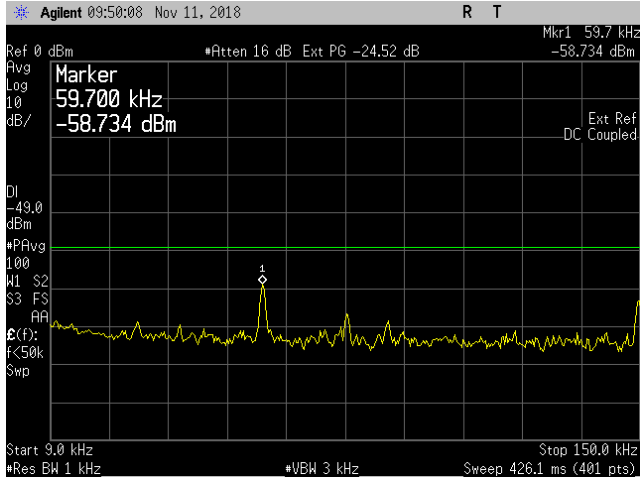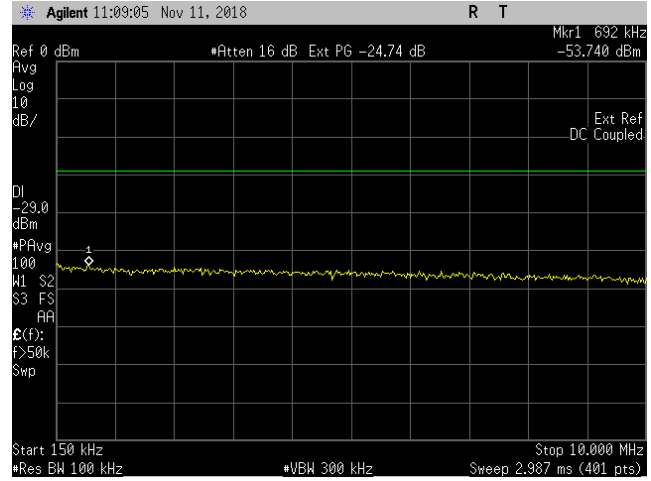**LTE20 Bottom Channel (627MHz) NB IoT at Upper Guard Band:**
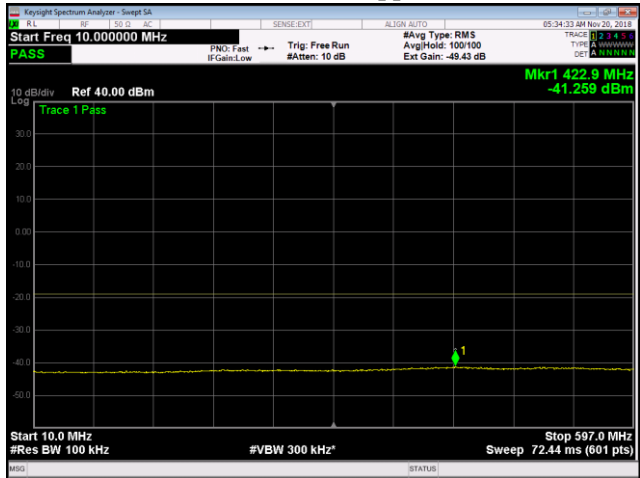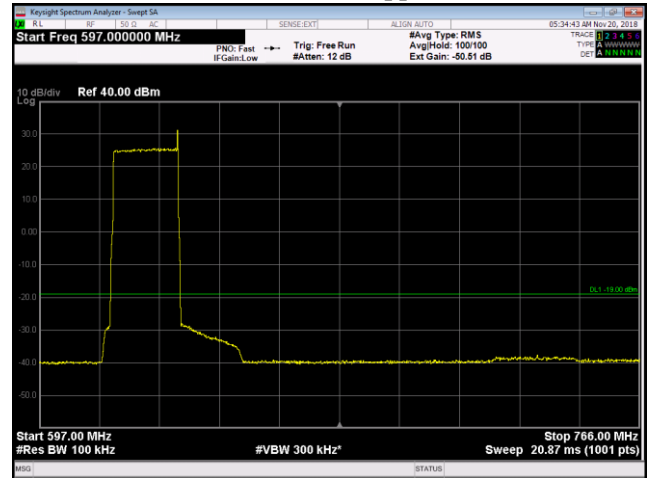
LTE20 Bottom+NB IoT GB (Upper) 9-150KHz

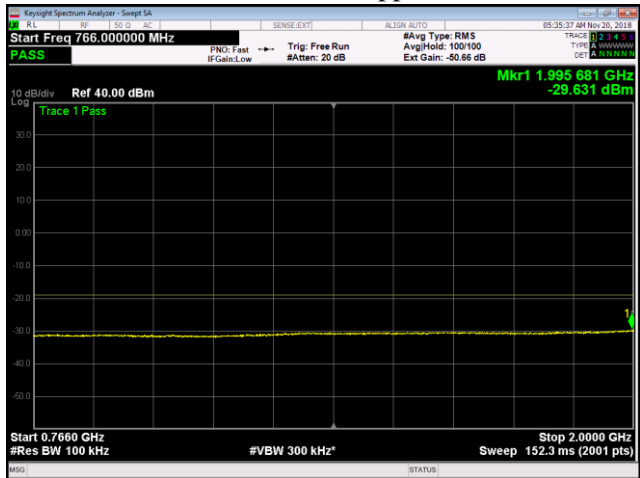LTE20 Bottom+NB IoT GB (Upper) 150KHz-10MHz

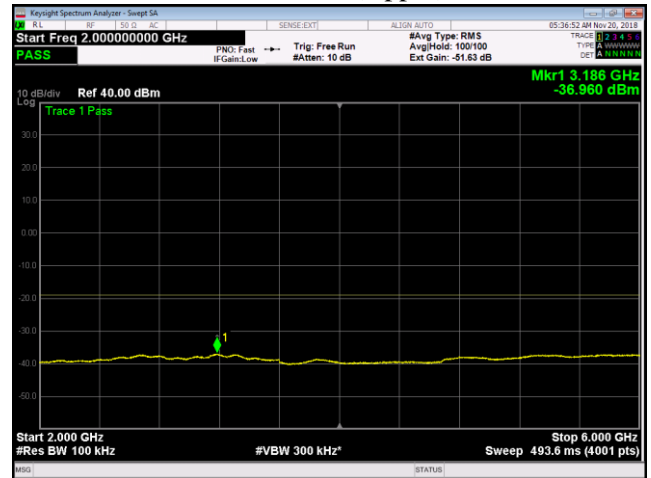

LTE20 Bottom+NB IoT GB (Upper) 10MHz-597MHz

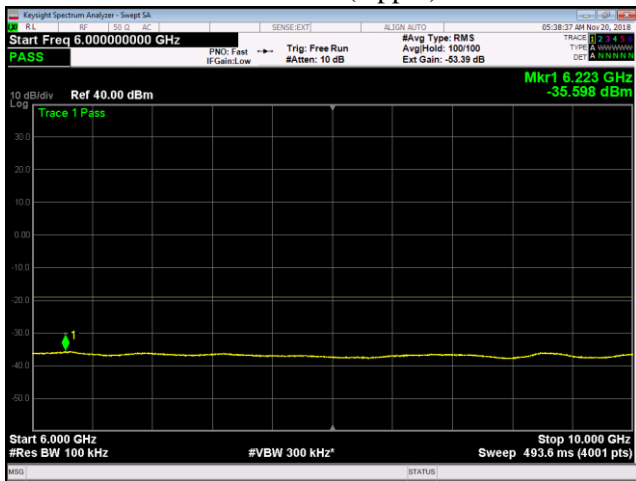LTE20 Bottom+NB IoT GB (Upper) 597MHz-766MHz

LTE20 Bottom+NB IoT GB (Upper) 766MHz-2GHz

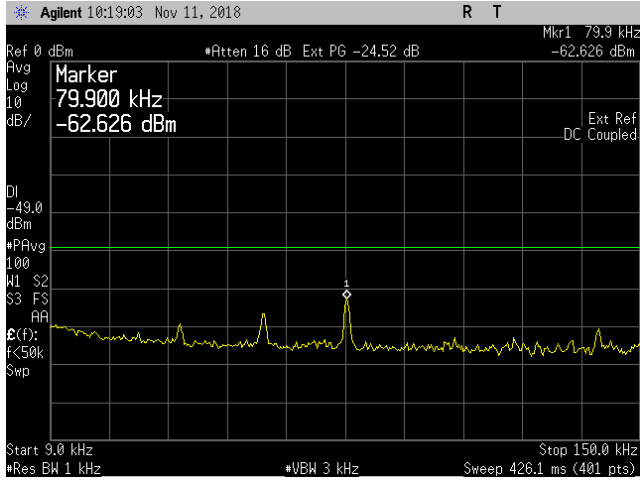LTE20 Bottom+NB IoT GB (Upper) 2GHz-6GHz

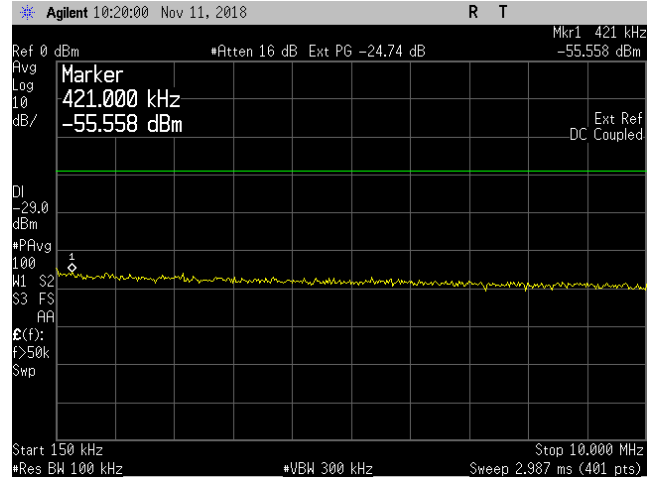LTE20 Bottom+NB IoT GB (Upper) 6GHz-10GHz

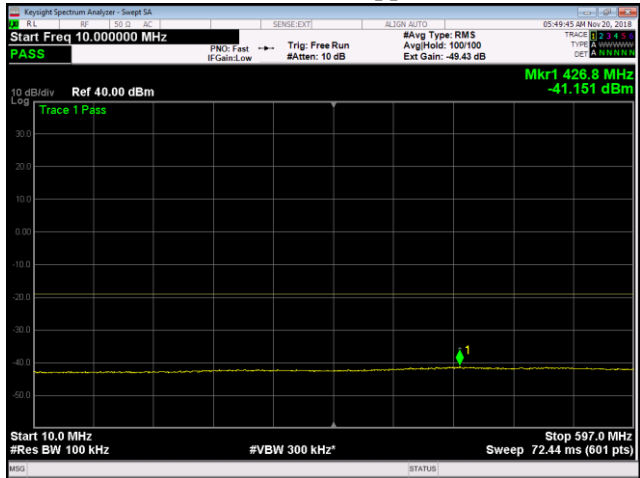**LTE20 Middle Channel (634.5MHz) NB IoT at Upper Guard Band:**

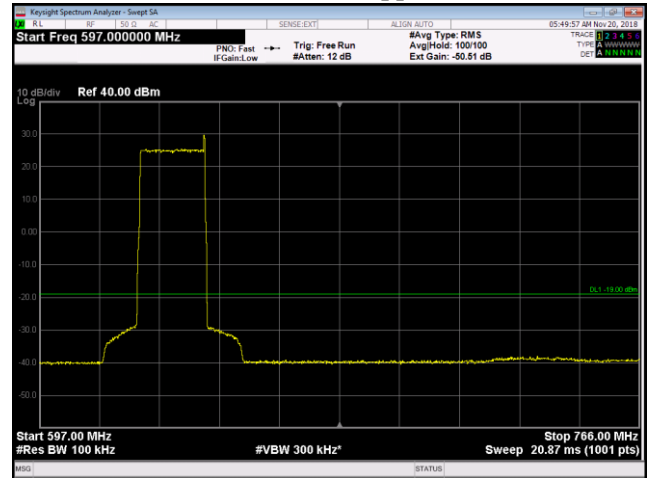LTE20 Middle+NB IoT GB (Upper) 9-150KHz

LTE20 Middle+NB IoT GB (Upper) 150KHz-10MHz
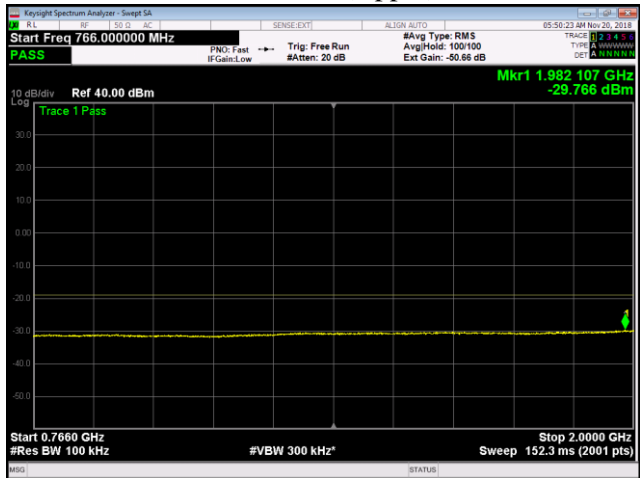

