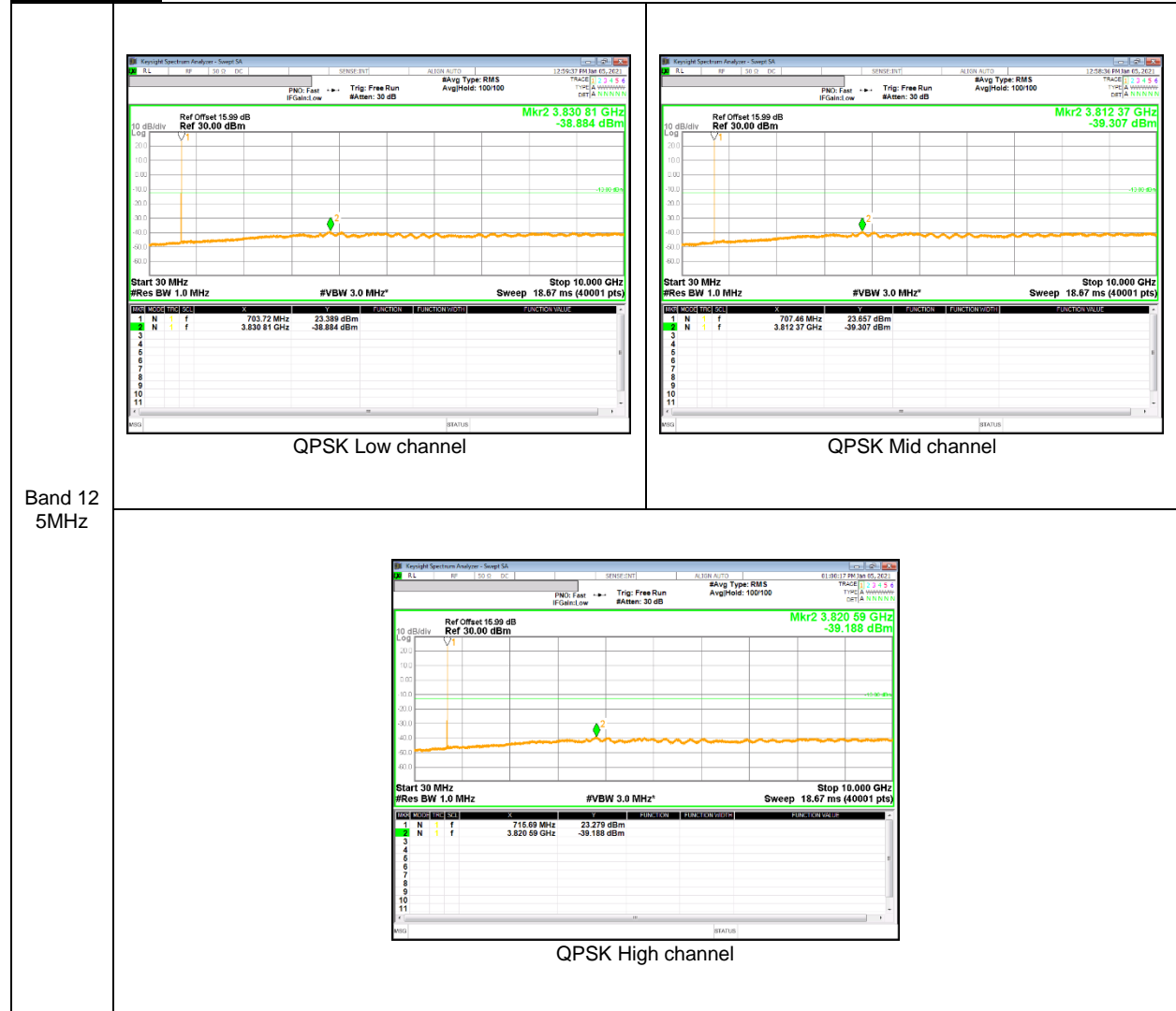
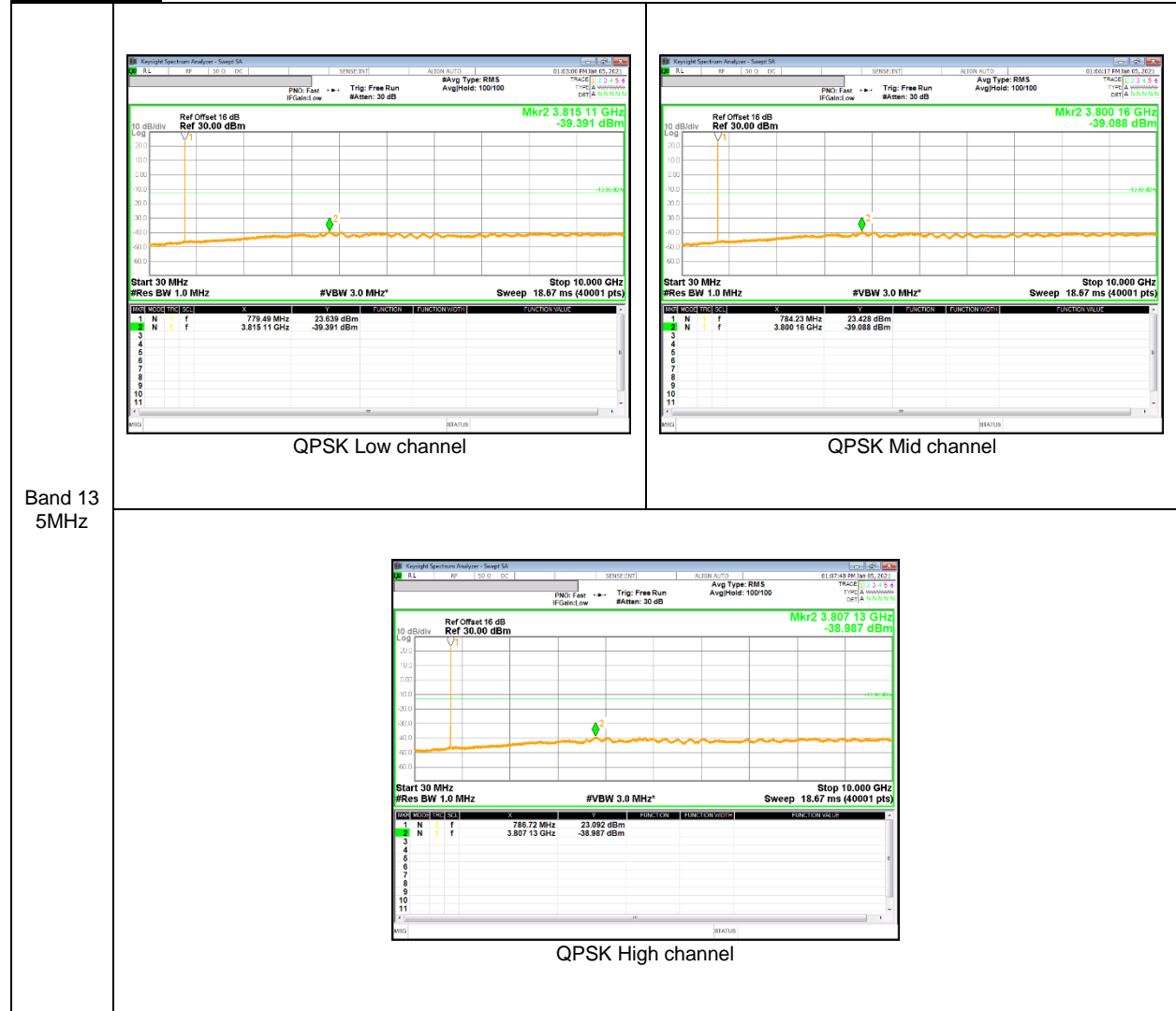


