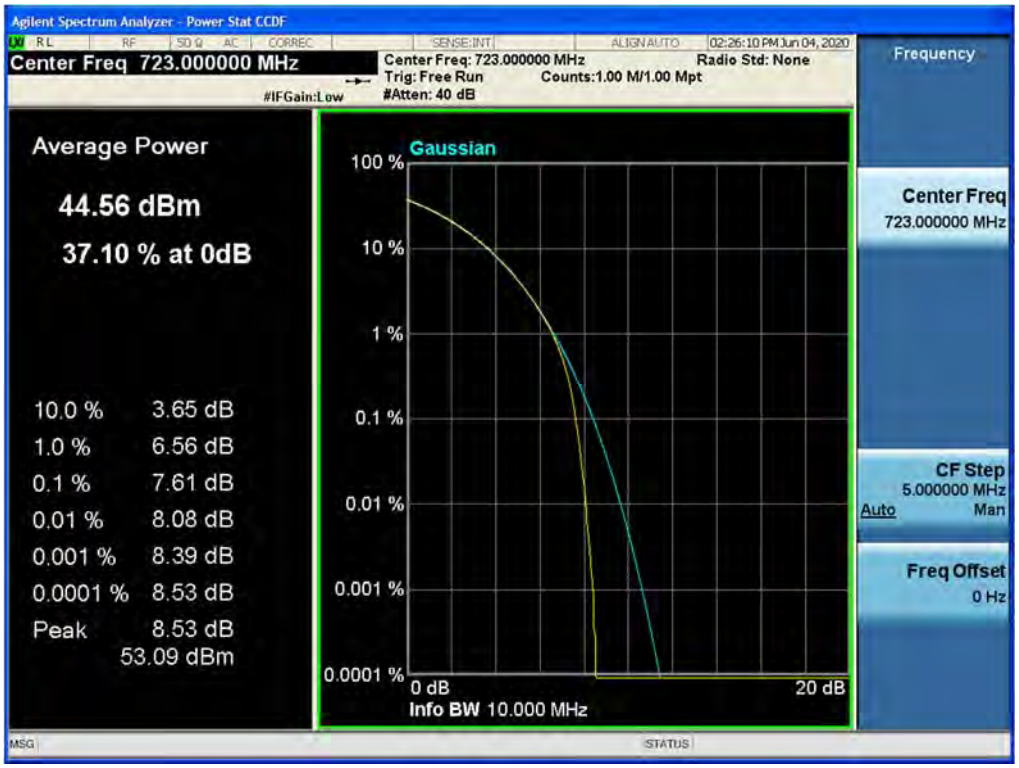
Antenna 2 / B29 LTE Band 5 MHz 1 Carrier / 16QAM / High


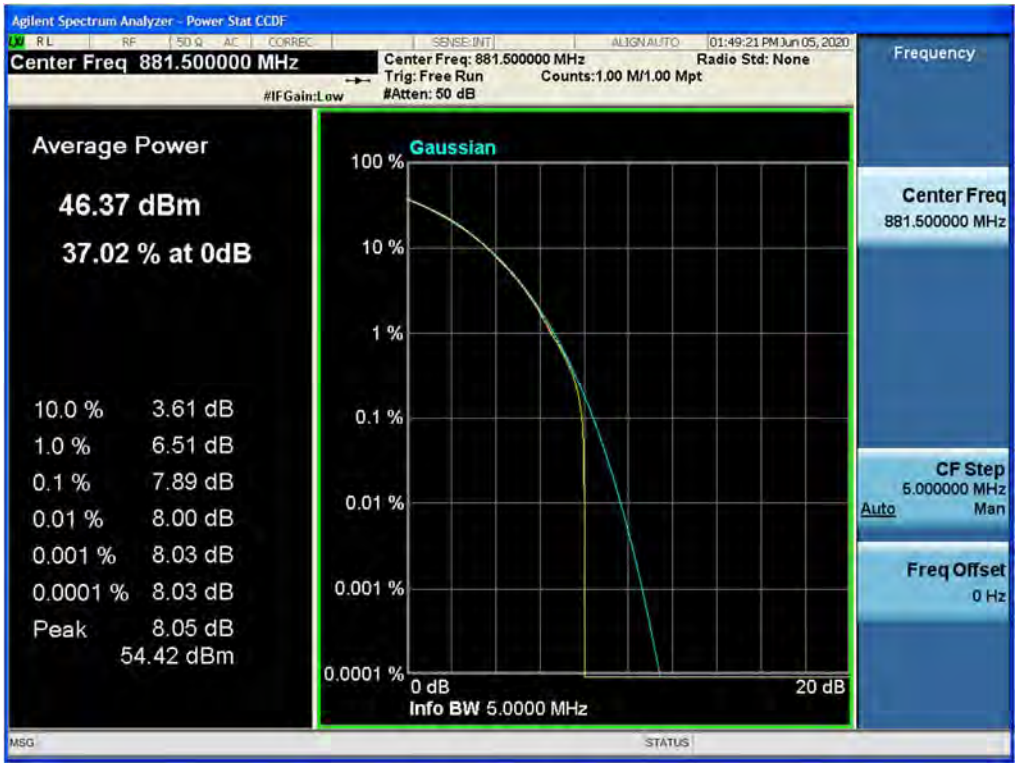
Antenna 3 / B29 LTE Band 5 MHz 1 Carrier / 64QAM / High


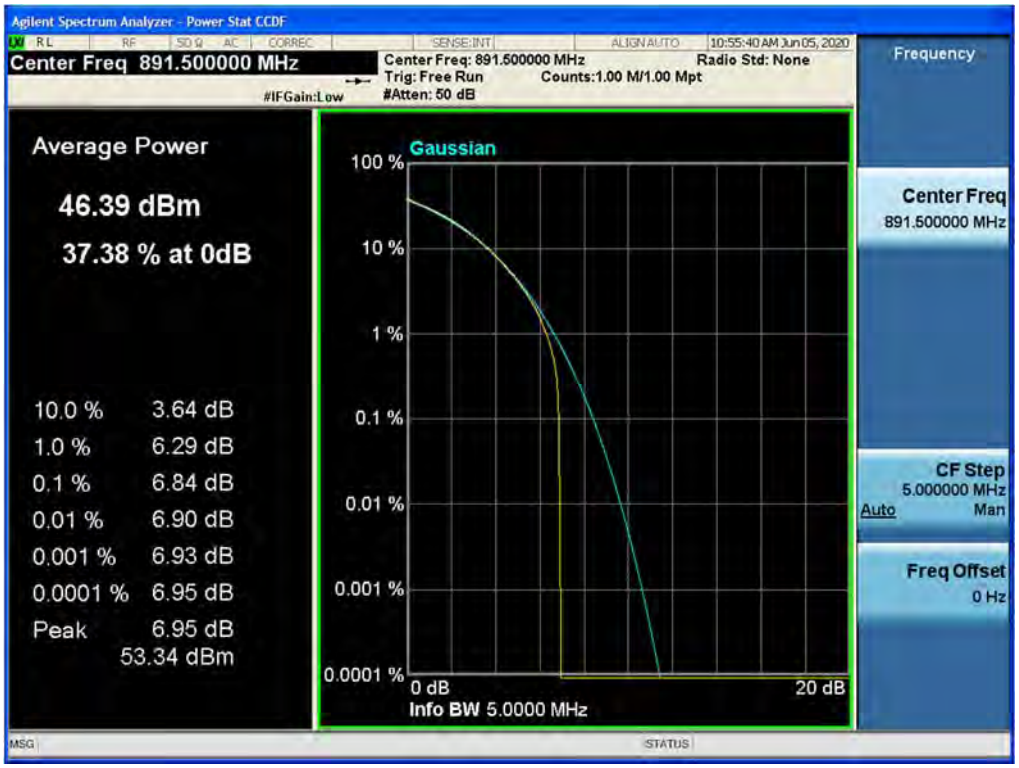
Antenna 0 / B29 LTE Band 10 MHz 1 Carrier/ 64QAM / Middle


Antenna 1 / B29 LTE Band 10 MHz 1 Carrier / 256QAM / Middle


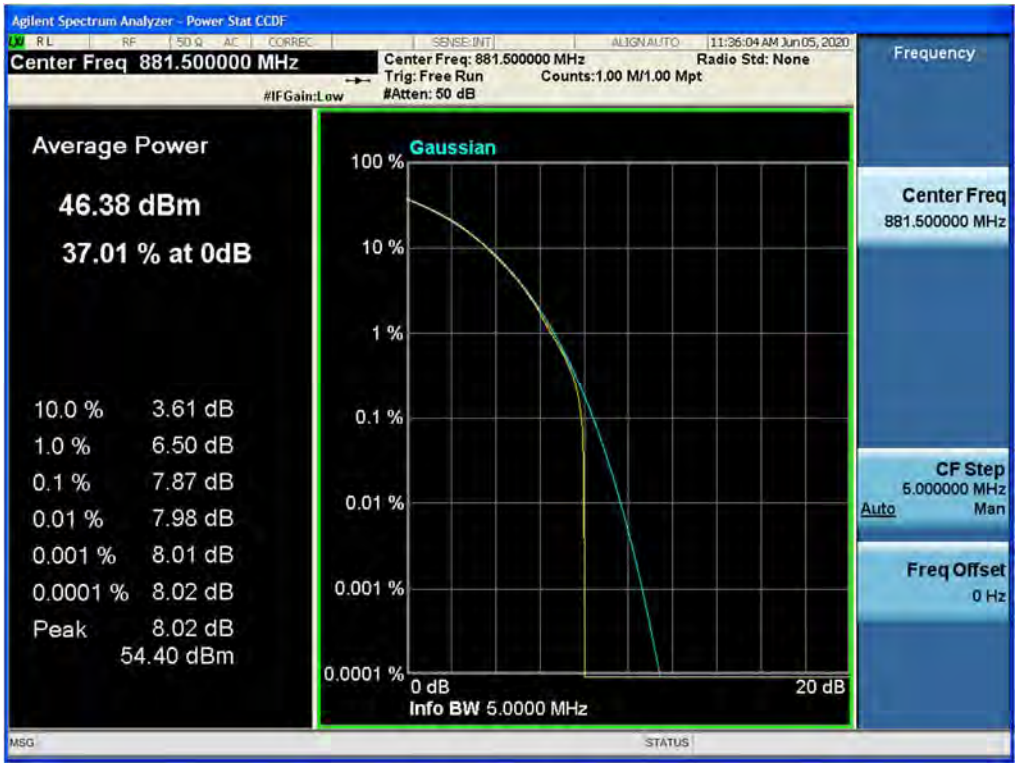
Antenna 2 / B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle


Antenna 3 / B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle


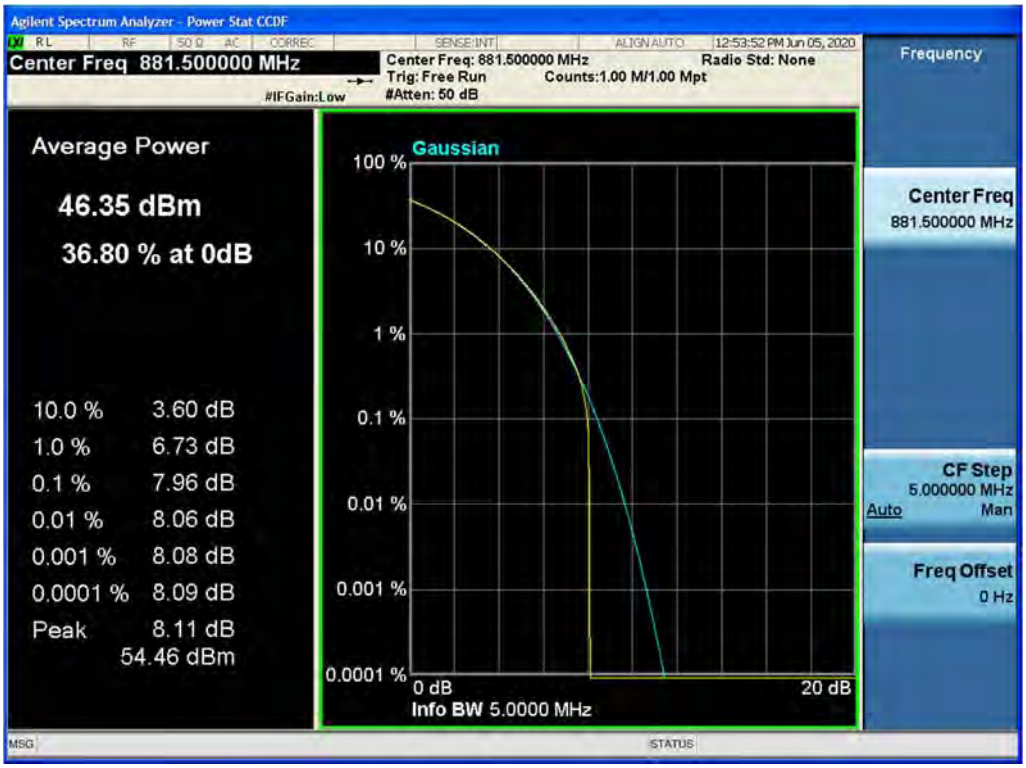
Antenna 0 / 5G NR Band 5 MHz 1 Carrier/ 64QAM / Middle


Antenna 1 / 5G NR Band 5 MHz 1 Carrier/ 64QAM / High


Antenna 2 / 5G NR Band 5 MHz 1 Carrier/ 64QAM / Middle



Antenna 3 / 5G NR Band 5 MHz 1 Carrier/ 16QAM / Middle



5.2. OCCUPIED BANDWIDTH

Test Requirements:

§ 2.1049 Measurements required: Occupied bandwidth.

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the specified conditions of § 2.1049 (a) through (i) as applicable.

Test Procedures:

The measurement is performed in accordance with Section 5.4.3 and 5.4.4 of ANSI C63.26.

5.4.3 Occupied bandwidth—Relative measurement procedure

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.

NOTE—Step a), step b), and step c) may require iteration to adjust within the specified tolerances.

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 reference value by either of the following:

1) 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).

2) Set the EUT to transmit an unmodulated carrier. Set the spectrum analyzer marker to the level of the carrier.

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) If the reference value was determined using an unmodulated carrier, turn the EUT modulation on, then either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise the trace from step f) shall be used for step i).

i) 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. The spectral envelope can cross the "−X dB amplitude" at multiple points. The lowest or Highest frequency shall be selected as the frequencies that are the farthest away from the center frequency at which the spectral envelope crosses the "−X dB amplitude."

j) 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).

5.4.4 Occupied bandwidth—Power bandwidth (99%) measurement procedure

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (typically a span of 1.5 × OBW is sufficient).

b) The nominal IF filter 3 dB bandwidth (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.

NOTE—Step a), step b), and step c) may require iteration to adjust within the specified tolerances.

d) Set the detection mode to peak, and the trace mode to max-hold.

e) If the instrument does not have a 99% OBW function, recover the trace data points and sum directly in linear power terms. Place the recovered amplitude data points, beginning at the lowest frequency, in a running sum until 0.5% of the total is reached. Record that frequency as the lower OBW frequency. Repeat the process until 99.5% of the total is reached and record that frequency as the upper OBW frequency. The 99% power OBW can be determined by computing the difference these two frequencies.

f) The OBW shall be reported and plot(s) of the measuring instrument display shall be provided with the test report. The frequency and amplitude axis and scale shall be clearly labeled. Tabular data can be reported in addition to the plot(s).

Note:

The results of the Occupied Bandwidth test shown above the frequency measured values are very small and similar trend for each port, so we are attached only the worst case plot.

Test Results:
Tabular Data of Occupied Bandwidth
B29 LTE Band 5 MHz 1 Carrier

Ant	Mod	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
0	QPSK	Low	720.50	4.5106
		Middle	723.00	4.5086
		High	725.50	4.5147
	16QAM	Low	720.50	4.4875
		Middle	723.00	4.4875
		High	725.50	4.4880
	64QAM	Low	720.50	4.5308
		Middle	723.00	4.5079
		High	725.50	4.5218
	256QAM	Low	720.50	4.5137
		Middle	723.00	4.5187
		High	725.50	4.5175
1	QPSK	Low	720.50	4.5194
		Middle	723.00	4.5191
		High	725.50	4.5140
	16QAM	Low	720.50	4.5029
		Middle	723.00	4.5026
		High	725.50	4.5106
	64QAM	Low	720.50	4.5090
		Middle	723.00	4.5072
		High	725.50	4.5128
	256QAM	Low	720.50	4.5171
		Middle	723.00	4.5161
		High	725.50	4.5218
2	QPSK	Low	720.50	4.5086
		Middle	723.00	4.5232
		High	725.50	4.5172
	16QAM	Low	720.50	4.4900
		Middle	723.00	4.5008
		High	725.50	4.4947
	64QAM	Low	720.50	4.4942
		Middle	723.00	4.5137
		High	725.50	4.5190
	256QAM	Low	720.50	4.5114

Ant	Mod	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
		Middle	723.00	4.5113
		High	725.50	4.5169
3	QPSK	Low	720.50	4.5162
		Middle	723.00	4.5075
		High	725.50	4.5123
	16QAM	Low	720.50	4.4671
		Middle	723.00	4.4907
		High	725.50	4.4924
	64QAM	Low	720.50	4.5278
		Middle	723.00	4.5270
		High	725.50	4.5195
	256QAM	Low	720.50	4.5038
		Middle	723.00	4.5098
		High	725.50	4.5194

B29 LTE Band 10 MHz 1 Carrier

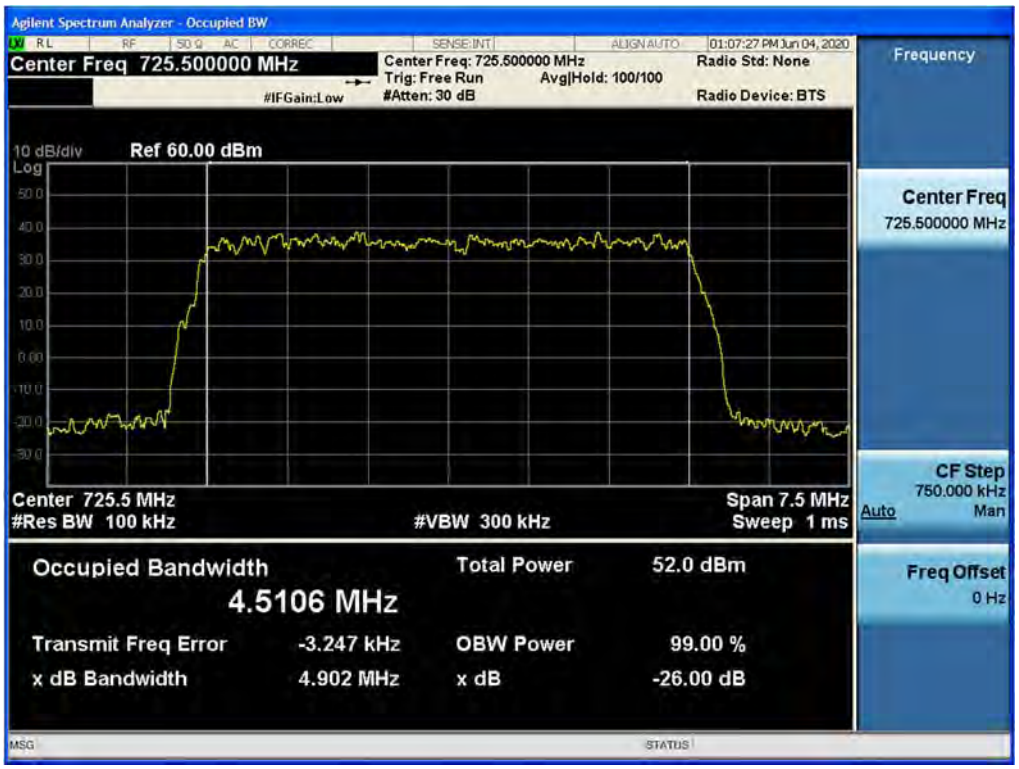
Ant	Mod	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
0	QPSK	Middle	723.00	9.0144
	16QAM	Middle	723.00	9.0476
	64QAM	Middle	723.00	8.9983
	256QAM	Middle	723.00	8.9736
1	QPSK	Middle	723.00	8.9829
	16QAM	Middle	723.00	8.9725
	64QAM	Middle	723.00	9.0112
	256QAM	Middle	723.00	8.9985
2	QPSK	Middle	723.00	8.9891
	16QAM	Middle	723.00	9.0085
	64QAM	Middle	723.00	8.9950
	256QAM	Middle	723.00	9.0122
3	QPSK	Middle	723.00	8.9690
	16QAM	Middle	723.00	8.9978
	64QAM	Middle	723.00	9.0028
	256QAM	Middle	723.00	8.9971

5G NR Band 5 MHz 1 Carrier

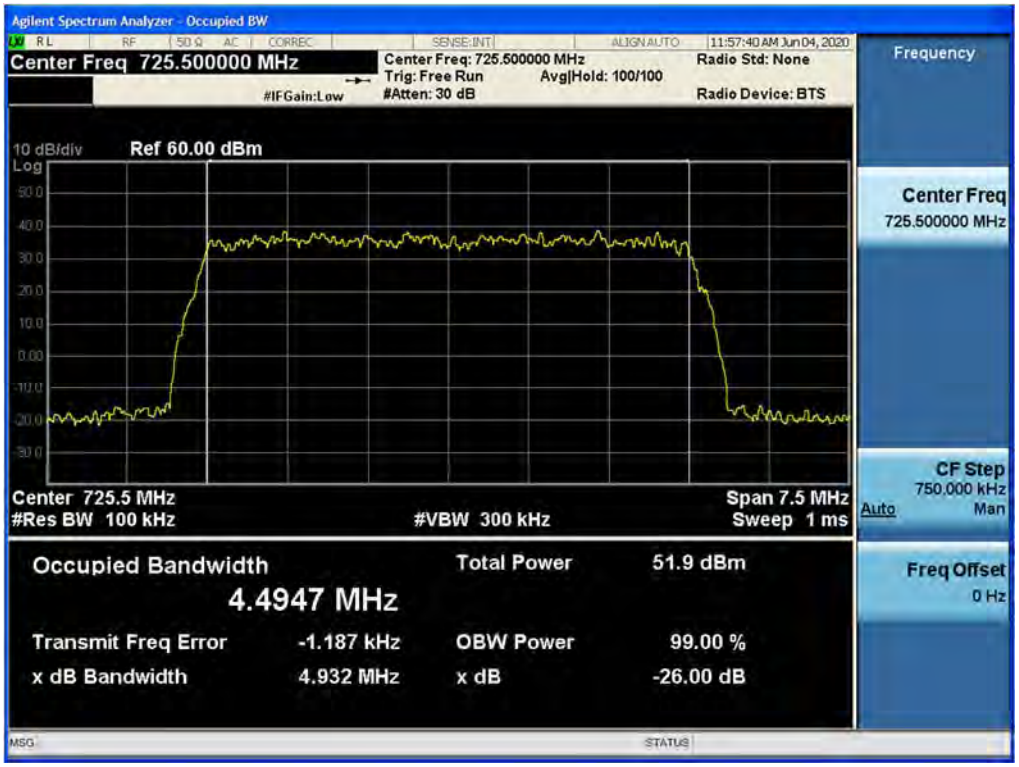
Ant	Mod	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
0	QPSK	Low	871.50	4.5026
		Middle	881.50	4.4873
		High	891.50	4.5033
	16QAM	Low	871.50	4.5112
		Middle	881.50	4.5212
		High	891.50	4.5204
	64QAM	Low	871.50	4.4925
		Middle	881.50	4.5209
		High	891.50	4.4969
1	QPSK	Low	871.50	4.4837
		Middle	881.50	4.5283
		High	891.50	4.4958
	16QAM	Low	871.50	4.5086
		Middle	881.50	4.5246
		High	891.50	4.5078
	64QAM	Low	871.50	4.4995
		Middle	881.50	4.5032
		High	891.50	4.4972
2	QPSK	Low	871.50	4.4948
		Middle	881.50	4.5047
		High	891.50	4.5134
	16QAM	Low	871.50	4.5145
		Middle	881.50	4.5071
		High	891.50	4.5322
	64QAM	Low	871.50	4.5049
		Middle	881.50	4.5171
		High	891.50	4.4944
3	QPSK	Low	871.50	4.4959
		Middle	881.50	4.5038
		High	891.50	4.5092
	16QAM	Low	871.50	4.5126
		Middle	881.50	4.5287
		High	891.50	4.5140
	64QAM	Low	871.50	4.4813
		Middle	881.50	4.5126
		High	891.50	4.4972

Plot Data of Occupied bandwidth

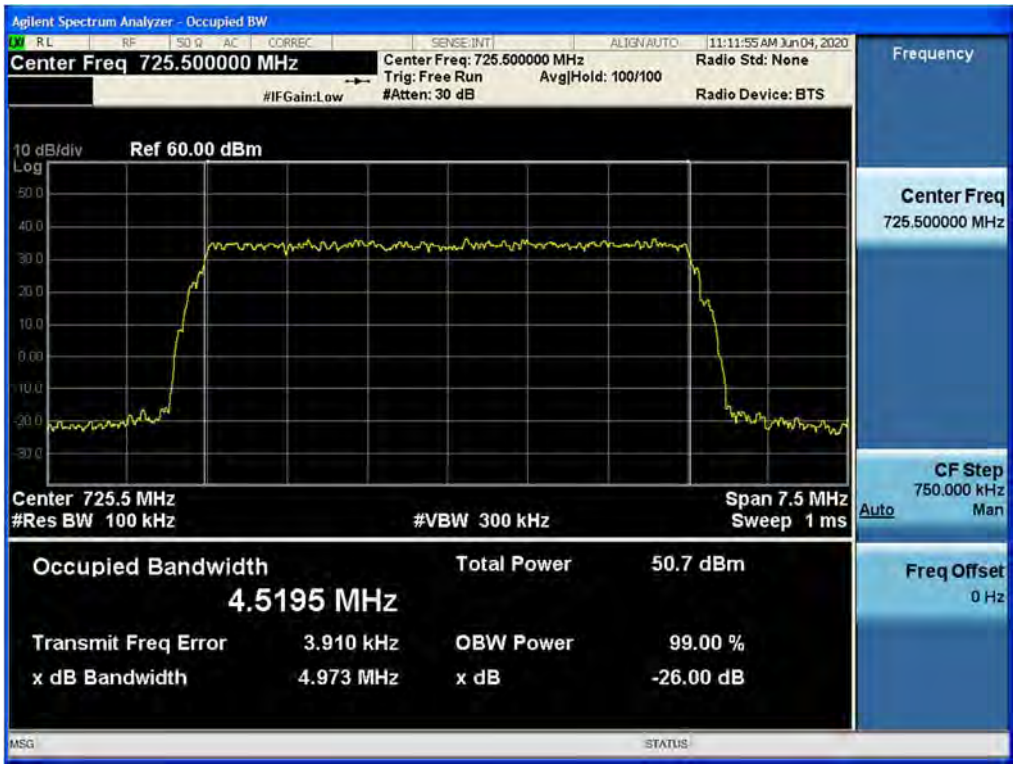
Antenna 0 / B29 LTE Band 5 MHz 1 Carrier/ 16QAM / Low


Antenna 1 / B29 LTE Band 5 MHz 1 Carrier / 16QAM / High


Antenna 2 / B29 LTE Band 5 MHz 1 Carrier / 16QAM / High

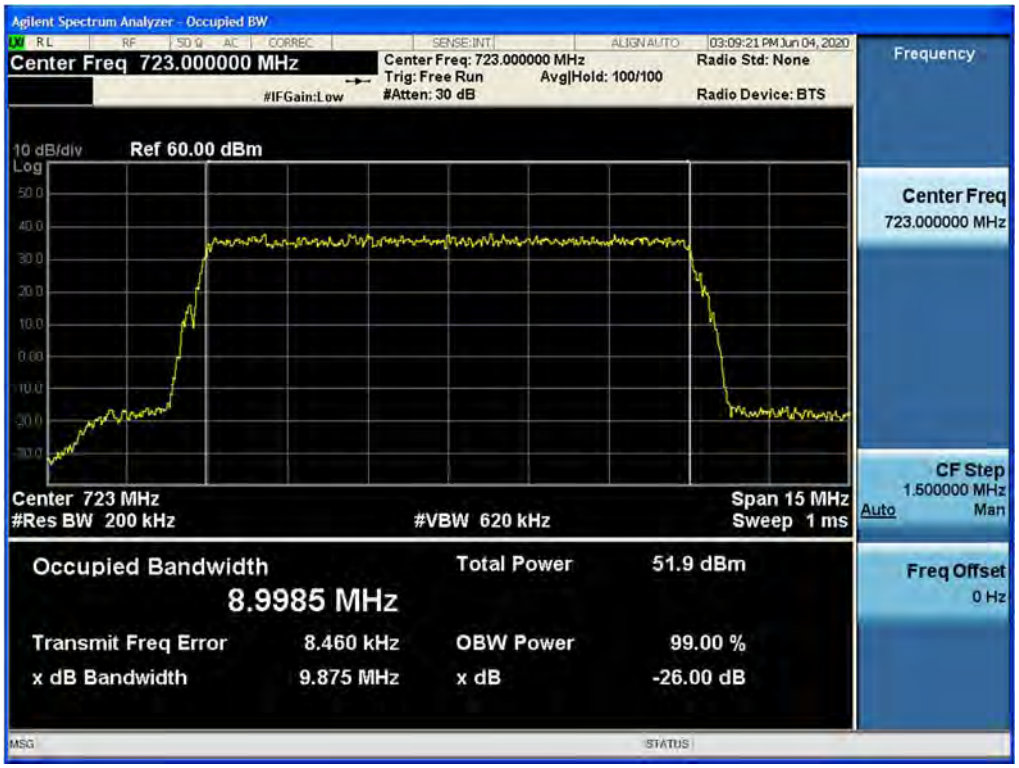


Antenna 3 / B29 LTE Band 5 MHz 1 Carrier / 64QAM / High



Antenna 0 / B29 LTE Band 10 MHz 1 Carrier/ 64QAM / Middle

Antenna 1 / B29 LTE Band 10 MHz 1 Carrier / 256QAM / Middle

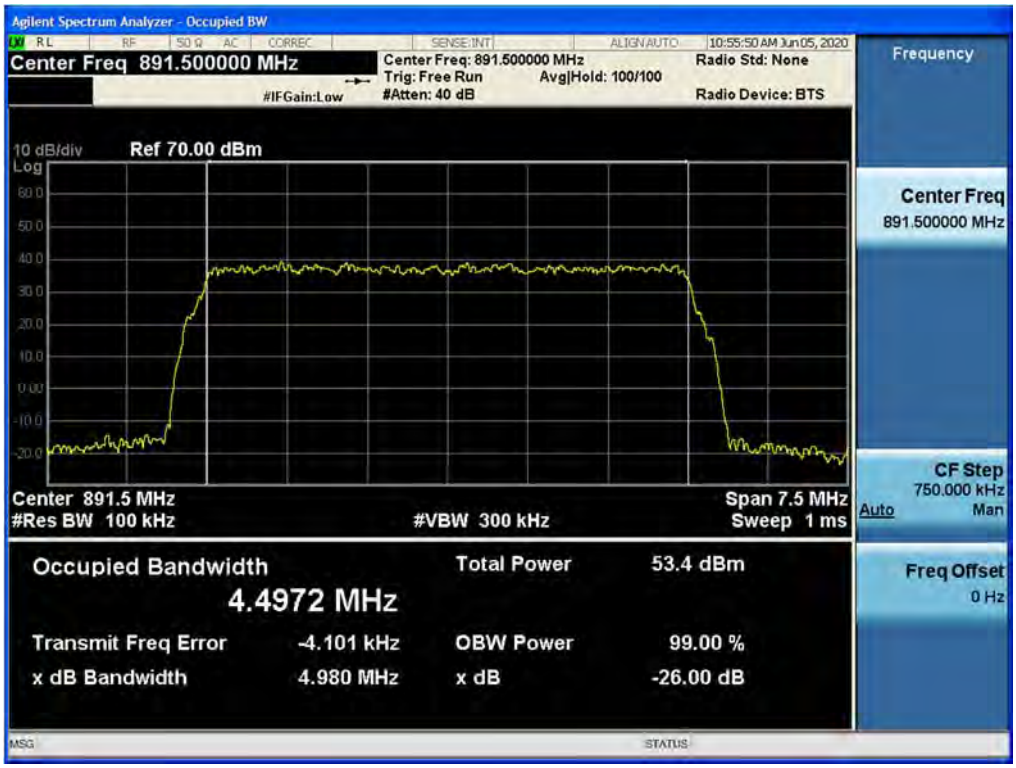


Antenna 2 / B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle

Antenna 3 / B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle

Antenna 0 / 5G NR Band 5 MHz 1 Carrier/ 64QAM / Middle

Antenna 1 / 5G NR Band 5 MHz 1 Carrier/ 64QAM / High



Antenna 2 / 5G NR Band 5 MHz 1 Carrier/ 64QAM / Middle

Antenna 3 / 5G NR Band 5 MHz 1 Carrier/ 16QAM / Middle

5.3. UNWANTED CONDUCTED 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.

§ 22.917 Emission limitations for cellular equipment.

The rules in this section govern the spectral characteristics of emissions in the Cellular Radiotelephone Service.

(a) *Out of band emissions.* 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 + 10 log(P) dB.

(b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a reference bandwidth as follows:

(1) In the spectrum below 1 GHz, instrumentation should employ a reference bandwidth of 100 kHz or greater. 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. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy, provided that the measured power is integrated over the full required reference bandwidth (i.e., 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(2) In the spectrum above 1 GHz, instrumentation should employ a reference bandwidth of 1 MHz.

(c) *Alternative out of band emission limit.* Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas, in lieu of that set forth in this section, pursuant to a private contractual arrangement of all affected licensees and applicants. In this event, each party to such contract shall maintain a copy of the contract in their station files and disclose it to prospective assignees or transferees and, upon request, to the FCC.

(d) *Interference caused by out of band emissions.* If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.

§ 27.53 Emission limits.

(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. 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.

Test Procedures:

The measurement is performed in accordance with Section 5.7.3 and 5.7.4 of ANSI C63.26.

5.7.3 Out-of-band unwanted emissions measurements

a) Set the spectrum analyzer center frequency to the block, band, or channel edge frequency.

b) Set the span wide enough to capture the fundamental emission closest to the authorized block or band edge, and to include all modulation products that spill into the immediately adjacent frequency band. In some cases, it may be possible to set the center frequency and span so as to encompass the fundamental emission and the unwanted out-of-band (band-edge) emissions on either side of the authorized block, band, or channel. This can be accomplished with a single (slow) sweep, if adequate overload protection and sufficient dynamic range can be maintained.

c) Set the number of points in sweep ≥ 2 × span / RBW.

d) Sweep time should be auto for peak detection. For rms detection the sweep time should be set as follows:

1) If the device can be configured to transmit continuously (duty cycle ≥ 98%), set the (sweep time) > (number of points in sweep) × (symbol period) (e.g., by a factor of 10 × symbol period × number of points). Increasing the sweep time (i.e., slowing the sweep speed) will allow for averaging over multiple symbols

2) If the device cannot be configured to transmit continuously (duty cycle < 98%) and a freerunning sweep must be used, set the sweep time so that the averaging is performed over multiple on/off cycles by setting the sweep time > (number of points in sweep) × (transmitter period) (i.e., the transmit on-time + the off-time). The spectrum analyzer readings shall subsequently be corrected by [10 log (1/duty cycle)]. This assumes that the transmission period and duty cycle is relatively constant (duty cycle variation ≤ ±2%).

3) If the device cannot be configured to transmit continuously (duty cycle < 98%) and a freerunning sweep must be used, set the sweep time so that the averaging is performed over multiple on/off cycles by setting the sweep time > (number of points in sweep) × (transmitter period) (i.e., the transmit on-time + the off-time). The spectrum analyzer readings shall subsequently be corrected by [10 log (1/duty cycle)]. This assumes that the transmission period and duty cycle is relatively constant (duty cycle variation ≤ ±2%).

4) If the device cannot be configured to transmit continuously and a free-running sweep must be used, and if the transmissions exhibit a non-constant duty cycle (duty cycle variations > ±2%), set the sweep time so that the averaging is performed over the on-period by setting the sweep time > (symbol period) × (number of points), while also maintaining the sweep time < (transmitter on-time). The trace mode shall be set to max hold, since not every display point will be averaged only over just the on-time. Thus, multiple sweeps (e.g., 100) in maximum hold are necessary to ensure that the maximum power is measured.

e) The test report shall include the plots of the measuring instrument display and the measured data.

f) See Annex I for example emission mask plots.

5.7.4 Spurious unwanted emission measurements

a) Set the spectrum analyzer start frequency to the lowest frequency generated by the EUT, without going below 9 kHz, and the stop frequency to the lower frequency covered by the measurements previously performed in 5.7.3. As an alternative, the stop frequency can be set to the value specified in 5.1.1, depending on the EUT operating range, if the resulting plot can clearly demonstrate compliance for all frequencies not addressed by the out-of-band emissions measurements performed as

per 5.7.3.

b) When using an average power (rms) detector, ensure that the number of points in the sweep ≥ 2 × (span / RBW). This may require that the measurement range defined by the start and stop frequencies be subdivided, depending on the spectrum analyzer capabilities. This requirement does not apply to peak-detected power measurements. When average power is specified by the applicable regulation, a peak-detector can be utilized for preliminary measurements to accommodate wider frequency spans. Any emissions found in the preliminary measurement to exceed the applicable limit(s) shall be further examined using a power averaging (rms) detector with the minimum number of measurement points as defined above.

c) The sweep time should be set to auto-couple for performing peak-detector measurements. For measurements that use a power averaging (rms) detector, the sweep time shall be set as described for out-of-band emissions measurements in item d) of 5.7.3.

d) Identify and measure the Highest spurious emission levels in each frequency range. It is not necessary to re-measure the out-of-band emissions as a part of this test. Record the frequencies and amplitudes corresponding to the measured emissions and capture the data plots.

e) Repeat step b) through step d) for the upper spurious emission frequency range if not already captured by a wide span measurement performed as per the alternative provided in step a). The upper frequency for this measurement is defined in 5.1.1 as a function of the EUT operating range.

f) Compare the results with the corresponding limit in the applicable regulation.

g) The test report shall include the data plots of the measuring instrument display and the measured data.

Note:

1) In 9 kHz to 30 MHz band, RBW narrower than reference bandwidth is used. So following correction factor is applied.

- 10 log [(reference bandwidth)/(resolution bandwidth)]

- 9 kHz to 150 kHz applied 1 kHz RBW, 10 log (1 kHz / 100 kHz) = - 20 dB

10 log (1 kHz / 1 MHz) = - 30 dB

- 150 kHz to 30 MHz applied 10 kHz RBW, 10 log (10 kHz / 100 kHz) = - 10 dB

10 log (10 kHz / 1 MHz) = - 20 dB

2) Due to MIMO operations, a correction has been added to the limit according to KDB 662911 D01 v02r01.

*- 4Tx MIMO correction: 10 log(N_{ANT}) = 10 log(4) = 6.02 dB / -19.02 dBm (-13 dBm – 10*log (4))*

*- 2Tx MIMO correction: 10 log(N_{ANT}) = 10 log(2) = 3.01 dB / -16.01 dBm (-13 dBm – 10*log (2))*

Note:

The results of the Band Edge test shown above the frequency measured values are very small and similar trend for each port, so we are attached only the worst case plot.

