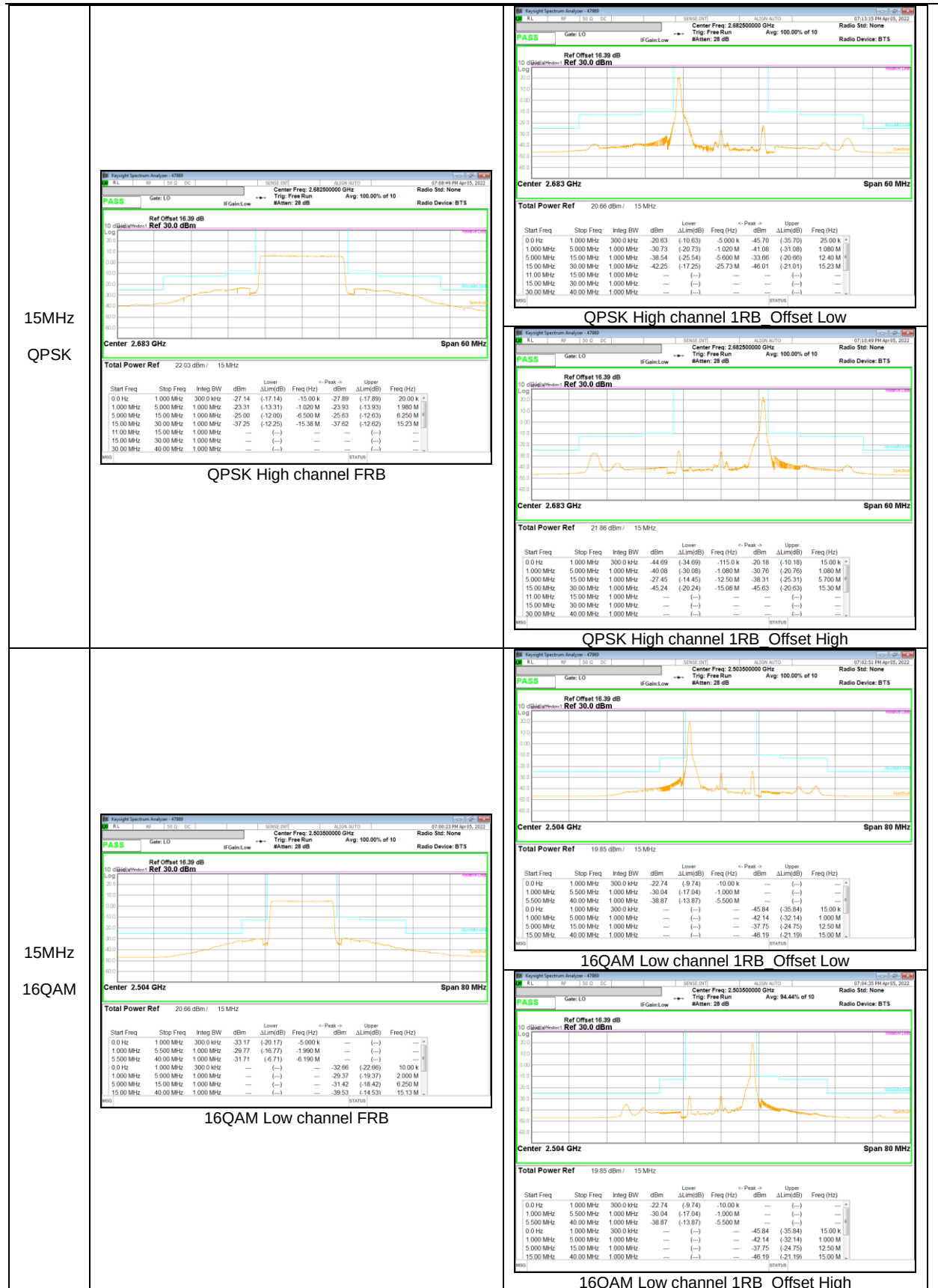
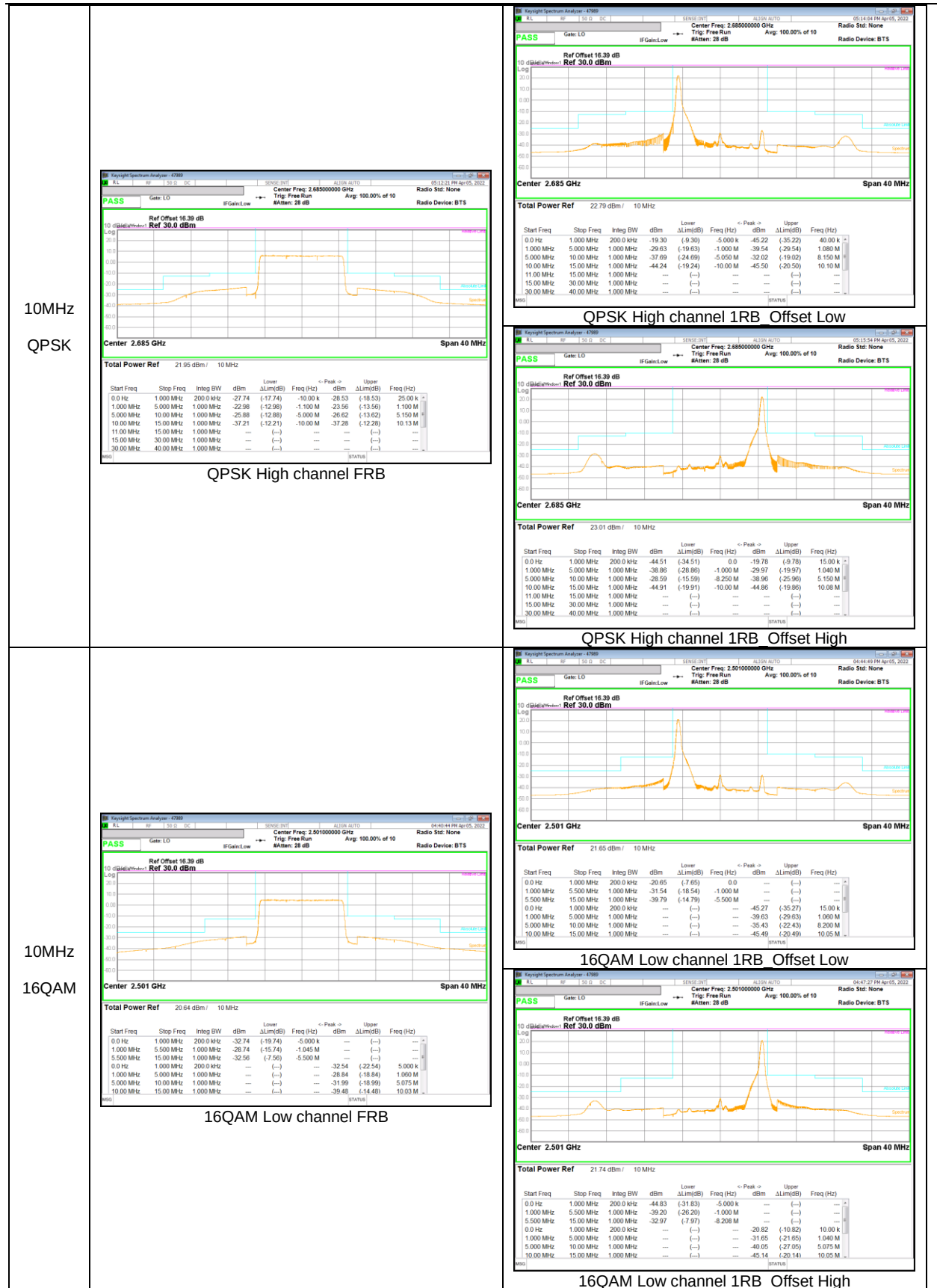