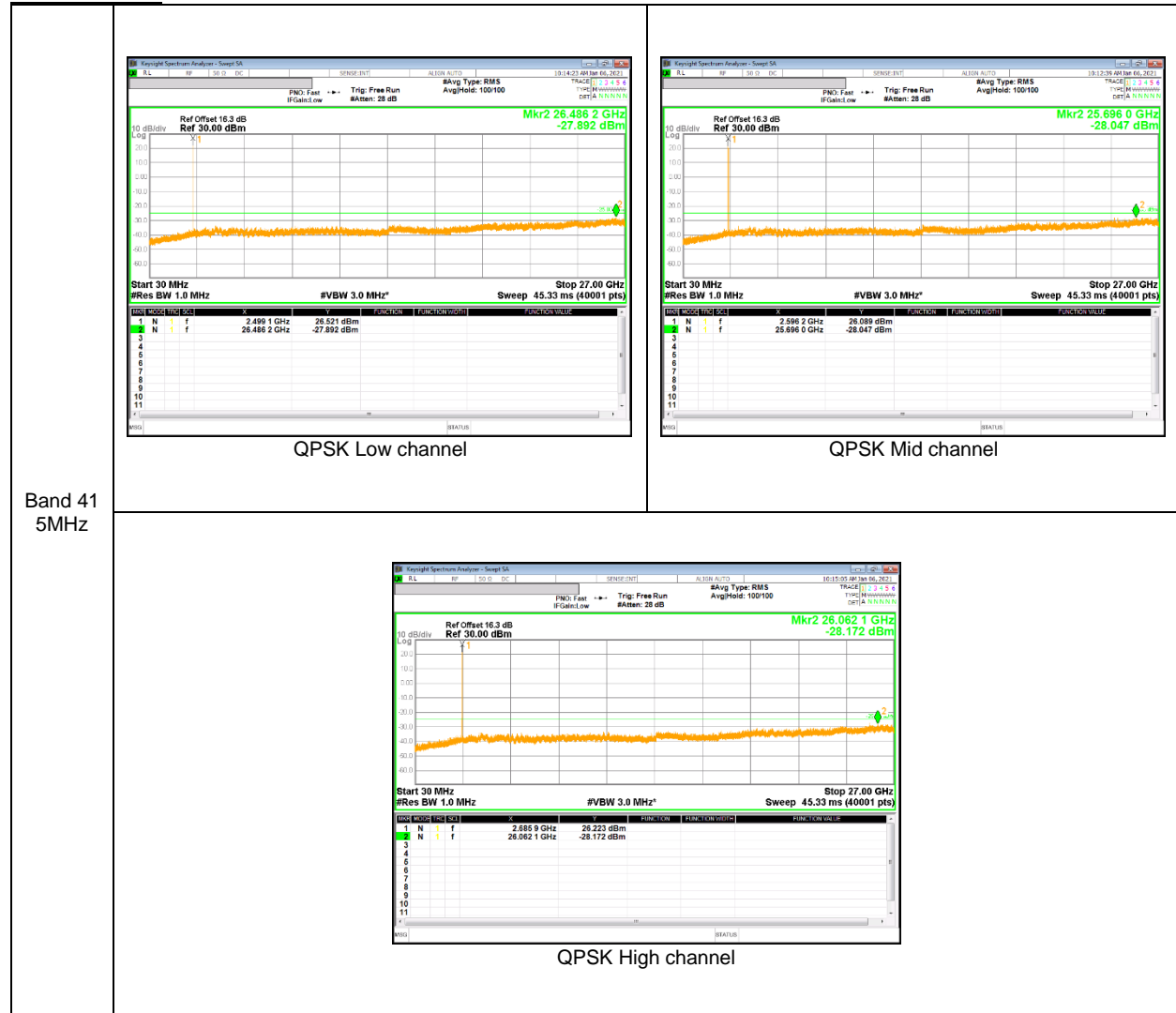
LTE Band 12



LTE Band 13



LTE Band 41



9.4. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §22.355, §24.235, §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

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	824.20003354	0.005	848.80003061	0.001	2.5	
3.88	40	824.20003742	0.000	848.80002848	0.004	2.5	
3.88	30	824.20003445	0.004	848.80003500	-0.004	2.5	
3.88	20	824.20003765	0.000	848.80003177	0.000	2.5	
3.88	10	824.20005789	-0.025	848.80004578	-0.017	2.5	
3.88	0	824.20005098	-0.016	848.80003958	-0.009	2.5	
3.88	-10	824.20003957	-0.002	848.80003810	-0.007	2.5	
3.88	-20	824.20005453	-0.020	848.80005792	-0.031	2.5	
3.88	-30	824.20005830	-0.025	848.80007487	-0.051	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]		
3.88	20	824.20003765	0	848.80003177	0	2.5	
4.40	20	824.20003380	0.005	848.80003280	-0.001	2.5	
3.65	20	824.20003335	0.005	848.80003251	-0.001	2.5	

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

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	1850.0779	1909.9244		
Extreme (50C)		1850.0779	1909.9245	45.4	0.024
Extreme (40C)		1850.0779	1909.9245	43.7	0.023
Extreme (30C)		1850.0779	1909.9244	36.9	0.020
Extreme (10C)		1850.0779	1909.9245	59.8	0.032
Extreme (0C)		1850.0779	1909.9245	41.6	0.022
Extreme (-10C)		1850.0779	1909.9244	26.5	0.014
Extreme (-20C)		1850.0779	1909.9245	42.1	0.022
Extreme (-30C)		1850.0779	1909.9245	51.4	0.027
20C	15%	1850.0779	1909.9245	43.8	0.023
	-15%	1850.0779	1909.9245	50.1	0.027
	End Point	1850.0779	1909.9245	42.4	0.023

WCDMA Band 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]		
3.88	50	826.40000540	-0.003	846.60000853	-0.006	2.5	
3.88	40	826.40000461	-0.002	846.60000519	-0.002	2.5	
3.88	30	826.40000286	0.001	846.60000386	0.000	2.5	
3.88	20	826.40000329	0.000	846.60000359	0.000	2.5	
3.88	10	826.40001315	-0.012	846.60001014	-0.008	2.5	
3.88	0	826.40001575	-0.015	846.60001144	-0.009	2.5	
3.88	-10	826.40001454	-0.014	846.60001340	-0.012	2.5	
3.88	-20	826.40002318	-0.024	846.60002156	-0.021	2.5	
3.88	-30	826.40002018	-0.020	846.60001095	-0.009	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]		
3.88	20	826.40000329	0	846.60000359	0	2.5	
4.40	20	826.40000247	0.001	846.60000364	0.000	2.5	
3.65	20	826.40000383	-0.001	846.60000377	0.000	2.5	

