

4.4.) Spurious Emission Limits**§ 2.1053, § 25.202f and SRSP-101 Clause 4.4**

Measurements were performed radiated from 30 MHz to 100 GHz.

Measurements were performed with higher bandwidth than the required 4 kHz Bandwidth to comply also with ETSI measurement requirements. In general no bandwidth correction was applied.

Harmonic mixers were utilized above 40 GHz.

At frequencies below 26,5 GHz the Antenna gain was assumed to be 0 dBi and the more stringent radiated limit of -13 dBm was applied. At frequencies above 26,5 GHz the average antenna gain of 36 dBi was used to calculate the spurious emissions limit with +23 dBm.

The spurious emissions measurements were performed at lowest, center and highest frequencies using all 3 modulation schemes (BPSK, QPSK, 8PSK) at highest data rate, giving the highest output power.

4.4.1.) Spurious emissions test data**Lower band edge**

Tuned frequency = 29.005 GHz, BPSK at 7.5Msymbol/s, iQ800

Frequency range	Frequency	EIRP	Measurement distance		RBW	Limit	Margin
			Required	Used			
GHz	GHz	dBm	meter	meter	kHz	dBm	dB
0,03-1	0,5625	-51,4	3	3	100	-13	38,4
1-18	2,045	-40,4	1	3	1000	-13	27,4
18-26,5	21,04175	-49	1	3	1000	-13	36
26,5-40	29,105	16,2	1	3	1000	23	6,8
40-60	58,01	-2,7	1	3	1000	23	25,7
60-90	87,4	-26,8	1	3	1000	23	49,8
85-100	91,3	-16,5	1	3	1000	23	39,5

Tuned frequency = 29.005 GHz, QPSK at 7.5Msymbol/s, iQ800

Frequency range	Frequency	EIRP	Measurement distance		RBW	Limit	Margin
			Required	Used			
GHz	GHz	dBm	meter	meter	kHz	dBm	dB
0,03-1	0,5625	-51,4	3	3	100	-13	38,4
1-18	17,9425	-42	1	3	1000	-13	29
18-26,5	21,0775	-52,1	1	3	1000	-13	39,1
26,5-40	28,905	19,8	1	3	1000	23	3,2
40-60	58,01	-9,1	1	3	1000	23	32,1
60-90	87,4	-26,3	1	3	1000	23	49,3
85-100	91,3	-16,8	1	3	1000	23	39,8

Tuned frequency = 29.005 GHz, 8PSK at 7.5Msymbol/s, IQ800

Frequency range	Frequency	EIRP	Measurement distance		RBW	Limit	Margin
			Required	Used			
GHz	GHz	dBm	meter	meter	kHz	dBm	dB
0,03-1	0,5625	-51,4	3	3	100	-13	38,4
1-18	17,958	-42	1	3	1000	-13	29
18-26,5	20,66825	-52,5	1	3	1000	-13	39,5
26,5-40	29,105	11,2	1	3	1000	23	11,8
40-60	58,01	-11,9	1	3	1000	23	34,9
60-90	85,8	-26,4	1	3	1000	23	49,4
85-100	91,3	-16,6	1	3	1000	23	39,6

Tuned frequency = 27.55 GHz, BPSK at 80Msymbols/s, LSDR

Frequency range	Frequency	EIRP	Measurement distance		RBW	Limit	Margin
			Required	Used			
GHz	GHz	dBm	meter	meter	kHz	dBm	dB
0,03-1	0,5625	-51,4	3	3	100	-13	38,4
1-18	17,9575	-42,2	1	3	1000	-13	29,2
18-26,5	25,3	-26,8	1	3	1000	-13	13,8
26,5-40	29,8	19,9	1	3	1000	23	3,1
40-60	55,1	10,6	1	3	1000	23	12,4
60-90	89,9	-27,7	1	3	1000	23	50,7
85-100	93,2	-15,8	1	3	1000	23	38,8

Tuned frequency = 27.55 GHz, QPSK at 80Msymbols/s, LSDR

Frequency range	Frequency	EIRP	Measurement distance		RBW	Limit	Margin
			Required	Used			
GHz	GHz	dBm	meter	meter	kHz	dBm	dB
0,03-1	0,5625	-51,4	3	3	100	-13	38,4
1-18	17,921	-42,5	1	3	1000	-13	29,5
18-26,5	25,3495	-37,1	1	3	1000	-13	24,1
26,5-40	29,8	20	1	3	1000	23	3
40-60	55,1	-5,3	1	3	1000	23	28,3
60-90	89,9	-27,8	1	3	1000	23	50,8
85-100	91,3	-17,2	1	3	1000	23	40,2

Tuned frequency = 27.55 GHz, 8PSK at 80Msymbols/s, LSDR

Frequency range	Frequency	EIRP	Measurement distance		RBW	Limit	Margin
			Required	Used			
GHz	GHz	dBm	meter	meter	kHz	dBm	dB
0,03-1	0,5625	-51,4	3	3	100	-13	38,4
1-18	18	-42,2	1	3	1000	-13	29,2
18-26,5	25,31925	-37,2	1	3	1000	-13	24,2
26,5-40	29,8	15,1	1	3	1000	23	7,9
40-60	55,1	-5,1	1	3	1000	23	28,1
60-90	89,9	-27,4	1	3	1000	23	50,4
85-100	91,3	-17,1	1	3	1000	23	40,1

Center frequency

Tuned frequency = 29.505 GHz, BPSK at 7.5Msymbol/s, iQ800

Frequency range	Frequency	EIRP	Measurement distance		RBW	Limit	Margin
			Required	Used			
GHz	GHz	dBm	meter	meter	kHz	dBm	dB
0,03-1	0,5625	-51,4	3	3	100	-13	38,4
1-18	2,045	-39,3	1	3	1000	-13	26,3
18-26,5	20,80725	-52,4	1	3	1000	-13	39,4
26,5-40	29,605	20,1	1	3	1000	23	2,9
40-60	59,01	2,1	1	3	1000	23	20,9
60-90	87,9	-25,8	1	3	1000	23	48,8
85-100	91,3	-17,1	1	3	1000	23	40,1

Tuned frequency = 29.505 GHz, QPSK at 7.5Msymbol/s, iQ800

Frequency range	Frequency	EIRP	Measurement distance		RBW	Limit	Margin
			Required	Used			
GHz	GHz	dBm	meter	meter	kHz	dBm	dB
0,03-1	0,5625	-51,4	3	3	100	-13	38,4
1-18	2,044	-40,2	1	3	1000	-13	27,2
18-26,5	20,78725	-52,2	1	3	1000	-13	39,2
26,5-40	29,405	19,2	1	3	1000	23	3,8
40-60	59,01	-5	1	3	1000	23	28
60-90	86,8	-27,3	1	3	1000	23	50,3
85-100	91,3	-16,8	1	3	1000	23	39,8

Tuned frequency = 29.505 GHz, 8PSK at 7.5Msymbol/s, iQ800

Frequency range	Frequency	EIRP	Measurement distance		RBW	Limit	Margin
			Required	Used			
GHz	GHz	dBm	meter	meter	kHz	dBm	dB
0,03-1	0,5625	-51,4	3	3	100	-13	38,4
1-18	2,044	-41,6	1	3	1000	-13	28,6
18-26,5	21,12	-52	1	3	1000	-13	39
26,5-40	29,605	14,3	1	3	1000	23	8,7
40-60	59,01	-5,3	1	3	1000	23	28,3
60-90	87,1	-27,6	1	3	1000	23	50,6
85-100	91,3	-17,2	1	3	1000	23	40,2

Tuned frequency = 28.75 GHz, BPSK at 80Msymbols/s, LSDR

Frequency range	Frequency	EIRP	Measurement distance		RBW	Limit	Margin
			Required	Used			
GHz	GHz	dBm	meter	meter	kHz	dBm	dB
0,03-1	0,5625	-51,4	3	3	100	-13	38,4
1-18	17,7635	-42,2	1	3	1000	-13	29,2
18-26,5	20,9925	-51,1	1	3	1000	-13	38,1
26,5-40	28,55	15,4	1	3	1000	23	7,6
40-60	57,5	-0,2	1	3	1000	23	23,2
60-90	87,8	-25,8	1	3	1000	23	48,8
85-100	92,8	-16,4	1	3	1000	23	39,4

Tuned frequency = 28.75 GHz, QPSK at 80Msymbols/s, LSDR

Frequency range	Frequency	EIRP	Measurement distance		RBW	Limit	Margin
			Required	Used			
GHz	GHz	dBm	meter	meter	kHz	dBm	dB
0,03-1	0,5625	-51,4	3	3	100	-13	38,4
1-18	17,86975	-42,6	1	3	1000	-13	29,6
18-26,5	21,82825	-51,5	1	3	1000	-13	38,5
26,5-40	28,9	12,7	1	3	1000	23	10,3
40-60	57,5	-16,6	1	3	1000	23	39,6
60-90	88,1	-27,2	1	3	1000	23	50,2
85-100	92,6	-16,2	1	3	1000	23	39,2

Tuned frequency = 28.75 GHz, 8PSK at 80Msymbols/s, LSDR

Frequency range	Frequency	EIRP	Measurement distance		RBW	Limit	Margin
			Required	Used			
GHz	GHz	dBm	meter	meter	kHz	dBm	dB
0,03-1	0,5625	-51,4	3	3	100	-13	38,4
1-18	17,99325	-42,1	1	3	1000	-13	29,1
18-26,5	21,05675	-51,3	1	3	1000	-13	38,3
26,5-40	35,3	15,8	1	3	1000	23	7,2
40-60	57,5	-17,2	1	3	1000	23	40,2
60-90	88,1	-25,3	1	3	1000	23	48,3
85-100	92,6	-15,6	1	3	1000	23	38,6

Upper band edge

Tuned frequency = 29.995 GHz, BPSK at 7.5Msymbol/s, iQ800

Frequency range	Frequency	EIRP	Measurement distance		RBW	Limit	Margin
			Required	Used			
GHz	GHz	dBm	meter	meter	kHz	dBm	dB
0,03-1	0,5625	-51,4	3	3	100	-13	38,4
1-18	17,85825	-42	1	3	1000	-13	29
18-26,5	20,6265	-52,1	1	3	1000	-13	39,1
26,5-40	30,095	22,4	1	3	1000	23	0,6
40-60	59,99	-2,2	1	3	1000	23	25,2
60-90	89,7	-25,8	1	3	1000	23	48,8
85-100	91,3	-17,3	1	3	1000	23	40,3

Tuned frequency = 29.995 GHz, QPSK at 7.5Msymbol/s, iQ800

Frequency range	Frequency	EIRP	Measurement distance		RBW	Limit	Margin
			Required	Used			
GHz	GHz	dBm	meter	meter	kHz	dBm	dB
0,03-1	0,5625	-51,4	3	3	100	-13	38,4
1-18	17,9225	-42,2	1	3	1000	-13	29,2
18-26,5	20,76725	-52,2	1	3	1000	-13	39,2
26,5-40	30,195	22,6	1	3	1000	23	0,4
40-60	59,99	-8,7	1	3	1000	23	31,7
60-90	89,4	-27,2	1	3	1000	23	50,2
85-100	91,3	-17,6	1	3	1000	23	40,6

Tuned frequency = 29.995 GHz, 8PSK at 7.5Msymbol/s, iQ800

Frequency range	Frequency	EIRP	Measurement distance		RBW	Limit	Margin
			Required	Used			
GHz	GHz	dBm	meter	meter	kHz	dBm	dB
0,03-1	0,5625	-51,4	3	3	100	-13	38,4
1-18	17,9685	-41,8	1	3	1000	-13	28,8
18-26,5	21,125	-52,1	1	3	1000	-13	39,1
26,5-40	30,095	18,6	1	3	1000	23	4,4
40-60	59,99	-9,4	1	3	1000	23	32,4
60-90	89,4	-27,5	1	3	1000	23	50,5
85-100	91,3	-17,1	1	3	1000	23	40,1

Tuned frequency = 29,95 GHz, BPSK at 80Msymbols/s, LSDR

Frequency range	Frequency	EIRP	Measurement distance		RBW	Limit	Margin
			Required	Used			
GHz	GHz	dBm	meter	meter	kHz	dBm	dB
0,03-1	0,5625	-51,4	3	3	100	-13	38,4
1-18	17,9535	-42,2	1	3	1000	-13	29,2
18-26,5	21,1825	-51,5	1	3	1000	-13	38,5
26,5-40	29,75	13,1	1	3	1000	23	9,9
40-60	59,9	1,2	1	3	1000	23	21,8
60-90	89,4	-26,2	1	3	1000	23	49,2
85-100	91,3	-17,3	1	3	1000	23	40,3

Tuned frequency = 29,95 GHz, QPSK at 80Msymbols/s, LSDR

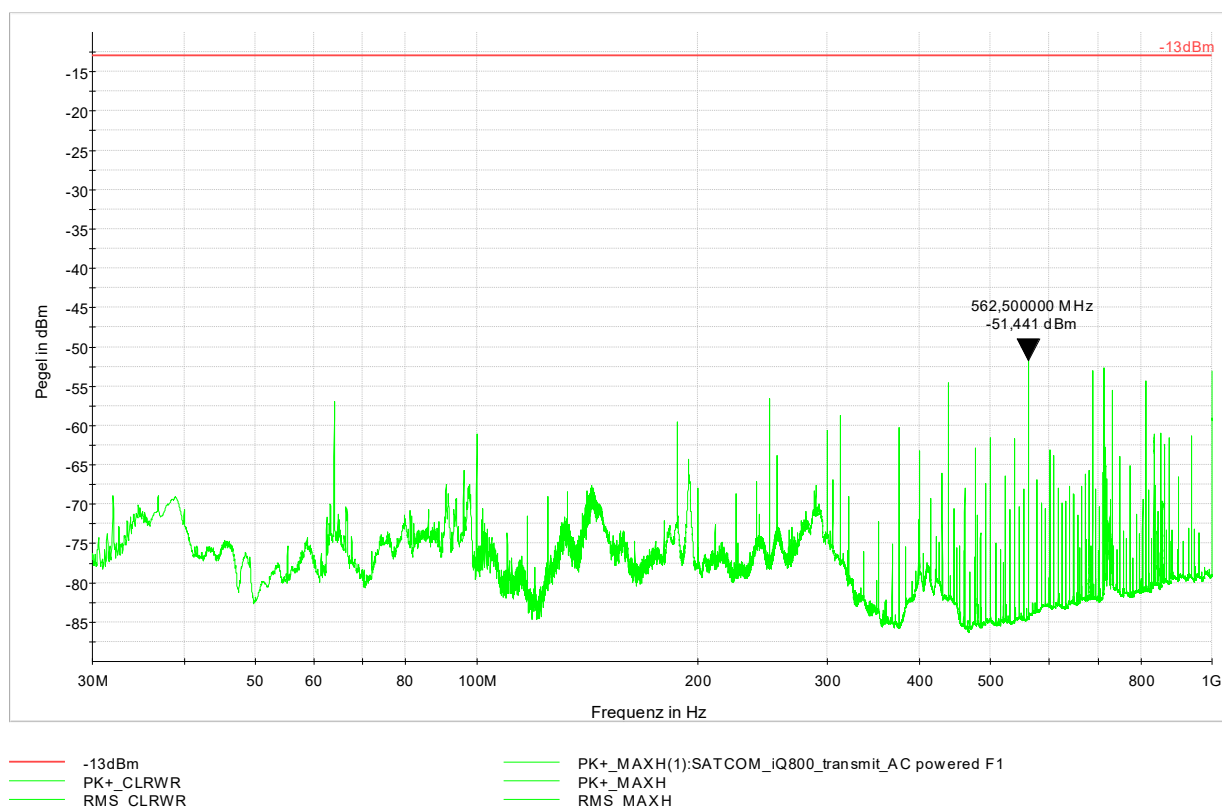
Frequency range	Frequency	EIRP	Measurement distance		RBW	Limit	Margin
			Required	Used			
GHz	GHz	dBm	meter	meter	kHz	dBm	dB
0,03-1	0,5625	-51,4	3	3	100	-13	38,4
1-18	17,71225	-42,8	1	3	1000	-13	29,8
18-26,5	20,8095	-51,5	1	3	1000	-13	38,5
26,5-40	35,1	15,2	1	3	1000	23	7,8
40-60	59,9	-11,8	1	3	1000	23	34,8
60-90	89,4	-26,3	1	3	1000	23	49,3
85-100	91,3	-17,4	1	3	1000	23	40,4

