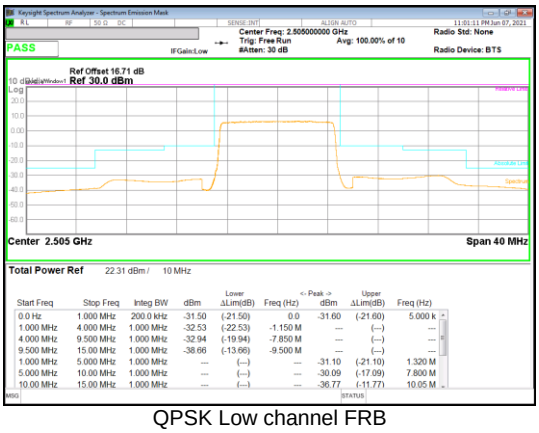
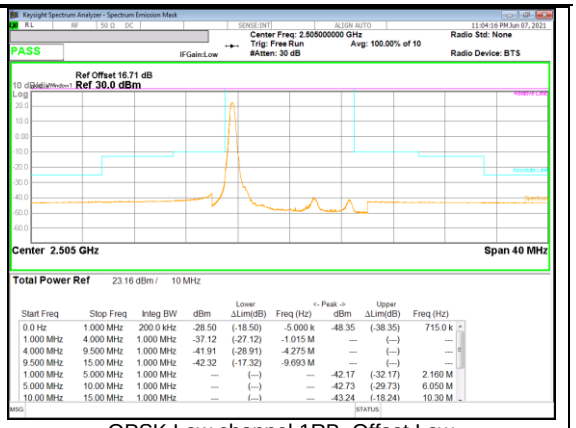
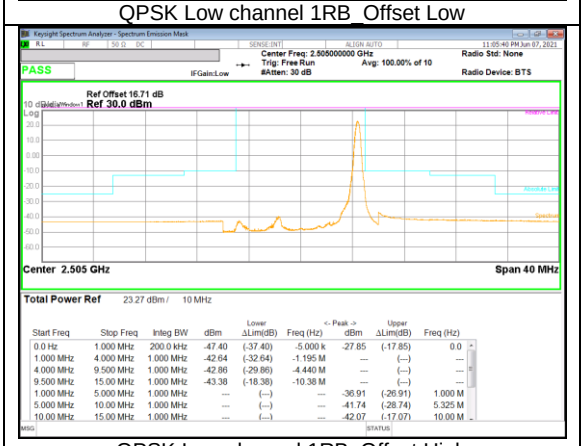
10 MHz



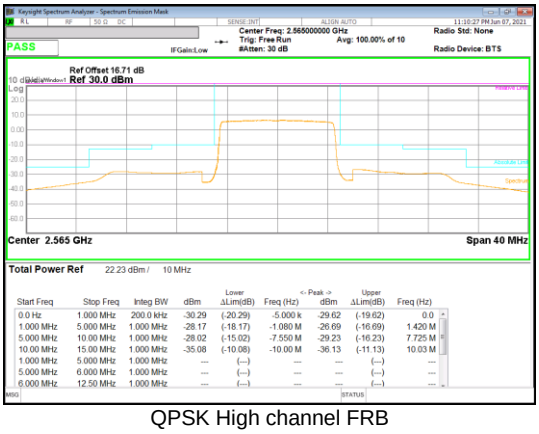
QPSK Low channel FRB



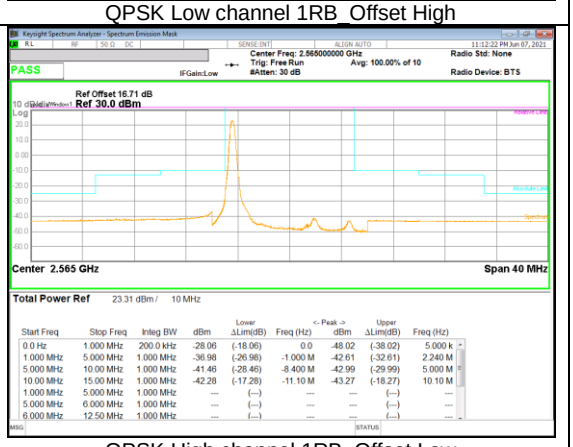
QPSK Low channel 1RB_Offset Low



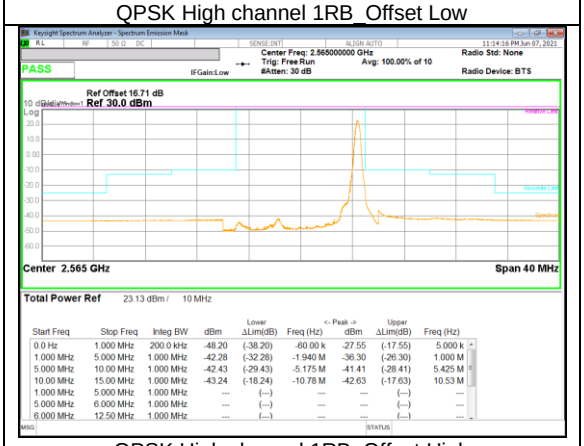
QPSK Low channel 1RB_Offset High



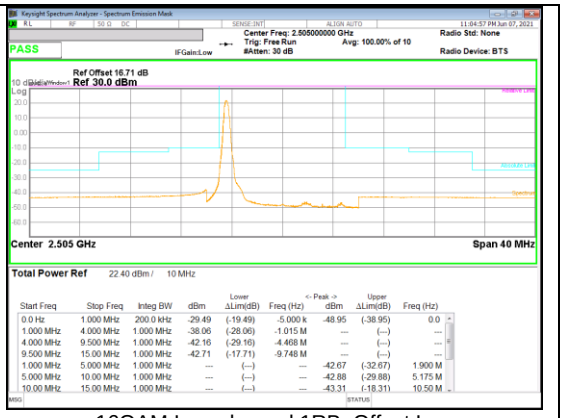
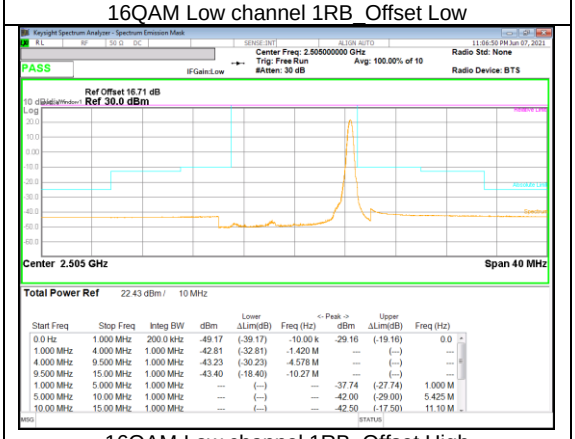
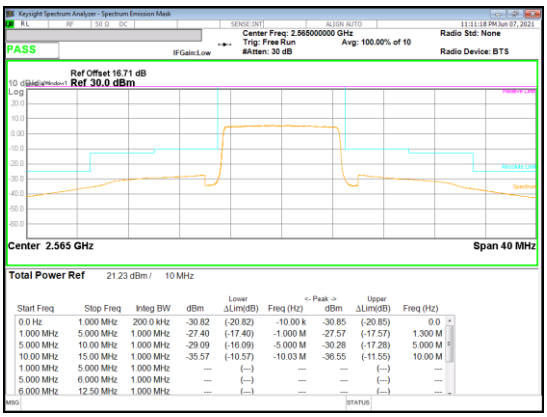
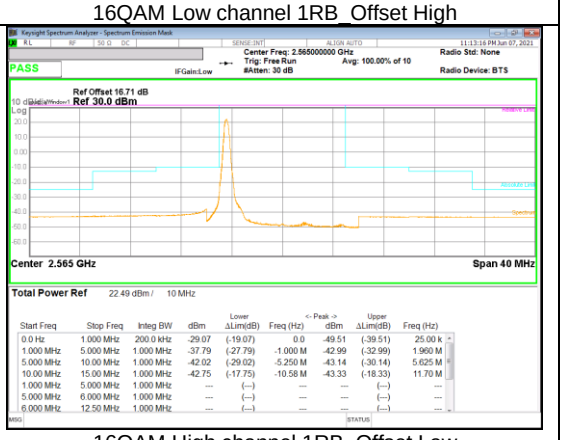
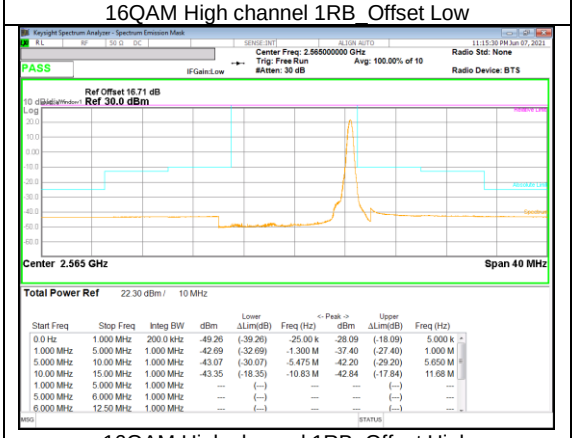
QPSK High channel FRB

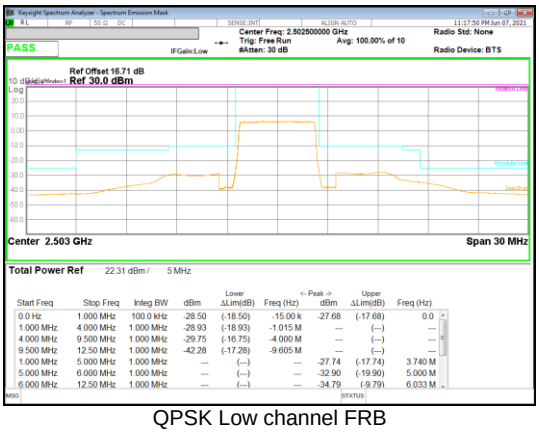
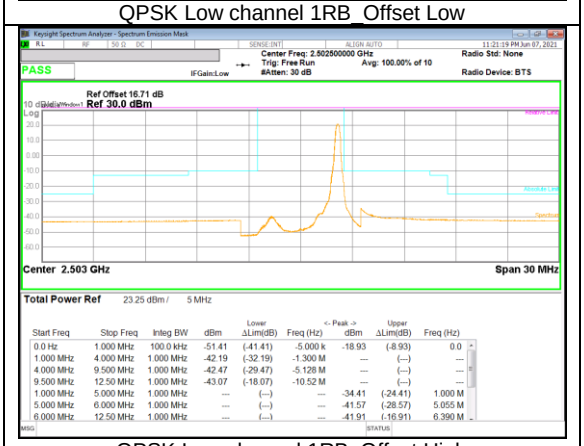
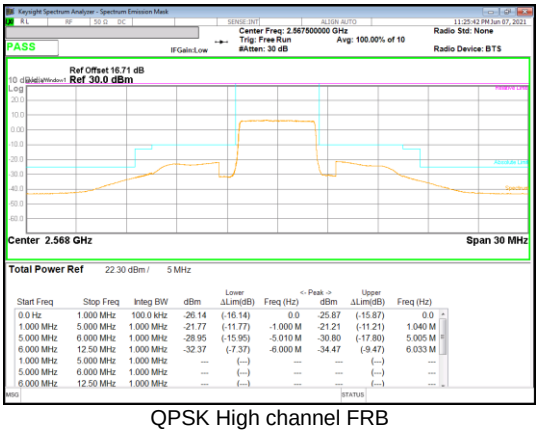
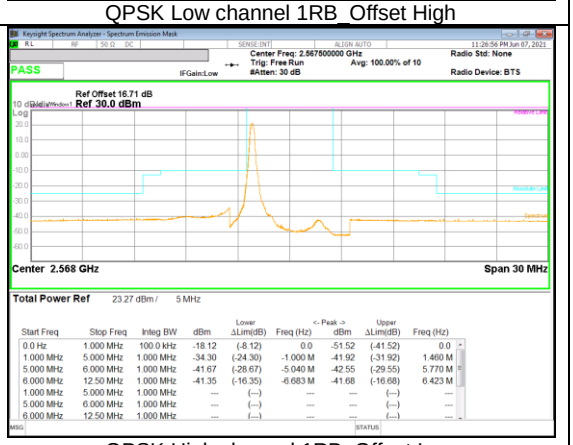
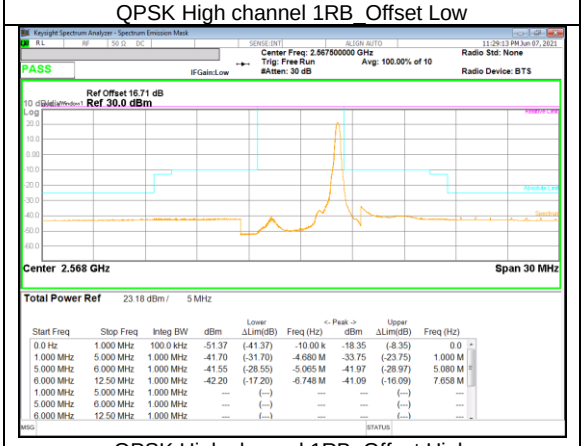


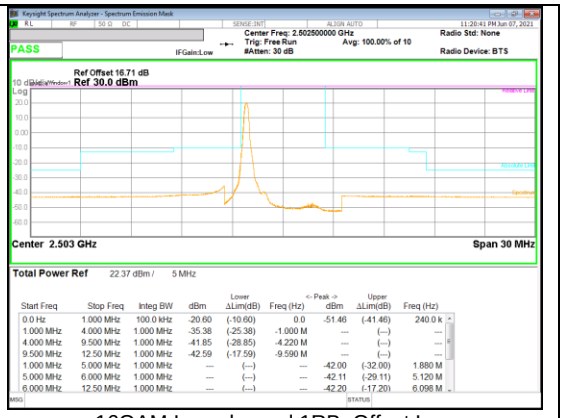
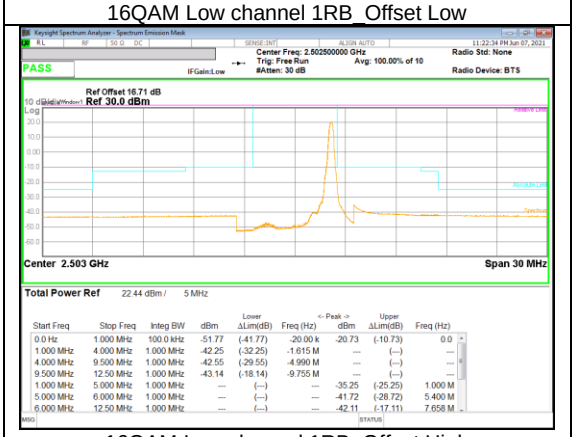
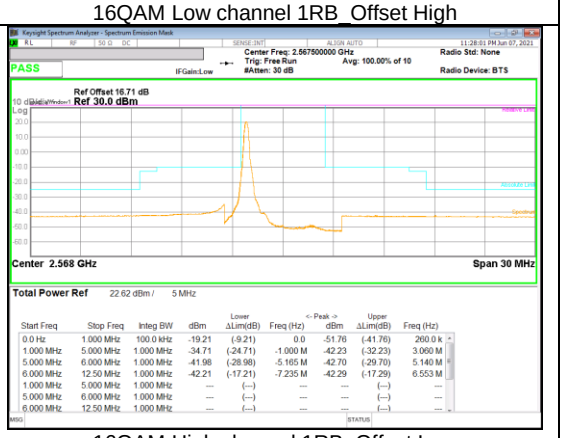
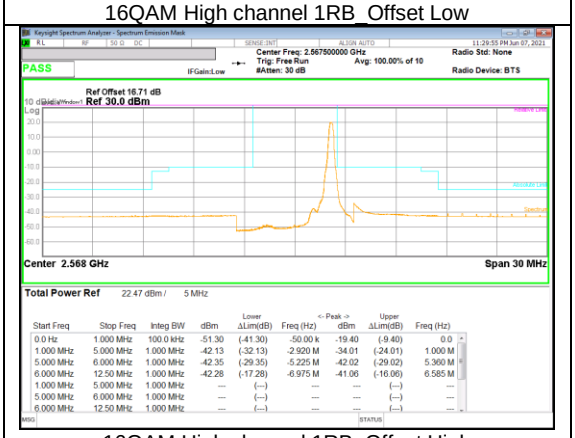
QPSK High channel 1RB_Offset Low



QPSK High channel 1RB_Offset High

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

5 MHz	 QPSK Low channel FRB	 QPSK Low channel 1RB_Offset Low
		 QPSK Low channel 1RB_Offset High
	 QPSK High channel FRB	 QPSK High channel 1RB_Offset Low
		 QPSK High channel 1RB_Offset High

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

LTE Band 4

LTE Band 4 (Frequency range: 1710-1755 MHz) is covered by LTE Band 66 (Frequency range: 1710-1780 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

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9.3. OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051, §22.901, §22.917, §24.238, §27.53

LIMITS

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

Part 27.53:
(c)(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB.

(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB.

(h) The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log (P) dB.

(m) (4) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

TEST PROCEDURE

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

a) Set the RBW = 100kHz for emission below 1GHz and 1MHz for emissions above 1GHz (Tests were performed 1MHz [Worst case], to sweep 1 time for all frequency range)

b) Set VBW ≥ 3 × RBW

c) Sweep time = auto couple;

d) Detector = RMS;

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

f) Trace mode = Average(FDD), Max hold(TDD);

NOTE

5GNR: All waveforms(CP-OFDM vs DFT-OFDM) were investigated to determine the worst case configuration. All mode of operation were investigated and the worst case configuration results are reported in tis section

RESULTS

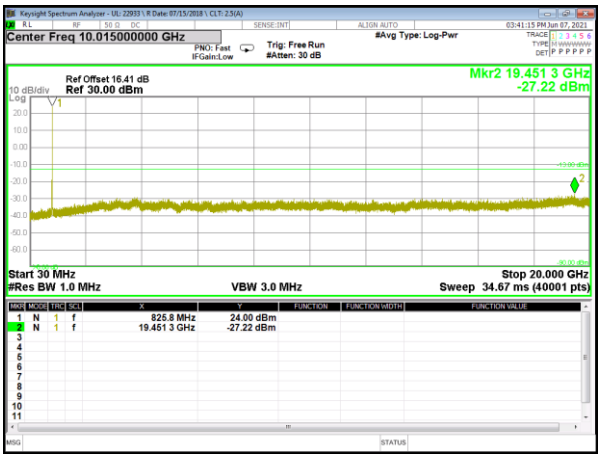
See the following pages.

