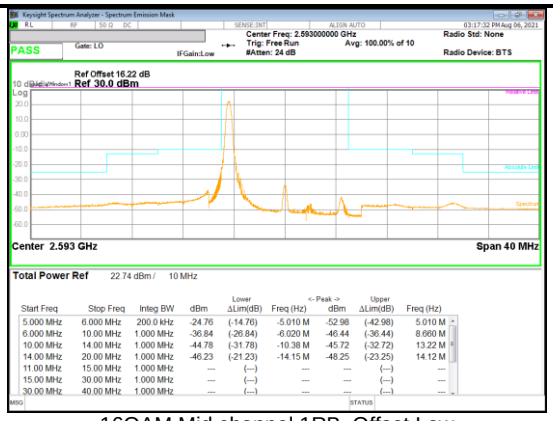
LTE Band 41

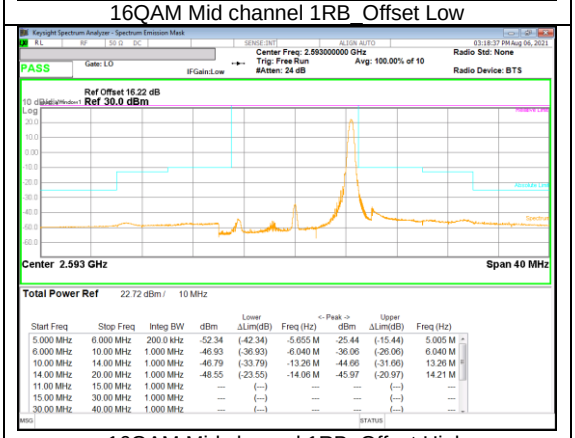
10MHz

16QAM

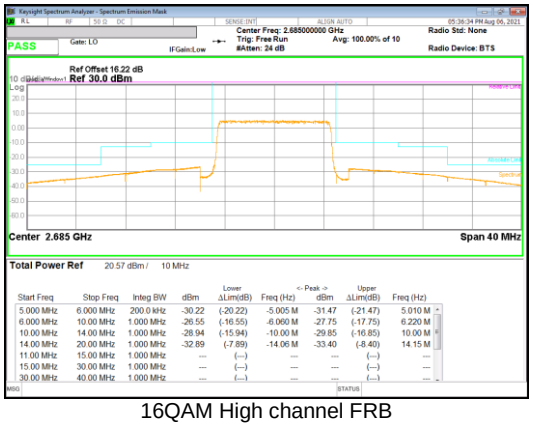
16QAM Mid channel FRB



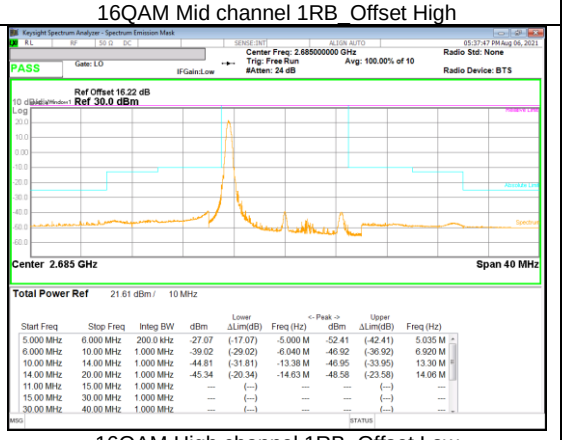
16QAM Mid channel 1RB_Offset Low



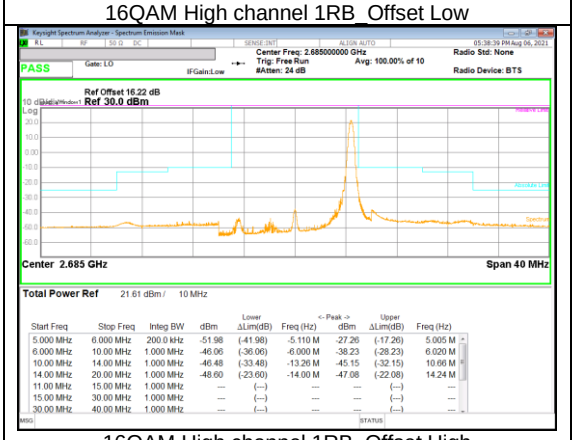
16QAM Mid channel 1RB_Offset High



16QAM High channel FRB



16QAM High channel 1RB_Offset Low



16QAM High channel 1RB_Offset High

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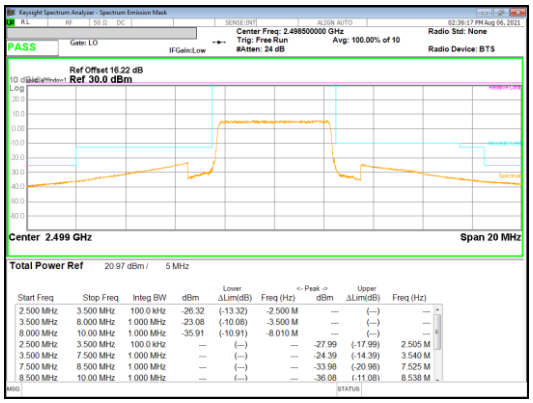
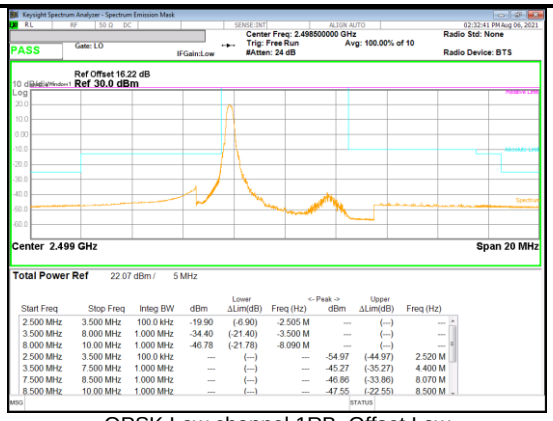
LTE Band 41

5MHz

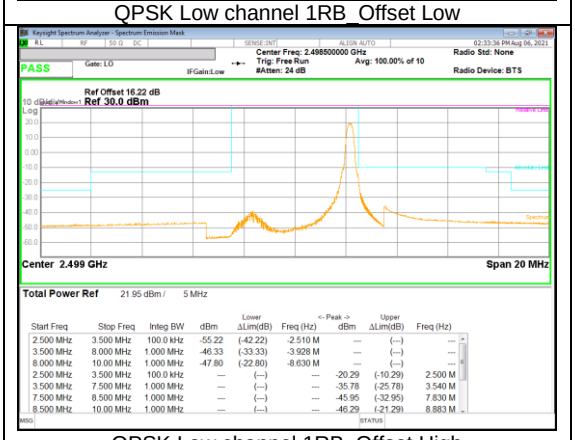
QPSK



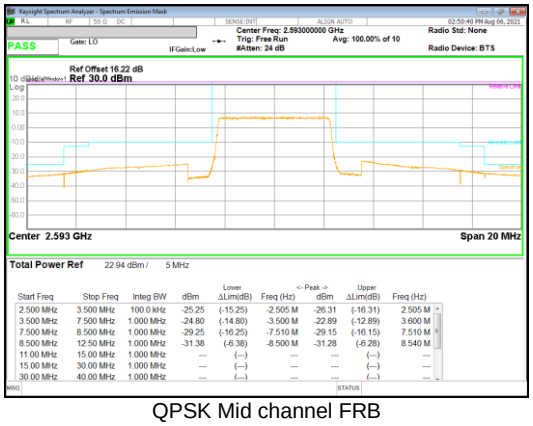
QPSK Low channel FRB



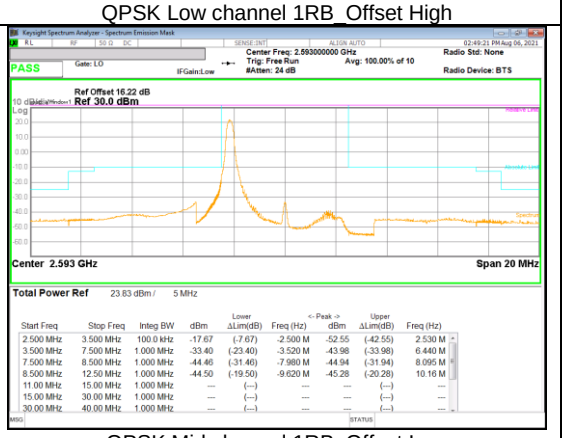
QPSK Low channel 1RB_Offset Low



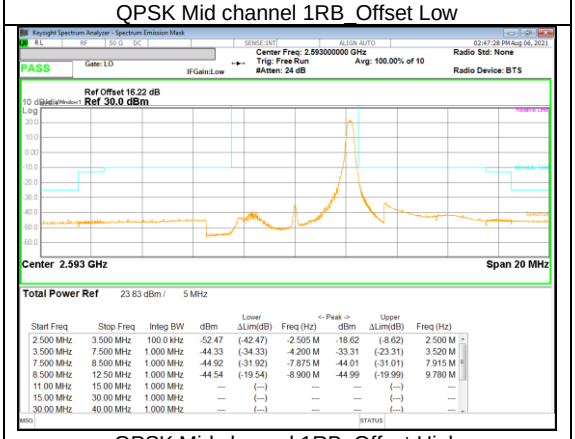
QPSK Low channel 1RB_Offset High



QPSK Mid channel FRB



QPSK Mid channel 1RB_Offset Low



QPSK Mid channel 1RB_Offset High

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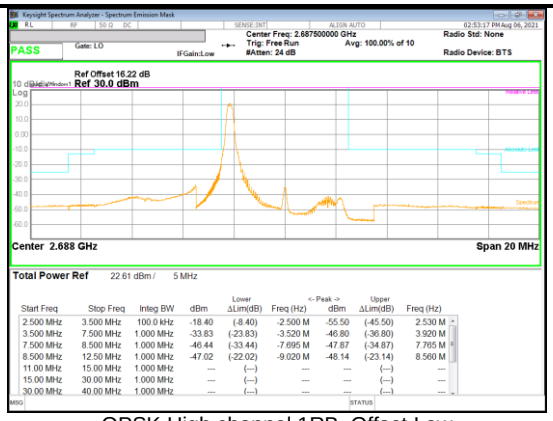
LTE Band 41

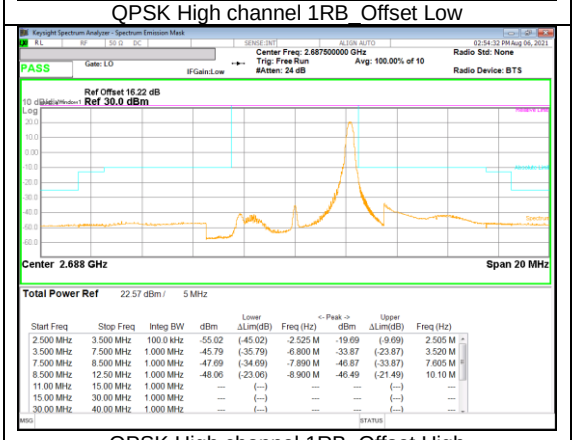
5MHz

QPSK

QPSK High channel FRB



QPSK High channel 1RB_Offset Low

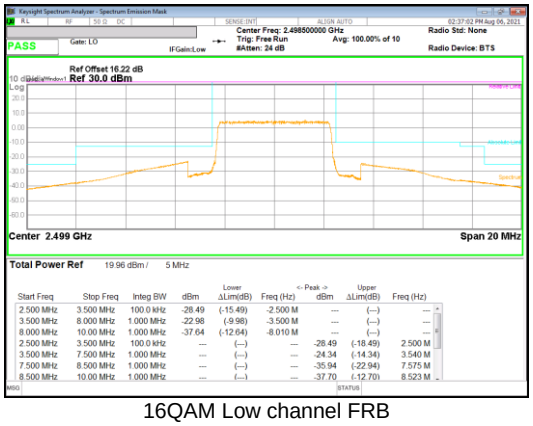


QPSK High channel 1RB_Offset High

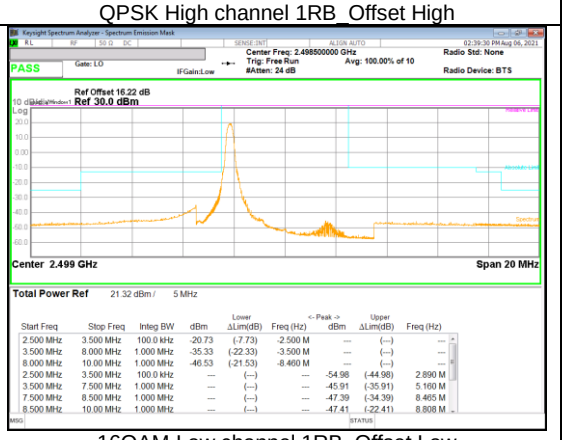
LTE Band 41

5MHz

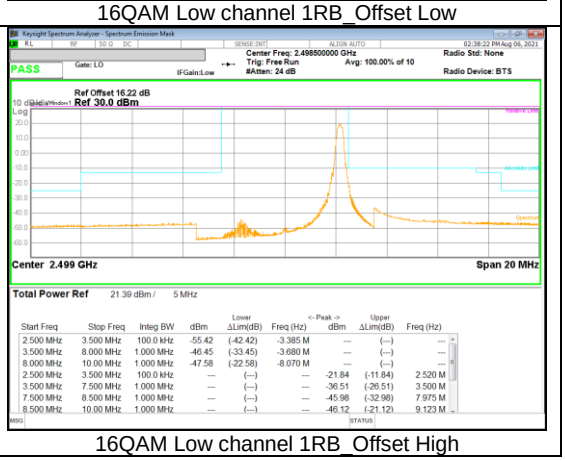
16QAM



16QAM Low channel FRB



16QAM Low channel 1RB_Offset Low



16QAM Low channel 1RB_Offset High

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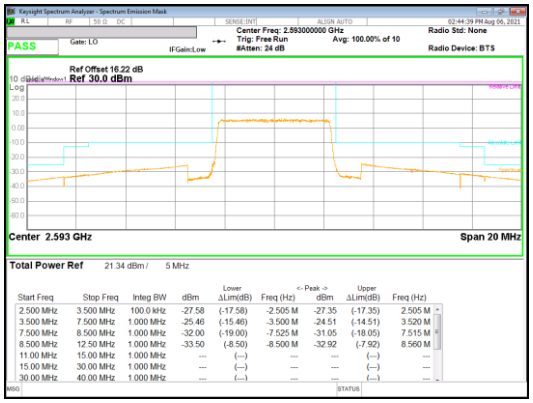
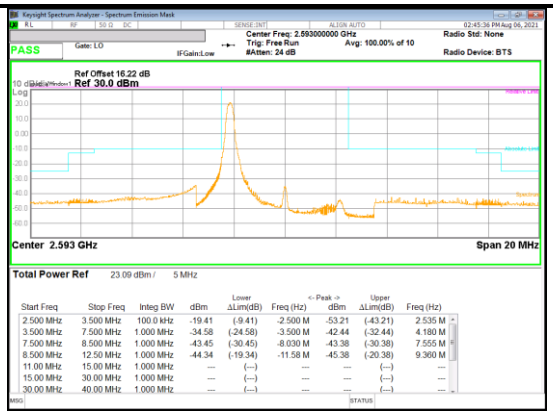
LTE Band 41

5MHz

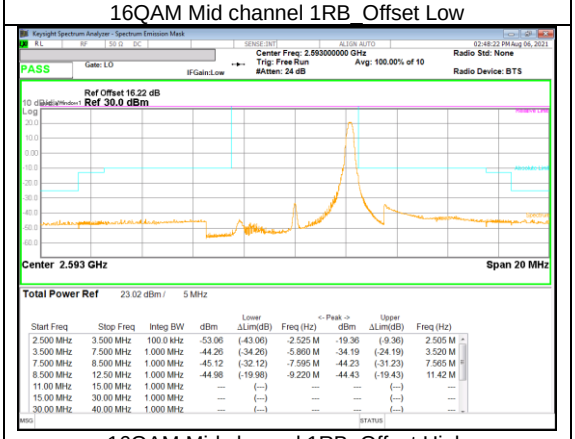
16QAM



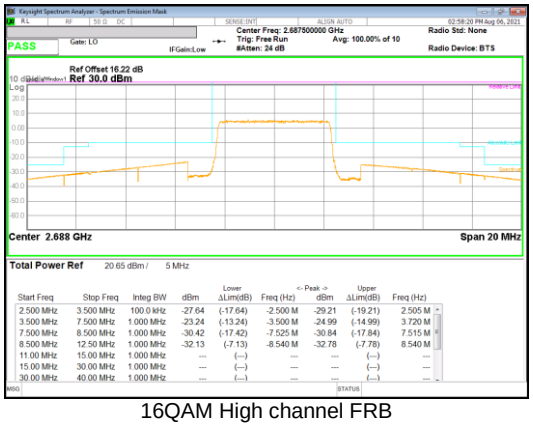
16QAM Mid channel FRB



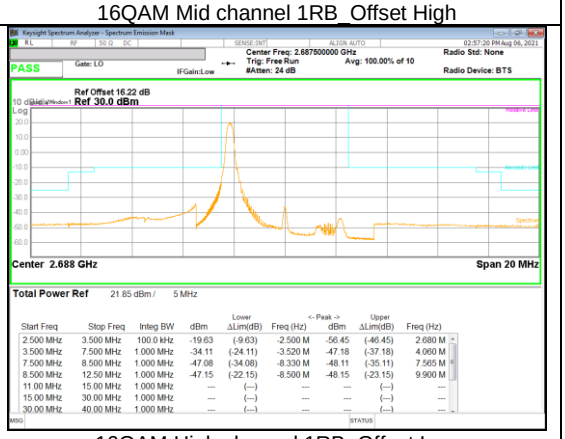
16QAM Mid channel 1RB_Offset Low



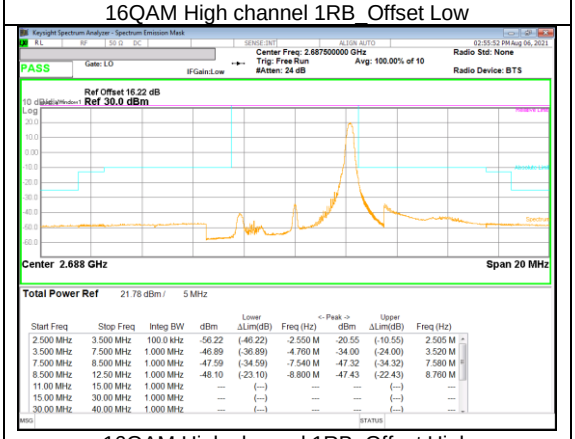
16QAM Mid channel 1RB_Offset High



16QAM High channel FRB



16QAM High channel 1RB_Offset Low



16QAM High channel 1RB_Offset High

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LTE Band 4

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

LTE Band 17

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

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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.

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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), Max hold(GSM, LTE Band41);

RESULTS

See the following pages.