Tuned frequency = 29,95 GHz, 8PSK at 80Msymbols/s, LSDR

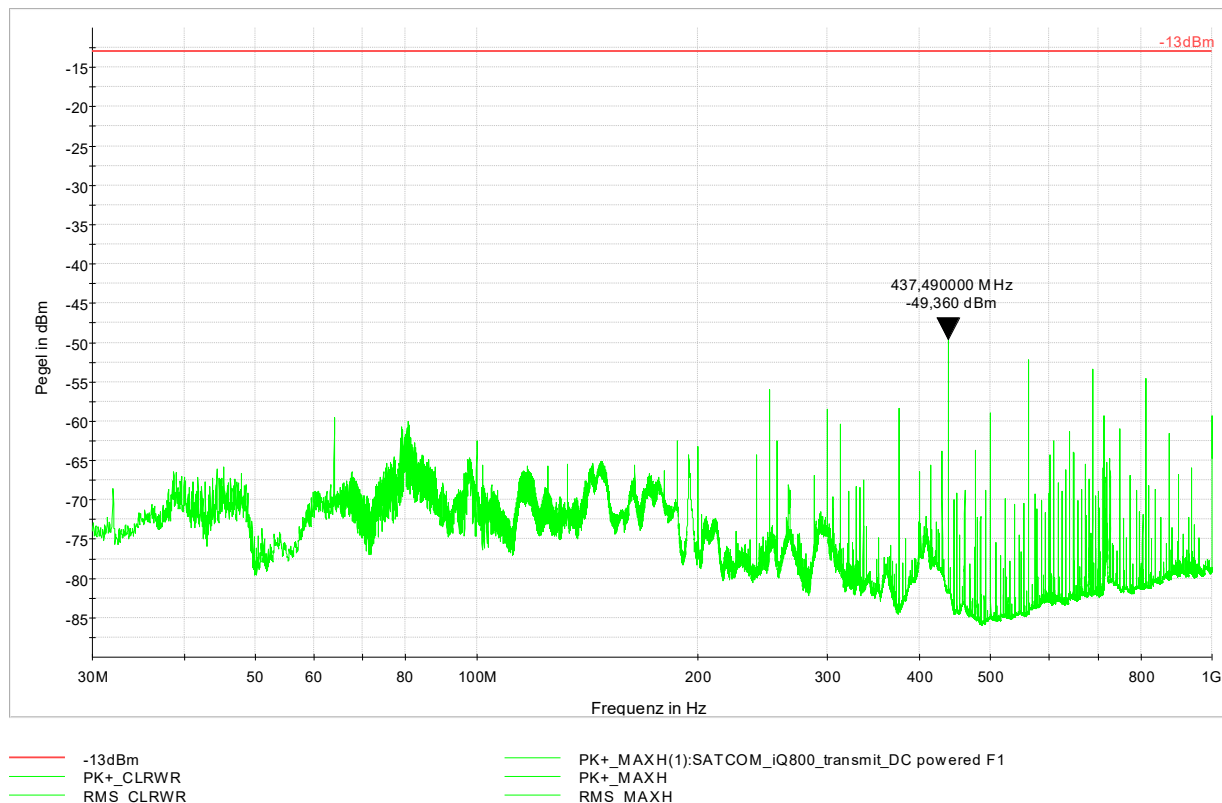
Frequency range	Frequency	EIRP	Measurement distance		RBW	Limit	Margin
			Required	Used			
GHz	GHz	dBm	meter	meter	kHz	dBm	dB
0,03-1	0,5625	-51,4	3	3	100	-13	38,4
1-18	17,98675	-41,7	1	3	1000	-13	28,7
18-26,5	20,799	-51,1	1	3	1000	-13	38,1
26,5-40	35,2	15,2	1	3	1000	23	7,8
40-60	59,9	-12,1	1	3	1000	23	35,1
60-90	89,4	-26,3	1	3	1000	23	49,3
85-100	91,3	-17,3	1	3	1000	23	40,3

4.4.2.) Graphical representation of the measurement results

Frequency range 30 MHz – 1 GHz worst case – AC power supply:

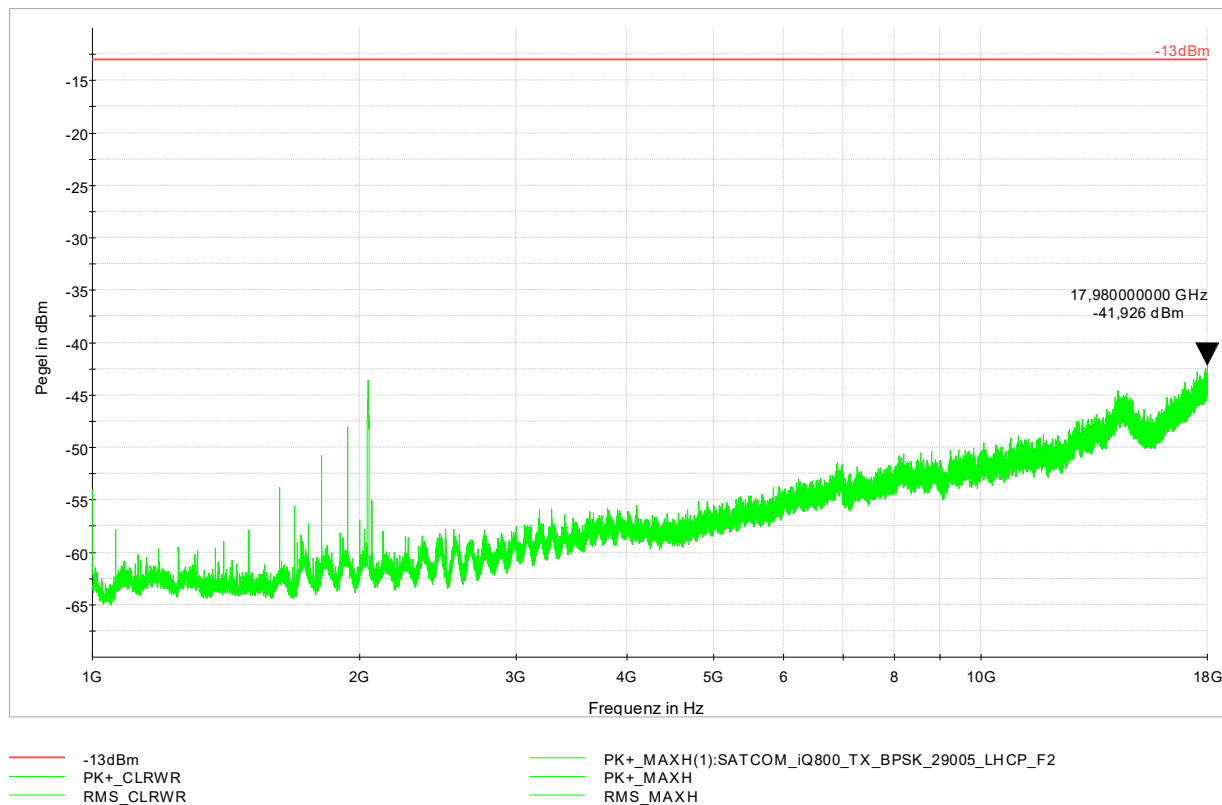


Preliminary measurements have shown, that there is no dependency on tuned frequency or modulation scheme on emissions below 1 GHz. Slightly higher emission was measured in iQ800 mode, than in LSDR mode. Therefore only iQ800 mode at highest output power was measured.

Frequency range 30 MHz – 1 GHz worst case – DC power supply:


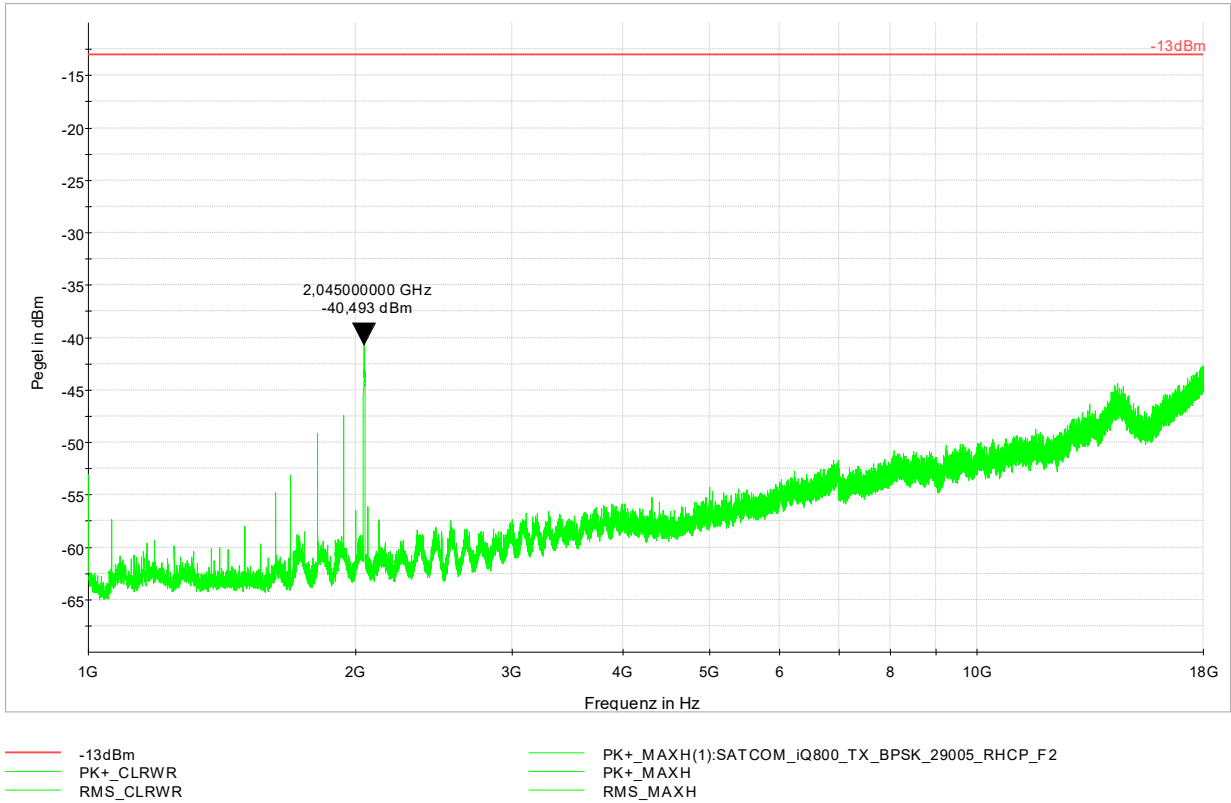
Preliminary measurements have shown, that there is no dependency on tuned frequency or modulation scheme on emissions below 1 GHz. Slightly higher emission was measured in iQ800 mode, than in LSDR mode. Therefore only iQ800 mode at highest output power was measured.

Frequency range 1 GHz – 18 GHz:



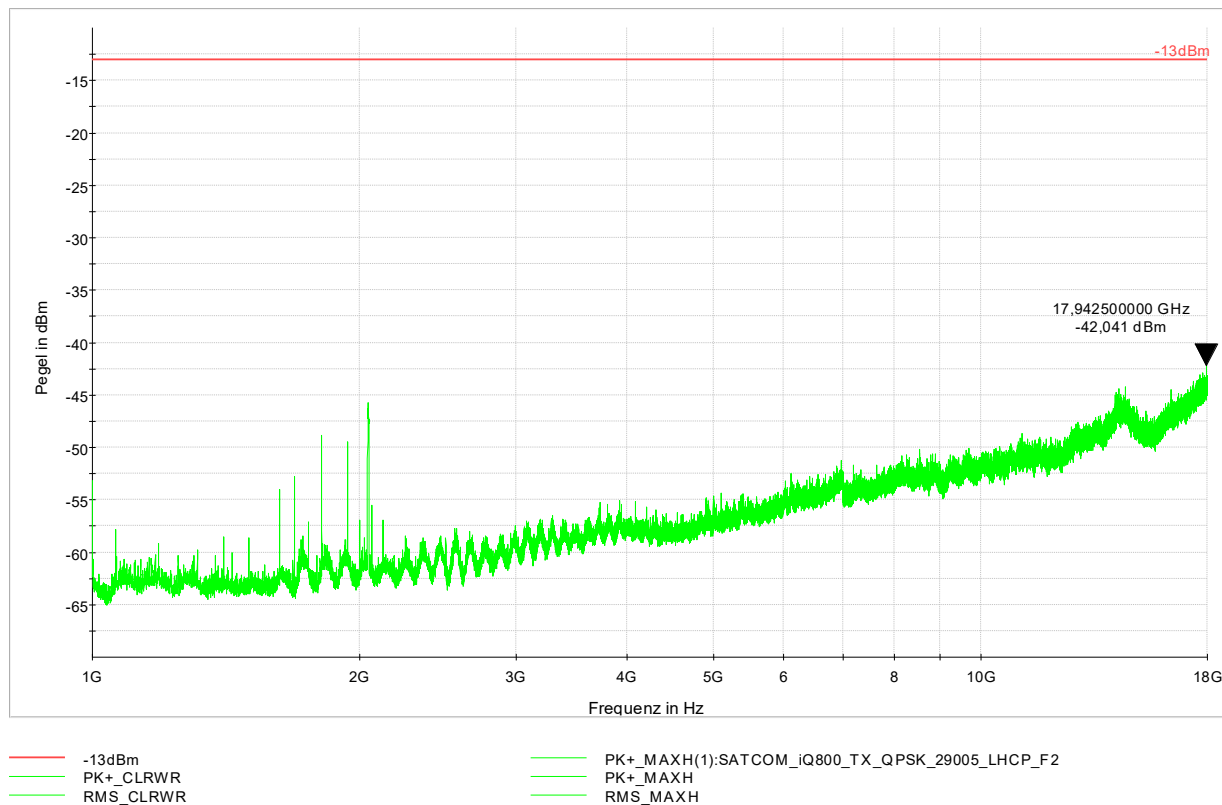
Tuned frequency = 29,005 GHz, LHCP, BPSK at 7.5MSymbol/s, iQ800

Frequency range 1 GHz – 18 GHz:



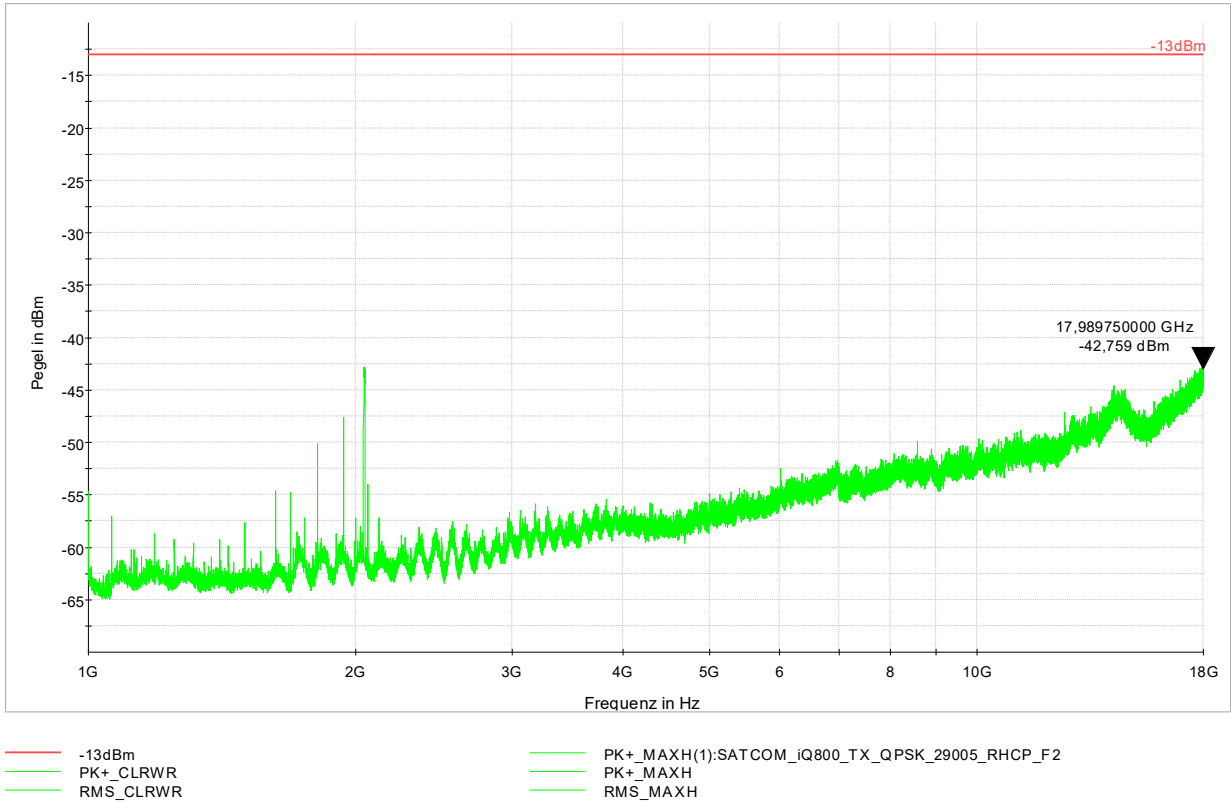
Tuned frequency = 29,005 GHz, RHCP, BPSK at 7.5MSymbol/s, iQ800

Frequency range 1 GHz – 18 GHz:



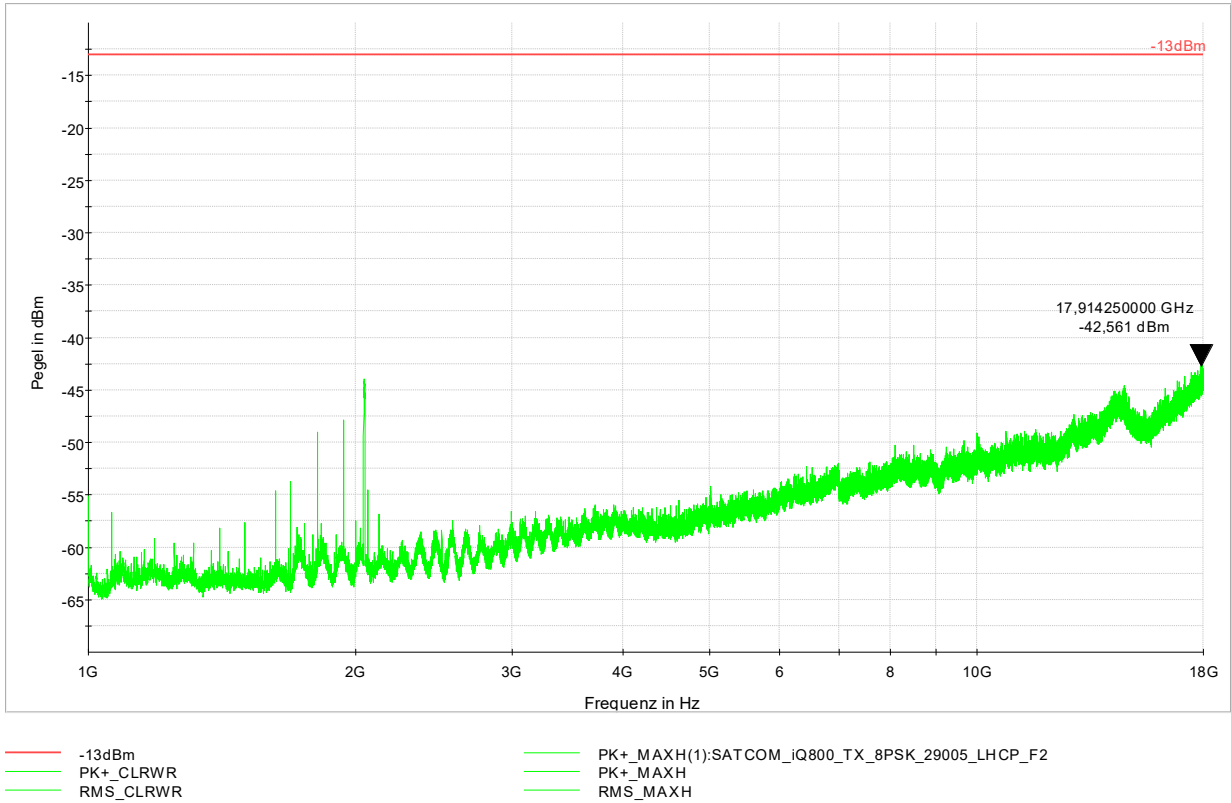
Tuned frequency = 29,005 GHz, LHCP, QPSK at 7.5MSymbol/s, iQ800

Frequency range 1 GHz – 18 GHz:



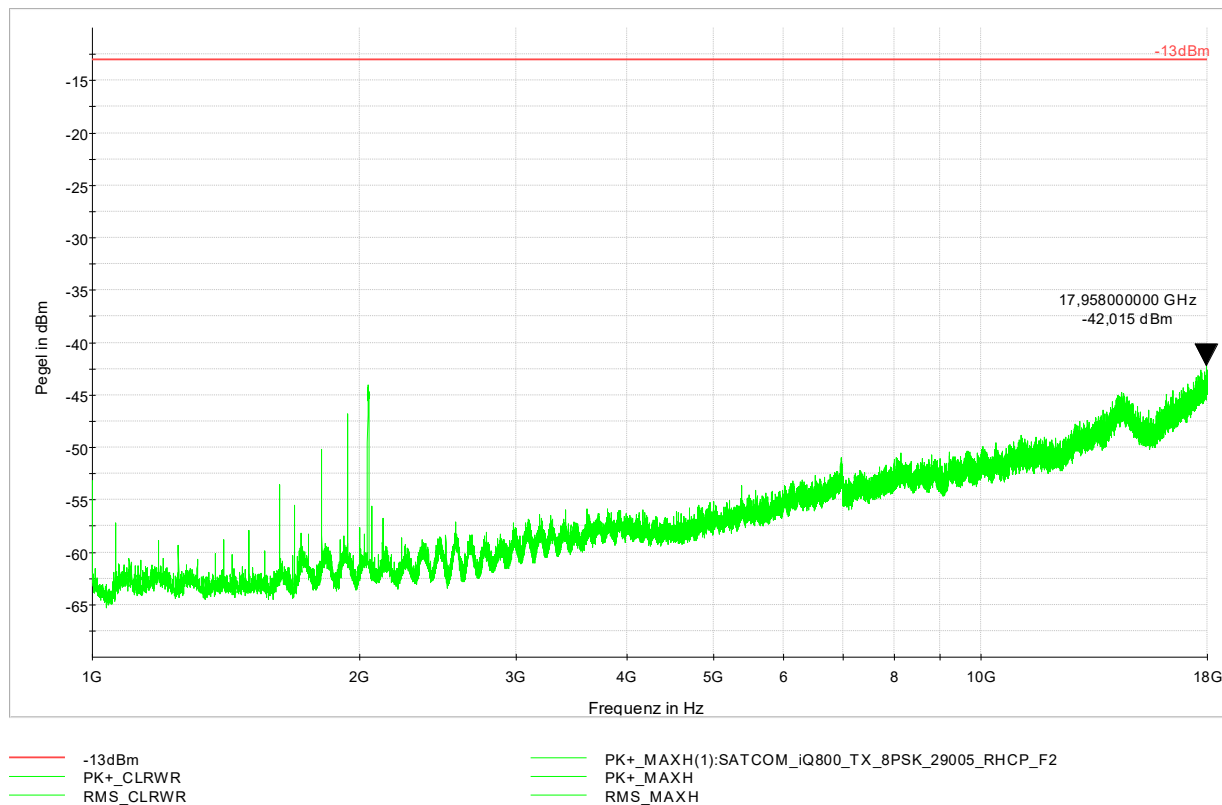
Tuned frequency = 29,005 GHz, RHCP, QPSK at 7.5MSymbol/s, iQ800

Frequency range 1 GHz – 18 GHz:

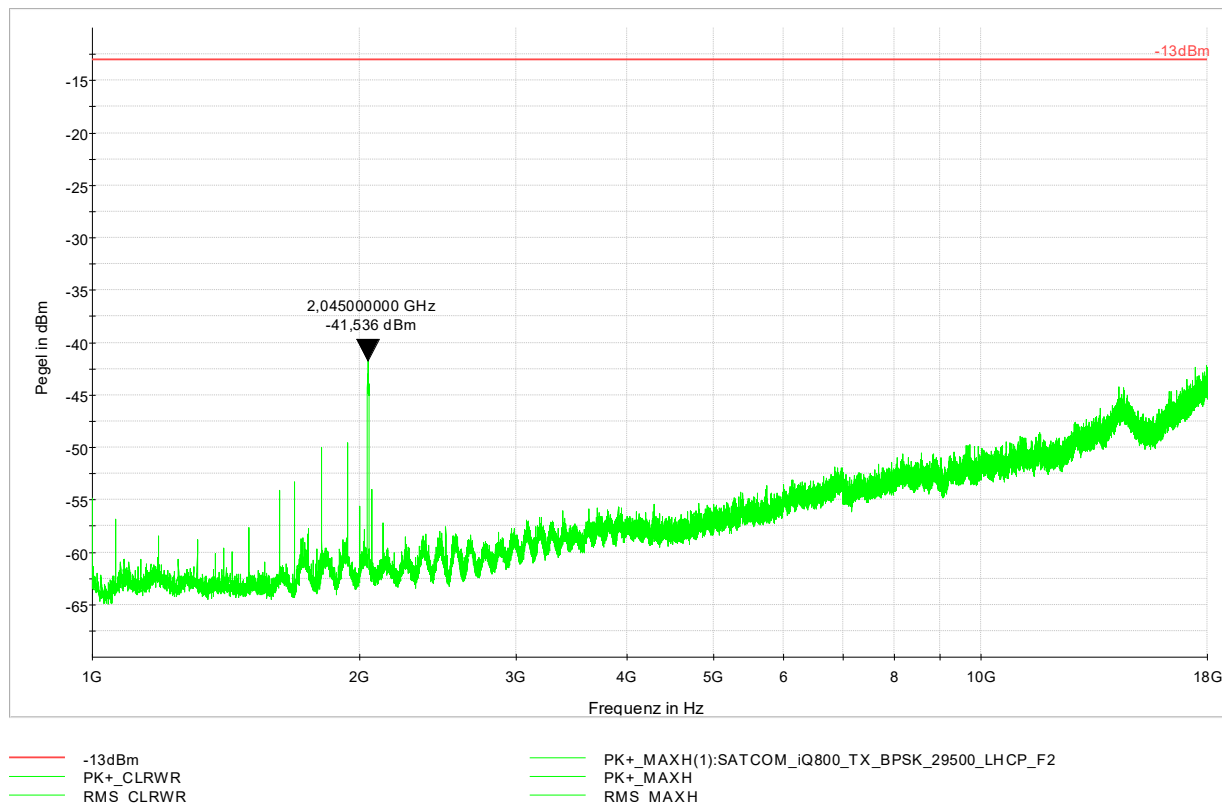


Tuned frequency = 29,005 GHz, LHCP, 8PSK at 7.5MSymbol/s, iQ800

Frequency range 1 GHz – 18 GHz:

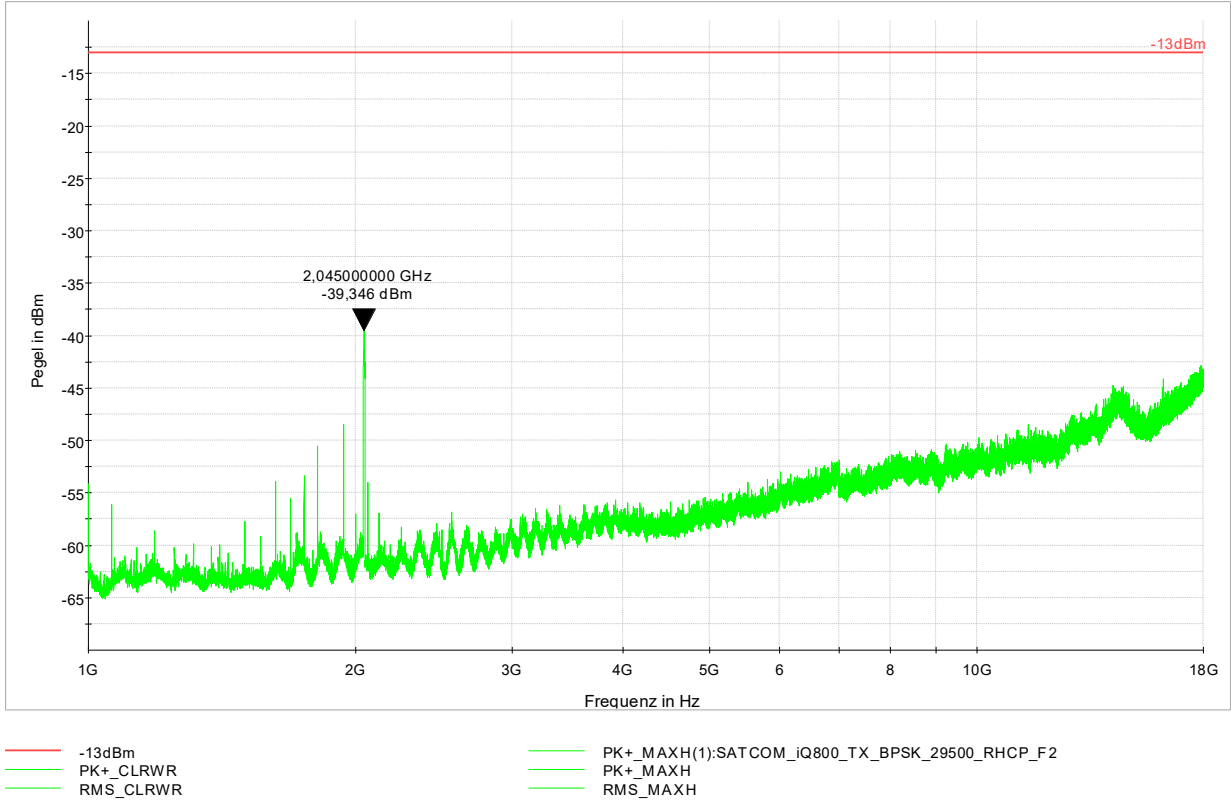


Tuned frequency = 29,005 GHz, RHCP, 8PSK at 7.5MSymbol/s, iQ800

Frequency range 1 GHz – 18 GHz:


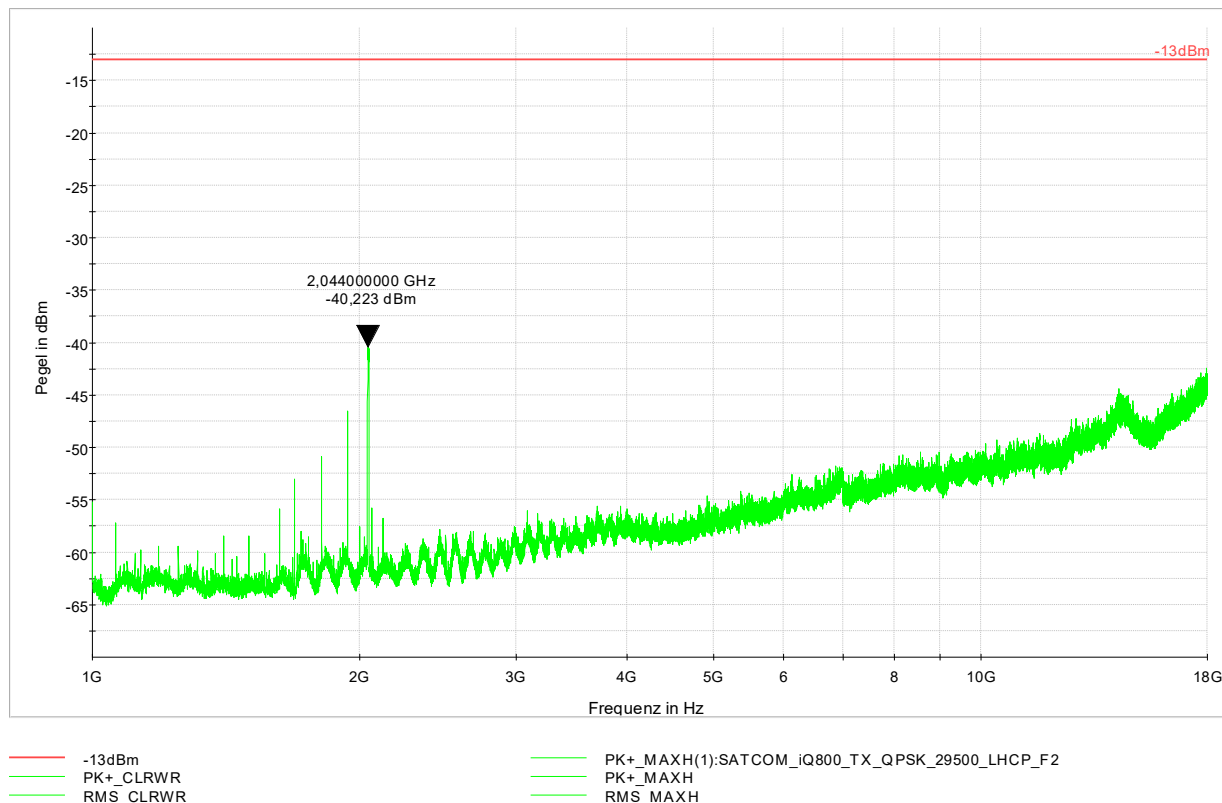
Tuned frequency = 29,505 GHz, LHCP, BPSK at 7.5MSymbol/s, iQ800

Frequency range 1 GHz – 18 GHz:



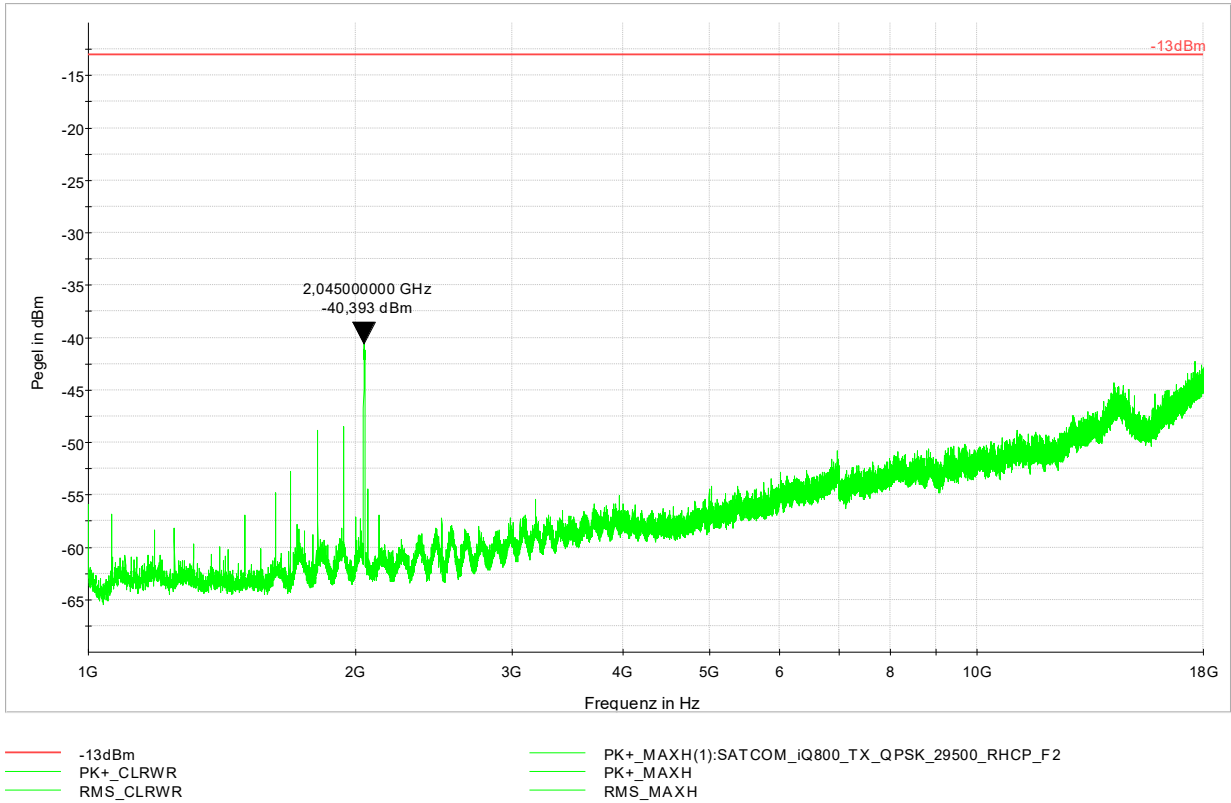
Tuned frequency = 29,505 GHz, RHCP, BPSK at 7.5MSymbol/s, iQ800

