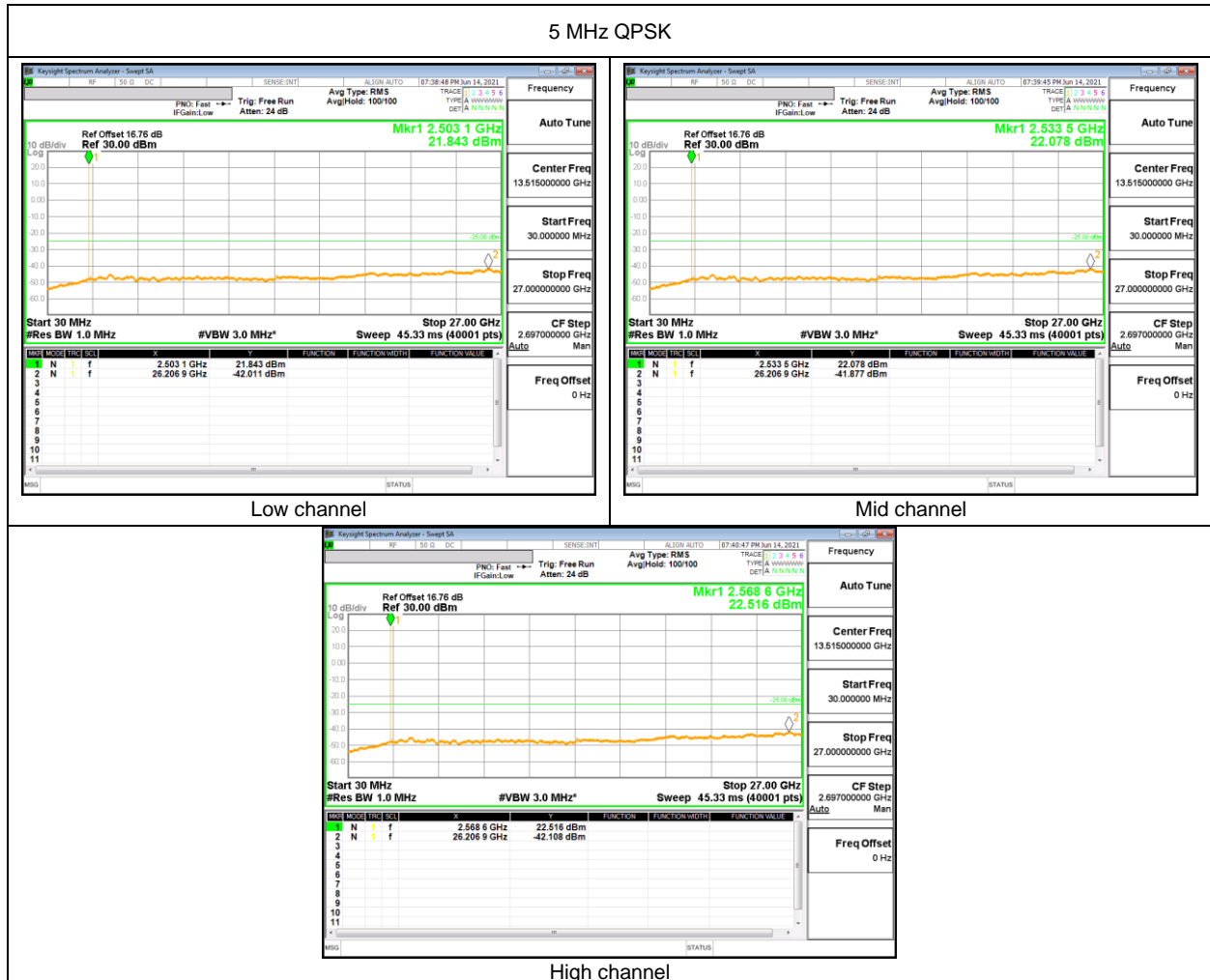


LTE Band 5

5 MHz QPSK

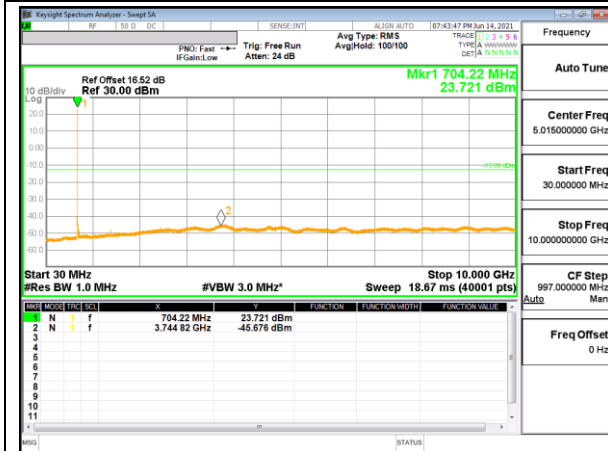


LTE Band 7

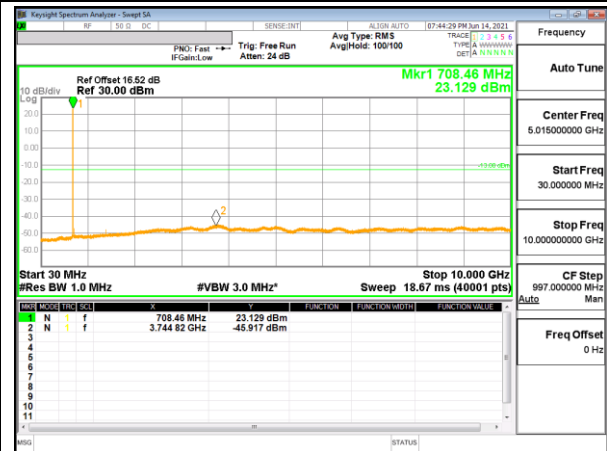


LTE Band 12

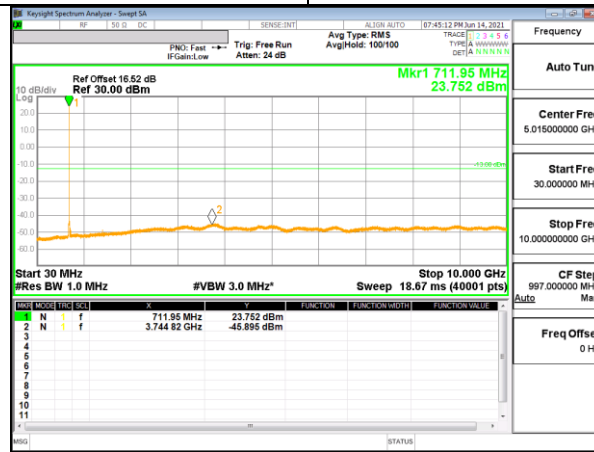
5 MHz QPSK



Low channel



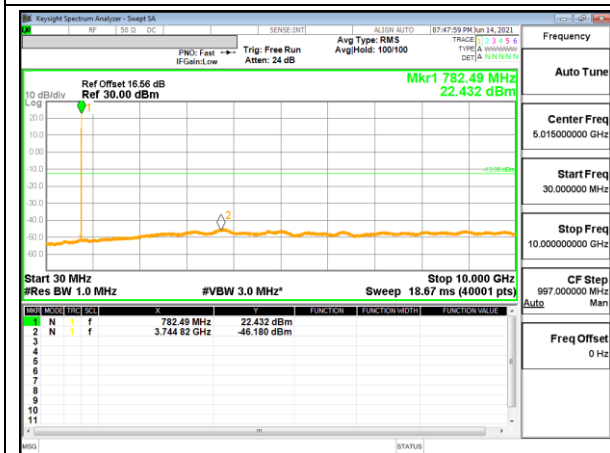
Mid channel



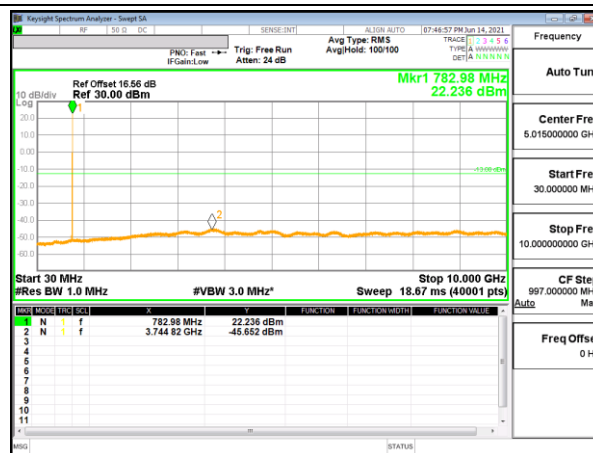
High channel

LTE Band 13

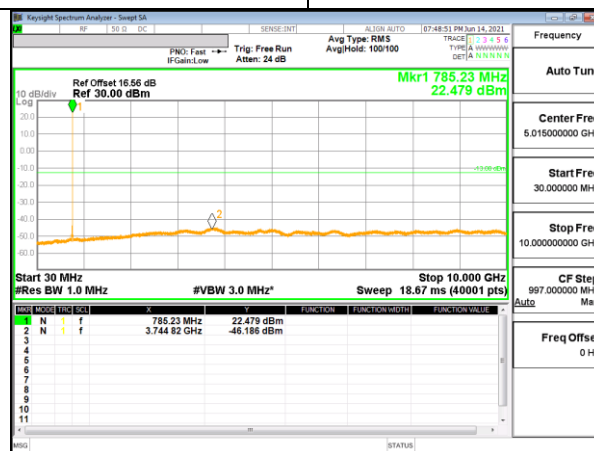
5 MHz QPSK



Low channel



Mid channel



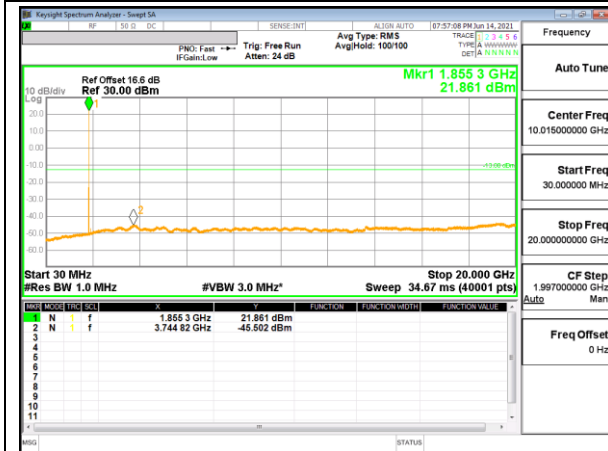
High channel

LTE Band 14

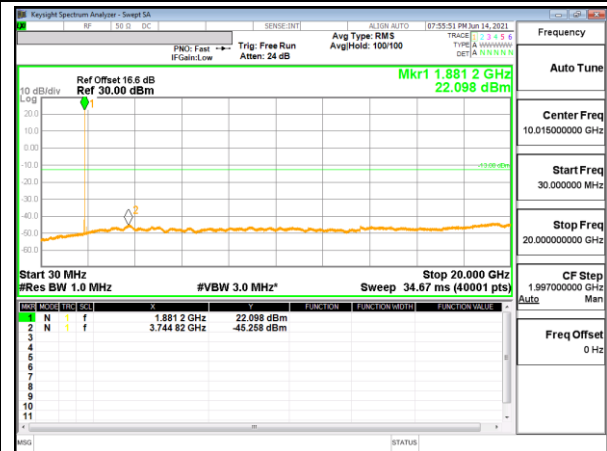


LTE Band 25

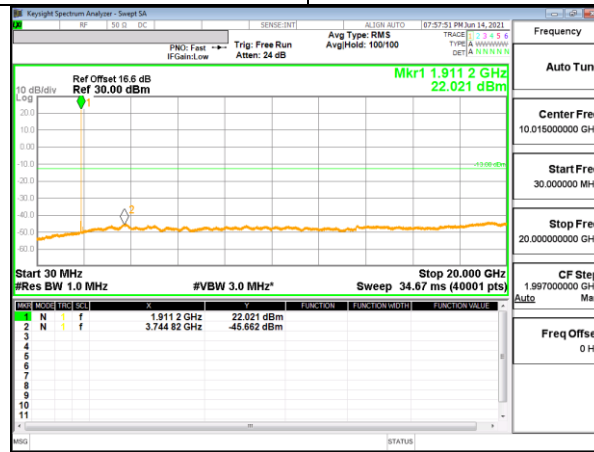
5 MHz QPSK



Low channel



Mid channel



High channel

LTE Band 30

5 MHz QPSK

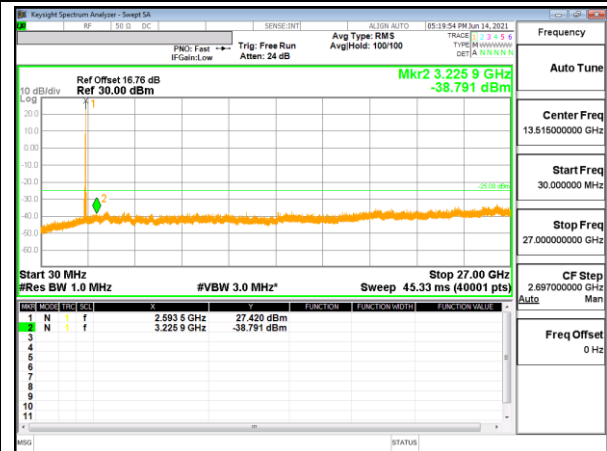


LTE Band 41 (PC2)