Test Results:

Tabular Data of Radiated Spurious Emissions
B29 LTE Band 5 MHz 1 Carrier
Test Result for Output Port 0

Mod.	Channel	Measured Level (dBm)			
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge-100	Low Edge-100 ~ Low Edge
QPSK	Low	-29.280	-28.880	-45.605	-23.244
	Middle	-29.270	-29.457	-46.257	-30.548
	High	-29.172	-30.345	-46.257	-32.405
16QAM	Low	-28.948	-29.033	-46.232	-23.679
	Middle	-28.769	-29.902	-44.997	-31.246
	High	-28.890	-30.961	-46.658	-31.364
64QAM	Low	-29.557	-30.171	-46.423	-23.090
	Middle	-29.229	-30.768	-46.628	-30.571
	High	-29.560	-31.190	-46.441	-32.085
256QAM	Low	-30.687	-30.408	-46.466	-23.103
	Middle	-30.558	-30.577	-45.489	-30.129
	High	-29.608	-28.778	-45.868	-32.696

Mod.	Channel	Measured Level (dBm)				
		High Edge ~ High Edge +100	High Edge +100 ~ 2 GHz	2 GHz ~ 4 GHz	4 GHz ~ 6 GHz	6 GHz ~ 8 GHz
QPSK	Low	-29.677	-31.697	-33.453	-34.117	-34.364
	Middle	-29.823	-31.850	-33.092	-34.996	-34.438
	High	-23.065	-31.824	-33.346	-34.631	-34.108
16QAM	Low	-31.363	-32.399	-33.705	-34.758	-34.331
	Middle	-30.239	-31.862	-33.899	-34.887	-34.368
	High	-22.495	-31.385	-33.364	-34.274	-34.150
64QAM	Low	-30.565	-31.714	-33.319	-34.242	-34.440
	Middle	-29.961	-31.384	-33.535	-34.747	-33.830
	High	-23.102	-32.546	-33.104	-34.831	-34.467
256QAM	Low	-29.929	-32.709	-34.180	-34.582	-34.513
	Middle	-30.070	-31.440	-33.515	-34.515	-34.313
	High	-22.105	-31.572	-33.662	-34.320	-34.322

Test Result for Output Port 1

Mod.	Channel	Measured Level (dBm)			
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge-100	Low Edge-100 ~ Low Edge
QPSK	Low	-30.764	-30.482	-46.218	-24.307
	Middle	-30.075	-30.318	-45.927	-31.259
	High	-29.563	-29.404	-46.220	-32.562
16QAM	Low	-30.223	-29.500	-46.587	-24.878
	Middle	-28.275	-30.752	-45.665	-30.954
	High	-29.074	-30.604	-46.677	-32.388
64QAM	Low	-29.829	-29.729	-45.610	-23.661
	Middle	-30.274	-31.023	-46.226	-31.780
	High	-29.534	-31.176	-46.519	-32.200
256QAM	Low	-30.108	-31.606	-45.747	-24.207
	Middle	-30.211	-29.607	-46.057	-31.120
	High	-30.544	-31.201	-46.799	-31.967

Mod.	Channel	Measured Level (dBm)				
		High Edge ~ High Edge +100	High Edge +100 ~ 2 GHz	2 GHz ~ 4 GHz	4 GHz ~ 6 GHz	6 GHz ~ 8 GHz
QPSK	Low	-31.431	-31.373	-33.298	-34.269	-34.610
	Middle	-30.048	-32.573	-34.040	-34.582	-34.429
	High	-22.046	-32.909	-34.643	-33.995	-34.627
16QAM	Low	-30.624	-31.317	-33.573	-34.431	-34.765
	Middle	-30.165	-32.561	-34.240	-34.826	-34.224
	High	-23.008	-32.045	-32.426	-34.403	-34.308
64QAM	Low	-31.083	-32.767	-34.603	-34.534	-34.351
	Middle	-30.963	-32.219	-34.321	-34.713	-33.933
	High	-20.711	-32.110	-34.529	-34.329	-34.046
256QAM	Low	-30.234	-31.379	-34.923	-34.344	-34.672
	Middle	-30.266	-32.673	-34.079	-34.685	-34.535
	High	-21.634	-31.282	-33.653	-34.912	-34.268

Test Result for Output Port 2

Mod.	Channel	Measured Level (dBm)			
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge-100	Low Edge-100 ~ Low Edge
QPSK	Low	-30.529	-31.230	-46.307	-22.677
	Middle	-29.213	-30.684	-46.417	-27.156
	High	-30.147	-28.013	-45.829	-30.864
16QAM	Low	-29.142	-29.929	-46.502	-22.603
	Middle	-29.468	-29.183	-46.820	-29.018
	High	-29.582	-30.156	-45.890	-29.386
64QAM	Low	-30.014	-29.341	-46.761	-23.229
	Middle	-29.124	-30.906	-46.388	-27.230
	High	-29.640	-29.812	-46.361	-30.869
256QAM	Low	-29.749	-31.212	-46.177	-22.616
	Middle	-30.033	-31.306	-46.294	-27.329
	High	-29.862	-31.235	-45.982	-31.610

Mod.	Channel	Measured Level (dBm)				
		High Edge ~ High Edge +100	High Edge +100 ~ 2 GHz	2 GHz ~ 4 GHz	4 GHz ~ 6 GHz	6 GHz ~ 8 GHz
QPSK	Low	-26.120	-31.620	-34.613	-34.615	-34.632
	Middle	-26.175	-32.212	-33.533	-34.666	-34.107
	High	-21.589	-32.076	-34.661	-34.824	-33.844
16QAM	Low	-27.948	-32.468	-33.628	-34.777	-34.635
	Middle	-28.574	-31.406	-34.114	-34.370	-34.477
	High	-21.455	-31.238	-34.083	-34.283	-34.425
64QAM	Low	-25.735	-32.947	-34.288	-34.456	-34.268
	Middle	-25.992	-31.699	-33.809	-34.516	-33.923
	High	-21.189	-32.599	-33.551	-34.605	-34.381
256QAM	Low	-25.864	-32.571	-33.121	-34.860	-34.520
	Middle	-26.314	-31.432	-34.506	-34.412	-34.071
	High	-21.115	-33.177	-34.260	-34.316	-34.541

Test Result for Output Port 3

Mod.	Channel	Measured Level (dBm)			
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge-100	Low Edge-100 ~ Low Edge
QPSK	Low	-30.298	-29.521	-46.501	-23.108
	Middle	-30.373	-30.885	-46.683	-30.449
	High	-30.243	-31.065	-46.463	-32.181
16QAM	Low	-29.533	-31.060	-45.955	-24.453
	Middle	-30.003	-29.678	-46.239	-31.280
	High	-29.378	-31.127	-46.178	-31.253
64QAM	Low	-30.369	-31.253	-46.500	-22.409
	Middle	-30.388	-31.594	-46.153	-30.780
	High	-30.432	-30.021	-46.409	-32.215
256QAM	Low	-30.084	-29.901	-46.546	-23.791
	Middle	-29.011	-31.557	-46.421	-31.292
	High	-30.441	-30.532	-45.869	-32.433

Mod.	Channel	Measured Level (dBm)				
		High Edge ~ High Edge +100	High Edge +100 ~ 2 GHz	2 GHz ~ 4 GHz	4 GHz ~ 6 GHz	6 GHz ~ 8 GHz
QPSK	Low	-30.656	-32.643	-34.776	-34.996	-34.298
	Middle	-30.409	-32.727	-34.139	-34.730	-34.570
	High	-24.806	-32.228	-34.418	-34.798	-34.214
16QAM	Low	-29.477	-31.839	-34.121	-34.386	-34.329
	Middle	-30.849	-31.437	-32.835	-34.673	-33.742
	High	-21.647	-32.075	-33.341	-34.620	-34.361
64QAM	Low	-30.827	-32.088	-34.350	-34.751	-34.040
	Middle	-30.332	-31.525	-34.098	-34.681	-34.542
	High	-21.992	-31.936	-33.228	-34.784	-34.340
256QAM	Low	-30.697	-32.018	-33.915	-34.588	-34.295
	Middle	-30.584	-32.376	-34.267	-34.961	-34.450
	High	-22.599	-32.196	-33.800	-34.547	-33.802

B29 LTE Band 10 MHz 1 Carrier
Test Result for Output Port 0

Mod.	Channel	Measured Level (dBm)								
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge-100	Low Edge-100 ~ Low Edge	High Edge ~ High Edge+100	High Edge+100 ~ 2 GHz	2 GHz ~ 4 GHz	4 GHz ~ 6 GHz	6 GHz ~ 8 GHz
QPSK	Middle	-30.015	-28.312	-45.955	-25.336	-26.603	-32.747	-33.528	-34.445	-34.727
16QAM	Middle	-28.873	-29.886	-46.040	-25.306	-25.859	-32.755	-34.265	-34.693	-34.189
64QAM	Middle	-29.384	-30.468	-45.953	-24.952	-25.478	-32.142	-33.715	-34.685	-34.708
256QAM	Middle	-29.700	-29.804	-45.542	-24.831	-25.218	-32.011	-33.499	-34.658	-34.438

Test Result for Output Port 1

Mod.	Channel	Measured Level (dBm)								
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge-100	Low Edge-100 ~ Low Edge	High Edge ~ High Edge+100	High Edge+100 ~ 2 GHz	2 GHz ~ 4 GHz	4 GHz ~ 6 GHz	6 GHz ~ 8 GHz
QPSK	Middle	-29.299	-29.084	-46.010	-25.789	-25.526	-32.521	-33.851	-34.476	-34.520
16QAM	Middle	-27.414	-30.089	-45.391	-26.325	-26.438	-32.853	-33.401	-34.289	-34.523
64QAM	Middle	-29.464	-29.363	-45.391	-26.526	-26.069	-32.512	-33.888	-34.492	-34.329
256QAM	Middle	-29.425	-29.596	-45.719	-26.003	-26.161	-32.830	-34.120	-34.591	-33.860

Test Result for Output Port 2

Mod.	Channel	Measured Level (dBm)								
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge-100	Low Edge-100 ~ Low Edge	High Edge ~ High Edge+100	High Edge+100 ~ 2 GHz	2 GHz ~ 4 GHz	4 GHz ~ 6 GHz	6 GHz ~ 8 GHz
QPSK	Middle	-29.186	-29.577	-45.683	-23.691	-23.484	-33.207	-33.420	-34.468	-34.310
16QAM	Middle	-28.142	-30.198	-46.243	-23.775	-23.816	-31.969	-34.377	-34.245	-34.511
64QAM	Middle	-29.710	-28.936	-45.705	-23.612	-23.476	-33.453	-34.645	-34.776	-34.530
256QAM	Middle	-29.379	-29.696	-45.782	-23.186	-23.931	-32.632	-33.061	-34.342	-34.524

Test Result for Output Port 3

Mod.	Channel	Measured Level (dBm)								
		9 kHz ~ 150 kHz	150 kHz ~ 30 MHz	30 MHz ~ Low Edge-100	Low Edge-100 ~ Low Edge	High Edge ~ High Edge+100	High Edge+100 ~ 2 GHz	2 GHz ~ 4 GHz	4 GHz ~ 6 GHz	6 GHz ~ 8 GHz
QPSK	Middle	-29.514	-27.895	-45.029	-25.494	-26.905	-32.903	-34.111	-34.254	-34.189
16QAM	Middle	-27.933	-28.998	-45.824	-26.782	-26.913	-32.541	-33.174	-34.421	-34.280
64QAM	Middle	-30.099	-29.356	-45.555	-26.689	-26.646	-33.293	-34.439	-34.473	-34.273
256QAM	Middle	-29.444	-29.713	-45.979	-26.384	-26.664	-32.762	-33.955	-34.821	-34.696

5G NR Band 5 MHz 1 Carrier
Test Result for Output Port 0

Mod.	Channel	Measured Level (dBm)				
		9 kHz ~ 150 kHz	**150 kHz ~ 30 MHz**	**30 MHz ~ Low Edge-100**	**Low Edge-100 ~ Low Edge**	**High Edge ~ High Edge +100**
QPSK	Low	-31.594	-40.986	-46.953	-21.980	-34.991
	Middle	-32.844	-39.837	-46.302	-33.512	-33.428
	High	-32.034	-41.015	-47.361	-35.384	-26.582
16QAM	Low	-31.058	-41.196	-47.080	-23.041	-35.371
	Middle	-32.403	-40.789	-46.491	-33.942	-34.428
	High	-32.249	-41.478	-47.247	-35.790	-24.692
64QAM	Low	-32.184	-41.112	-46.523	-21.995	-34.847
	Middle	-32.015	-41.080	-46.994	-33.429	-33.192
	High	-32.588	-41.366	-47.156	-35.309	-26.240

Mod.	Channel	Measured Level (dBm)
		High Edge +100 ~ 10 GHz
QPSK	Low	-20.929
	Middle	-21.392
	High	-19.952
16QAM	Low	-21.692
	Middle	-21.175
	High	-21.253
64QAM	Low	-20.952
	Middle	-20.594
	High	-21.807

Test Result for Output Port 1

Mod.	Channel	Measured Level (dBm)				
		9 kHz ~ 150 kHz	**150 kHz ~ 30 MHz**	**30 MHz ~ Low Edge-100**	**Low Edge-100 ~ Low Edge**	**High Edge ~ High Edge +100**
QPSK	Low	-31.419	-41.797	-46.850	-22.502	-35.056
	Middle	-32.235	-40.093	-46.798	-32.804	-32.832
	High	-32.572	-41.046	-46.634	-34.605	-24.272
16QAM	Low	-31.625	-40.848	-46.740	-23.603	-35.758
	Middle	-31.063	-40.732	-46.524	-33.222	-33.170
	High	-31.876	-42.843	-47.326	-34.939	-23.582
64QAM	Low	-32.804	-41.469	-47.004	-23.199	-35.358
	Middle	-31.968	-40.822	-47.481	-33.557	-33.041
	High	-31.725	-41.021	-47.136	-34.398	-25.053

Mod.	Channel	Measured Level (dBm)
		High Edge +100 ~ 10 GHz
QPSK	Low	-20.905
	Middle	-20.671
	High	-22.766
16QAM	Low	-21.289
	Middle	-20.868
	High	-20.983
64QAM	Low	-20.390
	Middle	-20.468
	High	-21.356

Test Result for Output Port 2

Mod.	Channel	Measured Level (dBm)				
		9 kHz ~ 150 kHz	**150 kHz ~ 30 MHz**	**30 MHz ~ Low Edge-100**	**Low Edge-100 ~ Low Edge**	**High Edge ~ High Edge +100**
QPSK	Low	-32.112	-40.312	-46.846	-23.863	-36.343
	Middle	-32.915	-39.537	-47.053	-34.351	-34.439
	High	-32.760	-41.584	-47.511	-35.898	-26.138
16QAM	Low	-31.938	-40.782	-47.117	-23.998	-35.884
	Middle	-31.561	-40.670	-47.110	-34.479	-34.308
	High	-33.569	-41.384	-47.215	-35.746	-25.172
64QAM	Low	-31.606	-41.524	-46.778	-23.442	-36.105
	Middle	-30.636	-38.848	-47.223	-34.399	-34.916
	High	-32.915	-42.089	-47.385	-36.241	-26.463

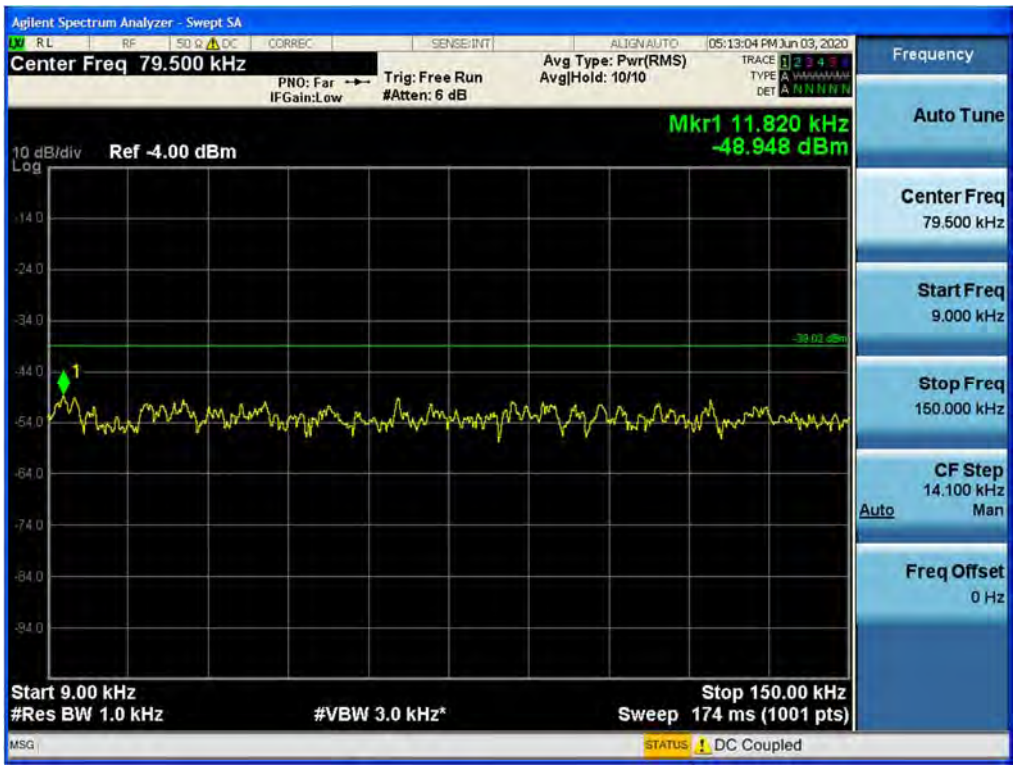
Mod.	Channel	Measured Level (dBm)
		High Edge +100 ~ 10 GHz
QPSK	Low	-21.833
	Middle	-21.905
	High	-20.470
16QAM	Low	-22.057
	Middle	-21.501
	High	-21.323
64QAM	Low	-21.349
	Middle	-20.192
	High	-20.510

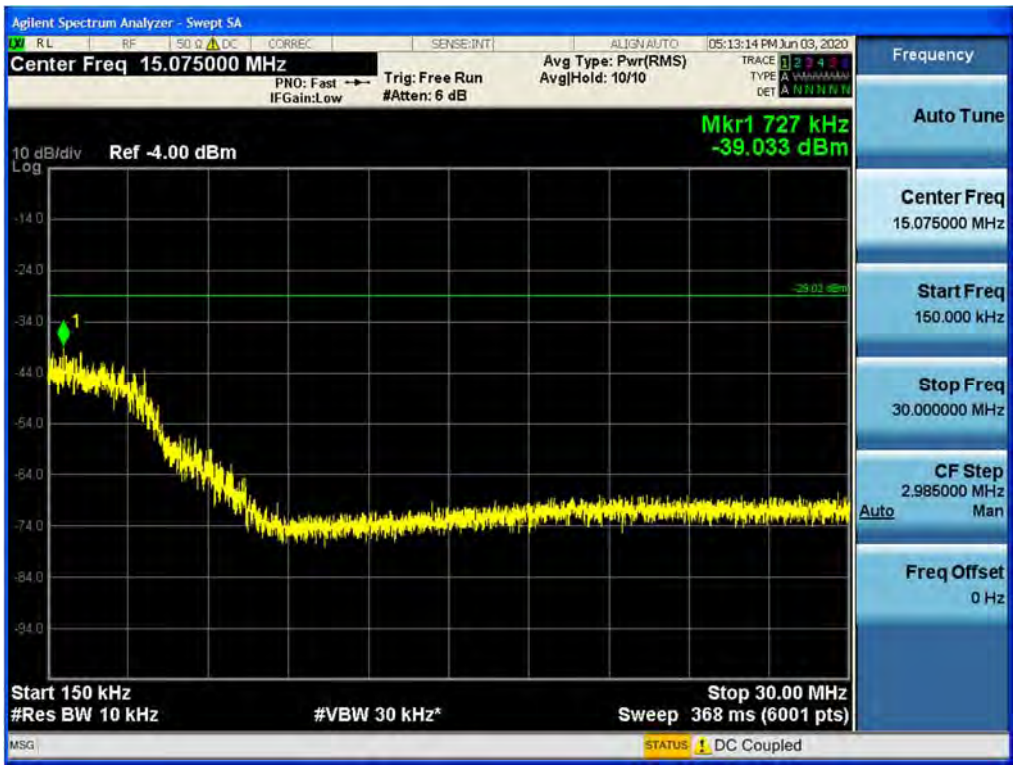
Test Result for Output Port 3

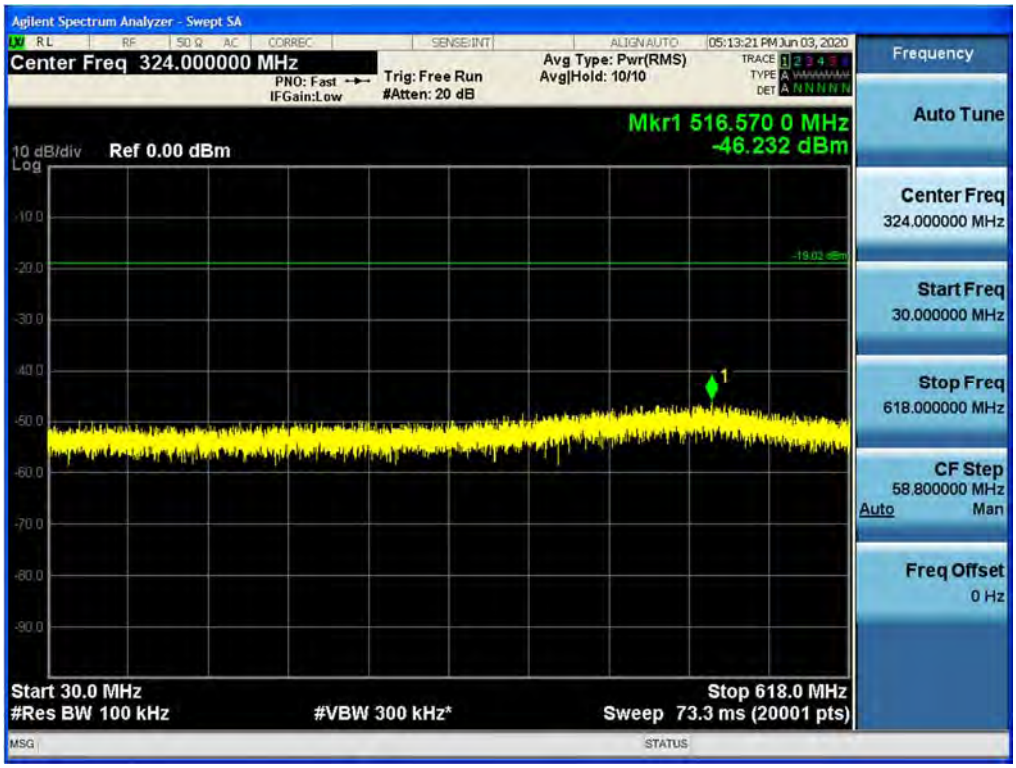
Mod.	Channel	Measured Level (dBm)				
		9 kHz ~ 150 kHz	**150 kHz ~ 30 MHz**	**30 MHz ~ Low Edge-100**	**Low Edge-100 ~ Low Edge**	**High Edge ~ High Edge +100**
QPSK	Low	-31.504	-39.834	-47.195	-23.360	-36.638
	Middle	-32.095	-40.690	-47.147	-34.078	-33.657
	High	-31.996	-40.753	-47.322	-35.835	-25.023
16QAM	Low	-31.309	-40.602	-46.970	-24.180	-36.342
	Middle	-32.101	-41.106	-47.050	-34.603	-34.044
	High	-33.231	-40.118	-47.090	-36.642	-24.751
64QAM	Low	-33.294	-42.344	-47.416	-23.677	-36.476
	Middle	-31.925	-40.450	-46.938	-34.708	-34.554
	High	-33.105	-41.233	-47.257	-36.136	-26.535

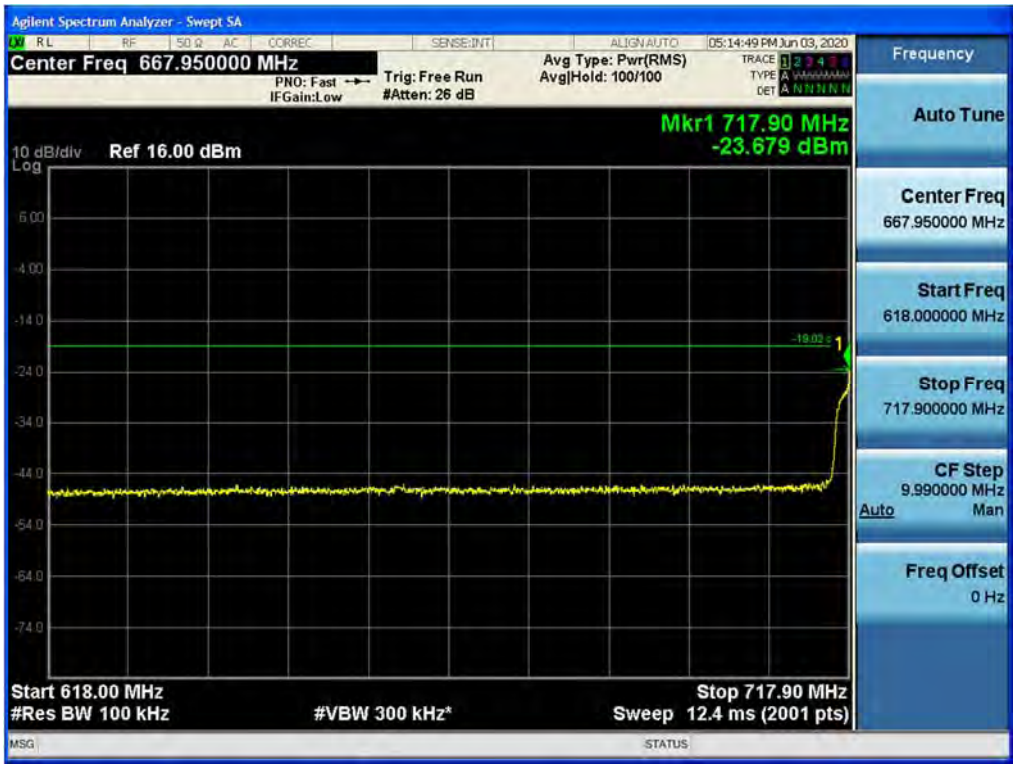
Mod.	Channel	Measured Level (dBm)
		High Edge +100 ~ 10 GHz
QPSK	Low	-20.817
	Middle	-21.346
	High	-21.130
16QAM	Low	-20.574
	Middle	-21.415
	High	-20.962
64QAM	Low	-20.901
	Middle	-20.911
	High	-21.640

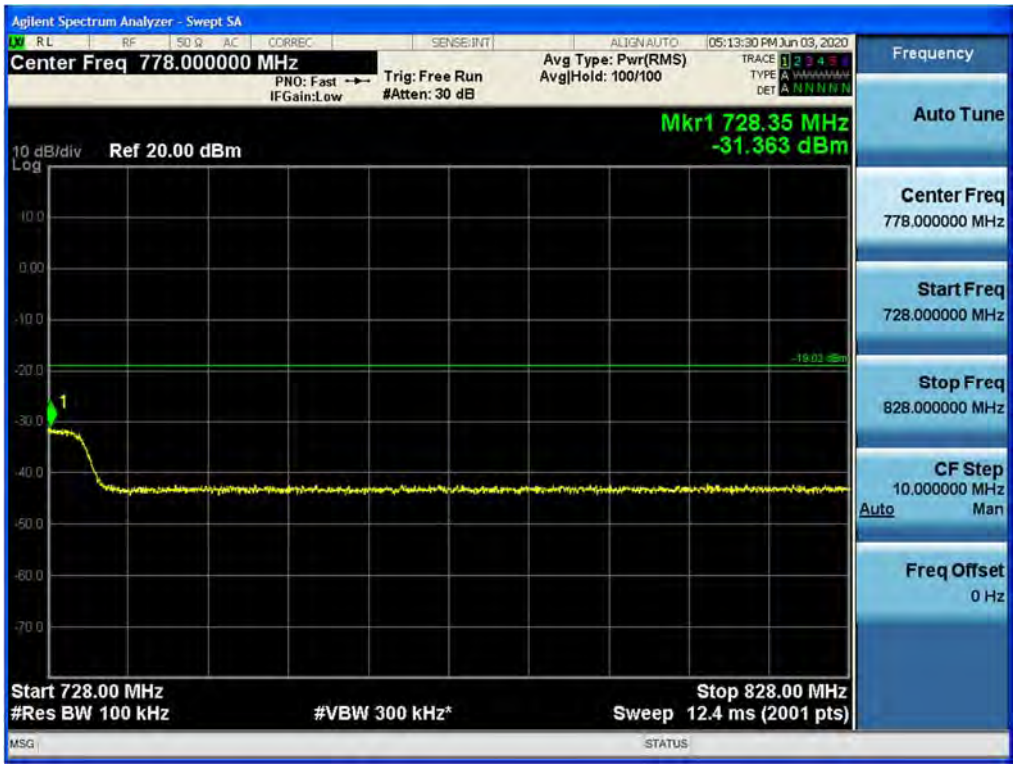
Plot Data of Conducted Spurious Emissions

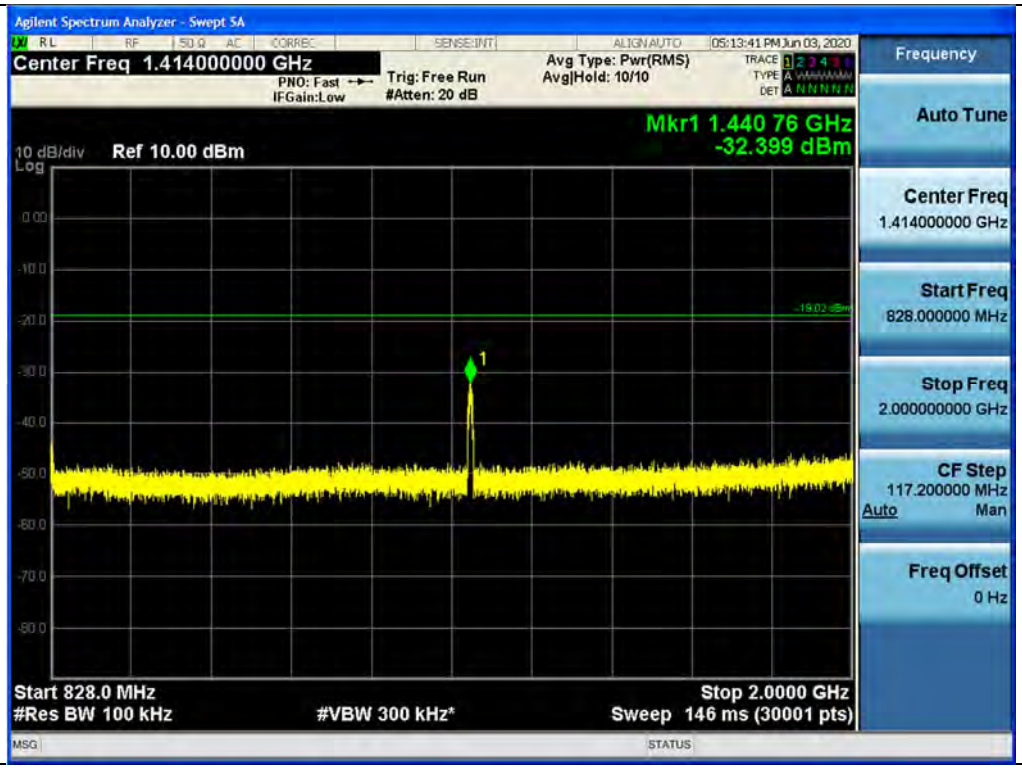
Antenna 0 / 9 kHz ~ 150 kHz / B29 LTE Band 5 MHz 1 Carrier / 16QAM / Low


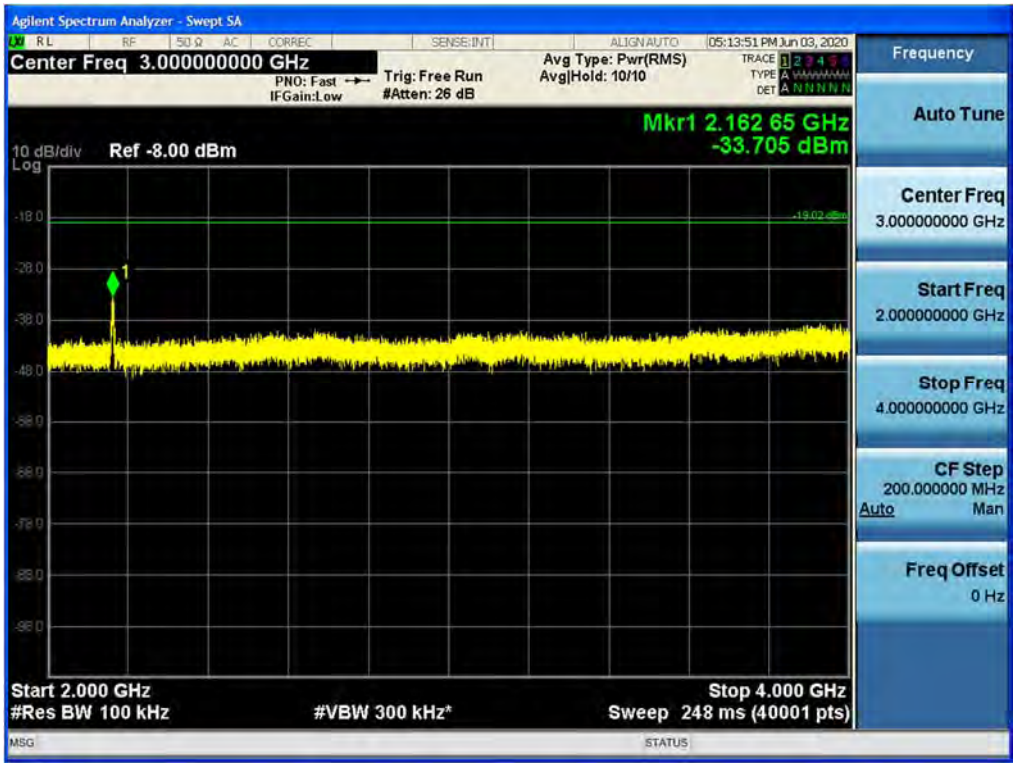
Antenna 0 / 150 kHz ~ 30 MHz / B29 LTE Band 5 MHz 1 Carrier / 16QAM / Low


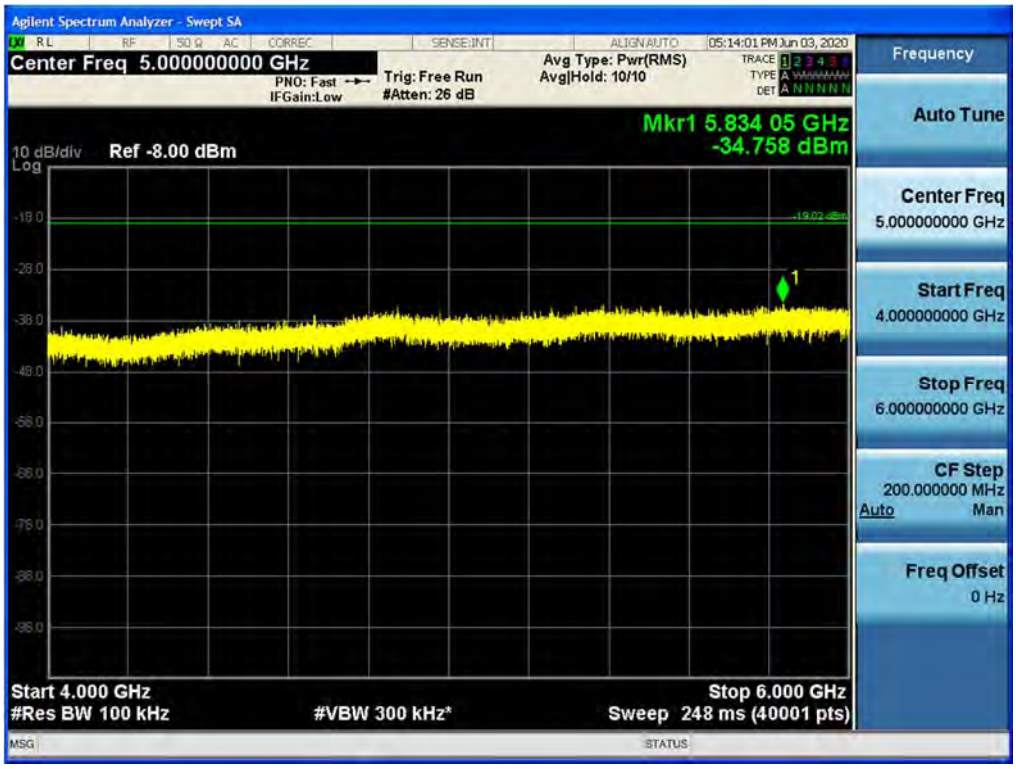
Antenna 0 / 30 MHz ~ Low Edge-100 / B29 LTE Band 5 MHz 1 Carrier / 16QAM / Low


Antenna 0 / Low Edge-100 ~ Low Edge / B29 LTE Band 5 MHz 1 Carrier / 16QAM / Low


Antenna 0 / High Edge ~ High Edge+100 / B29 LTE Band 5 MHz 1 Carrier / 16QAM / Low


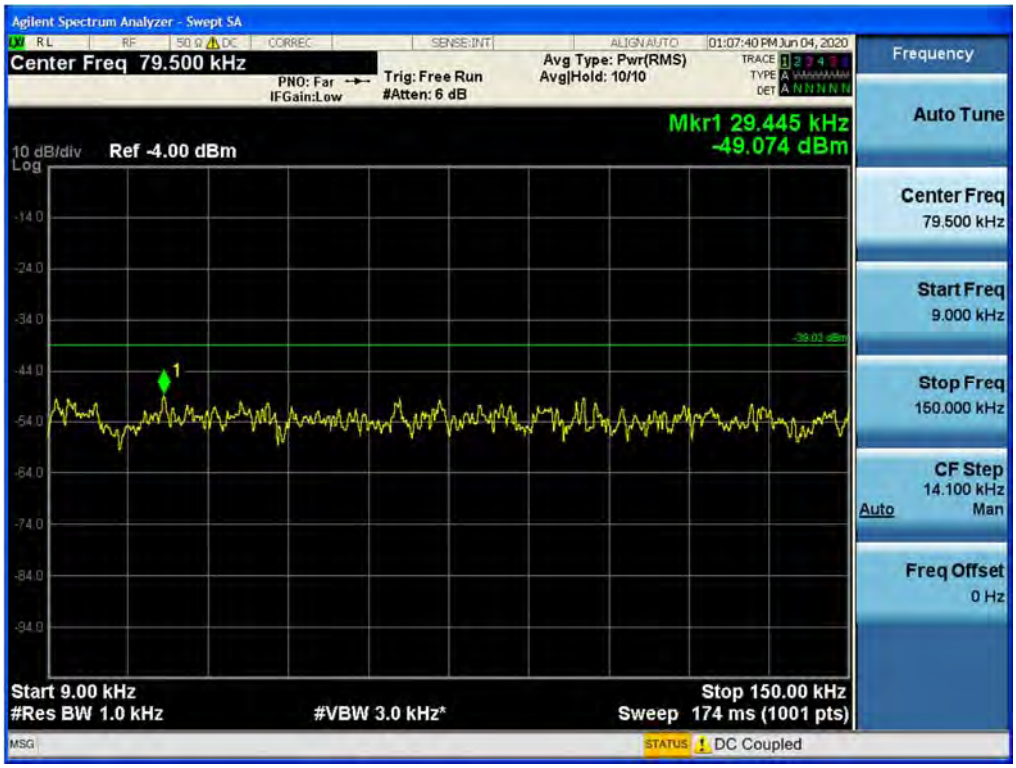
Antenna 0 / High Edge+100 ~ 2 GHz / B29 LTE Band 5 MHz 1 Carrier / 16QAM / Low


Antenna 0 / 2 GHz ~ 4 GHz/ B29 LTE Band 5 MHz 1 Carrier / 16QAM / Low


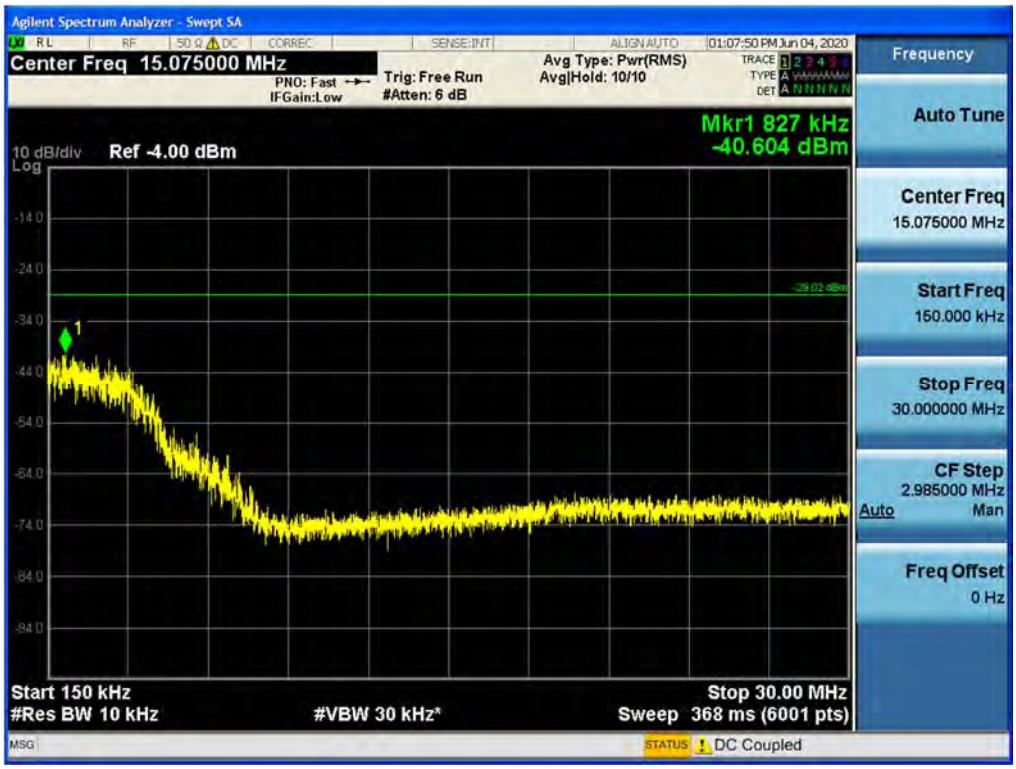
Antenna 0 / 4 GHz ~ 6 GHz/ B29 LTE Band 5 MHz 1 Carrier / 16QAM / Low


