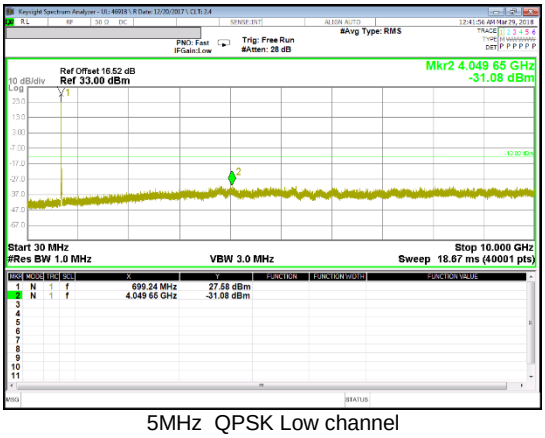
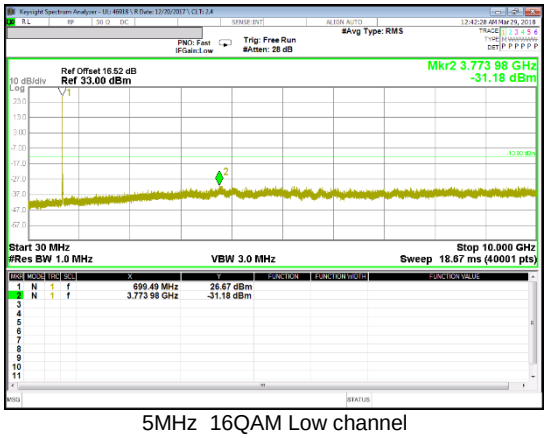
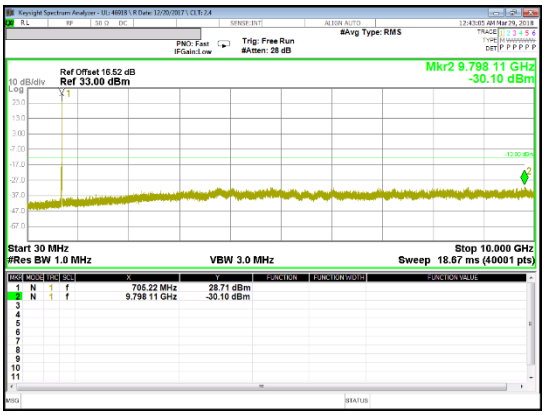
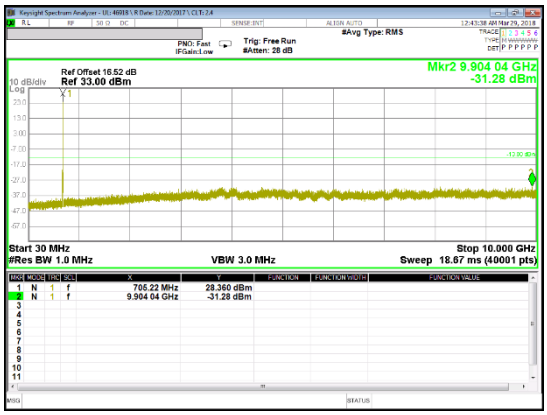
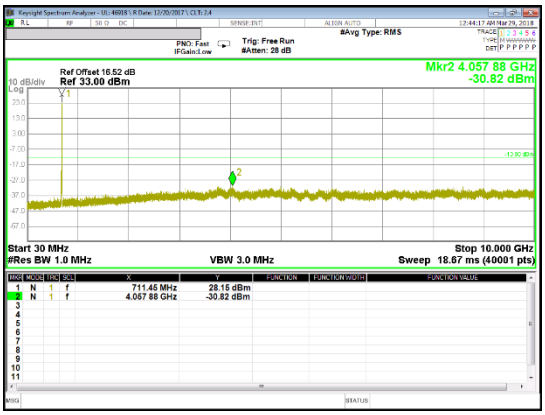
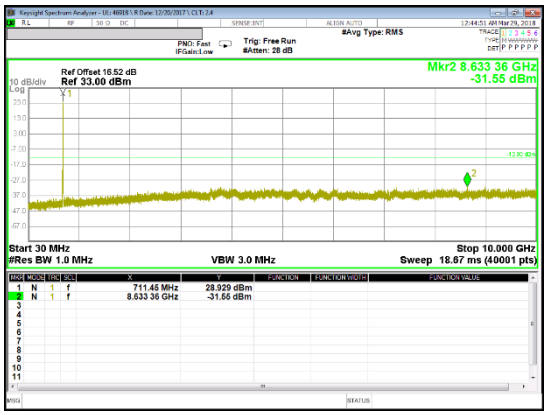
Band 12 5MHz	 5MHz QPSK Low channel	 5MHz 16QAM Low channel
	 5MHz QPSK Mid channel	 5MHz 16QAM Mid channel
	 5MHz QPSK High channel	 5MHz 16QAM High channel

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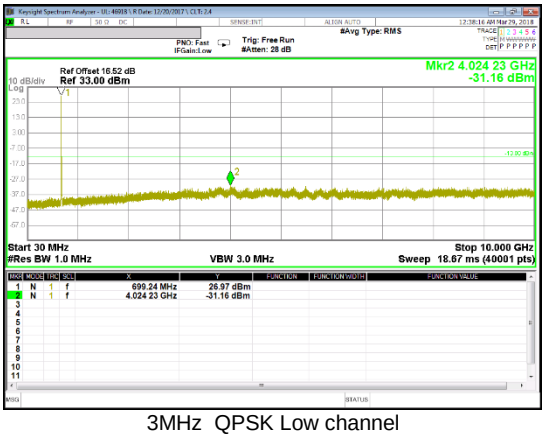
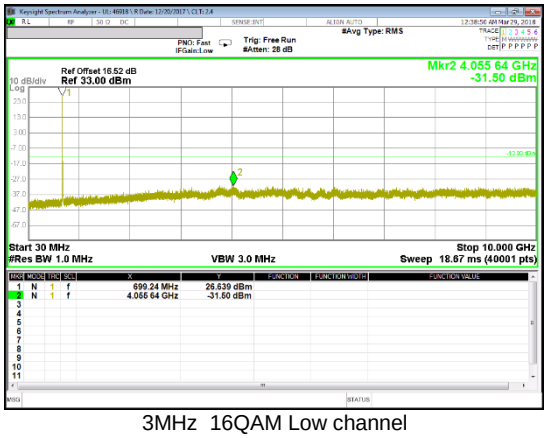
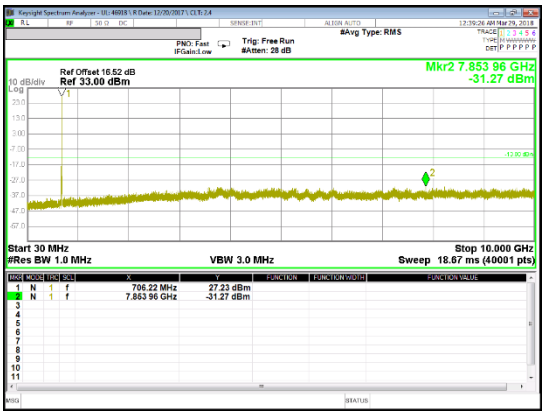
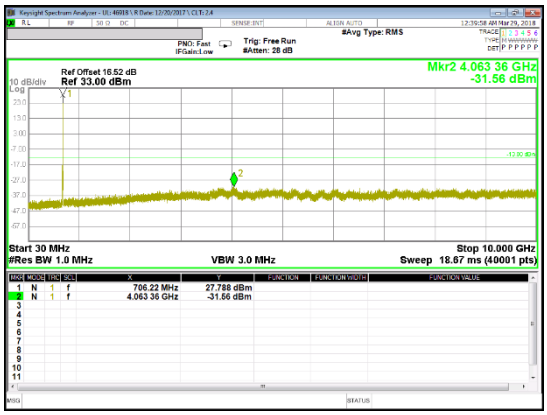
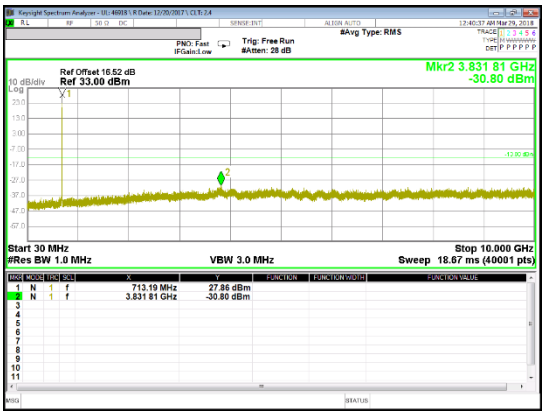
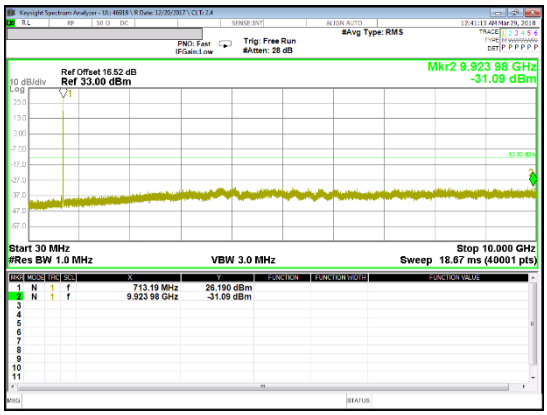
Band 12 3MHz	 3MHz QPSK Low channel	 3MHz 16QAM Low channel
	 3MHz QPSK Mid channel	 3MHz 16QAM Mid channel
	 3MHz QPSK High channel	 3MHz 16QAM High channel

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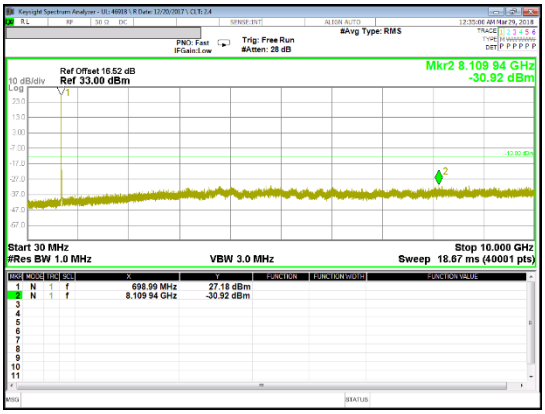
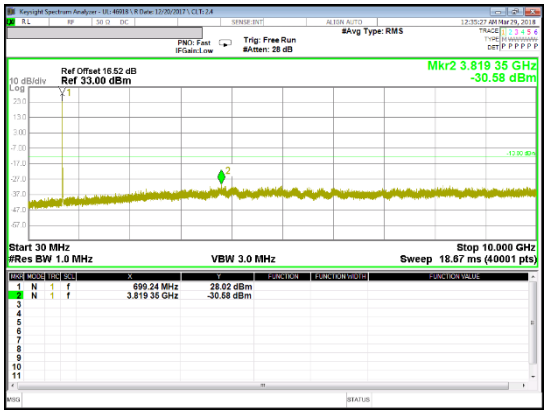
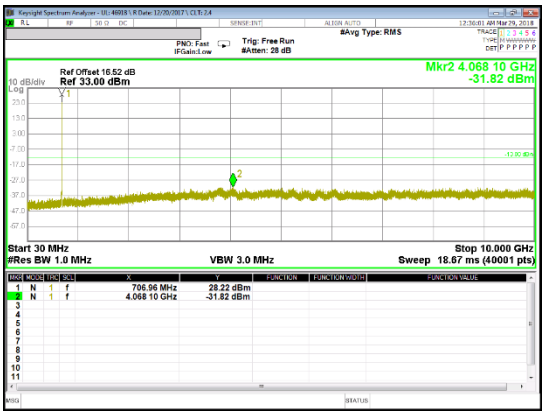
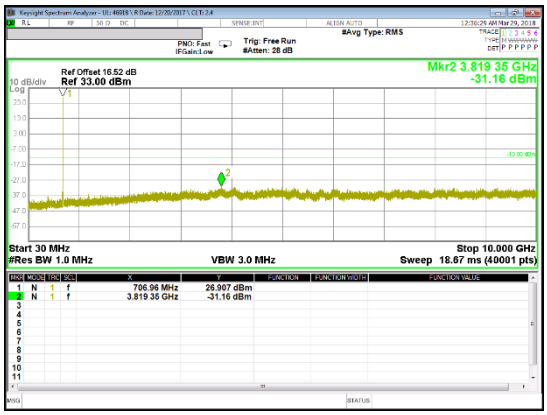
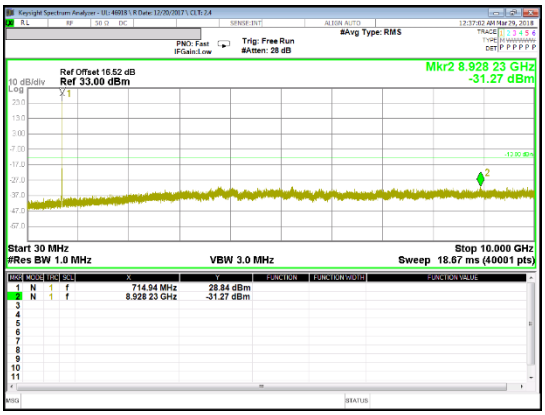
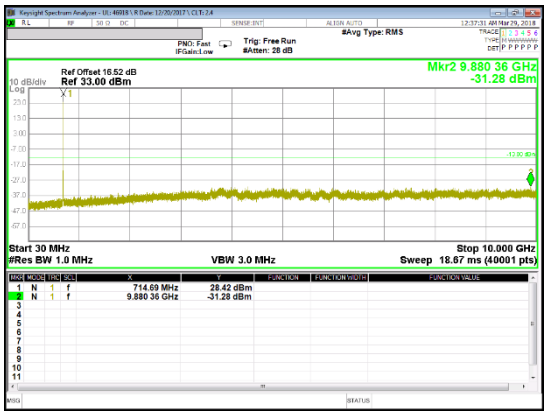
Band 12 1.4MHz	 1.4MHz QPSK Low channel	 1.4MHz 16QAM Low channel
	 1.4MHz QPSK Mid channel	 1.4MHz 16QAM Mid channel
	 1.4MHz QPSK High channel	 1.4MHz 16QAM High channel