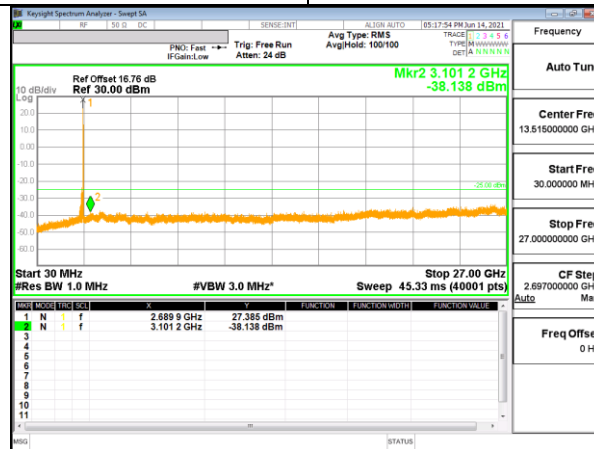
20 MHz QPSK



Low channel



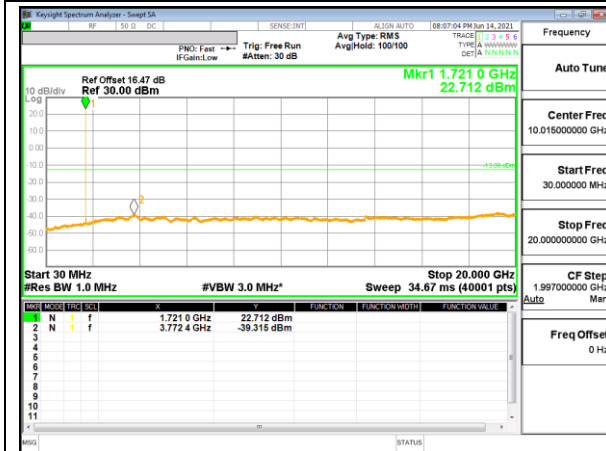
Mid channel



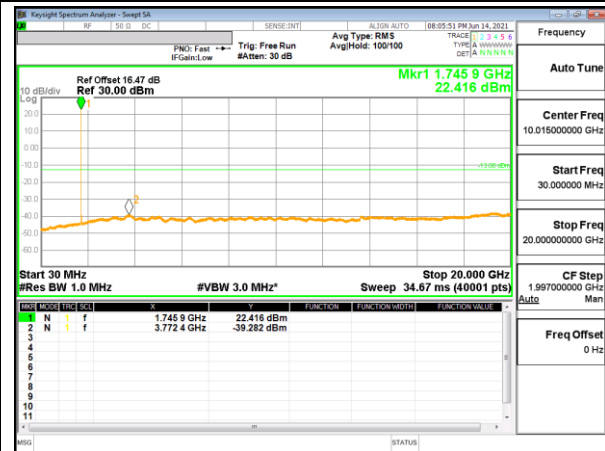
High channel

LTE Band 66

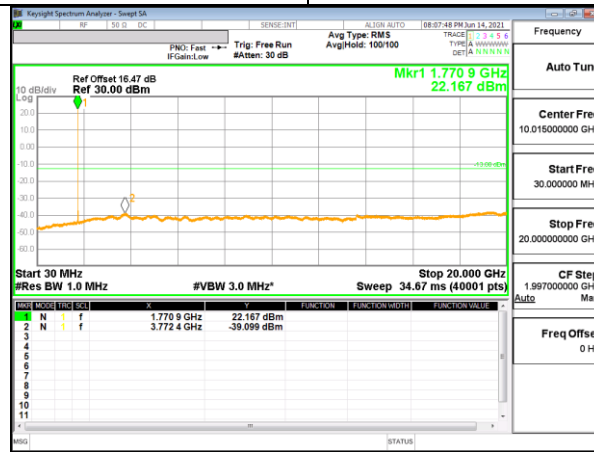
20 MHz QPSK



Low channel



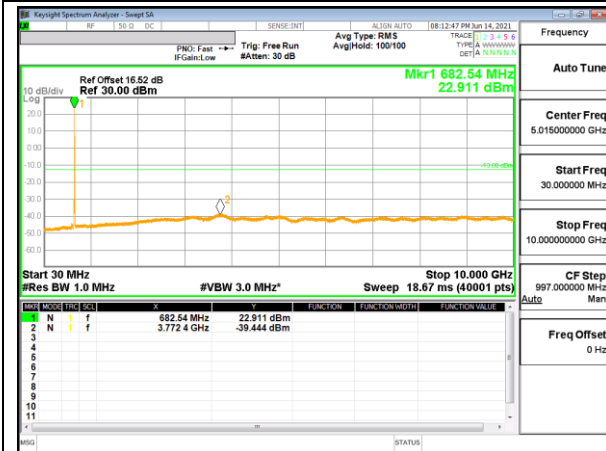
Mid channel



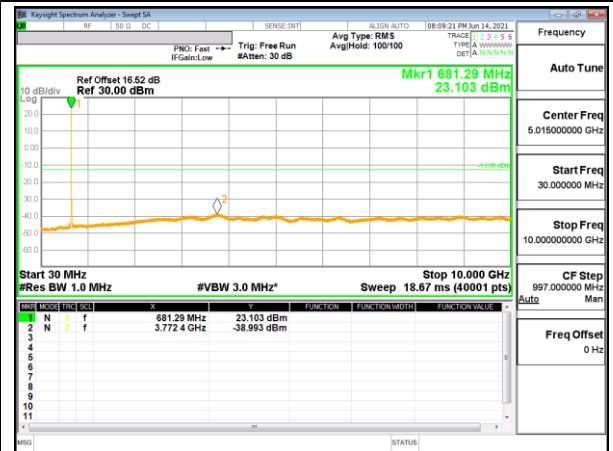
High channel

LTE Band 71

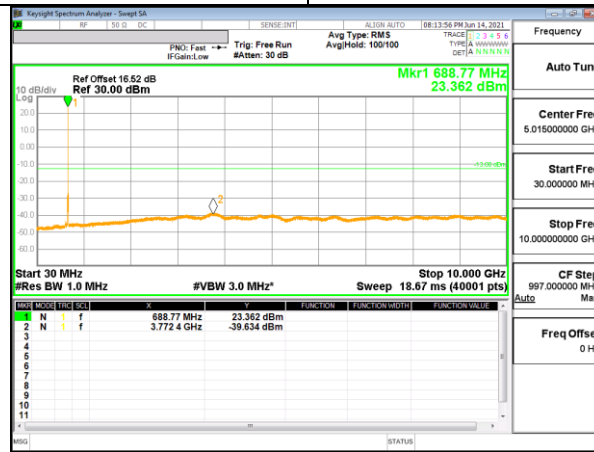
20 MHz QPSK



Low channel



Mid channel



High channel

LTE Band 2

LTE Band 2(Frequency range: 1850-1910 MHz) is covered by LTE Band 25 (Frequency range: 1850-1915 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

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.

LTE Band 17

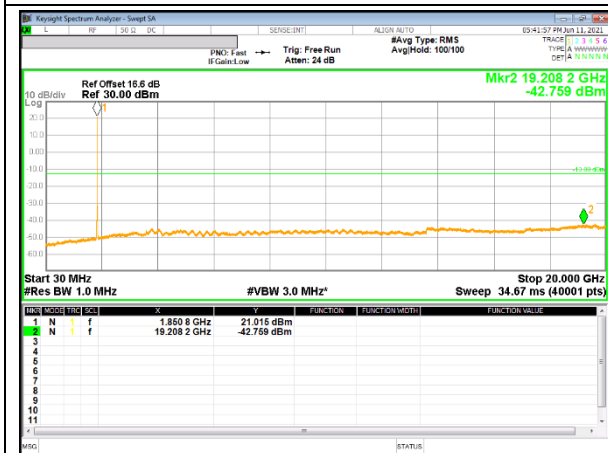
LTE Band 17 (Frequency range: 704-716 MHz) is covered by LTE Band 12 (Frequency range: 699-716 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

LTE Band41(PC3)

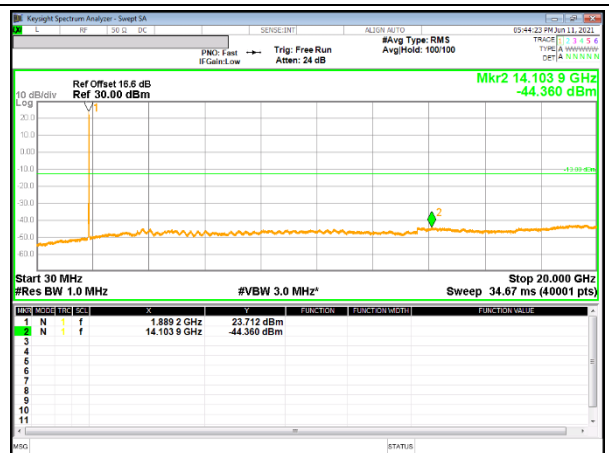
LTE Band 41(PC3, Frequency range : 2496-2690 MHz) is covered by LTE Band 41(PC2) (Frequency range: 2496-2690 MHz) due to same frequency range, same channel bandwidth and maximum tune-up limit is higher than LTE Band41(PC3).

