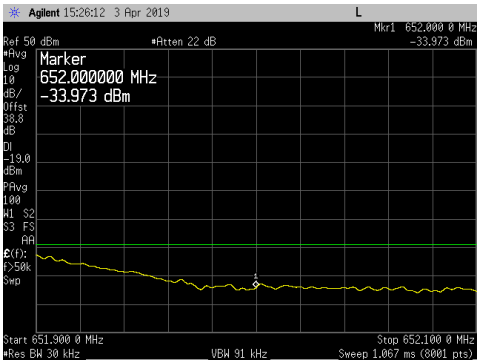
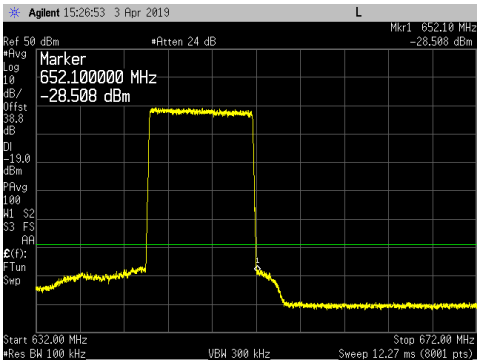
5G NR_ 10MHz Channel Bandwidth_ Upper Band Edge Plots for Antenna Port 4:

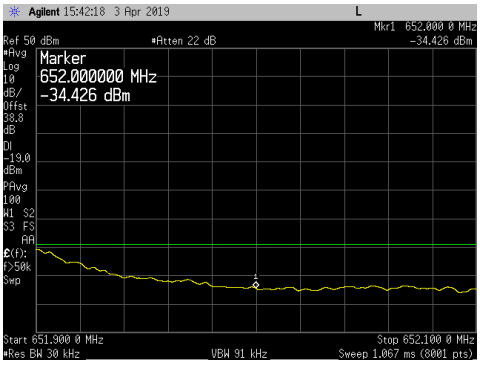
QPSK_ Top Ch_ 651.9 to 652.1MHz



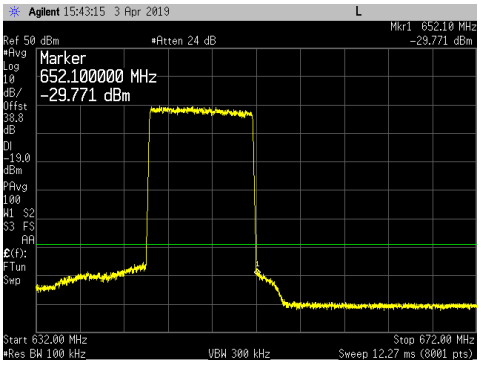
QPSK_ Top Ch_ 632 to 672MHz



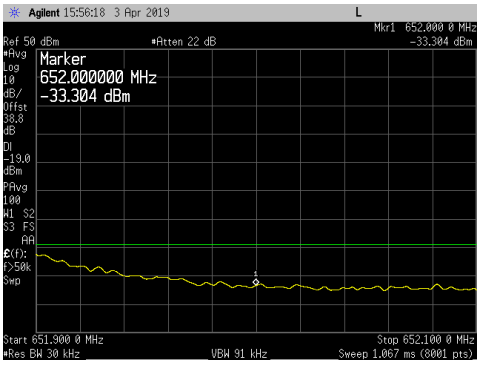
16QAM_ Top Ch_ 651.9 to 652.1MHz



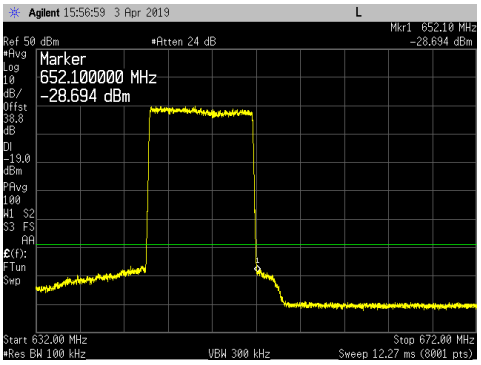
16QAM_ Top Ch_ 632 to 672MHz



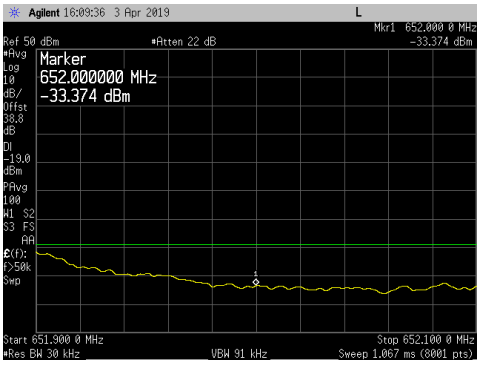
64QAM_ Top Ch_ 651.9 to 652.1MHz



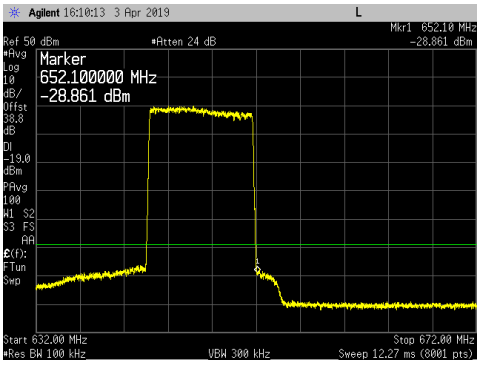
64QAM_ Top Ch_ 632 to 672MHz



256QAM_ Top Ch_ 651.9 to 652.1MHz

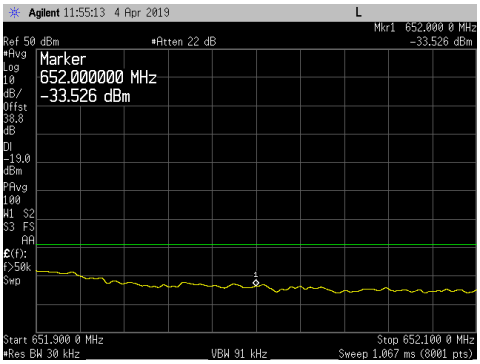


256QAM_ Top Ch_ 632 to 672MHz

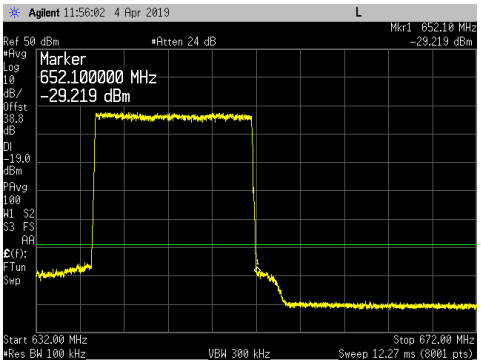


5G NR_ 15MHz Channel Bandwidth_ Upper Band Edge Plots for Antenna Port 4:

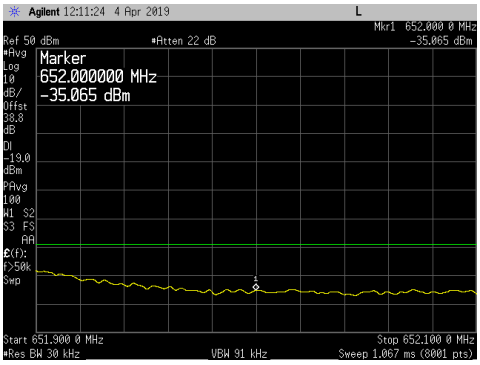
QPSK_ Top Ch_ 651.9 to 652.1MHz



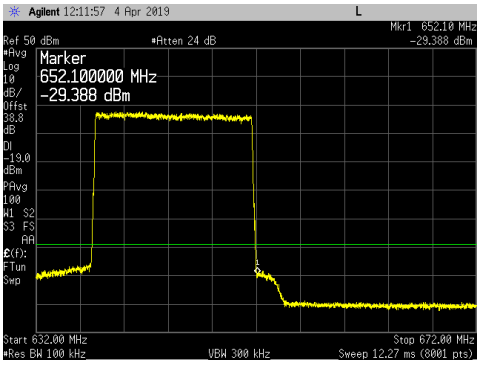
QPSK_ Top Ch_ 632 to 672MHz



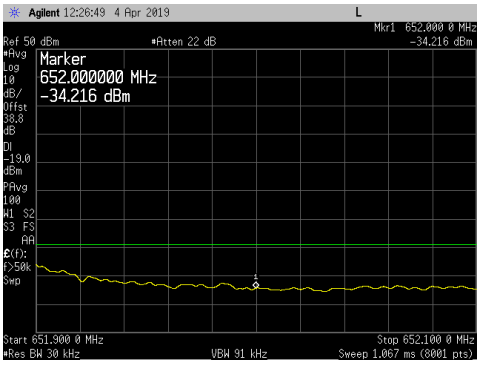
16QAM_ Top Ch_ 651.9 to 652.1MHz



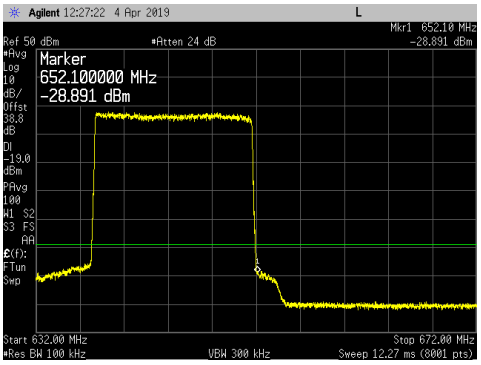
16QAM_ Top Ch_ 632 to 672MHz



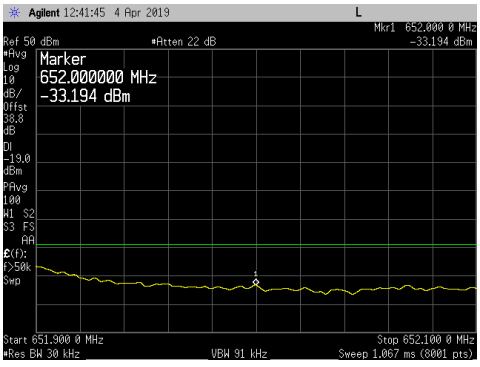
64QAM_ Top Ch_ 651.9 to 652.1MHz



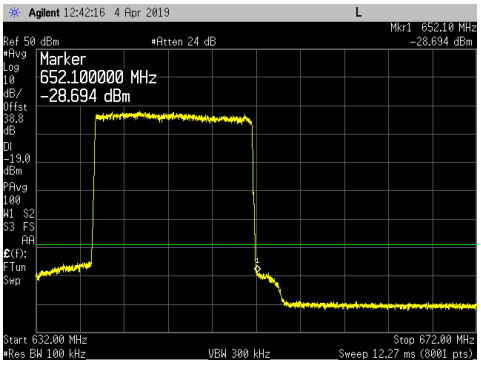
64QAM_ Top Ch_ 632 to 672MHz



256QAM_ Top Ch_ 651.9 to 652.1MHz

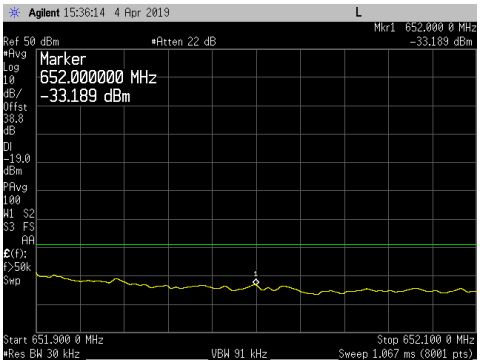


256QAM_ Top Ch_ 632 to 672MHz

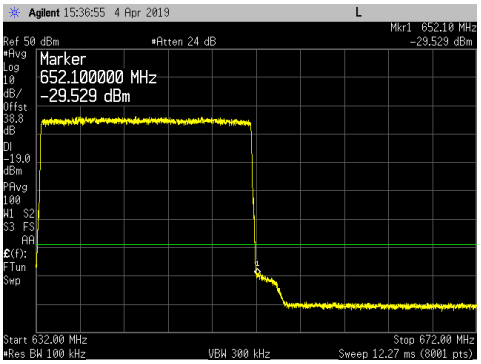


5G NR_ 20MHz Channel Bandwidth_ Upper Band Edge Plots for Antenna Port 4:

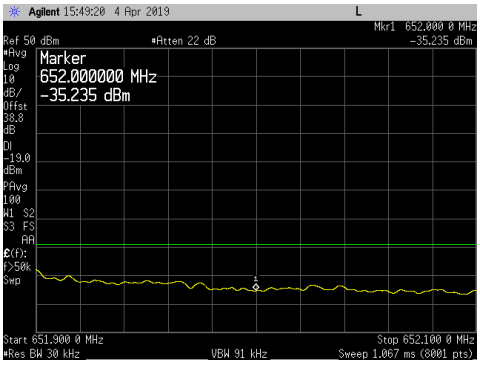
QPSK_ Top Ch_ 651.9 to 652.1MHz



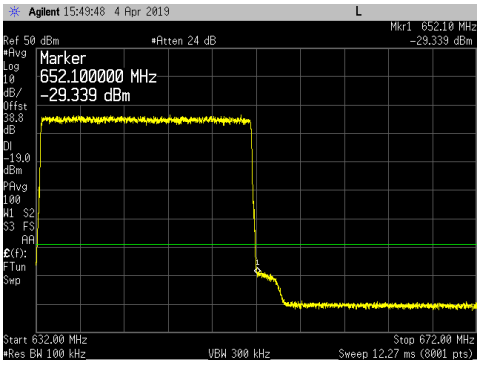
QPSK_ Top Ch_ 632 to 672MHz



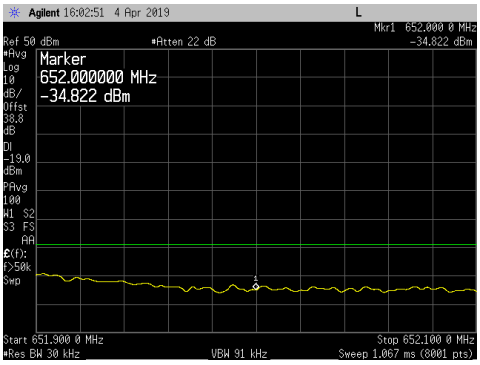
16QAM_ Top Ch_ 651.9 to 652.1MHz



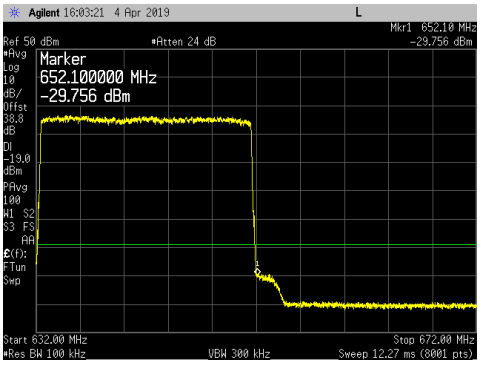
16QAM_ Top Ch_ 632 to 672MHz



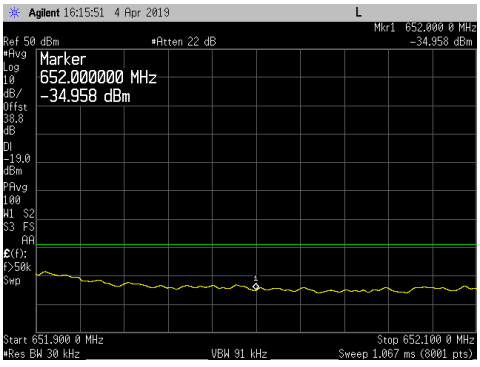
64QAM_ Top Ch_ 651.9 to 652.1MHz



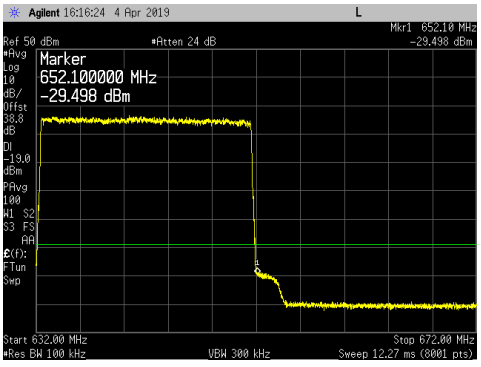
64QAM_ Top Ch_ 632 to 672MHz



256QAM_ Top Ch_ 651.9 to 652.1MHz



256QAM_ Top Ch_ 632 to 672MHz



Transmitter Antenna Port Conducted Emissions

Transmitter conducted emission measurements were made at RRH antenna port 4. Measurements were performed over the 9kHz to 8GHz frequency range.

The RRH was operated at the Band n71 center frequencies with a single 5G NR carrier at maximum power (60W) with all modulation types (QPSK, 16QAM, 64QAM, 256QAM) for 5MHz, 10MHz, 15MHz and 20MHz channel bandwidths.

The same limit of -19dBm used in the original certification testing is used for this testing. The limit is adjusted to -19dBm [-13dBm -10 log (4)] per FCC KDB 662911D01 v02r01 because the BTS may operate as a 4 port MIMO transmitter. The required measurement parameters include a 100kHz bandwidth with power measured in average value (since transmitter power was measured in average value).

Measurements were performed with a spectrum analyzer using a peak detector with max hold over 50 sweeps (except for the 9kHz to 150kHz and 600MHz to 800MHz frequency ranges). Measurements for the 9kHz to 150kHz and 600MHz to 800MHz frequency ranges were performed with the spectrum analyzer in the RMS average mode over 100 traces.

The limit for the 9kHz to 150kHz frequency range was adjusted to –39dBm to correct for a spectrum analyzer RBW of 1kHz versus required RBW of 100kHz [i.e.: -39dBm = -19dBm -10log(100kHz/1kHz)]. The limit for the 150kHz to 20MHz frequency range was adjusted to –29dBm to correct for a spectrum analyzer RBW of 10kHz versus required RBW of 100kHz [i.e.: -29dBm = -19dBm -10log(100kHz/10kHz)]. The required limit of -19dBm with a RBW of $\geq$100kHz was used for all other frequency ranges. The spectrum analyzer settings that were used for this test are summarized in the following table.

Frequency Range	RBW	VBW	Number of Data Points	Detector	Sweep Time	Max Hold over	Offset Note 1
9kHz to 150kHz	1kHz	3kHz	8001	Average	Auto	Note 2	37.8dB
150kHz to 20MHz	10kHz	30kHz	8001	Peak	Auto	50 Sweeps	37.7dB
20MHz to 600MHz	300kHz	910kHz	8001	Peak	Auto	50 Sweeps	38.7dB
600MHz to 800MHz	100kHz	300kHz	8001	Average	Auto	Note 2	38.8dB
800MHz to 1.1GHz	100kHz	300kHz	8192	Peak	Auto	50 Sweeps	38.9dB
1.1GHz to 8GHz	2MHz	6MHz	8192	Peak	Auto	50 Sweeps	25.2dB

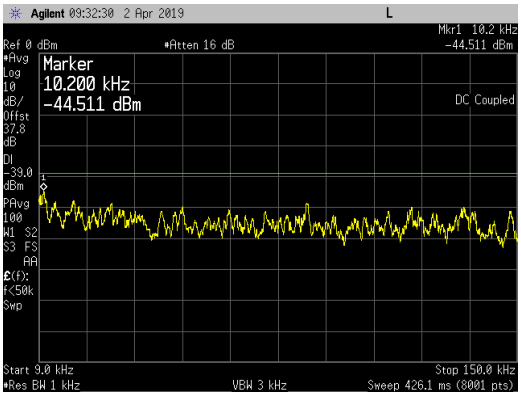
Note 1: The total measurement RF path loss of the test setup (attenuators, filters and test cables) is accounted for by the spectrum analyzer reference level offset.
Note 2: Max Hold not used and instead measurements were performed with the spectrum analyzer in the RMS average mode over 100 traces.

A high pass filter was used to reduce measurement instrumentation noise floor for the frequency ranges above 1100MHz. The total measurement RF path loss of the test setup (attenuators, high pass filter and test cables) as shown in the table is accounted for by the spectrum analyzer reference level offset. The display line on the plots reflects the required limit.

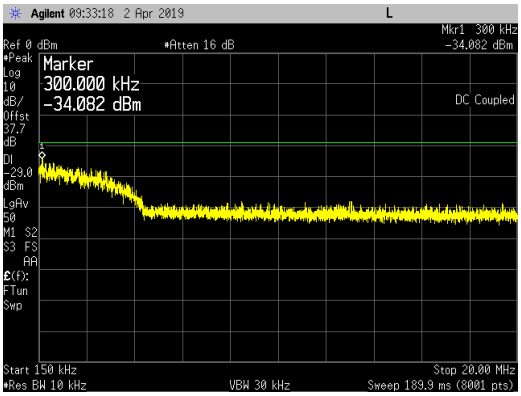
Conducted spurious emission plots/measurements are provided in the following pages.

5G NR_ 5MHz Channel Bandwidth_ QPSK_ Middle Channel (634.5MHz) at 60 watts/carrier:

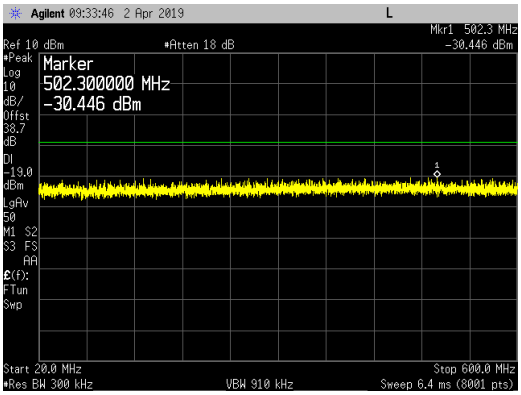
9kHz to 150kHz



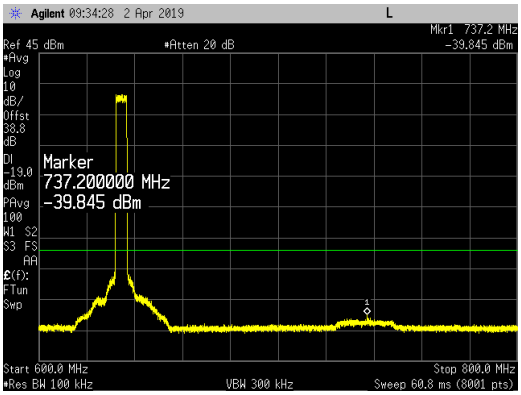
150kHz to 20MHz



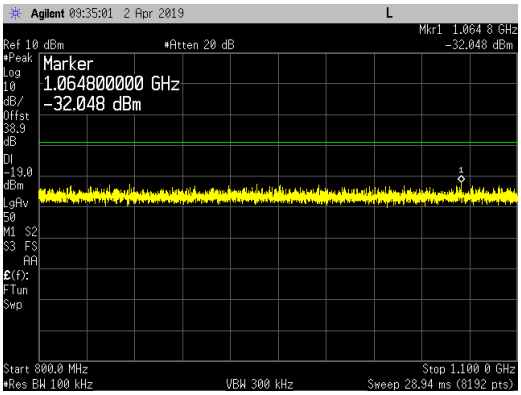
20MHz to 600MHz



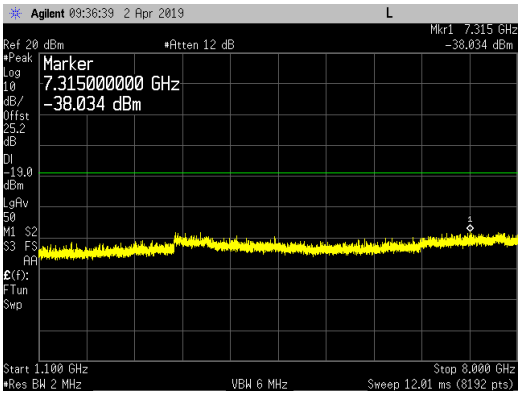
600MHz to 800MHz



800MHz to 1.1GHz

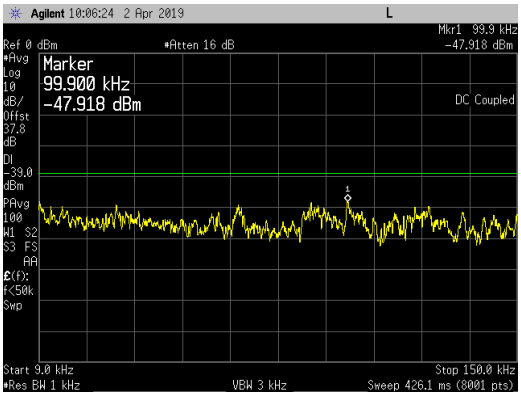


1.1GHz to 8GHz

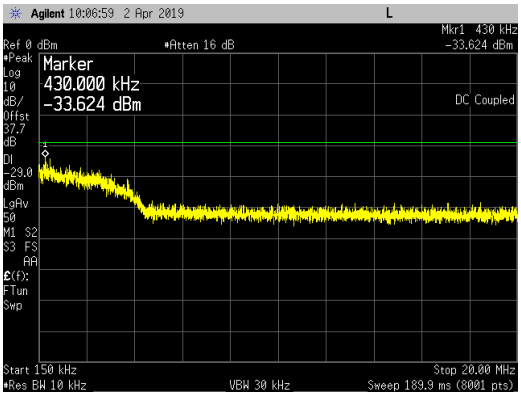


5G NR_ 5MHz Channel Bandwidth_ 16QAM_ Middle Channel (634.5MHz) at 60 watts/carrier:

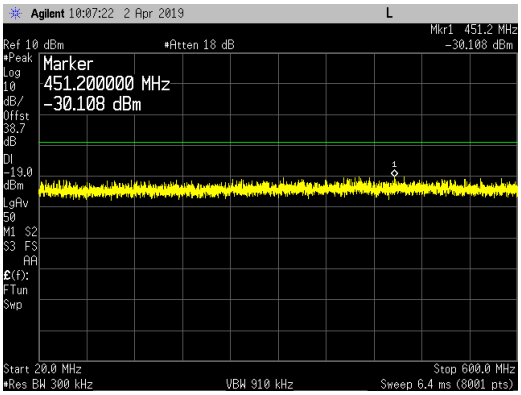
9kHz to 150kHz



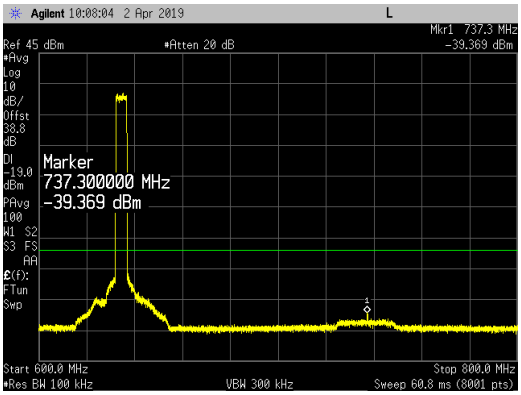
150kHz to 20MHz



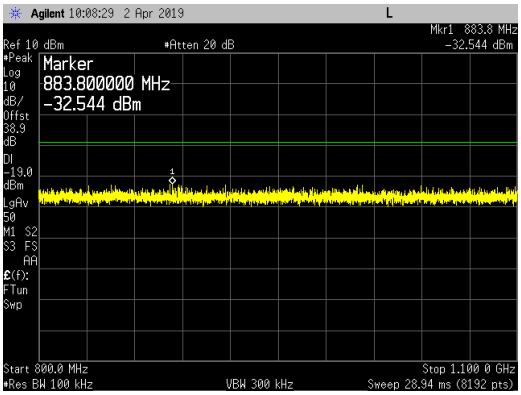
20MHz to 600MHz



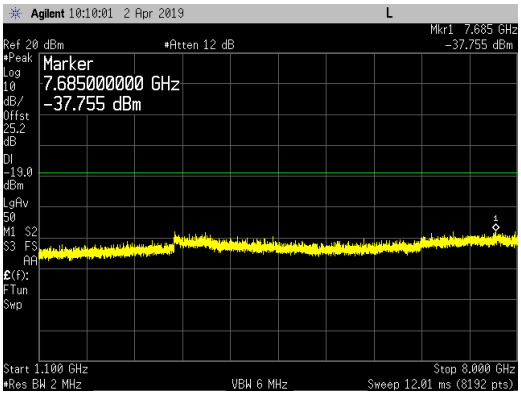
600MHz to 800MHz



800MHz to 1.1GHz

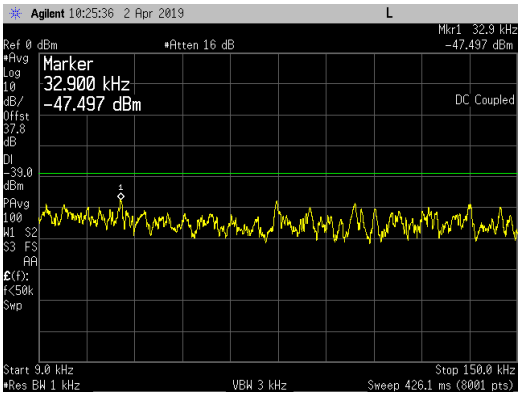


1.1GHz to 8GHz

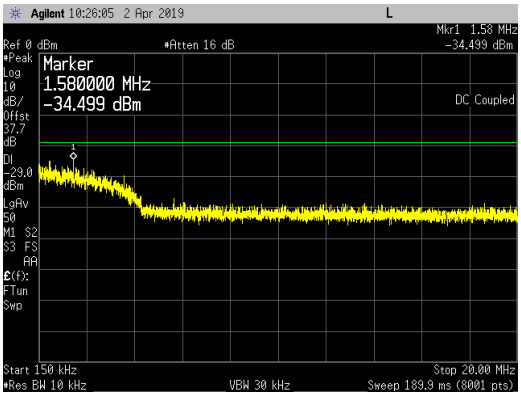


5G NR_ 5MHz Channel Bandwidth_64QAM_ Middle Channel (634.5MHz) at 60 watts/carrier:

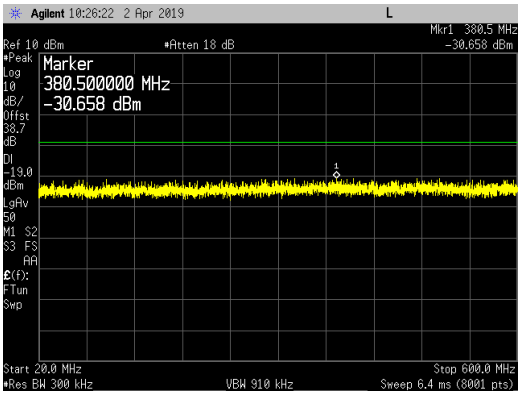
9kHz to 150kHz



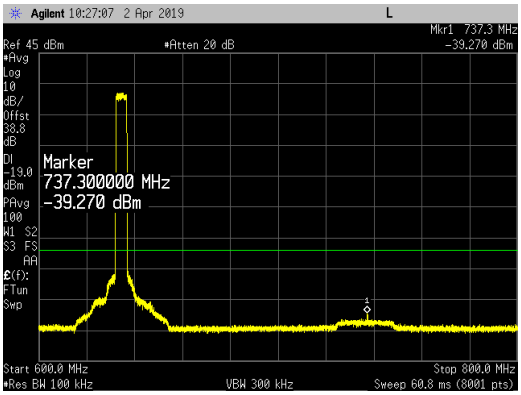
150kHz to 20MHz



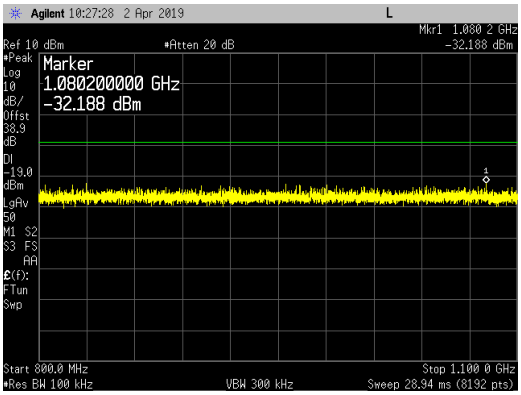
20MHz to 600MHz



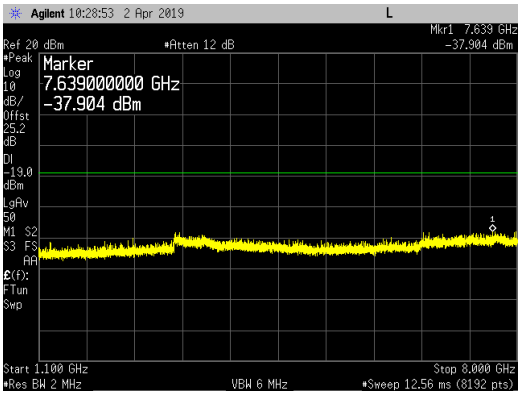
600MHz to 800MHz



800MHz to 1.1GHz

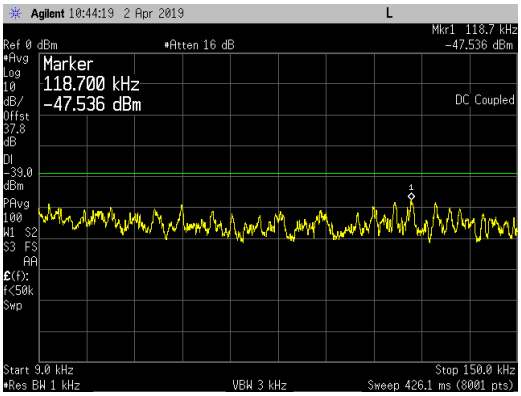


1.1GHz to 8GHz

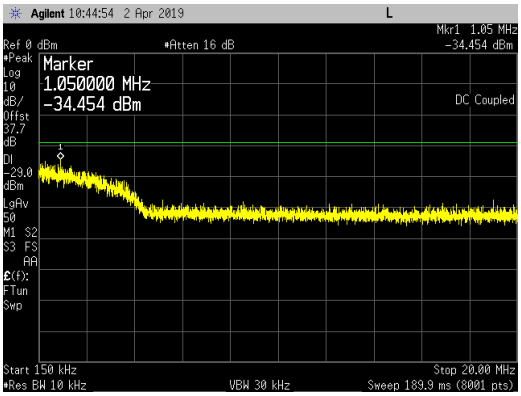


5G NR_ 5MHz Channel Bandwidth_ 256QAM_ Middle Channel (634.5MHz) at 60 watts/carrier:

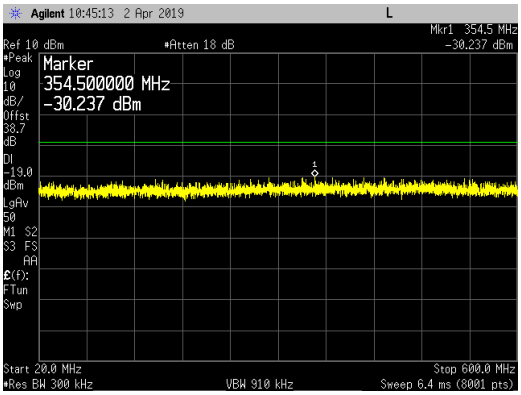
9kHz to 150kHz



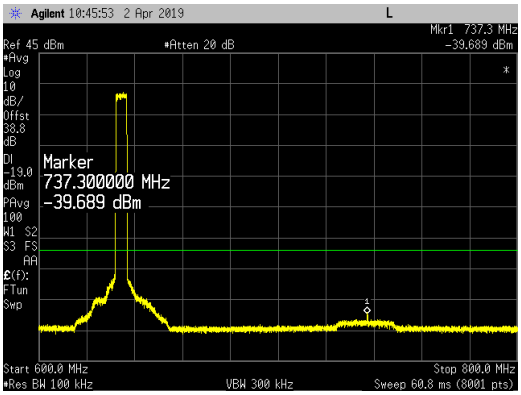
150kHz to 20MHz



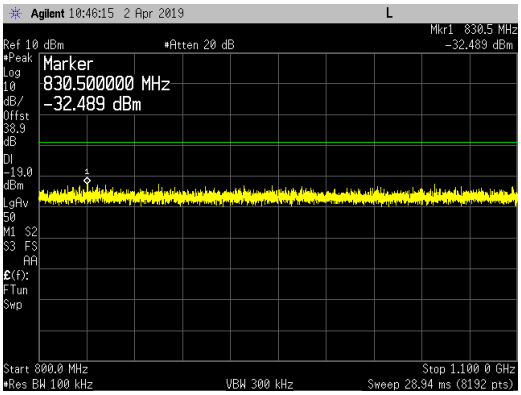
20MHz to 600MHz



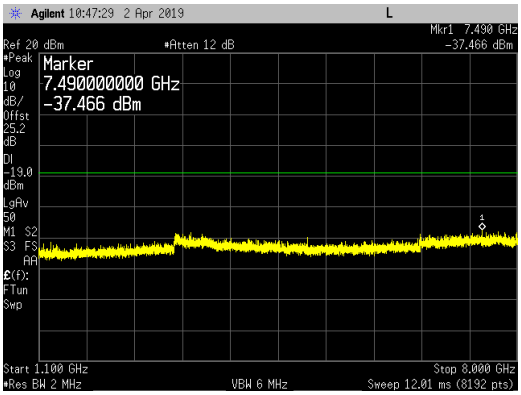
600MHz to 800MHz



800MHz to 1.1GHz

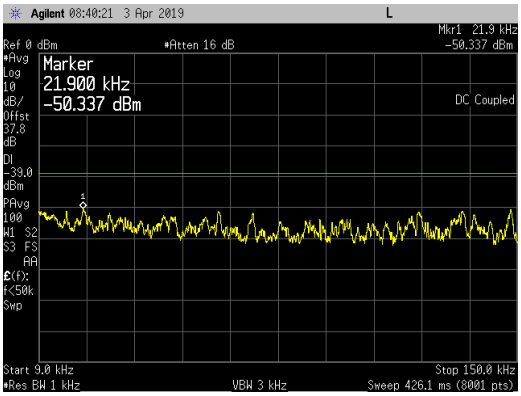


1.1GHz to 8GHz

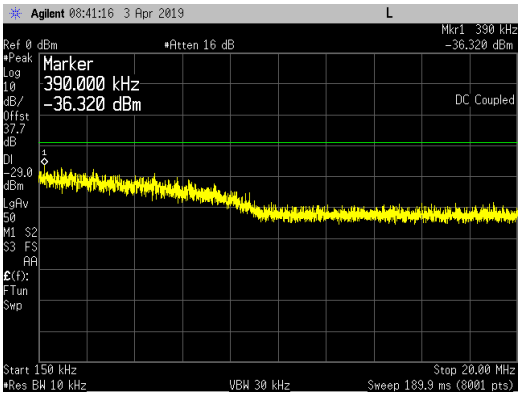


5G NR_ 10MHz Channel Bandwidth_ QPSK_ Middle Channel (634.5MHz) at 60 watts/carrier:

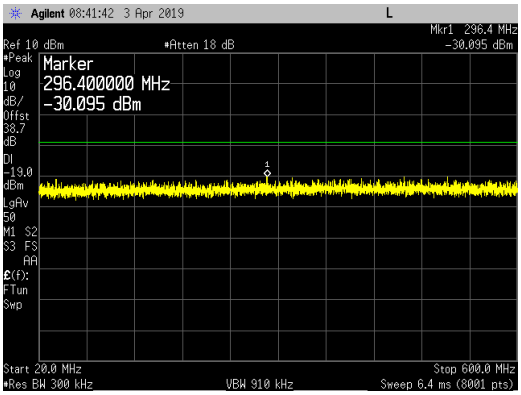
9kHz to 150kHz



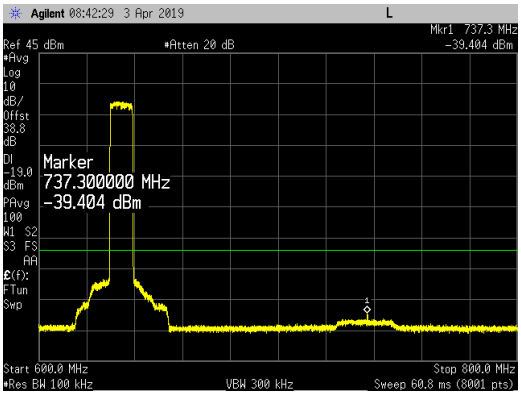
150kHz to 20MHz



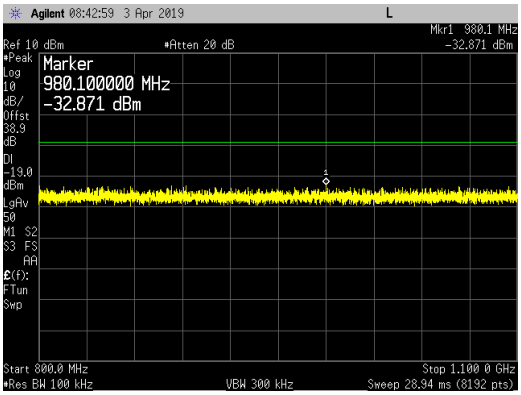
20MHz to 600MHz



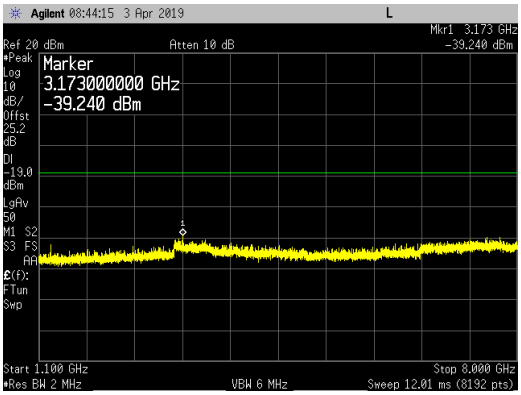
600MHz to 800MHz



800MHz to 1.1GHz

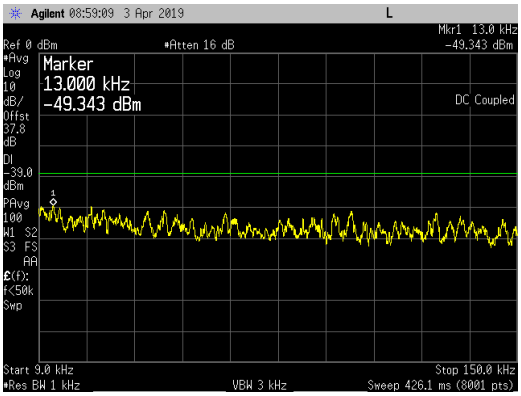


1.1GHz to 8GHz

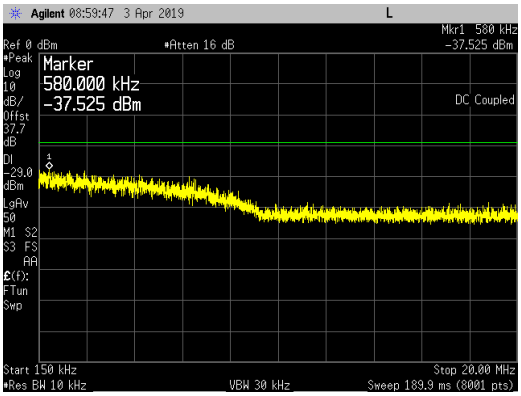


5G NR_ 10MHz Channel Bandwidth_ 16QAM_ Middle Channel (634.5MHz) at 60 watts/carrier:

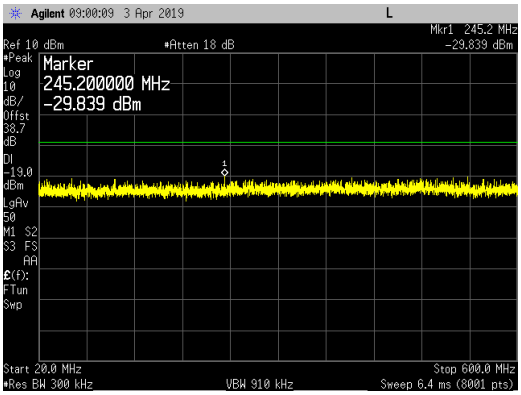
9kHz to 150kHz



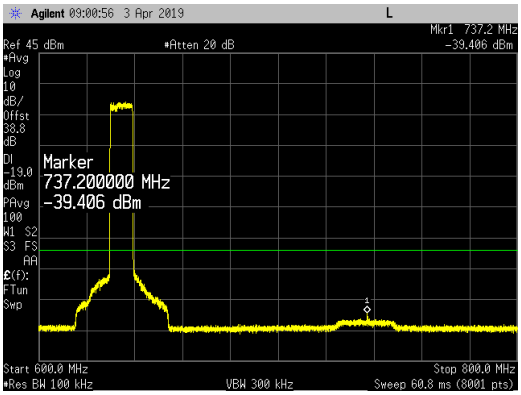
150kHz to 20MHz



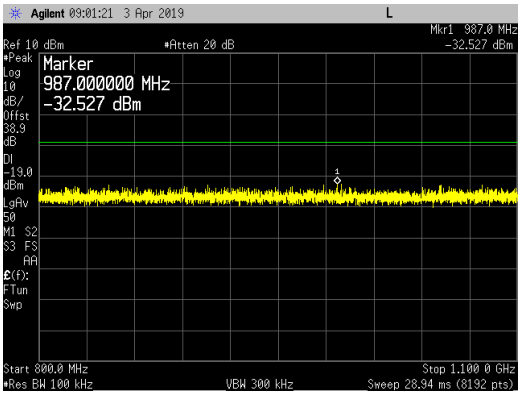
20MHz to 600MHz



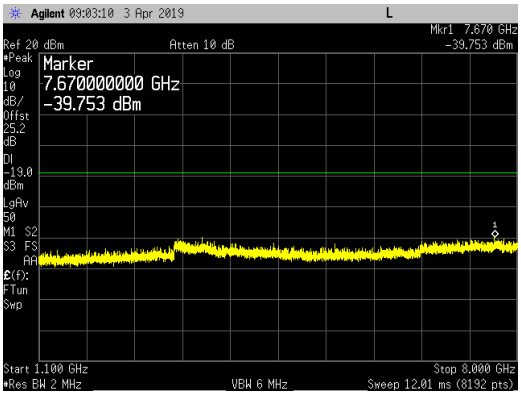
600MHz to 800MHz



800MHz to 1.1GHz

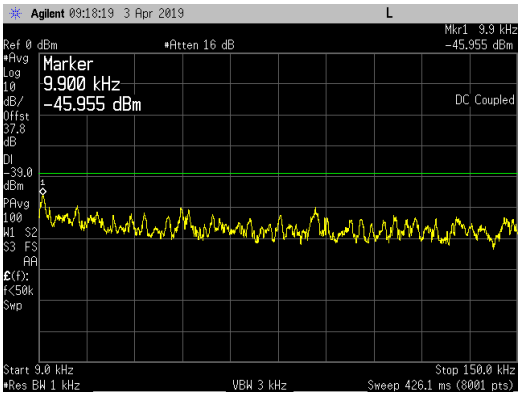


1.1GHz to 8GHz

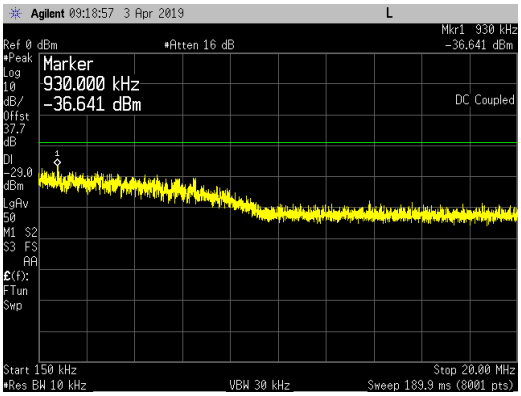


5G NR_ 10MHz Channel Bandwidth_ 64QAM_ Middle Channel (634.5MHz) at 60 watts/carrier:

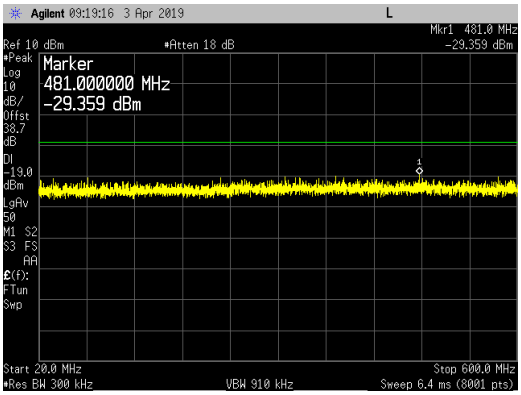
9kHz to 150kHz



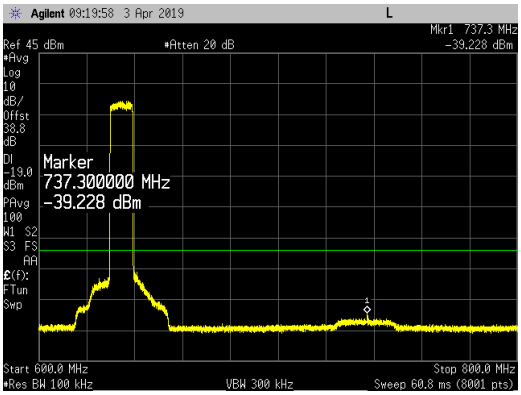
150kHz to 20MHz



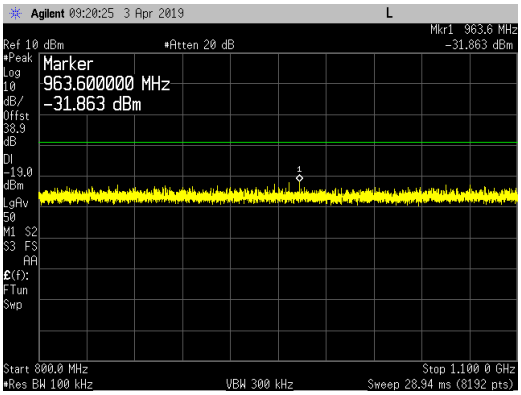
20MHz to 600MHz



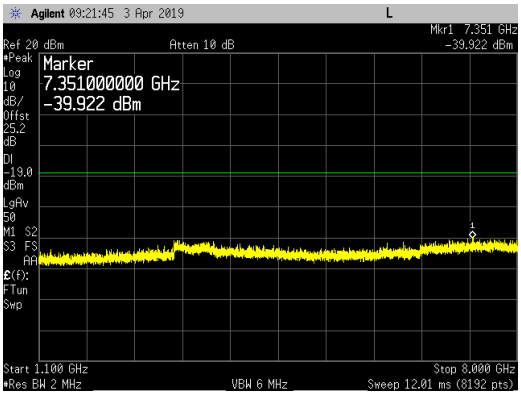
600MHz to 800MHz



800MHz to 1.1GHz

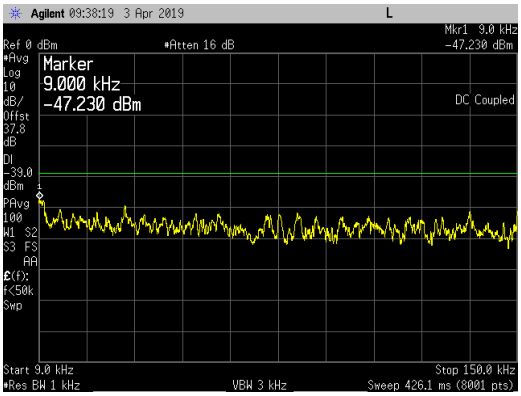


1.1GHz to 8GHz

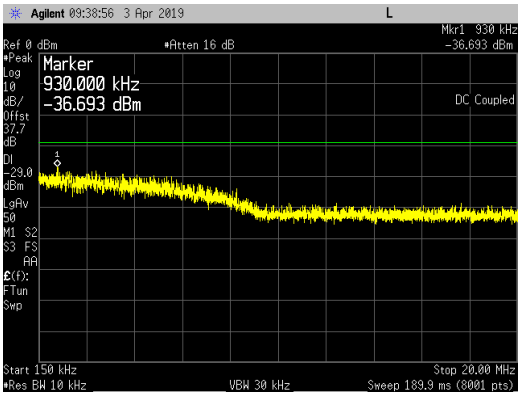


5G NR_ 10MHz Channel Bandwidth_ 256QAM_ Middle Channel (634.5MHz) at 60 watts/carrier:

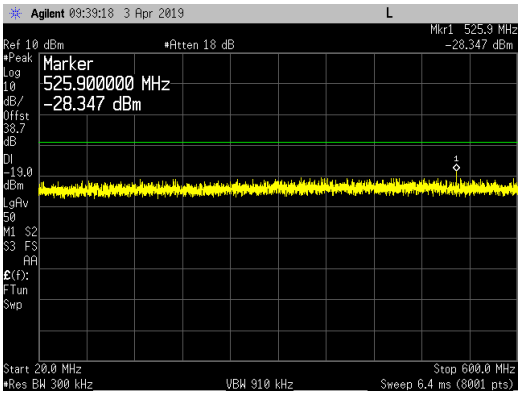
9kHz to 150kHz



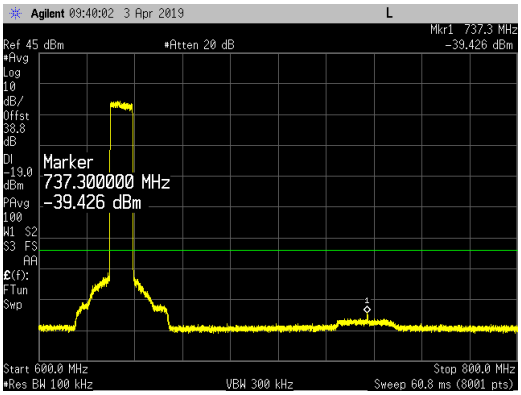
150kHz to 20MHz



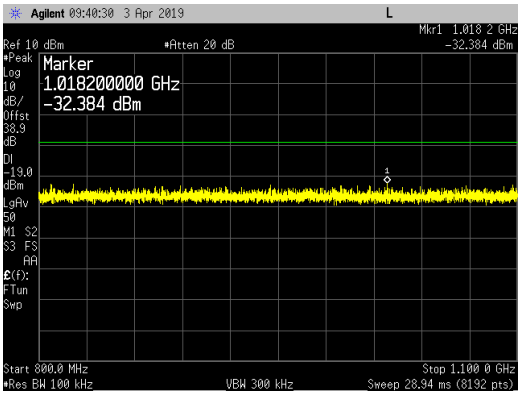
20MHz to 600MHz



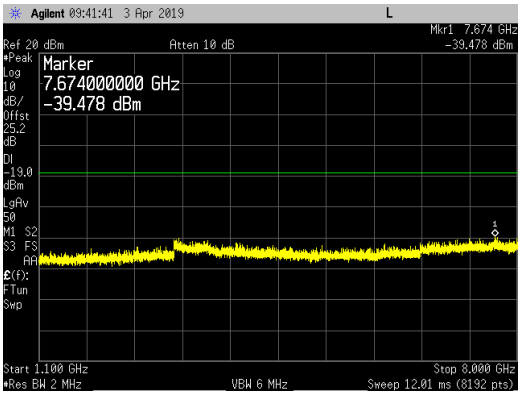
600MHz to 800MHz



800MHz to 1.1GHz

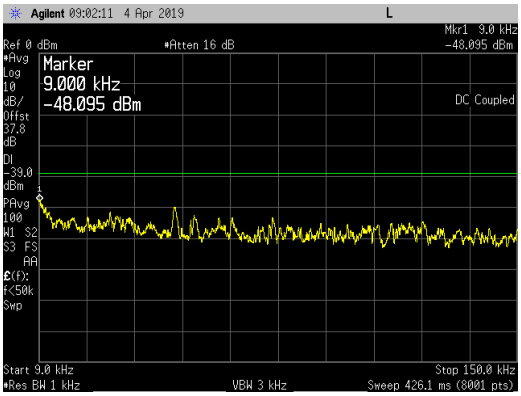


1.1GHz to 8GHz

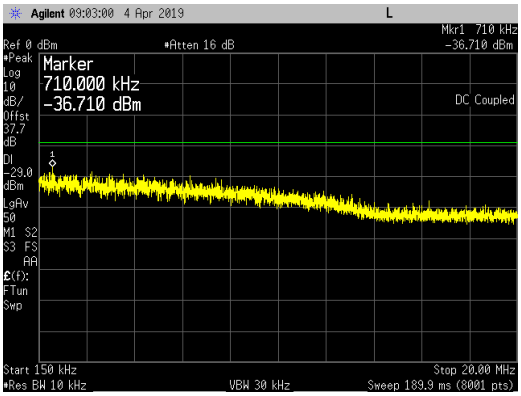


5G NR_ 15MHz Channel Bandwidth_ QPSK_ Middle Channel (634.5MHz) at 60 watts/carrier:

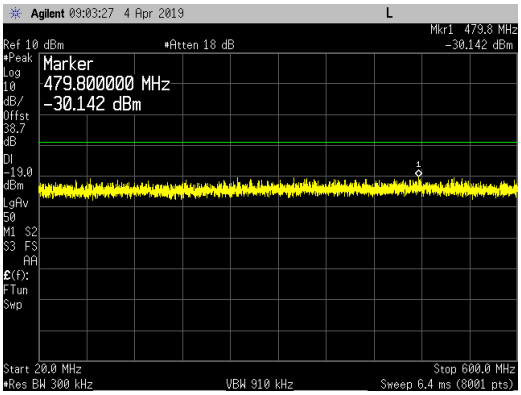
9kHz to 150kHz



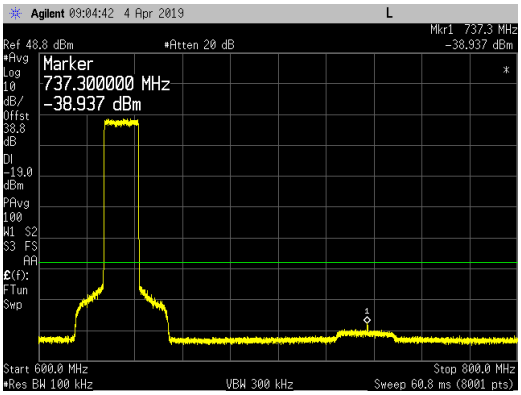
150kHz to 20MHz



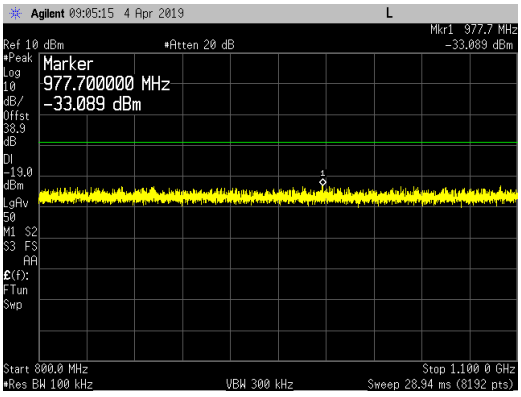
20MHz to 600MHz



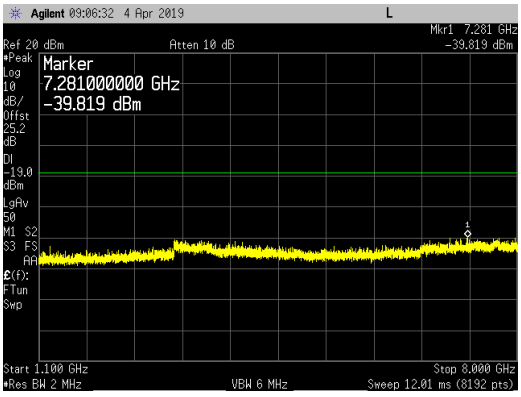
600MHz to 800MHz



800MHz to 1.1GHz

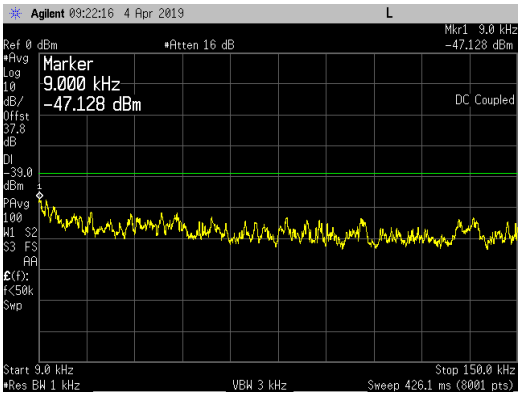


1.1GHz to 8GHz

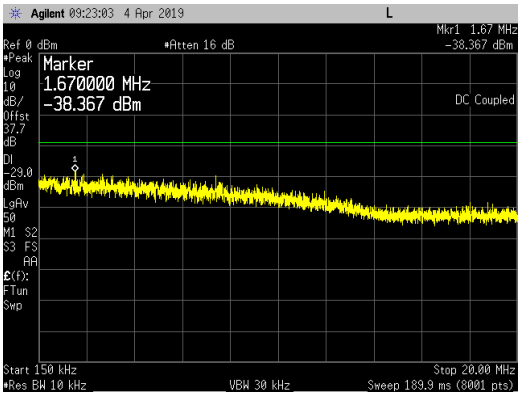


5G NR_ 15MHz Channel Bandwidth_ 16QAM_ Middle Channel (634.5MHz) at 60 watts/carrier:

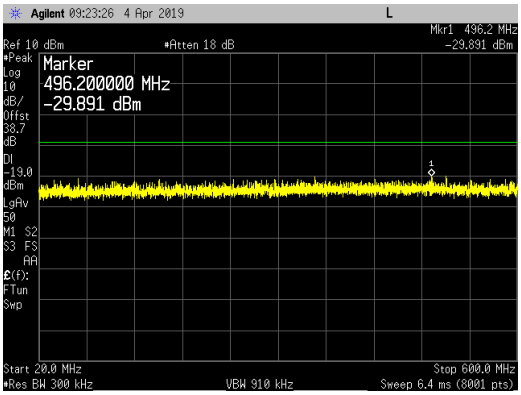
9kHz to 150kHz



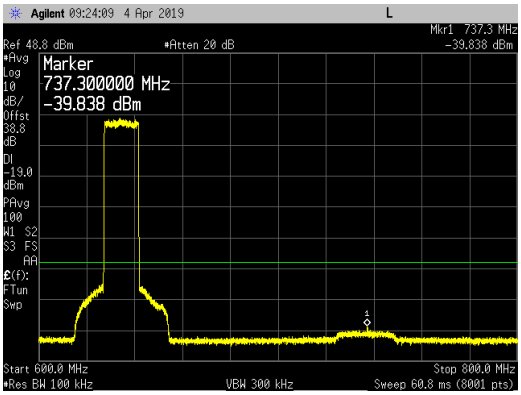
150kHz to 20MHz



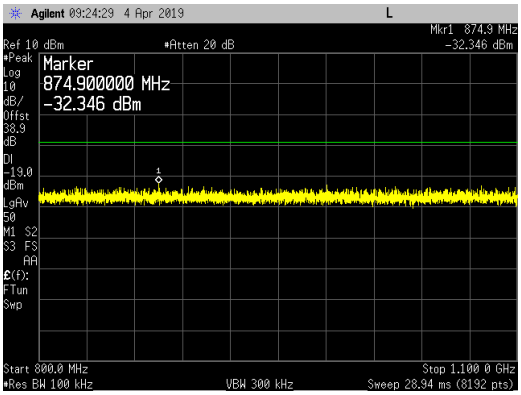
20MHz to 600MHz



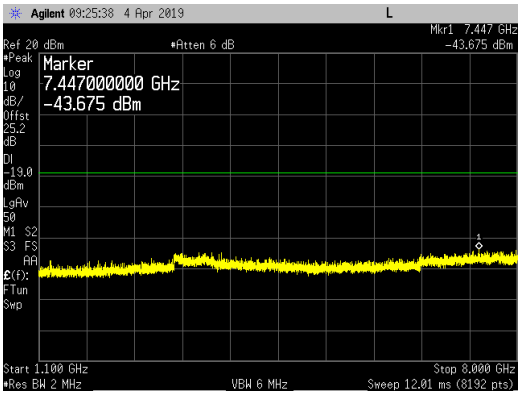
600MHz to 800MHz



800MHz to 1.1GHz

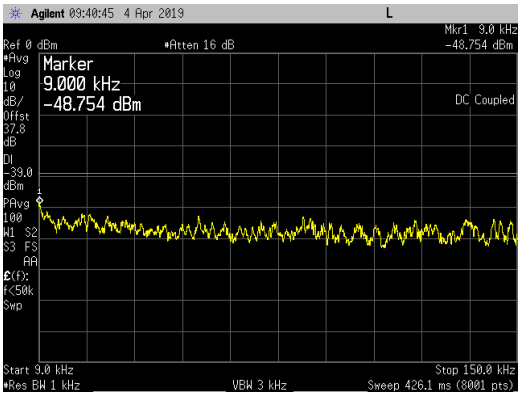


1.1GHz to 8GHz

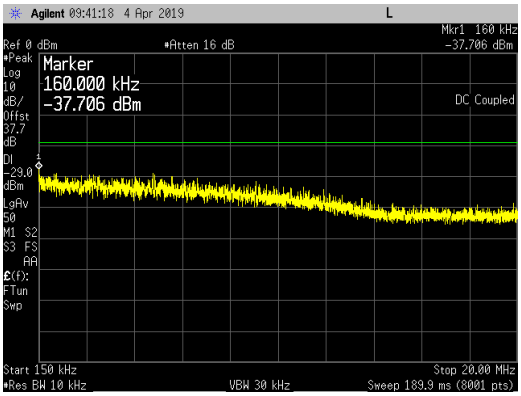


5G NR_ 15MHz Channel Bandwidth_64QAM_ Middle Channel (634.5MHz) at 60 watts/carrier:

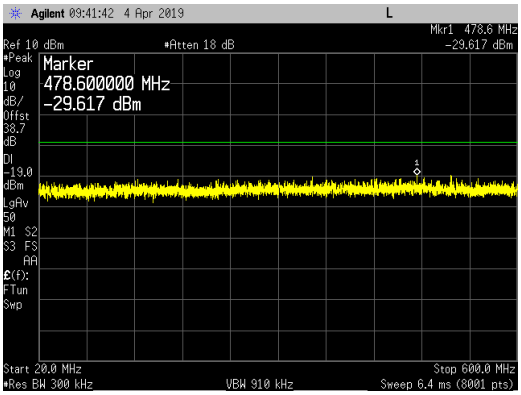
9kHz to 150kHz



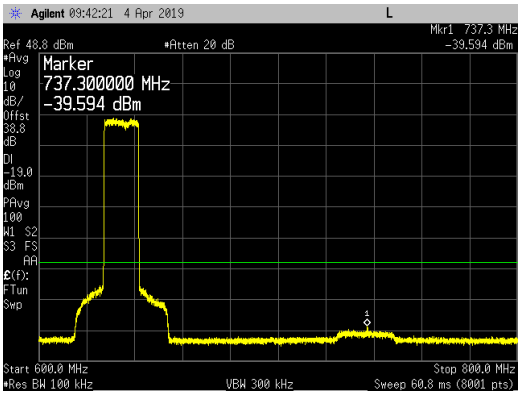
150kHz to 20MHz



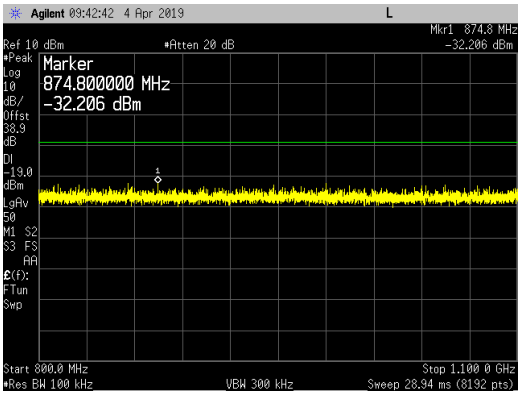
20MHz to 600MHz



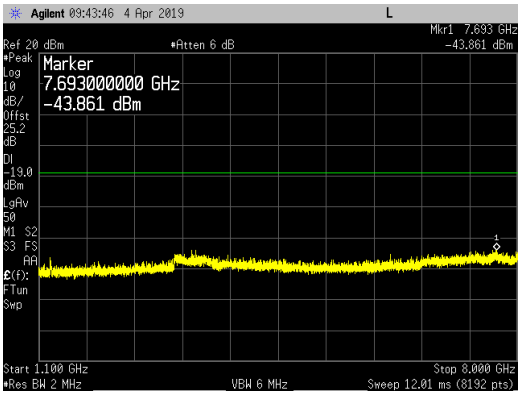
600MHz to 800MHz



800MHz to 1.1GHz

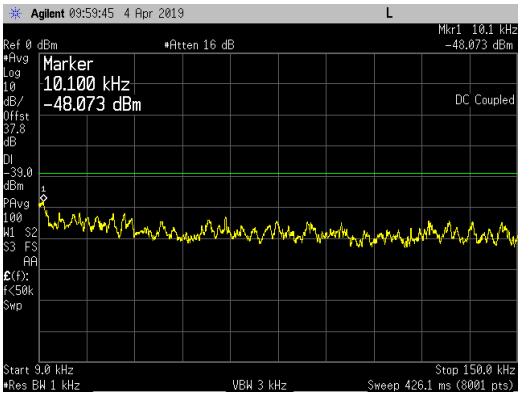


1.1GHz to 8GHz

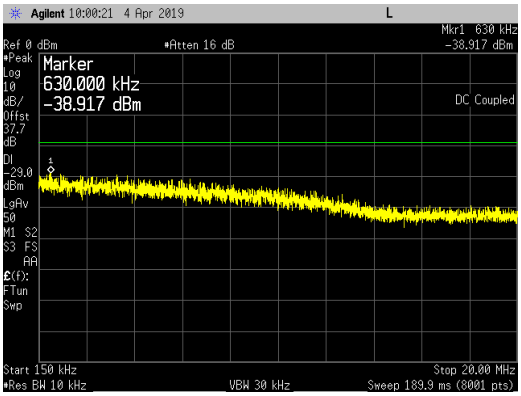


5G NR_ 15MHz Channel Bandwidth_ 256QAM_ Middle Channel (634.5MHz) at 60 watts/carrier:

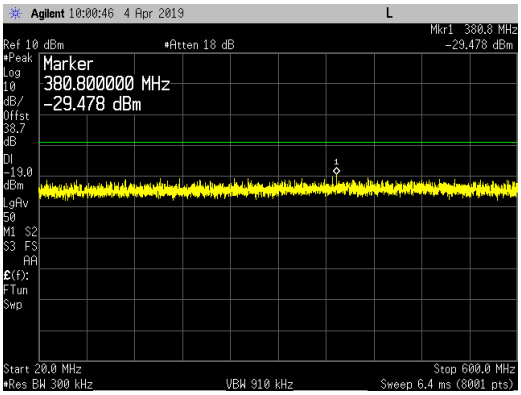
9kHz to 150kHz



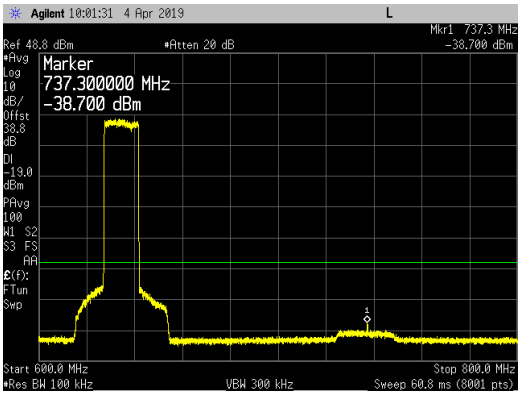
150kHz to 20MHz



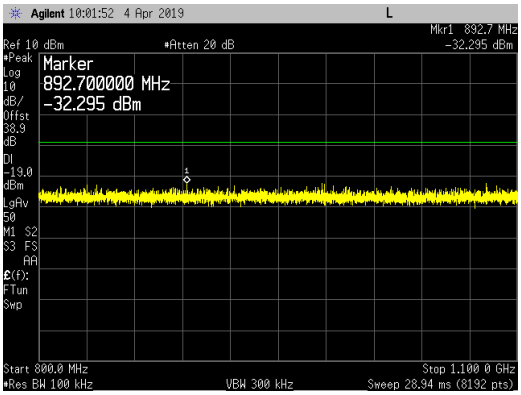
20MHz to 600MHz



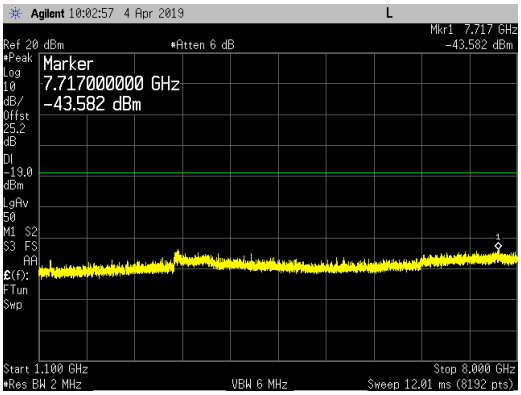
600MHz to 800MHz



800MHz to 1.1GHz

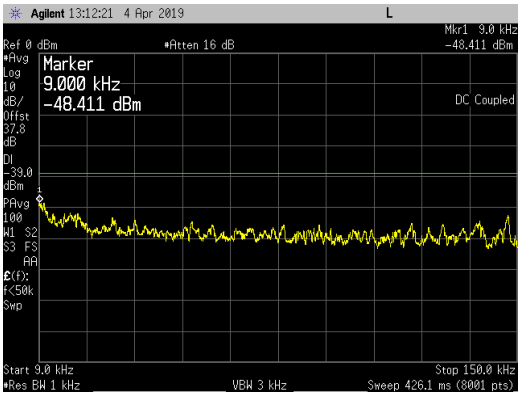


1.1GHz to 8GHz

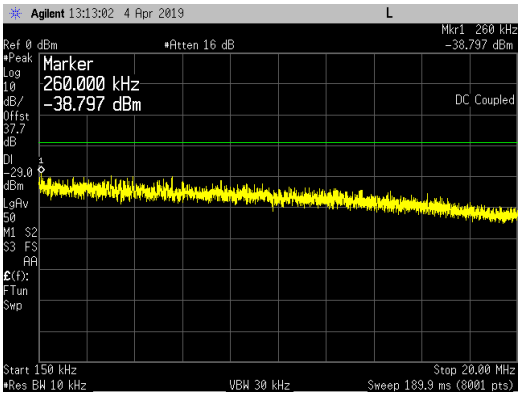


5G NR_ 20MHz Channel Bandwidth_ QPSK_ Middle Channel (634.5MHz) at 60 watts/carrier:

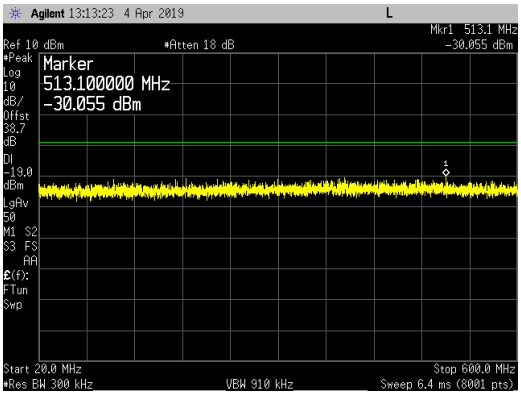
9kHz to 150kHz



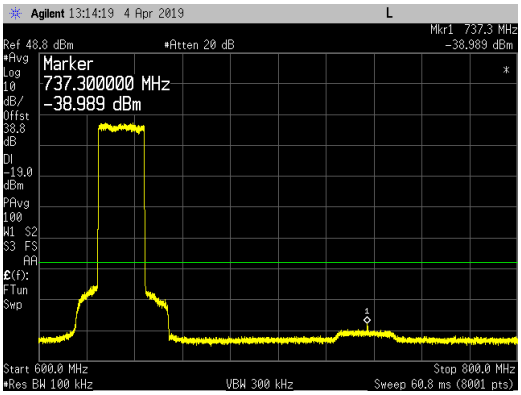
150kHz to 20MHz



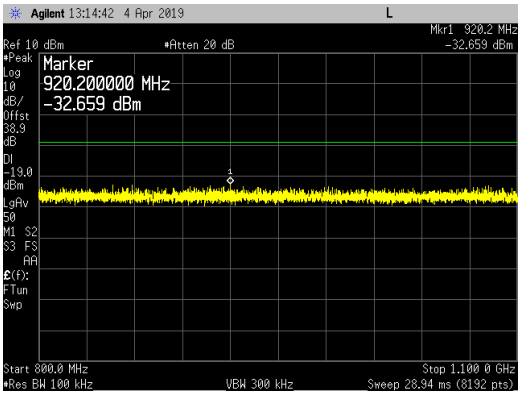
20MHz to 600MHz



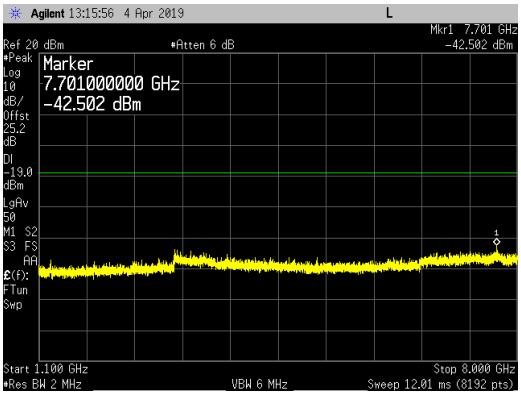
600MHz to 800MHz



800MHz to 1.1GHz

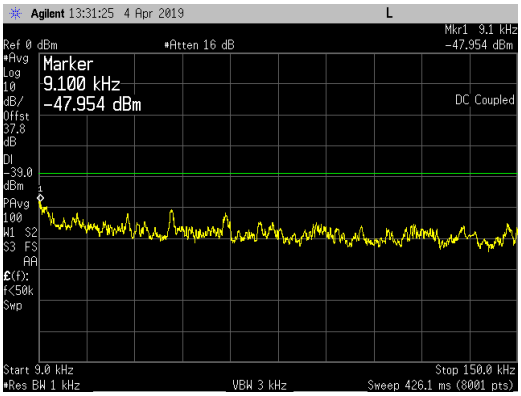


1.1GHz to 8GHz

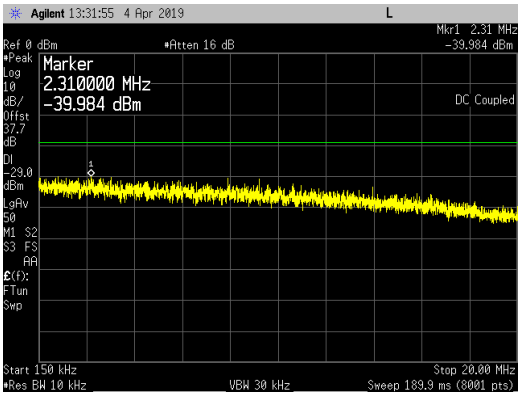


5G NR_ 20MHz Channel Bandwidth_ 16QAM_ Middle Channel (634.5MHz) at 60 watts/carrier:

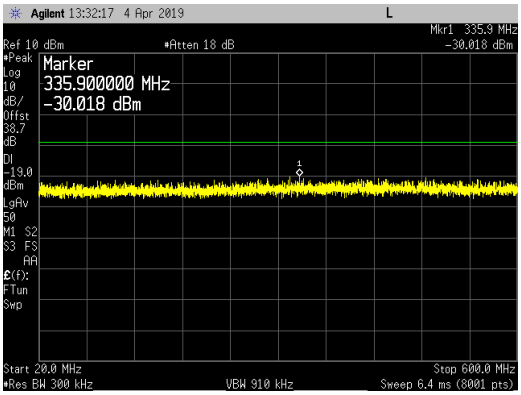
9kHz to 150kHz



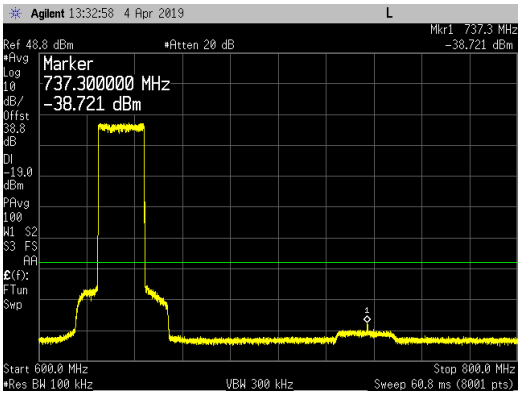
150kHz to 20MHz



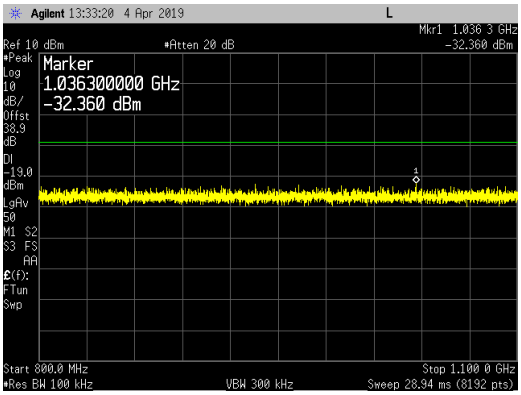
20MHz to 600MHz



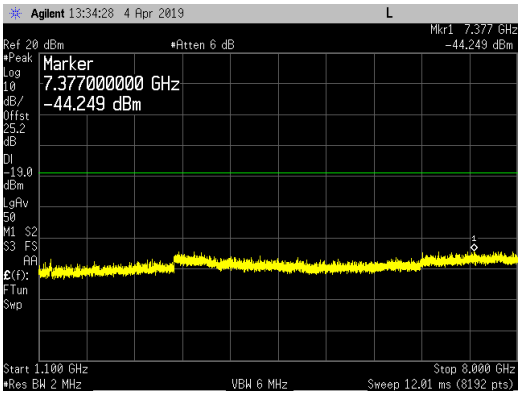
600MHz to 800MHz



800MHz to 1.1GHz

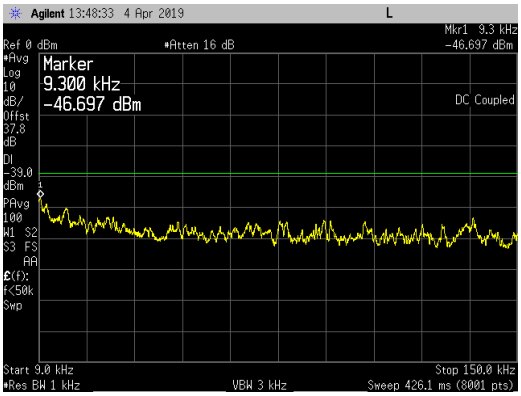


1.1GHz to 8GHz

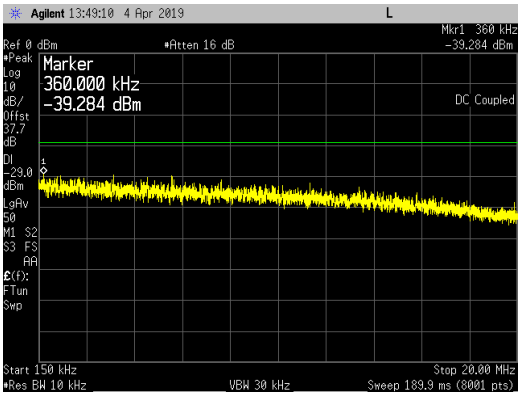


5G NR_ 20MHz Channel Bandwidth_ 64QAM_ Middle Channel (634.5MHz) at 60 watts/carrier:

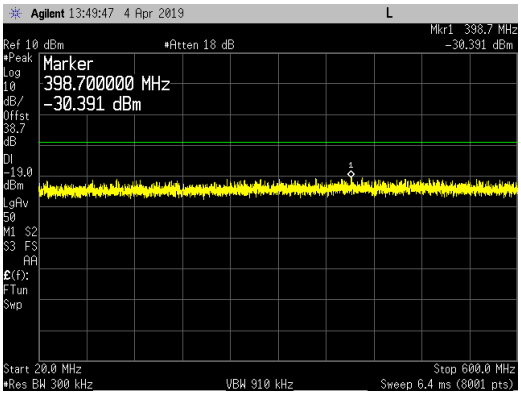
9kHz to 150kHz



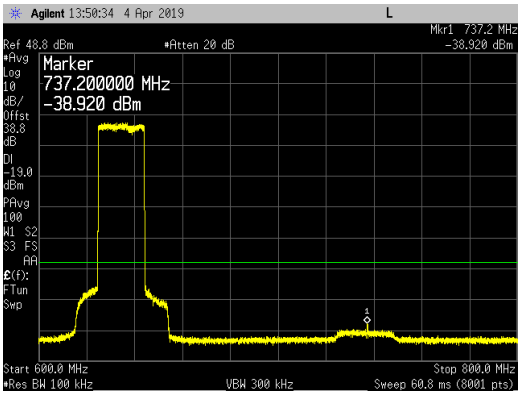
150kHz to 20MHz



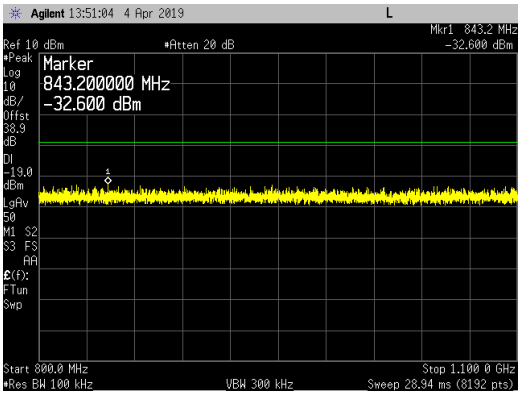
20MHz to 600MHz



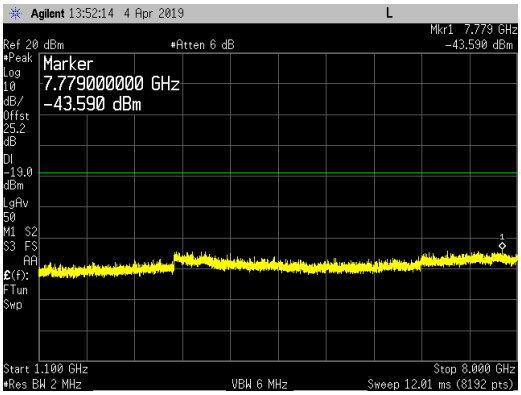
600MHz to 800MHz



800MHz to 1.1GHz

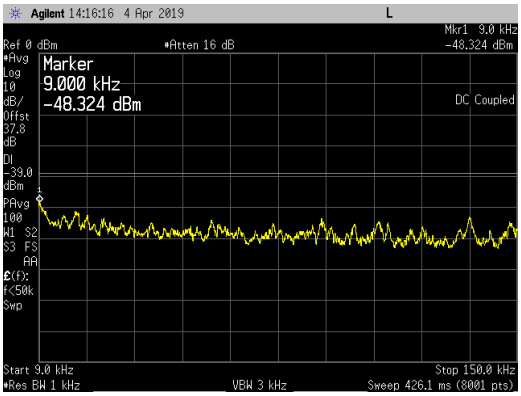


1.1GHz to 8GHz

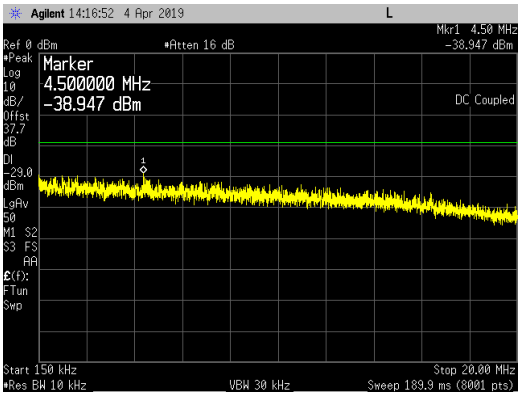


5G NR_ 20MHz Channel Bandwidth_ 256QAM_ Middle Channel (634.5MHz) at 60 watts/carrier:

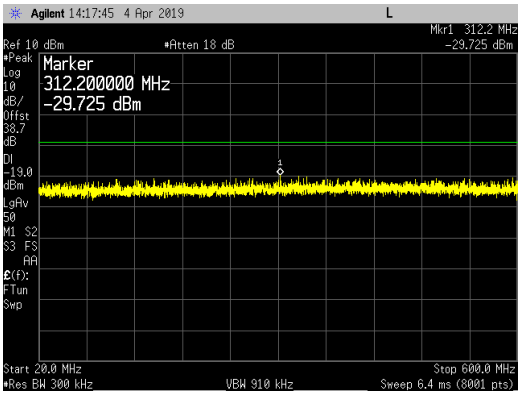
9kHz to 150kHz



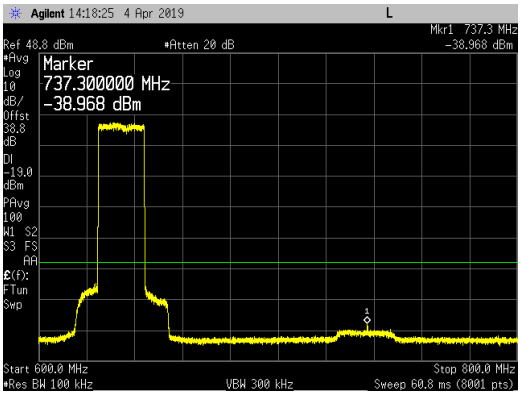
150kHz to 20MHz



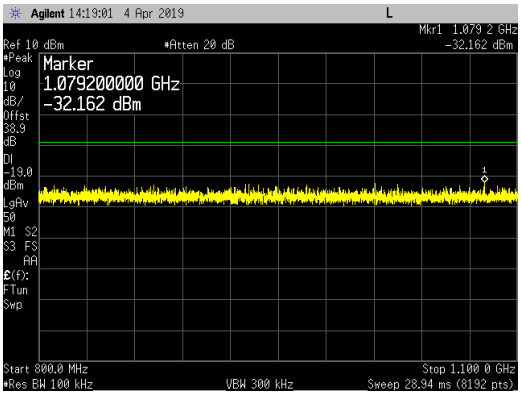
20MHz to 600MHz



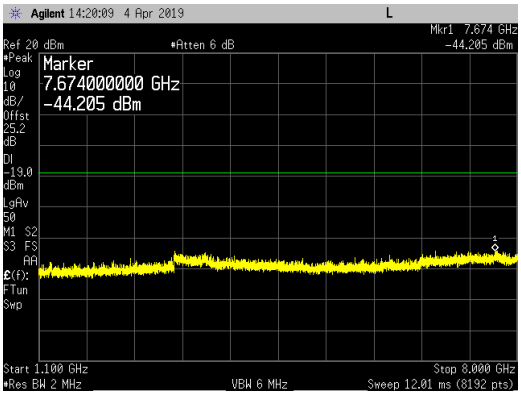
600MHz to 800MHz



800MHz to 1.1GHz



1.1GHz to 8GHz



Transmitter Radiated Spurious Emissions

Radiated spurious emission plots/measurement results are in the original FCC radio certification submittal (NTS Test Report Number PR078121 Revision 0 dated April 25, 2018).

Frequency Stability/Accuracy

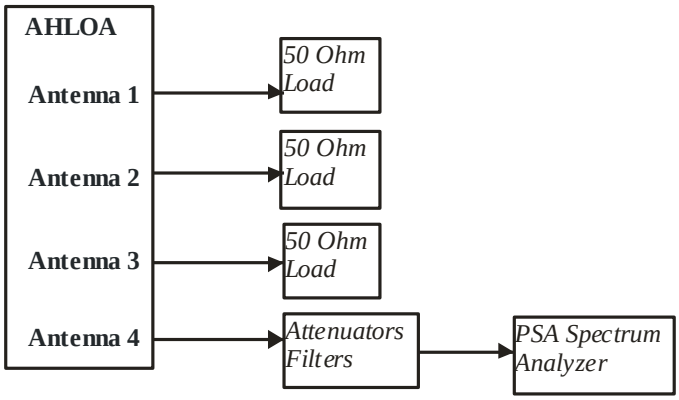
Frequency Stability/Accuracy measurement results are in the original FCC radio certification submittal (NTS Test Report Number PR078121 Revision 0 dated April 25, 2018).

APPENDIX B: ANTENNA PORT TEST DATA FOR BAND N85 (728-746MHZ)

All conducted RF measurements in this section were made at AHLOA antenna port 4. The testing was performed on the same hardware (EUT) as the original certification test. The same EUT RF port (Ant 4) determined in the original certification testing to be the highest power port was used for all testing in this effort.

The 5G NR carrier bandwidths of 5MHz and 10MHz with QPSK, 16QAM, 64QAM and 256QAM modulation types were measured. The 5G NR carriers/modulation types for this testing were based upon 3GPP TS 38.141-1 Test Models and are NR-FR1-TM 1.1 (QPSK modulation type), NR-FR1-TM 3.2 (16QAM modulation type), NR-FR1-TM 3.1 (64QAM modulation type), and NR-FR1-TM 3.1a (256QAM modulation type).

The test setup used is provided below.



Test Setup Used for Conducted RF Measurements on AHLOA

RF Output Power

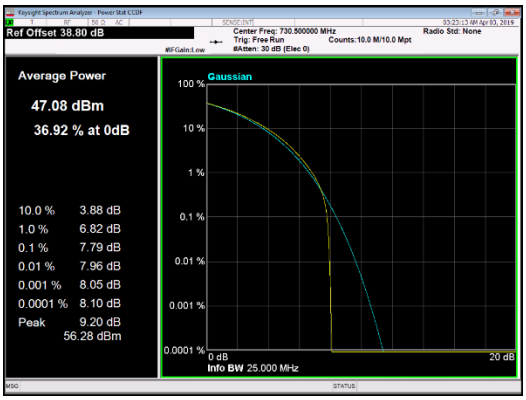
The AHLOA was operated at maximum RF output power. RF output power has been measured in RMS Average terms at the AHLOA Antenna Port 4 transmit chain [5G NR Band n85 (728 to 746MHz)] at the bottom, middle and top frequency channels for all 5G NR modulation types (QPSK, 16QAM, 64QAM and 256QAM) and channel bandwidths (5 and 10MHz) as described in section 5.2 of KDB 971168 D01v03r01 and ANSI C63.26-2015 section 5.2.4.4. The peak to average power ratio (PAPR) has been measured using the signal analyzer complementary cumulative distribution function (CCDF) for a probability of 0.1% as described in section 5.7.2 of KDB971168 D01v03r01 and ANSI C63.26-2015 section 5.2.3.4. All results are presented in tabular form below. The highest measured values are highlighted.

5G NR Channel BW	Modulation	Frequency _ Channel	PAPR (dB)	Ave (dBm)
5MHz	QPSK	730.5MHz _ Bottom Channel	7.79	47.16
		737.0MHz _ Middle Channel	7.75	47.22
		743.5MHz _ Top Channel	**7.82**	47.21
	16QAM	730.5MHz _ Bottom Channel	**7.82**	47.28
		737.0MHz _ Middle Channel	7.69	47.26
		743.5MHz _ Top Channel	7.67	47.28
	64QAM	730.5MHz _ Bottom Channel	7.76	47.26
		737.0MHz _ Middle Channel	7.80	47.07
		743.5MHz _ Top Channel	7.67	47.24
	256QAM	730.5MHz _ Bottom Channel	**7.82**	47.36
		737.0MHz _ Middle Channel	7.74	47.33
		743.5MHz _ Top Channel	7.78	47.24
10MHz	QPSK	733.0MHz _ Bottom Channel	7.77	47.32
		737.0MHz _ Middle Channel	7.64	47.28
		741.0MHz _ Top Channel	7.64	47.41
	16QAM	733.0MHz _ Bottom Channel	7.72	**47.43**
		737.0MHz _ Middle Channel	7.65	47.26
		741.0MHz _ Top Channel	7.70	47.19
	64QAM	733.0MHz _ Bottom Channel	7.68	47.37
		737.0MHz _ Middle Channel	7.61	47.35
		741.0MHz _ Top Channel	7.65	47.18
	256QAM	733.0MHz _ Bottom Channel	7.77	47.40
		737.0MHz _ Middle Channel	7.64	47.27
		741.0MHz _ Top Channel	7.67	47.35

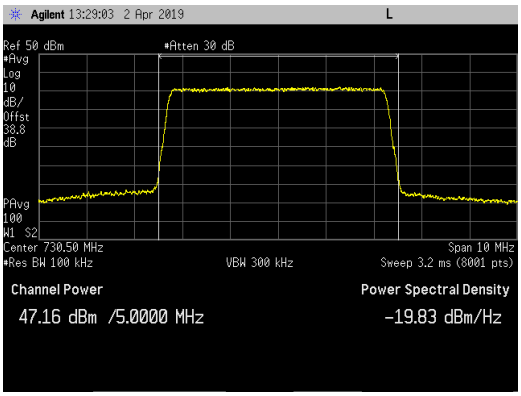
All measurement results are provided in the following pages. The total measurement RF path loss of the test setup (attenuator and test cables) was 38.8 dB and is accounted for by the spectrum analyzer reference level offset.

5G NR 5MHz Channel Power Plots for the QPSK Modulation Type:

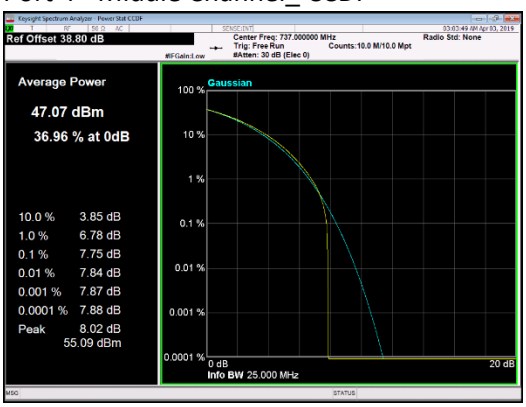
Port 4 - Bottom Channel_ CCDF



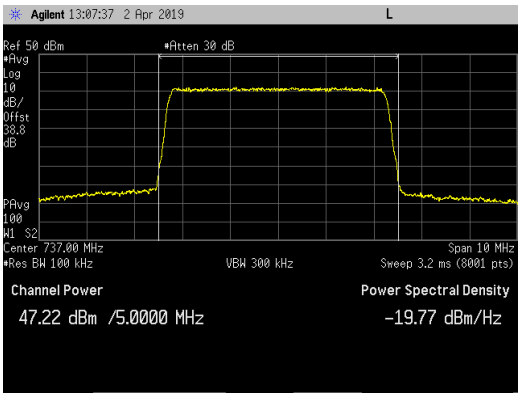
Port 4 - Bottom Channel_ Average



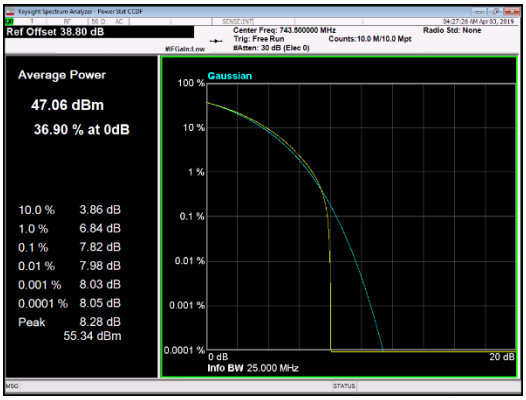
Port 4 - Middle Channel_ CCDF



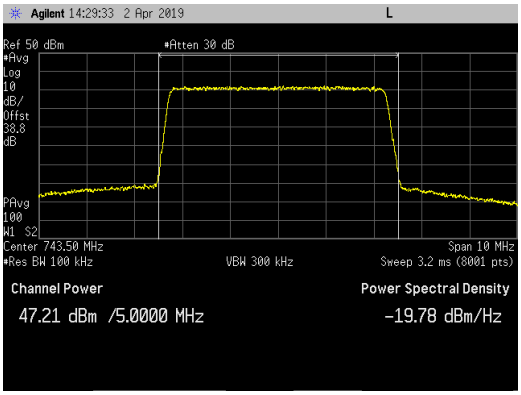
Port 4 - Middle Channel_ Average



Port 4 - Top Channel_ CCDF

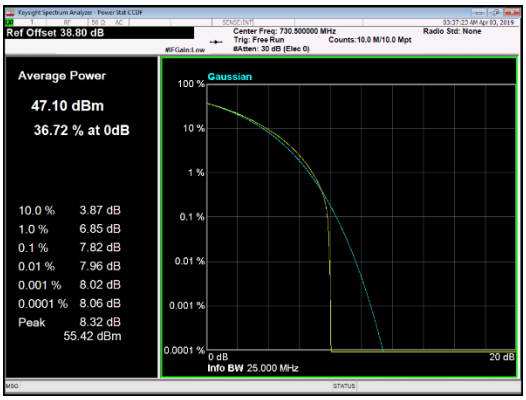


Port 4 - Top Channel_ Average

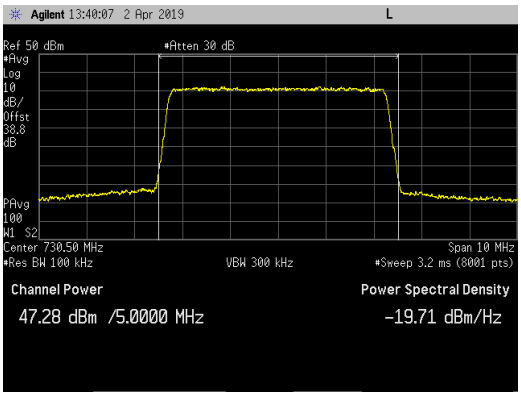


5G NR 5MHz Channel Power Plots for the 16QAM Modulation Type:

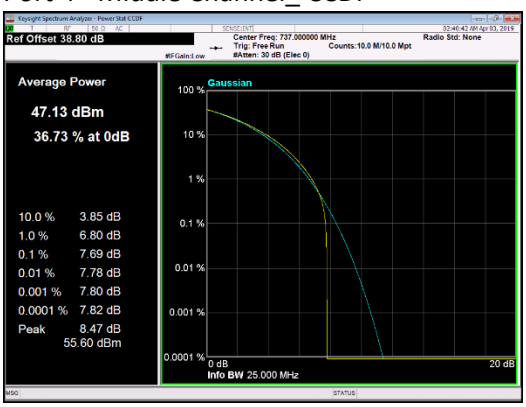
Port 4 - Bottom Channel_ CCDF



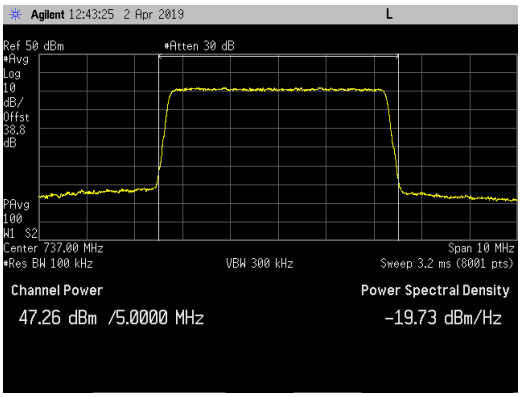
Port 4 - Bottom Channel_ Average



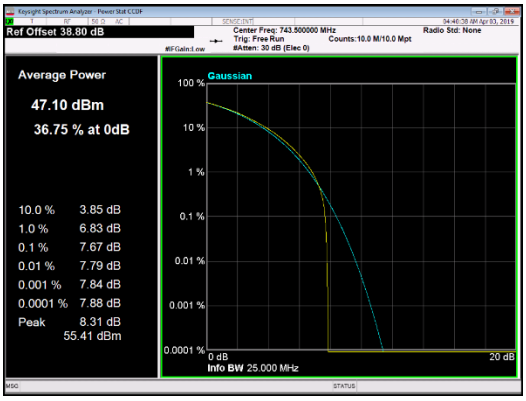
Port 4 - Middle Channel_ CCDF



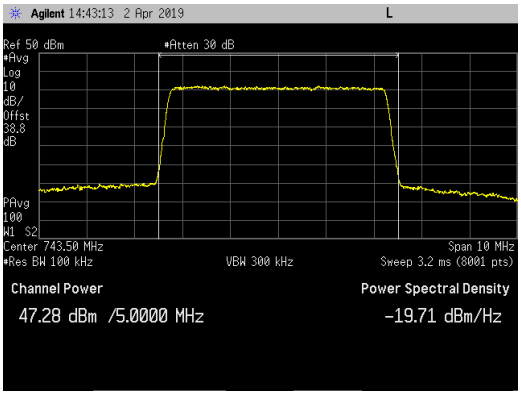
Port 4 - Middle Channel_ Average



Port 4 - Top Channel_ CCDF

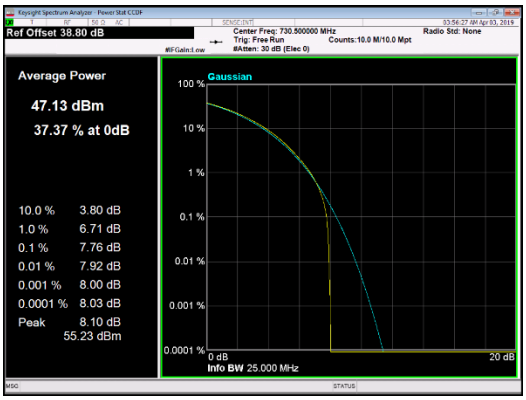


Port 4 - Top Channel_ Average

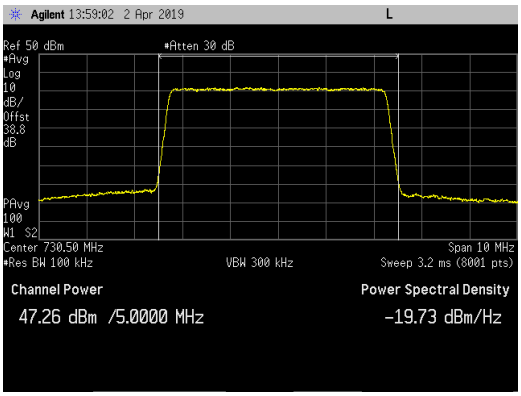


5G NR 5MHz Channel Power Plots for the 64QAM Modulation Type:

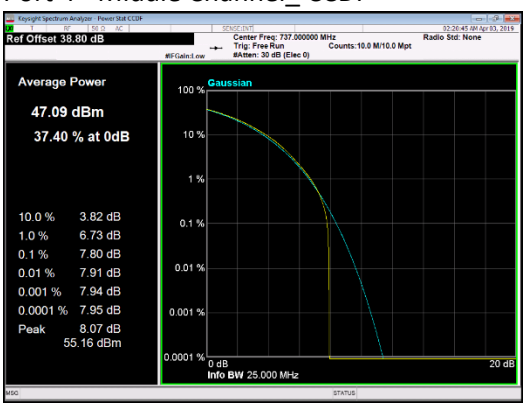
Port 4 - Bottom Channel_ CCDF



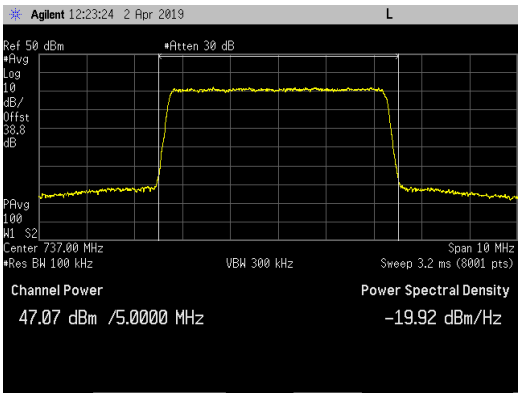
Port 4 - Bottom Channel_ Average



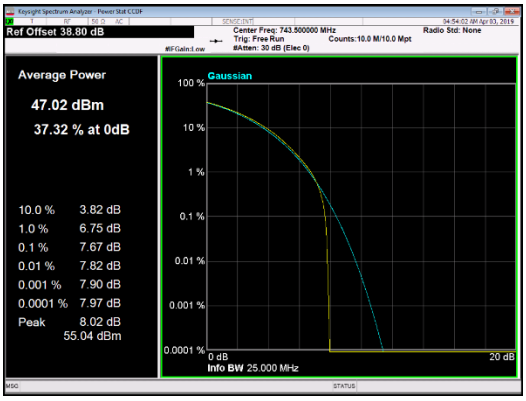
Port 4 - Middle Channel_ CCDF



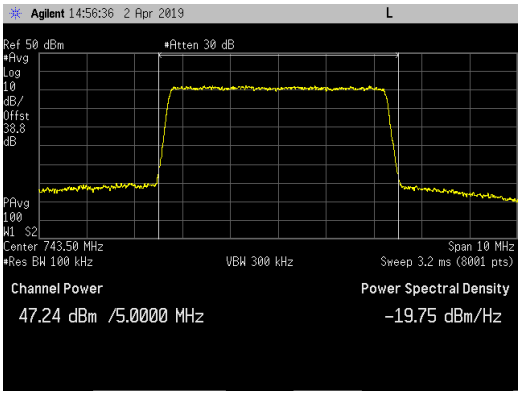
Port 4 - Middle Channel_ Average



Port 4 - Top Channel_ CCDF

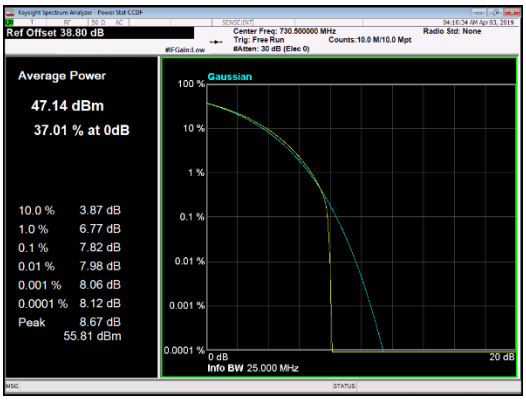


Port 4 - Top Channel_ Average

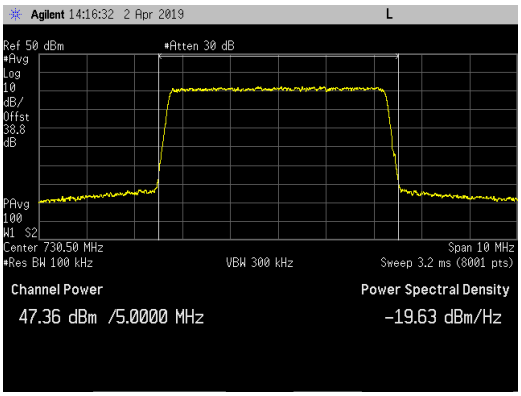


5G NR 5MHz Channel Power Plots for the 256QAM Modulation Type:

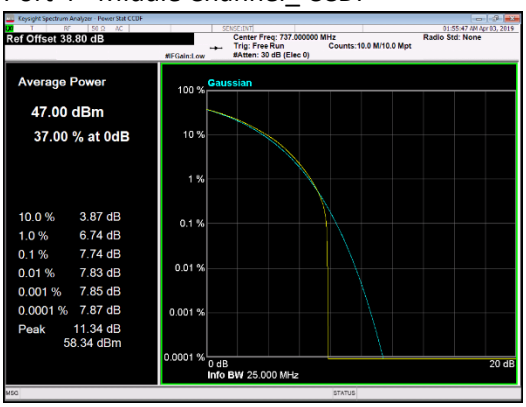
Port 4 - Bottom Channel_ CCDF



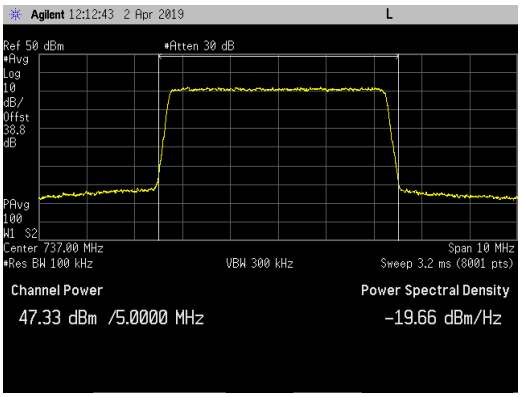
Port 4 - Bottom Channel_ Average



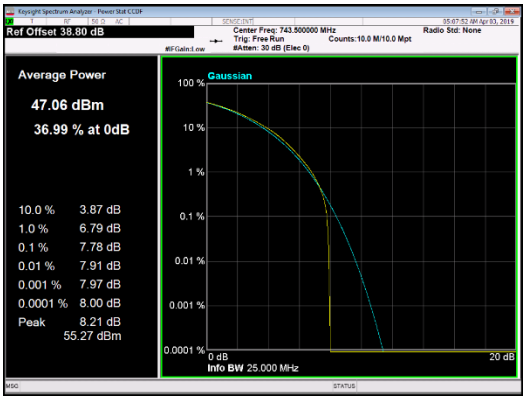
Port 4 - Middle Channel_ CCDF



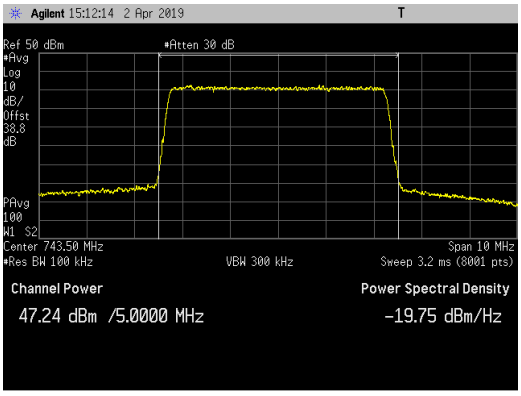
Port 4 - Middle Channel_ Average



Port 4 - Top Channel_ CCDF

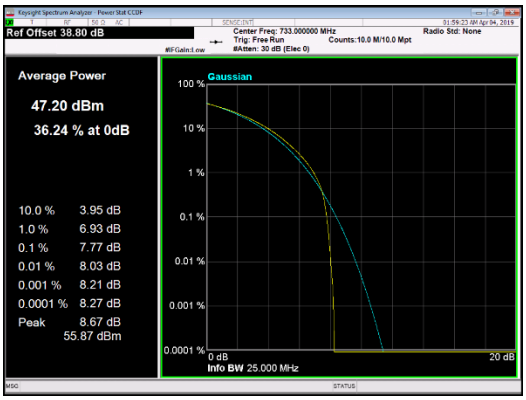


Port 4 - Top Channel_ Average

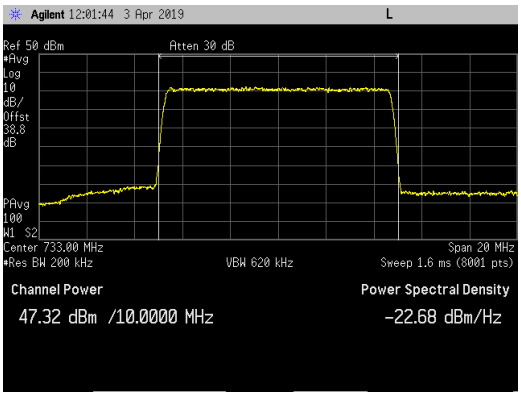


5G NR 10MHz Channel Power Plots for the QPSK Modulation Type:

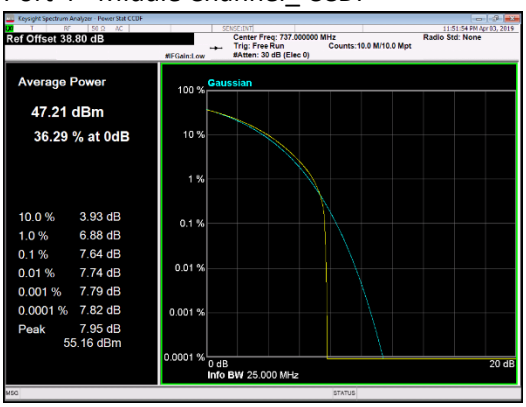
Port 4 - Bottom Channel_ CCDF



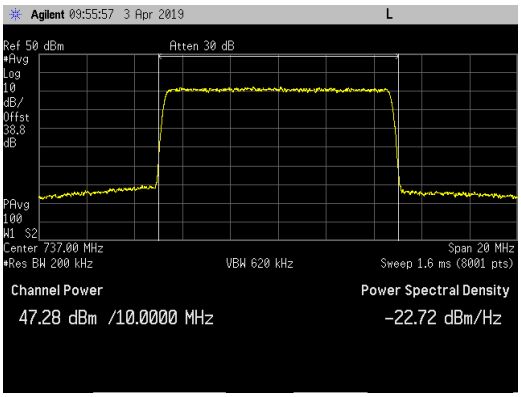
Port 4 - Bottom Channel_ Average



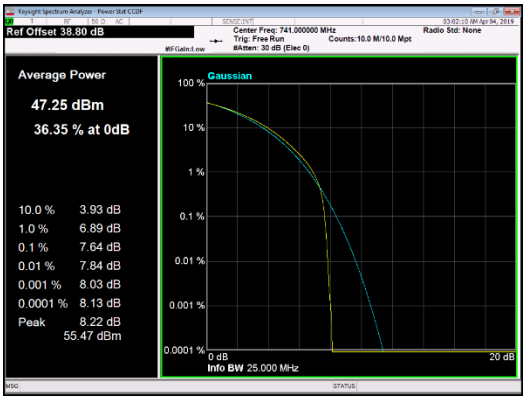
Port 4 - Middle Channel_ CCDF



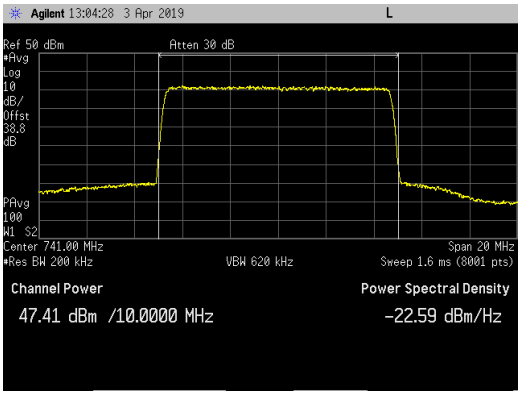
Port 4 - Middle Channel_ Average



Port 4 - Top Channel_ CCDF

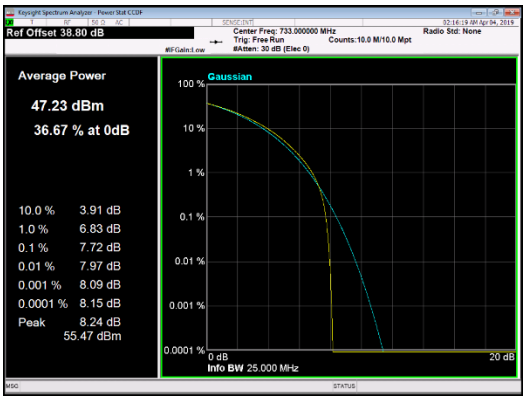


Port 4 - Top Channel_ Average

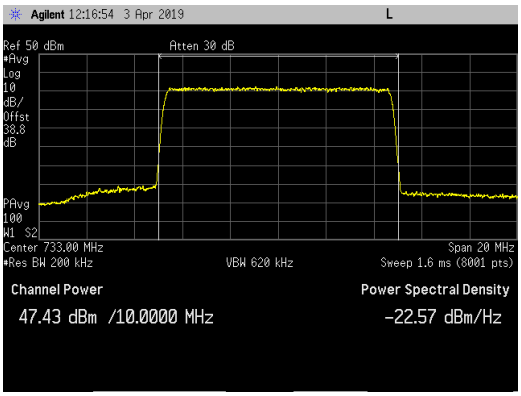


5G NR 10MHz Channel Power Plots for the 16QAM Modulation Type:

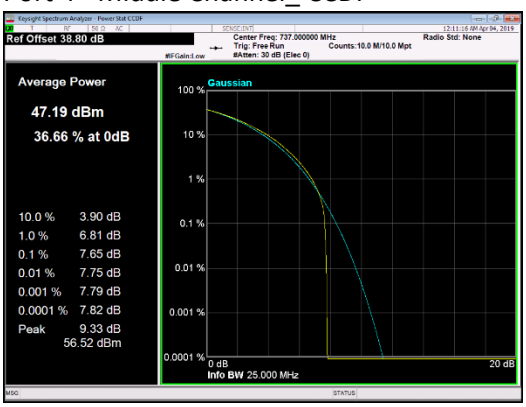
Port 4 - Bottom Channel_ CCDF



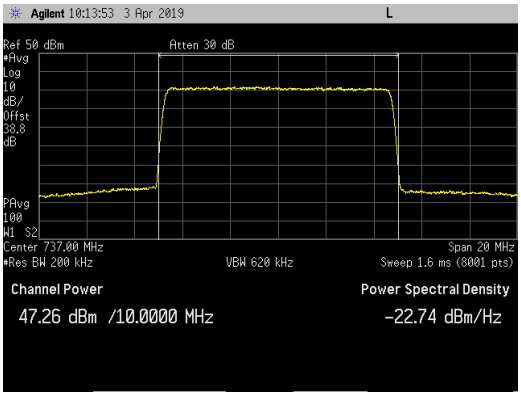
Port 4 - Bottom Channel_ Average



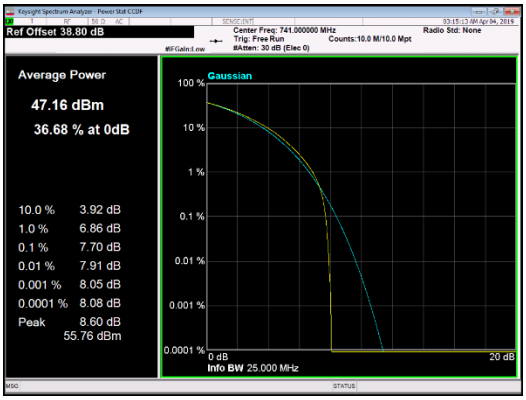
Port 4 - Middle Channel_ CCDF



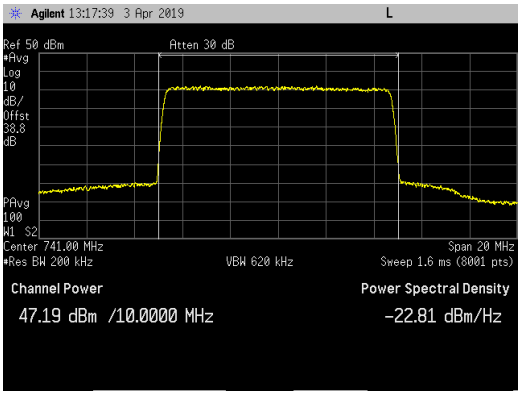
Port 4 - Middle Channel_ Average



Port 4 - Top Channel_ CCDF

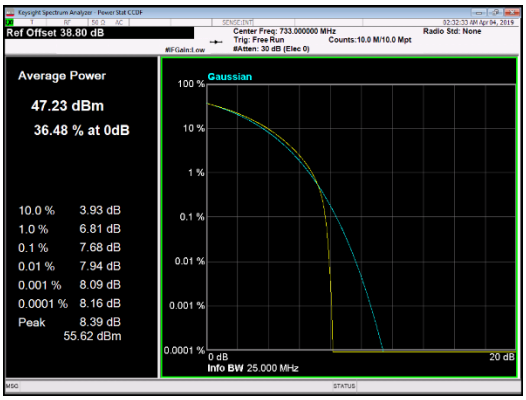


Port 4 - Top Channel_ Average

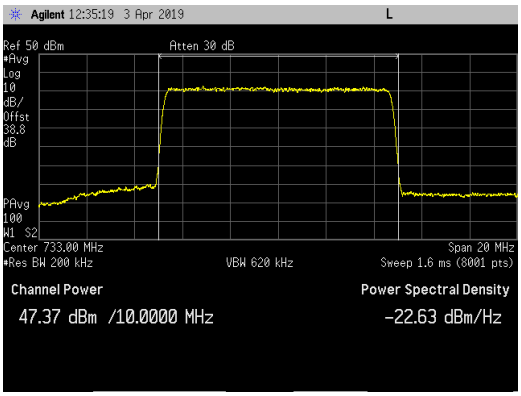


5G NR 10MHz Channel Power Plots for the 64QAM Modulation Type:

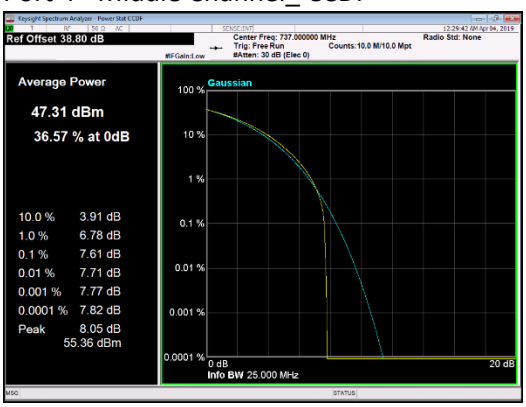
Port 4 - Bottom Channel_ CCDF



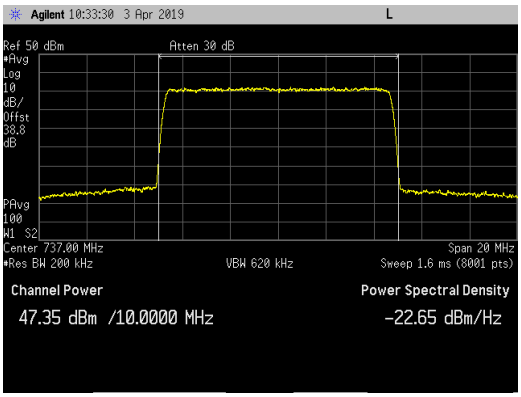
Port 4 - Bottom Channel_ Average



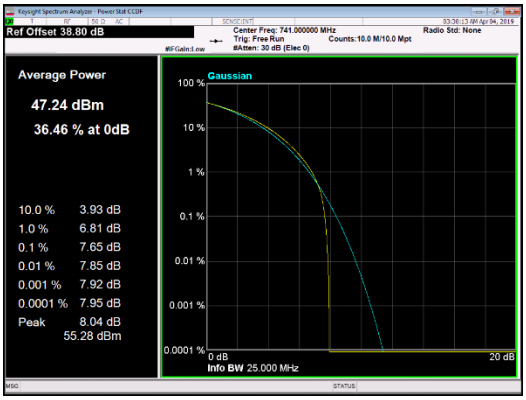
Port 4 - Middle Channel_ CCDF



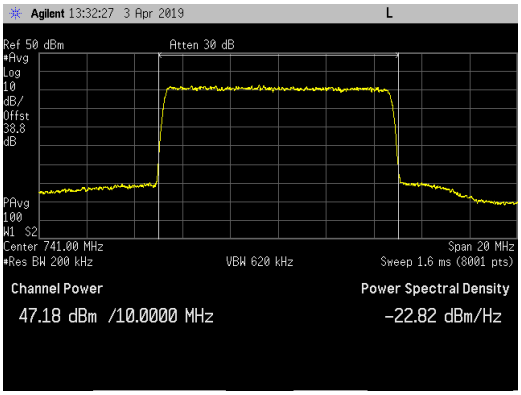
Port 4 - Middle Channel_ Average



Port 4 - Top Channel_ CCDF

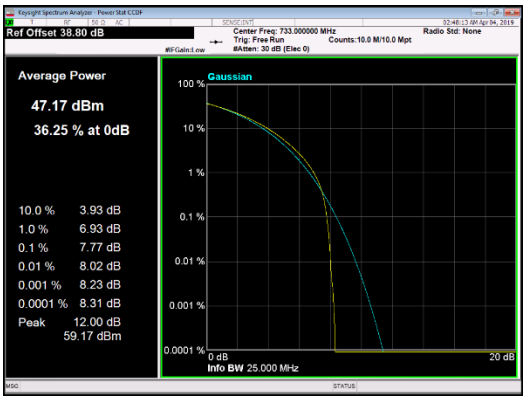


Port 4 - Top Channel_ Average

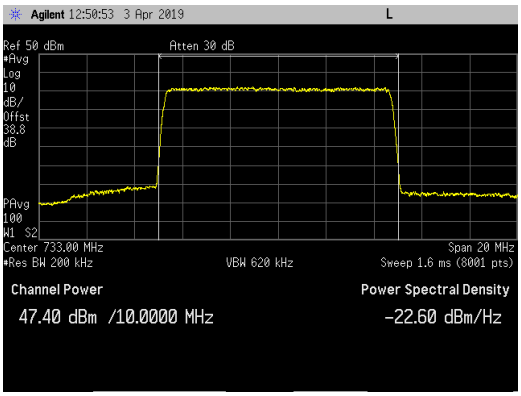


5G NR 10MHz Channel Power Plots for the 256QAM Modulation Type:

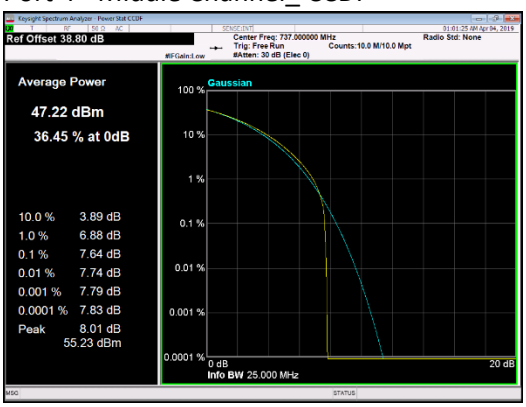
Port 4 - Bottom Channel_ CCDF



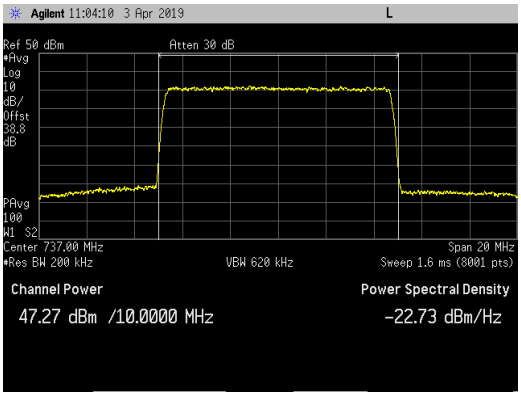
Port 4 - Bottom Channel_ Average



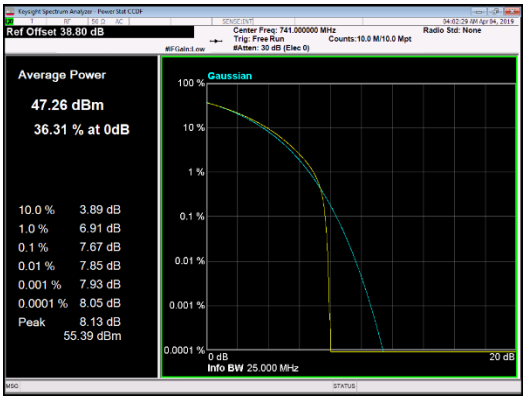
Port 4 - Middle Channel_ CCDF



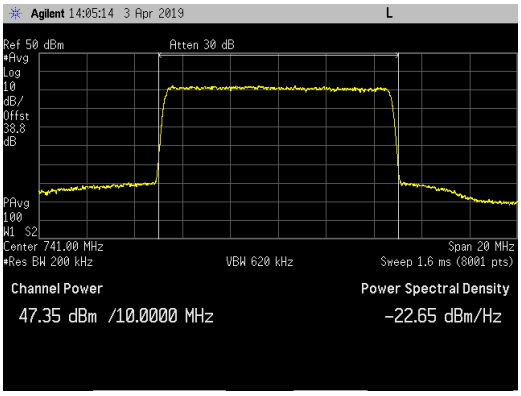
Port 4 - Middle Channel_ Average



Port 4 - Top Channel_ CCDF



Port 4 - Top Channel_ Average



Emission Bandwidth (26 dB down and 99%)

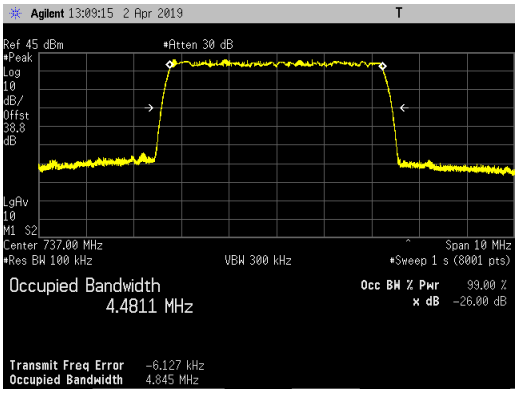
Emission bandwidth measurements were made at antenna port 4 on the middle channel with maximum RF output power. All available 5G NR modulations (QPSK, 16QAM, 64QAM, 256QAM) were used. All available 5G NR channel bandwidths (5MHz and 10MHz) were used. The results are provided in the following table. The 26dB emission bandwidth was measured in accordance with section 4 of FCC KDB 971168 D01v03r01 and ANSI C63.26 section 5.4. The 99% occupied bandwidth was measured in accordance with section 6.7 of RSS-Gen Issue 5. For both measurements, an occupied bandwidth built-in function in the spectrum analyzer was used. The results are provided in the following table. The largest emission bandwidths are highlighted.

5G NR Channel Bandwidth	5G NR Modulation Type							
	QPSK		16QAM		64QAM		256QAM	
	26dB (MHz)	99% (MHz)	26dB (MHz)	99% (MHz)	26dB (MHz)	99% (MHz)	26dB (MHz)	99% (MHz)
5 MHz	**4.845**	4.4811	4.835	4.4755	4.817	**4.4838**	4.820	4.4760
10 MHz	**9.888**	9.3022	9.884	9.2910	9.855	9.2760	9.840	**9.3024**

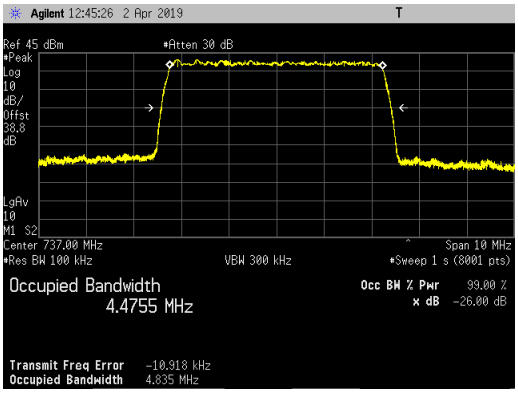
Emission bandwidth measurement data are provided in the following pages.

5G NR 5MHz Channel Bandwidth Emission Bandwidth Plots on the Middle Channel for Antenna Port 4:

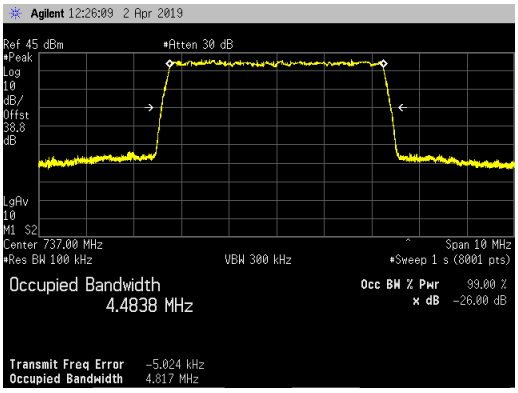
QPSK



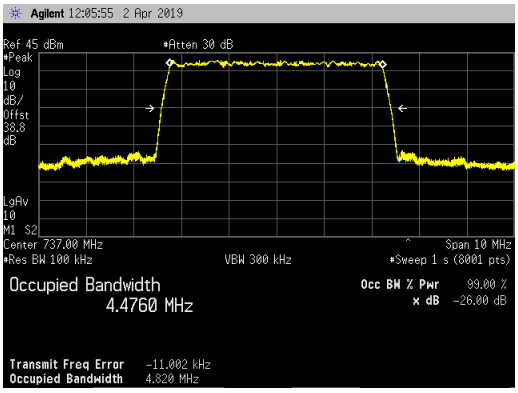
16QAM



64QAM

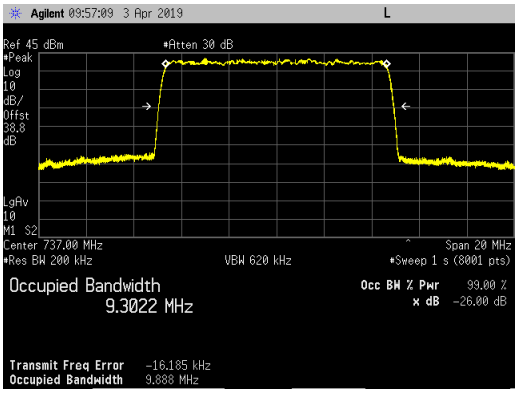


256QAM

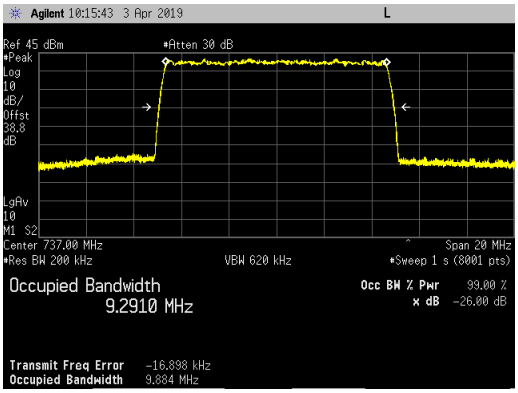


5G NR 10MHz Channel Bandwidth Emission Bandwidth Plots on the Middle Channel for Antenna Port 4:

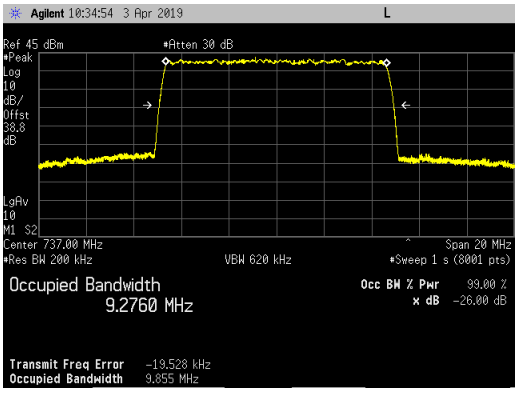
QPSK



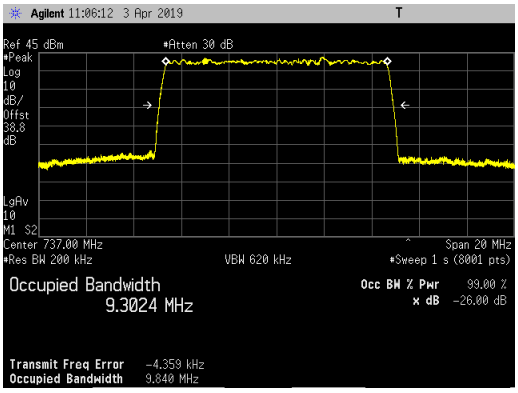
16QAM



64QAM



256QAM



Antenna Port Conducted Band Edge

Conducted band edge measurements were made at RRH antenna port 4. The RRH was operated at the Band n85 band edge frequencies with a single 5G NR carrier at maximum power (60W) with all modulation types (QPSK, 16QAM, 64QAM, 256QAM) for 5MHz and 10MHz channel bandwidths.

The same limit of -19dBm used in the original certification testing is used for this testing. The limit is adjusted to -19dBm [-13dBm -10 log (4)] per FCC KDB 662911D01 v02r01 because the BTS may operate as a 4 port MIMO transmitter.

Measurements were performed with the spectrum analyzer in the RMS average mode over 100 traces. In the 100kHz bands outside and adjacent to the frequency block, a resolution bandwidth of 30kHz as allowed by FCC 27.53(g) was used. Outside the 100kHz band edge noted above, a 100kHz RBW and 300kHz VBW was used. Measurements were performed in the frequency range from the band edge to ≥20 MHz outside the band edge (i.e.: 708 to 728MHz and 746 to 766MHz bands).

The results are summarized in the following table. The highest (worst case) emissions from the measurement data are provided.

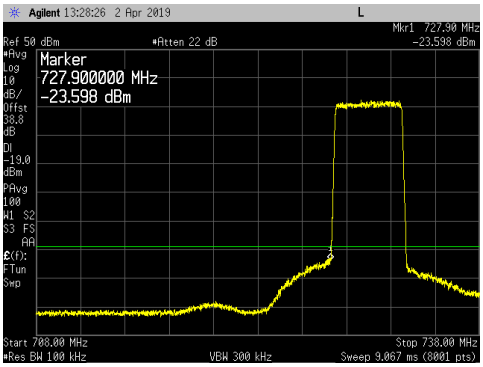
Channel BW, Carrier Frequency, Carrier Power	**Lower Band Edge (dBm)**				**Upper Band Edge (dBm)**			
Band n85	**QPSK**	**16QAM**	**64QAM**	**256QAM**	**QPSK**	**16QAM**	**64QAM**	**256QAM**
Single 5MHz Carrier, 730.5MHz (BC), 60W	-23.598	-24.320	-24.701	-24.021	N/A	N/A	N/A	N/A
Single 10MHz Carrier, 733.0MHz (BC), 60W	-25.624	-26.083	-25.688	-25.483	N/A	N/A	N/A	N/A
Single 5MHz Carrier, 743.5MHz (TC), 60W	N/A	N/A	N/A	N/A	-23.925	-23.620	**-22.602**	-23.652
Single 10MHz Carrier, 741.0MHz (TC), 60W	N/A	N/A	N/A	N/A	-25.024	-24.750	-23.646	-24.739

The total measurement RF path loss of the test setup (attenuator and test cables) was 38.8 dB and is accounted for by the spectrum analyzer reference level offset. The display line on the plots reflects the required limit.

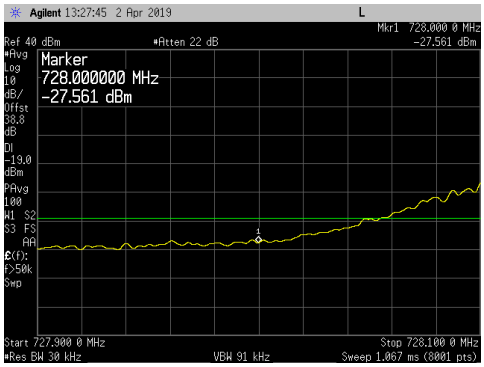
Conducted band edge measurements are provided in the following pages.

5G NR_ 5MHz Channel Bandwidth_ Lower Band Edge Plots for Antenna Port 4:

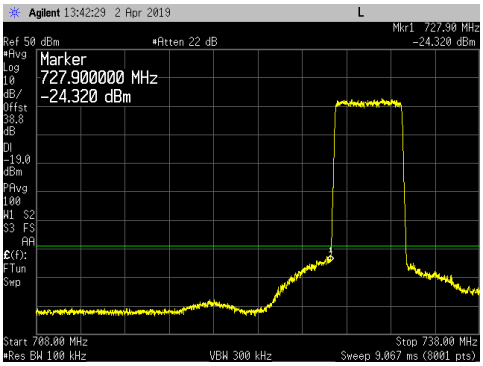
QPSK_ Bot Ch_ 708 to 738MHz



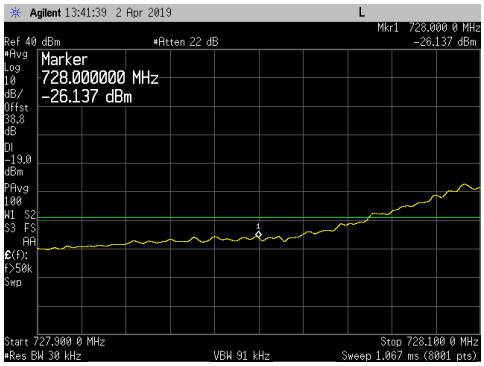
QPSK_ Bot Ch_ 727.9 to 728.1MHz



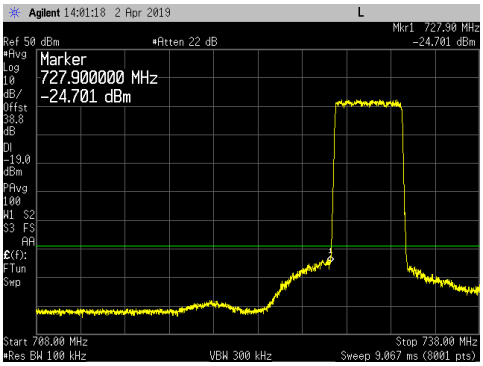
16QAM_ Bot Ch_ 708 to 738MHz



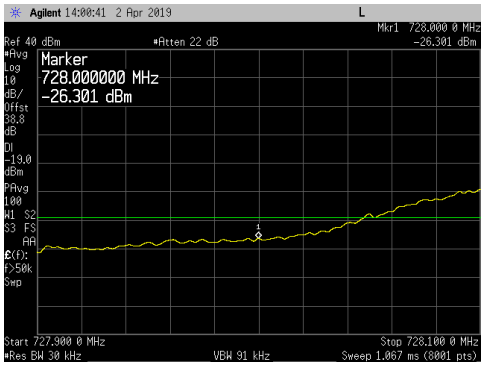
16QAM_ Bot Ch_ 727.9 to 728.1MHz



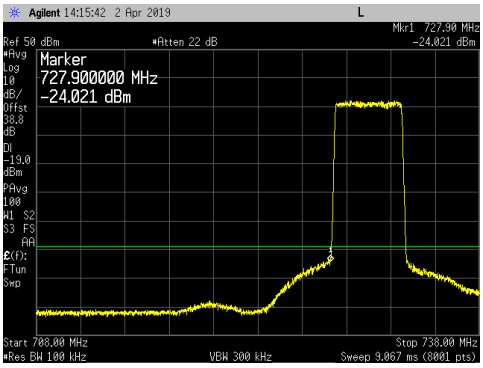
64QAM_ Bot Ch_ 708 to 738MHz



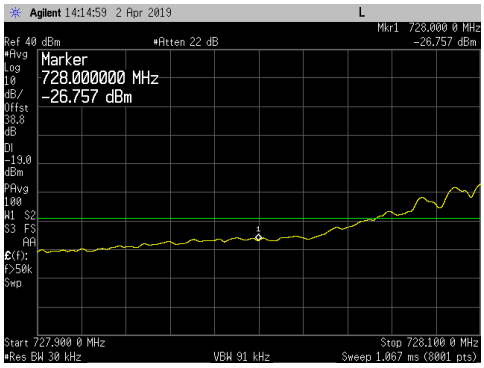
64QAM_ Bot Ch_ 727.9 to 728.1MHz



256QAM_ Bot Ch_ 708 to 738MHz

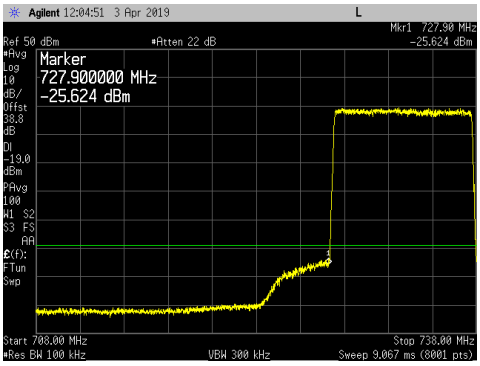


256QAM_ Bot Ch_ 727.9 to 728.1MHz

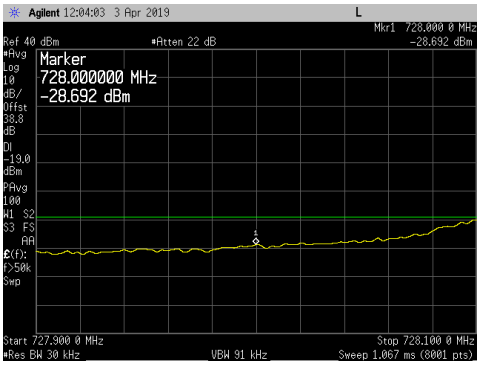


5G NR_ 10MHz Channel Bandwidth_ Lower Band Edge Plots for Antenna Port 4:

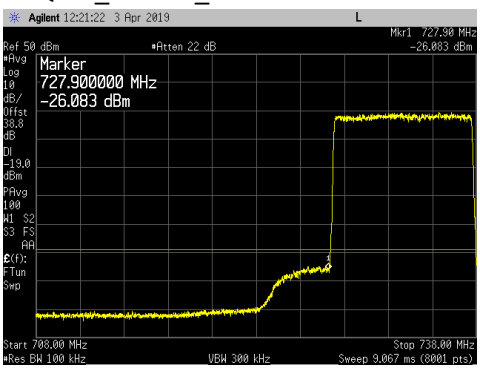
QPSK_ Bot Ch_ 708 to 738MHz



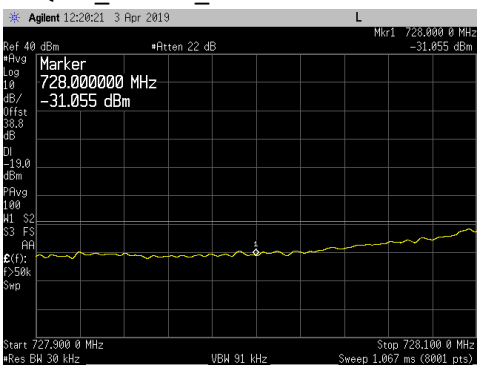
QPSK_ Bot Ch_ 727.9 to 728.1MHz



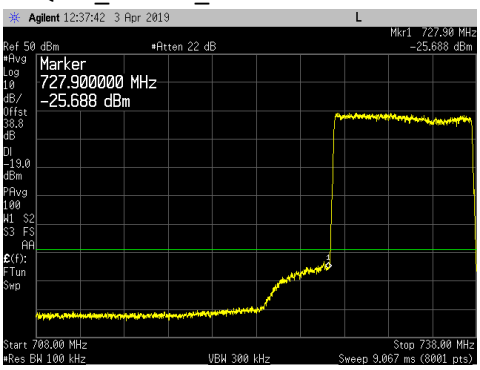
16QAM_ Bot Ch_ 708 to 738MHz



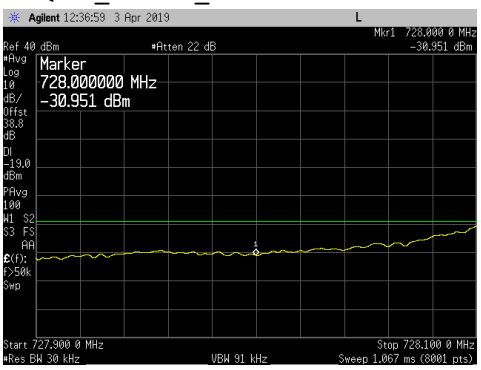
16QAM_ Bot Ch_ 727.9 to 728.1MHz



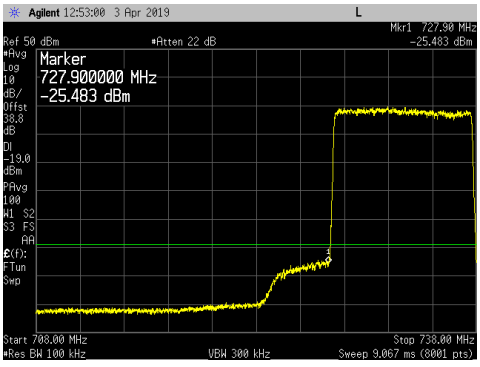
64QAM_ Bot Ch_ 708 to 738MHz



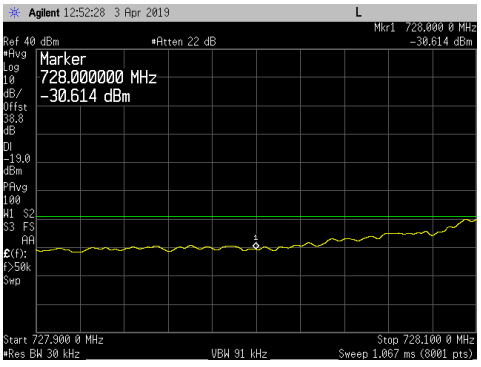
64QAM_ Bot Ch_ 727.9 to 728.1MHz



256QAM_ Bot Ch_ 708 to 738MHz

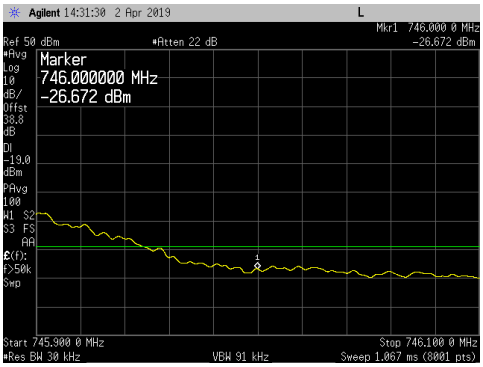


256QAM_ Bot Ch_ 727.9 to 728.1MHz

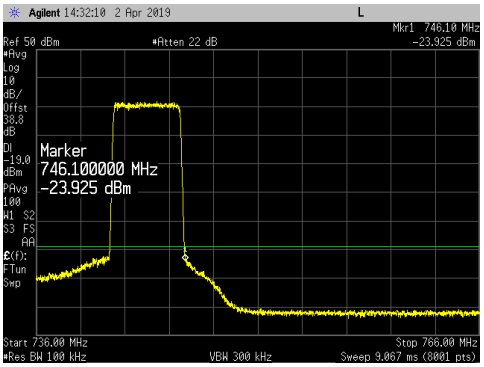


5G NR_ 5MHz Channel Bandwidth_ Upper Band Edge Plots for Antenna Port 4:

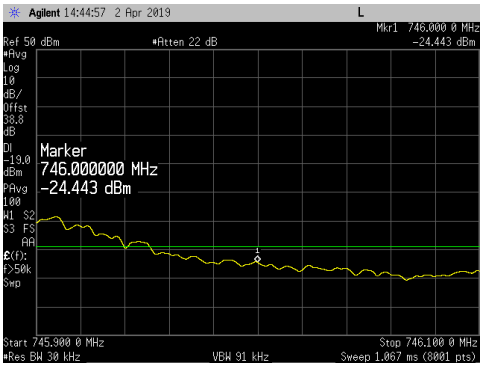
QPSK_ Top Ch_ 745.9 to 746.1MHz



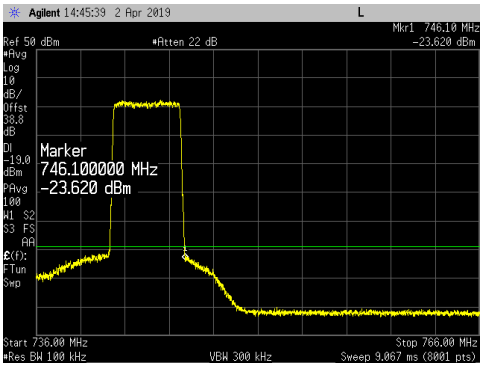
QPSK_ Top Ch_ 736 to 766MHz



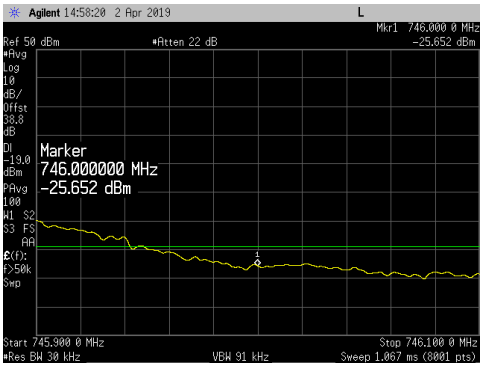
16QAM_ Top Ch_ 745.9 to 746.1MHz



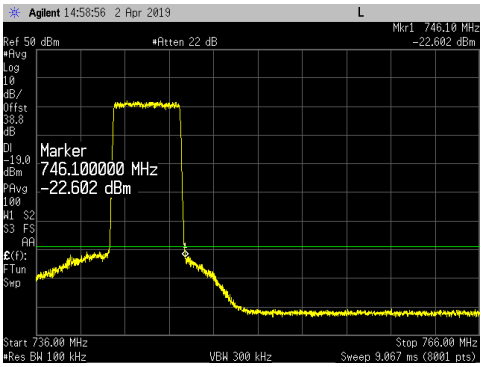
16QAM_ Top Ch_ 736 to 766MHz



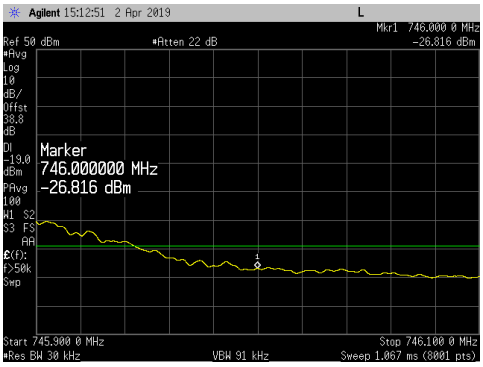
64QAM_ Top Ch_ 745.9 to 746.1MHz



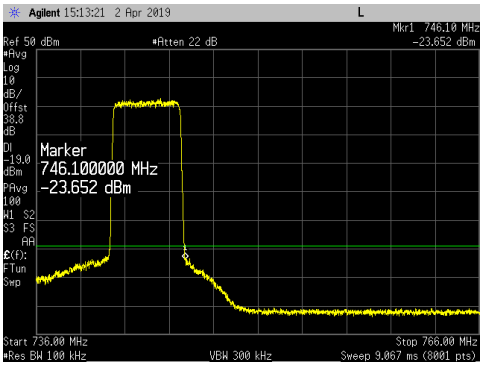
64QAM_ Top Ch_ 736 to 766MHz



256QAM_ Top Ch_ 745.9 to 746.1MHz

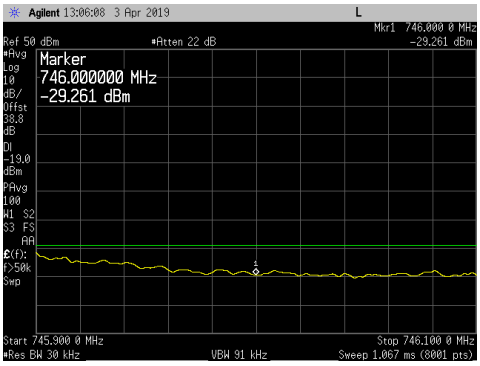


256QAM_ Top Ch_ 736 to 766MHz

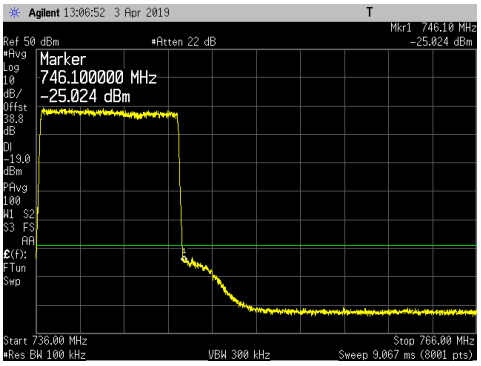


5G NR_ 10MHz Channel Bandwidth_ Upper Band Edge Plots for Antenna Port 4:

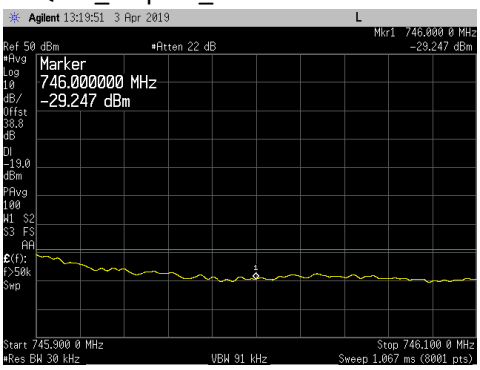
QPSK_ Top Ch_ 745.9 to 746.1MHz



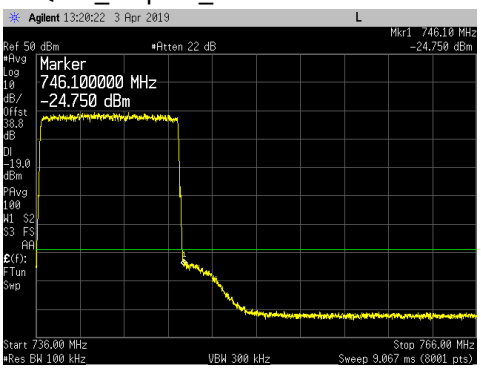
QPSK_ Top Ch_ 736 to 766MHz



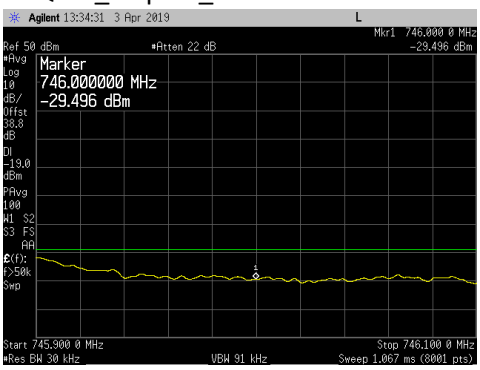
16QAM_ Top Ch_ 745.9 to 746.1MHz



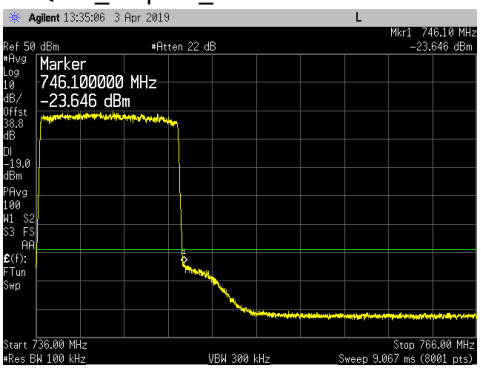
16QAM_ Top Ch_ 736 to 766MHz



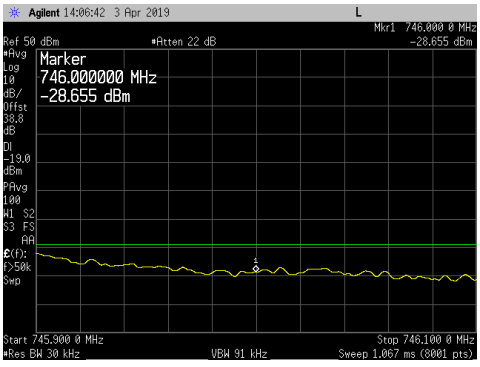
64QAM_ Top Ch_ 745.9 to 746.1MHz



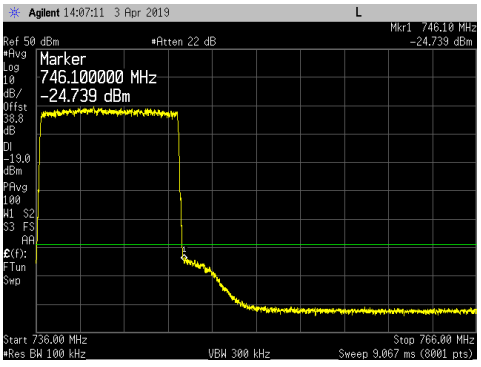
64QAM_ Top Ch_ 736 to 766MHz



256QAM_ Top Ch_ 745.9 to 746.1MHz



256QAM_ Top Ch_ 736 to 766MHz



Transmitter Antenna Port Conducted Emissions

Transmitter conducted emission measurements were made at RRH antenna port 4. Measurements were performed over the 9kHz to 8GHz frequency range.

The RRH was operated at the Band n85 center frequencies with a single 5G NR carrier at maximum power (60W) with all modulation types (QPSK, 16QAM, 64QAM, 256QAM) for 5MHz and 10MHz channel bandwidths.

The same limit of -19dBm used in the original certification testing is used for this testing. The limit is adjusted to -19dBm [-13dBm -10 log (4)] per FCC KDB 662911D01 v02r01 because the BTS may operate as a 4 port MIMO transmitter. The required measurement parameters include a 100kHz bandwidth with power measured in average value (since transmitter power was measured in average value).

Measurements were performed with a spectrum analyzer using a peak detector with max hold over 50 sweeps (except for the 9kHz to 150kHz and 600MHz to 800MHz frequency ranges). Measurements for the 9kHz to 150kHz and 600MHz to 800MHz frequency ranges were performed with the spectrum analyzer in the RMS average mode over 100 traces.

The limit for the 9kHz to 150kHz frequency range was adjusted to –39dBm to correct for a spectrum analyzer RBW of 1kHz versus required RBW of 100kHz [i.e.: -39dBm = -19dBm -10log(100kHz/1kHz)]. The limit for the 150kHz to 20MHz frequency range was adjusted to –29dBm to correct for a spectrum analyzer RBW of 10kHz versus required RBW of 100kHz [i.e.: -29dBm = -19dBm -10log(100kHz/10kHz)]. The required limit of -19dBm with a RBW of $\geq$100kHz was used for all other frequency ranges. The spectrum analyzer settings that were used for this test are summarized in the following table.

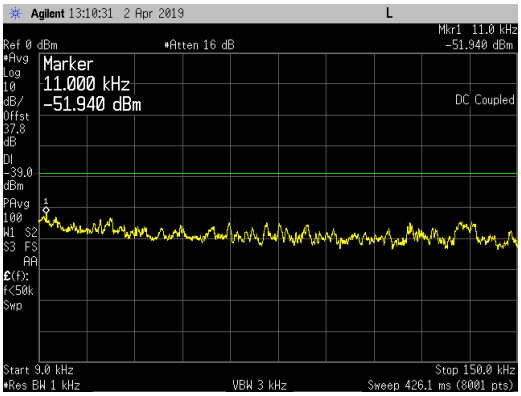
Frequency Range	RBW	VBW	Number of Data Points	Detector	Sweep Time	Max Hold over	Offset Note 1
9kHz to 150kHz	1kHz	3kHz	8001	Average	Auto	Note 2	37.8dB
150kHz to 20MHz	10kHz	30kHz	8001	Peak	Auto	50 Sweeps	37.7dB
20MHz to 600MHz	300kHz	910kHz	8001	Peak	Auto	50 Sweeps	38.7dB
600MHz to 800MHz	100kHz	300kHz	8001	Average	Auto	Note 2	38.8dB
800MHz to 1.1GHz	100kHz	300kHz	8192	Peak	Auto	50 Sweeps	38.9dB
1.1GHz to 8GHz	2MHz	6MHz	8192	Peak	Auto	50 Sweeps	25.2dB
Note 1: The total measurement RF path loss of the test setup (attenuators, filters and test cables) is accounted for by the spectrum analyzer reference level offset. Note 2: Max Hold not used and instead measurements were performed with the spectrum analyzer in the RMS average mode over 100 traces.							

A high pass filter was used to reduce measurement instrumentation noise floor for the frequency ranges above 1100MHz. The total measurement RF path loss of the test setup (attenuators, high pass filter and test cables) as shown in the table is accounted for by the spectrum analyzer reference level offset. The display line on the plots reflects the required limit.

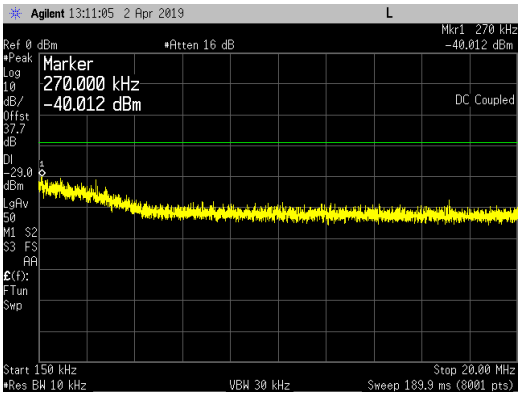
Conducted spurious emission plots/measurements are provided in the following pages.

5G NR_ 5MHz Channel Bandwidth_ QPSK_ Middle Channel (737.0MHz) at 60 watts/carrier:

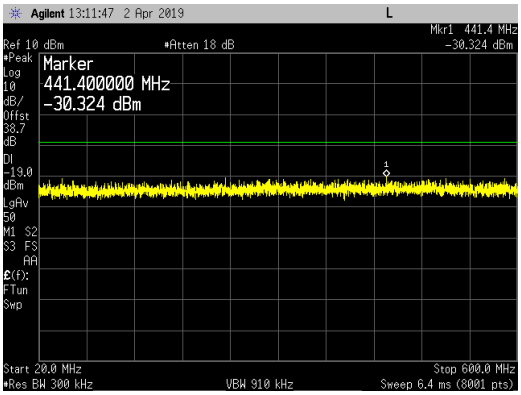
9kHz to 150kHz



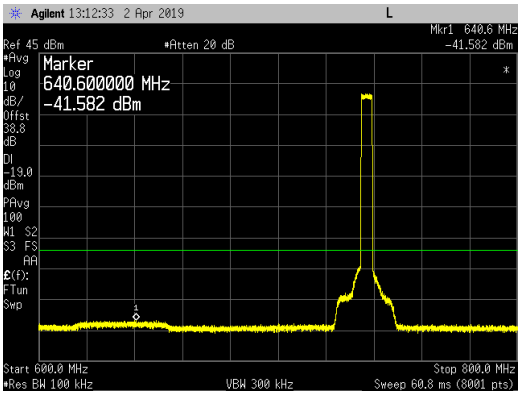
150kHz to 20MHz



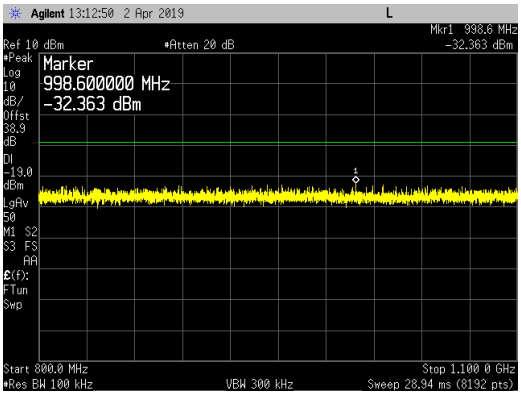
20MHz to 600MHz



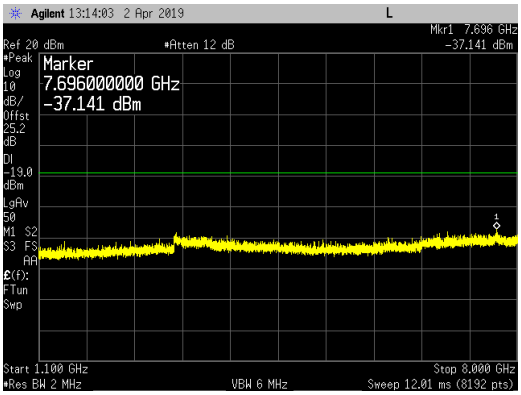
600MHz to 800MHz



800MHz to 1.1GHz

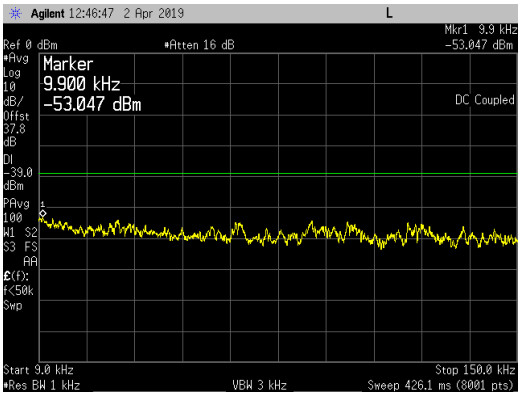


1.1GHz to 8GHz

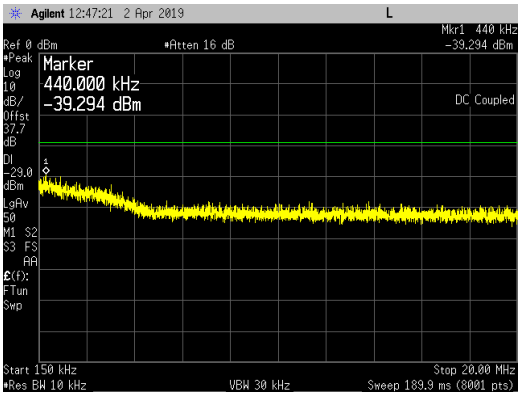


5G NR_ 5MHz Channel Bandwidth_ 16QAM_ Middle Channel (737.0MHz) at 60 watts/carrier:

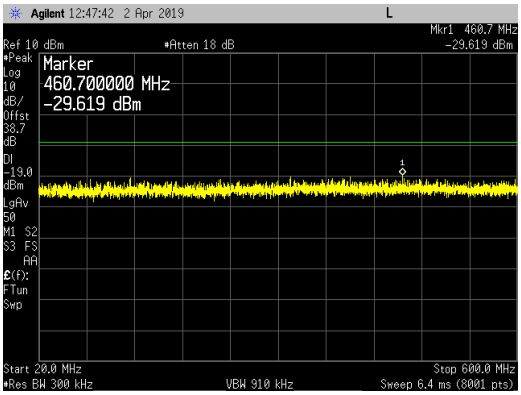
9kHz to 150kHz



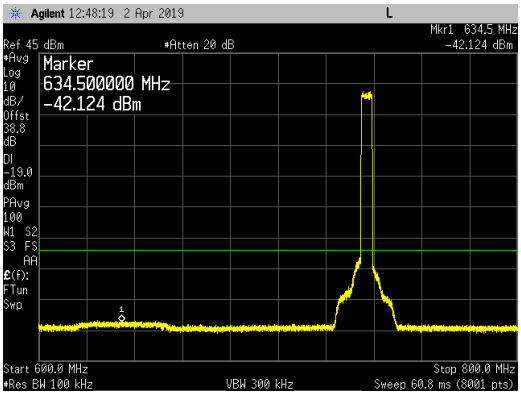
150kHz to 20MHz



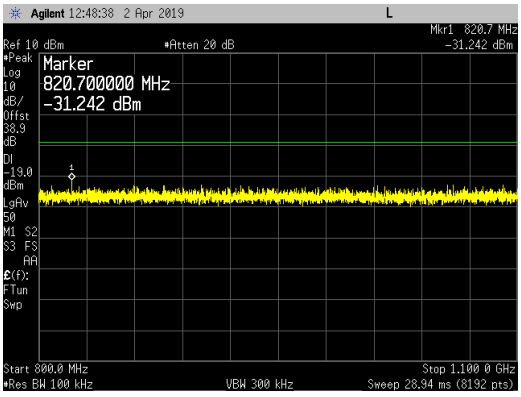
20MHz to 600MHz



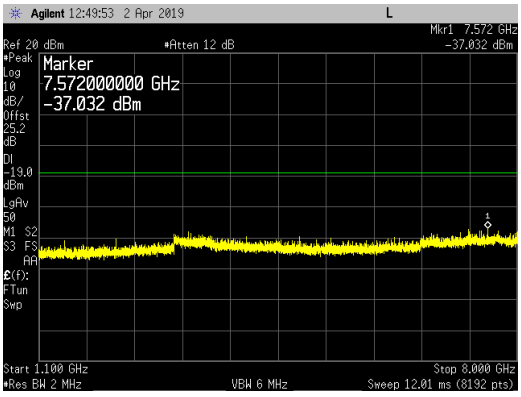
600MHz to 800MHz



800MHz to 1.1GHz

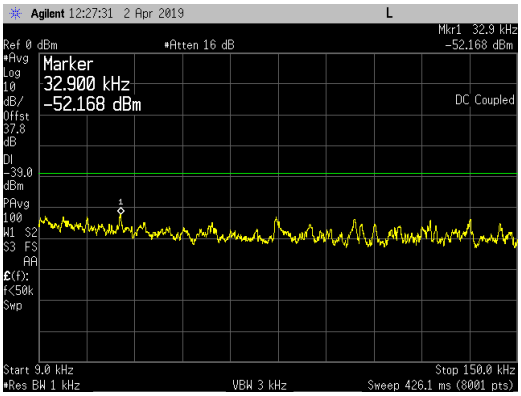


1.1GHz to 8GHz

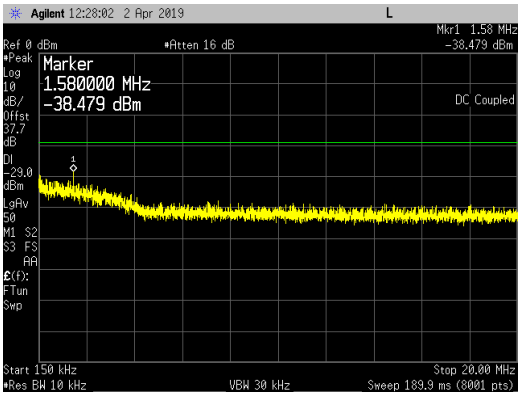


5G NR_ 5MHz Channel Bandwidth_64QAM_ Middle Channel (737.0MHz) at 60 watts/carrier:

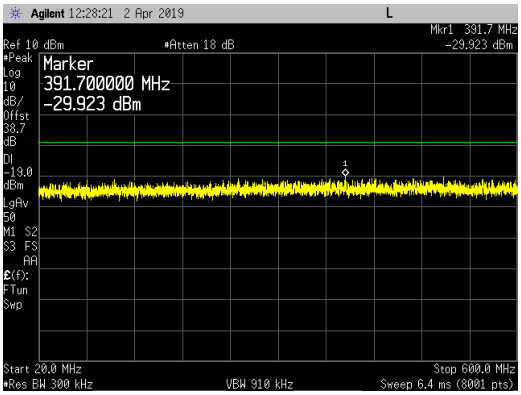
9kHz to 150kHz



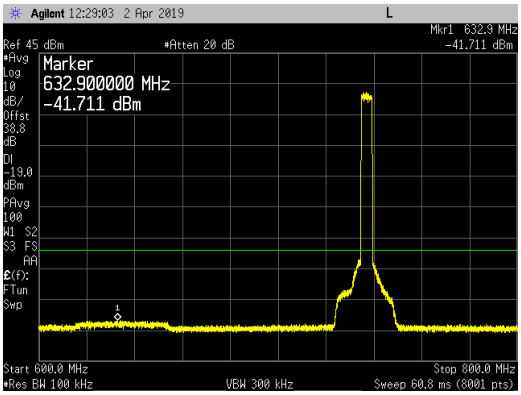
150kHz to 20MHz



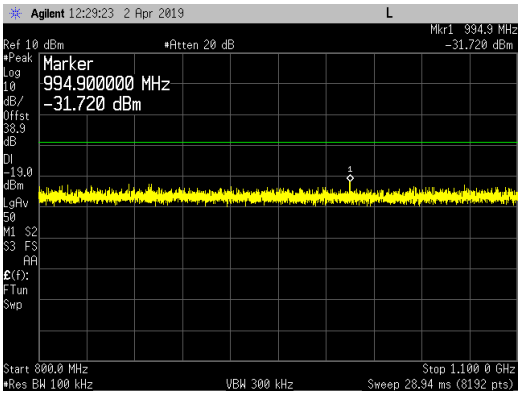
20MHz to 600MHz



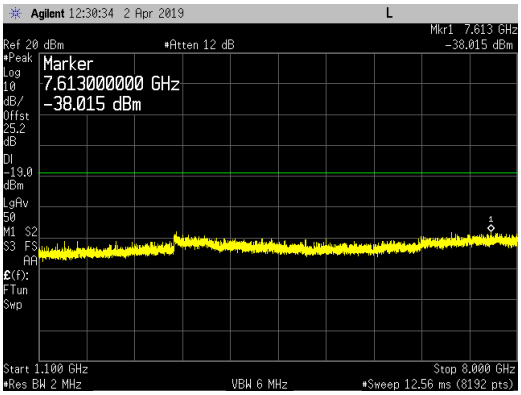
600MHz to 800MHz



800MHz to 1.1GHz

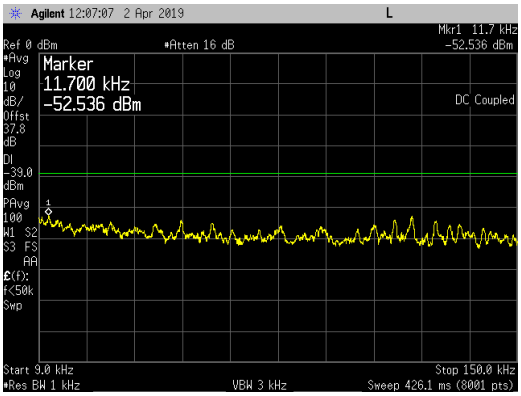


1.1GHz to 8GHz

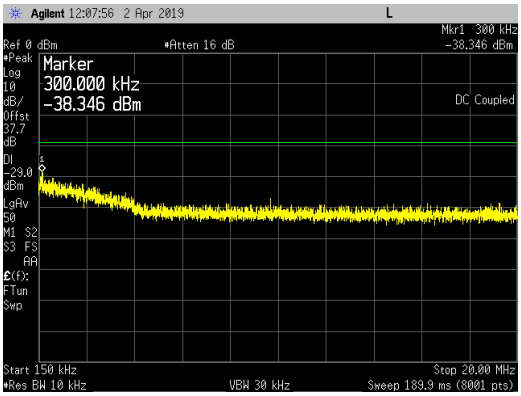


5G NR_ 5MHz Channel Bandwidth_ 256QAM_ Middle Channel (737.0MHz) at 60 watts/carrier:

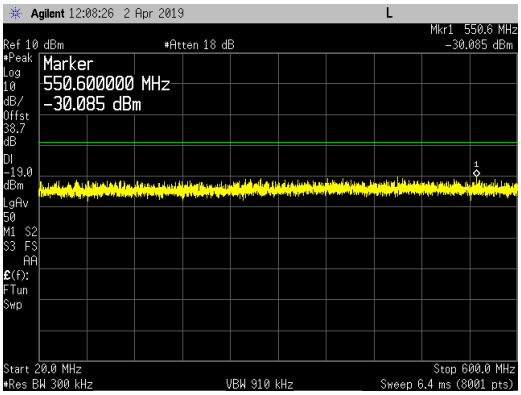
9kHz to 150kHz



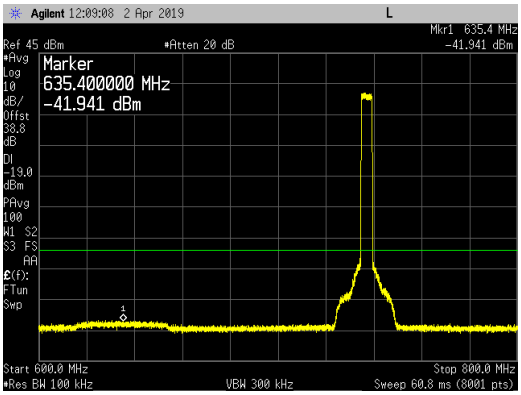
150kHz to 20MHz



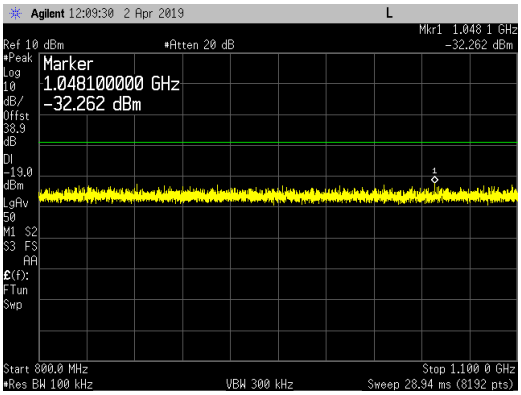
20MHz to 600MHz



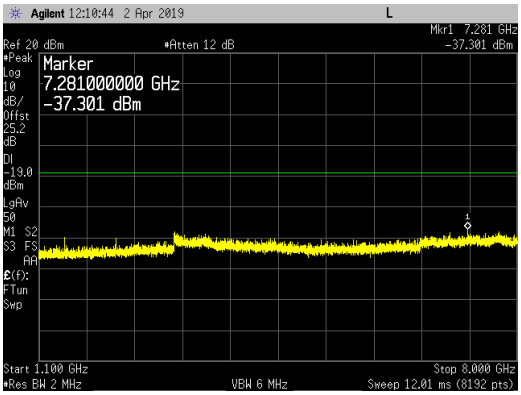
600MHz to 800MHz



800MHz to 1.1GHz

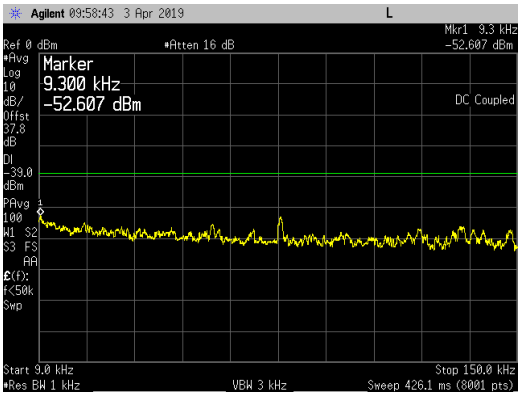


1.1GHz to 8GHz

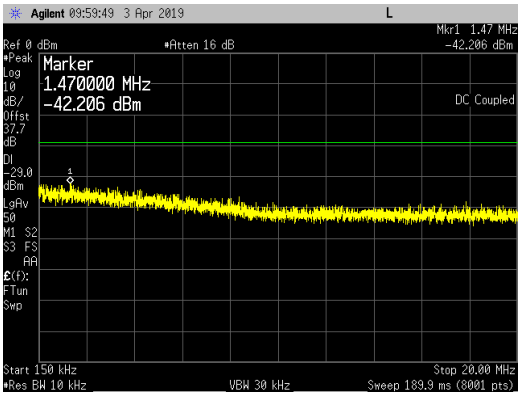


5G NR_ 10MHz Channel Bandwidth_ QPSK_ Middle Channel (737.0MHz) at 60 watts/carrier:

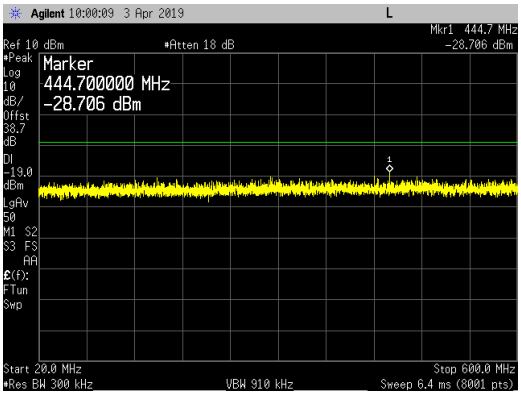
9kHz to 150kHz



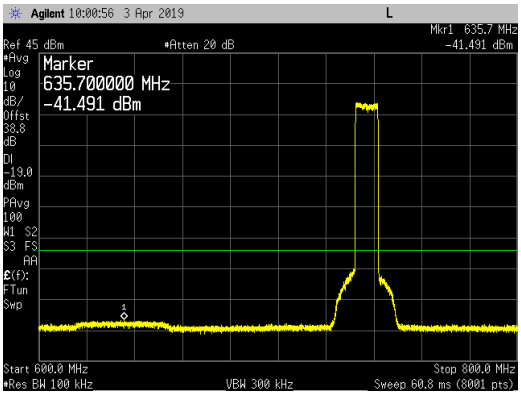
150kHz to 20MHz



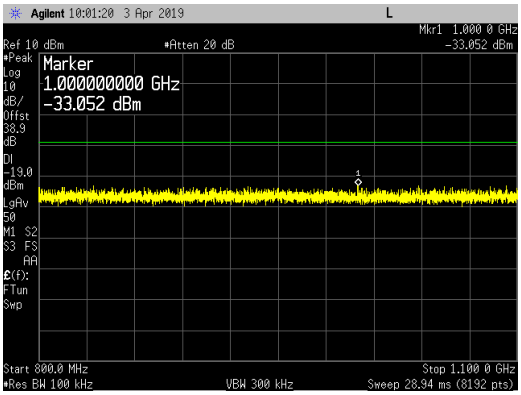
20MHz to 600MHz



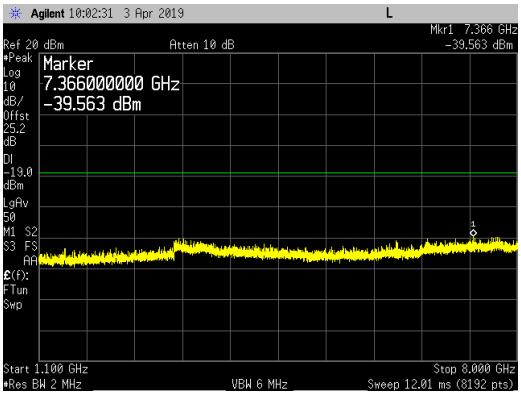
600MHz to 800MHz



800MHz to 1.1GHz

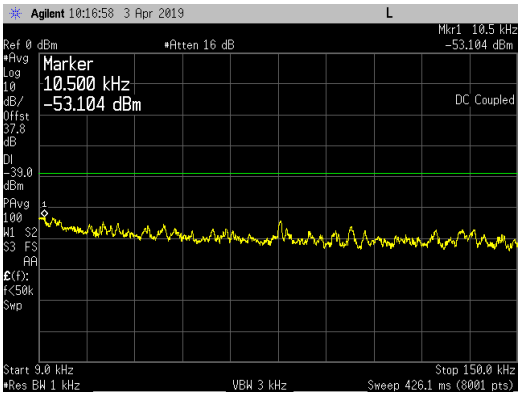


1.1GHz to 8GHz

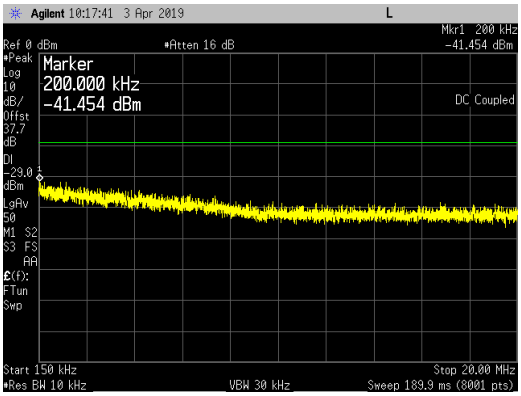


5G NR_ 10MHz Channel Bandwidth_ 16QAM_ Middle Channel (737.0MHz) at 60 watts/carrier:

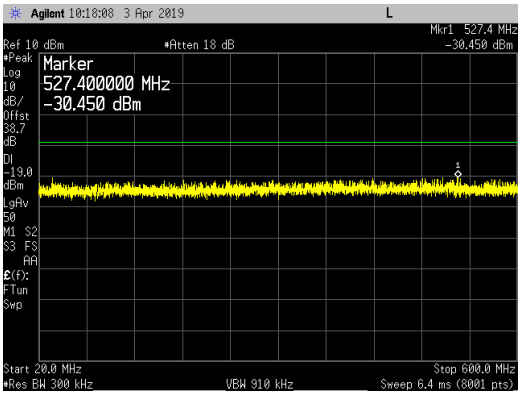
9kHz to 150kHz



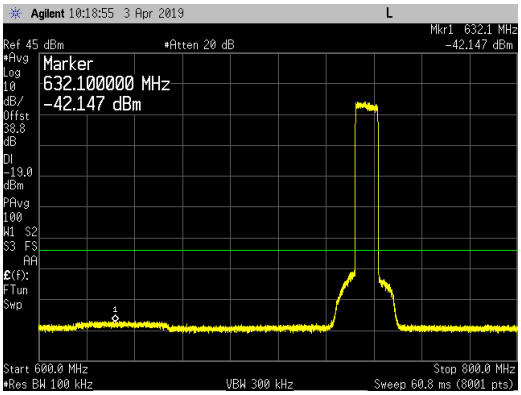
150kHz to 20MHz



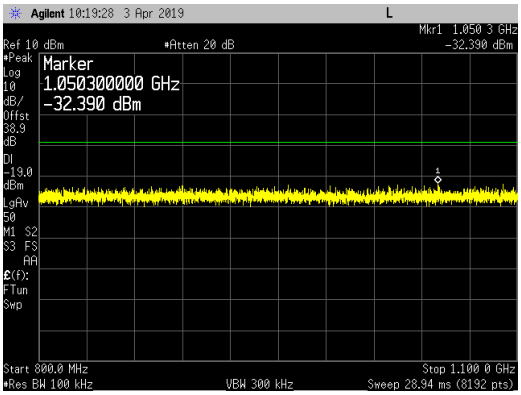
20MHz to 600MHz



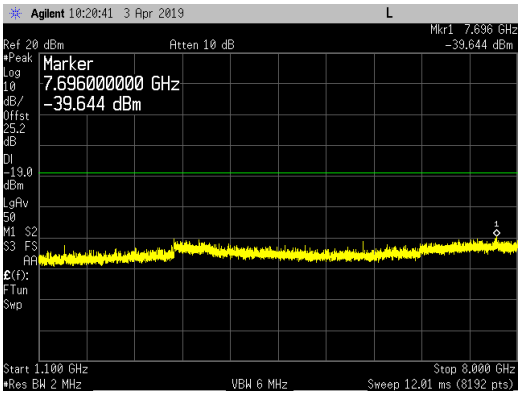
600MHz to 800MHz



800MHz to 1.1GHz

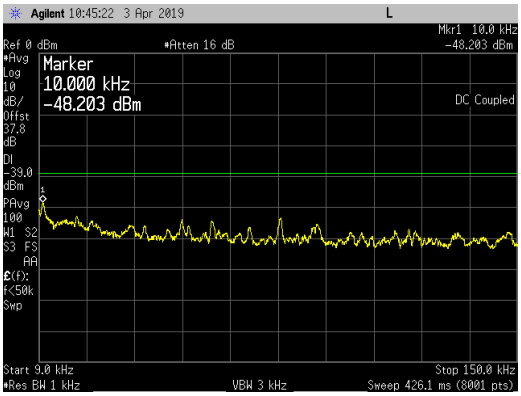


1.1GHz to 8GHz

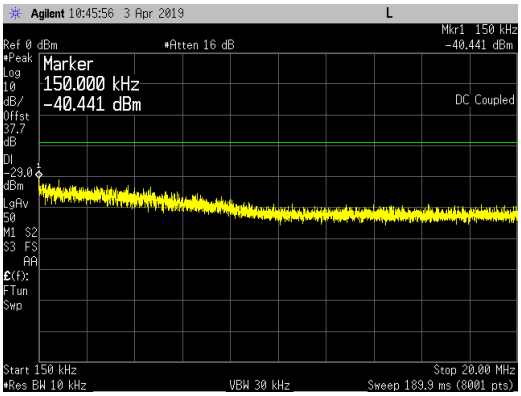


5G NR_ 10MHz Channel Bandwidth_ 64QAM_ Middle Channel (737.0MHz) at 60 watts/carrier:

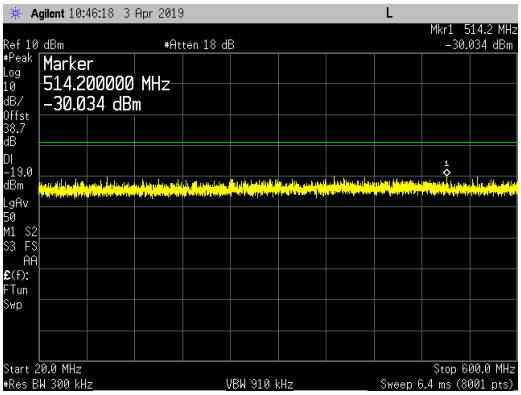
9kHz to 150kHz



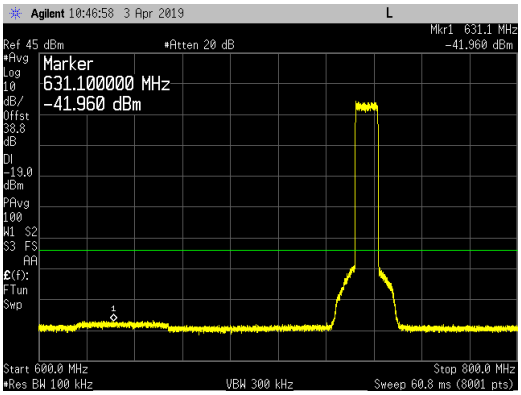
150kHz to 20MHz



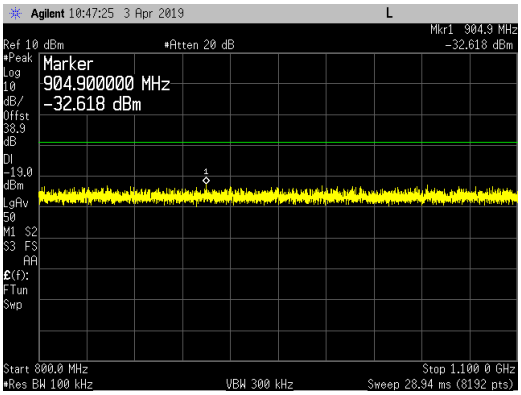
20MHz to 600MHz



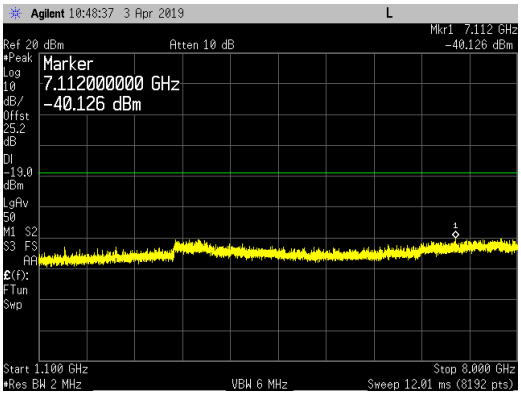
600MHz to 800MHz



800MHz to 1.1GHz

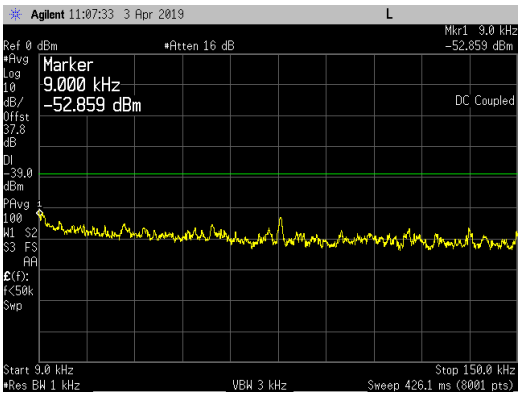


1.1GHz to 8GHz

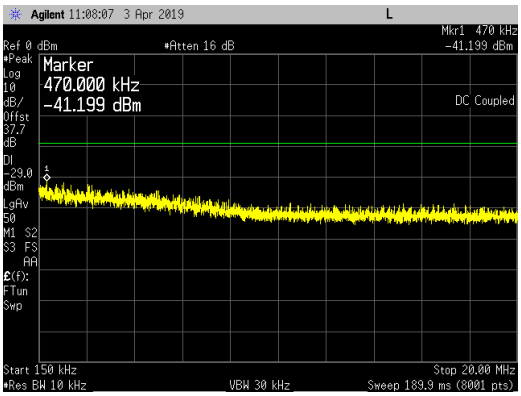


5G NR_ 10MHz Channel Bandwidth_ 256QAM_ Middle Channel (737.0MHz) at 60 watts/carrier:

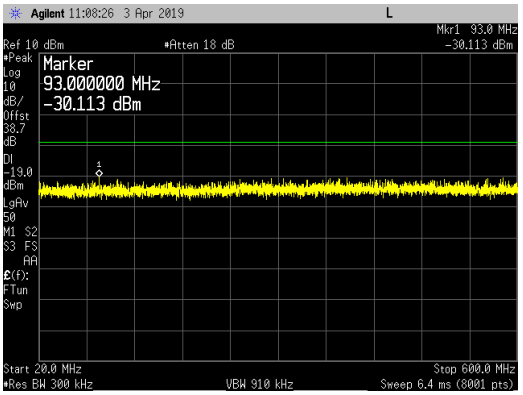
9kHz to 150kHz



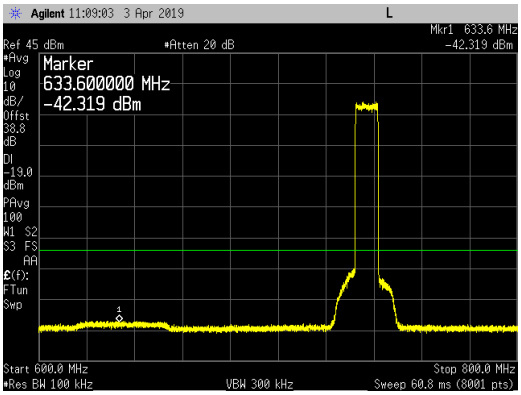
150kHz to 20MHz



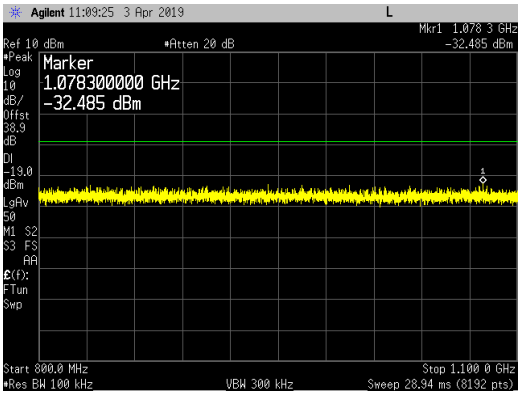
20MHz to 600MHz



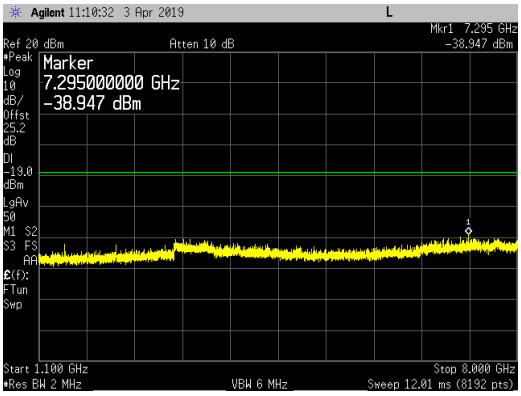
600MHz to 800MHz



800MHz to 1.1GHz



1.1GHz to 8GHz



Transmitter Radiated Spurious Emissions

Radiated spurious emission plots/measurement results are in the original FCC radio certification submittal (NTS Test Report Number PR078121 Revision 0 dated April 25, 2018).

Frequency Stability/Accuracy

Frequency Stability/Accuracy measurement results are in the original FCC radio certification submittal (NTS Test Report Number PR078121 Revision 0 dated April 25, 2018).