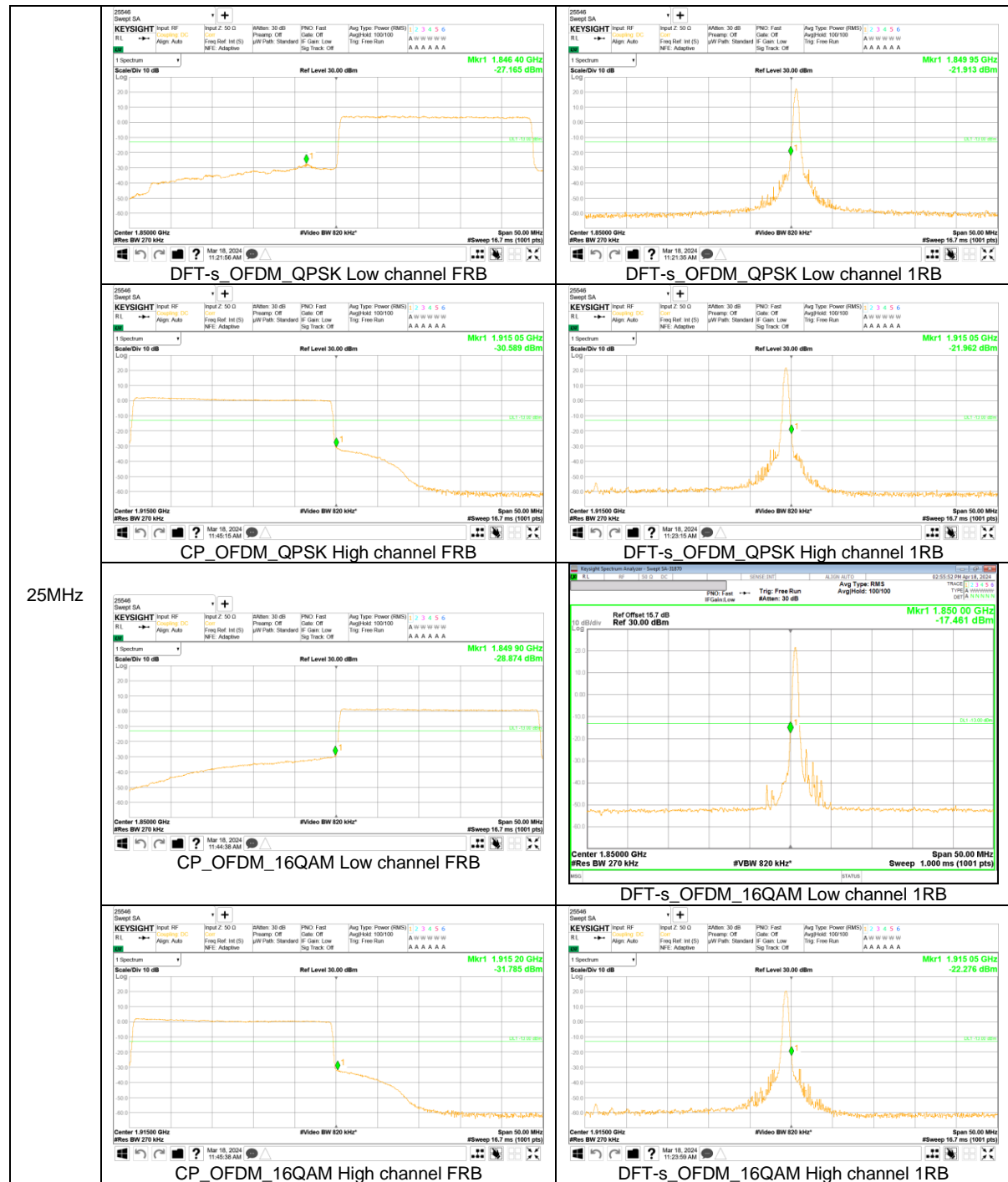
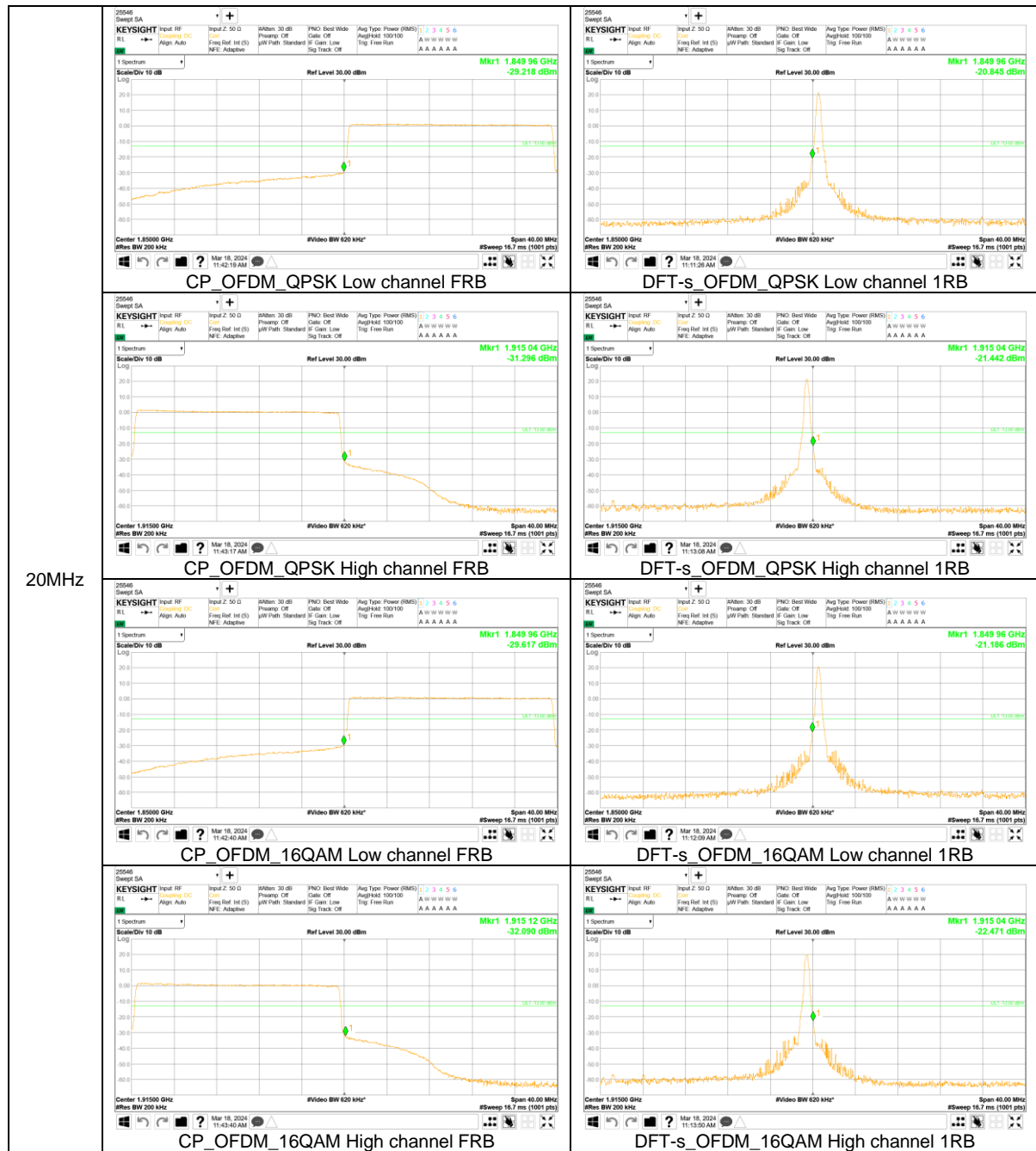


