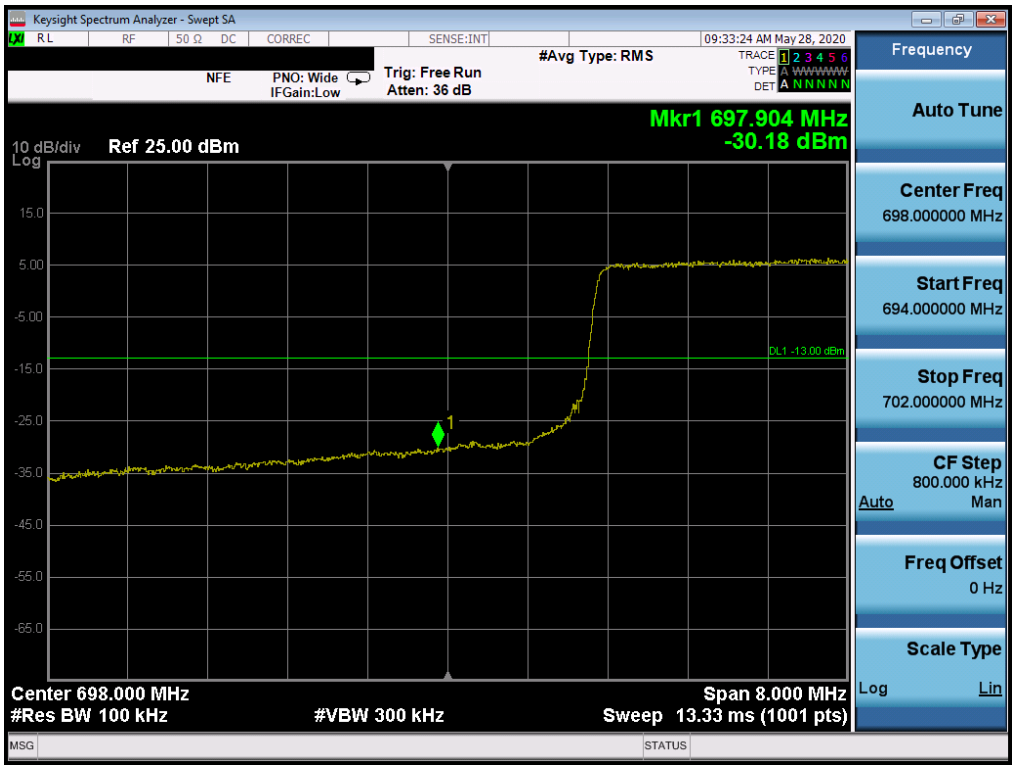
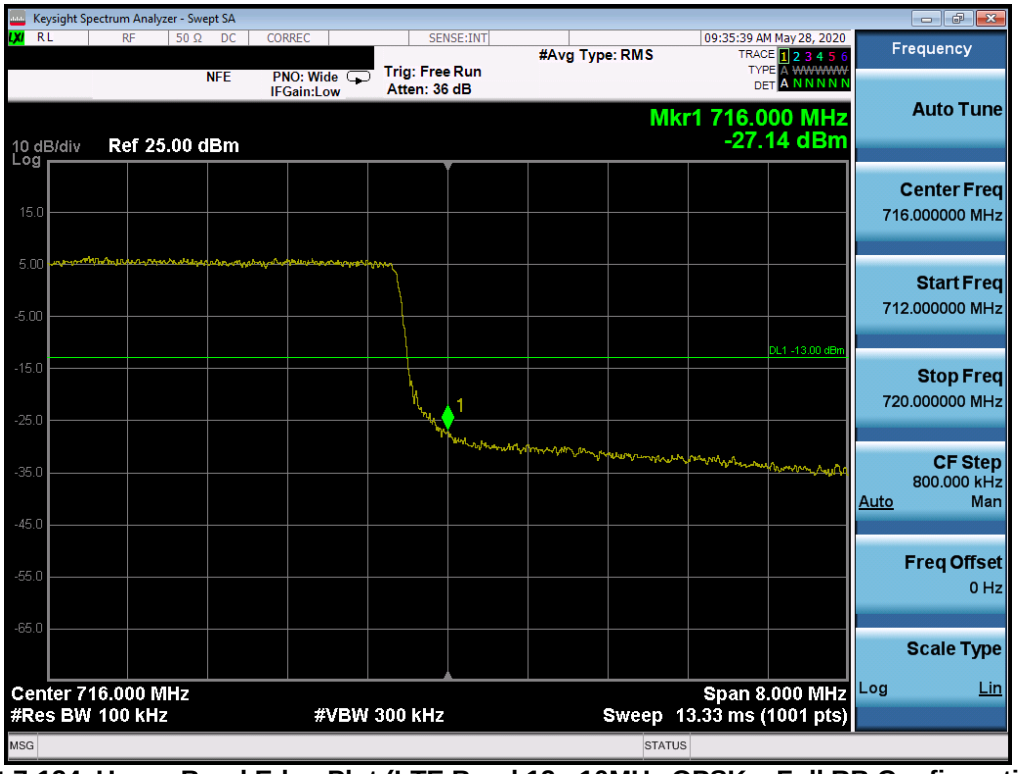
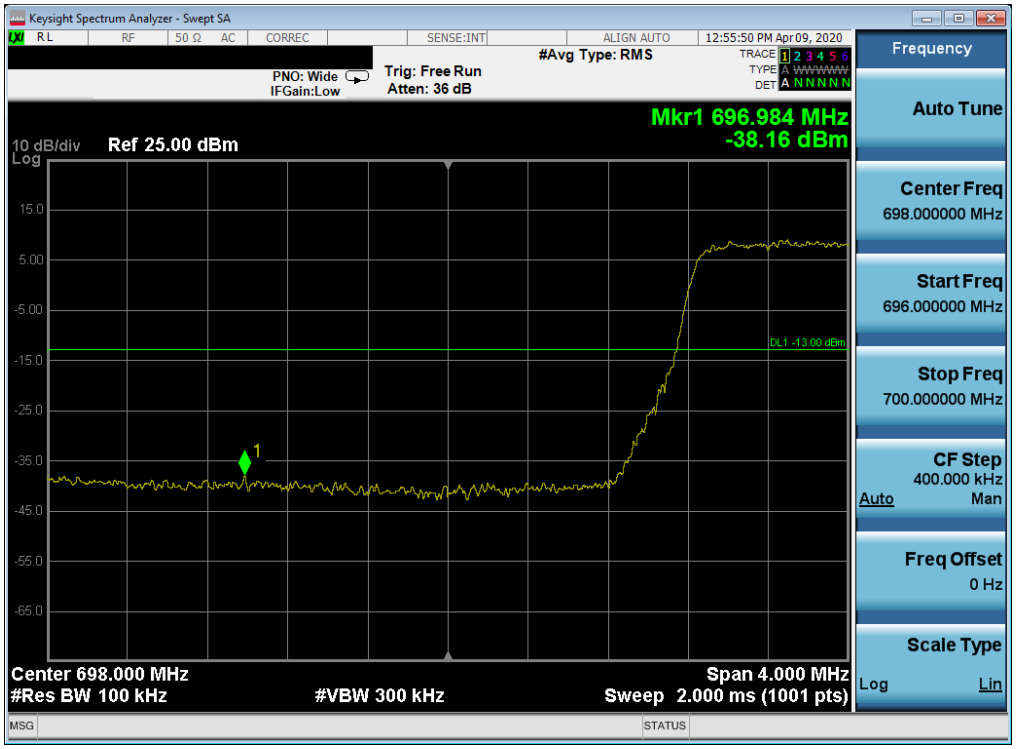
LTE Band 12



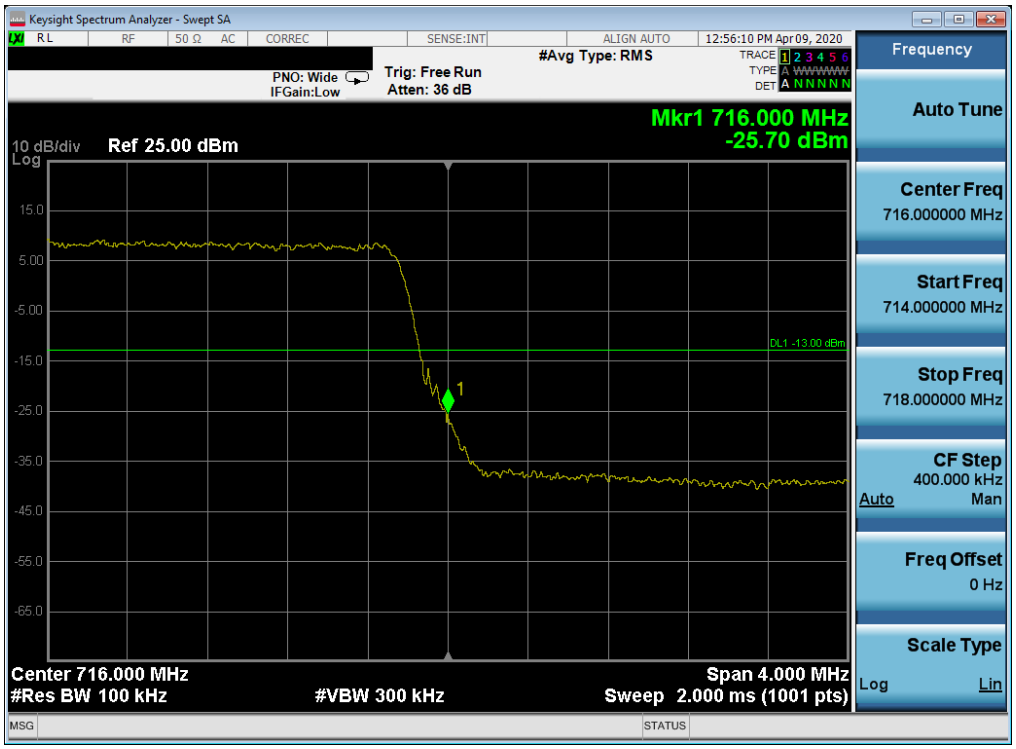
Plot 7-123. Lower Band Edge Plot (LTE Band 12 - 10MHz QPSK – Full RB Configuration)



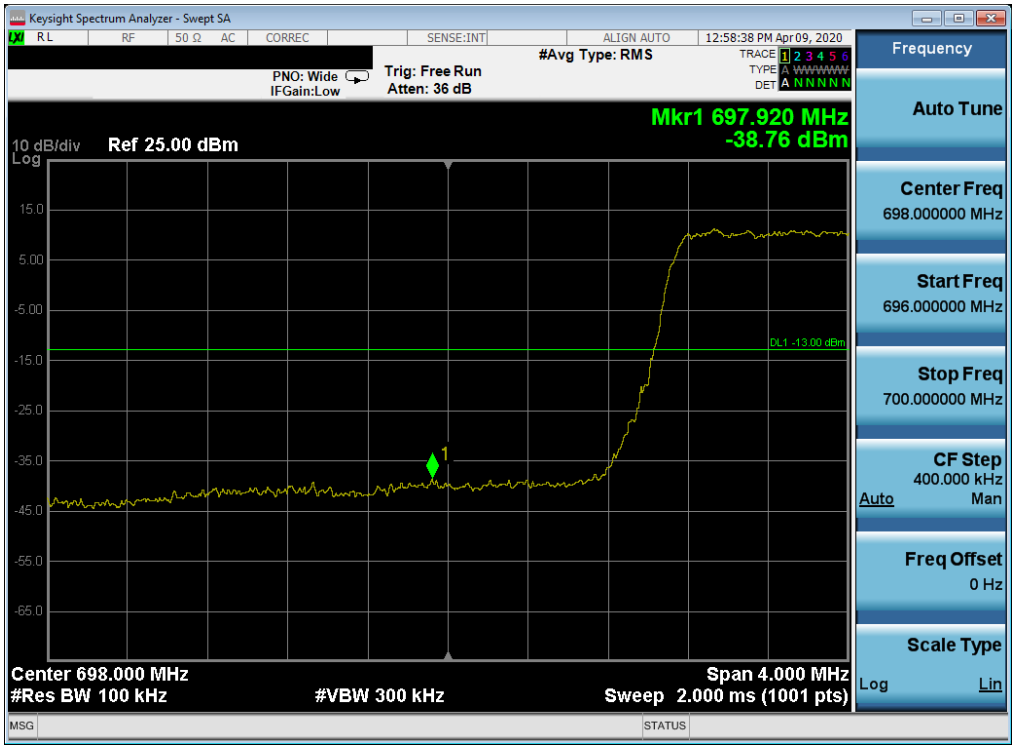
Plot 7-124. Upper Band Edge Plot (LTE Band 12 - 10MHz QPSK – Full RB Configuration)