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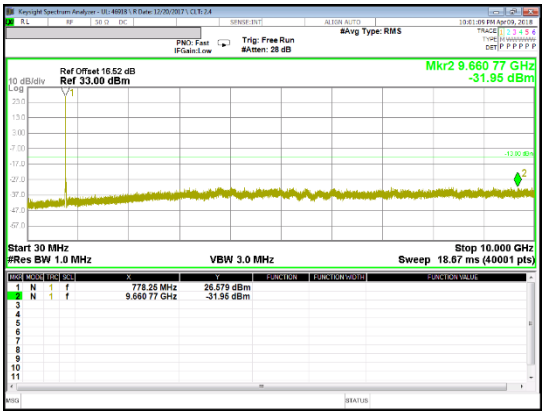
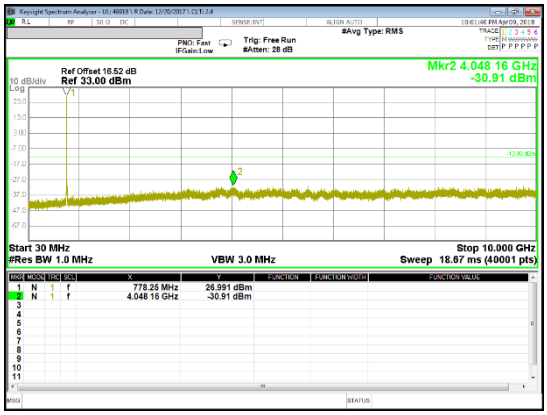
LTE Band 13

Band 13 10MHz	 10MHz QPSK Low channel	 10MHz 16QAM Low channel

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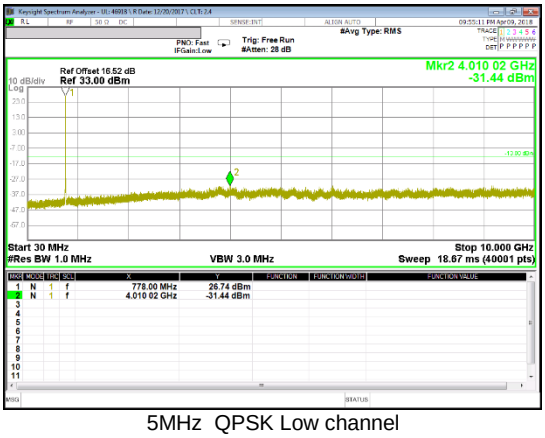
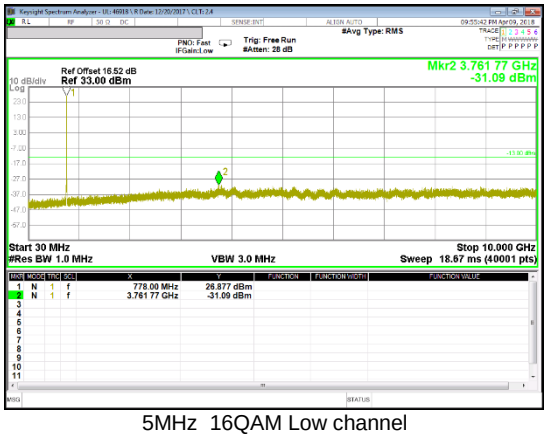
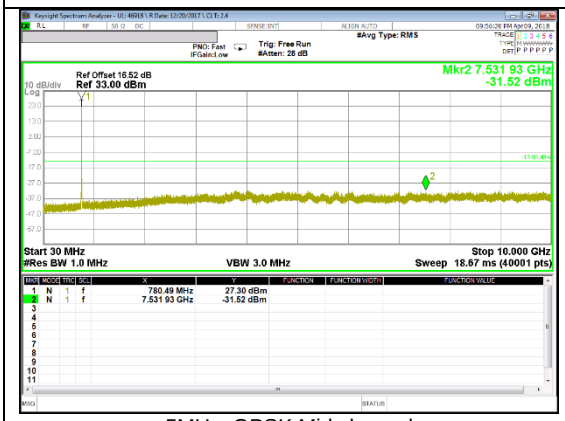
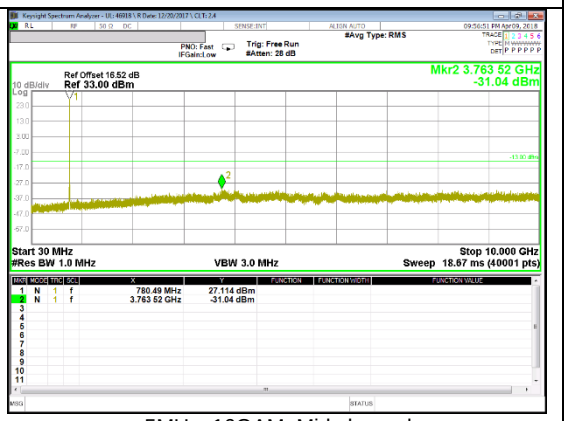
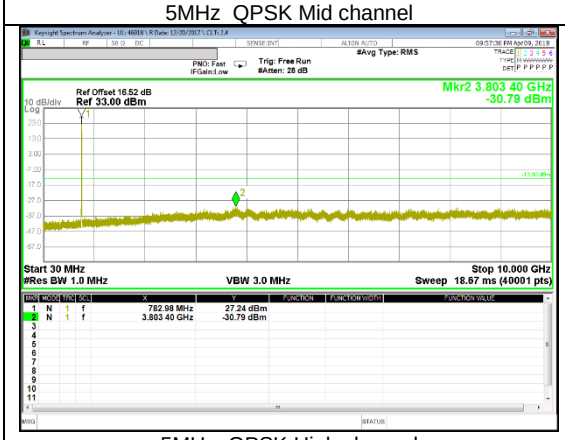
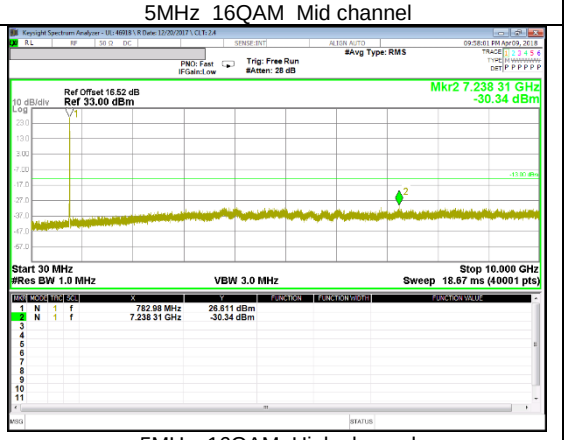
Band 13 5MHz	 5MHz QPSK Low channel	 5MHz 16QAM Low channel
	 5MHz QPSK Mid channel	 5MHz 16QAM Mid channel
	 5MHz QPSK High channel	 5MHz 16QAM High channel

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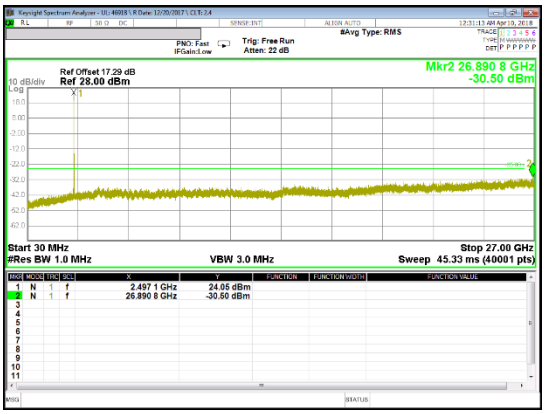
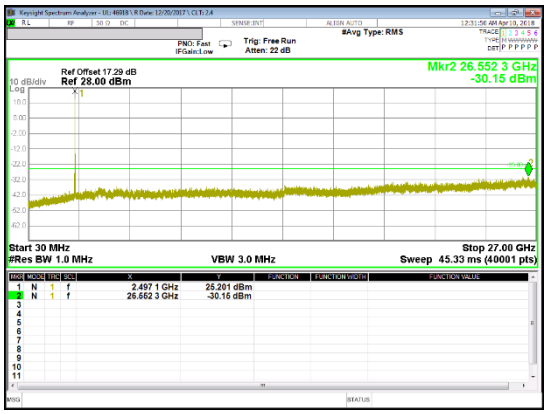
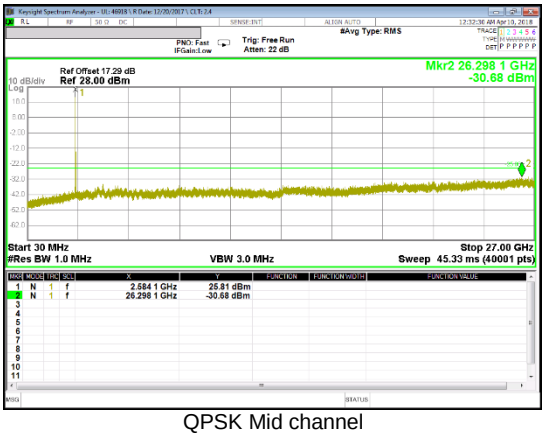
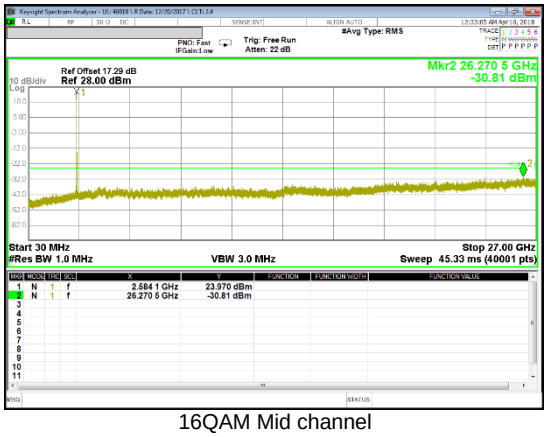
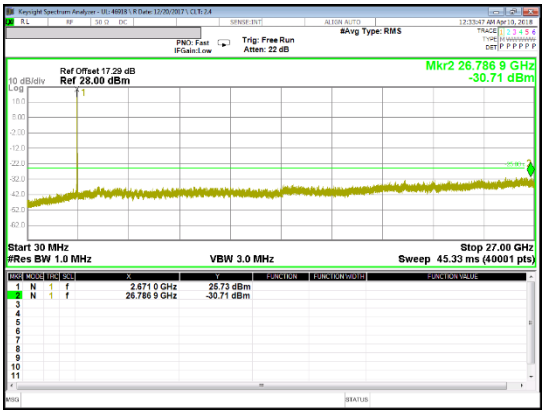
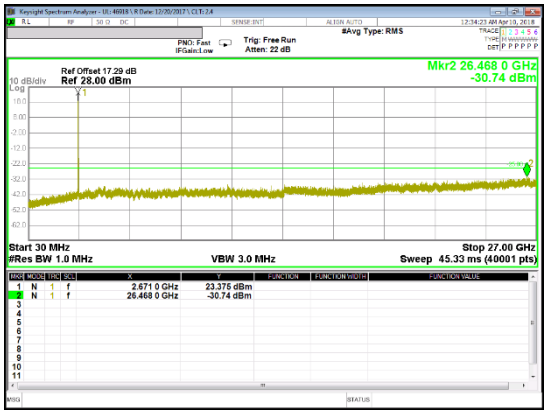
LTE Band 41

