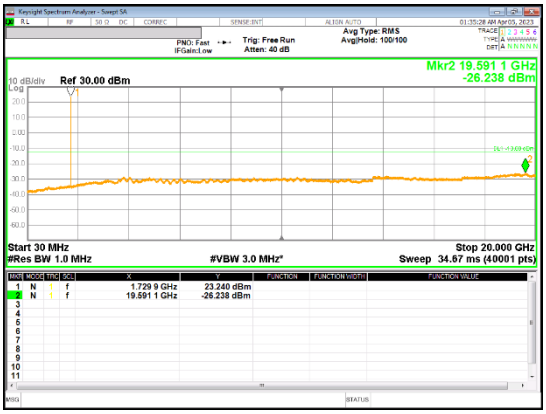
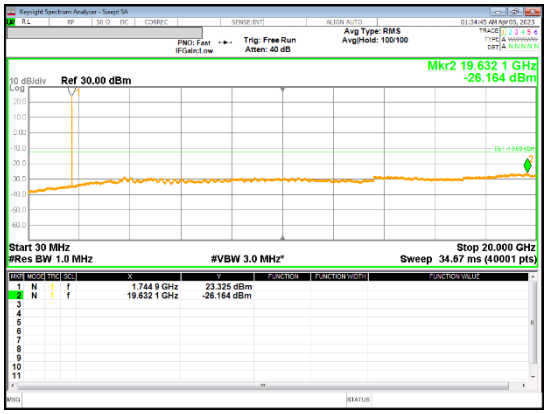
NR Band n66

40 MHz QPSK	 Low channel	 Mid channel
	 High channel	

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8.6. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §27.54

LIMITS

§27.54 - The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

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 section 9.1.1 OBW results)

RESULTS

See the following pages.

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8.6.1. FREQUENCY STABILITY RESULTS

WCDMA Band 4 (Lowest Frequency: HSDPA/ Highest Frequency: HSDPA)

Test Date	2023-04-11
Test Engineer	47989

Limit		1710	1755	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1710.3189	1754.6877		
Extreme (50C)		1710.3189	1754.6877	22.6	0.013
Extreme (40C)		1710.3189	1754.6877	22.8	0.013
Extreme (30C)		1710.3189	1754.6877	20.0	0.012
Extreme (10C)		1710.3189	1754.6877	11.7	0.007
Extreme (0C)		1710.3189	1754.6877	12.8	0.007
Extreme (-10C)		1710.3189	1754.6877	18.6	0.011
Extreme (-20C)		1710.3189	1754.6877	20.2	0.012
Extreme (-30C)		1710.3189	1754.6877	16.8	0.010
20C	15%	1710.3189	1754.6877	17.8	0.010
	-15%	1710.3189	1754.6877	16.4	0.009
	End Point	1710.3189	1754.6877	15.8	0.009

LTE Band 12 (Lowest Frequency: 16QAM / Highest Frequency: 16QAM)

Test Date	2023-04-12
Test Engineer	47989

Limit		699	716	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	699.1542	715.8471		
Extreme (50C)		699.1542	715.8471	5.3	0.008
Extreme (40C)		699.1542	715.8471	12.0	0.017
Extreme (30C)		699.1542	715.8471	4.9	0.007
Extreme (10C)		699.1542	715.8471	5.9	0.008
Extreme (0C)		699.1542	715.8471	6.3	0.009
Extreme (-10C)		699.1542	715.8471	5.5	0.008
Extreme (-20C)		699.1542	715.8471	27.4	0.039
Extreme (-30C)		699.1542	715.8471	28.2	0.040
20C	15%	699.1542	715.8471	7.3	0.010
	-15%	699.1542	715.8471	8.2	0.012
	End Point	699.1542	715.8471	8.3	0.012

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LTE Band 13 (Lowest Frequency: 16QAM / Highest Frequency: 16QAM)

Test Date	2023-04-13
Test Engineer	47989

Limit		777	787	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	777.2479	786.7464		
Extreme (50C)		777.2479	786.7464	6.8	0.009
Extreme (40C)		777.2479	786.7464	5.5	0.007
Extreme (30C)		777.2479	786.7464	4.9	0.006
Extreme (10C)		777.2479	786.7464	5.6	0.007
Extreme (0C)		777.2479	786.7464	5.9	0.008
Extreme (-10C)		777.2479	786.7464	6.5	0.008
Extreme (-20C)		777.2479	786.7464	5.5	0.007
Extreme (-30C)		777.2479	786.7464	5.2	0.007
20C	15%	777.2479	786.7464	8.1	0.010
	-15%	777.2479	786.7464	4.8	0.006
	End Point	777.2479	786.7464	5.5	0.007