LTE20 Middle+NB IoT GB (Upper) 10MHz-597MHz

LTE20 Middle+NB IoT GB (Upper) 597MHz-766MHz

LTE20 Middle+NB IoT GB (Upper) 766MHz-2GHz

LTE20 Middle+NB IoT GB (Upper) 2GHz-6GHz

LTE20 Middle+NB IoT GB (Upper) 6GHz-10GHz
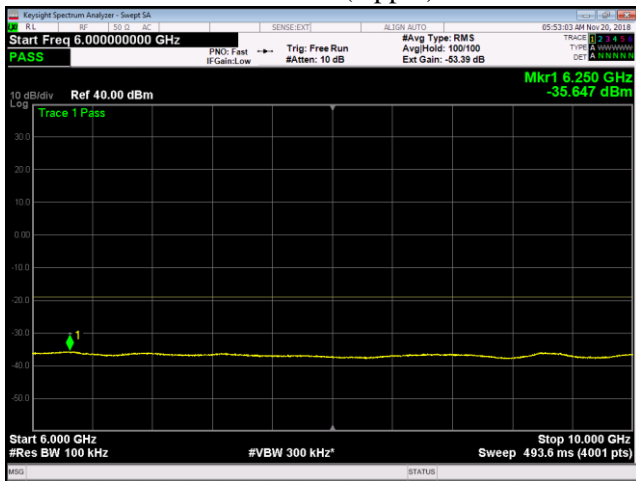
LTE20 Top Channel (642MHz) NB IoT at Upper Guard Band:

LTE20 Top+NB IoT GB (Upper) 9-150KHz

LTE20 Top+NB IoT GB (Upper) 150KHz-10MHz

LTE20 Top+NB IoT GB (Upper) 10MHz-597MHz

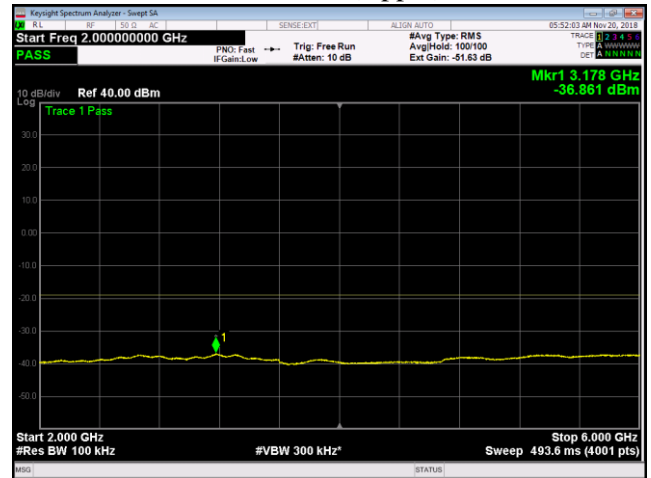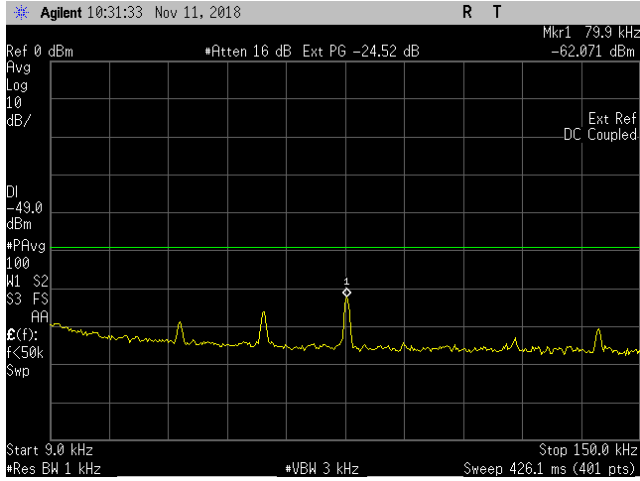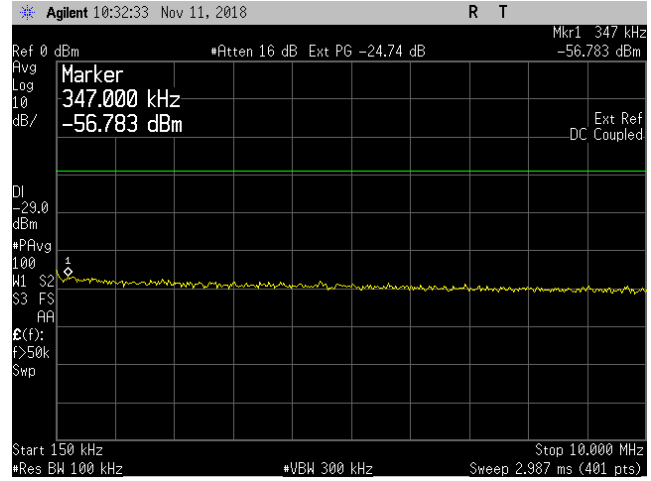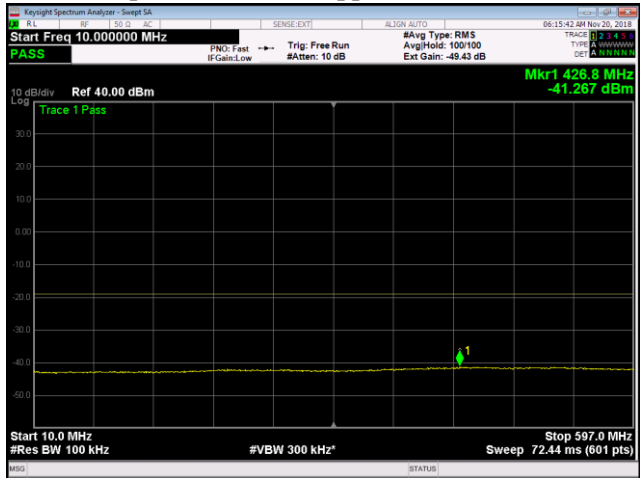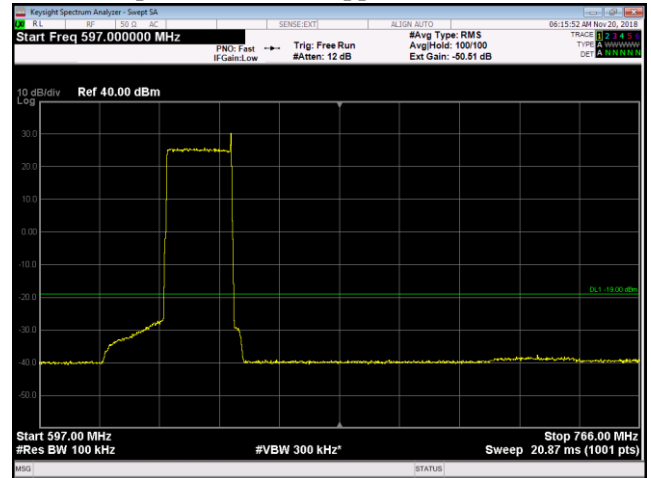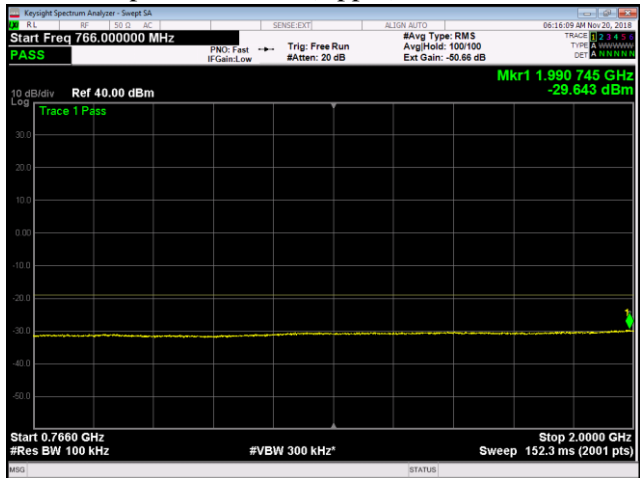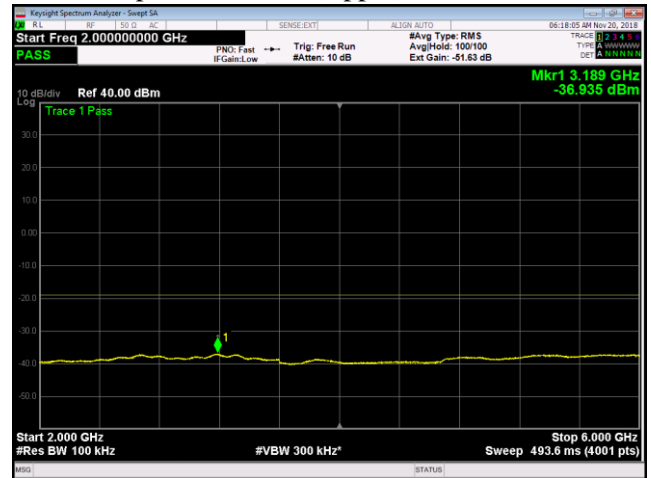

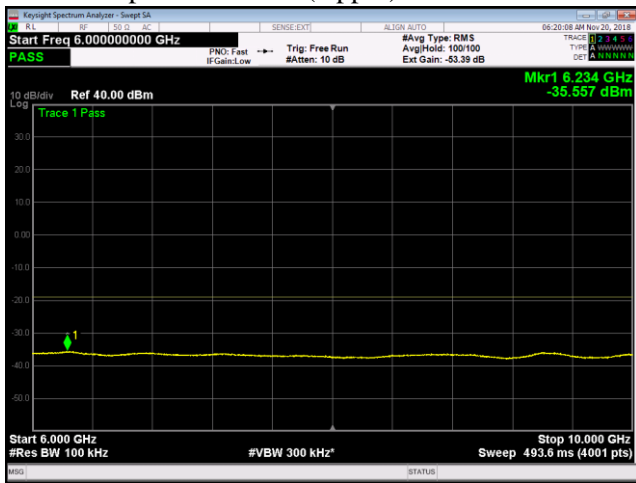LTE20 Top+NB IoT GB (Upper) 597MHz-766MHz

LTE20 Top+NB IoT GB (Upper) 766MHz-2GHz

LTE20 Top+NB IoT GB (Upper) 2GHz-6GHz

LTE20 Top+NB IoT GB (Upper) 6GHz-10GHz

13 TEST DATA FOR AHLOA Band 12 (728-746 MHz)

13.1 RF Output Power

RF Output Power Band 12 NB IoT Lower Guard Band Carrier				
AHLOA Ant port 4	**LTE Bandwidth**	**LTE - Aggregate w/NB IoT GB**		
		Peak (dBm)	**Average (dBm)**	**PAPR (dB)**
Bottom Channel	LTE10	55.30	47.29	8.01
Middle Channel	LTE10	55.31	47.22	8.09
Top Channel	LTE10	55.25	47.26	7.99

RF Output Power Band 12 NB IoT Upper Guard Band Carrier				
AHLOA Ant port 4	**LTE Bandwidth**	**LTE - Aggregate w/NB IoT GB**		
		Peak (dBm)	**Average (dBm)**	**PAPR (dB)**
Bottom Channel	LTE10	53.50	47.35	6.15
Middle Channel	LTE10	55.29	47.21	8.08
Top Channel	LTE10	55.28	47.29	7.99

