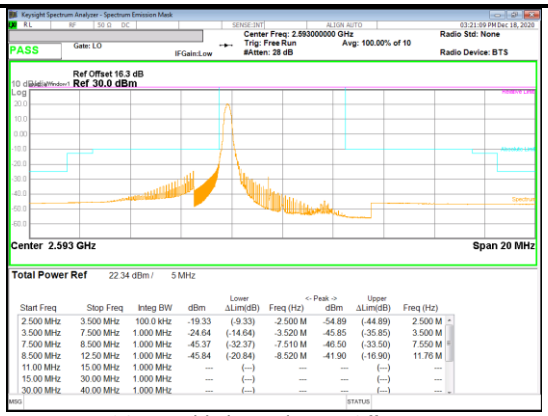
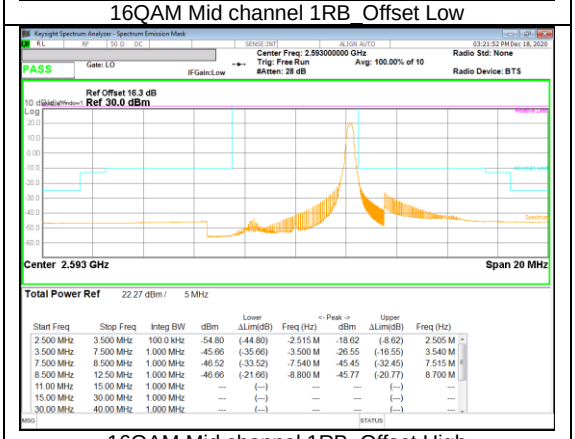
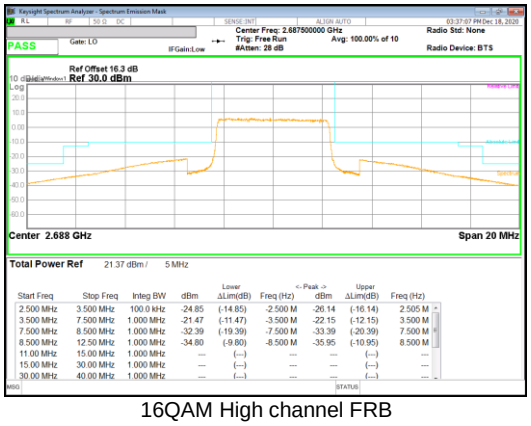
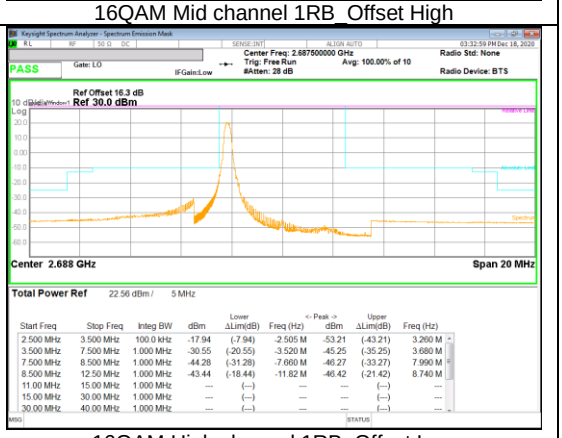
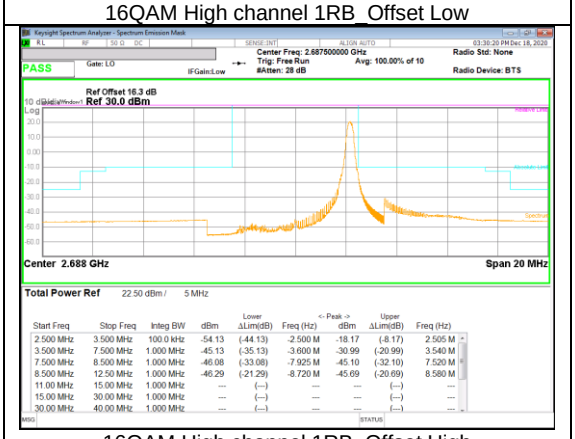
Band 41 5MHz 16QAM	 16QAM Mid channel FRB	 16QAM Mid channel 1RB_Offset Low
		 16QAM Mid channel 1RB_Offset High
	 16QAM High channel FRB	 16QAM High channel 1RB_Offset Low
		 16QAM High channel 1RB_Offset High

LTE Band 4

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

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.

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9.3. OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051, §22.901, §22.917, §27.53 and §90.691

LIMITS

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

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

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

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

TEST PROCEDURE

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

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

b) Set VBW ≥ 3 × RBW;

c) Set span ≥ 1.5 times the OBW;

d) Sweep time = auto couple;

e) Detector = RMS;

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

g) Trace mode = Average(WCDMA, LTE FDD), Max hold(GSM, LTE TDD);

RESULTS

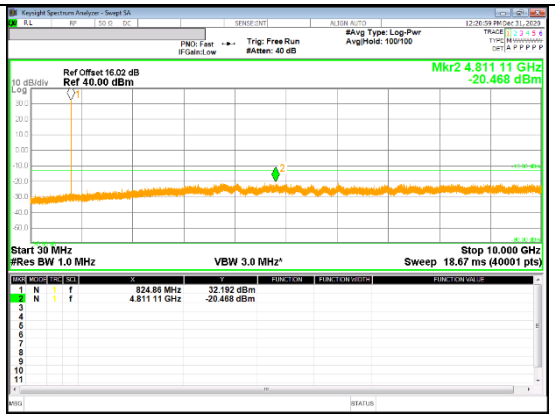
See the following pages.

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

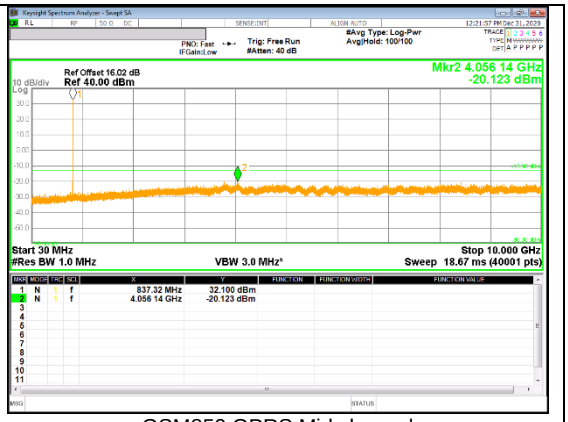
9.3.1. OUT OF BAND EMISSIONS RESULT

GSM 850

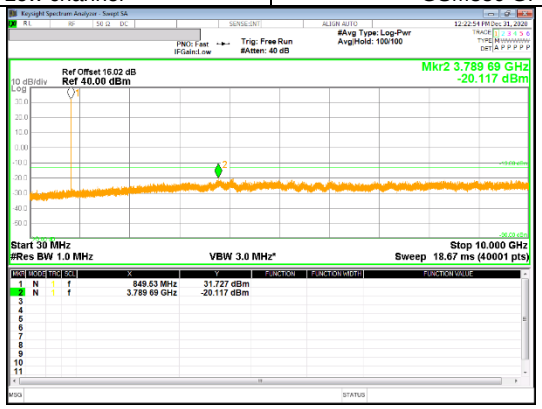
GSM 850



GSM850 GPRS Low channel



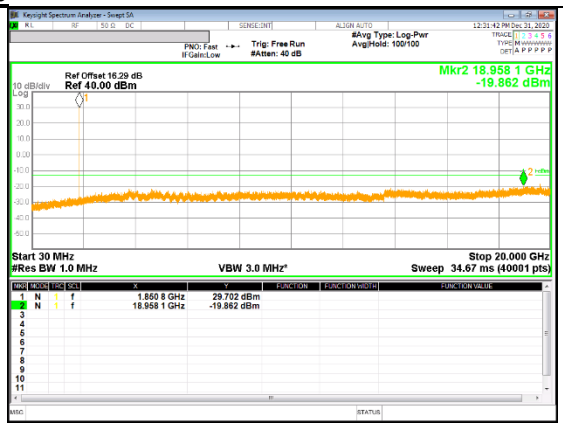
GSM850 GPRS Mid channel



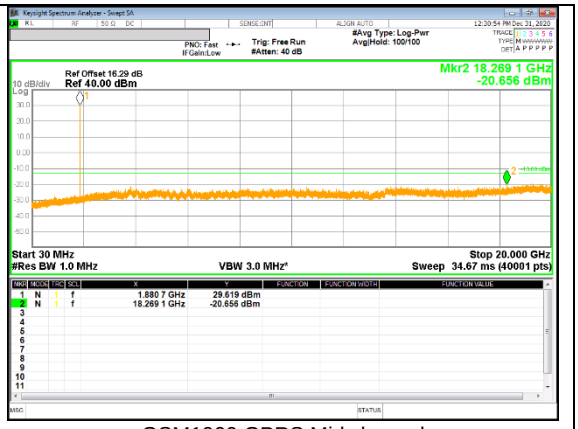
GSM850 GPRS High channel

GSM 1900

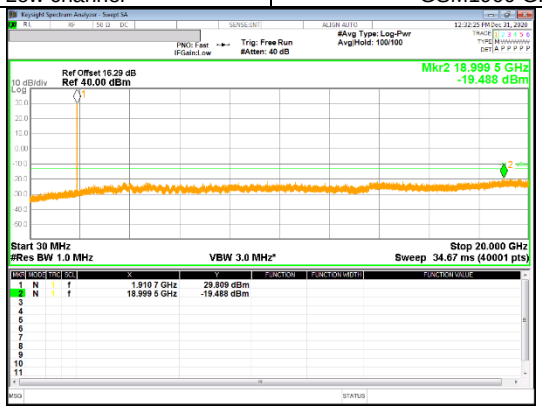
GSM 1900



GSM1900 GPRS Low channel



GSM1900 GPRS Mid channel



GSM1900 GPRS High channel

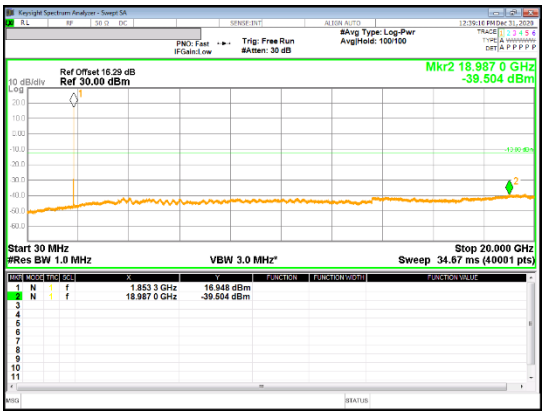
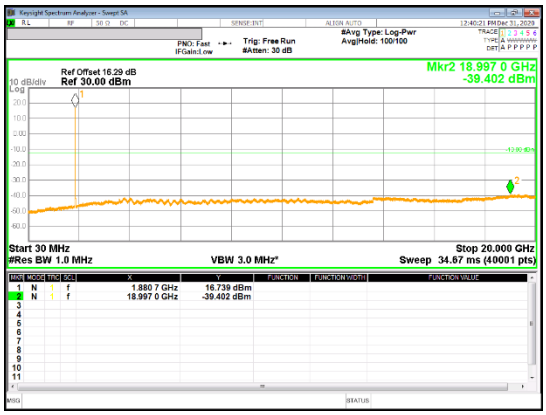
WCDMA Band 5

Band 5	 REL99 Low channel	 REL99 Mid channel
	 REL99 High channel	

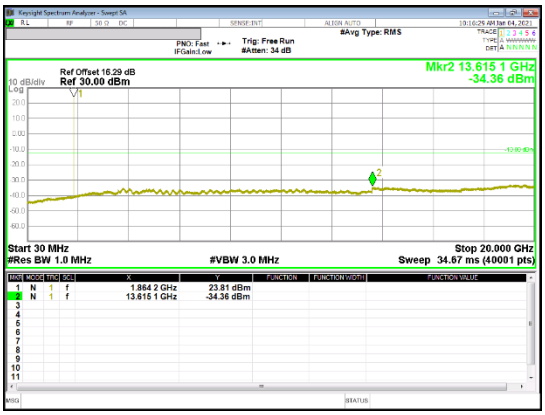
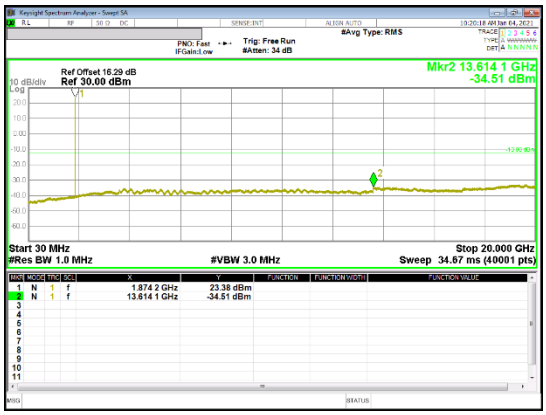
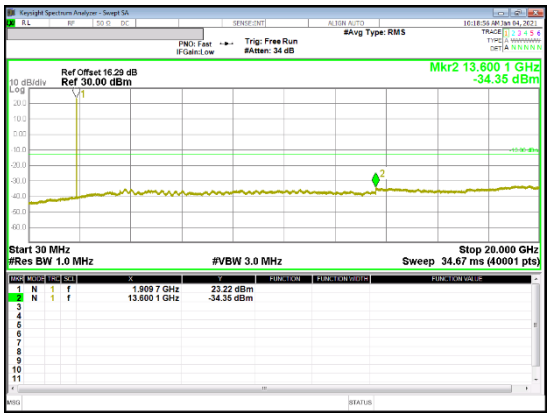
WCDMA Band 4

Band 4	 REL99 Low channel	 REL99 Mid channel
	 REL99 High channel	

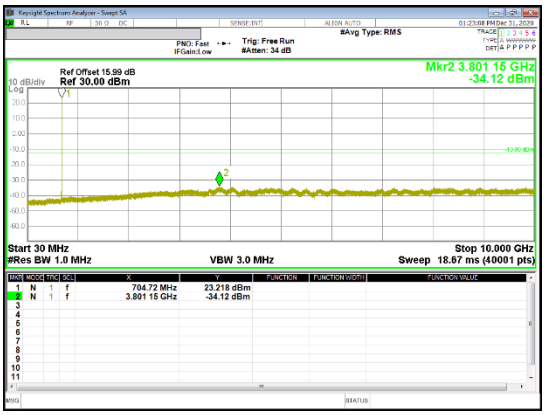
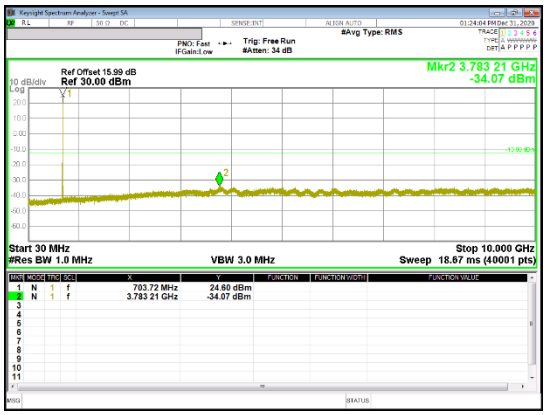
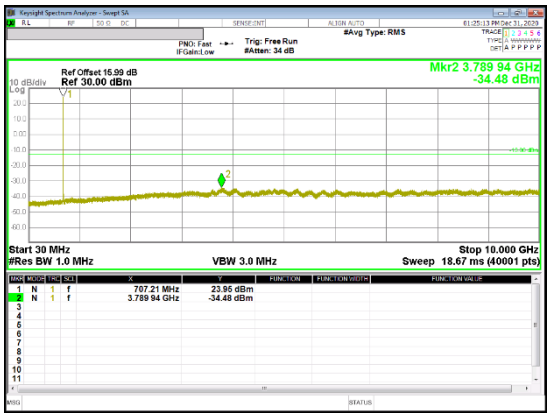
WCDMA Band 2

Band 2	 REL99 Low channel	 REL99 Mid channel
	 REL99 High channel	

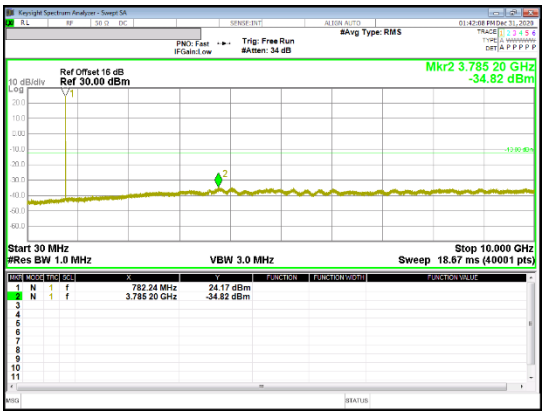
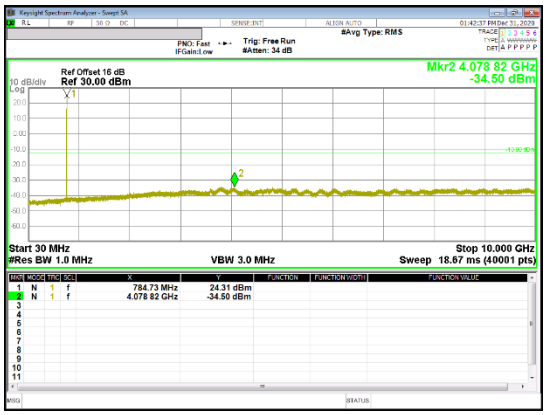
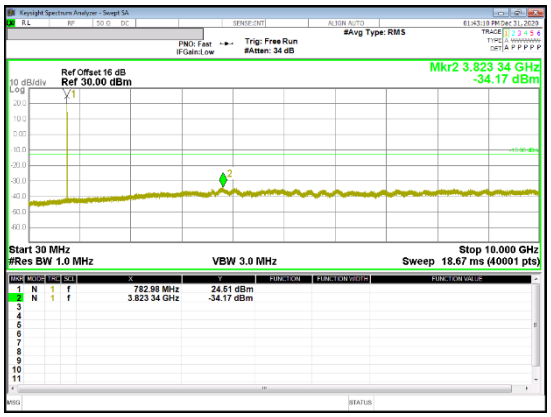
LTE Band 2

