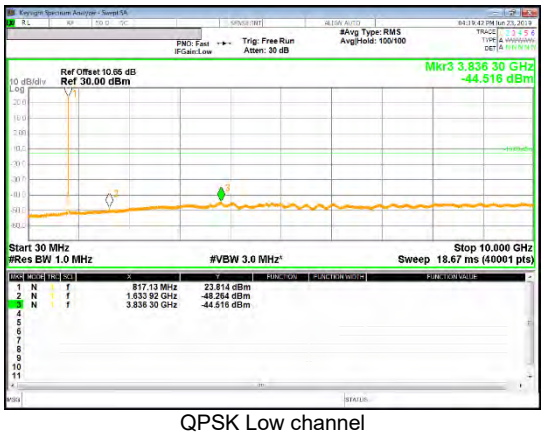
LTE Band 26(Part 90)

Band 26 5MHz	 QPSK Low channel	 QPSK High channel

LTE Band 26(Part 22)

Band 26 1.4MHz	 QPSK Low channel	 QPSK Mid channel
	 QPSK High channel	

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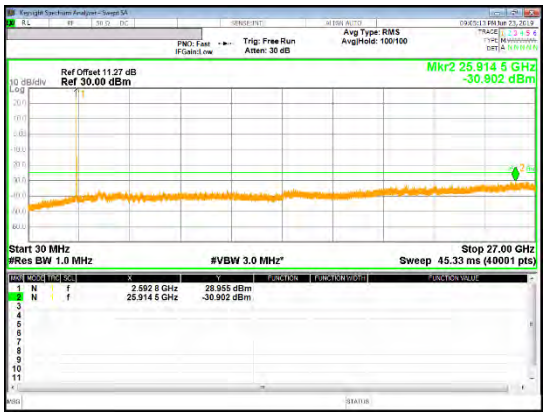
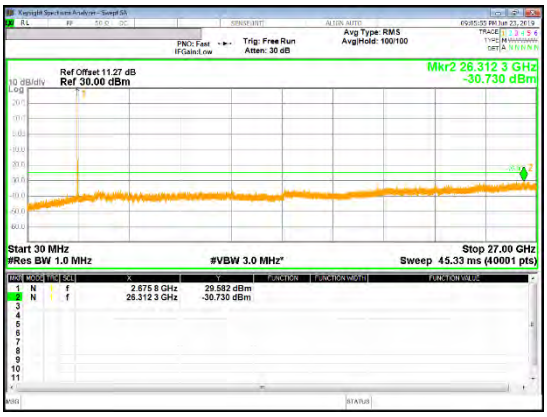
LTE Band 41(PC2)

Band 41 15MHz	 QPSK Low channel	 QPSK Mid channel
	 QPSK High channel	

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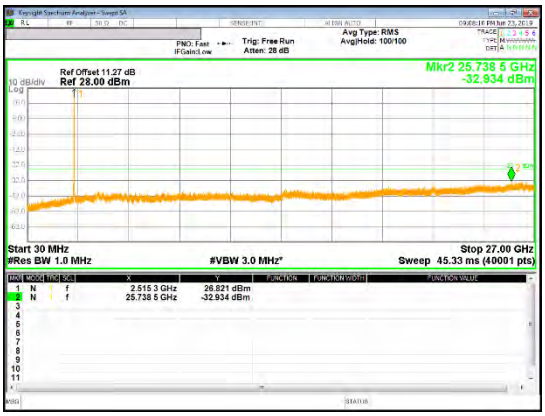
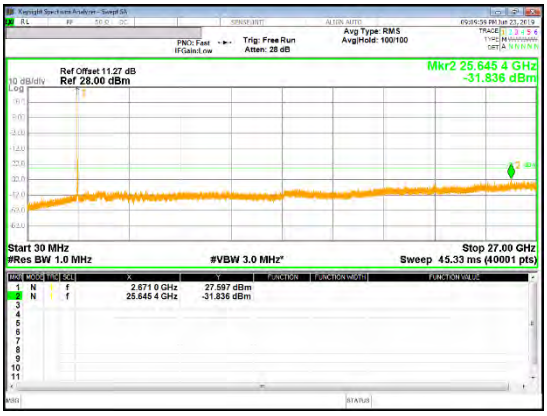
LTE Band 41(PC3)

Band 41 20MHz	 QPSK Low channel	 QPSK Mid channel
	 QPSK High channel	

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LTE Band 66

Band 66 20MHz	 QPSK Low channel	 QPSK Mid channel
	  QPSK High channel	

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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 5

LTE Band 5 (Frequency range: 824-849 MHz) is covered by LTE Band 26 (Frequency range: 814-849 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 Band 38

LTE Band 38 (Frequency range: 2570-2620 MHz) is covered by LTE Band 41(PC3) (Frequency range: 2496-2690 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

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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)

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9.4.1. FREQUENCY STABILITY RESULTS

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

Reference Frequency : GSM850 Low Channel 824.2 MHz / High Channel 848.8 MHz @ 20ºC						
Limit: +- 2.5 ppm =	Low Channel	2060.500	Hz	High Channel	2122.000	Hz
Power Supply [Vdc]	Environment Temperature [ºC]	Frequency Deviation Measureed with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.80	50	824.19999075	-0.007	848.79998299	0.007	2.5
3.80	40	824.19998573	-0.001	848.79998856	0.001	2.5
3.80	30	824.19999061	-0.007	848.79998219	0.008	2.5
3.80	***20***	***824.19998470***	***0.000***	***848.79998912***	***0.000***	***2.5***
3.80	10	824.19999019	-0.007	848.79998887	0.000	2.5
3.80	0	824.19998231	0.003	848.79998733	0.002	2.5
3.80	-10	824.19998952	-0.006	848.79998096	0.010	2.5
3.80	-20	824.19998985	-0.006	848.79998186	0.009	2.5
3.80	-30	824.19998892	-0.005	848.79998480	0.005	2.5

Reference Frequency : GSM850 Low Channel 824.2 MHz / High Channel 848.8 MHz @ 20ºC						
Limit: +- 2.5 ppm =	Low Channel	2060.500	Hz	High Channel	2122.000	Hz
Power Supply [Vdc]	Environment Temperature [ºC]	Frequency Deviation Measureed with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.80	***20***	**824.19998470**	***0***	**848.79998912**	***0***	***2.5***
4.30	20	824.19998210	0.003	848.79998949	0.000	2.5
3.60	20	824.19998970	-0.006	848.79998819	0.001	2.5

GSM 1900, Channel 512/810, Frequency 1850.0/1910.0 MHz (EGPRS)

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	1850.0767	1909.9218		
Extreme (50C)		1850.0767	1909.9218	-21.1	-0.011
Extreme (40C)		1850.0767	1909.9218	-21.0	-0.011
Extreme (30C)		1850.0767	1909.9218	-20.4	-0.011
Extreme (10C)		1850.0767	1909.9218	-29.2	-0.016
Extreme (0C)		1850.0767	1909.9218	-27.4	-0.015
Extreme (-10C)		1850.0767	1909.9218	-29.6	-0.016
Extreme (-20C)		1850.0767	1909.9218	-25.5	-0.014
Extreme (-30C)		1850.0767	1909.9218	-26.4	-0.014
20C	15%	1850.0767	1909.9218	-27.5	-0.015
	-15%	1850.0767	1909.9218	-21.1	-0.011
	End Point	1850.0767	1909.9218	-28.8	-0.015

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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				
		Low Channel		High Channel		Limit [ppm]
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.80	50	826.39998698	0.003	846.59998069	0.005	2.5
3.80	40	826.39998427	0.006	846.59998784	-0.003	2.5
3.80	30	826.39998684	0.003	846.59998882	-0.005	2.5
3.80	***20***	***826.39998935***	***0.000***	***846.59998498***	***0.000***	***2.5***
3.80	10	826.39998671	0.003	846.59998115	0.005	2.5
3.80	0	826.39998182	0.009	846.59998721	-0.003	2.5
3.80	-10	826.39998460	0.006	846.59999068	-0.007	2.5
3.80	-20	826.39998011	0.011	846.59998199	0.004	2.5
3.80	-30	826.39998721	0.003	846.59998733	-0.003	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				
		Low Channel		High Channel		Limit [ppm]
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.80	***20***	**826.39998935**	***0***	**846.59998498**	***0***	***2.5***
4.30	20	826.39999055	-0.001	846.59998590	-0.001	2.5
3.60	20	826.39998227	0.009	846.59998541	-0.001	2.5

WCDMA Band 2 (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	1850.3128	1909.6875		
Extreme (50C)		1850.3128	1909.6875	-26.1	-0.014
Extreme (40C)		1850.3128	1909.6875	-24.5	-0.013
Extreme (30C)		1850.3128	1909.6875	-26.0	-0.014
Extreme (10C)		1850.3128	1909.6875	-28.8	-0.015
Extreme (0C)		1850.3128	1909.6875	-23.0	-0.012
Extreme (-10C)		1850.3128	1909.6875	-19.5	-0.010
Extreme (-20C)		1850.3128	1909.6875	-19.9	-0.011
Extreme (-30C)		1850.3128	1909.6875	-27.8	-0.015
20C	15%	1850.3128	1909.6875	-27.1	-0.014
	-15%	1850.3128	1909.6875	-27.2	-0.014
	End Point	1850.3128	1909.6875	-19.8	-0.011

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WCDMA Band 4 (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	1710.3113	1754.6864		
Extreme (50C)		1710.3112	1754.6864	-25.0	-0.014
Extreme (40C)		1710.3112	1754.6864	-23.3	-0.013
Extreme (30C)		1710.3112	1754.6864	-23.1	-0.013
Extreme (10C)		1710.3112	1754.6864	-24.4	-0.014
Extreme (0C)		1710.3112	1754.6864	-24.8	-0.014
Extreme (-10C)		1710.3112	1754.6864	-28.6	-0.017
Extreme (-20C)		1710.3112	1754.6864	-28.9	-0.017
Extreme (-30C)		1710.3112	1754.6864	-19.7	-0.011
20C	15%	1710.3112	1754.6864	-24.1	-0.014
	-15%	1710.3112	1754.6864	-21.8	-0.013
	End Point	1710.3112	1754.6864	-29.8	-0.017

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LTE Band 7 (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	2500.2507	2569.7535		
Extreme (50C)		2500.2507	2569.7535	-31.9	-0.013
Extreme (40C)		2500.2507	2569.7535	-32.0	-0.013
Extreme (30C)		2500.2507	2569.7535	-29.9	-0.012
Extreme (10C)		2500.2507	2569.7535	-32.6	-0.013
Extreme (0C)		2500.2507	2569.7535	-33.5	-0.013
Extreme (-10C)		2500.2507	2569.7535	-34.7	-0.014
Extreme (-20C)		2500.2507	2569.7535	-36.9	-0.015
Extreme (-30C)		2500.2507	2569.7535	-34.1	-0.013
20C	15%	2500.2507	2569.7535	-30.5	-0.012
	-15%	2500.2507	2569.7535	-37.0	-0.015
	End Point	2500.2507	2569.7535	-32.5	-0.013

LTE Band 12 (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	699.1563	715.8454		
Extreme (50C)		699.1563	715.8454	-11.5	-0.016
Extreme (40C)		699.1563	715.8454	-10.4	-0.015
Extreme (30C)		699.1563	715.8454	-12.1	-0.017
Extreme (10C)		699.1563	715.8454	-16.5	-0.023
Extreme (0C)		699.1563	715.8454	-13.6	-0.019
Extreme (-10C)		699.1563	715.8454	-15.3	-0.022
Extreme (-20C)		699.1563	715.8454	-11.5	-0.016
Extreme (-30C)		699.1563	715.8454	-15.3	-0.022
20C	15%	699.1563	715.8454	-13.8	-0.020
	-15%	699.1563	715.8454	-12.5	-0.018
	End Point	699.1563	715.8454	-18.8	-0.027

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LTE Band 13 (16QAM)