LTE Band 41(PC2) (Lowest Frequency: QPSK / Highest Frequency: 16QAM)

Test Date	2023-04-18
Test Engineer	47989

Limit		2496	2690	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	2496.2591	2689.7444		
Extreme (50C)		2496.2591	2689.7444	12.1	0.005
Extreme (40C)		2496.2591	2689.7444	12.6	0.005
Extreme (30C)		2496.2591	2689.7444	12.7	0.005
Extreme (10C)		2496.2591	2689.7444	11.9	0.005
Extreme (0C)		2496.2591	2689.7444	13.5	0.005
Extreme (-10C)		2496.2591	2689.7444	13.8	0.005
Extreme (-20C)		2496.2591	2689.7444	14.4	0.006
Extreme (-30C)		2496.2591	2689.7444	20.1	0.008
20C	15%	2496.2591	2689.7444	10.6	0.004
	-15%	2496.2591	2689.7444	12.1	0.005
	End Point	2496.2591	2689.7444	10.9	0.004

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LTE Band 66 (Lowest Frequency: 16QAM / Highest Frequency: 16QAM)

Test Date	2023-04-20
Test Engineer	47989

Limit		1710	1780	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1710.1544	1779.8456		
Extreme (50C)		1710.1544	1779.8456	22.1	0.013
Extreme (40C)		1710.1544	1779.8456	6.3	0.004
Extreme (30C)		1710.1544	1779.8456	10.3	0.006
Extreme (10C)		1710.1544	1779.8456	7.7	0.004
Extreme (0C)		1710.1544	1779.8456	6.6	0.004
Extreme (-10C)		1710.1544	1779.8456	9.4	0.005
Extreme (-20C)		1710.1544	1779.8456	8.1	0.005
Extreme (-30C)		1710.1544	1779.8456	8.6	0.005
20C	15%	1710.1544	1779.8456	6.3	0.004
	-15%	1710.1544	1779.8456	6.3	0.004
	End Point	1710.1544	1779.8456	8.7	0.005

5G NR Band n66 (Lowest Frequency: QPSK / Highest Frequency: 16QAM)

Test Date	2023-04-21
Test Engineer	47989

Limit		1710	1780	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1710.2597	1779.7401		
Extreme (50C)		1710.2597	1779.7401	5.7	0.003
Extreme (40C)		1710.2597	1779.7401	4.2	0.002
Extreme (30C)		1710.2597	1779.7401	5.0	0.003
Extreme (10C)		1710.2597	1779.7401	5.0	0.003
Extreme (0C)		1710.2597	1779.7401	6.7	0.004
Extreme (-10C)		1710.2597	1779.7401	9.4	0.005
Extreme (-20C)		1710.2597	1779.7401	6.5	0.004
Extreme (-30C)		1710.2597	1779.7401	6.6	0.004
20C	15%	1710.2597	1779.7401	4.6	0.003
	-15%	1710.2597	1779.7401	5.8	0.003
	End Point	1710.2597	1779.7401	7.3	0.004

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9. RADIATED RESULTS

9.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §27.50

LIMITS

27.50:

(b)(10) Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.

(d)(4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.

(h) The following power limits shall apply in the BRS and EBS:

(2) Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

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 ≥ OBW;
b) Set VBW ≥ 3 × RBW;
c) Set span ≥ 2 x RBW;
d) Sweep time = auto couple or 1 second;
e) Detector = rms;
f) Ensure that the number of measurement points ≥ span/RBW;
g) Trace mode = max hold(WCDMA), average(LTE, 5G NR);

TEST RESULTS

See the following pages.

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9.1.1. ERP/EIRP Results

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 4	REL99	1712.40	20.10	H	4.31	9.51	25.30	338.84	33.00	-4.70
		1732.60	19.52	H	4.33	9.60	24.79	301.30	33.00	-5.21
		1752.60	18.98	H	4.36	9.68	24.31	269.77	33.00	-5.69
	HSDPA	1712.40	19.12	H	4.31	9.51	24.32	270.40	33.00	-5.68
		1732.60	18.62	H	4.33	9.60	23.89	244.91	33.00	-6.11
		1752.60	18.00	H	4.36	9.68	23.33	215.28	33.00	-6.67

