



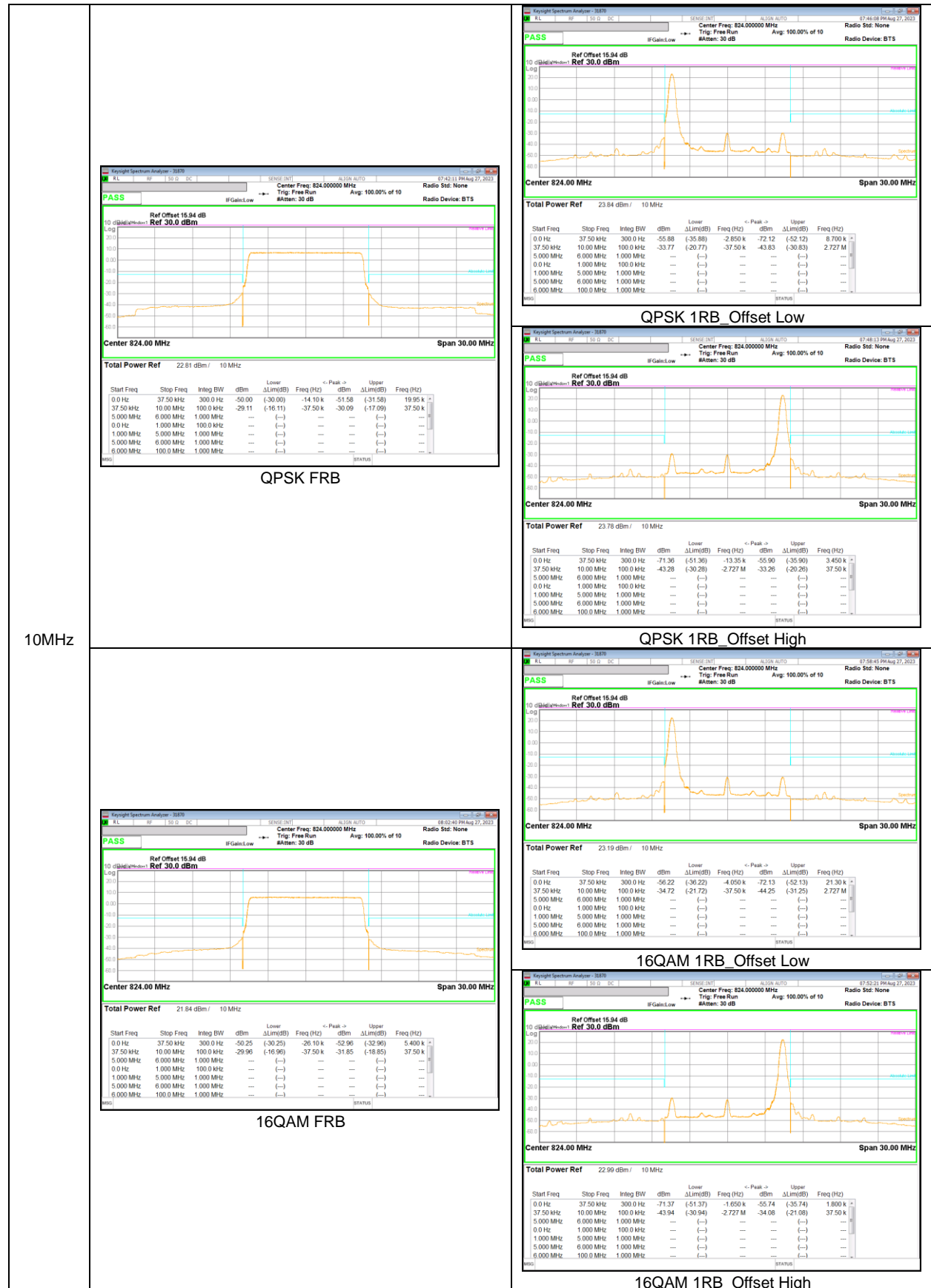


1.4MHz



LTE Band 26 (Straddle)







5MHz





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 $116 \log_{10}(f/6.1)$ decibels or $50 + 10 \log_{10}(P)$ 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 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 $43 + 10 \log_{10}(P)$ 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 and 1 MHz for emissions above 1 GHz
(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, 5G NR), Max hold(GSM);

NOTE1

5G NR: All Waveforms (CP-OFDM vs DFT-s_OFDM) and modulations ($\pi/2$ 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

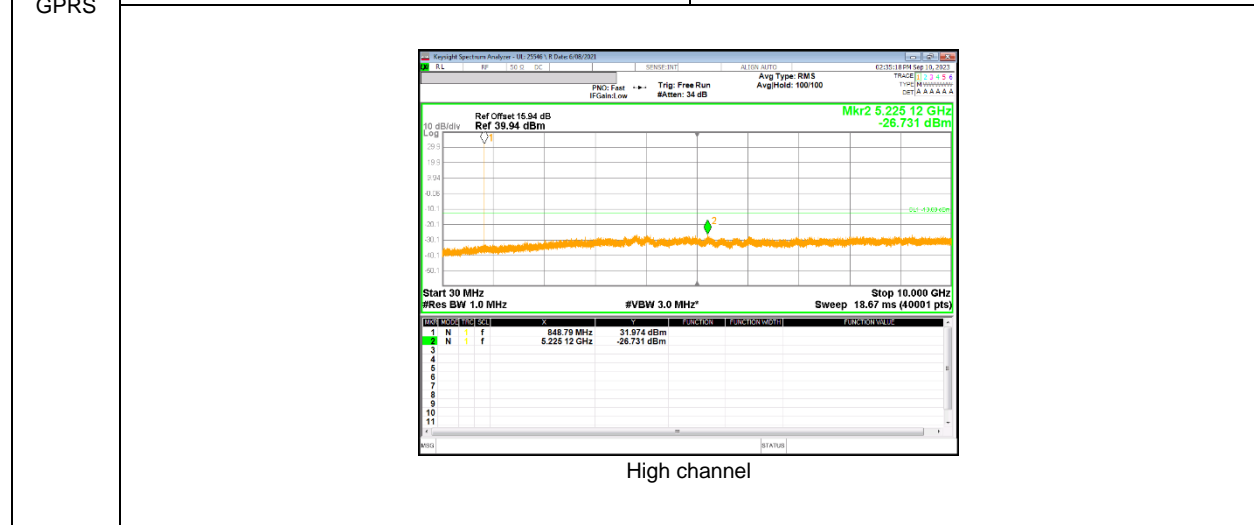
See the following pages.