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

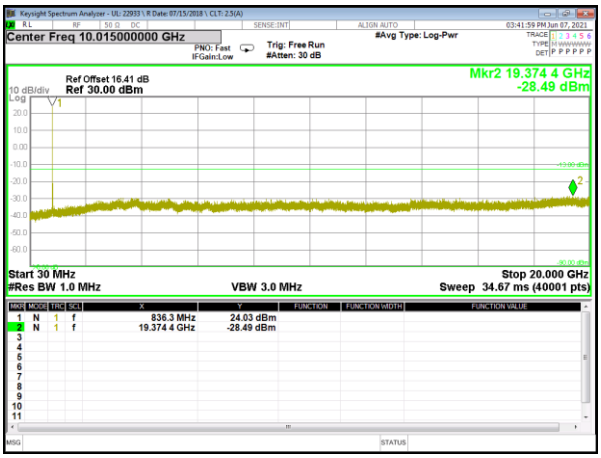
9.3.1. OUT OF BAND EMISSIONS RESULT

WCDMA

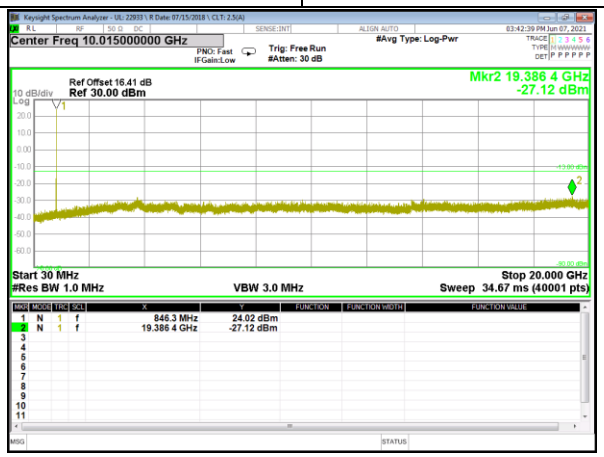
B5 REL99



Low channel

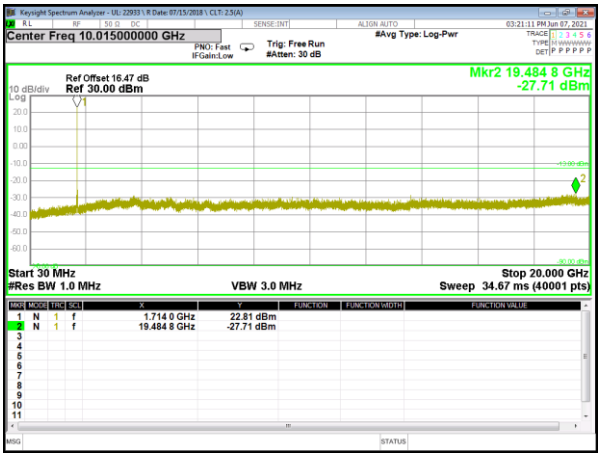


Mid channel

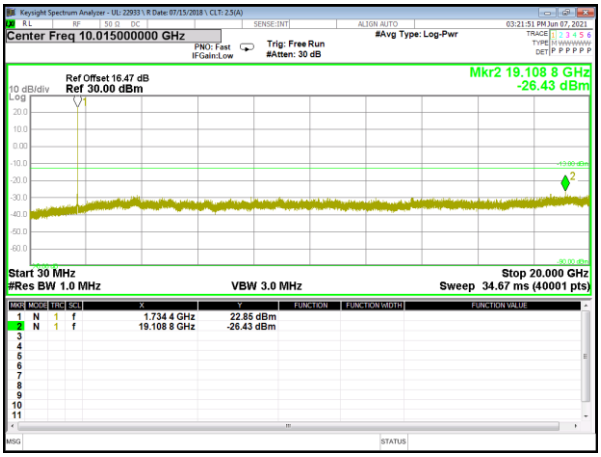


High channel

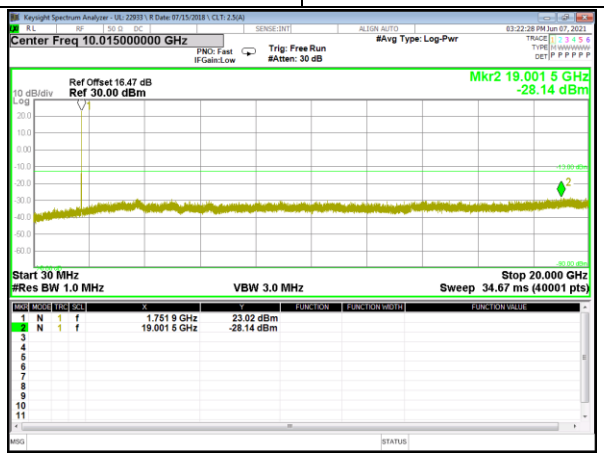
B4 REL99



Low channel

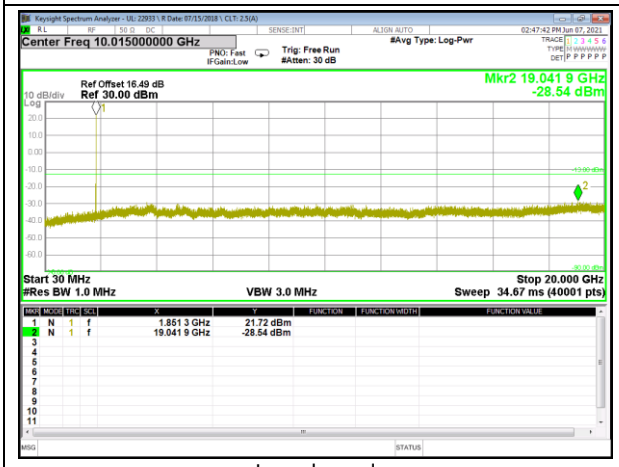


Mid channel

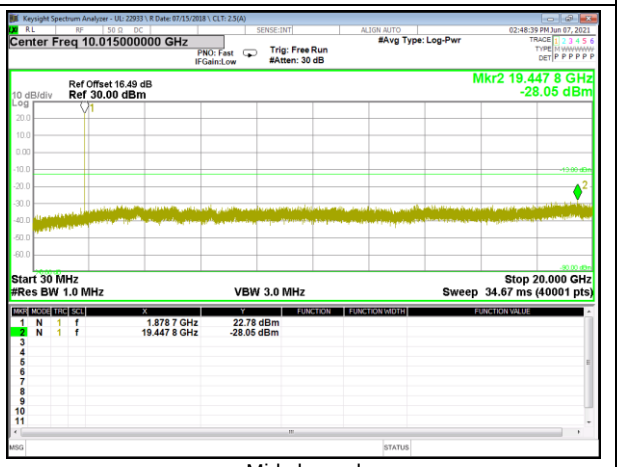


High channel

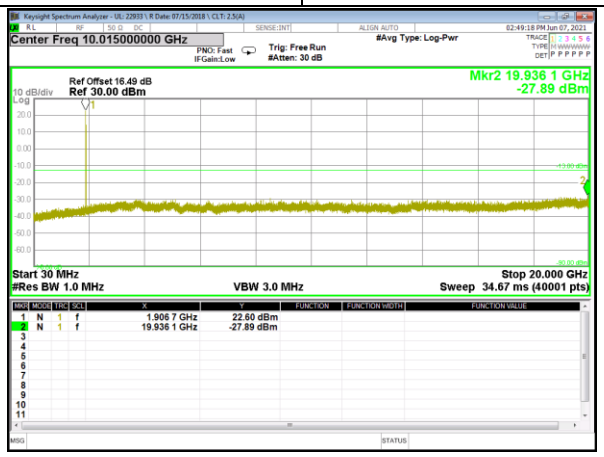
B2 REL99



Low channel



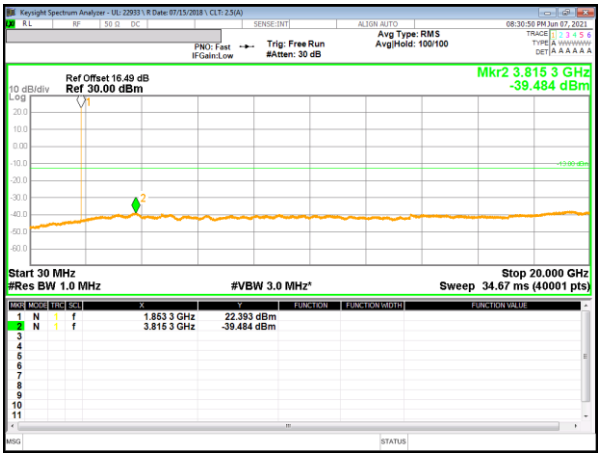
Mid channel



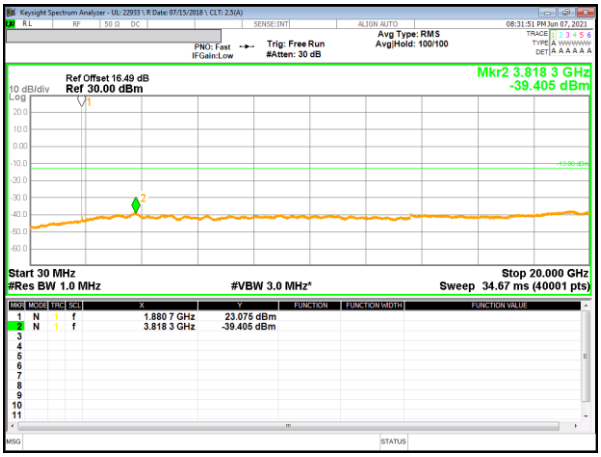
High channel

LTE Band 2

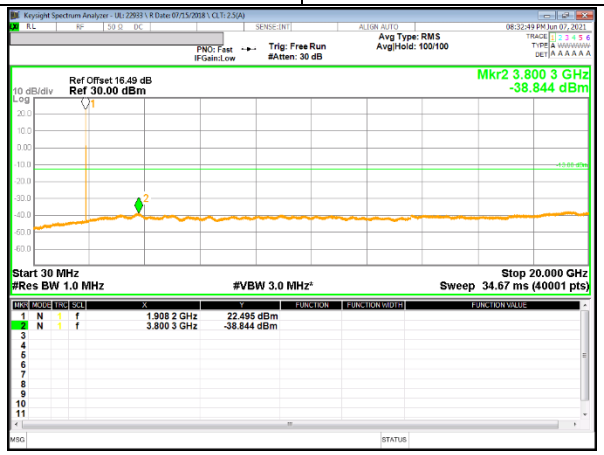
5 MHz QPSK



Low channel



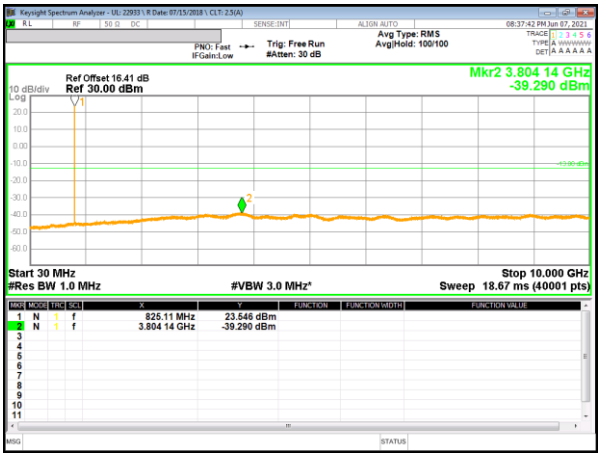
Mid channel



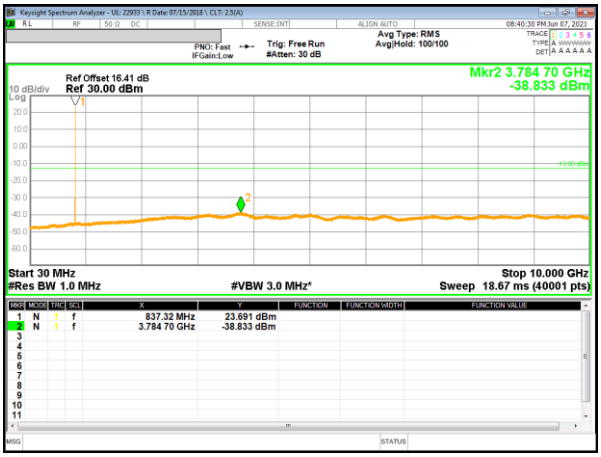
High channel

LTE Band 5

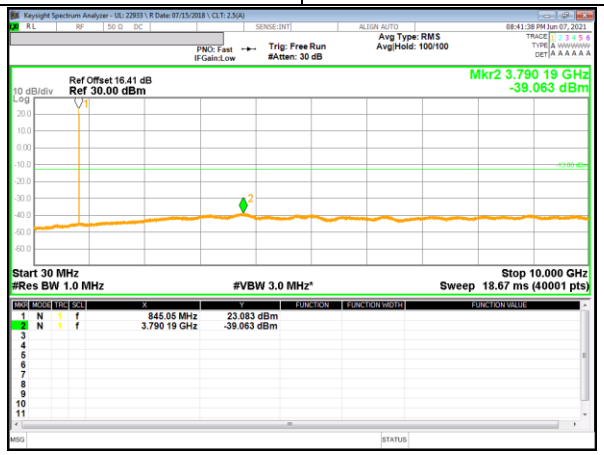
5 MHz QPSK



Low channel



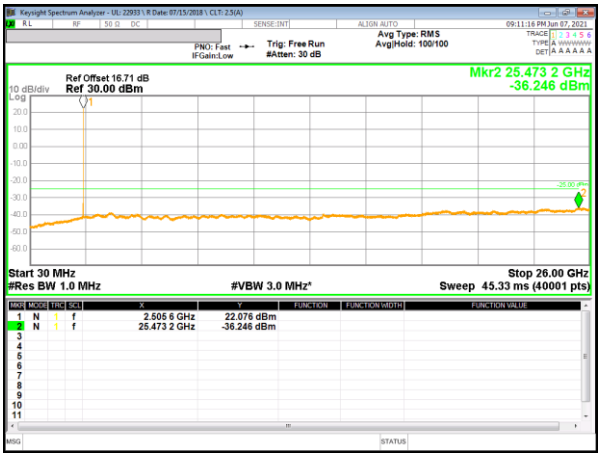
Mid channel



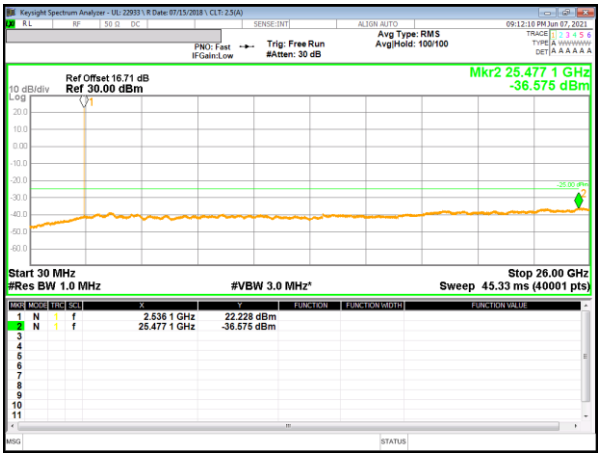
High channel

LTE Band 7

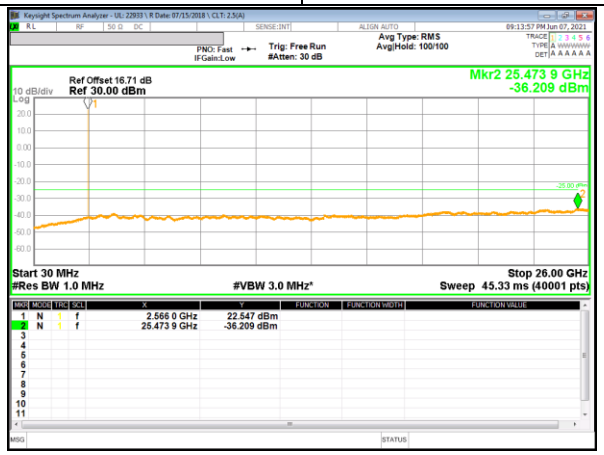
5 MHz QPSK



Low channel



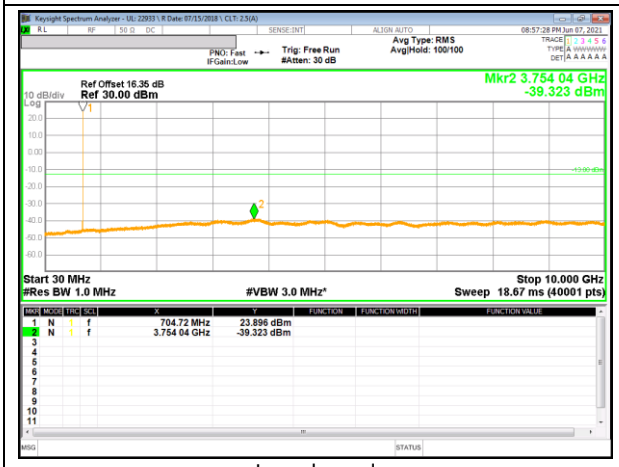
Mid channel



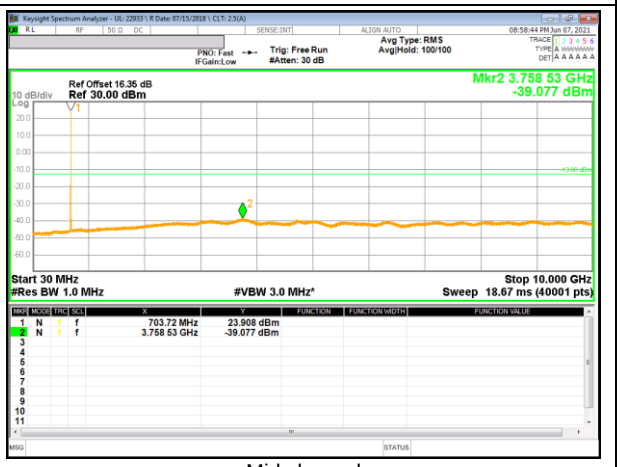
High channel

LTE Band 12

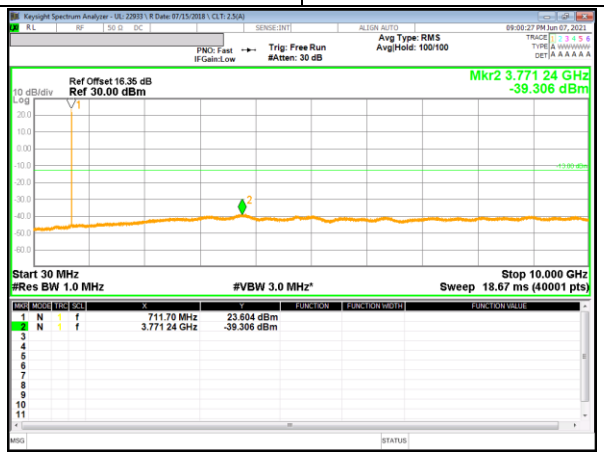
10 MHz QPSK



Low channel



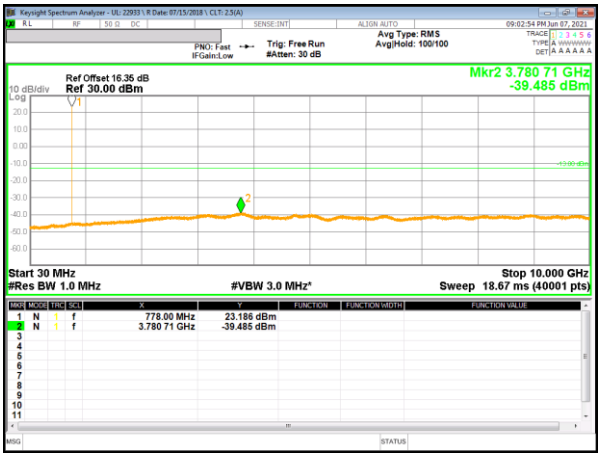
Mid channel



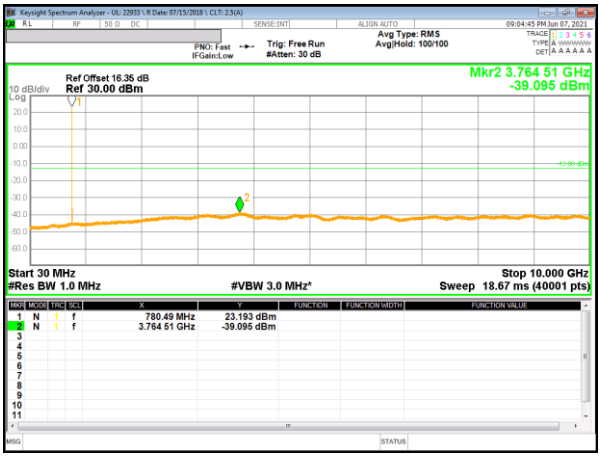
High channel

LTE Band 13

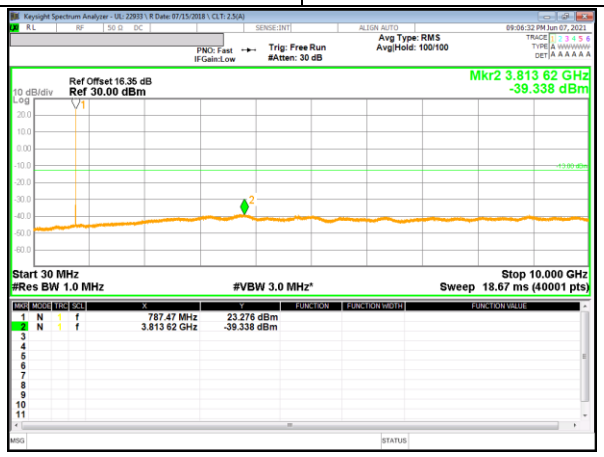
5 MHz QPSK



Low channel



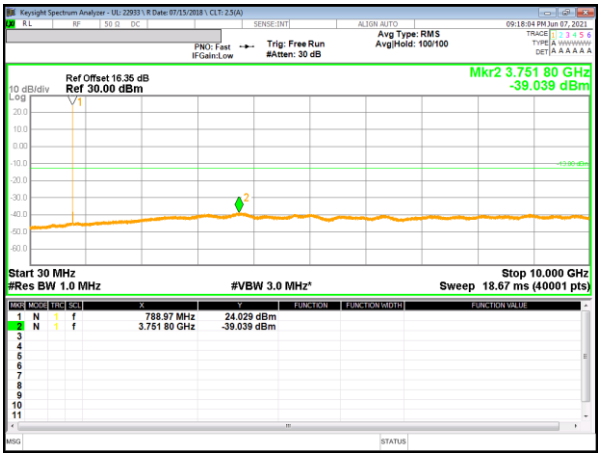
Mid channel



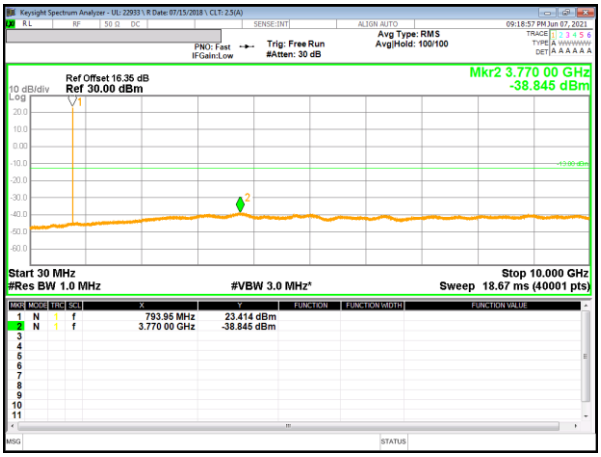
High channel

LTE Band 14

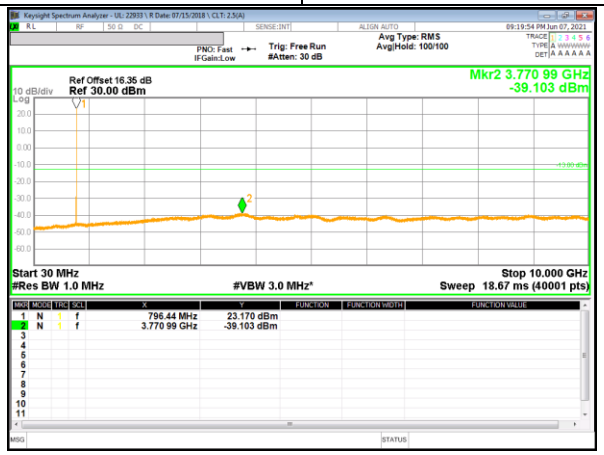
5 MHz QPSK