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

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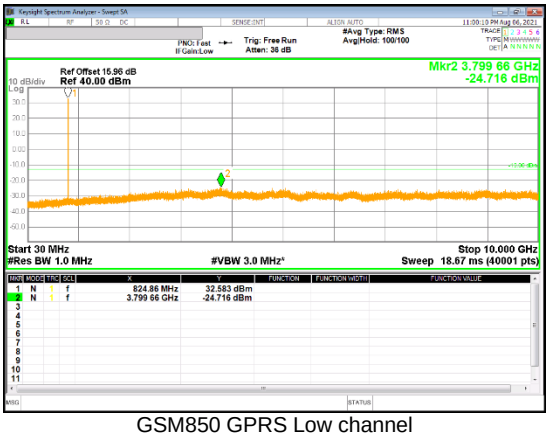
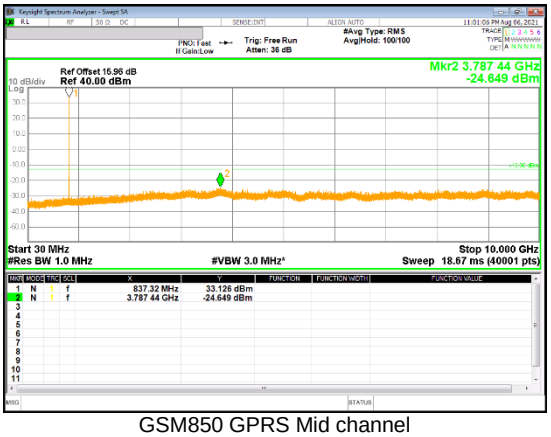
9.3.1. OUT OF BAND EMISSIONS RESULT

GSM 850

GSM 850	 GSM850 GPRS Low channel	 GSM850 GPRS Mid channel
	 GSM850 GPRS High channel	

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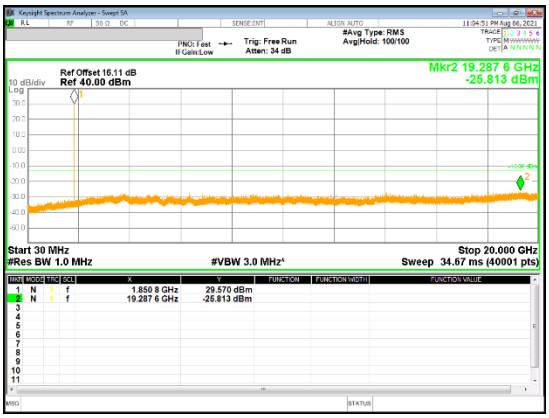
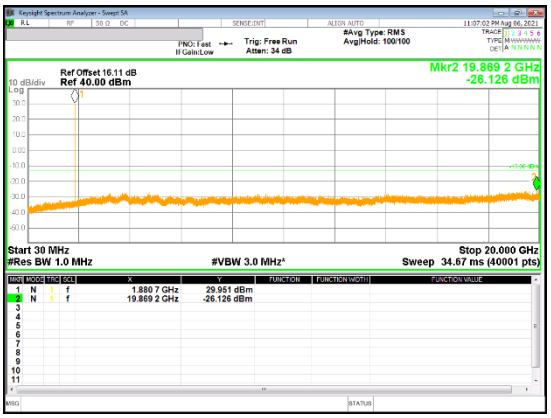
GSM 1900

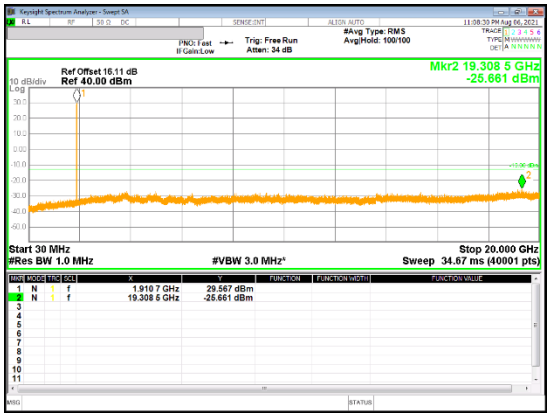
GSM 1900



GSM1900 GPRS Low channel



GSM1900 GPRS Mid channel



GSM1900 GPRS High channel

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WCDMA Band 5

Band 5	 REL99 Low channel	 REL99 Mid channel
	 REL99 High channel	

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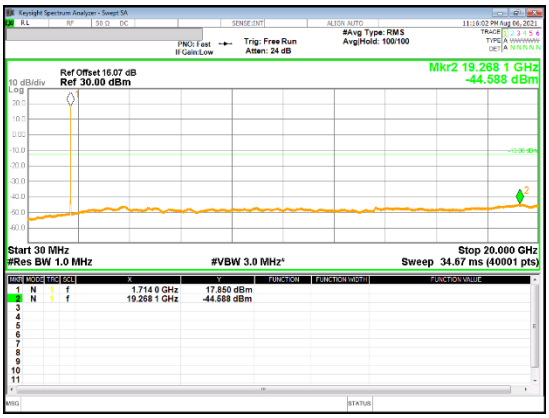
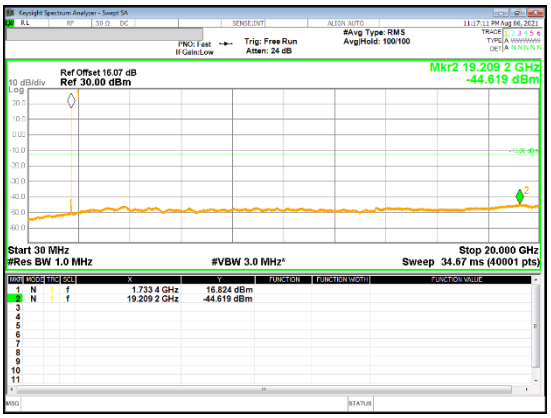
WCDMA Band 4

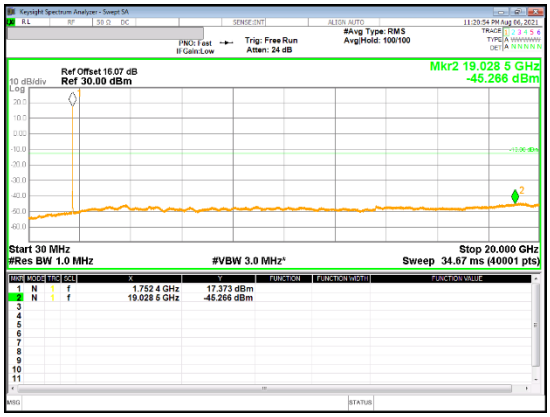
Band 4



REL99 Low channel



REL99 Mid channel



REL99 High channel

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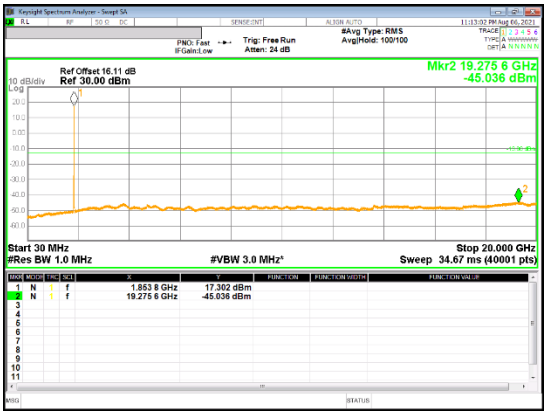
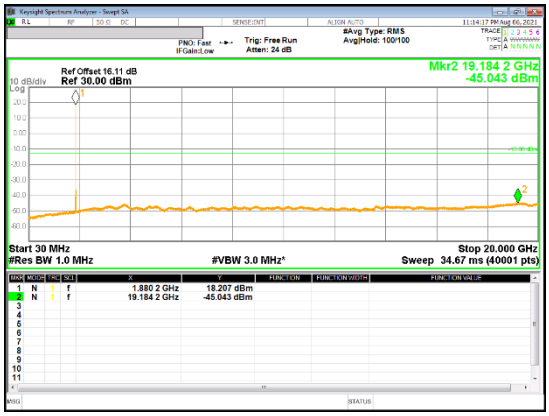
WCDMA Band 2

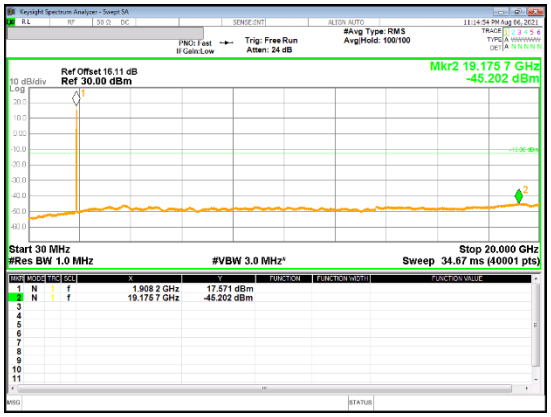
Band 2



REL99 Low channel



REL99 Mid channel



REL99 High channel

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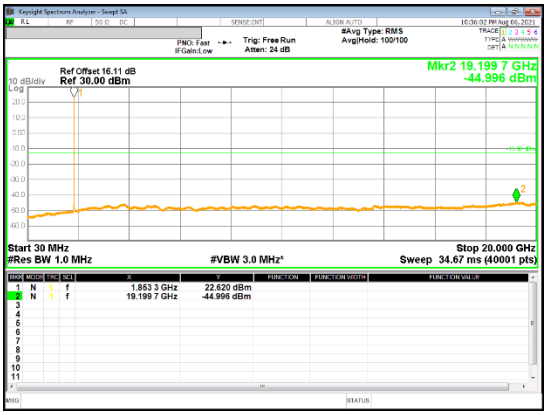
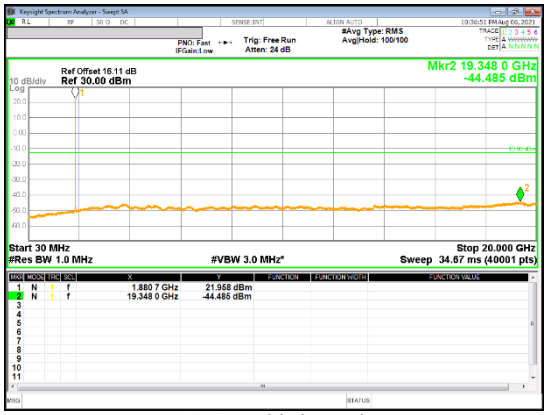
LTE Band 2

LTE Band 2 5MHz	 QPSK Low channel	 QPSK Mid channel
	 QPSK High channel	

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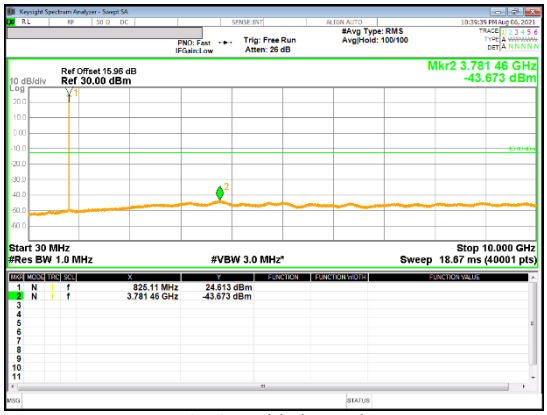
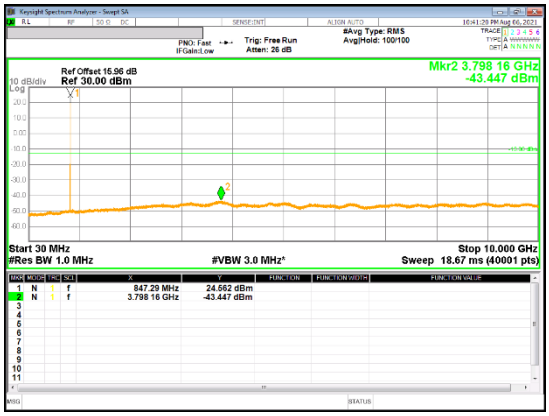
LTE Band 5

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

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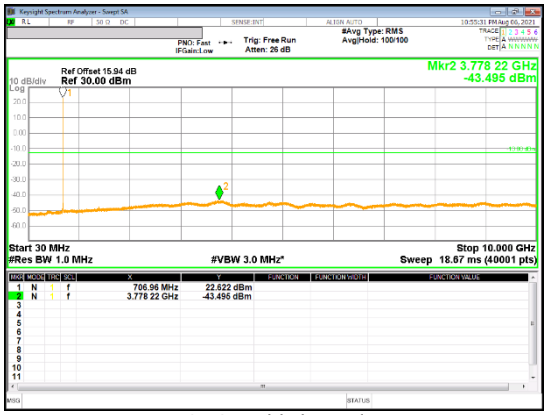
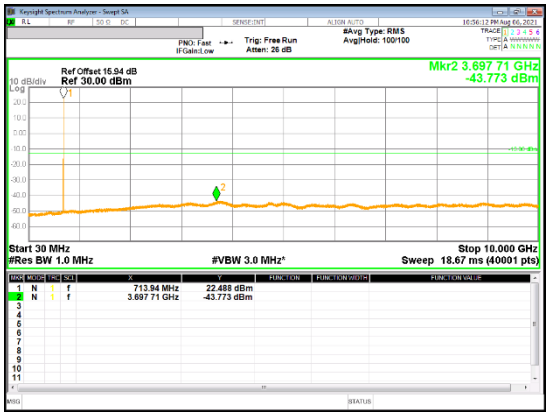
LTE Band 12

LTE Band 12 3MHz	 QPSK Low channel	 QPSK Mid channel
	 QPSK High channel	

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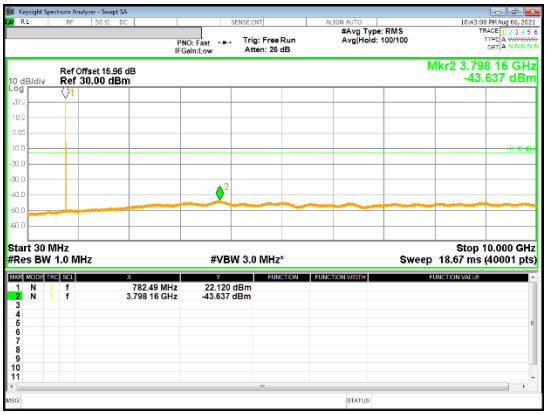
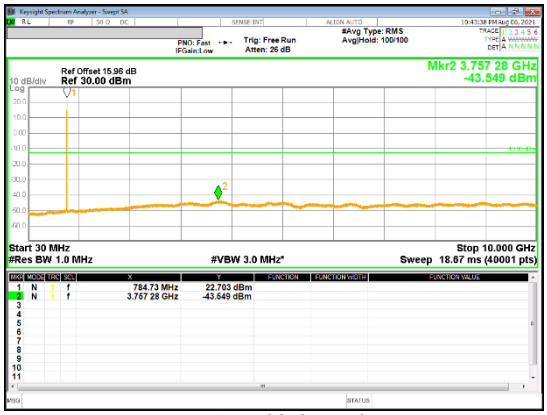
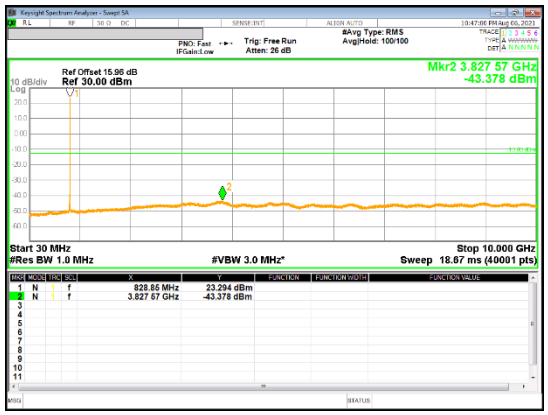
LTE Band 13

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

LTE Band 26(Part 90)

LTE Band 26 (Part90) 15MHz	 QPSK Low channel

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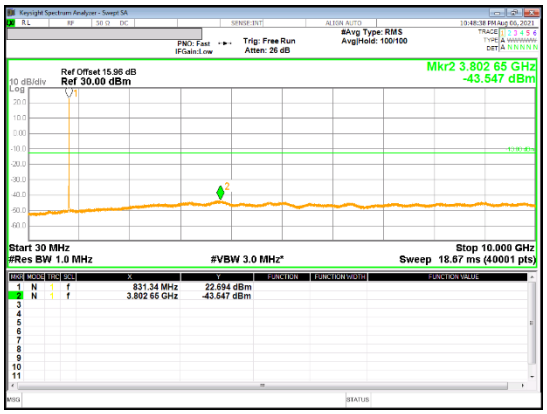
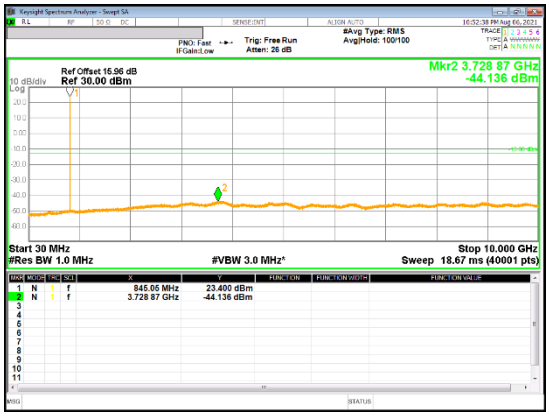
LTE Band 26 (Straddle)

LTE Band 26 (Straddle) 15MHz	 QPSK High channel

LTE Band 26 (Part 22)

LTE Band 26 (Part 22) 5MHz	 QPSK Low channel	 QPSK Mid channel
	 QPSK High channel	

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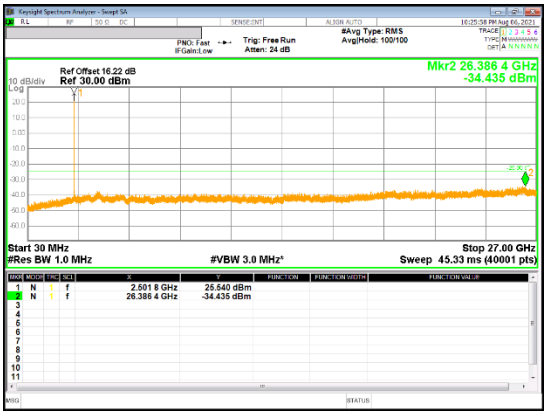
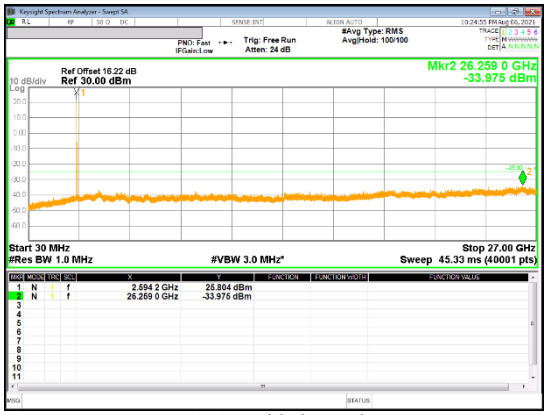
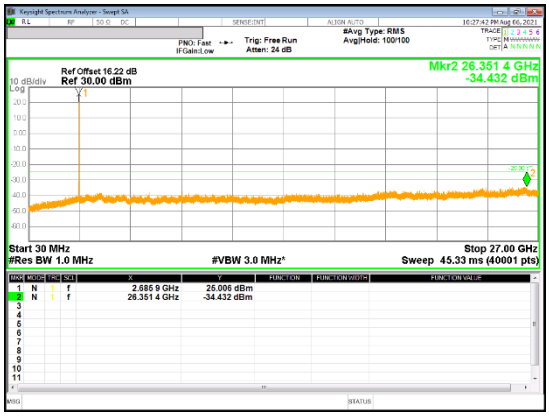
LTE Band 41 (PC3)

LTE Band 41 10MHz	 QPSK Low channel	 QPSK Mid channel
	 QPSK High channel	

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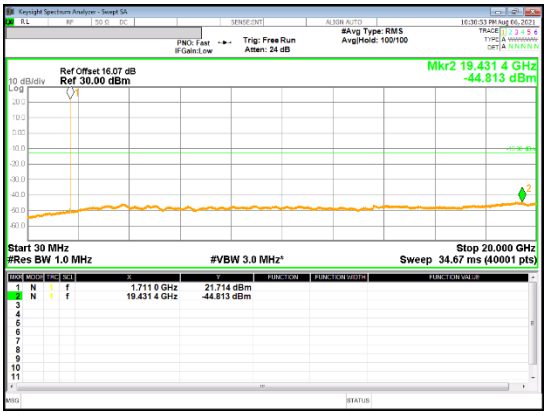
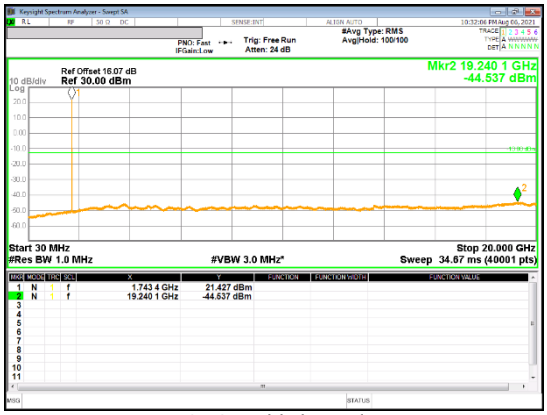
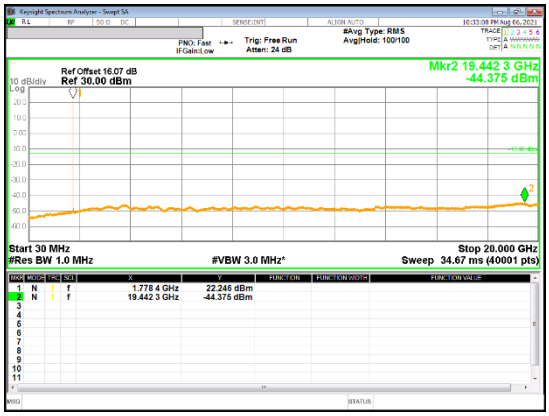
LTE Band 66

LTE Band 66 5MHz	 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 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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9.4. FREQUENCY STABILITY

RULE PART(S)

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

LIMITS

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

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

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

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

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v03r01

RESULTS

See the following pages.

