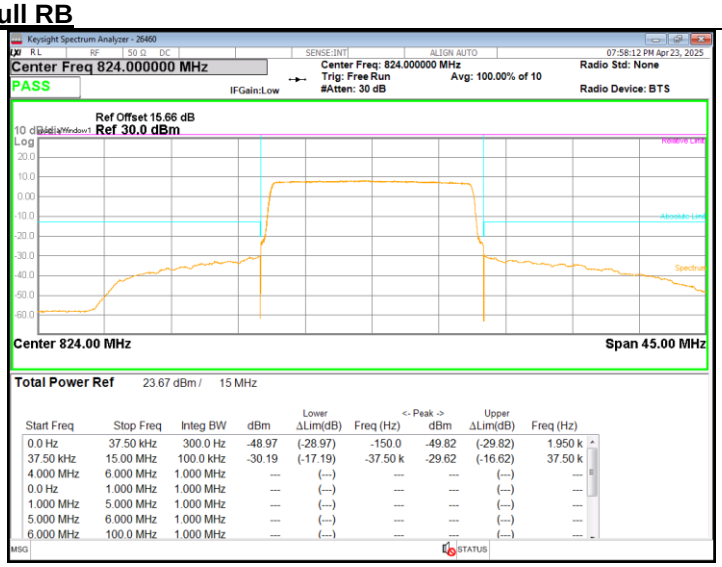
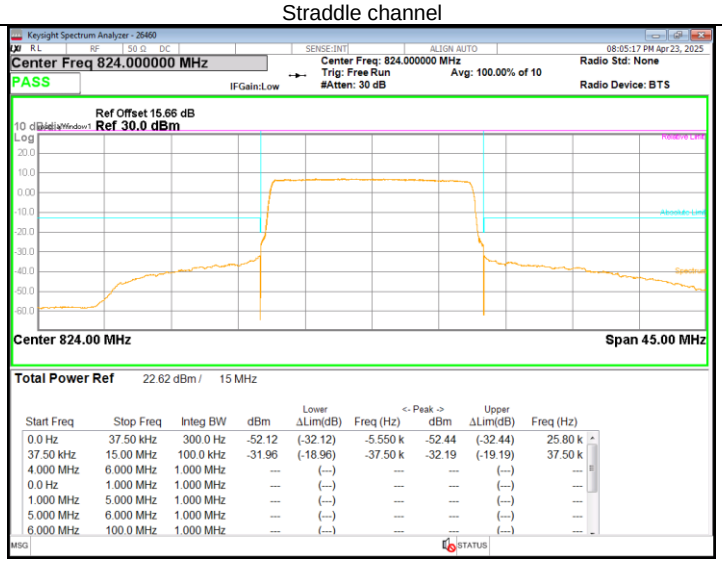
LTE Band 26 (Straddle) Full RB

15 MHz QPSK FRB	 Straddle channel
15 MHz 16QAM FRB	 Straddle channel

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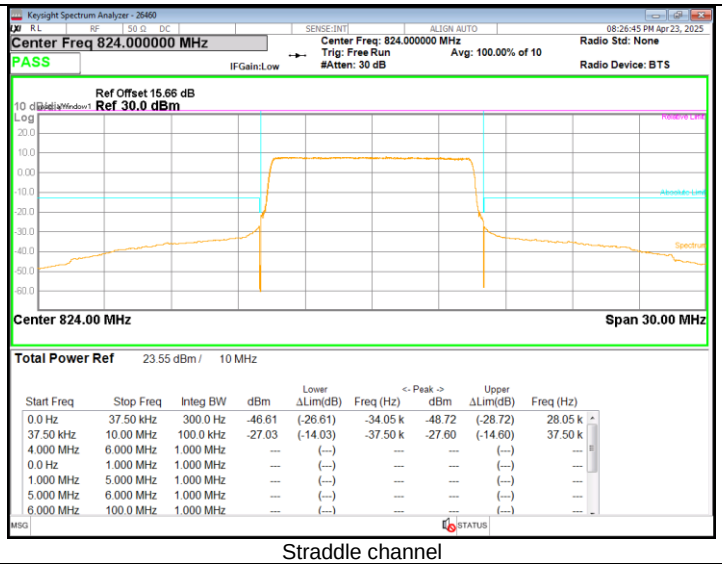
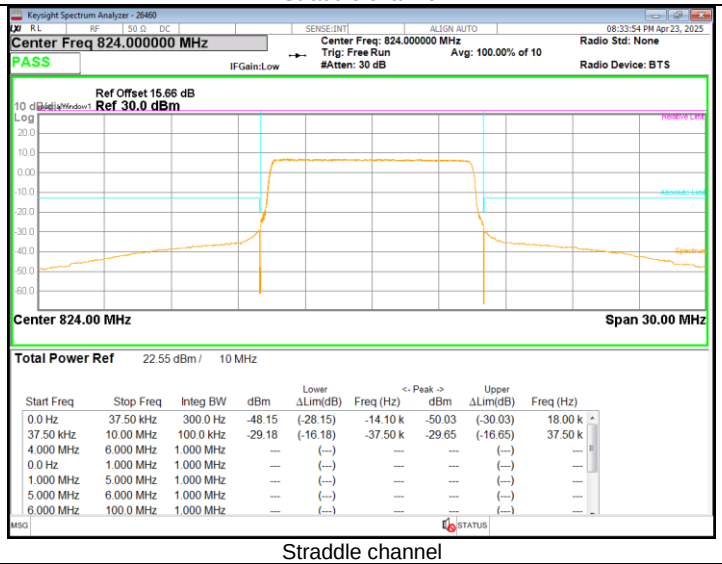
10 MHz QPSK FRB	 Straddle channel
10 MHz 16QAM FRB	 Straddle channel