Low channel



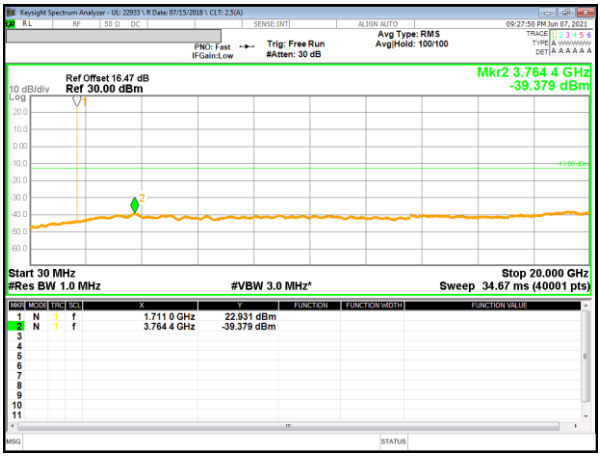
Mid channel



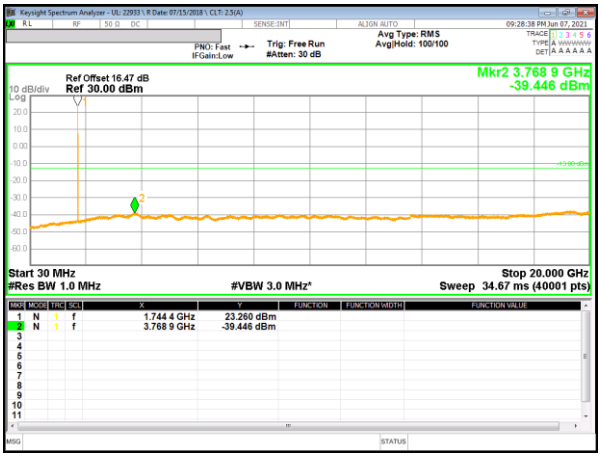
High channel

LTE Band 66

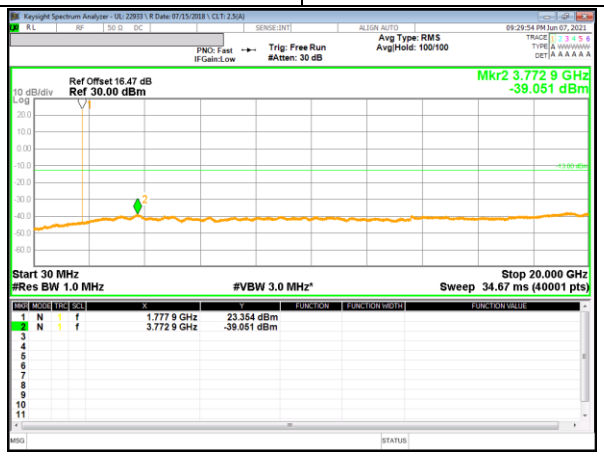
3 MHz QPSK



Low channel



Mid channel



High channel

LTE Band 4

LTE Band 4 (Frequency range: 1710-1755 MHz) is covered by LTE Band 66 (Frequency range: 1710-1780 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

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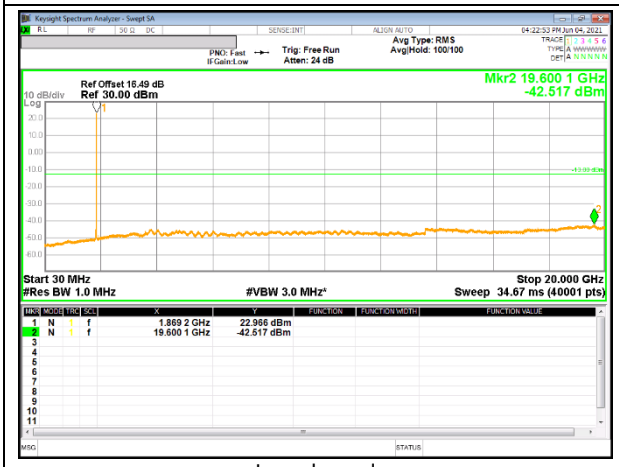
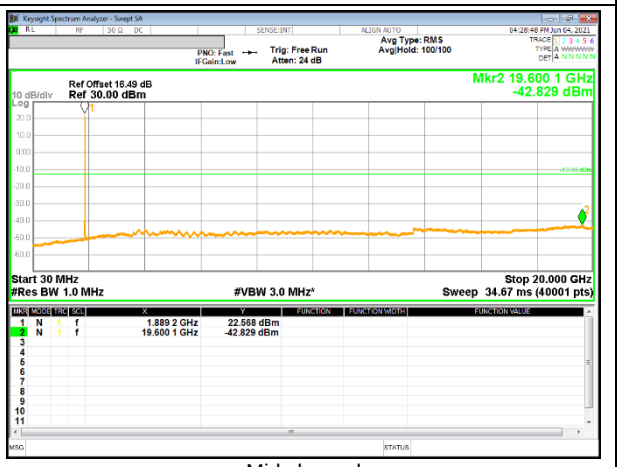
NR Band 2

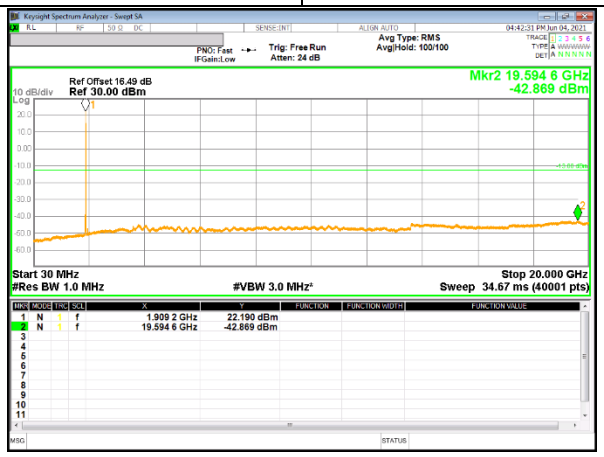
20 MHz QPSK



Low channel



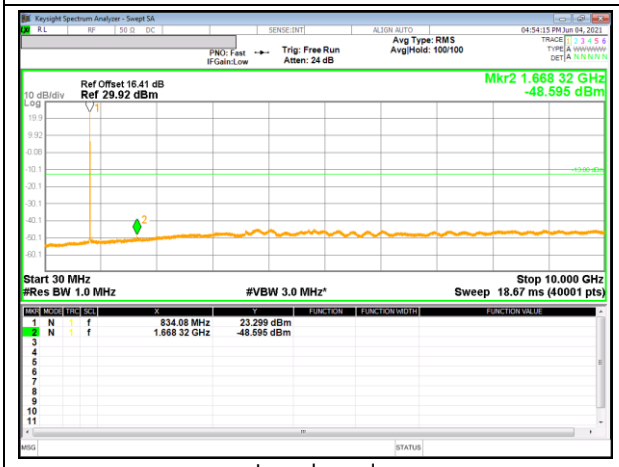
Mid channel



High channel

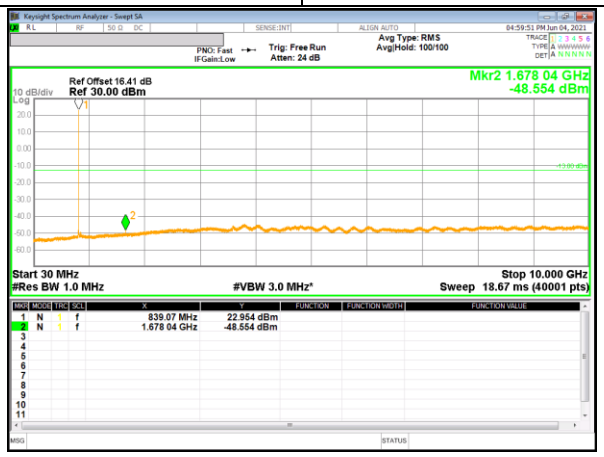
NR Band 5

20 MHz QPSK



Low channel

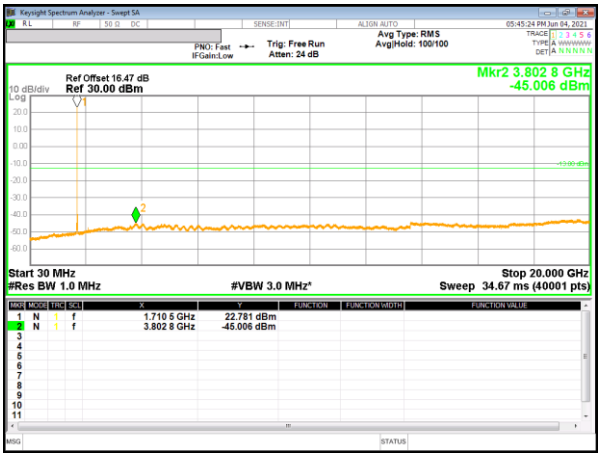
Mid channel



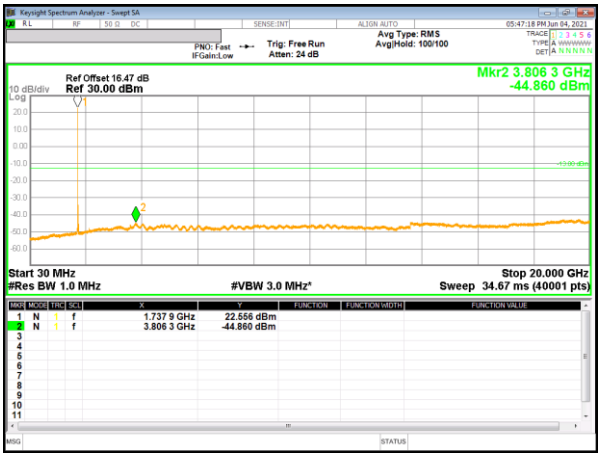
High channel

NR Band 66

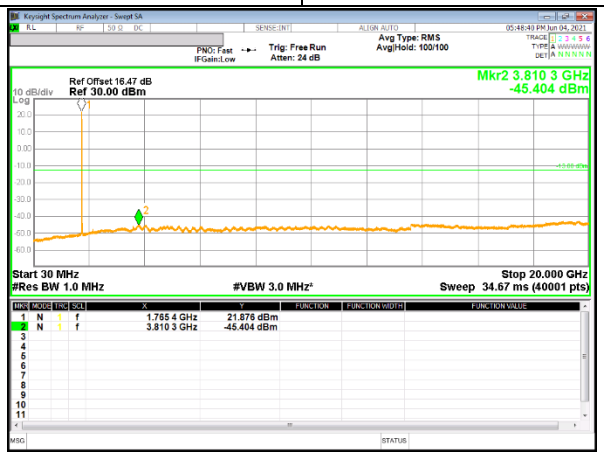
15 MHz QPSK



Low channel



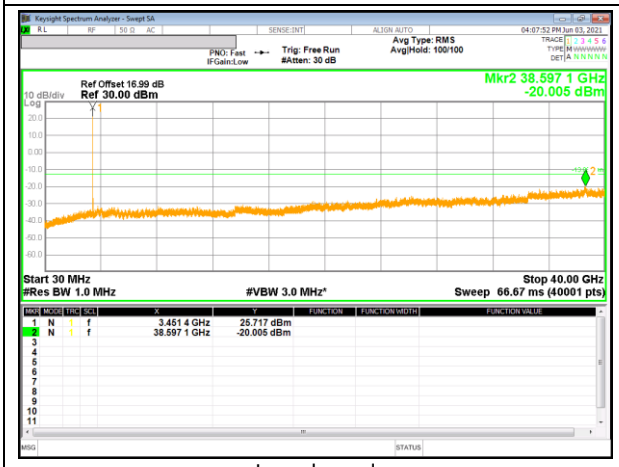
Mid channel



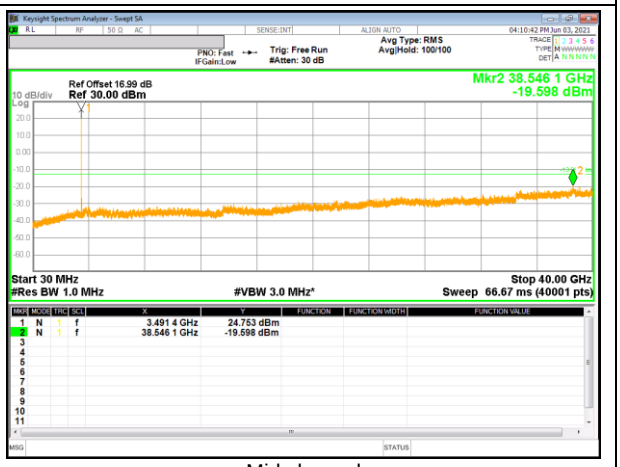
High channel

NR Band 77 (Lower)

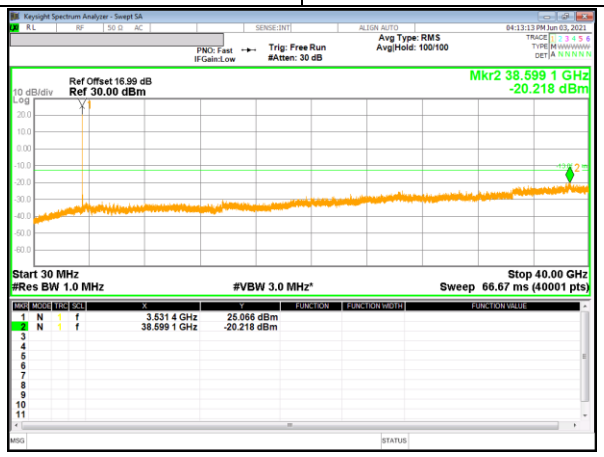
20 MHz QPSK



Low channel



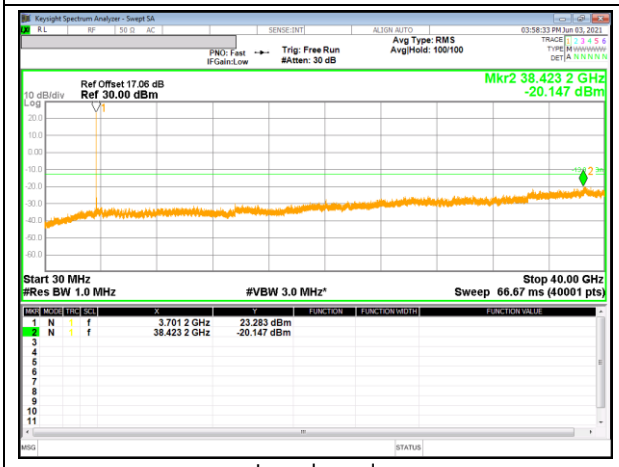
Mid channel



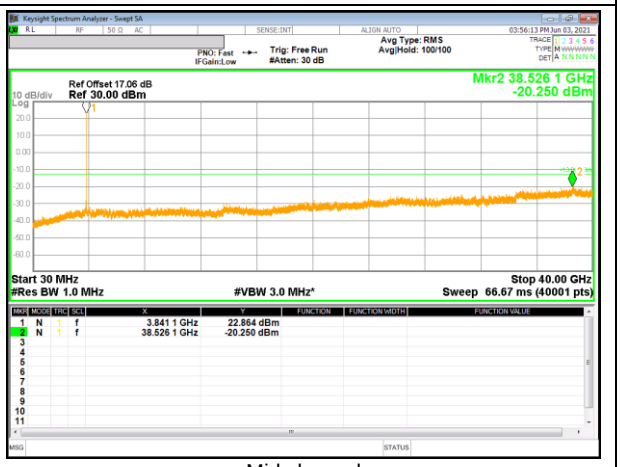
High channel

NR Band 77 (Upper)

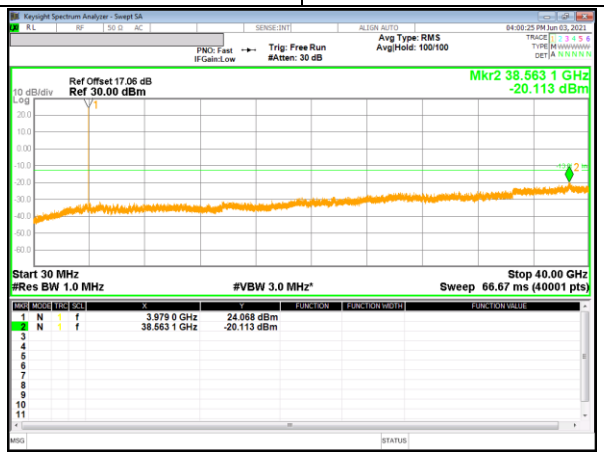
20 MHz QPSK



Low channel



Mid channel



High channel

9.4. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §22.355, §24.235,§27.54

LIMITS

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

§24.235 - The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

§27.54 - The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v03r01

RESULTS

See the following pages.