8.5.1. OUT OF BAND EMISSIONS RESULT

GSM 850



GPRS



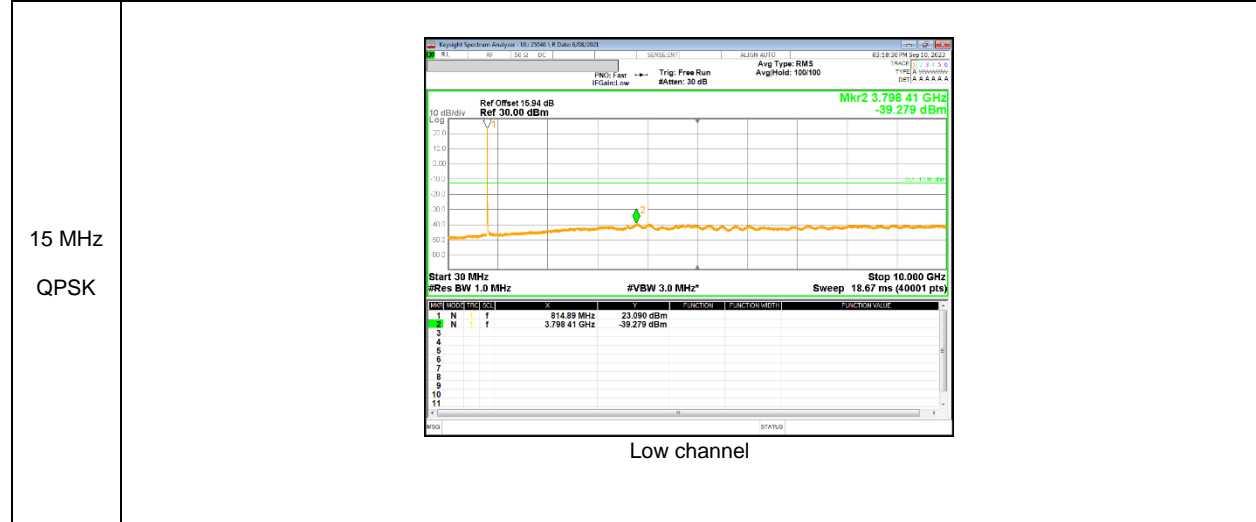
WCDMA Band 5



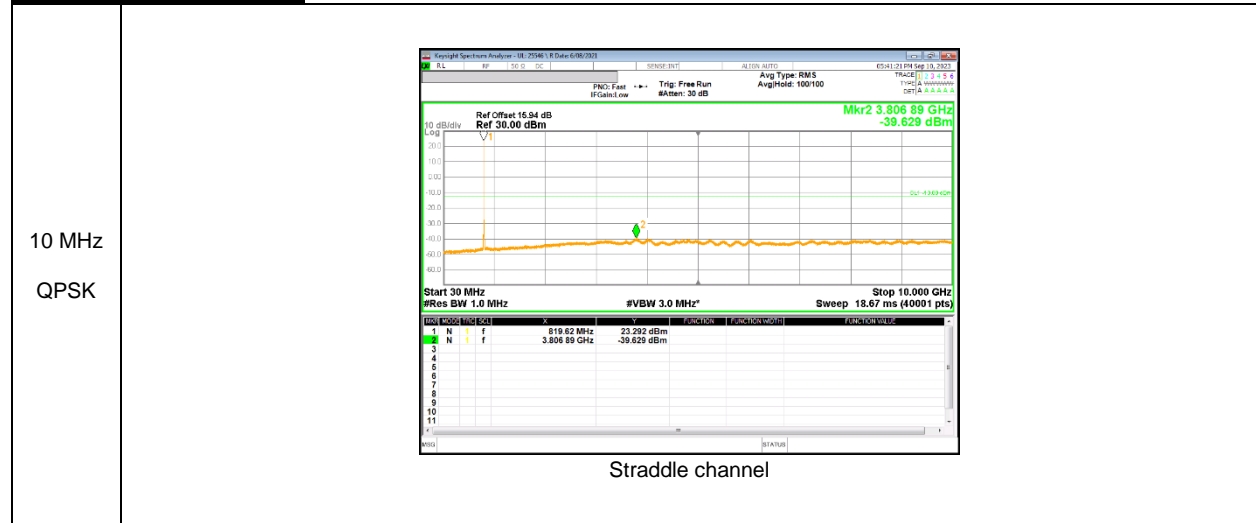
LTE Band 5



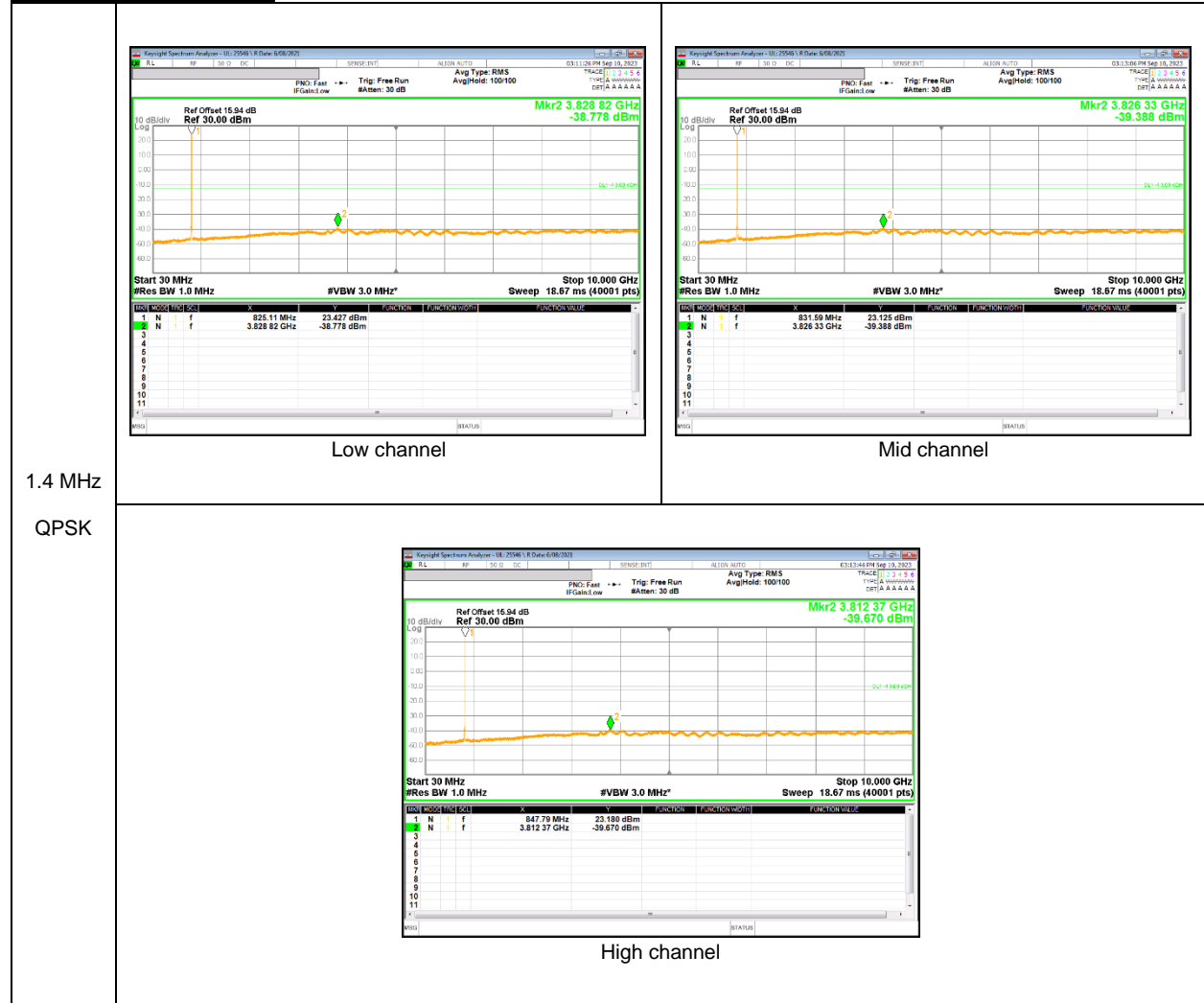
LTE Band 26(Part 90)



LTE Band 26 (Straddle)



LTE Band 26 (Part 22)



NR Band n5



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.

8.6.1. FREQUENCY STABILITY RESULTS

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

Test Date	2023-09-04
Test Engineer	47989

Reference Frequency : GSM850 Low Channel 824.2 MHz / High Channel 848.8 MHz @ 20°C						
Limit: +/- 2.5 ppm =	Low Channel	2060.500	Hz	High Channel	2122.000	Hz
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.88	50	824.20002048	-0.013	848.80000934	0.006	2.5
3.88	40	824.20001068	-0.001	848.80000854	0.007	2.5
3.88	30	824.20001310	-0.004	848.80001623	-0.002	2.5
3.88	20	824.20000950	0.000	848.80001441	0.000	2.5
3.88	10	824.20001575	-0.008	848.80001078	0.004	2.5
3.88	0	824.20001184	-0.003	848.80001134	0.004	2.5
3.88	-10	824.20001369	-0.005	848.80001502	-0.001	2.5
3.88	-20	824.20001788	-0.010	848.80001696	-0.003	2.5
3.88	-30	824.20001850	-0.011	848.80001630	-0.002	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	824.20000950	0	848.80001441	0	2.5
4.45	20	824.20001138	-0.002	848.80001674	-0.003	2.5
3.70	20	824.20001065	-0.001	848.80001354	0.001	2.5

WCDMA Band 5

Test Date	2023-09-08
Test Engineer	47989

Reference Frequency : WCDMA Band 5 Low Channel 826.4 MHz / High Channel 846.6 MHz @ 20°C						
Limit: +/- 2.5 ppm =	Low Channel	2066.000	Hz	High Channel	2116.500	Hz
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.88	50	826.40002674	-0.012	846.60002456	-0.001	2.5
3.88	40	826.40001830	-0.002	846.60001943	0.005	2.5
3.88	30	826.40003795	-0.026	846.60001550	0.010	2.5
3.88	20	826.40001668	0.000	846.60002380	0.000	2.5
3.88	10	826.40000835	0.010	846.60002456	-0.001	2.5
3.88	0	826.40004175	-0.030	846.60001874	0.006	2.5
3.88	-10	826.40002069	-0.005	846.60001136	0.015	2.5
3.88	-20	826.40002460	-0.010	846.60001564	0.010	2.5
3.88	-30	826.40002018	-0.004	846.60001575	0.010	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	826.40001668	0	846.60002380	0	2.5
4.45	20	826.40002496	-0.010	846.60002066	0.004	2.5
3.70	20	826.40001968	-0.004	846.60001234	0.014	2.5

LTE Band 5

Test Date	2023-09-11
Test Engineer	47989

Reference Frequency : Low Channel 824.7 MHz / High Channel 848.3 MHz @ 20°C							
Limit: +- 2.5 ppm =		Low Channel	2061.750	Hz	High Channel	2120.750	Hz
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse				Limit [ppm]	
		Low Channel		High Channel			
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]		
3.88	50	824.70002060	-0.005	848.30001320	0.003	2.5	
3.88	40	824.70001827	-0.002	848.30001749	-0.002	2.5	
3.88	30	824.70001822	-0.002	848.30001830	-0.003	2.5	
3.88	20	824.70001636	0.000	848.30001547	0.000	2.5	
3.88	10	824.70001984	-0.004	848.30001316	0.003	2.5	
3.88	0	824.70002164	-0.006	848.30001841	-0.003	2.5	
3.88	-10	824.70001843	-0.003	848.30001936	-0.005	2.5	
3.88	-20	824.70001634	0.000	848.30001134	0.005	2.5	
3.88	-30	824.70001765	-0.002	848.30001036	0.006	2.5	

Reference Frequency : 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	3.85	824.70000449	0	848.30000327	0	2.5	
4.45	4.4	824.70002036	-0.019	848.30001334	-0.012	2.5	
3.70	3.65	824.70001947	-0.018	848.30001865	-0.018	2.5	

