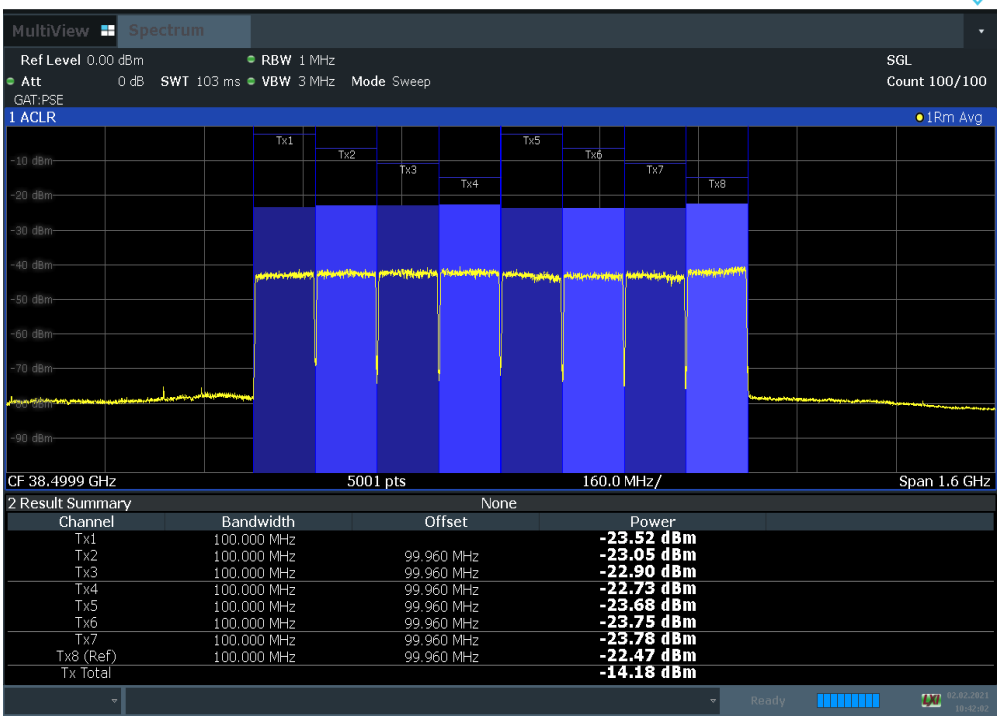
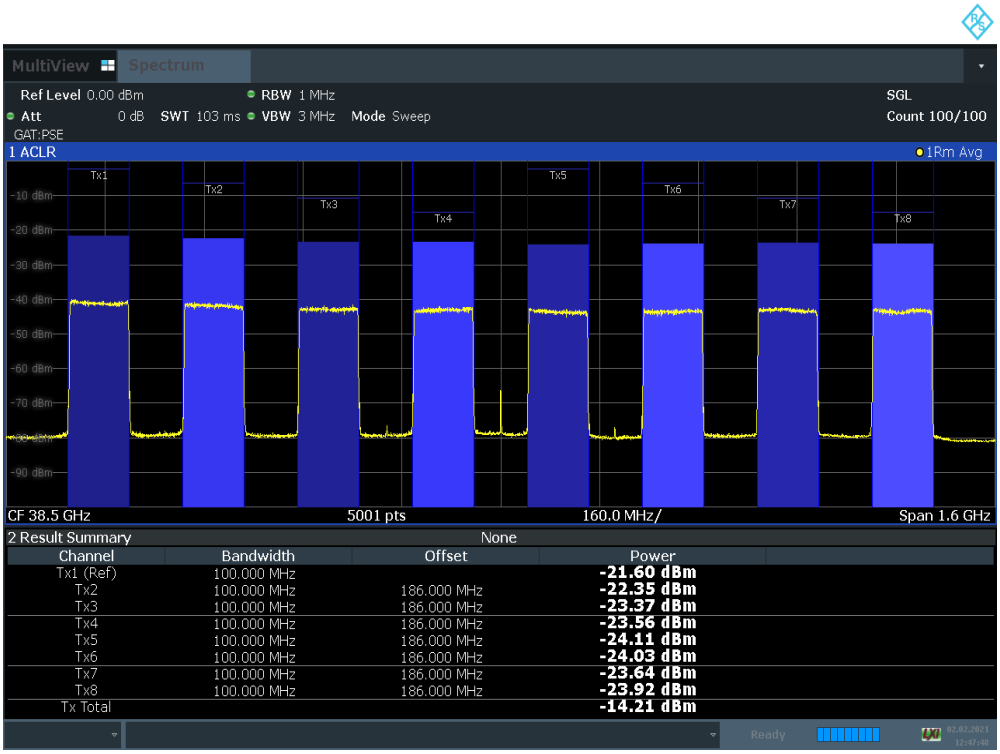
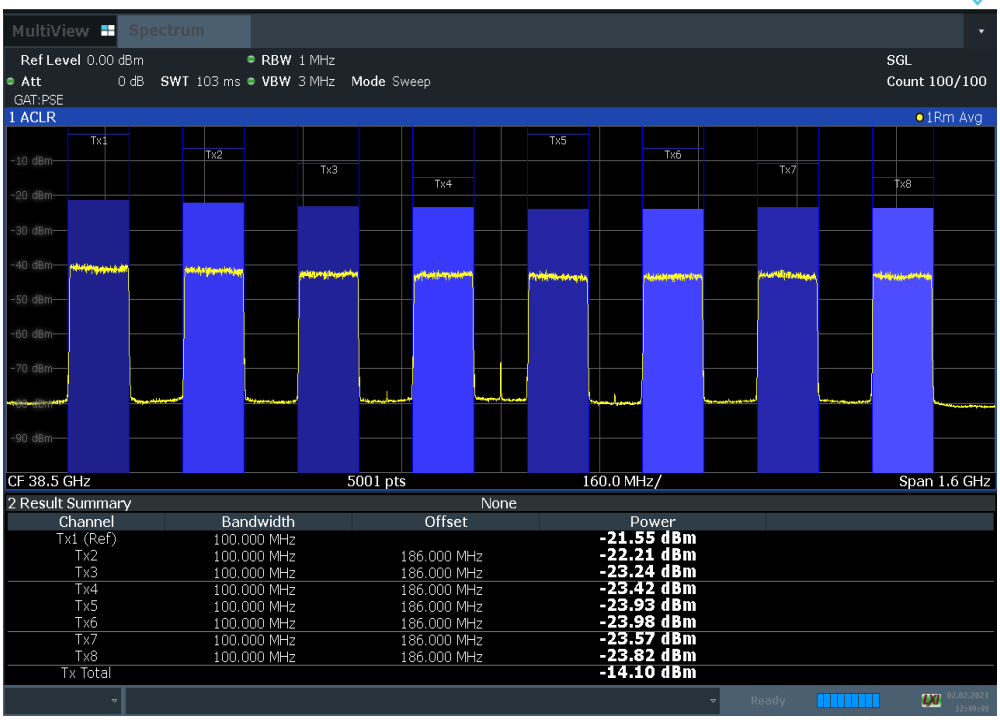


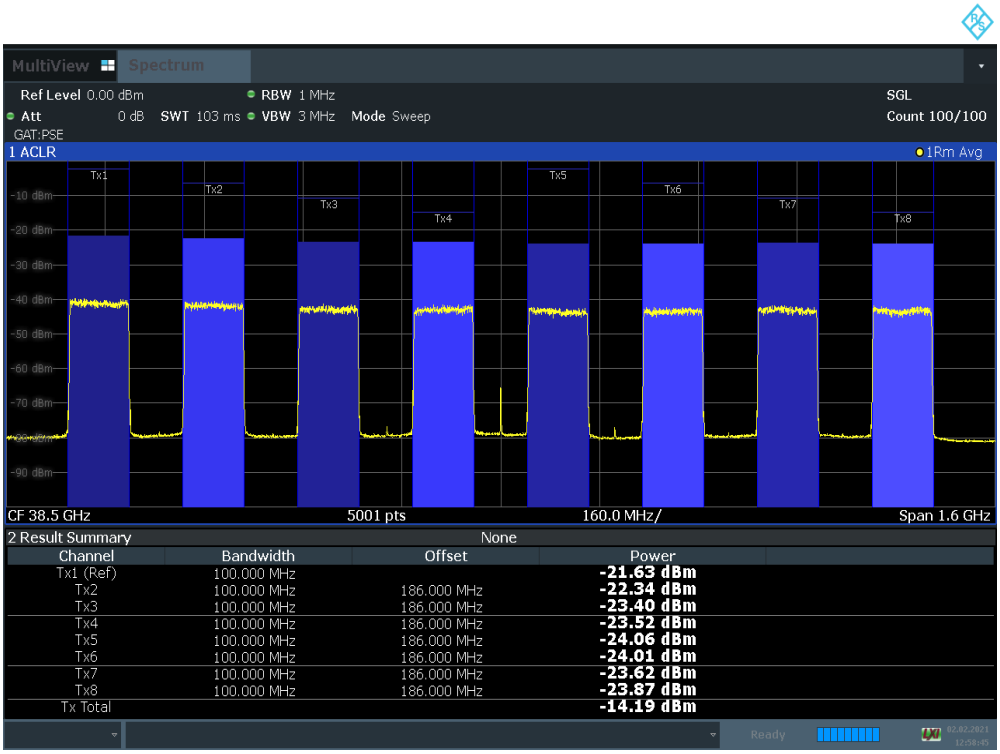
Plot 7-120. Antenna D EIRP Density Plot (100 MHz BW 8CC 64QAM Mid Channel)



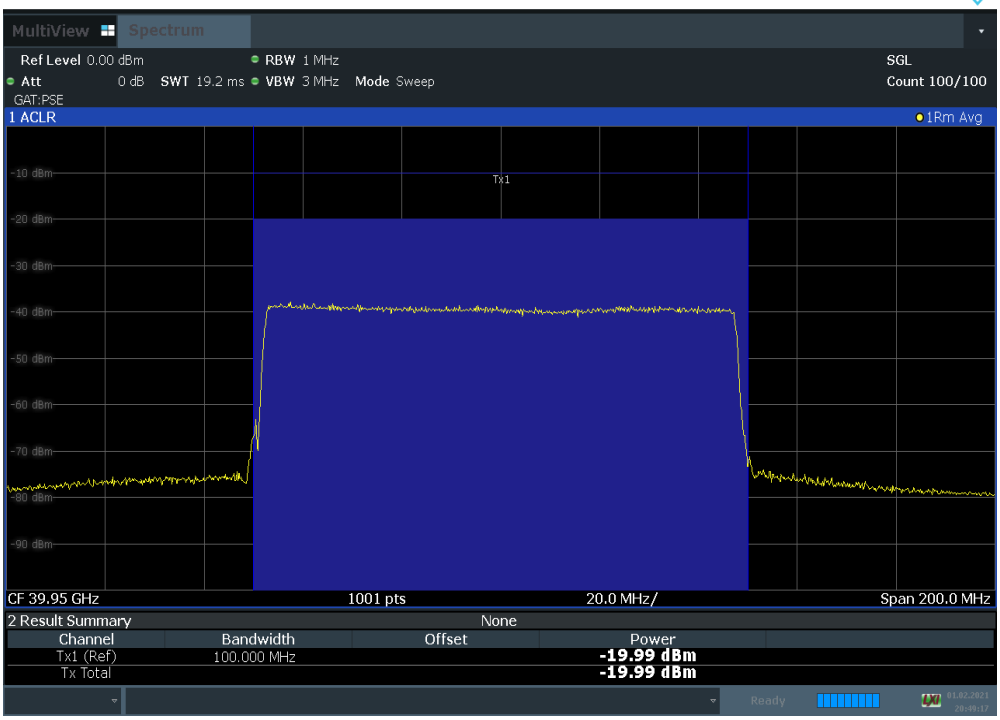
Plot 7-121. Antenna D EIRP Density Plot (100 MHz BW 8CC NC QPSK Mid Channel)



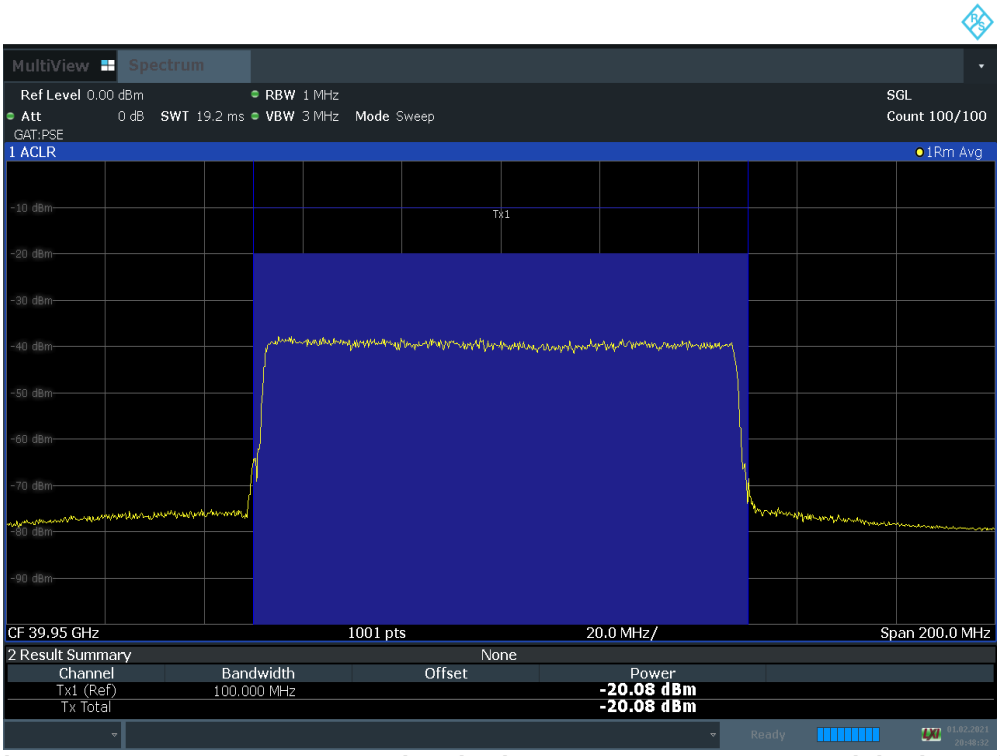
Plot 7-122. Antenna D EIRP Density Plot (100 MHz BW 8CC NC 16QAM Mid Channel)



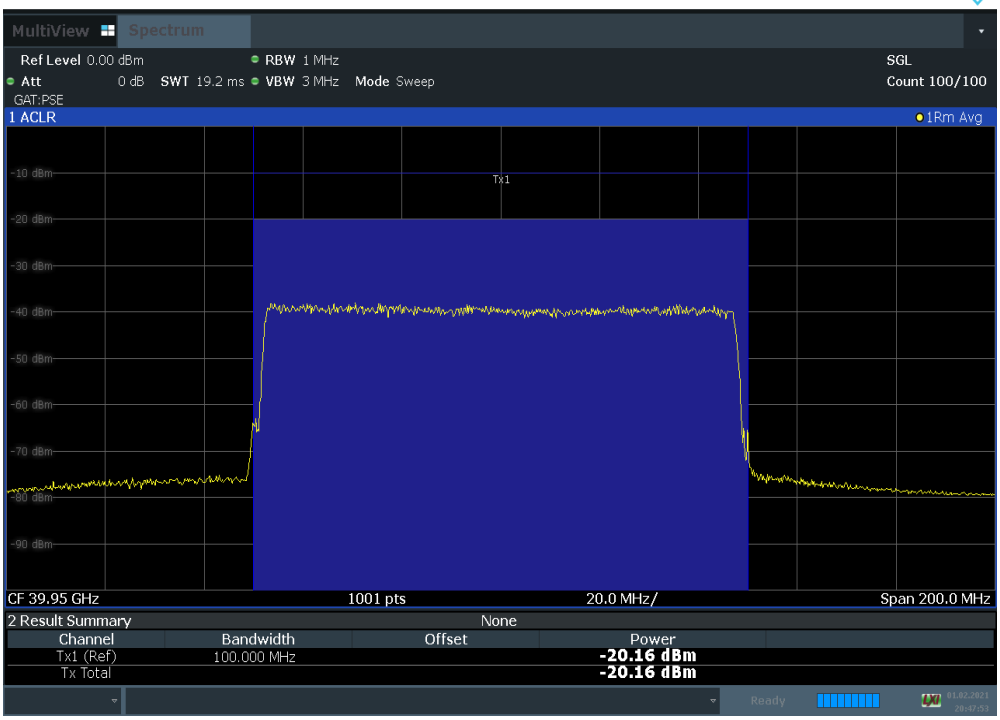
Plot 7-123. Antenna D EIRP Density Plot (100 MHz BW 8CC NC 64QAM Mid Channel)



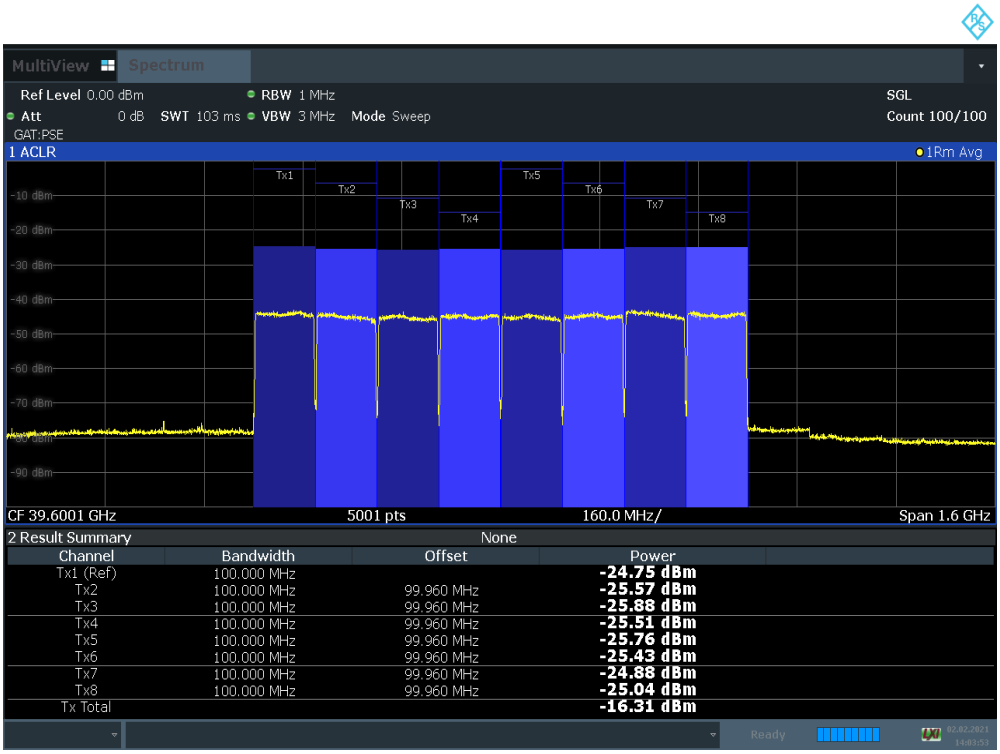
Plot 7-124. Antenna D EIRP Density Plot (100 MHz BW 1CC QPSK High Channel)



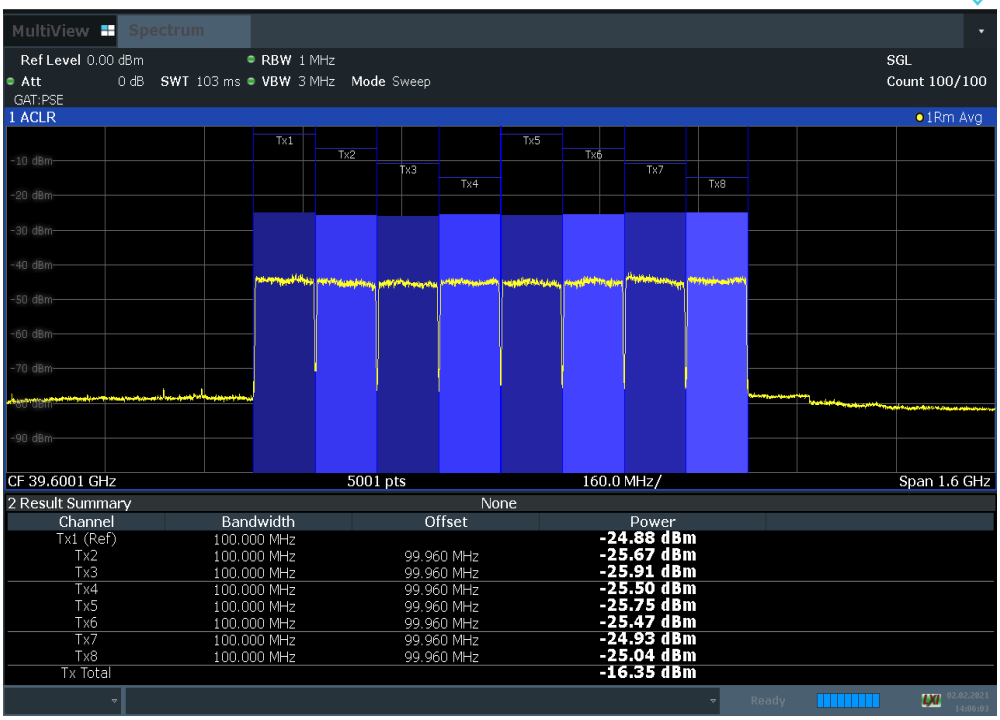
Plot 7-125. Antenna D EIRP Density Plot (100 MHz 1CC BW 16QAM High Channel)



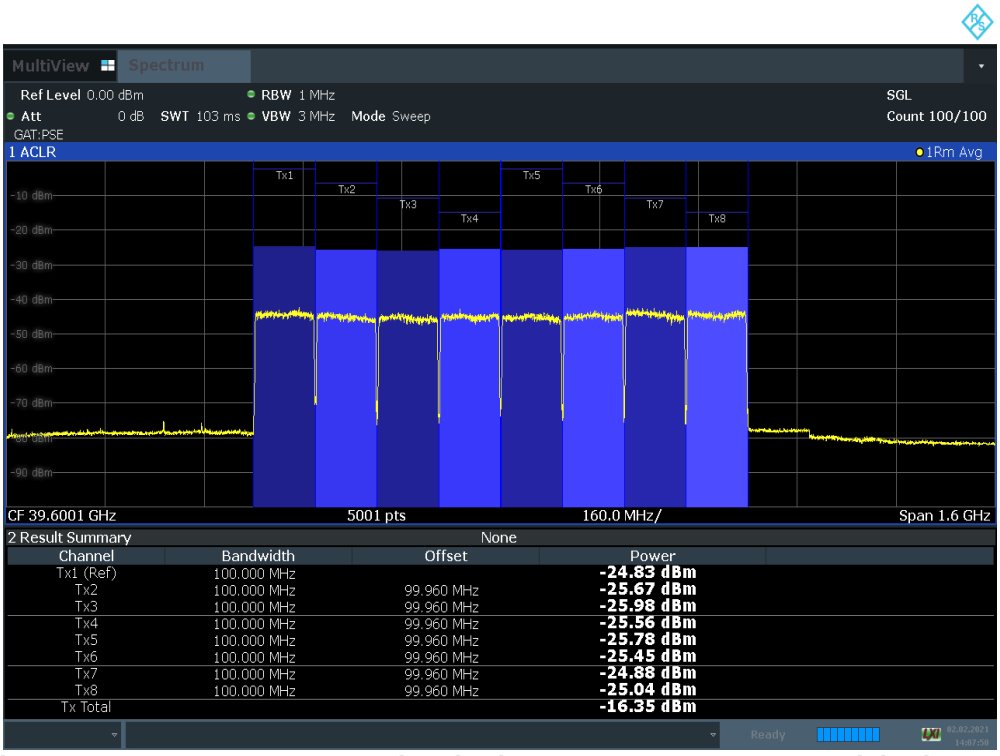
Plot 7-126. Antenna D EIRP Density Plot (100 MHz 1CC BW 64QAM High Channel)



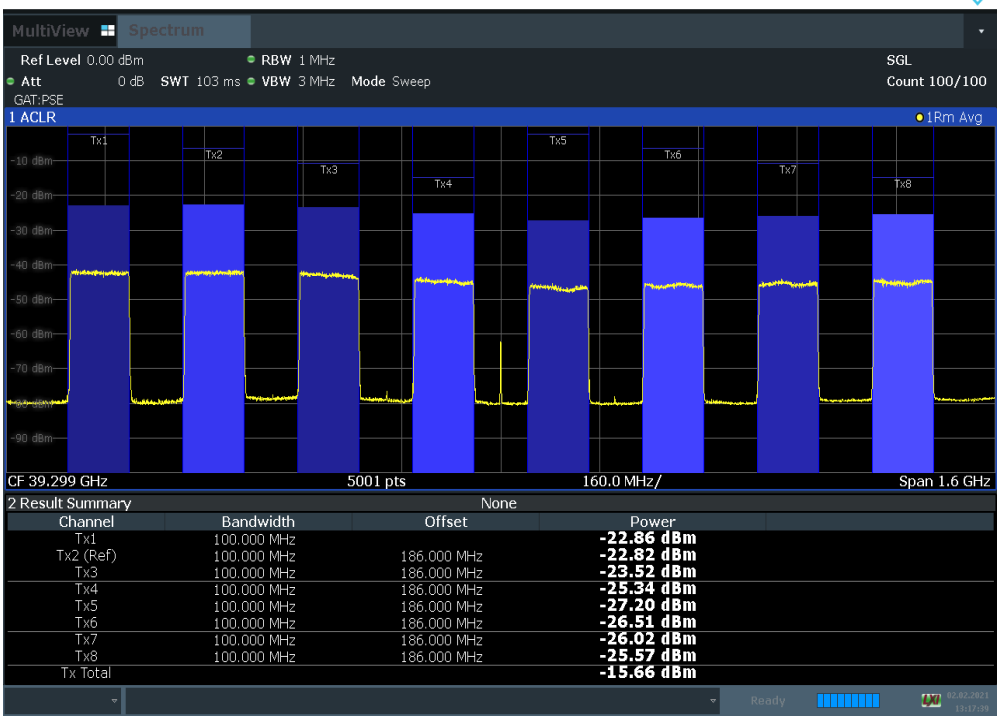
Plot 7-127. Antenna D EIRP Density Plot (100 MHz BW 8CC QPSK High Channel)



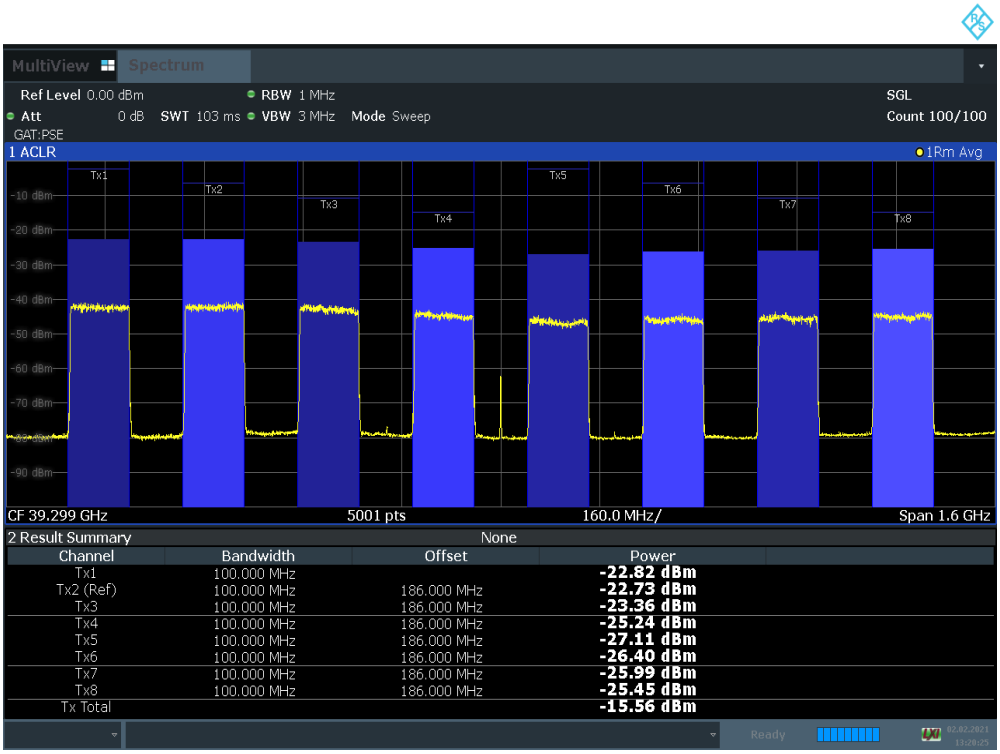
Plot 7-128. Antenna D EIRP Density Plot (100 MHz BW 8CC 16QAM High Channel)



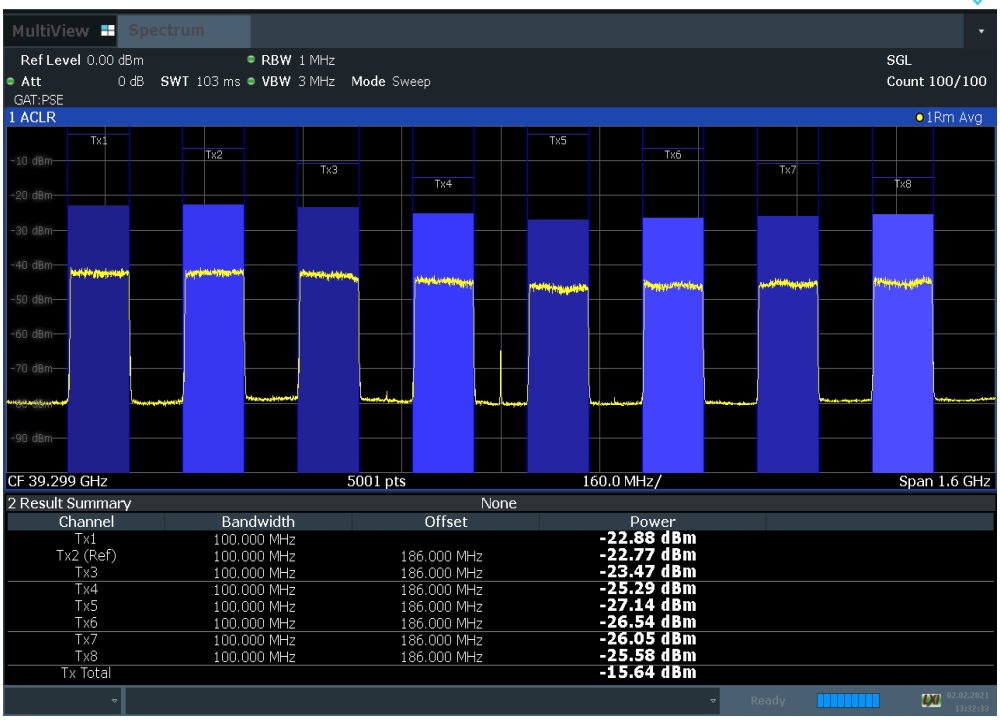
Plot 7-129. Antenna D EIRP Density Plot (100 MHz BW 8CC 64QAM High Channel)



Plot 7-130. Antenna D EIRP Density Plot (100 MHz BW 8CC NC QPSK High Channel)



Plot 7-131. Antenna D EIRP Density Plot (100 MHz BW 8CC NC 16QAM High Channel)



Plot 7-132. Antenna D EIRP Density Plot (100 MHz BW 8CC NC 64QAM High Channel)

7.3.5 MIMO EIRP Density

Antenna	Bandwidth	Configuration	Chan.	Frequency	Modulation	Ant A [mW]	Ant C [mW]	Average e.i.r.p. PSD	PSD Limit	Margin
	[MHz]			[GHz]				[dBm/100MHz]	[dBm/100MHz]	[dB]
A + C	100	1CC	Low	37.050	QPSK	117.17	110.29	53.57	75.00	21.43
	100		Low	37.050	16QAM	115.88	106.77	53.48	75.00	21.52
	100		Low	37.050	64QAM	119.14	112.94	53.66	75.00	21.34
	100	8CC	Low	37.050	QPSK	33.78	32.70	48.23	75.00	26.77
	100		Low	37.050	16QAM	34.85	32.94	48.31	75.00	26.69
	100		Low	37.050	64QAM	35.01	33.13	48.33	75.00	26.67
	100	8NC	Low	37.050	QPSK	28.99	30.65	47.76	75.00	27.24
	100		Low	37.050	16QAM	28.41	29.51	47.63	75.00	27.37
	100		Low	37.050	64QAM	28.17	29.86	47.64	75.00	27.36
	100	1CC	Mid	38.500	QPSK	104.80	99.79	53.11	75.00	21.89
	100		Mid	38.500	16QAM	102.64	97.97	53.02	75.00	21.98
	100		Mid	38.500	64QAM	104.37	95.70	53.01	75.00	21.99
	100	8CC	Mid	38.500	QPSK	33.18	34.30	48.29	75.00	26.71
	100		Mid	38.500	16QAM	34.19	36.09	48.47	75.00	26.53
	100		Mid	38.500	64QAM	32.92	35.01	48.32	75.00	26.68
	100	8NC	Mid	38.500	QPSK	36.54	38.64	48.76	75.00	26.24
	100		Mid	38.500	16QAM	35.84	37.98	48.68	75.00	26.32
	100		Mid	38.500	64QAM	36.87	39.15	48.81	75.00	26.19
	100	1CC	High	39.950	QPSK	104.73	82.48	52.72	75.00	22.28
	100		High	39.950	16QAM	101.69	81.71	52.63	75.00	22.37
	100		High	39.950	64QAM	104.54	82.28	52.71	75.00	22.29
	100	8CC	High	39.950	QPSK	30.35	26.93	**47.58**	75.00	27.42
	100		High	39.950	16QAM	29.04	25.18	47.34	75.00	27.66
	100		High	39.950	64QAM	30.38	26.79	47.57	75.00	27.43
	100	8NC	High	39.950	QPSK	44.52	42.10	49.38	75.00	25.62
	100		High	39.950	16QAM	44.99	41.42	49.37	75.00	25.63
	100		High	39.950	64QAM	45.10	42.36	49.42	75.00	25.58

Table 7-11. MIMO EIRP Density Summary Data (Antenna A + C)

Antenna	Bandwidth	Configuration	Chan.	Frequency	Modulation	Ant B [mW]	Ant D [mW]	Average e.i.r.p. PSD	PSD Limit	Margin
	[MHz]			[GHz]				[dBm/100MHz]	[dBm/100MHz]	[dB]
B + D	100	1CC	Low	37.050	QPSK	121.92	122.90	53.89	75.00	21.11
	100		Low	37.050	16QAM	123.98	128.91	54.03	75.00	20.97
	100		Low	37.050	64QAM	120.43	116.94	53.75	75.00	21.25
	100	8CC	Low	37.050	QPSK	37.08	36.98	48.70	75.00	26.30
	100		Low	37.050	16QAM	36.43	36.60	48.64	75.00	26.36
	100		Low	37.050	64QAM	35.31	35.57	48.51	75.00	26.49
	100	8NC	Low	37.050	QPSK	34.11	33.32	48.29	75.00	26.71
	100		Low	37.050	16QAM	34.06	34.50	48.36	75.00	26.64
	100		Low	37.050	64QAM	34.27	33.61	48.32	75.00	26.68
	100	1CC	Mid	38.500	QPSK	108.60	97.74	53.15	75.00	21.85
	100		Mid	38.500	16QAM	106.76	98.00	53.11	75.00	21.89
	100		Mid	38.500	64QAM	104.97	99.48	53.11	75.00	21.89
	100	8CC	Mid	38.500	QPSK	34.53	34.85	48.41	75.00	26.59
	100		Mid	38.500	16QAM	34.94	34.72	48.43	75.00	26.57
	100		Mid	38.500	64QAM	33.63	33.46	48.27	75.00	26.73
	100	8NC	Mid	38.500	QPSK	43.19	40.84	49.24	75.00	25.76
	100		Mid	38.500	16QAM	43.46	41.33	49.28	75.00	25.72
	100		Mid	38.500	64QAM	43.34	40.56	49.24	75.00	25.76
	100	1CC	High	39.950	QPSK	109.61	82.91	52.84	75.00	22.16
	100		High	39.950	16QAM	108.45	81.09	52.78	75.00	22.22
	100		High	39.950	64QAM	110.27	79.73	52.79	75.00	22.21
	100	8CC	High	39.950	QPSK	32.93	27.69	**47.83**	75.00	27.17
	100		High	39.950	16QAM	32.89	26.87	47.76	75.00	27.24
	100		High	39.950	64QAM	32.39	27.16	47.75	75.00	27.25
	100	8NC	High	39.950	QPSK	46.08	43.18	49.51	75.00	25.49
	100		High	39.950	16QAM	46.01	44.11	49.55	75.00	25.45
	100		High	39.950	64QAM	45.28	43.64	49.49	75.00	25.51

Table 7-12. MIMO EIRP Density Summary Data (Antenna B + D)

Antenna	Bandwidth	Configuration	Chan.	Frequency	Modulation	Ant A [mW]	Ant B [mW]	Ant C [mW]	Ant D [mW]	Average e.i.r.p. PSD	PSD Limit	Margin
	[MHz]			[GHz]						[dBm/100MHz]	[dBm/100MHz]	[dB]
A + B + C + D	100	1CC	Low	37.050	QPSK	117.17	121.92	110.29	122.90	56.74	75.00	18.26
	100		Low	37.050	16QAM	115.88	123.98	106.77	128.91	56.77	75.00	18.23
	100		Low	37.050	64QAM	119.14	120.43	112.94	116.94	56.72	75.00	18.28
	100	8CC	Low	37.050	QPSK	33.78	37.08	32.70	36.98	51.48	75.00	23.52
	100		Low	37.050	16QAM	34.85	36.43	32.94	36.60	51.49	75.00	23.51
	100		Low	37.050	64QAM	35.01	35.31	33.13	35.57	51.43	75.00	23.57
	100	8NC	Low	37.050	QPSK	28.99	34.11	30.65	33.32	51.04	75.00	23.96
	100		Low	37.050	16QAM	28.41	34.06	29.51	34.50	51.02	75.00	23.98
	100		Low	37.050	64QAM	28.17	34.27	29.86	33.61	51.00	75.00	24.00
	100	1CC	Mid	38.500	QPSK	104.80	108.60	99.79	97.74	56.14	75.00	18.86
	100		Mid	38.500	16QAM	102.64	106.76	97.97	98.00	56.08	75.00	18.92
	100		Mid	38.500	64QAM	104.37	104.97	95.70	99.48	56.07	75.00	18.93
	100	8CC	Mid	38.500	QPSK	33.18	34.53	34.30	34.85	51.36	75.00	23.64
	100		Mid	38.500	16QAM	34.19	34.94	36.09	34.72	51.46	75.00	23.54
	100		Mid	38.500	64QAM	32.92	33.63	35.01	33.46	51.30	75.00	23.70
	100	8NC	Mid	38.500	QPSK	36.54	43.19	38.64	40.84	52.02	75.00	22.98
	100		Mid	38.500	16QAM	35.84	43.46	37.98	41.33	52.00	75.00	23.00
	100		Mid	38.500	64QAM	36.87	43.34	39.15	40.56	52.04	75.00	22.96
	100	1CC	High	39.950	QPSK	104.73	109.61	82.48	82.91	55.79	75.00	19.21
	100		High	39.950	16QAM	101.69	108.45	81.71	81.09	55.72	75.00	19.28
	100		High	39.950	64QAM	104.54	110.27	82.28	79.73	55.76	75.00	19.24
	100	8CC	High	39.950	QPSK	30.35	32.93	26.93	27.69	**50.72**	75.00	24.28
	100		High	39.950	16QAM	29.04	32.89	25.18	26.87	50.57	75.00	24.43
	100		High	39.950	64QAM	30.38	32.39	26.79	27.16	50.67	75.00	24.33
	100	8NC	High	39.950	QPSK	44.52	46.08	42.10	43.18	52.45	75.00	22.55
	100		High	39.950	16QAM	44.99	46.01	41.42	44.11	52.47	75.00	22.53
	100		High	39.950	64QAM	45.10	45.28	42.36	43.64	52.46	75.00	22.54

Table 7-13. MIMO EIRP Density Summary Data (Antenna A + B + C + D)

7.4 RF Conducted Output Power

§2.1046

Test Overview

RF conducted output power measurements are performed using broadband horn antennas. The conducted power is determined by maximizing the full spectrum EIRP for all component carrier configurations and then subtracting the known antenna gain from the EIRP. 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

ANSI C63.26-2015 Section 5.2.4.4.1
ANSI C63.26-2015 Section 6.4

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
2. RBW = 1 – 5 % of the expected OBW
3. VBW ≥ 3 x RBW
4. Span = 2x to 3x the OBW
5. No. of sweep points ≥ 2 x span / RBW
6. Detector = RMS
7. The integration bandwidth was roughly set equal to the measured RF Conducted Output Power of the signal for signals with continuous operation. For signals with burst transmission, the "gating" function was enabled to ensure that measurements are performed during times in which the transmitter is operating at its maximum power
8. Trace mode = trace averaging (RMS) over 100 sweeps
9. The trace was allowed to stabilize

Test Notes

1) The EUT was tested while positioned upright and mounted on a mast at 1.5 m height. The worst case emissions are reported with the EUT in this fixed position and with the modulations and active component carriers shown in the tables below.

