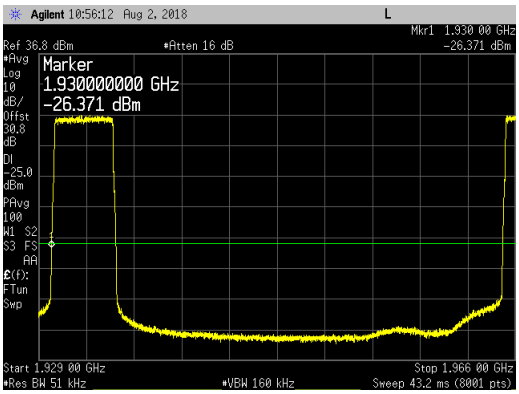
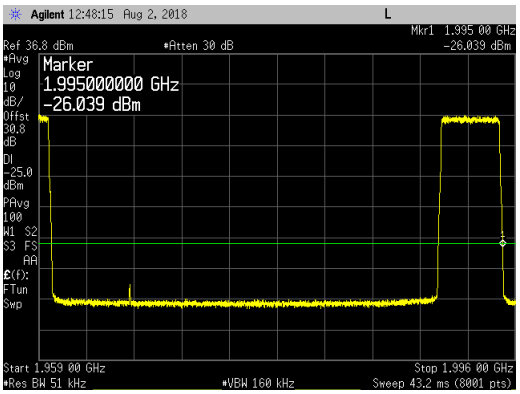
Dual LTE5_Max Spacing _Band Edge Plots for Antenna Port 2 and QPSK Modulation:

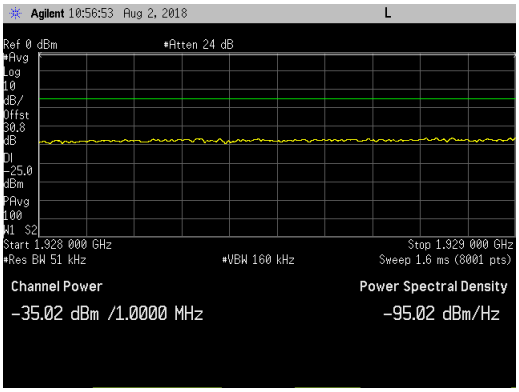
Dual LTE5_Bot Ch_LBE_1929 to 1966MHz



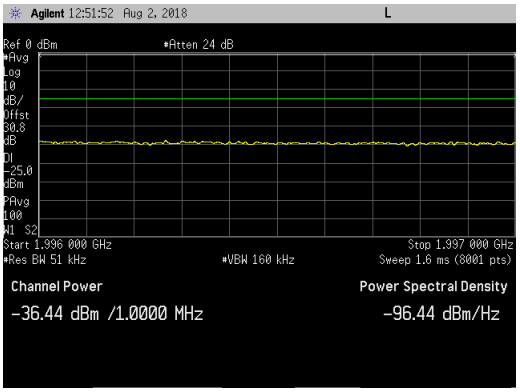
Dual LTE5_Top Ch_UBE_1959 to 1996MHz



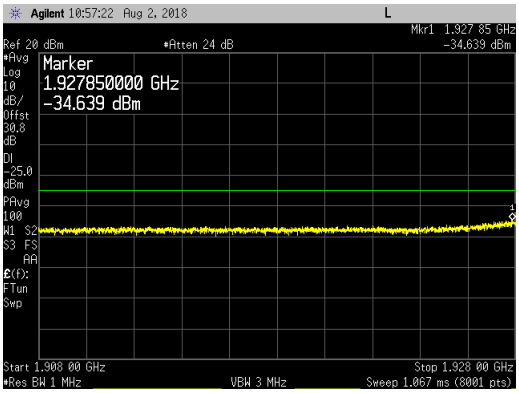
Dual LTE5_Bot Ch_LBE_1928 to 1929MHz



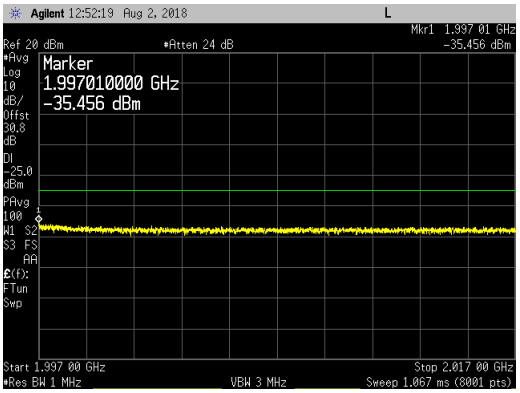
Dual LTE5_Top Ch_UBE_1996 to 1997MHz



Dual LTE5_Bot Ch_LBE_1908 to 1928MHz

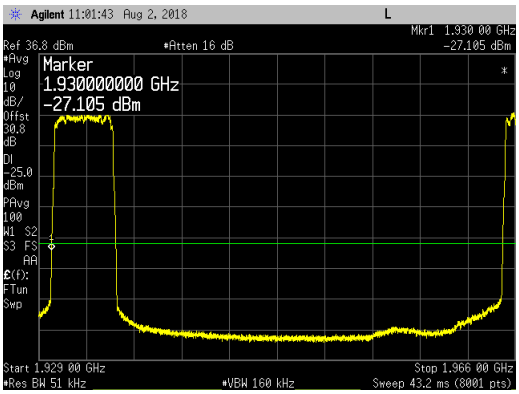


Dual LTE5_Top Ch_UBE_1997 to 2017MHz

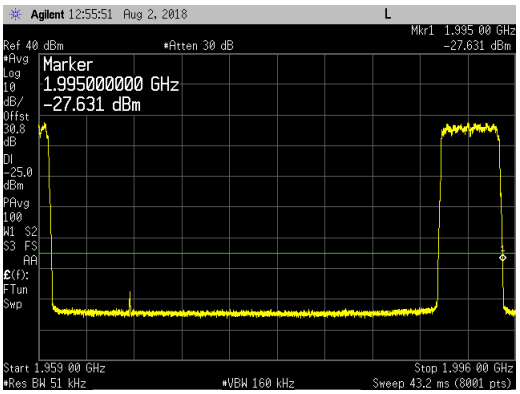


Dual LTE5_ Max Spacing _Band Edge Plots for Antenna Port 2 and 16QAM Modulation:

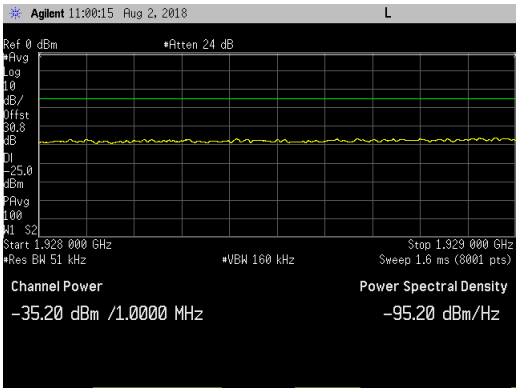
Dual LTE5_Bot Ch_LBE_1929 to 1966MHz



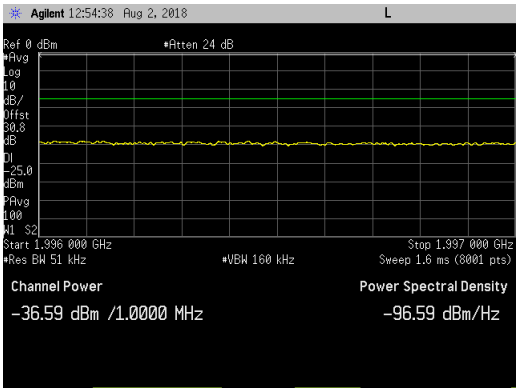
Dual LTE5_Top Ch_UBE_1959 to 1996MHz



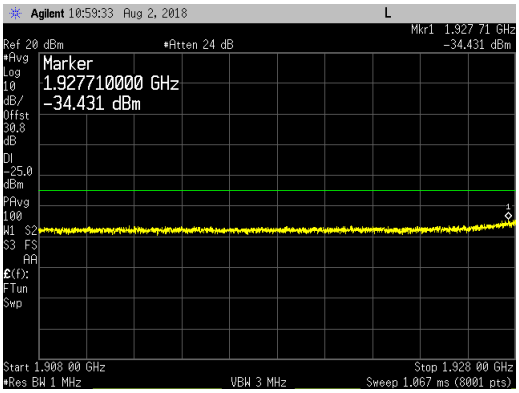
Dual LTE5_Bot Ch_LBE_1928 to 1929MHz



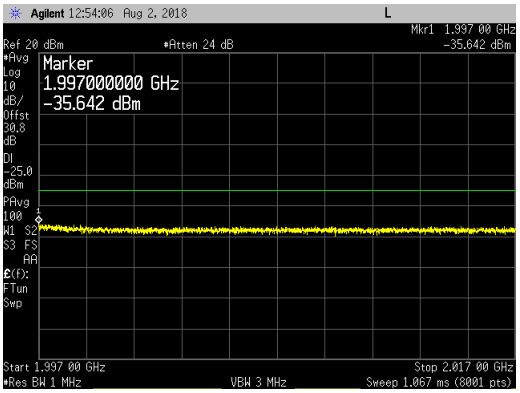
Dual LTE5_Top Ch_UBE_1996 to 1997MHz



Dual LTE5_Bot Ch_LBE_1908 to 1928MHz

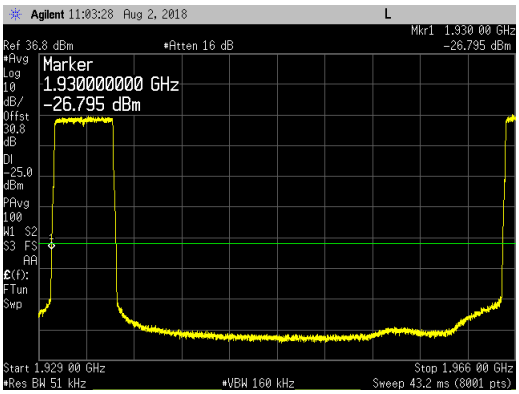


Dual LTE5_Top Ch_UBE_1997 to 2017MHz

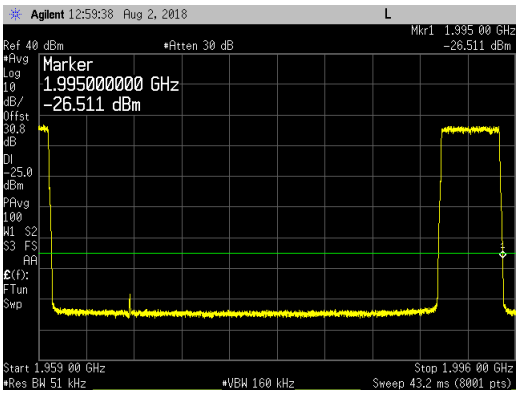


Dual LTE5_ Max Spacing _Band Edge Plots for Antenna Port 2 and 64QAM Modulation:

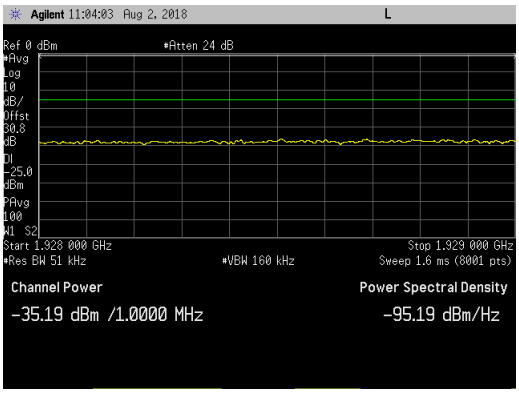
Dual LTE5_Bot Ch_LBE_1929 to 1966MHz



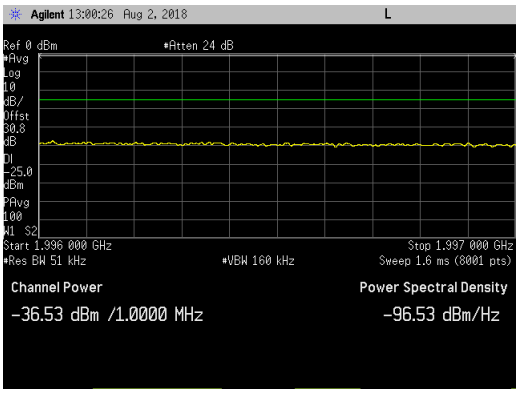
Dual LTE5_Top Ch_UBE_1959 to 1996MHz



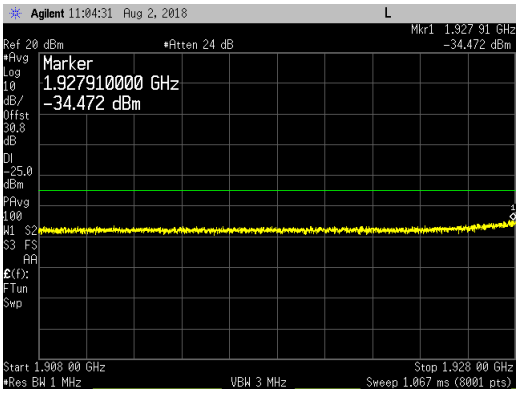
Dual LTE5_Bot Ch_LBE_1928 to 1929MHz



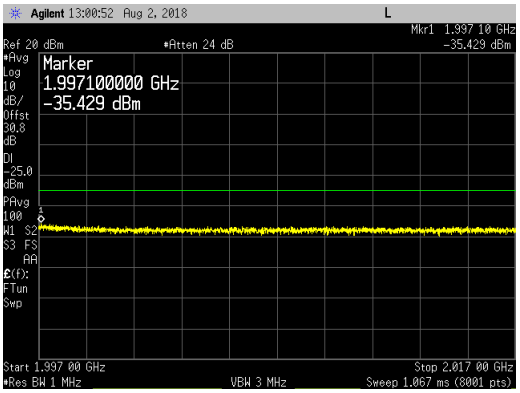
Dual LTE5_Top Ch_UBE_1996 to 1997MHz



Dual LTE5_Bot Ch_LBE_1908 to 1928MHz

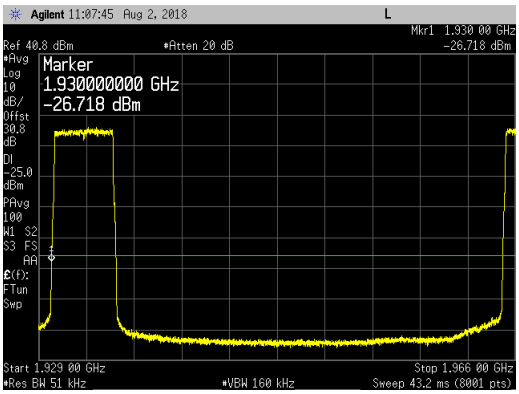


Dual LTE5_Top Ch_UBE_1997 to 2017MHz

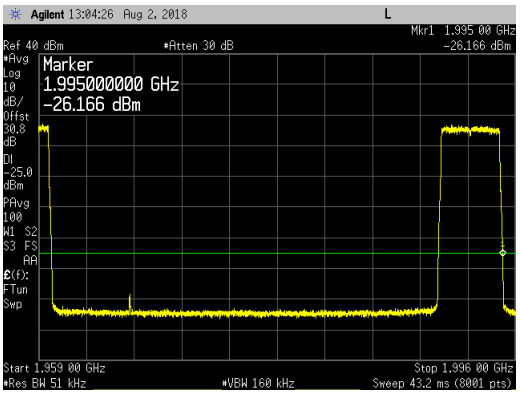


Dual LTE5_ Max Spacing _Band Edge Plots for Antenna Port 2 and 256QAM Modulation:

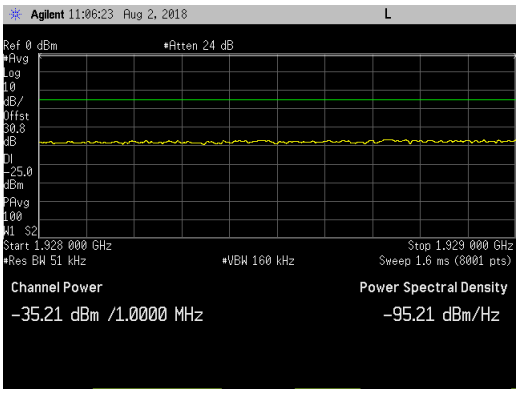
Dual LTE5_ Bot Ch_LBE_1929 to 1966MHz



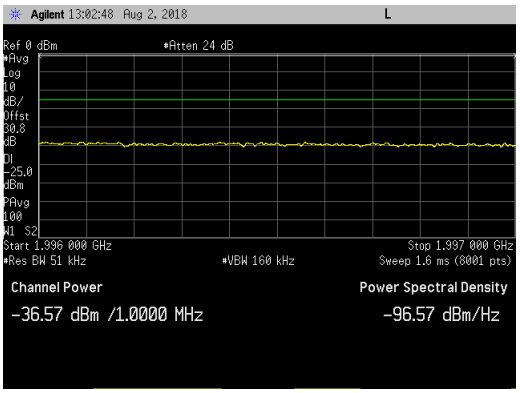
Dual LTE5_Top Ch_UBE_1959 to 1996MHz



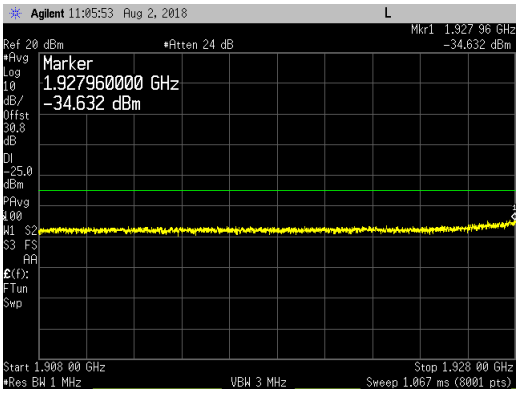
Dual LTE5_ Bot Ch_LBE_1928 to 1929MHz



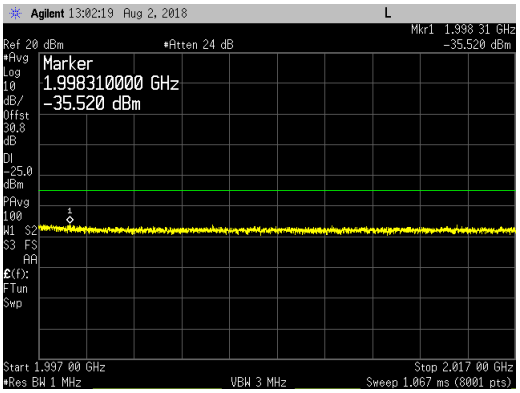
Dual LTE5_Top Ch_UBE_1996 to 1997MHz



Dual LTE5_ Bot Ch_LBE_1908 to 1928MHz



Dual LTE5_Top Ch_UBE_1997 to 2017MHz



Transmitter Antenna Port Conducted Emissions

Transmitter conducted emission measurements were made at radio module antenna port 2. Measurements were performed over the 9kHz to 20GHz frequency range. The radio module was operated on the PCS middle channel (1962.5MHz) with all LTE modulation types (QPSK, 16QAM, 64QAM and 256QAM) for LTE bandwidths of 5MHz, 10MHz, 15MHz and 20MHz. In addition, multicarrier operation was verified using LTE5 bandwidth and all modulation types using two carriers with minimum spacing at the bottom end of the band (1932.5MHz and 1937.5MHz), two carriers with minimum spacing at the top end of the band (1987.5MHz and 1992.5MHz), two carriers with maximum spacing at the bottom end of the band (1932.5MHz and 1967.5MHz), and two carriers with maximum spacing at the top end of the band (1957.5MHz and 1992.5MHz). The multicarrier test cases are based upon KDB 971168 D03v01 requirements using two carriers.

The limit of -25dBm was used in the certification testing. The limit is adjusted to -25dBm [-13dBm -10 log (16)] per FCC KDB 662911 D01v02r01 because the BTS may operate as a 16 port MIMO transmitter. The required measurement parameters include a 1MHz 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 9k to 150kHz and the 20MHz to 3GHz frequency ranges). Measurements for the 9k to 150kHz and the 20MHz to 3GHz frequency range 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 –55dBm to correct for a spectrum analyzer RBW of 1kHz versus required RBW of 1MHz [i.e.: -55dBm = -25dBm -10log(1MHz/1kHz)]. The limit for the 150kHz to 20MHz frequency range was adjusted to –45dBm to correct for a spectrum analyzer RBW of 10kHz versus required RBW of 1MHz [i.e.: -45dBm = -25dBm -10log(1MHz/10kHz)]. The required limit of -25dBm with a RBW of $\geq$1MHz 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)	9.4dB
150kHz to 20MHz	10kHz	30kHz	8001	Peak	Auto	50 Sweeps	9.5dB
20MHz to 3GHz	1MHz	3MHz	8001	Average	Auto	Note (2)	30.4dB
3GHz to 10GHz	2MHz	6MHz	8001	Peak	Auto	50 Sweeps	31.9dB
10GHz to 18GHz	2MHz	6MHz	8001	Peak	Auto	50 Sweeps	33.3dB
18GHz to 20GHz	1MHz	3MHz	8001	Peak	Auto	50 Sweeps	36.0dB

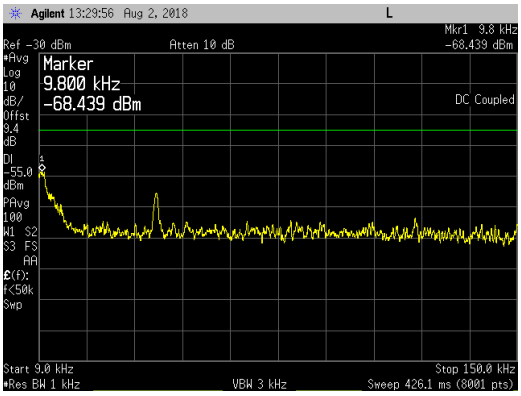
Note 1: The total measurement RF path loss of the test setup (attenuators, test cables and filters) is accounted for by the spectrum analyzer reference level offset.
Note 2: Max Hold not used and instead measurements were performed with the spectrum analyzer in the RMS average mode over 100 traces.

A low pass filter was used to reduce measurement instrumentation noise floor for the frequency ranges less than 20MHz. A high pass filter was used to reduce measurement instrumentation noise floor for the frequency ranges above 3GHz. The total measurement RF path loss of the test setup (attenuators, low pass filter, high pass filter and test cables) as shown in the table is accounted for by the spectrum

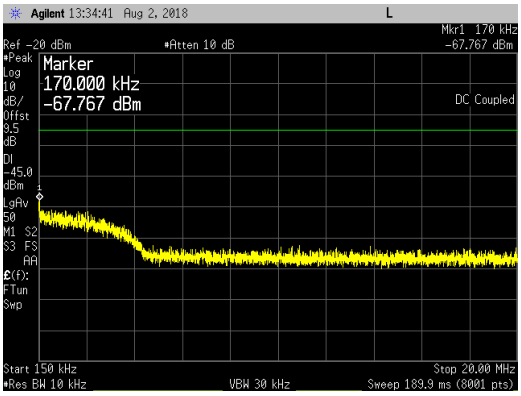
analyzer reference level offset. The display line on the plots reflects the required limit. Conducted spurious emission plots/measurements are provided in the following pages.

LTE5 Channel Bandwidth _ QPSK _ Middle Channel (1962.5MHz):

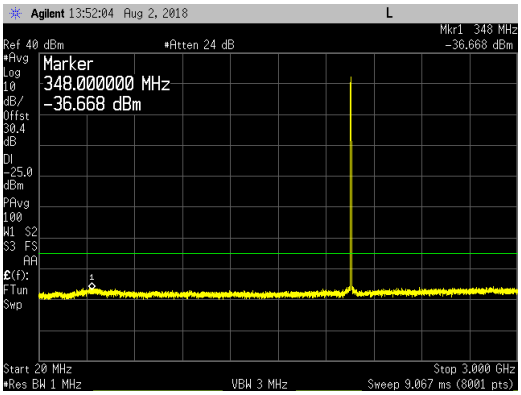
9kHz to 150kHz



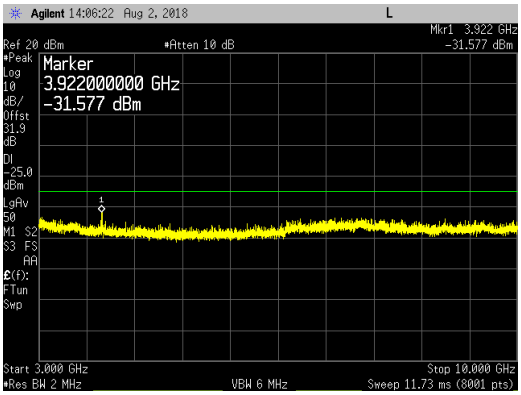
150kHz to 20MHz



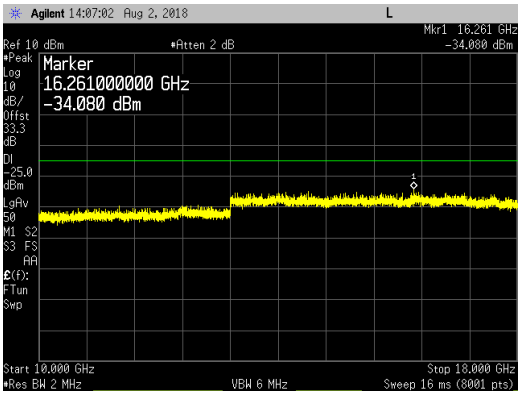
20MHz to 3GHz



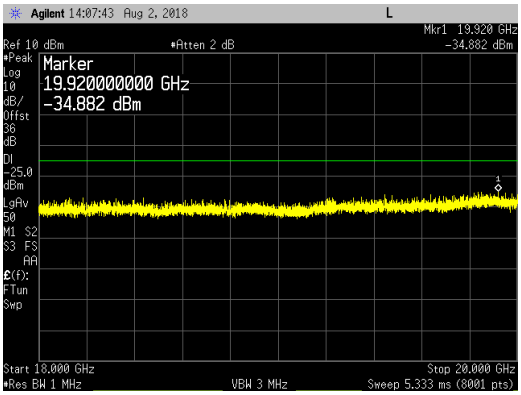
3GHz to 10GHz



10GHz to 18GHz

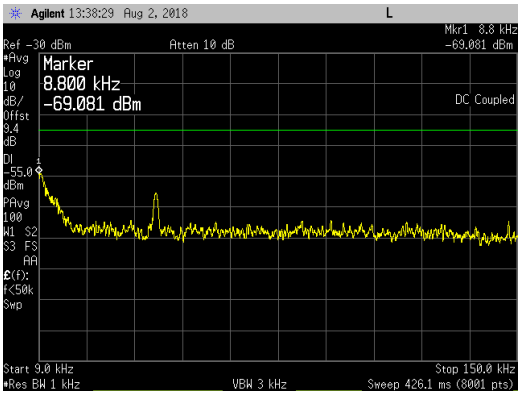


18GHz to 20GHz

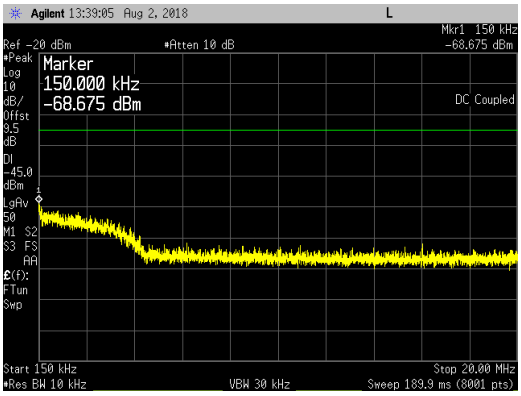


LTE5 Channel Bandwidth _ 16QAM _ Middle Channel (1962.5MHz):

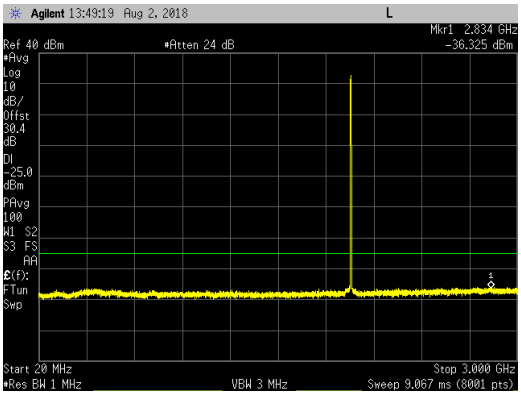
9kHz to 150kHz



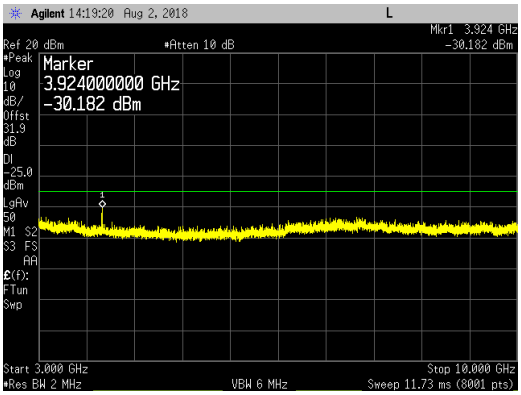
150kHz to 20MHz



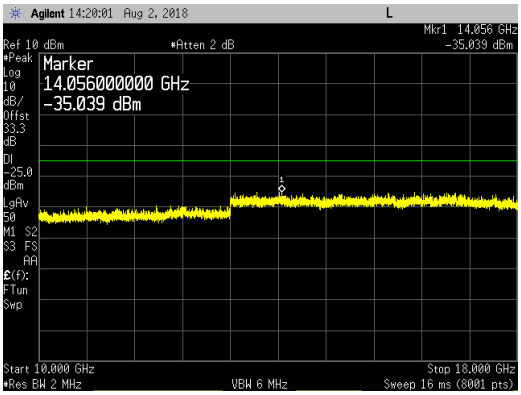
20MHz to 3GHz



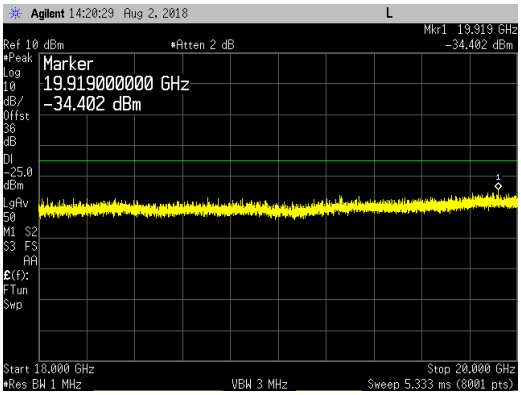
3GHz to 10GHz



10GHz to 18GHz

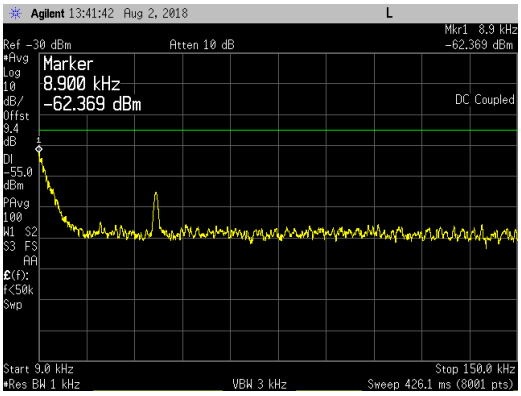


18GHz to 20GHz

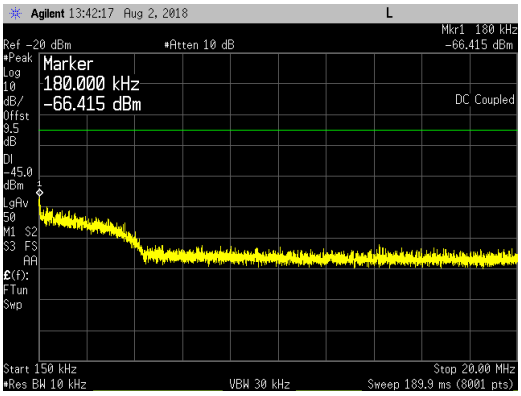


LTE5 Channel Bandwidth _64QAM_ Middle Channel (1962.5MHz):