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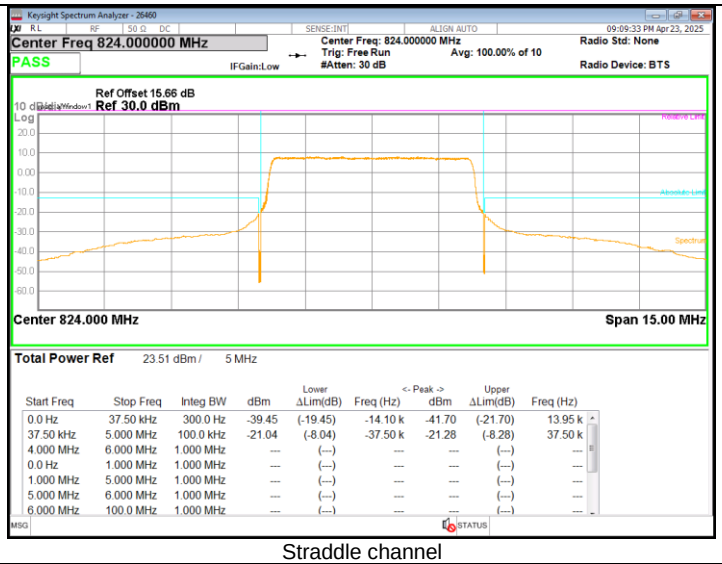
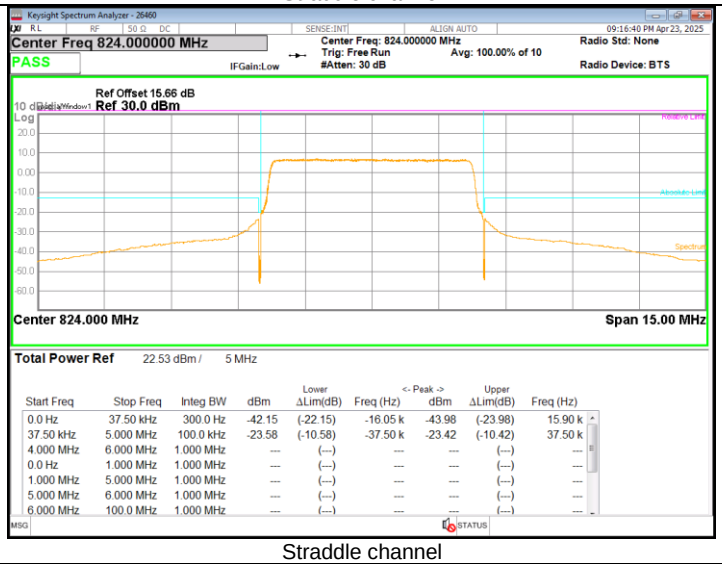
5 MHz QPSK FRB	 Straddle channel
5 MHz 16QAM FRB	 Straddle channel

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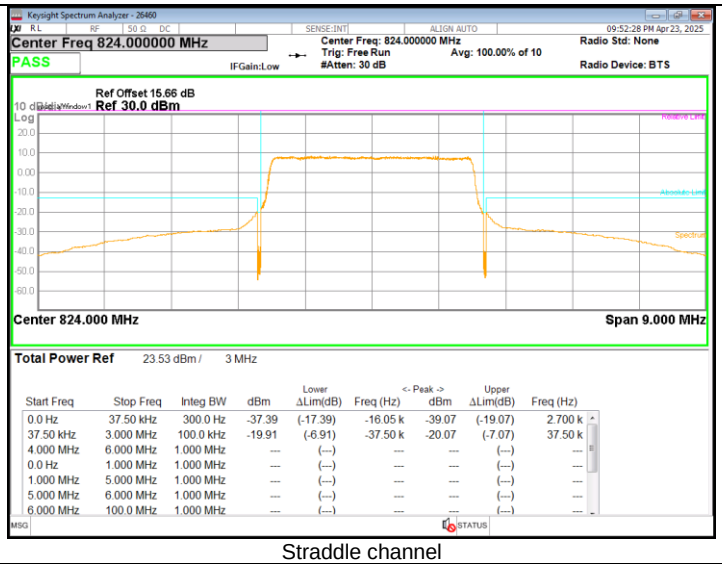
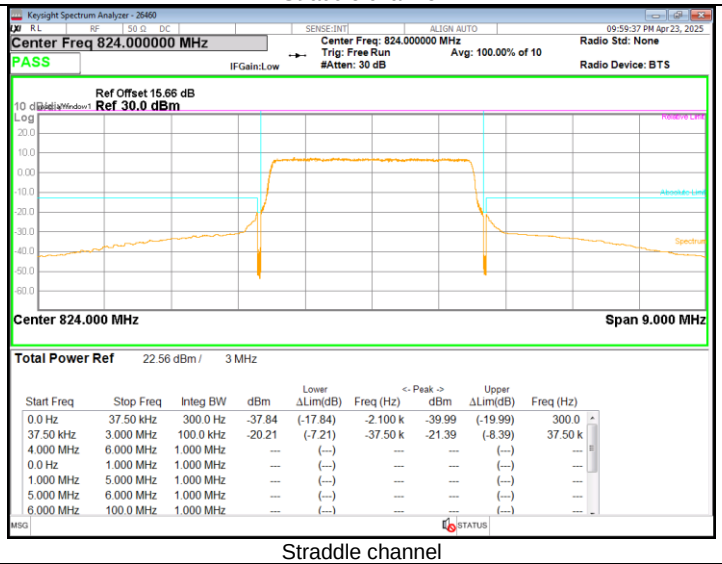
3 MHz QPSK FRB	 Straddle channel
3 MHz 16QAM FRB	 Straddle channel

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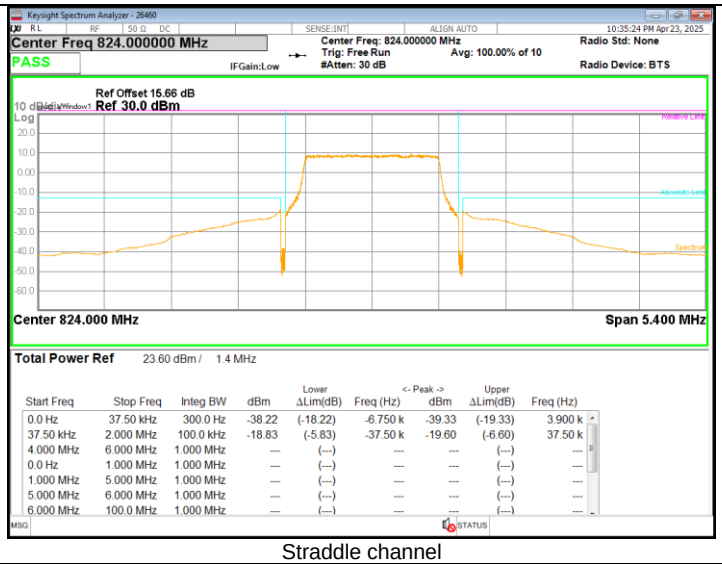
1.4 MHz QPSK FRB	 Straddle channel
1.4 MHz 16QAM FRB	 Straddle channel