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

9.4.1. FREQUENCY STABILITY RESULTS

WCDMA Band 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	50	826.40000611	-0.002	846.59999318	0.012	2.5
3.85	40	826.40000508	-0.001	846.59999429	0.011	2.5
3.85	30	826.40000390	0.000	846.59999577	0.009	2.5
3.85	***20***	***826.40000410***	***0.000***	***846.60000376***	***0.000***	***2.5***
3.85	10	826.39999615	0.010	846.60000487	-0.001	2.5
3.85	0	826.39999569	0.010	846.60000552	-0.002	2.5
3.85	-10	826.39999581	0.010	846.60000546	-0.002	2.5
3.85	-20	826.39999684	0.009	846.60000400	0.000	2.5
3.85	-30	826.40000449	0.000	846.59999469	0.011	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]	
7.70	***20***	**826.40000480**	***0***	**846.60000517**	***0***	***2.5***
8.70	20	826.40000517	0.000	846.60000379	0.002	2.5
7.35	20	826.40000414	0.001	846.60000461	0.001	2.5

WCDMA Band 4(Lowest Frequency: Rel99 / Highest Frequency: HSDPA)

Limit		1710	1755	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1712.4000	1754.6698		
Extreme (50C)		1712.4000	1754.6697	-25.7	-0.015
Extreme (40C)		1712.4000	1754.6697	-19.8	-0.011
Extreme (30C)		1712.4000	1754.6697	-10.2	-0.006
Extreme (10C)		1712.4000	1754.6698	11.9	0.007
Extreme (0C)		1712.4000	1754.6697	-12.1	-0.007
Extreme (-10C)		1712.4000	1754.6697	-12.9	-0.007
Extreme (-20C)		1712.4000	1754.6697	-6.7	-0.004
Extreme (-30C)		1712.4000	1754.6698	21.7	0.013
20C	15%	1712.4000	1754.6697	-9.0	-0.005
	-15%	1712.4000	1754.6697	-10.9	-0.006
	End Point	1712.4000	1754.6697	-16.2	-0.009

WCDMA Band 2 (Lowest Frequency: HSDPA / Highest Frequency: HSDPA)

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1850.3253	1909.6729		
Extreme (50C)		1850.3253	1909.6729	8.4	0.004
Extreme (40C)		1850.3253	1909.6729	18.5	0.010
Extreme (30C)		1850.3253	1909.6729	12.8	0.007
Extreme (10C)		1850.3253	1909.6729	15.5	0.008
Extreme (0C)		1850.3253	1909.6729	14.0	0.007
Extreme (-10C)		1850.3253	1909.6729	14.0	0.007
Extreme (-20C)		1850.3253	1909.6729	16.0	0.009
Extreme (-30C)		1850.3253	1909.6729	23.4	0.012
20C	15%	1850.3253	1909.6729	13.5	0.007
	-15%	1850.3253	1909.6729	12.7	0.007
	End Point	1850.3253	1909.6729	10.4	0.006

LTE Band 2(Lowest Frequency: QPSK / Highest Frequency: 16QAM)

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1850.1582	1909.8397		
Extreme (50C)		1850.1581	1909.8396	-11.3	-0.006
Extreme (40C)		1850.1581	1909.8396	-27.7	-0.015
Extreme (30C)		1850.1582	1909.8397	26.3	0.014
Extreme (10C)		1850.1582	1909.8397	16.6	0.009
Extreme (0C)		1850.1581	1909.8396	-34.8	-0.018
Extreme (-10C)		1850.1582	1909.8397	17.1	0.009
Extreme (-20C)		1850.1582	1909.8397	16.0	0.008
Extreme (-30C)		1850.1581	1909.8396	-34.7	-0.018
20C	15%	1850.1581	1909.8397	17.0	0.009
	-15%	1850.1581	1909.8397	15.6	0.008
	End Point	1850.1582	1909.8397	16.6	0.009

LTE Band 5(Lowest Frequency: 16QAM / Highest Frequency: QPSK)

Reference Frequency : LTE Band 5 Low Channel 824.7 MHz / High Channel 848.3 MHz @ 20°C						
Limit: +- 2.5 ppm =	Low Channel	2061.750	Hz	High Channel	2120.750	Hz

Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measureed with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.80	50	824.69996671	0.061	848.30004717	-0.077	2.5
3.80	40	824.70002133	-0.005	848.29995780	0.028	2.5
3.80	30	824.69996680	0.061	848.29997670	0.006	2.5
3.80	***20***	***824.70001722***	***0.000***	***848.29998164***	***0.000***	***2.5***
3.80	10	824.70002384	-0.008	848.29996305	0.022	2.5
3.80	0	824.70001574	0.002	848.30003401	-0.062	2.5
3.80	-10	824.70001899	-0.002	848.29995921	0.026	2.5
3.80	-20	824.70001752	0.000	848.30002356	-0.049	2.5
3.80	-30	824.70001825	-0.001	848.29997087	0.013	2.5

Reference Frequency : LTE Band 5 Low Channel 824.7 MHz / High Channel 848.3 MHz @ 20°C						
Limit: +- 2.5 ppm =	Low Channel	2061.750	Hz	High Channel	2120.750	Hz

Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measureed with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
7.70	***20***	**824.70001722**	***0***	**848.29998164**	***0***	***2.5***
8.70	20	824.70001574	0.002	848.29998097	0.001	2.5
7.35	20	824.70001678	0.001	848.30001841	-0.043	2.5

LTE Band 7(Lowest Frequency: QPSK / Highest Frequency: 16QAM)

Limit		2500	2570	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	2500.2568	2569.7420		
Extreme (50C)		2500.2567	2569.7419	-24.8	-0.010
Extreme (40C)		2500.2567	2569.7419	-24.9	-0.010
Extreme (30C)		2500.2567	2569.7419	-25.7	-0.010
Extreme (10C)		2500.2567	2569.7419	-26.2	-0.010
Extreme (0C)		2500.2568	2569.7420	23.0	0.009
Extreme (-10C)		2500.2568	2569.7420	21.7	0.009
Extreme (-20C)		2500.2568	2569.7420	20.4	0.008
Extreme (-30C)		2500.2568	2569.7420	21.2	0.008
20C	15%	2500.2567	2569.7419	-25.9	-0.010
	-15%	2500.2567	2569.7419	-24.8	-0.010
	End Point	2500.2567	2569.7419	-24.3	-0.010

LTE Band 12 (Lowest Frequency: QPSK / Highest Frequency: QPSK)

Limit		699	716	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	699.1558	715.8463		
Extreme (50C)		699.1558	715.8462	-24.1	-0.034
Extreme (40C)		699.1558	715.8462	-35.1	-0.050
Extreme (30C)		699.1558	715.8462	-9.6	-0.014
Extreme (10C)		699.1558	715.8462	-17.4	-0.025
Extreme (0C)		699.1558	715.8462	-8.9	-0.013
Extreme (-10C)		699.1558	715.8462	-16.3	-0.023
Extreme (-20C)		699.1558	715.8463	18.3	0.026
Extreme (-30C)		699.1558	715.8462	-29.2	-0.041
20C	15%	699.1558	715.8462	-9.7	-0.014
	-15%	699.1558	715.8463	17.5	0.025
	End Point	699.1558	715.8462	-22.2	-0.031

LTE Band 13 (Lowest Frequency: QPSK / Highest Frequency: QPSK)

Limit		777	787	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	777.2584	786.7439		
Extreme (50C)		777.2584	786.7439	17.0	0.022
Extreme (40C)		777.2584	786.7439	15.2	0.019
Extreme (30C)		777.2584	786.7439	15.0	0.019
Extreme (10C)		777.2584	786.7439	16.6	0.021
Extreme (0C)		777.2584	786.7439	16.9	0.022
Extreme (-10C)		777.2584	786.7439	16.2	0.021
Extreme (-20C)		777.2584	786.7439	20.4	0.026
Extreme (-30C)		777.2584	786.7439	16.9	0.022
20C	15%	777.2584	786.7439	17.1	0.022
	-15%	777.2584	786.7439	20.4	0.026
	End Point	777.2584	786.7439	16.2	0.021

LTE Band 14 (Lowest Frequency:QPSK / Highest Frequency: QPSK)

Limit		788	798	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	788.2623	797.7388		
Extreme (50C)		788.2623	797.7388	15.6	0.020
Extreme (40C)		788.2623	797.7388	15.8	0.020
Extreme (30C)		788.2623	797.7388	16.5	0.021
Extreme (10C)		788.2623	797.7388	13.9	0.018
Extreme (0C)		788.2623	797.7388	14.2	0.018
Extreme (-10C)		788.2623	797.7387	-10.8	-0.014
Extreme (-20C)		788.2623	797.7387	-11.8	-0.015
Extreme (-30C)		788.2623	797.7388	20.4	0.026
20C	15%	788.2623	797.7388	16.5	0.021
	-15%	788.2623	797.7388	15.8	0.020
	End Point	788.2623	797.7388	17.5	0.022

LTE Band 66 (Lowest Frequency: 16QAM / Highest Frequency: QPSK)

Limit		1710	1780	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1710.1586	1779.8402		
Extreme (50C)		1710.1586	1779.8402	16.1	0.009
Extreme (40C)		1710.1585	1779.8402	-20.9	-0.012
Extreme (30C)		1710.1585	1779.8402	-14.8	-0.008
Extreme (10C)		1710.1586	1779.8403	72.9	0.042
Extreme (0C)		1710.1586	1779.8402	15.0	0.009
Extreme (-10C)		1710.1585	1779.8402	-25.2	-0.014
Extreme (-20C)		1710.1585	1779.8402	-15.9	-0.009
Extreme (-30C)		1710.1585	1779.8402	-31.4	-0.018
20C	15%	1710.1586	1779.8402	-18.5	-0.011
	-15%	1710.1585	1779.8402	-15.7	-0.009
	End Point	1710.1585	1779.8402	-15.1	-0.009

5G NR Band 77 SCS 30kHz (Lowest Frequency: QPSK / Highest Frequency: 16QAM)

Limit		3450	3550	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	3450.9015	3549.1335		
Extreme (50C)		3450.9015	3549.1335	40.4	0.012
Extreme (40C)		3450.9015	3549.1335	-38.4	-0.011
Extreme (30C)		3450.9015	3549.1335	42.4	0.012
Extreme (10C)		3450.9015	3549.1335	39.1	0.011
Extreme (0C)		3450.9015	3549.1335	-44.3	-0.013
Extreme (-10C)		3450.9015	3549.1335	40.4	0.012
Extreme (-20C)		3450.9015	3549.1335	-47.5	-0.014
Extreme (-30C)		3450.9014	3549.1334	-51.2	-0.015
20C	15%	3450.9015	3549.1335	47.1	0.013
	-15%	3450.9015	3549.1336	51.1	0.015
	End Point	3450.9015	3549.1335	-41.8	-0.012

Limit		3700	3980	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	3700.8735	3979.1035		
Extreme (50C)		3700.8735	3979.1035	48.1	0.013
Extreme (40C)		3700.8734	3979.1034	-54.1	-0.014
Extreme (30C)		3700.8734	3979.1034	-50.8	-0.013
Extreme (10C)		3700.8735	3979.1035	49.1	0.013
Extreme (0C)		3700.8735	3979.1035	-49.5	-0.013
Extreme (-10C)		3700.8735	3979.1035	46.2	0.012
Extreme (-20C)		3700.8735	3979.1035	-38.2	-0.010
Extreme (-30C)		3700.8735	3979.1035	40.8	0.011
20C	15%	3700.8735	3979.1034	-51.5	-0.013
	-15%	3700.8734	3979.1036	53.5	0.014
	End Point	3700.8734	3979.1035	-44.2	-0.011

LTE Band 4

LTE Band 4 (Frequency range: 1710-1755 MHz) is covered by LTE Band 66 (Frequency range: 1710-1780 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

NR Band 2 (SCS 15kHz)

NR Band 2 (Frequency range: 1850-1910 MHz) is covered by LTE Band 2 (Frequency range: 1850-1910 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

NR Band 5 (SCS 15kHz)

NR Band 5 (Frequency range: 824-849 MHz) is covered by LTE Band 5 (Frequency range: 824-849 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

NR Band 66 (SCS 15kHz)

NR Band 66 (Frequency range: 1710-1780 MHz) is covered by LTE Band 66 (Frequency range: 1710-1780 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27/90 (04)
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9.5. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §22.913, §24.232, §27.50, §27.53

LIMITS

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

24.232(c) - Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

27.50:

(b)(10) Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.

(c) (10) - Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.

(d) (4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.

(h) The following power limits shall apply in the BRS and EBS:

(2) Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

90.542(a)(7) - Portable stations (hand-held devices) transmitting in the 758-768 MHz band and the 788-798 MHz band are limited to 3 watts ERP.

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;

e) Detector = rms;

f) Ensure that the number of measurement points ≥ 2 x span/RBW;

g) Trace mode = max hold(GSM, WCDMA), average(LTE);

NOTE

5GNR: All waveforms(CP-OFDM vs DFT-OFDM) were investigated to determine the worst case configuration. All mode of operation were investigated and the worst case configuration results are reported in tis section.

TEST RESULTS

9.5.1. ERP/EIRP Results

WCDMA

Band	Mode	Channel	f [MHz]	ERP / EIRP	
				[dBm]	[mW]
Band 5	REL99	4132	826.4	**23.17**	**207.49**
		4183	836.6	22.80	190.55
		4233	846.6	22.88	194.09
	HSDPA	4132	826.4	**22.66**	**184.50**
		4183	836.6	22.32	170.61
		4233	846.6	21.96	157.04
Band 4	REL99	1312	1712.4	24.51	282.49
		1413	1732.6	24.47	279.90
		1513	1752.6	**24.97**	**314.05**
	HSDPA	1312	1712.4	23.48	222.84
		1413	1732.6	23.48	222.84
		1513	1752.6	**24.02**	**252.35**
Band 2	REL99	9262	1852.4	**23.65**	**231.74**
		9400	1880.0	23.48	222.84
		9538	1907.6	23.46	221.82
	HSDPA	9262	1852.4	**23.16**	**207.01**
		9400	1880.0	22.17	164.82
		9538	1907.6	22.65	184.08

LTE Band 2

Band	BW [MHz]	Mode	RB Size/ RB Offset	f [MHz]	ERP / EIRP [dBm]	ERP / EIRP [mW]
Band 2	20	QPSK	1/0	1860.0	24.30	269.15
			1/99	1880.0	**24.36**	**272.90**
			1/99	1900.0	23.68	233.35
		16QAM	1/0	1860.0	**23.73**	**236.05**
			1/0	1880.0	23.00	199.53
			1/99	1900.0	23.30	213.80
	15	QPSK	1/37	1857.5	**24.54**	**284.45**
			1/74	1880.0	24.48	280.54
			1/74	1902.5	23.62	230.14
		16QAM	1/37	1857.5	**23.96**	**248.89**
			1/0	1880.0	23.26	211.84
			1/74	1902.5	22.68	185.35
	10	QPSK	1/25	1855.0	**24.25**	**266.07**
			1/25	1880.0	24.21	263.63
			1/49	1905.0	24.12	258.23
		16QAM	1/25	1855.0	23.63	230.67
			1/25	1880.0	**23.74**	**236.59**
			1/0	1905.0	23.72	235.50
	5	QPSK	1/12	1852.5	**24.42**	**276.69**
			1/12	1880.0	24.14	259.42
			1/12	1907.5	24.34	271.64
		16QAM	1/12	1852.5	23.78	238.78
			1/12	1880.0	23.55	226.46
			1/12	1907.5	**23.86**	**243.22**
	3	QPSK	1/0	1851.5	**24.62**	**289.73**
			1/8	1880.0	24.20	263.03
			1/0	1908.5	24.34	271.64
		16QAM	1/0	1851.5	**24.03**	**252.93**
			1/0	1880.0	23.18	207.97
			1/0	1908.5	23.43	220.29
	1.4	QPSK	1/0	1850.7	**24.48**	**280.54**
			1/3	1880.0	24.29	268.53
			1/3	1909.3	24.34	271.64
		16QAM	1/3	1850.7	**23.68**	**233.35**
			1/3	1880.0	23.02	200.45
			1/3	1909.3	23.44	220.80

LTE Band 5

Band	BW [MHz]	Mode	RB Size/ RB Offset	f [MHz]	ERP / EIRP [dBm]	ERP / EIRP [mW]
Band 5	10	QPSK	1/0	829.0	**23.90**	**245.47**
			1/49	836.5	23.01	199.99
			1/0	844.0	23.59	228.56
		16QAM	1/0	829.0	**23.18**	**207.97**
			1/49	836.5	21.91	155.24
			1/0	844.0	22.72	187.07
	5	QPSK	1/0	826.5	**23.88**	**244.34**
			1/12	836.5	23.48	222.84
			1/0	846.5	22.96	197.70
		16QAM	1/24	826.5	22.52	178.65
			1/12	836.5	**22.54**	**179.47**
			1/24	846.5	21.74	149.28
	3	QPSK	1/14	825.5	**23.74**	**236.59**
			1/14	836.5	23.35	216.27
			1/14	847.5	22.67	184.93
		16QAM	1/0	825.5	**22.94**	**196.79**
			1/14	836.5	22.22	166.72
			1/14	847.5	21.71	148.25
	1.4	QPSK	1/3	824.7	**23.85**	**242.66**
			1/3	836.5	23.29	213.30
			1/3	848.3	22.75	188.36
		16QAM	1/3	824.7	**22.63**	**183.23**
			1/5	836.5	22.31	170.22
			1/3	848.3	22.12	162.93