2) Elements within the same antenna array are correlated to produce beamforming array gain, only one antenna array was active.

3) Measurements were taken in the far field of the mmWave signal based on the formula: R ≥ 2D^2/wavelength.

4) The test case with from 1CC to 8CC active, was selected for the worst case emission testing as it created the highest EIRP within 100 MHz bandwidth carrier configurations.

5) The average EIRP reported below is calculated per formula specific in d) of ANSI C63.26-2015 Section 5.2.7:
EIRP (dBm) = E (dBµV/m) + 20log(D) -104.8; where D is the measurement distance (in the far field region) in m.
For this section, all EIRP density measurements were performed at a distance of 2.61 m, so the effective correction is:
EIRP (dBm) = E (dBuV/m) – 96.46 dB
= Analyzer Level (dBm) + AFCL (dB/m) + 107 dB – 96.46 dB
= Analyzer Level (dBm) + AFCL (dB/m) + 10.53 dB

6) The conducted average power over the full channel BW is calculated as follows:
Conducted Average Power (dBm) = Average EIRP (dBm) – Antenna Gain (dBi)

7) Per ANSI C63.26-2015 Section 6.4, individual EIRPs are also summed before compared to the limit.

8) The angle of the horn antenna was rotated to maximize and find the worst case emissions. Worst case EIRP is reported below.

9) 7.3 Equivalent Isotropic Radiated Power (EIRP) Density plots cover for 7.4 Conducted Output Power plot.

7.4.1 Antenna A Conducted Power

Antenna	Bandwidth	Configuration	Chan.	Frequency	Modulation	Analyzer Level	AFCL	EUT Antenna Gain	Average e.i.r.p. PSD	Conducted Average Power
	[MHz]			[GHz]		[dBm]	[dB/m]	[dBi]	[dBm]	[dBm]
A	100	1CC	Low	37.050	QPSK	-16.01	66.70	26.57	50.69	24.12
	100		Low	37.050	16QAM	-16.06	66.70	26.57	50.64	24.07
	100		Low	37.050	64QAM	-15.94	66.70	26.57	50.76	24.19
	100	8CC	Low	37.050	QPSK	-21.42	66.70	26.57	45.29	18.72
	100		Low	37.050	16QAM	-21.28	66.70	26.57	45.42	18.85
	100		Low	37.050	64QAM	-21.26	66.70	26.57	45.44	18.87
	100	8NC	Low	37.050	QPSK	-22.08	66.70	26.57	44.62	18.05
	100		Low	37.050	16QAM	-22.17	66.70	26.57	44.53	17.96
	100		Low	37.050	64QAM	-22.20	66.70	26.57	44.50	17.93
	100	1CC	Mid	38.500	QPSK	-17.51	67.71	26.88	50.20	23.32
	100		Mid	38.500	16QAM	-17.60	67.71	26.88	50.11	23.23
	100		Mid	38.500	64QAM	-17.53	67.71	26.88	50.19	23.31
	100	8CC	Mid	38.500	QPSK	-22.50	67.71	26.88	45.21	18.33
	100		Mid	38.500	16QAM	-22.37	67.71	26.88	45.34	18.46
	100		Mid	38.500	64QAM	-22.54	67.71	26.88	45.17	18.29
	100	8NC	Mid	38.500	QPSK	-22.09	67.71	26.88	45.63	18.75
	100		Mid	38.500	16QAM	-22.17	67.71	26.88	45.54	18.66
	100		Mid	38.500	64QAM	-22.05	67.71	26.88	45.67	18.79
	100	1CC	High	39.950	QPSK	-18.97	69.17	27.00	50.20	23.20
	100		High	39.950	16QAM	-19.10	69.17	27.00	50.07	23.07
	100		High	39.950	64QAM	-18.98	69.17	27.00	50.19	23.19
	100	8CC	High	39.950	QPSK	-24.35	69.17	27.00	44.82	17.82
	100		High	39.950	16QAM	-24.54	69.17	27.00	44.63	17.63
	100		High	39.950	64QAM	-24.35	69.17	27.00	44.83	17.83
	100	8NC	High	39.950	QPSK	-22.69	69.17	27.00	46.49	19.49
	100		High	39.950	16QAM	-22.64	69.17	27.00	46.53	19.53
	100		High	39.950	64QAM	-22.63	69.17	27.00	46.54	19.54

Table 7-14. Antenna A Conducted Power Summary Data

7.4.2 Antenna B Conducted Power

Antenna	Bandwidth	Configuration	Chan.	Frequency	Modulation	Analyzer Level	AFCL	EUT Antenna Gain	Average e.i.r.p. PSD	Conducted Average Power
	[MHz]			[GHz]		[dBm]	[dB/m]	[dBi]	[dBm]	[dBm]
B	100	1CC	Low	37.050	QPSK	-15.84	66.70	26.57	50.86	24.29
	100		Low	37.050	16QAM	-15.77	66.70	26.57	50.93	24.36
	100		Low	37.050	64QAM	-15.90	66.70	26.57	50.81	24.24
	100	8CC	Low	37.050	QPSK	-21.01	66.70	26.57	45.69	19.12
	100		Low	37.050	16QAM	-21.09	66.70	26.57	45.61	19.04
	100		Low	37.050	64QAM	-21.22	66.70	26.57	45.48	18.91
	100	8NC	Low	37.050	QPSK	-21.37	66.70	26.57	45.33	18.76
	100		Low	37.050	16QAM	-21.38	66.70	26.57	45.32	18.75
	100		Low	37.050	64QAM	-21.35	66.70	26.57	45.35	18.78
	100	1CC	Mid	38.500	QPSK	-17.35	67.71	26.88	50.36	23.48
	100		Mid	38.500	16QAM	-17.43	67.71	26.88	50.28	23.40
	100		Mid	38.500	64QAM	-17.50	67.71	26.88	50.21	23.33
	100	8CC	Mid	38.500	QPSK	-22.33	67.71	26.88	45.38	18.50
	100		Mid	38.500	16QAM	-22.28	67.71	26.88	45.43	18.55
	100		Mid	38.500	64QAM	-22.45	67.71	26.88	45.27	18.39
	100	8NC	Mid	38.500	QPSK	-21.36	67.71	26.88	46.35	19.47
	100		Mid	38.500	16QAM	-21.33	67.71	26.88	46.38	19.50
	100		Mid	38.500	64QAM	-21.34	67.71	26.88	46.37	19.49
	100	1CC	High	39.950	QPSK	-18.77	69.17	27.00	50.40	23.40
	100		High	39.950	16QAM	-18.82	69.17	27.00	50.35	23.35
	100		High	39.950	64QAM	-18.75	69.17	27.00	50.42	23.42
	100	8CC	High	39.950	QPSK	-24.00	69.17	27.00	45.18	18.18
	100		High	39.950	16QAM	-24.00	69.17	27.00	45.17	18.17
	100		High	39.950	64QAM	-24.07	69.17	27.00	45.10	18.10
	100	8NC	High	39.950	QPSK	-22.54	69.17	27.00	46.64	19.64
	100		High	39.950	16QAM	-22.54	69.17	27.00	46.63	19.63
	100		High	39.950	64QAM	-22.61	69.17	27.00	46.56	19.56

Table 7-15. Antenna B Conducted Power Summary Data

7.4.3 Antenna C Conducted Power

Antenna	Bandwidth	Configuration	Chan.	Frequency	Modulation	Analyzer Level	AFCL	EUT Antenna Gain	Average e.i.r.p. PSD	Conducted Average Power
	[MHz]			[GHz]		[dBm]	[dB/m]	[dBi]	[dBm]	[dBm]
C	100	1CC	Low	37.050	QPSK	-16.28	66.70	26.57	50.43	23.86
	100		Low	37.050	16QAM	-16.42	66.70	26.57	50.28	23.71
	100		Low	37.050	64QAM	-16.17	66.70	26.57	50.53	23.96
	100	8CC	Low	37.050	QPSK	-21.56	66.70	26.57	45.15	18.58
	100		Low	37.050	16QAM	-21.52	66.70	26.57	45.18	18.61
	100		Low	37.050	64QAM	-21.50	66.70	26.57	45.20	18.63
	100	8NC	Low	37.050	QPSK	-21.84	66.70	26.57	44.86	18.29
	100		Low	37.050	16QAM	-22.00	66.70	26.57	44.70	18.13
	100		Low	37.050	64QAM	-21.95	66.70	26.57	44.75	18.18
	100	1CC	Mid	38.500	QPSK	-17.72	67.71	26.88	49.99	23.11
	100		Mid	38.500	16QAM	-17.80	67.71	26.88	49.91	23.03
	100		Mid	38.500	64QAM	-17.90	67.71	26.88	49.81	22.93
	100	8CC	Mid	38.500	QPSK	-22.36	67.71	26.88	45.35	18.47
	100		Mid	38.500	16QAM	-22.14	67.71	26.88	45.57	18.69
	100		Mid	38.500	64QAM	-22.27	67.71	26.88	45.44	18.56
	100	8NC	Mid	38.500	QPSK	-21.84	67.71	26.88	45.87	18.99
	100		Mid	38.500	16QAM	-21.92	67.71	26.88	45.80	18.92
	100		Mid	38.500	64QAM	-21.79	67.71	26.88	45.93	19.05
	100	1CC	High	39.950	QPSK	-20.01	69.17	27.00	49.16	22.16
	100		High	39.950	16QAM	-20.05	69.17	27.00	49.12	22.12
	100		High	39.950	64QAM	-20.02	69.17	27.00	49.15	22.15
	100	8CC	High	39.950	QPSK	-24.87	69.17	27.00	44.30	17.30
	100		High	39.950	16QAM	-25.16	69.17	27.00	44.01	17.01
	100		High	39.950	64QAM	-24.89	69.17	27.00	44.28	17.28
	100	8NC	High	39.950	QPSK	-22.93	69.17	27.00	46.24	19.24
	100		High	39.950	16QAM	-23.00	69.17	27.00	46.17	19.17
	100		High	39.950	64QAM	-22.90	69.17	27.00	46.27	19.27

Table 7-16. Antenna C Conducted Power Summary Data

7.4.4 Antenna D Conducted Power

Antenna	Bandwidth	Configuration	Chan.	Frequency	Modulation	Analyzer Level	AFCL	EUT Antenna Gain	Average e.i.r.p. PSD	Conducted Average Power
	[MHz]			[GHz]		[dBm]	[dB/m]	[dBi]	[dBm]	[dBm]
D	100	1CC	Low	37.050	QPSK	-15.81	66.70	26.57	50.90	24.33
	100		Low	37.050	16QAM	-15.60	66.70	26.57	51.10	24.53
	100		Low	37.050	64QAM	-16.02	66.70	26.57	50.68	24.11
	100	8CC	Low	37.050	QPSK	-21.02	66.70	26.57	45.68	19.11
	100		Low	37.050	16QAM	-21.07	66.70	26.57	45.63	19.06
	100		Low	37.050	64QAM	-21.19	66.70	26.57	45.51	18.94
	100	8NC	Low	37.050	QPSK	-21.48	66.70	26.57	45.23	18.66
	100		Low	37.050	16QAM	-21.32	66.70	26.57	45.38	18.81
	100		Low	37.050	64QAM	-21.44	66.70	26.57	45.26	18.69
	100	1CC	Mid	38.500	QPSK	-17.81	67.71	26.88	49.90	23.02
	100		Mid	38.500	16QAM	-17.80	67.71	26.88	49.91	23.03
	100		Mid	38.500	64QAM	-17.74	67.71	26.88	49.98	23.10
	100	8CC	Mid	38.500	QPSK	-22.29	67.71	26.88	45.42	18.54
	100		Mid	38.500	16QAM	-22.31	67.71	26.88	45.41	18.53
	100		Mid	38.500	64QAM	-22.47	67.71	26.88	45.25	18.37
	100	8NC	Mid	38.500	QPSK	-21.60	67.71	26.88	46.11	19.23
	100		Mid	38.500	16QAM	-21.55	67.71	26.88	46.16	19.28
	100		Mid	38.500	64QAM	-21.63	67.71	26.88	46.08	19.20
	100	1CC	High	39.950	QPSK	-19.99	69.17	27.00	49.19	22.19
	100		High	39.950	16QAM	-20.08	69.17	27.00	49.09	22.09
	100		High	39.950	64QAM	-20.16	69.17	27.00	49.02	22.02
	100	8CC	High	39.950	QPSK	-24.75	69.17	27.00	44.42	17.42
	100		High	39.950	16QAM	-24.88	69.17	27.00	44.29	17.29
	100		High	39.950	64QAM	-24.83	69.17	27.00	44.34	17.34
	100	8NC	High	39.950	QPSK	-22.82	69.17	27.00	46.35	19.35
	100		High	39.950	16QAM	-22.73	69.17	27.00	46.45	19.45
	100		High	39.950	64QAM	-22.77	69.17	27.00	46.40	19.40

Table 7-17. Antenna D Conducted Power Summary Data

7.5 Radiated Spurious and Harmonic Emissions

§2.1051 §30.203

Test Overview

The spectrum is scanned from 30 MHz to 100 GHz for n261 and from 30 MHz to 200 GHz for n260. All out of band emissions are measured in a radiated setup while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All modulations were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

The conductive power or total radiated power of any emissions outside a licensee's frequency block shall be -13 dBm / 1 MHz.

Test Procedure Used

ANSI C63.26-2015 Section 5.7.4
ANSI C63.26-2015 Section 6.4
KDB 842590 D01 v01r01 Section 4.4.2 and Section 4.4.3

Test Settings

1. Start frequency was set to 30 MHz and stop frequency was set to 100 GHz for n261 and 200 GHz for n260. Several plots are used to show investigations in this entire span.
2. Detector = RMS
3. Trace mode = trace average
4. Sweep time = auto couple
5. Number of sweep points ≥ 2 x Span/RBW
6. The trace was allowed to stabilize
7. RBW = 1 MHz, VBW = 3 MHz

Test Notes

1) The EUT was tested while positioned upright and mounted on a mast 1.5 m height. The worst case emissions are reported with the EUT in this fixed position and with the modulations and active component carriers shown in the tables below.

2) All radiated spurious emissions were measured as EIRP to compare with the §30.203 TRP limits.

3) Emissions below 18 GHz were measured at a 3 meter test distance, while emissions above 18 GHz were measured at the appropriate far field distance. The far field of the mmWave signal is based on formula; R > 2D^2/wavelength, where D is the larger between the dimension of the measurement antenna and the transmitting antenna of the EUT. In this case, D is the largest dimension of the measurement antenna.

4) Out-band Emission of 10% channel bandwidth are exempted on Radiated Spurious and Harmonic Emissions test case.

5) The plots from 1-200 GHz show corrected average EIRP levels. The average EIRP reported below is calculated per section 5.2.7 of ANSI C63.26-2015 which states: EIRP (dBm) = E (dBμV/m) + 20log(D) – 104.8; where D is the measurement distance (in the far field region) in m. The field strength E is calculated E (dBμV/m) = Spectrum Analyzer Level (dBm) + Antenna Factor (dB/m) + Cable Loss (dB) + Duty Cycle (dB) + Harmonic Mixer Conversion Loss (dB) + 107. All appropriate Antenna Factor and Cable Loss have been applied in the spectrum analyzer for each measurement. For measurements > 40 GHz, Harmonic Mixer Conversion Loss was also applied to the spectrum analyzer.

Frequency Range [GHz]	Wavelength [cm]	Far Field Distance [m]	Measurements Distance [m]
18 to 40	0.749	2.61	2.61
40 to 60	0.500	1.39	2.61
60 to 90	0.333	0.91	2.61
90 to 140	0.214	0.58	1.00
140 to 200	0.150	0.39	1.00

Table 7-18. Far-field Distance & Measurement Distance per Frequency Rage

Frequency Range [GHz]	Calculated Measurement D * E [dB]	Duty Cycle [dB]	Reference offset [dB]
18 to 40	10.53	1.41	11.95
40 to 200	2.20	1.41	3.61

Table 7-19. Far-field Distance & Measurement Distance per Frequency Rage

6) Emissions > 40 GHz were measured using a harmonic mixer with the spectrum analyzer.

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

8) Spurious emissions were measured with all EUT antennas transmitting simultaneously.
- Per section 4.4.1 of KDB 842590 D01, unwanted emission measurements, "If the device does not meet the emission limit at one or some frequencies, then TRP measurements shall be performed only at the failing frequencies at which emission levels exceed the limit." The TRP measurement plots using the three cut test method as described in section 4.4 of the KDB, follow all failing emission plots in this report.

TRP Measurement Procedure

If the recorded EIRP value was close or above the TRP limit, a Two Cut TRP measurement was done according to KDB 842590 D01 v01 Section 4.4.3.3.2

a) Align the EUT with a chosen xy-plane and the xz-plane of the antenna measurement coordinate system. NOTE 1 For harmonics and spurious emission frequencies which are beamforming as identified in exploratory scan, it may be required to align the orthogonal cuts to include the peak based on exploratory scans.

b) Measure the EUT dimensions, i.e., depth (d), width (w), and height (h); see Figure A.1 in Appendix A.

c) Calculate the spherical and cylindrical diameters (D and Dcyl) using Equations (A.1) and (A.2) (see Appendix

d) For the highest frequency (smallest wavelength) of the frequency band measured, calculate the reference angular steps $\Delta\theta$ref and $\Delta\phi$ref using Equations (A.3) and (A.4).

e) Set the grid spatial sampling step $\Delta\theta \leq \Delta\theta$ref for the vertical angle and $\Delta\phi \leq \Delta\phi$ref for the horizontal cut.

f) For each emission frequency, measure the EIRP (as a sum of two orthogonal polarizations) at each spatial sampling step on the selected grid.

g) For each emission frequency, calculate the average EIRP for both the cuts separately, and then take the average of these two average values.

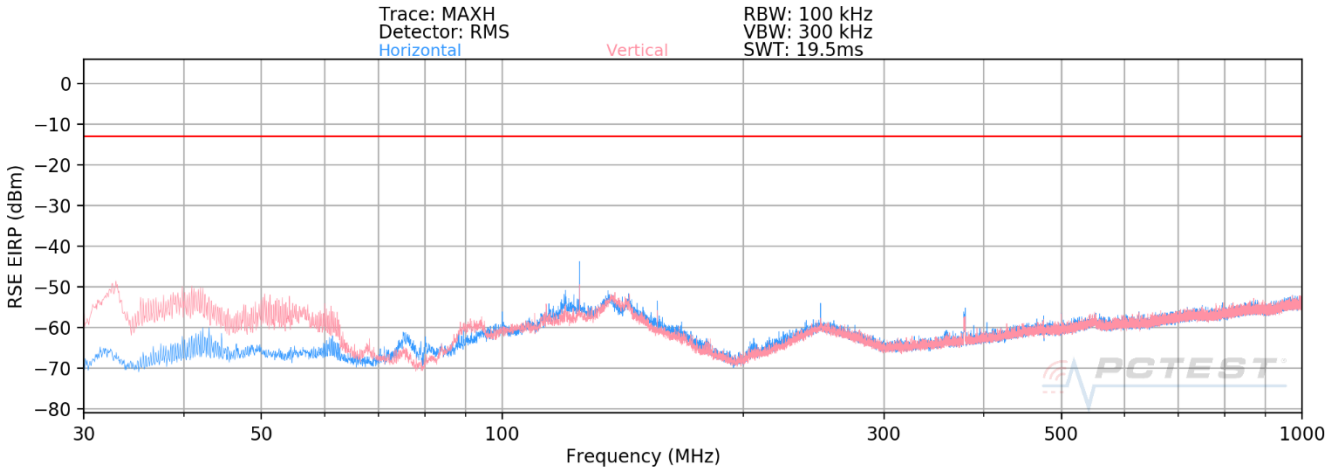
h) Add 2 dB as a correction factor to the averaged value computed in step g).

i) If the TRP limit is exceeded, a third orthogonal cut in the yz-plane and using the $\Delta\theta$ angular step, can be added. Now, calculate the average values in all three cuts separately, and then take the average value of these three average values.

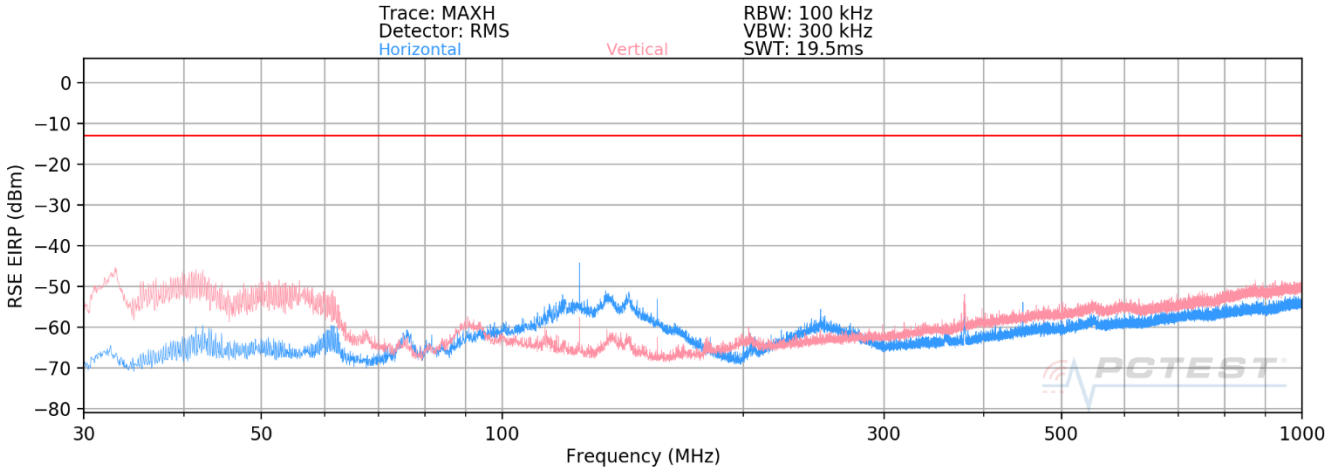
j) Add 1.5 dB as a correction factor to the averaged value computed in step i).

k) Evaluate the pass/fail decision by comparing TRP from step h) or step j) against the applicable TRP limit.

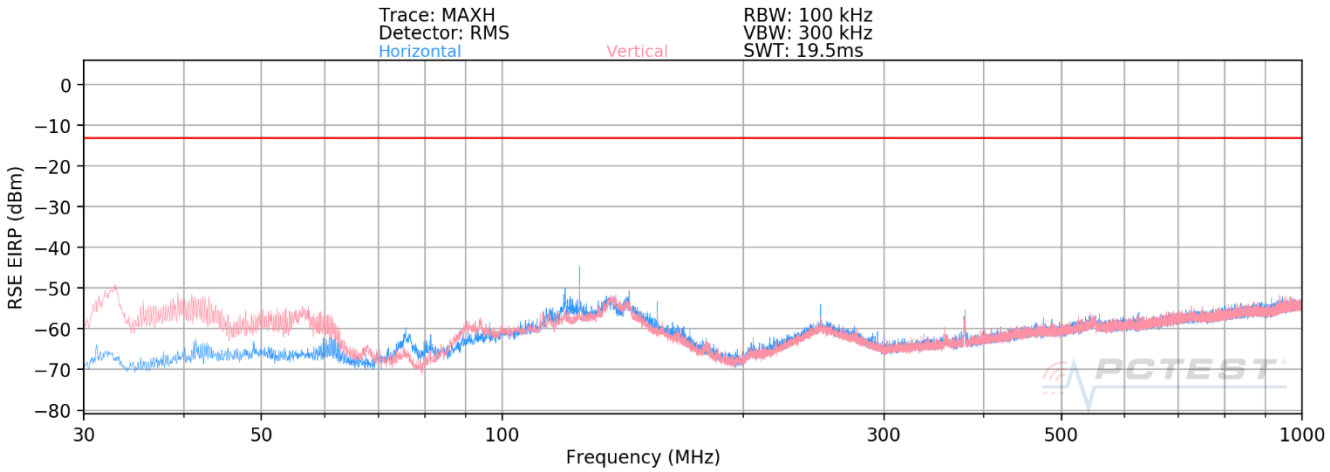
7.5.1 Radiated Spurious Emissions Plots (30 MHz to 1 GHz)



Plot 7-133. Radiated Spurious Plot 30 MHz - 1 GHz (100 MHz BW 1CC QPSK Mid Channel)



Plot 7-134. Radiated Spurious Plot 30 MHz - 1 GHz (100 MHz BW 8CC QPSK Mid Channel)



Plot 7-135. Radiated Spurious Plot 30 MHz - 1 GHz (100 MHz BW 8CC NC QPSK Mid Channel)

Spurious Emissions EIRP Sample Calculation (n260)

The raw radiated spurious level is converted to field strength in dBµV/m. Then, the RSE EIRP level is calculated by applying the additional factors shown below for a test distance of 3 meters.

RSE EIRP (dBm) = Analyzer Level (dBm) + AFCL (dB/m) + 107 + 20Log(D_m) – 104.8

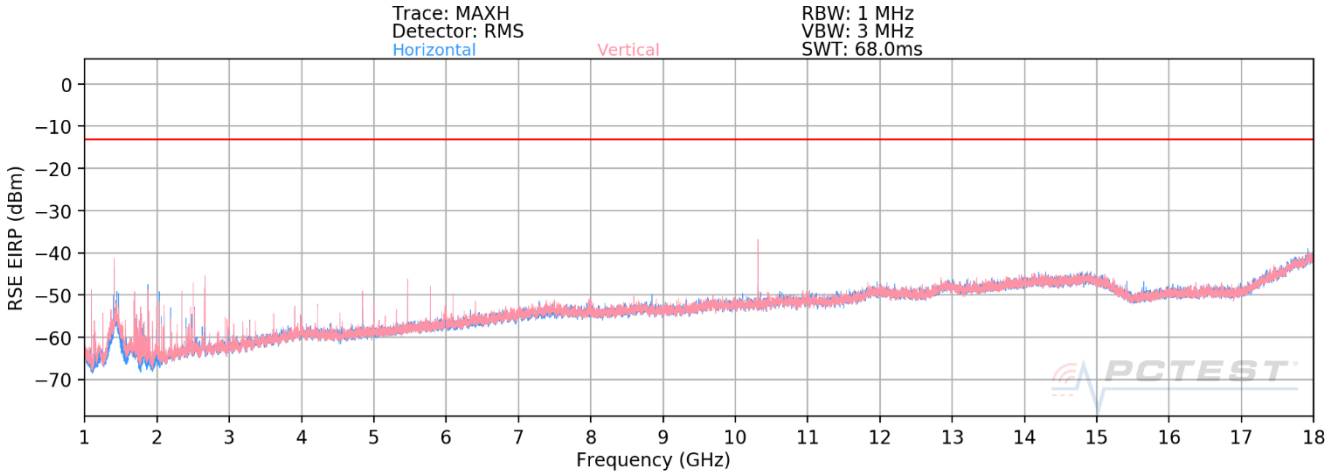
Frequency [MHz]	Channel	Configuration	Modulation	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dBm]	RSE EIRP [dBm]	Margin [dB]
135.37	Mid	8CC	QPSK	H	-	-	-77.75	22.64	-43.33	30.33
135.37	Mid	8CC	QPSK	V	-	-	-76.35	22.64	-41.93	28.93

Table 7-20. Spurious Emissions (30 MHz - 1GHz)

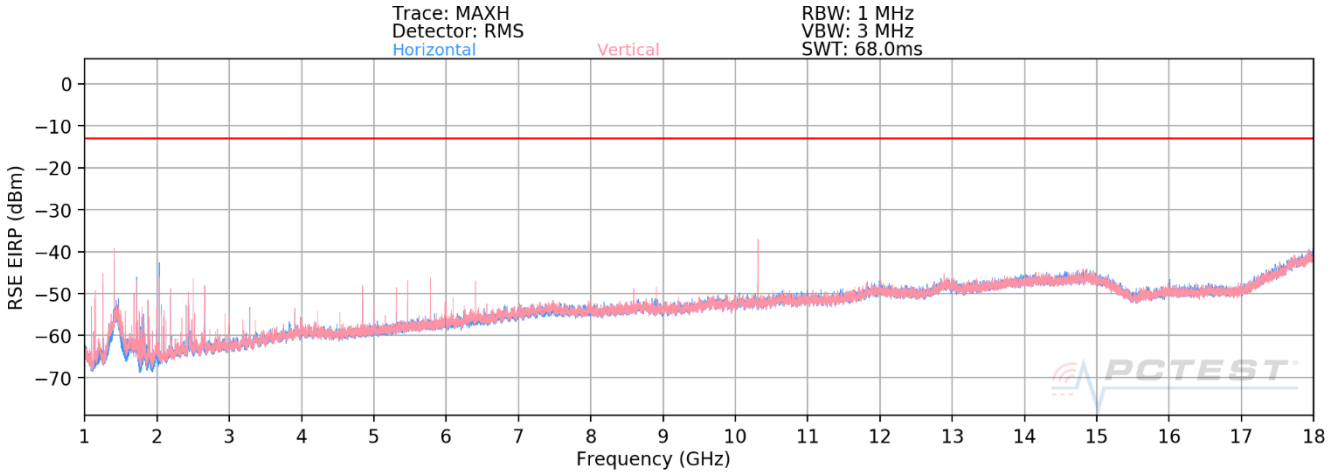
Notes

The RSE EIRP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, and cable losses. Measurements were performed at a distance of 3 meter.

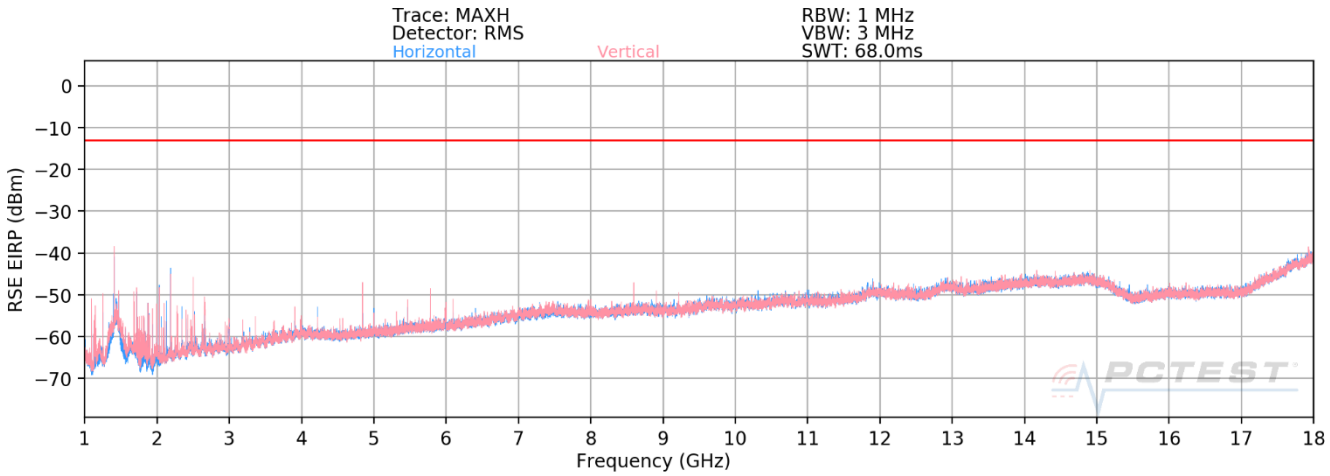
7.5.2 Radiated Spurious Emissions Plots (1 GHz to 18 GHz)



Plot 7-136. Radiated Spurious Plot 1 GHz - 18 GHz (100 MHz BW 1CC QPSK Mid Channel)



Plot 7-137. Radiated Spurious Plot 1 GHz - 18 GHz (100 MHz BW 8CC QPSK Mid Channel)



Plot 7-138. Radiated Spurious Plot 1 GHz - 18 GHz (100 MHz BW 8CC NC QPSK Mid Channel)

Spurious Emissions EIRP Sample Calculation (n260)

The raw radiated spurious level is converted to field strength in dBµV/m. Then, the RSE EIRP level is calculated by applying the additional factors shown below for a test distance of 3 meters.