Channel Power Plots, NB IoT Lower GB Carrier (10MHz):

LTE10 Bottom Channel Peak Power

Channel Power: 55.30 dBm / 13 MHz
Power Spectral Density: -15.84 dBm /Hz

LTE10 Bottom Channel Average Power

Channel Power: 47.29 dBm / 10 MHz
Power Spectral Density: -22.71 dBm /Hz

LTE10 Middle Channel Peak Power

Channel Power: 55.31 dBm / 13 MHz
Power Spectral Density: -15.83 dBm /Hz

LTE10 Middle Channel Average Power

Channel Power: 47.22 dBm / 10 MHz
Power Spectral Density: -22.78 dBm /Hz

LTE10 Top Channel Peak Power

Channel Power: 55.25 dBm / 13 MHz
Power Spectral Density: -15.89 dBm /Hz

LTE10 Top Channel Average Power

Channel Power: 47.26 dBm / 10 MHz
Power Spectral Density: -22.74 dBm /Hz

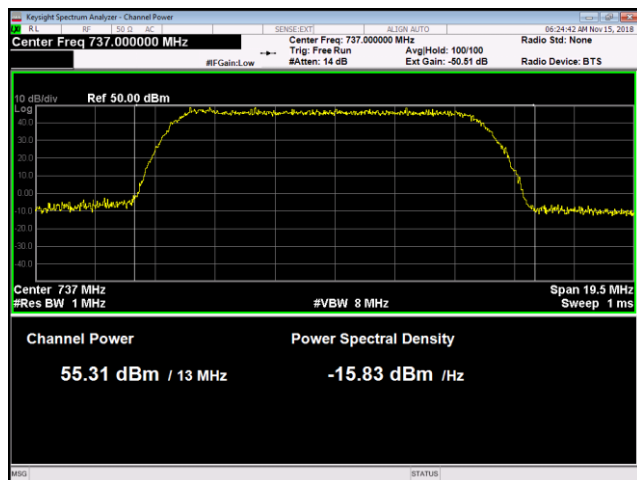**Channel Power Plots, NB IoT Upper GB Carrier (10MHz):**

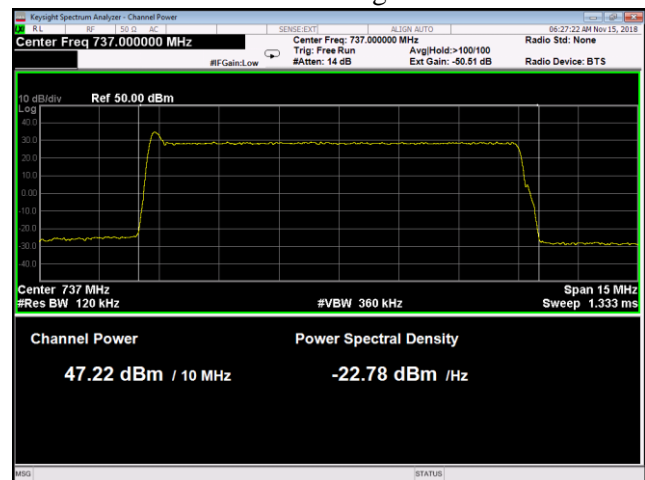LTE10 Bottom Channel Peak Power

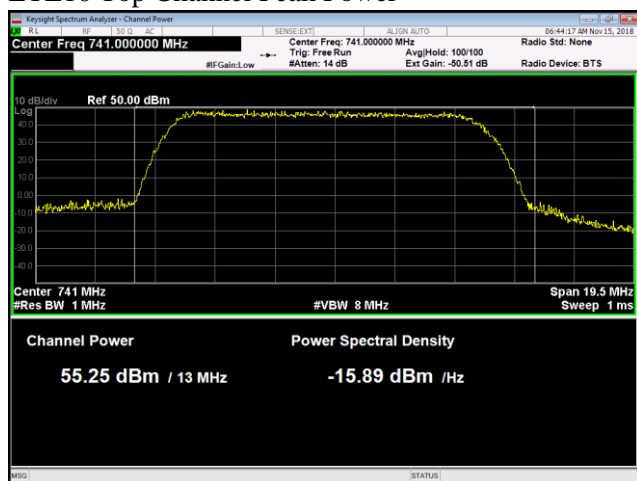LTE10 Bottom Channel Average Power

LTE10 Middle Channel Peak Power

LTE10 Middle Channel Average Power

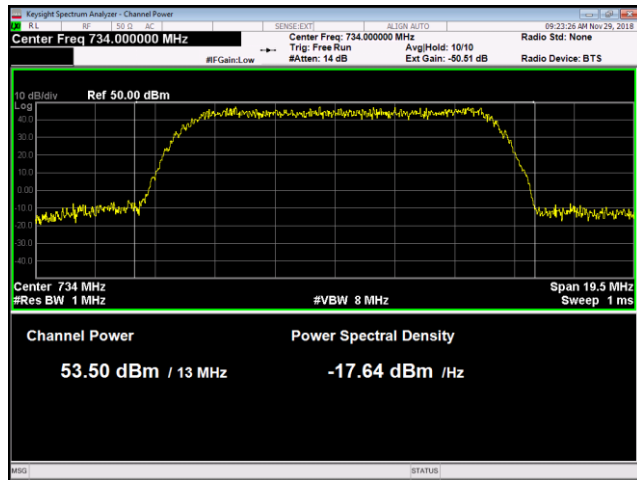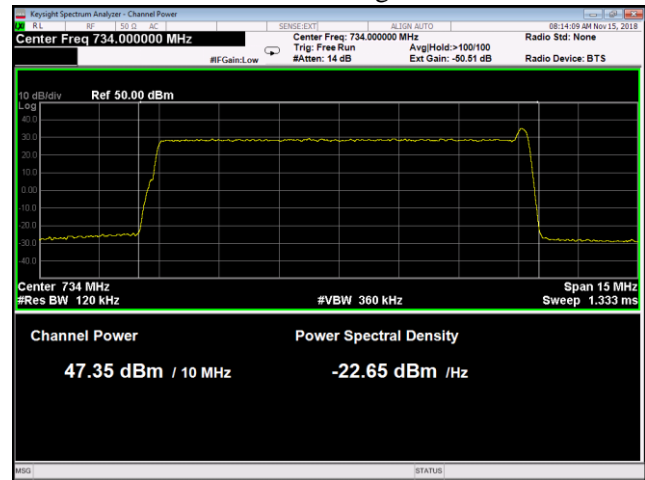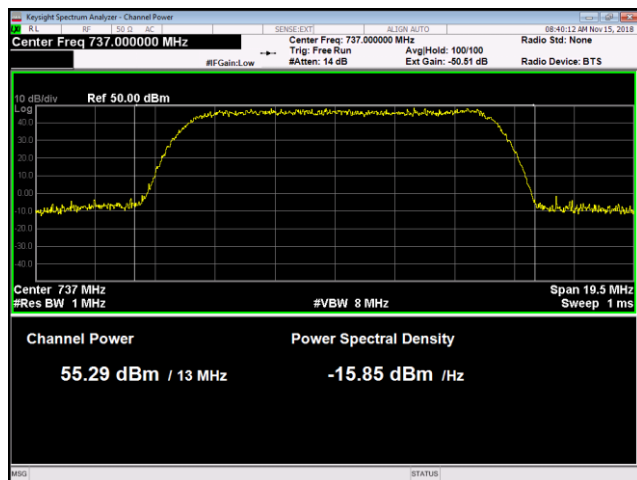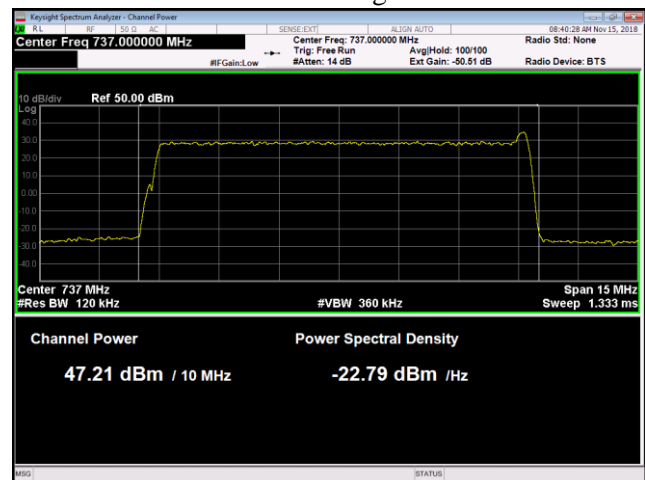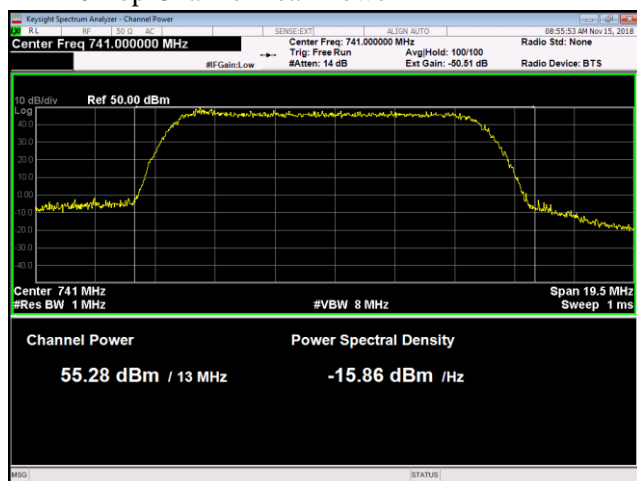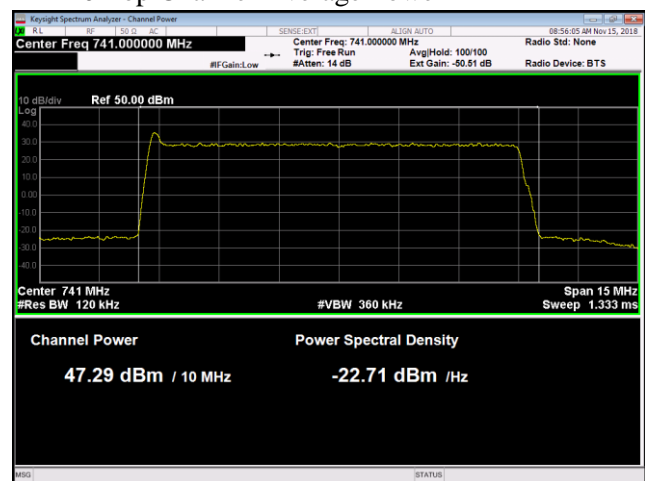LTE10 Top Channel Peak Power


LTE10 Top Channel Average Power

13.2 Emission Bandwidth (26 dB down and 99%)

| LTE Bandwidth | Emission Bandwidth Band 12 NB IoT GB (Lower) | | | | | |
| | Bottom Channel | | Middle Channel | | Top Channel | |
	26dB(MHz)	99% (MHz)	26dB(MHz)	99% (MHz)	26dB(MHz)	99% (MHz)
10MHz	9.79	9.23	9.81	9.24	9.80	9.23

| LTE Bandwidth | Emission Bandwidth Band 12 NB IoT GB (Upper) | | | | | |
| | Bottom Channel | | Middle Channel | | Top Channel | |
	26dB(MHz)	99% (MHz)	26dB(MHz)	99% (MHz)	26dB(MHz)	99% (MHz)
10MHz	9.80	9.24	9.81	9.24	9.81	9.24