Band 41 20MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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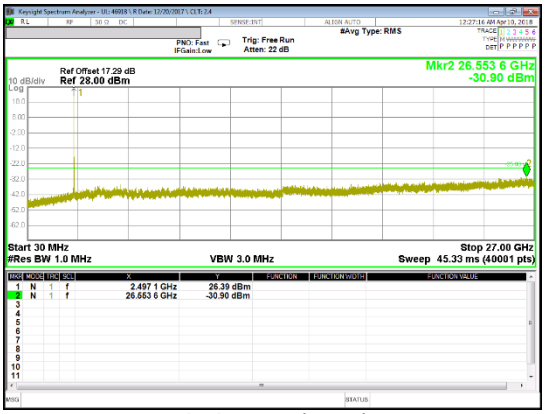
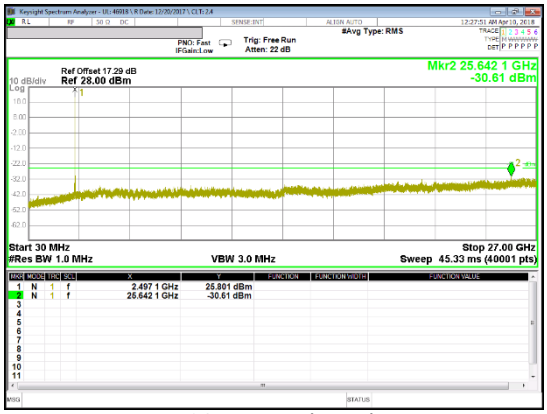
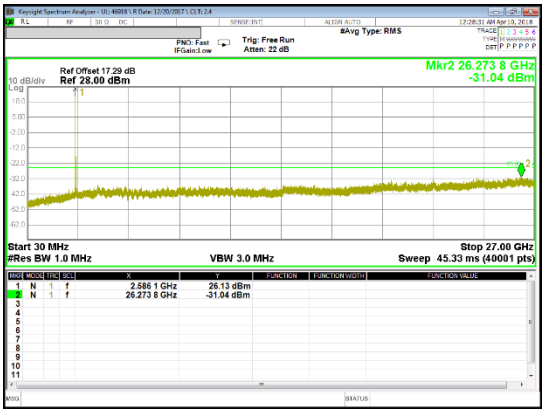
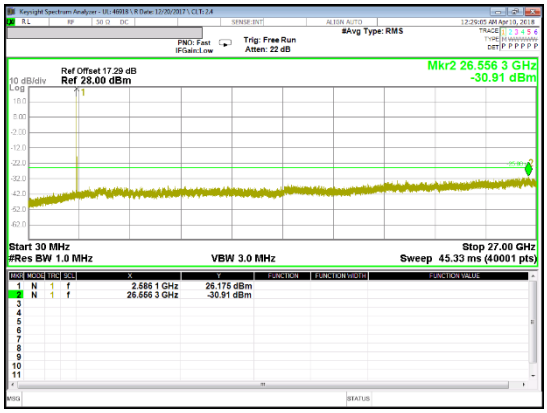
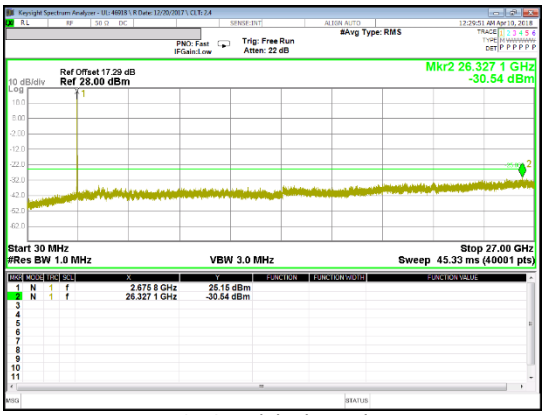
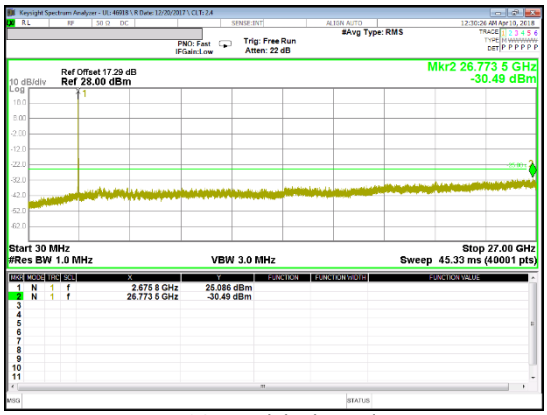
Band 41 15MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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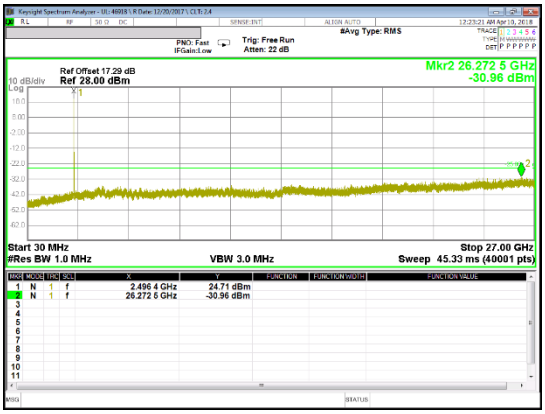
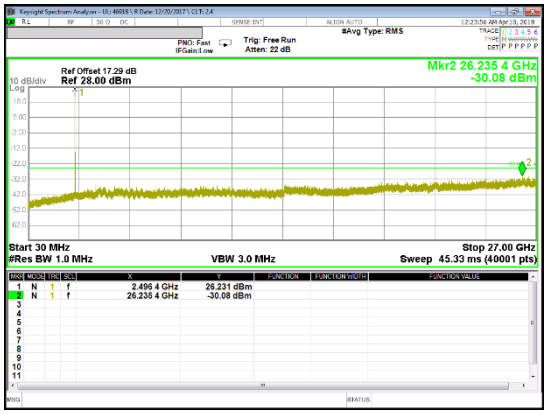
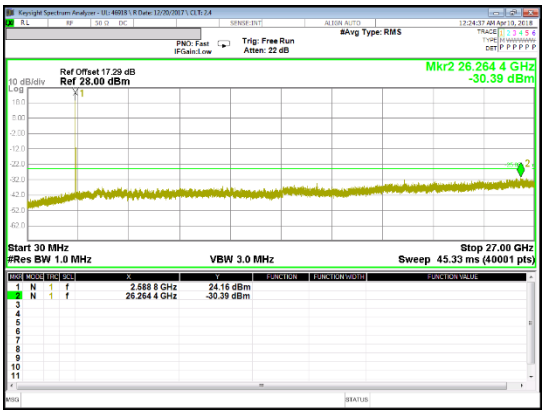
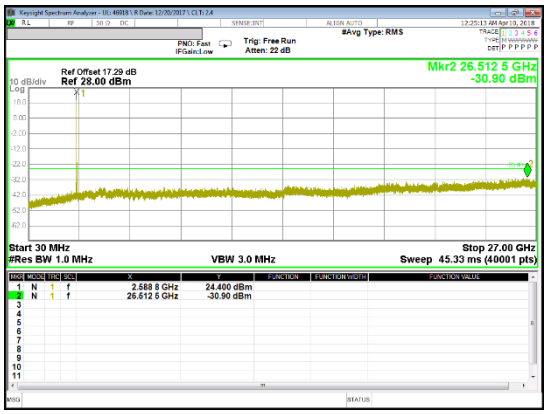
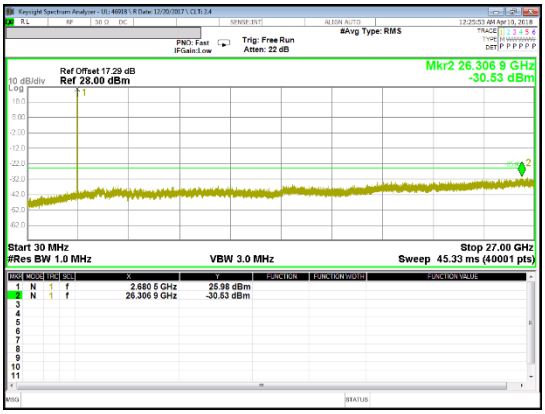
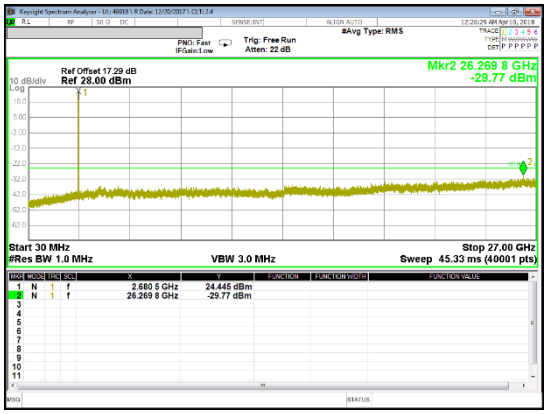
Band 41 10MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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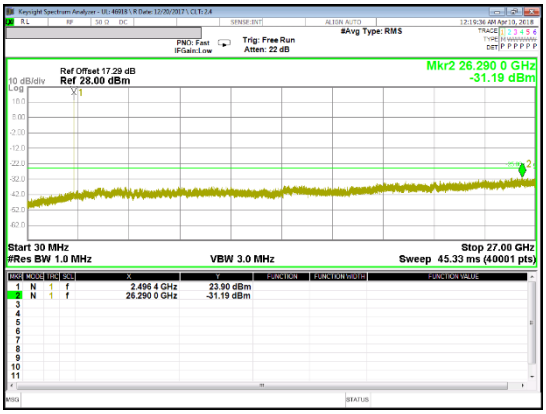
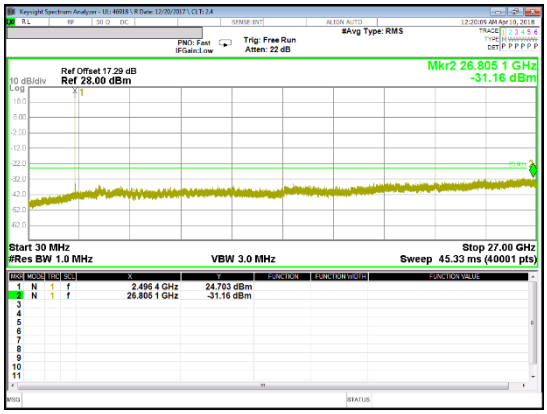
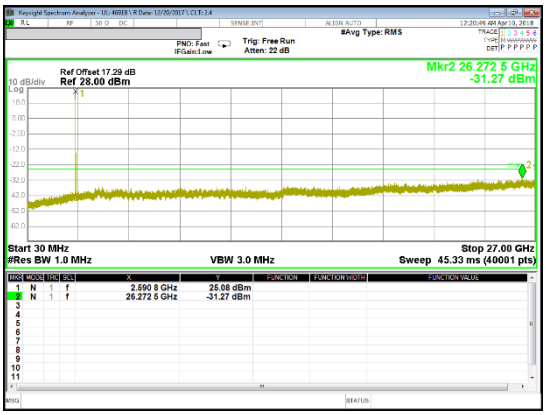
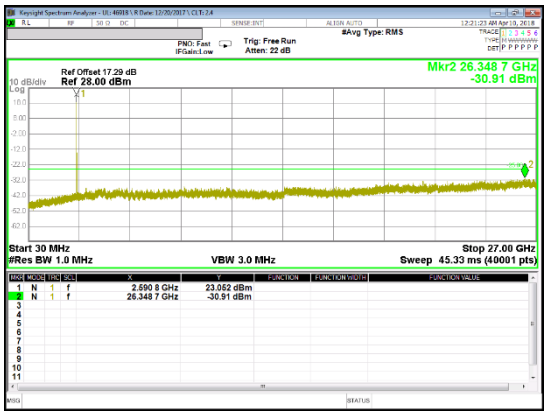
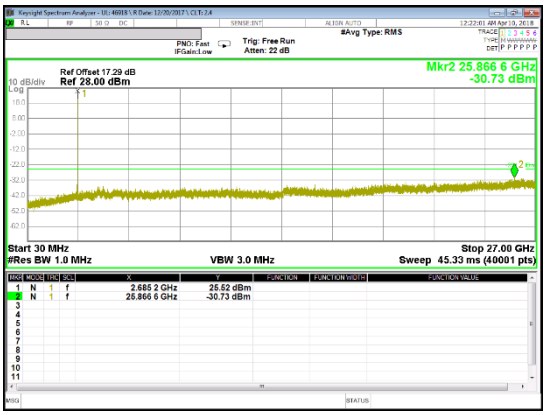
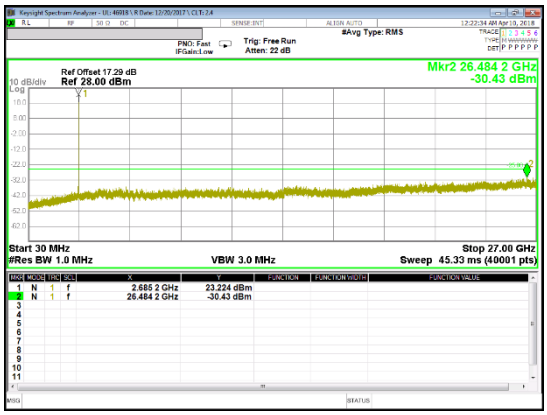
Band 41 5MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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9.4. FREQUENCY STABILITY

RULE PART(S)

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

LIMITS

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

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

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

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v03

RESULTS

See the following pages.