RSE EIRP (dBm) = Analyzer Level (dBm) + AFCL (dB/m) + 107 + 20Log(D_m) – 104.8

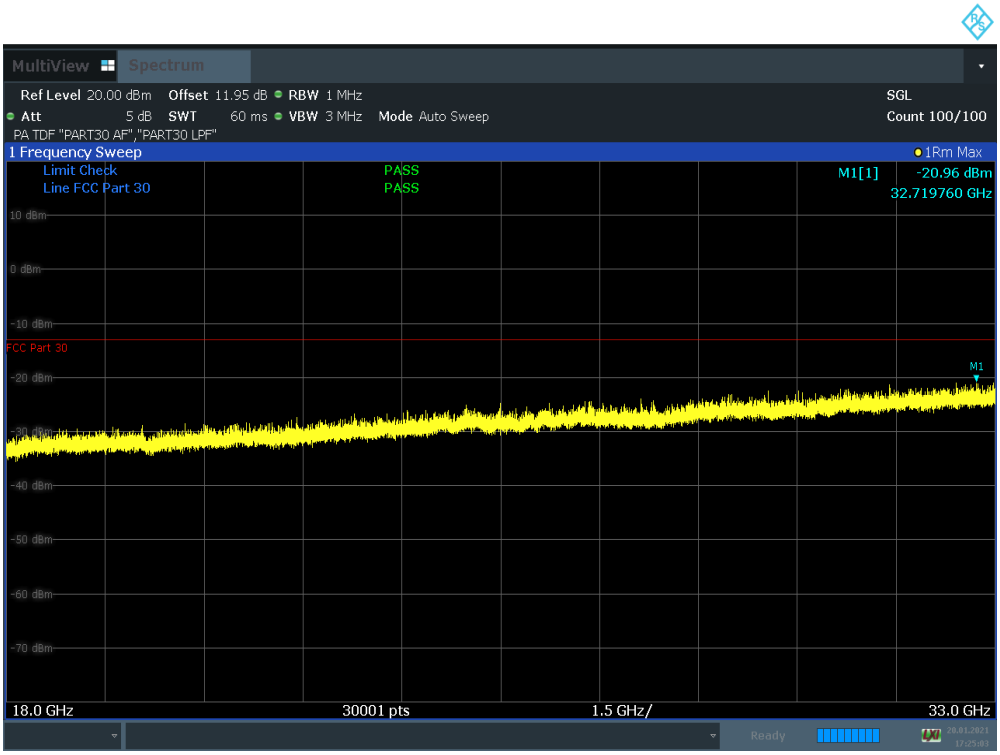
Frequency [MHz]	Configuration	Channel	Modulation	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dBm]	RSE EIRP [dBm]	Margin [dB]
1406.00	1CC	Low	QPSK	H	250	360	-47.22	-8.59	-44.03	31.03
1406.00	1CC	Low	QPSK	V	200	351	-48.45	-8.59	-45.26	32.26
1406.00	1CC	Mid	QPSK	H	250	356	-48.49	-8.59	-45.30	32.30
1406.00	1CC	Mid	QPSK	V	200	350	-50.02	-8.59	-46.83	33.83
1406.00	1CC	High	QPSK	H	220	350	-52.10	-8.59	-48.91	35.91
1406.00	1CC	High	QPSK	V	220	352	-51.34	-8.59	-48.15	35.15
1406.00	8CC	Low	QPSK	H	250	359	-51.01	-8.59	-47.82	34.82
1406.00	8CC	Low	QPSK	V	250	350	-51.34	-8.59	-48.15	35.15
1406.00	8CC	Mid	QPSK	H	245	350	-47.90	-8.59	-44.71	31.71
1406.00	8CC	Mid	QPSK	V	250	352	-49.55	-8.59	-46.36	33.36
1406.00	8CC	High	QPSK	H	250	355	-51.02	-8.59	-47.83	34.83
1406.00	8CC	High	QPSK	V	240	352	-52.00	-8.59	-48.81	35.81
1406.00	8NC	Low	QPSK	H	250	330	-49.69	-8.59	-46.50	33.50
1406.00	8NC	Low	QPSK	V	250	315	-46.32	-8.59	-43.13	30.13
1406.00	8NC	Low	QPSK	V	245	350	-48.50	-8.59	-45.31	32.31
1406.00	8NC	Mid	QPSK	H	250	350	-47.22	-8.59	-44.03	31.03
1406.00	8NC	Mid	QPSK	V	250	355	-49.53	-8.59	-46.34	33.34
1406.00	8NC	High	QPSK	H	250	340	-50.11	-8.59	-46.92	33.92

Table 7-21. Spurious Emissions (1 GHz to 18 GHz)

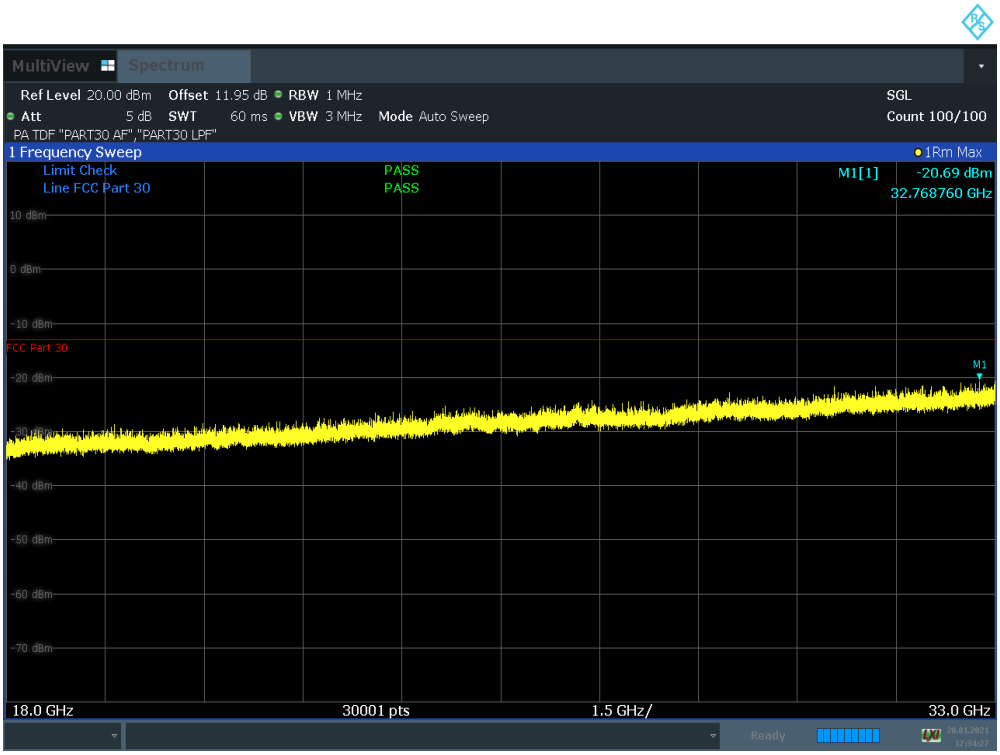
Notes

The RSE EIRP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, and cable losses. Measurements were performed at a distance of 3 meter.

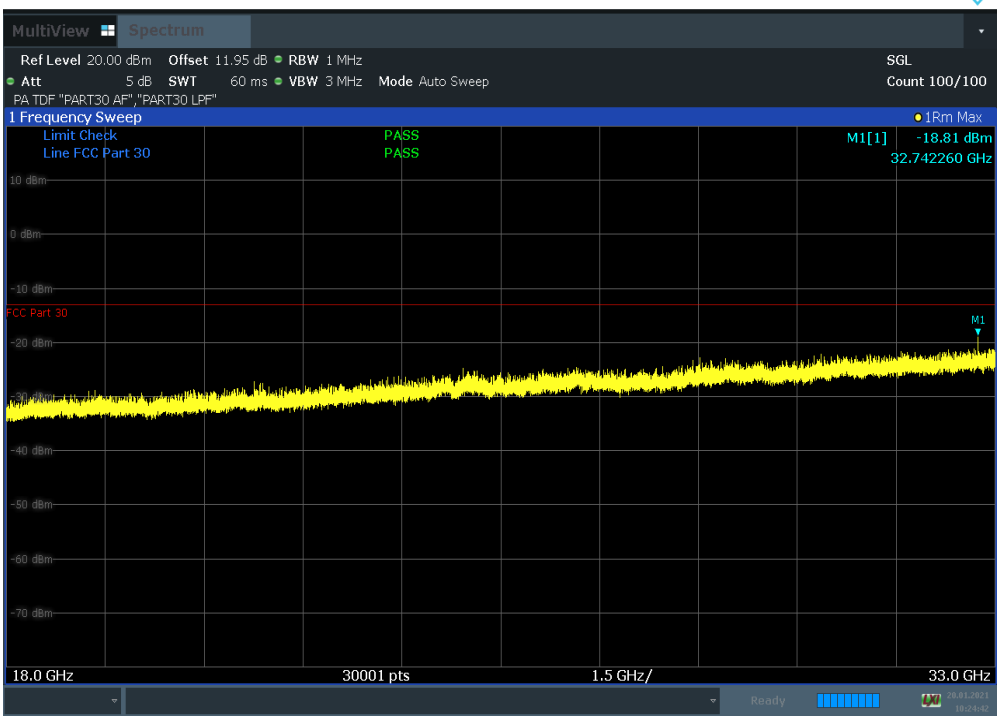
7.5.3 Radiated Spurious Emissions Plots (18 GHz to 33 GHz)



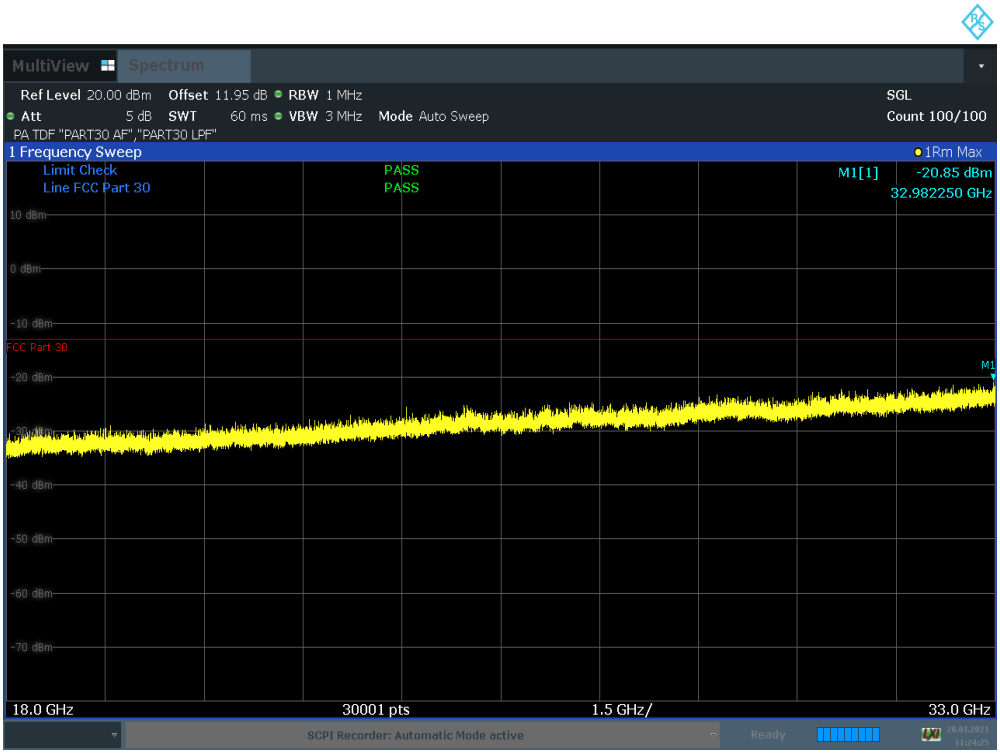
Plot 7-139. Radiated Spurious Plot 18 GHz – 33 GHz (100 MHz BW 1CC QPSK Mid Channel Pol. H)



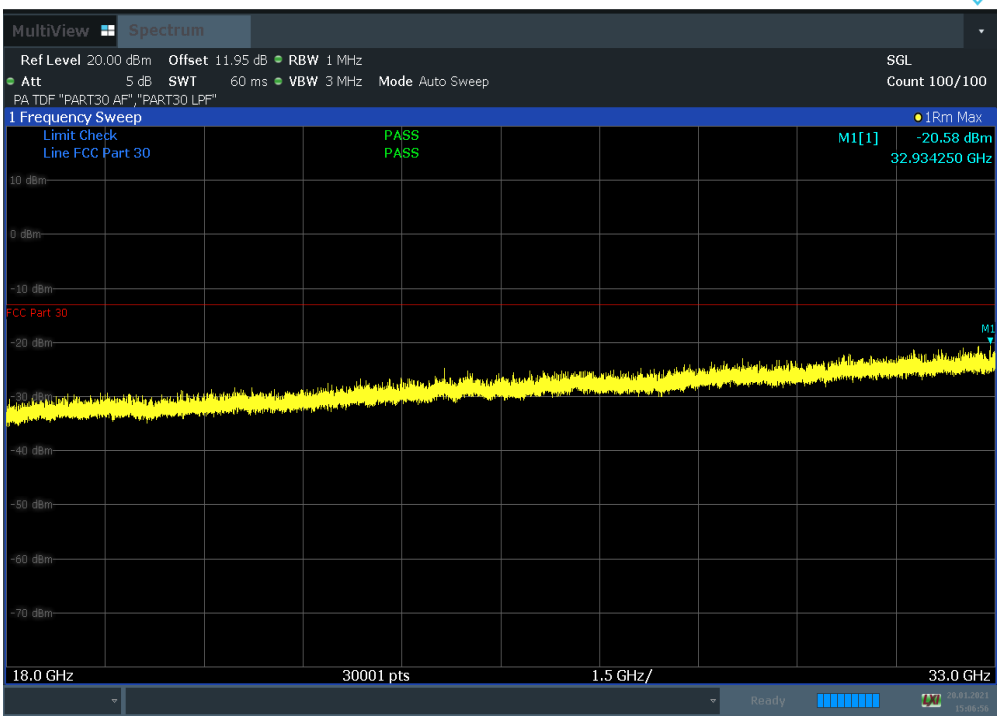
Plot 7-140. Radiated Spurious Plot 18 GHz – 33 GHz (100 MHz BW 1CC QPSK Mid Channel Pol. V)



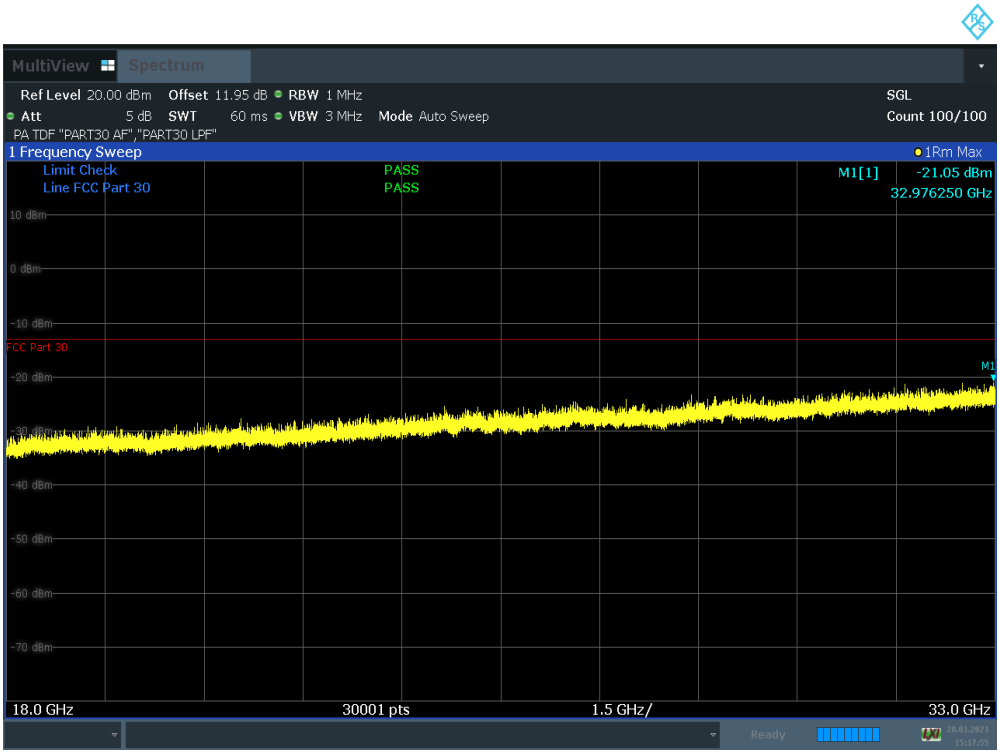
Plot 7-141. Radiated Spurious Plot 18 GHz – 33 GHz (100 MHz BW 8CC QPSK Mid Channel Pol. H)



Plot 7-142. Radiated Spurious Plot 18 GHz – 33 GHz (100 MHz BW 8CC QPSK Mid Channel Pol. V)

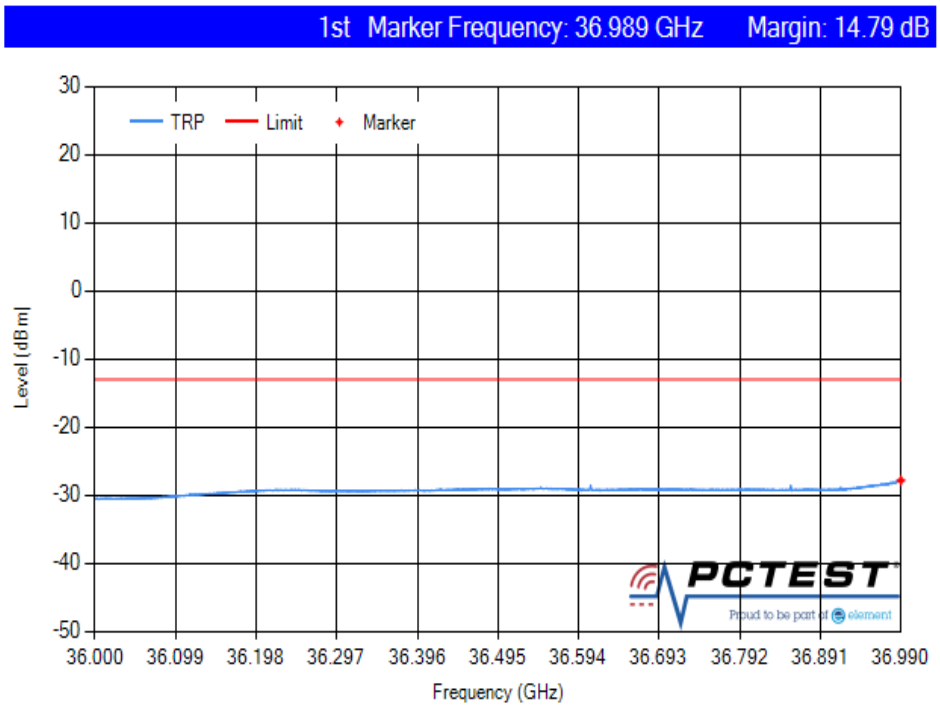


Plot 7-143. Radiated Spurious Plot 18 GHz – 33 GHz (100 MHz BW 8CC NC QPSK Mid Channel Pol. H)

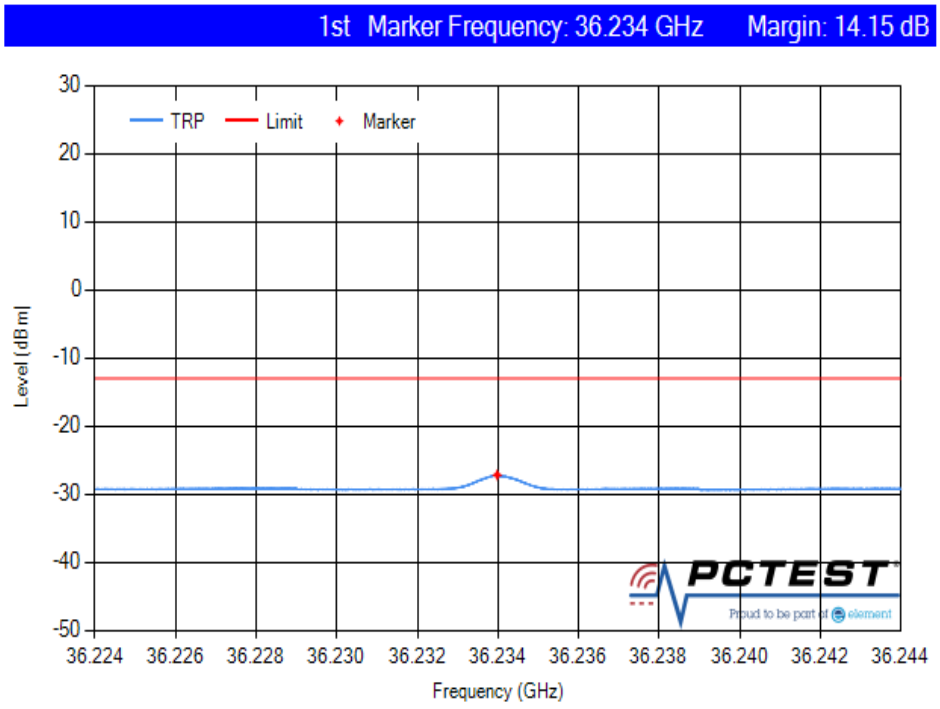


Plot 7-144. Radiated Spurious Plot 18 GHz – 33 GHz (100 MHz BW 8CC NC QPSK Mid Channel Pol. V)

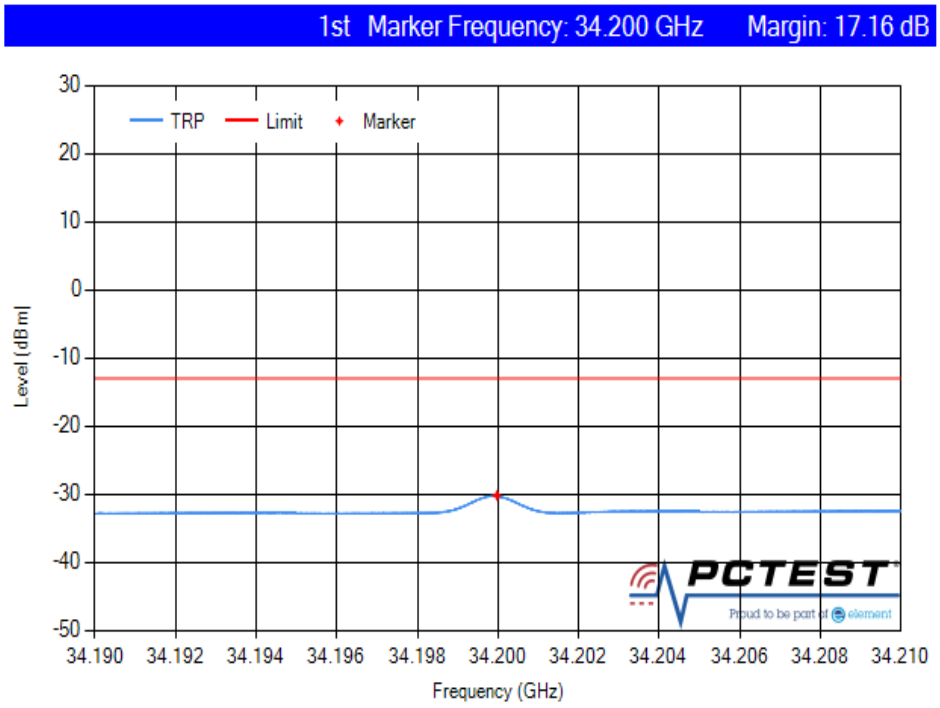
7.5.4 Radiated Spurious Emissions Plots (33 GHz to 37 GHz)



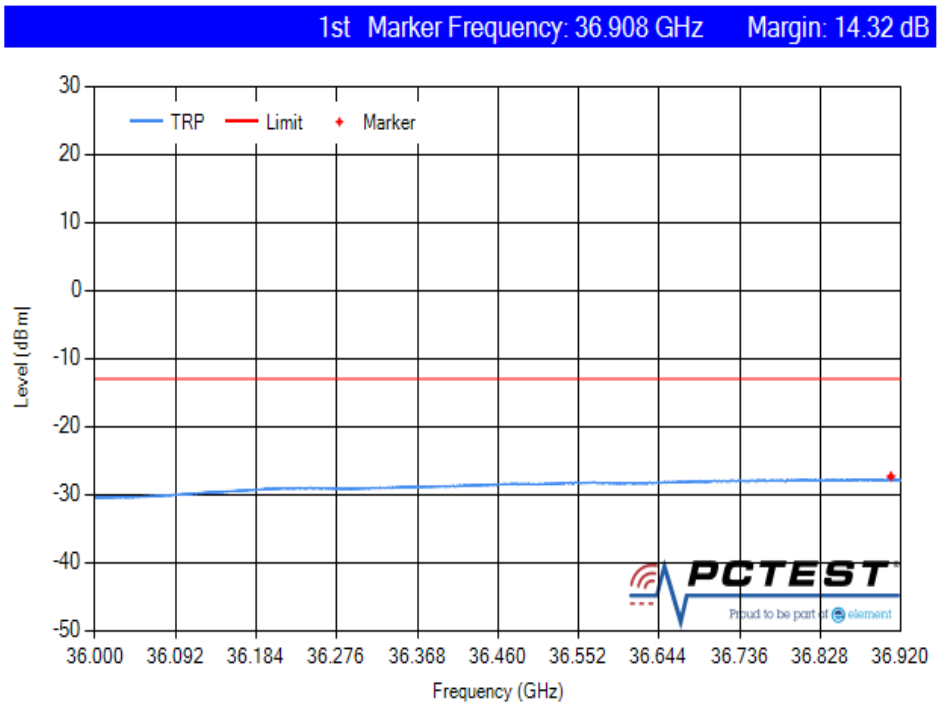
Plot 7-145. Radiated Spurious Plot 33 GHz – 36.99 GHz (100 MHz BW 1CC QPSK Low Channel TRP)



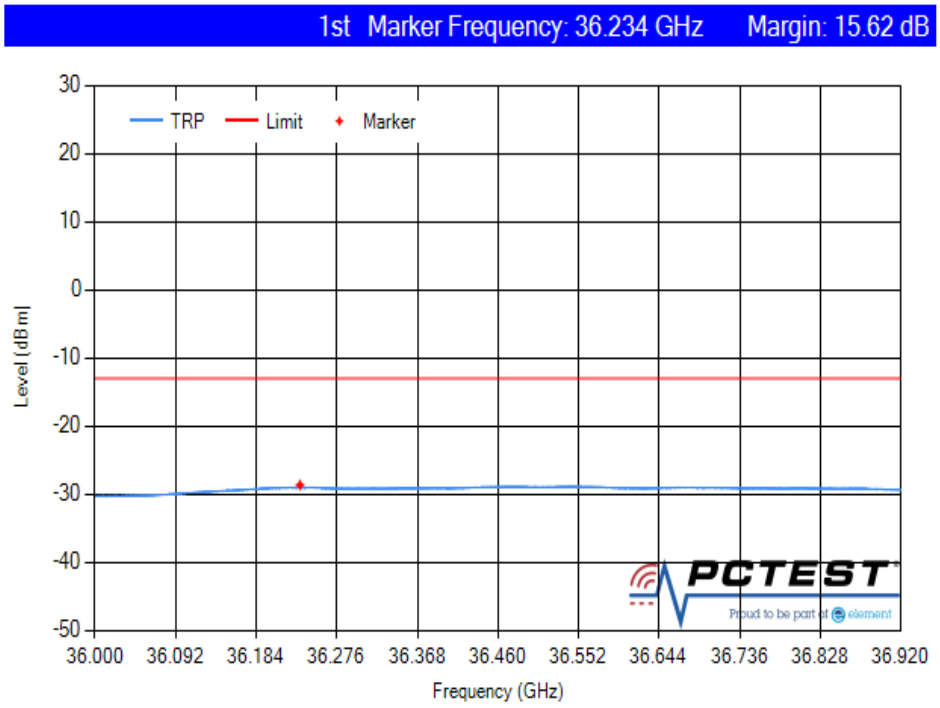
Plot 7-146. Radiated Spurious Plot 36.23 GHz (100 MHz BW 1CC QPSK Mid Channel TRP)



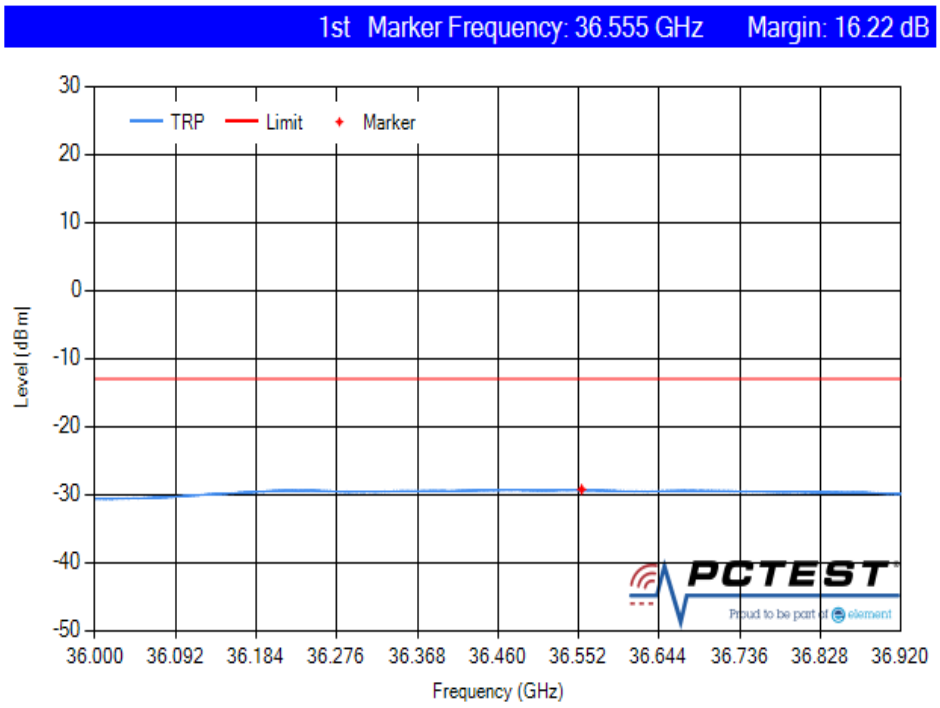
Plot 7-147. Radiated Spurious Plot 34.20 GHz (100 MHz BW 1CC QPSK High Channel TRP)



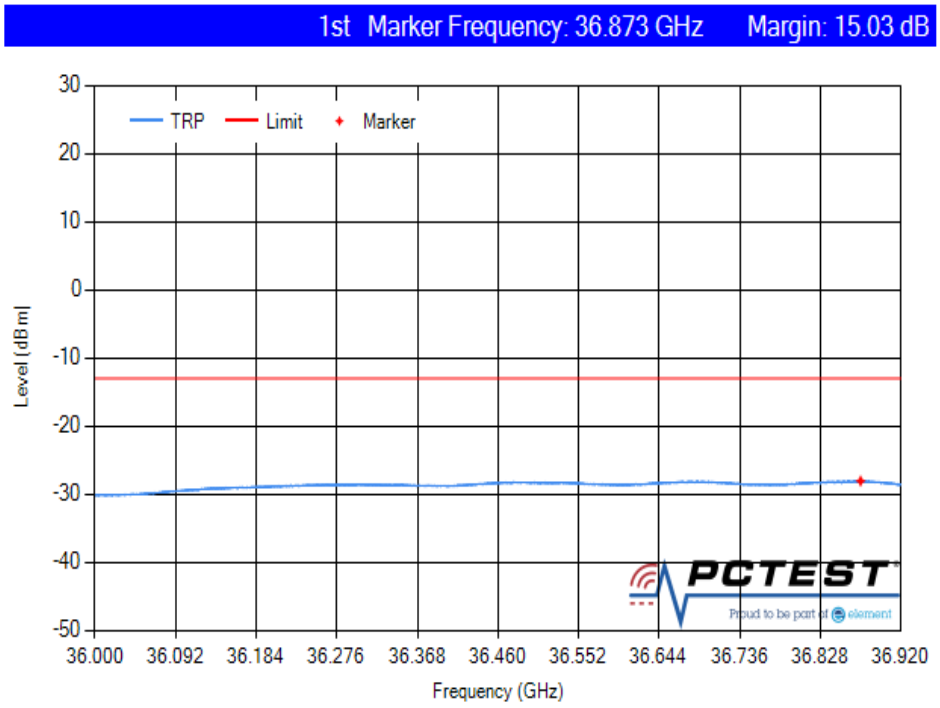
Plot 7-148. Radiated Spurious Plot 33 GHz – 36.92 GHz (100 MHz BW 8CC QPSK Low Channel TRP)



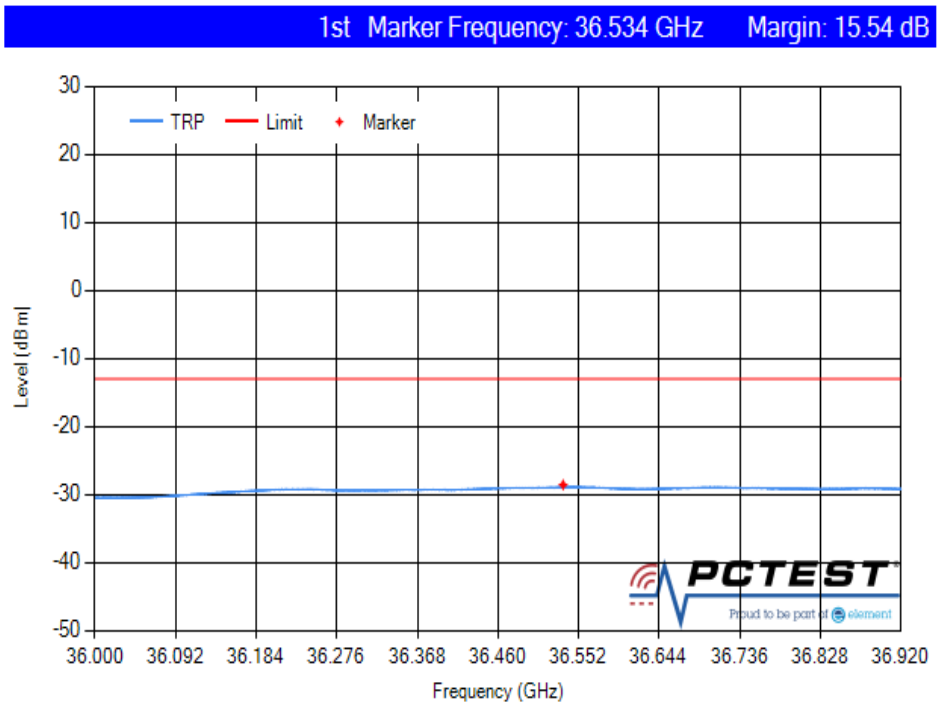
Plot 7-149. Radiated Spurious Plot 33 GHz – 36.92 GHz (100 MHz BW 8CC QPSK Mid Channel TRP)