LTE Band 4 (Lowest Frequency:16QAM / Highest Frequency: 16QAM)

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	1710.6995	1779.3005		
Extreme (50C)		1710.6995	1779.3006	14.6	0.008
Extreme (40C)		1710.6995	1779.3006	15.6	0.009
Extreme (30C)		1710.6995	1779.3006	14.7	0.008
Extreme (10C)		1710.6995	1779.3006	13.9	0.008
Extreme (0C)		1710.6995	1779.3006	14.2	0.008
Extreme (-10C)		1710.6995	1779.3006	13.3	0.008
Extreme (-20C)		1710.6995	1779.3006	13.8	0.008
Extreme (-30C)		1710.6995	1779.3006	14.1	0.008
20C	15%	1710.6995	1779.3006	15.1	0.009
	-15%	1710.6995	1779.3006	14.3	0.008
	End Point	1710.6995	1779.3006	15.2	0.009

LTE Band 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	50	824.70002911	-0.010	848.30001326	-0.004	2.5	
3.85	40	824.70001522	0.007	848.30002232	-0.014	2.5	
3.85	30	824.70002121	0.000	848.30001907	-0.011	2.5	
3.85	20	824.70002114	0.000	848.30001003	0.000	2.5	
3.85	10	824.70002801	-0.008	848.30002533	-0.018	2.5	
3.85	0	824.70002785	-0.008	848.30002267	-0.015	2.5	
3.85	-10	824.70003309	-0.014	848.30002678	-0.020	2.5	
3.85	-20	824.70002750	-0.008	848.30002645	-0.019	2.5	
3.85	-30	824.70003905	-0.022	848.30002805	-0.021	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]		
3.88	20	824.70002114	0	848.30001003	0	2.5	
4.40	20	824.70003018	-0.011	848.30002285	-0.015	2.5	
3.65	20	824.70001083	0.013	848.30001017	0.000	2.5	

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

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	699.1541	715.8459		
Extreme (50C)		699.1541	715.8459	12.4	0.018
Extreme (40C)		699.1541	715.8459	12.6	0.018
Extreme (30C)		699.1541	715.8459	12.0	0.017
Extreme (10C)		699.1541	715.8459	9.0	0.013
Extreme (0C)		699.1541	715.8459	9.6	0.014
Extreme (-10C)		699.1541	715.8459	9.5	0.013
Extreme (-20C)		699.1541	715.8459	8.9	0.013
Extreme (-30C)		699.1541	715.8459	10.6	0.015
20C	15%	699.1541	715.8459	8.8	0.012
	-15%	699.1541	715.8459	16.3	0.023
	End Point	699.1541	715.8459	8.4	0.012

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

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	777.2490	786.7446		
Extreme (50C)		777.2490	786.7446	8.1	0.010
Extreme (40C)		777.2490	786.7446	7.8	0.010
Extreme (30C)		777.2490	786.7446	9.3	0.012
Extreme (10C)		777.2490	786.7446	10.0	0.013
Extreme (0C)		777.2490	786.7446	12.2	0.016
Extreme (-10C)		777.2490	786.7446	12.3	0.016
Extreme (-20C)		777.2490	786.7446	11.6	0.015
Extreme (-30C)		777.2490	786.7446	15.8	0.020
20C	15%	777.2490	786.7446	8.3	0.011
	-15%	777.2490	786.7446	7.7	0.010
	End Point	777.2490	786.7446	9.5	0.012

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

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	2494.0174	2691.9943		
Extreme (50C)		2494.0174	2691.9943	25.6	0.010
Extreme (40C)		2494.0174	2691.9943	27.9	0.011
Extreme (30C)		2494.0174	2691.9943	27.8	0.011
Extreme (10C)		2494.0175	2691.9944	54.0	0.021
Extreme (0C)		2494.0175	2691.9944	51.9	0.020
Extreme (-10C)		2494.0174	2691.9943	49.5	0.019
Extreme (-20C)		2494.0175	2691.9944	51.5	0.020
Extreme (-30C)		2494.0175	2691.9944	51.6	0.020
20C	15%	2494.0174	2691.9943	24.4	0.009
	-15%	2494.0174	2691.9943	24.9	0.010
	End Point	2494.0174	2691.9943	22.5	0.009

9.5. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §22.913, §24.232, §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:

(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.

(c) (10) - Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band 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 \geq OBW;
- b) Set VBW \geq 3 \times RBW;
- c) Set span \geq 2 \times RBW;
- d) Sweep time = auto couple;
- 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

9.5.1. ERP/EIRP Results

GSM

Band	Mode	Channel	f [MHz]	ERP / EIRP	
				[dBm]	[mW]
GSM850	GPRS	128	824.2	27.69	587.49
		190	836.6	28.79	756.83
		251	848.8	28.42	695.02
	EGPRS	128	824.2	22.66	184.50
		190	836.6	23.10	204.17
		251	848.8	23.25	211.35
GSM1900	GPRS	512	1850.2	30.11	1025.65
		661	1880	30.86	1218.99
		810	1909.8	30.13	1030.39
	EGPRS	512	1850.2	26.49	445.66
		661	1880	28.13	650.13
		810	1909.8	27.47	558.47

WCDMA

Band	Mode	Channel	f [MHz]	ERP / EIRP	
				[dBm]	[mW]
Band 5	REL99	4132	826.4	18.88	77.27
		4183	836.6	19.12	81.66
		4233	846.6	19.47	88.51
	HSDPA	4132	826.4	18.10	64.57
		4183	836.6	18.30	67.61
		4233	846.6	18.24	66.68

