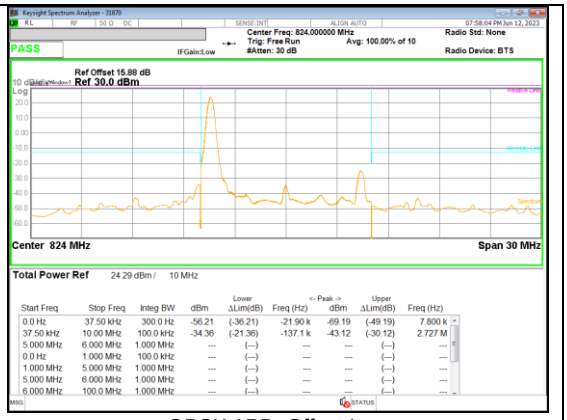
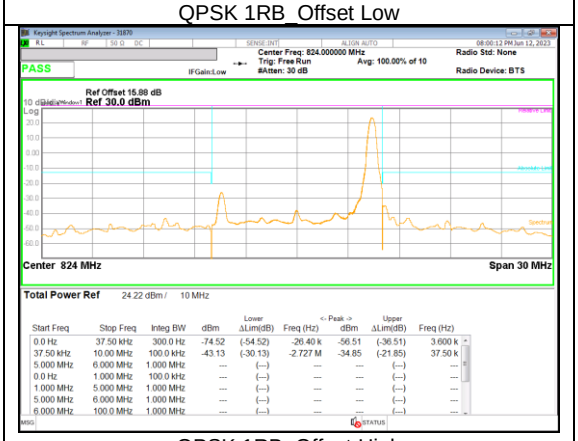
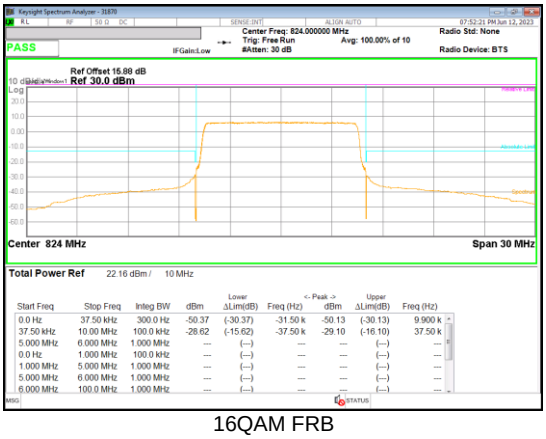
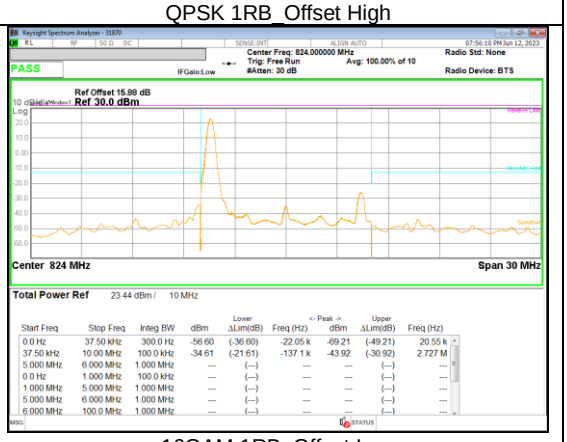
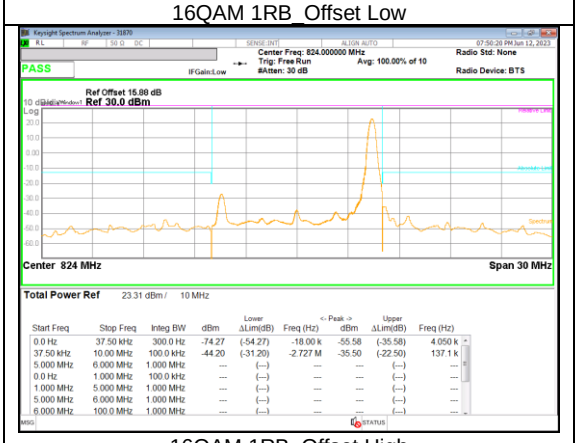
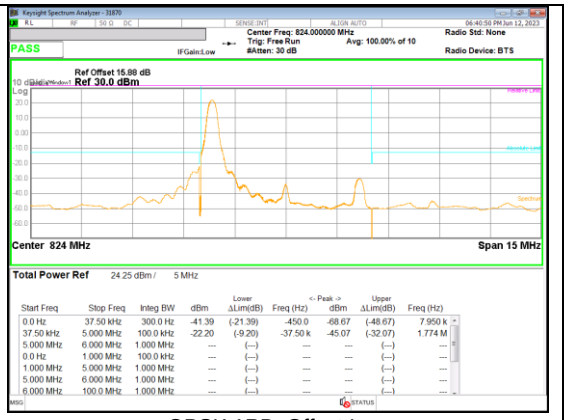
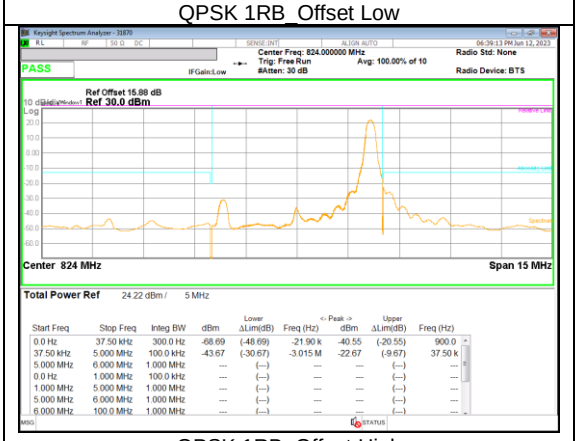
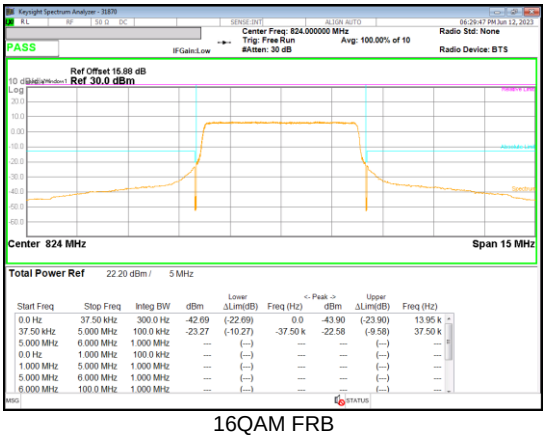
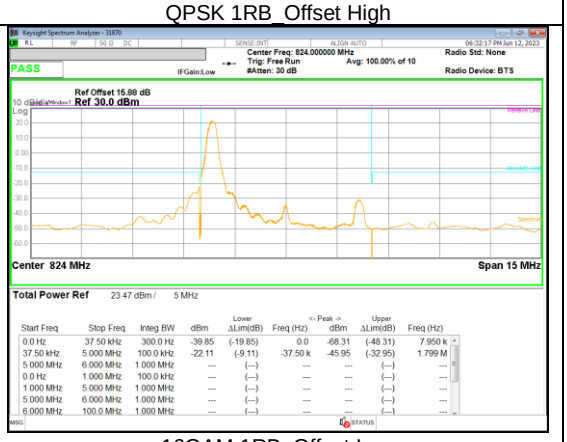
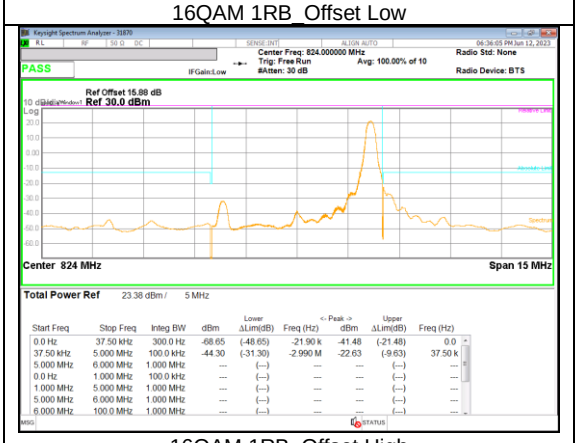
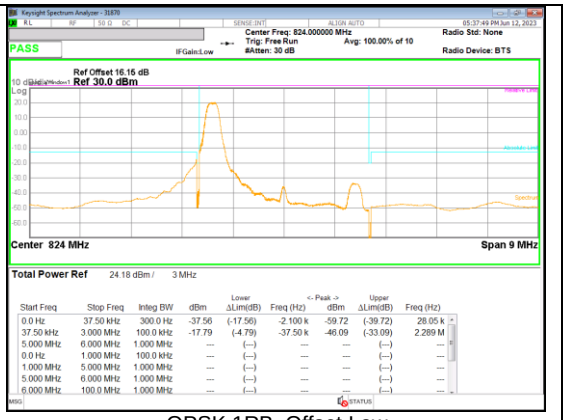