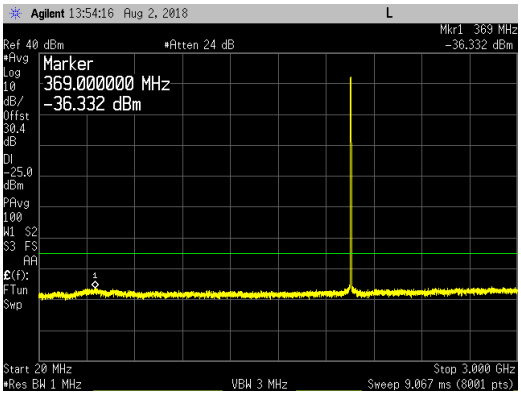
9kHz to 150kHz



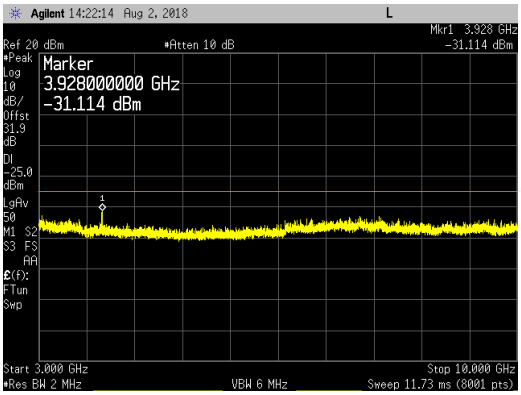
150kHz to 20MHz



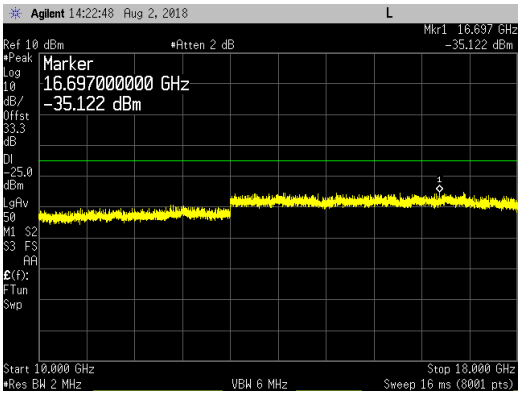
20MHz to 3GHz



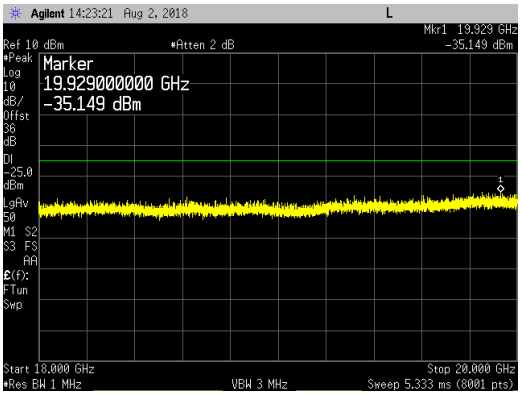
3GHz to 10GHz



10GHz to 18GHz

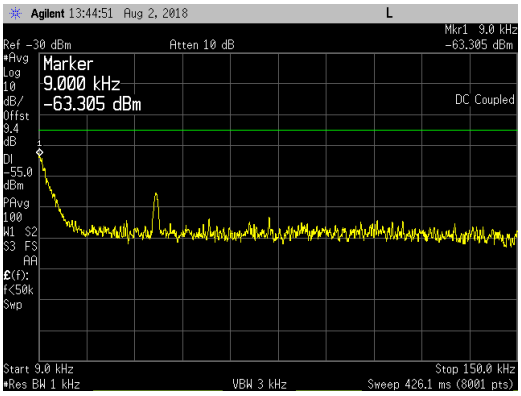


18GHz to 20GHz

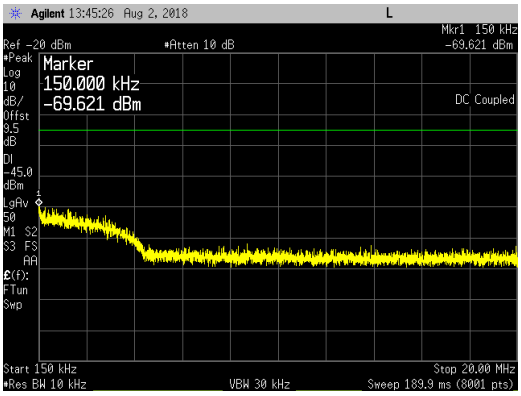


LTE5 Channel Bandwidth _256QAM_ Middle Channel (1962.5MHz):

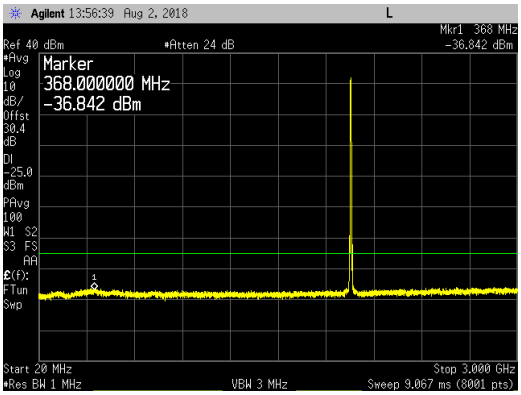
9kHz to 150kHz



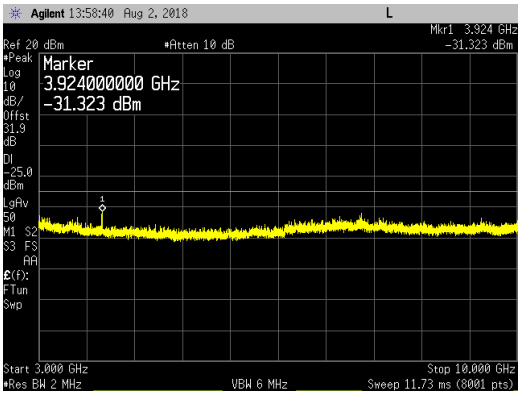
150kHz to 20MHz



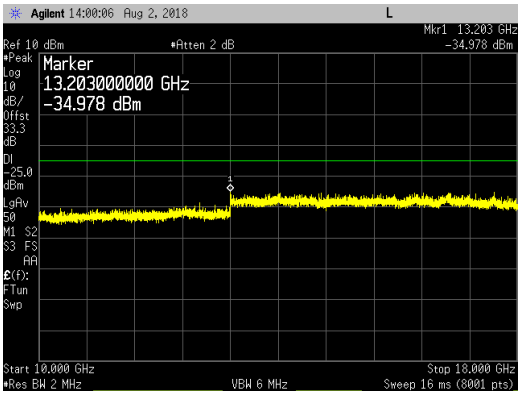
20MHz to 3GHz



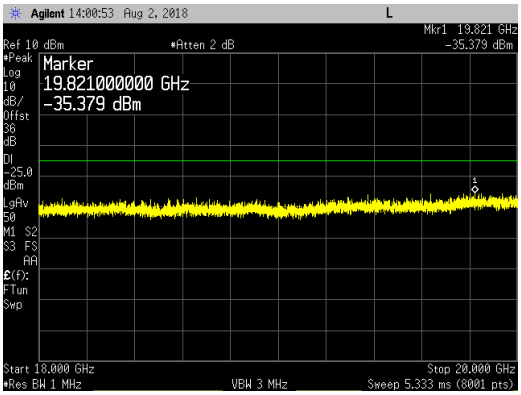
3GHz to 10GHz



10GHz to 18GHz

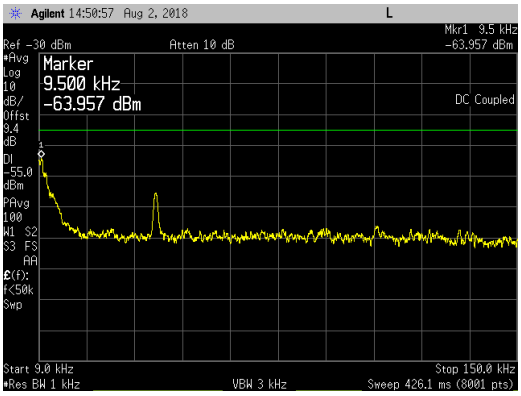


18GHz to 20GHz

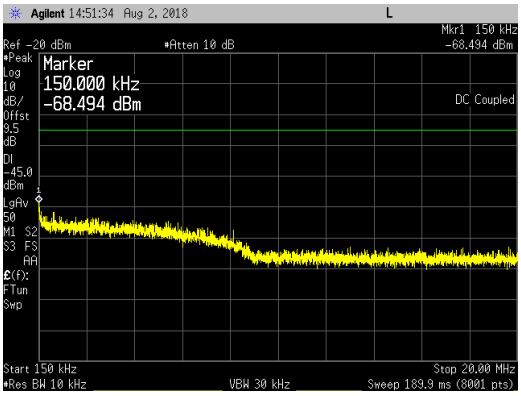


LTE10 Channel Bandwidth _ QPSK _ Middle Channel (1962.5MHz):

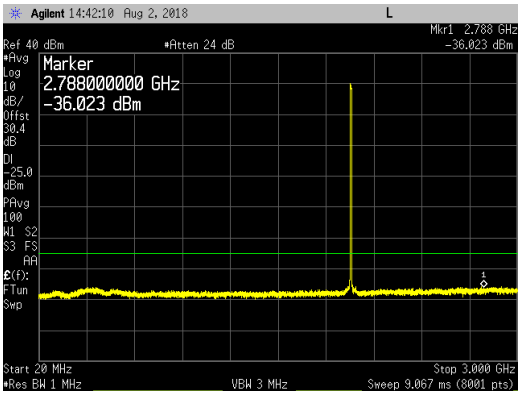
9kHz to 150kHz



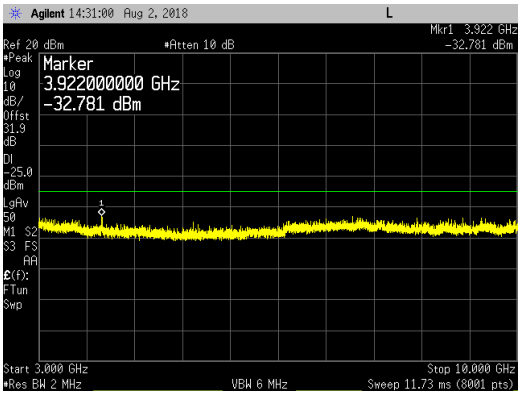
150kHz to 20MHz



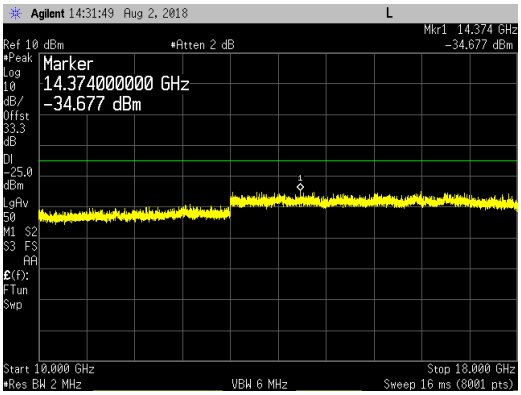
20MHz to 3GHz



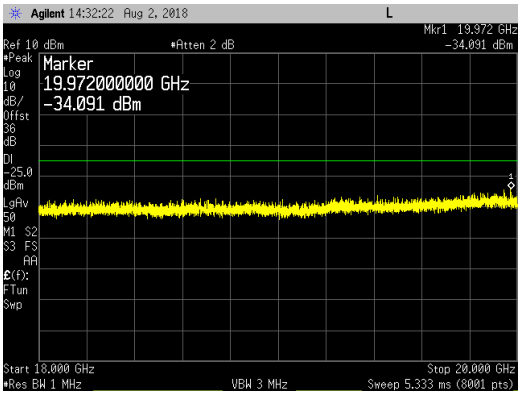
3GHz to 10GHz



10GHz to 18GHz

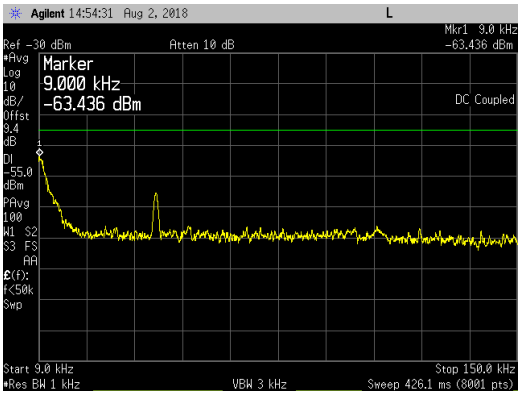


18GHz to 20GHz

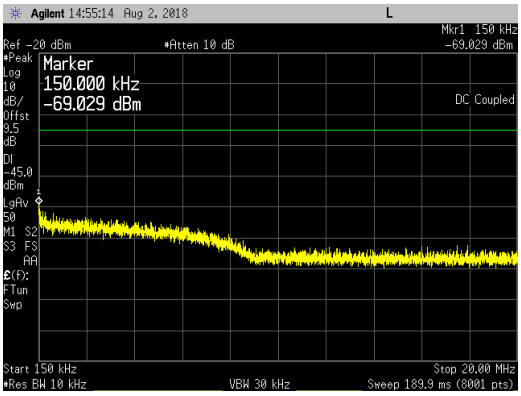


LTE10 Channel Bandwidth _ 16QAM _ Middle Channel (1962.5MHz):

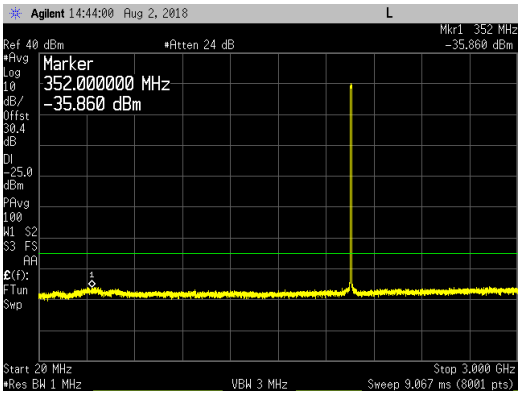
9kHz to 150kHz



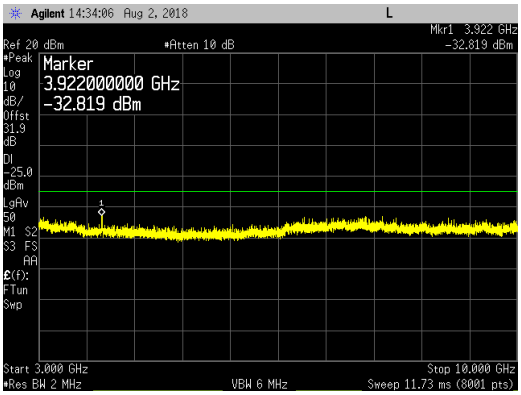
150kHz to 20MHz



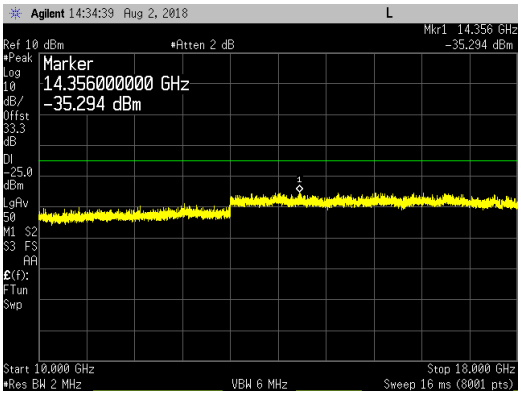
20MHz to 3GHz



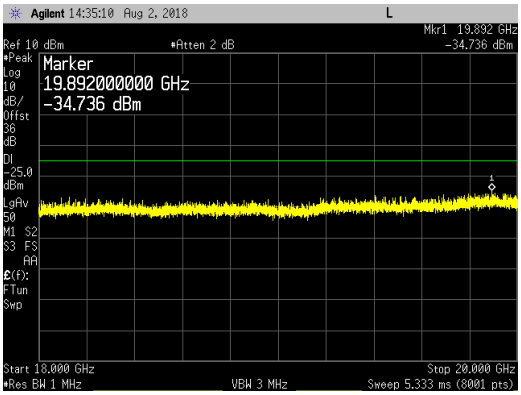
3GHz to 10GHz



10GHz to 18GHz

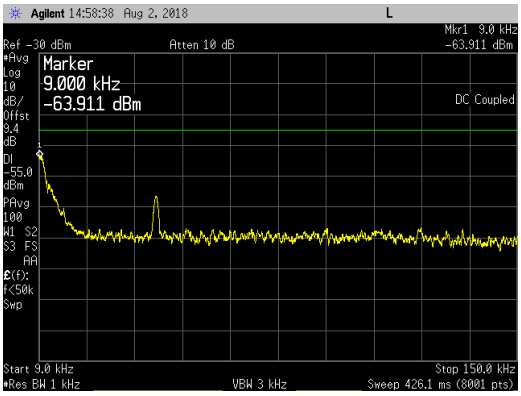


18GHz to 20GHz

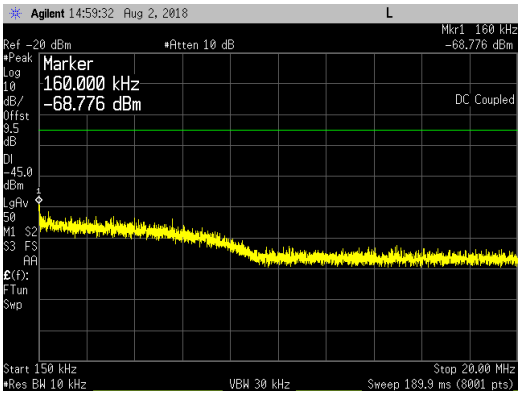


LTE10 Channel Bandwidth _64QAM_ Middle Channel (1962.5MHz):

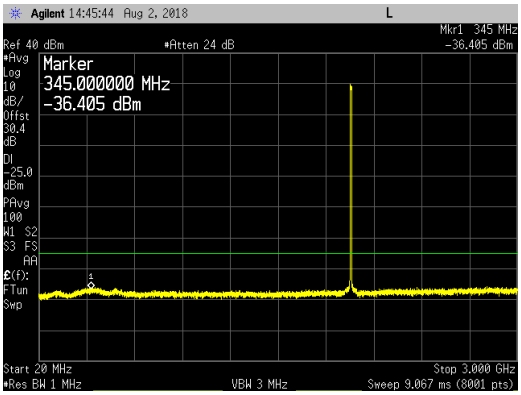
9kHz to 150kHz



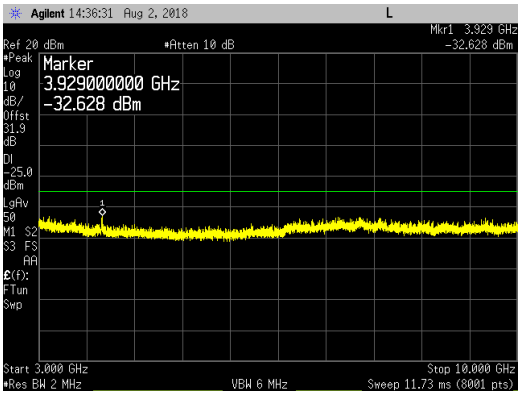
150kHz to 20MHz



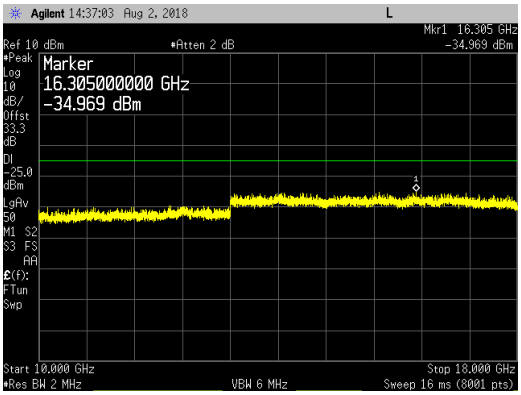
20MHz to 3GHz



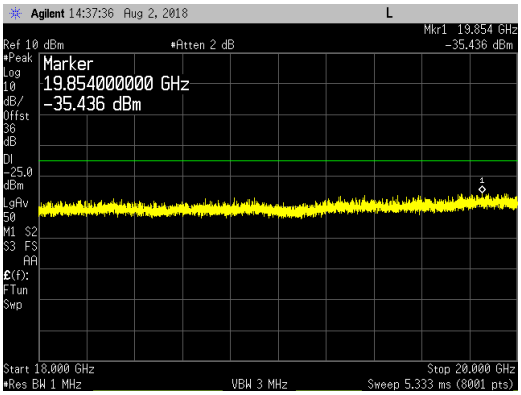
3GHz to 10GHz



10GHz to 18GHz

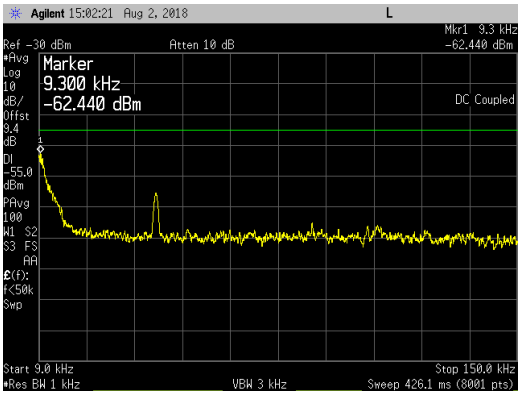


18GHz to 20GHz

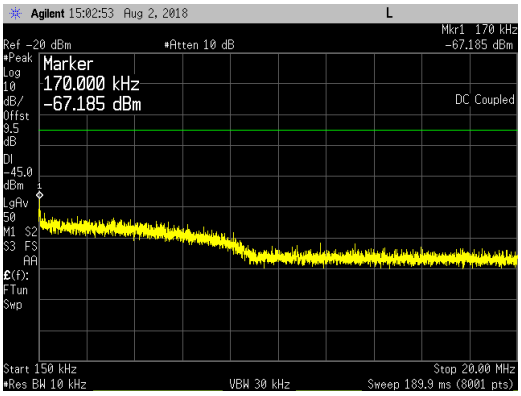


LTE10 Channel Bandwidth _256QAM_ Middle Channel (1962.5MHz):

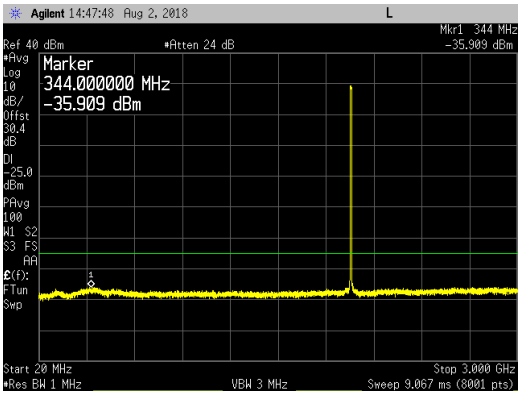
9kHz to 150kHz



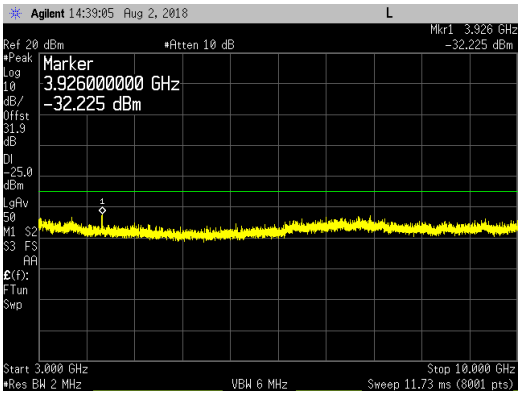
150kHz to 20MHz



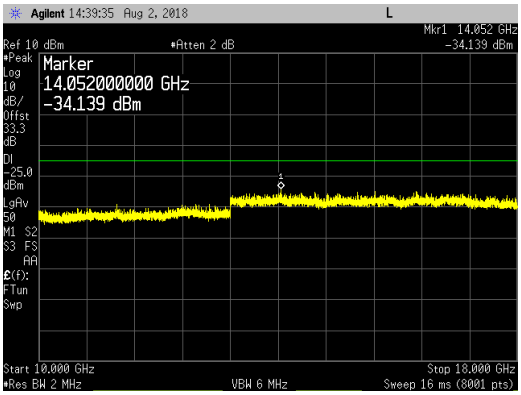
20MHz to 3GHz



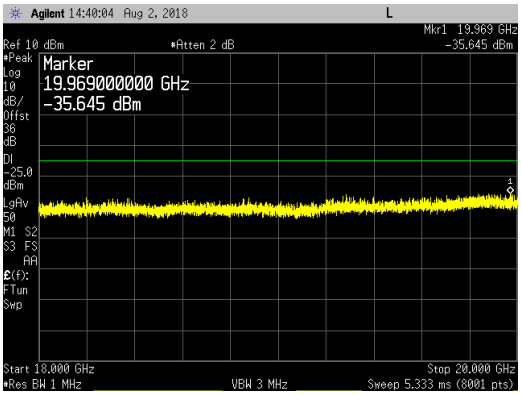
3GHz to 10GHz



10GHz to 18GHz

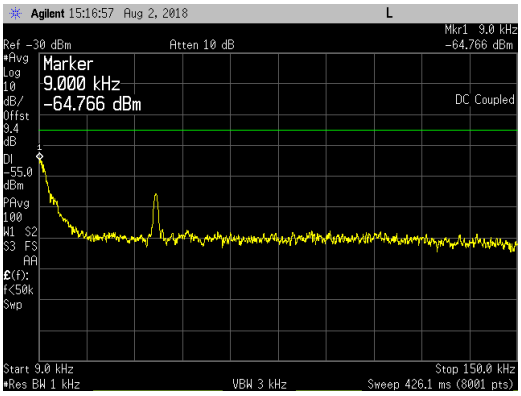


18GHz to 20GHz

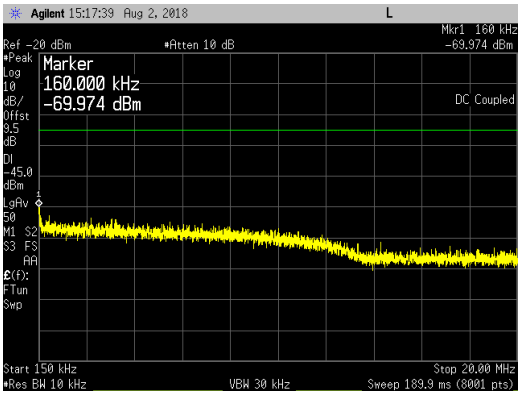


LTE15 Channel Bandwidth _ QPSK _ Middle Channel (1962.5MHz):

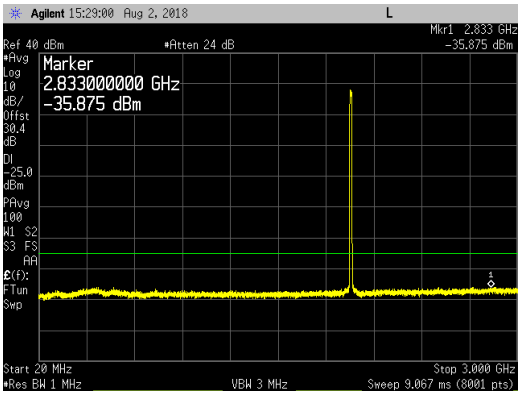
9kHz to 150kHz



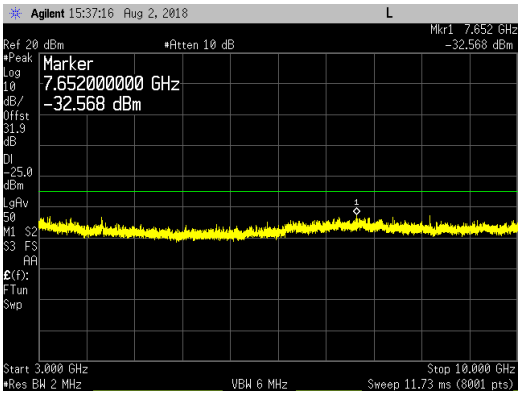
150kHz to 20MHz



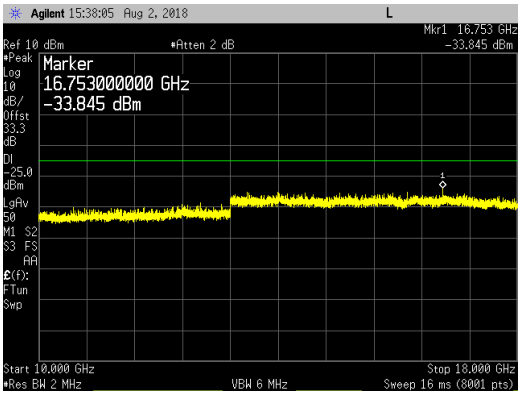
20MHz to 3GHz



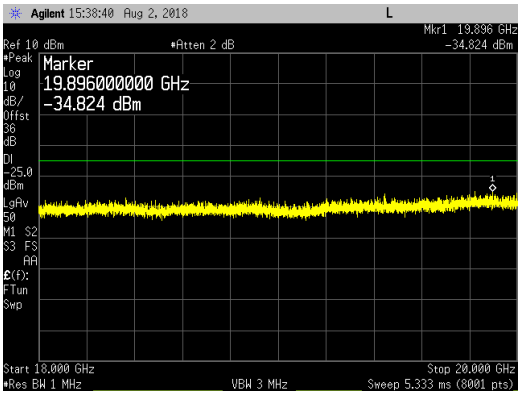
3GHz to 10GHz



10GHz to 18GHz

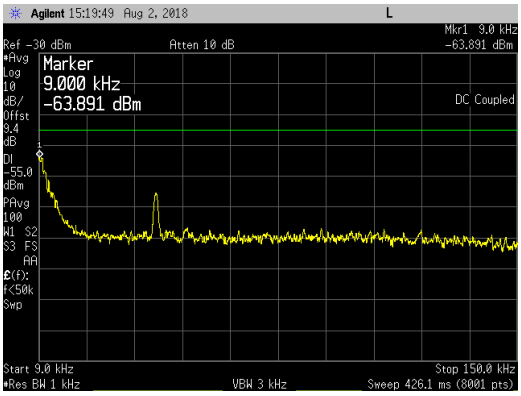


18GHz to 20GHz

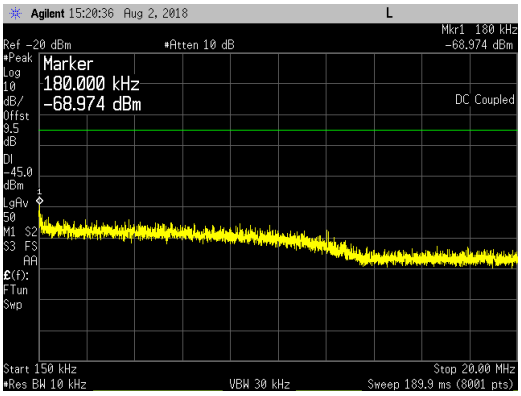


LTE15 Channel Bandwidth _ 16QAM _ Middle Channel (1962.5MHz):

