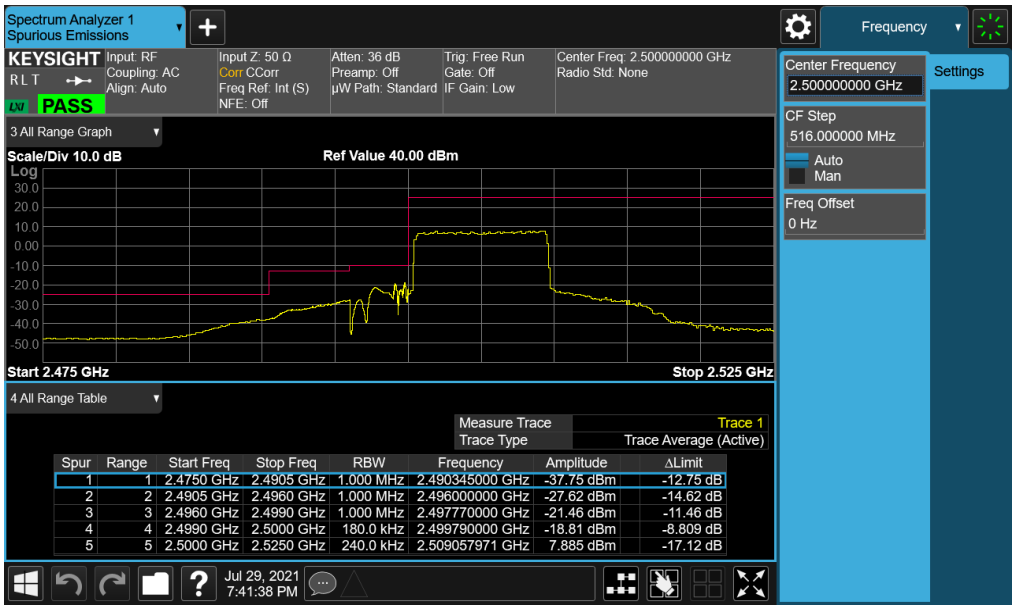
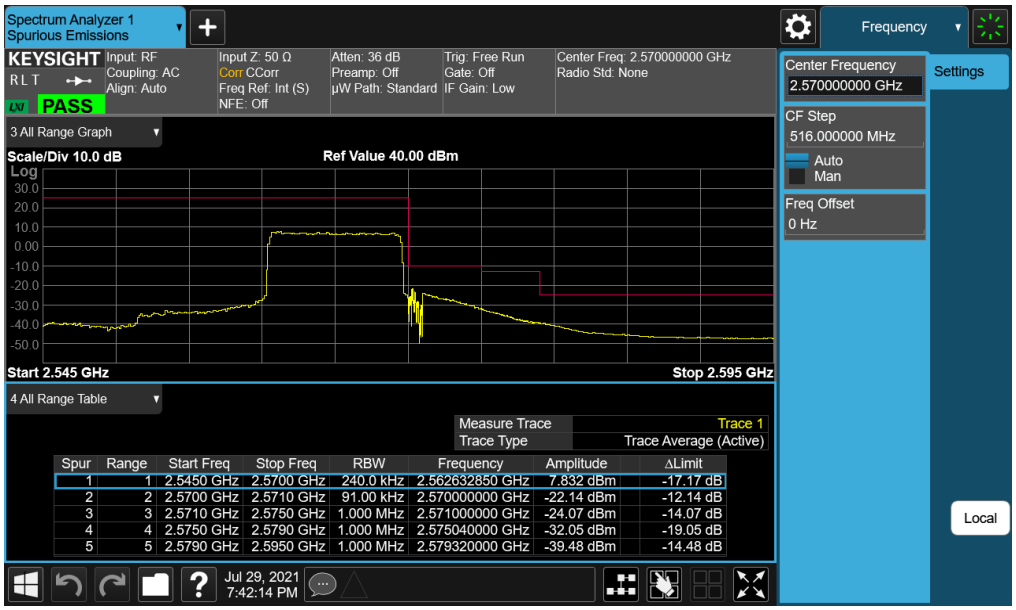
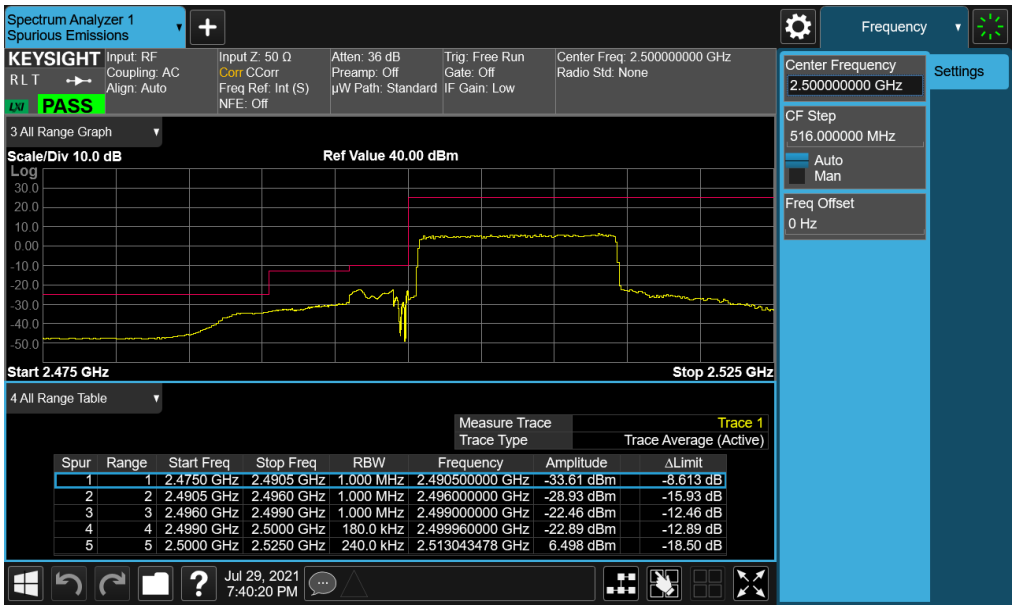


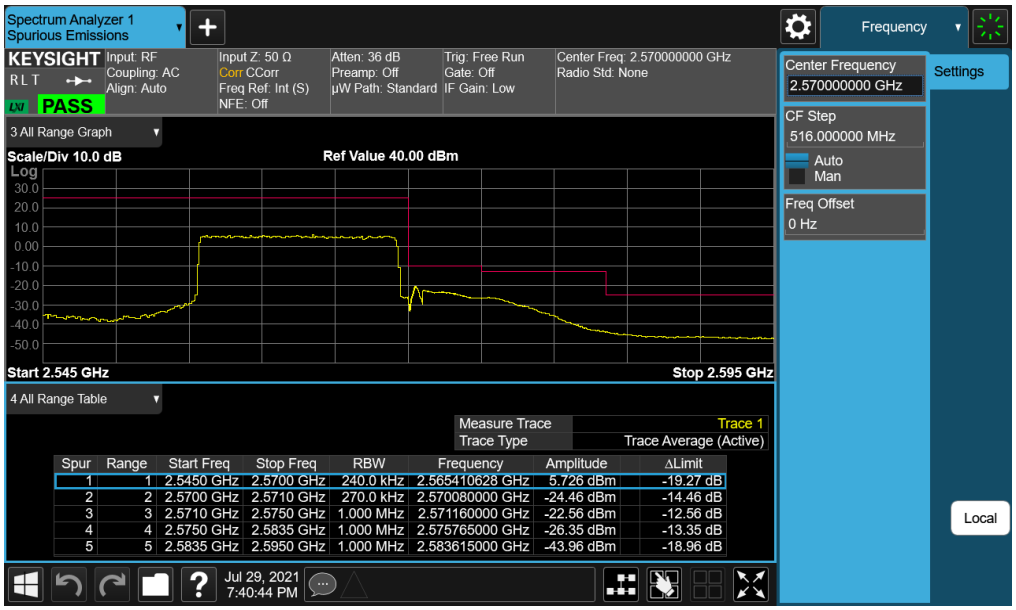
Plot 7-80. Lower ACP Plot (LTE Band 7 - 10MHz QPSK – Full RB Configuration)



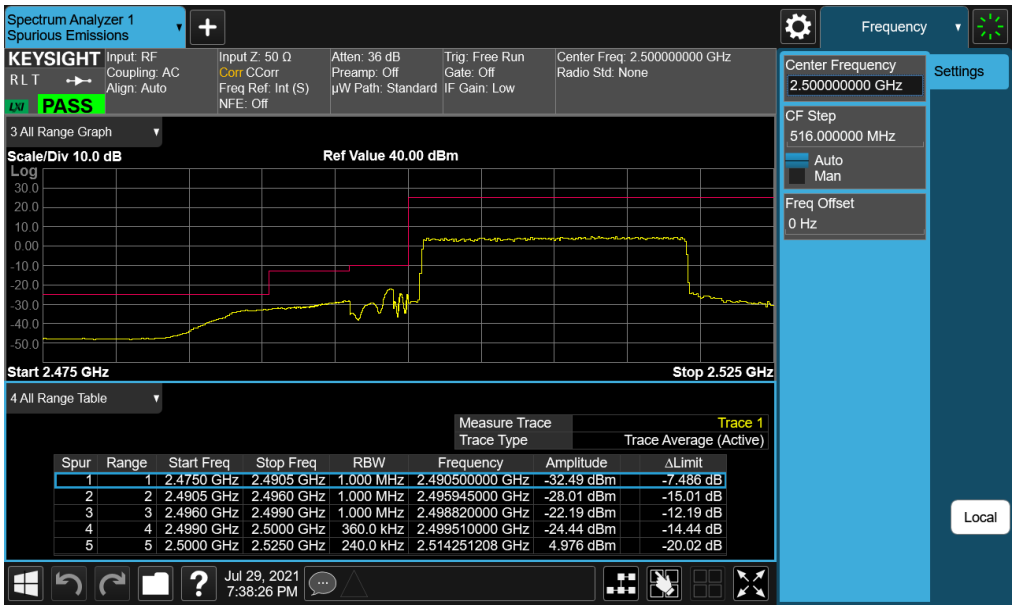
Plot 7-81. Upper ACP Plot (LTE Band 7 - 10MHz QPSK – Full RB Configuration)



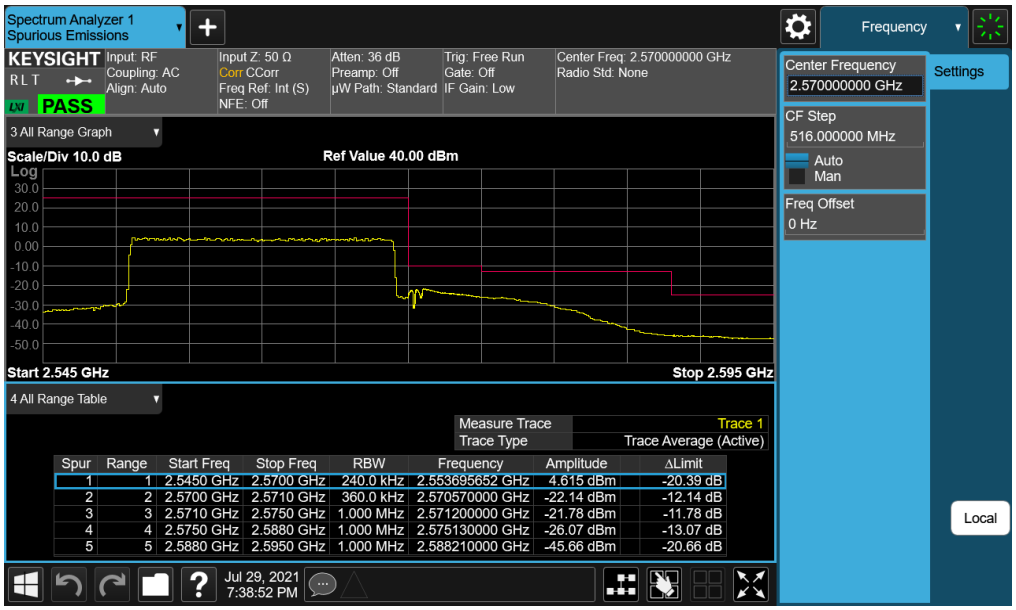
Plot 7-82. Lower ACP Plot (LTE Band 7 - 15MHz QPSK – Full RB Configuration)



Plot 7-83. Upper ACP Plot (LTE Band 7 - 15MHz QPSK – Full RB Configuration)

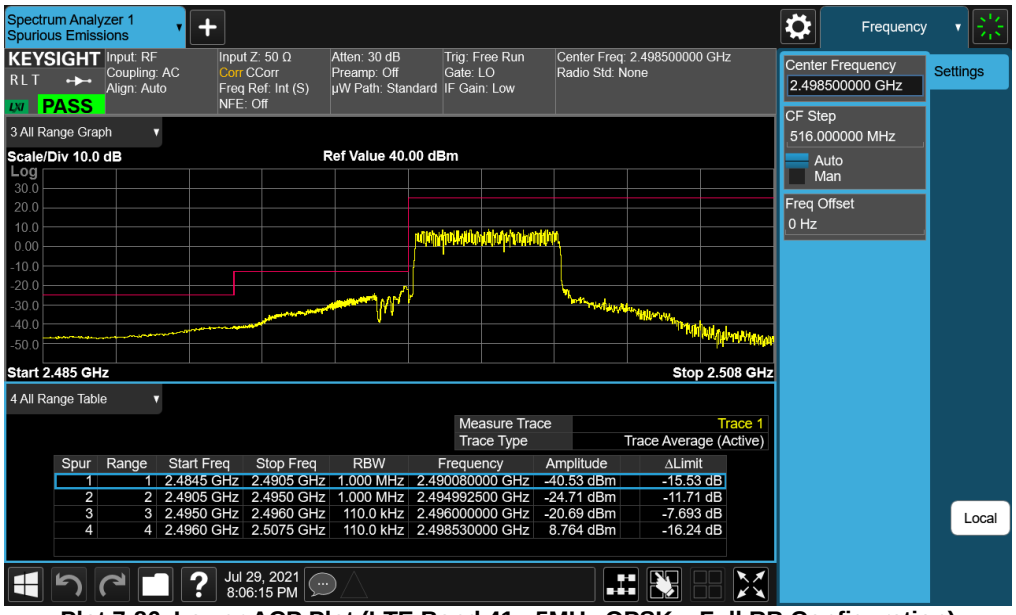


Plot 7-84. Lower ACP Plot (LTE Band 7 - 20MHz QPSK – Full RB Configuration)

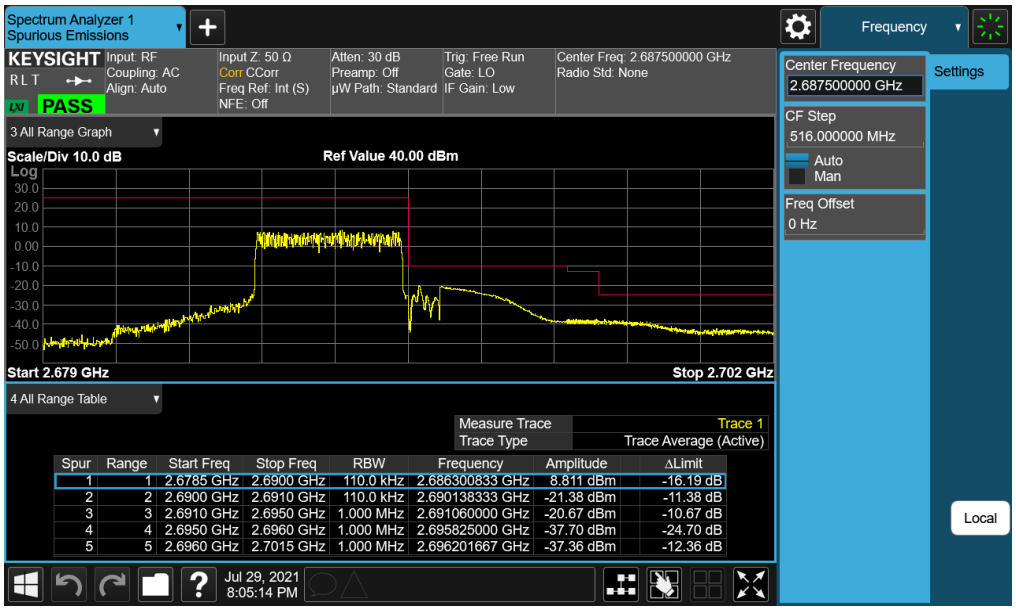


Plot 7-85. Upper ACP Plot (LTE Band 7 - 20MHz QPSK – Full RB Configuration)

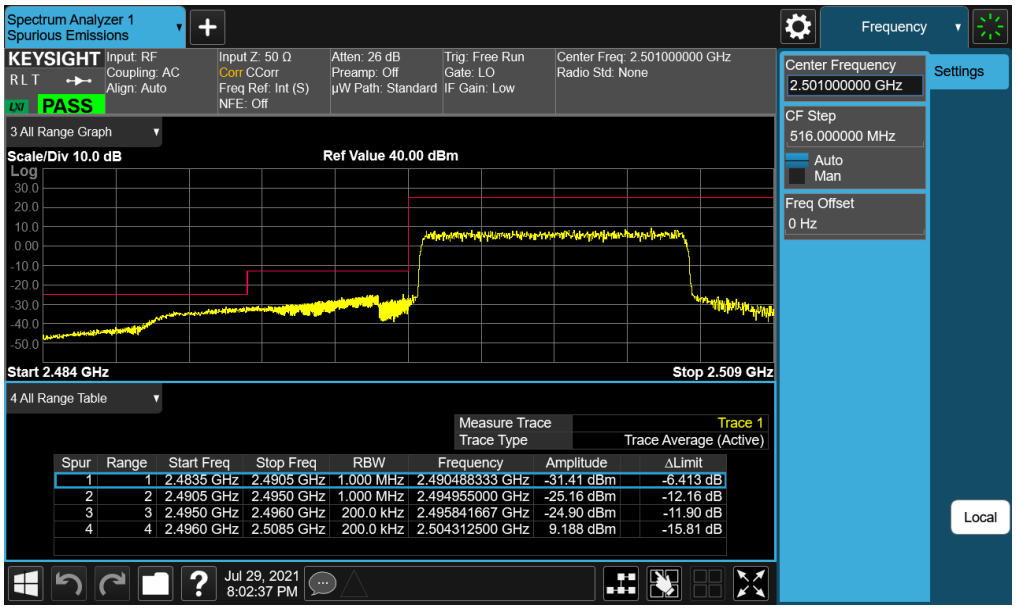
LTE Band 41



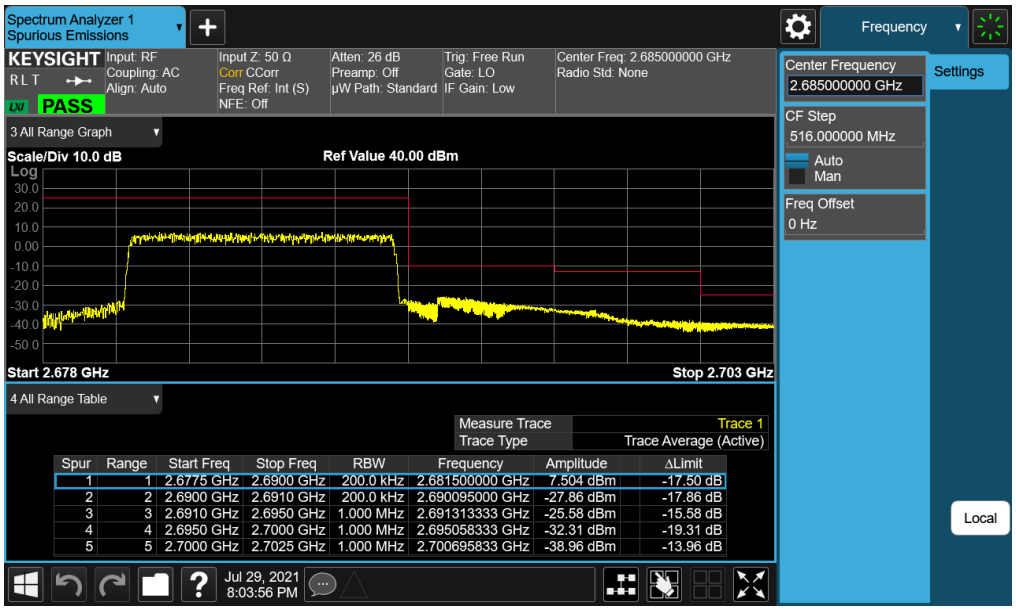
Plot 7-86. Lower ACP Plot (LTE Band 41 - 5MHz QPSK – Full RB Configuration)



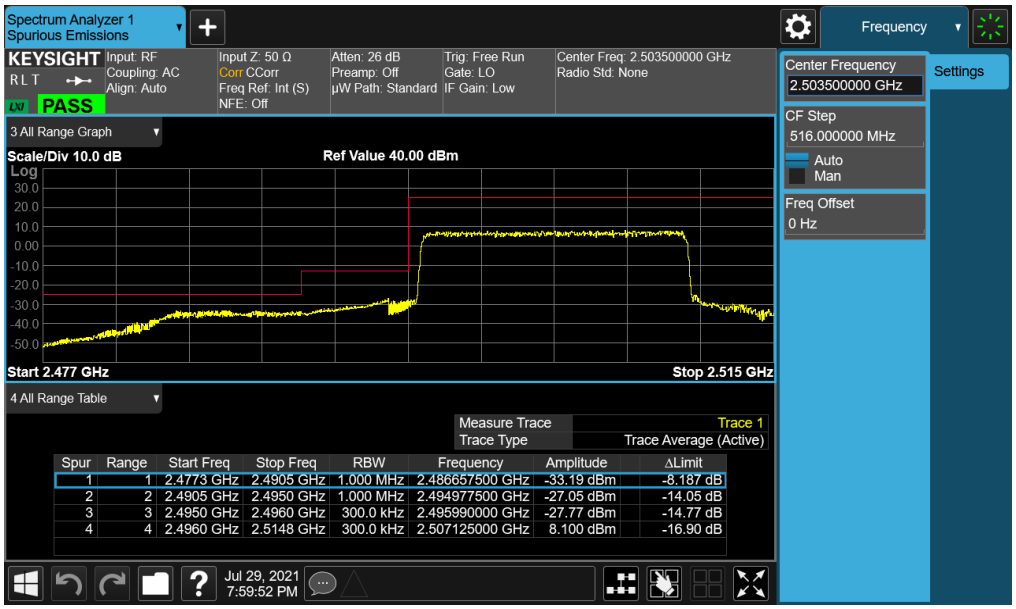
Plot 7-87. Upper ACP Plot (LTE Band 41 - 5MHz QPSK – Full RB Configuration)