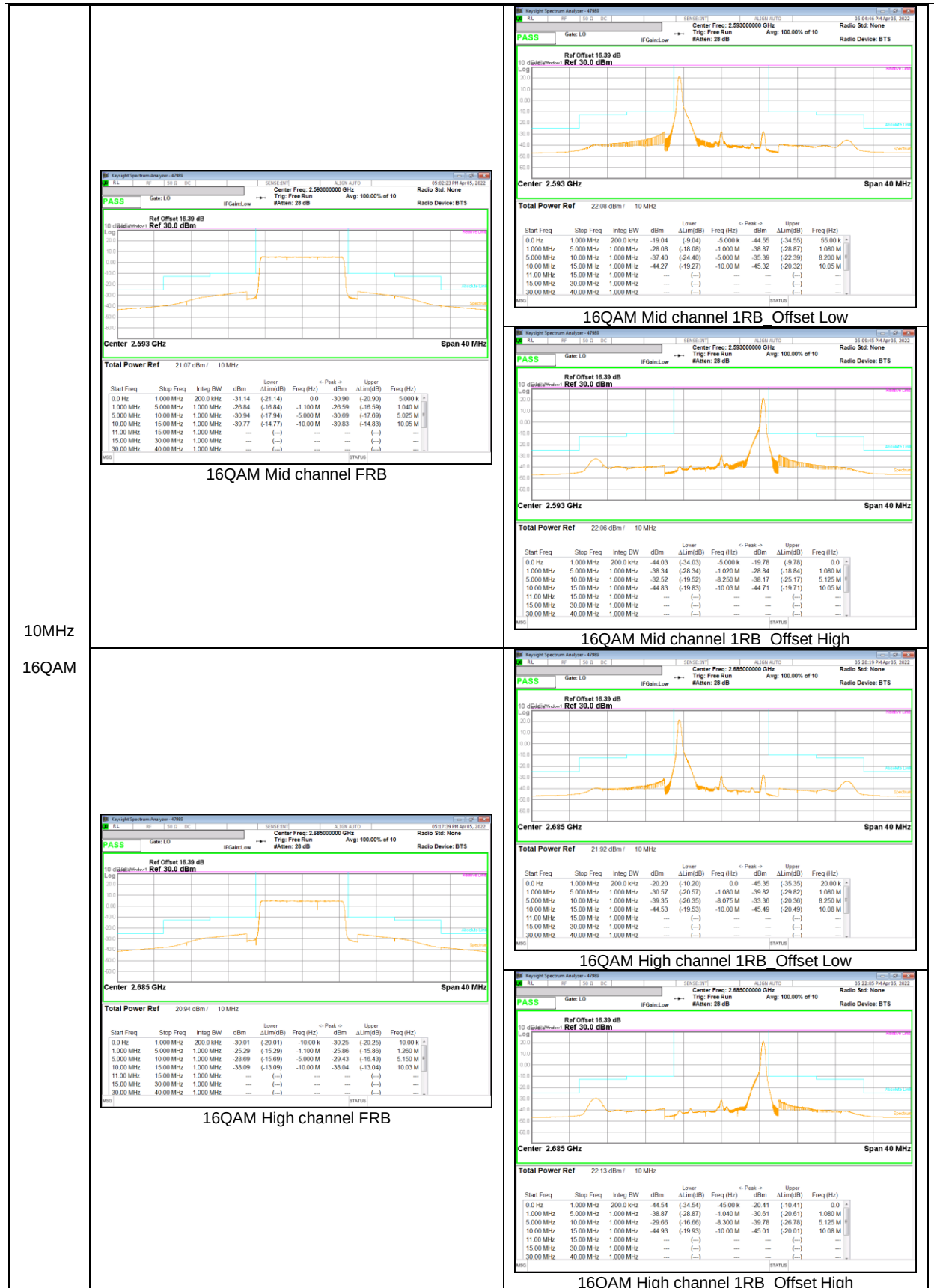




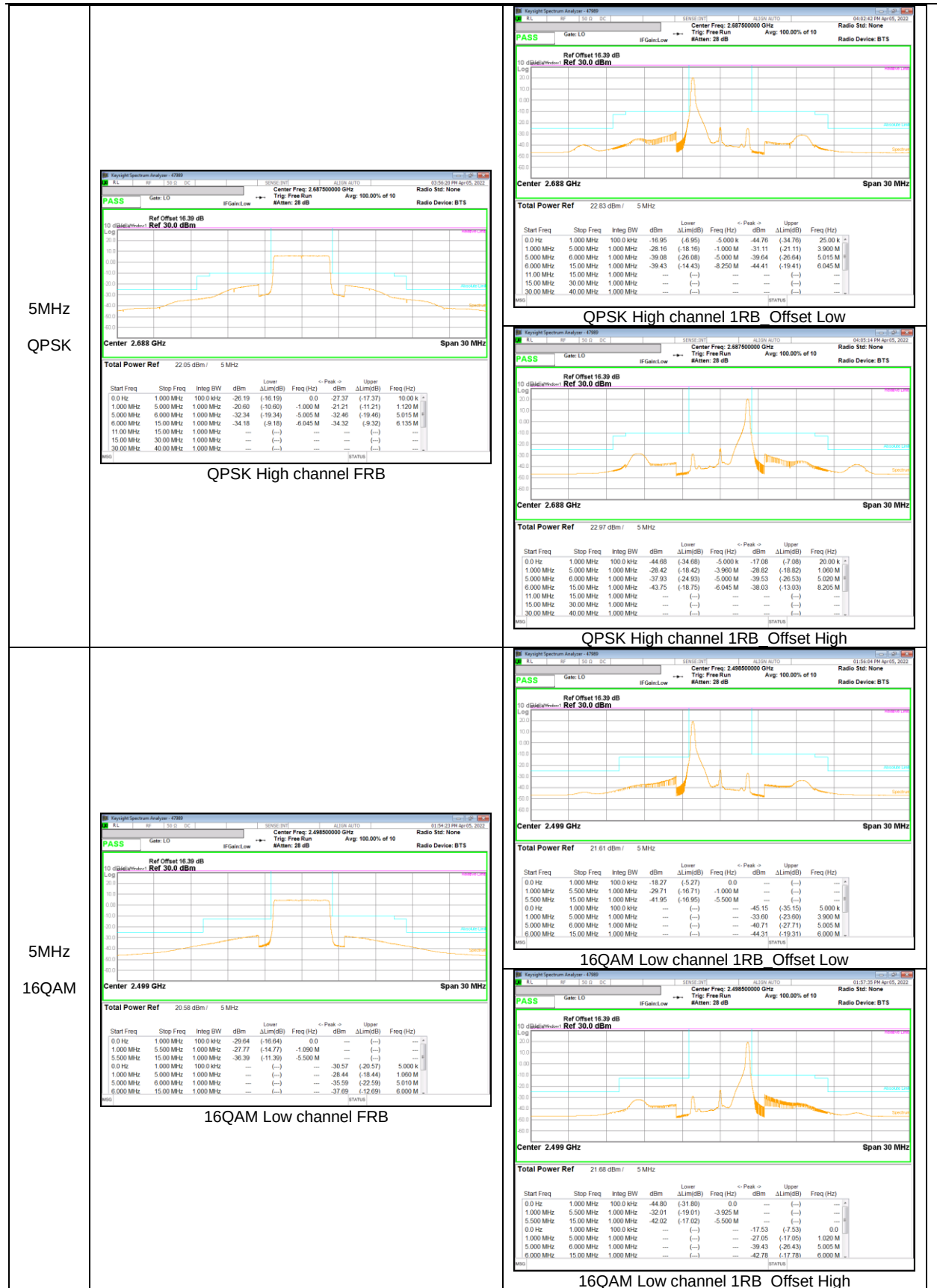














9.3. OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051, §22.901, §22.917, §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);

RESULTS

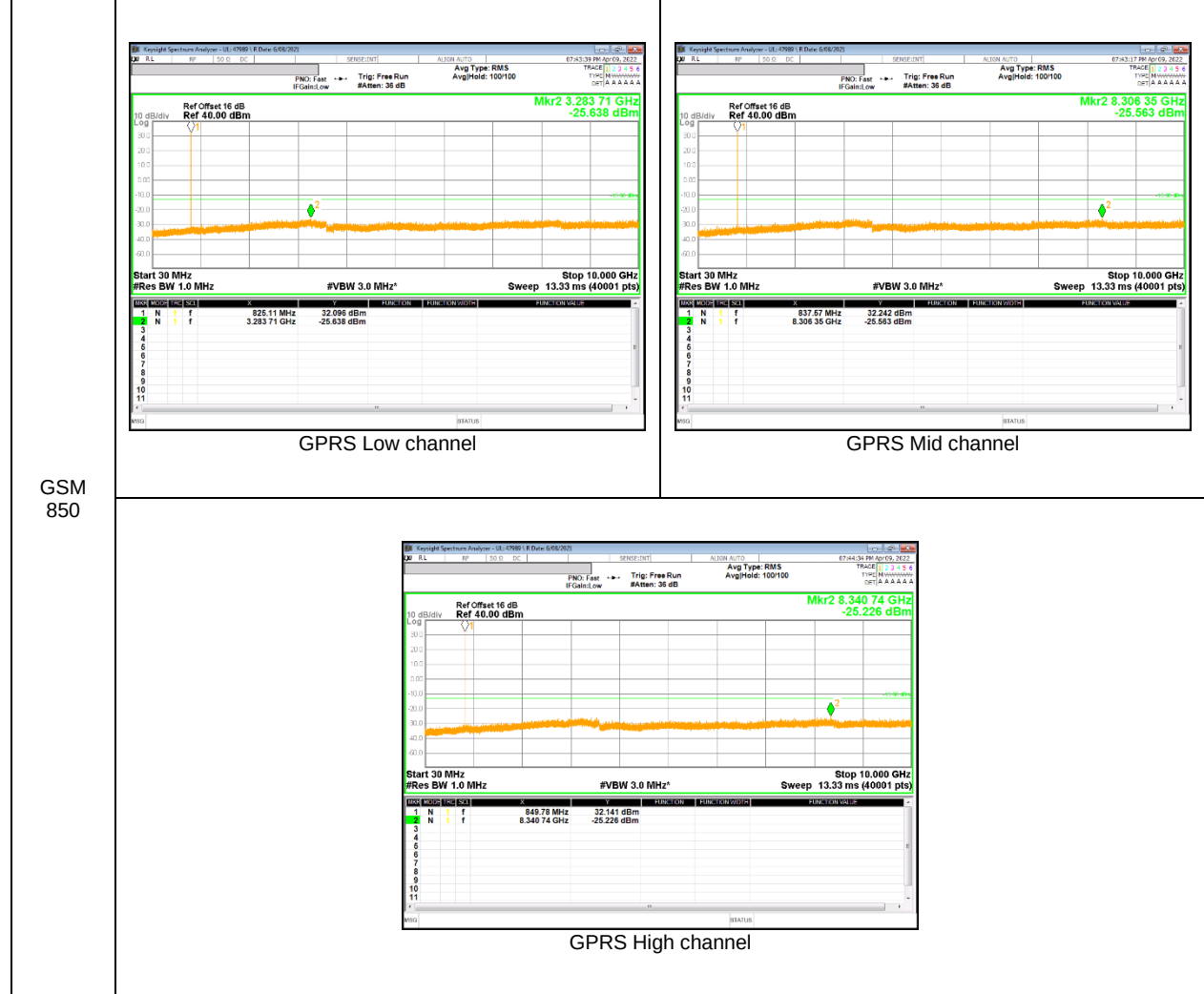
See the following pages.

