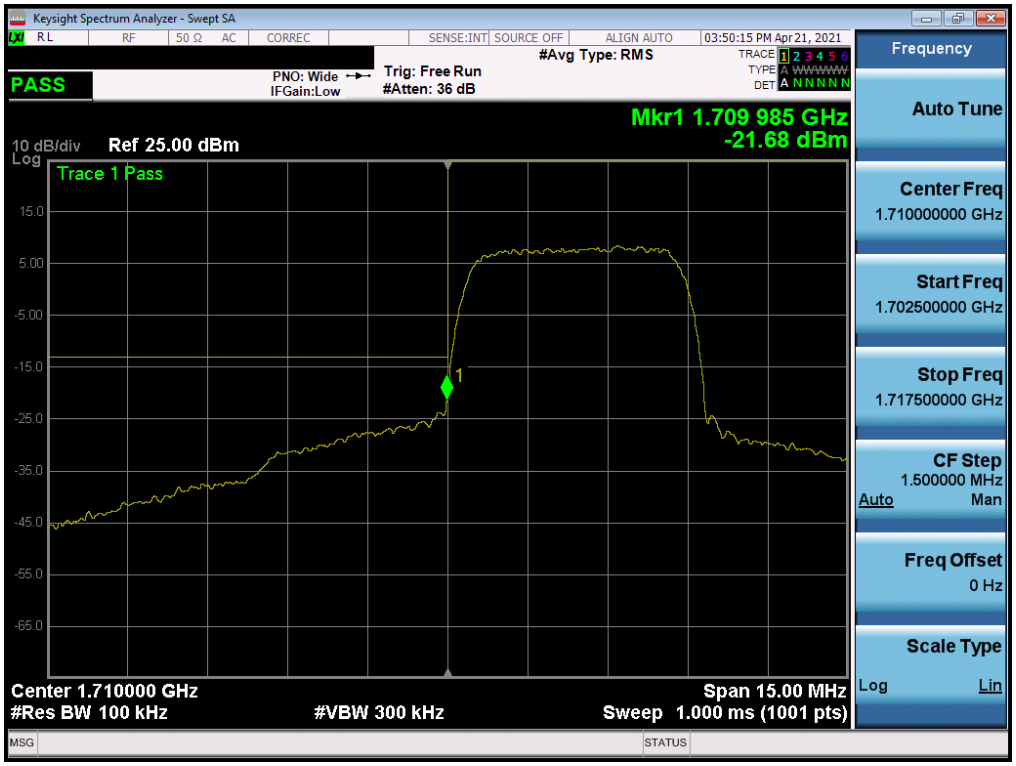
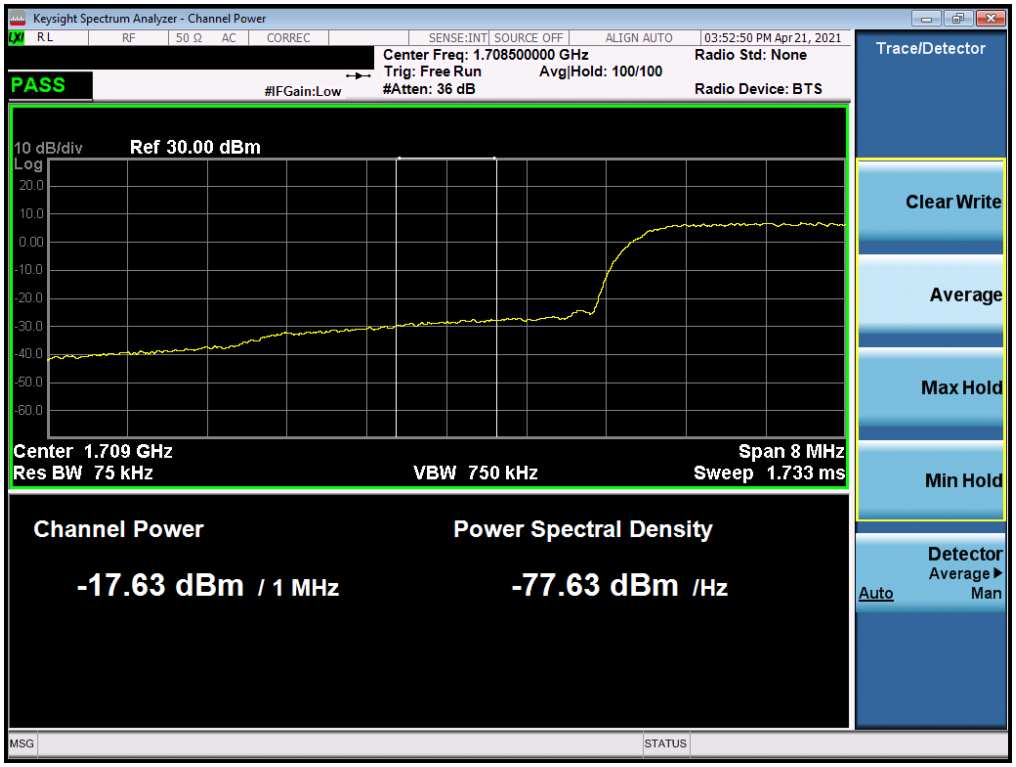
Plot 7-93. Upper Band Edge Plot (LTE Band 13 - 5MHz QPSK – Full RB)

Plot 7-94. Upper Emission Mask Plot (LTE Band 13 - 5MHz QPSK – Full RB)

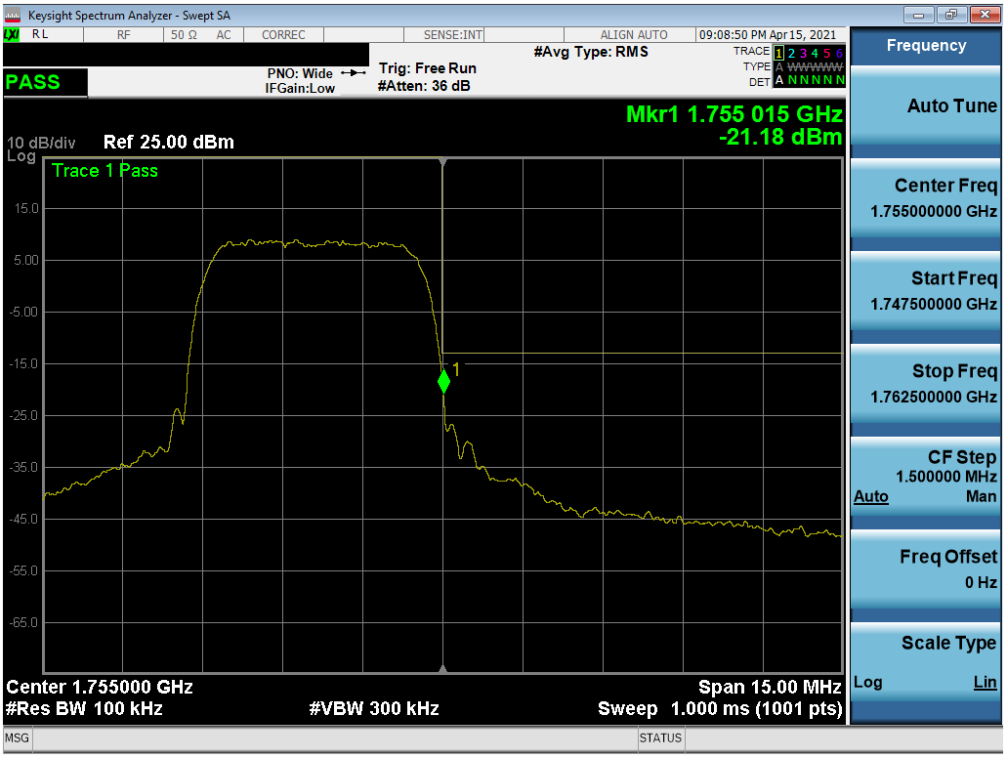
WCDMA AWS



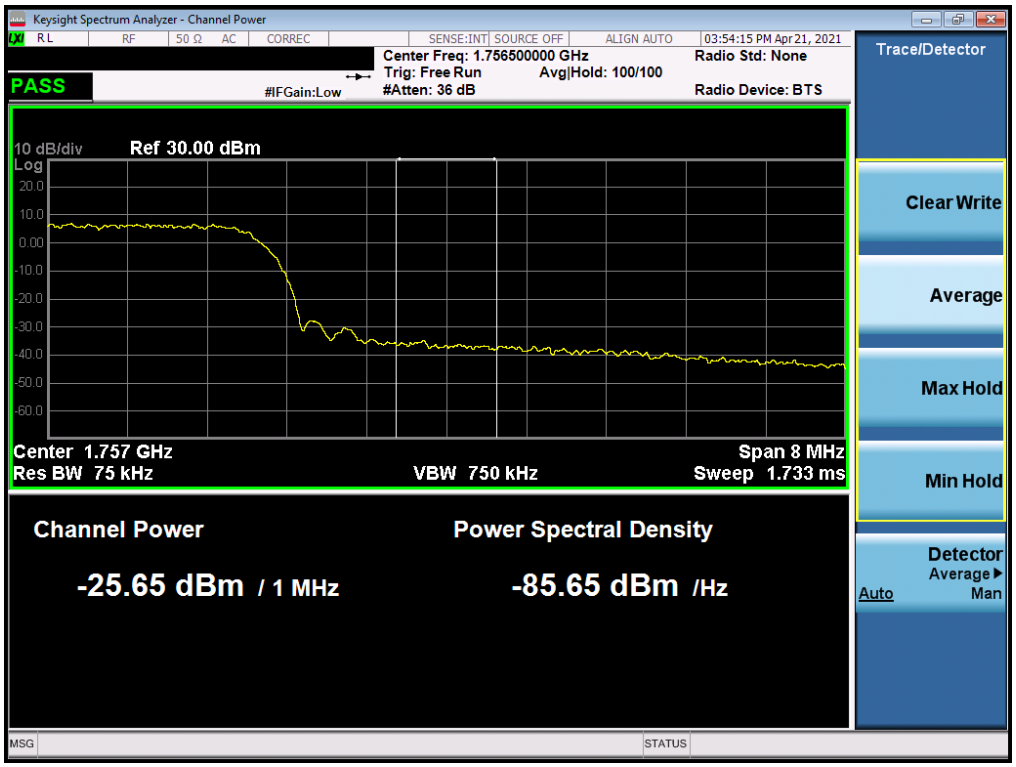
Plot 7-95. Lower Band Edge Plot (WCDMA AWS – Ch. 1312)



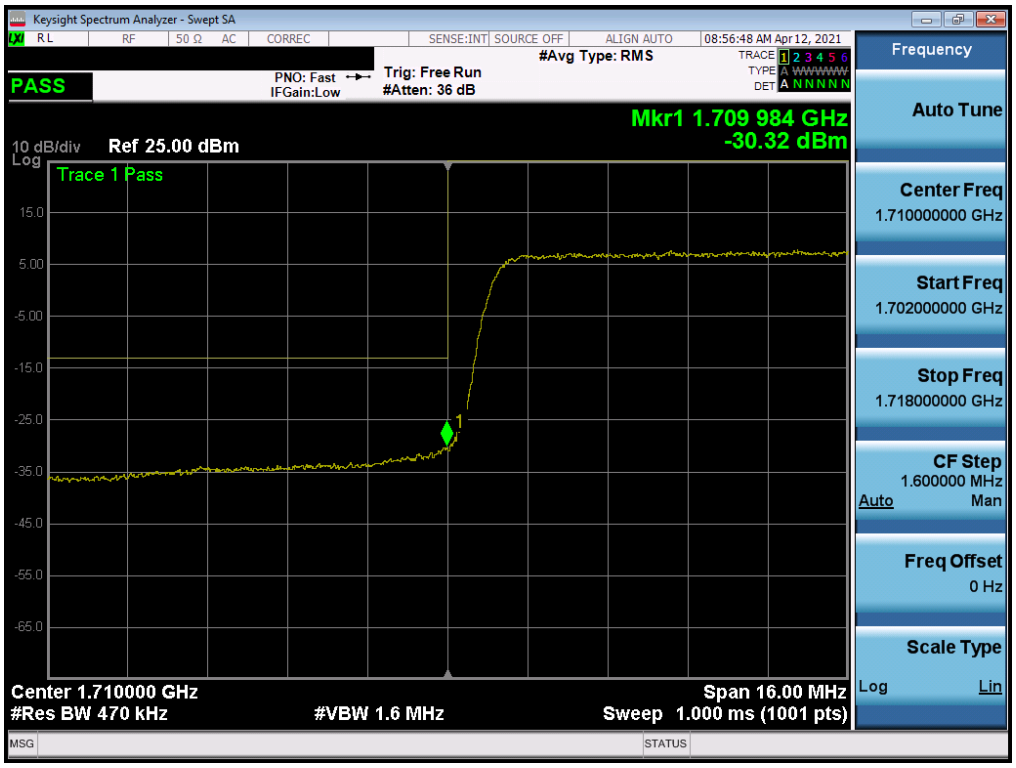
Plot 7-96. Lower Extended Band Edge Plot (WCDMA AWS – Ch. 1312)



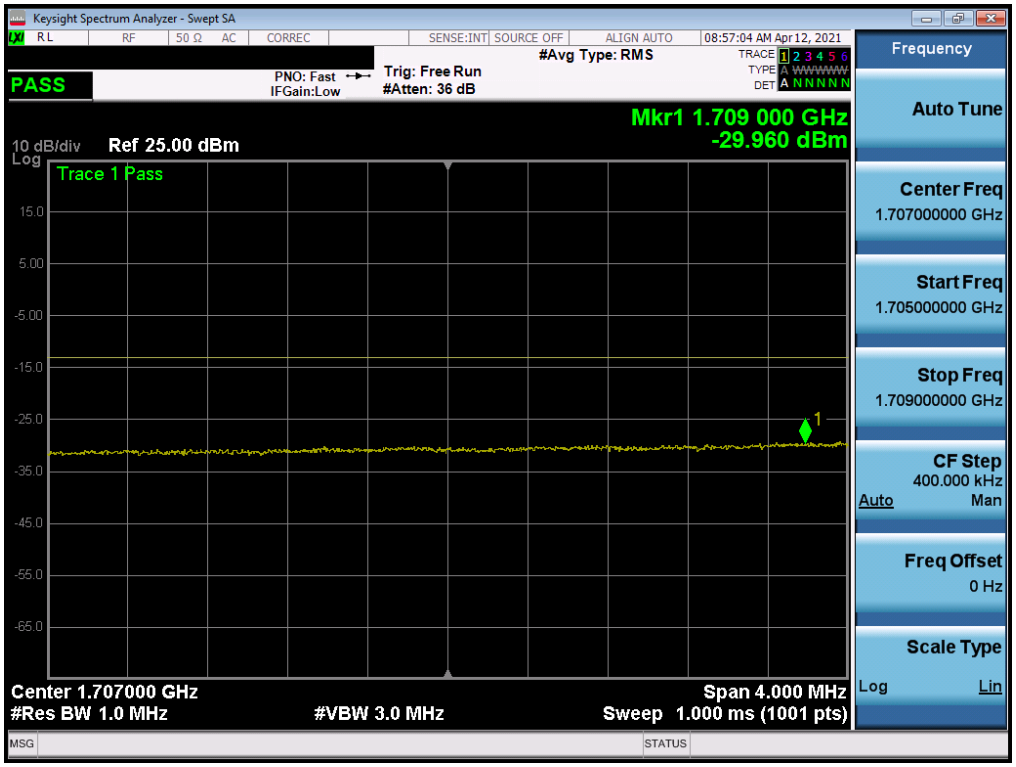
Plot 7-97. Upper Band Edge Plot (WCDMA AWS – Ch. 1513)



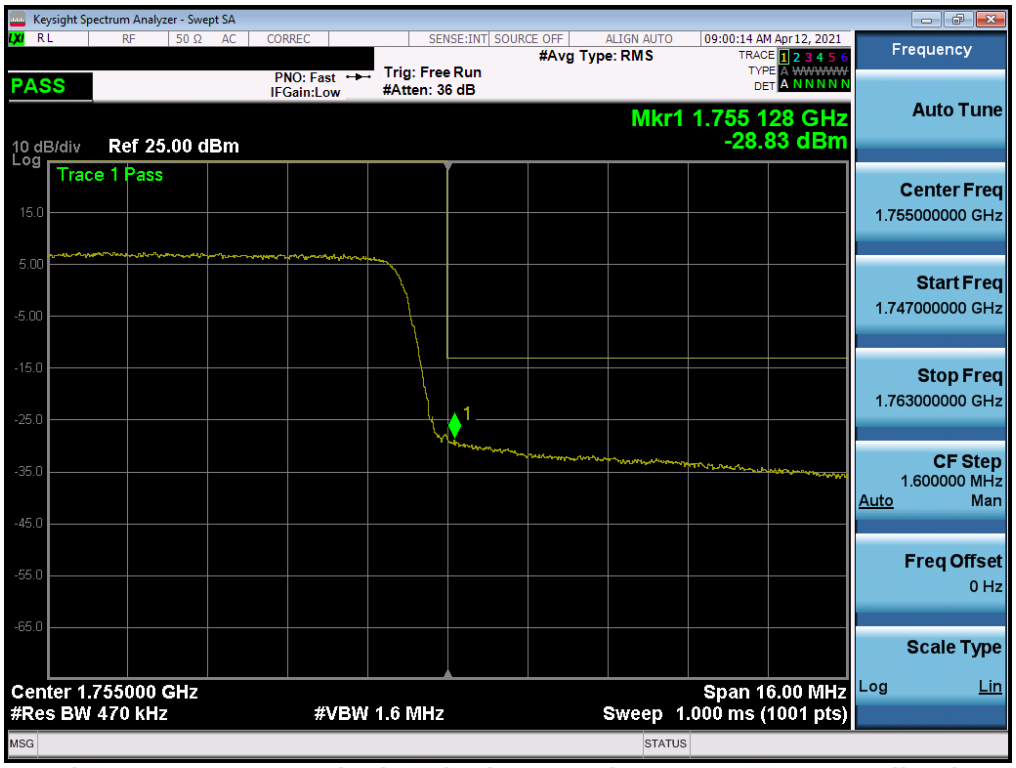
Plot 7-98. Upper Extended Band Edge Plot (WCDMA AWS – Ch. 1513)



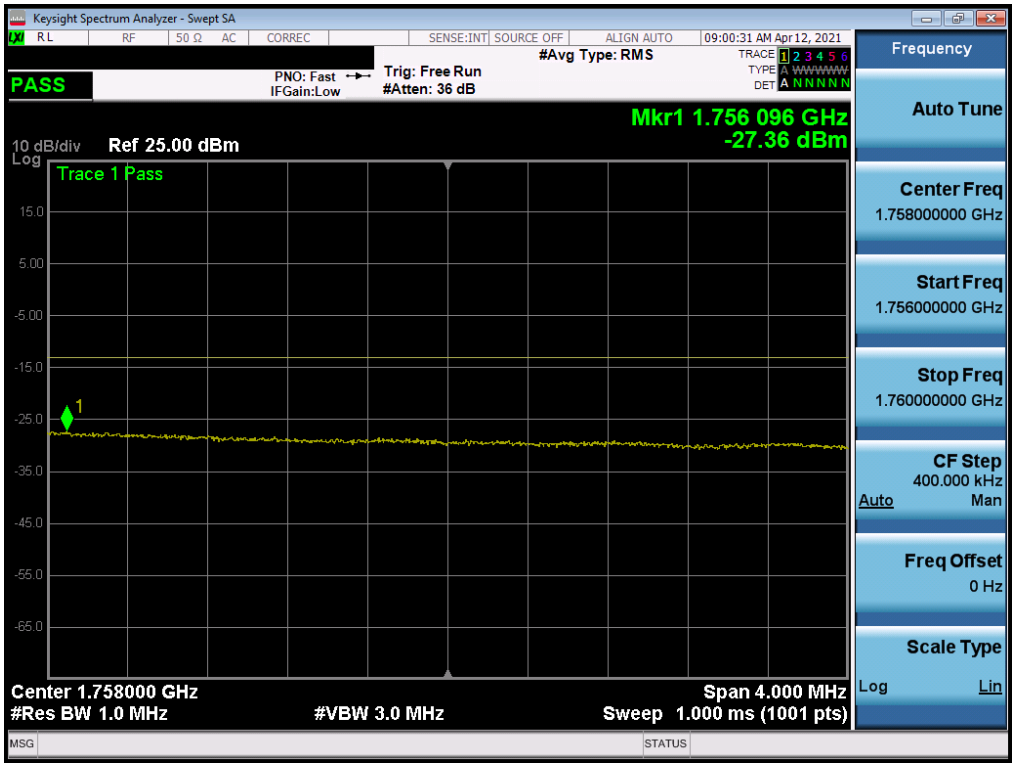
Plot 7-99. Lower Band Edge Plot (LTE Band 66/4 - 20MHz QPSK – Full RB)



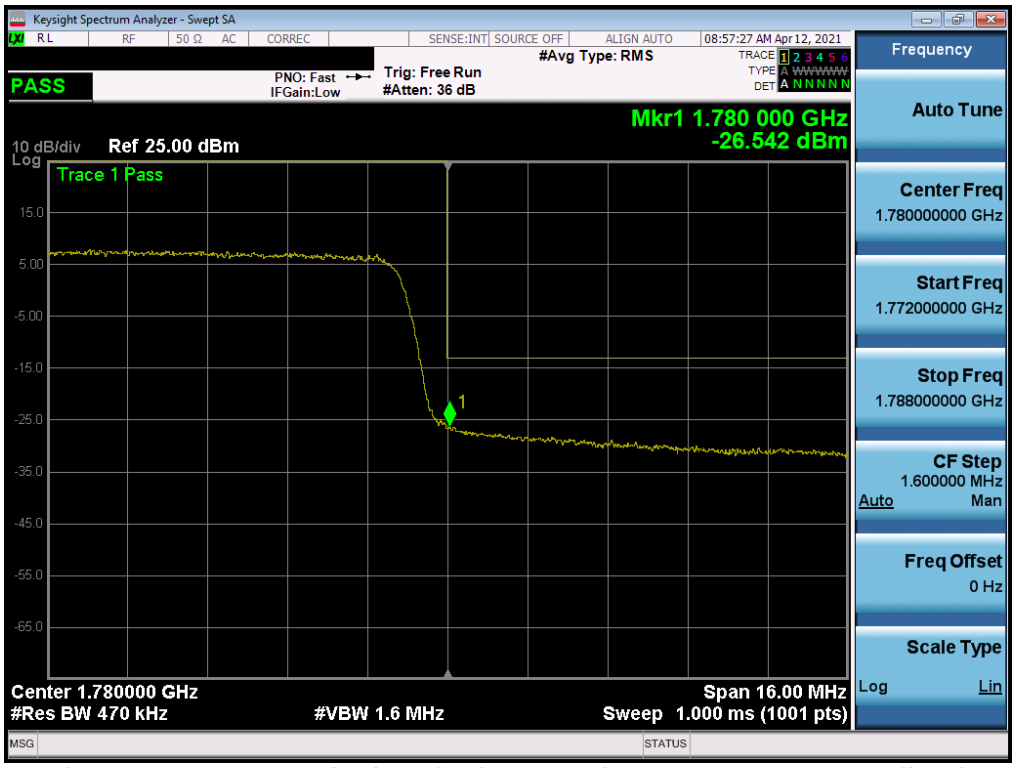
Plot 7-100. Lower Extended Band Edge Plot (LTE Band 66/4 - 20MHz QPSK – Full RB)