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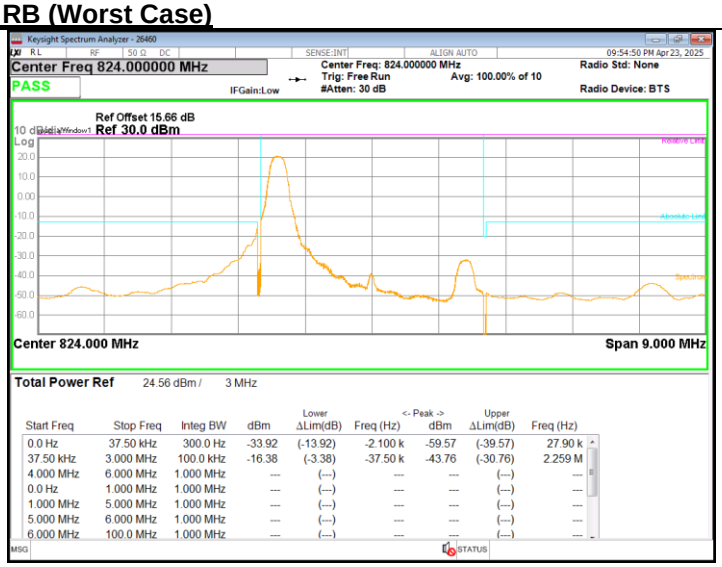
LTE Band 26 (Straddle) 1 RB (Worst Case)

3 MHz QPSK 1RB offstet 0	 Straddle channel

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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 + 10Log10(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 or Set ≥ [10 × (number of points in sweep) × (transmission period)] for single sweep (automation-compatible) measurement. Transmission period is the on and off time of the transmitter.
e) Detector = rms;
f) Ensure that the number of measurement points = Max (40001);
g) Trace mode = average;

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NOTE1

GSM : It was tested at GPRS as worst case (the highst output power and density).
UMTS: It was tested at REL 99 as worst case (the highst output power and density).
LTE: It was tested at 1RB QPSK as worst case (the highst output power and density).
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.

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8.5.1. OUT OF BAND EMISSIONS RESULT

GSM 850

GPRS

Low channel

Mid channel

High channel

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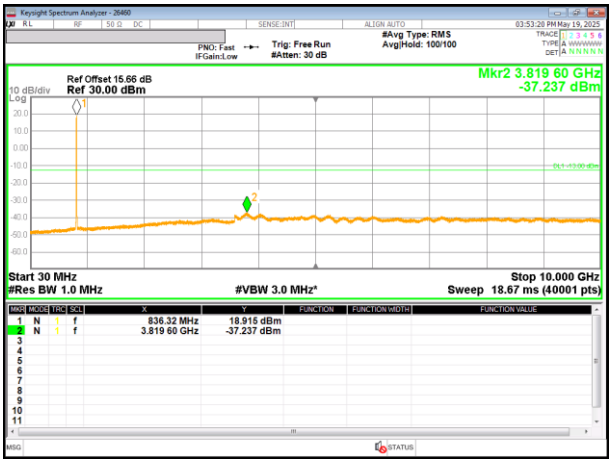
WCDMA Band 5

REL99

Low channel



Mid channel

High channel

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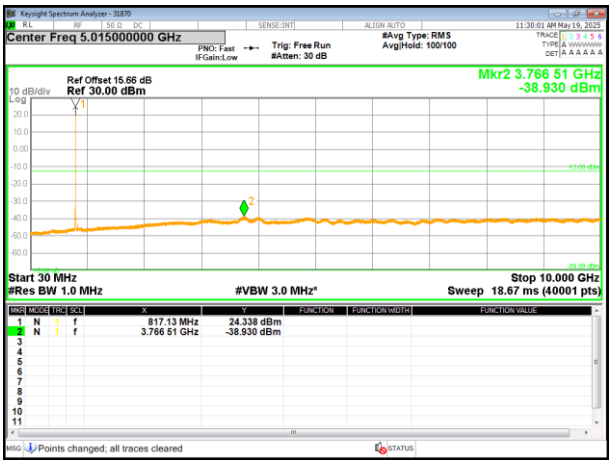
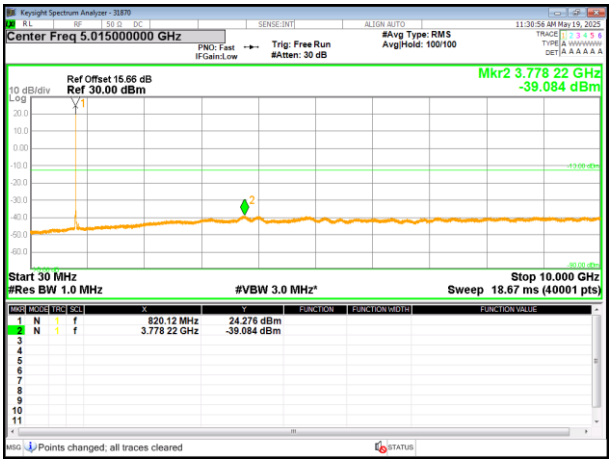
LTE Band 26 (Part 90)

5 MHz QPSK



Low channel



High channel

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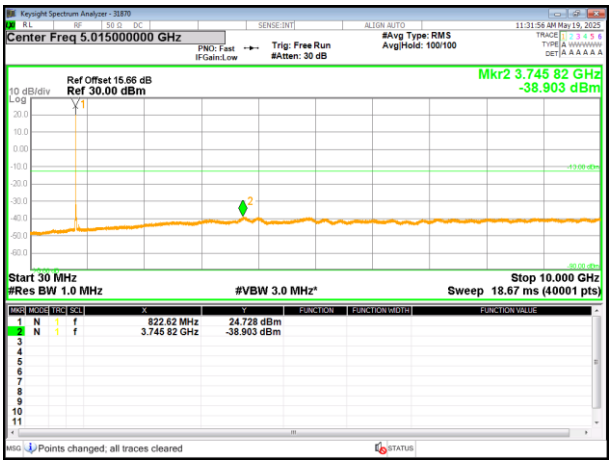
LTE Band 26 (Straddle)