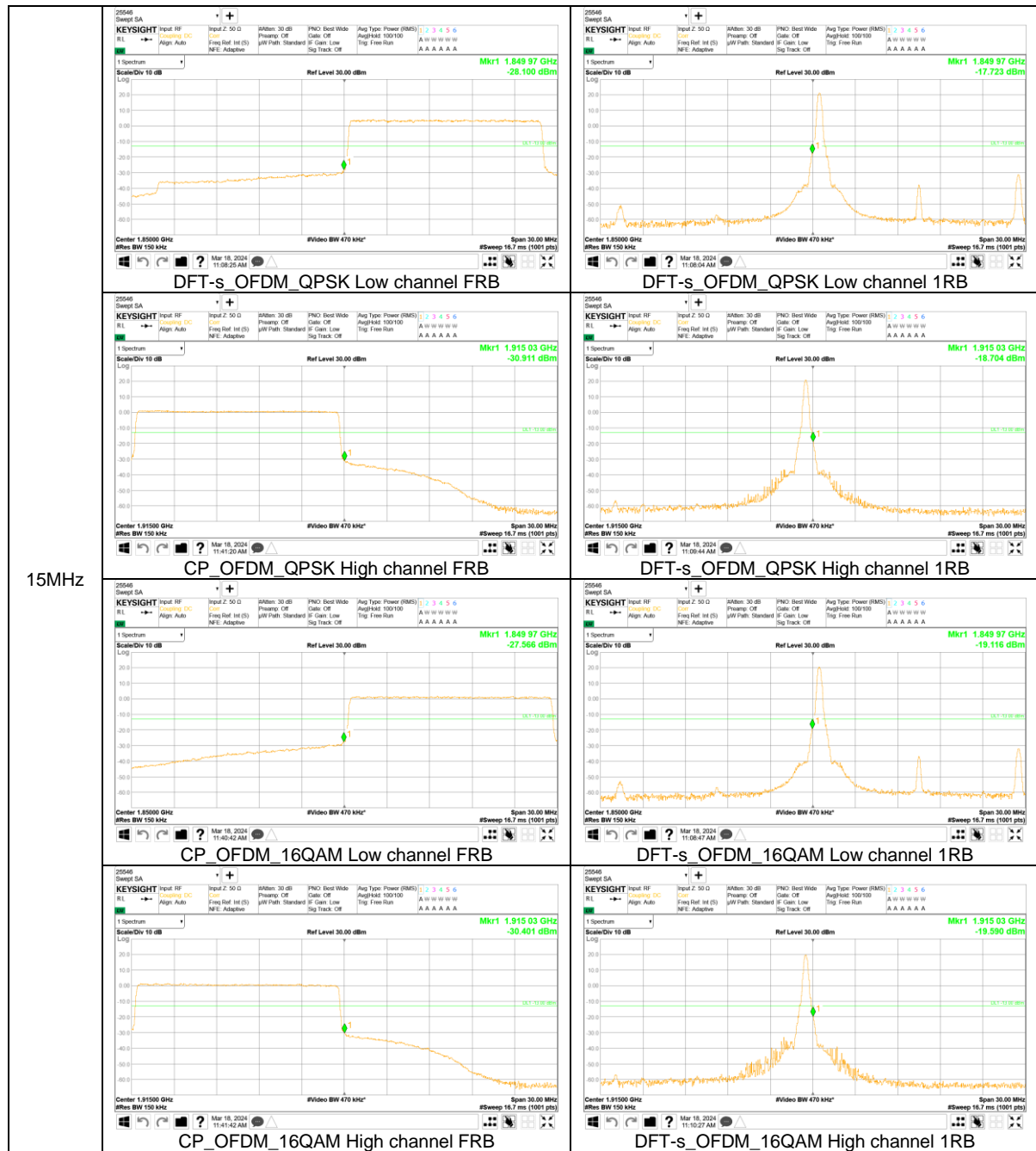
30MHz



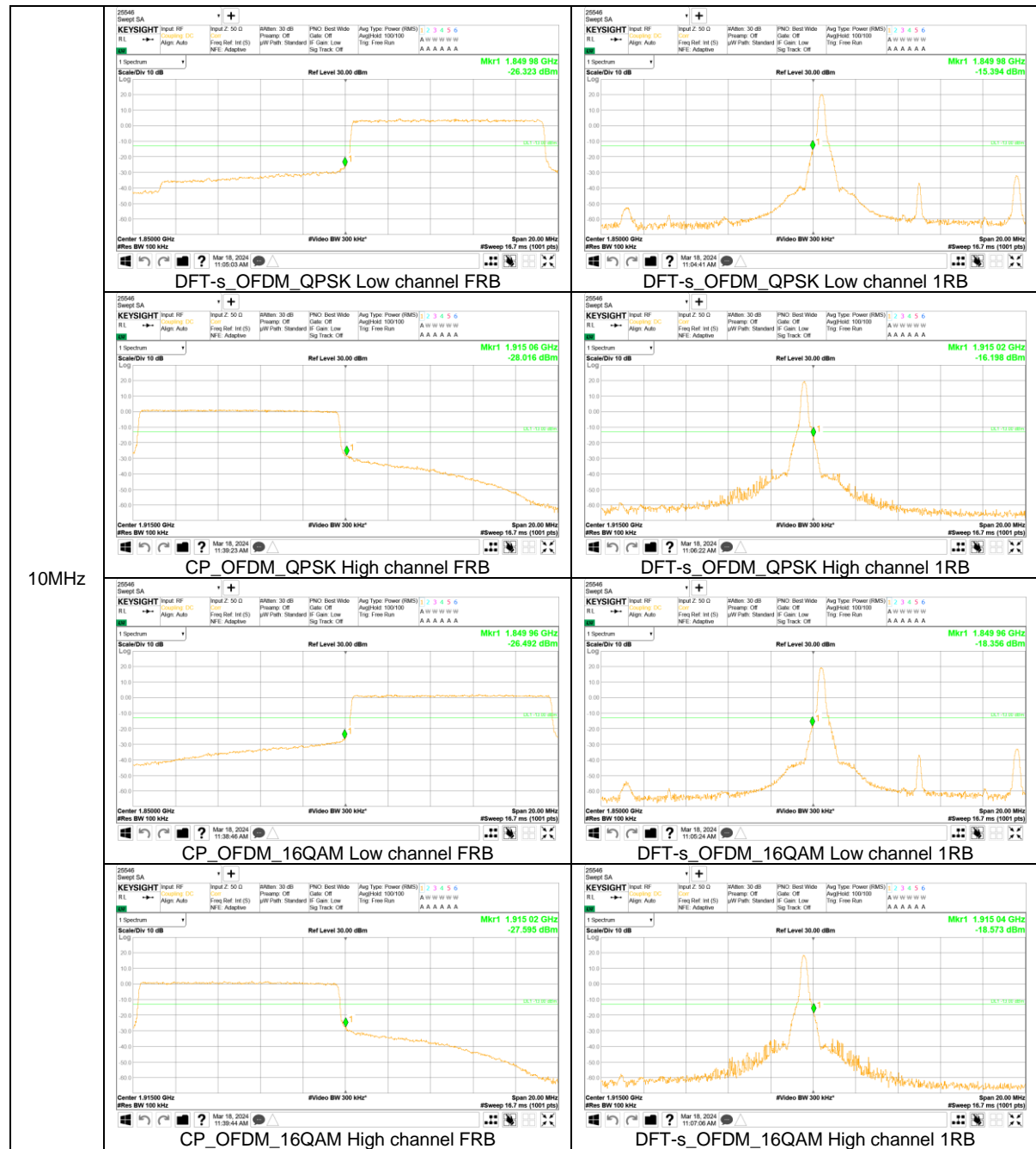
25MHz



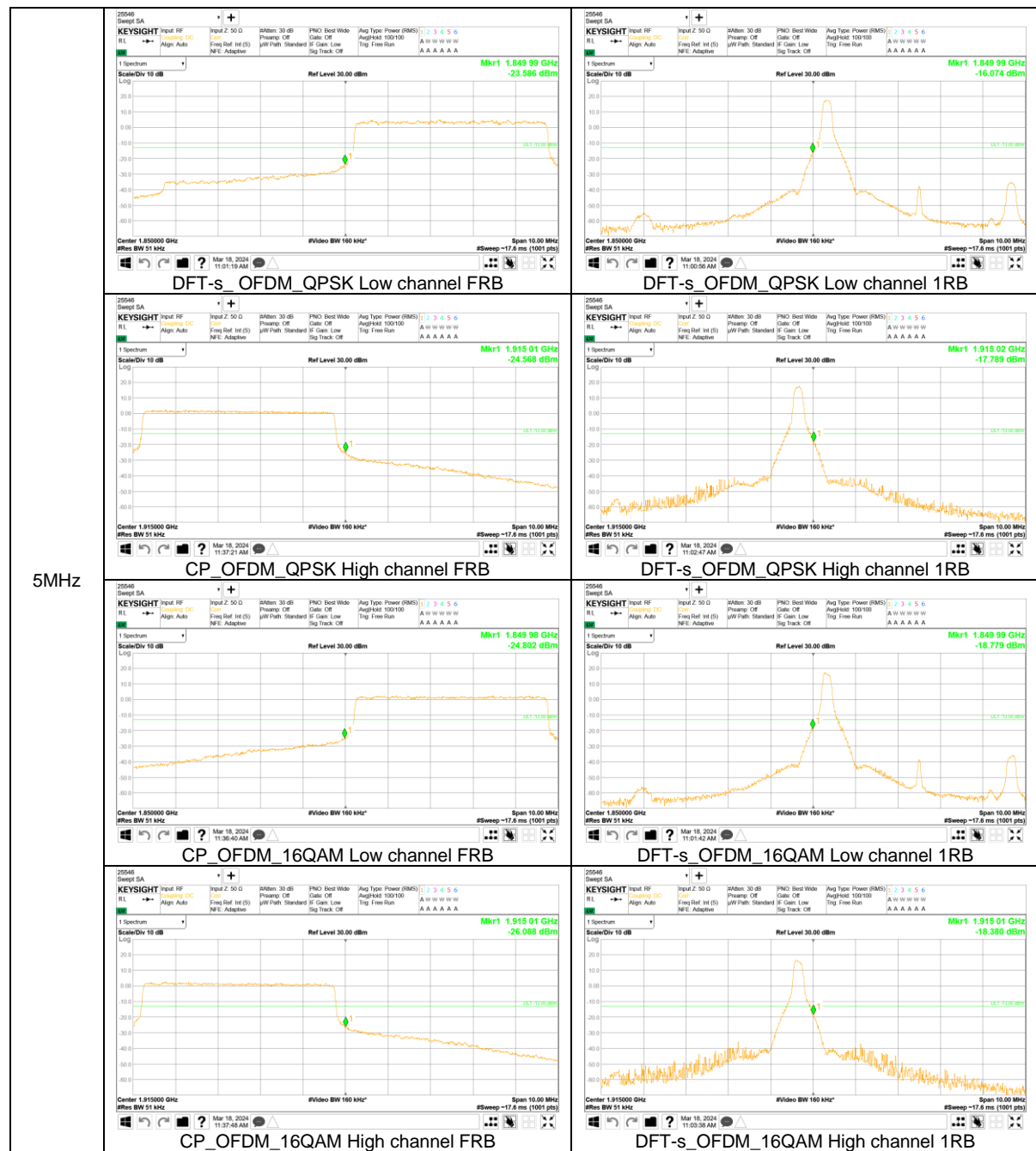
20MHz



15MHz



10MHz



5MHz

8.5. CONDUCTED SPURIOUS EMISSIONS

RULE PART(S)

FCC: §2.1051, §24.238

LIMITS

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB.