LTE Band 12

BW (MHz)	Modulation	f (MHz)	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	ERP (mW)	Limit (dBm)	Delta (dB)	RB
1.4	QPSK	699.70	24.82	V	2.78	-1.35	20.69	117.22	34.77	-14.08	1/0
		707.50	25.47	V	2.79	-1.34	21.34	136.14	34.77	-13.43	1/3
		715.30	25.13	V	2.81	-1.32	21.00	125.89	34.77	-13.77	1/0
	16-QAM	699.70	23.80	V	2.78	-1.35	19.67	92.68	34.77	-15.10	1/5
		707.50	24.36	V	2.79	-1.34	20.23	105.44	34.77	-14.54	1/0
		715.30	24.27	V	2.81	-1.32	20.14	103.28	34.77	-14.63	1/0
3	QPSK	700.50	25.32	V	2.78	-1.35	21.19	131.52	34.77	-13.58	1/8
		707.50	25.66	V	2.79	-1.34	21.53	142.23	34.77	-13.24	1/8
		714.50	25.39	V	2.81	-1.32	21.26	133.66	34.77	-13.51	1/8
	16-QAM	700.50	24.12	V	2.78	-1.35	19.99	99.77	34.77	-14.78	1/8
		707.50	24.22	V	2.79	-1.34	20.09	102.09	34.77	-14.68	1/14
		714.50	24.42	V	2.81	-1.32	20.29	106.91	34.77	-14.48	1/8
5	QPSK	701.50	25.35	V	2.78	-1.35	21.22	132.43	34.77	-13.55	1/12
		707.50	25.63	V	2.79	-1.34	21.50	141.25	34.77	-13.27	1/12
		713.50	25.32	V	2.81	-1.32	21.20	131.83	34.77	-13.57	1/24
	16-QAM	701.50	24.01	V	2.78	-1.35	19.88	97.27	34.77	-14.89	1/24
		707.50	24.29	V	2.79	-1.34	20.16	103.75	34.77	-14.61	1/24
		713.50	24.38	V	2.81	-1.32	20.26	106.17	34.77	-14.51	1/12
10	QPSK	704.00	25.42	V	2.79	-1.34	21.29	134.59	34.77	-13.48	1/49
		707.50	25.41	V	2.79	-1.34	21.28	134.28	34.77	-13.49	1/49
		711.00	25.06	V	2.80	-1.33	20.93	123.88	34.77	-13.84	1/49
	16-QAM	704.00	24.33	V	2.79	-1.34	20.20	104.71	34.77	-14.57	1/0
		707.50	24.15	V	2.79	-1.34	20.02	100.46	34.77	-14.75	1/0
		711.00	24.13	V	2.80	-1.33	20.00	100.00	34.77	-14.77	1/0

LTE Band 13

BW (MHz)	Modulation	f (MHz)	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	ERP (mW)	Limit (dBm)	Delta (dB)	RB
5	QPSK	779.50	26.26	V	2.93	-1.19	22.14	163.68	34.77	-12.63	1/0
		782.00	25.88	V	2.93	-1.19	21.76	149.97	34.77	-13.01	1/0
		784.50	25.62	V	2.94	-1.18	21.50	141.25	34.77	-13.27	1/12
	16-QAM	779.50	24.98	V	2.93	-1.19	20.86	121.90	34.77	-13.91	1/0
		782.00	24.45	V	2.93	-1.19	20.33	107.89	34.77	-14.44	1/12
		784.50	24.85	V	2.94	-1.18	20.73	118.30	34.77	-14.04	1/12
10	QPSK	782.00	25.70	V	2.93	-1.19	21.58	143.88	34.77	-13.19	1/0
	16-QAM	782.00	24.41	V	2.93	-1.19	20.29	106.91	34.77	-14.48	1/0

LTE Band 41 (PC2)