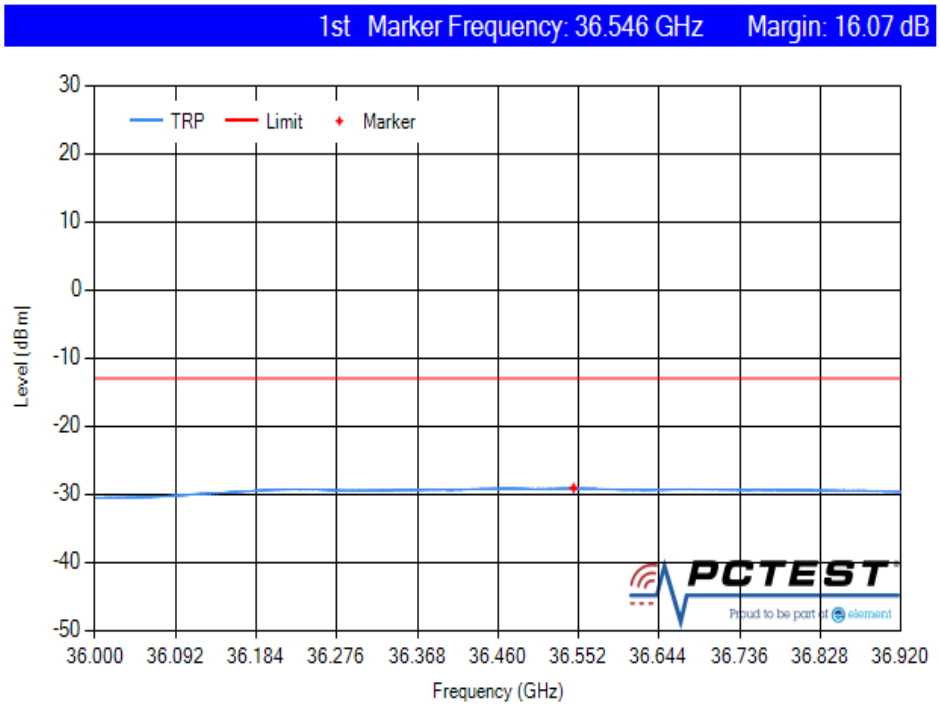
Plot 7-150. Radiated Spurious Plot 33 GHz – 36.92 GHz (100 MHz BW 8CC QPSK High Channel TRP)



Plot 7-151. Radiated Spurious Plot 33 GHz – 36.92 GHz (100 MHz BW 8CC NC QPSK Low Channel TRP)



Plot 7-152. Radiated Spurious Plot 33 GHz – 36.92 GHz (100 MHz BW 8CC NC QPSK Mid Channel TRP)

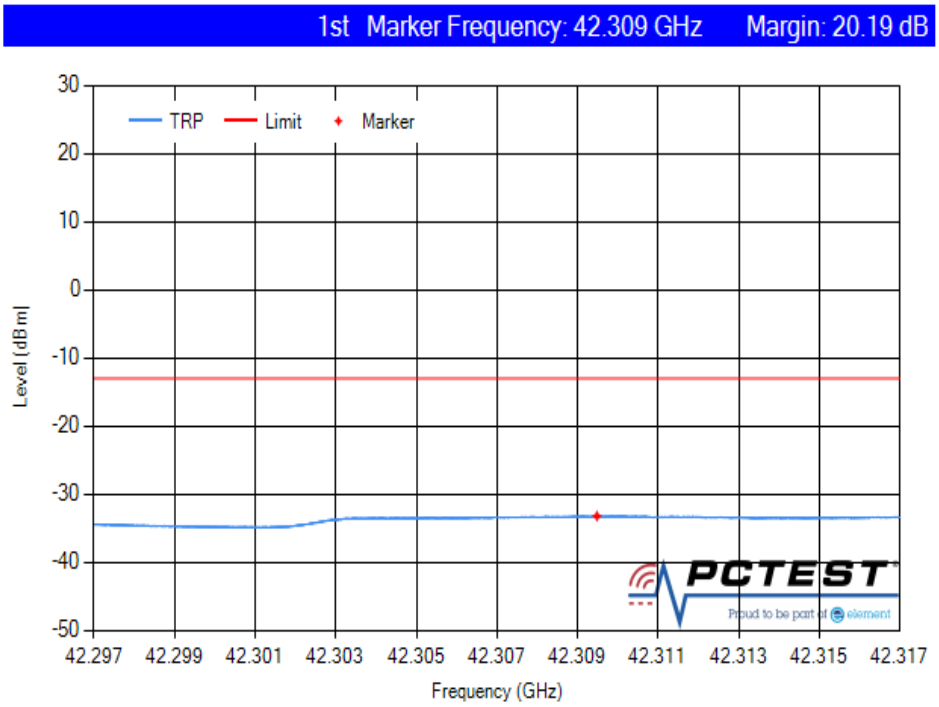


Plot 7-153. Radiated Spurious Plot 33 GHz – 36.92 GHz (100 MHz BW 8CC NC QPSK High Channel TRP)

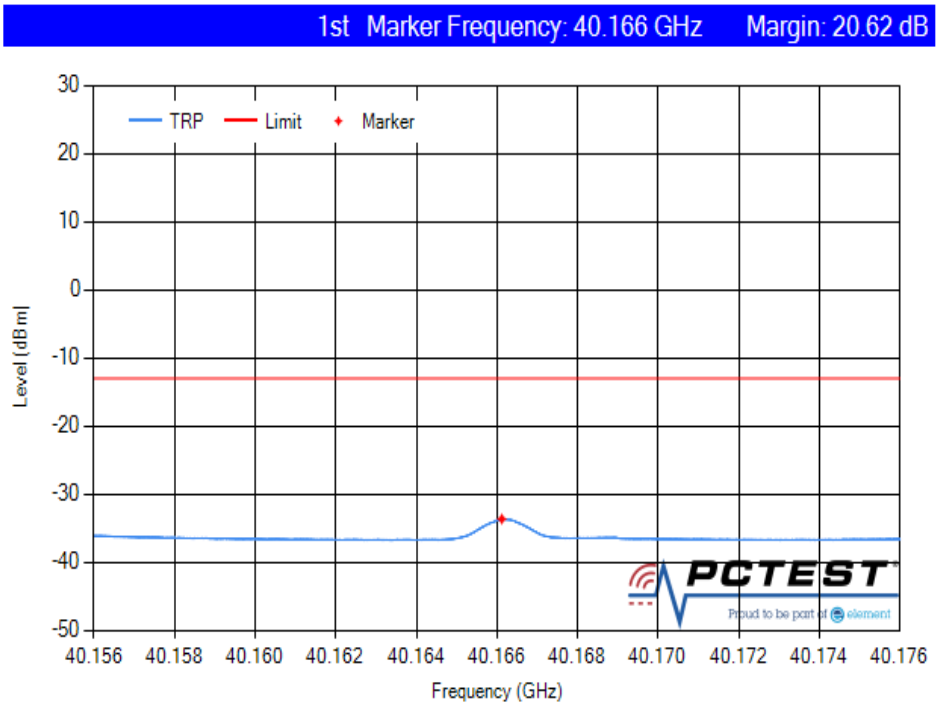
Configuration	Channel	Ant Pol. [Degree]	Frequency [GHz]	RSE EIRP [dBm]	Early Exit?	TRP [dBm]	Margin [dB]
100 MHz BW 1CC	Low	H	36.61	-8.73	No	-27.79	14.79
		V	36.85	-12.83	No		
	Mid	H	36.23	-12.03	No	-27.15	14.15
		V	36.23	-14.55	No[1]		
	High	H	34.20	-11.89	No	-30.16	17.16
		V	34.20	-13.49	No[1]		
100 MHz BW 8CC	Low	H	36.91	0.88	No	-27.32	14.32
		V	36.91	-10.57	No		
	Mid	H	36.23	-13.84	No	-28.62	15.62
		V	36.23	-12.52	No		
	High	H	36.34	-15.74	No[1]	-29.22	16.22
		V	36.54	-15.72	No[1]		
100 MHz BW 8CC NC	Low	H	36.89	-12.08	No	-28.03	15.03
		V	36.69	-12.50	No		
	Mid	H	36.90	-8.98	No	-28.54	15.54
		V	36.55	-14.24	No[1]		
	High	H	36.61	-15.46	No[1]	-29.07	16.07
		V	36.53	-15.07	No[1]		
1. "Early Exit" - Less than 3 dB margin							

Table 7-22. Radiated Spurious Emissions (33 GHz – 37 GHz)

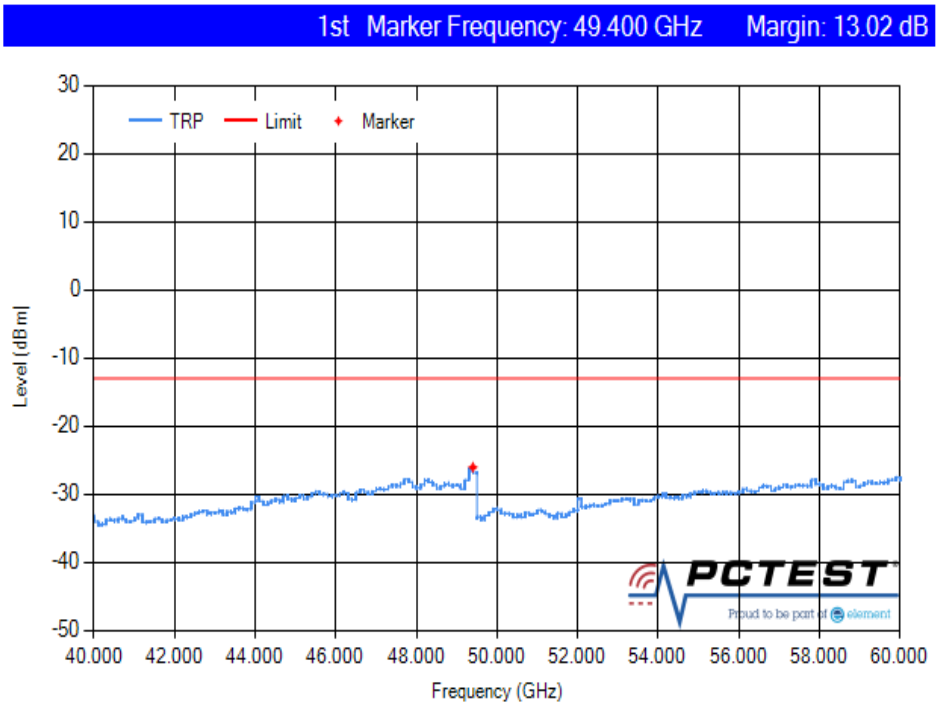
7.5.5 Radiated Spurious Emissions Plots (40 GHz to 60 GHz)



Plot 7-154. Radiated Spurious Plot 42.30 GHz (100 MHz BW 1CC QPSK Low Channel TRP)



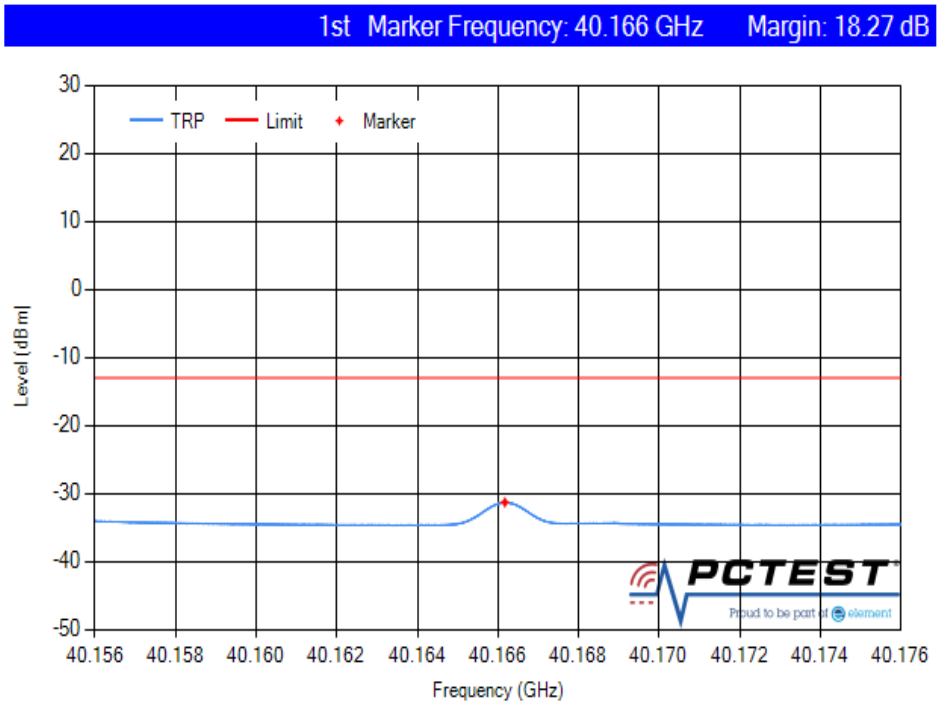
Plot 7-155. Radiated Spurious Plot 40.16 GHz (100 MHz BW 1CC QPSK Mid Channel TRP)



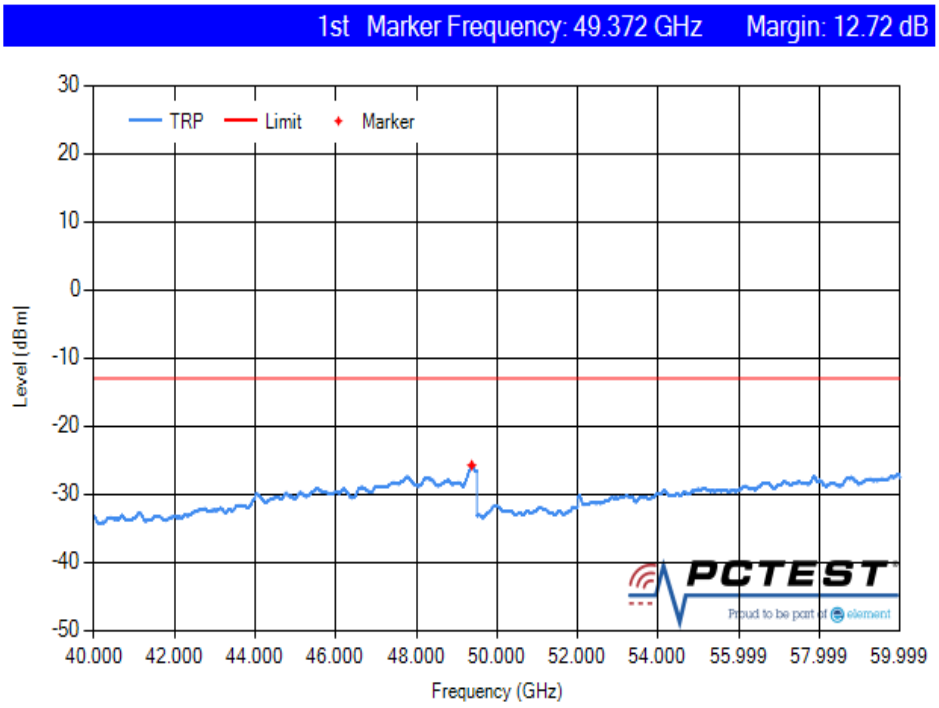
Plot 7-156. Radiated Spurious Plot 40 GHz – 60 GHz (100 MHz BW 1CC QPSK High Channel TRP)

Plot 7-157. Radiated Spurious Plot 40 GHz – 60 GHz (100 MHz 8CC CC BW QPSK Low Channel Pol. H)

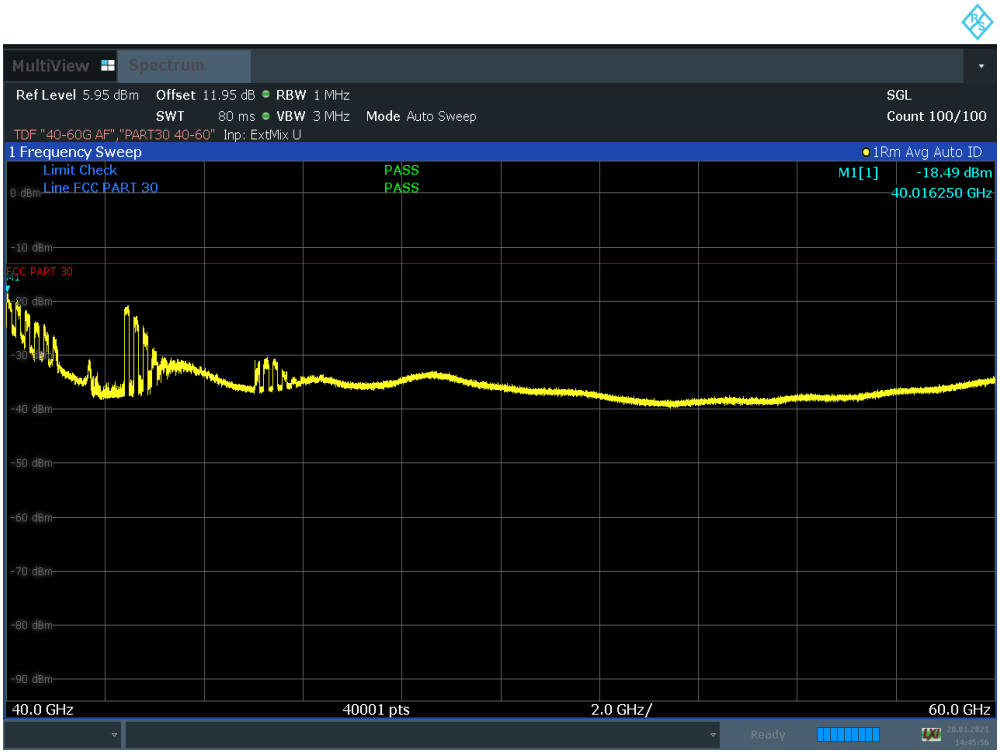
Plot 7-158. Radiated Spurious Plot 40 GHz – 60 GHz (100 MHz 8CC CC BW QPSK Low Channel Pol. V)



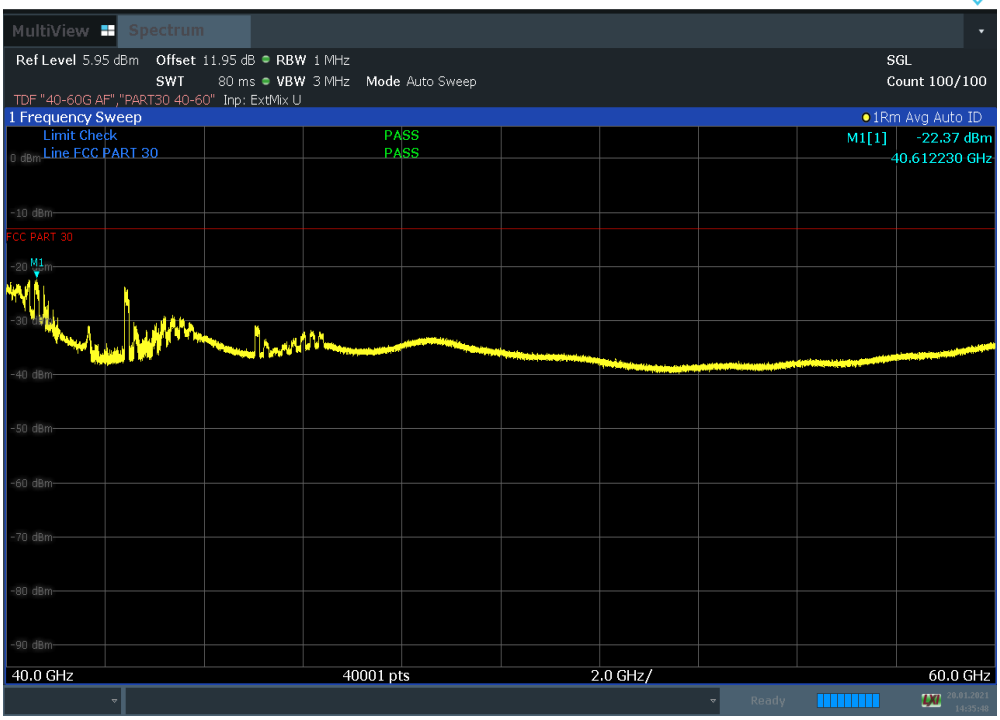
Plot 7-159. Radiated Spurious Plot 40.16 GHz (100 MHz BW 8CC QPSK Mid Channel TRP)



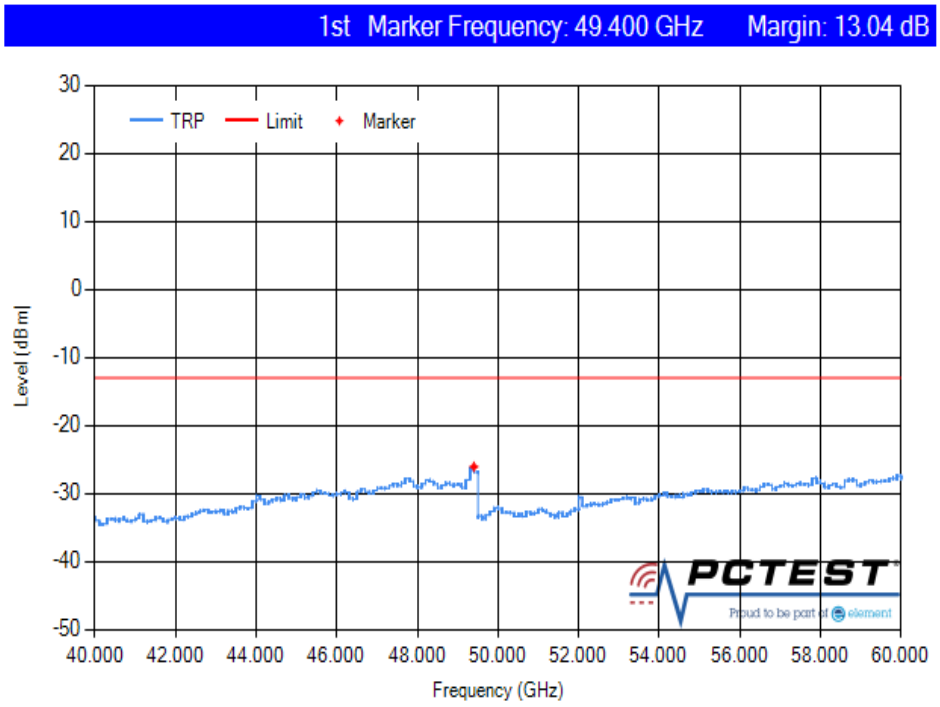
Plot 7-160. Radiated Spurious Plot 40 GHz – 60 GHz (100 MHz BW 8CC QPSK High Channel TRP)



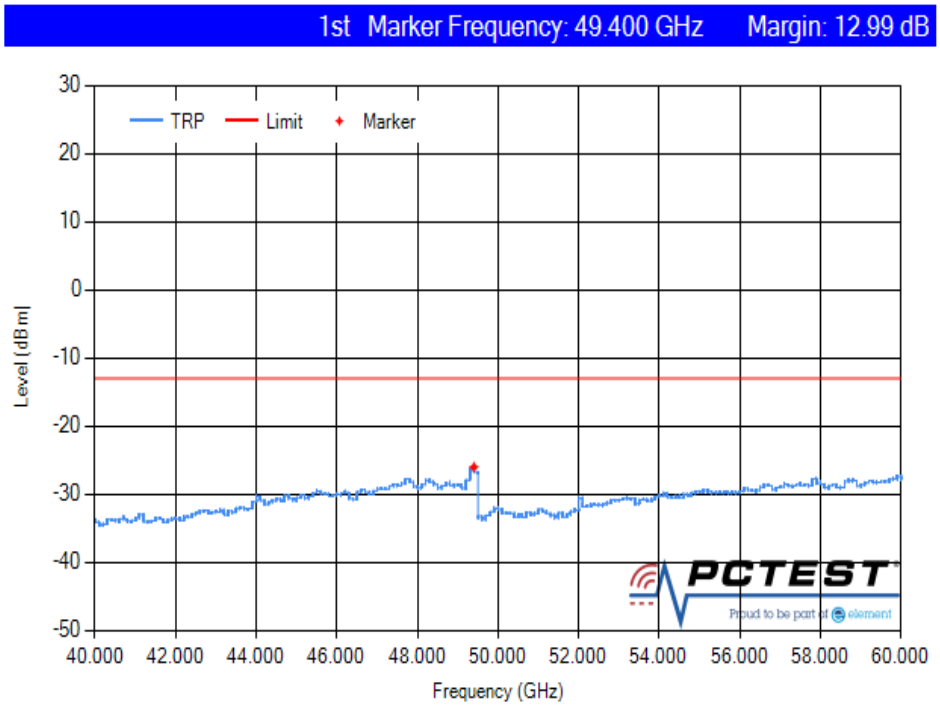
Plot 7-161. Radiated Spurious Plot 40 GHz – 60 GHz (100 MHz BW 8CC NC QPSK Low Channel Pol. H)



Plot 7-162. Radiated Spurious Plot 40 GHz – 60 GHz (100 MHz BW 8CC NC QPSK Low Channel Pol. V)



Plot 7-163. Radiated Spurious Plot 40 GHz – 60 GHz (100 MHz BW 8CC NC QPSK Mid Channel TRP)

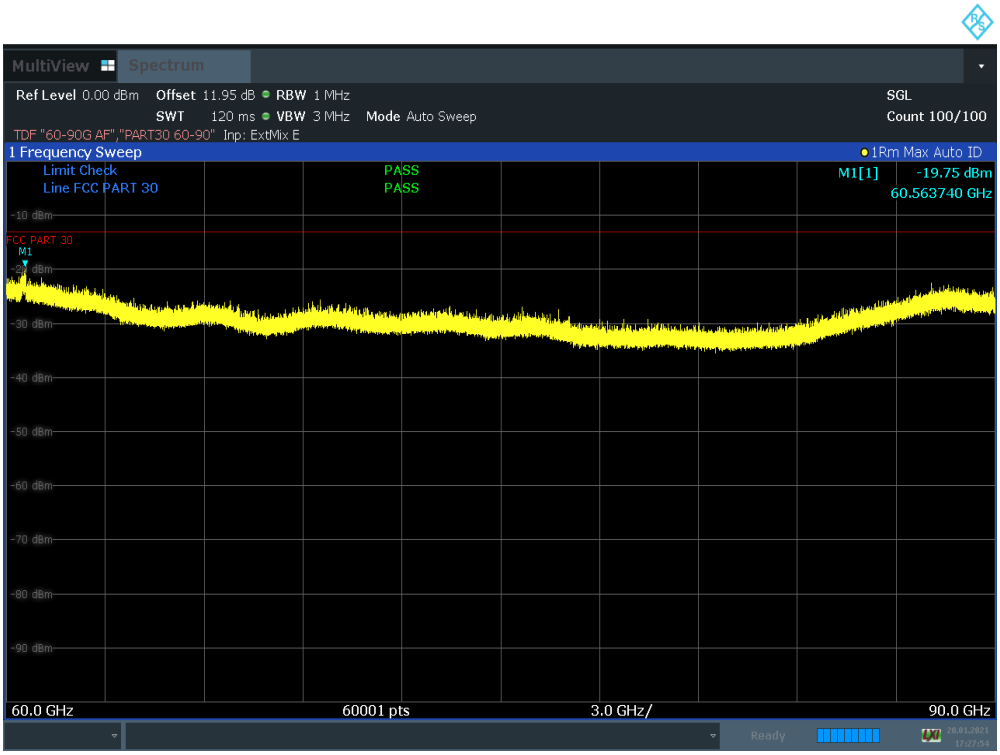


Plot 7-164. Radiated Spurious Plot 40 GHz – 60 GHz (100 MHz BW 8CC NC QPSK High Channel TRP)

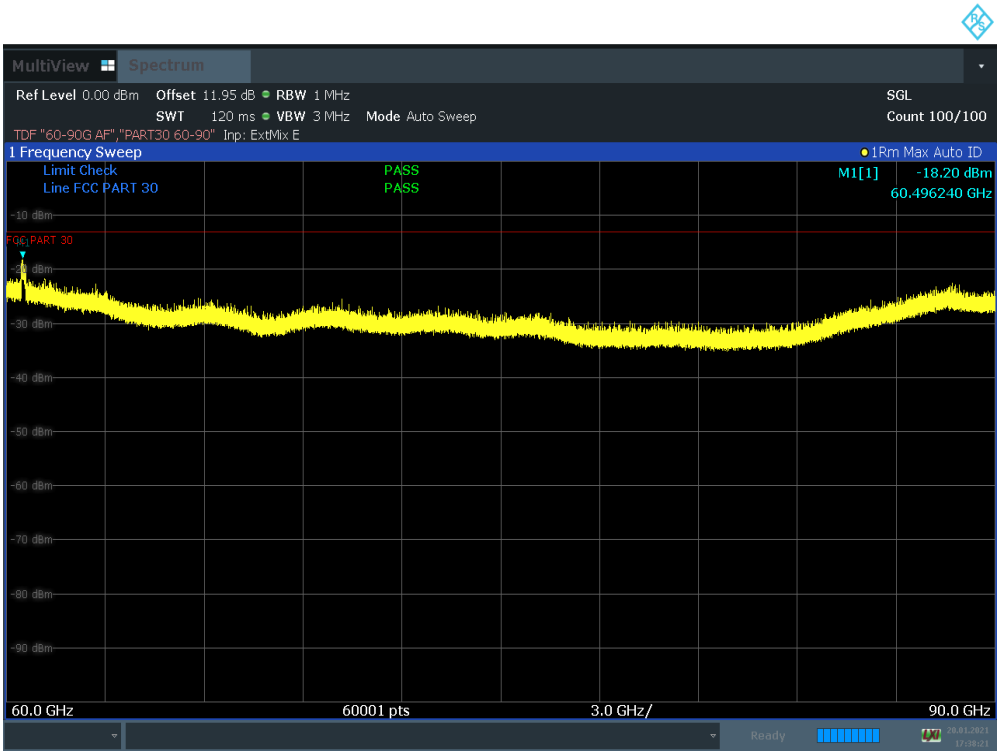
Configuration	Channel	Ant Pol. [Degree]	Frequency [GHz]	RSE EIRP [dBm]	Early Exit?	TRP [dBm]	Margin [dB]
100 MHz BW 1CC	Low	H	42.30	-14.77	No[1]	-33.19	20.19
		V	42.30	-20.95	Yes		
	Mid	H	40.16	-7.09	No	-33.62	20.62
		V	40.16	-13.97	No[1]		
	High	H	40.00	-9.59	No	-26.02	13.02
		V	40.00	-10.36	No		
100 MHz BW 8CC	Mid	H	40.16	-6.42	No	-31.27	18.27
		V	40.16	-9.08	No		
	High	H	40.00	3.60	No	-25.72	12.72
		V	40.00	8.04	No		
100 MHz BW 8CC NC	Mid	H	42.72	-11.50	No	-26.04	13.04
		V	40.46	-11.68	No		
	High	H	40.12	-0.15	No	-25.99	12.99
		V	40.14	6.02	No		
1. "Early Exit" - Less than 3 dB margin							

Table 7-23. Radiated Spurious Emissions (40 GHz – 60 GHz)

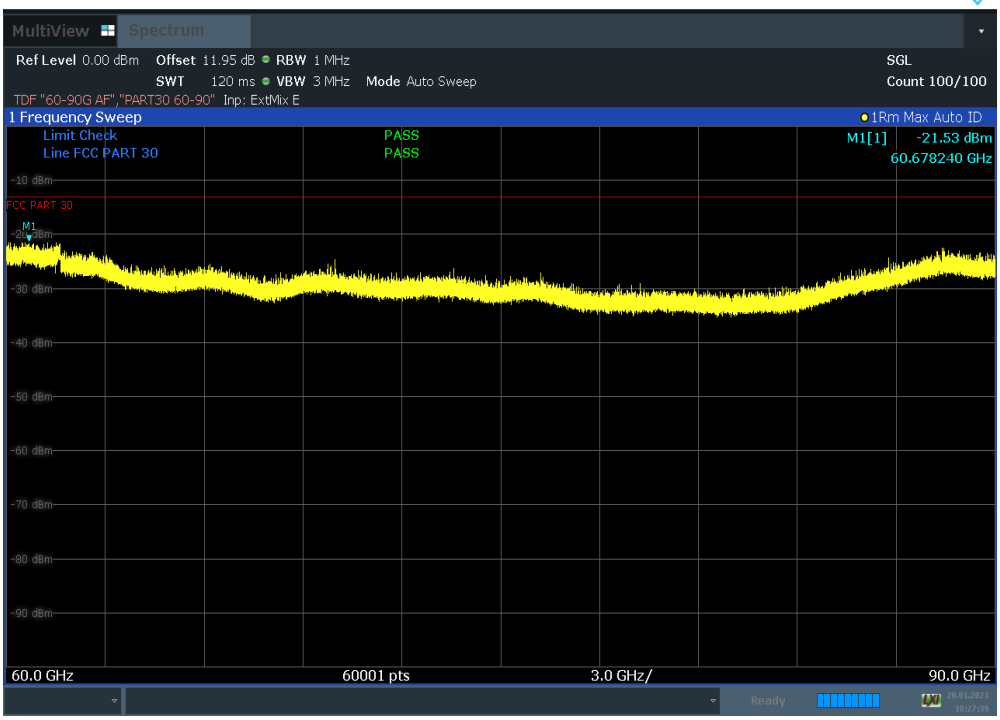
7.5.6 Radiated Spurious Emissions Plots (60 GHz to 90 GHz)



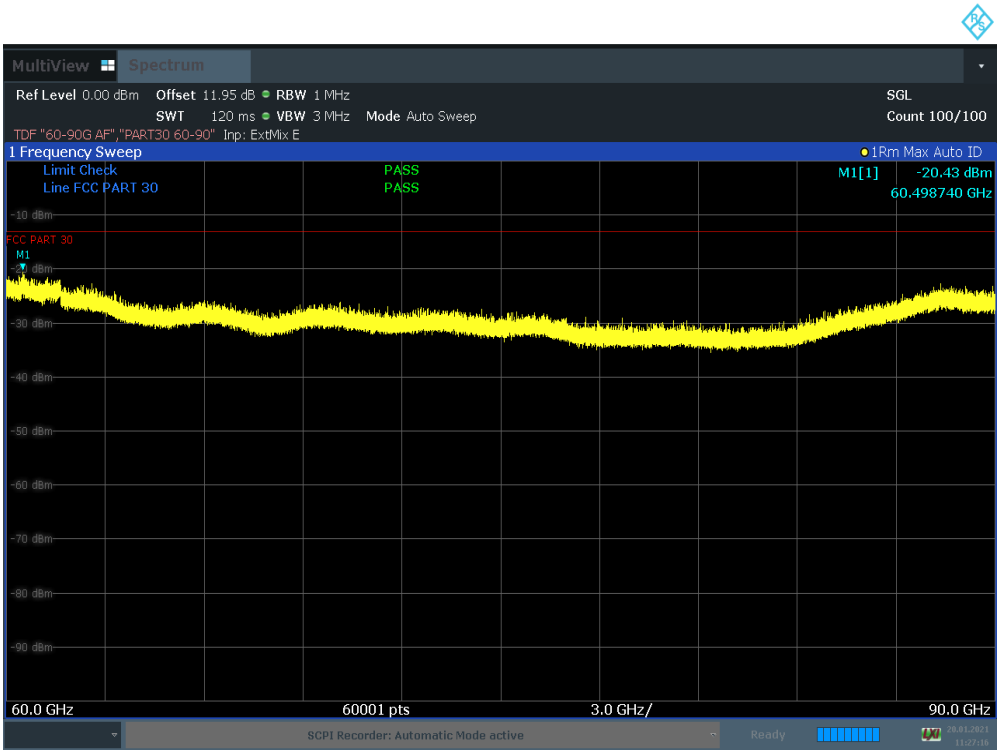
Plot 7-165. Radiated Spurious Plot 60 GHz – 90 GHz (100 MHz BW 1CC QPSK Mid Channel Pol. H)