NR Band 2

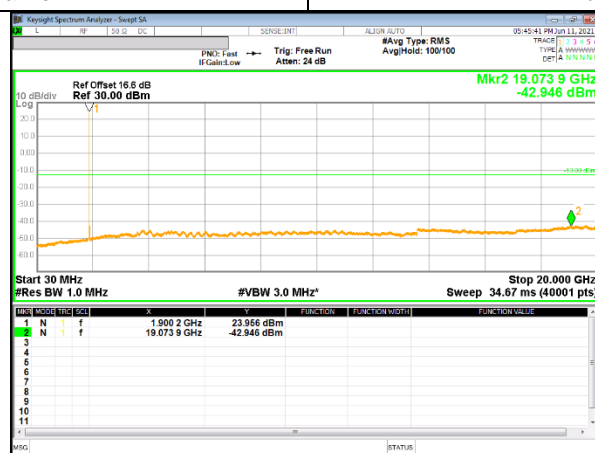
20 MHz QPSK



Low channel



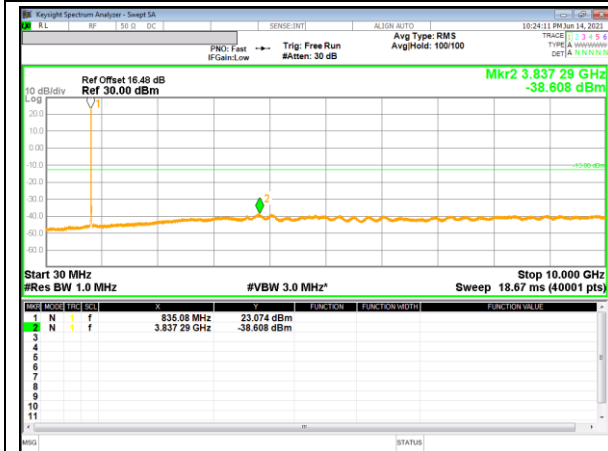
Mid channel



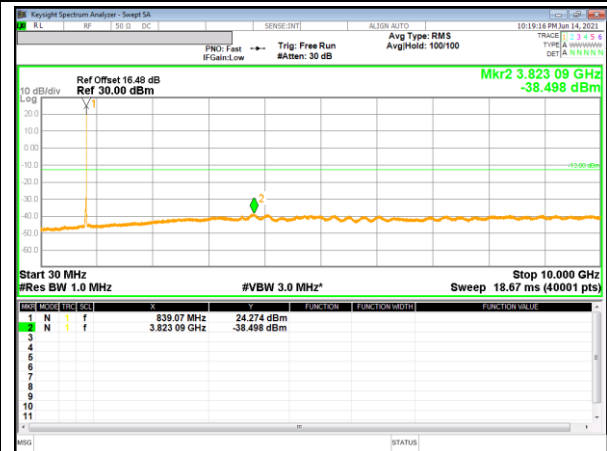
High channel

NR Band 5

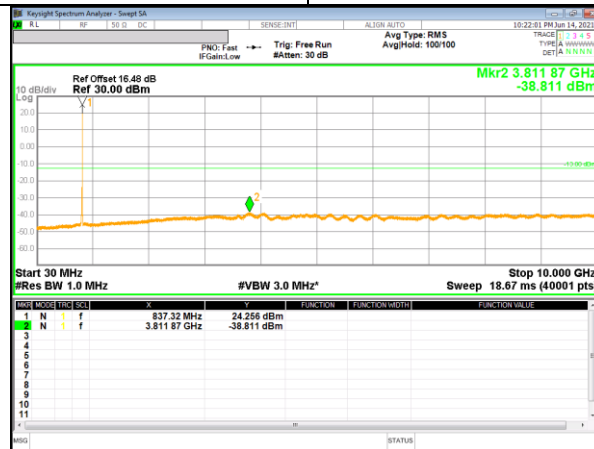
15 MHz QPSK



Low channel



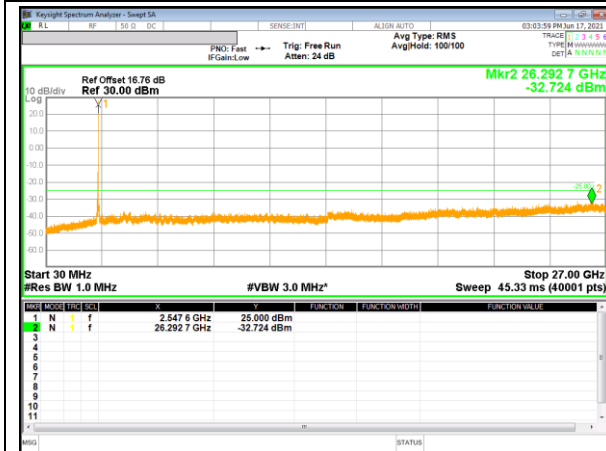
Mid channel



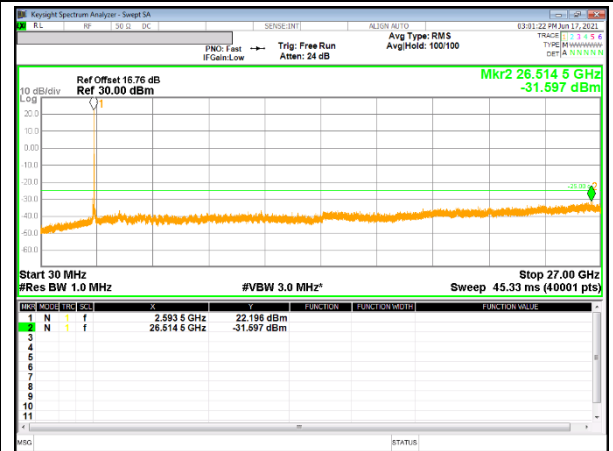
High channel

NR Band 41 #0

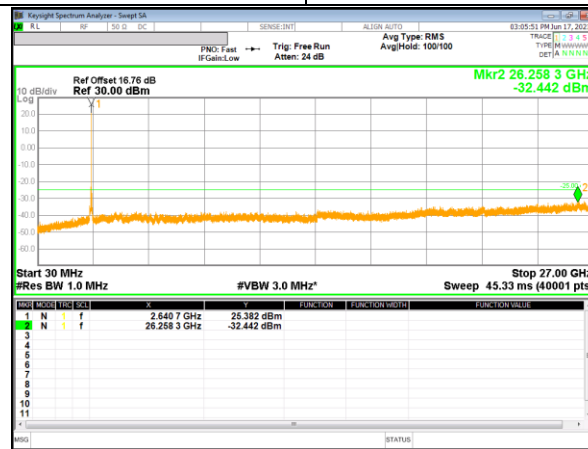
100 MHz QPSK



Low channel



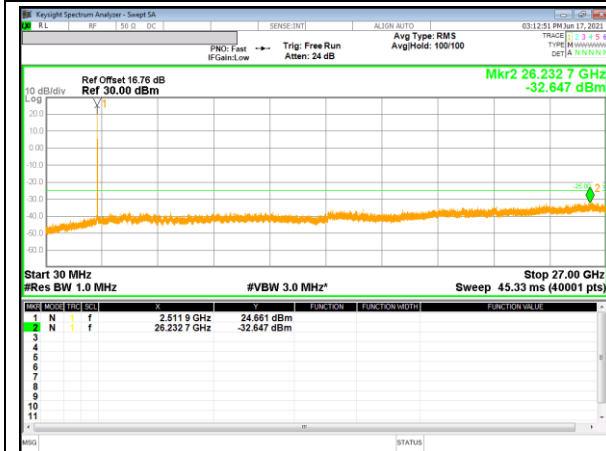
Mid channel



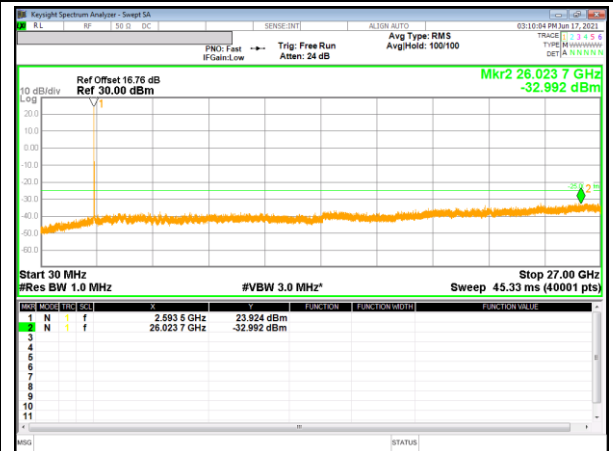
High channel

NR Band 41 #1

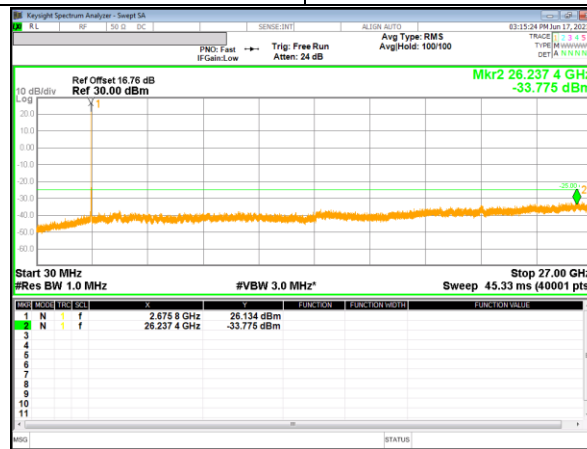
30 MHz QPSK



Low channel



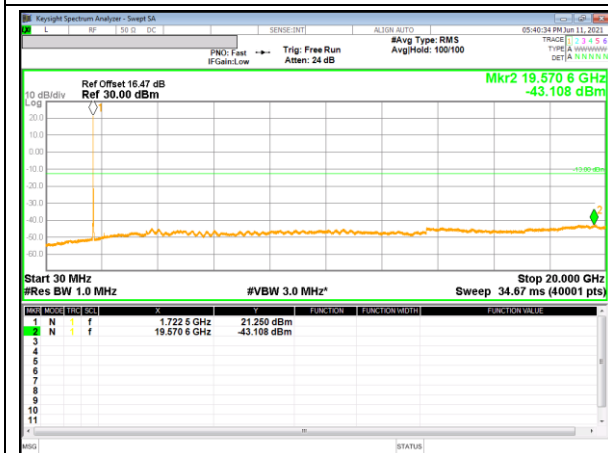
Mid channel



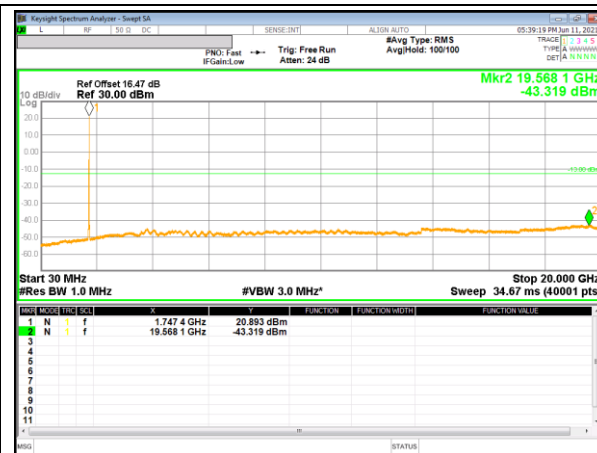
High channel

NR Band 66

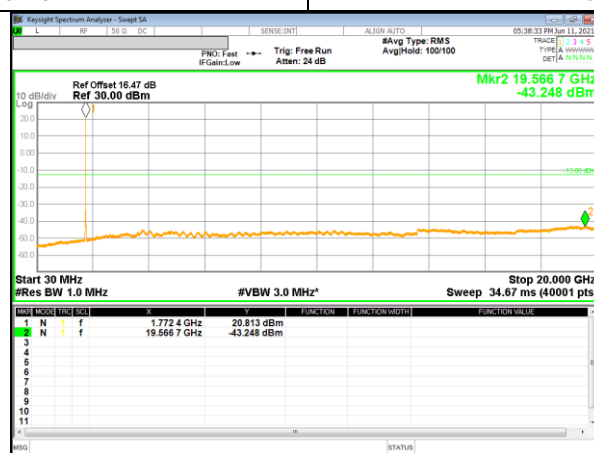
20 MHz QPSK



Low channel



Mid channel



High channel

NR Band 71

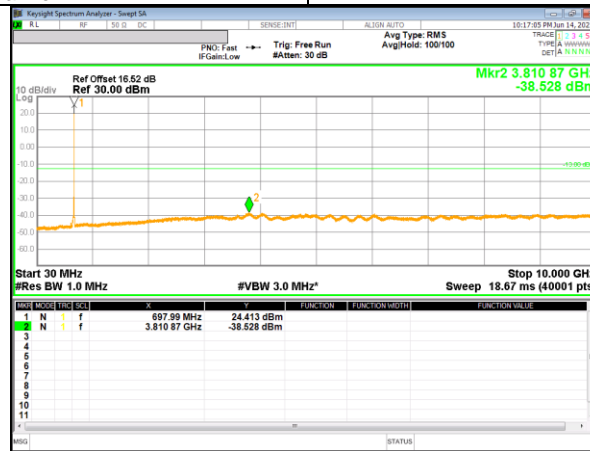
15 MHz QPSK



Low channel



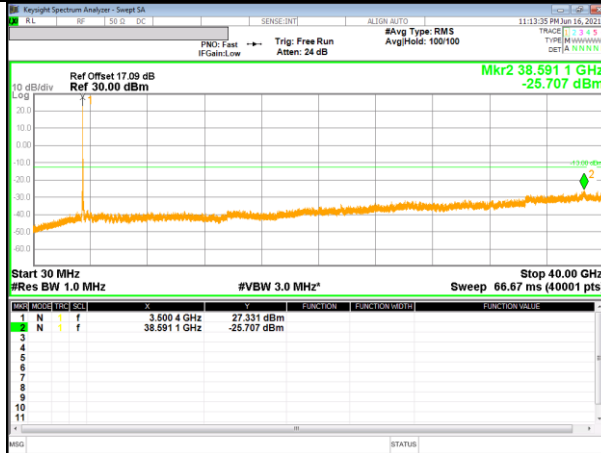
Mid channel



High channel

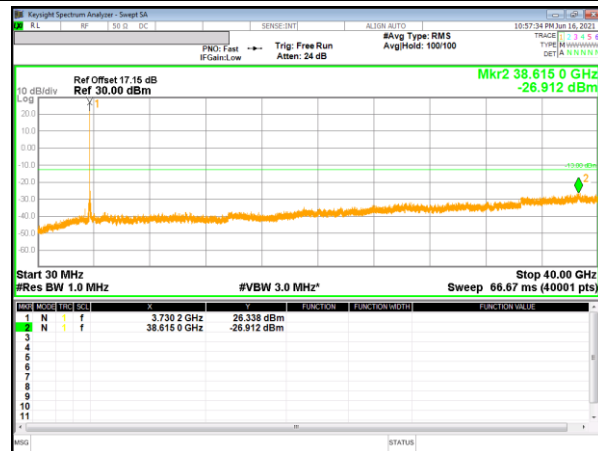
NR Band 77 (3450 – 3550 MHz)

100 MHz QPSK

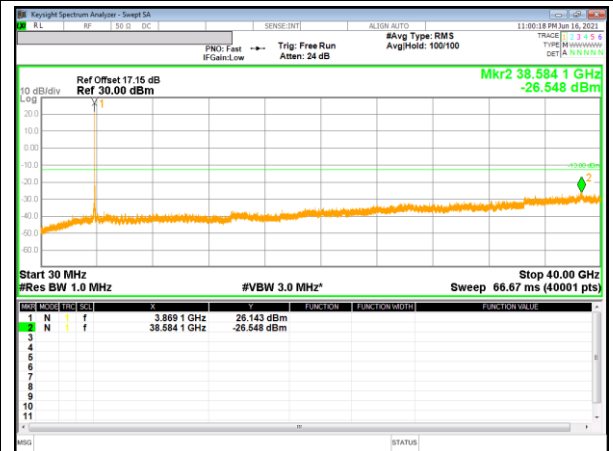


NR Band 77 (3700 – 3980 MHz)

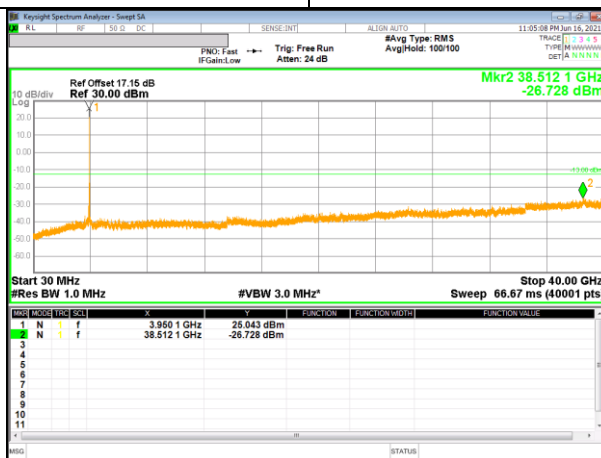
60 MHz QPSK



Low channel



Mid channel



High channel

9.4. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §22.355, §24.235, §27.54 and §90.213

LIMITS

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

§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.