Band 2 15MHz	 QPSK Low channel	 QPSK Mid channel
	 QPSK High channel	

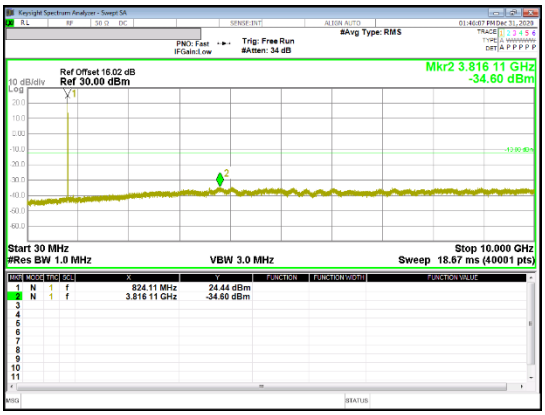
LTE Band 12

Band 12 10MHz	 QPSK Low channel	 QPSK Mid channel
	 QPSK High channel	

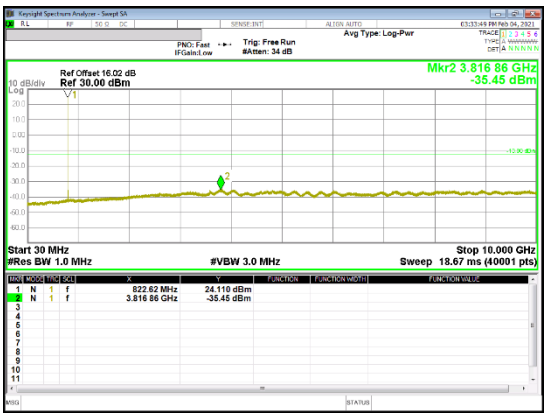
LTE Band 13

Band 13 5MHz	 QPSK Low channel	 QPSK Mid channel
	 QPSK High channel	

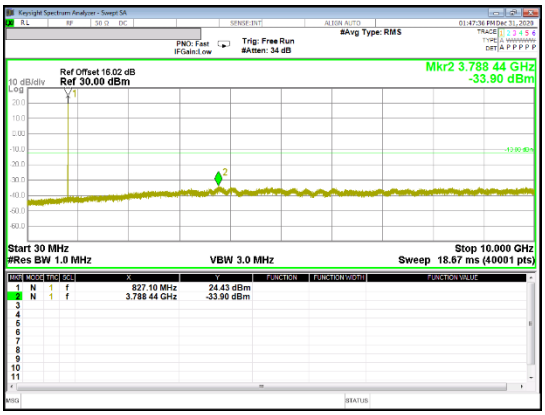
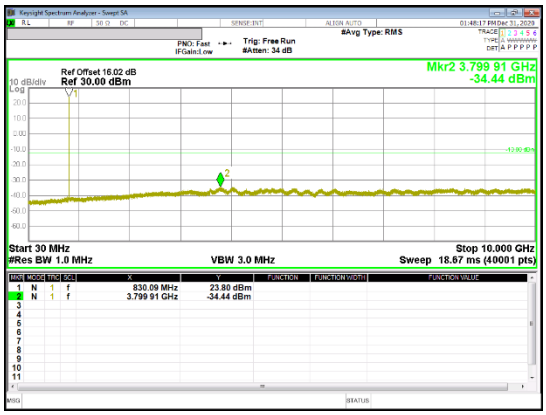
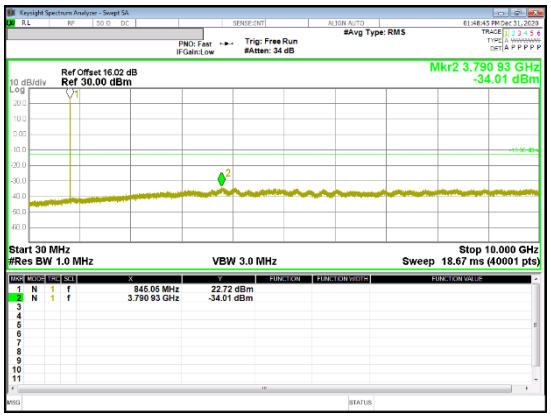
LTE Band 26 (Part 90)

Band 26 10MHz	 QPSK Mid channel

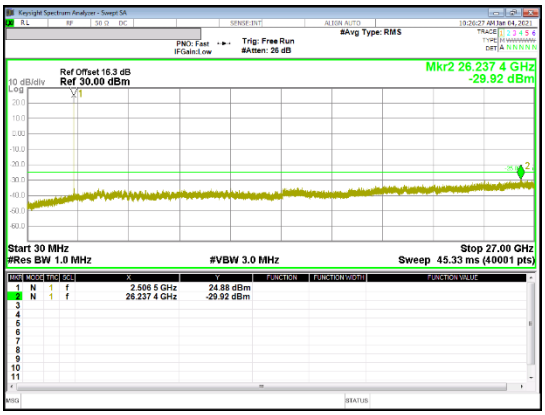
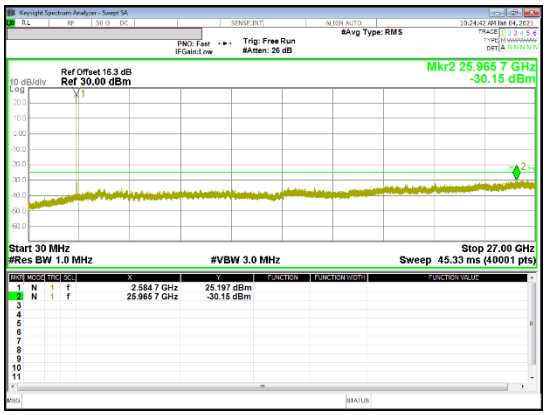
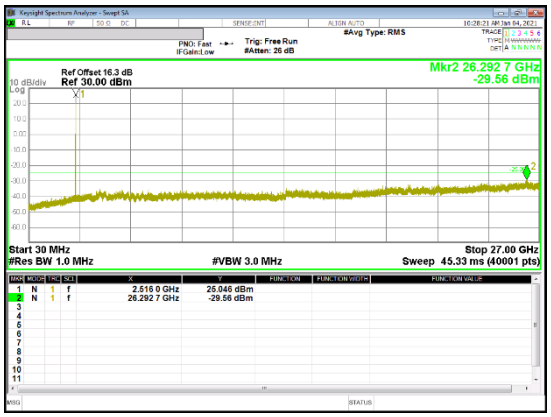
LTE Band 26 (Staddle Channel)

Band 26 5MHz	 QPSK

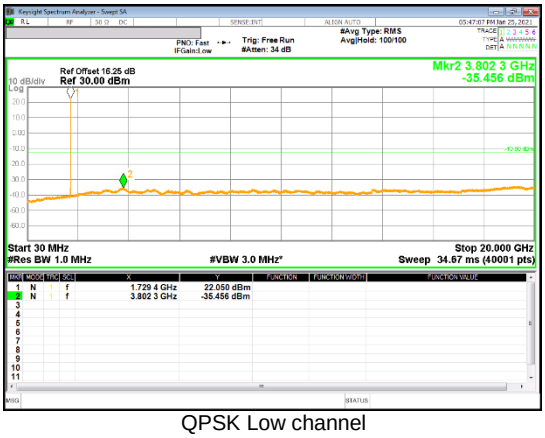
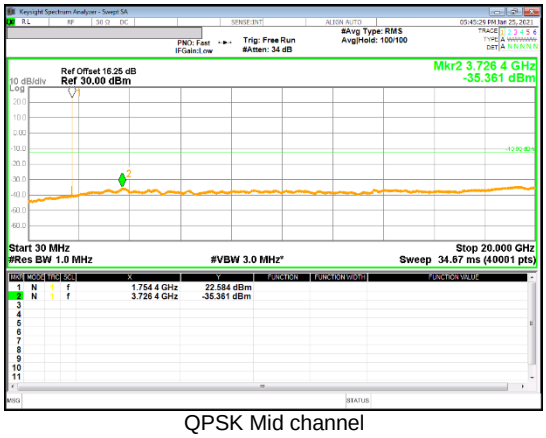
LTE Band 26 (Part 22)

Band 26 5MHz	 QPSK Low channel	 QPSK Mid channel
	 QPSK High channel	

LTE Band 41

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

LTE Band 66

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

LTE Band 4

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

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.

9.4. FREQUENCY STABILITY

RULE PART(S)

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

LIMITS

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

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

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

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

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v03r01

RESULTS

See the following pages.

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

9.4.1. FREQUENCY STABILITY RESULTS

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				
		Low Channel		High Channel		Limit [ppm]
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.85	50	824.20007038	-0.011	848.80003345	0.022	2.5
3.85	40	824.20005466	0.008	848.80004727	0.006	2.5
3.85	30	824.20006131	0.000	848.80004236	0.011	2.5
3.85	***20***	***824.20006093***	***0.000***	***848.80005205***	***0.000***	***2.5***
3.85	10	824.20009140	-0.037	848.80009098	-0.046	2.5
3.85	0	824.20005947	0.002	848.80005853	-0.008	2.5
3.85	-10	824.20006606	-0.006	848.80005870	-0.008	2.5
3.85	-20	824.20005175	0.011	848.80005792	-0.007	2.5
3.85	-30	824.20005773	0.004	848.80005941	-0.009	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				
		Low Channel		High Channel		Limit [ppm]
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.85	***20***	**824.20006093**	***0***	**848.80005205**	***0***	***2.5***
4.40	20	824.20003203	0.035	848.80003103	0.025	2.5
3.65	20	824.20003074	0.037	848.80004375	0.010	2.5

GSM 1900, Channel 512/810, Frequency 1850.0/1910.0 MHz (Lowest Frequency:GPRS / Highest Frequency: GPRS)

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	1850.0783	1909.9217		
Extreme (50C)		1850.0784	1909.9218	64.9	0.035
Extreme (40C)		1850.0783	1909.9218	48.4	0.026
Extreme (30C)		1850.0783	1909.9218	49.0	0.026
Extreme (10C)		1850.0784	1909.9218	63.8	0.034
Extreme (0C)		1850.0784	1909.9218	62.0	0.033
Extreme (-10C)		1850.0784	1909.9218	68.1	0.036
Extreme (-20C)		1850.0783	1909.9218	50.5	0.027
Extreme (-30C)		1850.0783	1909.9218	55.3	0.029
20C	15%	1850.0784	1909.9218	35.4	0.019
	-15%	1850.0783	1909.9218	36.6	0.019
	End Point	1850.0783	1909.9218	36.7	0.020

WCDMA Band 5

Reference Frequency : WCDMA Band 5 Low Channel 826.4 MHz / High Channel 846.6 MHz @ 20°C						
Limit: +- 2.5 ppm =	Low Channel	2066.000	Hz	High Channel	2116.500	Hz

Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measureed with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.85	50	826.40002525	0.009	846.60001212	0.028	2.5
3.85	40	826.40001135	0.026	846.60001760	0.022	2.5
3.85	30	826.40002126	0.014	846.60002005	0.019	2.5
3.85	***20***	***826.40003252***	***0.000***	***846.60003597***	***0.000***	***2.5***
3.85	10	826.40005998	-0.033	846.60003523	0.001	2.5
3.85	0	826.40004555	-0.016	846.60004666	-0.013	2.5
3.85	-10	826.40005453	-0.027	846.60004436	-0.010	2.5
3.85	-20	826.40004982	-0.021	846.60003402	0.002	2.5
3.85	-30	826.40004756	-0.018	846.60004399	-0.009	2.5

Reference Frequency : WCDMA Band 5 Low Channel 826.4 MHz / High Channel 846.6 MHz @ 20°C						
Limit: +- 2.5 ppm =	Low Channel	2066.000	Hz	High Channel	2116.500	Hz

Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measureed with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.85	***20***	**826.40003252**	***0***	**846.60003597**	***0***	***2.5***
4.40	20	826.40000217	0.037	846.60000297	0.039	2.5
3.65	20	826.40000236	0.036	846.60000305	0.039	2.5

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

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	1710.3231	1754.6728		
Extreme (50C)		1710.3231	1754.6728	38.3	0.022
Extreme (40C)		1710.3231	1754.6728	46.4	0.027
Extreme (30C)		1710.3231	1754.6728	47.6	0.027
Extreme (10C)		1710.3231	1754.6728	32.8	0.019
Extreme (0C)		1710.3231	1754.6728	49.0	0.028
Extreme (-10C)		1710.3231	1754.6728	52.4	0.030
Extreme (-20C)		1710.3231	1754.6728	46.4	0.027
Extreme (-30C)		1710.3231	1754.6728	48.9	0.028
20C	15%	1710.3231	1754.6728	13.4	0.008
	-15%	1710.3231	1754.6728	13.8	0.008
	End Point	1710.3231	1754.6728	13.9	0.008

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

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1850.3211	1909.6770		
Extreme (50C)		1850.3211	1909.6770	28.2	0.015
Extreme (40C)		1850.3211	1909.6770	22.8	0.012
Extreme (30C)		1850.3211	1909.6770	22.5	0.012
Extreme (10C)		1850.3211	1909.6770	48.6	0.026
Extreme (0C)		1850.3212	1909.6771	67.7	0.036
Extreme (-10C)		1850.3212	1909.6771	62.2	0.033
Extreme (-20C)		1850.3211	1909.6770	43.2	0.023
Extreme (-30C)		1850.3211	1909.6770	44.3	0.024
20C	15%	1850.3211	1909.6770	16.1	0.009
	-15%	1850.3211	1909.6770	16.6	0.009
	End Point	1850.3211	1909.6770	16.9	0.009

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

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1850.1530	1909.8424		
Extreme (50C)		1850.1531	1909.8424	50.2	0.027
Extreme (40C)		1850.1531	1909.8424	53.7	0.029
Extreme (30C)		1850.1531	1909.8424	65.1	0.035
Extreme (10C)		1850.1531	1909.8424	61.0	0.032
Extreme (0C)		1850.1531	1909.8424	60.5	0.032
Extreme (-10C)		1850.1531	1909.8424	65.4	0.035
Extreme (-20C)		1850.1530	1909.8424	43.1	0.023
Extreme (-30C)		1850.1530	1909.8424	47.0	0.025
20C	15%	1850.1531	1909.8424	18.9	0.010
	-15%	1850.1531	1909.8424	15.6	0.008
	End Point	1850.1531	1909.8424	15.5	0.008

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

Limit		699	716	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	699.1531	715.8463		
Extreme (50C)		699.1531	715.8463	20.9	0.030
Extreme (40C)		699.1531	715.8463	16.2	0.023
Extreme (30C)		699.1531	715.8463	17.9	0.025
Extreme (10C)		699.1531	715.8463	14.4	0.020
Extreme (0C)		699.1531	715.8463	9.0	0.013
Extreme (-10C)		699.1531	715.8463	16.0	0.023
Extreme (-20C)		699.1531	715.8463	10.1	0.014
Extreme (-30C)		699.1531	715.8463	15.7	0.022
20C	15%	699.1531	715.8463	11.8	0.017
	-15%	699.1531	715.8463	4.9	0.007
	End Point	699.1531	715.8463	2.7	0.004

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

Limit		777	787	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	777.2535	786.7424		
Extreme (50C)		777.2535	786.7424	12.0	0.015
Extreme (40C)		777.2535	786.7424	12.4	0.016
Extreme (30C)		777.2535	786.7424	12.5	0.016
Extreme (10C)		777.2535	786.7424	10.6	0.014
Extreme (0C)		777.2535	786.7424	11.3	0.014
Extreme (-10C)		777.2535	786.7424	12.9	0.016
Extreme (-20C)		777.2535	786.7424	9.4	0.012
Extreme (-30C)		777.2535	786.7424	10.5	0.013
20C	15%	777.2535	786.7424	9.8	0.012
	-15%	777.2535	786.7424	8.1	0.010
	End Point	777.2535	786.7424	9.7	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				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.85	50	814.70002781	-0.002	848.30001595	0.017	2.5
3.85	40	814.70002694	-0.001	848.30002591	0.005	2.5
3.85	30	814.70003520	-0.011	848.30002276	0.009	2.5
3.85	***20***	***814.70002641***	***0.000***	***848.30003048***	***0.000***	***2.5***
3.85	10	814.70003682	-0.013	848.30002594	0.005	2.5
3.85	0	814.70003039	-0.005	848.30003460	-0.005	2.5
3.85	-10	814.70003958	-0.016	848.30004580	-0.018	2.5
3.85	-20	814.70002961	-0.004	848.30003489	-0.005	2.5
3.85	-30	814.70002287	0.004	848.30002504	0.006	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				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.85	***20***	**814.70002641**	***0***	**848.30003048**	***0***	***2.5***
4.40	20	814.70002465	0.002	848.30000894	0.025	2.5
3.65	20	814.70000887	0.022	848.30000971	0.024	2.5

LTE Band 41 (Lowest Frequency: QPSK / Highest Frequency: QPSK)

Limit		2496	2690	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	2494.0121	2691.9996		
Extreme (50C)		2494.0122	2691.9997	66.5	0.026
Extreme (40C)		2494.0122	2691.9997	66.1	0.026
Extreme (30C)		2494.0122	2691.9997	69.6	0.027
Extreme (10C)		2494.0122	2691.9997	56.3	0.022
Extreme (0C)		2494.0121	2691.9996	48.1	0.019
Extreme (-10C)		2494.0121	2691.9996	40.3	0.016
Extreme (-20C)		2494.0121	2691.9996	33.1	0.013
Extreme (-30C)		2494.0121	2691.9996	22.3	0.009
20C	15%	2494.0122	2691.9996	17.2	0.007
	-15%	2494.0122	2691.9996	19.8	0.008
	End Point	2494.0122	2691.9996	19.3	0.007

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

Limit		1710	1780	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1710.6995	1779.3005		
Extreme (50C)		1710.6995	1779.3006	48.3	0.028
Extreme (40C)		1710.6995	1779.3006	48.6	0.028
Extreme (30C)		1710.6995	1779.3006	47.6	0.027
Extreme (10C)		1710.6995	1779.3006	46.3	0.027
Extreme (0C)		1710.6995	1779.3006	32.3	0.019
Extreme (-10C)		1710.6995	1779.3006	31.3	0.018
Extreme (-20C)		1710.6995	1779.3006	29.0	0.017
Extreme (-30C)		1710.6995	1779.3006	35.1	0.020
20C	15%	1710.6995	1779.3006	13.3	0.008
	-15%	1710.6995	1779.3006	14.1	0.008
	End Point	1710.6995	1779.3006	12.0	0.007

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.