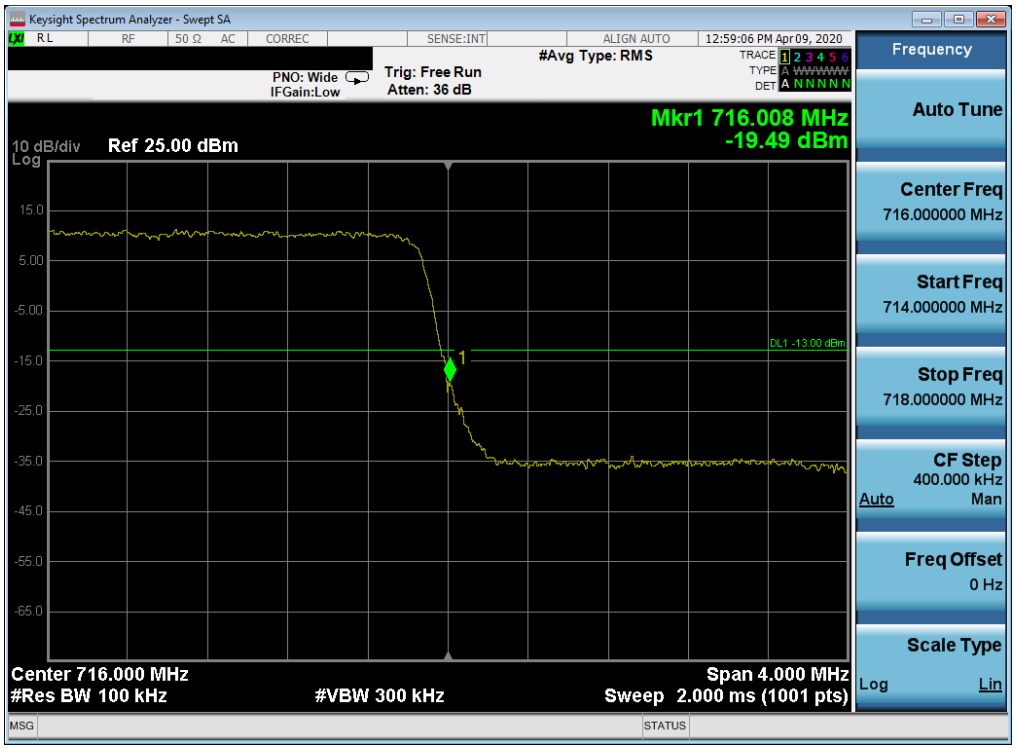
Plot 7-125. Lower Band Edge Plot (LTE Band 12 - 5MHz QPSK – Full RB Configuration)



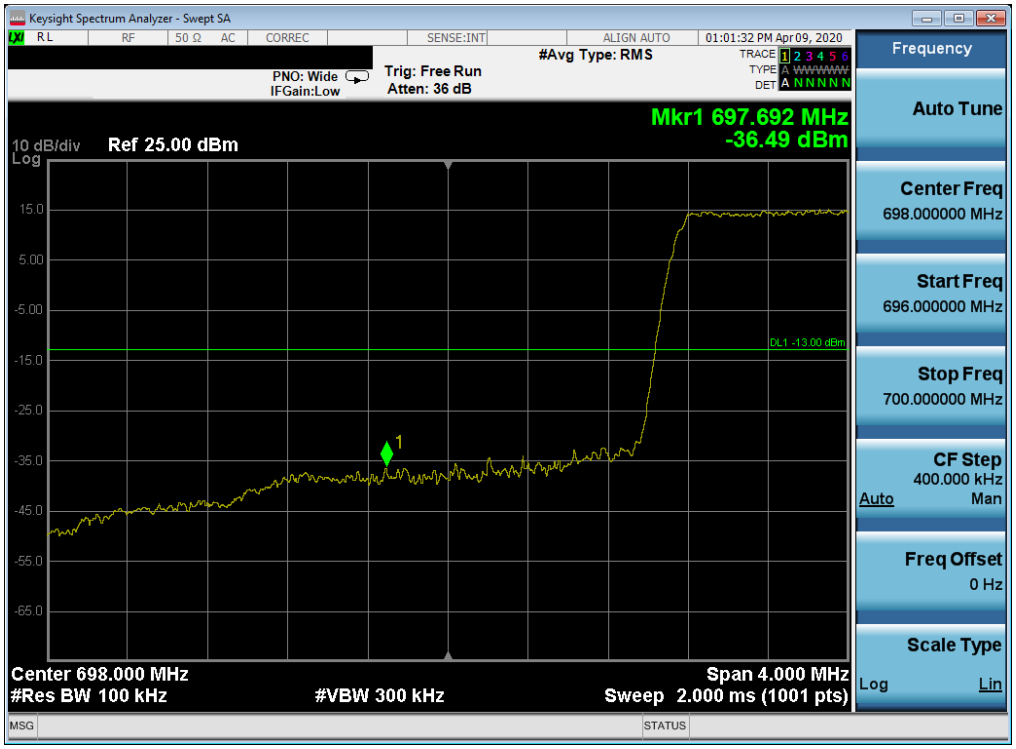
Plot 7-126. Upper Band Edge Plot (LTE Band 12 - 5MHz QPSK – Full RB Configuration)



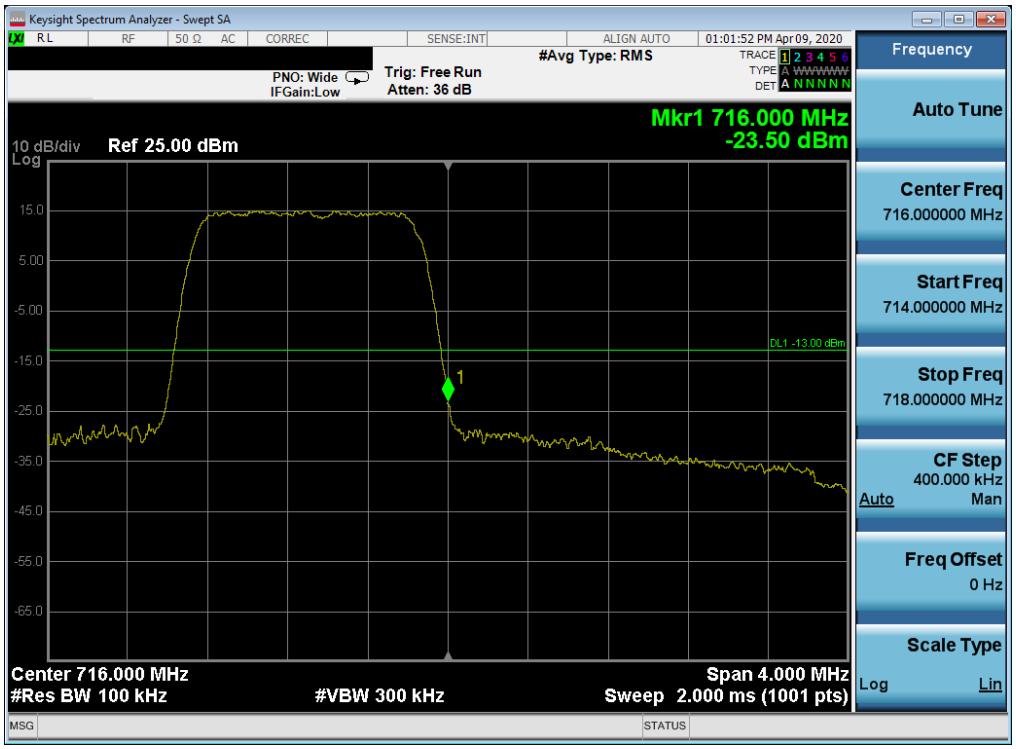
Plot 7-127. Lower Band Edge Plot (LTE Band 12 - 3MHz QPSK – Full RB Configuration)



Plot 7-128. Upper Band Edge Plot (LTE Band 12 - 3MHz QPSK – Full RB Configuration)

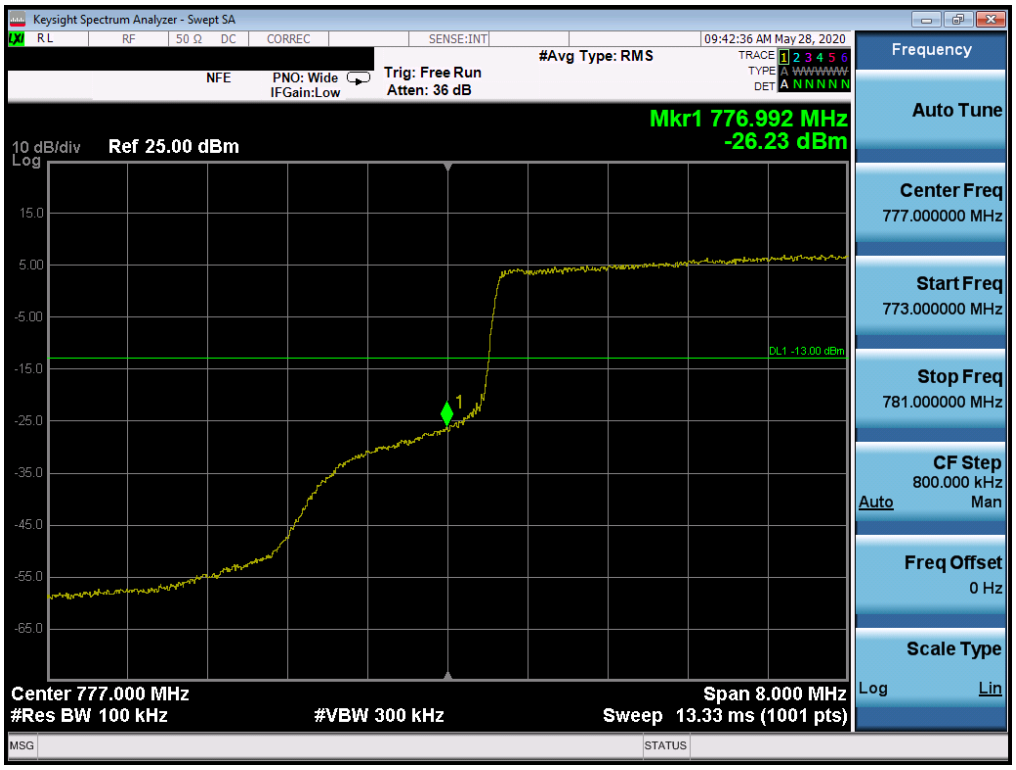


Plot 7-129. Lower Band Edge Plot (LTE Band 12 – 1.4MHz QPSK – Full RB Configuration)



Plot 7-130. Upper Band Edge Plot (LTE Band 12 – 1.4MHz QPSK – Full RB Configuration)

LTE Band 13

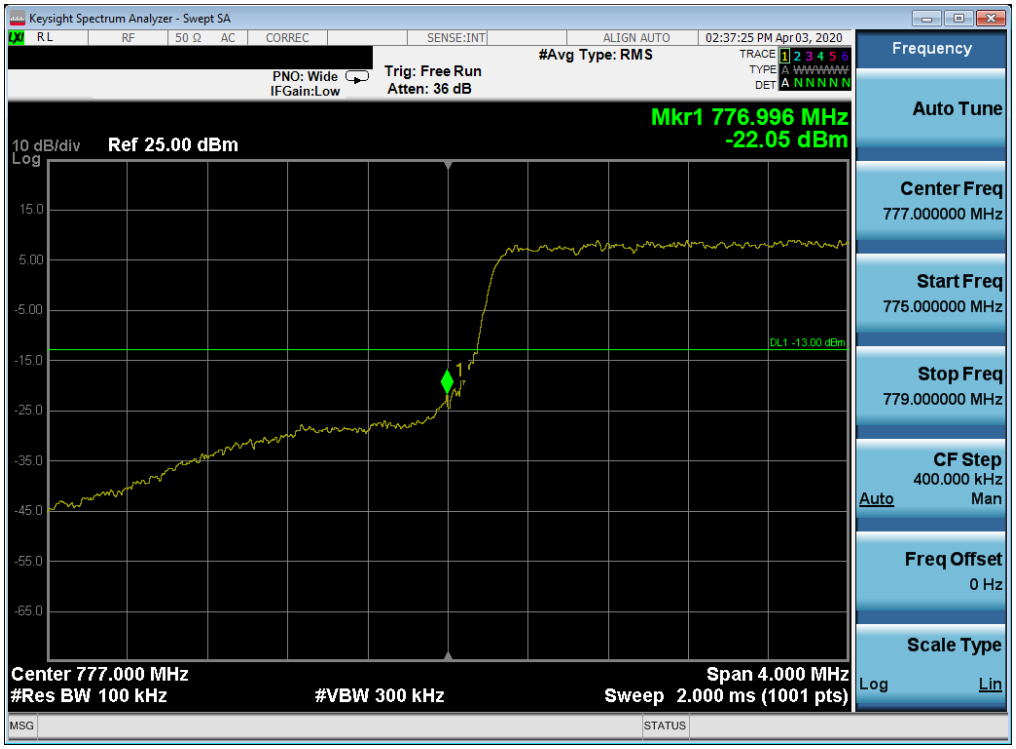


Plot 7-131. Lower Band Edge Plot (LTE Band 13 - 10MHz QPSK – Full RB Configuration)

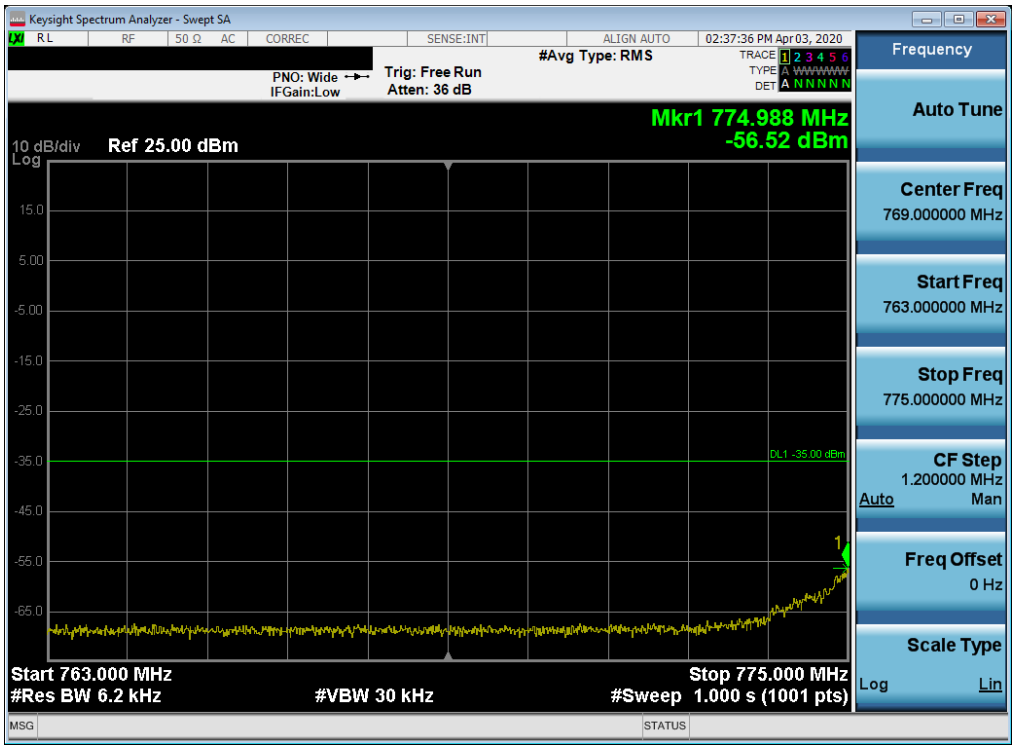
Plot 7-132. Lower Emission Mask Plot (LTE Band 13 - 10MHz QPSK – Full RB Configuration)