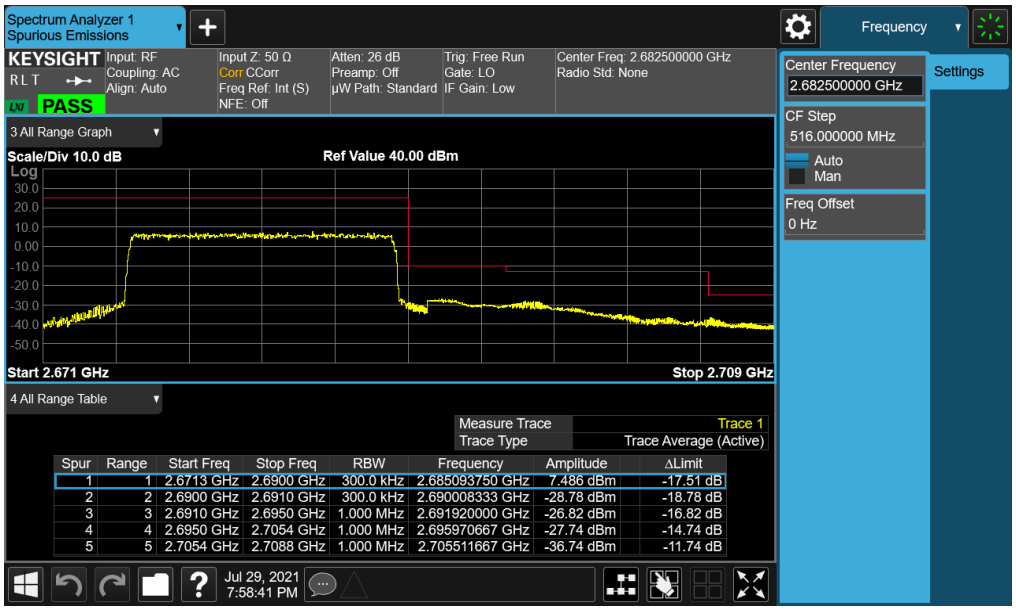
Plot 7-88. Lower ACP Plot (LTE Band 41 - 10MHz QPSK – Full RB Configuration)



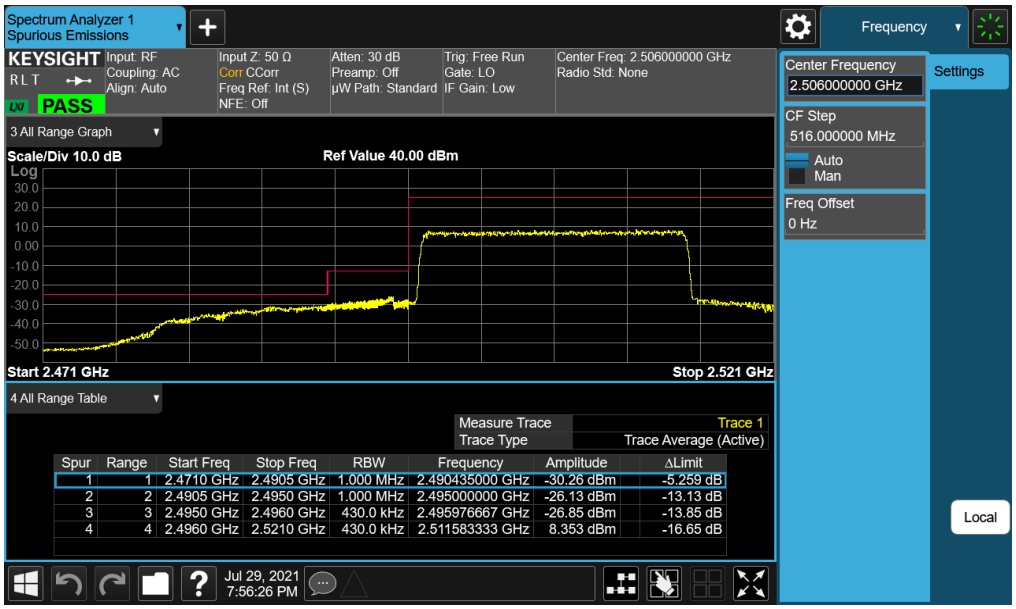
Plot 7-89. Upper ACP Plot (LTE Band 41 - 10MHz QPSK – Full RB Configuration)



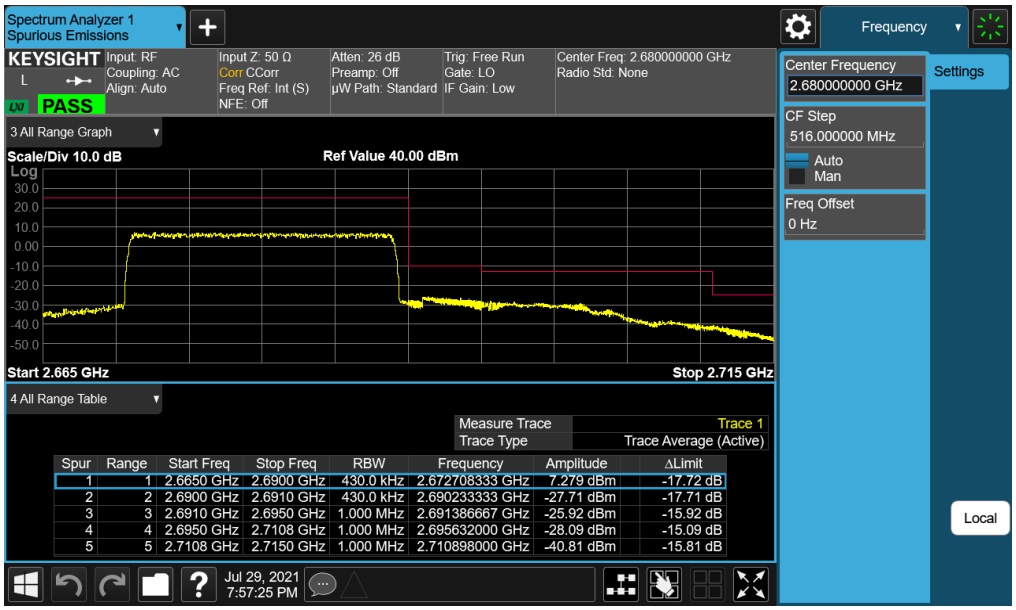
Plot 7-90. Lower ACP Plot (LTE Band 41 - 15MHz QPSK – Full RB Configuration)



Plot 7-91. Upper ACP Plot (LTE Band 41 - 15MHz QPSK – Full RB Configuration)

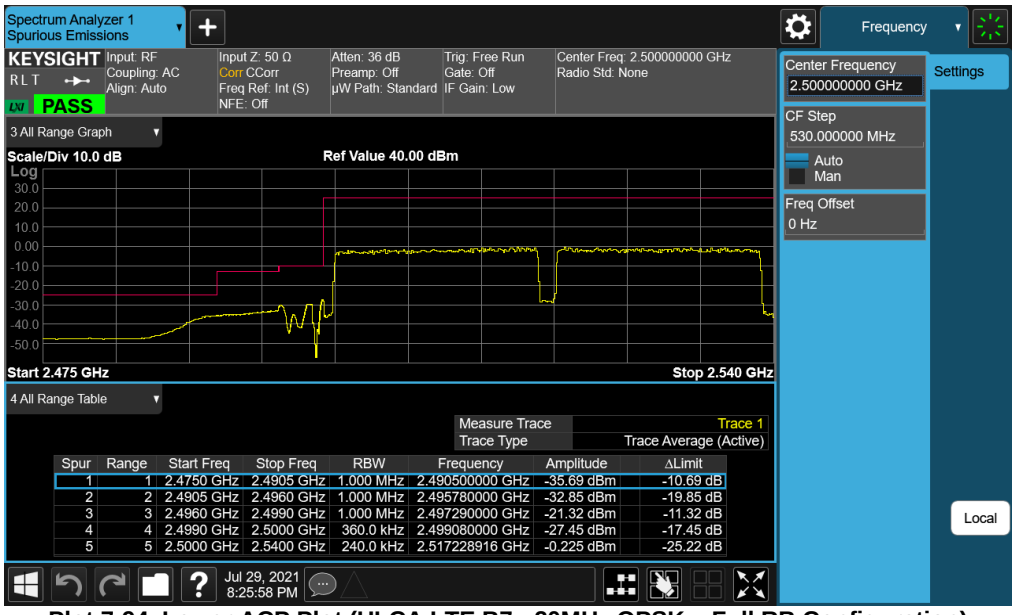


Plot 7-92. Lower ACP Plot (LTE Band 41 - 20MHz QPSK – Full RB Configuration)

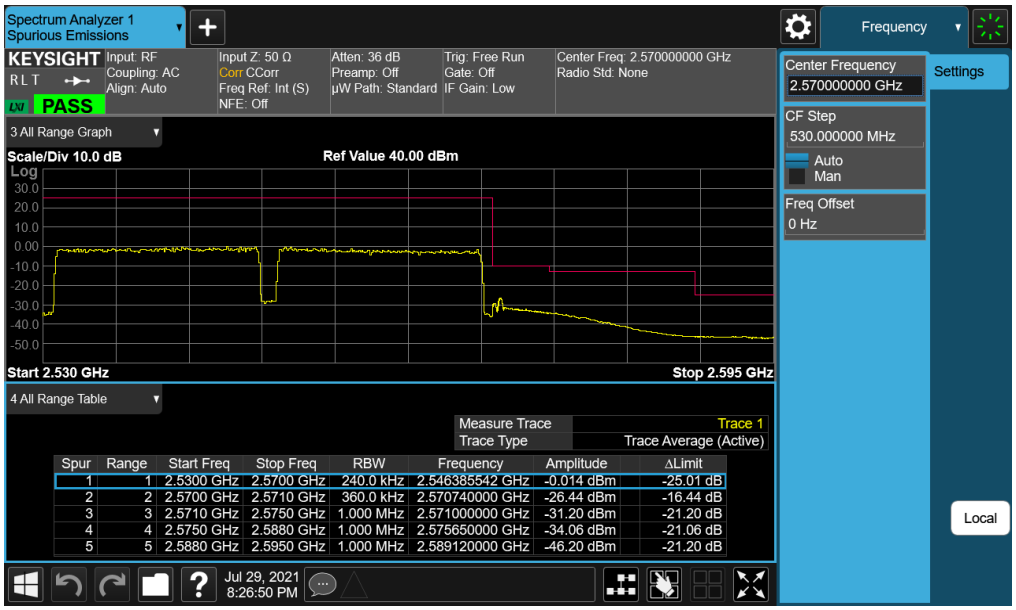


Plot 7-93. Upper ACP Plot (LTE Band 41 - 20MHz QPSK – Full RB Configuration)

ULCA - LTE Band 7

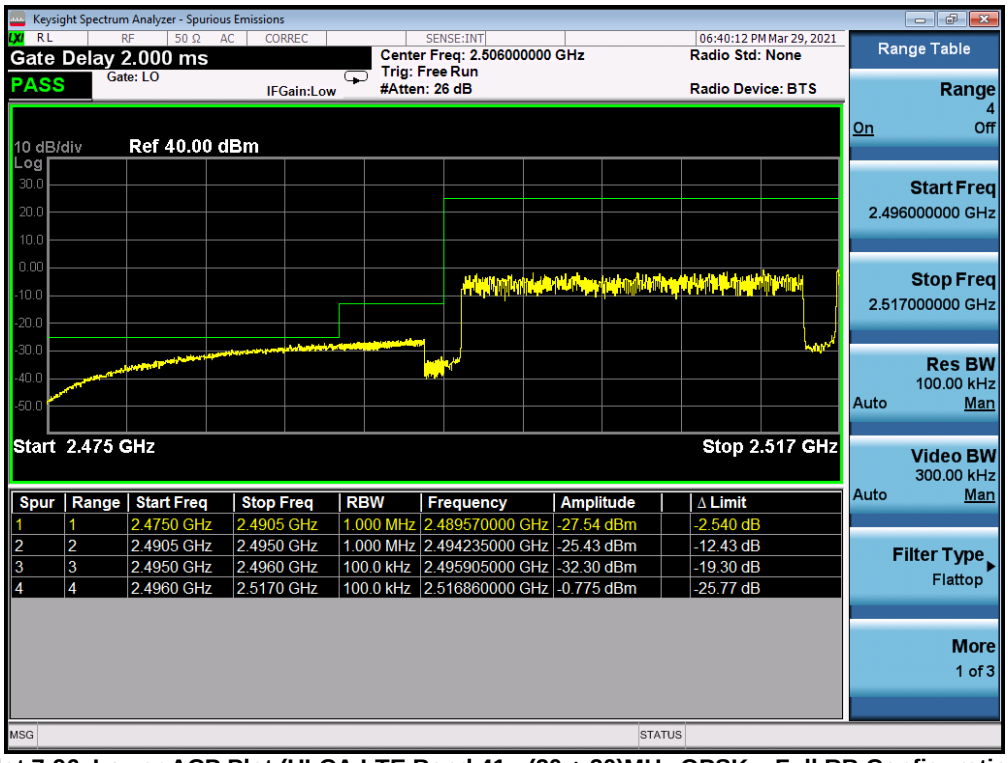


Plot 7-94. Lower ACP Plot (ULCA LTE B7 - 20MHz QPSK – Full RB Configuration)



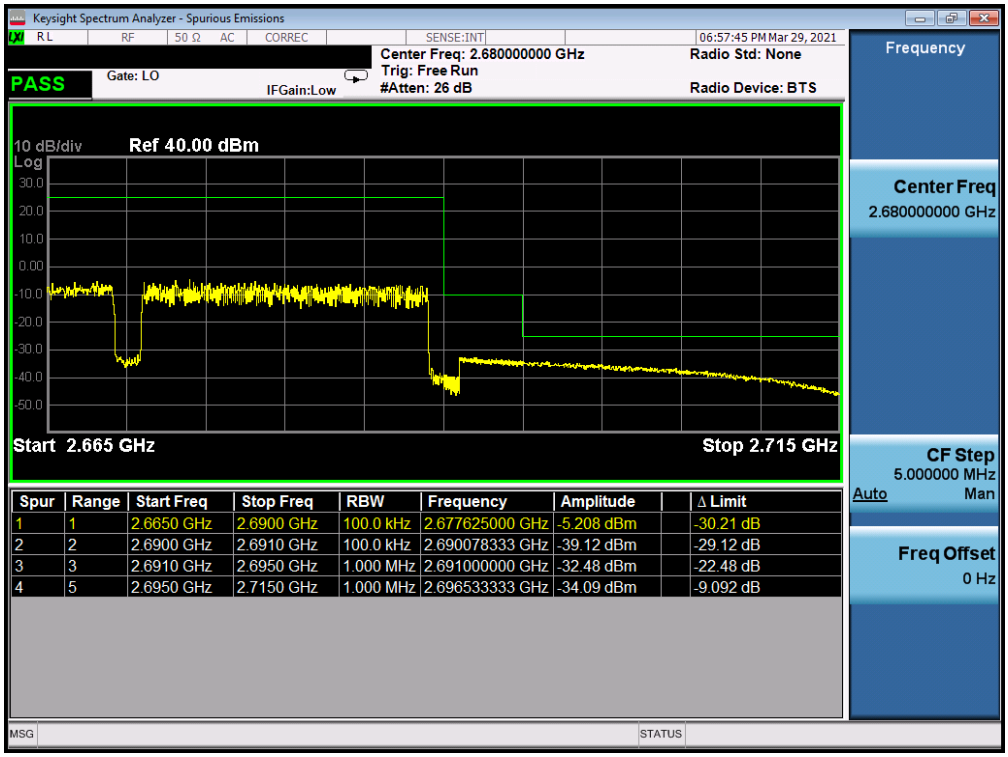
Plot 7-95. Upper ACP Plot (ULCA LTE B7 - 20MHz QPSK – Full RB Configuration)

ULCA - LTE Band 41



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.489570000 GHz	-27.54 dBm	-2.540 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494235000 GHz	-25.43 dBm	-12.43 dB
3	3	2.4950 GHz	2.4960 GHz	100.0 kHz	2.495905000 GHz	-32.30 dBm	-19.30 dB
4	4	2.4960 GHz	2.5170 GHz	100.0 kHz	2.516860000 GHz	-0.775 dBm	-25.77 dB

Plot 7-96. Lower ACP Plot (ULCA LTE Band 41 - (20 + 20)MHz QPSK – Full RB Configuration)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	100.0 kHz	2.677625000 GHz	-5.208 dBm	-30.21 dB
2	2	2.6900 GHz	2.6910 GHz	100.0 kHz	2.690078333 GHz	-39.12 dBm	-29.12 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691000000 GHz	-32.48 dBm	-22.48 dB
4	5	2.6950 GHz	2.7150 GHz	1.000 MHz	2.696533333 GHz	-34.09 dBm	-9.092 dB

Plot 7-97. Upper ACP Plot (ULCA LTE Band 41 - (20 + 20)MHz QPSK – Full RB Configuration)

7.5 Additional Maximum Power Reduction (A-MPR)

§2.1046

Test Overview

A-MPR is implemented in this device when operating at Power Class 2 in LTE Band 41 per the A-MPR specification in 3GPP TS 36.101. The conducted powers are shown herein to cover the different A-MPR levels specified in the standard. Conducted power measurements are performed to measure the average output power of the EUT. The averaging is to be performed only over duration of active transmissions at maximum output power level. The average measurements do not include averaging over periods when the transmitter is quiescent or when operating at reduced power level. All ports were tested and only the worst case data were reported.

Test Procedure Used

KDB 971168 D01 v03r01

Test Setup

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

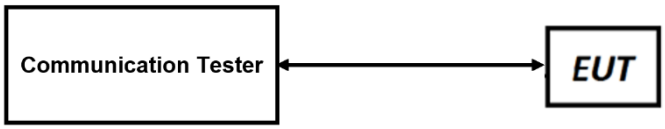


Figure 7-4. Conducted Power Measurement Setup

Test Notes

None.

Test Case	NS	MCC	MNC	Channel BW [MHz]	Channel Number	Channel Frequency [MHz]	RB Size	RB Offset	A-MPR [dB]	Modulation	MPR [dB]	Measured Power [dBm]	Lowest Typical Power [dBm]	Delta [dB]
1	01	312	530	5	39675	2498.5	1	0	3	QPSK	0	25.42	23.0	2.42
										16-QAM	1	25.06	22.0	3.06
										64-QAM	2	24.05	21.0	3.05
2				5	39675	2498.5	1	9	0	QPSK	0	27.00	26.0	1.00
										16-QAM	1	26.75	25.0	1.75
										64-QAM	2	25.87	24.0	1.87
3				10	39700	2501	1	0	5	QPSK	0	24.39	21.0	3.39
										16-QAM	1	23.76	20.0	3.76
										64-QAM	2	22.62	19.0	3.62
4				10	39700	2501	20	0	2	QPSK	0	25.24	24.0	1.24
										16-QAM	1	24.28	23.0	1.28
										64-QAM	2	23.30	22.0	1.30
5				10	39700	2501	50	0	3	QPSK	0	24.26	23.0	1.26
										16-QAM	1	23.22	22.0	1.22
										64-QAM	2	22.24	21.0	1.24
6				10	39700	2501	25	20	1	QPSK	0	25.24	25.0	0.24
										16-QAM	1	24.26	24.0	0.26
										64-QAM	2	23.26	23.0	0.26
7				10	39700	2501	1	36	0	QPSK	0	26.98	26.0	0.98
										16-QAM	1	26.65	25.0	1.65
										64-QAM	2	25.80	24.0	1.80
8				15	39725	2503.5	1	0	5	QPSK	0	24.38	21.0	3.38
										16-QAM	1	23.76	20.0	3.76
										64-QAM	2	22.83	19.0	3.83
9				15	39725	2503.5	20	0	2	QPSK	0	25.21	24.0	1.21
										16-QAM	1	24.22	23.0	1.22
										64-QAM	2	23.19	22.0	1.19
10				15	39725	2503.5	75	0	4	QPSK	0	23.26	22.0	1.26
										16-QAM	1	22.26	21.0	1.26
										64-QAM	2	21.24	20.0	1.24
11				15	39725	2503.5	50	15	3	QPSK	0	25.27	23.0	2.27
										16-QAM	1	24.28	22.0	2.28
										64-QAM	2	23.25	21.0	2.25
12				15	39725	2503.5	1	60	0	QPSK	0	27.00	26.0	1.00
										16-QAM	1	26.59	25.0	1.59
										64-QAM	2	25.74	24.0	1.74
13				20	39750	2506	1	0	5	QPSK	0	24.14	21.0	3.14
										16-QAM	1	23.72	20.0	3.72
										64-QAM	2	22.83	19.0	3.83
14				20	39750	2506	20	0	2	QPSK	0	25.18	24.0	1.18
										16-QAM	1	24.20	23.0	1.20
										64-QAM	2	23.17	22.0	1.17
15				20	39750	2506	100	0	4	QPSK	0	23.21	22.0	1.21
										16-QAM	1	22.20	21.0	1.20
										64-QAM	2	21.14	20.0	1.14
16				20	39750	2506	75	24	3	QPSK	0	25.13	23.0	2.13
										16-QAM	1	24.24	22.0	2.24
										64-QAM	2	23.16	21.0	2.16
17				20	39750	2506	1	77	0	QPSK	0	27.00	26.0	1.00
										16-QAM	1	26.61	25.0	1.61
										64-QAM	2	25.64	24.0	1.64
18	01	311	490	5	39675	2498.5	1	0	3	QPSK	0	25.39	23.0	2.39
										16-QAM	1	24.98	22.0	2.98
										64-QAM	2	23.99	21.0	2.99
19	01	001	01	5	39675	2498.5	1	0	0	QPSK	0	27.00	26.0	1.00
										16-QAM	1	26.86	25.0	1.86
										64-QAM	2	25.94	24.0	1.94

Table 7-2. A-MPR Conducted Power Measurements

7.6 Radiated Power (EIRP)

§27.50(a)(3), §27.50(h)(2)

Test Overview

Equivalent Isotropic Radiated Power (EIRP) measurements are calculated by adding highest antenna gain to maximum measured conducted output power. 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 C63.26-2015 – Section 5.2.5.5

Test Settings

The relevant equation for determining the ERP or EIRP from the conducted RF output power measured is:

EIRP = PMeas – LC + GT

Where:

EIRP = Equivalent Isotropic Radiated Power (expressed in the same units as PMeas, typically dBW or dBm)

PMeas = measured transmitter output power or PSD, in dBW or dBm

LC = signal attenuation in the connecting cable between the transmitter and antenna in dB

GT = gain of the transmitting antenna, in dBi (EIRP)

Test Setup

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

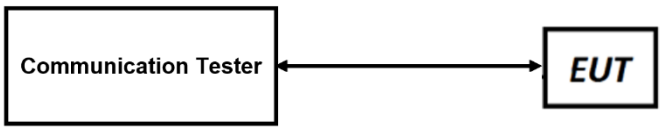


Figure 7-5. EIRP Measurement Setup

Test Notes

1. The EUT was tested in all possible test configurations. The worst case emissions are reported with the EUT 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 Level (dBm) readings in the table were taken with a correction table loaded into the base station simulator. The correction table was used to account for the signal attenuation in the connecting cable between the transmitter and antenna.

4. Uplink carrier aggregation for LTE Band 7 is only supported in this EUT while operating in Power Class 3.
5. Uplink carrier aggregation for LTE Band 41 is supported in this EUT while operating in Power Class 2 and Power Class 3.

6. For ULCA, conducted power measurements were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth. Channel bandwidth data is shown in the tables below based only on the channel bandwidths that were supported in this device.