NOTE

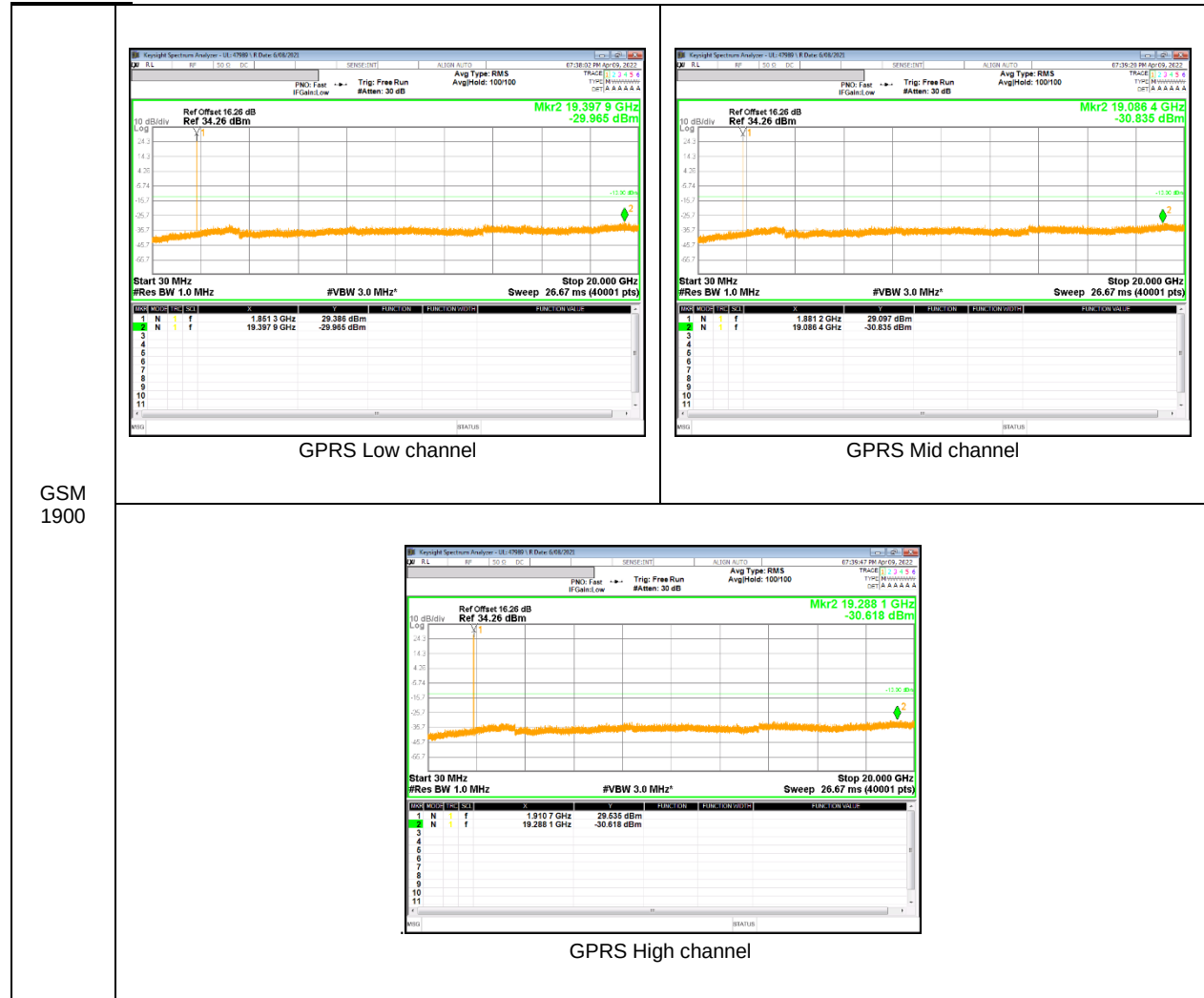
Please refer to section 5.4 for bandwidth and RB setting about LTE bands.