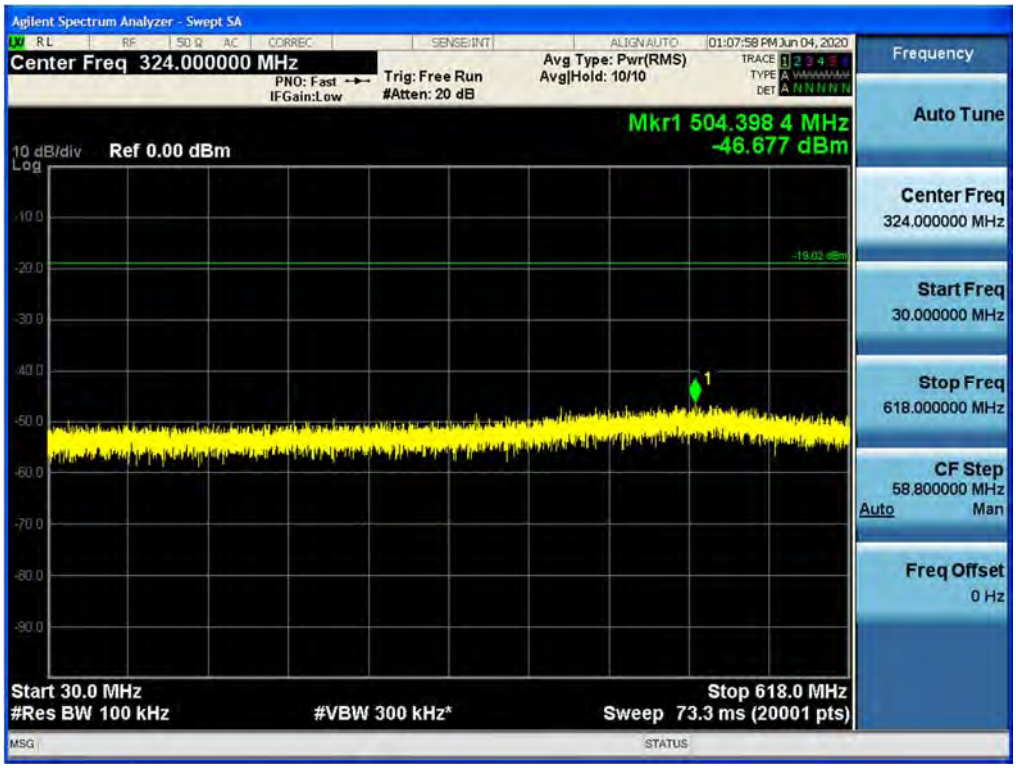
Antenna 0 / 6 GHz ~ 8 GHz/ B29 LTE Band 5 MHz 1 Carrier / 16QAM / Low

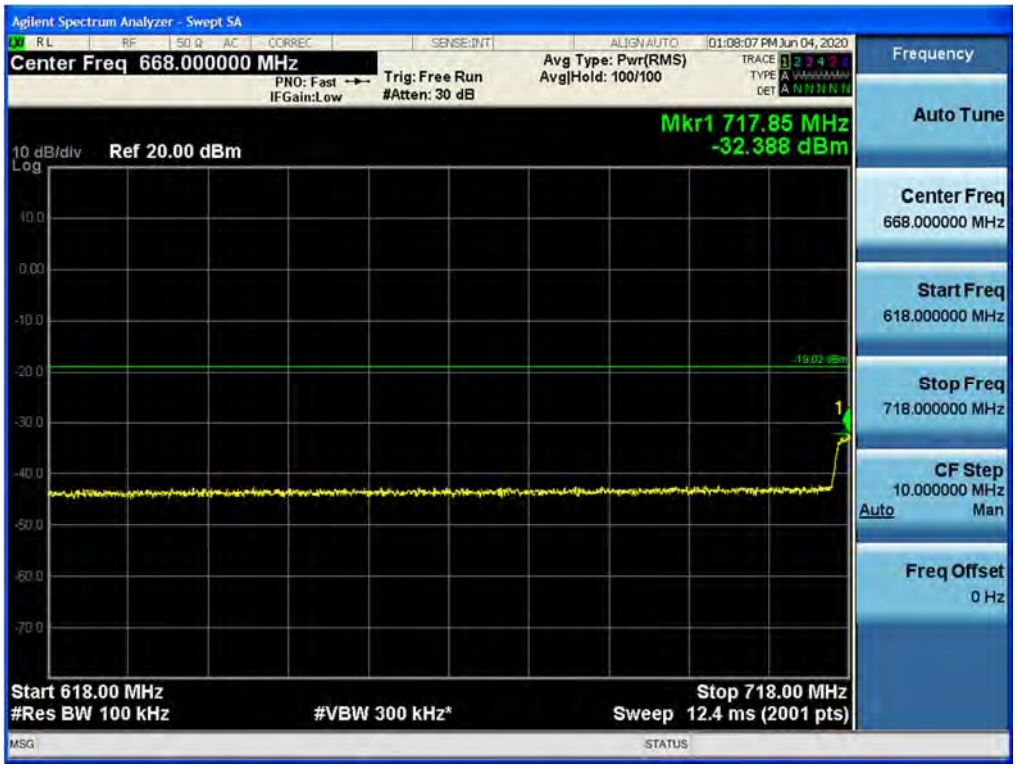

Antenna 1 / 9 kHz ~ 150 kHz / B29 LTE Band 5 MHz 1 Carrier / 16QAM / High

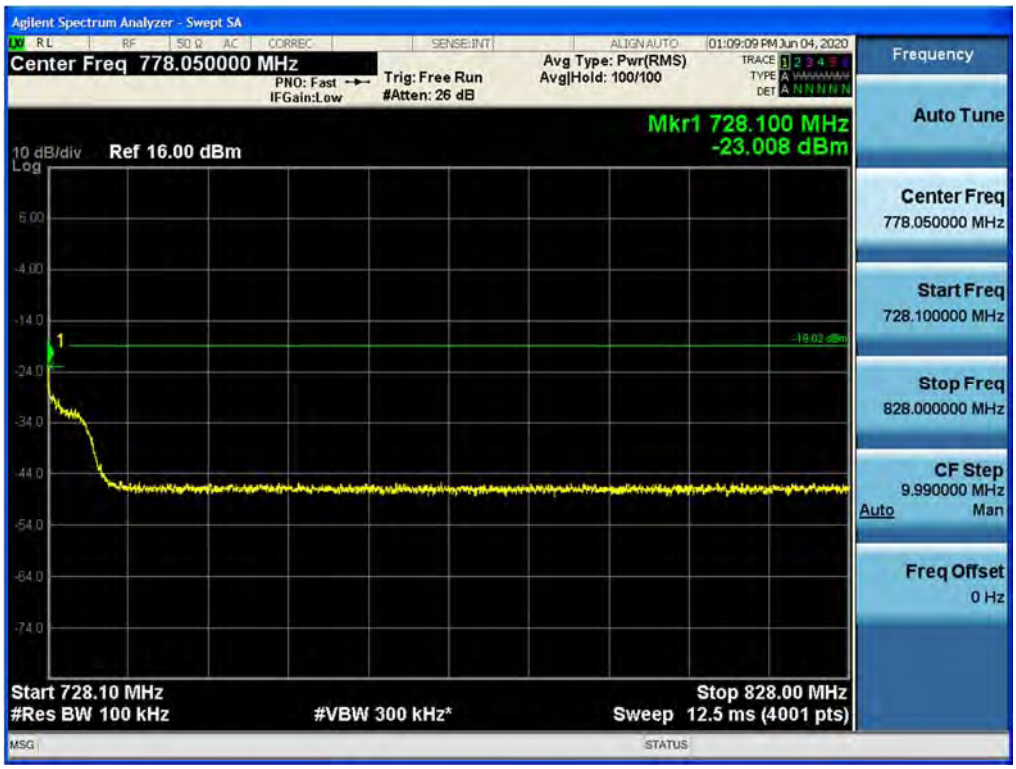


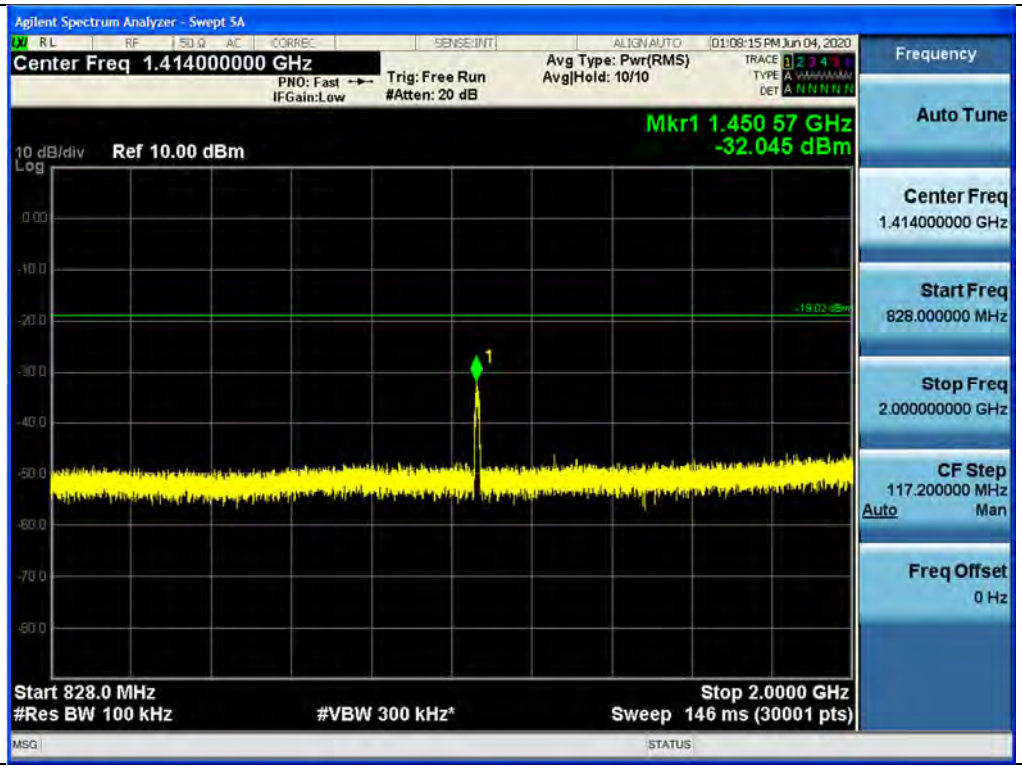
Antenna 1 / 150 kHz ~ 30 MHz / B29 LTE Band 5 MHz 1 Carrier / 16QAM / High

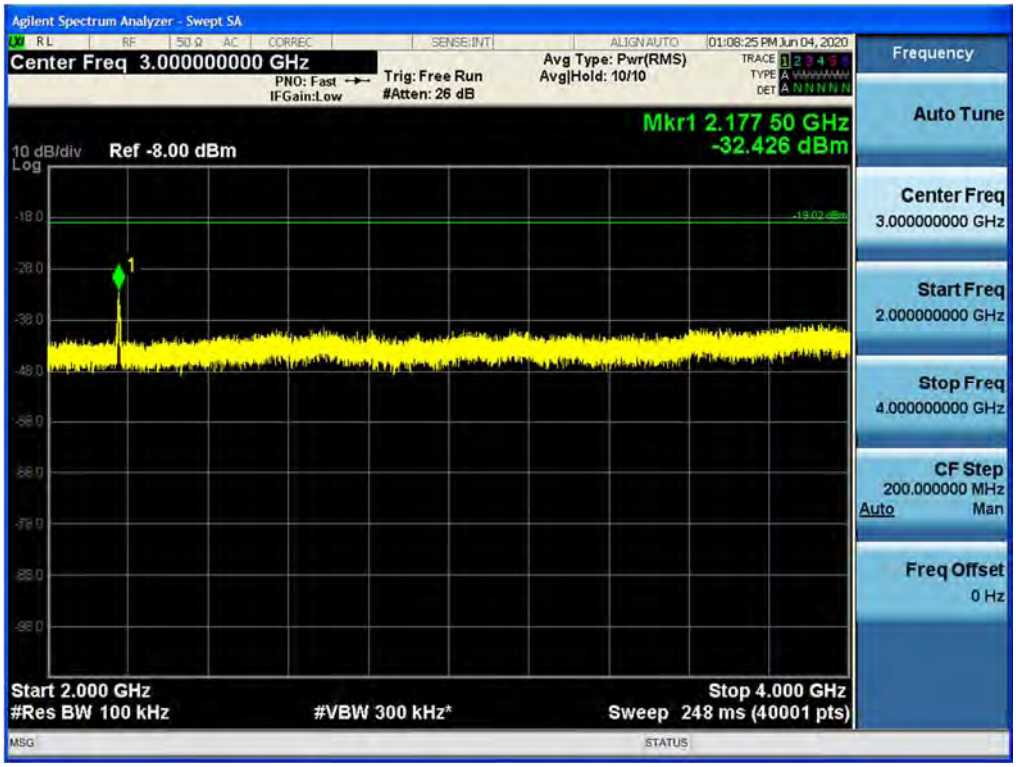


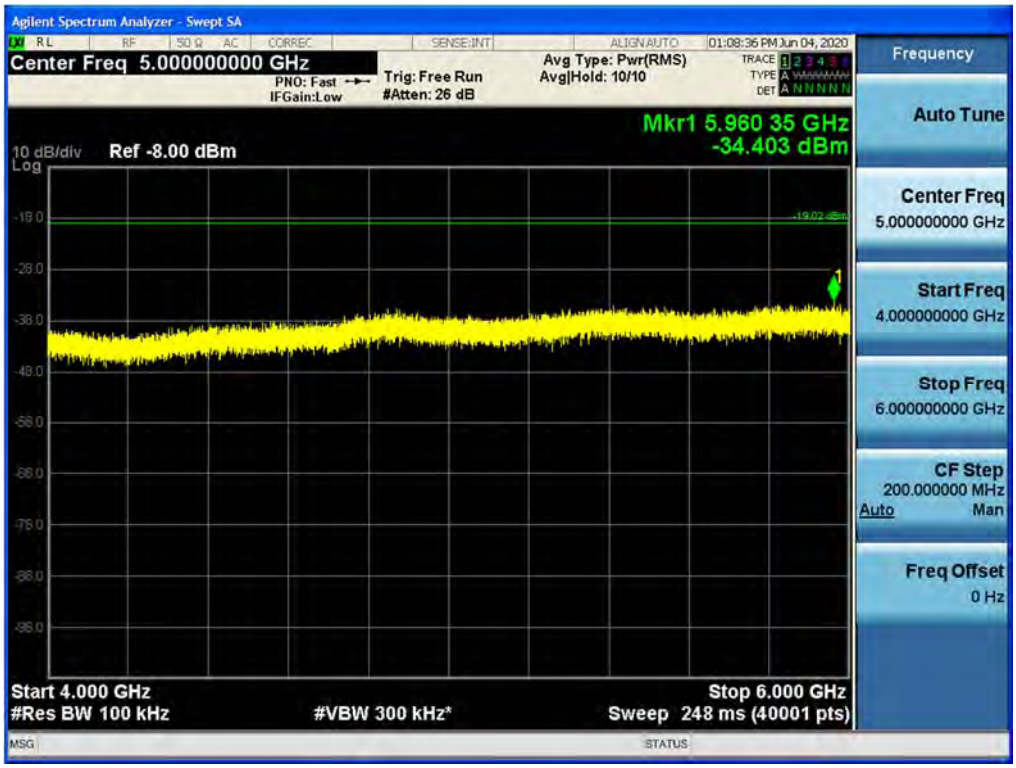
Antenna 1 / 30 MHz ~ Low Edge-100 / B29 LTE Band 5 MHz 1 Carrier / 16QAM / High


Antenna 1 / Low Edge-100 ~ Low Edge / B29 LTE Band 5 MHz 1 Carrier / 16QAM / High


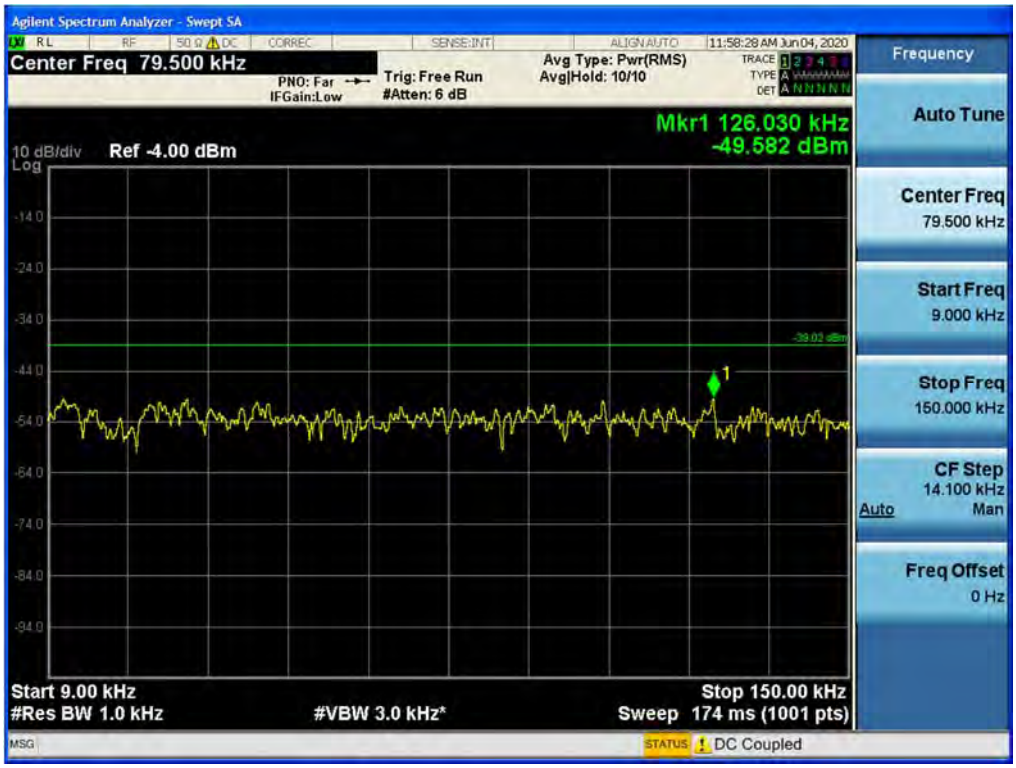
Antenna 1 / High Edge ~ High Edge+100 / B29 LTE Band 5 MHz 1 Carrier / 16QAM / High


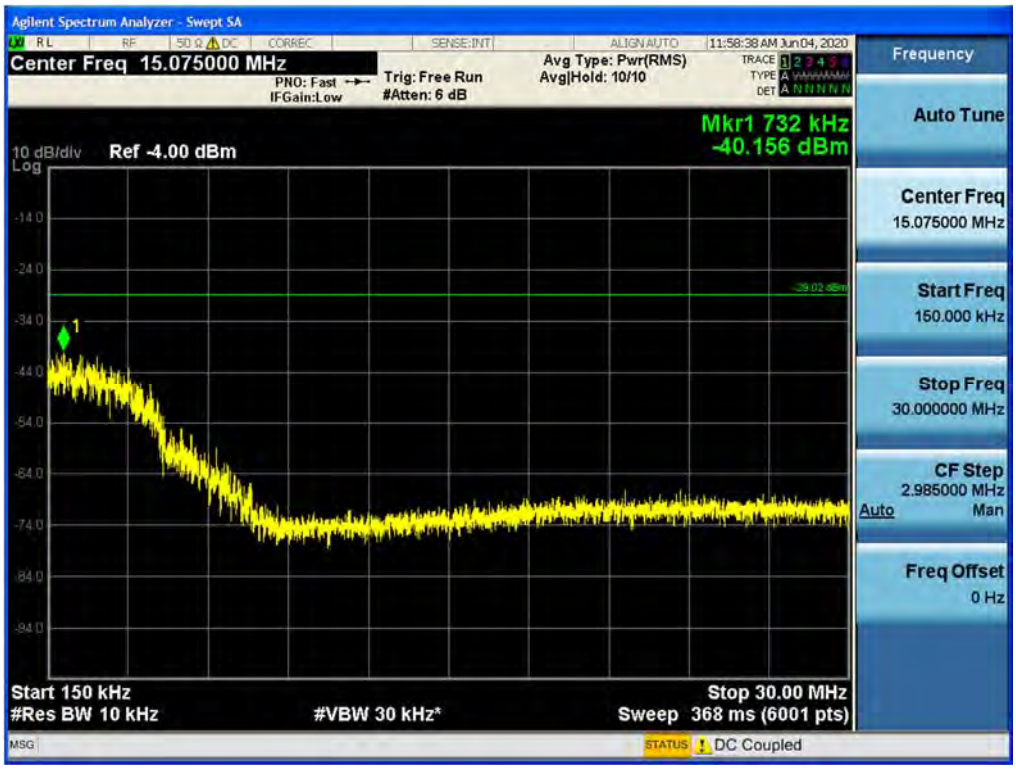
Antenna 1 / High Edge+100 ~ 2 GHz / B29 LTE Band 5 MHz 1 Carrier / 16QAM / High


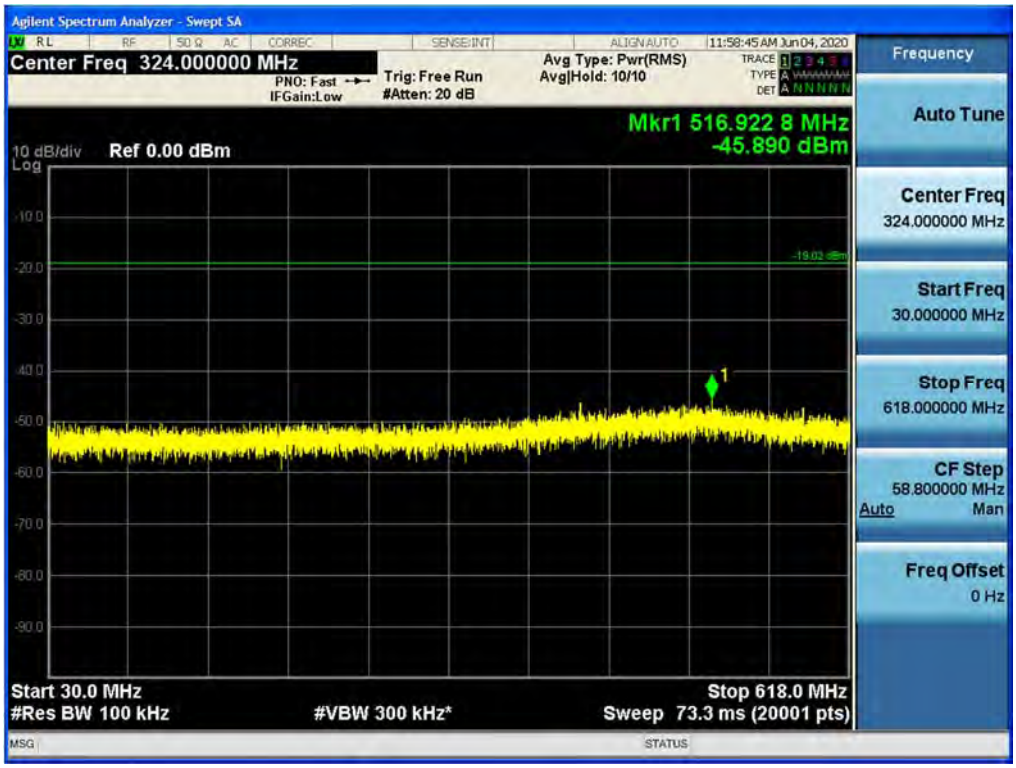
Antenna 1 / 2 GHz ~ 4 GHz/ B29 LTE Band 5 MHz 1 Carrier / 16QAM / High


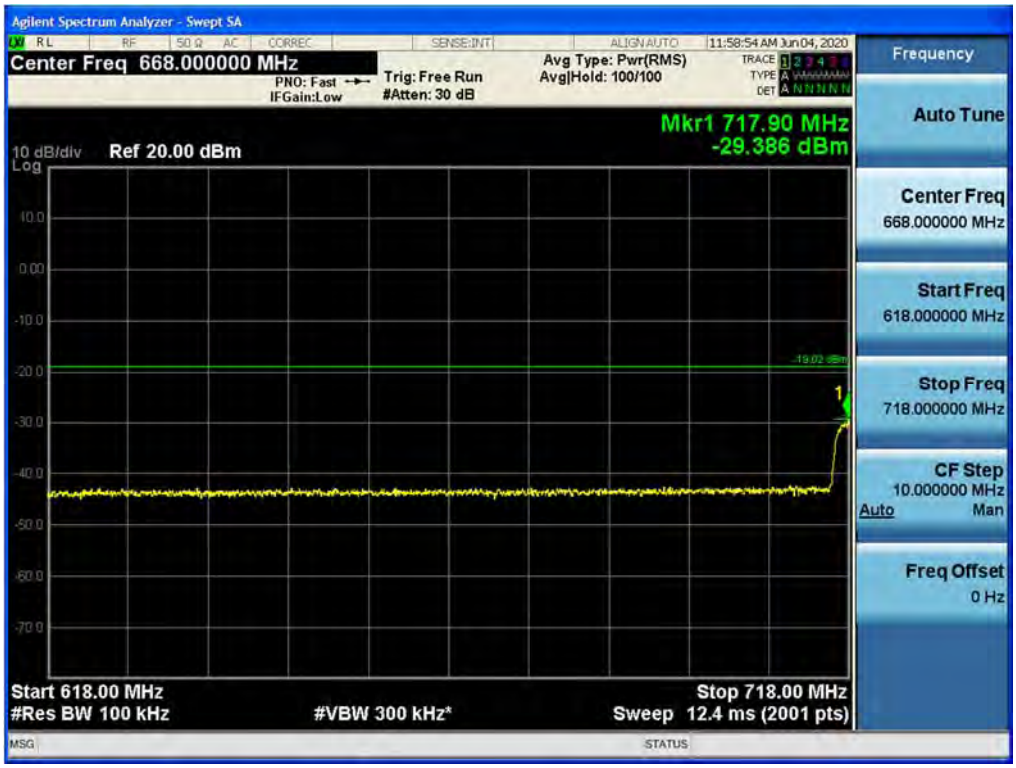
Antenna 1 / 4 GHz ~ 6 GHz/ B29 LTE Band 5 MHz 1 Carrier / 16QAM / High


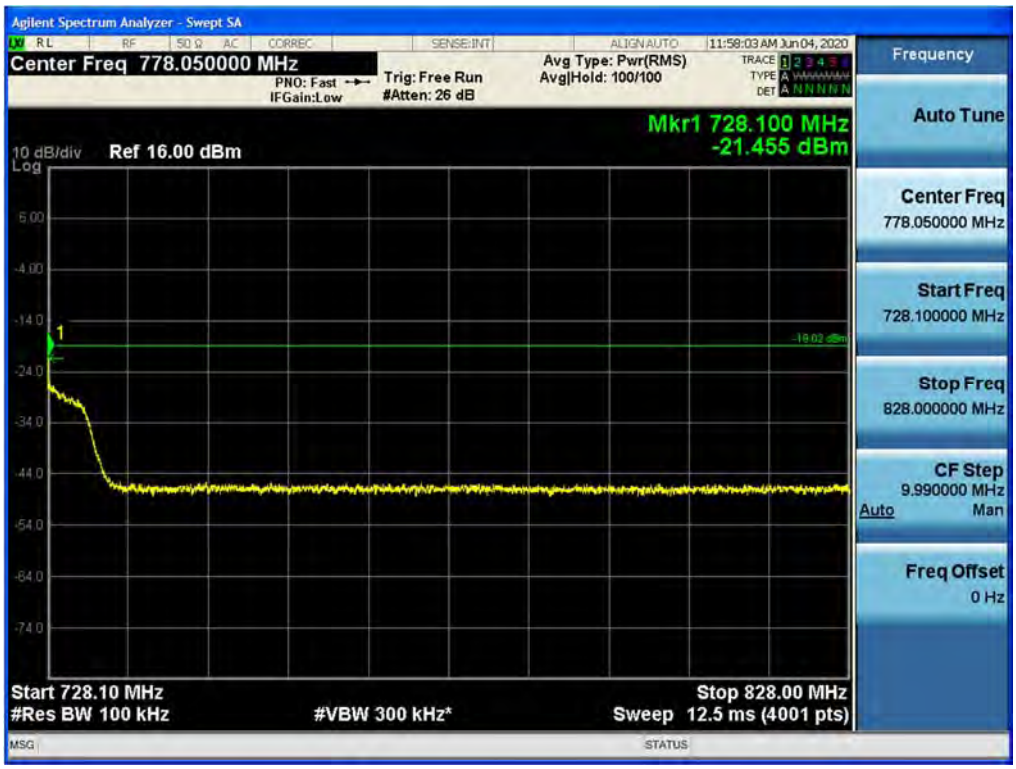
Antenna 1 / 6 GHz ~ 8 GHz/ B29 LTE Band 5 MHz 1 Carrier / 16QAM / High

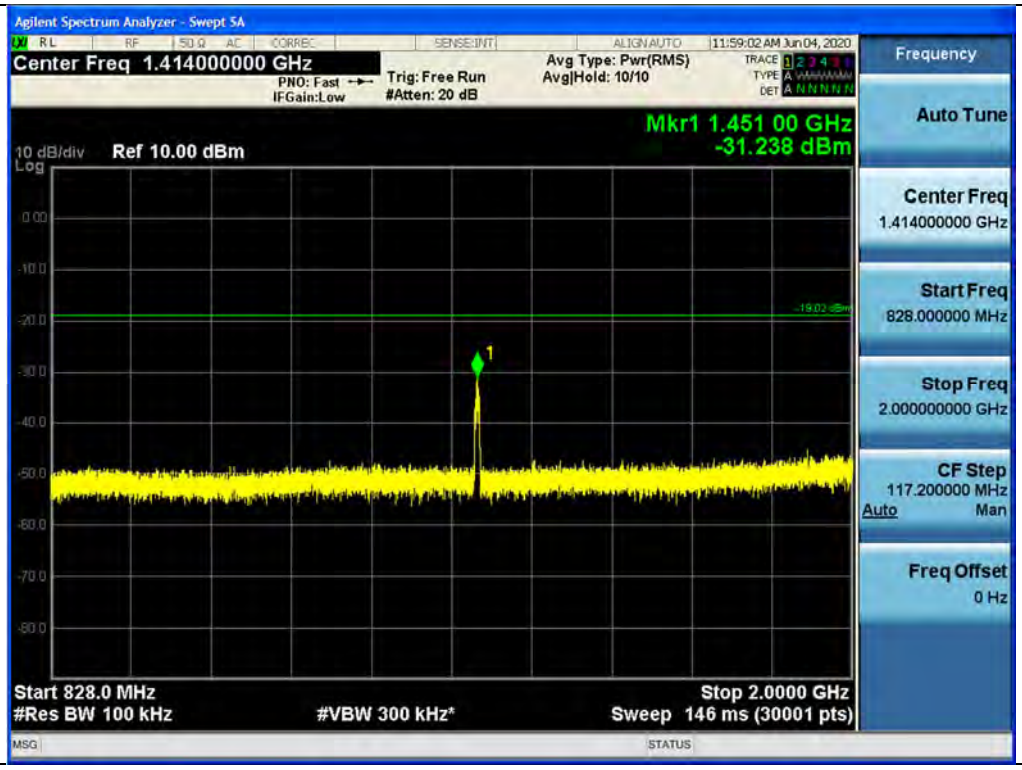

Antenna 2 / 9 kHz ~ 150 kHz / B29 LTE Band 5 MHz 1 Carrier / 16QAM / High


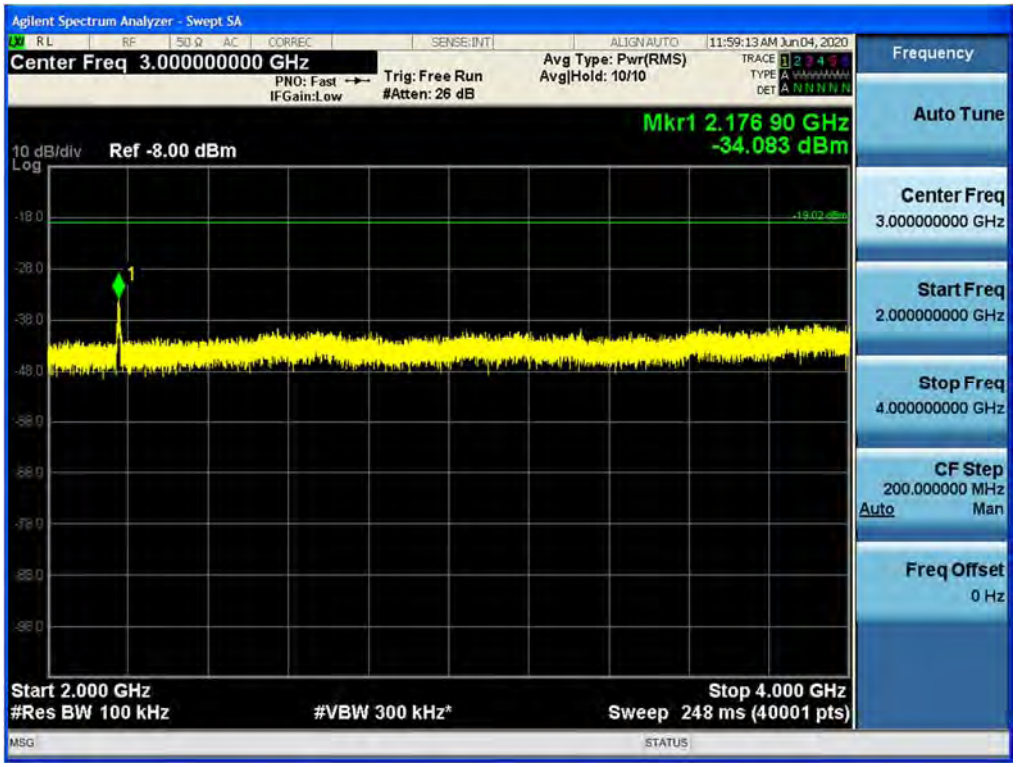
Antenna 2 / 150 kHz ~ 30 MHz / B29 LTE Band 5 MHz 1 Carrier / 16QAM / High


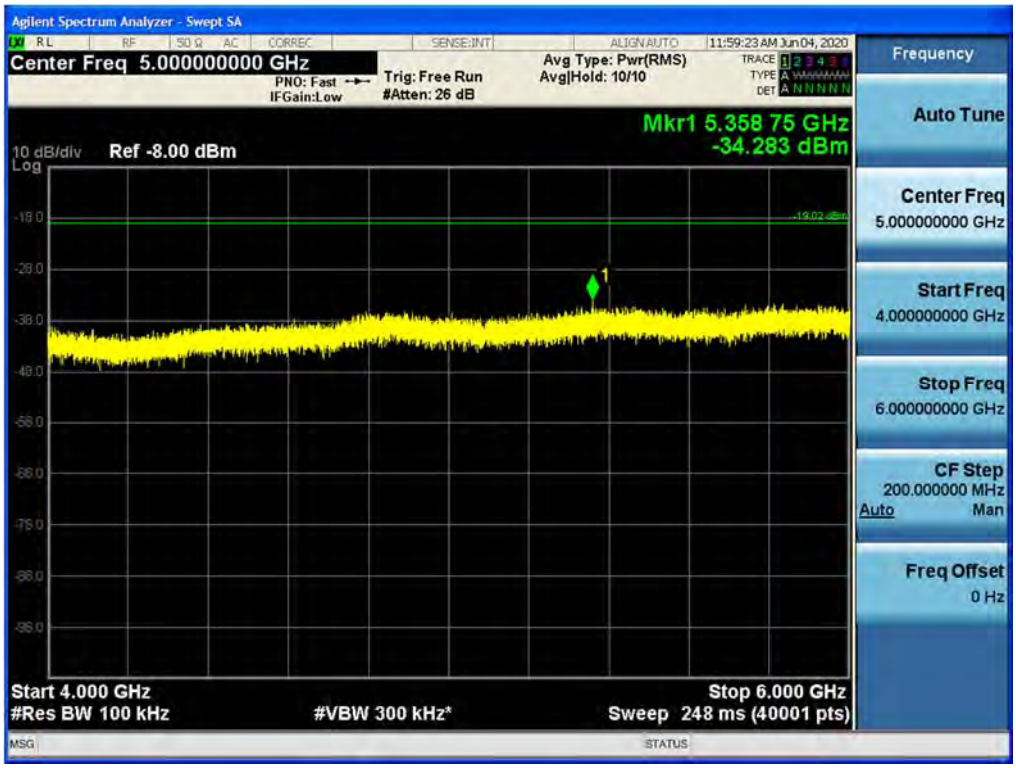
Antenna 2 / 30 MHz ~ Low Edge-100 / B29 LTE Band 5 MHz 1 Carrier / 16QAM / High


Antenna 2 / Low Edge-100 ~ Low Edge / B29 LTE Band 5 MHz 1 Carrier / 16QAM / High


Antenna 2 / High Edge ~ High Edge+100 / B29 LTE Band 5 MHz 1 Carrier / 16QAM / High


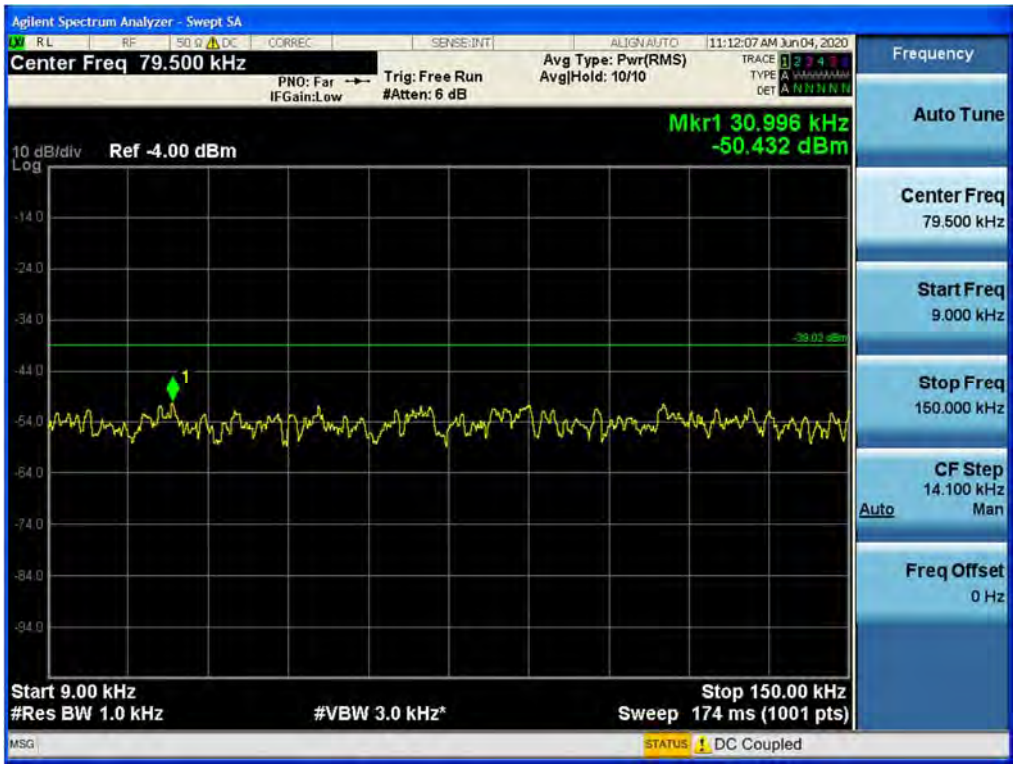
Antenna 2 / High Edge+100 ~ 2 GHz / B29 LTE Band 5 MHz 1 Carrier / 16QAM / High