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
5	QPSK	2498.50	19.68	H	5.23	10.00	24.45	278.61	33.00	-8.55	1/12
		2593.00	20.30	H	5.34	9.91	24.88	307.61	33.00	-8.12	1/12
		2687.50	23.18	H	5.44	9.87	27.61	576.77	33.00	-5.39	1/12
	16-QAM	2498.50	19.29	H	5.23	10.00	24.06	254.68	33.00	-8.94	1/12
		2593.00	19.52	H	5.34	9.91	24.10	257.04	33.00	-8.90	1/12
		2687.50	22.55	H	5.44	9.87	26.98	498.88	33.00	-6.02	1/12
10	QPSK	2501.00	19.80	H	5.24	10.00	24.55	285.10	33.00	-8.45	1/25
		2593.00	20.59	H	5.34	9.91	25.17	328.85	33.00	-7.83	1/25
		2685.00	23.28	H	5.43	9.87	27.72	591.56	33.00	-5.28	1/0
	16-QAM	2501.00	19.24	H	5.24	10.00	23.99	250.61	33.00	-9.01	1/25
		2593.00	20.02	H	5.34	9.91	24.60	288.40	33.00	-8.40	1/25
		2685.00	22.71	H	5.43	9.87	27.15	518.80	33.00	-5.85	1/49
15	QPSK	2503.50	19.89	H	5.24	9.99	24.64	291.07	33.00	-8.36	1/37
		2593.00	20.57	H	5.34	9.91	25.15	327.34	33.00	-7.85	1/74
		2682.50	23.23	H	5.43	9.87	27.68	586.14	33.00	-5.32	1/74
	16-QAM	2503.50	19.35	H	5.24	9.99	24.10	257.04	33.00	-8.90	1/37
		2593.00	19.97	H	5.34	9.91	24.55	285.10	33.00	-8.45	1/74
		2682.50	22.73	H	5.43	9.87	27.18	522.40	33.00	-5.82	1/74
20	QPSK	2506.00	20.13	H	5.25	9.99	24.87	306.90	33.00	-8.13	1/49
		2593.00	20.52	H	5.34	9.91	25.10	323.59	33.00	-7.90	1/99
		2680.00	20.91	H	5.43	9.87	25.35	342.77	33.00	-7.65	1/99
	16-QAM	2506.00	19.45	H	5.25	9.99	24.19	262.42	33.00	-8.81	1/49
		2593.00	19.81	H	5.34	9.91	24.39	274.79	33.00	-8.61	1/49
		2680.00	19.86	H	5.43	9.87	24.30	269.15	33.00	-8.70	1/49

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LTE Band 66

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
1.4	QPSK	1710.70	16.09	H	4.31	9.50	21.29	134.59	33.00	-8.71	1/3
		1745.00	18.31	H	4.35	9.66	23.62	230.14	33.00	-6.38	1/5
		1779.30	18.31	H	4.39	9.68	23.60	229.09	33.00	-6.40	1/3
	16-QAM	1710.70	15.30	H	4.31	9.50	20.50	112.20	33.00	-9.50	1/3
		1745.00	17.39	H	4.35	9.66	22.70	186.21	33.00	-7.30	1/3
		1779.30	17.55	H	4.39	9.68	22.84	192.31	33.00	-7.16	1/0
3	QPSK	1711.50	18.58	H	4.31	9.51	23.78	238.78	33.00	-6.22	1/8
		1745.00	18.91	H	4.35	9.66	24.22	264.24	33.00	-5.78	1/8
		1778.50	19.20	H	4.39	9.68	24.49	281.19	33.00	-5.51	1/8
	16-QAM	1711.50	17.90	H	4.31	9.51	23.10	204.17	33.00	-6.90	1/8
		1745.00	18.22	H	4.35	9.66	23.53	225.42	33.00	-6.47	1/8
		1778.50	18.49	H	4.39	9.68	23.78	238.78	33.00	-6.22	1/8
5	QPSK	1712.50	18.63	H	4.31	9.51	23.83	241.55	33.00	-6.17	1/12
		1745.00	18.95	H	4.35	9.66	24.26	266.69	33.00	-5.74	1/12
		1777.50	19.14	H	4.39	9.68	24.43	277.33	33.00	-5.57	1/12
	16-QAM	1712.50	17.91	H	4.31	9.51	23.11	204.64	33.00	-6.89	1/12
		1745.00	18.21	H	4.35	9.66	23.52	224.91	33.00	-6.48	1/12
		1777.50	18.38	H	4.39	9.68	23.67	232.81	33.00	-6.33	1/12
10	QPSK	1715.00	18.43	H	4.31	9.52	23.64	231.21	33.00	-6.36	1/25
		1745.00	18.87	H	4.35	9.66	24.18	261.82	33.00	-5.82	1/25
		1775.00	19.03	H	4.38	9.68	24.33	271.02	33.00	-5.67	1/25
	16-QAM	1715.00	17.83	H	4.31	9.52	23.04	201.37	33.00	-6.96	1/0
		1745.00	17.99	H	4.35	9.66	23.30	213.80	33.00	-6.70	1/25
		1775.00	18.32	H	4.38	9.68	23.62	230.14	33.00	-6.38	1/25
15	QPSK	1717.50	18.12	H	4.31	9.53	23.34	215.77	33.00	-6.66	1/74
		1745.00	18.71	H	4.35	9.66	24.02	252.35	33.00	-5.98	1/37
		1772.50	18.94	H	4.38	9.68	24.24	265.46	33.00	-5.76	1/37
	16-QAM	1717.50	17.44	H	4.31	9.53	22.66	184.50	33.00	-7.34	1/74
		1745.00	18.03	H	4.35	9.66	23.34	215.77	33.00	-6.66	1/74
		1772.50	18.41	H	4.38	9.68	23.71	234.96	33.00	-6.29	1/0
20	QPSK	1720.00	18.22	H	4.32	9.55	23.45	221.31	33.00	-6.55	1/99
		1745.00	18.73	H	4.35	9.66	24.04	253.51	33.00	-5.96	1/99
		1770.00	18.87	H	4.38	9.68	24.17	261.22	33.00	-5.83	1/49
	16-QAM	1720.00	17.41	H	4.32	9.55	22.64	183.65	33.00	-7.36	1/49
		1745.00	18.07	H	4.35	9.66	23.38	217.77	33.00	-6.62	1/49
		1770.00	18.30	H	4.38	9.68	23.60	229.09	33.00	-6.40	1/0