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

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v03r01

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 @ 20°C						
Limit: +/- 2.5 ppm =		Low Channel	2066.000 Hz	High Channel	2116.500 Hz	
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.86	50	826.39999423	0.014	846.60000501	0.000	2.5
3.86	40	826.39999487	0.013	846.59999489	0.012	2.5
3.86	30	826.39999408	0.014	846.60000572	-0.001	2.5
3.86	20	826.40000570	0.000	846.60000508	0.000	2.5
3.86	10	826.40000622	-0.001	846.60000491	0.000	2.5
3.86	0	826.40000590	0.000	846.59999511	0.012	2.5

Reference Frequency : WCDMA Band 5 Low Channel 826.4 MHz / High Channel 846.6 MHz @ 20°C						
Limit: +/- 2.5 ppm =		Low Channel	2066.000 Hz	High Channel	2116.500 Hz	
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.30	20	826.40000570	0	846.60000508	0	2.5
3.40	20	826.40000590	0.000	846.60000530	0.000	2.5
3.20	20	826.39999460	0.013	846.60000490	0.000	2.5

WCDMA Band 4(Lowest Frequency: HSDPA / Highest Frequency: Rel 99)

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	1754.6757		
Extreme (50C)		1712.4000	1754.6757	10.9	0.006
Extreme (40C)		1712.4000	1754.6757	10.2	0.006
Extreme (30C)		1712.4000	1754.6757	14.0	0.008
Extreme (10C)		1712.4000	1754.6757	14.2	0.008
Extreme (0C)		1712.4000	1754.6757	16.5	0.010
20C	3.4 V	1712.4000	1754.6757	11.7	0.007
	3.2 V	1712.4000	1754.6757	15.4	0.009

WCDMA Band 2 (Lowest Frequency: HSDPA / Highest Frequency: Rel99)

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	1850.3226	1909.6693	12.5	0.007
Extreme (50C)		1850.3226	1909.6693		
Extreme (40C)		1850.3225	1909.6692		
Extreme (30C)		1850.3226	1909.6693		
Extreme (10C)		1850.3226	1909.6693		
Extreme (0C)		1850.3226	1909.6693		
20C		3.4V	1850.3226		
	3.2V	1850.3226	1909.6693	13.7	0.007

LTE Band 5

Reference Frequency : LTE Band 5 Low Channel 824.7 MHz / High Channel 848.3 MHz @ 20°C							
Limit: +- 2.5 ppm =		Low Channel	2061.750	Hz	High Channel	2120.750	Hz
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse				Limit [ppm]	
		Low Channel		High Channel			
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]		
3.80	50	824.70001892	-0.007	848.30001843	0.104	2.5	
3.80	40	824.70001097	0.003	848.30001687	0.106	2.5	
3.80	30	824.70002335	-0.012	848.30001907	0.104	2.5	
3.80	20	824.70001340	0.000	848.30010692	0.000	2.5	
3.80	10	824.69998043	0.040	848.30001465	0.109	2.5	
3.80	0	824.69997955	0.041	848.29997722	0.153	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 Measured with Time Elapse				Limit [ppm]	
		Low Channel		High Channel			
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]		
3.30	20	824.70001340	0	848.30010692	0	2.5	
3.40	20	824.70003570	-0.027	848.30003690	0.083	2.5	
3.20	20	824.70002540	-0.015	848.30001670	0.106	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	2500.2519	2569.7438	-36.3	-0.014
Extreme (50C)		2500.2518	2569.7438		
Extreme (40C)		2500.2518	2569.7437		
Extreme (30C)		2500.2519	2569.7438		
Extreme (10C)		2500.2517	2569.7437		
Extreme (0C)		2500.2519	2569.7438		
20C		3.4 V	2500.2518		
	3.2 V	2500.2519	2569.7437	-52.2	-0.021

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	699.1526	715.8411	12.0	0.017
Extreme (50C)		699.1526	715.8411		
Extreme (40C)		699.1526	715.8411		
Extreme (30C)		699.1526	715.8411		
Extreme (10C)		699.1526	715.8411		
Extreme (0C)		699.1526	715.8411		
20C		3.4 V	699.1526		
	3.2 V	699.1526	715.8411	36.8	0.052

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	777.2595	786.7402	20.3	0.026
Extreme (50C)		777.2595	786.7402		
Extreme (40C)		777.2596	786.7403		
Extreme (30C)		777.2595	786.7402		
Extreme (10C)		777.2595	786.7402		
Extreme (0C)		777.2595	786.7402		
20C		3.4 V	777.2595		
	3.2 V	777.2595	786.7402	21.7	0.028

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	788.2602	797.7409	13.7	0.017
Extreme (50C)		788.2602	797.7409		
Extreme (40C)		788.2602	797.7409		
Extreme (30C)		788.2602	797.7409		
Extreme (10C)		788.2602	797.7409		
Extreme (0C)		788.2602	797.7409		
20C		3.4 V	788.2602		
	3.2 V	788.2602	797.7409	32.7	0.041

LTE Band 25 (Lowest Frequency:16QAM / Highest Frequency: QPSK)

Limit		1850	1915	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1850.1550	1914.8468		
Extreme (50C)		1850.1550	1914.8467	-37.3	-0.020
Extreme (40C)		1850.1550	1914.8468	41.4	0.022
Extreme (30C)		1850.1551	1914.8468	99.9	0.053
Extreme (10C)		1850.1550	1914.8467	-47.2	-0.025
Extreme (0C)		1850.1549	1914.8467	-56.5	-0.030
20C	3.4 V	1850.1550	1914.8467	-27.5	-0.015
	3.2 V	1850.1551	1914.8467	-51.2	-0.027

LTE Band 30 (Lowest Frequency: 16QAM / Highest Frequency: 16QAM)

Limit		2305	2315	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	2305.2547	2314.7443		
Extreme (50C)		2305.2547	2314.7443	40.8	0.018
Extreme (40C)		2305.2548	2314.7444	106.1	0.046
Extreme (30C)		2305.2547	2314.7443	31.7	0.014
Extreme (10C)		2305.2546	2314.7442	-99.1	-0.043
Extreme (0C)		2305.2545	2314.7441	-100.1	-0.043
20C	3.4 V	2305.2547	2314.7443	66.7	0.029
	3.2 V	2305.2547	2314.7443	94.6	0.041

LTE Band 41 (PC2) (Lowest Frequency: QPSK / Highest Frequency: 16QAM)

Limit		2496	2690	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	2496.2497	2689.7412		
Extreme (50C)		2496.2498	2689.7413	125.9	0.049
Extreme (40C)		2496.2497	2689.7412	26.6	0.010
Extreme (30C)		2496.2497	2689.7412	71.3	0.028
Extreme (10C)		2496.2496	2689.7411	-43.7	-0.017
Extreme (0C)		2496.2497	2689.7412	68.8	0.027
20C	3.4 V	2496.2498	2689.7411	-67.4	-0.026
	3.2 V	2496.2497	2689.7412	82.1	0.032

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

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	1710.1570	1779.8420	17.7	0.010
Extreme (50C)		1710.1570	1779.8420		
Extreme (40C)		1710.1569	1779.8420		
Extreme (30C)		1710.1571	1779.8421		
Extreme (10C)		1710.1571	1779.8421		
Extreme (0C)		1710.1570	1779.8420		
20C		3.4 V	1710.1570		
	3.2 V	1710.1571	1779.8419	-62.8	-0.036

LTE Band 71 (Lowest Frequency: QPSK / Highest Frequency: QPSK)

Limit		663	698	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	663.2623	697.7405	16.0	0.023
Extreme (50C)		663.2623	697.7405		
Extreme (40C)		663.2623	697.7405		
Extreme (30C)		663.2623	697.7405		
Extreme (10C)		663.2624	697.7406		
Extreme (0C)		663.2622	697.7403		
20C		3.4 V	663.2623		
	3.2 V	663.2623	697.7405	37.1	0.055

5G NR Band 41 #0 SCS 30kHz (Lowest Frequency: QPSK / Highest Frequency: QPSK)

Limit		2496	2690	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	2496.7128	2689.2988	52.8	0.020
Extreme (50C)		2496.7129	2689.2989		
Extreme (40C)		2496.7128	2689.2988		
Extreme (30C)		2496.7128	2689.2988		
Extreme (10C)		2496.7129	2689.2989		
Extreme (0C)		2496.7128	2689.2988		
20C		3.4 V	2496.7129		
	3.2 V	2496.7128	2689.2988	33.3	0.013

5G NR Band 41 #1 SCS 30kHz (Lowest Frequency: 16QAM / Highest Frequency: 16QAM)

Limit		2496	2690	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	2496.7107	2689.2889	52.8	0.020
Extreme (50C)		2496.7108	2689.2890		
Extreme (40C)		2496.7107	2689.2889		
Extreme (30C)		2496.7107	2689.2889		
Extreme (10C)		2496.7108	2689.2890		
Extreme (0C)		2496.7107	2689.2889		
20C		3.4 V	2496.7108		
	3.2 V	2496.7107	2689.2889	33.3	0.013

5G NR Band 77 SCS 30kHz (Lowest Frequency: 16QAM / 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	3450.7046	3554.2886	42.6	0.012
Extreme (50C)		3450.7046	3554.2886		
Extreme (40C)		3450.7047	3554.2887		
Extreme (30C)		3450.7046	3554.2886		
Extreme (10C)		3450.7047	3554.2887		
Extreme (0C)		3450.7046	3554.2886		
20C		3.4 V	3450.7046		
	3.2 V	3450.7046	3554.2887	53.9	0.015

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	3701.0600	3978.9450	35.6	0.009
Extreme (50C)		3701.0600	3978.9450		
Extreme (40C)		3701.0600	3978.9450		
Extreme (30C)		3701.0600	3978.9450		
Extreme (10C)		3701.0601	3978.9451		
Extreme (0C)		3701.0600	3978.9450		
20C		3.4 V	3701.0600		
	3.2 V	3701.0600	3978.9450	47.2	0.012

LTE Band 2

LTE Band 2(Frequency range: 1850-1910 MHz) is covered by LTE Band 25 (Frequency range: 1850-1915 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

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.

LTE Band 17

LTE Band 17 (Frequency range: 704-716 MHz) is covered by LTE Band 12 (Frequency range: 699-716 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

LTE Band41(PC3)

LTE Band 41(PC3, Frequency range : 2496-2690 MHz) is covered by LTE Band 41(PC2) (Frequency range: 2496-2690 MHz) due to same frequency range, same channel bandwidth and maximum tune-up limit is higher than LTE Band41(PC3).

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.

NR Band 71 (SCS 15kHz)

NR Band 71 (Frequency range: 663-698 MHz) is covered by LTE Band 71 (Frequency range: 663-698 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

9.5. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §22.913, §24.232, §27.50, §27.53 and §90.542

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:

(a)(3) Mobile and portable stations. (i) For mobile and portable stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, except that for mobile and portable stations compliant with 3GPP LTE standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth. For mobile and portable stations using time division duplexing (TDD) technology, the duty cycle must not exceed 38 percent in the 2305-2315 MHz and 2350-2360 MHz bands. Mobile and portable stations using FDD technology are restricted to transmitting in the 2305-2315 MHz band. Power averaging shall not include intervals in which the transmitter is off.

(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 \geq OBW;
- b) Set VBW \geq 3 \times RBW;
- c) Set span \geq 2 \times RBW;
- d) Sweep time = auto couple;
- e) Detector = rms;
- f) Ensure that the number of measurement points \geq 2 \times 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

ERP / EIRP	Band	Frequency Range [MHz]		Max. Conducted Power [dBm]	Allowed Max. Antenna Gain [dBi]	Max. ERP/EIRP		Limit [W]
						[dBm]	[mW]	
ERP	LTE 71	665.50	695.50	24.21	5.50	27.56	570.16	3.00
	n71	665.50	715.30	24.42	5.50	27.77	598.412	3.00
	LTE 12	669.70	715.30	24.41	5.50	27.76	597.035	3.00
	LTE 13	779.50	784.50	23.87	6.50	28.22	663.743	3.00
	LTE 14	790.50	795.50	24.25	6.00	28.10	645.654	3.00
	WCDMA 5	826.40	846.60	23.95	6.10	27.90	616.595	7.00
	LTE5	824.70	848.30	24.41	6.10	28.36	685.488	7.00
	n5	826.50	846.50	24.63	6.10	28.58	721.107	7.00
EIRP	WCDMA 4	1712.40	1752.60	23.63	5.20	28.83	763.836	1.00
	LTE 66/4	1710.70	1779.30	23.33	5.20	28.53	712.853	1.00
	n66	1712.50	1777.50	23.82	5.20	29.02	797.995	1.00
	WCDMA 2	1852.40	1907.60	23.41	8.20	31.61	1448.77	2.00
	LTE 25/2	1850.70	1909.30	23.36	8.20	31.56	1432.19	2.00
	n2	1852.50	1907.50	23.90	8.20	32.10	1621.81	2.00
	LTE 30	2307.50	2312.50	22.45	0.50	22.95	197.242	0.25
	LTE 41 (PC2)	2498.50	2687.50	25.41	6.50	31.91	1552.39	2.00
	n41#0	2501.01	2685.00	23.18	6.50	29.68	928.966	2.00
	n41#1	2501.01	2685.00	24.34	6.50	30.84	1213.39	2.00
	LTE 7	2502.50	2567.50	23.11	8.20	31.31	1352.07	2.00
	n77 (3450-3550 MHz)	3455.01	3544.98	24.36	5.50	29.86	968.278	1.00
	n77 (3700-3980 MHz)	3705.00	3975.00	24.49	5.50	29.99	997.7	1.00

9.6. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053, §22.917, §24.238, §27.53 and §90.691

LIMIT

Part 22.917(a) & Part 24.238(a) & Part 27.53(h) The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

Part 27.53:

(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.

