











5MHz
16QAM

9.3. OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051, §22.901, §22.917, §24.238 and §27.53

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.

Part 27.53:

(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 than $43 + 10 \log (P)$ 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

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 = 100KHz for emission below 1GHz and 1MHz for emissions above 1GHz
(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 FDD), Max hold(GSM, LTE TDD);

NOTE1

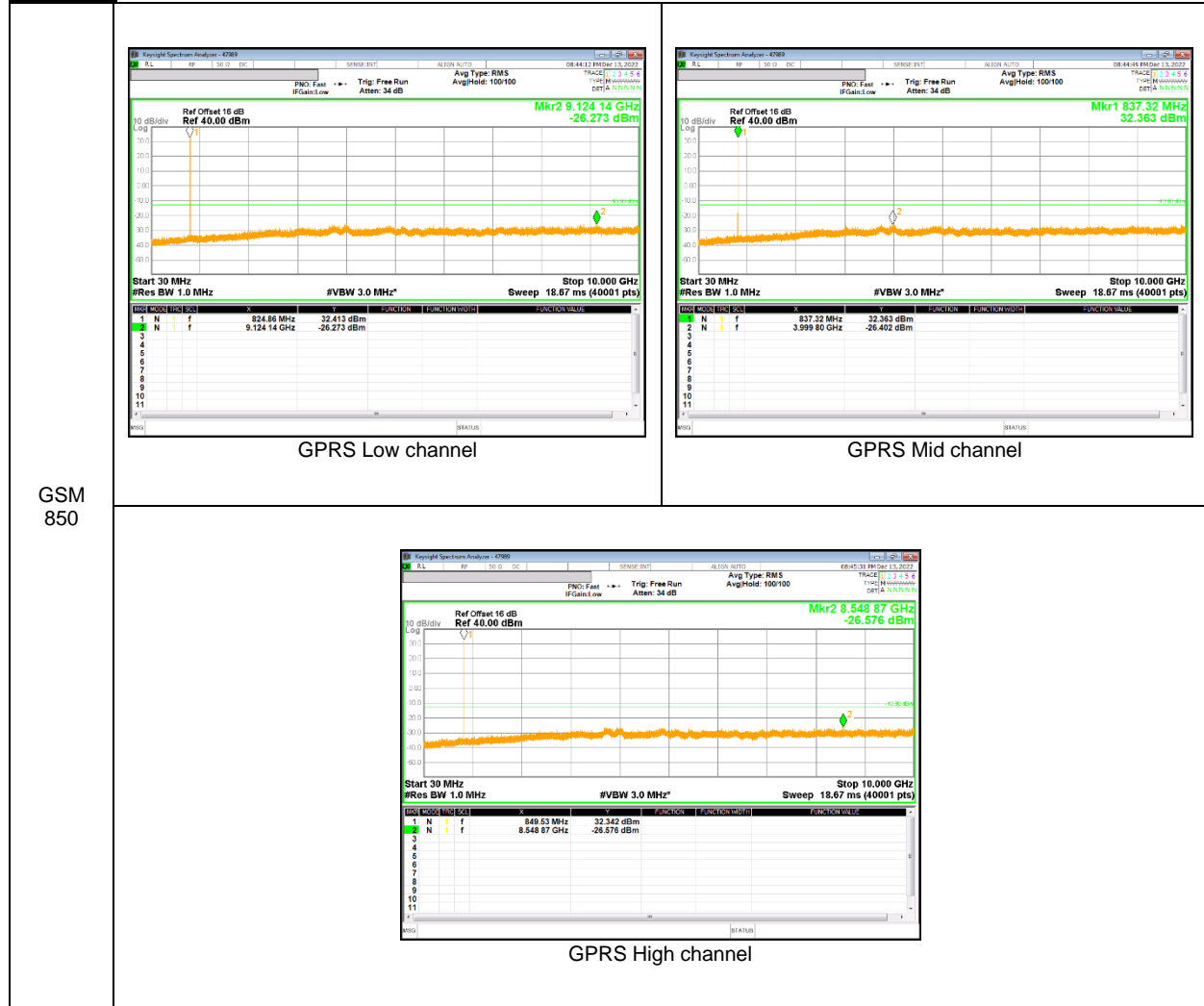
Please refer to section 5.4 for bandwidth and RB setting about LTE bands.

RESULTS

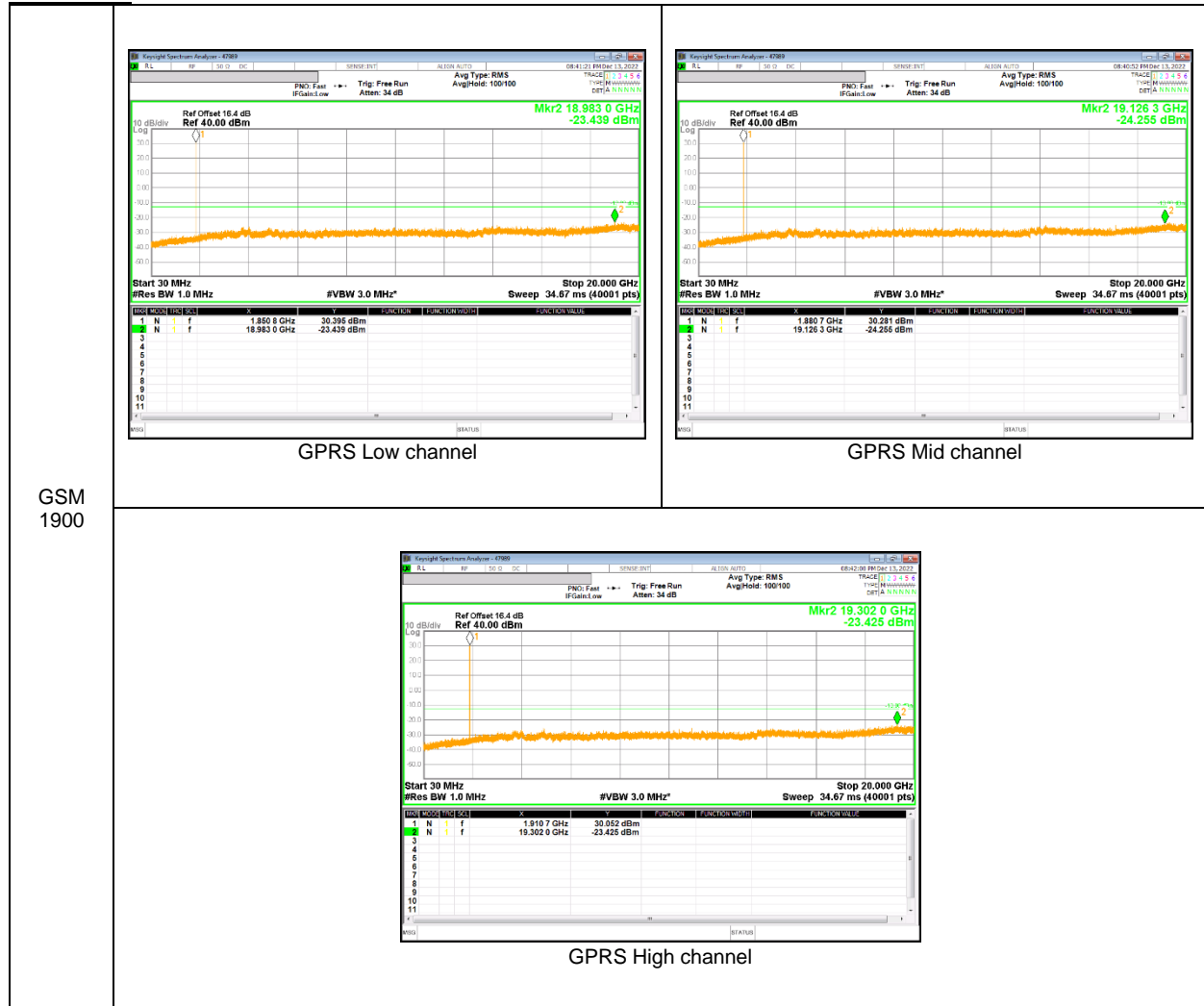
See the following pages.