LTE Band 26

Test Date	2023-09-19
Test Engineer	47989

Reference Frequency : Low Channel 814.7 MHz / High Channel 848.3 MHz @ 20°C							
Limit: +- 2.5 ppm =		Low Channel	2036.750	Hz	High Channel	2120.750	Hz
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse				Limit [ppm]	
		Low Channel		High Channel			
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]		
3.88	50	814.70000468	0.000	848.30000460	0.001	2.5	
3.88	40	814.70000680	-0.002	848.30000810	-0.003	2.5	
3.88	30	814.70000515	0.000	848.30000765	-0.002	2.5	
3.88	20	814.70000483	0.000	848.30000580	0.000	2.5	
3.88	10	814.70000764	-0.003	848.30000411	0.002	2.5	
3.88	0	814.70000450	0.000	848.30000614	0.000	2.5	
3.88	-10	814.70000535	-0.001	848.30000798	-0.003	2.5	
3.88	-20	814.70000883	-0.005	848.30000869	-0.003	2.5	
3.88	-30	814.70000745	-0.003	848.30000551	0.000	2.5	

Reference Frequency : Low Channel 814.7 MHz / High Channel 848.3 MHz @ 20°C							
Limit: +- 2.5 ppm =		Low Channel	2036.750	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	814.70000483	0	848.30000580	0	2.5	
4.45	20	814.70000748	-0.003	848.30000636	-0.001	2.5	
3.70	20	814.70000536	-0.001	848.30000430	0.002	2.5	

NR Band n5

Test Date	2023-10-02
Test Engineer	47989

Reference Frequency : Low Channel 826.5 MHz / High Channel 846.5 MHz @ 20°C							
Limit: +- 2.5 ppm =		Low Channel	2066.250	Hz	High Channel	2116.250	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	826.50002336	-0.004	846.50001869	0.004	2.5	
3.88	40	826.50002067	-0.001	846.50001674	0.006	2.5	
3.88	30	826.50002449	-0.006	846.50001836	0.004	2.5	
3.88	20	826.50001968	0.000	846.50002169	0.000	2.5	
3.88	10	826.50002131	-0.002	846.50002041	0.002	2.5	
3.88	0	826.50002269	-0.004	846.50001847	0.004	2.5	
3.88	-10	826.50002147	-0.002	846.50002113	0.001	2.5	
3.88	-20	826.50001843	0.002	846.50001947	0.003	2.5	
3.88	-30	826.50001974	0.000	846.50002246	-0.001	2.5	

Reference Frequency : Low Channel 826.5 MHz / High Channel 846.5 MHz @ 20°C							
Limit: +- 2.5 ppm =		Low Channel	2066.250	Hz	High Channel	2116.250	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	826.50001968	0	846.50002169	0	2.5	
4.45	20	826.50001976	0.000	846.50002496	-0.004	2.5	
3.70	20	826.50001864	0.001	846.50002047	0.001	2.5	

9. RADIATED RESULTS

9.1. RADIATED POWER (ERP)

RULE PART(S)

FCC: §2.1046, §22.913, §90.542 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 \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, 5G NR);

TEST RESULTS

See the following pages.

9.1.1. ERP Results

GSM (ANT A)

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_ANT A	GPRS	824.20	32.90	V	3.01	-1.03	28.87	770.07	38.50	-9.63
		836.60	34.13	V	3.03	-0.97	30.13	1031.54	38.50	-8.37
		848.80	33.47	V	3.05	-0.91	29.51	894.06	38.50	-8.99
	EGPRS	824.20	27.68	V	3.01	-1.03	23.65	231.49	38.50	-14.85
		836.60	28.42	V	3.03	-0.97	24.42	277.00	38.50	-14.08
		848.80	27.94	V	3.05	-0.91	23.98	250.24	38.50	-14.52

GSM (ANT E)

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_ANT E	GPRS	824.20	31.22	V	3.01	-1.03	27.19	523.04	38.50	-11.31
		836.60	32.20	V	3.03	-0.97	28.20	661.43	38.50	-10.30
		848.80	31.54	V	3.05	-0.91	27.58	573.28	38.50	-10.92
	EGPRS	824.20	26.22	V	3.01	-1.03	22.19	165.40	38.50	-16.31
		836.60	27.97	V	3.03	-0.97	23.97	249.74	38.50	-14.53
		848.80	28.03	V	3.05	-0.91	24.07	255.48	38.50	-14.43

WCDMA (ANT A)

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_ANT A	REL99	826.40	24.20	V	3.01	-1.02	20.17	104.05	38.50	-18.33
		836.60	24.87	V	3.03	-0.97	20.87	122.32	38.50	-17.63
		846.60	24.92	V	3.05	-0.92	20.95	124.49	38.50	-17.55
	HSDPA	826.40	21.83	V	3.01	-1.02	17.80	60.29	38.50	-20.70
		836.60	22.33	V	3.03	-0.97	18.33	68.15	38.50	-20.17
		846.60	22.31	V	3.05	-0.92	18.34	68.26	38.50	-20.16

WCDMA (ANT E)

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_ANT E	REL99	826.40	22.94	V	3.01	-1.02	18.91	77.85	38.50	-19.59
		836.60	23.51	V	3.03	-0.97	19.51	89.43	38.50	-18.99
		846.60	23.51	V	3.05	-0.92	19.54	89.98	38.50	-18.96
	HSDPA	826.40	22.41	V	3.01	-1.02	18.38	68.90	38.50	-20.12
		836.60	22.84	V	3.03	-0.97	18.84	76.65	38.50	-19.66
		846.60	22.96	V	3.05	-0.92	18.99	79.27	38.50	-19.51

LTE Band 5 (ANT A)

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
10	QPSK	829.00	24.24	V	3.02	-1.01	20.21	105.05	38.50	-18.29	1/25
		836.50	24.46	V	3.03	-0.97	20.47	111.32	38.50	-18.03	1/0
		844.00	23.74	V	3.04	-0.93	19.76	94.68	38.50	-18.74	1/25
	16-QAM	829.00	23.24	V	3.02	-1.01	19.21	83.44	38.50	-19.29	1/25
		836.50	23.46	V	3.03	-0.97	19.47	88.42	38.50	-19.03	1/0
		844.00	22.72	V	3.04	-0.93	18.74	74.86	38.50	-19.76	1/25
5	QPSK	826.50	23.96	V	3.01	-1.02	19.93	98.41	38.50	-18.57	1/12
		836.50	24.42	V	3.03	-0.97	20.43	110.30	38.50	-18.07	1/0
		846.50	24.01	V	3.05	-0.92	20.04	100.92	38.50	-18.46	1/12
	16-QAM	826.50	22.83	V	3.01	-1.02	18.80	75.86	38.50	-19.70	1/0
		836.50	23.33	V	3.03	-0.97	19.34	85.81	38.50	-19.16	1/0
		846.50	22.66	V	3.05	-0.92	18.69	73.96	38.50	-19.81	1/0
3	QPSK	825.50	24.05	V	3.01	-1.02	20.02	100.44	38.50	-18.48	1/0
		836.50	24.07	V	3.03	-0.97	20.08	101.76	38.50	-18.42	1/0
		847.50	23.74	V	3.05	-0.91	19.78	95.05	38.50	-18.72	1/0
	16-QAM	825.50	23.06	V	3.01	-1.02	19.03	79.96	38.50	-19.47	1/0
		836.50	23.04	V	3.03	-0.97	19.05	80.27	38.50	-19.45	1/14
		847.50	22.77	V	3.05	-0.91	18.81	76.02	38.50	-19.69	1/0
1.4	QPSK	824.70	23.67	V	3.01	-1.03	19.63	91.89	38.50	-18.87	1/3
		836.50	24.10	V	3.03	-0.97	20.11	102.46	38.50	-18.39	1/0
		848.30	23.92	V	3.05	-0.91	19.96	99.07	38.50	-18.54	1/0
	16-QAM	824.70	22.66	V	3.01	-1.03	18.62	72.82	38.50	-19.88	1/3
		836.50	22.93	V	3.03	-0.97	18.94	78.26	38.50	-19.56	1/5
		848.30	22.75	V	3.05	-0.91	18.79	75.67	38.50	-19.71	1/5

LTE Band 5 (ANT E)