(f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.

(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 $43 + 10 \log_{10}(P)$ 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 than $43 + 10 \log(P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log(P)$ dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

Part 90.691:

(a) Out-of-band emission requirement shall apply only to the "outer" channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

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

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

TEST PROCEDURE

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

For peak power measurement with a ESU40:

- a) Set the RBW = 100 kHz for emission below 1GHz and 1MHz for emissions above 1GHz
- b) Set VBW $\geq 3 \times$ RBW;
- c) Sweep time = auto couple;
- d) Detector = rms;
- e) Ensure that the number of measurement points \geq span/RBW;
- f) Trace mode = average(FDD), Max hold(TDD);

NOTE

5G NR: 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.

9.6.1. SPURIOUS RADIATION PLOTS

WCDMA

		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement								
		Company:	Samsung							
		Project #:	4789899747							
		Date:	2021-05-18							
		Test Engineer:	19227							
		Configuration:	EUT, X-Position							
		Location:	Chamber 2							
		Mode:	Rel99 Band 5 Harmonics							
		Test Voltage:	DC 3.3 V							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
Band 5										
REL99										
Low Ch, 826.4MHz										
1652.80	-15.9	V	3.0	40.7	1.0	-55.6	-13.0	-42.6		
2479.20	-13.2	V	3.0	41.3	1.0	-53.5	-13.0	-40.5		
3305.60	-10.5	V	3.0	42.1	1.0	-51.6	-13.0	-38.6		
1652.80	-15.9	H	3.0	40.7	1.0	-55.6	-13.0	-42.6		
2479.20	-12.9	H	3.0	41.3	1.0	-53.2	-13.0	-40.2		
3305.60	-10.4	H	3.0	42.1	1.0	-51.5	-13.0	-38.5		
Mid Ch, 836.6MHz										
1673.20	-15.9	V	3.0	40.7	1.0	-55.6	-13.0	-42.6		
2509.80	-13.0	V	3.0	41.4	1.0	-53.4	-13.0	-40.4		
3346.40	-10.2	V	3.0	42.1	1.0	-51.3	-13.0	-38.3		
1673.20	-15.8	H	3.0	40.7	1.0	-55.5	-13.0	-42.5		
2509.80	-12.7	H	3.0	41.4	1.0	-53.1	-13.0	-40.1		
3346.40	-10.1	H	3.0	42.1	1.0	-51.2	-13.0	-38.2		
High Ch, 846.6MHz										
1693.20	-15.9	V	3.0	40.7	1.0	-55.5	-13.0	-42.5		
2539.80	-12.9	V	3.0	41.4	1.0	-53.3	-13.0	-40.3		
3386.40	-10.1	V	3.0	42.1	1.0	-51.2	-13.0	-38.2		
1693.20	-15.8	H	3.0	40.7	1.0	-55.5	-13.0	-42.5		
2539.80	-12.6	H	3.0	41.4	1.0	-53.0	-13.0	-40.0		
3386.40	-10.1	H	3.0	42.1	1.0	-51.2	-13.0	-38.2		
		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement								
		Company:	Samsung							
		Project #:	4789899747							
		Date:	2021-05-18							
		Test Engineer:	22943							
		Configuration:	EUT, X-Position							
		Location:	Chamber 2							
		Mode:	HSDPA Band 5 Harmonics							
		Test Voltage:	DC 3.3 V							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
Band 5										
HSDPA										
Low Ch, 826.4MHz										
1652.80	-15.8	V	3.0	40.7	1.0	-55.5	-13.0	-42.5		
2479.20	-13.1	V	3.0	41.3	1.0	-53.4	-13.0	-40.4		
3305.60	-10.4	V	3.0	42.1	1.0	-51.5	-13.0	-38.5		
1652.80	-15.9	H	3.0	40.7	1.0	-55.6	-13.0	-42.6		
2479.20	-12.9	H	3.0	41.3	1.0	-53.2	-13.0	-40.2		
3305.60	-10.4	H	3.0	42.1	1.0	-51.5	-13.0	-38.5		
Mid Ch, 836.6MHz										
1673.20	-15.8	V	3.0	40.7	1.0	-55.5	-13.0	-42.5		
2509.80	-12.9	V	3.0	41.4	1.0	-53.3	-13.0	-40.3		
3346.40	-10.2	V	3.0	42.1	1.0	-51.2	-13.0	-38.2		
1673.20	-15.7	H	3.0	40.7	1.0	-55.4	-13.0	-42.4		
2509.80	-12.7	H	3.0	41.4	1.0	-53.0	-13.0	-40.0		
3346.40	-10.1	H	3.0	42.1	1.0	-51.2	-13.0	-38.2		
High Ch, 846.6MHz										
1693.20	-15.8	V	3.0	40.7	1.0	-55.5	-13.0	-42.5		
2539.80	-12.8	V	3.0	41.4	1.0	-53.2	-13.0	-40.2		
3386.40	-10.1	V	3.0	42.1	1.0	-51.2	-13.0	-38.2		
1693.20	-15.8	H	3.0	40.7	1.0	-55.5	-13.0	-42.5		
2539.80	-12.5	H	3.0	41.4	1.0	-52.9	-13.0	-39.9		
3386.40	-10.1	H	3.0	42.1	1.0	-51.1	-13.0	-38.1		

		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
		Company:	Samsung								
		Project #:	4789899747								
		Date:	2021-05-18								
		Test Engineer:	22943								
		Configuration:	EUT, X-Position								
		Location:	Chamber 2								
		Mode:	Rel99 Band 4 Harmonics								
		Test Voltage:	DC 3.3 V								
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes		
Band 4											
REL99											
Low Ch, 1712.4MHz											
3424.80	-9.9	V	3.0	42.1	1.0	-51.0	-13.0	-38.0			
5137.20	-9.4	V	3.0	42.8	1.0	-51.2	-13.0	-38.2			
6849.60	-6.7	V	3.0	42.7	1.0	-48.4	-13.0	-35.4			
3424.80	-9.9	H	3.0	42.1	1.0	-51.0	-13.0	-38.0			
5137.20	-8.9	H	3.0	42.8	1.0	-50.8	-13.0	-37.8			
6849.60	-6.7	H	3.0	42.7	1.0	-48.5	-13.0	-35.5			
Mid Ch, 1732.6MHz											
3465.20	-9.4	V	3.0	42.1	1.0	-50.5	-13.0	-37.5			
5197.80	-9.1	V	3.0	42.8	1.0	-50.9	-13.0	-37.9			
6930.40	-6.7	V	3.0	42.7	1.0	-48.4	-13.0	-35.4			
3465.20	-9.4	H	3.0	42.1	1.0	-50.5	-13.0	-37.5			
5197.80	-8.7	H	3.0	42.8	1.0	-50.6	-13.0	-37.6			
6930.40	-6.8	H	3.0	42.7	1.0	-48.5	-13.0	-35.5			
High Ch, 1752.6MHz											
3505.20	-9.0	V	3.0	42.1	1.0	-50.1	-13.0	-37.1			
5257.80	-9.1	V	3.0	42.8	1.0	-51.0	-13.0	-38.0			
7010.40	-6.5	V	3.0	42.7	1.0	-48.2	-13.0	-35.2			
3505.20	-9.0	H	3.0	42.1	1.0	-50.0	-13.0	-37.0			
5257.80	-8.8	H	3.0	42.8	1.0	-50.7	-13.0	-37.7			
7010.40	-6.6	H	3.0	42.7	1.0	-48.3	-13.0	-35.3			
		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
		Company:	Samsung								
		Project #:	4789899747								
		Date:	2021-05-18								
		Test Engineer:	22943								
		Configuration:	EUT, X-Position								
		Location:	Chamber 2								
		Mode:	HSDPA Band 4 Harmonics								
		Test Voltage:	DC 3.3 V								
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes		
Band 4											
HSDPA											
Low Ch, 1712.4MHz											
3424.80	-9.7	V	3.0	42.1	1.0	-50.8	-13.0	-37.8			
5137.20	-9.2	V	3.0	42.8	1.0	-51.0	-13.0	-38.0			
6849.60	-6.6	V	3.0	42.7	1.0	-48.3	-13.0	-35.3			
3424.80	-9.8	H	3.0	42.1	1.0	-50.9	-13.0	-37.9			
5137.20	-8.7	H	3.0	42.8	1.0	-50.5	-13.0	-37.5			
6849.60	-6.6	H	3.0	42.7	1.0	-48.4	-13.0	-35.4			
Mid Ch, 1732.6MHz											
3465.20	-9.4	V	3.0	42.1	1.0	-50.4	-13.0	-37.4			
5197.80	-8.9	V	3.0	42.8	1.0	-50.7	-13.0	-37.7			
6930.40	-6.6	V	3.0	42.7	1.0	-48.3	-13.0	-35.3			
3465.20	-9.4	H	3.0	42.1	1.0	-50.5	-13.0	-37.5			
5197.80	-8.6	H	3.0	42.8	1.0	-50.5	-13.0	-37.5			
6930.40	-6.8	H	3.0	42.7	1.0	-48.5	-13.0	-35.5			
High Ch, 1752.6MHz											
3505.20	-9.0	V	3.0	42.1	1.0	-50.0	-13.0	-37.0			
5257.80	-9.1	V	3.0	42.8	1.0	-51.0	-13.0	-38.0			
7010.40	-6.4	V	3.0	42.7	1.0	-48.0	-13.0	-35.0			
3505.20	-9.0	H	3.0	42.1	1.0	-50.0	-13.0	-37.0			
5257.80	-8.8	H	3.0	42.8	1.0	-50.7	-13.0	-37.7			
7010.40	-6.6	H	3.0	42.7	1.0	-48.3	-13.0	-35.3			

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement										
Company: Samsung Project #: 4789899747 Date: 2021-05-18 Test Engineer: 22943 Configuration: EUT, X-Position Location: Chamber 2 Mode: Rel99 Band 2 Harmonics Test Votage: DC 3.3 V										
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
Band 2 REL99										
Low Ch, 1852.4MHz										
3704.80	-11.9	V	3.0	42.1	1.0	-53.0	-13.0	-40.0		
5557.20	-8.5	V	3.0	42.9	1.0	-50.4	-13.0	-37.4		
7409.60	-6.6	V	3.0	42.5	1.0	-48.1	-13.0	-35.1		
3704.80	-11.9	H	3.0	42.1	1.0	-53.0	-13.0	-40.0		
5557.20	-8.2	H	3.0	42.9	1.0	-50.2	-13.0	-37.2		
7409.60	-6.7	H	3.0	42.5	1.0	-48.2	-13.0	-35.2		
Mid Ch, 1880MHz										
3760.00	-11.7	V	3.0	42.1	1.0	-52.8	-13.0	-39.8		
5640.00	-8.1	V	3.0	42.9	1.0	-50.1	-13.0	-37.1		
7520.00	-6.7	V	3.0	42.4	1.0	-48.1	-13.0	-35.1		
3760.00	-11.7	H	3.0	42.1	1.0	-52.8	-13.0	-39.8		
5640.00	-7.9	H	3.0	42.9	1.0	-49.8	-13.0	-36.8		
7520.00	-6.8	H	3.0	42.4	1.0	-48.3	-13.0	-35.3		
High Ch, 1907.6MHz										
3815.20	-11.7	V	3.0	42.1	1.0	-52.8	-13.0	-39.8		
5722.80	-8.3	V	3.0	42.9	1.0	-50.2	-13.0	-37.2		
7630.40	-6.6	V	3.0	42.4	1.0	-48.0	-13.0	-35.0		
3815.20	-11.8	H	3.0	42.1	1.0	-52.9	-13.0	-39.9		
5722.80	-8.1	H	3.0	42.9	1.0	-50.1	-13.0	-37.1		
7630.40	-6.8	H	3.0	42.4	1.0	-48.1	-13.0	-35.1		
UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement										
Company: Samsung Project #: 4789899747 Date: 2021-05-18 Test Engineer: 22943 Configuration: EUT, X-Position Location: Chamber 2 Mode: HSDPA Band 2 Harmonics Test Votage: DC 3.3 V										
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
Band 2 HSDPA										
Low Ch, 1852.4MHz										
3704.80	-11.9	V	3.0	42.1	1.0	-53.0	-13.0	-40.0		
5557.20	-8.4	V	3.0	42.9	1.0	-50.3	-13.0	-37.3		
7409.60	-6.4	V	3.0	42.5	1.0	-47.9	-13.0	-34.9		
3704.80	-11.8	H	3.0	42.1	1.0	-52.9	-13.0	-39.9		
5557.20	-8.3	H	3.0	42.9	1.0	-50.2	-13.0	-37.2		
7409.60	-6.7	H	3.0	42.5	1.0	-48.2	-13.0	-35.2		
Mid Ch, 1880MHz										
3760.00	-11.7	V	3.0	42.1	1.0	-52.8	-13.0	-39.8		
5640.00	-8.0	V	3.0	42.9	1.0	-50.0	-13.0	-37.0		
7520.00	-6.7	V	3.0	42.4	1.0	-48.1	-13.0	-35.1		
3760.00	-11.8	H	3.0	42.1	1.0	-52.8	-13.0	-39.8		
5640.00	-7.9	H	3.0	42.9	1.0	-49.8	-13.0	-36.8		
7520.00	-6.7	H	3.0	42.4	1.0	-48.2	-13.0	-35.2		
High Ch, 1907.6MHz										
3815.20	-11.6	V	3.0	42.1	1.0	-52.7	-13.0	-39.7		
5722.80	-8.2	V	3.0	42.9	1.0	-50.2	-13.0	-37.2		
7630.40	-6.6	V	3.0	42.4	1.0	-48.0	-13.0	-35.0		
3815.20	-11.7	H	3.0	42.1	1.0	-52.8	-13.0	-39.8		
5722.80	-8.1	H	3.0	42.9	1.0	-50.0	-13.0	-37.0		
7630.40	-6.7	H	3.0	42.4	1.0	-48.1	-13.0	-35.1		