9.3.1. OUT OF BAND EMISSIONS RESULT

GSM 850



GSM 1900



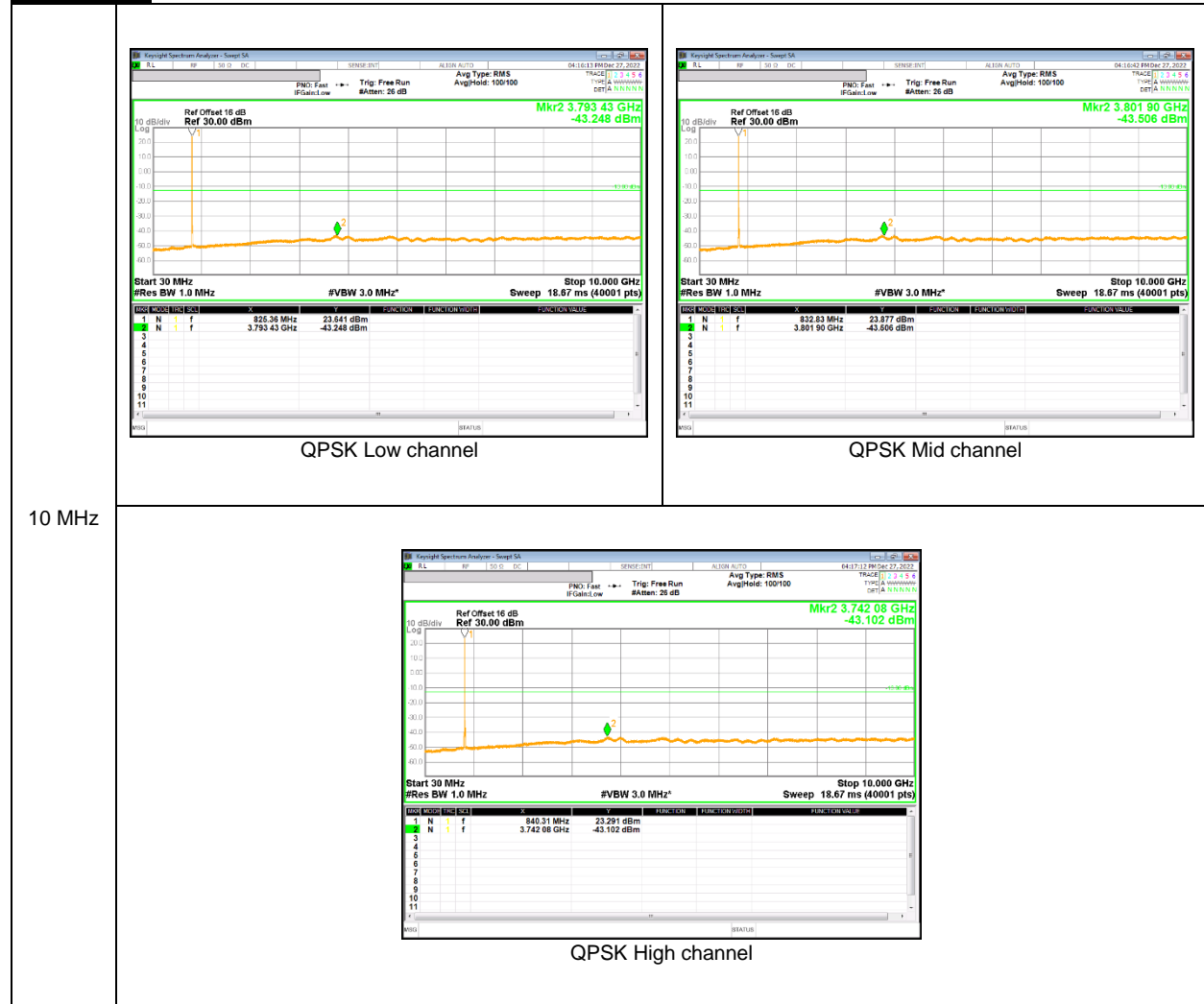
GSM 1900

WCDMA Band 5

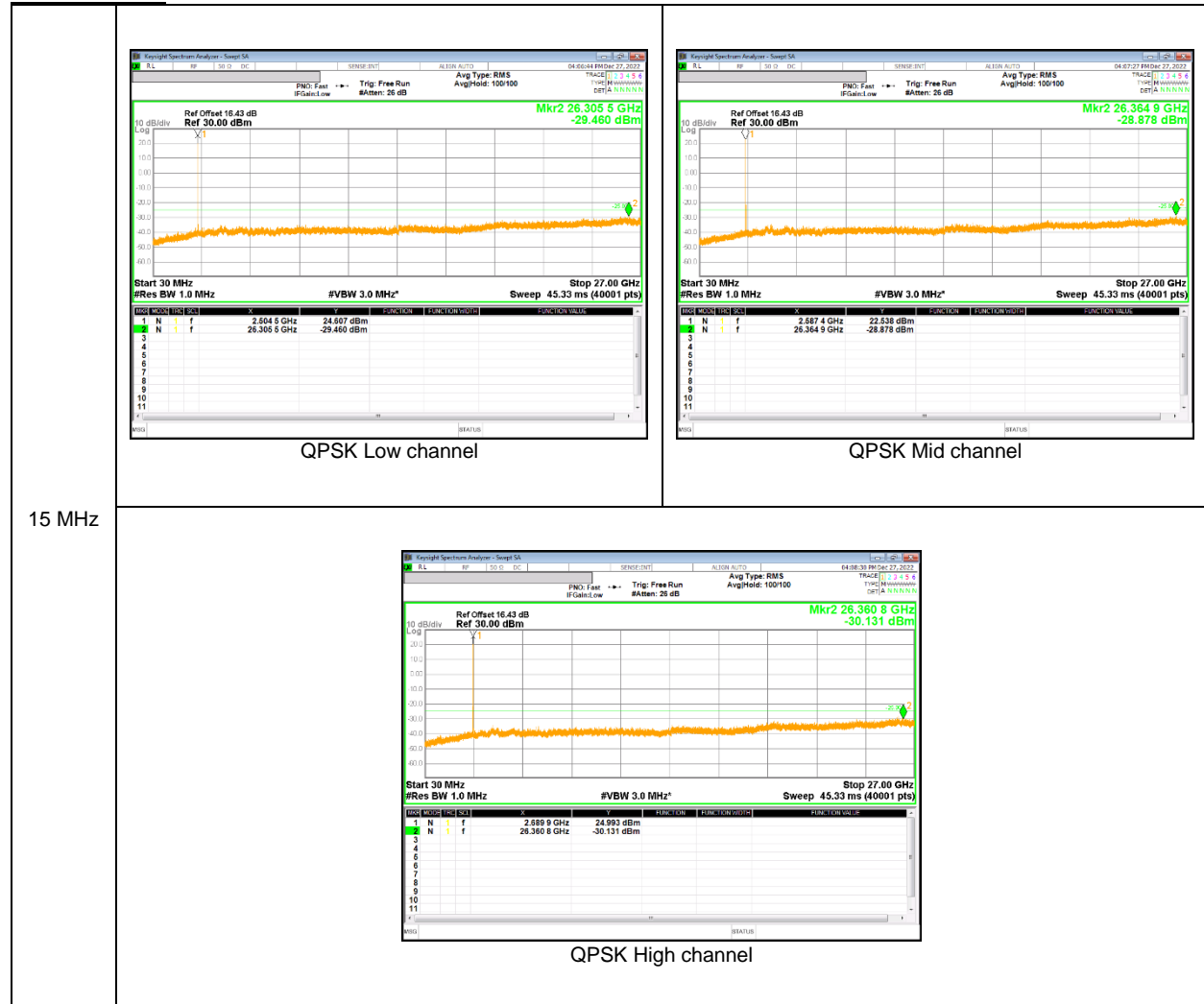


Band 5

LTE Band 5



LTE Band 41



9.4. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §22.355, §24.235 and §27.54

LIMITS

§22.355 - The carrier frequency shall not depart from the reference frequency in excess of ± 2.5 ppm for mobile stations.

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

§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

RESULTS

See the following pages.

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)

9.4.1. FREQUENCY STABILITY RESULTS

GSM 850, Channel 128/251, Frequency 824.2/848.8 MHz

Test Date	2022-12-20
Test Engineer	47989

Reference Frequency : GSM850 Low Channel 824.2 MHz / High Channel 848.8 MHz @ 20°C							
Limit: +/- 2.5 ppm =		Low Channel	2060.500	Hz	High Channel	2122.000	Hz
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse				Limit [ppm]	
		Low Channel		High Channel			
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]		
3.88	50	824.20027157	-0.254	848.80025158	-0.225	2.5	
3.88	40	824.20024285	-0.219	848.80026408	-0.240	2.5	
3.88	30	824.20023217	-0.206	848.80022749	-0.197	2.5	
3.88	20	824.20006243	0.000	848.80006051	0.000	2.5	
3.88	10	824.20004270	0.024	848.80004403	0.019	2.5	