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	777.2545	786.7557		
Extreme (50C)		777.2545	786.7557	-18.0	-0.023
Extreme (40C)		777.2545	786.7557	-13.2	-0.017
Extreme (30C)		777.2545	786.7557	-15.8	-0.020
Extreme (10C)		777.2545	786.7557	-17.7	-0.023
Extreme (0C)		777.2545	786.7557	-10.4	-0.013
Extreme (-10C)		777.2545	786.7557	-18.4	-0.024
Extreme (-20C)		777.2545	786.7557	-19.2	-0.025
Extreme (-30C)		777.2545	786.7557	-11.9	-0.015
20C	15%	777.2545	786.7557	-12.1	-0.015
	-15%	777.2545	786.7557	-19.9	-0.025
	End Point	777.2545	786.7557	-14.3	-0.018

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	1850.1534	1914.8448		
Extreme (50C)		1850.1533	1914.8447	-25.0	-0.013
Extreme (40C)		1850.1533	1914.8447	-23.2	-0.012
Extreme (30C)		1850.1533	1914.8447	-19.6	-0.010
Extreme (10C)		1850.1533	1914.8447	-23.1	-0.012
Extreme (0C)		1850.1533	1914.8447	-19.2	-0.010
Extreme (-10C)		1850.1533	1914.8447	-27.7	-0.015
Extreme (-20C)		1850.1533	1914.8447	-23.3	-0.012
Extreme (-30C)		1850.1533	1914.8447	-24.0	-0.013
20C	15%	1850.1533	1914.8447	-23.2	-0.012
	-15%	1850.1533	1914.8447	-24.8	-0.013
	End Point	1850.1533	1914.8447	-23.4	-0.012

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LTE Band 26

Reference Frequency : LTE Band 26 Low Channel 814.7 MHz / High Channel 848.3 MHz @ 20ºC						
Limit: +- 2.5 ppm =	Low Channel	2036.750	Hz	High Channel	2120.750	Hz
Power Supply [Vdc]	Environment Temperature [ºC]	Frequency Deviation Measureed with Time Elapse				
		Low Channel		High Channel		Limit [ppm]
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.80	50	814.69998480	-0.002	848.29998847	-0.002	2.5
3.80	40	814.69999013	-0.009	848.29998973	-0.004	2.5
3.80	30	814.69998145	0.002	848.29999006	-0.004	2.5
3.80	***20***	***814.69998312***	***0.000***	***848.29998655***	***0.000***	***2.5***
3.80	10	814.69998313	0.000	848.29998806	-0.002	2.5
3.80	0	814.69998410	-0.001	848.29998326	0.004	2.5
3.80	-10	814.69998389	-0.001	848.29998333	0.004	2.5
3.80	-20	814.69998822	-0.006	848.29998284	0.004	2.5
3.80	-30	814.69999085	-0.009	848.29999001	-0.004	2.5

Reference Frequency : LTE Band 26 Low Channel 814.7 MHz / High Channel 848.3 MHz @ 20ºC						
Limit: +- 2.5 ppm =	Low Channel	2036.750	Hz	High Channel	2120.750	Hz
Power Supply [Vdc]	Environment Temperature [ºC]	Frequency Deviation Measureed with Time Elapse				
		Low Channel		High Channel		Limit [ppm]
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.80	***20***	***814.69998312***	***0***	***848.29998655***	***0***	***2.5***
4.30	20	814.69998302	0.000	848.29998247	0.005	2.5
3.60	20	814.69999015	-0.009	848.29998326	0.004	2.5

LTE Band 41 PC2 (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	2496.2521	2689.7461		
Extreme (50C)		2496.2521	2689.7461	-35.0	-0.013
Extreme (40C)		2496.2521	2689.7461	-31.1	-0.012
Extreme (30C)		2496.2521	2689.7461	-37.8	-0.015
Extreme (10C)		2496.2521	2689.7461	-30.4	-0.012
Extreme (0C)		2496.2521	2689.7461	-29.2	-0.011
Extreme (-10C)		2496.2521	2689.7461	-39.1	-0.015
Extreme (-20C)		2496.2521	2689.7461	-33.4	-0.013
Extreme (-30C)		2496.2521	2689.7461	-37.2	-0.014
20C	15%	2496.2521	2689.7461	-33.4	-0.013
	-15%	2496.2521	2689.7461	-29.9	-0.012
	End Point	2496.2521	2689.7461	-30.4	-0.012

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LTE Band 41 PC3 (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	2496.2475	2689.7500		
Extreme (50C)		2496.2475	2689.7500	-29.1	-0.011
Extreme (40C)		2496.2475	2689.7500	-31.7	-0.012
Extreme (30C)		2496.2475	2689.7500	-36.4	-0.014
Extreme (10C)		2496.2475	2689.7500	-29.7	-0.011
Extreme (0C)		2496.2475	2689.7500	-38.7	-0.015
Extreme (-10C)		2496.2475	2689.7500	-39.8	-0.015
Extreme (-20C)		2496.2475	2689.7500	-37.3	-0.014
Extreme (-30C)		2496.2475	2689.7500	-30.6	-0.012
20C	15%	2496.2475	2689.7500	-38.2	-0.015
	-15%	2496.2475	2689.7500	-38.9	-0.015
	End Point	2496.2475	2689.7500	-30.2	-0.012

LTE Band 66 (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	1710.1561	1779.8452		
Extreme (50C)		1710.1561	1779.8451	-29.3	-0.017
Extreme (40C)		1710.1561	1779.8451	-24.3	-0.014
Extreme (30C)		1710.1561	1779.8451	-24.2	-0.014
Extreme (10C)		1710.1561	1779.8451	-28.0	-0.016
Extreme (0C)		1710.1561	1779.8451	-23.8	-0.014
Extreme (-10C)		1710.1561	1779.8451	-19.6	-0.011
Extreme (-20C)		1710.1561	1779.8451	-23.7	-0.014
Extreme (-30C)		1710.1561	1779.8451	-26.2	-0.015
20C	15%	1710.1561	1779.8451	-22.7	-0.013
	-15%	1710.1561	1779.8451	-20.9	-0.012
	End Point	1710.1561	1779.8451	-21.4	-0.012

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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 5

LTE Band 5 (Frequency range: 824-849 MHz) is covered by LTE Band 26 (Frequency range: 814-849 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 Band 38

LTE Band 38 (Frequency range: 2570-2620 MHz) is covered by LTE Band 41(PC3) (Frequency range: 2496-2690 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

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10. RADIATED TEST RESULTS

10.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §22.913, §24.232, §27.50 and §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.

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13dB.

TEST PROCEDURE

ANSI / TIA / EIA 603 E Clause 2.2.17; ESU40 setting reference to 971168 D01 v03r01

For radiated output power measurement with a ESU40:

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

TEST RESULTS

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10.1.1. ERP/EIRP Results

GSM

Band	Mode	Channel	f [MHz]	ERP / EIRP	
				[dBm]	[mW]
GSM850	GPRS	512	824.2	25.40	346.74
		661	836.6	26.50	446.68
		810	848.8	26.63	460.26
	EGPRS	512	824.2	17.38	54.70
		661	836.6	18.99	79.25
		810	848.8	19.34	85.90
GSM1900	GPRS	512	1850.2	27.39	548.28
		661	1880	27.23	528.45
		810	1909.8	25.63	365.59
	EGPRS	512	1850.2	24.71	295.80
		661	1880	24.51	282.49
		810	1909.8	22.74	187.93

WCDMA

Band	Mode	Channel	f [MHz]	ERP / EIRP	
				[dBm]	[mW]
Band 5	REL99	4132	826.4	**16.72**	46.99
		4183	836.6	16.43	**43.95**
		4233	846.6	15.93	39.17
	HSDPA	4132	826.4	**15.02**	31.77
		4183	836.6	15.01	**31.70**
		4233	846.6	14.44	27.80
Band 4	REL99	1312	1712.4	22.71	186.64
		1413	1732.6	**22.92**	**195.88**
		1513	1752.6	21.48	140.60
	HSDPA	1312	1712.4	22.04	**159.96**
		1413	1732.6	**22.07**	161.06
		1513	1752.6	21.45	139.64
Band 2	REL99	9262	1852.4	19.29	84.92
		9400	1880.0	20.32	**107.65**
		9538	1907.6	**20.44**	110.66
	HSDPA	9262	1852.4	20.07	101.62
		9400	1880.0	**22.31**	**170.22**
		9538	1907.6	21.11	129.12

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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	20.18	104.23
			1 / 0	2535.0	19.51	89.33
			1 / 0	2560.0	**20.52**	112.72
		16QAM	1 / 0	2510.0	**18.27**	67.14
			1 / 0	2535.0	17.64	58.08
			1 / 0	2560.0	18.17	65.61
	15	QPSK	1 / 37	2507.5	20.04	100.93
			1 / 0	2535.0	**20.09**	102.09
			1 / 37	2562.5	19.65	92.26
		16QAM	1 / 37	2507.5	18.03	63.53
			1 / 0	2535.0	17.48	55.98
			1 / 37	2562.5	**18.17**	65.61
	10	QPSK	1 / 0	2505.0	**20.59**	**114.55**
			1 / 0	2535.0	19.35	86.10
			1 / 0	2565.0	20.16	103.75
		16QAM	1 / 0	2505.0	17.99	62.95
			1 / 0	2535.0	17.00	50.12
			1 / 0	2565.0	**18.02**	63.39
	5	QPSK	1 / 12	2502.5	**20.27**	106.41
			1 / 12	2535.0	19.26	84.33
			1 / 12	2567.5	19.88	97.27
		16QAM	1 / 24	2502.5	**18.05**	63.83
			1 / 24	2535.0	17.10	51.29
			1 / 24	2567.5	17.96	62.52

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LTE Band 12

Band	BW [MHz]	Mode	RB Size/ RB Offset	f [MHz]	ERP / EIRP [dBm]	ERP / EIRP [mW]
Band 12	10	QPSK	1 / 0	704.0	15.30	33.88
			1 / 0	707.5	15.81	38.11
			1 / 0	711.0	**16.06**	40.36
		16QAM	1 / 0	704.0	14.09	25.64
			1 / 0	707.5	14.59	28.77
			1 / 0	711.0	**15.09**	32.28
	5	QPSK	1 / 12	701.5	15.05	31.99
			1 / 24	707.5	15.96	39.45
			1 / 24	713.5	**16.23**	41.98
		16QAM	1 / 24	701.5	13.87	24.38
			1 / 12	707.5	**14.83**	30.41
			1 / 12	713.5	14.81	30.27
	3	QPSK	1 / 8	700.5	15.08	32.21
			1 / 0	707.5	15.79	37.93
			1 / 8	714.5	**16.31**	42.76
		16QAM	1 / 8	700.5	13.83	24.15
			1 / 0	707.5	14.39	27.48
			1 / 8	714.5	**15.05**	31.99
	1.4	QPSK	1 / 5	699.7	14.65	29.17
			1 / 0	707.5	15.66	36.81
			1 / 3	715.3	**16.38**	**43.45**
		16QAM	1 / 5	699.7	13.78	23.88
			1 / 0	707.5	14.57	28.64
			1 / 0	715.3	**15.11**	32.43

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	18.20	66.07
		16QAM	1 / 49	782.0	17.24	52.97
	5	QPSK	1 / 12	779.5	18.38	68.87
			1 / 0	782.0	**18.60**	**72.44**
			1 / 12	784.5	17.98	62.81
		16QAM	1 / 24	779.5	**17.55**	56.89
			1 / 0	782.0	17.15	51.88
			1 / 0	784.5	17.29	53.58