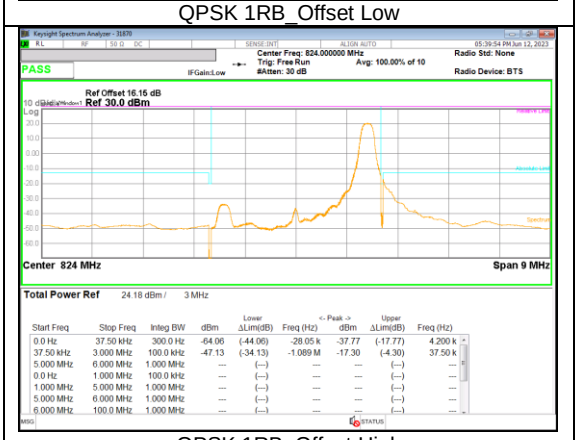
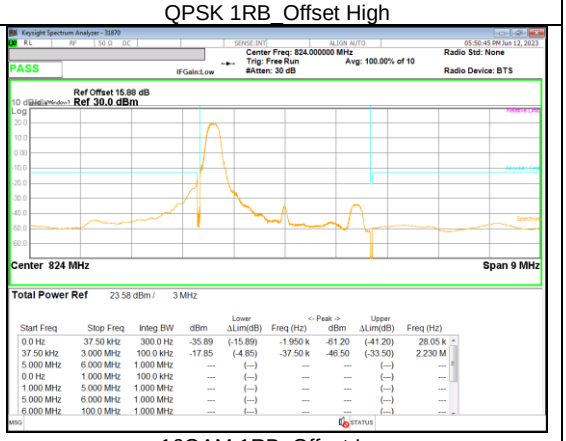
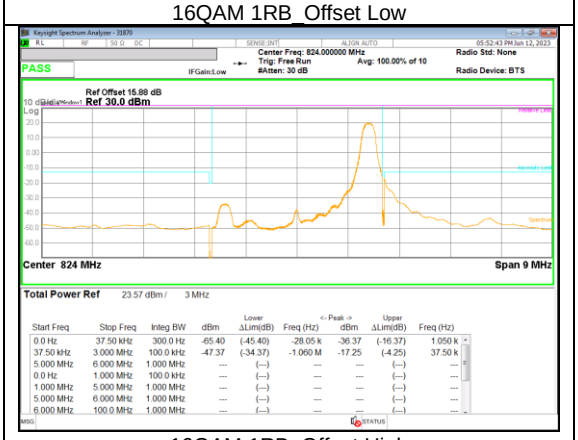
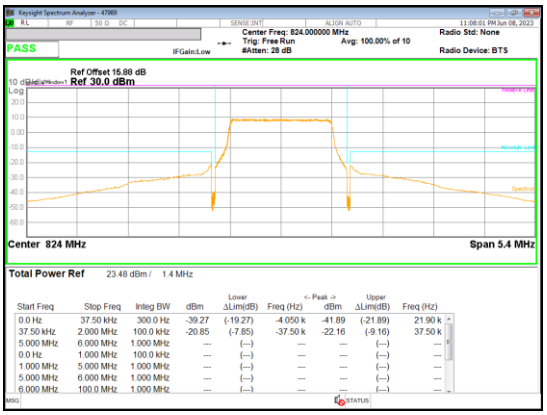
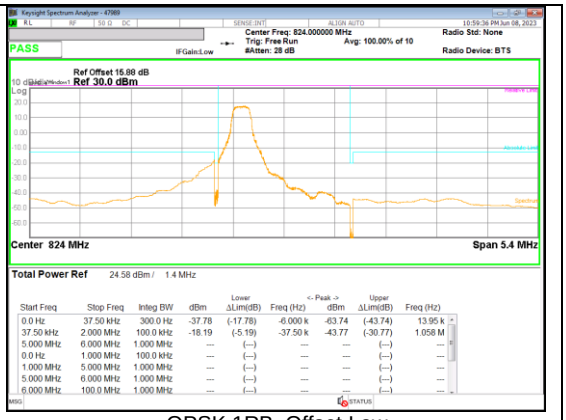
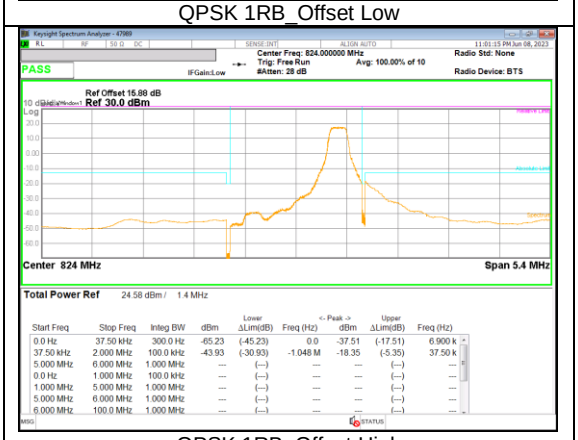
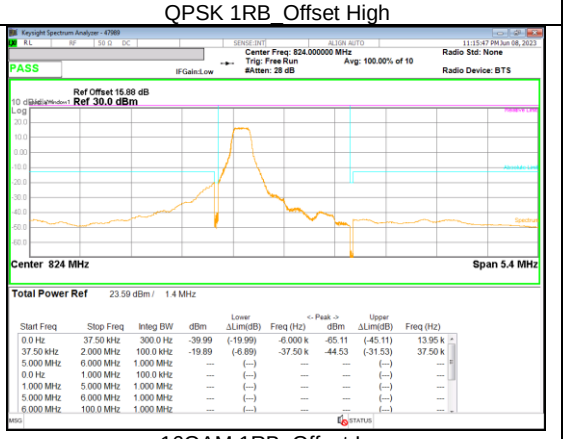
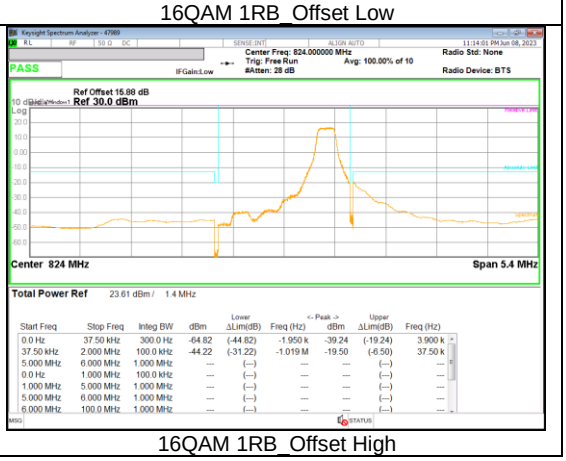
10MHz	 QPSK FRB	 QPSK 1RB_Offset Low
		 QPSK 1RB_Offset High
	 16QAM FRB	 16QAM 1RB_Offset Low
		 16QAM 1RB_Offset High