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9.4.1. FREQUENCY STABILITY RESULTS

GSM 850, Channel 190, Frequency 836.6 MHz

Reference Frequency : GSM850 Mid Channel 836.6 MHz @ 20ºC				
Limit: +- 2.5 ppm = 2091.500 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
[Vdc]	Temperature [*C]	[MHz]	Delta [ppm]	Limit [ppm]
3.85	50	836.59998063	-0.004	2.5
3.85	40	836.59998411	-0.008	2.5
3.85	30	836.59998373	-0.007	2.5
3.85	***20***	836.59997763	***0***	***2.5***
3.85	10	836.59997396	0.004	2.5
3.85	0	836.59998112	-0.004	2.5
3.85	-10	836.59998324	-0.007	2.5
3.85	-20	836.59997482	0.003	2.5
3.85	-30	836.59997686	0.001	2.5

Reference Frequency : GSM850 Mid Channel 836.6 MHz @ 20ºC				
Limit: +- 2.5 ppm = 2091.500 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
[Vdc]	Temperature [*C]	[MHz]	Delta [ppm]	Limit [ppm]
3.85	***20***	**836.59997763**	***0***	***2.5***
4.40	20	836.59998144	-0.005	2.5
3.60	20	836.59997316	0.005	2.5

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GSM 1900, Channel 661, Frequency 1880.0 MHz

Reference Frequency: GSM1900 Mid Channel 1880.0 MHz @ 20ºC				
Limit: +- 2.5 ppm = 4700.000 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
[Vdc]	Temperature [*C]	[MHz]	Delta [ppm]	Limit [ppm]
3.85	50	1879.99996541	0.000	2.5
3.85	40	1879.99997101	-0.003	2.5
3.85	30	1879.99996618	0.000	2.5
3.85	***20***	1879.99996580	***0***	***2.5***
3.85	10	1879.99996469	0.001	2.5
3.85	0	1879.99996429	0.001	2.5
3.85	-10	1879.99997367	-0.004	2.5
3.85	-20	1879.99996657	0.000	2.5
3.85	-30	1879.99996667	0.000	2.5

Reference Frequency: GSM1900 Mid Channel 1880.0 MHz @ 20ºC				
Limit: +- 2.5 ppm = 4700.000 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
[Vdc]	Temperature [*C]	[MHz]	Delta [ppm]	Limit [ppm]
3.85	***20***	**1879.99996580**	***0***	***2.5***
4.40	20	1879.99997184	-0.003	2.5
3.60	20	1879.99996693	-0.001	2.5

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WCDMA Band 5 , Channel 4183, Frequency 836.6 MHz

Reference Frequency: WCDMA Band 5 Mid Channel 836.6 MHz @ 20ºC				
Limit: +- 2.5 ppm = 2091.500 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
[Vdc]	Temperature [*C]	[MHz]	Delta [ppm]	Limit [ppm]
3.85	50	836.59998242	0.001	2.5
3.85	40	836.59998514	-0.002	2.5
3.85	30	836.59998550	-0.003	2.5
3.85	***20***	836.59998334	***0***	***2.5***
3.85	10	836.59998708	-0.004	2.5
3.85	0	836.59998695	-0.004	2.5
3.85	-10	836.59997801	0.006	2.5
3.85	-20	836.59997846	0.006	2.5
3.85	-30	836.59998068	0.003	2.5

Reference Frequency: WCDMA Band 5 Mid Channel 836.6 MHz @ 20ºC				
Limit: +- 2.5 ppm = 2091.500 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
[Vdc]	Temperature [*C]	[MHz]	Delta [ppm]	Limit [ppm]
3.85	***20***	**836.59998334**	***0***	***2.5***
4.40	20	836.59998520	-0.002	2.5
3.60	20	836.59997847	0.006	2.5

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WCDMA Band 2 , Channel 9400, Frequency 1880.0 MHz

Reference Frequency: WCDMA Band 2 Mid Channel 1880.0 MHz @ 20ºC				
Limit: +- 2.5 ppm = 4700.000 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
[Vdc]	Temperature [*C]	[MHz]	Delta [ppm]	Limit [ppm]
3.85	50	1879.99997192	-0.001	2.5
3.85	40	1879.99997029	0.000	2.5
3.85	30	1879.99996512	0.003	2.5
3.85	***20***	1879.99997035	***0***	***2.5***
3.85	10	1879.99996958	0.000	2.5
3.85	0	1879.99997125	0.000	2.5
3.85	-10	1879.99996833	0.001	2.5
3.85	-20	1879.99996973	0.000	2.5
3.85	-30	1879.99996905	0.001	2.5

Reference Frequency: WCDMA Band 2 Mid Channel 1880.0 MHz @ 20ºC				
Limit: +- 2.5 ppm = 4700.000 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
[Vdc]	Temperature [*C]	[MHz]	Delta [ppm]	Limit [ppm]
3.85	***20***	**1879.99997035**	***0***	***2.5***
4.40	20	1879.99997349	-0.002	2.5
3.60	20	1879.99997334	-0.002	2.5

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WCDMA Band 4, Channel 1413, Frequency 1732.6 MHz

Reference Frequency: WCDMA Band 4 Mid Channel 1732.6 MHz @ 20ºC				
Limit: +- 2.5 ppm = 4331.500 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
[Vdc]	Temperature [*C]	[MHz]	Delta [ppm]	Limit [ppm]
3.85	50	1732.59997643	0.002	2.5
3.85	40	1732.59998156	-0.001	2.5
3.85	30	1732.59997810	0.001	2.5
3.85	***20***	1732.59997903	***0***	***2.5***
3.85	10	1732.59998136	-0.001	2.5
3.85	0	1732.59997883	0.000	2.5
3.85	-10	1732.59997545	0.002	2.5
3.85	-20	1732.59998404	-0.003	2.5
3.85	-30	1732.59997713	0.001	2.5

Reference Frequency: WCDMA Band 4 Mid Channel 1732.6 MHz @ 20ºC				
Limit: +- 2.5 ppm = 4331.500 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
[Vdc]	Temperature [*C]	[MHz]	Delta [ppm]	Limit [ppm]
3.85	***20***	**1732.59997903**	***0***	***2.5***
4.40	20	1732.59997504	0.002	2.5
3.60	20	1732.59998229	-0.002	2.5

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LTE Band 66, Channel 132322, Frequency 1745.0 MHz

Reference Frequency: LTE Band 66 Mid Channel 1745 MHz @ 20ºC Limit: +- 2.5 ppm = 4362.500 Hz				
Power Supply	**Environment**	**Frequency Deviation Measureed with Time Elapse**		
[Vdc]	**Temperature [*C]**	**[MHz]**	**Delta [ppm]**	**Limit [ppm]**
3.85	50	1745.00001652	0.000	2.5
3.85	40	1745.00001753	0.000	2.5
3.85	30	1745.00001932	-0.001	2.5
3.85	***20***	1745.00001713	***0***	***2.5***
3.85	10	1745.00001912	-0.001	2.5
3.85	0	1745.00002036	-0.002	2.5
3.85	-10	1745.00002152	-0.003	2.5
3.85	-20	1745.00001681	0.000	2.5
3.85	-30	1745.00001547	0.001	2.5

Reference Frequency: LTE Band 66 Mid Channel 1745 MHz @ 20ºC Limit: +- 2.5 ppm = 4362.500 Hz				
Power Supply	**Environment**	**Frequency Deviation Measureed with Time Elapse**		
[Vdc]	**Temperature [*C]**	**[MHz]**	**Delta [ppm]**	**Limit [ppm]**
3.85	***20***	**1745.00001713**	***0***	***2.5***
4.40	20	1745.00001455	0.001	2.5
3.60	20	1745.00001697	0.000	2.5

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LTE Band 2, Channel 18900, Frequency 1880.0 MHz

Reference Frequency: LTE Band 2 Mid Channel 1880 MHz @ 20ºC Limit: +- 2.5 ppm = 4700.000 Hz				
Power Supply	**Environment**	**Frequency Deviation Measureed with Time Elapse**		
[Vdc]	**Temperature [*C]**	**[MHz]**	**Delta [ppm]**	**Limit [ppm]**
3.85	50	1880.00002539	0.000	2.5
3.85	40	1880.00002551	0.000	2.5
3.85	30	1880.00002485	0.000	2.5
3.85	***20***	1880.00002477	***0***	***2.5***
3.85	10	1880.00002646	-0.001	2.5
3.85	0	1880.00002816	-0.002	2.5
3.85	-10	1880.00002640	-0.001	2.5
3.85	-20	1880.00002903	-0.002	2.5
3.85	-30	1880.00002315	0.001	2.5

Reference Frequency: LTE Band 2 Mid Channel 1880 MHz @ 20ºC Limit: +- 2.5 ppm = 4700.000 Hz				
Power Supply	**Environment**	**Frequency Deviation Measureed with Time Elapse**		
[Vdc]	**Temperature [*C]**	**[MHz]**	**Delta [ppm]**	**Limit [ppm]**
3.85	***20***	**1880.00002477**	***0***	***2.5***
4.40	20	1880.00002956	-0.003	2.5
3.60	20	1880.00002526	0.000	2.5

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LTE Band 12, Channel 23095, Frequency 707.5 MHz

Reference Frequency: LTE Band 12 Mid Channel 707.5 MHz @ 20ºC				
Limit: +- 2.5 ppm = 1768.750 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
[Vdc]	Temperature [*C]	[MHz]	Delta [ppm]	Limit [ppm]
3.85	50	707.49997805	0.005	2.5
3.85	40	707.49998179	0.000	2.5
3.85	30	707.49997652	0.007	2.5
3.85	***20***	707.49998173	***0***	***2.5***
3.85	10	707.49998608	-0.006	2.5
3.85	0	707.49998036	0.002	2.5
3.85	-10	707.49997991	0.003	2.5
3.85	-20	707.49997902	0.004	2.5
3.85	-30	707.49998572	-0.006	2.5

Reference Frequency: LTE Band 12 Mid Channel 707.5 MHz @ 20ºC				
Limit: +- 2.5 ppm = 1768.750 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
[Vdc]	Temperature [*C]	[MHz]	Delta [ppm]	Limit [ppm]
3.85	***20***	**707.49998173**	***0***	***2.5***
4.40	20	707.49997674	0.007	2.5
3.60	20	707.49997994	0.003	2.5

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LTE Band 5 , Channel 20524, Frequency 836.5 MHz

Reference Frequency: LTE Band 5 Mid Channel 836.5 MHz @ 20ºC Limit: +- 2.5 ppm = 2091.250 Hz				
Power Supply	**Environment**	**Frequency Deviation Measureed with Time Elapse**		
[Vdc]	**Temperature [*C]**	**[MHz]**	**Delta [ppm]**	**Limit [ppm]**
3.85	50	836.50000000	0.000	2.5
3.85	40	836.50000000	0.000	2.5
3.85	30	836.50000000	0.000	2.5
3.85	***20***	836.50000000	***0***	***2.5***
3.85	10	836.50000000	0.000	2.5
3.85	0	836.50000000	0.000	2.5
3.85	-10	836.50000000	0.000	2.5
3.85	-20	836.50000000	0.000	2.5
3.85	-30	836.50000000	0.000	2.5

Reference Frequency: LTE Band 5 Mid Channel 836.5 MHz @ 20ºC Limit: +- 2.5 ppm = 2091.250 Hz				
Power Supply	**Environment**	**Frequency Deviation Measureed with Time Elapse**		
[Vdc]	**Temperature [*C]**	**[MHz]**	**Delta [ppm]**	**Limit [ppm]**
3.85	***20***	**836.50000000**	***0***	***2.5***
4.40	20	836.50000000	0.000	2.5
3.60	20	836.50000000	0.000	2.5

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LTE Band 13, Channel 23230, Frequency 782.0 MHz

Reference Frequency: LTE Band 13 Mid Channel 782 MHz @ 20ºC				
Limit: +- 2.5 ppm = 1955.000 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
[Vdc]	Temperature [*C]	[MHz]	Delta [ppm]	Limit [ppm]
3.85	50	781.99997071	0.007	2.5
3.85	40	781.99997408	0.003	2.5
3.85	30	781.99997208	0.005	2.5
3.85	***20***	781.99997634	***0***	***2.5***
3.85	10	781.99997010	0.008	2.5
3.85	0	781.99997253	0.005	2.5
3.85	-10	781.99997327	0.004	2.5
3.85	-20	781.99998085	-0.006	2.5
3.85	-30	781.99997499	0.002	2.5

Reference Frequency: LTE Band 13 Mid Channel 782 MHz @ 20ºC				
Limit: +- 2.5 ppm = 1955.000 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
[Vdc]	Temperature [*C]	[MHz]	Delta [ppm]	Limit [ppm]
3.85	***20***	**781.99997634**	***0***	***2.5***
4.40	20	781.99998096	-0.006	2.5
3.60	20	781.99997330	0.004	2.5

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LTE Band 41 , Channel 40620, Frequency 2593.0 MHz

Reference Frequency: LTE Band 41 Mid Channel 2593 MHz @ 20ºC				
Limit: +- 2.5 ppm = 6482.500 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
[Vdc]	Temperature [*C]	[MHz]	Delta [ppm]	Limit [ppm]
3.85	50	2592.99995799	-0.002	2.5
3.85	40	2592.99994903	0.002	2.5
3.85	30	2592.99995766	-0.002	2.5
3.85	***20***	2592.99995366	***0***	***2.5***
3.85	10	2592.99995583	-0.001	2.5
3.85	0	2592.99994924	0.002	2.5
3.85	-10	2592.99994973	0.002	2.5
3.85	-20	2592.99994895	0.002	2.5
3.85	-30	2592.99995157	0.001	2.5

Reference Frequency: LTE Band 41 Mid Channel 2593 MHz @ 20ºC				
Limit: +- 2.5 ppm = 6482.500 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
[Vdc]	Temperature [*C]	[MHz]	Delta [ppm]	Limit [ppm]
3.85	***20***	**2592.99995366**	***0***	***2.5***
4.40	20	2592.99995069	0.001	2.5
3.60	20	2592.99995011	0.001	2.5

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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10. RADIATED TEST RESULTS

10.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

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

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(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.