5G NR n66

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
5	QPSK	1712.50	18.41	H	4.31	9.51	23.61	229.61	30.00	-6.39	1/1
		1745.00	18.68	H	4.35	9.66	23.99	250.61	30.00	-6.01	1/13
		1777.50	18.55	H	4.39	9.68	23.84	242.10	30.00	-6.16	1/13
	16-QAM	1712.50	17.39	H	4.31	9.51	22.59	181.55	30.00	-7.41	1/1
		1745.00	17.52	H	4.35	9.66	22.83	191.87	30.00	-7.17	1/13
		1777.50	17.53	H	4.39	9.68	22.82	191.43	30.00	-7.18	1/13
10	QPSK	1715.00	18.34	H	4.31	9.52	23.55	226.46	30.00	-6.45	1/50
		1745.00	18.63	H	4.35	9.66	23.94	247.74	30.00	-6.06	1/26
		1775.00	18.39	H	4.38	9.68	23.69	233.88	30.00	-6.31	1/26
	16-QAM	1715.00	17.44	H	4.31	9.52	22.65	184.08	30.00	-7.35	1/50
		1745.00	17.54	H	4.35	9.66	22.85	192.75	30.00	-7.15	1/26
		1775.00	17.50	H	4.38	9.68	22.80	190.55	30.00	-7.20	1/26
15	QPSK	1717.50	18.05	H	4.31	9.53	23.27	212.32	30.00	-6.73	1/77
		1745.00	18.45	H	4.35	9.66	23.76	237.68	30.00	-6.24	1/77
		1772.50	18.68	H	4.38	9.68	23.98	250.03	30.00	-6.02	1/1
	16-QAM	1717.50	17.15	H	4.31	9.53	22.37	172.58	30.00	-7.63	1/77
		1745.00	17.48	H	4.35	9.66	22.79	190.11	30.00	-7.21	1/77
		1772.50	17.63	H	4.38	9.68	22.93	196.34	30.00	-7.07	1/1
20	QPSK	1720.00	17.92	H	4.32	9.55	23.15	206.54	30.00	-6.85	1/104
		1745.00	18.46	H	4.35	9.66	23.77	238.23	30.00	-6.23	1/104
		1770.00	18.00	H	4.38	9.68	23.30	213.80	30.00	-6.70	1/104
	16-QAM	1720.00	16.95	H	4.32	9.55	22.18	165.20	30.00	-7.82	1/104
		1745.00	17.45	H	4.35	9.66	22.76	188.80	30.00	-7.24	1/104
		1770.00	17.49	H	4.38	9.68	22.79	190.11	30.00	-7.21	1/104
30	QPSK	1725.00	18.47	H	4.32	9.57	23.72	235.50	30.00	-6.28	1/158
		1745.00	18.47	H	4.35	9.66	23.78	238.78	30.00	-6.22	1/80
		1765.00	18.44	H	4.37	9.68	23.75	237.14	30.00	-6.25	1/1
	16-QAM	1725.00	17.60	H	4.32	9.57	22.85	192.75	30.00	-7.15	1/158
		1745.00	17.59	H	4.35	9.66	22.90	194.98	30.00	-7.10	1/80
		1765.00	17.40	H	4.37	9.68	22.71	186.64	30.00	-7.29	1/1
40	QPSK	1730.00	18.15	H	4.33	9.59	23.41	219.28	30.00	-6.59	1/214
		1745.00	19.04	H	4.35	9.66	24.35	272.27	30.00	-5.65	1/108
		1760.00	18.43	H	4.37	9.68	23.75	237.14	30.00	-6.25	1/108
	16-QAM	1730.00	17.18	H	4.33	9.59	22.44	175.39	30.00	-7.56	1/214
		1745.00	18.39	H	4.35	9.66	23.70	234.42	30.00	-6.30	1/108
		1760.00	16.91	H	4.37	9.68	22.23	167.11	30.00	-7.77	1/108

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9.2. RADIATIED SPURIOUS EMISSION

RULE PART(S)

FCC: §2.1053, §27. 53

LIMIT

(c)(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB.