Plots for LTE10 and LTE15 Bandwidths + NB-IoT-GB in the Lower Guard Band:
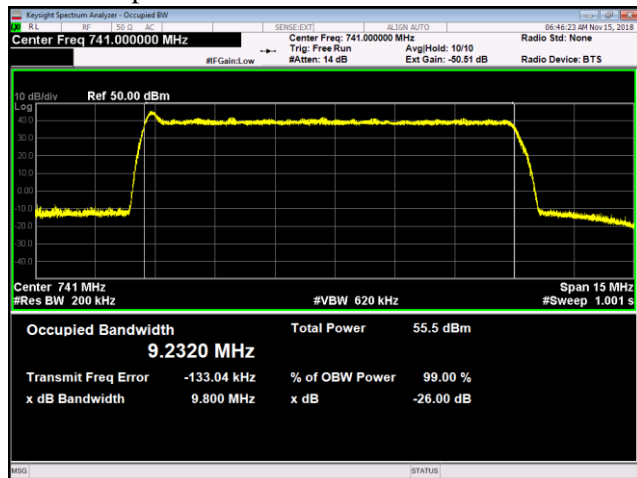
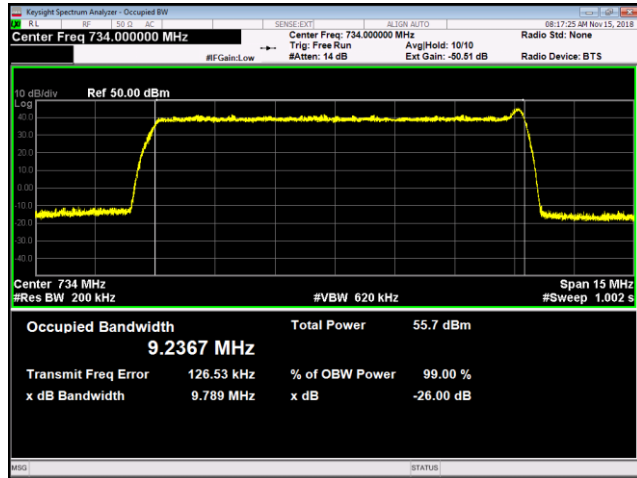LTE10 Bottom Channel
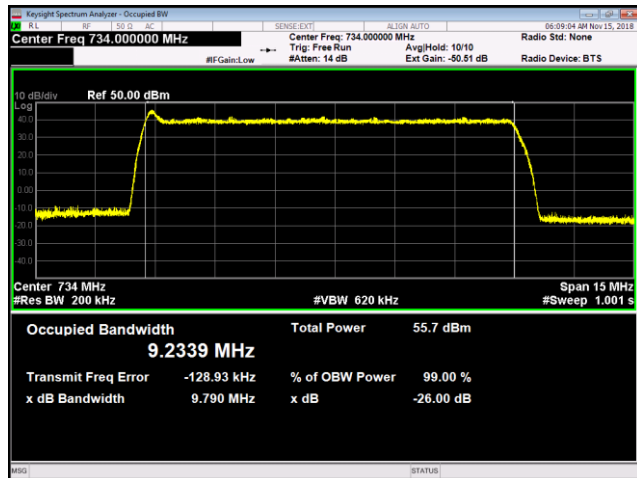
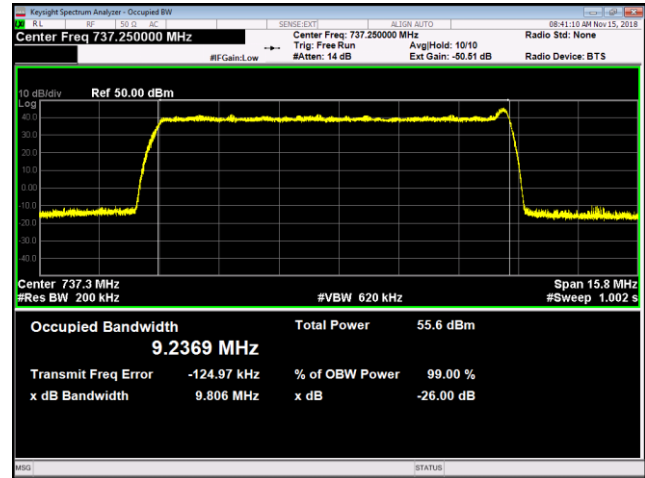LTE10 Middle Channel
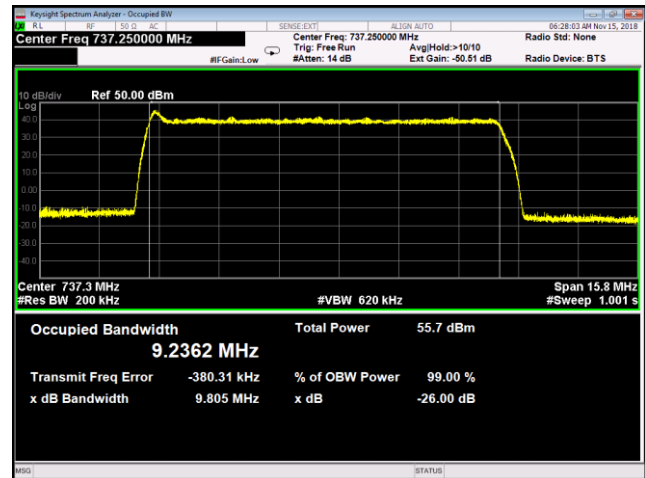
LTE10 Top Channel

Plots for LTE10 and LTE15 Bandwidths + NB-IoT-GB in the Upper Guard Band:
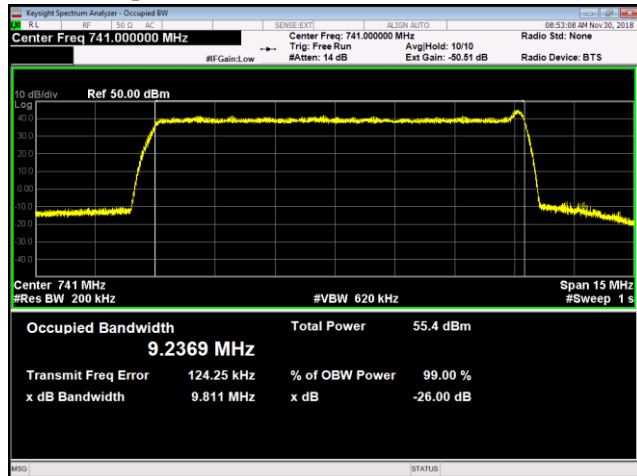
LTE10 Bottom Channel

LTE10 Middle Channel

LTE10 Top Channel

13.3 Antenna Port Conducted Band Edge

Conducted band edge measurements were made at AHLOA RRH antenna port 4. The AHLOA was operated at the band edge frequencies with a single NB IoT GB carrier for 10MHz LTE bandwidth.

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

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

The total measurement RF path loss of the test setup (attenuator and test cables) was 50.51 dB and is accounted for by the spectrum analyzer external gain offset.

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

| LTE BW	NB IoT Guardband Placement	Bottom Channel (dBm)	Top Channel (dBm)
10 MHz	Lower	-24.92	-24.68
10 MHz	Upper	-25.95	-22.50

Conducted band edge measurements are provided in the following pages. Captions are marked with LBE for lower band edge and UBE for upper band edge.

LTE10 + Lower NB IoT GB Carrier Band Edge Plots:
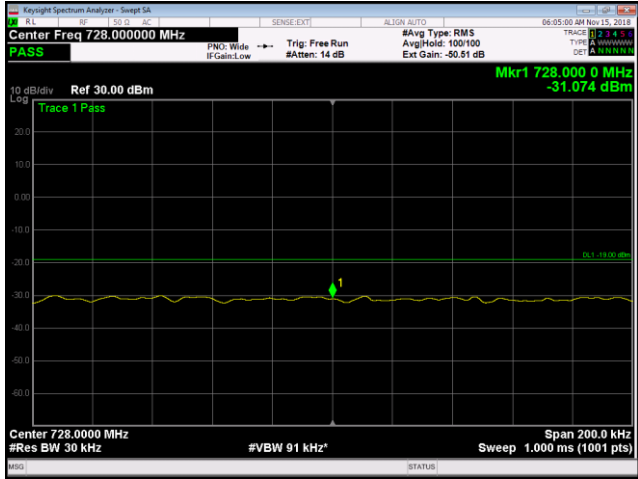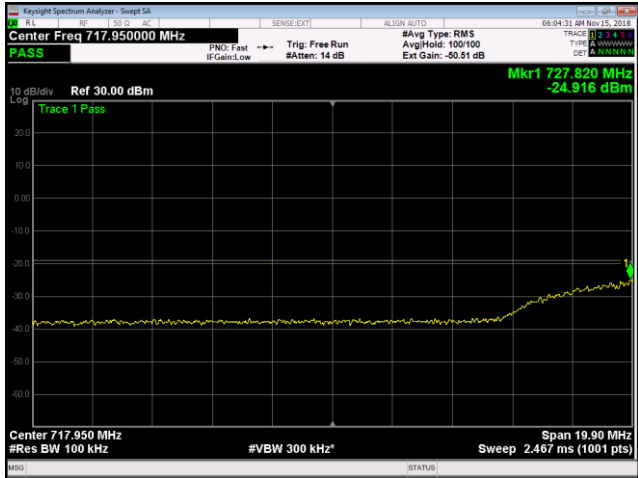
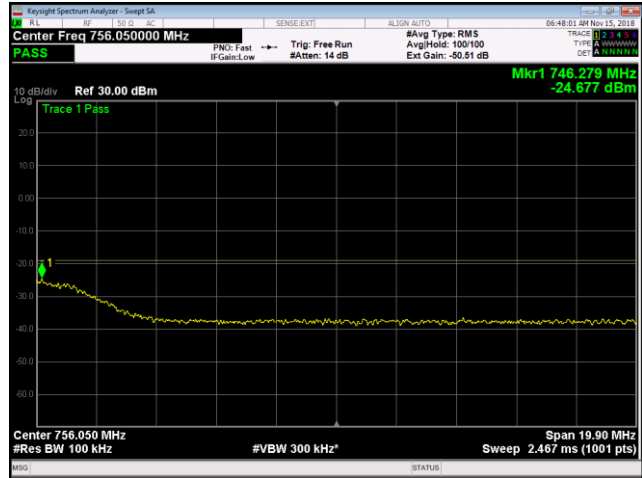LTE10 Bottom Channel LBE 727.9MHz to 728.1MHz

LTE10 Top Channel UBE 745.9MHz to 746.1MHz
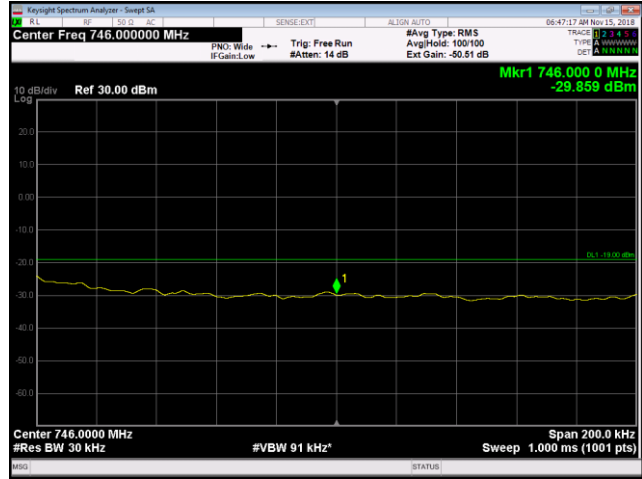
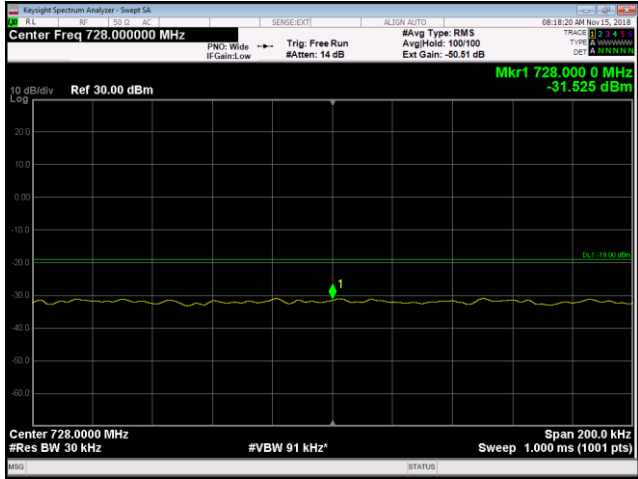LTE10 Bottom Channel LBE 708MHz to 727.9MHz
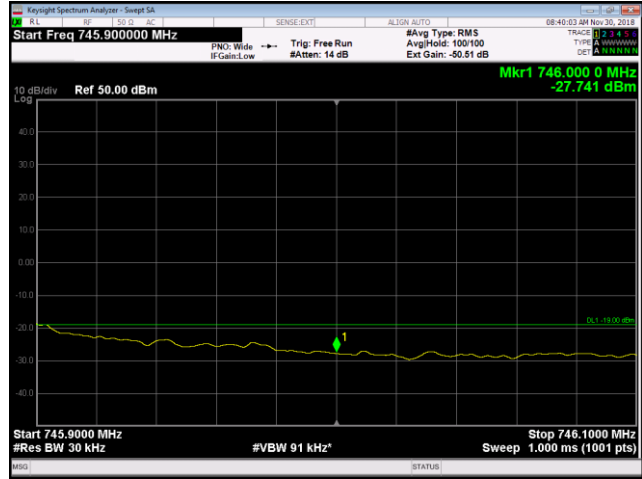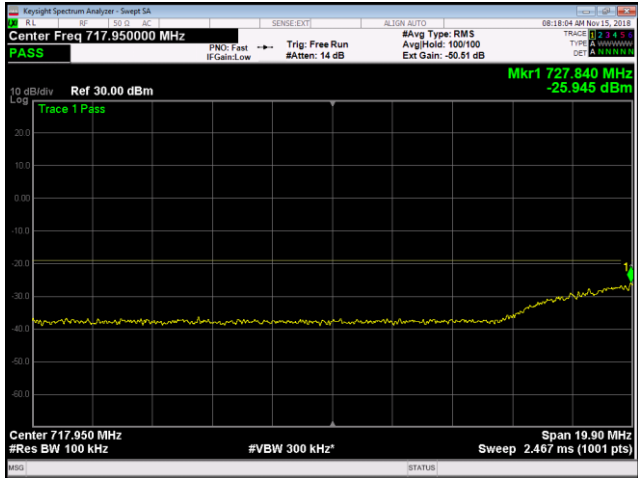