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LTE Band 25

Band	BW [MHz]	Mode	RB Size/ RB Offset	f [MHz]	ERP / EIRP [dBm]	ERP / EIRP [mW]
Band 25	20	QPSK	1 / 0	1860.0	23.78	238.78
			1 / 0	1882.5	25.44	349.95
			1 / 0	1905.0	24.66	292.42
		16QAM	1 / 0	1860.0	22.99	199.07
			1 / 0	1882.5	24.31	269.77
			1 / 0	1905.0	23.72	235.50
	15	QPSK	1 / 37	1857.5	23.65	231.74
			1 / 0	1882.5	**25.64**	**366.44**
			1 / 74	1907.5	24.36	272.90
		16QAM	1 / 0	1857.5	22.72	187.07
			1 / 37	1882.5	**24.37**	273.53
			1 / 0	1907.5	23.74	236.59
	10	QPSK	1 / 0	1855.0	23.84	242.10
			1 / 0	1882.5	25.10	323.59
			1 / 49	1910.0	24.63	290.40
		16QAM	1 / 0	1855.0	22.72	187.07
			1 / 0	1882.5	24.27	267.30
			1 / 0	1910.0	23.39	218.27
	5	QPSK	1 / 12	1852.5	23.19	208.45
			1 / 24	1882.5	25.25	334.97
			1 / 24	1912.5	24.50	281.84
		16QAM	1 / 24	1852.5	22.44	175.39
			1 / 24	1882.5	23.90	245.47
			1 / 12	1912.5	23.37	217.27
	3	QPSK	1 / 8	1851.5	24.09	256.45
			1 / 0	1882.5	25.45	350.75
			1 / 0	1913.5	24.42	276.69
		16QAM	1 / 8	1851.5	22.84	192.31
			1 / 8	1882.5	24.06	254.68
			1 / 8	1913.5	23.45	221.31
	1.4	QPSK	1 / 0	1850.7	23.60	229.09
			1 / 0	1882.5	24.94	311.89
			1 / 0	1914.3	24.35	272.27
		16QAM	1 / 3	1850.7	22.40	173.78
			1 / 0	1882.5	23.93	247.17
			1 / 0	1914.3	23.59	228.56

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LTE Band 26

Band	BW [MHz]	Mode	RB Size/ RB Offset	f [MHz]	ERP/EIRP [dBm]	ERP/EIRP [mW]
Band 26	15	QPSK	1 / 0	821.5	16.30	42.66
			1 / 37	831.5	**16.20**	41.69
			1 / 37	841.5	14.67	29.31
		16QAM	1 / 0	821.5	15.19	33.04
			1 / 37	831.5	**14.23**	26.49
			1 / 37	841.5	13.63	23.07
	10	QPSK	1 / 0	819.0	16.23	41.98
			1 / 0	829.0	15.59	36.22
			1 / 0	831.5	**15.68**	36.98
			1 / 0	844.0	14.62	28.97
		16QAM	1 / 0	819.0	15.04	31.92
			1 / 25	829.0	**14.66**	29.24
			1 / 0	831.5	14.61	28.91
			1 / 0	844.0	13.39	21.83
	5	QPSK	1 / 12	816.5	**15.88**	38.73
			1 / 12	821.5	15.63	36.56
			1 / 12	826.5	**15.75**	37.58
			1 / 0	831.5	15.69	37.07
			1 / 0	846.5	14.35	27.23
		16QAM	1 / 12	816.5	14.93	31.12
			1 / 24	821.5	**14.94**	31.19
			1 / 24	826.5	**14.60**	28.84
			1 / 0	831.5	14.54	28.44
			1 / 12	846.5	13.49	22.34
	3	QPSK	1 / 14	815.5	**16.16**	41.30
			1 / 0	822.5	15.80	38.02
			1 / 0	825.5	**15.79**	37.93
			1 / 8	831.5	15.02	31.77
			1 / 8	847.5	14.42	27.67
		16QAM	1 / 14	815.5	14.83	30.41
			1 / 0	822.5	**14.97**	31.41
			1 / 14	825.5	14.19	26.24
			1 / 0	831.5	**14.64**	29.11
			1 / 8	847.5	13.42	21.98
	1.4	QPSK	1 / 0	814.7	14.98	31.48
			1 / 0	823.3	**15.80**	38.02
			1 / 0	824.7	**15.55**	35.89
			1 / 0	831.5	15.46	35.16
			1 / 0	848.3	14.63	29.04
		16QAM	1 / 0	814.7	**16.22**	41.88
			1 / 0	823.3	14.85	30.55
			1 / 0	824.7	**14.81**	30.27
			1 / 0	831.5	14.51	28.25
			1 / 0	848.3	13.57	22.75

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LTE Band 41(PC2)

Band	BW [MHz]	Mode	RB Size/ RB Offset	f [MHz]	ERP / EIRP [dBm]	ERP / EIRP [mW]
Band 41	20	QPSK	1 / 99	2506.0	**23.78**	238.78
			1 / 0	2593.0	23.60	229.09
			1 / 0	2680.0	21.30	134.90
		16QAM	1 / 0	2506.0	**24.26**	266.69
			1 / 0	2593.0	23.01	199.99
			1 / 0	2680.0	20.29	106.91
	15	QPSK	1 / 37	2503.5	**24.23**	264.85
			1 / 37	2593.0	23.29	213.30
			1 / 0	2682.5	21.76	149.97
		16QAM	1 / 0	2503.5	**23.57**	227.51
			1 / 0	2593.0	22.65	184.08
			1 / 0	2682.5	19.62	91.62
	10	QPSK	1 / 25	2501.0	**24.84**	**304.79**
			1 / 0	2593.0	22.48	177.01
			1 / 25	2685.0	21.55	142.89
		16QAM	1 / 25	2501.0	**23.72**	235.50
			1 / 0	2593.0	22.00	158.49
			1 / 25	2685.0	22.34	171.40
	5	QPSK	1 / 0	2498.5	**24.66**	292.42
			1 / 12	2593.0	21.68	147.23
			1 / 0	2687.5	22.05	160.32
		16QAM	1 / 24	2498.5	**24.26**	266.69
			1 / 0	2593.0	21.92	155.60
			1 / 0	2687.5	20.20	104.71

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LTE Band 41(PC3)

Band	BW [MHz]	Mode	RB Size/ RB Offset	f [MHz]	ERP / EIRP [dBm]	ERP / EIRP [mW]
Band 41	20	QPSK	1 / 99	2506.0	**19.95**	98.86
			1 / 0	2593.0	19.81	95.72
			1 / 0	2680.0	17.69	58.75
		16QAM	1 / 49	2506.0	**18.63**	72.95
			1 / 99	2593.0	16.82	48.08
			1 / 0	2680.0	15.92	39.08
	15	QPSK	1 / 0	2503.5	**21.02**	126.47
			1 / 0	2593.0	19.71	93.54
			1 / 0	2682.5	17.98	62.81
		16QAM	1 / 37	2503.5	**19.03**	79.98
			1 / 37	2593.0	17.58	57.28
			1 / 37	2682.5	16.21	41.78
	10	QPSK	1 / 0	2501.0	**21.40**	**138.04**
			1 / 0	2593.0	20.18	104.23
			1 / 25	2685.0	20.13	103.04
		16QAM	1 / 0	2501.0	**19.20**	83.18
			1 / 0	2593.0	17.04	50.58
			1 / 0	2685.0	17.51	56.36
	5	QPSK	1 / 0	2498.5	20.36	108.64
			1 / 0	2593.0	**20.71**	117.76
			1 / 0	2687.5	17.48	55.98
		16QAM	1 / 0	2498.5	**18.77**	75.34
			1 / 0	2593.0	18.28	67.30
			1 / 0	2687.5	16.57	45.39

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LTE Band 66

Band	BW [MHz]	Mode	RB Size/ RB Offset	f [MHz]	ERP / EIRP [dBm]	ERP / EIRP [mW]
Band 66	20	QPSK	1 / 0	1720.0	**23.02**	200.45
			1 / 0	1745.0	22.12	162.93
			1 / 0	1770.0	22.74	187.93
		16QAM	1 / 0	1720.0	**22.59**	181.55
			1 / 0	1745.0	21.71	148.25
			1 / 0	1770.0	22.43	174.98
	15	QPSK	1 / 37	1717.5	22.70	186.21
			1 / 0	1747.5	22.56	180.30
			1 / 0	1772.5	**22.73**	187.50
		16QAM	1 / 37	1717.5	**21.79**	151.01
			1 / 37	1747.5	20.37	108.89
			1 / 37	1772.5	21.53	142.23
	10	QPSK	1 / 0	1715.0	**23.07**	**202.77**
			1 / 0	1745.0	22.38	172.98
			1 / 0	1775.0	22.61	182.39
		16QAM	1 / 0	1715.0	**21.72**	148.59
			1 / 0	1745.0	20.89	122.74
			1 / 0	1775.0	21.44	139.32
	5	QPSK	1 / 12	1712.5	**22.54**	179.47
			1 / 12	1745.0	21.78	150.66
			1 / 24	1777.5	22.36	172.19
		16QAM	1 / 24	1712.5	**21.42**	138.68
			1 / 12	1745.0	20.77	119.40
			1 / 12	1777.5	21.00	125.89
	3	QPSK	1 / 8	1711.5	22.53	179.06
			1 / 0	1745.0	**22.75**	188.36
			1 / 8	1778.5	22.13	163.31
		16QAM	1 / 8	1711.5	**21.57**	143.55
			1 / 0	1745.0	21.45	139.64
			1 / 8	1778.5	20.89	122.74
	1.4	QPSK	1 / 0	1710.7	**22.83**	191.87
			1 / 0	1745.0	22.79	190.11
			1 / 0	1779.3	22.08	161.44
		16QAM	1 / 0	1710.7	**21.77**	150.31
			1 / 5	1745.0	21.66	146.55
			1 / 0	1779.3	21.02	126.47

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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 5

LTE Band 5 (Frequency range: 824-849 MHz) is covered by LTE Band 26 (Frequency range: 814-849 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 Band 38

LTE Band 38 (Frequency range: 2570-2620 MHz) is covered by LTE Band 41(PC3) (Frequency range: 2496-2690 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

10.1.2. ERP/EIRP DATA

GSM850

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GSM850

GPRS

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-06-17
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 2
Mode: GPRS 850 MHz 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								
824.20	29.89	V	3.0	-1.5	25.40	38.5	-13.1	
824.20	18.76	H	3.0	-1.5	14.27	38.5	-24.2	
Mid Ch								
836.60	30.96	V	3.0	-1.4	26.50	38.5	-12.0	
836.60	18.93	H	3.0	-1.4	14.47	38.5	-24.0	
High Ch								
848.80	31.07	V	3.1	-1.4	26.63	38.5	-11.9	
848.80	19.66	H	3.1	-1.4	15.22	38.5	-23.3	

GSM850

EGPRS

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-28
Test Engineer: 45585
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: EGPRS 850 MHz Fundamentals

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								
824.20	21.87	V	3.0	-1.5	17.38	38.5	-21.1	
824.20	13.76	H	3.0	-1.5	9.27	38.5	-29.2	
Mid Ch								
836.60	23.45	V	3.0	-1.4	18.99	38.5	-19.5	
836.60	14.14	H	3.0	-1.4	9.67	38.5	-28.8	
High Ch								
848.80	23.78	V	3.1	-1.4	19.34	38.5	-19.2	
848.80	14.26	H	3.1	-1.4	9.82	38.5	-28.7	

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GSM1900

GSM1900

GPRS

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-06-18
Test Engineer: 45585
Configuration: EUT, Z-Position
Location: Chamber 2
Mode: GPRS 1900 MHz Fundamentals

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00167451], 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								
1850.20	17.86	V	4.5	9.4	22.78	33.0	-10.2	
1850.20	22.47	H	4.5	9.4	27.39	33.0	-5.6	
Mid Ch								
1880.00	20.32	V	4.5	9.2	24.98	33.0	-8.0	
1880.00	22.56	H	4.5	9.2	27.23	33.0	-5.8	
High Ch								
1909.80	19.25	V	4.6	8.9	23.61	33.0	-9.4	
1909.80	21.27	H	4.6	8.9	25.63	33.0	-7.4	

GSM1900

EGPRS

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-06-18
Test Engineer: 45585
Configuration: EUT, Z-Position
Location: Chamber 2
Mode: EGPRS 1900 MHz Fundamentals