9.3.1. OUT OF BAND EMISSIONS RESULT

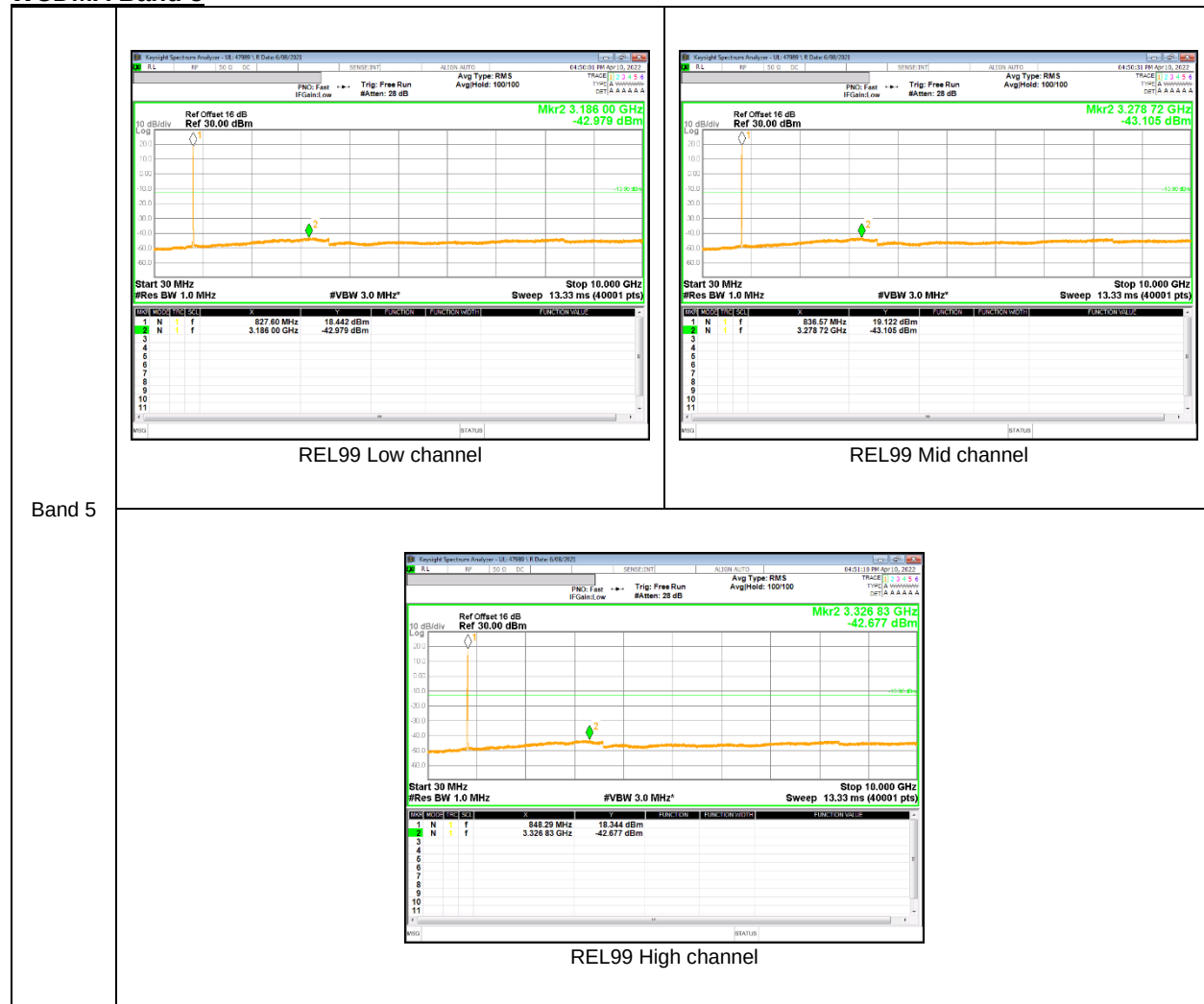
GSM 850



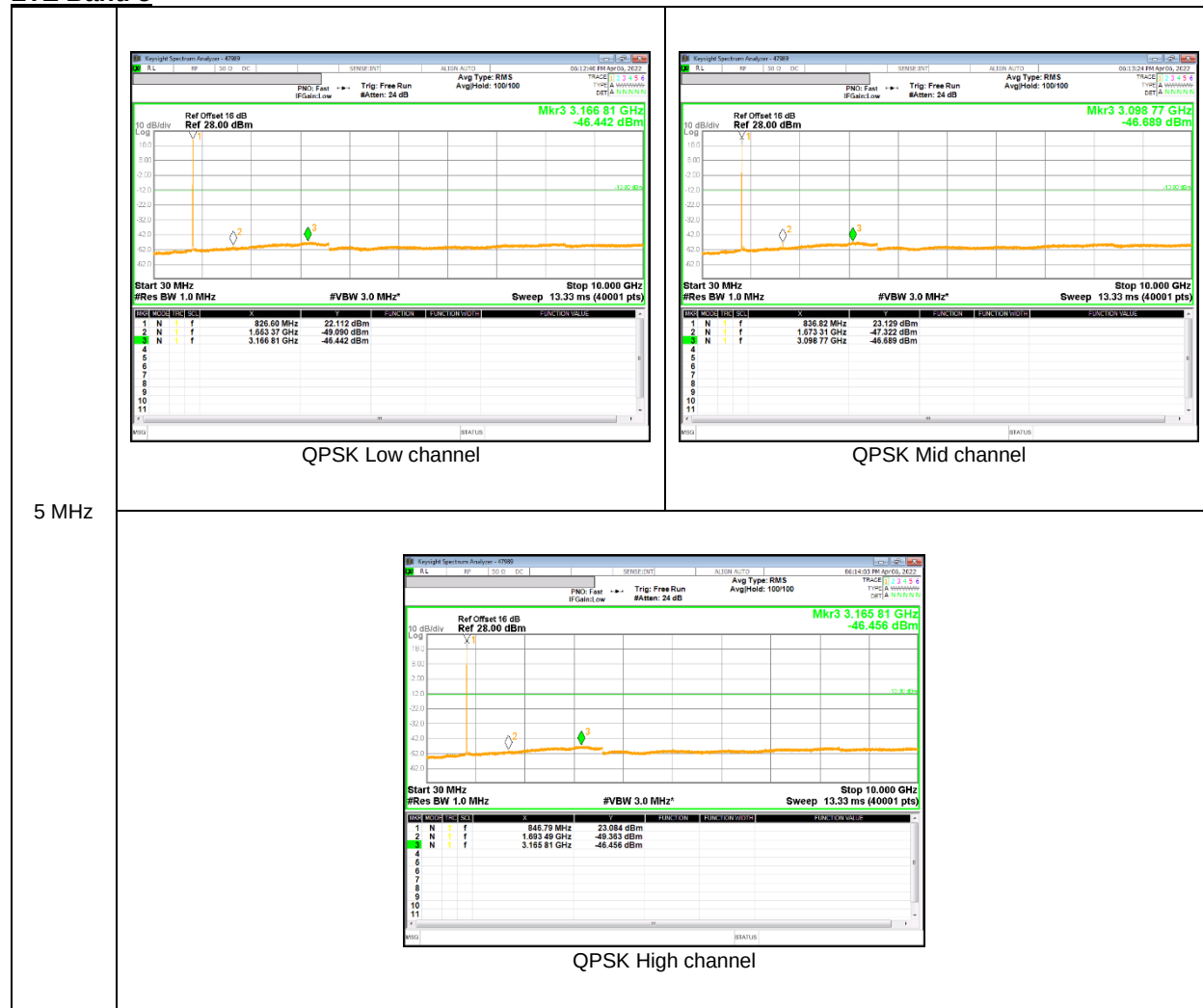
GSM 1900



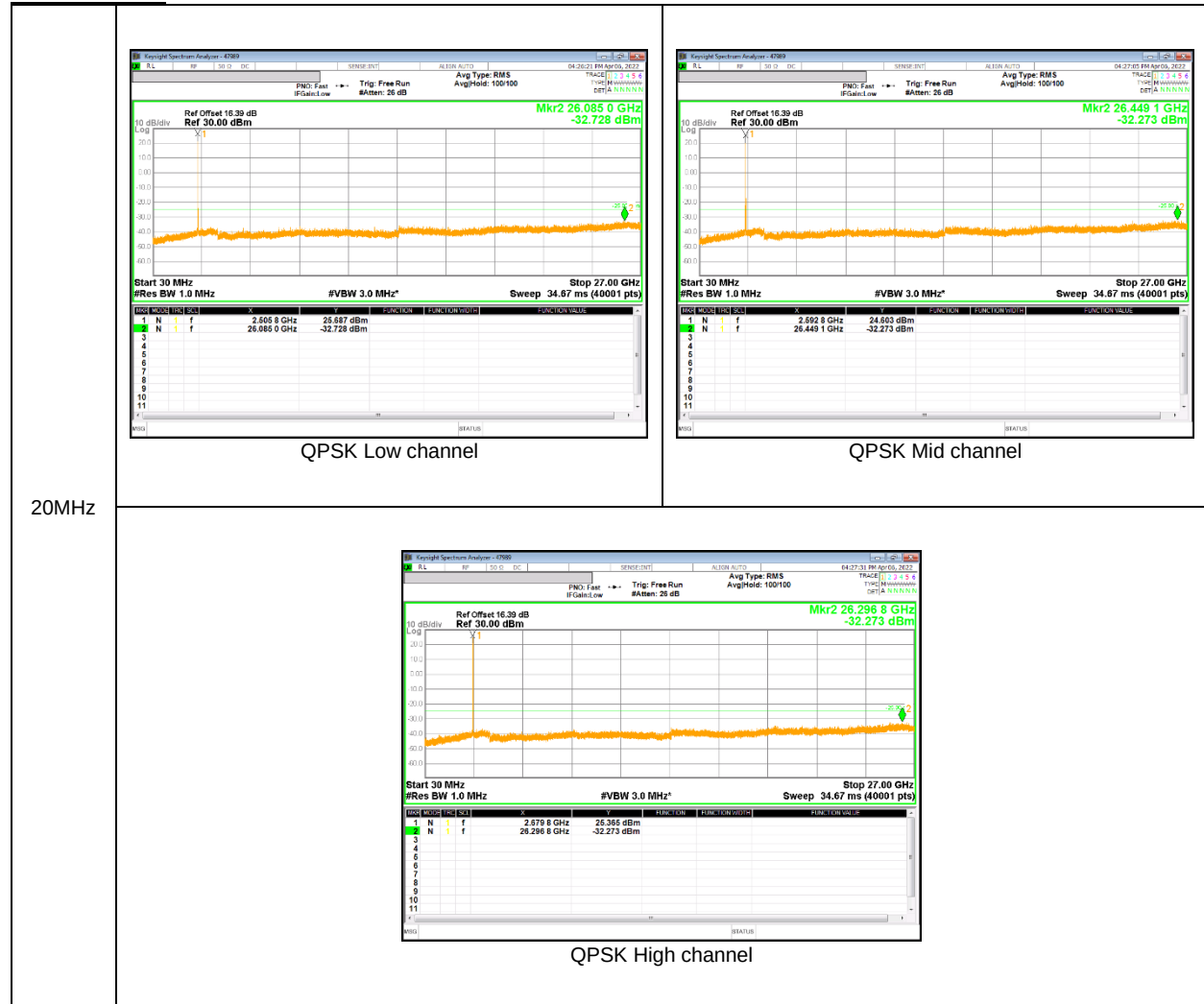
WCDMA Band 5



LTE Band 5



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
		Frequency Deviation Measured with Time Elapse				
Power Supply [Vdc]	Environment Temperature [°C]	Low Channel		High Channel		Limit [ppm]
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.85	50	824.20002185	0.001	848.80002025	-0.002	2.5
3.85	40	824.20001947	0.004	848.80001925	-0.001	2.5
3.85	30	824.20002014	0.003	848.80001980	-0.002	2.5
3.85	20	824.20002274	0.000	848.80001846	0.000	2.5
3.85	10	824.20002553	-0.003	848.80002272	-0.005	2.5
3.85	0	824.20000888	0.017	848.80000828	0.012	2.5
3.85	-10	824.20001751	0.006	848.80000954	0.011	2.5
3.85	-20	824.20002151	0.001	848.80002074	-0.003	2.5
3.85	-30	824.20004686	-0.029	848.80002228	-0.005	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
		Frequency Deviation Measured with Time Elapse				
Power Supply [Vdc]	Environment Temperature [°C]	Low Channel		High Channel		Limit [ppm]
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.85	20	824.20002274	0	848.80001846	0	2.5
4.40	20	824.20002123	0.002	848.80001411	0.005	2.5
3.60	20	824.20002557	-0.003	848.80001338	0.006	2.5