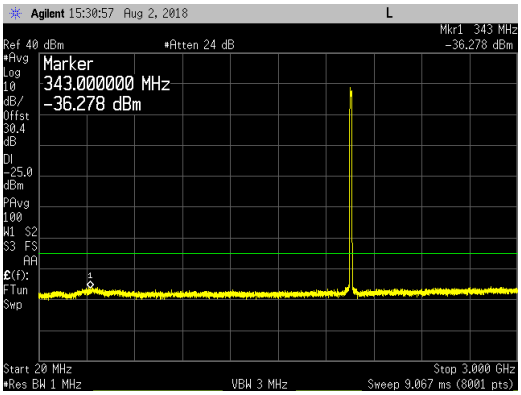
9kHz to 150kHz



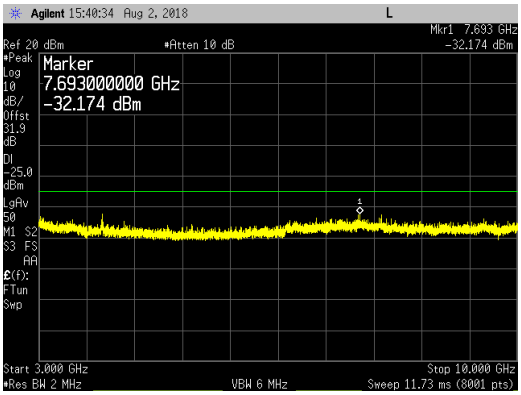
150kHz to 20MHz



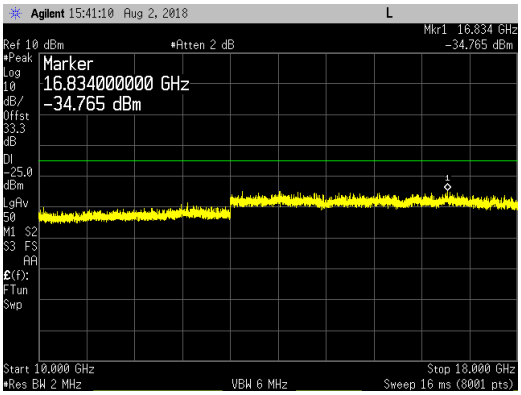
20MHz to 3GHz



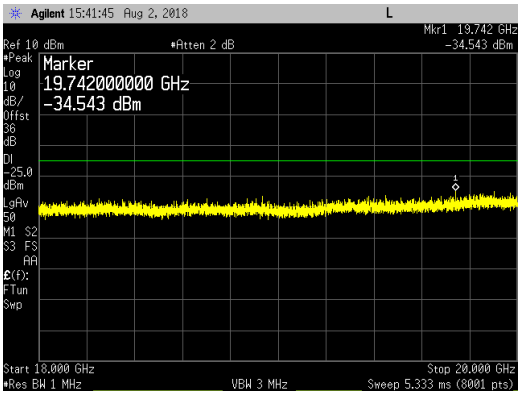
3GHz to 10GHz



10GHz to 18GHz

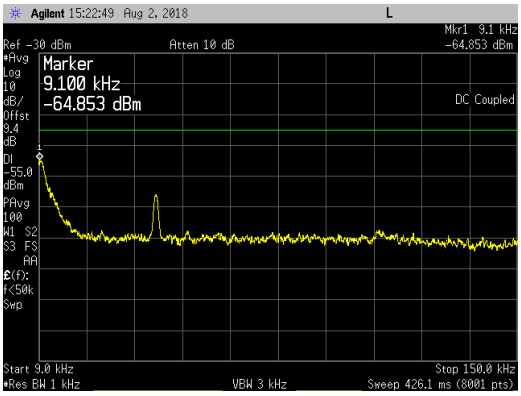


18GHz to 20GHz

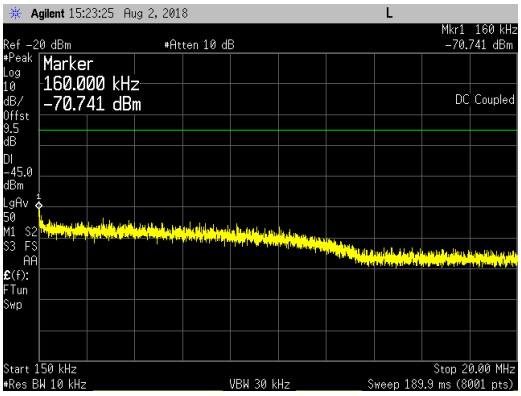


LTE15 Channel Bandwidth _64QAM_ Middle Channel (1962.5MHz):

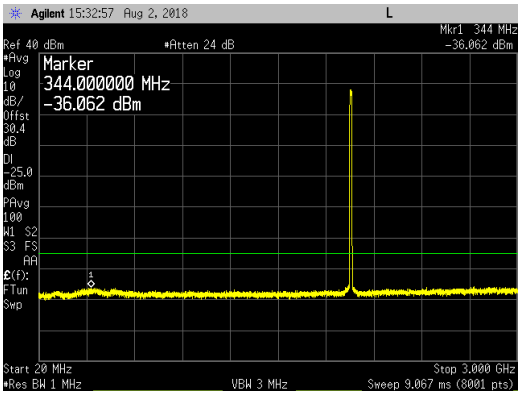
9kHz to 150kHz



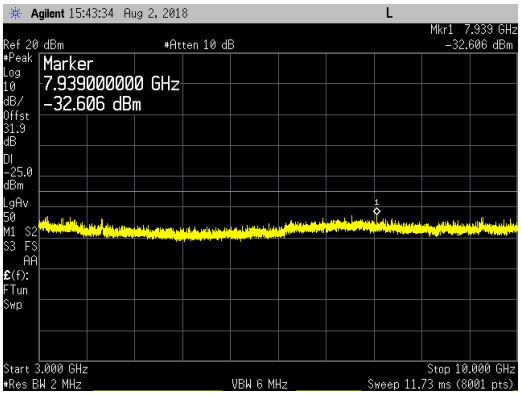
150kHz to 20MHz



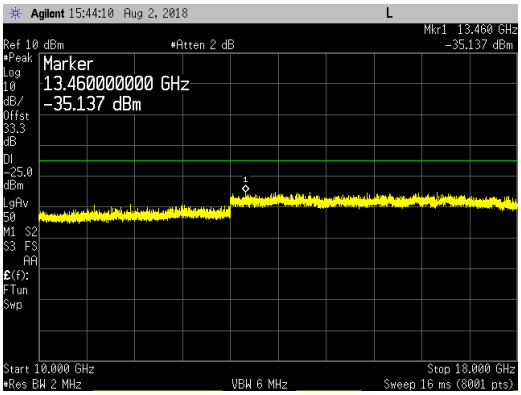
20MHz to 3GHz



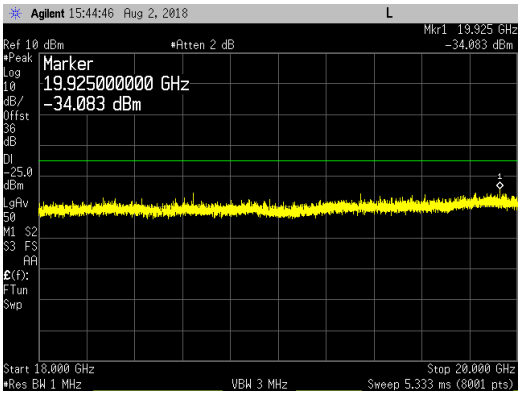
3GHz to 10GHz



10GHz to 18GHz

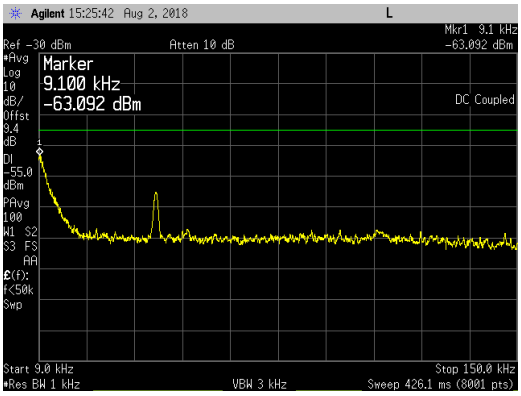


18GHz to 20GHz

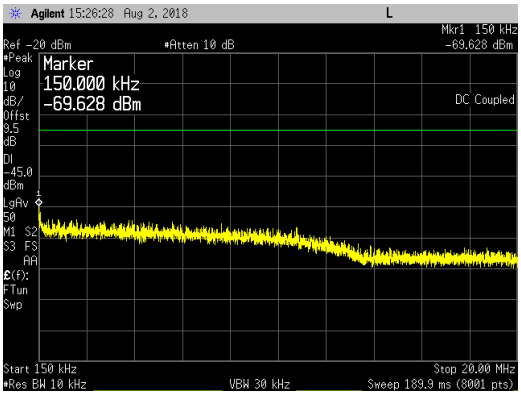


LTE15 Channel Bandwidth _256QAM_ Middle Channel (1962.5MHz):

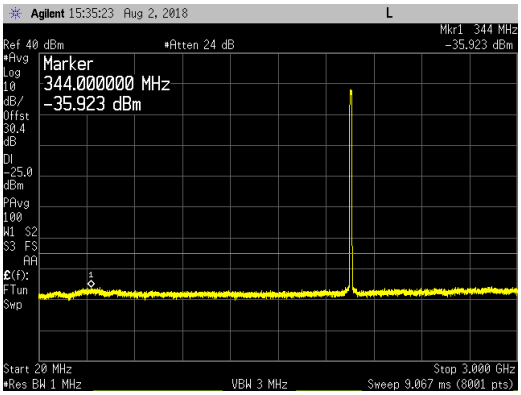
9kHz to 150kHz



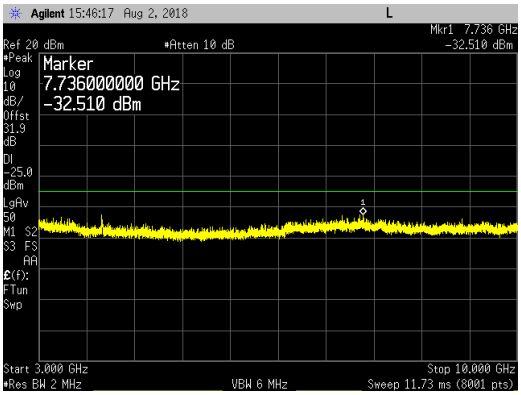
150kHz to 20MHz



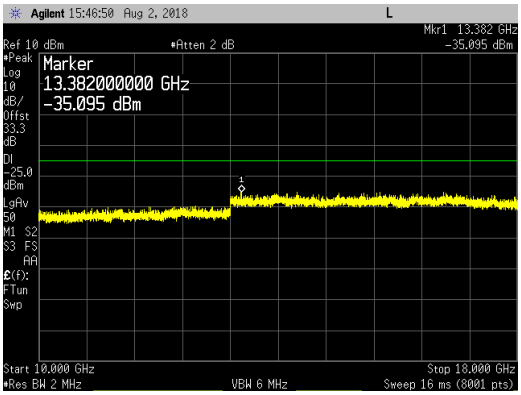
20MHz to 3GHz



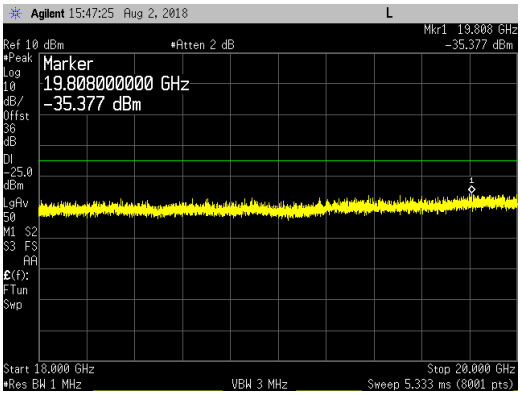
3GHz to 10GHz



10GHz to 18GHz

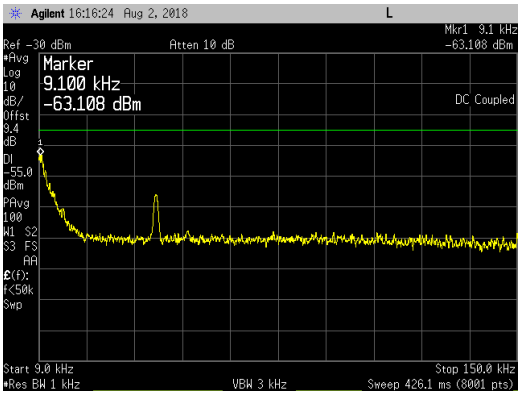


18GHz to 20GHz

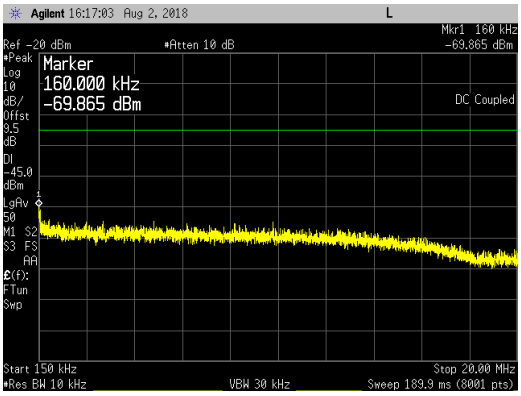


LTE20 Channel Bandwidth _ QPSK _ Middle Channel (1962.5MHz):

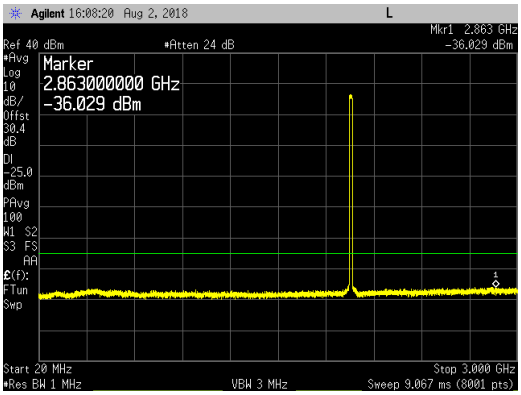
9kHz to 150kHz



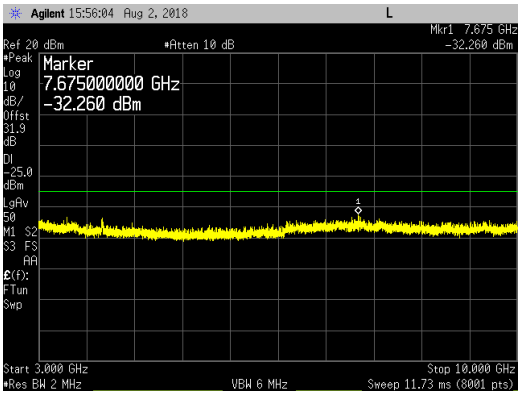
150kHz to 20MHz



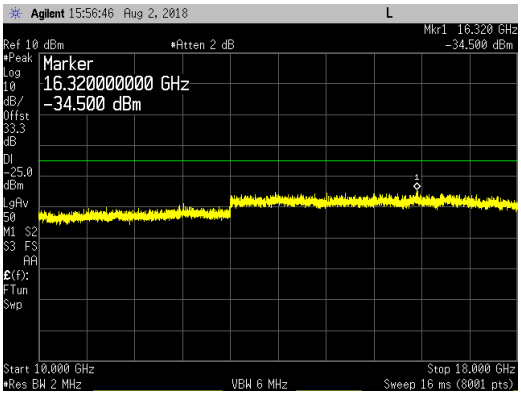
20MHz to 3GHz



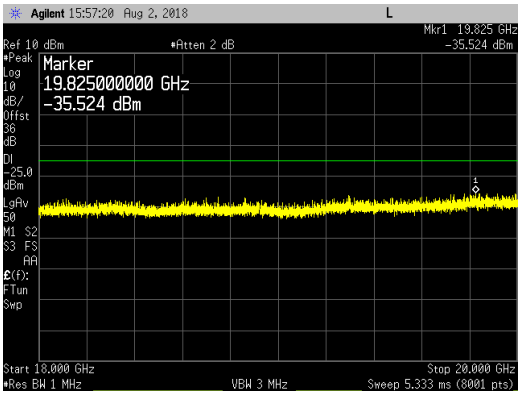
3GHz to 10GHz



10GHz to 18GHz

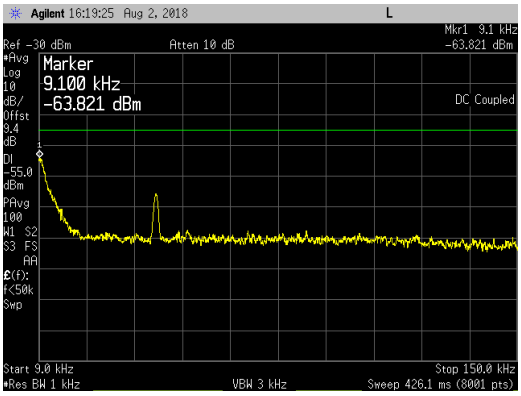


18GHz to 20GHz

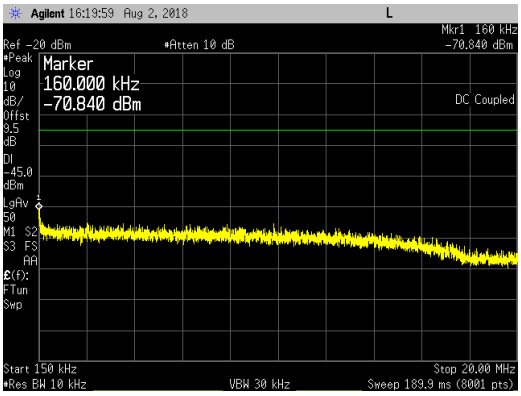


LTE20 Channel Bandwidth _ 16QAM _ Middle Channel (1962.5MHz):

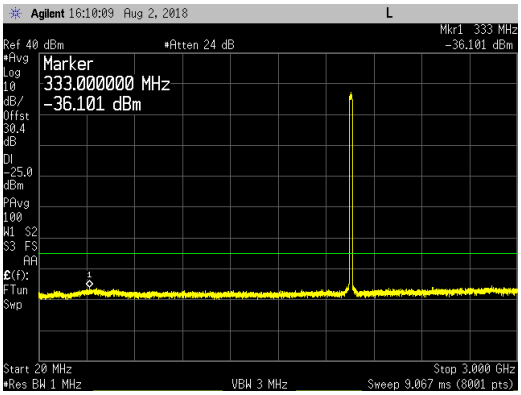
9kHz to 150kHz



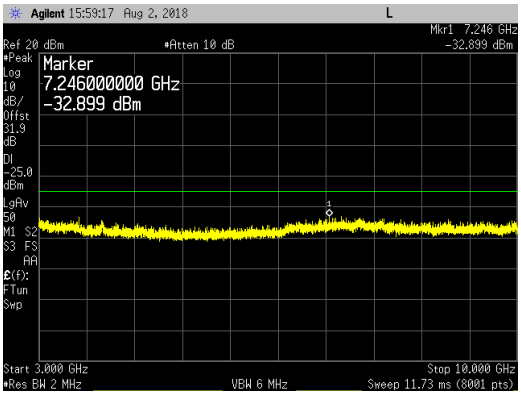
150kHz to 20MHz



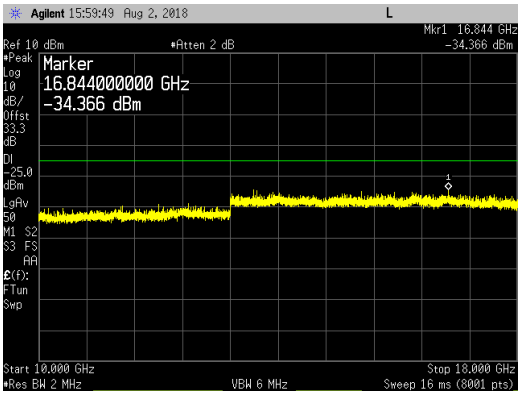
20MHz to 3GHz



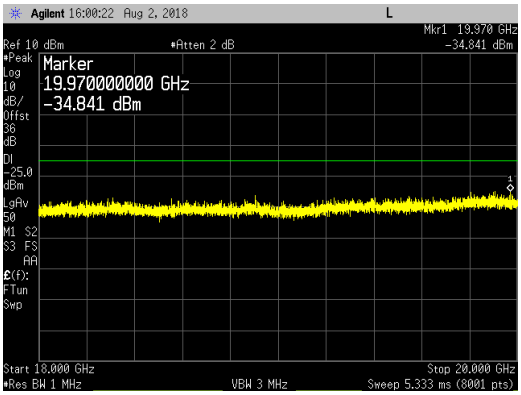
3GHz to 10GHz



10GHz to 18GHz

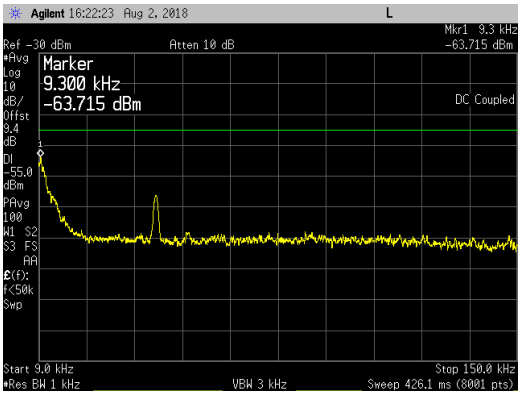


18GHz to 20GHz

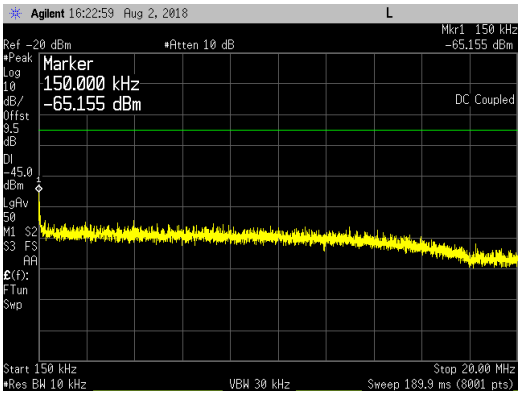


LTE20 Channel Bandwidth _64QAM_ Middle Channel (1962.5MHz):

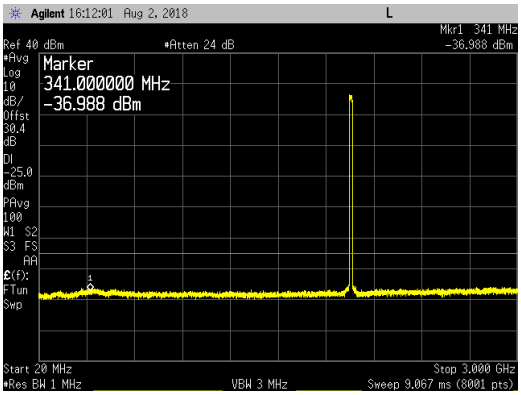
9kHz to 150kHz



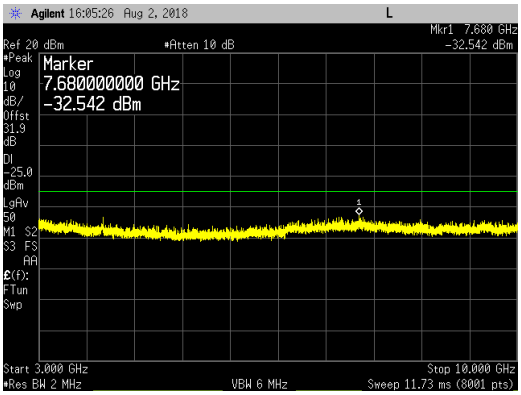
150kHz to 20MHz



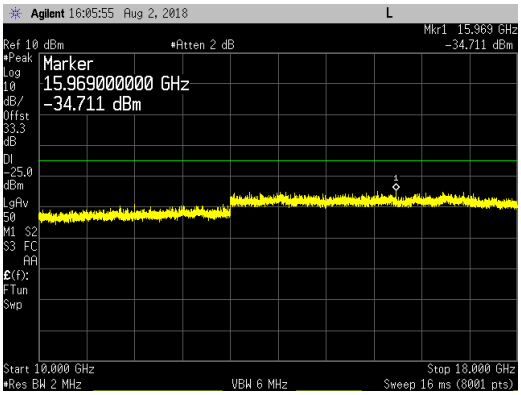
20MHz to 3GHz



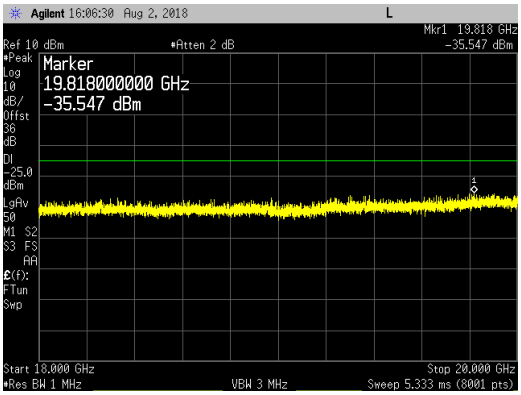
3GHz to 10GHz



10GHz to 18GHz

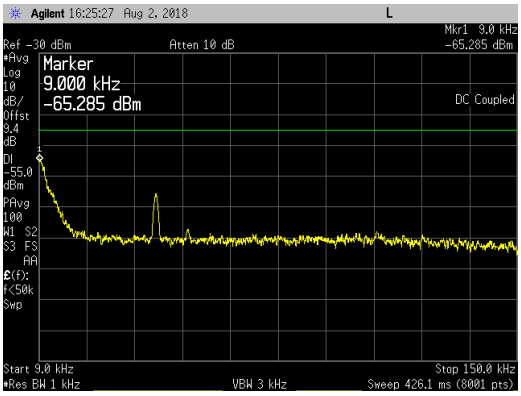


18GHz to 20GHz

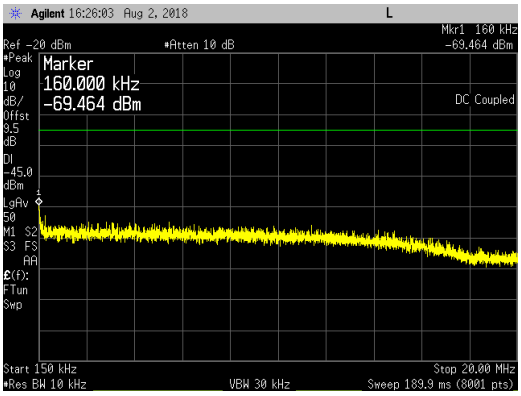


LTE20 Channel Bandwidth _256QAM_ Middle Channel (1962.5MHz):

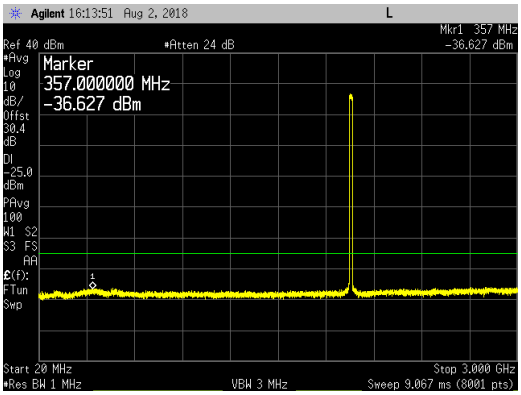
9kHz to 150kHz



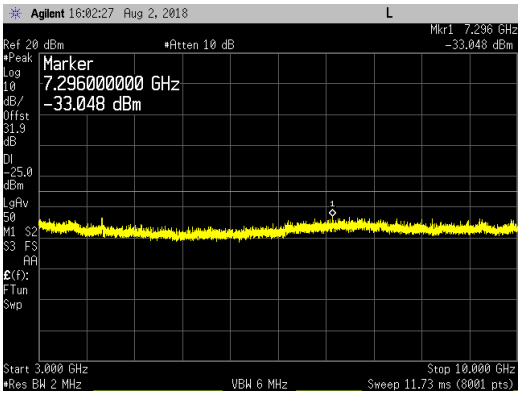
150kHz to 20MHz



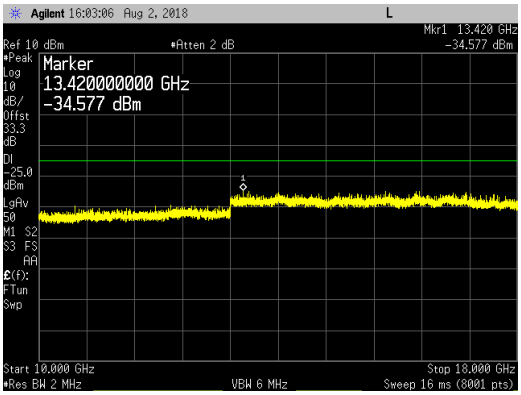
20MHz to 3GHz



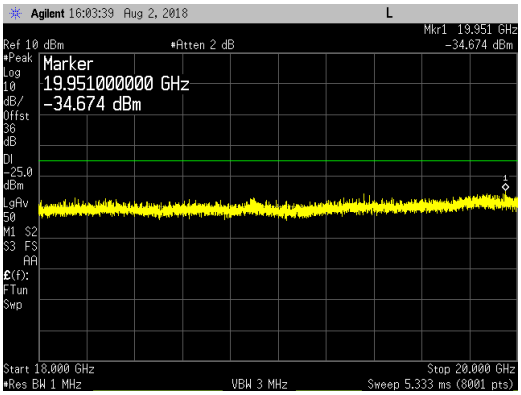
3GHz to 10GHz



10GHz to 18GHz

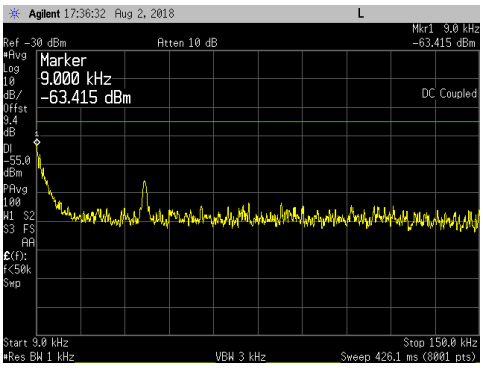


18GHz to 20GHz

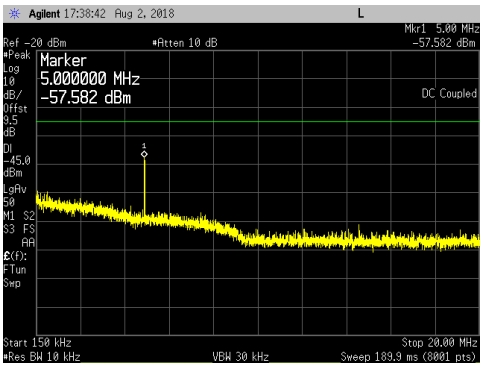


DUAL LTE5 Channel Bandwidth _ QPSK _ Bot Ch_Minimum Spacing (1932.5MHz & 1937.5MHz):

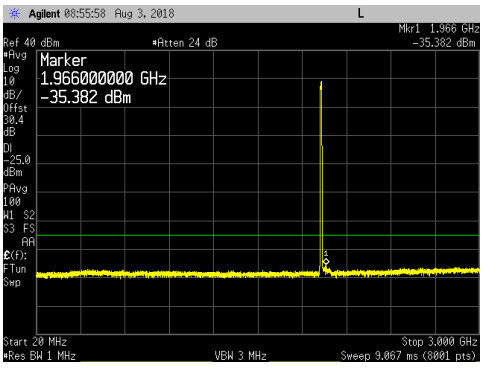
9kHz to 150kHz



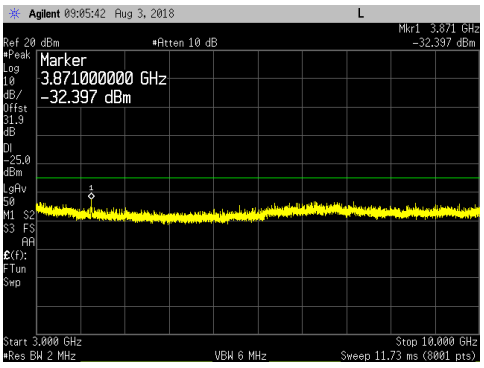
150kHz to 20MHz



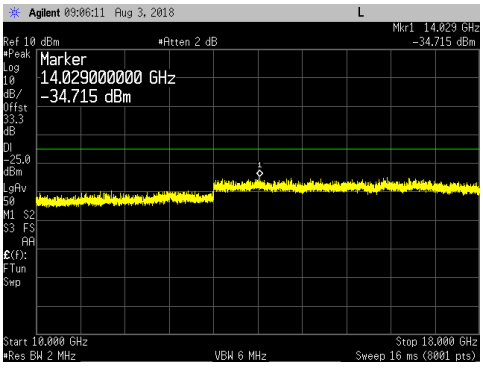
20MHz to 3GHz



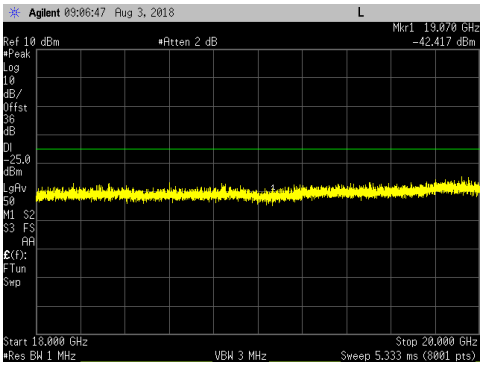
3GHz to 10GHz



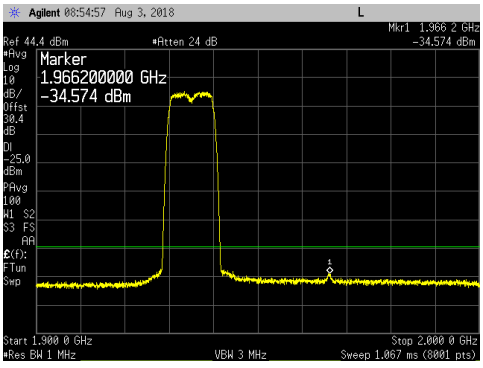
10GHz to 18GHz



18GHz to 20GHz

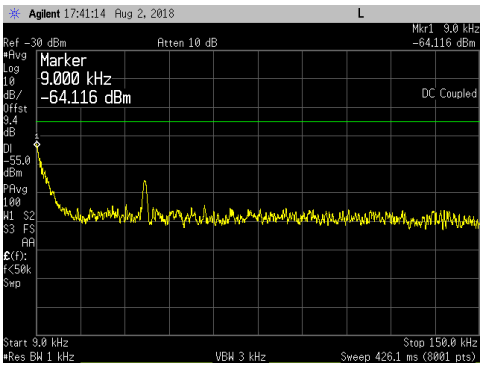


1900MHz to 2000MHz

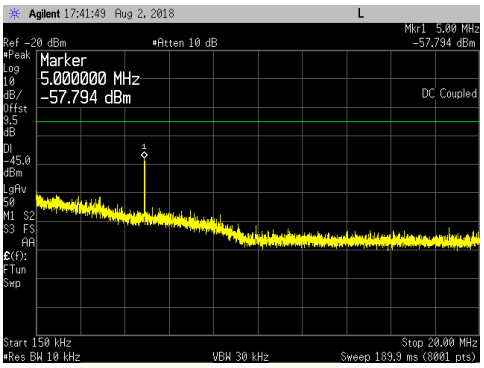


DUAL LTE5 Channel Bandwidth _ 16QAM _ Bot Ch _Minimum Spacing (1932.5MHz & 1937.5MHz):