LTE Band 2

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4789899747							
Date:		2021-05-13							
Test Engineer:		19568							
Configuration:		EUT, X-Position							
Location:		Chamber 1							
Mode:		LTE_QPSK Band 5 Harmonics, 5MHz Bandwidth							
Test Voltage:		DC 3.3 V							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
5MHz QPSK									
Low Ch, 826.5MHz									
1653.00	-13.8	V	3.0	45.3	1.0	-58.1	-13.0	-45.1	
2479.50	-10.7	V	3.0	45.1	1.0	-54.8	-13.0	-41.8	
3306.00	-9.3	V	3.0	45.3	1.0	-53.7	-13.0	-40.7	
1653.00	-15.0	H	3.0	45.3	1.0	-59.2	-13.0	-46.2	
2479.50	-11.6	H	3.0	45.1	1.0	-55.7	-13.0	-42.7	
3306.00	-9.3	H	3.0	45.3	1.0	-53.7	-13.0	-40.7	
Mid Ch, 836.5MHz									
1673.00	-13.7	V	3.0	45.3	1.0	-57.9	-13.0	-44.9	
2509.50	-10.6	V	3.0	45.1	1.0	-54.7	-13.0	-41.7	
3346.00	-9.6	V	3.0	45.3	1.0	-53.9	-13.0	-40.9	
1673.00	-15.3	H	3.0	45.3	1.0	-59.6	-13.0	-46.6	
2509.50	-11.5	H	3.0	45.1	1.0	-55.6	-13.0	-42.6	
3346.00	-9.1	H	3.0	45.3	1.0	-53.5	-13.0	-40.5	
High Ch, 846.5MHz									
1693.00	-13.5	V	3.0	45.2	1.0	-57.8	-13.0	-44.8	
2539.50	-10.6	V	3.0	45.1	1.0	-54.7	-13.0	-41.7	
3386.00	-9.0	V	3.0	45.3	1.0	-53.3	-13.0	-40.3	
1693.00	-15.0	H	3.0	45.2	1.0	-59.3	-13.0	-46.3	
2539.50	-11.6	H	3.0	45.1	1.0	-55.7	-13.0	-42.7	
3386.00	-9.0	H	3.0	45.3	1.0	-53.3	-13.0	-40.3	

LTE Band 7

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4789899747							
Date:		2021-05-18							
Test Engineer:		19227							
Configuration:		EUT, X-Position							
Location:		Chamber 2							
Mode:		LTE_QPSK Band 7 Harmonics, 5MHz Bandwidth							
Test Voltage:		DC 3.3 V							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
5MHz QPSK									
Low Ch, 2502.5MHz									
5005.00	-21.3	V	3.0	42.8	1.0	-63.1	-25.0	-38.1	
7507.50	-19.7	V	3.0	42.4	1.0	-61.1	-25.0	-36.1	
10010.00	-16.6	V	3.0	40.9	1.0	-56.5	-25.0	-31.5	
5005.00	-20.3	H	3.0	42.8	1.0	-62.1	-25.0	-37.1	
7507.50	-19.8	H	3.0	42.4	1.0	-61.3	-25.0	-36.3	
10010.00	-16.4	H	3.0	40.9	1.0	-56.3	-25.0	-31.3	
Mid Ch, 2535MHz									
5070.00	-21.1	V	3.0	42.8	1.0	-62.9	-25.0	-37.9	
7605.00	-19.6	V	3.0	42.4	1.0	-61.0	-25.0	-36.0	
10140.00	-16.5	V	3.0	40.9	1.0	-56.4	-25.0	-31.4	
5070.00	-20.8	H	3.0	42.8	1.0	-62.6	-25.0	-37.6	
7605.00	-19.8	H	3.0	42.4	1.0	-61.2	-25.0	-36.2	
10140.00	-16.4	H	3.0	40.9	1.0	-56.3	-25.0	-31.3	
High Ch, 2567.5MHz									
5135.00	-21.7	V	3.0	42.8	1.0	-63.5	-25.0	-38.5	
7702.50	-19.1	V	3.0	42.3	1.0	-60.5	-25.0	-35.5	
10270.00	-15.9	V	3.0	41.0	1.0	-55.9	-25.0	-30.9	
5135.00	-21.1	H	3.0	42.8	1.0	-62.9	-25.0	-37.9	
7702.50	-19.5	H	3.0	42.3	1.0	-60.9	-25.0	-35.9	
10270.00	-16.2	H	3.0	41.0	1.0	-56.1	-25.0	-31.1	

LTE Band 12

		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
		f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
5MHz QPSK	Company: Samsung Project #: 4789899747 Date: 2021-05-13 Test Engineer: 19568 Configuration: EUT, Y-Position Location: Chamber 1 Mode: LTE_QPSK Band 12 Harmonics, 5MHz Bandwidth Test Votage: DC 3.3 V										
	Low Ch, 701.5MHz										
	1403.00	-15.4	V	3.0	45.5	1.0	-59.9	-13.0	-46.9		
	2104.50	-11.7	V	3.0	45.0	1.0	-55.7	-13.0	-42.7		
	2806.00	-10.4	V	3.0	45.2	1.0	-54.5	-13.0	-41.5		
	1403.00	-16.8	H	3.0	45.5	1.0	-61.3	-13.0	-48.3		
	2104.50	-13.1	H	3.0	45.0	1.0	-57.2	-13.0	-44.2		
	2806.00	-10.5	H	3.0	45.2	1.0	-54.6	-13.0	-41.6		
	Mid Ch, 707.5MHz										
	1415.00	-15.4	V	3.0	45.5	1.0	-59.8	-13.0	-46.8		
	2122.50	-11.7	V	3.0	45.0	1.0	-55.8	-13.0	-42.8		
	2830.00	-10.4	V	3.0	45.2	1.0	-54.6	-13.0	-41.6		
	1415.00	-16.9	H	3.0	45.5	1.0	-61.3	-13.0	-48.3		
	2122.50	-13.0	H	3.0	45.0	1.0	-57.0	-13.0	-44.0		
	2830.00	-10.5	H	3.0	45.2	1.0	-54.6	-13.0	-41.6		
	High Ch, 713.5MHz										
	1427.00	-15.1	V	3.0	45.4	1.0	-59.6	-13.0	-46.6		
	2140.50	-11.5	V	3.0	45.0	1.0	-55.5	-13.0	-42.5		
	2854.00	-10.0	V	3.0	45.2	1.0	-54.2	-13.0	-41.2		
	1427.00	-16.6	H	3.0	45.4	1.0	-61.1	-13.0	-48.1		
	2140.50	-13.1	H	3.0	45.0	1.0	-57.1	-13.0	-44.1		
	2854.00	-10.3	H	3.0	45.2	1.0	-54.5	-13.0	-41.5		

LTE Band 13

		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
		f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
5MHz QPSK	Company: Samsung Project #: 4789899747 Date: 2021-05-13 Test Engineer: 19568 Configuration: EUT, Y-Position Location: Chamber 1 Mode: LTE_QPSK Band 13 Harmonics, 5MHz Bandwidth Test Votage: DC 3.3 V										
	Low Ch, 779.5MHz										
	1559.00	-23.9	V	3.0	45.3	1.0	-68.2	-40.0	-28.2		
	2338.50	-11.0	V	3.0	45.1	1.0	-55.0	-13.0	-42.0		
	3118.00	-10.0	V	3.0	45.3	1.0	-54.3	-13.0	-41.3		
	1559.00	-25.4	H	3.0	45.3	1.0	-69.7	-40.0	-29.7		
	2338.50	-12.1	H	3.0	45.1	1.0	-56.1	-13.0	-43.1		
	3118.00	-9.7	H	3.0	45.3	1.0	-53.9	-13.0	-40.9		
	Mid Ch, 782MHz										
	1564.00	-23.9	V	3.0	45.3	1.0	-68.3	-40.0	-28.3		
	2346.00	-11.0	V	3.0	45.1	1.0	-55.1	-13.0	-42.1		
	3128.00	-9.7	V	3.0	45.3	1.0	-53.9	-13.0	-40.9		
	1564.00	-25.6	H	3.0	45.3	1.0	-69.9	-40.0	-29.9		
	2346.00	-12.1	H	3.0	45.1	1.0	-56.2	-13.0	-43.2		
	3128.00	-9.7	H	3.0	45.3	1.0	-54.0	-13.0	-41.0		
	High Ch, 784.5MHz										
	1569.00	-23.9	V	3.0	45.3	1.0	-68.2	-40.0	-28.2		
	2353.50	-10.8	V	3.0	45.1	1.0	-54.9	-13.0	-41.9		
	3138.00	-9.9	V	3.0	45.3	1.0	-54.2	-13.0	-41.2		
	1569.00	-25.6	H	3.0	45.3	1.0	-69.9	-40.0	-29.9		
	2353.50	-12.1	H	3.0	45.1	1.0	-56.1	-13.0	-43.1		
	3138.00	-9.8	H	3.0	45.3	1.0	-54.0	-13.0	-41.0		

Note : No narrowband emissions so only applied the -70dBW/MHz (-40dBm/MHz) wideband emission limit for the 1559-1610 MHz band

LTE Band 14

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4789899747							
Date:		2021-05-13							
Test Engineer:		20882							
Configuration:		EUT, X-Position							
Location:		Chamber 1							
Mode:		LTE_QPSK Band 14 Harmonics, 5MHz Bandwidth							
Test Voltage:		DC 3.3 V							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
5MHz QPSK									
Low Ch, 790.5MHz									
1581.00	-23.8	V	3.0	45.3	1.0	-68.1	-40.0	-28.1	
2371.50	-11.1	V	3.0	45.1	1.0	-55.2	-13.0	-42.2	
3162.00	-9.9	V	3.0	45.3	1.0	-54.2	-13.0	-41.2	
1581.00	-25.2	H	3.0	45.3	1.0	-69.5	-40.0	-29.5	
2371.50	-12.1	H	3.0	45.1	1.0	-56.2	-13.0	-43.2	
3162.00	-9.6	H	3.0	45.3	1.0	-53.8	-13.0	-40.8	
Mid Ch, 793MHz									
1586.00	-23.8	V	3.0	45.3	1.0	-68.1	-40.0	-28.1	
2379.00	-11.1	V	3.0	45.1	1.0	-55.1	-13.0	-42.1	
3172.00	-9.8	V	3.0	45.3	1.0	-54.1	-13.0	-41.1	
1586.00	-25.3	H	3.0	45.3	1.0	-69.6	-40.0	-29.6	
2379.00	-12.0	H	3.0	45.1	1.0	-56.0	-13.0	-43.0	
3172.00	-9.7	H	3.0	45.3	1.0	-54.0	-13.0	-41.0	
High Ch, 795.5MHz									
1591.00	-23.6	V	3.0	45.3	1.0	-67.9	-40.0	-27.9	
2386.50	-11.1	V	3.0	45.1	1.0	-55.1	-13.0	-42.1	
3182.00	-9.8	V	3.0	45.3	1.0	-54.1	-13.0	-41.1	
1591.00	-25.1	H	3.0	45.3	1.0	-69.5	-40.0	-29.5	
2386.50	-12.1	H	3.0	45.1	1.0	-56.2	-13.0	-43.2	
3182.00	-9.8	H	3.0	45.3	1.0	-54.1	-13.0	-41.1	

LTE Band 25

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4789899747							
Date:		2021-05-18							
Test Engineer:		19227							
Configuration:		EUT, X-Position							
Location:		Chamber 2							
Mode:		LTE_QPSK Band 25 Harmonics, 5MHz Bandwidth							
Test Voltage:		DC 3.3 V							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
5MHz QPSK									
Low Ch, 1852.5MHz									
3705.00	-11.8	V	3.0	42.1	1.0	-52.9	-13.0	-39.9	
5557.50	-8.4	V	3.0	42.9	1.0	-50.3	-13.0	-37.3	
7410.00	-6.5	V	3.0	42.5	1.0	-48.0	-13.0	-35.0	
3705.00	-11.8	H	3.0	42.1	1.0	-52.9	-13.0	-39.9	
5557.50	-8.1	H	3.0	42.9	1.0	-50.0	-13.0	-37.0	
7410.00	-6.7	H	3.0	42.5	1.0	-48.1	-13.0	-35.1	
Mid Ch, 1882.5MHz									
3765.00	-11.4	V	3.0	42.1	1.0	-52.5	-13.0	-39.5	
5647.50	-7.8	V	3.0	42.9	1.0	-49.8	-13.0	-36.8	
7530.00	-6.6	V	3.0	42.4	1.0	-48.1	-13.0	-35.1	
3765.00	-11.7	H	3.0	42.1	1.0	-52.8	-13.0	-39.8	
5647.50	-7.9	H	3.0	42.9	1.0	-49.8	-13.0	-36.8	
7530.00	-6.7	H	3.0	42.4	1.0	-48.1	-13.0	-35.1	
High Ch, 1912.5MHz									
3825.00	-11.4	V	3.0	42.1	1.0	-52.5	-13.0	-39.5	
5737.50	-7.9	V	3.0	43.0	1.0	-49.9	-13.0	-36.9	
7650.00	-6.6	V	3.0	42.4	1.0	-47.9	-13.0	-34.9	
3825.00	-11.5	H	3.0	42.1	1.0	-52.6	-13.0	-39.6	
5737.50	-8.0	H	3.0	43.0	1.0	-49.9	-13.0	-36.9	
7650.00	-6.7	H	3.0	42.4	1.0	-48.1	-13.0	-35.1	