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

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9.4.1. FREQUENCY STABILITY RESULTS

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

Reference Frequency : GSM850 Low Channel 824.2 MHz / High Channel 848.8 MHz @ 20ºC						
Limit: +- 2.5 ppm =	Low Channel	2060.500	Hz	High Channel	2122.000	Hz
Power Supply [Vdc]	Environment Temperature [*C]	Frequency Deviation Measureed with Time Elapse				
		Low Channel		High Channel		Limit [ppm]
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.86	50	824.20002815	0.006	848.80002756	0.003	2.5
3.86	40	824.20002906	0.005	848.80002682	0.004	2.5
3.86	30	824.20003128	0.003	848.80003183	-0.002	2.5
3.86	***20***	***824.20003347***	***0.000***	***848.80003026***	***0.000***	***2.5***
3.86	10	824.20003228	0.001	848.80003139	-0.001	2.5
3.86	0	824.20002956	0.005	848.80002958	0.001	2.5
3.86	-10	824.20003047	0.004	848.80002748	0.003	2.5
3.86	-20	824.20003135	0.003	848.80003022	0.000	2.5
3.86	-30	824.20002919	0.005	848.80002967	0.001	2.5

Reference Frequency : GSM850 Low Channel 824.2 MHz / High Channel 848.8 MHz @ 20ºC						
Limit: +- 2.5 ppm =	Low Channel	2060.500	Hz	High Channel	2122.000	Hz
Power Supply [Vdc]	Environment Temperature [*C]	Frequency Deviation Measureed with Time Elapse				
		Low Channel		High Channel		Limit [ppm]
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.86	***20***	**824.20003347**	***0***	**848.80003026**	***0***	***2.5***
4.40	20	824.20004446	-0.013	848.80004350	-0.016	2.5
3.65	20	824.20003667	-0.004	848.80004423	-0.016	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	1850.0788	1909.9208		
Extreme (50C)		1850.0789	1909.9208	40.3	0.021
Extreme (40C)		1850.0789	1909.9208	38.2	0.020
Extreme (30C)		1850.0789	1909.9208	39.6	0.021
Extreme (10C)		1850.0789	1909.9208	40.3	0.021
Extreme (0C)		1850.0789	1909.9208	41.3	0.022
Extreme (-10C)		1850.0789	1909.9208	52.6	0.028
Extreme (-20C)		1850.0789	1909.9208	52.6	0.028
Extreme (-30C)		1850.0789	1909.9208	58.1	0.031
20C	15%	1850.0789	1909.9208	39.7	0.021
	-15%	1850.0789	1909.9208	39.2	0.021
	End Point	1850.0789	1909.9208	40.3	0.021

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WCDMA Band 5

Reference Frequency : WCDMA Band 5 Low Channel 826.4 MHz / High Channel 846.6 MHz @ 20ºC						
Limit: +- 2.5 ppm =	Low Channel	2066.000	Hz	High Channel	2116.500	Hz
Power Supply [Vdc]	Environment Temperature [*C]	Frequency Deviation Measureed with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.86	50	826.40001012	0.001	846.60000895	0.002	2.5
3.86	40	826.40001058	0.000	846.60000961	0.001	2.5
3.86	30	826.40001318	-0.003	846.60001508	-0.006	2.5
3.86	***20***	***826.40001062***	***0.000***	***846.60001024***	***0.000***	***2.5***
3.86	10	826.40001153	-0.001	846.60001308	-0.003	2.5
3.86	0	826.40001051	0.000	846.60001113	-0.001	2.5
3.86	-10	826.40001307	-0.003	846.60001042	0.000	2.5
3.86	-20	826.40001036	0.000	846.60001562	-0.006	2.5
3.86	-30	826.40001046	0.000	846.60001428	-0.005	2.5

Reference Frequency : WCDMA Band 5 Low Channel 826.4 MHz / High Channel 846.6 MHz @ 20ºC						
Limit: +- 2.5 ppm =	Low Channel	2066.000	Hz	High Channel	2116.500	Hz
Power Supply [Vdc]	Environment Temperature [*C]	Frequency Deviation Measureed with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.86	***20***	**826.40001062**	***0***	**846.60001024**	***0***	***2.5***
4.40	20	826.40000573	0.006	846.60000733	0.003	2.5
3.65	20	826.40000628	0.005	846.60000791	0.003	2.5

WCDMA Band 4 (Lowest Frequency:Rel99 / 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	1710.3263	1754.6767		
Extreme (50C)		1710.3263	1754.6767	19.1	0.011
Extreme (40C)		1710.3263	1754.6767	21.3	0.012
Extreme (30C)		1710.3263	1754.6767	20.1	0.012
Extreme (10C)		1710.3263	1754.6767	27.8	0.016
Extreme (0C)		1710.3263	1754.6767	24.3	0.014
Extreme (-10C)		1710.3263	1754.6767	22.7	0.013
Extreme (-20C)		1710.3263	1754.6767	19.2	0.011
Extreme (-30C)		1710.3263	1754.6767	20.6	0.012
20C	15%	1710.3263	1754.6767	20.7	0.012
	-15%	1710.3263	1754.6767	20.6	0.012
	End Point	1710.3263	1754.6767	19.7	0.011

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

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1850.3260	1909.6779		
Extreme (50C)		1850.3260	1909.6779	17.6	0.009
Extreme (40C)		1850.3260	1909.6779	19.1	0.010
Extreme (30C)		1850.3260	1909.6779	13.2	0.007
Extreme (10C)		1850.3260	1909.6779	11.1	0.006
Extreme (0C)		1850.3260	1909.6779	12.8	0.007
Extreme (-10C)		1850.3260	1909.6779	13.4	0.007
Extreme (-20C)		1850.3260	1909.6779	11.0	0.006
Extreme (-30C)		1850.3260	1909.6779	11.7	0.006
20C	15%	1850.3260	1909.6779	19.7	0.010
	-15%	1850.3260	1909.6779	21.0	0.011
	End Point	1850.3260	1909.6779	18.2	0.010

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

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	1850.1534	1909.8464		
Extreme (50C)		1850.1534	1909.8464	27.0	0.014
Extreme (40C)		1850.1534	1909.8464	36.0	0.019
Extreme (30C)		1850.1534	1909.8464	20.6	0.011
Extreme (10C)		1850.1534	1909.8464	14.1	0.007
Extreme (0C)		1850.1534	1909.8464	20.5	0.011
Extreme (-10C)		1850.1534	1909.8464	13.8	0.007
Extreme (-20C)		1850.1534	1909.8464	31.4	0.017
Extreme (-30C)		1850.1534	1909.8464	13.0	0.007
20C	15%	1850.1534	1909.8464	25.5	0.014
	-15%	1850.1534	1909.8464	25.8	0.014
	End Point	1850.1534	1909.8464	26.7	0.014

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LTE Band 5

Reference Frequency : LTE Band 5 Low Channel 824.7 MHz / High Channel 848.3 MHz @ 20ºC						
Limit: +- 2.5 ppm =	Low Channel	2061.750	Hz	High Channel	2120.750	Hz
Power Supply [Vdc]	Environment Temperature [*C]	Frequency Deviation Measureed with Time Elapse				
		Low Channel		High Channel		Limit [ppm]
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.85	50	824.70004018	-0.015	848.30004085	-0.022	2.5
3.85	40	824.70003724	-0.011	848.30003687	-0.017	2.5
3.85	30	824.70003615	-0.010	848.30002408	-0.002	2.5
3.85	***20***	***824.70002815***	***0.000***	***848.30002209***	***0.000***	***2.5***
3.85	10	824.70002248	0.007	848.30002568	-0.004	2.5
3.85	0	824.70003167	-0.004	848.30002581	-0.004	2.5
3.85	-10	824.70003285	-0.006	848.30003065	-0.010	2.5
3.85	-20	824.70003158	-0.004	848.30003828	-0.019	2.5
3.85	-30	824.70004318	-0.018	848.30004210	-0.024	2.5

Reference Frequency : LTE Band 5 Low Channel 824.7 MHz / High Channel 848.3 MHz @ 20ºC						
Limit: +- 2.5 ppm =	Low Channel	2061.750	Hz	High Channel	2120.750	Hz
Power Supply [Vdc]	Environment Temperature [*C]	Frequency Deviation Measureed with Time Elapse				
		Low Channel		High Channel		Limit [ppm]
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.86	***20***	**824.70002815**	***0***	**848.30002209**	***0***	***2.5***
4.40	20	824.70001568	0.015	848.30002064	0.002	2.5
3.65	20	824.70001199	0.020	848.30001773	0.005	2.5

LTE Band 12 (Lowest Frequency:QPSK / Highest Frequency: 16QAM)

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	699.1539	715.8453		
Extreme (50C)		699.1539	715.8453	10.1	0.014
Extreme (40C)		699.1539	715.8453	10.5	0.015
Extreme (30C)		699.1539	715.8453	10.4	0.015
Extreme (10C)		699.1539	715.8453	10.1	0.014
Extreme (0C)		699.1539	715.8453	13.1	0.019
Extreme (-10C)		699.1539	715.8453	19.2	0.027
Extreme (-20C)		699.1539	715.8453	24.2	0.034
Extreme (-30C)		699.1539	715.8453	17.9	0.025
20C	15%	699.1539	715.8453	11.2	0.016
	-15%	699.1539	715.8453	11.7	0.017
	End Point	699.1539	715.8453	11.1	0.016

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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	777.2576	786.7391		
Extreme (50C)		777.2576	786.7391	14.6	0.019
Extreme (40C)		777.2576	786.7391	15.0	0.019
Extreme (30C)		777.2576	786.7391	10.2	0.013
Extreme (10C)		777.2576	786.7391	9.6	0.012
Extreme (0C)		777.2576	786.7391	10.7	0.014
Extreme (-10C)		777.2576	786.7391	13.0	0.017
Extreme (-20C)		777.2576	786.7391	15.2	0.019
Extreme (-30C)		777.2576	786.7391	16.3	0.021
20C	15%	777.2576	786.7391	12.7	0.016
	-15%	777.2576	786.7391	13.6	0.017
	End Point	777.2576	786.7391	16.7	0.021

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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 [*C]	Frequency Deviation Measureed with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.85	50	814.70002713	-0.007	848.30003175	-0.017	2.5
3.85	40	814.70003508	-0.017	848.30003026	-0.015	2.5
3.85	30	814.70002452	-0.004	848.30002179	-0.005	2.5
3.85	***20***	***814.70002154***	***0.000***	***848.30001719***	***0.000***	***2.5***
3.85	10	814.70002714	-0.007	848.30002308	-0.007	2.5
3.85	0	814.70002757	-0.007	848.30002082	-0.004	2.5
3.85	-10	814.70004018	-0.023	848.30003855	-0.025	2.5
3.85	-20	814.70004024	-0.023	848.30004228	-0.030	2.5
3.85	-30	814.70003058	-0.011	848.30004335	-0.031	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 [*C]	Frequency Deviation Measureed with Time Elapse				Limit [ppm]
		Low Channel		High Channel		
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]	
3.86	***20***	**814.70002154**	***0***	**848.30001719**	***0***	***2.5***
4.40	20	814.70000000	0.026	848.30000000	0.020	2.5
3.65	20	814.70000000	0.026	848.30000000	0.020	2.5

LTE Band 41 PC3 (Lowest Frequency:QPSK / Highest Frequency: QPSK)

Limit		2496	2690	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	2496.2486	2689.7450		
Extreme (50C)		2496.2487	2689.7450	50.7	0.020
Extreme (40C)		2496.2486	2689.7450	48.1	0.019
Extreme (30C)		2496.2486	2689.7450	40.7	0.016
Extreme (10C)		2496.2486	2689.7450	48.3	0.019
Extreme (0C)		2496.2486	2689.7450	42.6	0.016
Extreme (-10C)		2496.2487	2689.7450	58.1	0.022
Extreme (-20C)		2496.2487	2689.7450	52.0	0.020
Extreme (-30C)		2496.2487	2689.7450	50.3	0.019
20C	15%	2496.2487	2689.7450	25.3	0.010
	-15%	2496.2486	2689.7450	26.2	0.010
	End Point	2496.2486	2689.7450	25.7	0.010

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LTE Band 66 (Lowest Frequency: 16QAM / 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	12.3	0.007
Extreme (40C)		1710.6995	1779.3006	25.8	0.015
Extreme (30C)		1710.6995	1779.3006	22.1	0.013
Extreme (10C)		1710.6995	1779.3006	19.7	0.011
Extreme (0C)		1710.6995	1779.3006	12.3	0.007
Extreme (-10C)		1710.6995	1779.3006	11.9	0.007
Extreme (-20C)		1710.6995	1779.3006	14.1	0.008
Extreme (-30C)		1710.6995	1779.3006	32.3	0.019
20C	15%	1710.6995	1779.3006	14.5	0.008
	-15%	1710.6995	1779.3006	16.3	0.009
	End Point	1710.6995	1779.3006	14.3	0.008

LTE Band 4

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

LTE Band 17

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

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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

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9.5.1. ERP/EIRP Results

GSM

Band	Mode	Channel	f [MHz]	ERP / EIRP	
				[dBm]	[mW]
GSM850	GPRS	128	824.2	**30.22**	**1051.96**
		190	836.6	29.77	948.42
		251	848.8	28.07	641.21
	EGPRS	128	824.2	**25.28**	**337.29**
		190	836.6	24.93	311.17
		251	848.8	20.40	109.65
GSM1900	GPRS	512	1850.2	**29.32**	**855.07**
		661	1880	28.66	734.51
		810	1909.8	27.97	626.61
	EGPRS	512	1850.2	22.35	171.79
		661	1880	**25.85**	**384.59**
		810	1909.8	24.17	261.22

WCDMA

Band	Mode	Channel	f [MHz]	ERP / EIRP	
				[dBm]	[mW]
Band 5	REL99	4132	826.4	**20.85**	**121.62**
		4183	836.6	20.77	119.40
		4233	846.6	19.99	99.77
	HSDPA	4132	826.4	19.66	92.47
		4183	836.6	19.70	93.33
		4233	846.6	**19.95**	**98.86**
Band 4	REL99	1312	1712.4	21.96	157.04
		1413	1732.6	**22.57**	**180.72**
		1513	1752.6	21.99	158.12
	HSDPA	1312	1712.4	20.91	123.31
		1413	1732.6	**21.51**	**141.58**
		1513	1752.6	21.21	132.13
Band 2	REL99	9262	1852.4	**22.44**	**175.39**
		9400	1880.0	21.88	154.17
		9538	1907.6	21.75	149.62
	HSDPA	9262	1852.4	**21.05**	**127.35**
		9400	1880.0	20.96	124.74
		9538	1907.6	20.83	121.06

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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	**22.72**	**187.07**
			1/49	1880.0	22.45	175.79
			1/0	1900.0	22.59	181.55
		16QAM	1/99	1860.0	21.55	142.89
			1/49	1880.0	21.47	140.28
			1/0	1900.0	**21.74**	**149.28**
	15	QPSK	1/74	1857.5	22.43	174.98
			1/0	1880.0	**22.48**	**177.01**
			1/0	1902.5	22.38	172.98
		16QAM	1/37	1857.5	**21.44**	**139.32**
			1/74	1880.0	20.71	117.76
			1/0	1902.5	**21.44**	**139.32**
	10	QPSK	1/25	1855.0	**22.84**	**192.31**
			1/25	1880.0	22.07	161.06
			1/0	1905.0	21.91	155.24
		16QAM	1/25	1855.0	**21.81**	**151.71**
			1/25	1880.0	21.25	133.35
			1/0	1905.0	21.07	127.94
	5	QPSK	1/12	1852.5	**23.21**	**209.41**
			1/12	1880.0	22.44	175.39
			1/0	1907.5	20.99	125.60
		16QAM	1/12	1852.5	**22.41**	**174.18**
			1/12	1880.0	21.47	140.28
			1/12	1907.5	20.08	101.86
	3	QPSK	1/0	1851.5	**22.93**	**196.34**
			1/0	1880.0	22.30	169.82
			1/8	1908.5	21.50	141.25
		16QAM	1/0	1851.5	**22.09**	**161.81**
			1/0	1880.0	21.23	132.74
			1/0	1908.5	20.39	109.40
	1.4	QPSK	1/3	1850.7	**22.99**	**199.07**
			1/3	1880.0	22.37	172.58
			1/3	1909.3	21.27	133.97
		16QAM	1/3	1850.7	**21.91**	**155.24**
			1/3	1880.0	21.16	130.62
			1/3	1909.3	20.06	101.39

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LTE Band 5

Band	BW [MHz]	Mode	RB Size/ RB Offset	f [MHz]	ERP / EIRP [dBm]	ERP / EIRP [mW]
Band 5	10	QPSK	1/49	829.0	**21.09**	**128.53**
			1/25	836.5	20.81	120.50
			1/0	844.0	20.48	111.69
		16QAM	1/0	829.0	**20.17**	**103.99**
			1/25	836.5	19.61	91.41
			1/0	844.0	19.84	96.38
	5	QPSK	1/0	826.5	20.92	123.59
			1/12	836.5	20.91	123.31
			1/12	846.5	**21.38**	**137.40**
		16QAM	1/0	826.5	20.37	108.89
			1/12	836.5	19.84	96.38
			1/12	846.5	**20.39**	**109.40**
	3	QPSK	1/0	825.5	20.88	122.46
			1/14	836.5	20.87	122.18
			1/0	847.5	**21.52**	**141.91**
		16QAM	1/0	825.5	19.76	94.62
			1/14	836.5	19.81	95.72
			1/14	847.5	**20.60**	**114.82**
	1.4	QPSK	1/3	824.7	21.15	130.32
			1/3	836.5	21.06	127.64
			1/3	848.3	**21.62**	**145.21**
		16QAM	1/3	824.7	19.80	95.50
			1/3	836.5	20.17	103.99
			1/3	848.3	**20.61**	**115.08**