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v03r01

The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold Mode using a peak detector to ensure that the worst-case emissions were caught.

- a) Set the RBW = 100 kHz for emission below 1 GHz and 1 MHz for emissions above 1 GHz
(Tests were performed 1MHz [Worst case], to sweep 1 time for all frequency range)
- b) Set VBW $\geq 3 \times$ RBW;
- c) Set span ≥ 1.5 times the OBW;
- d) Sweep time = auto couple;
- e) Detector = rms;
- f) Ensure that the number of measurement points = Max (40001);
- g) Trace Mode = average(WCDMA, LTE, 5G NR), Max hold(GSM);

NOTE1

LTE: It was tested at 1RB QPSK as worst case (the highest output power and density).

5G NR: All Waveforms (CP-OFDM vs DFT-s_OFDM) and modulations ($\pi/2$ BPSK, QPSK, 16QAM, 64QAM, 256QAM) 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.

NOTE2

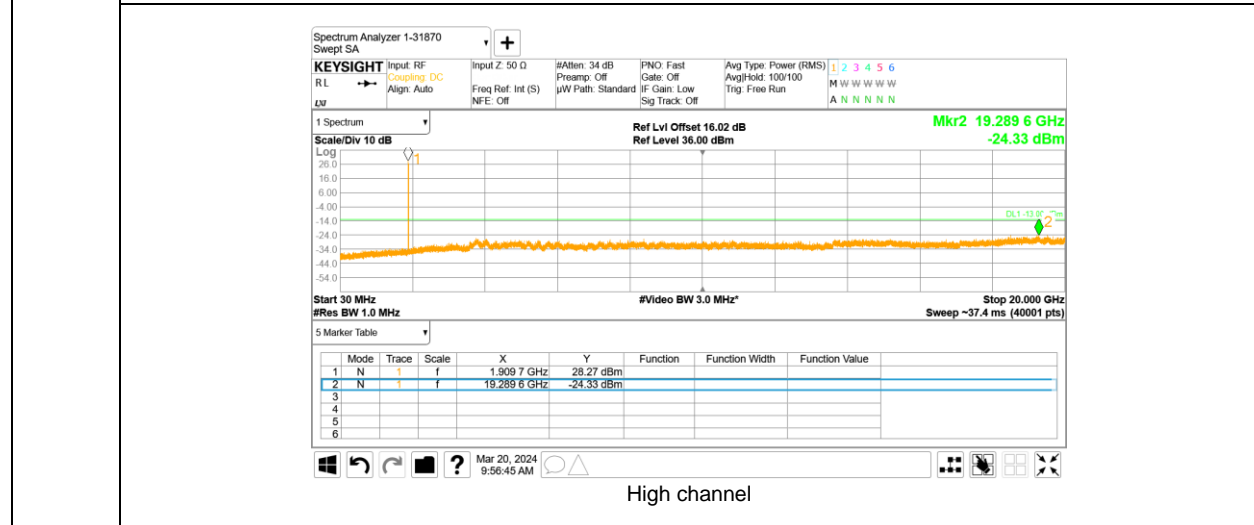
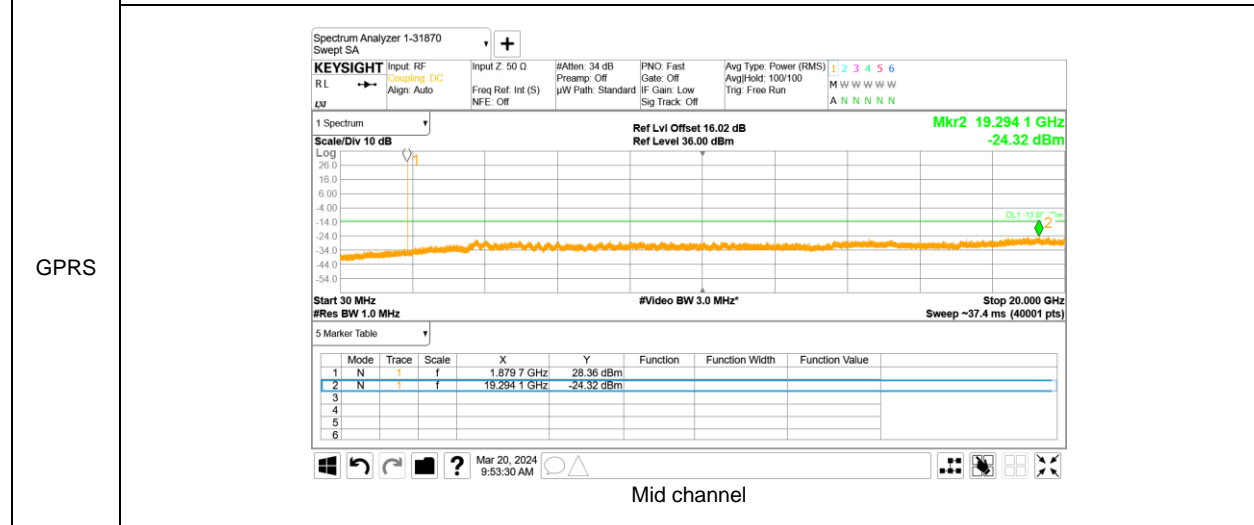
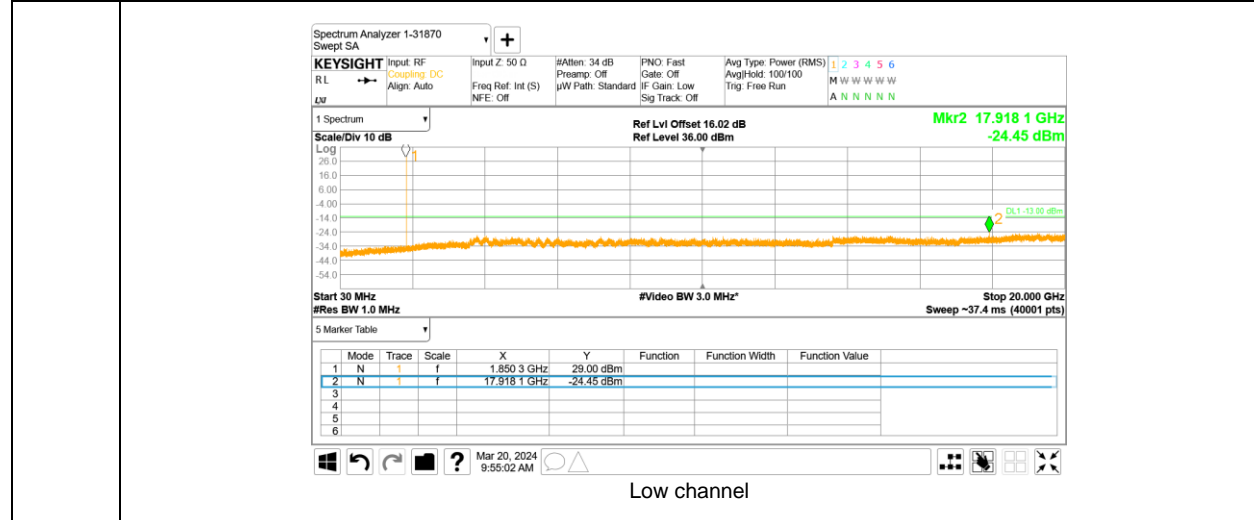
Please refer to section 5.4 for bandwidth and RB setting about LTE, 5G NR bands.

RESULTS

See the following pages.