GSM 1900, Channel 512/810, Frequency 1850.0/1910.0 MHz

(Lowest Frequency:EGPRS / Highest Frequency: GPRS)

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	1850.0743	1909.9237		
Extreme (50C)		1850.0743	1909.9237	31.8	0.017
Extreme (40C)		1850.0743	1909.9238	56.9	0.030
Extreme (30C)		1850.0743	1909.9238	74.9	0.040
Extreme (10C)		1850.0743	1909.9238	50.1	0.027
Extreme (0C)		1850.0743	1909.9238	56.9	0.030
Extreme (-10C)		1850.0743	1909.9238	56.2	0.030
Extreme (-20C)		1850.0743	1909.9238	50.4	0.027
Extreme (-30C)		1850.0743	1909.9238	48.1	0.026
20C	15%	1850.0743	1909.9237	25.2	0.013
	-15%	1850.0743	1909.9237	28.8	0.015
	End Point	1850.0743	1909.9237	26.0	0.014

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
		Frequency Deviation Measured with Time Elapse				
Power Supply [Vdc]	Environment Temperature [°C]	Low Channel		High Channel		Limit [ppm]
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.85	50	826.40001722	0.003	846.60001641	0.004	2.5
3.85	40	826.40002018	0.000	846.60001708	0.003	2.5
3.85	30	826.40002057	-0.001	846.60001780	0.003	2.5
3.85	20	826.40001994	0.000	846.60001997	0.000	2.5
3.85	10	826.40001789	0.002	846.60001827	0.002	2.5
3.85	0	826.40001803	0.002	846.60002020	0.000	2.5
3.85	-10	826.40001566	0.005	846.60001938	0.001	2.5
3.85	-20	826.40001561	0.005	846.60001274	0.009	2.5
3.85	-30	826.40002062	-0.001	846.60001918	0.001	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
		Frequency Deviation Measured with Time Elapse				
Power Supply [Vdc]	Environment Temperature [°C]	Low Channel		High Channel		Limit [ppm]
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.85	20	826.40001994	0	846.60001997	0	2.5
4.40	20	826.40001751	0.003	846.60001664	0.004	2.5
3.60	20	826.40001906	0.001	846.60002055	-0.001	2.5

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
		Frequency Deviation Measured with Time Elapse				
Power Supply [Vdc]	Environment Temperature [°C]	Low Channel		High Channel		Limit [ppm]
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.85	50	824.70004291	0.013	848.30002886	0.033	2.5
3.85	40	824.70001693	0.045	848.30001980	0.044	2.5
3.85	30	824.70001792	0.044	848.30002043	0.043	2.5
3.85	20	824.70005388	0.000	848.30005720	0.000	2.5
3.85	10	824.70004163	0.015	848.30003258	0.029	2.5
3.85	0	824.70003249	0.026	848.30001537	0.049	2.5
3.85	-10	824.70001330	0.049	848.30001473	0.050	2.5
3.85	-20	824.70002855	0.031	848.30001706	0.047	2.5
3.85	-30	824.70002036	0.041	848.30002528	0.038	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
		Frequency Deviation Measured with Time Elapse				
Power Supply [Vdc]	Environment Temperature [°C]	Low Channel		High Channel		Limit [ppm]
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.85	20	824.70005388	0	848.30005720	0	2.5
4.40	20	824.70001834	0.043	848.30002197	0.042	2.5
3.60	20	824.70001535	0.047	848.30001859	0.046	2.5

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	2496.2561	2689.9695		
Extreme (50C)		2496.2561	2689.9696	62.5	0.024
Extreme (40C)		2496.2561	2689.9696	55.6	0.021
Extreme (30C)		2496.2561	2689.9695	31.4	0.012
Extreme (10C)		2496.2561	2689.9695	37.5	0.014
Extreme (0C)		2496.2561	2689.9695	27.3	0.011
Extreme (-10C)		2496.2561	2689.9696	68.9	0.027
Extreme (-20C)		2496.2561	2689.9696	53.1	0.020
Extreme (-30C)		2496.2561	2689.9696	63.7	0.025
20C	15%	2496.2561	2689.9695	35.1	0.014
	-15%	2496.2561	2689.9695	31.8	0.012
	End Point	2496.2561	2689.9695	37.7	0.015

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:

(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

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	31.05	V	3.01	-1.33	26.71	468.81	38.50	-11.79
		824.20	32.27	H	3.01	-1.33	27.93	620.87	38.50	-10.57
		836.60	29.54	V	3.03	-1.22	25.29	338.06	38.50	-13.21
		836.60	32.59	H	3.03	-1.22	28.34	682.34	38.50	-10.16
		848.80	29.18	V	3.05	-1.11	25.02	317.69	38.50	-13.48
		848.80	31.94	H	3.05	-1.11	27.78	599.79	38.50	-10.72
	EGPRS	824.20	24.12	V	3.01	-1.33	19.78	95.06	38.50	-18.72
		824.20	25.43	H	3.01	-1.33	21.09	128.53	38.50	-17.41
		836.60	22.41	V	3.03	-1.22	18.16	65.46	38.50	-20.34
		836.60	25.51	H	3.03	-1.22	21.26	133.66	38.50	-17.24
		848.80	21.74	V	3.05	-1.11	17.58	57.28	38.50	-20.92
		848.80	24.25	H	3.05	-1.11	20.09	102.09	38.50	-18.41

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	22.59	V	4.47	9.60	27.72	591.56	33.00	-5.28
		1850.20	24.83	H	4.47	9.60	29.96	990.83	33.00	-3.04
		1880.00	22.47	V	4.50	9.39	27.35	543.25	33.00	-5.65
		1880.00	25.04	H	4.50	9.39	29.92	981.75	33.00	-3.08
		1909.80	23.80	V	4.54	9.13	28.38	688.65	33.00	-4.62
		1909.80	26.05	H	4.54	9.13	30.63	1156.11	33.00	-2.37
	EGPRS	1850.20	19.65	V	4.47	9.60	24.78	300.61	33.00	-8.22
		1850.20	22.56	H	4.47	9.60	27.69	587.49	33.00	-5.31
		1880.00	18.01	V	4.50	9.39	22.89	194.54	33.00	-10.11
		1880.00	20.82	H	4.50	9.39	25.70	371.54	33.00	-7.30
		1909.80	18.26	V	4.54	9.13	22.84	192.31	33.00	-10.16
		1909.80	21.08	H	4.54	9.13	25.66	368.13	33.00	-7.34

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	24.18	V	3.01	-1.31	19.86	96.83	38.50	-18.64
		826.40	12.86	H	3.01	-1.31	8.54	7.14	38.50	-29.96
		836.60	24.21	V	3.03	-1.22	19.96	99.08	38.50	-18.54
		836.60	13.21	H	3.03	-1.22	8.96	7.87	38.50	-29.54
		846.60	25.37	V	3.05	-1.13	21.20	131.83	38.50	-17.30
	HSDPA	846.60	14.99	H	3.05	-1.13	10.81	12.05	38.50	-27.69
		826.40	23.19	V	3.01	-1.31	18.87	77.09	38.50	-19.63
		826.40	11.44	H	3.01	-1.31	7.12	5.15	38.50	-31.38
		836.60	23.06	V	3.03	-1.22	18.81	76.03	38.50	-19.69
		836.60	11.36	H	3.03	-1.22	7.11	5.14	38.50	-31.39
		846.60	23.41	V	3.05	-1.13	19.24	83.95	38.50	-19.26
		846.60	13.00	H	3.05	-1.13	8.82	7.62	38.50	-29.68