9.5. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §22.913, §24.232, §27.50, §27.53 and §90.635

LIMITS

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

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

27.50:

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

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

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

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

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

90.635(b) – The maximum output power of the transmitter for mobile stations is 100 watts (20dBw).

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

TEST PROCEDURE

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

For radiated output power measurement with a ESU40:

a) Set the RBW ≥ 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

9.5.1. ERP/EIRP Results

GSM

Band	Mode	Channel	f [MHz]	ERP / EIRP	
				[dBm]	[mW]
GSM850	GPRS	128	824.2	27.35	543.25
		190	836.6	29.66	924.70
		251	848.8	**30.30**	**1071.52**
	EGPRS	128	824.2	21.14	130.02
		190	836.6	**23.16**	**207.01**
		251	848.8	22.09	161.81
GSM1900	GPRS	512	1850.2	29.94	986.28
		661	1880	**30.00**	**1000.00**
		810	1909.8	29.87	970.51
	EGPRS	512	1850.2	25.96	394.46
		661	1880	25.98	396.28
		810	1909.8	**26.37**	**433.51**

WCDMA

Band	Mode	Channel	f [MHz]	ERP / EIRP	
				[dBm]	[mW]
Band 5	REL99	4132	826.4	20.56	113.76
		4183	836.6	**20.61**	**115.08**
		4233	846.6	19.44	87.90
	HSDPA	4132	826.4	**20.19**	**104.47**
		4183	836.6	20.08	101.86
		4233	846.6	18.96	78.70
Band 4	REL99	1312	1712.4	21.65	146.22
		1413	1732.6	**22.44**	**175.39**
		1513	1752.6	22.16	164.44
	HSDPA	1312	1712.4	20.73	118.30
		1413	1732.6	**21.47**	**140.28**
		1513	1752.6	21.18	131.22
Band 2	REL99	9262	1852.4	21.91	155.24
		9400	1880.0	21.57	143.55
		9538	1907.6	**22.02**	**159.22**
	HSDPA	9262	1852.4	20.73	118.30
		9400	1880.0	**21.47**	**140.28**
		9538	1907.6	21.18	131.22

LTE Band 2

Band	BW [MHz]	Mode	RB Size/ RB Offset	f [MHz]	ERP / EIRP [dBm]	ERP / EIRP [mW]
Band 2	20	QPSK	1/99	1860.0	**23.05**	**201.84**
			1/0	1880.0	22.60	181.97
			1/99	1900.0	22.38	172.98
		16QAM	1/49	1860.0	**21.71**	**148.25**
			1/0	1880.0	21.40	138.04
			1/99	1900.0	21.12	129.42
	15	QPSK	1/74	1857.5	22.66	184.50
			1/0	1880.0	22.64	183.65
			1/74	1902.5	**22.74**	**187.93**
		16QAM	1/37	1857.5	21.27	133.97
			1/0	1880.0	21.48	140.60
			174	1902.5	**21.61**	**144.88**
	10	QPSK	1/49	1855.0	22.41	174.18
			1/0	1880.0	22.71	186.64
			1/49	1905.0	**23.00**	**199.53**
		16QAM	1/49	1855.0	21.66	146.55
			1/0	1880.0	21.78	150.66
			1/49	1905.0	**21.90**	**154.88**
	5	QPSK	1/12	1852.5	22.25	167.88
			1/0	1880.0	**22.61**	**182.39**
			1/12	1907.5	22.08	161.44
		16QAM	1/12	1852.5	21.43	139.00
			1/0	1880.0	21.84	152.76
			1/0	1907.5	**21.87**	**153.82**
	3	QPSK	1/8	1851.5	22.21	166.34
			1/8	1880.0	**22.60**	**181.97**
			1/0	1908.5	22.26	168.27
		16QAM	1/14	1851.5	21.16	130.62
			1/8	1880.0	21.37	137.09
			1/8	1908.5	**22.04**	**159.96**
	1.4	QPSK	1/3	1850.7	22.27	168.66
			1/3	1880.0	22.39	173.38
			1/3	1909.3	**22.70**	**186.21**
		16QAM	1/3	1850.7	21.15	130.32
			1/5	1880.0	20.80	120.23
			1/3	1909.3	**21.41**	**138.36**

LTE Band 12

Band	BW [MHz]	Mode	RB Size/ RB Offset	f [MHz]	ERP / EIRP [dBm]	ERP / EIRP [mW]
Band 12	10	QPSK	1/25	704.0	20.20	104.71
			1/0	707.5	20.49	111.94
			1/0	711.0	**20.56**	**113.76**
		16QAM	1/25	704.0	19.66	92.47
			1/25	707.5	20.01	100.23
			1/0	711.0	**20.03**	**100.69**
	5	QPSK	1/24	701.5	19.85	96.61
			1/0	707.5	20.52	112.72
			1/12	713.5	**20.86**	**121.90**
		16QAM	1/24	701.5	19.46	88.31
			1/0	707.5	19.99	99.77
			1/24	713.5	**20.69**	**117.22**
	3	QPSK	1/8	700.5	19.84	96.38
			1/8	707.5	20.71	117.76
			1/8	714.5	**20.95**	**124.45**
		16QAM	1/8	700.5	19.14	82.04
			1/8	707.5	19.91	97.95
			1/8	714.5	**20.25**	**105.93**
	1.4	QPSK	1/3	699.7	19.72	93.76
			1/3	707.5	20.68	116.95
			1/3	715.3	**20.91**	**123.31**
		16QAM	1/3	699.7	19.09	81.10
			1/3	707.5	19.90	97.72
			1/3	715.3	**20.31**	**107.40**

LTE Band 13

Band	BW [MHz]	Mode	RB size / RB Offset	f [MHz]	ERP / EIRP [dBm]	ERP / EIRP [mW]
Band 13	10	QPSK	1/25	782.0	**17.41**	**55.08**
		16QAM	1/0	782.0	16.82	48.08
	5	QPSK	1/24	779.5	17.35	54.33
			1/24	782.0	**17.47**	**55.85**
			1/0	784.5	17.28	53.46
		16QAM	1/24	779.5	16.68	46.56
			1/24	782.0	16.78	47.64
			1/12	784.5	**16.83**	**48.19**

LTE Band 26

Band	BW [MHz]	Mode	RB Size/ RB Offset	f [MHz]	ERP/EIRP [dBm]	ERP/EIRP [mW]
Band 26	15	QPSK	1/37	821.5	20.63	115.61
			1/0	831.5	**21.20**	**131.83**
			1/0	841.5	19.96	99.08
		16QAM	1/37	821.5	20.10	102.33
			1/0	831.5	**20.78**	**119.67**
			1/0	841.5	19.36	86.30
	10	QPSK	1/49	819.0	19.08	80.91
			1/0	829.0	20.83	121.06
			1/0	831.5	**21.16**	**130.62**
			1/0	844.0	19.62	91.62
		16QAM	1/49	819.0	18.64	73.11
			1/0	829.0	20.26	106.17
			1/0	831.5	**20.58**	**114.29**
			1/0	844.0	18.94	78.34
	5	QPSK	1/24	816.5	19.55	90.16
			1/24	821.5	19.85	96.61
			1/12	826.5	20.49	111.94
			1/0	831.5	**20.89**	**122.74**
			1/0	846.5	19.07	80.72
		16QAM	1/24	816.5	18.87	77.09
			1/24	821.5	18.95	78.52
			1/24	826.5	20.00	100.00
			1/0	831.5	**20.49**	**111.94**
			1/0	846.5	18.98	79.07
	3	QPSK	1/8	815.5	19.58	90.78
			1/0	822.5	20.04	100.93
			1/8	825.5	20.20	104.71
			1/8	831.5	**20.85**	**121.62**
			1/8	847.5	18.99	79.25
		16QAM	1/14	815.5	19.06	80.54
			1/8	822.5	19.53	89.74
			1/8	825.5	19.76	94.62
			1/8	831.5	**20.15**	**103.51**
			1/8	847.5	18.39	69.02
	1.4	QPSK	1/3	814.7	19.36	86.30
			1/3	823.3	20.05	101.16
			1/3	824.7	20.15	103.51
			1/3	831.5	**20.92**	**123.59**
			1/5	848.3	18.79	75.68
		16QAM	1/3	814.7	18.69	73.96
			1/3	823.3	19.48	88.72
			1/3	824.7	19.58	90.78
			1/3	831.5	**20.37**	**108.89**
			1/3	848.3	18.12	64.86

LTE Band 26 (Straddle Channel)

Band	BW	Mode	RB Size/	f [MHz]	ERP/EIRP	
	[MHz]		RB Offset		[dBm]	[mW]
Band 26	15	QPSK	1/0	824.0	20.24	105.68
		16QAM	1/0	824.0	19.57	90.57
	10	QPSK	1/0	824.0	**20.66**	**116.41**
		16QAM	1/0	824.0	20.17	103.99
	5	QPSK	1/0	824.0	20.53	112.98
		16QAM	1/0	824.0	20.05	101.16
	3	QPSK	1/0	824.0	20.65	116.14
		16QAM	1/0	824.0	20.46	111.17
	1.4	QPSK	1/0	824.0	20.45	110.92
		16QAM	1/0	824.0	19.95	98.86

LTE Band 41

Band	BW [MHz]	Mode	RB Size/ RB Offset	f [MHz]	ERP / EIRP [dBm]	ERP / EIRP [mW]
Band 41	20	QPSK	1/49	2506.0	20.29	106.91
			1/0	2593.0	**21.64**	**145.88**
			1/99	2680.0	20.85	121.62
		16QAM	1/99	2506.0	19.67	92.68
			1/0	2593.0	**21.10**	**128.82**
			1/99	2680.0	19.76	94.62
	15	QPSK	1/74	2503.5	20.51	112.46
			1/0	2593.0	**21.61**	**144.88**
			1/37	2682.5	21.01	126.18
		16QAM	1/74	2503.5	19.88	97.27
			1/0	2593.0	**21.26**	**133.66**
			1/74	2682.5	20.03	100.69
	10	QPSK	1/49	2501.0	20.32	107.65
			1/0	2593.0	**21.64**	**145.88**
			1/0	2685.0	21.24	133.05
		16QAM	1/49	2501.0	19.99	99.77
			1/0	2593.0	**21.21**	**132.13**
			1/0	2685.0	20.36	108.64
	5	QPSK	1/0	2498.5	19.82	95.94
			1/0	2593.0	**21.87**	**153.82**
			1/0	2687.5	21.26	133.66
		16QAM	1/0	2498.5	19.59	90.99
			1/0	2593.0	**21.24**	**133.05**
			1/0	2687.5	20.54	113.24

LTE Band 66

Band	BW [MHz]	Mode	RB Size/ RB Offset	f [MHz]	ERP / EIRP [dBm]	ERP / EIRP [mW]
Band 66	20	QPSK	1/99	1720.0	23.04	201.37
			1/99	1745.0	**23.59**	**228.56**
			1/99	1770.0	20.62	115.35
		16QAM	1/0	1720.0	21.37	137.09
			1/99	1745.0	**22.54**	**179.47**
			1/99	1770.0	19.44	87.90
	15	QPSK	1/0	1717.5	22.64	183.65
			1/37	1747.5	**23.07**	**202.77**
			1/37	1772.5	21.81	151.71
		16QAM	1/0	1717.5	21.62	145.21
			1/37	1747.5	**21.91**	**155.24**
			1/37	1772.5	20.85	121.62
	10	QPSK	1/0	1715.0	22.46	176.20
			1/49	1745.0	**23.51**	**224.39**
			1/0	1775.0	21.68	147.23
		16QAM	1/0	1715.0	21.36	136.77
			1/0	1745.0	**21.68**	**147.23**
			1/0	1775.0	20.60	114.82
	5	QPSK	1/0	1712.5	22.43	174.98
			1/0	1745.0	**23.00**	**199.53**
			1/0	1777.5	21.68	147.23
		16QAM	1/24	1712.5	21.54	142.56
			1/0	1745.0	**21.88**	**154.17**
			1/0	1777.5	20.90	123.03
	3	QPSK	1/8	1711.5	22.38	172.98
			1/8	1745.0	**23.29**	**213.30**
			1/8	1778.5	20.73	118.30
		16QAM	1/8	1711.5	21.50	141.25
			1/8	1745.0	**22.12**	**162.93**
			1/8	1778.5	19.63	91.83
	1.4	QPSK	1/3	1710.7	22.49	177.42
			1/3	1745.0	**22.99**	**199.07**
			1/3	1779.3	21.41	138.36
		16QAM	1/3	1710.7	21.48	140.60
			1/3	1745.0	**21.82**	**152.05**
			1/3	1779.3	20.20	104.71

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.

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27(04)
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9.5.2. ERP/EIRP DATA

GSM850

GSM850

GPRS

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company:	Samsung
Project #:	4789746830
Date:	2021-01-18
Test Engineer:	20882
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	31.35	V	3.0	-1.0	27.35	38.5	-11.1	
824.20	9.52	H	3.0	-1.0	5.53	38.5	-33.0	
Mid Ch								
836.60	33.62	V	3.1	-0.9	29.66	38.5	-8.8	
836.60	11.11	H	3.1	-0.9	7.15	38.5	-31.4	
High Ch								
848.80	34.24	V	3.1	-0.9	30.30	38.5	-8.2	
848.80	11.68	H	3.1	-0.9	7.74	38.5	-30.8	

GSM850

EGPRS

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company:	Samsung
Project #:	4789746830
Date:	2021-01-18
Test Engineer:	20882
Configuration:	EUT, Z-Position
Location:	Chamber 2
Mode:	EGPRS 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	25.14	V	3.0	-1.0	21.14	38.5	-17.4	
824.20	3.80	H	3.0	-1.0	-0.19	38.5	-38.7	
Mid Ch								
836.60	27.12	V	3.1	-0.9	23.16	38.5	-15.3	
836.60	2.03	H	3.1	-0.9	-1.93	38.5	-40.4	
High Ch								
848.80	26.03	V	3.1	-0.9	22.09	38.5	-16.4	
848.80	-1.06	H	3.1	-0.9	-5.00	38.5	-43.5	

GSM1900

GSM1900

GPRS

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-01-25
Test Engineer: 20896
Configuration: EUT, X-Position
Location: Chamber 1
Mode: GPRS 1900 MHz Fundamentals

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								
1850.20	21.67	V	4.5	9.6	26.74	33.0	-6.3	
1850.20	24.87	H	4.5	9.6	29.94	33.0	-3.1	
Mid Ch								
1880.00	21.75	V	4.6	9.4	26.56	33.0	-6.4	
1880.00	25.19	H	4.6	9.4	30.00	33.0	-3.0	
High Ch								
1909.80	22.65	V	4.6	9.1	27.17	33.0	-5.8	
1909.80	25.35	H	4.6	9.1	29.87	33.0	-3.1	

GSM1900

EGPRS

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-01-25
Test Engineer: 20896
Configuration: EUT, X-Position
Location: Chamber 1
Mode: EGPRS 1900 MHz Fundamentals

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								
1850.20	17.02	V	4.5	9.6	22.09	33.0	-10.9	
1850.20	20.89	H	4.5	9.6	25.96	33.0	-7.0	
Mid Ch								
1880.00	17.70	V	4.6	9.4	22.51	33.0	-10.5	
1880.00	21.17	H	4.6	9.4	25.98	33.0	-7.0	
High Ch								
1909.80	18.53	V	4.6	9.1	23.05	33.0	-10.0	
1909.80	21.85	H	4.6	9.1	26.37	33.0	-6.6	