3.88	0	824.20002478	0.046	848.80002453	0.042	2.5	
3.88	-10	824.20006339	-0.001	848.80005083	0.011	2.5	
3.88	-20	824.20002365	0.047	848.80002567	0.041	2.5	
3.88	-30	824.20004280	0.024	848.80004193	0.022	2.5	

Reference Frequency : GSM850 Low Channel 824.2 MHz / High Channel 848.8 MHz @ 20°C							
Limit: +/- 2.5 ppm =		Low Channel	2060.500	Hz	High Channel	2122.000	Hz
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse				Limit [ppm]	
		Low Channel		High Channel			
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]		
3.85	20	824.20006243	0	848.80006051	0	2.5	
4.40	20	824.20003135	0.038	848.80004997	0.012	2.5	
3.60	20	824.20008475	-0.027	848.80007375	-0.016	2.5	

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

Test Date	2022-12-19
Test Engineer	47989

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	1850.0738	1909.9219		
Extreme (50C)		1850.0741	1909.9221	220.8	0.117
Extreme (40C)		1850.0741	1909.9221	222.7	0.118
Extreme (30C)		1850.0741	1909.9221	213.7	0.114
Extreme (10C)		1850.0739	1909.9219	21.3	0.011
Extreme (0C)		1850.0739	1909.9219	25.8	0.014
Extreme (-10C)		1850.0739	1909.9219	24.7	0.013
Extreme (-20C)		1850.0739	1909.9219	23.5	0.013
Extreme (-30C)		1850.0739	1909.9219	30.0	0.016
20C		15%	1850.0741	1909.9219	20.7
	-15%	1850.0741	1909.9219	13.3	0.007
	End Point	1850.0741	1909.9219	12.0	0.006