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00167451], 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								
1850.20	15.25	V	4.5	9.4	20.17	33.0	-12.8	
1850.20	19.79	H	4.5	9.4	24.71	33.0	-8.3	
Mid Ch								
1880.00	17.70	V	4.5	9.2	22.36	33.0	-10.6	
1880.00	19.84	H	4.5	9.2	24.51	33.0	-8.5	
High Ch								
1909.80	16.36	V	4.6	8.9	20.72	33.0	-12.3	
1909.80	18.38	H	4.6	8.9	22.74	33.0	-10.3	

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WCDMA Band 5

WCDMA

Band 5
REL99

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-06-14
Test Engineer: 45585
Configuration: EUT, Z-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	21.20	V	3.0	-1.5	16.72	38.5	-21.8	
826.40	8.62	H	3.0	-1.5	4.14	38.5	-34.4	
Mid Ch								
836.60	20.89	V	3.0	-1.4	16.43	38.5	-22.1	
836.60	7.96	H	3.0	-1.4	3.50	38.5	-35.0	
High Ch								
846.60	20.37	V	3.1	-1.4	15.93	38.5	-22.6	
846.60	8.66	H	3.1	-1.4	4.22	38.5	-34.3	

WCDMA

Band 5
HSDPA

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-30
Test Engineer: 45585
Configuration: EUT, Z-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	19.50	V	3.0	-1.5	15.02	38.5	-23.5	
826.40	6.90	H	3.0	-1.5	2.42	38.5	-36.1	
Mid Ch								
836.60	19.47	V	3.0	-1.4	15.01	38.5	-23.5	
836.60	6.34	H	3.0	-1.4	1.88	38.5	-36.6	
High Ch								
846.60	18.88	V	3.1	-1.4	14.44	38.5	-24.1	
846.60	6.60	H	3.1	-1.4	2.16	38.5	-36.3	

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WCDMA Band 4

WCDMA

Band 4
REL99

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-06-14
Test Engineer: 45585
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[00167451], 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	10.29	V	4.3	9.3	15.31	30.0	-14.7	
1712.40	17.69	H	4.3	9.3	22.71	30.0	-7.3	
Mid Ch								
1732.60	11.65	V	4.3	9.4	16.71	30.0	-13.3	
1732.60	17.86	H	4.3	9.4	22.92	30.0	-7.1	
High Ch								
1752.60	9.88	V	4.4	9.5	14.99	30.0	-15.0	
1752.60	16.37	H	4.4	9.5	21.48	30.0	-8.5	

WCDMA

Band 4
HSDPA

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-30
Test Engineer: 45585
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[00167451], 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	5.79	V	4.3	9.3	10.81	30.0	-19.2	
1712.40	17.02	H	4.3	9.3	22.04	30.0	-8.0	
Mid Ch								
1732.60	9.54	V	4.3	9.4	14.60	30.0	-15.4	
1732.60	17.01	H	4.3	9.4	22.07	30.0	-7.9	
High Ch								
1752.60	9.41	V	4.4	9.5	14.52	30.0	-15.5	
1752.60	16.34	H	4.4	9.5	21.45	30.0	-8.6	

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WCDMA Band 2

WCDMA

Band 2
REL99

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-06-14
Test Engineer: 45585
Configuration: EUT, Y-Position
Location: Chamber 2
Mode: Rel99 Band 2 Fundamentals

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00167451], 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	14.39	V	4.5	9.4	19.29	33.0	-13.7	
1852.40	9.77	H	4.5	9.4	14.67	33.0	-18.3	
Mid Ch								
1880.00	15.66	V	4.5	9.2	20.32	33.0	-12.7	
1880.00	10.78	H	4.5	9.2	15.45	33.0	-17.6	
High Ch								
1907.60	16.05	V	4.6	9.0	20.44	33.0	-12.6	
1907.60	9.56	H	4.6	9.0	13.95	33.0	-19.0	

WCDMA

Band 2
HSDPA

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-30
Test Engineer: 45585
Configuration: EUT / Y-Position
Location: Chamber 2
Mode: HSDPA Band 2 Fundamentals

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00167451], 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	15.17	V	4.5	9.4	20.07	33.0	-12.9	
1852.40	9.49	H	4.5	9.4	14.39	33.0	-18.6	
Mid Ch								
1880.00	17.65	V	4.5	9.2	22.31	33.0	-10.7	
1880.00	11.32	H	4.5	9.2	15.99	33.0	-17.0	
High Ch								
1907.60	16.72	V	4.6	9.0	21.11	33.0	-11.9	
1907.60	10.08	H	4.6	9.0	14.47	33.0	-18.5	

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LTE Band 7

LTE Band 7 20MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-29
Test Engineer: 45585
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[00167451], 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	12.04	V	5.3	10.1	16.86	33.0	-16.1	
2510.00	15.36	H	5.3	10.1	20.18	33.0	-12.8	
Mid Ch								
2535.00	10.47	V	5.3	10.0	15.23	33.0	-17.8	
2535.00	14.74	H	5.3	10.0	19.51	33.0	-13.5	
High Ch								
2560.00	10.63	V	5.3	10.0	15.34	33.0	-17.7	
2560.00	15.82	H	5.3	10.0	20.52	33.0	-12.5	

LTE Band 7 20MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-29
Test Engineer: 45585
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[00167451], 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	9.94	V	5.3	10.1	14.76	33.0	-18.2	
2510.00	13.45	H	5.3	10.1	18.27	33.0	-14.7	
Mid Ch								
2535.00	8.49	V	5.3	10.0	13.25	33.0	-19.7	
2535.00	12.87	H	5.3	10.0	17.64	33.0	-15.4	
High Ch								
2560.00	8.13	V	5.3	10.0	12.84	33.0	-20.2	
2560.00	13.47	H	5.3	10.0	18.17	33.0	-14.8	

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LTE

Band 7

15MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-29
Test Engineer: 45585
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[00167451], 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	11.75	V	5.3	10.1	16.58	33.0	-16.4	
2507.50	15.21	H	5.3	10.1	20.04	33.0	-13.0	
Mid Ch								
2535.00	10.82	V	5.3	10.0	15.58	33.0	-17.4	
2535.00	15.32	H	5.3	10.0	20.09	33.0	-12.9	
High Ch								
2562.50	10.98	V	5.3	10.0	15.68	33.0	-17.3	
2562.50	14.94	H	5.3	10.0	19.65	33.0	-13.4	

LTE

Band 7

15MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-29
Test Engineer: 45585
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[00167451], 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	9.58	V	5.3	10.1	14.41	33.0	-18.6	
2507.50	13.20	H	5.3	10.1	18.03	33.0	-15.0	
Mid Ch								
2535.00	9.23	V	5.3	10.0	13.99	33.0	-19.0	
2535.00	12.71	H	5.3	10.0	17.48	33.0	-15.5	
High Ch								
2562.50	8.87	V	5.3	10.0	13.57	33.0	-19.4	
2562.50	13.46	H	5.3	10.0	18.17	33.0	-14.8	

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LTE

Band 7

10MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-29
Test Engineer: 45585
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[00167451], 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	12.04	V	5.2	10.1	16.87	33.0	-16.1	
2505.00	15.76	H	5.2	10.1	20.59	33.0	-12.4	
Mid Ch								
2535.00	10.83	V	5.3	10.0	15.59	33.0	-17.4	
2535.00	14.58	H	5.3	10.0	19.35	33.0	-13.7	
High Ch								
2565.00	11.03	V	5.3	10.0	15.73	33.0	-17.3	
2565.00	15.46	H	5.3	10.0	20.16	33.0	-12.8	

LTE

Band 7

10MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-29
Test Engineer: 45585
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[00167451], 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	9.53	V	5.2	10.1	14.36	33.0	-18.6	
2505.00	13.16	H	5.2	10.1	17.99	33.0	-15.0	
Mid Ch								
2535.00	8.81	V	5.3	10.0	13.57	33.0	-19.4	
2535.00	12.23	H	5.3	10.0	17.00	33.0	-16.0	
High Ch								
2565.00	9.01	V	5.3	10.0	13.71	33.0	-19.3	
2565.00	13.32	H	5.3	10.0	18.02	33.0	-15.0	

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LTE

Band 7

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-29
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 7 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00167451], 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	11.94	V	5.2	10.1	16.78	33.0	-16.2	
2502.50	15.43	H	5.2	10.1	20.27	33.0	-12.7	
Mid Ch								
2535.00	10.64	V	5.3	10.0	15.40	33.0	-17.6	
2535.00	14.49	H	5.3	10.0	19.26	33.0	-13.7	
High Ch								
2567.50	10.65	V	5.3	10.0	15.34	33.0	-17.7	
2567.50	15.19	H	5.3	10.0	19.88	33.0	-13.1	

LTE

Band 7

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-29
Test Engineer: 45585
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[00167451], 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	9.62	V	5.2	10.1	14.46	33.0	-18.5	
2502.50	13.21	H	5.2	10.1	18.05	33.0	-15.0	
Mid Ch								
2535.00	8.63	V	5.3	10.0	13.39	33.0	-19.6	
2535.00	12.33	H	5.3	10.0	17.10	33.0	-15.9	
High Ch								
2567.50	8.95	V	5.3	10.0	13.64	33.0	-19.4	
2567.50	13.27	H	5.3	10.0	17.96	33.0	-15.0	

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LTE Band 12

LTE

Band 12

10MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-23
Test Engineer: 45585
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	9.92	V	2.8	-1.6	5.54	34.8	-29.3	
704.00	19.69	H	2.8	-1.6	15.30	34.8	-19.5	
Mid Ch								
707.50	11.43	V	2.8	-1.6	7.05	34.8	-27.8	
707.50	20.19	H	2.8	-1.6	15.81	34.8	-19.0	
High Ch								
711.00	10.18	V	2.8	-1.6	5.78	34.8	-29.0	
711.00	20.46	H	2.8	-1.6	16.06	34.8	-18.7	

LTE

Band 12

10MHz

16QAM

2

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-23
Test Engineer: 45585
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	8.92	V	2.8	-1.6	4.54	34.8	-30.3	
704.00	18.48	H	2.8	-1.6	14.09	34.8	-20.7	
Mid Ch								
707.50	9.37	V	2.8	-1.6	4.99	34.8	-29.8	
707.50	18.97	H	2.8	-1.6	14.59	34.8	-20.2	
High Ch								
711.00	9.18	V	2.8	-1.6	4.78	34.8	-30.0	
711.00	19.49	H	2.8	-1.6	15.09	34.8	-19.7	

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LTE

Band 12

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-23
Test Engineer: 45585
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	9.30	V	2.8	-1.6	4.92	34.8	-29.9	
701.50	19.43	H	2.8	-1.6	15.05	34.8	-19.8	
Mid Ch								
707.50	12.34	V	2.8	-1.6	7.96	34.8	-26.8	
707.50	20.34	H	2.8	-1.6	15.96	34.8	-18.8	
High Ch								
713.50	12.34	V	2.8	-1.6	7.94	34.8	-26.9	
713.50	20.62	H	2.8	-1.6	16.23	34.8	-18.6	

LTE

Band 12

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-23
Test Engineer: 45585
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	8.52	V	2.8	-1.6	4.14	34.8	-30.7	
701.50	18.25	H	2.8	-1.6	13.87	34.8	-20.9	
Mid Ch								
707.50	10.92	V	2.8	-1.6	6.54	34.8	-28.3	
707.50	19.21	H	2.8	-1.6	14.83	34.8	-20.0	
High Ch								
713.50	11.46	V	2.8	-1.6	7.06	34.8	-27.7	
713.50	19.20	H	2.8	-1.6	14.81	34.8	-20.0	

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Band 12

3MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-27
Test Engineer: 45585
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 12 Fundamentals, 3MHz Bandwidth