Antenna 2 / 2 GHz ~ 4 GHz/ B29 LTE Band 5 MHz 1 Carrier / 16QAM / High


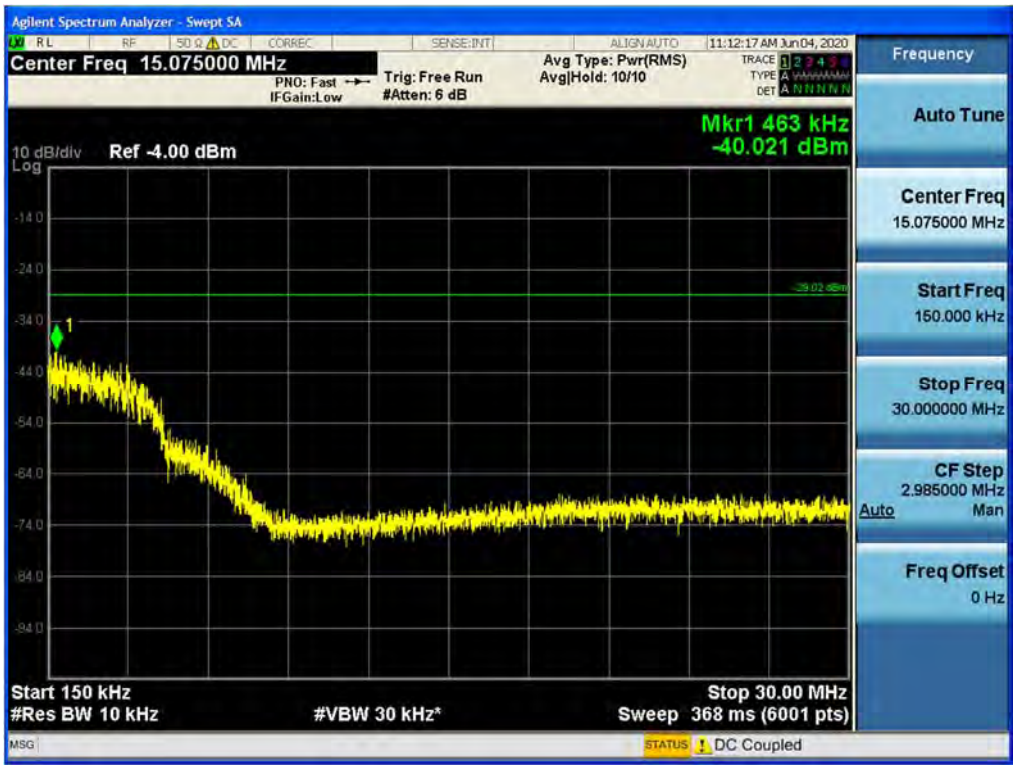
Antenna 2 / 4 GHz ~ 6 GHz/ B29 LTE Band 5 MHz 1 Carrier / 16QAM / High


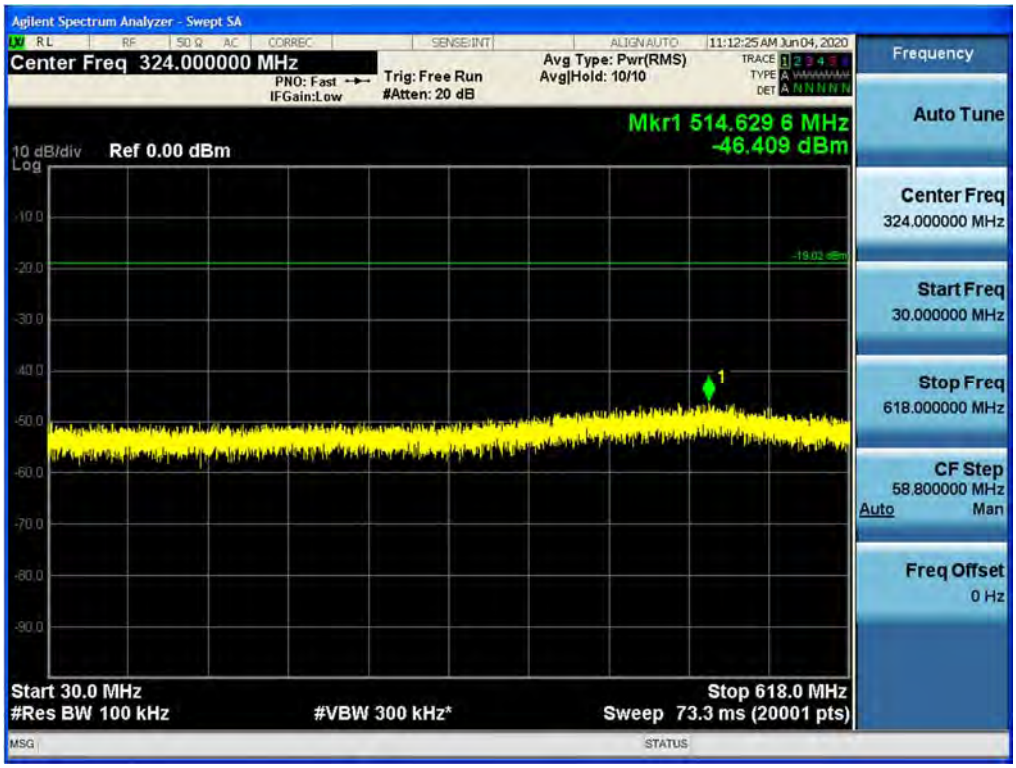
Antenna 2 / 6 GHz ~ 8 GHz/ B29 LTE Band 5 MHz 1 Carrier / 16QAM / High

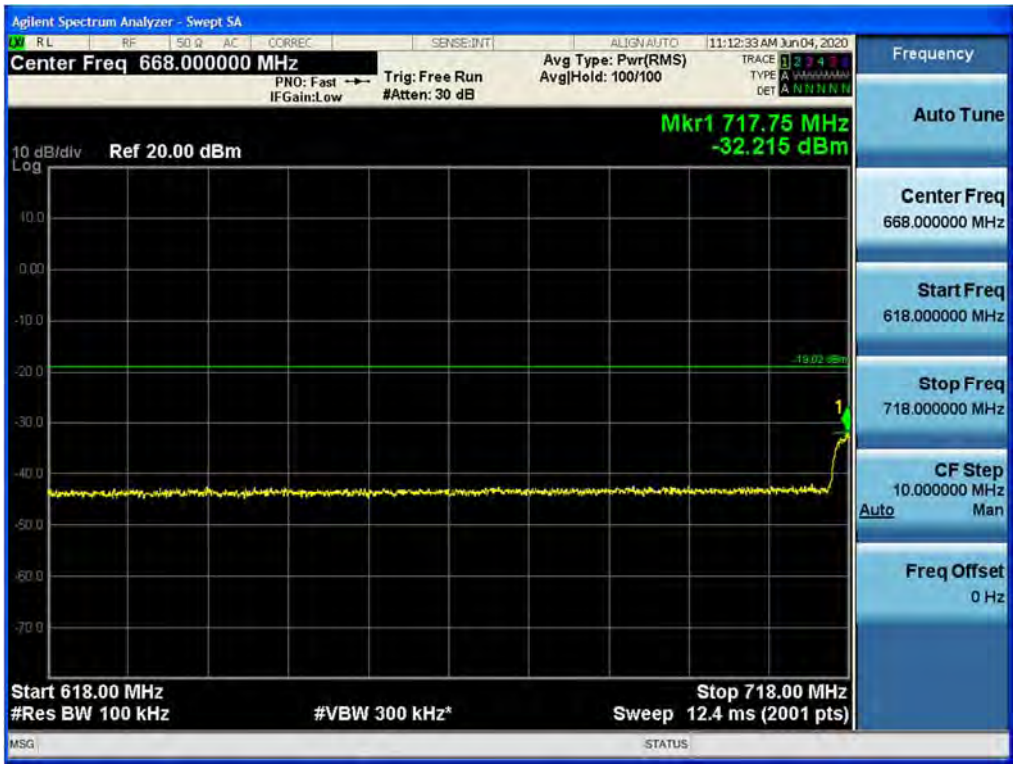

Antenna 3 / 9 kHz ~ 150 kHz / B29 LTE Band 5 MHz 1 Carrier / 64QAM / High

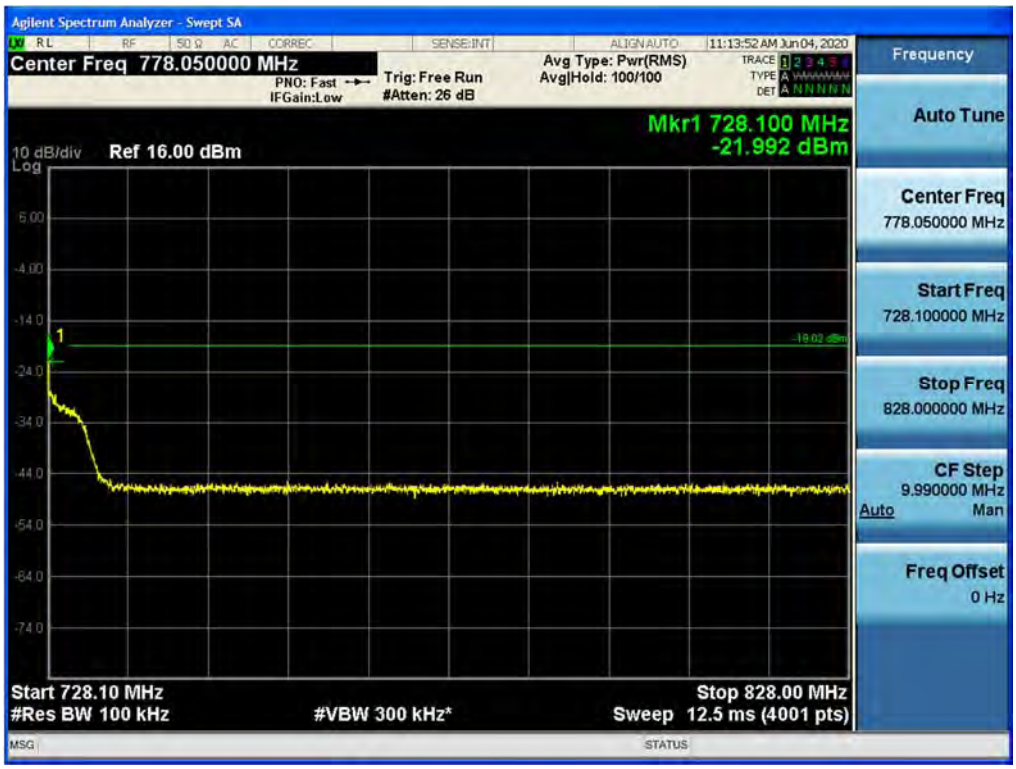


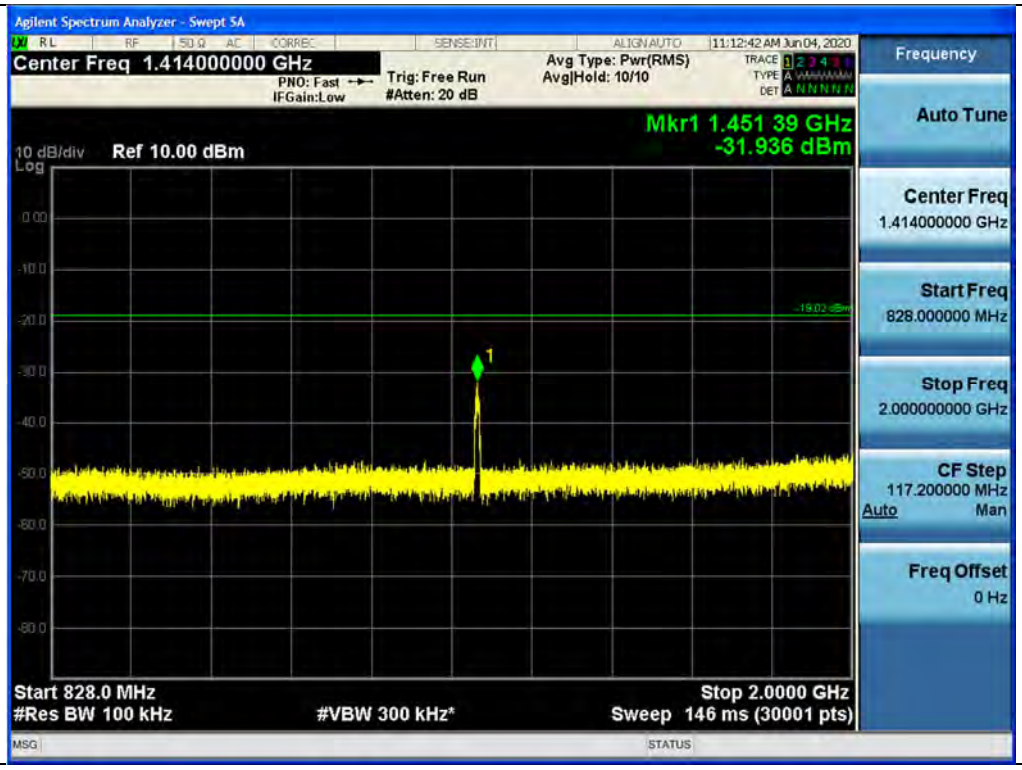
Antenna 3 / 150 kHz ~ 30 MHz / B29 LTE Band 5 MHz 1 Carrier / 64QAM / High

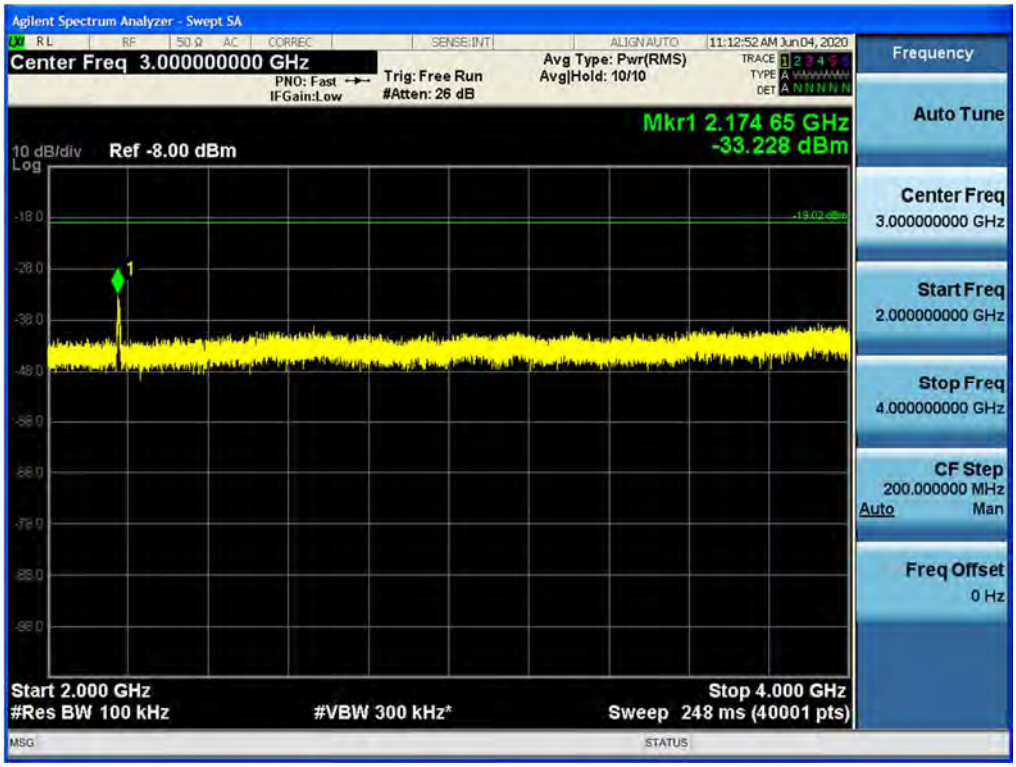


Antenna 3 / 30 MHz ~ Low Edge-100 / B29 LTE Band 5 MHz 1 Carrier / 64QAM / High


Antenna 3 / Low Edge-100 ~ Low Edge / B29 LTE Band 5 MHz 1 Carrier / 64QAM / High


Antenna 3 / High Edge ~ High Edge+100 / B29 LTE Band 5 MHz 1 Carrier / 64QAM / High


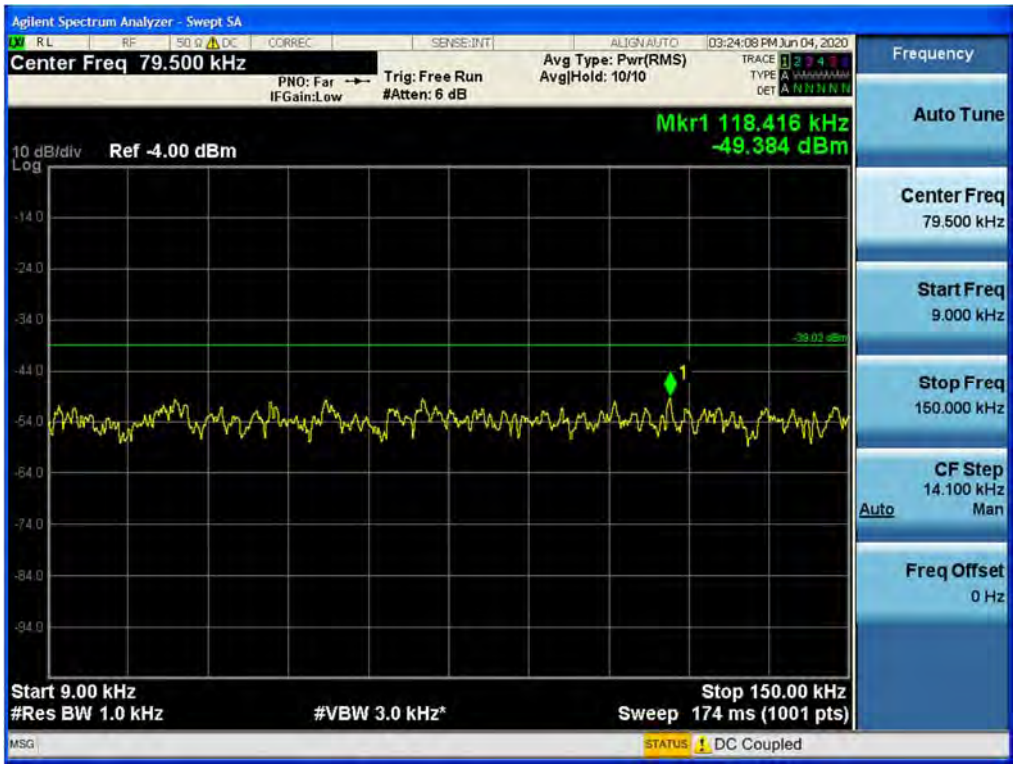
Antenna 3 / High Edge+100 ~ 2 GHz / B29 LTE Band 5 MHz 1 Carrier / 64QAM / High


Antenna 3 / 2 GHz ~ 4 GHz/ B29 LTE Band 5 MHz 1 Carrier / 64QAM / High


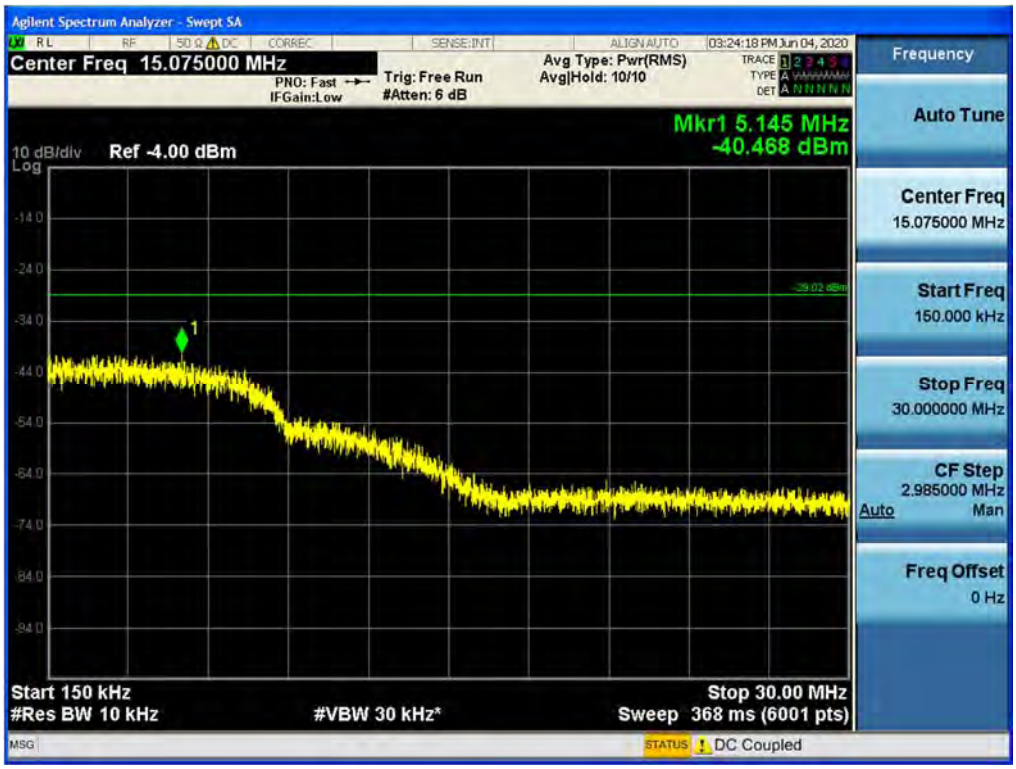
Antenna 3 / 4 GHz ~ 6 GHz/ B29 LTE Band 5 MHz 1 Carrier / 64QAM / High

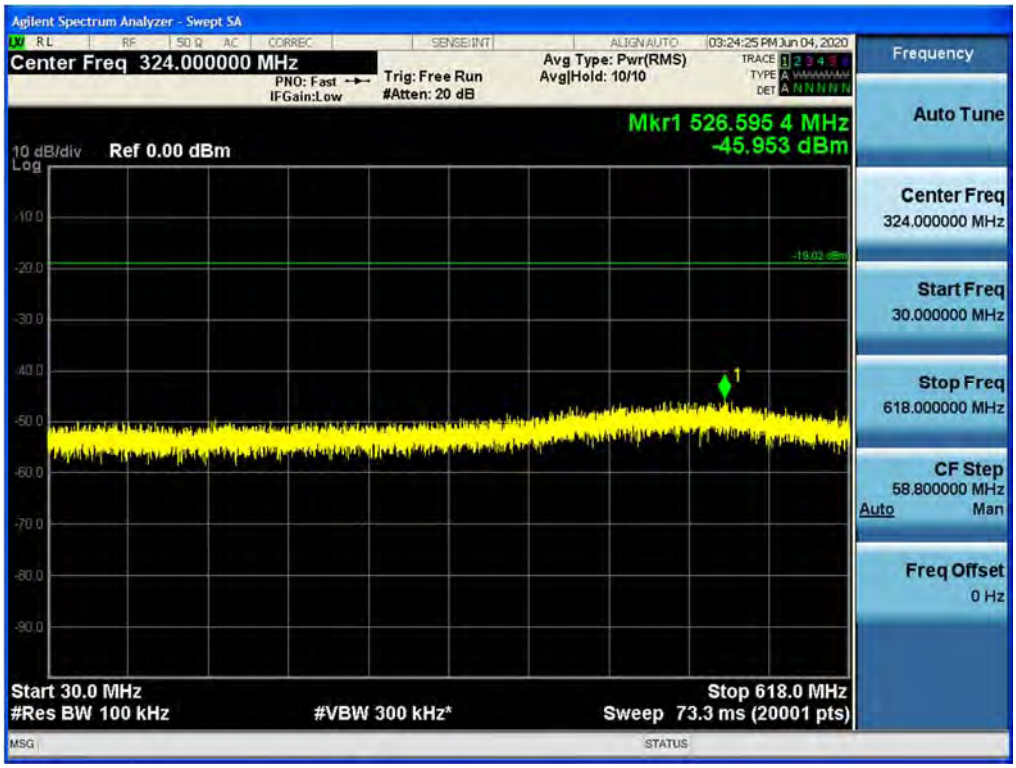

Antenna 3 / 6 GHz ~ 8 GHz/ B29 LTE Band 5 MHz 1 Carrier / 64QAM / High

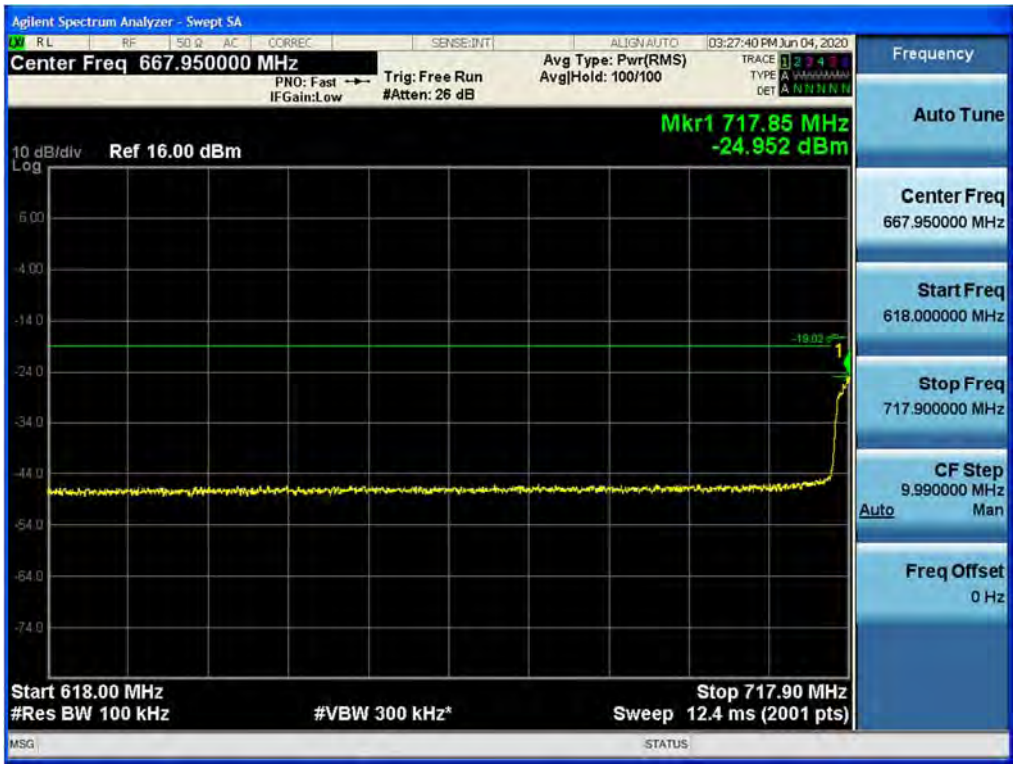

Antenna 0 / 9 kHz ~ 150 kHz / B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle

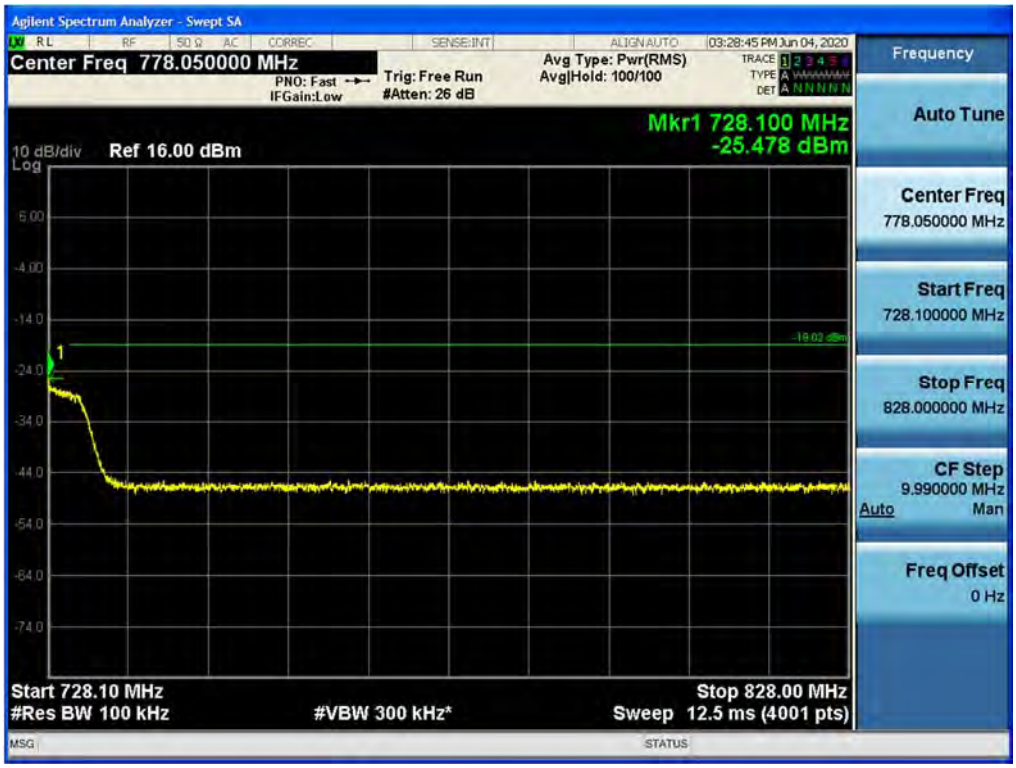


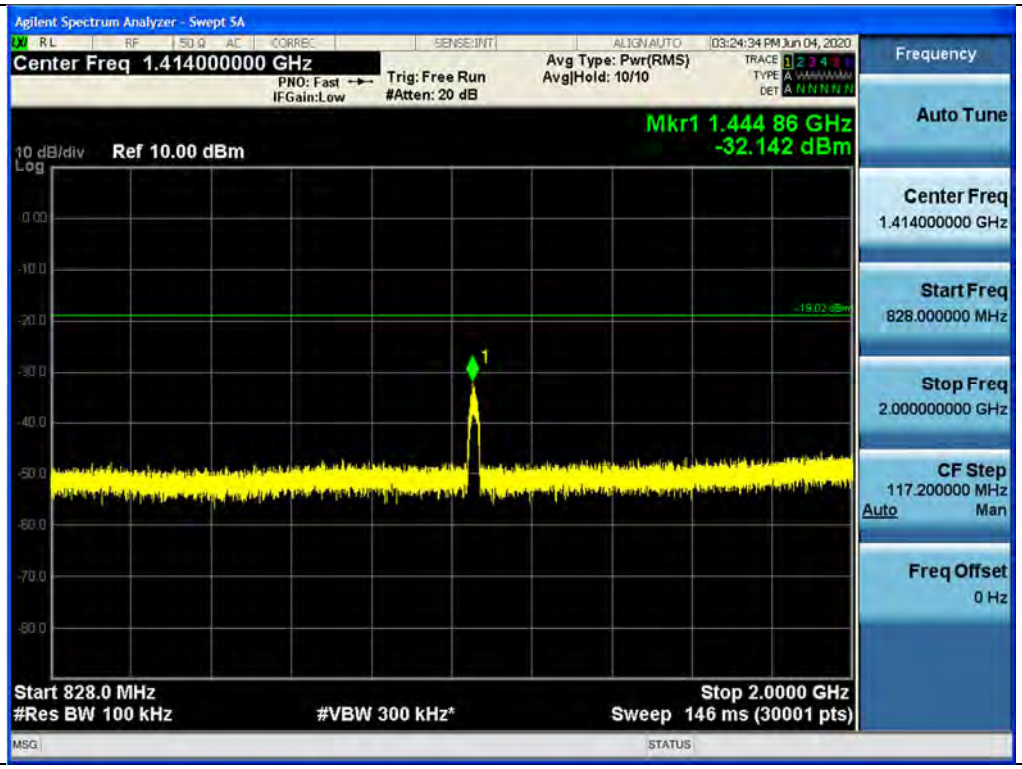
Antenna 0 / 150 kHz ~ 30 MHz / B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle

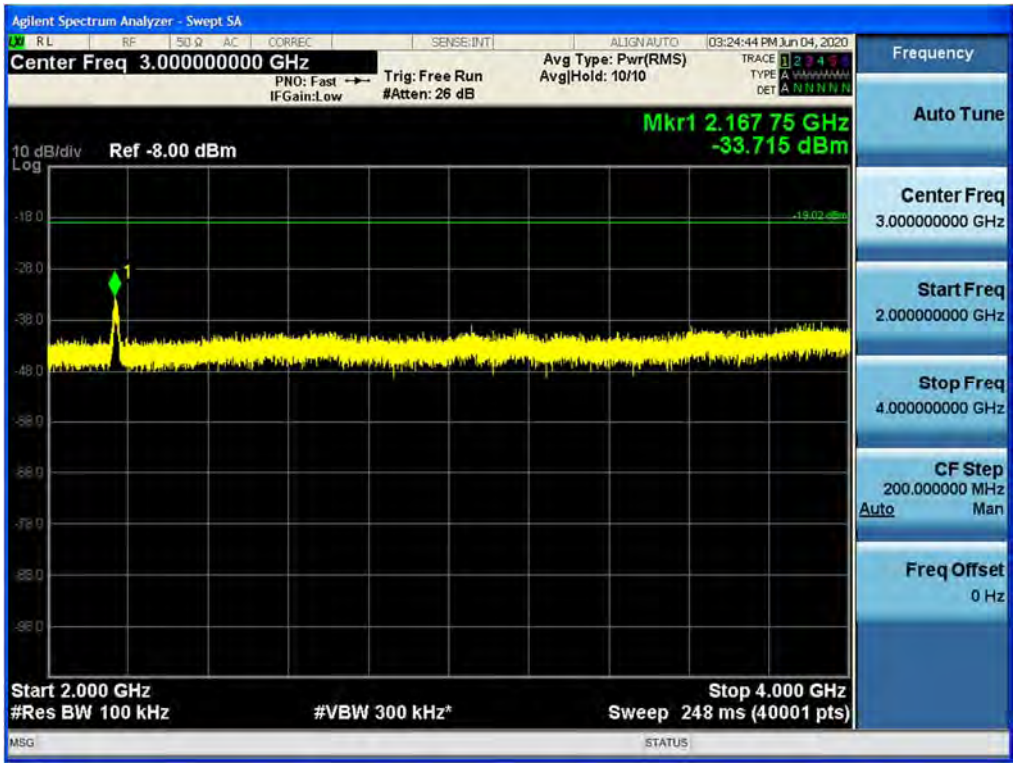


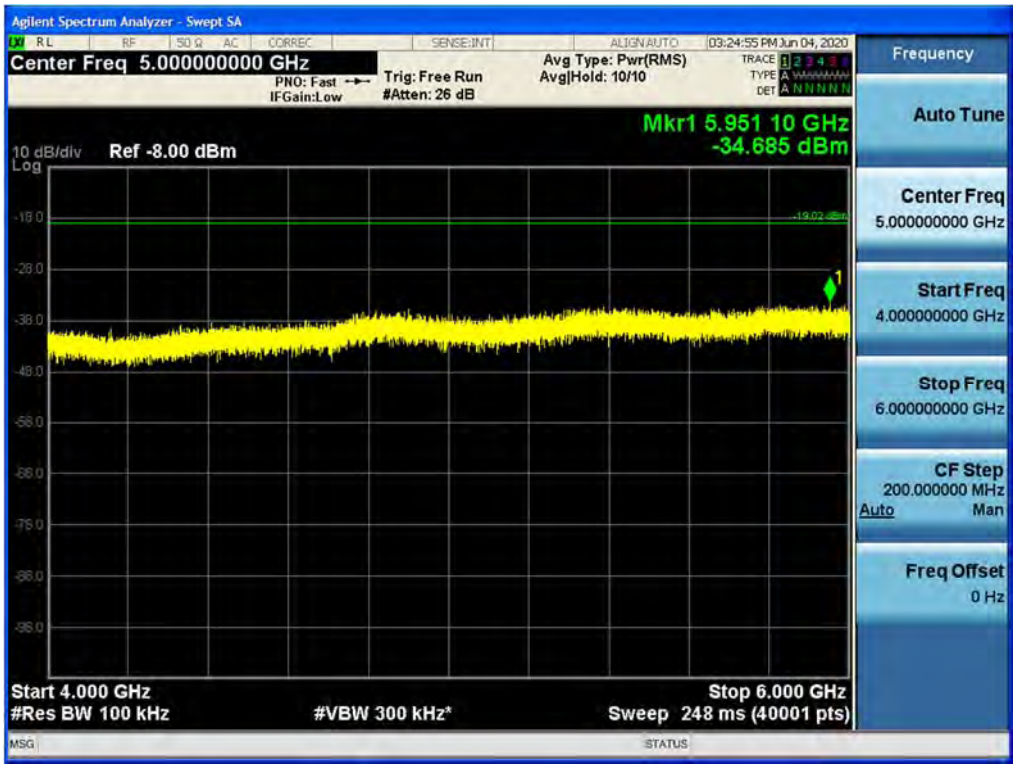
Antenna 0 / 30 MHz ~ Low Edge-100 / B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle


Antenna 0 / Low Edge-100 ~ Low Edge / B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle


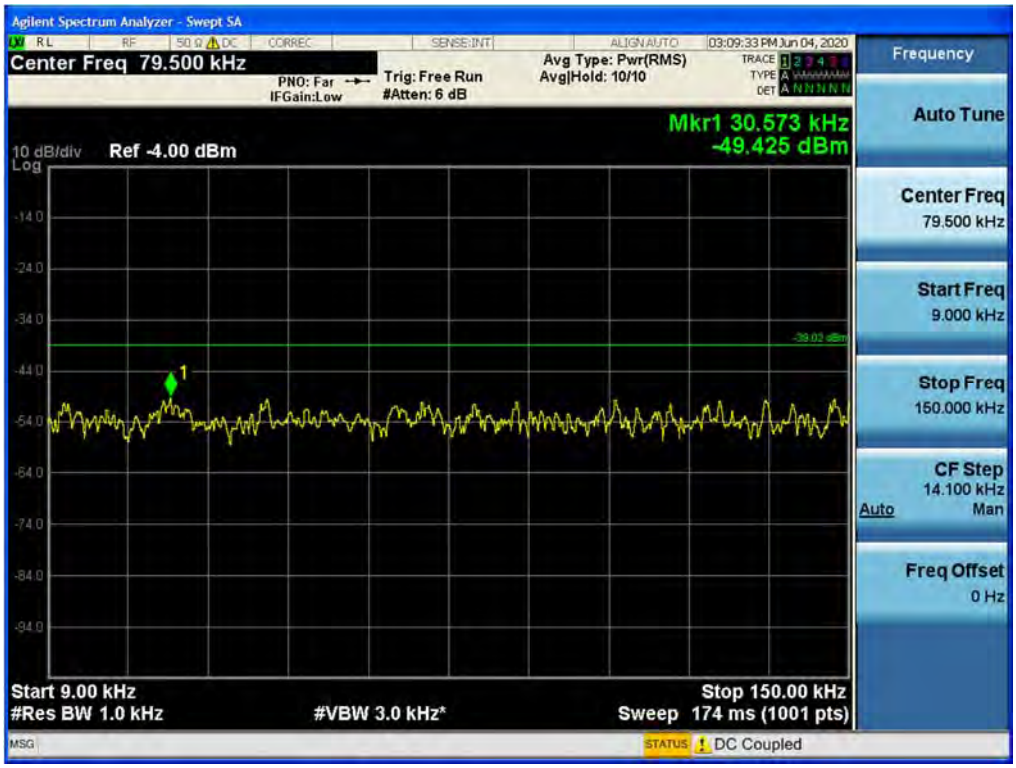
Antenna 0 / High Edge ~ High Edge+100 / B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle


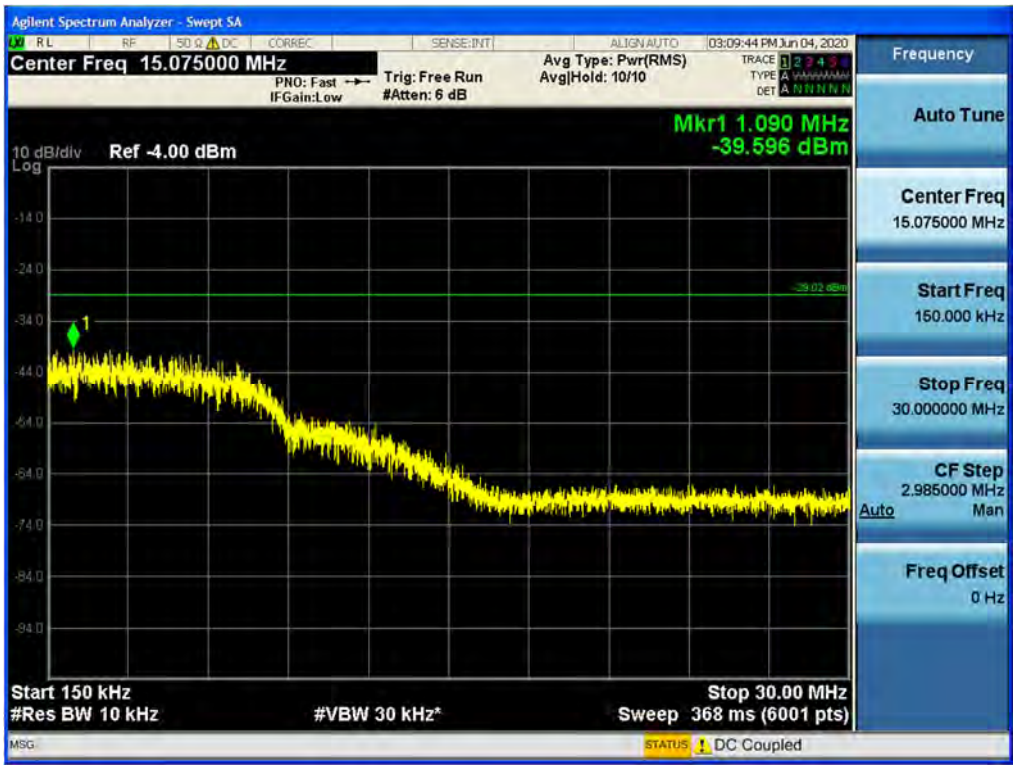
Antenna 0 / High Edge+100 ~ 2 GHz / B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle


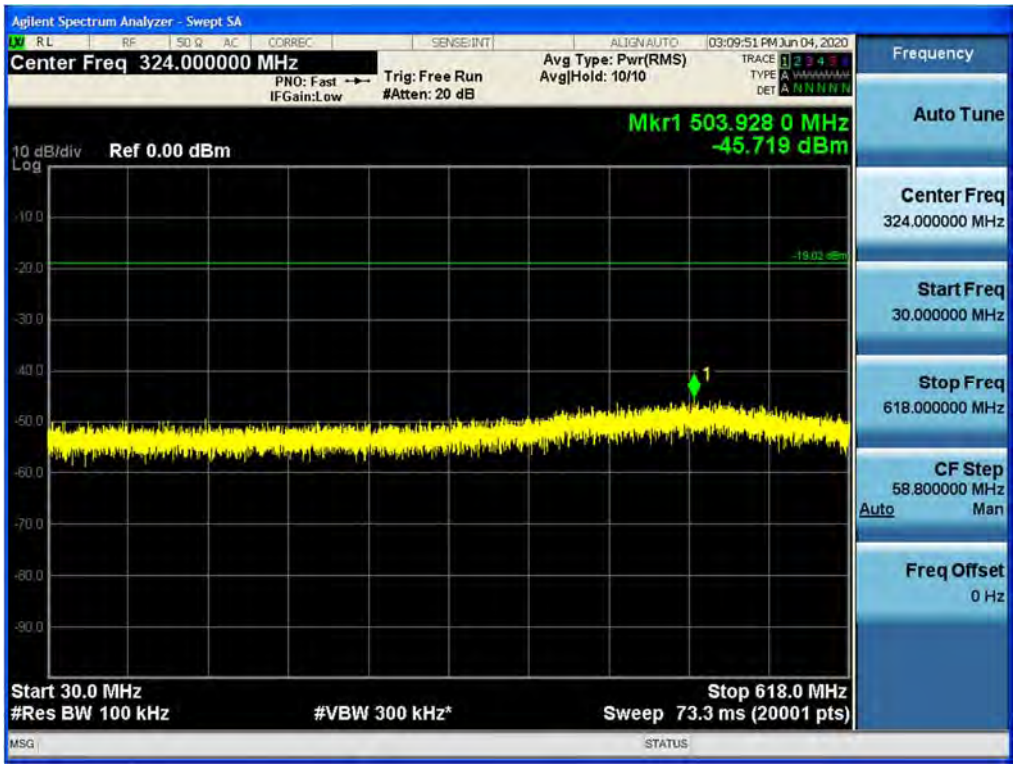
Antenna 0 / 2 GHz ~ 4 GHz/ B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle


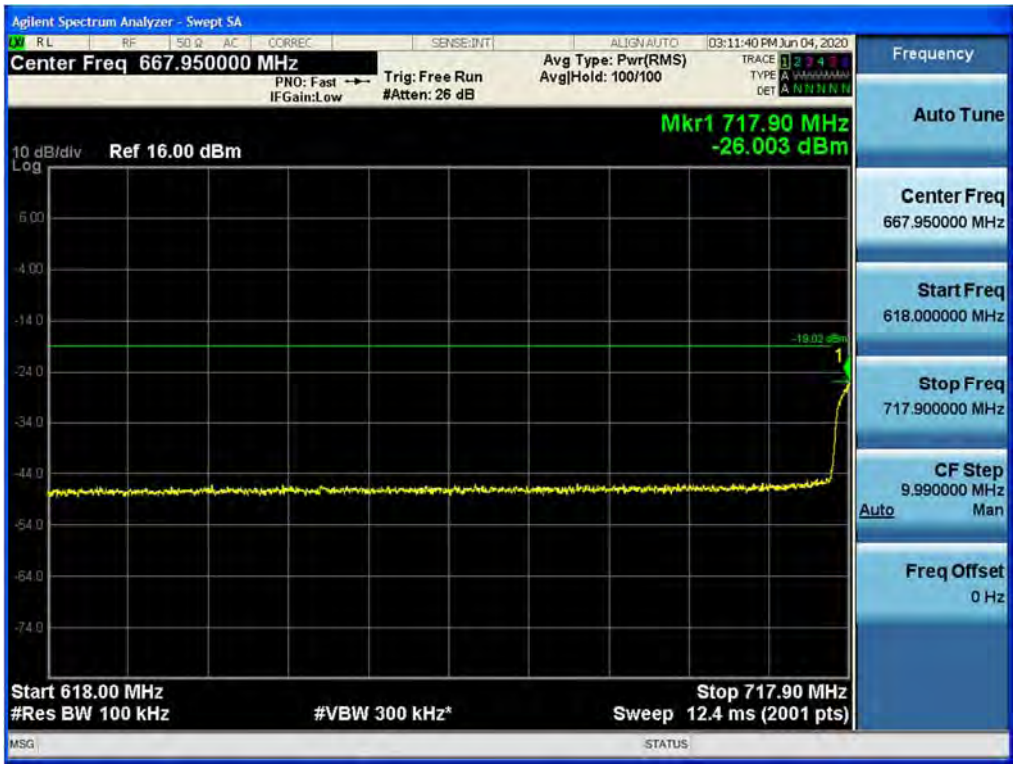
Antenna 0 / 4 GHz ~ 6 GHz/ B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle


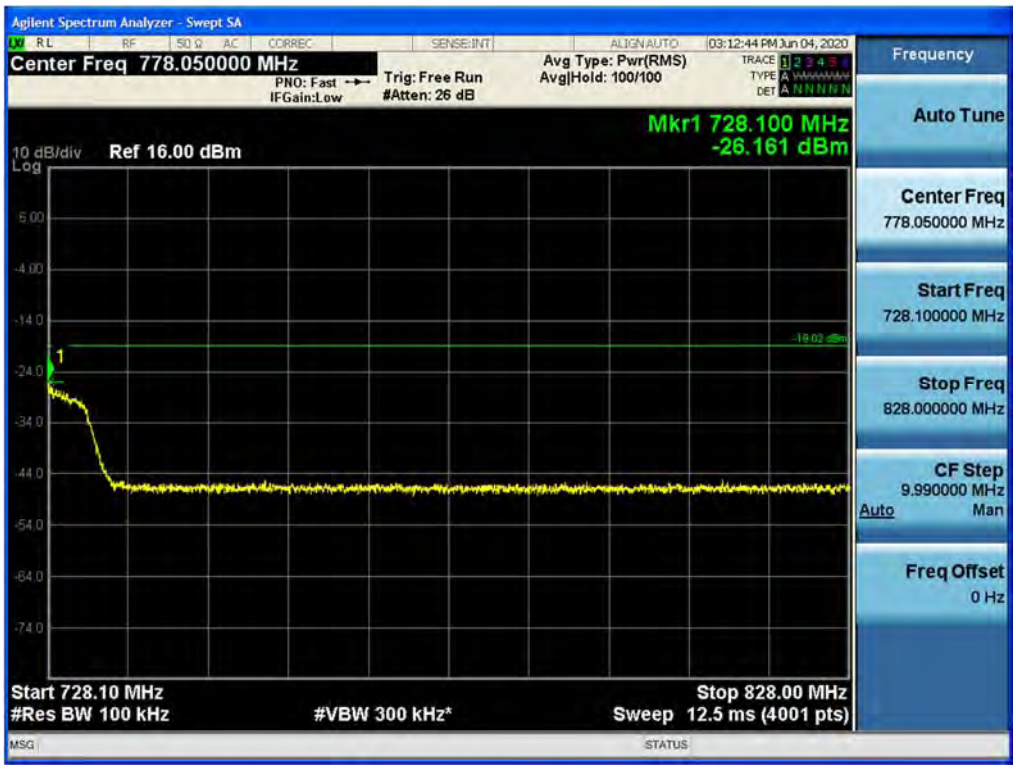
Antenna 0 / 6 GHz ~ 8 GHz/ B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle

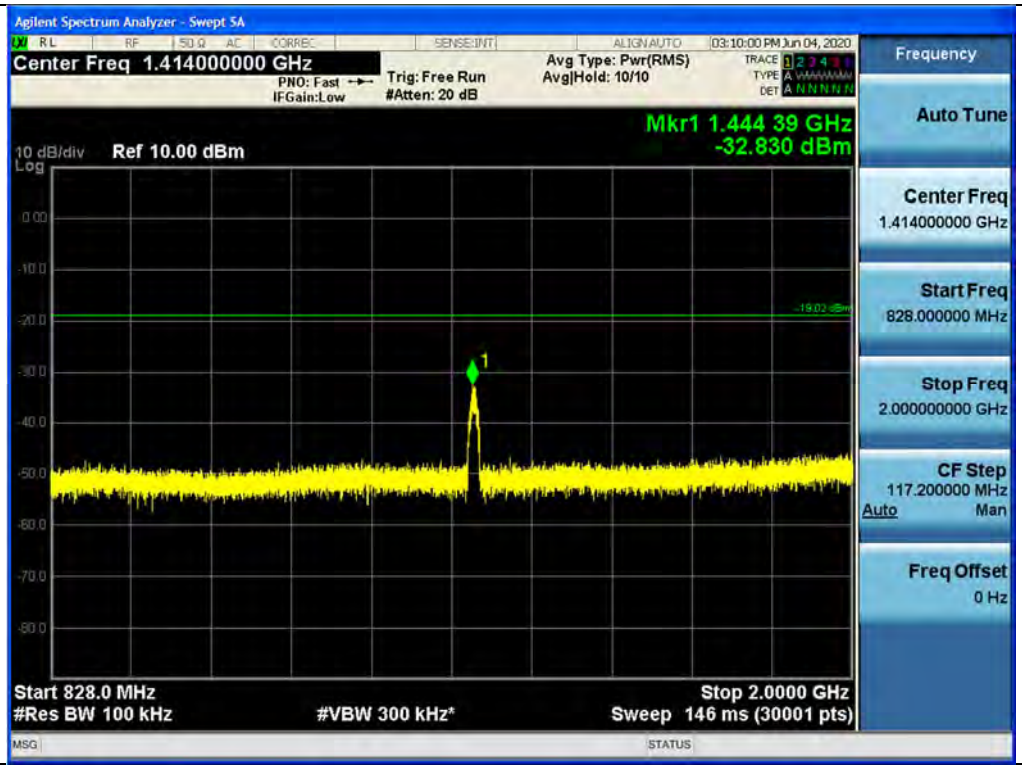

Antenna 1 / 9 kHz ~ 150 kHz / B29 LTE Band 10 MHz 1 Carrier / 256QAM / Middle


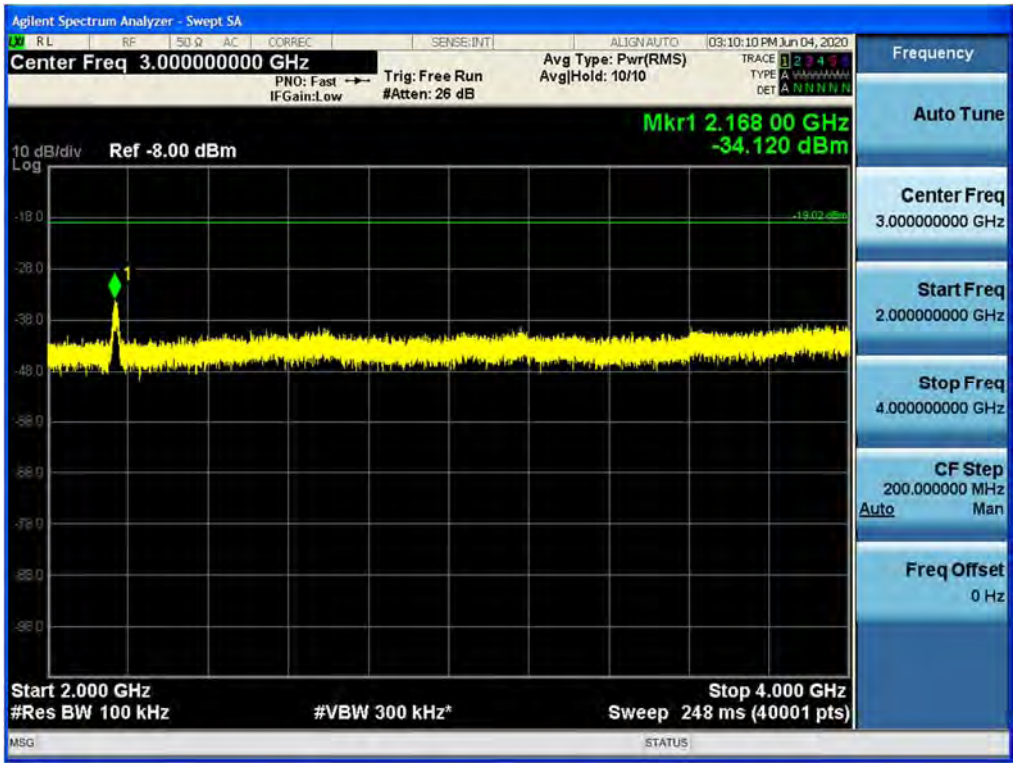
Antenna 1 / 150 kHz ~ 30 MHz / B29 LTE Band 10 MHz 1 Carrier / 256QAM / Middle


Antenna 1 / 30 MHz ~ Low Edge-100 / B29 LTE Band 10 MHz 1 Carrier / 256QAM / Middle


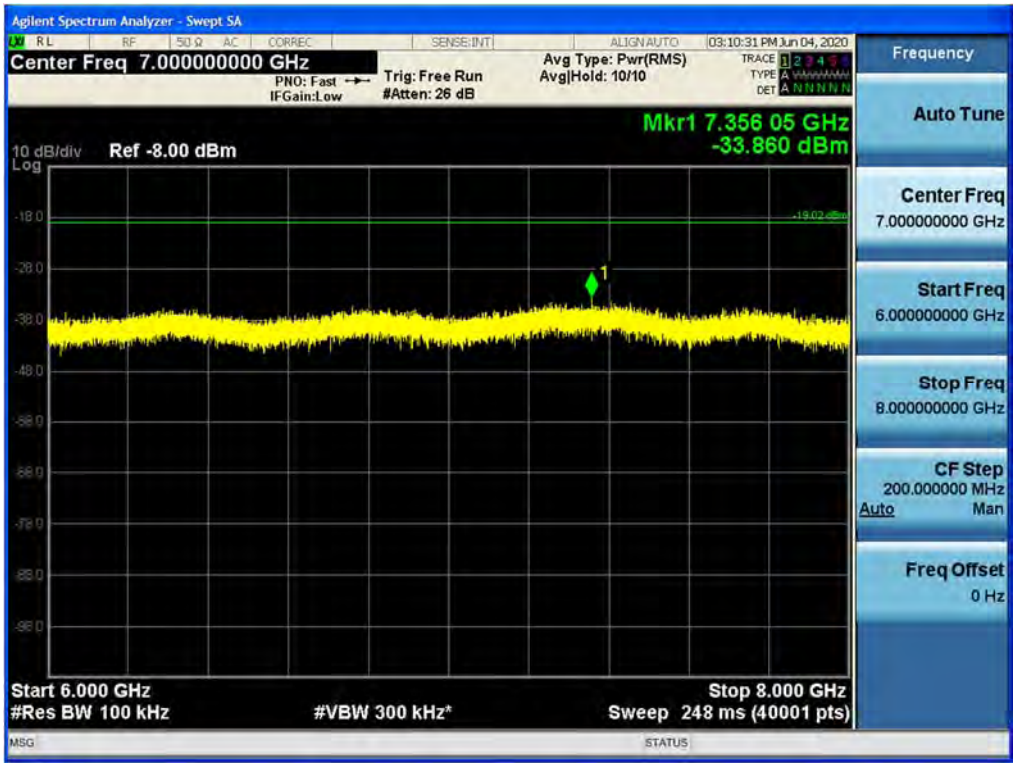
Antenna 1 / Low Edge-100 ~ Low Edge / B29 LTE Band 10 MHz 1 Carrier / 256QAM / Middle


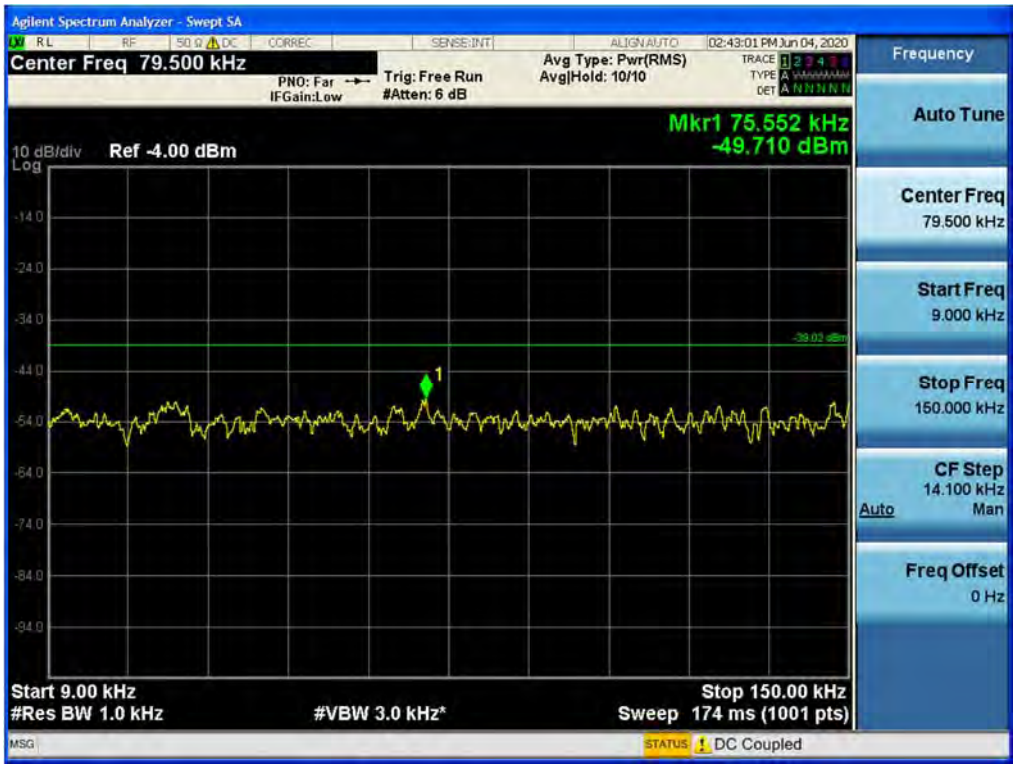
Antenna 1 / High Edge ~ High Edge+100 / B29 LTE Band 10 MHz 1 Carrier / 256QAM / Middle


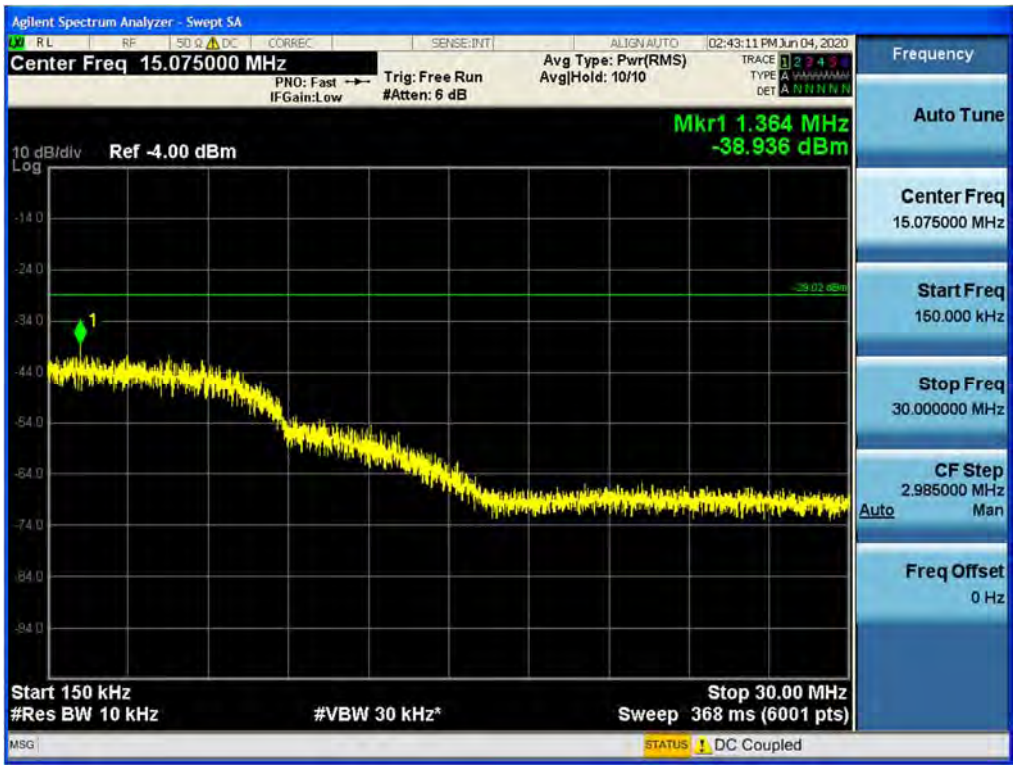
Antenna 1 / High Edge+100 ~ 2 GHz / B29 LTE Band 10 MHz 1 Carrier / 256QAM / Middle


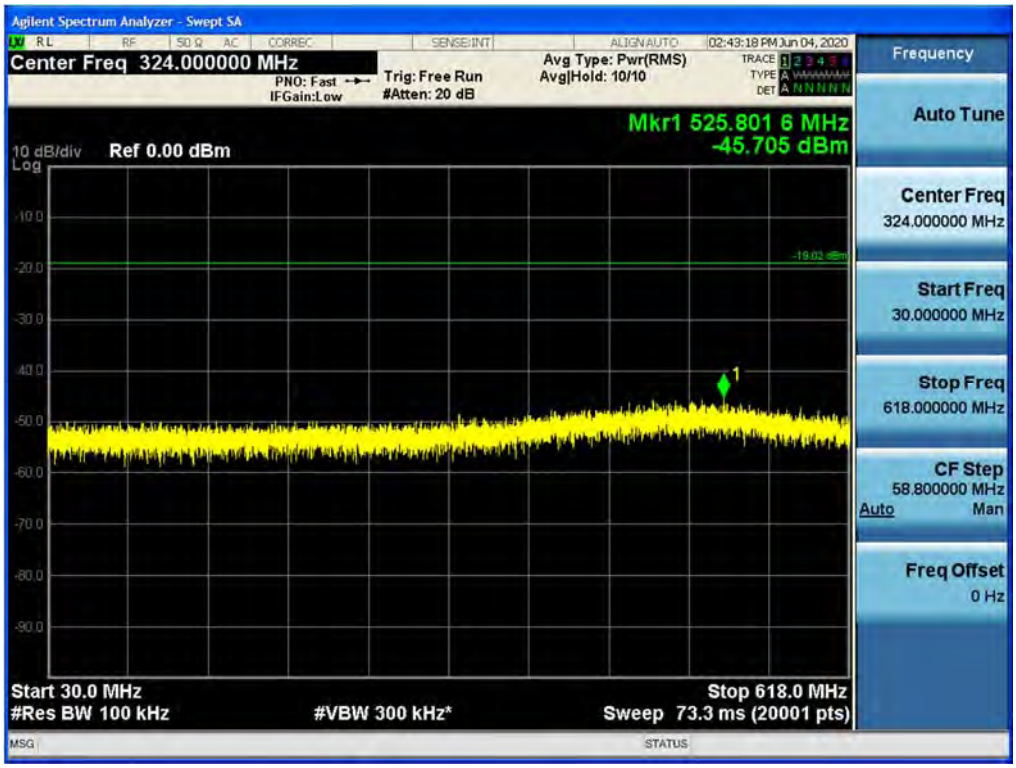
Antenna 1 / 2 GHz ~ 4 GHz/ B29 LTE Band 10 MHz 1 Carrier / 256QAM / Middle


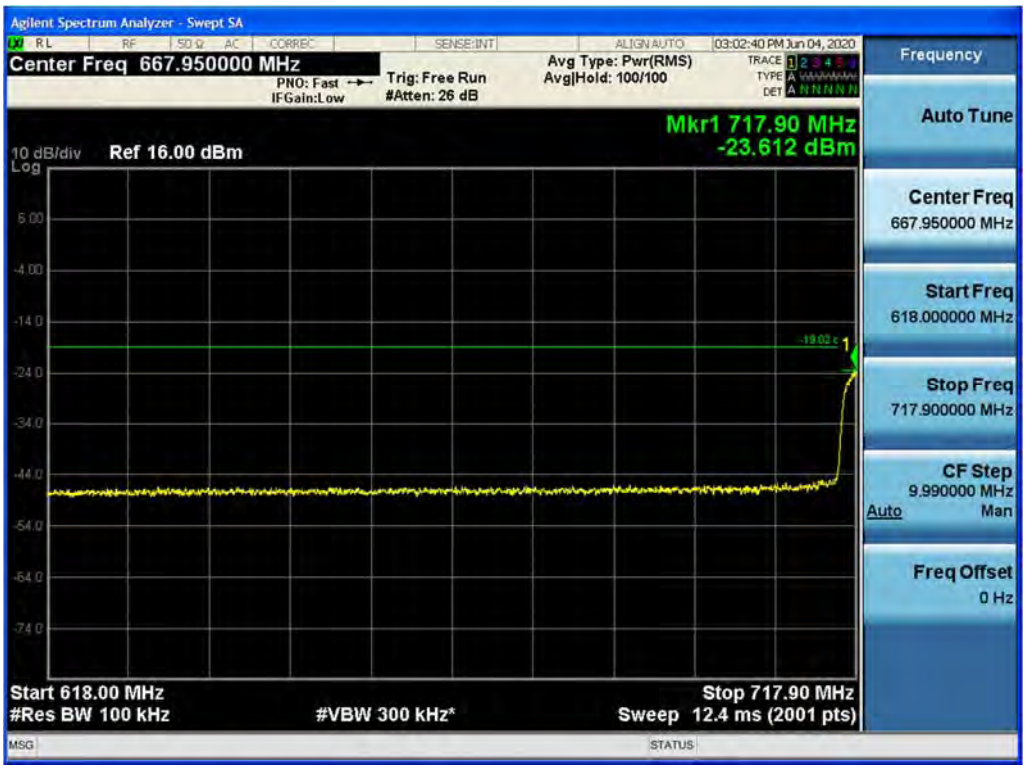
Antenna 1 / 4 GHz ~ 6 GHz/ B29 LTE Band 10 MHz 1 Carrier / 256QAM / Middle

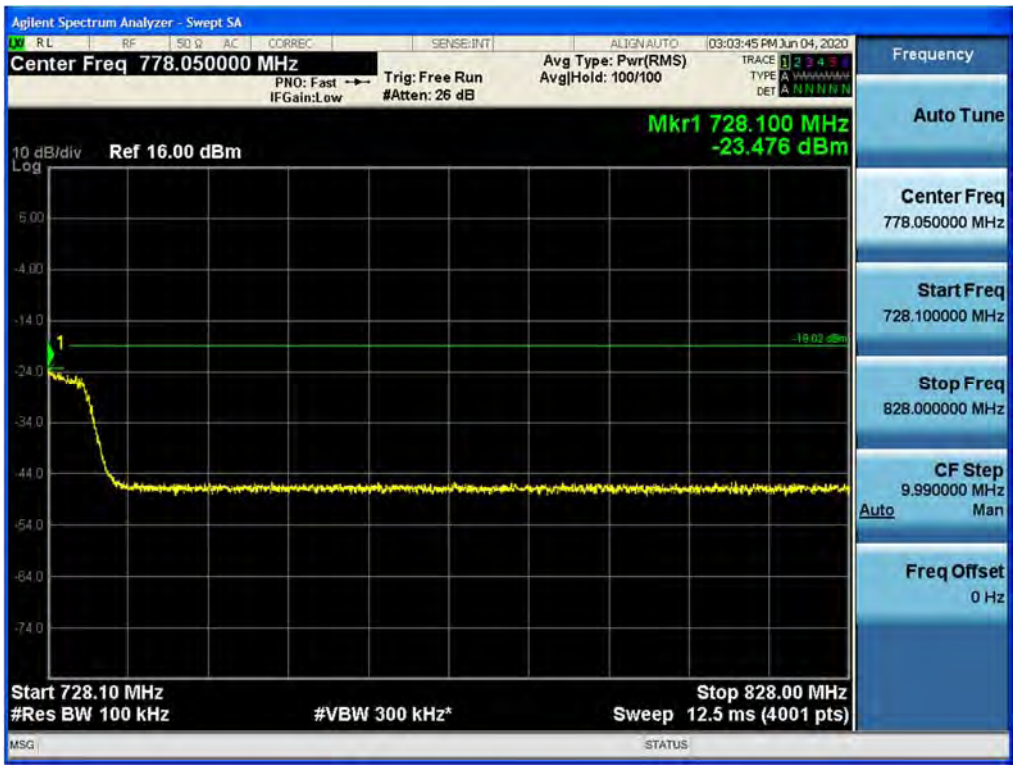

Antenna 1 / 6 GHz ~ 8 GHz/ B29 LTE Band 10 MHz 1 Carrier / 256QAM / Middle


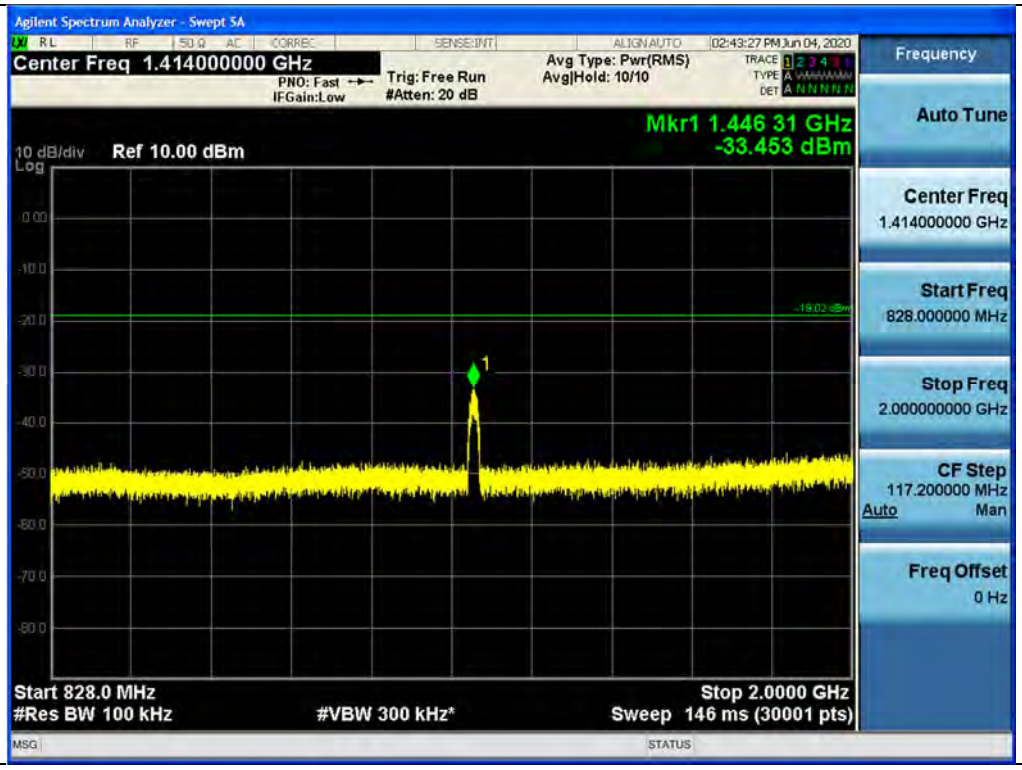
Antenna 2 / 9 kHz ~ 150 kHz / B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle


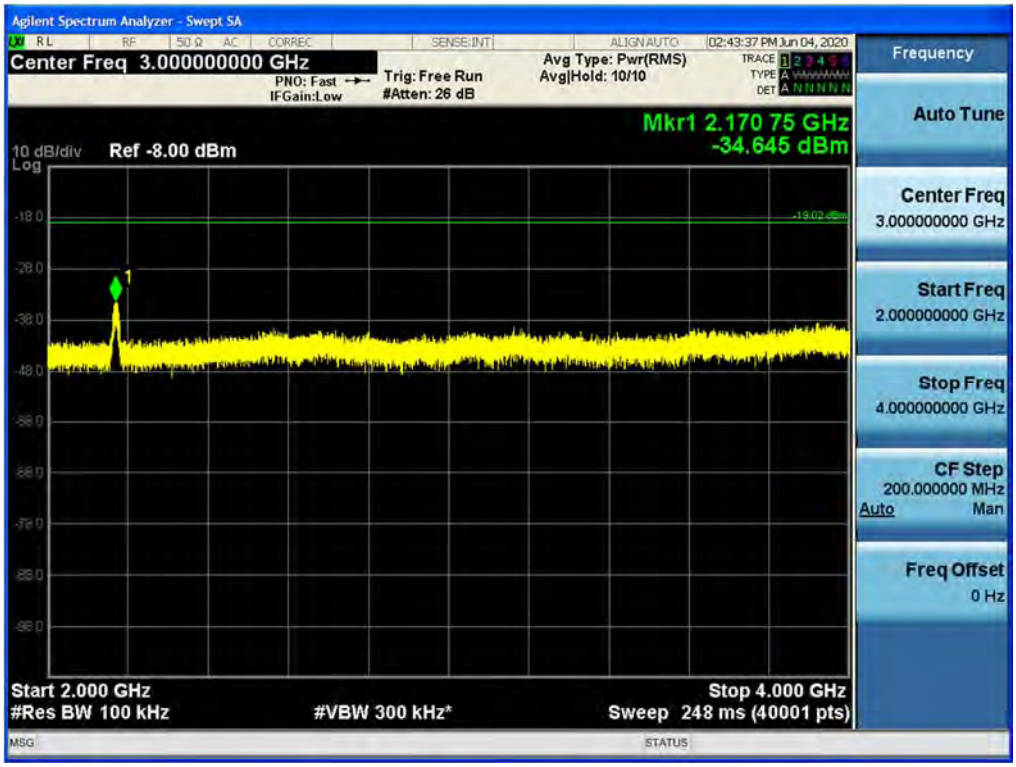
Antenna 2 / 150 kHz ~ 30 MHz / B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle


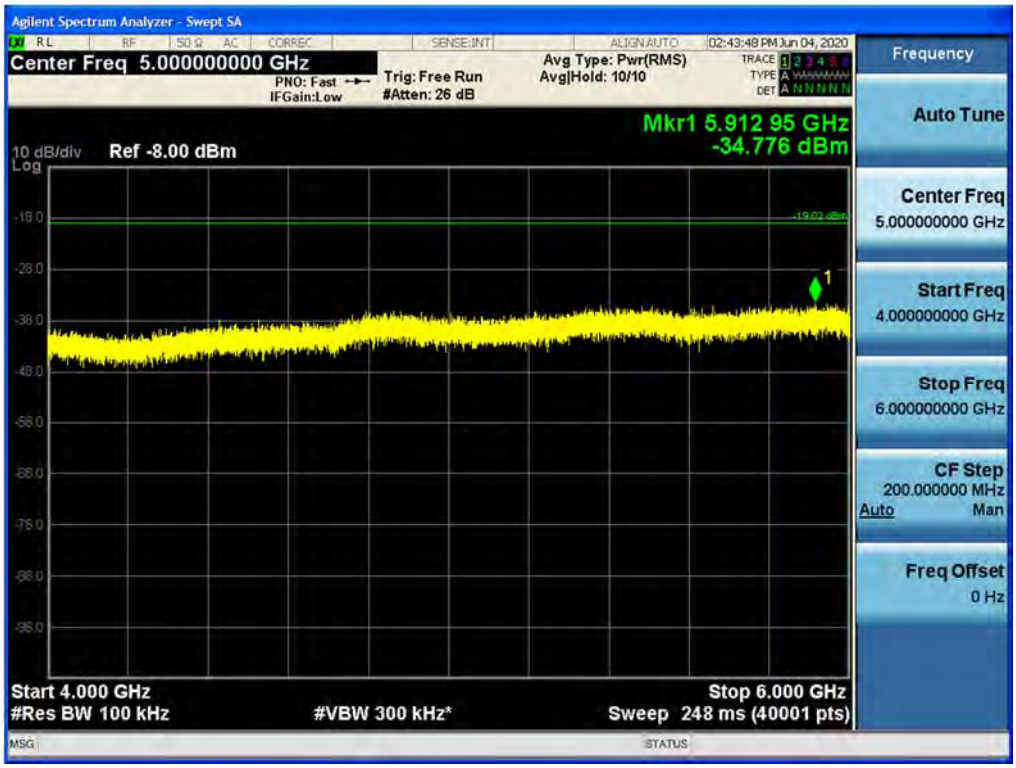
Antenna 2 / 30 MHz ~ Low Edge-100 / B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle


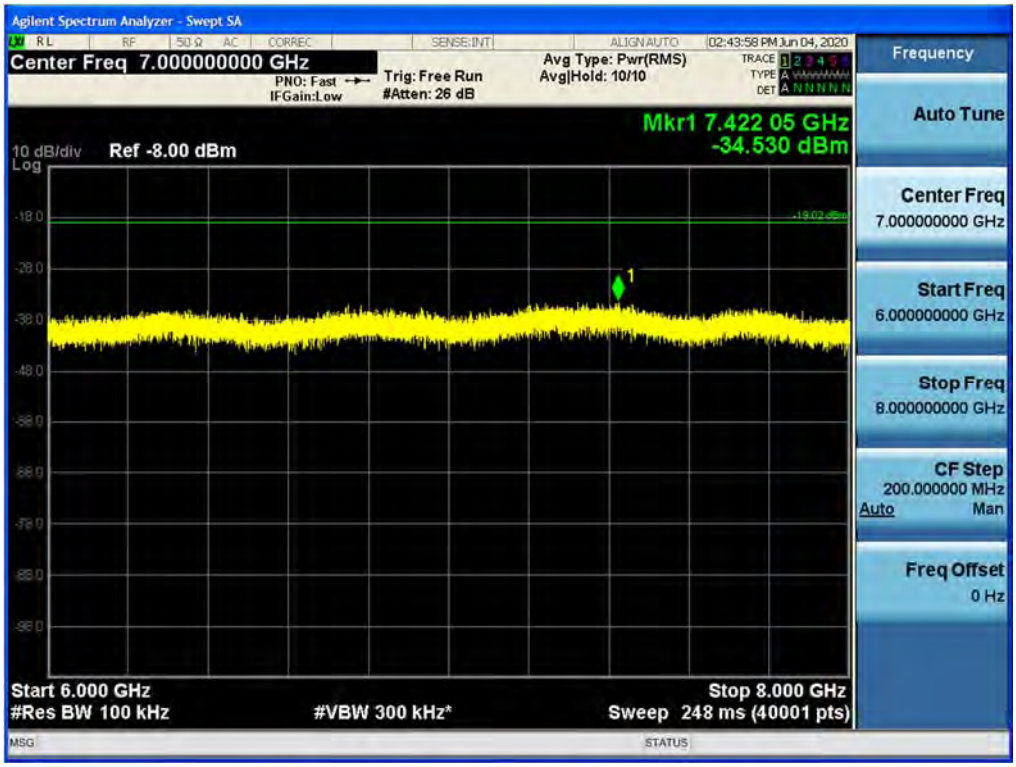
Antenna 2 / Low Edge-100 ~ Low Edge / B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle


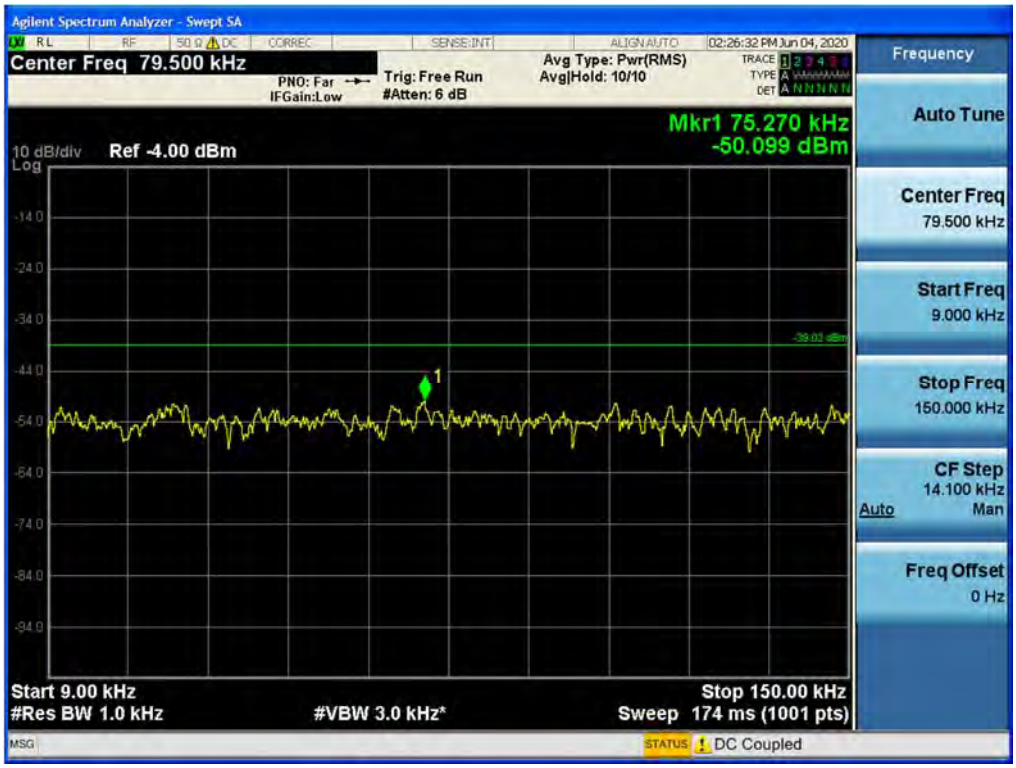
Antenna 2 / High Edge ~ High Edge+100 / B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle


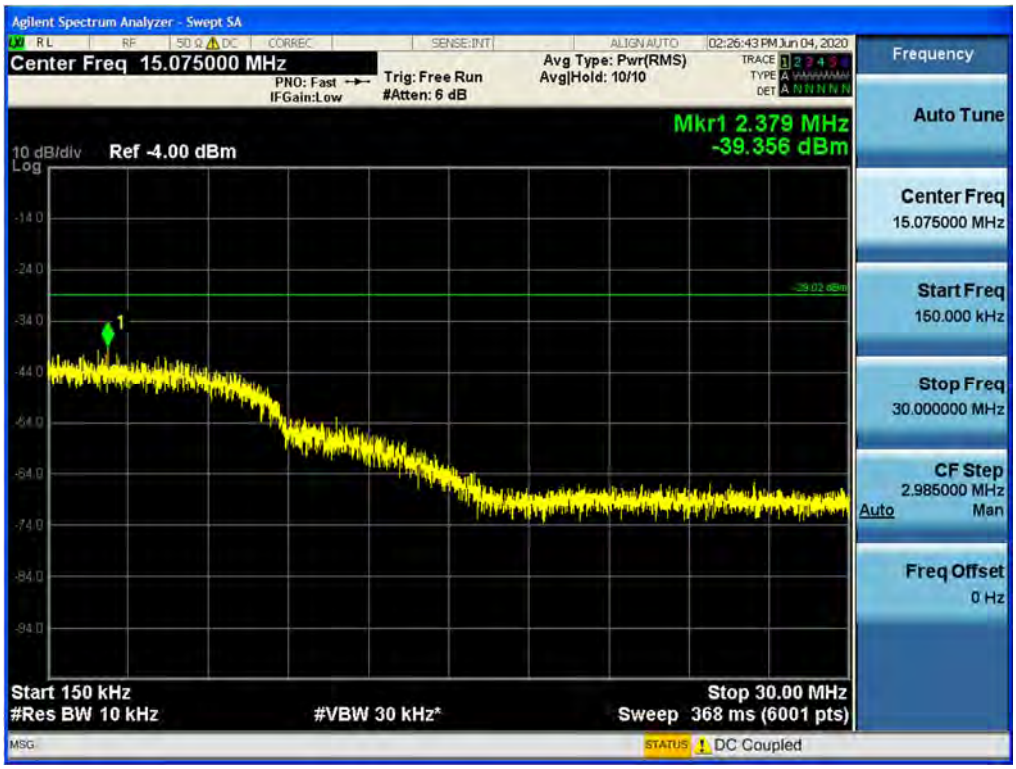
Antenna 2 / High Edge+100 ~ 2 GHz / B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle


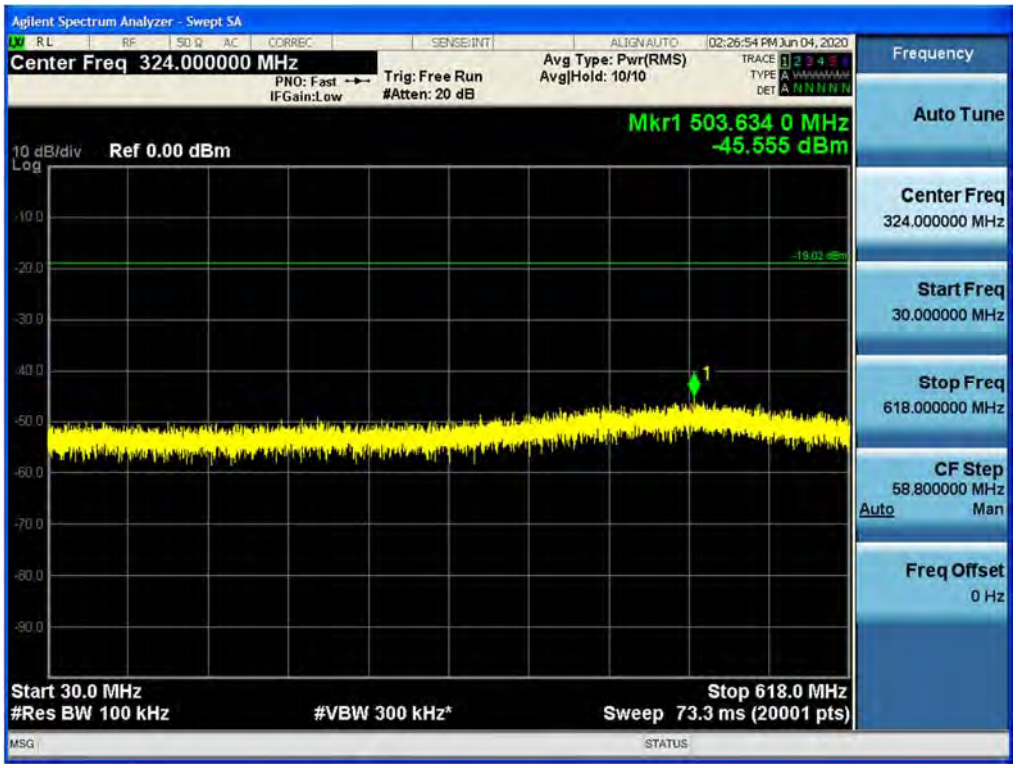
Antenna 2 / 2 GHz ~ 4 GHz/ B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle


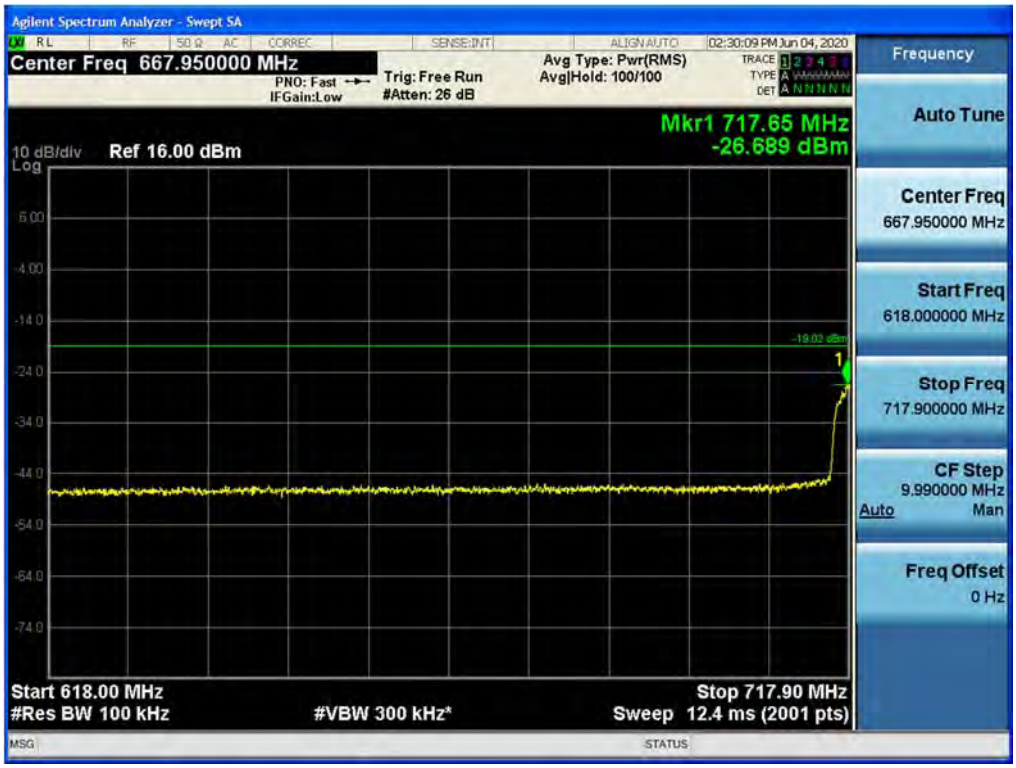
Antenna 2 / 4 GHz ~ 6 GHz/ B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle


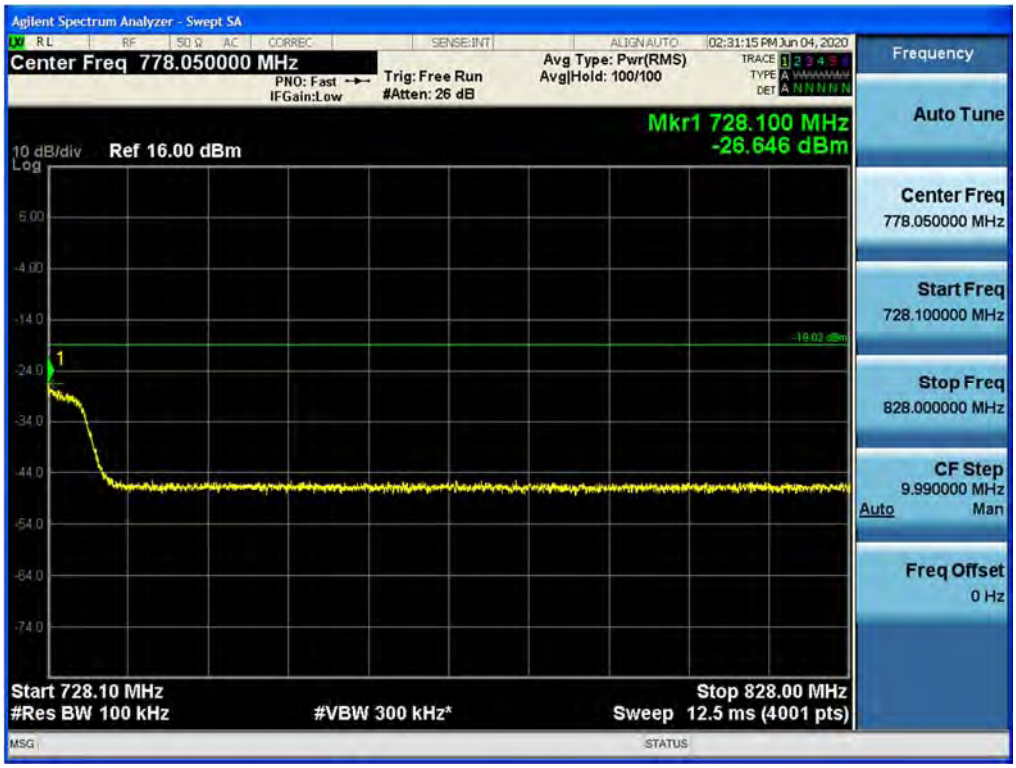
Antenna 2 / 6 GHz ~ 8 GHz/ B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle


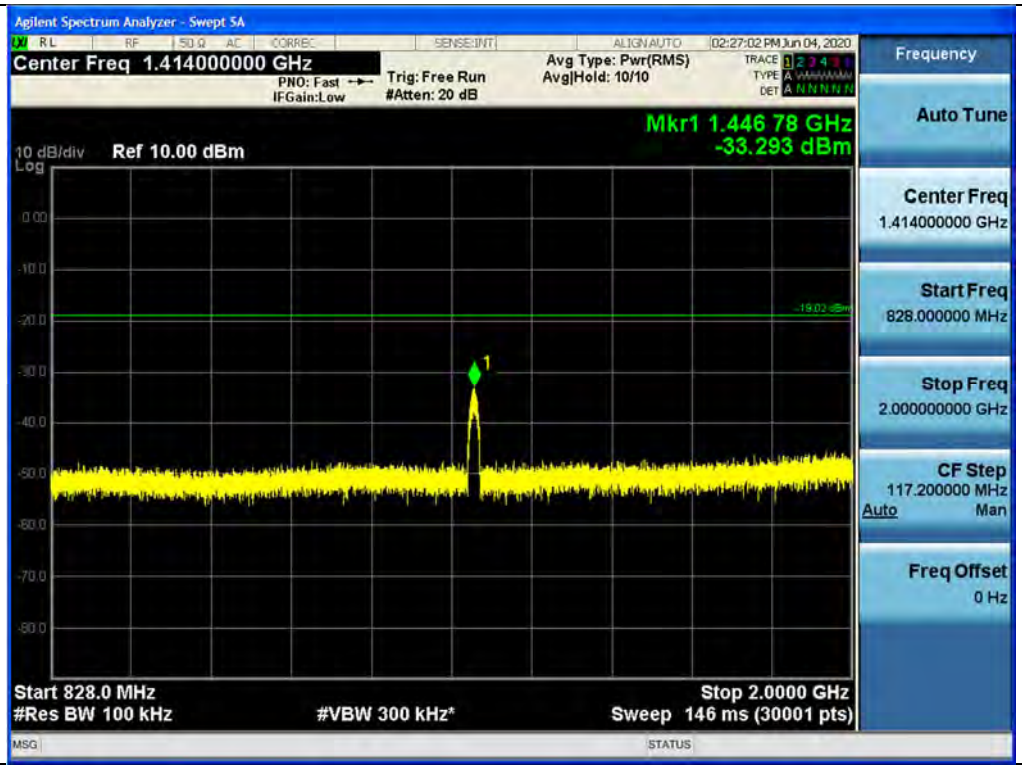
Antenna 3 / 9 kHz ~ 150 kHz / B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle


Antenna 3 / 150 kHz ~ 30 MHz / B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle


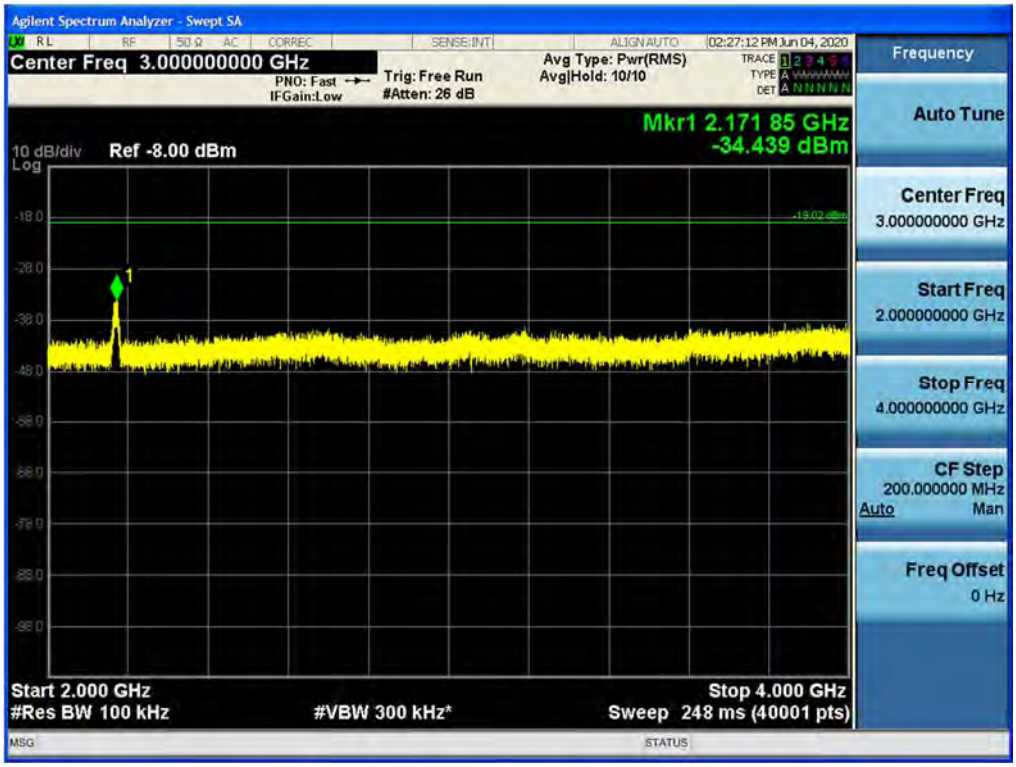
Antenna 3 / 30 MHz ~ Low Edge-100 / B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle


Antenna 3 / Low Edge-100 ~ Low Edge / B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle


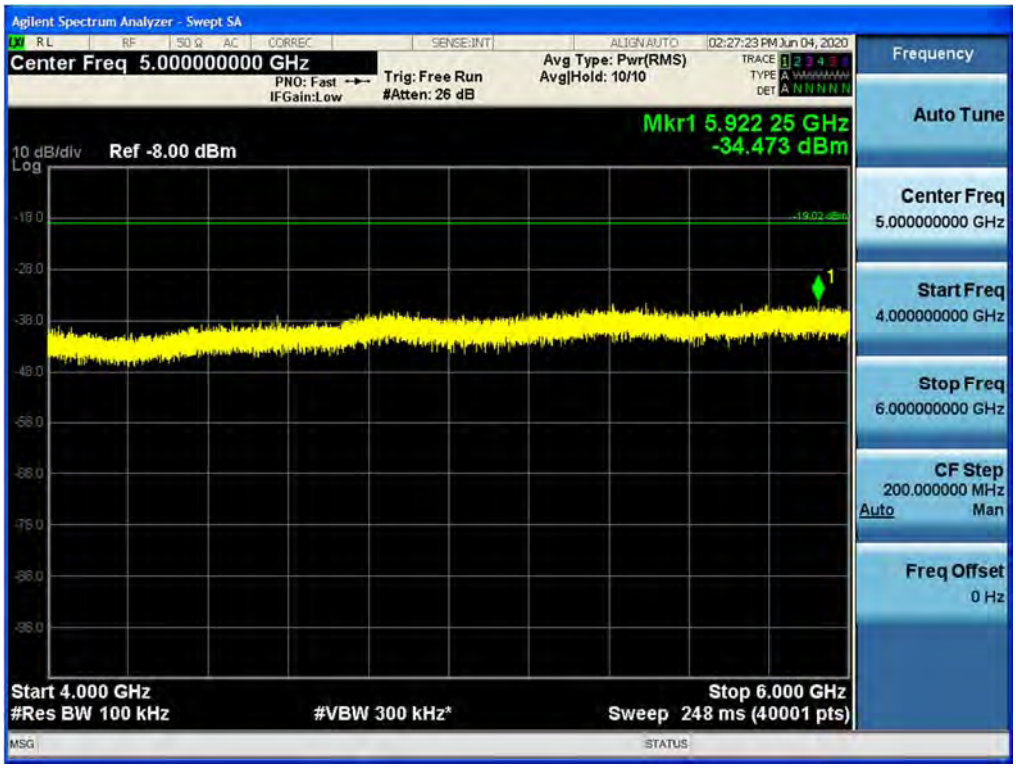
Antenna 3 / High Edge ~ High Edge+100 / B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle


Antenna 3 / High Edge+100 ~ 2 GHz / B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle


Antenna 3 / 2 GHz ~ 4 GHz/ B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle

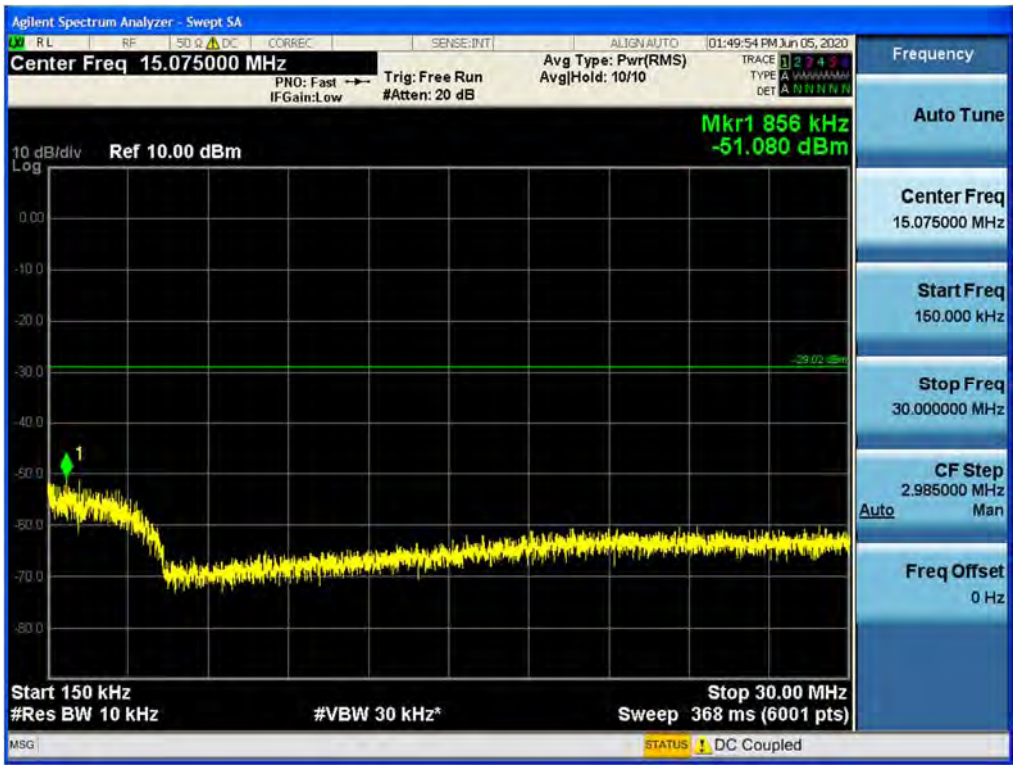


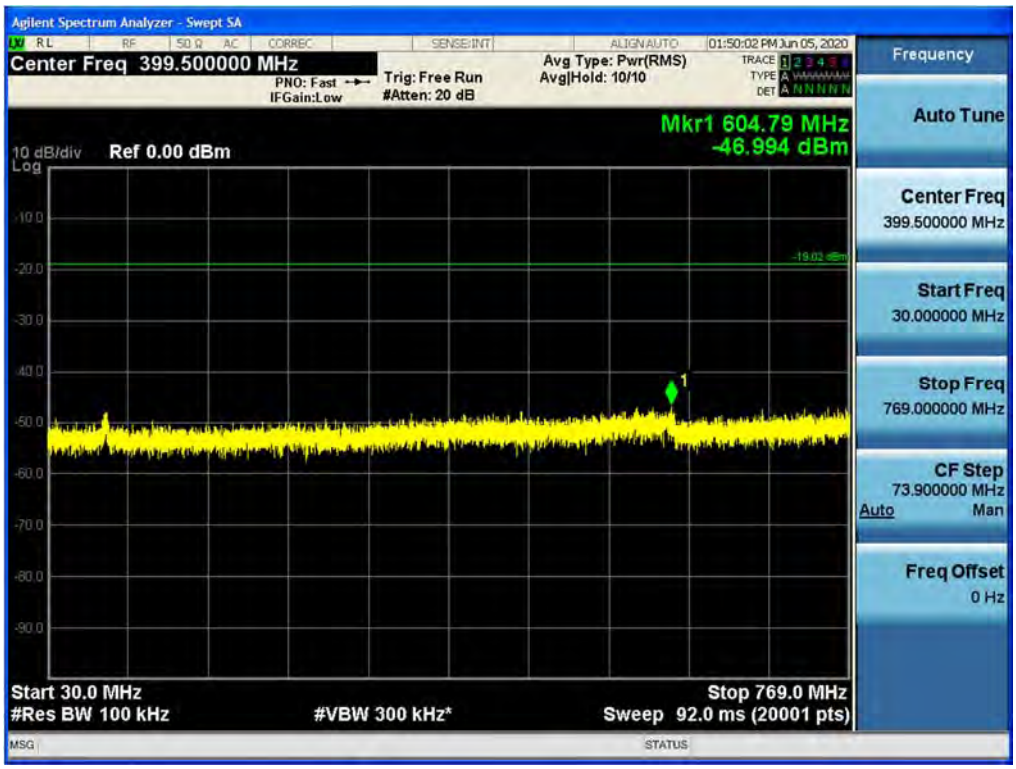
Antenna 3 / 4 GHz ~ 6 GHz/ B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle

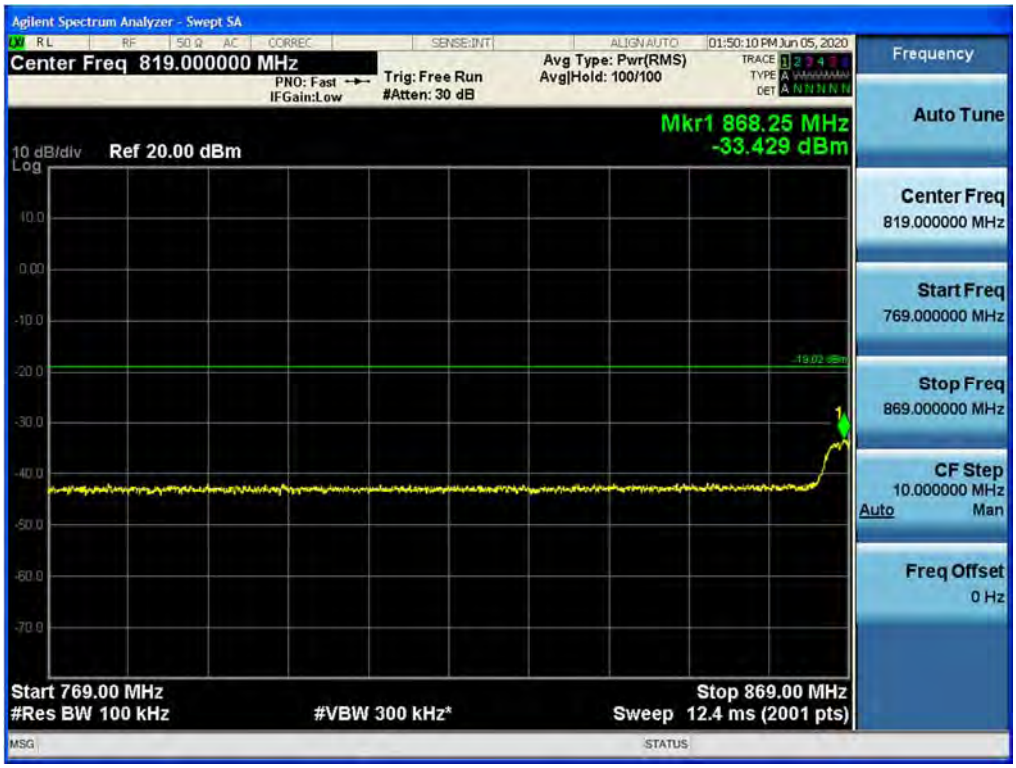


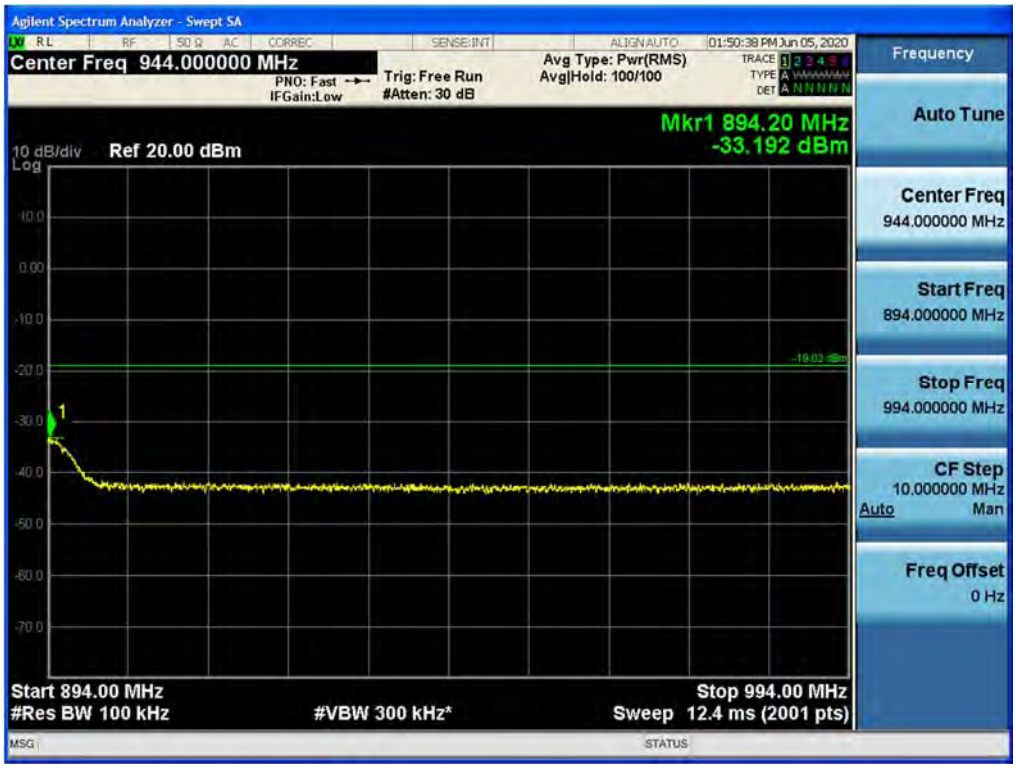
Antenna 3 / 6 GHz ~ 8 GHz/ B29 LTE Band 10 MHz 1 Carrier / 64QAM / Middle


Antenna 0 / 9 kHz ~ 150 kHz / 5G NR Band 5 MHz 1 Carrier / 64QAM / Middle

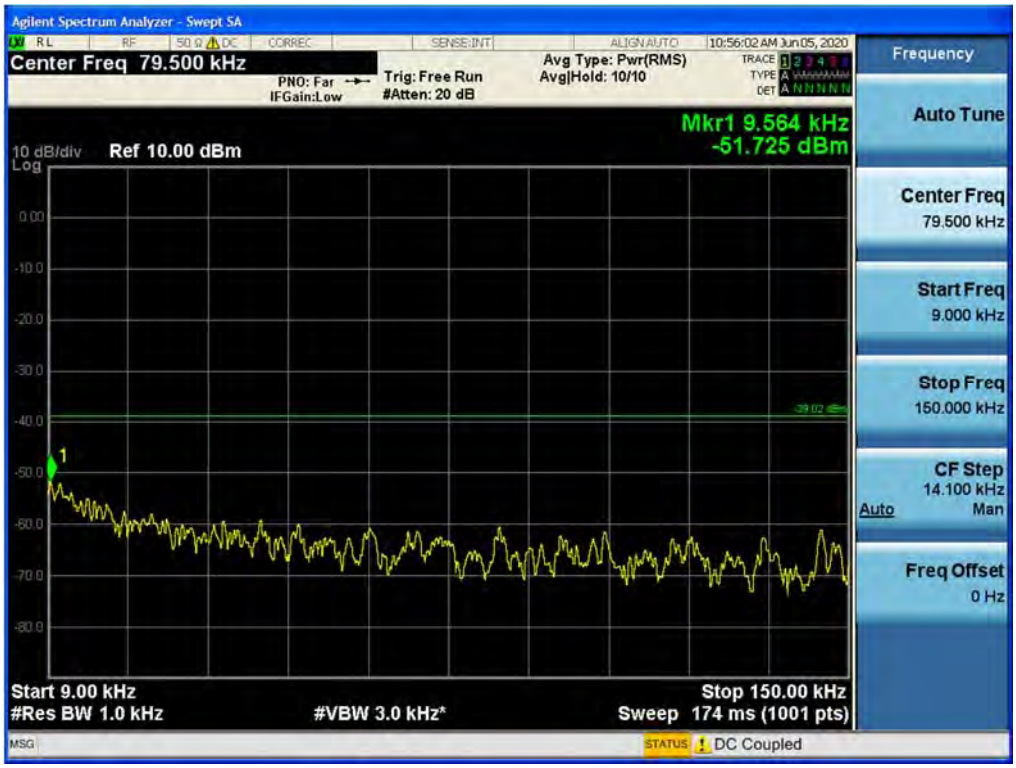

Antenna 0 / 150 kHz ~ 30 MHz / 5G NR Band 5 MHz 1 Carrier / 64QAM / Middle


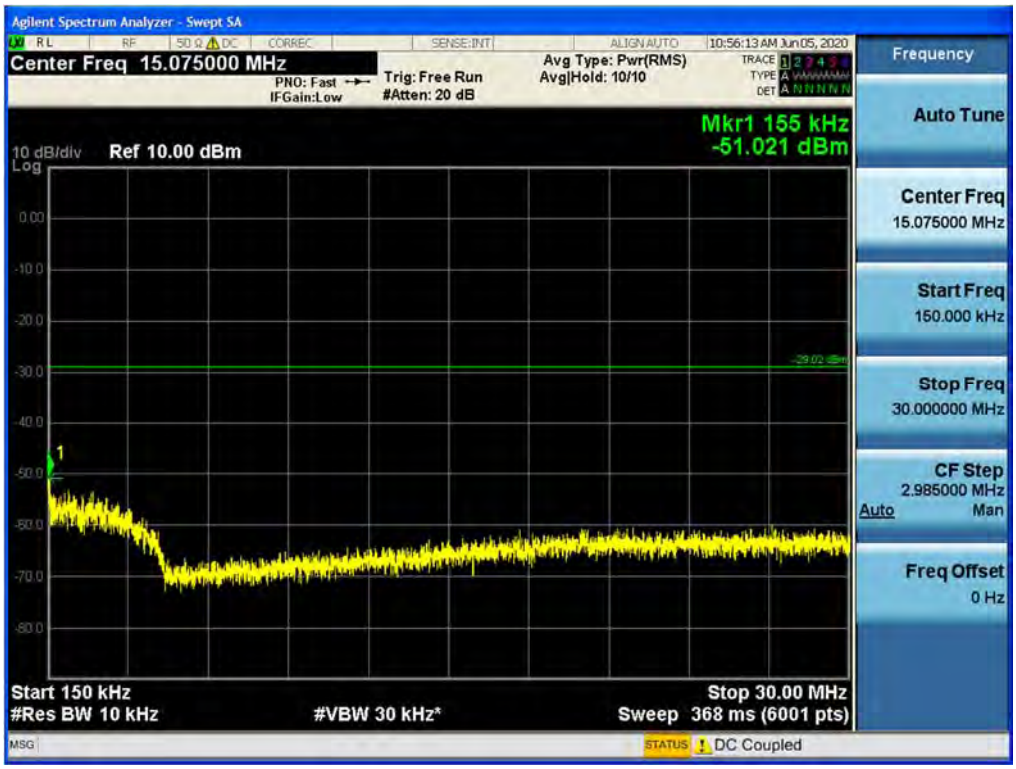
Antenna 0 / 30 MHz ~ Low Edge-100 / 5G NR Band 5 MHz 1 Carrier / 64QAM / Middle


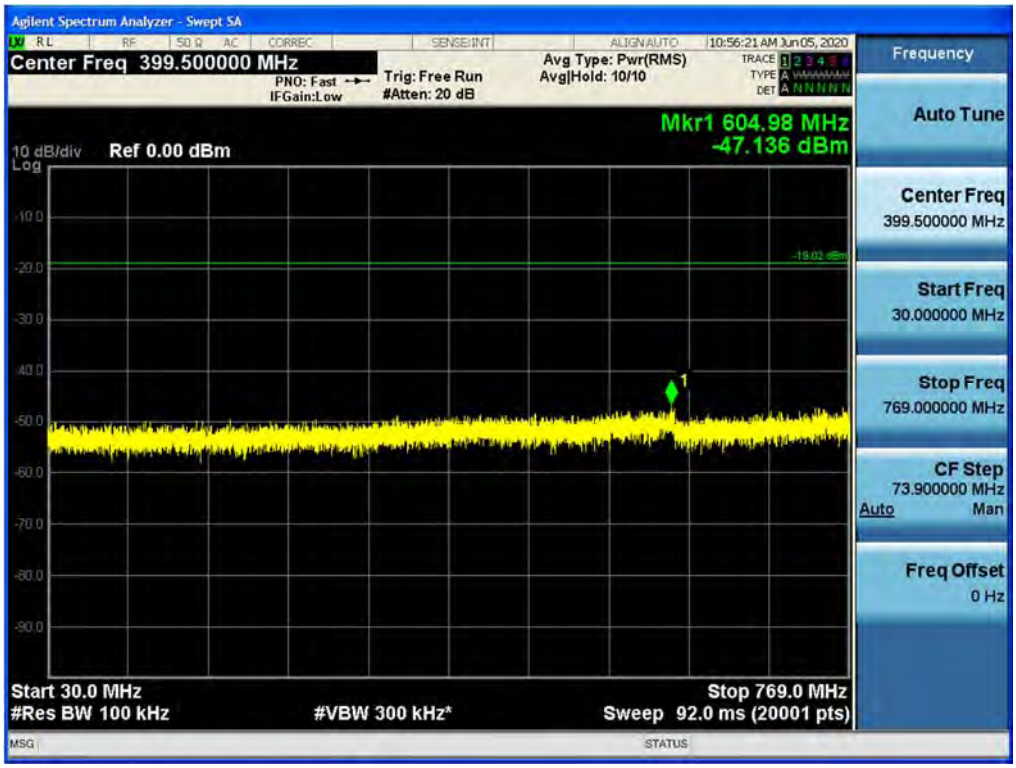
Antenna 0 / Low Edge-100 ~ Low Edge / 5G NR Band 5 MHz 1 Carrier / 64QAM / Middle


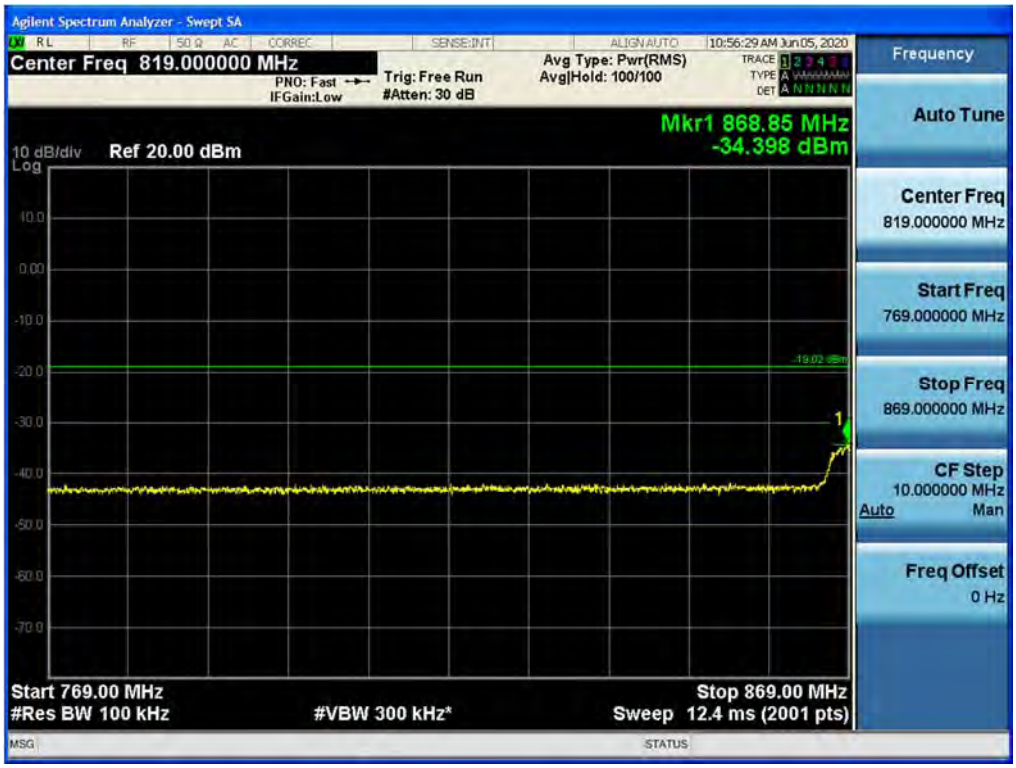
Antenna 0 / High Edge ~ High Edge+100 / 5G NR Band 5 MHz 1 Carrier / 64QAM / Middle