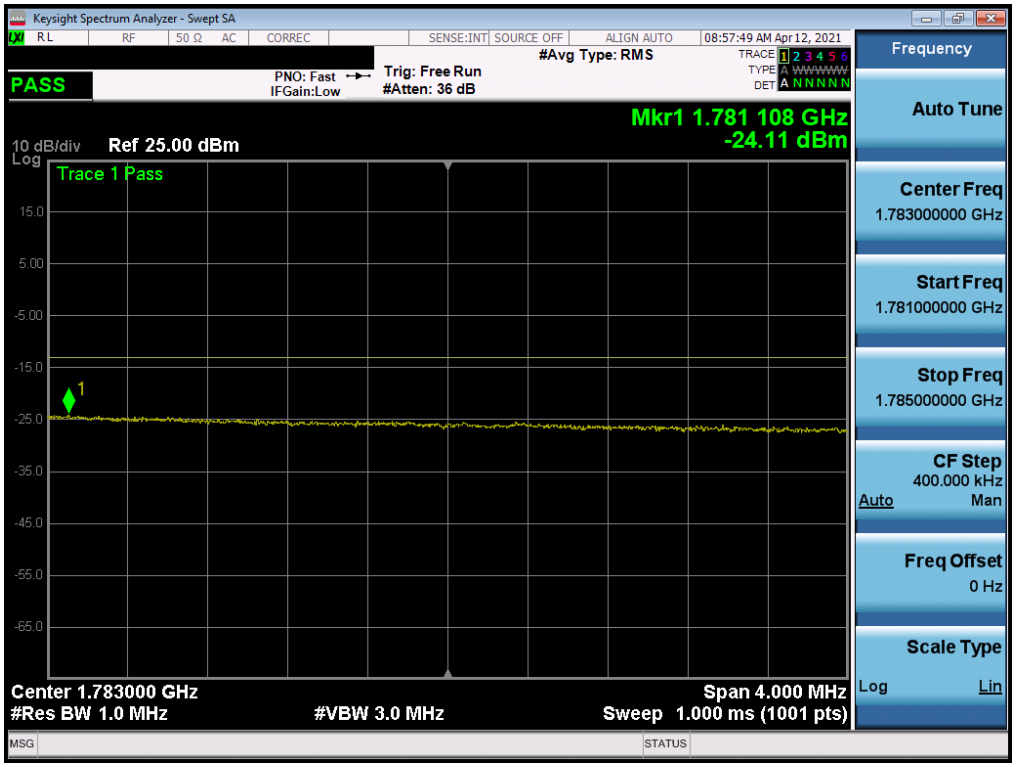
Plot 7-101. Upper Band Edge Plot (LTE Band 4 - 20MHz QPSK – Full RB)



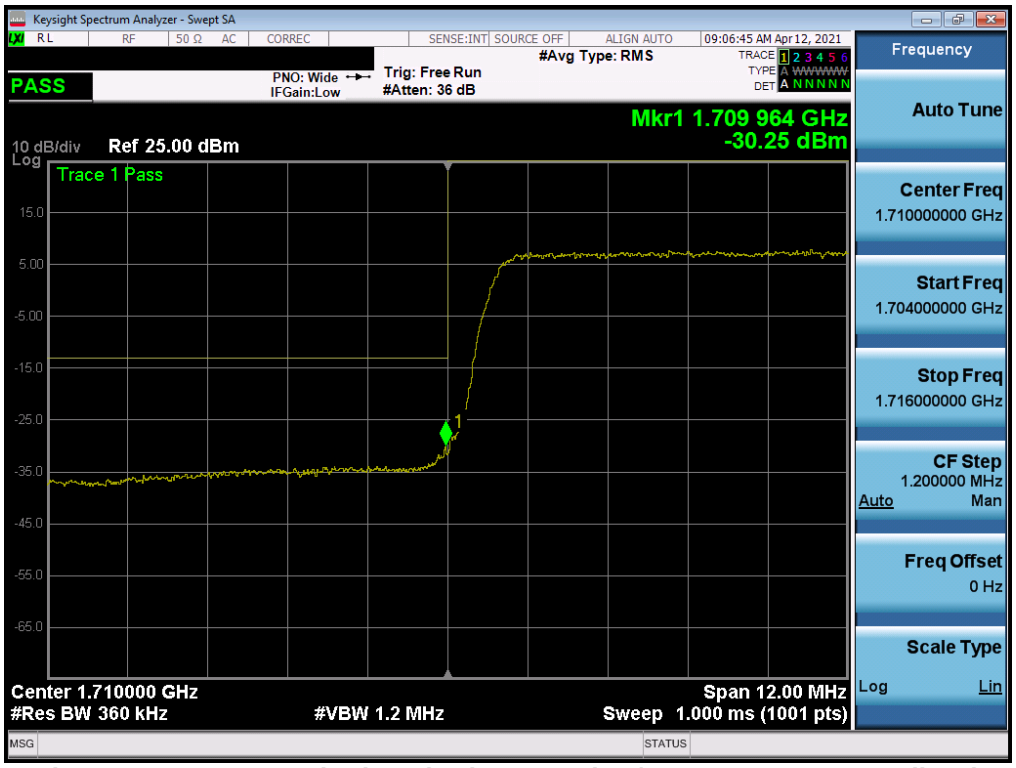
Plot 7-102. Upper Extended Band Edge Plot (LTE Band 4 - 20MHz QPSK – Full RB)



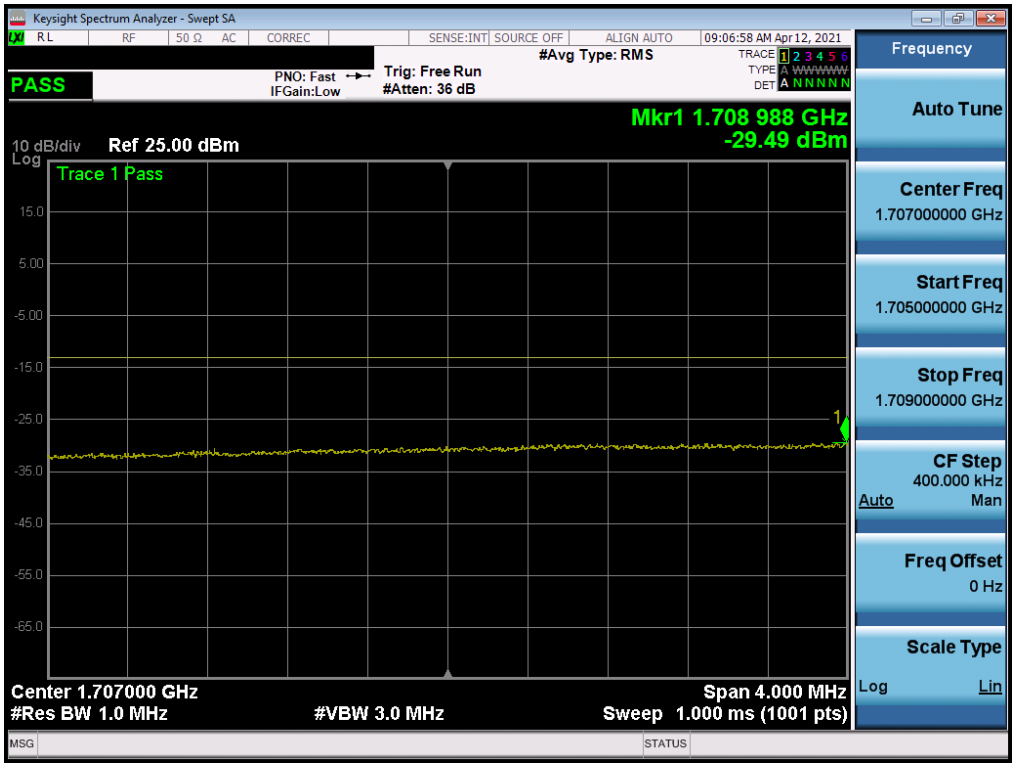
Plot 7-103. Upper Band Edge Plot (LTE Band 66 - 20MHz QPSK – Full RB)



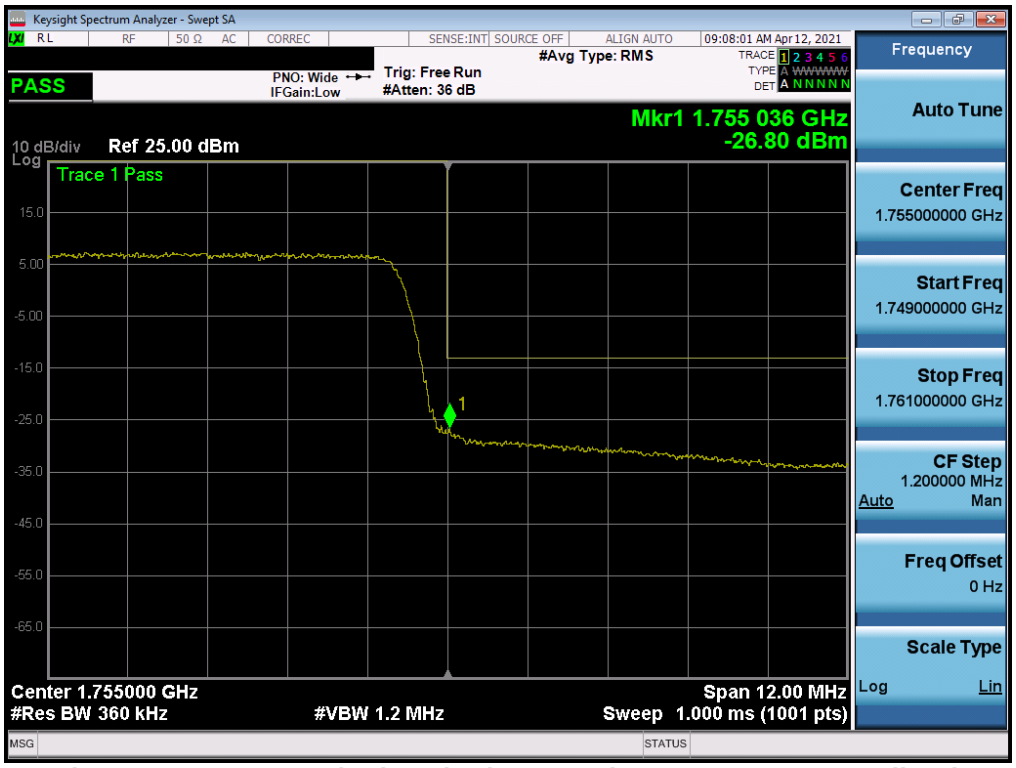
Plot 7-104. Channel Edge Plot (LTE Band 66 - 20MHz QPSK – Full RB)



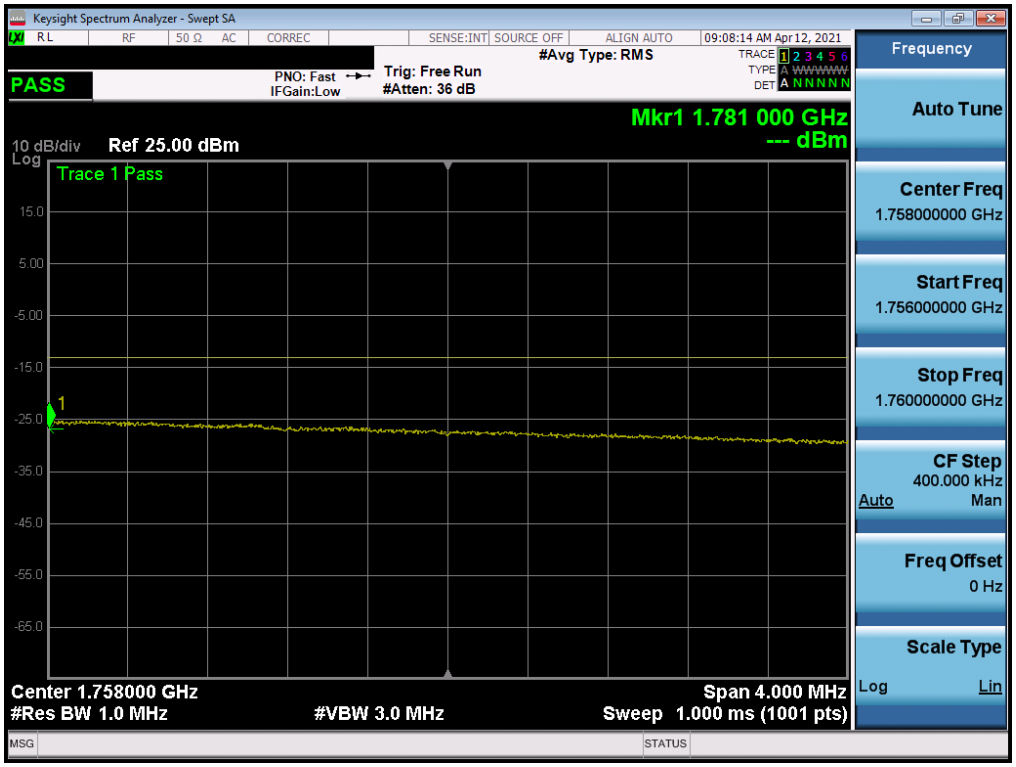
Plot 7-105. Lower Band Edge Plot (LTE Band 66/4 - 15MHz QPSK – Full RB)



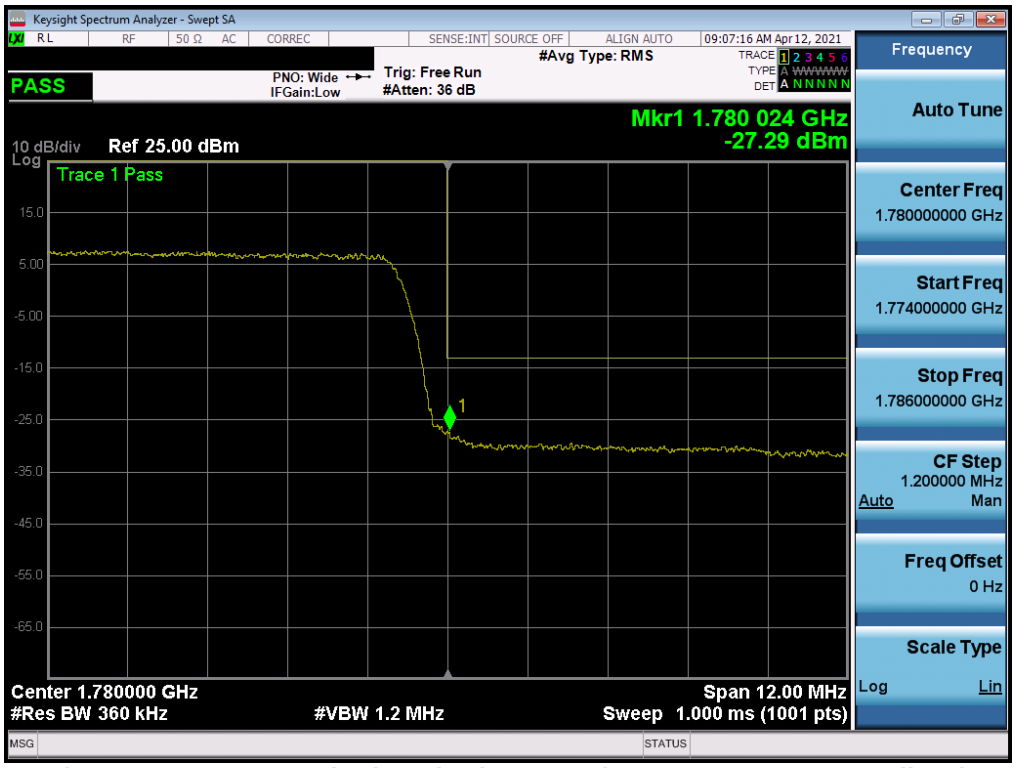
Plot 7-106. Lower Extended Band Edge Plot (LTE Band 66/4 - 15MHz QPSK – Full RB)



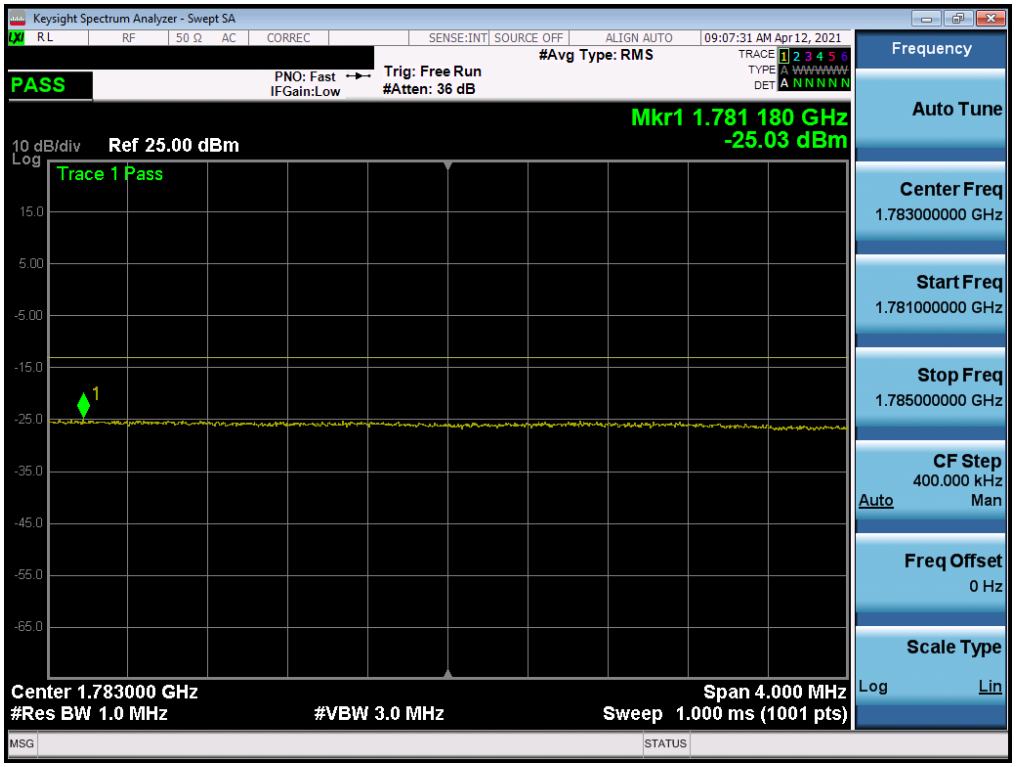
Plot 7-107. Upper Band Edge Plot (LTE Band 4 - 15MHz QPSK – Full RB)



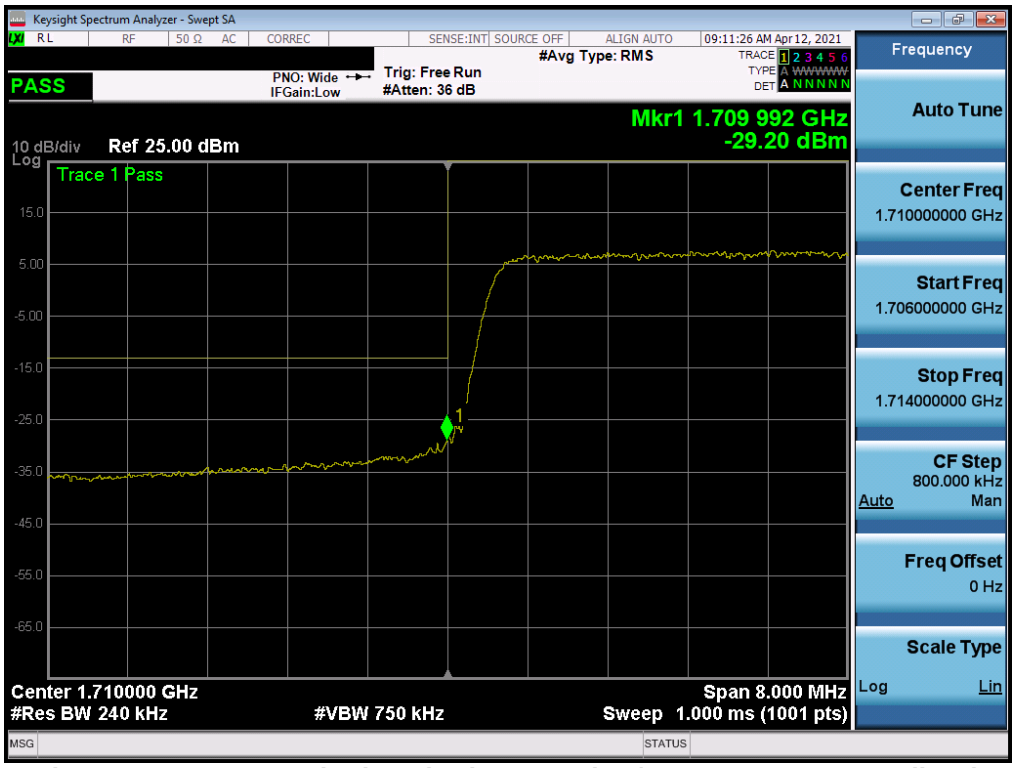
Plot 7-108. Upper Extended Band Edge Plot (LTE Band 4 - 15MHz QPSK – Full RB)