Plot 7-133. Upper Band Edge Plot (LTE Band 13 - 10MHz QPSK – Full RB Configuration)

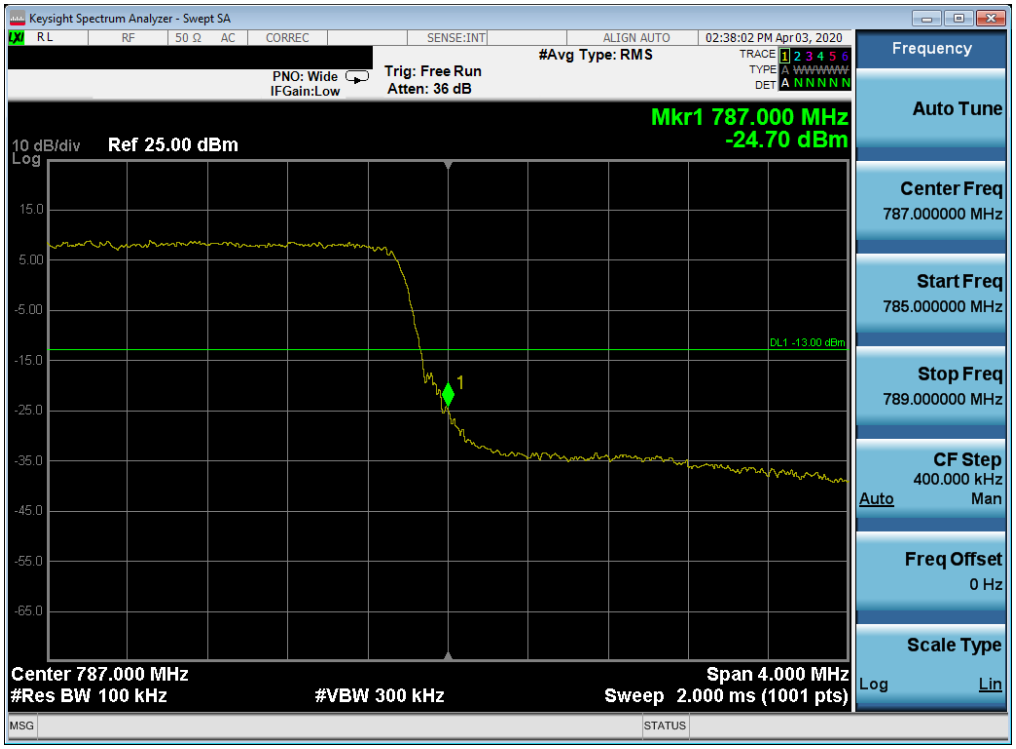
Plot 7-134. Upper Emission Mask Plot (LTE Band 13 - 10MHz QPSK – Full RB Configuration)



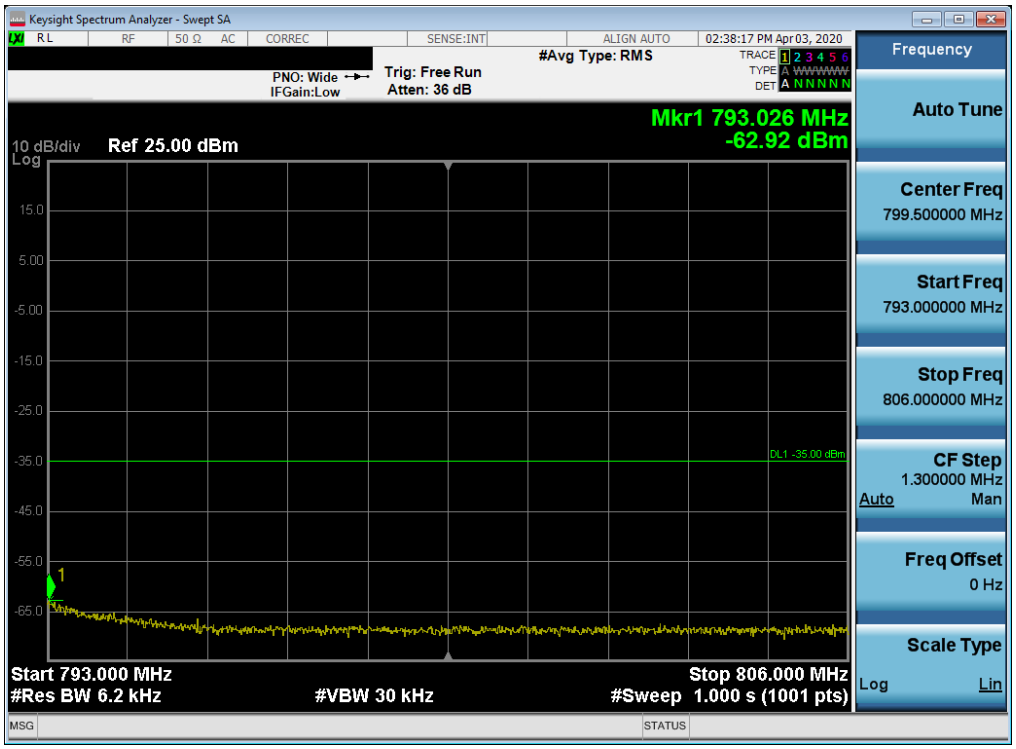
Plot 7-135. Lower Band Edge Plot (LTE Band 13 - 5MHz QPSK – Full RB Configuration)



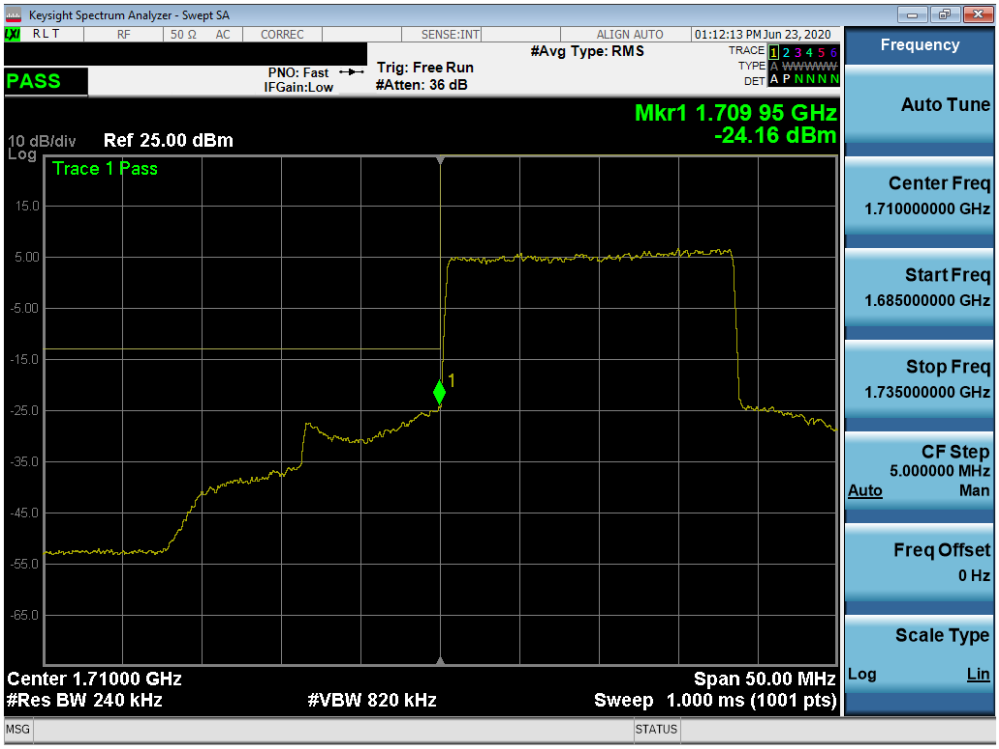
Plot 7-136. Lower Emission Mask Plot (LTE Band 13 - 5MHz QPSK – Full RB Configuration)



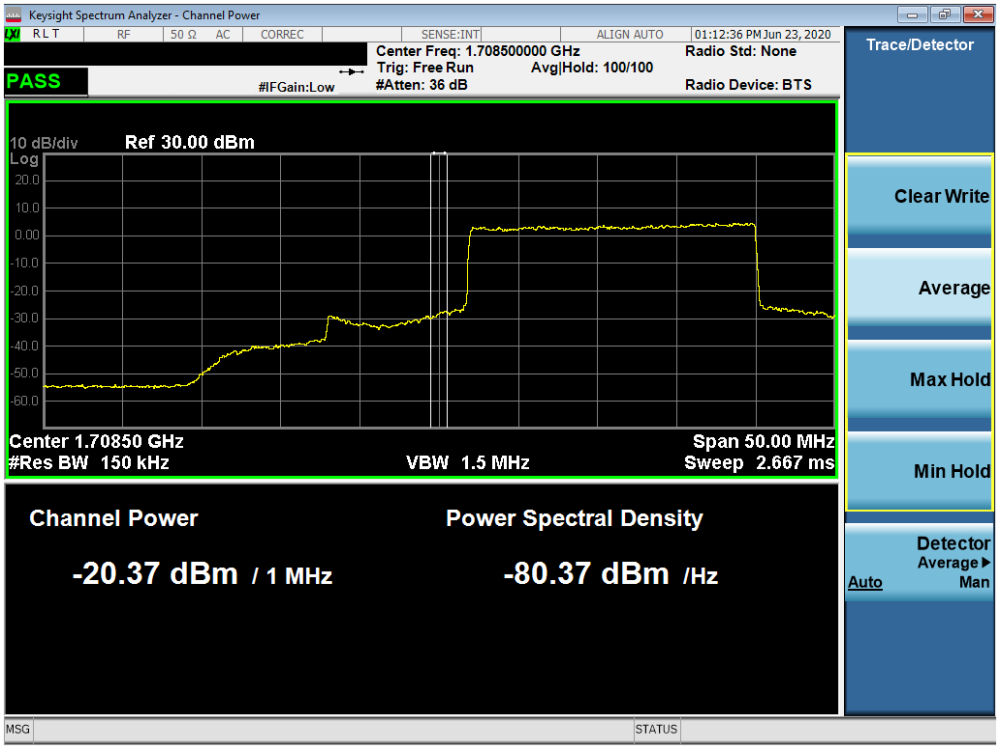
Plot 7-137. Upper Band Edge Plot (LTE Band 13 - 5MHz QPSK – Full RB Configuration)



Plot 7-138. Upper Emission Mask Plot (LTE Band 13 - 5MHz QPSK – Full RB Configuration)

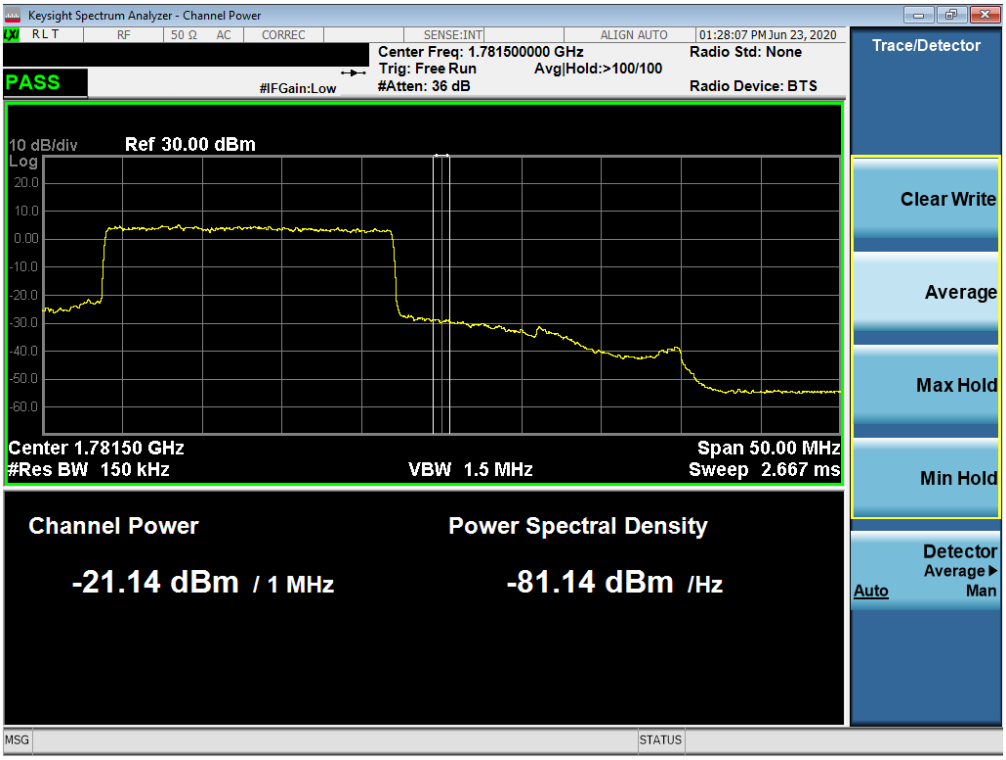


Plot 7-139. Lower Band Edge Plot (NR Band n66 – 20.0MHz - Full RB)