5MHz	 QPSK FRB	 QPSK 1RB_Offset Low
		 QPSK 1RB_Offset High
	 16QAM FRB	 16QAM 1RB_Offset Low
		 16QAM 1RB_Offset High

3MHz	 QPSK FRB	 QPSK 1RB_Offset Low  QPSK 1RB_Offset High
	 16QAM FRB	 16QAM 1RB_Offset Low  16QAM 1RB_Offset High

1.4MHz	 QPSK FRB	 QPSK 1RB_Offset Low
		 QPSK 1RB_Offset High
	 16QAM FRB	 16QAM 1RB_Offset Low
		 16QAM 1RB_Offset High

8.5. CONDUCTED SPURIOUS EMISSIONS

RULE PART(S)

FCC: §2.1051, §22.901, §22.917 and 90.691

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 90.691(a):
(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log10(f/6.1) decibels or 50 + 10 Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.
(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10\text{Log}_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.(NOTE : Use 100kHz reference bandwidth)

(b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v03r01
The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

a) Set the RBW = 100 kHz for emission below 1 GHz

   (Tests were performed 1MHz [Worst case], to sweep 1 time for all frequency range)

b) Set VBW ≥ 3 × RBW;

c) Set span ≥ 1.5 times the OBW;

d) Sweep time = auto couple;

e) Detector = rms;

f) Ensure that the number of measurement points = Max (40001);

g) Trace mode = average(WCDMA, LTE, 5G NR), Max hold(GSM);

NOTE1

5G NR: All Waveforms (CP-OFDM vs DFT-s_OFDM) and modulations (π/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

NOTE2

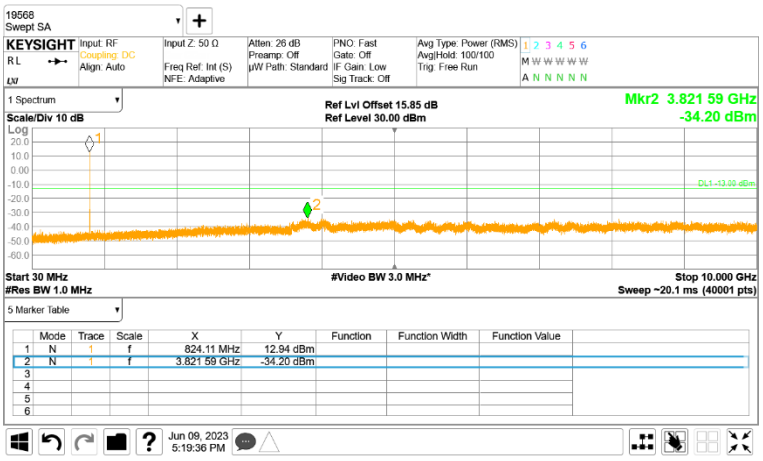
Please refer to section 5.4 for bandwidth and RB setting about LTE, 5G NR bands.

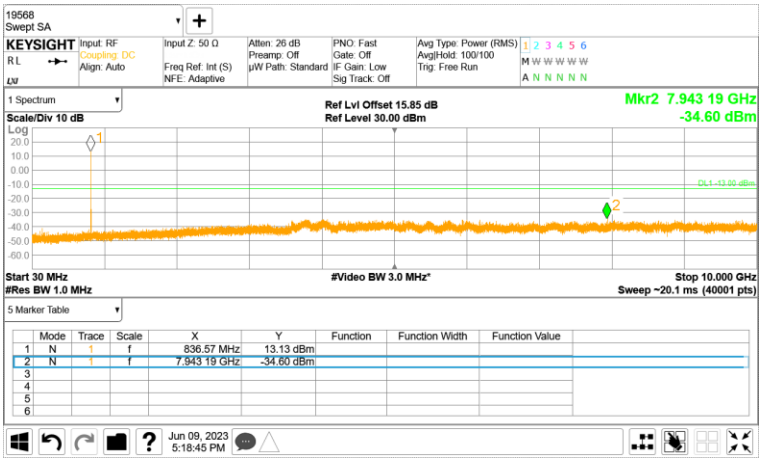
RESULTS

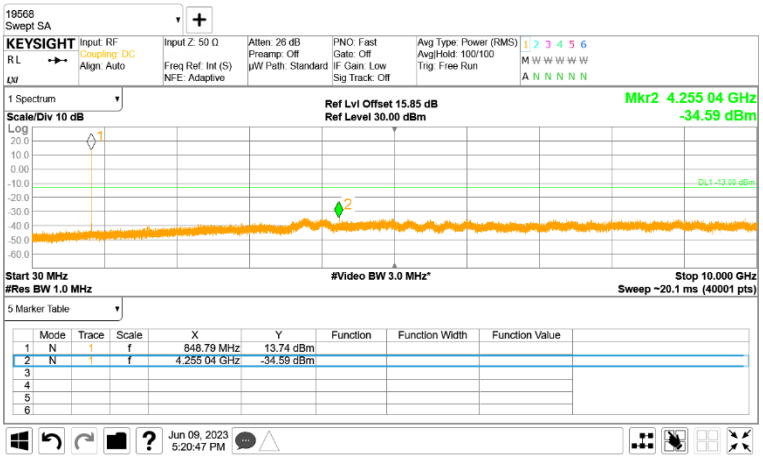
See the following pages.

8.5.1. OUT OF BAND EMISSIONS RESULT

GSM 850

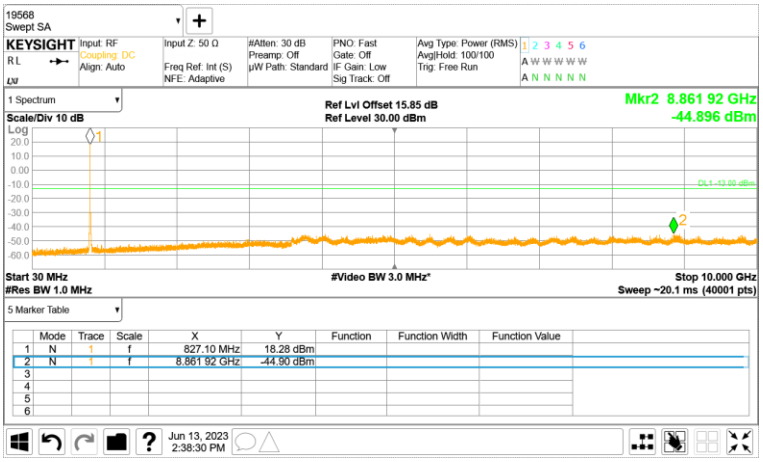
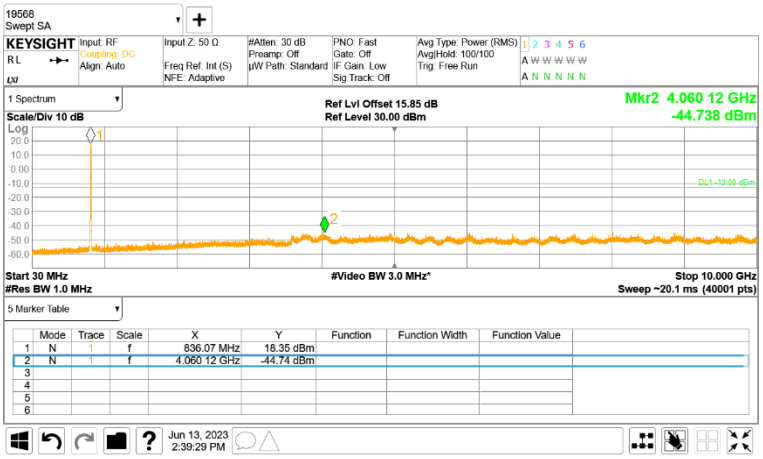
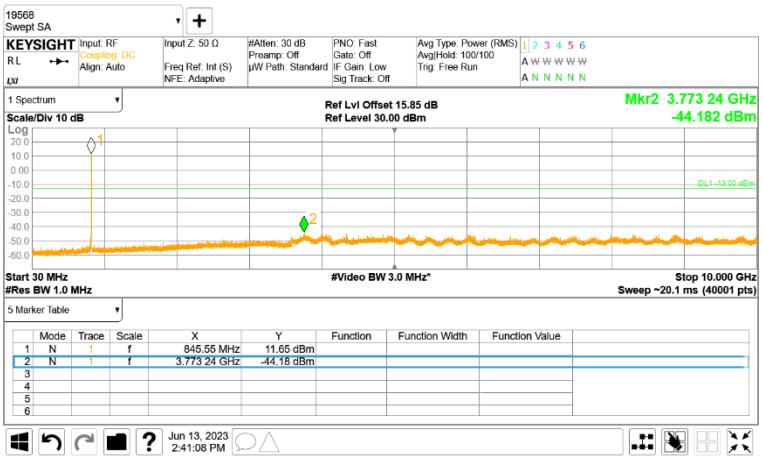
<table>
<tr><td rowspan="3">GPRS</td><td> 