LTE10 Top Channel UBE 746.1MHz to 766MHz

LTE10 + Upper NB IoT GB Carrier Band Edge Plots:
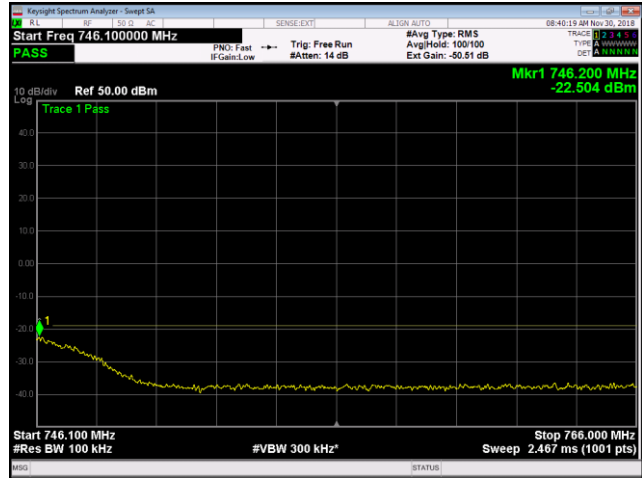
LTE10 Bottom Channel LBE 727.9MHz to 728.1MHz

LTE10 Top Channel UBE 745.9MHz to 746.1MHz

LTE10 Bottom Channel LBE 708MHz to 727.9MHz

LTE10 Top Channel UBE 746.1MHz to 766MHz

13.4 Transmitter Antenna Port Conducted Emissions

Transmitter conducted spurious emissions measurement were made at AHLOA RRH antenna port 4 across the range 9kHz-10GHz. The AHLOA was operated on bottom, middle and top channels with a single NB IoT GB carrier with LTE bandwidth of 10MHz at maximum port power. The Keysight PSA E4440A was used to measure frequencies below 10MHz because of the lower noise floor in that frequency range, and the MXA N2090A was used to measure from 10MHz to 10GHz. The total measurement RF path loss of the test setup (attenuators, high pass filter and test cables) was accounted for by the spectrum analyzer reference level offset (see table below).

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

Frequency Range	RBW (KHz)	VBW (KHz)	Detector/Avg Type	Sweep Time	Path Loss (dB)
9KHz to 150KHz	1	3	RMS Avg	Auto	24.52
150KHz to 10MHz	100	300	RMS Avg	Auto	24.74
10-597 MHz	100	300	RMS Avg	Auto	49.43
597-766 MHz	100	300	RMS Avg	Auto	50.51
766-2000 MHz	100	300	RMS Avg	Auto	50.66
2GHz to 6GHz	100	300	RMS Avg	Auto	51.63
6GHz to 10GHz	100	300	RMS Avg	Auto	53.39

LTE10 Bottom Channel (734MHz) NB IoT at lower Guard Band:
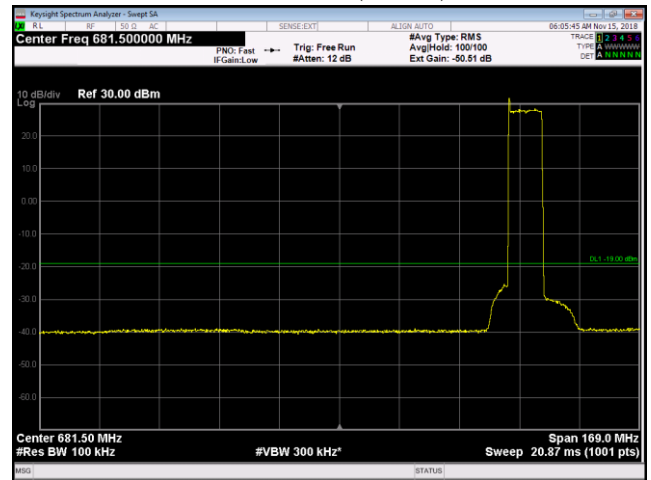
LTE10 Bottom+NB IoT GB (Lower) 9-150KHz
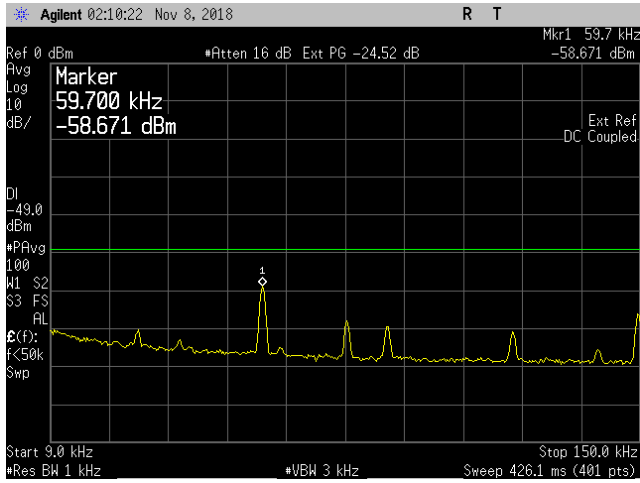
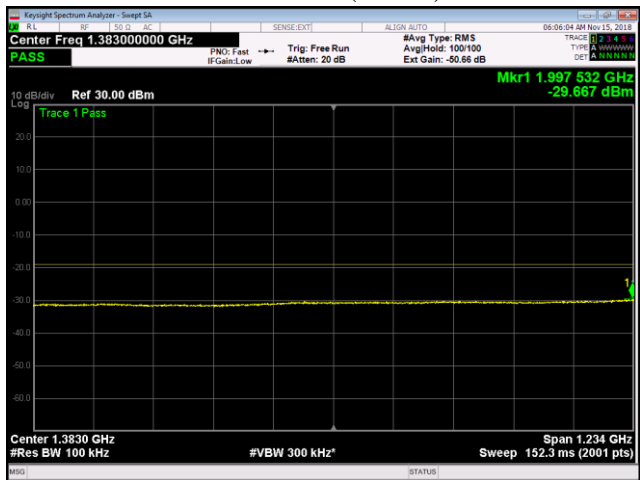LTE10 Bottom+NB IoT GB (Lower) 150KHz-10MHz
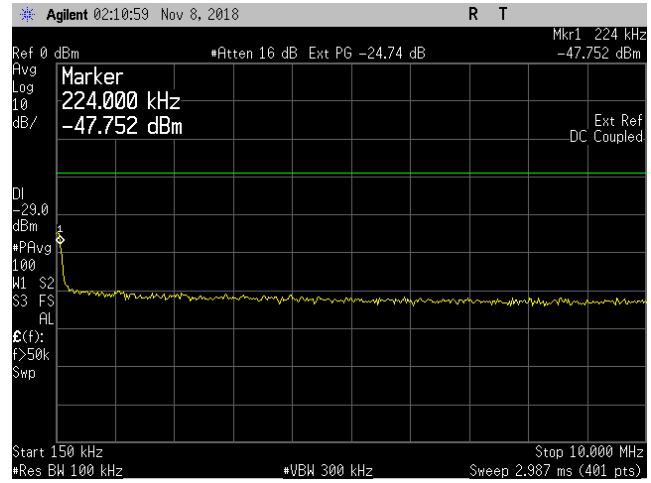
LTE10 Bottom+NB IoT GB (Lower) 10MHz-597MHz
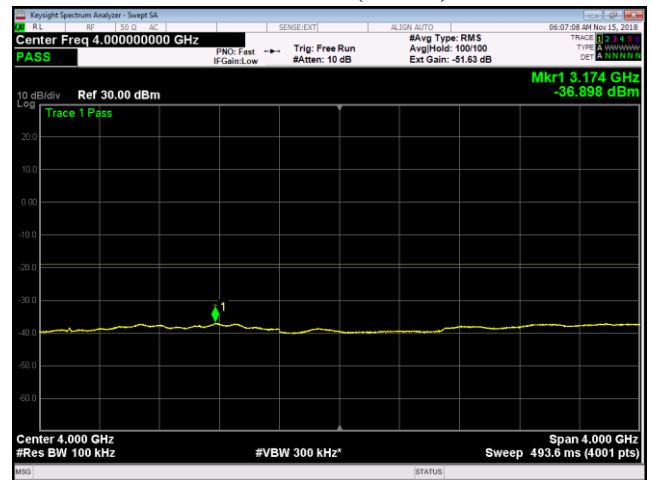

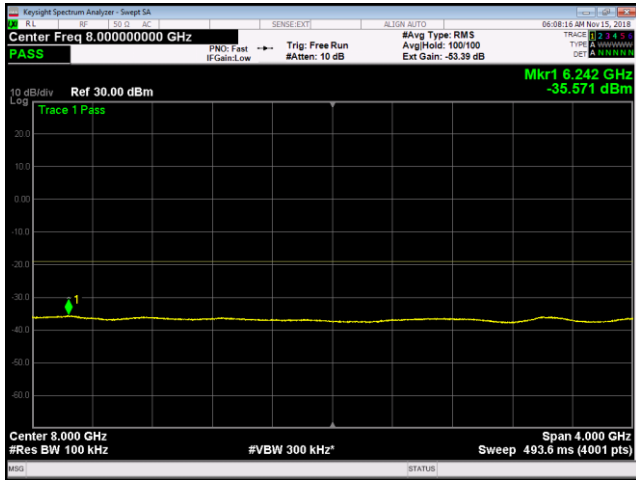LTE10 Bottom+NB IoT GB (Lower) 597MHz-766MHz

LTE10 Bottom+NB IoT GB (Lower) 766MHz-2GHz

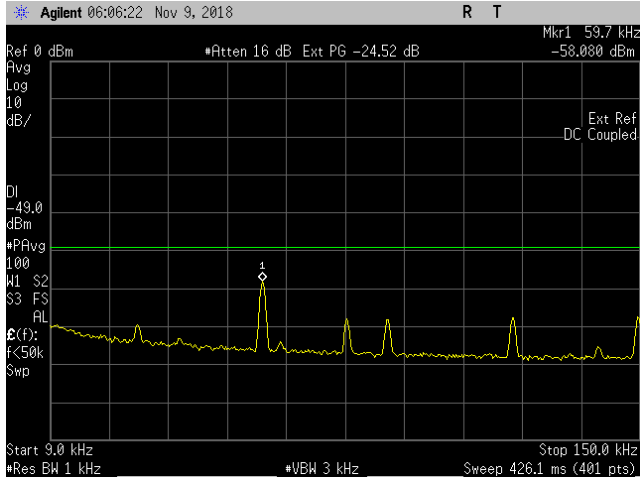LTE10 Bottom+NB IoT GB (Lower) 2GHz-6GHz
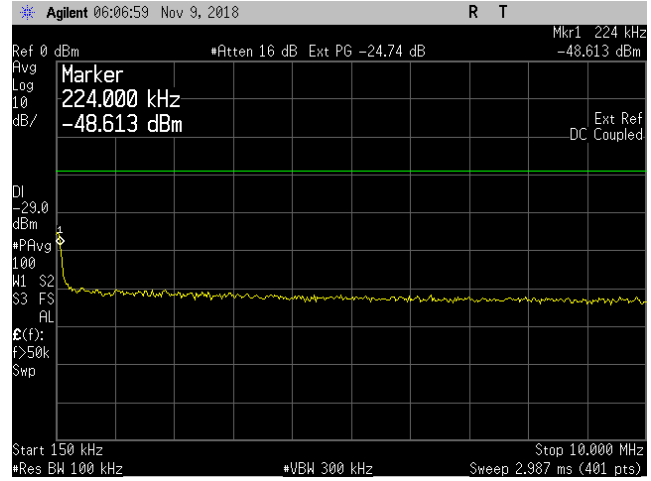
LTE10 Bottom+NB IoT GB (Lower) 6GHz-10GHz