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LTE Band 7

Band	BW [MHz]	Mode	RB Size/ RB Offset	f [MHz]	ERP / EIRP [dBm]	ERP / EIRP [mW]
Band 7	20	QPSK	1/99	2510.0	**25.12**	**325.09**
			1/49	2535.0	25.05	319.89
			1/0	2560.0	25.04	319.15
		16QAM	1/99	2510.0	**24.23**	**264.85**
			1/99	2535.0	24.22	264.24
			1/49	2560.0	23.87	243.78
	15	QPSK	1/74	2507.5	24.79	301.30
			1/37	2535.0	**25.51**	**355.63**
			1/0	2562.5	25.07	321.37
		16QAM	1/0	2507.5	23.86	243.22
			1/74	2535.0	**24.52**	**283.14**
			1/0	2562.5	24.04	253.51
	10	QPSK	1/49	2505.0	24.73	297.17
			1/0	2535.0	**25.37**	**344.35**
			1/0	2565.0	25.25	334.97
		16QAM	1/49	2505.0	23.86	243.22
			1/0	2535.0	**24.43**	**277.33**
			1/0	2565.0	24.35	272.27
	5	QPSK	1/24	2502.5	23.15	206.54
			1/12	2535.0	**24.82**	**303.39**
			1/0	2567.5	24.73	297.17
		16QAM	1/24	2502.5	22.37	172.58
			1/12	2535.0	24.01	251.77
			1/0	2567.5	**24.44**	**277.97**

LTE Band 12

Band	BW [MHz]	Mode	RB Size/ RB Offset	f [MHz]	ERP / EIRP [dBm]	ERP / EIRP [mW]
Band 12	10	QPSK	1/25	704.0	21.66	146.55
			1/0	707.5	21.99	158.12
			1/25	711.0	**22.32**	**170.61**
		16QAM	1/0	704.0	20.65	116.14
			1/0	707.5	**21.21**	**132.13**
			1/0	711.0	21.05	127.35
	5	QPSK	1/12	701.5	21.48	140.60
			1/0	707.5	22.11	162.55
			1/12	713.5	**22.27**	**168.66**
		16QAM	1/12	701.5	20.68	116.95
			1/12	707.5	21.20	131.83
			1/0	713.5	**21.58**	**143.88**
	3	QPSK	1/0	700.5	21.38	137.40
			1/14	707.5	21.99	158.12
			1/0	714.5	**22.64**	**183.65**
		16QAM	1/0	700.5	20.65	116.14
			1/14	707.5	20.93	123.88
			1/14	714.5	**21.44**	**139.32**
	1.4	QPSK	1/3	699.7	21.27	133.97
			1/3	707.5	21.94	156.31
			1/3	715.3	**22.34**	**171.40**
		16QAM	1/3	699.7	20.30	107.15
			1/3	707.5	21.21	132.13
			1/3	715.3	**21.34**	**136.14**

LTE Band 13

Band	BW [MHz]	Mode	RB size / RB Offset	f [MHz]	ERP / EIRP [dBm]	ERP / EIRP [mW]
Band 13	10	QPSK	1/0	782.0	**23.40**	**218.78**
		16QAM	1/0	782.0	21.96	157.04
	5	QPSK	1/0	779.5	**23.29**	**213.30**
			1/0	782.0	23.27	212.32
			1/24	784.5	23.15	206.54
		16QAM	1/12	779.5	22.28	169.04
			1/24	782.0	**22.46**	**176.20**
			1/24	784.5	22.13	163.31

LTE Band 14

Band	BW [MHz]	Mode	RB size / RB Offset	f [MHz]	ERP / EIRP	
					[dBm]	[mW]
Band 14	10	QPSK	1/0	793.0	**23.56**	**226.99**
		16QAM	1/0	793.0	22.55	179.89
	5	QPSK	1/0	790.5	23.22	209.89
			1/12	793.0	**23.53**	**225.42**
			1/12	795.5	23.44	220.80
		16QAM	1/12	790.5	**22.61**	**182.39**
			1/12	793.0	22.58	181.13
			1/12	795.5	22.32	170.61

LTE Band 66

Band	BW [MHz]	Mode	RB Size/ RB Offset	f [MHz]	ERP / EIRP	
					[dBm]	[mW]
Band 66	20	QPSK	1/49	1720.0	**25.15**	**327.34**
			1/49	1745.0	24.43	277.33
			1/49	1770.0	24.23	264.85
		16QAM	1/49	1720.0	**24.02**	**252.35**
			1/49	1745.0	23.22	209.89
			1/0	1770.0	23.63	230.67
	15	QPSK	1/37	1717.5	**25.26**	**335.74**
			1/37	1747.5	24.62	289.73
			1/37	1772.5	24.36	272.90
		16QAM	1/37	1717.5	**24.26**	**266.69**
			1/74	1747.5	23.39	218.27
			1/37	1772.5	23.32	214.78
	10	QPSK	1/25	1715.0	**25.41**	**347.54**
			1/25	1745.0	24.85	305.49
			1/25	1775.0	24.79	301.30
		16QAM	1/25	1715.0	**24.20**	**263.03**
			1/25	1745.0	23.96	248.89
			1/25	1775.0	23.64	231.21
	5	QPSK	1/12	1712.5	**25.42**	**348.34**
			1/12	1745.0	24.93	311.17
			1/0	1777.5	24.57	286.42
		16QAM	1/24	1712.5	**24.03**	**252.93**
			1/12	1745.0	23.91	246.04
			1/24	1777.5	23.11	204.64
	3	QPSK	1/0	1711.5	**25.09**	**322.85**
			1/14	1745.0	24.95	312.61
			1/8	1778.5	24.81	302.69
		16QAM	1/0	1711.5	**23.99**	**250.61**
			1/8	1745.0	23.54	225.94
			1/0	1778.5	23.51	224.39
	1.4	QPSK	1/3	1710.7	25.22	332.66
			1/3	1745.0	**25.73**	**374.11**
			1/3	1779.3	24.26	266.69
		16QAM	1/3	1710.7	**24.02**	**252.35**
			1/3	1745.0	23.40	218.78
			1/3	1779.3	23.25	211.35

LTE Band 4

LTE Band 4 (Frequency range: 1710-1755 MHz) is covered by LTE Band 66 (Frequency range: 1710-1780 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

NR Band 2

Band	BW [MHz]	Modulation	Mode	RB Size/ RB Offset	f [MHz]	ERP / EIRP [dBm]	ERP / EIRP [mW]
n2	20	DFT-s OFDM	QPSK	1/104	1860.0	24.35	272.27
				1/1	1882.5	**24.63**	**290.40**
				1/53	1905.0	24.43	277.33
			16QAM	1/104	1860.0	23.21	209.41
				1/1	1882.5	**23.50**	**223.87**
				1/53	1905.0	23.28	212.81
	15	DFT-s OFDM	QPSK	1/77	1857.5	24.38	274.16
				1/77	1882.5	24.78	300.61
				1/1	1907.5	**24.85**	**305.49**
			16QAM	1/77	1857.5	23.33	215.28
				1/77	1882.5	23.48	222.84
				1/1	1907.5	**23.54**	**225.94**
	10	DFT-s OFDM	QPSK	1/26	1855.0	24.55	**285.10**
				1/1	1882.5	24.41	276.06
				1/1	1910.0	**24.76**	**299.23**
			16QAM	1/26	1855.0	23.42	219.79
				1/1	1882.5	**23.67**	**232.81**
				1/1	1910.0	23.50	223.87
	5	DFT-s OFDM	QPSK	1/13	1852.5	24.35	272.27
				1/13	1882.5	**24.77**	**299.92**
				1/13	1912.5	24.59	287.74
			16QAM	1/13	1852.5	22.94	196.79
				1/13	1882.5	**23.44**	**220.80**
				1/13	1912.5	23.32	214.78

NR Band 5

Band	BW [MHz]	Modulation	Mode	RB Size/ RB Offset	f [MHz]	ERP / EIRP [dBm]	ERP / EIRP [mW]
n5	20	DFT-s OFDM	QPSK	1/53	834.0	**24.14**	**259.42**
				1/1	836.5	24.03	252.93
				1/53	839.0	23.42	219.79
			16QAM	1/53	834.0	**23.06**	**202.30**
				1/1	836.5	22.96	197.70
				1/53	839.0	22.13	163.31
	15	DFT-s OFDM	QPSK	1/37	831.5	**23.63**	**230.67**
				1/77	836.5	23.24	210.86
				1/37	841.5	23.28	212.81
			16QAM	1/37	831.5	22.24	167.49
				1/77	836.5	22.26	168.27
				1/37	841.5	**22.51**	**178.24**
	10	DFT-s OFDM	QPSK	1/26	829.0	**23.67**	**232.81**
				1/50	836.5	23.61	**229.61**
				1/26	844.0	23.41	219.28
			16QAM	1/26	829.0	**22.61**	182.39
				1/50	836.5	22.25	167.88
				1/26	844.0	22.39	**173.38**
	5	DFT-s OFDM	QPSK	1/1	826.5	23.92	246.60
				1/13	836.5	**23.96**	**248.89**
				1/1	846.5	23.74	236.59
			16QAM	1/1	826.5	**22.90**	**194.98**
				1/13	836.5	22.55	179.89
				1/1	846.5	22.51	178.24

NR Band 66

Band	BW [MHz]	Modulation	Mode	RB Size/ RB Offset	f [MHz]	ERP / EIRP [dBm]	ERP / EIRP [mW]
n66	20	DFT-s OFDM	QPSK	1/1	1720.0	**26.32**	**428.55**
				1/1	1745.0	26.27	423.64
				1/1	1770.0	25.68	369.83
			16QAM	1/1	1720.0	25.11	324.34
				1/1	1745.0	**25.19**	**330.37**
				1/1	1770.0	24.56	285.76
	15	DFT-s OFDM	QPSK	1/1	1717.5	26.40	436.52
				1/1	1745.0	**26.47**	**443.61**
				1/1	1772.5	25.82	381.94
			16QAM	1/1	1717.5	25.18	329.61
				1/1	1745.0	**25.29**	**338.06**
				1/1	1772.5	24.84	304.79
	10	DFT-s OFDM	QPSK	1/26	1715.0	26.02	**399.94**
				1/1	1745.0	**26.20**	**416.87**
				1/1	1775.0	25.61	363.92
			16QAM	1/26	1715.0	**24.89**	308.32
				1/1	1745.0	24.80	**302.00**
				1/1	1775.0	24.53	283.79
	5	DFT-s OFDM	QPSK	1/23	1712.5	22.43	174.98
				1/13	1745.0	**25.86**	**385.48**
				1/13	1777.5	25.72	373.25
			16QAM	1/23	1712.5	24.64	291.07
				1/13	1745.0	**24.68**	**293.76**
				1/13	1777.5	24.41	276.06

NR Band 77(Lower)

Band	BW [MHz]	Modulation	Mode	RB Size/ RB Offset	f [MHz]	ERP / EIRP [dBm]	ERP / EIRP [mW]
n77	100	DFT-s OFDM	QPSK	1/137	3499.98	**25.94**	**392.64**
			16QAM	1/137	3499.98	**24.92**	**310.46**
	90	DFT-s OFDM	QPSK	1/1	3495.00	25.98	396.28
				1/1	3499.98	25.60	363.08
				1/1	3504.99	**26.08**	**405.51**
			16QAM	1/1	3495.00	24.87	306.90
				1/1	3499.98	**25.09**	**322.85**
				1/1	3504.99	25.07	321.37
	80	DFT-s OFDM	QPSK	1/109	3490.02	25.88	387.26
				1/1	3499.98	25.95	393.55
				1/1	3510.00	**26.08**	**405.51**
			16QAM	1/109	3490.02	24.74	297.85
				1/1	3499.98	24.76	299.23
				1/1	3510.00	**25.18**	**329.61**
	60	DFT-s OFDM	QPSK	1/81	3480.00	26.09	406.44
				1/81	3499.98	25.88	387.26
				1/1	3519.99	**26.22**	**418.79**
			16QAM	1/81	3480.00	**25.34**	**341.98**
				1/81	3499.98	25.27	336.51
				1/1	3519.99	25.33	341.19
	50	DFT-s OFDM	QPSK	1/131	3475.02	25.85	384.59
				1/1	3499.98	26.00	398.11
				1/1	3525.00	**26.01**	**399.02**
			16QAM	1/131	3475.02	24.76	299.23
				1/1	3499.98	**25.13**	**325.84**
				1/1	3525.00	25.03	318.42
	40	DFT-s OFDM	QPSK	1/104	3470.01	26.09	406.44
				1/1	3499.98	**26.11**	**408.32**
				1/1	3529.98	26.02	399.94
			16QAM	1/104	3470.01	25.16	328.10
				1/1	3499.98	25.26	335.74
				1/1	3529.98	**25.37**	**344.35**
	20	DFT-s OFDM	QPSK	1/1	3460.02	25.75	375.84
				1/1	3499.98	**26.44**	**440.55**
				1/1	3540.00	25.87	386.37
			16QAM	1/1	3460.02	24.83	304.09
				1/1	3499.98	**25.65**	**367.28**
				1/1	3540.00	24.81	302.69

NR Band 77(Upper)

Band	BW [MHz]	Modulation	Mode	RB Size/ RB Offset	f [MHz]	ERP / EIRP [dBm]	ERP / EIRP [mW]
n77	100	DFT-s OFDM	QPSK	1/1	3750.00	22.79	190.11
				1/271	3840.00	**26.66**	**463.45**
				1/271	3930.00	26.56	452.90
			16QAM	1/1	3750.00	22.33	171.00
				1/271	3840.00	**26.34**	**430.53**
				1/271	3930.00	25.60	363.08
	90	DFT-s OFDM	QPSK	1/1	3745.02	22.57	180.72
				1/243	3840.00	**26.46**	**442.59**
				1/1	3934.98	26.43	439.54
			16QAM	1/1	3745.02	21.78	150.66
				1/243	3840.00	23.87	243.78
				1/1	3934.98	**25.80**	**380.19**
	80	DFT-s OFDM	QPSK	1/1	3740.01	21.76	149.97
				1/215	3840.00	26.45	441.57
				1/1	3939.99	**26.73**	**470.98**
			16QAM	1/1	3740.01	21.22	132.43
				1/215	3840.00	26.18	414.95
				1/1	3939.99	**26.19**	**415.91**
	60	DFT-s OFDM	QPSK	1/81	3730.02	21.40	138.04
				1/81	3840.00	26.15	412.10
				1/160	3949.98	**27.03**	**504.66**
			16QAM	1/81	3730.02	20.85	121.62
				1/81	3840.00	25.97	395.37
				1/160	3949.98	**26.41**	**437.52**
	50	DFT-s OFDM	QPSK	1/1	3725.01	22.14	163.68
				1/131	3840.00	26.02	399.94
				1/131	3954.99	**26.96**	**496.59**
			16QAM	1/1	3725.01	20.88	122.46
				1/131	3840.00	25.31	339.63
				1/131	3954.99	**26.44**	**440.55**
	40	DFT-s OFDM	QPSK	1/104	3720.00	22.17	164.82
				1/53	3840.00	25.72	373.25
				1/104	3960.00	**27.00**	**501.19**
			16QAM	1/104	3720.00	21.56	143.22
				1/53	3840.00	24.81	302.69
				1/104	3960.00	**26.42**	**438.53**
	20	DFT-s OFDM	QPSK	1/1	3710.01	23.18	207.97
				1/26	3840.00	26.32	428.55
				1/49	3969.99	**27.15**	**518.80**
			16QAM	1/1	3710.01	21.49	140.93
				1/26	3840.00	25.99	397.19
				1/49	3969.99	**26.67**	**464.52**

9.5.2. ERP/EIRP DATA

WCDMA

Band 5

REL99

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 19227
Configuration: EUT, X-Position
Location: Chamber 2
Mode: Rel99 Band 5 Fundamentals

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
826.40	25.44	V	3.0	-0.9	21.45	38.5	-17.0	
826.40	27.16	H	3.0	-0.9	23.17	38.5	-15.3	
Mid Ch								
836.60	26.15	V	3.1	-0.9	22.19	38.5	-16.3	
836.60	26.76	H	3.1	-0.9	22.80	38.5	-15.7	
High Ch								
846.60	26.43	V	3.1	-0.9	22.48	38.5	-16.0	
846.60	26.83	H	3.1	-0.9	22.88	38.5	-15.6	

Band 5

HSDPA

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 19227
Configuration: EUT, X-Position
Location: Chamber 2
Mode: HSDPA Band 5 Fundamentals

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
826.40	24.53	V	3.0	-0.9	20.54	38.5	-18.0	
826.40	26.65	H	3.0	-0.9	22.66	38.5	-15.8	
Mid Ch								
836.60	25.12	V	3.1	-0.9	21.16	38.5	-17.3	
836.60	26.28	H	3.1	-0.9	22.32	38.5	-16.2	
High Ch								
846.60	25.50	V	3.1	-0.9	21.55	38.5	-17.0	
846.60	25.91	H	3.1	-0.9	21.96	38.5	-16.5	

Band 4

REL99

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-30
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 2
Mode: Rel99 Band 4 Fundamentals

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1712.40	16.91	V	4.4	9.6	22.13	30.0	-7.9	
1712.40	19.29	H	4.4	9.6	24.51	30.0	-5.5	
Mid Ch								
1732.60	16.76	V	4.4	9.6	22.01	30.0	-8.0	
1732.60	19.22	H	4.4	9.6	24.47	30.0	-5.5	
High Ch								
1752.60	15.95	V	4.4	9.7	21.24	30.0	-8.8	
1752.60	19.68	H	4.4	9.7	24.97	30.0	-5.0	

Band 4

HSDPA

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-30
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 2
Mode: HSDPA Band 4 Fundamentals

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1712.40	15.84	V	4.4	9.6	21.06	30.0	-8.9	
1712.40	18.26	H	4.4	9.6	23.48	30.0	-6.5	
Mid Ch								
1732.60	15.97	V	4.4	9.6	21.22	30.0	-8.8	
1732.60	18.23	H	4.4	9.6	23.48	30.0	-6.5	
High Ch								
1752.60	15.01	V	4.4	9.7	20.30	30.0	-9.7	
1752.60	18.73	H	4.4	9.7	24.02	30.0	-6.0	

Band 2

REL99

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-30
Test Engineer: 20881
Configuration: EUT, X-Position
Location: Chamber 2
Mode: Rel99 Band 2 Fundamentals