27.50(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.(Band 4)

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 v03

For peak 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 = peak; f) Ensure that the number of measurement points ≥ span/RBW; g) Trace mode = max hold;

For average power measurement with a ESU40:

a) Set span to at least 1.5 times the OBW; b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz; c) Set VBW ≥ 3 x RBW; d) Set number of points in sweep ≥ 2 × span / RBW; e) Sweep time = auto-couple; f) Detector = RMS (power averaging); g) Use free run trigger If burst duty cycle ≥ 98; h) Use trigger to capture bursts If burst duty cycle < 98; i) Trace average at least 100 traces in power averaging (*i.e.*, RMS) mode. j) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function.

TEST RESULTS

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10.1.1. ERP/EIRP Results

GSM

Band	Mode	Channel	f [MHz]	ERP / EIRP	
				[dBm]	[mW]
GSM850	GPRS	512	824.2	26.31	427.56
		661	836.6	26.96	496.59
		810	848.8	27.87	612.35
	EGPRS	512	824.2	21.82	152.05
		661	836.6	22.63	183.23
		810	848.8	23.82	240.99
GSM1900	GPRS	512	1850.2	28.42	695.78
		661	1880.0	29.53	896.82
		810	1909.8	30.13	1030.39
	EGPRS	512	1850.2	26.28	425.08
		661	1880.0	26.66	463.13
		810	1909.8	27.41	550.81

WCDMA

Band	Mode	Channel	f [MHz]	ERP / EIRP	
				[dBm]	[mW]
Band 5	REL99	4132	826.4	17.09	51.22
		4183	836.6	17.45	55.64
		4233	846.6	18.04	63.68
	HSDPA	4132	826.4	13.95	24.86
		4183	836.6	14.58	28.73
		4233	846.6	15.86	38.55
Band 2	REL99	9262	1852.4	17.24	52.93
		9400	1880.0	21.53	142.23
		9538	1907.6	18.93	78.13
	HSDPA	9262	1852.4	15.26	33.55
		9400	1880.0	19.11	81.47
		9538	1907.6	17.05	50.68

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WCDMA

Band	Mode	Channel	f [MHz]	ERP / EIRP	
				[dBm]	[mW]
Band 4	REL99	1312	1712.4	20.14	103.24
		1413	1732.6	20.84	121.34
		1513	1752.6	20.02	100.49
	HSDPA	1312	1712.4	18.95	78.49
		1413	1732.6	19.84	96.38
		1513	1752.6	18.23	66.54

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LTE Band 5

Band	BW [MHz]	Mode	RB/RB Size	f [MHz]	ERP / EIRP	
			Full RB		[dBm]	[mW]
Band 5	10	QPSK	50/0	829.0	14.96	31.30
			50/0	836.5	16.86	48.54
			50/0	844.0	17.19	52.36
		16QAM	50/0	829.0	13.96	24.86
			50/0	836.5	15.83	38.29
			50/0	844.0	16.18	41.50
	5	QPSK	25/0	826.5	15.16	32.83
			25/0	836.5	16.20	41.69
			25/0	846.5	16.63	46.03
		16QAM	25/0	826.5	14.19	26.26
			25/0	836.5	15.19	33.04
			25/0	846.5	15.67	36.90
	3	QPSK	15/0	825.5	13.18	20.81
			15/0	836.5	14.05	25.41
			15/0	847.5	16.59	45.60
		16QAM	15/0	825.5	14.32	27.06
			15/0	836.5	15.20	33.12
			15/0	847.5	15.59	36.22
	1.4	QPSK	6/0	824.7	13.29	21.31
			6/0	836.5	14.15	26.01
			6/0	848.3	14.54	28.44
		16QAM	6/0	824.7	12.24	16.74
			6/0	836.5	14.09	25.64
			6/0	848.3	13.51	22.44

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LTE Band 66

Band	BW [MHz]	Mode	RB/RB Size	f [MHz]	ERP / EIRP	
			Full RB		[dBm]	[mW]
Band 66	20	QPSK	100/0	1720.0	21.83	152.41
			100/0	1745.0	21.50	141.31
			100/0	1770.0	20.66	116.50
		16QAM	100/0	1720.0	20.85	121.62
			100/0	1745.0	20.52	112.77
			100/0	1770.0	19.66	92.54
	15	QPSK	75/0	1717.5	22.22	166.72
			75/0	1745.0	21.96	157.10
			75/0	1772.5	21.56	143.30
		16QAM	75/0	1717.5	21.17	130.92
			75/0	1745.0	20.90	123.08
			75/0	1772.5	20.50	112.27
	10	QPSK	50/0	1715.0	21.50	141.25
			50/0	1745.0	21.12	129.47
			50/0	1775.0	20.51	112.47
		16QAM	50/0	1715.0	20.48	111.69
			50/0	1745.0	20.15	103.56
			50/0	1775.0	19.43	87.71
	5	QPSK	25/0	1712.5	20.88	122.46
			25/0	1745.0	20.77	119.45
			25/0	1777.5	20.03	100.69
		16QAM	25/0	1712.5	19.19	82.97
			25/0	1745.0	19.77	94.84
			25/0	1777.5	19.01	79.62
	3	QPSK	15/0	1711.5	20.85	121.65
			15/0	1745.0	20.97	125.03
			15/0	1778.5	19.99	99.76
		16QAM	15/0	1711.5	20.60	114.82
			15/0	1745.0	19.90	97.76
			15/0	1778.5	18.90	77.62
	1.4	QPSK	6/0	1710.7	18.29	67.42
			6/0	1745.0	19.13	81.85
			6/0	1779.3	18.14	65.12
		16QAM	6/0	1710.7	17.37	54.55
			6/0	1745.0	18.02	63.39
			6/0	1779.3	17.31	53.79

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LTE Band 2

Band	BW [MHz]	Mode	RB/RB Size	f [MHz]	ERP / EIRP	
			Full RB		[dBm]	[mW]
Band 2	20	QPSK	100/0	1860.0	21.35	136.36
			100/0	1880.0	21.67	146.79
			100/0	1900.0	22.55	179.89
		16QAM	100/0	1860.0	20.40	109.57
			100/0	1880.0	20.65	116.07
			100/0	1900.0	21.60	144.54
	15	QPSK	75/0	1857.5	20.99	125.48
			75/0	1880.0	21.81	151.60
			75/0	1902.5	22.04	159.96
		16QAM	75/0	1857.5	19.97	99.22
			75/0	1880.0	20.79	119.87
			75/0	1902.5	21.04	127.06
	10	QPSK	50/0	1855.0	21.13	129.58
			50/0	1880.0	21.69	147.47
			50/0	1905.0	22.17	164.82
		16QAM	50/0	1855.0	20.16	103.64
			50/0	1880.0	20.70	117.41
			50/0	1905.0	21.15	130.32
	5	QPSK	25/0	1852.5	20.06	101.31
			25/0	1880.0	20.83	120.98
			25/0	1907.5	21.71	148.25
		16QAM	25/0	1852.5	19.09	81.03
			25/0	1880.0	19.81	95.65
			25/0	1907.5	20.70	117.49
	3	QPSK	15/0	1851.5	17.86	61.04
			15/0	1880.0	19.03	79.93
			15/0	1908.5	19.25	84.14
		16QAM	15/0	1851.5	16.92	49.16
			15/0	1880.0	17.89	61.48
			15/0	1908.5	18.30	67.61
	1.4	QPSK	6/0	1850.7	17.34	54.20
			6/0	1880.0	18.34	68.19
			6/0	1909.3	19.14	82.04
		16QAM	6/0	1850.7	16.25	42.17
			6/0	1880.0	17.28	53.42
			6/0	1909.3	18.22	66.37

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LTE Band 12

Band	BW [MHz]	Mode	RB/RB Size	f [MHz]	ERP / EIRP	
			Full RB		[dBm]	[mW]
Band 12	10	QPSK	50/0	704.0	13.07	20.28
			50/0	707.5	12.17	16.47
			50/0	711.0	13.20	20.89
		16QAM	50/0	704.0	11.63	14.56
			50/0	707.5	10.78	11.96
			50/0	711.0	11.74	14.93
	5	QPSK	25/0	701.5	11.45	13.96
			25/0	707.5	12.98	19.86
			25/0	713.5	12.96	19.78
		16QAM	25/0	701.5	10.26	10.61
			25/0	707.5	11.55	14.29
			25/0	713.5	11.46	14.00
	3	QPSK	15/0	700.5	10.90	12.31
			15/0	707.5	11.52	14.18
			15/0	714.5	12.86	19.32
		16QAM	15/0	700.5	9.80	9.56
			15/0	707.5	10.18	10.42
			15/0	714.5	11.42	13.87
	1.4	QPSK	6/0	699.7	9.27	8.45
			6/0	707.5	10.53	11.29
			6/0	715.3	10.77	11.94
		16QAM	6/0	699.7	8.32	6.79
			6/0	707.5	9.28	8.47
			6/0	715.3	9.84	9.64

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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LTE Band 13

Band	BW [MHz]	Mode	RB/RB Size	f [MHz]	ERP / EIRP	
			Full RB		[dBm]	[mW]
Band 13	10	QPSK	50/0	782.0	15.46	35.16
		16QAM	50/0	782.0	14.49	28.12
	5	QPSK	25/0	779.5	14.69	29.44
			25/0	782.0	15.11	32.43
			25/0	784.5	15.18	32.96
		16QAM	25/0	779.5	13.69	23.39
			25/0	782.0	14.18	26.18
			25/0	784.5	14.19	26.24

LTE Band 41

Band	BW [MHz]	Mode	RB/RB Size	f [MHz]	ERP / EIRP	
			Full RB		[dBm]	[mW]
Band 41	20	QPSK	100/0	2506.0	20.01	100.23
			100/0	2593.0	19.04	80.17
			100/0	2680.0	19.52	89.54
		16QAM	100/0	2506.0	19.11	81.47
			100/0	2593.0	18.10	64.57
			100/0	2680.0	18.48	70.47
	15	QPSK	75/0	2503.5	20.18	104.23
			75/0	2593.0	19.22	83.56
			75/0	2682.5	19.58	90.78
		16QAM	75/0	2503.5	19.22	83.56
			75/0	2593.0	18.34	68.23
			75/0	2682.5	18.61	72.61
	10	QPSK	50/0	2501.0	19.75	94.41
			50/0	2593.0	19.00	79.43
			50/0	2685.0	19.27	84.53
		16QAM	50/0	2501.0	18.92	77.98
			50/0	2593.0	18.24	66.68
			50/0	2685.0	18.34	68.23
	5	QPSK	25/0	2498.5	19.63	91.83
			25/0	2593.0	19.66	92.47
			25/0	2687.5	19.39	86.9
		16QAM	25/0	2498.5	18.89	77.45
			25/0	2593.0	18.48	70.47
			25/0	2687.5	18.36	68.55

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10.1.2. ERP/EIRP DATA

GSM 850

GSM

GSM850
GPRS

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-03-31
Test Engineer: 51072
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: GPRS 850 MHz Fundamentals

Test Equipment:
Receiving: VULB9163-750, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-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	28.74	V	1.0	-1.5	26.31	38.5	-12.2	
824.20	17.11	H	1.0	-1.5	14.68	38.5	-23.8	
Mid Ch								
836.60	29.34	V	1.0	-1.4	26.96	38.5	-11.5	
836.60	17.93	H	1.0	-1.4	15.55	38.5	-23.0	
High Ch								
848.80	30.21	V	1.0	-1.4	27.87	38.5	-10.6	
848.80	18.02	H	1.0	-1.4	15.68	38.5	-22.8	