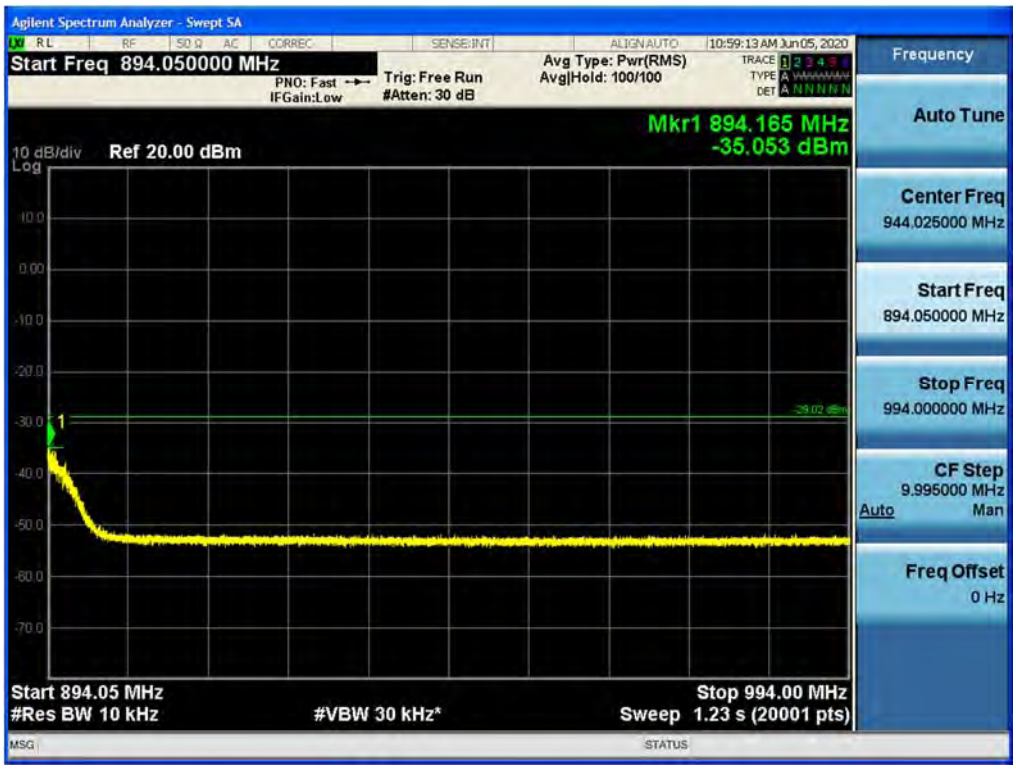
Antenna 0 / High Edge+100 ~ 10 GHz / 5G NR Band 5 MHz 1 Carrier / 64QAM / Middle

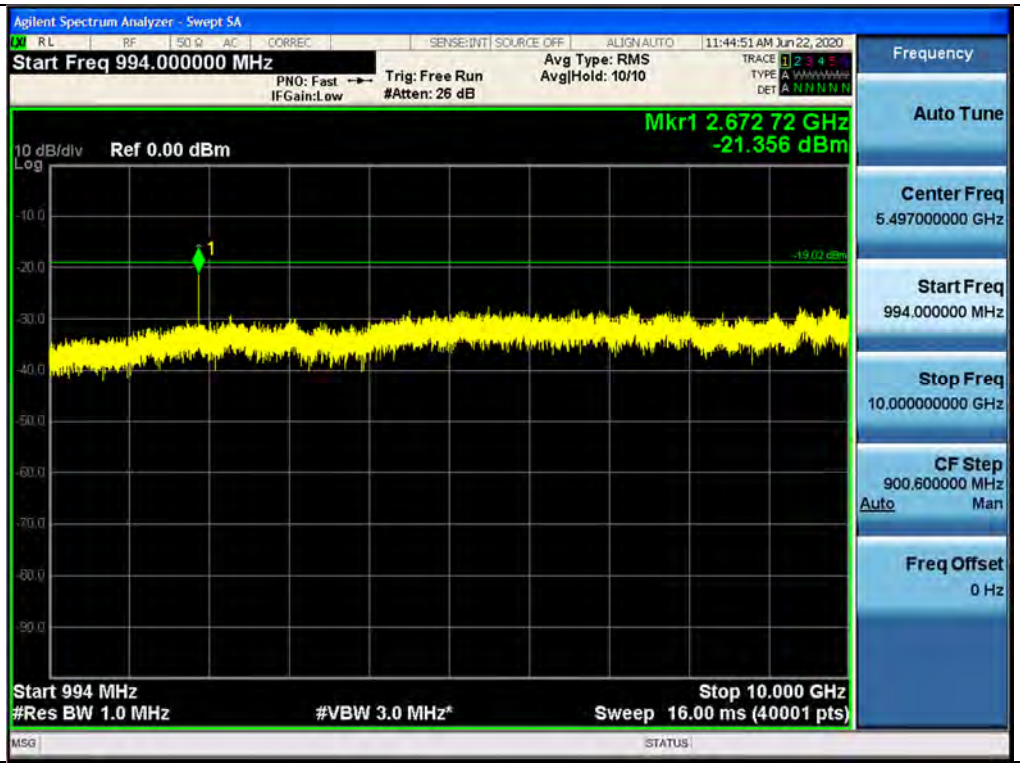

Antenna 1 / 9 kHz ~ 150 kHz / 5G NR Band 5 MHz 1 Carrier / 64QAM / High


Antenna 1 / 150 kHz ~ 30 MHz / 5G NR Band 5 MHz 1 Carrier / 64QAM / High


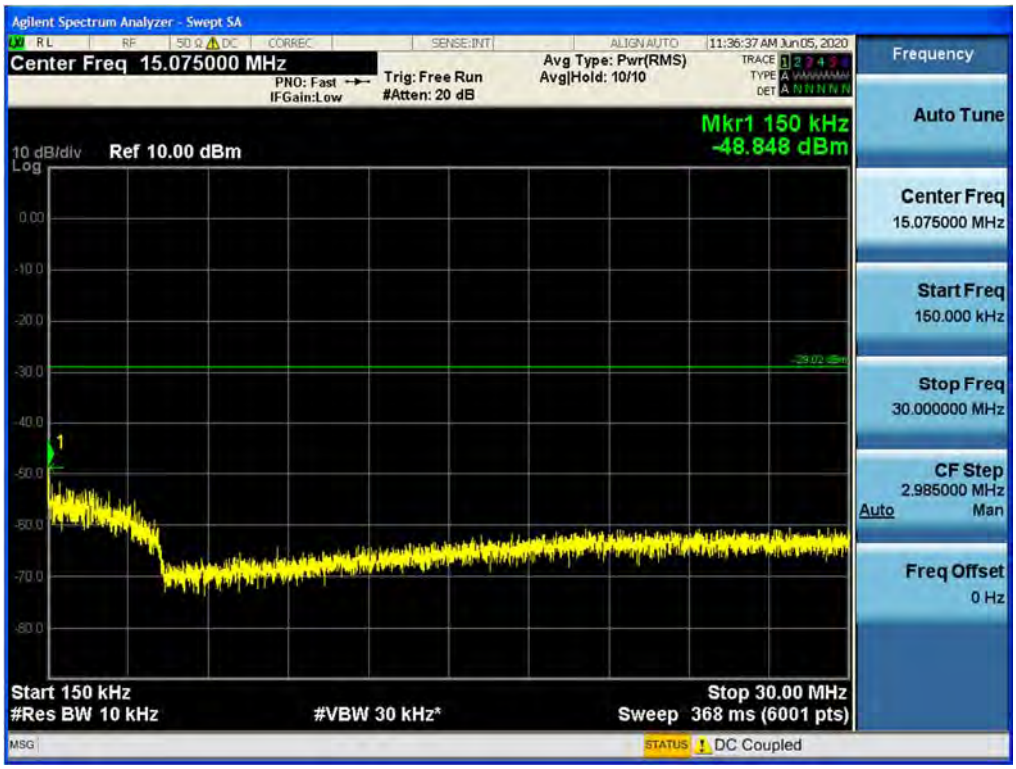
Antenna 1 / 30 MHz ~ Low Edge-100 / 5G NR Band 5 MHz 1 Carrier / 64QAM / High


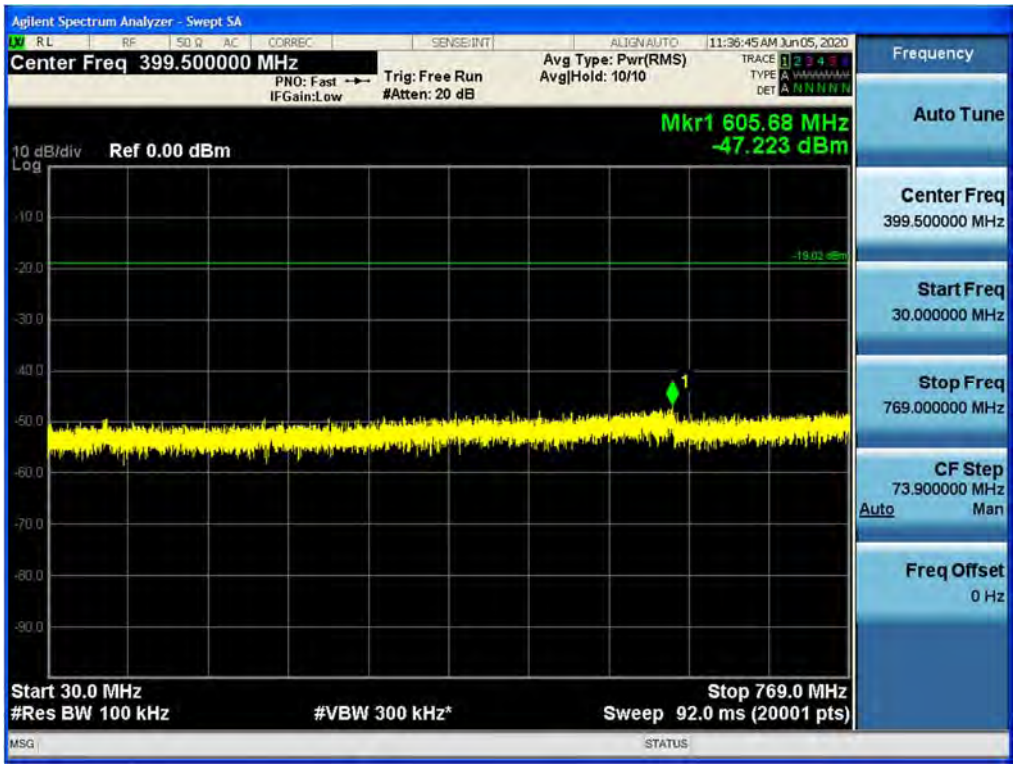
Antenna 1 / Low Edge-100 ~ Low Edge / 5G NR Band 5 MHz 1 Carrier / 64QAM / High


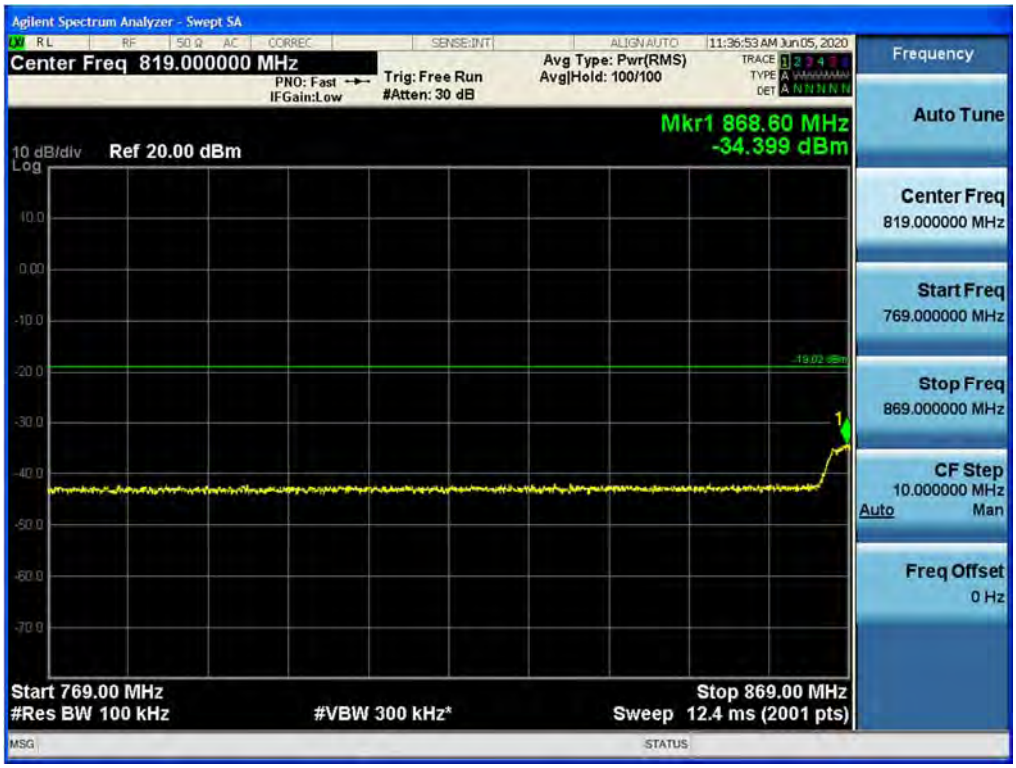
Antenna 1 / High Edge ~ High Edge+100 / 5G NR Band 5 MHz 1 Carrier / 64QAM / High


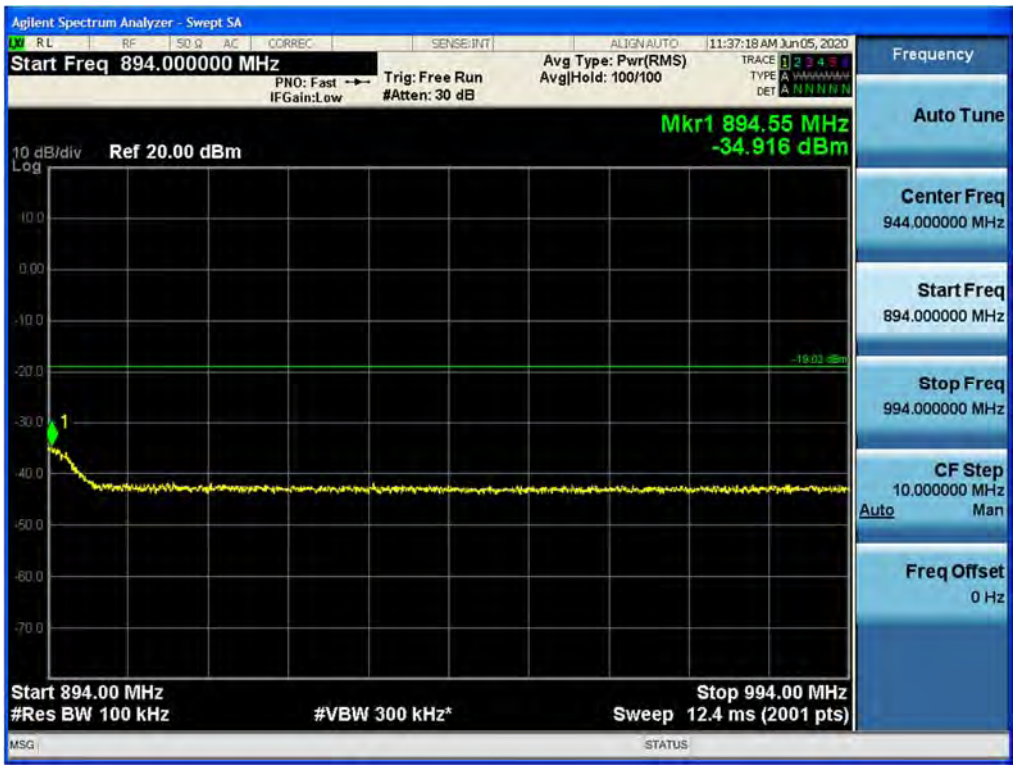
Antenna 1 / High Edge+100 ~ 10 GHz / 5G NR Band 5 MHz 1 Carrier / 64QAM / High


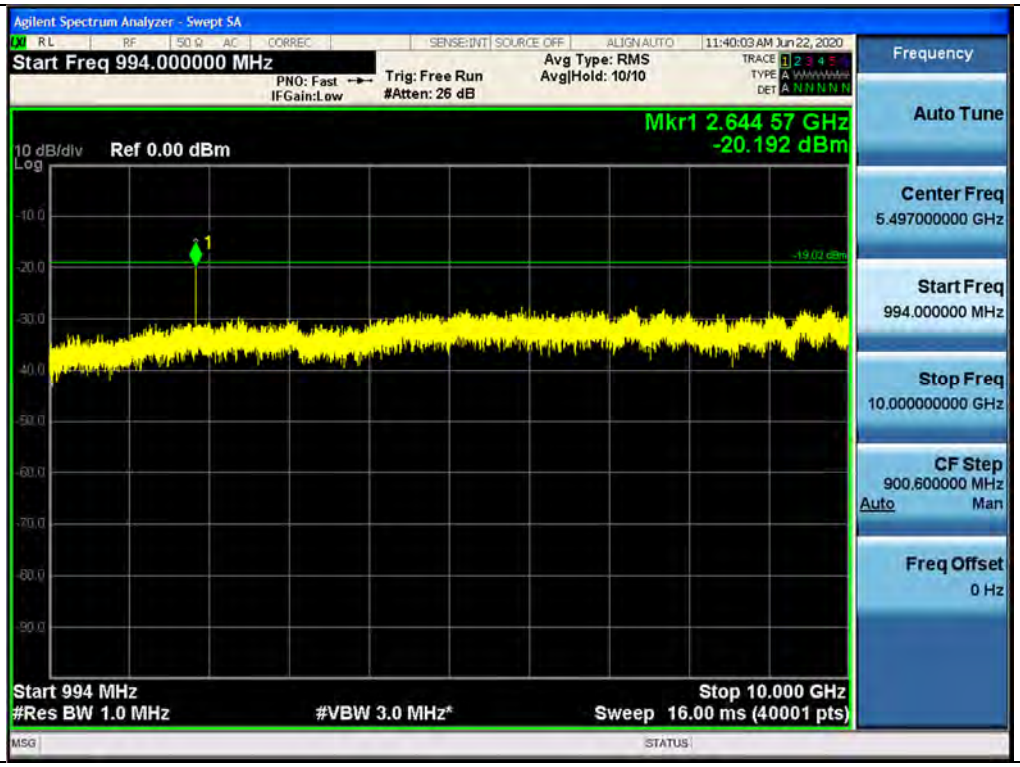
Antenna 2 / 9 kHz ~ 150 kHz / 5G NR Band 5 MHz 1 Carrier / 64QAM / Middle

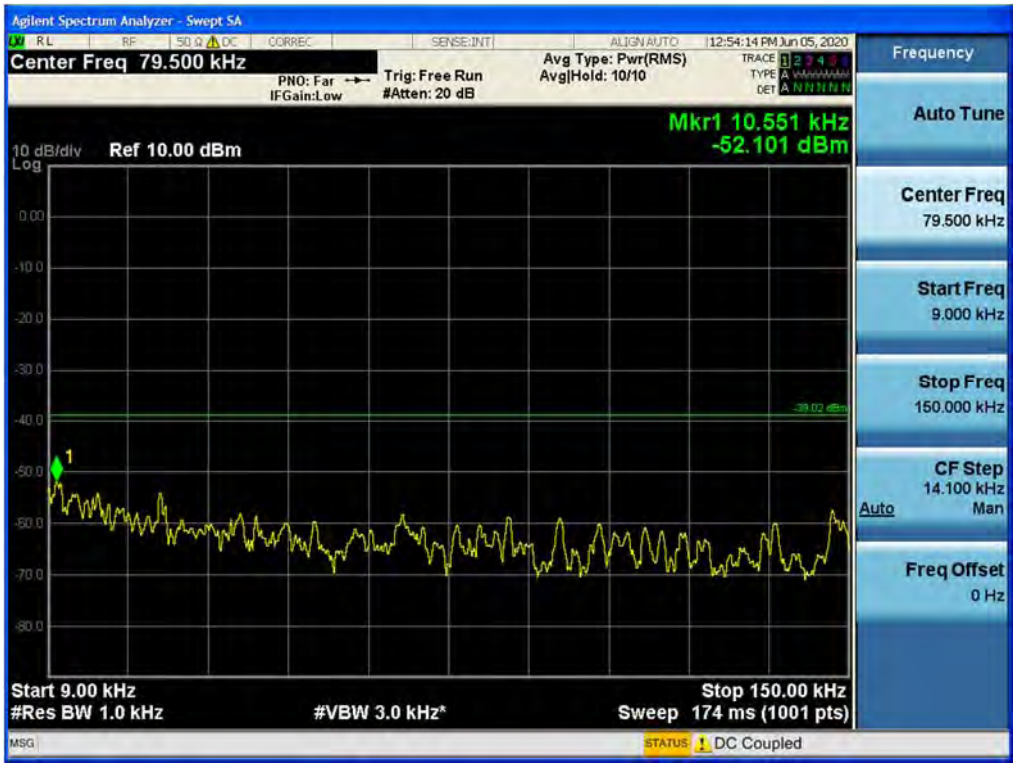

Antenna 2 / 150 kHz ~ 30 MHz / 5G NR Band 5 MHz 1 Carrier / 64QAM / Middle


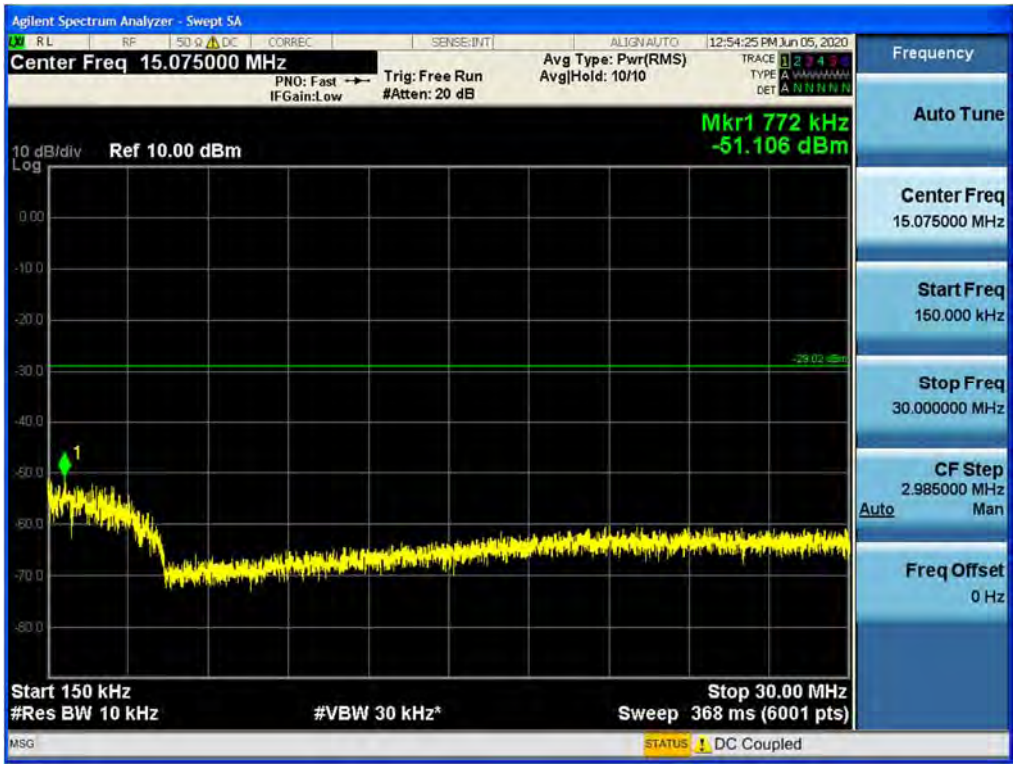
Antenna 2 / 30 MHz ~ Low Edge-100 / 5G NR Band 5 MHz 1 Carrier / 64QAM / Middle


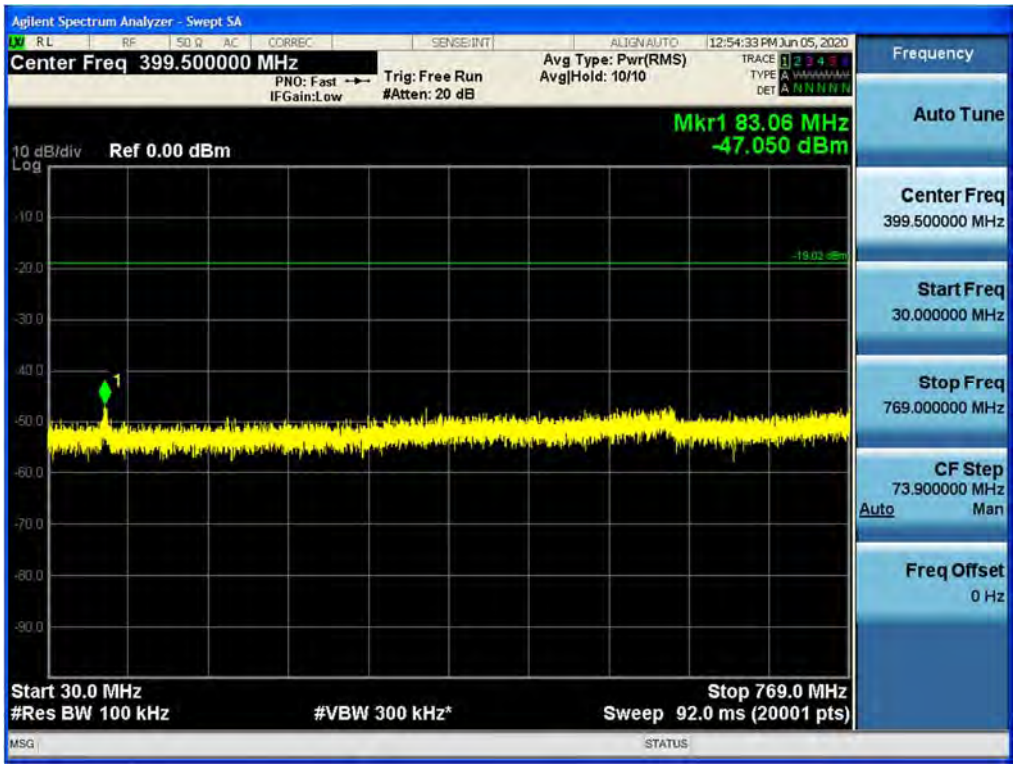
Antenna 2 / Low Edge-100 ~ Low Edge / 5G NR Band 5 MHz 1 Carrier / 64QAM / Middle


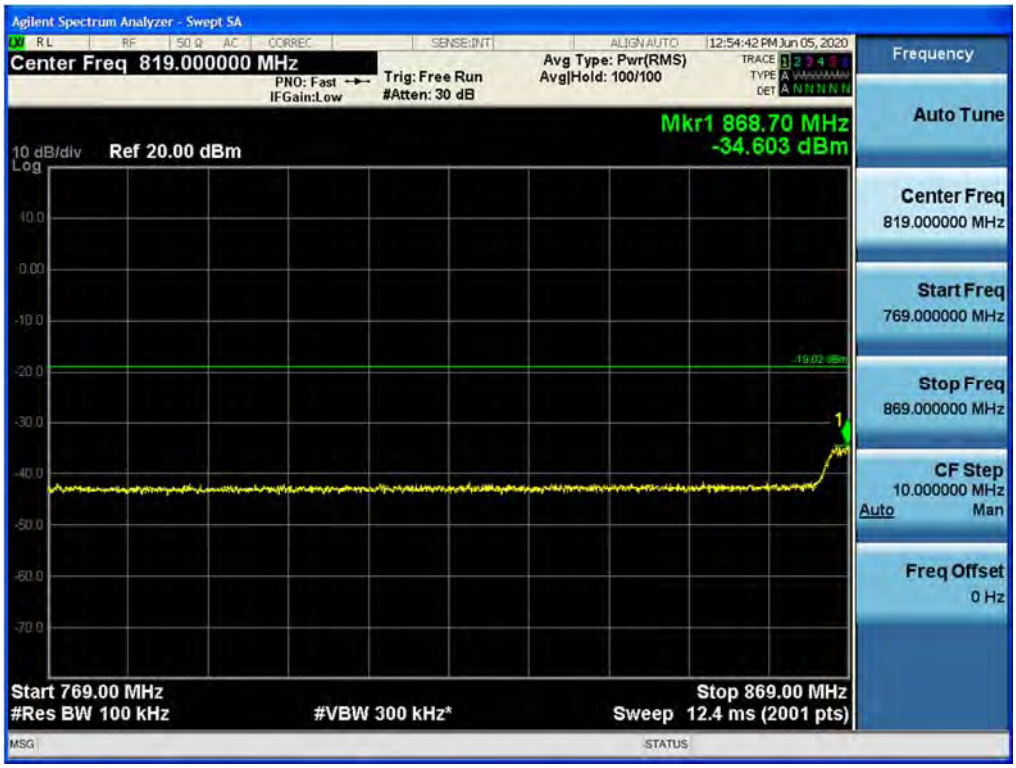
Antenna 2 / High Edge ~ High Edge+100 / 5G NR Band 5 MHz 1 Carrier / 64QAM / Middle


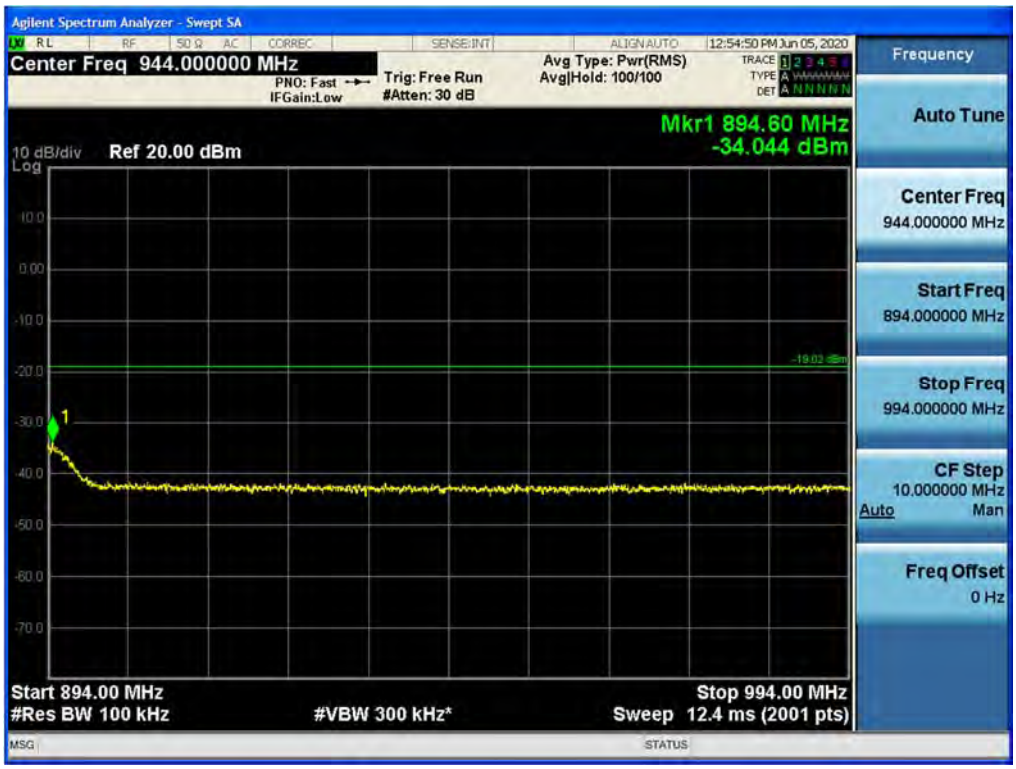
Antenna 2 / High Edge+100 ~ 10 GHz / 5G NR Band 5 MHz 1 Carrier / 64QAM / Middle


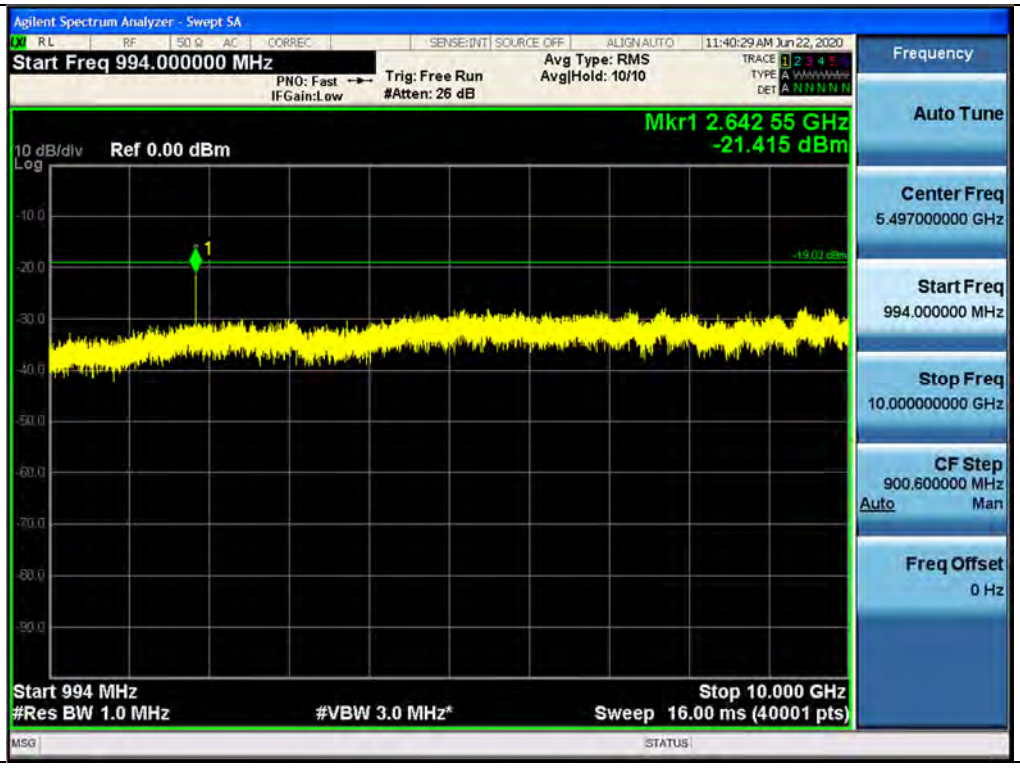
Antenna 3 / 9 kHz ~ 150 kHz / 5G NR Band 5 MHz 1 Carrier / 16QAM / Middle


Antenna 3 / 150 kHz ~ 30 MHz / 5G NR Band 5 MHz 1 Carrier / 16QAM / Middle


Antenna 3 / 30 MHz ~ Low Edge-100 / 5G NR Band 5 MHz 1 Carrier / 16QAM / Middle


Antenna 3 / Low Edge-100 ~ Low Edge / 5G NR Band 5 MHz 1 Carrier / 16QAM / Middle


Antenna 3 / High Edge ~ High Edge+100 / 5G NR Band 5 MHz 1 Carrier / 16QAM / Middle


Antenna 3 / High Edge+100 ~ 10 GHz / 5G NR Band 5 MHz 1 Carrier / 16QAM / Middle


5.4. BAND EDGE

Test Results:

Tabular Data of Band Edge

B29 LTE Band 5 MHz 1 Carrier

Ant.	Mod.	Channel	Frequency (MHz)	Measured Value (dBm)
0	QPSK	Low	718.00	-20.35
		High	728.00	-19.52
	16QAM	Low	718.00	-20.73
		High	728.00	-19.97
	64QAM	Low	718.00	-20.55
		High	728.00	-20.10
	256QAM	Low	718.00	-19.60
		High	728.00	-19.39
1	QPSK	Low	718.00	-20.45
		High	728.01	-19.67
	16QAM	Low	718.00	-20.44
		High	728.00	-19.42
	64QAM	Low	718.00	-20.90
		High	728.00	-19.55
	256QAM	Low	718.00	-20.14
		High	728.00	-19.73

Ant.	Mod.	Channel	Frequency (MHz)	Measured Value (dBm)
2	QPSK	Low	718.00	-19.79
		High	728.00	-19.65
	16QAM	Low	718.00	-19.92
		High	728.00	-19.44
	64QAM	Low	718.00	-19.61
		High	728.00	-19.83
	256QAM	Low	717.99	-20.53
		High	728.00	-19.82
3	QPSK	Low	718.00	-20.79
		High	728.00	-19.54
	16QAM	Low	718.00	-19.89
		High	728.00	-19.58
	64QAM	Low	718.00	-20.42
		High	728.00	-19.78
	256QAM	Low	718.00	-20.23
		High	728.00	-19.77

B29 LTE Band 10 MHz 1 Carrier

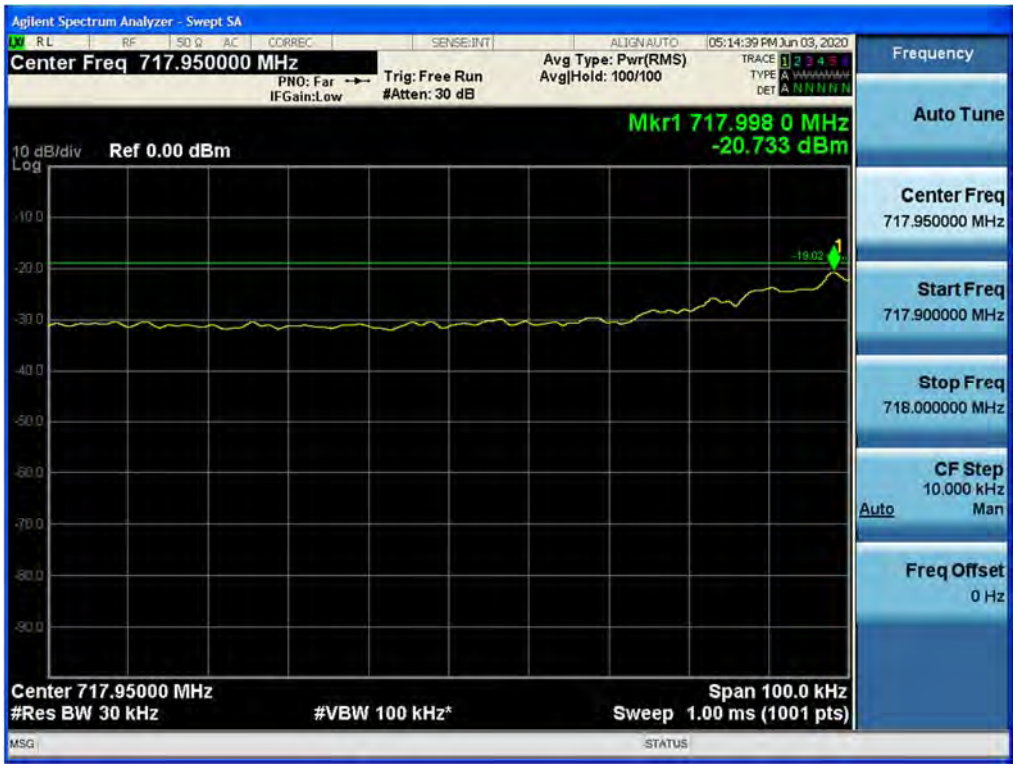
Ant.	Mod.	Channel	Frequency (MHz)	Measured Value (dBm)
0	QPSK	Low	718.00	-25.27
		High	728.00	-25.10
	16QAM	Low	718.00	-26.18
		High	728.00	-25.09
	64QAM	Low	718.00	-25.57
		High	728.00	-24.97
	256QAM	Low	718.00	-25.14
		High	728.00	-24.60
1	QPSK	Low	718.00	-26.15
		High	728.00	-25.86
	16QAM	Low	718.00	-26.01
		High	728.00	-25.98
	64QAM	Low	718.00	-25.38
		High	728.00	-25.86
	256QAM	Low	718.00	-25.72
		High	728.00	-24.55