3 MHz QPSK

Straddle channel

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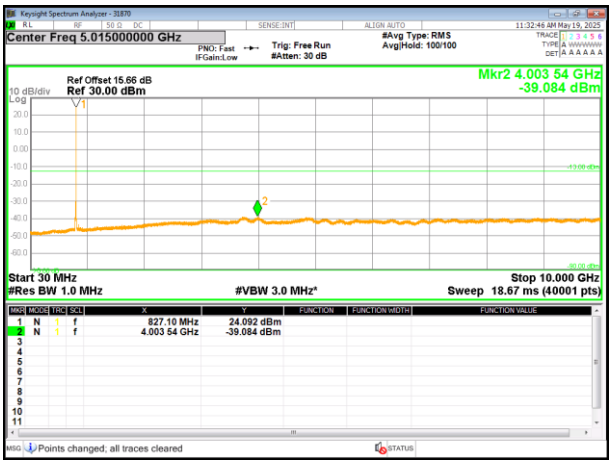
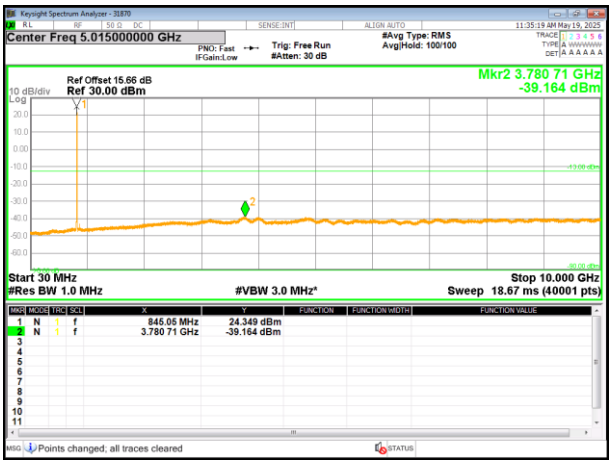
LTE Band 26 (Part 22)

5 MHz QPSK



Low channel

Mid channel



High channel

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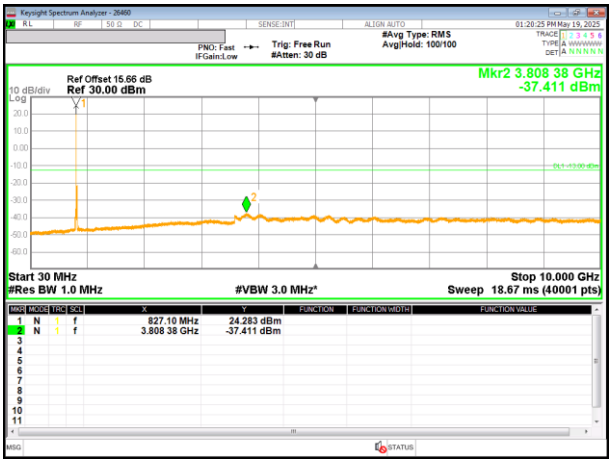
NR Band n5 DFT-s OFDM

20 MHz QPSK

Low channel



Mid channel

High channel

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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 OBW results)

RESULTS

See the following pages.

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8.6.1. FREQUENCY STABILITY RESULT

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

Test Date	2025-05-14
Test Engineer	26460

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 [*C]	Frequency Deviation Measureed with Time Elapse				
		Low Channel		High Channel		Limit [ppm]
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.80	50	824.19999200	0.004	848.79999147	0.001	2.5
3.80	40	824.19999220	0.004	848.79999213	0.000	2.5
3.80	30	824.19999328	0.002	848.79999308	-0.001	2.5
3.80	***20***	***824.19999531***	***0.000***	***848.79999233***	***0.000***	***2.5***
3.80	10	824.19999357	0.002	848.79999207	0.000	2.5
3.80	0	824.19999145	0.005	848.79999439	-0.002	2.5
3.80	-10	824.19999367	0.002	848.79999099	0.002	2.5
3.80	-20	824.19999137	0.005	848.79999365	-0.002	2.5
3.80	-30	824.19998982	0.007	848.79999242	0.000	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 [*C]	Frequency Deviation Measureed with Time Elapse				
		Low Channel		High Channel		Limit [ppm]
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.80	***20***	***824.19999531***	***0***	***848.79999233***	***0***	***2.5***
4.40	20	824.19999362	0.002	848.79999303	-0.001	2.5
3.20	20	824.19999334	0.002	848.79999270	0.000	2.5

WCDMA Band 5

Test Date	2025-05-14
Test Engineer	26460

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 [*C]	Frequency Deviation Measureed with Time Elapse				
		Low Channel		High Channel		Limit [ppm]
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.80	50	826.39999507	0.003	846.59999418	0.005	2.5
3.80	40	826.39999576	0.002	846.59999591	0.003	2.5
3.80	30	826.39999686	0.001	846.59999708	0.002	2.5
3.80	***20***	***826.39999745***	***0.000***	***846.59999841***	***0.000***	***2.5***
3.80	10	826.39999726	0.000	846.59999768	0.001	2.5
3.80	0	826.39999694	0.001	846.59999827	0.000	2.5
3.80	-10	826.39999800	-0.001	846.59999737	0.001	2.5
3.80	-20	826.39999548	0.002	846.59999683	0.002	2.5
3.80	-30	826.39999386	0.004	846.59999409	0.005	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 [*C]	Frequency Deviation Measureed with Time Elapse				
		Low Channel		High Channel		Limit [ppm]
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.80	***20***	***826.39999745***	***0***	***846.59999841***	***0***	***2.5***
4.40	20	826.39999740	0.000	846.59999826	0.000	2.5
3.20	20	826.39999754	0.000	846.59999817	0.000	2.5

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LTE Band 26 (Lowest Frequency: 16QAM / Highest Frequency: 16QAM)

Test Date	2025-05-14
Test Engineer	26460

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 [*C]	Frequency Deviation Measureed with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.80	50	814.69999688	0.002	848.29999488	0.006	2.5
3.80	40	814.69999854	0.000	848.29999675	0.003	2.5
3.80	30	814.69999886	-0.001	848.29999792	0.002	2.5
3.80	***20***	***814.69999839***	***0.000***	***848.29999955***	***0.000***	***2.5***
3.80	10	814.69999785	0.001	848.29999841	0.001	2.5
3.80	0	814.69999753	0.001	848.29999726	0.003	2.5
3.80	-10	814.69999635	0.003	848.29999505	0.005	2.5
3.80	-20	814.69999160	0.008	848.29999363	0.007	2.5
3.80	-30	814.69999361	0.006	848.29999259	0.008	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 [*C]	Frequency Deviation Measureed with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.80	***20***	***814.69999839***	***0***	***848.29999955***	***0***	***2.5***
4.40	20	814.69999947	-0.001	848.29999877	0.001	2.5
3.20	20	814.69999894	-0.001	848.29999786	0.002	2.5