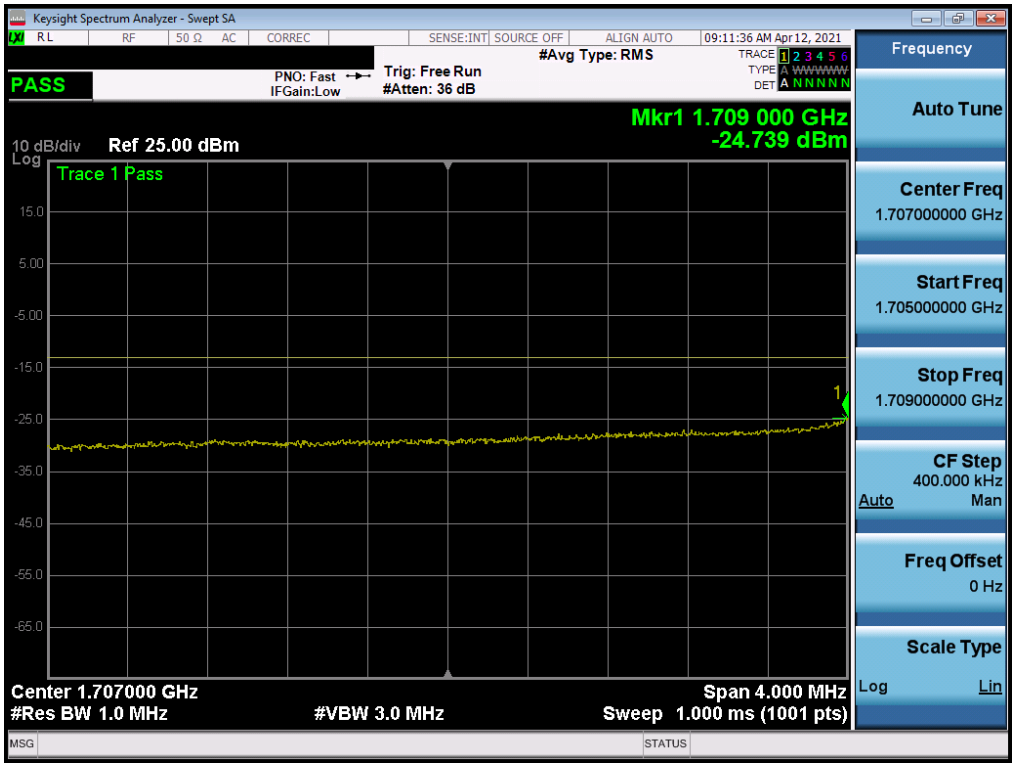
Plot 7-109. Upper Band Edge Plot (LTE Band 66 - 15MHz QPSK – Full RB)



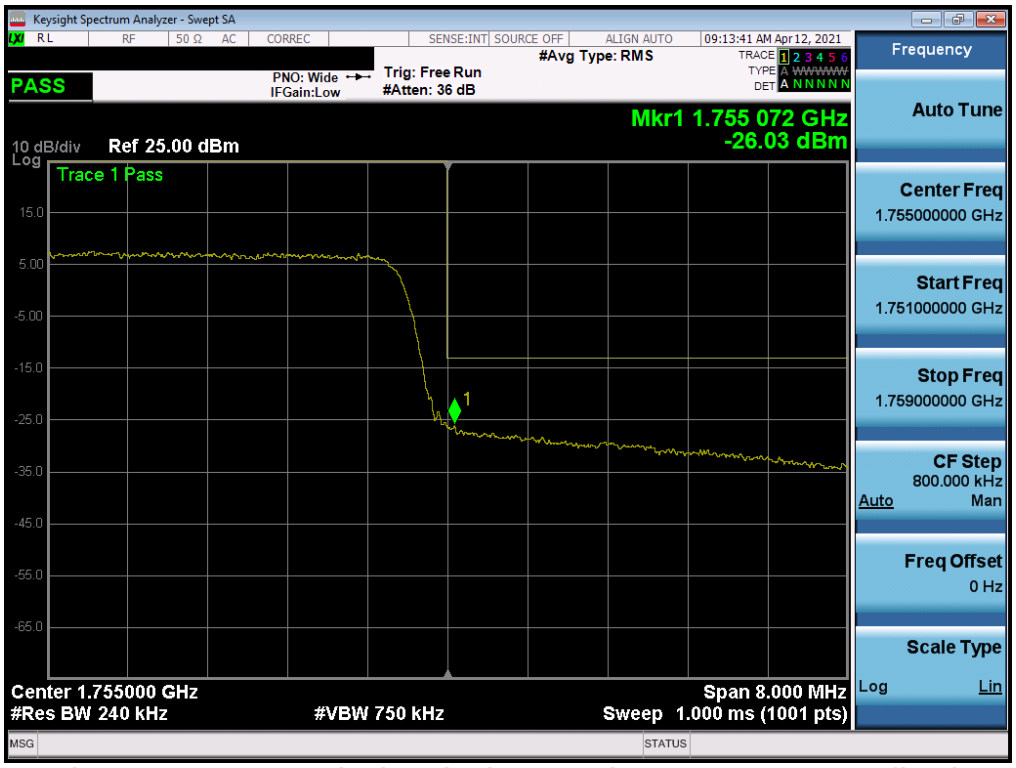
Plot 7-110. Upper Extended Band Edge Plot (LTE Band 66 - 15MHz QPSK – Full RB)



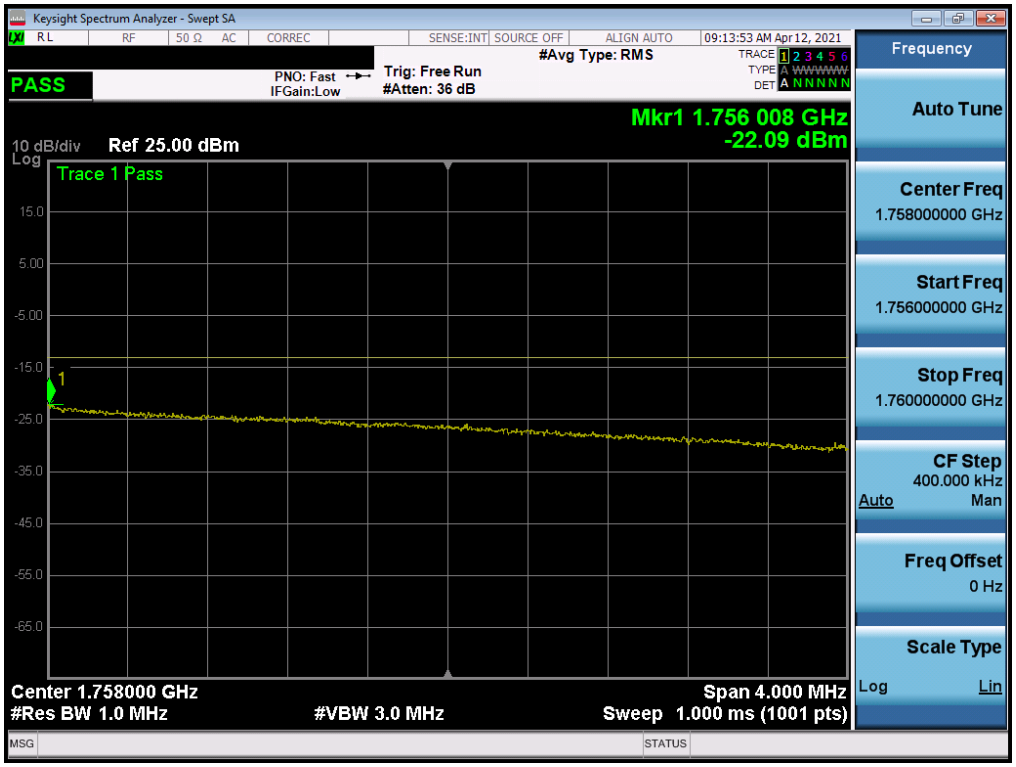
Plot 7-111. Lower Band Edge Plot (LTE Band 66/4 - 10MHz QPSK – Full RB)



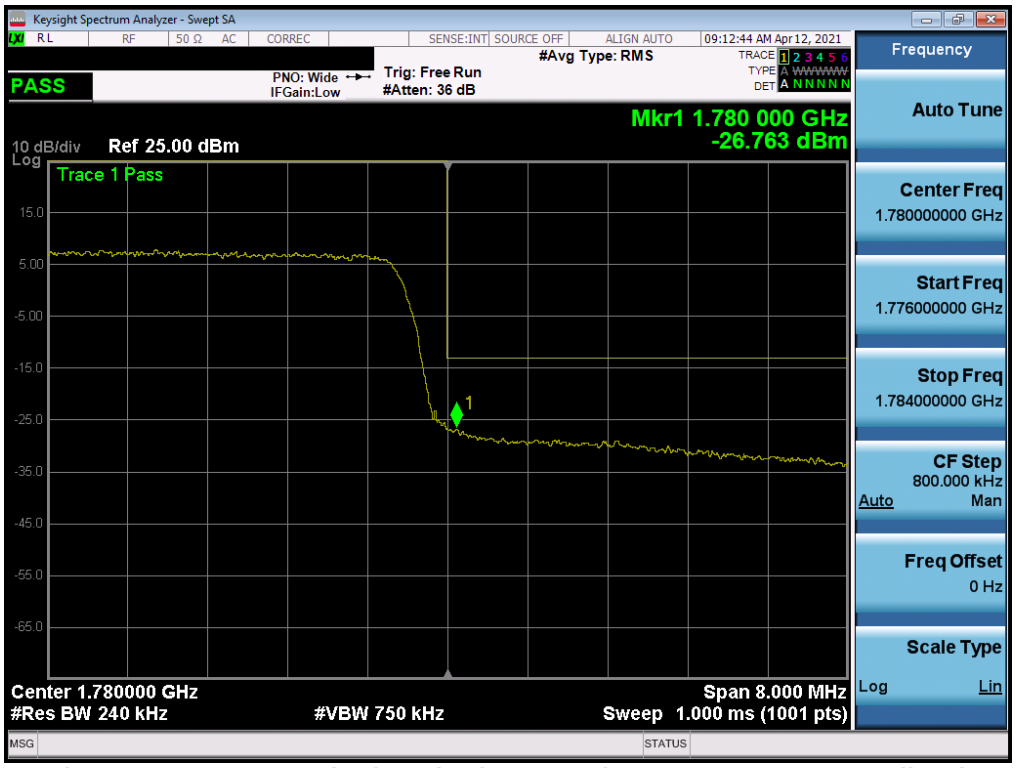
Plot 7-112. Lower Extended Band Edge Plot (LTE Band 66/4 - 10MHz QPSK – Full RB)



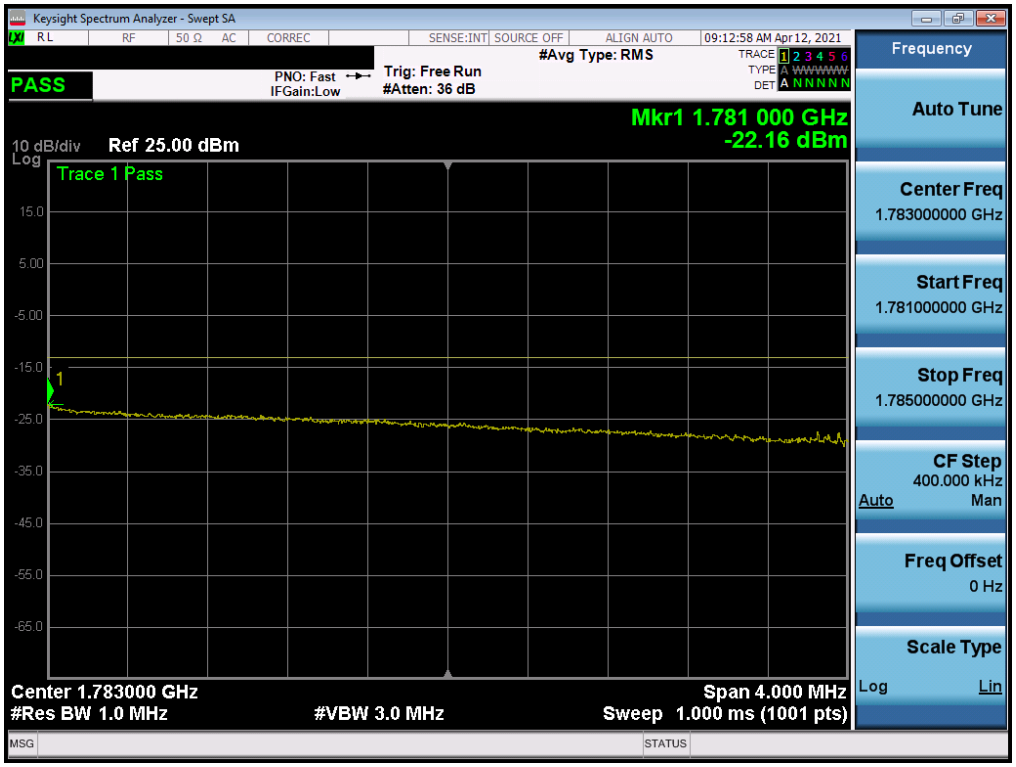
Plot 7-113. Upper Band Edge Plot (LTE Band 4 - 10MHz QPSK – Full RB)



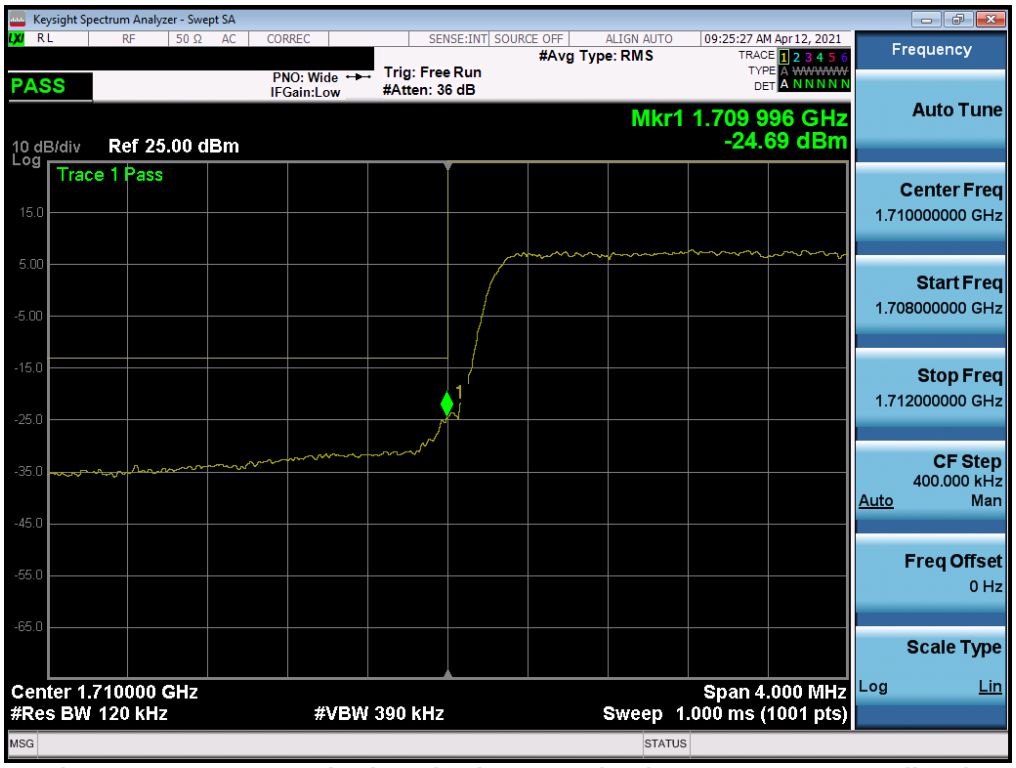
Plot 7-114. Upper Extended Band Edge Plot (LTE Band 4 - 10MHz QPSK – Full RB)



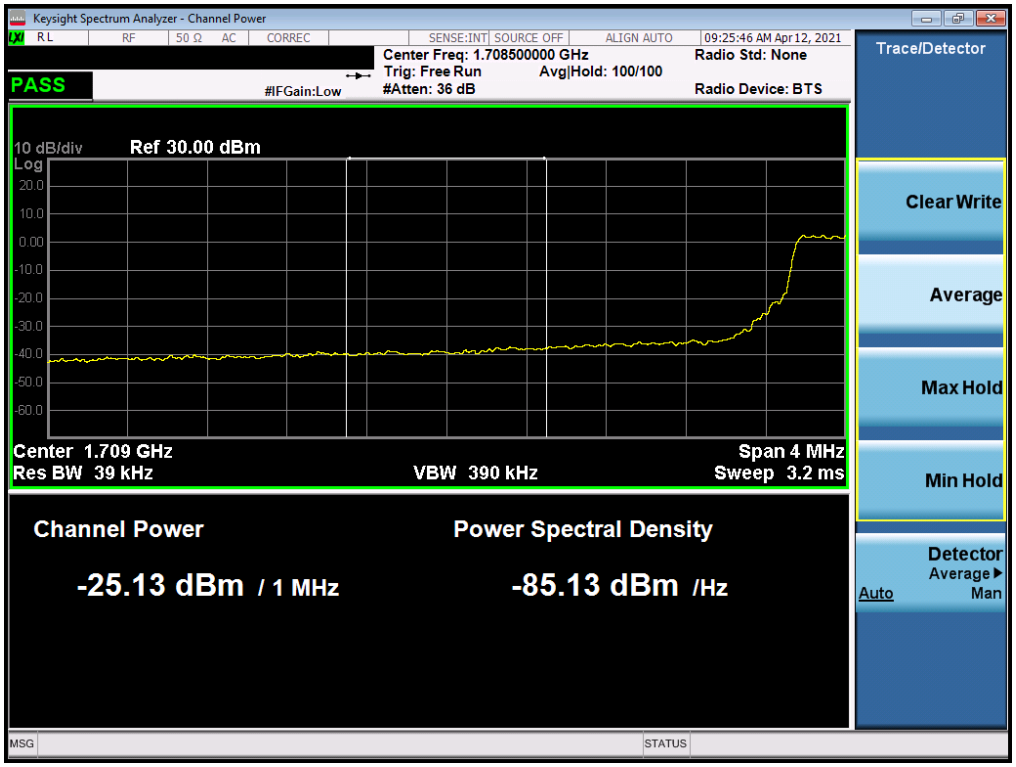
Plot 7-115. Upper Band Edge Plot (LTE Band 66 - 10MHz QPSK – Full RB)



Plot 7-116. Upper Extended Band Edge Plot (LTE Band 66 - 10MHz QPSK – Full RB)

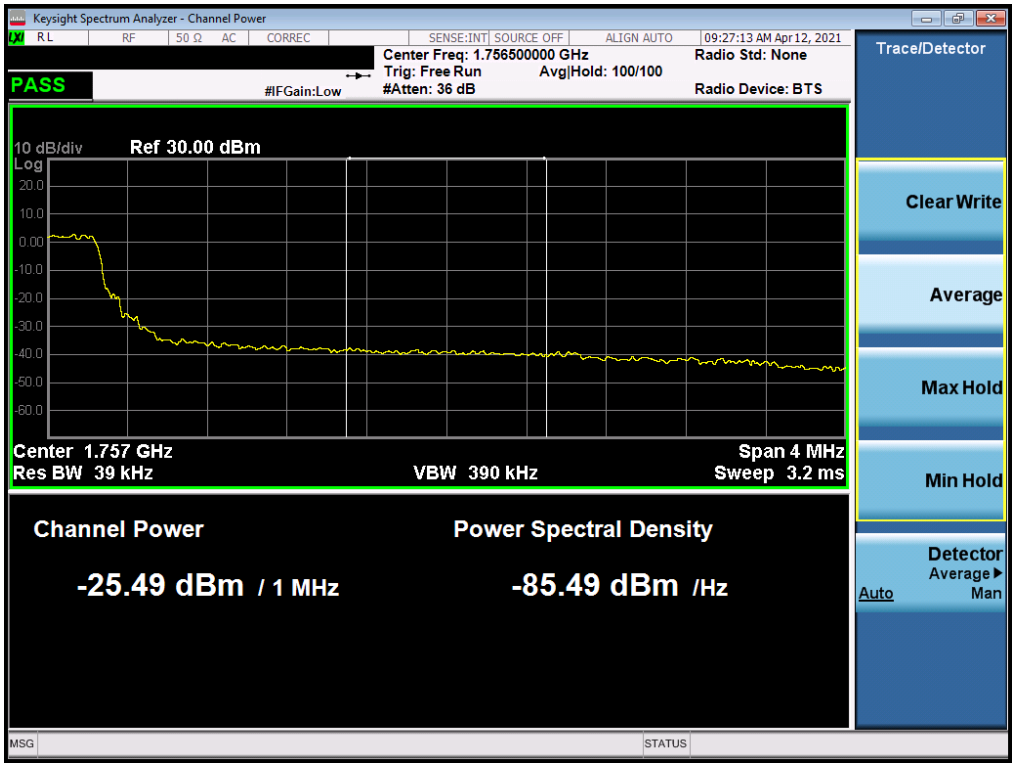


Plot 7-117. Lower Band Edge Plot (LTE Band 66/4 - 5MHz QPSK – Full RB)

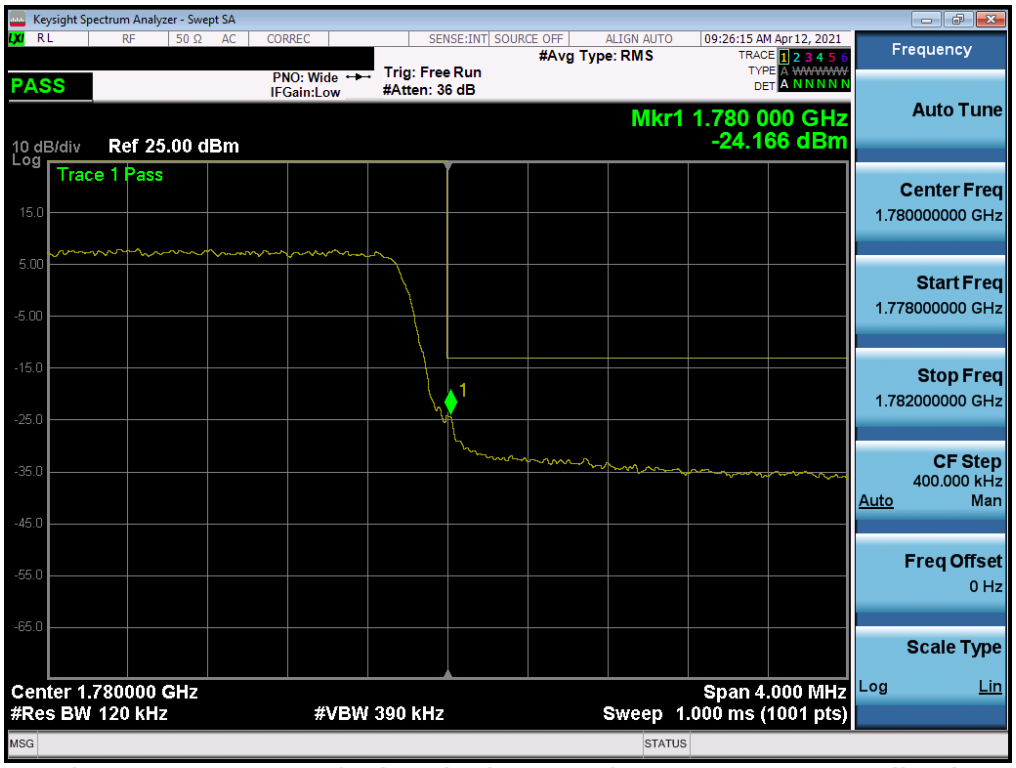


Plot 7-118. Lower Extended Band Edge Plot (LTE Band 66/4 - 5MHz QPSK – Full RB)