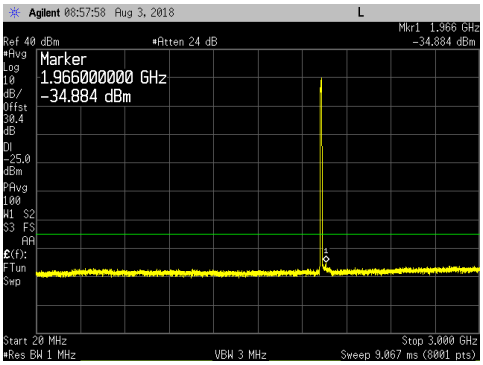
9kHz to 150kHz



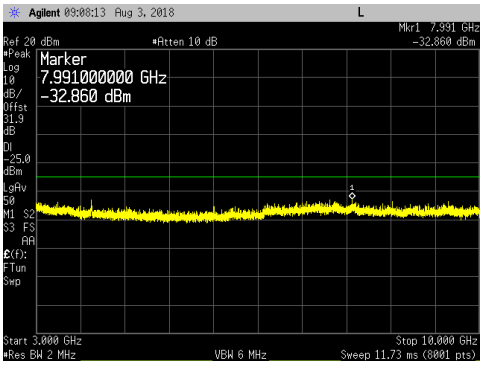
150kHz to 20MHz



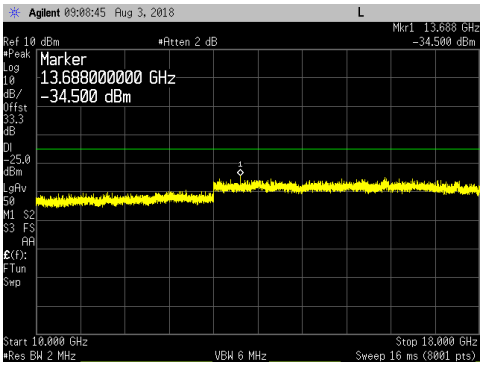
20MHz to 3GHz



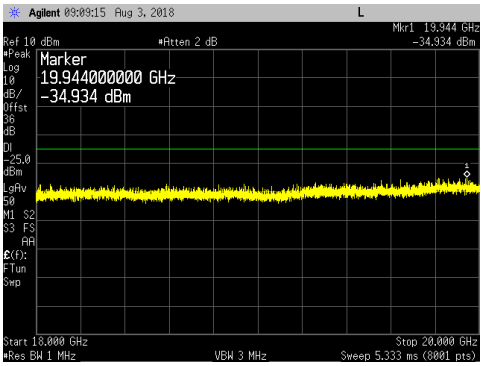
3GHz to 10GHz



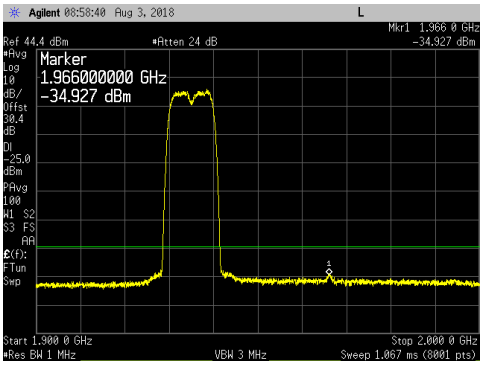
10GHz to 18GHz



18GHz to 20GHz

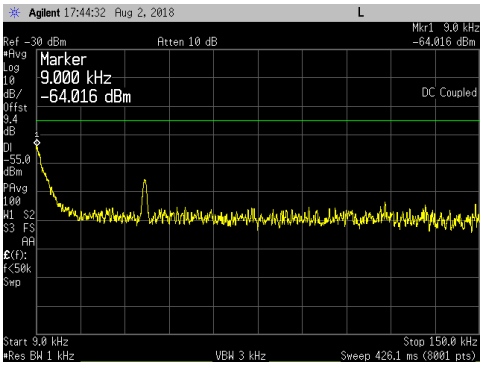


1900MHz to 2000MHz

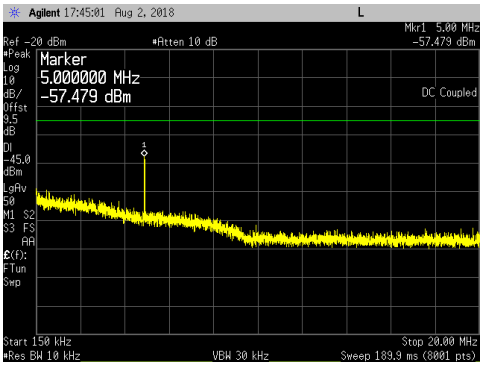


DUAL LTE5 Channel Bandwidth _ 64QAM _ Bot Ch _Minimum Spacing (1932.5MHz & 1937.5MHz):

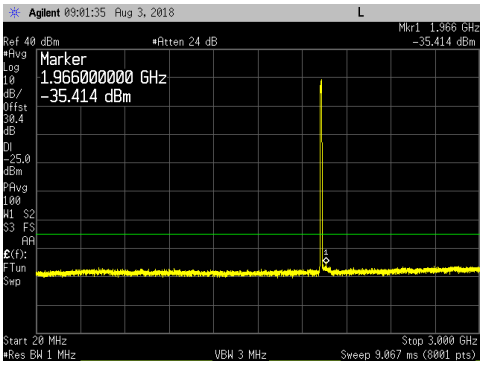
9kHz to 150kHz



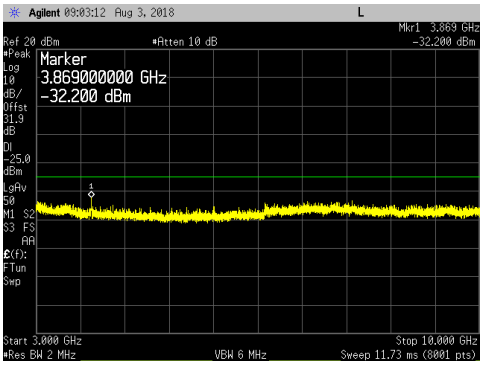
150kHz to 20MHz



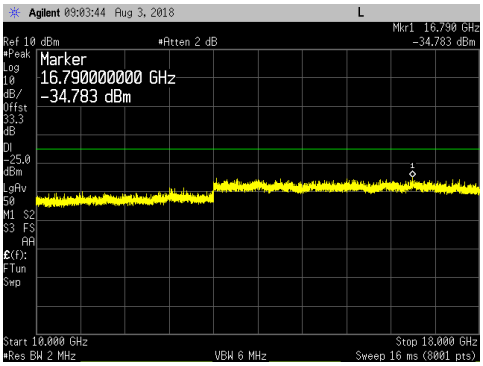
20MHz to 3GHz



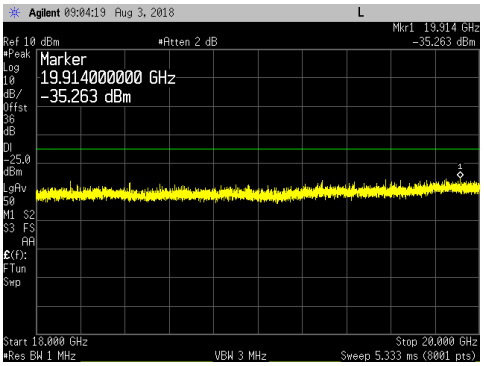
3GHz to 10GHz



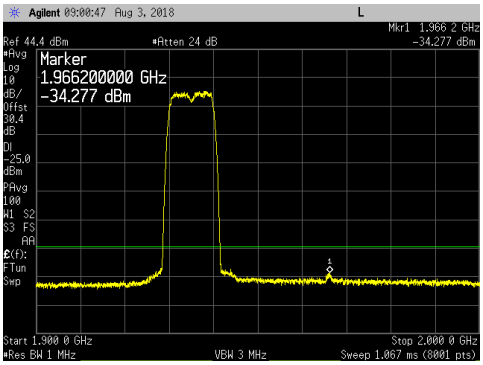
10GHz to 18GHz



18GHz to 20GHz

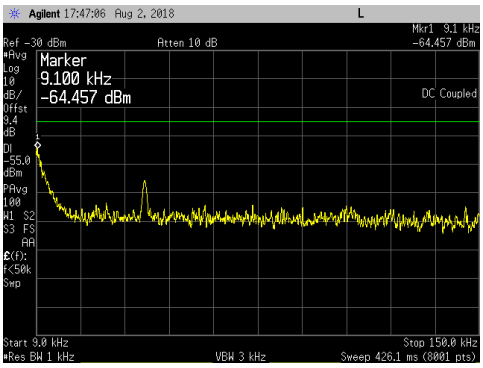


1900MHz to 2000MHz

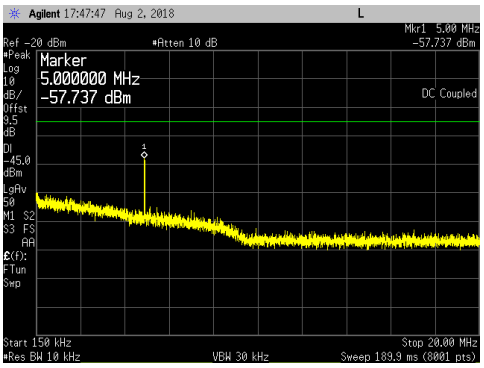


DUAL LTE5 Channel Bandwidth _ 256QAM _ Bot Ch _Minimum Spacing (1932.5MHz & 1937.5MHz):

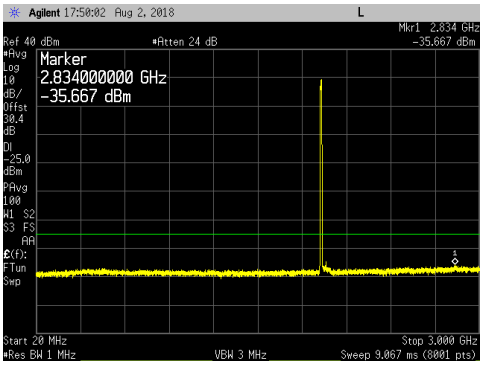
9kHz to 150kHz



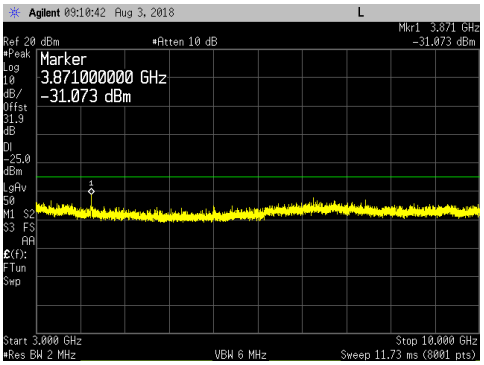
150kHz to 20MHz



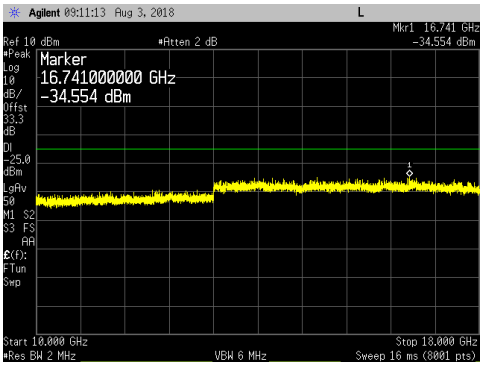
20MHz to 3GHz



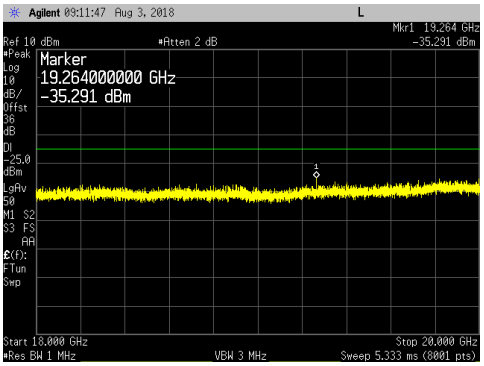
3GHz to 10GHz



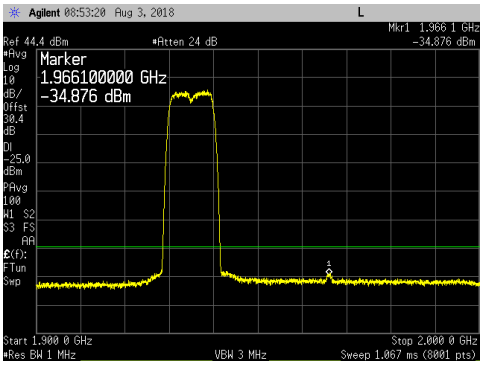
10GHz to 18GHz



18GHz to 20GHz

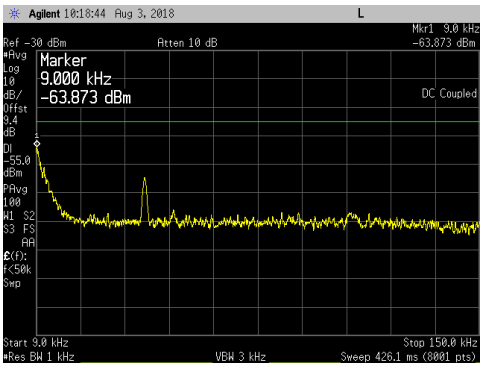


1900MHz to 2000MHz

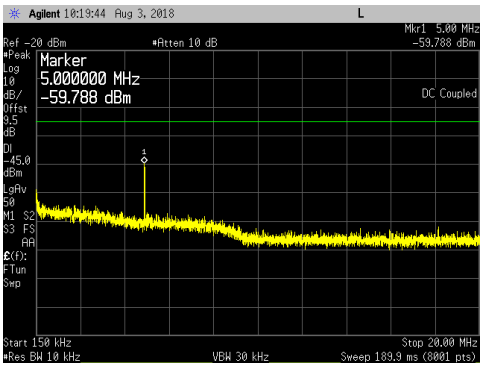


DUAL LTE5 Channel Bandwidth _ QPSK _ Top Ch _Minimum Spacing (1987.5MHz & 1992.5MHz):

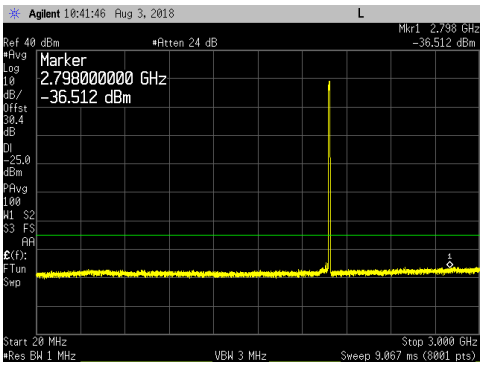
9kHz to 150kHz



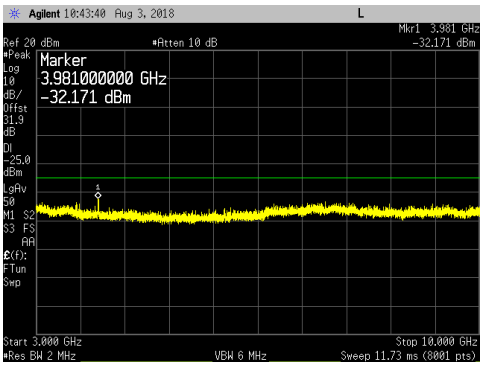
150kHz to 20MHz



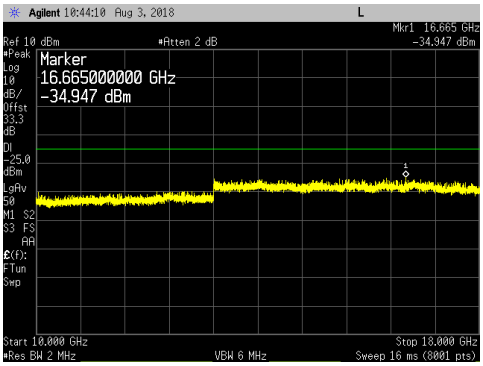
20MHz to 3GHz



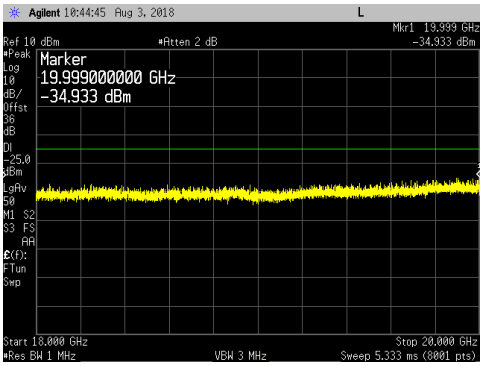
3GHz to 10GHz



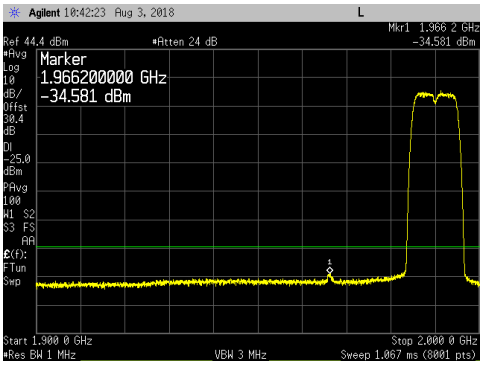
10GHz to 18GHz



18GHz to 20GHz

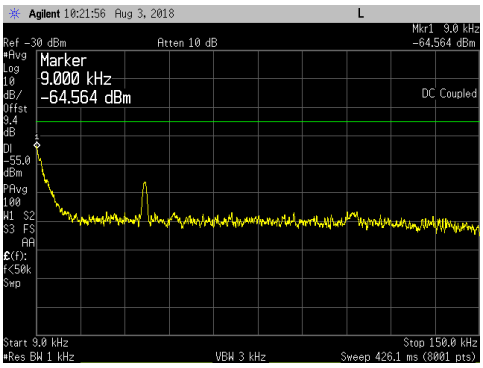


1900MHz to 2000MHz

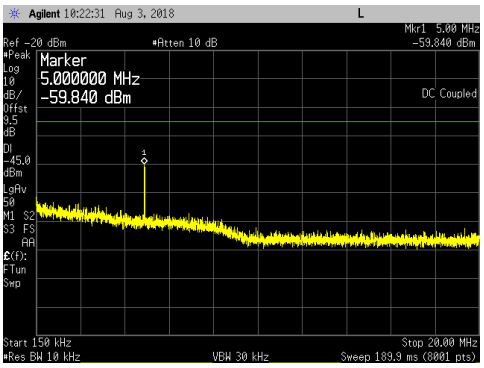


DUAL LTE5 Channel Bandwidth _ 16QAM _ Top Ch _Minimum Spacing (1987.5MHz & 1992.5MHz):

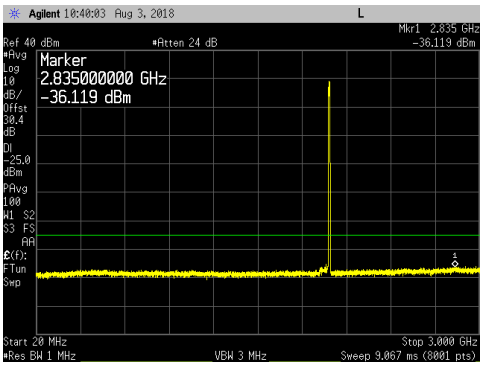
9kHz to 150kHz



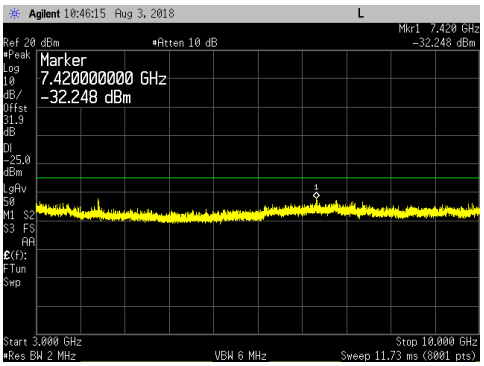
150kHz to 20MHz



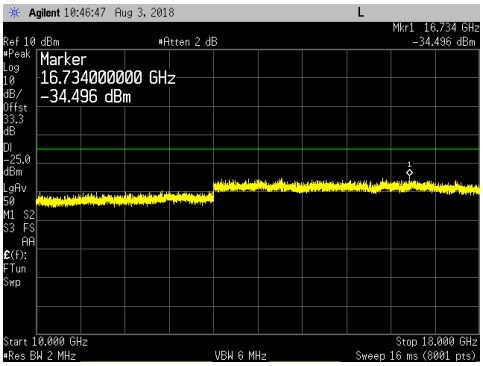
20MHz to 3GHz



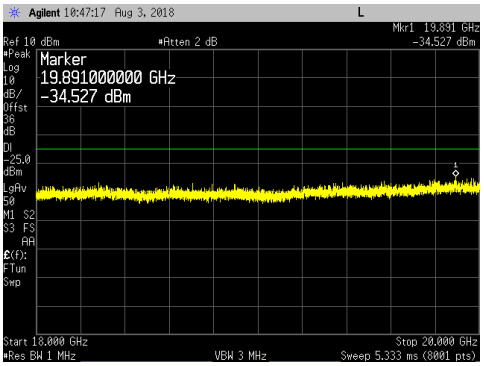
3GHz to 10GHz



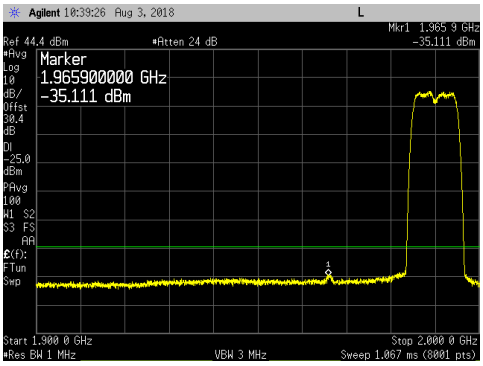
10GHz to 18GHz



18GHz to 20GHz

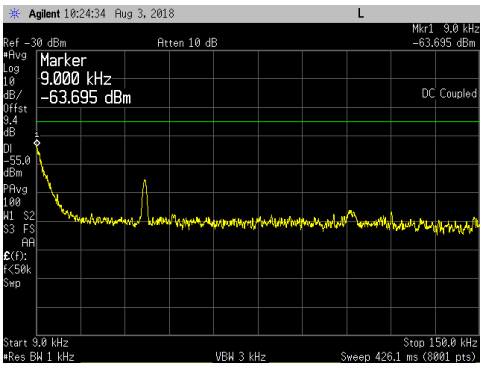


1900MHz to 2000MHz

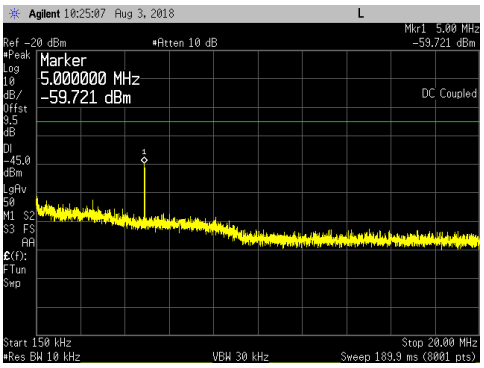


DUAL LTE5 Channel Bandwidth _ 64QAM _ Top Ch _Minimum Spacing (1987.5MHz & 1992.5MHz):

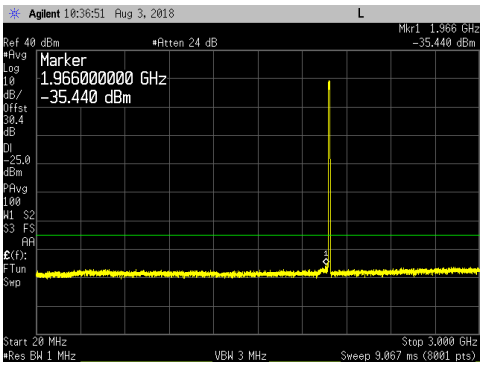
9kHz to 150kHz



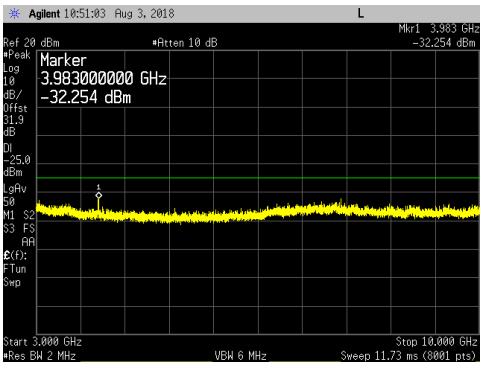
150kHz to 20MHz



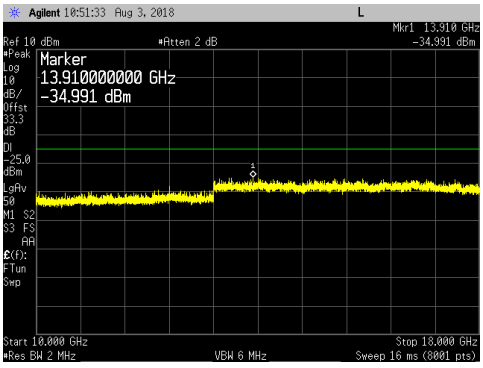
20MHz to 3GHz



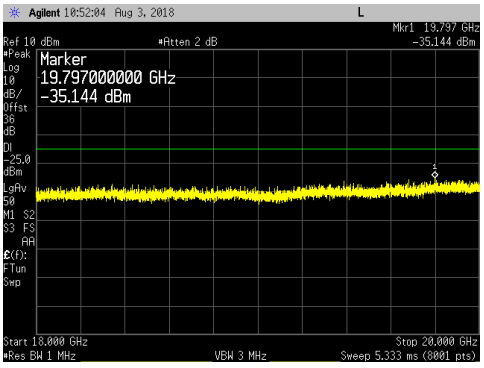
3GHz to 10GHz



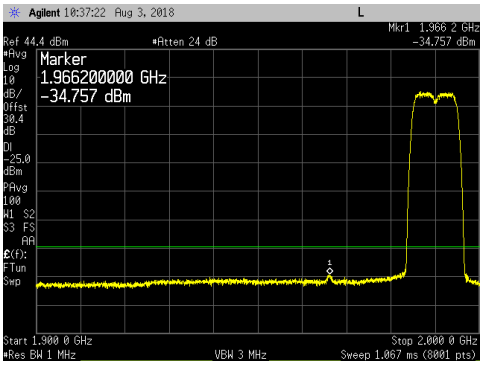
10GHz to 18GHz



18GHz to 20GHz

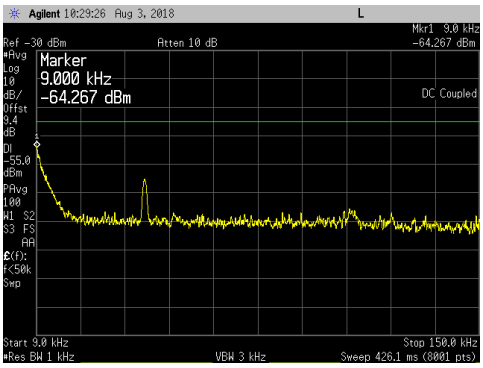


1900MHz to 2000MHz

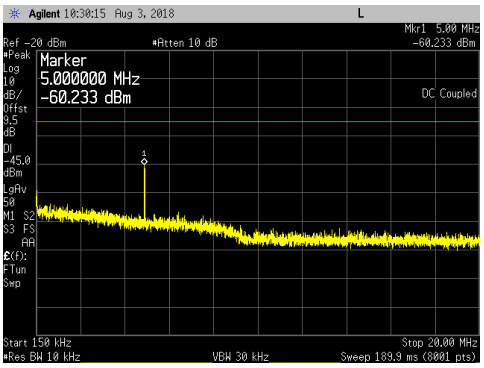


DUAL LTE5 Channel Bandwidth _ 256QAM _ Top Ch _Minimum Spacing (1987.5MHz & 1992.5MHz):