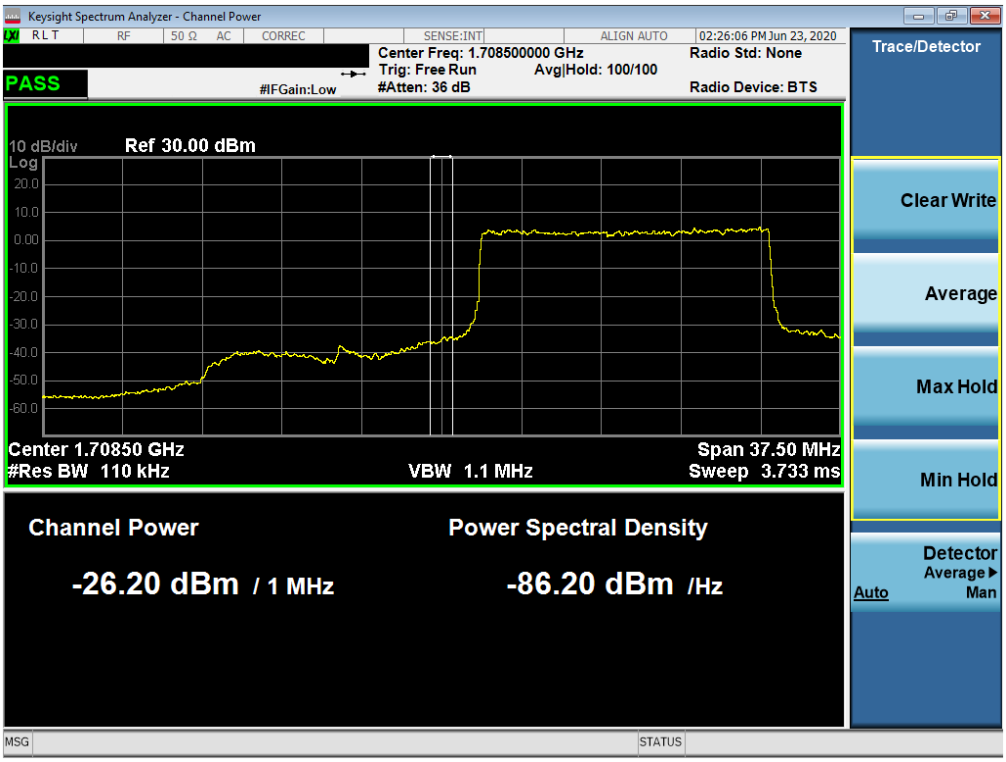
Plot 7-140. Lower Extended Band Edge Plot (NR Band n66 – 20.0MHz - Full RB)

Plot 7-141. Upper Band Edge Plot (NR Band n66 – 20.0MHz - Full RB)



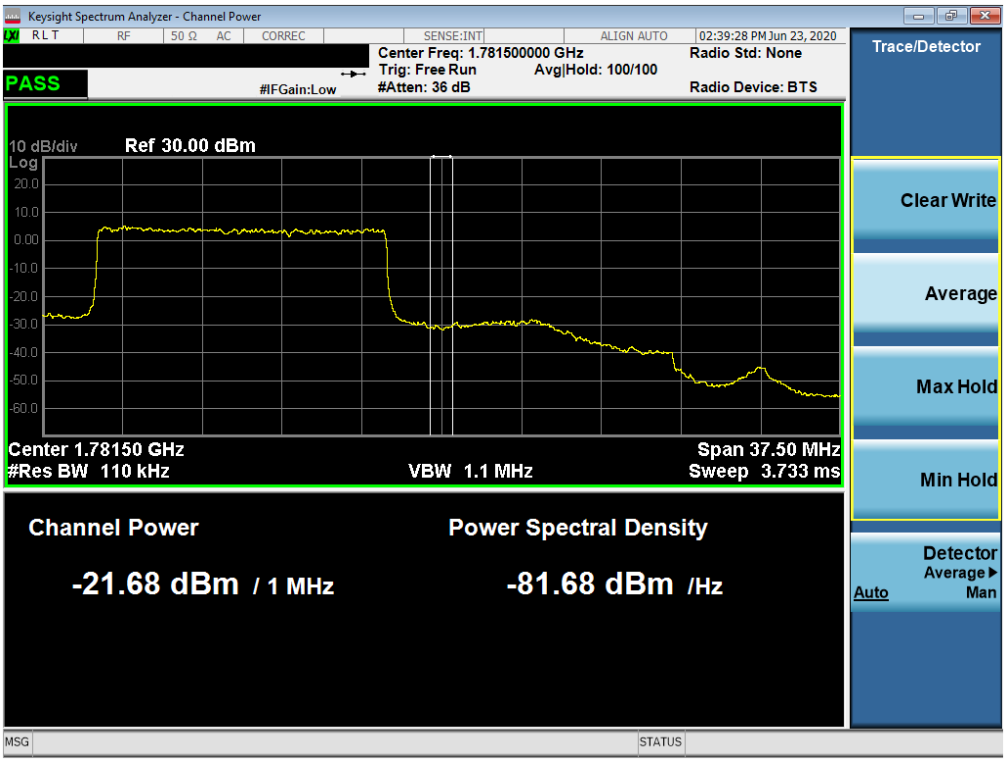
Plot 7-142. Upper Extended Band Edge Plot (NR Band n66 – 20.0MHz - Full RB)

Plot 7-143. Lower Band Edge Plot (NR Band n66 – 15.0MHz - Full RB)

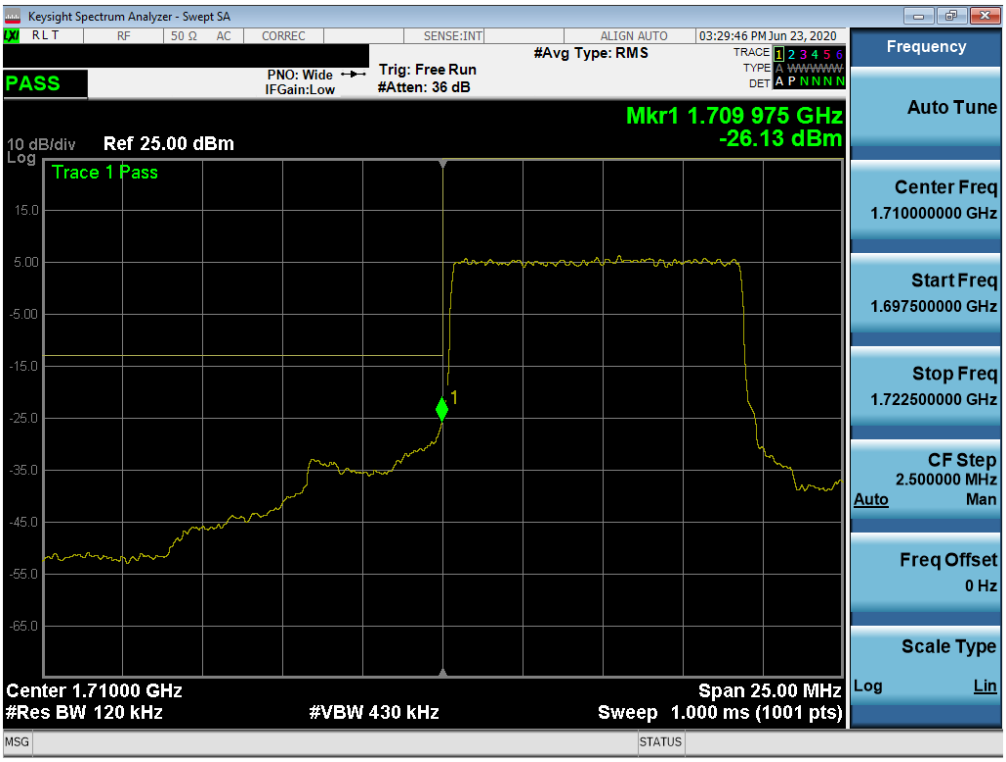


Plot 7-144. Lower Extended Band Edge Plot (NR Band n66 – 15.0MHz - Full RB)

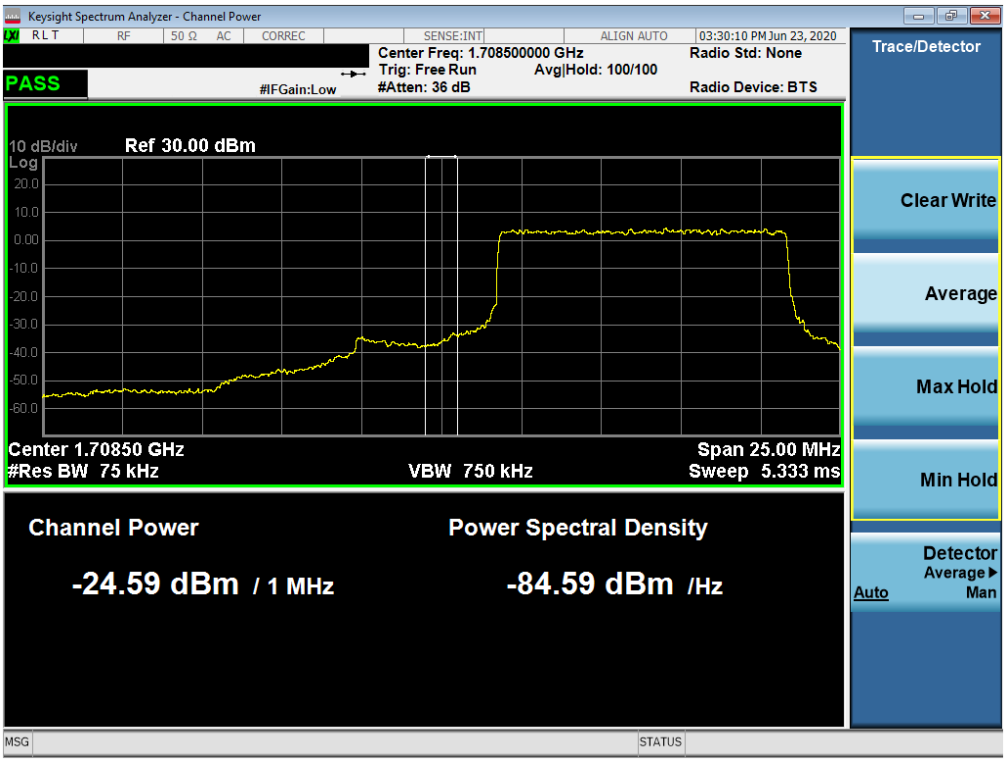
Plot 7-145. Upper Band Edge Plot (NR Band n66 – 15.0MHz - Full RB)



Plot 7-146. Upper Extended Band Edge Plot (NR Band n66 – 15.0MHz - Full RB)

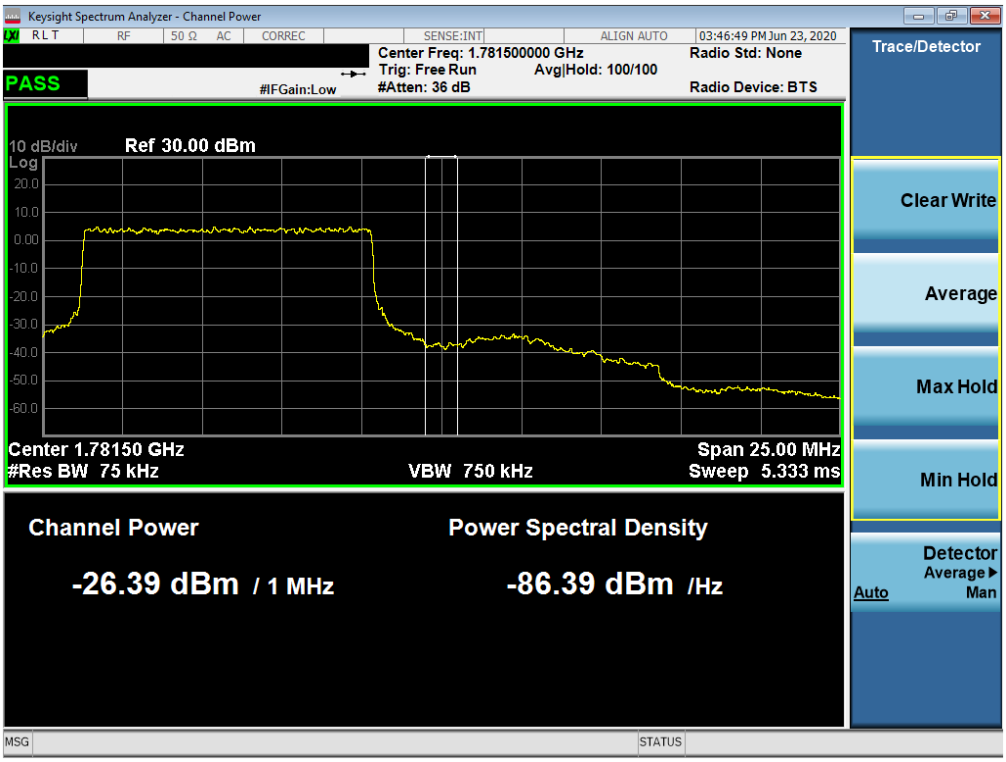


Plot 7-147. Lower Band Edge Plot (NR Band n66 – 10.0MHz - Full RB)