Low channel</td></tr>
<tr><td> 

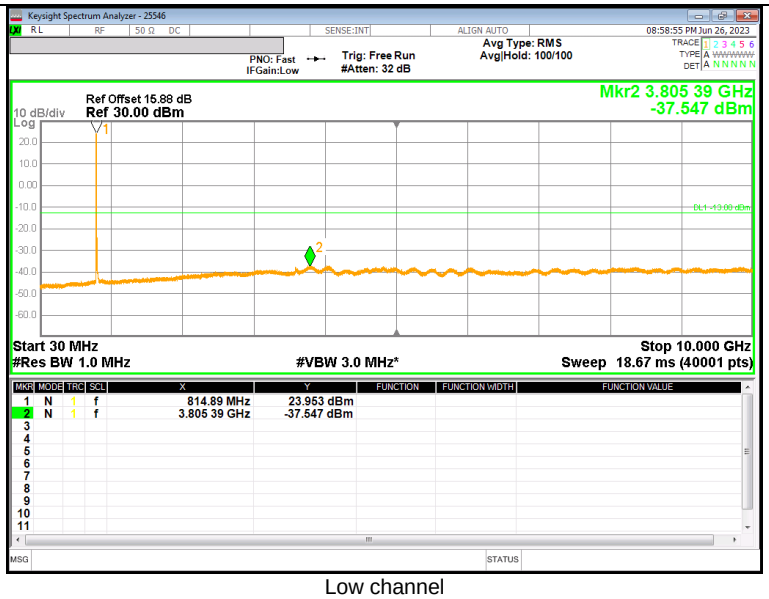
Mid channel</td></tr>
<tr><td> 

High channel</td></tr>
</table>

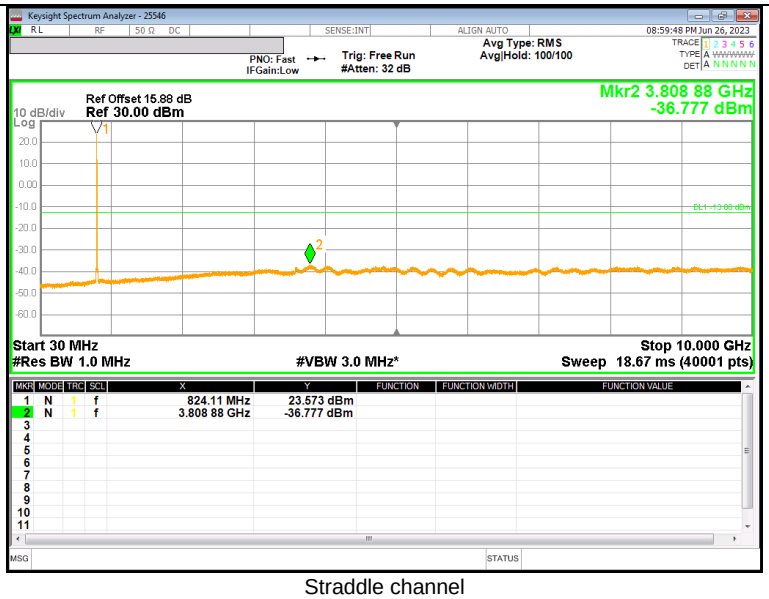
WCDMA Band 5

Rel 99	 Low channel
	 Mid channel
	 High channel

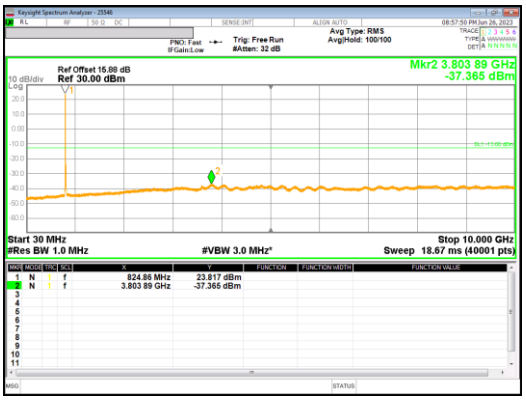
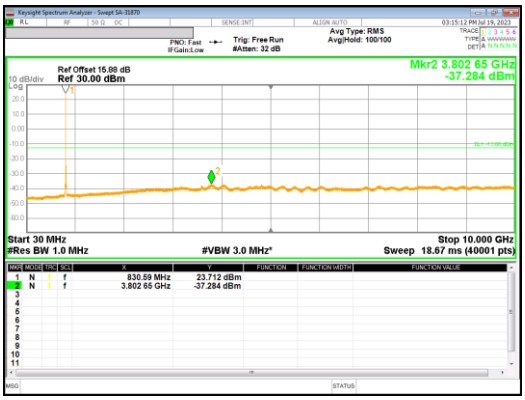
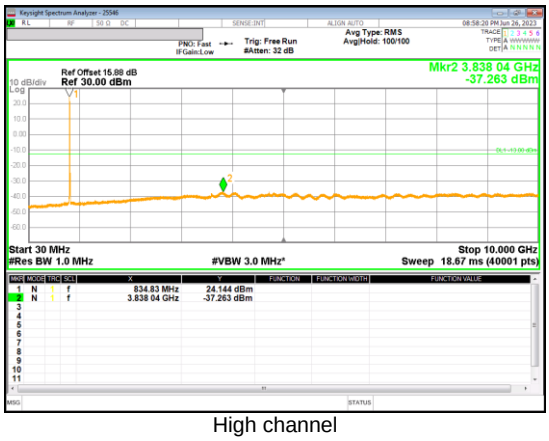
LTE Band 26 (Part 90)