LTE Band 4

Band	BW [MHz]	Mode	RB Size/	f [MHz]	ERP / EIRP	
			RB Offset		[dBm]	[mW]
Band 4	20	QPSK	1/49	1720.0	24.48	280.54
			1/49	1732.5	24.71	295.80
			1/49	1745.0	20.86	121.90
		16QAM	1/49	1720.0	23.60	229.09
			1/49	1732.5	23.63	230.67
			1/49	1745.0	19.74	94.19
	15	QPSK	1/74	1717.5	24.04	253.51
			1/37	1732.5	23.92	246.60
			1/37	1747.5	20.16	103.75
		16QAM	1/37	1717.5	23.72	235.50
			1/37	1732.5	22.76	188.80
			1/37	1747.5	19.21	83.37
	10	QPSK	1/25	1715.0	24.04	253.51
			1/25	1732.5	24.04	253.51
			1/25	1750.0	20.84	121.34
		16QAM	1/25	1715.0	23.03	200.91
			1/25	1732.5	23.08	203.24
			1/25	1750.0	19.70	93.33
	5	QPSK	1/12	1712.5	22.29	169.43
			1/12	1732.5	23.91	246.04
			1/12	1752.5	21.74	149.28
		16QAM	1/12	1712.5	21.24	133.05
			1/12	1732.5	22.86	193.20
			1/12	1752.5	21.07	127.94
	3	QPSK	1/8	1711.5	22.67	184.93
			1/8	1732.5	24.20	263.03
			1/14	1753.5	22.20	165.96
		16QAM	1/8	1711.5	21.12	129.42
			1/8	1732.5	23.30	213.80
			1/0	1753.5	21.13	129.72
1.4	QPSK	1/3	1710.7	22.12	162.93	
		1/3	1732.5	24.01	251.77	
		1/3	1754.3	21.92	155.60	
	16QAM	1/3	1710.7	20.88	122.46	
		1/3	1732.5	22.85	192.75	
		1/5	1754.3	21.06	127.64	

LTE Band 5

Band	BW [MHz]	Mode	RB Size/ RB Offset	f [MHz]	ERP / EIRP	
					[dBm]	[mW]
Band 5	10	QPSK	1/0	829.0	20.25	105.93
			1/25	836.5	19.55	90.16
			1/49	844.0	19.55	90.16
		16QAM	1/0	829.0	19.35	86.10
			1/0	836.5	18.40	69.18
			1/49	844.0	18.57	71.94
	5	QPSK	1/24	826.5	19.69	93.11
			1/12	836.5	19.22	83.56
			1/24	846.5	19.17	82.60
		16QAM	1/24	826.5	18.62	72.78
			1/12	836.5	18.22	66.37
			1/24	846.5	17.86	61.09
	3	QPSK	1/14	825.5	19.81	95.72
			1/14	836.5	19.73	93.97
			1/14	847.5	19.41	87.30
		16QAM	1/8	825.5	18.74	74.82
			1/14	836.5	18.73	74.64
			1/14	847.5	18.14	65.16
	1.4	QPSK	1/3	824.7	19.64	92.04
			1/3	836.5	19.54	89.95
			1/3	848.3	19.13	81.85
		16QAM	1/3	824.7	18.74	74.82
			1/3	836.5	18.48	70.47
			1/3	848.3	18.18	65.77

LTE Band 12

Band	BW [MHz]	Mode	RB Size/	f [MHz]	ERP / EIRP	
			RB Offset		[dBm]	[mW]
Band 12	10	QPSK	1/25	704.0	19.14	82.04
			1/25	707.5	19.44	87.90
			1/0	711.0	19.62	91.62
		16QAM	1/0	704.0	17.78	59.98
			1/0	707.5	18.49	70.63
			1/0	711.0	18.22	66.37
	5	QPSK	1/24	701.5	18.93	78.16
			1/12	707.5	19.37	86.50
			1/24	713.5	19.64	92.04
		16QAM	1/24	701.5	17.84	60.81
			1/12	707.5	18.54	71.45
			1/12	713.5	18.93	78.16
	3	QPSK	1/14	700.5	18.62	72.78
			1/14	707.5	19.48	88.72
			1/0	714.5	19.79	95.28
		16QAM	1/14	700.5	17.85	60.95
			1/0	707.5	18.31	67.76
			1/0	714.5	18.76	75.16
	1.4	QPSK	1/3	699.7	18.61	72.61
			1/5	707.5	19.12	81.66
			1/3	715.3	19.49	88.92
		16QAM	1/3	699.7	17.63	57.94
			1/3	707.5	17.82	60.53
			1/3	715.3	18.28	67.30

LTE Band 13

Band	BW [MHz]	Mode	RB size / RB Offset	f [MHz]	ERP / EIRP	
					[dBm]	[mW]
Band 13	10	QPSK	1/0	782.0	20.50	112.20
		16QAM	1/0	782.0	19.92	98.17
	5	QPSK	1/12	779.5	20.69	117.22
			1/24	782.0	20.64	115.88
			1/24	784.5	21.00	125.89
	16QAM	1/12	779.5	19.44	87.90	
		1/0	782.0	19.58	90.78	
		1/24	784.5	20.26	106.17	

LTE Band 41

Band	BW [MHz]	Mode	RB Size/	f [MHz]	ERP / EIRP	
			RB Offset		[dBm]	[mW]
Band 41	20	QPSK	1/0	2506.0	23.91	246.04
			1/49	2593.0	24.17	261.22
			1/49	2680.0	22.15	164.06
		16QAM	1/0	2506.0	23.63	230.67
			1/49	2593.0	23.75	237.14
			1/49	2680.0	21.42	138.68
	15	QPSK	1/0	2503.5	23.59	228.56
			1/37	2593.0	23.98	250.03
			1/74	2682.5	22.32	170.61
		16QAM	1/0	2503.5	23.28	212.81
			1/37	2593.0	23.73	236.05
			1/74	2682.5	22.24	167.49
	10	QPSK	1/0	2501.0	23.61	229.61
			1/25	2593.0	24.19	262.42
			1/25	2685.0	22.52	178.65
		16QAM	1/0	2501.0	23.45	221.31
			1/25	2593.0	23.59	228.56
			1/25	2685.0	22.18	165.20
	5	QPSK	1/12	2498.5	24.02	252.35
			1/24	2593.0	24.27	267.30
			1/0	2687.5	22.12	162.93
16QAM		1/12	2498.5	23.95	248.31	
		1/12	2593.0	23.32	214.78	
		1/0	2687.5	21.69	147.57	