WCDMA Band 5

WCDMA

Band 5
REL99

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-22
Test Engineer: 20890
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: Rel99 Band 5 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								
826.40	24.55	V	3.0	-0.9	20.56	38.5	-17.9	
826.40	6.72	H	3.0	-0.9	2.73	38.5	-35.8	
Mid Ch								
836.60	24.58	V	3.1	-0.9	20.61	38.5	-17.9	
836.60	4.51	H	3.1	-0.9	0.55	38.5	-38.0	
High Ch								
846.60	23.39	V	3.1	-0.9	19.44	38.5	-19.1	
846.60	2.91	H	3.1	-0.9	-1.04	38.5	-39.5	

WCDMA

Band 5
HSDPA

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-22
Test Engineer: 20890
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: HSDPA Band 5 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								
826.40	24.18	V	3.0	-0.9	20.19	38.5	-18.3	
826.40	6.19	H	3.0	-0.9	2.20	38.5	-36.3	
Mid Ch								
836.60	24.05	V	3.1	-0.9	20.08	38.5	-18.4	
836.60	2.89	H	3.1	-0.9	-1.07	38.5	-39.6	
High Ch								
846.60	22.91	V	3.1	-0.9	18.96	38.5	-19.5	
846.60	1.93	H	3.1	-0.9	-2.02	38.5	-40.5	

WCDMA Band 4

WCDMA

Band 4
REL99

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-22
Test Engineer: 20890
Configuration: EUT / X-Position
Location: Chamber 1
Mode: Rel99 Band 4 Fundamentals

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								
1712.40	13.33	V	4.4	9.6	18.54	30.0	-11.5	
1712.40	16.44	H	4.4	9.6	21.65	30.0	-8.4	
Mid Ch								
1732.60	13.78	V	4.4	9.6	19.03	30.0	-11.0	
1732.60	17.19	H	4.4	9.6	22.44	30.0	-7.6	
High Ch								
1752.60	14.76	V	4.4	9.7	20.04	30.0	-10.0	
1752.60	16.87	H	4.4	9.7	22.16	30.0	-7.8	

WCDMA

Band 4
HSDPA

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-22
Test Engineer: 20890
Configuration: EUT / X-Position
Location: Chamber 1
Mode: HSDPA Band 4 Fundamentals

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								
1712.40	12.28	V	4.4	9.6	17.49	30.0	-12.5	
1712.40	15.52	H	4.4	9.6	20.73	30.0	-9.3	
Mid Ch								
1732.60	12.83	V	4.4	9.6	18.08	30.0	-11.9	
1732.60	16.22	H	4.4	9.6	21.47	30.0	-8.5	
High Ch								
1752.60	13.91	V	4.4	9.7	19.19	30.0	-10.8	
1752.60	15.89	H	4.4	9.7	21.18	30.0	-8.8	

WCDMA Band 2

WCDMA

Band 2
REL99

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-01-18
Test Engineer: 20882
Configuration: EUT, X-Position
Location: Chamber 1
Mode: Rel99 Band 2 Fundamentals

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								
1852.40	13.89	V	4.5	9.6	18.93	33.0	-14.1	
1852.40	16.86	H	4.5	9.6	21.91	33.0	-11.1	
Mid Ch								
1880.00	14.86	V	4.6	9.4	19.67	33.0	-13.3	
1880.00	16.76	H	4.6	9.4	21.57	33.0	-11.4	
High Ch								
1907.60	15.00	V	4.6	9.2	19.55	33.0	-13.5	
1907.60	17.47	H	4.6	9.2	22.02	33.0	-11.0	

WCDMA

Band 2
HSDPA

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-01-18
Test Engineer: 20882
Configuration: EUT, X-Position
Location: Chamber 1
Mode: HSDPA Band 2 Fundamentals

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								
1852.40	10.88	V	4.5	9.6	15.92	33.0	-17.1	
1852.40	14.03	H	4.5	9.6	19.08	33.0	-13.9	
Mid Ch								
1880.00	11.61	V	4.6	9.4	16.42	33.0	-16.6	
1880.00	13.74	H	4.6	9.4	18.55	33.0	-14.5	
High Ch								
1907.60	11.98	V	4.6	9.2	16.53	33.0	-16.5	
1907.60	14.30	H	4.6	9.2	18.85	33.0	-14.2	

LTE Band 2

LTE Band 2 20MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-21
Test Engineer: 20881
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 2 Fundamentals, 20MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1860.00	15.28	V	4.6	9.6	20.28	33.0	-12.7	
1860.00	18.05	H	4.6	9.6	23.05	33.0	-9.9	
Mid Ch								
1880.00	15.10	V	4.6	9.4	19.89	33.0	-13.1	
1880.00	17.81	H	4.6	9.4	22.60	33.0	-10.4	
High Ch								
1900.00	15.69	V	4.6	9.2	20.29	33.0	-12.7	
1900.00	17.79	H	4.6	9.2	22.38	33.0	-10.6	

LTE Band 2 20MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-21
Test Engineer: 20881
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 2 Fundamentals, 20MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1860.00	13.60	V	4.6	9.6	18.60	33.0	-14.4	
1860.00	16.71	H	4.6	9.6	21.71	33.0	-11.3	
Mid Ch								
1880.00	13.81	V	4.6	9.4	18.60	33.0	-14.4	
1880.00	16.61	H	4.6	9.4	21.40	33.0	-11.6	
High Ch								
1900.00	14.36	V	4.6	9.2	18.96	33.0	-14.0	
1900.00	16.53	H	4.6	9.2	21.12	33.0	-11.9	

LTE Band 2 15MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-21
Test Engineer: 20881
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 2 Fundamentals, 15MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1857.50	14.85	V	4.5	9.6	19.88	33.0	-13.1	
1857.50	17.63	H	4.5	9.6	22.66	33.0	-10.3	
Mid Ch								
1880.00	14.94	V	4.6	9.4	19.73	33.0	-13.3	
1880.00	17.85	H	4.6	9.4	22.64	33.0	-10.4	
High Ch								
1902.50	15.83	V	4.6	9.2	20.39	33.0	-12.6	
1902.50	18.18	H	4.6	9.2	22.74	33.0	-10.3	

LTE Band 2 15MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-21
Test Engineer: 20881
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 2 Fundamentals, 15MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1857.50	13.56	V	4.5	9.6	18.59	33.0	-14.4	
1857.50	16.24	H	4.5	9.6	21.27	33.0	-11.7	
Mid Ch								
1880.00	13.91	V	4.6	9.4	18.70	33.0	-14.3	
1880.00	16.69	H	4.6	9.4	21.48	33.0	-11.5	
High Ch								
1902.50	15.02	V	4.6	9.2	19.58	33.0	-13.4	
1902.50	17.05	H	4.6	9.2	21.61	33.0	-11.4	

LTE Band 2 10MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-21
Test Engineer: 20896
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 2 Fundamentals, 10MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1855.00	14.55	V	4.5	9.6	19.60	33.0	-13.4	
1855.00	17.36	H	4.5	9.6	22.41	33.0	-10.6	
Mid Ch								
1880.00	15.02	V	4.6	9.4	19.81	33.0	-13.2	
1880.00	17.92	H	4.6	9.4	22.71	33.0	-10.3	
High Ch								
1905.00	15.75	V	4.6	9.1	20.27	33.0	-12.7	
1905.00	18.47	H	4.6	9.1	23.00	33.0	-10.0	

LTE Band 2 10MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-21
Test Engineer: 20896
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 2 Fundamentals, 10MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1855.00	13.44	V	4.5	9.6	18.49	33.0	-14.5	
1855.00	16.61	H	4.5	9.6	21.66	33.0	-11.3	
Mid Ch								
1880.00	13.94	V	4.6	9.4	18.73	33.0	-14.3	
1880.00	16.99	H	4.6	9.4	21.78	33.0	-11.2	
High Ch								
1905.00	14.54	V	4.6	9.1	19.06	33.0	-13.9	
1905.00	17.37	H	4.6	9.1	21.90	33.0	-11.1	

LTE Band 2 5MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-21
Test Engineer: 20896
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 2 Fundamentals, 5MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1852.50	13.78	V	4.5	9.6	18.86	33.0	-14.1	
1852.50	17.17	H	4.5	9.6	22.25	33.0	-10.7	
Mid Ch								
1880.00	14.76	V	4.6	9.4	19.55	33.0	-13.4	
1880.00	17.82	H	4.6	9.4	22.61	33.0	-10.4	
High Ch								
1907.50	16.08	V	4.6	9.1	20.57	33.0	-12.4	
1907.50	17.59	H	4.6	9.1	22.08	33.0	-10.9	

LTE Band 2 5MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-21
Test Engineer: 20896
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 2 Fundamentals, 5MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1852.50	13.08	V	4.5	9.6	18.16	33.0	-14.8	
1852.50	16.35	H	4.5	9.6	21.43	33.0	-11.6	
Mid Ch								
1880.00	13.62	V	4.6	9.4	18.41	33.0	-14.6	
1880.00	17.05	H	4.6	9.4	21.84	33.0	-11.2	
High Ch								
1907.50	15.27	V	4.6	9.1	19.76	33.0	-13.2	
1907.50	17.38	H	4.6	9.1	21.87	33.0	-11.1	

LTE Band 2 3MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-21
Test Engineer: 20896
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 2 Fundamentals, 3MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1851.50	14.34	V	4.5	9.6	19.44	33.0	-13.6	
1851.50	17.11	H	4.5	9.6	22.21	33.0	-10.8	
Mid Ch								
1880.00	14.74	V	4.6	9.4	19.53	33.0	-13.5	
1880.00	17.81	H	4.6	9.4	22.60	33.0	-10.4	
High Ch								
1908.50	15.90	V	4.6	9.1	20.37	33.0	-12.6	
1908.50	17.78	H	4.6	9.1	22.26	33.0	-10.7	

LTE Band 2 3MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-21
Test Engineer: 20896
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 2 Fundamentals, 3MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1851.50	13.28	V	4.5	9.6	18.38	33.0	-14.6	
1851.50	16.06	H	4.5	9.6	21.16	33.0	-11.8	
Mid Ch								
1880.00	13.70	V	4.6	9.4	18.49	33.0	-14.5	
1880.00	16.58	H	4.6	9.4	21.37	33.0	-11.6	
High Ch								
1908.50	14.55	V	4.6	9.1	19.02	33.0	-14.0	
1908.50	17.56	H	4.6	9.1	22.04	33.0	-11.0	

LTE
Band 2
1.4MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-21
Test Engineer: 22943
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 2 Fundamentals, 1.4MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1850.70	14.15	V	4.5	9.6	19.25	33.0	-13.8	
1850.70	17.16	H	4.5	9.6	22.27	33.0	-10.7	
Mid Ch								
1880.00	14.93	V	4.6	9.4	19.72	33.0	-13.3	
1880.00	17.60	H	4.6	9.4	22.39	33.0	-10.6	
High Ch								
1909.30	15.05	V	4.6	9.1	19.51	33.0	-13.5	
1909.30	18.24	H	4.6	9.1	22.70	33.0	-10.3	

LTE
Band 2
1.4MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-21
Test Engineer: 22943
Configuration: EUT, X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 2 Fundamentals, 1.4MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1850.70	13.01	V	4.5	9.6	18.11	33.0	-14.9	
1850.70	16.04	H	4.5	9.6	21.15	33.0	-11.9	
Mid Ch								
1880.00	13.71	V	4.6	9.4	18.50	33.0	-14.5	
1880.00	16.01	H	4.6	9.4	20.80	33.0	-12.2	
High Ch								
1909.30	14.00	V	4.6	9.1	18.46	33.0	-14.5	
1909.30	16.95	H	4.6	9.1	21.41	33.0	-11.6	

LTE Band 12

LTE Band 12 10MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-18
Test Engineer: 20882
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 12 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								
704.00	24.07	V	2.8	-1.1	20.20	34.8	-14.6	
704.00	4.48	H	2.8	-1.1	0.61	34.8	-34.2	
Mid Ch								
707.50	24.36	V	2.8	-1.1	20.49	34.8	-14.3	
707.50	4.39	H	2.8	-1.1	0.52	34.8	-34.3	
High Ch								
711.00	24.44	V	2.8	-1.1	20.56	34.8	-14.2	
711.00	5.25	H	2.8	-1.1	1.37	34.8	-33.4	

LTE Band 12 10MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-18
Test Engineer: 20882
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 12 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								
704.00	23.53	V	2.8	-1.1	19.66	34.8	-15.1	
704.00	3.65	H	2.8	-1.1	-0.22	34.8	-35.0	
Mid Ch								
707.50	23.88	V	2.8	-1.1	20.01	34.8	-14.8	
707.50	4.75	H	2.8	-1.1	0.88	34.8	-33.9	
High Ch								
711.00	23.91	V	2.8	-1.1	20.03	34.8	-14.7	
711.00	4.46	H	2.8	-1.1	0.58	34.8	-34.2	

LTE
Band 12
5MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-18
Test Engineer: 20882
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 12 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								
701.50	23.71	V	2.8	-1.1	19.85	34.8	-14.9	
701.50	4.28	H	2.8	-1.1	0.42	34.8	-34.3	
Mid Ch								
707.50	24.39	V	2.8	-1.1	20.52	34.8	-14.3	
707.50	4.88	H	2.8	-1.1	1.01	34.8	-33.8	
High Ch								
713.50	24.74	V	2.8	-1.1	20.86	34.8	-13.9	
713.50	4.80	H	2.8	-1.1	0.91	34.8	-33.9	

LTE
Band 12
5MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-18
Test Engineer: 20882
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 12 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								
701.50	23.32	V	2.8	-1.1	19.46	34.8	-15.3	
701.50	3.86	H	2.8	-1.1	0.00	34.8	-34.8	
Mid Ch								
707.50	23.86	V	2.8	-1.1	19.99	34.8	-14.8	
707.50	4.09	H	2.8	-1.1	0.22	34.8	-34.6	
High Ch								
713.50	24.57	V	2.8	-1.1	20.69	34.8	-14.1	
713.50	4.66	H	2.8	-1.1	0.77	34.8	-34.0	

LTE Band 12 3MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-18
Test Engineer: 20881
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 12 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								
700.50	23.69	V	2.8	-1.1	19.84	34.8	-14.9	
700.50	3.74	H	2.8	-1.1	-0.11	34.8	-34.9	
Mid Ch								
707.50	24.58	V	2.8	-1.1	20.71	34.8	-14.1	
707.50	5.24	H	2.8	-1.1	1.37	34.8	-33.4	
High Ch								
714.50	24.84	V	2.8	-1.1	20.95	34.8	-13.8	
714.50	4.44	H	2.8	-1.1	0.55	34.8	-34.2	

LTE Band 12 3MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-18
Test Engineer: 20881
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 12 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								
700.50	22.99	V	2.8	-1.1	19.14	34.8	-15.6	
700.50	2.98	H	2.8	-1.1	-0.87	34.8	-35.6	
Mid Ch								
707.50	23.78	V	2.8	-1.1	19.91	34.8	-14.9	
707.50	4.55	H	2.8	-1.1	0.68	34.8	-34.1	
High Ch								
714.50	24.14	V	2.8	-1.1	20.25	34.8	-14.5	
714.50	3.74	H	2.8	-1.1	-0.15	34.8	-34.9	

LTE
Band 12
1.4MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-18
Test Engineer: 20881
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 12 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								
699.70	23.58	V	2.8	-1.1	19.72	34.8	-15.1	
699.70	3.15	H	2.8	-1.1	-0.71	34.8	-35.5	
Mid Ch								
707.50	24.55	V	2.8	-1.1	20.68	34.8	-14.1	
707.50	4.95	H	2.8	-1.1	1.08	34.8	-33.7	
High Ch								
715.30	24.80	V	2.8	-1.1	20.91	34.8	-13.9	
715.30	4.31	H	2.8	-1.1	0.42	34.8	-34.4	

LTE
Band 12
1.4MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-18
Test Engineer: 20881
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 12 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								
699.70	22.95	V	2.8	-1.1	19.09	34.8	-15.7	
699.70	2.47	H	2.8	-1.1	-1.39	34.8	-36.2	
Mid Ch								
707.50	23.77	V	2.8	-1.1	19.90	34.8	-14.9	
707.50	4.34	H	2.8	-1.1	0.47	34.8	-34.3	
High Ch								
715.30	24.20	V	2.8	-1.1	20.31	34.8	-14.5	
715.30	3.65	H	2.8	-1.1	-0.24	34.8	-35.0	

LTE Band 13

LTE Band 13 10MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-01-19
Test Engineer: 22943
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 13 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
Mid Ch								
782.00	15.86	V	3.0	-1.1	11.84	34.8	-22.9	
782.00	21.43	H	3.0	-1.1	17.41	34.8	-17.4	

LTE Band 13 10MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-01-11=9
Test Engineer: 22943
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 13 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
Mid Ch								
782.00	15.34	V	3.0	-1.1	11.32	34.8	-23.4	
782.00	20.84	H	3.0	-1.1	16.82	34.8	-17.9	