WCDMA Band 5

Test Date	2022-12-26
Test Engineer	47989

Reference Frequency : WCDMA Band 5 Low Channel 826.4 MHz / High Channel 846.6 MHz @ 20°C						
Limit: + 2.5 ppm =	Low Channel	2066.000	Hz	High Channel	2116.500	Hz
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.88	50	826.40000560	0.003	846.60000920	-0.003	2.5
3.88	40	826.40000780	0.000	846.60000965	-0.003	2.5
3.88	30	826.40001040	-0.003	846.60000768	-0.001	2.5
3.88	20	826.40000813	0.000	846.60000682	0.000	2.5
3.88	10	826.40001157	-0.004	846.60001041	-0.004	2.5
3.88	0	826.40001248	-0.005	846.60000891	-0.002	2.5
3.88	-10	826.40001028	-0.003	846.60000956	-0.003	2.5
3.88	-20	826.40001131	-0.004	846.60001038	-0.004	2.5
3.88	-30	826.40001028	-0.003	846.60001120	-0.005	2.5

Reference Frequency : WCDMA Band 5 Low Channel 826.4 MHz / High Channel 846.6 MHz @ 20°C						
Limit: + 2.5 ppm =	Low Channel	2066.000	Hz	High Channel	2116.500	Hz
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.85	20	826.40000813	0	846.60000682	0	2.5
4.40	20	826.40001083	-0.003	846.60000971	-0.003	2.5
3.60	20	826.40001029	-0.003	846.60001041	-0.004	2.5

LTE Band 5

Test Date	2022-12-22
Test Engineer	47989

Reference Frequency : LTE Band 5 Low Channel 824.7 MHz / High Channel 848.3 MHz @ 20°C						
Limit: + 2.5 ppm =	Low Channel	2061.750	Hz	High Channel	2120.750	Hz
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.88	50	824.70000690	0.000	848.30000732	0.000	2.5
3.88	40	824.70000701	0.000	848.30000735	0.000	2.5
3.88	30	824.70000586	0.002	848.30000718	0.000	2.5
3.88	20	824.70000716	0.000	848.30000694	0.000	2.5
3.88	10	824.70000629	0.001	848.30000639	0.001	2.5
3.88	0	824.70000783	-0.001	848.30000774	-0.001	2.5
3.88	-10	824.70000594	0.001	848.30000643	0.001	2.5
3.88	-20	824.70000682	0.000	848.30000644	0.001	2.5
3.88	-30	824.70000631	0.001	848.30058500	-0.681	2.5

Reference Frequency : LTE Band 5 Low Channel 824.7 MHz / High Channel 848.3 MHz @ 20°C						
Limit: + 2.5 ppm =	Low Channel	2061.750	Hz	High Channel	2120.750	Hz
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.85	20	824.70000716	0	848.30000694	0	2.5
4.40	20	824.70000601	0.001	848.30000634	0.001	2.5
3.60	20	824.70000587	0.002	848.30000772	-0.001	2.5

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

Test Date	2022-12-26
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	2496.2500	2689.7462		
Extreme (50C)		2496.2500	2689.7462	16.4	0.006
Extreme (40C)		2496.2500	2689.7462	17.3	0.007
Extreme (30C)		2496.2500	2689.7462	18.7	0.007
Extreme (10C)		2496.2500	2689.7462	18.2	0.007
Extreme (0C)		2496.2500	2689.7462	17.0	0.007
Extreme (-10C)		2496.2500	2689.7462	20.9	0.008
Extreme (-20C)		2496.2500	2689.7462	17.0	0.007
Extreme (-30C)		2496.2500	2689.7462	15.5	0.006
20C	15%	2496.2500	2689.7462	16.2	0.006
	-15%	2496.2500	2689.7462	17.9	0.007
	End Point	2496.2500	2689.7462	18.9	0.007

9.5. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §22.913, §24.232 and §27.50

LIMITS

22.913(a) - The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

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.

27.50:

(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.

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13dB.

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 RBW;
- 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);

TEST RESULTS

See the following pages.

9.5.1. ERP/EIRP Results

GSM

Band	Mode	f (MHz)	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	ERP (dBm)	ERP (mW)	Limit (dBm)	Delta (dB)
GSM 850	GPRS	824.20	34.02	V	3.11	-0.82	30.09	1020.94	38.50	-8.41
		824.20	20.05	H	3.11	-0.82	16.13	41.02	38.50	-22.37
		836.60	34.03	V	3.13	-0.93	29.97	993.12	38.50	-8.53
		836.60	20.93	H	3.13	-0.93	16.87	48.64	38.50	-21.63
		848.80	33.14	V	3.15	-1.04	28.95	785.24	38.50	-9.55
	848.80	21.06	H	3.15	-1.04	16.87	48.64	38.50	-21.63	
	EGPRS	824.20	30.08	V	3.11	-0.82	26.15	412.10	38.50	-12.35
		824.20	16.70	H	3.11	-0.82	12.78	18.97	38.50	-25.72
		836.60	30.23	V	3.13	-0.93	26.17	414.00	38.50	-12.33
		836.60	17.36	H	3.13	-0.93	13.30	21.38	38.50	-25.20
848.80		29.14	V	3.15	-1.04	24.95	312.61	38.50	-13.55	
848.80	17.50	H	3.15	-1.04	13.31	21.43	38.50	-25.19		

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)
GSM 1900	GPRS	1850.20	26.96	V	4.62	9.52	31.86	1534.62	33.00	-1.14
		1850.20	22.12	H	4.62	9.52	27.02	503.50	33.00	-5.98
		1880.00	27.37	V	4.65	9.29	32.00	1584.89	33.00	-1.00
		1880.00	23.45	H	4.65	9.29	28.09	644.17	33.00	-4.91
		1909.80	26.84	V	4.68	9.00	31.16	1306.17	33.00	-1.84
	1909.80	24.04	H	4.68	9.00	28.36	685.49	33.00	-4.64	
	EGPRS	1850.20	21.48	V	4.62	9.52	26.38	434.51	33.00	-6.62
		1850.20	16.75	H	4.62	9.52	21.65	146.22	33.00	-11.35
		1880.00	22.83	V	4.65	9.29	27.46	557.19	33.00	-5.54
		1880.00	18.64	H	4.65	9.29	23.28	212.81	33.00	-9.72
1909.80		22.70	V	4.68	9.00	27.02	503.50	33.00	-5.98	
1909.80	19.86	H	4.68	9.00	24.18	261.82	33.00	-8.82		