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
10	QPSK	829.00	24.22	V	3.02	-1.01	20.19	104.56	38.50	-18.31	1/25
		836.50	24.32	V	3.03	-0.97	20.33	107.79	38.50	-18.17	1/25
		844.00	23.88	V	3.04	-0.93	19.90	97.78	38.50	-18.60	1/25
	16-QAM	829.00	22.20	V	3.02	-1.01	18.17	65.67	38.50	-20.33	1/25
		836.50	22.66	V	3.03	-0.97	18.67	73.55	38.50	-19.83	1/25
		844.00	21.91	V	3.04	-0.93	17.93	62.12	38.50	-20.57	1/25
5	QPSK	826.50	24.14	V	3.01	-1.02	20.11	102.57	38.50	-18.39	1/12
		836.50	24.22	V	3.03	-0.97	20.23	105.33	38.50	-18.27	1/12
		846.50	23.58	V	3.05	-0.92	19.61	91.41	38.50	-18.89	1/12
	16-QAM	826.50	22.07	V	3.01	-1.02	18.04	63.69	38.50	-20.46	1/12
		836.50	22.24	V	3.03	-0.97	18.25	66.77	38.50	-20.25	1/12
		846.50	21.47	V	3.05	-0.92	17.50	56.23	38.50	-21.00	1/12
3	QPSK	825.50	24.03	V	3.01	-1.02	20.00	99.97	38.50	-18.50	1/8
		836.50	24.09	V	3.03	-0.97	20.10	102.23	38.50	-18.40	1/8
		847.50	23.42	V	3.05	-0.91	19.46	88.30	38.50	-19.04	1/8
	16-QAM	825.50	21.97	V	3.01	-1.02	17.94	62.21	38.50	-20.56	1/8
		836.50	21.97	V	3.03	-0.97	17.98	62.74	38.50	-20.52	1/8
		847.50	21.44	V	3.05	-0.91	17.48	55.97	38.50	-21.02	1/8
1.4	QPSK	824.70	23.82	V	3.01	-1.03	19.78	95.12	38.50	-18.72	1/3
		836.50	24.15	V	3.03	-0.97	20.16	103.65	38.50	-18.34	1/3
		848.30	23.45	V	3.05	-0.91	19.49	88.91	38.50	-19.01	1/3
	16-QAM	824.70	21.75	V	3.01	-1.03	17.71	59.06	38.50	-20.79	1/3
		836.50	22.04	V	3.03	-0.97	18.05	63.76	38.50	-20.45	1/3
		848.30	21.40	V	3.05	-0.91	17.44	55.45	38.50	-21.06	1/3

LTE Band 26 (ANT A)

BW (MHz)	Modulation	f (MHz)	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	ERP	ERP (mW)	Limit (dBm)	Delta (dB)	RB		
15	QPSK	821.50	22.45	V	3.01	-1.04	18.40	69.25	50.00	-31.60	1/0		
		831.50	23.47	V	3.02	-0.99	19.45	88.12	38.50	-19.05	1/0		
		836.50	23.86	V	3.03	-0.97	19.87	96.95	38.50	-18.63	1/37		
		841.50	22.54	V	3.04	-0.94	18.56	71.76	38.50	-19.94	1/0		
	16-QAM	821.50	21.37	V	3.01	-1.04	17.32	54.00	50.00	-32.68	1/0		
		831.50	22.50	V	3.02	-0.99	18.48	70.48	38.50	-20.02	1/0		
836.50		22.90	V	3.03	-0.97	18.91	77.73	38.50	-19.59	1/37			
10	QPSK	819.00	21.88	V	3.00	-1.06	17.83	60.67	50.00	-32.17	1/25		
		829.00	23.14	V	3.02	-1.01	19.11	81.54	38.50	-19.39	1/25		
		831.50	23.69	V	3.02	-0.99	19.67	92.70	38.50	-18.83	1/25		
		844.00	23.44	V	3.04	-0.93	19.46	88.36	38.50	-19.04	1/0		
	16-QAM	819.00	20.81	V	3.00	-1.06	16.76	47.42	50.00	-33.24	1/25		
		829.00	22.00	V	3.02	-1.01	17.97	62.72	38.50	-20.53	1/25		
		831.50	22.57	V	3.02	-0.99	18.55	71.63	38.50	-19.95	1/25		
		844.00	22.19	V	3.04	-0.93	18.21	66.26	38.50	-20.29	1/0		
		5	QPSK	816.50	21.77	V	3.00	-1.07	17.70	58.91	50.00	-32.30	1/24
				821.50	22.43	V	3.01	-1.04	18.38	68.93	50.00	-31.62	1/0
826.50	22.87			V	3.01	-1.02	18.84	76.57	38.50	-19.66	1/0		
831.50	23.58			V	3.02	-0.99	19.56	90.38	38.50	-18.94	1/0		
16-QAM	846.50		23.54	V	3.05	-0.92	19.57	90.57	38.50	-18.93	1/12		
	816.50		20.67	V	3.00	-1.07	16.60	45.73	50.00	-33.40	1/0		
	821.50		21.29	V	3.01	-1.04	17.24	53.02	50.00	-32.76	1/24		
	826.50		21.74	V	3.01	-1.02	17.71	59.03	38.50	-20.79	1/0		
	831.50		22.55	V	3.02	-0.99	18.53	71.30	38.50	-19.97	1/24		
	846.50		22.24	V	3.05	-0.92	18.27	67.14	38.50	-20.23	1/0		
3	QPSK	815.50	21.74	V	2.99	-1.07	17.67	58.47	50.00	-32.33	1/14		
		822.50	22.50	V	3.01	-1.04	18.45	70.06	50.00	-31.55	1/0		
		825.50	23.04	V	3.01	-1.02	19.01	79.59	38.50	-19.49	1/0		
		831.50	23.72	V	3.02	-0.99	19.70	93.34	38.50	-18.80	1/0		
		847.50	23.71	V	3.05	-0.91	19.75	94.39	38.50	-18.75	1/0		
		815.50	20.66	V	2.99	-1.07	16.59	45.60	50.00	-33.41	1/0		
	16-QAM	822.50	21.31	V	3.02	-0.99	17.29	53.61	50.00	-32.71	1/0		
		825.50	21.88	V	3.01	-1.02	17.85	60.94	38.50	-20.65	1/0		
		831.50	22.54	V	3.02	-0.99	18.52	71.13	38.50	-19.98	1/14		
		847.50	22.53	V	3.05	-0.91	18.57	71.93	38.50	-19.93	1/0		
1.4	QPSK	814.70	21.68	V	2.99	-1.08	17.61	57.66	50.00	-32.39	1/3		
		823.30	22.53	V	3.01	-1.03	18.49	70.55	50.00	-31.51	1/5		
		824.70	22.82	V	3.01	-1.03	18.78	75.55	38.50	-19.72	1/5		
		831.50	23.91	V	3.02	-0.99	19.89	97.52	38.50	-18.61	1/3		
		848.30	23.58	V	3.05	-0.91	19.62	91.61	38.50	-18.88	1/0		
	16-QAM	814.70	20.32	V	2.99	-1.08	16.25	42.16	50.00	-33.75	1/3		
		823.30	21.53	V	3.01	-1.03	17.49	56.04	50.00	-32.51	1/5		
		824.70	21.71	V	3.01	-1.03	17.67	58.51	38.50	-20.83	1/5		
		831.50	22.63	V	3.02	-0.99	18.61	72.62	38.50	-19.89	1/5		
		848.30	22.48	V	3.05	-0.91	18.52	71.11	38.50	-19.98	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	22.63	V	3.01	-1.03	18.59	72.32	38.50	-19.91	1/37
	16-QAM		21.66	V	3.01	-1.03	17.62	57.84	38.50	-20.88	1/37
10	QPSK		22.46	V	3.01	-1.03	18.42	69.54	38.50	-20.08	1/25
	16-QAM		21.55	V	3.01	-1.03	17.51	56.40	38.50	-20.99	1/25
5	QPSK		22.41	V	3.01	-1.03	18.37	68.75	38.50	-20.13	1/12
	16-QAM		21.41	V	3.01	-1.03	17.37	54.61	38.50	-21.13	1/12
3	QPSK		22.57	V	3.01	-1.03	18.53	71.32	38.50	-19.97	1/8
	16-QAM		21.52	V	3.01	-1.03	17.48	56.01	38.50	-21.02	1/8
1.4	QPSK		22.71	V	3.01	-1.03	18.67	73.66	38.50	-19.83	1/3
	16-QAM		21.61	V	3.01	-1.03	17.57	57.18	38.50	-20.93	1/3

LTE Band 26 (ANT E)