7. For ULCA, compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than 1 GHz.

7.6.1 Antenna C – EIRP

LTE Band 30

Bandwidth	Mod.	Frequency [MHz]	Ant. Gain [dBi]	RB Size/Offset	Conducted Power [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
5 MHz	QPSK	2307.5	1.40	1 / 0	21.75	23.15	0.207	23.98	-0.83
		2310.0	1.40	1 / 24	21.80	**23.20**	0.209	23.98	-0.78
		2312.5	1.40	1 / 0	21.79	23.19	0.208	23.98	-0.79
	16-QAM	2310.0	1.40	1 / 12	21.27	22.67	0.185	23.98	-1.31
	64-QAM	2312.5	1.40	1 / 24	20.40	21.80	0.151	23.98	-2.18
10 MHz	QPSK	2310.0	1.40	1 / 25	21.80	**23.20**	0.209	23.98	-0.78
	16-QAM	2310.0	1.40	1 / 0	21.43	22.83	0.192	23.98	-1.15
	64-QAM	2310.0	1.40	1 / 25	20.29	21.69	0.148	23.98	-2.29

Table 7-3. Antenna C EIRP Data (LTE Band 30)

LTE Band 7

Bandwidth	Mod.	Frequency [MHz]	Ant. Gain [dBi]	RB Size/Offset	Conducted Power [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
5 MHz	QPSK	2502.5	1.70	1 / 12	25.40	**27.10**	0.513	33.01	-5.91
		2535.0	1.70	1 / 12	25.45	**27.15**	0.519	33.01	-5.86
		2567.5	1.70	1 / 12	25.20	26.90	0.490	33.01	-6.11
	16-QAM	2535.0	1.70	1 / 12	24.79	26.49	0.446	33.01	-6.52
	64-QAM	2535.0	1.70	1 / 24	23.86	25.56	0.360	33.01	-7.45
10 MHz	QPSK	2505.0	1.70	1 / 49	25.32	**27.02**	0.504	33.01	-5.99
		2535.0	1.70	1 / 25	25.24	26.94	0.494	33.01	-6.07
		2565.0	1.70	1 / 25	25.16	26.86	0.485	33.01	-6.15
	16-QAM	2535.0	1.70	1 / 25	24.79	26.49	0.446	33.01	-6.52
	64-QAM	2505.0	1.70	1 / 49	23.63	25.33	0.341	33.01	-7.68
15 MHz	QPSK	2507.5	1.70	1 / 0	25.50	**27.20**	0.525	33.01	-5.81
		2535.0	1.70	1 / 37	25.36	27.06	0.508	33.01	-5.95
		2562.5	1.70	1 / 37	25.21	26.91	0.491	33.01	-6.10
	16-QAM	2535.0	1.70	1 / 0	24.76	26.46	0.443	33.01	-6.55
	64-QAM	2507.5	1.70	1 / 74	23.75	25.45	0.351	33.01	-7.56
20 MHz	QPSK	2510.0	1.70	1 / 99	25.20	26.90	0.490	33.01	-6.11
		2535.0	1.70	1 / 0	25.11	26.81	0.480	33.01	-6.20
		2560.0	1.70	1 / 0	25.31	**27.01**	0.502	33.01	-6.00
	16-QAM	2535.0	1.70	1 / 0	24.66	26.36	0.433	33.01	-6.65
	64-QAM	2535.0	1.70	1 / 99	23.78	25.48	0.353	33.01	-7.53

Table 7-4. Antenna C EIRP Data (LTE Band 7)

LTE Band 41 (PC2)

Bandwidth	Mod.	Frequency [MHz]	Ant. Gain [dBi]	RB Size/Offset	Conducted Power [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
5 MHz	QPSK	2498.5	1.70	1 / 12	26.80	**28.50**	0.708	33.01	-4.51
		2593.0	1.70	1 / 12	26.48	28.18	0.658	33.01	-4.83
		2687.5	1.70	1 / 24	26.56	**28.26**	0.670	33.01	-4.75
	16-QAM	2498.5	1.70	1 / 12	26.48	28.18	0.658	33.01	-4.83
	64-QAM	2498.5	1.70	1 / 12	25.54	27.24	0.530	33.01	-5.77
10 MHz	QPSK	2501.0	1.70	1 / 25	26.98	**28.68**	0.738	33.01	-4.33
		2593.0	1.70	1 / 49	26.77	28.47	0.703	33.01	-4.54
		2685.0	1.70	1 / 49	26.55	28.25	0.668	33.01	-4.76
	16-QAM	2501.0	1.70	1 / 49	26.50	28.20	0.661	33.01	-4.81
	64-QAM	2501.0	1.70	1 / 49	25.65	27.35	0.543	33.01	-5.66
15 MHz	QPSK	2503.5	1.70	1 / 37	26.99	**28.69**	0.740	33.01	-4.32
		2593.0	1.70	1 / 0	26.83	28.53	0.713	33.01	-4.48
		2682.5	1.70	1 / 37	26.51	28.21	0.662	33.01	-4.80
	16-QAM	2503.5	1.70	1 / 0	26.36	28.06	0.640	33.01	-4.95
	64-QAM	2503.5	1.70	1 / 74	25.51	27.21	0.526	33.01	-5.80
20 MHz	QPSK	2506.0	1.70	1 / 99	26.95	**28.65**	0.733	33.01	-4.36
		2593.0	1.70	1 / 99	26.79	28.49	0.706	33.01	-4.52
		2680.0	1.70	1 / 50	26.50	28.20	0.661	33.01	-4.81
	16-QAM	2506.0	1.70	1 / 99	26.31	28.01	0.632	33.01	-5.00
	64-QAM	2506.0	1.70	1 / 99	25.65	27.35	0.543	33.01	-5.66

Table 7-5. Antenna C EIRP Data (LTE Band 41(PC2))

LTE Band 41 (PC3)

Bandwidth	Mod.	Frequency [MHz]	Ant. Gain [dBi]	RB Size/Offset	Conducted Power [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
5 MHz	QPSK	2498.5	1.70	1 / 0	25.18	**26.88**	0.488	33.01	-6.13
		2593.0	1.70	1 / 12	25.23	**26.93**	0.493	33.01	-6.08
		2687.5	1.70	1 / 12	24.91	26.61	0.458	33.01	-6.40
	16-QAM	2498.5	1.70	1 / 24	24.47	26.17	0.414	33.01	-6.84
	64-QAM	2498.5	1.70	1 / 24	23.81	25.51	0.356	33.01	-7.50
10 MHz	QPSK	2501.0	1.70	1 / 25	25.47	**27.17**	0.521	33.01	-5.84
		2593.0	1.70	1 / 49	25.26	26.96	0.497	33.01	-6.05
		2685.0	1.70	1 / 49	25.04	26.74	0.472	33.01	-6.27
	16-QAM	2501.0	1.70	1 / 49	24.47	26.17	0.414	33.01	-6.84
	64-QAM	2685.0	1.70	1 / 49	23.50	25.20	0.331	33.01	-7.81
15 MHz	QPSK	2503.5	1.70	1 / 37	25.50	**27.20**	0.525	33.01	-5.81
		2593.0	1.70	1 / 0	25.34	27.04	0.506	33.01	-5.97
		2682.5	1.70	1 / 37	25.02	26.72	0.470	33.01	-6.29
	16-QAM	2503.5	1.70	1 / 0	24.35	26.05	0.403	33.01	-6.96
	64-QAM	2593.0	1.70	1 / 74	23.53	25.23	0.333	33.01	-7.78
20 MHz	QPSK	2506.0	1.70	1 / 99	25.50	**27.20**	0.525	33.01	-5.81
		2593.0	1.70	1 / 99	25.34	27.04	0.506	33.01	-5.97
		2680.0	1.70	1 / 50	25.05	26.75	0.473	33.01	-6.26
	16-QAM	2506.0	1.70	1 / 99	24.56	26.26	0.423	33.01	-6.75
	64-QAM	2506.0	1.70	1 / 99	23.58	25.28	0.337	33.01	-7.73

Table 7-6. Antenna C EIRP Data (LTE Band 41(PC3))

ULCA - Band 7

Power State	Band	Bandwidth (PCC + SCC)	PCC					SCC					ULCA Tx. Power [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
			Modulation	UL Channel	UL Frequency	UL # RB	UL RB Offset	Modulation	UL Channel	UL Frequency	UL # RB	UL RB Offset						
Max	LTE B7	20MHz + 20MHz	QPSK	20850	2510.0	1	99	QPSK	21048	2529.8	1	0	25.00	1.70	**26.70**	0.468	33.01	-6.31
				21100	2535.0	1	99		21298	2554.8	1	0	25.00	1.70	**26.70**	0.468	33.01	-6.31
				21350	2560.0	1	0		21152	2540.2	1	99	25.00	1.70	**26.70**	0.468	33.01	-6.31
			QPSK	20850	2510	100	0	QPSK	21048	2529.8	100	0	23.72	1.70	25.42	0.348	33.01	-7.59
			16-QAM	20850	2510	100	0	16-QAM	21048	2529.8	100	0	22.00	1.70	**23.70**	0.234	33.01	-9.31
			64-QAM	20850	2510	100	0	64-QAM	21048	2529.8	100	0	21.90	1.70	**23.60**	0.229	33.01	-9.41

Table 7-7. Antenna C EIRP Data (ULCA LTE Band 7)

ULCA - Band 41

Power State	Band	Bandwidth (PCC + SCC)	PCC					SCC					ULCA Tx. Power [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
			Modulation	UL Channel	UL Frequency	UL # RB	UL RB Offset	Modulation	UL Channel	UL Frequency	UL # RB	UL RB Offset						
Max	LTE B41 (PC2)	20MHz + 20MHz	QPSK	39750	2506.0	1	99	QPSK	39948	2525.8	1	0	25.00	1.70	**26.70**	0.468	33.01	-6.31
				40620	2593.0	1	99		40818	2612.8	1	0	24.97	1.70	26.67	0.465	33.01	-6.34
				41490	2680.0	1	0		41292	2660.2	1	99	24.91	1.70	26.61	0.458	33.01	-6.40
			QPSK	39750	2506	100	0	QPSK	39948	2525.8	100	0	24.00	1.70	25.70	0.372	33.01	-7.31
			16-QAM	39750	2506	100	0	16-QAM	39948	2525.8	100	0	23.16	1.70	**24.86**	0.306	33.01	-8.15
			64-QAM	39750	2506	100	0	64-QAM	39948	2525.8	100	0	23.09	1.70	**24.79**	0.301	33.01	-8.22

Table 7-8. Antenna C EIRP Data (ULCA LTE Band 41)

7.6.2 Antenna D – EIRP

LTE Band 30

Bandwidth	Mod.	Frequency [MHz]	Ant. Gain [dBi]	RB Size/Offset	Conducted Power [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
5 MHz	QPSK	2307.5	1.70	1 / 24	21.30	**23.00**	0.200	23.98	-0.98
		2310.0	1.70	1 / 24	21.27	22.97	0.198	23.98	-1.01
		2312.5	1.70	1 / 12	21.11	22.81	0.191	23.98	-1.17
	16-QAM	2307.5	1.70	1 / 24	20.50	22.20	0.166	23.98	-1.78
	64-QAM	2312.5	1.70	1 / 12	19.61	21.31	0.135	23.98	-2.67
10 MHz	QPSK	2310.0	1.70	1 / 25	21.30	**23.00**	0.200	23.98	-0.98
	16-QAM	2310.0	1.70	1 / 25	20.60	22.30	0.170	23.98	-1.68
	64-QAM	2310.0	1.70	1 / 25	19.82	21.52	0.142	23.98	-2.46

Table 7-9. Antenna D EIRP Data (LTE Band 30)

LTE Band 7

Bandwidth	Mod.	Frequency [MHz]	Ant. Gain [dBi]	RB Size/Offset	Conducted Power [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
5 MHz	QPSK	2502.5	2.00	1 / 12	23.20	**25.20**	0.331	33.01	-7.81
		2535.0	2.00	1 / 12	23.25	**25.25**	0.335	33.01	-7.76
		2567.5	2.00	1 / 12	23.23	25.23	0.333	33.01	-7.78
	16-QAM	2535.0	2.00	1 / 24	22.71	24.71	0.296	33.01	-8.30
	64-QAM	2535.0	2.00	1 / 24	21.67	23.67	0.233	33.01	-9.34
10 MHz	QPSK	2505.0	2.00	1 / 49	23.25	**25.25**	0.335	33.01	-7.76
		2535.0	2.00	1 / 49	23.22	25.22	0.333	33.01	-7.79
		2565.0	2.00	1 / 25	23.20	25.20	0.331	33.01	-7.81
	16-QAM	2505.0	2.00	1 / 0	22.62	24.62	0.290	33.01	-8.39
	64-QAM	2505.0	2.00	1 / 49	21.57	23.57	0.228	33.01	-9.44
15 MHz	QPSK	2507.5	2.00	1 / 74	23.25	**25.25**	0.335	33.01	-7.76
		2535.0	2.00	1 / 0	23.22	25.22	0.333	33.01	-7.79
		2562.5	2.00	1 / 0	23.18	25.18	0.330	33.01	-7.83
	16-QAM	2507.5	2.00	1 / 74	22.69	24.69	0.294	33.01	-8.32
	64-QAM	2507.5	2.00	1 / 0	21.68	23.68	0.233	33.01	-9.33
20 MHz	QPSK	2510.0	2.00	1 / 99	23.25	**25.25**	0.335	33.01	-7.76
		2535.0	2.00	1 / 99	23.22	25.22	0.333	33.01	-7.79
		2560.0	2.00	1 / 0	23.19	25.19	0.330	33.01	-7.82
	16-QAM	2560.0	2.00	1 / 0	22.63	24.63	0.290	33.01	-8.38
	64-QAM	2535.0	2.00	1 / 0	21.52	23.52	0.225	33.01	-9.49

Table 7-10. Antenna D EIRP Data (LTE Band 7)

LTE Band 41 (PC2)

Bandwidth	Mod.	Frequency [MHz]	Ant. Gain [dBi]	RB Size/Offset	Conducted Power [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
5 MHz	QPSK	2498.5	2.00	1 / 0	24.43	**26.43**	0.440	33.01	-6.58
		2593.0	2.00	1 / 12	24.48	**26.48**	0.445	33.01	-6.53
		2687.5	2.00	1 / 12	24.16	26.16	0.413	33.01	-6.85
	16-QAM	2498.5	2.00	1 / 24	24.24	26.24	0.421	33.01	-6.77
	64-QAM	2498.5	2.00	1 / 0	23.38	25.38	0.345	33.01	-7.63
10 MHz	QPSK	2501.0	2.00	1 / 25	24.72	**26.72**	0.470	33.01	-6.29
		2593.0	2.00	1 / 49	24.51	26.51	0.448	33.01	-6.50
		2685.0	2.00	1 / 49	24.29	26.29	0.426	33.01	-6.72
	16-QAM	2501.0	2.00	1 / 49	24.24	26.24	0.421	33.01	-6.77
	64-QAM	2501.0	2.00	1 / 49	23.39	25.39	0.346	33.01	-7.62
15 MHz	QPSK	2503.5	2.00	1 / 37	24.75	**26.75**	0.473	33.01	-6.26
		2593.0	2.00	1 / 0	24.59	26.59	0.456	33.01	-6.42
		2682.5	2.00	1 / 37	24.27	26.27	0.424	33.01	-6.74
	16-QAM	2503.5	2.00	1 / 0	24.12	26.12	0.409	33.01	-6.89
	64-QAM	2503.5	2.00	1 / 74	23.27	25.27	0.337	33.01	-7.74
20 MHz	QPSK	2506.0	2.00	1 / 99	24.75	**26.75**	0.473	33.01	-6.26
		2593.0	2.00	1 / 99	24.59	26.59	0.456	33.01	-6.42
		2680.0	2.00	1 / 50	24.30	26.30	0.427	33.01	-6.71
	16-QAM	2506.0	2.00	1 / 99	24.11	26.11	0.408	33.01	-6.90
	64-QAM	2506.0	2.00	1 / 99	23.45	25.45	0.351	33.01	-7.56

Table 7-11. Antenna D EIRP Data (LTE Band 41(PC2))

LTE Band 41 (PC3)

Bandwidth	Mod.	Frequency [MHz]	Ant. Gain [dBi]	RB Size/Offset	Conducted Power [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
5 MHz	QPSK	2498.5	2.00	1 / 12	23.25	**25.25**	0.335	33.01	-7.76
		2593.0	2.00	1 / 12	22.91	**24.91**	0.310	33.01	-8.10
		2687.5	2.00	1 / 24	22.88	24.88	0.308	33.01	-8.13
	16-QAM	2498.5	2.00	1 / 24	22.41	24.41	0.276	33.01	-8.60
	64-QAM	2498.5	2.00	1 / 0	21.59	23.59	0.229	33.01	-9.42
10 MHz	QPSK	2501.0	2.00	1 / 25	23.23	**25.23**	0.333	33.01	-7.78
		2593.0	2.00	1 / 25	22.91	24.91	0.310	33.01	-8.10
		2685.0	2.00	1 / 49	22.92	24.92	0.310	33.01	-8.09
	16-QAM	2501.0	2.00	1 / 25	22.31	24.31	0.270	33.01	-8.70
	64-QAM	2501.0	2.00	1 / 0	21.41	23.41	0.219	33.01	-9.60
15 MHz	QPSK	2503.5	2.00	1 / 37	23.25	**25.25**	0.335	33.01	-7.76
		2593.0	2.00	1 / 37	22.96	24.96	0.313	33.01	-8.05
		2682.5	2.00	1 / 0	22.89	24.89	0.308	33.01	-8.12
	16-QAM	2503.5	2.00	1 / 37	22.14	24.14	0.259	33.01	-8.87
	64-QAM	2503.5	2.00	1 / 37	21.45	23.45	0.221	33.01	-9.56
20 MHz	QPSK	2506.0	2.00	1 / 50	23.25	**25.25**	0.335	33.01	-7.76
		2593.0	2.00	1 / 99	23.05	25.05	0.320	33.01	-7.96
		2680.0	2.00	1 / 50	23.13	25.13	0.326	33.01	-7.88
	16-QAM	2506.0	2.00	1 / 50	22.23	24.23	0.265	33.01	-8.78
	64-QAM	2506.0	2.00	1 / 99	21.40	23.40	0.219	33.01	-9.61

Table 7-12. Antenna D EIRP Data (LTE Band 41(PC3))

ULCA - Band 7

Power State	Band	Bandwidth (PCC + SCC)	PCC					SCC					ULCA Tx. Power [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
			Modulation	UL Channel	UL Frequency	UL # RB	UL RB Offset	Modulation	UL Channel	UL Frequency	UL # RB	UL RB Offset						
Max	LTE B7	20MHz + 20MHz	QPSK	20850	2510.0	1	99	QPSK	21048	2529.8	1	0	22.72	2.00	**24.72**	0.296	33.01	-8.29
				21100	2535.0	1	99		21298	2554.8	1	0	22.71	2.00	24.71	0.296	33.01	-8.30
				21350	2560.0	1	0		21152	2540.2	1	99	22.70	2.00	24.70	0.295	33.01	-8.31
			QPSK	20850	2510	100	0	QPSK	21048	2529.8	100	0	20.68	2.00	22.68	0.185	33.01	-10.33
			16-QAM	20850	2510	100	0	16-QAM	21048	2529.8	100	0	19.63	2.00	**21.63**	0.146	33.01	-11.38
			64-QAM	20850	2510	100	0	64-QAM	21048	2529.8	100	0	19.59	2.00	**21.59**	0.144	33.01	-11.42

Table 7-13. Antenna D EIRP Data (ULCA LTE Band 7)

ULCA - Band 41

Power State	Band	Bandwidth (PCC + SCC)	PCC					SCC					ULCA Tx. Power [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
			Modulation	UL Channel	UL Frequency	UL # RB	UL RB Offset	Modulation	UL Channel	UL Frequency	UL # RB	UL RB Offset						
Max	LTE B41 (PC2)	20MHz + 20MHz	QPSK	39750	2506.0	1	99	QPSK	39948	2525.8	1	0	22.67	2.00	24.67	0.293	33.01	-8.34
				40620	2593.0	1	99		40818	2612.8	1	0	22.74	2.00	24.74	0.298	33.01	-8.27
				41490	2680.0	1	0		41292	2660.2	1	99	22.75	2.00	**24.75**	0.299	33.01	-8.26
			QPSK	41490	2680	100	0	QPSK	41292	2660.2	100	0	21.70	2.00	23.70	0.234	33.01	-9.31
			16-QAM	41490	2680	100	0	16-QAM	41292	2660.2	100	0	20.88	2.00	**22.88**	0.194	33.01	-10.13
			64-QAM	41490	2680	100	0	64-QAM	41292	2660.2	100	0	20.82	2.00	**22.82**	0.191	33.01	-10.19

Table 7-14. Antenna D EIRP Data (ULCA LTE Band 41)

7.7 Radiated Spurious Emissions

§2.1053, 27.53(a), 27.53(m)

Test Overview

Radiated spurious emissions measurements are performed using the field strength conversion method described in KDB 971168 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using horizontally and vertically polarized broadband hybrid antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed while the EUT is operating at maximum power and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.8

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.

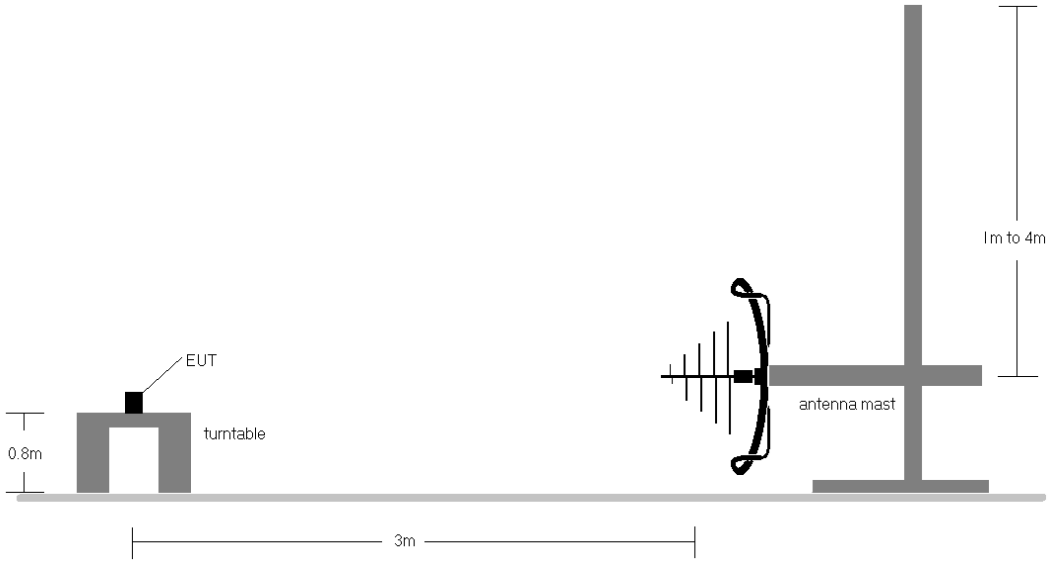


Figure 7-6. Test Instrument & Measurement Setup < 1GHz

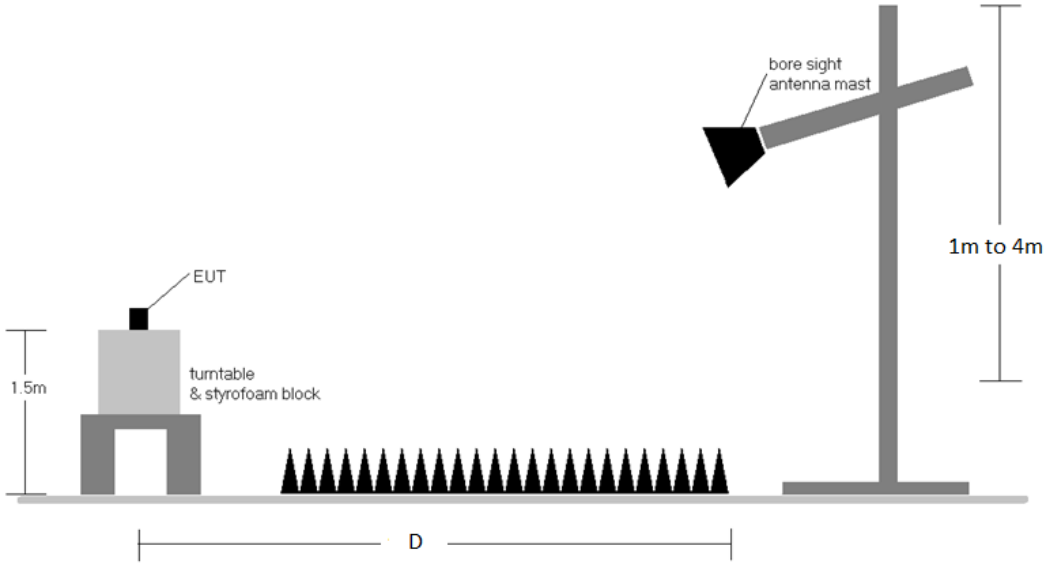


Figure 7-7. Test Instrument & Measurement Setup >1 GHz

Test Notes

1. Field strengths are calculated using the Measurement quantity conversions in KDB 971168 Section 5.8.4.
   a. E(dBµV/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m)
   b. 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 spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.