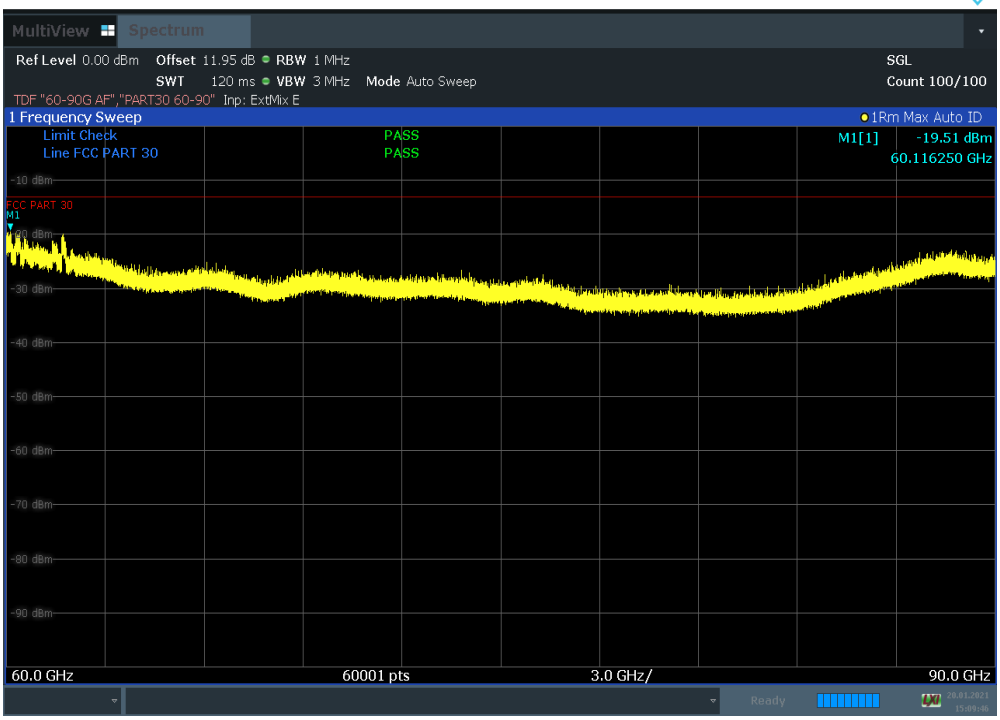
Plot 7-166. Radiated Spurious Plot 60 GHz – 90 GHz (100 MHz BW 1CC QPSK Mid Channel Pol. V)



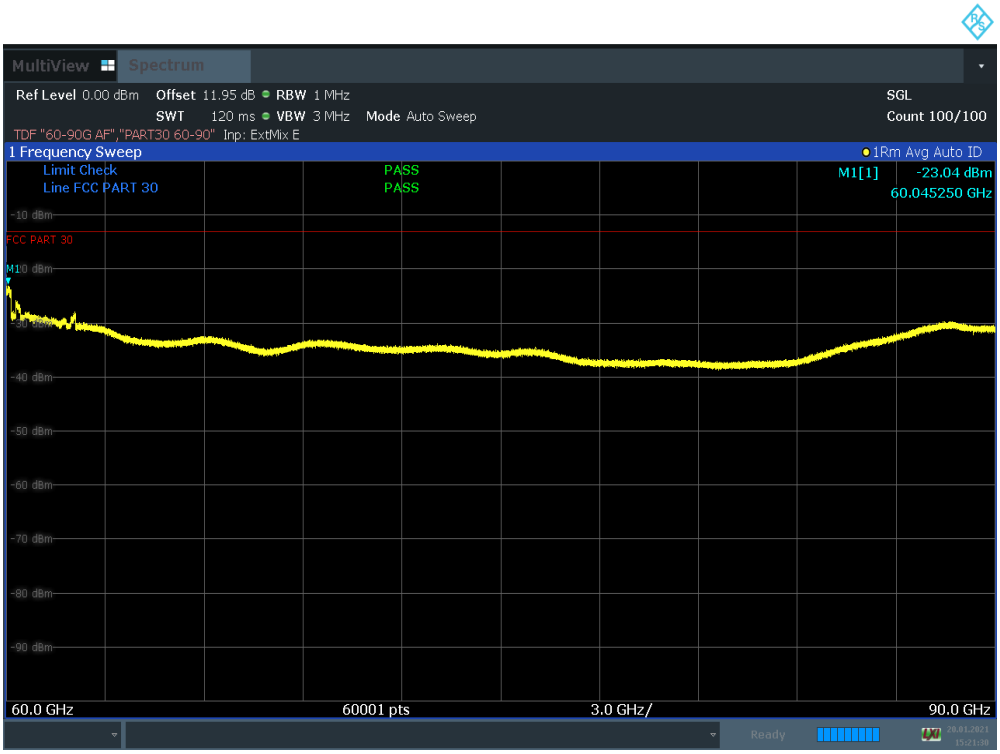
Plot 7-167. Radiated Spurious Plot 60 GHz – 90 GHz (100 MHz BW 8CC QPSK Mid Channel Pol. H)



Plot 7-168. Radiated Spurious Plot 60 GHz – 90 GHz (100 MHz BW 8CC QPSK Mid Channel Pol. V)

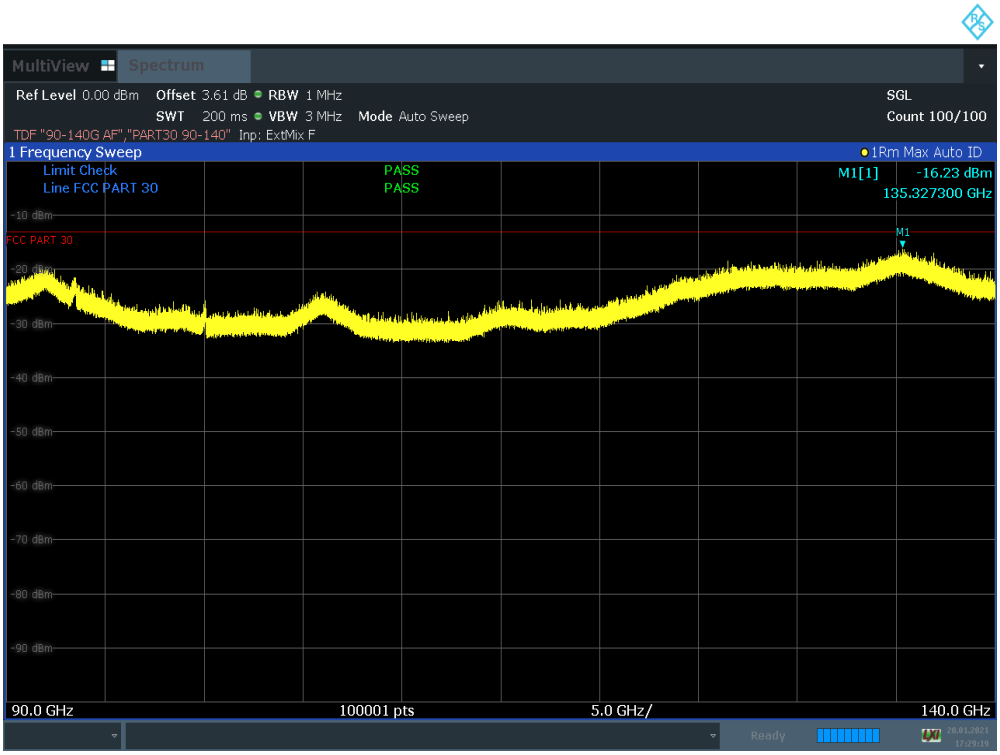


Plot 7-169. Radiated Spurious Plot 60 GHz – 90 GHz (100 MHz BW 8CC NC QPSK Mid Channel Pol. H)

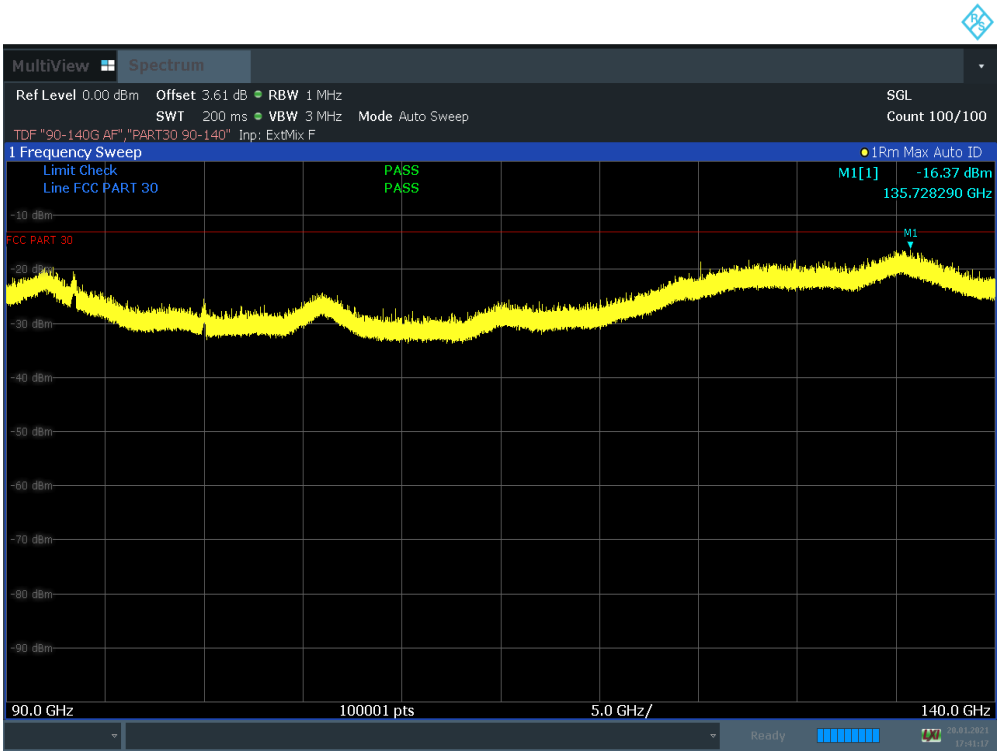


Plot 7-170. Radiated Spurious Plot 60 GHz – 90 GHz (100 MHz BW 8CC NC QPSK Mid Channel Pol. V)

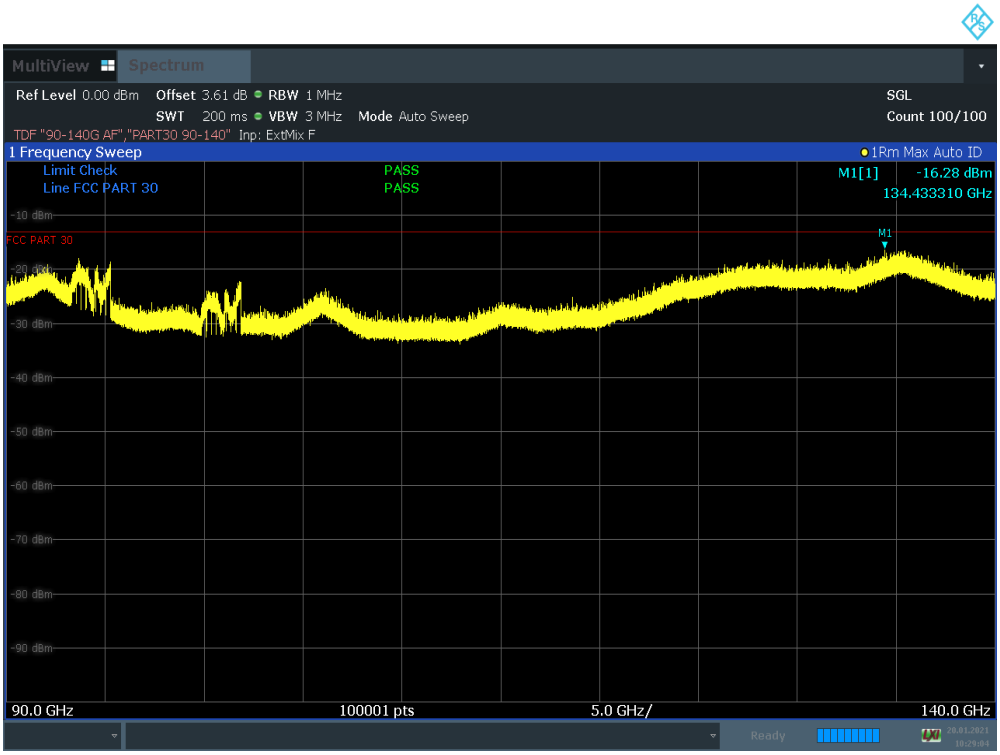
7.5.7 Radiated Spurious Emissions Plots (90 GHz – 140 GHz)



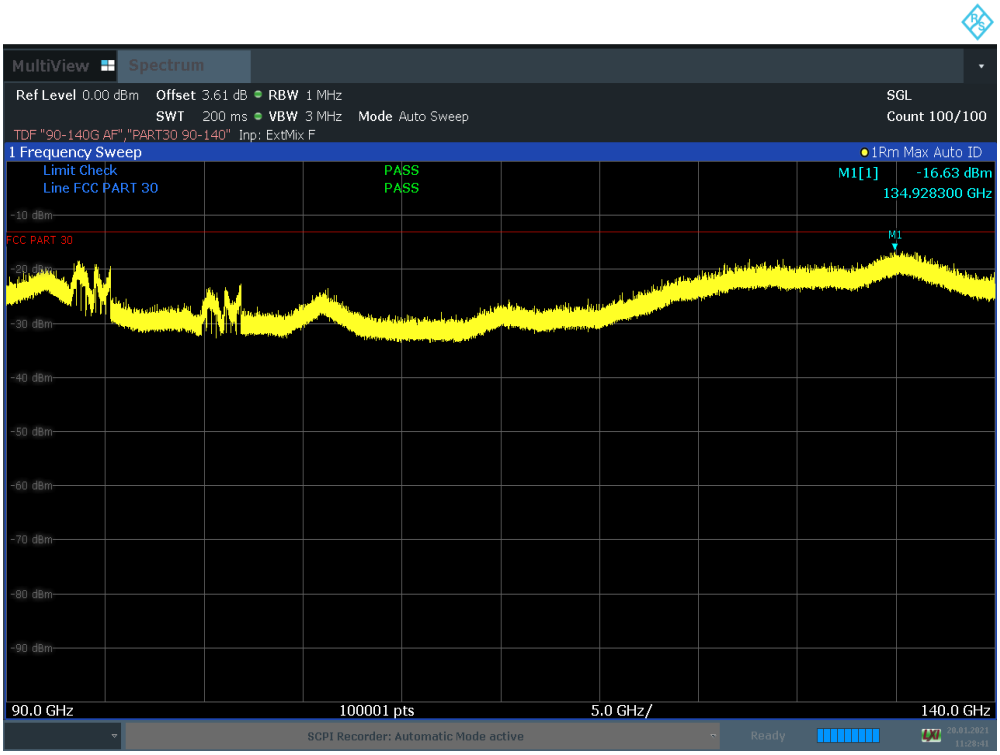
Plot 7-171. Radiated Spurious Plot 90 GHz – 140 GHz (100 MHz BW 1CC QPSK Mid Channel Pol. H)



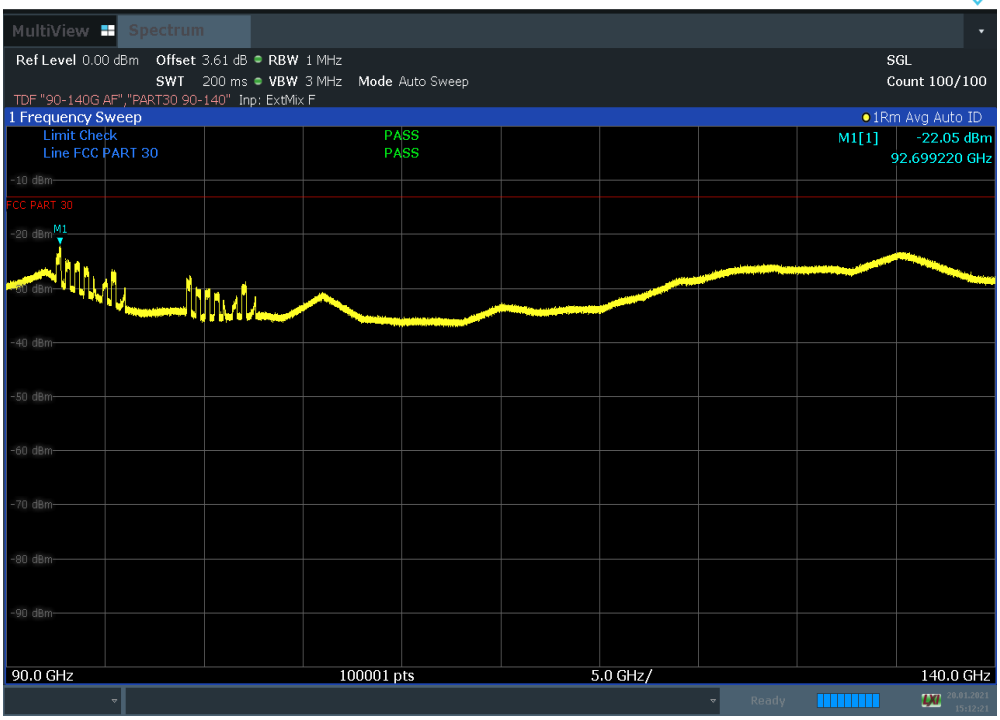
Plot 7-172. Radiated Spurious Plot 90 GHz – 140 GHz (100 MHz BW 1CC QPSK Mid Channel Pol. V)



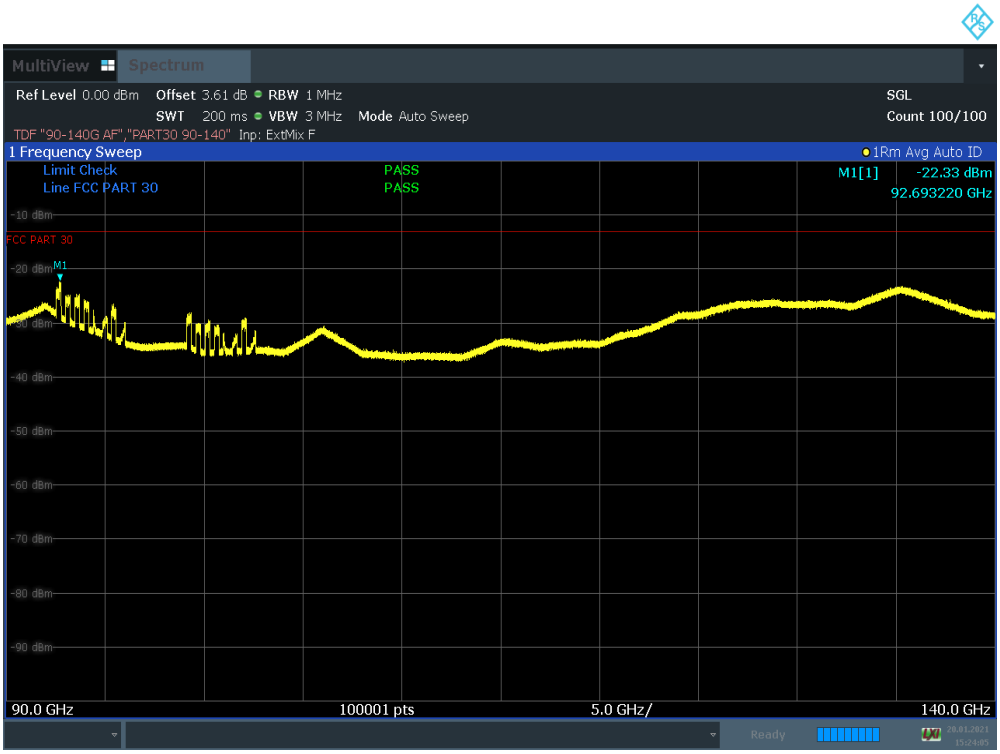
Plot 7-173. Radiated Spurious Plot 90 GHz – 140 GHz (100 MHz BW 8CC QPSK Mid Channel Pol. H)



Plot 7-174. Radiated Spurious Plot 90 GHz – 140 GHz (100 MHz BW 8CC QPSK Mid Channel Pol. V)

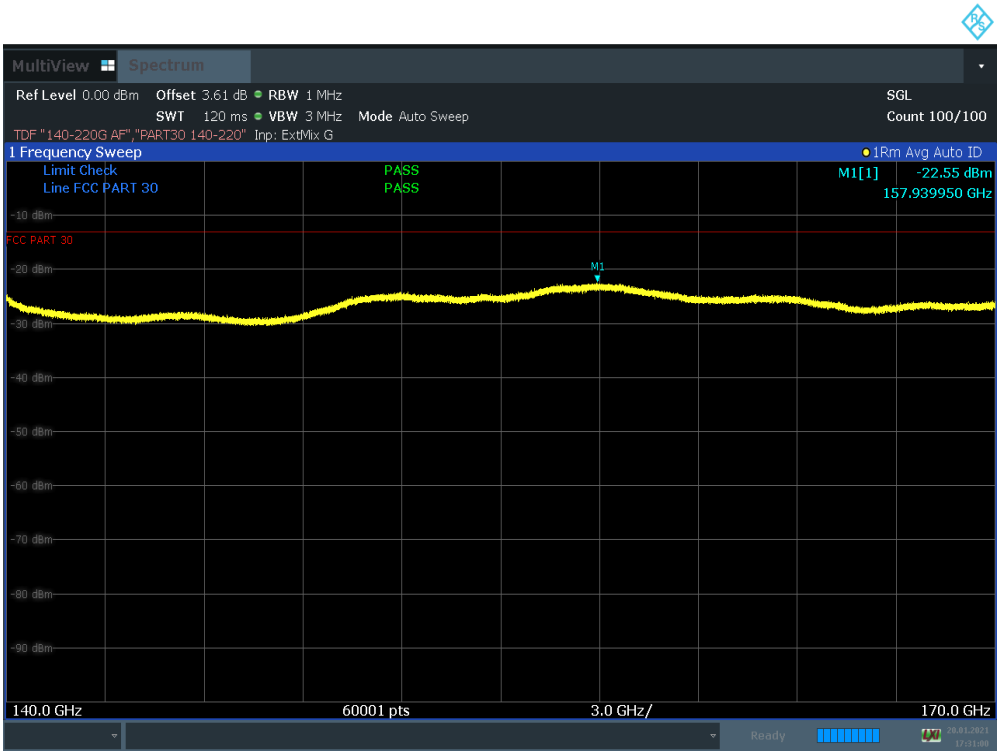


Plot 7-175. Radiated Spurious Plot 90 GHz – 140 GHz (100 MHz BW 8CC NC QPSK Mid Channel Pol. H)

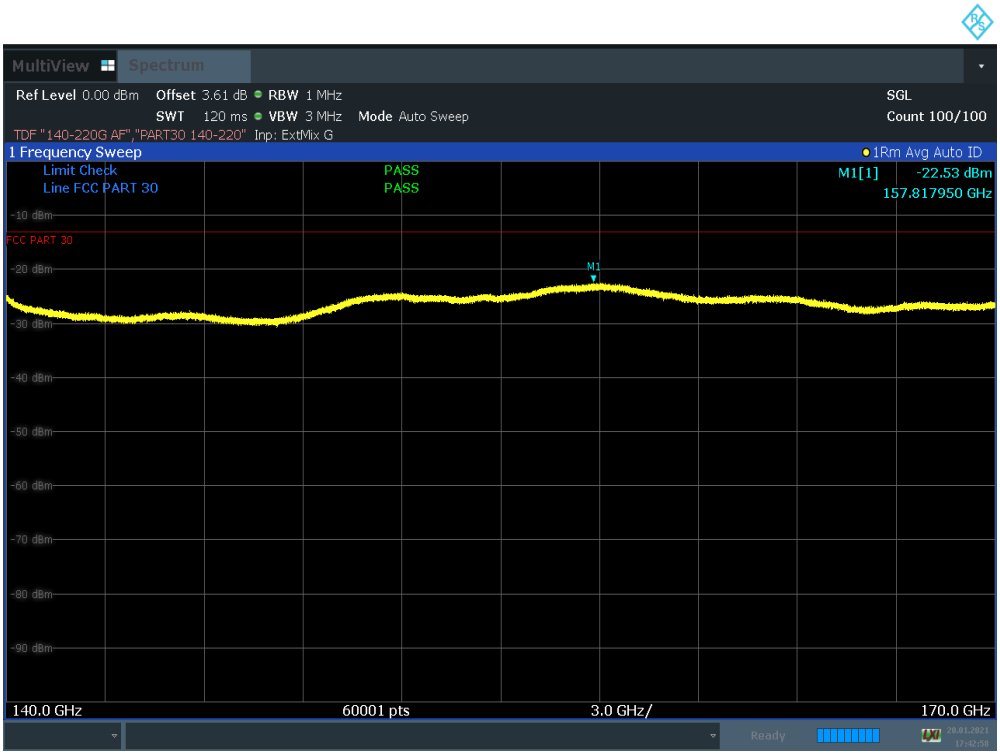


Plot 7-176. Radiated Spurious Plot 90 GHz – 140 GHz (100 MHz BW 8CC NC QPSK Mid Channel Pol. V)

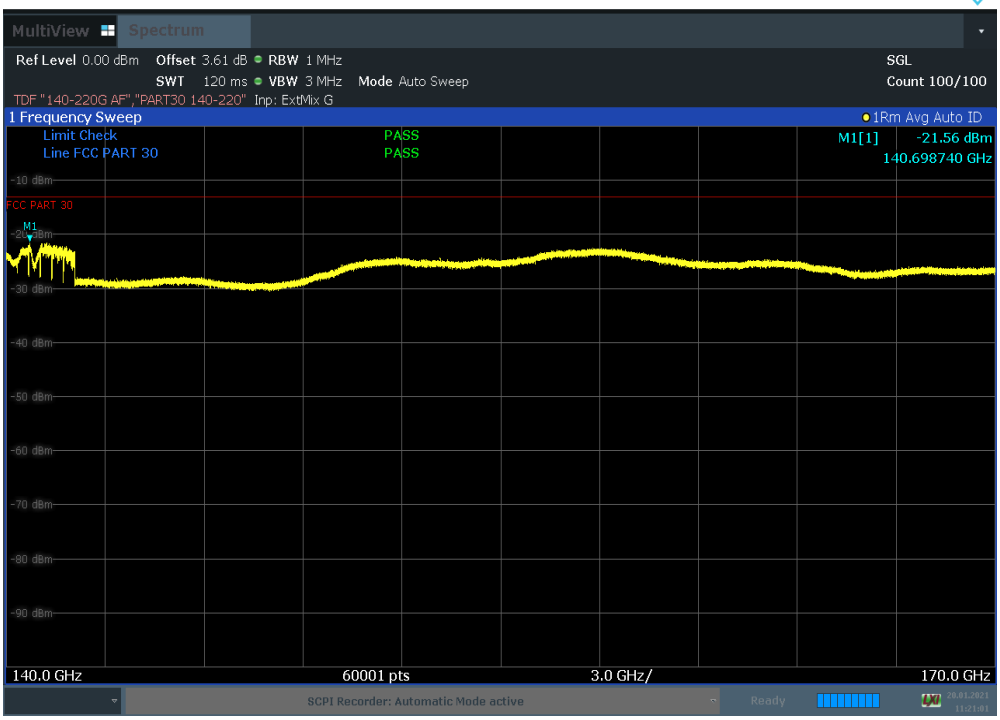
7.5.8 Radiated Spurious Emissions Plots (140 GHz – 170 GHz)



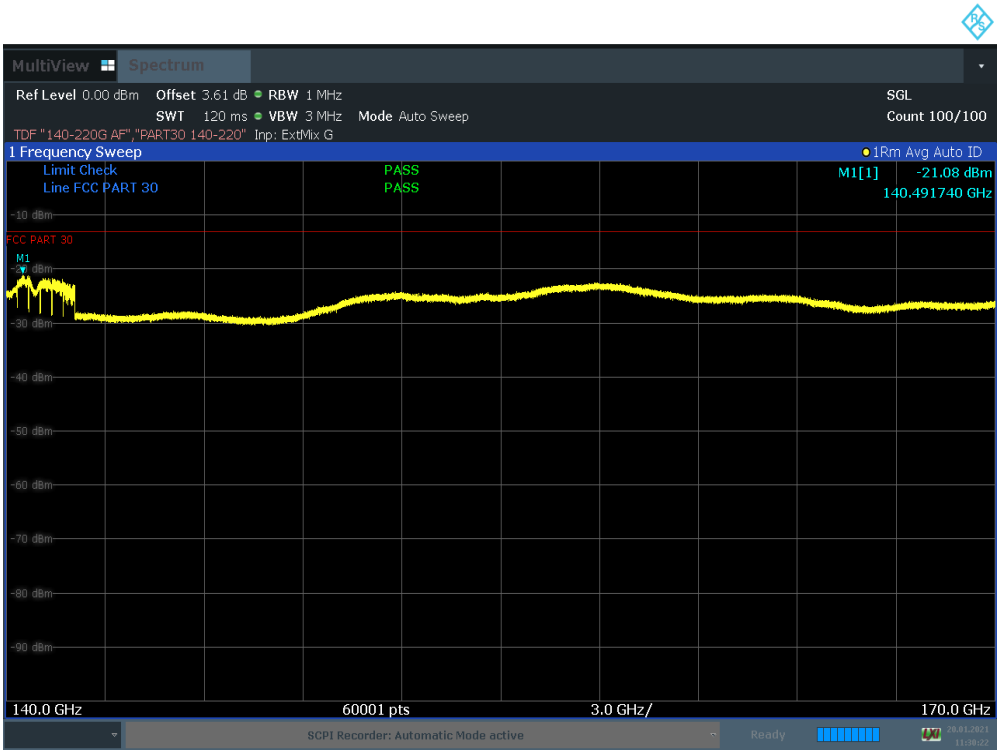
Plot 7-177. Radiated Spurious Plot 140 GHz – 170 GHz (100 MHz BW 1CC QPSK Mid Channel Pol. H)



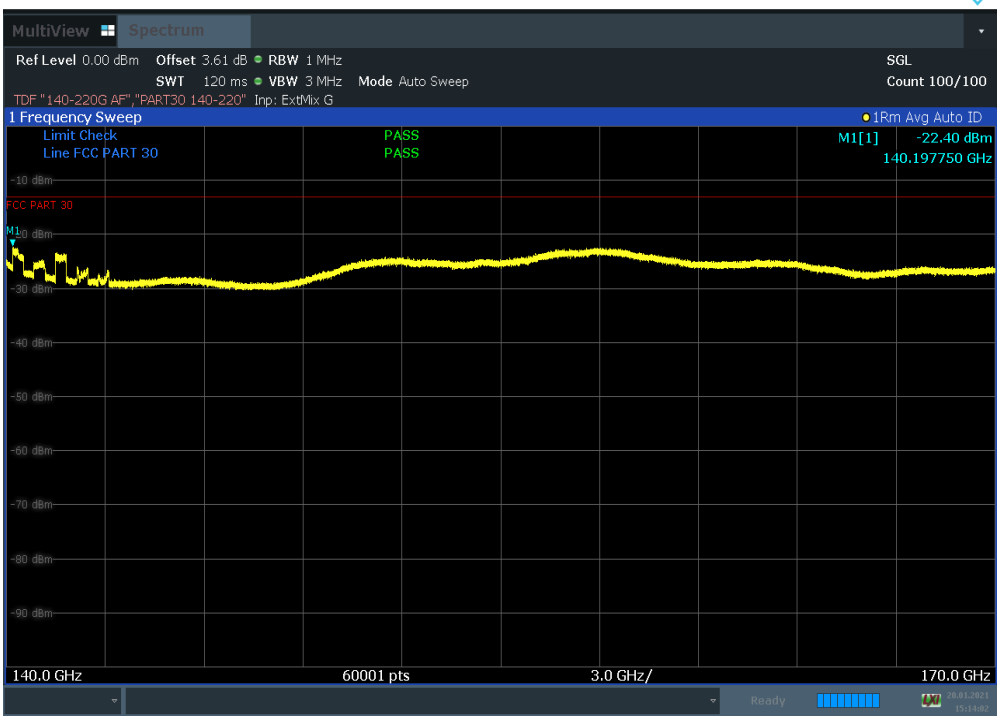
Plot 7-178. Radiated Spurious Plot 140 GHz – 170 GHz (100 MHz BW 1CC QPSK Mid Channel Pol. V)



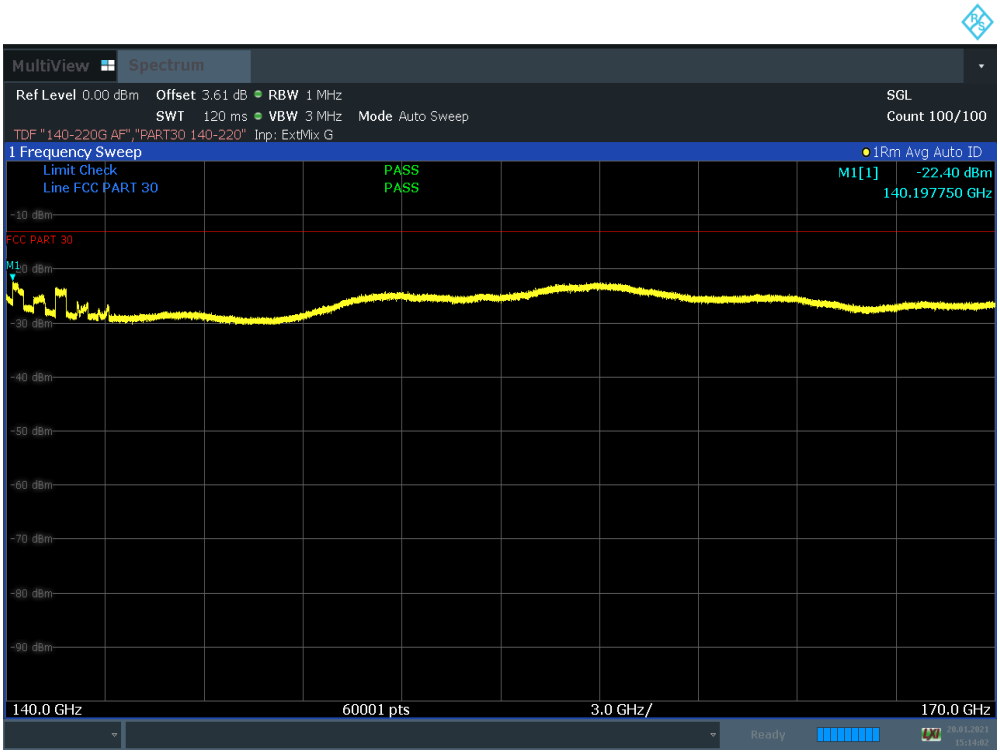
Plot 7-179. Radiated Spurious Plot 140 GHz – 170 GHz (100 MHz BW 8CC QPSK Mid Channel Pol. H)



Plot 7-180. Radiated Spurious Plot 140 GHz – 170 GHz (100 MHz BW 8CC QPSK Mid Channel Pol. V)