LTE
Band 13
5MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-01-18
Test Engineer: 20882
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 13 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								
779.50	15.80	V	3.0	-1.1	11.79	34.8	-23.0	
779.50	21.36	H	3.0	-1.1	17.35	34.8	-17.4	
Mid Ch								
782.00	16.05	V	3.0	-1.1	12.03	34.8	-22.7	
782.00	21.49	H	3.0	-1.1	17.47	34.8	-17.3	
High Ch								
784.50	16.27	V	3.0	-1.1	12.26	34.8	-22.5	
784.50	21.30	H	3.0	-1.1	17.28	34.8	-17.5	

LTE
Band 13
5MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-01-18
Test Engineer: 20882
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 13 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								
779.50	15.66	V	3.0	-1.1	11.65	34.8	-23.1	
779.50	20.69	H	3.0	-1.1	16.68	34.8	-18.1	
Mid Ch								
782.00	15.65	V	3.0	-1.1	11.63	34.8	-23.1	
782.00	20.80	H	3.0	-1.1	16.78	34.8	-18.0	
High Ch								
784.50	15.96	V	3.0	-1.1	11.95	34.8	-22.8	
784.50	20.85	H	3.0	-1.1	16.83	34.8	-17.9	

LTE Band 26 (Part 90)

LTE Band 26 15MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-28
Test Engineer: 20881
Configuration: EUT, Z-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	24.64	V	3.0	-1.0	20.63	50.0	-29.4	Part 90
821.50	5.88	H	3.0	-1.0	1.87	50.0	-48.1	Part 90

LTE Band 26 15MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-28
Test Engineer: 20881
Configuration: EUT, Z-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	24.11	V	3.0	-1.0	20.10	50.0	-29.9	Part 90
821.50	5.31	H	3.0	-1.0	1.30	50.0	-48.7	Part 90

LTE
Band 26
10MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-28
Test Engineer: 20881
Configuration: EUT, Z-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	23.08	V	3.0	-1.0	19.08	50.0	-30.9	Part 90
819.00	5.75	H	3.0	-1.0	1.75	50.0	-48.3	Part 90

LTE
Band 26
10MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-28
Test Engineer: 20881
Configuration: EUT, Z-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	22.64	V	3.0	-1.0	18.64	50.0	-31.4	Part 90
819.00	5.23	H	3.0	-1.0	1.23	50.0	-48.8	Part 90

LTE

Band 26

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-28
Test Engineer: 20881
Configuration: EUT, Z-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	23.56	V	3.0	-1.0	19.55	50.0	-30.5	Part 90
816.50	5.73	H	3.0	-1.0	1.72	50.0	-48.3	Part 90
Mid Ch								
821.50	23.86	V	3.0	-1.0	19.85	50.0	-30.1	Part 90
821.50	5.64	H	3.0	-1.0	1.63	50.0	-48.4	Part 90

LTE

Band 26

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-28
Test Engineer: 20881
Configuration: EUT, Z-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	22.88	V	3.0	-1.0	18.87	50.0	-31.1	Part 90
816.50	5.32	H	3.0	-1.0	1.31	50.0	-48.7	Part 90
Mid Ch								
821.50	22.96	V	3.0	-1.0	18.95	50.0	-31.0	Part 90
821.50	5.12	H	3.0	-1.0	1.11	50.0	-48.9	Part 90

LTE

Band 26

3MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-28
Test Engineer: 20881
Configuration: EUT, Z-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	23.60	V	3.0	-1.0	19.58	50.0	-30.4	Part 90
815.50	5.87	H	3.0	-1.0	1.86	50.0	-48.1	Part 90
Mid Ch								
822.50	24.04	V	3.0	-1.0	20.04	50.0	-30.0	Part 90
822.50	5.94	H	3.0	-1.0	1.93	50.0	-48.1	Part 90

LTE

Band 26

3MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-28
Test Engineer: 20881
Configuration: EUT, Z-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	23.08	V	3.0	-1.0	19.06	50.0	-30.9	Part 90
815.50	5.28	H	3.0	-1.0	1.27	50.0	-48.7	Part 90
Mid Ch								
822.50	23.53	V	3.0	-1.0	19.53	50.0	-30.5	Part 90
822.50	5.40	H	3.0	-1.0	1.39	50.0	-48.6	Part 90

LTE

Band 26

1.4MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-28
Test Engineer: 20881
Configuration: EUT, Z-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	23.38	V	3.0	-1.0	19.36	50.0	-30.6	Part 90
814.70	5.87	H	3.0	-1.0	1.85	50.0	-48.2	Part 90
Mid Ch								
823.30	24.05	V	3.0	-1.0	20.05	50.0	-29.9	Part 90
823.30	5.84	H	3.0	-1.0	1.84	50.0	-48.2	Part 90

LTE

Band 26

1.4MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-28
Test Engineer: 20881
Configuration: EUT, Z-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	22.71	V	3.0	-1.0	18.69	50.0	-31.3	Part 90
814.70	5.26	H	3.0	-1.0	1.24	50.0	-48.8	Part 90
Mid Ch								
823.30	23.48	V	3.0	-1.0	19.48	50.0	-30.5	Part 90
823.30	4.96	H	3.0	-1.0	0.96	50.0	-49.0	Part 90

LTE Band 26 (Straddle Channel)

LTE Band 26 15MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-02-04
Test Engineer: 22943
Configuration: EUT, Z-Position
Location: Chamber 2
Mode: LTE_QPSK Band 26 Fundamentals, 15MHz 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
Straddle Ch								
824.00	24.23	V	3.0	-1.0	20.24	38.5	-18.3	
824.00	4.53	H	3.0	-1.0	0.53	38.5	-38.0	

LTE Band 26 15MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-02-04
Test Engineer: 22943
Configuration: EUT, Z-Position
Location: Chamber 2
Mode: LTE_16QAM Band 26 Fundamentals, 15MHz 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
Straddle Ch								
824.00	23.56	V	3.0	-1.0	19.57	38.5	-18.9	
824.00	3.60	H	3.0	-1.0	-0.40	38.5	-38.9	

LTE
Band 26
10MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-02-04
Test Engineer: 22943
Configuration: EUT, Z-Position
Location: Chamber 2
Mode: LTE_QPSK Band 26 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
Straddle Ch								
824.00	24.65	V	3.0	-1.0	20.66	38.5	-17.8	
824.00	4.86	H	3.0	-1.0	0.86	38.5	-37.6	

LTE
Band 26
10MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-02-04
Test Engineer: 22943
Configuration: EUT, Z-Position
Location: Chamber 2
Mode: LTE_16QAM Band 26 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
Straddle Ch								
824.00	24.16	V	3.0	-1.0	20.17	38.5	-18.3	
824.00	3.99	H	3.0	-1.0	-0.01	38.5	-38.5	

LTE
Band 26
5MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-02-04
Test Engineer: 22943
Configuration: EUT, Z-Position
Location: Chamber 2
Mode: LTE_QPSK Band 26 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
Straddle Ch								
824.00	24.52	V	3.0	-1.0	20.53	38.5	-18.0	
824.00	4.65	H	3.0	-1.0	0.65	38.5	-37.8	

LTE
Band 26
5MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-02-04
Test Engineer: 22943
Configuration: EUT, Z-Position
Location: Chamber 2
Mode: LTE_16QAM Band 26 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
Straddle Ch								
824.00	24.04	V	3.0	-1.0	20.05	38.5	-18.5	
824.00	3.96	H	3.0	-1.0	-0.04	38.5	-38.5	

LTE

Band 26

3MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-02-04
Test Engineer: 22943
Configuration: EUT, Z-Position
Location: Chamber 2
Mode: LTE_QPSK Band 26 Fundamentals, 3MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Straddle Ch								
824.00	24.64	V	3.0	-1.0	20.65	38.5	-17.9	
824.00	4.21	H	3.0	-1.0	0.21	38.5	-38.3	

LTE

Band 26

3MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-02-04
Test Engineer: 22943
Configuration: EUT, Z-Position
Location: Chamber 2
Mode: LTE_16QAM Band 26 Fundamentals, 3MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Straddle Ch								
824.00	24.45	V	3.0	-1.0	20.46	38.5	-18.0	
824.00	3.85	H	3.0	-1.0	-0.15	38.5	-38.6	

LTE

Band 26

1.4MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-02-04
Test Engineer: 22943
Configuration: EUT, Z-Position
Location: Chamber 2
Mode: LTE_QPSK Band 26 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
Straddle Ch								
824.00	24.44	V	3.0	-1.0	20.45	38.5	-18.1	
824.00	4.55	H	3.0	-1.0	0.55	38.5	-37.9	

LTE

Band 26

1.4MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-02-04
Test Engineer: 22943
Configuration: EUT, Z-Position
Location: Chamber 2
Mode: LTE_QPSK Band 26 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
Straddle Ch								
824.00	24.44	V	3.0	-1.0	20.45	38.5	-18.1	
824.00	4.55	H	3.0	-1.0	0.55	38.5	-37.9	

LTE Band 26 (Part 22)

LTE Band 26 15MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-28
Test Engineer: 20881
Configuration: EUT, Z-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	25.18	V	3.1	-0.9	21.20	38.5	-17.3	
831.50	5.40	H	3.1	-0.9	1.42	38.5	-37.1	
High Ch								
841.50	23.92	V	3.1	-0.9	19.96	38.5	-18.5	
841.50	3.84	H	3.1	-0.9	-0.12	38.5	-38.6	

LTE Band 26 15MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-28
Test Engineer: 20881
Configuration: EUT, Z-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	24.76	V	3.1	-0.9	20.78	38.5	-17.7	
831.50	5.12	H	3.1	-0.9	1.14	38.5	-37.4	
High Ch								
841.50	23.32	V	3.1	-0.9	19.36	38.5	-19.1	
841.50	3.14	H	3.1	-0.9	-0.82	38.5	-39.3	

LTE

Band 26

10MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-28
Test Engineer: 20881
Configuration: EUT, Z-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	24.81	V	3.1	-0.9	20.83	38.5	-17.7	
829.00	5.71	H	3.1	-0.9	1.72	38.5	-36.8	
Mid Ch								
831.50	25.14	V	3.1	-0.9	21.16	38.5	-17.3	
831.50	3.96	H	3.1	-0.9	-0.02	38.5	-38.5	
High Ch								
844.00	23.57	V	3.1	-0.9	19.62	38.5	-18.9	
844.00	3.79	H	3.1	-0.9	-0.16	38.5	-38.7	

LTE

Band 26

10MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-28
Test Engineer: 20881
Configuration: EUT, Z-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	24.24	V	3.1	-0.9	20.26	38.5	-18.2	
829.00	5.20	H	3.1	-0.9	1.21	38.5	-37.3	
Mid Ch								
831.50	24.56	V	3.1	-0.9	20.58	38.5	-17.9	
831.50	3.22	H	3.1	-0.9	-0.76	38.5	-39.3	
High Ch								
844.00	22.89	V	3.1	-0.9	18.94	38.5	-19.6	
844.00	3.35	H	3.1	-0.9	-0.60	38.5	-39.1	

LTE

Band 26

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-28
Test Engineer: 20881
Configuration: EUT, Z-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	24.48	V	3.0	-0.9	20.49	38.5	-18.0	
826.50	3.70	H	3.0	-0.9	-0.30	38.5	-38.8	
Mid Ch								
831.50	24.87	V	3.1	-0.9	20.89	38.5	-17.6	
831.50	5.00	H	3.1	-0.9	1.02	38.5	-37.5	
High Ch								
846.50	23.01	V	3.1	-0.9	19.07	38.5	-19.4	
846.50	4.05	H	3.1	-0.9	0.10	38.5	-38.4	

LTE

Band 26

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-28
Test Engineer: 20881
Configuration: EUT, Z-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	23.99	V	3.0	-0.9	20.00	38.5	-18.5	
826.50	3.11	H	3.0	-0.9	-0.89	38.5	-39.4	
Mid Ch								
831.50	24.47	V	3.1	-0.9	20.49	38.5	-18.0	
831.50	4.52	H	3.1	-0.9	0.54	38.5	-38.0	
High Ch								
846.50	22.92	V	3.1	-0.9	18.98	38.5	-19.5	
846.50	3.72	H	3.1	-0.9	-0.23	38.5	-38.7	

LTE

Band 26

3MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-28
Test Engineer: 20881
Configuration: EUT, Z-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	24.19	V	3.0	-0.9	20.20	38.5	-18.3	
825.50	3.92	H	3.0	-0.9	-0.07	38.5	-38.6	
Mid Ch								
831.50	24.83	V	3.1	-0.9	20.85	38.5	-17.6	
831.50	0.14	H	3.1	-0.9	-3.84	38.5	-42.3	
High Ch								
847.50	22.93	V	3.1	-0.9	18.99	38.5	-19.5	
847.50	2.99	H	3.1	-0.9	-0.95	38.5	-39.5	

LTE

Band 26

3MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-28
Test Engineer: 20881
Configuration: EUT, Z-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	23.75	V	3.0	-0.9	19.76	38.5	-18.7	
825.50	3.46	H	3.0	-0.9	-0.53	38.5	-39.0	
Mid Ch								
831.50	24.13	V	3.1	-0.9	20.15	38.5	-18.3	
831.50	-0.24	H	3.1	-0.9	-4.22	38.5	-42.7	
High Ch								
847.50	22.33	V	3.1	-0.9	18.39	38.5	-20.1	
847.50	2.39	H	3.1	-0.9	-1.55	38.5	-40.1	

LTE

Band 26

1.4MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-28
Test Engineer: 20881
Configuration: EUT, Z-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	24.14	V	3.0	-1.0	20.15	38.5	-18.4	
824.70	5.52	H	3.0	-1.0	1.52	38.5	-37.0	
Mid Ch								
831.50	24.90	V	3.1	-0.9	20.92	38.5	-17.6	
831.50	3.45	H	3.1	-0.9	-0.53	38.5	-39.0	
High Ch								
848.30	22.73	V	3.1	-0.9	18.79	38.5	-19.7	
848.30	2.72	H	3.1	-0.9	-1.22	38.5	-39.7	

LTE

Band 26

1.4MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-28
Test Engineer: 20881
Configuration: EUT, Z-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	23.57	V	3.0	-1.0	19.58	38.5	-18.9	
824.70	4.97	H	3.0	-1.0	0.97	38.5	-37.5	
Mid Ch								
831.50	24.35	V	3.1	-0.9	20.37	38.5	-18.1	
831.50	2.72	H	3.1	-0.9	-1.26	38.5	-39.8	
High Ch								
848.30	22.06	V	3.1	-0.9	18.12	38.5	-20.4	
848.30	2.07	H	3.1	-0.9	-1.87	38.5	-40.4	

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27(04)
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LTE Band 41

LTE Band 41 20MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-24
Test Engineer: 22943
Configuration: EUT, Y-Position
Location: Chamber 2
Mode: LTE_QPSK Band 41 Fundamentals, 20MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2506.00	15.31	V	5.3	10.2	20.21	33.0	-12.8	
2506.00	15.38	H	5.3	10.2	20.29	33.0	-12.7	
Mid Ch								
2593.00	16.71	V	5.4	10.1	21.45	33.0	-11.6	
2593.00	16.90	H	5.4	10.1	21.64	33.0	-11.4	
High Ch								
2680.00	16.15	V	5.5	10.2	20.85	33.0	-12.1	
2680.00	15.80	H	5.5	10.2	20.51	33.0	-12.5	

LTE Band 41 20MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-24
Test Engineer: 22943
Configuration: EUT, Y-Position
Location: Chamber 2
Mode: LTE_16QAM Band 41 Fundamentals, 20MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2506.00	14.74	V	5.3	10.2	19.64	33.0	-13.4	
2506.00	14.76	H	5.3	10.2	19.67	33.0	-13.3	
Mid Ch								
2593.00	16.35	V	5.4	10.1	21.09	33.0	-11.9	
2593.00	16.36	H	5.4	10.1	21.10	33.0	-11.9	
High Ch								
2680.00	15.06	V	5.5	10.2	19.76	33.0	-13.2	
2680.00	14.76	H	5.5	10.2	19.47	33.0	-13.5	

LTE
Band 41
15MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-24
Test Engineer: 22943
Configuration: EUT, Y-Position
Location: Chamber 2
Mode: LTE_QPSK Band 41 Fundamentals, 15MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2503.50	15.57	V	5.3	10.2	20.48	33.0	-12.5	
2503.50	15.59	H	5.3	10.2	20.51	33.0	-12.5	
Mid Ch								
2593.00	16.80	V	5.4	10.1	21.54	33.0	-11.5	
2593.00	16.87	H	5.4	10.1	21.61	33.0	-11.4	
High Ch								
2682.50	16.31	V	5.5	10.2	21.01	33.0	-12.0	
2682.50	16.02	H	5.5	10.2	20.73	33.0	-12.3	

LTE
Band 41
15MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-24
Test Engineer: 22943
Configuration: EUT, Y-Position
Location: Chamber 2
Mode: LTE_16QAM Band 41 Fundamentals, 15MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2503.50	14.90	V	5.3	10.2	19.81	33.0	-13.2	
2503.50	14.96	H	5.3	10.2	19.88	33.0	-13.1	
Mid Ch								
2593.00	16.38	V	5.4	10.1	21.12	33.0	-11.9	
2593.00	16.52	H	5.4	10.1	21.26	33.0	-11.7	
High Ch								
2682.50	15.32	V	5.5	10.2	20.02	33.0	-13.0	
2682.50	15.32	H	5.5	10.2	20.03	33.0	-13.0	