Ant.	Mod.	Channel	Frequency (MHz)	Measured Value (dBm)
2	QPSK	Low	718.00	-25.15
		High	728.00	-25.02
	16QAM	Low	718.00	-24.79
		High	728.00	-24.63
	64QAM	Low	718.00	-25.01
		High	728.00	-24.79
	256QAM	Low	718.00	-24.22
		High	728.00	-23.43
3	QPSK	Low	718.00	-25.40
		High	728.00	-25.59
	16QAM	Low	718.00	-25.48
		High	728.00	-24.72
	64QAM	Low	718.00	-25.80
		High	728.00	-24.71
	256QAM	Low	718.00	-25.51
		High	728.00	-24.80

5G NR Band 5 MHz 1 Carrier

Ant.	Mod.	Channel	Frequency (MHz)	Measured Value (dBm)
0	QPSK	Low	869.00	-24.96
		High	894.00	-25.98
	16QAM	Low	869.00	-25.05
		High	894.00	-24.73
	64QAM	Low	869.00	-23.10
		High	894.00	-25.96
1	QPSK	Low	869.00	-25.19
		High	894.00	-25.52
	16QAM	Low	869.00	-25.68
		High	894.00	-24.84
	64QAM	Low	869.00	-25.27
		High	894.00	-25.48
2	QPSK	Low	869.00	-25.65
		High	894.00	-26.20
	16QAM	Low	869.00	-25.95
		High	894.00	-25.13
	64QAM	Low	869.00	-25.72
		High	894.00	-26.33
3	QPSK	Low	869.00	-25.60
		High	894.00	-26.54
	16QAM	Low	869.00	-26.07
		High	894.00	-24.96
	64QAM	Low	869.00	-25.57
		High	894.00	-26.41

Plot Data of Band Edge

Antenna 0 / B29 LTE Band 5 MHz 1 Carrier / 16QAM / Low


Antenna 0 / B29 LTE Band 5 MHz 1 Carrier / 16QAM / High


Antenna 1 / B29 LTE Band 5 MHz 1 Carrier / 16QAM / Low


Antenna 1 / B29 LTE Band 5 MHz 1 Carrier / 16QAM / High


Antenna 2 / B29 LTE Band 5 MHz 1 Carrier / 16QAM / Low

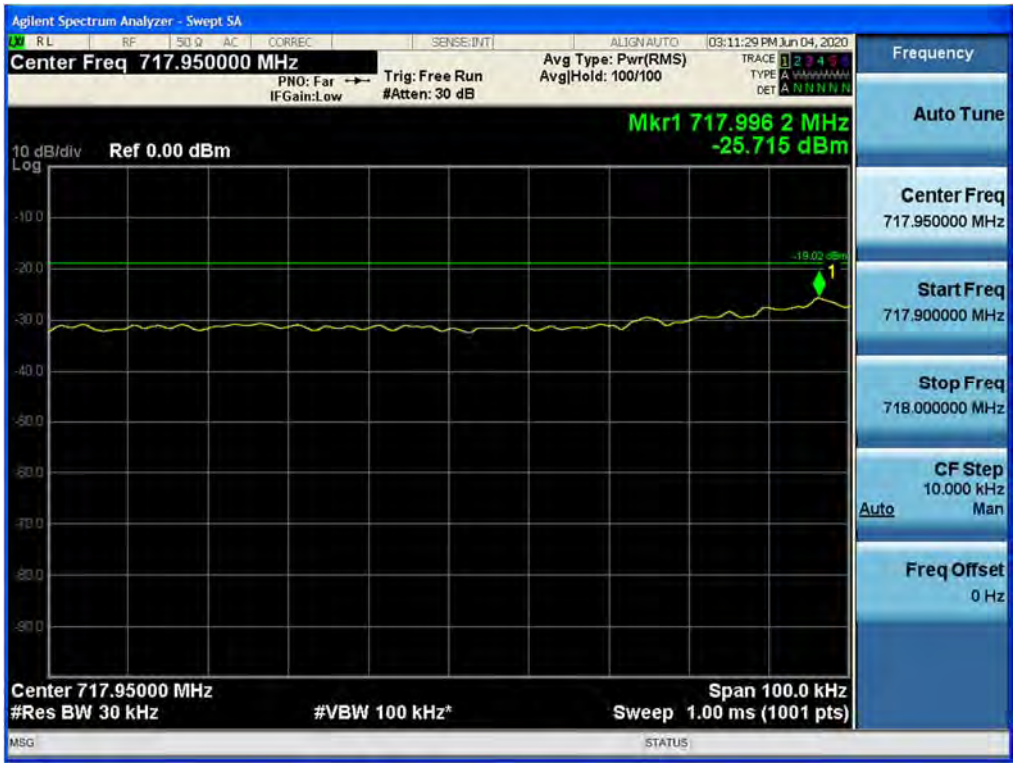

Antenna 2 / B29 LTE Band 5 MHz 1 Carrier / 16QAM / High


Antenna 3 / B29 LTE Band 5 MHz 1 Carrier / 64QAM / Low

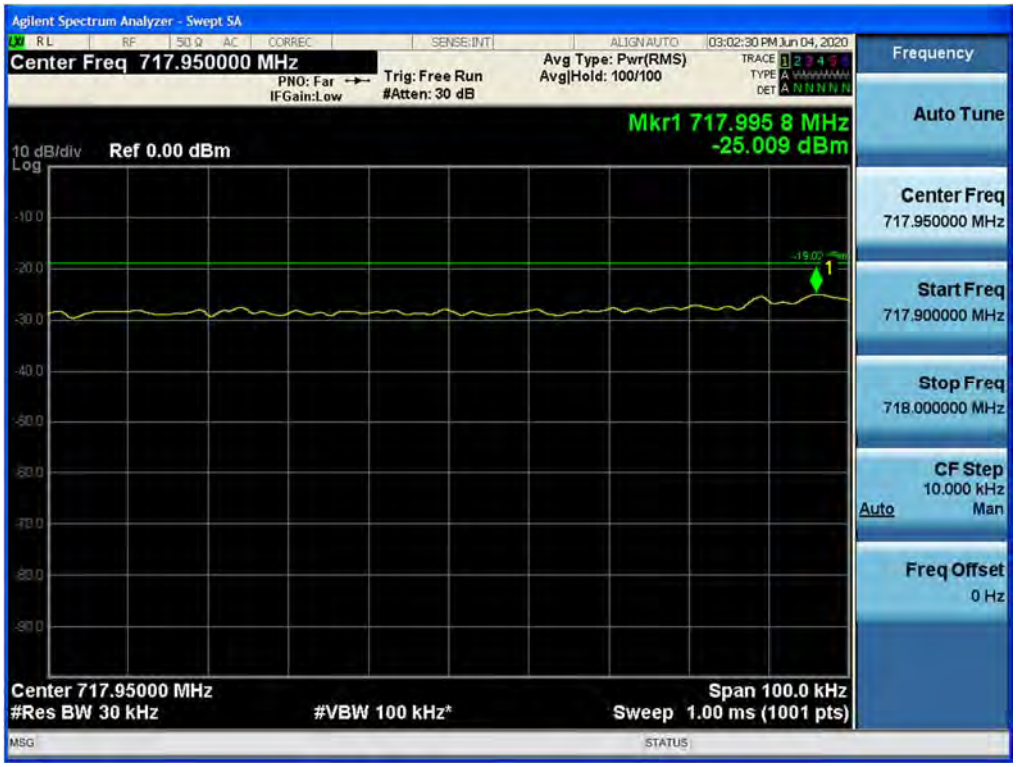

Antenna 3 / B29 LTE Band 5 MHz 1 Carrier / 64QAM / High

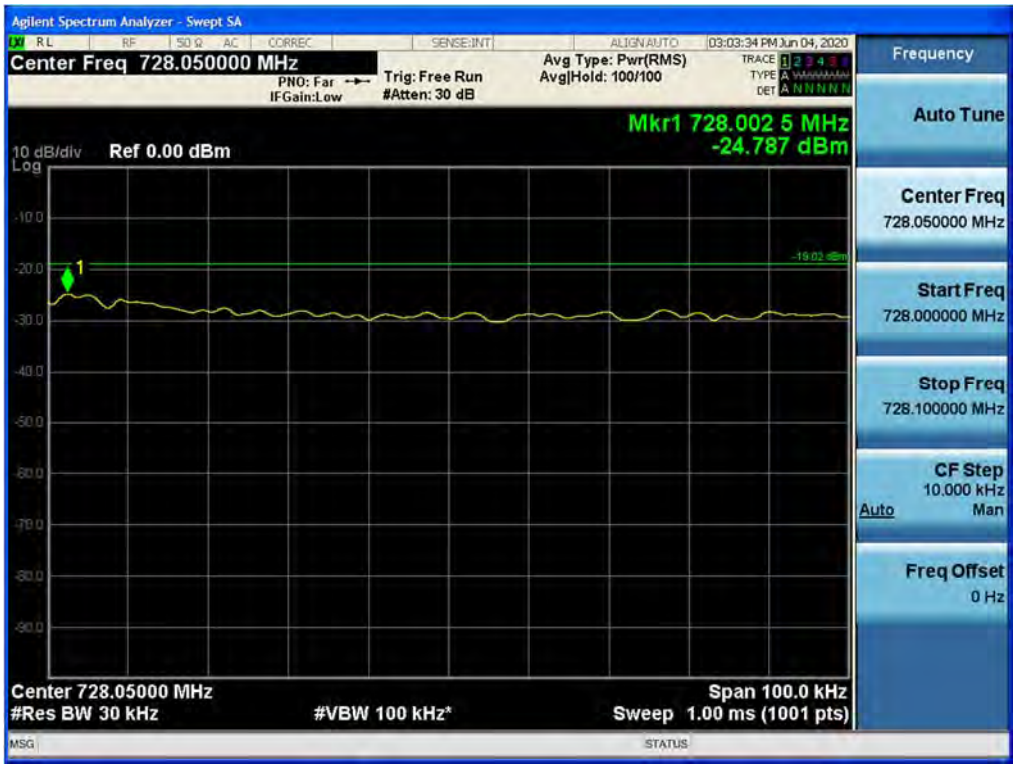

Antenna 0 / B29 LTE Band 10 MHz 1 Carrier / 64QAM / Low


Antenna 0 / B29 LTE Band 10 MHz 1 Carrier / 64QAM / High


Antenna 1 / B29 LTE Band 10 MHz 1 Carrier / 256QAM / Low


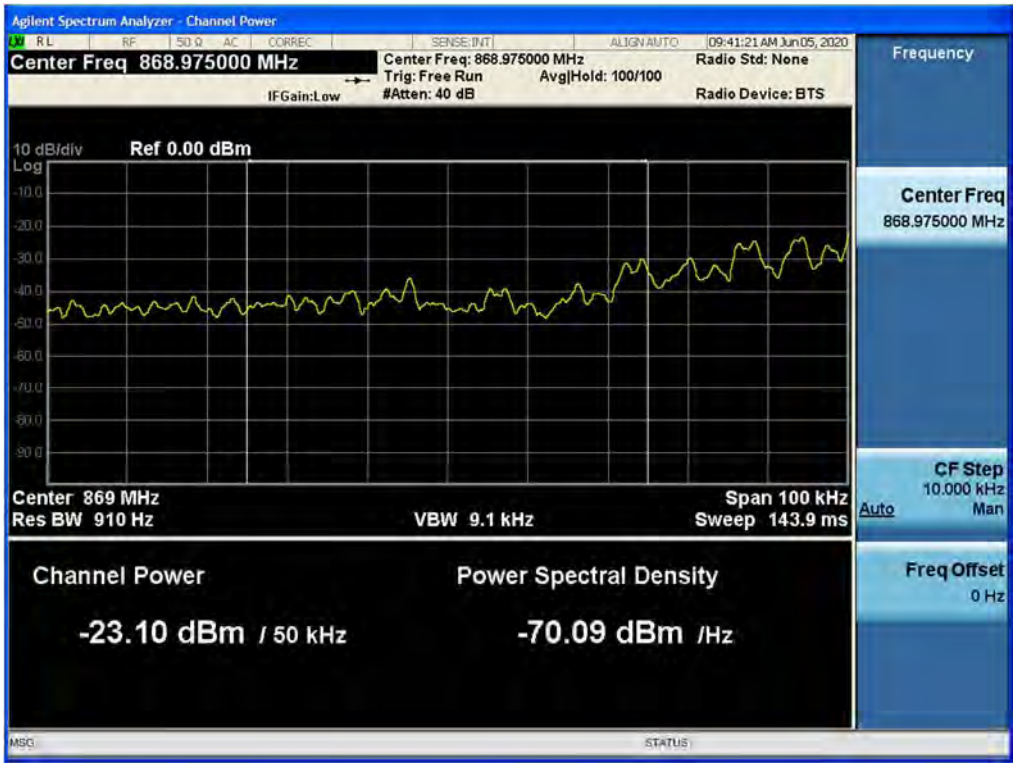
Antenna 1 / B29 LTE Band 10 MHz 1 Carrier / 256QAM / High

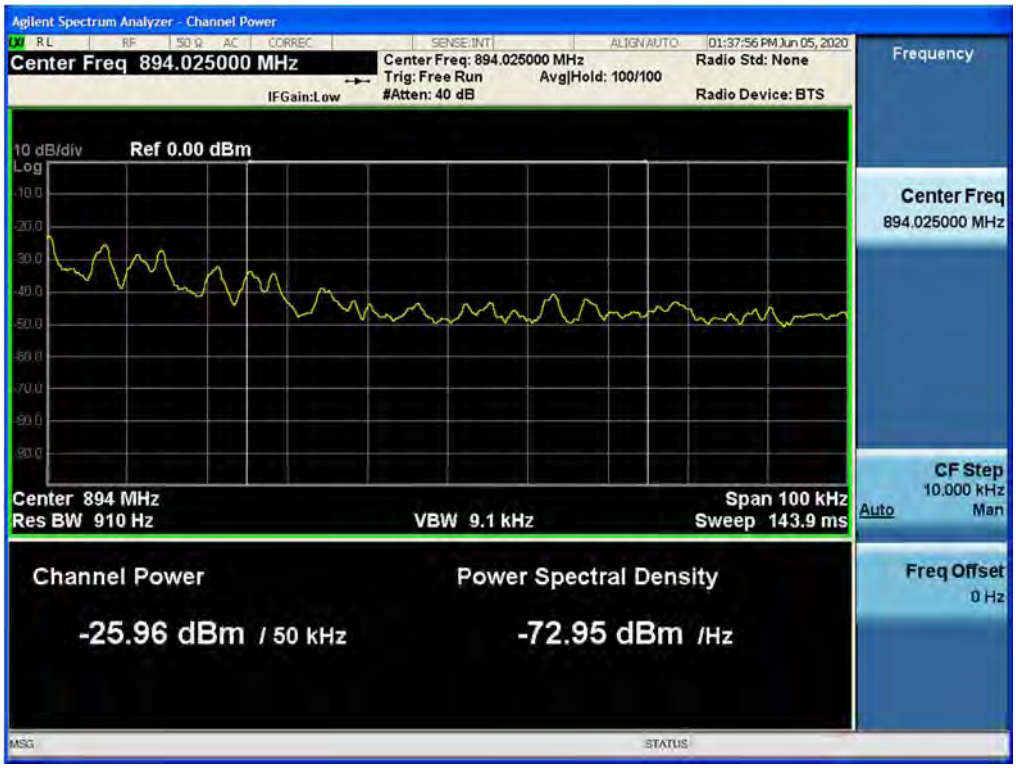

Antenna 2 / B29 LTE Band 10 MHz 1 Carrier / 64QAM / Low


Antenna 2 / B29 LTE Band 10 MHz 1 Carrier / 64QAM / High


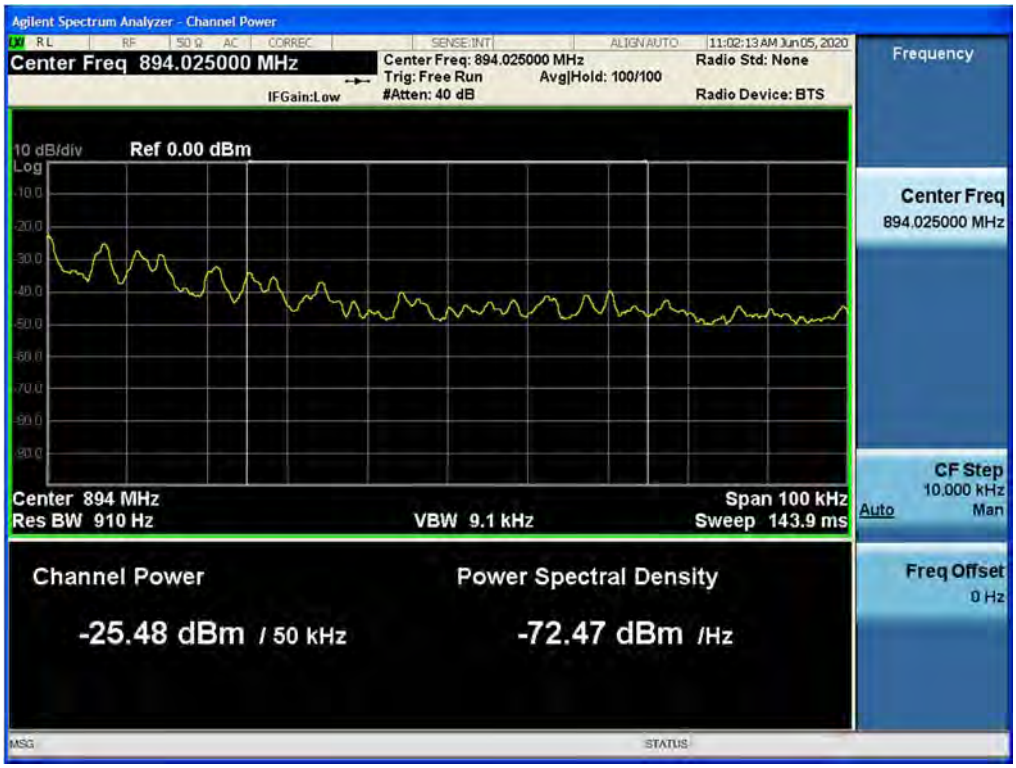
Antenna 3 / B29 LTE Band 10 MHz 1 Carrier / 64QAM / Low


Antenna 3 / B29 LTE Band 10 MHz 1 Carrier / 64QAM / High


Antenna 0 / 5G NR Band 5 MHz 1 Carrier / 64QAM / Low


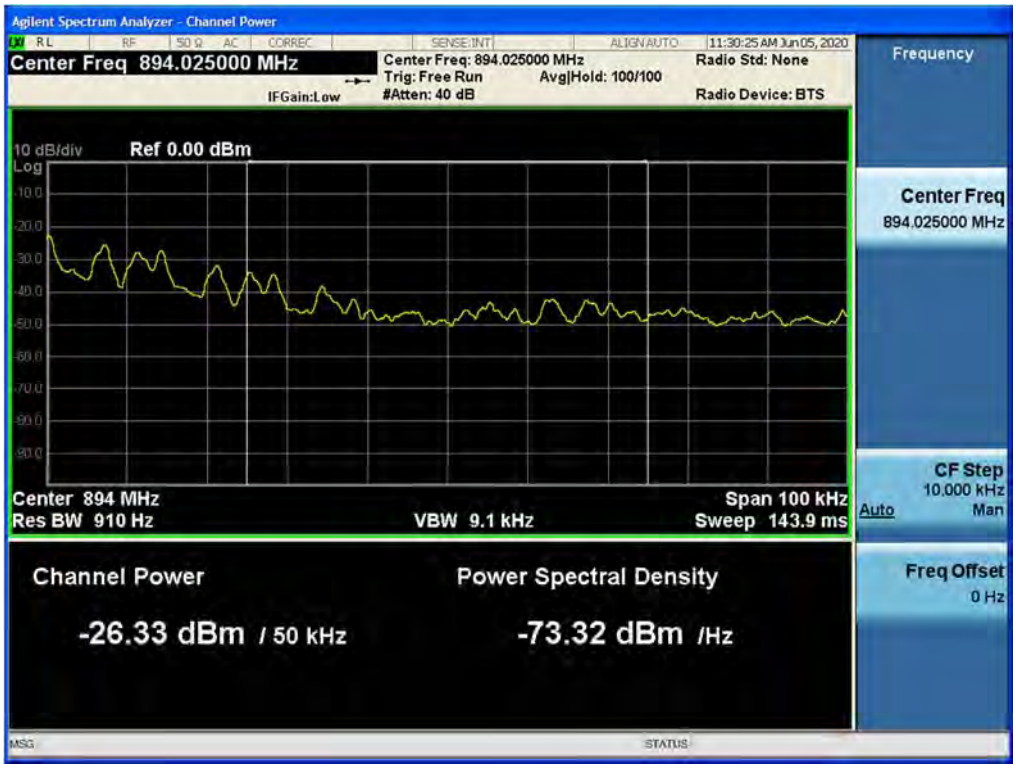
Antenna 0 / 5G NR Band 5 MHz 1 Carrier / 64QAM / High


Antenna 1 / 5G NR Band 5 MHz 1 Carrier / 64QAM / Low

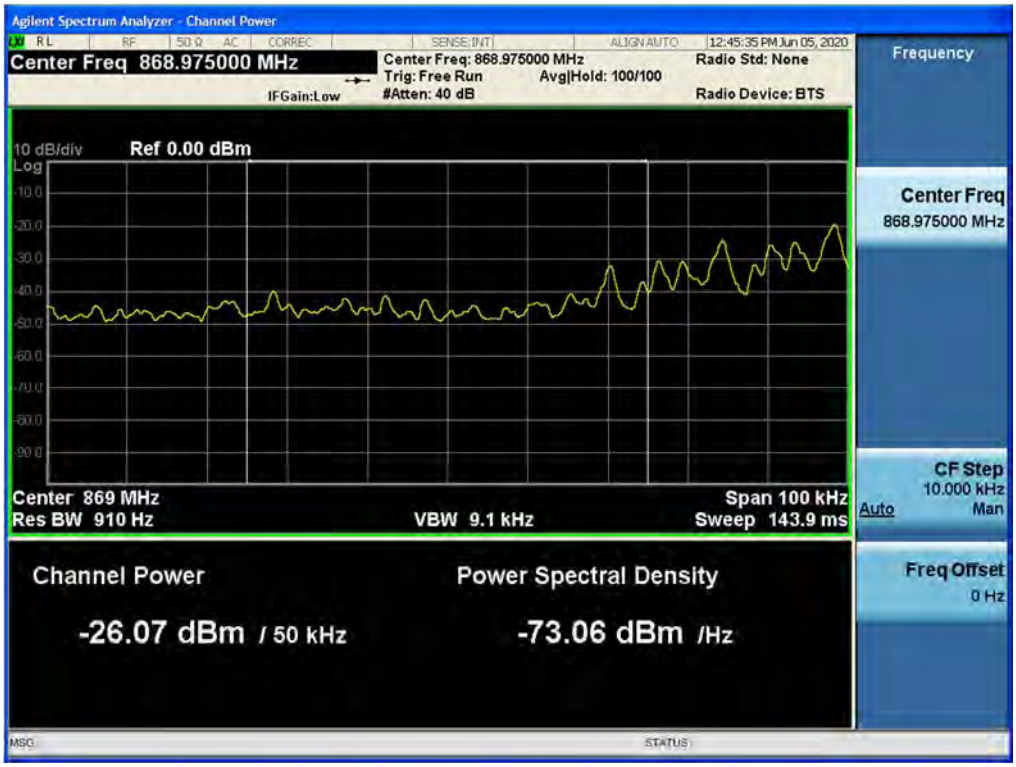

Antenna 1 / 5G NR Band 5 MHz 1 Carrier / 64QAM / High


Antenna 2 / 5G NR Band 5 MHz 1 Carrier / 64QAM / Low

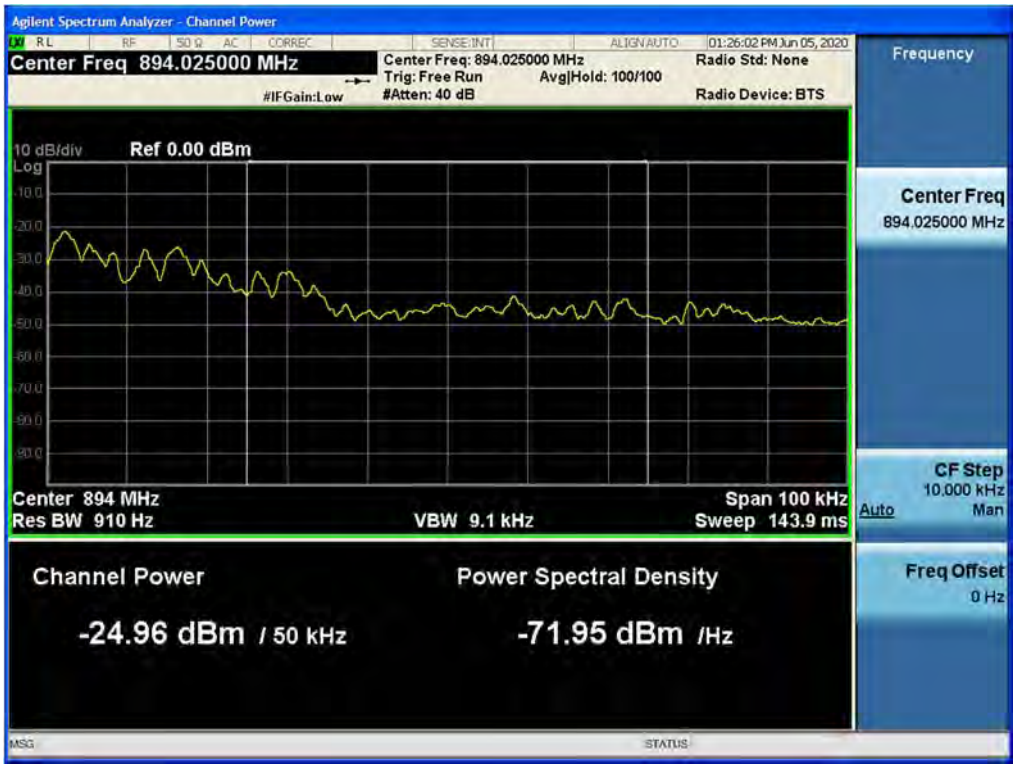
Antenna 2 / 5G NR Band 5 MHz 1 Carrier / 64QAM / High



Antenna 3 / 5G NR Band 5 MHz 1 Carrier / 16QAM / Low



Antenna 3 / 5G NR Band 5 MHz 1 Carrier / 16QAM / High



5.4. RADIATED EMISSIONS

Test Requirements:

§ 2.1053 Measurements required: Field strength of spurious radiation.

(a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of § 2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required, with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from halfwave dipole antennas.

(b) The measurements specified in paragraph (a) of this section shall be made for the following equipment:

(1) Those in which the spurious emissions are required to be 60 dB or more below the mean power of the transmitter.

(2) All equipment operating on frequencies higher than 25 MHz.

(3) All equipment where the antenna is an integral part of, and attached directly to the transmitter.

(4) Other types of equipment as required, when deemed necessary by the Commission.

Test Procedures:

The measurement is performed in accordance with Section 5.5.3.2 of ANSI C63.26.

a) Place the EUT in the center of the turntable. The EUT shall be configured to transmit into the standard non-radiating load (for measuring radiated spurious emissions), connected with cables of minimal length unless specified otherwise. If the EUT uses an adjustable antenna, the antenna shall be positioned to the length that produces the worst case emission at the fundamental operating frequency.

b) Each emission under consideration shall be evaluated:

1) Raise and lower the measurement antenna in accordance 5.5.2, as necessary to enable detection of the maximum emission amplitude relative to measurement antenna height.

2) Rotate the EUT through 360° to determine the maximum emission level relative to the axial position.

3) Return the turntable to the azimuth where the highest emission amplitude level was observed.

4) Vary the measurement antenna height again through 1 m to 4 m again to find the height associated with the maximum emission amplitude.

5) Record the measured emission amplitude level and frequency using the appropriate RBW.

c) Repeat step b) for each emission frequency with the measurement antenna oriented in both the horizontal and vertical polarizations to determine the orientation that gives the maximum emissions amplitude.

d) ~ j) Omitted

k) Provide the complete measurement results as a part of the test report.

Note:

1) Measure distance: 3 m

B29 LTE Band _ QPSK

Mode	Freq.(MHz)	Measured Level [dBuV]	Ant. Factor [dB/m]	C.L [dB]	Amp. Gain (+ 1G H.P.F.) [dB]	Pol.	Measured Power [dBm]	Result [dBm/m]
LTE5M	3,932.00	49.32	29.800	6.41	32.23	V	-45.88	-41.90

* C.L.: Cable Loss / A.G.: Amp Gain / H.P.F.: High Pass Filter

B29 LTE Band _ QAM

Mode	Freq.(MHz)	Measured Level [dBuV]	Ant. Factor [dB/m]	C.L [dB]	Amp. Gain (+ 1G H.P.F.) [dB]	Pol.	Measured Power [dBm]	Result [dBm/m]
LTE5M	3,932.00	51.31	29.800	6.41	32.23	V	-43.89	-39.91

* C.L.: Cable Loss / A.G.: Amp Gain / H.P.F.: High Pass Filter

B29 LTE Band _ QPSK

Mode	Freq.(MHz)	Measured Level [dBuV]	Ant. Factor [dB/m]	C.L [dB]	Amp. Gain (+ 1G H.P.F.) [dB]	Pol.	Measured Power [dBm]	Result [dBm/m]
LTE10M	3,932.00	50.60	29.800	6.41	32.23	H	-44.60	-40.62

* C.L.: Cable Loss / A.G.: Amp Gain / H.P.F.: High Pass Filter

B29 LTE Band _ QAM

Mode	Freq.(MHz)	Measured Level [dBuV]	Ant. Factor [dB/m]	C.L [dB]	Amp. Gain (+ 1G H.P.F.) [dB]	Pol.	Measured Power [dBm]	Result [dBm/m]
LTE10M	3,932.00	50.04	29.800	6.41	32.23	H	-45.16	-41.18

* C.L.: Cable Loss / A.G.: Amp Gain / H.P.F.: High Pass Filter

5G NR Band_ QPSK

Mode	Freq.(MHz)	Measured Level [dBuV]	Ant. Factor [dB/m]	C.L [dB]	Amp. Gain (+ 1G H.P.F.) [dB]	Pol.	Measured Power [dBm]	Result [dBm/m]
NR5M	3,932.00	49.14	29.800	6.41	32.23	H	-46.06	-42.08

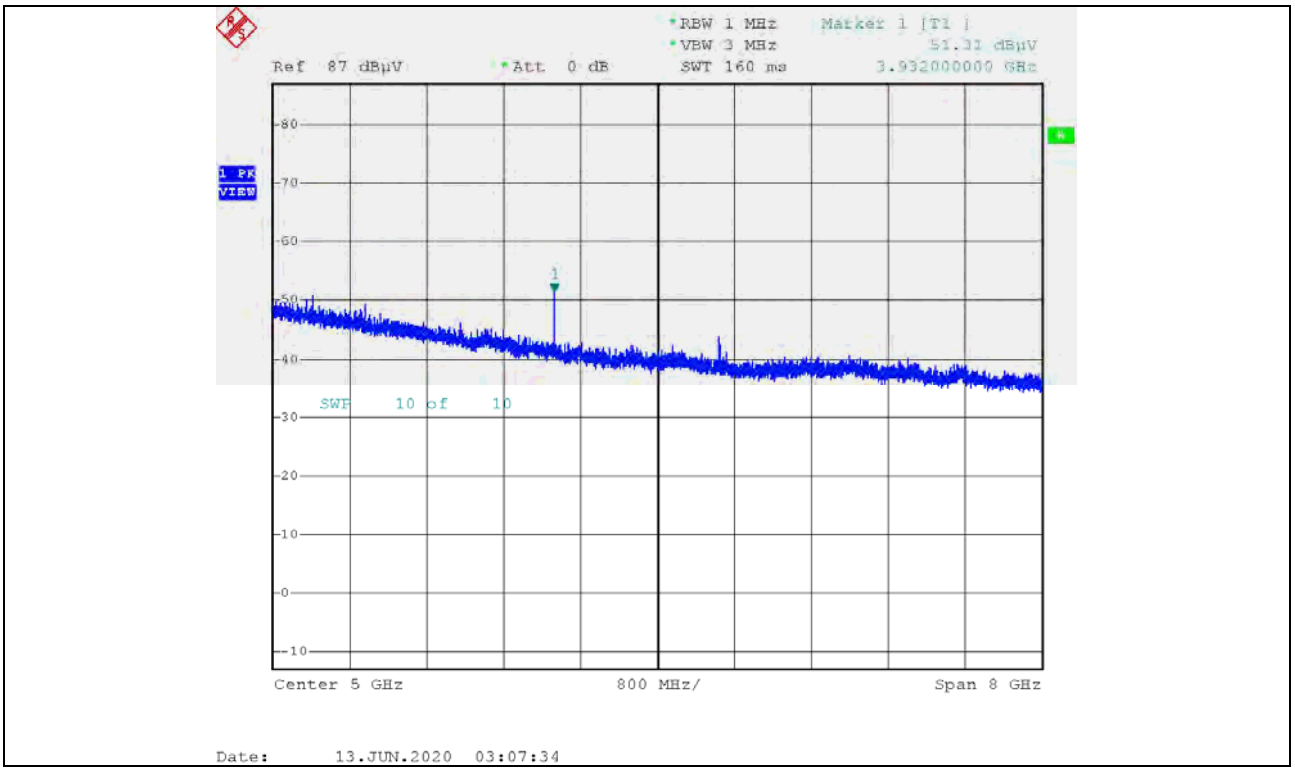
* C.L.: Cable Loss / A.G.: Amp Gain / H.P.F.: High Pass Filter

5G NR Band_ QAM

Mode	Freq.(MHz)	Measured Level [dBuV]	Ant. Factor [dB/m]	C.L [dB]	Amp. Gain (+ 1G H.P.F.) [dB]	Pol.	Measured Power [dBm]	Result [dBm/m]
NR5M	3,932.00	50.28	29.800	6.41	32.23	V	-44.92	-40.94

* C.L.: Cable Loss / A.G.: Amp Gain / H.P.F.: High Pass Filter

Plot data of radiated spurious emissions



Note : Only the worst case plots for Radiated Spurious Emissions.

5.5. FREQUENCY STABILITY

Test Requirements:

§ 2.1055 Measurements required: Frequency stability.

(a) The frequency stability shall be measured with variation of ambient temperature as follows:

(1) From −30° to + 50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

§ 22.355 Frequency tolerance.

Except as otherwise provided in this part, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table C-1 of this section.

Table C-1—Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency range (MHz)	Base, fixed (ppm)	Mobile >3 watts (ppm)	Mobile ≤3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929	5.0	n/a	n/a
929 to 960	1.5	n/a	n/a
2110 to 2220	10.0	n/a	n/a

§ 27.54 Frequency stability.

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

Test Procedures:

The measurement is performed in accordance with Section 5.6.4 and 5.6.5 of ANSI C63.26.

5.6.4 Frequency stability over variations in temperature

a) Supply the EUT with a nominal 60 Hz ac voltage, dc voltage, or install a new or fully charged battery in the EUT.

b) If possible a dummy load should be connected to the EUT because an antenna near the metallic walls of an environmental test chamber could affect the output frequency of the EUT. If the EUT is equipped with a permanently attached, adjustable-length antenna, the EUT should be placed in the center of the chamber with the antenna adjusted to the shortest length possible.

c) Turn on the EUT, and tune it to the center frequency of the operating band.

d) Couple the transmitter output to the measuring instrument through a suitable attenuator and coaxial cable. If connection

to the EUT output is not possible, make the measurement by connecting an antenna to the measuring instrument with a suitable length of coaxial cable and placing the measuring antenna near the EUT (e.g., 15 cm away).

NOTE—An instrument that has an adequate level of accuracy as specified by the procuring or regulatory authority is the recommended measuring instrument.

e) Adjust the location of the measurement antenna and the controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement instrument, but is strong enough to allow measurement of the operating or fundamental frequency of the EUT). Adjust the detector bandwidth and span settings to achieve a resolution capable of accurate frequency measurements over the applicable frequency stability limits.

f) Turn the EUT off, and place it inside the environmental temperature chamber. For devices that have oscillator heaters, energize only the heater circuit.

g) Set the temperature control on the chamber to the Highest temperature specified in the regulatory requirements for the type of device, and allow the oscillator heater and the chamber temperature to stabilize. Unless otherwise instructed by the regulatory authority, this temperature should be 50 °C.

h) While maintaining a constant temperature inside the environmental chamber, turn on the EUT and allow sufficient time for the EUT temperature to stabilize.

i) Measure the frequency.

j) Switch off the EUT, but do not switch off the oscillator heater.

k) Lower the chamber temperature to the next level that is required by the standard and allow the temperature inside the chamber to stabilize. Unless otherwise instructed by the regulators, this temperature step should be 10 °C.

l) Repeat step h) through step k) down to the lowest specified temperature. Unless otherwise instructed by the regulators, this temperature should be −30 °C. When the frequency stability limit is stated as being sufficient such that the fundamental emissions stay within the authorized bands of operation, a reference point shall be established at the applicable unwanted emissions limit using a RBW equal to the RBW required by the unwanted emissions specification of the applicable regulatory standard. These reference points measured using the lowest and Highest channel of operation shall be identified as f_L and f_H respectively. The worst-case frequency offset determined in the above methods shall be added or subtracted from the values of f_L and f_H and the resulting frequencies must remain within the band.

m) Omitted

5.6.5 Frequency stability when varying supply voltage

a) Couple the transmitter output to the measuring instrument through a suitable attenuator and coaxial cable. If connection to the EUT output is not possible make the measurement by connecting an antenna to the measuring instrument with a suitable length of coaxial cable and placing the measuring antenna near the EUT (e.g., 15 cm away)

b) Supply the EUT with nominal ac or dc voltage. The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

c) Turn on the EUT, and couple its output to a frequency counter or other frequency-measuring instrument.

d) Tune the EUT to the center frequency of the operating band. Adjust the location of the measurement antenna and the controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement

instrument, but is strong enough to allow measurement of the operating or fundamental frequency of the EUT). Adjust the detector bandwidth and span settings to achieve a resolution capable of accurate frequency measurements over the applicable frequency stability limits.

NOTE—An instrument that has an adequate level of accuracy as specified by the procuring or regulatory authority is the recommended measuring instrument.

e) Measure the frequency.

f) Unless otherwise specified, vary primary supply voltage from 85% to 115% of the nominal value for other than hand carried battery equipment.

g) For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.

h) Repeat the frequency measurement.

NOTE—For band-edge compliance, it can be required to make these measurements at the low and High channel of the operating band.

Note:

The results of the frequency stability test shown above the frequency deviation measured values are very small and similar trend for each port, so we are attached only the worst case data.

Test Results:

Reference: - 48 Vdc at 20°C **Freq.** = 723,000,000 Hz

Voltage (%)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	+20(Ref)	723 000 008	8.033	0.000	0.00000
	-30	723 000 006	6.409	-1.625	-0.00225
	-20	723 000 010	9.552	1.519	0.00210
	-10	723 000 004	3.829	-4.204	-0.00582
	0	723 000 000	0.261	-7.772	-0.01075
	+10	723 000 008	7.559	-0.474	-0.00066
	+30	723 000 004	3.711	-4.323	-0.00598
	+40	723 000 001	0.700	-7.333	-0.01014
	+50	723 000 007	7.487	-0.546	-0.00076
115%	+20	723 000 009	8.863	0.830	0.00115
85%	+20	723 000 004	4.192	-3.841	-0.00531

Note:

The results of the frequency stability test shown above the frequency deviation measured values are very small and similer trend for each port, so attached datas were only the port 0.

Reference: - 48 Vdc at 20°C **Freq.** = 881,500,000 Hz

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	3.700	+20(Ref)	881 500 009	8.597	0.000	0.00000
		-30	881 500 005	4.969	-3.064	-0.00424
		-20	881 500 004	3.943	-4.091	-0.00566
		-10	881 500 001	0.657	-7.376	-0.01020
		0	881 500 001	1.033	-7.000	-0.00968
		+10	881 500 002	1.707	-6.326	-0.00875
		+30	881 500 000	0.298	-7.735	-0.01070
		+40	881 500 004	4.295	-3.738	-0.00517
		+50	881 500 006	6.352	-1.681	-0.00233
115%	4.255	+20	881 500 001	0.544	-7.489	-0.01036
85%	3.400	+20	881 500 001	1.309	-6.724	-0.00930

Note:

The results of the frequency stability test shown above the frequency deviation measured values are very small and similer trend for each port, so attached datas were only the port 0.

6. Annex B_EUT AND TEST SETUP PHOTO

Please refer to test setup photo file no. as follows;

No.	Description
1	HCT-RF-2006-FC046-P