GSM

GSM850
EGPRS

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-03-31
Test Engineer: 51072
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: EGPRS 850 MHz Fundamentals

Test Equipment:
Receiving: VULB9163-750, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-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	24.25	V	1.0	-1.5	21.82	38.5	-16.7	
824.20	12.62	H	1.0	-1.5	10.19	38.5	-28.3	
Mid Ch								
836.60	25.01	V	1.0	-1.4	22.63	38.5	-15.9	
836.60	13.68	H	1.0	-1.4	11.30	38.5	-27.2	
High Ch								
848.80	26.16	V	1.0	-1.4	23.82	38.5	-14.7	
848.80	13.24	H	1.0	-1.4	10.90	38.5	-27.6	

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GSM 1900

GSM

GSM1900
GPRS

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-03-31
Test Engineer: 51072
Configuration: EUT / X-Position
Location: Chamber 1
Mode: GPRS 1900 MHz Fundamentals

Test Equipment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00161451], 3m N-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	20.75	V	4.5	9.5	25.76	33.0	-7.2	
1850.20	23.41	H	4.5	9.5	28.42	33.0	-4.6	
Mid Ch								
1880.00	21.72	V	4.5	9.2	26.40	33.0	-6.6	
1880.00	24.85	H	4.5	9.2	29.53	33.0	-3.5	
High Ch								
1909.80	23.06	V	4.6	8.9	27.36	33.0	-5.6	
1909.80	25.83	H	4.6	8.9	30.13	33.0	-2.9	

GSM

GSM1900
EGPRS

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-03-31
Test Engineer: 51072
Configuration: EUT / X-Position
Location: Chamber 1
Mode: EGPRS 1900 MHz Fundamentals

Test Equipment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00161451], 3m N-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	18.50	V	4.5	9.5	23.51	33.0	-9.5	
1850.20	21.27	H	4.5	9.5	26.28	33.0	-6.7	
Mid Ch								
1880.00	18.86	V	4.5	9.2	23.54	33.0	-9.5	
1880.00	21.98	H	4.5	9.2	26.66	33.0	-6.3	
High Ch								
1909.80	20.37	V	4.6	8.9	24.67	33.0	-8.3	
1909.80	23.11	H	4.6	8.9	27.41	33.0	-5.6	

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WCDMA Band 5

WCDMA

Band 5
REL99

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-02
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 2
Mode: Rel99 Band 5 Fundamentals

Test Equipment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
826.40	19.51	V	1.0	-1.5	17.09	38.5	-21.4	
826.40	6.81	H	1.0	-1.5	4.39	38.5	-34.1	
Mid Ch								
836.60	19.83	V	1.0	-1.4	17.45	38.5	-21.0	
836.60	7.83	H	1.0	-1.4	5.45	38.5	-33.0	
High Ch								
846.60	20.39	V	1.0	-1.4	18.04	38.5	-20.5	
846.60	8.75	H	1.0	-1.4	6.40	38.5	-32.1	

WCDMA

Band 5
HSDPA

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-02
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 2
Mode: HSDPA Band 5 Fundamentals

Test Equipment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-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	16.37	V	1.0	-1.5	13.95	38.5	-24.5	
826.40	3.23	H	1.0	-1.5	0.81	38.5	-37.7	
Mid Ch								
836.60	16.96	V	1.0	-1.4	14.58	38.5	-23.9	
836.60	4.20	H	1.0	-1.4	1.82	38.5	-36.7	
High Ch								
846.60	18.21	V	1.0	-1.4	15.86	38.5	-22.6	
846.60	6.06	H	1.0	-1.4	3.71	38.5	-34.8	

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WCDMA Band 4

WCDMA

Band 4
REL99

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-02
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 2
Mode: Rel99 Band 4 Fundamentals

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1712.40	13.58	V	4.3	9.5	18.73	30.0	-11.3	
1712.40	14.99	H	4.3	9.5	20.14	30.0	-9.9	
Mid Ch								
1732.60	13.70	V	4.3	9.5	18.90	30.0	-11.1	
1732.60	15.65	H	4.3	9.5	20.84	30.0	-9.2	
High Ch								
1752.60	13.93	V	4.4	9.6	19.17	30.0	-10.8	
1752.60	14.78	H	4.4	9.6	20.02	30.0	-10.0	

WCDMA

Band 4
HSDPA

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-02
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 2
Mode: HSDPA Band 4 Fundamentals

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 3m N-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	11.87	V	4.3	9.5	17.02	30.0	-13.0	
1712.40	13.80	H	4.3	9.5	18.95	30.0	-11.1	
Mid Ch								
1732.60	12.54	V	4.3	9.5	17.74	30.0	-12.3	
1732.60	14.65	H	4.3	9.5	19.84	30.0	-10.2	
High Ch								
1752.60	12.14	V	4.4	9.6	17.38	30.0	-12.6	
1752.60	12.99	H	4.4	9.6	18.23	30.0	-11.8	

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WCDMA Band 2

WCDMA

Band 2
REL99

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-02
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 2
Mode: Rel99 Band 2 Fundamentals

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 3m N-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	12.25	V	4.5	9.5	17.24	33.0	-15.8	
1852.40	12.08	H	4.5	9.5	17.07	33.0	-15.9	
Mid Ch								
1880.00	13.23	V	4.5	9.2	17.91	33.0	-15.1	
1880.00	16.85	H	4.5	9.2	21.53	33.0	-11.5	
High Ch								
1907.60	14.59	V	4.6	8.9	18.93	33.0	-14.1	
1907.60	14.45	H	4.6	8.9	18.79	33.0	-14.2	

WCDMA

Band 2
HSDPA

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-02
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 2
Mode: HSDPA Band 2 Fundamentals

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1852.40	10.27	V	4.5	9.5	15.26	33.0	-17.7	
1852.40	9.82	H	4.5	9.5	14.81	33.0	-18.2	
Mid Ch								
1880.00	11.31	V	4.5	9.2	15.99	33.0	-17.0	
1880.00	14.43	H	4.5	9.2	19.11	33.0	-13.9	
High Ch								
1907.60	12.71	V	4.6	8.9	17.05	33.0	-16.0	
1907.60	12.69	H	4.6	8.9	17.03	33.0	-16.0	

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LTE Band 5

LTE

Band 5

10MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-02
Test Engineer: 47989
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 5 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: VULB9163-750, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-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	17.37	V	1.0	-1.5	14.96	38.5	-23.5	
829.00	3.51	H	1.0	-1.5	1.10	38.5	-37.4	
Mid Ch								
836.50	19.24	V	1.0	-1.4	16.86	38.5	-21.6	
836.50	5.59	H	1.0	-1.4	3.21	38.5	-35.3	
High Ch								
844.00	19.55	V	1.0	-1.4	17.19	38.5	-21.3	
844.00	6.28	H	1.0	-1.4	3.93	38.5	-34.6	

LTE

Band 5

10MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-02
Test Engineer: 47989
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 5 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: VULB9163-750, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-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	16.37	V	1.0	-1.5	13.96	38.5	-24.5	
829.00	3.31	H	1.0	-1.5	0.90	38.5	-37.6	
Mid Ch								
836.50	18.21	V	1.0	-1.4	15.83	38.5	-22.7	
836.50	5.12	H	1.0	-1.4	2.74	38.5	-35.8	
High Ch								
844.00	18.54	V	1.0	-1.4	16.18	38.5	-22.3	
844.00	5.36	H	1.0	-1.4	3.01	38.5	-35.5	

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Band 5

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-02
Test Engineer: 47989
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 5 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: VULB9163-750, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-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	17.58	V	1.0	-1.5	15.16	38.5	-23.3	
826.50	4.56	H	1.0	-1.5	2.14	38.5	-36.4	
Mid Ch								
836.50	18.58	V	1.0	-1.4	16.20	38.5	-22.3	
836.50	5.51	H	1.0	-1.4	3.13	38.5	-35.4	
High Ch								
846.50	18.98	V	1.0	-1.4	16.63	38.5	-21.9	
846.50	5.68	H	1.0	-1.4	3.33	38.5	-35.2	

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Band 5

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-02
Test Engineer: 47989
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 5 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: VULB9163-750, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-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	16.61	V	1.0	-1.5	14.19	38.5	-24.3	
826.50	4.04	H	1.0	-1.5	1.62	38.5	-36.9	
Mid Ch								
836.50	17.57	V	1.0	-1.4	15.19	38.5	-23.3	
836.50	4.51	H	1.0	-1.4	2.13	38.5	-36.4	
High Ch								
846.50	18.02	V	1.0	-1.4	15.67	38.5	-22.8	
846.50	4.57	H	1.0	-1.4	2.22	38.5	-36.3	

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Band 5

3MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-02
Test Engineer: 47989
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 5 Fundamentals, 3MHz Bandwidth

Test Equipment:
Receiving: VULB9163-750, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-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	15.61	V	1.0	-1.5	13.18	38.5	-25.3	
825.50	4.48	H	1.0	-1.5	2.06	38.5	-36.4	
Mid Ch								
836.50	16.43	V	1.0	-1.4	14.05	38.5	-24.4	
836.50	5.32	H	1.0	-1.4	2.94	38.5	-35.6	
High Ch								
847.50	18.94	V	1.0	-1.4	16.59	38.5	-21.9	
847.50	5.50	H	1.0	-1.4	3.16	38.5	-35.3	

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Band 5

3MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-02
Test Engineer: 47989
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 5 Fundamentals, 3MHz Bandwidth

Test Equipment:
Receiving: VULB9163-750, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-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	16.75	V	1.0	-1.5	14.32	38.5	-24.2	
825.50	3.35	H	1.0	-1.5	0.93	38.5	-37.6	
Mid Ch								
836.50	17.58	V	1.0	-1.4	15.20	38.5	-23.3	
836.50	4.37	H	1.0	-1.4	1.99	38.5	-36.5	
High Ch								
847.50	17.94	V	1.0	-1.4	15.59	38.5	-22.9	
847.50	4.43	H	1.0	-1.4	2.09	38.5	-36.4	

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Band 5

1.4MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-02
Test Engineer: 47989
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 5 Fundamentals, 1.4MHz Bandwidth

Test Equipment:
Receiving: VULB9163-750, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-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	15.71	V	1.0	-1.5	13.29	38.5	-25.2	
824.70	2.15	H	1.0	-1.5	-0.27	38.5	-38.8	
Mid Ch								
836.50	16.53	V	1.0	-1.4	14.15	38.5	-24.3	
836.50	3.21	H	1.0	-1.4	0.83	38.5	-37.7	
High Ch								
848.30	16.88	V	1.0	-1.4	14.54	38.5	-24.0	
848.30	3.42	H	1.0	-1.4	1.08	38.5	-37.4	

LTE

Band 5

1.4MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-02
Test Engineer: 47989
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 5 Fundamentals, 1.4MHz Bandwidth

Test Equipment:
Receiving: VULB9163-750, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-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	14.66	V	1.0	-1.5	12.24	38.5	-26.3	
824.70	1.10	H	1.0	-1.5	-1.32	38.5	-39.8	
Mid Ch								
836.50	16.47	V	1.0	-1.4	14.09	38.5	-24.4	
836.50	2.58	H	1.0	-1.4	0.20	38.5	-38.3	
High Ch								
848.30	15.85	V	1.0	-1.4	13.51	38.5	-25.0	
848.30	2.53	H	1.0	-1.4	0.19	38.5	-38.3	

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LTE Band 66

LTE

Band 66

20MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-03
Test Engineer: 47989
Configuration: EUT / X-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[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1720.00	12.86	V	4.3	9.5	18.03	30.0	-12.0	
1720.00	16.66	H	4.3	9.5	21.83	30.0	-8.2	
Mid Ch								
1745.00	12.44	V	4.4	9.6	17.66	30.0	-12.3	
1745.00	16.28	H	4.4	9.6	21.50	30.0	-8.5	
High Ch								
1770.00	11.97	V	4.4	9.6	17.21	30.0	-12.8	
1770.00	15.43	H	4.4	9.6	20.66	30.0	-9.3	

LTE

Band 66

20MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-03
Test Engineer: 47989
Configuration: EUT / X-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[00161451], 3m N-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	11.87	V	4.3	9.5	17.04	30.0	-13.0	
1720.00	15.68	H	4.3	9.5	20.85	30.0	-9.2	
Mid Ch								
1745.00	11.46	V	4.4	9.6	16.68	30.0	-13.3	
1745.00	15.30	H	4.4	9.6	20.52	30.0	-9.5	
High Ch								
1770.00	10.99	V	4.4	9.6	16.23	30.0	-13.8	
1770.00	14.43	H	4.4	9.6	19.66	30.0	-10.3	