5. D is the measurement test distance and emissions 1-18GHz were measured at a 3 meters test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.

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

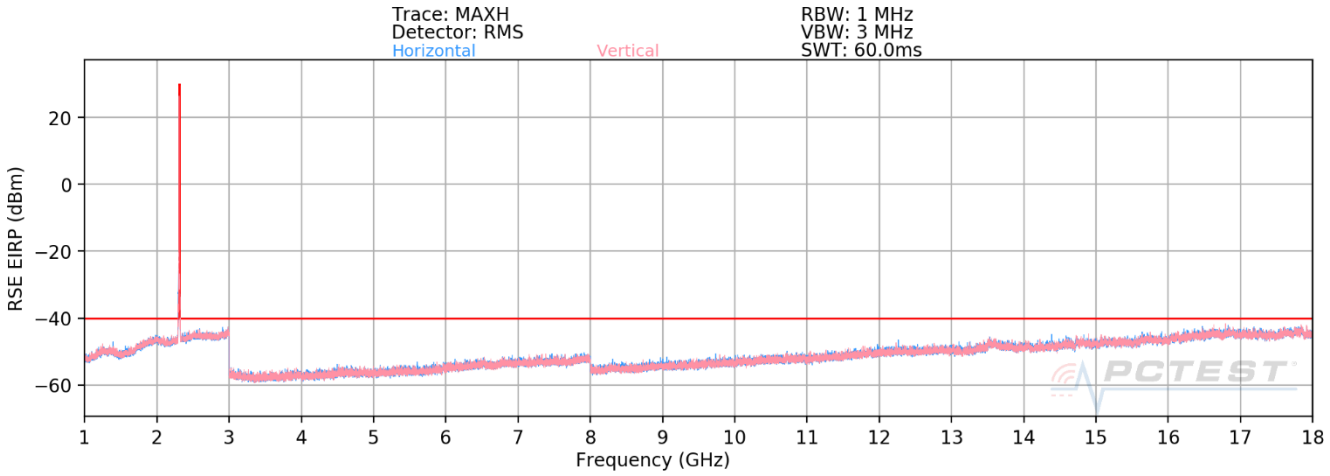
7. Uplink carrier aggregation intra-band radiated spurious emissions measurements were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth. The worst case (highest) emissions were found while operating with QPSK modulation with both carriers set to transmit using 1RB.

8. Uplink carrier aggregation for LTE Band 7 is only supported in this EUT while operating in Power Class 3.

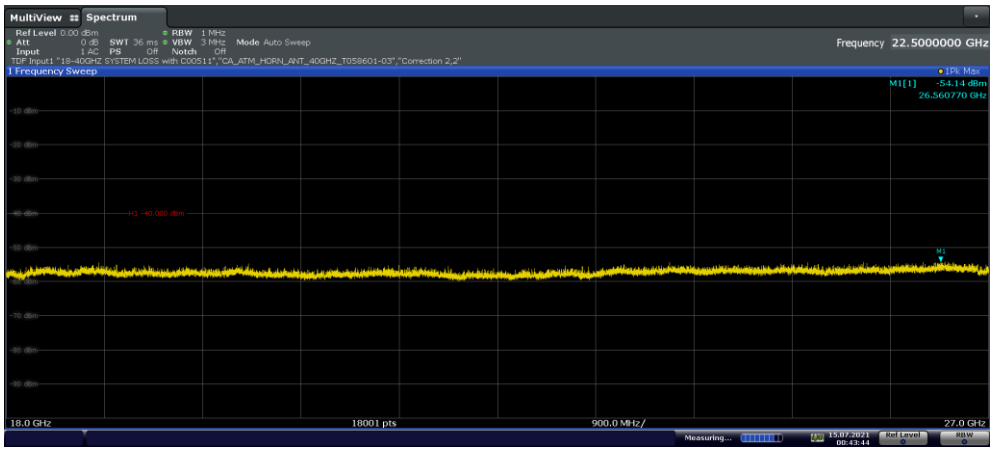
9. Uplink carrier aggregation for LTE Band 41 is supported in this EUT while operating in Power Class 3.

7.7.1 Antenna C Radiated Spurious Emission Measurements

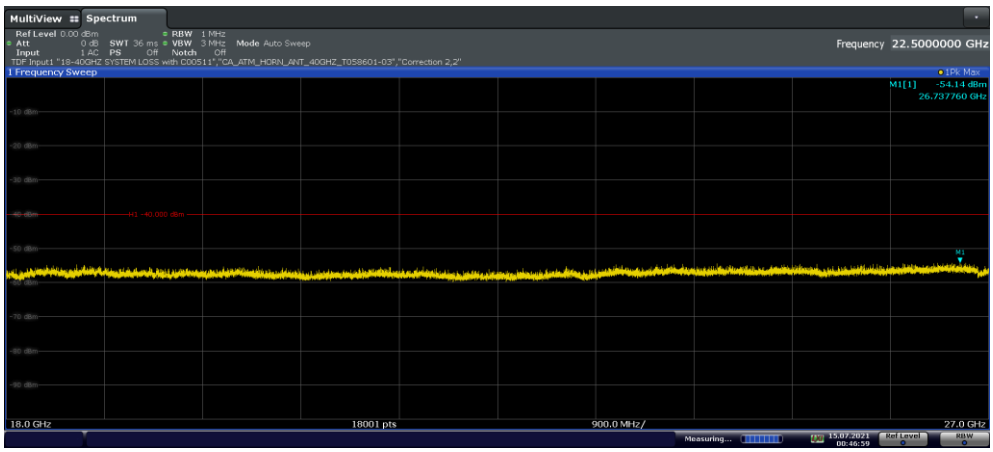
LTE Band 30



Plot 7-98. Antenna C Radiated Spurious Emission 1GHz – 18GHz (LTE Band 30)



Plot 7-99. Antenna C Radiated Spurious Emission above 18GHz (LTE Band 30, Pol. H)



Plot 7-100. Antenna C Radiated Spurious Emission above 18GHz (LTE Band 30, Pol. V)

Bandwidth (MHz):	5
Frequency (MHz):	2307.5
RB / Offset:	1 / 12

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]
4615.0	H	-	-	-80.41	7.10	33.69	-61.57	-40.00	-21.57
6922.5	H	-	-	-81.41	9.80	35.39	-59.87	-40.00	-19.87
9230.0	H	-	-	-83.58	12.06	35.48	-59.78	-40.00	-19.78

Table 7-15. Radiated Spurious Data (LTE Band 30 – Low Channel)

Bandwidth (MHz):	10
Frequency (MHz):	2310.0
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]
4620.0	H	-	-	-80.44	7.06	33.62	-61.64	-40.00	-21.64
6930.0	H	-	-	-81.72	9.64	34.92	-60.34	-40.00	-20.34
9240.0	H	-	-	-83.78	12.23	35.45	-59.80	-40.00	-19.80

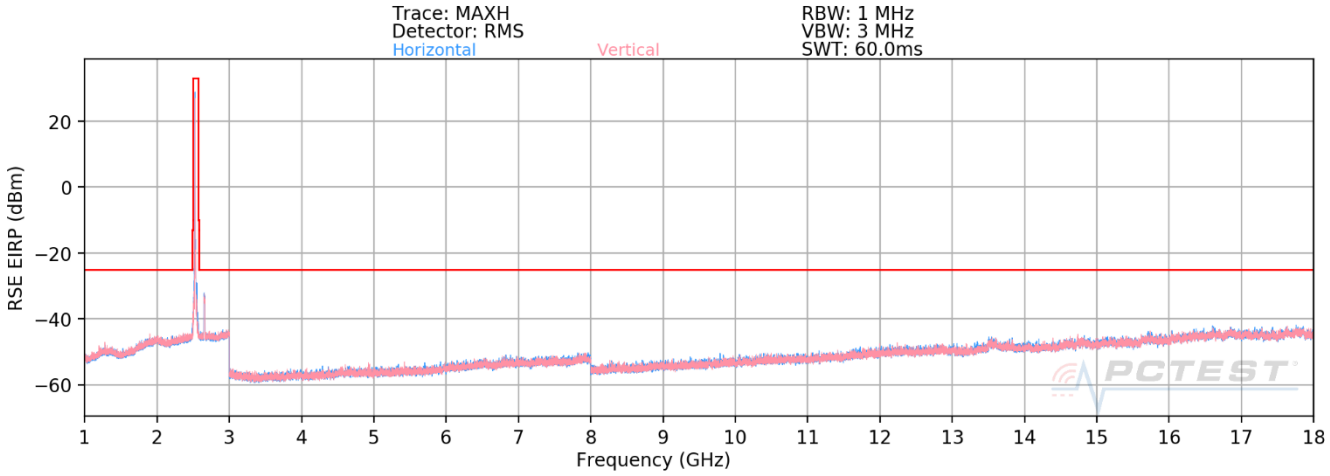
Table 7-16. Radiated Spurious Data (LTE Band 30 – Mid Channel)

Bandwidth (MHz):	5
Frequency (MHz):	2312.5
RB / Offset:	1 / 12

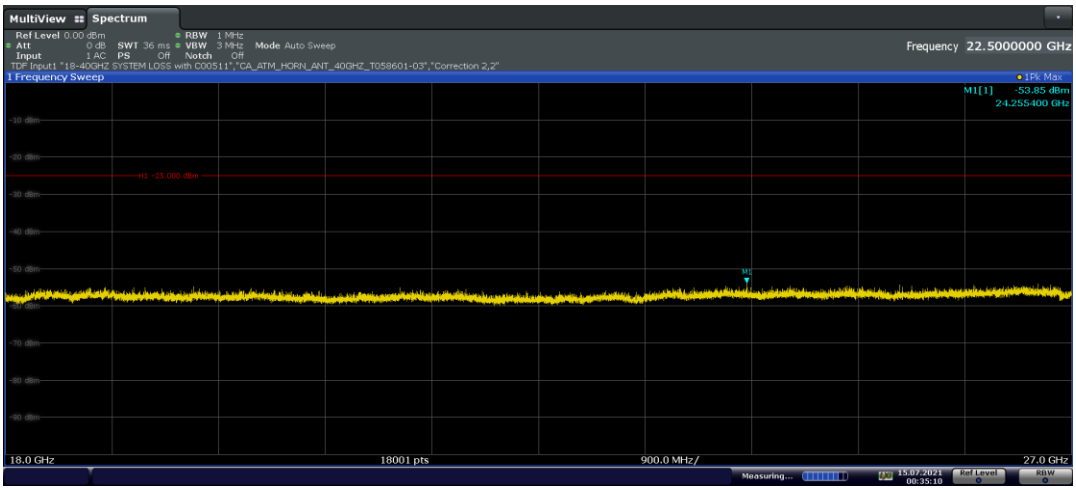
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
4625.00	H	-	-	-80.64	7.12	33.48	-61.78	-40.00	-21.78
6937.50	H	-	-	-81.71	9.65	34.94	-60.32	-40.00	-20.32
9250.00	H	-	-	-83.72	12.28	35.56	-59.70	-40.00	-19.70

Table 7-17. Radiated Spurious Data (LTE Band 30 – High Channel)

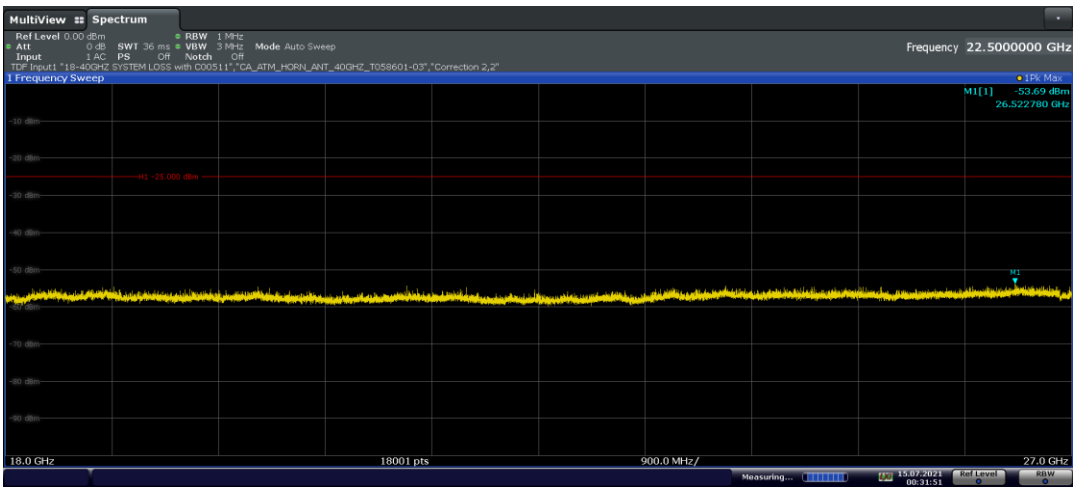
LTE Band 7



Plot 7-101. Antenna C Radiated Spurious Emission 1GHz – 18GHz (LTE Band 7)



Plot 7-102. Antenna C Radiated Spurious Emission above 18GHz (LTE Band 7, Pol. H)



Plot 7-103. Antenna C Radiated Spurious Emission above 18GHz (LTE Band 7, Pol. V)

Bandwidth (MHz):	20
Frequency (MHz):	2510.0
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]
5020.0	H	-	-	-81.11	7.68	33.57	-61.69	-25.00	-36.69
7530.0	H	-	-	-82.19	10.81	35.62	-59.64	-25.00	-34.64
10040.0	H	-	-	-84.50	13.87	36.37	-58.89	-25.00	-33.89

Table 7-18. Radiated Spurious Data (LTE Band 7 – Low Channel)

Bandwidth (MHz):	20
Frequency (MHz):	2535.0
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]
5070.0	H	-	-	-81.25	7.43	33.18	-62.08	-25.00	-37.08
7605.0	H	-	-	-82.01	10.53	35.52	-59.74	-25.00	-34.74
10140.0	H	-	-	-84.38	14.39	37.01	-58.25	-25.00	-33.25

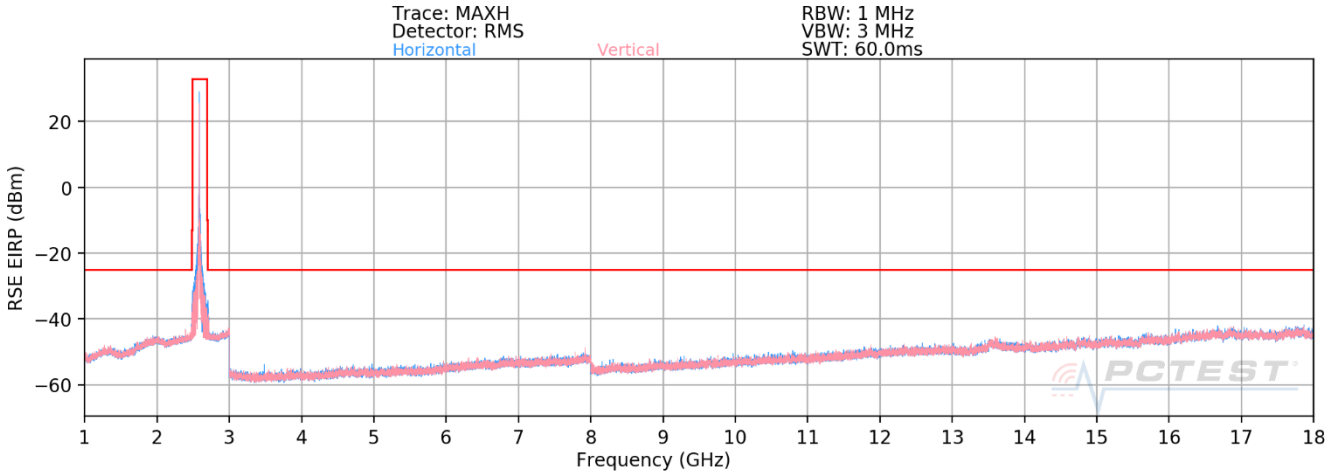
Table 7-19. Radiated Spurious Data (LTE Band 7 – Mid Channel)

Bandwidth (MHz):	20
Frequency (MHz):	2560.0
RB / Offset:	1 / 50

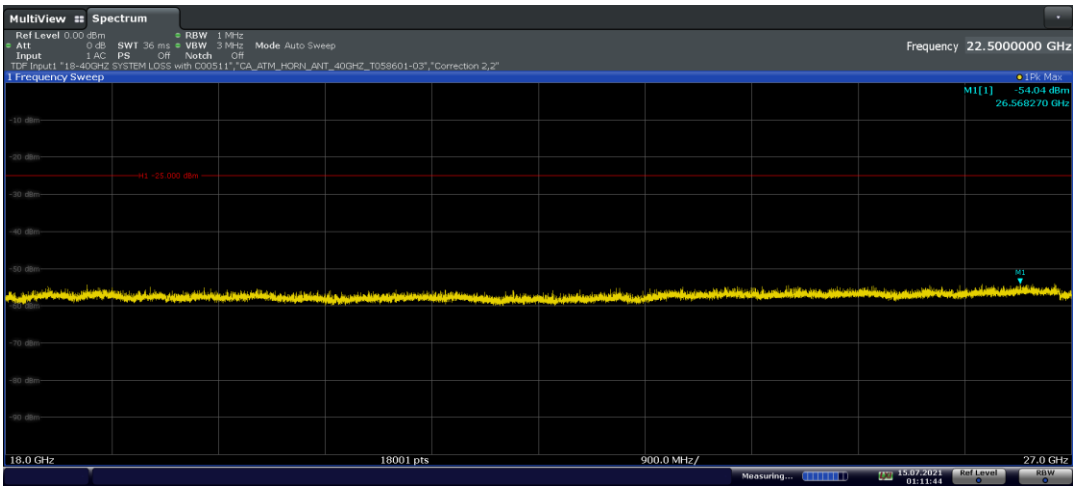
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
5120.00	H	-	-	-81.09	7.66	33.57	-61.69	-25.00	-36.69
7680.00	H	-	-	-81.50	9.84	35.34	-59.92	-25.00	-34.92
10240.00	H	-	-	-84.04	13.64	36.60	-58.66	-25.00	-33.66

Table 7-20. Radiated Spurious Data (LTE Band 7 – High Channel)

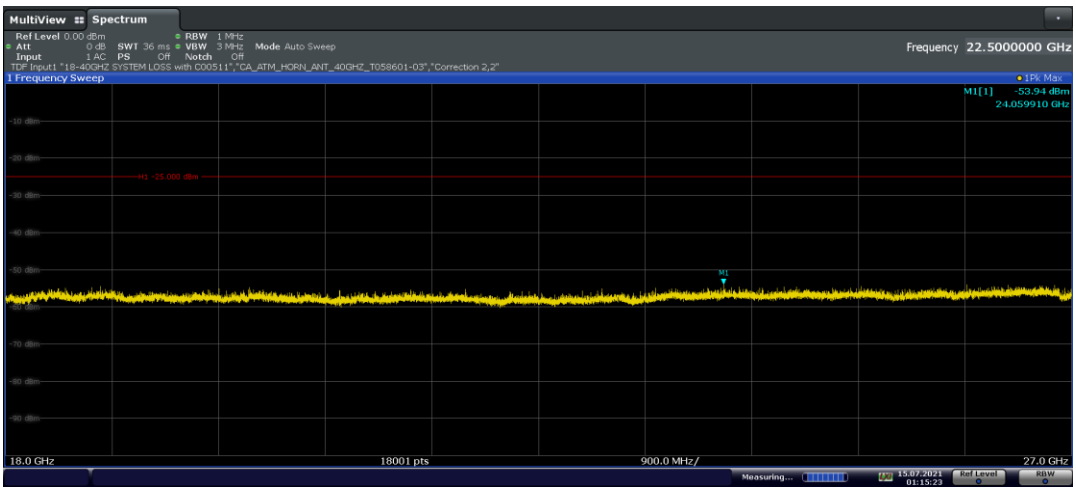
LTE Band 41



Plot 7-104. Antenna C Radiated Spurious Emission 1GHz – 18GHz (LTE Band 41)



Plot 7-105. Antenna C Radiated Spurious Emission above 18GHz (LTE Band 41, Pol. H)



Plot 7-106. Antenna C Radiated Spurious Emission above 18GHz (LTE Band 41, Pol. V)

Bandwidth (MHz):	20
Frequency (MHz):	2506.0
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]
5012.0	H	-	-	-72.98	7.61	41.63	-53.62	-25.00	-28.62
7518.0	H	-	-	-74.12	10.72	43.60	-51.66	-25.00	-26.66
10024.0	H	-	-	-76.71	13.51	43.80	-51.46	-25.00	-26.46

Table 7-21. Radiated Spurious Data (LTE Band 41 – Low Channel)

Bandwidth (MHz):	20
Frequency (MHz):	2593.0
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]
5186.0	H	-	-	-72.00	7.68	42.68	-52.58	-25.00	-27.58
7779.0	H	-	-	-73.77	10.41	43.64	-51.62	-25.00	-26.62
10372.0	H	-	-	-77.08	14.61	44.53	-50.73	-25.00	-25.73