BW (MHz)	Modulation	f (MHz)	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	ERP	ERP (mW)	Limit (dBm)	Delta (dB)	RB		
15	QPSK	821.50	23.38	V	3.01	-1.04	19.33	85.79	50.00	-30.67	1/0		
		831.50	23.15	V	3.02	-0.99	19.13	81.94	38.50	-19.37	1/0		
		836.50	23.06	V	3.03	-0.97	19.06	80.57	38.50	-19.44	1/0		
		841.50	23.17	V	3.04	-0.94	19.19	82.95	38.50	-19.31	1/0		
	16-QAM	821.50	22.86	V	3.01	-1.04	18.81	76.11	50.00	-31.19	1/0		
		831.50	22.74	V	3.02	-0.99	18.72	74.55	38.50	-19.78	1/0		
836.50		22.52	V	3.03	-0.97	18.52	71.15	38.50	-19.98	1/0			
10	QPSK	819.00	23.11	V	3.00	-1.06	19.05	80.44	50.00	-30.95	1/0		
		829.00	22.94	V	3.02	-1.01	18.92	77.95	38.50	-19.58	1/0		
		831.50	22.93	V	3.02	-0.99	18.91	77.89	38.50	-19.59	1/25		
		844.00	22.99	V	3.04	-0.93	19.02	79.74	38.50	-19.48	1/0		
	16-QAM	819.00	22.42	V	3.00	-1.06	18.36	68.63	50.00	-31.64	1/25		
		829.00	22.91	V	3.02	-1.01	18.89	77.41	38.50	-19.61	1/25		
		831.50	22.87	V	3.02	-0.99	18.85	76.82	38.50	-19.65	1/25		
		844.00	22.75	V	3.04	-0.93	18.78	75.45	38.50	-19.72	1/0		
		5	QPSK	816.50	23.14	V	3.00	-1.07	19.08	80.84	50.00	-30.92	1/0
				821.50	23.20	V	3.01	-1.04	19.15	82.26	50.00	-30.85	1/12
826.50	23.21			V	3.01	-1.02	19.18	82.78	38.50	-19.32	1/12		
831.50	23.11			V	3.02	-0.99	19.09	81.18	38.50	-19.41	1/0		
16-QAM	846.50		23.11	V	3.05	-0.92	19.14	82.11	38.50	-19.36	1/0		
	816.50		22.84	V	3.00	-1.07	18.78	75.44	50.00	-31.22	1/0		
	821.50		22.72	V	3.01	-1.04	18.67	73.66	50.00	-31.33	1/12		
	826.50		22.56	V	3.01	-1.02	18.53	71.27	38.50	-19.97	1/0		
	831.50		22.64	V	3.02	-0.99	18.62	72.86	38.50	-19.88	1/24		
	846.50		22.66	V	3.05	-0.92	18.69	74.02	38.50	-19.81	1/0		
3	QPSK	815.50	23.22	V	2.99	-1.07	19.15	82.28	50.00	-30.85	1/0		
		822.50	23.15	V	3.01	-1.04	19.11	81.40	50.00	-30.89	1/0		
		825.50	23.24	V	3.01	-1.02	19.21	83.28	38.50	-19.29	1/0		
		831.50	23.06	V	3.02	-0.99	19.04	80.26	38.50	-19.46	1/0		
		847.50	23.17	V	3.05	-0.91	19.21	83.30	38.50	-19.29	1/0		
		16-QAM	815.50	22.84	V	2.99	-1.07	18.77	75.39	50.00	-31.23	1/0	
	822.50		22.69	V	3.02	-0.99	18.67	73.70	50.00	-31.33	1/8		
	825.50		22.74	V	3.01	-1.02	18.71	74.23	38.50	-19.79	1/8		
	831.50		22.61	V	3.02	-0.99	18.59	72.36	38.50	-19.91	1/0		
	1.4	QPSK	814.70	23.15	V	2.99	-1.08	19.08	80.91	50.00	-30.92	1/5	
823.30			23.24	V	3.01	-1.03	19.20	83.16	50.00	-30.80	1/0		
824.70			23.12	V	3.01	-1.03	19.08	80.96	38.50	-19.42	1/0		
831.50			23.23	V	3.02	-0.99	19.21	83.38	38.50	-19.29	1/0		
848.30			22.31	V	3.05	-0.91	18.35	68.38	38.50	-20.15	1/0		
16-QAM			814.70	22.95	V	2.99	-1.08	18.88	77.27	50.00	-31.12	1/3	
		823.30	22.84	V	3.01	-1.03	18.80	75.84	50.00	-31.20	1/5		
		824.70	22.72	V	3.01	-1.03	18.68	73.83	38.50	-19.82	1/5		
		831.50	22.98	V	3.02	-0.99	18.96	78.72	38.50	-19.54	1/5		
848.30		21.73	V	3.05	-0.91	17.77	59.83	38.50	-20.73	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	23.07	V	3.01	-1.03	19.03	79.98	38.50	-20.17	1/0
	16-QAM		22.09	V	3.01	-1.03	18.05	63.83	38.50	-21.15	1/0
10	QPSK		23.09	V	3.01	-1.03	19.05	80.35	38.50	-20.15	1/0
	16-QAM		22.08	V	3.01	-1.03	18.04	63.68	38.50	-21.16	1/25
5	QPSK		22.98	V	3.01	-1.03	18.94	78.34	38.50	-20.26	1/12
	16-QAM		21.94	V	3.01	-1.03	17.90	61.66	38.50	-21.30	1/0
3	QPSK		22.79	V	3.01	-1.03	18.75	74.99	38.50	-20.45	1/0
	16-QAM		21.86	V	3.01	-1.03	17.82	60.53	38.50	-21.38	1/0
1.4	QPSK		23.13	V	3.01	-1.03	19.09	81.10	38.50	-20.11	1/0
	16-QAM		22.14	V	3.01	-1.03	18.10	64.57	38.50	-21.10	1/5

NR Band n5 (ANT A)

DFT-OFDM

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	24.29	V	3.03	-0.98	20.28	106.64	38.50	-18.22	1/53
		836.50	23.98	V	3.03	-0.97	19.99	99.67	38.50	-18.51	1/53
		839.00	23.71	V	3.03	-0.96	19.72	93.79	38.50	-18.78	1/1
	16-QAM	834.00	23.37	V	3.03	-0.98	19.36	86.28	38.50	-19.14	1/53
		836.50	22.96	V	3.03	-0.97	18.97	78.81	38.50	-19.53	1/53
		839.00	22.63	V	3.03	-0.96	18.64	73.14	38.50	-19.86	1/1
15	QPSK	831.50	24.19	V	3.02	-0.99	20.17	104.01	38.50	-18.33	1/1
		836.50	23.91	V	3.03	-0.97	19.92	98.08	38.50	-18.58	1/40
		841.50	23.85	V	3.04	-0.94	19.87	97.02	38.50	-18.63	1/77
	16-QAM	831.50	23.20	V	3.02	-0.99	19.18	82.81	38.50	-19.32	1/1
		836.50	22.91	V	3.03	-0.97	18.92	77.90	38.50	-19.58	1/40
		841.50	22.75	V	3.04	-0.94	18.77	75.31	38.50	-19.73	1/77
10	QPSK	829.00	24.18	V	3.02	-1.01	20.15	103.61	38.50	-18.35	1/50
		836.50	24.18	V	3.03	-0.97	20.19	104.37	38.50	-18.31	1/1
		844.00	23.44	V	3.04	-0.93	19.46	88.36	38.50	-19.04	1/26
	16-QAM	829.00	23.05	V	3.02	-1.01	19.02	79.87	38.50	-19.48	1/50
		836.50	23.09	V	3.03	-0.97	19.10	81.20	38.50	-19.40	1/1
		844.00	22.26	V	3.04	-0.93	18.28	67.34	38.50	-20.22	1/26
5	QPSK	826.50	24.27	V	3.01	-1.02	20.24	105.69	38.50	-18.26	1/23
		836.50	23.69	V	3.03	-0.97	19.70	93.23	38.50	-18.80	1/23
		846.50	23.73	V	3.05	-0.92	19.76	94.62	38.50	-18.74	1/23
	16-QAM	826.50	23.37	V	3.01	-1.02	19.34	85.91	38.50	-19.16	1/23
		836.50	22.68	V	3.03	-0.97	18.69	73.89	38.50	-19.81	1/23
		846.50	22.81	V	3.05	-0.92	18.84	76.55	38.50	-19.66	1/23

NR Band n5 (ANT E)

DFT-OFDM

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	22.78	V	3.03	-0.98	18.77	75.35	38.50	-19.73	1/1
		836.50	22.80	V	3.03	-0.97	18.80	75.88	38.50	-19.70	1/1
		839.00	22.99	V	3.03	-0.96	19.00	79.50	38.50	-19.50	1/1
	16-QAM	834.00	22.32	V	3.03	-0.98	18.31	67.78	38.50	-20.19	1/1
		836.50	22.44	V	3.03	-0.97	18.44	69.84	38.50	-20.06	1/1
		839.00	22.72	V	3.03	-0.96	18.73	74.70	38.50	-19.77	1/1
15	QPSK	831.50	22.29	V	3.02	-0.99	18.28	67.26	38.50	-20.22	1/1
		836.50	22.50	V	3.03	-0.97	18.50	70.81	38.50	-20.00	1/1
		841.50	23.20	V	3.04	-0.94	19.22	83.46	38.50	-19.28	1/1
	16-QAM	831.50	22.06	V	3.02	-0.99	18.05	63.79	38.50	-20.45	1/1
		836.50	22.23	V	3.03	-0.97	18.23	66.54	38.50	-20.27	1/1
		841.50	22.82	V	3.04	-0.94	18.84	76.47	38.50	-19.66	1/1
10	QPSK	829.00	23.30	V	3.02	-1.01	19.28	84.78	38.50	-19.22	1/26
		836.50	22.74	V	3.03	-0.97	18.74	74.84	38.50	-19.76	1/26
		844.00	22.92	V	3.04	-0.93	18.95	78.53	38.50	-19.55	1/50
	16-QAM	829.00	22.35	V	3.02	-1.01	18.33	68.12	38.50	-20.17	1/26
		836.50	21.46	V	3.03	-0.97	17.46	55.73	38.50	-21.04	1/26
		844.00	21.93	V	3.04	-0.93	17.96	62.52	38.50	-20.54	1/50
5	QPSK	826.50	22.79	V	3.01	-1.02	18.76	75.13	38.50	-19.74	1/1
		836.50	22.27	V	3.03	-0.97	18.27	67.16	38.50	-20.23	1/1
		846.50	22.39	V	3.05	-0.92	18.42	69.50	38.50	-20.08	1/1
	16-QAM	826.50	21.96	V	3.01	-1.02	17.93	62.06	38.50	-20.57	1/1
		836.50	20.96	V	3.03	-0.97	16.96	49.67	38.50	-21.54	1/23
		846.50	21.49	V	3.05	-0.92	17.52	56.50	38.50	-20.98	1/1