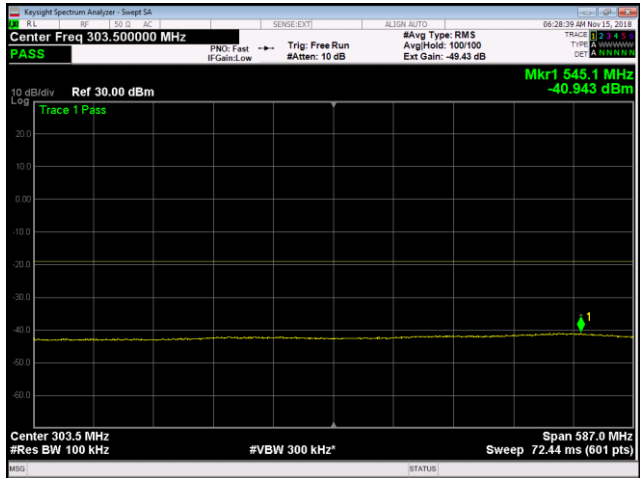**LTE10 Middle Channel (737MHz) NB IoT at lower Guard Band:**
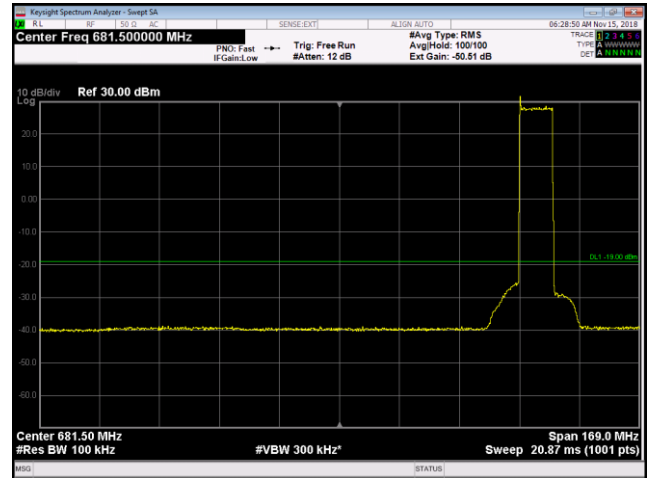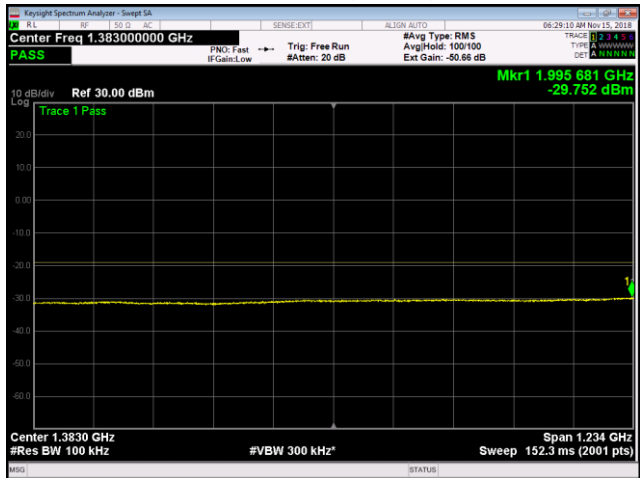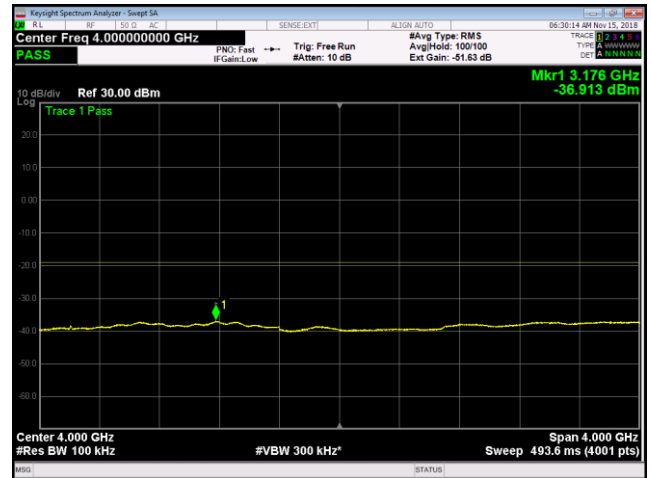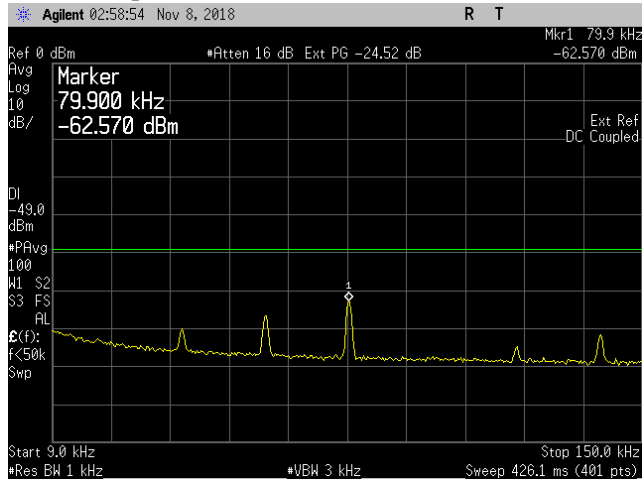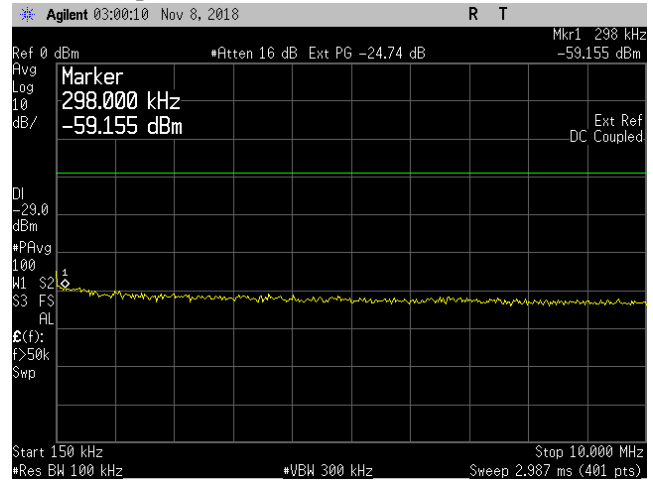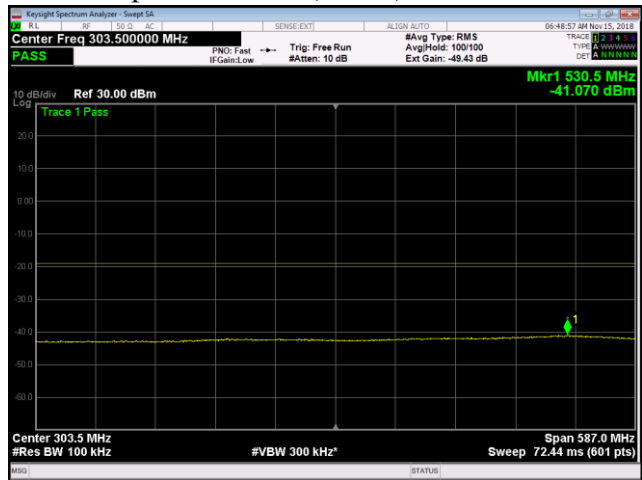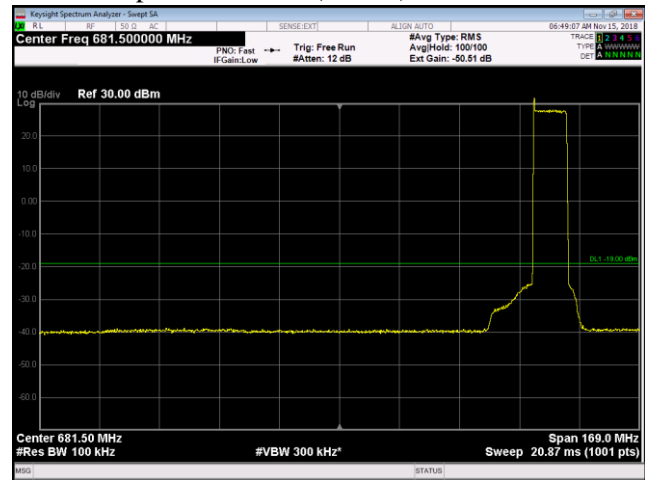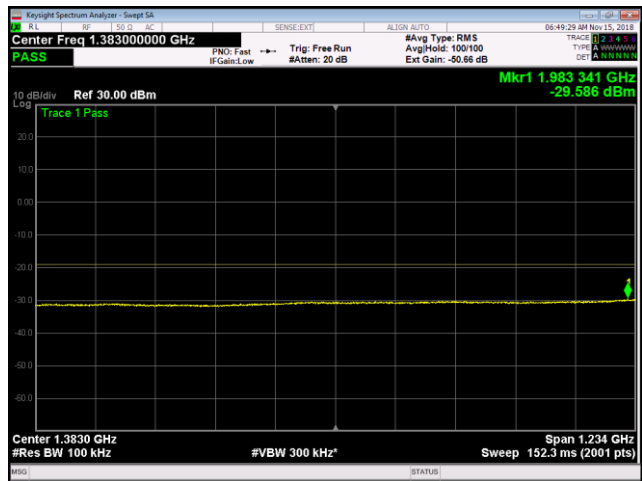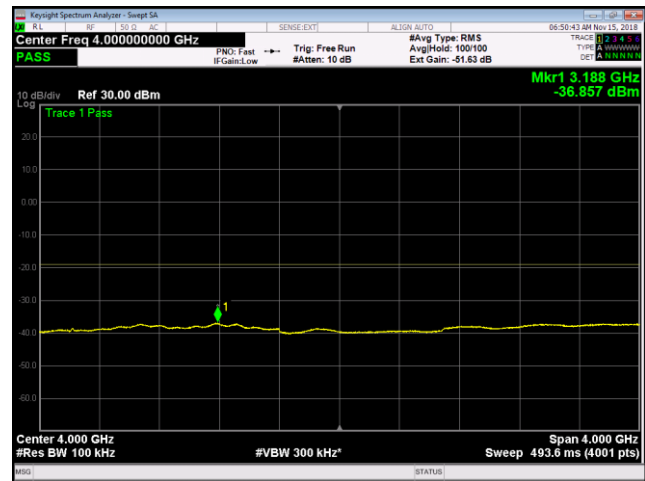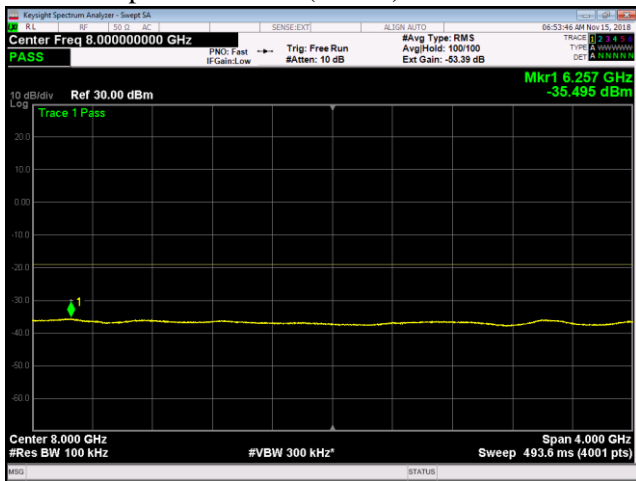
LTE10 Middle+NB IoT GB (Lower) 9-150KHz