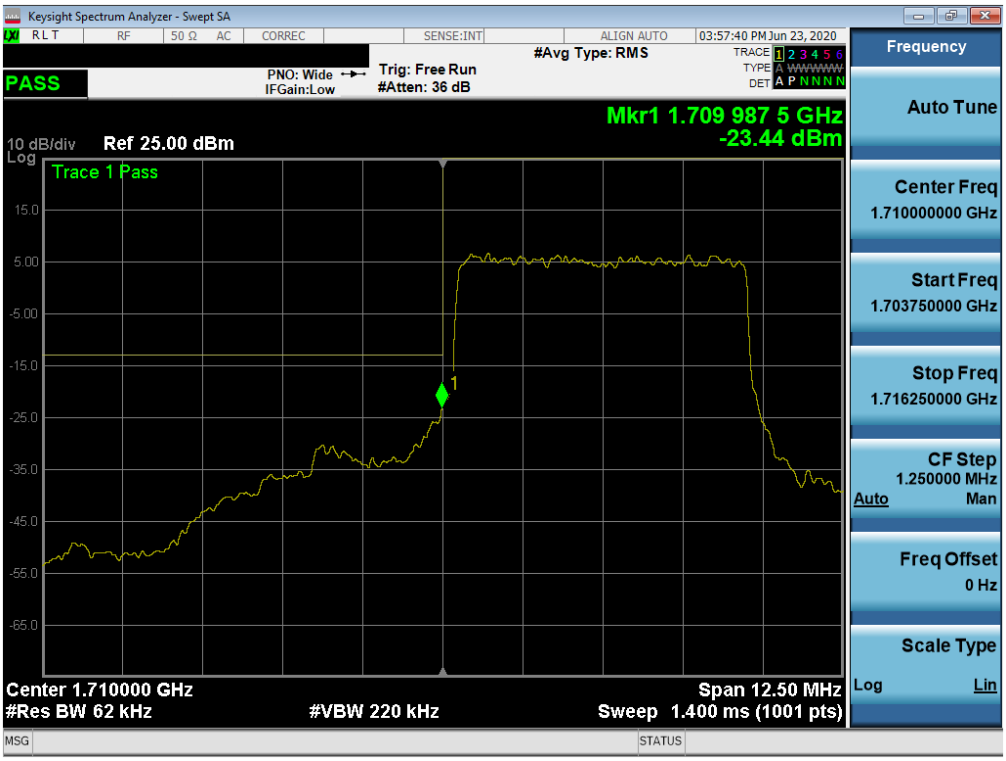


Plot 7-148. Lower Extended Band Edge Plot (NR Band n66 – 10.0MHz - Full RB)

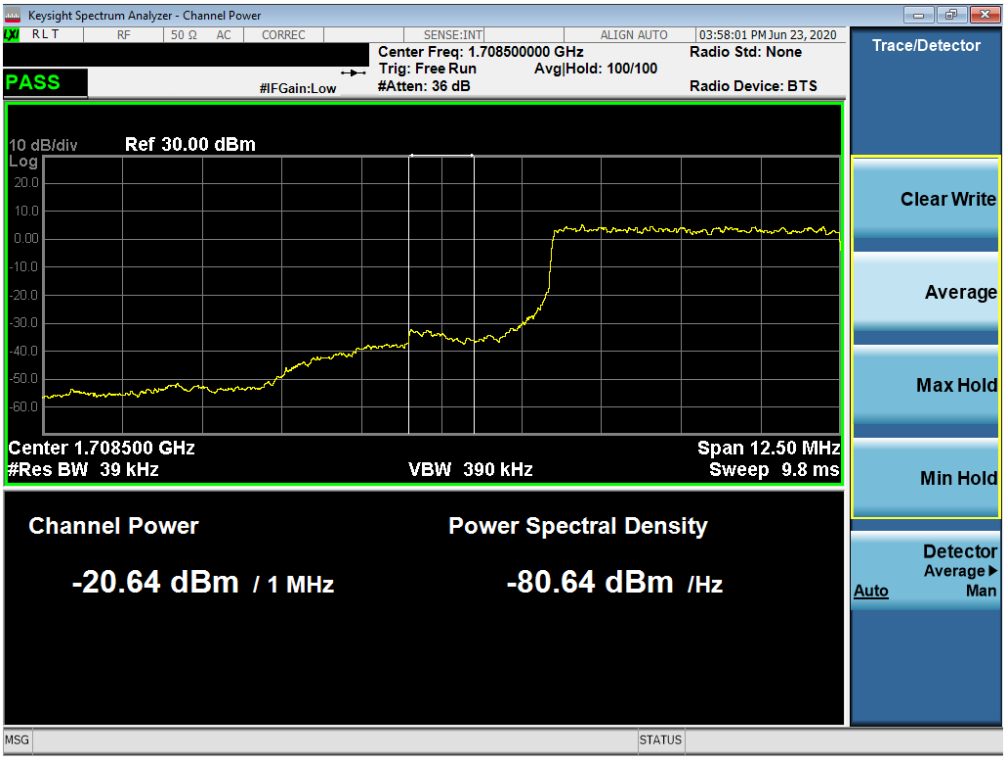
Plot 7-149. Upper Band Edge Plot (NR Band n66 – 10.0MHz - Full RB)



Plot 7-150. Upper Extended Band Edge Plot (NR Band n66 – 10.0MHz - Full RB)

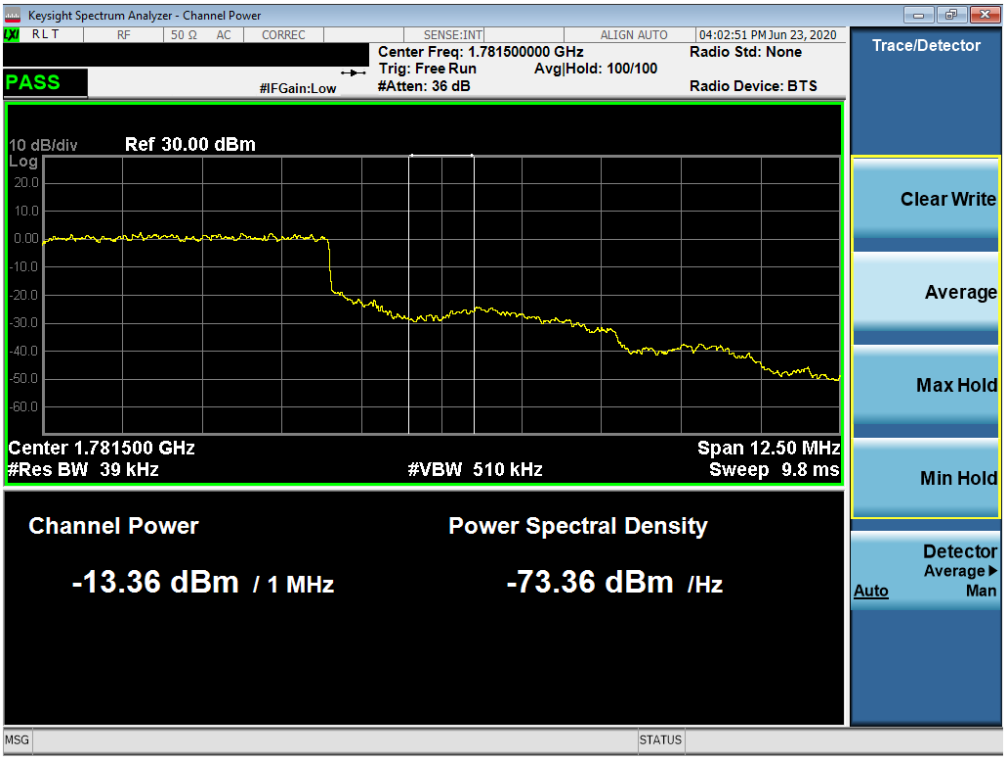


Plot 7-151. Lower Band Edge Plot (NR Band n66 – 5.0MHz - Full RB)



Plot 7-152. Lower Extended Band Edge Plot (NR Band n66 – 5.0MHz - Full RB)

Plot 7-153. Upper Band Edge Plot (NR Band n66 – 5.0MHz - Full RB)



Plot 7-154. Upper Extended Band Edge Plot (NR Band n66 – 5.0MHz - Full RB)

7.5 Radiated Power (EIRP)

Test Overview

Effective Radiated Power (ERP) 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. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, 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.

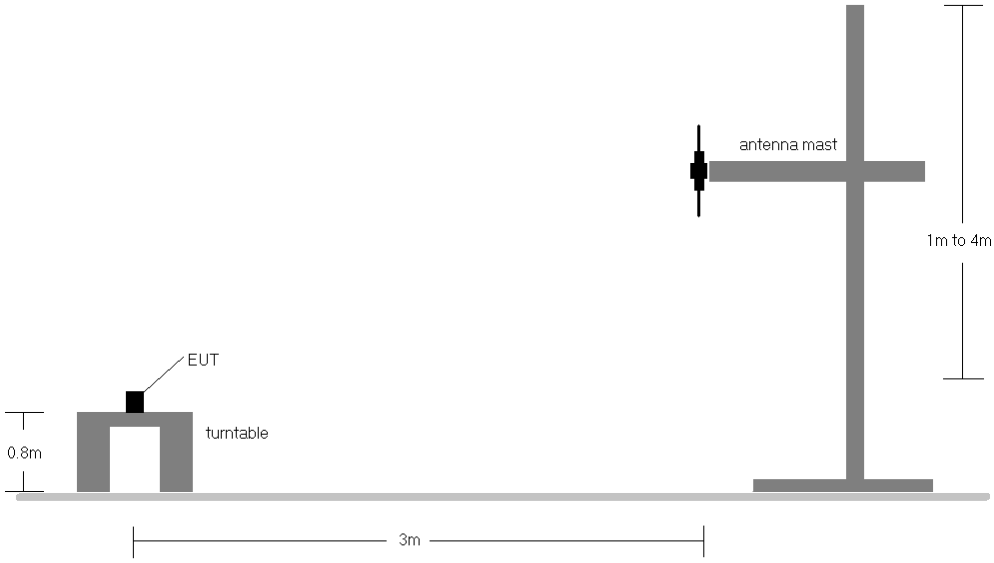


Figure 7-4. Radiated Test Setup <1GHz

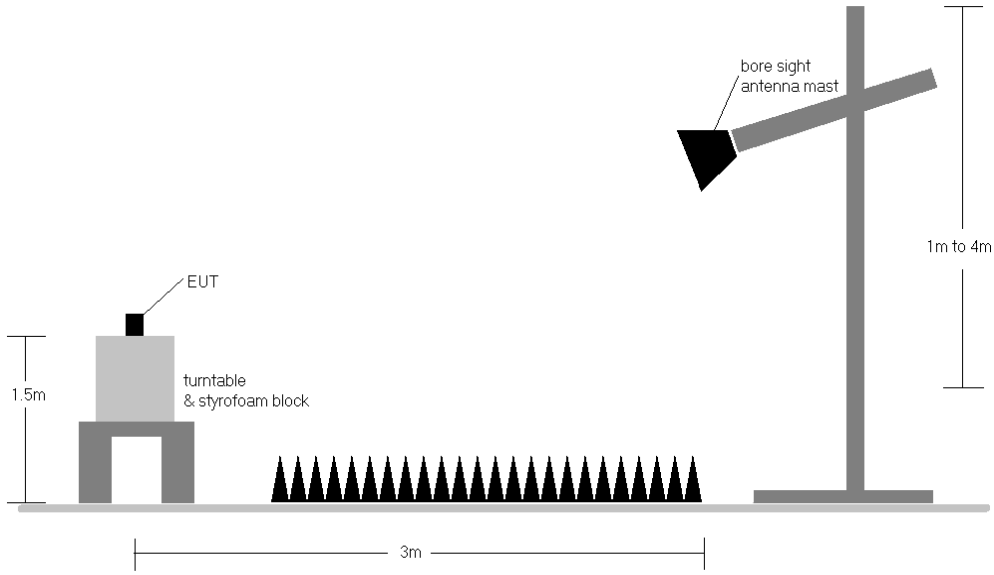


Figure 7-5. Radiated Test Setup >1GHz

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]
20 MHz	QPSK	1720.0	V	121.0	342.0	9.31	1 / 99	12.53	21.84	0.153	30.00	-8.16
		1745.0	V	133.0	330.0	9.14	1 / 99	12.99	22.13	0.163	30.00	-7.87
		1770.0	V	140.0	327.0	9.17	1 / 50	13.07	**22.24**	0.167	30.00	-7.76
	16-QAM	1770.0	V	140.0	327.0	9.17	1 / 50	12.66	**21.83**	0.152	30.00	-8.17
	64-QAM	1770.0	V	140.0	327.0	9.17	1 / 50	12.34	**21.51**	0.142	30.00	-8.49
15 MHz	QPSK	1717.5	V	121.0	342.0	9.33	1 / 37	12.52	21.85	0.153	30.00	-8.15
		1745.0	V	133.0	330.0	9.14	1 / 37	12.94	22.08	0.161	30.00	-7.92
		1772.5	V	140.0	327.0	9.18	1 / 37	12.94	**22.12**	0.163	30.00	-7.88
	16-QAM	1772.5	V	140.0	327.0	9.18	1 / 37	13.14	**22.32**	0.171	30.00	-7.68
	64-QAM	1745.0	V	133.0	330.0	9.14	1 / 37	12.68	**21.82**	0.152	30.00	-8.18
10 MHz	QPSK	1715.0	V	121.0	342.0	9.35	1 / 25	12.51	21.86	0.154	30.00	-8.14
		1745.0	V	133.0	330.0	9.14	1 / 25	12.84	21.98	0.158	30.00	-8.02
		1775.0	V	140.0	327.0	9.18	1 / 25	13.01	**22.20**	0.166	30.00	-7.80
	16-QAM	1775.0	V	140.0	327.0	9.18	1 / 25	12.52	**21.71**	0.148	30.00	-8.29
	64-QAM	1775.0	V	140.0	327.0	9.18	1 / 25	12.48	**21.67**	0.147	30.00	-8.33
5 MHz	QPSK	1712.5	V	121.0	342.0	9.37	1 / 0	12.52	21.88	0.154	30.00	-8.12
		1745.0	V	133.0	330.0	9.14	1 / 12	12.77	21.91	0.155	30.00	-8.09
		1777.5	V	140.0	327.0	9.19	1 / 0	12.98	**22.17**	0.165	30.00	-7.83
	16-QAM	1777.5	V	140.0	327.0	9.19	1 / 0	12.74	**21.93**	0.156	30.00	-8.07
	64-QAM	1777.5	V	140.0	327.0	9.19	1 / 0	12.21	**21.40**	0.138	30.00	-8.60
3 MHz	QPSK	1711.5	V	121.0	342.0	9.37	1 / 0	12.59	21.96	0.157	30.00	-8.04
		1745.0	V	133.0	330.0	9.14	1 / 0	12.90	22.04	0.160	30.00	-7.96
		1778.5	V	140.0	327.0	9.20	1 / 0	13.06	**22.26**	0.168	30.00	-7.74
	16-QAM	1778.5	V	140.0	327.0	9.20	1 / 0	12.81	**22.01**	0.159	30.00	-7.99
	64-QAM	1778.5	V	140.0	327.0	9.20	1 / 0	12.36	**21.56**	0.143	30.00	-8.44
1.4 MHz	QPSK	1710.7	V	121.0	342.0	9.38	1 / 3	12.50	21.88	0.154	30.00	-8.12
		1745.0	V	133.0	330.0	9.14	1 / 3	12.89	22.03	0.160	30.00	-7.97
		1779.3	V	140.0	327.0	9.20	1 / 3	12.97	**22.17**	0.165	30.00	-7.83
	16-QAM	1745.0	V	133.0	330.0	9.14	1 / 3	12.60	**21.74**	0.149	30.00	-8.26
	64-QAM	1779.3	V	140.0	327.0	9.20	1 / 3	12.35	**21.55**	0.143	30.00	-8.45
	Opposite Pol.	1770.0	H	357.0	144.0	9.17	1 / 50	12.18	21.35	0.136	30.00	-8.65