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Band 66

15MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-03
Test Engineer: 47989
Configuration: EUT / X-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[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1717.50	13.67	V	4.3	9.5	18.84	30.0	-11.2	
1717.50	17.05	H	4.3	9.5	22.22	30.0	-7.8	
Mid Ch								
1745.00	13.25	V	4.4	9.6	18.47	30.0	-11.5	
1745.00	16.74	H	4.4	9.6	21.96	30.0	-8.0	
High Ch								
1772.50	13.10	V	4.4	9.6	18.33	30.0	-11.7	
1772.50	16.32	H	4.4	9.6	21.56	30.0	-8.4	

LTE

Band 66

15MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-03
Test Engineer: 47989
Configuration: EUT / X-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[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1717.50	12.61	V	4.3	9.5	17.78	30.0	-12.2	
1717.50	16.00	H	4.3	9.5	21.17	30.0	-8.8	
Mid Ch								
1745.00	12.34	V	4.4	9.6	17.56	30.0	-12.4	
1745.00	15.68	H	4.4	9.6	20.90	30.0	-9.1	
High Ch								
1772.50	12.13	V	4.4	9.6	17.36	30.0	-12.6	
1772.50	15.26	H	4.4	9.6	20.50	30.0	-9.5	

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Band 66

10MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-03
Test Engineer: 47989
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 66 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1715.00	13.36	V	4.3	9.5	18.52	30.0	-11.5	
1715.00	16.35	H	4.3	9.5	21.50	30.0	-8.5	
Mid Ch								
1745.00	13.38	V	4.4	9.6	18.60	30.0	-11.4	
1745.00	15.90	H	4.4	9.6	21.12	30.0	-8.9	
High Ch								
1775.00	13.03	V	4.4	9.6	18.27	30.0	-11.7	
1775.00	15.27	H	4.4	9.6	20.51	30.0	-9.5	

LTE

Band 66

10MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-03
Test Engineer: 47989
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 66 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1715.00	12.34	V	4.3	9.5	17.50	30.0	-12.5	
1715.00	15.33	H	4.3	9.5	20.48	30.0	-9.5	
Mid Ch								
1745.00	12.33	V	4.4	9.6	17.55	30.0	-12.4	
1745.00	14.93	H	4.4	9.6	20.15	30.0	-9.8	
High Ch								
1775.00	12.07	V	4.4	9.6	17.31	30.0	-12.7	
1775.00	14.19	H	4.4	9.6	19.43	30.0	-10.6	

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Band 66

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-03
Test Engineer: 47989
Configuration: EUT / X-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[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1712.50	12.72	V	4.3	9.5	17.87	30.0	-12.1	
1712.50	15.73	H	4.3	9.5	20.88	30.0	-9.1	
Mid Ch								
1745.00	12.08	V	4.4	9.6	17.30	30.0	-12.7	
1745.00	15.55	H	4.4	9.6	20.77	30.0	-9.2	
High Ch								
1777.50	12.40	V	4.4	9.6	17.63	30.0	-12.4	
1777.50	14.79	H	4.4	9.6	20.03	30.0	-10.0	

LTE

Band 66

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-03
Test Engineer: 47989
Configuration: EUT / X-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[00161451], 3m N-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	11.97	V	4.3	9.5	17.12	30.0	-12.9	
1712.50	14.04	H	4.3	9.5	19.19	30.0	-10.8	
Mid Ch								
1745.00	11.08	V	4.4	9.6	16.30	30.0	-13.7	
1745.00	14.55	H	4.4	9.6	19.77	30.0	-10.2	
High Ch								
1777.50	11.42	V	4.4	9.6	16.65	30.0	-13.3	
1777.50	13.77	H	4.4	9.6	19.01	30.0	-11.0	

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LTE

Band 66

3MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-03
Test Engineer: 47989
Configuration: EUT / X-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[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1711.50	12.19	V	4.3	9.5	17.35	30.0	-12.7	
1711.50	15.70	H	4.3	9.5	20.85	30.0	-9.1	
Mid Ch								
1745.00	12.96	V	4.4	9.6	18.18	30.0	-11.8	
1745.00	15.75	H	4.4	9.6	20.97	30.0	-9.0	
High Ch								
1778.50	11.59	V	4.4	9.6	16.82	30.0	-13.2	
1778.50	14.75	H	4.4	9.6	19.99	30.0	-10.0	

LTE

Band 66

3MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-03
Test Engineer: 47989
Configuration: EUT / X-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[00161451], 3m N-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	11.21	V	4.3	9.5	16.37	30.0	-13.6	
1711.50	15.45	H	4.3	9.5	20.60	30.0	-9.4	
Mid Ch								
1745.00	11.97	V	4.4	9.6	17.19	30.0	-12.8	
1745.00	14.68	H	4.4	9.6	19.90	30.0	-10.1	
High Ch								
1778.50	10.50	V	4.4	9.6	15.73	30.0	-14.3	
1778.50	13.66	H	4.4	9.6	18.90	30.0	-11.1	

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Band 66

1.4MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-02
Test Engineer: 47989
Configuration: EUT / X-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[00161451], 3m N-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	10.59	V	4.3	9.5	15.74	30.0	-14.3	
1710.70	13.14	H	4.3	9.5	18.29	30.0	-11.7	
Mid Ch								
1745.00	10.28	V	4.4	9.6	15.50	30.0	-14.5	
1745.00	13.91	H	4.4	9.6	19.13	30.0	-10.9	
High Ch								
1779.30	10.16	V	4.4	9.6	15.40	30.0	-14.6	
1779.30	12.90	H	4.4	9.6	18.14	30.0	-11.9	

LTE

Band 66

1.4MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-02
Test Engineer: 47989
Configuration: EUT / X-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[00161451], 3m N-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	9.51	V	4.3	9.5	14.66	30.0	-15.3	
1710.70	12.22	H	4.3	9.5	17.37	30.0	-12.6	
Mid Ch								
1745.00	9.21	V	4.4	9.6	14.43	30.0	-15.6	
1745.00	12.80	H	4.4	9.6	18.02	30.0	-12.0	
High Ch								
1779.30	8.93	V	4.4	9.6	14.17	30.0	-15.8	
1779.30	12.07	H	4.4	9.6	17.31	30.0	-12.7	

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LTE Band 2

LTE Band 2 20MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-04
Test Engineer: 51072
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 2 Fundamentals, 20MHz Bandwidth

Test Equipment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00161451], 3m N-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	14.49	V	4.5	9.4	19.39	33.0	-13.6	
1860.00	16.45	H	4.5	9.4	21.35	33.0	-11.7	
Mid Ch								
1880.00	14.81	V	4.5	9.2	19.49	33.0	-13.5	
1880.00	16.99	H	4.5	9.2	21.67	33.0	-11.3	
High Ch								
1900.00	14.66	V	4.6	9.0	19.12	33.0	-13.9	
1900.00	18.09	H	4.6	9.0	22.55	33.0	-10.5	

LTE Band 2 20MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-04
Test Engineer: 51072
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 2 Fundamentals, 20MHz Bandwidth

Test Equipment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00161451], 3m N-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	13.55	V	4.5	9.4	18.45	33.0	-14.6	
1860.00	15.50	H	4.5	9.4	20.40	33.0	-12.6	
Mid Ch								
1880.00	13.86	V	4.5	9.2	18.54	33.0	-14.5	
1880.00	15.97	H	4.5	9.2	20.65	33.0	-12.4	
High Ch								
1900.00	13.71	V	4.6	9.0	18.17	33.0	-14.8	
1900.00	17.14	H	4.6	9.0	21.60	33.0	-11.4	

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Band 2

15MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-03
Test Engineer: 51072
Configuration: EUT / X-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[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1857.50	14.23	V	4.5	9.4	19.16	33.0	-13.8	
1857.50	16.06	H	4.5	9.4	20.99	33.0	-12.0	
Mid Ch								
1880.00	15.19	V	4.5	9.2	19.87	33.0	-13.1	
1880.00	17.13	H	4.5	9.2	21.81	33.0	-11.2	
High Ch								
1902.50	14.61	V	4.6	9.0	19.03	33.0	-14.0	
1902.50	17.63	H	4.6	9.0	22.04	33.0	-11.0	

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Band 2

15MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-03
Test Engineer: 51072
Configuration: EUT / X-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[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1857.50	13.27	V	4.5	9.4	18.20	33.0	-14.8	
1857.50	15.04	H	4.5	9.4	19.97	33.0	-13.0	
Mid Ch								
1880.00	14.18	V	4.5	9.2	18.86	33.0	-14.1	
1880.00	16.11	H	4.5	9.2	20.79	33.0	-12.2	
High Ch								
1902.50	13.62	V	4.6	9.0	18.04	33.0	-15.0	
1902.50	16.63	H	4.6	9.0	21.04	33.0	-12.0	

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Band 2

10MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-03
Test Engineer: 51072
Configuration: EUT / X-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[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1855.00	14.06	V	4.5	9.5	19.01	33.0	-14.0	
1855.00	16.17	H	4.5	9.5	21.13	33.0	-11.9	
Mid Ch								
1880.00	14.53	V	4.5	9.2	19.21	33.0	-13.8	
1880.00	17.01	H	4.5	9.2	21.69	33.0	-11.3	
High Ch								
1905.00	14.86	V	4.6	8.9	19.23	33.0	-13.8	
1905.00	17.79	H	4.6	8.9	22.17	33.0	-10.8	

LTE

Band 2

10MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-03
Test Engineer: 51072
Configuration: EUT / X-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[00161451], 3m N-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	13.11	V	4.5	9.5	18.06	33.0	-14.9	
1855.00	15.20	H	4.5	9.5	20.16	33.0	-12.8	
Mid Ch								
1880.00	13.55	V	4.5	9.2	18.23	33.0	-14.8	
1880.00	16.02	H	4.5	9.2	20.70	33.0	-12.3	
High Ch								
1905.00	13.85	V	4.6	8.9	18.22	33.0	-14.8	
1905.00	16.77	H	4.6	8.9	21.15	33.0	-11.9	

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LTE

Band 2

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-03
Test Engineer: 51072
Configuration: EUT / X-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[00161451], 3m N-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	12.93	V	4.5	9.5	17.92	33.0	-15.1	
1852.50	15.07	H	4.5	9.5	20.06	33.0	-12.9	
Mid Ch								
1880.00	14.30	V	4.5	9.2	18.98	33.0	-14.0	
1880.00	16.15	H	4.5	9.2	20.83	33.0	-12.2	
High Ch								
1907.50	14.58	V	4.6	8.9	18.92	33.0	-14.1	
1907.50	17.37	H	4.6	8.9	21.71	33.0	-11.3	

LTE

Band 2

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-03
Test Engineer: 51072
Configuration: EUT / X-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[00161451], 3m N-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	11.93	V	4.5	9.5	16.92	33.0	-16.1	
1852.50	14.10	H	4.5	9.5	19.09	33.0	-13.9	
Mid Ch								
1880.00	13.28	V	4.5	9.2	17.96	33.0	-15.0	
1880.00	15.13	H	4.5	9.2	19.81	33.0	-13.2	
High Ch								
1907.50	13.62	V	4.6	8.9	17.96	33.0	-15.0	
1907.50	16.36	H	4.6	8.9	20.70	33.0	-12.3	

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LTE

Band 2

3MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-03
Test Engineer: 51072
Configuration: EUT / X-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[00161451], 3m N-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	10.87	V	4.5	9.5	15.87	33.0	-17.1	
1851.50	12.86	H	4.5	9.5	17.86	33.0	-15.1	
Mid Ch								
1880.00	12.20	V	4.5	9.2	16.88	33.0	-16.1	
1880.00	14.35	H	4.5	9.2	19.03	33.0	-14.0	
High Ch								
1908.50	12.06	V	4.6	8.9	16.39	33.0	-16.6	
1908.50	14.93	H	4.6	8.9	19.25	33.0	-13.8	

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Band 2

3MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-03
Test Engineer: 51072
Configuration: EUT / X-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[00161451], 3m N-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	9.85	V	4.5	9.5	14.85	33.0	-18.2	
1851.50	11.92	H	4.5	9.5	16.92	33.0	-16.1	
Mid Ch								
1880.00	11.18	V	4.5	9.2	15.86	33.0	-17.1	
1880.00	13.21	H	4.5	9.2	17.89	33.0	-15.1	
High Ch								
1908.50	11.14	V	4.6	8.9	15.47	33.0	-17.5	
1908.50	13.98	H	4.6	8.9	18.30	33.0	-14.7	

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Band 2

1.4MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-03
Test Engineer: 51072
Configuration: EUT / X-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[00161451], 3m N-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	10.12	V	4.5	9.5	15.12	33.0	-17.9	
1850.70	12.33	H	4.5	9.5	17.34	33.0	-15.7	
Mid Ch								
1880.00	12.09	V	4.5	9.2	16.77	33.0	-16.2	
1880.00	13.66	H	4.5	9.2	18.34	33.0	-14.7	
High Ch								
1909.30	12.47	V	4.6	8.9	16.78	33.0	-16.2	
1909.30	14.83	H	4.6	8.9	19.14	33.0	-13.9	