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1852.40	16.83	V	4.5	9.6	21.91	33.0	-11.1	
1852.40	18.57	H	4.5	9.6	23.65	33.0	-9.4	
Mid Ch								
1880.00	16.06	V	4.6	9.4	20.85	33.0	-12.1	
1880.00	18.69	H	4.6	9.4	23.48	33.0	-9.5	
High Ch								
1907.60	17.53	V	4.6	9.1	22.02	33.0	-11.0	
1907.60	18.97	H	4.6	9.1	23.46	33.0	-9.5	

Band 2

HSDPA

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-30
Test Engineer: 20881
Configuration: EUT, X-Position
Location: Chamber 2
Mode: HSDPA Band 2 Fundamentals

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1852.40	15.91	V	4.5	9.6	20.99	33.0	-12.0	
1852.40	18.08	H	4.5	9.6	23.16	33.0	-9.8	
Mid Ch								
1880.00	14.45	V	4.6	9.4	19.24	33.0	-13.8	
1880.00	17.38	H	4.6	9.4	22.17	33.0	-10.8	
High Ch								
1907.60	16.56	V	4.6	9.1	21.05	33.0	-12.0	
1907.60	18.16	H	4.6	9.1	22.65	33.0	-10.3	

LTE Band 2

20MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-27
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 2 Fundamentals, 20MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1860.00	17.93	V	4.6	9.6	22.93	33.0	-10.1	
1860.00	19.30	H	4.6	9.6	24.30	33.0	-8.7	
Mid Ch								
1880.00	18.21	V	4.6	9.4	23.00	33.0	-10.0	
1880.00	19.57	H	4.6	9.4	24.36	33.0	-8.6	
High Ch								
1900.00	18.11	V	4.6	9.2	22.71	33.0	-10.3	
1900.00	19.09	H	4.6	9.2	23.68	33.0	-9.3	

20MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-27
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 2 Fundamentals, 20MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1860.00	17.31	V	4.6	9.6	22.31	33.0	-10.7	
1860.00	18.73	H	4.6	9.6	23.73	33.0	-9.3	
Mid Ch								
1880.00	16.18	V	4.6	9.4	20.97	33.0	-12.0	
1880.00	18.21	H	4.6	9.4	23.00	33.0	-10.0	
High Ch								
1900.00	17.32	V	4.6	9.2	21.92	33.0	-11.1	
1900.00	18.71	H	4.6	9.2	23.30	33.0	-9.7	

15MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-27
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 2 Fundamentals, 15MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1857.50	18.08	V	4.5	9.6	23.11	33.0	-9.9	
1857.50	19.51	H	4.5	9.6	24.54	33.0	-8.5	
Mid Ch								
1880.00	17.69	V	4.6	9.4	22.48	33.0	-10.5	
1880.00	19.69	H	4.6	9.4	24.48	33.0	-8.5	
High Ch								
1902.50	18.00	V	4.6	9.2	22.56	33.0	-10.4	
1902.50	19.06	H	4.6	9.2	23.62	33.0	-9.4	

15MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-27
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 2 Fundamentals, 15MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1857.50	17.41	V	4.5	9.6	22.44	33.0	-10.6	
1857.50	18.93	H	4.5	9.6	23.96	33.0	-9.0	
Mid Ch								
1880.00	16.38	V	4.6	9.4	21.17	33.0	-11.8	
1880.00	18.47	H	4.6	9.4	23.26	33.0	-9.7	
High Ch								
1902.50	16.99	V	4.6	9.2	21.55	33.0	-11.5	
1902.50	18.12	H	4.6	9.2	22.68	33.0	-10.3	

10MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-27
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 2 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1855.00	17.85	V	4.5	9.6	22.90	33.0	-10.1	
1855.00	19.20	H	4.5	9.6	24.25	33.0	-8.7	
Mid Ch								
1880.00	19.29	V	4.6	9.4	24.08	33.0	-8.9	
1880.00	19.42	H	4.6	9.4	24.21	33.0	-8.8	
High Ch								
1905.00	17.57	V	4.6	9.1	22.09	33.0	-10.9	
1905.00	19.59	H	4.6	9.1	24.12	33.0	-8.9	

10MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-27
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 2 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1855.00	17.00	V	4.5	9.6	22.05	33.0	-11.0	
1855.00	18.58	H	4.5	9.6	23.63	33.0	-9.4	
Mid Ch								
1880.00	18.80	V	4.6	9.4	23.59	33.0	-9.4	
1880.00	18.95	H	4.6	9.4	23.74	33.0	-9.3	
High Ch								
1905.00	17.39	V	4.6	9.1	21.91	33.0	-11.1	
1905.00	19.19	H	4.6	9.1	23.72	33.0	-9.3	

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-27
Test Engineer: 20881
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 2 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1852.50	17.70	V	4.5	9.6	22.78	33.0	-10.2	
1852.50	19.34	H	4.5	9.6	24.42	33.0	-8.6	
Mid Ch								
1880.00	17.49	V	4.6	9.4	22.28	33.0	-10.7	
1880.00	19.35	H	4.6	9.4	24.14	33.0	-8.9	
High Ch								
1907.50	18.26	V	4.6	9.1	22.75	33.0	-10.2	
1907.50	19.85	H	4.6	9.1	24.34	33.0	-8.7	

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-27
Test Engineer: 20881
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 2 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1852.50	17.69	V	4.5	9.6	22.77	33.0	-10.2	
1852.50	18.70	H	4.5	9.6	23.78	33.0	-9.2	
Mid Ch								
1880.00	16.17	V	4.6	9.4	20.96	33.0	-12.0	
1880.00	18.76	H	4.6	9.4	23.55	33.0	-9.4	
High Ch								
1907.50	17.82	V	4.6	9.1	22.31	33.0	-10.7	
1907.50	19.37	H	4.6	9.1	23.86	33.0	-9.1	

3MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-27
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 2 Fundamentals, 3MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1851.50	17.93	V	4.5	9.6	23.03	33.0	-10.0	
1851.50	19.52	H	4.5	9.6	24.62	33.0	-8.4	
Mid Ch								
1880.00	17.35	V	4.6	9.4	22.14	33.0	-10.9	
1880.00	19.41	H	4.6	9.4	24.20	33.0	-8.8	
High Ch								
1908.50	18.17	V	4.6	9.1	22.64	33.0	-10.4	
1908.50	19.86	H	4.6	9.1	24.34	33.0	-8.7	

3MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-27
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 2 Fundamentals, 3MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1851.50	17.10	V	4.5	9.6	22.20	33.0	-10.8	
1851.50	18.93	H	4.5	9.6	24.03	33.0	-9.0	
Mid Ch								
1880.00	16.58	V	4.6	9.4	21.37	33.0	-11.6	
1880.00	18.39	H	4.6	9.4	23.18	33.0	-9.8	
High Ch								
1908.50	17.47	V	4.6	9.1	21.94	33.0	-11.1	
1908.50	18.95	H	4.6	9.1	23.43	33.0	-9.6	

1.4MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-27
Test Engineer: 20881
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 2 Fundamentals, 1.4MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1850.70	18.16	V	4.5	9.6	23.26	33.0	-9.7	
1850.70	19.37	H	4.5	9.6	24.48	33.0	-8.5	
Mid Ch								
1880.00	17.35	V	4.6	9.4	22.14	33.0	-10.9	
1880.00	19.50	H	4.6	9.4	24.29	33.0	-8.7	
High Ch								
1909.30	18.55	V	4.6	9.1	23.01	33.0	-10.0	
1909.30	19.88	H	4.6	9.1	24.34	33.0	-8.7	

1.4MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-27
Test Engineer: 20881
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 2 Fundamentals, 1.4MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1850.70	17.38	V	4.5	9.6	22.48	33.0	-10.5	
1850.70	18.57	H	4.5	9.6	23.68	33.0	-9.3	
Mid Ch								
1880.00	16.46	V	4.6	9.4	21.25	33.0	-11.7	
1880.00	18.23	H	4.6	9.4	23.02	33.0	-10.0	
High Ch								
1909.30	17.68	V	4.6	9.1	22.14	33.0	-10.9	
1909.30	18.98	H	4.6	9.1	23.44	33.0	-9.6	

LTE Band 5

10MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 19227
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 5 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
829.00	26.14	V	3.1	-0.9	22.15	38.5	-16.3	
829.00	27.89	H	3.1	-0.9	23.90	38.5	-14.6	
Mid Ch								
836.50	25.64	V	3.1	-0.9	21.67	38.5	-16.8	
836.50	26.98	H	3.1	-0.9	23.01	38.5	-15.5	
High Ch								
844.00	26.68	V	3.1	-0.9	22.73	38.5	-15.8	
844.00	27.54	H	3.1	-0.9	23.59	38.5	-14.9	

10MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 19227
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 5 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
829.00	25.41	V	3.1	-0.9	21.42	38.5	-17.1	
829.00	27.17	H	3.1	-0.9	23.18	38.5	-15.3	
Mid Ch								
836.50	24.60	V	3.1	-0.9	20.63	38.5	-17.9	
836.50	25.88	H	3.1	-0.9	21.91	38.5	-16.6	
High Ch								
844.00	25.68	V	3.1	-0.9	21.73	38.5	-16.8	
844.00	26.67	H	3.1	-0.9	22.72	38.5	-15.8	

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 19227
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 5 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
826.50	25.93	V	3.0	-0.9	21.93	38.5	-16.6	
826.50	27.87	H	3.0	-0.9	23.88	38.5	-14.6	
Mid Ch								
836.50	26.29	V	3.1	-0.9	22.32	38.5	-16.2	
836.50	27.45	H	3.1	-0.9	23.48	38.5	-15.0	
High Ch								
846.50	25.83	V	3.1	-0.9	21.88	38.5	-16.6	
846.50	26.90	H	3.1	-0.9	22.96	38.5	-15.5	

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 19227
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 5 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
826.50	24.59	V	3.0	-0.9	20.59	38.5	-17.9	
826.50	26.51	H	3.0	-0.9	22.52	38.5	-16.0	
Mid Ch								
836.50	24.86	V	3.1	-0.9	20.89	38.5	-17.6	
836.50	26.51	H	3.1	-0.9	22.54	38.5	-16.0	
High Ch								
846.50	24.74	V	3.1	-0.9	20.79	38.5	-17.7	
846.50	25.68	H	3.1	-0.9	21.74	38.5	-16.8	

3MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 5 Fundamentals, 3MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
825.50	25.91	V	3.0	-0.9	21.92	38.5	-16.6	
825.50	27.73	H	3.0	-0.9	23.74	38.5	-14.8	
Mid Ch								
836.50	26.05	V	3.1	-0.9	22.08	38.5	-16.4	
836.50	27.32	H	3.1	-0.9	23.35	38.5	-15.1	
High Ch								
847.50	25.98	V	3.1	-0.9	22.04	38.5	-16.5	
847.50	26.61	H	3.1	-0.9	22.67	38.5	-15.8	

3MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 5 Fundamentals, 3MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
825.50	25.29	V	3.0	-0.9	21.30	38.5	-17.2	
825.50	26.93	H	3.0	-0.9	22.94	38.5	-15.6	
Mid Ch								
836.50	25.00	V	3.1	-0.9	21.03	38.5	-17.5	
836.50	26.19	H	3.1	-0.9	22.22	38.5	-16.3	
High Ch								
847.50	24.78	V	3.1	-0.9	20.84	38.5	-17.7	
847.50	25.65	H	3.1	-0.9	21.71	38.5	-16.8	

1.4MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 5 Fundamentals, 1.4MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
824.70	25.81	V	3.0	-1.0	21.81	38.5	-16.7	
824.70	27.85	H	3.0	-1.0	23.85	38.5	-14.6	
Mid Ch								
836.50	26.24	V	3.1	-0.9	22.27	38.5	-16.2	
836.50	27.26	H	3.1	-0.9	23.29	38.5	-15.2	
High Ch								
848.30	25.62	V	3.1	-0.9	21.68	38.5	-16.8	
848.30	26.69	H	3.1	-0.9	22.75	38.5	-15.7	

1.4MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 5 Fundamentals, 1.4MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
824.70	24.57	V	3.0	-1.0	20.57	38.5	-17.9	
824.70	26.63	H	3.0	-1.0	22.63	38.5	-15.9	
Mid Ch								
836.50	24.85	V	3.1	-0.9	20.88	38.5	-17.6	
836.50	26.28	H	3.1	-0.9	22.31	38.5	-16.2	
High Ch								
848.30	24.71	V	3.1	-0.9	20.77	38.5	-17.7	
848.30	26.06	H	3.1	-0.9	22.12	38.5	-16.4	

LTE Band 7

20MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-28
Test Engineer: 20881
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 7 Fundamentals, 20MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2510.00	14.79	V	5.3	10.2	19.67	33.0	-13.3	
2510.00	20.23	H	5.3	10.2	25.12	33.0	-7.9	
Mid Ch								
2535.00	13.97	V	5.3	10.1	18.79	33.0	-14.2	
2535.00	20.23	H	5.3	10.1	25.05	33.0	-8.0	
High Ch								
2560.00	14.13	V	5.4	10.1	18.89	33.0	-14.1	
2560.00	20.28	H	5.4	10.1	25.04	33.0	-8.0	

20MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-28
Test Engineer: 20881
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 7 Fundamentals, 20MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2510.00	13.96	V	5.3	10.2	18.84	33.0	-14.2	
2510.00	19.34	H	5.3	10.2	24.23	33.0	-8.8	
Mid Ch								
2535.00	12.98	V	5.3	10.1	17.80	33.0	-15.2	
2535.00	19.40	H	5.3	10.1	24.22	33.0	-8.8	
High Ch								
2560.00	13.20	V	5.4	10.1	17.96	33.0	-15.0	
2560.00	19.11	H	5.4	10.1	23.87	33.0	-9.1	

15MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-27
Test Engineer: 20881
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 7 Fundamentals, 15MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2507.50	14.85	V	5.3	10.2	19.75	33.0	-13.2	
2507.50	19.89	H	5.3	10.2	24.79	33.0	-8.2	
Mid Ch								
2535.00	13.66	V	5.3	10.1	18.48	33.0	-14.5	
2535.00	20.69	H	5.3	10.1	25.51	33.0	-7.5	
High Ch								
2562.50	15.33	V	5.4	10.1	20.09	33.0	-12.9	
2562.50	20.31	H	5.4	10.1	25.07	33.0	-7.9	

15MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-27
Test Engineer: 20881
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 7 Fundamentals, 15MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2507.50	14.06	V	5.3	10.2	18.96	33.0	-14.0	
2507.50	18.96	H	5.3	10.2	23.86	33.0	-9.1	
Mid Ch								
2535.00	12.89	V	5.3	10.1	17.71	33.0	-15.3	
2535.00	19.70	H	5.3	10.1	24.52	33.0	-8.5	
High Ch								
2562.50	14.14	V	5.4	10.1	18.90	33.0	-14.1	
2562.50	19.28	H	5.4	10.1	24.04	33.0	-9.0	

10MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-27
Test Engineer: 20881
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 7 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2505.00	14.81	V	5.3	10.2	19.72	33.0	-13.3	
2505.00	19.82	H	5.3	10.2	24.73	33.0	-8.3	
Mid Ch								
2535.00	14.18	V	5.3	10.1	19.00	33.0	-14.0	
2535.00	20.55	H	5.3	10.1	25.37	33.0	-7.6	
High Ch								
2565.00	12.40	V	5.4	10.1	17.17	33.0	-15.8	
2565.00	20.48	H	5.4	10.1	25.25	33.0	-7.8	

10MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-27
Test Engineer: 20881
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 7 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2505.00	13.70	V	5.3	10.2	18.61	33.0	-14.4	
2505.00	18.95	H	5.3	10.2	23.86	33.0	-9.1	
Mid Ch								
2535.00	13.17	V	5.3	10.1	17.99	33.0	-15.0	
2535.00	19.61	H	5.3	10.1	24.43	33.0	-8.6	
High Ch								
2565.00	12.19	V	5.4	10.1	16.96	33.0	-16.0	
2565.00	19.58	H	5.4	10.1	24.35	33.0	-8.7	

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-27
Test Engineer: 20881
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 7 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2505.00	13.70	V	5.3	10.2	18.61	33.0	-14.4	
2505.00	18.95	H	5.3	10.2	23.86	33.0	-9.1	
Mid Ch								
2535.00	13.17	V	5.3	10.1	17.99	33.0	-15.0	
2535.00	19.61	H	5.3	10.1	24.43	33.0	-8.6	
High Ch								
2565.00	12.19	V	5.4	10.1	16.96	33.0	-16.0	
2565.00	19.58	H	5.4	10.1	24.35	33.0	-8.7	

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-27
Test Engineer: 20881
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 7 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2502.50	14.42	V	5.3	10.2	19.33	33.0	-13.7	
2502.50	17.46	H	5.3	10.2	22.37	33.0	-10.6	
Mid Ch								
2535.00	12.86	V	5.3	10.1	17.68	33.0	-15.3	
2535.00	19.19	H	5.3	10.1	24.01	33.0	-9.0	
High Ch								
2567.50	12.26	V	5.4	10.1	17.03	33.0	-16.0	
2567.50	19.67	H	5.4	10.1	24.44	33.0	-8.6	

LTE Band 12

10MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 12 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
704.00	24.27	V	2.8	-1.1	20.40	34.8	-14.4	
704.00	25.53	H	2.8	-1.1	21.66	34.8	-13.1	
Mid Ch								
707.50	24.06	V	2.8	-1.1	20.19	34.8	-14.6	
707.50	25.86	H	2.8	-1.1	21.99	34.8	-12.8	
High Ch								
711.00	23.48	V	2.8	-1.1	19.60	34.8	-15.2	
711.00	26.20	H	2.8	-1.1	22.32	34.8	-12.4	

10MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 12 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
704.00	23.14	V	2.8	-1.1	19.27	34.8	-15.5	
704.00	24.52	H	2.8	-1.1	20.65	34.8	-14.1	
Mid Ch								
707.50	23.38	V	2.8	-1.1	19.51	34.8	-15.3	
707.50	25.08	H	2.8	-1.1	21.21	34.8	-13.6	
High Ch								
711.00	23.14	V	2.8	-1.1	19.26	34.8	-15.5	
711.00	24.93	H	2.8	-1.1	21.05	34.8	-13.7	

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 19227
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 12 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
701.50	24.21	V	2.8	-1.1	20.35	34.8	-14.4	
701.50	25.34	H	2.8	-1.1	21.48	34.8	-13.3	
Mid Ch								
707.50	24.19	V	2.8	-1.1	20.32	34.8	-14.5	
707.50	25.98	H	2.8	-1.1	22.11	34.8	-12.7	
High Ch								
713.50	23.61	V	2.8	-1.1	19.73	34.8	-15.0	
713.50	26.16	H	2.8	-1.1	22.27	34.8	-12.5	

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 19227
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 12 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
701.50	23.27	V	2.8	-1.1	19.41	34.8	-15.4	
701.50	24.54	H	2.8	-1.1	20.68	34.8	-14.1	
Mid Ch								
707.50	23.00	V	2.8	-1.1	19.13	34.8	-15.6	
707.50	25.07	H	2.8	-1.1	21.20	34.8	-13.6	
High Ch								
713.50	22.95	V	2.8	-1.1	19.07	34.8	-15.7	
713.50	25.47	H	2.8	-1.1	21.58	34.8	-13.2	

3MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 22943
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 12 Fundamentals, 3MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
700.50	24.24	V	2.8	-1.1	20.39	34.8	-14.4	
700.50	25.24	H	2.8	-1.1	21.38	34.8	-13.4	
Mid Ch								
707.50	24.08	V	2.8	-1.1	20.21	34.8	-14.6	
707.50	25.86	H	2.8	-1.1	21.99	34.8	-12.8	
High Ch								
714.50	23.84	V	2.8	-1.1	19.96	34.8	-14.8	
714.50	26.53	H	2.8	-1.1	22.64	34.8	-12.1	

3MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 22943
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 12 Fundamentals, 3MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
700.50	22.99	V	2.8	-1.1	19.14	34.8	-15.6	
700.50	24.51	H	2.8	-1.1	20.65	34.8	-14.1	
Mid Ch								
707.50	22.84	V	2.8	-1.1	18.97	34.8	-15.8	
707.50	24.80	H	2.8	-1.1	20.93	34.8	-13.8	
High Ch								
714.50	22.72	V	2.8	-1.1	18.84	34.8	-15.9	
714.50	25.33	H	2.8	-1.1	21.44	34.8	-13.3	

1.4MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 22943
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 12 Fundamentals, 1.4MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
699.70	24.31	V	2.8	-1.1	20.45	34.8	-14.3	
699.70	25.13	H	2.8	-1.1	21.27	34.8	-13.5	
Mid Ch								
707.50	24.25	V	2.8	-1.1	20.38	34.8	-14.4	
707.50	25.81	H	2.8	-1.1	21.94	34.8	-12.8	
High Ch								
715.30	23.95	V	2.8	-1.1	20.06	34.8	-14.7	
715.30	26.23	H	2.8	-1.1	22.34	34.8	-12.4	

1.4MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 22943
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 12 Fundamentals, 1.4MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
699.70	23.25	V	2.8	-1.1	19.39	34.8	-15.4	
699.70	24.16	H	2.8	-1.1	20.30	34.8	-14.5	
Mid Ch								
707.50	23.09	V	2.8	-1.1	19.22	34.8	-15.6	
707.50	25.08	H	2.8	-1.1	21.21	34.8	-13.6	
High Ch								
715.30	22.77	V	2.8	-1.1	18.88	34.8	-15.9	
715.30	25.23	H	2.8	-1.1	21.34	34.8	-13.4	

LTE Band 13

10MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 22943
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 13 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Mid Ch								
782.00	24.48	V	3.0	-1.1	20.46	34.8	-14.3	
782.00	27.42	H	3.0	-1.1	23.40	34.8	-11.4	

10MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 22943
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 13 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Mid Ch								
782.00	23.50	V	3.0	-1.1	19.48	34.8	-15.3	
782.00	25.98	H	3.0	-1.1	21.96	34.8	-12.8	

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 22943
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 13 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
779.50	24.69	V	3.0	-1.1	20.68	34.8	-14.1	
779.50	27.30	H	3.0	-1.1	23.29	34.8	-11.5	
Mid Ch								
782.00	24.39	V	3.0	-1.1	20.37	34.8	-14.4	
782.00	27.29	H	3.0	-1.1	23.27	34.8	-11.5	
High Ch								
784.50	24.81	V	3.0	-1.1	20.79	34.8	-14.0	
784.50	27.16	H	3.0	-1.1	23.15	34.8	-11.6	

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 22943
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 13 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
779.50	23.64	V	3.0	-1.1	19.63	34.8	-15.1	
779.50	26.29	H	3.0	-1.1	22.28	34.8	-12.5	
Mid Ch								
782.00	24.05	V	3.0	-1.1	20.03	34.8	-14.7	
782.00	26.48	H	3.0	-1.1	22.46	34.8	-12.3	
High Ch								
784.50	23.82	V	3.0	-1.1	19.80	34.8	-15.0	
784.50	26.14	H	3.0	-1.1	22.13	34.8	-12.6	

LTE Band 14

10MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 22943
Configuration: EUT, Y-Position
Location: Chamber 2
Mode: LTE_QPSK Band 14 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Mid Ch								
793.00	27.60	V	3.0	-1.1	23.56	34.8	-11.2	
793.00	24.09	H	3.0	-1.1	20.06	34.8	-14.7	

10MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 22943
Configuration: EUT, Y-Position
Location: Chamber 2
Mode: LTE_16QAM Band 14 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Mid Ch								
793.00	26.59	V	3.0	-1.1	22.55	34.8	-12.2	
793.00	23.20	H	3.0	-1.1	19.17	34.8	-15.6	

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 22943
Configuration: EUT, Y-Position
Location: Chamber 2
Mode: LTE_QPSK Band 14 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
790.50	27.25	V	3.0	-1.1	23.22	34.8	-11.6	
790.50	24.12	H	3.0	-1.1	20.09	34.8	-14.7	
Mid Ch								
793.00	27.57	V	3.0	-1.1	23.53	34.8	-11.2	
793.00	24.20	H	3.0	-1.1	20.17	34.8	-14.6	
High Ch								
795.50	27.48	V	3.0	-1.1	23.44	34.8	-11.3	
795.50	24.19	H	3.0	-1.1	20.15	34.8	-14.6	

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 22943
Configuration: EUT, Y-Position
Location: Chamber 2
Mode: LTE_16QAM Band 14 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
790.50	26.64	V	3.0	-1.1	22.61	34.8	-12.2	
790.50	23.55	H	3.0	-1.1	19.52	34.8	-15.3	
Mid Ch								
793.00	26.62	V	3.0	-1.1	22.58	34.8	-12.2	
793.00	23.33	H	3.0	-1.1	19.30	34.8	-15.5	
High Ch								
795.50	26.36	V	3.0	-1.1	22.32	34.8	-12.5	
795.50	23.32	H	3.0	-1.1	19.28	34.8	-15.5	

LTE Band 66

20MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-2/8
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 66 Fundamentals, 20MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1720.00	17.83	V	4.4	9.6	23.07	30.0	-6.9	
1720.00	20.66	H	4.4	9.6	25.89	30.0	-4.1	
Mid Ch								
1745.00	16.77	V	4.4	9.7	22.05	30.0	-8.0	
1745.00	21.54	H	4.4	9.7	26.82	30.0	-3.2	
High Ch								
1770.00	15.83	V	4.4	9.7	21.10	30.0	-8.9	
1770.00	20.59	H	4.4	9.7	25.87	30.0	-4.1	

20MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-28
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 66 Fundamentals, 20MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1720.00	16.84	V	4.4	9.6	22.08	30.0	-7.9	
1720.00	20.04	H	4.4	9.6	25.27	30.0	-4.7	
Mid Ch								
1745.00	15.82	V	4.4	9.7	21.10	30.0	-8.9	
1745.00	20.70	H	4.4	9.7	25.98	30.0	-4.0	
High Ch								
1770.00	15.07	V	4.4	9.7	20.34	30.0	-9.7	
1770.00	20.14	H	4.4	9.7	25.42	30.0	-4.6	

15MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-2/8
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 66 Fundamentals, 15MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1717.50	17.38	V	4.4	9.6	22.61	30.0	-7.4	
1717.50	20.65	H	4.4	9.6	25.88	30.0	-4.1	
Mid Ch								
1745.00	16.97	V	4.4	9.7	22.25	30.0	-7.8	
1745.00	21.48	H	4.4	9.7	26.76	30.0	-3.2	
High Ch								
1772.50	16.84	V	4.4	9.7	22.11	30.0	-7.9	
1772.50	21.15	H	4.4	9.7	26.42	30.0	-3.6	

15MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-28
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 66 Fundamentals, 15MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1717.50	16.20	V	4.4	9.6	21.43	30.0	-8.6	
1717.50	19.63	H	4.4	9.6	24.86	30.0	-5.1	
Mid Ch								
1745.00	16.15	V	4.4	9.7	21.43	30.0	-8.6	
1745.00	20.68	H	4.4	9.7	25.96	30.0	-4.0	
High Ch								
1772.50	16.02	V	4.4	9.7	21.29	30.0	-8.7	
1772.50	20.45	H	4.4	9.7	25.72	30.0	-4.3	

10MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-28
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 66 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1715.00	15.90	V	4.4	9.6	21.13	30.0	-8.9	
1715.00	20.59	H	4.4	9.6	25.81	30.0	-4.2	
Mid Ch								
1745.00	16.90	V	4.4	9.7	22.18	30.0	-7.8	
1745.00	21.36	H	4.4	9.7	26.64	30.0	-3.4	
High Ch								
1775.00	16.22	V	4.4	9.7	21.49	30.0	-8.5	
1775.00	21.03	H	4.4	9.7	26.30	30.0	-3.7	

10MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-28
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 66 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1715.00	15.13	V	4.4	9.6	20.36	30.0	-9.6	
1715.00	19.78	H	4.4	9.6	25.00	30.0	-5.0	
Mid Ch								
1745.00	16.16	V	4.4	9.7	21.44	30.0	-8.6	
1745.00	20.43	H	4.4	9.7	25.71	30.0	-4.3	
High Ch								
1775.00	15.39	V	4.4	9.7	20.66	30.0	-9.3	
1775.00	19.89	H	4.4	9.7	25.16	30.0	-4.8	

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-28
Test Engineer: 20881
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 66 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1712.50	18.24	V	4.4	9.6	23.46	30.0	-6.5	
1712.50	20.30	H	4.4	9.6	25.52	30.0	-4.5	
Mid Ch								
1745.00	16.32	V	4.4	9.7	21.60	30.0	-8.4	
1745.00	21.31	H	4.4	9.7	26.59	30.0	-3.4	
High Ch								
1777.50	15.68	V	4.4	9.7	20.95	30.0	-9.1	
1777.50	20.88	H	4.4	9.7	26.14	30.0	-3.9	

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-28
Test Engineer: 20881
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 66 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1712.50	17.62	V	4.4	9.6	22.84	30.0	-7.2	
1712.50	19.54	H	4.4	9.6	24.76	30.0	-5.2	
Mid Ch								
1745.00	15.71	V	4.4	9.7	20.99	30.0	-9.0	
1745.00	20.80	H	4.4	9.7	26.08	30.0	-3.9	
High Ch								
1777.50	14.97	V	4.4	9.7	20.24	30.0	-9.8	
1777.50	20.46	H	4.4	9.7	25.72	30.0	-4.3	

3MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-28
Test Engineer: 20881
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 66 Fundamentals, 3MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1711.50	14.01	V	4.4	9.6	19.22	30.0	-10.8	
1711.50	20.67	H	4.4	9.6	25.89	30.0	-4.1	
Mid Ch								
1745.00	16.90	V	4.4	9.7	22.18	30.0	-7.8	
1745.00	21.60	H	4.4	9.7	26.88	30.0	-3.1	
High Ch								
1778.50	15.23	V	4.4	9.7	20.49	30.0	-9.5	
1778.50	20.69	H	4.4	9.7	25.95	30.0	-4.0	

3MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-28
Test Engineer: 20881
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 66 Fundamentals, 3MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1711.50	14.04	V	4.4	9.6	19.25	30.0	-10.7	
1711.50	19.85	H	4.4	9.6	25.07	30.0	-4.9	
Mid Ch								
1745.00	15.92	V	4.4	9.7	21.20	30.0	-8.8	
1745.00	20.82	H	4.4	9.7	26.10	30.0	-3.9	
High Ch								
1778.50	15.16	V	4.4	9.7	20.42	30.0	-9.6	
1778.50	19.96	H	4.4	9.7	25.22	30.0	-4.8	

1.4MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-28
Test Engineer: 20881
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 66 Fundamentals, 1.4MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1710.70	18.35	V	4.4	9.6	23.56	30.0	-6.4	
1710.70	21.00	H	4.4	9.6	26.22	30.0	-3.8	
Mid Ch								
1745.00	16.88	V	4.4	9.7	22.16	30.0	-7.8	
1745.00	21.23	H	4.4	9.7	26.51	30.0	-3.5	
High Ch								
1779.30	15.22	V	4.4	9.7	20.48	30.0	-9.5	
1779.30	20.19	H	4.4	9.7	25.46	30.0	-4.5	

1.4MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-04-28
Test Engineer: 20881
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 66 Fundamentals, 1.4MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1710.70	17.50	V	4.4	9.6	22.71	30.0	-7.3	
1710.70	20.09	H	4.4	9.6	25.31	30.0	-4.7	
Mid Ch								
1745.00	15.92	V	4.4	9.7	21.20	30.0	-8.8	
1745.00	19.74	H	4.4	9.7	25.02	30.0	-5.0	
High Ch								
1779.30	14.66	V	4.4	9.7	19.92	30.0	-10.1	
1779.30	19.34	H	4.4	9.7	24.61	30.0	-5.4	

NR Band 2

20MHz DFT-s QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-03
Test Engineer: 19227
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_QPSK NR n2 Fundamentals, 20MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1860.00	19.20	V	4.6	9.5	24.18	33.0	-8.8	
1860.00	19.38	H	4.6	9.5	24.35	33.0	-8.6	
Mid Ch								
1880.00	19.82	V	4.6	9.4	24.63	33.0	-8.4	
1880.00	19.67	H	4.6	9.4	24.48	33.0	-8.5	
High Ch								
1900.00	19.79	V	4.6	9.2	24.43	33.0	-8.6	
1900.00	19.69	H	4.6	9.2	24.34	33.0	-8.7	

20MHz DFT-s 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-03
Test Engineer: 19227
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_16QAM NR n2 Fundamentals, 20MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1860.00	18.03	V	4.6	9.5	23.01	33.0	-10.0	
1860.00	18.24	H	4.6	9.5	23.21	33.0	-9.8	
Mid Ch								
1880.00	18.69	V	4.6	9.4	23.50	33.0	-9.5	
1880.00	18.57	H	4.6	9.4	23.38	33.0	-9.6	
High Ch								
1900.00	18.54	V	4.6	9.2	23.18	33.0	-9.8	
1900.00	18.63	H	4.6	9.2	23.28	33.0	-9.7	

15MHz DFT-s QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-03
Test Engineer: 19227
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_QPSK NR n2 Fundamentals, 15MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1857.50	19.38	V	4.5	9.5	24.38	33.0	-8.6	
1857.50	19.10	H	4.5	9.5	24.10	33.0	-8.9	
Mid Ch								
1880.00	19.97	V	4.6	9.4	24.78	33.0	-8.2	
1880.00	19.47	H	4.6	9.4	24.28	33.0	-8.7	
High Ch								
1902.50	20.24	V	4.6	9.2	24.85	33.0	-8.1	
1902.50	20.09	H	4.6	9.2	24.71	33.0	-8.3	

15MHz DFT-s 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-03
Test Engineer: 19227
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_16QAM NR n2 Fundamentals, 15MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1857.50	18.33	V	4.5	9.5	23.33	33.0	-9.7	
1857.50	17.59	H	4.5	9.5	22.59	33.0	-10.4	
Mid Ch								
1880.00	18.67	V	4.6	9.4	23.48	33.0	-9.5	
1880.00	18.27	H	4.6	9.4	23.08	33.0	-9.9	
High Ch								
1902.50	18.93	V	4.6	9.2	23.54	33.0	-9.5	
1902.50	18.76	H	4.6	9.2	23.38	33.0	-9.6	

10MHz DFT-s QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-03
Test Engineer: 20882
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_QPSK NR n2 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1855.00	19.53	V	4.5	9.6	24.55	33.0	-8.4	
1855.00	19.18	H	4.5	9.6	24.20	33.0	-8.8	
Mid Ch								
1880.00	19.60	V	4.6	9.4	24.41	33.0	-8.6	
1880.00	19.53	H	4.6	9.4	24.34	33.0	-8.7	
High Ch								
1905.00	20.18	V	4.6	9.2	24.76	33.0	-8.2	
1905.00	19.59	H	4.6	9.2	24.17	33.0	-8.8	

10MHz DFT-s 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-03
Test Engineer: 20882
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_16QAM NR n2 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1855.00	18.40	V	4.5	9.6	23.42	33.0	-9.6	
1855.00	18.07	H	4.5	9.6	23.09	33.0	-9.9	
Mid Ch								
1880.00	18.04	V	4.6	9.4	22.85	33.0	-10.2	
1880.00	18.86	H	4.6	9.4	23.67	33.0	-9.3	
High Ch								
1905.00	18.92	V	4.6	9.2	23.50	33.0	-9.5	
1905.00	18.12	H	4.6	9.2	22.70	33.0	-10.3	

5MHz DFT-s QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-03
Test Engineer: 20882
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_QPSK NR n2 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1852.50	18.80	V	4.5	9.6	23.84	33.0	-9.2	
1852.50	19.30	H	4.5	9.6	24.35	33.0	-8.7	
Mid Ch								
1880.00	19.96	V	4.6	9.4	24.77	33.0	-8.2	
1880.00	19.60	H	4.6	9.4	24.41	33.0	-8.6	
High Ch								
1907.50	20.05	V	4.6	9.2	24.59	33.0	-8.4	
1907.50	19.50	H	4.6	9.2	24.04	33.0	-9.0	

5MHz DFT-s 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-03
Test Engineer: 20882
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_16QAM NR n2 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1852.50	17.49	V	4.5	9.6	22.53	33.0	-10.5	
1852.50	17.89	H	4.5	9.6	22.94	33.0	-10.1	
Mid Ch								
1880.00	18.63	V	4.6	9.4	23.44	33.0	-9.6	
1880.00	18.26	H	4.6	9.4	23.07	33.0	-9.9	
High Ch								
1907.50	18.78	V	4.6	9.2	23.32	33.0	-9.7	
1907.50	18.15	H	4.6	9.2	22.69	33.0	-10.3	

NR Band 5

20MHz DFT-s QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 20881
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_QPSK NR n5 Fundamentals, 20MHz Bandwidth

Test Equpment:
Receiving: VULB9163-750, and Chamber 1 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
834.00	26.61	V	3.1	-0.9	22.64	38.5	-15.9	
834.00	28.11	H	3.1	-0.9	24.14	38.5	-14.4	
Mid Ch								
836.50	25.94	V	3.1	-0.9	21.97	38.5	-16.5	
836.50	28.00	H	3.1	-0.9	24.03	38.5	-14.5	
High Ch								
839.00	25.51	V	3.1	-0.9	21.55	38.5	-17.0	
839.00	27.38	H	3.1	-0.9	23.42	38.5	-15.1	

20MHz DFT-s 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 20881
Configuration: EUT, Laptop_X
Location: Chamber 1
Mode: LTE_16QAM NR n5 Fundamentals, 20MHz Bandwidth

Test Equpment:
Receiving: VULB9163-750, and Chamber 1 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
834.00	25.26	V	3.1	-0.9	21.29	38.5	-17.2	
834.00	27.03	H	3.1	-0.9	23.06	38.5	-15.4	
Mid Ch								
836.50	24.92	V	3.1	-0.9	20.95	38.5	-17.6	
836.50	26.93	H	3.1	-0.9	22.96	38.5	-15.5	
High Ch								
839.00	24.39	V	3.1	-0.9	20.43	38.5	-18.1	
839.00	26.09	H	3.1	-0.9	22.13	38.5	-16.4	

15MHz DFT-s QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 20881
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_QPSK NR n5 Fundamentals, 15MHz Bandwidth