8.5.1. OUT OF BAND EMISSIONS RESULT

GSM 1900



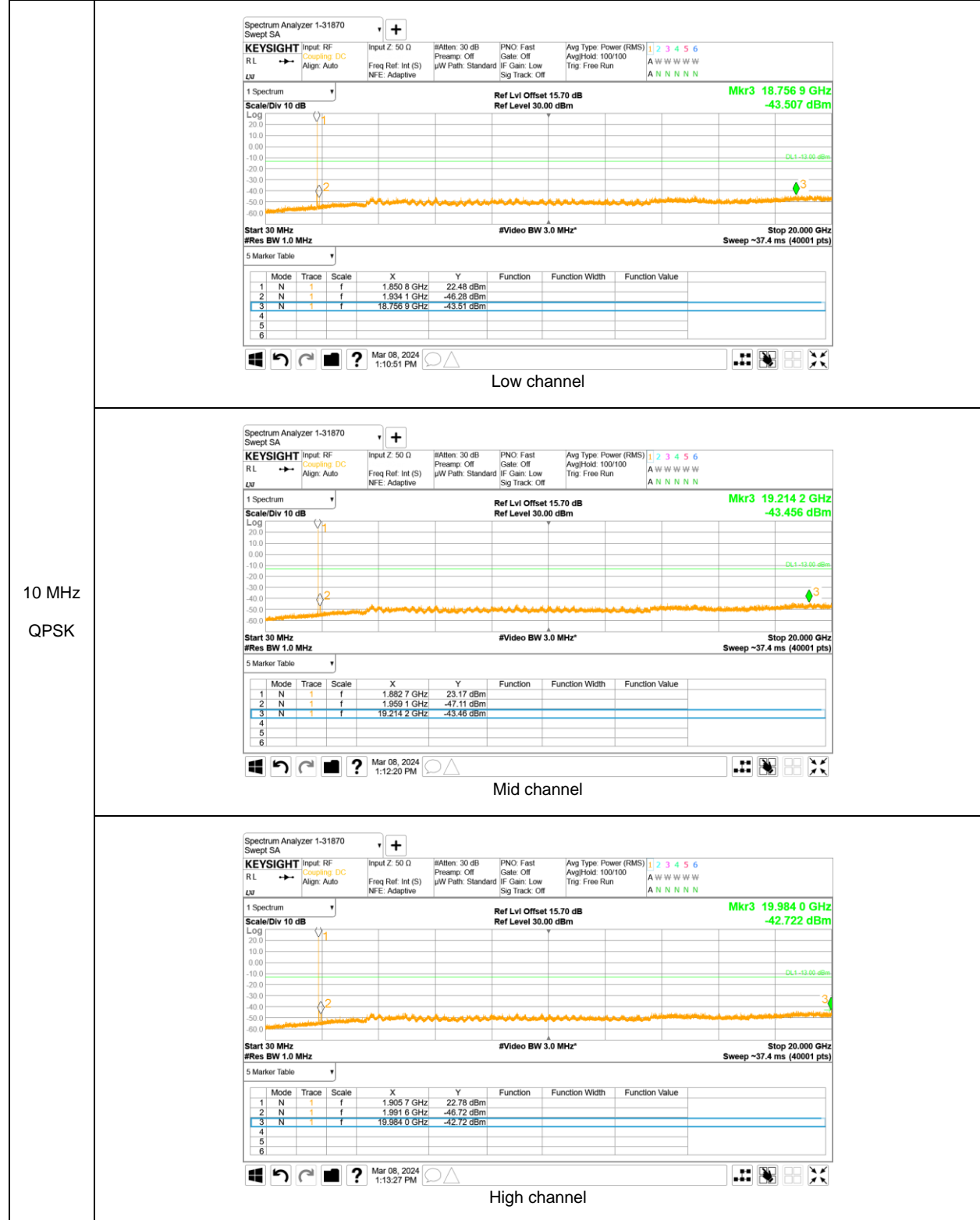
GPRS

WCDMA Band 2

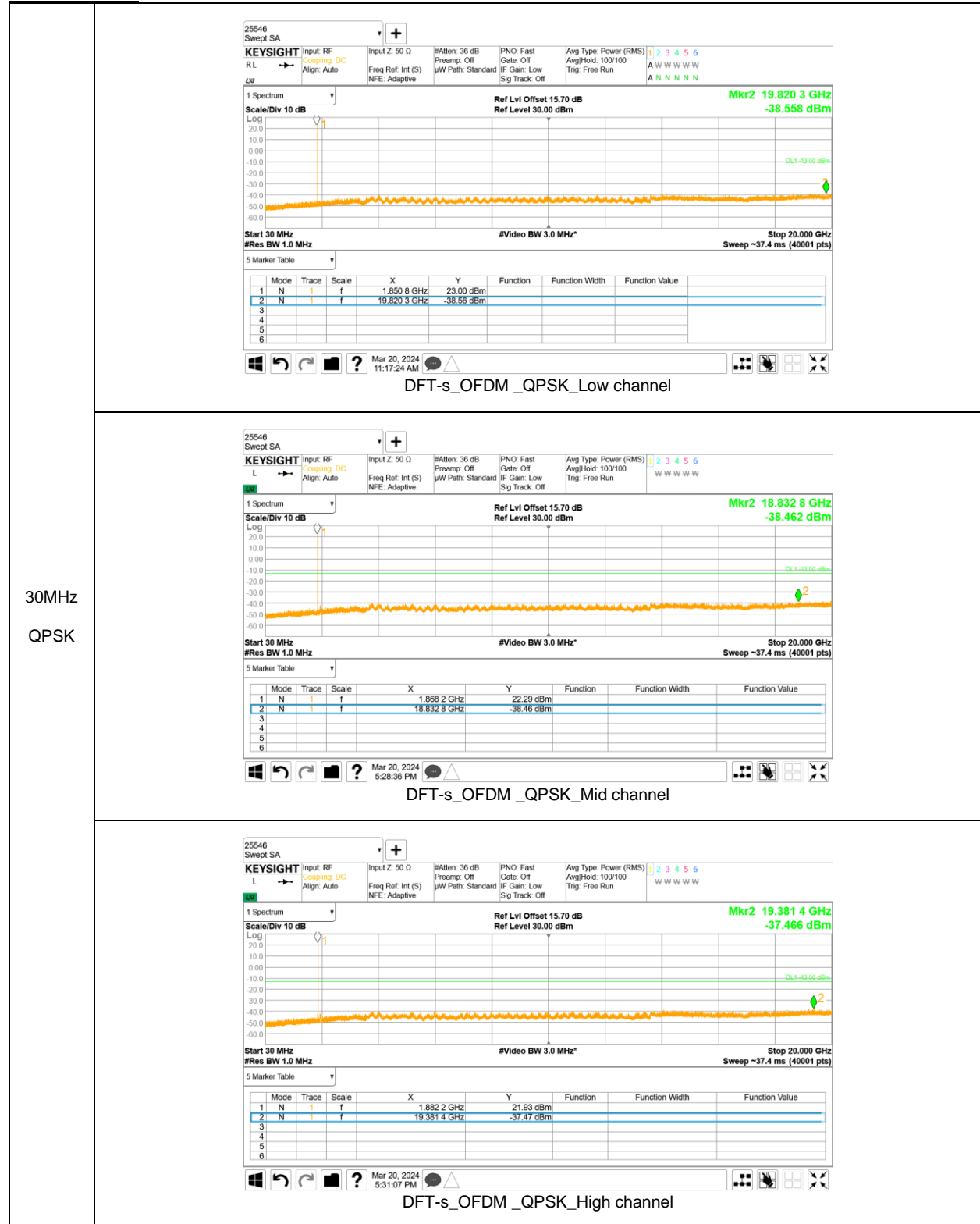


REL99

LTE Band 25



NR Band n25



8.6. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §24.235

LIMITS

24.235

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v03r01

NOTE

Test were performed each lowest or highest frequency on the modulation condition of more wide bandwidth.(Please refer to OBW results)

RESULTS

See the following pages.

8.6.1. FREQUENCY STABILITY RESULTS

**GSM 1900, Channel 512/810, Frequency 1850.0/1910.0 MHz
 (Lowest Frequency:EGPRS / Highest Frequency: GPRS)**

Test Date	2024-03-05
Test Engineer	31870

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1850.0758	1909.9234		
Extreme (50C)		1850.0759	1909.9234	25.9	0.014
Extreme (40C)		1850.0759	1909.9234	21.5	0.011
Extreme (30C)		1850.0759	1909.9234	33.3	0.018
Extreme (10C)		1850.0759	1909.9234	28.5	0.015
Extreme (0C)		1850.0759	1909.9234	24.3	0.013
Extreme (-10C)		1850.0759	1909.9234	29.4	0.016
Extreme (-20C)		1850.0759	1909.9234	28.6	0.015
Extreme (-30C)		1850.0759	1909.9234	21.2	0.011
20C		15%	1850.0759	1909.9234	32.5
	-15%	1850.0759	1909.9234	26.1	0.014
	End Point	1850.0759	1909.9234	25.5	0.014

WCDMA Band 2 (Lowest Frequency: Rel99 / Highest Frequency: HSDPA)

Test Date	2024-03-08
Test Engineer	31870

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1850.3183	1909.6794		
Extreme (50C)		1850.3183	1909.6794	7.6	0.004
Extreme (40C)		1850.3183	1909.6794	15.5	0.008
Extreme (30C)		1850.3183	1909.6794	18.1	0.010
Extreme (10C)		1850.3183	1909.6794	11.3	0.006
Extreme (0C)		1850.3183	1909.6794	9.9	0.005
Extreme (-10C)		1850.3183	1909.6794	12.3	0.007
Extreme (-20C)		1850.3183	1909.6794	8.2	0.004
Extreme (-30C)		1850.3183	1909.6794	13.2	0.007
20C		15%	1850.3183	1909.6794	14.2
	-15%	1850.3183	1909.6794	6.9	0.004
	End Point	1850.3183	1909.6794	8.5	0.005

LTE Band 25 (Lowest Frequency:QPSK / Highest Frequency: 16QAM)