WCDMA

Band	Mode	f (MHz)	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	ERP (dBm)	ERP (mW)	Limit (dBm)	Delta (dB)
Band 5	REL99	826.40	26.64	V	3.11	-0.84	22.69	185.78	38.50	-15.81
		826.40	12.15	H	3.11	-0.84	8.21	6.62	38.50	-30.29
		836.60	26.22	V	3.13	-0.93	22.16	164.44	38.50	-16.34
		836.60	12.28	H	3.13	-0.93	8.22	6.64	38.50	-30.28
		846.60	25.77	V	3.14	-1.02	21.61	144.88	38.50	-16.89
	846.60	12.71	H	3.14	-1.02	8.55	7.16	38.50	-29.95	
	HSDPA	826.40	24.57	V	3.11	-0.84	20.62	115.35	38.50	-17.88
		826.40	10.19	H	3.11	-0.84	6.25	4.22	38.50	-32.25
		836.60	24.26	V	3.13	-0.93	20.20	104.71	38.50	-18.30
		836.60	10.18	H	3.13	-0.93	6.12	4.09	38.50	-32.38
846.60		23.89	V	3.14	-1.02	19.73	93.97	38.50	-18.77	
846.60	10.53	H	3.14	-1.02	6.37	4.34	38.50	-32.13		

LTE Band 5

BW (MHz)	Modulation	f (MHz)	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	ERP (dBm)	ERP (mW)	Limit (dBm)	Delta (dB)	RB
1.4	QPSK	824.70	26.55	V	3.11	-0.82	22.62	182.81	38.50	-15.88	1/0
		836.50	26.22	V	3.13	-0.93	22.16	164.44	38.50	-16.34	1/5
		848.30	26.12	V	3.15	-1.03	21.93	155.96	38.50	-16.57	1/5
	16-QAM	824.70	25.34	V	3.11	-0.82	21.41	138.36	38.50	-17.09	1/0
		836.50	25.18	V	3.13	-0.93	21.12	129.42	38.50	-17.38	1/5
		848.30	24.74	V	3.15	-1.03	20.55	113.50	38.50	-17.95	1/5
3	QPSK	825.50	26.94	V	3.10	-0.83	23.01	199.99	38.50	-15.49	1/8
		836.50	27.04	V	3.13	-0.93	22.98	198.61	38.50	-15.52	1/0
		847.50	26.62	V	3.15	-1.03	22.44	175.39	38.50	-16.06	1/0
	16-QAM	825.50	25.78	V	3.10	-0.83	21.85	153.11	38.50	-16.65	1/0
		836.50	25.88	V	3.13	-0.93	21.82	152.05	38.50	-16.68	1/0
		847.50	25.08	V	3.15	-1.03	20.90	123.03	38.50	-17.60	1/0
5	QPSK	826.50	27.02	V	3.11	-0.84	23.07	202.77	38.50	-15.43	1/0
		836.50	26.83	V	3.13	-0.93	22.77	189.23	38.50	-15.73	1/0
		846.50	26.14	V	3.14	-1.02	21.97	157.40	38.50	-16.53	1/0
	16-QAM	826.50	25.90	V	3.11	-0.84	21.95	156.68	38.50	-16.55	1/0
		836.50	25.74	V	3.13	-0.93	21.68	147.23	38.50	-16.82	1/0
		846.50	25.13	V	3.14	-1.02	20.96	124.74	38.50	-17.54	1/0
10	QPSK	829.00	27.41	V	3.11	-0.86	23.44	220.80	38.50	-15.06	1/0
		836.50	27.27	V	3.13	-0.93	23.21	209.41	38.50	-15.29	1/0
		844.00	26.65	V	3.14	-1.00	22.51	178.24	38.50	-15.99	1/0
	16-QAM	829.00	26.50	V	3.11	-0.86	22.53	179.06	38.50	-15.97	1/0
		836.50	25.80	V	3.13	-0.93	21.74	149.28	38.50	-16.76	1/0
		844.00	25.40	V	3.14	-1.00	21.26	133.66	38.50	-17.24	1/0

LTE Band 41

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	18.81	V	5.36	10.00	23.45	221.31	33.00	-9.55	1/12
		2593.00	19.81	V	5.47	9.91	24.26	266.69	33.00	-8.74	1/0
		2687.50	19.94	V	5.57	9.87	24.24	265.46	33.00	-8.76	1/0
	16-QAM	2498.50	17.69	V	5.36	10.00	22.33	171.00	33.00	-10.67	1/24
		2593.00	19.02	V	5.47	9.91	23.47	222.33	33.00	-9.53	1/0
		2687.50	19.06	V	5.57	9.87	23.36	216.77	33.00	-9.64	1/0
10	QPSK	2501.00	18.97	V	5.38	10.00	23.59	228.56	33.00	-9.41	1/49
		2593.00	19.50	V	5.47	9.91	23.95	248.31	33.00	-9.05	1/25
		2685.00	20.07	V	5.56	9.87	24.39	274.79	33.00	-8.61	1/25
	16-QAM	2501.00	17.95	V	5.38	10.00	22.57	180.72	33.00	-10.43	1/49
		2593.00	18.56	V	5.47	9.91	23.01	199.99	33.00	-9.99	1/25
		2685.00	19.12	V	5.56	9.87	23.44	220.80	33.00	-9.56	1/25
15	QPSK	2503.50	19.03	V	5.37	9.99	23.65	231.74	33.00	-9.35	1/37
		2593.00	19.82	V	5.47	9.91	24.26	266.69	33.00	-8.74	1/0
		2682.50	20.09	V	5.56	9.87	24.40	275.42	33.00	-8.60	1/74
	16-QAM	2503.50	17.95	V	5.37	9.99	22.57	180.72	33.00	-10.43	1/0
		2593.00	18.76	V	5.47	9.91	23.21	209.41	33.00	-9.79	1/37
		2682.50	19.08	V	5.56	9.87	23.40	218.78	33.00	-9.60	1/74
20	QPSK	2506.00	19.05	V	5.37	9.99	23.67	232.81	33.00	-9.33	1/99
		2593.00	19.84	V	5.47	9.91	24.29	268.53	33.00	-8.71	1/99
		2680.00	20.06	V	5.56	9.87	24.38	274.16	33.00	-8.62	1/99
	16-QAM	2506.00	18.07	V	5.37	9.99	22.68	185.35	33.00	-10.32	1/49
		2593.00	18.89	V	5.47	9.91	23.34	215.77	33.00	-9.66	1/49
		2680.00	19.14	V	5.56	9.87	23.46	221.82	33.00	-9.54	1/49

9.6. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053, §22.917, §24.238, and §27.53

LIMIT

Part 22.917(a) & Part 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.