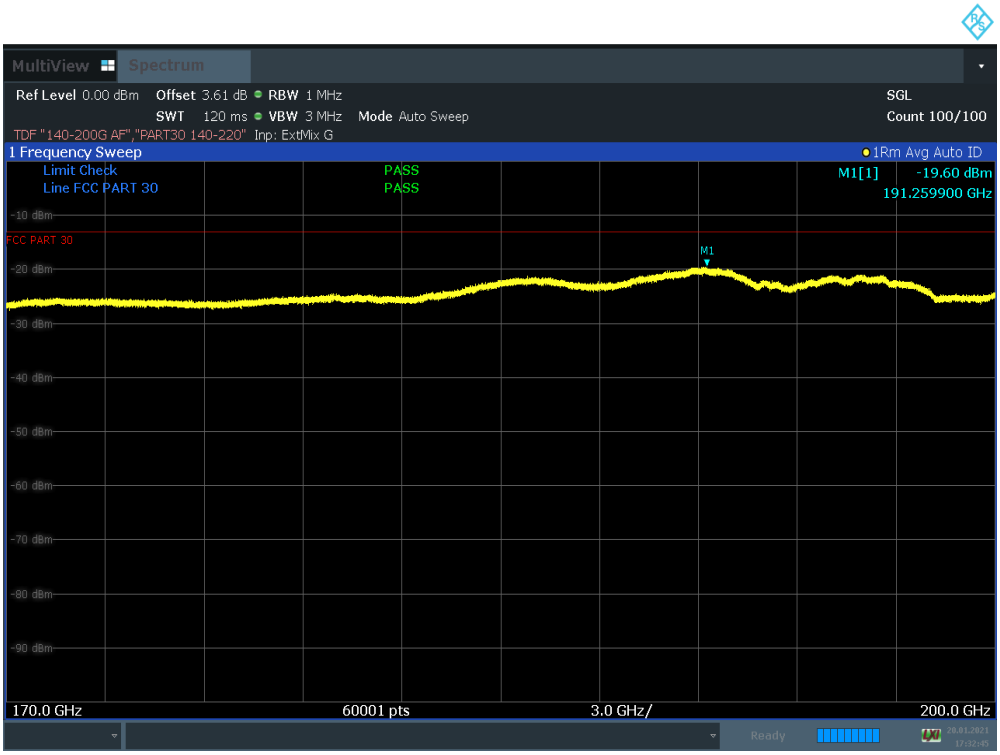


Plot 7-181. Radiated Spurious Plot 140 GHz – 170 GHz (100 MHz BW 8CC NC QPSK Mid Channel Pol. H)

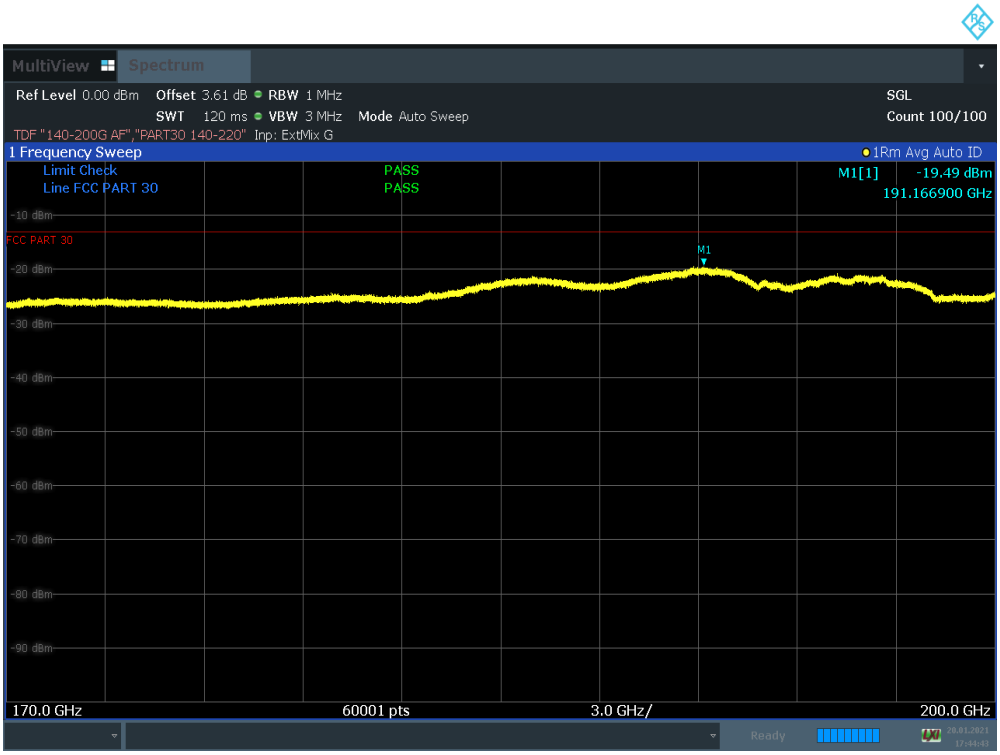


Plot 7-182. Radiated Spurious Plot 140 GHz – 170 GHz (100 MHz BW 8CC NC QPSK Mid Channel Pol. V)

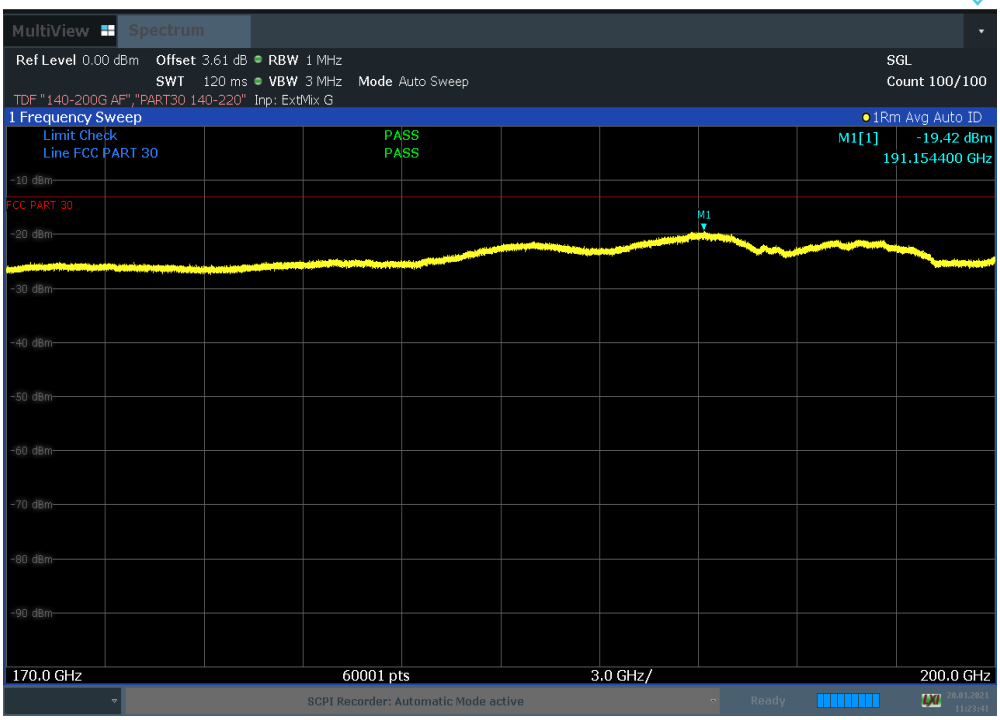
7.5.9 Radiated Spurious Emissions Plots (170 GHz – 200 GHz)



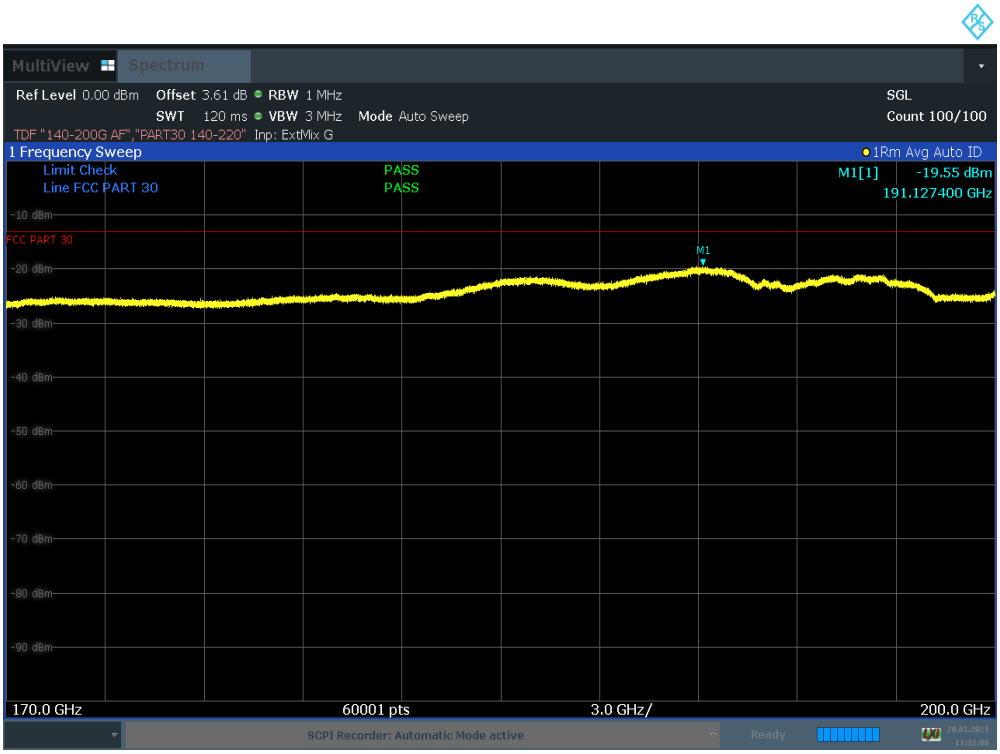
Plot 7-183. Radiated Spurious Plot 170 GHz – 200 GHz (100 MHz BW 1CC QPSK Mid Channel Pol. H)



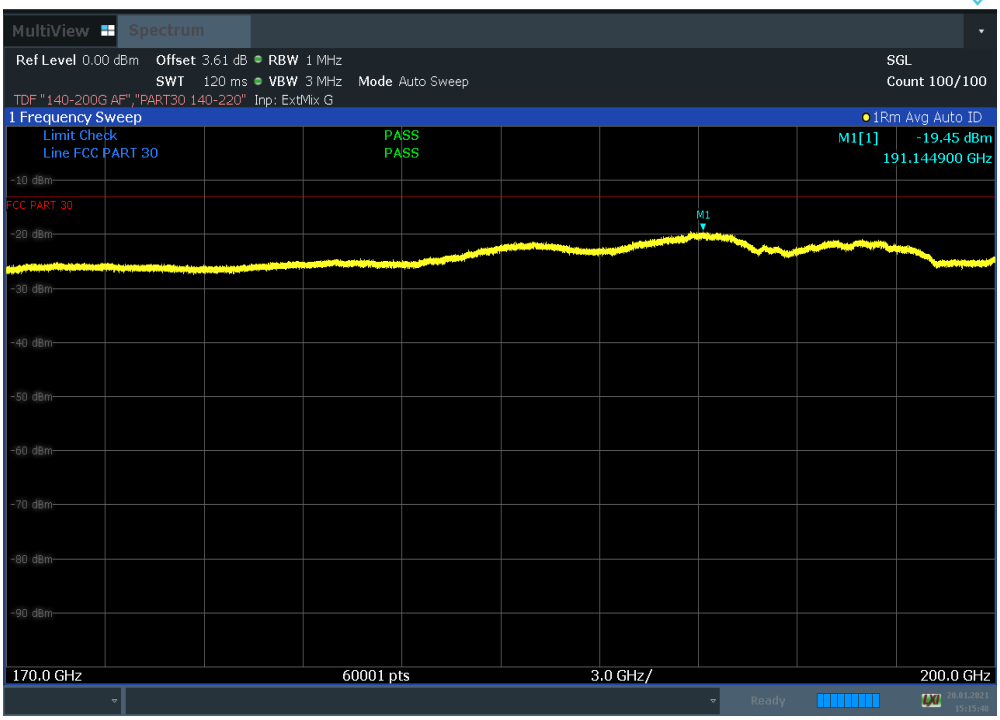
Plot 7-184. Radiated Spurious Plot 170 GHz – 200 GHz (100 MHz BW 1CC QPSK Mid Channel Pol. V)



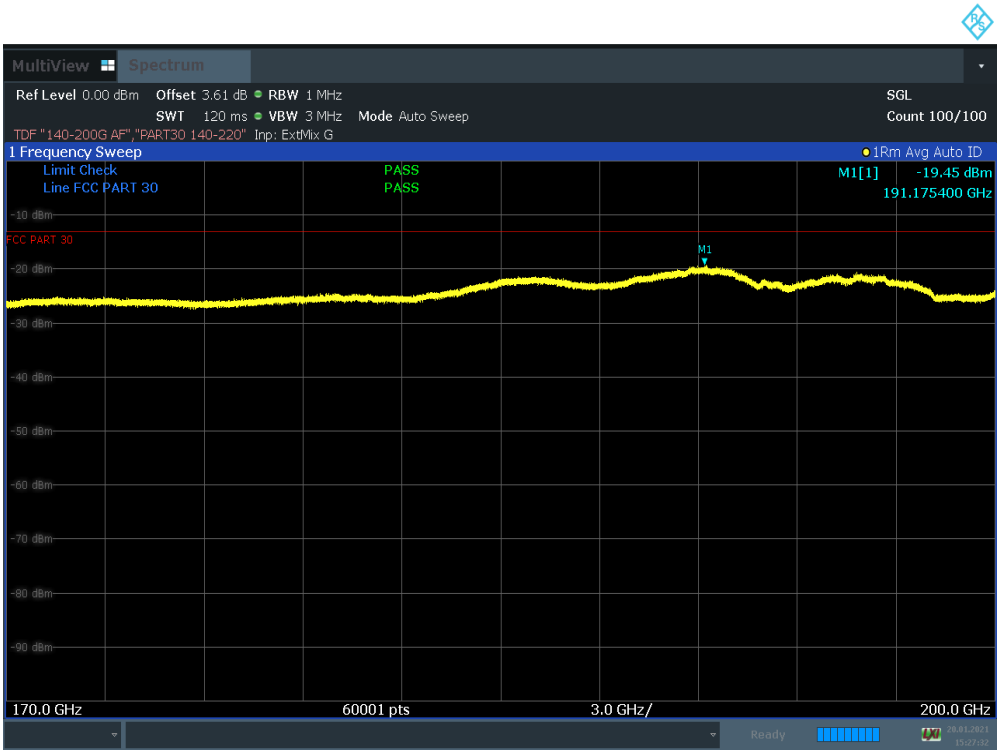
Plot 7-185. Radiated Spurious Plot 170 GHz – 200 GHz (100 MHz BW 8CC QPSK Mid Channel Pol. H)



Plot 7-186. Radiated Spurious Plot 170 GHz – 200 GHz (100 MHz BW 8CC QPSK Mid Channel Pol. V)



Plot 7-187. Radiated Spurious Plot 170 GHz – 200 GHz (100 MHz BW 8CC NC QPSK Mid Channel Pol. H)



Plot 7-188. Radiated Spurious Plot 170 GHz – 200 GHz (100 MHz BW 8CC NC QPSK Mid Channel Pol. V)

7.6 Band Edge Emissions

§2.1051 §30.203

Test Overview

All out of band emissions are measured in a radiated setup while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All modulations were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

The minimum permissible attenuation level of any spurious emission is -13 dBm / 1 MHz. However, in the bands immediately outside and adjacent to the licensee's frequency block, having a bandwidth equal to 10 percent of the channel bandwidth, the conductive power or the total radiated power of any emission shall be −5 dBm / MHz or lower.

Test Procedure Used

ANSI C63.26-2015 Section 5.7.3
ANSI C63.26-2015 Section 6.4
KDB 842590 D01 v01r01 Section 4.4.2.5

Test Settings

1. Start and stop frequency were set such that both upper and lower band edges are measured.
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW = 1 MHz
4. VBW ≥ 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW
7. Trace mode = trace average
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Test Notes

1) The EUT was tested while positioned upright and mounted on a mast 1.5 m height. The worst case emissions are reported with the EUT in this fixed position and with the modulations and active component carriers shown in the tables below.

2) All measurements in this section was performed in the radiated setup in the far field.

3) All appropriate Antenna Factor, Cable Loss, and Duty Correction factor have been applied in the spectrum analyzer for each measurement. Additionally, band Edge measurements in this section are shown as equivalent conductive powers for direct comparison to the 30.203 limit. The conductive power at the band edge is calculated by subtracting the gain of the EUT's antenna from the measured EIRP level. Antenna Gain information is shown on the following page.

4) For band edge measurement of the receive horn antenna was maximized on Antenna A were individually energized and measured while maintaining maximized position on Antenna A. These measurements were saved into a spreadsheet and their spectra were summed to determine the total conducted power for the band edge emissions level shown starting in Section 7.6.5. The same procedure was repeated with the receive horn antenna maximized on Antennas B, C, and D.

5) The MIMO Band Edges were calculated by using the “measure and sum the spectra across the outputs” technique specified in Section 6.4.3.2.2 of ANSI C63.26-2015. The spectra were summed linearly and converted to dBm for comparison with the limit.

6) 10% outside of the channel bandwidth result should be referred from 7.5 Radiated Spurious and Harmonic Emissions due to EUT Antenna subtraction calculation adoption. Thus, some failure results are performed of TRP measurement adopted.

7.6.1 Antenna Gain Information at the Band Edge

The following antenna gain information is provided to demonstrate the antenna performance of the 37.05 GHz to 39.95 GHz band. These antenna gains were subtracted from the measured EIRP levels at the lower and upper band edge frequencies to determine an equivalent conductive power that was compared directly with the §30.203 limits.

Frequency [GHz]	Channel	Antenna Gain [dBi]
37.05	Low	26.57
39.95	High	27.00

Table 7-24. Antenna Gains at the Band Edges

Sample Analyzer Offset Calculation (at 37.05 GHz)

Measurement Antenna Factor = 42.91 dB/m

Cable Loss = 13.26 dB

Far Field Distance = 2.61 m

EUT Antenna Gain = 26.57 dBi

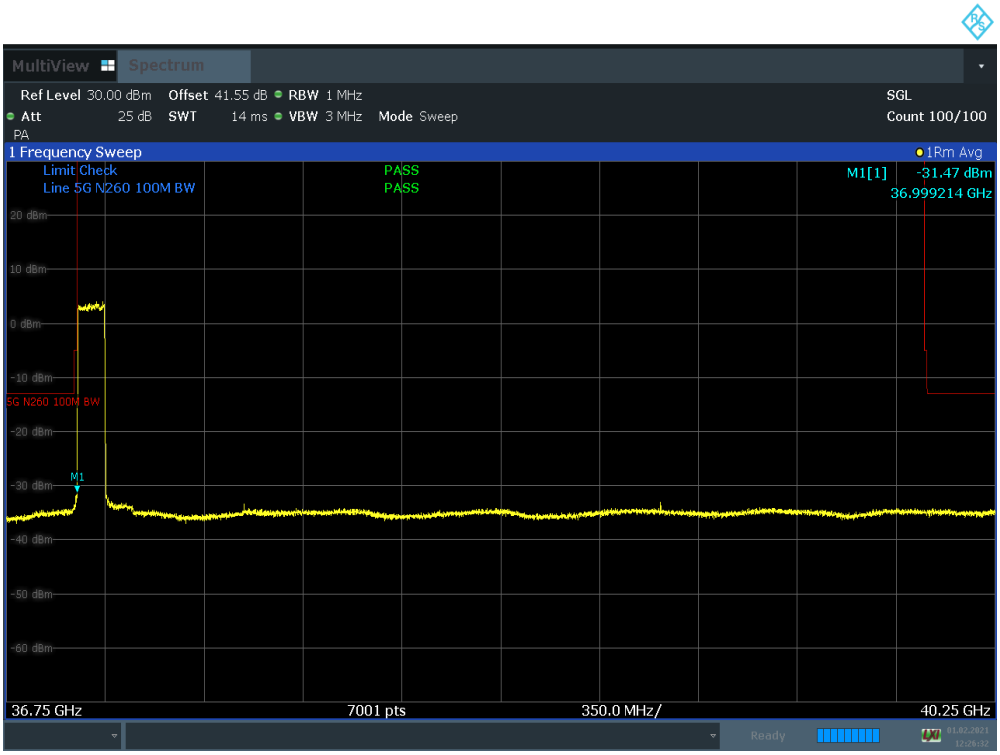
Duty Cycle Correction Factor = 1.41 dB

Analyzer Offset (dB) = AF (dB/m) + CL (dB) + 107 + $20\log_{10}(D)$ – 104.8 dB – Gain (dBi) + Duty Correction factor (dB)

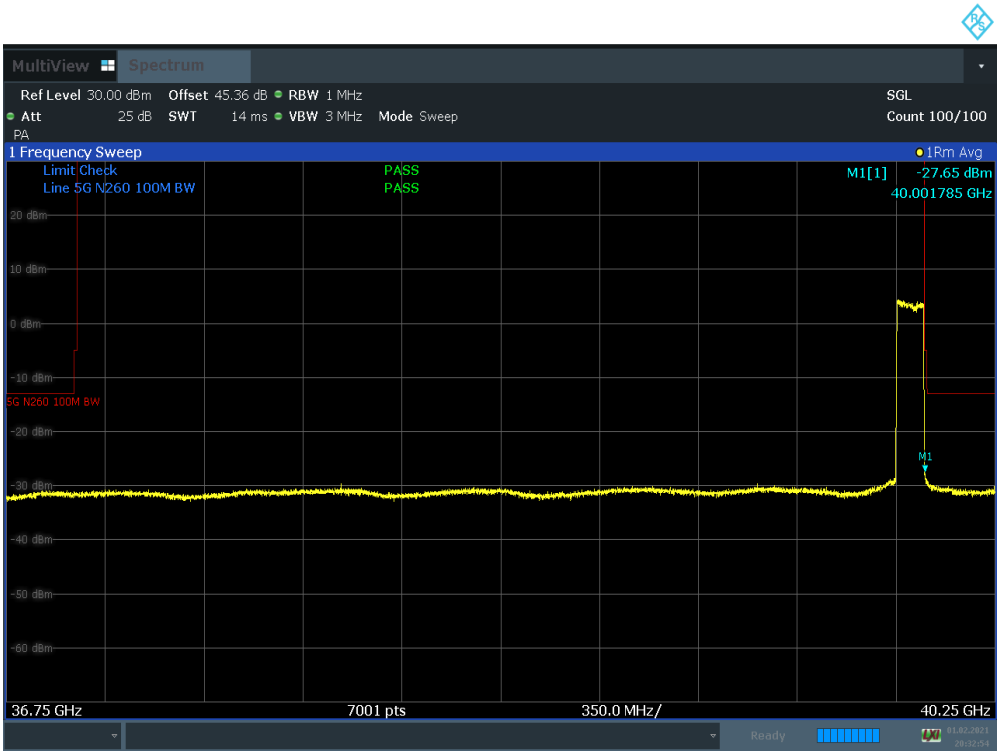
= 42.91 dB/m + 13.26 dB + 107 + $20\log_{10}(2.61)$ – 104.8 dB – 26.57 dBi + 1.41 dB

= 41.55 dB

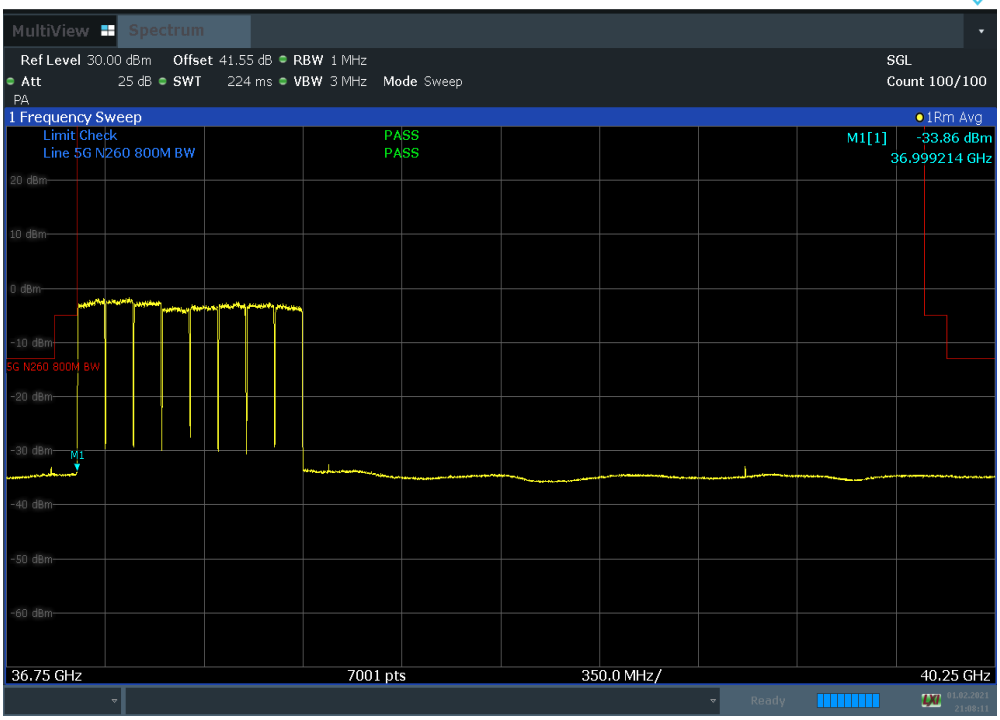
7.6.2 Antenna A Conducted Band Edge Maximized on Antenna A



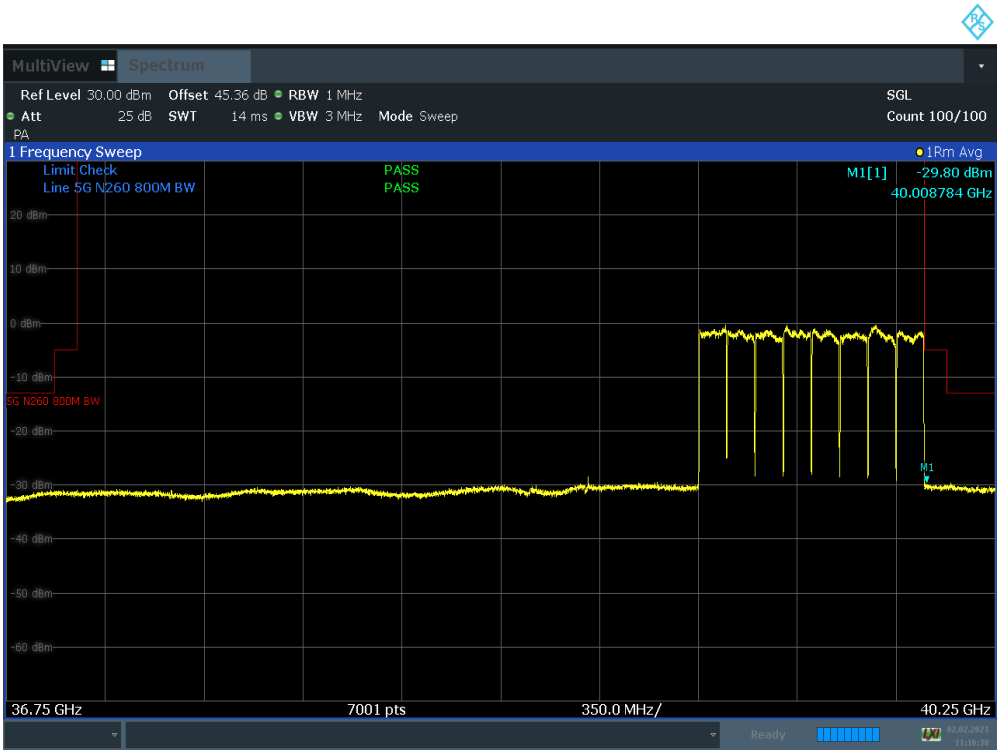
Plot 7-189. Band Edge (100 MHz BW 1CC QPSK Low)



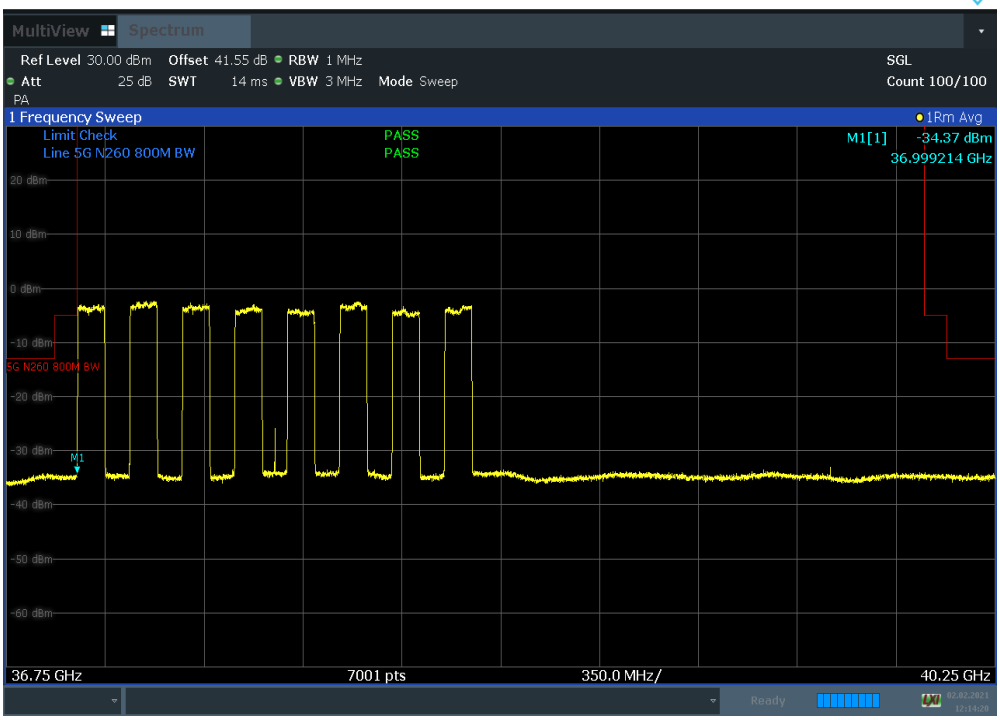
Plot 7-190. Band Edge (100 MHz BW 1CC QPSK High)



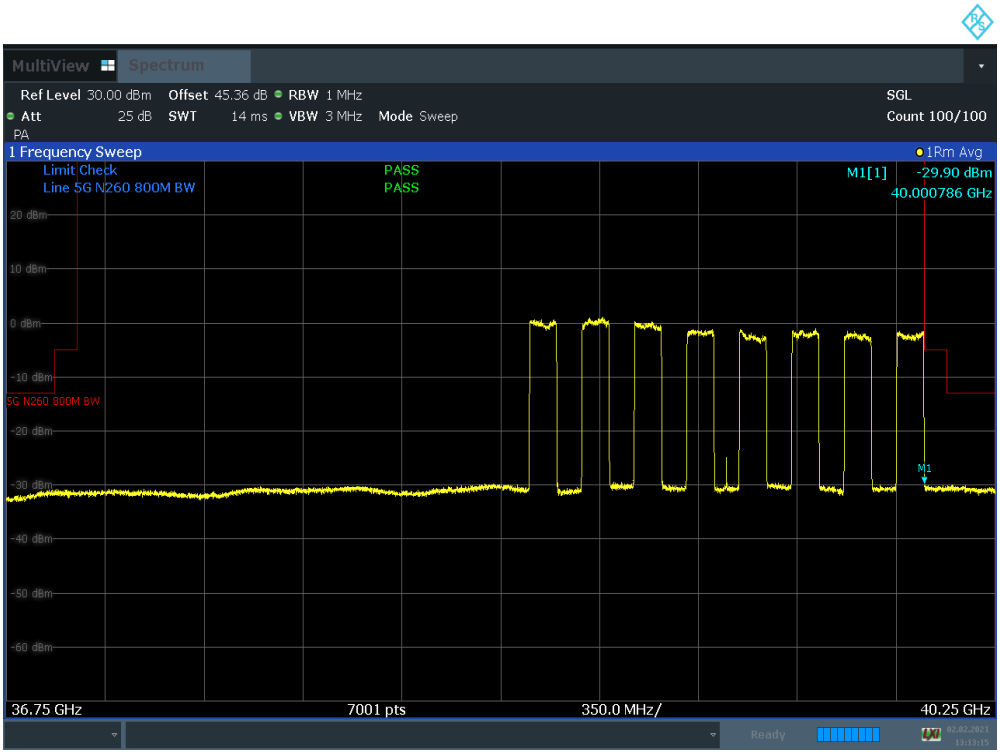
Plot 7-191. Band Edge (100 MHz BW 8CC QPSK Low)



Plot 7-192. Band Edge (100 MHz BW 8CC QPSK High)

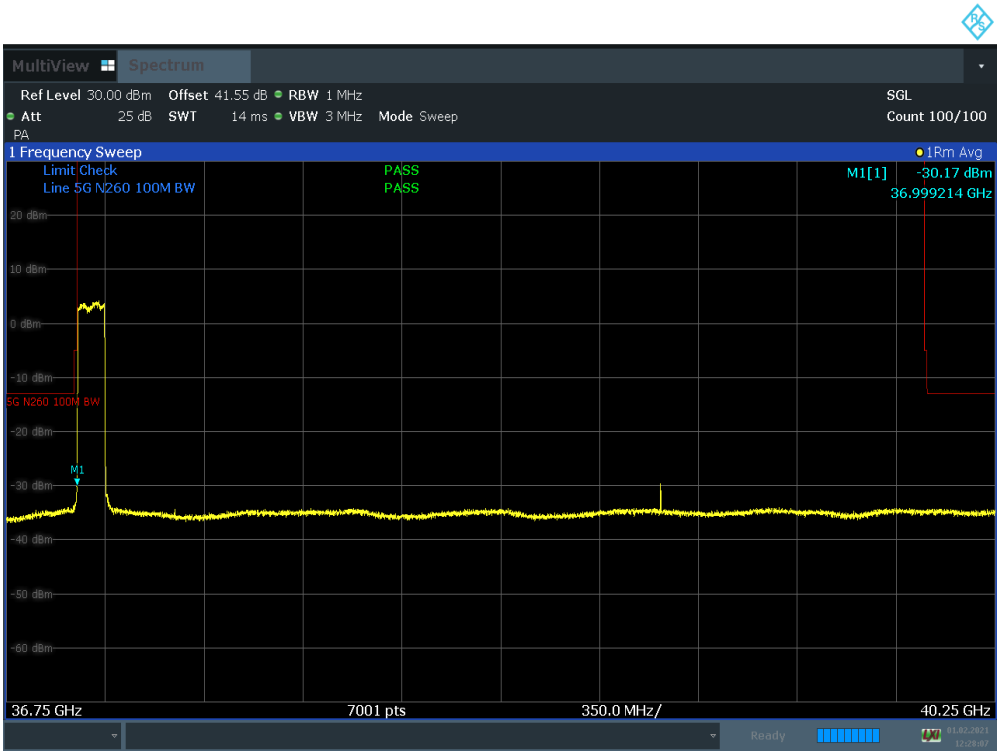


Plot 7-193. Band Edge (100 MHz BW 8CC NC QPSK Low)

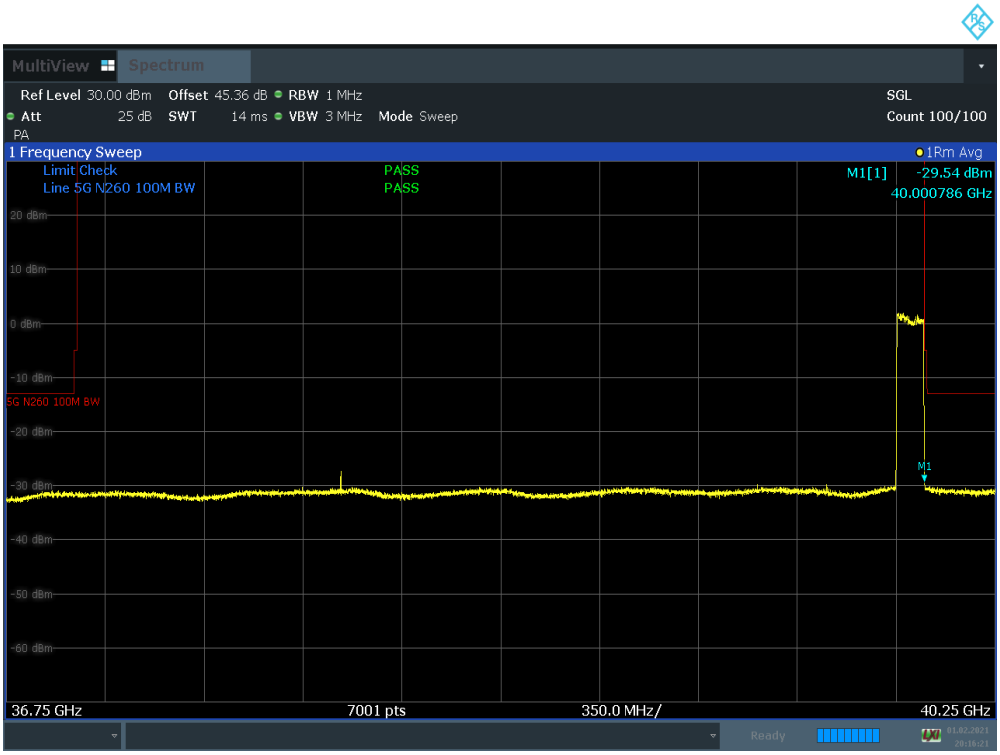


Plot 7-194. Band Edge (100 MHz BW 8CC NC QPSK High)