LTE Band 30

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4789899747							
Date:		2021-05-18							
Test Engineer:		19568							
Configuration:		EUT, Z-Position							
Location:		Chamber 2							
Mode:		LTE_QPSK Band 30 Harmonics, 5MHz Bandwidth							
Test Voltage:		DC 3.3V							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
5MHz QPSK									
Low Ch, 2307.5MHz									
4615.00	-21.1	V	3.0	42.5	1.0	-62.6	-40.0	-22.6	
6922.50	-24.3	V	3.0	42.7	1.0	-66.0	-40.0	-26.0	
9230.00	-18.9	V	3.0	41.6	1.0	-59.4	-40.0	-19.4	
4615.00	-17.1	H	3.0	42.5	1.0	-58.6	-40.0	-18.6	
6922.50	-23.9	H	3.0	42.7	1.0	-65.7	-40.0	-25.7	
9230.00	-18.6	H	3.0	41.6	1.0	-59.2	-40.0	-19.2	
Mid Ch, 2310MHz									
4620.00	-20.5	V	3.0	42.5	1.0	-62.0	-40.0	-22.0	
6930.00	-23.0	V	3.0	42.7	1.0	-64.7	-40.0	-24.7	
9240.00	-19.1	V	3.0	41.6	1.0	-59.6	-40.0	-19.6	
4620.00	-22.9	H	3.0	42.5	1.0	-64.5	-40.0	-24.5	
6930.00	-23.0	H	3.0	42.7	1.0	-64.7	-40.0	-24.7	
9240.00	-21.0	H	3.0	41.6	1.0	-61.6	-40.0	-21.6	
High Ch, 2312.5MHz									
4625.00	-19.5	V	3.0	42.5	1.0	-61.0	-40.0	-21.0	
6937.50	-24.5	V	3.0	42.7	1.0	-66.2	-40.0	-26.2	
9250.00	-18.3	V	3.0	41.6	1.0	-58.8	-40.0	-18.8	
4625.00	-16.2	H	3.0	42.5	1.0	-57.7	-40.0	-17.7	
6937.50	-24.6	H	3.0	42.7	1.0	-66.3	-40.0	-26.3	
9250.00	-18.5	H	3.0	41.6	1.0	-59.0	-40.0	-19.0	

LTE Band 41(PC2)

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4789899747							
Date:		2021-05-18							
Test Engineer:		22943							
Configuration:		EUT, Y-Position							
Location:		Chamber 2							
Mode:		LTE_QPSK Band 41 Harmonics, 20MHz Bandwidth							
Test Voltage:		DC 3.3 V							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
20MHz QPSK									
Low Ch, 2506MHz									
5012.00	-18.3	V	3.0	42.8	1.0	-60.1	-25.0	-35.1	
7518.00	-17.1	V	3.0	42.4	1.0	-58.5	-25.0	-33.5	
10024.00	-15.8	V	3.0	40.9	1.0	-55.7	-25.0	-30.7	
5012.00	-18.2	H	3.0	42.8	1.0	-60.0	-25.0	-35.0	
7518.00	-18.7	H	3.0	42.4	1.0	-60.1	-25.0	-35.1	
10024.00	-15.7	H	3.0	40.9	1.0	-55.5	-25.0	-30.5	
Mid Ch, 2593MHz									
5186.00	-18.4	V	3.0	42.8	1.0	-60.2	-25.0	-35.2	
7779.00	-17.6	V	3.0	42.3	1.0	-58.9	-25.0	-33.9	
10372.00	-13.4	V	3.0	41.0	1.0	-53.4	-25.0	-28.4	
5186.00	-17.5	H	3.0	42.8	1.0	-59.3	-25.0	-34.3	
7779.00	-18.8	H	3.0	42.3	1.0	-60.1	-25.0	-35.1	
10372.00	-13.3	H	3.0	41.0	1.0	-53.3	-25.0	-28.3	
High Ch, 2680MHz									
5360.00	-17.4	V	3.0	42.9	1.0	-59.3	-25.0	-34.3	
8040.00	-18.0	V	3.0	42.2	1.0	-59.2	-25.0	-34.2	
10720.00	-12.4	V	3.0	41.2	1.0	-52.5	-25.0	-27.5	
5360.00	-17.2	H	3.0	42.9	1.0	-59.0	-25.0	-34.0	
8040.00	-16.0	H	3.0	42.2	1.0	-57.2	-25.0	-32.2	
10720.00	-12.8	H	3.0	41.2	1.0	-53.0	-25.0	-28.0	

LTE Band 66

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4789899747							
Date:		2021-05-18							
Test Engineer:		19227							
Configuration:		EUT, X-Position							
Location:		Chamber 2							
Mode:		LTE_QPSK Band 66 Harmonics, 20MHz Bandwidth							
Test Voltage:		DC 3.3 V							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1720MHz									
3440.00	-9.9	V	3.0	42.1	1.0	-50.9	-13.0	-37.9	
5160.00	-9.2	V	3.0	42.8	1.0	-51.0	-13.0	-38.0	
6880.00	-6.5	V	3.0	42.7	1.0	-48.3	-13.0	-35.3	
3440.00	-9.8	H	3.0	42.1	1.0	-50.8	-13.0	-37.8	
5160.00	-8.8	H	3.0	42.8	1.0	-50.6	-13.0	-37.6	
6880.00	-6.6	H	3.0	42.7	1.0	-48.4	-13.0	-35.4	
Mid Ch, 1745MHz									
3490.00	-9.3	V	3.0	42.1	1.0	-50.3	-13.0	-37.3	
5235.00	-9.1	V	3.0	42.8	1.0	-51.0	-13.0	-38.0	
6980.00	-6.6	V	3.0	42.7	1.0	-48.3	-13.0	-35.3	
3490.00	-9.3	H	3.0	42.1	1.0	-50.4	-13.0	-37.4	
5235.00	-8.8	H	3.0	42.8	1.0	-50.6	-13.0	-37.6	
6980.00	-6.6	H	3.0	42.7	1.0	-48.4	-13.0	-35.4	
High Ch, 1770MHz									
3540.00	-8.7	V	3.0	42.1	1.0	-49.8	-13.0	-36.8	
5310.00	-8.7	V	3.0	42.9	1.0	-50.5	-13.0	-37.5	
7080.00	-6.3	V	3.0	42.7	1.0	-48.0	-13.0	-35.0	
3540.00	-8.8	H	3.0	42.1	1.0	-49.9	-13.0	-36.9	
5310.00	-8.4	H	3.0	42.9	1.0	-50.3	-13.0	-37.3	
7080.00	-6.6	H	3.0	42.7	1.0	-48.2	-13.0	-35.2	

LTE Band 71

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4789899747							
Date:		2021-05-13							
Test Engineer:		19227							
Configuration:		EUT, X-Position							
Location:		Chamber 1							
Mode:		LTE_QPSK Band 71 Harmonics, 20MHz Bandwidth							
Test Voltage:		DC 3.3 V							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 673MHz									
1346.00	-15.8	V	3.0	45.5	1.0	-60.3	-13.0	-47.3	
2019.00	-11.9	V	3.0	45.0	1.0	-55.9	-13.0	-42.9	
2692.00	-10.7	V	3.0	45.1	1.0	-54.8	-13.0	-41.8	
1346.00	-17.4	H	3.0	45.5	1.0	-61.9	-13.0	-48.9	
2019.00	-13.6	H	3.0	45.0	1.0	-57.6	-13.0	-44.6	
2692.00	-11.1	H	3.0	45.1	1.0	-55.2	-13.0	-42.2	
Mid Ch, 680.5MHz									
1361.00	-15.8	V	3.0	45.5	1.0	-60.3	-13.0	-47.3	
2041.50	-11.8	V	3.0	45.0	1.0	-55.8	-13.0	-42.8	
2722.00	-10.7	V	3.0	45.1	1.0	-54.9	-13.0	-41.9	
1361.00	-17.3	H	3.0	45.5	1.0	-61.8	-13.0	-48.8	
2041.50	-13.4	H	3.0	45.0	1.0	-57.4	-13.0	-44.4	
2722.00	-11.1	H	3.0	45.1	1.0	-55.2	-13.0	-42.2	
High Ch, 688MHz									
1376.00	-15.6	V	3.0	45.5	1.0	-60.1	-13.0	-47.1	
2064.00	-11.7	V	3.0	45.0	1.0	-55.7	-13.0	-42.7	
2752.00	-10.5	V	3.0	45.2	1.0	-54.7	-13.0	-41.7	
1376.00	-17.1	H	3.0	45.5	1.0	-61.6	-13.0	-48.6	
2064.00	-13.4	H	3.0	45.0	1.0	-57.4	-13.0	-44.4	
2752.00	-10.8	H	3.0	45.2	1.0	-55.0	-13.0	-42.0	

LTE Band 2

LTE Band 2(Frequency range: 1850-1910 MHz) is covered by LTE Band 25 (Frequency range: 1850-1915 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

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.

LTE Band 17

LTE Band 17 (Frequency range: 704-716 MHz) is covered by LTE Band 12 (Frequency range: 699-716 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

LTE Band41(PC3)

LTE Band 41(PC3, Frequency range : 2496-2690 MHz) is covered by LTE Band 41(PC2) (Frequency range: 2496-2690 MHz) due to same frequency range, same channel bandwidth and maximum tune-up limit is higher than LTE Band41(PC3).

NR Band 2

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4789899747							
Date:		2021-05-31							
Test Engineer:		20882							
Configuration:		EUT, X-Position							
Location:		Chamber 1							
Mode:		LTE_QPSK NR n2 Harmonics, 20MHz Bandwidth							
Test Voltage:		DC 3.3V							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1860MHz									
3720.00	-11.3	V	3.0	45.5	1.0	-55.8	-13.0	-42.8	
5580.00	-8.6	V	3.0	45.4	1.0	-53.0	-13.0	-40.0	
7440.00	-5.9	V	3.0	44.2	1.0	-49.1	-13.0	-36.1	
3720.00	-10.8	H	3.0	45.5	1.0	-55.2	-13.0	-42.2	
5580.00	-8.6	H	3.0	45.4	1.0	-53.0	-13.0	-40.0	
7440.00	-5.7	H	3.0	44.2	1.0	-48.9	-13.0	-35.9	
Mid Ch, 1880MHz									
3760.00	-11.0	V	3.0	45.5	1.0	-55.5	-13.0	-42.5	
5640.00	-8.6	V	3.0	45.4	1.0	-53.0	-13.0	-40.0	
7520.00	-6.0	V	3.0	44.1	1.0	-49.2	-13.0	-36.2	
3760.00	-10.9	H	3.0	45.5	1.0	-55.3	-13.0	-42.3	
5640.00	-8.6	H	3.0	45.4	1.0	-52.9	-13.0	-39.9	
7520.00	-5.9	H	3.0	44.1	1.0	-49.1	-13.0	-36.1	
High Ch, 1900MHz									
3800.00	-11.0	V	3.0	45.5	1.0	-55.4	-13.0	-42.4	
5700.00	-8.6	V	3.0	45.4	1.0	-53.0	-13.0	-40.0	
7600.00	-5.9	V	3.0	44.1	1.0	-49.0	-13.0	-36.0	
3800.00	-10.7	H	3.0	45.5	1.0	-55.2	-13.0	-42.2	
5700.00	-8.5	H	3.0	45.4	1.0	-52.9	-13.0	-39.9	
7600.00	-5.8	H	3.0	44.1	1.0	-48.9	-13.0	-35.9	