9.5.2. ERP/EIRP DATA

GSM850

GSM850 GPRS	<p style="text-align: center;">UL Verification Services, Inc. High Frequency Substitution Measurement</p> <p>Company: Samsung Project #: 4789754174 Date: 2021-01-05 Test Engineer: 20882 Configuration: EUT, Z-Position Location: Chamber 1 Mode: GPRS 850 MHz Fundamentals</p> <p>Test Equipment: Receiving: VULB9163-750, and Chamber 1 SMA Cables Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable</p> <table border="1"> <thead> <tr> <th>f MHz</th> <th>SG reading (dBm)</th> <th>Ant. Pol. (H/V)</th> <th>Cable Loss (dB)</th> <th>Antenna Gain (dBd)</th> <th>ERP (dBm)</th> <th>Limit (dBm)</th> <th>Delta (dB)</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td colspan="9">Low Ch</td> </tr> <tr> <td>824.20</td> <td>31.68</td> <td>V</td> <td>3.0</td> <td>-1.0</td> <td>27.69</td> <td>38.5</td> <td>-10.8</td> <td></td> </tr> <tr> <td>824.20</td> <td>21.93</td> <td>H</td> <td>3.0</td> <td>-1.0</td> <td>17.93</td> <td>38.5</td> <td>-20.6</td> <td></td> </tr> <tr> <td colspan="9">Mid Ch</td> </tr> <tr> <td>836.60</td> <td>32.76</td> <td>V</td> <td>3.1</td> <td>-0.9</td> <td>28.79</td> <td>38.5</td> <td>-9.7</td> <td></td> </tr> <tr> <td>836.60</td> <td>20.90</td> <td>H</td> <td>3.1</td> <td>-0.9</td> <td>16.94</td> <td>38.5</td> <td>-21.6</td> <td></td> </tr> <tr> <td colspan="9">High Ch</td> </tr> <tr> <td>848.80</td> <td>32.36</td> <td>V</td> <td>3.1</td> <td>-0.9</td> <td>28.42</td> <td>38.5</td> <td>-10.1</td> <td></td> </tr> <tr> <td>848.80</td> <td>19.16</td> <td>H</td> <td>3.1</td> <td>-0.9</td> <td>15.22</td> <td>38.5</td> <td>-23.3</td> <td></td> </tr> </tbody> </table>									f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes	Low Ch									824.20	31.68	V	3.0	-1.0	27.69	38.5	-10.8		824.20	21.93	H	3.0	-1.0	17.93	38.5	-20.6		Mid Ch									836.60	32.76	V	3.1	-0.9	28.79	38.5	-9.7		836.60	20.90	H	3.1	-0.9	16.94	38.5	-21.6		High Ch									848.80	32.36	V	3.1	-0.9	28.42	38.5	-10.1		848.80	19.16	H	3.1	-0.9	15.22	38.5	-23.3	
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GSM1900

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WCDMA Band 5

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LTE Band 41

LTE Band 41 20MHz QPSK	UL Verification Services, Inc. High Frequency Substitution Measurement								
	Company: Samsung Project #: 4789754174 Date: 2021-01-07 Test Engineer: 22943 Configuration: EUT, X-Position Location: Chamber 1 Mode: LTE_QPSK Band 41 Fundamentals, 20MHz Bandwidth								
	Test Equipment: Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables Substitution: Horn 3115[00167211], 8.5m SMA-type Cable								
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Low Ch								
	2506.00	17.16	V	5.3	10.2	22.03	33.0	-11.0	
	2506.00	19.03	H	5.3	10.2	23.91	33.0	-9.1	
	Mid Ch								
	2593.00	14.42	V	5.4	10.0	19.08	33.0	-13.9	
	2593.00	19.52	H	5.4	10.0	24.17	33.0	-8.8	
High Ch									
2680.00	16.15	V	5.5	10.1	20.72	33.0	-12.3		
2680.00	17.58	H	5.5	10.1	22.15	33.0	-10.9		
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	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Low Ch								
	2506.00	17.13	V	5.3	10.2	22.00	33.0	-11.0	
	2506.00	18.75	H	5.3	10.2	23.63	33.0	-9.4	
	Mid Ch								
	2593.00	13.94	V	5.4	10.0	18.60	33.0	-14.4	
	2593.00	19.10	H	5.4	10.0	23.75	33.0	-9.2	
High Ch									
2680.00	16.26	V	5.5	10.1	20.83	33.0	-12.2		
2680.00	16.85	H	5.5	10.1	21.42	33.0	-11.6		

LTE Band 41 15MHz QPSK	UL Verification Services, Inc. High Frequency Substitution Measurement																																																																																																	
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9.6. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

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

LIMIT

Part 22.917(a) & Part 24.238(a) & Part 27.53(h) 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:

(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.

(f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.

(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, 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 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), Max hold(GSM, LTE Band41);;

RESULTS

See the following pages.

NOTE : 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								
		Company:	Samsung							
		Project #:	4789754174							
		Date:	2021-01-15							
		Test Engineer:	20882							
		Configuration:	EUT, Z-Position							
		Location:	Chamber 1							
		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	-8.4	V	3.0	45.3	1.0	-52.7	-13.0	-39.7		
2472.60	0.8	V	3.0	45.1	1.0	-43.3	-13.0	-30.3		
3296.80	-9.6	V	3.0	45.3	1.0	-54.0	-13.0	-41.0		
1648.40	-11.6	H	3.0	45.3	1.0	-55.8	-13.0	-42.8		
2472.60	1.4	H	3.0	45.1	1.0	-42.7	-13.0	-29.7		
3296.80	-9.5	H	3.0	45.3	1.0	-53.9	-13.0	-40.9		
Mid Ch, 836.6MHz										
1673.20	-7.6	V	3.0	45.3	1.0	-51.9	-13.0	-38.9		
2509.80	0.1	V	3.0	45.1	1.0	-44.0	-13.0	-31.0		
3346.40	-9.0	V	3.0	45.3	1.0	-53.3	-13.0	-40.3		
1673.20	-8.2	H	3.0	45.3	1.0	-52.4	-13.0	-39.4		
2509.80	-5.6	H	3.0	45.1	1.0	-49.7	-13.0	-36.7		
3346.40	-8.7	H	3.0	45.3	1.0	-53.0	-13.0	-40.0		
High Ch, 848.8MHz										
1697.60	-11.3	V	3.0	45.2	1.0	-55.5	-13.0	-42.5		
2546.40	-0.9	V	3.0	45.1	1.0	-45.0	-13.0	-32.0		
3395.20	-8.9	V	3.0	45.3	1.0	-53.3	-13.0	-40.3		
1697.60	-9.1	H	3.0	45.2	1.0	-53.3	-13.0	-40.3		
2546.40	-5.1	H	3.0	45.1	1.0	-49.2	-13.0	-36.2		
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		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	-13.1	V	3.0	45.3	1.0	-57.4	-13.0	-44.4		
2472.60	-8.4	V	3.0	45.1	1.0	-52.5	-13.0	-39.5		
3296.80	-9.6	V	3.0	45.3	1.0	-53.9	-13.0	-40.9		
1648.40	-14.6	H	3.0	45.3	1.0	-58.8	-13.0	-45.8		
2472.60	-8.9	H	3.0	45.1	1.0	-53.0	-13.0	-40.0		
3296.80	-9.4	H	3.0	45.3	1.0	-53.7	-13.0	-40.7		
Mid Ch, 836.6MHz										
1673.20	-12.6	V	3.0	45.3	1.0	-56.8	-13.0	-43.8		
2509.80	-7.7	V	3.0	45.1	1.0	-51.8	-13.0	-38.8		
3346.40	-9.3	V	3.0	45.3	1.0	-53.6	-13.0	-40.6		
1673.20	-14.3	H	3.0	45.3	1.0	-58.5	-13.0	-45.5		
2509.80	-11.1	H	3.0	45.1	1.0	-55.2	-13.0	-42.2		
3346.40	-9.0	H	3.0	45.3	1.0	-53.4	-13.0	-40.4		
High Ch, 848.8MHz										
1697.60	-12.9	V	3.0	45.2	1.0	-57.1	-13.0	-44.1		
2546.40	-9.4	V	3.0	45.1	1.0	-53.5	-13.0	-40.5		
3395.20	-9.0	V	3.0	45.3	1.0	-53.3	-13.0	-40.3		
1697.60	-13.9	H	3.0	45.2	1.0	-58.1	-13.0	-45.1		
2546.40	-11.1	H	3.0	45.1	1.0	-55.2	-13.0	-42.2		
3395.20	-8.6	H	3.0	45.3	1.0	-53.0	-13.0	-40.0		