Test Equipment:
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	9.36	V	2.8	-1.6	4.98	34.8	-29.8	
700.50	19.46	H	2.8	-1.6	15.08	34.8	-19.7	
Mid Ch								
707.50	10.53	V	2.8	-1.6	6.15	34.8	-28.7	
707.50	20.17	H	2.8	-1.6	15.79	34.8	-19.0	
High Ch								
714.50	11.57	V	2.8	-1.6	7.17	34.8	-27.6	
714.50	20.71	H	2.8	-1.6	16.31	34.8	-18.5	

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Band 12

3MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-27
Test Engineer: 45585
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 12 Fundamentals, 3MHz Bandwidth

Test Equipment:
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	8.32	V	2.8	-1.6	3.94	34.8	-30.9	
700.50	18.21	H	2.8	-1.6	13.83	34.8	-21.0	
Mid Ch								
707.50	9.27	V	2.8	-1.6	4.89	34.8	-29.9	
707.50	18.77	H	2.8	-1.6	14.39	34.8	-20.4	
High Ch								
714.50	10.59	V	2.8	-1.6	6.19	34.8	-28.6	
714.50	19.45	H	2.8	-1.6	15.05	34.8	-19.7	

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Band 12

1.4MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-27
Test Engineer: 45585
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	9.87	V	2.8	-1.6	5.49	34.8	-29.3	
699.70	19.02	H	2.8	-1.6	14.65	34.8	-20.2	
Mid Ch								
707.50	10.59	V	2.8	-1.6	6.21	34.8	-28.6	
707.50	20.04	H	2.8	-1.6	15.66	34.8	-19.1	
High Ch								
715.30	11.93	V	2.8	-1.6	7.53	34.8	-27.3	
715.30	20.78	H	2.8	-1.6	16.38	34.8	-18.4	

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Band 12

1.4MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-27
Test Engineer: 45585
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	8.62	V	2.8	-1.6	4.24	34.8	-30.6	
699.70	18.15	H	2.8	-1.6	13.78	34.8	-21.0	
Mid Ch								
707.50	9.84	V	2.8	-1.6	5.46	34.8	-29.3	
707.50	18.95	H	2.8	-1.6	14.57	34.8	-20.2	
High Ch								
715.30	10.77	V	2.8	-1.6	6.37	34.8	-28.4	
715.30	19.51	H	2.8	-1.6	15.11	34.8	-19.7	

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LTE Band 13

LTE
Band 13
10MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-06-06
Test Engineer: 45585
Configuration: EUT, Z-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	22.70	V	2.9	-1.6	18.20	34.8	-16.6	
782.00	8.00	H	2.9	-1.6	3.50	34.8	-31.3	

LTE
Band 13
10MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-06-06
Test Engineer: 45585
Configuration: EUT, Z-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	21.74	V	2.9	-1.6	17.24	34.8	-17.5	
782.00	7.21	H	2.9	-1.6	2.71	34.8	-32.1	

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Band 13

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-06-06
Test Engineer: 45585
Configuration: EUT, Z-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	22.88	V	2.9	-1.6	18.38	34.8	-16.4	
779.50	8.12	H	2.9	-1.6	3.62	34.8	-31.2	
Mid Ch								
782.00	23.10	V	2.9	-1.6	18.60	34.8	-16.2	
782.00	8.04	H	2.9	-1.6	3.54	34.8	-31.2	
High Ch								
784.50	22.48	V	2.9	-1.6	17.98	34.8	-16.8	
784.50	8.06	H	2.9	-1.6	3.55	34.8	-31.2	

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Band 13

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-06-06
Test Engineer: 45585
Configuration: EUT, Z-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	22.05	V	2.9	-1.6	17.55	34.8	-17.2	
779.50	7.03	H	2.9	-1.6	2.53	34.8	-32.2	
Mid Ch								
782.00	21.65	V	2.9	-1.6	17.15	34.8	-17.6	
782.00	7.00	H	2.9	-1.6	2.50	34.8	-32.3	
High Ch								
784.50	21.79	V	2.9	-1.6	17.29	34.8	-17.5	
784.50	7.10	H	2.9	-1.6	2.59	34.8	-32.2	

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LTE Band 25

LTE Band 25 20MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-23
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 25 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	15.29	V	4.5	9.4	20.23	33.0	-12.8	
1860.00	18.85	H	4.5	9.4	23.78	33.0	-9.2	
Mid Ch								
1882.50	16.55	V	4.5	9.3	21.30	33.0	-11.7	
1882.50	20.69	H	4.5	9.3	25.44	33.0	-7.6	
High Ch								
1905.00	17.16	V	4.6	9.1	21.71	33.0	-11.3	
1905.00	20.11	H	4.6	9.1	24.66	33.0	-8.3	

LTE Band 25 20MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-23
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 25 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	14.38	V	4.5	9.4	19.32	33.0	-13.7	
1860.00	18.06	H	4.5	9.4	22.99	33.0	-10.0	
Mid Ch								
1882.50	15.33	V	4.5	9.3	20.08	33.0	-12.9	
1882.50	19.56	H	4.5	9.3	24.31	33.0	-8.7	
High Ch								
1905.00	16.02	V	4.6	9.1	20.57	33.0	-12.4	
1905.00	19.17	H	4.6	9.1	23.72	33.0	-9.3	

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Band 25

15MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-23
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 25 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	15.51	V	4.5	9.5	20.46	33.0	-12.5	
1857.50	18.70	H	4.5	9.5	23.65	33.0	-9.3	
Mid Ch								
1882.50	16.27	V	4.5	9.3	21.02	33.0	-12.0	
1882.50	20.89	H	4.5	9.3	25.64	33.0	-7.4	
High Ch								
1907.50	14.78	V	4.6	9.1	19.30	33.0	-13.7	
1907.50	19.84	H	4.6	9.1	24.36	33.0	-8.6	

LTE

Band 25

15MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-23
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 25 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	14.01	V	4.5	9.5	18.96	33.0	-14.0	
1857.50	17.77	H	4.5	9.5	22.72	33.0	-10.3	
Mid Ch								
1882.50	14.97	V	4.5	9.3	19.72	33.0	-13.3	
1882.50	19.62	H	4.5	9.3	24.37	33.0	-8.6	
High Ch								
1907.50	14.04	V	4.6	9.1	18.56	33.0	-14.4	
1907.50	19.22	H	4.6	9.1	23.74	33.0	-9.3	

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Band 25

10MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-23
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 25 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	15.21	V	4.5	9.5	20.18	33.0	-12.8	
1855.00	18.87	H	4.5	9.5	23.84	33.0	-9.2	
Mid Ch								
1882.50	16.02	V	4.5	9.3	20.77	33.0	-12.2	
1882.50	20.35	H	4.5	9.3	25.10	33.0	-7.9	
High Ch								
1910.00	14.89	V	4.6	9.1	19.38	33.0	-13.6	
1910.00	20.15	H	4.6	9.1	24.63	33.0	-8.4	

LTE

Band 25

10MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-23
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 25 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	14.02	V	4.5	9.5	18.99	33.0	-14.0	
1855.00	17.75	H	4.5	9.5	22.72	33.0	-10.3	
Mid Ch								
1882.50	15.01	V	4.5	9.3	19.76	33.0	-13.2	
1882.50	19.52	H	4.5	9.3	24.27	33.0	-8.7	
High Ch								
1910.00	13.79	V	4.6	9.1	18.28	33.0	-14.7	
1910.00	18.91	H	4.6	9.1	23.39	33.0	-9.6	

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Band 25

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-23
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 25 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	14.97	V	4.5	9.5	19.97	33.0	-13.0	
1852.50	18.19	H	4.5	9.5	23.19	33.0	-9.8	
Mid Ch								
1882.50	16.26	V	4.5	9.3	21.01	33.0	-12.0	
1882.50	20.50	H	4.5	9.3	25.25	33.0	-7.7	
High Ch								
1912.50	14.87	V	4.6	9.0	19.32	33.0	-13.7	
1912.50	20.04	H	4.6	9.0	24.50	33.0	-8.5	

LTE

Band 25

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-23
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 25 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	14.31	V	4.5	9.5	19.31	33.0	-13.7	
1852.50	17.44	H	4.5	9.5	22.44	33.0	-10.6	
Mid Ch								
1882.50	15.18	V	4.5	9.3	19.93	33.0	-13.1	
1882.50	19.15	H	4.5	9.3	23.90	33.0	-9.1	
High Ch								
1912.50	13.87	V	4.6	9.0	18.32	33.0	-14.7	
1912.50	18.91	H	4.6	9.0	23.37	33.0	-9.6	

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LTE

Band 25

3MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-23
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 25 Fundamentals, 3MHz 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								
1851.50	13.97	V	4.5	9.5	18.98	33.0	-14.0	
1851.50	19.09	H	4.5	9.5	24.09	33.0	-8.9	
Mid Ch								
1882.50	16.16	V	4.5	9.3	20.91	33.0	-12.1	
1882.50	20.70	H	4.5	9.3	25.45	33.0	-7.5	
High Ch								
1913.50	15.10	V	4.6	9.0	19.54	33.0	-13.5	
1913.50	19.98	H	4.6	9.0	24.42	33.0	-8.6	

LTE

Band 25

3MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-23
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 25 Fundamentals, 3MHz 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								
1851.50	12.91	V	4.5	9.5	17.92	33.0	-15.1	
1851.50	17.84	H	4.5	9.5	22.84	33.0	-10.2	
Mid Ch								
1882.50	13.21	V	4.5	9.3	17.96	33.0	-15.0	
1882.50	19.31	H	4.5	9.3	24.06	33.0	-8.9	
High Ch								
1913.50	13.77	V	4.6	9.0	18.21	33.0	-14.8	
1913.50	19.01	H	4.6	9.0	23.45	33.0	-9.5	

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Band 25

1.4MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-23
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 25 Fundamentals, 1.4MHz 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								
1850.70	14.74	V	4.5	9.5	19.75	33.0	-13.2	
1850.70	18.59	H	4.5	9.5	23.60	33.0	-9.4	
Mid Ch								
1882.50	15.38	V	4.5	9.3	20.13	33.0	-12.9	
1882.50	20.19	H	4.5	9.3	24.94	33.0	-8.1	
High Ch								
1914.30	14.76	V	4.6	9.0	19.19	33.0	-13.8	
1914.30	19.91	H	4.6	9.0	24.35	33.0	-8.7	

LTE

Band 25

1.4MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-23
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 25 Fundamentals, 1.4MHz 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								
1850.70	13.61	V	4.5	9.5	18.62	33.0	-14.4	
1850.70	17.39	H	4.5	9.5	22.40	33.0	-10.6	
Mid Ch								
1882.50	14.18	V	4.5	9.3	18.93	33.0	-14.1	
1882.50	19.18	H	4.5	9.3	23.93	33.0	-9.1	
High Ch								
1914.30	13.71	V	4.6	9.0	18.14	33.0	-14.9	
1914.30	19.15	H	4.6	9.0	23.59	33.0	-9.4	

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LTE Band 26

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Band 26

15MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-28
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 26 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								
821.50	12.42	V	3.0	-1.5	7.92	50.0	-42.1	Part 90
821.50	20.78	H	3.0	-1.5	16.29	50.0	-33.7	Part 90

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-28
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 26 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
Mid Ch								
831.50	12.55	V	3.0	-1.4	8.08	38.5	-30.4	
831.50	20.67	H	3.0	-1.4	16.20	38.5	-22.3	
High Ch								
841.50	11.87	V	3.0	-1.4	7.41	38.5	-31.1	
841.50	19.12	H	3.0	-1.4	14.67	38.5	-23.8	

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Band 26

15MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-28
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 26 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								
821.50	11.25	V	3.0	-1.5	6.75	50.0	-43.2	Part 90
821.50	19.68	H	3.0	-1.5	15.19	50.0	-34.8	Part 90

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-28
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 26 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
Mid Ch								
831.50	11.09	V	3.0	-1.4	6.62	38.5	-31.9	
831.50	18.70	H	3.0	-1.4	14.23	38.5	-24.3	
High Ch								
841.50	10.99	V	3.0	-1.4	6.53	38.5	-32.0	
841.50	18.08	H	3.0	-1.4	13.63	38.5	-24.9	