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LTE Band 12

Band	BW [MHz]	Mode	RB Size/ RB Offset	f [MHz]	ERP / EIRP [dBm]	ERP / EIRP [mW]
Band 12	10	QPSK	1/0	704.0	18.11	64.71
			1/0	707.5	18.16	65.46
			1/0	711.0	**18.20**	**66.07**
		16QAM	1/0	704.0	17.18	52.24
			1/0	707.5	17.10	51.29
			1/0	711.0	**17.23**	**52.84**
	5	QPSK	1/12	701.5	**18.10**	**64.57**
			1/0	707.5	17.83	60.67
			1/0	713.5	17.82	60.53
		16QAM	1/0	701.5	**17.03**	**50.47**
			1/0	707.5	16.87	48.64
			1/0	713.5	17.00	50.12
	3	QPSK	1/0	700.5	**17.94**	**62.23**
			1/0	707.5	17.86	61.09
			1/0	714.5	17.83	60.67
		16QAM	1/0	700.5	17.17	52.12
			1/0	707.5	**17.73**	**59.29**
			1/0	714.5	16.70	46.77
	1.4	QPSK	1/3	699.7	**18.00**	**63.10**
			1/3	707.5	17.86	61.09
			1/3	715.3	17.80	60.26
		16QAM	1/3	699.7	16.72	46.99
			1/3	707.5	**16.96**	**49.66**
			1/3	715.3	16.64	46.13

LTE Band 13

Band	BW [MHz]	Mode	RB size / RB Offset	f [MHz]	ERP / EIRP [dBm]	ERP / EIRP [mW]
Band 13	10	QPSK	1/49	782.0	**18.41**	**69.34**
		16QAM	1/49	782.0	17.41	55.08
	5	QPSK	1/24	779.5	18.50	70.79
			1/24	782.0	**18.56**	**71.78**
			1/12	784.5	18.37	68.71
		16QAM	1/24	779.5	17.29	53.58
			1/24	782.0	**17.75**	**59.57**
			1/24	784.5	17.73	59.29

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LTE Band 26

Band	BW [MHz]	Mode	RB Size/ RB Offset	f [MHz]	ERP/EIRP [dBm]	ERP/EIRP [mW]
Band 26	15	QPSK	1/74	821.5	19.35	86.10
			1/37	831.5	**19.82**	**95.94**
			1/0	841.5	19.42	87.50
		16QAM	1/37	821.5	18.06	63.97
			1/37	831.5	18.78	75.51
			1/74	841.5	**19.11**	**81.47**
	10	QPSK	1/49	819.0	18.67	73.62
			1/0	829.0	19.84	96.38
			1/49	831.5	**20.31**	**107.40**
			1/0	844.0	19.38	86.70
		16QAM	1/0	819.0	17.74	59.43
			1/25	829.0	19.03	79.98
			1/25	831.5	**19.52**	**89.54**
			1/0	844.0	18.26	66.99
	5	QPSK	1/12	816.5	18.56	71.78
			1/24	821.5	19.32	85.51
			1/12	826.5	20.04	100.93
			1/24	831.5	**20.25**	**105.93**
			1/0	846.5	19.49	88.92
		16QAM	1/12	816.5	17.43	55.34
			1/12	821.5	18.32	67.92
			1/24	826.5	**19.48**	**88.72**
			1/24	831.5	19.22	83.56
			1/0	846.5	18.39	69.02
	3	QPSK	1/0	815.5	18.31	67.76
			1/8	822.5	19.20	83.18
			1/8	825.5	19.79	95.28
			1/14	831.5	**20.20**	**104.71**
			1/0	847.5	19.64	92.04
		16QAM	1/14	815.5	17.44	55.46
			1/8	822.5	18.30	67.61
			1/8	825.5	18.93	78.16
			1/14	831.5	**19.30**	**85.11**
			1/0	847.5	18.67	73.62
	1.4	QPSK	1/5	814.7	18.32	67.92
			1/3	823.3	19.81	95.72
			1/3	824.7	19.84	96.38
			1/5	831.5	**20.19**	**104.47**
			1/5	848.3	19.64	92.04
		16QAM	1/5	814.7	16.93	49.32
			1/3	823.3	18.63	72.95
			1/3	824.7	18.64	73.11
			1/5	831.5	**19.14**	**82.04**
			1/5	848.3	18.55	71.61

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LTE Band 26(Straddle)

Band	BW [MHz]	Mode	RB Size/ RB Offset	f [MHz]	ERP/EIRP [dBm]	ERP/EIRP [mW]
Band 26 Straddle	15	QPSK	1/74	824	19.98	99.54
		16QAM	1/74		19.08	80.91
	10	QPSK	1/49	824	20.08	101.86
		16QAM	1/49		19.39	86.90
	5	QPSK	1/12	824	19.96	99.08
		16QAM	1/24		19.05	80.35
	3	QPSK	1/8	824	20.19	104.47
		16QAM	1/8		19.17	82.60
	1.4	QPSK	1/3	824	19.80	95.50
		16QAM	1/3		18.80	75.86

LTE Band 41 (PC3)

Band	BW [MHz]	Mode	RB Size/ RB Offset	f [MHz]	ERP / EIRP [dBm]	ERP / EIRP [mW]
Band 41	20	QPSK	1/99	2506.0	21.25	133.35
			1/49	2593.0	**22.87**	**193.64**
			1/0	2680.0	20.26	106.17
		16QAM	1/0	2506.0	19.69	93.11
			1/49	2593.0	**22.17**	**164.82**
			1/49	2680.0	19.56	90.36
	15	QPSK	1/37	2503.5	21.44	139.32
			1/37	2593.0	**22.80**	**190.55**
			1/37	2682.5	20.32	107.65
		16QAM	1/0	2503.5	19.79	95.28
			1/37	2593.0	**22.43**	**174.98**
			1/37	2682.5	20.13	103.04
	10	QPSK	1/25	2501.0	21.07	127.94
			1/25	2593.0	**22.90**	**194.98**
			1/25	2685.0	20.34	108.14
		16QAM	1/25	2501.0	21.02	126.47
			1/25	2593.0	**22.71**	**186.64**
			1/25	2685.0	19.69	93.11
	5	QPSK	1/24	2498.5	21.46	139.96
			1/24	2593.0	**22.79**	**190.11**
			1/12	2687.5	20.18	104.23
		16QAM	1/0	2498.5	19.96	99.08
			1/0	2593.0	**22.65**	**184.08**
			1/12	2687.5	19.94	98.63

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LTE Band 66

Band	BW [MHz]	Mode	RB Size/ RB Offset	f [MHz]	ERP / EIRP [dBm]	ERP / EIRP [mW]
Band 66	20	QPSK	1/49	1720.0	22.11	162.55
			1/49	1745.0	22.33	171.00
			1/0	1770.0	**23.00**	**199.53**
		16QAM	1/49	1720.0	21.11	129.12
			1/49	1745.0	21.61	144.88
			1/0	1770.0	**21.77**	**150.31**
	15	QPSK	1/37	1717.5	22.39	173.38
			1/37	1747.5	22.65	184.08
			1/0	1772.5	**22.95**	**197.24**
		16QAM	1/0	1717.5	20.53	112.98
			1/37	1747.5	21.80	151.36
			1/0	1772.5	**21.88**	**154.17**
	10	QPSK	1/25	1715.0	21.88	154.17
			1/25	1745.0	22.32	170.61
			1/25	1775.0	**22.65**	**184.08**
		16QAM	1/25	1715.0	20.72	118.03
			1/25	1745.0	21.16	130.62
			1/25	1775.0	**21.41**	**138.36**
	5	QPSK	1/0	1712.5	21.75	149.62
			1/0	1745.0	**22.60**	**181.97**
			1/12	1777.5	22.58	181.13
		16QAM	1/0	1712.5	20.47	111.43
			1/24	1745.0	**21.71**	**148.25**
			1/12	1777.5	21.69	147.57
	3	QPSK	1/0	1711.5	21.63	145.55
			1/0	1745.0	22.47	176.60
			1/0	1778.5	**22.75**	**188.36**
		16QAM	1/0	1711.5	20.47	111.43
			1/0	1745.0	21.35	136.46
			1/0	1778.5	**21.48**	**140.60**
	1.4	QPSK	1/3	1710.7	21.52	141.91
			1/3	1745.0	**22.68**	**185.35**
			1/3	1779.3	22.35	171.79
		16QAM	1/3	1710.7	20.69	117.22
			1/3	1745.0	**21.53**	**142.23**
			1/3	1779.3	21.22	132.43

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LTE Band 4

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

LTE Band 17

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

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9.5.2. ERP/EIRP DATA

GSM850

GSM850

GPRS

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/3/2021
Test Engineer: 20882
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: GPRS 850 MHz Fundamentals

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
824.20	34.22	V	3.0	-1.0	30.22	38.5	-8.3	
824.20	22.77	H	3.0	-1.0	18.77	38.5	-19.7	
Mid Ch								
836.60	33.73	V	3.1	-0.9	29.77	38.5	-8.7	
836.60	24.23	H	3.1	-0.9	20.26	38.5	-18.2	
High Ch								
848.80	32.01	V	3.1	-0.9	28.07	38.5	-10.4	
848.80	23.82	H	3.1	-0.9	19.88	38.5	-18.6	

GSM850

EGPRS

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/3/2021
Test Engineer: 20882
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: EGPRS 850 MHz Fundamentals

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
824.20	29.28	V	3.0	-1.0	25.28	38.5	-13.2	
824.20	17.92	H	3.0	-1.0	13.92	38.5	-24.6	
Mid Ch								
836.60	28.89	V	3.1	-0.9	24.93	38.5	-13.6	
836.60	19.03	H	3.1	-0.9	15.06	38.5	-23.4	
High Ch								
848.80	24.34	V	3.1	-0.9	20.40	38.5	-18.1	
848.80	18.40	H	3.1	-0.9	14.46	38.5	-24.0	

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GSM1900

GSM1900

GPRS

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/3/2021
Test Engineer: 20882
Configuration: EUT, Y-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	24.25	V	4.5	9.6	29.32	33.0	-3.7	
1850.20	17.90	H	4.5	9.6	22.97	33.0	-10.0	
Mid Ch								
1880.00	23.85	V	4.6	9.4	28.66	33.0	-4.3	
1880.00	17.03	H	4.6	9.4	21.84	33.0	-11.2	
High Ch								
1909.80	23.45	V	4.6	9.1	27.97	33.0	-5.0	
1909.80	17.43	H	4.6	9.1	21.95	33.0	-11.0	

GSM1900

EGPRS

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/3/2021
Test Engineer: 20882
Configuration: EUT, Y-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	17.28	V	4.5	9.6	22.35	33.0	-10.7	
1850.20	14.49	H	4.5	9.6	19.56	33.0	-13.4	
Mid Ch								
1880.00	21.04	V	4.6	9.4	25.85	33.0	-7.2	
1880.00	14.58	H	4.6	9.4	19.39	33.0	-13.6	
High Ch								
1909.80	19.65	V	4.6	9.1	24.17	33.0	-8.8	
1909.80	13.98	H	4.6	9.1	18.50	33.0	-14.5	

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WCDMA Band 5

Band 5
REL99

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/3/2021
Test Engineer: 19568
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	24.85	V	3.0	-0.9	20.85	38.5	-17.6	
826.40	13.44	H	3.0	-0.9	9.44	38.5	-29.1	
Mid Ch								
836.60	24.73	V	3.1	-0.9	20.77	38.5	-17.7	
836.60	14.23	H	3.1	-0.9	10.26	38.5	-28.2	
High Ch								
846.60	23.94	V	3.1	-0.9	19.99	38.5	-18.5	
846.60	14.18	H	3.1	-0.9	10.24	38.5	-28.3	

Band 5
HSDPA

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/3/2021
Test Engineer: 19568
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	23.66	V	3.0	-0.9	19.66	38.5	-18.8	
826.40	12.82	H	3.0	-0.9	8.82	38.5	-29.7	
Mid Ch								
836.60	23.66	V	3.1	-0.9	19.70	38.5	-18.8	
836.60	12.59	H	3.1	-0.9	8.62	38.5	-29.9	
High Ch								
846.60	23.90	V	3.1	-0.9	19.95	38.5	-18.6	
846.60	12.52	H	3.1	-0.9	8.58	38.5	-29.9	

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WCDMA Band 4

Band 4
REL99

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/3/2021
Test Engineer: 19568
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	9.82	V	4.4	9.6	15.03	30.0	-15.0	
1712.40	16.75	H	4.4	9.6	21.96	30.0	-8.0	
Mid Ch								
1732.60	11.36	V	4.4	9.6	16.61	30.0	-13.4	
1732.60	17.32	H	4.4	9.6	22.57	30.0	-7.4	
High Ch								
1752.60	12.18	V	4.4	9.7	17.46	30.0	-12.5	
1752.60	16.70	H	4.4	9.7	21.99	30.0	-8.0	

Band 4
HSDPA

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/3/2021
Test Engineer: 19568
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	8.74	V	4.4	9.6	13.95	30.0	-16.1	
1712.40	15.70	H	4.4	9.6	20.91	30.0	-9.1	
Mid Ch								
1732.60	10.26	V	4.4	9.6	15.51	30.0	-14.5	
1732.60	16.26	H	4.4	9.6	21.51	30.0	-8.5	
High Ch								
1752.60	11.35	V	4.4	9.7	16.63	30.0	-13.4	
1752.60	15.92	H	4.4	9.7	21.21	30.0	-8.8	

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WCDMA Band 2

Band 2
REL99

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/2/2021
Test Engineer: 20890
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	12.73	V	4.5	9.6	17.77	33.0	-15.2	
1852.40	17.39	H	4.5	9.6	22.44	33.0	-10.6	
Mid Ch								
1880.00	12.52	V	4.6	9.4	17.33	33.0	-15.7	
1880.00	17.07	H	4.6	9.4	21.88	33.0	-11.1	
High Ch								
1907.60	11.94	V	4.6	9.2	16.49	33.0	-16.5	
1907.60	17.20	H	4.6	9.2	21.75	33.0	-11.3	

Band 2
HSDPA

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/3/2021
Test Engineer: 19568
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	11.79	V	4.5	9.6	16.83	33.0	-16.2	
1852.40	16.00	H	4.5	9.6	21.05	33.0	-12.0	
Mid Ch								
1880.00	12.47	V	4.6	9.4	17.28	33.0	-15.7	
1880.00	16.15	H	4.6	9.4	20.96	33.0	-12.0	
High Ch								
1907.60	11.73	V	4.6	9.2	16.28	33.0	-16.7	
1907.60	16.28	H	4.6	9.2	20.83	33.0	-12.2	

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LTE Band 2

LTE Band 2

20MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/4/2021
Test Engineer: 20882
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 2 Fundamentals, 20MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1860.00	14.11	V	4.6	9.5	19.09	33.0	-13.9	
1860.00	17.75	H	4.6	9.5	22.72	33.0	-10.3	
Mid Ch								
1880.00	13.73	V	4.6	9.4	18.54	33.0	-14.5	
1880.00	17.64	H	4.6	9.4	22.45	33.0	-10.6	
High Ch								
1900.00	14.09	V	4.6	9.2	18.73	33.0	-14.3	
1900.00	17.94	H	4.6	9.2	22.59	33.0	-10.4	

LTE Band 2

20MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/4/2021
Test Engineer: 20882
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 2 Fundamentals, 20MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1860.00	13.13	V	4.6	9.5	18.11	33.0	-14.9	
1860.00	16.58	H	4.6	9.5	21.55	33.0	-11.4	
Mid Ch								
1880.00	12.79	V	4.6	9.4	17.60	33.0	-15.4	
1880.00	16.66	H	4.6	9.4	21.47	33.0	-11.5	
High Ch								
1900.00	13.07	V	4.6	9.2	17.71	33.0	-15.3	
1900.00	17.09	H	4.6	9.2	21.74	33.0	-11.3	

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LTE Band 2

15MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/4/2021
Test Engineer: 19568
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 2 Fundamentals, 15MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1857.50	12.13	V	4.5	9.5	17.13	33.0	-15.9	
1857.50	17.43	H	4.5	9.5	22.43	33.0	-10.6	
Mid Ch								
1880.00	14.65	V	4.6	9.4	19.46	33.0	-13.5	
1880.00	17.67	H	4.6	9.4	22.48	33.0	-10.5	
High Ch								
1902.50	14.53	V	4.6	9.2	19.14	33.0	-13.9	
1902.50	17.76	H	4.6	9.2	22.38	33.0	-10.6	

LTE Band 2

15MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/4/2021
Test Engineer: 19568
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 2 Fundamentals, 15MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1857.50	12.51	V	4.5	9.5	17.51	33.0	-15.5	
1857.50	16.44	H	4.5	9.5	21.44	33.0	-11.6	
Mid Ch								
1880.00	12.33	V	4.6	9.4	17.14	33.0	-15.9	
1880.00	15.90	H	4.6	9.4	20.71	33.0	-12.3	
High Ch								
1902.50	13.44	V	4.6	9.2	18.05	33.0	-14.9	
1902.50	16.82	H	4.6	9.2	21.44	33.0	-11.6	

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LTE Band 2

10MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/4/2021
Test Engineer: 19568
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 2 Fundamentals, 10MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1855.00	13.38	V	4.5	9.6	18.40	33.0	-14.6	
1855.00	17.82	H	4.5	9.6	22.84	33.0	-10.2	
Mid Ch								
1880.00	13.56	V	4.6	9.4	18.37	33.0	-14.6	
1880.00	17.26	H	4.6	9.4	22.07	33.0	-10.9	
High Ch								
1905.00	15.39	V	4.6	9.2	19.97	33.0	-13.0	
1905.00	17.33	H	4.6	9.2	21.91	33.0	-11.1	

LTE Band 2

10MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/4/2021
Test Engineer: 19568
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 2 Fundamentals, 10MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1855.00	11.98	V	4.5	9.6	17.00	33.0	-16.0	
1855.00	16.79	H	4.5	9.6	21.81	33.0	-11.2	
Mid Ch								
1880.00	12.50	V	4.6	9.4	17.31	33.0	-15.7	
1880.00	16.44	H	4.6	9.4	21.25	33.0	-11.8	
High Ch								
1905.00	13.97	V	4.6	9.2	18.55	33.0	-14.4	
1905.00	16.49	H	4.6	9.2	21.07	33.0	-11.9	

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LTE Band 2

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/4/2021
Test Engineer: 19568
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 2 Fundamentals, 5MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1852.50	13.50	V	4.5	9.6	18.54	33.0	-14.5	
1852.50	18.16	H	4.5	9.6	23.21	33.0	-9.8	
Mid Ch								
1880.00	13.42	V	4.6	9.4	18.23	33.0	-14.8	
1880.00	17.63	H	4.6	9.4	22.44	33.0	-10.6	
High Ch								
1907.50	15.11	V	4.6	9.2	19.65	33.0	-13.3	
1907.50	16.45	H	4.6	9.2	20.99	33.0	-12.0	

LTE Band 2

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/4/2021
Test Engineer: 19568
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 2 Fundamentals, 5MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1852.50	12.68	V	4.5	9.6	17.72	33.0	-15.3	
1852.50	17.36	H	4.5	9.6	22.41	33.0	-10.6	
Mid Ch								
1880.00	12.74	V	4.6	9.4	17.55	33.0	-15.5	
1880.00	16.66	H	4.6	9.4	21.47	33.0	-11.5	
High Ch								
1907.50	14.15	V	4.6	9.2	18.69	33.0	-14.3	
1907.50	15.54	H	4.6	9.2	20.08	33.0	-12.9	

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LTE Band 2

3MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/4/2021
Test Engineer: 19568
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 2 Fundamentals, 3MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1851.50	12.85	V	4.5	9.6	17.90	33.0	-15.1	
1851.50	17.88	H	4.5	9.6	22.93	33.0	-10.1	
Mid Ch								
1880.00	13.60	V	4.6	9.4	18.41	33.0	-14.6	
1880.00	17.49	H	4.6	9.4	22.30	33.0	-10.7	
High Ch								
1908.50	15.16	V	4.6	9.1	19.70	33.0	-13.3	
1908.50	16.96	H	4.6	9.1	21.50	33.0	-11.5	