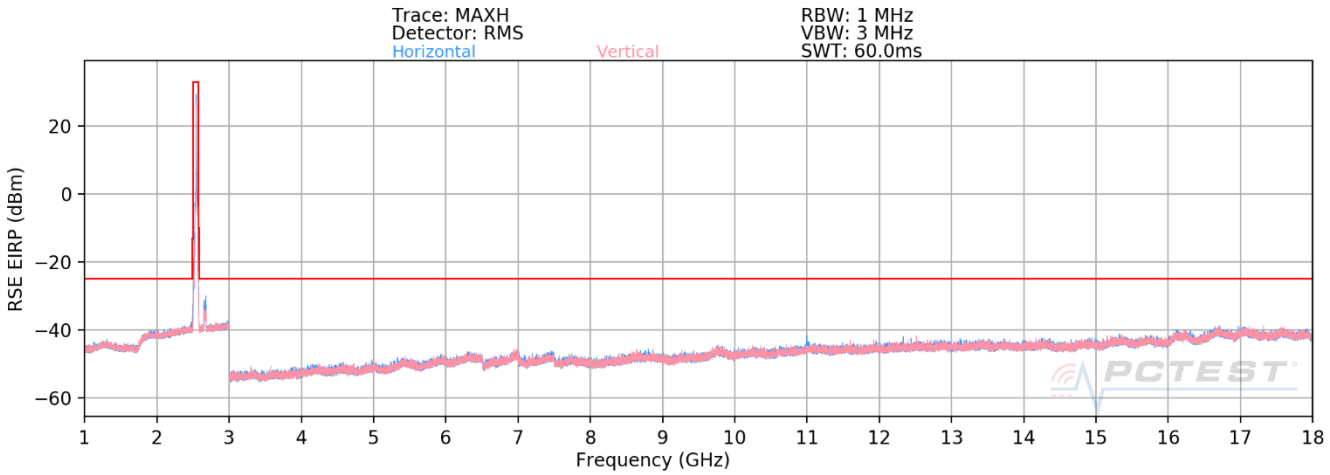
Table 7-22. Radiated Spurious Data (LTE Band 41 – Mid Channel)

Bandwidth (MHz):	20
Frequency (MHz):	2680.0
RB / Offset:	1 / 50

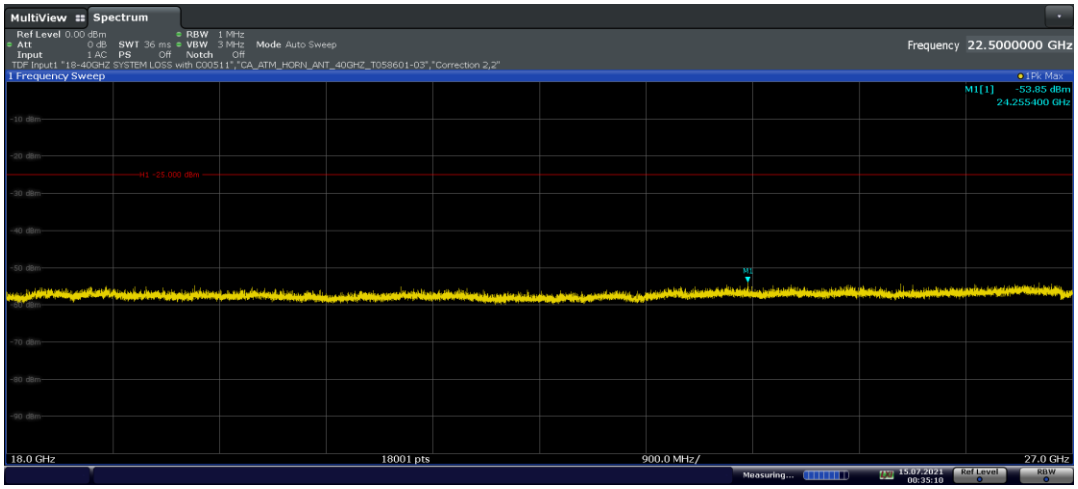
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
5360.0	H	-	-	-72.69	7.83	42.14	-53.11	-25.00	-28.11
8040.0	H	-	-	-75.62	10.94	42.32	-52.94	-25.00	-27.94
10720.0	H	-	-	-77.34	15.57	45.23	-50.03	-25.00	-25.03

Table 7-23. Radiated Spurious Data (LTE Band 41 – High Channel)

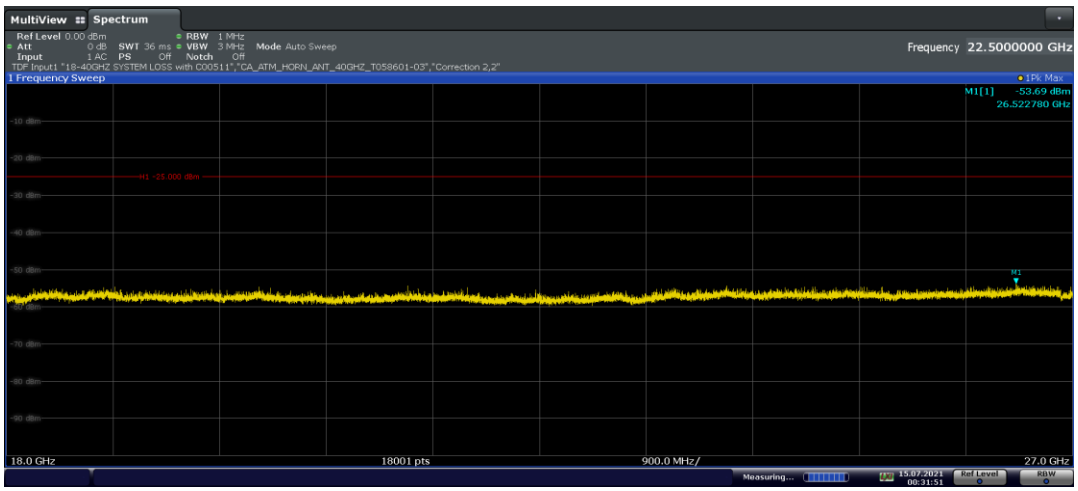
ULCA - LTE B7



Plot 7-107. Antenna C Radiated Spurious Emission 1GHz – 18GHz (ULCA LTE B7)



Plot 7-108. Antenna C Radiated Spurious Emission above 18GHz (ULCA LTE B7, Pol. H)



Plot 7-109. Antenna C Radiated Spurious Emission above 18GHz (ULCA LTE B7, Pol. V)

PCC Bandwidth (MHz):	20
PCC Frequency (MHz):	2510.0
PCC RB / Offset:	1 / 99
SCC Bandwidth (MHz):	20
SCC Frequency (MHz):	2529.8
SCC RB / Offset:	1 / 0

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]
5020.0	H	-	-	-79.15	5.93	33.78	-61.48	-25.00	-36.48
7530.0	H	-	-	-79.87	8.40	35.53	-59.72	-25.00	-34.72
10040.0	H	-	-	-80.79	10.57	36.78	-58.47	-25.00	-33.47
12550.0	H	-	-	-80.98	13.97	39.99	-55.27	-25.00	-30.27

Table 7-24. Radiated Spurious Data (ULCA LTE B7 – Low Channel)

PCC Bandwidth (MHz):	20
PCC Frequency (MHz):	2535.0
PCC RB / Offset:	1 / 99
SCC Bandwidth (MHz):	20
SCC Frequency (MHz):	2554.8
SCC RB / Offset:	1 / 0

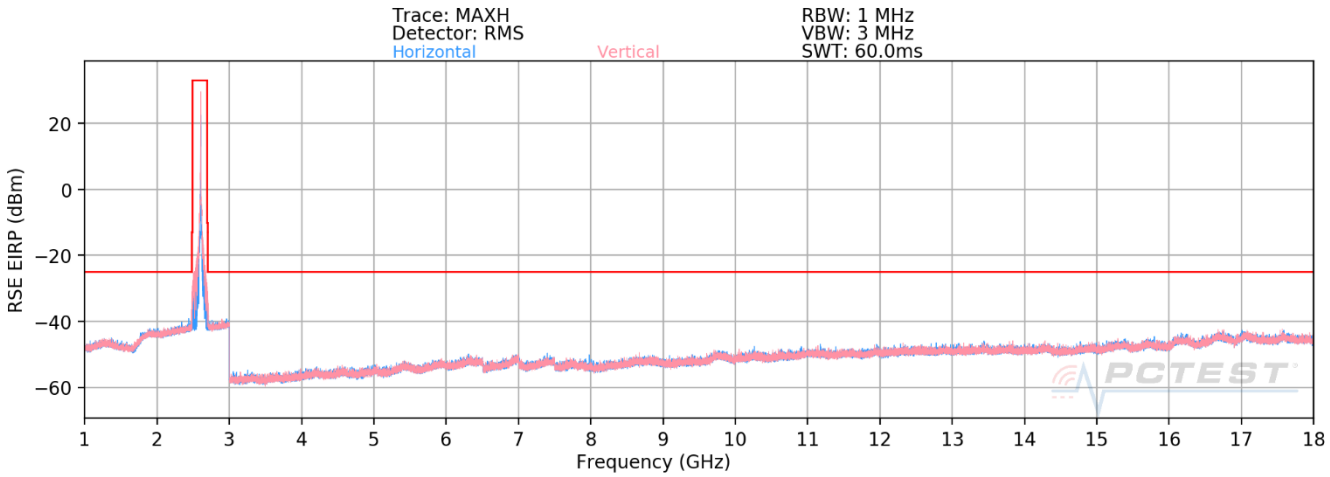
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
5070.0	H	-	-	-79.25	6.23	33.98	-61.28	-25.00	-36.28
7605.0	H	-	-	-79.82	8.08	35.26	-60.00	-25.00	-35.00
10140.0	H	-	-	-81.32	11.31	36.99	-58.27	-25.00	-33.27
12675.0	H	-	-	-80.93	13.93	40.00	-55.26	-25.00	-30.26

Table 7-25. Radiated Spurious Data (ULCA LTE B7 – Mid Channel)

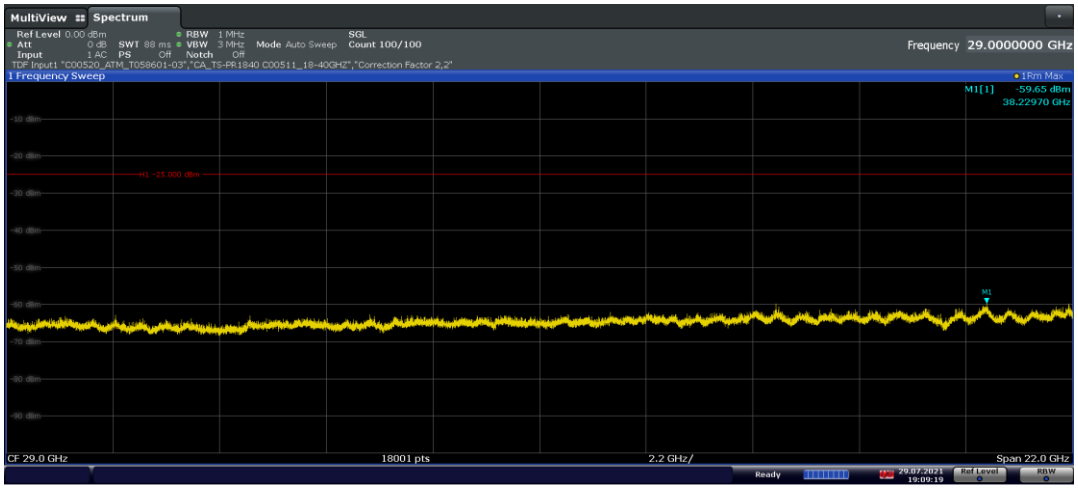
PCC Bandwidth (MHz):	20
PCC Frequency (MHz):	2560.0
PCC RB / Offset:	1 / 0
SCC Bandwidth (MHz):	20
SCC Frequency (MHz):	2540.2
SCC RB / Offset:	1 / 99

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]
5120.0	H	-	-	-79.27	5.70	33.43	-61.83	-25.00	-36.83
7680.0	H	-	-	-79.65	8.54	35.89	-59.36	-25.00	-34.36
10240.0	H	-	-	-81.13	11.93	37.80	-57.46	-25.00	-32.46
12800.0	H	-	-	-81.20	14.18	39.98	-55.27	-25.00	-30.27

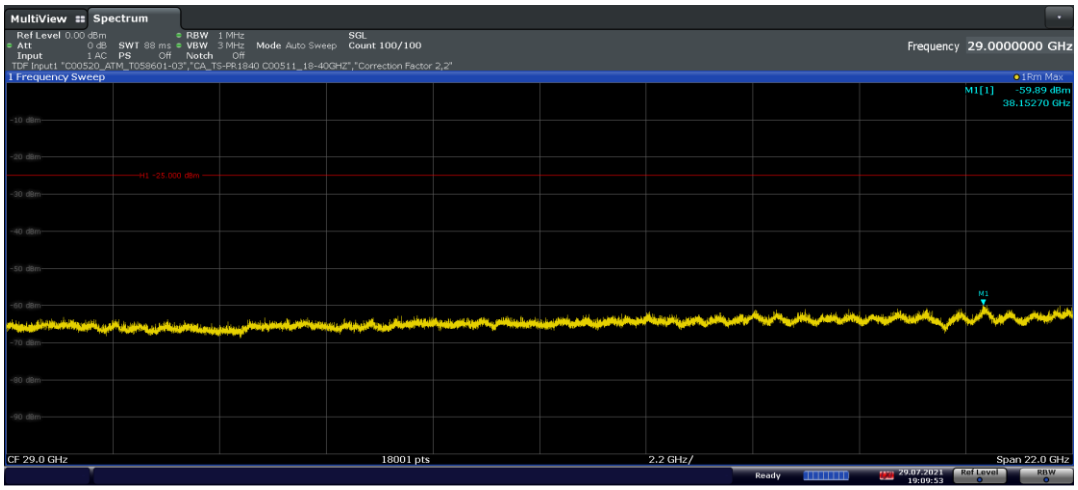
Table 7-26. Radiated Spurious Data (ULCA LTE B7 – High Channel)



Plot 7-110. Antenna C Radiated Spurious Emission 1GHz – 18GHz (ULCA LTE B41)



Plot 7-111. Antenna C Radiated Spurious Emission above 18GHz (ULCA LTE B41, Pol. H)



Plot 7-112. Antenna C Radiated Spurious Emission above 18GHz (ULCA LTE B41, Pol. V)

PCC Bandwidth (MHz):	20
PCC Frequency (MHz):	2506.0
PCC RB / Offset:	1 / 99
SCC Bandwidth (MHz):	20
SCC Frequency (MHz):	2525.8
SCC RB / Offset:	1 / 0

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]
5012.0	H	-	-	-71.48	8.29	43.81	-51.44	-25.00	-26.44
7518.0	H	-	-	-72.26	11.20	45.94	-49.31	-25.00	-24.31
10024.0	H	-	-	-73.35	15.36	49.01	-46.24	-25.00	-21.24

Table 7-27. Radiated Spurious Data (ULCA LTE B41 – Low Channel)

PCC Bandwidth (MHz):	20
PCC Frequency (MHz):	2593.0
PCC RB / Offset:	1 / 99
SCC Bandwidth (MHz):	20
SCC Frequency (MHz):	2612.8
SCC RB / Offset:	1 / 0

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]
5186.0	H	-	-	-71.78	9.36	44.58	-50.68	-25.00	-25.68
7779.0	H	-	-	-73.67	12.05	45.38	-49.88	-25.00	-24.88
10372.0	H	-	-	-73.87	15.90	49.03	-46.22	-25.00	-21.22

Table 7-28. Radiated Spurious Data (ULCA LTE B41 – Mid Channel)

PCC Bandwidth (MHz):	20
PCC Frequency (MHz):	2680.0
PCC RB / Offset:	1 / 0
SCC Bandwidth (MHz):	20
SCC Frequency (MHz):	2660.2
SCC RB / Offset:	1 / 99

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]
5360.0	H	-	-	-72.91	9.66	43.75	-51.51	-25.00	-26.51
8040.0	H	-	-	-72.63	13.07	47.44	-47.82	-25.00	-22.82
10720.0	H	-	-	-73.73	15.50	48.77	-46.48	-25.00	-21.48
13400.0	H	-	-	-73.61	18.35	51.74	-43.52	-25.00	-18.52

Table 7-29. Radiated Spurious Data (ULCA LTE B41 – High Channel)

7.7.2 Antenna D Radiated Spurious Emission Measurements

LTE Band 30

Bandwidth (MHz):	5
Frequency (MHz):	2307.5
RB / Offset:	1 / 12

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]
4615.0	H	-	-	-79.09	5.21	33.12	-62.14	-40.00	-22.14
6922.5	H	-	-	-79.71	7.81	35.10	-60.16	-40.00	-20.16
9230.0	H	-	-	-81.01	10.89	36.88	-58.37	-40.00	-18.37

Table 7-30. Radiated Spurious Data (LTE Band 30 – Low Channel)

Bandwidth (MHz):	10
Frequency (MHz):	2310.0
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]
4620.0	H	-	-	-79.15	5.13	32.98	-62.28	-40.00	-22.28
6930.0	H	-	-	-79.48	7.79	35.31	-59.95	-40.00	-19.95
9240.0	H	-	-	-81.04	11.02	36.98	-58.28	-40.00	-18.28

Table 7-31. Radiated Spurious Data (LTE Band 30 – Mid Channel)

Bandwidth (MHz):	5
Frequency (MHz):	2312.5
RB / Offset:	1 / 12

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]
4625.00	H	-	-	-78.96	5.05	33.09	-62.17	-40.00	-22.17
6937.50	H	-	-	-79.85	7.79	34.94	-60.31	-40.00	-20.31
9250.00	H	-	-	-81.22	11.06	36.84	-58.42	-40.00	-18.42

Table 7-32. Radiated Spurious Data (LTE Band 30 – High Channel)

LTE Band 7

Bandwidth (MHz):	20
Frequency (MHz):	2510.0
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]
5020.0	H	-	-	-81.12	7.68	33.56	-61.70	-25.00	-36.70
7530.0	H	103	64	-79.99	10.81	37.82	-57.44	-25.00	-32.44
10040.0	H	-	-	-84.15	13.87	36.72	-58.54	-25.00	-33.54
12550.0	H	-	-	-85.74	18.32	39.58	-55.68	-25.00	-30.68
15060.0	H	-	-	-86.08	20.64	41.56	-53.70	-25.00	-28.70

Table 7-33. Radiated Spurious Data (LTE Band 7 – Low Channel)

Bandwidth (MHz):	20
Frequency (MHz):	2535.0
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]
5070.0	H	-	-	-81.44	7.43	32.99	-62.27	-25.00	-37.27
7605.0	H	104	28	-76.67	10.53	40.86	-54.40	-25.00	-29.40
10140.0	H	-	-	-84.32	14.39	37.07	-58.19	-25.00	-33.19
12675.0	H	-	-	-85.98	18.59	39.61	-55.65	-25.00	-30.65
15210.0	H	-	-	-86.49	20.77	41.28	-53.97	-25.00	-28.97

Table 7-34. Radiated Spurious Data (LTE Band 7 – Mid Channel)

Bandwidth (MHz):	20
Frequency (MHz):	2560.0
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]
5120.00	H	-	-	-81.27	7.66	33.39	-61.87	-25.00	-36.87
7680.00	H	108	36	-76.17	9.84	40.67	-54.59	-25.00	-29.59
10240.00	H	-	-	-84.16	13.64	36.48	-58.78	-25.00	-33.78
12800.00	H	-	-	-85.91	18.89	39.98	-55.28	-25.00	-30.28
15360.00	H	-	-	-86.55	20.91	41.36	-53.90	-25.00	-28.90

Table 7-35. Radiated Spurious Data (LTE Band 7 – High Channel)

LTE Band 41

Bandwidth (MHz):	20
Frequency (MHz):	2506.0
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]
5012.0	H	-	-	-72.35	7.61	42.26	-52.99	-25.00	-27.99
7518.0	H	-	-	-72.39	10.72	45.33	-49.93	-25.00	-24.93
10024.0	H	-	-	-74.40	13.51	46.11	-49.15	-25.00	-24.15

Table 7-36. Radiated Spurious Data (LTE Band 41 – Low Channel)

Bandwidth (MHz):	20
Frequency (MHz):	2593.0
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]
5186.0	H	-	-	-71.84	7.68	42.84	-52.42	-25.00	-27.42
7779.0	H	-	-	-71.64	10.41	45.77	-49.49	-25.00	-24.49
10372.0	H	-	-	-75.83	14.61	45.78	-49.48	-25.00	-24.48

Table 7-37. Radiated Spurious Data (LTE Band 41 – Mid Channel)

Bandwidth (MHz):	20
Frequency (MHz):	2680.0
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]
5360.0	H	-	-	-69.48	7.83	45.35	-49.90	-25.00	-24.90
8040.0	H	-	-	-71.45	10.94	46.49	-48.77	-25.00	-23.77
10720.0	H	-	-	-73.14	15.57	49.43	-45.83	-25.00	-20.83

Table 7-38. Radiated Spurious Data (LTE Band 41 – High Channel)

ULCA - LTE B7

PCC Bandwidth (MHz):	20
PCC Frequency (MHz):	2510.0
PCC RB / Offset:	1 / 99
SCC Bandwidth (MHz):	20
SCC Frequency (MHz):	2529.8
SCC RB / Offset:	1 / 0

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]
5020.0	H	-	-	-80.77	8.23	34.46	-60.79	-25.00	-35.79
7530.0	H	-	-	-81.97	11.21	36.24	-59.02	-25.00	-34.02
10040.0	H	-	-	-82.24	14.94	39.70	-55.56	-25.00	-30.56

Table 7-39. Radiated Spurious Data (ULCA LTE B7 – Low Channel)

PCC Bandwidth (MHz):	20
PCC Frequency (MHz):	2535.0
PCC RB / Offset:	1 / 99
SCC Bandwidth (MHz):	20
SCC Frequency (MHz):	2554.8
SCC RB / Offset:	1 / 0

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]
5070.0	H	-	-	-81.25	7.88	33.63	-61.63	-25.00	-36.63
7605.0	H	-	-	-82.88	12.79	36.91	-58.35	-25.00	-33.35
10140.0	H	-	-	-82.82	14.84	39.02	-56.24	-25.00	-31.24

Table 7-40. Radiated Spurious Data (ULCA LTE B7 – Mid Channel)

PCC Bandwidth (MHz):	20
PCC Frequency (MHz):	2560.0
PCC RB / Offset:	1 / 0
SCC Bandwidth (MHz):	20
SCC Frequency (MHz):	2540.2
SCC RB / Offset:	1 / 99

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]
5120.0	H	-	-	-81.16	9.07	34.91	-60.35	-25.00	-35.35
7680.0	H	-	-	-82.81	12.28	36.47	-58.78	-25.00	-33.78
10240.0	H	-	-	-82.82	15.63	39.81	-55.45	-25.00	-30.45

Table 7-41. Radiated Spurious Data (ULCA LTE B7 – High Channel)

ULCA - LTE B41

PCC Bandwidth (MHz):	20
PCC Frequency (MHz):	2506.0
PCC RB / Offset:	1 / 99
SCC Bandwidth (MHz):	20
SCC Frequency (MHz):	2525.8
SCC RB / Offset:	1 / 0

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]
5012.0	H	-	-	-71.48	8.29	43.81	-51.44	-25.00	-26.44
7518.0	H	-	-	-72.26	11.20	45.94	-49.31	-25.00	-24.31
10024.0	H	-	-	-73.35	15.36	49.01	-46.24	-25.00	-21.24

Table 7-42. Radiated Spurious Data (ULCA LTE B41 – Low Channel)

Sample #:	77821
PCC Bandwidth (MHz):	20
PCC Frequency (MHz):	2593.0
PCC RB / Offset:	1 / 99
SCC Bandwidth (MHz):	20
SCC Frequency (MHz):	2612.8
SCC RB / Offset:	1 / 0

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]
5186.0	H	-	-	-71.75	9.36	44.61	-50.65	-25.00	-25.65
7779.0	H	-	-	-73.15	12.05	45.90	-49.36	-25.00	-24.36
10372.0	H	-	-	-73.88	15.90	49.02	-46.23	-25.00	-21.23

Table 7-43. Radiated Spurious Data (ULCA LTE B41 – Mid Channel)

Sample #:	77821
PCC Bandwidth (MHz):	20
PCC Frequency (MHz):	2680.0
PCC RB / Offset:	1 / 0
SCC Bandwidth (MHz):	20
SCC Frequency (MHz):	2660.2
SCC RB / Offset:	1 / 99

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]
5360.0	H	-	-	-71.69	9.66	44.97	-50.29	-25.00	-25.29
8040.0	H	-	-	-73.06	13.07	47.01	-48.25	-25.00	-23.25
10720.0	H	-	-	-73.48	15.50	49.02	-46.23	-25.00	-21.23
13400.0	H	-	-	-73.63	18.35	51.72	-43.54	-25.00	-18.54

Table 7-44. Radiated Spurious Data (ULCA LTE B41 – High Channel)

7.8 Frequency Stability / Temperature Variation

§2.1055, §27.54

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI C63.26-2015 and 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.