LTE10 Middle+NB IoT GB (Lower) 150KHz-10MHz

LTE10 Middle+NB IoT GB (Lower) 10MHz-597MHz

LTE10 Middle+NB IoT GB (Lower) 597MHz-766MHz

LTE10 Middle+NB IoT GB (Lower) 766MHz-2GHz
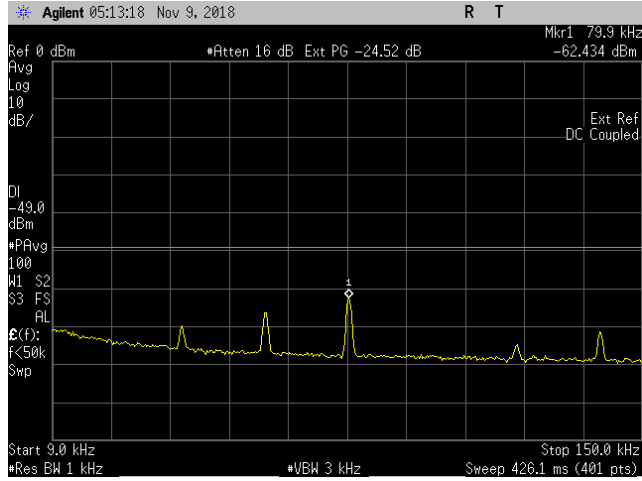

LTE10 Middle+NB IoT GB (Lower) 2GHz-6GHz

LTE10 Middle+NB IoT GB (Lower) 6GHz-10GHz
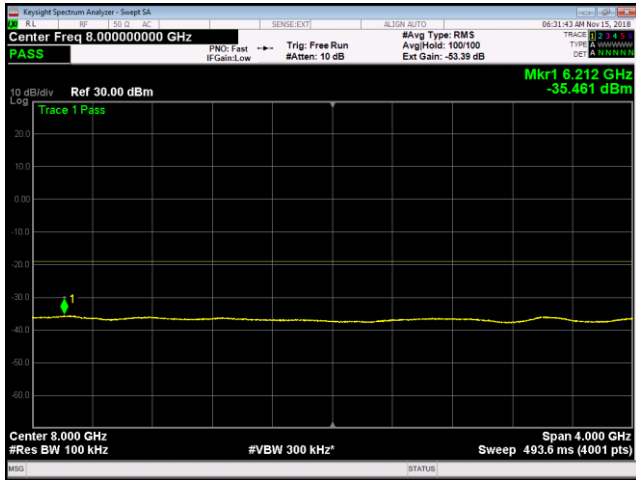
LTE10 Top Channel (741MHz) NB IoT at lower Guard Band:

LTE10 Top+NB IoT GB (Lower) 9-150KHz

LTE10 Top+NB IoT GB (Lower) 150KHz-10MHz

LTE10 Top+NB IoT GB (Lower) 10MHz-597MHz

LTE10 Top+NB IoT GB (Lower) 597MHz-766MHz

LTE10 Top+NB IoT GB (Lower) 766MHz-2GHz

LTE10 Top+NB IoT GB (Lower) 2GHz-6GHz
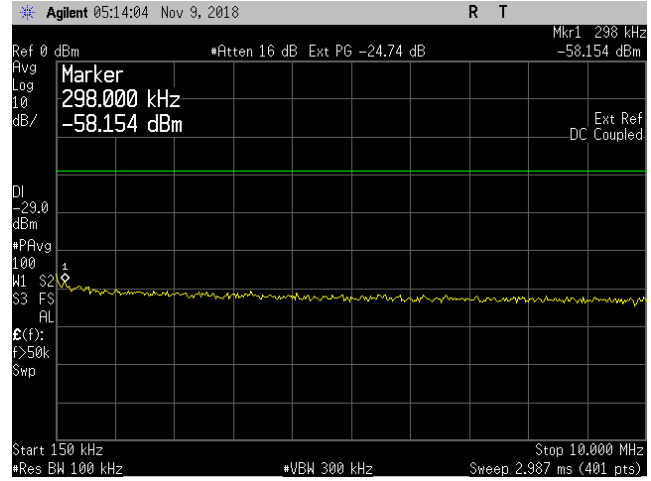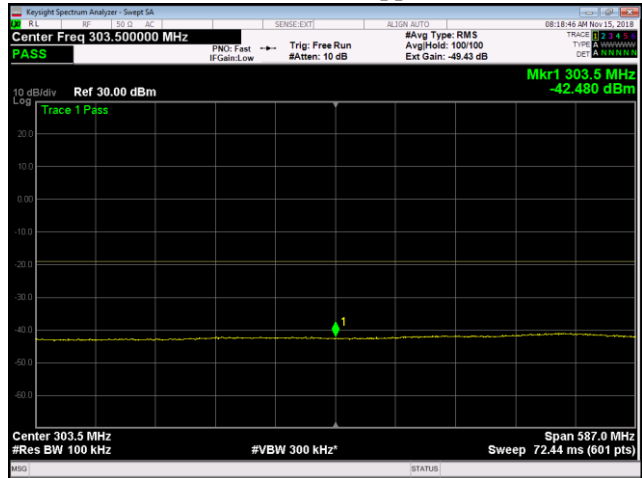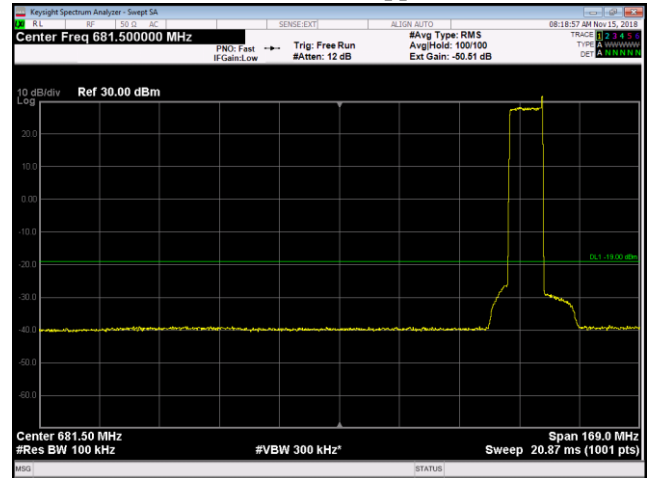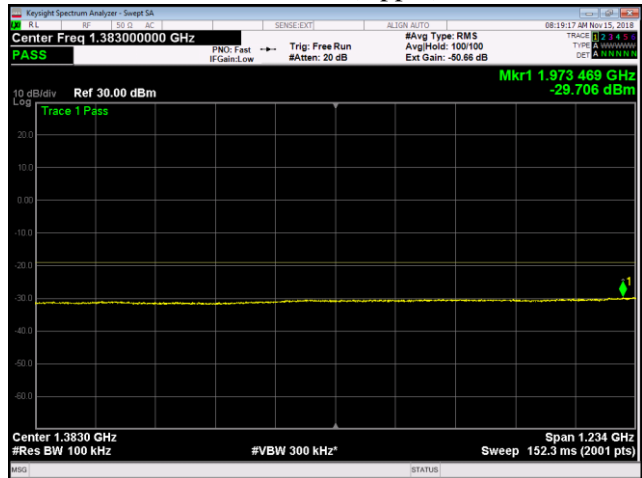
LTE10 Top+NB IoT GB (Lower) 6GHz-10GHz

LTE10 Bottom Channel (734MHz) NB IoT at Upper Guard Band:

LTE10 Bottom+NB IoT GB (Upper) 9-150KHz

LTE10 Bottom+NB IoT GB (Upper) 150KHz-10MHz

LTE10 Bottom+NB IoT GB (Upper) 10MHz-597MHz
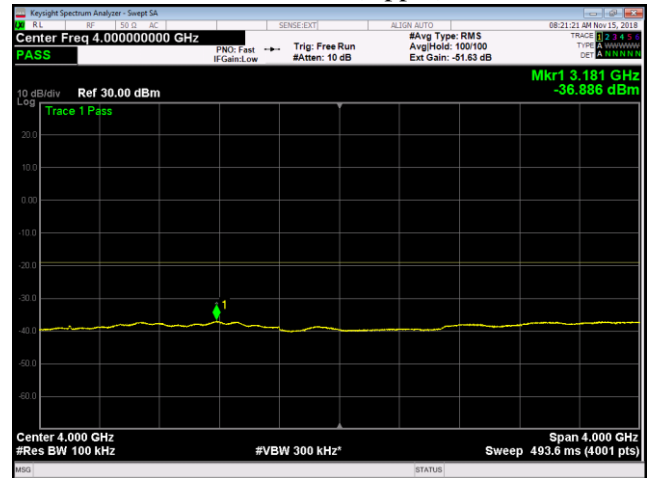

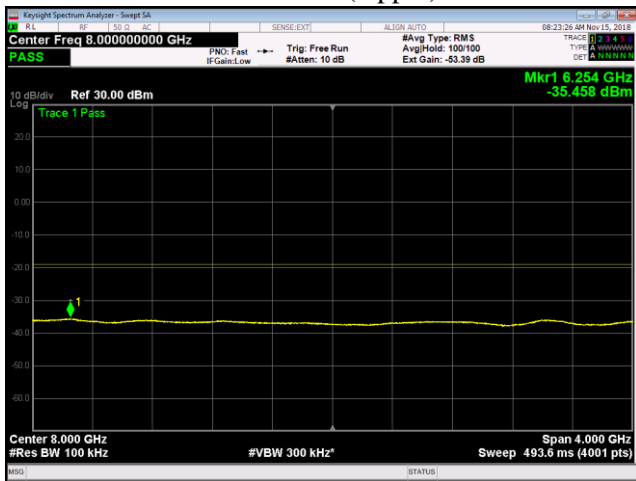LTE10 Bottom+NB IoT GB (Upper) 597MHz-766MHz

LTE10 Bottom+NB IoT GB (Upper) 766MHz-2GHz

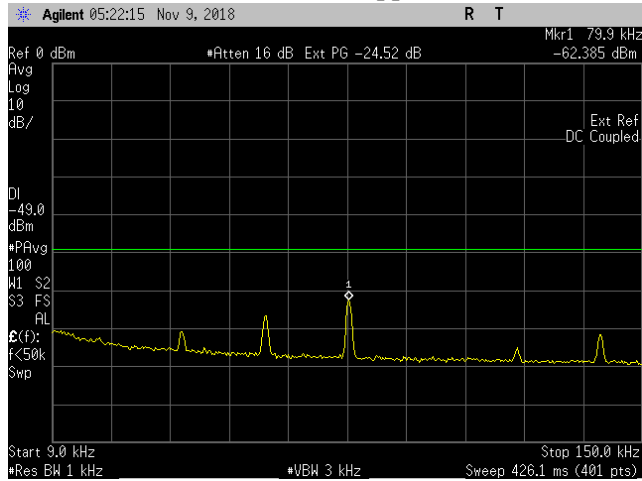LTE10 Bottom+NB IoT GB (Upper) 2GHz-6GHz

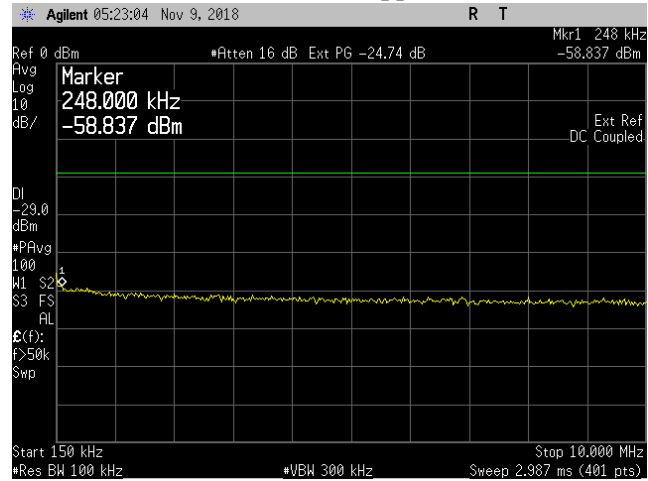LTE10 Bottom+NB IoT GB (Upper) 6GHz-10GHz