20MHz
DFT-s
QPSK

NR Band 5

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4789899747							
Date:		2021-05-31							
Test Engineer:		20881							
Configuration:		EUT, X-Position							
Location:		Chamber 1							
Mode:		LTE_QPSK NR n5 Harmonics, 15MHz Bandwidth							
Test Voltage:		DC 3.3 V							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 831.5MHz									
1663.00	-13.9	V	3.0	45.3	1.0	-58.2	-13.0	-45.2	
2494.50	-11.0	V	3.0	45.1	1.0	-55.1	-13.0	-42.1	
3326.00	-9.7	V	3.0	45.3	1.0	-54.0	-13.0	-41.0	
1663.00	-15.3	H	3.0	45.3	1.0	-59.6	-13.0	-46.6	
2494.50	-11.9	H	3.0	45.1	1.0	-56.0	-13.0	-43.0	
3326.00	-9.4	H	3.0	45.3	1.0	-53.7	-13.0	-40.7	
Mid Ch, 836.5MHz									
1673.00	-13.9	V	3.0	45.3	1.0	-58.2	-13.0	-45.2	
2509.50	-11.6	V	3.0	45.1	1.0	-55.7	-13.0	-42.7	
3346.00	-9.7	V	3.0	45.3	1.0	-54.0	-13.0	-41.0	
1673.00	-15.4	H	3.0	45.3	1.0	-59.6	-13.0	-46.6	
2509.50	-11.9	H	3.0	45.1	1.0	-56.0	-13.0	-43.0	
3346.00	-9.4	H	3.0	45.3	1.0	-53.8	-13.0	-40.8	
High Ch, 841.5MHz									
1683.00	-13.9	V	3.0	45.2	1.0	-58.1	-13.0	-45.1	
2524.50	-11.1	V	3.0	45.1	1.0	-55.2	-13.0	-42.2	
3366.00	-9.5	V	3.0	45.3	1.0	-53.8	-13.0	-40.8	
1683.00	-15.4	H	3.0	45.2	1.0	-59.6	-13.0	-46.6	
2524.50	-11.9	H	3.0	45.1	1.0	-56.0	-13.0	-43.0	
3366.00	-9.2	H	3.0	45.3	1.0	-53.6	-13.0	-40.6	

15MHz
DFT-s
QPSK

NR Band 41#0

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4789899747							
Date:		2021-06-04							
Test Engineer:		20881							
Configuration:		EUT, Z-Position							
Location:		Chamber 1							
Mode:		NR_QPSK n41 Harmonics, 100MHz Bandwidth							
Test Voltage:		AC 120 V, 60 Hz							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
100MHz DFT-s QPSK									
Low Ch, 2546.01MHz									
5092.02	-19.3	V	3.0	45.5	1.0	-63.7	-25.0	-38.7	
7638.03	3.4	V	3.0	44.1	1.0	-39.7	-25.0	-14.7	
10184.04	-14.3	V	3.0	42.3	1.0	-55.6	-25.0	-30.6	
5092.02	-18.7	H	3.0	45.5	1.0	-63.2	-25.0	-38.2	
7638.03	8.2	H	3.0	44.1	1.0	-34.9	-25.0	-9.9	
10184.04	-14.4	H	3.0	42.3	1.0	-55.7	-25.0	-30.7	
Mid Ch, 2592.99MHz									
5185.98	-19.1	V	3.0	45.4	1.0	-63.5	-25.0	-38.5	
7778.97	1.5	V	3.0	44.0	1.0	-41.5	-25.0	-16.5	
10371.96	-14.2	V	3.0	42.4	1.0	-55.5	-25.0	-30.5	
5185.98	-18.8	H	3.0	45.4	1.0	-63.2	-25.0	-38.2	
7778.97	7.4	H	3.0	44.0	1.0	-35.6	-25.0	-10.6	
10371.96	-14.2	H	3.0	42.4	1.0	-55.6	-25.0	-30.6	
High Ch, 2640MHz									
5280.00	-18.7	V	3.0	45.4	1.0	-63.1	-25.0	-38.1	
7920.00	3.3	V	3.0	43.9	1.0	-39.6	-25.0	-14.6	
10560.00	-14.0	V	3.0	42.4	1.0	-55.4	-25.0	-30.4	
5280.00	-18.2	H	3.0	45.4	1.0	-62.7	-25.0	-37.7	
7920.00	9.4	H	3.0	43.9	1.0	-33.6	-25.0	-8.6	
10560.00	-13.8	H	3.0	42.4	1.0	-55.2	-25.0	-30.2	

NR Band 41#1

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4789899747							
Date:		2021-06-04							
Test Engineer:		20881							
Configuration:		EUT, Z-Position							
Location:		Chamber 1							
Mode:		NR_QPSK n41 Harmonics, 30MHz Bandwidth							
Test Voltage:		AC 120 V, 60 Hz							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
30MHz DFT-s QPSK									
Low Ch, 2511MHz									
5022.00	-16.6	V	3.0	45.5	1.0	-61.1	-25.0	-36.1	
7533.00	-15.9	V	3.0	44.1	1.0	-59.1	-25.0	-34.1	
10044.00	-12.8	V	3.0	42.3	1.0	-54.0	-25.0	-29.0	
5022.00	-16.8	H	3.0	45.5	1.0	-61.3	-25.0	-36.3	
7533.00	-15.4	H	3.0	44.1	1.0	-58.5	-25.0	-33.5	
10044.00	-12.5	H	3.0	42.3	1.0	-53.8	-25.0	-28.8	
Mid Ch, 2592.99MHz									
5185.98	-16.8	V	3.0	45.4	1.0	-61.2	-25.0	-36.2	
7778.97	-15.6	V	3.0	44.0	1.0	-58.6	-25.0	-33.6	
10371.96	-12.4	V	3.0	42.4	1.0	-53.8	-25.0	-28.8	
5185.98	-16.6	H	3.0	45.4	1.0	-61.1	-25.0	-36.1	
7778.97	-15.6	H	3.0	44.0	1.0	-58.6	-25.0	-33.6	
10371.96	-12.8	H	3.0	42.4	1.0	-54.1	-25.0	-29.1	
High Ch, 2674.98MHz									
5349.96	-16.4	V	3.0	45.4	1.0	-60.8	-25.0	-35.8	
8024.94	-15.5	V	3.0	43.9	1.0	-58.3	-25.0	-33.3	
10699.92	-12.2	V	3.0	42.5	1.0	-53.7	-25.0	-28.7	
5349.96	-15.8	H	3.0	45.4	1.0	-60.2	-25.0	-35.2	
8024.94	-15.7	H	3.0	43.9	1.0	-58.6	-25.0	-33.6	
10699.92	-12.2	H	3.0	42.5	1.0	-53.6	-25.0	-28.6	

NR Band 66

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4789899747							
Date:		2021-06-02							
Test Engineer:		20882							
Configuration:		EUT, X-Position							
Location:		Chamber 1							
Mode:		LTE_QPSK NR n66 Harmonics, 20MHz Bandwidth							
Test Voltage:		AC 120 V, 60 Hz							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1720MHz									
3440.00	-8.8	V	3.0	45.4	1.0	-53.1	-13.0	-40.1	
5160.00	-9.2	V	3.0	45.4	1.0	-53.6	-13.0	-40.6	
6880.00	-6.6	V	3.0	44.5	1.0	-50.1	-13.0	-37.1	
3440.00	-8.3	H	3.0	45.4	1.0	-52.6	-13.0	-39.6	
5160.00	-9.1	H	3.0	45.4	1.0	-53.6	-13.0	-40.6	
6880.00	-6.1	H	3.0	44.5	1.0	-49.6	-13.0	-36.6	
Mid Ch, 1745MHz									
3490.00	-8.4	V	3.0	45.4	1.0	-52.7	-13.0	-39.7	
5235.00	-9.1	V	3.0	45.4	1.0	-53.6	-13.0	-40.6	
6980.00	-6.4	V	3.0	44.4	1.0	-49.9	-13.0	-36.9	
3490.00	-8.2	H	3.0	45.4	1.0	-52.6	-13.0	-39.6	
5235.00	-8.5	H	3.0	45.4	1.0	-53.0	-13.0	-40.0	
6980.00	-6.1	H	3.0	44.4	1.0	-49.5	-13.0	-36.5	
High Ch, 1770MHz									
3540.00	-8.0	V	3.0	45.4	1.0	-52.4	-13.0	-39.4	
5310.00	-8.9	V	3.0	45.4	1.0	-53.4	-13.0	-40.4	
7080.00	-6.1	V	3.0	44.4	1.0	-49.5	-13.0	-36.5	
3540.00	-8.0	H	3.0	45.4	1.0	-52.4	-13.0	-39.4	
5310.00	-8.8	H	3.0	45.4	1.0	-53.2	-13.0	-40.2	
7080.00	-5.9	H	3.0	44.4	1.0	-49.3	-13.0	-36.3	

NR Band 71

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4789899747							
Date:		2021-05-31							
Test Engineer:		20881							
Configuration:		EUT, X-Position							
Location:		Chamber 1							
Mode:		LTE_QPSK NR_n71 Harmonics, 15MHz Bandwidth							
Test Voltage:		DC 3.3 V							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 670.5MHz									
1341.00	-16.6	V	3.0	45.5	1.0	-61.1	-13.0	-48.1	
2011.50	-12.7	V	3.0	45.0	1.0	-56.7	-13.0	-43.7	
2682.00	-11.2	V	3.0	45.1	1.0	-55.4	-13.0	-42.4	
1341.00	-18.1	H	3.0	45.5	1.0	-62.6	-13.0	-49.6	
2011.50	-14.2	H	3.0	45.0	1.0	-58.2	-13.0	-45.2	
2682.00	-11.6	H	3.0	45.1	1.0	-55.8	-13.0	-42.8	
Mid Ch, 680.5MHz									
1361.00	-16.4	V	3.0	45.5	1.0	-60.9	-13.0	-47.9	
2041.50	-12.5	V	3.0	45.0	1.0	-56.5	-13.0	-43.5	
2722.00	-11.1	V	3.0	45.1	1.0	-55.2	-13.0	-42.2	
1361.00	-18.0	H	3.0	45.5	1.0	-62.5	-13.0	-49.5	
2041.50	-14.2	H	3.0	45.0	1.0	-58.2	-13.0	-45.2	
2722.00	-11.4	H	3.0	45.1	1.0	-55.5	-13.0	-42.5	
High Ch, 690.5MHz									
1381.00	-16.3	V	3.0	45.5	1.0	-60.8	-13.0	-47.8	
2071.50	-12.4	V	3.0	45.0	1.0	-56.4	-13.0	-43.4	
2762.00	-10.6	V	3.0	45.2	1.0	-54.8	-13.0	-41.8	
1381.00	-17.8	H	3.0	45.5	1.0	-62.3	-13.0	-49.3	
2071.50	-13.9	H	3.0	45.0	1.0	-57.9	-13.0	-44.9	
2762.00	-11.0	H	3.0	45.2	1.0	-55.2	-13.0	-42.2	

NR Band 77(3450 – 3550 MHz)

100MHz DFT-s QPSK		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
		f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
		Company: Samsung Project #: 4789899747 Date: 2021-07-01 Test Engineer: 20881 Configuration: EUT, Y-Position Location: Chamber 1 Mode: NR_QPSK n77 Harmonics, 100MHz Bandwidth Test Voltage: DC 3.3 V									
		Mid Ch, 3499.98MHz									
		6999.96	-4.1	V	3.0	44.4	1.0	-47.5	-13.0	-34.5	
		10499.94	0.5	V	3.0	42.4	1.0	-40.9	-13.0	-27.9	
		13999.92	4.4	V	3.0	44.5	1.0	-39.2	-13.0	-26.2	
		6999.96	-3.9	H	3.0	44.4	1.0	-47.3	-13.0	-34.3	
		10499.94	0.7	H	3.0	42.4	1.0	-40.7	-13.0	-27.7	
		13999.92	4.6	H	3.0	44.5	1.0	-38.9	-13.0	-25.9	

NR Band 77(3700 – 3980 MHz)

60MHz DFT-s QPSK		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
		f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
		Company: Samsung Project #: 4789893923 Date: 2021-07-01 Test Engineer: 20881 Configuration: EUT, Y-Position Location: Chamber 1 Mode: NR_QPSK n77 Harmonics, 60MHz Bandwidth Test Voltage: DC 3.3 V									
		Low Ch, 3730.02MHz									
		7460.04	-3.6	V	3.0	44.2	1.0	-46.7	-13.0	-33.7	
		11190.06	2.0	V	3.0	42.6	1.0	-39.6	-13.0	-26.6	
		14920.08	5.9	V	3.0	45.3	1.0	-38.4	-13.0	-25.4	
		7460.04	-3.1	H	3.0	44.2	1.0	-46.3	-13.0	-33.3	
		11190.06	2.2	H	3.0	42.6	1.0	-39.4	-13.0	-26.4	
		14920.08	5.9	H	3.0	45.3	1.0	-38.5	-13.0	-25.5	
		Mid Ch, 3840MHz									
		7680.00	-3.1	V	3.0	44.1	1.0	-46.2	-13.0	-33.2	
		11520.00	2.1	V	3.0	42.7	1.0	-39.6	-13.0	-26.6	
		15360.00	6.3	V	3.0	45.0	1.0	-37.7	-13.0	-24.7	
		7680.00	-3.1	H	3.0	44.1	1.0	-46.2	-13.0	-33.2	
		11520.00	2.5	H	3.0	42.7	1.0	-39.2	-13.0	-26.2	
		15360.00	6.2	H	3.0	45.0	1.0	-37.8	-13.0	-24.8	
		High Ch, 3949.98MHz									
		7899.96	-3.0	V	3.0	43.9	1.0	-46.0	-13.0	-33.0	
		11849.94	3.0	V	3.0	42.8	1.0	-38.8	-13.0	-25.8	
		15799.92	6.8	V	3.0	44.4	1.0	-36.6	-13.0	-23.6	
		7899.96	-3.3	H	3.0	43.9	1.0	-46.2	-13.0	-33.2	
		11849.94	2.7	H	3.0	42.8	1.0	-39.1	-13.0	-26.1	
		15799.92	7.0	H	3.0	44.4	1.0	-36.4	-13.0	-23.4	

END OF TEST REPORT