15 MHz QPSK	 Low channel

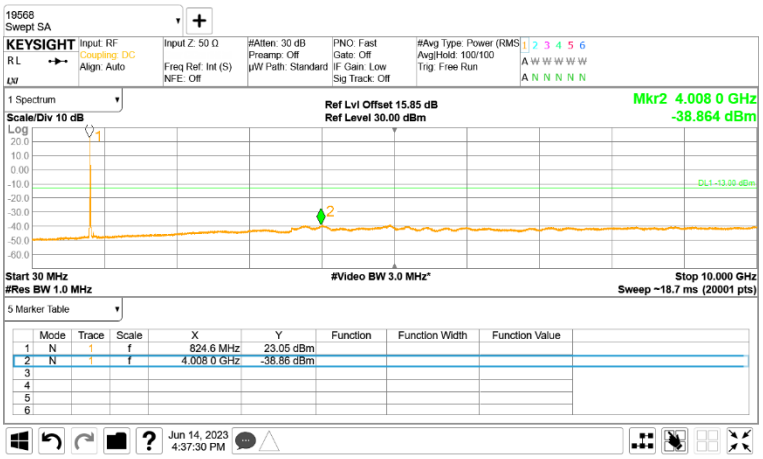
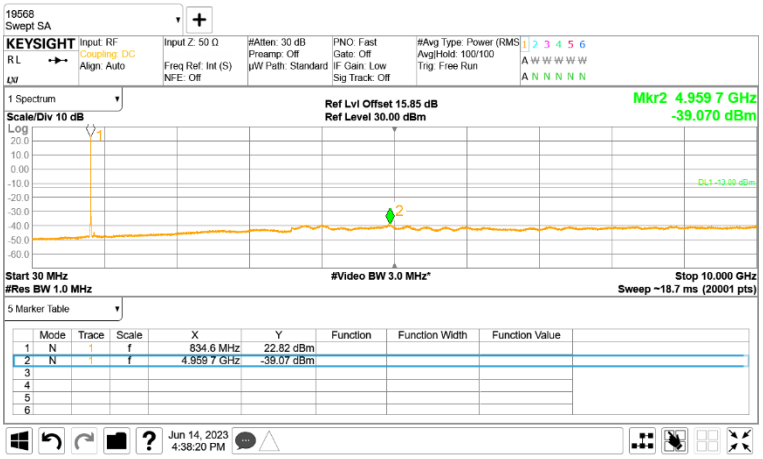
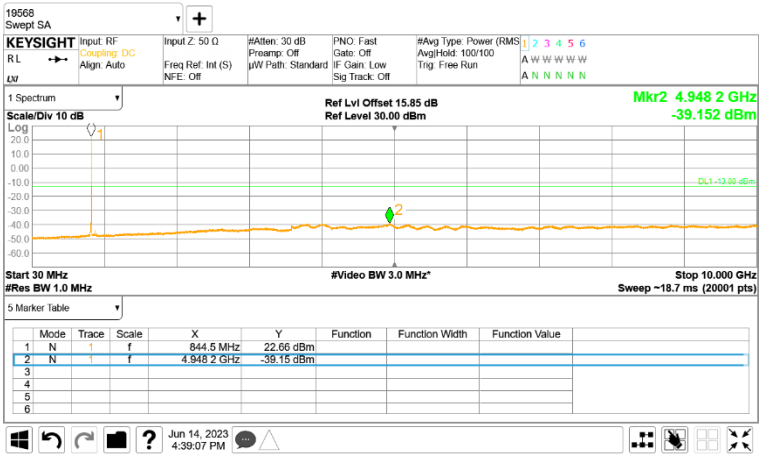
LTE Band 26 (Straddle)

1.4 MHz QPSK	 Straddle channel

LTE Band 26(Part 22)

15 MHz QPSK	 Low channel	 Mid channel
	 High channel	

NR Band n5

5 MHz QPSK	 DFT-OFDM Low channel
	 DFT-OFDM Mid channel
	 DFT-OFDM High channel

8.6. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §22.355 and §90.213

LIMITS

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

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

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v03r01

NOTE

Test were performed each lowest or highest frequency on the modulation condition of more wide bandwidth.(Please refer to section 9.1.1 OBW results)

RESULTS

See the following pages.

UL KOREA LTD. Suwon Laboratory FORM ID: FCC_22/90(05)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

8.6.1. FREQUENCY STABILITY RESULTS

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

Test Date	2023-06-22
Test Engineer	47989

Reference Frequency : GSM850 Low Channel 824.2 MHz / High Channel 848.8 MHz @ 20ºC						
Limit: +- 2.5 ppm =	Low Channel	2060.500 Hz		High Channel	2122.000 Hz	
Power Supply [Vdc]	Environment Temperature [ºC]	Frequency Deviation Measureed with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.85	50	824.20001363	0.003	848.80001167	-0.001	2.5
3.85	40	824.20001154	0.006	848.80001338	-0.003	2.5
3.85	30	824.20001454	0.002	848.80001602	-0.006	2.5
3.85	***20***	***824.20001625***	***0.000***	***848.80001120***	***0.000***	***2.5***
3.85	10	824.20001357	0.003	848.80001225	-0.001	2.5
3.85	0	824.20001617	0.000	848.80001211	-0.001	2.5
3.85	-10	824.20001523	0.001	848.80001571	-0.005	2.5
3.85	-20	824.20001561	0.001	848.80001609	-0.006	2.5
3.85	-30	824.20002031	-0.005	848.80001621	-0.006	2.5

Reference Frequency : GSM850 Low Channel 824.2 MHz / High Channel 848.8 MHz @ 20ºC						
Limit: +- 2.5 ppm =	Low Channel	2060.500 Hz		High Channel	2122.000 Hz	
Power Supply [Vdc]	Environment Temperature [ºC]	Frequency Deviation Measureed with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.85	***20***	**824.20001625**	***0***	**848.80001120**	***0***	***2.5***
4.40	20	824.20001252	0.005	848.80001205	-0.001	2.5
3.65	20	824.20001411	0.003	848.80001064	0.001	2.5

WCDMA Band 5

Test Date	2023-06-28
Test Engineer	47989

Reference Frequency : WCDMA Band 5 Low Channel 826.4 MHz / High Channel 846.6 MHz @ 20ºC						
Limit: +- 2.5 ppm =	Low Channel	2066.000 Hz		High Channel	2116.500 Hz	
Power Supply [Vdc]	Environment Temperature [ºC]	Frequency Deviation Measureed with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.85	50	826.40000421	0.003	846.60000424	0.002	2.5
3.85	40	826.40000449	0.003	846.60000489	0.001	2.5
3.85	30	826.40000521	0.002	846.60000647	-0.001	2.5
3.85	***20***	***826.40000685***	***0.000***	***846.60000558***	***0.000***	***2.5***
3.85	10	826.40001084	-0.005	846.60001049	-0.006	2.5
3.85	0	826.40001159	-0.006	846.60000996	-0.005	2.5
3.85	-10	826.40002346	-0.020	846.60001496	-0.011	2.5
3.85	-20	826.40002218	-0.019	846.60001119	-0.007	2.5
3.85	-30	826.40002217	-0.019	846.60001303	-0.009	2.5

Reference Frequency : WCDMA Band 5 Low Channel 826.4 MHz / High Channel 846.6 MHz @ 20ºC						
Limit: +- 2.5 ppm =	Low Channel	2066.000 Hz		High Channel	2116.500 Hz	
Power Supply [Vdc]	Environment Temperature [ºC]	Frequency Deviation Measureed with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.85	***20***	**826.40000685**	***0***	**846.60000558**	***0***	***2.5***
4.40	20	826.40000520	0.002	846.60000782	-0.003	2.5
3.65	20	826.40000428	0.003	846.60000303	0.003	2.5

LTE Band 26

Test Date	2023-07-05
Test Engineer	47989

Reference Frequency : Low Channel 814.7 MHz / High Channel 848.3 MHz @ 20ºC						
Limit: +- 2.5 ppm =	Low Channel	2036.750	Hz	High Channel	2120.750	Hz
Power Supply [Vdc]	Environment Temperature [ºC]	Frequency Deviation Measureed with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.85	50	814.70000733	-0.003	848.30000651	-0.002	2.5
3.85	40	814.70000426	0.000	848.30000561	-0.001	2.5
3.85	30	814.70001147	-0.008	848.30000531	-0.001	2.5
3.85	***20***	***814.70000463***	***0.000***	***848.30000456***	***0.000***	***2.5***
3.85	10	814.70000522	-0.001	848.30000579	-0.001	2.5
3.85	0	814.70000563	-0.001	848.30000487	0.000	2.5
3.85	-10	814.70000411	0.001	848.30000470	0.000	2.5
3.85	-20	814.70000350	0.001	848.30000321	0.002	2.5
3.85	-30	814.70000435	0.000	848.30000511	-0.001	2.5

Reference Frequency : Low Channel 814.7 MHz / High Channel 848.3 MHz @ 20ºC						
Limit: +- 2.5 ppm =	Low Channel	2036.750	Hz	High Channel	2120.750	Hz
Power Supply [Vdc]	Environment Temperature [ºC]	Frequency Deviation Measureed with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.85	***20***	**814.70000463**	***0***	**848.30000456**	***0***	***2.5***
4.40	20	814.70000417	0.001	848.30000361	0.001	2.5
3.65	20	814.70000450	0.000	848.30000360	0.001	2.5