LTE

Band 41

10MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-24
Test Engineer: 22943
Configuration: EUT, Y-Position
Location: Chamber 2
Mode: LTE_QPSK Band 41 Fundamentals, 10MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2501.00	15.23	V	5.3	10.2	20.15	33.0	-12.9	
2501.00	15.40	H	5.3	10.2	20.32	33.0	-12.7	
Mid Ch								
2593.00	16.87	V	5.4	10.1	21.61	33.0	-11.4	
2593.00	16.90	H	5.4	10.1	21.64	33.0	-11.4	
High Ch								
2685.00	16.53	V	5.5	10.2	21.24	33.0	-11.8	
2685.00	16.16	H	5.5	10.2	20.86	33.0	-12.1	

LTE

Band 41

10MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-24
Test Engineer: 22943
Configuration: EUT, Y-Position
Location: Chamber 2
Mode: LTE_16QAM Band 41 Fundamentals, 10MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2501.00	14.90	V	5.3	10.2	19.82	33.0	-13.2	
2501.00	15.07	H	5.3	10.2	19.99	33.0	-13.0	
Mid Ch								
2593.00	16.42	V	5.4	10.1	21.16	33.0	-11.8	
2593.00	16.47	H	5.4	10.1	21.21	33.0	-11.8	
High Ch								
2685.00	15.65	V	5.5	10.2	20.36	33.0	-12.6	
2685.00	15.29	H	5.5	10.2	19.99	33.0	-13.0	

LTE
Band 41
5MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-28
Test Engineer: 20881
Configuration: EUT, Y-Position
Location: Chamber 2
Mode: LTE_QPSK Band 41 Fundamentals, 5MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2498.50	14.64	V	5.3	10.2	19.58	33.0	-13.4	
2498.50	14.89	H	5.3	10.2	19.82	33.0	-13.2	
Mid Ch								
2593.00	17.04	V	5.4	10.1	21.78	33.0	-11.2	
2593.00	17.13	H	5.4	10.1	21.87	33.0	-11.1	
High Ch								
2687.50	16.54	V	5.5	10.2	21.26	33.0	-11.7	
2687.50	13.76	H	5.5	10.2	18.48	33.0	-14.5	

LTE
Band 41
5MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2020-12-28
Test Engineer: 20881
Configuration: EUT, Y-Position
Location: Chamber 2
Mode: LTE_16QAM Band 41 Fundamentals, 5MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2498.50	14.29	V	5.3	10.2	19.23	33.0	-13.8	
2498.50	14.66	H	5.3	10.2	19.59	33.0	-13.4	
Mid Ch								
2593.00	16.31	V	5.4	10.1	21.05	33.0	-12.0	
2593.00	16.50	H	5.4	10.1	21.24	33.0	-11.8	
High Ch								
2687.50	15.82	V	5.5	10.2	20.54	33.0	-12.5	
2687.50	13.00	H	5.5	10.2	17.72	33.0	-15.3	

LTE Band 66

LTE Band 66 20MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-01-18
Test Engineer: 20890
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 66 Fundamentals, 20MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1720.00	15.32	V	4.4	9.6	20.56	30.0	-9.4	
1720.00	17.81	H	4.4	9.6	23.04	30.0	-7.0	
Mid Ch								
1745.00	15.87	V	4.4	9.7	21.15	30.0	-8.9	
1745.00	18.31	H	4.4	9.7	23.59	30.0	-6.4	
High Ch								
1770.00	13.75	V	4.4	9.7	19.02	30.0	-11.0	
1770.00	15.34	H	4.4	9.7	20.62	30.0	-9.4	

LTE Band 66 20MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-01-18
Test Engineer: 20890
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 66 Fundamentals, 20MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1720.00	14.30	V	4.4	9.6	19.54	30.0	-10.5	
1720.00	16.14	H	4.4	9.6	21.37	30.0	-8.6	
Mid Ch								
1745.00	15.04	V	4.4	9.7	20.32	30.0	-9.7	
1745.00	17.26	H	4.4	9.7	22.54	30.0	-7.5	
High Ch								
1770.00	12.67	V	4.4	9.7	17.94	30.0	-12.1	
1770.00	14.16	H	4.4	9.7	19.44	30.0	-10.6	

LTE
Band 66
15MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-01-18
Test Engineer: 20890
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 66 Fundamentals, 15MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1717.50	15.33	V	4.4	9.6	20.56	30.0	-9.4	
1717.50	17.41	H	4.4	9.6	22.64	30.0	-7.4	
Mid Ch								
1745.00	15.56	V	4.4	9.7	20.84	30.0	-9.2	
1745.00	17.79	H	4.4	9.7	23.07	30.0	-6.9	
High Ch								
1772.50	13.93	V	4.4	9.7	19.20	30.0	-10.8	
1772.50	16.54	H	4.4	9.7	21.81	30.0	-8.2	

LTE
Band 66
15MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-01-18
Test Engineer: 20890
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 66 Fundamentals, 15MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1717.50	14.02	V	4.4	9.6	19.25	30.0	-10.7	
1717.50	16.39	H	4.4	9.6	21.62	30.0	-8.4	
Mid Ch								
1745.00	14.33	V	4.4	9.7	19.61	30.0	-10.4	
1745.00	16.63	H	4.4	9.7	21.91	30.0	-8.1	
High Ch								
1772.50	12.90	V	4.4	9.7	18.17	30.0	-11.8	
1772.50	15.58	H	4.4	9.7	20.85	30.0	-9.1	

LTE

Band 66

10MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-01-18
Test Engineer: 20890
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 66 Fundamentals, 10MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1715.00	15.27	V	4.4	9.6	20.50	30.0	-9.5	
1715.00	17.24	H	4.4	9.6	22.46	30.0	-7.5	
Mid Ch								
1745.00	15.88	V	4.4	9.7	21.16	30.0	-8.8	
1745.00	18.23	H	4.4	9.7	23.51	30.0	-6.5	
High Ch								
1775.00	13.91	V	4.4	9.7	19.18	30.0	-10.8	
1775.00	16.41	H	4.4	9.7	21.68	30.0	-8.3	

LTE

Band 66

10MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-01-18
Test Engineer: 20890
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 66 Fundamentals, 10MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1715.00	14.16	V	4.4	9.6	19.39	30.0	-10.6	
1715.00	16.14	H	4.4	9.6	21.36	30.0	-8.6	
Mid Ch								
1745.00	13.47	V	4.4	9.7	18.75	30.0	-11.3	
1745.00	16.40	H	4.4	9.7	21.68	30.0	-8.3	
High Ch								
1775.00	12.93	V	4.4	9.7	18.20	30.0	-11.8	
1775.00	15.33	H	4.4	9.7	20.60	30.0	-9.4	

LTE

Band 66

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-01-18
Test Engineer: 20890
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 66 Fundamentals, 5MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1712.50	15.14	V	4.4	9.6	20.36	30.0	-9.6	
1712.50	17.21	H	4.4	9.6	22.43	30.0	-7.6	
Mid Ch								
1745.00	14.61	V	4.4	9.7	19.89	30.0	-10.1	
1745.00	17.72	H	4.4	9.7	23.00	30.0	-7.0	
High Ch								
1777.50	13.92	V	4.4	9.7	19.19	30.0	-10.8	
1777.50	16.42	H	4.4	9.7	21.68	30.0	-8.3	

LTE

Band 66

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-01-18
Test Engineer: 20890
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 66 Fundamentals, 5MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1712.50	14.25	V	4.4	9.6	19.47	30.0	-10.5	
1712.50	16.32	H	4.4	9.6	21.54	30.0	-8.5	
Mid Ch								
1745.00	13.68	V	4.4	9.7	18.96	30.0	-11.0	
1745.00	16.60	H	4.4	9.7	21.88	30.0	-8.1	
High Ch								
1777.50	13.11	V	4.4	9.7	18.38	30.0	-11.6	
1777.50	15.64	H	4.4	9.7	20.90	30.0	-9.1	

LTE
Band 66
3MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-01-18
Test Engineer: 20890
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 66 Fundamentals, 3MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1711.50	15.27	V	4.4	9.6	20.48	30.0	-9.5	
1711.50	17.16	H	4.4	9.6	22.38	30.0	-7.6	
Mid Ch								
1745.00	15.16	V	4.4	9.7	20.44	30.0	-9.6	
1745.00	18.01	H	4.4	9.7	23.29	30.0	-6.7	
High Ch								
1778.50	13.64	V	4.4	9.7	18.90	30.0	-11.1	
1778.50	15.47	H	4.4	9.7	20.73	30.0	-9.3	

LTE
Band 66
3MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-01-18
Test Engineer: 20890
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 66 Fundamentals, 3MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1711.50	14.14	V	4.4	9.6	19.35	30.0	-10.6	
1711.50	16.28	H	4.4	9.6	21.50	30.0	-8.5	
Mid Ch								
1745.00	13.76	V	4.4	9.7	19.04	30.0	-11.0	
1745.00	16.84	H	4.4	9.7	22.12	30.0	-7.9	
High Ch								
1778.50	12.59	V	4.4	9.7	17.85	30.0	-12.1	
1778.50	14.37	H	4.4	9.7	19.63	30.0	-10.4	

LTE

Band 66

1.4MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-01-18
Test Engineer: 20890
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 66 Fundamentals, 1.4MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1710.70	15.09	V	4.4	9.6	20.30	30.0	-9.7	
1710.70	17.27	H	4.4	9.6	22.49	30.0	-7.5	
Mid Ch								
1745.00	15.14	V	4.4	9.7	20.42	30.0	-9.6	
1745.00	17.71	H	4.4	9.7	22.99	30.0	-7.0	
High Ch								
1779.30	13.66	V	4.4	9.7	18.92	30.0	-11.1	
1779.30	16.14	H	4.4	9.7	21.41	30.0	-8.6	

LTE

Band 66

1.4MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789746830
Date: 2021-01-18
Test Engineer: 20890
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 66 Fundamentals, 1.4MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1710.70	14.14	V	4.4	9.6	19.35	30.0	-10.6	
1710.70	16.26	H	4.4	9.6	21.48	30.0	-8.5	
Mid Ch								
1745.00	13.94	V	4.4	9.7	19.22	30.0	-10.8	
1745.00	16.54	H	4.4	9.7	21.82	30.0	-8.2	
High Ch								
1779.30	12.56	V	4.4	9.7	17.82	30.0	-12.2	
1779.30	14.93	H	4.4	9.7	20.20	30.0	-9.8	

9.6. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053, §22.917, §24.238, §27. 53 and §90.691

LIMIT

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

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

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

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

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

(m) (4) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less 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.

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), Max hold(GSM, LTE Band41)

RESULTS

See the following pages.
NOTE : Please refer to section 5.4 for bandwidth and RB setting about LTE.

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_22/24/27(04)
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9.6.1. SPURIOUS RADIATION PLOTS

GSM850

GSM850

GPRS

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

Company:	Samsung
Project #:	4789746830
Date:	2021-01-18
Test Engineer:	20882
Configuration:	EUT, Y-Position
Location:	Chamber 2
Mode:	GPRS 850 MHz Harmonics
Test Votage:	AC 120 V, 60 Hz

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 824.2MHz									
1648.40	8.2	V	3.0	40.7	1.0	-31.5	-13.0	-18.5	
2472.60	18.0	V	3.0	41.3	1.0	-22.3	-13.0	-9.3	
3296.80	4.7	V	3.0	42.1	1.0	-36.3	-13.0	-23.3	
4121.00	3.7	V	3.0	42.2	1.0	-37.5	-13.0	-24.5	
4945.20	1.3	V	3.0	42.8	1.0	-40.5	-13.0	-27.5	
1648.40	13.7	H	3.0	40.7	1.0	-26.0	-13.0	-13.0	
2472.60	14.9	H	3.0	41.3	1.0	-25.4	-13.0	-12.4	
3296.80	8.3	H	3.0	42.1	1.0	-32.8	-13.0	-19.8	
4121.00	3.7	H	3.0	42.2	1.0	-37.5	-13.0	-24.5	
4945.20	0.8	H	3.0	42.8	1.0	-41.0	-13.0	-28.0	
Mid Ch, 836.6MHz									
1673.20	9.4	V	3.0	40.7	1.0	-30.3	-13.0	-17.3	
2509.80	16.6	V	3.0	41.4	1.0	-23.8	-13.0	-10.8	
3346.40	9.0	V	3.0	42.1	1.0	-32.1	-13.0	-19.1	
4183.00	2.9	V	3.0	42.2	1.0	-38.3	-13.0	-25.3	
5019.60	4.3	V	3.0	42.8	1.0	-37.5	-13.0	-24.5	
1673.20	16.3	H	3.0	40.7	1.0	-23.4	-13.0	-10.4	
2509.80	17.6	H	3.0	41.4	1.0	-22.7	-13.0	-9.7	
3346.40	9.1	H	3.0	42.1	1.0	-32.0	-13.0	-19.0	
4183.00	7.2	H	3.0	42.2	1.0	-34.1	-13.0	-21.1	
5019.60	5.2	H	3.0	42.8	1.0	-36.6	-13.0	-23.6	
High Ch, 848.8MHz									
1697.60	6.9	V	3.0	40.7	1.0	-32.8	-13.0	-19.8	
2546.40	20.6	V	3.0	41.4	1.0	-19.8	-13.0	-6.8	
3395.20	6.0	V	3.0	42.1	1.0	-35.1	-13.0	-22.1	
4244.00	1.6	V	3.0	42.3	1.0	-39.7	-13.0	-26.7	
5092.80	5.1	V	3.0	42.8	1.0	-36.7	-13.0	-23.7	
1697.60	14.1	H	3.0	40.7	1.0	-25.6	-13.0	-12.6	
2546.40	18.2	H	3.0	41.4	1.0	-22.2	-13.0	-9.2	
3395.20	8.3	H	3.0	42.1	1.0	-32.7	-13.0	-19.7	
4244.00	3.4	H	3.0	42.3	1.0	-37.9	-13.0	-24.9	
5092.80	5.2	H	3.0	42.8	1.0	-36.6	-13.0	-23.6	

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

Company:	Samsung
Project #:	4789746830
Date:	2021-01-18
Test Engineer:	20896
Configuration:	EUT, Y-Position
Location:	Chamber 2
Mode:	EGPRS 850 MHz Harmonics
Test Votage:	AC 120 V, 60 Hz

GSM850

EGPRS

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	-7.3	V	3.0	40.7	1.0	-46.9	-13.0	-33.9	
2472.60	8.7	V	3.0	41.3	1.0	-31.6	-13.0	-18.6	
3296.80	-9.0	V	3.0	42.1	1.0	-50.1	-13.0	-37.1	
4121.00	-9.0	V	3.0	42.2	1.0	-50.2	-13.0	-37.2	
4945.20	-8.2	V	3.0	42.8	1.0	-49.9	-13.0	-36.9	
1648.40	-1.8	H	3.0	40.7	1.0	-41.5	-13.0	-28.5	
2472.60	6.5	H	3.0	41.3	1.0	-33.8	-13.0	-20.8	
3296.80	-8.4	H	3.0	42.1	1.0	-49.5	-13.0	-36.5	
4121.00	-7.5	H	3.0	42.2	1.0	-48.7	-13.0	-35.7	
4945.20	-7.5	H	3.0	42.8	1.0	-49.3	-13.0	-36.3	
Mid Ch, 836.6MHz									
1673.20	-7.8	V	3.0	40.7	1.0	-47.5	-13.0	-34.5	
2509.80	11.6	V	3.0	41.4	1.0	-28.8	-13.0	-15.8	
3346.40	-8.3	V	3.0	42.1	1.0	-49.3	-13.0	-36.3	
4183.00	-9.6	V	3.0	42.2	1.0	-50.8	-13.0	-37.8	
5019.60	-7.7	V	3.0	42.8	1.0	-49.5	-13.0	-36.5	
1673.20	-1.2	H	3.0	40.7	1.0	-40.9	-13.0	-27.9	
2509.80	7.0	H	3.0	41.4	1.0	-33.3	-13.0	-20.3	
3346.40	-8.5	H	3.0	42.1	1.0	-49.6	-13.0	-36.6	
4183.00	-7.8	H	3.0	42.2	1.0	-49.0	-13.0	-36.0	
5019.60	-7.4	H	3.0	42.8	1.0	-49.2	-13.0	-36.2	
High Ch, 848.8MHz									
1697.60	-9.2	V	3.0	40.7	1.0	-48.9	-13.0	-35.9	
2546.40	11.8	V	3.0	41.4	1.0	-28.6	-13.0	-15.6	
3395.20	-8.9	V	3.0	42.1	1.0	-49.9	-13.0	-36.9	
4244.00	-8.7	V	3.0	42.3	1.0	-50.0	-13.0	-37.0	
5092.80	-7.9	V	3.0	42.8	1.0	-49.7	-13.0	-36.7	
1697.60	-2.7	H	3.0	40.7	1.0	-42.4	-13.0	-29.4	
2546.40	10.4	H	3.0	41.4	1.0	-30.0	-13.0	-17.0	
3395.20	-8.8	H	3.0	42.1	1.0	-49.9	-13.0	-36.9	
4244.00	-7.2	H	3.0	42.3	1.0	-48.5	-13.0	-35.5	
5092.80	-7.6	H	3.0	42.8	1.0	-49.4	-13.0	-36.4	

GSM1900

GSM1900
GPRS

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

Company: Samsung
Project #: 4789746830
Date: 2021-01-25
Test Engineer: 20896
Configuration: EUT / AC Adapter / Earphone, X-Position
Location: Chamber 1
Mode: GPRS 1900 MHz Harmonics
Test Votage: AC 120 V, 60 Hz