NR Band n5 (Lowest Frequency: QPSK / Highest Frequency: 16QAM)

Test Date	2025-05-22
Test Engineer	26460

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 [*C]	Frequency Deviation Measureed with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.80	50	826.50000881	-0.008	846.50000754	-0.008	2.5
3.80	40	826.50000638	-0.005	846.50000591	-0.006	2.5
3.80	30	826.50000523	-0.004	846.50000511	-0.005	2.5
3.80	***20***	***826.50000213***	***0.000***	***846.50000105***	***0.000***	***2.5***
3.80	10	826.50000452	-0.003	846.50000383	-0.003	2.5
3.80	0	826.50000599	-0.005	846.50000454	-0.004	2.5
3.80	-10	826.50000782	-0.007	846.50000613	-0.006	2.5
3.80	-20	826.50000966	-0.009	846.50001023	-0.011	2.5
3.80	-30	826.50000854	-0.008	846.50000699	-0.007	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 [*C]	Frequency Deviation Measureed with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.80	***20***	***826.50000213***	***0***	***846.50000105***	***0***	***2.5***
4.40	20	826.50000558	-0.004	846.50000754	-0.008	2.5
3.20	20	826.50000123	0.001	846.50000252	-0.002	2.5

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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.

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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 ≥ 1% to 5% of the OBW;
b) Set VBW ≥ 3 × RBW;
c) Set span ≥ 2 × to 3 × the OBW.;
d) Sweep time = auto couple or Set ≥ [10 × (number of points in sweep) × (transmission period)] for single sweep (automation-compatible) measurement. Transmission period is the on and off time of the transmitter.;
e) Detector = rms;
f) Ensure that the number of measurement points ≥ 2 x span/RBW;
g) Trace mode = average;
h) If the EUT can be configured to transmit continuously, then set the trigger to free run.
i) If the EUT cannot be configured to transmit continuously, then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep. Verify that the sweep time is less than or equal to the transmission burst duration. Time gating can also be used under similar constraints (i.e., configured such that measurement data is collected only during active full-power transmissions).
j) Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over multiple symbols, it can be necessary to increase the number of traces to be averaged above 100 or, if using a manually configured sweep time, increase the sweep time.
k) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band or channel power measurement function, with the band/channel limits set equal to the OBW band edges. If the instrument does not have a band or channel power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

NOTE

LTE, 5G NR : The OBW value corresponding to the total channel bandwidth is the OBW of FullRB. Measurements were made with a 1RB configuration (Worst case) over the entire channel bandwidth, and FRB configurations were also reported for the worst BW.

TEST RESULTS

See the following pages.

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9.1.1. ERP RESULT

GSM

Band	Mode	Frequency (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	30.97	V	3.02	-1.03	26.93	493.17	38.50	-11.57
		836.60	32.66	V	3.04	-0.97	28.65	732.82	38.50	-9.85
		848.80	31.88	V	3.06	-0.91	27.91	618.02	38.50	-10.59
	EGPRS	824.20	25.19	V	3.02	-1.03	21.15	130.32	38.50	-17.35
		836.60	25.99	V	3.04	-0.97	21.98	157.76	38.50	-16.52
		848.80	25.83	V	3.06	-0.91	21.86	153.46	38.50	-16.64

WCDMA

Band	Mode	Frequency (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	22.83	H	3.02	-1.02	18.79	75.68	38.50	-19.71
		836.60	23.26	V	3.04	-0.97	19.25	84.14	38.50	-19.25
		846.60	22.81	V	3.06	-0.92	18.84	76.56	38.50	-19.66
	HSDPA	826.40	21.90	H	3.02	-1.02	17.86	61.09	38.50	-20.64
		836.60	22.08	V	3.04	-0.97	18.07	64.12	38.50	-20.43
		846.60	22.04	H	3.06	-0.92	18.07	64.12	38.50	-20.43