Part 27.53:

(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 than $43 + 10 \log (P)$ 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 1GHz and 1MHz for emissions above 1GHz
- 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 FDD), Maxhold(GSM, LTE TDD);

RESULTS

See the following pages.

NOTE1

Please refer to section 5.4 for bandwidth and RB setting about LTE bands.

9.6.1. SPURIOUS RADIATION PLOTS

GSM850

		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement										
GSM850 GPRS	Company:		Samsung									
	Project #:		4790677381									
	Date:		2023-01-09									
	Test Engineer:		26087									
	Configuration:		EUT / Earphone, Y-Position									
	Location:		Chamber 2									
	Mode:		GPRS 850 MHz 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, 824.2MHz											
	1648.40	-7.1	V	3.0	40.9	1.0	-47.0	-13.0	-34.0			
	2472.60	0.5	V	3.0	41.5	1.0	-40.1	-13.0	-27.1			
	3296.80	-4.5	V	3.0	42.3	1.0	-45.9	-13.0	-32.9			
	1648.40	-8.1	H	3.0	40.9	1.0	-48.1	-13.0	-35.1			
	2472.60	3.7	H	3.0	41.5	1.0	-36.8	-13.0	-23.8			
	3296.80	-5.0	H	3.0	42.3	1.0	-46.3	-13.0	-33.3			
	Mid Ch, 836.6MHz											
	1673.20	-8.8	V	3.0	40.9	1.0	-48.7	-13.0	-35.7			
	2509.80	1.4	V	3.0	41.6	1.0	-39.2	-13.0	-26.2			
	3346.40	-5.1	V	3.0	42.3	1.0	-46.4	-13.0	-33.4			
	1673.20	-7.6	H	3.0	40.9	1.0	-47.5	-13.0	-34.5			
	2509.80	5.4	H	3.0	41.6	1.0	-35.2	-13.0	-22.2			
	3346.40	-4.5	H	3.0	42.3	1.0	-45.8	-13.0	-32.8			
	High Ch, 848.8MHz											
	1697.60	-8.4	V	3.0	40.9	1.0	-48.3	-13.0	-35.3			
2546.40	0.6	V	3.0	41.6	1.0	-40.0	-13.0	-27.0				
3395.20	-4.8	V	3.0	42.3	1.0	-46.2	-13.0	-33.2				
1697.60	-9.4	H	3.0	40.9	1.0	-49.3	-13.0	-36.3				
2546.40	3.3	H	3.0	41.6	1.0	-37.3	-13.0	-24.3				
3395.20	-4.9	H	3.0	42.3	1.0	-46.2	-13.0	-33.2				
UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement												
Company:		Samsung										
Project #:		4790677381										
Date:		2023-01-09										
Test Engineer:		26087										
Configuration:		EUT / Earphone, Y-Position										
Location:		Chamber 2										
Mode:		EGPRS 850 MHz 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, 824.2MHz												
1648.40	-10.6	V	3.0	40.9	1.0	-50.5	-13.0	-37.5				
2472.60	-6.9	V	3.0	41.5	1.0	-47.4	-13.0	-34.4				
3296.80	-5.2	V	3.0	42.3	1.0	-46.5	-13.0	-33.5				
1648.40	-11.3	H	3.0	40.9	1.0	-51.2	-13.0	-38.2				
2472.60	-6.0	H	3.0	41.5	1.0	-46.6	-13.0	-33.6				
3296.80	0.0	H	3.0	42.3	1.0	-41.3	-13.0	-28.3				
Mid Ch, 836.6MHz												
1673.20	-10.5	V	3.0	40.9	1.0	-50.5	-13.0	-37.5				
2509.80	-7.3	V	3.0	41.6	1.0	-47.9	-13.0	-34.9				
3346.40	-4.4	V	3.0	42.3	1.0	-45.7	-13.0	-32.7				
1673.20	-10.8	H	3.0	40.9	1.0	-50.7	-13.0	-37.7				
2509.80	-6.2	H	3.0	41.6	1.0	-46.8	-13.0	-33.8				
3346.40	-5.2	H	3.0	42.3	1.0	-46.5	-13.0	-33.5				
High Ch, 848.8MHz												
1697.60	-10.7	V	3.0	40.9	1.0	-50.6	-13.0	-37.6				
2546.40	-7.0	V	3.0	41.6	1.0	-47.6	-13.0	-34.6				
3395.20	-4.8	V	3.0	42.3	1.0	-46.1	-13.0	-33.1				
1697.60	-11.0	H	3.0	40.9	1.0	-50.9	-13.0	-37.9				
2546.40	-7.2	H	3.0	41.6	1.0	-47.9	-13.0	-34.9				
3395.20	-4.4	H	3.0	42.3	1.0	-45.7	-13.0	-32.7				