9.2. RADIATED 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 $116 \log_{10}(f/6.1)$ decibels or $50 + 10 \log_{10}(P)$ 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 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 $43 + 10 \log_{10}(P)$ 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 and 1 MHz for emissions above 1 GHz
- 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, 5G NR), Maxhold(GSM);

NOTE1

5G NR: All Waveforms (CP-OFDM vs DFT-s_OFDM) and modulations ($\pi/2$ 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

		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement								
		Company:	Samsung							
		Project #:	4790976555							
		Date:	2023-09-07							
		Test Engineer:	26087							
		Configuration:	EUT / AC Adapter, Z-Position							
		Location:	Chamber 2							
		Mode:	GPRS 850 MHz Harmonics							
		Test Voltage:	AC 120 V, 60 Hz							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
Low Ch, 824.2MHz										
GPRS	1648.40	-9.5	V	3.0	40.8	1.0	-49.4	-13.0	-36.4	
	2472.60	-4.1	V	3.0	41.4	1.0	-44.6	-13.0	-31.6	
ANT A	3296.80	-4.3	V	3.0	42.2	1.0	-45.5	-13.0	-32.5	
	1648.40	-10.5	H	3.0	40.8	1.0	-50.4	-13.0	-37.4	
	2472.60	-6.0	H	3.0	41.4	1.0	-46.5	-13.0	-33.5	
	3296.80	-3.4	H	3.0	42.2	1.0	-44.6	-13.0	-31.6	
Mid Ch, 836.6MHz										
	1673.20	-9.6	V	3.0	40.8	1.0	-49.5	-13.0	-36.5	
	2509.80	1.3	V	3.0	41.5	1.0	-39.2	-13.0	-26.2	
	3346.40	-3.8	V	3.0	42.2	1.0	-45.0	-13.0	-32.0	
	1673.20	-10.7	H	3.0	40.8	1.0	-50.5	-13.0	-37.5	
	2509.80	0.4	H	3.0	41.5	1.0	-40.1	-13.0	-27.1	
	3346.40	-3.4	H	3.0	42.2	1.0	-44.6	-13.0	-31.6	
High Ch, 848.8MHz										
	1697.60	-9.8	V	3.0	40.8	1.0	-49.6	-13.0	-36.6	
	2546.40	-5.5	V	3.0	41.5	1.0	-46.0	-13.0	-33.0	
	3395.20	-3.5	V	3.0	42.2	1.0	-44.7	-13.0	-31.7	
	1697.60	-10.5	H	3.0	40.8	1.0	-50.3	-13.0	-37.3	
	2546.40	-5.1	H	3.0	41.5	1.0	-45.7	-13.0	-32.7	
	3395.20	-3.3	H	3.0	42.2	1.0	-44.5	-13.0	-31.5	

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement										
Company:		Samsung								
Project #:		4790976555								
Date:		2023-09-20								
Test Engineer:		26087								
Configuration:		EUT, Z-Position								
Location:		Chamber 2								
Mode:		GPRS 850 MHz Harmonics								
Test Voltage:		AC 120 V, 60 Hz								
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
Low Ch, 824.2MHz										
1648.40	-9.7	V	3.0	40.8	1.0	-49.5	-13.0	-36.5		
2472.60	3.1	V	3.0	41.4	1.0	-37.3	-13.0	-24.3		
3296.80	-4.0	V	3.0	42.2	1.0	-45.2	-13.0	-32.2		
4121.00	-5.9	V	3.0	42.3	1.0	-47.2	-13.0	-34.2		
4945.20	-6.5	V	3.0	42.9	1.0	-48.4	-13.0	-35.4		
1648.40	-10.4	H	3.0	40.8	1.0	-50.2	-13.0	-37.2		
2472.60	2.9	H	3.0	41.4	1.0	-37.6	-13.0	-24.6		
3296.80	-3.5	H	3.0	42.2	1.0	-44.7	-13.0	-31.7		
4121.00	-4.6	H	3.0	42.3	1.0	-45.9	-13.0	-32.9		
4945.20	-6.6	H	3.0	42.9	1.0	-48.5	-13.0	-35.5		
Mid Ch, 836.6MHz										
1673.20	-9.7	V	3.0	40.8	1.0	-49.5	-13.0	-36.5		
2509.80	2.8	V	3.0	41.5	1.0	-37.6	-13.0	-24.6		
3346.40	-4.0	V	3.0	42.2	1.0	-45.2	-13.0	-32.2		
4183.00	-6.1	V	3.0	42.3	1.0	-47.5	-13.0	-34.5		
5019.60	-6.3	V	3.0	42.9	1.0	-48.2	-13.0	-35.2		
1673.20	-10.9	H	3.0	40.8	1.0	-50.7	-13.0	-37.7		
2509.80	4.7	H	3.0	41.5	1.0	-35.8	-13.0	-22.8		
3346.40	-3.6	H	3.0	42.2	1.0	-44.8	-13.0	-31.8		
4183.00	-4.4	H	3.0	42.3	1.0	-45.7	-13.0	-32.7		
5019.60	-6.2	H	3.0	42.9	1.0	-48.1	-13.0	-35.1		
High Ch, 848.8MHz										
1697.60	-9.8	V	3.0	40.8	1.0	-49.6	-13.0	-36.6		
2546.40	4.9	V	3.0	41.5	1.0	-35.6	-13.0	-22.6		
3395.20	-4.2	V	3.0	42.2	1.0	-45.4	-13.0	-32.4		
4244.00	-6.9	V	3.0	42.4	1.0	-48.3	-13.0	-35.3		
5092.80	-6.4	V	3.0	42.9	1.0	-48.3	-13.0	-35.3		
1697.60	-10.7	H	3.0	40.8	1.0	-50.5	-13.0	-37.5		
2546.40	5.3	H	3.0	41.5	1.0	-35.2	-13.0	-22.2		
3395.20	-3.6	H	3.0	42.2	1.0	-44.8	-13.0	-31.8		
4244.00	-6.2	H	3.0	42.4	1.0	-47.6	-13.0	-34.6		
5092.80	-6.5	H	3.0	42.9	1.0	-48.4	-13.0	-35.4		

GPRS
 ANTE

WCDMA Band 5

		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
		Company: Samsung Project #: 4790976555 Date: 2023-09-08 Test Engineer: 26087 Configuration: EUT / AC Adapter, Z-Position Location: Chamber 2 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	
REL99 ANT A	Low Ch, 826.4MHz										
		1652.80	-15.0	V	3.0	40.8	1.0	-54.8	-13.0	-41.8	
		2479.20	-11.9	V	3.0	41.4	1.0	-52.4	-13.0	-39.4	
		3305.60	-9.3	V	3.0	42.2	1.0	-50.5	-13.0	-37.5	
		1652.80	-15.9	H	3.0	40.8	1.0	-55.8	-13.0	-42.8	
		2479.20	-11.8	H	3.0	41.4	1.0	-52.2	-13.0	-39.2	
		3305.60	-8.9	H	3.0	42.2	1.0	-50.1	-13.0	-37.1	
	Mid Ch, 836.6MHz										
		1673.20	-14.9	V	3.0	40.8	1.0	-54.7	-13.0	-41.7	
		2509.80	-11.8	V	3.0	41.5	1.0	-52.3	-13.0	-39.3	
		3346.40	-9.0	V	3.0	42.2	1.0	-50.2	-13.0	-37.2	
		1673.20	-15.8	H	3.0	40.8	1.0	-55.6	-13.0	-42.6	
		2509.80	-11.6	H	3.0	41.5	1.0	-52.1	-13.0	-39.1	
		3346.40	-8.7	H	3.0	42.2	1.0	-49.9	-13.0	-36.9	
	High Ch, 846.6MHz										
		1693.20	-14.9	V	3.0	40.8	1.0	-54.7	-13.0	-41.7	
		2539.80	-11.7	V	3.0	41.5	1.0	-52.2	-13.0	-39.2	
		3386.40	-8.9	V	3.0	42.2	1.0	-50.1	-13.0	-37.1	
	1693.20	-15.7	H	3.0	40.8	1.0	-55.5	-13.0	-42.5		
	2539.80	-11.5	H	3.0	41.5	1.0	-52.0	-13.0	-39.0		
	3386.40	-8.5	H	3.0	42.2	1.0	-49.7	-13.0	-36.7		