NR Band n5

Test Date	2023-07-10
Test Engineer	47989

Reference Frequency : Low Channel 826.5 MHz / High Channel 846.5 MHz @ 20ºC						
Limit: +- 2.5 ppm =	Low Channel	2066.250	Hz	High Channel	2116.250	Hz
Power Supply [Vdc]	Environment Temperature [ºC]	Frequency Deviation Measureed with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.85	50	826.50001123	0.015	846.50001035	0.014	2.5
3.85	40	826.50002336	0.000	846.50002046	0.002	2.5
3.85	30	826.50001435	0.011	846.50001132	0.013	2.5
3.85	***20***	***826.50002333***	***0.000***	***846.50002243***	***0.000***	***2.5***
3.85	10	826.50001569	0.009	846.50001932	0.004	2.5
3.85	0	826.50001754	0.007	846.50001132	0.013	2.5
3.85	-10	826.50001035	0.016	846.50000921	0.016	2.5
3.85	-20	826.50002323	0.000	846.50002110	0.002	2.5
3.85	-30	826.50002023	0.004	846.50002432	-0.002	2.5

Reference Frequency : Low Channel 826.5 MHz / High Channel 846.5 MHz @ 20ºC						
Limit: +- 2.5 ppm =	Low Channel	2066.250	Hz	High Channel	2116.250	Hz
Power Supply [Vdc]	Environment Temperature [ºC]	Frequency Deviation Measureed with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.85	***20***	**826.50002333**	***0***	**846.50002243**	***0***	***2.5***
4.40	20	826.50001136	0.014	846.50001665	0.007	2.5
3.65	20	826.50001732	0.007	846.50002342	-0.001	2.5

9. RADIATED RESULTS

9.1. RADIATED POWER (ERP)

RULE PART(S)

FCC: §2.1046, §22.913, and §90.635

LIMITS

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

90.635(b) The maximum output power of the transmitter for mobile stations is 100 watts (20dBw).

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

NOTE

5G NR: All Waveforms (CP-OFDM vs DFT-s_OFDM) and modulations (π/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

TEST RESULTS

See the following pages.

9.1.1. ERP Results

GSM

Band	Mode	f (MHz)	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	ERP (mW)	Limit (dBm)	Delta (dB)
GSM 850	GPRS	824.20	38.53	V	3.01	-1.03	34.50	2818.38	38.50	-4.00
		836.60	38.66	V	3.03	-0.97	34.66	2924.15	38.50	-3.84
		848.80	38.19	V	3.05	-0.91	34.23	2648.50	38.50	-4.27
	EGPRS	824.20	31.43	V	3.01	-1.03	27.40	549.54	38.50	-11.10
		836.60	32.20	V	3.03	-0.97	28.20	660.69	38.50	-10.30
		848.80	31.61	V	3.05	-0.91	27.65	582.10	38.50	-10.85

WCDMA

Band	Mode	f (MHz)	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	ERP (mW)	Limit (dBm)	Delta (dB)
Band 5	REL99	826.40	28.60	V	3.01	-1.02	24.57	286.42	38.50	-13.93
		836.60	28.76	V	3.03	-0.97	24.76	299.23	38.50	-13.74
		846.60	28.28	V	3.05	-0.92	24.31	269.77	38.50	-14.19
	HSDPA	826.40	27.92	V	3.01	-1.02	23.89	244.91	38.50	-14.61
		836.60	28.29	V	3.03	-0.97	24.29	268.53	38.50	-14.21
		846.60	27.95	V	3.05	-0.92	23.98	250.03	38.50	-14.52

LTE Band 26

BW (MHz)	Modulation	f (MHz)	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	ERP (mW)	Limit (dBm)	Delta (dB)	RB
15	QPSK	821.50	27.48	V	3.01	-1.04	23.43	220.29	50.00	-26.57	1/0
		831.50	28.70	V	3.02	-0.99	24.68	293.76	38.50	-13.82	1/0
		836.50	28.64	V	3.03	-0.97	24.64	291.07	38.50	-13.86	1/0
		841.50	28.79	V	3.04	-0.94	24.81	302.69	38.50	-13.69	1/0
	16-QAM	821.50	26.31	V	3.01	-1.04	22.26	168.27	50.00	-27.74	1/0
		831.50	27.64	V	3.02	-0.99	23.62	230.14	38.50	-14.88	1/0
		836.50	27.53	V	3.03	-0.97	23.53	225.42	38.50	-14.97	1/0
		841.50	27.60	V	3.04	-0.94	23.62	230.14	38.50	-14.88	1/0
10	QPSK	819.00	27.23	V	3.00	-1.06	23.18	207.97	50.00	-26.82	1/0
		829.00	28.01	V	3.02	-1.01	23.99	250.61	38.50	-14.51	1/0
		831.50	29.17	V	3.02	-0.99	25.15	327.34	38.50	-13.35	1/25
		844.00	28.70	V	3.04	-0.93	24.72	296.48	38.50	-13.78	1/0
	16-QAM	819.00	25.83	V	3.00	-1.06	21.78	150.66	50.00	-28.22	1/0
		829.00	27.01	V	3.02	-1.01	22.99	199.07	38.50	-15.51	1/25
		831.50	27.87	V	3.02	-0.99	23.85	242.66	38.50	-14.65	1/0
		844.00	27.64	V	3.04	-0.93	23.66	232.27	38.50	-14.84	1/0
5	QPSK	816.50	27.20	V	3.00	-1.07	23.13	205.59	50.00	-26.87	1/24
		821.50	27.68	V	3.01	-1.04	23.63	230.67	50.00	-26.37	1/0
		826.50	27.99	V	3.01	-1.02	23.96	248.89	38.50	-14.54	1/24
		831.50	29.06	V	3.02	-0.99	25.04	319.15	38.50	-13.46	1/0
		846.50	28.37	V	3.05	-0.92	24.40	275.42	38.50	-14.10	1/24
	16-QAM	816.50	25.94	V	3.00	-1.07	21.87	153.82	50.00	-28.13	1/0
		821.50	26.65	V	3.01	-1.04	22.60	181.97	50.00	-27.40	1/0
		826.50	26.90	V	3.01	-1.02	22.87	193.64	38.50	-15.63	1/0
		831.50	27.86	V	3.02	-0.99	23.84	242.10	38.50	-14.66	1/0
		846.50	27.35	V	3.05	-0.92	23.38	217.77	38.50	-15.12	1/0
3	QPSK	815.50	27.02	V	2.99	-1.07	22.95	197.24	50.00	-27.05	1/14
		822.50	28.22	V	3.02	-0.99	24.20	263.03	50.00	-25.80	1/14
		825.50	27.92	V	3.01	-1.02	23.89	244.91	38.50	-14.61	1/8
		831.50	28.91	V	3.02	-0.99	24.89	308.32	38.50	-13.61	1/0
		847.50	27.82	V	3.05	-0.91	23.86	243.22	38.50	-14.64	1/14
	16-QAM	815.50	25.89	V	2.99	-1.07	21.82	152.05	50.00	-28.18	1/0
		822.50	27.01	V	3.02	-0.99	22.99	199.07	50.00	-27.01	1/0
		825.50	26.91	V	3.01	-1.02	22.88	194.09	38.50	-15.62	1/0
		831.50	27.90	V	3.02	-0.99	23.88	244.34	38.50	-14.62	1/14
		847.50	26.80	V	3.05	-0.91	22.84	192.31	38.50	-15.66	1/0
1.4	QPSK	814.70	26.87	V	2.99	-1.08	22.80	190.55	50.00	-27.20	1/5
		823.30	28.06	V	3.01	-1.03	24.02	252.35	50.00	-25.98	1/3
		824.70	28.05	V	3.01	-1.03	24.01	251.77	38.50	-14.49	1/3
		831.50	29.04	V	3.02	-0.99	25.02	317.69	38.50	-13.48	1/5
		848.30	28.10	V	3.05	-0.91	24.14	259.42	38.50	-14.36	1/5
	16-QAM	814.70	25.80	V	2.99	-1.08	21.73	148.94	50.00	-28.27	1/3
		823.30	26.80	V	3.01	-1.03	22.76	188.80	50.00	-27.24	1/5
		824.70	27.12	V	3.01	-1.03	23.08	203.24	38.50	-15.42	1/3
		831.50	27.98	V	3.02	-0.99	23.96	248.89	38.50	-14.54	1/3
		848.30	27.01	V	3.05	-0.91	23.05	201.84	38.50	-15.45	1/3