LTE Band 2

3MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/4/2021
Test Engineer: 19568
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 2 Fundamentals, 3MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1851.50	11.76	V	4.5	9.6	16.81	33.0	-16.2	
1851.50	17.04	H	4.5	9.6	22.09	33.0	-10.9	
Mid Ch								
1880.00	12.58	V	4.6	9.4	17.39	33.0	-15.6	
1880.00	16.42	H	4.6	9.4	21.23	33.0	-11.8	
High Ch								
1908.50	14.25	V	4.6	9.1	18.79	33.0	-14.2	
1908.50	15.85	H	4.6	9.1	20.39	33.0	-12.6	

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LTE Band 2

1.4MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/4/2021
Test Engineer: 19568
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 2 Fundamentals, 1.4MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1850.70	12.84	V	4.5	9.6	17.90	33.0	-15.1	
1850.70	17.94	H	4.5	9.6	22.99	33.0	-10.0	
Mid Ch								
1880.00	13.36	V	4.6	9.4	18.17	33.0	-14.8	
1880.00	17.56	H	4.6	9.4	22.37	33.0	-10.6	
High Ch								
1909.30	15.50	V	4.6	9.1	20.02	33.0	-13.0	
1909.30	16.74	H	4.6	9.1	21.27	33.0	-11.7	

LTE Band 2

1.4MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/4/2021
Test Engineer: 19568
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 2 Fundamentals, 1.4MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1850.70	11.92	V	4.5	9.6	16.98	33.0	-16.0	
1850.70	16.86	H	4.5	9.6	21.91	33.0	-11.1	
Mid Ch								
1880.00	12.35	V	4.6	9.4	17.16	33.0	-15.8	
1880.00	16.35	H	4.6	9.4	21.16	33.0	-11.8	
High Ch								
1909.30	14.38	V	4.6	9.1	18.90	33.0	-14.1	
1909.30	15.53	H	4.6	9.1	20.06	33.0	-12.9	

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LTE Band 5

LTE Band 5

10MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/5/2021
Test Engineer: 19568
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 5 Fundamentals, 10MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
829.00	25.07	V	3.1	-0.9	21.09	38.5	-17.4	
829.00	14.84	H	3.1	-0.9	10.86	38.5	-27.6	
Mid Ch								
836.50	24.78	V	3.1	-0.9	20.81	38.5	-17.7	
836.50	14.91	H	3.1	-0.9	10.94	38.5	-27.6	
High Ch								
844.00	24.43	V	3.1	-0.9	20.48	38.5	-18.0	
844.00	14.55	H	3.1	-0.9	10.60	38.5	-27.9	

LTE Band 5

10MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/5/2021
Test Engineer: 19568
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 5 Fundamentals, 10MHz Bandwidth

Test Equipment:
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	24.15	V	3.1	-0.9	20.17	38.5	-18.3	
829.00	13.62	H	3.1	-0.9	9.64	38.5	-28.9	
Mid Ch								
836.50	23.58	V	3.1	-0.9	19.61	38.5	-18.9	
836.50	14.07	H	3.1	-0.9	10.10	38.5	-28.4	
High Ch								
844.00	23.79	V	3.1	-0.9	19.84	38.5	-18.7	
844.00	13.61	H	3.1	-0.9	9.66	38.5	-28.8	

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LTE Band 5

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/5/2021
Test Engineer: 19568
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 5 Fundamentals, 5MHz Bandwidth

Test Equipment:
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	24.91	V	3.0	-0.9	20.92	38.5	-17.6	
826.50	14.56	H	3.0	-0.9	10.57	38.5	-27.9	
Mid Ch								
836.50	24.88	V	3.1	-0.9	20.91	38.5	-17.6	
836.50	14.81	H	3.1	-0.9	10.84	38.5	-27.7	
High Ch								
846.50	25.32	V	3.1	-0.9	21.38	38.5	-17.1	
846.50	14.65	H	3.1	-0.9	10.71	38.5	-27.8	

LTE Band 5

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/5/2021
Test Engineer: 19568
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 5 Fundamentals, 5MHz Bandwidth

Test Equipment:
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	24.36	V	3.0	-0.9	20.37	38.5	-18.1	
826.50	13.65	H	3.0	-0.9	9.66	38.5	-28.8	
Mid Ch								
836.50	23.81	V	3.1	-0.9	19.84	38.5	-18.7	
836.50	14.13	H	3.1	-0.9	10.16	38.5	-28.3	
High Ch								
846.50	24.33	V	3.1	-0.9	20.39	38.5	-18.1	
846.50	13.77	H	3.1	-0.9	9.83	38.5	-28.7	

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LTE Band 5

3MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/5/2021
Test Engineer: 19568
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 5 Fundamentals, 3MHz Bandwidth

Test Equipment:
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	24.87	V	3.0	-0.9	20.88	38.5	-17.6	
825.50	14.75	H	3.0	-0.9	10.76	38.5	-27.7	
Mid Ch								
836.50	24.84	V	3.1	-0.9	20.87	38.5	-17.6	
836.50	15.14	H	3.1	-0.9	11.17	38.5	-27.3	
High Ch								
847.50	25.47	V	3.1	-0.9	21.52	38.5	-17.0	
847.50	15.32	H	3.1	-0.9	11.38	38.5	-27.1	

LTE Band 5

3MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/5/2021
Test Engineer: 19568
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 5 Fundamentals, 3MHz Bandwidth

Test Equipment:
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	13.71	H	3.0	-0.9	9.72	38.5	-28.8	
Mid Ch								
836.50	23.78	V	3.1	-0.9	19.81	38.5	-18.7	
836.50	14.02	H	3.1	-0.9	10.05	38.5	-28.5	
High Ch								
847.50	24.55	V	3.1	-0.9	20.60	38.5	-17.9	
847.50	14.30	H	3.1	-0.9	10.36	38.5	-28.1	

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LTE Band 5

1.4MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/5/2021
Test Engineer: 19568
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 5 Fundamentals, 1.4MHz Bandwidth

Test Equipment:
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	25.14	V	3.0	-1.0	21.15	38.5	-17.4	
824.70	14.65	H	3.0	-1.0	10.65	38.5	-27.8	
Mid Ch								
836.50	25.03	V	3.1	-0.9	21.06	38.5	-17.4	
836.50	15.45	H	3.1	-0.9	11.48	38.5	-27.0	
High Ch								
848.30	25.56	V	3.1	-0.9	21.62	38.5	-16.9	
848.30	15.37	H	3.1	-0.9	11.43	38.5	-27.1	

LTE Band 5

1.4MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/5/2021
Test Engineer: 19568
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 5 Fundamentals, 1.4MHz Bandwidth

Test Equipment:
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	23.79	V	3.0	-1.0	19.80	38.5	-18.7	
824.70	13.55	H	3.0	-1.0	9.55	38.5	-28.9	
Mid Ch								
836.50	24.14	V	3.1	-0.9	20.17	38.5	-18.3	
836.50	14.13	H	3.1	-0.9	10.16	38.5	-28.3	
High Ch								
848.30	24.55	V	3.1	-0.9	20.61	38.5	-17.9	
848.30	14.11	H	3.1	-0.9	10.17	38.5	-28.3	

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LTE Band 12

LTE Band 12

10MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/5/2021
Test Engineer: 20882
Configuration: EUT, X-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	14.86	V	2.8	-1.1	10.99	34.8	-23.8	
704.00	21.97	H	2.8	-1.1	18.11	34.8	-16.7	
Mid Ch								
707.50	14.85	V	2.8	-1.1	10.98	34.8	-23.8	
707.50	22.03	H	2.8	-1.1	18.16	34.8	-16.6	
High Ch								
711.00	14.72	V	2.8	-1.1	10.84	34.8	-23.9	
711.00	22.08	H	2.8	-1.1	18.20	34.8	-16.6	

LTE Band 12

10MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/5/2021
Test Engineer: 20882
Configuration: EUT, X-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	13.65	V	2.8	-1.1	9.78	34.8	-25.0	
704.00	21.04	H	2.8	-1.1	17.18	34.8	-17.6	
Mid Ch								
707.50	13.73	V	2.8	-1.1	9.86	34.8	-24.9	
707.50	20.97	H	2.8	-1.1	17.10	34.8	-17.7	
High Ch								
711.00	13.74	V	2.8	-1.1	9.86	34.8	-24.9	
711.00	21.11	H	2.8	-1.1	17.23	34.8	-17.5	

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LTE Band 12

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/5/2021
Test Engineer: 20882
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 12 Fundamentals, 5MHz Bandwidth

Test Equipment:
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	14.87	V	2.8	-1.1	11.01	34.8	-23.8	
701.50	21.96	H	2.8	-1.1	18.10	34.8	-16.7	
Mid Ch								
707.50	14.59	V	2.8	-1.1	10.72	34.8	-24.1	
707.50	21.70	H	2.8	-1.1	17.83	34.8	-16.9	
High Ch								
713.50	14.22	V	2.8	-1.1	10.33	34.8	-24.4	
713.50	21.70	H	2.8	-1.1	17.82	34.8	-17.0	

LTE Band 12

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/5/2021
Test Engineer: 20882
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 12 Fundamentals, 5MHz Bandwidth

Test Equipment:
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	14.02	V	2.8	-1.1	10.16	34.8	-24.6	
701.50	20.89	H	2.8	-1.1	17.03	34.8	-17.7	
Mid Ch								
707.50	13.60	V	2.8	-1.1	9.73	34.8	-25.0	
707.50	20.74	H	2.8	-1.1	16.87	34.8	-17.9	
High Ch								
713.50	13.26	V	2.8	-1.1	9.37	34.8	-25.4	
713.50	20.88	H	2.8	-1.1	17.00	34.8	-17.8	

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LTE Band 12

3MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/5/2021
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 12 Fundamentals, 3MHz Bandwidth

Test Equipment:
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	14.70	V	2.8	-1.1	10.84	34.8	-23.9	
700.50	21.80	H	2.8	-1.1	17.94	34.8	-16.8	
Mid Ch								
707.50	14.89	V	2.8	-1.1	11.02	34.8	-23.8	
707.50	21.73	H	2.8	-1.1	17.86	34.8	-16.9	
High Ch								
714.50	13.86	V	2.8	-1.1	9.97	34.8	-24.8	
714.50	21.71	H	2.8	-1.1	17.83	34.8	-16.9	

LTE Band 12

3MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/5/2021
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 12 Fundamentals, 3MHz Bandwidth

Test Equipment:
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	13.90	V	2.8	-1.1	10.04	34.8	-24.7	
700.50	21.03	H	2.8	-1.1	17.17	34.8	-17.6	
Mid Ch								
707.50	13.77	V	2.8	-1.1	9.90	34.8	-24.9	
707.50	21.00	H	2.8	-1.1	17.13	34.8	-17.6	
High Ch								
714.50	12.75	V	2.8	-1.1	8.86	34.8	-25.9	
714.50	20.58	H	2.8	-1.1	16.70	34.8	-18.1	

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LTE Band 12

1.4MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/5/2021
Test Engineer: 20882
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 12 Fundamentals, 1.4MHz Bandwidth

Test Equipment:
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	14.70	V	2.8	-1.1	10.84	34.8	-23.9	
699.70	21.86	H	2.8	-1.1	18.00	34.8	-16.8	
Mid Ch								
707.50	14.85	V	2.8	-1.1	10.98	34.8	-23.8	
707.50	21.73	H	2.8	-1.1	17.86	34.8	-16.9	
High Ch								
715.30	13.89	V	2.8	-1.1	10.00	34.8	-24.8	
715.30	21.69	H	2.8	-1.1	17.80	34.8	-17.0	

LTE Band 12

1.4MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/5/2021
Test Engineer: 20882
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 12 Fundamentals, 1.4MHz Bandwidth

Test Equipment:
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	13.73	V	2.8	-1.1	9.87	34.8	-24.9	
699.70	20.58	H	2.8	-1.1	16.72	34.8	-18.1	
Mid Ch								
707.50	13.81	V	2.8	-1.1	9.94	34.8	-24.8	
707.50	20.83	H	2.8	-1.1	16.96	34.8	-17.8	
High Ch								
715.30	12.88	V	2.8	-1.1	8.99	34.8	-25.8	
715.30	20.53	H	2.8	-1.1	16.64	34.8	-18.1	

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LTE Band 13

LTE Band 13

10MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/5/2021
Test Engineer: 20882
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	15.35	V	3.0	-1.1	11.33	34.8	-23.4	
782.00	22.43	H	3.0	-1.1	18.41	34.8	-16.4	

LTE Band 13

10MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/5/2021
Test Engineer: 20882
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	14.43	V	3.0	-1.1	10.41	34.8	-24.4	
782.00	21.43	H	3.0	-1.1	17.41	34.8	-17.4	

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LTE Band 13

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/5/2021
Test Engineer: 20882
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 13 Fundamentals, 5MHz Bandwidth

Test Equipment:
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	15.75	V	3.0	-1.1	11.74	34.8	-23.0	
779.50	22.52	H	3.0	-1.1	18.50	34.8	-16.3	
Mid Ch								
782.00	15.44	V	3.0	-1.1	11.42	34.8	-23.3	
782.00	22.58	H	3.0	-1.1	18.56	34.8	-16.2	
High Ch								
784.50	15.64	V	3.0	-1.1	11.62	34.8	-23.1	
784.50	22.39	H	3.0	-1.1	18.37	34.8	-16.4	

LTE Band 13

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/5/2021
Test Engineer: 20882
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 13 Fundamentals, 5MHz Bandwidth

Test Equipment:
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	14.79	V	3.0	-1.1	10.78	34.8	-24.0	
779.50	21.31	H	3.0	-1.1	17.29	34.8	-17.5	
Mid Ch								
782.00	14.85	V	3.0	-1.1	10.83	34.8	-23.9	
782.00	21.77	H	3.0	-1.1	17.75	34.8	-17.0	
High Ch								
784.50	14.61	V	3.0	-1.1	10.59	34.8	-24.2	
784.50	21.75	H	3.0	-1.1	17.73	34.8	-17.0	

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LTE Band 26 (Part 90)

LTE Band 26

15MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/6/2021
Test Engineer: 19568
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 26 Fundamentals, 15MHz Bandwidth

Test Equipment:
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	23.35	V	3.0	-1.0	19.35	50.0	-30.7	Part 90
821.50	13.06	H	3.0	-1.0	9.05	50.0	-40.9	Part 90

LTE Band 26

15MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/6/2021
Test Engineer: 19568
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 26 Fundamentals, 15MHz Bandwidth

Test Equipment:
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	22.06	V	3.0	-1.0	18.06	50.0	-31.9	Part 90
821.50	13.43	H	3.0	-1.0	9.42	50.0	-40.6	Part 90

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LTE Band 26

10MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/6/2021
Test Engineer: 19568
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 26 Fundamentals, 10MHz Bandwidth

Test Equipment:
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	22.68	V	3.0	-1.0	18.67	50.0	-31.3	Part 90
819.00	14.28	H	3.0	-1.0	10.27	50.0	-39.7	Part 90

LTE Band 26

10MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/6/2021
Test Engineer: 19568
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 26 Fundamentals, 10MHz Bandwidth

Test Equipment:
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	21.75	V	3.0	-1.0	17.74	50.0	-32.3	Part 90
819.00	12.84	H	3.0	-1.0	8.83	50.0	-41.2	Part 90

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LTE Band 26

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/6/2021
Test Engineer: 19568
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 26 Fundamentals, 5MHz Bandwidth

Test Equipment:
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	22.58	V	3.0	-1.0	18.56	50.0	-31.4	Part 90
816.50	13.91	H	3.0	-1.0	9.89	50.0	-40.1	Part 90
Mid Ch								
821.50	23.32	V	3.0	-1.0	19.32	50.0	-30.7	Part 90
821.50	14.14	H	3.0	-1.0	10.13	50.0	-39.9	Part 90

LTE Band 26

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/6/2021
Test Engineer: 19568
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 26 Fundamentals, 5MHz Bandwidth

Test Equipment:
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	21.45	V	3.0	-1.0	17.43	50.0	-32.6	Part 90
816.50	12.76	H	3.0	-1.0	8.74	50.0	-41.3	Part 90
Mid Ch								
821.50	22.32	V	3.0	-1.0	18.32	50.0	-31.7	Part 90
821.50	13.13	H	3.0	-1.0	9.12	50.0	-40.9	Part 90

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LTE Band 26

3MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/6/2021
Test Engineer: 19568
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 26 Fundamentals, 3MHz Bandwidth

Test Equipment:
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	22.33	V	3.0	-1.0	18.31	50.0	-31.7	Part 90
815.50	13.68	H	3.0	-1.0	9.66	50.0	-40.3	Part 90
Mid Ch								
822.50	23.20	V	3.0	-1.0	19.20	50.0	-30.8	Part 90
822.50	14.21	H	3.0	-1.0	10.21	50.0	-39.8	Part 90

LTE Band 26

3MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/6/2021
Test Engineer: 19568
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 26 Fundamentals, 3MHz Bandwidth

Test Equipment:
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	21.46	V	3.0	-1.0	17.44	50.0	-32.6	Part 90
815.50	12.96	H	3.0	-1.0	8.94	50.0	-41.1	Part 90
Mid Ch								
822.50	22.30	V	3.0	-1.0	18.30	50.0	-31.7	Part 90
822.50	13.30	H	3.0	-1.0	9.30	50.0	-40.7	Part 90

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LTE Band 26

1.4MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/6/2021
Test Engineer: 19568
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 26 Fundamentals, 1.4MHz Bandwidth

Test Equipment:
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	22.34	V	3.0	-1.0	18.32	50.0	-31.7	Part 90
814.70	13.80	H	3.0	-1.0	9.79	50.0	-40.2	Part 90
Mid Ch								
823.30	23.81	V	3.0	-1.0	19.81	50.0	-30.2	Part 90
823.30	13.12	H	3.0	-1.0	9.13	50.0	-40.9	Part 90

LTE Band 26

1.4MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/6/2021
Test Engineer: 19568
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 26 Fundamentals, 1.4MHz Bandwidth

Test Equipment:
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	20.95	V	3.0	-1.0	16.93	50.0	-33.1	Part 90
814.70	12.52	H	3.0	-1.0	8.51	50.0	-41.5	Part 90
Mid Ch								
823.30	22.63	V	3.0	-1.0	18.63	50.0	-31.4	Part 90
823.30	12.01	H	3.0	-1.0	8.02	50.0	-42.0	Part 90

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LTE Band 26 (Part 22)

LTE Band 26

15MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/6/2021
Test Engineer: 19568
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
Straddle Ch								
824.00	23.97	V	3.0	-1.0	19.98	38.5	-18.5	
824.00	13.76	H	3.0	-1.0	9.77	38.5	-28.7	
Mid Ch								
831.50	23.80	V	3.1	-0.9	19.82	38.5	-18.7	
831.50	13.95	H	3.1	-0.9	9.97	38.5	-28.5	
High Ch								
841.50	23.38	V	3.1	-0.9	19.42	38.5	-19.1	
841.50	13.63	H	3.1	-0.9	9.67	38.5	-28.8	

LTE Band 26

15MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/6/2021
Test Engineer: 19568
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
Straddle Ch								
824.00	23.07	V	3.0	-1.0	19.08	38.5	-19.4	
824.00	12.63	H	3.0	-1.0	8.64	38.5	-29.9	
Mid Ch								
831.50	22.76	V	3.1	-0.9	18.78	38.5	-19.7	
831.50	13.11	H	3.1	-0.9	9.13	38.5	-29.4	
High Ch								
841.50	23.07	V	3.1	-0.9	19.11	38.5	-19.4	
841.50	12.29	H	3.1	-0.9	8.33	38.5	-30.2	

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LTE Band 26

10MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/5/2021
Test Engineer: 20882
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 26 Fundamentals, 10MHz Bandwidth