Table 7-155. 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]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
10 MHz	QPSK	704.0	V	156.0	62.0	1.34	1 / 0	23.76	25.10	0.324	36.99	-11.89	22.95	0.197	34.77	-11.82
		707.5	V	100.0	53.0	1.33	1 / 0	24.02	**25.35**	0.343	36.99	-11.64	**23.20**	0.209	34.77	-11.57
		711.0	V	171.0	67.0	1.33	1 / 0	23.61	24.94	0.312	36.99	-12.05	22.79	0.190	34.77	-11.99
	16-QAM	704.0	V	156.0	62.0	1.34	1 / 0	23.36	**24.70**	0.295	36.99	-12.29	**22.55**	0.180	34.77	-12.22
	64-QAM	711.0	V	171.0	67.0	1.33	1 / 0	22.15	**23.48**	0.223	36.99	-13.51	**21.33**	0.136	34.77	-13.45
5 MHz	QPSK	701.5	V	156.0	62.0	1.35	25 / 0	24.60	**25.95**	0.393	36.99	-11.04	**23.80**	0.240	34.77	-10.97
		707.5	V	100.0	53.0	1.33	25 / 0	24.13	25.46	0.352	36.99	-11.53	23.31	0.214	34.77	-11.46
		713.5	V	171.0	67.0	1.32	25 / 0	24.21	25.53	0.357	36.99	-11.46	23.38	0.218	34.77	-11.39
	16-QAM	701.5	V	156.0	62.0	1.35	1 / 24	23.77	**25.12**	0.325	36.99	-11.87	**22.97**	0.198	34.77	-11.80
	64-QAM	701.5	V	156.0	62.0	1.35	1 / 12	22.94	**24.29**	0.268	36.99	-12.70	**22.14**	0.164	34.77	-12.63
3 MHz	QPSK	700.5	V	156.0	62.0	1.35	15 / 0	23.90	**25.25**	0.335	36.99	-11.74	**23.10**	0.204	34.77	-11.67
		707.5	V	100.0	53.0	1.33	1 / 14	23.40	24.73	0.297	36.99	-12.26	22.58	0.181	34.77	-12.19
		714.5	V	171.0	67.0	1.32	15 / 0	23.71	25.03	0.318	36.99	-11.96	22.88	0.194	34.77	-11.89
	16-QAM	700.5	V	156.0	62.0	1.35	1 / 7	23.51	**24.86**	0.306	36.99	-12.13	**22.71**	0.187	34.77	-12.06
	64-QAM	707.5	V	100.0	53.0	1.33	1 / 14	22.55	**23.88**	0.245	36.99	-13.11	**21.73**	0.149	34.77	-13.04
1.4 MHz	QPSK	699.7	V	156.0	62.0	1.35	6 / 0	24.30	**25.65**	0.367	36.99	-11.34	**23.50**	0.224	34.77	-11.27
		707.5	V	100.0	53.0	1.33	6 / 0	23.75	25.08	0.322	36.99	-11.91	22.93	0.197	34.77	-11.84
		715.3	V	171.0	67.0	1.32	6 / 0	23.84	25.16	0.328	36.99	-11.83	23.01	0.200	34.77	-11.77
	16-QAM	699.7	V	156.0	62.0	1.35	1 / 3	23.80	**25.15**	0.327	36.99	-11.84	**23.00**	0.200	34.77	-11.77
	64-QAM	699.7	V	156.0	62.0	1.35	1 / 5	22.76	**24.11**	0.258	36.99	-12.88	**21.96**	0.157	34.77	-12.81
	Opposite Pol.	701.5	H	293.0	87.0	1.35	25 / 0	24.52	25.87	0.386	36.99	-11.12	23.72	0.235	34.77	-11.05

Table 7-156. ERP Data (LTE Band 12)

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	V	194.0	88.0	1.17	1 / 0	17.71	**18.88**	0.077	36.99	-18.11	**16.73**	0.047	34.77	-18.04
	16-QAM	782.0	V	194.0	88.0	1.17	1 / 0	17.10	**18.27**	0.067	36.99	-18.72	**16.12**	0.041	34.77	-18.65
	64-QAM	782.0	V	194.0	88.0	1.17	1 / 0	16.17	**17.34**	0.054	36.99	-19.65	**15.19**	0.033	34.77	-19.58
5 MHz	QPSK	779.5	V	194.0	88.0	1.17	1 / 0	17.80	**18.97**	0.079	36.99	-18.02	**16.82**	0.048	34.77	-17.95
		782.0	V	194.0	88.0	1.17	1 / 0	16.97	18.14	0.065	36.99	-18.85	15.99	0.040	34.77	-18.78
		784.5	V	194.0	88.0	1.16	1 / 0	16.43	17.59	0.057	36.99	-19.40	15.44	0.035	34.77	-19.33
	16-QAM	779.5	V	194.0	88.0	1.17	1 / 0	17.09	**18.26**	0.067	36.99	-18.73	**16.11**	0.041	34.77	-18.66
	64-QAM	779.5	V	194.0	88.0	1.17	1 / 0	16.02	**17.19**	0.052	36.99	-19.80	**15.04**	0.032	34.77	-19.73
	Opposite Pol.	779.5	H	223.0	18.0	1.17	1 / 0	10.57	11.74	0.015	36.99	-25.25	9.59	0.009	34.77	-25.18

Table 7-157. 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	π/2 BPSK	1720.0	H	138.0	220.0	9.41	1 / 99	8.30	17.71	0.059	30.00	-12.29
		1745.0	H	144.0	216.0	9.26	1 / 99	9.87	19.13	0.082	30.00	-10.87
		1770.0	H	131.0	217.0	9.27	1 / 50	10.16	**19.43**	0.088	30.00	-10.57
	QPSK	1720.0	H	138.0	220.0	9.41	1 / 99	8.34	17.75	0.060	30.00	-12.25
		1745.0	H	144.0	216.0	9.26	1 / 99	9.91	19.17	0.083	30.00	-10.83
		1770.0	H	131.0	217.0	9.27	1 / 50	10.15	**19.42**	0.087	30.00	-10.58
	16-QAM	1770.0	H	131.0	217.0	9.27	1 / 50	9.26	**18.53**	0.071	30.00	-11.47
	64-QAM	1770.0	H	131.0	217.0	9.27	1 / 50	7.87	**17.14**	0.052	30.00	-12.86
	256-QAM	1770.0	H	131.0	217.0	9.27	1 / 50	5.23	**14.50**	0.028	30.00	-15.50
15 MHz	π/2 BPSK	1717.5	H	138.0	220.0	9.43	1 / 77	8.29	17.72	0.059	30.00	-12.28
		1745.0	H	144.0	216.0	9.26	1 / 1	10.17	19.43	0.088	30.00	-10.57
		1772.5	H	131.0	217.0	9.27	1 / 77	10.28	**19.55**	0.090	30.00	-10.45
	QPSK	1717.5	H	138.0	220.0	9.43	1 / 77	8.40	17.82	0.061	30.00	-12.18
		1745.0	H	144.0	216.0	9.26	1 / 1	9.88	19.14	0.082	30.00	-10.86
		1772.5	H	131.0	217.0	9.27	1 / 77	10.47	**19.74**	0.094	30.00	-10.26
	16-QAM	1772.5	H	131.0	217.0	9.27	1 / 77	9.48	**18.75**	0.075	30.00	-11.25
	64-QAM	1772.5	H	131.0	217.0	9.27	1 / 77	7.95	**17.22**	0.053	30.00	-12.78
	256-QAM	1745.0	H	144.0	216.0	9.26	1 / 1	5.27	**14.53**	0.028	30.00	-15.47
10 MHz	π/2 BPSK	1715.0	H	138.0	220.0	9.44	1 / 25	8.11	17.55	0.057	30.00	-12.45
		1745.0	H	144.0	216.0	9.26	1 / 25	9.83	19.09	0.081	30.00	-10.91
		1775.0	H	131.0	217.0	9.28	1 / 25	9.96	**19.24**	0.084	30.00	-10.76
	QPSK	1715.0	H	138.0	220.0	9.44	1 / 25	8.26	17.70	0.059	30.00	-12.30
		1745.0	H	144.0	216.0	9.26	1 / 25	9.87	19.13	0.082	30.00	-10.87
		1775.0	H	131.0	217.0	9.28	1 / 25	10.27	**19.55**	0.090	30.00	-10.45
	16-QAM	1775.0	H	131.0	217.0	9.28	1 / 25	9.47	**18.75**	0.075	30.00	-11.25
	64-QAM	1775.0	H	131.0	217.0	9.28	1 / 25	8.15	**17.42**	0.055	30.00	-12.58
	256-QAM	1775.0	H	131.0	217.0	9.28	1 / 25	5.29	**14.56**	0.029	30.00	-15.44
5 MHz	π/2 BPSK	1712.5	H	138.0	220.0	9.46	1 / 1	8.28	17.74	0.059	30.00	-12.26
		1745.0	H	144.0	216.0	9.26	1 / 1	9.85	19.11	0.081	30.00	-10.89
		1777.5	H	131.0	217.0	9.28	1 / 12	10.08	**19.36**	0.086	30.00	-10.64
	QPSK	1712.5	H	138.0	220.0	9.46	1 / 1	8.41	17.87	0.061	30.00	-12.13
		1745.0	H	144.0	216.0	9.26	1 / 1	9.95	19.21	0.083	30.00	-10.79
		1777.5	H	131.0	217.0	9.28	1 / 12	10.22	**19.50**	0.089	30.00	-10.50
	16-QAM	1777.5	H	131.0	217.0	9.28	1 / 12	9.32	**18.60**	0.072	30.00	-11.40
	64-QAM	1777.5	H	131.0	217.0	9.28	1 / 12	8.01	**17.29**	0.054	30.00	-12.71
	256-QAM	1777.5	H	131.0	217.0	9.28	1 / 12	5.24	14.52	0.028	30.00	-15.48
	BPSK (CP-OFDM)	1770.0	H	131.0	217.0	9.27	1 / 50	9.20	**18.47**	0.070	30.00	-11.53
	BPSK (Opposite Pol.)	1770.0	V	317.0	120.0	9.27	1 / 50	8.72	17.99	0.063	30.00	-12.01

Table 7-158. EIRP Data (NR Band n66)

7.6 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.

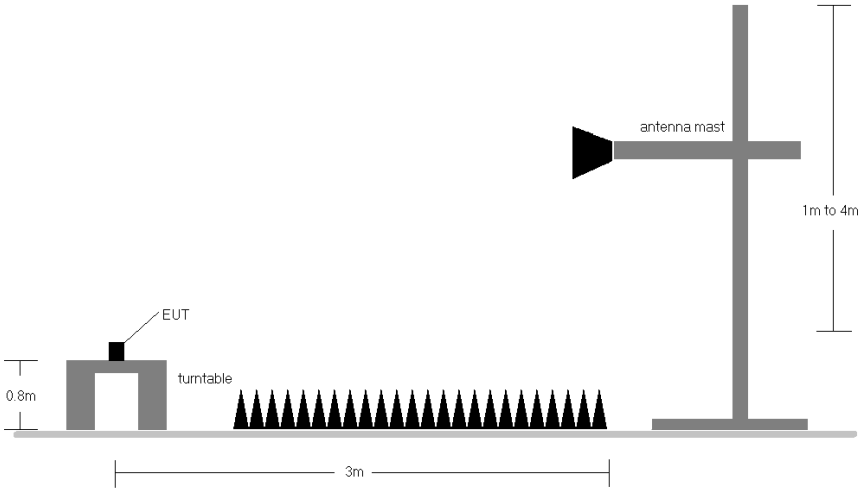


Figure 7-6. Test Instrument & Measurement Setup

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.