Test Date	2024-03-14
Test Engineer	31870

Limit		1850	1915	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1850.1531	1914.8479		
Extreme (50C)		1850.1531	1914.8479	18.5	0.010
Extreme (40C)		1850.1531	1914.8479	22.2	0.012
Extreme (30C)		1850.1531	1914.8479	25.5	0.014
Extreme (10C)		1850.1531	1914.8479	17.4	0.009
Extreme (0C)		1850.1531	1914.8479	10.6	0.006
Extreme (-10C)		1850.1531	1914.8479	7.7	0.004
Extreme (-20C)		1850.1531	1914.8479	11.2	0.006
Extreme (-30C)		1850.1531	1914.8479	10.8	0.006
20C	15%	1850.1531	1914.8479	11.2	0.006
	-15%	1850.1531	1914.8479	7.6	0.004
	End Point	1850.1531	1914.8479	6.4	0.003

5G NR Band n25 (Lowest Frequency: QPSK / Highest Frequency: QPSK)

Test Date	2024-03-21
Test Engineer	31870

Limit		1850	1915	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1850.2559	1914.7417		
Extreme (50C)		1850.2559	1914.7417	28.5	0.015
Extreme (40C)		1850.2559	1914.7417	31.3	0.017
Extreme (30C)		1850.2559	1914.7417	26.9	0.014
Extreme (10C)		1850.2559	1914.7417	22.7	0.012
Extreme (0C)		1850.2559	1914.7417	7.7	0.004
Extreme (-10C)		1850.2559	1914.7417	15.6	0.008
Extreme (-20C)		1850.2559	1914.7417	21.9	0.012
Extreme (-30C)		1850.2559	1914.7417	18.6	0.010
20C	15%	1850.2559	1914.7417	22.6	0.012
	-15%	1850.2559	1914.7417	19.5	0.010
	End Point	1850.2559	1914.7417	20.9	0.011

9. RADIATED RESULTS

9.1. RADIATED POWER (EIRP)

RULE PART(S)

FCC: §2.1046, §24.232

LIMITS

24.232(c)

Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

TEST PROCEDURE

ANSI / TIA / EIA 603 E Clause 2.2.17; ESU40 setting reference to 971168 D01 v03r01

For radiated output power measurement with a ESU40:

- a) Set the RBW \geq OBW;
- b) Set VBW $\geq 3 \times$ RBW;
- c) Set span $\geq 2 \times$ OBW;
- d) Sweep time = auto couple or 1 second;
- e) Detector = rms;
- f) Ensure that the number of measurement points \geq span/RBW;
- g) Trace Mode = max hold(GSM, WCDMA), average(LTE, 5G NR);

TEST RESULTS

See the following pages.

9.1.1. EIRP Results

GSM

Band	Mode	f (MHz)	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	ERP (dBm)	EIRP (mW)	Limit (dBm)	Delta (dB)
GSM 1900_ANT B	GPRS	1850.20	25.59	H	4.48	9.52	30.63	1156.11	33.00	-2.37
		1880.00	25.26	H	4.52	9.29	30.02	1004.62	33.00	-2.98
		1909.80	26.19	H	4.55	9.00	30.64	1158.78	33.00	-2.36
	EGPRS	1850.20	22.16	H	4.48	9.52	27.20	524.81	33.00	-5.80
		1880.00	22.13	H	4.52	9.29	26.89	488.65	33.00	-6.11
		1909.80	23.22	H	4.55	9.00	27.67	584.79	33.00	-5.33

WCDMA

Band	Mode	f (MHz)	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	Limit (dBm)	Delta (dB)
Band 2_ANT B	REL99	1852.40	20.83	H	4.49	9.51	25.84	383.71	33.00	-7.16
		1880.00	21.00	H	4.52	9.29	25.76	376.70	33.00	-7.24
		1907.60	21.72	H	4.55	9.03	26.20	416.87	33.00	-6.80
	HSDPA	1852.40	19.98	H	4.49	9.51	24.99	315.50	33.00	-8.01
		1880.00	20.09	H	4.52	9.29	24.85	305.49	33.00	-8.15
		1907.60	20.76	H	4.55	9.03	25.24	334.20	33.00	-7.76

LTE Band 25 (ANT B)

BW (MHz)	Modulation	f (MHz)	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	Limit (dBm)	Delta (dB)	RB
20	QPSK	1860.00	20.39	H	4.49	9.45	25.35	342.77	33.00	-7.65	1/0
		1882.50	19.74	H	4.52	9.27	24.49	281.19	33.00	-8.51	1/0
		1905.00	20.20	H	4.55	9.06	24.72	296.48	33.00	-8.28	1/0
	16-QAM	1860.00	19.77	H	4.49	9.45	24.73	297.17	33.00	-8.27	1/0
		1882.50	19.43	H	4.52	9.27	24.18	261.82	33.00	-8.82	1/49
		1905.00	19.47	H	4.55	9.06	23.99	250.61	33.00	-9.01	1/49
15	QPSK	1857.50	20.30	H	4.49	9.47	25.28	337.29	33.00	-7.72	1/0
		1882.50	20.19	H	4.52	9.27	24.94	311.89	33.00	-8.06	1/0
		1907.50	20.21	H	4.55	9.03	24.69	294.44	33.00	-8.31	1/0
	16-QAM	1857.50	19.50	H	4.49	9.47	24.48	280.54	33.00	-8.52	1/37
		1882.50	19.28	H	4.52	9.27	24.03	252.93	33.00	-8.97	1/37
		1907.50	19.32	H	4.55	9.03	23.80	239.88	33.00	-9.20	1/0
10	QPSK	1855.00	20.39	H	4.49	9.48	25.38	345.14	33.00	-7.62	1/0
		1882.50	19.82	H	4.52	9.27	24.57	286.42	33.00	-8.43	1/25
		1910.00	20.19	H	4.55	8.99	24.63	290.40	33.00	-8.37	1/0
	16-QAM	1855.00	19.91	H	4.49	9.48	24.91	309.74	33.00	-8.09	1/25
		1882.50	19.23	H	4.52	9.27	23.98	250.03	33.00	-9.02	1/25
		1910.00	19.48	H	4.55	8.99	23.92	246.60	33.00	-9.08	1/0
5	QPSK	1852.50	20.46	H	4.49	9.50	25.48	353.18	33.00	-7.52	1/12
		1882.50	19.98	H	4.52	9.27	24.73	297.17	33.00	-8.27	1/12
		1912.50	20.93	H	4.56	8.96	25.34	341.98	33.00	-7.66	1/12
	16-QAM	1852.50	19.76	H	4.49	9.50	24.78	300.61	33.00	-8.22	1/0
		1882.50	19.52	H	4.52	9.27	24.27	267.30	33.00	-8.73	1/12
		1912.50	20.15	H	4.56	8.96	24.56	285.76	33.00	-8.44	1/12
3	QPSK	1851.50	20.42	H	4.49	9.51	25.45	350.75	33.00	-7.55	1/8
		1882.50	20.17	H	4.52	9.27	24.92	310.46	33.00	-8.08	1/8
		1913.50	20.88	H	4.56	8.95	25.27	336.51	33.00	-7.73	1/8
	16-QAM	1851.50	19.89	H	4.49	9.51	24.92	310.46	33.00	-8.08	1/8
		1882.50	18.99	H	4.52	9.27	23.74	236.59	33.00	-9.26	1/8
		1913.50	20.00	H	4.56	8.95	24.39	274.79	33.00	-8.61	1/8
1.4	QPSK	1850.70	20.30	H	4.48	9.52	25.34	341.98	33.00	-7.66	1/0
		1882.50	20.11	H	4.52	9.27	24.86	306.20	33.00	-8.14	1/3
		1914.30	21.13	H	4.56	8.94	25.51	355.63	33.00	-7.49	1/0
	16-QAM	1850.70	19.71	H	4.48	9.52	24.75	298.54	33.00	-8.25	1/3
		1882.50	19.26	H	4.52	9.27	24.01	251.77	33.00	-8.99	1/3
		1914.30	20.22	H	4.56	8.94	24.60	288.40	33.00	-8.40	1/3

LTE Band 25 (ANT E)