BW (MHz)	Modulation	f (MHz)	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	ERP (mW)	Limit (dBm)	Delta (dB)	RB
15	QPSK	824.00	27.88	V	3.01	-1.03	23.84	242.10	38.50	-14.66	1/3
	16-QAM		26.67	V	3.01	-1.04	22.62	182.81	38.50	-15.88	1/5
10	QPSK		28.12	V	3.01	-1.03	24.08	255.86	38.50	-14.42	1/0
	16-QAM		27.23	V	3.01	-1.03	23.19	208.45	38.50	-15.31	1/0
5	QPSK		28.18	V	3.01	-1.03	24.14	259.42	38.50	-14.36	1/12
	16-QAM		27.18	V	3.01	-1.03	23.14	206.06	38.50	-15.36	1/12
3	QPSK		28.13	V	3.01	-1.03	24.09	256.45	38.50	-14.41	1/25
	16-QAM		27.00	V	3.01	-1.03	22.96	197.70	38.50	-15.54	1/25
1.4	QPSK		28.26	V	3.01	-1.03	24.22	264.24	38.50	-14.28	1/0
	16-QAM		26.94	V	3.01	-1.03	22.90	194.98	38.50	-15.60	1/0

NR Band n5

BW (MHz)	Modulation	f (MHz)	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	ERP (mW)	Limit (dBm)	Delta (dB)	RB
20	QPSK	834.00	29.01	V	3.03	-0.98	25.00	316.23	38.50	-13.50	1/53
		836.50	28.46	V	3.03	-0.97	24.47	279.90	38.50	-14.03	1/1
		839.00	28.66	V	3.03	-0.96	24.67	293.09	38.50	-13.83	1/1
	16-QAM	834.00	28.02	V	3.03	-0.98	24.01	251.77	38.50	-14.49	1/53
		836.50	27.51	V	3.03	-0.97	23.52	224.91	38.50	-14.98	1/1
		839.00	27.74	V	3.03	-0.96	23.75	237.14	38.50	-14.75	1/1
15	QPSK	831.50	28.96	V	3.02	-0.99	24.94	311.89	38.50	-13.56	1/1
		836.50	28.41	V	3.03	-0.97	24.42	276.69	38.50	-14.08	1/1
		841.50	28.58	V	3.04	-0.94	24.60	288.40	38.50	-13.90	1/1
	16-QAM	831.50	27.85	V	3.02	-0.99	23.83	241.55	38.50	-14.67	1/1
		836.50	27.49	V	3.03	-0.97	23.50	223.87	38.50	-15.00	1/1
		841.50	27.54	V	3.04	-0.94	23.56	226.99	38.50	-14.94	1/1
10	QPSK	829.00	28.59	V	3.02	-1.01	24.56	285.76	38.50	-13.94	1/1
		836.50	28.70	V	3.03	-0.97	24.71	295.80	38.50	-13.79	1/1
		844.00	28.80	V	3.04	-0.93	24.82	303.39	38.50	-13.68	1/1
	16-QAM	829.00	27.65	V	3.02	-1.01	23.62	230.14	38.50	-14.88	1/1
		836.50	27.76	V	3.03	-0.97	23.77	238.23	38.50	-14.73	1/1
		844.00	27.80	V	3.04	-0.93	23.82	240.99	38.50	-14.68	1/1
5	QPSK	826.50	28.51	V	3.01	-1.02	24.48	280.54	38.50	-14.02	1/1
		836.50	28.62	V	3.03	-0.97	24.63	290.40	38.50	-13.87	1/1
		846.50	28.47	V	3.05	-0.92	24.50	281.84	38.50	-14.00	1/1
	16-QAM	826.50	27.53	V	3.01	-1.02	23.50	223.87	38.50	-15.00	1/1
		836.50	27.66	V	3.03	-0.97	23.67	232.81	38.50	-14.83	1/1
		846.50	27.48	V	3.05	-0.92	23.51	224.39	38.50	-14.99	1/1

9.2. RADIATIED SPURIOUS EMISSION

RULE PART(S)

FCC: §2.1053, §22.917, and §90.691

LIMIT

Part 22.917(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 90.691(a):
(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log10(f/6.1) decibels or 50 + 10 Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.
(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10\text{Log}_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.(NOTE : Use 100kHz reference bandwidth)

(b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

TEST PROCEDURE

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

For peak power measurement with a ESU40:

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

NOTE1

5G NR: All Waveforms (CP-OFDM vs DFT-s_OFDM) and modulations (π/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

NOTE2

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

RESULTS

See the following pages.

9.2.1. SPURIOUS RADIATION PLOTS

GSM850

GPRS

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

Company:	Samsung
Project #:	4790841155
Date:	2023-06-21
Test Engineer:	24542
Configuration:	EUT / AC Adapter, X-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	-1.0	V	3.0	46.4	1.0	-46.5	-13.0	-33.5	
2472.60	-4.3	V	3.0	46.9	1.0	-50.2	-13.0	-37.2	
3296.80	-4.3	V	3.0	46.6	1.0	-50.0	-13.0	-37.0	
1648.40	-5.0	H	3.0	46.4	1.0	-50.5	-13.0	-37.5	
2472.60	-4.1	H	3.0	46.9	1.0	-50.0	-13.0	-37.0	
3296.80	-4.1	H	3.0	46.6	1.0	-49.7	-13.0	-36.7	
Mid Ch, 836.6MHz									
1673.20	0.1	V	3.0	46.4	1.0	-45.4	-13.0	-32.4	
2509.80	-4.6	V	3.0	46.9	1.0	-50.5	-13.0	-37.5	
3346.40	-4.0	V	3.0	46.6	1.0	-49.6	-13.0	-36.6	
1673.20	-6.6	H	3.0	46.4	1.0	-52.1	-13.0	-39.1	
2509.80	-2.8	H	3.0	46.9	1.0	-48.7	-13.0	-35.7	
3346.40	-3.9	H	3.0	46.6	1.0	-49.5	-13.0	-36.5	
High Ch, 848.8MHz									
1697.60	-2.7	V	3.0	46.5	1.0	-48.2	-13.0	-35.2	
2546.40	-5.1	V	3.0	46.9	1.0	-51.0	-13.0	-38.0	
3395.20	-4.1	V	3.0	46.5	1.0	-49.6	-13.0	-36.6	
1697.60	-4.0	H	3.0	46.5	1.0	-49.4	-13.0	-36.4	
2546.40	-3.4	H	3.0	46.9	1.0	-49.4	-13.0	-36.4	
3395.20	-3.7	H	3.0	46.5	1.0	-49.2	-13.0	-36.2	

WCDMA Band 5

REL99

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

Company: Samsung
Project #: 4790841155
Date: 2023-06-23
Test Engineer: 24542
Configuration: EUT / AC Adapter, Y-Position
Location: Chamber 2
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	-15.2	V	3.0	40.7	1.0	-54.9	-13.0	-41.9	
2479.20	-12.4	V	3.0	41.3	1.0	-52.7	-13.0	-39.7	
3305.60	-9.9	V	3.0	42.1	1.0	-50.9	-13.0	-37.9	
1652.80	-15.8	H	3.0	40.7	1.0	-55.5	-13.0	-42.5	
2479.20	-12.6	H	3.0	41.3	1.0	-52.9	-13.0	-39.9	
3305.60	-10.1	H	3.0	42.1	1.0	-51.1	-13.0	-38.1	
Mid Ch, 836.6MHz									
1673.20	-15.0	V	3.0	40.7	1.0	-54.7	-13.0	-41.7	
2509.80	-12.3	V	3.0	41.3	1.0	-52.7	-13.0	-39.7	
3346.40	-9.6	V	3.0	42.1	1.0	-50.6	-13.0	-37.6	
1673.20	-17.3	H	3.0	40.7	1.0	-56.9	-13.0	-43.9	
2509.80	-12.5	H	3.0	41.3	1.0	-52.8	-13.0	-39.8	
3346.40	-9.8	H	3.0	42.1	1.0	-50.9	-13.0	-37.9	
High Ch, 846.6MHz									
1693.20	-15.1	V	3.0	40.7	1.0	-54.8	-13.0	-41.8	
2539.80	-12.1	V	3.0	41.4	1.0	-52.5	-13.0	-39.5	
3386.40	-9.3	V	3.0	42.1	1.0	-50.3	-13.0	-37.3	
1693.20	-15.6	H	3.0	40.7	1.0	-55.3	-13.0	-42.3	
2539.80	-12.4	H	3.0	41.4	1.0	-52.8	-13.0	-39.8	
3386.40	-9.4	H	3.0	42.1	1.0	-50.5	-13.0	-37.5	