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	23.33	H	3.01	-1.33	19.00	79.43	38.50	-19.50	1/3
		836.50	23.52	H	3.03	-1.22	19.27	84.53	38.50	-19.23	1/3
		848.30	23.17	H	3.05	-1.12	19.00	79.43	38.50	-19.50	1/3
	16-QAM	824.70	22.22	H	3.01	-1.33	17.89	61.52	38.50	-20.61	1/3
		836.50	22.71	H	3.03	-1.22	18.46	70.15	38.50	-20.04	1/3
		848.30	21.82	H	3.05	-1.12	17.65	58.21	38.50	-20.85	1/3
3	QPSK	825.50	23.71	H	3.01	-1.32	19.38	86.70	38.50	-19.12	1/8
		836.50	23.98	H	3.03	-1.22	19.73	93.97	38.50	-18.77	1/8
		847.50	22.95	H	3.05	-1.12	18.78	75.51	38.50	-19.72	1/8
	16-QAM	825.50	22.57	H	3.01	-1.32	18.24	66.68	38.50	-20.26	1/8
		836.50	22.83	H	3.03	-1.22	18.58	72.11	38.50	-19.92	1/8
		847.50	21.80	H	3.05	-1.12	17.63	57.94	38.50	-20.87	1/8
5	QPSK	826.50	23.00	H	3.01	-1.31	18.67	73.62	38.50	-19.83	1/12
		836.50	23.42	H	3.03	-1.22	19.17	82.60	38.50	-19.33	1/12
		846.50	23.18	H	3.05	-1.13	19.00	79.43	38.50	-19.50	1/12
	16-QAM	826.50	22.04	H	3.01	-1.31	17.71	59.02	38.50	-20.79	1/12
		836.50	23.02	H	3.03	-1.22	18.77	75.34	38.50	-19.73	1/12
		846.50	22.21	H	3.05	-1.13	18.03	63.53	38.50	-20.47	1/12
10	QPSK	829.00	23.13	H	3.02	-1.29	18.82	76.21	38.50	-19.68	1/25
		836.50	23.41	H	3.03	-1.22	19.16	82.41	38.50	-19.34	1/25
		844.00	23.36	H	3.04	-1.15	19.16	82.41	38.50	-19.34	1/25
	16-QAM	829.00	22.58	H	3.02	-1.29	18.27	67.14	38.50	-20.23	1/25
		836.50	22.31	H	3.03	-1.22	18.06	63.97	38.50	-20.44	1/25
		844.00	22.10	H	3.04	-1.15	17.90	61.66	38.50	-20.60	1/25

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	19.05	H	5.23	10.21	24.02	252.35	33.00	-8.98	1/12
		2593.00	19.66	H	5.34	10.12	24.44	277.97	33.00	-8.56	1/12
		2687.50	17.78	H	5.44	10.20	22.54	179.47	33.00	-10.46	1/24
	16-QAM	2498.50	18.36	H	5.23	10.21	23.33	215.28	33.00	-9.67	1/12
		2593.00	18.89	H	5.34	10.12	23.67	232.81	33.00	-9.33	1/12
		2687.50	17.48	H	5.44	10.20	22.24	167.49	33.00	-10.76	1/24
10	QPSK	2501.00	19.02	H	5.24	10.20	23.99	250.61	33.00	-9.01	1/25
		2593.00	19.86	H	5.34	10.12	24.64	291.07	33.00	-8.36	1/25
		2685.00	18.58	H	5.43	10.20	23.34	215.77	33.00	-9.66	1/25
	16-QAM	2501.00	18.46	H	5.24	10.20	23.43	220.29	33.00	-9.57	1/25
		2593.00	19.36	H	5.34	10.12	24.14	259.42	33.00	-8.86	1/25
		2685.00	18.21	H	5.43	10.20	22.97	198.15	33.00	-10.03	1/25
15	QPSK	2503.50	20.11	H	5.24	10.20	25.07	321.37	33.00	-7.93	1/0
		2593.00	19.73	H	5.34	10.12	24.51	282.49	33.00	-8.49	1/37
		2682.50	17.89	H	5.43	10.19	22.65	184.08	33.00	-10.35	1/74
	16-QAM	2503.50	18.66	H	5.24	10.20	23.62	230.14	33.00	-9.38	1/74
		2593.00	18.99	H	5.34	10.12	23.77	238.23	33.00	-9.23	1/37
		2682.50	17.62	H	5.43	10.19	22.38	172.98	33.00	-10.62	1/74
20	QPSK	2506.00	19.13	H	5.24	10.19	24.09	256.45	33.00	-8.91	1/49
		2593.00	20.30	H	5.34	10.12	25.08	322.11	33.00	-7.92	1/49
		2680.00	19.00	H	5.43	10.19	23.76	237.68	33.00	-9.24	1/49
	16-QAM	2506.00	18.54	H	5.24	10.19	23.50	223.87	33.00	-9.50	1/49
		2593.00	19.46	H	5.34	10.12	24.24	265.46	33.00	-8.76	1/49
		2680.00	18.10	H	5.43	10.19	22.86	193.20	33.00	-10.14	1/49

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:

(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.

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 #:		4790360891							
Date:		4/13/2022							
Test Engineer:		19227							
Configuration:		EUT/ AC Adapter, Y-Position							
Location:		Chamber 1							
Mode:		GPRS 850 MHz Harmonics							
Test Votage:		AC 120 V, 60 Hz							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 824.2MHz									
1648.40	1.8	V	3.0	45.6	1.0	-42.8	-13.0	-29.8	
2472.60	14.5	V	3.0	45.4	1.0	-29.9	-13.0	-16.9	
3296.80	-7.6	V	3.0	45.7	1.0	-52.3	-13.0	-39.3	
4121.00	6.8	V	3.0	45.9	1.0	-38.1	-13.0	-25.1	
1648.40	0.2	H	3.0	45.6	1.0	-44.4	-13.0	-31.4	
2472.60	11.3	H	3.0	45.4	1.0	-33.2	-13.0	-20.2	
3296.80	-7.2	H	3.0	45.7	1.0	-51.9	-13.0	-38.9	
4121.00	5.5	H	3.0	45.9	1.0	-39.4	-13.0	-26.4	
Mid Ch, 836.8MHz									
1673.20	-0.3	V	3.0	45.6	1.0	-44.9	-13.0	-31.9	
2509.80	3.8	V	3.0	45.5	1.0	-40.7	-13.0	-27.7	
3346.40	-7.7	V	3.0	45.7	1.0	-52.4	-13.0	-39.4	
4183.00	-0.7	V	3.0	45.9	1.0	-45.6	-13.0	-32.6	
1673.20	-2.1	H	3.0	45.6	1.0	-46.7	-13.0	-33.7	
2509.80	1.9	H	3.0	45.5	1.0	-42.5	-13.0	-29.5	
3346.40	-7.2	H	3.0	45.7	1.0	-51.9	-13.0	-38.9	
4183.00	-3.9	H	3.0	45.9	1.0	-48.8	-13.0	-35.8	
High Ch, 848.8MHz									
1697.60	1.0	V	3.0	45.6	1.0	-43.6	-13.0	-30.6	
2546.40	1.8	V	3.0	45.5	1.0	-42.7	-13.0	-29.7	
3395.20	-7.2	V	3.0	45.7	1.0	-51.9	-13.0	-38.9	
4244.00	5.7	V	3.0	45.9	1.0	-39.2	-13.0	-26.2	
1697.60	-0.6	H	3.0	45.6	1.0	-45.2	-13.0	-32.2	
2546.40	2.9	H	3.0	45.5	1.0	-41.6	-13.0	-28.6	
3395.20	-7.2	H	3.0	45.7	1.0	-51.9	-13.0	-38.9	
4244.00	6.4	H	3.0	45.9	1.0	-38.5	-13.0	-25.5	

GSM850
GPRS

GSM1900

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4790360891							
Date:		4/14/2022							
Test Engineer:		25546							
Configuration:		EUT / AC Adapter, Y-Position							
Location:		Chamber 1							
Mode:		GPRS 1900 MHz Harmonics							
Test Votage:		AC 120 V, 60 Hz							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1850.2MHz									
3700.40	-8.0	V	3.0	45.8	1.0	-52.8	-13.0	-39.8	
5550.60	18.2	V	3.0	45.7	1.0	-26.5	-13.0	-13.5	
7400.80	-4.5	V	3.0	44.6	1.0	-48.0	-13.0	-35.0	
9251.00	7.3	V	3.0	43.3	1.0	-35.0	-13.0	-22.0	
11101.20	1.2	V	3.0	42.9	1.0	-40.7	-13.0	-27.7	
3700.40	-8.3	H	3.0	45.8	1.0	-53.1	-13.0	-40.1	
5550.60	18.3	H	3.0	45.7	1.0	-26.5	-13.0	-13.5	
7400.80	-4.7	H	3.0	44.6	1.0	-48.2	-13.0	-35.2	
9251.00	4.9	H	3.0	43.3	1.0	-37.4	-13.0	-24.4	
11101.20	5.4	H	3.0	42.9	1.0	-36.6	-13.0	-23.6	
Mid Ch, 1880MHz									
3760.00	-1.9	V	3.0	45.8	1.0	-46.8	-13.0	-33.8	
5640.00	16.0	V	3.0	45.7	1.0	-28.7	-13.0	-15.7	
7520.00	-1.5	V	3.0	44.5	1.0	-45.0	-13.0	-32.0	
9400.00	9.0	V	3.0	43.2	1.0	-33.2	-13.0	-20.2	
11280.00	1.3	V	3.0	43.0	1.0	-40.7	-13.0	-27.7	
3760.00	-1.3	H	3.0	45.8	1.0	-46.1	-13.0	-33.1	
5640.00	22.7	H	3.0	45.7	1.0	-22.1	-13.0	-9.1	
7520.00	-1.0	H	3.0	44.5	1.0	-44.5	-13.0	-31.5	
9400.00	3.8	H	3.0	43.2	1.0	-38.4	-13.0	-25.4	
11280.00	3.5	H	3.0	43.0	1.0	-38.5	-13.0	-25.5	
High Ch, 1909.8MHz									
3819.60	-6.7	V	3.0	45.8	1.0	-51.5	-13.0	-38.5	
5729.40	19.5	V	3.0	45.7	1.0	-25.2	-13.0	-12.2	
7639.20	-4.5	V	3.0	44.4	1.0	-48.0	-13.0	-35.0	
9549.00	-1.4	V	3.0	43.0	1.0	-43.4	-13.0	-30.4	
11458.80	1.5	V	3.0	43.1	1.0	-40.5	-13.0	-27.5	
3819.60	-1.1	H	3.0	45.8	1.0	-45.9	-13.0	-32.9	
5729.40	20.6	H	3.0	45.7	1.0	-24.1	-13.0	-11.1	
7639.20	-4.5	H	3.0	44.4	1.0	-47.9	-13.0	-34.9	
9549.00	6.6	H	3.0	43.0	1.0	-35.4	-13.0	-22.4	
11458.80	4.9	H	3.0	43.1	1.0	-37.1	-13.0	-24.1	