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Band 26

10MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-28
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 26 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								
819.00	12.31	V	3.0	-1.5	7.81	50.0	-42.2	Part 90
819.00	20.73	H	3.0	-1.5	16.23	50.0	-33.8	Part 90

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-28
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 26 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	12.98	V	3.0	-1.5	8.50	38.5	-30.0	
829.00	20.07	H	3.0	-1.5	15.59	38.5	-22.9	
Mid Ch								
831.50	12.97	V	3.0	-1.4	8.50	38.5	-30.0	
831.50	20.15	H	3.0	-1.4	15.68	38.5	-22.8	
High Ch								
844.00	12.18	V	3.1	-1.4	7.73	38.5	-30.8	
844.00	19.07	H	3.1	-1.4	14.62	38.5	-23.9	

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Band 26

10MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-28
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 26 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								
819.00	11.36	V	3.0	-1.5	6.86	50.0	-43.1	Part 90
819.00	19.54	H	3.0	-1.5	15.04	50.0	-35.0	Part 90

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-28
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 26 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	11.84	V	3.0	-1.5	7.36	38.5	-31.1	
829.00	19.14	H	3.0	-1.5	14.66	38.5	-23.8	
Mid Ch								
831.50	11.93	V	3.0	-1.4	7.46	38.5	-31.0	
831.50	19.08	H	3.0	-1.4	14.61	38.5	-23.9	
High Ch								
844.00	10.97	V	3.1	-1.4	6.52	38.5	-32.0	
844.00	17.84	H	3.1	-1.4	13.39	38.5	-25.1	

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Band 26

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-28
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 26 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								
816.50	11.72	V	3.0	-1.5	7.21	50.0	-42.8	Part 90
816.50	20.39	H	3.0	-1.5	15.88	50.0	-34.1	Part 90
Mid Ch								
821.50	11.62	V	3.0	-1.5	7.12	38.5	-31.4	Part 90
821.50	20.12	H	3.0	-1.5	15.63	38.5	-22.9	Part 90

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-28
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 26 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	12.83	V	3.0	-1.5	8.35	38.5	-30.1	
826.50	20.23	H	3.0	-1.5	15.75	38.5	-22.8	
Mid Ch								
831.50	13.08	V	3.0	-1.4	8.61	38.5	-29.9	
831.50	20.16	H	3.0	-1.4	15.69	38.5	-22.8	
High Ch								
846.50	12.04	V	3.1	-1.4	7.59	38.5	-30.9	
846.50	18.80	H	3.1	-1.4	14.35	38.5	-24.2	

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Band 26

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-28
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 26 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								
816.50	10.55	V	3.0	-1.5	6.04	50.0	-44.0	Part 90
816.50	19.44	H	3.0	-1.5	14.93	50.0	-35.1	Part 90
Mid Ch								
821.50	10.28	V	3.0	-1.5	5.78	38.5	-32.7	Part 90
821.50	19.43	H	3.0	-1.5	14.94	38.5	-23.6	Part 90

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-28
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 26 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	11.63	V	3.0	-1.5	7.15	38.5	-31.3	
826.50	19.08	H	3.0	-1.5	14.60	38.5	-23.9	
Mid Ch								
831.50	12.05	V	3.0	-1.4	7.58	38.5	-30.9	
831.50	19.01	H	3.0	-1.4	14.54	38.5	-24.0	
High Ch								
846.50	10.77	V	3.1	-1.4	6.32	38.5	-32.2	
846.50	17.94	H	3.1	-1.4	13.49	38.5	-25.0	

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Band 26

3MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-28
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 26 Fundamentals, 3MHz 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								
815.50	12.00	V	3.0	-1.5	7.50	50.0	-42.5	Part 90
815.50	20.67	H	3.0	-1.5	16.16	50.0	-33.8	Part 90
Mid Ch								
822.50	11.77	V	3.0	-1.5	7.28	38.5	-31.2	Part 90
822.50	20.29	H	3.0	-1.5	15.80	38.5	-22.7	Part 90

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-24
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 26 Fundamentals, 3MHz 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								
825.50	12.52	V	3.0	-1.5	8.04	38.5	-30.5	
825.50	20.27	H	3.0	-1.5	15.79	38.5	-22.7	
Mid Ch								
831.50	12.60	V	3.0	-1.4	8.13	38.5	-30.4	
831.50	19.49	H	3.0	-1.4	15.02	38.5	-23.5	
High Ch								
847.50	11.65	V	3.1	-1.4	7.21	38.5	-31.3	
847.50	18.87	H	3.1	-1.4	14.42	38.5	-24.1	

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Band 26

3MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-28
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 26 Fundamentals, 3MHz 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								
815.50	10.82	V	3.0	-1.5	6.32	50.0	-43.7	Part 90
815.50	19.34	H	3.0	-1.5	14.83	50.0	-35.2	Part 90
Mid Ch								
822.50	10.75	V	3.0	-1.5	6.26	38.5	-32.2	Part 90
822.50	19.46	H	3.0	-1.5	14.97	38.5	-23.5	Part 90

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-24
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 26 Fundamentals, 3MHz 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								
825.50	11.19	V	3.0	-1.5	6.71	38.5	-31.8	
825.50	18.67	H	3.0	-1.5	14.19	38.5	-24.3	
Mid Ch								
831.50	12.10	V	3.0	-1.4	7.63	38.5	-30.9	
831.50	19.11	H	3.0	-1.4	14.64	38.5	-23.9	
High Ch								
847.50	10.59	V	3.1	-1.4	6.15	38.5	-32.4	
847.50	17.87	H	3.1	-1.4	13.42	38.5	-25.1	

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LTE

Band 26

1.4MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-28
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 26 Fundamentals, 1.4MHz 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								
814.70	12.24	V	3.0	-1.5	7.73	50.0	-42.3	Part 90
814.70	19.49	H	3.0	-1.5	14.98	50.0	-35.0	Part 90
Mid Ch								
823.30	11.96	V	3.0	-1.5	7.47	38.5	-31.0	Part 90
823.30	20.29	H	3.0	-1.5	15.80	38.5	-22.7	Part 90

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-24
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 26 Fundamentals, 1.4MHz 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								
824.70	12.85	V	3.0	-1.5	8.36	38.5	-30.1	
824.70	20.04	H	3.0	-1.5	15.55	38.5	-22.9	
Mid Ch								
831.50	12.72	V	3.0	-1.4	8.25	38.5	-30.3	
831.50	19.93	H	3.0	-1.4	15.46	38.5	-23.0	
High Ch								
848.30	11.70	V	3.1	-1.4	7.26	38.5	-31.2	
848.30	19.07	H	3.1	-1.4	14.63	38.5	-23.9	

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LTE

Band 26

1.4MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-28
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 26 Fundamentals, 1.4MHz 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								
814.70	10.88	V	3.0	-1.5	6.37	50.0	-43.6	Part 90
814.70	20.73	H	3.0	-1.5	16.22	50.0	-33.8	Part 90
Mid Ch								
823.30	10.74	V	3.0	-1.5	6.25	38.5	-32.2	Part 90
823.30	19.34	H	3.0	-1.5	14.85	38.5	-23.7	Part 90

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-24
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 26 Fundamentals, 1.4MHz 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								
824.70	11.65	V	3.0	-1.5	7.16	38.5	-31.3	
824.70	19.30	H	3.0	-1.5	14.81	38.5	-23.7	
Mid Ch								
831.50	11.66	V	3.0	-1.4	7.19	38.5	-31.3	
831.50	18.98	H	3.0	-1.4	14.51	38.5	-24.0	
High Ch								
848.30	10.62	V	3.1	-1.4	6.18	38.5	-32.3	
848.30	18.01	H	3.1	-1.4	13.57	38.5	-24.9	

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LTE Band 41(PC2)

LTE Band 41 20MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-06-27
Test Engineer: 45585
Configuration: EUT, Z-Position
Location: Chamber 2
Mode: LTE_QPSK Band 41 Fundamentals, 20MHz Bandwidth

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00167451], 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								
2506.00	18.77	V	5.2	10.1	23.60	33.0	-9.4	
2506.00	18.95	H	5.2	10.1	23.78	33.0	-9.2	
Mid Ch								
2593.00	16.26	V	5.3	10.0	20.90	33.0	-12.1	
2593.00	18.96	H	5.3	10.0	23.60	33.0	-9.4	
High Ch								
2680.00	16.35	V	5.4	10.0	20.94	33.0	-12.1	
2680.00	16.71	H	5.4	10.0	21.30	33.0	-11.7	

LTE Band 41 20MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-06-27
Test Engineer: 45585
Configuration: EUT, Z-Position
Location: Chamber 2
Mode: LTE_16QAM Band 41 Fundamentals, 20MHz Bandwidth

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00167451], 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								
2506.00	17.66	V	5.2	10.1	22.49	33.0	-10.5	
2506.00	19.43	H	5.2	10.1	24.26	33.0	-8.7	
Mid Ch								
2593.00	16.17	V	5.3	10.0	20.81	33.0	-12.2	
2593.00	18.37	H	5.3	10.0	23.01	33.0	-10.0	
High Ch								
2680.00	15.35	V	5.4	10.0	19.94	33.0	-13.1	
2680.00	15.70	H	5.4	10.0	20.29	33.0	-12.7	

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LTE
Band 41
15MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-06-27
Test Engineer: 45585
Configuration: EUT, Z-Position
Location: Chamber 2
Mode: LTE_QPSK Band 41 Fundamentals, 15MHz Bandwidth

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00167451], 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								
2503.50	19.40	V	5.2	10.1	24.23	33.0	-8.8	
2503.50	18.20	H	5.2	10.1	23.03	33.0	-10.0	
Mid Ch								
2593.00	15.79	V	5.3	10.0	20.43	33.0	-12.6	
2593.00	18.65	H	5.3	10.0	23.29	33.0	-9.7	
High Ch								
2682.50	15.51	V	5.4	10.0	20.11	33.0	-12.9	
2682.50	17.16	H	5.4	10.0	21.76	33.0	-11.2	

LTE
Band 41
15MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-06-27
Test Engineer: 45585
Configuration: EUT, Z-Position
Location: Chamber 2
Mode: LTE_16QAM Band 41 Fundamentals, 15MHz Bandwidth

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00167451], 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								
2503.50	18.74	V	5.2	10.1	23.57	33.0	-9.4	
2503.50	17.70	H	5.2	10.1	22.53	33.0	-10.5	
Mid Ch								
2593.00	16.51	V	5.3	10.0	21.15	33.0	-11.9	
2593.00	18.01	H	5.3	10.0	22.65	33.0	-10.4	
High Ch								
2682.50	14.72	V	5.4	10.0	19.32	33.0	-13.7	
2682.50	15.02	H	5.4	10.0	19.62	33.0	-13.4	

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LTE
Band 41
10MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-06-26
Test Engineer: 45585
Configuration: EUT, Z-Position
Location: Chamber 2
Mode: LTE_QPSK Band 41 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00167451], 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								
2501.00	17.99	V	5.2	10.1	22.83	33.0	-10.2	
2501.00	20.00	H	5.2	10.1	24.84	33.0	-8.2	
Mid Ch								
2593.00	16.28	V	5.3	10.0	20.92	33.0	-12.1	
2593.00	17.84	H	5.3	10.0	22.48	33.0	-10.5	
High Ch								
2685.00	15.83	V	5.4	10.0	20.42	33.0	-12.6	
2685.00	16.96	H	5.4	10.0	21.55	33.0	-11.5	