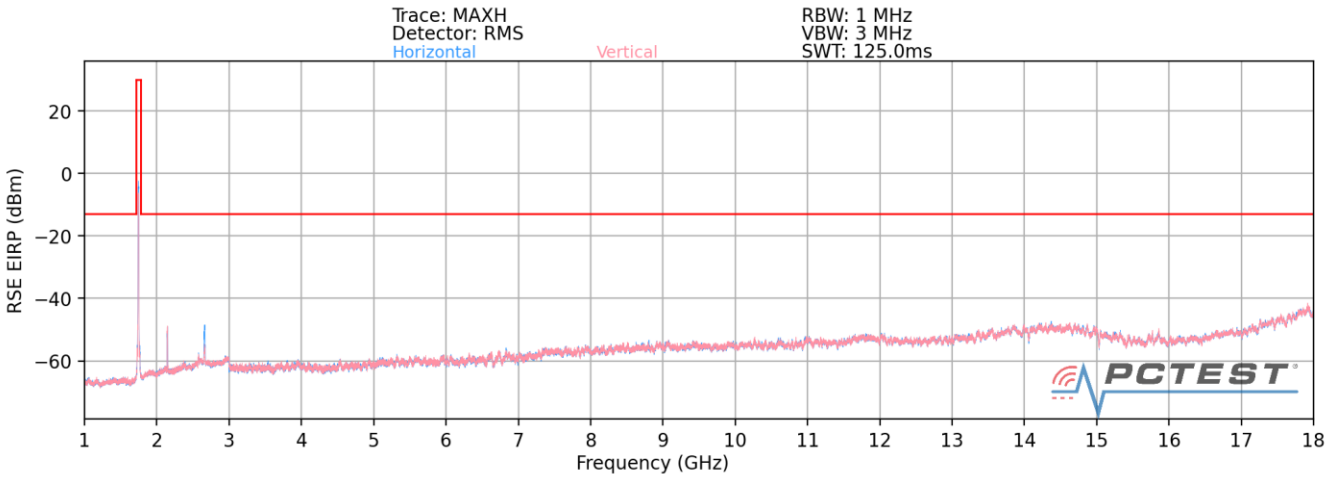
6) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.

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 66/4



Plot 7-159. 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	H	121	324	-43.91	-1.23	61.86	-33.39	-13.00	-20.39
5160.0	H	110	310	-51.41	2.31	57.90	-37.36	-13.00	-24.36
6880.0	H	100	310	-58.45	6.92	55.47	-39.78	-13.00	-26.78
8600.0	H	114	287	-73.49	10.09	43.60	-51.65	-13.00	-38.65
10320.0	H	-	-	-77.40	12.33	41.93	-53.33	-13.00	-40.33
12040.0	H	100	308	-67.38	15.15	54.77	-40.49	-13.00	-27.49
13760.0	H	-	-	-77.41	16.80	46.39	-48.86	-13.00	-35.86
15480.0	H	-	-	-77.48	15.04	44.56	-50.70	-13.00	-37.70

Table 7-2. 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	H	114	325	-42.27	-1.08	63.65	-31.61	-13.00	-18.61
5235.0	H	112	338	-50.90	2.61	58.71	-36.55	-13.00	-23.55
6980.0	H	119	353	-54.57	7.18	59.61	-35.64	-13.00	-22.64
8725.0	H	111	346	-73.39	10.38	43.99	-51.26	-13.00	-38.26
10470.0	H	123	356	-72.30	12.80	47.50	-47.75	-13.00	-34.75
12215.0	H	121	344	-73.99	15.34	48.35	-46.91	-13.00	-33.91
13960.0	H	-	-	-77.62	17.67	47.05	-48.21	-13.00	-35.21
15705.0	H	-	-	-77.16	15.47	45.31	-49.94	-13.00	-36.94

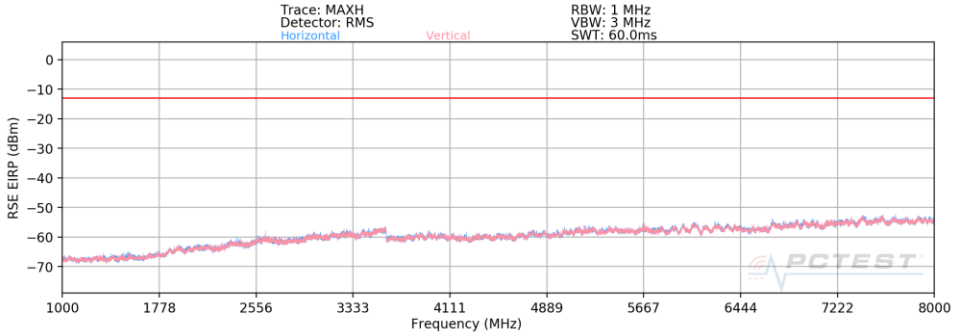
Table 7-3. Radiated Spurious Data (LTE Band 66/4 – Mid Channel)

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	H	114	321	-43.57	-0.71	62.72	-32.54	-13.00	-19.54
5310.00	H	123	336	-51.48	3.34	58.86	-36.40	-13.00	-23.40
7080.00	H	111	320	-54.09	7.48	60.39	-34.87	-13.00	-21.87
8850.00	H	107	335	-70.50	10.17	46.67	-48.59	-13.00	-35.59
10620.00	H	105	349	-71.67	13.10	48.43	-46.83	-13.00	-33.83
12390.00	H	119	346	-72.81	15.28	49.47	-45.79	-13.00	-32.79
14160.00	H	-	-	-81.52	17.87	43.35	-51.90	-13.00	-38.90
15930.00	H	-	-	-81.86	15.47	40.61	-54.65	-13.00	-41.65

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

LTE Band 12



Plot 7-160. Radiated Spurious Plot (LTE Band 12)

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	137	331	-73.19	-9.01	24.80	-70.46	-13.00	-57.46
2112.0	H	-	-	-74.33	-5.59	27.08	-68.18	-13.00	-55.18
2816.0	H	-	-	-74.75	-2.88	29.37	-65.88	-13.00	-52.88

Table 7-5. Radiated Spurious Data (LTE Band 12 – 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	-	-	-73.98	-8.99	24.03	-71.23	-13.00	-58.23
2122.5	H	-	-	-74.85	-5.63	26.52	-68.74	-13.00	-55.74
2830.0	H	-	-	-74.65	-2.92	29.43	-65.83	-13.00	-52.83

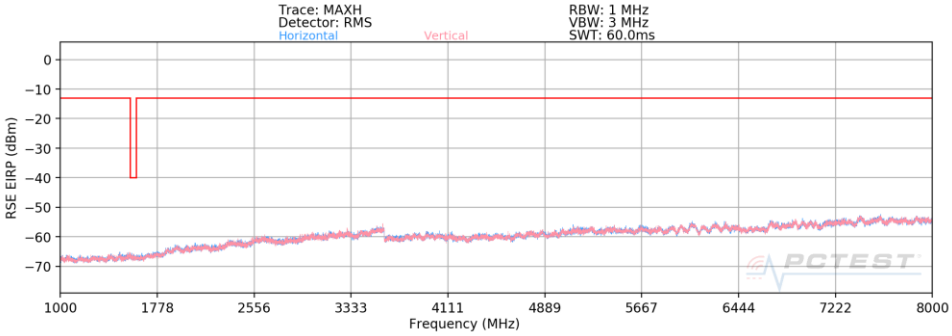
Table 7-6. Radiated Spurious Data (LTE Band 12 – Mid Channel)

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	-	-	-73.97	-8.97	24.06	-71.20	-13.00	-58.20
2133.0	H	-	-	-74.91	-5.63	26.46	-68.80	-13.00	-55.80
2844.0	H	-	-	-74.25	-2.95	29.80	-65.46	-13.00	-52.46

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

LTE Band 13

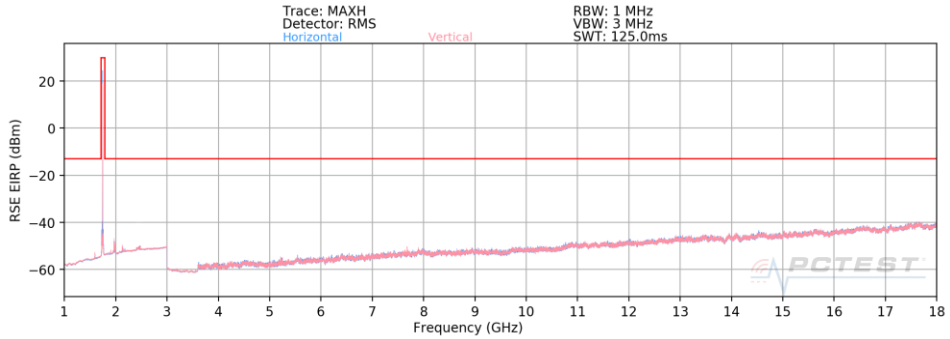


Plot 7-161. Radiated Spurious Plot (LTE Band 13)

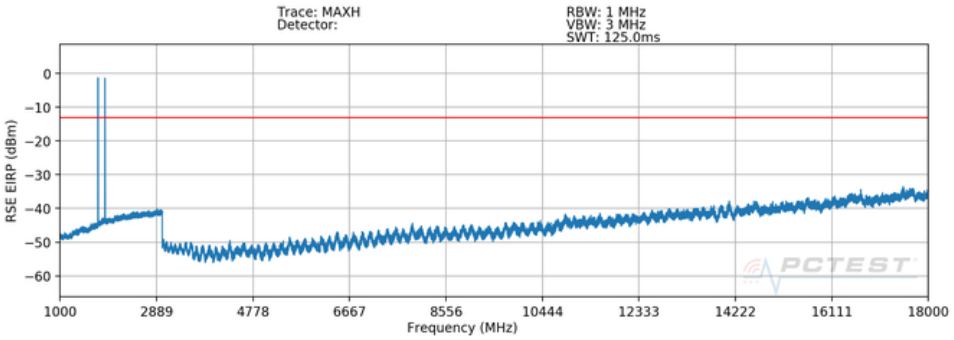
Bandwidth (MHz):	10
Frequency (MHz):	782.0
RB / Offset:	1 / 25

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	V	100	164	-72.83	-8.32	25.85	-69.41	-40.00	-29.41
2346.0	V	-	-	-74.90	-4.48	27.62	-67.64	-13.00	-54.64
3128.0	V	-	-	-75.17	-2.55	29.28	-65.98	-13.00	-52.98

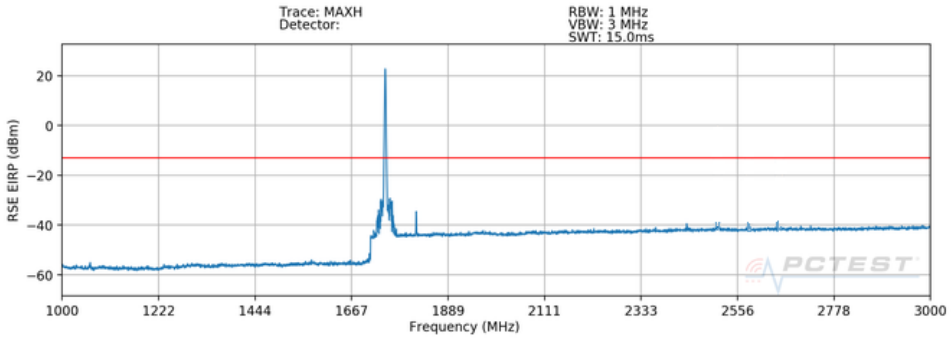
Table 7-8. Radiated Spurious Data (LTE Band 13)



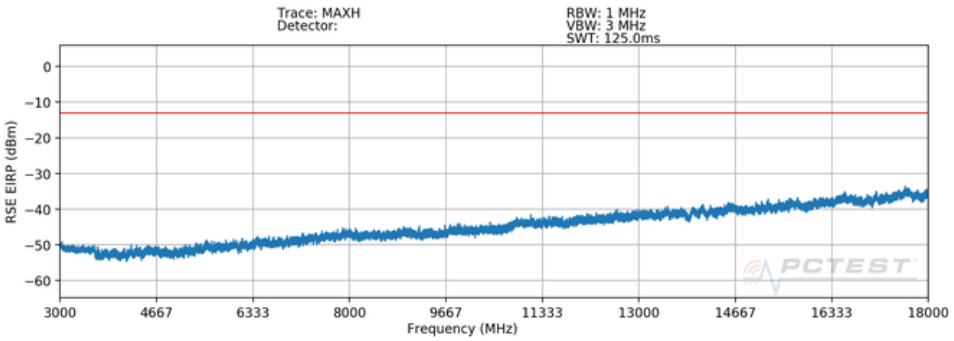
Plot 7-162. Radiated Spurious Plot (NR Band n66)



Plot 7-163. Radiated Spurious Plot (ENDC n66-LB2)



Plot 7-164. Radiated Spurious Plot (ENDC n66-LB5)



Plot 7-165. Radiated Spurious Plot (ENDC n66-LB5)

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

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	H	-	-	-77.19	5.16	34.97	-60.29	-13.00	-47.29
5160.0	H	221	133	-74.92	7.77	39.85	-55.40	-13.00	-42.40
6880.0	H	-	-	-76.97	11.95	41.98	-53.27	-13.00	-40.27

Table 7-9. Radiated Spurious Data (NR Band n66 – Low Channel)

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

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	-	-	-77.18	5.97	35.79	-59.47	-13.00	-46.47
5235.0	H	251	147	-73.66	8.02	41.36	-53.90	-13.00	-40.90
6980.0	H	-	-	-77.51	12.27	41.76	-53.49	-13.00	-40.49

Table 7-10. Radiated Spurious Data (NR Band n66 – Mid Channel)

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

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]
3540.0	H	-	-	-77.02	5.92	35.90	-59.36	-13.00	-46.36
5310.0	H	228	84	-73.88	8.01	41.13	-54.13	-13.00	-41.13
7080.0	H	-	-	-76.49	12.79	43.30	-51.96	-13.00	-38.96

Table 7-11. Radiated Spurious Data (NR Band n66 – High Channel)

Bandwidth (MHz):	20
Frequency (MHz):	1745.0
RB / Offset:	1 / 50
Mode:	EN-DC
Anchor Band:	LTE Band 2

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]
1609.0	H	-	-	-77.19	18.24	48.05	-47.20	-13.00	-34.20
2016.0	H	-	-	-77.68	20.69	50.01	-45.25	-13.00	-32.25
3760.5	H	100	331	-68.75	6.00	44.25	-51.01	-13.00	-38.01
4386.0	H	-	-	-78.28	5.71	34.43	-60.83	-13.00	-47.83
5640.5	H	112	72	-70.61	8.02	44.41	-50.85	-13.00	-37.85
8056.0	H	-	-	-79.98	12.11	39.13	-56.13	-13.00	-43.13

Table 7-12. Radiated Spurious Data (ENDC n66-LB2)

Bandwidth (MHz):	20
Frequency (MHz):	1745.0
RB / Offset:	1 / 50
Mode:	EN-DC
Anchor Band:	LTE Band 5

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]
2510.2	H	-	-	-77.99	22.38	51.39	-43.87	-13.00	-30.87
2580.9	H	389	28	-78.17	22.59	51.42	-43.84	-13.00	-30.84
2652.3	H	357	146	-77.95	22.76	51.81	-43.45	-13.00	-30.45

Table 7-13. Radiated Spurious Data (ENDC n66-LB2)

7.7 Frequency Stability / Temperature Variation

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-E-2016. The frequency stability of the transmitter is measured by:

a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.

b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

For Part 27, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Procedure Used

ANSI/TIA-603-E-2016

Test Settings

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

Test Setup

The EUT was connected via an RF cable to a spectrum analyzer with the EUT placed inside an environmental chamber.