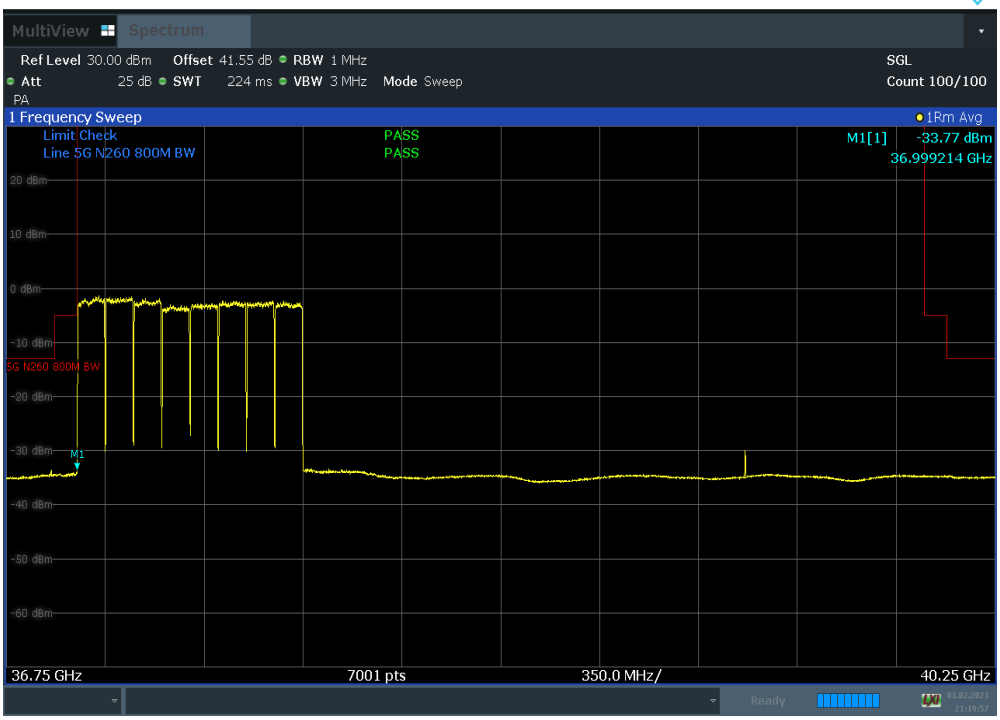
7.6.3 Antenna B Conducted Band Edge Maximized on Antenna B



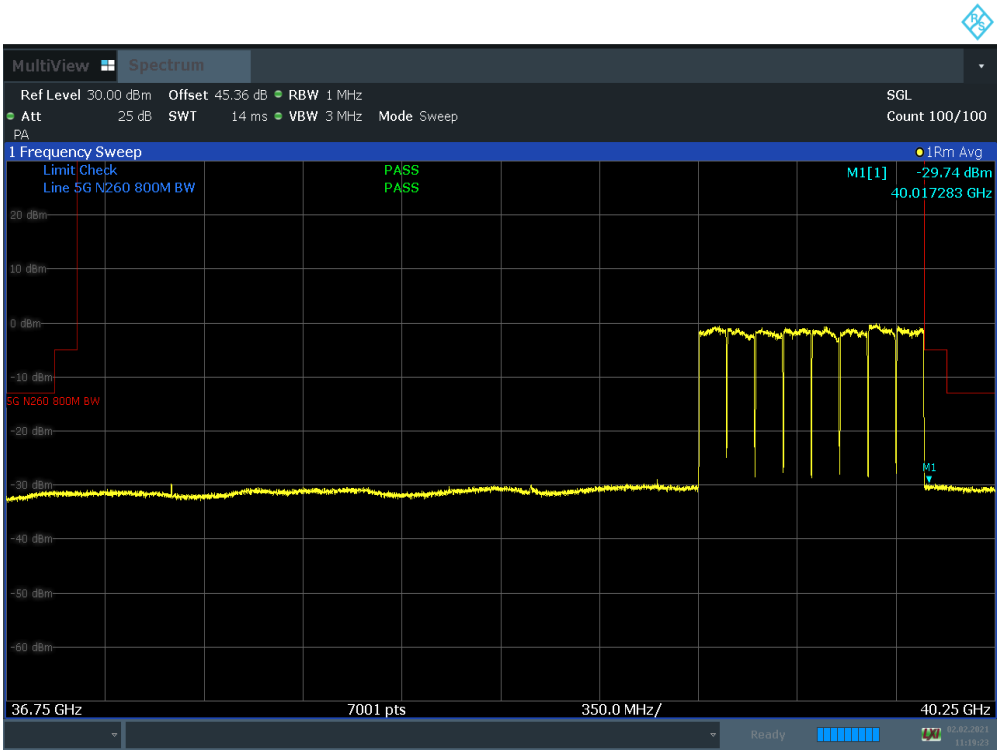
Plot 7-195. Band Edge (100 MHz BW 1CC QPSK Low)



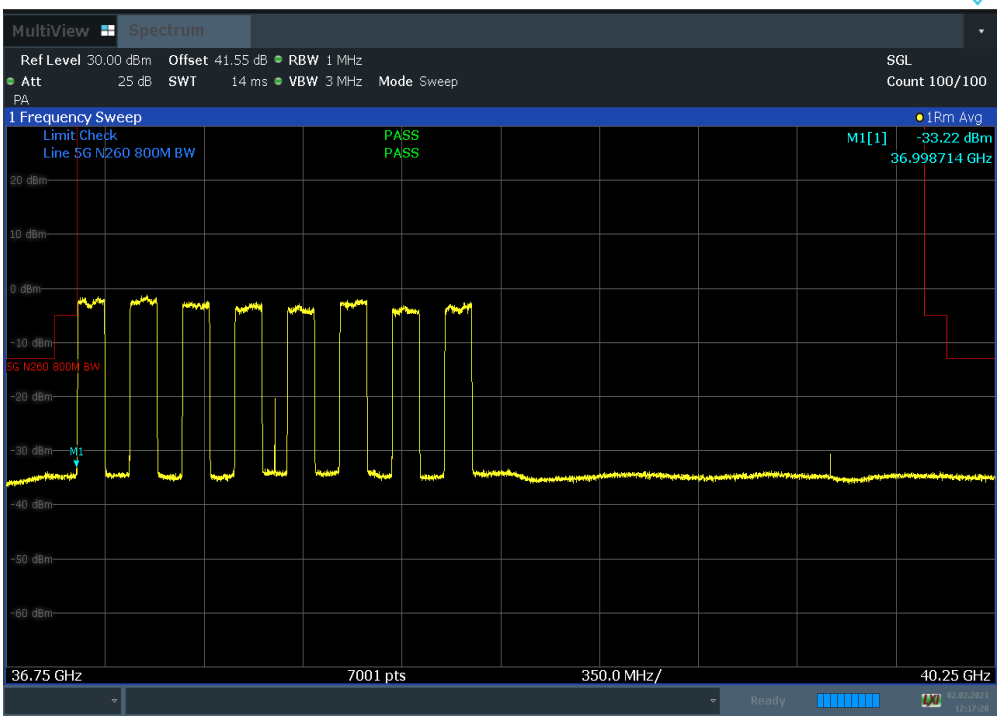
Plot 7-196. Band Edge (100 MHz BW 1CC QPSK High)



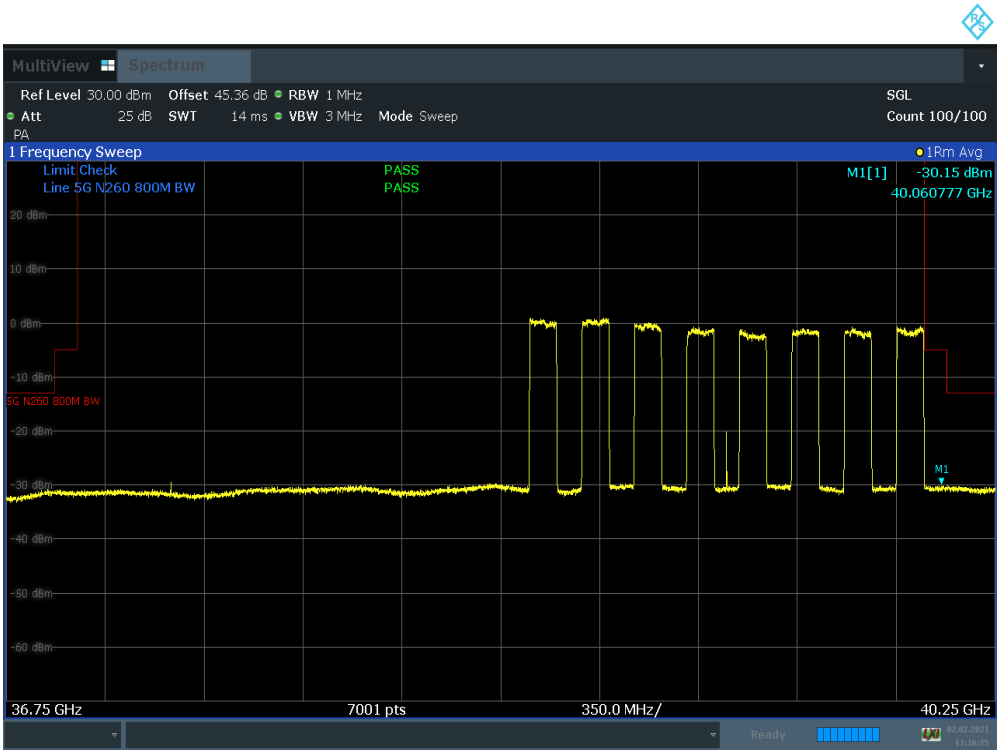
Plot 7-197. Band Edge (100 MHz BW 8CC QPSK Low)



Plot 7-198. Band Edge (100 MHz BW 8CC QPSK High)

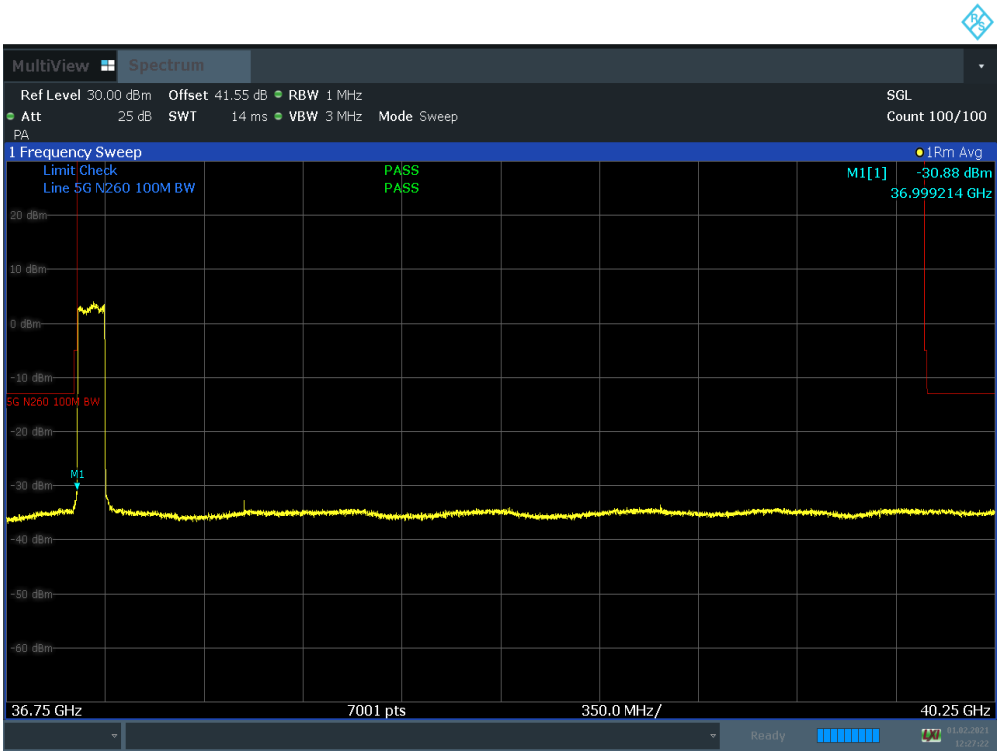


Plot 7-199. Band Edge (100 MHz BW 8CC NC QPSK Low)

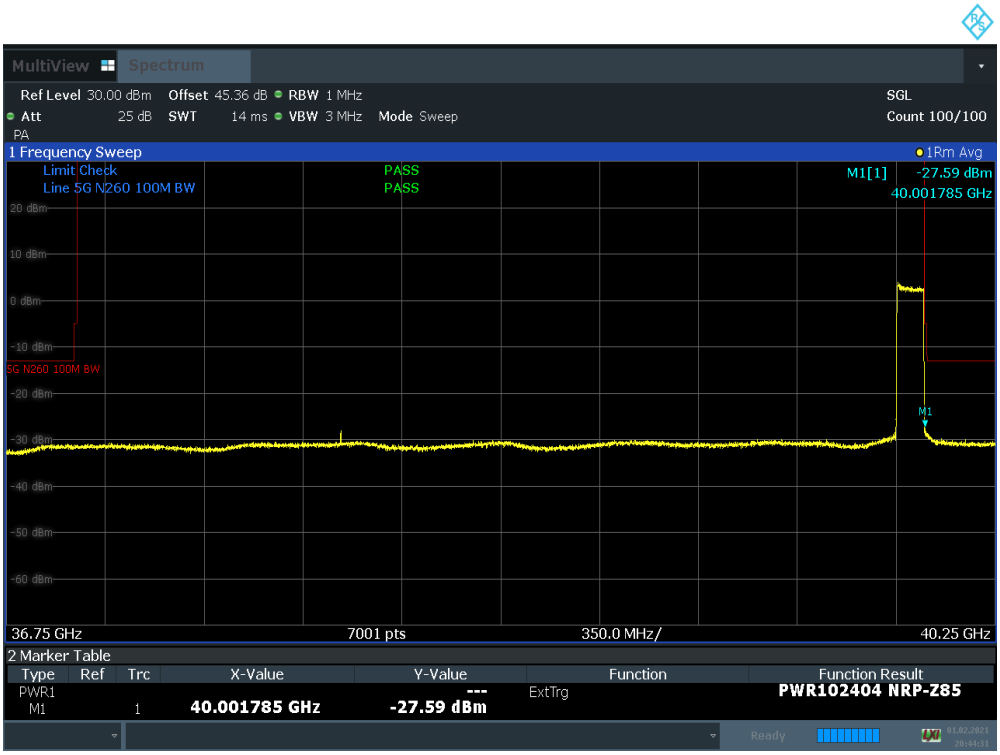


Plot 7-200. Band Edge (100 MHz BW 8CC NC QPSK High)

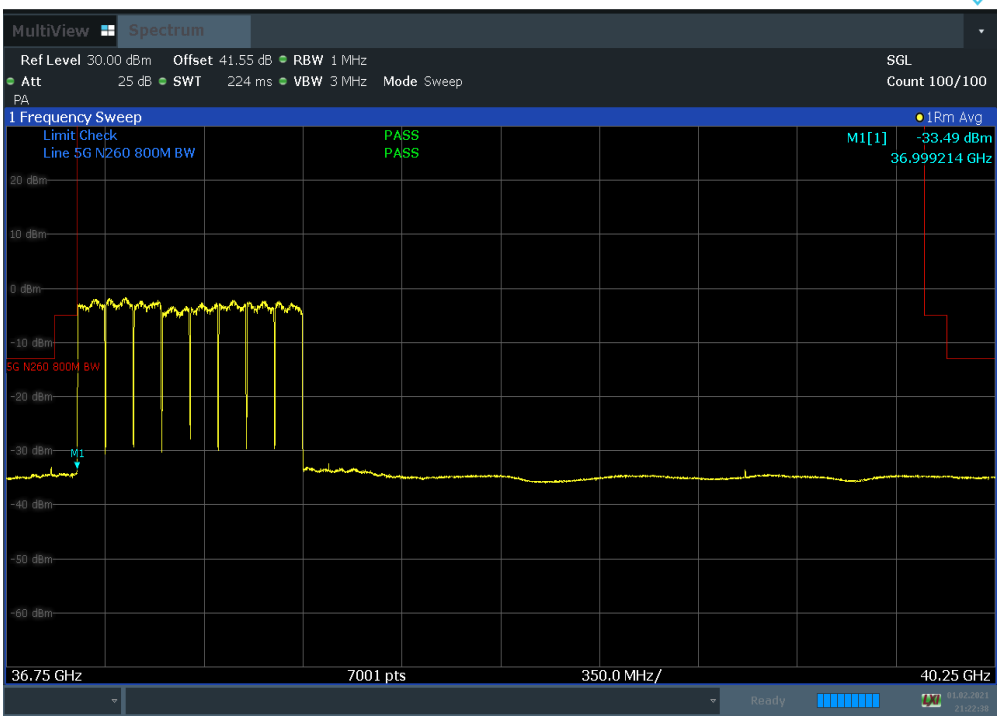
7.6.4 Antenna C Conducted Band Edge Maximized on Antenna C



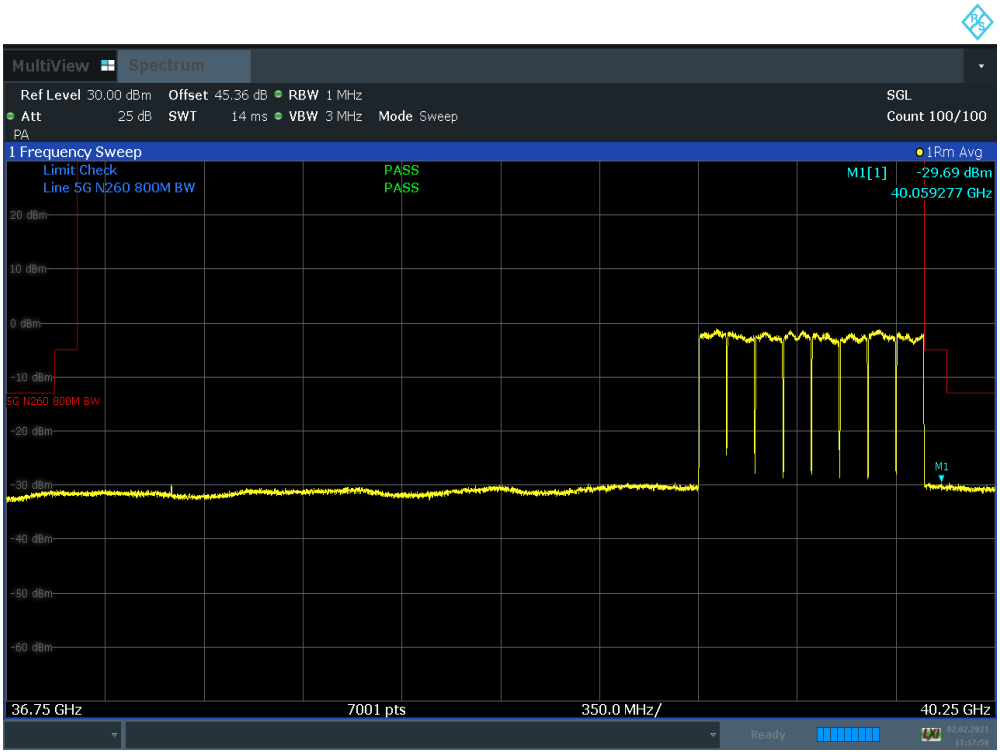
Plot 7-201. Band Edge (100 MHz BW 1CC QPSK Low)



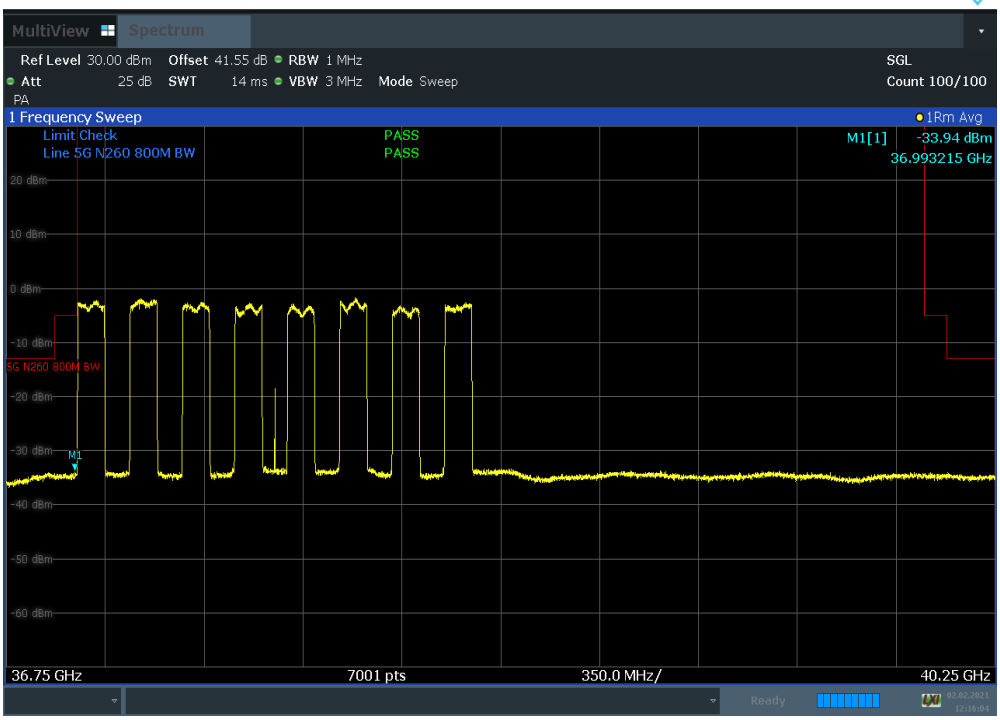
Plot 7-202. Band Edge (100 MHz BW 1CC QPSK High)



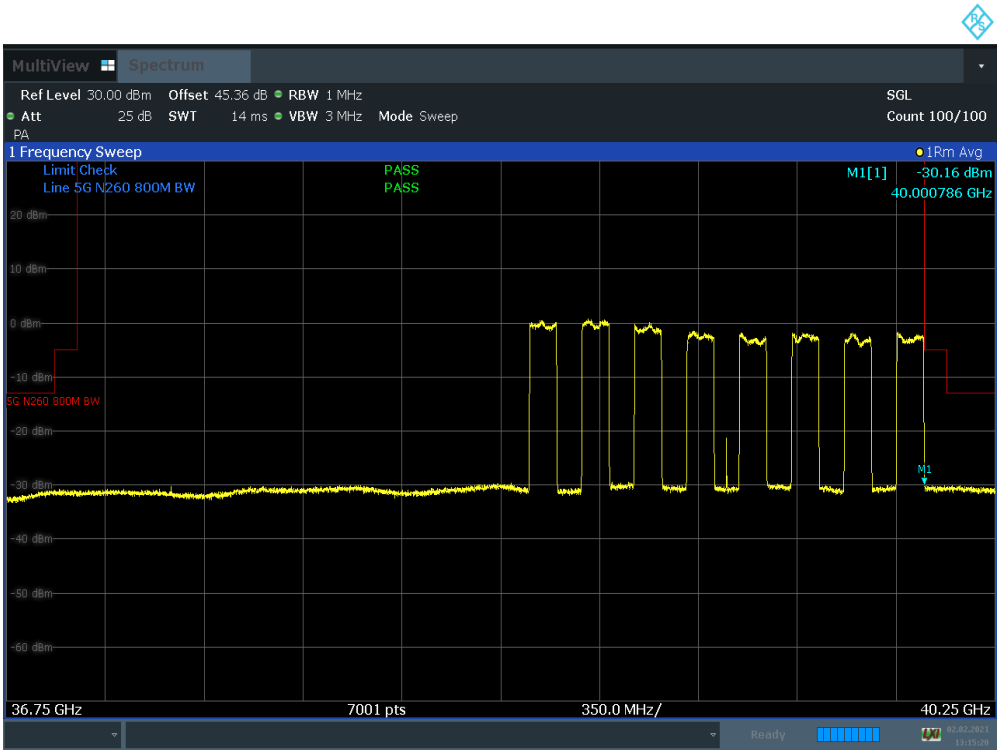
Plot 7-203. Band Edge (100 MHz BW 8CC QPSK Low)



Plot 7-204. Band Edge (100 MHz BW 8CC QPSK High)

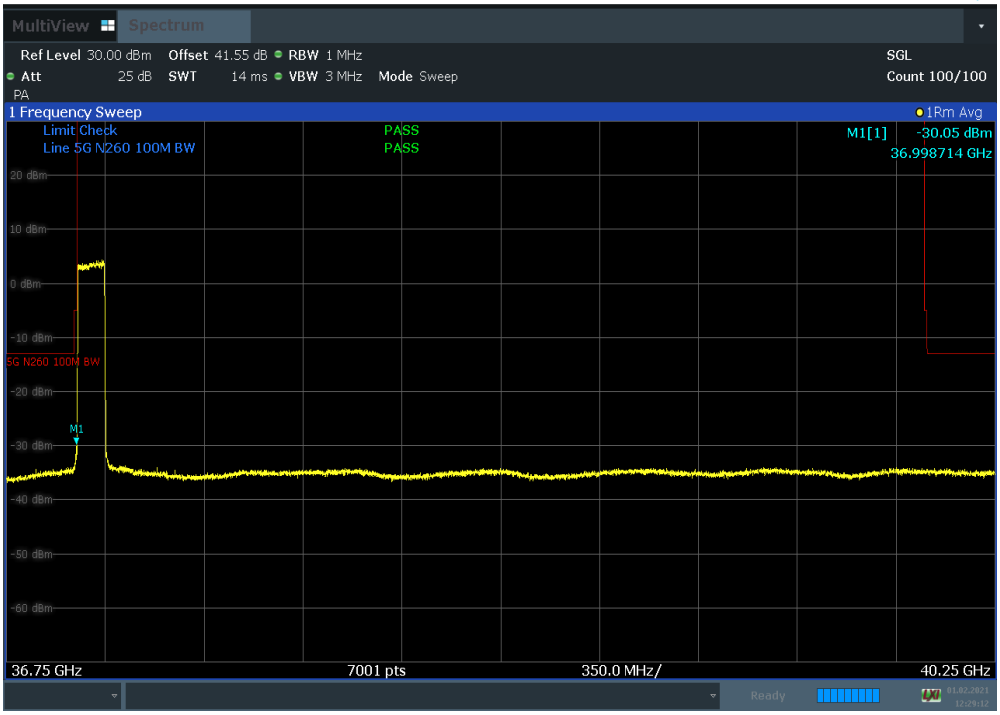


Plot 7-205. Band Edge (100 MHz BW 8CC NC QPSK Low)

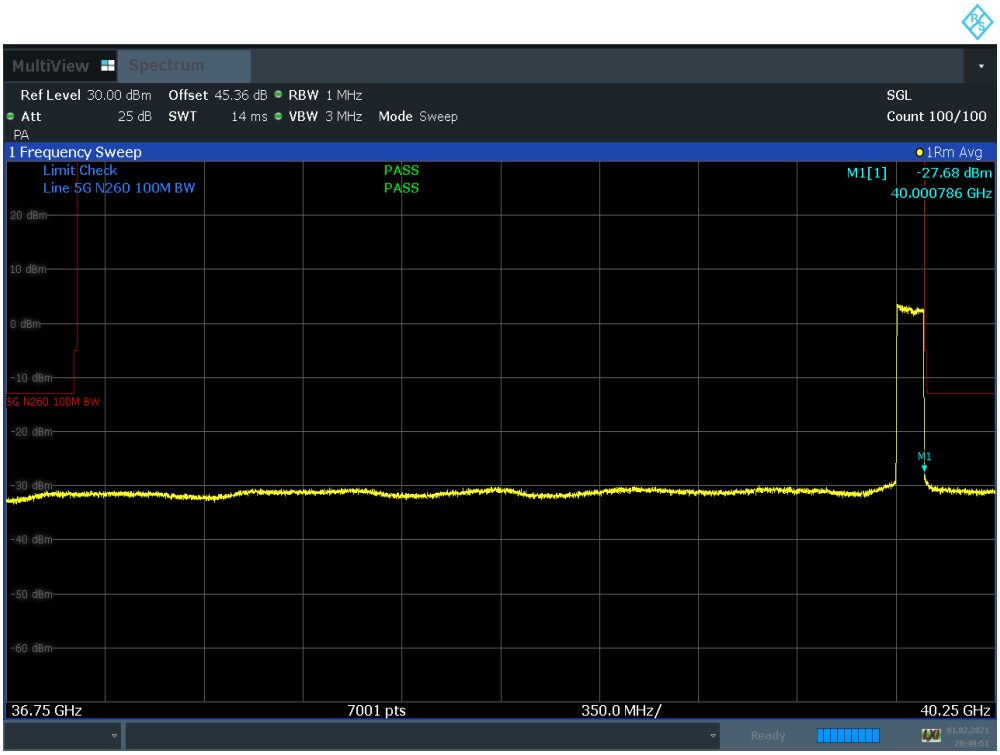


Plot 7-206. Band Edge (100 MHz BW 8CC NC QPSK High)

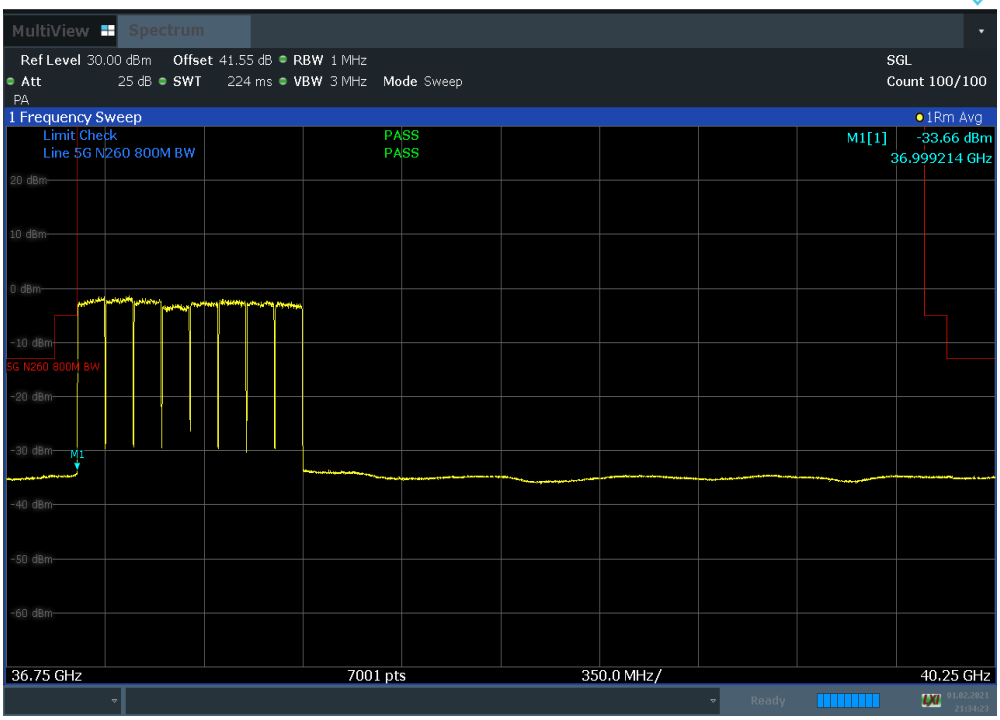
7.6.5 Antenna D Conducted Band Edge Maximized on Antenna D



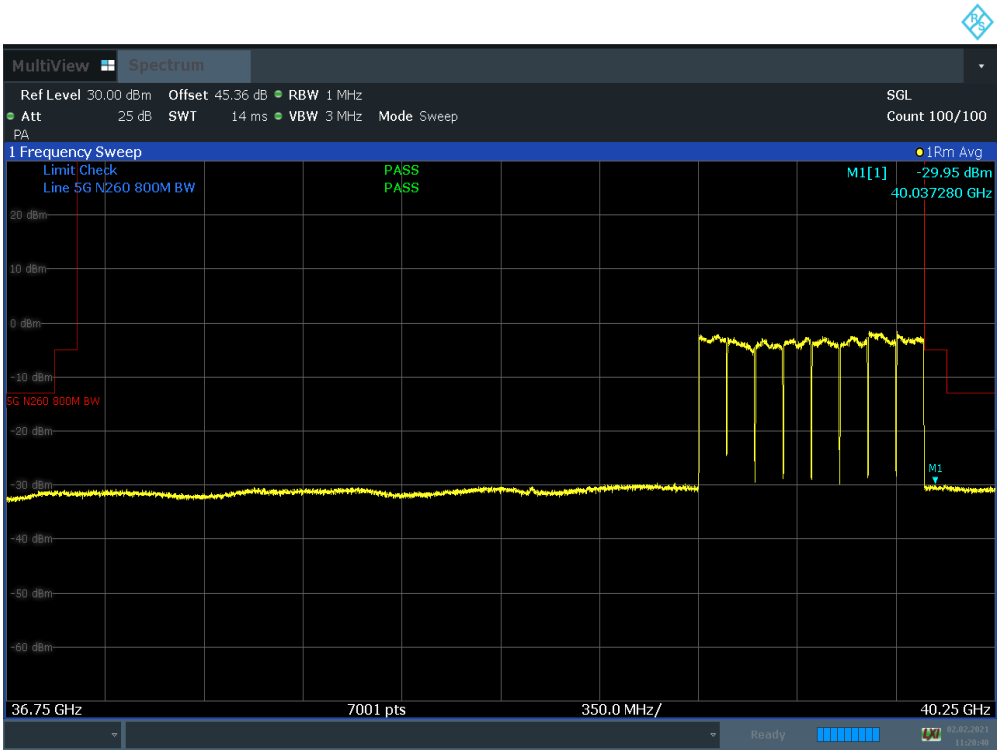
Plot 7-207. Band Edge (100 MHz BW 1CC QPSK Low)



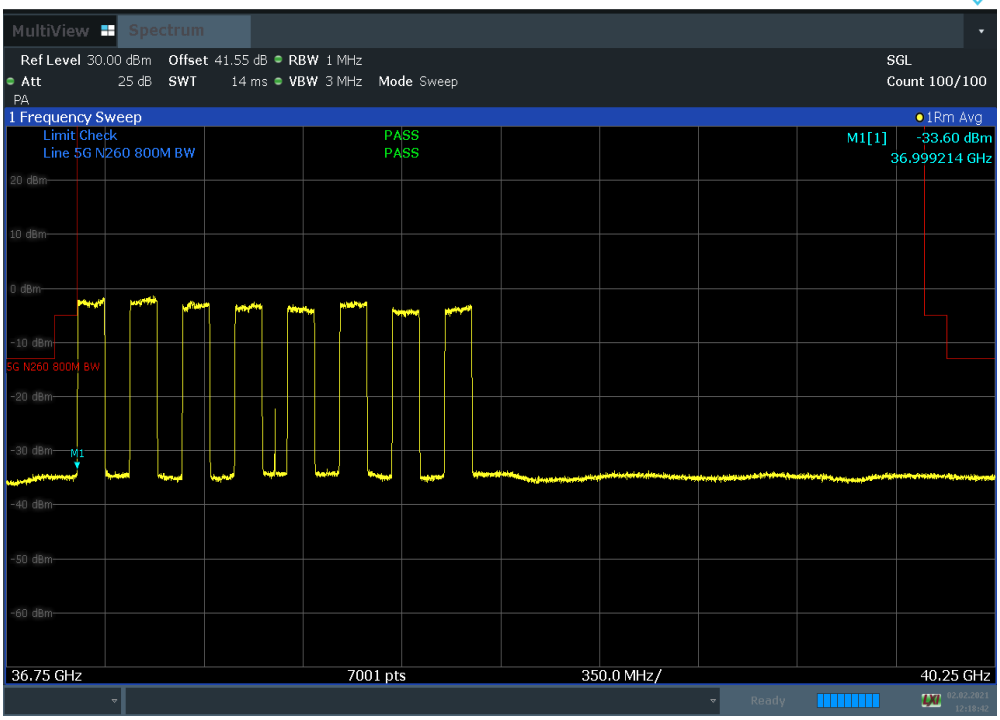
Plot 7-208. Band Edge (100 MHz BW 1CC QPSK High)