Frequency range 1 GHz – 18 GHz:



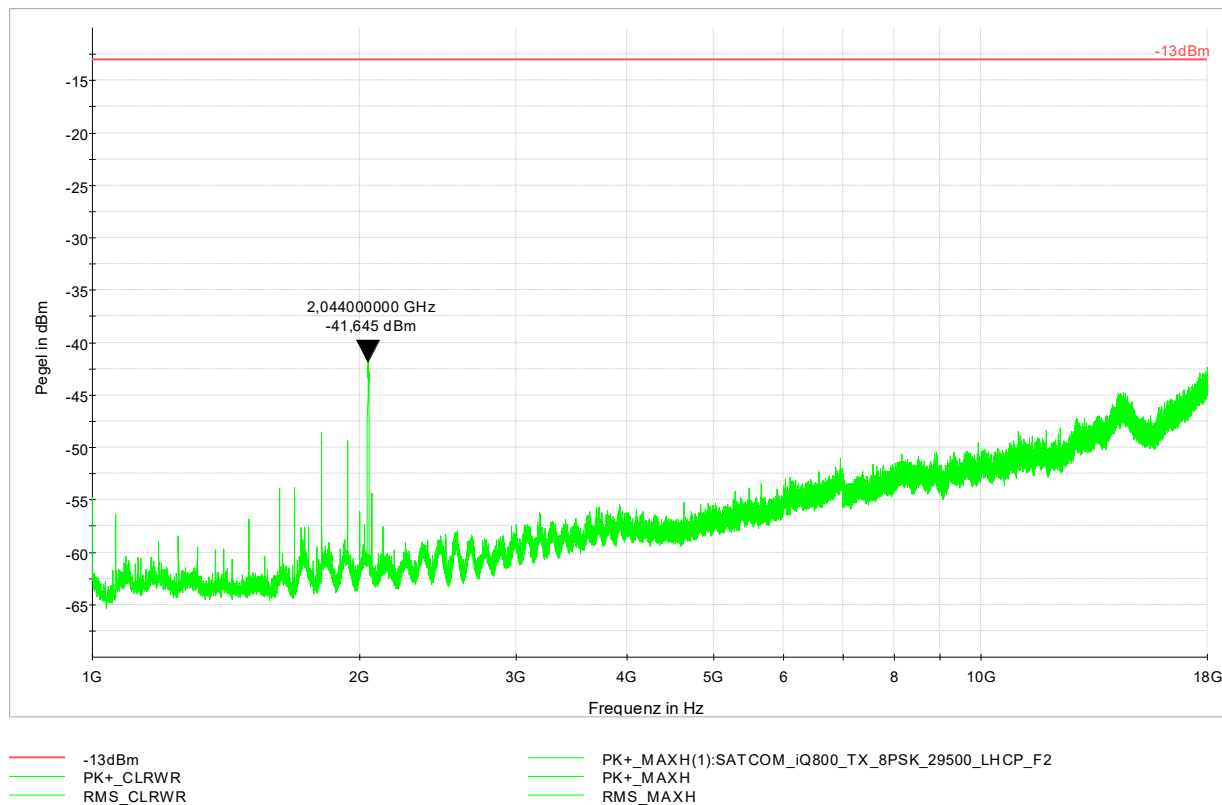
Tuned frequency = 29,505 GHz, LHCP, QPSK at 7.5MSymbol/s, iQ800

Frequency range 1 GHz – 18 GHz:



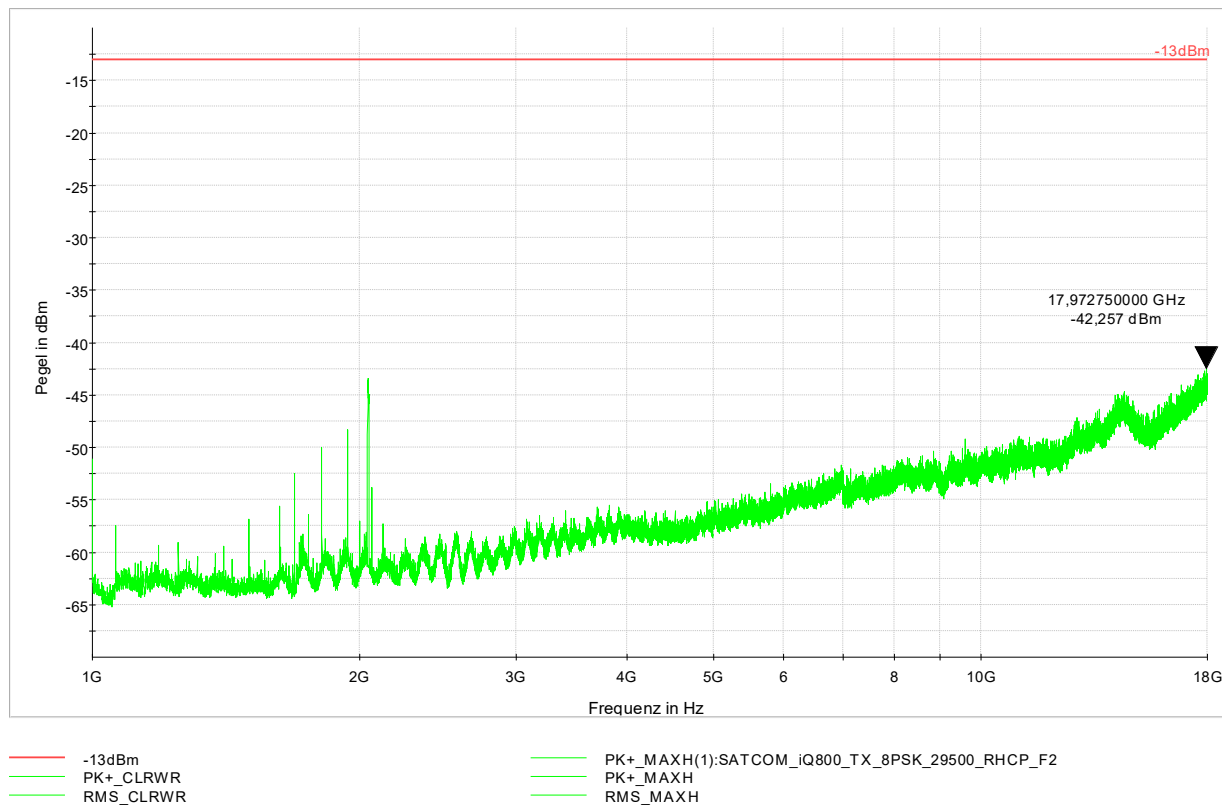
Tuned frequency = 29,505 GHz, RHCP, QPSK at 7.5MSymbol/s, iQ800

Frequency range 1 GHz – 18 GHz:



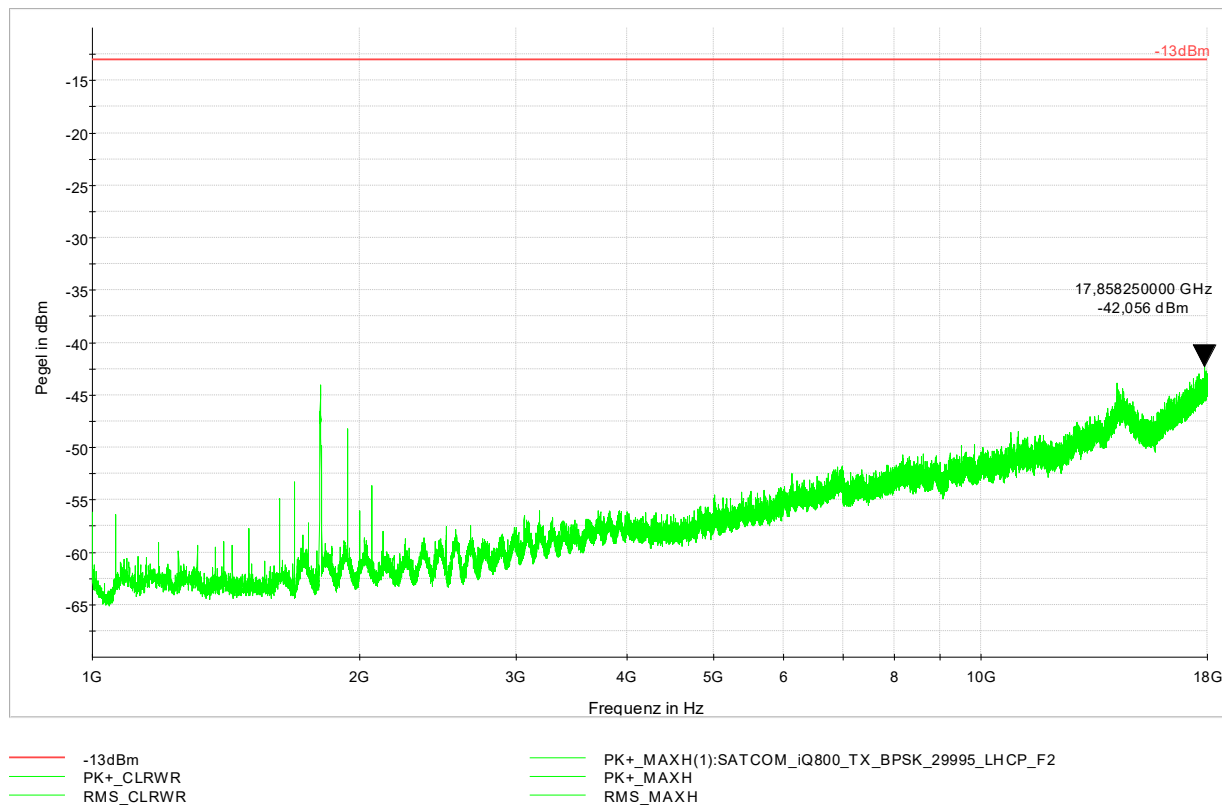
Tuned frequency = 29,505 GHz, LHCP, 8PSK at 7.5MSymbol/s, iQ800

Frequency range 1 GHz – 18 GHz:



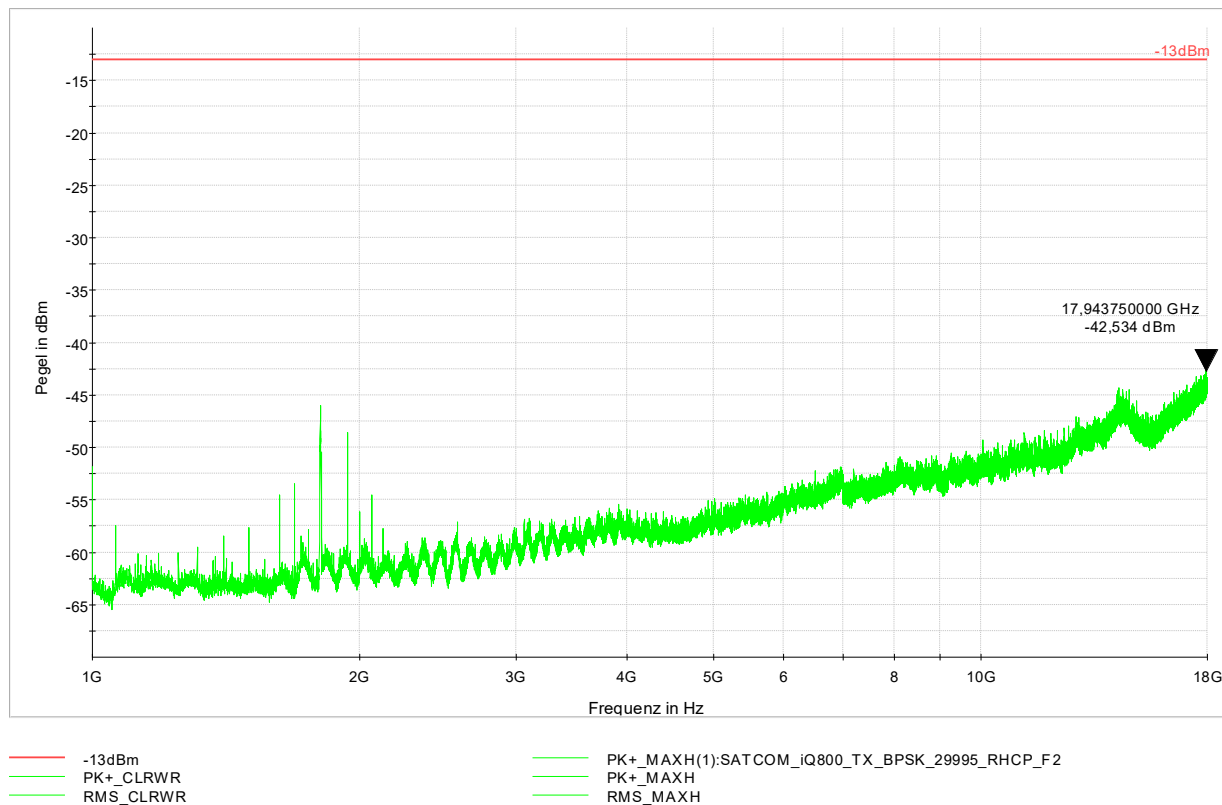
Tuned frequency = 29,505 GHz, RHCP, 8PSK at 7.5MSymbol/s, iQ800

Frequency range 1 GHz – 18 GHz:



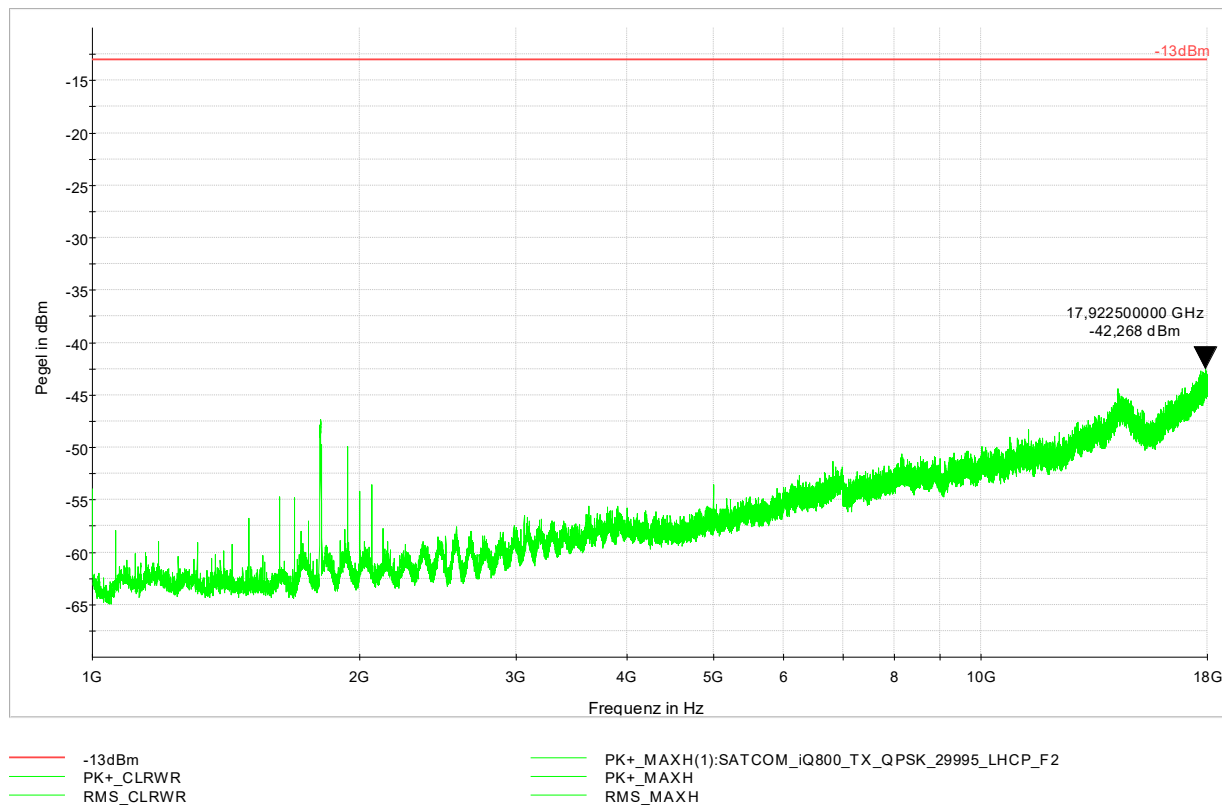
Tuned frequency = 29,995 GHz, LHCP, BPSK at 7.5MSymbol/s, iQ800