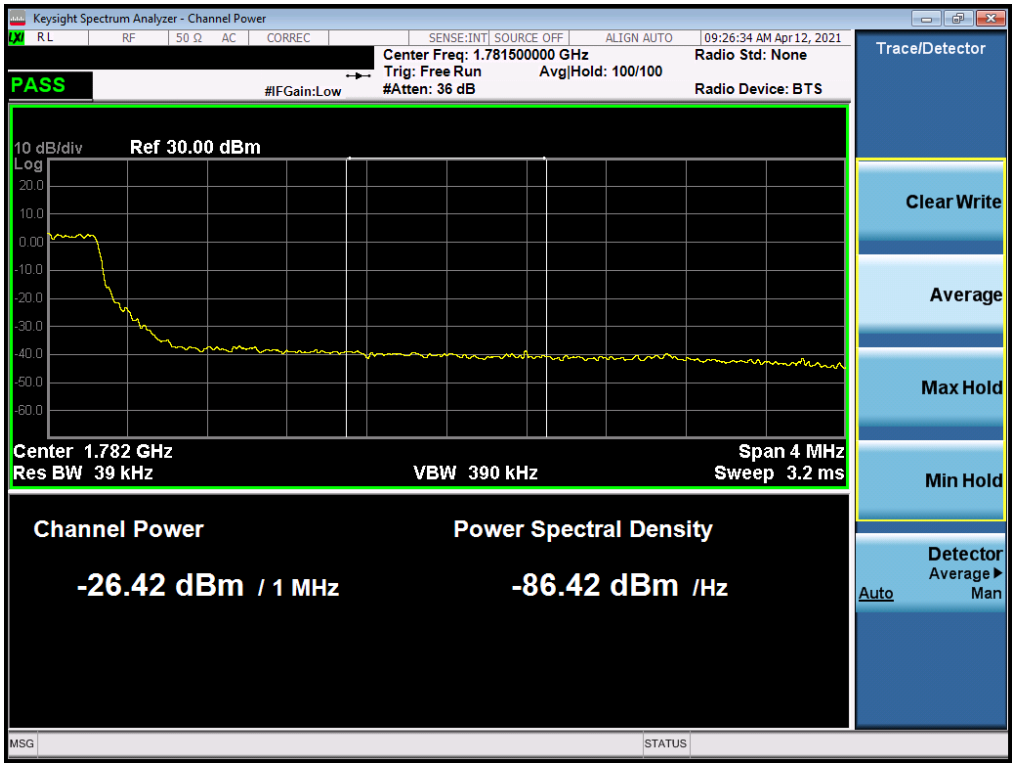
Plot 7-119. Upper Band Edge Plot (LTE Band 4 - 5MHz QPSK – Full RB)



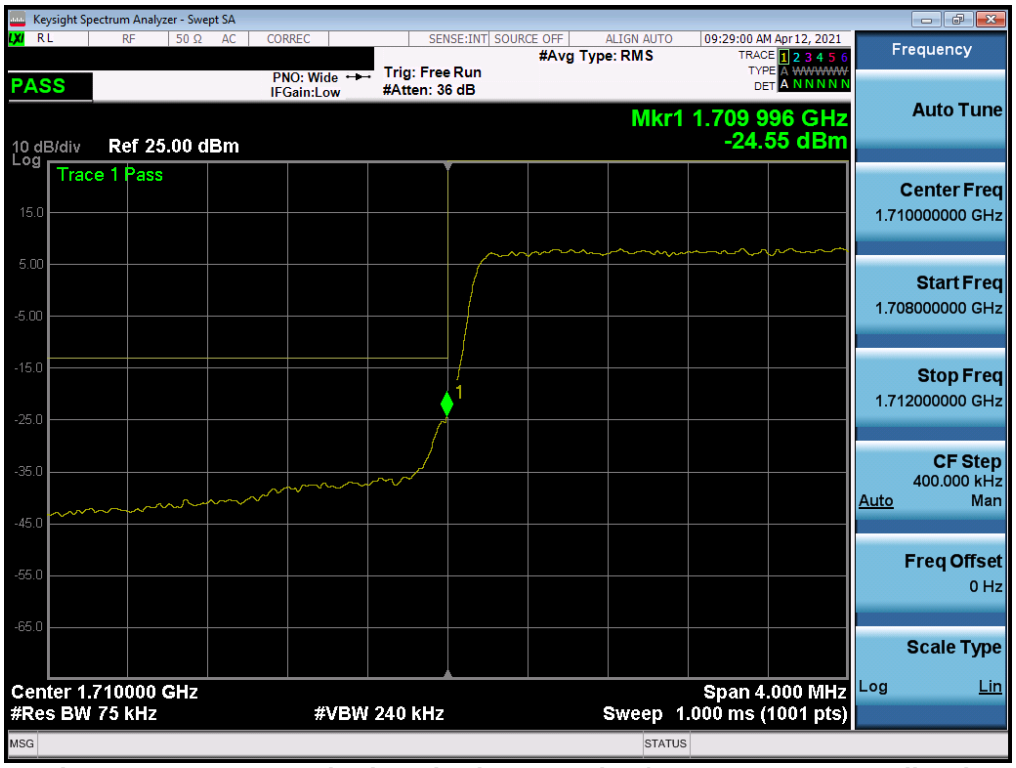
Plot 7-120. Upper Extended Band Edge Plot (LTE Band 4 - 5MHz QPSK – Full RB)



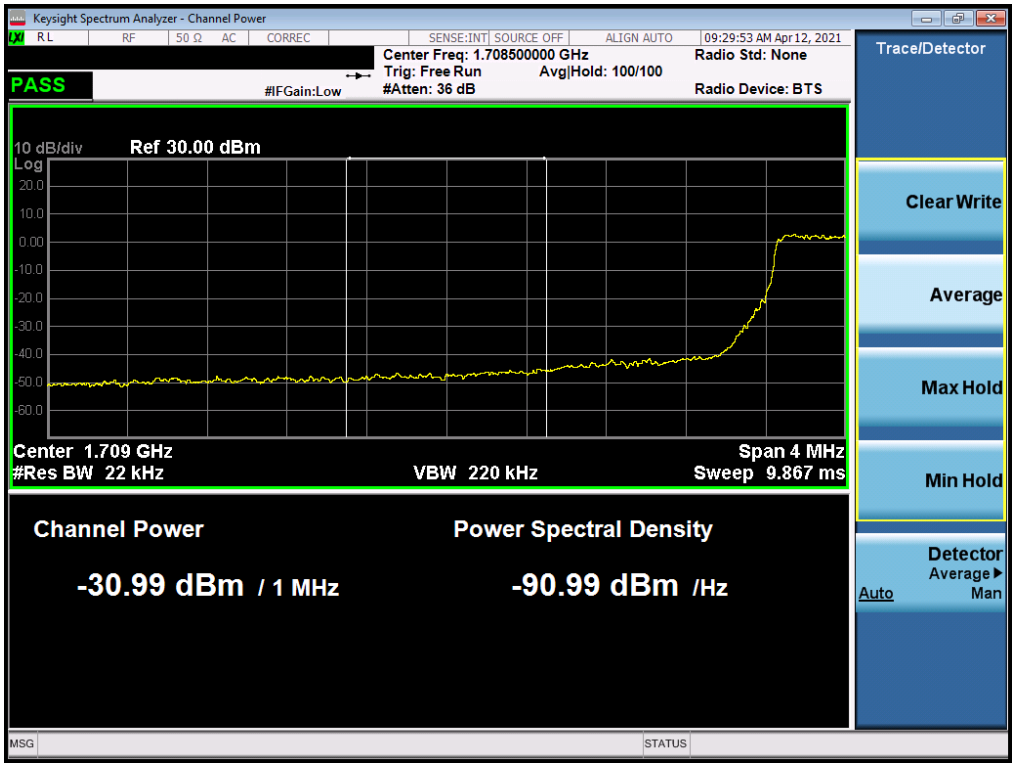
Plot 7-121. Upper Band Edge Plot (LTE Band 66 - 5MHz QPSK – Full RB)



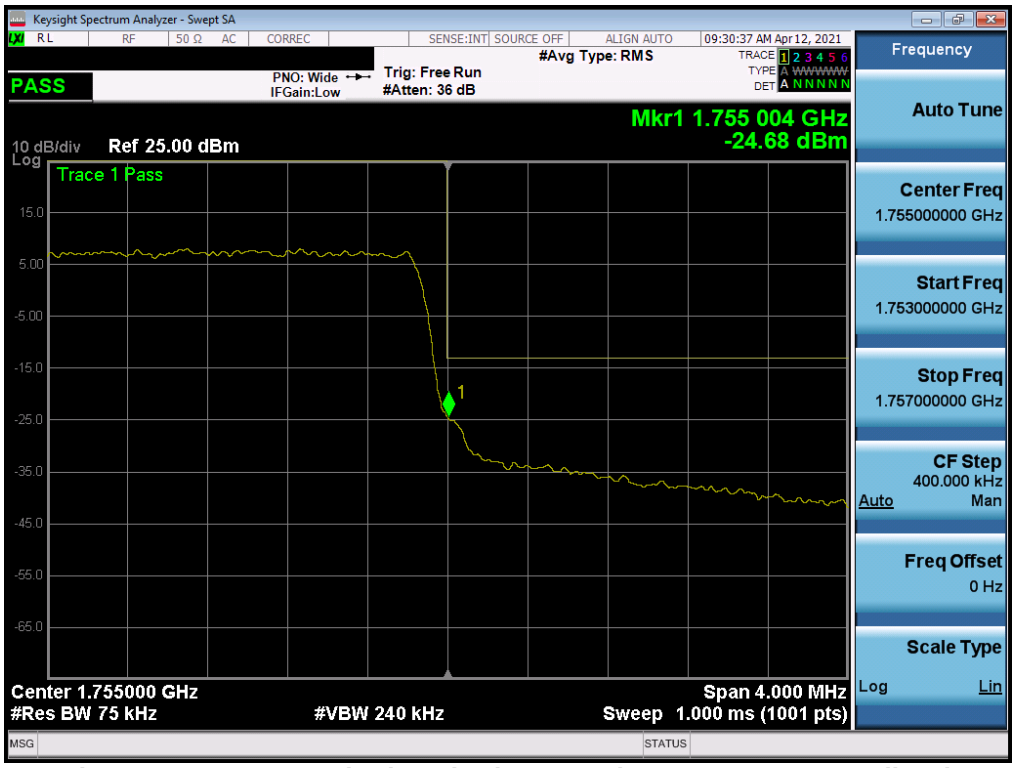
Plot 7-122. Upper Extended Band Edge Plot (LTE Band 66 - 5MHz QPSK – Full RB)



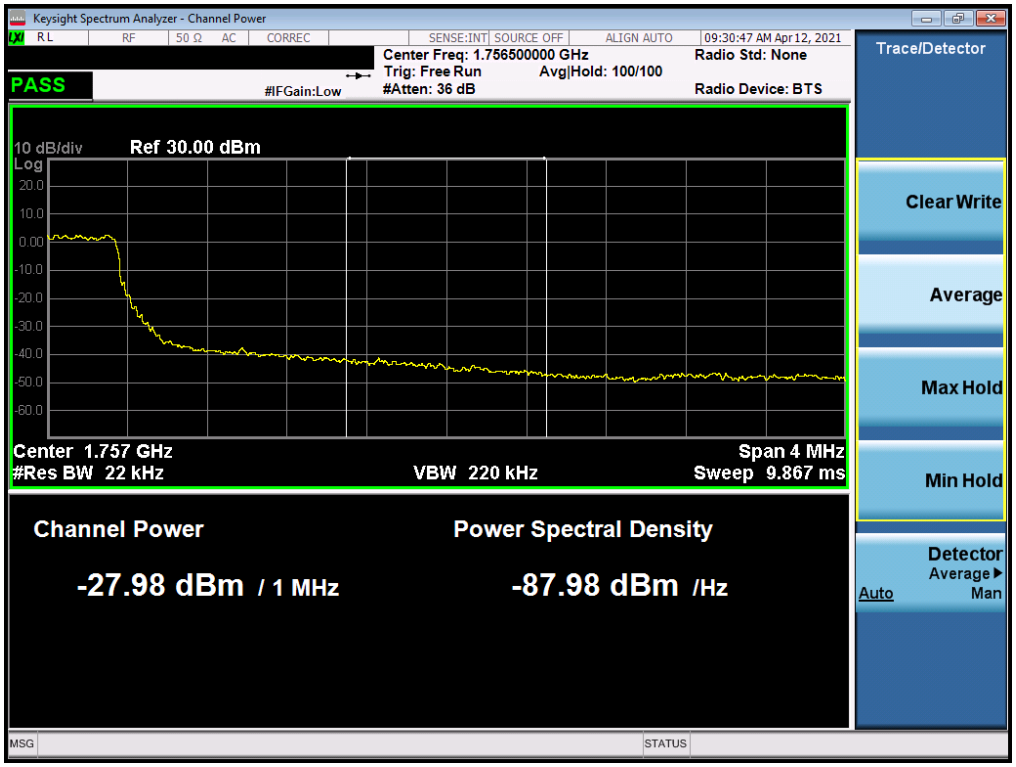
Plot 7-123. Lower Band Edge Plot (LTE Band 66/4 - 3MHz QPSK – Full RB)



Plot 7-124. Lower Extended Band Edge Plot (LTE Band 66/4 - 3MHz QPSK – Full RB)

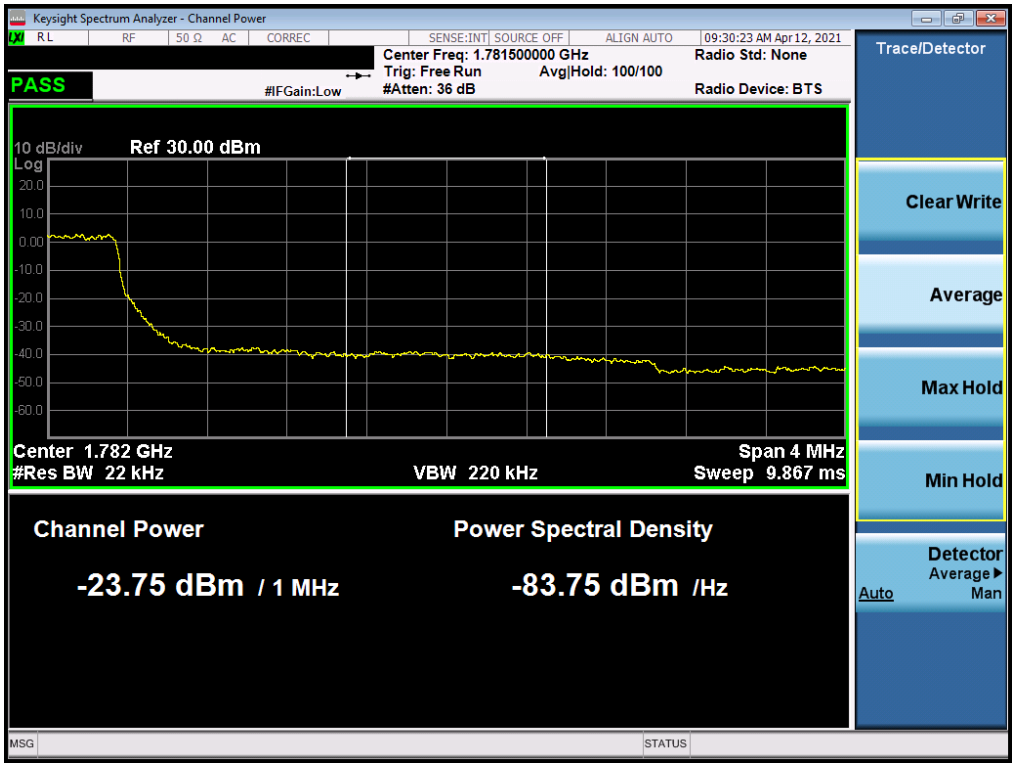


Plot 7-125. Upper Band Edge Plot (LTE Band 4 - 3MHz QPSK – Full RB)

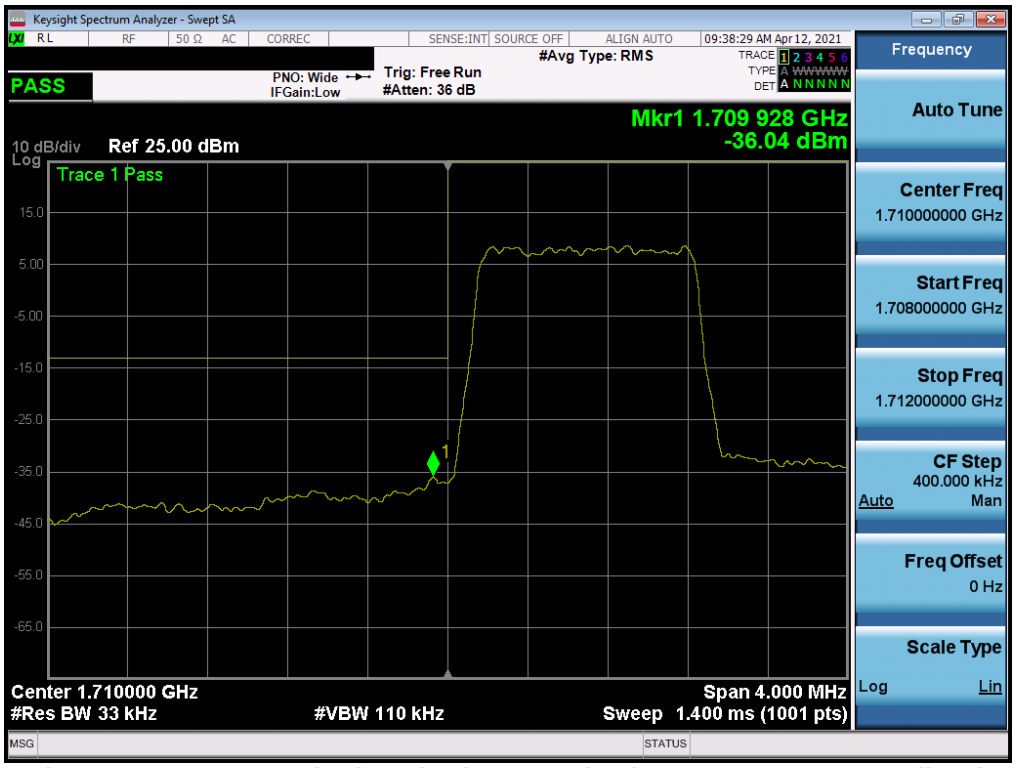


Plot 7-126. Upper Extended Band Edge Plot (LTE Band 4 - 3MHz QPSK – Full RB)

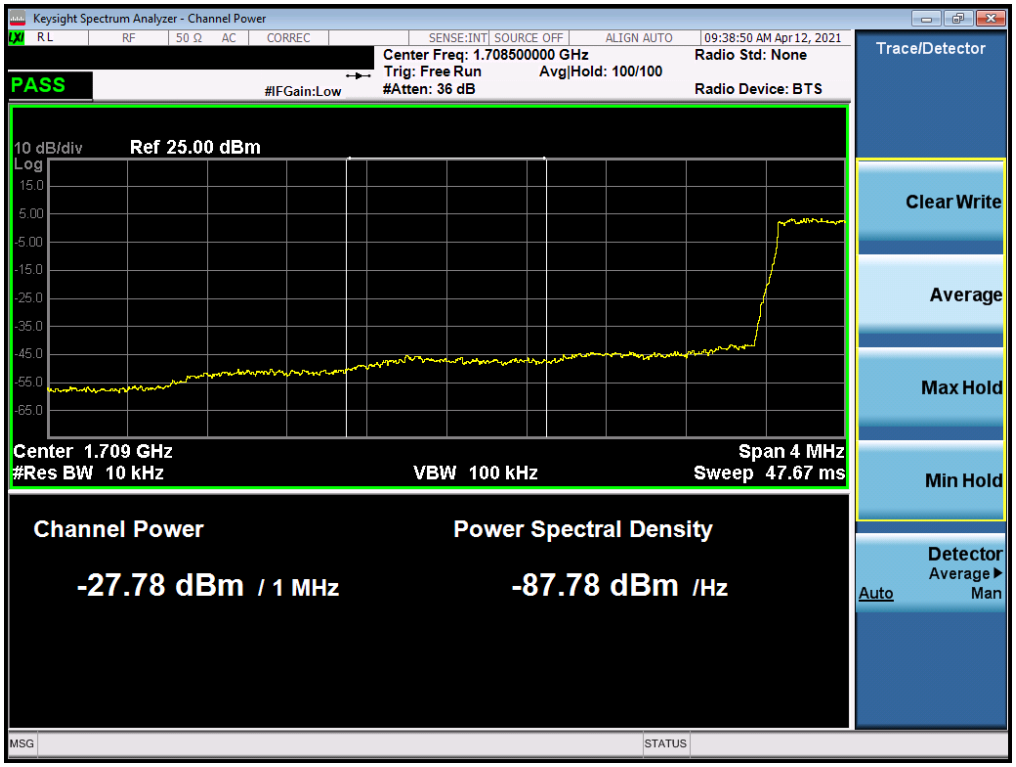
Plot 7-127. Upper Band Edge Plot (LTE Band 66 - 3MHz QPSK – Full RB)



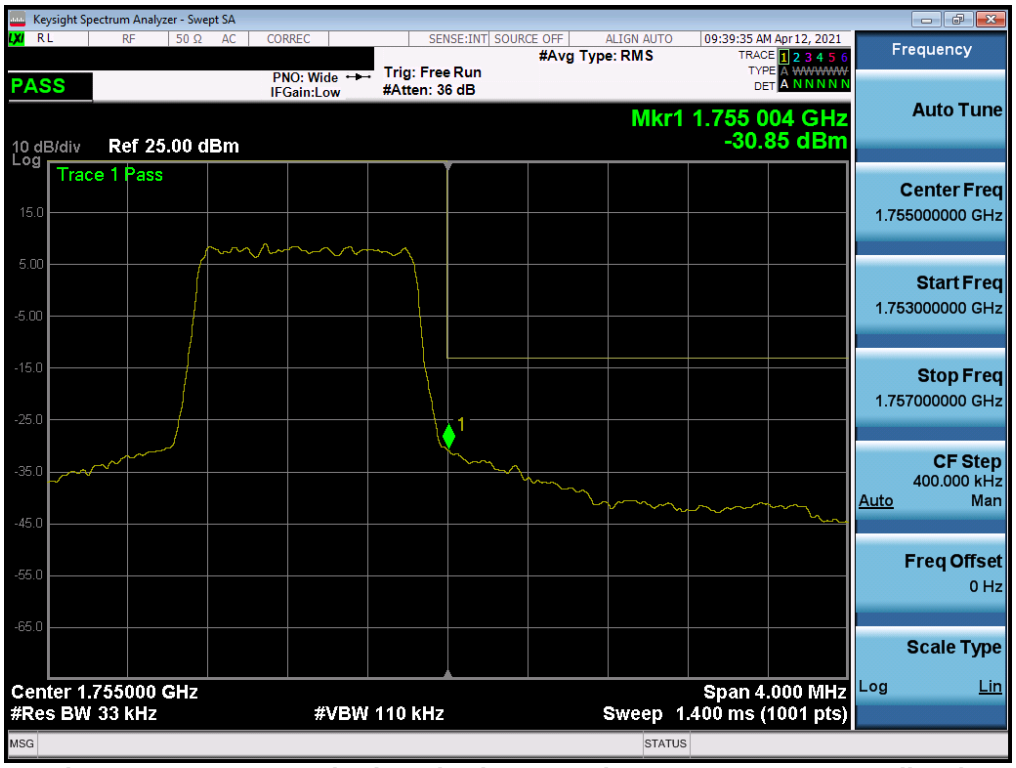
Plot 7-128. Upper Extended Band Edge Plot (LTE Band 66 - 3MHz QPSK – Full RB)