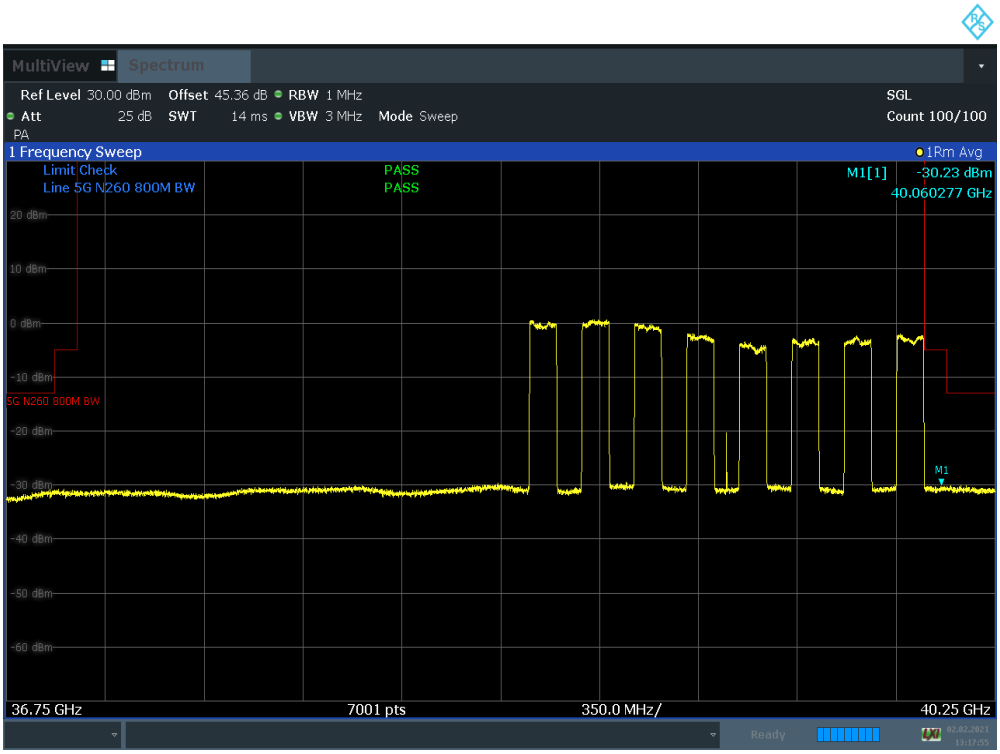
Plot 7-209. Band Edge (100 MHz BW 8CC QPSK Low)



Plot 7-210. Band Edge (100 MHz BW 8CC QPSK High)

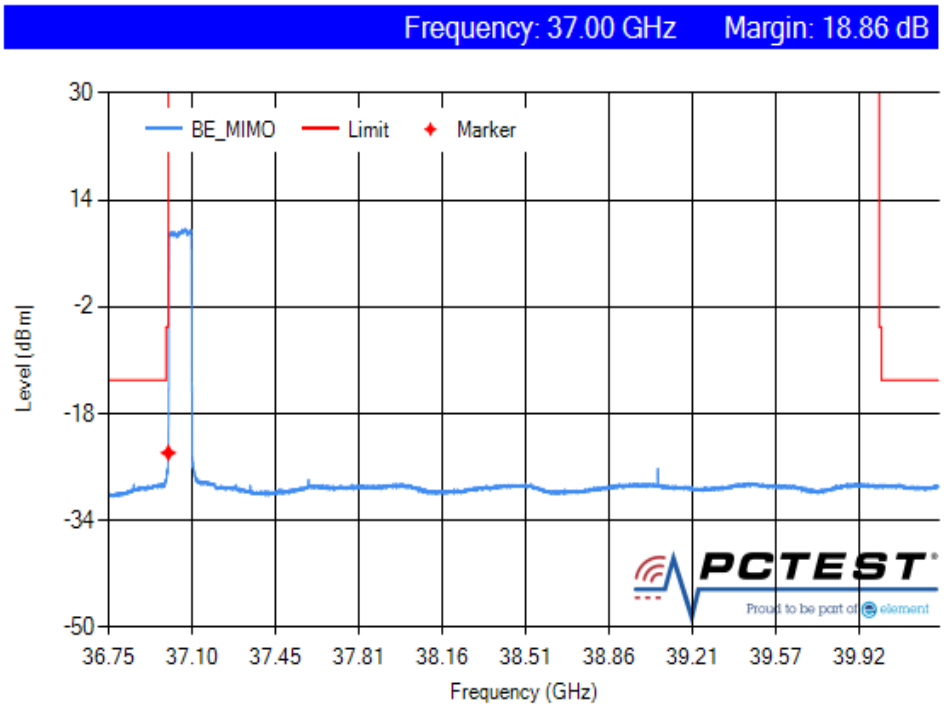


Plot 7-211. Band Edge (100 MHz BW 8CC NC QPSK Low)

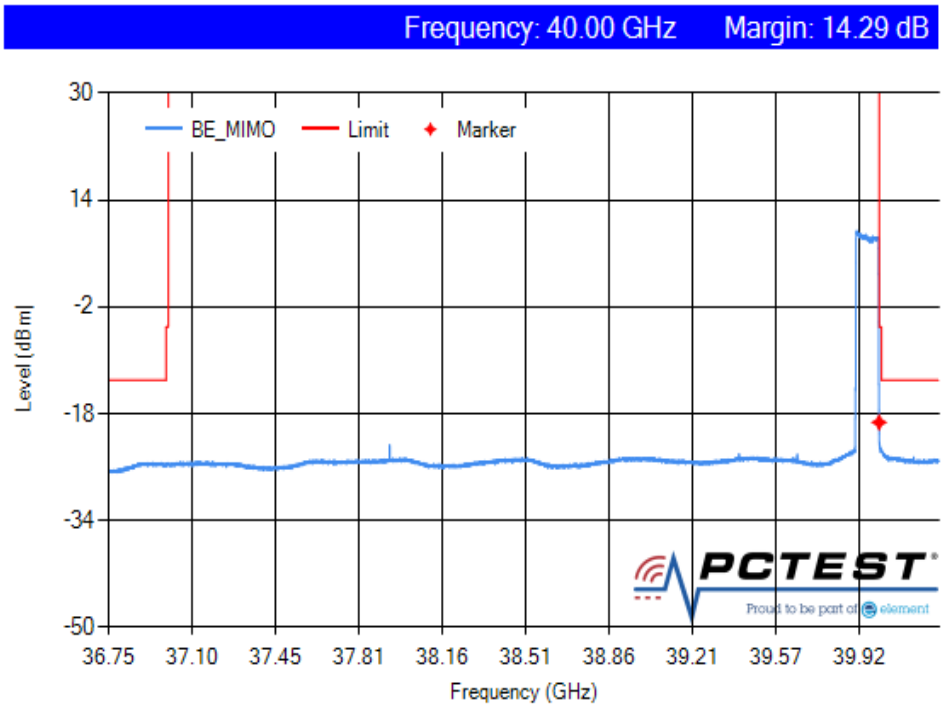


Plot 7-212. Band Edge (100 MHz BW 8CC NC QPSK High)

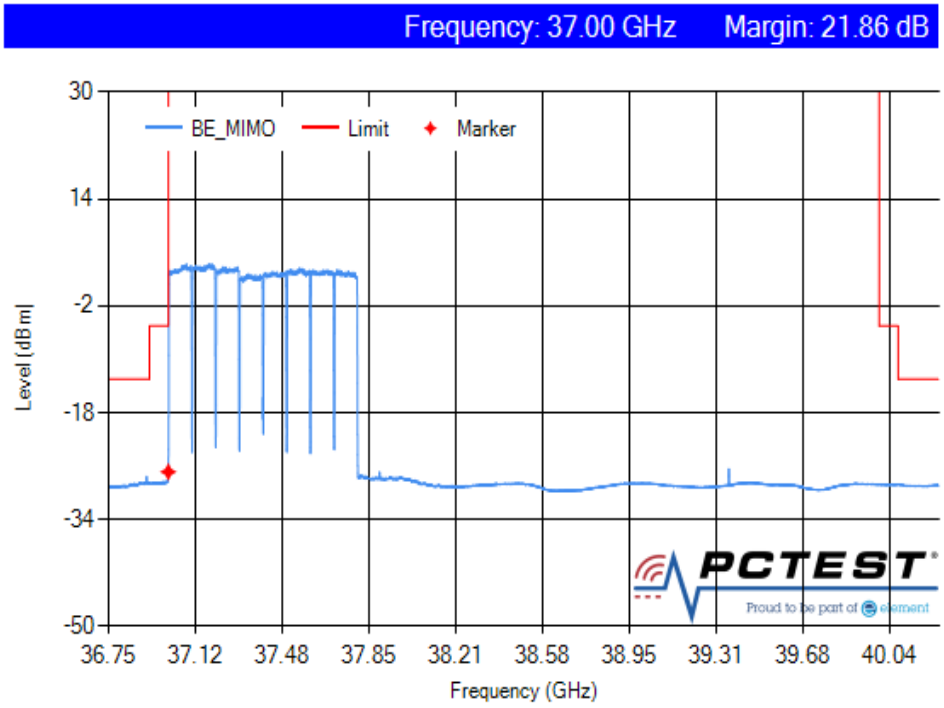
7.6.6 MIMO Band Edge Maximized on Antenna A/B/C/D



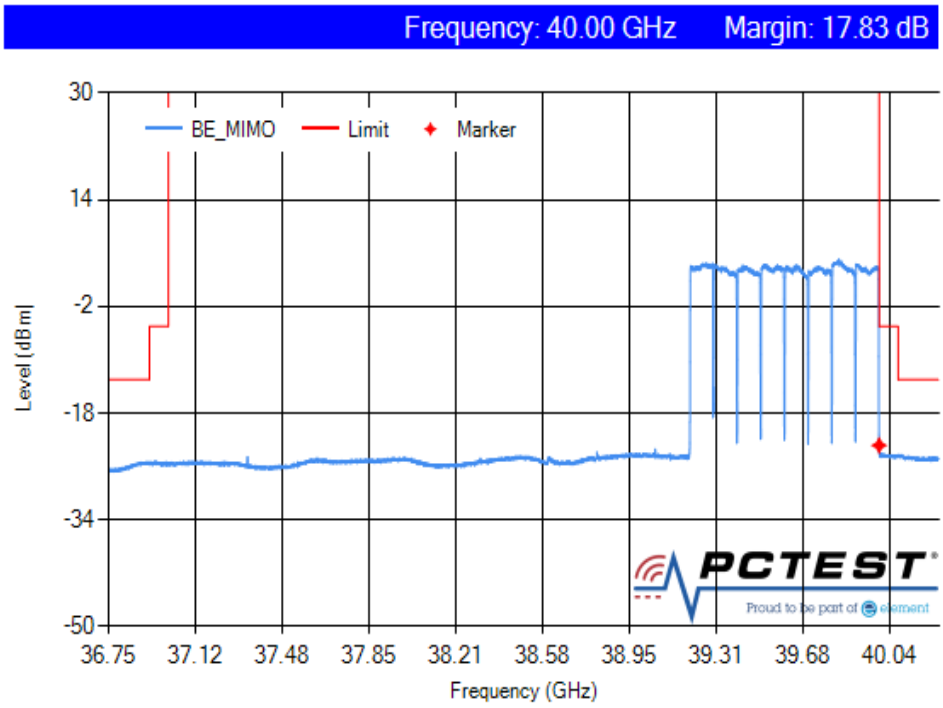
Plot 7-213. Band Edge MIMO (100 MHz BW 1CC QPSK Low)



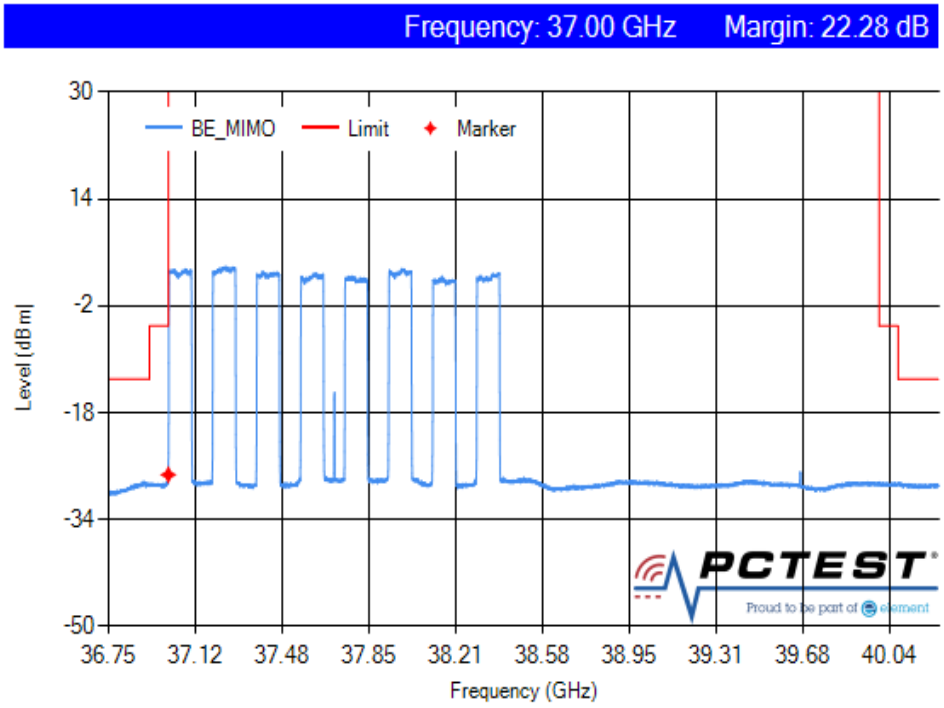
Plot 7-214. Band Edge MIMO (100 MHz BW 1CC QPSK High)



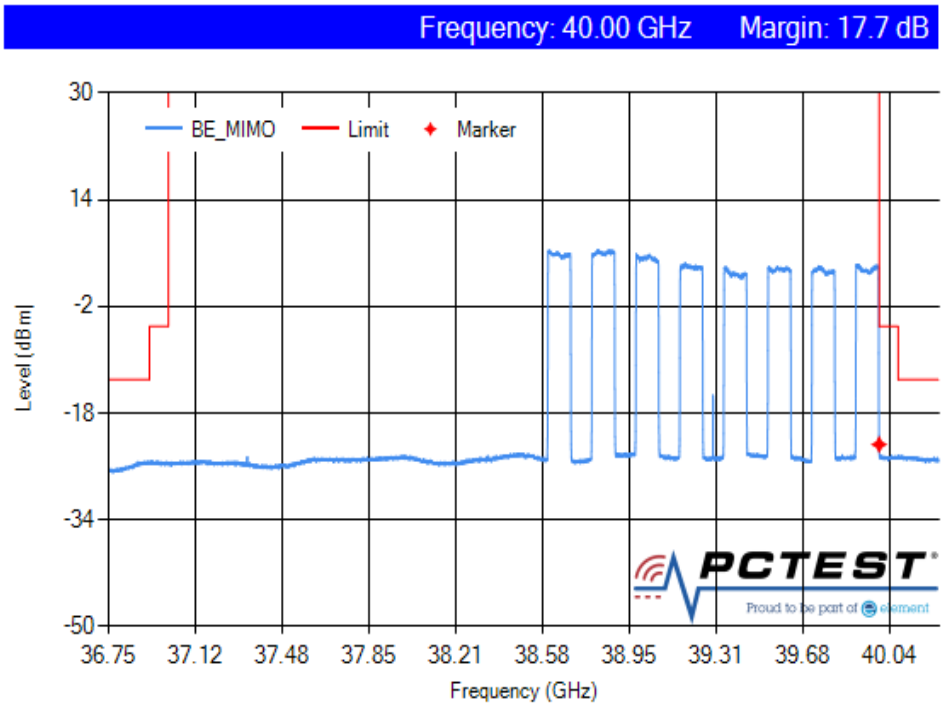
Plot 7-215. Band Edge MIMO (100 MHz BW 8CC QPSK Low)



Plot 7-216. Band Edge MIMO (100 MHz BW 8CC QPSK High)



Plot 7-217. Band Edge MIMO (100 MHz BW 8CC NC QPSK Low)



Plot 7-218. Band Edge MIMO (100 MHz BW 8CC NC QPSK High)

7.7 Frequency Stability / Temperature Variation

§2.1055

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI C63.26-2015. 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 Section 5.6
KDB 842590 D01 v01r01 Section 4.5

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 hour is provided to allow stabilization of the equipment at each temperature level.

Test Setup

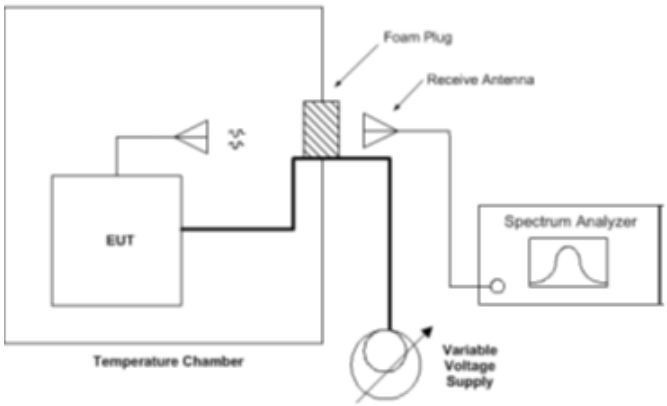


Figure 7-1. Test Instrument & Measurement Setup

The EUT was measured using horn antenna connected to a spectrum analyzer. The EUT was placed inside an environmental chamber.

Test Notes

The Frequency Deviation column in the table below is the amount of deviation measured from the center frequency of the Reference measurement (first row).

Frequency Stability Measurements

§2.1055

OPERATING FREQUENCY:	38,050,000,000	Hz
CHANNEL:	2084999	
REFERENCE VOLTAGE:	120.00	VAC

VOLTAGE (%)	POWER (VAC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	120.00	+ 20 (Ref)	38,050,000,131	0	0.0000000
100 %		- 30	38,050,000,185	54	0.0000001
100 %		- 20	38,050,000,185	54	0.0000001
100 %		- 10	38,050,000,196	65	0.0000002
100 %		0	38,050,000,195	64	0.0000002
100 %		+ 10	38,050,000,262	131	0.0000003
100 %		+ 30	38,050,000,268	137	0.0000004
100 %		+ 40	38,050,000,144	13	0.0000000
100 %		+ 50	38,050,000,264	133	0.0000003
85 %	102.00	+ 20	38,050,000,189	58	0.0000002
115 %	138.00	+ 20	38,050,000,262	131	0.0000003

Table 7-25. Frequency Stability Data

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore, the device is determined to remain operating in band over the temperature and voltage range as tested.

Frequency Stability Measurements
§2.1055

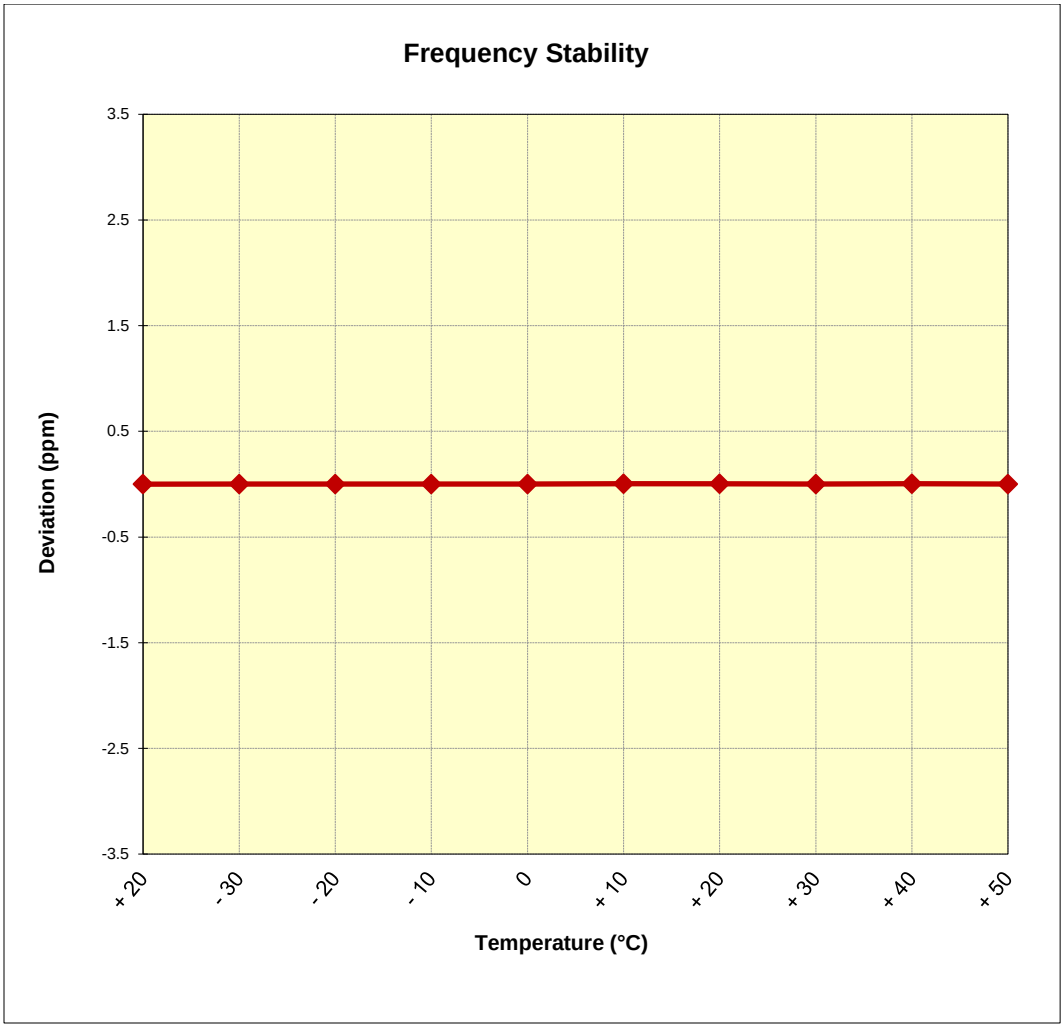


Figure 7-2. Frequency Stability Graph

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung 5G Access Unit Model: AT1K06-A00** complies with all the requirements of Part 30.

9.0 APPENDIX A

9.1 HARMONIC MIXER Verification Certificate

HCT

교 정 성 적 서

CALIBRATION CERTIFICATE

경기도 이천시 마장면 서이천로 578번길 74
TEL : 031-645-6900, FAX : 031-645-6969

KOLAS — KOREA LABORATORY ACCREDITATION SCHEME

성적서발급번호(Certificate No) : IC-2020-16953
교 정 번 호(Calibration No) : C-2020-020404

1. 의뢰자 (Client)
- 기관명 (Name) : 피씨테스트코리아 주식회사
- 주소 (Address) : 경기도 용인시 기흥구 흥덕1로 13, 피136, 피137호(영덕동, 흥덕 IT 밸리)

2. 측정기 (Calibration Subject) ◇ 등록번호 : 380383
- 기기명 (Description) : HARMONIC MIXER
- 제작회사 및 형식(Manufacturer and Model Name) : ROHDE & SCHWARZ / FS-Z60
- 기기번호 (Serial Number) : 100981

3. 교정일자 (Date of Calibration) : 2020.03.13

4. 교정환경 (Environment)
- 온도(Temperature) : (22.4 ± 0.4) ℃ - 습도(Humidity) : (46 ± 4) % R.H.
- 교정장소 (Location) : 고정표준실(Permanent Calibration Lab)
(주소: 경기도 이천시 마장면 서이천로 578번길 74)

5. 측정표준의 소급성 (Traceability) ◇Field code : 40641(RF SPECTRUM ANALYZER)

교정방법 및 소급성 서술 (Calibration method and/or brief description)

상기 기기는 고주파 스펙트럼 분석기의 교정절차(HCT-CS-125-40641)에 따라 국가측정표준기관으로부터 측정의 소급성이 확보된 아래의 표준장비를 이용하여 교정 되었음.

교정에 사용한 표준장비 명세 (List of used standards/specifications)

기기명 (Description)	제작회사 및 형식 (Manufacturer and Model Name)	기기번호 (Serial Number)	차기교정예정일자 (The due date of next Calibration)	교정기관 (Calibration laboratory)
EXG ANALOG SIGNAL GENERATOR	KEYSIGHT N5173B	MY53270544	2020/10/02	(주)에이치시티
EPM SERIES POWER METER	AGILENT E4419B	GB42420565	2020/11/02	(주)에이치시티
POWER SENSOR	AGILENT 8487A	MY41092450	2021/01/15	Keysight Technologies
POWER SENSOR	KEYSIGHT V8486A	MY56330017	2020/12/30	Keysight Technologies
WR-19 MULTIPLIER SOURCE MODULE	OML S19MS-A	160516-1	2020/09/09	(주)에이치시티

6. 교정결과 (Calibration result) : 교정결과 참조 (Refer to attachment)

7. 측정불확도 (Measurement uncertainty) : 교정결과 참조 (Refer to attachment)
신뢰수준 약 95 %, k = 2 (Confidence level about 95 %, k = 2)

확 인 (affirmation)	작성자 (Measurements performed by)	승인자 (Approved by)
	성명 (Name) 박 민 지	직위 (Title) 기술책임자(Technical Cal. Manager) (정) 성명 (Name) 이 승 찬

위 성적서는 국제시험기관인정협력체(International Laboratory Accreditation Cooperation) 상호인정협정(Mutual Recognition Arrangement)에 서명한 한국인정기구(KOLAS)로부터 공인 받은 분야의 교정결과입니다.

2020. 03. 16

한국인정기구 인정
Accredited by KOLAS, Republic of KOREA

㈜에이치시티 대표이사
President, HCT Co., Ltd.

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F-02P-02-008 (Rev.02)

열 람 용

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CALIBRATION CERTIFICATE

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TEL : 031-645-6900, FAX : 031-645-6969

KOREA LABORATORY ACCREDITATION SCHEME KOLAS CALIBRATION NO KC01-01

성적서발급번호(Certificate No) : IC-2020-77176
교 정 번 호(Calibration No) : C-2020-089965

1. 의뢰자 (Client)
- 기관명 (Name) : 피씨테스트코리아 주식회사
- 주소 (Address) : 경기도 용인시 기흥구 흥덕1로 13, 피136, 피137호(영덕동, 흥덕 IT 밸리)

2. 측정기 (Calibration Subject) ◇ 등록번호 : 369548
- 기기명 (Description) : HARMONIC MIXER
- 제작회사 및 형식 (Manufacturer and Model Name) : ROHDE & SCHWARZ / FS-Z90
- 기기번호 (Serial Number) : 101860

3. 교정일자 (Date of Calibration) : 2020.10.21

4. 교정환경 (Environment)
- 온도(Temperature) : (23.1 ± 0.3) ℃ - 습도(Humidity) : (46 ± 3) % R.H.
- 교정장소 (Location) : 고정표준실(Permanent Calibration Lab)
(주소: 경기도 이천시 마장면 서이천로 578번길 74)

5. 측정표준의 소급성 (Traceability) ◇Field code : 40641(RF SPECTRUM ANALYZER)

교정방법 및 소급성 서술 (Calibration method and/or brief description)

상기 기기는 고주파 스펙트럼 분석기의 교정절차(HCT-CS-125-40641)에 따라 국가측정표준기관으로부터 측정의 소급성이 확보된 아래의 표준장비를 이용하여 교정 되었음.

교정에 사용한 표준장비 명세 (List of used standards/specifications)

기기명 (Description)	제작회사 및 형식 (Manufacturer and Model Name)	기기번호 (Serial Number)	차기교정예정일자 (The due date of next Calibration)	교정기관 (Calibration laboratory)
EXG ANALOG SIGNAL GENERATOR	KEYSIGHT N5173B	MY53270544	2021/06/23	(주)에이치시티
EPM SERIES POWER METER	AGILENT E4419B	GB42420565	2020/11/02	(주)에이치시티
POWER SENSOR	KEYSIGHT V8486A	MY56330017	2021/01/03	Keysight Technologies
POWER SENSOR	KEYSIGHT W8486A	MY56370005	2020/12/30	Keysight Technologies
WR-12 MULTIPLIER SOURCE MODULE	OML S12MS-A	160419-1	2021/09/09	(주)에이치시티

6. 교정결과 (Calibration result) : 교정결과 참조 (Refer to attachment)

7. 측정불확도 (Measurement uncertainty) : 교정결과 참조 (Refer to attachment)
신뢰수준 약 95 %, k = 2 (Confidence level about 95 %, k = 2)

확 인 (affirmation)	작성자 (Measurements performed by)	승인자 (Approved by)
	성명 (Name) 박 민 지	직위 (Title) 기술책임자(Technical Cal. Manager) (정) 성명 (Name) 이 승 찬 (서명)

위 성적서는 국제시험기관인정협력체(International Laboratory Accreditation Cooperation) 상호인정협정(Mutual Recognition Arrangement)에 서명한 한국인정기구(KOLAS)로부터 공인 받은 분야의 교정결과입니다.

2020. 10. 21

한국인정기구 인정
Accredited by KOLAS, Republic of KOREA

㈜에이치시티 대표이사
President, HCT Co., Ltd.

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※ 성적서의 원본은 상단에 HCT홀로그램이 들어간 위변조 방지 용지에 인쇄되어 발급되며, 원본 복사시에는 복사본이라는 표시가 처리됩니다.

F-02P-02-008 (Rev.02)

HCT

교 정 성 적 서

CALIBRATION CERTIFICATE

경기도 이천시 마장면 서이천로 578번길 74
TEL : 031-645-6900, FAX : 031-645-6969

KOREA LABORATORY ACCREDITATION SCHEME KOLAS CALIBRATION NO. KC03Y1

성적서발급번호(Certificate No) : IC-2020-16950
교 정 번 호(Calibration No) : C-2020-020401

1. 의뢰자 (Client)
- 기관명 (Name) : 피씨테스트코리아 주식회사
- 주소 (Address) : 경기도 용인시 기흥구 흥덕1로 13, 피136, 피137호(영덕동, 흥덕 IT 밸리)

2. 측정기 (Calibration Subject) ◇ 등록번호 : 380381
- 기기명 (Description) : HARMONIC MIXER
- 제작회사 및 형식(Manufacturer and Model Name) : ROHDE & SCHWARZ / FS-Z140
- 기기번호 (Serial Number) : 101135

3. 교정일자 (Date of Calibration) : 2020.03.13

4. 교정환경 (Environment)
- 온도(Temperature) : (22.4 ± 0.4)℃ 습도(Humidity) : (46 ± 4) % R.H.
- 교정장소 (Location) : 고정표준실(Permanent Calibration Lab)
(주소: 경기도 이천시 마장면 서이천로 578번길 74)

5. 측정표준의 소급성 (Traceability) ◇Field code : 40641(RF SPECTRUM ANALYZER)

교정방법 및 소급성 서술 (Calibration method and/or brief description)

상기 기기는 고주파 스펙트럼 분석기의 교정절차(HCT-CS-125-40641)에 따라 국가측정표준기관으로부터 측정의 소급성이 확보된 아래의 표준장비를 이용하여 교정 되었음.

교정에 사용한 표준장비 명세 (List of used standards/specifications)

기기명 (Description)	제작회사 및 형식 (Manufacturer and Model Name)	기기번호 (Serial Number)	차기교정예정일자 (The due date of next Calibration)	교정기관 (Calibration laboratory)
EXG ANALOG SIGNAL GENERATOR	KEYSIGHT N5173B	MY53270544	2020/10/02	(주)에이치시티
EPM SERIES POWER METER	AGILENT E4419B	GB42420565	2020/11/02	(주)에이치시티
POWER SENSOR	KEYSIGHT W8486A	MY56370005	2020/12/30	Keysight Technologies
WR-08 MULTIPLIER SOURCE MODULE	OML S08MS-A	164019-1	2020/09/09	(주)에이치시티

6. 교정결과 (Calibration result) : 교정결과 참조 (Refer to attachment)

7. 측정불확도 (Measurement uncertainty) : 교정결과 참조 (Refer to attachment)
신뢰수준 약 95 %, k = 2 (Confidence level about 95 %, k = 2)

확 인 (affirmation)	작성자 (Measurements performed by)	승인자 (Approved by)
	성명 (Name) 박 민 지	직위 (Title) 기술책임자(Technical Cal. Manager) (정) 성명 (Name) 이 승 찬

위 성적서는 국제시험기관인정협력체(International Laboratory Accreditation Cooperation) 상호인정협정(Mutual Recognition Arrangement)에 서명한 한국인정기구(KOLAS)로부터 공인 받은 분야의 교정결과입니다.

2020. 03. 16

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㈜에이치시티 대표이사
President, HCT Co., Ltd.

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※ 성적서의 원본은 상단에 HCT홀로그램이 들어간 워터존 방지 용지에 인쇄되어 발급되며, 원본 복사시에는 복사본이라는 표시가 처리됩니다.

F-02P-02-008 (Rev.02)

열 람 용

Measurement Report

74, Seoicheon-ro 578beon-gil, Majang-myeon,
Icheon-si, Gyeonggi-do, Korea 17383
Tel :82-31-645-6900, www.hct.co.kr

보고서번호(Report No) : IC-2020-77177
측 정 번 호(Measurement No) : C-2020-089966

1. 의뢰자 (Client)
- 기관명 (Name) : 피씨테스트코리아 주식회사
- 주소 (Address) : 경기도 용인시 기흥구 흥덕1로 13, 피136, 피137호(영덕동, 흥덕 IT 밸리)

2. 대상품목 (Measurement Item) ◇ HCT 등록번호 : 369547
- 기기명 (Description) : HARMONIC MIXER
- 제작회사 및 형식(Manufacturer and Model Name) : ROHDE & SCHWARZ / FS-Z220
- 기기번호 (Serial Number) : 101015

3. 측정일자 (Measurement date) : 2020.10.21

4. 측정환경 (Environment)
- 온도(Temperature) : (23.1 ± 0.3) ℃ - 습도(Humidity) : (46 ± 3) % R.H.

5. 측정방법 (Measurement method used)

상기 기기는 고주파 스펙트럼 분석기의 교정절차(HCT-CS-125-40641)에 따라 국가측정표준기관으로부터 측정의 소급성이 확보된 아래의 표준장비와 자체 점검된 장비를 사용하여 측정 되었음.

측정에 사용한 표준장비 명세 (List of used standards/specifications)

기기명 (Description)	제작회사 및 형식 (Manufacturer and Model Name)	기기번호 (Serial Number)	차기교정예정일자 (The due date of next Calibration)	교정기관 (Calibration laboratory)
EXG ANALOG SIGNAL GENERATOR	KEYSIGHT N5173B	MY53270544	2021/06/23	(주)에이치시티
ERICKSON POWER METER	VDI PM5	394V	측정	(주)에이치시티
WR-05 MULTIPLIER SOURCE MODULE	OML S05MS-A	160419-1	측정	(주)에이치시티

6. 측정결과 (Messurement result) : 측정결과 참조 (Refer to attachment)

㈜이 측정결과는 의뢰자가 제시한 시료 및 시료명에만 한정됩니다.
The messuremen results shown in this report refer only to the sample(s) measured unless otherwise stated.

확 인 (Affirmation)	작성자 (Tested by) 성명 (Name) : 박 민 지	승인자 (Approved by) 직위 (Title) 기술책임자(Technical Manager) 성명 (Name) 이 승 찬

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2020. 10. 21

㈜에이치시티 대표이사
President, HCT Co., Ltd.

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F-02P-02-010 (Rev.01)