Test Procedure Used

ANSI C63.26 2015

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

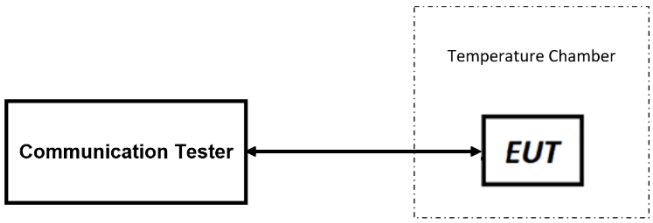


Figure 7-8. Test Instrument & Measurement Setup

Test Notes

1. All ports were tested and only the worst case data were reported.

Frequency Stability / Temperature Variation

LTE Band 30

Low Channel Frequency (Hz):	2,307,500,000
High Channel Frequency (Hz):	2,312,500,000
Ref. Voltage (VDC):	3.8

Voltage (%)	Power (VDC)	Temp (°C)	Low Freq. (Hz)	High Freq. (Hz)	Low Freq. Dev. (Hz)	High Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	- 30	2,307,500,005	2,307,500,005	4	4	0.000000170
		- 20	2,307,500,006	2,307,500,005	4	4	0.000000181
		- 10	2,307,500,003	2,307,500,004	2	3	0.000000110
		0	2,307,500,003	2,307,500,003	2	1	0.000000088
		+ 10	2,307,500,003	2,307,500,003	2	1	0.000000087
		+ 20 (Ref)	2,307,500,001	2,307,500,001	0	0	0.000000000
		+ 30	2,307,500,003	2,307,500,003	1	1	0.000000063
		+ 40	2,307,500,006	2,307,500,005	5	4	0.000000198
		+ 50	2,307,500,007	2,307,500,005	5	3	0.000000222
Battery Endpoint	3.23	+ 20	2,307,500,004	2,307,500,004	3	3	0.000000121

Table 7-45. LTE Band 30 Frequency Stability Data

Frequency Stability / Temperature Variation

LTE Band 30

Low Channel Frequency (Hz):	2,307,500,000
High Channel Frequency (Hz):	2,312,500,000
Ref. Voltage (VDC):	3.8

Voltage (%)	Power (VDC)	Temp (°C)	Low Freq. (Hz)	High Freq. (Hz)	Low Freq. Dev. (Hz)	High Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	- 30	2,307,500,005	2,307,500,005	4	4	0.000000170
		- 20	2,307,500,006	2,307,500,005	4	4	0.000000181
		- 10	2,307,500,003	2,307,500,004	2	3	0.000000110
		0	2,307,500,003	2,307,500,003	2	1	0.000000088
		+ 10	2,307,500,003	2,307,500,003	2	1	0.000000087
		+ 20 (Ref)	2,307,500,001	2,307,500,001	0	0	0.000000000
		+ 30	2,307,500,003	2,307,500,003	1	1	0.000000063
		+ 40	2,307,500,006	2,307,500,005	5	4	0.000000198
		+ 50	2,307,500,007	2,307,500,005	5	3	0.000000222
Battery Endpoint	3.23	+ 20	2,307,500,004	2,307,500,004	3	3	0.000000121

Table 7-46. LTE Band 7 Frequency Stability Data

Frequency Stability / Temperature Variation

LTE Band 30

Low Channel Frequency (Hz):	2,307,500,000
High Channel Frequency (Hz):	2,312,500,000
Ref. Voltage (VDC):	3.8

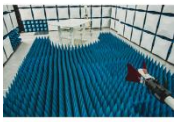
Voltage (%)	Power (VDC)	Temp (°C)	Low Freq. (Hz)	High Freq. (Hz)	Low Freq. Dev. (Hz)	High Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	- 30	2,307,500,005	2,307,500,005	4	4	0.000000170
		- 20	2,307,500,006	2,307,500,005	4	4	0.000000181
		- 10	2,307,500,003	2,307,500,004	2	3	0.000000110
		0	2,307,500,003	2,307,500,003	2	1	0.000000088
		+ 10	2,307,500,003	2,307,500,003	2	1	0.000000087
		+ 20 (Ref)	2,307,500,001	2,307,500,001	0	0	0.000000000
		+ 30	2,307,500,003	2,307,500,003	1	1	0.000000063
		+ 40	2,307,500,006	2,307,500,005	5	4	0.000000198
		+ 50	2,307,500,007	2,307,500,005	5	3	0.000000222
Battery Endpoint	3.23	+ 20	2,307,500,004	2,307,500,004	3	3	0.000000121

Table 7-47. LTE Band 41 Frequency Stability Data

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the Apple **Tablet Device FCC ID: BCGA2603** complies with all the requirements of Part 27 of the FCC rules.

PCTEST
18855 Adams Court, Morgan Hill, CA 95037 USA
Tel. 410.290.6652 / Fax 410.290.6654
http://www.pctest.com



PART 27 MEASUREMENT REPORT

Applicant Name:
Apple Inc.
One Apple Park Way
Cupertino, CA 95014
United States

Date of Testing:
6/7/2021 - 7/30/2021
Test Site/Location:
PCTEST Morgan Hill, CA, USA
Test Report Serial No.:
1C2106080051-04-R1.BCG

FCC ID:	**BCGA2603**
Applicant Name:	**Apple Inc.**

Application Type:	Certification
Model:	A2603
EUT Type:	Tablet Device
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part:	27
Test Procedure(s):	ANSI C63.26-2015, TIA-603-E-2016, KDB 971168 D01 v03r01

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in §2.947. Test results reported herein relate only to the item(s) tested.

This revised Test Report (S/N: 1C2106080051-04-R1.BCG Report SNs) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Randy Ortanez
President

ACCREDITED
CERT #2041.02

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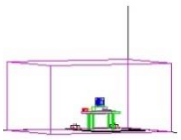
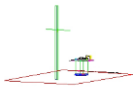


PART 27 MEASUREMENT REPORT



Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	OBW [MHz]	EIRP		Emission Designator
					Max. Power [W]	Max. Power [dBm]	
LTE Band 30	5 MHz	QPSK	2307.5 - 2312.5	4.5559	0.209	23.20	4M56G7W
		16QAM	2307.5 - 2312.5	4.5497	0.185	22.67	4M55D7W
		64QAM	2307.5 - 2312.5	4.5586	0.151	21.80	4M56D7W
	10MHz	QPSK	2310.0	9.0239	0.209	23.20	9M02G7W
		16QAM	2310.0	9.0338	0.192	22.83	9M03D7W
		64QAM	2310.0	9.0016	0.148	21.69	9M00D7W
LTE Band 7	5 MHz	QPSK	2502.5 - 2567.5	4.5541	0.519	27.15	4M55G7W
		16QAM	2502.5 - 2567.5	4.5330	0.446	26.49	4M53D7W
		64QAM	2502.5 - 2567.5	4.5525	0.360	25.56	4M55D7W
	10 MHz	QPSK	2505.0 - 2565.0	9.0575	0.504	27.02	9M06G7W
		16QAM	2505.0 - 2565.0	9.0203	0.446	26.49	9M02D7W
		64QAM	2505.0 - 2565.0	9.0525	0.341	25.33	9M05D7W
	15 MHz	QPSK	2507.5 - 2562.5	13.6280	0.525	27.20	13M6G7W
		16QAM	2507.5 - 2562.5	13.6500	0.443	26.46	13M7D7W
		64QAM	2507.5 - 2562.5	13.5723	0.351	25.45	13M6D7W
	20 MHz	QPSK	2510.0 - 2560.0	18.0867	0.502	27.01	18M1G7W
		16QAM	2510.0 - 2560.0	18.0714	0.433	26.36	18M1D7W
		64QAM	2510.0 - 2560.0	18.0422	0.353	25.48	18M0D7W
LTE Band 41 (PC2)	5 MHz	QPSK	2498.5 - 2687.5	4.5589	0.708	28.50	4M56G7W
		16QAM	2498.5 - 2687.5	4.5933	0.658	28.18	4M59D7W
		64QAM	2498.5 - 2687.5	4.6223	0.530	27.24	4M62D7W
	10 MHz	QPSK	2501.0 - 2685.0	9.1830	0.738	28.68	9M18G7W
		16QAM	2501.0 - 2685.0	9.1836	0.661	28.20	9M18D7W
		64QAM	2501.0 - 2685.0	9.1481	0.543	27.35	9M15D7W
	15 MHz	QPSK	2503.5 - 2682.5	13.9410	0.740	28.69	13M9G7W
		16QAM	2503.5 - 2682.5	13.8282	0.640	28.06	13M8D7W
		64QAM	2503.5 - 2682.5	13.8332	0.526	27.21	13M8D7W
	20 MHz	QPSK	2506.0 - 2680.0	18.3084	0.733	28.65	18M3G7W
		16QAM	2506.0 - 2680.0	18.2122	0.632	28.01	18M2D7W
		64QAM	2506.0 - 2680.0	18.2739	0.543	27.35	18M3D7W
LTE Band 41(PC3)	5 MHz	QPSK	2498.5 - 2687.5	4.5589	0.493	26.93	4M56G7W
		16QAM	2498.5 - 2687.5	4.5933	0.414	26.17	4M59D7W
		64QAM	2498.5 - 2687.5	4.6223	0.356	25.51	4M62D7W
	10 MHz	QPSK	2501.0 - 2685.0	9.1830	0.521	27.17	9M18G7W
		16QAM	2501.0 - 2685.0	9.1836	0.414	26.17	9M18D7W
		64QAM	2501.0 - 2685.0	9.1481	0.331	25.20	9M15D7W
	15 MHz	QPSK	2503.5 - 2682.5	13.9410	0.525	27.20	13M9G7W
		16QAM	2503.5 - 2682.5	13.8282	0.403	26.05	13M8D7W
		64QAM	2503.5 - 2682.5	13.8332	0.333	25.23	13M8D7W
	20 MHz	QPSK	2506.0 - 2680.0	18.3084	0.525	27.20	18M3G7W
		16QAM	2506.0 - 2680.0	18.2122	0.423	26.26	18M2D7W
		64QAM	2506.0 - 2680.0	18.2739	0.337	25.28	18M3D7W
ULCA LTE Band 7	20 + 20 MHz	QPSK	2510.0 - 2560.0	37.8190	0.468	26.70	37M8G7W
		16QAM	2510.0 - 2560.0	37.6360	0.234	23.70	37M6D7W
		64QAM	2510.0 - 2560.0	37.7380	0.229	23.60	37M7D7W
ULCA LTE Band 41	20 + 20 MHz	QPSK	2506.0 - 2680.0	38.1010	0.468	26.70	38M1G7W
		16QAM	2506.0 - 2680.0	37.9450	0.306	24.86	37M9D7W
		64QAM	2506.0 - 2680.0	37.9070	0.301	24.79	37M9D7W

Overview Table

1.0 NTRODUCTION

1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada.

1.2 PCTEST Test Location

These measurement tests were conducted at the PCTEST facility located at 18855 Adams Court, Morgan Hill, CA 95037. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014 and KDB 414788 D01 v01r01.

1.3 Test Facility / Accreditations

Measurements were performed at PCTEST located in Morgan Hill, CA 95037, U.S.A.

- PCTEST is an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.02 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.

- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISED Standards (RSS).

- PCTEST facility is a registered (22831) test laboratory with the site description on file with ISED.

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Apple Tablet Device FCC ID:BCGA2603**. The test data contained in this report pertains only to the emissions due to the EUT's licensed transmitters that operate under the provisions of Part 27.

Test Device Serial No.: QCQ16N0YCW, VCXH667WN9, F9F11660HE012891K

2.2 Device Capabilities

This device contains the following capabilities:

WCDMA/HSPA, Multi-Band LTE, 802.11b/g/n WLAN, 802.11a/n/ac UNII, BT (1x, EDR, LE)

LTE Band 41 support NS04 for Antenna C and NS01 for Antenna D.

2.3 Antenna Description

Following antenna gains provided by manufacturer were used for testing.

Frequency [MHz]	Antennas	
	Antenna C	Antenna D
2300-2320	1.4	1.7
2400-2700	1.7	2.0

Table 2-1. Highest Antenna Gain

2.4 Test Support Equipment

1	Apple MacBook	Model:	A2141	S/N:	C02DV7VKMD6T
	w/AC/DC Adapter	Model:	A2166	S/N:	N/A
2	Apple Cable	Model:	Kanzi	S/N:	32530F
3	Apple USB-C to Lightning Cable	Model:	N/A	S/N:	N/A
	w/ AC/DC Adapter	Model:	A2305	S/N:	N/A
4	DC Power Supply	Model:	KPS3010D	S/N:	N/A

Table 2-2. Test Support Equipment

2.5 Test Configuration

The EUT was tested per the guidance of ANSI C63.26 2015, TIA-603-E-2016 and KDB 971168 D01 v03r01. See Section 7.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

For emissions from 1GHz – 18GHz, low, mid, and high channels were tested with highest power and worst case configuration. The emissions below 1GHz and above 18GHz were tested with the highest transmitting power and the worst case channel.

The EUT was manipulated through three orthogonal planes of X-orientation (flatbed), Y-orientation (landscape), and Z-orientation (portrait) during the testing. Only the worst case emissions were reported in this test report.

2.6 Software and Firmware

The test was conducted with firmware version 19A32670z installed on the EUT.

2.7 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and no modifications were made during testing.

3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedures described in the "Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards" (ANSI C63.26 2015, TIA-603-E-2016) and "Measurement Guidance for Certification of Licensed Digital Transmitters" (KDB 971168 D01 v03r01) were used in the measurement of the EUT.

Deviation from Measurement Procedure……..None

3.2 Radiated Spurious Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Figure 5.7 of Clause 5 in ANSI C63.4-2014. Absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections for measurements above 1GHz. For measurements below 1GHz, the absorbers are removed. A raised turntable is used for radiated measurement. The turn table is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm tall test table made of Styrodur is placed on top of the turn table. A Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

The equipment under test was transmitting while connected to its integral antenna and is placed on a turntable 3 meters from the receive antenna. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer.

For radiated spurious emissions measurements and calculations, conversion method is used per the formulas in KDB 971168 Section 5.8.4. Field Strength (EIRP) is calculated using the following formulas:

$$E_{[dB\mu V/m]} = \text{Measured amplitude level}_{[dBm]} + 107 + \text{Cable Loss}_{[dB]} + \text{Antenna Factor}_{[dB/m]}$$

And

$$EIRP_{[dBm]} = E_{[dB\mu V/m]} + 20\log D - 104.8;\ \text{where D is the measurement distance in meters.}$$

All radiated measurements are performed in a chamber that meets the site requirements per ANSI C63.4-2014.

Per KDB 414788 D01 v01r01, radiated emission test sites other than open-field test sites (e.g., shielded anechoic chambers), may be employed for emission measurements below 30MHz if characterized so that the measurements correspond to those obtained at an open-field test site. To determine test site equivalency, a reference sample transmitting at 149kHz was measured on an open field test site (asphalt with no ground plane) and then measured in the 3m semi-anechoic chamber. A calibrated 60cm loop antenna was used while the reference device was rotated through the X, Y and Z axis in order to capture the worst case level. A maximum deviation of 2.77dB at 149kHz was measured when comparing the 3 meter semi-anechoic chamber to the open field site.

Radiated spurious emission levels are investigated with the receive antenna horizontally and vertically polarized per ANSI C63.26-2015 and TIA-603-E-2016.

4.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.23-2012. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Contribution	Expanded Uncertainty (±dB)
Conducted Bench Top Measurements	1.65
Radiated Disturbance (<30MHz)	4.06
Radiated Disturbance (30MHz-1GHz)	4.30
Radiated Disturbance (1-18GHz)	4.78
Radiated Disturbance (>18GHz)	4.79

5.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurements antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent Technologies	N9030A	3Hz-44GHz PXA Signal Analyzer	3/31/2021	Annual	3/31/2022	MY49430244
ATM	180-442A-KF	20dB Nominal Gain Horn Antenna	12/1/2020	Annual	12/1/2021	T058701-02
ETS-Lindgren	3142E	BiConiLog Antenna (30MHz - 6GHz)	9/15/2020	Annual	9/15/2021	208204
ETS-Lindgren	3117	Double Ridged Guide Antenna (1-18 GHz)	11/4/2020	Annual	11/4/2021	227597
ESPEC	SU-241	Tabletop Temperature Chamber	9/28/2020	Annual	9/28/2021	92009574
Keysight Technology	N9040B	UXA Signal Analyzer	12/19/2020	Annual	12/19/2021	MY57212015
Rohde & Schwarz	TS-PR8	Pre-Amplifier (30MHz - 8GHz)	12/3/2020	Annual	12/3/2021	102327
Rohde & Schwarz	TS-PR18	Pre-Amplifier (1GHz - 18GHz)	12/3/2020	Annual	12/3/2021	101648
Rohde & Schwarz	FSV40	Signal Analyzer (10Hz-40GHz)	3/16/2021	Annual	3/16/2022	101619
Rohde & Schwarz	ESW26	EMI Test Receiver	6/11/2021	Annual	6/11/2022	101299
Rohde & Schwarz	ESW44	EMI Test Receiver	12/14/2020	Annual	12/14/2021	101867
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	10/13/2020	Annual	10/13/2021	161616
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	9/24/2020	Annual	9/24/2021	151888
Rohde & Schwarz	TS-PR1840	Pre-Amplifier (18GHz - 40GHz)	4/29/2021	Annual	4/29/2022	100051
Rohde & Schwarz	TC-TA18	oss Polarized Vivaldi Antenna (400MHz-18GH	10/2/2020	Annual	10/2/2021	101063
Rohde & Schwarz	HFH2-Z2	Loop Antenna	4/5/2021	Annual	4/5/2022	100519

Table 5-1. Test Equipment

Notes:

For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.

6.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 8M62G7W
BW = 8.62 MHz
G = Phase Modulation
7 = Quantized/Digital Info
W = Combination of Any

QAM Modulation

Emission Designator = 8M45D7W
BW = 8.45 MHz
W = Amplitude/Angle Modulated
7 = Quantized/Digital Info
W = Combination of Any

Spurious Radiated Emission

Example: Spurious emission at 3700.40 MHz

The receive spectrum analyzer reading at 3 meters with the EUT on the turntable was –81.0 dBm. The gain of the substituted antenna is 8.1 dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of –81.0 dBm on the spectrum analyzer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 3700.40 MHz. So 6.1 dB is added to the signal generator reading of –30.9 dBm yielding –24.80 dBm. The fundamental EIRP was 25.50 dBm so this harmonic was 25.50 dBm – (-24.80) = 50.3 dBc.

7.0 TEST RESULTS

7.1 Summary

Company Name: Apple Inc.

FCC ID: BCGA2603

FCC Classification: PCS Licensed Transmitter (PCB)

Mode(s): LTE/ULCA

Test Condition	Test Description	FCC Part Section(s)	Test Limit	Test Result	Reference
CONDUCTED	Occupied Bandwidth	2.1049	N/A	N/A	Section 7.2
	Conducted Band Edge / Spurious Emissions (LTE Band 30)	2.1051, 27.53(a)	Undesirable emissions must meet the limits detailed in 27.53(a)	PASS	Sections 7.3, 7.4
	Conducted Band Edge / Spurious Emissions (LTE Band 7)	2.1051, 27.53(m)	Undesirable emissions must meet the limits detailed in 27.53(m)	PASS	Sections 7.3, 7.4
	Conducted Band Edge / Spurious Emissions (LTE Band 41)			PASS	Sections 7.3, 7.4
	Transmitter Conducted Output Power	2.1046	N/A	N/A	See RF Exposure Report
	Additional Maximum Power Reduction (A-MPR)	2.1046	N/A	N/A	Section 7.5
	Effective Radiated Power / Equivalent Isotropic Radiated Power (LTE Band 30)	27.50(a)(3)	< 0.25 Watts max. EIRP	PASS	Section 7.6
	Effective Radiated Power / Equivalent Isotropic Radiated Power (LTE Band 7)	27.50(h)(2)	< 2 Watts max. EIRP	PASS	Section 7.6
	Effective Radiated Power / Equivalent Isotropic Radiated Power (LTE Band 41)			PASS	Section 7.6
	Frequency Stability	2.1055, 27.54	Fundamental emissions stay within authorized frequency block over the temperature and voltage range as tested	PASS	Section 7.8
RADIATED	Radiated Spurious Emissions (LTE Band 30)	2.1053, 27.53(a)	Undesirable emissions must meet the limits detailed in 27.53(a)	PASS	Section 7.7
	Radiated Spurious Emissions (LTE Band 7)	2.1053, 27.53(m)	Undesirable emissions must meet the limits detailed in 27.53(m)	PASS	Section 7.7
	Radiated Spurious Emissions (LTE Band 41)			PASS	Section 7.7

Table 7-1. Summary of Test Results

Notes:

1. All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.

2. The analyzer plots were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.

3. All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.

4. All conducted emissions measurements are performed with automated test software to capture the corresponding plots necessary to show compliance. The measurement software utilized was PCTEST EMC Software Tool 1.0.