GSM1900
GPRS

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4790360891							
Date:		4/14/2022							
Test Engineer:		25546							
Configuration:		EUT / AC Adapter, 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	-10.2	V	3.0	45.8	1.0	-55.0	-13.0	-42.0	
5550.60	16.9	V	3.0	45.7	1.0	-27.8	-13.0	-14.8	
7400.80	-5.1	V	3.0	44.6	1.0	-48.7	-13.0	-35.7	
9251.00	-0.8	V	3.0	43.3	1.0	-43.1	-13.0	-30.1	
11101.20	0.1	V	3.0	42.9	1.0	-41.8	-13.0	-28.8	
3700.40	-10.0	H	3.0	45.8	1.0	-54.8	-13.0	-41.8	
5550.60	17.6	H	3.0	45.7	1.0	-27.2	-13.0	-14.2	
7400.80	-4.5	H	3.0	44.6	1.0	-48.1	-13.0	-35.1	
9251.00	2.1	H	3.0	43.3	1.0	-40.2	-13.0	-27.2	
11101.20	1.1	H	3.0	42.9	1.0	-40.9	-13.0	-27.9	
Mid Ch, 1880MHz									
3760.00	-8.2	V	3.0	45.8	1.0	-53.1	-13.0	-40.1	
5640.00	15.2	V	3.0	45.7	1.0	-29.5	-13.0	-16.5	
7520.00	-5.1	V	3.0	44.5	1.0	-48.6	-13.0	-35.6	
9400.00	1.7	V	3.0	43.2	1.0	-40.5	-13.0	-27.5	
11280.00	0.6	V	3.0	43.0	1.0	-41.4	-13.0	-28.4	
3760.00	-8.0	H	3.0	45.8	1.0	-52.9	-13.0	-39.9	
5640.00	21.7	H	3.0	45.7	1.0	-23.0	-13.0	-10.0	
7520.00	-5.2	H	3.0	44.5	1.0	-48.7	-13.0	-35.7	
9400.00	-106.7	H	3.0	43.2	1.0	-148.8	-13.0	-135.8	
11280.00	0.6	H	3.0	43.0	1.0	-41.4	-13.0	-28.4	
High Ch, 1909.8MHz									
3819.60	-9.5	V	3.0	45.8	1.0	-54.4	-13.0	-41.4	
5729.40	18.1	V	3.0	45.7	1.0	-26.6	-13.0	-13.6	
7639.20	-4.9	V	3.0	44.4	1.0	-48.3	-13.0	-35.3	
9549.00	0.9	V	3.0	43.0	1.0	-41.1	-13.0	-28.1	
11458.80	0.6	V	3.0	43.1	1.0	-41.5	-13.0	-28.5	
3819.60	-9.6	H	3.0	45.8	1.0	-54.5	-13.0	-41.5	
5729.40	18.9	H	3.0	45.7	1.0	-25.8	-13.0	-12.8	
7639.20	-4.9	H	3.0	44.4	1.0	-48.3	-13.0	-35.3	
9549.00	5.3	H	3.0	43.0	1.0	-36.7	-13.0	-23.7	
11458.80	3.5	H	3.0	43.1	1.0	-38.6	-13.0	-25.6	

GSM1900
EGPRS

WCDMA Band 5

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4790360891							
Date:		4/15/2022							
Test Engineer:		19568							
Configuration:		EUT / AC Adapter, Z-Position							
Location:		Chamber 1							
Mode:		Rel99 Band 5 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, 826.4MHz									
1652.80	-14.6	V	3.0	45.6	1.0	-59.3	-13.0	-46.3	
2479.20	-11.5	V	3.0	45.5	1.0	-55.9	-13.0	-42.9	
3305.60	-9.2	V	3.0	45.7	1.0	-53.9	-13.0	-40.9	
4132.00	-9.4	V	3.0	45.9	1.0	-54.3	-13.0	-41.3	
4958.40	-8.5	V	3.0	45.8	1.0	-53.3	-13.0	-40.3	
1652.80	-16.2	H	3.0	45.6	1.0	-60.8	-13.0	-47.8	
2479.20	-12.8	H	3.0	45.5	1.0	-57.2	-13.0	-44.2	
3305.60	-8.9	H	3.0	45.7	1.0	-53.6	-13.0	-40.6	
4132.00	-9.3	H	3.0	45.9	1.0	-54.2	-13.0	-41.2	
4958.40	-8.9	H	3.0	45.8	1.0	-53.8	-13.0	-40.8	
Mid Ch, 836.6MHz									
1673.20	-15.1	V	3.0	45.6	1.0	-59.7	-13.0	-46.7	
2509.80	-11.8	V	3.0	45.5	1.0	-56.2	-13.0	-43.2	
3346.40	-9.2	V	3.0	45.7	1.0	-53.9	-13.0	-40.9	
4183.00	-9.4	V	3.0	45.9	1.0	-54.3	-13.0	-41.3	
5019.60	-9.0	V	3.0	45.8	1.0	-53.8	-13.0	-40.8	
1673.20	-16.3	H	3.0	45.6	1.0	-60.9	-13.0	-47.9	
2509.80	-12.1	H	3.0	45.5	1.0	-56.6	-13.0	-43.6	
3346.40	-8.9	H	3.0	45.7	1.0	-53.6	-13.0	-40.6	
4183.00	-9.2	H	3.0	45.9	1.0	-54.1	-13.0	-41.1	
5019.60	-8.7	H	3.0	45.8	1.0	-53.5	-13.0	-40.5	
High Ch, 846.6MHz									
1693.20	-14.7	V	3.0	45.6	1.0	-59.3	-13.0	-46.3	
2539.80	-11.7	V	3.0	45.5	1.0	-56.2	-13.0	-43.2	
3386.40	-8.7	V	3.0	45.7	1.0	-53.4	-13.0	-40.4	
4233.00	-9.4	V	3.0	45.9	1.0	-54.3	-13.0	-41.3	
5079.60	-8.5	V	3.0	45.8	1.0	-53.3	-13.0	-40.3	
1693.20	-15.8	H	3.0	45.6	1.0	-60.4	-13.0	-47.4	
2539.80	-12.1	H	3.0	45.5	1.0	-56.5	-13.0	-43.5	
3386.40	-8.9	H	3.0	45.7	1.0	-53.6	-13.0	-40.6	
4233.00	-9.2	H	3.0	45.9	1.0	-54.1	-13.0	-41.1	
5079.60	-8.6	H	3.0	45.8	1.0	-53.4	-13.0	-40.4	