Frequency range 1 GHz – 18 GHz:



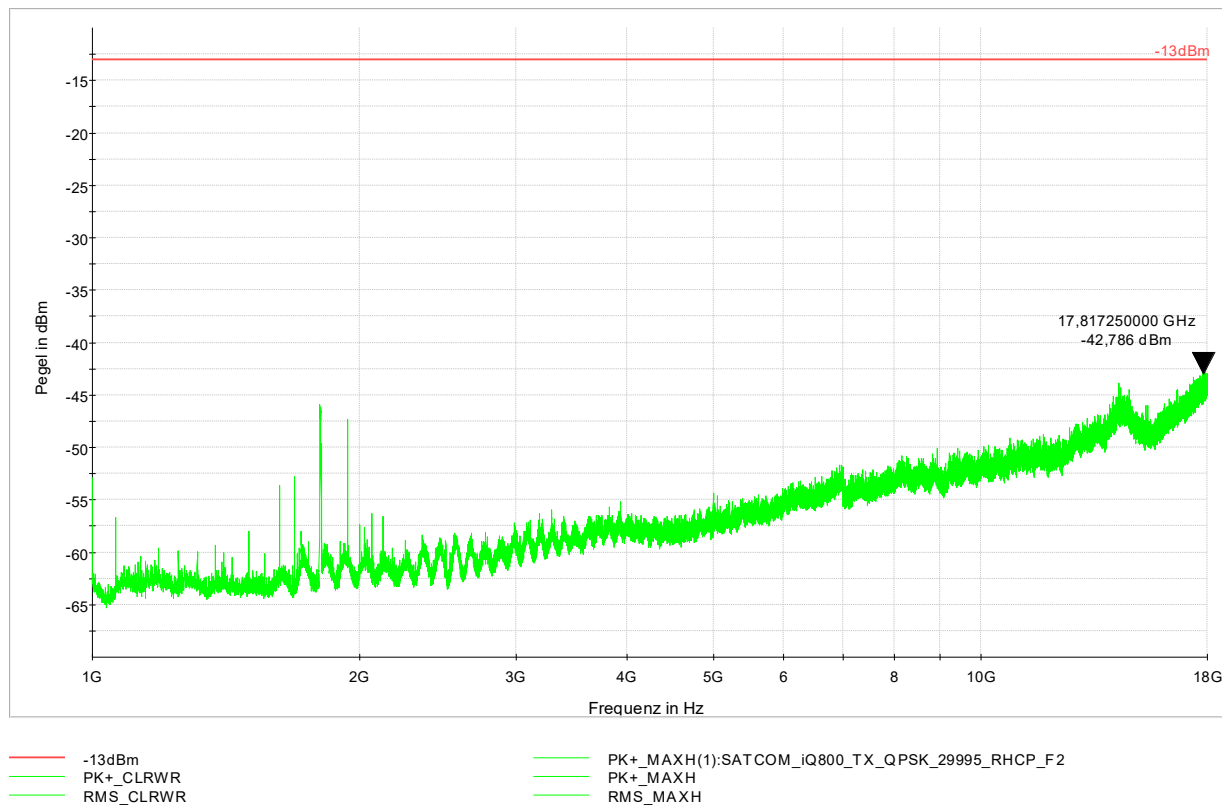
Tuned frequency = 29,995 GHz, RHCP, BPSK at 7.5MSymbol/s, iQ800

Frequency range 1 GHz – 18 GHz:



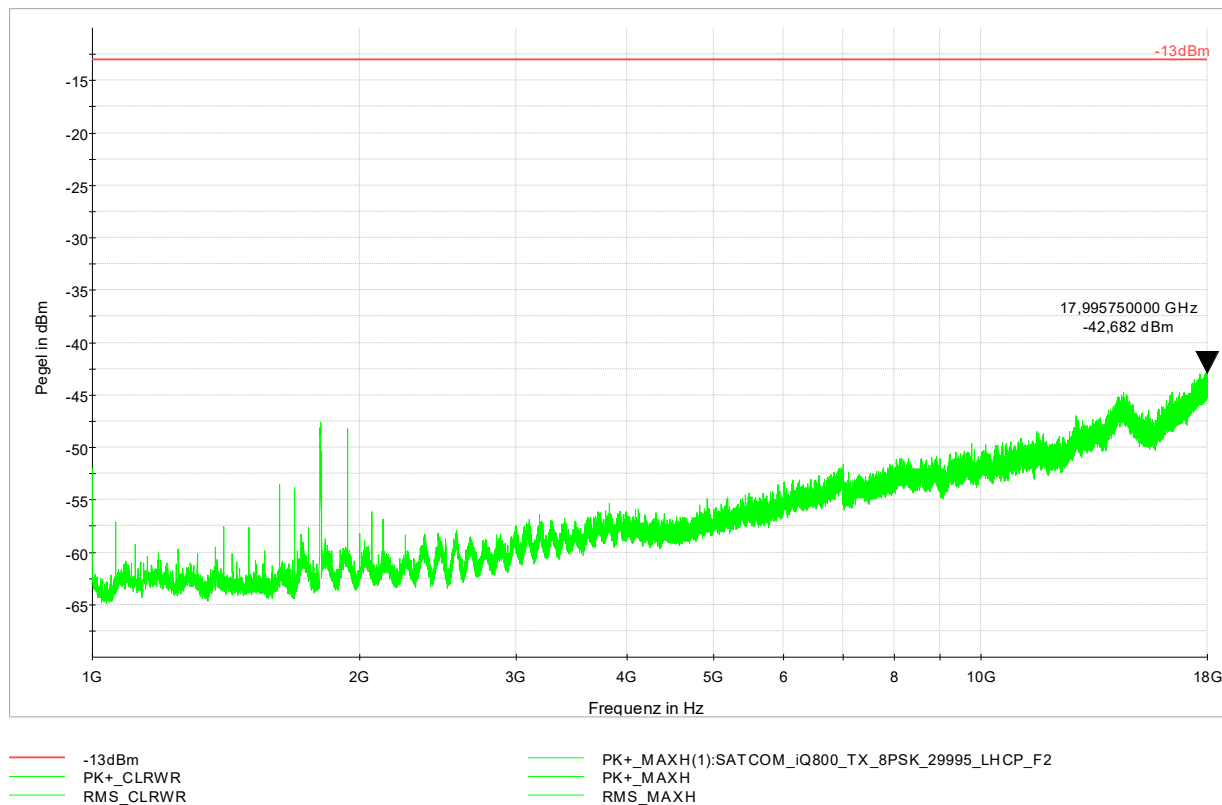
Tuned frequency = 29,995 GHz, LHCP, QPSK at 7.5MSymbol/s, iQ800

Frequency range 1 GHz – 18 GHz:



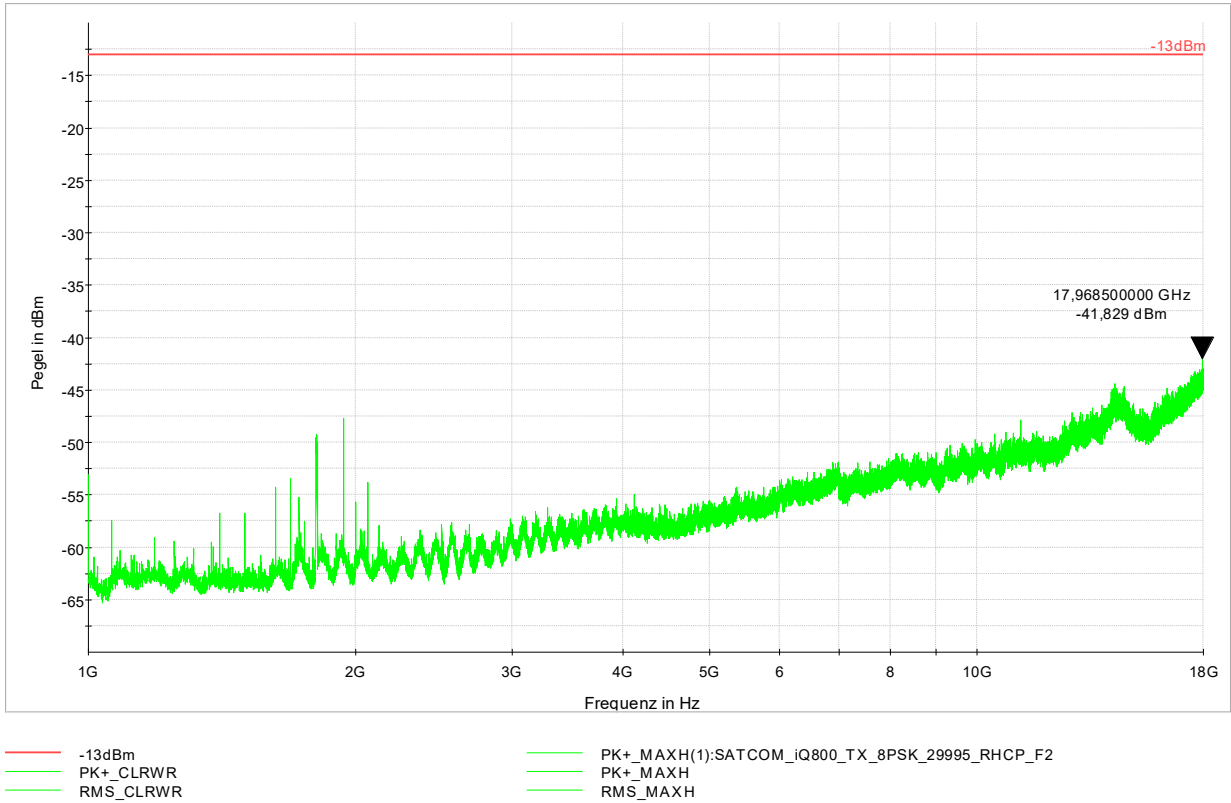
Tuned frequency = 29,995 GHz, RHCP, QPSK at 7.5MSymbol/s, iQ800

Frequency range 1 GHz – 18 GHz:



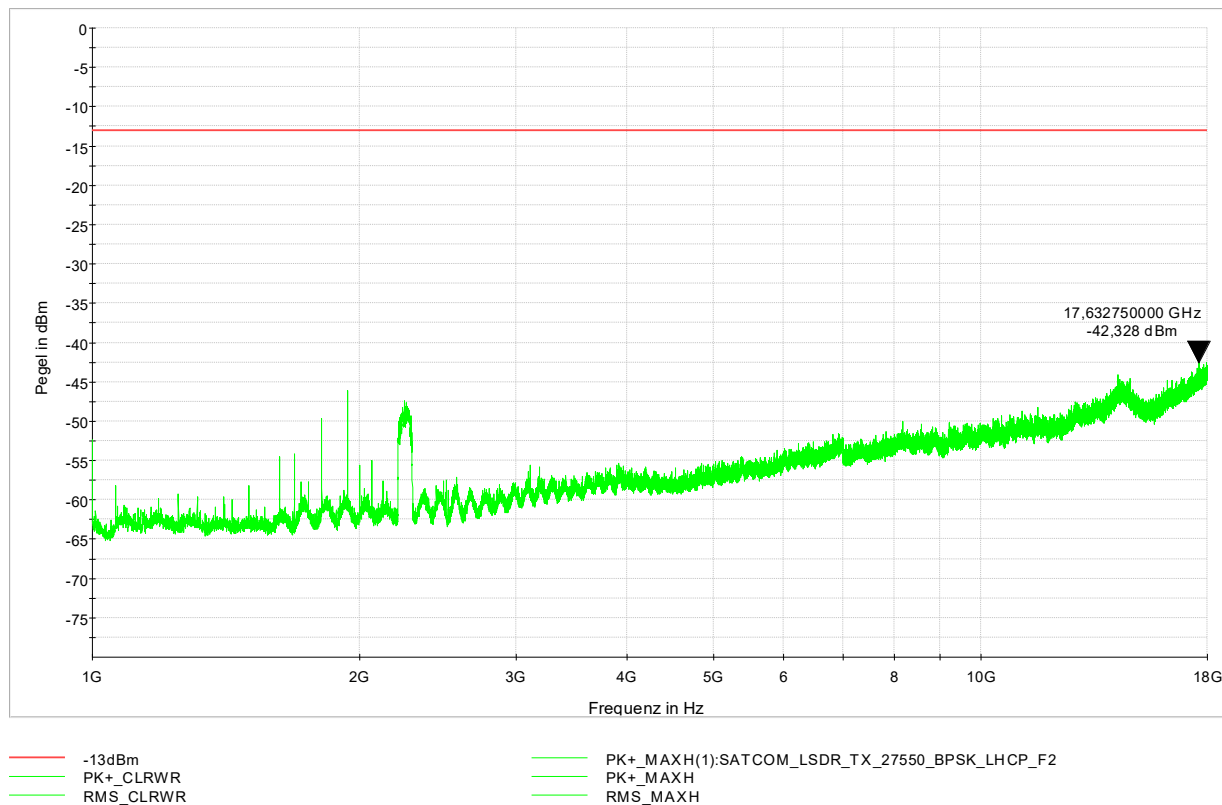
Tuned frequency = 29,995 GHz, LHCP, 8PSK at 7.5MSymbol/s, iQ800

Frequency range 1 GHz – 18 GHz:

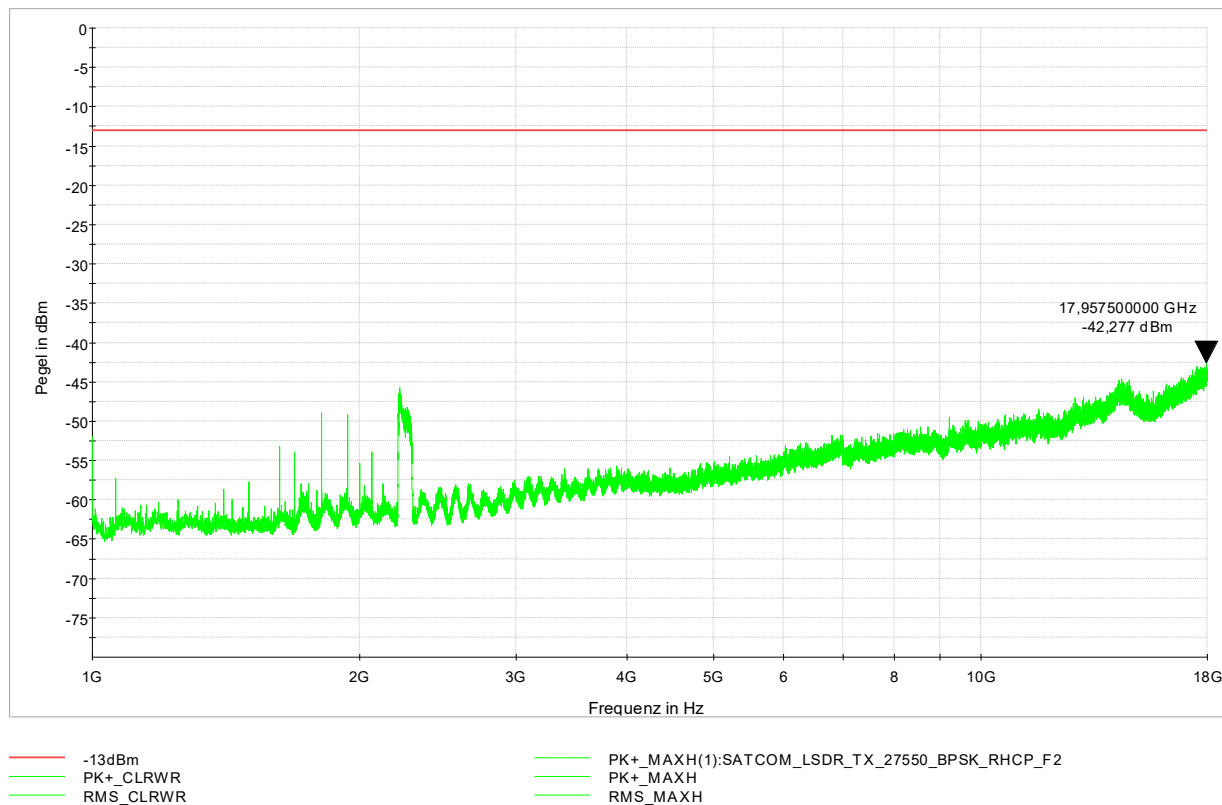


Tuned frequency = 29,995 GHz, RHCP, 8PSK at 7.5MSymbol/s, iQ800

Frequency range 1 GHz – 18 GHz:

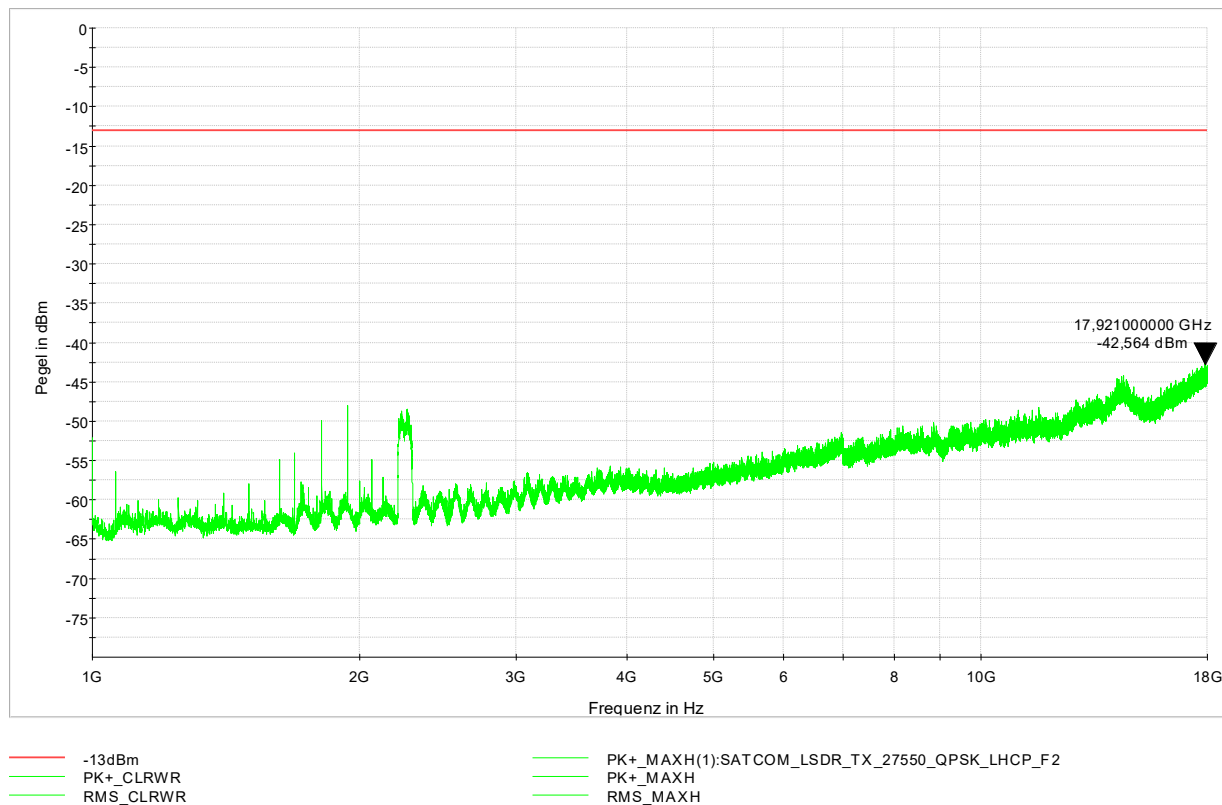


Tuned frequency = 27,55 GHz, LHCP, BPSK at 80MSymbol/s, LSDR

Frequency range 1 GHz – 18 GHz:


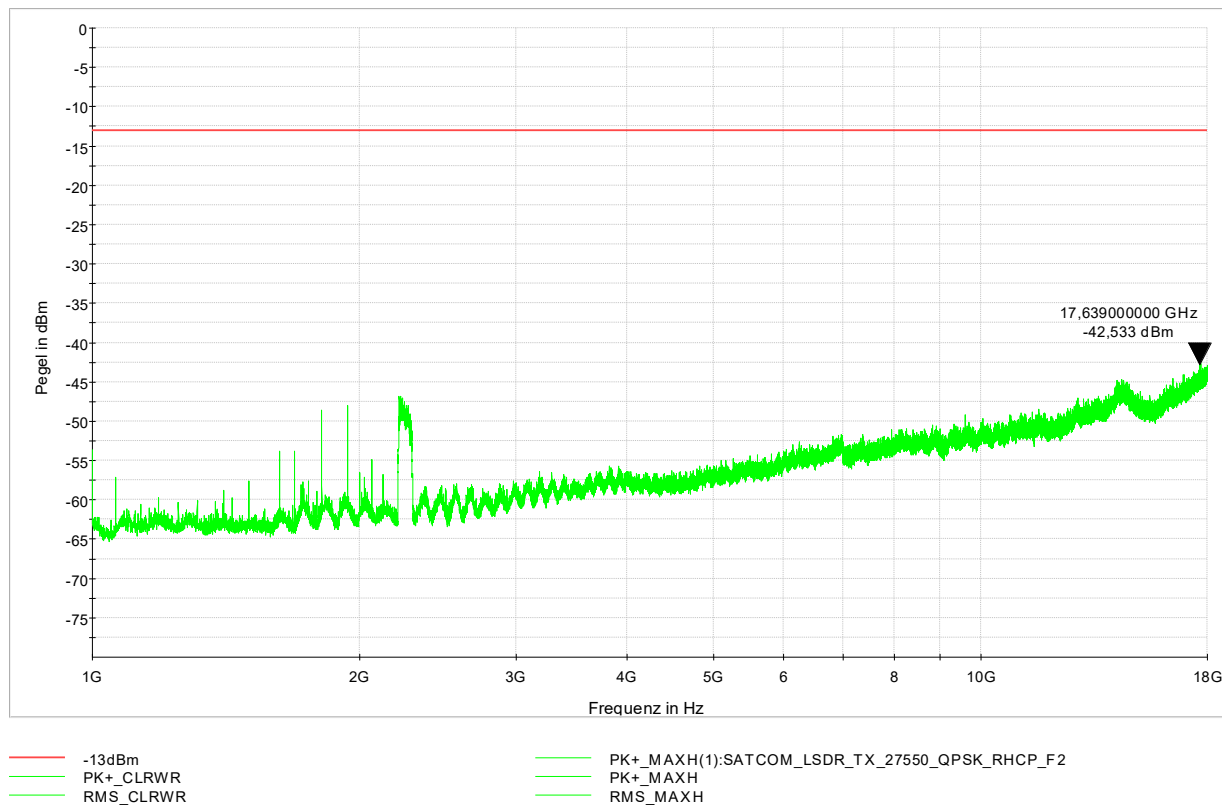
Tuned frequency = 27,55 GHz, RHCP, BPSK at 80MSymbol/s, LSDR

Frequency range 1 GHz – 18 GHz:



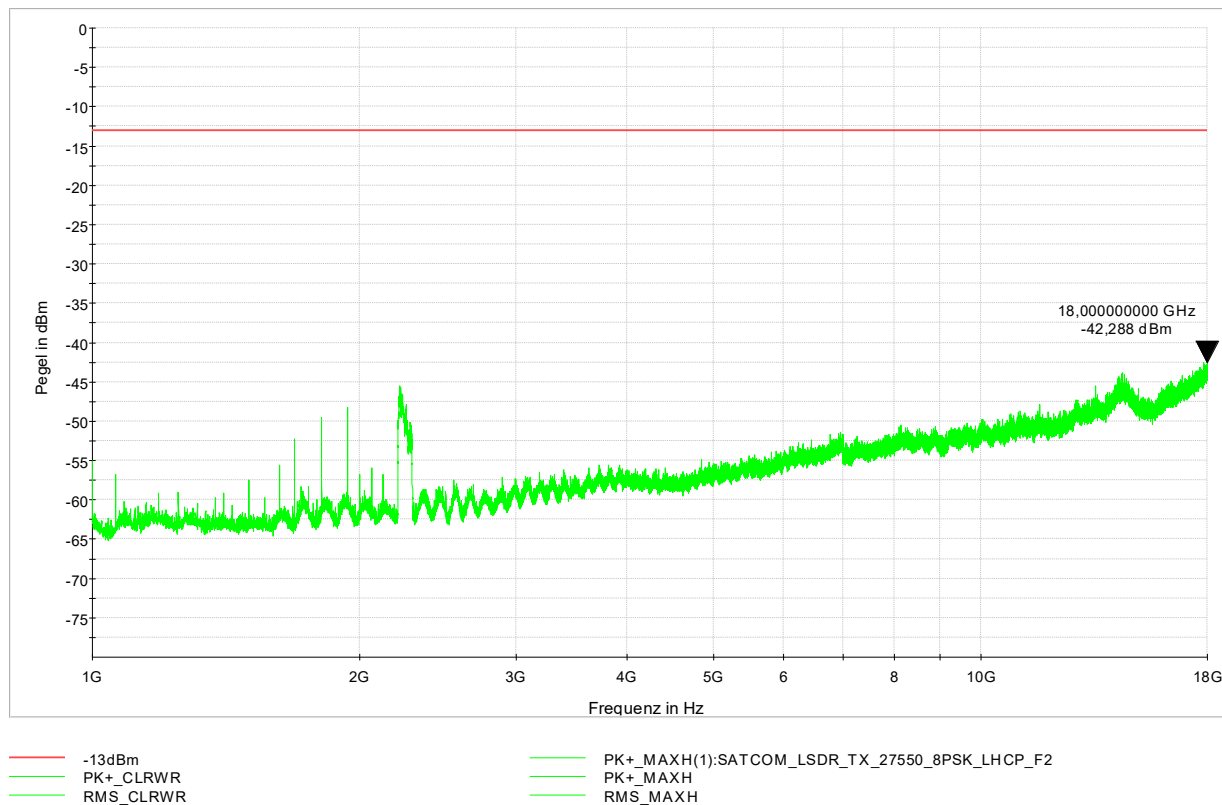
Tuned frequency = 27,55 GHz, LHCP, QPSK at 80MSymbol/s, LSDR

Frequency range 1 GHz – 18 GHz:



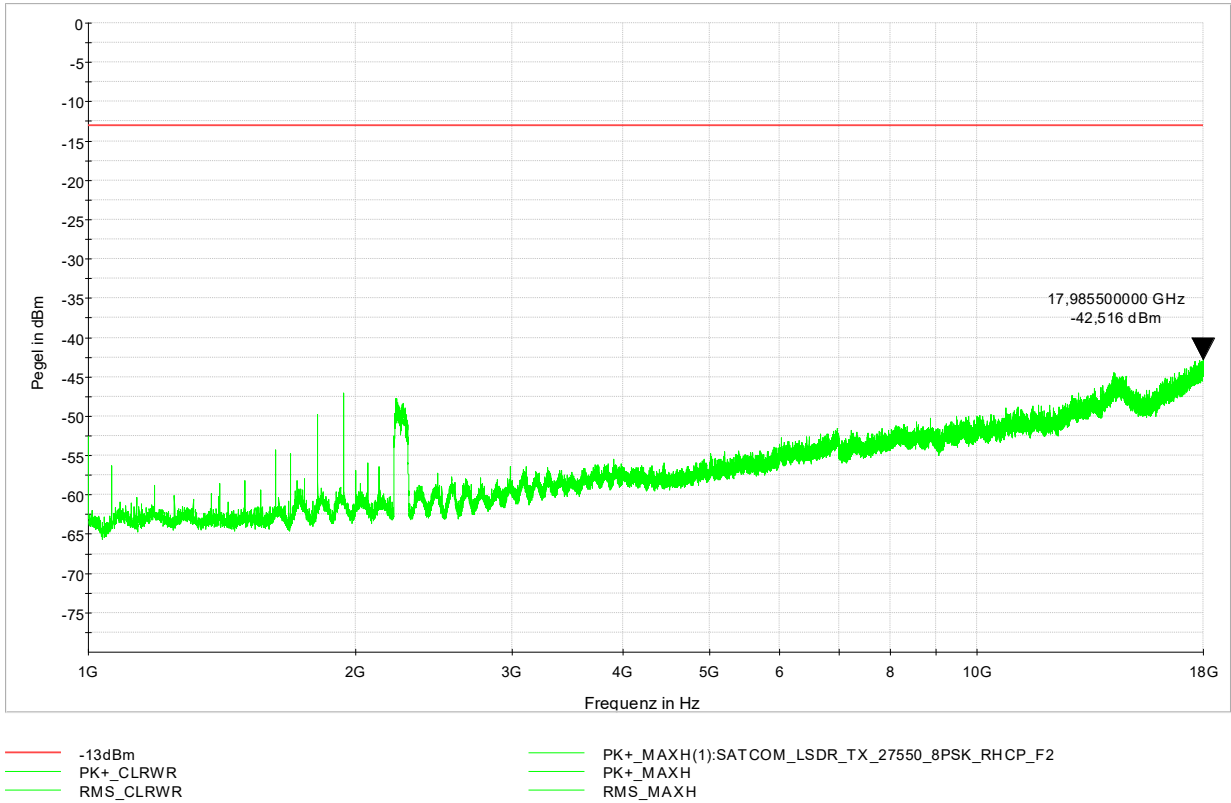
Tuned frequency = 27,55 GHz, RHCP, QPSK at 80MSymbol/s, LSDR

Frequency range 1 GHz – 18 GHz:



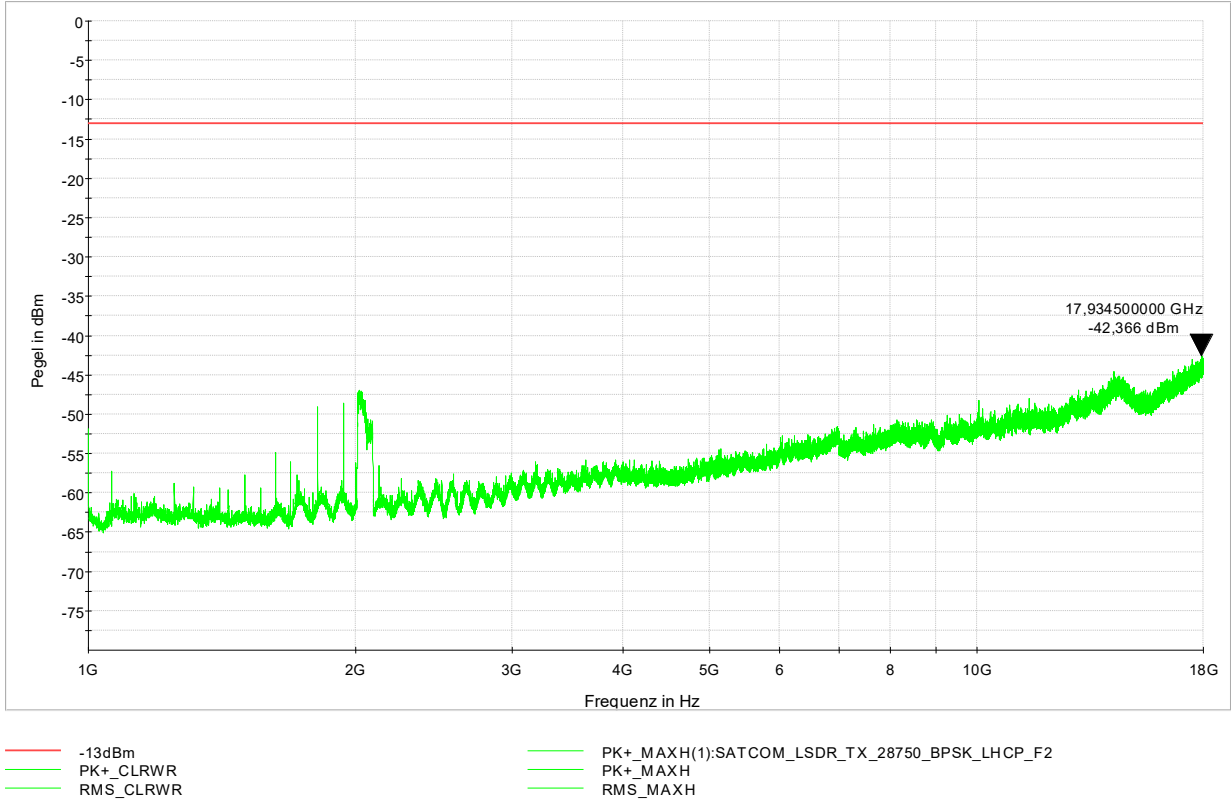
Tuned frequency = 27,55 GHz, LHCP, 8PSK at 80MSymbol/s, LSDR

Frequency range 1 GHz – 18 GHz:



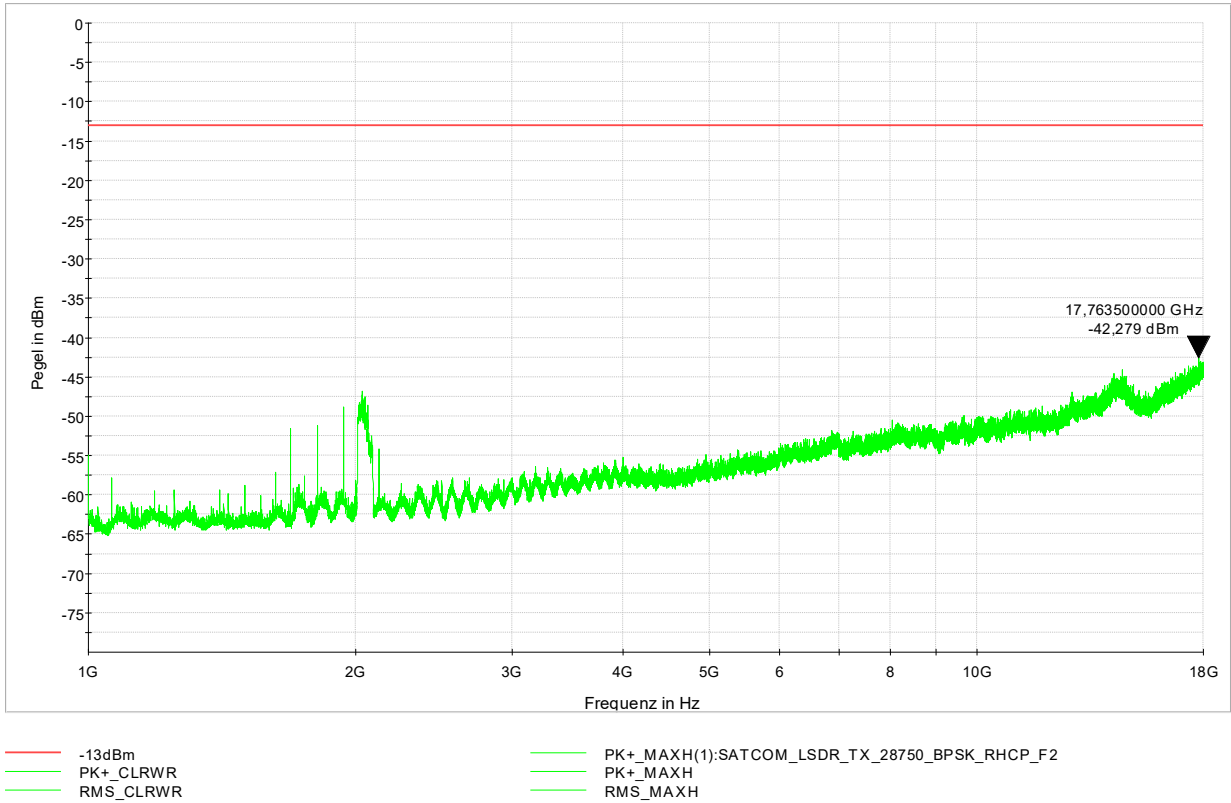
Tuned frequency = 27,55 GHz, RHCP, 8PSK at 80MSymbol/s, LSDR

Frequency range 1 GHz – 18 GHz:



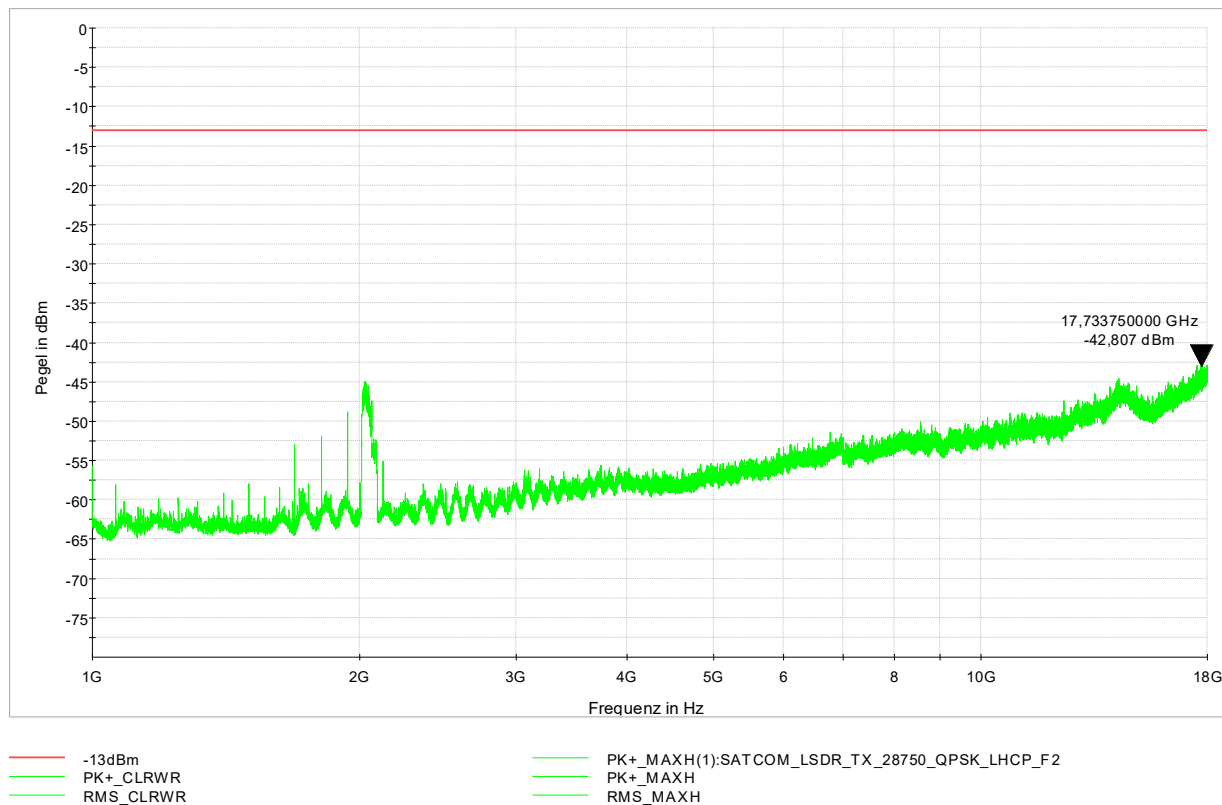
Tuned frequency = 28,75 GHz, LHCP, BPSK at 80MSymbol/s, LSDR

Frequency range 1 GHz – 18 GHz:



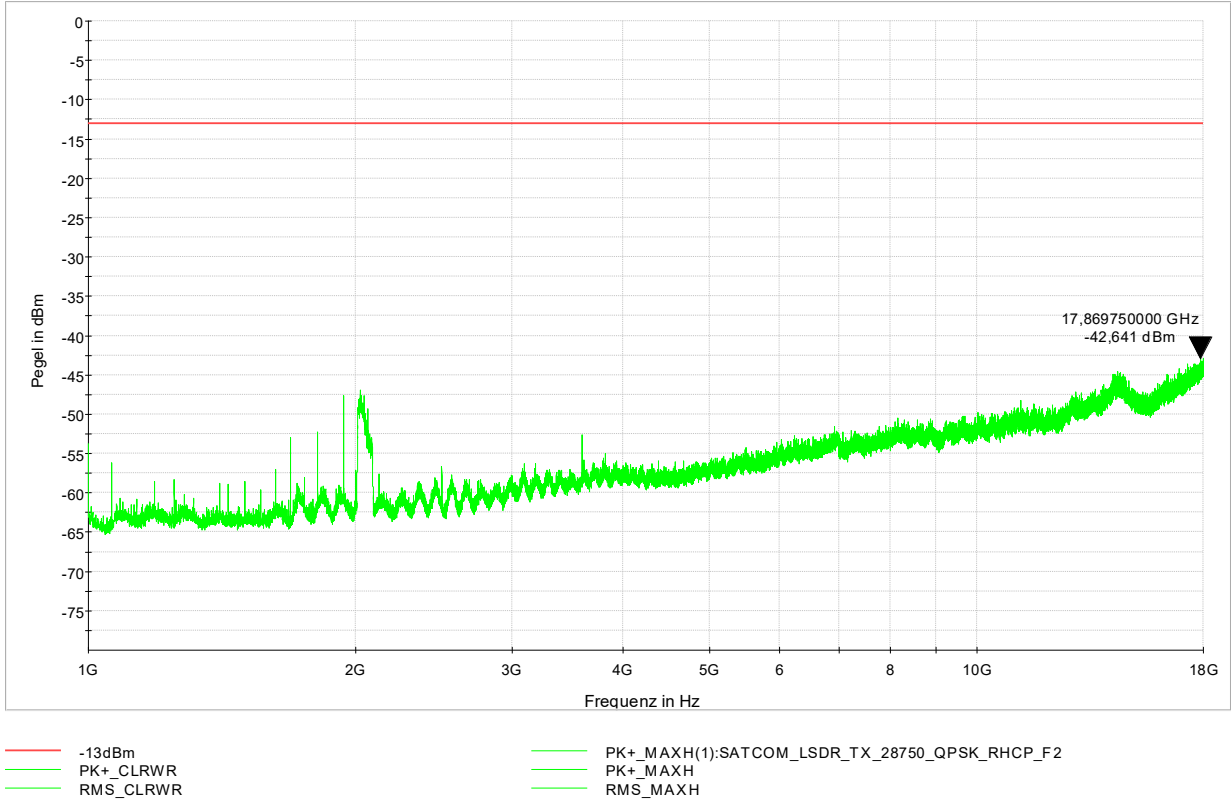
Tuned frequency = 28,75 GHz, RHCP, BPSK at 80MSymbol/s, LSDR

Frequency range 1 GHz – 18 GHz:



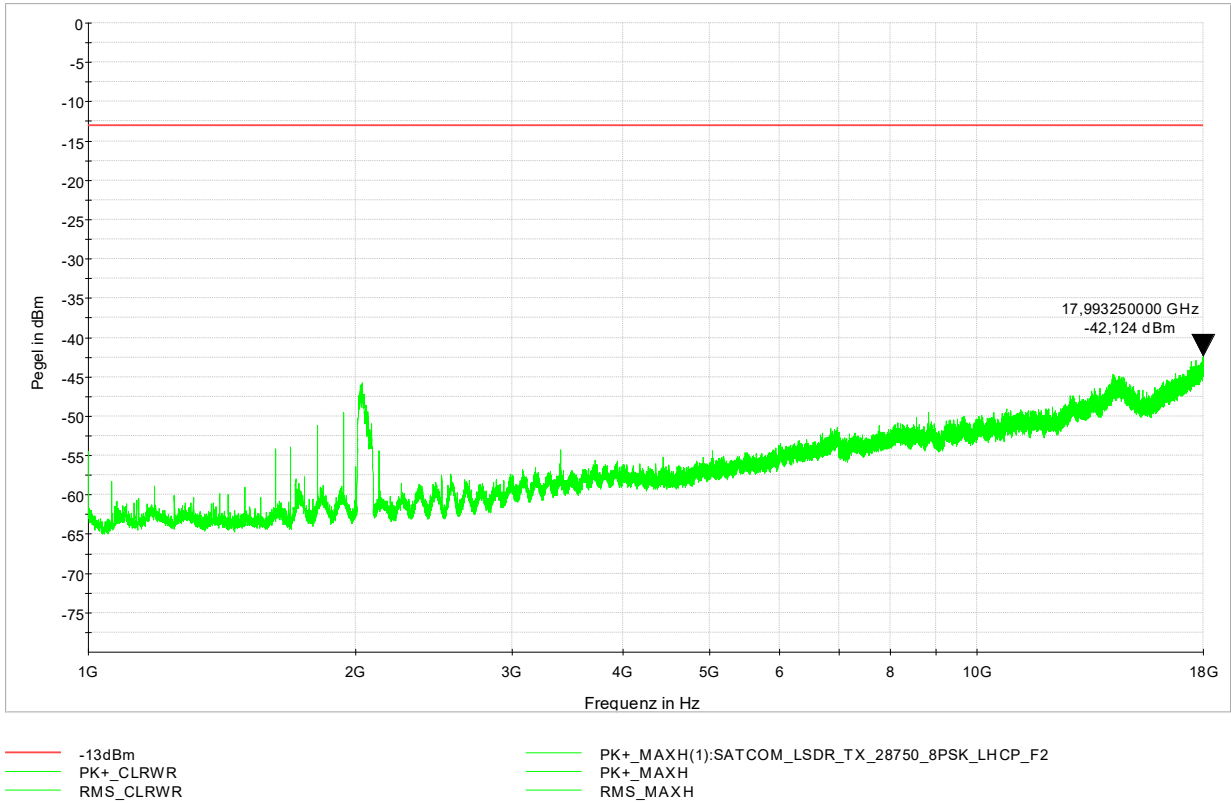
Tuned frequency = 28,75 GHz, LHCP, QPSK at 80MSymbol/s, LSDR

Frequency range 1 GHz – 18 GHz:



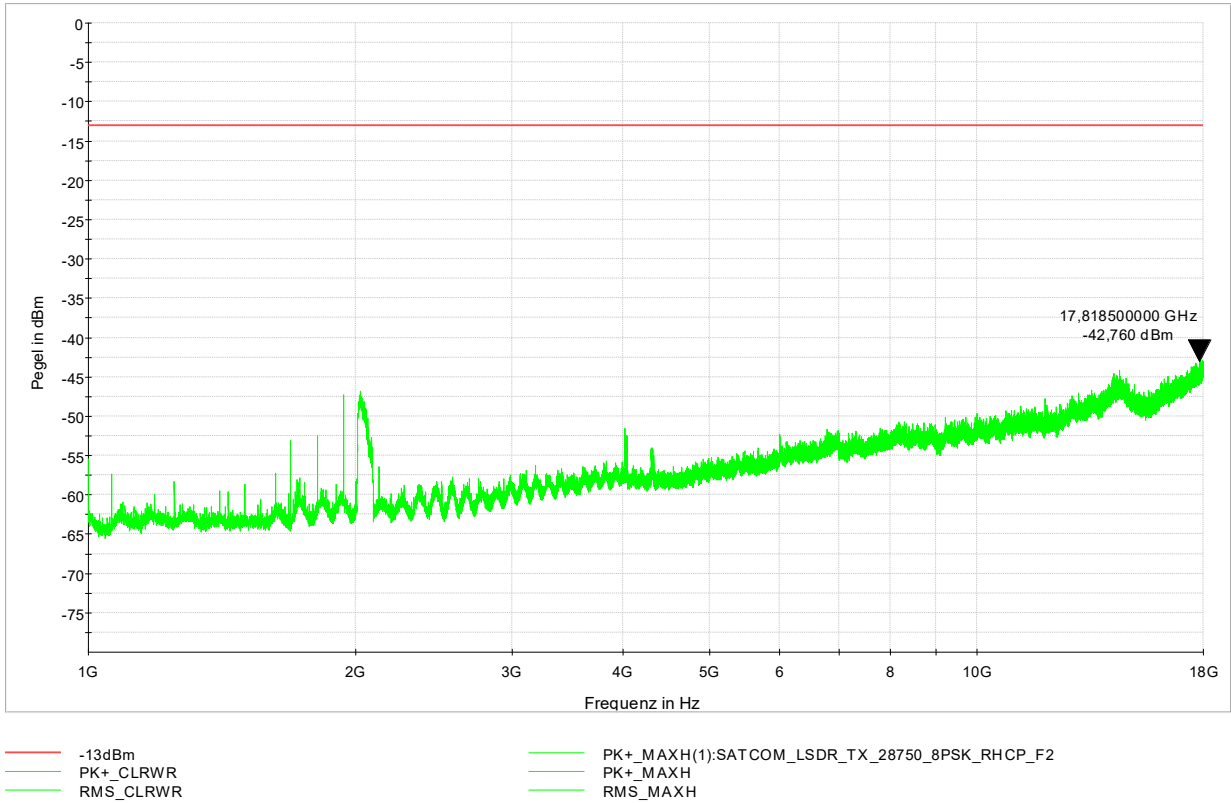
Tuned frequency = 28,75 GHz, RHCP, QPSK at 80MSymbol/s, LSDR

Frequency range 1 GHz – 18 GHz:



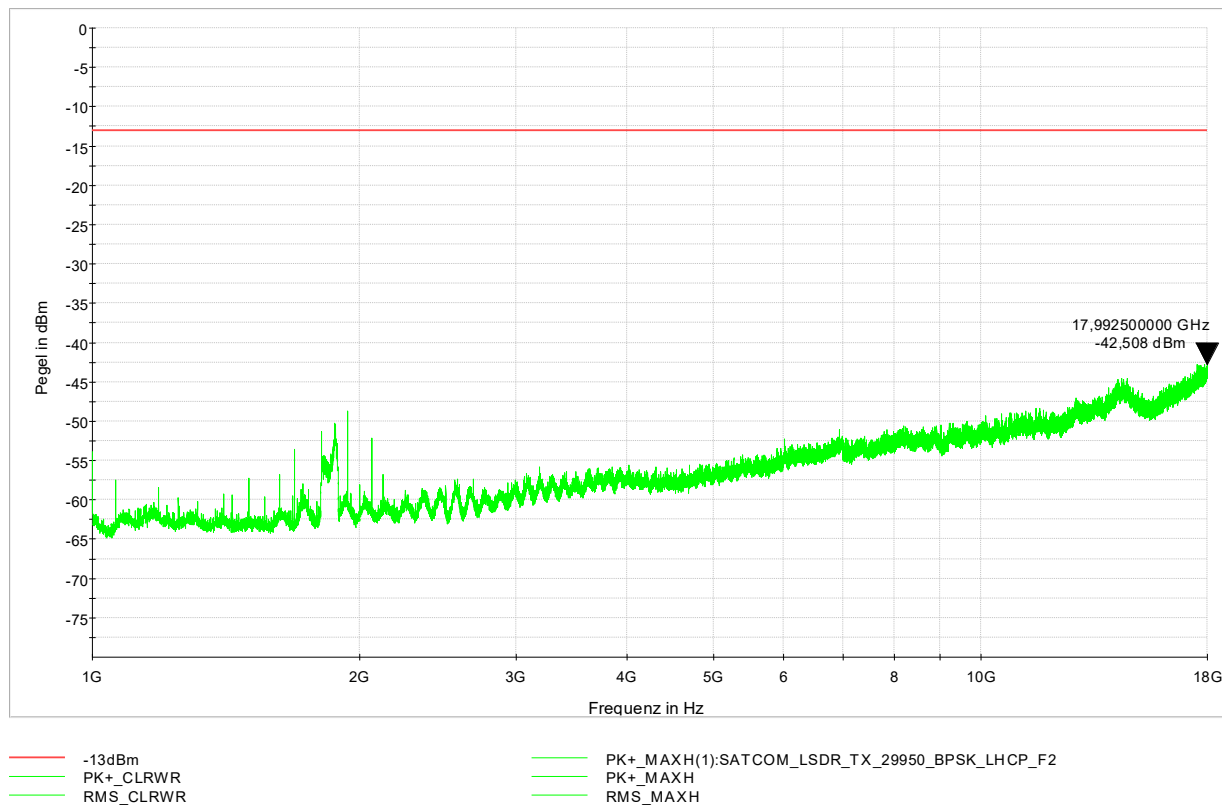
Tuned frequency = 28,75 GHz, LHCP, 8PSK at 80MSymbol/s, LSDR