GSM1900

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4789754174							
Date:		2021-01-05							
Test Engineer:		22943							
Configuration:		EUT / AC Adapter, Z-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	-8.9	V	3.0	45.5	1.0	-53.3	-13.0	-40.3	
5550.60	-3.8	V	3.0	45.4	1.0	-48.2	-13.0	-35.2	
7400.80	-5.1	V	3.0	44.2	1.0	-48.3	-13.0	-35.3	
3700.40	-7.0	H	3.0	45.5	1.0	-51.4	-13.0	-38.4	
5550.60	-2.7	H	3.0	45.4	1.0	-47.1	-13.0	-34.1	
7400.80	-4.8	H	3.0	44.2	1.0	-48.0	-13.0	-35.0	
Mid Ch, 1880MHz									
3760.00	-8.2	V	3.0	45.5	1.0	-52.7	-13.0	-39.7	
5640.00	-1.2	V	3.0	45.4	1.0	-45.6	-13.0	-32.6	
7520.00	-4.9	V	3.0	44.1	1.0	-48.0	-13.0	-35.0	
3760.00	-8.1	H	3.0	45.5	1.0	-52.6	-13.0	-39.6	
5640.00	0.2	H	3.0	45.4	1.0	-44.1	-13.0	-31.1	
7520.00	-4.9	H	3.0	44.1	1.0	-48.0	-13.0	-35.0	
High Ch, 1909.8MHz									
3819.60	-9.7	V	3.0	45.5	1.0	-54.2	-13.0	-41.2	
5729.40	1.8	V	3.0	45.4	1.0	-42.6	-13.0	-29.6	
7639.20	-4.6	V	3.0	44.1	1.0	-47.7	-13.0	-34.7	
3819.60	-9.3	H	3.0	45.5	1.0	-53.8	-13.0	-40.8	
5729.40	-2.7	H	3.0	45.4	1.0	-47.1	-13.0	-34.1	
7639.20	-4.7	H	3.0	44.1	1.0	-47.7	-13.0	-34.7	

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4789754174							
Date:		2021-01-05							
Test Engineer:		22943							
Configuration:		EUT / AC Adapter, Z-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	-10.3	V	3.0	45.5	1.0	-54.8	-13.0	-41.8	
5550.60	-5.0	V	3.0	45.4	1.0	-49.4	-13.0	-36.4	
7400.80	-5.0	V	3.0	44.2	1.0	-48.2	-13.0	-35.2	
3700.40	-10.0	H	3.0	45.5	1.0	-54.4	-13.0	-41.4	
5550.60	-4.6	H	3.0	45.4	1.0	-49.0	-13.0	-36.0	
7400.80	-4.8	H	3.0	44.2	1.0	-48.0	-13.0	-35.0	
Mid Ch, 1880MHz									
3760.00	-10.1	V	3.0	45.5	1.0	-54.6	-13.0	-41.6	
5640.00	-6.8	V	3.0	45.4	1.0	-51.1	-13.0	-38.1	
7520.00	-5.2	V	3.0	44.1	1.0	-48.3	-13.0	-35.3	
3760.00	-9.6	H	3.0	45.5	1.0	-54.0	-13.0	-41.0	
5640.00	-3.9	H	3.0	45.4	1.0	-48.3	-13.0	-35.3	
7520.00	-4.5	H	3.0	44.1	1.0	-47.6	-13.0	-34.6	
High Ch, 1909.8MHz									
3819.60	-10.3	V	3.0	45.5	1.0	-54.8	-13.0	-41.8	
5729.40	-5.8	V	3.0	45.4	1.0	-50.1	-13.0	-37.1	
7639.20	-4.7	V	3.0	44.1	1.0	-47.8	-13.0	-34.8	
3819.60	-9.6	H	3.0	45.5	1.0	-54.1	-13.0	-41.1	
5729.40	-5.3	H	3.0	45.4	1.0	-49.7	-13.0	-36.7	
7639.20	-4.9	H	3.0	44.1	1.0	-48.0	-13.0	-35.0	

WCDMA Band 5

		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement								
		Company:	Samsung							
		Project #:	4789754174							
		Date:	2021-01-05							
		Test Engineer:	20882							
		Configuration:	EUT / AC Adapter, Z-Position							
		Location:	Chamber 1							
		Mode:	Rel99 Band 5 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, 826.4MHz										
1652.80	-13.7	V	3.0	45.3	1.0	-58.0	-13.0	-45.0		
2479.20	-11.2	V	3.0	45.1	1.0	-55.2	-13.0	-42.2		
3305.60	-10.4	V	3.0	45.3	1.0	-54.7	-13.0	-41.7		
1652.80	-15.6	H	3.0	45.3	1.0	-59.9	-13.0	-46.9		
2479.20	-12.1	H	3.0	45.1	1.0	-56.2	-13.0	-43.2		
3305.60	-10.1	H	3.0	45.3	1.0	-54.4	-13.0	-41.4		
Mid Ch, 836.6MHz										
1673.20	-13.9	V	3.0	45.3	1.0	-58.1	-13.0	-45.1		
2509.80	-11.4	V	3.0	45.1	1.0	-55.5	-13.0	-42.5		
3346.40	-9.9	V	3.0	45.3	1.0	-54.2	-13.0	-41.2		
1673.20	-15.4	H	3.0	45.3	1.0	-59.7	-13.0	-46.7		
2509.80	-12.2	H	3.0	45.1	1.0	-56.3	-13.0	-43.3		
3346.40	-9.6	H	3.0	45.3	1.0	-54.0	-13.0	-41.0		
High Ch, 846.6MHz										
1693.20	-13.6	V	3.0	45.2	1.0	-57.8	-13.0	-44.8		
2539.80	-11.4	V	3.0	45.1	1.0	-55.5	-13.0	-42.5		
3386.40	-9.7	V	3.0	45.3	1.0	-54.0	-13.0	-41.0		
1693.20	-15.2	H	3.0	45.2	1.0	-59.4	-13.0	-46.4		
2539.80	-12.1	H	3.0	45.1	1.0	-56.2	-13.0	-43.2		
3386.40	-9.5	H	3.0	45.3	1.0	-53.9	-13.0	-40.9		