Test Equipment:
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
Straddle Ch								
824.00	24.07	V	3.0	-1.0	20.08	38.5	-18.4	
824.00	13.51	H	3.0	-1.0	9.52	38.5	-29.0	
Low Ch								
829.00	23.82	V	3.1	-0.9	19.84	38.5	-18.7	
829.00	14.19	H	3.1	-0.9	10.21	38.5	-28.3	
Mid Ch								
831.50	24.29	V	3.1	-0.9	20.31	38.5	-18.2	
831.50	14.56	H	3.1	-0.9	10.58	38.5	-27.9	
High Ch								
844.00	23.33	V	3.1	-0.9	19.38	38.5	-19.1	
844.00	14.51	H	3.1	-0.9	10.56	38.5	-27.9	

LTE Band 26

10MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/5/2021
Test Engineer: 20882
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 26 Fundamentals, 10MHz Bandwidth

Test Equipment:
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
Straddle Ch								
824.00	23.38	V	3.0	-1.0	19.39	38.5	-19.1	
824.00	12.53	H	3.0	-1.0	8.54	38.5	-30.0	
Low Ch								
829.00	23.01	V	3.1	-0.9	19.03	38.5	-19.5	
829.00	13.17	H	3.1	-0.9	9.19	38.5	-29.3	
Mid Ch								
831.50	23.50	V	3.1	-0.9	19.52	38.5	-19.0	
831.50	13.77	H	3.1	-0.9	9.79	38.5	-28.7	
High Ch								
844.00	22.21	V	3.1	-0.9	18.26	38.5	-20.2	
844.00	13.52	H	3.1	-0.9	9.57	38.5	-28.9	

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LTE Band 26

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/5/2021
Test Engineer: 20882
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 26 Fundamentals, 5MHz Bandwidth

Test Equipment:
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
Straddle Ch								
824.00	23.95	V	3.0	-1.0	19.96	38.5	-18.5	
824.00	13.24	H	3.0	-1.0	9.25	38.5	-29.3	
Low Ch								
826.50	24.03	V	3.0	-0.9	20.04	38.5	-18.5	
826.50	14.33	H	3.0	-0.9	10.34	38.5	-28.2	
Mid Ch								
831.50	24.23	V	3.1	-0.9	20.25	38.5	-18.3	
831.50	14.38	H	3.1	-0.9	10.40	38.5	-28.1	
High Ch								
846.50	23.43	V	3.1	-0.9	19.49	38.5	-19.0	
846.50	14.03	H	3.1	-0.9	10.09	38.5	-28.4	

LTE Band 26

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/5/2021
Test Engineer: 20882
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 26 Fundamentals, 5MHz Bandwidth

Test Equipment:
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
Straddle Ch								
824.00	23.04	V	3.0	-1.0	19.05	38.5	-19.5	
824.00	12.45	H	3.0	-1.0	8.46	38.5	-30.0	
Low Ch								
826.50	23.47	V	3.0	-0.9	19.48	38.5	-19.0	
826.50	13.16	H	3.0	-0.9	9.17	38.5	-29.3	
Mid Ch								
831.50	23.20	V	3.1	-0.9	19.22	38.5	-19.3	
831.50	13.50	H	3.1	-0.9	9.52	38.5	-29.0	
High Ch								
846.50	22.33	V	3.1	-0.9	18.39	38.5	-20.1	
846.50	13.05	H	3.1	-0.9	9.11	38.5	-29.4	

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LTE Band 26

3MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/5/2021
Test Engineer: 20882
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 26 Fundamentals, 3MHz Bandwidth

Test Equipment:
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
Straddle Ch								
824.00	24.18	V	3.0	-1.0	20.19	38.5	-18.3	
824.00	13.34	H	3.0	-1.0	9.35	38.5	-29.2	
Low Ch								
825.50	23.78	V	3.0	-0.9	19.79	38.5	-18.7	
825.50	14.06	H	3.0	-0.9	10.07	38.5	-28.4	
Mid Ch								
831.50	24.18	V	3.1	-0.9	20.20	38.5	-18.3	
831.50	14.45	H	3.1	-0.9	10.47	38.5	-28.0	
High Ch								
847.50	23.59	V	3.1	-0.9	19.64	38.5	-18.9	
847.50	14.03	H	3.1	-0.9	10.09	38.5	-28.4	

LTE Band 26

3MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/5/2021
Test Engineer: 20882
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 26 Fundamentals, 3MHz Bandwidth

Test Equipment:
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
Straddle Ch								
824.00	23.16	V	3.0	-1.0	19.17	38.5	-19.3	
824.00	12.55	H	3.0	-1.0	8.56	38.5	-29.9	
Low Ch								
825.50	22.92	V	3.0	-0.9	18.93	38.5	-19.6	
825.50	13.00	H	3.0	-0.9	9.01	38.5	-29.5	
Mid Ch								
831.50	23.28	V	3.1	-0.9	19.30	38.5	-19.2	
831.50	13.52	H	3.1	-0.9	9.54	38.5	-29.0	
High Ch								
847.50	22.62	V	3.1	-0.9	18.67	38.5	-19.8	
847.50	12.92	H	3.1	-0.9	8.98	38.5	-29.5	

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LTE Band 26

1.4MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/5/2021
Test Engineer: 20882
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 26 Fundamentals, 1.4MHz Bandwidth

Test Equipment:
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
Straddle Ch								
824.00	23.79	V	3.0	-1.0	19.80	38.5	-18.7	
824.00	13.38	H	3.0	-1.0	9.39	38.5	-29.1	
Low Ch								
824.70	23.83	V	3.0	-1.0	19.84	38.5	-18.7	
824.70	14.09	H	3.0	-1.0	10.09	38.5	-28.4	
Mid Ch								
831.50	24.17	V	3.1	-0.9	20.19	38.5	-18.3	
831.50	14.37	H	3.1	-0.9	10.39	38.5	-28.1	
High Ch								
848.30	23.58	V	3.1	-0.9	19.64	38.5	-18.9	
848.30	14.06	H	3.1	-0.9	10.12	38.5	-28.4	

LTE Band 26

1.4MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/5/2021
Test Engineer: 20882
Configuration: EUT, Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 26 Fundamentals, 1.4MHz Bandwidth

Test Equipment:
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
Straddle Ch								
824.00	22.79	V	3.0	-1.0	18.80	38.5	-19.7	
824.00	12.35	H	3.0	-1.0	8.36	38.5	-30.1	
Low Ch								
824.70	22.63	V	3.0	-1.0	18.64	38.5	-19.9	
824.70	13.27	H	3.0	-1.0	9.27	38.5	-29.2	
Mid Ch								
831.50	23.12	V	3.1	-0.9	19.14	38.5	-19.4	
831.50	13.35	H	3.1	-0.9	9.37	38.5	-29.1	
High Ch								
848.30	22.49	V	3.1	-0.9	18.55	38.5	-19.9	
848.30	12.72	H	3.1	-0.9	8.78	38.5	-29.7	

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LTE Band 41 (PC3)

LTE Band 41

20MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/9/2021
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 41 Fundamentals, 20MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2506.00	14.15	V	5.3	10.2	19.02	33.0	-14.0	
2506.00	16.37	H	5.3	10.2	21.25	33.0	-11.8	
Mid Ch								
2593.00	14.23	V	5.4	10.0	18.89	33.0	-14.1	
2593.00	18.22	H	5.4	10.0	22.87	33.0	-10.1	
High Ch								
2680.00	12.99	V	5.5	10.1	17.56	33.0	-15.4	
2680.00	15.69	H	5.5	10.1	20.26	33.0	-12.7	

LTE Band 41

20MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/9/2021
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 41 Fundamentals, 20MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2506.00	13.86	V	5.3	10.2	18.73	33.0	-14.3	
2506.00	14.81	H	5.3	10.2	19.69	33.0	-13.3	
Mid Ch								
2593.00	13.35	V	5.4	10.0	18.01	33.0	-15.0	
2593.00	17.52	H	5.4	10.0	22.17	33.0	-10.8	
High Ch								
2680.00	12.50	V	5.5	10.1	17.07	33.0	-15.9	
2680.00	14.99	H	5.5	10.1	19.56	33.0	-13.4	

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LTE Band 41

15MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/9/2021
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 41 Fundamentals, 15MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2503.50	14.19	V	5.3	10.2	19.08	33.0	-13.9	
2503.50	16.56	H	5.3	10.2	21.44	33.0	-11.6	
Mid Ch								
2593.00	14.17	V	5.4	10.0	18.83	33.0	-14.2	
2593.00	18.15	H	5.4	10.0	22.80	33.0	-10.2	
High Ch								
2682.50	13.72	V	5.5	10.1	18.28	33.0	-14.7	
2682.50	15.75	H	5.5	10.1	20.32	33.0	-12.7	

LTE Band 41

15MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/9/2021
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 41 Fundamentals, 15MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2503.50	14.15	V	5.3	10.2	19.04	33.0	-14.0	
2503.50	14.91	H	5.3	10.2	19.79	33.0	-13.2	
Mid Ch								
2593.00	13.77	V	5.4	10.0	18.43	33.0	-14.6	
2593.00	17.78	H	5.4	10.0	22.43	33.0	-10.6	
High Ch								
2682.50	13.52	V	5.5	10.1	18.08	33.0	-14.9	
2682.50	15.56	H	5.5	10.1	20.13	33.0	-12.9	

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LTE Band 41

10MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/9/2021
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 41 Fundamentals, 10MHz Bandwidth

Test Equipment:
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								
2501.00	14.10	V	5.3	10.2	18.99	33.0	-14.0	
2501.00	16.19	H	5.3	10.2	21.07	33.0	-11.9	
Mid Ch								
2593.00	13.66	V	5.4	10.0	18.32	33.0	-14.7	
2593.00	18.25	H	5.4	10.0	22.90	33.0	-10.1	
High Ch								
2685.00	13.70	V	5.5	10.1	18.26	33.0	-14.7	
2685.00	15.78	H	5.5	10.1	20.34	33.0	-12.7	

LTE Band 41

10MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/9/2021
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 41 Fundamentals, 10MHz Bandwidth

Test Equipment:
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								
2501.00	13.99	V	5.3	10.2	18.88	33.0	-14.1	
2501.00	16.14	H	5.3	10.2	21.02	33.0	-12.0	
Mid Ch								
2593.00	13.51	V	5.4	10.0	18.17	33.0	-14.8	
2593.00	18.06	H	5.4	10.0	22.71	33.0	-10.3	
High Ch								
2685.00	13.25	V	5.5	10.1	17.81	33.0	-15.2	
2685.00	15.13	H	5.5	10.1	19.69	33.0	-13.3	

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LTE Band 41

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/9/2021
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 41 Fundamentals, 5MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2498.50	14.06	V	5.3	10.2	18.96	33.0	-14.0	
2498.50	16.56	H	5.3	10.2	21.46	33.0	-11.5	
Mid Ch								
2593.00	13.70	V	5.4	10.0	18.36	33.0	-14.6	
2593.00	18.14	H	5.4	10.0	22.79	33.0	-10.2	
High Ch								
2687.50	14.19	V	5.5	10.1	18.75	33.0	-14.2	
2687.50	15.62	H	5.5	10.1	20.18	33.0	-12.8	

LTE Band 41

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/9/2021
Test Engineer: 19568
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 41 Fundamentals, 5MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2498.50	14.29	V	5.3	10.2	19.19	33.0	-13.8	
2498.50	15.06	H	5.3	10.2	19.96	33.0	-13.0	
Mid Ch								
2593.00	17.46	V	5.4	10.0	22.12	33.0	-10.9	
2593.00	18.00	H	5.4	10.0	22.65	33.0	-10.3	
High Ch								
2687.50	13.92	V	5.5	10.1	18.48	33.0	-14.5	
2687.50	15.38	H	5.5	10.1	19.94	33.0	-13.1	

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LTE Band 66

LTE Band 66

20MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/4/2021
Test Engineer: 20882
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_QPSK Band 66 Fundamentals, 20MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1720.00	16.88	V	4.4	9.6	22.11	30.0	-7.9	
1720.00	10.29	H	4.4	9.6	15.51	30.0	-14.5	
Mid Ch								
1745.00	17.06	V	4.4	9.7	22.33	30.0	-7.7	
1745.00	10.18	H	4.4	9.7	15.45	30.0	-14.5	
High Ch								
1770.00	17.73	V	4.4	9.7	23.00	30.0	-7.0	
1770.00	8.23	H	4.4	9.7	13.50	30.0	-16.5	

LTE Band 66

20MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/4/2021
Test Engineer: 20882
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_16QAM Band 66 Fundamentals, 20MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1720.00	15.88	V	4.4	9.6	21.11	30.0	-8.9	
1720.00	9.25	H	4.4	9.6	14.47	30.0	-15.5	
Mid Ch								
1745.00	16.34	V	4.4	9.7	21.61	30.0	-8.4	
1745.00	8.96	H	4.4	9.7	14.23	30.0	-15.8	
High Ch								
1770.00	16.50	V	4.4	9.7	21.77	30.0	-8.2	
1770.00	7.32	H	4.4	9.7	12.59	30.0	-17.4	

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LTE Band 66

15MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/4/2021
Test Engineer: 20882
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_QPSK Band 66 Fundamentals, 15MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1717.50	17.17	V	4.4	9.6	22.39	30.0	-7.6	
1717.50	10.98	H	4.4	9.6	16.21	30.0	-13.8	
Mid Ch								
1745.00	17.38	V	4.4	9.7	22.65	30.0	-7.3	
1745.00	9.93	H	4.4	9.7	15.20	30.0	-14.8	
High Ch								
1772.50	17.68	V	4.4	9.7	22.95	30.0	-7.1	
1772.50	8.23	H	4.4	9.7	13.49	30.0	-16.5	

LTE Band 66

15MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/4/2021
Test Engineer: 20882
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_16QAM Band 66 Fundamentals, 15MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1717.50	15.31	V	4.4	9.6	20.53	30.0	-9.5	
1717.50	9.14	H	4.4	9.6	14.37	30.0	-15.6	
Mid Ch								
1745.00	16.53	V	4.4	9.7	21.80	30.0	-8.2	
1745.00	9.14	H	4.4	9.7	14.41	30.0	-15.6	
High Ch								
1772.50	16.61	V	4.4	9.7	21.88	30.0	-8.1	
1772.50	7.20	H	4.4	9.7	12.46	30.0	-17.5	

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LTE Band 66

10MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/4/2021
Test Engineer: 20882
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_QPSK Band 66 Fundamentals, 10MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1715.00	16.66	V	4.4	9.6	21.88	30.0	-8.1	
1715.00	10.36	H	4.4	9.6	15.58	30.0	-14.4	
Mid Ch								
1745.00	17.05	V	4.4	9.7	22.32	30.0	-7.7	
1745.00	10.10	H	4.4	9.7	15.37	30.0	-14.6	
High Ch								
1775.00	17.38	V	4.4	9.7	22.65	30.0	-7.4	
1775.00	10.63	H	4.4	9.7	15.89	30.0	-14.1	

LTE Band 66

10MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/4/2021
Test Engineer: 20882
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_16QAM Band 66 Fundamentals, 10MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1715.00	15.50	V	4.4	9.6	20.72	30.0	-9.3	
1715.00	9.58	H	4.4	9.6	14.80	30.0	-15.2	
Mid Ch								
1745.00	15.89	V	4.4	9.7	21.16	30.0	-8.8	
1745.00	9.42	H	4.4	9.7	14.69	30.0	-15.3	
High Ch								
1775.00	16.14	V	4.4	9.7	21.41	30.0	-8.6	
1775.00	9.52	H	4.4	9.7	14.78	30.0	-15.2	

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LTE Band 66

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/4/2021
Test Engineer: 20882
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_QPSK Band 66 Fundamentals, 5MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1712.50	16.54	V	4.4	9.6	21.75	30.0	-8.2	
1712.50	10.03	H	4.4	9.6	15.24	30.0	-14.8	
Mid Ch								
1745.00	17.33	V	4.4	9.7	22.60	30.0	-7.4	
1745.00	10.18	H	4.4	9.7	15.45	30.0	-14.5	
High Ch								
1777.50	17.32	V	4.4	9.7	22.58	30.0	-7.4	
1777.50	10.72	H	4.4	9.7	15.98	30.0	-14.0	

LTE Band 66

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/4/2021
Test Engineer: 20882
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_16QAM Band 66 Fundamentals, 5MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1712.50	15.26	V	4.4	9.6	20.47	30.0	-9.5	
1712.50	8.80	H	4.4	9.6	14.01	30.0	-16.0	
Mid Ch								
1745.00	16.44	V	4.4	9.7	21.71	30.0	-8.3	
1745.00	6.35	H	4.4	9.7	11.62	30.0	-18.4	
High Ch								
1777.50	16.43	V	4.4	9.7	21.69	30.0	-8.3	
1777.50	9.90	H	4.4	9.7	15.16	30.0	-14.8	

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LTE Band 66

3MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/4/2021
Test Engineer: 20882
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_QPSK Band 66 Fundamentals, 3MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1711.50	16.42	V	4.4	9.6	21.63	30.0	-8.4	
1711.50	10.31	H	4.4	9.6	15.52	30.0	-14.5	
Mid Ch								
1745.00	17.20	V	4.4	9.7	22.47	30.0	-7.5	
1745.00	10.28	H	4.4	9.7	15.55	30.0	-14.4	
High Ch								
1778.50	17.49	V	4.4	9.7	22.75	30.0	-7.2	
1778.50	10.80	H	4.4	9.7	16.06	30.0	-13.9	

LTE Band 66

3MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/4/2021
Test Engineer: 20882
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_16QAM Band 66 Fundamentals, 3MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1711.50	15.26	V	4.4	9.6	20.47	30.0	-9.5	
1711.50	9.20	H	4.4	9.6	14.41	30.0	-15.6	
Mid Ch								
1745.00	16.08	V	4.4	9.7	21.35	30.0	-8.6	
1745.00	9.23	H	4.4	9.7	14.50	30.0	-15.5	
High Ch								
1778.50	16.22	V	4.4	9.7	21.48	30.0	-8.5	
1778.50	9.89	H	4.4	9.7	15.15	30.0	-14.9	

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LTE Band 66

1.4MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/4/2021
Test Engineer: 20882
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_QPSK Band 66 Fundamentals, 1.4MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1710.70	16.31	V	4.4	9.6	21.52	30.0	-8.5	
1710.70	10.02	H	4.4	9.6	15.22	30.0	-14.8	
Mid Ch								
1745.00	17.41	V	4.4	9.7	22.68	30.0	-7.3	
1745.00	7.25	H	4.4	9.7	12.52	30.0	-17.5	
High Ch								
1779.30	17.09	V	4.4	9.7	22.35	30.0	-7.7	
1779.30	10.66	H	4.4	9.7	15.92	30.0	-14.1	

LTE Band 66

1.4MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4790047196
Date: 8/4/2021
Test Engineer: 20882
Configuration: EUT, Y-Position
Location: Chamber 1
Mode: LTE_16QAM Band 66 Fundamentals, 1.4MHz Bandwidth

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

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1710.70	15.48	V	4.4	9.6	20.69	30.0	-9.3	
1710.70	8.91	H	4.4	9.6	14.11	30.0	-15.9	
Mid Ch								
1745.00	16.26	V	4.4	9.7	21.53	30.0	-8.5	
1745.00	6.34	H	4.4	9.7	11.61	30.0	-18.4	
High Ch								
1779.30	15.96	V	4.4	9.7	21.22	30.0	-8.8	
1779.30	9.61	H	4.4	9.7	14.87	30.0	-15.1	

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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.

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TEST PROCEDURE

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

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

RESULTS

See the following pages.