		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
		Company: Samsung Project #: 4790976555 Date: 2023-09-19 Test Engineer: 26087 Configuration: EUT / AC Adapter, X-Position Location: Chamber 2 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	
REL99 ANT E	Low Ch, 826.4MHz										
		1652.80	-14.9	V	3.0	40.8	1.0	-54.8	-13.0	-41.8	
		2479.20	-11.4	V	3.0	41.4	1.0	-51.9	-13.0	-38.9	
		3305.60	-9.3	V	3.0	42.2	1.0	-50.5	-13.0	-37.5	
		1652.80	-15.9	H	3.0	40.8	1.0	-55.7	-13.0	-42.7	
		2479.20	-10.3	H	3.0	41.4	1.0	-50.7	-13.0	-37.7	
		3305.60	-8.9	H	3.0	42.2	1.0	-50.1	-13.0	-37.1	
	Mid Ch, 836.6MHz										
		1673.20	-14.9	V	3.0	40.8	1.0	-54.7	-13.0	-41.7	
		2509.80	-11.2	V	3.0	41.5	1.0	-51.7	-13.0	-38.7	
		3346.40	-9.1	V	3.0	42.2	1.0	-50.3	-13.0	-37.3	
		1673.20	-15.9	H	3.0	40.8	1.0	-55.7	-13.0	-42.7	
		2509.80	-10.4	H	3.0	41.5	1.0	-50.9	-13.0	-37.9	
		3346.40	-8.5	H	3.0	42.2	1.0	-49.7	-13.0	-36.7	
	High Ch, 846.6MHz										
		1693.20	-14.9	V	3.0	40.8	1.0	-54.7	-13.0	-41.7	
		2539.80	-10.3	V	3.0	41.5	1.0	-50.8	-13.0	-37.8	
		3386.40	-8.9	V	3.0	42.2	1.0	-50.1	-13.0	-37.1	
	1693.20	-15.7	H	3.0	40.8	1.0	-55.5	-13.0	-42.5		
	2539.80	-9.6	H	3.0	41.5	1.0	-50.1	-13.0	-37.1		
	3386.40	-8.5	H	3.0	42.2	1.0	-49.7	-13.0	-36.7		

LTE Band 5

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement												
Company: Samsung Project #: 4790946555 Date: 2023-09-07 Test Engineer: 26087 Configuration: EUT / AC Adapter, Z-Position Location: Chamber 2 Mode: LTE_QPSK Band 5 Harmonics, 10MHz Bandwidth Test Votage: AC 120 V, 60 Hz												
10 MHz QPSK ANT A	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes		
	Low Ch, 829MHz											
	1658.00	-14.9	V	3.0	40.8	1.0	-54.7	-13.0	-41.7			
	2487.00	-11.8	V	3.0	41.5	1.0	-52.2	-13.0	-39.2			
	3316.00	-9.2	V	3.0	42.2	1.0	-50.4	-13.0	-37.4			
	1658.00	-15.9	H	3.0	40.8	1.0	-55.7	-13.0	-42.7			
	2487.00	-11.8	H	3.0	41.5	1.0	-52.3	-13.0	-39.3			
	3316.00	-8.8	H	3.0	42.2	1.0	-50.0	-13.0	-37.0			
	Mid Ch, 836.5MHz											
	1673.00	-14.9	V	3.0	40.8	1.0	-54.7	-13.0	-41.7			
	2509.50	-11.8	V	3.0	41.5	1.0	-52.3	-13.0	-39.3			
	3346.00	-9.1	V	3.0	42.2	1.0	-50.3	-13.0	-37.3			
	1673.00	-15.7	H	3.0	40.8	1.0	-55.5	-13.0	-42.5			
	2509.50	-11.7	H	3.0	41.5	1.0	-52.2	-13.0	-39.2			
	3346.00	-8.7	H	3.0	42.2	1.0	-49.9	-13.0	-36.9			
	High Ch, 844MHz											
	1688.00	-14.9	V	3.0	40.8	1.0	-54.7	-13.0	-41.7			
	2532.00	-11.6	V	3.0	41.5	1.0	-52.1	-13.0	-39.1			
	3376.00	-8.9	V	3.0	42.2	1.0	-50.1	-13.0	-37.1			
	1688.00	-15.7	H	3.0	40.8	1.0	-55.5	-13.0	-42.5			
	2532.00	-11.5	H	3.0	41.5	1.0	-52.0	-13.0	-39.0			
	3376.00	-8.5	H	3.0	42.2	1.0	-49.7	-13.0	-36.7			
	UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement											
	Company: Samsung Project #: 4790976555 Date: 2023-09-24 Test Engineer: 26087 Configuration: EUT / AC Adapter, X-Position Location: Chamber 2 Mode: LTE_QPSK Band 5 Harmonics, 10MHz Bandwidth Test Votage: AC 120 V, 60 Hz											
	10 MHz QPSK ANT E	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
		Low Ch, 829MHz										
		1658.00	-14.9	V	3.0	40.8	1.0	-54.7	-13.0	-41.7		
		2487.00	-11.1	V	3.0	41.5	1.0	-51.5	-13.0	-38.5		
3316.00		-9.2	V	3.0	42.2	1.0	-50.4	-13.0	-37.4			
1658.00		-15.8	H	3.0	40.8	1.0	-55.7	-13.0	-42.7			
2487.00		-10.5	H	3.0	41.5	1.0	-50.9	-13.0	-37.9			
3316.00		-8.8	H	3.0	42.2	1.0	-50.0	-13.0	-37.0			
Mid Ch, 836.5MHz												
1673.00		-14.9	V	3.0	40.8	1.0	-54.7	-13.0	-41.7			
2509.50		-11.3	V	3.0	41.5	1.0	-51.8	-13.0	-38.8			
3346.00		-9.1	V	3.0	42.2	1.0	-50.3	-13.0	-37.3			
1673.00		-15.8	H	3.0	40.8	1.0	-55.6	-13.0	-42.6			
2509.50		-10.6	H	3.0	41.5	1.0	-51.1	-13.0	-38.1			
3346.00		-8.6	H	3.0	42.2	1.0	-49.8	-13.0	-36.8			
High Ch, 844MHz												
1688.00		-14.9	V	3.0	40.8	1.0	-54.7	-13.0	-41.7			
2532.00		-11.6	V	3.0	41.5	1.0	-52.1	-13.0	-39.1			
3376.00		-8.9	V	3.0	42.2	1.0	-50.1	-13.0	-37.1			
1688.00		-15.7	H	3.0	40.8	1.0	-55.5	-13.0	-42.5			
2532.00		-10.7	H	3.0	41.5	1.0	-51.2	-13.0	-38.2			
3376.00		-8.6	H	3.0	42.2	1.0	-49.8	-13.0	-36.8			

LTE Band 26 (Part 90)

1.4 MHz QPSK ANT A	UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement										
	Company: Samsung Project #: 4790976555 Date: 2023-09-08 Test Engineer: 26087 Configuration: EUT / AC Adapter, X-Position Location: Chamber 2 Mode: LTE_QPSK Band 26 Harmonics, 1.4MHz Bandwidth Test Votage: AC 120 V, 60 Hz										
	f	SG reading	Ant. Pol.	Distance	Preamp	Filter	EIRP	Limit	Delta	Notes	
	MHz	(dBm)	(H/V)	(m)	(dB)	(dB)	(dBm)	(dBm)	(dB)		
	Low Ch, 814.7MHz										
	1629.40	-14.9	V	3.0	40.8	1.0	-54.8	-13.0	-41.8		
	2444.10	-12.0	V	3.0	41.4	1.0	-52.4	-13.0	-39.4		
	3258.80	-9.5	V	3.0	42.2	1.0	-50.7	-13.0	-37.7		
	1629.40	-16.0	H	3.0	40.8	1.0	-55.8	-13.0	-42.8		
	2444.10	-11.7	H	3.0	41.4	1.0	-52.1	-13.0	-39.1		
	3258.80	-8.9	H	3.0	42.2	1.0	-50.1	-13.0	-37.1		
	Mid Ch, 823.3MHz										
	1646.60	-15.0	V	3.0	40.8	1.0	-54.9	-13.0	-41.9		
	2469.90	-11.8	V	3.0	41.4	1.0	-52.3	-13.0	-39.3		
	3293.20	-9.5	V	3.0	42.2	1.0	-50.7	-13.0	-37.7		
	1646.60	-16.0	H	3.0	40.8	1.0	-55.8	-13.0	-42.8		
	2469.90	-11.9	H	3.0	41.4	1.0	-52.4	-13.0	-39.4		
	3293.20	-8.9	H	3.0	42.2	1.0	-50.1	-13.0	-37.1		
	15 MHz QPSK ANT E	UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
		Company: Sasmsung Project #: 479076555 Date: 2023-10-13 Test Engineer: 245242 Configuration: EUT / AC Adapter, X-Position Location: Chamber 1 Mode: LTE_QPSK Band 26 Harmonics, 15MHz Bandwidth Test Votage: AC 120 V, 60 Hz									
f		SG reading	Ant. Pol.	Distance	Preamp	Filter	EIRP	Limit	Delta	Notes	
MHz		(dBm)	(H/V)	(m)	(dB)	(dB)	(dBm)	(dBm)	(dB)		
Low Ch, 821.5MHz											
1643.00		-14.3	V	3.0	43.3	1.0	-56.6	-13.0	-43.6		
2464.50		-12.0	V	3.0	43.6	1.0	-54.6	-13.0	-41.6		
3286.00		-9.5	V	3.0	43.9	1.0	-52.5	-13.0	-39.5		
1643.00		-14.9	H	3.0	43.3	1.0	-57.2	-13.0	-44.2		
2464.50		-12.3	H	3.0	43.6	1.0	-54.9	-13.0	-41.9		
3286.00		-9.3	H	3.0	43.9	1.0	-52.2	-13.0	-39.2		

LTE Band 26 (Straddle)

1.4 MHz QPSK ANT A	UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement																																																																																								
	Company: Samsung																																																																																								
	Project #: 4790976555																																																																																								
	Date: 2023-09-08																																																																																								
	Test Engineer: 26087																																																																																								
	Configuration: EUT / AC Adapter, X-Position																																																																																								
	Location: Chamber 2																																																																																								
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LTE Band 26 (Part 22)