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LTE Band 26

BW (MHz)	Modulation	Frequency (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	23.32	V	3.01	-1.04	19.26	84.33	50.00	-30.74	1/0
		824.00	23.29	H	3.02	-1.03	19.24	83.95	38.50	-19.26	1/0
		831.50	23.69	H	3.03	-0.99	19.67	92.68	38.50	-18.83	1/37
		836.50	23.66	H	3.04	-0.97	19.65	92.26	38.50	-18.85	1/0
		841.50	23.88	V	3.05	-0.94	19.89	97.50	38.50	-18.61	1/37
	16-QAM	821.50	22.18	V	3.01	-1.04	18.12	64.86	50.00	-31.88	1/37
		824.00	22.35	H	3.02	-1.03	18.30	67.61	38.50	-20.20	1/37
		831.50	22.53	H	3.03	-0.99	18.51	70.96	38.50	-19.99	1/37
		836.50	22.78	H	3.04	-0.97	18.77	75.34	38.50	-19.73	1/37
		841.50	23.05	V	3.05	-0.94	19.06	80.54	38.50	-19.44	1/37
10	QPSK	819.00	23.35	V	3.01	-1.06	19.28	84.72	50.00	-30.72	1/0
		824.00	23.41	H	3.02	-1.03	19.36	86.30	38.50	-19.14	1/49
		829.00	23.76	H	3.03	-1.01	19.73	93.97	38.50	-18.77	1/0
		836.50	23.77	H	3.04	-0.97	19.76	94.62	38.50	-18.74	1/0
		844.00	23.77	V	3.05	-0.93	19.79	95.28	38.50	-18.71	1/0
	16-QAM	819.00	22.29	V	3.01	-1.06	18.22	66.37	50.00	-31.78	1/0
		824.00	22.67	H	3.02	-1.03	18.62	72.78	38.50	-19.88	1/0
		829.00	21.86	H	3.03	-1.01	17.83	60.67	38.50	-20.67	1/0
		836.50	22.88	H	3.04	-0.97	18.87	77.09	38.50	-19.63	1/0
		844.00	23.20	V	3.05	-0.93	19.22	83.56	38.50	-19.28	1/0
5	QPSK	816.50	23.57	V	3.00	-1.07	19.50	89.13	50.00	-30.61	1/12
		821.50	23.45	V	3.01	-1.04	19.39	86.90	50.00	-30.56	1/0
		824.00	23.49	H	3.02	-1.03	19.44	87.90	38.50	-18.63	1/12
		826.50	23.91	H	3.02	-1.02	19.87	97.05	38.50	-18.70	1/12
		836.50	23.81	H	3.04	-0.97	19.80	95.50	38.50	-18.87	1/0
		846.50	23.61	V	3.06	-0.92	19.63	91.83	38.50	-20.23	1/0
	16-QAM	816.50	22.34	V	3.00	-1.07	18.27	67.14	50.00	-31.28	1/12
		821.50	22.78	V	3.01	-1.04	18.72	74.47	50.00	-31.74	1/12
		824.00	22.31	H	3.02	-1.03	18.26	66.99	38.50	-20.61	1/12
		826.50	21.93	H	3.02	-1.02	17.89	61.52	38.50	-19.21	1/12
		836.50	23.30	H	3.04	-0.97	19.29	84.92	38.50	-19.97	1/12
		846.50	22.51	V	3.06	-0.92	18.53	71.29	38.50	-19.97	1/12
3	QPSK	815.50	23.32	V	3.00	-1.07	19.24	83.95	50.00	-30.76	1/0
		822.50	23.58	V	3.01	-1.04	19.53	89.74	50.00	-30.47	1/14
		824.00	23.56	H	3.02	-1.03	19.51	89.33	38.50	-18.99	1/0
		825.50	23.55	H	3.02	-1.02	19.51	89.33	38.50	-18.99	1/0
		836.50	21.29	H	3.04	-0.97	17.28	53.46	38.50	-21.22	1/0
		847.50	23.62	V	3.06	-0.91	19.64	92.04	38.50	-18.86	1/0
	16-QAM	815.50	22.79	V	3.00	-1.07	18.71	74.30	50.00	-31.29	1/0
		822.50	22.31	V	3.01	-1.04	18.26	66.99	50.00	-31.74	1/0
		824.00	22.20	H	3.02	-1.03	18.15	65.31	38.50	-20.35	1/0
		825.50	22.37	H	3.02	-1.02	18.33	68.08	38.50	-20.17	1/0
		836.50	22.74	H	3.04	-0.97	18.73	74.64	38.50	-19.77	1/0
		847.50	22.33	V	3.06	-0.91	18.35	68.39	38.50	-20.15	1/0
1.4	QPSK	814.70	23.32	V	3.00	-1.08	19.24	83.95	50.00	-30.76	1/0
		823.30	23.61	V	3.01	-1.03	19.56	90.36	50.00	-30.44	1/5
		824.00	23.46	H	3.02	-1.03	19.41	87.30	38.50	-19.09	1/5
		824.70	23.59	H	3.02	-1.03	19.55	90.16	38.50	-18.95	1/0
		836.50	23.82	H	3.04	-0.97	19.81	95.72	38.50	-18.69	1/5
		848.30	23.42	V	3.06	-0.91	19.45	88.10	38.50	-19.05	1/5
	16-QAM	814.70	22.49	V	3.00	-1.08	18.41	69.34	50.00	-31.59	1/0
		823.30	22.53	V	3.01	-1.03	18.48	70.47	50.00	-31.52	1/0
		824.00	22.35	H	3.02	-1.03	18.30	67.61	38.50	-20.20	1/0
		824.70	22.00	H	3.02	-1.03	17.96	62.52	38.50	-20.54	1/5
		836.50	22.91	H	3.04	-0.97	18.90	77.62	38.50	-19.60	1/0
		848.30	22.38	V	3.06	-0.91	18.41	69.34	38.50	-20.09	1/5
15	QPSK	821.50	22.39	V	3.01	-1.04	18.33	68.08	50.00	-31.67	75/0
		824.00	22.21	H	3.02	-1.03	18.16	65.46	38.50	-20.34	75/0
		831.50	22.72	H	3.03	-0.99	18.70	74.13	38.50	-19.80	75/0
		836.50	22.63	H	3.04	-0.97	18.62	72.78	38.50	-19.88	75/0
		841.50	22.94	V	3.05	-0.94	18.95	78.52	38.50	-19.55	75/0
5	16-QAM	816.50	21.21	V	3.00	-1.07	17.14	51.76	50.00	-32.28	25/0
		821.50	21.78	V	3.01	-1.04	17.72	59.16	50.00	-32.75	25/0
		824.00	21.30	H	3.02	-1.03	17.25	53.09	38.50	-21.66	25/0
		826.50	20.88	H	3.02	-1.02	16.84	48.31	38.50	-20.33	25/0
		836.50	22.18	H	3.04	-0.97	18.17	65.61	38.50	-20.75	25/0
		846.50	21.73	V	3.06	-0.92	17.75	59.57	38.50	-20.75	25/0

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NR Band n5 DFT-s OFDM

BW (MHz)	Modulation	Frequency (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	22.96	V	3.04	-0.98	18.94	78.34	38.50	-19.56	1/1
		836.50	23.26	V	3.04	-0.97	19.26	84.33	38.50	-19.24	1/1
		839.00	23.69	V	3.04	-0.96	19.69	93.11	38.50	-18.81	1/1
	16-QAM	834.00	22.06	V	3.04	-0.98	18.04	63.68	38.50	-20.46	1/1
		836.50	22.24	V	3.04	-0.97	18.24	66.68	38.50	-20.26	1/1
		839.00	22.72	V	3.04	-0.96	18.72	74.47	38.50	-19.78	1/52
15	QPSK	831.50	22.58	V	3.03	-0.99	18.56	71.78	38.50	-19.94	1/1
		836.50	22.95	V	3.04	-0.97	18.95	78.52	38.50	-19.55	1/1
		841.50	23.48	V	3.05	-0.94	19.49	88.92	38.50	-19.01	1/1
	16-QAM	831.50	21.61	V	3.03	-0.99	17.59	57.41	38.50	-20.91	1/1
		836.50	22.00	V	3.04	-0.97	18.00	63.10	38.50	-20.50	1/1
		841.50	22.54	V	3.05	-0.94	18.55	71.61	38.50	-19.95	1/1
10	QPSK	829.00	22.41	V	3.03	-1.01	18.38	68.87	38.50	-20.12	1/1
		836.50	22.95	V	3.04	-0.97	18.95	78.52	38.50	-19.55	1/1
		844.00	23.33	V	3.05	-0.93	19.35	86.10	38.50	-19.15	1/1
	16-QAM	829.00	21.45	V	3.03	-1.01	17.42	55.21	38.50	-21.08	1/26
		836.50	22.14	V	3.04	-0.97	18.14	65.16	38.50	-20.36	1/1
		844.00	22.46	V	3.05	-0.93	18.48	70.47	38.50	-20.02	1/26
5	QPSK	826.50	22.03	V	3.02	-1.02	17.99	62.95	38.50	-20.51	1/1
		836.50	22.76	V	3.04	-0.97	18.76	75.16	38.50	-19.74	1/1
		846.50	22.99	V	3.06	-0.92	19.01	79.62	38.50	-19.49	1/1
	16-QAM	826.50	21.27	V	3.02	-1.02	17.23	52.84	38.50	-21.27	1/1
		836.50	21.98	V	3.04	-0.97	17.98	62.81	38.50	-20.52	1/23
		846.50	22.04	V	3.06	-0.92	18.06	63.97	38.50	-20.44	1/13
20	QPSK	834.00	22.04	V	3.04	-0.98	18.02	63.39	38.50	-20.48	100/0
		836.50	22.28	V	3.04	-0.97	18.28	67.30	38.50	-20.22	100/0
		839.00	22.67	V	3.04	-0.96	18.67	73.62	38.50	-19.83	100/0
	16-QAM	834.00	21.16	V	3.04	-0.98	17.14	51.76	38.50	-21.36	100/0
		836.50	21.28	V	3.04	-0.97	17.28	53.46	38.50	-21.22	100/0
		839.00	21.54	V	3.04	-0.96	17.54	56.75	38.50	-20.96	100/0