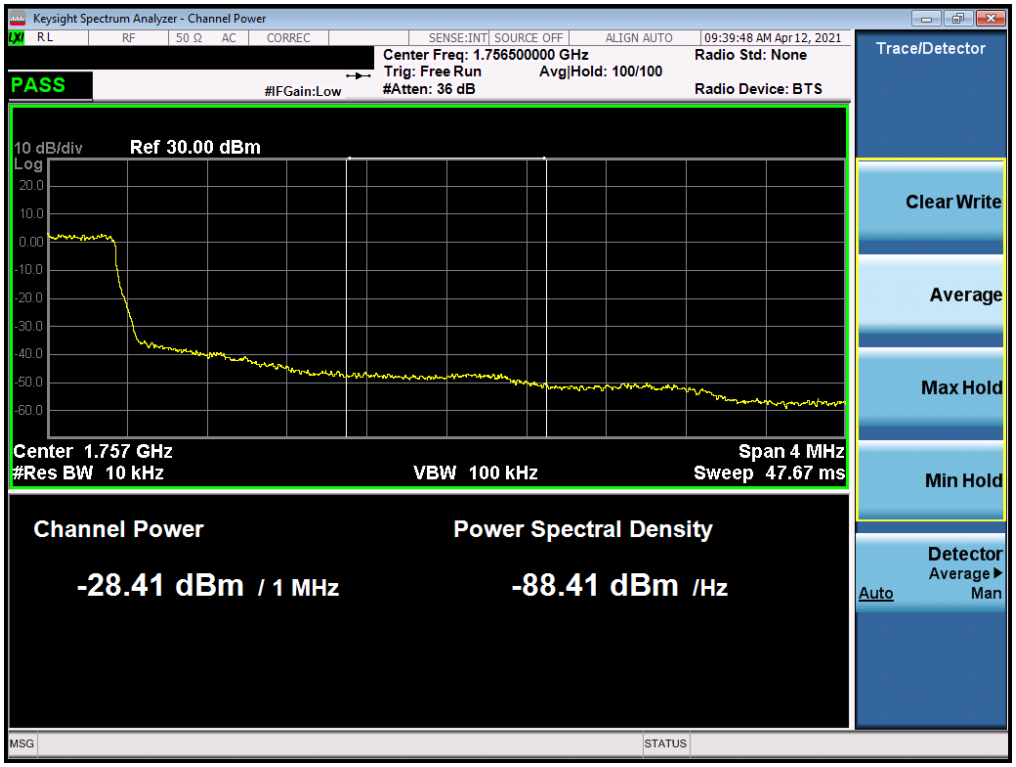
Plot 7-129. Lower Band Edge Plot (LTE Band 66/4 – 1.4MHz QPSK – Full RB)



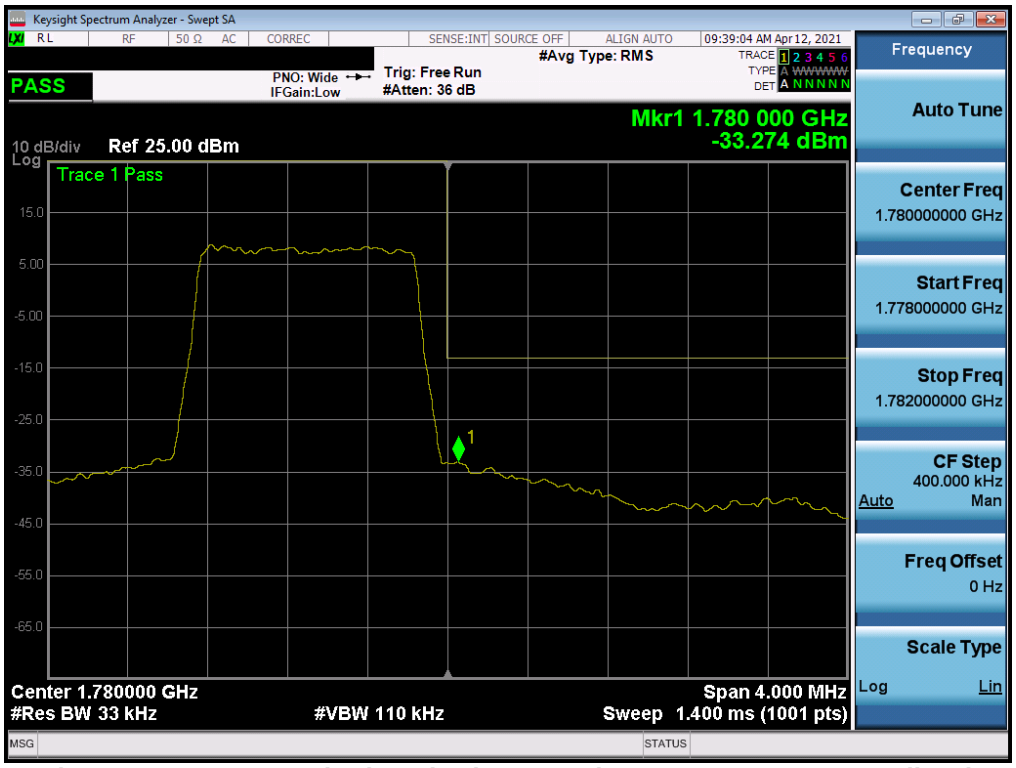
Plot 7-130. Lower Extended Band Edge Plot (LTE Band 66/4 – 1.4MHz QPSK – Full RB)



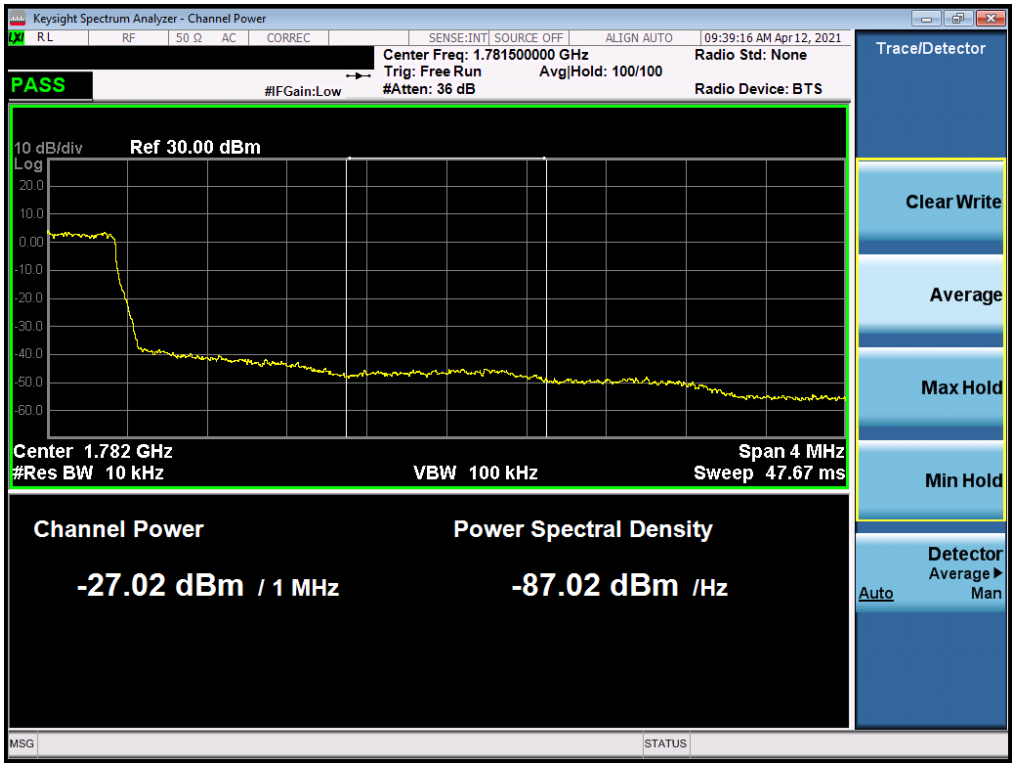
Plot 7-131. Upper Band Edge Plot (LTE Band 4 – 1.4MHz QPSK – Full RB)



Plot 7-132. Upper Extended Band Edge Plot (LTE Band 4 – 1.4MHz QPSK – Full RB)

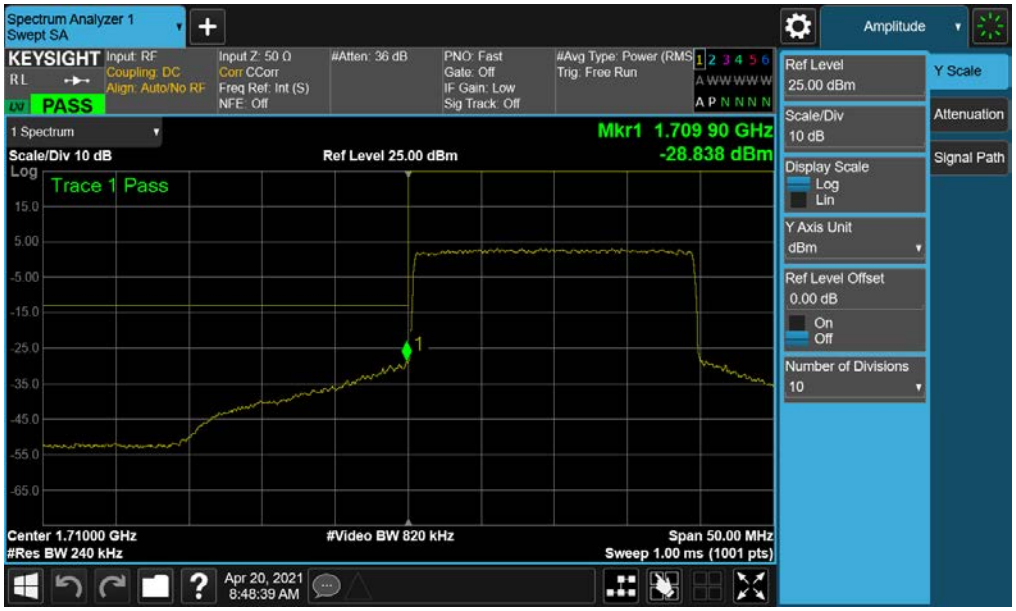


Plot 7-133. Upper Band Edge Plot (LTE Band 66 – 1.4MHz QPSK – Full RB)



Plot 7-134. Upper Extended Band Edge Plot (LTE Band 66 – 1.4MHz QPSK – Full RB)

NR Band n66

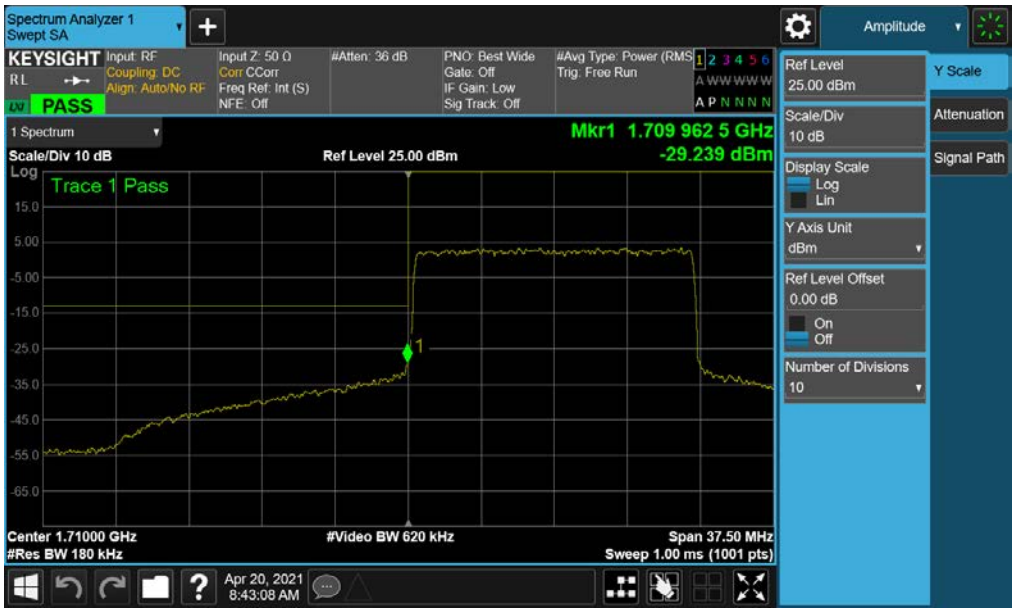


Plot 7-135. Lower Band Edge Plot (NR Band n66 – 20.0MHz - Full RB)

Plot 7-136. Lower Extended Band Edge Plot (NR Band n66 – 20.0MHz - Full RB)

Plot 7-137. Upper Band Edge Plot (NR Band n66 – 20.0MHz - Full RB)

Plot 7-138. Upper Extended Band Edge Plot (NR Band n66 – 20.0MHz - Full RB)



Plot 7-139. Lower Band Edge Plot (NR Band n66 – 15.0MHz - Full RB)

Plot 7-140. Lower Extended Band Edge Plot (NR Band n66 – 15.0MHz - Full RB)

Plot 7-141. Upper Band Edge Plot (NR Band n66 – 15.0MHz - Full RB)

Plot 7-142. Upper Extended Band Edge Plot (NR Band n66 – 15.0MHz - Full RB)

Plot 7-143. Lower Band Edge Plot (NR Band n66 – 10.0MHz - Full RB)

Plot 7-144. Lower Extended Band Edge Plot (NR Band n66 – 10.0MHz - Full RB)

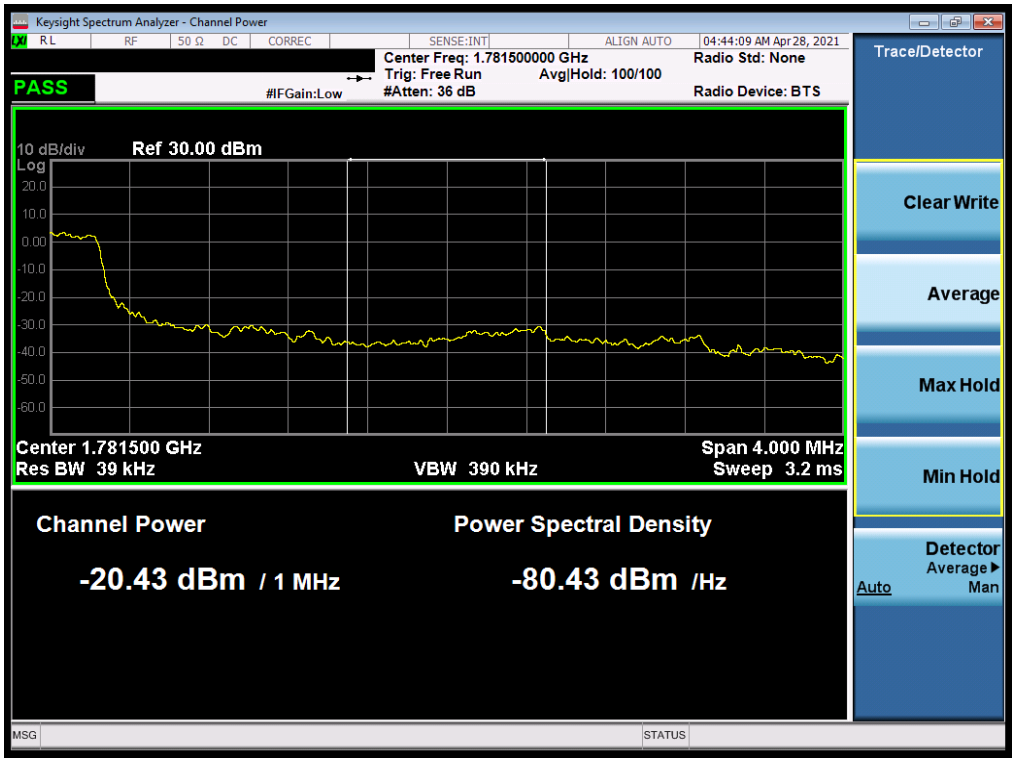
Plot 7-145. Upper Band Edge Plot (NR Band n66 – 10.0MHz - Full RB)

Plot 7-146. Upper Extended Band Edge Plot (NR Band n66 – 10.0MHz - Full RB)

Plot 7-147. Lower Band Edge Plot (NR Band n66 – 5.0MHz - Full RB)

Plot 7-148. Lower Extended Band Edge Plot (NR Band n66 – 5.0MHz - Full RB)

Plot 7-149. Upper Band Edge Plot (NR Band n66 – 5.0MHz - Full RB)



Plot 7-150. Upper Extended Band Edge Plot (NR Band n66 – 5.0MHz - Full RB)

7.6 Peak-Average Ratio

Test Overview

A peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 5.7.1

Test Settings

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW ≥ OBW or specified reference bandwidth
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

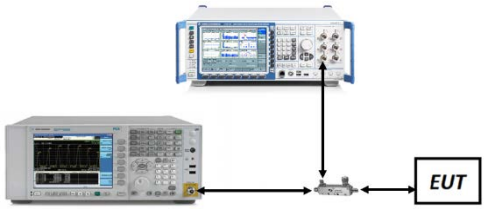
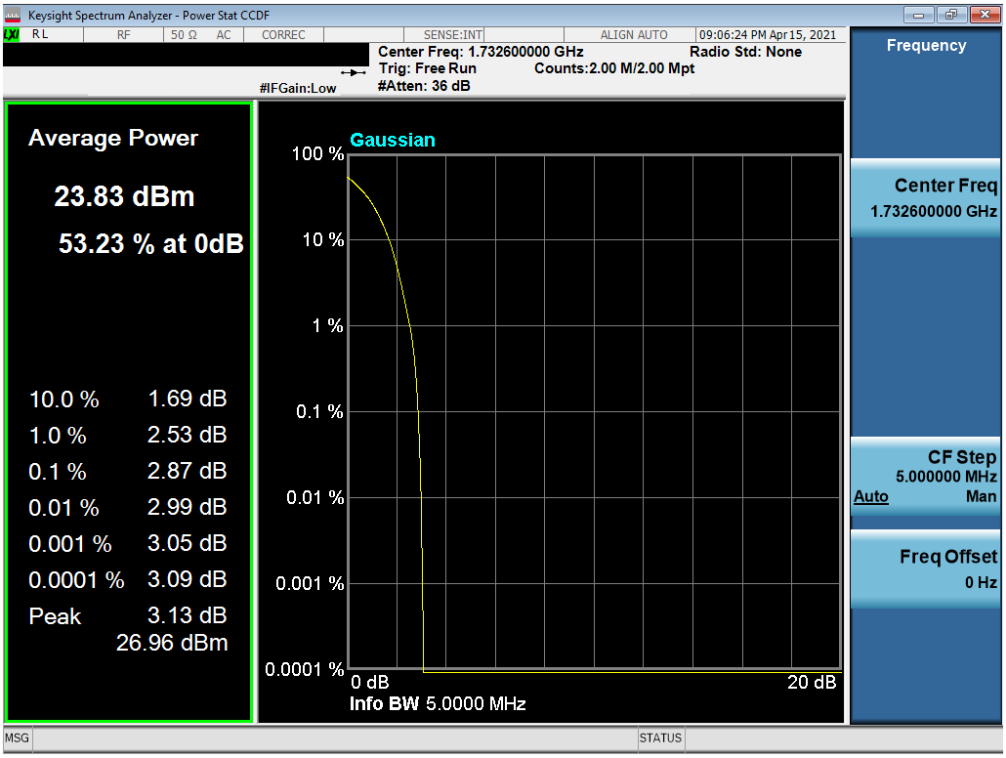


Figure 7-4. Test Instrument & Measurement Setup

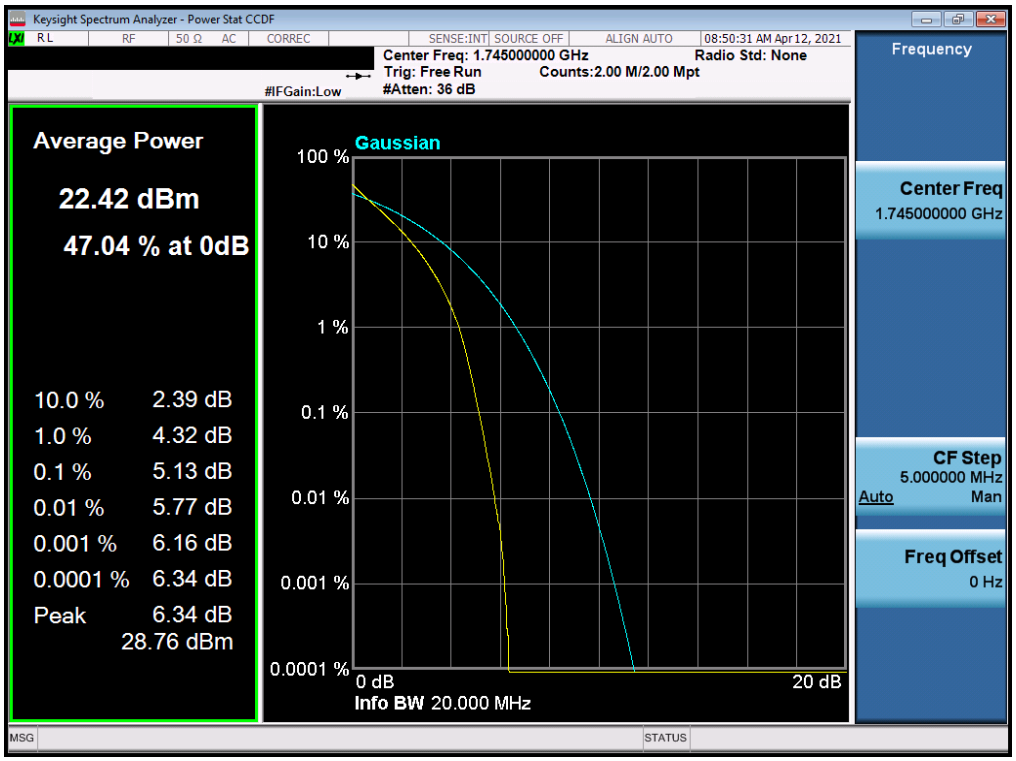
Test Notes

None.