7.2 Occupied Bandwidth

§2.1049

Test Overview

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. All modes of operation were investigated and the worst case configuration results are reported in this section. All ports were tested and only the worst case data were reported.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 4.2

Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW ≥ 3 x RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the 99% occupied bandwidth observed in Step 7

Test Setup

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

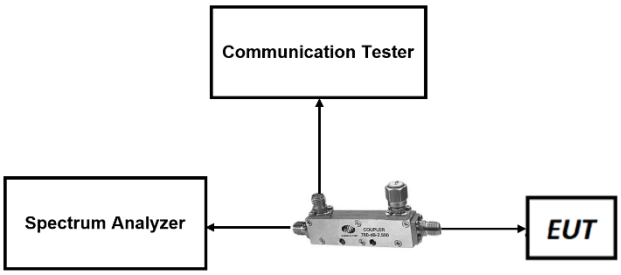
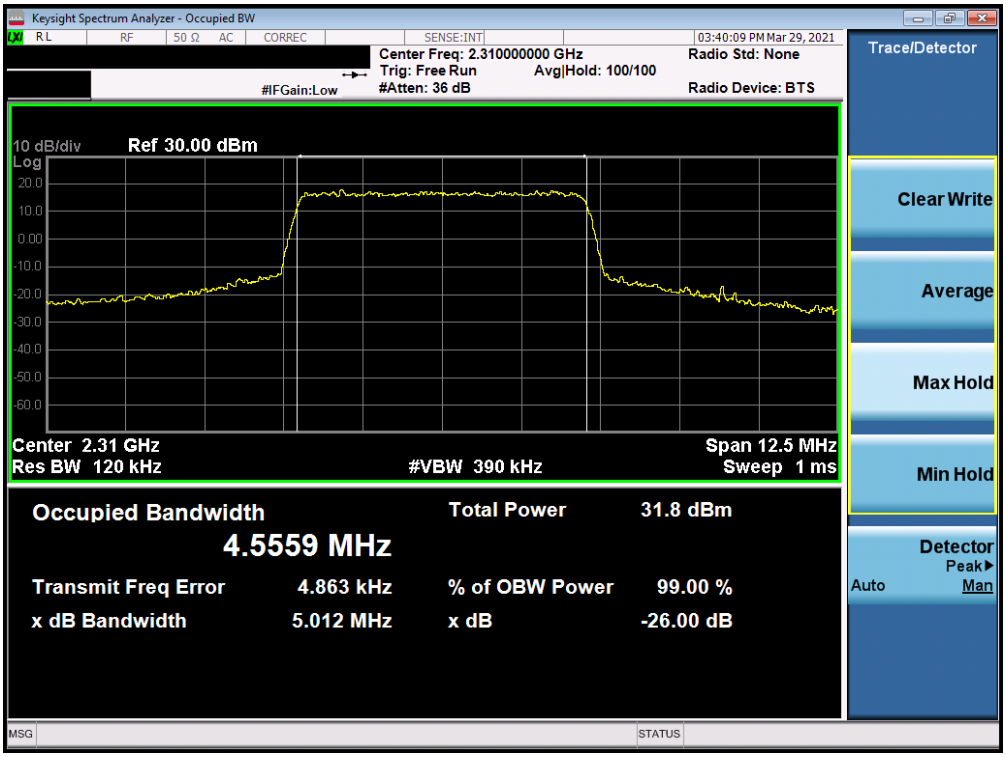


Figure 7-1. Test Instrument & Measurement Setup

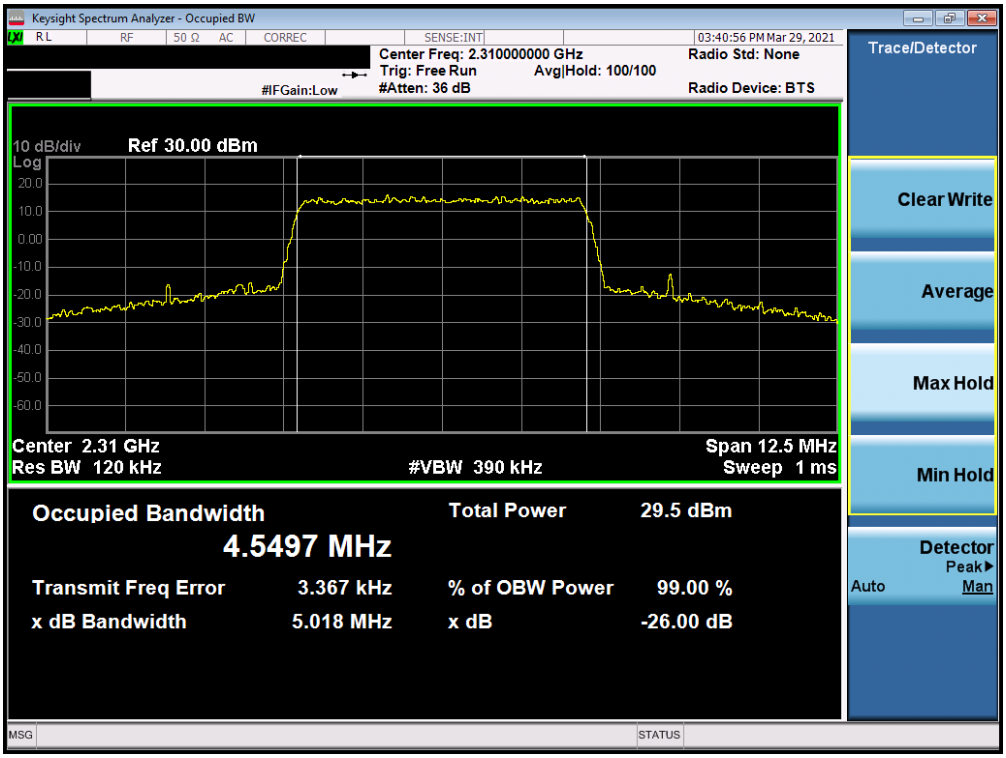
Test Notes

None.

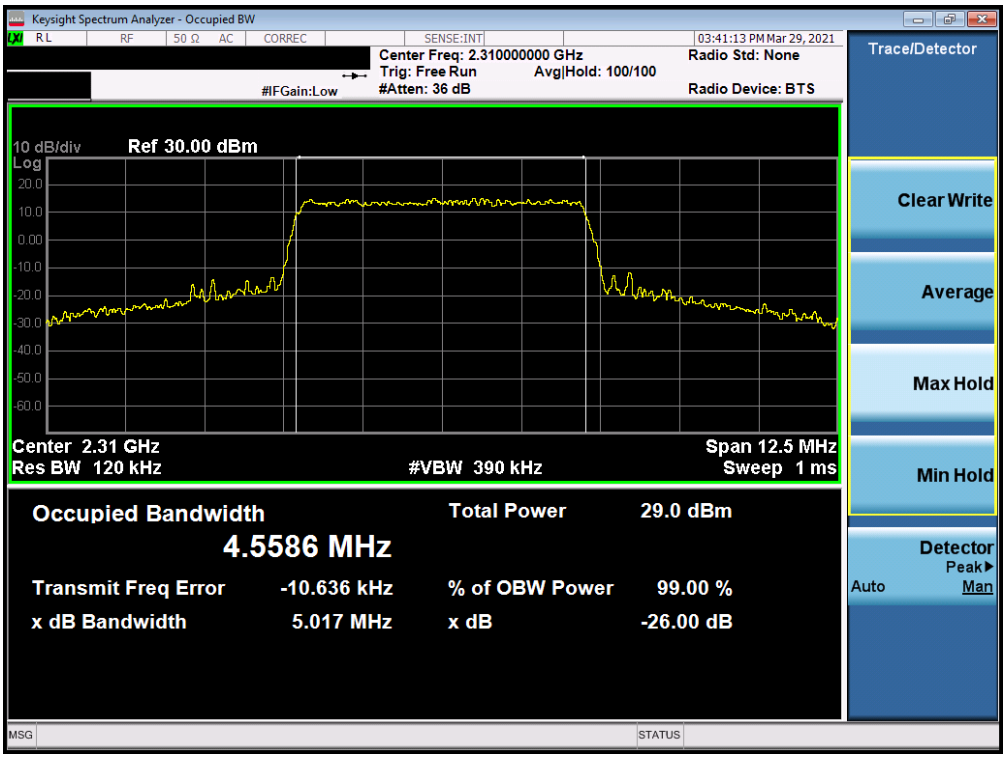
LTE Band 30



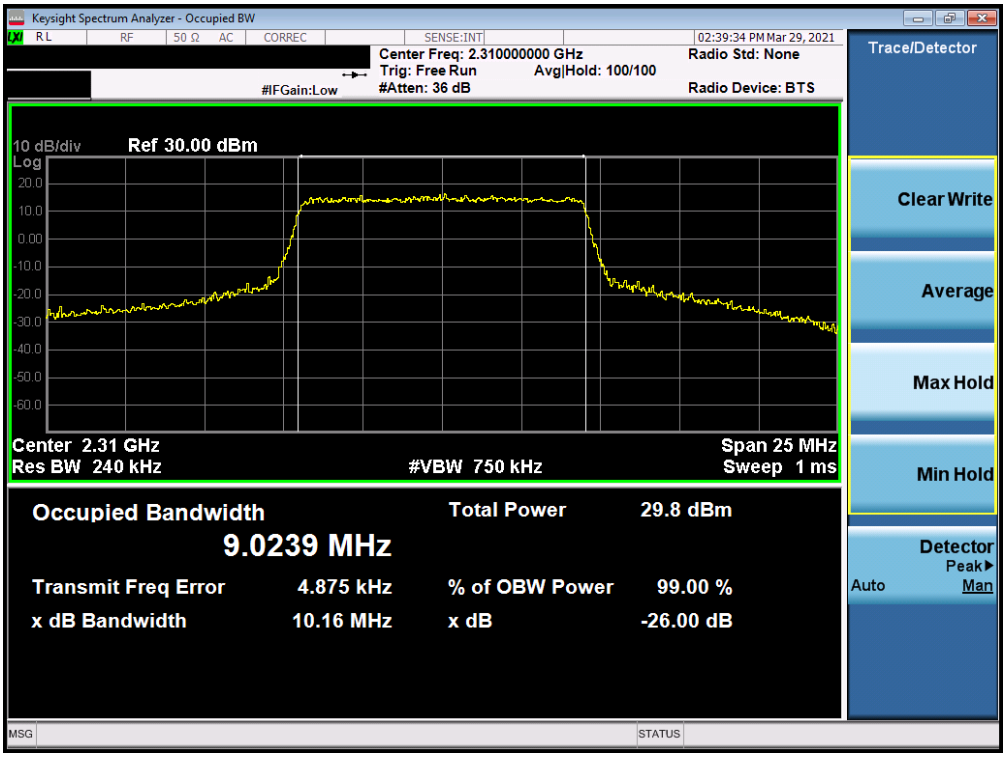
Plot 7-1. Occupied Bandwidth Plot (Band 30 - 5.0MHz QPSK - Full RB Configuration)



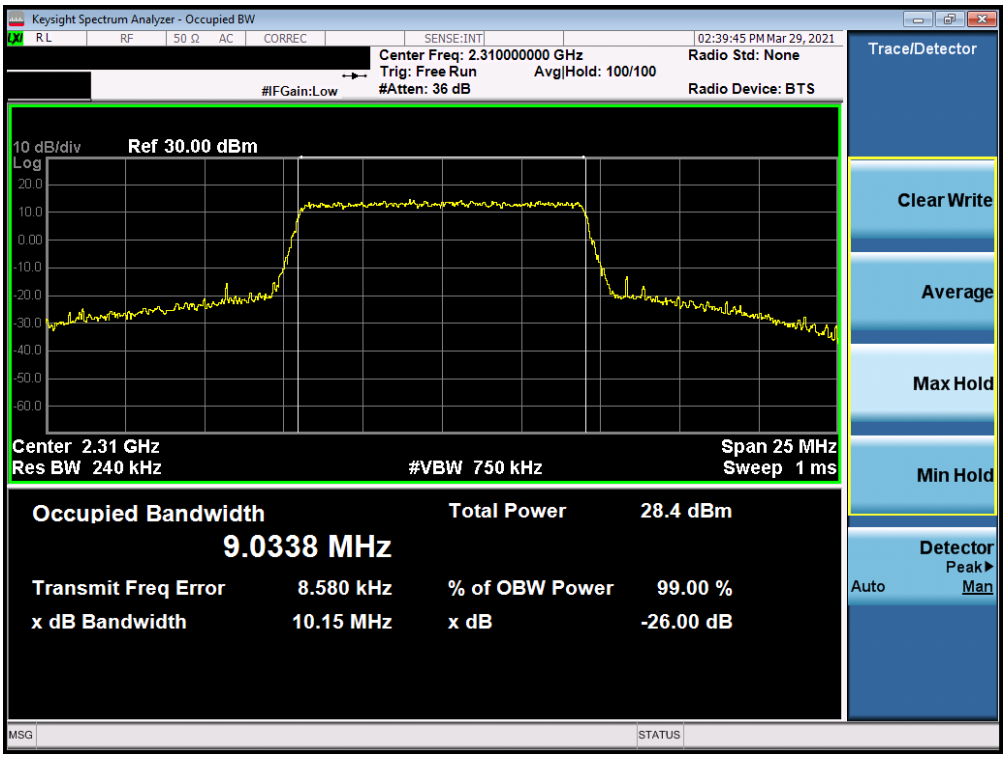
Plot 7-2. Occupied Bandwidth Plot (Band 30 - 5.0MHz 16-QAM - Full RB Configuration)



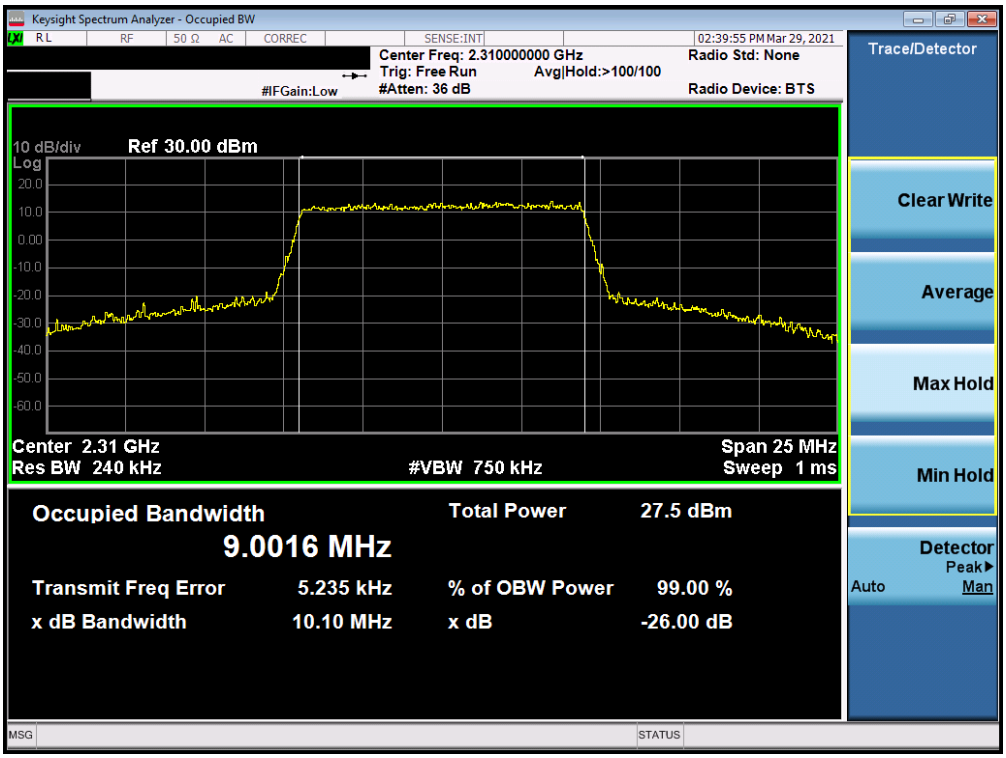
Plot 7-3. Occupied Bandwidth Plot (Band 30 - 5.0MHz 64-QAM - Full RB Configuration)



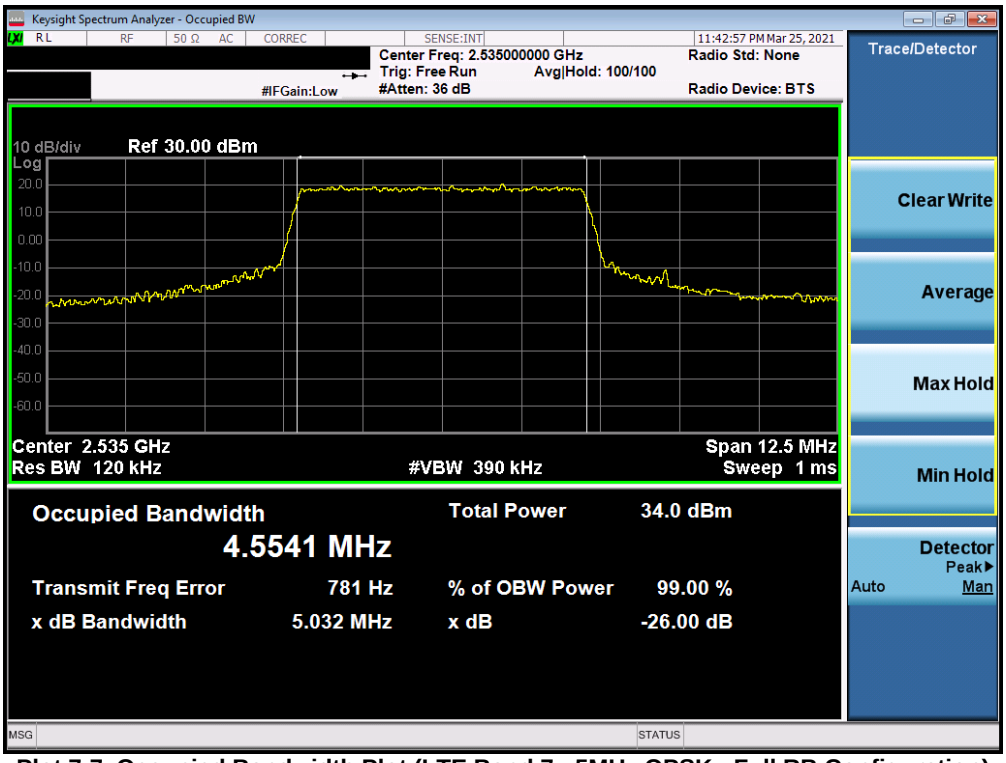
Plot 7-4. Occupied Bandwidth Plot (Band 30 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-5. Occupied Bandwidth Plot (Band 30 - 10.0MHz 16-QAM - Full RB Configuration)

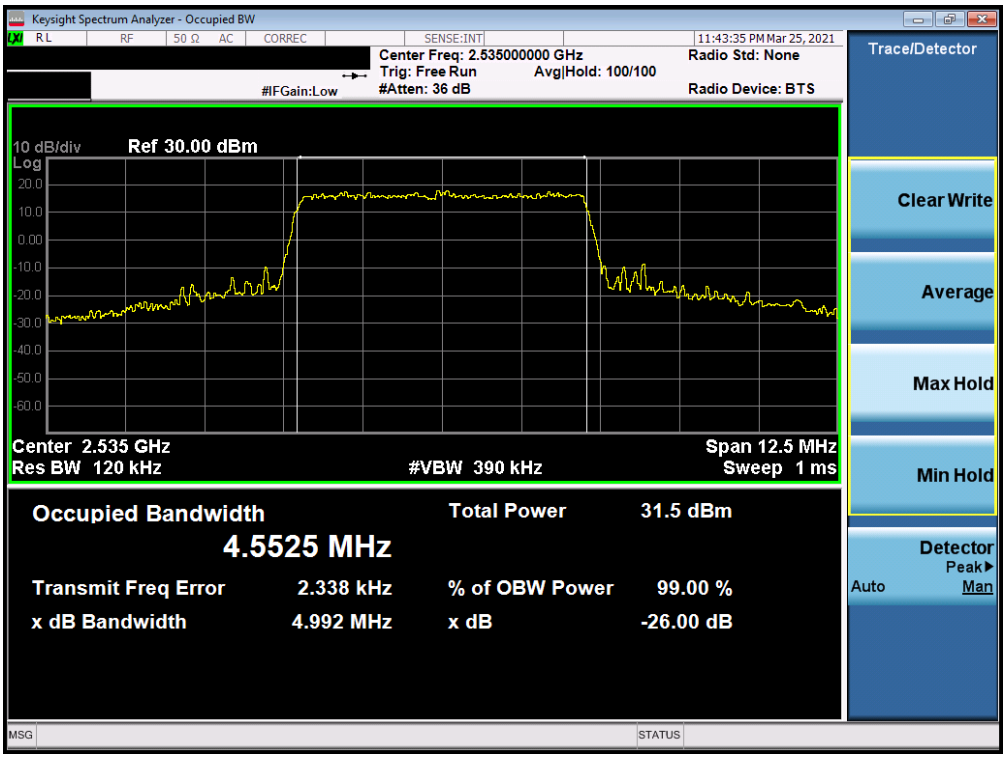


Plot 7-6. Occupied Bandwidth Plot (Band 30 - 10.0MHz 64-QAM - Full RB Configuration)

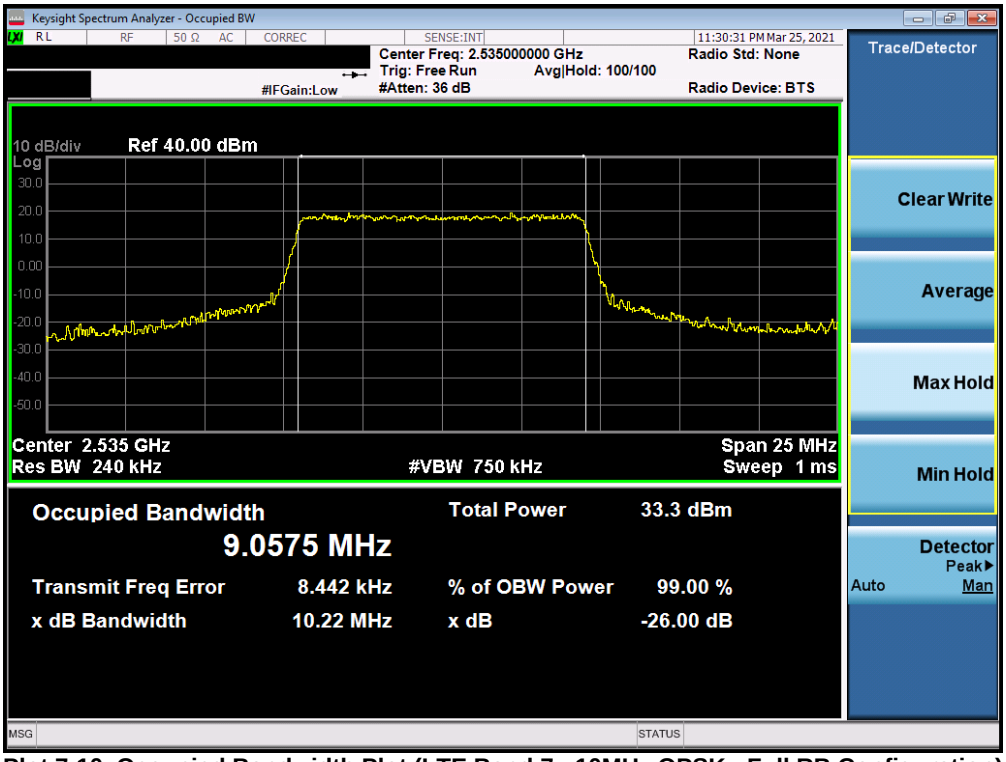


Plot 7-7. Occupied Bandwidth Plot (LTE Band 7 - 5MHz QPSK - Full RB Configuration)