LTE Band 26 (Part 90)

3 MHz

QPSK

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

Company: Samsung
Project #: 4790841155
Date: 2023-06-23
Test Engineer: 19568
Configuration: EUT / AC Adapter, Y-Position
Location: Chamber 2
Mode: LTE_QPSK Band 26 Harmonics, 3MHz 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, 815.5MHz									
1631.00	-15.2	V	3.0	40.7	1.0	-54.9	-13.0	-41.9	
2446.50	-12.4	V	3.0	41.3	1.0	-52.7	-13.0	-39.7	
3262.00	-10.0	V	3.0	42.1	1.0	-51.1	-13.0	-38.1	
1631.00	-16.0	H	3.0	40.7	1.0	-55.7	-13.0	-42.7	
2446.50	-12.5	H	3.0	41.3	1.0	-52.7	-13.0	-39.7	
3262.00	-10.2	H	3.0	42.1	1.0	-51.2	-13.0	-38.2	
Mid Ch, 822.5MHz									
1645.00	-15.2	V	3.0	40.7	1.0	-54.9	-13.0	-41.9	
2467.50	-12.4	V	3.0	41.3	1.0	-52.7	-13.0	-39.7	
3290.00	-9.8	V	3.0	42.1	1.0	-50.8	-13.0	-37.8	
1645.00	-15.8	H	3.0	40.7	1.0	-55.5	-13.0	-42.5	
2467.50	-12.3	H	3.0	41.3	1.0	-52.6	-13.0	-39.6	
3290.00	-10.1	H	3.0	42.1	1.0	-51.1	-13.0	-38.1	

LTE Band 26 (Straddle)

1.4 MHz

QPSK

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

Company: Samsung
Project #: 4790841155
Date: 2023-07-14
Test Engineer: 19568
Configuration: EUT / AC Adapter, Y-Position
Location: Chamber 2
Mode: LTE_QPSK Band 26 Harmonics, 1.4MHz Bandwidth
Test Votage: AC 120 V, 60 Hz

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Straddle Ch, 824MHz									
1648.00	-15.3	V	3.0	40.7	1.0	-55.0	-13.0	-42.0	
2472.00	-12.2	V	3.0	41.3	1.0	-52.5	-13.0	-39.5	
3296.00	-10.1	V	3.0	42.1	1.0	-51.1	-13.0	-38.1	
1648.00	-15.9	H	3.0	40.7	1.0	-55.5	-13.0	-42.5	
2472.00	-12.5	H	3.0	41.3	1.0	-52.7	-13.0	-39.7	
3296.00	-10.3	H	3.0	42.1	1.0	-51.3	-13.0	-38.3	

LTE Band 26 (Part 22)

10 MHz

QPSK

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

Company: Samsung
Project #: 4790841155
Date: 2023-06-23
Test Engineer: 19568
Configuration: EUT / AC Adapter, Y-Position
Location: Chamber 2
Mode: LTE_QPSK Band 26 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	-15.2	V	3.0	40.7	1.0	-54.9	-13.0	-41.9	
2487.00	-12.4	V	3.0	41.3	1.0	-52.7	-13.0	-39.7	
3316.00	-10.0	V	3.0	42.1	1.0	-51.0	-13.0	-38.0	
1658.00	-15.9	H	3.0	40.7	1.0	-55.6	-13.0	-42.6	
2487.00	-12.4	H	3.0	41.3	1.0	-52.7	-13.0	-39.7	
3316.00	-10.1	H	3.0	42.1	1.0	-51.1	-13.0	-38.1	
Mid Ch, 831.5MHz									
1663.00	-15.0	V	3.0	40.7	1.0	-54.7	-13.0	-41.7	
2494.50	-12.1	V	3.0	41.3	1.0	-52.4	-13.0	-39.4	
3326.00	-9.6	V	3.0	42.1	1.0	-50.6	-13.0	-37.6	
1663.00	-15.6	H	3.0	40.7	1.0	-55.3	-13.0	-42.3	
2494.50	-12.4	H	3.0	41.3	1.0	-52.8	-13.0	-39.8	
3326.00	-9.7	H	3.0	42.1	1.0	-50.7	-13.0	-37.7	
High Ch, 844MHz									
1688.00	-14.9	V	3.0	40.7	1.0	-54.6	-13.0	-41.6	
2532.00	-12.1	V	3.0	41.4	1.0	-52.5	-13.0	-39.5	
3376.00	-9.3	V	3.0	42.1	1.0	-50.4	-13.0	-37.4	
1688.00	-15.6	H	3.0	40.7	1.0	-55.3	-13.0	-42.3	
2532.00	-12.3	H	3.0	41.4	1.0	-52.7	-13.0	-39.7	
3376.00	-9.4	H	3.0	42.1	1.0	-50.5	-13.0	-37.5	

NR Band n5

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

Company: Samsung
Project #: 4790841155
Date: 202-06-23
Test Engineer: 24542
Configuration: EUT / AC Adapter, Y-Position
Location: Chamber 2
Mode: 5G NR_QPSK NR n5 Harmonics, 20MHz Bandwidth
Test Votage: AC 120 V, 60 Hz

20 MHz

DFT-OFDM

QPSK

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 834MHz									
1668.00	-15.1	V	3.0	40.7	1.0	-54.8	-13.0	-41.8	
2502.00	-12.3	V	3.0	41.3	1.0	-52.6	-13.0	-39.6	
3336.00	-9.7	V	3.0	42.1	1.0	-50.8	-13.0	-37.8	
1668.00	-15.9	H	3.0	40.7	1.0	-55.5	-13.0	-42.5	
2502.00	-12.5	H	3.0	41.3	1.0	-52.9	-13.0	-39.9	
3336.00	-10.0	H	3.0	42.1	1.0	-51.0	-13.0	-38.0	
Mid Ch, 836.5MHz									
1673.00	-16.5	V	3.0	40.7	1.0	-56.2	-13.0	-43.2	
2509.50	-12.2	V	3.0	41.3	1.0	-52.6	-13.0	-39.6	
3346.00	-9.5	V	3.0	42.1	1.0	-50.5	-13.0	-37.5	
1673.00	-15.6	H	3.0	40.7	1.0	-55.3	-13.0	-42.3	
2509.50	-12.4	H	3.0	41.3	1.0	-52.7	-13.0	-39.7	
3346.00	-9.7	H	3.0	42.1	1.0	-50.7	-13.0	-37.7	
High Ch, 839MHz									
1678.00	-15.1	V	3.0	40.7	1.0	-54.8	-13.0	-41.8	
2517.00	-12.3	V	3.0	41.4	1.0	-52.7	-13.0	-39.7	
3356.00	-9.6	V	3.0	42.1	1.0	-50.6	-13.0	-37.6	
1678.00	-15.7	H	3.0	40.7	1.0	-55.4	-13.0	-42.4	
2517.00	-12.5	H	3.0	41.4	1.0	-52.9	-13.0	-39.9	
3356.00	-9.6	H	3.0	42.1	1.0	-50.6	-13.0	-37.6	

END OF REPORT

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