Test Notes

None

Frequency Stability / Temperature Variation

LTE Band 66/4

Operating Frequency (Hz):	1,745,000,000
Ref. Voltage (VDC):	3.85
Deviation Limit:	± 0.00025% or 2.5 ppm

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	- 30	1,745,000,413	1,369	0.0000785
		- 20	1,744,999,722	678	0.0000389
		- 10	1,745,000,767	1,723	0.0000987
		0	1,744,999,593	549	0.0000315
		+ 10	1,745,000,643	1,599	0.0000916
		+ 20 (Ref)	1,744,999,044	0	0.0000000
		+ 30	1,744,999,243	199	0.0000114
		+ 40	1,745,000,764	1,720	0.0000986
		+ 50	1,745,000,732	1,688	0.0000967
Battery Endpoint	2.90	+ 20	1,745,000,288	1,244	0.0000713

Table 7-9. LTE Band 66/4 Frequency Stability Data

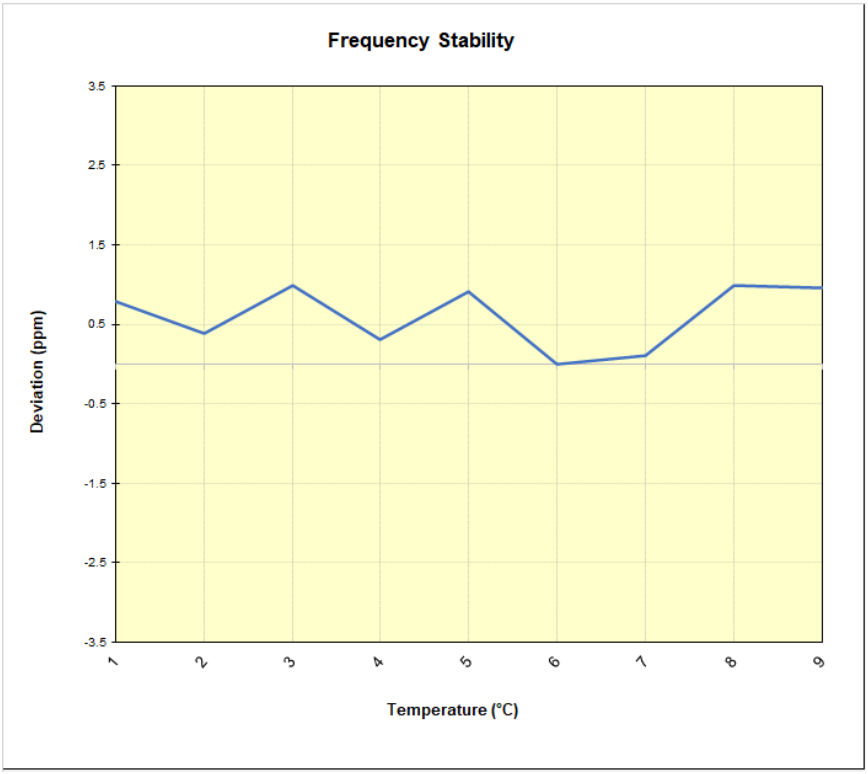


Table 7-9. LTE Band 66/4 Frequency Stability Chart

Frequency Stability / Temperature Variation

LTE Band 12

Operating Frequency (Hz):	707,500,000
Ref. Voltage (VDC):	3.85
Deviation Limit:	± 0.00025% or 2.5 ppm

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	- 30	707,500,045	91	0.0000129
		- 20	707,499,848	-106	-0.0000150
		- 10	707,500,212	258	0.0000365
		0	707,500,003	49	0.0000069
		+ 10	707,500,330	376	0.0000531
		+ 20 (Ref)	707,499,954	0	0.0000000
		+ 30	707,500,051	97	0.0000137
		+ 40	707,499,882	-72	-0.0000102
		+ 50	707,500,371	417	0.0000589
Battery Endpoint	2.90	+ 20	707,499,534	-420	-0.0000594

Table 7-9. LTE Band 12 Frequency Stability Data

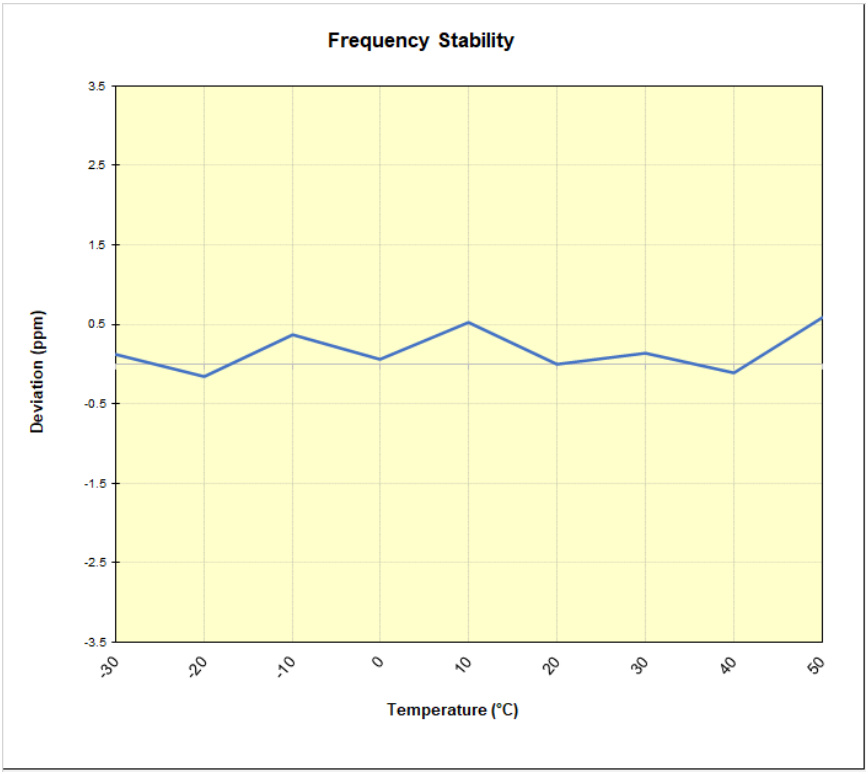


Table 7-9. LTE Band 12 Frequency Stability Chart

Frequency Stability / Temperature Variation

LTE Band 13

Operating Frequency (Hz):	782,000,000
Ref. Voltage (VDC):	3.85
Deviation Limit:	± 0.00025% or 2.5 ppm

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	- 30	781,999,838	-560	-0.0000716
		- 20	782,000,343	-55	-0.0000070
		- 10	782,000,148	-250	-0.0000320
		0	781,999,819	-579	-0.0000740
		+ 10	782,000,285	-113	-0.0000145
		+ 20 (Ref)	782,000,398	0	0.0000000
		+ 30	782,000,309	-89	-0.0000114
		+ 40	781,999,743	-655	-0.0000838
		+ 50	781,999,530	-868	-0.0001110
Battery Endpoint	2.90	+ 20	782,000,176	-222	-0.0000284

Table 7-9. LTE Band 13 Frequency Stability Data

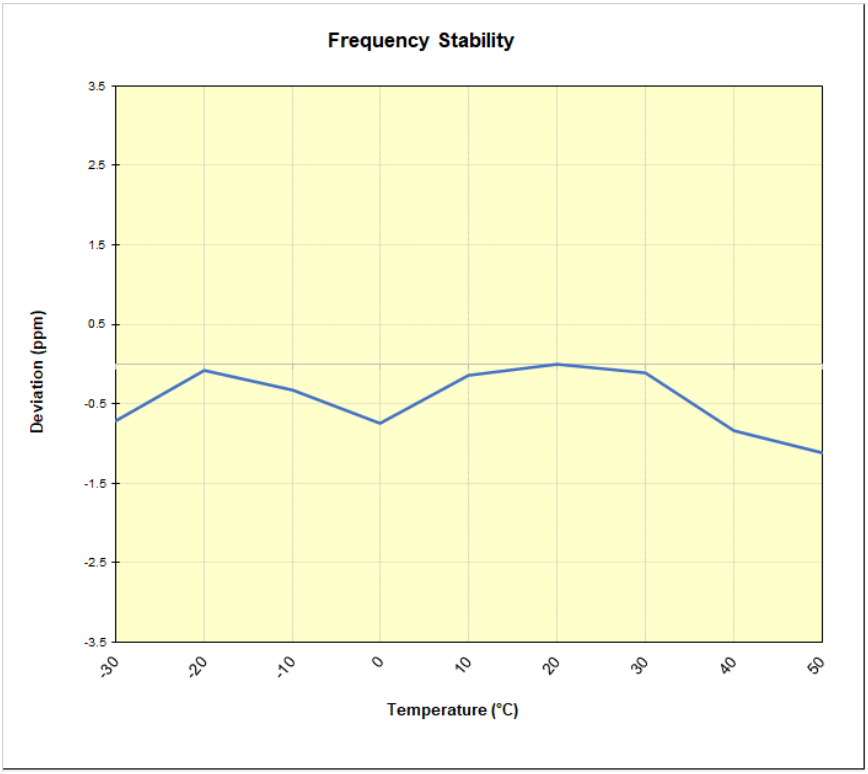


Table 7-9. LTE Band 13 Frequency Stability Chart

Frequency Stability / Temperature Variation

NR Band n66

Operating Frequency (Hz):	1,745,000,000
Ref. Voltage (VDC):	3.85
Deviation Limit:	± 0.00025% or 2.5 ppm

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	- 30	1,744,999,788	308	0.0000177
		- 20	1,744,999,709	229	0.0000131
		- 10	1,745,000,455	975	0.0000559
		0	1,744,999,001	-479	-0.0000274
		+ 10	1,744,999,291	-189	-0.0000108
		+ 20 (Ref)	1,744,999,480	0	0.0000000
		+ 30	1,745,000,649	1,169	0.0000670
		+ 40	1,745,000,071	591	0.0000339
		+ 50	1,744,999,003	-477	-0.0000273
Battery Endpoint	2.90	+ 20	1,745,000,751	1,271	0.0000728

Table 7-9. NR Band n66 Frequency Stability Data

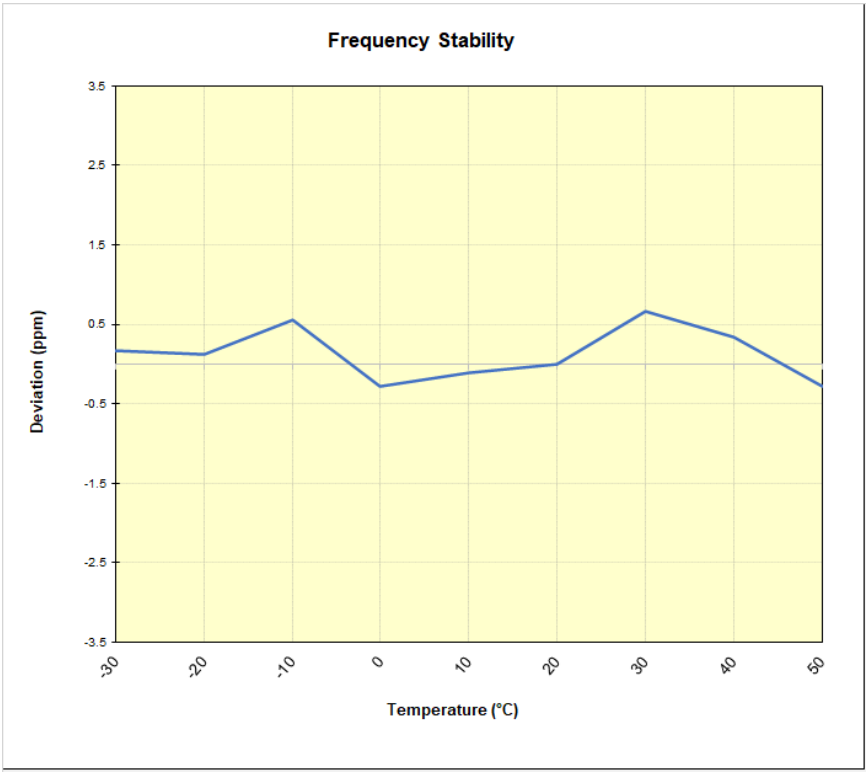


Table 7-9. NR Band n66 Frequency Stability Chart

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFG900VM** complies with all the requirements of Parts 27 of the FCC rules.