BW (MHz)	Modulation	f (MHz)	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	Limit (dBm)	Delta (dB)	RB
20	QPSK	1860.00	16.47	H	4.49	9.45	21.43	139.00	33.00	-11.57	1/0
		1882.50	16.62	H	4.52	9.27	21.37	137.09	33.00	-11.63	1/49
		1905.00	17.34	H	4.55	9.06	21.86	153.46	33.00	-11.14	1/49
	16-QAM	1860.00	15.45	H	4.49	9.45	20.41	109.90	33.00	-12.59	1/0
		1882.50	15.60	H	4.52	9.27	20.35	108.39	33.00	-12.65	1/0
		1905.00	16.45	H	4.55	9.06	20.97	125.03	33.00	-12.03	1/49
15	QPSK	1857.50	16.49	H	4.49	9.47	21.47	140.28	33.00	-11.53	1/0
		1882.50	17.02	H	4.52	9.27	21.77	150.31	33.00	-11.23	1/0
		1907.50	17.69	H	4.55	9.03	22.17	164.82	33.00	-10.83	1/37
	16-QAM	1857.50	15.52	H	4.49	9.47	20.50	112.20	33.00	-12.50	1/0
		1882.50	16.05	H	4.52	9.27	20.80	120.23	33.00	-12.20	1/37
		1907.50	16.67	H	4.55	9.03	21.15	130.32	33.00	-11.85	1/0
10	QPSK	1855.00	16.65	H	4.49	9.48	21.65	146.22	33.00	-11.35	1/25
		1882.50	16.69	H	4.52	9.27	21.44	139.32	33.00	-11.56	1/25
		1910.00	17.93	H	4.55	8.99	22.37	172.58	33.00	-10.63	1/25
	16-QAM	1855.00	15.83	H	4.49	9.48	20.83	121.06	33.00	-12.17	1/25
		1882.50	15.85	H	4.52	9.27	20.60	114.82	33.00	-12.40	1/25
		1910.00	16.80	H	4.55	8.99	21.24	133.05	33.00	-11.76	1/0
5	QPSK	1852.50	16.64	H	4.49	9.50	21.66	146.55	33.00	-11.34	1/12
		1882.50	16.88	H	4.52	9.27	21.63	145.55	33.00	-11.37	1/12
		1912.50	17.65	H	4.56	8.96	22.06	160.69	33.00	-10.94	1/12
	16-QAM	1852.50	15.87	H	4.49	9.50	20.89	122.74	33.00	-12.11	1/12
		1882.50	16.09	H	4.52	9.27	20.84	121.34	33.00	-12.16	1/12
		1912.50	16.72	H	4.56	8.96	21.13	129.72	33.00	-11.87	1/12
3	QPSK	1851.50	16.53	H	4.49	9.51	21.56	143.22	33.00	-11.44	1/8
		1882.50	16.84	H	4.52	9.27	21.59	144.21	33.00	-11.41	1/8
		1913.50	17.79	H	4.56	8.95	22.18	165.20	33.00	-10.82	1/8
	16-QAM	1851.50	15.51	H	4.49	9.51	20.54	113.24	33.00	-12.46	1/8
		1882.50	15.80	H	4.52	9.27	20.55	113.50	33.00	-12.45	1/14
		1913.50	16.97	H	4.56	8.95	21.36	136.77	33.00	-11.64	1/8
1.4	QPSK	1850.70	16.38	H	4.48	9.52	21.42	138.68	33.00	-11.58	1/3
		1882.50	16.77	H	4.52	9.27	21.52	141.91	33.00	-11.48	1/0
		1914.30	17.87	H	4.56	8.94	22.25	167.88	33.00	-10.75	1/0
	16-QAM	1850.70	15.41	H	4.48	9.52	20.45	110.92	33.00	-12.55	1/5
		1882.50	15.71	H	4.52	9.27	20.46	111.17	33.00	-12.54	1/0
		1914.30	16.98	H	4.56	8.94	21.36	136.77	33.00	-11.64	1/0

5G NR n25 DFT-s OFDM (ANT B)

BW (MHz)	Modulation	f (MHz)	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	Limit (dBm)	Delta (dB)	RB
40	QPSK	1870.00	20.43	H	4.51	9.37	25.29	338.06	33.00	-7.71	1/1
		1882.50	20.69	H	4.52	9.27	25.44	349.95	33.00	-7.56	1/1
		1895.00	20.76	H	4.54	9.17	25.39	345.94	33.00	-7.61	1/1
	16-QAM	1870.00	19.49	H	4.51	9.37	24.35	272.27	33.00	-8.65	1/1
		1882.50	19.80	H	4.52	9.27	24.55	285.10	33.00	-8.45	1/1
		1895.00	19.69	H	4.54	9.17	24.32	270.40	33.00	-8.68	1/1
35	QPSK	1867.50	20.25	H	4.51	9.39	25.13	325.84	33.00	-7.87	1/1
		1882.50	20.01	H	4.52	9.27	24.76	299.23	33.00	-8.24	1/93
		1897.50	20.01	H	4.54	9.15	24.63	290.40	33.00	-8.37	1/93
	16-QAM	1867.50	19.22	H	4.51	9.39	24.10	257.04	33.00	-8.90	1/1
		1882.50	19.04	H	4.52	9.27	23.79	239.33	33.00	-9.21	1/93
		1897.50	19.04	H	4.54	9.15	23.66	232.27	33.00	-9.34	1/93
30	QPSK	1865.00	20.20	H	4.50	9.41	25.10	323.59	33.00	-7.90	1/1
		1882.50	20.13	H	4.52	9.27	24.88	307.61	33.00	-8.12	1/1
		1900.00	20.33	H	4.54	9.13	24.93	311.17	33.00	-8.07	1/79
	16-QAM	1865.00	19.21	H	4.50	9.41	24.11	257.63	33.00	-8.89	1/1
		1882.50	19.21	H	4.52	9.27	23.96	248.89	33.00	-9.04	1/1
		1900.00	19.17	H	4.54	9.13	23.77	238.23	33.00	-9.23	1/79
25	QPSK	1862.50	20.35	H	4.50	9.43	25.28	337.29	33.00	-7.72	1/1
		1882.50	20.22	H	4.52	9.27	24.97	314.05	33.00	-8.03	1/1
		1902.50	20.23	H	4.54	9.10	24.78	300.61	33.00	-8.22	1/1
	16-QAM	1862.50	19.43	H	4.50	9.43	24.36	272.90	33.00	-8.64	1/1
		1882.50	19.21	H	4.52	9.27	23.96	248.89	33.00	-9.04	1/1
		1902.50	19.16	H	4.54	9.10	23.71	234.96	33.00	-9.29	1/1
20	QPSK	1860.00	20.31	H	4.49	9.45	25.27	336.51	33.00	-7.73	1/52
		1882.50	20.07	H	4.52	9.27	24.82	303.39	33.00	-8.18	1/1
		1905.00	19.95	H	4.55	9.06	24.47	279.90	33.00	-8.53	1/52
	16-QAM	1860.00	19.28	H	4.49	9.45	24.24	265.46	33.00	-8.76	1/52
		1882.50	18.98	H	4.52	9.27	23.73	236.05	33.00	-9.27	1/1
		1905.00	18.95	H	4.55	9.06	23.47	222.33	33.00	-9.53	1/52
15	QPSK	1857.50	20.36	H	4.49	9.47	25.34	341.98	33.00	-7.66	1/1
		1882.50	20.10	H	4.52	9.27	24.85	305.49	33.00	-8.15	1/1
		1907.50	20.21	H	4.55	9.03	24.69	294.44	33.00	-8.31	1/1
	16-QAM	1857.50	19.37	H	4.49	9.47	24.35	272.27	33.00	-8.65	1/1
		1882.50	19.09	H	4.52	9.27	23.84	242.10	33.00	-9.16	1/1
		1907.50	19.40	H	4.55	9.03	23.88	244.34	33.00	-9.12	1/1
10	QPSK	1855.00	20.23	H	4.49	9.48	25.23	333.43	33.00	-7.77	1/1
		1882.50	20.00	H	4.52	9.27	24.75	298.54	33.00	-8.25	1/1
		1910.00	20.46	H	4.55	8.99	24.90	309.03	33.00	-8.10	1/1
	16-QAM	1855.00	19.24	H	4.49	9.48	24.24	265.46	33.00	-8.76	1/1
		1882.50	19.09	H	4.52	9.27	23.84	242.10	33.00	-9.16	1/1
		1910.00	19.37	H	4.55	8.99	23.81	240.44	33.00	-9.19	1/1
5	QPSK	1852.50	19.91	H	4.49	9.50	24.93	311.17	33.00	-8.07	1/1
		1882.50	19.94	H	4.52	9.27	24.69	294.44	33.00	-8.31	1/1
		1912.50	20.40	H	4.56	8.96	24.81	302.69	33.00	-8.19	1/1
	16-QAM	1852.50	18.87	H	4.49	9.50	23.89	244.91	33.00	-9.11	1/1
		1882.50	18.89	H	4.52	9.27	23.64	231.21	33.00	-9.36	1/1
		1912.50	19.39	H	4.56	8.96	23.80	239.88	33.00	-9.20	1/1

5G NR n25 DFT-s OFDM (ANT E)