		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement								
		Company:	Samsung							
		Project #:	4789754174							
		Date:	2021-01-05							
		Test Engineer:	20882							
		Configuration:	EUT / AC Adapter, Z-Position							
		Location:	Chamber 1							
		Mode:	HSDPA Band 5 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, 826.4MHz										
1652.80	-14.0	V	3.0	45.3	1.0	-58.3	-13.0	-45.3		
2479.20	-11.3	V	3.0	45.1	1.0	-55.4	-13.0	-42.4		
3305.60	-10.5	V	3.0	45.3	1.0	-54.8	-13.0	-41.8		
1652.80	-15.6	H	3.0	45.3	1.0	-59.8	-13.0	-46.8		
2479.20	-12.1	H	3.0	45.1	1.0	-56.2	-13.0	-43.2		
3305.60	-10.5	H	3.0	45.3	1.0	-54.8	-13.0	-41.8		
Mid Ch, 836.6MHz										
1673.20	-13.6	V	3.0	45.3	1.0	-57.9	-13.0	-44.9		
2509.80	-11.3	V	3.0	45.1	1.0	-55.4	-13.0	-42.4		
3346.40	-9.9	V	3.0	45.3	1.0	-54.2	-13.0	-41.2		
1673.20	-15.2	H	3.0	45.3	1.0	-59.5	-13.0	-46.5		
2509.80	-12.0	H	3.0	45.1	1.0	-56.1	-13.0	-43.1		
3346.40	-9.7	H	3.0	45.3	1.0	-54.0	-13.0	-41.0		
High Ch, 846.6MHz										
1693.20	-13.8	V	3.0	45.2	1.0	-58.0	-13.0	-45.0		
2539.80	-11.5	V	3.0	45.1	1.0	-55.6	-13.0	-42.6		
3386.40	-9.9	V	3.0	45.3	1.0	-54.2	-13.0	-41.2		
1693.20	-15.3	H	3.0	45.2	1.0	-59.6	-13.0	-46.6		
2539.80	-12.0	H	3.0	45.1	1.0	-56.2	-13.0	-43.2		
3386.40	-9.8	H	3.0	45.3	1.0	-54.1	-13.0	-41.1		

LTE Band 4

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
		Company:	Samsung						
		Project #:	4789754174						
		Date:	2021-01-07						
		Test Engineer:	20881						
		Configuration:	EUT / AC Adapter, X-Position						
		Location:	Chamber 1						
		Mode:	LTE_QPSK Band 4 Harmonics, 5MHz 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
Low Ch, 1712.5MHz									
3425.00	-9.3	V	3.0	45.4	1.0	-53.7	-13.0	-40.7	
5137.50	-9.2	V	3.0	45.5	1.0	-53.7	-13.0	-40.7	
6850.00	-6.4	V	3.0	44.5	1.0	-49.9	-13.0	-36.9	
3425.00	-9.3	H	3.0	45.4	1.0	-53.6	-13.0	-40.6	
5137.50	-8.8	H	3.0	45.5	1.0	-53.3	-13.0	-40.3	
6850.00	-6.2	H	3.0	44.5	1.0	-49.8	-13.0	-36.8	
Mid Ch, 1732.5MHz									
3465.00	-9.1	V	3.0	45.4	1.0	-53.4	-13.0	-40.4	
5197.50	-8.9	V	3.0	45.4	1.0	-53.4	-13.0	-40.4	
6930.00	-6.4	V	3.0	44.5	1.0	-49.9	-13.0	-36.9	
3465.00	-9.0	H	3.0	45.4	1.0	-53.4	-13.0	-40.4	
5197.50	-8.5	H	3.0	45.4	1.0	-53.0	-13.0	-40.0	
6930.00	-6.2	H	3.0	44.5	1.0	-49.6	-13.0	-36.6	
High Ch, 1752.5MHz									
3505.00	-8.3	V	3.0	45.4	1.0	-52.6	-13.0	-39.6	
5257.50	-9.0	V	3.0	45.4	1.0	-53.4	-13.0	-40.4	
7010.00	-5.9	V	3.0	44.4	1.0	-49.3	-13.0	-36.3	
3505.00	-8.1	H	3.0	45.4	1.0	-52.5	-13.0	-39.5	
5257.50	-8.6	H	3.0	45.4	1.0	-53.0	-13.0	-40.0	
7010.00	-5.6	H	3.0	44.4	1.0	-49.0	-13.0	-36.0	

LTE
 Band 4
 5MHz
 QPSK

LTE Band 5

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4789754174							
Date:		2021-01-12							
Test Engineer:		20896							
Configuration:		EUT, AC Adapter / Z-Position							
Location:		Chamber 2							
Mode:		LTE_QPSK Band 5 Harmonics, 5MHz 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
Low Ch, 826.5MHz									
1653.00	-15.6	V	3.0	40.7	1.0	-55.3	-13.0	-42.3	
2479.50	-12.6	V	3.0	41.3	1.0	-52.9	-13.0	-39.9	
3306.00	-10.0	V	3.0	42.1	1.0	-51.0	-13.0	-38.0	
5MHz									
1653.00	-15.5	H	3.0	40.7	1.0	-55.2	-13.0	-42.2	
2479.50	-12.3	H	3.0	41.3	1.0	-52.6	-13.0	-39.6	
3306.00	-9.8	H	3.0	42.1	1.0	-50.8	-13.0	-37.8	
QPSK									
Mid Ch, 836.5MHz									
1673.00	-15.5	V	3.0	40.7	1.0	-55.2	-13.0	-42.2	
2509.50	-12.6	V	3.0	41.4	1.0	-52.9	-13.0	-39.9	
3346.00	-9.8	V	3.0	42.1	1.0	-50.9	-13.0	-37.9	
1673.00	-15.4	H	3.0	40.7	1.0	-55.1	-13.0	-42.1	
2509.50	-12.2	H	3.0	41.4	1.0	-52.5	-13.0	-39.5	
3346.00	-9.7	H	3.0	42.1	1.0	-50.7	-13.0	-37.7	
High Ch, 846.5MHz									
1693.00	-15.4	V	3.0	40.7	1.0	-55.1	-13.0	-42.1	
2539.50	-12.4	V	3.0	41.4	1.0	-52.8	-13.0	-39.8	
3386.00	-9.6	V	3.0	42.1	1.0	-50.6	-13.0	-37.6	
1693.00	-15.4	H	3.0	40.7	1.0	-55.1	-13.0	-42.1	
2539.50	-12.1	H	3.0	41.4	1.0	-52.5	-13.0	-39.5	
3386.00	-9.5	H	3.0	42.1	1.0	-50.5	-13.0	-37.5	