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

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9.6.1. SPURIOUS RADIATION PLOTS

GSM850

GSM850

GPRS

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

Company: Samsung
Project #: 4790047196
Date: 8/3/2021
Test Engineer: 20882
Configuration: EUT / AC Adapter, Z-Position
Location: Chamber 1
Mode: GPRS 850 MHz Harmonics
Test Votage: AC 120 V, 60 Hz

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 824.2MHz									
1648.40	-10.7	V	3.0	45.3	1.0	-55.0	-13.0	-42.0	
2472.60	-4.2	V	3.0	45.1	1.0	-48.3	-13.0	-35.3	
3296.80	-8.4	V	3.0	45.3	1.0	-52.7	-13.0	-39.7	
1648.40	-12.0	H	3.0	45.3	1.0	-56.2	-13.0	-43.2	
2472.60	-5.8	H	3.0	45.1	1.0	-49.9	-13.0	-36.9	
3296.80	-8.3	H	3.0	45.3	1.0	-52.6	-13.0	-39.6	
Mid Ch, 836.6MHz									
1673.20	-10.5	V	3.0	45.3	1.0	-54.8	-13.0	-41.8	
2509.80	1.9	V	3.0	45.1	1.0	-42.2	-13.0	-29.2	
3346.40	-8.5	V	3.0	45.3	1.0	-52.8	-13.0	-39.8	
1673.20	-7.8	H	3.0	45.3	1.0	-52.1	-13.0	-39.1	
2509.80	0.7	H	3.0	45.1	1.0	-43.4	-13.0	-30.4	
3346.40	-8.2	H	3.0	45.3	1.0	-52.5	-13.0	-39.5	
High Ch, 848.8MHz									
1697.60	-1.0	V	3.0	45.2	1.0	-45.3	-13.0	-32.3	
2546.40	-9.0	V	3.0	45.1	1.0	-53.1	-13.0	-40.1	
3395.20	-8.1	V	3.0	45.3	1.0	-52.5	-13.0	-39.5	
1697.60	-0.8	H	3.0	45.2	1.0	-45.0	-13.0	-32.0	
2546.40	-10.2	H	3.0	45.1	1.0	-54.4	-13.0	-41.4	
3395.20	-7.9	H	3.0	45.3	1.0	-52.2	-13.0	-39.2	

GSM850

EGPRS

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

Company: Samsung
Project #: 4790047196
Date: 8/3/2021
Test Engineer: 20882
Configuration: EUT / AC Adapter, Z-Position
Location: Chamber 1
Mode: EGPRS 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	-4.1	V	3.0	45.3	1.0	-48.3	-13.0	-35.3	
2472.60	-9.8	V	3.0	45.1	1.0	-53.9	-13.0	-40.9	
3296.80	-8.6	V	3.0	45.3	1.0	-52.9	-13.0	-39.9	
1648.40	-6.9	H	3.0	45.3	1.0	-51.2	-13.0	-38.2	
2472.60	-6.8	H	3.0	45.1	1.0	-50.9	-13.0	-37.9	
3296.80	-8.3	H	3.0	45.3	1.0	-52.6	-13.0	-39.6	
Mid Ch, 836.6MHz									
1673.20	-9.9	V	3.0	45.3	1.0	-54.1	-13.0	-41.1	
2509.80	-9.0	V	3.0	45.1	1.0	-53.1	-13.0	-40.1	
3346.40	-8.4	V	3.0	45.3	1.0	-52.8	-13.0	-39.8	
1673.20	-7.8	H	3.0	45.3	1.0	-52.1	-13.0	-39.1	
2509.80	-10.2	H	3.0	45.1	1.0	-54.3	-13.0	-41.3	
3346.40	-8.2	H	3.0	45.3	1.0	-52.5	-13.0	-39.5	
High Ch, 848.8MHz									
1697.60	-5.1	V	3.0	45.2	1.0	-49.3	-13.0	-36.3	
2546.40	-9.8	V	3.0	45.1	1.0	-53.9	-13.0	-40.9	
3395.20	-8.3	V	3.0	45.3	1.0	-52.6	-13.0	-39.6	
1697.60	-4.7	H	3.0	45.2	1.0	-48.9	-13.0	-35.9	
2546.40	-10.6	H	3.0	45.1	1.0	-54.7	-13.0	-41.7	
3395.20	-8.0	H	3.0	45.3	1.0	-52.3	-13.0	-39.3	

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GSM1900

GSM1900

GPRS

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

Company:	Samsung
Project #:	4790047196
Date:	8/3/2021
Test Engineer:	20882
Configuration:	EUT/ AC Adapter, Z-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	-10.5	V	3.0	45.5	1.0	-55.0	-13.0	-42.0	
5550.60	5.4	V	3.0	45.4	1.0	-39.0	-13.0	-26.0	
7400.80	-5.3	V	3.0	44.2	1.0	-48.5	-13.0	-35.5	
9251.00	-0.9	V	3.0	43.0	1.0	-42.8	-13.0	-29.8	
11101.20	0.7	V	3.0	42.6	1.0	-40.9	-13.0	-27.9	
3700.40	-10.3	H	3.0	45.5	1.0	-54.7	-13.0	-41.7	
5550.60	4.0	H	3.0	45.4	1.0	-40.4	-13.0	-27.4	
7400.80	-5.2	H	3.0	44.2	1.0	-48.4	-13.0	-35.4	
9251.00	-1.5	H	3.0	43.0	1.0	-43.5	-13.0	-30.5	
11101.20	0.8	H	3.0	42.6	1.0	-40.8	-13.0	-27.8	
Mid Ch, 1880MHz									
3760.00	-10.3	V	3.0	45.5	1.0	-54.8	-13.0	-41.8	
5640.00	7.1	V	3.0	45.4	1.0	-37.3	-13.0	-24.3	
7520.00	-5.5	V	3.0	44.1	1.0	-48.6	-13.0	-35.6	
9400.00	0.6	V	3.0	42.8	1.0	-41.2	-13.0	-28.2	
11280.00	0.7	V	3.0	42.6	1.0	-41.0	-13.0	-28.0	
3760.00	-10.3	H	3.0	45.5	1.0	-54.8	-13.0	-41.8	
5640.00	9.8	H	3.0	45.4	1.0	-34.6	-13.0	-21.6	
7520.00	-5.4	H	3.0	44.1	1.0	-48.6	-13.0	-35.6	
9400.00	0.2	H	3.0	42.8	1.0	-41.6	-13.0	-28.6	
11280.00	0.6	H	3.0	42.6	1.0	-41.1	-13.0	-28.1	
High Ch, 1909.8MHz									
3819.60	-10.5	V	3.0	45.5	1.0	-55.0	-13.0	-42.0	
5729.40	3.9	V	3.0	45.4	1.0	-40.4	-13.0	-27.4	
7639.20	-4.9	V	3.0	44.1	1.0	-48.0	-13.0	-35.0	
9549.00	-2.0	V	3.0	42.7	1.0	-43.7	-13.0	-30.7	
11458.80	0.6	V	3.0	42.7	1.0	-41.1	-13.0	-28.1	
3819.60	-10.1	H	3.0	45.5	1.0	-54.6	-13.0	-41.6	
5729.40	5.4	H	3.0	45.4	1.0	-38.9	-13.0	-25.9	
7639.20	-4.7	H	3.0	44.1	1.0	-47.8	-13.0	-34.8	
9549.00	-1.3	H	3.0	42.7	1.0	-43.0	-13.0	-30.0	
11458.80	0.7	H	3.0	42.7	1.0	-41.0	-13.0	-28.0	

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GSM1900

EGPRS

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

Company: Samsung
Project #: 4790047196
Date: 8/3/2021
Test Engineer: 20882
Configuration: EUT / AC Adapter, Z-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	-10.6	V	3.0	45.5	1.0	-55.0	-13.0	-42.0	
5550.60	-2.7	V	3.0	45.4	1.0	-47.1	-13.0	-34.1	
7400.80	-5.2	V	3.0	44.2	1.0	-48.4	-13.0	-35.4	
9251.00	-3.0	V	3.0	43.0	1.0	-44.9	-13.0	-31.9	
11101.20	0.8	V	3.0	42.6	1.0	-40.8	-13.0	-27.8	
3700.40	-10.2	H	3.0	45.5	1.0	-54.7	-13.0	-41.7	
5550.60	-4.9	H	3.0	45.4	1.0	-49.3	-13.0	-36.3	
7400.80	-5.0	H	3.0	44.2	1.0	-48.2	-13.0	-35.2	
9251.00	-3.3	H	3.0	43.0	1.0	-45.3	-13.0	-32.3	
11101.20	0.8	H	3.0	42.6	1.0	-40.8	-13.0	-27.8	
Mid Ch, 1880MHz									
3760.00	-10.4	V	3.0	45.5	1.0	-54.8	-13.0	-41.8	
5640.00	0.9	V	3.0	45.4	1.0	-43.5	-13.0	-30.5	
7520.00	-5.3	V	3.0	44.1	1.0	-48.4	-13.0	-35.4	
9400.00	-1.9	V	3.0	42.8	1.0	-43.7	-13.0	-30.7	
11280.00	0.4	V	3.0	42.6	1.0	-41.2	-13.0	-28.2	
3760.00	-10.2	H	3.0	45.5	1.0	-54.7	-13.0	-41.7	
5640.00	-0.2	H	3.0	45.4	1.0	-44.6	-13.0	-31.6	
7520.00	-5.3	H	3.0	44.1	1.0	-48.4	-13.0	-35.4	
9400.00	-2.2	H	3.0	42.8	1.0	-44.0	-13.0	-31.0	
11280.00	0.5	H	3.0	42.6	1.0	-41.2	-13.0	-28.2	
High Ch, 1909.8MHz									
3819.60	-10.3	V	3.0	45.5	1.0	-54.8	-13.0	-41.8	
5729.40	-7.2	V	3.0	45.4	1.0	-51.6	-13.0	-38.6	
7639.20	-5.2	V	3.0	44.1	1.0	-48.3	-13.0	-35.3	
9549.00	-2.6	V	3.0	42.7	1.0	-44.3	-13.0	-31.3	
11458.80	0.6	V	3.0	42.7	1.0	-41.1	-13.0	-28.1	
3819.60	-10.3	H	3.0	45.5	1.0	-54.8	-13.0	-41.8	
5729.40	-5.5	H	3.0	45.4	1.0	-49.9	-13.0	-36.9	
7639.20	-5.0	H	3.0	44.1	1.0	-48.1	-13.0	-35.1	
9549.00	-2.7	H	3.0	42.7	1.0	-44.4	-13.0	-31.4	
11458.80	0.5	H	3.0	42.7	1.0	-41.2	-13.0	-28.2	

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WCDMA Band 5

Band 5 REL99

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

Company: Samsung
Project #: 4790047196
Date: 8/3/2021
Test Engineer: 19568
Configuration: EUT / AC Adapter, Z-Position
Location: Chamber 1
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	-13.6	V	3.0	45.3	1.0	-57.8	-13.0	-44.8	
2479.20	-9.7	V	3.0	45.1	1.0	-53.8	-13.0	-40.8	
3305.60	-9.4	V	3.0	45.3	1.0	-53.7	-13.0	-40.7	
1652.80	-15.4	H	3.0	45.3	1.0	-59.6	-13.0	-46.6	
2479.20	-9.9	H	3.0	45.1	1.0	-54.0	-13.0	-41.0	
3305.60	-9.0	H	3.0	45.3	1.0	-53.3	-13.0	-40.3	
Mid Ch, 836.6MHz									
1673.20	-13.2	V	3.0	45.3	1.0	-57.5	-13.0	-44.5	
2509.80	-9.3	V	3.0	45.1	1.0	-53.4	-13.0	-40.4	
3346.40	-9.0	V	3.0	45.3	1.0	-53.3	-13.0	-40.3	
1673.20	-15.2	H	3.0	45.3	1.0	-59.4	-13.0	-46.4	
2509.80	-10.3	H	3.0	45.1	1.0	-54.4	-13.0	-41.4	
3346.40	-8.9	H	3.0	45.3	1.0	-53.2	-13.0	-40.2	
High Ch, 846.6MHz									
1693.20	-13.5	V	3.0	45.2	1.0	-57.7	-13.0	-44.7	
2539.80	-7.0	V	3.0	45.1	1.0	-51.1	-13.0	-38.1	
3386.40	-8.7	V	3.0	45.3	1.0	-53.1	-13.0	-40.1	
1693.20	-14.9	H	3.0	45.2	1.0	-59.1	-13.0	-46.1	
2539.80	-6.6	H	3.0	45.1	1.0	-50.8	-13.0	-37.8	
3386.40	-8.9	H	3.0	45.3	1.0	-53.2	-13.0	-40.2	

Band 5 HSDPA

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

Company: Samsung
Project #: 4790047196
Date: 8/3/2021
Test Engineer: 19568
Configuration: EUT / AC Adpater, Z-Position
Location: Chamber 1
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	-13.7	V	3.0	45.3	1.0	-57.9	-13.0	-44.9	
2479.20	-10.9	V	3.0	45.1	1.0	-55.0	-13.0	-42.0	
3305.60	-9.4	V	3.0	45.3	1.0	-53.8	-13.0	-40.8	
1652.80	-15.3	H	3.0	45.3	1.0	-59.6	-13.0	-46.6	
2479.20	-11.6	H	3.0	45.1	1.0	-55.7	-13.0	-42.7	
3305.60	-9.3	H	3.0	45.3	1.0	-53.6	-13.0	-40.6	
Mid Ch, 836.6MHz									
1673.20	-13.5	V	3.0	45.3	1.0	-57.7	-13.0	-44.7	
2509.80	-10.8	V	3.0	45.1	1.0	-54.9	-13.0	-41.9	
3346.40	-9.2	V	3.0	45.3	1.0	-53.5	-13.0	-40.5	
1673.20	-15.1	H	3.0	45.3	1.0	-59.3	-13.0	-46.3	
2509.80	-11.6	H	3.0	45.1	1.0	-55.7	-13.0	-42.7	
3346.40	-9.0	H	3.0	45.3	1.0	-53.3	-13.0	-40.3	
High Ch, 846.6MHz									
1693.20	-13.4	V	3.0	45.2	1.0	-57.6	-13.0	-44.6	
2539.80	-10.9	V	3.0	45.1	1.0	-55.0	-13.0	-42.0	
3386.40	-9.1	V	3.0	45.3	1.0	-53.4	-13.0	-40.4	
1693.20	-14.9	H	3.0	45.2	1.0	-59.2	-13.0	-46.2	
2539.80	-11.5	H	3.0	45.1	1.0	-55.6	-13.0	-42.6	
3386.40	-8.7	H	3.0	45.3	1.0	-53.0	-13.0	-40.0	

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WCDMA Band 4

Band 4 REL99

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

Company: Samsung
Project #: 4790047196
Date: 8/3/2021
Test Engineer: 19568
Configuration: EUT / AC Adpater, X-Position
Location: Chamber 1
Mode: Rel99 Band 4 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, 1712.4MHz									
3424.80	-8.6	V	3.0	45.4	1.0	-53.0	-13.0	-40.0	
5137.20	-9.8	V	3.0	45.5	1.0	-54.2	-13.0	-41.2	
6849.60	-6.8	V	3.0	44.5	1.0	-50.3	-13.0	-37.3	
3424.80	-8.4	H	3.0	45.4	1.0	-52.7	-13.0	-39.7	
5137.20	-9.4	H	3.0	45.5	1.0	-53.9	-13.0	-40.9	
6849.60	-6.6	H	3.0	44.5	1.0	-50.1	-13.0	-37.1	
Mid Ch, 1732.6MHz									
3465.20	-8.4	V	3.0	45.4	1.0	-52.8	-13.0	-39.8	
5197.80	-9.4	V	3.0	45.4	1.0	-53.8	-13.0	-40.8	
6930.40	-6.7	V	3.0	44.5	1.0	-50.1	-13.0	-37.1	
3465.20	-8.2	H	3.0	45.4	1.0	-52.6	-13.0	-39.6	
5197.80	-9.0	H	3.0	45.4	1.0	-53.5	-13.0	-40.5	
6930.40	-6.4	H	3.0	44.5	1.0	-49.8	-13.0	-36.8	
High Ch, 1752.6MHz									
3505.20	-8.3	V	3.0	45.4	1.0	-52.7	-13.0	-39.7	
5257.80	-9.4	V	3.0	45.4	1.0	-53.9	-13.0	-40.9	
7010.40	-6.2	V	3.0	44.4	1.0	-49.6	-13.0	-36.6	
3505.20	-8.1	H	3.0	45.4	1.0	-52.5	-13.0	-39.5	
5257.80	-9.1	H	3.0	45.4	1.0	-53.5	-13.0	-40.5	
7010.40	-6.0	H	3.0	44.4	1.0	-49.4	-13.0	-36.4	

Band 4 HSDPA

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

Company: Samsung
Project #: 4790047196
Date: 8/3/2021
Test Engineer: 19568
Configuration: EUT / AC Adpater, X-Position
Location: Chamber 1
Mode: HSDPA Band 4 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, 1712.4MHz									
3424.80	-8.6	V	3.0	45.4	1.0	-53.0	-13.0	-40.0	
5137.20	-9.7	V	3.0	45.5	1.0	-54.2	-13.0	-41.2	
6849.60	-6.8	V	3.0	44.5	1.0	-50.3	-13.0	-37.3	
3424.80	-8.4	H	3.0	45.4	1.0	-52.7	-13.0	-39.7	
5137.20	-9.4	H	3.0	45.5	1.0	-53.9	-13.0	-40.9	
6849.60	-6.6	H	3.0	44.5	1.0	-50.2	-13.0	-37.2	
Mid Ch, 1732.6MHz									
3465.20	-8.4	V	3.0	45.4	1.0	-52.8	-13.0	-39.8	
5197.80	-9.5	V	3.0	45.4	1.0	-53.9	-13.0	-40.9	
6930.40	-6.8	V	3.0	44.5	1.0	-50.3	-13.0	-37.3	
3465.20	-8.3	H	3.0	45.4	1.0	-52.7	-13.0	-39.7	
5197.80	-9.1	H	3.0	45.4	1.0	-53.5	-13.0	-40.5	
6930.40	-6.5	H	3.0	44.5	1.0	-49.9	-13.0	-36.9	
High Ch, 1752.6MHz									
3505.20	-8.4	V	3.0	45.4	1.0	-52.7	-13.0	-39.7	
5257.80	-9.5	V	3.0	45.4	1.0	-53.9	-13.0	-40.9	
7010.40	-6.3	V	3.0	44.4	1.0	-49.7	-13.0	-36.7	
3505.20	-8.1	H	3.0	45.4	1.0	-52.5	-13.0	-39.5	
5257.80	-9.1	H	3.0	45.4	1.0	-53.5	-13.0	-40.5	
7010.40	-5.9	H	3.0	44.4	1.0	-49.3	-13.0	-36.3	

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WCDMA Band 2

Band 2 REL99

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

Company: Samsung
Project #: 4790047196
Date: 8/3/2021
Test Engineer: 19568
Configuration: EUT / AC Adapter, X-Position
Location: Chamber 1
Mode: Rel99 Band 2 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, 1852.4MHz									
3704.80	-11.4	V	3.0	45.5	1.0	-55.9	-13.0	-42.9	
5557.20	-9.2	V	3.0	45.4	1.0	-53.6	-13.0	-40.6	
7409.60	-6.4	V	3.0	44.2	1.0	-49.6	-13.0	-36.6	
3704.80	-11.2	H	3.0	45.5	1.0	-55.6	-13.0	-42.6	
5557.20	-8.9	H	3.0	45.4	1.0	-53.3	-13.0	-40.3	
7409.60	-6.2	H	3.0	44.2	1.0	-49.4	-13.0	-36.4	
Mid Ch, 1880MHz									
3760.00	-11.2	V	3.0	45.5	1.0	-55.7	-13.0	-42.7	
5640.00	-8.9	V	3.0	45.4	1.0	-53.3	-13.0	-40.3	
7520.00	-6.4	V	3.0	44.1	1.0	-49.6	-13.0	-36.6	
3760.00	-11.1	H	3.0	45.5	1.0	-55.6	-13.0	-42.6	
5640.00	-8.8	H	3.0	45.4	1.0	-53.1	-13.0	-40.1	
7520.00	-6.3	H	3.0	44.1	1.0	-49.4	-13.0	-36.4	
High Ch, 1907.6MHz									
3815.20	-11.4	V	3.0	45.5	1.0	-55.9	-13.0	-42.9	
5722.80	-9.0	V	3.0	45.4	1.0	-53.3	-13.0	-40.3	
7630.40	-6.1	V	3.0	44.1	1.0	-49.2	-13.0	-36.2	
3815.20	-11.0	H	3.0	45.5	1.0	-55.5	-13.0	-42.5	
5722.80	-8.9	H	3.0	45.4	1.0	-53.3	-13.0	-40.3	
7630.40	-5.8	H	3.0	44.1	1.0	-48.9	-13.0	-35.9	