		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
		Company: Samsung Project #: 4790946555 Date: 2023-09-08 Test Engineer: 26087 Configuration: EUT / AC Adapter, X-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		
1.4 MHz QPSK ANT A	Low Ch, 824.7MHz										
	1649.40	-15.1	V	3.0	40.8	1.0	-54.9	-13.0	-41.9		
	2474.10	-11.9	V	3.0	41.4	1.0	-52.3	-13.0	-39.3		
	3298.80	-9.3	V	3.0	42.2	1.0	-50.5	-13.0	-37.5		
	1649.40	-16.0	H	3.0	40.8	1.0	-55.8	-13.0	-42.8		
	2474.10	-11.8	H	3.0	41.4	1.0	-52.3	-13.0	-39.3		
	3298.80	-9.0	H	3.0	42.2	1.0	-50.2	-13.0	-37.2		
	Mid Ch, 831.5MHz										
	1663.00	-14.9	V	3.0	40.8	1.0	-54.7	-13.0	-41.7		
	2494.50	-11.9	V	3.0	41.5	1.0	-52.4	-13.0	-39.4		
	3326.00	-9.3	V	3.0	42.2	1.0	-50.5	-13.0	-37.5		
	1663.00	-15.8	H	3.0	40.8	1.0	-55.6	-13.0	-42.6		
	2494.50	-11.3	H	3.0	41.5	1.0	-51.7	-13.0	-38.7		
	3326.00	-8.9	H	3.0	42.2	1.0	-50.1	-13.0	-37.1		
	High Ch, 848.3MHz										
	1696.60	-14.9	V	3.0	40.8	1.0	-54.7	-13.0	-41.7		
	2544.90	-11.6	V	3.0	41.5	1.0	-52.2	-13.0	-39.2		
	3393.20	-8.9	V	3.0	42.2	1.0	-50.1	-13.0	-37.1		
	1696.60	-15.8	H	3.0	40.8	1.0	-55.6	-13.0	-42.6		
	2544.90	-11.5	H	3.0	41.5	1.0	-52.0	-13.0	-39.0		
	3393.20	-8.4	H	3.0	42.2	1.0	-49.6	-13.0	-36.6		
			UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement								
			Company: Samsung Project #: 4790976555 Date: 2023-10-13 Test Engineer: 24542 Configuration: EUT / AC Adapter, X-Position Location: Chamber 1 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	
1.4 MHz QPSK ANT E	Low Ch, 824.7MHz										
	1649.40	-14.5	V	3.0	43.3	1.0	-56.8	-13.0	-43.8		
	2474.10	-11.9	V	3.0	43.6	1.0	-54.5	-13.0	-41.5		
	3298.80	-9.5	V	3.0	43.9	1.0	-52.4	-13.0	-39.4		
	1649.40	-14.9	H	3.0	43.3	1.0	-57.3	-13.0	-44.3		
	2474.10	-12.3	H	3.0	43.6	1.0	-54.9	-13.0	-41.9		
	3298.80	-9.1	H	3.0	43.9	1.0	-52.1	-13.0	-39.1		
	Mid Ch, 831.5MHz										
	1663.00	-16.9	V	3.0	43.3	1.0	-59.2	-13.0	-46.2		
	2494.50	-11.9	V	3.0	43.6	1.0	-54.5	-13.0	-41.5		
	3326.00	-9.5	V	3.0	43.9	1.0	-52.4	-13.0	-39.4		
	1663.00	-16.0	H	3.0	43.3	1.0	-58.4	-13.0	-45.4		
	2494.50	-12.3	H	3.0	43.6	1.0	-54.9	-13.0	-41.9		
	3326.00	-9.2	H	3.0	43.9	1.0	-52.1	-13.0	-39.1		
	High Ch, 848.3MHz										
	1696.60	-14.6	V	3.0	43.3	1.0	-57.0	-13.0	-44.0		
	2544.90	-11.9	V	3.0	43.6	1.0	-54.5	-13.0	-41.5		
	3393.20	-8.9	V	3.0	44.0	1.0	-51.9	-13.0	-38.9		
	1696.60	-15.5	H	3.0	43.3	1.0	-57.9	-13.0	-44.9		
	2544.90	-12.1	H	3.0	43.6	1.0	-54.7	-13.0	-41.7		
	3393.20	-8.7	H	3.0	44.0	1.0	-51.7	-13.0	-38.7		

NR Band n5

		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement										
		Company:	Samsung									
		Project #:	4790976555									
		Date:	2023-09-10									
		Test Engineer:	26087									
		Configuration:	EUT / AC Adapter, Z-Position									
		Location:	Chamber 1									
		Mode:	5G NR_QPSK NR n5 Harmonics, 20MHz Bandwidth									
		Test Voltage:	AC 120 V, 60 Hz									
20 MHz		f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
DFT-OFDM	QPSK	Low Ch, 834MHz										
		1668.00	-15.1	V	3.0	43.3	1.0	-57.4	-13.0	-44.4		
		2502.00	-11.9	V	3.0	43.6	1.0	-54.5	-13.0	-41.5		
		3336.00	-9.3	V	3.0	43.9	1.0	-52.2	-13.0	-39.2		
		1668.00	-16.3	H	3.0	43.3	1.0	-58.6	-13.0	-45.6		
		2502.00	-12.3	H	3.0	43.6	1.0	-54.9	-13.0	-41.9		
	ANT A	QPSK	3336.00	-9.0	H	3.0	43.9	1.0	-51.9	-13.0	-38.9	
			Mid Ch, 836.5MHz									
			1673.00	-15.1	V	3.0	43.3	1.0	-57.5	-13.0	-44.5	
			2509.50	-11.7	V	3.0	43.6	1.0	-54.3	-13.0	-41.3	
			3346.00	-9.2	V	3.0	43.9	1.0	-52.2	-13.0	-39.2	
			1673.00	-16.2	H	3.0	43.3	1.0	-58.5	-13.0	-45.5	
	ANT A	QPSK	2509.50	-12.1	H	3.0	43.6	1.0	-54.7	-13.0	-41.7	
			3346.00	-9.0	H	3.0	43.9	1.0	-51.9	-13.0	-38.9	
			High Ch, 839MHz									
			1678.00	-15.1	V	3.0	43.3	1.0	-57.4	-13.0	-44.4	
			2517.00	-11.9	V	3.0	43.6	1.0	-54.5	-13.0	-41.5	
			3356.00	-9.2	V	3.0	43.9	1.0	-52.2	-13.0	-39.2	
DFT-OFDM	QPSK	1678.00	-16.2	H	3.0	43.3	1.0	-58.5	-13.0	-45.5		
		2517.00	-12.2	H	3.0	43.6	1.0	-54.8	-13.0	-41.8		
		3356.00	-8.9	H	3.0	43.9	1.0	-51.9	-13.0	-38.9		

		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement										
		Company:	Samsung									
		Project #:	4790976555									
		Date:	2023-10-12									
		Test Engineer:	24542									
		Configuration:	EUT / AC Adapter, Y-Position									
		Location:	Chamber 2									
		Mode:	5G NR_QPSK NR n5 Harmonics, 10MHz Bandwidth									
		Test Voltage:	AC 120 V, 60 Hz									
10 MHz		f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
DFT-OFDM	QPSK	Low Ch, 829MHz										
		1658.00	-14.9	V	3.0	40.8	1.0	-54.7	-13.0	-41.7		
		2487.00	-8.1	V	3.0	41.5	1.0	-48.5	-13.0	-35.5		
		3316.00	-9.3	V	3.0	42.2	1.0	-50.5	-13.0	-37.5		
		1658.00	-15.7	H	3.0	40.8	1.0	-55.5	-13.0	-42.5		
		2487.00	-9.5	H	3.0	41.5	1.0	-50.0	-13.0	-37.0		
	ANT E	QPSK	3316.00	-8.7	H	3.0	42.2	1.0	-49.9	-13.0	-36.9	
			Mid Ch, 836.5MHz									
			1673.00	-14.5	V	3.0	40.8	1.0	-54.3	-13.0	-41.3	
			2509.50	-7.4	V	3.0	41.5	1.0	-47.9	-13.0	-34.9	
			3346.00	-9.1	V	3.0	42.2	1.0	-50.3	-13.0	-37.3	
			1673.00	-15.8	H	3.0	40.8	1.0	-55.6	-13.0	-42.6	
	ANT E	QPSK	2509.50	-8.7	H	3.0	41.5	1.0	-49.2	-13.0	-36.2	
			3346.00	-8.6	H	3.0	42.2	1.0	-49.8	-13.0	-36.8	
			High Ch, 844MHz									
			1688.00	-14.8	V	3.0	40.8	1.0	-54.6	-13.0	-41.6	
			2532.00	-10.0	V	3.0	41.5	1.0	-50.5	-13.0	-37.5	
			3376.00	-8.9	V	3.0	42.2	1.0	-50.1	-13.0	-37.1	
DFT-OFDM	QPSK	1688.00	-15.7	H	3.0	40.8	1.0	-55.6	-13.0	-42.6		
		2532.00	-10.6	H	3.0	41.5	1.0	-51.1	-13.0	-38.1		
		3376.00	-8.5	H	3.0	42.2	1.0	-49.7	-13.0	-36.7		

END OF REPORT