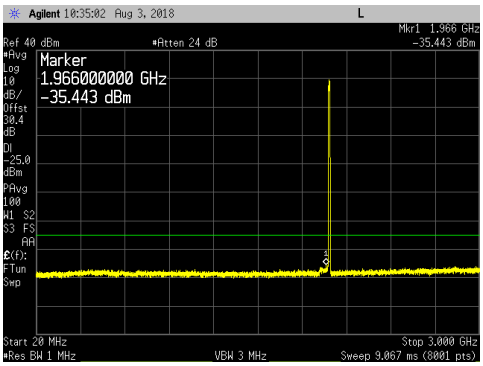
9kHz to 150kHz



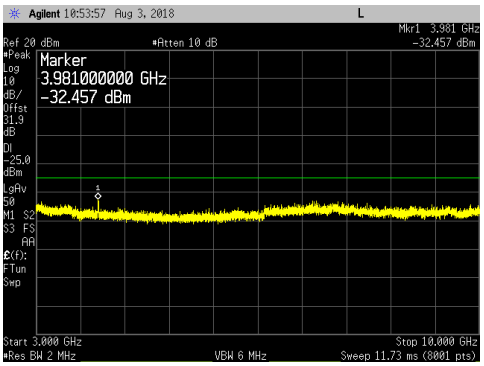
150kHz to 20MHz



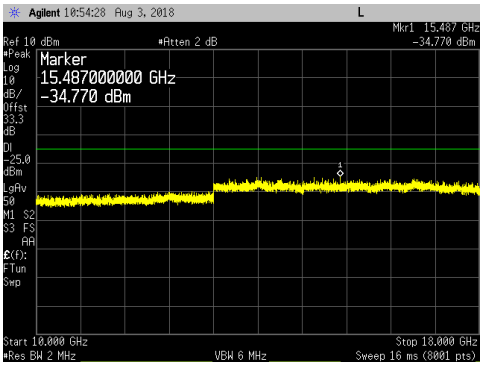
20MHz to 3GHz



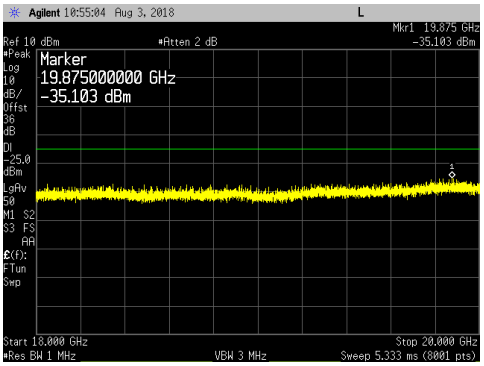
3GHz to 10GHz



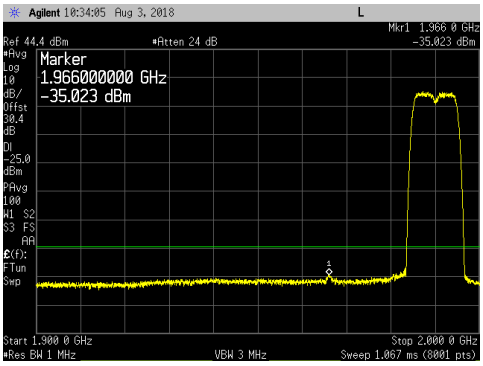
10GHz to 18GHz



18GHz to 20GHz

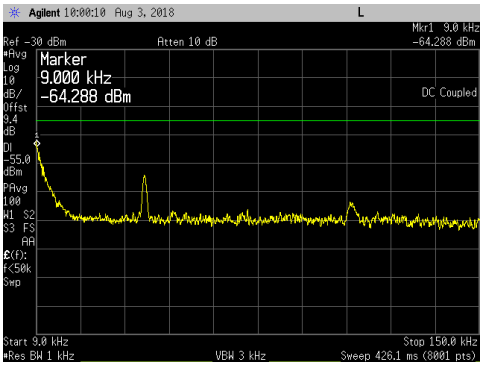


1900MHz to 2000MHz

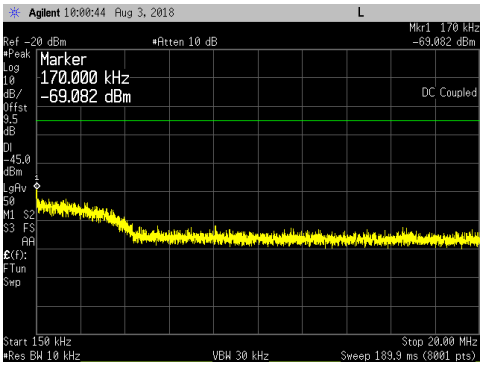


DUAL LTE5 Channel Bandwidth _ QPSK _ Bot Ch_Maximum Spacing (1932.5MHz & 1967.5MHz):

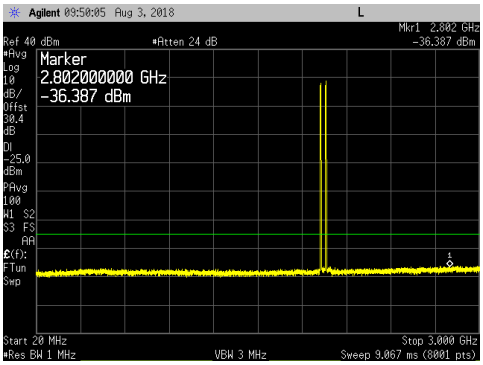
9kHz to 150kHz



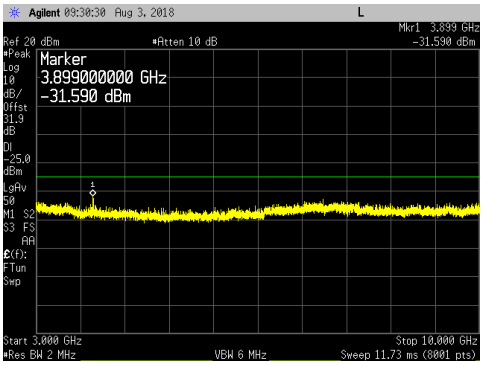
150kHz to 20MHz



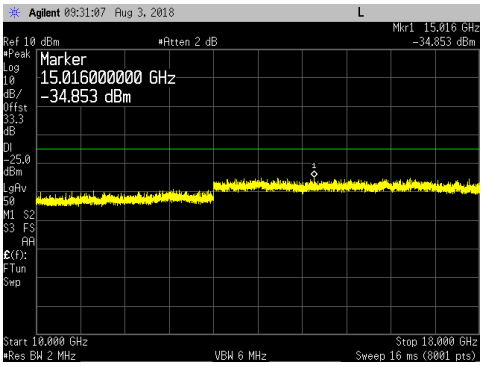
20MHz to 3GHz



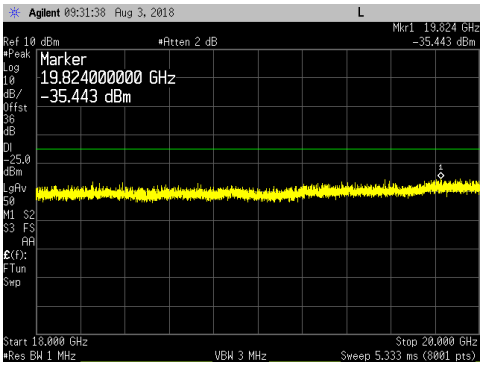
3GHz to 10GHz



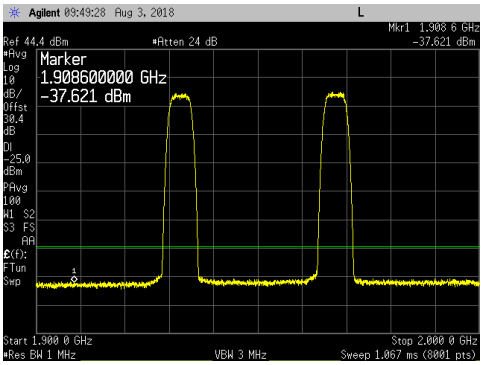
10GHz to 18GHz



18GHz to 20GHz

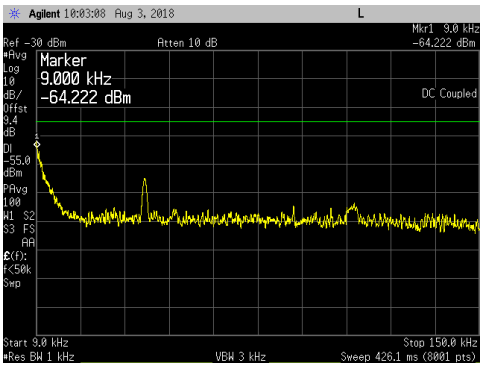


1900MHz to 2000MHz

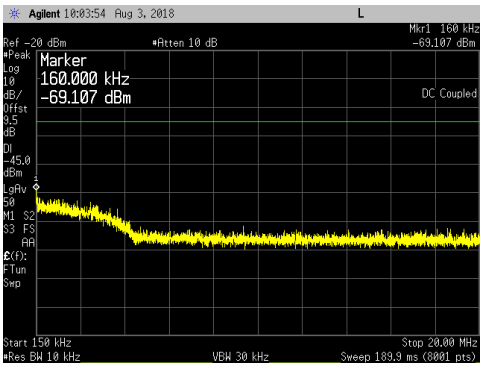


DUAL LTE5 Channel Bandwidth _ 16QAM _ Bot Ch _Maximum Spacing (1932.5MHz & 1967.5MHz):

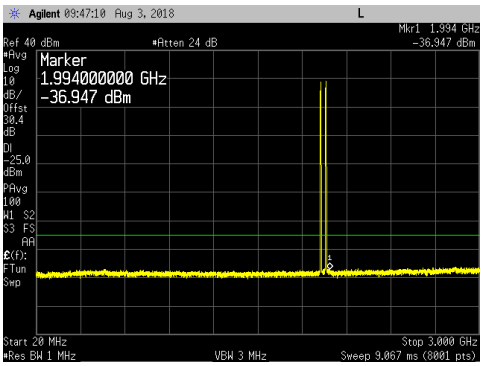
9kHz to 150kHz



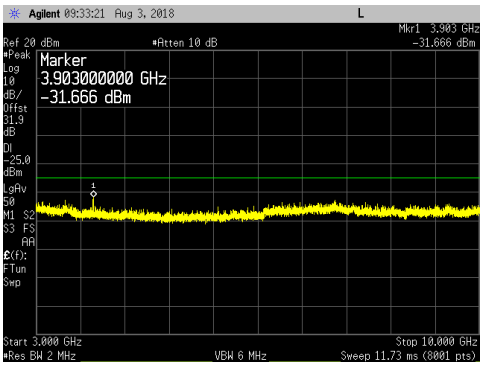
150kHz to 20MHz



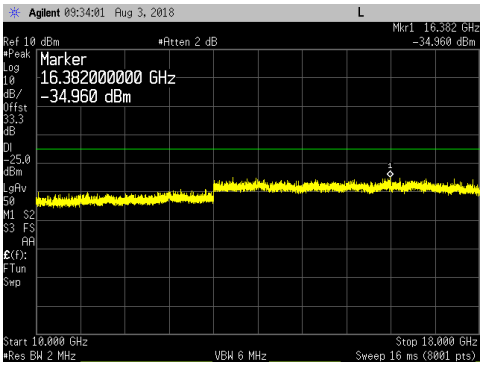
20MHz to 3GHz



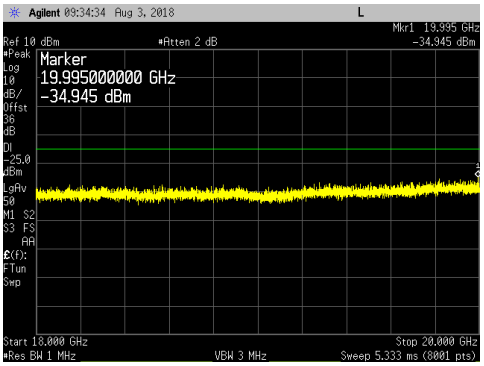
3GHz to 10GHz



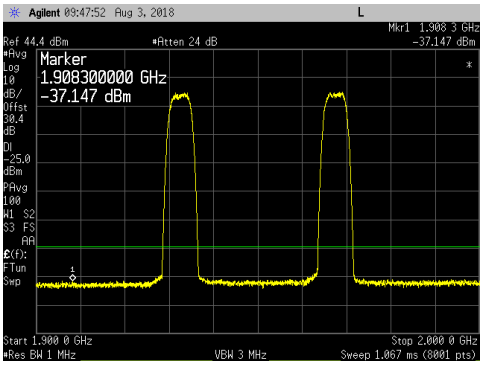
10GHz to 18GHz



18GHz to 20GHz

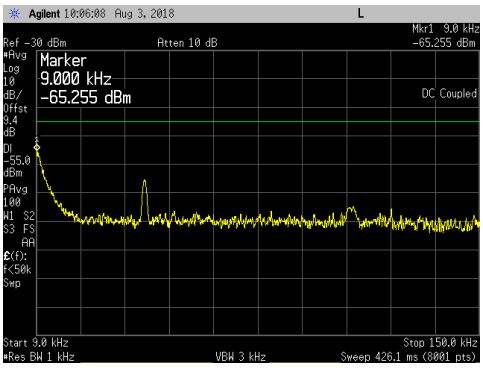


1900MHz to 2000MHz

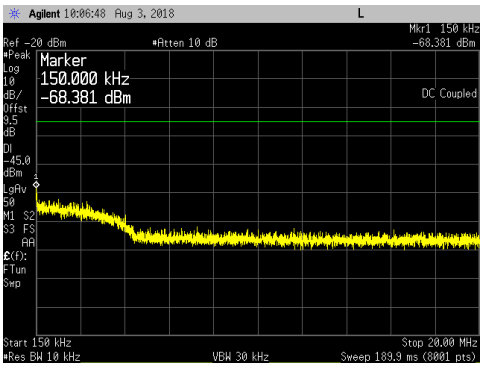


DUAL LTE5 Channel Bandwidth _ 64QAM _ Bot Ch _Maximum Spacing (1932.5MHz & 1967.5MHz):

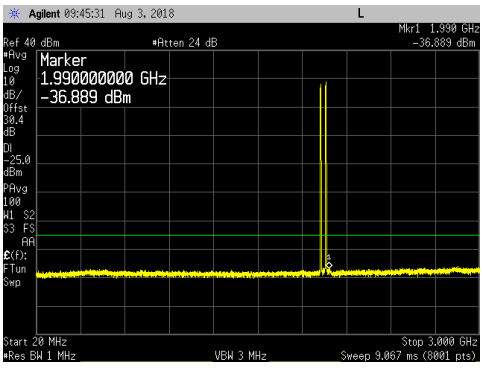
9kHz to 150kHz



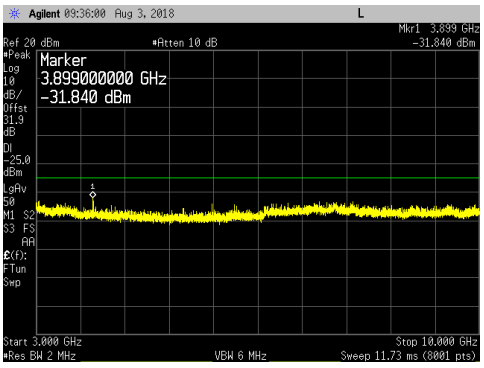
150kHz to 20MHz



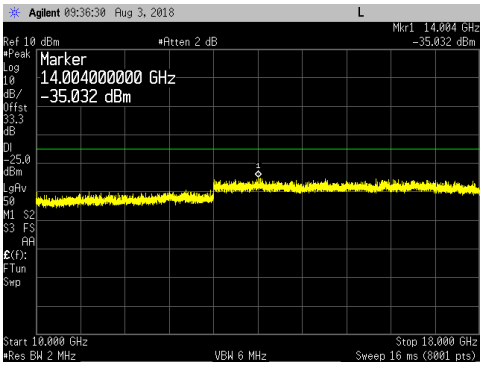
20MHz to 3GHz



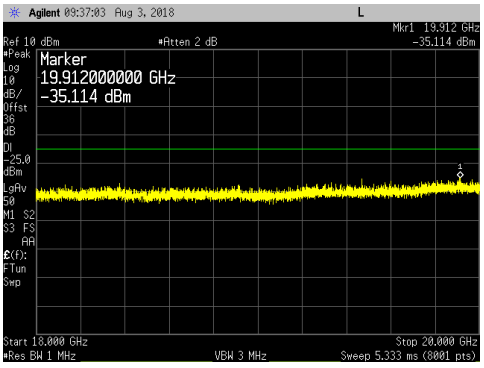
3GHz to 10GHz



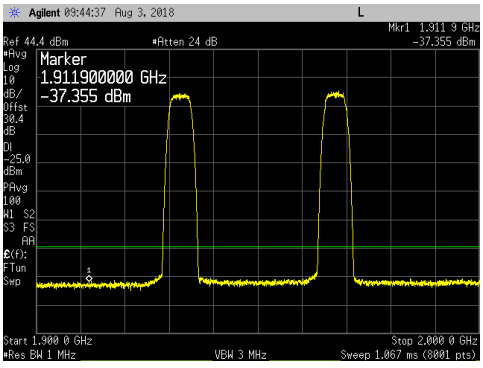
10GHz to 18GHz



18GHz to 20GHz

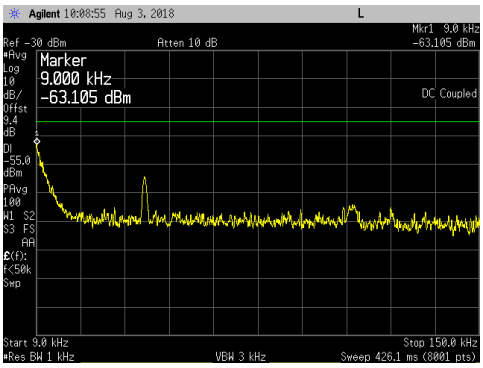


1900MHz to 2000MHz

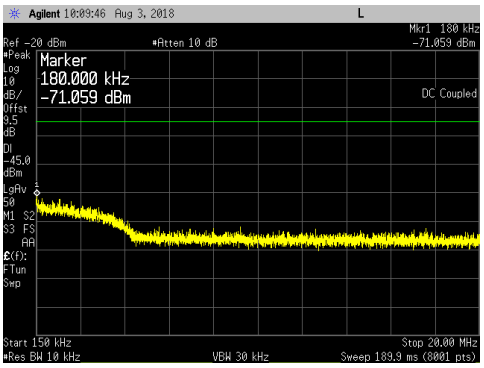


DUAL LTE5 Channel Bandwidth _ 256QAM _ Bot Ch _Maximum Spacing (1932.5MHz & 1967.5MHz):

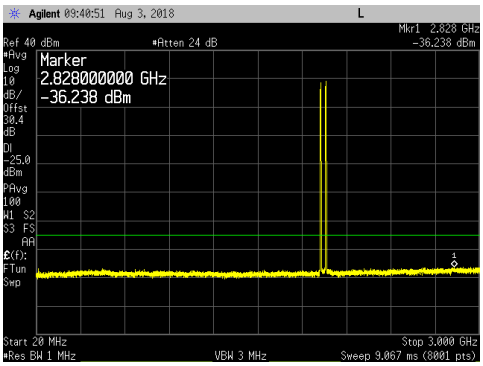
9kHz to 150kHz



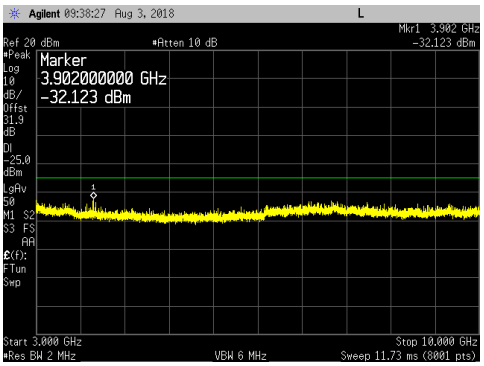
150kHz to 20MHz



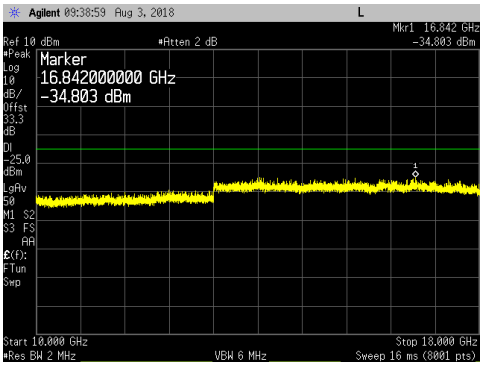
20MHz to 3GHz



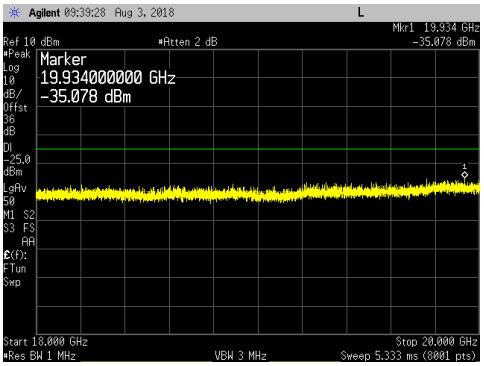
3GHz to 10GHz



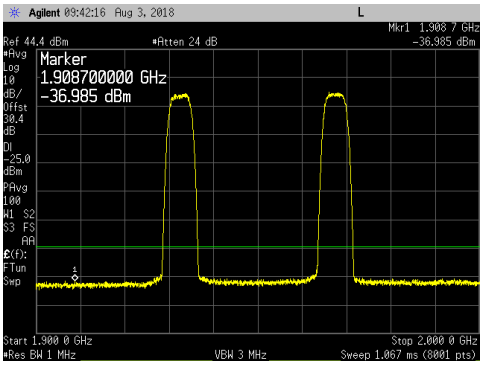
10GHz to 18GHz



18GHz to 20GHz

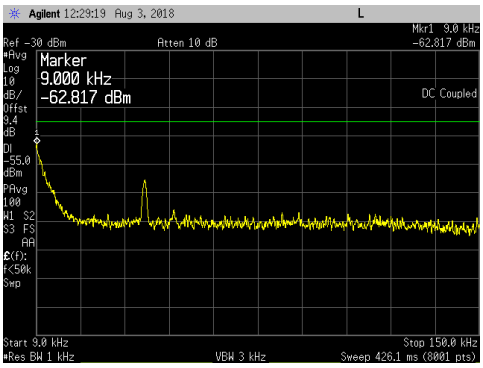


1900MHz to 2000MHz

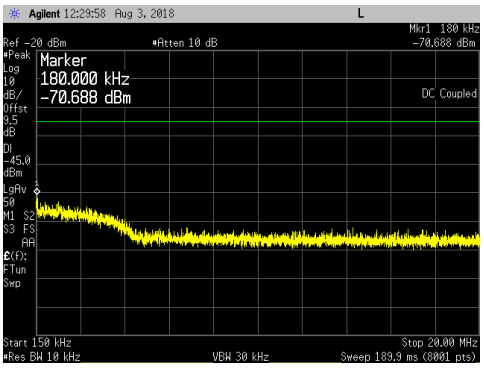


DUAL LTE5 Channel Bandwidth _ QPSK _ Top Ch _Maximum Spacing (1957.5MHz & 1992.5MHz):

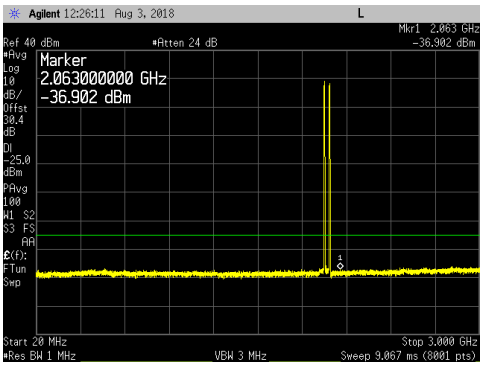
9kHz to 150kHz



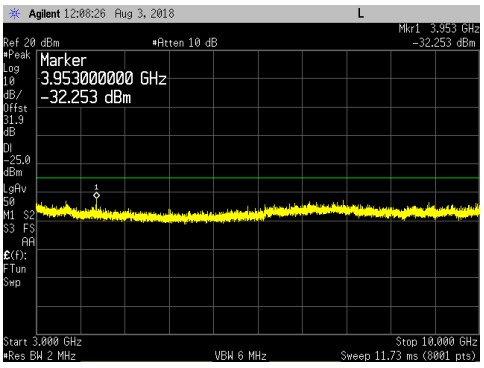
150kHz to 20MHz



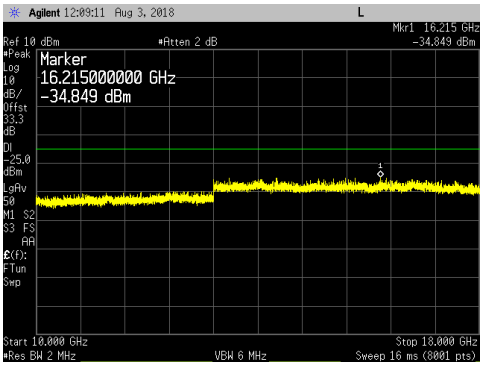
20MHz to 3GHz



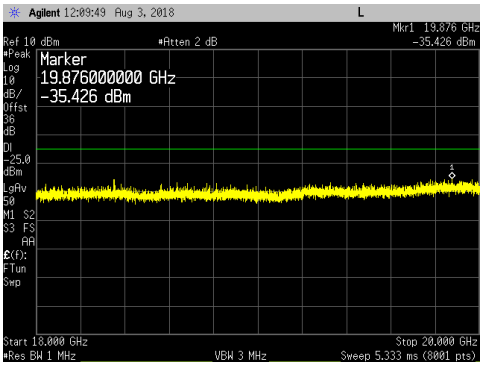
3GHz to 10GHz



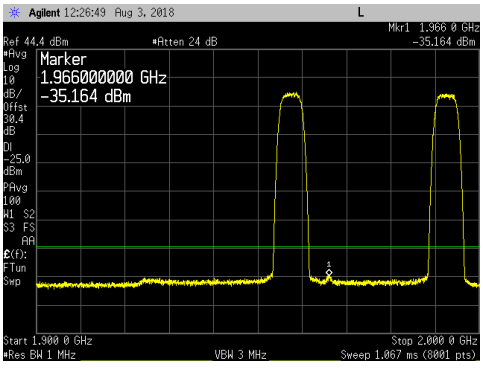
10GHz to 18GHz



18GHz to 20GHz

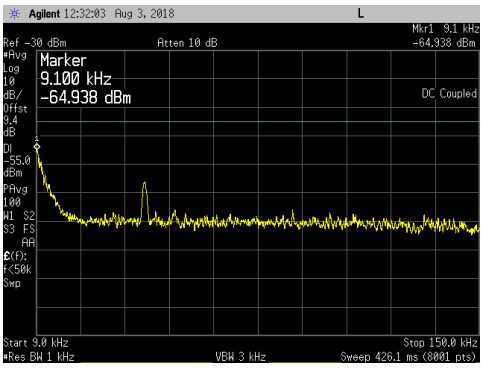


1900MHz to 2000MHz

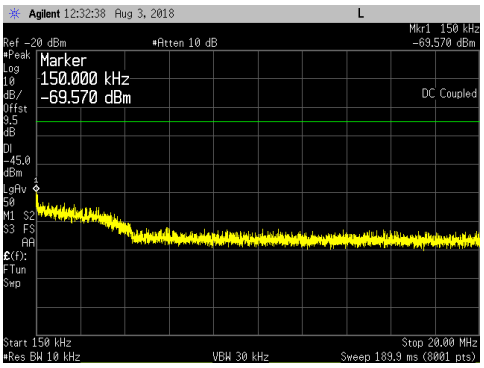


DUAL LTE5 Channel Bandwidth _ 16QAM _ Top Ch _Maximum Spacing (1957.5MHz & 1992.5MHz):

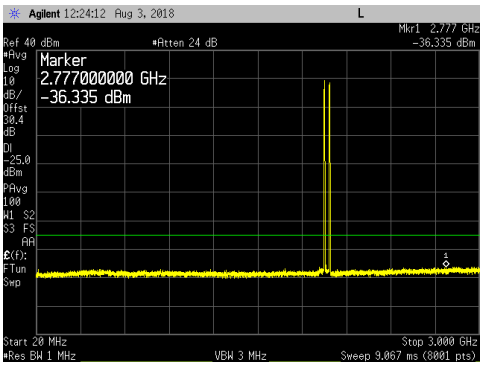
9kHz to 150kHz



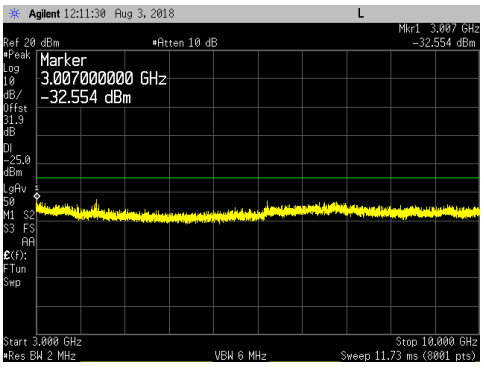
150kHz to 20MHz



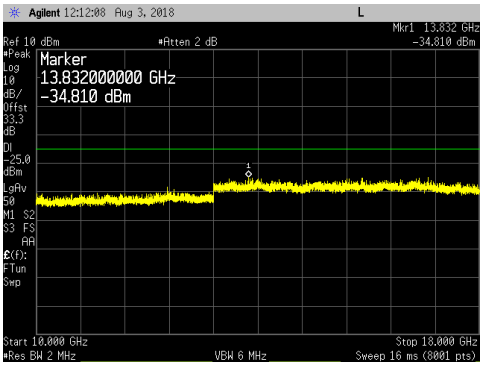
20MHz to 3GHz



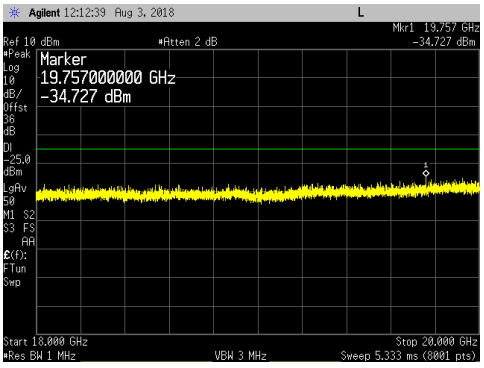
3GHz to 10GHz



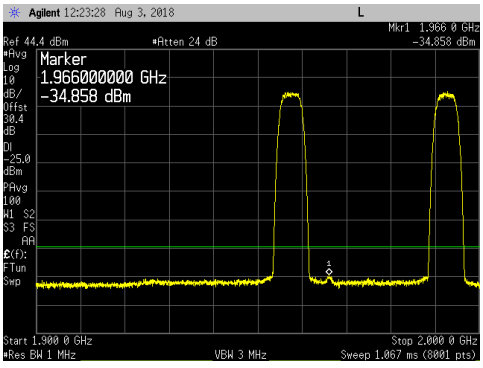
10GHz to 18GHz



18GHz to 20GHz

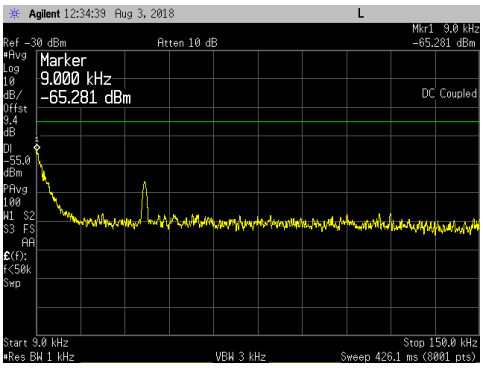


1900MHz to 2000MHz

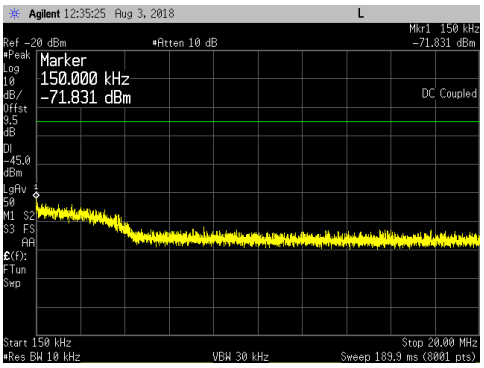


DUAL LTE5 Channel Bandwidth _ 64QAM _ Top Ch _Maximum Spacing (1957.5MHz & 1992.5MHz):