LTE
Band 41
10MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-06-26
Test Engineer: 45585
Configuration: EUT, Z-Position
Location: Chamber 2
Mode: LTE_16QAM Band 41 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00167451], 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								
2501.00	16.88	V	5.2	10.1	21.72	33.0	-11.3	
2501.00	18.88	H	5.2	10.1	23.72	33.0	-9.3	
Mid Ch								
2593.00	15.92	V	5.3	10.0	20.56	33.0	-12.4	
2593.00	17.36	H	5.3	10.0	22.00	33.0	-11.0	
High Ch								
2685.00	15.20	V	5.4	10.0	19.79	33.0	-13.2	
2685.00	17.75	H	5.4	10.0	22.34	33.0	-10.7	

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LTE

Band 41

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-06-26
Test Engineer: 45585
Configuration: EUT, Z-Position
Location: Chamber 2
Mode: LTE_QPSK Band 41 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00167451], 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								
2498.50	18.04	V	5.2	10.1	22.88	33.0	-10.1	
2498.50	19.82	H	5.2	10.1	24.66	33.0	-8.3	
Mid Ch								
2593.00	15.30	V	5.3	10.0	19.94	33.0	-13.1	
2593.00	17.04	H	5.3	10.0	21.68	33.0	-11.3	
High Ch								
2687.50	15.55	V	5.4	10.0	20.15	33.0	-12.9	
2687.50	17.45	H	5.4	10.0	22.05	33.0	-11.0	

LTE

Band 41

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-06-26
Test Engineer: 45585
Configuration: EUT, Z-Position
Location: Chamber 2
Mode: LTE_16QAM Band 41 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00167451], 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								
2498.50	17.17	V	5.2	10.1	22.01	33.0	-11.0	
2498.50	19.42	H	5.2	10.1	24.26	33.0	-8.7	
Mid Ch								
2593.00	15.45	V	5.3	10.0	20.09	33.0	-12.9	
2593.00	17.28	H	5.3	10.0	21.92	33.0	-11.1	
High Ch								
2687.50	14.45	V	5.4	10.0	19.05	33.0	-14.0	
2687.50	15.60	H	5.4	10.0	20.20	33.0	-12.8	

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LTE Band 41(PC3)

LTE Band 41 20MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-06-27
Test Engineer: 45585
Configuration: EUT, Z-Position
Location: Chamber 2
Mode: LTE_QPSK Band 41 Fundamentals, 20MHz Bandwidth

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00167451], 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								
2506.00	14.16	V	5.2	10.1	18.99	33.0	-14.0	
2506.00	15.12	H	5.2	10.1	19.95	33.0	-13.0	
Mid Ch								
2593.00	13.63	V	5.3	10.0	18.27	33.0	-14.7	
2593.00	15.17	H	5.3	10.0	19.81	33.0	-13.2	
High Ch								
2680.00	12.89	V	5.4	10.0	17.48	33.0	-15.5	
2680.00	13.10	H	5.4	10.0	17.69	33.0	-15.3	

LTE Band 41 20MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-06-27
Test Engineer: 45585
Configuration: EUT, Z-Position
Location: Chamber 2
Mode: LTE_16QAM Band 41 Fundamentals, 20MHz Bandwidth

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00167451], 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								
2506.00	13.80	V	5.2	10.1	18.63	33.0	-14.4	
2506.00	13.64	H	5.2	10.1	18.47	33.0	-14.5	
Mid Ch								
2593.00	9.94	V	5.3	10.0	14.58	33.0	-18.4	
2593.00	12.18	H	5.3	10.0	16.82	33.0	-16.2	
High Ch								
2680.00	10.51	V	5.4	10.0	15.10	33.0	-17.9	
2680.00	11.33	H	5.4	10.0	15.92	33.0	-17.1	

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LTE
Band 41
15MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-06-27
Test Engineer: 45585
Configuration: EUT, Z-Position
Location: Chamber 2
Mode: LTE_QPSK Band 41 Fundamentals, 15MHz Bandwidth

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00167451], 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								
2503.50	16.19	V	5.2	10.1	21.02	33.0	-12.0	
2503.50	15.24	H	5.2	10.1	20.07	33.0	-12.9	
Mid Ch								
2593.00	12.74	V	5.3	10.0	17.38	33.0	-15.6	
2593.00	15.07	H	5.3	10.0	19.71	33.0	-13.3	
High Ch								
2682.50	12.65	V	5.4	10.0	17.25	33.0	-15.8	
2682.50	13.38	H	5.4	10.0	17.98	33.0	-15.0	

LTE
Band 41
15MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-06-27
Test Engineer: 45585
Configuration: EUT, Z-Position
Location: Chamber 2
Mode: LTE_16QAM Band 41 Fundamentals, 15MHz Bandwidth

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00167451], 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								
2503.50	13.56	V	5.2	10.1	18.39	33.0	-14.6	
2503.50	14.20	H	5.2	10.1	19.03	33.0	-14.0	
Mid Ch								
2593.00	11.95	V	5.3	10.0	16.59	33.0	-16.4	
2593.00	12.94	H	5.3	10.0	17.58	33.0	-15.4	
High Ch								
2682.50	10.12	V	5.4	10.0	14.72	33.0	-18.3	
2682.50	11.61	H	5.4	10.0	16.21	33.0	-16.8	

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LTE
Band 41
10MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-06-27
Test Engineer: 45585
Configuration: EUT, Z-Position
Location: Chamber 2
Mode: LTE_QPSK Band 41 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00167451], 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								
2501.00	16.56	V	5.2	10.1	21.40	33.0	-11.6	
2501.00	15.86	H	5.2	10.1	20.70	33.0	-12.3	
Mid Ch								
2593.00	12.96	V	5.3	10.0	17.60	33.0	-15.4	
2593.00	15.54	H	5.3	10.0	20.18	33.0	-12.8	
High Ch								
2685.00	14.69	V	5.4	10.0	19.28	33.0	-13.7	
2685.00	15.54	H	5.4	10.0	20.13	33.0	-12.9	

LTE
Band 41
10MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-06-27
Test Engineer: 45585
Configuration: EUT, Z-Position
Location: Chamber 2
Mode: LTE_16QAM Band 41 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00167451], 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								
2501.00	14.36	V	5.2	10.1	19.20	33.0	-13.8	
2501.00	12.97	H	5.2	10.1	17.81	33.0	-15.2	
Mid Ch								
2593.00	11.06	V	5.3	10.0	15.70	33.0	-17.3	
2593.00	12.40	H	5.3	10.0	17.04	33.0	-16.0	
High Ch								
2685.00	11.87	V	5.4	10.0	16.46	33.0	-16.5	
2685.00	12.92	H	5.4	10.0	17.51	33.0	-15.5	

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LTE

Band 41

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-06-27
Test Engineer: 45585
Configuration: EUT, Z-Position
Location: Chamber 2
Mode: LTE_QPSK Band 41 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00167451], 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								
2498.50	14.47	V	5.2	10.1	19.31	33.0	-13.7	
2498.50	15.52	H	5.2	10.1	20.36	33.0	-12.6	
Mid Ch								
2593.00	12.93	V	5.3	10.0	17.57	33.0	-15.4	
2593.00	16.07	H	5.3	10.0	20.71	33.0	-12.3	
High Ch								
2687.50	12.85	V	5.4	10.0	17.45	33.0	-15.6	
2687.50	12.88	H	5.4	10.0	17.48	33.0	-15.5	

LTE

Band 41

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-06-27
Test Engineer: 45585
Configuration: EUT, Z-Position
Location: Chamber 2
Mode: LTE_16QAM Band 41 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00167451], 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								
2498.50	13.93	V	5.2	10.1	18.77	33.0	-14.2	
2498.50	12.98	H	5.2	10.1	17.82	33.0	-15.2	
Mid Ch								
2593.00	11.84	V	5.3	10.0	16.48	33.0	-16.5	
2593.00	13.64	H	5.3	10.0	18.28	33.0	-14.7	
High Ch								
2687.50	10.22	V	5.4	10.0	14.82	33.0	-18.2	
2687.50	11.97	H	5.4	10.0	16.57	33.0	-16.4	

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LTE Band 66

LTE Band 66 20MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-23
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 66 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	14.27	V	4.3	9.4	19.37	30.0	-10.6	
1720.00	17.91	H	4.3	9.4	23.02	30.0	-7.0	
Mid Ch								
1745.00	14.22	V	4.4	9.5	19.38	30.0	-10.6	
1745.00	16.95	H	4.4	9.5	22.12	30.0	-7.9	
High Ch								
1770.00	13.28	V	4.4	9.6	18.45	30.0	-11.6	
1770.00	17.57	H	4.4	9.6	22.74	30.0	-7.3	

LTE Band 66 20MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-23
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 66 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	12.62	V	4.3	9.4	17.72	30.0	-12.3	
1720.00	17.48	H	4.3	9.4	22.59	30.0	-7.4	
Mid Ch								
1745.00	13.77	V	4.4	9.5	18.93	30.0	-11.1	
1745.00	16.54	H	4.4	9.5	21.71	30.0	-8.3	
High Ch								
1770.00	13.08	V	4.4	9.6	18.25	30.0	-11.8	
1770.00	17.26	H	4.4	9.6	22.43	30.0	-7.6	

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Band 66

15MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-23
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 66 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	13.34	V	4.3	9.4	18.44	30.0	-11.6	
1717.50	17.60	H	4.3	9.4	22.70	30.0	-7.3	
Mid Ch								
1745.00	15.29	V	4.4	9.5	20.45	30.0	-9.5	
1745.00	17.39	H	4.4	9.5	22.56	30.0	-7.4	
High Ch								
1772.50	14.06	V	4.4	9.6	19.23	30.0	-10.8	
1772.50	17.56	H	4.4	9.6	22.73	30.0	-7.3	

LTE

Band 66

15MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-23
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 66 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	12.15	V	4.3	9.4	17.25	30.0	-12.7	
1717.50	16.69	H	4.3	9.4	21.79	30.0	-8.2	
Mid Ch								
1745.00	14.01	V	4.4	9.5	19.17	30.0	-10.8	
1745.00	15.20	H	4.4	9.5	20.37	30.0	-9.6	
High Ch								
1772.50	12.96	V	4.4	9.6	18.13	30.0	-11.9	
1772.50	16.36	H	4.4	9.6	21.53	30.0	-8.5	

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Band 66

10MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-23
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 66 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	13.93	V	4.3	9.4	19.02	30.0	-11.0	
1715.00	17.97	H	4.3	9.4	23.07	30.0	-6.9	
Mid Ch								
1745.00	15.49	V	4.4	9.5	20.65	30.0	-9.3	
1745.00	17.21	H	4.4	9.5	22.38	30.0	-7.6	
High Ch								
1775.00	13.93	V	4.4	9.6	19.10	30.0	-10.9	
1775.00	17.44	H	4.4	9.6	22.61	30.0	-7.4	

LTE

Band 66

10MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-23
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 66 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	12.61	V	4.3	9.4	17.70	30.0	-12.3	
1715.00	16.62	H	4.3	9.4	21.72	30.0	-8.3	
Mid Ch								
1745.00	13.92	V	4.4	9.5	19.08	30.0	-10.9	
1745.00	15.72	H	4.4	9.5	20.89	30.0	-9.1	
High Ch								
1775.00	12.77	V	4.4	9.6	17.94	30.0	-12.1	
1775.00	16.27	H	4.4	9.6	21.44	30.0	-8.6	

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Band 66

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-23
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 66 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	13.47	V	4.3	9.4	18.56	30.0	-11.4	
1712.50	17.45	H	4.3	9.4	22.54	30.0	-7.5	
Mid Ch								
1745.00	15.21	V	4.4	9.5	20.37	30.0	-9.6	
1745.00	16.61	H	4.4	9.5	21.78	30.0	-8.2	
High Ch								
1777.50	14.66	V	4.4	9.6	19.83	30.0	-10.2	
1777.50	17.19	H	4.4	9.6	22.36	30.0	-7.6	

