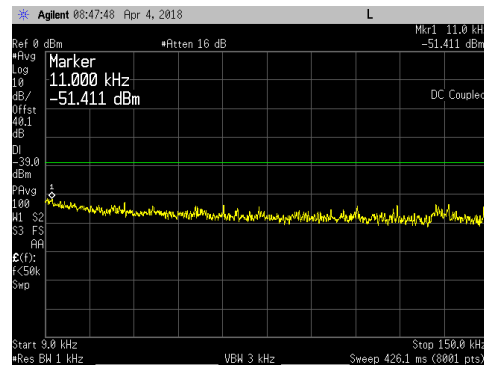
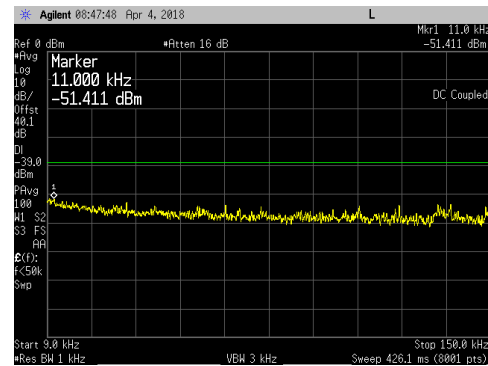


LTE20 Ch BW _ 64QAM _ Middle Channel (634.5MHz) at 60 watts/carrier:

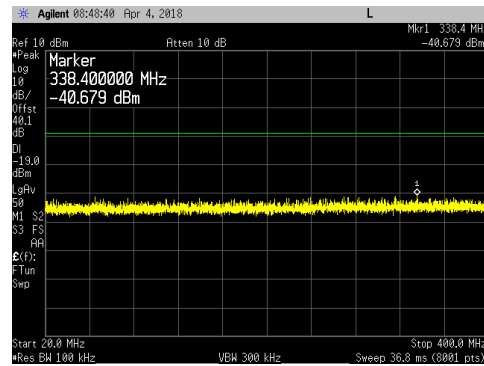
9kHz to 150kHz



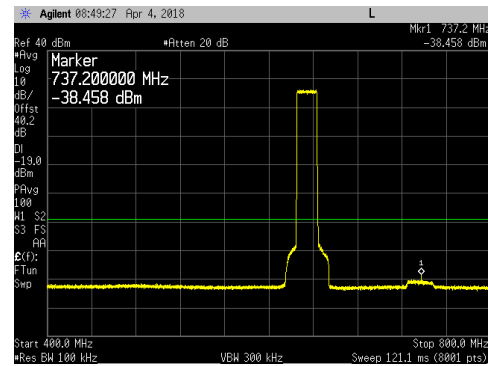
150kHz to 20MHz



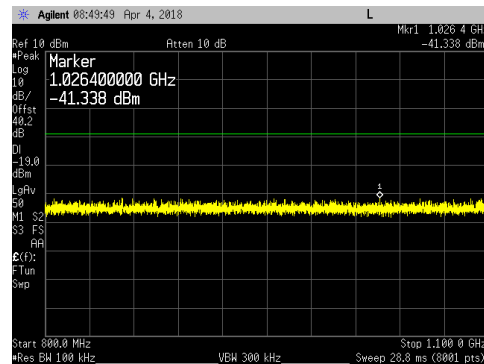
20MHz to 400MHz



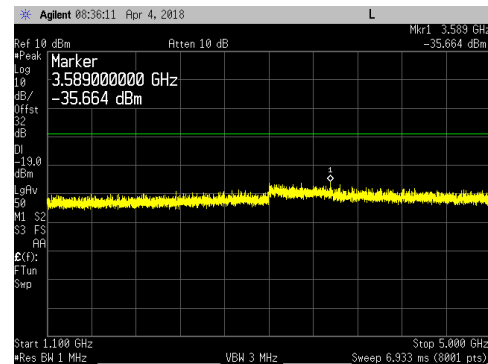
400MHz to 800MHz



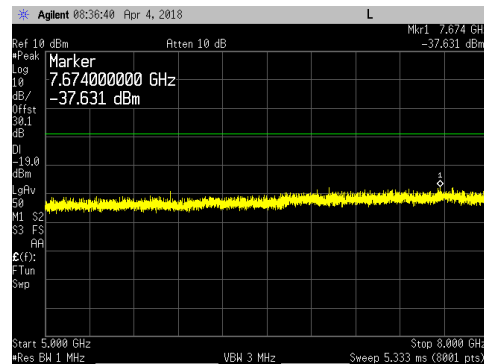
800MHz to 1.1GHz



1.1GHz to 5GHz

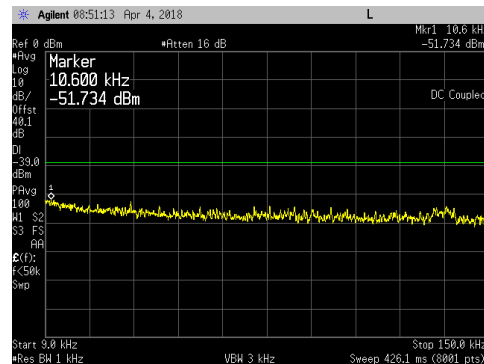


5GHz to 8GHz

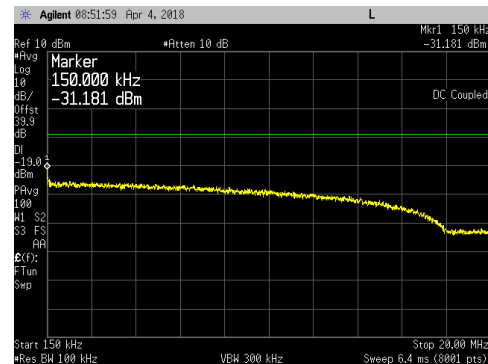


LTE20 Ch BW _ 256QAM _ Middle Channel (634.5MHz) at 60 watts/carrier:

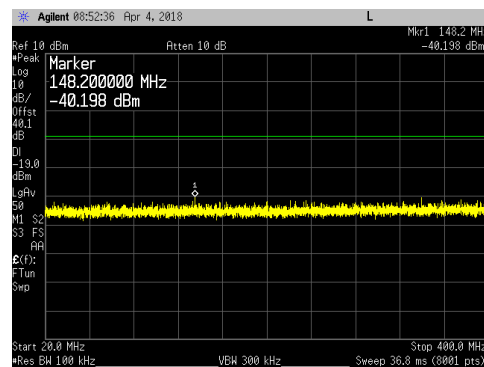
9kHz to 150kHz



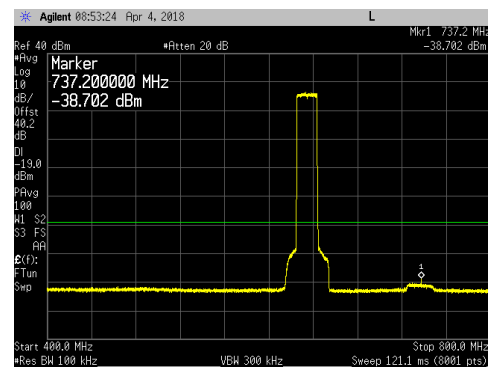
150kHz to 20MHz



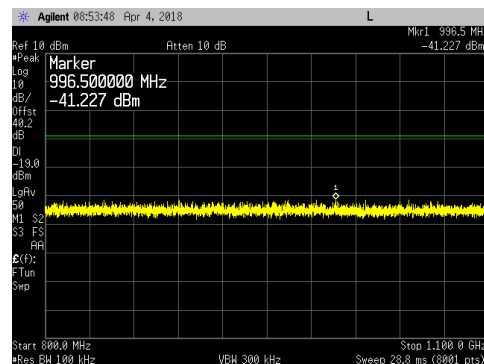
20MHz to 400MHz



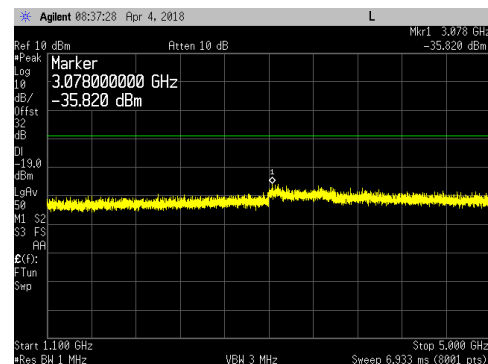
400MHz to 800MHz



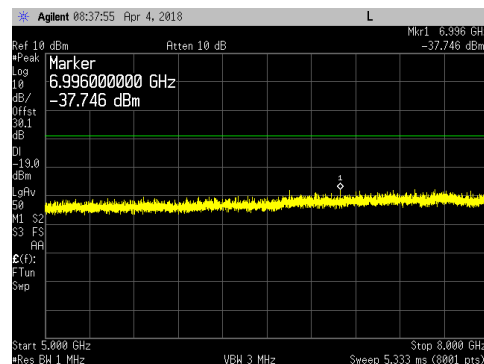
800MHz to 1.1GHz



1.1GHz to 5GHz

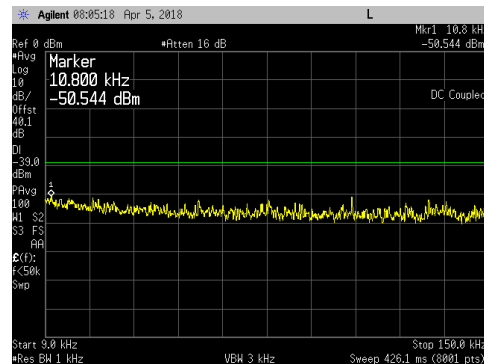


5GHz to 8GHz

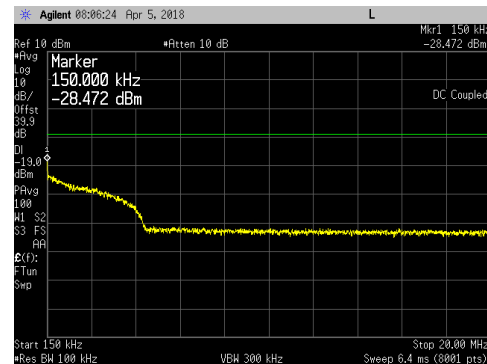


LTE5 & LTE1.4 Ch BWs _ QPSK _ Middle Channels (634.5MHz and 737.0MHz) at 30 watts/carrier:

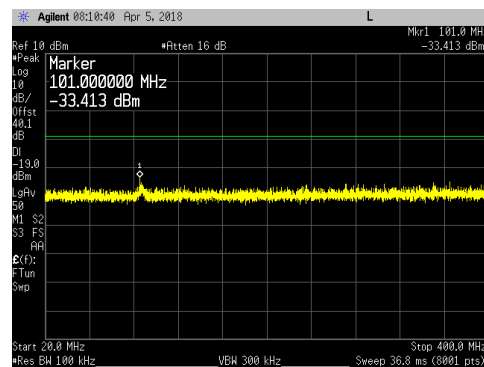
9kHz to 150kHz



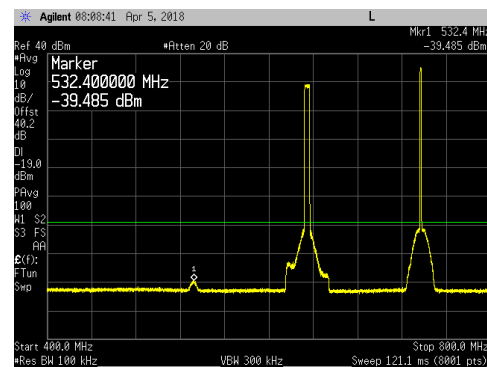
150kHz to 20MHz



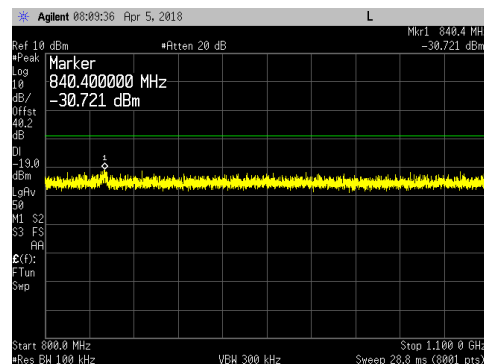
20MHz to 400MHz



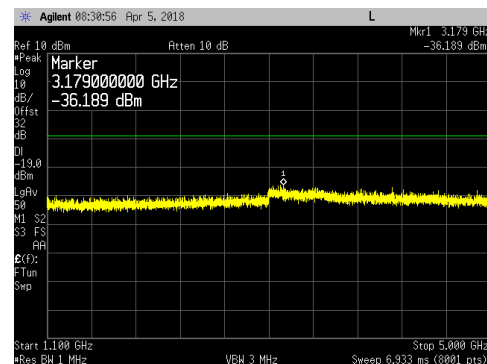
400MHz to 800MHz



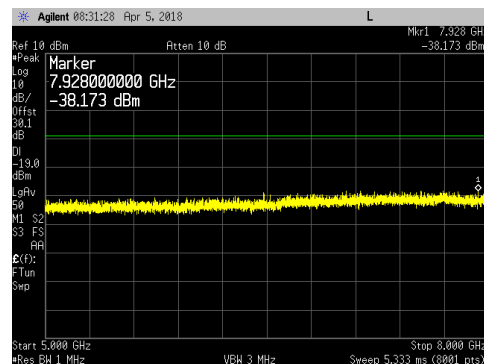
800MHz to 1.1GHz



1.1GHz to 5GHz

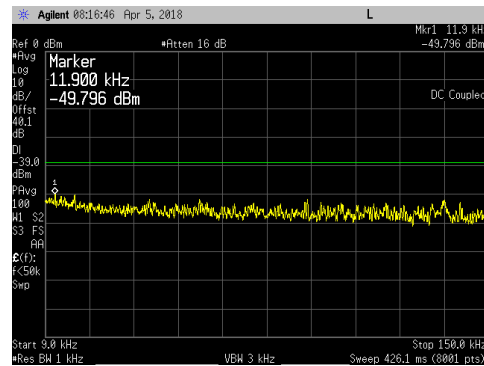


5GHz to 8GHz

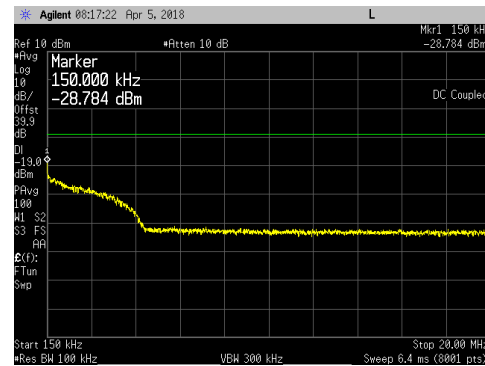


LTE5 & LTE1.4 Ch BWs _ 16QAM _ Middle Channels (634.5MHz and 737.0MHz) at 30 watts/carrier:

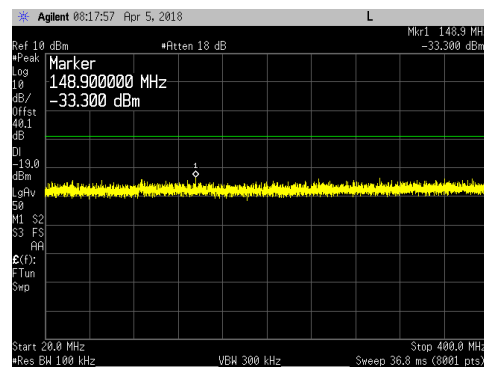
9kHz to 150kHz



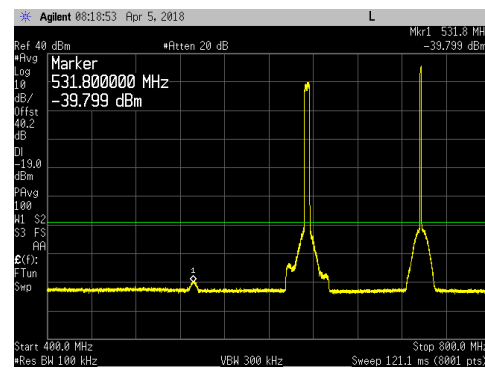
150kHz to 20MHz



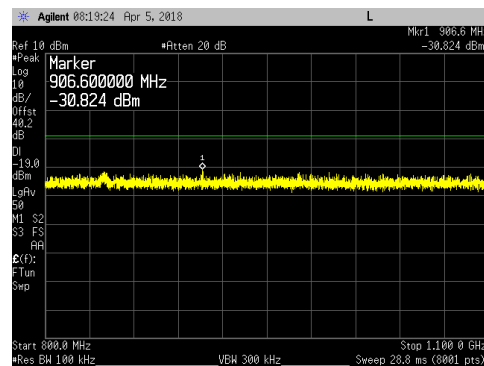
20MHz to 400MHz



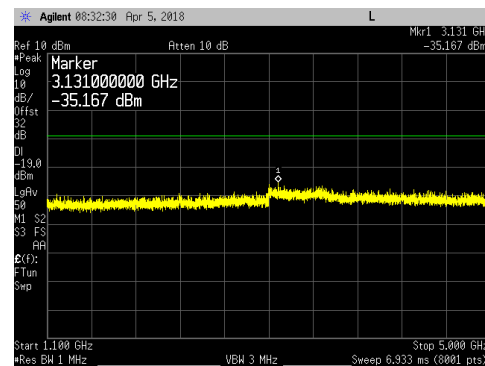
400MHz to 800MHz



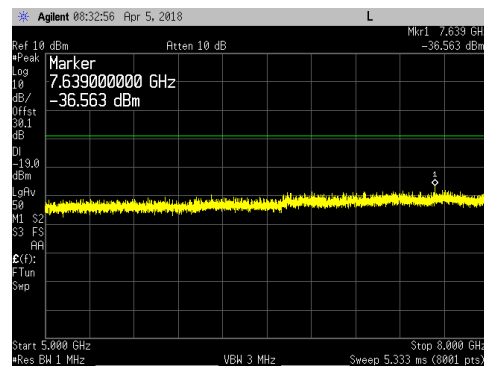
800MHz to 1.1GHz



1.1GHz to 5GHz

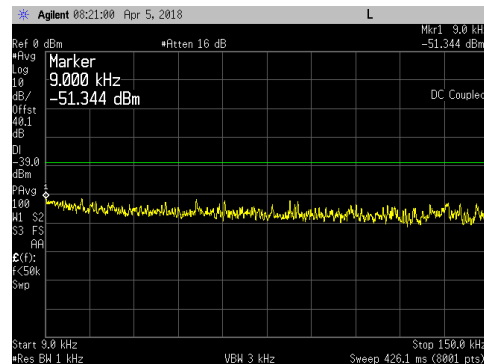


5GHz to 8GHz

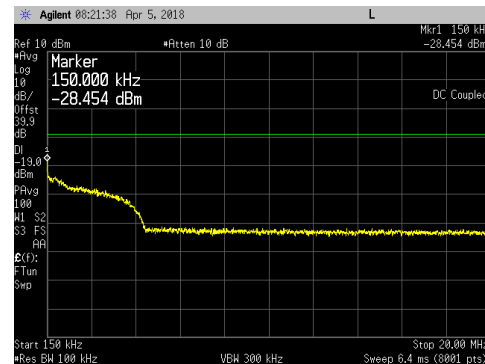


LTE5 & LTE1.4 Ch BWs _ 64QAM _ Middle Channels (634.5MHz and 737.0MHz) at 30 watts/carrier:

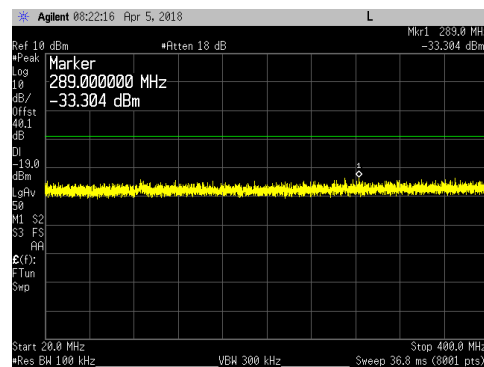
9kHz to 150kHz



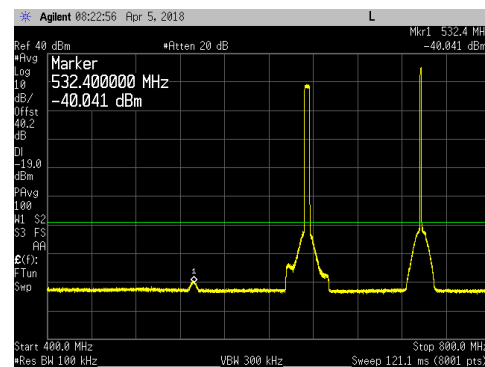
150kHz to 20MHz



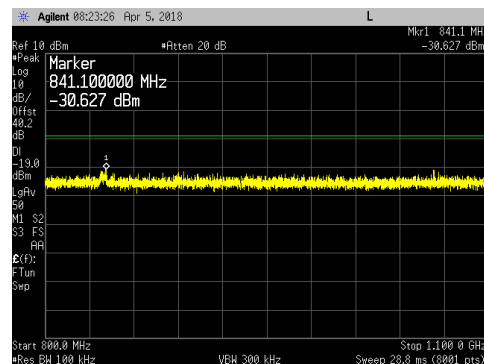
20MHz to 400MHz



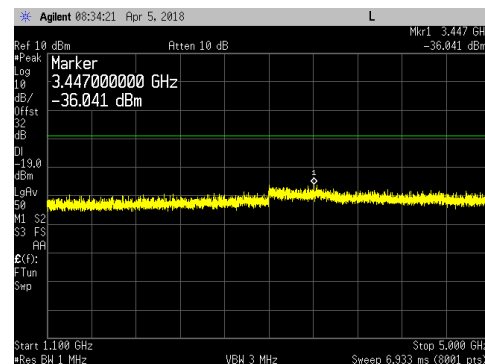
400MHz to 800MHz



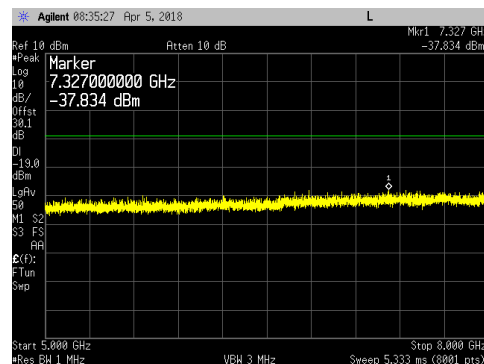
800MHz to 1.1GHz



1.1GHz to 5GHz

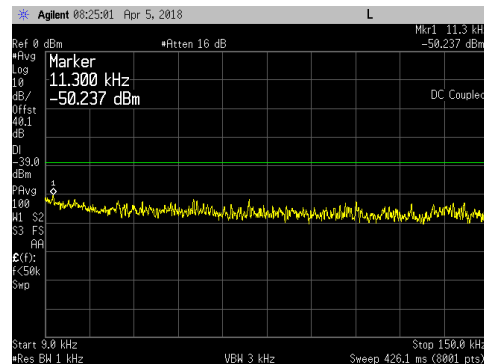


5GHz to 8GHz

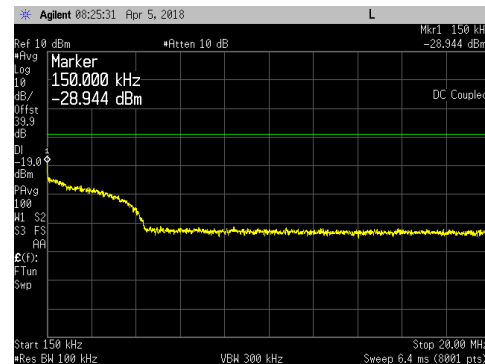


LTE5 & LTE1.4 Ch BWs _ 256QAM _ Middle Channels (634.5MHz and 737.0MHz) at 30 watts/carrier:

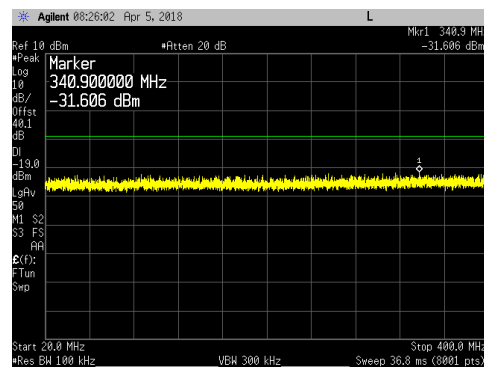
9kHz to 150kHz



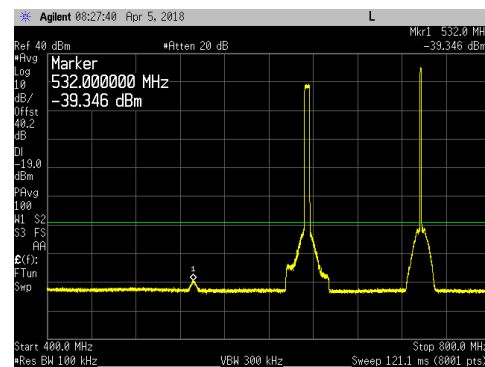
150kHz to 20MHz



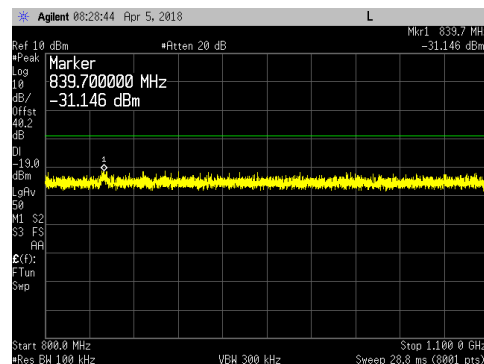
20MHz to 400MHz



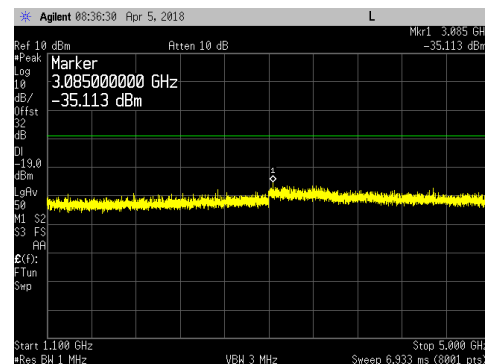
400MHz to 800MHz



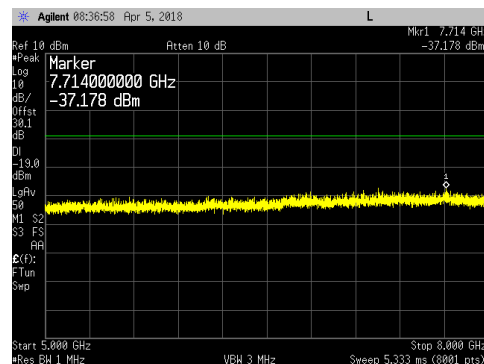
800MHz to 1.1GHz



1.1GHz to 5GHz

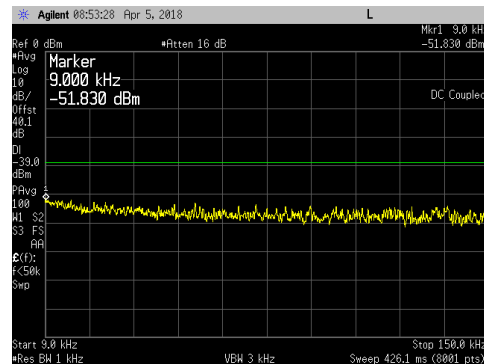


5GHz to 8GHz

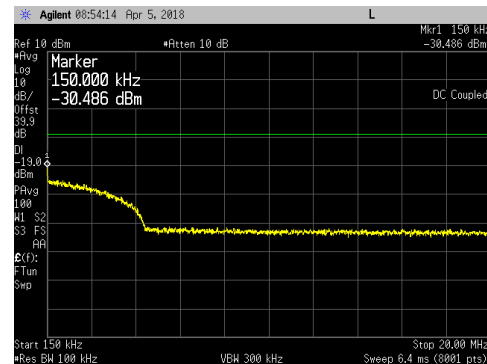


LTE5 & LTE3 Ch BWs _ QPSK _ Middle Channels (634.5MHz and 737.0MHz) at 30 watts/carrier:

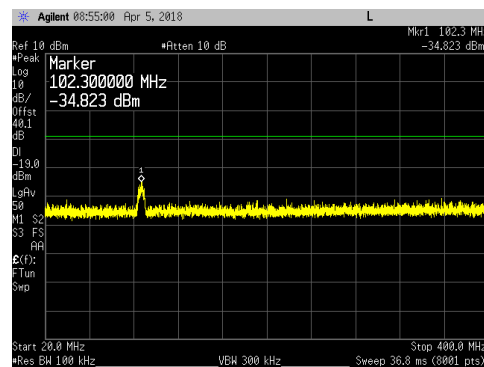
9kHz to 150kHz



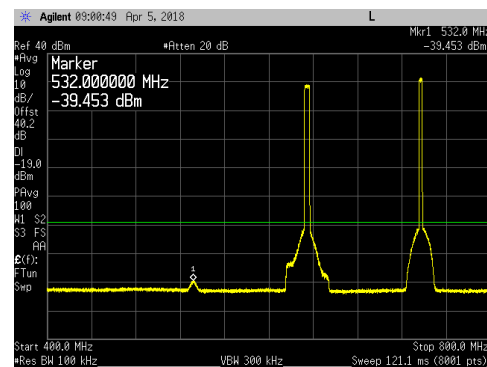
150kHz to 20MHz



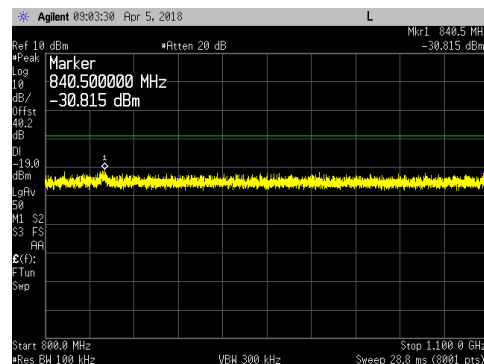
20MHz to 400MHz



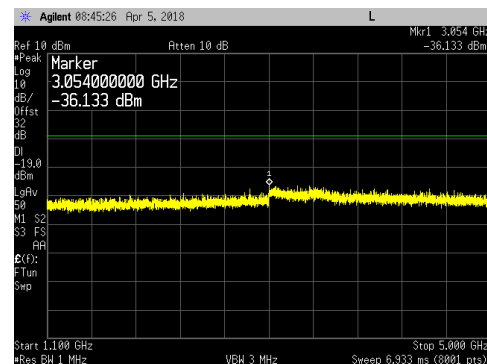
400MHz to 800MHz



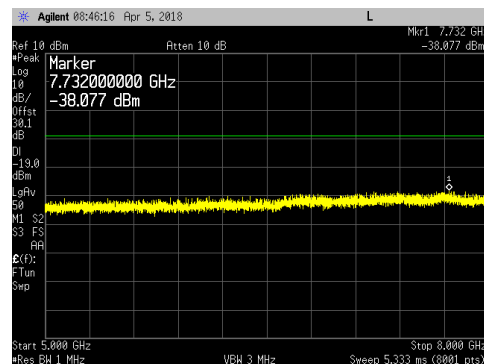
800MHz to 1.1GHz



1.1GHz to 5GHz

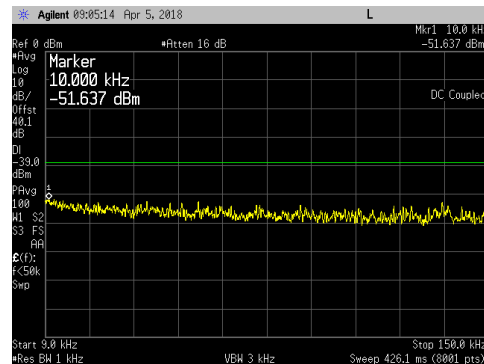


5GHz to 8GHz

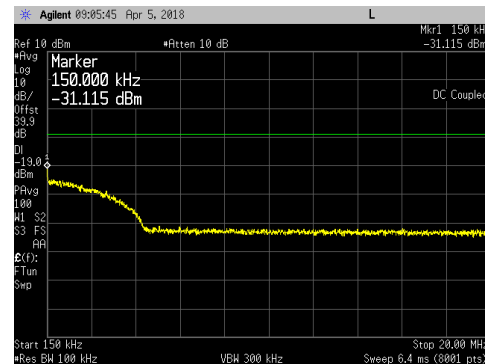


LTE5 & LTE3 Ch BWs _ 16QAM _ Middle Channels (634.5MHz and 737.0MHz) at 30 watts/carrier:

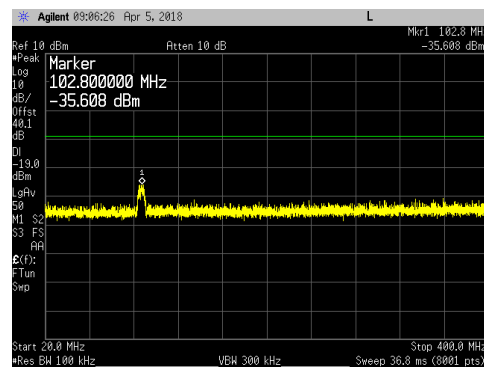
9kHz to 150kHz



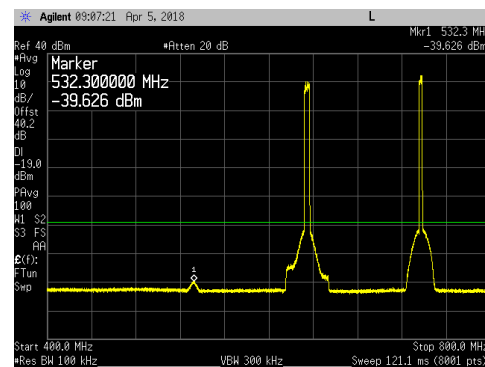
150kHz to 20MHz



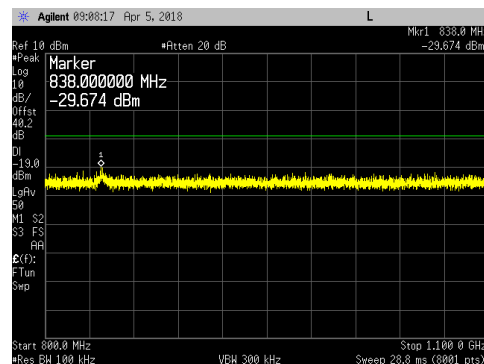
20MHz to 400MHz



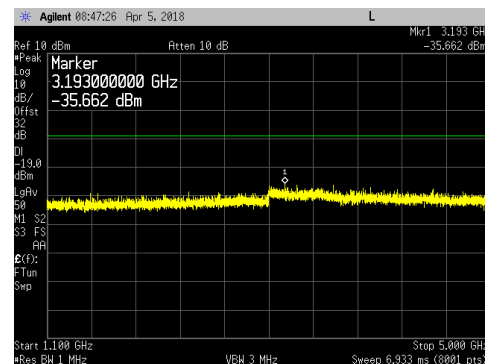
400MHz to 800MHz



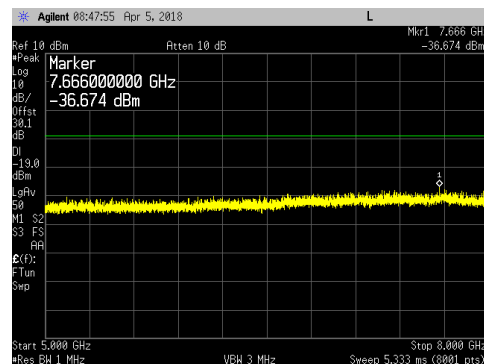
800MHz to 1.1GHz



1.1GHz to 5GHz

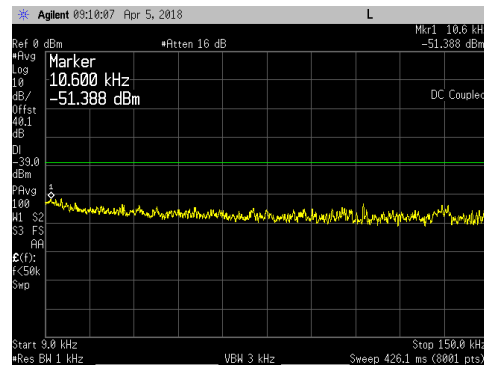


5GHz to 8GHz

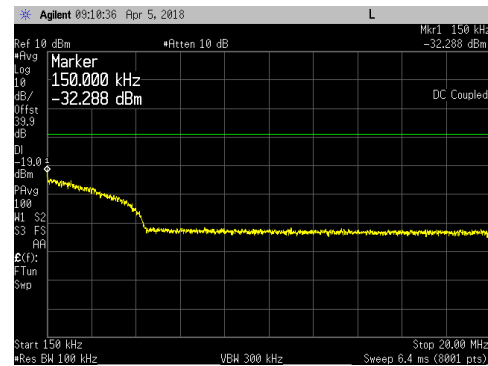


LTE5 & LTE3 Ch BWs _ 64QAM _ Middle Channels (634.5MHz and 737.0MHz) at 30 watts/carrier:

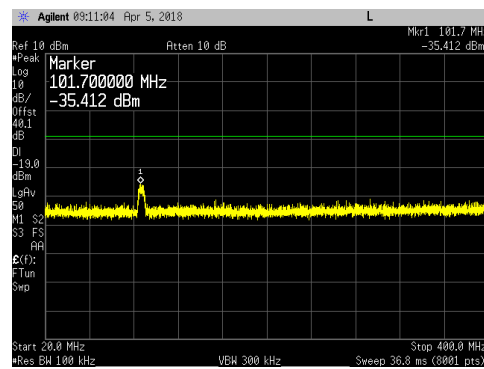
9kHz to 150kHz



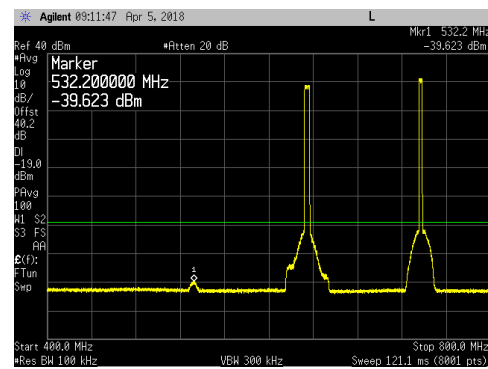
150kHz to 20MHz



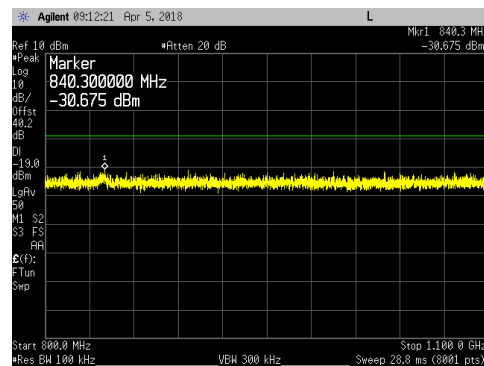
20MHz to 400MHz



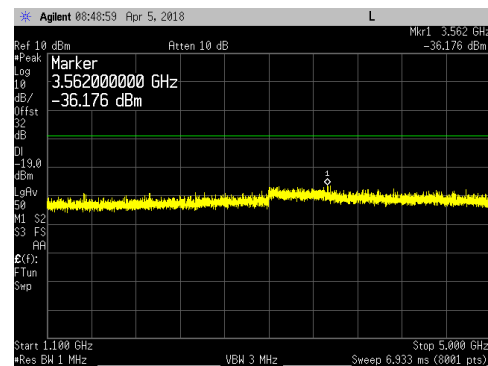
400MHz to 800MHz



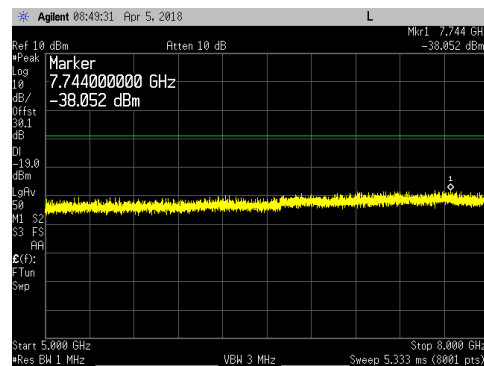
800MHz to 1.1GHz



1.1GHz to 5GHz

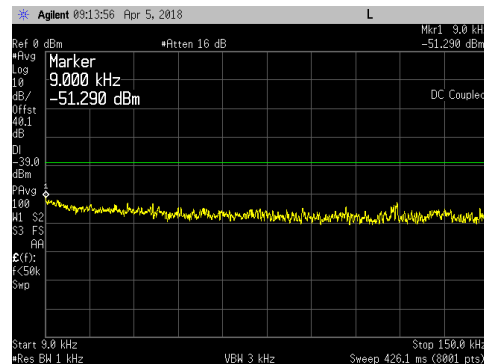


5GHz to 8GHz

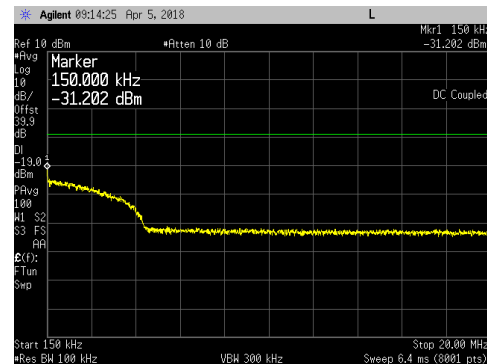


LTE5 & LTE3 Ch BWs _ 256QAM _ Middle Channels (634.5MHz and 737.0MHz) at 30 watts/carrier:

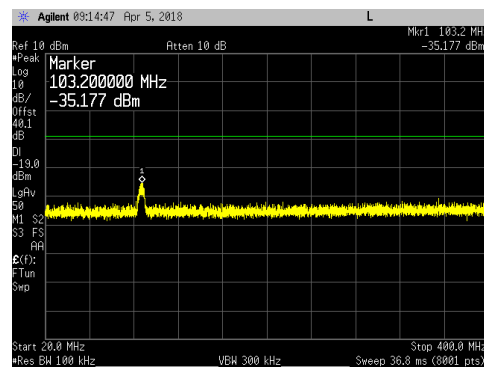
9kHz to 150kHz



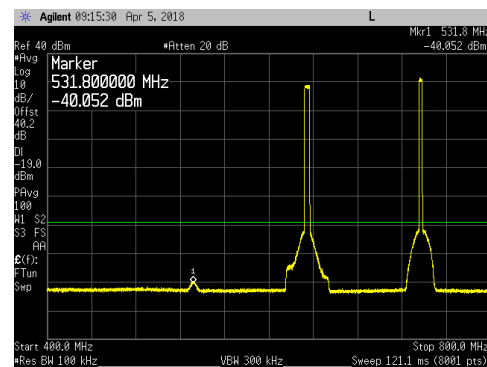
150kHz to 20MHz



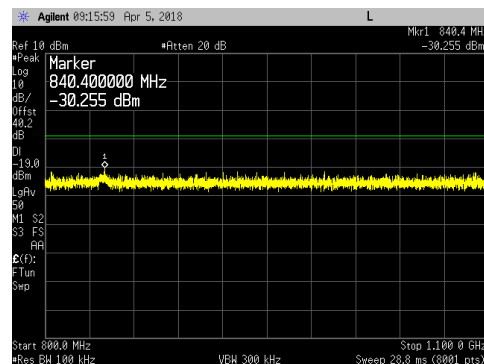
20MHz to 400MHz



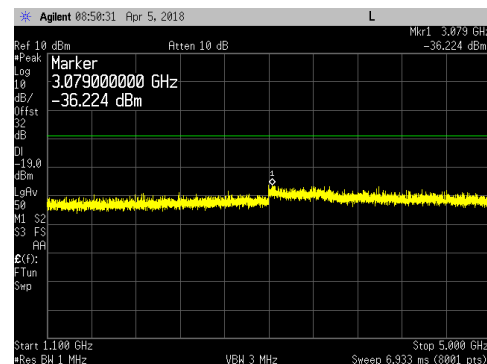
400MHz to 800MHz



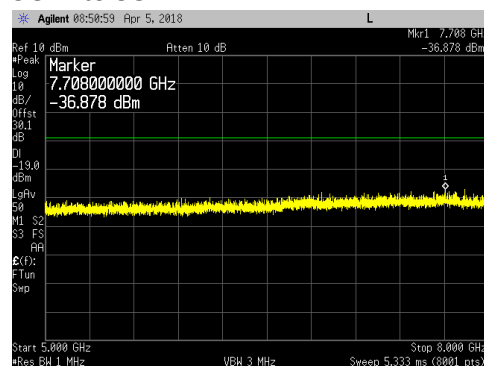
800MHz to 1.1GHz



1.1GHz to 5GHz

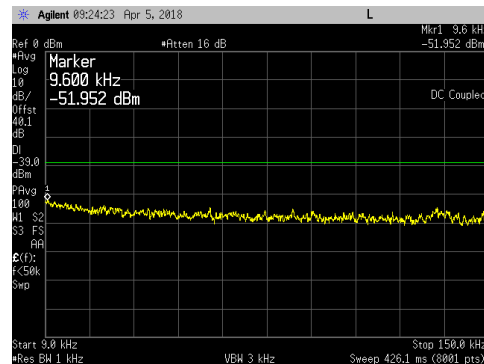


5GHz to 8GHz

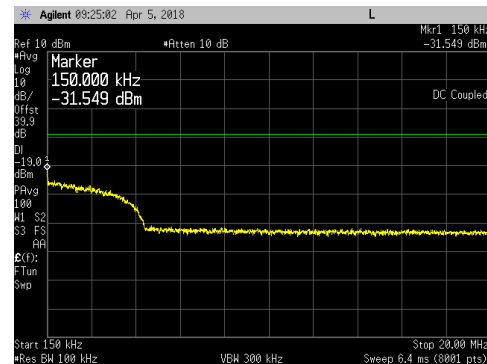


LTE5 & LTE5 Ch BWs _ QPSK _ Middle Channels (634.5MHz and 737.0MHz) at 30 watts/carrier:

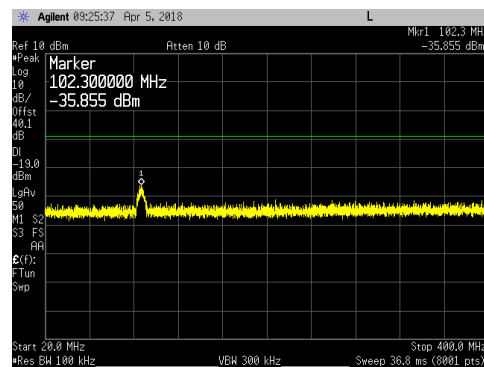
9kHz to 150kHz



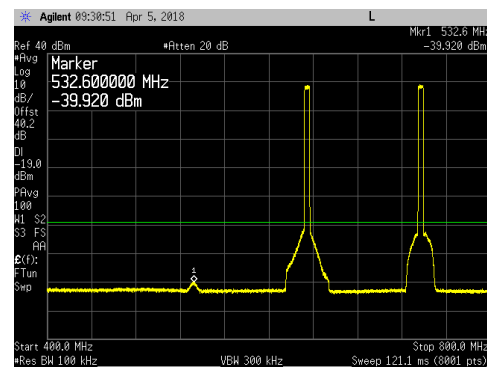
150kHz to 20MHz



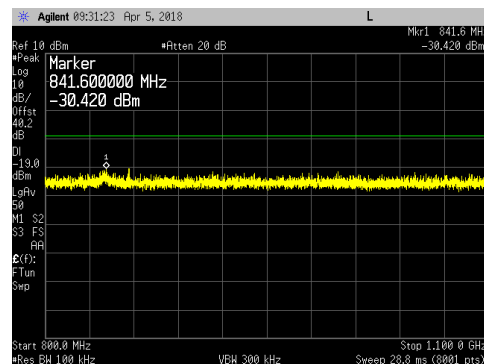
20MHz to 400MHz



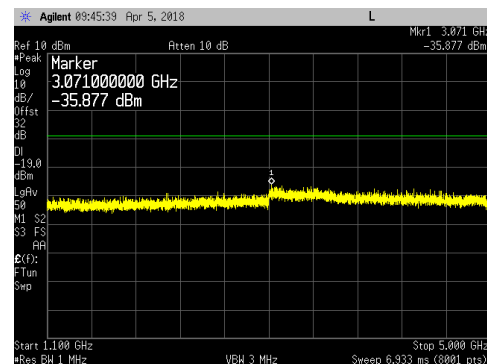
400MHz to 800MHz



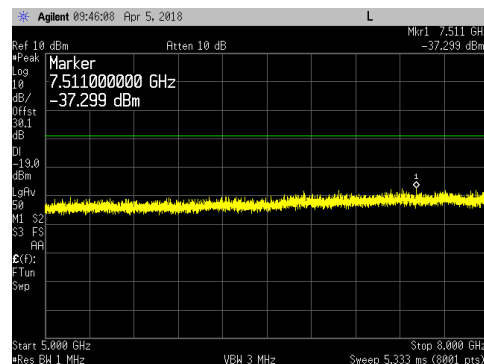
800MHz to 1.1GHz



1.1GHz to 5GHz

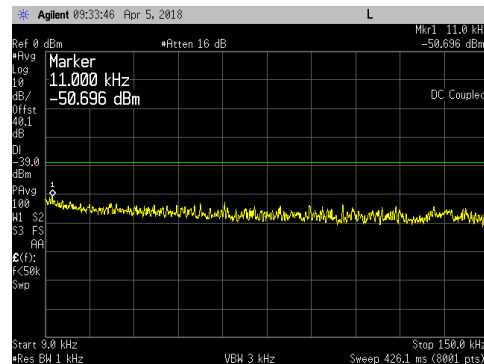


5GHz to 8GHz

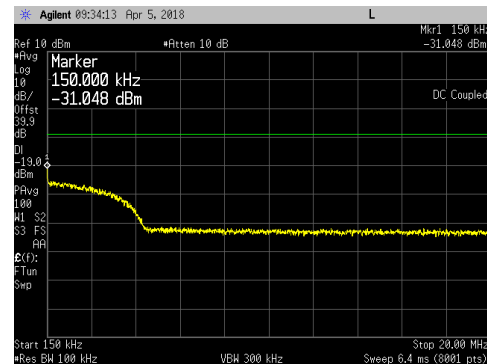


LTE5 & LTE5 Ch BWs _ 16QAM _ Middle Channels (634.5MHz and 737.0MHz) at 30 watts/carrier:

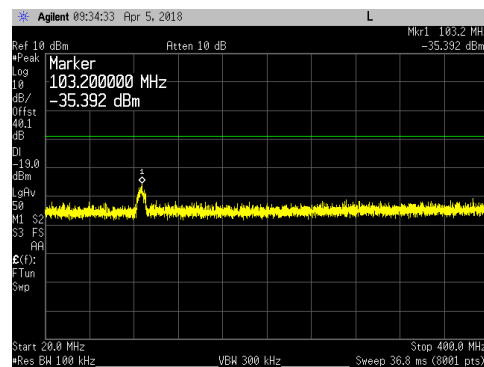
9kHz to 150kHz



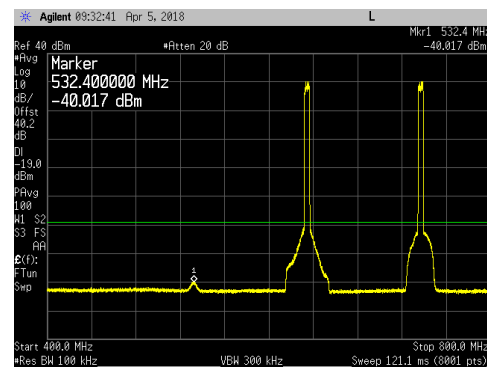
150kHz to 20MHz



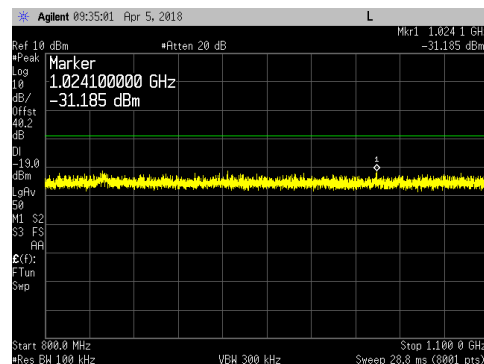
20MHz to 400MHz



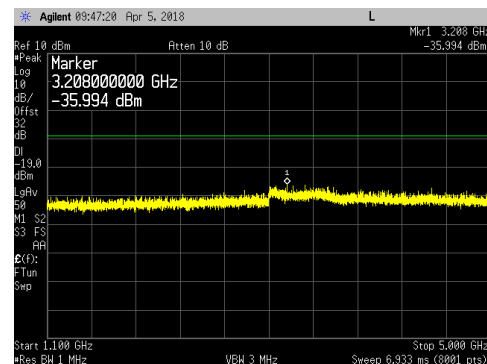
400MHz to 800MHz



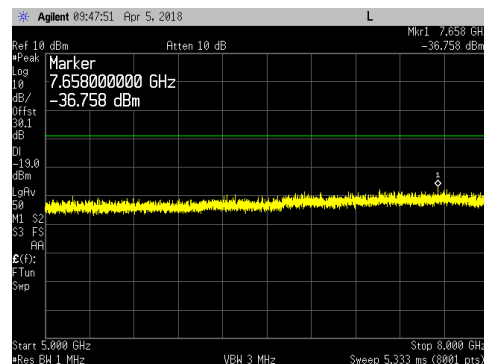
800MHz to 1.1GHz



1.1GHz to 5GHz

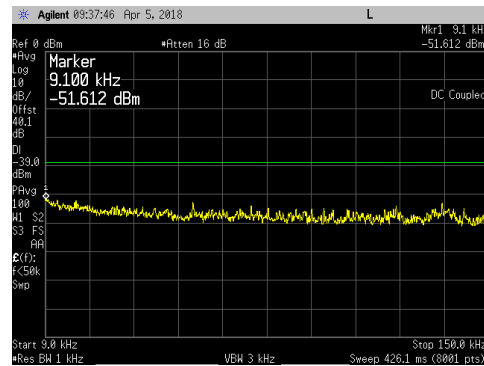


5GHz to 8GHz

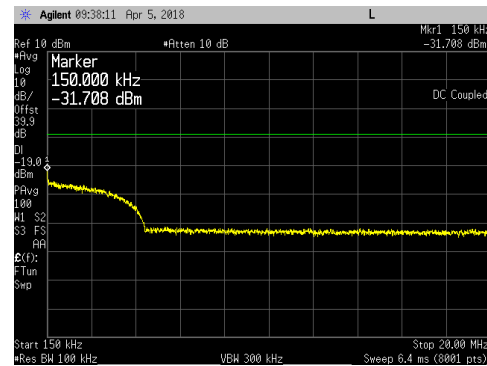


LTE5 & LTE5 Ch BWs _ 64QAM _ Middle Channels (634.5MHz and 737.0MHz) at 30 watts/carrier:

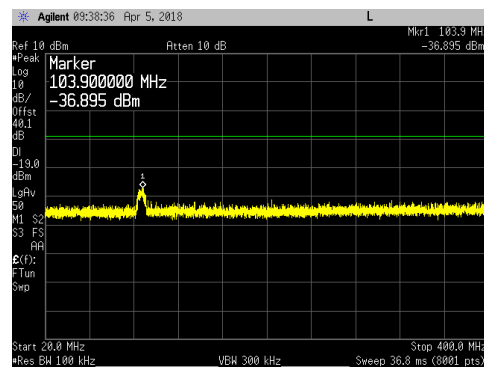
9kHz to 150kHz



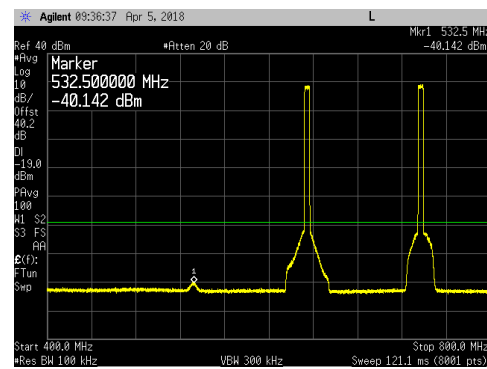
150kHz to 20MHz



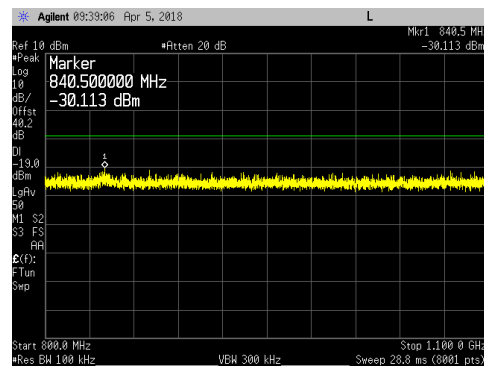
20MHz to 400MHz



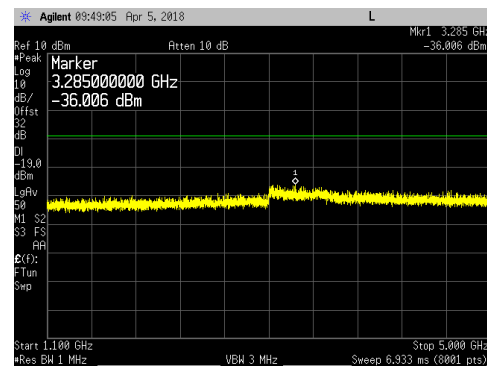
400MHz to 800MHz



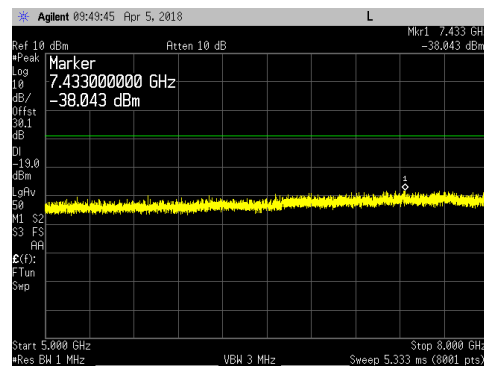
800MHz to 1.1GHz



1.1GHz to 5GHz

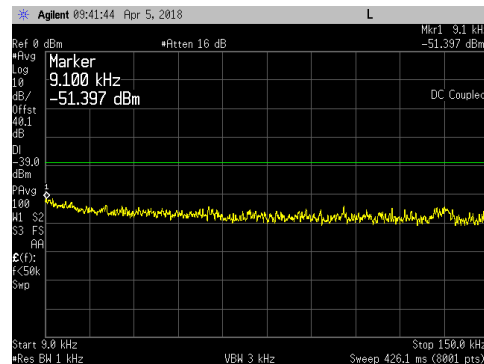


5GHz to 8GHz

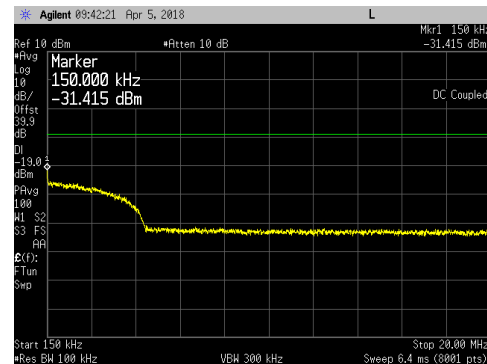


LTE5 & LTE5 Ch BWs _ 256QAM _ Middle Channels (634.5MHz and 737.0MHz) at 30 watts/carrier:

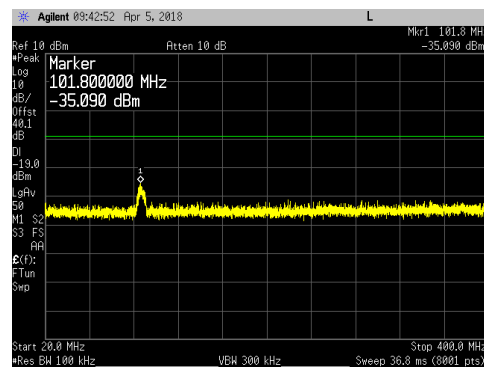
9kHz to 150kHz



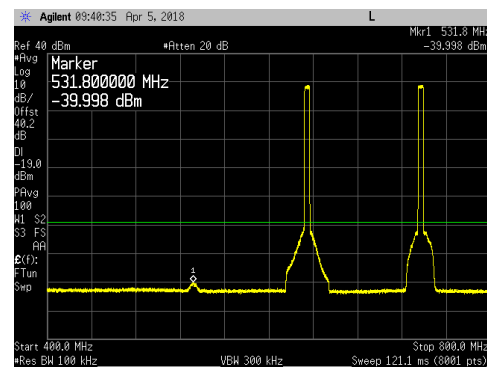
150kHz to 20MHz



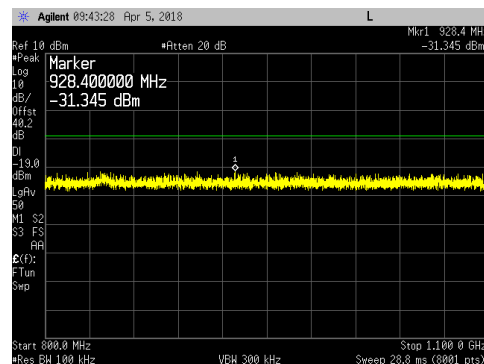
20MHz to 400MHz



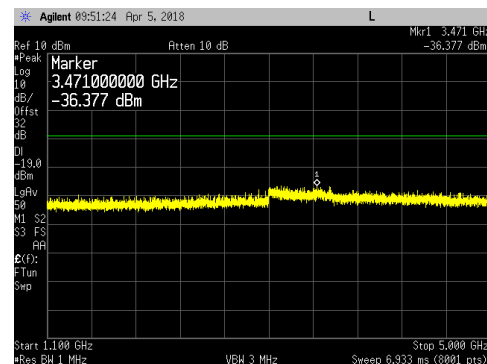
400MHz to 800MHz



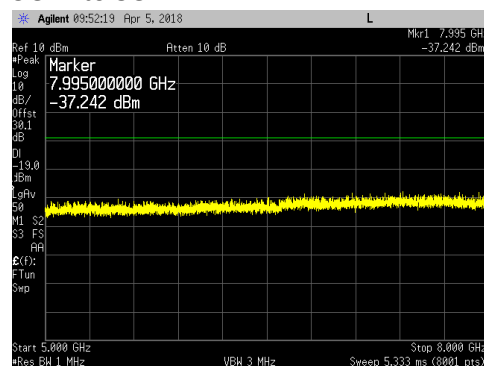
800MHz to 1.1GHz



1.1GHz to 5GHz

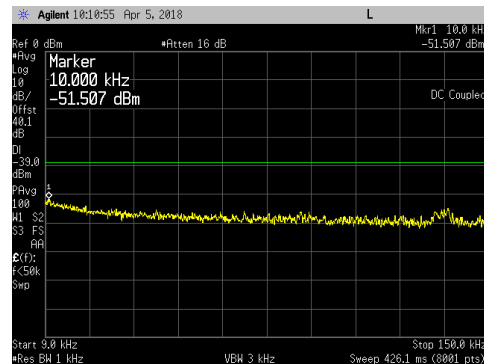


5GHz to 8GHz

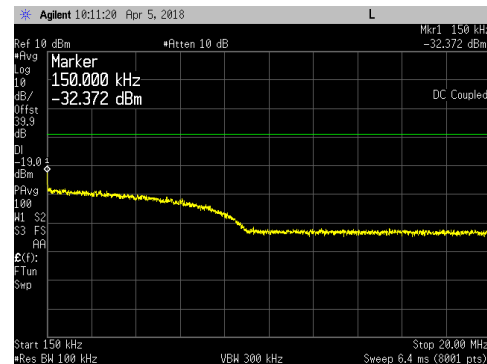


LTE10 & LTE10 Ch BWs _ QPSK _ Middle Channels (634.5MHz and 737.0MHz) at 30 watts/carrier:

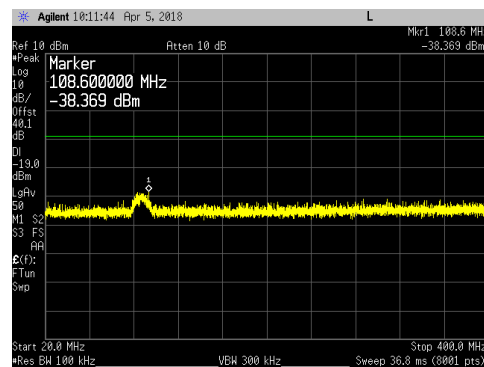
9kHz to 150kHz



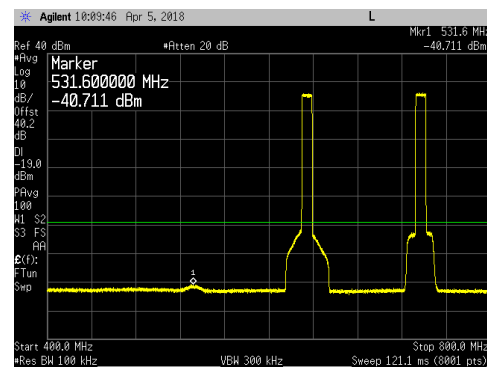
150kHz to 20MHz



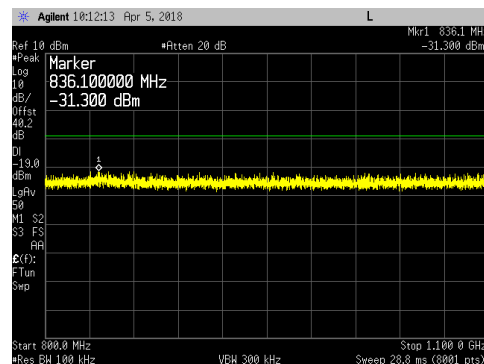
20MHz to 400MHz



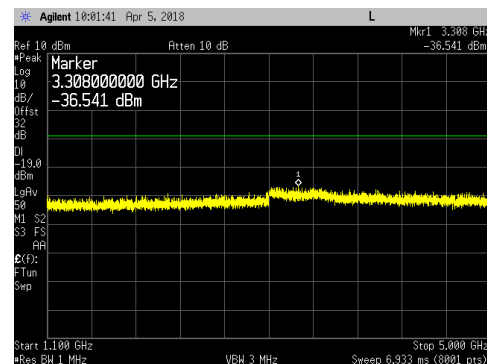
400MHz to 800MHz



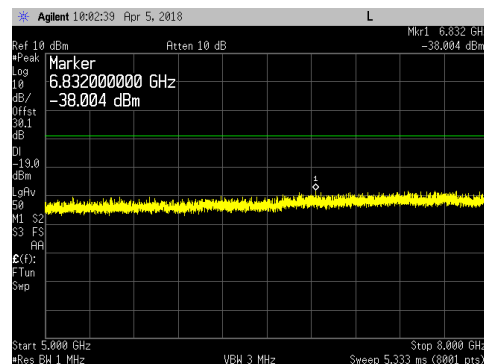
800MHz to 1.1GHz



1.1GHz to 5GHz

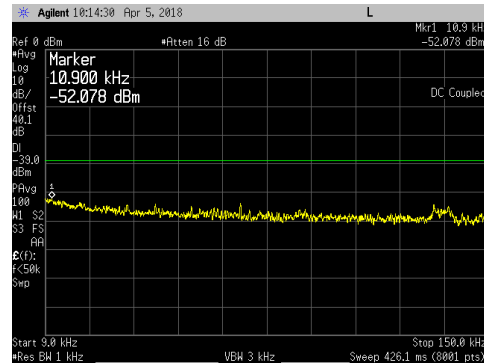


5GHz to 8GHz

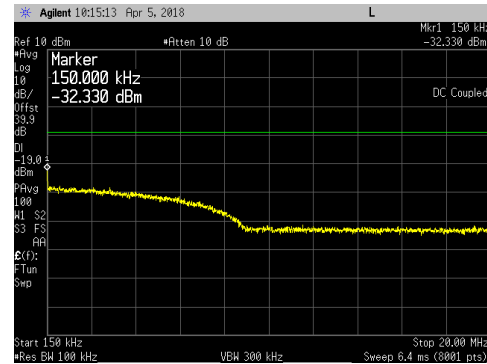


LTE10 & LTE10 Ch BWs _ 16QAM _ Middle Channels (634.5MHz and 737.0MHz) at 30 watts/carrier:

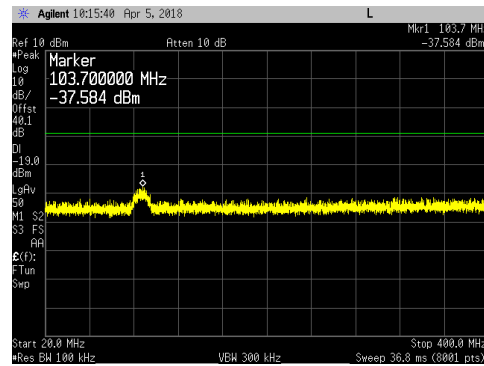
9kHz to 150kHz



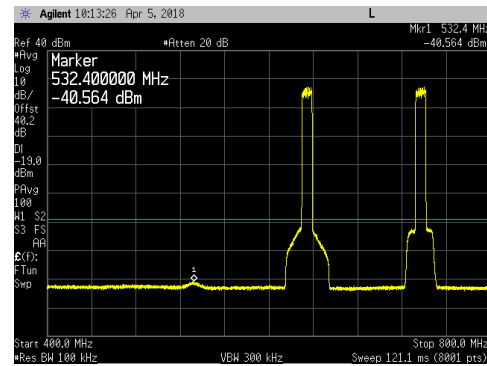
150kHz to 20MHz



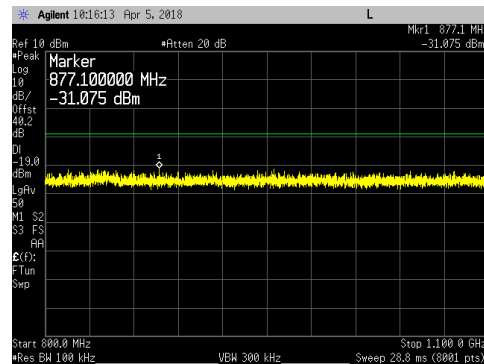
20MHz to 400MHz



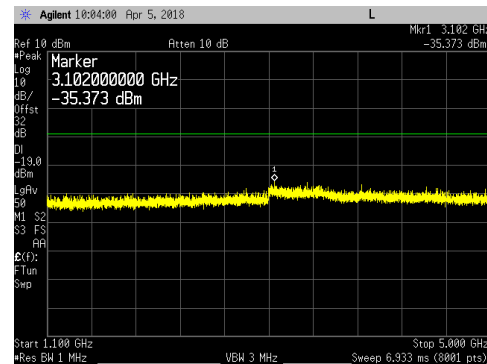
400MHz to 800MHz



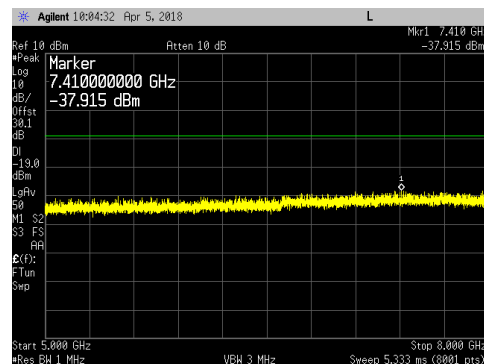
800MHz to 1.1GHz



1.1GHz to 5GHz

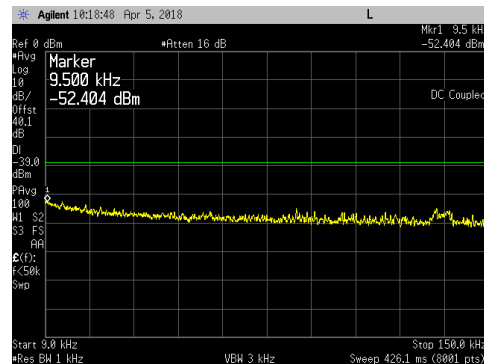


5GHz to 8GHz

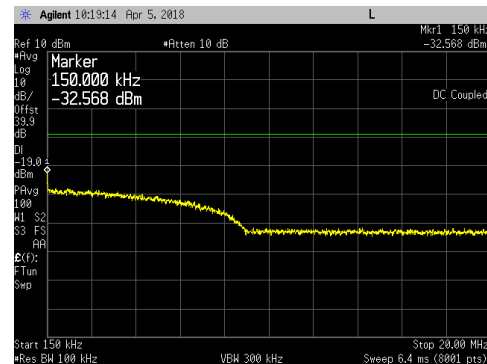


LTE10 & LTE10 Ch BWs _ 64QAM _ Middle Channels (634.5MHz and 737.0MHz) at 30 watts/carrier:

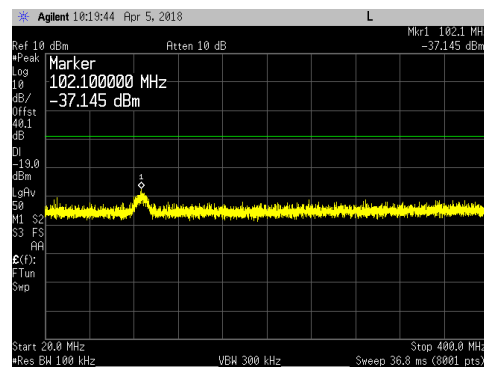
9kHz to 150kHz



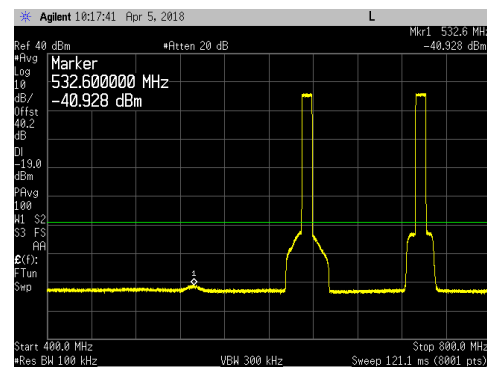
150kHz to 20MHz



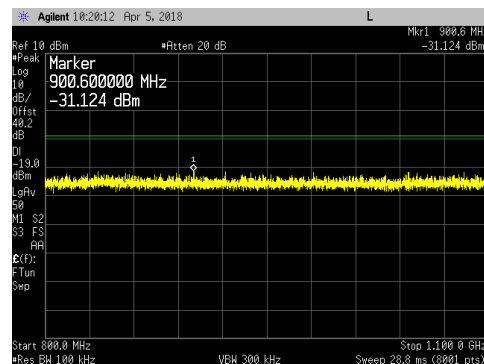
20MHz to 400MHz



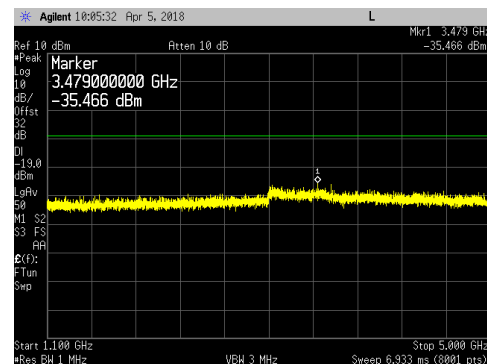
400MHz to 800MHz



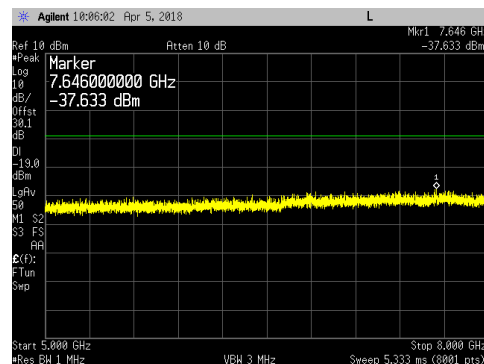
800MHz to 1.1GHz



1.1GHz to 5GHz

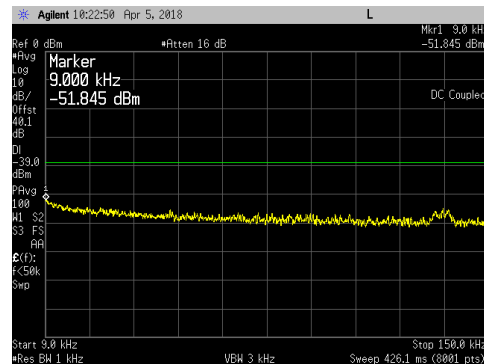


5GHz to 8GHz

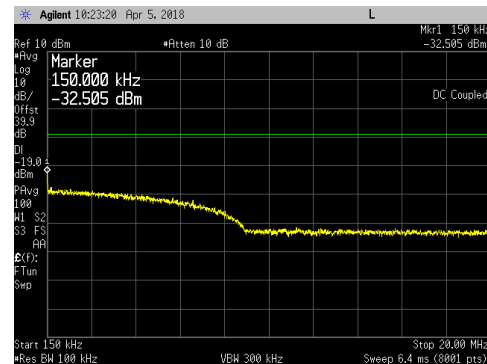


LTE10 & LTE10 Ch BWs _ 256QAM _ Middle Channels (634.5MHz and 737.0MHz) at 30 watts/carrier:

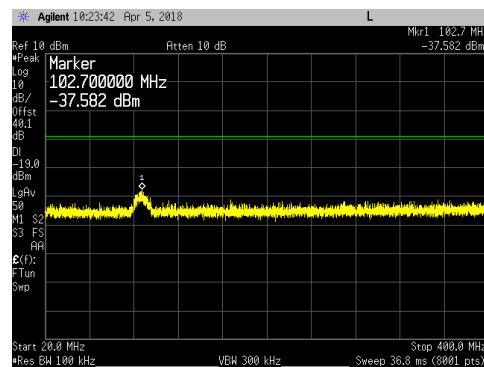
9kHz to 150kHz



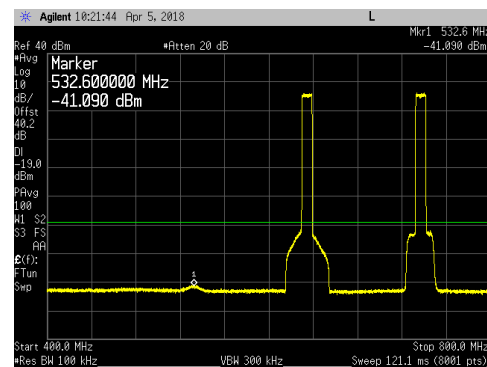
150kHz to 20MHz



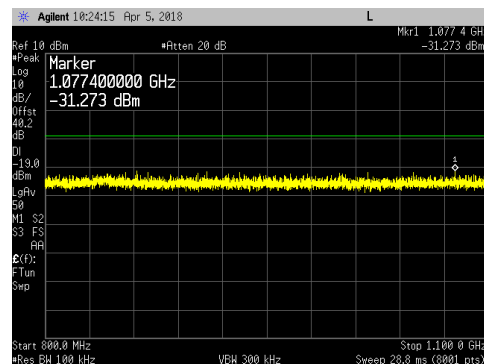
20MHz to 400MHz



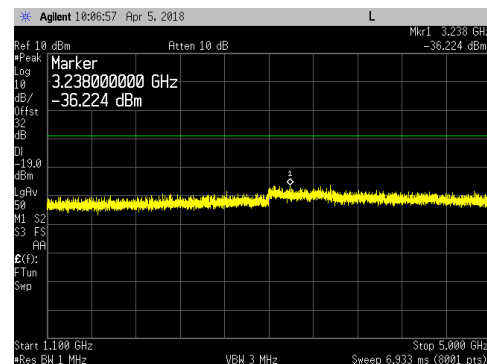
400MHz to 800MHz



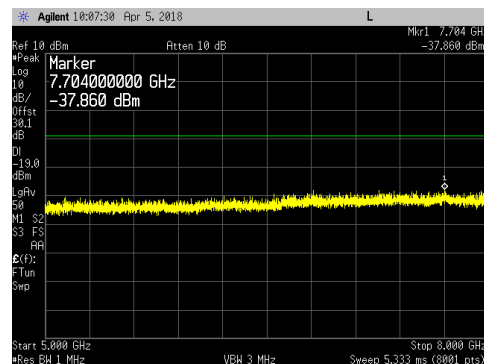
800MHz to 1.1GHz



1.1GHz to 5GHz

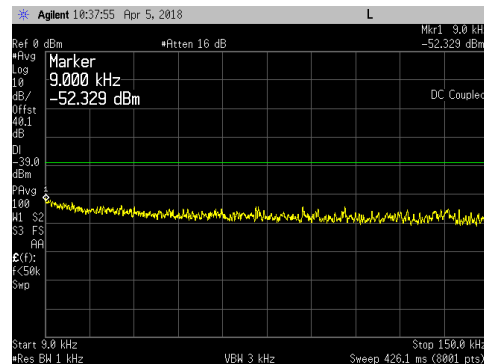


5GHz to 8GHz

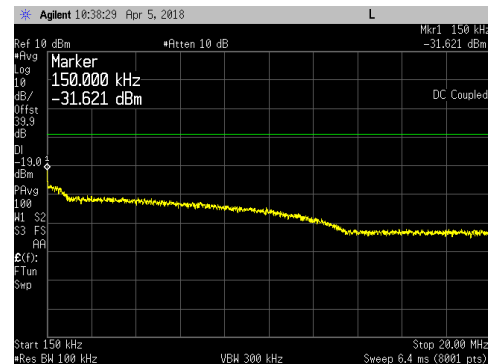


LTE15 & LTE1.4 Ch BWs _ QPSK _ Middle Channels (634.5MHz and 737.0MHz) at 30 watts/carrier:

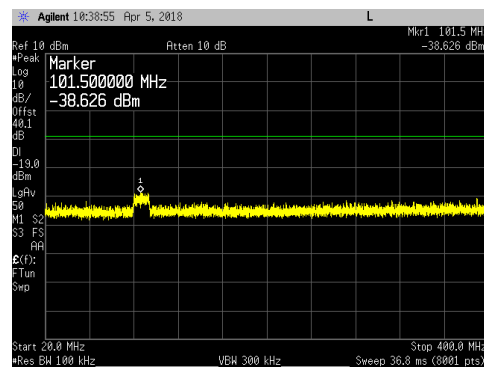
9kHz to 150kHz



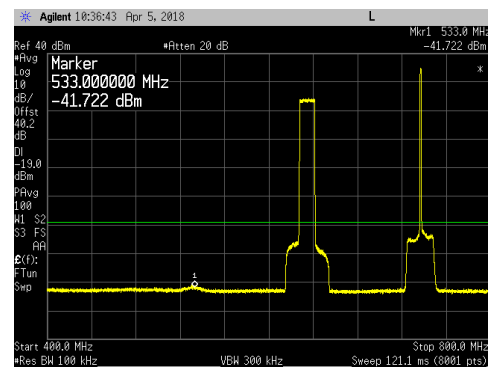
150kHz to 20MHz



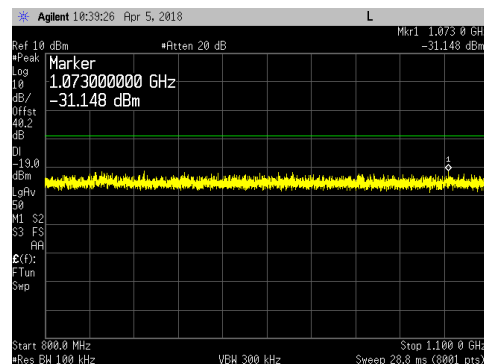
20MHz to 400MHz



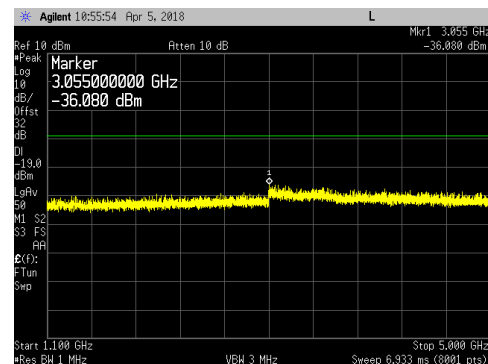
400MHz to 800MHz



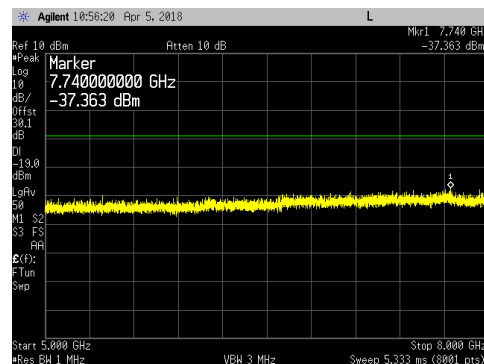
800MHz to 1.1GHz



1.1GHz to 5GHz

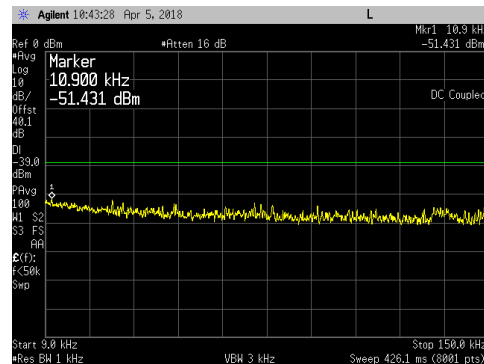


5GHz to 8GHz

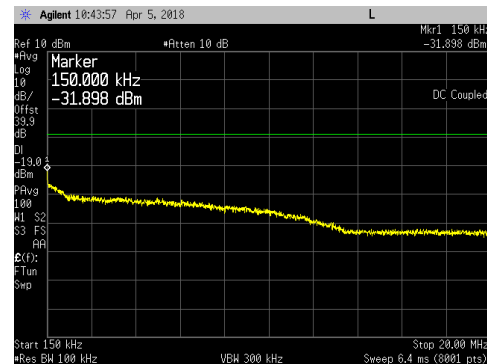


LTE15 & LTE1.4 Ch BWs _ 16QAM _ Middle Channels (634.5MHz and 737.0MHz) at 30 watts/carrier:

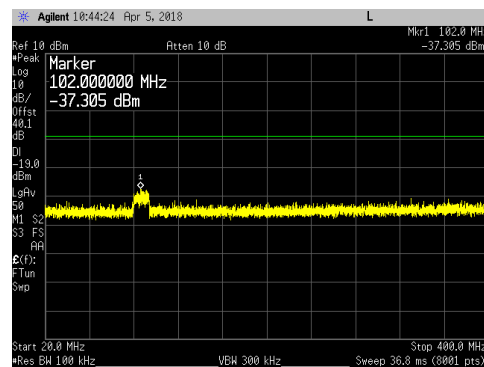
9kHz to 150kHz



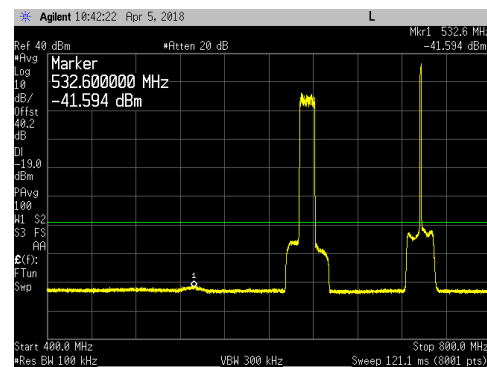
150kHz to 20MHz



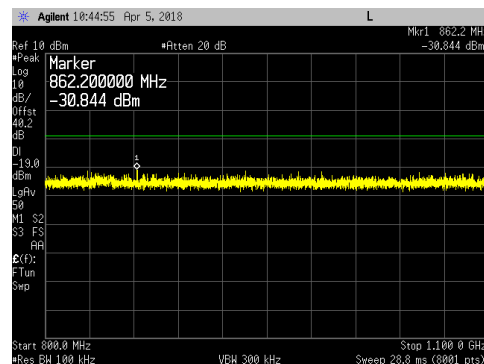
20MHz to 400MHz



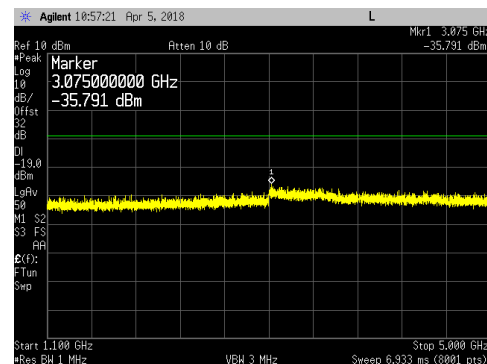
400MHz to 800MHz



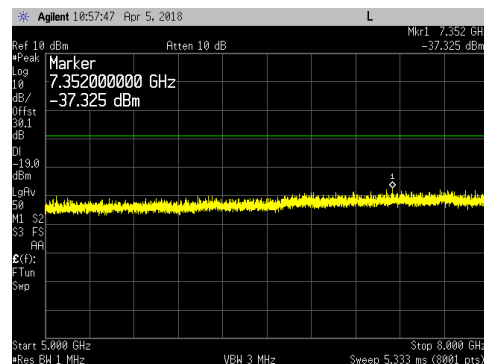
800MHz to 1.1GHz



1.1GHz to 5GHz

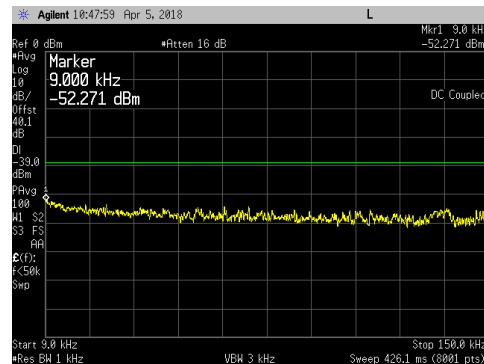


5GHz to 8GHz

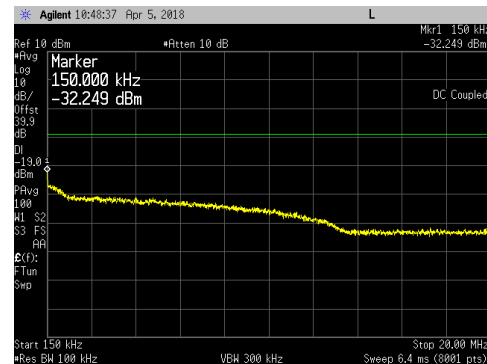


LTE15 & LTE1.4 Ch BWs _ 64QAM _ Middle Channels (634.5MHz and 737.0MHz) at 30 watts/carrier:

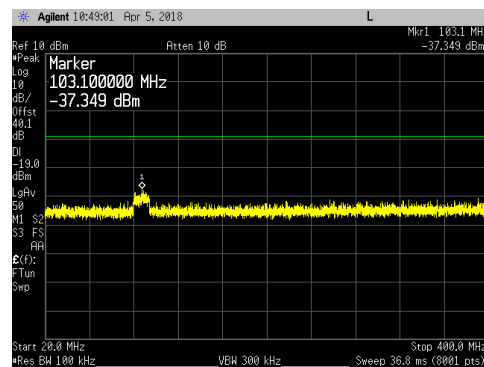
9kHz to 150kHz



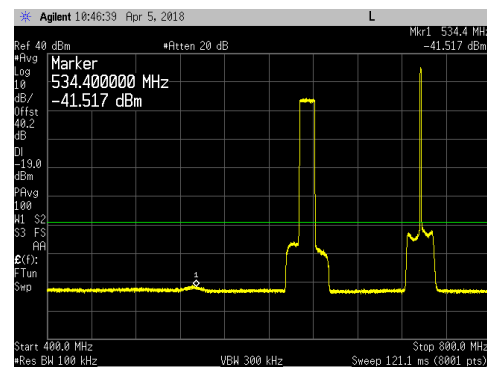
150kHz to 20MHz



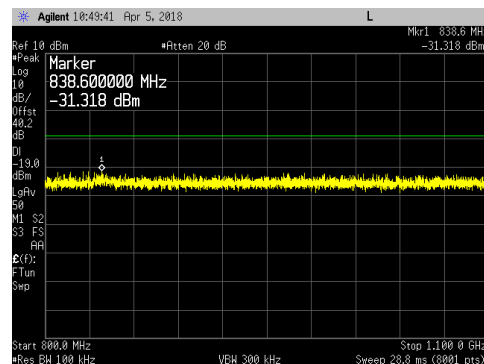
20MHz to 400MHz



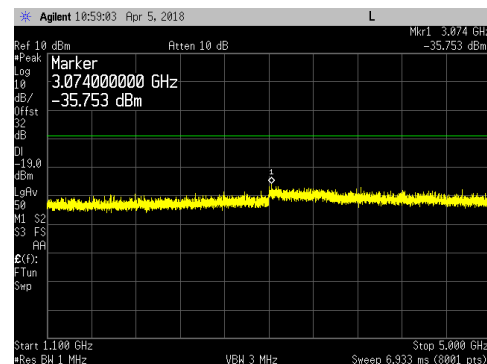
400MHz to 800MHz



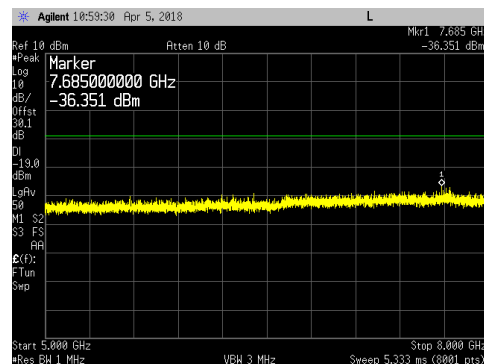
800MHz to 1.1GHz



1.1GHz to 5GHz

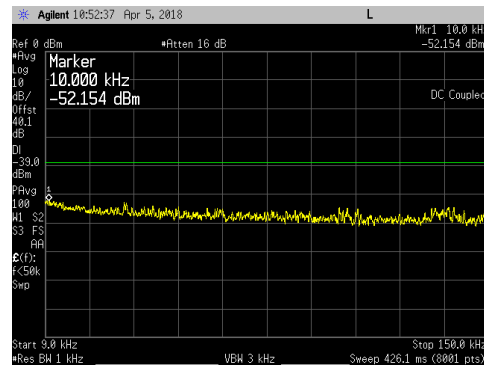


5GHz to 8GHz

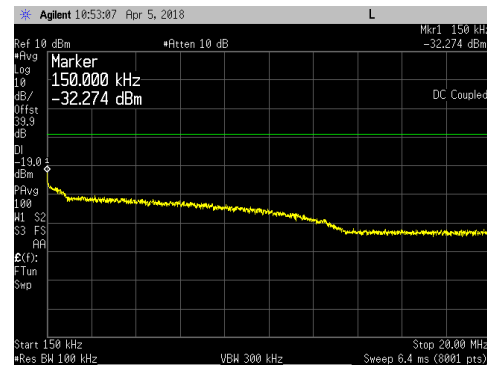


LTE15 & LTE1.4 Ch BWs _ 256QAM _ Middle Channels (634.5MHz and 737.0MHz) at 30 watts/carrier:

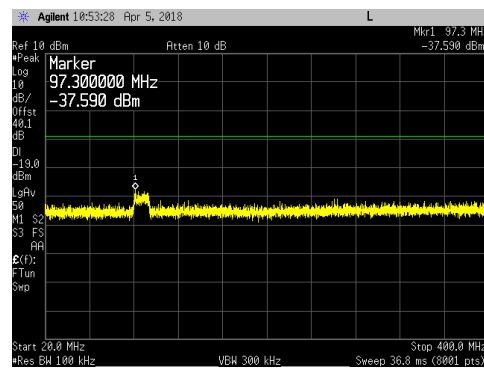
9kHz to 150kHz



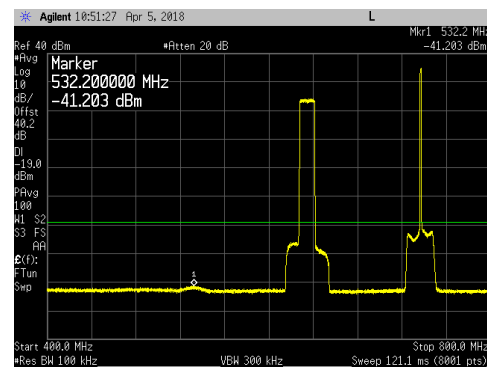
150kHz to 20MHz



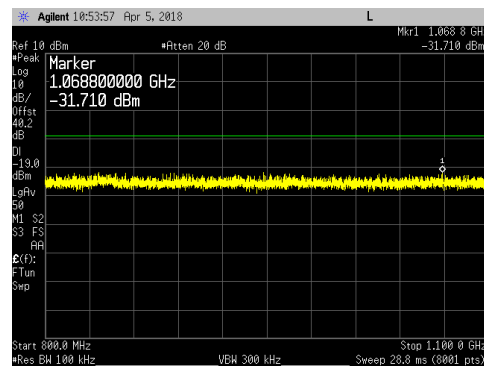
20MHz to 400MHz



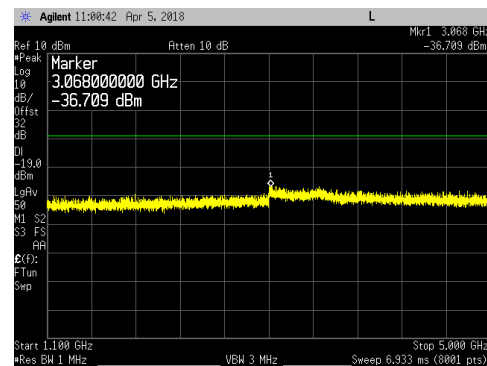
400MHz to 800MHz



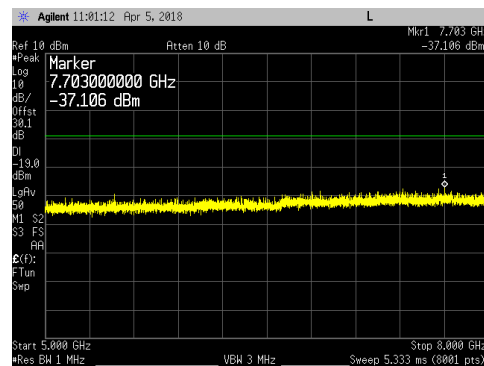
800MHz to 1.1GHz



1.1GHz to 5GHz

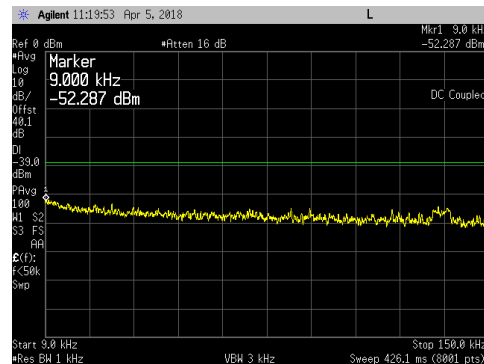


5GHz to 8GHz

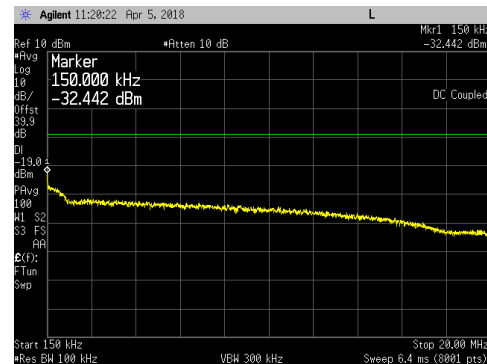


LTE20 & LTE1.4 Ch BWs _ QPSK _ Middle Channels (634.5MHz and 737.0MHz) at 30 watts/carrier:

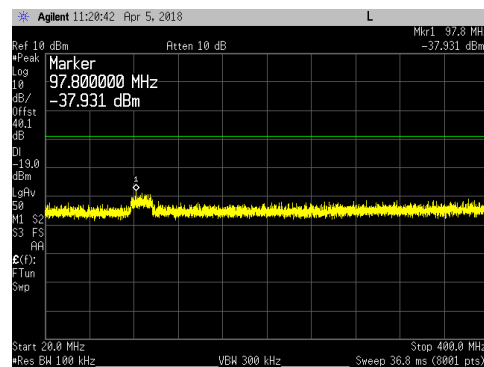
9kHz to 150kHz



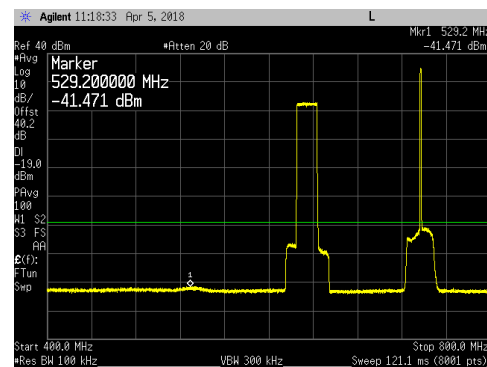
150kHz to 20MHz



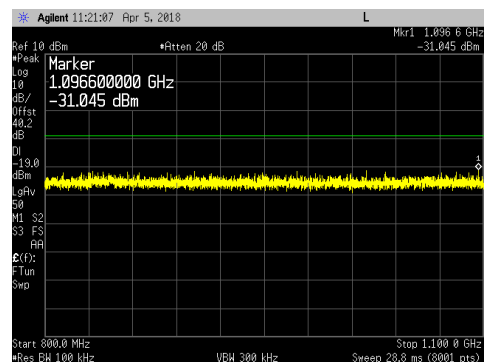
20MHz to 400MHz



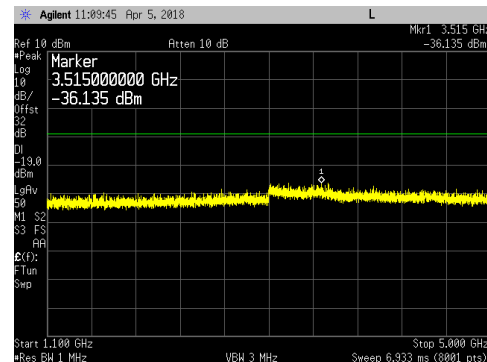
400MHz to 800MHz



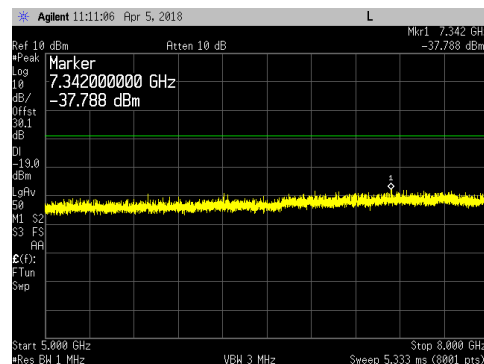
800MHz to 1.1GHz



1.1GHz to 5GHz

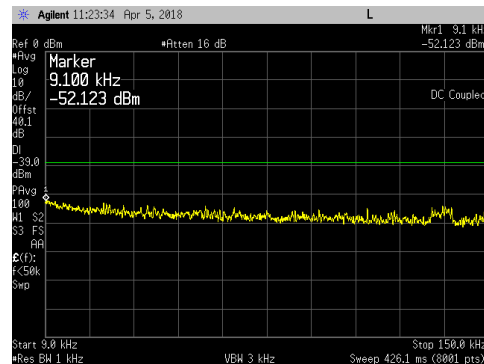


5GHz to 8GHz

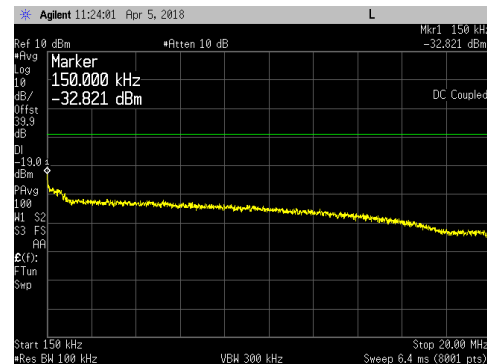


LTE20 & LTE1.4 Ch BWs _ 16QAM _ Middle Channels (634.5MHz and 737.0MHz) at 30 watts/carrier:

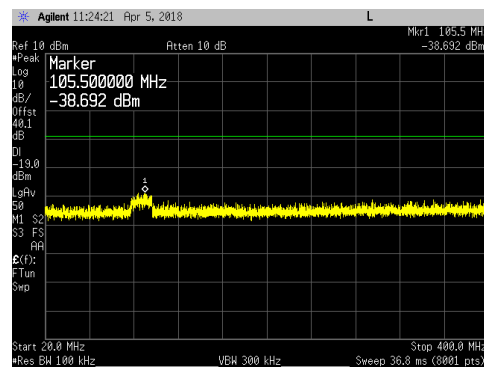
9kHz to 150kHz



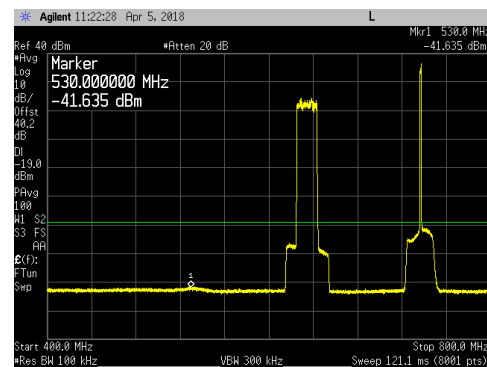
150kHz to 20MHz



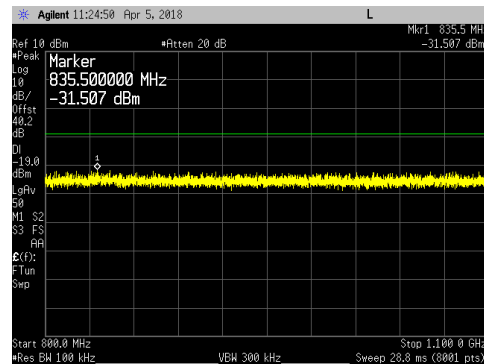
20MHz to 400MHz



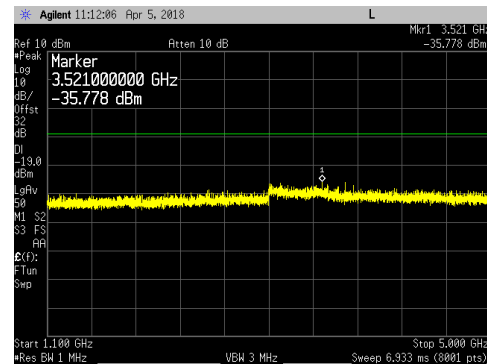
400MHz to 800MHz



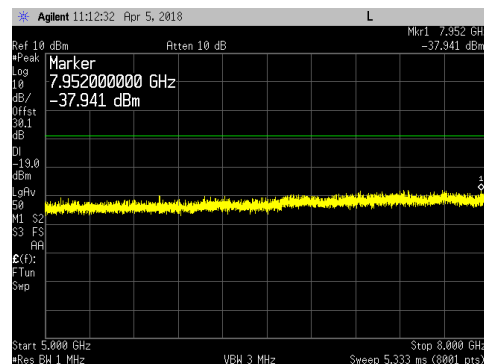
800MHz to 1.1GHz



1.1GHz to 5GHz

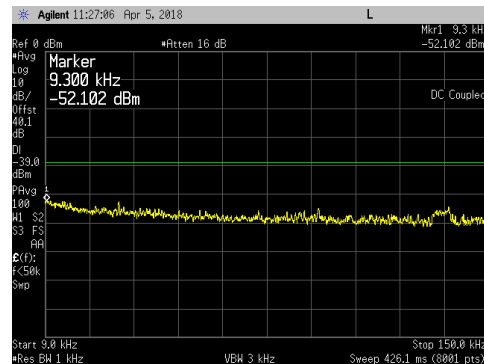


5GHz to 8GHz

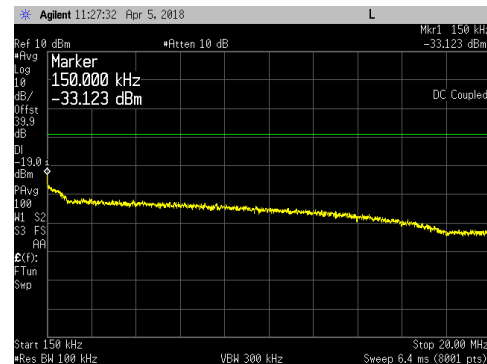


LTE20 & LTE1.4 Ch BWs _ 64QAM _ Middle Channels (634.5MHz and 737.0MHz) at 30 watts/carrier:

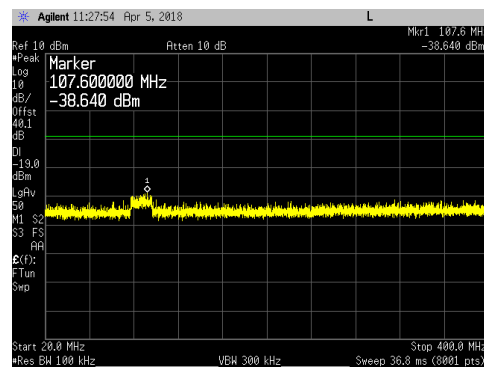
9kHz to 150kHz



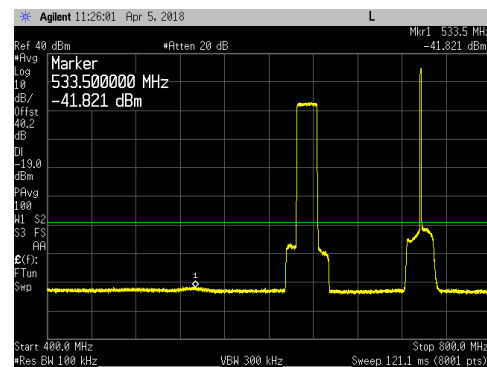
150kHz to 20MHz



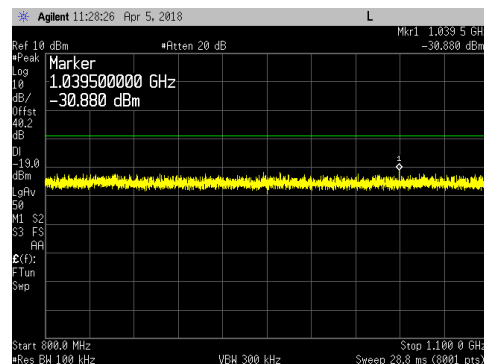
20MHz to 400MHz



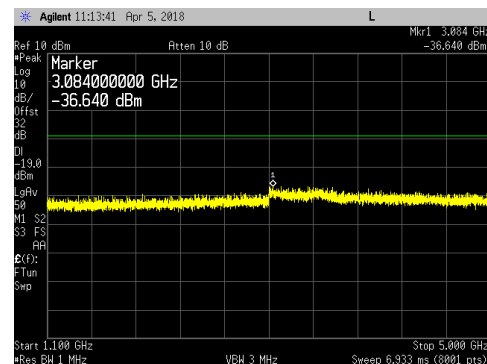
400MHz to 800MHz



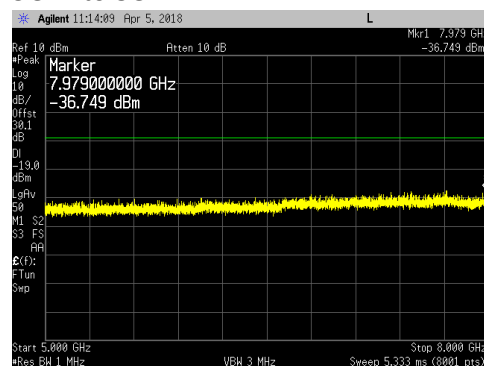
800MHz to 1.1GHz



1.1GHz to 5GHz

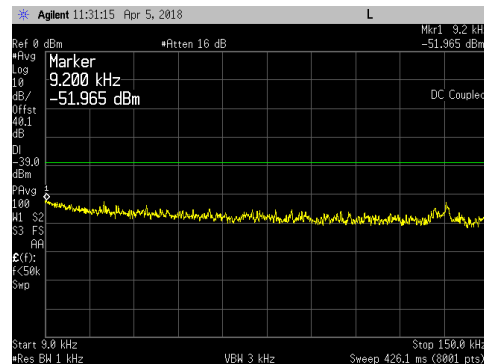


5GHz to 8GHz

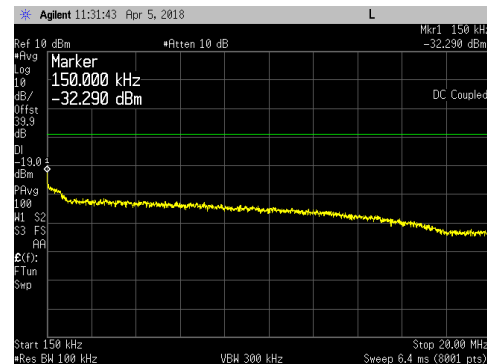


LTE20 & LTE1.4 Ch BWs _ 256QAM _ Middle Channels (634.5MHz and 737.0MHz) at 30 watts/carrier:

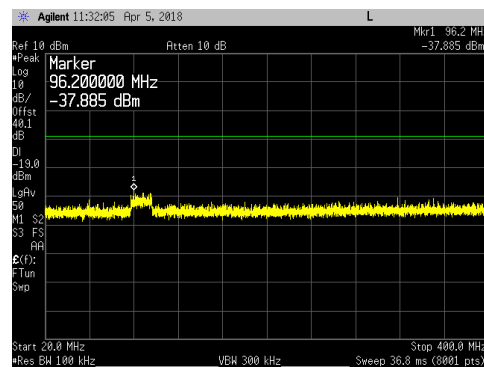
9kHz to 150kHz



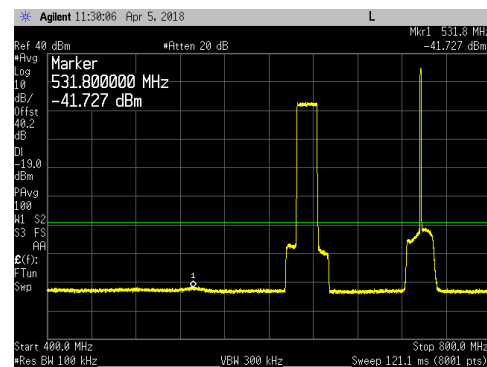
150kHz to 20MHz



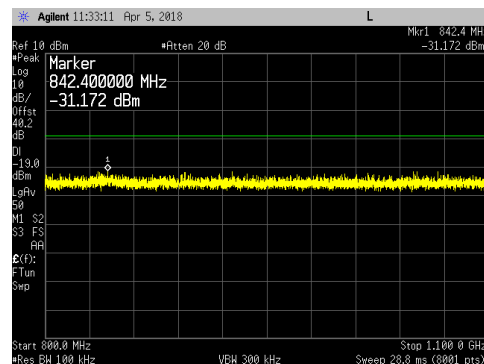
20MHz to 400MHz



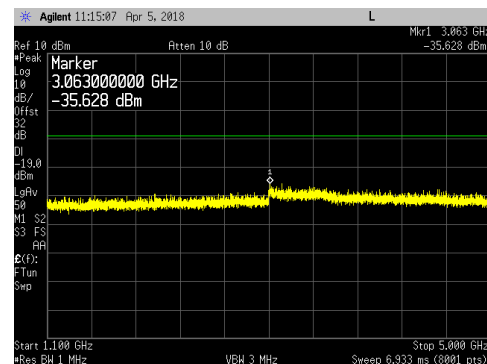
400MHz to 800MHz



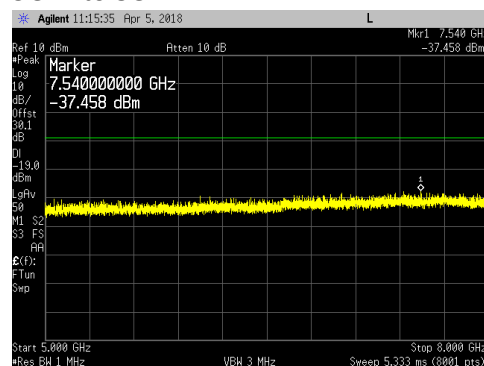
800MHz to 1.1GHz



1.1GHz to 5GHz

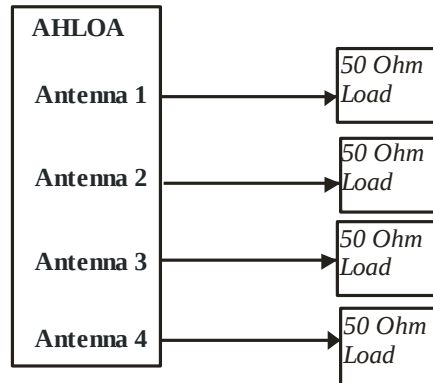


5GHz to 8GHz



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.



Based on antenna port conducted spurious emissions tests results, preliminary scans for radiated spurious emissions were performed in 30MHz – 8GHz frequency range.

Two test configurations (with the RRH fan assembly) are needed for radiated spurious emission measurements to prove compliance in the 3GPP Band 71 frequency range. The first test is with 3GPP Band 71 carriers operating at 60W/carrier (3GPP Band 12 carriers are not enabled). The second test is with the 3GPP Band 71 carriers and 3GPP Band 12 carriers operating simultaneously (at 30 watts per carrier and total carrier power of 60 watts per antenna port).

The tests include channel bandwidth with the highest spectral density for both frequency bands. The bottom, middle and top frequency channels for each band are enabled. The carrier configurations for the radiated emission testing are provided below. Final maximized radiated emissions are measured in these modes.

Frequency Band	Antenna Port	RF Bandwidth	EARFCN	Transmit Frequency	Carrier Power
Band 71	1	5 MHz	68611 (Bottom Channel)	619.5 MHz	60 Watts
Band 71	2	5 MHz	68761 (Middle Channel)	634.5 MHz	60 Watts
Band 71	3	5 MHz	68761 (Middle Channel)	634.5 MHz	60 Watts
Band 71	4	5 MHz	68911 (Top Channel)	649.5 MHz	60 Watts
Band 12	1	1.4 MHz	5007 (Bottom Channel)	728.7 MHz	0 Watts
Band 12	2	1.4 MHz	5090 (Middle Channel)	737.0 MHz	0 Watts
Band 12	3	1.4 MHz	5090 (Middle Channel)	737.0 MHz	0 Watts
Band 12	4	1.4 MHz	5173 (Top Channel)	745.3 MHz	0 Watts

Band 71 at Maximum (60W/carrier) and Band 12 Carriers not Enabled

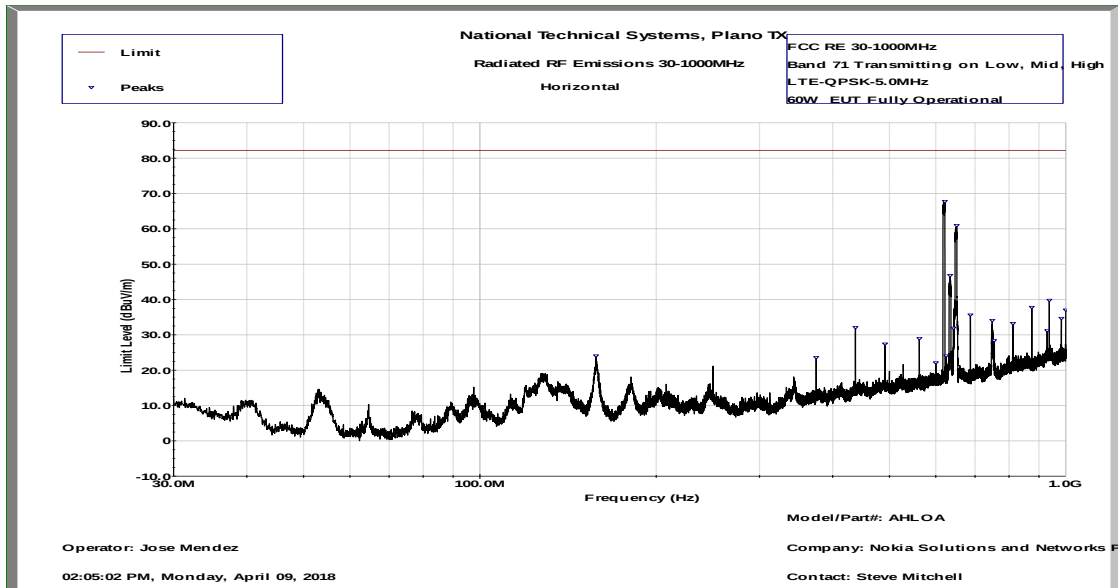
Frequency Band	Antenna Port	RF Bandwidth	EARFCN	Transmit Frequency	Carrier Power
Band 71	1	5 MHz	68611 (Bottom Channel)	619.5 MHz	30 Watts
Band 71	2	5 MHz	68761 (Middle Channel)	634.5 MHz	30 Watts
Band 71	3	5 MHz	68761 (Middle Channel)	634.5 MHz	30 Watts
Band 71	4	5 MHz	68911 (Top Channel)	649.5 MHz	30 Watts
Band 12	1	1.4 MHz	5007 (Bottom Channel)	728.7 MHz	30 Watts
Band 12	2	1.4 MHz	5090 (Middle Channel)	737.0 MHz	30 Watts
Band 12	3	1.4 MHz	5090 (Middle Channel)	737.0 MHz	30 Watts
Band 12	4	1.4 MHz	5173 (Top Channel)	745.3 MHz	30 Watts

Band 71 and Band 12 Carriers Enabled Simultaneously (30W/carrier)

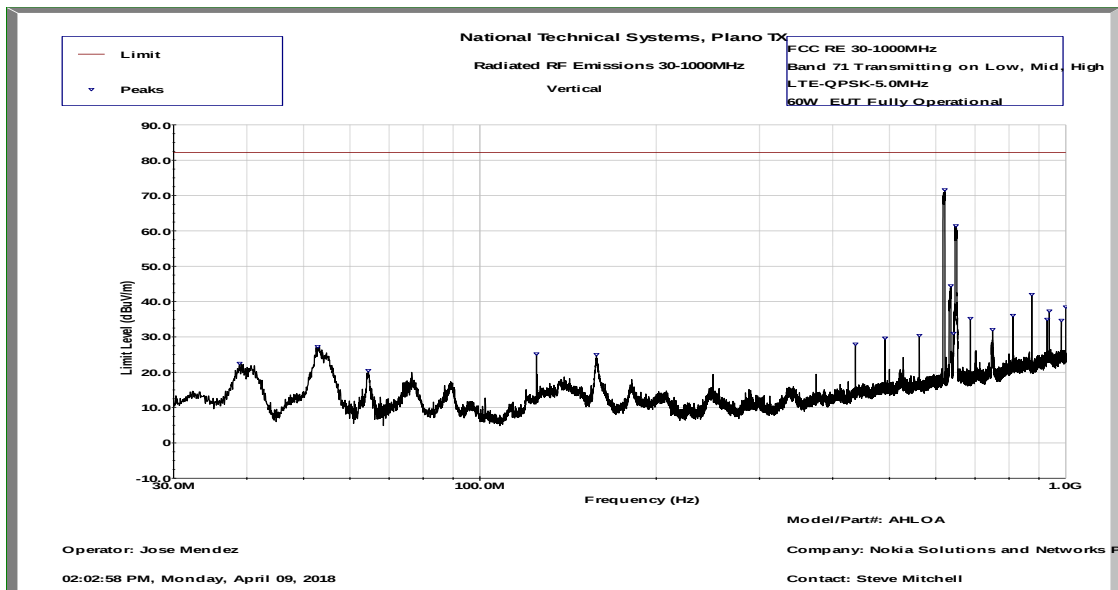
Band 71 Data

Frequency	Polarity	Peaks Raw	QP Raw	Antenna	Pre Amp	Cableloss	Peaks	QP	Limit	Margin	Tower	Turntable
MHz	V/H	dBuV/m	dBuV/m	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dB	cm	Degrees
874.987	V	51.314	51.341	24.2	-36.781	3.207	41.942	41.969	82.2	-40.231	100	359
937.497	H	47.346	49.18	25.7	-37.002	3.712	39.76	41.594	82.2	-40.606	100	171
5898.01	V	40.242	36.79	34.079	-37.161	6.465	43.625	40.173	82.2	-42.027	107	0
937.502	V	44.91	46.929	25.7	-37.002	3.712	37.325	39.343	82.2	-42.857	100	347
812.487	V	45.372	46.858	24.6	-36.698	2.668	35.942	37.428	82.2	-44.772	100	330
687.503	V	48.262	50.402	21.3	-36.485	2.102	35.178	37.318	82.2	-44.882	100	91
874.992	H	47.109	46.318	24.2	-36.781	3.207	37.737	36.946	82.2	-45.254	100	199
2949.27	V	42.653	40.325	29.718	-37.32	4.174	39.224	36.896	82.2	-45.304	155.1	360.1
687.485	H	48.547	49.851	21.3	-36.485	2.102	35.464	36.767	82.2	-45.433	100	69
5898.3	H	33.023	31.336	34.08	-37.161	6.465	36.407	34.721	82.2	-47.479	199.9	311.1
9260.5	H	27.067	28.63	37.528	-38.8	7.353	33.147	34.711	82.2	-47.489	198	360.1
3932.15	V	33.121	33.601	32.676	-36.953	4.966	33.81	34.29	82.2	-47.91	200.1	18.2
8489.64	H	33.074	28.186	37.277	-38.096	6.779	39.034	34.147	82.2	-48.053	198	360
437.503	H	48.707	50.631	18.55	-36.704	1.519	32.072	33.996	82.2	-48.204	100	26
9397.03	V	34.584	27.985	37.731	-38.8	6.836	40.35	33.752	82.2	-48.448	200	-0.1
8600.67	V	25.097	27.339	37.39	-38.425	7.213	31.275	33.517	82.2	-48.683	200	0
7860.02	H	22.667	27.004	36.506	-38.1	6.242	27.316	31.653	82.2	-50.547	198.9	360.1
7873.12	V	30.497	26.881	36.545	-38.147	6.279	35.174	31.559	82.2	-50.641	200.1	0
3932.71	H	32.765	30.368	32.677	-36.953	4.968	33.456	31.06	82.2	-51.14	200.1	360
562.486	H	43.749	45.551	20.2	-36.924	1.782	28.808	30.609	82.2	-51.591	100	342
749.276	H	44.599	40.682	23.228	-36.667	2.303	33.464	29.547	82.2	-52.653	156	352
562.491	V	45.348	44.14	20.2	-36.924	1.782	30.407	29.198	82.2	-53.002	100	11
491.501	V	45.356	44.162	19.1	-36.775	1.644	29.326	28.132	82.2	-54.068	100	359
2938.71	H	31.719	29.512	29.647	-37.324	4.167	28.209	26.003	82.2	-56.197	200.1	360.3