(h) The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 $\log_{10}$ (P) dB.

(m) (4) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

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 ≥ 3 × 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 ≥ span/RBW;
g) Trace mode = average(WCDMA, LTE FDD, 5G NR), Max Hold(LTE TDD);

NOTE1

5G NR: All Waveforms (CP-OFDM vs DFT-s_OFDM) and modulations (π/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.

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9.2.1. SPURIOUS RADIATION PLOTS

WCDMA Band 4

REL99

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 4790776103
Date: 2023-04-13
Test Engineer: 24542
Configuration: EUT / AC Adapter, X-Position
Location: Chamber 1
Mode: Rel99 Band 4 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, 1712.4MHz									
3424.80	-8.2	V	3.0	46.4	1.0	-53.6	-13.0	-40.6	
5137.20	-7.5	V	3.0	46.1	1.0	-52.6	-13.0	-39.6	
6849.60	-4.3	V	3.0	45.5	1.0	-48.8	-13.0	-35.8	
3424.80	-8.4	H	3.0	46.4	1.0	-53.9	-13.0	-40.9	
5137.20	-7.3	H	3.0	46.1	1.0	-52.4	-13.0	-39.4	
6849.60	-4.5	H	3.0	45.5	1.0	-49.0	-13.0	-36.0	
Mid Ch, 1732.6MHz									
3465.20	-8.6	V	3.0	46.4	1.0	-54.0	-13.0	-41.0	
5197.80	-7.3	V	3.0	46.1	1.0	-52.4	-13.0	-39.4	
6930.40	-4.3	V	3.0	45.5	1.0	-48.8	-13.0	-35.8	
3465.20	-8.3	H	3.0	46.4	1.0	-53.6	-13.0	-40.6	
5197.80	-7.1	H	3.0	46.1	1.0	-52.2	-13.0	-39.2	
6930.40	-4.4	H	3.0	45.5	1.0	-48.9	-13.0	-35.9	
High Ch, 1752.6MHz									
3505.20	-8.5	V	3.0	46.3	1.0	-53.8	-13.0	-40.8	
5257.80	-7.3	V	3.0	46.0	1.0	-52.3	-13.0	-39.3	
7010.40	-4.1	V	3.0	45.5	1.0	-48.6	-13.0	-35.6	
3505.20	-8.2	H	3.0	46.3	1.0	-53.5	-13.0	-40.5	
5257.80	-7.1	H	3.0	46.0	1.0	-52.1	-13.0	-39.1	
7010.40	-4.4	H	3.0	45.5	1.0	-48.9	-13.0	-35.9	

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LTE Band 12

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 4790776103
Date: 2023-04-07
Test Engineer: 26087
Configuration: EUT / AC Adapter, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 12 Harmonics, 3MHz Bandwidth
Test Votage: AC 120 V, 60 Hz

3MHz

QPSK

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 700.5MHz									
1401.00	-16.3	V	3.0	40.7	1.0	-56.0	-13.0	-43.0	
2101.50	-13.4	V	3.0	40.8	1.0	-53.2	-13.0	-40.2	
2802.00	-11.4	V	3.0	41.8	1.0	-52.2	-13.0	-39.2	
1401.00	-17.2	H	3.0	40.7	1.0	-56.9	-13.0	-43.9	
2101.50	-13.6	H	3.0	40.8	1.0	-53.3	-13.0	-40.3	
2802.00	-11.6	H	3.0	41.8	1.0	-52.4	-13.0	-39.4	
Mid Ch, 707.5MHz									
1415.00	-16.3	V	3.0	40.7	1.0	-56.1	-13.0	-43.1	
2122.50	-10.4	V	3.0	40.8	1.0	-50.2	-13.0	-37.2	
2830.00	-11.3	V	3.0	41.8	1.0	-52.1	-13.0	-39.1	
1415.00	-17.3	H	3.0	40.7	1.0	-57.0	-13.0	-44.0	
2122.50	-9.9	H	3.0	40.8	1.0	-49.7	-13.0	-36.7	
2830.00	-11.5	H	3.0	41.8	1.0	-52.3	-13.0	-39.3	
High Ch, 714.5MHz									
1429.00	-16.2	V	3.0	40.7	1.0	-56.0	-13.0	-43.0	
2143.50	-13.4	V	3.0	40.8	1.0	-53.2	-13.0	-40.2	
2858.00	-11.1	V	3.0	41.8	1.0	-51.9	-13.0	-38.9	
1429.00	-17.3	H	3.0	40.7	1.0	-57.0	-13.0	-44.0	
2143.50	-13.5	H	3.0	40.8	1.0	-53.3	-13.0	-40.3	
2858.00	-11.3	H	3.0	41.8	1.0	-52.2	-13.0	-39.2	