LTE10 Middle Channel (737MHz) NB IoT at Upper Guard Band:
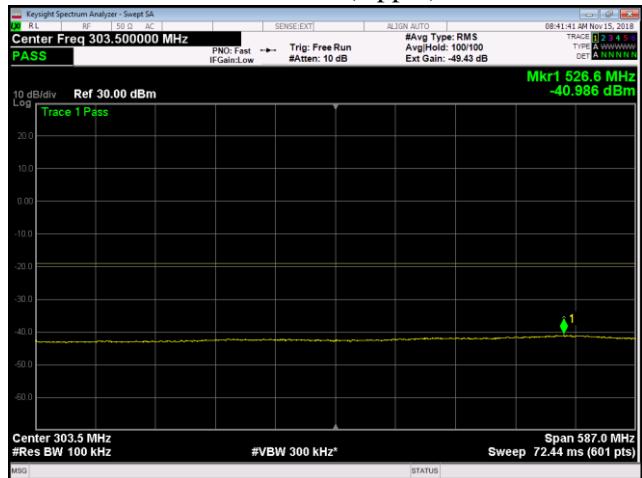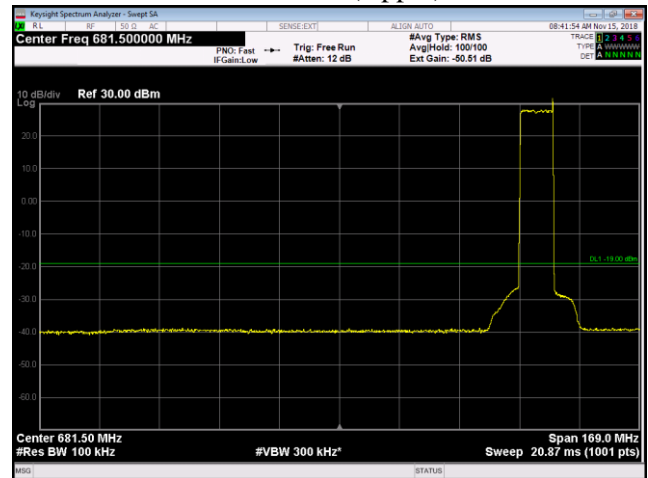
LTE10 Middle+NB IoT GB (Upper) 9-150KHz

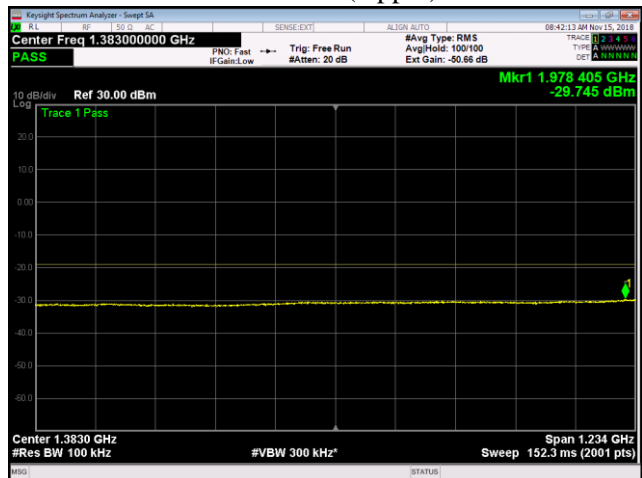LTE10 Middle+NB IoT GB (Upper) 150KHz-10MHz

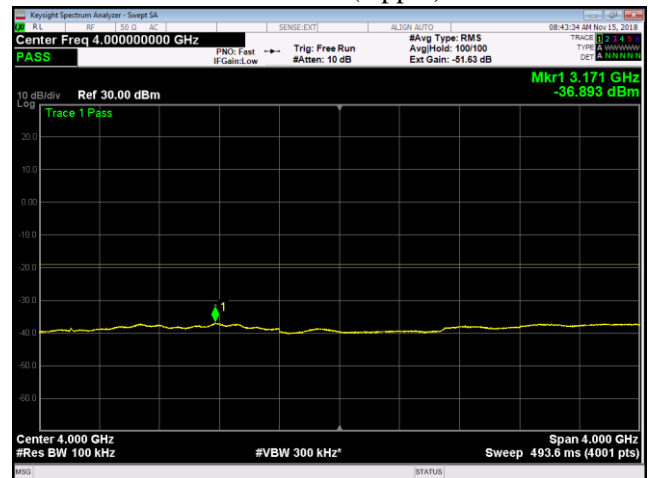LTE10 Middle+NB IoT GB (Upper) 10MHz-597MHz

LTE10 Middle+NB IoT GB (Upper) 597MHz-766MHz

LTE10 Middle+NB IoT GB (Upper) 766MHz-2GHz
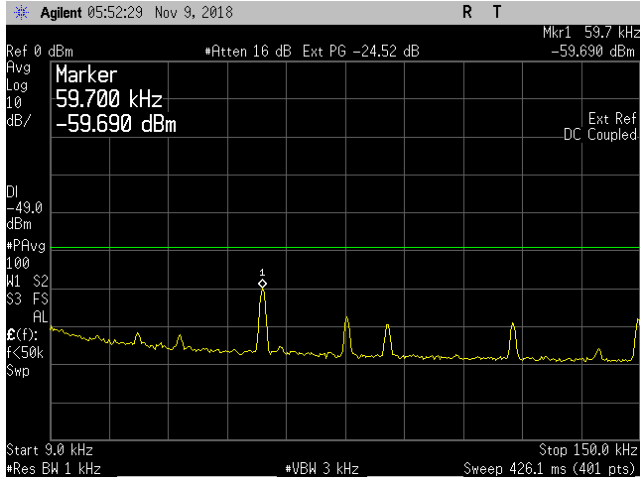

LTE10 Middle+NB IoT GB (Upper) 2GHz-6GHz
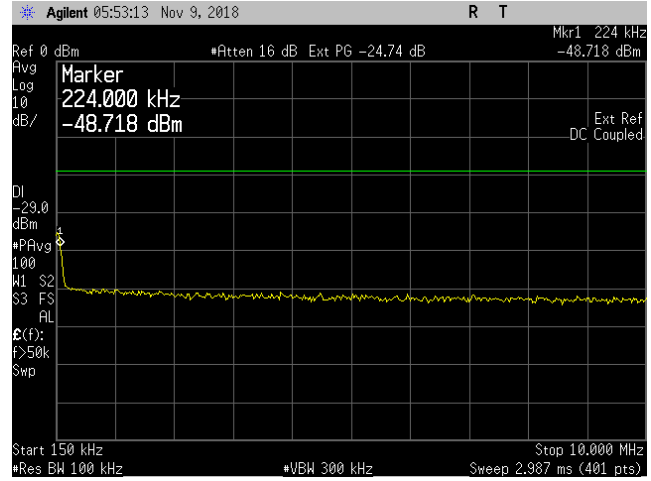
LTE10 Middle+NB IoT GB (Upper) 6GHz-10GHz

LTE10 Top Channel (741MHz) NB IoT at Upper Guard Band:
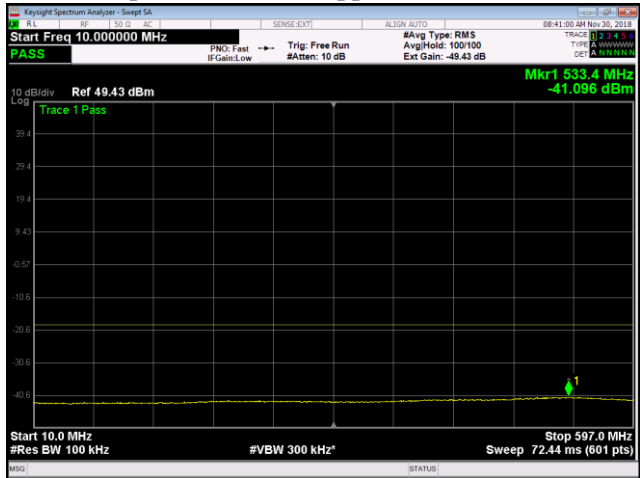
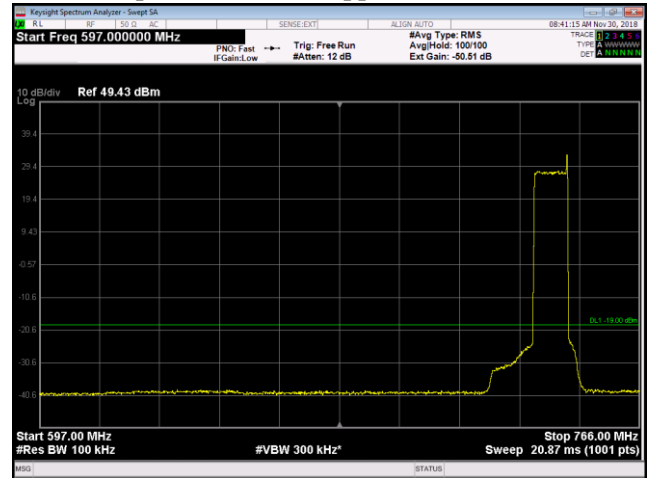LTE10 Top+NB IoT GB (Upper) 9-150KHz

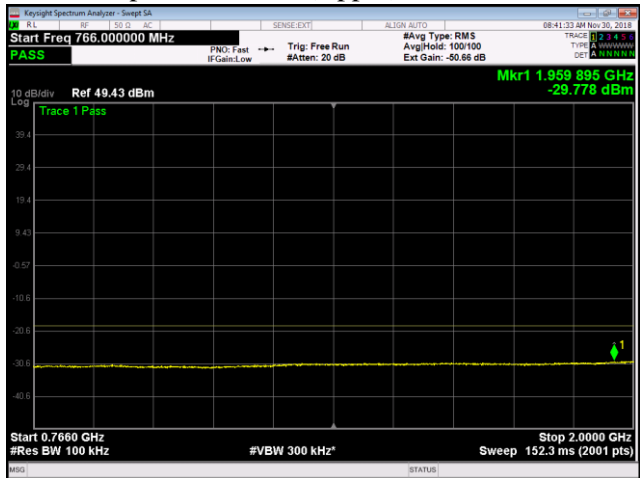LTE10 Top+NB IoT GB (Upper) 150KHz-10MHz
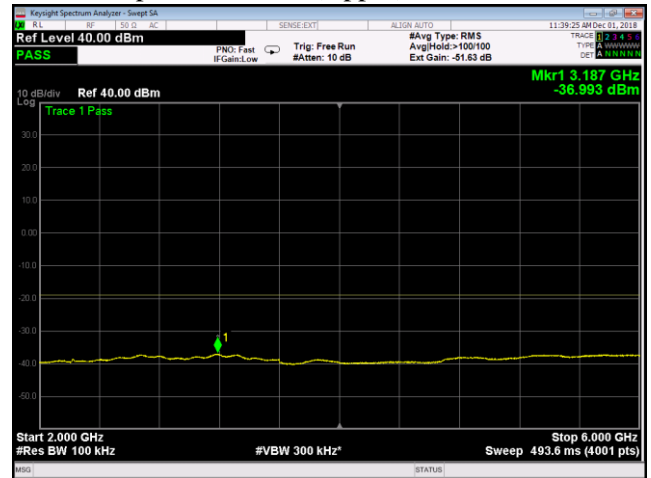

LTE10 Top+NB IoT GB (Upper) 10MHz-597MHz

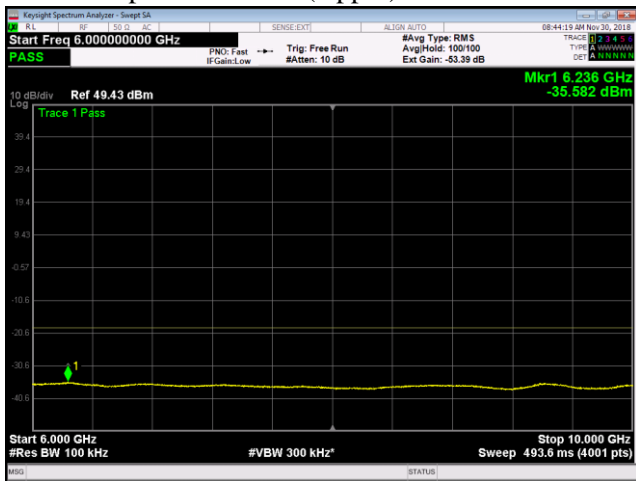LTE10 Top+NB IoT GB (Upper) 597MHz-766MHz

LTE10 Top+NB IoT GB (Upper) 766MHz-2GHz

LTE10 Top+NB IoT GB (Upper) 2GHz-6GHz

LTE10 Top+NB IoT GB (Upper) 6GHz-10GHz

End of Report