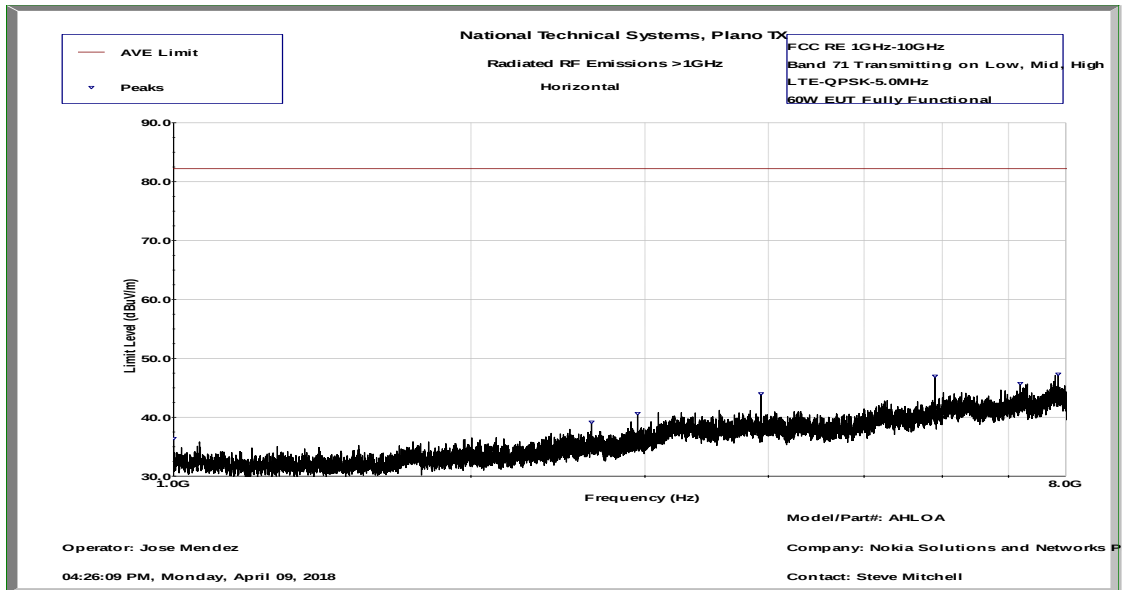
A three-meter measurement distance was used for radiated emission measurements. The highest radiated emissions detected were more than 20dB below the three-meter limit of 82.2dBuV/m (equivalent to -13dBm EIRP). Since all maximized measurements were more than 20dB below these levels, substitution measurements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



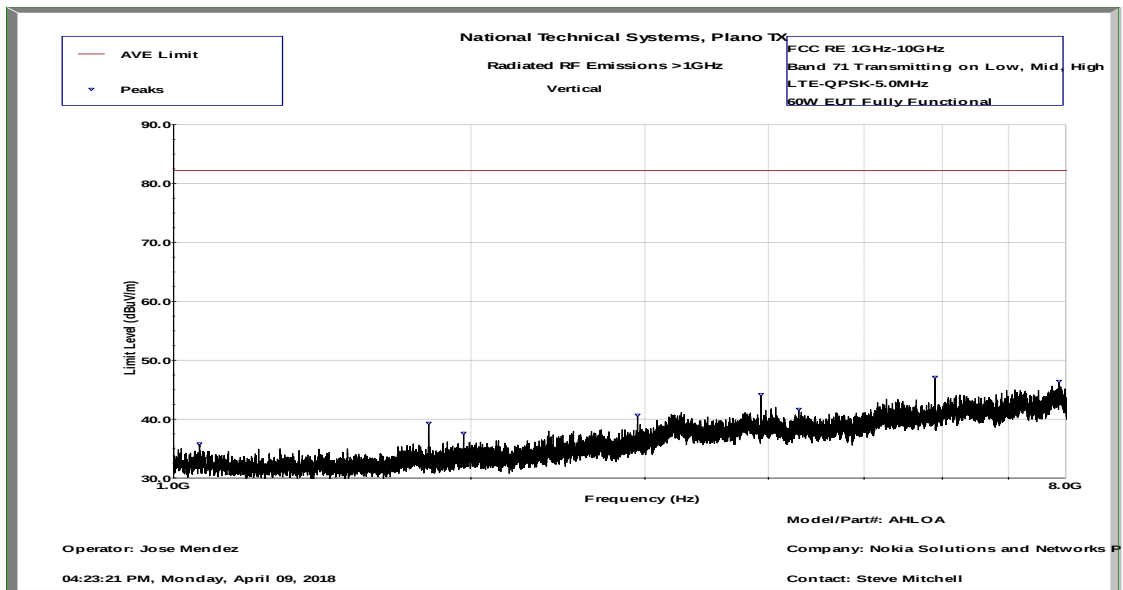
Radiated Spurious Emissions – 30-1000MHz – Horizontal Band 71



Radiated Spurious Emissions – 30-1000MHz – Vertical Band 71



Radiated Spurious Emissions – 1-8GHz – Horizontal Band 71

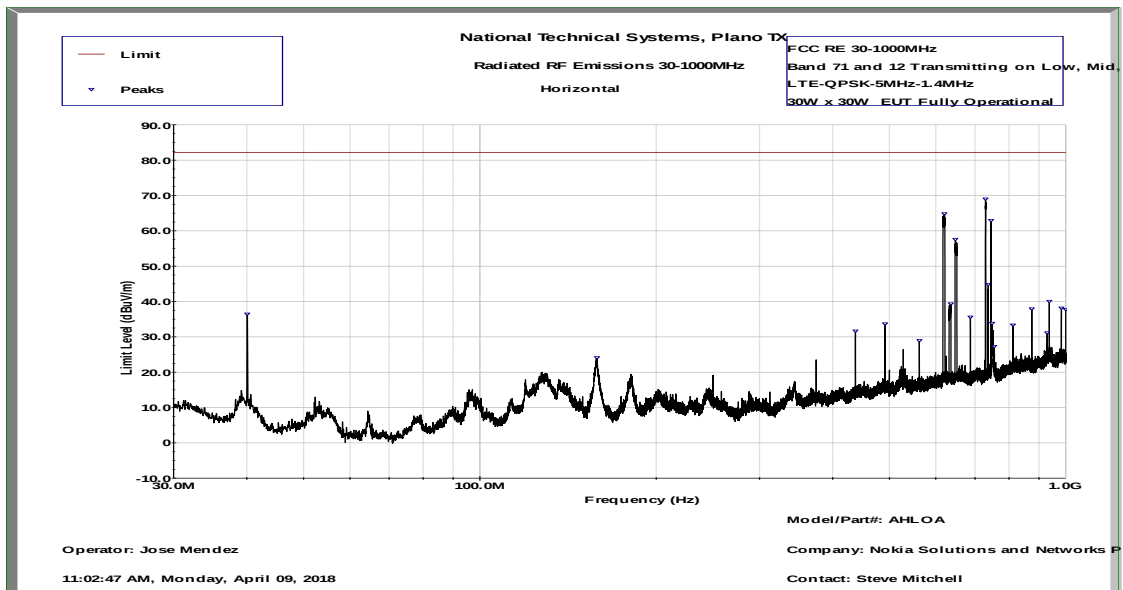


Radiated Spurious Emissions – 1-8GHz – Vertical Band 71

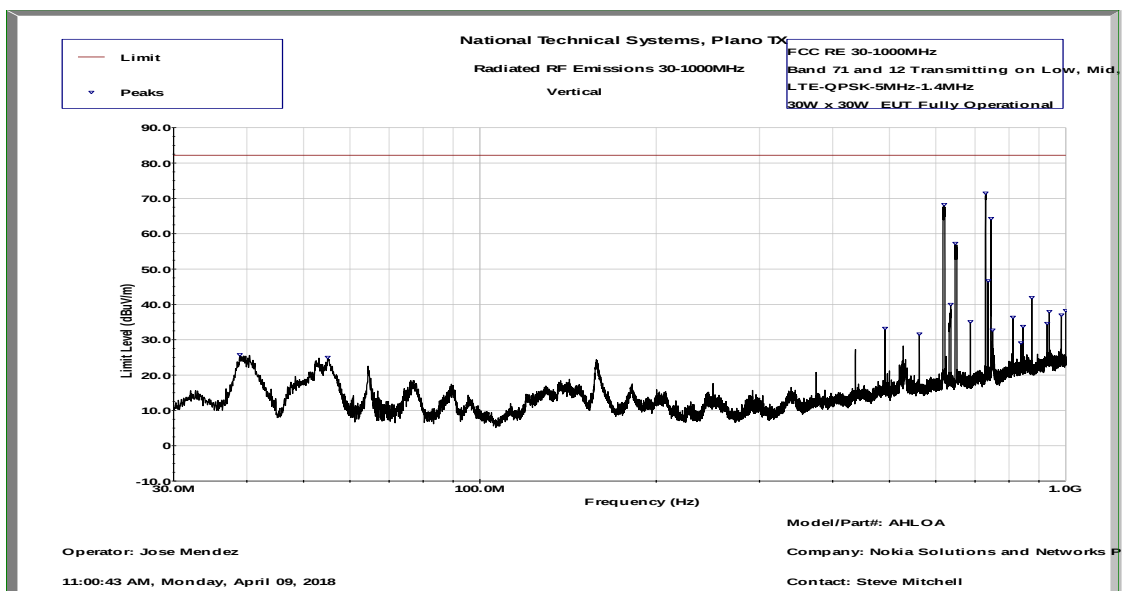
Band 71 & 12 Data

Frequency	Polarity	Peaks Raw	QP Raw	Antenna	Pre Amp	Cableloss	Peaks	QP	Limit	Margin	Tower	Turntable
MHz	V/H	dBuV/m	dBuV/m	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dB	cm	Degrees
875.001	V	51.246	50.278	24.2	-36.781	3.207	41.875	40.906	82.2	-40.325	170	312
875.001	H	51.246	50.278	24.2	-36.781	3.207	41.875	40.906	82.2	-40.325	170	312
8539.01	V	34.818	29.016	37.349	-38.226	6.948	40.889	35.088	82.2	-41.311	200.1	-0.1
5898.18	V	34.76	36.463	34.079	-37.161	6.465	38.143	39.847	82.2	-44.057	142.2	-0.1
937.504	V	45.553	45.689	25.7	-37.002	3.712	37.968	38.103	82.2	-44.232	171	105
937.504	H	45.553	45.689	25.7	-37.002	3.712	37.968	38.103	82.2	-44.232	171	105
983.032	V	44.464	47.874	25.6	-37.266	3.971	36.772	40.182	82.2	-45.428	192	359
983.032	H	44.464	47.874	25.6	-37.266	3.971	36.772	40.182	82.2	-45.428	192	359
7861.9	H	31.887	26.926	36.512	-38.106	6.247	36.54	31.579	82.2	-45.66	200.1	0
812.477	V	45.563	45.446	24.6	-36.698	2.668	36.133	36.016	82.2	-46.067	183	1
812.477	H	45.563	45.446	24.6	-36.698	2.668	36.133	36.016	82.2	-46.067	183	1
7877.01	V	30.235	26.815	36.556	-38.161	6.29	34.92	31.5	82.2	-47.28	200	-0.1
491.509	V	49.115	46.486	19.1	-36.775	1.644	33.086	30.456	82.2	-49.114	208	184
491.509	H	49.115	46.486	19.1	-36.775	1.644	33.086	30.456	82.2	-49.114	208	184
562.503	V	46.46	39.9	20.2	-36.924	1.782	31.519	24.958	82.2	-50.681	213	317
562.503	H	46.46	39.9	20.2	-36.924	1.782	31.519	24.958	82.2	-50.681	213	317
5898.5	H	25.756	27.871	34.08	-37.16	6.465	29.141	31.256	82.2	-53.059	200	-0.1
3931.97	V	27.023	32.55	32.676	-36.953	4.966	27.711	33.238	82.2	-54.489	100.1	0.9
2742.1	H	30.108	29.109	29.086	-37.403	3.991	25.781	24.782	82.2	-56.419	200.1	0
3930.76	H	21.216	27.699	32.675	-36.954	4.963	21.899	28.382	82.2	-60.301	200	0
2949.63	V	23.73	34.343	29.72	-37.319	4.174	20.304	30.918	82.2	-61.896	200.1	1
2939.78	H	22.495	29.314	29.653	-37.323	4.168	18.992	25.811	82.2	-63.208	200.1	-0.1
2738.9	V	20.596	28.8	29.086	-37.404	3.989	16.267	24.471	82.2	-65.933	200.1	1.1
8838.54	H	9.354	27.521	37.654	-38.864	7.701	15.845	34.012	82.2	-66.355	200.1	-0.1

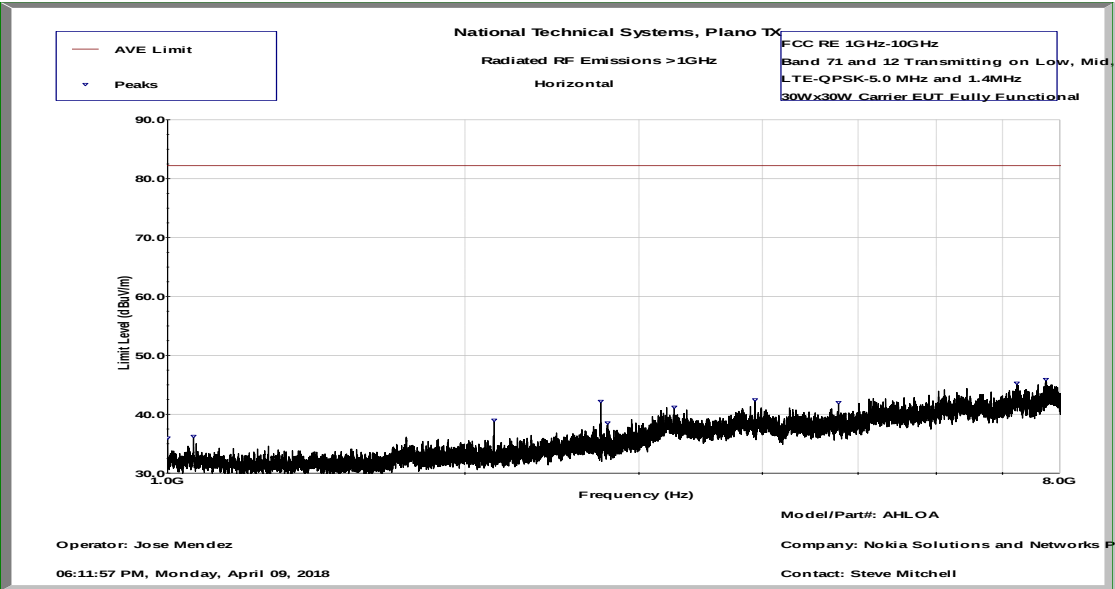
A three-meter measurement distance was used for radiated emission measurements. The highest radiated emissions detected were more than 20dB below the three-meter limit of 82.2dBuV/m (equivalent to -13dBm EIRP). Since all maximized measurements were more than 20dB below these levels, substitution measurements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



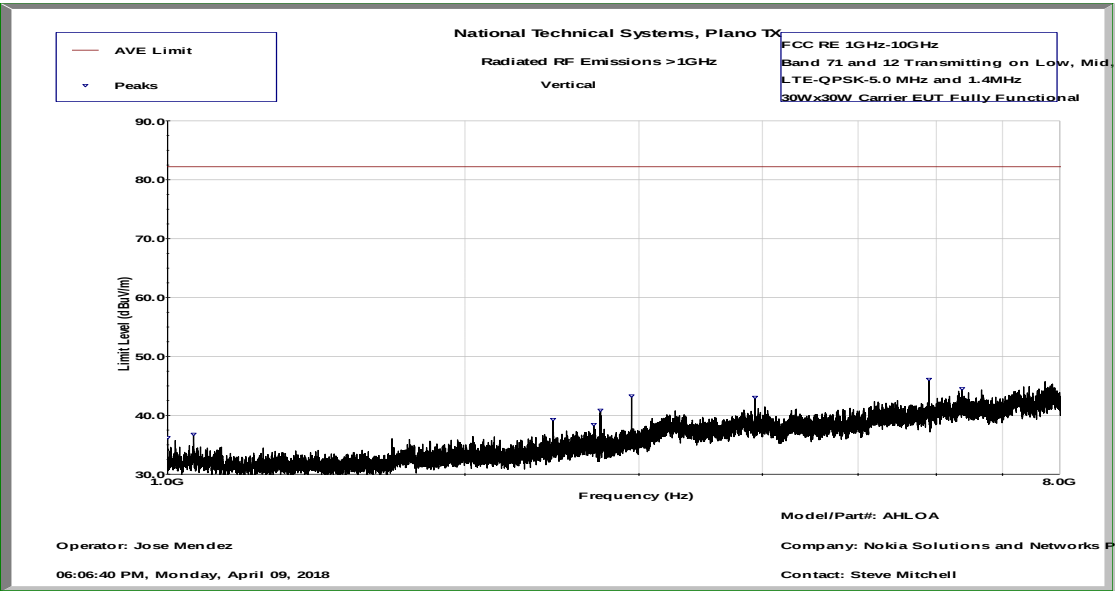
Radiated Spurious Emissions – 30-1000MHz – Horizontal Band 71 & 12



Radiated Spurious Emissions – 30-1000MHz – Vertical Band 71 & 12



Radiated Spurious Emissions – 1-8GHz – Horizontal Band 71 & 12



Radiated Spurious Emissions – 1-8GHz – Vertical Band 71 & 12

Frequency Stability/Accuracy

Carrier frequency stability of the EUT at extreme temperatures and voltages was measured. The frequency error was measured as follows:

- (1) EUT transmitting in 5MHz-QPSK-LTE mode at center channel (634.5MHz) on port 4.
- (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)	Maximum Frequency Error (Hz) at 20°C
85%	40.8	0.68
100%	48.0	0.75
115%	55.2	0.64

Extreme Temperatures:

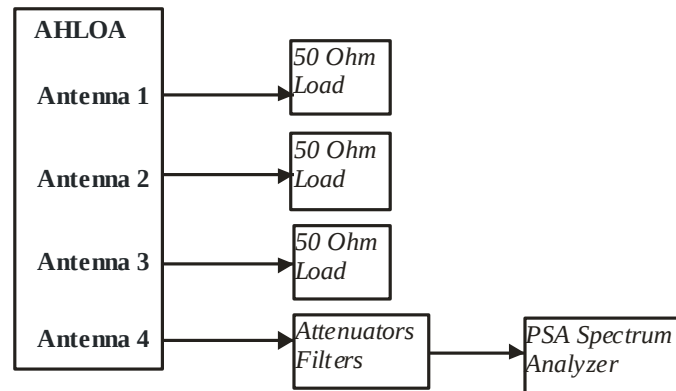
Temperature	Maximum Frequency Error (Hz) at 48VDC
-30 °C	0.72
-20 °C	0.70
-10 °C	0.67
0 °C	0.64
10 °C	0.93
20 °C	0.75
30 °C	0.67
40 °C	0.80
50 °C	0.71

The highest recorded frequency error is 0.93Hz or ~0.0015 ppm ensures that the transmitted signal remains in its authorized frequency block at extreme voltages and temperatures.

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.

APPENDIX B: ANTENNA PORT TEST DATA FOR BAND 12 (728-746MHZ)

All conducted RF measurements for this test effort in this section were made at AHLOA antenna ports for Band 12 measurements. The test setup used is provided below.



Test Setup Used for Conducted RF Measurements on AHLOA

RF Output Power

RF output power has been measured in both Peak and RMS Average terms for each Band 12 transmit chain at the middle channel for 256QAM modulation and LTE5 bandwidth. Peak to average power ratio (PAPR) has been calculated as described in Section 5.7.2 of KDB971168 D01 v02r02 and all results are presented in tabular form below.

Antenna	LTE Bandwidth	LTE - 256QAM		
		Peak (dBm)	Average (dBm)	PAPR (dB)
Port 1 Middle Channel	5M	55.26	47.66	7.60
Port 2 Middle Channel	5M	55.21	47.65	7.56
Port 3 Middle Channel	5M	55.32	47.67	7.65
Port 4 Middle Channel	5M	55.27	47.71	7.56

The variation in RMS output power levels between the antenna ports is 0.06 dB per data sample provided above. Pre-compliance testing (and testing of similar EUTs) shows that the output power variation between antenna ports is small (the output ports are essentially electrically identical).

Pre-compliance testing has shown that the output power variation between modulation types is small. Antenna port 4 power output measurements for the LTE5 bandwidth for all modulation types on the middle (center) channel are provided below.

	Modulation Type							
	QPSK		16QAM		64QAM		256QAM	
	Peak (dBm)	Ave (dBm)	Peak (dBm)	Ave (dBm)	Peak (dBm)	Ave (dBm)	Peak (dBm)	Ave (dBm)
Antenna Port 4 Middle Channel LTE5	55.24	47.64	55.20	47.65	55.29	47.65	55.27	47.71

The output power variation between modulation types is small in this measurement snapshot (and from past efforts on similar hardware as well). The variation of average power output versus modulation type is 0.07dB for the data snapshot provided. The variation of peak power output versus modulation type is 0.09dB for the data snapshot provided. All power measurements in this report (except the sample test noted above) were performed with the EUT operating with 256QAM modulation.

Based on the results above, Port 4 had the highest RMS average power for Band 12 (represents the worst case) and therefore it was selected for all the remaining antenna port tests. Port 4 has the highest combined RMS average power for Band 71 + Band 12.

Subsequently output power levels on bottom, middle, and top channels in all 4 LTE channel bandwidths using 256QAM modulation type were tested only at Port 4 and the results presented below. The highest measured values are highlighted.

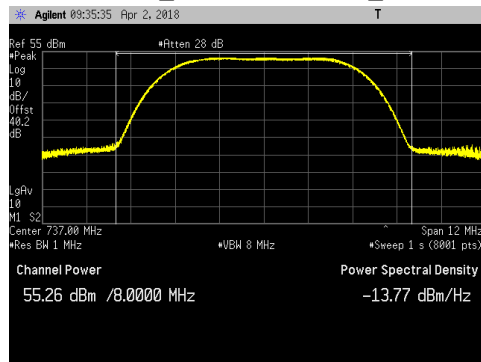
Antenna LTE Channel	LTE Bandwidth	LTE - 256QAM		
		Peak (dBm)	Ave (dBm)	PAPR (dB)
Port 4 Bottom Channel	1.4M	55.07	47.77	7.30
	3M	55.48	47.84	7.64
	5M	55.56	47.80	7.76
	10M	55.86	47.86	8.00
Port 4 Middle Channel	1.4M	54.63	47.68	6.95
	3M	55.00	47.61	7.39
	5M	55.27	47.71	7.56
	10M	55.82	47.87	7.95
Port 4 Top Channel -1	1.4M (Note 1)	54.80	47.56	7.24
Port 4 Top Channel	1.4M (Note 1)	53.40	45.85	7.55
	3M	55.26	47.63	7.63
	5M	55.91	47.88	8.03
	10M	56.12	47.92	8.20

Note (1): The power level on the LTE1.4 top channel carrier was reduced from 60 to 40 watts to meet band edge emission requirements. The LTE1.4 carrier met band edge emission requirements at full power (60 watts) when transmitting at one channel (100kHz) below the top channel. All other LTE carriers met band edge emission limits when operating at full power (60watts) at the top and bottom channel frequencies.