LTE

Band 66

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-23
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 66 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	12.16	V	4.3	9.4	17.25	30.0	-12.8	
1712.50	16.33	H	4.3	9.4	21.42	30.0	-8.6	
Mid Ch								
1745.00	14.00	V	4.4	9.5	19.16	30.0	-10.8	
1745.00	15.60	H	4.4	9.5	20.77	30.0	-9.2	
High Ch								
1777.50	13.11	V	4.4	9.6	18.28	30.0	-11.7	
1777.50	15.83	H	4.4	9.6	21.00	30.0	-9.0	

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LTE

Band 66

3MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-23
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 66 Fundamentals, 3MHz 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								
1711.50	13.55	V	4.3	9.4	18.64	30.0	-11.4	
1711.50	17.44	H	4.3	9.4	22.53	30.0	-7.5	
Mid Ch								
1745.00	15.52	V	4.4	9.5	20.68	30.0	-9.3	
1745.00	17.58	H	4.4	9.5	22.75	30.0	-7.3	
High Ch								
1778.50	14.70	V	4.4	9.6	19.87	30.0	-10.1	
1778.50	16.96	H	4.4	9.6	22.13	30.0	-7.9	

LTE

Band 66

3MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-23
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 66 Fundamentals, 3MHz 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								
1711.50	12.39	V	4.3	9.4	17.48	30.0	-12.5	
1711.50	16.48	H	4.3	9.4	21.57	30.0	-8.4	
Mid Ch								
1745.00	14.37	V	4.4	9.5	19.53	30.0	-10.5	
1745.00	16.28	H	4.4	9.5	21.45	30.0	-8.6	
High Ch								
1778.50	13.42	V	4.4	9.6	18.59	30.0	-11.4	
1778.50	15.72	H	4.4	9.6	20.89	30.0	-9.1	

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Band 66

1.4MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-23
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 66 Fundamentals, 1.4MHz 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								
1710.70	13.71	V	4.3	9.4	18.79	30.0	-11.2	
1710.70	17.75	H	4.3	9.4	22.83	30.0	-7.2	
Mid Ch								
1745.00	15.28	V	4.4	9.5	20.44	30.0	-9.6	
1745.00	17.62	H	4.4	9.5	22.79	30.0	-7.2	
High Ch								
1779.30	14.94	V	4.4	9.6	20.11	30.0	-9.9	
1779.30	16.91	H	4.4	9.6	22.08	30.0	-7.9	

LTE

Band 66

1.4MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789014604
Date: 2019-05-23
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 66 Fundamentals, 1.4MHz 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								
1710.70	12.43	V	4.3	9.4	17.51	30.0	-12.5	
1710.70	16.69	H	4.3	9.4	21.77	30.0	-8.2	
Mid Ch								
1745.00	14.10	V	4.4	9.5	19.26	30.0	-10.7	
1745.00	16.49	H	4.4	9.5	21.66	30.0	-8.3	
High Ch								
1779.30	13.57	V	4.4	9.6	18.74	30.0	-11.3	
1779.30	15.85	H	4.4	9.6	21.02	30.0	-9.0	

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10.2. 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 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.

Part 90.691(a):

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log10(f/6.1) decibels or 50 + 10 Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log_{10}(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.(NOTE : Use 100kHz reference bandwidth)

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

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TEST PROCEDURE

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

For peak power measurement with a ESU40:
a) Set the RBW = 100 KHz for emission below 1GHz and 1MHz for emissions above 1GHz
b) Set VBW ≥ 3 × RBW;
c) Set span ≥ 1.5 times the OBW;
d) Sweep time = auto couple;
e) Detector = rms;
f) Ensure that the number of measurement points ≥ span/RBW;
g) Trace mode = average(WCDMA, LTE), Maxhold(GSM, LTE Band41);;

RESULTS

See the following pages.

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

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10.2.1. SPURIOUS RADIATION PLOTS

GSM850

GSM850

GPRS

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

Company: Samsung
Project #: 4789014604
Date: 2019-05-28
Test Engineer: 45585
Configuration: EUT / AC Adapter, Z-Position
Location: Chamber 1
Mode: GPRS 850 MHz Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 824.2MHz									
1648.40	1.8	V	3.0	43.6	1.0	-40.8	-13.0	-27.8	
2472.60	-11.6	V	3.0	43.4	1.0	-54.1	-13.0	-41.1	
3296.80	-9.6	V	3.0	43.6	1.0	-52.3	-13.0	-39.3	
1648.40	3.3	H	3.0	43.6	1.0	-39.3	-13.0	-26.3	
2472.60	-12.3	H	3.0	43.4	1.0	-54.7	-13.0	-41.7	
3296.80	-9.7	H	3.0	43.6	1.0	-52.3	-13.0	-39.3	
Mid Ch, 836.6MHz									
1673.20	0.2	V	3.0	43.6	1.0	-42.4	-13.0	-29.4	
2509.80	-11.6	V	3.0	43.4	1.0	-54.0	-13.0	-41.0	
3346.40	-9.3	V	3.0	43.6	1.0	-51.9	-13.0	-38.9	
1673.20	3.6	H	3.0	43.6	1.0	-39.0	-13.0	-26.0	
2509.80	-12.3	H	3.0	43.4	1.0	-54.7	-13.0	-41.7	
3346.40	-9.3	H	3.0	43.6	1.0	-52.0	-13.0	-39.0	
High Ch, 848.8MHz									
1697.60	-2.2	V	3.0	43.6	1.0	-44.7	-13.0	-31.7	
2546.40	-11.5	V	3.0	43.4	1.0	-53.9	-13.0	-40.9	
3395.20	-9.0	V	3.0	43.7	1.0	-51.6	-13.0	-38.6	
1697.60	2.1	H	3.0	43.6	1.0	-40.4	-13.0	-27.4	
2546.40	-12.2	H	3.0	43.4	1.0	-54.6	-13.0	-41.6	
3395.20	-9.0	H	3.0	43.7	1.0	-51.7	-13.0	-38.7	

GSM850

EGPRS

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

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Project #: 4789014604
Date: 2019-05-28
Test Engineer: 45585
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Location: Chamber 1
Mode: EGPRS 850 MHz Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 824.2MHz									
1648.40	-10.0	V	3.0	43.6	1.0	-52.6	-13.0	-39.6	
2472.60	-11.2	V	3.0	43.4	1.0	-53.7	-13.0	-40.7	
3296.80	-9.7	V	3.0	43.6	1.0	-52.3	-13.0	-39.3	
1648.40	-8.8	H	3.0	43.6	1.0	-51.4	-13.0	-38.4	
2472.60	-11.6	H	3.0	43.4	1.0	-54.1	-13.0	-41.1	
3296.80	-9.7	H	3.0	43.6	1.0	-52.3	-13.0	-39.3	
Mid Ch, 836.6MHz									
1673.20	-10.1	V	3.0	43.6	1.0	-52.7	-13.0	-39.7	
2509.80	-11.6	V	3.0	43.4	1.0	-54.0	-13.0	-41.0	
3346.40	-9.3	V	3.0	43.6	1.0	-51.9	-13.0	-38.9	
1673.20	-7.9	H	3.0	43.6	1.0	-50.5	-13.0	-37.5	
2509.80	-11.8	H	3.0	43.4	1.0	-54.2	-13.0	-41.2	
3346.40	-9.5	H	3.0	43.6	1.0	-52.1	-13.0	-39.1	
High Ch, 848.8MHz									
1697.60	-12.8	V	3.0	43.6	1.0	-55.4	-13.0	-42.4	
2546.40	-11.7	V	3.0	43.4	1.0	-54.1	-13.0	-41.1	
3395.20	-9.2	V	3.0	43.7	1.0	-51.9	-13.0	-38.9	
1697.60	-10.2	H	3.0	43.6	1.0	-52.8	-13.0	-39.8	
2546.40	-12.3	H	3.0	43.4	1.0	-54.7	-13.0	-41.7	
3395.20	-9.2	H	3.0	43.7	1.0	-51.8	-13.0	-38.8	

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GSM1900

GSM1900

GPRS

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

Company: Samsung
Project #: 4789014604
Date: 2019-06-18
Test Engineer: 45585
Configuration: EUT / AC Adapter, X-Position
Location: Chamber 2
Mode: GPRS 1900 MHz Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1850.2MHz									
3700.40	-8.9	V	3.0	39.7	1.0	-47.5	-13.0	-34.5	
5550.60	-7.2	V	3.0	39.9	1.0	-46.1	-13.0	-33.1	
7400.80	-5.1	V	3.0	39.4	1.0	-43.5	-13.0	-30.5	
3700.40	-6.6	H	3.0	39.7	1.0	-45.3	-13.0	-32.3	
5550.60	-7.6	H	3.0	39.9	1.0	-46.5	-13.0	-33.5	
7400.80	-5.8	H	3.0	39.4	1.0	-44.3	-13.0	-31.3	
Mid Ch, 1880MHz									
3760.00	-8.8	V	3.0	39.7	1.0	-47.5	-13.0	-34.5	
5640.00	-6.8	V	3.0	40.0	1.0	-45.8	-13.0	-32.8	
7520.00	-5.1	V	3.0	39.4	1.0	-43.5	-13.0	-30.5	
3760.00	-6.4	H	3.0	39.7	1.0	-45.1	-13.0	-32.1	
5640.00	-7.2	H	3.0	40.0	1.0	-46.1	-13.0	-33.1	
7520.00	-5.9	H	3.0	39.4	1.0	-44.3	-13.0	-31.3	
High Ch, 1909.8MHz									
3819.60	-9.6	V	3.0	39.7	1.0	-48.3	-13.0	-35.3	
5729.40	-6.9	V	3.0	40.0	1.0	-45.9	-13.0	-32.9	
7639.20	-5.0	V	3.0	39.3	1.0	-43.4	-13.0	-30.4	
3819.60	-8.9	H	3.0	39.7	1.0	-47.6	-13.0	-34.6	
5729.40	-7.2	H	3.0	40.0	1.0	-46.2	-13.0	-33.2	
7639.20	-5.9	H	3.0	39.3	1.0	-44.3	-13.0	-31.3	

GSM1900

EGPRS

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

Company: Samsung
Project #: 4789014604
Date: 2019-06-18
Test Engineer: 45585
Configuration: EUT / AC Adapter, X-Position
Location: Chamber 2
Mode: EGPRS 1900 MHz Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1850.2MHz									
3700.40	-10.0	V	3.0	39.7	1.0	-48.7	-13.0	-35.7	
5550.60	-7.3	V	3.0	39.9	1.0	-46.2	-13.0	-33.2	
7400.80	-5.2	V	3.0	39.4	1.0	-43.6	-13.0	-30.6	
3700.40	-10.1	H	3.0	39.7	1.0	-48.7	-13.0	-35.7	
5550.60	-7.5	H	3.0	39.9	1.0	-46.4	-13.0	-33.4	
7400.80	-6.0	H	3.0	39.4	1.0	-44.5	-13.0	-31.5	
Mid Ch, 1880MHz									
3760.00	-9.7	V	3.0	39.7	1.0	-48.4	-13.0	-35.4	
5640.00	-6.7	V	3.0	40.0	1.0	-45.7	-13.0	-32.7	
7520.00	-5.1	V	3.0	39.4	1.0	-43.5	-13.0	-30.5	
3760.00	-9.5	H	3.0	39.7	1.0	-48.2	-13.0	-35.2	
5640.00	-7.1	H	3.0	40.0	1.0	-46.1	-13.0	-33.1	
7520.00	-6.0	H	3.0	39.4	1.0	-44.4	-13.0	-31.4	
High Ch, 1909.8MHz									
3819.60	-10.7	V	3.0	39.7	1.0	-49.4	-13.0	-36.4	
5729.40	-7.0	V	3.0	40.0	1.0	-46.0	-13.0	-33.0	
7639.20	-5.2	V	3.0	39.3	1.0	-43.5	-13.0	-30.5	
3819.60	-10.9	H	3.0	39.7	1.0	-49.6	-13.0	-36.6	
5729.40	-7.4	H	3.0	40.0	1.0	-46.4	-13.0	-33.4	
7639.20	-5.8	H	3.0	39.3	1.0	-44.2	-13.0	-31.2	

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