BW (MHz)	Modulation	f (MHz)	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	Limit (dBm)	Delta (dB)	RB
40	QPSK	1870.00	16.63	H	4.51	9.37	21.49	140.93	33.00	-11.51	1/1
		1882.50	16.80	H	4.52	9.27	21.55	142.89	33.00	-11.45	1/1
		1895.00	15.59	H	4.54	9.17	20.22	105.20	33.00	-12.78	1/1
	16-QAM	1870.00	15.58	H	4.51	9.37	20.44	110.66	33.00	-12.56	1/1
		1882.50	15.82	H	4.52	9.27	20.57	114.02	33.00	-12.43	1/1
		1895.00	14.69	H	4.54	9.17	19.32	85.51	33.00	-13.68	1/1
35	QPSK	1867.50	16.33	H	4.51	9.39	21.21	132.13	33.00	-11.79	1/93
		1882.50	16.52	H	4.52	9.27	21.27	133.97	33.00	-11.73	1/1
		1897.50	16.33	H	4.54	9.15	20.95	124.45	33.00	-12.05	1/93
	16-QAM	1867.50	15.30	H	4.51	9.39	20.18	104.23	33.00	-12.82	1/93
		1882.50	15.46	H	4.52	9.27	20.21	104.95	33.00	-12.79	1/1
		1897.50	15.48	H	4.54	9.15	20.10	102.33	33.00	-12.90	1/93
30	QPSK	1865.00	16.73	H	4.50	9.41	21.63	145.55	33.00	-11.37	1/1
		1882.50	16.61	H	4.52	9.27	21.36	136.77	33.00	-11.64	1/1
		1900.00	15.63	H	4.54	9.13	20.23	105.44	33.00	-12.77	1/79
	16-QAM	1865.00	15.64	H	4.50	9.41	20.54	113.24	33.00	-12.46	1/1
		1882.50	15.65	H	4.52	9.27	20.40	109.65	33.00	-12.60	1/1
		1900.00	14.70	H	4.54	9.13	19.30	85.11	33.00	-13.70	1/79
25	QPSK	1862.50	16.60	H	4.50	9.43	21.53	142.23	33.00	-11.47	1/1
		1882.50	16.49	H	4.52	9.27	21.24	133.05	33.00	-11.76	1/1
		1902.50	16.03	H	4.54	9.10	20.58	114.29	33.00	-12.42	1/1
	16-QAM	1862.50	15.56	H	4.50	9.43	20.49	111.94	33.00	-12.51	1/1
		1882.50	15.53	H	4.52	9.27	20.28	106.66	33.00	-12.72	1/1
		1902.50	14.99	H	4.54	9.10	19.54	89.95	33.00	-13.46	1/1
20	QPSK	1860.00	16.42	H	4.49	9.45	21.38	137.40	33.00	-11.62	1/52
		1882.50	16.31	H	4.52	9.27	21.06	127.64	33.00	-11.94	1/1
		1905.00	15.84	H	4.55	9.06	20.36	108.64	33.00	-12.64	1/52
	16-QAM	1860.00	15.46	H	4.49	9.45	20.42	110.15	33.00	-12.58	1/52
		1882.50	15.36	H	4.52	9.27	20.11	102.57	33.00	-12.89	1/1
		1905.00	14.96	H	4.55	9.06	19.48	88.72	33.00	-13.52	1/52
15	QPSK	1857.50	16.51	H	4.49	9.48	21.51	141.58	33.00	-11.49	1/1
		1882.50	15.80	H	4.52	9.27	20.55	113.50	33.00	-12.45	1/1
		1907.50	15.82	H	4.55	8.99	20.26	106.17	33.00	-12.74	1/39
	16-QAM	1857.50	15.48	H	4.49	9.47	20.46	111.17	33.00	-12.54	1/1
		1882.50	15.37	H	4.52	9.27	20.12	102.80	33.00	-12.88	1/1
		1907.50	15.24	H	4.55	9.03	19.72	93.76	33.00	-13.28	1/39
10	QPSK	1855.00	16.43	H	4.49	9.47	21.41	138.36	33.00	-11.59	1/1
		1882.50	16.27	H	4.52	9.27	21.02	126.47	33.00	-11.98	1/1
		1910.00	16.19	H	4.55	9.03	20.67	116.68	33.00	-12.33	1/1
	16-QAM	1855.00	15.65	H	4.49	9.48	20.65	116.14	33.00	-12.35	1/1
		1882.50	14.77	H	4.52	9.27	19.52	89.54	33.00	-13.48	1/1
		1910.00	14.86	H	4.55	8.99	19.30	85.11	33.00	-13.70	1/1
5	QPSK	1852.50	15.73	H	4.49	9.50	20.75	118.85	33.00	-12.25	1/1
		1882.50	16.09	H	4.52	9.27	20.84	121.34	33.00	-12.16	1/1
		1912.50	16.09	H	4.56	8.96	20.50	112.20	33.00	-12.50	1/1
	16-QAM	1852.50	14.83	H	4.49	9.50	19.85	96.61	33.00	-13.15	1/1
		1882.50	15.23	H	4.52	9.27	19.98	99.54	33.00	-13.02	1/1
		1912.50	15.11	H	4.56	8.96	19.52	89.54	33.00	-13.48	1/1

9.2. RADIATED SPURIOUS EMISSION

RULE PART(S)

FCC: §2.1053, §24.238

LIMIT

24.238(a)

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB.

TEST PROCEDURE

ANSI / TIA / EIA 603 E Clause 2.2.12; ESU40 setting reference to 971168 D01 v03r01

For peak power measurement with a ESU40:

- a) Set the RBW = 100 kHz for emission below 1 GHz and 1 MHz for emissions above 1 GHz
- b) Set VBW $\geq 3 \times$ RBW;
- c) Set span ≥ 1.5 times the OBW;
- d) Sweep time = auto couple;
- e) Detector = rms;
- f) Ensure that the number of measurement points \geq span/RBW;
- g) Trace Mode = average(WCDMA, LTE, 5G NR), Maxhold(GSM);

NOTE1

LTE: It was tested at 1RB QPSK as worst case (the highest output power and density).

5G NR: All Waveforms (CP-OFDM vs DFT-s_OFDM) and modulations ($\pi/2$ BPSK, QPSK, 16QAM, 64QAM, 256QAM) 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.

NOTE2

Please refer to section 5.4 for bandwidth and RB setting about LTE, 5G NR bands.

NOTE3

For interband ULCA, it was checked in the RSE considering intermodulation, but no additional spurious emissions were founded.

RESULTS

See the following pages.

9.2.1. SPURIOUS RADIATION PLOTS

GSM1900

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement										
GPRS		Company:		Samsung						
		Project #:		4791196575						
		Date:		2024-02-28						
		Test Engineer:		28183						
		Configuration:		EUT / AC Adapter, Z-Position, HF						
		Location:		Chamber 2						
		Mode:		GPRS 1900 MHz Harmonics						
Test Votage:		AC 120 V, 60 Hz								
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
Low Ch, 1850.2MHz										
3700.40	-9.2	V	3.0	42.2	1.0	-50.4	-13.0	-37.4		
5550.60	-6.0	V	3.0	43.0	1.0	-48.0	-13.0	-35.0		
7400.80	-4.1	V	3.0	42.6	1.0	-45.7	-13.0	-32.7		
3700.40	-9.7	H	3.0	42.2	1.0	-50.9	-13.0	-37.9		
5550.60	-5.5	H	3.0	43.0	1.0	-47.5	-13.0	-34.5		
7400.80	-4.6	H	3.0	42.6	1.0	-46.3	-13.0	-33.3		
Mid Ch, 1880MHz										
3760.00	-9.4	V	3.0	42.2	1.0	-50.6	-13.0	-37.6		
5640.00	-5.5	V	3.0	43.1	1.0	-47.5	-13.0	-34.5		
7520.00	-3.9	V	3.0	42.6	1.0	-45.4	-13.0	-32.4		
3760.00	-9.4	H	3.0	42.2	1.0	-50.7	-13.0	-37.7		
5640.00	-4.0	H	3.0	43.1	1.0	-46.0	-13.0	-33.0		
7520.00	-4.3	H	3.0	42.6	1.0	-45.9	-13.0	-32.9		
High Ch, 1909.8MHz										
3819.60	-9.3	V	3.0	42.2	1.0	-50.5	-13.0	-37.5		
5729.40	-6.0	V	3.0	43.1	1.0	-48.0	-13.0	-35.0		
7639.20	-3.9	V	3.0	42.5	1.0	-45.4	-13.0	-32.4		
3819.60	-9.5	H	3.0	42.2	1.0	-50.7	-13.0	-37.7		
5729.40	-4.8	H	3.0	43.1	1.0	-46.9	-13.0	-33.9		
7639.20	-4.5	H	3.0	42.5	1.0	-46.0	-13.0	-33.0		

WCDMA Band 2

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4791196575							
Date:		2024-03-13							
Test Engineer:		24542							
Configuration:		EUT / AC Adapter, Y-Position, FF							
Location:		Chamber 1							
Mode:		Rel99 Band 2 Harmonics							
Test Voltage:		AC 120 V, 60 Hz							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1852.4MHz									
3704.80	-8.9	V	3.0	44.1	1.0	-52.0	-13.0	-39.0	
5557.20	-6.1	V	3.0	45.0	1.0	-50.0	-13.0	-37.0	
7409.60	-3.4	V	3.0	45.0	1.0	-47.4	-13.0	-34.4	
3704.80	-8.7	H	3.0	44.1	1.0	-51.8	-13.0	-38.8	
5557.20	-6.0	H	3.0	45.0	1.0	-49.9	-13.0	-36.9	
7409.60	-3.3	H	3.0	45.0	1.0	-47.2	-13.0	-34.2	
Mid Ch, 1880MHz									
3760.00	-8.6	V	3.0	44.1	1.0	-51.8	-13.0	-38.8	
5640.00	-5.1	V	3.0	45.0	1.0	-49.1	-13.0	-36.1	
7520.00	-3.3	V	3.0	44.9	1.0	-47.3	-13.0	-34.3	
3760.00	-8.6	H	3.0	44.1	1.0	-51.8	-13.0	-38.8	
5640.00	-4.6	H	3.0	45.0	1.0	-48.6	-13.0	-35.6	
7520.00	-3.4	H	3.0	44.9	1.0	-47.3	-13.0	-34.3	
High Ch, 1907.6MHz									
3815.20	-8.7	V	3.0	44.2	1.0	-51.9	-13.0	-38.9	
5722.80	-6.0	V	3.0	45.0	1.0	-50.0	-13.0	-37.0	
7630.40	-3.1	V	3.0	44.9	1.0	-47.0	-13.0	-34.0	
3815.20	-8.2	H	3.0	44.2	1.0	-51.4	-13.0	-38.4	
5722.80	-5.8	H	3.0	45.0	1.0	-49.9	-13.0	-36.9	
7630.40	-2.9	H	3.0	44.9	1.0	-46.8	-13.0	-33.8	