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1850.2MHz									
3700.40	-0.8	V	3.0	45.5	1.0	-45.2	-13.0	-32.2	
5550.60	-3.1	V	3.0	45.4	1.0	-47.5	-13.0	-34.5	
7400.80	-2.8	V	3.0	44.2	1.0	-46.0	-13.0	-33.0	
3700.40	2.0	H	3.0	45.5	1.0	-42.5	-13.0	-29.5	
5550.60	1.3	H	3.0	45.4	1.0	-43.1	-13.0	-30.1	
7400.80	-3.2	H	3.0	44.2	1.0	-46.4	-13.0	-33.4	
Mid Ch, 1880MHz									
3760.00	0.0	V	3.0	45.5	1.0	-44.4	-13.0	-31.4	
5640.00	7.5	V	3.0	45.4	1.0	-36.9	-13.0	-23.9	
7520.00	-3.4	V	3.0	44.1	1.0	-46.5	-13.0	-33.5	
3760.00	1.5	H	3.0	45.5	1.0	-43.0	-13.0	-30.0	
5640.00	4.5	H	3.0	45.4	1.0	-39.9	-13.0	-26.9	
7520.00	-3.5	H	3.0	44.1	1.0	-46.6	-13.0	-33.6	
High Ch, 1909.8MHz									
3819.60	6.9	V	3.0	45.5	1.0	-37.6	-13.0	-24.6	
5729.40	17.3	V	3.0	45.4	1.0	-27.0	-13.0	-14.0	
7639.20	0.7	V	3.0	44.1	1.0	-42.3	-13.0	-29.3	
3819.60	10.2	H	3.0	45.5	1.0	-34.3	-13.0	-21.3	
5729.40	12.4	H	3.0	45.4	1.0	-32.0	-13.0	-19.0	
7639.20	0.9	H	3.0	44.1	1.0	-42.2	-13.0	-29.2	

GSM1900
EGPRS

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

Company: Samsung
Project #: 4789746830
Date: 2021-01-25
Test Engineer: 20896
Configuration: EUT / AC Adapter / Earphone, X-Position
Location: Chamber 1
Mode: EGPRS 1900 MHz Harmonics
Test Votage: AC 120 V, 60 Hz

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1850.2MHz									
3700.40	-10.3	V	3.0	45.5	1.0	-54.7	-13.0	-41.7	
5550.60	-7.7	V	3.0	45.4	1.0	-52.1	-13.0	-39.1	
7400.80	-4.9	V	3.0	44.2	1.0	-48.1	-13.0	-35.1	
3700.40	-9.7	H	3.0	45.5	1.0	-54.1	-13.0	-41.1	
5550.60	-7.5	H	3.0	45.4	1.0	-51.9	-13.0	-38.9	
7400.80	-2.8	H	3.0	44.2	1.0	-46.0	-13.0	-33.0	
Mid Ch, 1880MHz									
3760.00	-9.1	V	3.0	45.5	1.0	-53.6	-13.0	-40.6	
5640.00	-4.0	V	3.0	45.4	1.0	-48.4	-13.0	-35.4	
7520.00	-4.8	V	3.0	44.1	1.0	-48.0	-13.0	-35.0	
3760.00	-9.7	H	3.0	45.5	1.0	-54.2	-13.0	-41.2	
5640.00	-6.2	H	3.0	45.4	1.0	-50.5	-13.0	-37.5	
7520.00	-4.2	H	3.0	44.1	1.0	-47.4	-13.0	-34.4	
High Ch, 1909.8MHz									
3819.60	-4.3	V	3.0	45.5	1.0	-48.8	-13.0	-35.8	
5729.40	7.8	V	3.0	45.4	1.0	-36.6	-13.0	-23.6	
7639.20	-4.5	V	3.0	44.1	1.0	-47.6	-13.0	-34.6	
3819.60	-1.5	H	3.0	45.5	1.0	-46.0	-13.0	-33.0	
5729.40	3.3	H	3.0	45.4	1.0	-41.1	-13.0	-28.1	
7639.20	-4.3	H	3.0	44.1	1.0	-47.4	-13.0	-34.4	

WCDMA Band 5

WCDMA

Band 5
REL99

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

Company: Samsung
Project #: 4789746830
Date: 2021-01-19
Test Engineer: 20896
Configuration: EUT, Y-Position
Location: Chamber 2
Mode: Rel99 Band 5 Harmonics
Test Votage: AC 120 V, 60 Hz

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 826.4MHz									
1652.80	-13.7	V	3.0	40.7	1.0	-53.4	-13.0	-40.4	
2479.20	-1.8	V	3.0	41.3	1.0	-42.2	-13.0	-29.2	
3305.60	-10.2	V	3.0	42.1	1.0	-51.2	-13.0	-38.2	
1652.80	-10.5	H	3.0	40.7	1.0	-50.2	-13.0	-37.2	
2479.20	-3.6	H	3.0	41.3	1.0	-43.9	-13.0	-30.9	
3305.60	-10.1	H	3.0	42.1	1.0	-51.2	-13.0	-38.2	
Mid Ch, 836.6MHz									
1673.20	-13.9	V	3.0	40.7	1.0	-53.5	-13.0	-40.5	
2509.80	-1.8	V	3.0	41.4	1.0	-42.2	-13.0	-29.2	
3346.40	-9.9	V	3.0	42.1	1.0	-51.0	-13.0	-38.0	
1673.20	-11.3	H	3.0	40.7	1.0	-51.0	-13.0	-38.0	
2509.80	-4.9	H	3.0	41.4	1.0	-45.2	-13.0	-32.2	
3346.40	-9.8	H	3.0	42.1	1.0	-50.9	-13.0	-37.9	
High Ch, 846.6MHz									
1693.20	-14.6	V	3.0	40.7	1.0	-54.3	-13.0	-41.3	
2539.80	-1.9	V	3.0	41.4	1.0	-42.3	-13.0	-29.3	
3386.40	-10.0	V	3.0	42.1	1.0	-51.1	-13.0	-38.1	
1693.20	-13.4	H	3.0	40.7	1.0	-53.1	-13.0	-40.1	
2539.80	-3.7	H	3.0	41.4	1.0	-44.1	-13.0	-31.1	
3386.40	-9.9	H	3.0	42.1	1.0	-51.0	-13.0	-38.0	

WCDMA

Band 5
HSDPA

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

Company: Samsung
Project #: 4789746830
Date: 2021-01-19
Test Engineer: 20881
Configuration: EUT, Y-Position
Location: Chamber 2
Mode: HSDPA Band 5 Harmonics
Test Votage: AC 120 V, 60 Hz

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 826.4MHz									
1652.80	-14.3	V	3.0	40.7	1.0	-54.0	-13.0	-41.0	
2479.20	-12.7	V	3.0	41.3	1.0	-53.1	-13.0	-40.1	
3305.60	-10.2	V	3.0	42.1	1.0	-51.2	-13.0	-38.2	
1652.80	-11.6	H	3.0	40.7	1.0	-51.3	-13.0	-38.3	
2479.20	-12.4	H	3.0	41.3	1.0	-52.7	-13.0	-39.7	
3305.60	-10.1	H	3.0	42.1	1.0	-51.1	-13.0	-38.1	
Mid Ch, 836.6MHz									
1673.20	-14.6	V	3.0	40.7	1.0	-54.3	-13.0	-41.3	
2509.80	-12.7	V	3.0	41.4	1.0	-53.0	-13.0	-40.0	
3346.40	-9.9	V	3.0	42.1	1.0	-50.9	-13.0	-37.9	
1673.20	-12.7	H	3.0	40.7	1.0	-52.4	-13.0	-39.4	
2509.80	-12.4	H	3.0	41.4	1.0	-52.8	-13.0	-39.8	
3346.40	-9.8	H	3.0	42.1	1.0	-50.9	-13.0	-37.9	
High Ch, 846.6MHz									
1693.20	-15.2	V	3.0	40.7	1.0	-54.9	-13.0	-41.9	
2539.80	-12.9	V	3.0	41.4	1.0	-53.3	-13.0	-40.3	
3386.40	-10.0	V	3.0	42.1	1.0	-51.1	-13.0	-38.1	
1693.20	-14.2	H	3.0	40.7	1.0	-53.9	-13.0	-40.9	
2539.80	-12.3	H	3.0	41.4	1.0	-52.7	-13.0	-39.7	
3386.40	-9.9	H	3.0	42.1	1.0	-51.0	-13.0	-38.0	

WCDMA Band 4

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

Company: Samsung
Project #: 4789746830
Date: 2021-01-19
Test Engineer: 20881
Configuration: EUT, Y-Position
Location: Chamber 2
Mode: Rel99 Band 4 Harmonics
Test Votage: AC 120 V, 60 Hz

WCDMA Band 4 REL99

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1712.4MHz									
3424.80	9.8	V	3.0	42.1	1.0	-31.3	-13.0	-18.3	
5137.20	1.5	V	3.0	42.8	1.0	-40.3	-13.0	-27.3	
6849.60	-6.3	V	3.0	42.7	1.0	-48.0	-13.0	-35.0	
3424.80	7.2	H	3.0	42.1	1.0	-33.9	-13.0	-20.9	
5137.20	2.3	H	3.0	42.8	1.0	-39.5	-13.0	-26.5	
6849.60	-5.6	H	3.0	42.7	1.0	-47.4	-13.0	-34.4	
Mid Ch, 1732.6MHz									
3465.20	10.2	V	3.0	42.1	1.0	-30.9	-13.0	-17.9	
5197.80	-0.5	V	3.0	42.8	1.0	-42.3	-13.0	-29.3	
6930.40	-5.8	V	3.0	42.7	1.0	-47.5	-13.0	-34.5	
3465.20	9.0	H	3.0	42.1	1.0	-32.1	-13.0	-19.1	
5197.80	1.4	H	3.0	42.8	1.0	-40.4	-13.0	-27.4	
6930.40	-5.8	H	3.0	42.7	1.0	-47.5	-13.0	-34.5	
High Ch, 1752.6MHz									
3505.20	15.3	V	3.0	42.1	1.0	-25.7	-13.0	-12.7	
5257.80	3.1	V	3.0	42.8	1.0	-38.8	-13.0	-25.8	
7010.40	-4.9	V	3.0	42.7	1.0	-46.6	-13.0	-33.6	
3505.20	13.6	H	3.0	42.1	1.0	-27.5	-13.0	-14.5	
5257.80	-0.4	H	3.0	42.8	1.0	-42.3	-13.0	-29.3	
7010.40	-5.3	H	3.0	42.7	1.0	-47.0	-13.0	-34.0	

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

Company: Samsung
Project #: 4789746830
Date: 2021-01-19
Test Engineer: 20881
Configuration: EUT, Y-Position
Location: Chamber 2
Mode: HSDPA Band 4 Harmonics
Test Votage: AC 120 V, 60 Hz

WCDMA Band 4 HSDPA

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1712.4MHz									
3424.80	5.9	V	3.0	42.1	1.0	-35.2	-13.0	-22.2	
5137.20	0.3	V	3.0	42.8	1.0	-41.5	-13.0	-28.5	
6849.60	-5.6	V	3.0	42.7	1.0	-47.3	-13.0	-34.3	
3424.80	3.2	H	3.0	42.1	1.0	-37.8	-13.0	-24.8	
5137.20	-0.2	H	3.0	42.8	1.0	-42.0	-13.0	-29.0	
6849.60	-5.9	H	3.0	42.7	1.0	-47.6	-13.0	-34.6	
Mid Ch, 1732.6MHz									
3465.20	6.4	V	3.0	42.1	1.0	-34.7	-13.0	-21.7	
5197.80	-0.8	V	3.0	42.8	1.0	-42.6	-13.0	-29.6	
6930.40	-6.1	V	3.0	42.7	1.0	-47.9	-13.0	-34.9	
3465.20	5.7	H	3.0	42.1	1.0	-35.4	-13.0	-22.4	
5197.80	-0.7	H	3.0	42.8	1.0	-42.5	-13.0	-29.5	
6930.40	-5.7	H	3.0	42.7	1.0	-47.4	-13.0	-34.4	
High Ch, 1752.6MHz									
3505.20	12.8	V	3.0	42.1	1.0	-28.2	-13.0	-15.2	
5257.80	1.4	V	3.0	42.8	1.0	-40.5	-13.0	-27.5	
7010.40	-3.0	V	3.0	42.7	1.0	-44.7	-13.0	-31.7	
3505.20	9.0	H	3.0	42.1	1.0	-32.1	-13.0	-19.1	
5257.80	-4.9	H	3.0	42.8	1.0	-46.7	-13.0	-33.7	
7010.40	-5.6	H	3.0	42.7	1.0	-47.3	-13.0	-34.3	

WCDMA Band 2

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

Company: Samsung
Project #: 4789746830
Date: 2021-01-18
Test Engineer: 20881
Configuration: EUT / AC Adapter/ Earphone, Z-Position
Location: Chamber 1
Mode: Rel99 Band 2 Harmonics
Test Votage: AC 120 V, 60 Hz

WCDMA

Band 2
REL99

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1852.4MHz									
3704.80	10.0	V	3.0	45.5	1.0	-34.4	-13.0	-21.4	
5557.20	-3.4	V	3.0	45.4	1.0	-47.8	-13.0	-34.8	
7409.60	-5.9	V	3.0	44.2	1.0	-49.1	-13.0	-36.1	
3704.80	6.9	H	3.0	45.5	1.0	-37.5	-13.0	-24.5	
5557.20	-2.7	H	3.0	45.4	1.0	-47.1	-13.0	-34.1	
7409.60	-5.5	H	3.0	44.2	1.0	-48.7	-13.0	-35.7	
Mid Ch, 1880MHz									
3760.00	11.6	V	3.0	45.5	1.0	-32.9	-13.0	-19.9	
5640.00	0.3	V	3.0	45.4	1.0	-44.1	-13.0	-31.1	
7520.00	-5.5	V	3.0	44.1	1.0	-48.6	-13.0	-35.6	
3760.00	7.8	H	3.0	45.5	1.0	-36.7	-13.0	-23.7	
5640.00	0.5	H	3.0	45.4	1.0	-43.9	-13.0	-30.9	
7520.00	-4.8	H	3.0	44.1	1.0	-48.0	-13.0	-35.0	
High Ch, 1907.6MHz									
3815.20	13.4	V	3.0	45.5	1.0	-31.1	-13.0	-18.1	
5722.80	3.1	V	3.0	45.4	1.0	-41.2	-13.0	-28.2	
7630.40	-4.9	V	3.0	44.1	1.0	-48.0	-13.0	-35.0	
3815.20	13.9	H	3.0	45.5	1.0	-30.6	-13.0	-17.6	
5722.80	1.0	H	3.0	45.4	1.0	-43.3	-13.0	-30.3	
7630.40	-4.8	H	3.0	44.1	1.0	-47.9	-13.0	-34.9	

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

Company: Samsung
Project #: 4789746830
Date: 2021-01-18
Test Engineer: 20882
Configuration: EUT / AC Adapter/ Earphone, Z-Position
Location: Chamber 1
Mode: HSDPA Band 2 Harmonics
Test Votage: AC 120 V, 60 Hz

WCDMA

Band 2
HSDPA

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1852.4MHz									
3704.80	0.4	V	3.0	45.5	1.0	-44.0	-13.0	-31.0	
5557.20	-8.6	V	3.0	45.4	1.0	-53.0	-13.0	-40.0	
7409.60	-6.2	V	3.0	44.2	1.0	-49.4	-13.0	-36.4	
3704.80	-6.1	H	3.0	45.5	1.0	-50.5	-13.0	-37.5	
5557.20	-8.2	H	3.0	45.4	1.0	-52.6	-13.0	-39.6	
7409.60	-6.0	H	3.0	44.2	1.0	-49.2	-13.0	-36.2	
Mid Ch, 1880MHz									
3760.00	1.0	V	3.0	45.5	1.0	-43.5	-13.0	-30.5	
5640.00	-8.0	V	3.0	45.4	1.0	-52.4	-13.0	-39.4	
7520.00	-6.0	V	3.0	44.1	1.0	-49.2	-13.0	-36.2	
3760.00	-9.0	H	3.0	45.5	1.0	-53.5	-13.0	-40.5	
5640.00	-8.2	H	3.0	45.4	1.0	-52.6	-13.0	-39.6	
7520.00	-5.8	H	3.0	44.1	1.0	-48.9	-13.0	-35.9	
High Ch, 1907.6MHz									
3815.20	1.7	V	3.0	45.5	1.0	-42.8	-13.0	-29.8	
5722.80	-8.2	V	3.0	45.4	1.0	-52.5	-13.0	-39.5	
7630.40	-5.6	V	3.0	44.1	1.0	-48.7	-13.0	-35.7	
3815.20	-5.9	H	3.0	45.5	1.0	-50.3	-13.0	-37.3	
5722.80	-7.4	H	3.0	45.4	1.0	-51.8	-13.0	-38.8	
7630.40	-5.7	H	3.0	44.1	1.0	-48.8	-13.0	-35.8	

LTE Band 2

LTE
Band 2
15MHz
QPSK

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

Company:	Samsung
Project #:	4789746830
Date:	2021-01-19
Test Engineer:	22943
Configuration:	EUT / AC Adapter / Earphone, Y-Position
Location:	Chamber 1
Mode:	LTE_QPSK Band 2 Harmonics, 15MHz Bandwidth
Test Votage:	AC 120 V, 60 Hz