LTE Band 12

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement										
		Company:	Samsung							
		Project #:	4789754174							
		Date:	2021-01-06							
		Test Engineer:	20882							
		Configuration:	EUT / AC Adapter, Z-Position							
		Location:	Chamber 1							
		Mode:	LTE_QPSK Band 12 Harmonics, 5MHz Bandwidth							
		Test Voltage:	AC 120 V, 60 Hz							
LTE Band 12 5MHz QPSK	f	SG reading	Ant. Pol.	Distance	Preamp	Filter	EIRP	Limit	Delta	Notes
	MHz	(dBm)	(H/V)	(m)	(dB)	(dB)	(dBm)	(dBm)	(dB)	
	Low Ch, 701.5MHz									
	1403.00	-15.5	V	3.0	45.5	1.0	-60.0	-13.0	-47.0	
	2104.50	-12.0	V	3.0	45.0	1.0	-56.0	-13.0	-43.0	
	2806.00	-11.1	V	3.0	45.2	1.0	-55.3	-13.0	-42.3	
	1403.00	-16.9	H	3.0	45.5	1.0	-61.4	-13.0	-48.4	
	2104.50	-13.3	H	3.0	45.0	1.0	-57.4	-13.0	-44.4	
	2806.00	-11.2	H	3.0	45.2	1.0	-55.4	-13.0	-42.4	
	Mid Ch, 707.5MHz									
	1415.00	-15.5	V	3.0	45.5	1.0	-59.9	-13.0	-46.9	
	2122.50	-11.9	V	3.0	45.0	1.0	-56.0	-13.0	-43.0	
	2830.00	-11.0	V	3.0	45.2	1.0	-55.2	-13.0	-42.2	
	1415.00	-16.9	H	3.0	45.5	1.0	-61.4	-13.0	-48.4	
	2122.50	-13.1	H	3.0	45.0	1.0	-57.2	-13.0	-44.2	
	2830.00	-11.2	H	3.0	45.2	1.0	-55.4	-13.0	-42.4	
	High Ch, 713.5MHz									
	1427.00	-15.3	V	3.0	45.4	1.0	-59.8	-13.0	-46.8	
	2140.50	-11.9	V	3.0	45.0	1.0	-55.9	-13.0	-42.9	
	2854.00	-10.8	V	3.0	45.2	1.0	-55.0	-13.0	-42.0	
	1427.00	-16.8	H	3.0	45.4	1.0	-61.3	-13.0	-48.3	
	2140.50	-13.4	H	3.0	45.0	1.0	-57.4	-13.0	-44.4	
	2854.00	-11.1	H	3.0	45.2	1.0	-55.3	-13.0	-42.3	

LTE Band 13

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement										
		Company:	Samsung							
		Project #:	4789754174							
		Date:	2021-01-06							
		Test Engineer:	20882							
		Configuration:	EUT, Y-Position							
		Location:	Chamber 1							
		Mode:	LTE_QPSK Band 13 Harmonics, 5MHz 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	
Low Ch, 779.5MHz										
1559.00	-17.8	V	3.0	45.3	1.0	-62.2	-40.0	-22.2		
2338.50	-11.3	V	3.0	45.1	1.0	-55.3	-13.0	-42.3		
3118.00	-10.0	V	3.0	45.3	1.0	-54.3	-13.0	-41.3		
5MHz										
1559.00	-22.4	H	3.0	45.3	1.0	-66.7	-40.0	-26.7		
2338.50	-12.1	H	3.0	45.1	1.0	-56.1	-13.0	-43.1		
3118.00	-10.1	H	3.0	45.3	1.0	-54.3	-13.0	-41.3		
QPSK										
Mid Ch, 782MHz										
1564.00	-17.7	V	3.0	45.3	1.0	-62.1	-40.0	-22.1		
2346.00	-11.4	V	3.0	45.1	1.0	-55.4	-13.0	-42.4		
3128.00	-10.3	V	3.0	45.3	1.0	-54.6	-13.0	-41.6		
1564.00	-22.2	H	3.0	45.3	1.0	-66.5	-40.0	-26.5		
2346.00	-12.6	H	3.0	45.1	1.0	-56.6	-13.0	-43.6		
3128.00	-10.3	H	3.0	45.3	1.0	-54.5	-13.0	-41.5		
High Ch, 784.5MHz										
1569.00	-19.0	V	3.0	45.3	1.0	-63.4	-40.0	-23.4		
2353.50	-10.7	V	3.0	45.1	1.0	-54.8	-13.0	-41.8		
3138.00	-10.0	V	3.0	45.3	1.0	-54.2	-13.0	-41.2		
1569.00	-23.2	H	3.0	45.3	1.0	-67.5	-40.0	-27.5		
2353.50	-12.1	H	3.0	45.1	1.0	-56.2	-13.0	-43.2		
3138.00	-9.5	H	3.0	45.3	1.0	-53.7	-13.0	-40.7		

Note : No narrowband emissions so only applied the -70dBW/MHz (-40dBm/MHz) wideband emission limit for the 1559-1610 MHz band

LTE Band 41

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4789754174							
Date:		2021-01-07							
Test Engineer:		22943							
Configuration:		EUT / AC Adapter, Y-Position							
Location:		Chamber 1							
Mode:		LTE_QPSK Band 41 Harmonics, 5MHz 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
Low Ch, 2498.5MHz									
4997.00	-17.0	V	3.0	45.5	1.0	-61.5	-25.0	-36.5	
7495.50	-4.2	V	3.0	44.2	1.0	-47.4	-25.0	-22.4	
9994.00	-9.7	V	3.0	42.2	1.0	-50.9	-25.0	-25.9	
12492.50	-6.6	V	3.0	43.3	1.0	-48.9	-25.0	-23.9	
4997.00	-16.7	H	3.0	45.5	1.0	-61.2	-25.0	-36.2	
7495.50	-9.3	H	3.0	44.2	1.0	-52.5	-25.0	-27.5	
9994.00	-9.9	H	3.0	42.2	1.0	-51.2	-25.0	-26.2	
12492.50	-4.1	H	3.0	43.3	1.0	-46.3	-25.0	-21.3	
Mid Ch, 2593MHz									
5186.00	-16.5	V	3.0	45.4	1.0	-61.0	-25.0	-36.0	
7779.00	-1.9	V	3.0	44.0	1.0	-44.9	-25.0	-19.9	
10372.00	-7.0	V	3.0	42.4	1.0	-48.4	-25.0	-23.4	
12965.00	-6.7	V	3.0	43.7	1.0	-49.4	-25.0	-24.4	
5186.00	-16.1	H	3.0	45.4	1.0	-60.5	-25.0	-35.5	
7779.00	-4.6	H	3.0	44.0	1.0	-47.6	-25.0	-22.6	
10372.00	-8.9	H	3.0	42.4	1.0	-50.3	-25.0	-25.3	
12965.00	-6.2	H	3.0	43.7	1.0	-48.9	-25.0	-23.9	
High Ch, 2687.5MHz									
5375.00	-16.7	V	3.0	45.4	1.0	-61.2	-25.0	-36.2	
8062.50	-6.4	V	3.0	43.8	1.0	-49.2	-25.0	-24.2	
10750.00	-7.7	V	3.0	42.5	1.0	-49.2	-25.0	-24.2	
13437.50	-8.5	V	3.0	44.1	1.0	-51.6	-25.0	-26.6	
5375.00	-16.2	H	3.0	45.4	1.0	-60.6	-25.0	-35.6	
8062.50	-4.1	H	3.0	43.8	1.0	-46.9	-25.0	-21.9	
10750.00	-9.3	H	3.0	42.5	1.0	-50.8	-25.0	-25.8	
13437.50	-8.4	H	3.0	44.1	1.0	-51.4	-25.0	-26.4	

LTE
 Band 41
 5MHz
 QPSK

END OF TEST REPORT