Band 5
REL99

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4790360891							
Date:		4/15/2022							
Test Engine Test Engineer:		19568							
Configuration:		EUT / AC Adapter, Z-Position							
Location:		Chamber 1							
Mode:		HSDPA Band 5 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, 826.4MHz									
1652.80	-14.7	V	3.0	45.6	1.0	-59.3	-13.0	-46.3	
2479.20	-11.5	V	3.0	45.5	1.0	-56.0	-13.0	-43.0	
3305.60	-9.1	V	3.0	45.7	1.0	-53.7	-13.0	-40.7	
4132.00	-9.5	V	3.0	45.9	1.0	-54.4	-13.0	-41.4	
4958.40	-8.4	V	3.0	45.8	1.0	-53.3	-13.0	-40.3	
1652.80	-15.8	H	3.0	45.6	1.0	-60.5	-13.0	-47.5	
2479.20	-12.0	H	3.0	45.5	1.0	-56.5	-13.0	-43.5	
3305.60	-9.1	H	3.0	45.7	1.0	-53.8	-13.0	-40.8	
4132.00	-9.6	H	3.0	45.9	1.0	-54.5	-13.0	-41.5	
4958.40	-8.7	H	3.0	45.8	1.0	-53.5	-13.0	-40.5	
Mid Ch, 836.6MHz									
1673.20	-15.2	V	3.0	45.6	1.0	-59.8	-13.0	-46.8	
2509.80	-11.3	V	3.0	45.5	1.0	-55.8	-13.0	-42.8	
3346.40	-9.0	V	3.0	45.7	1.0	-53.7	-13.0	-40.7	
4183.00	-9.2	V	3.0	45.9	1.0	-54.1	-13.0	-41.1	
5019.60	-8.7	V	3.0	45.8	1.0	-53.6	-13.0	-40.6	
1673.20	-15.6	H	3.0	45.6	1.0	-60.2	-13.0	-47.2	
2509.80	-12.0	H	3.0	45.5	1.0	-56.4	-13.0	-43.4	
3346.40	-9.9	H	3.0	45.7	1.0	-54.6	-13.0	-41.6	
4183.00	-9.2	H	3.0	45.9	1.0	-54.1	-13.0	-41.1	
5019.60	-8.8	H	3.0	45.8	1.0	-53.6	-13.0	-40.6	
High Ch, 846.6MHz									
1693.20	-14.5	V	3.0	45.6	1.0	-59.0	-13.0	-46.0	
2539.80	-11.6	V	3.0	45.5	1.0	-56.1	-13.0	-43.1	
3386.40	-8.6	V	3.0	45.7	1.0	-53.3	-13.0	-40.3	
4233.00	-9.7	V	3.0	45.9	1.0	-54.6	-13.0	-41.6	
5079.60	-8.6	V	3.0	45.8	1.0	-53.5	-13.0	-40.5	
1693.20	-15.7	H	3.0	45.6	1.0	-60.3	-13.0	-47.3	
2539.80	-11.9	H	3.0	45.5	1.0	-56.4	-13.0	-43.4	
3386.40	-8.9	H	3.0	45.7	1.0	-53.6	-13.0	-40.6	
4233.00	-9.3	H	3.0	45.9	1.0	-54.2	-13.0	-41.2	
5079.60	-8.9	H	3.0	45.8	1.0	-53.7	-13.0	-40.7	

Band 5
HSDPA

LTE Band 5

	UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
	Company: Samsung Project #: 4790360891 Date: 4/11/2022 Test Engineer: 19568 Configuration: EUT / AC Adapter, Z-Position Location: Chamber 1 Mode: LTE_QPSK Band 5 Harmonics, 5MHz 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
LTE Band 5 5MHz QPSK	Low Ch, 826.5MHz									
	1653.00	-13.1	V	3.0	45.6	1.0	-57.7	-13.0	-44.7	
	2479.50	-12.2	V	3.0	45.5	1.0	-56.6	-13.0	-43.6	
	3306.00	-9.9	V	3.0	45.7	1.0	-54.6	-13.0	-41.6	
	4132.50	-7.3	V	3.0	45.9	1.0	-52.2	-13.0	-39.2	
	4959.00	-8.6	V	3.0	45.8	1.0	-53.4	-13.0	-40.4	
	1653.00	-14.8	H	3.0	45.6	1.0	-59.4	-13.0	-46.4	
	2479.50	-12.7	H	3.0	45.5	1.0	-57.1	-13.0	-44.1	
	3306.00	-9.9	H	3.0	45.7	1.0	-54.6	-13.0	-41.6	
	4132.50	-9.1	H	3.0	45.9	1.0	-54.0	-13.0	-41.0	
	4959.00	-8.8	H	3.0	45.8	1.0	-53.6	-13.0	-40.6	
	Mid Ch, 836.5MHz									
	1673.00	-13.1	V	3.0	45.6	1.0	-57.7	-13.0	-44.7	
	2509.50	-12.2	V	3.0	45.5	1.0	-56.6	-13.0	-43.6	
	3346.00	-9.7	V	3.0	45.7	1.0	-54.3	-13.0	-41.3	
	4182.50	-7.4	V	3.0	45.9	1.0	-52.3	-13.0	-39.3	
	5019.00	-7.4	V	3.0	45.8	1.0	-52.2	-13.0	-39.2	
	1673.00	-13.7	H	3.0	45.6	1.0	-58.3	-13.0	-45.3	
	2509.50	-12.3	H	3.0	45.5	1.0	-56.7	-13.0	-43.7	
	3346.00	-9.5	H	3.0	45.7	1.0	-54.2	-13.0	-41.2	
	4182.50	-9.2	H	3.0	45.9	1.0	-54.1	-13.0	-41.1	
	5019.00	-8.4	H	3.0	45.8	1.0	-53.2	-13.0	-40.2	
	High Ch, 846.5MHz									
	1693.00	-13.4	V	3.0	45.6	1.0	-57.9	-13.0	-44.9	
	2539.50	-11.8	V	3.0	45.5	1.0	-56.3	-13.0	-43.3	
	3386.00	-9.4	V	3.0	45.7	1.0	-54.1	-13.0	-41.1	
	4232.50	-7.7	V	3.0	45.9	1.0	-52.6	-13.0	-39.6	
	5079.00	-4.6	V	3.0	45.8	1.0	-49.4	-13.0	-36.4	
	1693.00	-13.4	H	3.0	45.6	1.0	-58.0	-13.0	-45.0	
	2539.50	-12.4	H	3.0	45.5	1.0	-56.9	-13.0	-43.9	
	3386.00	-9.4	H	3.0	45.7	1.0	-54.1	-13.0	-41.1	
	4232.50	-8.9	H	3.0	45.9	1.0	-53.8	-13.0	-40.8	
	5079.00	-7.4	H	3.0	45.8	1.0	-52.2	-13.0	-39.2	

LTE Band 41

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4790360891							
Date:		4/11/2022							
Test Engineer:		19568							
Configuration:		EUT / AC Adapter, Z-Position							
Location:		Chamber 2							
Mode:		LTE_QPSK Band 41 Harmonics, 20MHz 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, 2506MHz									
5012.00	-12.2	V	3.0	43.0	1.0	-54.3	-25.0	-29.3	
7518.00	-7.8	V	3.0	42.7	1.0	-49.4	-25.0	-24.4	
10024.00	-12.5	V	3.0	41.1	1.0	-52.6	-25.0	-27.6	
12530.00	-9.5	V	3.0	42.3	1.0	-50.8	-25.0	-25.8	
15036.00	-5.0	V	3.0	43.9	1.0	-48.0	-25.0	-23.0	
5012.00	-9.1	H	3.0	43.0	1.0	-51.1	-25.0	-26.1	
7518.00	-9.3	H	3.0	42.7	1.0	-51.0	-25.0	-26.0	
10024.00	-12.2	H	3.0	41.1	1.0	-52.3	-25.0	-27.3	
12530.00	-9.3	H	3.0	42.3	1.0	-50.6	-25.0	-25.6	
15036.00	-4.7	H	3.0	43.9	1.0	-47.6	-25.0	-22.6	
Mid Ch, 2593MHz									
5186.00	-14.3	V	3.0	43.1	1.0	-56.3	-25.0	-31.3	
7779.00	-10.8	V	3.0	42.5	1.0	-52.4	-25.0	-27.4	
10372.00	-13.2	V	3.0	41.3	1.0	-53.4	-25.0	-28.4	
12965.00	-9.1	V	3.0	42.6	1.0	-50.6	-25.0	-25.6	
15558.00	-4.3	V	3.0	43.8	1.0	-47.1	-25.0	-22.1	
5186.00	-9.1	H	3.0	43.1	1.0	-51.2	-25.0	-26.2	
7779.00	-13.0	H	3.0	42.5	1.0	-54.5	-25.0	-29.5	
10372.00	-12.8	H	3.0	41.3	1.0	-53.1	-25.0	-28.1	
12965.00	-8.9	H	3.0	42.6	1.0	-50.5	-25.0	-25.5	
15558.00	-3.3	H	3.0	43.8	1.0	-46.1	-25.0	-21.1	
High Ch, 2680MHz									
5360.00	-8.6	V	3.0	43.1	1.0	-50.7	-25.0	-25.7	
8040.00	-11.6	V	3.0	42.4	1.0	-53.0	-25.0	-28.0	
10720.00	-12.1	V	3.0	41.4	1.0	-52.5	-25.0	-27.5	
13400.00	-6.9	V	3.0	42.9	1.0	-48.8	-25.0	-23.8	
16080.00	0.6	V	3.0	43.6	1.0	-42.0	-25.0	-17.0	
5360.00	-7.7	H	3.0	43.1	1.0	-49.8	-25.0	-24.8	
8040.00	-12.4	H	3.0	42.4	1.0	-53.9	-25.0	-28.9	
10720.00	-11.7	H	3.0	41.4	1.0	-52.1	-25.0	-27.1	
13400.00	-7.3	H	3.0	42.9	1.0	-49.1	-25.0	-24.1	
16080.00	-2.7	H	3.0	43.6	1.0	-45.3	-25.0	-20.3	

LTE
Band 41

20MHz

QPSK

END OF REPORT