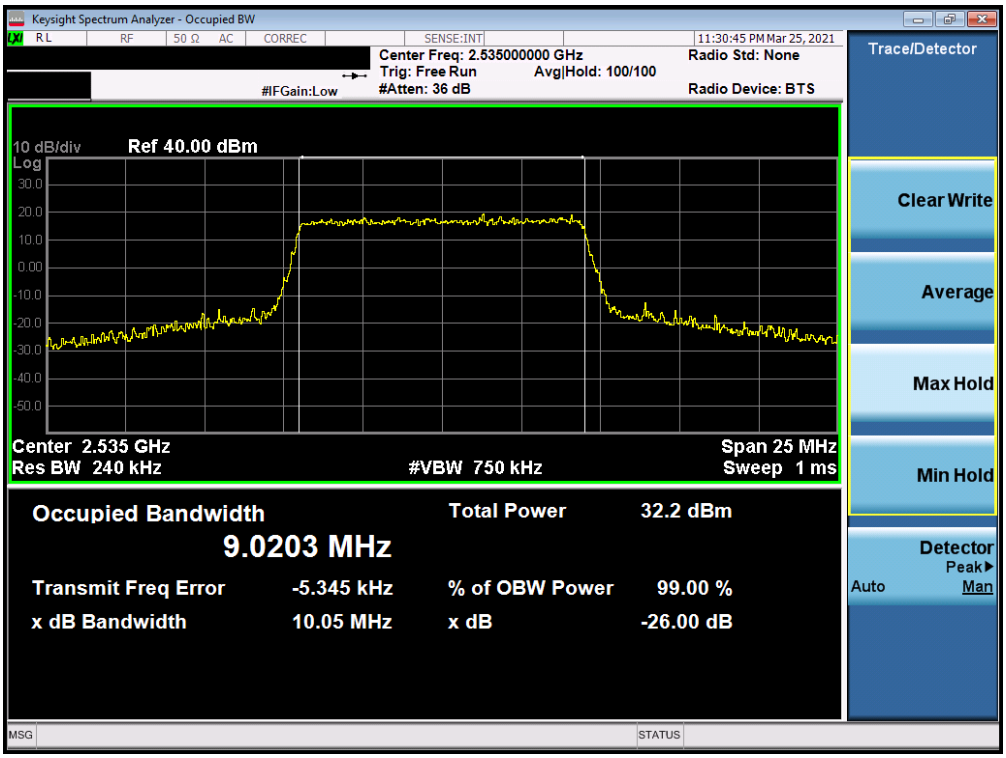
Plot 7-8. Occupied Bandwidth Plot (LTE Band 7 - 5MHz 16-QAM - Full RB Configuration)



Plot 7-9. Occupied Bandwidth Plot (LTE Band 7 - 5MHz 64-QAM - Full RB Configuration)

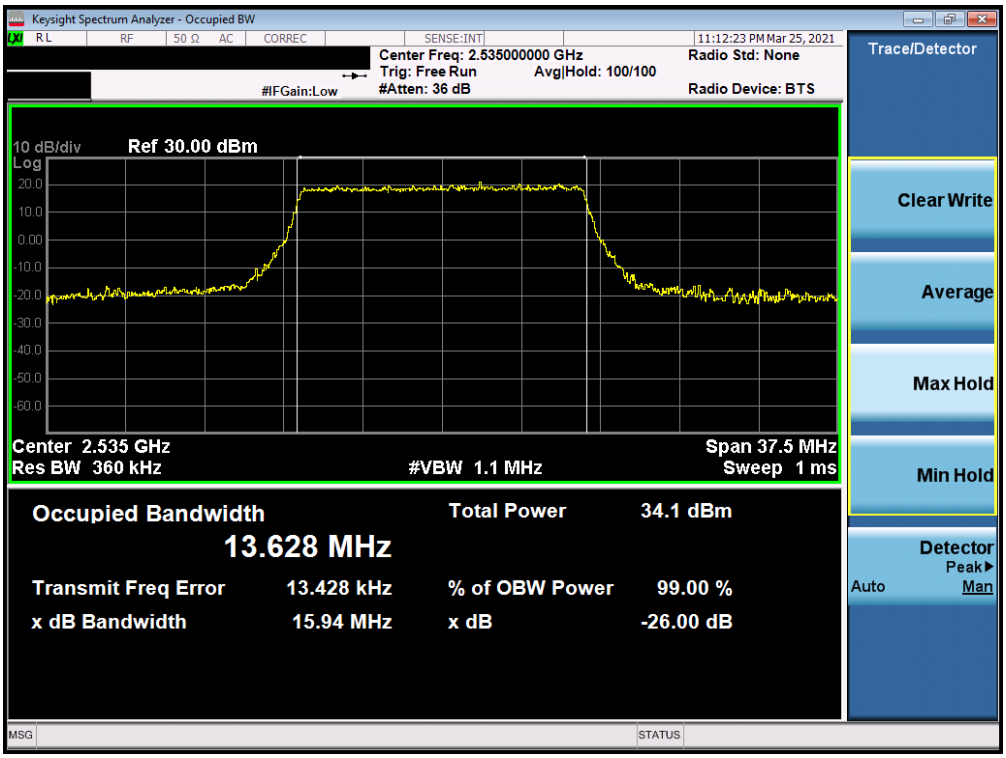


Plot 7-10. Occupied Bandwidth Plot (LTE Band 7 - 10MHz QPSK - Full RB Configuration)

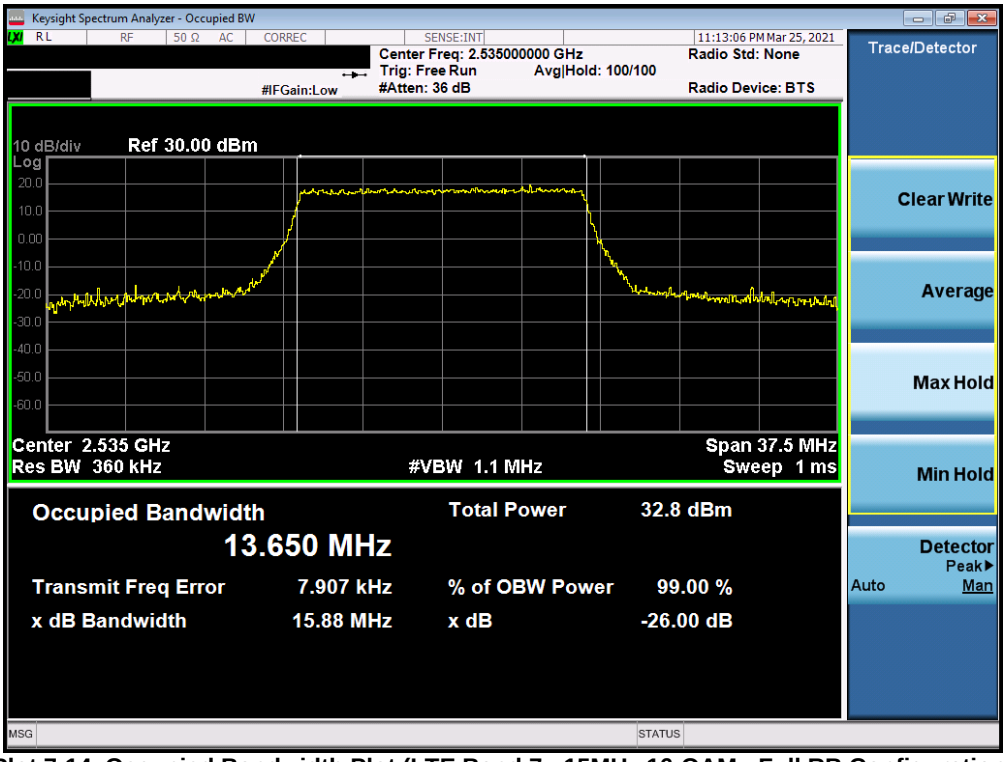


Plot 7-11. Occupied Bandwidth Plot (LTE Band 7 - 10MHz 16-QAM - Full RB Configuration)

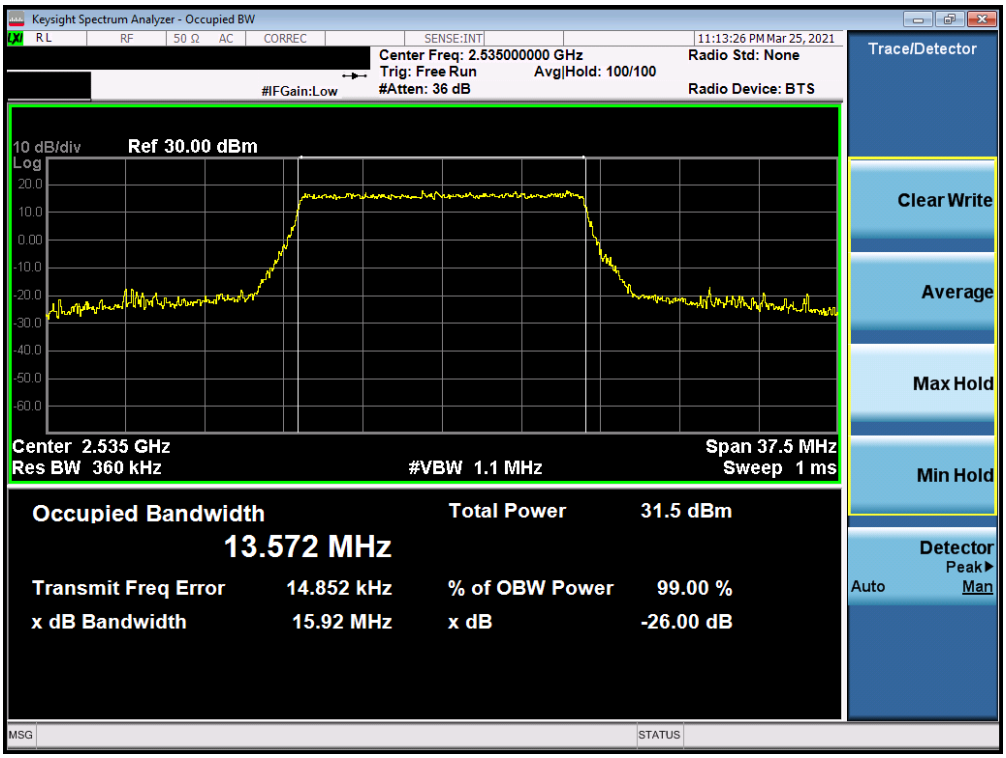
Plot 7-12. Occupied Bandwidth Plot (LTE Band 7 - 10MHz 64-QAM - Full RB Configuration)



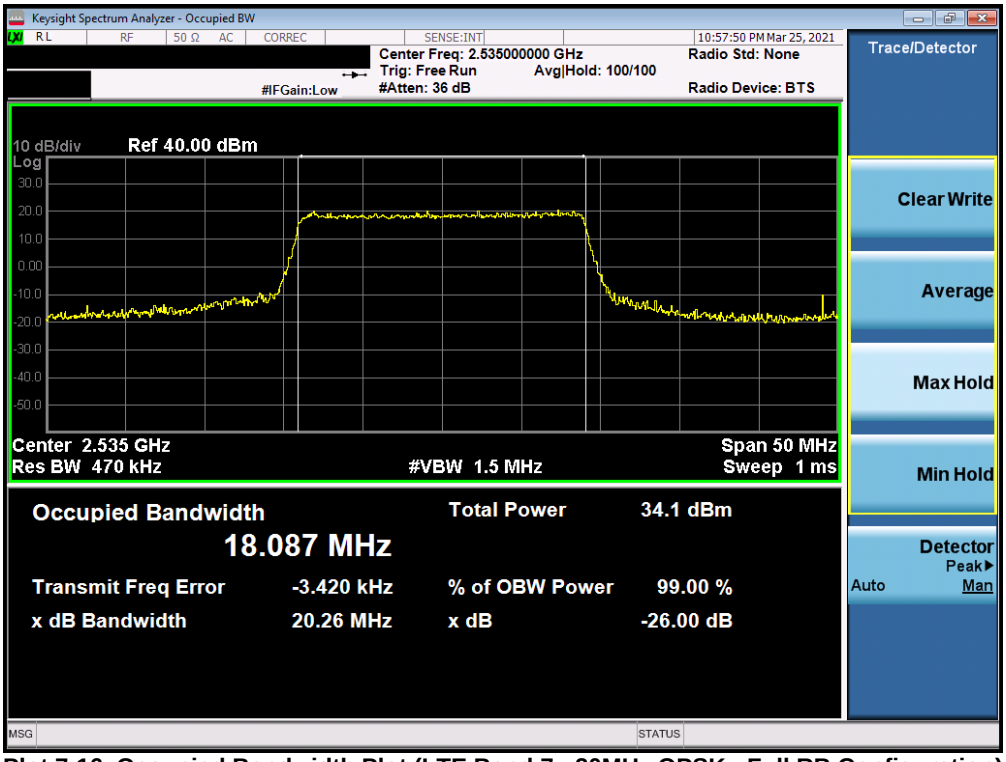
Plot 7-13. Occupied Bandwidth Plot (LTE Band 7 - 15MHz QPSK - Full RB Configuration)



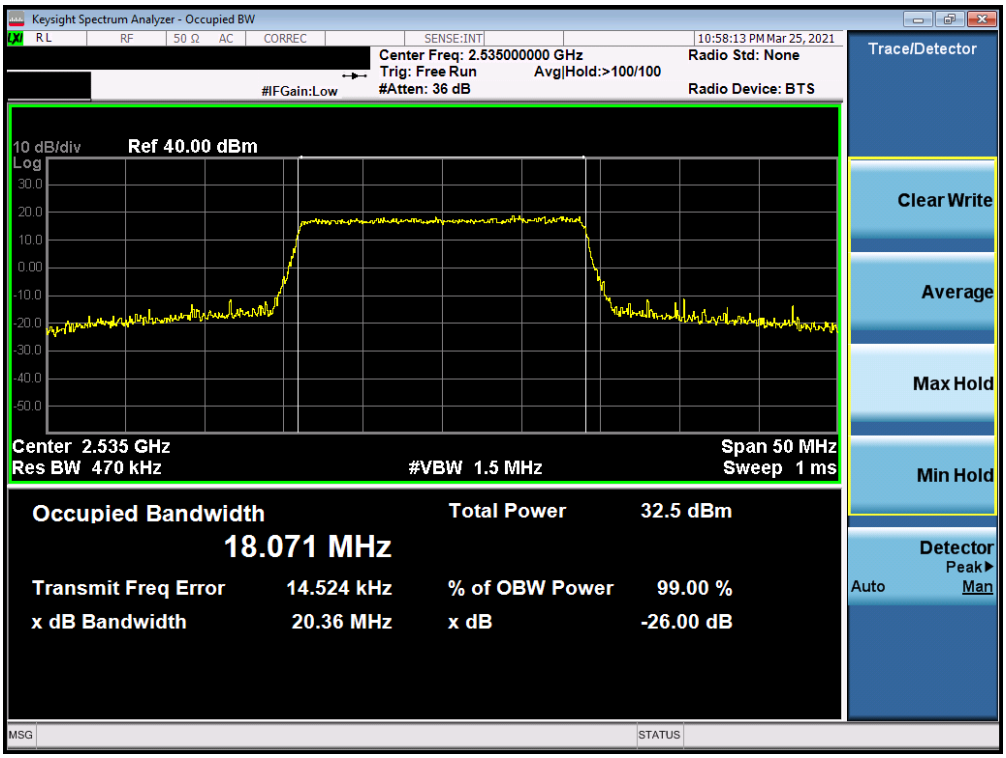
Plot 7-14. Occupied Bandwidth Plot (LTE Band 7 - 15MHz 16-QAM - Full RB Configuration)



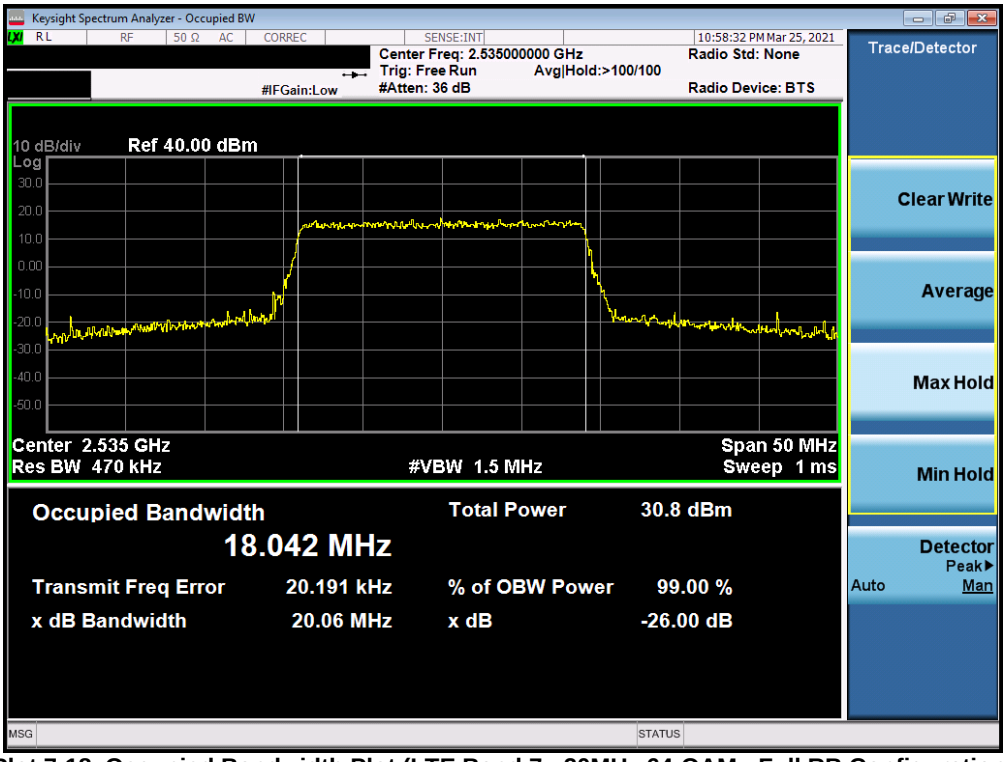
Plot 7-15. Occupied Bandwidth Plot (LTE Band 7 - 15MHz 64-QAM - Full RB Configuration)



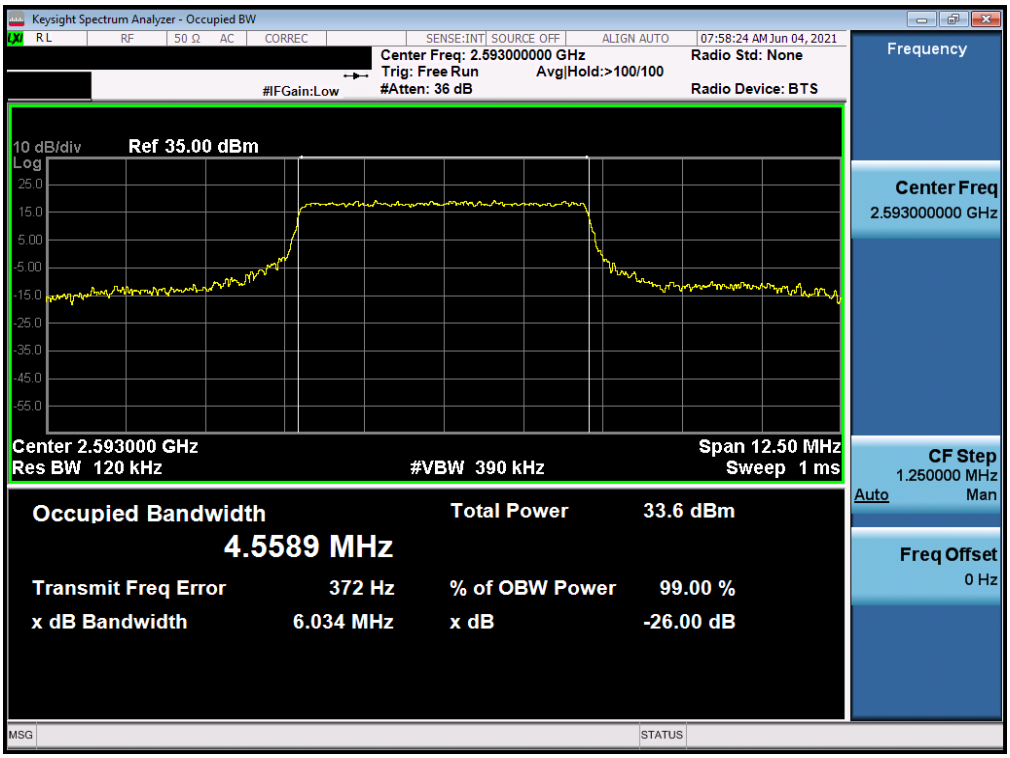
Plot 7-16. Occupied Bandwidth Plot (LTE Band 7 - 20MHz QPSK - Full RB Configuration)



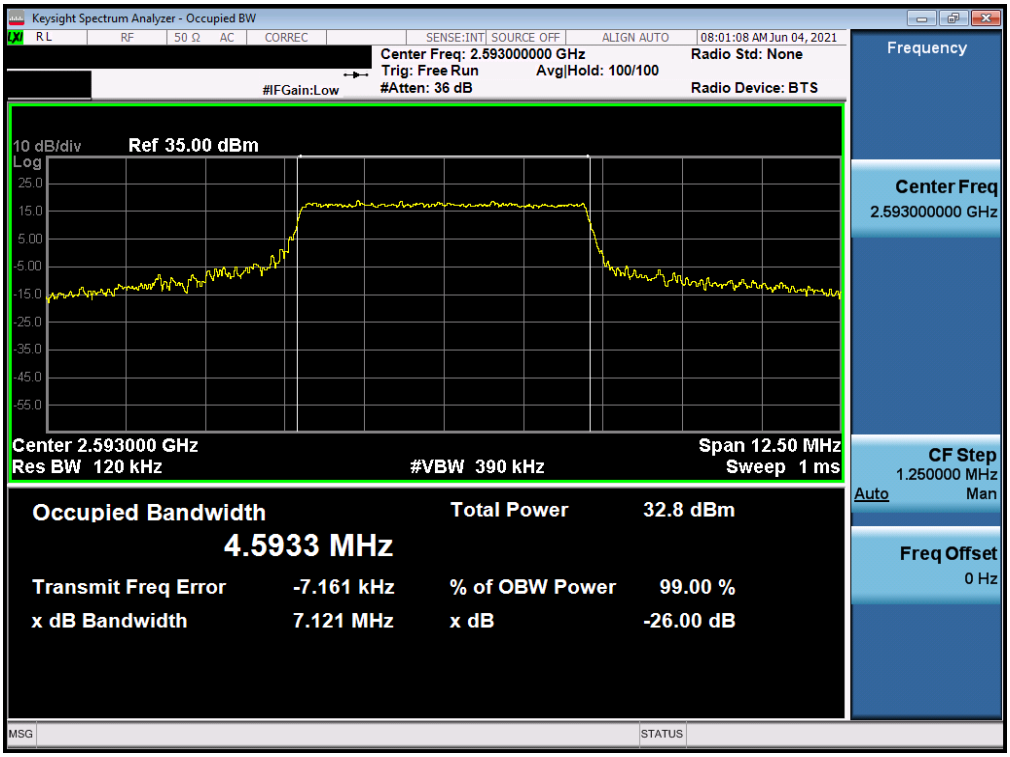
Plot 7-17. Occupied Bandwidth Plot (LTE Band 7 - 20MHz 16-QAM - Full RB Configuration)



Plot 7-18. Occupied Bandwidth Plot (LTE Band 7 - 20MHz 64-QAM - Full RB Configuration)



Plot 7-19. Occupied Bandwidth Plot (LTE Band 41 - 5MHz QPSK - Full RB Configuration)



Plot 7-20. Occupied Bandwidth Plot (LTE Band 41 - 5MHz 16-QAM - Full RB Configuration)