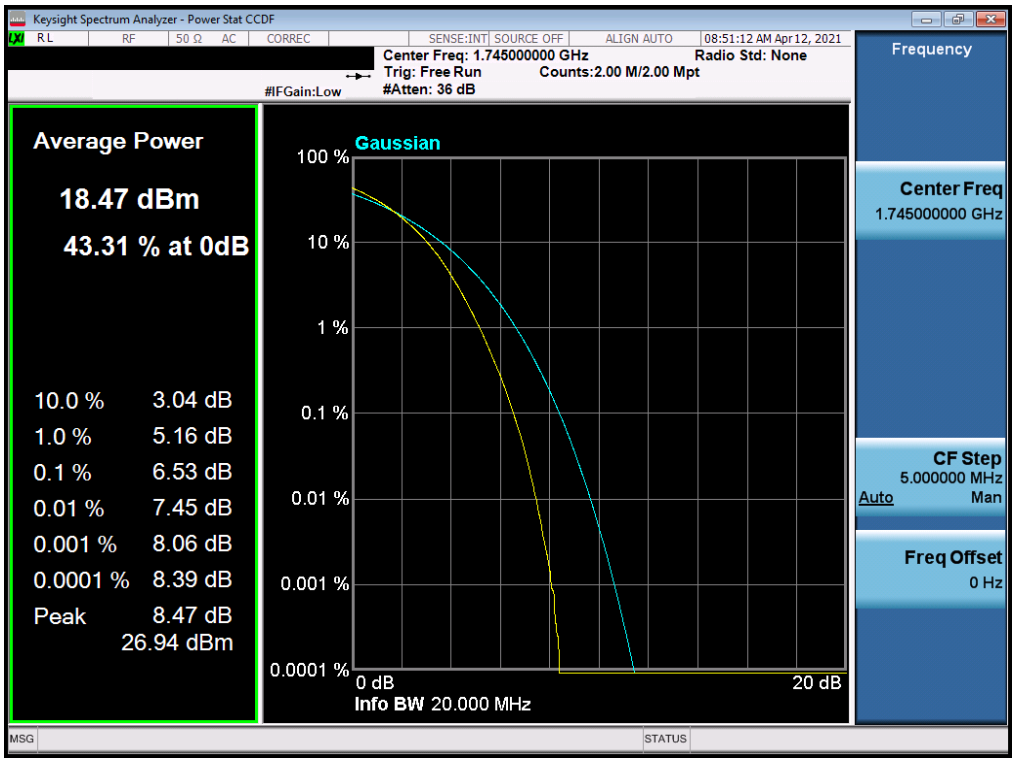
WCDMA AWS



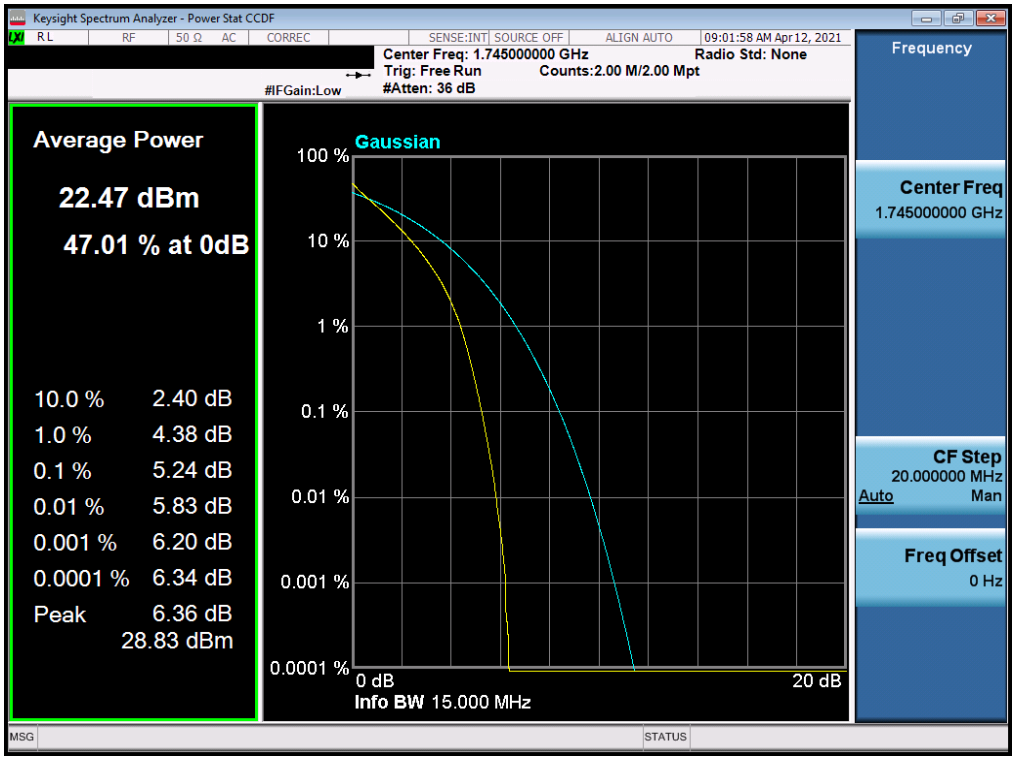
Plot 7-151. PAR Plot (WCDMA, Ch. 1413)



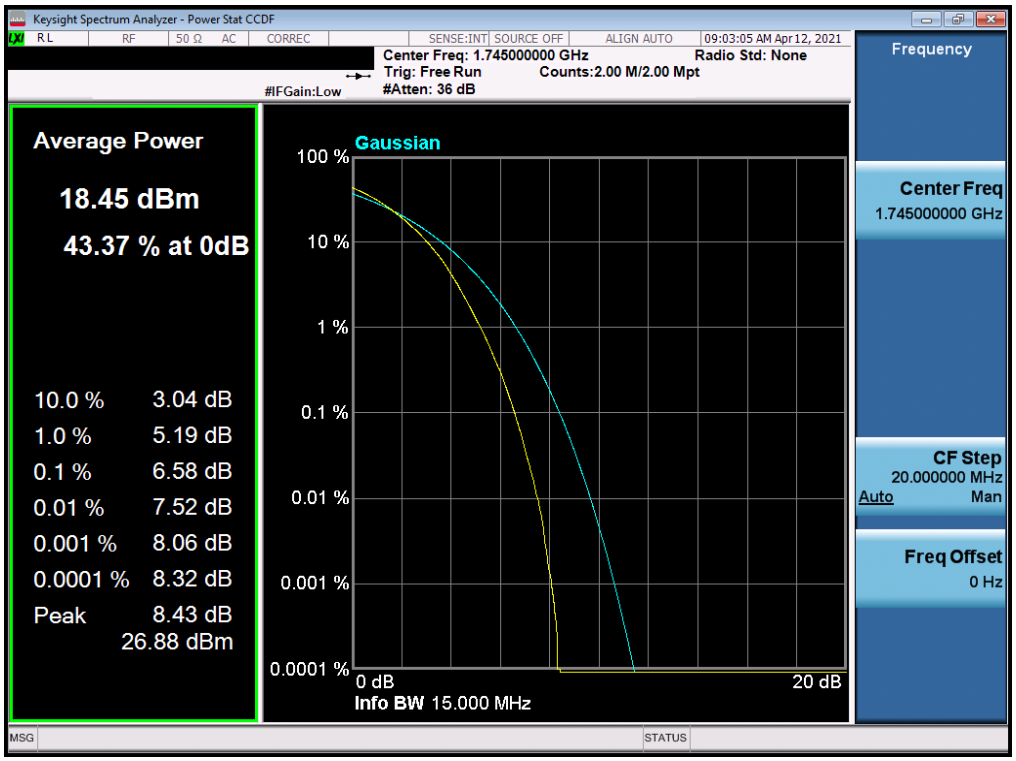
Plot 7-152. PAR Plot (LTE Band 66/4 - 20MHz QPSK - Full RB)



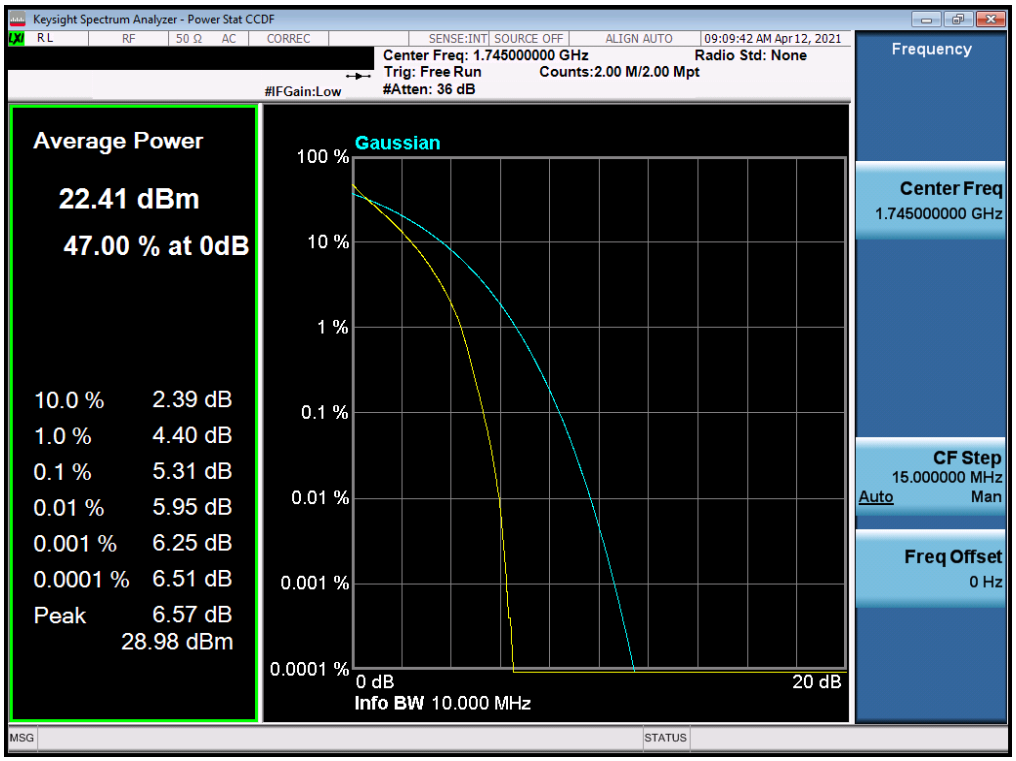
Plot 7-153. PAR Plot (LTE Band 66/4 - 20MHz 256-QAM - Full RB)



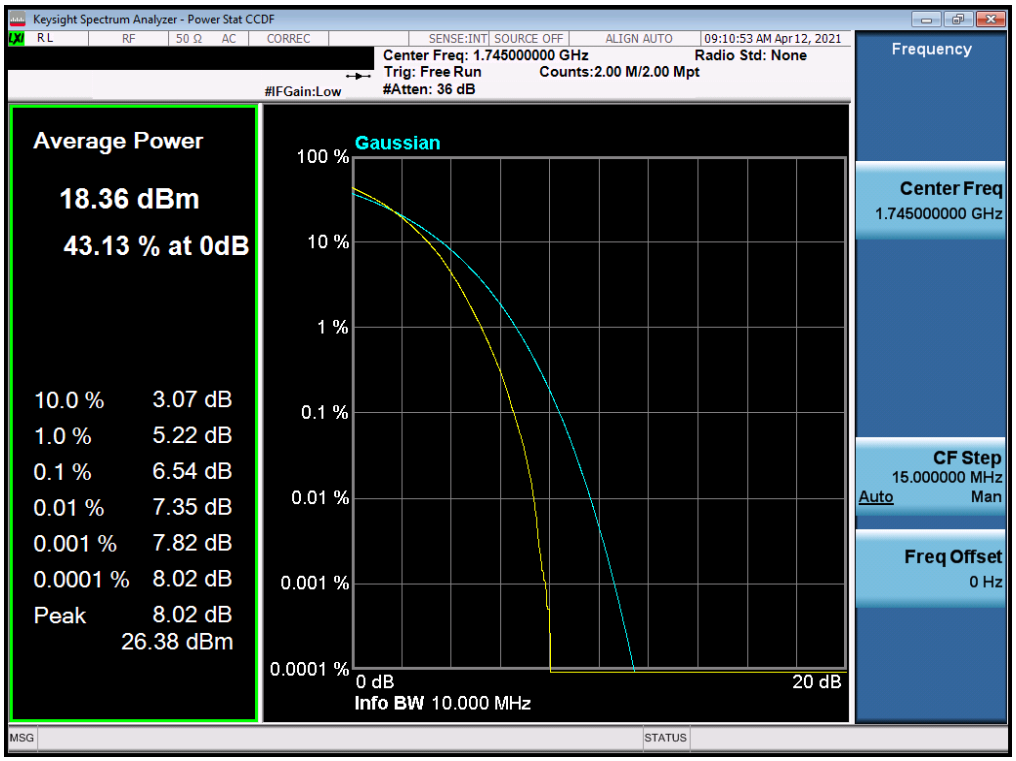
Plot 7-154. PAR Plot (LTE Band 66/4 - 15MHz QPSK - Full RB)



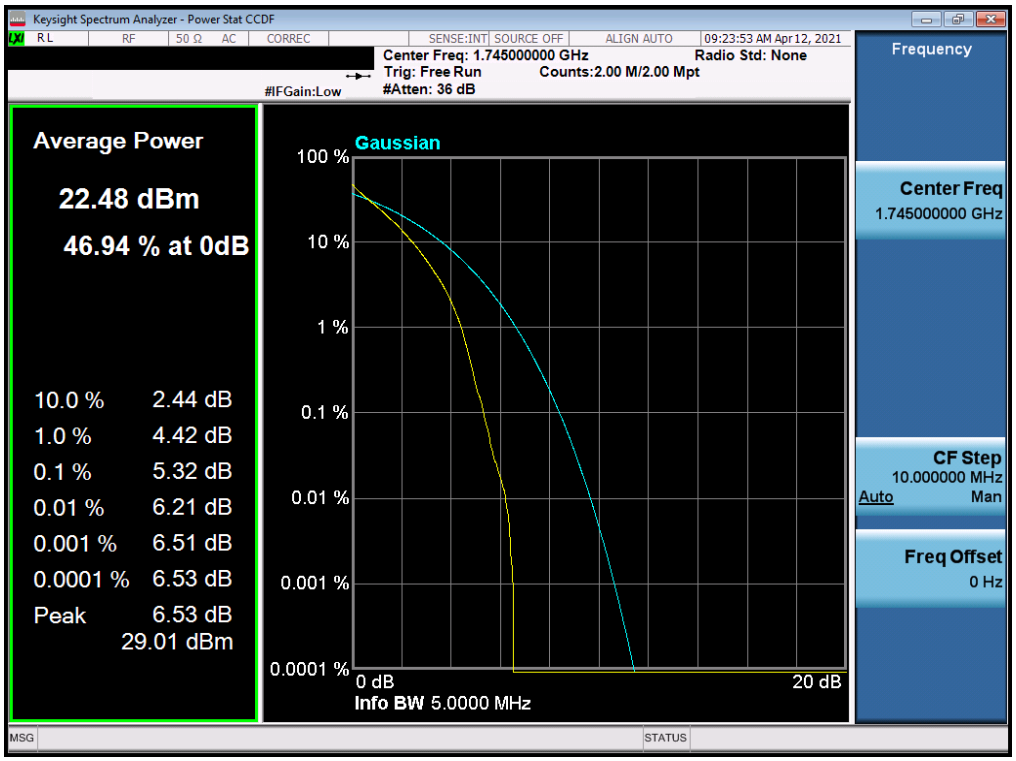
Plot 7-155. PAR Plot (LTE Band 66/4 - 15MHz 256-QAM - Full RB)



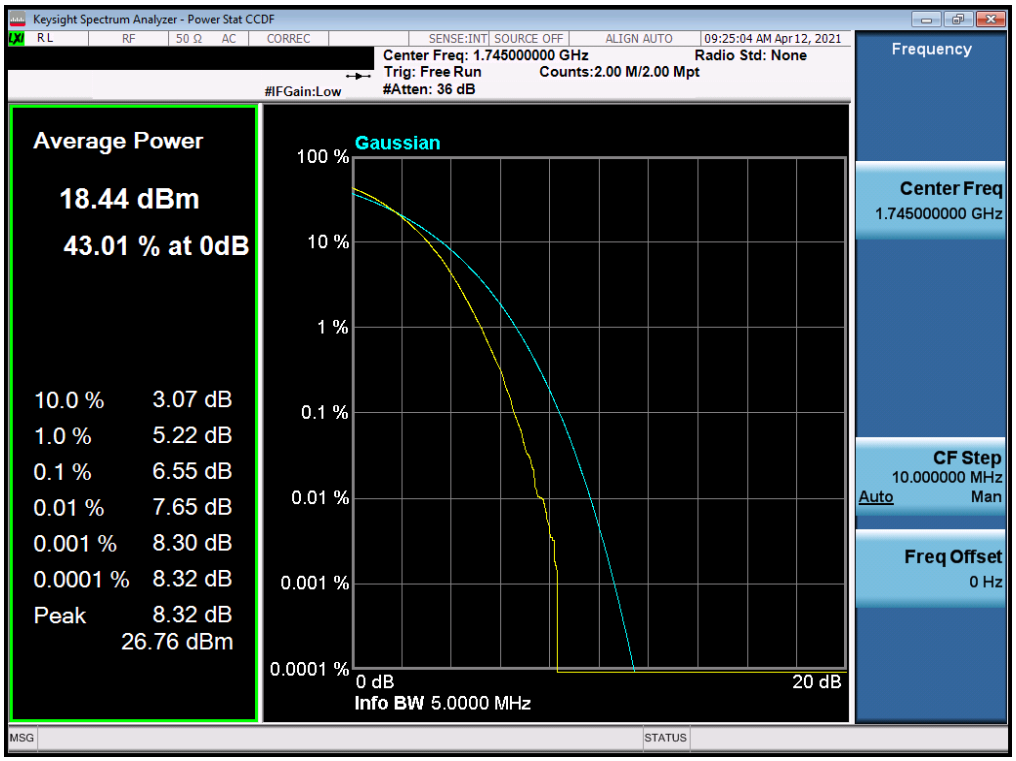
Plot 7-156. PAR Plot (LTE Band 66/4 - 10MHz QPSK - Full RB)



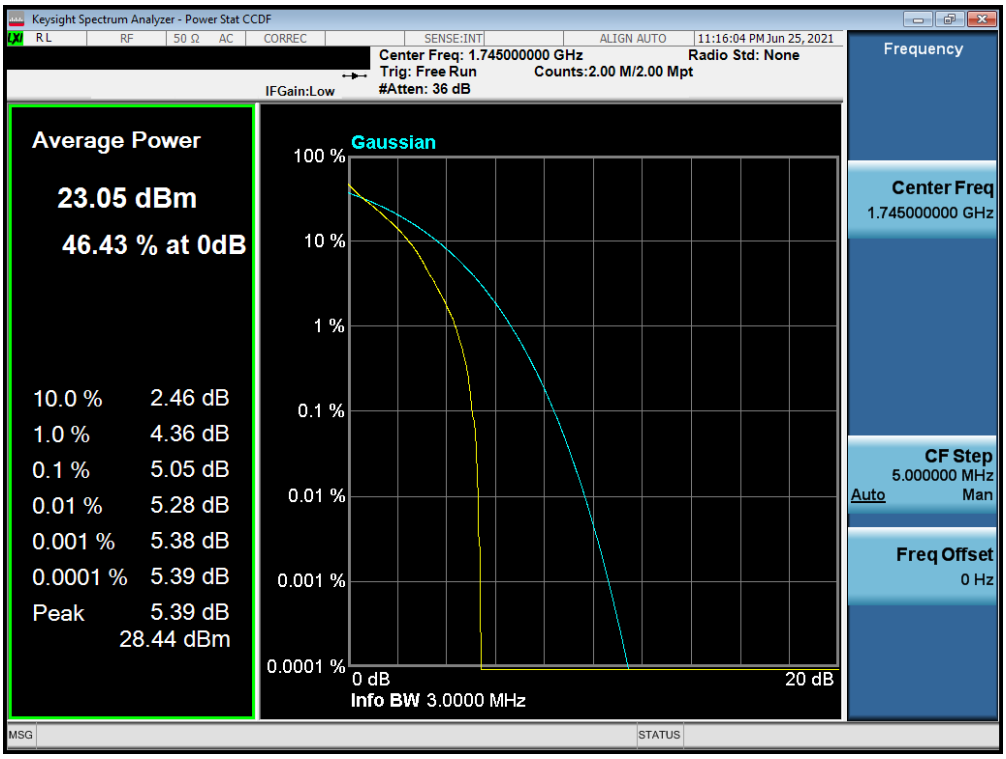
Plot 7-157. PAR Plot (LTE Band 66/4 - 10MHz 256-QAM - Full RB)



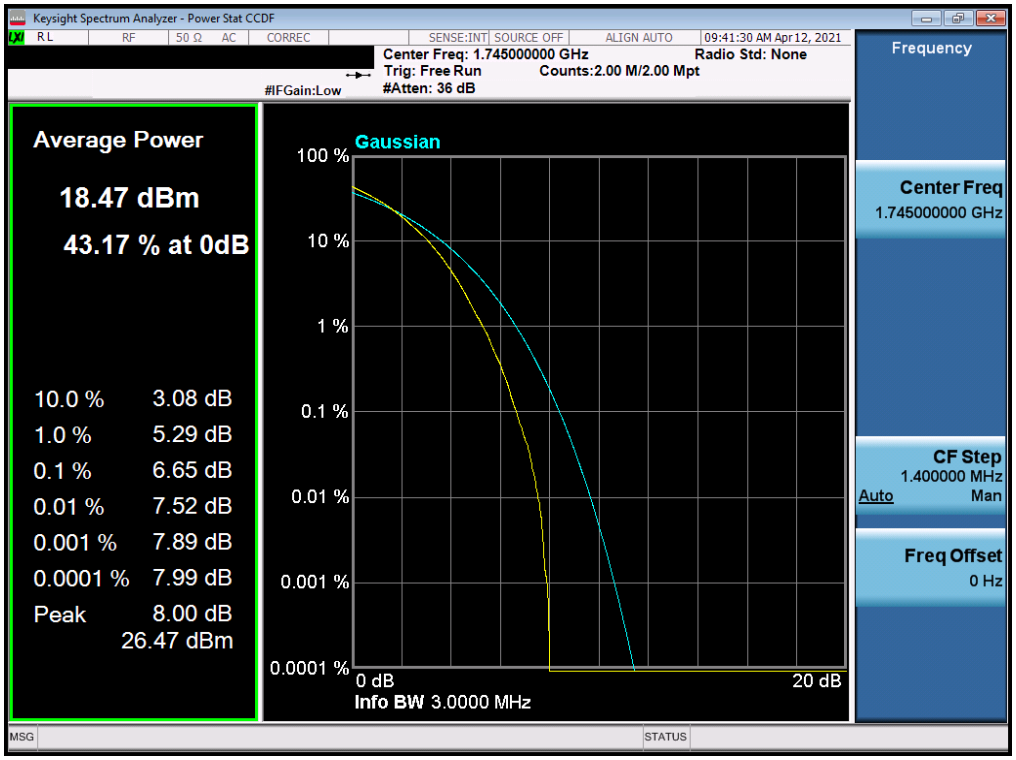
Plot 7-158. PAR Plot (LTE Band 66/4 - 5MHz QPSK - Full RB)