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9.2. RADIATIED SPURIOUS EMISSION

RULE PART(S)

FCC: §2.1053, §22.917 and §90.691

LIMIT

§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.

§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 + $10Log_{10}$(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.

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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 or Set ≥ [10 × (number of points in sweep) × (transmission period)] for single sweep (automation-compatible) measurement. Transmission period is the on and off time of the transmitter.
e) Detector = rms;
f) Ensure that the number of measurement points ≥ 2 x span/RBW;
g) Trace mode = average(WCDMA, LTE, 5G NR), Maxhold(GSM);

NOTE1

GSM : It was tested at GPRS as worst case (the highst output power and density).
UMTS: It was tested at REL 99 as worst case (the highst output power and density).
LTE: It was tested at 1RB QPSK as worst case (the highst output power and density).
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.

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9.2.1. SPURIOUS RADIATION RESULT

GSM850

GPRS

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

Company: Samsung
Project #: 4791754791
Date: 2025-05-14
Test Engineer: 24542
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	-12.1	V	3.0	43.5	1.0	-54.6	-13.0	-41.6	
2472.60	-3.0	V	3.0	43.8	1.0	-45.8	-13.0	-32.8	
3296.80	-8.3	V	3.0	43.8	1.0	-51.0	-13.0	-38.0	
1648.40	-11.4	H	3.0	43.5	1.0	-53.8	-13.0	-40.8	
2472.60	-1.9	H	3.0	43.8	1.0	-44.7	-13.0	-31.7	
3296.80	-8.1	H	3.0	43.8	1.0	-50.8	-13.0	-37.8	
Mid Ch, 836.6MHz									
1673.20	-9.3	V	3.0	43.5	1.0	-51.8	-13.0	-38.8	
2509.80	-2.3	V	3.0	43.7	1.0	-45.1	-13.0	-32.1	
3346.40	-7.9	V	3.0	43.8	1.0	-50.8	-13.0	-37.8	
1673.20	-10.0	H	3.0	43.5	1.0	-52.6	-13.0	-39.6	
2509.80	-3.8	H	3.0	43.7	1.0	-46.5	-13.0	-33.5	
3346.40	-7.8	H	3.0	43.8	1.0	-50.6	-13.0	-37.6	
High Ch, 848.8MHz									
1697.60	-12.2	V	3.0	43.5	1.0	-54.8	-13.0	-41.8	
2546.40	-7.6	V	3.0	43.7	1.0	-50.3	-13.0	-37.3	
3395.20	-7.4	V	3.0	43.9	1.0	-50.3	-13.0	-37.3	
1697.60	-14.1	H	3.0	43.5	1.0	-56.6	-13.0	-43.6	
2546.40	-8.1	H	3.0	43.7	1.0	-50.8	-13.0	-37.8	
3395.20	-7.2	H	3.0	43.9	1.0	-50.1	-13.0	-37.1	

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WCDMA Band 5

REL99

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

Company: Samsung
Project #: 4791754791
Date: 2025-05-14
Test Engineer: 27089
Configuration: EUT / AC Adapter, Z-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	-15.8	V	3.0	42.0	1.0	-56.7	-13.0	-43.7	
2479.20	-12.6	V	3.0	42.4	1.0	-54.0	-13.0	-41.0	
3305.60	-9.8	V	3.0	42.9	1.0	-51.7	-13.0	-38.7	
1652.80	-16.2	H	3.0	42.0	1.0	-57.2	-13.0	-44.2	
2479.20	-12.9	H	3.0	42.4	1.0	-54.2	-13.0	-41.2	
3305.60	-9.6	H	3.0	42.9	1.0	-51.5	-13.0	-38.5	
Mid Ch, 836.6MHz									
1673.20	-15.7	V	3.0	42.0	1.0	-56.7	-13.0	-43.7	
2509.80	-12.7	V	3.0	42.4	1.0	-54.1	-13.0	-41.1	
3346.40	-9.3	V	3.0	42.9	1.0	-51.2	-13.0	-38.2	
1673.20	-16.1	H	3.0	42.0	1.0	-57.1	-13.0	-44.1	
2509.80	-13.0	H	3.0	42.4	1.0	-54.4	-13.0	-41.4	
3346.40	-9.2	H	3.0	42.9	1.0	-51.1	-13.0	-38.1	
High Ch, 846.6MHz									
1693.20	-15.6	V	3.0	42.0	1.0	-56.6	-13.0	-43.6	
2539.80	-12.5	V	3.0	42.4	1.0	-53.9	-13.0	-40.9	
3386.40	-9.1	V	3.0	42.9	1.0	-51.1	-13.0	-38.1	
1693.20	-16.1	H	3.0	42.0	1.0	-57.1	-13.0	-44.1	
2539.80	-12.8	H	3.0	42.4	1.0	-54.2	-13.0	-41.2	
3386.40	-8.9	H	3.0	42.9	1.0	-50.8	-13.0	-37.8	

LTE Band 26 (Part 90)