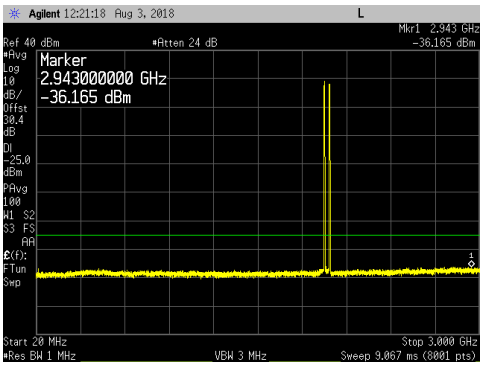
9kHz to 150kHz



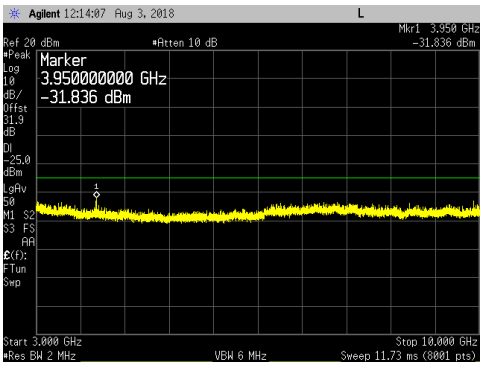
150kHz to 20MHz



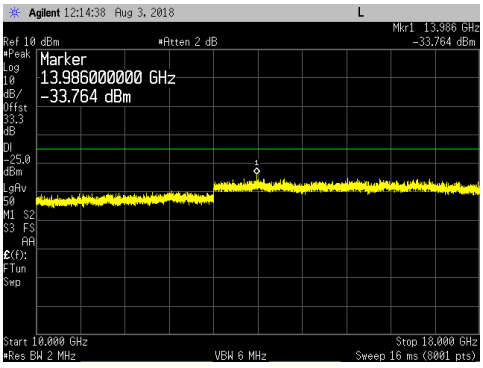
20MHz to 3GHz



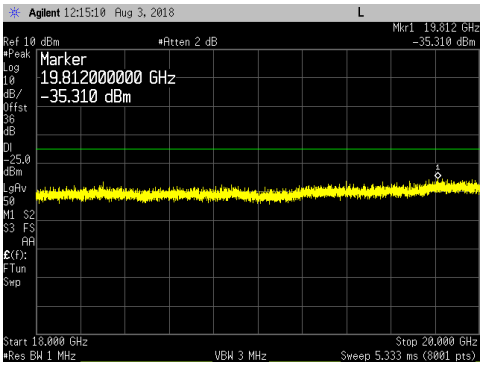
3GHz to 10GHz



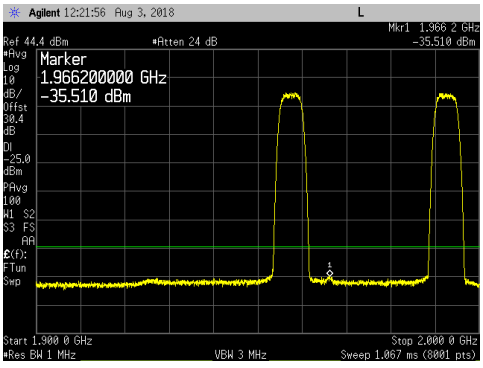
10GHz to 18GHz



18GHz to 20GHz

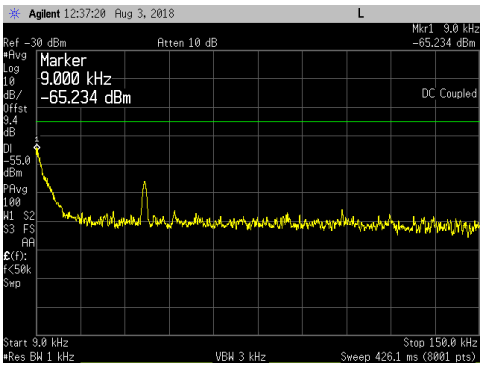


1900MHz to 2000MHz

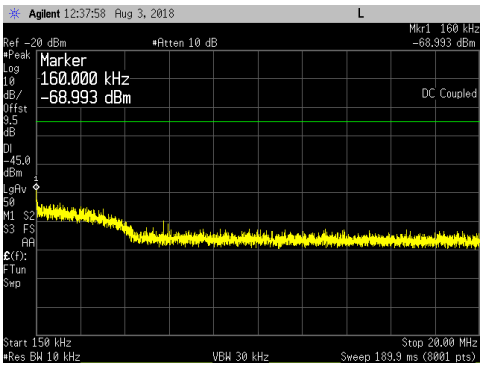


DUAL LTE5 Channel Bandwidth _ 256QAM _ Top Ch _Maximum Spacing (1957.5MHz & 1992.5MHz):

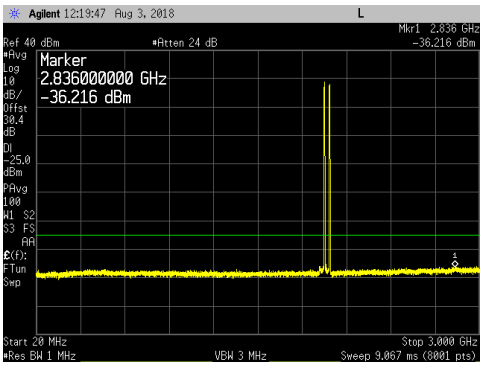
9kHz to 150kHz



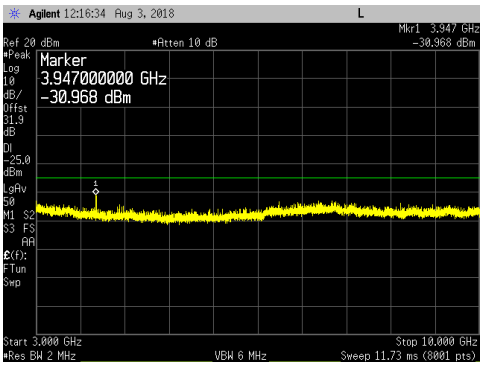
150kHz to 20MHz



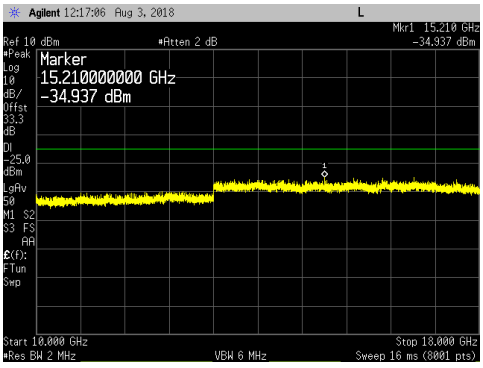
20MHz to 3GHz



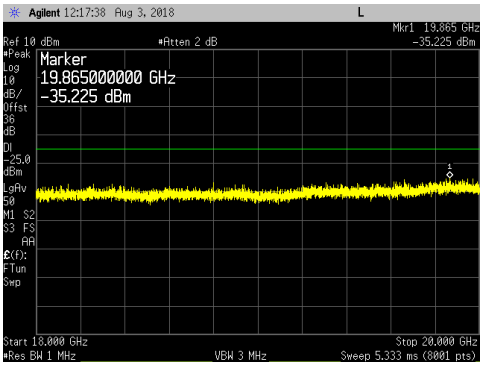
3GHz to 10GHz



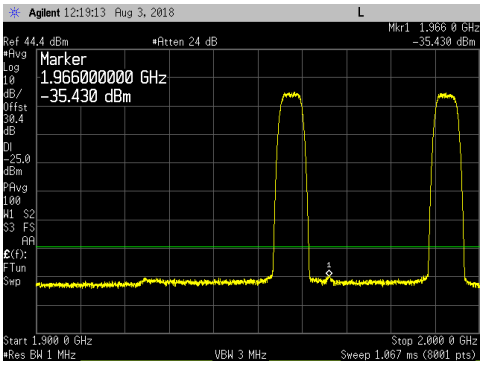
10GHz to 18GHz



18GHz to 20GHz

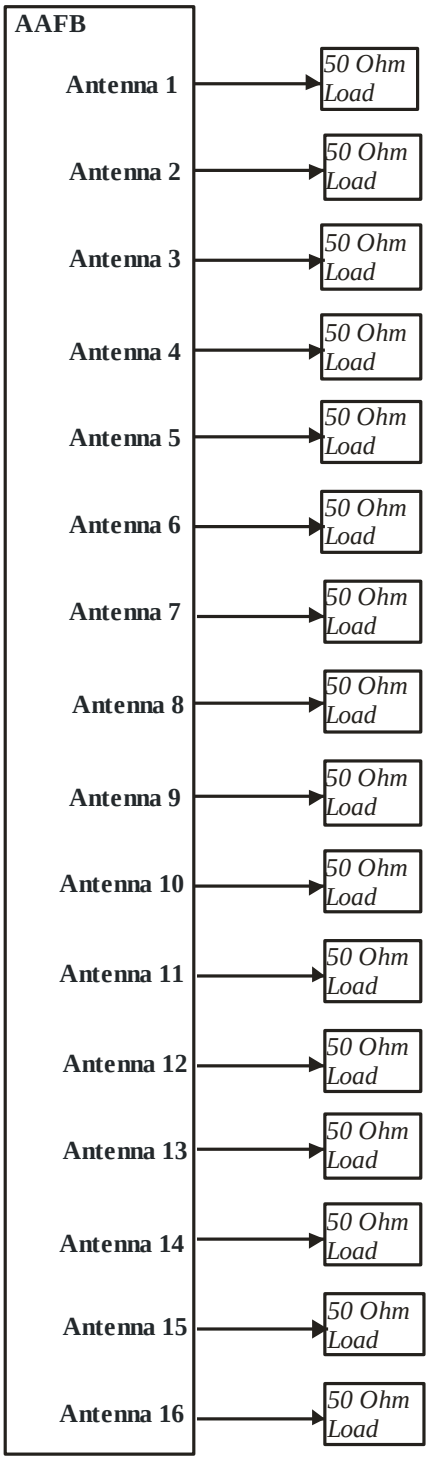


1900MHz to 2000MHz



Transmitter Radiated Spurious Emissions

During radiated emission testing all antenna ports of the base station were terminated with 50ohm termination blocks as shown in the diagram below.



Test Setup Used for Radiated Emission Measurements on AAFB

See ANSI C63.26-2015 paragraph 5.1 for details of test setup requirements. Based on antenna port conducted spurious emissions tests results, preliminary scans for radiated spurious emissions were performed in 30MHz – 20GHz frequency range. Three radiated emission test configurations were used to prove compliance. The transmitters were enabled simultaneously at maximum power using QPSK modulation on all sixteen ports for this test. The test includes channel bandwidth with the highest spectral density (LTE5). The bottom, middle and top frequency channels were enabled. The carrier configurations for the radiated emission testing is provided below. Final maximized peak radiated emissions were measured in these modes.

Test Configuration	Antenna Ports	RF Bandwidth	EARFCN	Transmit Frequency
1	1-16	5 MHz	8065 (Bottom Channel)	1932.5 MHz
2	1-16	5 MHz	8365 (Middle Channel)	1962.5 MHz
3	1-16	5 MHz	8665 (Top Channel)	1992.5 MHz

Radiated Spurious Emissions Testing Transmit Characteristics

RE Data for LTE5-QPSK-High Channel

Frequency	Peaks Raw	Antenna	Pre Amp	Cables	Peaks	Limit	Margin	Tower	Turntable	Polarity
MHz	dBuV/m	dB	dB	dB	dBuV/m	dBuV/m	dB	cm	Degrees	H/V
13360.6	34.278	41.619	-34.333	9.06	50.624	91.7	-41.076	199	357	V
17986.5	28.453	46.854	-36.543	9.057	47.472	91.7	-44.228	199.1	355.9	V
13334.3	30.985	41.618	-34.396	9.263	47.469	91.7	-44.231	199	354	H
17993.9	25.76	46.868	-36.519	9.09	44.821	91.7	-46.879	199	359.1	H
17801.4	24.744	46.076	-37.134	8.218	41.913	91.7	-49.787	199	359	H
17854.4	20.849	46.052	-36.964	8.459	38.75	91.7	-52.95	199	359.1	H
14897.6	28.075	40.695	-33.441	3.367	38.693	91.7	-53.007	199	356.9	V
15040.4	27.851	39.92	-32.561	3.387	38.531	91.7	-53.169	199	359.1	H
9977.23	33.665	38.642	-38.19	2.853	36.969	82.2	-45.231	199.1	359	V
7734.76	30.719	37.325	-37.712	6.303	36.636	82.2	-45.564	200	359	V
11915.2	29.79	39.675	-36.9	3.88	36.417	91.7	-55.283	199	354.9	H
10832.8	30.546	38.847	-37.334	4.027	36.087	91.7	-55.613	200.1	357.9	V
929.615	44.046	25.7	-36.955	2.968	35.763	82.2	-46.437	99.8	245.2	V
7754.06	29.753	37.326	-37.715	6.272	35.636	82.2	-46.564	199.1	358	H
929.527	40.876	25.7	-36.955	2.968	32.593	82.2	-49.607	100.2	-0.1	H
9377.02	28.594	38.393	-38.8	3.394	31.581	82.2	-50.619	199.1	358	H
748.696	41.859	23.2	-36.665	2.459	30.854	82.2	-51.346	300	196.1	V
8412.97	25.692	37.852	-38.066	5.323	30.802	82.2	-51.398	199.9	359	V
1858.41	32.787	27.293	-38.055	8.45	30.474	82.2	-51.726	199.1	358	H
9992.49	27.019	38.583	-38.13	2.838	30.31	82.2	-51.89	199.1	358	H
10149.5	26.466	38.64	-38.34	3.236	30.072	91.7	-61.628	200.1	358.9	V
754.506	40.197	23.349	-36.684	2.485	29.348	82.2	-52.852	176.1	0.9	H
8537.23	24.264	37.817	-38.221	4.877	28.739	82.2	-53.461	199	358	H
864.92	37.492	24.4	-36.762	2.941	28.072	82.2	-54.128	100.2	-0.2	H
747.822	38.914	23.182	-36.662	2.455	27.891	82.2	-54.309	99.8	17.2	V
747.974	38.496	23.197	-36.662	2.456	27.488	82.2	-54.712	262.9	1.1	H
4760.99	24.949	33.524	-36.618	5.55	27.405	82.2	-54.795	199.1	358	H
7254.2	20.327	37.454	-37.31	6.601	27.072	82.2	-55.128	200	359.1	V
864.978	36.468	24.4	-36.762	2.941	27.048	82.2	-55.152	278.1	1.1	V
754.253	36.589	23.375	-36.683	2.483	25.765	82.2	-56.435	300	84.9	V
11632.9	19.702	39.58	-37.459	3.609	25.431	91.7	-66.269	199.9	357	V
940.973	32.725	25.6	-37.023	2.945	24.253	82.2	-57.947	99.8	0	H
9360.47	21.017	38.4	-38.8	3.399	24.016	82.2	-58.184	199	359	V
899.113	30.927	24.5	-36.826	3.029	21.631	82.2	-60.569	173	1.3	V
1856.45	22.163	27.272	-38.056	8.382	19.76	82.2	-62.44	200.1	359	V
416.623	34.395	16.8	-36.797	1.767	16.163	82.2	-66.037	300	111.8	H

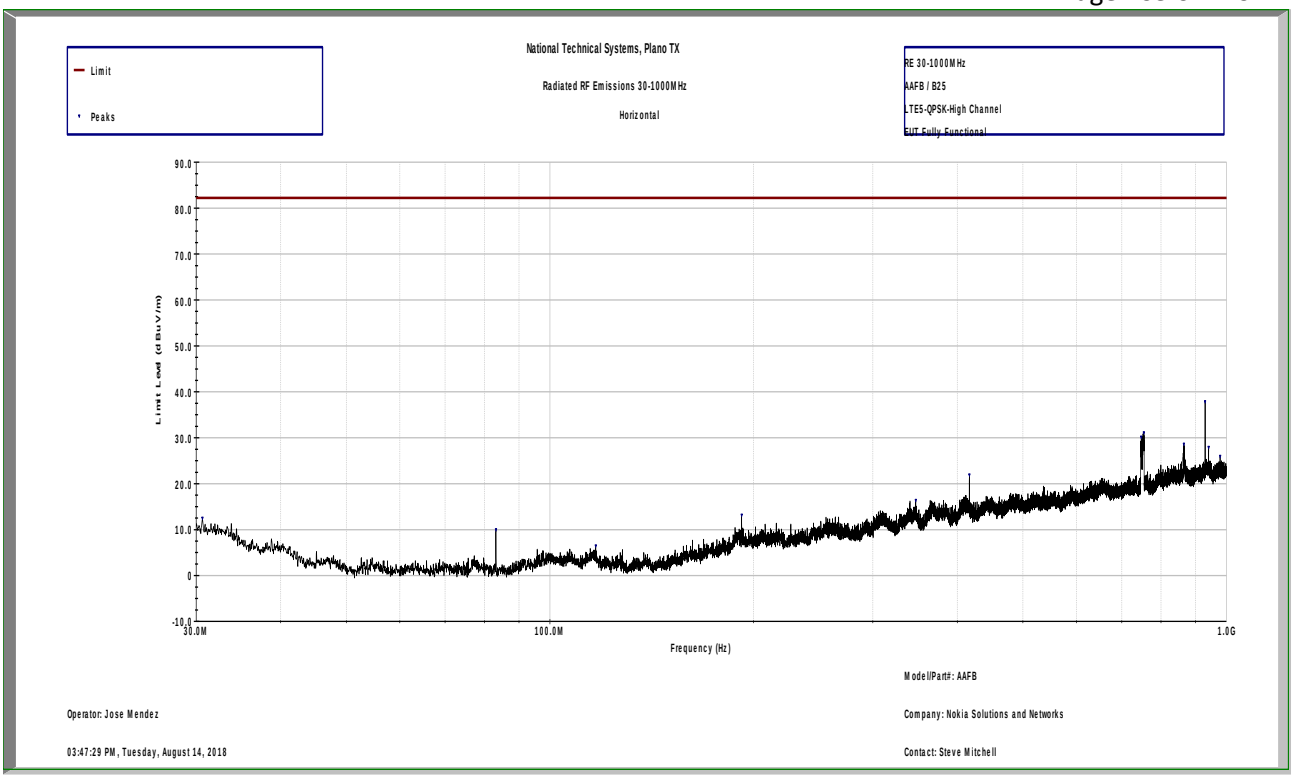
RE Data for LTE5-QPSK-Low Channel

Frequency	Peaks Raw	Antenna	Pre Amp	Cableloss	Peaks	Limit	Margin	Tower	Turntable	Polarity
MHz	dBuV/m	dB	dB	dB	dBuV/m	dBuV/m	dB	cm	Degrees	H/V
17986.10	30.004	46.853	-36.544	9.055	49.021	91.7	-42.679	199.2	358.9	H
13315.00	29.405	41.617	-34.443	9.21	45.788	91.7	-45.912	200	360.1	H
13316.90	29.109	41.617	-34.438	9.215	45.502	91.7	-46.198	200	360.1	V
14899.00	30.087	40.696	-33.426	3.368	40.722	91.7	-50.978	199.9	359	H
12656.70	28.544	39.995	-35.948	7.336	40.101	91.7	-51.599	200.1	360	H
17826.30	21.762	46.065	-37.055	8.331	39.275	91.7	-52.425	200	360.2	V
14974.20	27.391	40.287	-32.587	3.396	38.379	91.7	-53.321	200	360.2	V
12740.30	25.497	40.24	-35.815	7.58	37.501	91.7	-54.199	200	360.1	V
7786.22	31.504	37.371	-37.832	6.22	37.263	82.2	-44.937	199	358	H
11757.30	30.372	39.7	-36.9	3.669	36.841	91.7	-54.859	99.9	204	V
17850.10	18.381	46.054	-36.978	8.439	36.223	91.7	-55.477	199	359	H
7724.30	29.962	37.329	-37.72	6.32	35.891	82.2	-46.309	200	359.1	V
6743.11	30.096	36.218	-37.189	6.455	35.579	82.2	-46.621	199	358.9	H
5567.62	31.829	34.833	-37.11	5.173	34.725	82.2	-47.475	199.1	359.2	H
14176.00	22.043	42.128	-34.318	3.013	32.866	91.7	-58.834	200	359.9	H
17991.20	12.614	46.863	-36.528	9.078	31.66	91.7	-60.04	200.1	360.1	V
9343.35	28.335	38.379	-38.8	3.404	31.318	82.2	-50.882	199.1	358	H
3832.60	29.693	33.203	-37.032	5.008	30.87	82.2	-51.33	200	359.1	V
9783.71	28.122	38.486	-38.964	3.04	30.683	82.2	-51.517	199	358	H
9579.52	27.612	38.447	-38.896	3.238	30.401	82.2	-51.799	199.2	359	V
8556.35	25.931	37.787	-38.282	4.807	30.245	82.2	-51.955	199.9	359.1	V
1854.92	32.688	27.255	-38.056	8.329	30.214	82.2	-51.986	199.1	359.1	H
929.66	35.233	25.7	-36.956	2.968	26.949	82.2	-55.251	132.9	0	V
698.79	38.791	21.9	-36.497	2.277	26.472	82.2	-55.728	100.1	113	V
747.92	35.798	23.192	-36.662	2.456	24.785	82.2	-57.415	100	0	V
929.40	32.124	25.7	-36.954	2.969	23.842	82.2	-58.358	100	9.2	H
752.49	33.886	23.349	-36.677	2.476	23.034	82.2	-59.166	100	-0.1	V
753.73	32.99	23.4	-36.681	2.481	22.191	82.2	-60.009	100.2	359.3	H
1855.52	23.662	27.261	-38.056	8.35	21.216	82.2	-60.984	200.1	359	V
543.99	35.41	19.699	-36.908	1.799	20	82.2	-62.2	100.2	309.8	H
368.88	37.34	15.8	-37.106	1.648	17.681	82.2	-64.519	100.1	42	V
367.14	36.152	15.8	-37.119	1.644	16.475	82.2	-65.725	189.1	0	H
416.71	33.973	16.8	-36.797	1.767	15.741	82.2	-66.459	100.1	77.1	H
416.83	33.343	16.8	-36.797	1.768	15.112	82.2	-67.088	100	-0.1	V
9343.66	9.721	38.38	-38.8	3.404	12.705	82.2	-69.495	199.1	359.1	V
30.57	28.661	18.014	-37.529	0.492	9.639	82.2	-72.561	300.1	0	H

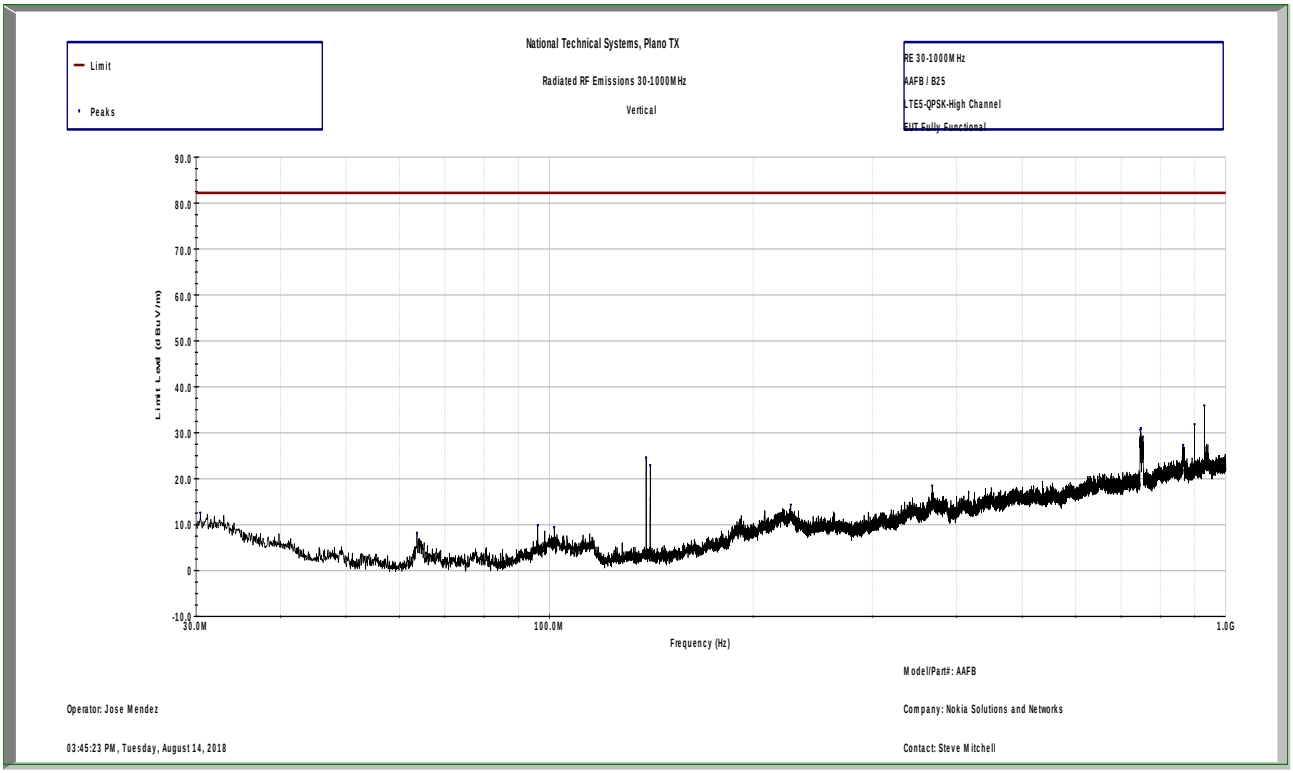
RE Data for LTE5-QPSK-Mid Channel

Frequency	Peaks Raw	Antenna	Pre Amp	Cableloss	Peaks	Limit	Margin	Tower	Turntable	Polarity
MHz	dBuV/m	dB	dB	dB	dBuV/m	dBuV/m	dB	cm	Degrees	H/V
17990.80	25.795	46.862	-36.529	9.076	44.839	91.7	-46.861	199.1	0.9	H
17995.30	25.296	46.871	-36.515	9.096	44.365	91.7	-47.335	199.1	1.1	V
17815.80	24.878	46.07	-37.088	8.284	42.246	91.7	-49.454	199.1	1.1	V
7783.22	33.295	37.367	-37.821	6.225	39.066	82.2	-43.134	199	356	H
14968.20	27.824	40.283	-32.654	3.397	38.797	91.7	-52.903	199	1	H
14173.20	27.868	42.128	-34.322	3.012	38.685	91.7	-53.015	199.1	0.9	H
14964.60	26.659	40.28	-32.694	3.398	37.622	91.7	-54.078	199	113	V
7251.26	29.562	37.447	-37.303	6.6	36.306	82.2	-45.894	199.1	357.9	V
12584.30	24.592	39.932	-36.064	7.116	35.576	91.7	-56.124	199.1	104.9	H
14169.50	23.658	42.127	-34.328	3.01	34.467	91.7	-57.233	199	-0.3	V
13474.70	18.233	41.755	-34.06	8.136	34.012	91.7	-57.688	199.1	1	H
7806.04	28.216	37.383	-37.904	6.188	33.884	82.2	-48.316	199	357.1	V
9643.28	31.004	38.295	-38.973	3.176	33.501	82.2	-48.699	199.1	355	H
13333.90	16.608	41.618	-34.397	9.262	33.09	91.7	-58.61	199.1	-0.1	V
12592.90	21.151	39.94	-36.05	7.151	32.213	91.7	-59.487	199.1	-0.1	V
11765.70	25.658	39.671	-36.9	3.673	32.101	91.7	-59.599	199.9	357.9	H
1855.58	32.541	27.262	-38.056	8.352	30.098	82.2	-52.102	199.9	358.9	V
929.59	37.945	25.7	-36.955	2.968	29.661	82.2	-52.539	300	217.1	V
8495.35	21.533	37.954	-38.098	5.028	26.416	82.2	-55.784	199.2	356.9	V
9973.14	22.916	38.658	-38.206	2.857	26.223	82.2	-55.977	199.1	355	H
9987.23	22.521	38.603	-38.15	2.843	25.816	82.2	-56.384	199	356	V
929.57	33.996	25.7	-36.955	2.968	25.713	82.2	-56.487	100.1	-0.1	H
8547.86	20.723	37.775	-38.255	4.838	25.082	82.2	-57.118	199.1	355.9	H
9416.89	21.86	38.42	-38.8	3.383	24.862	82.2	-57.338	199.1	355	H
9463.12	20.676	38.466	-38.8	3.354	23.695	82.2	-58.505	199.1	356	V
753.59	33.82	23.4	-36.681	2.481	23.02	82.2	-59.18	168.9	359.1	V
754.30	31.678	23.37	-36.683	2.484	20.849	82.2	-61.351	177	87.1	H
748.82	31.817	23.2	-36.665	2.46	20.813	82.2	-61.387	99.7	180.8	V
1857.31	21.337	27.281	-38.055	8.412	18.974	82.2	-63.226	199.1	356.1	H
385.57	36.588	17.1	-36.978	1.692	18.4	82.2	-63.8	100	0.9	V
591.70	31.947	20.9	-36.844	1.95	17.95	82.2	-64.25	100.2	-0.1	V
416.98	35.333	16.8	-36.796	1.768	17.103	82.2	-65.097	300	324.1	H
424.92	31.927	17.092	-36.759	1.786	14.045	82.2	-68.155	300.2	359.1	H
32.33	31.104	17.034	-37.532	0.522	11.129	82.2	-71.071	300	359.1	H
61.32	38.828	7.467	-37.618	0.714	9.391	82.2	-72.809	300	359.1	H
193.48	33.897	11.1	-37.511	1.208	8.694	82.2	-73.506	100	168	V

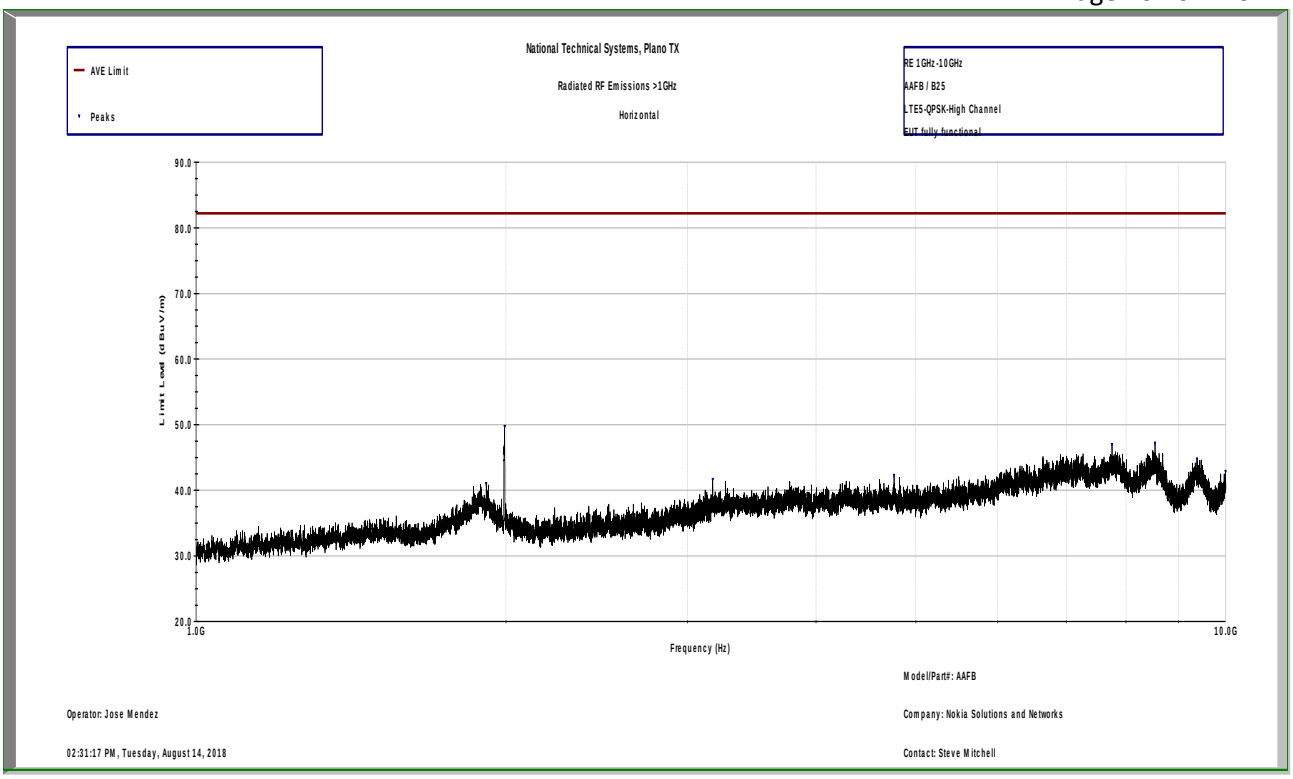
A three-meter measurement distance was used for radiated emission measurements less than 10GHz. A one-meter measurement was used for radiated emission greater that 10GHz The highest radiated emissions detected were more than 20dB below the three-meter limit of 82.2dBuV/m (equivalent to -13dBm EIRP) and the one-meter limit of 91.7dBuV/m (equivalent to 13dBm EIRP). Since all maximized measurements were more than 20dB below these levels, substitution measurements were not performed. TILE software was used for all preliminary scans and plots that are included on the following pages.