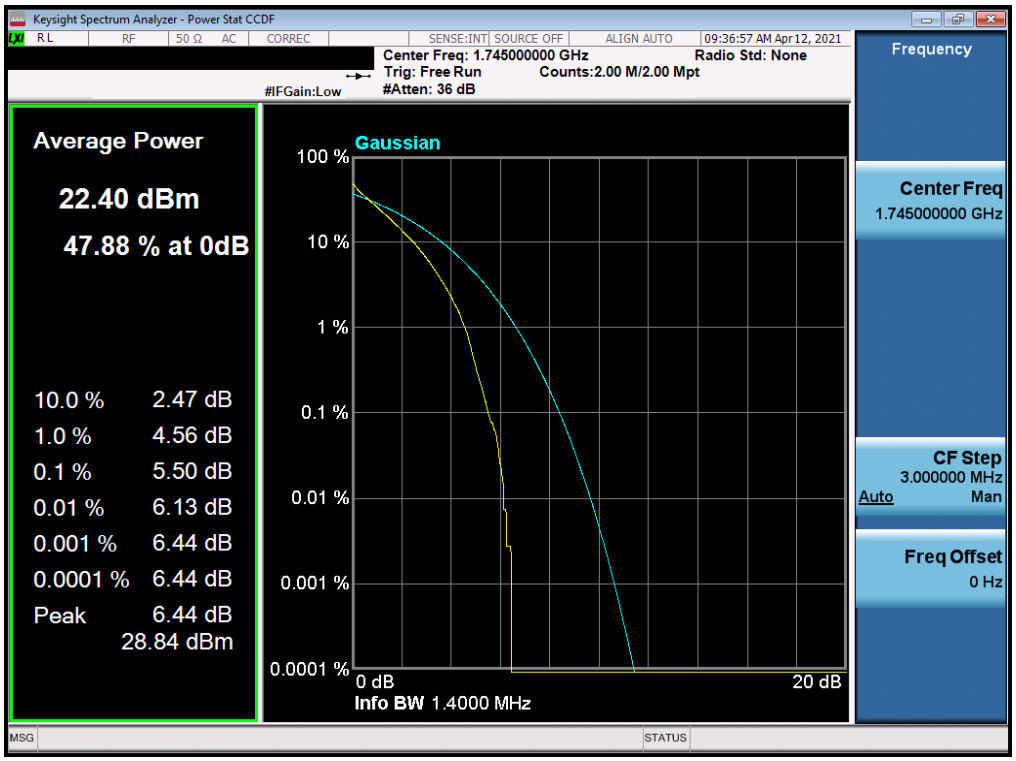
Plot 7-159. PAR Plot (LTE Band 66/4 - 5MHz 256-QAM - Full RB)



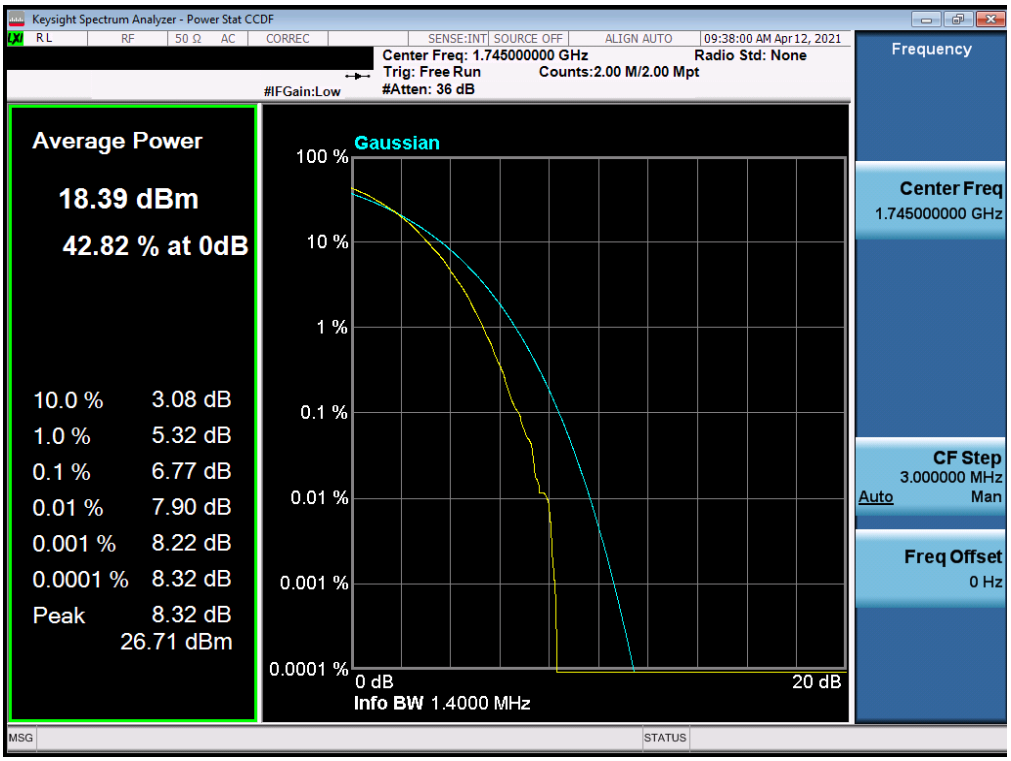
Plot 7-160. PAR Plot (LTE Band 66/4 - 3MHz QPSK - Full RB)



Plot 7-161. PAR Plot (LTE Band 66/4 - 3MHz 256-QAM - Full RB)



Plot 7-162. PAR Plot (LTE Band 66/4 - 1.4MHz QPSK - Full RB)



Plot 7-163. PAR Plot (LTE Band 66/4 - 1.4MHz 256-QAM - Full RB)

NR Band n66

Plot 7-164. PAR Plot (NR Band n66 - 20.0MHz DFT-s-OFDM BPSK - Full RB)

Plot 7-165. PAR Plot (NR Band n66 - 20.0MHz CP-OFDM QPSK - Full RB)

Plot 7-166. PAR Plot (NR Band n66 - 20.0MHz CP-OFDM 256-QAM - Full RB)

Plot 7-167. PAR Plot (NR Band n66 - 15.0MHz DFT-s-OFDM BPSK - Full RB)

Plot 7-168. PAR Plot (NR Band n66 - 15.0MHz CP-OFDM QPSK - Full RB)

Plot 7-169. PAR Plot (NR Band n66 - 15.0MHz CP-OFDM 256-QAM - Full RB)

Plot 7-170. PAR Plot (NR Band n66 - 10.0MHz DFT-s-OFDM BPSK - Full RB)

Plot 7-171. PAR Plot (NR Band n66 - 10.0MHz CP-OFDM QPSK - Full RB)

Plot 7-172. PAR Plot (NR Band n66 - 10.0MHz CP-OFDM 256-QAM - Full RB)

Plot 7-173. PAR Plot (NR Band n66 - 5.0MHz DFT-s-OFDM BPSK - Full RB)

Plot 7-174. PAR Plot (NR Band n66 - 5.0MHz CP-OFDM QPSK - Full RB)

Plot 7-175. PAR Plot (NR Band n66 - 5.0MHz CP-OFDM 256-QAM - Full RB)

7.7 Radiated Power (ERP/EIRP)

Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.2.1

ANSI/TIA-603-E-2016 – Section 2.2.17

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW ≥ 3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points ≥ 2 x span / RBW
6. Detector = RMS
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto".
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

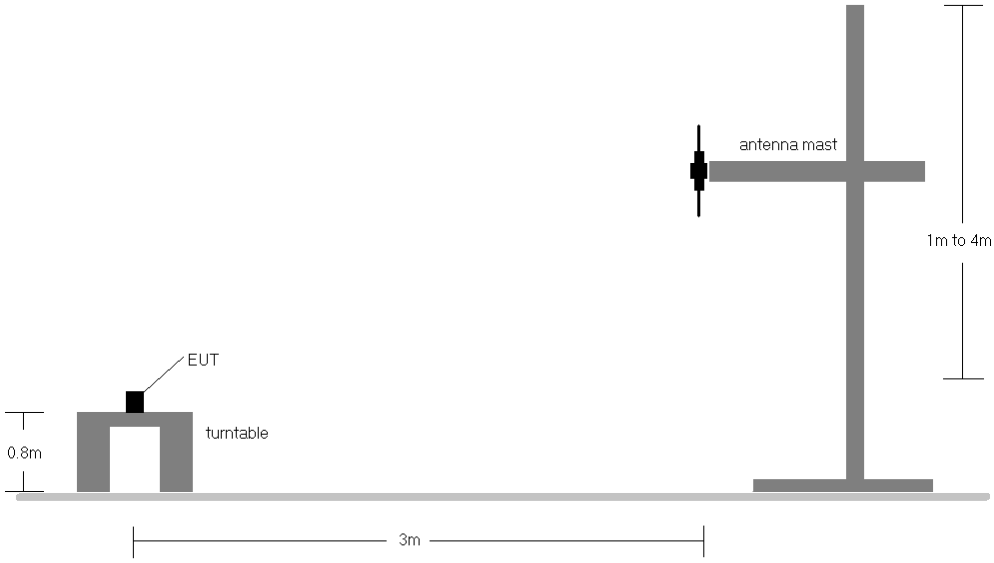


Figure 7-5. Radiated Test Setup <1GHz

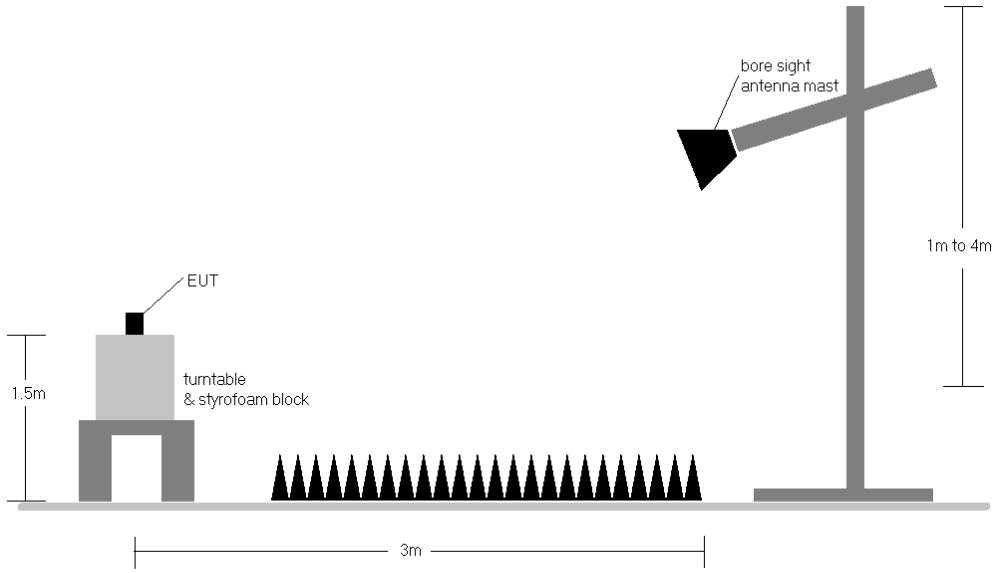


Figure 7-6. Radiated Test Setup >1GHz

Test Notes

1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.

2) This unit was tested with its standard battery.

3) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.

4) For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
10 MHz	QPSK	704.0	V	158.0	327.0	4.58	1 / 49	15.26	19.84	0.096	36.99	-17.15	17.69	0.059	34.77	-17.08
		707.5	V	166.0	336.0	4.62	1 / 49	15.38	20.00	0.100	36.99	-16.99	17.85	0.061	34.77	-16.92
		711.0	V	107.0	300.0	4.67	1 / 49	16.25	**20.92**	0.124	36.99	-16.07	**18.77**	0.075	34.77	-16.00
	16-QAM	711.0	V	107.0	300.0	4.67	1 / 49	15.57	20.24	0.106	36.99	-16.75	18.09	0.064	34.77	-16.68
5 MHz	QPSK	701.5	V	158.0	327.0	4.58	1 / 12	15.24	19.82	0.096	36.99	-17.17	17.67	0.059	34.77	-17.10
		707.5	V	166.0	336.0	4.62	1 / 12	15.31	19.94	0.099	36.99	-17.05	17.79	0.060	34.77	-16.98
		713.5	V	107.0	300.0	4.67	1 / 12	16.31	**20.98**	0.125	36.99	-16.01	**18.83**	0.076	34.77	-15.94
	16-QAM	713.5	V	107.0	300.0	4.67	1 / 12	15.56	20.23	0.105	36.99	-16.76	18.08	0.064	34.77	-16.69
3 MHz	QPSK	700.5	V	158.0	327.0	4.59	1 / 7	15.24	19.83	0.096	36.99	-17.16	17.68	0.059	34.77	-17.09
		707.5	V	166.0	336.0	4.62	1 / 7	15.22	19.84	0.096	36.99	-17.15	17.69	0.059	34.77	-17.08
		714.5	V	107.0	300.0	4.71	1 / 0	16.19	**20.90**	0.123	36.99	-16.09	**18.75**	0.075	34.77	-16.02
	16-QAM	714.5	V	107.0	300.0	4.71	1 / 0	15.39	20.10	0.102	36.99	-16.89	17.95	0.062	34.77	-16.82
1.4 MHz	QPSK	699.7	V	158.0	327.0	4.56	1 / 3	15.17	19.73	0.094	36.99	-17.26	17.58	0.057	34.77	-17.20
		707.5	V	166.0	336.0	4.62	1 / 3	15.28	19.91	0.098	36.99	-17.08	17.76	0.060	34.77	-17.02
		715.3	V	107.0	300.0	4.72	1 / 3	16.16	**20.88**	0.122	36.99	-16.11	**18.73**	0.075	34.77	-16.04
	16-QAM	715.3	V	107.0	300.0	4.72	1 / 3	15.49	20.21	0.105	36.99	-16.78	18.06	0.064	34.77	-16.71
10 MHz	Opposite Pol.	711.0	H	101.0	67.0	3.67	1 / 0	15.74	19.41	0.087	36.99	-17.58	17.26	0.053	34.77	-17.51
	Opposite Config.	711.0	V	181.0	247.0	4.72	2 / 0	10.54	15.26	0.034	36.99	-21.73	13.11	0.020	34.77	-21.66
	WCP	711.0	V	159.0	321.0	4.72	1 / 49	13.77	18.49	0.071	36.99	-18.50	16.34	0.043	34.77	-18.43

Table 7-2. ERP Data (LTE Band 12/17)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
10 MHz	QPSK	782.0	H	188.0	290.0	5.89	1 / 25	15.71	**21.60**	0.145	36.99	-15.39	**19.45**	0.088	34.77	-15.32
	16-QAM	782.0	H	188.0	290.0	5.89	1 / 25	14.97	20.86	0.122	36.99	-16.13	18.71	0.074	34.77	-16.06
5 MHz	QPSK	779.5	H	188.0	290.0	5.82	1 / 12	15.78	**21.60**	0.145	36.99	-15.39	**19.45**	0.088	34.77	-15.32
		782.0	H	188.0	290.0	5.89	1 / 12	15.62	21.51	0.142	36.99	-15.48	19.36	0.086	34.77	-15.41
		784.5	H	188.0	290.0	5.92	1 / 12	15.53	21.45	0.140	36.99	-15.54	19.30	0.085	34.77	-15.47
	16-QAM	779.5	H	188.0	290.0	5.82	1 / 12	14.52	20.34	0.108	36.99	-16.65	18.19	0.066	34.77	-16.58
10 MHz	Opposite Pol.	782.0	V	170.0	299.0	5.79	1 / 49	15.43	21.22	0.133	36.99	-15.77	19.07	0.081	34.77	-15.70
	QPSK (Closed)	782.0	V	153.0	322.0	5.79	1 / 25	10.71	16.50	0.045	36.99	-20.49	14.35	0.027	34.77	-20.42
	WCP	782.0	H	190.0	282.0	5.89	1 / 25	14.89	20.78	0.120	36.99	-16.21	18.63	0.073	34.77	-16.14

Table 7-3. ERP Data (LTE Band 13)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
20 MHz	QPSK	1720.0	H	133.0	174.0	9.41	1 / 50	14.29	**23.70**	0.235	30.00	-6.30
		1745.0	H	177.0	173.0	9.26	1 / 50	13.98	23.24	0.211	30.00	-6.76
		1770.0	H	120.0	180.0	9.27	1 / 50	13.63	22.90	0.195	30.00	-7.10
	16-QAM	1720.0	H	133.0	174.0	9.41	1 / 50	13.61	23.02	0.201	30.00	-6.98
15 MHz	QPSK	1717.5	H	133.0	174.0	9.43	1 / 0	14.24	**23.67**	0.233	30.00	-6.33
		1745.0	H	177.0	173.0	9.26	1 / 37	14.25	23.51	0.225	30.00	-6.49
		1772.5	H	120.0	180.0	9.27	1 / 37	13.80	23.07	0.203	30.00	-6.93
	16-QAM	1772.5	H	120.0	180.0	9.27	1 / 37	13.48	22.75	0.188	30.00	-7.25
10 MHz	QPSK	1715.0	H	133.0	174.0	9.44	1 / 25	14.44	**23.89**	0.245	30.00	-6.11
		1745.0	H	177.0	173.0	9.26	1 / 25	13.96	23.22	0.210	30.00	-6.78
		1775.0	H	120.0	180.0	9.28	1 / 25	13.63	22.91	0.195	30.00	-7.09
	16-QAM	1715.0	H	133.0	174.0	9.44	1 / 25	13.68	23.13	0.205	30.00	-6.87
5 MHz	QPSK	1712.5	H	133.0	174.0	9.46	1 / 12	14.36	**23.82**	0.241	30.00	-6.18
		1745.0	H	177.0	173.0	9.26	1 / 0	14.24	23.50	0.224	30.00	-6.50
		1777.5	H	120.0	180.0	9.28	1 / 12	13.88	23.16	0.207	30.00	-6.84
	16-QAM	1712.5	H	133.0	174.0	9.46	1 / 12	13.66	23.12	0.205	30.00	-6.88
3 MHz	QPSK	1711.5	H	133.0	174.0	9.47	1 / 7	14.40	**23.86**	0.243	30.00	-6.14
		1745.0	H	177.0	173.0	9.26	1 / 7	14.21	23.47	0.223	30.00	-6.53
		1778.5	H	120.0	180.0	9.28	1 / 7	13.87	23.15	0.207	30.00	-6.85
	16-QAM	1711.5	H	133.0	174.0	9.47	1 / 7	13.85	23.32	0.215	30.00	-6.68
1.4 MHz	QPSK	1710.7	H	133.0	174.0	9.47	1 / 3	14.36	**23.83**	0.241	30.00	-6.17
		1745.0	H	177.0	173.0	9.26	1 / 3	14.15	23.41	0.219	30.00	-6.59
		1779.3	H	120.0	180.0	9.29	1 / 3	13.79	23.08	0.203	30.00	-6.92
	16-QAM	1710.7	H	133.0	174.0	9.47	1 / 3	13.75	23.22	0.210	30.00	-6.78
20 MHz	Opposite Pol.	1720.0	V	141.0	274.0	9.31	1 / 50	13.15	22.46	0.176	30.00	-7.54
	QPSK (Closed)	1720.0	H	286.0	197.0	9.41	1 / 50	12.84	22.25	0.168	30.00	-7.75
	WCP	1720.0	H	151.0	197.0	9.41	1 / 99	11.35	20.76	0.119	30.00	-9.24

Table 7-4. EIRP Data (LTE Band 66/4)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
20 MHz	π/2 BPSK	1720.0	V	139.0	297.0	9.53	1 / 79	13.99	23.52	0.225	30.00	-6.48
		1745.0	V	134.0	300.0	9.39	1 / 53	14.62	**24.01**	0.252	30.00	-5.99
		1770.0	V	120.0	276.0	9.48	1 / 26	13.80	23.28	0.213	30.00	-6.72
	QPSK	1745.0	V	134.0	300.0	9.39	1 / 53	14.59	23.98	0.250	30.00	-6.02
	16-QAM	1745.0	V	134.0	300.0	9.39	1 / 53	13.56	22.95	0.197	30.00	-7.05
15 MHz	π/2 BPSK	1717.5	V	139.0	297.0	9.56	1 / 20	13.90	23.46	0.222	30.00	-6.54
		1745.0	V	134.0	300.0	9.39	1 / 20	14.80	**24.19**	0.263	30.00	-5.81
		1772.5	V	120.0	276.0	9.49	1 / 39	13.79	23.28	0.213	30.00	-6.72
	QPSK	1745.0	V	134.0	300.0	9.39	1 / 20	14.72	24.11	0.258	30.00	-5.89
	16-QAM	1745.0	V	134.0	300.0	9.39	1 / 20	13.30	22.69	0.186	30.00	-7.31
10 MHz	π/2 BPSK	1715.0	V	139.0	297.0	9.59	1 / 38	14.09	23.68	0.233	30.00	-6.32
		1745.0	V	134.0	300.0	9.39	1 / 38	14.72	**24.11**	0.258	30.00	-5.89
		1775.0	V	120.0	276.0	9.51	1 / 13	13.81	23.32	0.215	30.00	-6.68
	QPSK	1745.0	V	134.0	300.0	9.39	1 / 38	14.58	23.97	0.249	30.00	-6.03
	16-QAM	1745.0	V	134.0	300.0	9.39	1 / 38	12.86	22.25	0.168	30.00	-7.75
5 MHz	π/2 BPSK	1712.5	V	139.0	297.0	9.62	1 / 6	14.02	23.64	0.231	30.00	-6.36
		1745.0	V	134.0	300.0	9.39	1 / 12	14.98	**24.37**	0.273	30.00	-5.63
		1777.5	V	120.0	276.0	9.53	1 / 12	13.78	23.31	0.214	30.00	-6.69
	QPSK	1745.0	V	134.0	300.0	9.39	1 / 12	14.56	23.96	0.249	30.00	-6.04
	16-QAM	1745.0	V	134.0	300.0	9.39	1 / 12	13.18	22.57	0.181	30.00	-7.43
20 MHz	QPSK (CP-OFDM)	1745.0	V	106.0	1.0	9.39	1 / 53	11.67	21.06	0.128	30.00	-8.94
	QPSK (Opposite Pol.)	1745.0	H	127.0	179.0	9.88	1 / 53	10.86	20.74	0.119	30.00	-9.26
	QPSK (WCP)	1745.0	V	272.0	216.0	9.39	1 / 53	8.40	17.79	0.060	30.00	-12.21