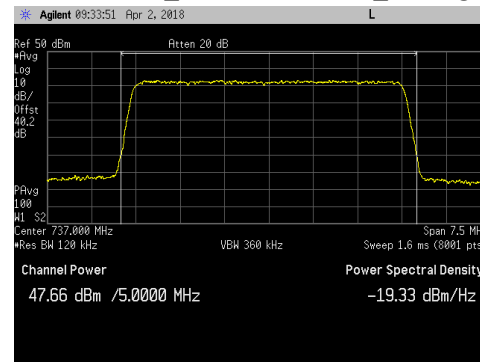
All measurement results are provided in the following pages. The total measurement RF path loss of the test setup (attenuator and test cables) was 40.2 dB and is accounted for by the spectrum analyzer reference level offset.

LTE5 Channel Power Plots at Middle Channel and 256QAM Modulation:

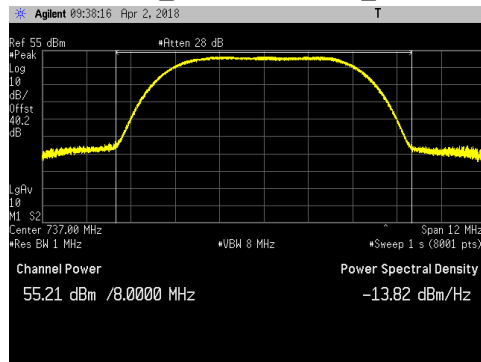
Port 1 - LTE5_ Middle Channel_Peak



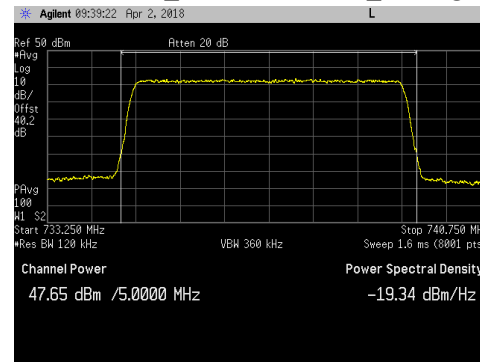
Port 1 - LTE5_ Middle Channel_Average



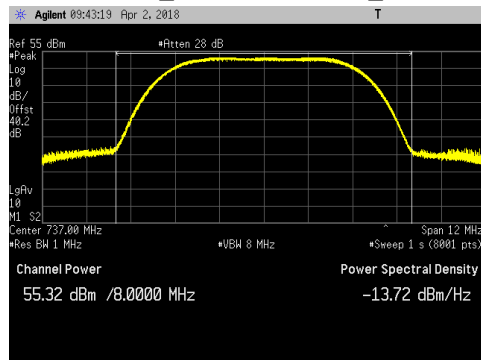
Port 2 - LTE5_ Middle Channel_Peak



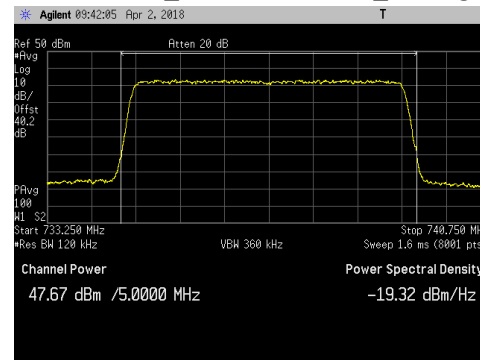
Port 2 - LTE5_ Middle Channel_Average



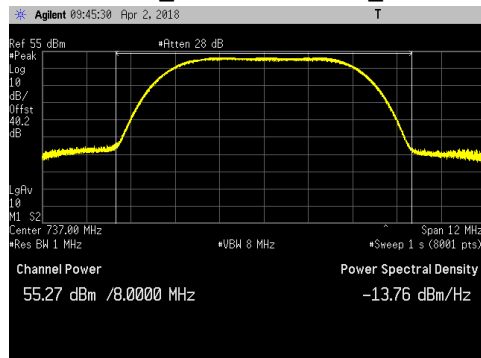
Port 3 - LTE5_ Middle Channel_Peak



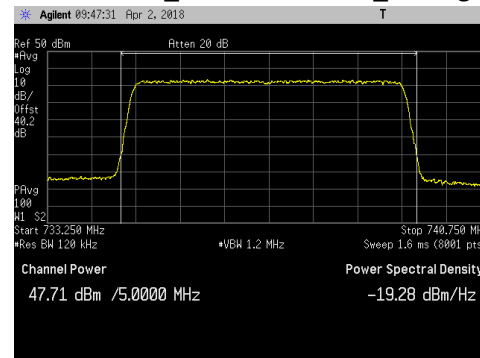
Port 3 - LTE5_ Middle Channel_Average



Port 4 - LTE5_ Middle Channel_Peak

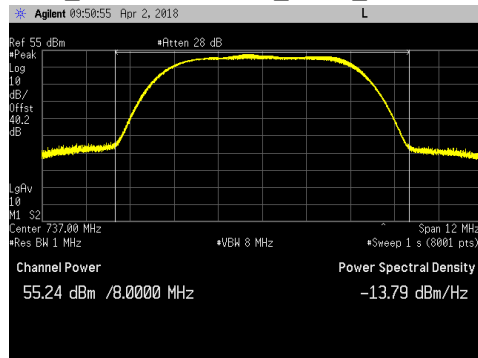


Port 4 - LTE5_ Middle Channel_Average

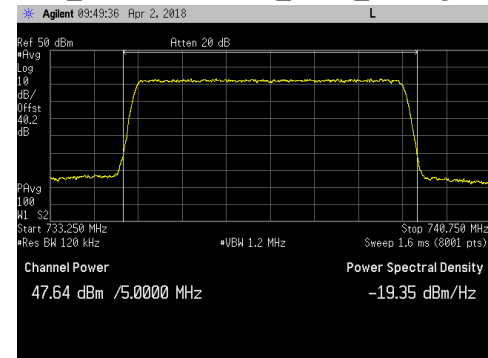


LTE5 Channel Power Plots for Antenna Port 4 at Middle Channel and all Modulation Types:

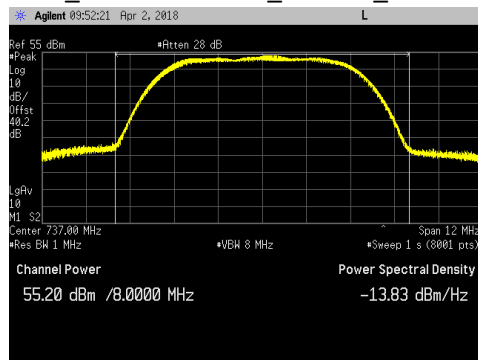
LTE5_ Middle Channel_QPSK_Peak



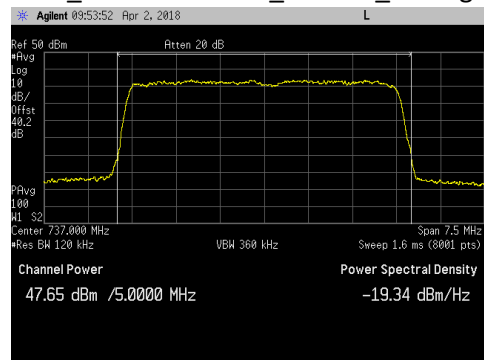
LTE5_ Middle Channel_QPSK_Average



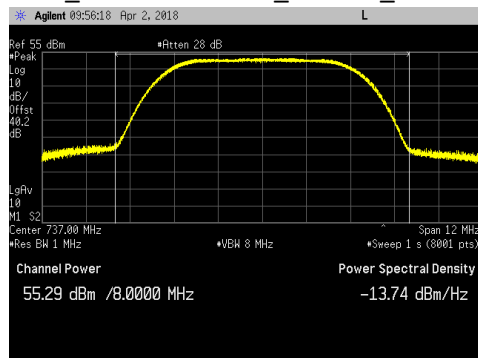
LTE5_ Middle Channel_16QAM_Peak



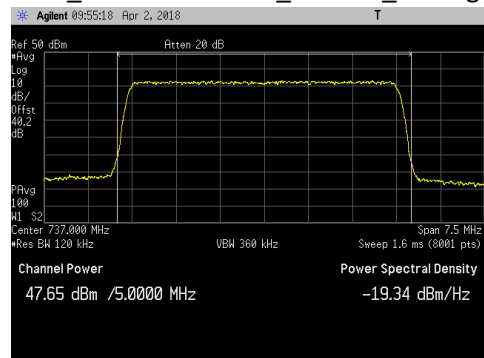
LTE5_ Middle Channel_16QAM_Average



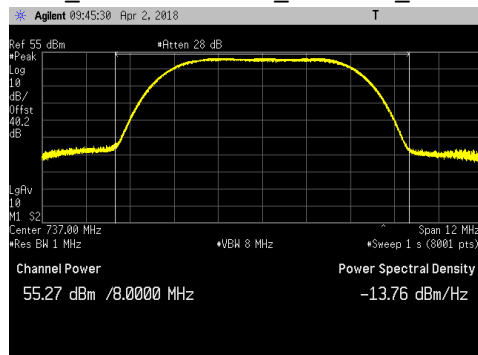
LTE5_ Middle Channel_64QAM_Peak



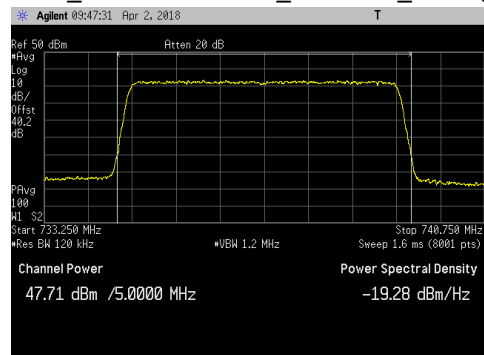
LTE5_ Middle Channel_64QAM_Average



LTE5_ Middle Channel_256QAM_Peak

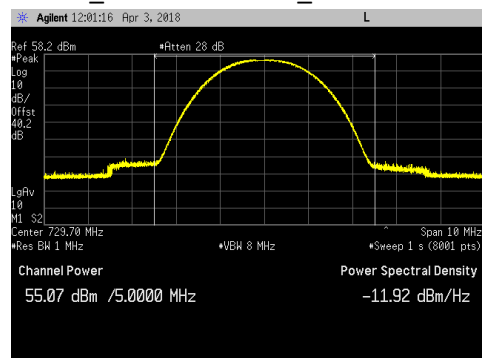


LTE5_ Middle Channel_256QAM_Average

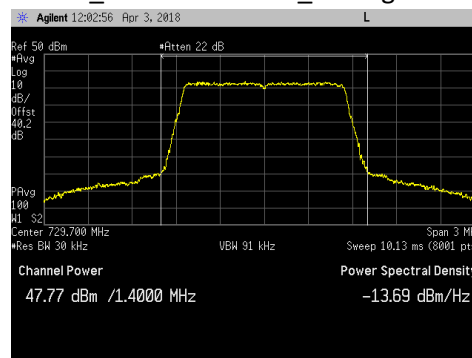


LTE1.4 Channel Power Plots for Antenna Port 4 and 256QAM Modulation:

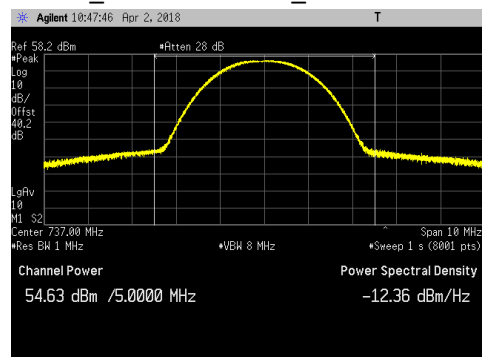
LTE1.4_Bottom Channel_Peak



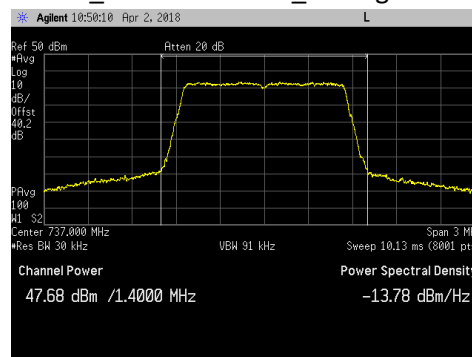
LTE1.4_Bottom Channel_Average



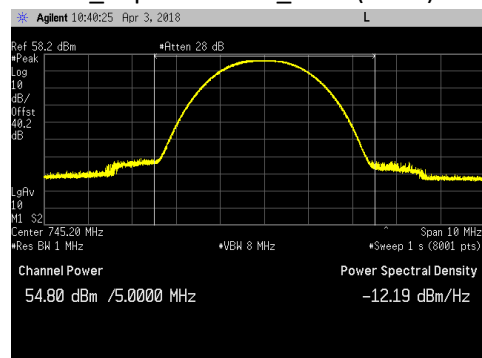
LTE1.4_Middle Channel_Peak



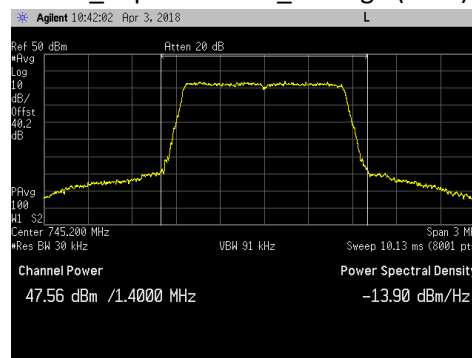
LTE1.4_Middle Channel_Average



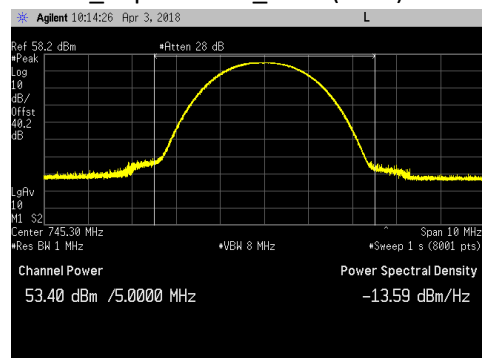
LTE1.4_Top Channel-1_Peak (60 W)



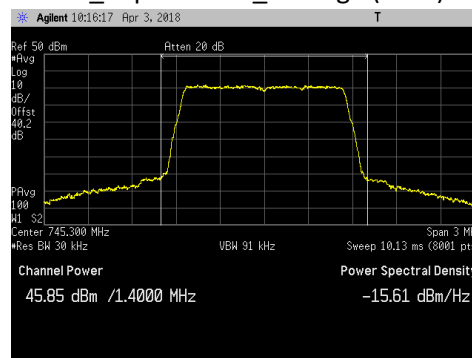
LTE1.4_Top Channel-1_Average (60W)



LTE1.4_Top Channel_Peak (40W)

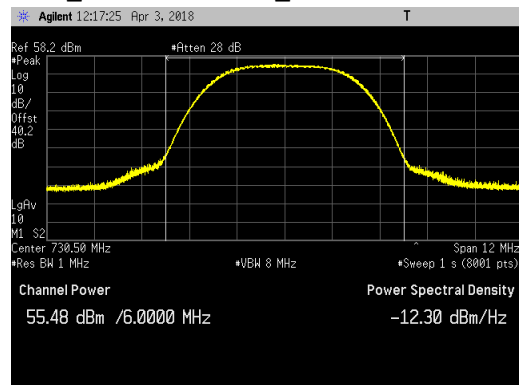


LTE1.4_Top Channel_Average (40W)

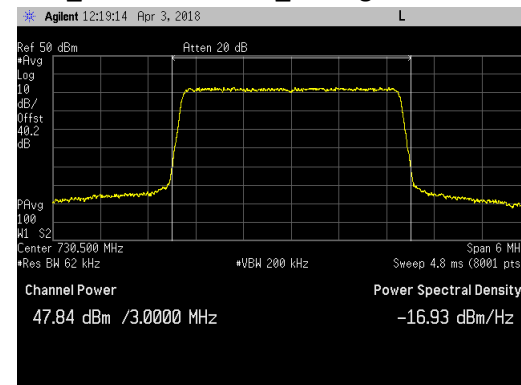


LTE3 Channel Power Plots for Antenna Port 4 and 256QAM Modulation:

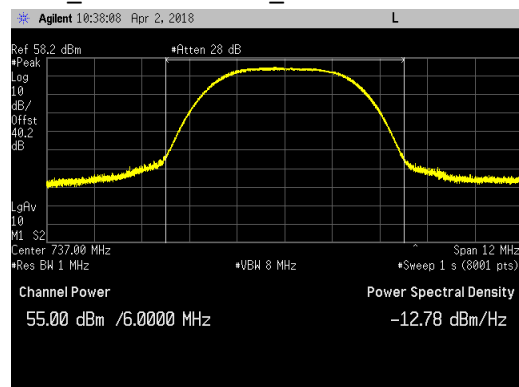
LTE3_Bottom Channel_Peak



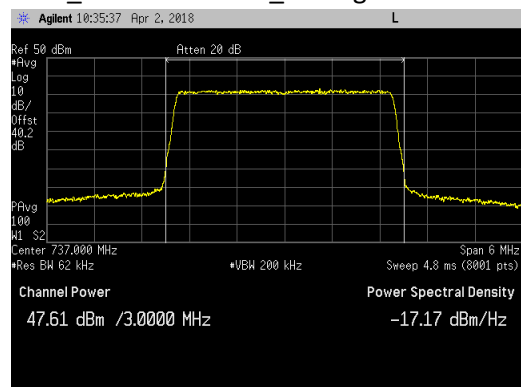
LTE3_Bottom Channel_Average



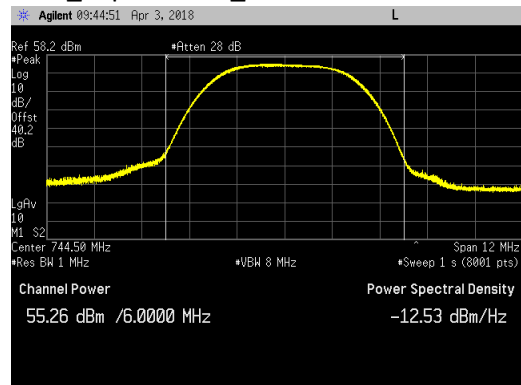
LTE3_Middle Channel_Peak



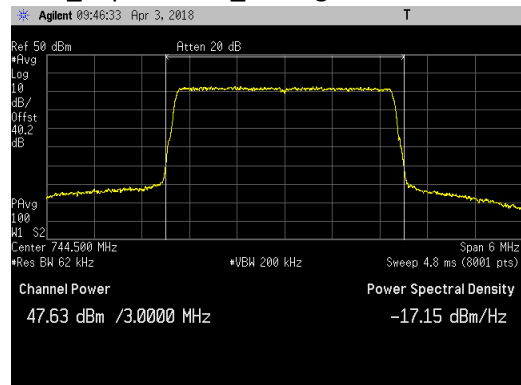
LTE3_Middle Channel_Average



LTE3_Top Channel_Peak

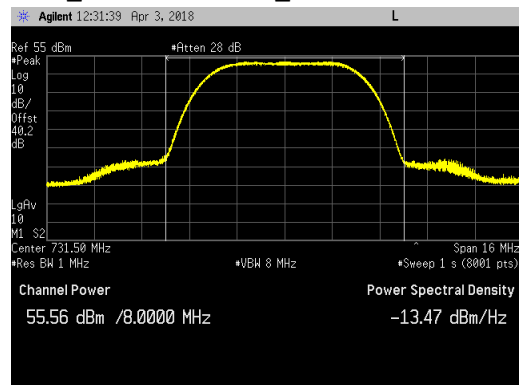


LTE3_Top Channel_Average

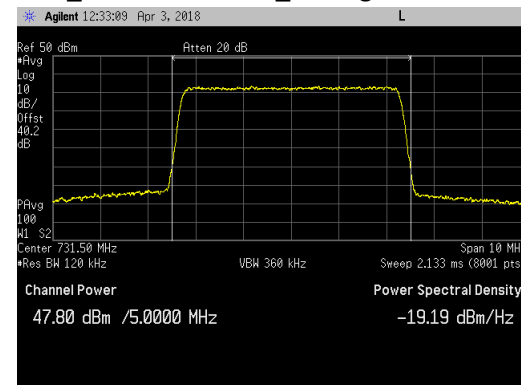


LTE5 Channel Power Plots for Antenna Port 4 and 256QAM Modulation:

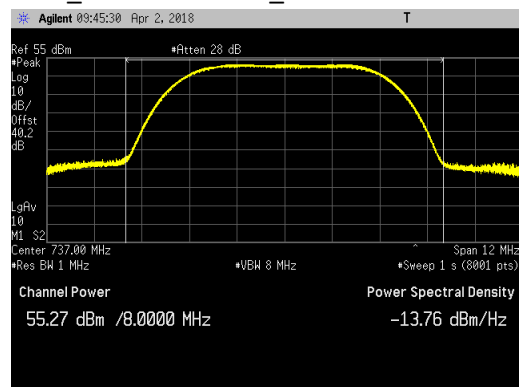
LTE5_Bottom Channel_Peak



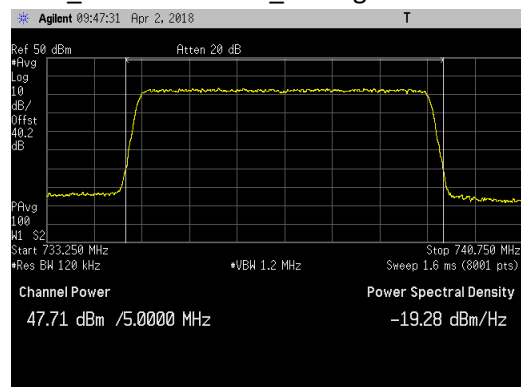
LTE5_Bottom Channel_Average



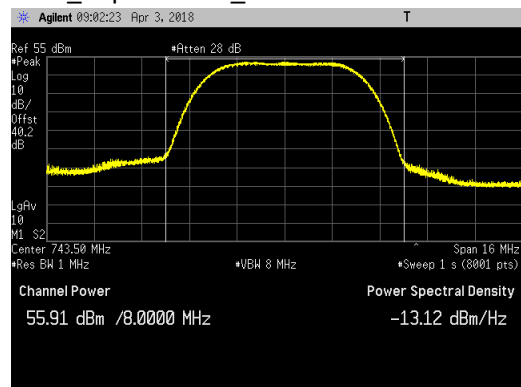
LTE5_Middle Channel_Peak



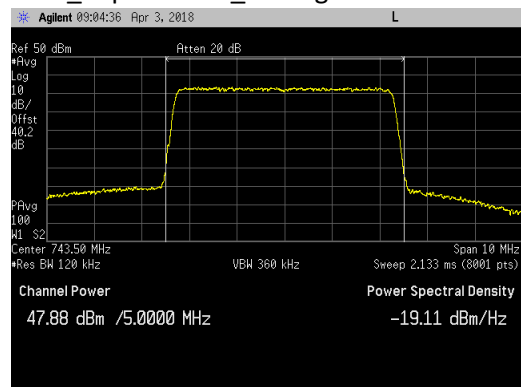
LTE5_Middle Channel_Average



LTE5_Top Channel_Peak

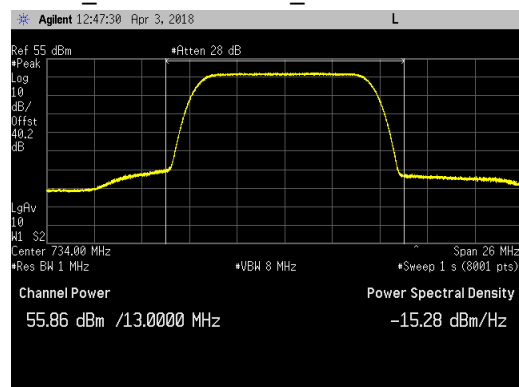


LTE5_Top Channel_Average

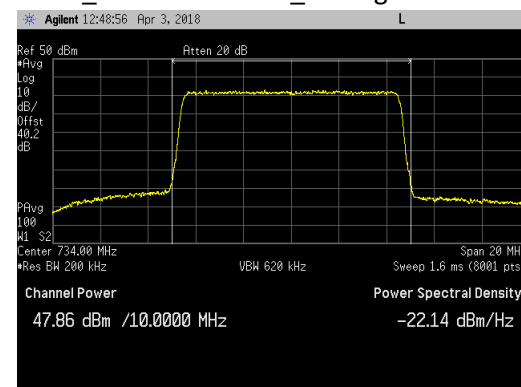


LTE10 Channel Power Plots for Antenna Port 4 and 256QAM Modulation:

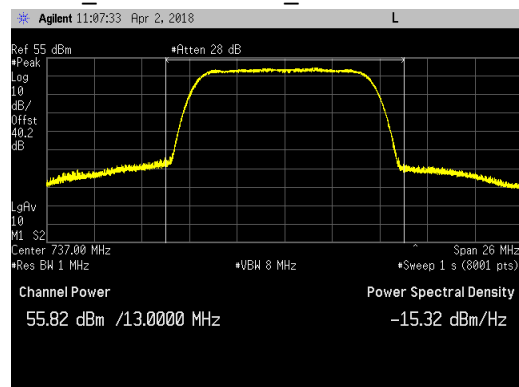
LTE10_Bottom Channel_Peak



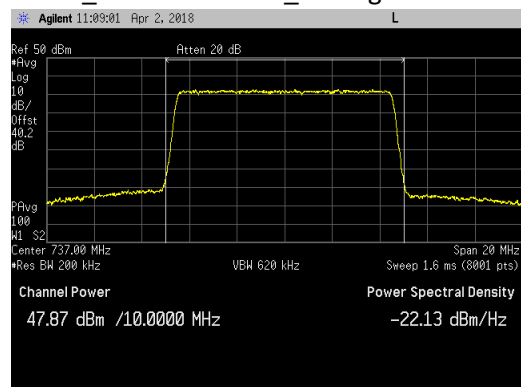
LTE10_Bottom Channel_Average



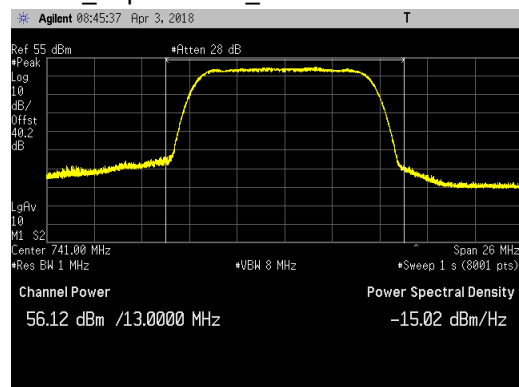
LTE10_Middle Channel_Peak



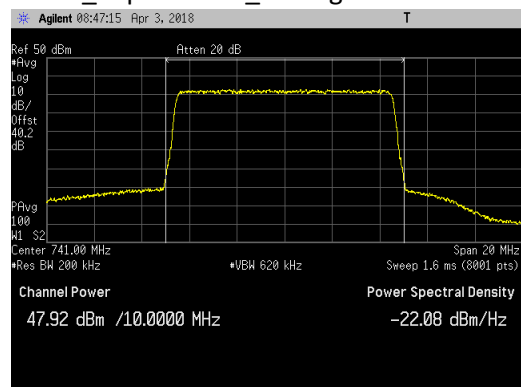
LTE10_Middle Channel_Average



LTE10_Top Channel_Peak



LTE10_Top Channel_Average



Emission Bandwidth (26 dB down and 99%)

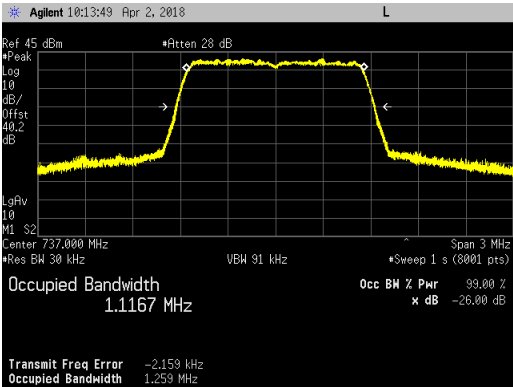
Emission bandwidth measurements were made at antenna port 4 on the middle channel with maximum RF output power. All available LTE modulations (QPSK, 16QAM, 64QAM, 256QAM) were used. All available LTE channel bandwidths (1.4MHz, 3MHz, 5MHz and 10MHz) were used. The results are provided in the following table (largest value in each channel type is highlighted).