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1857.5MHz									
3715.00	16.7	V	3.0	45.5	1.0	-27.7	-13.0	-14.7	
5572.50	7.0	V	3.0	45.4	1.0	-37.4	-13.0	-24.4	
7430.00	-4.0	V	3.0	44.2	1.0	-47.1	-13.0	-34.1	
3715.00	17.7	H	3.0	45.5	1.0	-26.8	-13.0	-13.8	
5572.50	7.8	H	3.0	45.4	1.0	-36.6	-13.0	-23.6	
7430.00	-2.7	H	3.0	44.2	1.0	-45.9	-13.0	-32.9	
Mid Ch, 1880MHz									
3760.00	17.0	V	3.0	45.5	1.0	-27.4	-13.0	-14.4	
5640.00	7.8	V	3.0	45.4	1.0	-36.6	-13.0	-23.6	
7520.00	-3.3	V	3.0	44.1	1.0	-46.4	-13.0	-33.4	
3760.00	17.8	H	3.0	45.5	1.0	-26.7	-13.0	-13.7	
5640.00	8.9	H	3.0	45.4	1.0	-35.5	-13.0	-22.5	
7520.00	-2.9	H	3.0	44.1	1.0	-46.1	-13.0	-33.1	
High Ch, 1902.5MHz									
3805.00	17.7	V	3.0	45.5	1.0	-26.8	-13.0	-13.8	
5707.50	9.6	V	3.0	45.4	1.0	-34.8	-13.0	-21.8	
7610.00	-2.4	V	3.0	44.1	1.0	-45.5	-13.0	-32.5	
3805.00	19.7	H	3.0	45.5	1.0	-24.8	-13.0	-11.8	
5707.50	11.7	H	3.0	45.4	1.0	-32.7	-13.0	-19.7	
7610.00	-1.7	H	3.0	44.1	1.0	-44.8	-13.0	-31.8	

LTE Band 12

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

Company: Samsung
Project #: 4789746830
Date: 2021-01-18
Test Engineer: 20882
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 12 Harmonics, 10MHz Bandwidth
Test Votage: AC 120 V, 60 Hz

LTE
Band 12
10MHz
QPSK

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 704MHz									
1408.00	-4.1	V	3.0	45.5	1.0	-48.5	-13.0	-35.5	
2112.00	-5.0	V	3.0	45.0	1.0	-49.0	-13.0	-36.0	
2816.00	-3.6	V	3.0	45.2	1.0	-47.7	-13.0	-34.7	
3520.00	-2.6	V	3.0	45.4	1.0	-47.0	-13.0	-34.0	
4224.00	-5.1	V	3.0	45.5	1.0	-49.6	-13.0	-36.6	
1408.00	-6.7	H	3.0	45.5	1.0	-51.2	-13.0	-38.2	
2112.00	1.3	H	3.0	45.0	1.0	-42.7	-13.0	-29.7	
2816.00	-5.7	H	3.0	45.2	1.0	-49.9	-13.0	-36.9	
3520.00	-2.0	H	3.0	45.4	1.0	-46.4	-13.0	-33.4	
4224.00	0.0	H	3.0	45.5	1.0	-44.5	-13.0	-31.5	
Mid Ch, 707.5MHz									
1415.00	-7.4	V	3.0	45.5	1.0	-51.9	-13.0	-38.9	
2122.50	-4.8	V	3.0	45.0	1.0	-48.8	-13.0	-35.8	
2830.00	-3.3	V	3.0	45.2	1.0	-47.4	-13.0	-34.4	
3537.50	-2.5	V	3.0	45.4	1.0	-46.9	-13.0	-33.9	
4245.00	-4.8	V	3.0	45.5	1.0	-49.3	-13.0	-36.3	
1415.00	-10.6	H	3.0	45.5	1.0	-55.0	-13.0	-42.0	
2122.50	1.4	H	3.0	45.0	1.0	-42.6	-13.0	-29.6	
2830.00	-5.2	H	3.0	45.2	1.0	-49.4	-13.0	-36.4	
3537.50	-2.0	H	3.0	45.4	1.0	-46.4	-13.0	-33.4	
4245.00	-6.6	H	3.0	45.5	1.0	-51.1	-13.0	-38.1	
High Ch, 711MHz									
1422.00	-2.0	V	3.0	45.5	1.0	-46.5	-13.0	-33.5	
2133.00	-5.6	V	3.0	45.0	1.0	-49.6	-13.0	-36.6	
2844.00	-3.7	V	3.0	45.2	1.0	-47.9	-13.0	-34.9	
3555.00	-2.2	V	3.0	45.4	1.0	-46.6	-13.0	-33.6	
4266.00	-6.3	V	3.0	45.5	1.0	-50.8	-13.0	-37.8	
1422.00	-6.0	H	3.0	45.5	1.0	-50.5	-13.0	-37.5	
2133.00	0.1	H	3.0	45.0	1.0	-44.0	-13.0	-31.0	
2844.00	-5.5	H	3.0	45.2	1.0	-49.6	-13.0	-36.6	
3555.00	-3.0	H	3.0	45.4	1.0	-47.4	-13.0	-34.4	
4266.00	-7.5	H	3.0	45.5	1.0	-52.0	-13.0	-39.0	

LTE Band 13

LTE Band 13 5MHz QPSK

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

Company:	Samsung
Project #:	4789746830
Date:	2021-01-18
Test Engineer:	20882
Configuration:	EUT / AC Adapter / Earphone, Y-Position
Location:	Chamber 1
Mode:	LTE_QPSK Band 13 Harmonics, 5MHz Bandwidth
Test Votage:	AC 120 V, 60 Hz

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 779.5MHz									
1559.00	-11.8	V	3.0	45.3	1.0	-56.2	-40.0	-16.2	
2338.50	-8.6	V	3.0	45.1	1.0	-52.7	-13.0	-39.7	
3118.00	-10.4	V	3.0	45.3	1.0	-54.6	-13.0	-41.6	
1559.00	-12.7	H	3.0	45.3	1.0	-57.0	-40.0	-17.0	
2338.50	-6.8	H	3.0	45.1	1.0	-50.9	-13.0	-37.9	
3118.00	-10.2	H	3.0	45.3	1.0	-54.5	-13.0	-41.5	
Mid Ch, 782MHz									
1564.00	-12.5	V	3.0	45.3	1.0	-56.9	-40.0	-16.9	
2346.00	-9.1	V	3.0	45.1	1.0	-53.2	-13.0	-40.2	
3128.00	-9.8	V	3.0	45.3	1.0	-54.0	-13.0	-41.0	
1564.00	-12.6	H	3.0	45.3	1.0	-57.0	-40.0	-17.0	
2346.00	-6.0	H	3.0	45.1	1.0	-50.1	-13.0	-37.1	
3128.00	-10.0	H	3.0	45.3	1.0	-54.2	-13.0	-41.2	
High Ch, 784.5MHz									
1569.00	-12.0	V	3.0	45.3	1.0	-56.3	-40.0	-16.3	
2353.50	-8.8	V	3.0	45.1	1.0	-52.8	-13.0	-39.8	
3138.00	-9.9	V	3.0	45.3	1.0	-54.2	-13.0	-41.2	
1569.00	-12.4	H	3.0	45.3	1.0	-56.7	-40.0	-16.7	
2353.50	-7.1	H	3.0	45.1	1.0	-51.2	-13.0	-38.2	
3138.00	-9.9	H	3.0	45.3	1.0	-54.2	-13.0	-41.2	

LTE Band 26 (Part 90)

LTE Band 26 10MHz QPSK

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

Company:	Samsung
Project #:	4789746830
Date:	2021-01-19
Test Engineer:	20890
Configuration:	EUT / AC Adapter / Earphone, Y-Position
Location:	Chamber 1
Mode:	LTE_QPSK Band 26 Harmonics, 10MHz Bandwidth
Test Votage:	AC 120 V, 60 Hz

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 819MHz									
1638.00	6.8	V	3.0	45.3	1.0	-37.5	-13.0	-24.5	
2457.00	-2.1	V	3.0	45.1	1.0	-46.2	-13.0	-33.2	
3276.00	-9.8	V	3.0	45.3	1.0	-54.1	-13.0	-41.1	
1638.00	5.0	H	3.0	45.3	1.0	-39.3	-13.0	-26.3	
2457.00	-3.1	H	3.0	45.1	1.0	-47.2	-13.0	-34.2	
3276.00	-9.7	H	3.0	45.3	1.0	-54.0	-13.0	-41.0	

LTE Band 26 (Straddle)

LTE Band 26 5MHz QPSK

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

Company:	Samsung
Project #:	4789746830
Date:	2021-02-04
Test Engineer:	22943
Configuration:	EUT / AC Adapter / Earphone, X-Position
Location:	Chamber 2
Mode:	LTE_QPSK Band 26 Harmonics, 5MHz Bandwidth
Test Votage:	AC 120 V, 60 Hz

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Straddle Ch, 824MHz									
1648.00	-0.1	V	3.0	40.7	1.0	-39.8	-13.0	-26.8	
2472.00	-9.8	V	3.0	41.3	1.0	-50.1	-13.0	-37.1	
3296.00	-10.1	V	3.0	42.1	1.0	-51.2	-13.0	-38.2	
1648.00	-1.6	H	3.0	40.7	1.0	-41.3	-13.0	-28.3	
2472.00	-7.4	H	3.0	41.3	1.0	-47.7	-13.0	-34.7	
3296.00	-10.0	H	3.0	42.1	1.0	-51.1	-13.0	-38.1	

LTE Band 26 (Part 22)

LTE Band 26 5MHz QPSK

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

Company:	Samsung
Project #:	4789746830
Date:	2021-01-19
Test Engineer:	20890
Configuration:	EUT / AC Adapter / Earphone, X-Position
Location:	Chamber 1
Mode:	LTE_QPSK Band 26 Harmonics, 5MHz Bandwidth
Test Votage:	AC 120 V, 60 Hz

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 826.5MHz									
1653.00	1.6	V	3.0	45.3	1.0	-42.7	-13.0	-29.7	
2479.50	-6.0	V	3.0	45.1	1.0	-50.1	-13.0	-37.1	
3306.00	-9.5	V	3.0	45.3	1.0	-53.8	-13.0	-40.8	
1653.00	5.6	H	3.0	45.3	1.0	-38.7	-13.0	-25.7	
2479.50	-3.8	H	3.0	45.1	1.0	-47.9	-13.0	-34.9	
3306.00	-9.3	H	3.0	45.3	1.0	-53.6	-13.0	-40.6	
Mid Ch, 831.5MHz									
1663.00	0.4	V	3.0	45.3	1.0	-43.9	-13.0	-30.9	
2494.50	-5.7	V	3.0	45.1	1.0	-49.8	-13.0	-36.8	
3326.00	-10.0	V	3.0	45.3	1.0	-54.3	-13.0	-41.3	
1663.00	7.1	H	3.0	45.3	1.0	-37.2	-13.0	-24.2	
2494.50	-4.3	H	3.0	45.1	1.0	-48.4	-13.0	-35.4	
3326.00	-9.8	H	3.0	45.3	1.0	-54.1	-13.0	-41.1	
High Ch, 846.5MHz									
1693.00	1.0	V	3.0	45.2	1.0	-43.2	-13.0	-30.2	
2539.50	-7.7	V	3.0	45.1	1.0	-51.8	-13.0	-38.8	
3386.00	-9.2	V	3.0	45.3	1.0	-53.6	-13.0	-40.6	
1693.00	5.5	H	3.0	45.2	1.0	-38.7	-13.0	-25.7	
2539.50	-4.2	H	3.0	45.1	1.0	-48.3	-13.0	-35.3	
3386.00	-8.9	H	3.0	45.3	1.0	-53.3	-13.0	-40.3	

LTE Band 41

LTE

Band 41

20MHz

QPSK

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

Company:	Samsung
Project #:	4789746830
Date:	2021-01-22
Test Engineer:	20882
Configuration:	EUT / AC Adapter / Earphone, Y-Position
Location:	Chamber 1
Mode:	LTE_QPSK Band 41 Harmonics, 20MHz Bandwidth
Test Votage:	AC 120 V, 60 Hz

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 2506MHz									
5012.00	0.0	V	3.0	45.5	1.0	-44.5	-25.0	-19.5	
7518.00	0.0	V	3.0	44.1	1.0	-43.1	-25.0	-18.1	
10024.00	0.0	V	3.0	42.2	1.0	-41.2	-25.0	-16.2	
12530.00	0.0	V	3.0	43.3	1.0	-42.3	-25.0	-17.3	
15036.00	0.0	V	3.0	45.3	1.0	-44.3	-25.0	-19.3	
5012.00	-3.5	H	3.0	45.5	1.0	-48.0	-25.0	-23.0	
7518.00	0.0	H	3.0	44.1	1.0	-43.1	-25.0	-18.1	
10024.00	0.0	H	3.0	42.2	1.0	-41.2	-25.0	-16.2	
12530.00	0.0	H	3.0	43.3	1.0	-42.3	-25.0	-17.3	
15036.00	0.0	H	3.0	45.3	1.0	-44.3	-25.0	-19.3	
Mid Ch, 2593MHz									
5186.00	0.0	V	3.0	45.4	1.0	-44.4	-25.0	-19.4	
7779.00	0.0	V	3.0	44.0	1.0	-43.0	-25.0	-18.0	
10372.00	0.0	V	3.0	42.4	1.0	-41.4	-25.0	-16.4	
12965.00	0.0	V	3.0	43.7	1.0	-42.7	-25.0	-17.7	
15558.00	0.0	V	3.0	44.7	1.0	-43.7	-25.0	-18.7	
5186.00	6.6	H	3.0	45.4	1.0	-37.8	-25.0	-12.8	
7779.00	0.0	H	3.0	44.0	1.0	-43.0	-25.0	-18.0	
10372.00	0.0	H	3.0	42.4	1.0	-41.4	-25.0	-16.4	
12965.00	0.0	H	3.0	43.7	1.0	-42.7	-25.0	-17.7	
15558.00	0.0	H	3.0	44.7	1.0	-43.7	-25.0	-18.7	
High Ch, 2680MHz									
5360.00	0.0	V	3.0	45.4	1.0	-44.4	-25.0	-19.4	
8040.00	0.0	V	3.0	43.9	1.0	-42.9	-25.0	-17.9	
10720.00	0.0	V	3.0	42.5	1.0	-41.5	-25.0	-16.5	
13400.00	0.0	V	3.0	44.0	1.0	-43.0	-25.0	-18.0	
16080.00	0.0	V	3.0	44.1	1.0	-43.1	-25.0	-18.1	
5360.00	9.3	H	3.0	45.4	1.0	-35.1	-25.0	-10.1	
8040.00	0.0	H	3.0	43.9	1.0	-42.9	-25.0	-17.9	
10720.00	0.0	H	3.0	42.5	1.0	-41.5	-25.0	-16.5	
13400.00	0.0	H	3.0	44.0	1.0	-43.0	-25.0	-18.0	
16080.00	0.0	H	3.0	44.1	1.0	-43.1	-25.0	-18.1	

LTE Band 66

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

Company:	Samsung
Project #:	4789746830
Date:	2021-01-18
Test Engineer:	20882
Configuration:	EUT, Y-Position
Location:	Chamber 2
Mode:	LTE_QPSK Band 66 Harmonics, 20MHz Bandwidth
Test Votage:	AC 120 V, 60 Hz

LTE
Band 66
20MHz
QPSK

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1720MHz									
3440.00	16.2	V	3.0	42.1	1.0	-24.9	-13.0	-11.9	
5160.00	7.7	V	3.0	42.8	1.0	-34.1	-13.0	-21.1	
6880.00	-4.0	V	3.0	42.7	1.0	-45.8	-13.0	-32.8	
3440.00	13.8	H	3.0	42.1	1.0	-27.3	-13.0	-14.3	
5160.00	9.1	H	3.0	42.8	1.0	-32.8	-13.0	-19.8	
6880.00	-6.4	H	3.0	42.7	1.0	-48.2	-13.0	-35.2	
Mid Ch, 1745MHz									
3490.00	5.5	V	3.0	42.1	1.0	-35.5	-13.0	-22.5	
5235.00	-2.6	V	3.0	42.8	1.0	-44.4	-13.0	-31.4	
6980.00	-6.2	V	3.0	42.7	1.0	-47.9	-13.0	-34.9	
3490.00	4.0	H	3.0	42.1	1.0	-37.1	-13.0	-24.1	
5235.00	0.3	H	3.0	42.8	1.0	-41.6	-13.0	-28.6	
6980.00	-6.1	H	3.0	42.7	1.0	-47.9	-13.0	-34.9	
High Ch, 1770MHz									
3540.00	8.5	V	3.0	42.1	1.0	-32.6	-13.0	-19.6	
5310.00	2.6	V	3.0	42.9	1.0	-39.2	-13.0	-26.2	
7080.00	-5.9	V	3.0	42.7	1.0	-47.6	-13.0	-34.6	
3540.00	8.1	H	3.0	42.1	1.0	-33.0	-13.0	-20.0	
5310.00	-0.5	H	3.0	42.9	1.0	-42.3	-13.0	-29.3	
7080.00	-6.1	H	3.0	42.7	1.0	-47.8	-13.0	-34.8	

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.

END OF TEST REPORT