Table 7-5. EIRP Data (NR Band n66)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1712.40	WCDMA1700	H	136	174	14.46	9.46	**23.92**	**0.247**	30.00	-6.08
1732.60	WCDMA1700	H	172	172	14.14	9.34	23.48	0.223	30.00	-6.52
1752.60	WCDMA1700	H	180	177	13.70	9.24	22.94	0.197	30.00	-7.06
1712.40	WCDMA1700	V	158	271	13.31	9.37	22.68	0.185	30.00	-7.32
1712.40	WCDMA1700	H	136	30	13.09	9.46	22.55	0.180	30.00	-7.45
1712.40	WCDMA1700 (WCP)	H	171	177	12.89	9.46	22.35	0.172	30.00	-7.65

Table 7-6. EIRP Data (WCDMA AWS)

7.8 Radiated Spurious Emissions Measurements

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using horizontally and vertically polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as peak measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.8

ANSI/TIA-603-E-2016 – Section 2.2.12

Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW ≥ 3 x RBW
3. Span = 1.5 times the OBW
4. No. of sweep points ≥ 2 x span / RBW
5. Detector = RMS
6. Trace mode = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

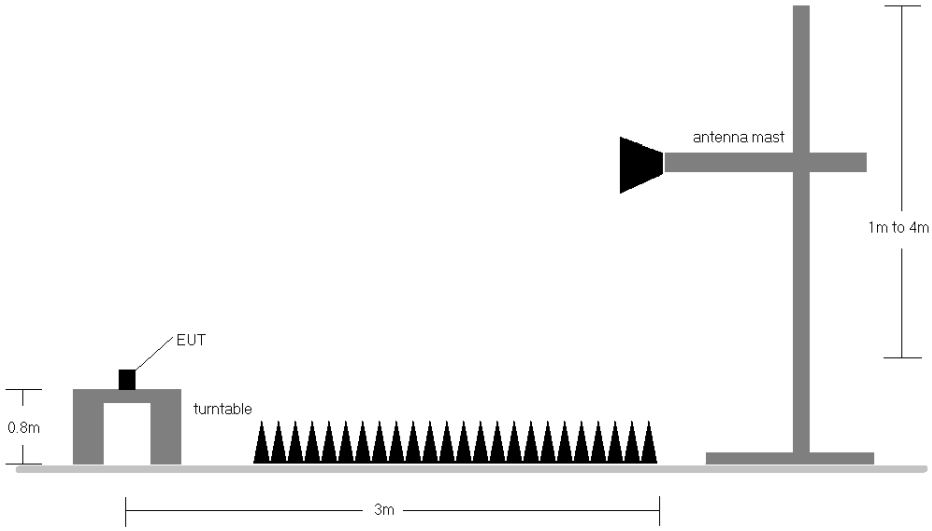


Figure 7-7. Test Instrument & Measurement Setup

Test Notes

1) Field strengths are calculated using the Measurement quantity conversions in KDB 971168 Section 5.8.4.
   b) E(dBµV/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m)
   d) EIRP (dBm) = E(dBµV/m) + 20logD – 104.8; where D is the measurement distance in meters.

2) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.

3) This unit was tested with its standard battery.

4) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.

5) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.

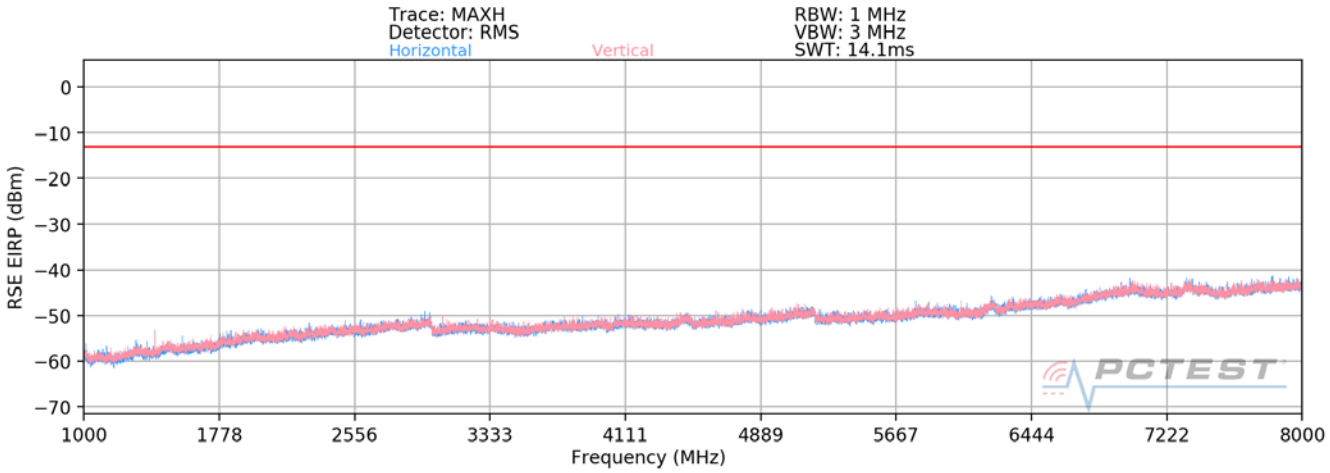
6) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.

7) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

8) For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

9) Spurious emissions shown in this section are measured while operating in EN-DC mode with Sub 6GHz NR carrier as well as an LTE carrier (anchor). Spurious emissions from the NR carrier device, is subject to the rules under which the NR carrier operates. Spurious emission caused by the LTE carrier must meet the requirements of the rules under which the LTE carrier operates.

LTE Band 12/17



Plot 7-176. Radiated Spurious Plot (LTE Band 12/17)

Bandwidth (MHz):	10
Frequency (MHz):	704.0
RB / Offset:	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1408.0	H	219	18	-69.51	-1.53	35.96	-59.30	-13.00	-46.30
2112.0	H	-	-	-77.49	1.97	31.48	-63.77	-13.00	-50.77
2816.0	H	-	-	-78.01	3.88	32.87	-62.39	-13.00	-49.39
3520.0	H	-	-	-78.11	4.16	33.05	-62.20	-13.00	-49.20

Table 7-7. Radiated Spurious Data (LTE Band 12/17 – Low Channel)

Bandwidth (MHz):	10
Frequency (MHz):	707.5
RB / Offset:	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1415.0	H	209	115	-71.88	-1.48	33.64	-61.62	-13.00	-48.62
2122.5	H	-	-	-77.40	2.03	31.63	-63.62	-13.00	-50.62
2830.0	H	-	-	-78.07	3.90	32.83	-62.43	-13.00	-49.43
3537.5	H	-	-	-78.44	4.24	32.80	-62.46	-13.00	-49.46

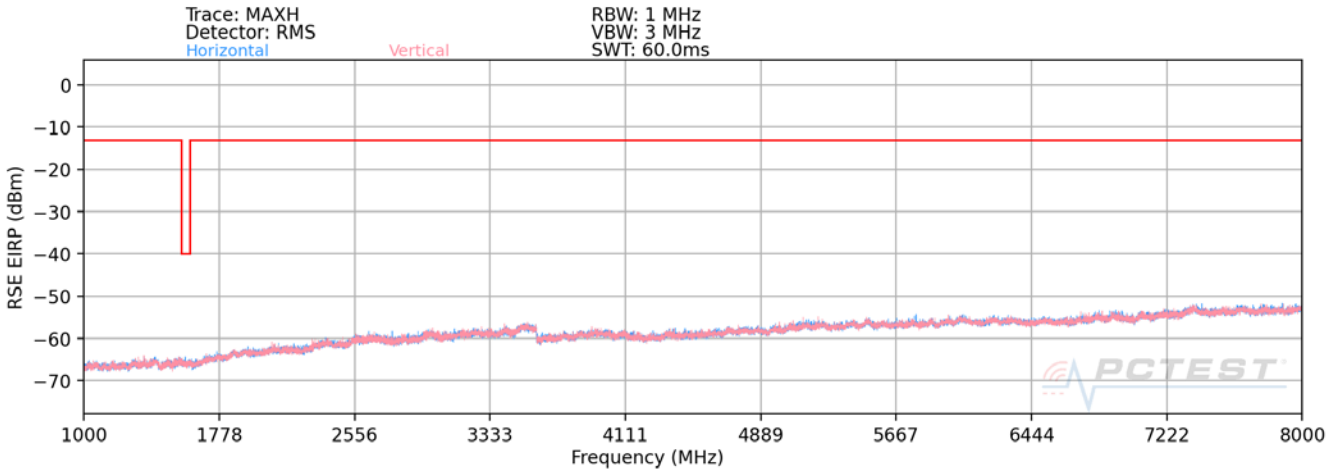
Table 7-8. Radiated Spurious Data (LTE Band 12/17 – Mid Channel)

Bandwidth (MHz):	10
Frequency (MHz):	711.0
RB / Offset:	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1422.0	H	272	105	-74.32	-1.62	31.06	-64.20	-13.00	-51.20
2133.0	H	-	-	-77.31	2.13	31.82	-63.44	-13.00	-50.44
2844.0	H	-	-	-77.98	3.90	32.92	-62.33	-13.00	-49.33
3555.0	H	-	-	-78.17	4.55	33.38	-61.88	-13.00	-48.88

Table 7-9. Radiated Spurious Data (LTE Band 12/17 – High Channel)

LTE Band 13



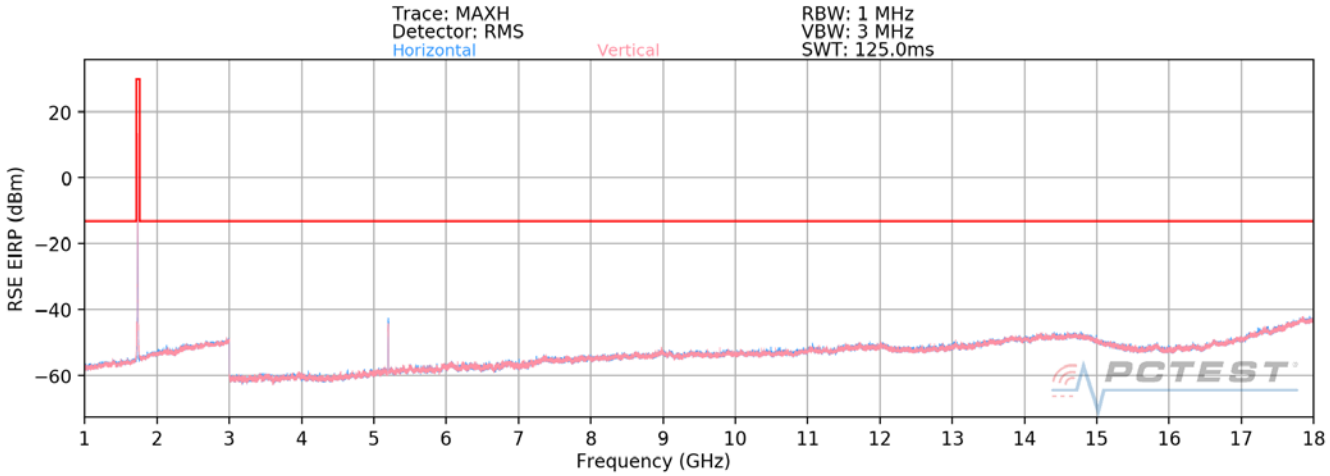
Plot 7-177. Radiated Spurious Plot (LTE Band 13)

Bandwidth (MHz):	10
Frequency (MHz):	782.0
RB / Offset:	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1564.0	H	-	-	-76.69	-5.62	24.69	-70.57	-40.00	-30.57
2346.0	H	120	135	-73.96	-2.43	30.61	-64.65	-13.00	-51.65
3128.0	H	-	-	-77.71	-0.05	29.24	-66.01	-13.00	-53.01
3910.0	H	-	-	-79.41	2.72	30.31	-64.95	-13.00	-51.95
4692.0	H	-	-	-79.85	2.86	30.01	-65.25	-13.00	-52.25

Table 7-10. Radiated Spurious Data (LTE Band 13 – Mid Channel)

WCDMA AWS



Plot 7-178. Radiated Spurious Plot (WCDMA AWS)

Mode:	WCDMA RMC
Channel:	1312
Frequency (MHz):	1712.4

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3424.8	H	-	-	-77.27	1.93	31.66	-63.59	-13.00	-50.59
5137.2	H	365	130	-55.40	4.72	56.32	-38.94	-13.00	-25.94
6849.6	H	-	-	-80.29	8.19	34.90	-60.36	-13.00	-47.36
8562.0	H	-	-	-80.71	10.66	36.95	-58.31	-13.00	-45.31
10274.4	H	-	-	-81.04	11.74	37.70	-57.56	-13.00	-44.56

7-11. Radiated Spurious Data (WCDMA AWS – Low Channel)

Mode:	WCDMA RMC
Channel:	1413
Frequency (MHz):	1732.6

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3465.2	H	-	-	-77.40	1.19	30.79	-64.47	-13.00	-51.47
5197.8	H	111	1	-54.39	5.15	57.76	-37.50	-13.00	-24.50
6930.4	H	-	-	-79.90	7.36	34.46	-60.79	-13.00	-47.79
8663.0	H	-	-	-80.63	11.06	37.43	-57.83	-13.00	-44.83
10395.6	H	-	-	-81.18	12.18	38.00	-57.25	-13.00	-44.25

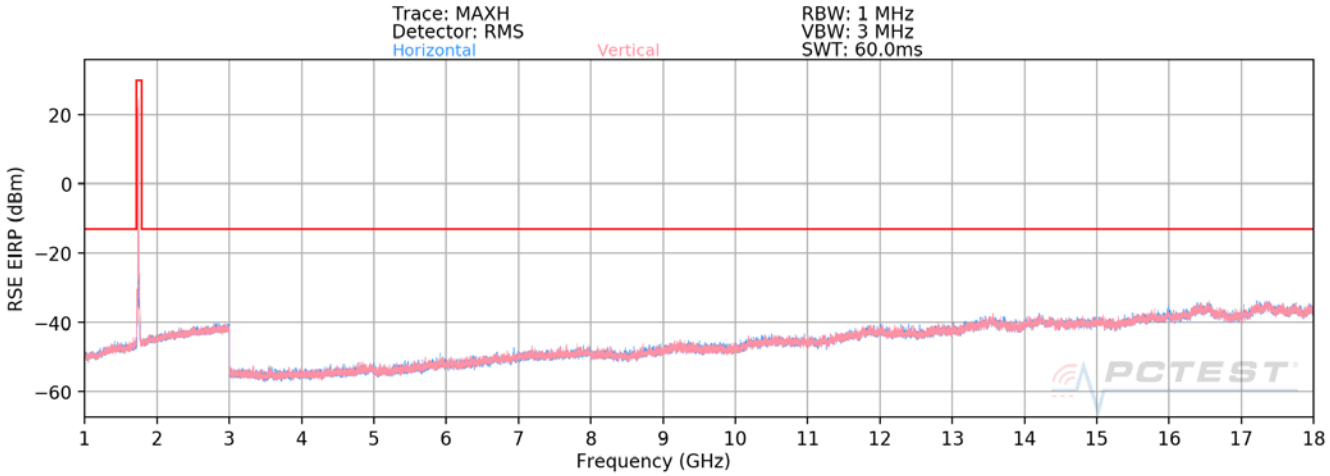
Table 7-12. Radiated Spurious Data (WCDMA AWS – Mid Channel)

Mode:	WCDMA RMC
Channel:	1513
Frequency (MHz):	1752.6

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3505.2	H	-	-	-77.51	1.60	31.09	-64.17	-13.00	-51.17
5257.8	H	111	362	-51.22	4.78	60.56	-34.69	-13.00	-21.69
7010.4	H	-	-	-79.48	6.75	34.27	-60.98	-13.00	-47.98
8763.0	H	-	-	-80.28	10.58	37.30	-57.95	-13.00	-44.95
10515.6	H	-	-	-81.21	11.72	37.51	-57.75	-13.00	-44.75

Table 7-13. Radiated Spurious Data (WCDMA AWS – High Channel)

LTE Band 66/4



Plot 7-179. Radiated Spurious Plot (LTE Band 66/4)

Bandwidth (MHz):	20
Frequency (MHz):	1720.0
RB / Offset:	1 / 50

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3440.0	V	229	269	-78.80	7.79	35.99	-59.27	-13.00	-46.27
5160.0	V	-	-	-81.65	10.62	35.97	-59.29	-13.00	-46.29
6880.0	V	-	-	-82.44	14.42	38.98	-56.28	-13.00	-43.28
8600.0	V	-	-	-83.81	17.90	41.09	-54.17	-13.00	-41.17

Table 7-14. Radiated Spurious Data (LTE Band 66/4 – Low Channel)

Bandwidth (MHz):	20
Frequency (MHz):	1745.0
RB / Offset:	1 / 50

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3490.0	V	217	278	-78.62	7.63	36.01	-59.25	-13.00	-46.25
5235.0	V	127	360	-80.40	10.39	36.99	-58.27	-13.00	-45.27
6980.0	V	-	-	-82.22	14.54	39.32	-55.94	-13.00	-42.94
8725.0	V	-	-	-83.56	17.61	41.05	-54.21	-13.00	-41.21
10470.0	V	-	-	-83.96	20.56	43.60	-51.66	-13.00	-38.66

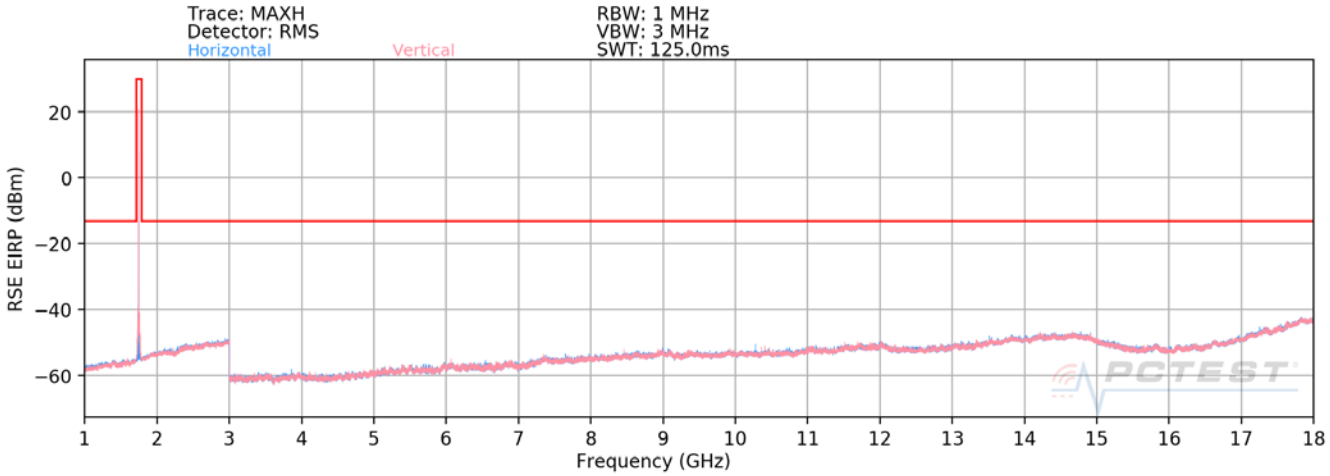
Table 7-15. Radiated Spurious Data (LTE Band 66/4 – Mid Channel)

Bandwidth (MHz):	20
Frequency (MHz):	1770.0
RB / Offset:	1 / 50

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3540.00	V	178	273	-78.70	8.04	36.34	-58.91	-13.00	-45.91
5310.00	V	188	351	-79.16	11.38	39.22	-56.04	-13.00	-43.04
7080.00	V	-	-	-82.61	14.82	39.21	-56.04	-13.00	-43.04
8850.00	V	-	-	-83.59	17.23	40.64	-54.62	-13.00	-41.62
10620.00	V	-	-	-83.96	20.91	43.95	-51.31	-13.00	-38.31

Table 7-16. Radiated Spurious Data (LTE Band 66/4 – High Channel)

NR Band n66



Plot 7-180. Radiated Spurious Plot (NR Band n66)

Bandwidth (MHz):	40
Frequency (MHz):	1730.0
RB / Offset:	1 / 108
Mode:	SA
Anchor Band:	-

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3460.0	H	330	312	-71.68	1.27	36.59	-58.67	-13.00	-45.67
5190.0	H	324	327	-76.72	5.14	35.42	-59.83	-13.00	-46.83
6920.0	H	-	-	-77.83	7.77	36.94	-58.32	-13.00	-45.32
8650.0	H	-	-	-78.60	11.11	39.51	-55.75	-13.00	-42.75

Table 7-17. Radiated Spurious Data (NR Band n66 – Low Channel)

Bandwidth (MHz):	40
Frequency (MHz):	1745.0
RB / Offset:	1 / 108
Mode:	SA
Anchor Band:	-

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3490.0	H	121	305	-69.78	1.27	38.49	-56.76	-13.00	-43.76
5235.0	H	336	64	-75.92	1.27	32.35	-62.90	-13.00	-49.90
6980.0	H	-	-	-77.58	6.82	36.24	-59.02	-13.00	-46.02
8725.0	H	-	-	-77.97	10.67	39.70	-55.56	-13.00	-42.56
10470.0	H	-	-	-78.85	11.92	40.07	-55.19	-13.00	-42.19

Table 7-18. Radiated Spurious Data (NR Band n66 – Mid Channel)

Bandwidth (MHz):	40
Frequency (MHz):	1760.0
RB / Offset:	1 / 108
Mode:	SA
Anchor Band:	-

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3520.0	H	400	326	-71.25	1.74	37.49	-57.77	-13.00	-44.77
5280.0	H	398	341	-77.19	4.69	34.50	-60.76	-13.00	-47.76
7040.0	H	-	-	-77.79	6.93	36.14	-59.12	-13.00	-46.12
8800.0	H	-	-	-78.19	10.75	39.56	-55.70	-13.00	-42.70

Table 7-19. Radiated Spurious Data (NR Band n66 – High Channel)