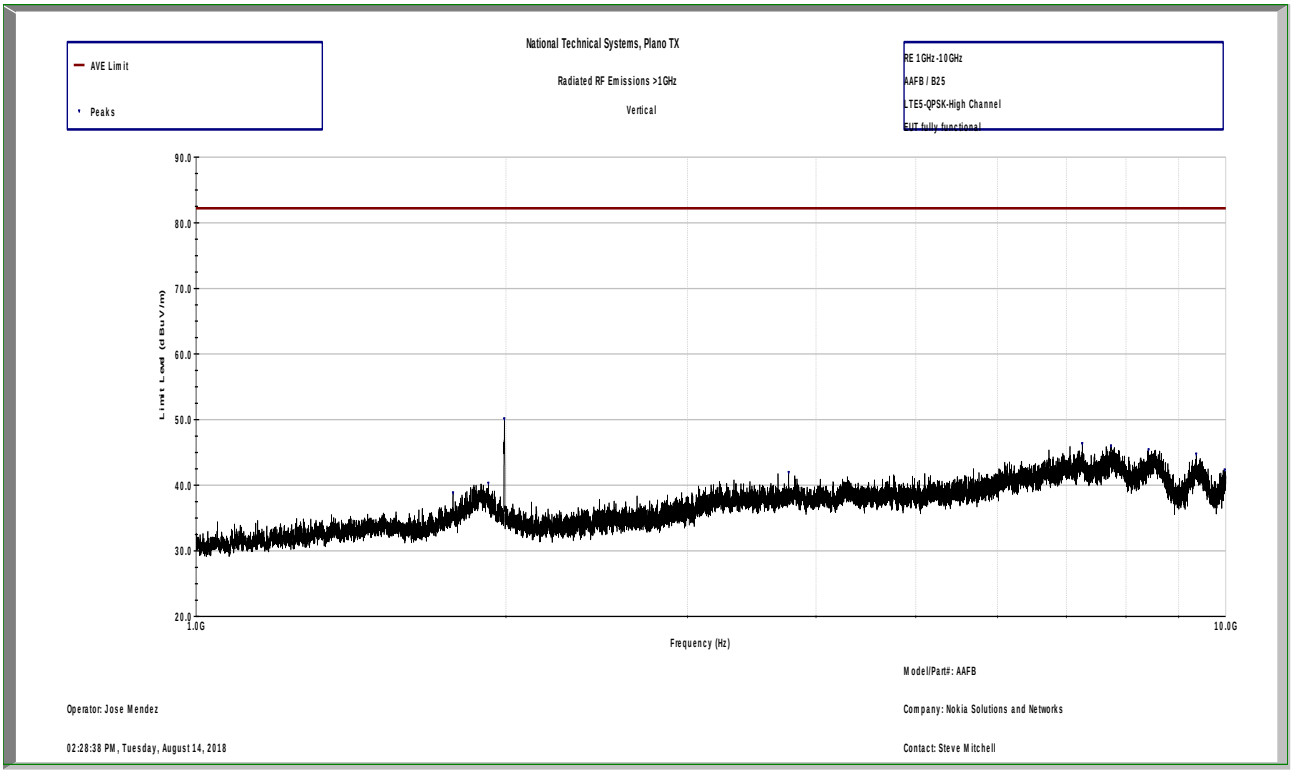
Radiated Spurious Emissions 30MHz-1GHz Horizontal at 3m LTE5-QPSK-High Channel



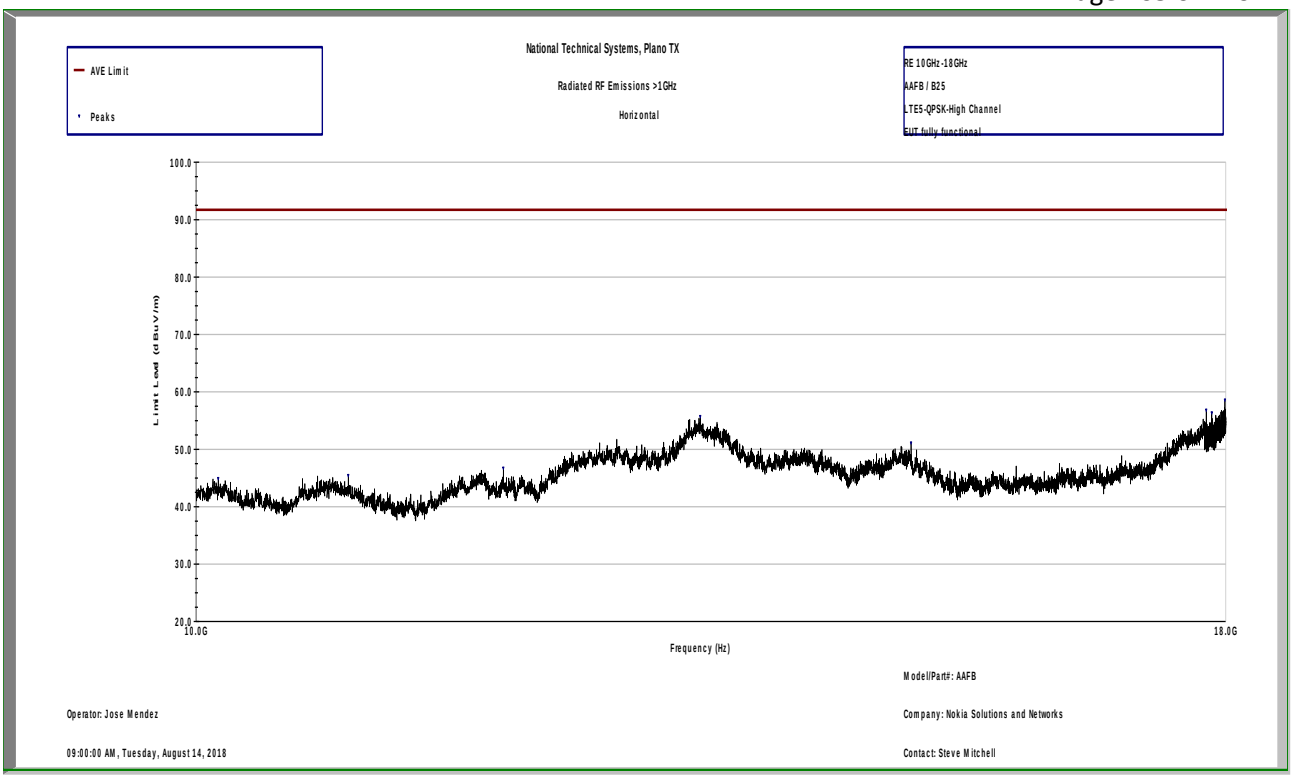
Radiated Spurious Emissions 30MHz-1GHz Vertical at 3m LTE5-QPSK-High Channel



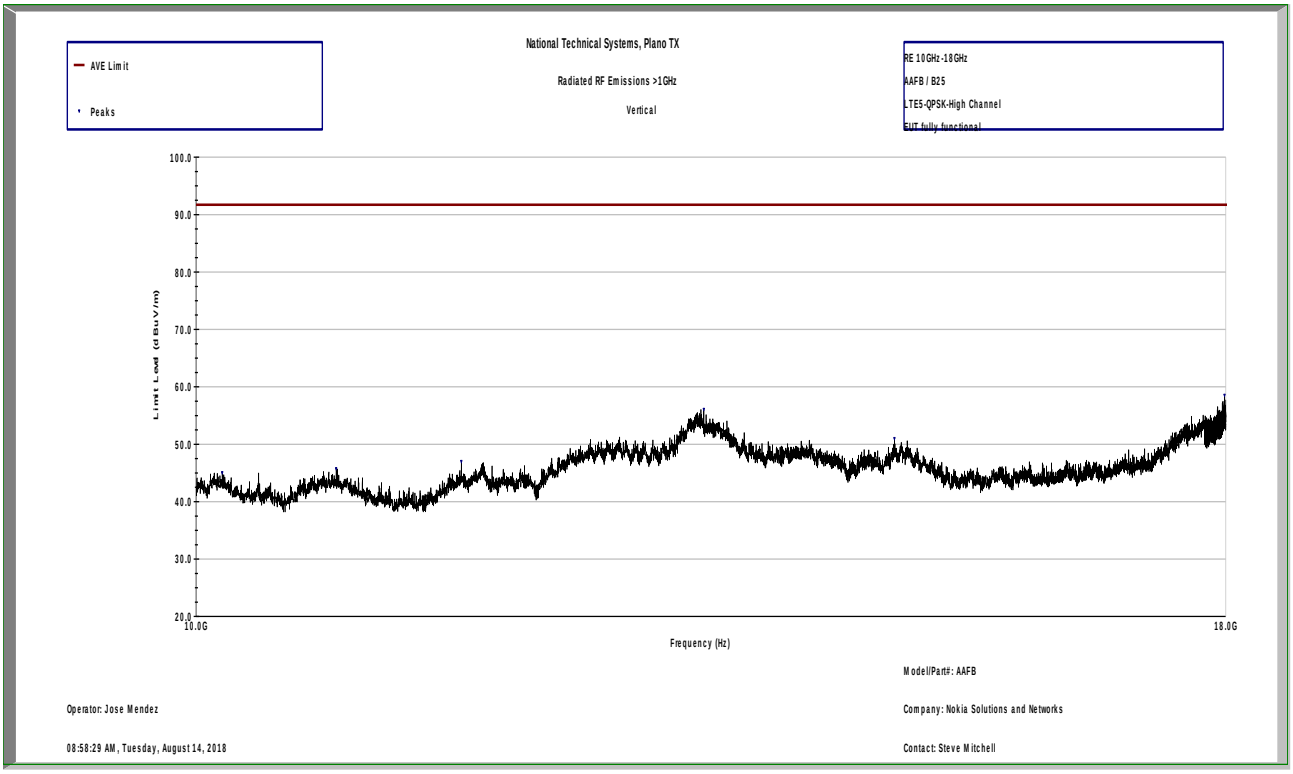
Radiated Spurious Emissions 1-10GHz Horizontal at 3m LTE5-QPSK-High Channel



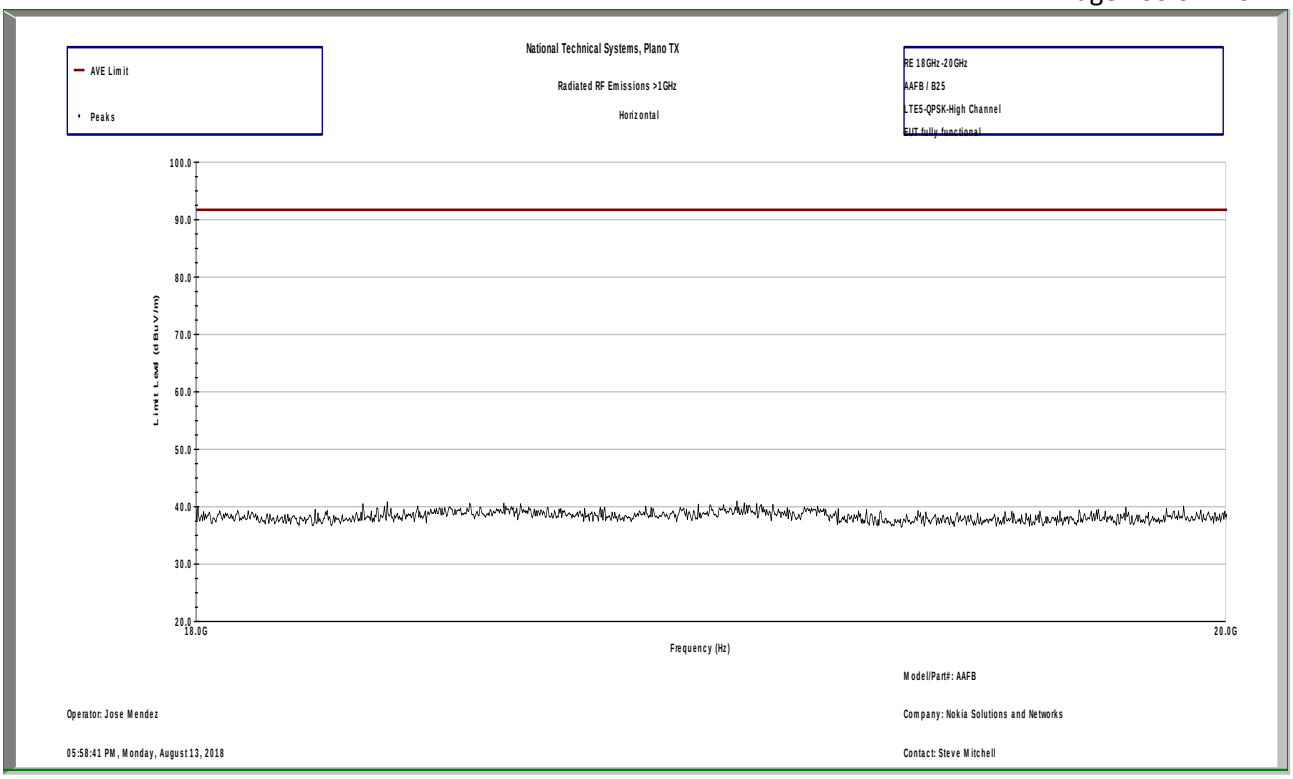
Radiated Spurious Emissions 1-10GHz Vertical at 3m LTE5-QPSK-High Channel



Radiated Spurious Emissions 10-18GHz Horizontal at 1m LTE5-QPSK-High Channel

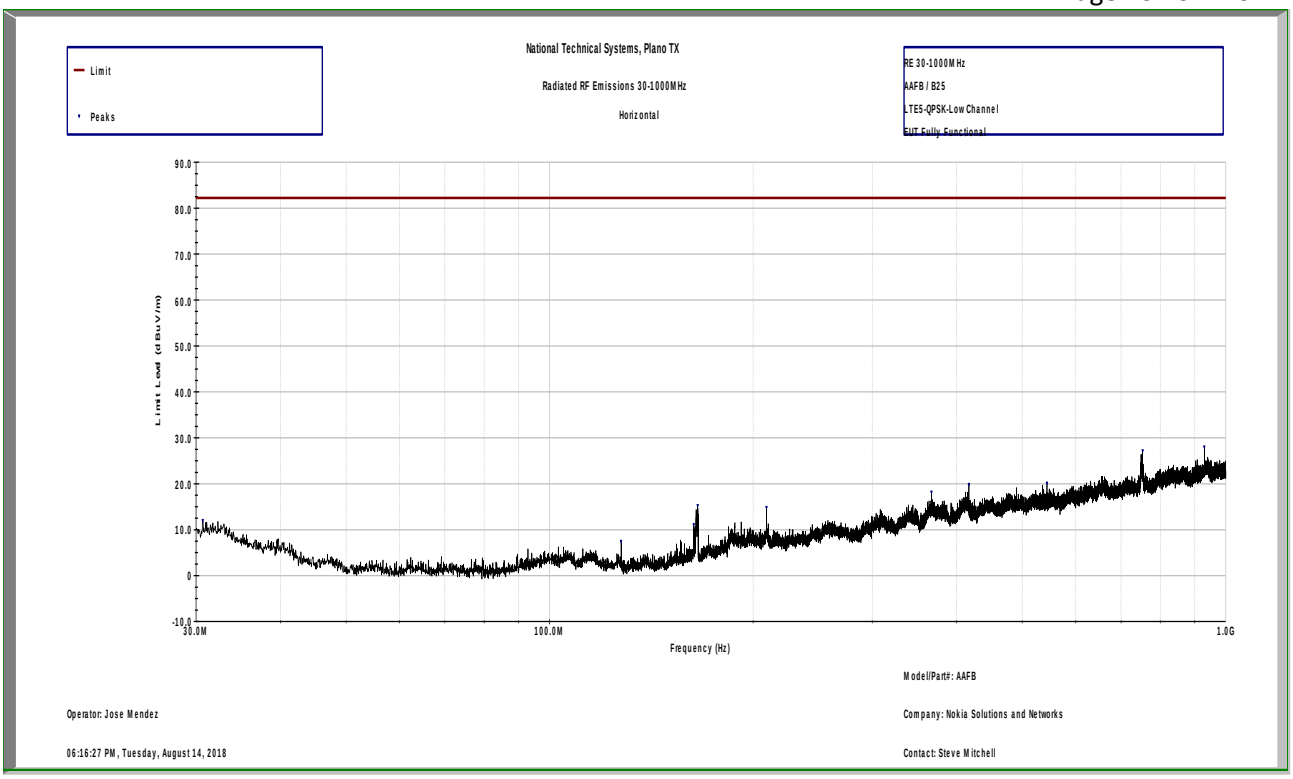


Radiated Spurious Emissions 10-18GHz Vertical at 1m LTE5-QPSK-High Channel

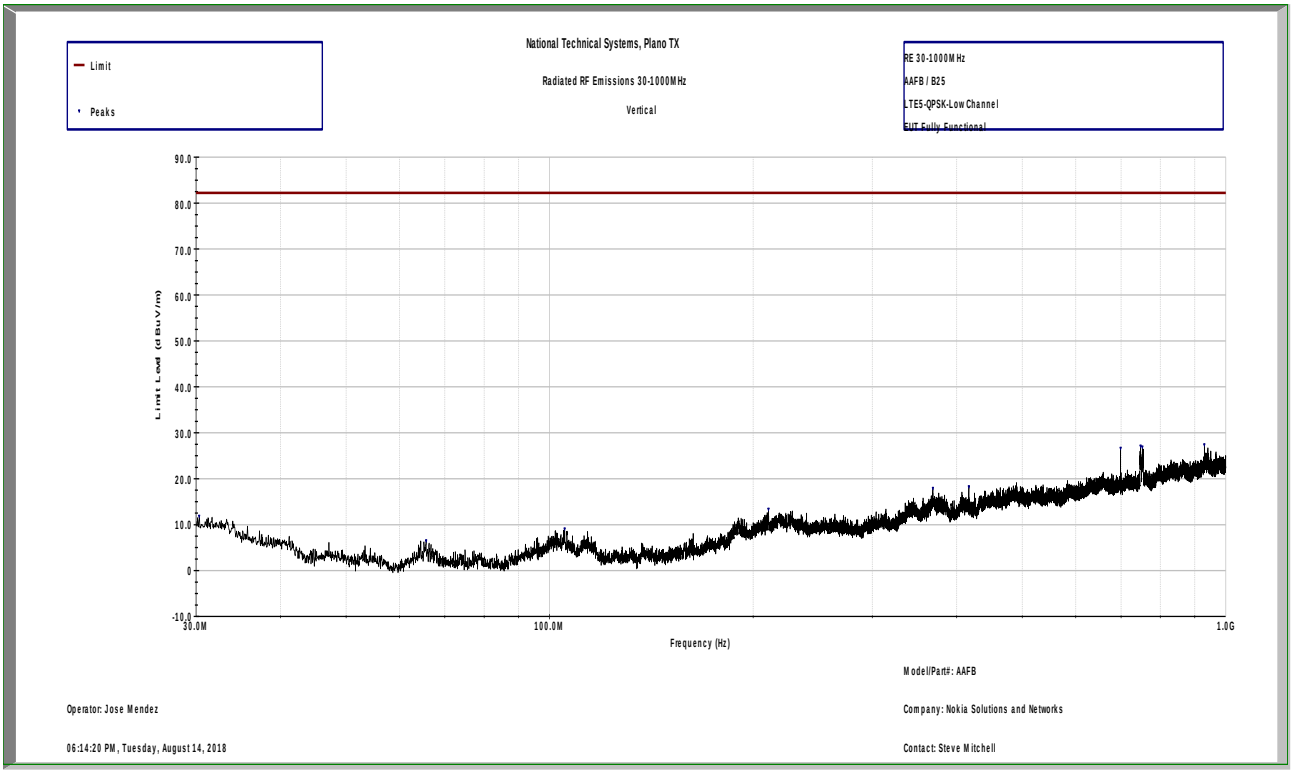


Radiated Spurious Emissions 18-20GHz Horizontal at 1m LTE5-QPSK-High Channel

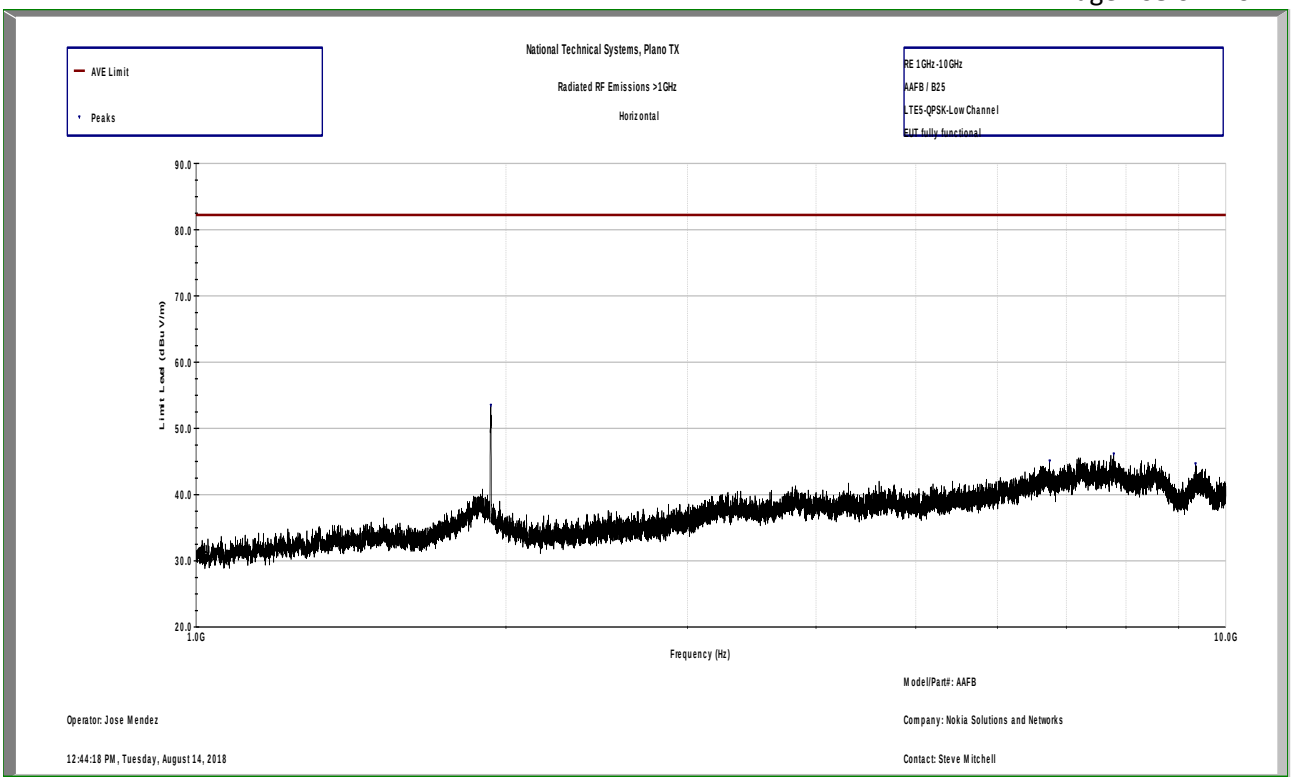
Radiated Spurious Emissions 18-20GHz Vertical at 1m LTE5-QPSK-High Channel



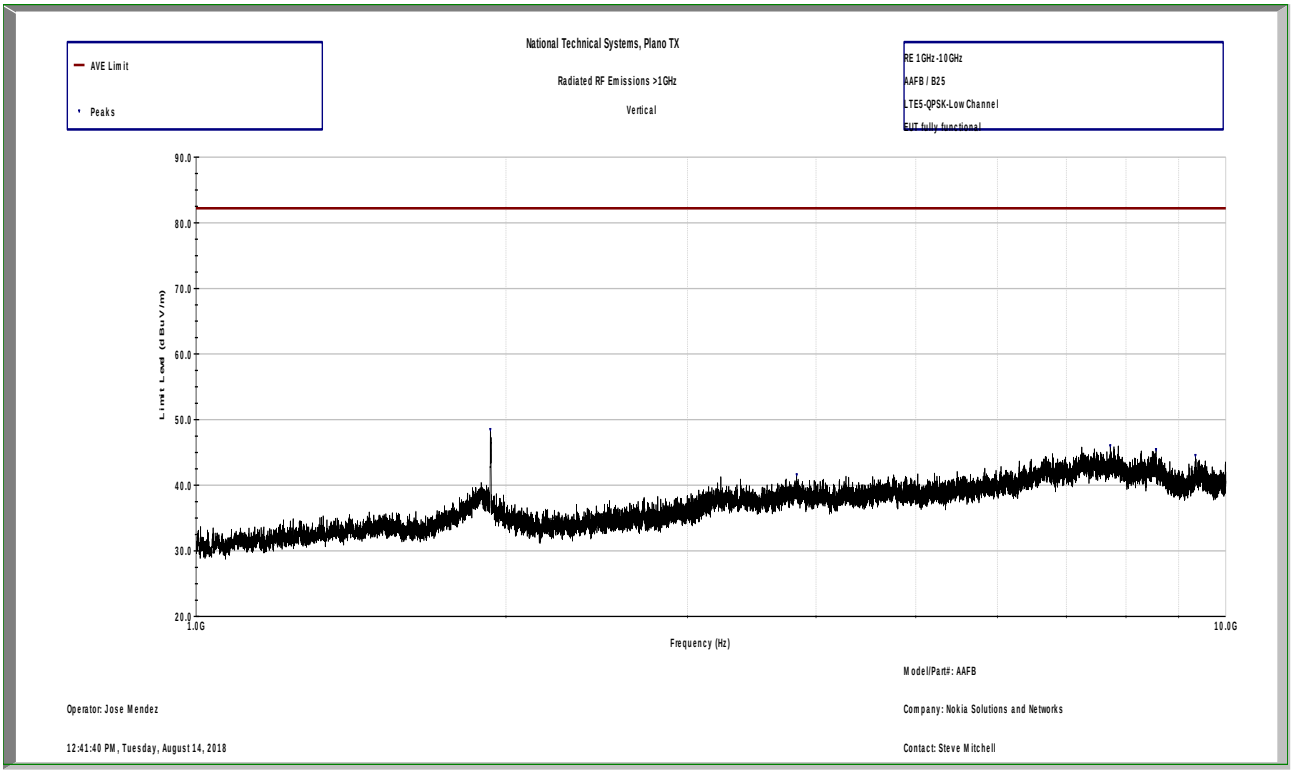
Radiated Spurious Emissions 30MHz-1GHz Horizontal at 3m LTE5-QPSK-Low Channel



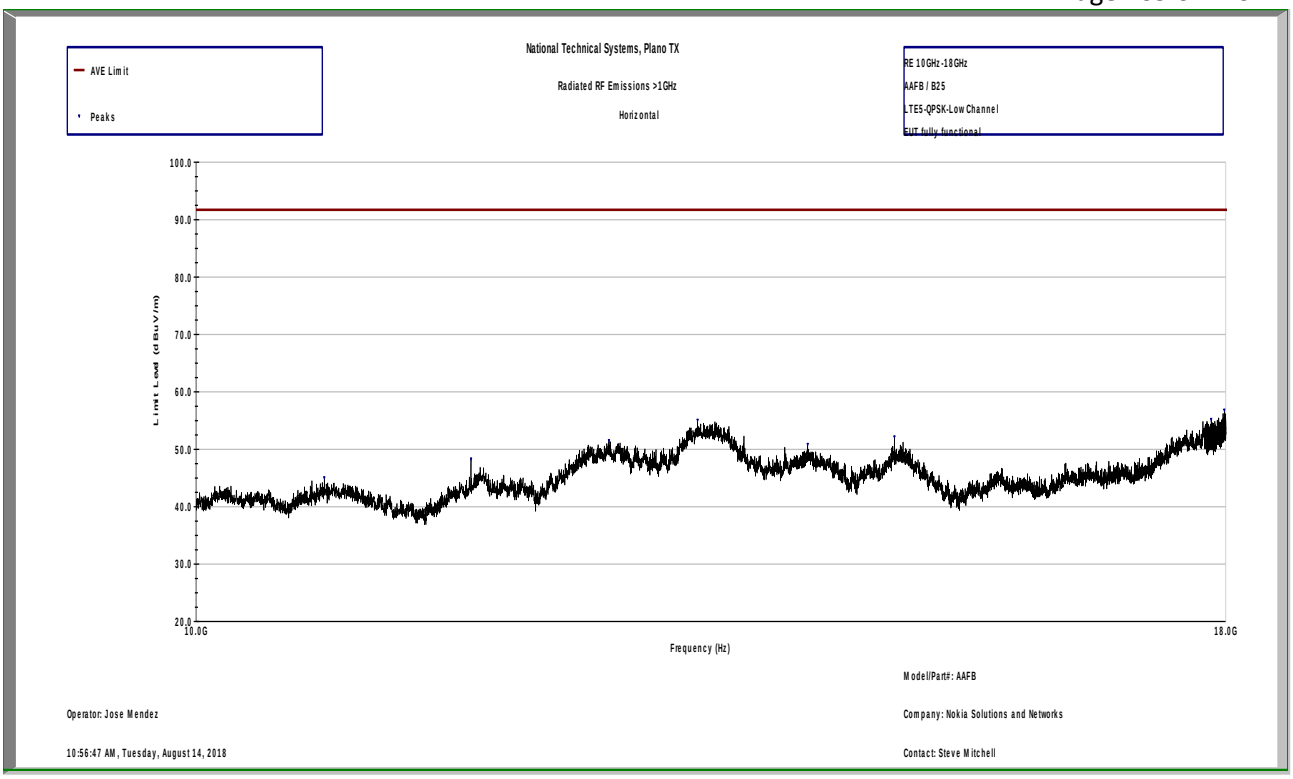
Radiated Spurious Emissions 30MHz-1GHz Vertical at 3m LTE5-QPSK-Low Channel



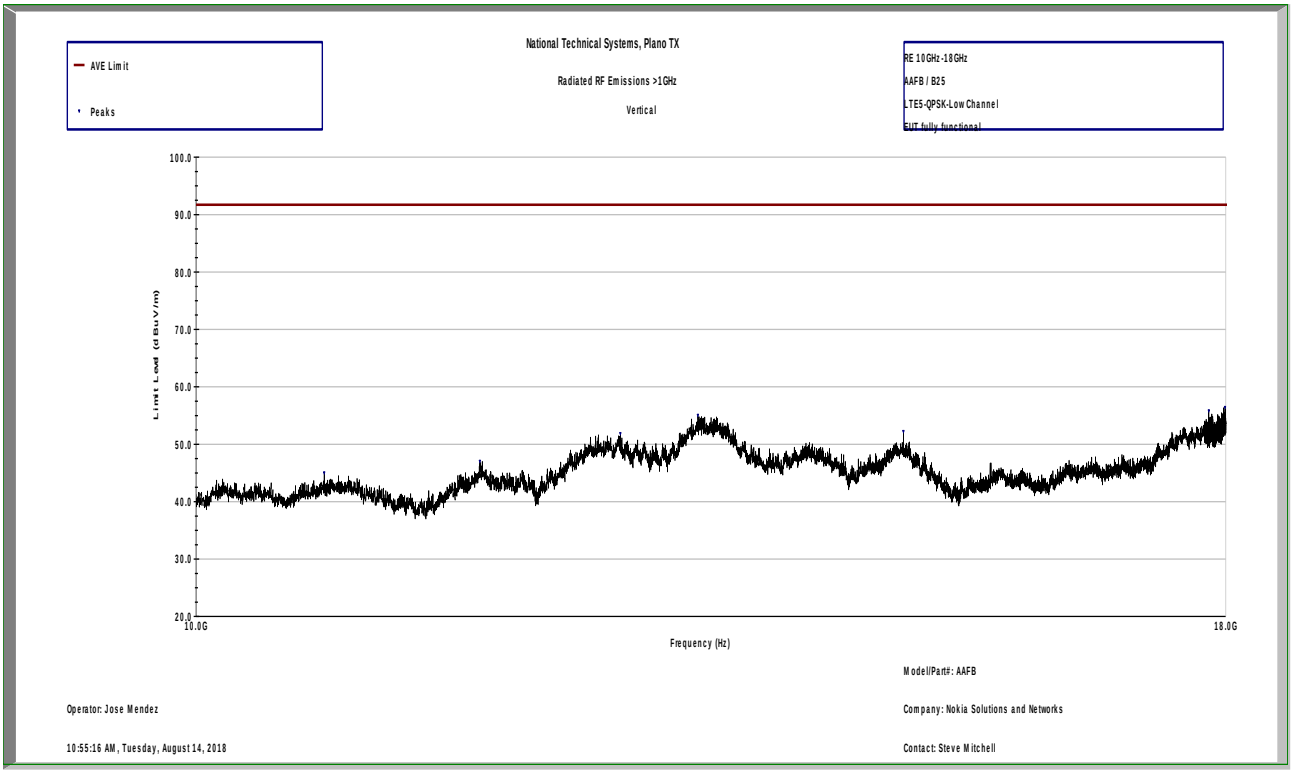
Radiated Spurious Emissions 1-10GHz Horizontal at 3m LTE5-QPSK-Low Channel