1.4 MHz

QPSK

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

Company: Samsung
Project #: 4791754791
Date: 2025-05-14
Test Engineer: 24542
Configuration: EUT / Y-Position
Location: Chamber 1
Mode: LTE_QPSK Band 26(Part90) 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
Low Ch, 814.7MHz									
1629.40	-14.9	V	3.0	43.4	1.0	-57.3	-13.0	-44.3	
2444.10	-9.6	V	3.0	43.8	1.0	-52.4	-13.0	-39.4	
3258.80	-9.1	V	3.0	43.7	1.0	-51.8	-13.0	-38.8	
1629.40	-16.0	H	3.0	43.4	1.0	-58.4	-13.0	-45.4	
2444.10	-10.6	H	3.0	43.8	1.0	-53.4	-13.0	-40.4	
3258.80	-8.9	H	3.0	43.7	1.0	-51.6	-13.0	-38.6	
Mid Ch, 823.3MHz									
1646.60	-14.8	V	3.0	43.5	1.0	-57.2	-13.0	-44.2	
2469.90	-10.7	V	3.0	43.8	1.0	-53.4	-13.0	-40.4	
3293.20	-10.2	V	3.0	43.7	1.0	-52.9	-13.0	-39.9	
1646.60	-16.0	H	3.0	43.5	1.0	-58.4	-13.0	-45.4	
2469.90	-11.3	H	3.0	43.8	1.0	-54.0	-13.0	-41.0	
3293.20	-8.9	H	3.0	43.7	1.0	-51.7	-13.0	-38.7	

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LTE Band 26 (Straddle)

3 MHz

QPSK

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

Company: Samsung
Project #: 4791754791
Date: 2025-05-14
Test Engineer: 24542
Configuration: EUT / Y-Position
Location: Chamber 1
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
Straddle Ch, 824MHz									
1648.00	-14.8	V	3.0	43.5	1.0	-57.3	-13.0	-44.3	
2472.00	-10.7	V	3.0	43.8	1.0	-53.5	-13.0	-40.5	
3296.00	-9.1	V	3.0	43.8	1.0	-51.8	-13.0	-38.8	
1648.00	-16.0	H	3.0	43.5	1.0	-58.4	-13.0	-45.4	
2472.00	-11.4	H	3.0	43.8	1.0	-54.1	-13.0	-41.1	
3296.00	-8.8	H	3.0	43.8	1.0	-51.6	-13.0	-38.6	

LTE Band 26 (Part 22)

15 MHz

QPSK

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

Company: Samsung
Project #: 4791754791
Date: 2025-05-14
Test Engineer: 24542
Configuration: EUT / Y-Position
Location: Chamber 1
Mode: LTE_QPSK Band 26 Harmonics, 15MHz Bandwidth
Test Votage: AC 120 V, 60 Hz

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 831.5MHz									
1663.00	-14.7	V	3.0	43.5	1.0	-57.2	-13.0	-44.2	
2494.50	-10.6	V	3.0	43.8	1.0	-53.4	-13.0	-40.4	
3326.00	-8.9	V	3.0	43.8	1.0	-51.7	-13.0	-38.7	
1663.00	-15.9	H	3.0	43.5	1.0	-58.4	-13.0	-45.4	
2494.50	-11.2	H	3.0	43.8	1.0	-54.0	-13.0	-41.0	
3326.00	-8.8	H	3.0	43.8	1.0	-51.6	-13.0	-38.6	
Mid Ch, 836.5MHz									
1673.00	-14.9	V	3.0	43.5	1.0	-57.4	-13.0	-44.4	
2509.50	-11.2	V	3.0	43.7	1.0	-54.0	-13.0	-41.0	
3346.00	-8.8	V	3.0	43.8	1.0	-51.6	-13.0	-38.6	
1673.00	-15.8	H	3.0	43.5	1.0	-58.3	-13.0	-45.3	
2509.50	-11.6	H	3.0	43.7	1.0	-54.4	-13.0	-41.4	
3346.00	-8.4	H	3.0	43.8	1.0	-51.2	-13.0	-38.2	
High Ch, 841.5MHz									
1683.00	-14.7	V	3.0	43.5	1.0	-57.3	-13.0	-44.3	
2524.50	-11.1	V	3.0	43.7	1.0	-53.8	-13.0	-40.8	
3366.00	-8.7	V	3.0	43.8	1.0	-51.6	-13.0	-38.6	
1683.00	-15.9	H	3.0	43.5	1.0	-58.4	-13.0	-45.4	
2524.50	-11.4	H	3.0	43.7	1.0	-54.1	-13.0	-41.1	
3366.00	-8.6	H	3.0	43.8	1.0	-51.5	-13.0	-38.5	

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NR Band n5 DFT-s OFDM

20 MHz

DFT-s-OFDM

QPSK

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

Company: Samsung
Project #: 4791754791
Date: 2025-05-12
Test Engineer: 24542
Configuration: EUT /Y-Position
Location: Chamber 1
Mode: 5G NR_QPSK NR n5 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, 834MHz									
1668.00	-14.7	V	3.0	43.5	1.0	-57.2	-13.0	-44.2	
2502.00	-11.7	V	3.0	43.8	1.0	-54.4	-13.0	-41.4	
3336.00	-8.9	V	3.0	43.8	1.0	-51.7	-13.0	-38.7	
1668.00	-15.9	H	3.0	43.5	1.0	-58.4	-13.0	-45.4	
2502.00	-11.5	H	3.0	43.8	1.0	-54.2	-13.0	-41.2	
3336.00	-8.8	H	3.0	43.8	1.0	-51.6	-13.0	-38.6	
Mid Ch, 836.5MHz									
1673.00	-14.8	V	3.0	43.5	1.0	-57.3	-13.0	-44.3	
2509.50	-10.0	V	3.0	43.7	1.0	-52.8	-13.0	-39.8	
3346.00	-8.8	V	3.0	43.8	1.0	-51.6	-13.0	-38.6	
1673.00	-15.9	H	3.0	43.5	1.0	-58.4	-13.0	-45.4	
2509.50	-11.6	H	3.0	43.7	1.0	-54.4	-13.0	-41.4	
3346.00	-8.6	H	3.0	43.8	1.0	-51.4	-13.0	-38.4	
High Ch, 839MHz									
1678.00	-14.8	V	3.0	43.5	1.0	-57.3	-13.0	-44.3	
2517.00	-11.2	V	3.0	43.7	1.0	-53.9	-13.0	-40.9	
3356.00	-8.7	V	3.0	43.8	1.0	-51.5	-13.0	-38.5	
1678.00	-15.8	H	3.0	43.5	1.0	-58.3	-13.0	-45.3	
2517.00	-11.6	H	3.0	43.7	1.0	-54.3	-13.0	-41.3	
3356.00	-8.6	H	3.0	43.8	1.0	-51.4	-13.0	-38.4	

END OF REPORT

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