Test Equpment:
Receiving: VULB9163-750, and Chamber 1 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
831.50	26.32	V	3.1	-0.9	22.34	38.5	-16.2	
831.50	27.61	H	3.1	-0.9	23.63	38.5	-14.9	
Mid Ch								
836.50	25.47	V	3.1	-0.9	21.50	38.5	-17.0	
836.50	27.21	H	3.1	-0.9	23.24	38.5	-15.3	
High Ch								
841.50	25.05	V	3.1	-0.9	21.09	38.5	-17.4	
841.50	27.24	H	3.1	-0.9	23.28	38.5	-15.2	

15MHz DFT-s 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 20881
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_16QAM NR n5 Fundamentals, 15MHz Bandwidth

Test Equpment:
Receiving: VULB9163-750, and Chamber 1 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
831.50	25.04	V	3.1	-0.9	21.06	38.5	-17.4	
831.50	26.22	H	3.1	-0.9	22.24	38.5	-16.3	
Mid Ch								
836.50	24.42	V	3.1	-0.9	20.45	38.5	-18.1	
836.50	26.23	H	3.1	-0.9	22.26	38.5	-16.2	
High Ch								
841.50	23.72	V	3.1	-0.9	19.76	38.5	-18.7	
841.50	26.47	H	3.1	-0.9	22.51	38.5	-16.0	

10MHz DFT-s QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_QPSK NR n5 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: VULB9163-750, and Chamber 1 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
829.00	26.56	V	3.1	-0.9	22.58	38.5	-15.9	
829.00	27.65	H	3.1	-0.9	23.67	38.5	-14.8	
Mid Ch								
836.50	26.08	V	3.1	-0.9	22.11	38.5	-16.4	
836.50	27.58	H	3.1	-0.9	23.61	38.5	-14.9	
High Ch								
844.00	24.87	V	3.1	-0.9	20.92	38.5	-17.6	
844.00	27.36	H	3.1	-0.9	23.41	38.5	-15.1	

10MHz DFT-s 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_16QAM NR n5 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: VULB9163-750, and Chamber 1 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
829.00	25.41	V	3.1	-0.9	21.43	38.5	-17.1	
829.00	26.59	H	3.1	-0.9	22.61	38.5	-15.9	
Mid Ch								
836.50	24.85	V	3.1	-0.9	20.88	38.5	-17.6	
836.50	26.22	H	3.1	-0.9	22.25	38.5	-16.3	
High Ch								
844.00	23.58	V	3.1	-0.9	19.63	38.5	-18.9	
844.00	26.34	H	3.1	-0.9	22.39	38.5	-16.1	

5MHz DFT-s QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_QPSK NR n5 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: VULB9163-750, and Chamber 1 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
826.50	26.84	V	3.0	-0.9	22.85	38.5	-15.7	
826.50	27.91	H	3.0	-0.9	23.92	38.5	-14.6	
Mid Ch								
836.50	26.17	V	3.1	-0.9	22.20	38.5	-16.3	
836.50	27.93	H	3.1	-0.9	23.96	38.5	-14.5	
High Ch								
846.50	24.70	V	3.1	-0.9	20.76	38.5	-17.7	
846.50	27.68	H	3.1	-0.9	23.74	38.5	-14.8	

5MHz DFT-s 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-17
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_16QAM NR n5 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: VULB9163-750, and Chamber 1 SMA Cables
Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
826.50	25.61	V	3.0	-0.9	21.62	38.5	-16.9	
826.50	26.89	H	3.0	-0.9	22.90	38.5	-15.6	
Mid Ch								
836.50	25.05	V	3.1	-0.9	21.08	38.5	-17.4	
836.50	26.52	H	3.1	-0.9	22.55	38.5	-16.0	
High Ch								
846.50	23.47	V	3.1	-0.9	19.53	38.5	-19.0	
846.50	26.45	H	3.1	-0.9	22.51	38.5	-16.0	

NR Band 66

20MHz DFT-s QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-03
Test Engineer: 19227
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_QPSK NR n66 Fundamentals, 20MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1720.00	18.24	V	4.4	9.6	23.47	30.0	-6.5	
1720.00	21.10	H	4.4	9.6	26.32	30.0	-3.7	
Mid Ch								
1745.00	16.61	V	4.4	9.7	21.88	30.0	-8.1	
1745.00	21.00	H	4.4	9.7	26.27	30.0	-3.7	
High Ch								
1770.00	15.44	V	4.4	9.7	20.71	30.0	-9.3	
1770.00	20.41	H	4.4	9.7	25.68	30.0	-4.3	

20MHz DFT-s 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-03
Test Engineer: 19227
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_16QAM NR n66 Fundamentals, 20MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1720.00	16.88	V	4.4	9.6	22.11	30.0	-7.9	
1720.00	19.89	H	4.4	9.6	25.11	30.0	-4.9	
Mid Ch								
1745.00	15.82	V	4.4	9.7	21.09	30.0	-8.9	
1745.00	19.92	H	4.4	9.7	25.19	30.0	-4.8	
High Ch								
1770.00	14.38	V	4.4	9.7	19.65	30.0	-10.4	
1770.00	19.29	H	4.4	9.7	24.56	30.0	-5.4	

15MHz DFT-s QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-03
Test Engineer: 19227
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_QPSK NR n66 Fundamentals, 15MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1717.50	18.41	V	4.4	9.6	23.63	30.0	-6.4	
1717.50	21.17	H	4.4	9.6	26.40	30.0	-3.6	
Mid Ch								
1745.00	17.89	V	4.4	9.7	23.16	30.0	-6.8	
1745.00	21.20	H	4.4	9.7	26.47	30.0	-3.5	
High Ch								
1772.50	15.67	V	4.4	9.7	20.94	30.0	-9.1	
1772.50	20.56	H	4.4	9.7	25.82	30.0	-4.2	

15MHz DFT-s 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-03
Test Engineer: 19227
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_16QAM NR n66 Fundamentals, 15MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1717.50	17.15	V	4.4	9.6	22.37	30.0	-7.6	
1717.50	19.95	H	4.4	9.6	25.18	30.0	-4.8	
Mid Ch								
1745.00	16.55	V	4.4	9.7	21.82	30.0	-8.2	
1745.00	20.02	H	4.4	9.7	25.29	30.0	-4.7	
High Ch								
1772.50	14.29	V	4.4	9.7	19.56	30.0	-10.4	
1772.50	19.58	H	4.4	9.7	24.84	30.0	-5.2	

10MHz DFT-s QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-03
Test Engineer: 19227
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_QPSK NR n66 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1715.00	17.32	V	4.4	9.6	22.54	30.0	-7.5	
1715.00	20.80	H	4.4	9.6	26.02	30.0	-4.0	
Mid Ch								
1745.00	16.93	V	4.4	9.7	22.20	30.0	-7.8	
1745.00	20.93	H	4.4	9.7	26.20	30.0	-3.8	
High Ch								
1775.00	17.49	V	4.4	9.7	22.76	30.0	-7.2	
1775.00	20.35	H	4.4	9.7	25.61	30.0	-4.4	

10MHz DFT-s 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-03
Test Engineer: 19227
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_16QAM NR n66 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1715.00	15.86	V	4.4	9.6	21.08	30.0	-8.9	
1715.00	19.67	H	4.4	9.6	24.89	30.0	-5.1	
Mid Ch								
1745.00	15.77	V	4.4	9.7	21.04	30.0	-9.0	
1745.00	19.53	H	4.4	9.7	24.80	30.0	-5.2	
High Ch								
1775.00	16.16	V	4.4	9.7	21.43	30.0	-8.6	
1775.00	19.27	H	4.4	9.7	24.53	30.0	-5.5	

5MHz DFT-s QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-03
Test Engineer: 19227
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_QPSK NR n66 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1712.50	17.22	V	4.4	9.6	22.43	30.0	-7.6	
1712.50	16.36	H	4.4	9.6	21.57	30.0	-8.4	
Mid Ch								
1745.00	17.53	V	4.4	9.7	22.80	30.0	-7.2	
1745.00	20.59	H	4.4	9.7	25.86	30.0	-4.1	
High Ch								
1777.50	16.61	V	4.4	9.7	21.87	30.0	-8.1	
1777.50	20.46	H	4.4	9.7	25.72	30.0	-4.3	

5MHz DFT-s 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-03
Test Engineer: 19227
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_16QAM NR n66 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1712.50	16.03	V	4.4	9.6	21.24	30.0	-8.8	
1712.50	19.43	H	4.4	9.6	24.64	30.0	-5.4	
Mid Ch								
1745.00	16.34	V	4.4	9.7	21.61	30.0	-8.4	
1745.00	19.41	H	4.4	9.7	24.68	30.0	-5.3	
High Ch								
1777.50	15.40	V	4.4	9.7	20.66	30.0	-9.3	
1777.50	19.15	H	4.4	9.7	24.41	30.0	-5.6	

NR Band 77(Lower)

100MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-27
Test Engineer: 20881
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_QPSK NR n77 Fundamentals, 100MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Mid Ch								
3499.98	17.25	V	6.3	10.6	21.64	33.0	-11.4	
3499.98	21.55	H	6.3	10.6	25.94	33.0	-7.1	

100MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-27
Test Engineer: 20881
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_16QAM NR n77 Fundamentals, 100MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Mid Ch								
3499.98	16.42	V	6.3	10.6	20.81	33.0	-12.2	
3499.98	20.53	H	6.3	10.6	24.92	33.0	-8.1	

90MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-28
Test Engineer: 19568
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_QPSK NR n77 Fundamentals, 90MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
3495.00	17.41	V	6.3	10.6	21.80	30.0	-8.2	
3495.00	21.59	H	6.3	10.6	25.98	30.0	-4.0	
Mid Ch								
3499.98	17.00	V	6.3	10.6	21.39	30.0	-8.6	
3499.98	21.21	H	6.3	10.6	25.60	30.0	-4.4	
High Ch								
3504.99	16.70	V	6.3	10.7	21.09	30.0	-8.9	
3504.99	21.69	H	6.3	10.7	26.08	30.0	-3.9	

90MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-28
Test Engineer: 19568
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_16QAM NR n77 Fundamentals, 90MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
3495.00	16.25	V	6.3	10.6	20.64	30.0	-9.4	
3495.00	20.48	H	6.3	10.6	24.87	30.0	-5.1	
Mid Ch								
3499.98	15.76	V	6.3	10.6	20.15	30.0	-9.9	
3499.98	20.70	H	6.3	10.6	25.09	30.0	-4.9	
High Ch								
3504.99	15.83	V	6.3	10.7	20.22	30.0	-9.8	
3504.99	20.68	H	6.3	10.7	25.07	30.0	-4.9	

80MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2020-05-28
Test Engineer: 20881
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_QPSK NR n77 Fundamentals, 80MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
3490.02	17.25	V	6.2	10.6	21.63	33.0	-11.4	
3490.02	21.49	H	6.2	10.6	25.88	33.0	-7.1	
Mid Ch								
3499.98	16.63	V	6.3	10.6	21.02	33.0	-12.0	
3499.98	21.56	H	6.3	10.6	25.95	33.0	-7.0	
High Ch								
3510.00	16.76	V	6.3	10.7	21.15	33.0	-11.8	
3510.00	21.69	H	6.3	10.7	26.08	33.0	-6.9	

80MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2020-05-28
Test Engineer: 20881
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_16QAM NR n77 Fundamentals, 80MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
3490.02	16.42	V	6.2	10.6	20.80	33.0	-12.2	
3490.02	20.35	H	6.2	10.6	24.74	33.0	-8.3	
Mid Ch								
3499.98	15.70	V	6.3	10.6	20.09	33.0	-12.9	
3499.98	20.37	H	6.3	10.6	24.76	33.0	-8.2	
High Ch								
3510.00	15.54	V	6.3	10.7	19.93	33.0	-13.1	
3510.00	20.79	H	6.3	10.7	25.18	33.0	-7.8	

60MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-28
Test Engineer: 20882
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_QPSK NR n77 Fundamentals, 60MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
3480.00	15.84	V	6.2	10.6	20.23	33.0	-12.8	
3480.00	21.71	H	6.2	10.6	26.09	33.0	-6.9	
Mid Ch								
3499.98	16.21	V	6.3	10.6	20.60	33.0	-12.4	
3499.98	21.49	H	6.3	10.6	25.88	33.0	-7.1	
High Ch								
3519.99	14.50	V	6.3	10.7	18.90	33.0	-14.1	
3519.99	21.82	H	6.3	10.7	26.22	33.0	-6.8	

60MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-28
Test Engineer: 20882
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_16QAM NR n77 Fundamentals, 60MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
3480.00	15.84	V	6.2	10.6	20.23	33.0	-12.8	
3480.00	20.96	H	6.2	10.6	25.34	33.0	-7.7	
Mid Ch								
3499.98	15.20	V	6.3	10.6	19.59	33.0	-13.4	
3499.98	20.88	H	6.3	10.6	25.27	33.0	-7.7	
High Ch								
3519.99	14.50	V	6.3	10.7	18.90	33.0	-14.1	
3519.99	20.93	H	6.3	10.7	25.33	33.0	-7.7	

50MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-28
Test Engineer: 19227
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_QPSK NR n77 Fundamentals, 50MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
3475.02	15.46	V	6.2	10.6	19.84	33.0	-13.2	
3475.02	21.47	H	6.2	10.6	25.85	33.0	-7.1	
Mid Ch								
3499.98	16.57	V	6.3	10.6	20.96	33.0	-12.0	
3499.98	21.61	H	6.3	10.6	26.00	33.0	-7.0	
High Ch								
3525.00	16.81	V	6.3	10.7	21.22	33.0	-11.8	
3525.00	21.60	H	6.3	10.7	26.01	33.0	-7.0	

50MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-28
Test Engineer: 19227
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_16QAM NR n77 Fundamentals, 50MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
3475.02	14.64	V	6.2	10.6	19.02	33.0	-14.0	
3475.02	20.38	H	6.2	10.6	24.76	33.0	-8.2	
Mid Ch								
3499.98	16.42	V	6.3	10.6	20.81	33.0	-12.2	
3499.98	20.73	H	6.3	10.6	25.12	33.0	-7.9	
High Ch								
3525.00	15.92	V	6.3	10.7	20.33	33.0	-12.7	
3525.00	20.62	H	6.3	10.7	25.03	33.0	-8.0	

40MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-28
Test Engineer: 19227
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_QPSK NR n77 Fundamentals, 40MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
3470.01	16.68	V	6.2	10.6	21.05	33.0	-12.0	
3470.01	21.72	H	6.2	10.6	26.09	33.0	-6.9	
Mid Ch								
3499.98	17.06	V	6.3	10.6	21.45	33.0	-11.6	
3499.98	21.72	H	6.3	10.6	26.11	33.0	-6.9	
High Ch								
3529.98	15.99	V	6.3	10.7	20.40	33.0	-12.6	
3529.98	21.61	H	6.3	10.7	26.02	33.0	-7.0	

40MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-28
Test Engineer: 19227
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_16QAM NR n77 Fundamentals, 40MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
3470.01	16.14	V	6.2	10.6	20.51	33.0	-12.5	
3470.01	20.79	H	6.2	10.6	25.16	33.0	-7.8	
Mid Ch								
3499.98	16.39	V	6.3	10.6	20.78	33.0	-12.2	
3499.98	20.87	H	6.3	10.6	25.26	33.0	-7.7	
High Ch								
3529.98	15.03	V	6.3	10.7	19.44	33.0	-13.6	
3529.98	20.96	H	6.3	10.7	25.37	33.0	-7.6	

20MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-27
Test Engineer: 22943
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_QPSK NR n77 Fundamentals, 20MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
3460.02	17.39	V	6.2	10.6	21.76	33.0	-11.2	
3460.02	21.38	H	6.2	10.6	25.75	33.0	-7.2	
Mid Ch								
3499.98	17.53	V	6.3	10.6	21.92	33.0	-11.1	
3499.98	22.05	H	6.3	10.6	26.44	33.0	-6.6	
High Ch								
3540.00	16.05	V	6.3	10.7	20.46	33.0	-12.5	
3540.00	21.45	H	6.3	10.7	25.87	33.0	-7.1	

20MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-27
Test Engineer: 22943
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_16QAM NR n77 Fundamentals, 20MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
3460.02	16.29	V	6.2	10.6	20.66	33.0	-12.3	
3460.02	20.46	H	6.2	10.6	24.83	33.0	-8.2	
Mid Ch								
3499.98	16.44	V	6.3	10.6	20.83	33.0	-12.2	
3499.98	21.26	H	6.3	10.6	25.65	33.0	-7.3	
High Ch								
3540.00	15.24	V	6.3	10.7	19.65	33.0	-13.3	
3540.00	20.39	H	6.3	10.7	24.81	33.0	-8.2	

NR Band 77(Upper)

100MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-03
Test Engineer: 20881
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: NR_QPSK n77 Fundamentals, 100MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
3750.00	16.32	V	6.5	10.8	20.59	30.0	-9.4	
3750.00	18.52	H	6.5	10.8	22.79	30.0	-7.2	
Mid Ch								
3840.00	22.58	V	6.6	10.6	26.66	30.0	-3.3	
3840.00	20.13	H	6.6	10.6	24.21	30.0	-5.8	
High Ch								
3930.00	22.59	V	6.6	10.6	26.56	30.0	-3.4	
3930.00	21.46	H	6.6	10.6	25.43	30.0	-4.6	

100MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-03
Test Engineer: 20881
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: NR_16QAM n77 Fundamentals, 100MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
3750.00	15.63	V	6.5	10.8	19.90	30.0	-10.1	
3750.00	18.06	H	6.5	10.8	22.33	30.0	-7.7	
Mid Ch								
3840.00	22.26	V	6.6	10.6	26.34	30.0	-3.7	
3840.00	19.72	H	6.6	10.6	23.80	30.0	-6.2	
High Ch								
3930.00	21.63	V	6.6	10.6	25.60	30.0	-4.4	
3930.00	21.13	H	6.6	10.6	25.10	30.0	-4.9	

90MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-03
Test Engineer: 20881
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: NR_QPSK n77 Fundamentals, 90MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
3745.02	14.69	V	6.5	10.8	18.96	30.0	-11.0	
3745.02	18.29	H	6.5	10.8	22.57	30.0	-7.4	
Mid Ch								
3840.00	22.38	V	6.6	10.6	26.46	30.0	-3.5	
3840.00	20.51	H	6.6	10.6	24.59	30.0	-5.4	
High Ch								
3934.98	22.46	V	6.6	10.6	26.43	30.0	-3.6	
3934.98	18.24	H	6.6	10.6	22.21	30.0	-7.8	

90MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789893923
Date: 2021-05-03
Test Engineer: 20881
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: NR_16QAM n77 Fundamentals, 90MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
3745.02	15.14	V	6.5	10.8	19.41	30.0	-10.6	
3745.02	17.50	H	6.5	10.8	21.78	30.0	-8.2	
Mid Ch								
3840.00	21.57	V	6.6	10.6	25.65	30.0	-4.4	
3840.00	19.79	H	6.6	10.6	23.87	30.0	-6.1	
High Ch								
3934.98	21.83	V	6.6	10.6	25.80	30.0	-4.2	
3934.98	17.62	H	6.6	10.6	21.59	30.0	-8.4	