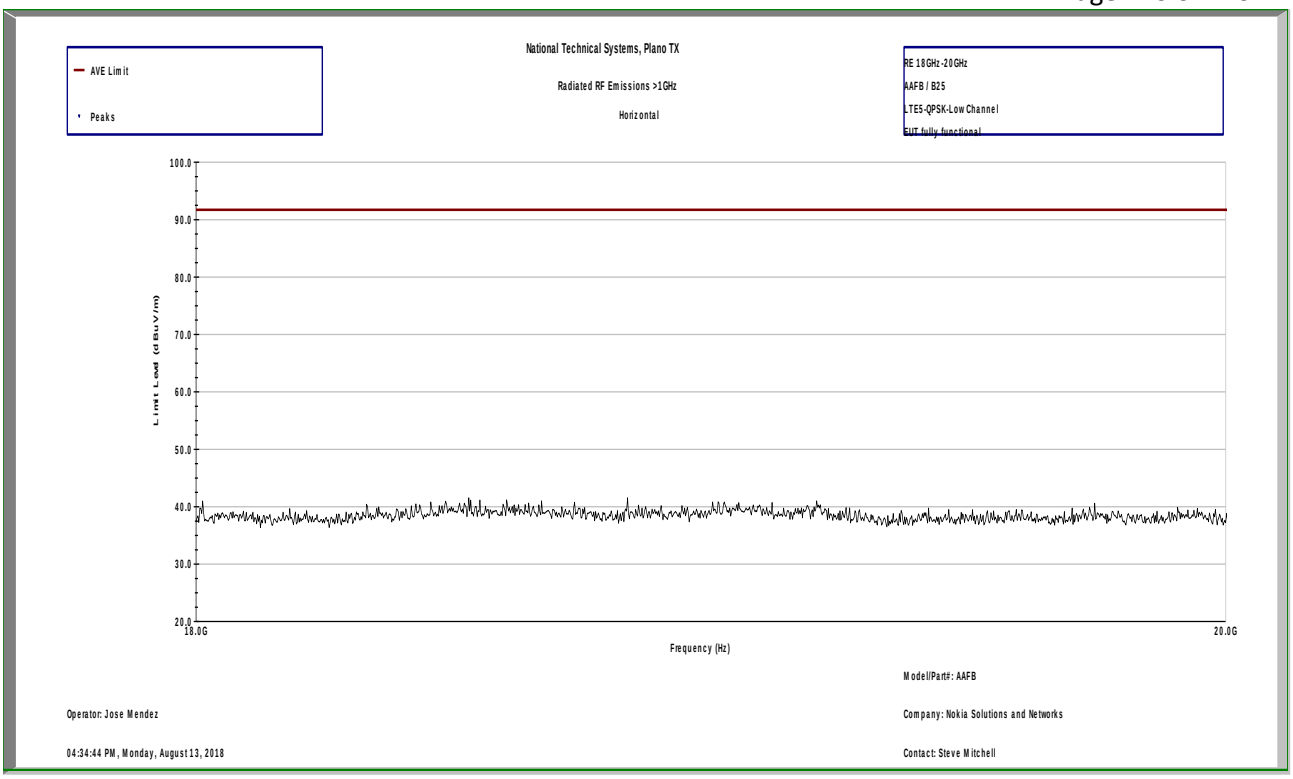
Radiated Spurious Emissions 1-10GHz Vertical at 3m LTE5-QPSK-Low Channel



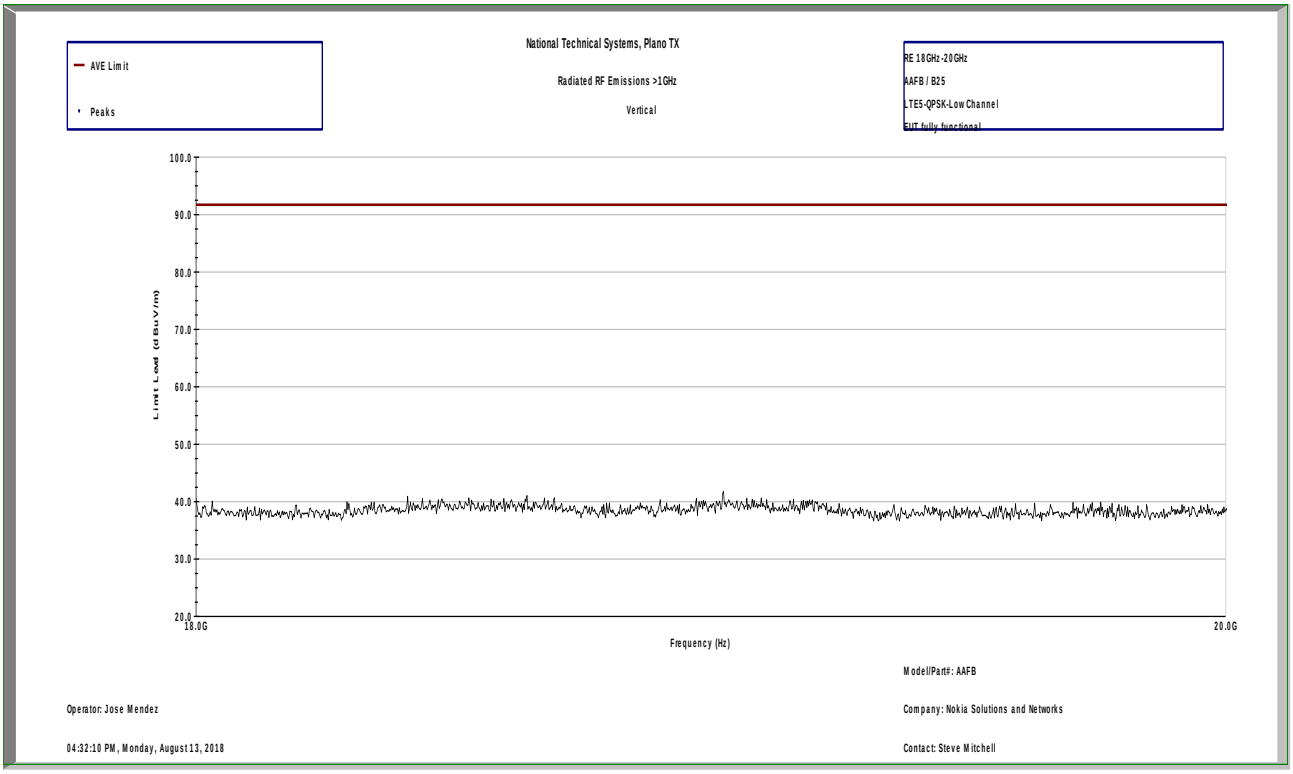
Radiated Spurious Emissions 10-18GHz Horizontal at 1m LTE5-QPSK-Low Channel



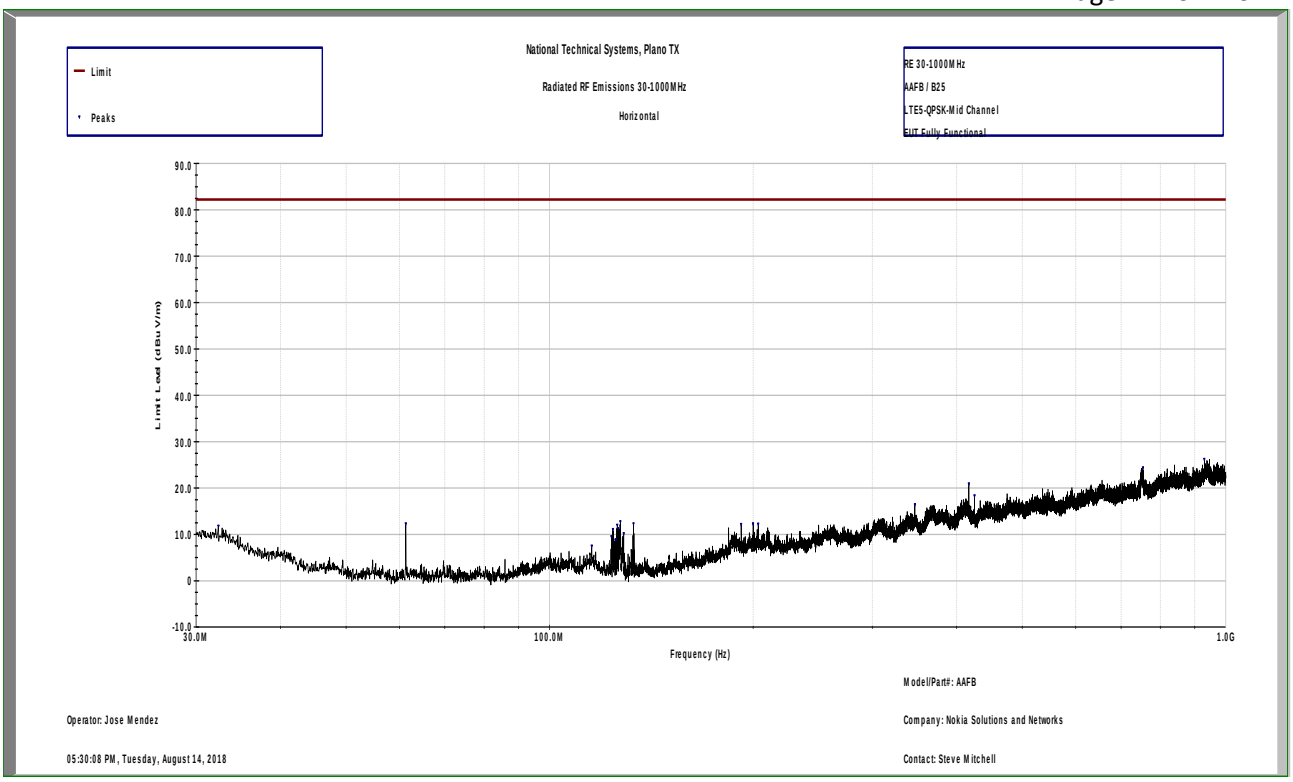
Radiated Spurious Emissions 10-18GHz Vertical at 1m LTE5-QPSK-Low Channel



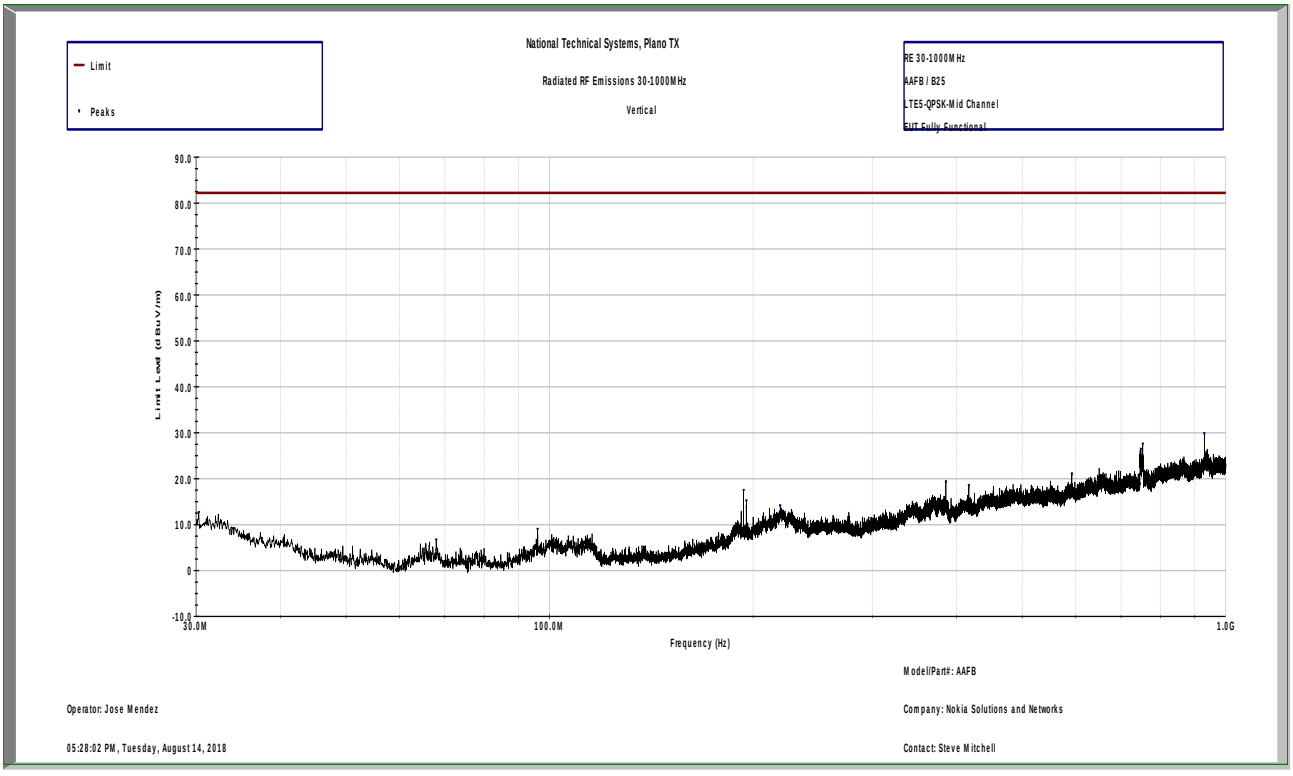
Radiated Spurious Emissions 18-20GHz Horizontal at 1m LTE5-QPSK-Low Channel



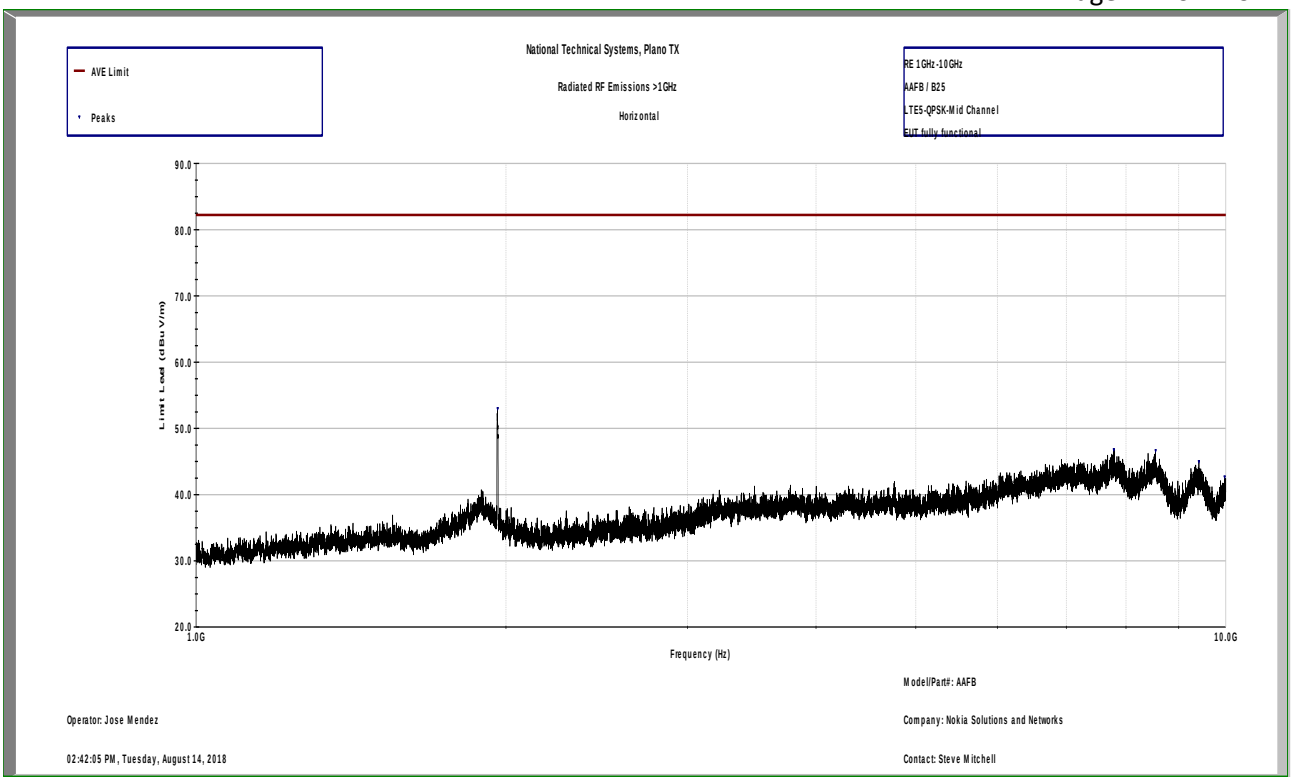
Radiated Spurious Emissions 18-20GHz Vertical at 1m LTE5-QPSK-Low Channel



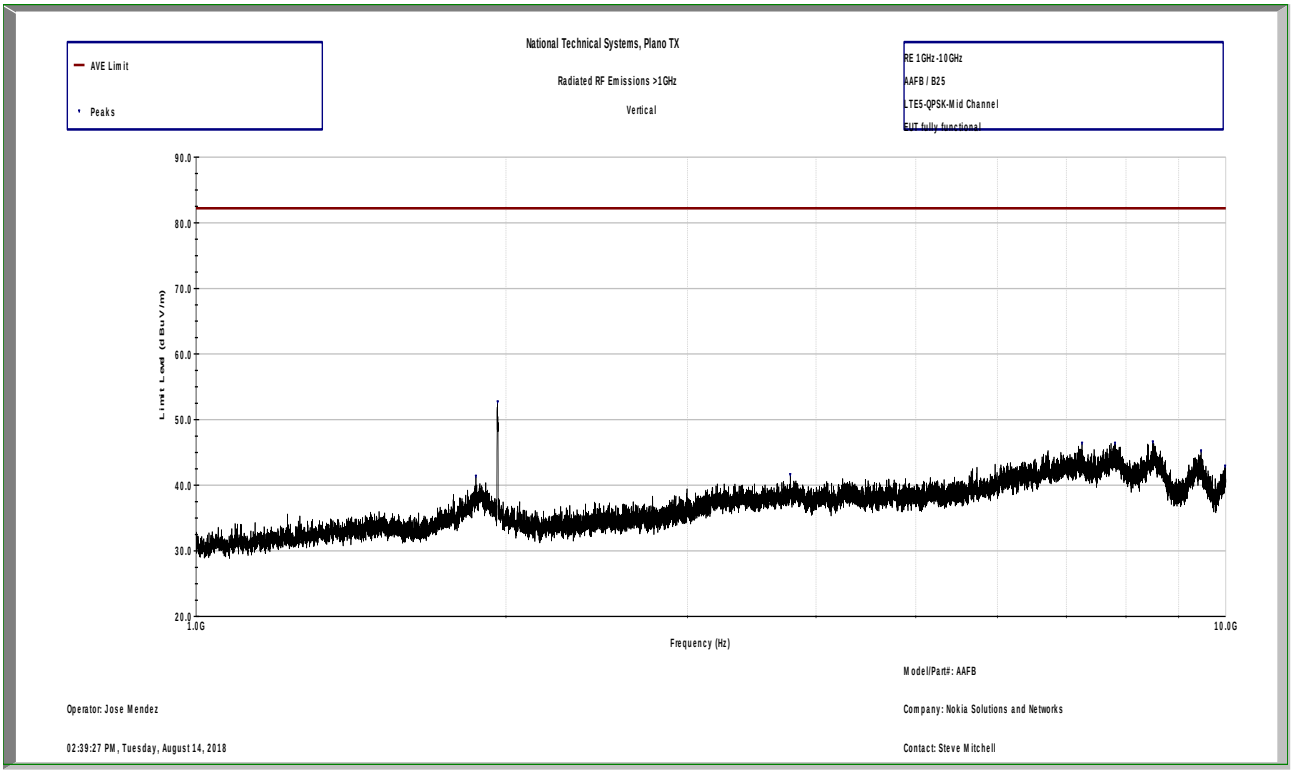
Radiated Spurious Emissions 30MHz-1GHz Horizontal at 3m LTE5-QPSK-Mid Channel



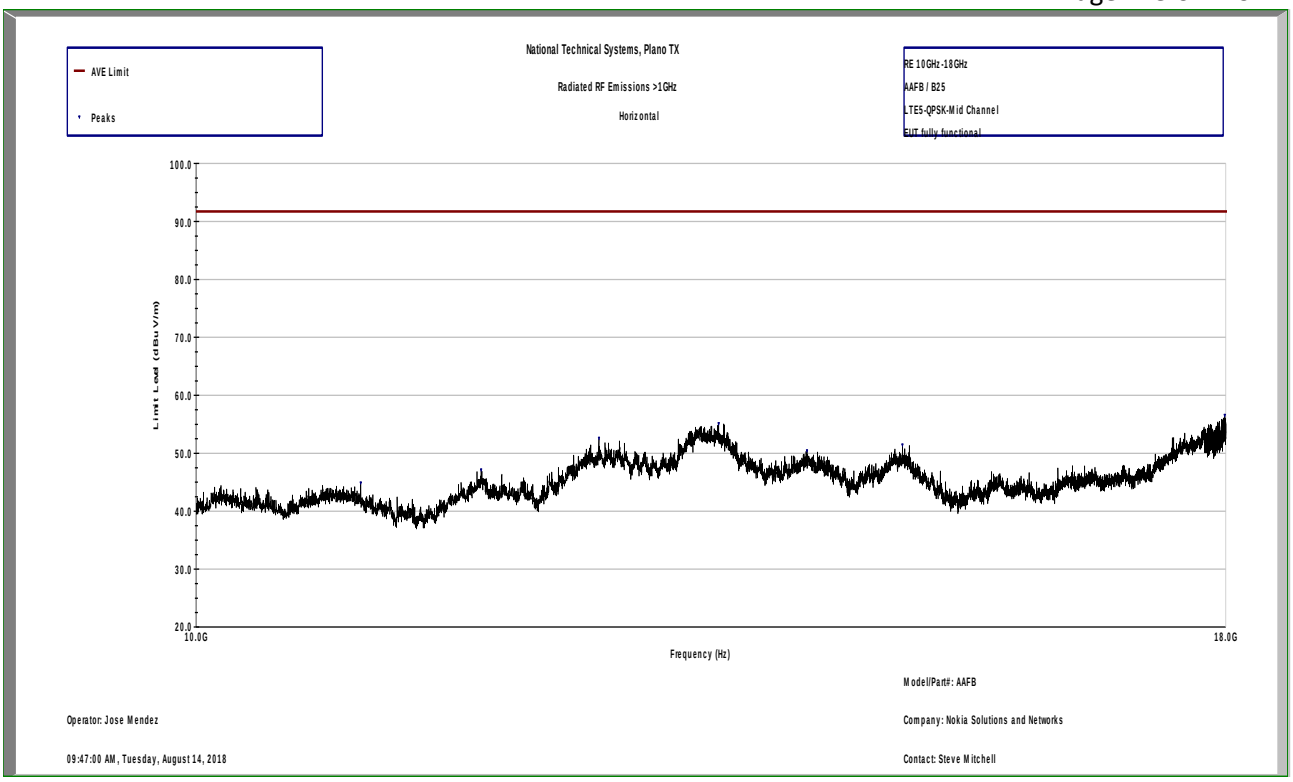
Radiated Spurious Emissions 30MHz-1GHz Vertical at 3m LTE5-QPSK-Mid Channel



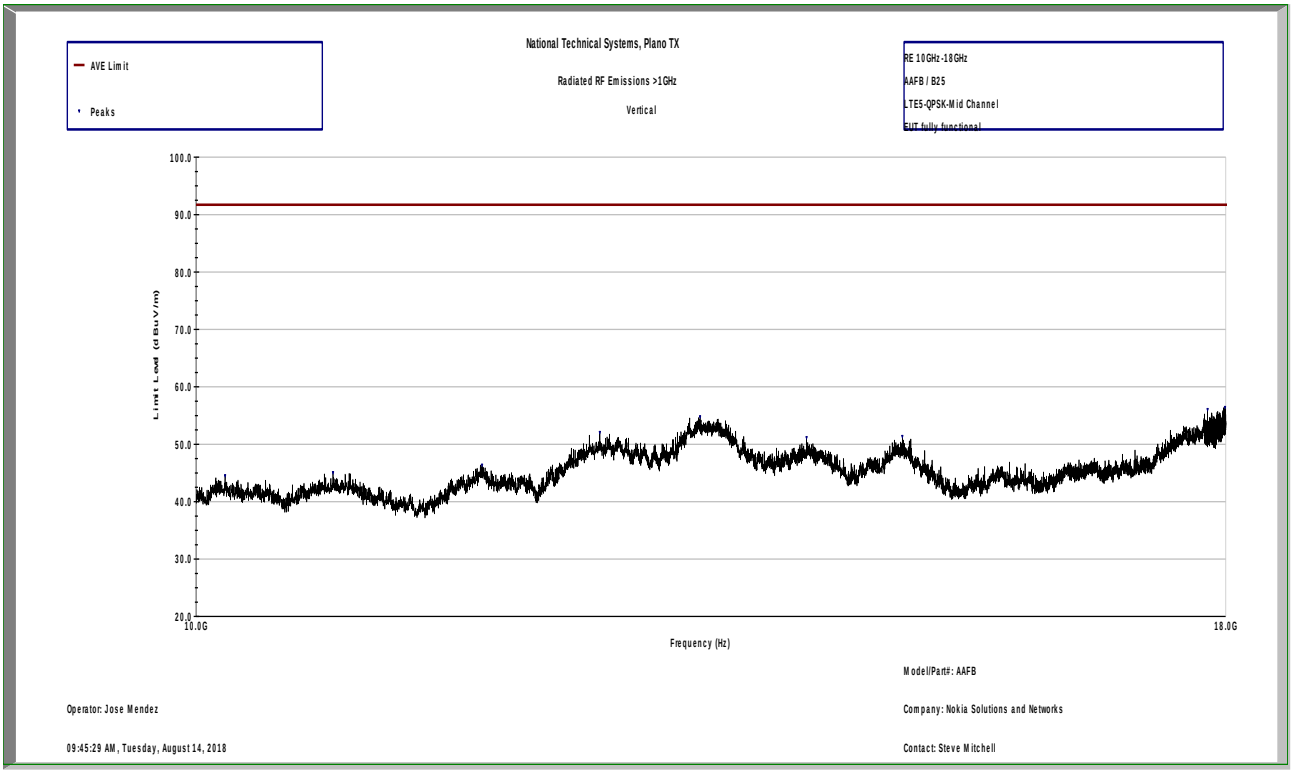
Radiated Spurious Emissions 1-10GHz Horizontal at 3m LTE5-QPSK-Mid Channel



Radiated Spurious Emissions 1-10GHz Vertical at 3m LTE5-QPSK-Mid Channel

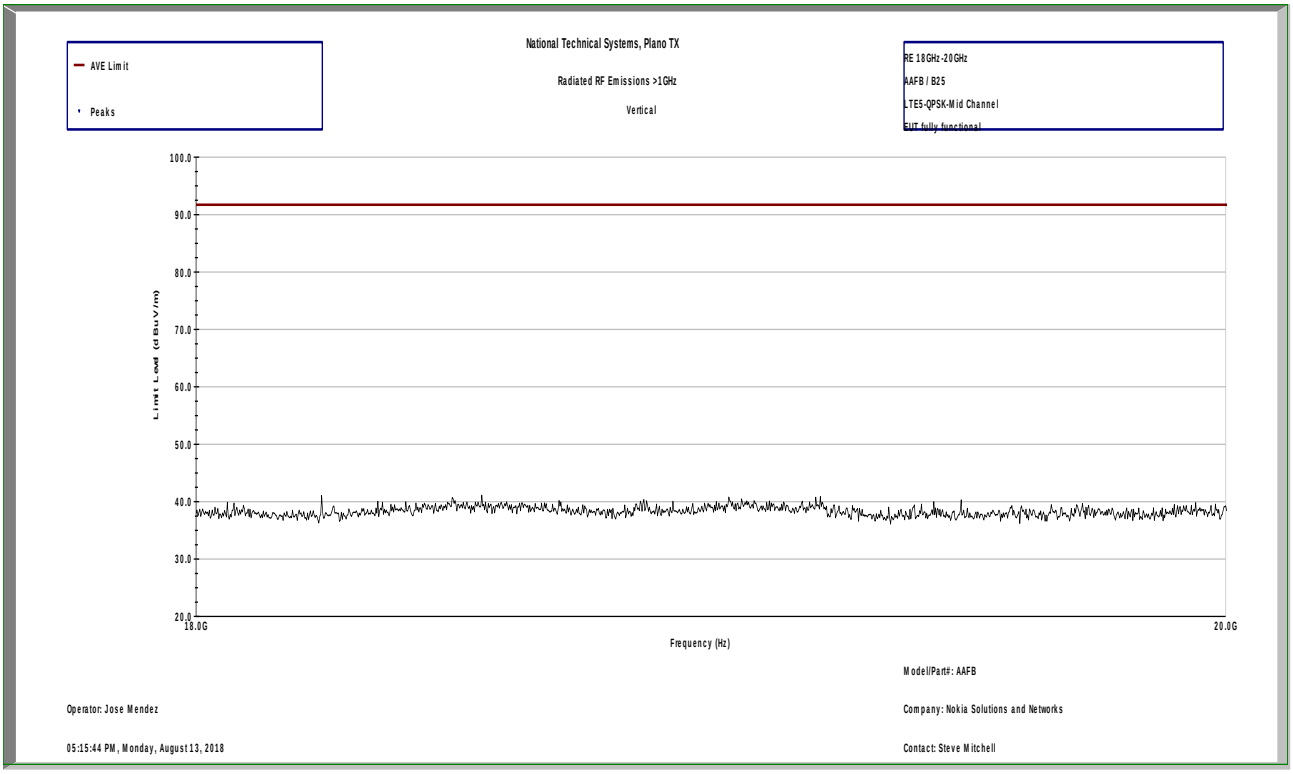


Radiated Spurious Emissions 10-18GHz Horizontal at 1m LTE5-QPSK-Mid Channel



Radiated Spurious Emissions 10-18GHz Vertical at 1m LTE5-QPSK-Mid Channel

Radiated Spurious Emissions 18-20GHz Horizontal at 1m LTE5-QPSK-Mid Channel



Radiated Spurious Emissions 18-20GHz Vertical at 1m LTE5-QPSK-Mid Channel

Frequency Stability/Accuracy

Measurement methods are detailed in KDB 971168 D01v03r01 section 9 and ANSI C63.26-2015. Carrier frequency stability at extreme temperatures and voltages, frequency error was measured as follows:

(1) Transmitting in 5MHz-QPSK-LTE mode at center channel (1962.5MHz) on port 2.
(2) The EUT temperature was stabilized at each temperature step (for a minimum of 30 minutes) prior to frequency accuracy measurement.

Nominal operating voltage of the product is declared as 48VDC.

Frequency error results are listed below for extreme voltages and temperatures.

Extreme Voltages:

Percentage of Rated Supply	DC Voltage (VDC)	Frequency Error (Hz) at 20°C
85%	40.8	2.13
100%	48.0	1.62
115%	55.2	1.39

Extreme Temperatures:

Temperature	Frequency Error (Hz) at 48VDC
-30 °C	1.76
-20 °C	1.24
-10 °C	2.04
0 °C	1.39
10 °C	1.48
20 °C	1.62
30 °C	1.82
40 °C	**2.47**
50 °C	1.55

Based on the results above, highest recorded frequency error (2.47Hz or 0.0013ppm) ensures that the transmitted signal remains in its authorized frequency block at extreme voltages and temperatures as required by FCC 24.235.

RSS 133 6.3 frequency stability requirement for a base station is ±1.0 ppm (± 1962.5Hz at center channel).

The results above are deemed sufficient to demonstrate carrier frequency stability for all other channel bandwidth modes and modulations since all carriers are controlled by the same frequency stabilization circuitry that was subjected to the extreme conditions under this test.

End of Report

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