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LTE Band 13

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 4790776103
Date: 2023-04-19
Test Engineer: 26087
Configuration: EUT / AC Adapter, Y-Position
Location: Chamber 2
Mode: LTE_QPSK Band 13 Harmonics, 5MHz Bandwidth
Test Votage: AC 120 V, 60 Hz

5 MHz

QPSK

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 779.5MHz									
1559.00	-11.5	V	3.0	40.7	1.0	-51.2	-40.0	-11.2	
2338.50	-9.2	V	3.0	41.1	1.0	-49.3	-13.0	-36.3	
3118.00	-10.0	V	3.0	42.0	1.0	-51.1	-13.0	-38.1	
1559.00	-20.0	H	3.0	40.7	1.0	-59.7	-40.0	-19.7	
2338.50	-9.1	H	3.0	41.1	1.0	-49.2	-13.0	-36.2	
3118.00	-10.2	H	3.0	42.0	1.0	-51.3	-13.0	-38.3	
Mid Ch, 782MHz									
1564.00	-28.5	V	3.0	40.7	1.0	-68.2	-40.0	-28.2	
2346.00	-11.5	V	3.0	41.1	1.0	-51.6	-13.0	-38.6	
3128.00	-10.1	V	3.0	42.0	1.0	-51.1	-13.0	-38.1	
1564.00	-29.8	H	3.0	40.7	1.0	-69.5	-40.0	-29.5	
2346.00	-10.7	H	3.0	41.1	1.0	-50.8	-13.0	-37.8	
3128.00	-10.4	H	3.0	42.0	1.0	-51.5	-13.0	-38.5	
High Ch, 784.5MHz									
1569.00	-13.1	V	3.0	40.7	1.0	-52.8	-40.0	-12.8	
2353.50	-6.5	V	3.0	41.1	1.0	-46.7	-13.0	-33.7	
3138.00	-9.9	V	3.0	42.0	1.0	-50.9	-13.0	-37.9	
1569.00	-19.9	H	3.0	40.7	1.0	-59.6	-40.0	-19.6	
2353.50	-5.4	H	3.0	41.1	1.0	-45.6	-13.0	-32.6	
3138.00	-10.1	H	3.0	42.0	1.0	-51.2	-13.0	-38.2	

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LTE Band 41(PC2)

10 MHz

QPSK

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company:	Samsung
Project #:	4790776103
Date:	2023-04-12
Test Engineer:	24542
Configuration:	EUT / AC Adapter, X-Position
Location:	Chamber 1
Mode:	LTE_QPSK Band 41 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
Low Ch, 2501MHz									
5002.00	-14.6	V	3.0	46.2	1.0	-59.8	-25.0	-34.8	
7503.00	-12.7	V	3.0	45.5	1.0	-57.2	-25.0	-32.2	
10004.00	-11.5	V	3.0	45.6	1.0	-56.1	-25.0	-31.1	
5002.00	-14.4	H	3.0	46.2	1.0	-59.7	-25.0	-34.7	
7503.00	-13.1	H	3.0	45.5	1.0	-57.7	-25.0	-32.7	
10004.00	-11.4	H	3.0	45.6	1.0	-56.0	-25.0	-31.0	
Mid Ch, 2593MHz									
5186.00	-14.4	V	3.0	46.1	1.0	-59.5	-25.0	-34.5	
7779.00	-12.5	V	3.0	45.6	1.0	-57.1	-25.0	-32.1	
10372.00	-11.2	V	3.0	45.9	1.0	-56.1	-25.0	-31.1	
5186.00	-14.4	H	3.0	46.1	1.0	-59.5	-25.0	-34.5	
7779.00	-12.6	H	3.0	45.6	1.0	-57.1	-25.0	-32.1	
10372.00	-11.1	H	3.0	45.9	1.0	-56.0	-25.0	-31.0	
High Ch, 2685MHz									
5370.00	-14.6	V	3.0	45.9	1.0	-59.5	-25.0	-34.5	
8055.00	-12.6	V	3.0	45.6	1.0	-57.2	-25.0	-32.2	
10740.00	-10.8	V	3.0	46.2	1.0	-56.0	-25.0	-31.0	
5370.00	-14.4	H	3.0	45.9	1.0	-59.3	-25.0	-34.3	
8055.00	-12.7	H	3.0	45.6	1.0	-57.3	-25.0	-32.3	
10740.00	-10.7	H	3.0	46.2	1.0	-55.9	-25.0	-30.9	