Band 2 HSDPA

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

Company: Samsung
Project #: 4790047196
Date: 8/3/2021
Test Engineer: 19568
Configuration: EUT / AC Adapter, X-Position
Location: Chamber 1
Mode: HSDPA Band 2 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, 1852.4MHz									
3704.80	-11.6	V	3.0	45.5	1.0	-56.0	-13.0	-43.0	
5557.20	-9.3	V	3.0	45.4	1.0	-53.7	-13.0	-40.7	
7409.60	-6.4	V	3.0	44.2	1.0	-49.6	-13.0	-36.6	
3704.80	-11.3	H	3.0	45.5	1.0	-55.7	-13.0	-42.7	
5557.20	-8.9	H	3.0	45.4	1.0	-53.3	-13.0	-40.3	
7409.60	-5.9	H	3.0	44.2	1.0	-49.1	-13.0	-36.1	
Mid Ch, 1880MHz									
3760.00	-11.4	V	3.0	45.5	1.0	-55.9	-13.0	-42.9	
5640.00	-9.1	V	3.0	45.4	1.0	-53.4	-13.0	-40.4	
7520.00	-6.5	V	3.0	44.1	1.0	-49.7	-13.0	-36.7	
3760.00	-11.1	H	3.0	45.5	1.0	-55.6	-13.0	-42.6	
5640.00	-8.9	H	3.0	45.4	1.0	-53.3	-13.0	-40.3	
7520.00	-6.4	H	3.0	44.1	1.0	-49.5	-13.0	-36.5	
High Ch, 1907.6MHz									
3815.20	-11.4	V	3.0	45.5	1.0	-55.9	-13.0	-42.9	
5722.80	-9.0	V	3.0	45.4	1.0	-53.4	-13.0	-40.4	
7630.40	-6.2	V	3.0	44.1	1.0	-49.3	-13.0	-36.3	
3815.20	-11.1	H	3.0	45.5	1.0	-55.6	-13.0	-42.6	
5722.80	-9.0	H	3.0	45.4	1.0	-53.4	-13.0	-40.4	
7630.40	-6.1	H	3.0	44.1	1.0	-49.2	-13.0	-36.2	

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LTE Band 2

LTE Band 2

5MHz

QPSK

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

Company:	Samsung
Project #:	4790047196
Date:	8/4/2021
Test Engineer:	20882
Configuration:	EUT / AC Adapter, Z-Position
Location:	Chamber 1
Mode:	LTE_QPSK Band 2 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, 1852.5MHz									
3705.00	-11.4	V	3.0	45.5	1.0	-55.9	-13.0	-42.9	
5557.50	-8.9	V	3.0	45.4	1.0	-53.3	-13.0	-40.3	
7410.00	-6.2	V	3.0	44.2	1.0	-49.4	-13.0	-36.4	
3705.00	-11.2	H	3.0	45.5	1.0	-55.7	-13.0	-42.7	
5557.50	-8.9	H	3.0	45.4	1.0	-53.3	-13.0	-40.3	
7410.00	-6.1	H	3.0	44.2	1.0	-49.3	-13.0	-36.3	
Mid Ch, 1880MHz									
3760.00	-11.2	V	3.0	45.5	1.0	-55.7	-13.0	-42.7	
5640.00	-8.5	V	3.0	45.4	1.0	-52.9	-13.0	-39.9	
7520.00	-6.2	V	3.0	44.1	1.0	-49.3	-13.0	-36.3	
3760.00	-11.0	H	3.0	45.5	1.0	-55.5	-13.0	-42.5	
5640.00	-7.8	H	3.0	45.4	1.0	-52.1	-13.0	-39.1	
7520.00	-6.2	H	3.0	44.1	1.0	-49.3	-13.0	-36.3	
High Ch, 1907.5MHz									
3815.00	-11.4	V	3.0	45.5	1.0	-55.9	-13.0	-42.9	
5722.50	-9.0	V	3.0	45.4	1.0	-53.4	-13.0	-40.4	
7630.00	-6.1	V	3.0	44.1	1.0	-49.2	-13.0	-36.2	
3815.00	-11.0	H	3.0	45.5	1.0	-55.5	-13.0	-42.5	
5722.50	-9.0	H	3.0	45.4	1.0	-53.4	-13.0	-40.4	
7630.00	-6.0	H	3.0	44.1	1.0	-49.1	-13.0	-36.1	

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LTE Band 5

LTE Band 5

5MHz

QPSK

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

Company:	Samsung
Project #:	4790047196
Date:	8/6/2021
Test Engineer:	20882
Configuration:	EUT / AC Adapter, Z-Position
Location:	Chamber 1
Mode:	LTE_QPSK Band 5 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	-13.5	V	3.0	45.3	1.0	-57.8	-13.0	-44.8	
2479.50	-10.5	V	3.0	45.1	1.0	-54.6	-13.0	-41.6	
3306.00	-9.1	V	3.0	45.3	1.0	-53.4	-13.0	-40.4	
1653.00	-14.9	H	3.0	45.3	1.0	-59.1	-13.0	-46.1	
2479.50	-11.4	H	3.0	45.1	1.0	-55.5	-13.0	-42.5	
3306.00	-9.0	H	3.0	45.3	1.0	-53.3	-13.0	-40.3	
Mid Ch, 836.5MHz									
1673.00	-13.3	V	3.0	45.3	1.0	-57.5	-13.0	-44.5	
2509.50	-10.5	V	3.0	45.1	1.0	-54.6	-13.0	-41.6	
3346.00	-8.7	V	3.0	45.3	1.0	-53.1	-13.0	-40.1	
1673.00	-14.8	H	3.0	45.3	1.0	-59.0	-13.0	-46.0	
2509.50	-11.0	H	3.0	45.1	1.0	-55.1	-13.0	-42.1	
3346.00	-9.0	H	3.0	45.3	1.0	-53.3	-13.0	-40.3	
High Ch, 846.5MHz									
1693.00	-13.1	V	3.0	45.2	1.0	-57.4	-13.0	-44.4	
2539.50	-10.6	V	3.0	45.1	1.0	-54.7	-13.0	-41.7	
3386.00	-8.9	V	3.0	45.3	1.0	-53.2	-13.0	-40.2	
1693.00	-14.8	H	3.0	45.2	1.0	-59.1	-13.0	-46.1	
2539.50	-11.3	H	3.0	45.1	1.0	-55.4	-13.0	-42.4	
3386.00	-8.9	H	3.0	45.3	1.0	-53.2	-13.0	-40.2	

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LTE Band 12

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

Company:	Samsung
Project #:	4790047196
Date:	8/6/2021
Test Engineer:	19568
Configuration:	EUT, Y-Position
Location:	Chamber 1
Mode:	LTE_QPSK Band 12 Harmonics, 3MHz Bandwidth
Test Votage:	AC 120 V, 60 Hz

LTE Band 12

3MHz

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, 700.5MHz									
1401.00	-15.1	V	3.0	45.5	1.0	-59.6	-13.0	-46.6	
2101.50	-2.7	V	3.0	45.0	1.0	-46.7	-13.0	-33.7	
2802.00	-9.8	V	3.0	45.2	1.0	-54.0	-13.0	-41.0	
1401.00	-16.5	H	3.0	45.5	1.0	-60.9	-13.0	-47.9	
2101.50	-9.2	H	3.0	45.0	1.0	-53.3	-13.0	-40.3	
2802.00	-10.0	H	3.0	45.2	1.0	-54.2	-13.0	-41.2	
Mid Ch, 707.5MHz									
1415.00	-13.8	V	3.0	45.5	1.0	-58.2	-13.0	-45.2	
2122.50	-3.3	V	3.0	45.0	1.0	-47.3	-13.0	-34.3	
2830.00	-10.0	V	3.0	45.2	1.0	-54.1	-13.0	-41.1	
1415.00	-16.6	H	3.0	45.5	1.0	-61.0	-13.0	-48.0	
2122.50	-8.7	H	3.0	45.0	1.0	-52.7	-13.0	-39.7	
2830.00	-9.9	H	3.0	45.2	1.0	-54.1	-13.0	-41.1	
High Ch, 714.5MHz									
1429.00	-14.8	V	3.0	45.4	1.0	-59.2	-13.0	-46.2	
2143.50	-3.4	V	3.0	45.0	1.0	-47.5	-13.0	-34.5	
2858.00	-10.0	V	3.0	45.2	1.0	-54.1	-13.0	-41.1	
1429.00	-16.3	H	3.0	45.4	1.0	-60.7	-13.0	-47.7	
2143.50	-6.7	H	3.0	45.0	1.0	-50.7	-13.0	-37.7	
2858.00	-11.0	H	3.0	45.2	1.0	-55.2	-13.0	-42.2	

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LTE Band 13

LTE Band 13

5MHz

QPSK

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

Company:	Samsung
Project #:	4790047196
Date:	8/6/2021
Test Engineer:	20882
Configuration:	EUT / AC Adapter, Z-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	-20.7	V	3.0	45.3	1.0	-65.1	-40.0	-25.1	
2338.50	-10.3	V	3.0	45.1	1.0	-54.3	-13.0	-41.3	
3118.00	-9.1	V	3.0	45.3	1.0	-53.3	-13.0	-40.3	
1559.00	-19.5	H	3.0	45.3	1.0	-63.9	-40.0	-23.9	
2338.50	-11.3	H	3.0	45.1	1.0	-55.4	-13.0	-42.4	
3118.00	-9.6	H	3.0	45.3	1.0	-53.8	-13.0	-40.8	
Mid Ch, 782MHz									
1564.00	-18.8	V	3.0	45.3	1.0	-63.1	-40.0	-23.1	
2346.00	-10.0	V	3.0	45.1	1.0	-54.0	-13.0	-41.0	
3128.00	-9.4	V	3.0	45.3	1.0	-53.7	-13.0	-40.7	
1564.00	-19.7	H	3.0	45.3	1.0	-64.1	-40.0	-24.1	
2346.00	-9.7	H	3.0	45.1	1.0	-53.7	-13.0	-40.7	
3128.00	-9.4	H	3.0	45.3	1.0	-53.6	-13.0	-40.6	
High Ch, 784.5MHz									
1569.00	-20.4	V	3.0	45.3	1.0	-64.7	-40.0	-24.7	
2353.50	-10.3	V	3.0	45.1	1.0	-54.4	-13.0	-41.4	
3138.00	-9.5	V	3.0	45.3	1.0	-53.7	-13.0	-40.7	
1569.00	-19.6	H	3.0	45.3	1.0	-63.9	-40.0	-23.9	
2353.50	-11.6	H	3.0	45.1	1.0	-55.7	-13.0	-42.7	
3138.00	-9.5	H	3.0	45.3	1.0	-53.7	-13.0	-40.7	

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

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LTE Band 26 (Part 90)

LTE Band 26

15MHz

QPSK

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

Company: Samsung
Project #: 4790047196
Date: 8/6/2021
Test Engineer: 20882
Configuration: EUT / AC Adapter, X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 26 Harmonics, 15MHz Bandwidth
Test Votage: AC 120 V, 60 Hz

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 821.5MHz									
1653.00	-13.5	V	3.0	45.3	1.0	-57.8	-13.0	-44.8	
2479.50	-10.6	V	3.0	45.1	1.0	-54.7	-13.0	-41.7	
3306.00	-9.1	V	3.0	45.3	1.0	-53.4	-13.0	-40.4	
1653.00	-15.2	H	3.0	45.3	1.0	-59.4	-13.0	-46.4	
2479.50	-11.1	H	3.0	45.1	1.0	-55.2	-13.0	-42.2	
3306.00	-9.1	H	3.0	45.3	1.0	-53.4	-13.0	-40.4	

LTE Band 26 (Straddle)

LTE Band 26

15MHz

QPSK

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

Company: Samsung
Project #: 4790047196
Date: 8/6/2021
Test Engineer: 20882
Configuration: EUT / AC Adapter, X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 26 Harmonics, 15MHz Bandwidth
Test Votage: AC 120 V, 60 Hz

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 824 MHz									
1648.00	-13.2	V	3.0	45.3	1.0	-57.5	-13.0	-44.5	
2472.00	-10.4	V	3.0	45.1	1.0	-54.5	-13.0	-41.5	
3296.00	-9.1	V	3.0	45.3	1.0	-53.4	-13.0	-40.4	
1648.00	-14.6	H	3.0	45.3	1.0	-58.9	-13.0	-45.9	
2472.00	-10.8	H	3.0	45.1	1.0	-54.9	-13.0	-41.9	
3296.00	-9.0	H	3.0	45.3	1.0	-53.3	-13.0	-40.3	

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LTE Band 26 (Part 22)

LTE Band 26

5MHz

QPSK

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

Company:	Samsung
Project #:	4790047196
Date:	8/6/2021
Test Engineer:	20882
Configuration:	EUT / AC Adapter, 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, 826.5									
1653.00	-13.2	V	3.0	45.3	1.0	-57.5	-13.0	-44.5	
2479.50	-10.6	V	3.0	45.1	1.0	-54.6	-13.0	-41.6	
3306.00	-9.1	V	3.0	45.3	1.0	-53.4	-13.0	-40.4	
1653.00	-13.3	H	3.0	45.3	1.0	-57.6	-13.0	-44.6	
2479.50	-11.1	H	3.0	45.1	1.0	-55.2	-13.0	-42.2	
3306.00	-9.1	H	3.0	45.3	1.0	-53.4	-13.0	-40.4	
Mid Ch, 831.5MHz									
1663.00	-11.7	V	3.0	45.3	1.0	-56.0	-13.0	-43.0	
2494.50	-7.3	V	3.0	45.1	1.0	-51.4	-13.0	-38.4	
3326.00	-9.2	V	3.0	45.3	1.0	-53.5	-13.0	-40.5	
1663.00	-13.2	H	3.0	45.3	1.0	-57.5	-13.0	-44.5	
2494.50	-8.9	H	3.0	45.1	1.0	-53.0	-13.0	-40.0	
3326.00	-9.1	H	3.0	45.3	1.0	-53.4	-13.0	-40.4	
High Ch, 846.5MHz									
1693.00	-12.9	V	3.0	45.2	1.0	-57.1	-13.0	-44.1	
2539.50	-10.3	V	3.0	45.1	1.0	-54.4	-13.0	-41.4	
3386.00	-9.0	V	3.0	45.3	1.0	-53.3	-13.0	-40.3	
1693.00	-13.5	H	3.0	45.2	1.0	-57.8	-13.0	-44.8	
2539.50	-11.3	H	3.0	45.1	1.0	-55.4	-13.0	-42.4	
3386.00	-8.9	H	3.0	45.3	1.0	-53.2	-13.0	-40.2	

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LTE Band 41 (PC3)

LTE Band 41 (PC3)

10MHz

QPSK

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

Company: Samsung
Project #: 4790047196
Date: 8/9/2021
Test Engineer: 20882
Configuration: EUT / AC Adapter, Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 41 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, 2501MHz									
5002.00	-19.3	V	3.0	45.5	1.0	-63.8	-25.0	-38.8	
7503.00	-17.4	V	3.0	44.1	1.0	-60.6	-25.0	-35.6	
10004.00	-14.8	V	3.0	42.2	1.0	-56.0	-25.0	-31.0	
5002.00	-18.8	H	3.0	45.5	1.0	-63.2	-25.0	-38.2	
7503.00	-16.9	H	3.0	44.1	1.0	-60.0	-25.0	-35.0	
10004.00	-14.9	H	3.0	42.2	1.0	-56.1	-25.0	-31.1	
Mid Ch, 2593MHz									
5186.00	-19.2	V	3.0	45.4	1.0	-63.6	-25.0	-38.6	
7779.00	-15.7	V	3.0	44.0	1.0	-58.7	-25.0	-33.7	
10372.00	-14.5	V	3.0	42.4	1.0	-55.8	-25.0	-30.8	
5186.00	-18.9	H	3.0	45.4	1.0	-63.4	-25.0	-38.4	
7779.00	-11.6	H	3.0	44.0	1.0	-54.6	-25.0	-29.6	
10372.00	-14.6	H	3.0	42.4	1.0	-56.0	-25.0	-31.0	
High Ch, 2685MHz									
5370.00	-18.5	V	3.0	45.4	1.0	-62.9	-25.0	-37.9	
8055.00	-13.4	V	3.0	43.9	1.0	-56.2	-25.0	-31.2	
10740.00	-13.7	V	3.0	42.5	1.0	-55.1	-25.0	-30.1	
5370.00	-18.3	H	3.0	45.4	1.0	-62.7	-25.0	-37.7	
8055.00	-12.8	H	3.0	43.9	1.0	-55.6	-25.0	-30.6	
10740.00	-14.1	H	3.0	42.5	1.0	-55.6	-25.0	-30.6	

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LTE Band 66

LTE Band 66

5MHz

QPSK

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

Company: Samsung
Project #: 4790047196
Date: 8/4/2021
Test Engineer: 20882
Configuration: EUT / AC Adapter, Y-Position
Location: Chamber 1
Mode: LTE_QPSK Band 66 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, 1712.5MHz									
3425.00	-8.4	V	3.0	45.4	1.0	-52.7	-13.0	-39.7	
5137.50	-9.5	V	3.0	45.5	1.0	-54.0	-13.0	-41.0	
6850.00	-6.3	V	3.0	44.5	1.0	-49.8	-13.0	-36.8	
3425.00	-8.0	H	3.0	45.4	1.0	-52.4	-13.0	-39.4	
5137.50	-9.1	H	3.0	45.5	1.0	-53.6	-13.0	-40.6	
6850.00	-6.1	H	3.0	44.5	1.0	-49.7	-13.0	-36.7	
Mid Ch, 1745MHz									
3490.00	-8.5	V	3.0	45.4	1.0	-52.9	-13.0	-39.9	
5235.00	-9.2	V	3.0	45.4	1.0	-53.7	-13.0	-40.7	
6980.00	-6.3	V	3.0	44.4	1.0	-49.7	-13.0	-36.7	
3490.00	-7.9	H	3.0	45.4	1.0	-52.2	-13.0	-39.2	
5235.00	-8.8	H	3.0	45.4	1.0	-53.3	-13.0	-40.3	
6980.00	-6.1	H	3.0	44.4	1.0	-49.5	-13.0	-36.5	
High Ch, 1777.5MHz									
3555.00	-7.8	V	3.0	45.4	1.0	-52.2	-13.0	-39.2	
5332.50	-9.0	V	3.0	45.4	1.0	-53.4	-13.0	-40.4	
7110.00	-6.0	V	3.0	44.4	1.0	-49.4	-13.0	-36.4	
3555.00	-7.4	H	3.0	45.4	1.0	-51.8	-13.0	-38.8	
5332.50	-8.7	H	3.0	45.4	1.0	-53.2	-13.0	-40.2	
7110.00	-5.8	H	3.0	44.4	1.0	-49.2	-13.0	-36.2	

LTE Band 4

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

LTE Band 17

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

END OF REPORT

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