REL99

LTE Band 25

		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement							
		Company: Samsung Project #: 4791196575 Date: 2024-02-28 Test Engineer: 26087 Configuration: EUT / AC Adpter, Y-Position, Open Location: Chamber 2 Mode: LTE_QPSK Band 25 Harmonics, 1.4MHz Bandwidth Test Votage: AC 120 V, 60 Hz							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.4 MHz									
QPSK									
ANT B									
Low Ch, 1850.7MHz									
3701.40	-10.5	V	3.0	42.2	1.0	-51.7	-13.0	-38.7	
5552.10	-7.7	V	3.0	43.0	1.0	-49.7	-13.0	-36.7	
7402.80	-5.2	V	3.0	42.6	1.0	-46.8	-13.0	-33.8	
3701.40	-10.8	H	3.0	42.2	1.0	-52.0	-13.0	-39.0	
5552.10	-7.9	H	3.0	43.0	1.0	-50.0	-13.0	-37.0	
7402.80	-5.7	H	3.0	42.6	1.0	-47.3	-13.0	-34.3	
Mid Ch, 1882.5MHz									
3765.00	-10.3	V	3.0	42.2	1.0	-51.5	-13.0	-38.5	
5647.50	-7.3	V	3.0	43.1	1.0	-49.3	-13.0	-36.3	
7530.00	-5.1	V	3.0	42.6	1.0	-46.6	-13.0	-33.6	
3765.00	-10.6	H	3.0	42.2	1.0	-51.8	-13.0	-38.8	
5647.50	-7.6	H	3.0	43.1	1.0	-49.7	-13.0	-36.7	
7530.00	-5.7	H	3.0	42.6	1.0	-47.3	-13.0	-34.3	
High Ch, 1914.3MHz									
3828.60	-10.3	V	3.0	42.2	1.0	-51.5	-13.0	-38.5	
5742.90	-7.3	V	3.0	43.1	1.0	-49.3	-13.0	-36.3	
7657.20	-5.0	V	3.0	42.5	1.0	-46.5	-13.0	-33.5	
3828.60	-11.0	H	3.0	42.2	1.0	-52.2	-13.0	-39.2	
5742.90	-8.1	H	3.0	43.1	1.0	-50.2	-13.0	-37.2	
7657.20	-5.6	H	3.0	42.5	1.0	-47.1	-13.0	-34.1	
		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement							
		Company: Samsung Project #: 4791196575 Date: 2024-03-11 Test Engineer: 28775 Configuration: EUT / AC Adapter, X-Position, HF Location: Chamber 2 Mode: LTE_QPSK Band 25 Harmonics, 10MHz Bandwidth Test Votage: AC 120 V, 60 Hz							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
10 MHz									
QPSK									
ANT E									
Low Ch, 1855MHz									
3710.00	-10.4	V	3.0	42.2	1.0	-51.6	-13.0	-38.6	
5565.00	-7.6	V	3.0	43.0	1.0	-49.6	-13.0	-36.6	
7420.00	-5.2	V	3.0	42.6	1.0	-46.8	-13.0	-33.8	
3710.00	-10.6	H	3.0	42.2	1.0	-51.9	-13.0	-38.9	
5565.00	-7.9	H	3.0	43.0	1.0	-49.9	-13.0	-36.9	
7420.00	-5.7	H	3.0	42.6	1.0	-47.3	-13.0	-34.3	
Mid Ch, 1882.5MHz									
3765.00	-10.4	V	3.0	42.2	1.0	-51.7	-13.0	-38.7	
5647.50	-6.9	V	3.0	43.1	1.0	-49.0	-13.0	-36.0	
7530.00	-5.1	V	3.0	42.6	1.0	-46.7	-13.0	-33.7	
3765.00	-11.7	H	3.0	42.2	1.0	-52.9	-13.0	-39.9	
5647.50	-7.5	H	3.0	43.1	1.0	-49.6	-13.0	-36.6	
7530.00	-5.7	H	3.0	42.6	1.0	-47.2	-13.0	-34.2	
High Ch, 1910MHz									
3820.00	-10.4	V	3.0	42.2	1.0	-51.6	-13.0	-38.6	
5730.00	-7.2	V	3.0	43.1	1.0	-49.3	-13.0	-36.3	
7640.00	-5.0	V	3.0	42.5	1.0	-46.5	-13.0	-33.5	
3820.00	-10.6	H	3.0	42.2	1.0	-51.8	-13.0	-38.8	
5730.00	-7.6	H	3.0	43.1	1.0	-49.7	-13.0	-36.7	
7640.00	-5.6	H	3.0	42.5	1.0	-47.1	-13.0	-34.1	

NR Band n25

		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement										
		Company: Samsung Project #: 47911976575 Date: 2024-03-08 Test Engineer: 28775 Configuration: EUT / AC Adapter, Y-Position, FF Location: Chamber 2 Mode: 5G NR_QPSK NR n25 Harmonics, 40MHz Bandwidth Test Voltage: AC 120 V, 60 Hz										
		f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
40 MHz	DFT-s_OFDM	Low Ch, 1870MHz										
		3740.00	-10.3	V	3.0	42.2	1.0	-51.5	-13.0	-38.5		
		5610.00	-6.1	V	3.0	43.0	1.0	-48.1	-13.0	-35.1		
		7480.00	-4.9	V	3.0	42.6	1.0	-46.5	-13.0	-33.5		
		3740.00	-10.6	H	3.0	42.2	1.0	-51.8	-13.0	-38.8		
		5610.00	-7.5	H	3.0	43.0	1.0	-49.6	-13.0	-36.6		
		7480.00	-5.6	H	3.0	42.6	1.0	-47.2	-13.0	-34.2		
		Mid Ch, 1882.5MHz										
		3765.00	-10.2	V	3.0	42.2	1.0	-51.4	-13.0	-38.4		
		5647.50	-6.0	V	3.0	43.1	1.0	-48.1	-13.0	-35.1		
		7530.00	-4.8	V	3.0	42.6	1.0	-46.4	-13.0	-33.4		
		3765.00	-10.5	H	3.0	42.2	1.0	-51.7	-13.0	-38.7		
		5647.50	-7.4	H	3.0	43.1	1.0	-49.4	-13.0	-36.4		
		7530.00	-5.6	H	3.0	42.6	1.0	-47.1	-13.0	-34.1		
		High Ch, 1895MHz										
		3790.00	-10.4	V	3.0	42.2	1.0	-51.6	-13.0	-38.6		
		5685.00	-5.9	V	3.0	43.1	1.0	-47.9	-13.0	-34.9		
		7580.00	-4.9	V	3.0	42.5	1.0	-46.4	-13.0	-33.4		
		3790.00	-10.6	H	3.0	42.2	1.0	-51.8	-13.0	-38.8		
		5685.00	-7.3	H	3.0	43.1	1.0	-49.4	-13.0	-36.4		
		7580.00	-5.6	H	3.0	42.5	1.0	-47.1	-13.0	-34.1		
				UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement								
				Company: Samsung Project #: 4791196575 Date: 2024-03-11 Test Engineer: 26087 Configuration: EUT / AC Adapter, Y-Position, FF Location: Chamber 1 Mode: 5G NR_QPSK NR n25 Harmonics, 30MHz Bandwidth Test Voltage: AC 120 V, 60 Hz								
				f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)
30 MHz	DFT-s_OFDM	Low Ch, 1865MHz										
		3730.00	-8.8	V	3.0	44.1	1.0	-51.9	-13.0	-38.9		
		5595.00	-5.8	V	3.0	45.0	1.0	-49.8	-13.0	-36.8		
		7460.00	-3.3	V	3.0	45.0	1.0	-47.3	-13.0	-34.3		
		3730.00	-8.7	H	3.0	44.1	1.0	-51.8	-13.0	-38.8		
		5595.00	-5.7	H	3.0	45.0	1.0	-49.7	-13.0	-36.7		
		7460.00	-3.3	H	3.0	45.0	1.0	-47.3	-13.0	-34.3		
		Mid Ch, 1882.5MHz										
		3765.00	-8.4	V	3.0	44.1	1.0	-51.6	-13.0	-38.6		
		5647.50	-5.7	V	3.0	45.0	1.0	-49.7	-13.0	-36.7		
		7530.00	-3.3	V	3.0	44.9	1.0	-47.2	-13.0	-34.2		
		3765.00	-8.2	H	3.0	44.1	1.0	-51.3	-13.0	-38.3		
		5647.50	-5.5	H	3.0	45.0	1.0	-49.5	-13.0	-36.5		
		7530.00	-3.2	H	3.0	44.9	1.0	-47.2	-13.0	-34.2		
		High Ch, 1900MHz										
		3800.00	-8.8	V	3.0	44.2	1.0	-52.0	-13.0	-39.0		
		5700.00	-6.1	V	3.0	45.0	1.0	-50.1	-13.0	-37.1		
		7600.00	-3.2	V	3.0	44.9	1.0	-47.1	-13.0	-34.1		
		3800.00	-8.6	H	3.0	44.2	1.0	-51.8	-13.0	-38.8		
		5700.00	-5.5	H	3.0	45.0	1.0	-49.6	-13.0	-36.6		
		7600.00	-3.2	H	3.0	44.9	1.0	-47.1	-13.0	-34.1		

END OF REPORT