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LTE Band 66

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 4790776103
Date: 2023-04-12
Test Engineer: 24542
Configuration: EUT / AC Adapter, Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 66 Harmonics, 3MHz Bandwidth
Test Votage: AC 120 V, 60 Hz

3 MHz

QPSK

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1711.5MHz									
3423.00	-8.5	V	3.0	46.4	1.0	-54.0	-13.0	-41.0	
5134.50	-7.6	V	3.0	46.1	1.0	-52.8	-13.0	-39.8	
6846.00	-4.4	V	3.0	45.5	1.0	-48.9	-13.0	-35.9	
3423.00	-8.5	H	3.0	46.4	1.0	-53.9	-13.0	-40.9	
5134.50	-7.5	H	3.0	46.1	1.0	-52.6	-13.0	-39.6	
6846.00	-4.8	H	3.0	45.5	1.0	-49.2	-13.0	-36.2	
Mid Ch, 1745MHz									
3490.00	-8.4	V	3.0	46.3	1.0	-53.7	-13.0	-40.7	
5235.00	-7.1	V	3.0	46.0	1.0	-52.2	-13.0	-39.2	
6980.00	-4.1	V	3.0	45.5	1.0	-48.6	-13.0	-35.6	
3490.00	-8.1	H	3.0	46.3	1.0	-53.5	-13.0	-40.5	
5235.00	-7.0	H	3.0	46.0	1.0	-52.1	-13.0	-39.1	
6980.00	-4.5	H	3.0	45.5	1.0	-49.0	-13.0	-36.0	
High Ch, 1778.5MHz									
3557.00	-8.1	V	3.0	46.3	1.0	-53.3	-13.0	-40.3	
5335.50	-6.9	V	3.0	46.0	1.0	-51.9	-13.0	-38.9	
7114.00	-3.7	V	3.0	45.5	1.0	-48.2	-13.0	-35.2	
3557.00	-9.9	H	3.0	46.3	1.0	-55.1	-13.0	-42.1	
5335.50	-6.8	H	3.0	46.0	1.0	-51.7	-13.0	-38.7	
7114.00	-4.1	H	3.0	45.5	1.0	-48.6	-13.0	-35.6	

UL KOREA LTD. Suwon Laboratory FORM ID: FCC_27(05)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433
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NR Band n66

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 4790776103
Date: 2023-04-15
Test Engineer: 26087
Configuration: EUT / AC Adapter, Z-Position
Location: Chamber 1
Mode: 5G NR_QPSK NR n66 Harmonics, 40MHz Bandwidth
Test Votage: AC 120 V, 60 Hz

40 MHz

QPSK

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1730MHz									
3460.00	-8.1	V	3.0	46.4	1.0	-53.5	-13.0	-40.5	
5190.00	-7.3	V	3.0	46.1	1.0	-52.4	-13.0	-39.4	
6920.00	-4.0	V	3.0	45.5	1.0	-48.5	-13.0	-35.5	
3460.00	-8.3	H	3.0	46.4	1.0	-53.7	-13.0	-40.7	
5190.00	-7.2	H	3.0	46.1	1.0	-52.3	-13.0	-39.3	
6920.00	-4.6	H	3.0	45.5	1.0	-49.0	-13.0	-36.0	
Mid Ch, 1745MHz									
3490.00	-8.4	V	3.0	46.3	1.0	-53.8	-13.0	-40.8	
5235.00	-7.3	V	3.0	46.0	1.0	-52.3	-13.0	-39.3	
6980.00	-4.2	V	3.0	45.5	1.0	-48.6	-13.0	-35.6	
3490.00	-8.2	H	3.0	46.3	1.0	-53.5	-13.0	-40.5	
5235.00	-7.1	H	3.0	46.0	1.0	-52.1	-13.0	-39.1	
6980.00	-4.5	H	3.0	45.5	1.0	-49.0	-13.0	-36.0	
High Ch, 1760MHz									
3520.00	-8.3	V	3.0	46.3	1.0	-53.6	-13.0	-40.6	
5280.00	-7.2	V	3.0	46.0	1.0	-52.2	-13.0	-39.2	
7040.00	-3.8	V	3.0	45.5	1.0	-48.3	-13.0	-35.3	
3520.00	-8.0	H	3.0	46.3	1.0	-53.3	-13.0	-40.3	
5280.00	-7.1	H	3.0	46.0	1.0	-52.1	-13.0	-39.1	
7040.00	-4.3	H	3.0	45.5	1.0	-48.8	-13.0	-35.8	

END OF REPORT

UL KOREA LTD. Suwon Laboratory FORM ID: FCC_27(05)
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