Frequency range 1 GHz – 18 GHz:



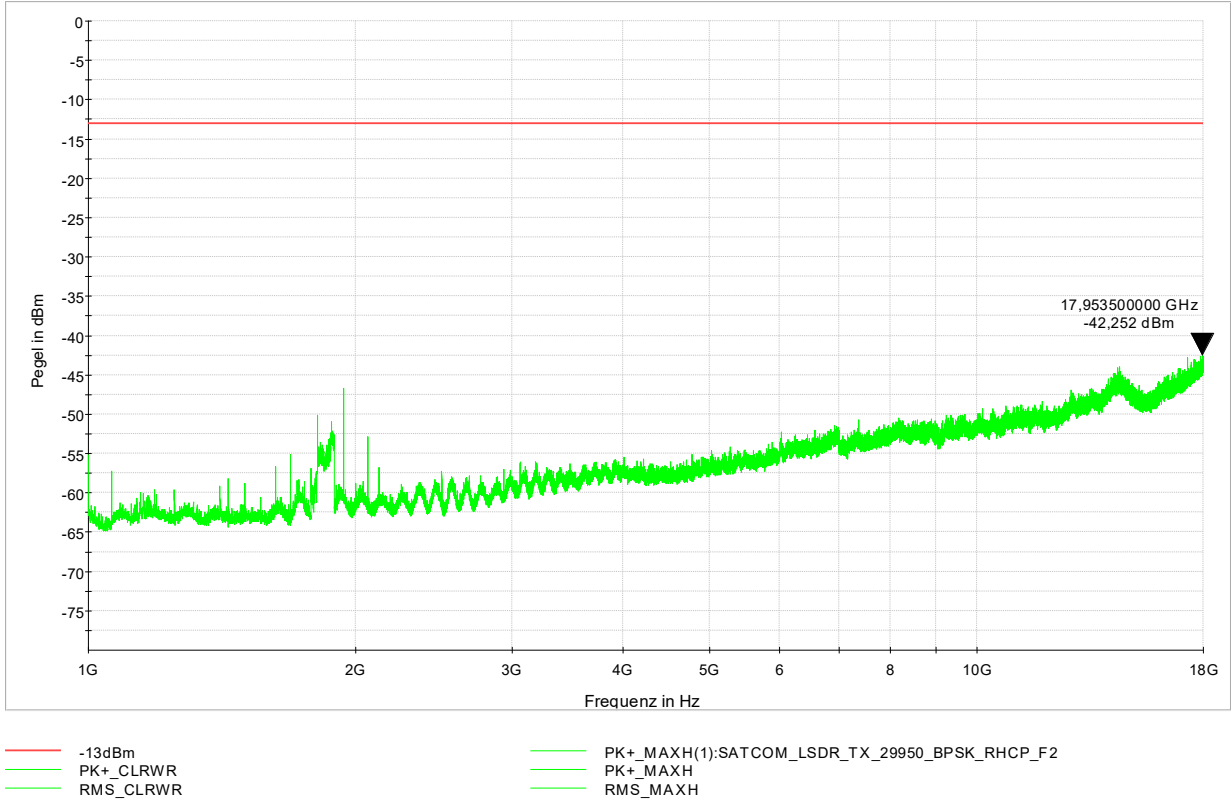
Tuned frequency = 28,75 GHz, RHCP, 8PSK at 80MSymbol/s, LSDR

Frequency range 1 GHz – 18 GHz:



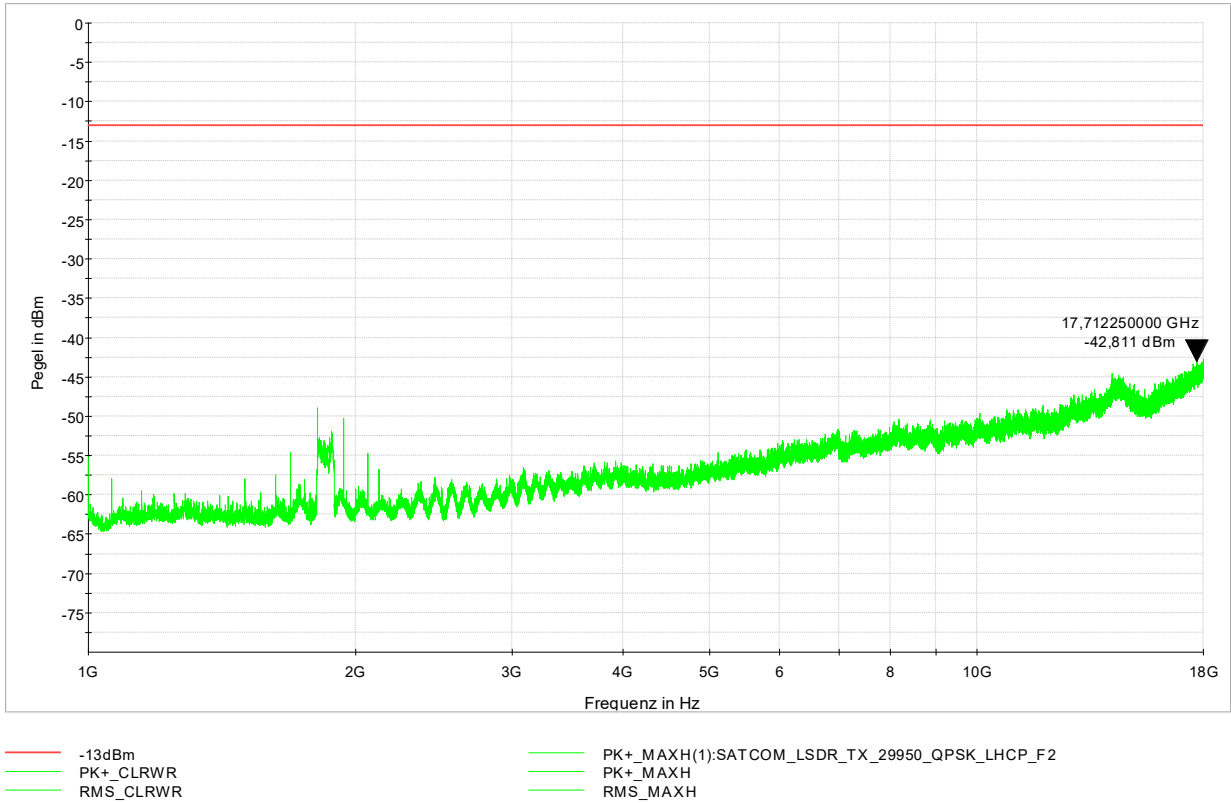
Tuned frequency = 29,95 GHz, LHCP, BPSK at 80MSymbol/s, LSDR

Frequency range 1 GHz – 18 GHz:



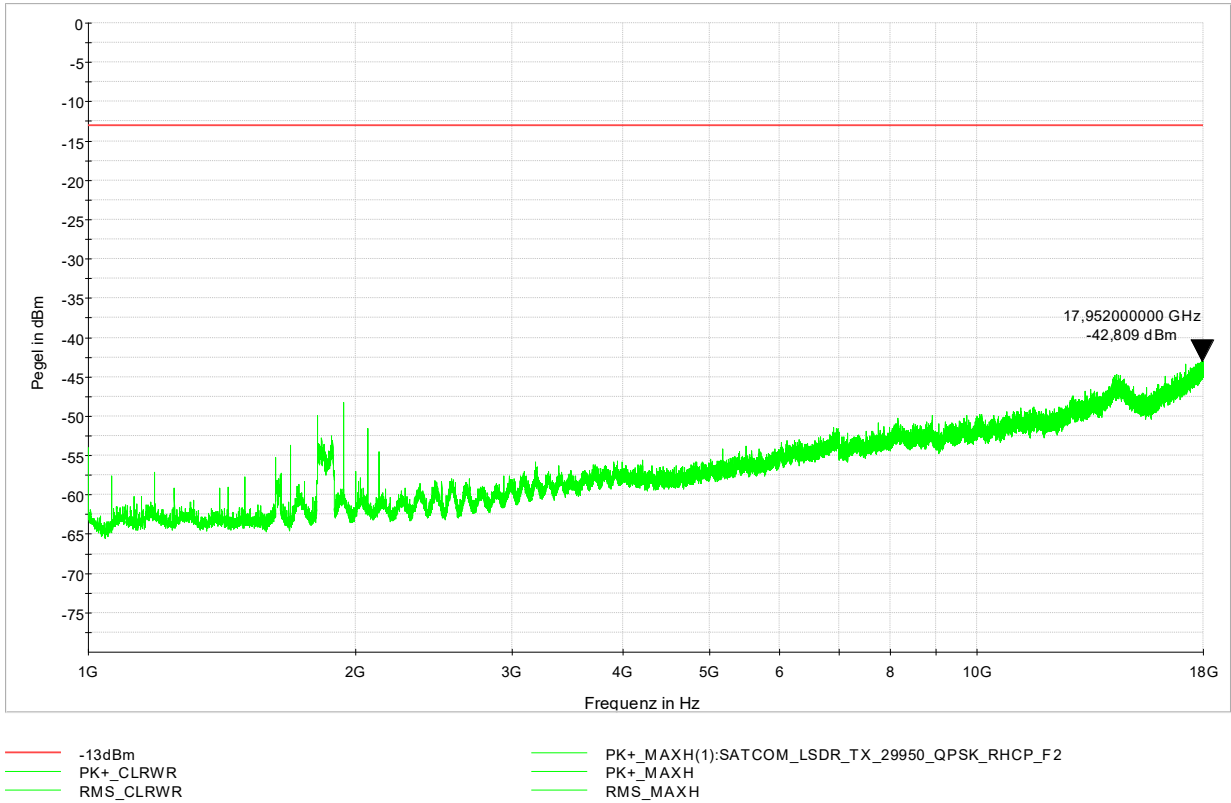
Tuned frequency = 29,95 GHz, RHCP, BPSK at 80MSymbol/s, LSDR

Frequency range 1 GHz – 18 GHz:



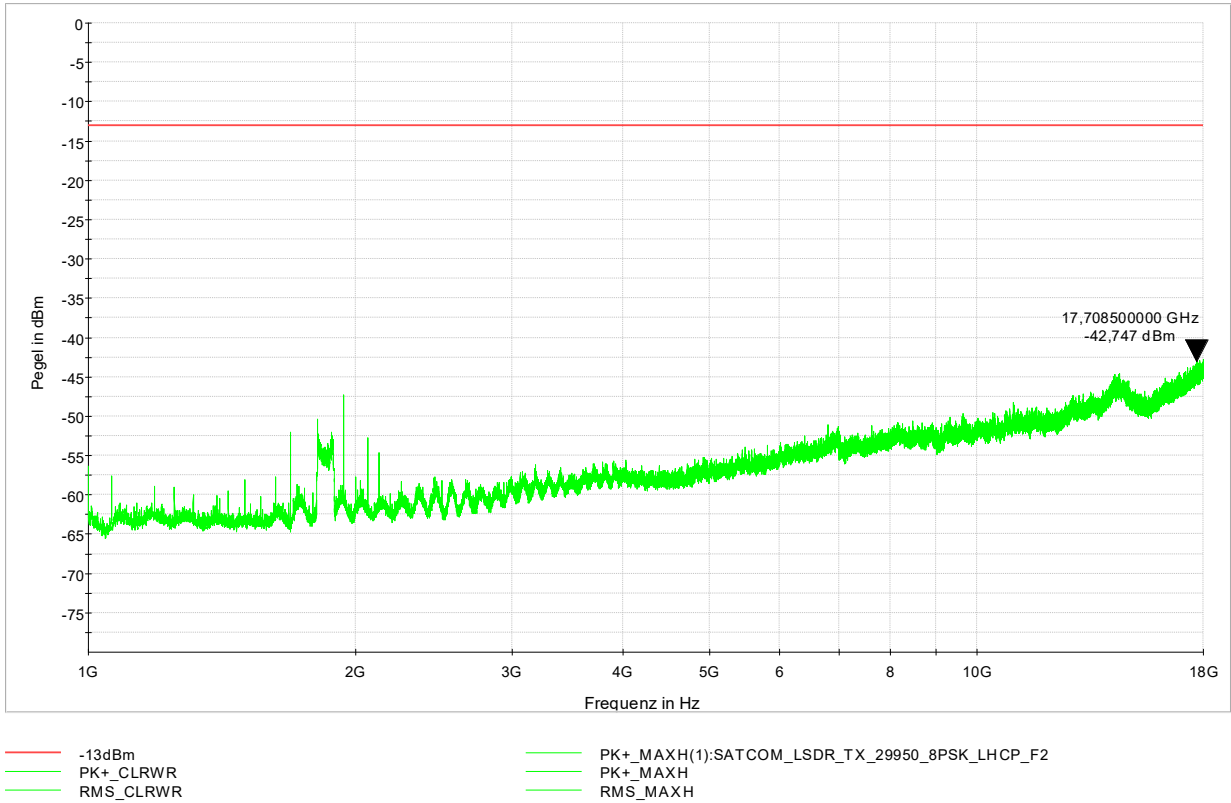
Tuned frequency = 29,95 GHz, LHCP, QPSK at 80MSymbol/s, LSDR

Frequency range 1 GHz – 18 GHz:

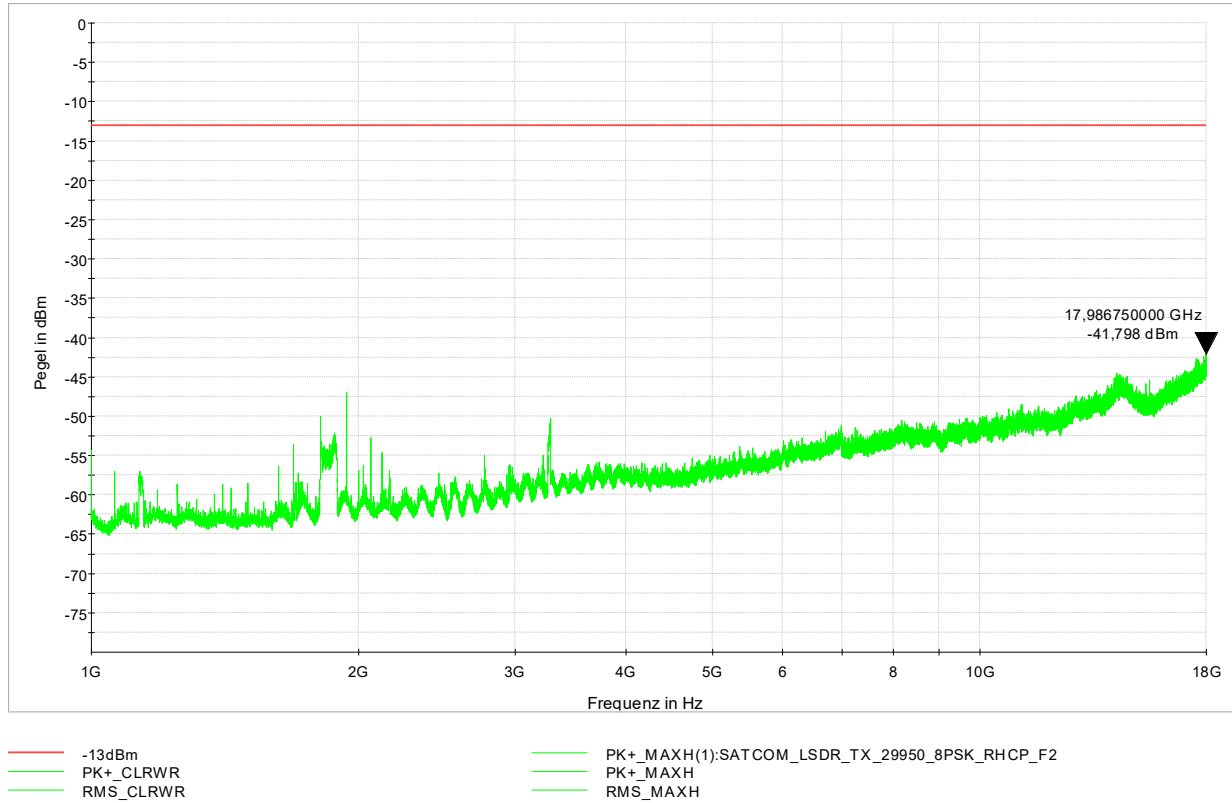


Tuned frequency = 29,95 GHz, RHCP, QPSK at 80MSymbol/s, LSDR

Frequency range 1 GHz – 18 GHz:



Tuned frequency = 29,95 GHz, LHCP, 8PSK at 80MSymbol/s, LSDR

Frequency range 1 GHz – 18 GHz:

Tuned frequency = 29,95 GHz, RHCP, 8PSK at 80MSymbol/s, LSDR