GSM1900

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4790677381							
Date:		2023-01-09							
Test Engineer:		26087							
Configuration:		EUT / AC Adapter / Earphone, Y-Position							
Location:		Chamber 1							
Mode:		GPRS 1900 MHz 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, 1850.2MHz									
3700.40	-4.9	V	3.0	46.0	1.0	-49.9	-13.0	-36.9	
5550.60	-0.1	V	3.0	45.8	1.0	-44.8	-13.0	-31.8	
7400.80	-1.1	V	3.0	45.5	1.0	-45.6	-13.0	-32.6	
3700.40	-3.5	H	3.0	46.0	1.0	-48.6	-13.0	-35.6	
5550.60	2.6	H	3.0	45.8	1.0	-42.2	-13.0	-29.2	
7400.80	-1.2	H	3.0	45.5	1.0	-45.7	-13.0	-32.7	
Mid Ch, 1880MHz									
3760.00	-3.1	V	3.0	46.0	1.0	-48.1	-13.0	-35.1	
5640.00	0.8	V	3.0	45.7	1.0	-43.9	-13.0	-30.9	
7520.00	-0.9	V	3.0	45.5	1.0	-45.4	-13.0	-32.4	
3760.00	-0.6	H	3.0	46.0	1.0	-45.5	-13.0	-32.5	
5640.00	2.0	H	3.0	45.7	1.0	-42.7	-13.0	-29.7	
7520.00	-1.0	H	3.0	45.5	1.0	-45.6	-13.0	-32.6	
High Ch, 1909.8MHz									
3819.60	-1.8	V	3.0	45.9	1.0	-46.6	-13.0	-33.6	
5729.40	-0.3	V	3.0	45.6	1.0	-44.9	-13.0	-31.9	
7639.20	-1.3	V	3.0	45.6	1.0	-45.8	-13.0	-32.8	
3819.60	-2.3	H	3.0	45.9	1.0	-47.2	-13.0	-34.2	
5729.40	1.4	H	3.0	45.6	1.0	-43.2	-13.0	-30.2	
7639.20	-0.7	H	3.0	45.6	1.0	-45.3	-13.0	-32.3	

GSM1900
GPRS

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4790677381							
Date:		2023-01-09							
Test Engineer:		26087							
Configuration:		EUT / AC Adapter / Earphone, Y-Position							
Location:		Chamber 1							
Mode:		EGPRS 1900 MHz 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, 1850.2MHz									
3700.40	-6.6	V	3.0	46.0	1.0	-51.6	-13.0	-38.6	
5550.60	-3.4	V	3.0	45.8	1.0	-48.1	-13.0	-35.1	
7400.80	-1.1	V	3.0	45.5	1.0	-45.7	-13.0	-32.7	
3700.40	-6.5	H	3.0	46.0	1.0	-51.6	-13.0	-38.6	
5550.60	-0.5	H	3.0	45.8	1.0	-45.3	-13.0	-32.3	
7400.80	-1.4	H	3.0	45.5	1.0	-45.9	-13.0	-32.9	
Mid Ch, 1880MHz									
3760.00	-6.3	V	3.0	46.0	1.0	-51.2	-13.0	-38.2	
5640.00	-3.3	V	3.0	45.7	1.0	-48.0	-13.0	-35.0	
7520.00	-1.4	V	3.0	45.5	1.0	-45.9	-13.0	-32.9	
3760.00	-6.2	H	3.0	46.0	1.0	-51.2	-13.0	-38.2	
5640.00	-1.6	H	3.0	45.7	1.0	-46.3	-13.0	-33.3	
7520.00	-0.9	H	3.0	45.5	1.0	-45.4	-13.0	-32.4	
High Ch, 1909.8MHz									
3819.60	-6.0	V	3.0	45.9	1.0	-50.9	-13.0	-37.9	
5729.40	-3.1	V	3.0	45.6	1.0	-47.7	-13.0	-34.7	
7639.20	-0.7	V	3.0	45.6	1.0	-45.3	-13.0	-32.3	
3819.60	-6.2	H	3.0	45.9	1.0	-51.0	-13.0	-38.0	
5729.40	-3.0	H	3.0	45.6	1.0	-47.6	-13.0	-34.6	
7639.20	-1.1	H	3.0	45.6	1.0	-45.7	-13.0	-32.7	

GSM1900
EGPRS

WCDMA Band 5

		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
		f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Band 5 REL99	Company: Samsung										
	Project #: 4790677381										
	Date: 2023-01-09										
	Test Engineer: 25770										
	Configuration: EUT / AC Adapter / Earphone, X-Position										
	Location: Chamber 1										
	Mode: Rel99 Band 5 Harmonics										
	Test Voltage: AC 120 V, 60 Hz										
	Low Ch, 826.4MHz										
		1652.80	-13.9	V	3.0	46.4	1.0	-59.3	-13.0	-46.3	
		2479.20	-11.4	V	3.0	46.9	1.0	-57.3	-13.0	-44.3	
		3305.60	-8.1	V	3.0	46.6	1.0	-53.7	-13.0	-40.7	
		1652.80	-14.7	H	3.0	46.4	1.0	-60.1	-13.0	-47.1	
		2479.20	-11.8	H	3.0	46.9	1.0	-57.7	-13.0	-44.7	
		3305.60	-7.7	H	3.0	46.6	1.0	-53.3	-13.0	-40.3	
	Mid Ch, 836.6MHz										
		1673.20	-14.0	V	3.0	46.4	1.0	-59.5	-13.0	-46.5	
		2509.80	-11.3	V	3.0	46.9	1.0	-57.2	-13.0	-44.2	
		3346.40	-8.5	V	3.0	46.6	1.0	-54.0	-13.0	-41.0	
		1673.20	-14.5	H	3.0	46.4	1.0	-60.0	-13.0	-47.0	
		2509.80	-11.7	H	3.0	46.9	1.0	-57.6	-13.0	-44.6	
		3346.40	-7.8	H	3.0	46.6	1.0	-53.3	-13.0	-40.3	
	High Ch, 846.6MHz										
		1693.20	-13.6	V	3.0	46.5	1.0	-59.1	-13.0	-46.1	
	2539.80	-11.2	V	3.0	46.9	1.0	-57.1	-13.0	-44.1		
	3386.40	-8.4	V	3.0	46.5	1.0	-53.9	-13.0	-40.9		
	1693.20	-14.4	H	3.0	46.5	1.0	-59.8	-13.0	-46.8		
	2539.80	-11.7	H	3.0	46.9	1.0	-57.6	-13.0	-44.6		
	3386.40	-8.1	H	3.0	46.5	1.0	-53.6	-13.0	-40.6		