LTE Ch BW			Modulation Type					
	QPSK		16QAM		64QAM		256QAM	
	26dB (MHz)	99% (MHz)	26dB (MHz)	99% (MHz)	26dB (MHz)	99% (MHz)	26dB (MHz)	99% (MHz)
1.4M	1.259	1.1167	1.238	1.1072	1.241	1.1089	1.246	1.1084
3M	2.929	2.7109	2.922	2.7067	2.921	2.7126	2.925	2.7039
5M	4.843	4.4859	4.808	4.4793	4.839	4.4931	4.842	4.4970
10M	9.652	8.9808	9.667	9.0029	9.682	8.9854	9.651	8.9776

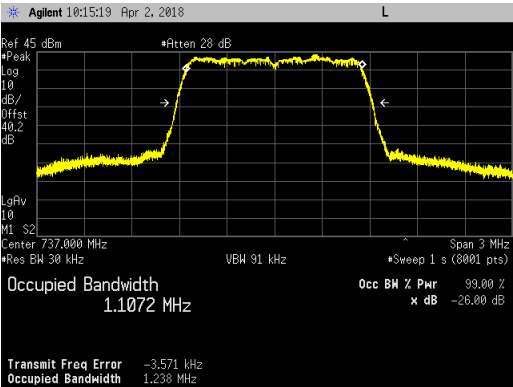
Emission bandwidth measurement data are provided in the following pages.

LTE1.4 Emission Bandwidth Plots on the Middle Channel for Antenna Port 4:

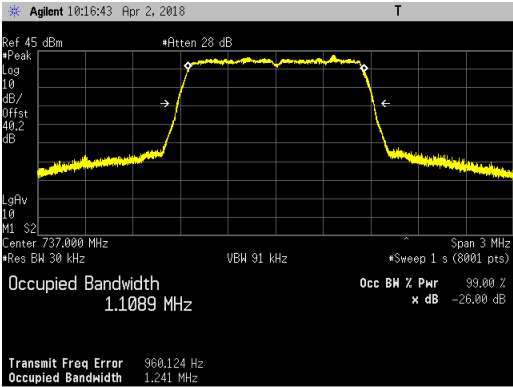
LTE1.4_QPSK



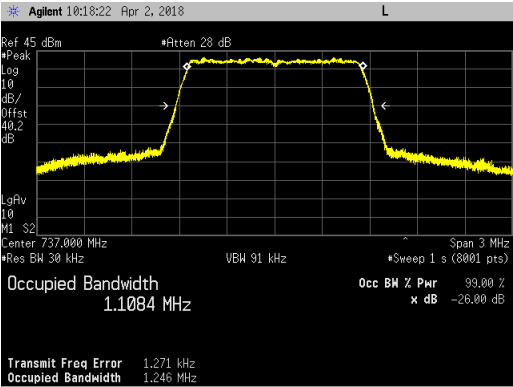
LTE1.4_16QAM



LTE1.4_64QAM

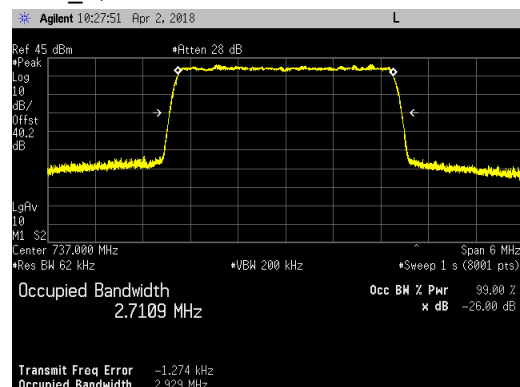


LTE1.4_256QAM

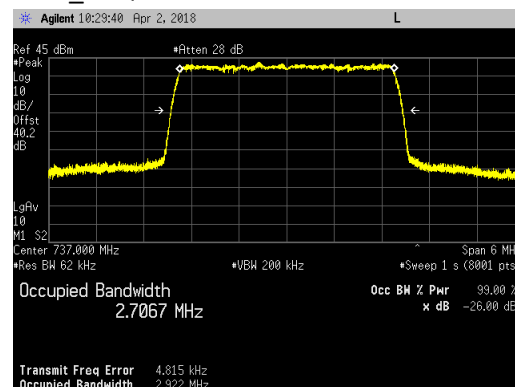


LTE3 Emission Bandwidth Plots on the Middle Channel for Antenna Port 4:

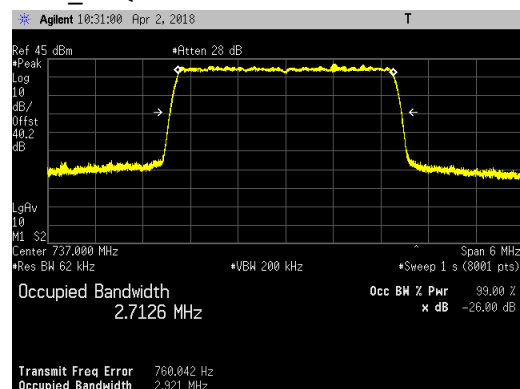
LTE3_QPSK



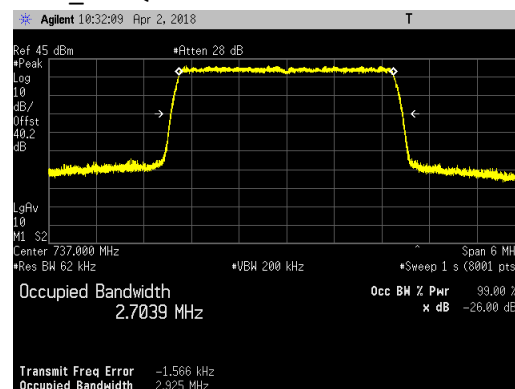
LTE3_16QAM



LTE3_64QAM

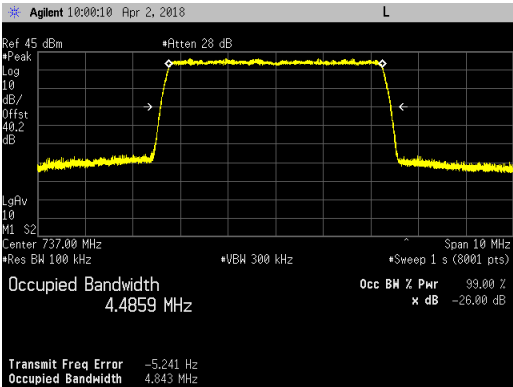


LTE3_256QAM

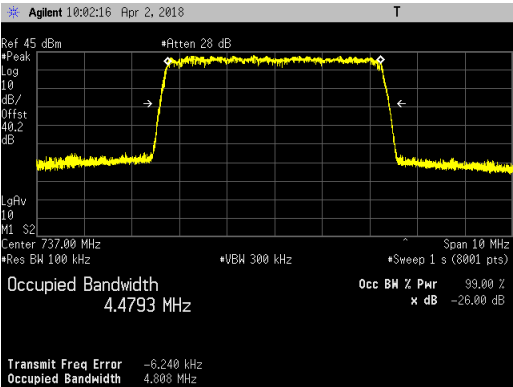


LTE5 Emission Bandwidth Plots on the Middle Channel for Antenna Port 4:

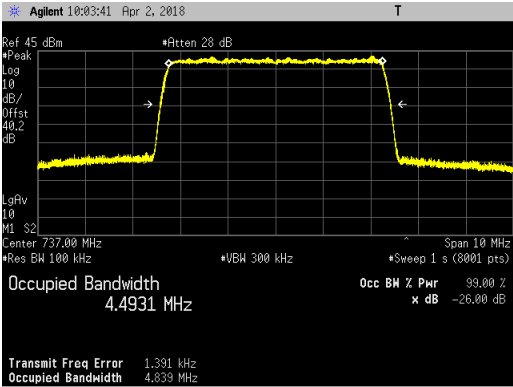
LTE5_QPSK



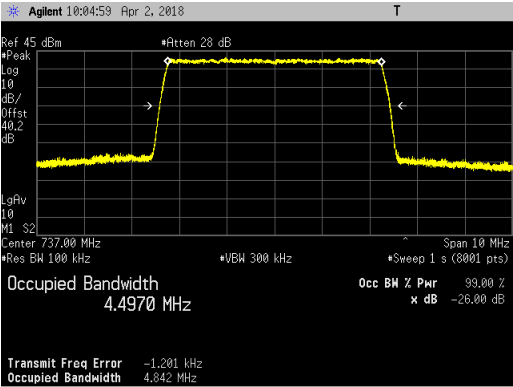
LTE5_16QAM



LTE5_64QAM

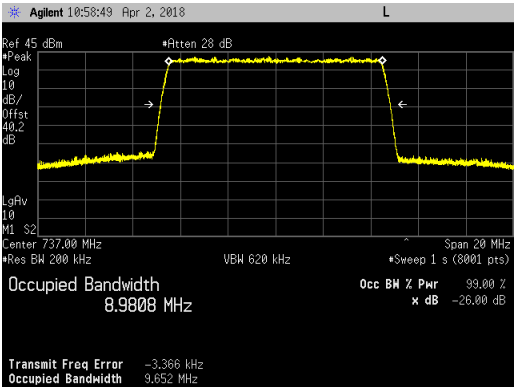


LTE5_256QAM

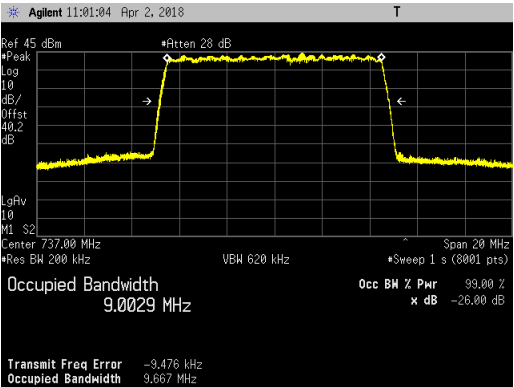


LTE10 Emission Bandwidth Plots on the Middle Channel for Antenna Port 4:

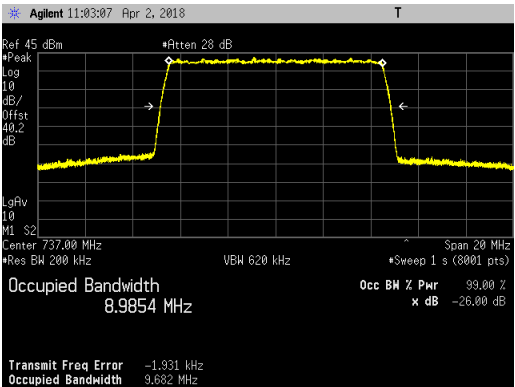
LTE10_QPSK



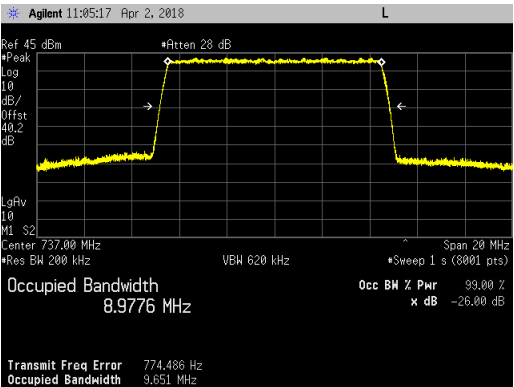
LTE10_16QAM



LTE10_64QAM



LTE10_256QAM



Antenna Port Conducted Band Edge

Conducted band edge measurements were made at RRH antenna port 4. The RRH was operated at the band edge frequencies with all modulation types (QPSK, 16QAM, 64QAM, 256QAM) for 1.4MHz, 3MHz, 5MHz and 10MHz LTE bandwidths.

The limit of -19dBm was used in the certification testing. The limit is adjusted to -19dBm $[-13\text{dBm} - 10 \log(4)]$ 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 power level on the LTE1.4 top channel carrier was reduced from 60 to 40 watts to meet band edge emission requirements. The LTE1.4 carrier met band edge emission requirements at full power (60 watts) when transmitting at one channel (100kHz) below the top channel. All other LTE carriers met band edge emission limits when operating at full power (60watts) at the top and bottom channel frequencies. The cells shaded orange are the for the LTE 1.4M carrier operating at one channel below the top channel.

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

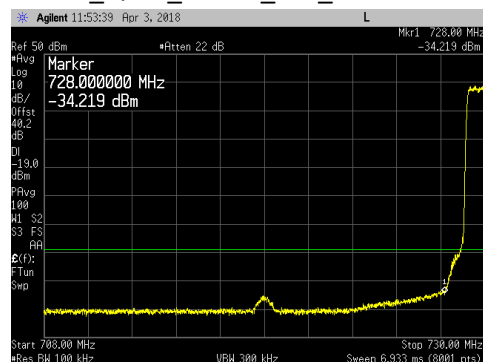
LTE BW	QPSK (dBm)			16QAM (dBm)			64QAM (dBm)			256QAM (dBm)		
	Bottom Channel	Top Channel		Bottom Channel	Top Channel		Bottom Channel	Top Channel		Bottom Channel	Top Channel	
1.4M	-34.219	-20.184	-19.796	-33.875	-21.68	-20.40	-33.835	-20.80	-19.85	-34.346	-21.034	-19.721
3M	-23.983	-19.872		-24.563	-20.065		-23.680	-19.865		-23.812	-19.939	
5M	-25.152	-21.509		-26.739	-23.156		-25.357	-22.971		-25.946	-22.283	
10M	-26.063	-24.725		-26.248	-24.697		-25.891	-24.693		-26.224	-24.819	
Dual 1.4M	-23.742	-20.75		-23.792	-20.816		-23.905	-20.586		-24.38	-20.423	

The total measurement RF path loss of the test setup (attenuator and test cables) was 40.2 dB and is accounted for by the spectrum analyzer reference level offset. The display line on the plots reflects the required limit.

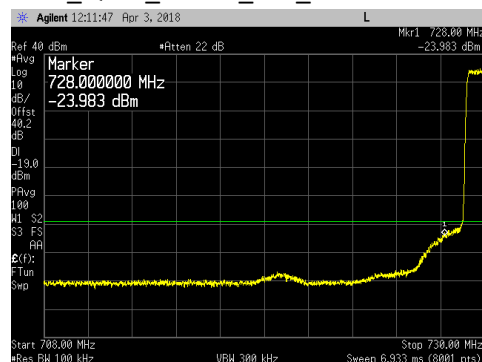
Conducted band edge measurements are provided in the following pages.

LTE1.4 and LTE3 Lower Band Edge Plots for Antenna Port 4:

LTE1.4_QPSK_Bot Ch_LBE_708MHz to 730MHz



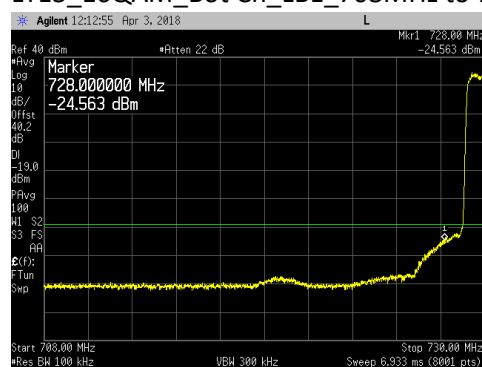
LTE3_QPSK_Bot Ch_LBE_708MHz to 730MHz



LTE1.4_16QAM_Bot Ch_LBE_708MHz to 730MHz



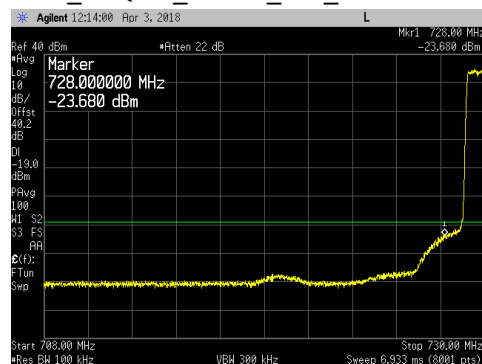
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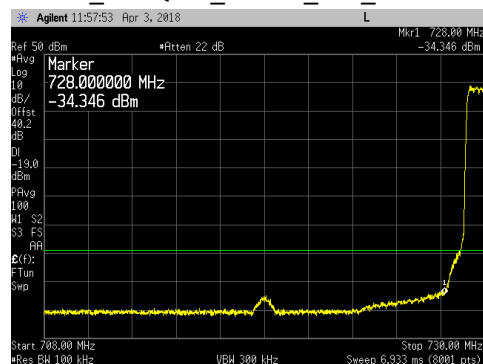
LTE1.4_64QAM_Bot Ch_LBE_708MHz to 730MHz



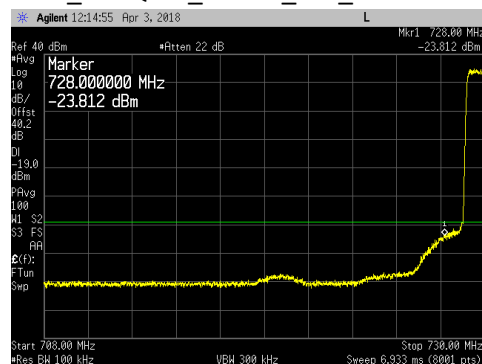
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LTE1.4_256QAM_Bot Ch_LBE_708MHz to 730MHz

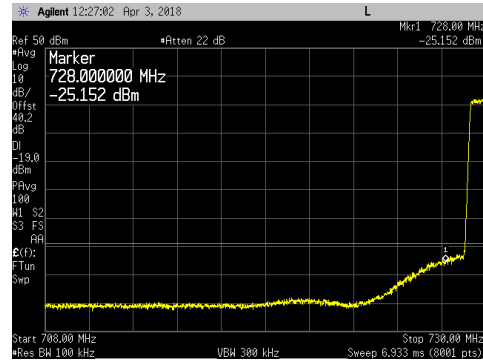


LTE3_256QAM_Bot Ch_LBE_708MHz to 730MHz

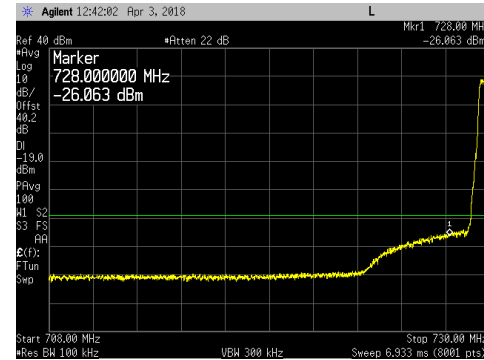


LTE5 and LTE10 Lower Band Edge Plots for Antenna Port 4:

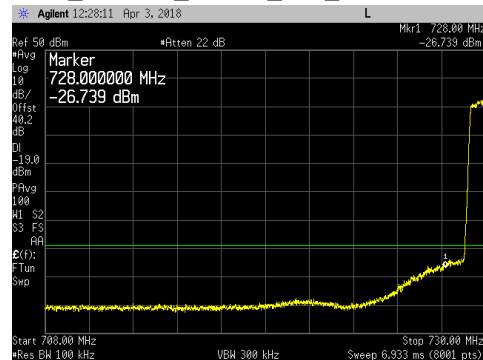
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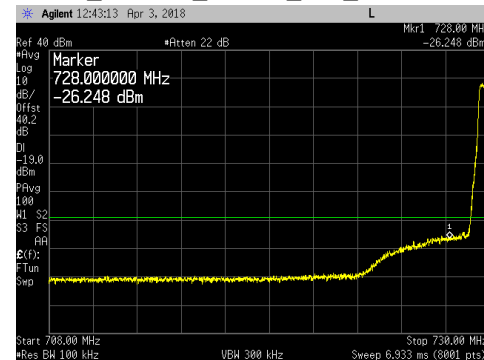
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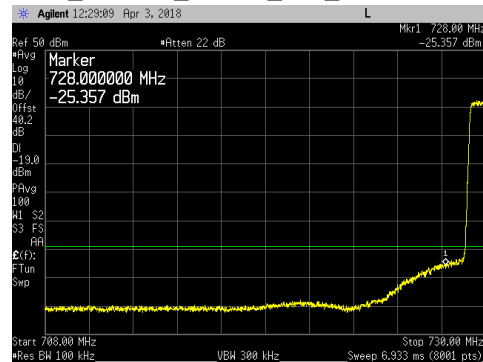
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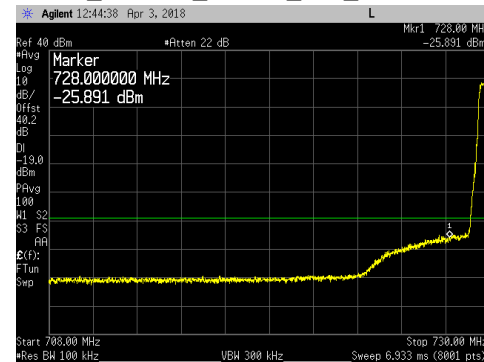
LTE10_16QAM_Bot Ch_LBE_708MHz to 730MHz



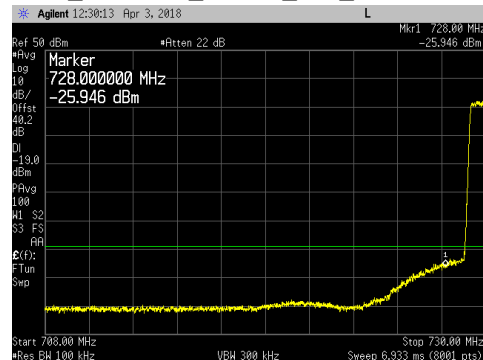
LTE5_64QAM_Bot Ch_LBE_708MHz to 730MHz



LTE10_64QAM_Bot Ch_LBE_708MHz to 730MHz



LTE5_256QAM_Bot Ch_LBE_708MHz to 730MHz



LTE10_256QAM_Bot Ch_LBE_708MHz to 730MHz