		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
		f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Band 5 HSDPA	Company: Samsung										
	Project #: 4790677381										
	Date: 2023-01-09										
	Test Engineer: 25770										
	Configuration: EUT / AC Adapter / Earphone, X-Position										
	Location: Chamber 1										
	Mode: HSDPA Band 5 Harmonics										
	Test Voltage: AC 120 V, 60 Hz										
	Low Ch, 826.4MHz										
		1652.80	-14.2	V	3.0	46.4	1.0	-59.6	-13.0	-46.6	
		2479.20	-11.3	V	3.0	46.9	1.0	-57.2	-13.0	-44.2	
		3305.60	-8.6	V	3.0	46.6	1.0	-54.2	-13.0	-41.2	
		1652.80	-15.0	H	3.0	46.4	1.0	-60.4	-13.0	-47.4	
		2479.20	-11.8	H	3.0	46.9	1.0	-57.7	-13.0	-44.7	
		3305.60	-8.3	H	3.0	46.6	1.0	-53.9	-13.0	-40.9	
	Mid Ch, 836.6MHz										
		1673.20	-14.1	V	3.0	46.4	1.0	-59.6	-13.0	-46.6	
		2509.80	-11.3	V	3.0	46.9	1.0	-57.1	-13.0	-44.1	
		3346.40	-8.7	V	3.0	46.6	1.0	-54.3	-13.0	-41.3	
		1673.20	-15.1	H	3.0	46.4	1.0	-60.5	-13.0	-47.5	
		2509.80	-11.8	H	3.0	46.9	1.0	-57.7	-13.0	-44.7	
		3346.40	-8.4	H	3.0	46.6	1.0	-54.0	-13.0	-41.0	
	High Ch, 846.6MHz										
		1693.20	-13.9	V	3.0	46.5	1.0	-59.3	-13.0	-46.3	
	2539.80	-11.2	V	3.0	46.9	1.0	-57.1	-13.0	-44.1		
	3386.40	-8.5	V	3.0	46.5	1.0	-54.0	-13.0	-41.0		
	1693.20	-15.2	H	3.0	46.5	1.0	-60.7	-13.0	-47.7		
	2539.80	-11.7	H	3.0	46.9	1.0	-57.6	-13.0	-44.6		
	3386.40	-8.4	H	3.0	46.5	1.0	-53.9	-13.0	-40.9		

LTE Band 5

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4790677381							
Date:		2023-01-09							
Test Engineer:		25770							
Configuration:		EUT / Earphone, Z-Position							
Location:		Chamber 1							
Mode:		LTE_QPSK Band 5 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, 829MHz									
1658.00	-14.5	V	3.0	46.4	1.0	-59.9	-13.0	-46.9	
2487.00	-11.5	V	3.0	46.9	1.0	-57.4	-13.0	-44.4	
3316.00	-4.0	V	3.0	46.6	1.0	-49.6	-13.0	-36.6	
1658.00	-14.4	H	3.0	46.4	1.0	-59.8	-13.0	-46.8	
2487.00	-12.0	H	3.0	46.9	1.0	-57.9	-13.0	-44.9	
3316.00	-3.5	H	3.0	46.6	1.0	-49.1	-13.0	-36.1	
Mid Ch, 836.5MHz									
1673.00	-14.3	V	3.0	46.4	1.0	-59.7	-13.0	-46.7	
2509.50	-11.4	V	3.0	46.9	1.0	-57.3	-13.0	-44.3	
3346.00	-5.4	V	3.0	46.6	1.0	-50.9	-13.0	-37.9	
1673.00	-14.7	H	3.0	46.4	1.0	-60.1	-13.0	-47.1	
2509.50	-12.1	H	3.0	46.9	1.0	-57.9	-13.0	-44.9	
3346.00	-2.7	H	3.0	46.6	1.0	-48.3	-13.0	-35.3	
High Ch, 844MHz									
1688.00	-13.7	V	3.0	46.5	1.0	-59.2	-13.0	-46.2	
2532.00	-11.1	V	3.0	46.9	1.0	-57.0	-13.0	-44.0	
3376.00	-6.0	V	3.0	46.5	1.0	-51.5	-13.0	-38.5	
1688.00	-14.3	H	3.0	46.5	1.0	-59.8	-13.0	-46.8	
2532.00	-11.5	H	3.0	46.9	1.0	-57.4	-13.0	-44.4	
3376.00	-3.2	H	3.0	46.5	1.0	-48.7	-13.0	-35.7	

LTE
 Band 5
 10MHz
 QPSK

LTE Band 41

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4790677381							
Date:		2023-01-09							
Test Engineer:		26087							
Configuration:		EUT / Y-Position							
Location:		Chamber 1							
Mode:		LTE_QPSK Band 41 Harmonics, 15MHz 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, 2503.5MHz									
5007.00	-8.4	V	3.0	46.2	1.0	-53.6	-25.0	-28.6	
7510.50	-5.5	V	3.0	45.5	1.0	-50.0	-25.0	-25.0	
10014.00	-1.8	V	3.0	45.6	1.0	-46.3	-25.0	-21.3	
5007.00	-4.7	H	3.0	46.2	1.0	-50.0	-25.0	-25.0	
7510.50	-8.0	H	3.0	45.5	1.0	-52.6	-25.0	-27.6	
10014.00	-1.9	H	3.0	45.6	1.0	-46.5	-25.0	-21.5	
Mid Ch, 2593MHz									
5186.00	-8.8	V	3.0	46.1	1.0	-53.9	-25.0	-28.9	
7779.00	-4.8	V	3.0	45.6	1.0	-49.4	-25.0	-24.4	
10372.00	5.5	V	3.0	45.9	1.0	-39.3	-25.0	-14.3	
5186.00	-5.4	H	3.0	46.1	1.0	-50.5	-25.0	-25.5	
7779.00	-4.6	H	3.0	45.6	1.0	-49.2	-25.0	-24.2	
10372.00	0.0	H	3.0	45.9	1.0	-44.9	-25.0	-19.9	
High Ch, 2682.5MHz									
5365.00	-7.8	V	3.0	45.9	1.0	-52.8	-25.0	-27.8	
8047.50	-3.4	V	3.0	45.6	1.0	-48.0	-25.0	-23.0	
10730.00	3.7	V	3.0	46.2	1.0	-41.5	-25.0	-16.5	
5365.00	-3.2	H	3.0	45.9	1.0	-48.1	-25.0	-23.1	
8047.50	-4.5	H	3.0	45.6	1.0	-49.1	-25.0	-24.1	
10730.00	-1.6	H	3.0	46.2	1.0	-46.8	-25.0	-21.8	

LTE
 Band 41
 15 MHz
 QPSK

END OF REPORT