LTE

Band 2

1.4MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-03
Test Engineer: 51072
Configuration: EUT / X-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[00161451], 3m N-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	9.58	V	4.5	9.5	14.58	33.0	-18.4	
1850.70	11.24	H	4.5	9.5	16.25	33.0	-16.7	
Mid Ch								
1880.00	11.09	V	4.5	9.2	15.77	33.0	-17.2	
1880.00	12.60	H	4.5	9.2	17.28	33.0	-15.7	
High Ch								
1909.30	11.48	V	4.6	8.9	15.79	33.0	-17.2	
1909.30	13.91	H	4.6	8.9	18.22	33.0	-14.8	

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LTE Band 12

LTE

Band 12

10MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-02
Test Engineer: 47989
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 12 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: VULB9163-750, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-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	15.54	V	0.9	-1.6	13.07	34.8	-21.7	
704.00	-0.91	H	0.9	-1.6	-3.38	34.8	-38.2	
Mid Ch								
707.50	14.64	V	0.9	-1.6	12.17	34.8	-22.6	
707.50	-0.68	H	0.9	-1.6	-3.15	34.8	-37.9	
High Ch								
711.00	15.67	V	0.9	-1.6	13.20	34.8	-21.6	
711.00	-1.54	H	0.9	-1.6	-4.02	34.8	-38.8	

LTE

Band 12

10MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-02
Test Engineer: 47989
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 12 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: VULB9163-750, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-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	14.10	V	0.9	-1.6	11.63	34.8	-23.2	
704.00	-2.29	H	0.9	-1.6	-4.76	34.8	-39.6	
Mid Ch								
707.50	13.25	V	0.9	-1.6	10.78	34.8	-24.0	
707.50	-1.97	H	0.9	-1.6	-4.44	34.8	-39.2	
High Ch								
711.00	14.21	V	0.9	-1.6	11.74	34.8	-23.1	
711.00	-0.02	H	0.9	-1.6	-2.50	34.8	-37.3	

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Band 12

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-02
Test Engineer: 47989
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 12 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: VULB9163-750, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-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	13.92	V	0.9	-1.6	11.45	34.8	-23.4	
701.50	-2.09	H	0.9	-1.6	-4.55	34.8	-39.4	
Mid Ch								
707.50	15.45	V	0.9	-1.6	12.98	34.8	-21.8	
707.50	-0.99	H	0.9	-1.6	-3.46	34.8	-38.3	
High Ch								
713.50	15.44	V	0.9	-1.6	12.96	34.8	-21.8	
713.50	-0.49	H	0.9	-1.6	-2.97	34.8	-37.8	

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Band 12

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-02
Test Engineer: 47989
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 12 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: VULB9163-750, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-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	12.73	V	0.9	-1.6	10.26	34.8	-24.5	
701.50	-3.67	H	0.9	-1.6	-6.13	34.8	-40.9	
Mid Ch								
707.50	14.02	V	0.9	-1.6	11.55	34.8	-23.3	
707.50	-2.34	H	0.9	-1.6	-4.81	34.8	-39.6	
High Ch								
713.50	13.94	V	0.9	-1.6	11.46	34.8	-23.3	
713.50	-2.01	H	0.9	-1.6	-4.49	34.8	-39.3	

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Band 12

3MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-02
Test Engineer: 47989
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 12 Fundamentals, 3MHz Bandwidth

Test Equipment:
Receiving: VULB9163-750, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-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	13.37	V	0.9	-1.6	10.90	34.8	-23.9	
700.50	-2.75	H	0.9	-1.6	-5.21	34.8	-40.0	
Mid Ch								
707.50	13.99	V	0.9	-1.6	11.52	34.8	-23.3	
707.50	-0.99	H	0.9	-1.6	-3.46	34.8	-38.3	
High Ch								
714.50	15.33	V	0.9	-1.6	12.86	34.8	-21.9	
714.50	-0.25	H	0.9	-1.6	-2.73	34.8	-37.5	

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Band 12

3MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-02
Test Engineer: 47989
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 12 Fundamentals, 3MHz Bandwidth

Test Equipment:
Receiving: VULB9163-750, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-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	12.27	V	0.9	-1.6	9.80	34.8	-25.0	
700.50	-3.78	H	0.9	-1.6	-6.24	34.8	-41.0	
Mid Ch								
707.50	12.65	V	0.9	-1.6	10.18	34.8	-24.6	
707.50	-2.24	H	0.9	-1.6	-4.71	34.8	-39.5	
High Ch								
714.50	13.89	V	0.9	-1.6	11.42	34.8	-23.4	
714.50	-1.78	H	0.9	-1.6	-4.26	34.8	-39.1	

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Band 12

1.4MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-02
Test Engineer: 47989
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_QPSK Band 12 Fundamentals, 1.4MHz Bandwidth

Test Equipment:
Receiving: VULB9163-750, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-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	11.74	V	0.9	-1.6	9.27	34.8	-25.5	
699.70	-4.50	H	0.9	-1.6	-6.97	34.8	-41.8	
Mid Ch								
707.50	13.00	V	0.9	-1.6	10.53	34.8	-24.3	
707.50	-3.53	H	0.9	-1.6	-6.00	34.8	-40.8	
High Ch								
715.30	13.25	V	0.9	-1.6	10.77	34.8	-24.0	
715.30	-2.57	H	0.9	-1.6	-5.04	34.8	-39.8	

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Band 12

1.4MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397760
Date: 2018-04-02
Test Engineer: 47989
Configuration: EUT / Z-Position
Location: Chamber 1
Mode: LTE_16QAM Band 12 Fundamentals, 1.4MHz Bandwidth

Test Equipment:
Receiving: VULB9163-750, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-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	10.79	V	0.9	-1.6	8.32	34.8	-26.5	
699.70	-5.61	H	0.9	-1.6	-8.08	34.8	-42.9	
Mid Ch								
707.50	11.75	V	0.9	-1.6	9.28	34.8	-25.5	
707.50	-4.20	H	0.9	-1.6	-6.67	34.8	-41.5	
High Ch								
715.30	12.32	V	0.9	-1.6	9.84	34.8	-25.0	
715.30	-3.94	H	0.9	-1.6	-6.41	34.8	-41.2	

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LTE Band 13

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Band 13

10MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397759
Date: 2018-04-03
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 2
Mode: LTE_QPSK Band 13 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-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								
782.00	0.00	V	0.9	-1.6	0.00	34.8	0.0	
782.00	0.00	H	0.9	-1.6	0.00	34.8	0.0	
Mid Ch								
782.00	17.95	V	0.9	-1.6	15.46	34.8	-19.3	
782.00	4.24	H	0.9	-1.6	1.75	34.8	-33.0	
High Ch								
782.00	0.00	V	0.9	-1.6	0.00	34.8	0.0	
782.00	0.00	H	0.9	-1.6	0.00	34.8	0.0	

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Band 13

10MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397759
Date: 2018-04-03
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 2
Mode: LTE_16QAM Band 13 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-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								
782.00	0.00	V	0.9	-1.6	0.00	34.8	0.0	
782.00	0.00	H	0.9	-1.6	0.00	34.8	0.0	
Mid Ch								
782.00	16.98	V	0.9	-1.6	14.49	34.8	-20.3	
782.00	3.24	H	0.9	-1.6	0.75	34.8	-34.0	
High Ch								
782.00	0.00	V	0.9	-1.6	0.00	34.8	0.0	
782.00	0.00	H	0.9	-1.6	0.00	34.8	0.0	

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Band 13

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397759
Date: 2018-04-03
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 2
Mode: LTE_QPSK Band 13 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-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	17.18	V	0.9	-1.6	14.69	34.8	-20.1	
779.50	4.30	H	0.9	-1.6	1.80	34.8	-33.0	
Mid Ch								
782.00	17.60	V	0.9	-1.6	15.11	34.8	-19.7	
782.00	4.52	H	0.9	-1.6	2.03	34.8	-32.7	
High Ch								
784.50	17.67	V	0.9	-1.6	15.18	34.8	-19.6	
784.50	4.55	H	0.9	-1.6	2.05	34.8	-32.7	

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Band 13

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397759
Date: 2018-04-03
Test Engineer: 45585
Configuration: EUT / Z-Position
Location: Chamber 2
Mode: LTE_16QAM Band 13 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-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	16.18	V	0.9	-1.6	13.69	34.8	-21.1	
779.50	3.27	H	0.9	-1.6	0.77	34.8	-34.0	
Mid Ch								
782.00	16.67	V	0.9	-1.6	14.18	34.8	-20.6	
782.00	3.61	H	0.9	-1.6	1.12	34.8	-33.6	
High Ch								
784.50	16.68	V	0.9	-1.6	14.19	34.8	-20.6	
784.50	3.65	H	0.9	-1.6	1.15	34.8	-33.6	

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LTE Band 41

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Band 41

20MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397759
Date: 2018-04-03
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 41 Fundamentals, 20MHz Bandwidth

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2506.00	15.07	V	5.3	10.3	20.01	33.0	-13.0	
2506.00	14.24	H	5.3	10.3	19.17	33.0	-13.8	
Mid Ch								
2593.00	14.28	V	5.4	10.1	18.95	33.0	-14.1	
2593.00	14.37	H	5.4	10.1	19.04	33.0	-14.0	
High Ch								
2680.00	14.30	V	5.5	10.2	18.93	33.0	-14.1	
2680.00	14.89	H	5.5	10.2	19.52	33.0	-13.5	

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Band 41

20MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397759
Date: 2018-04-03
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 41 Fundamentals, 20MHz Bandwidth

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 3m N-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	14.17	V	5.3	10.3	19.11	33.0	-13.9	
2506.00	13.32	H	5.3	10.3	18.25	33.0	-14.7	
Mid Ch								
2593.00	13.28	V	5.4	10.1	17.95	33.0	-15.1	
2593.00	13.43	H	5.4	10.1	18.10	33.0	-14.9	
High Ch								
2680.00	13.33	V	5.5	10.2	17.96	33.0	-15.0	
2680.00	13.85	H	5.5	10.2	18.48	33.0	-14.5	

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Band 41

15MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397759
Date: 2018-04-03
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 41 Fundamentals, 15MHz Bandwidth

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2503.50	15.22	V	5.3	10.3	20.18	33.0	-12.8	
2503.50	14.36	H	5.3	10.3	19.31	33.0	-13.7	
Mid Ch								
2593.00	14.47	V	5.4	10.1	19.14	33.0	-13.9	
2593.00	14.55	H	5.4	10.1	19.22	33.0	-13.8	
High Ch								
2682.50	14.24	V	5.5	10.2	18.87	33.0	-14.1	
2682.50	14.95	H	5.5	10.2	19.58	33.0	-13.4	

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Band 41

15MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397759
Date: 2018-04-03
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 41 Fundamentals, 15MHz Bandwidth

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 3m N-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	14.26	V	5.3	10.3	19.22	33.0	-13.8	
2503.50	13.45	H	5.3	10.3	18.40	33.0	-14.6	
Mid Ch								
2593.00	13.60	V	5.4	10.1	18.27	33.0	-14.7	
2593.00	13.67	H	5.4	10.1	18.34	33.0	-14.7	
High Ch								
2682.50	13.31	V	5.5	10.2	17.94	33.0	-15.1	
2682.50	13.98	H	5.5	10.2	18.61	33.0	-14.4	

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Band 41

10MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397759
Date: 2018-04-03
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 41 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 3m N-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	14.79	V	5.3	10.3	19.75	33.0	-13.2	
2501.00	14.11	H	5.3	10.3	19.08	33.0	-13.9	
Mid Ch								
2593.00	14.31	V	5.4	10.1	18.98	33.0	-14.0	
2593.00	14.33	H	5.4	10.1	19.00	33.0	-14.0	
High Ch								
2685.00	13.53	V	5.5	10.2	18.16	33.0	-14.8	
2685.00	14.64	H	5.5	10.2	19.27	33.0	-13.7	

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Band 41

10MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397759
Date: 2018-04-03
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 41 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 3m N-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	13.96	V	5.3	10.3	18.92	33.0	-14.1	
2501.00	13.35	H	5.3	10.3	18.32	33.0	-14.7	
Mid Ch								
2593.00	13.54	V	5.4	10.1	18.21	33.0	-14.8	
2593.00	13.57	H	5.4	10.1	18.24	33.0	-14.8	
High Ch								
2685.00	12.59	V	5.5	10.2	17.22	33.0	-15.8	
2685.00	13.71	H	5.5	10.2	18.34	33.0	-14.7	

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Band 41

5MHz

QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397759
Date: 2018-04-03
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 41 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 3m N-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	14.63	V	5.3	10.3	19.63	33.0	-13.4	
2498.50	14.06	H	5.3	10.3	19.06	33.0	-13.9	
Mid Ch								
2593.00	14.06	V	5.4	10.1	18.73	33.0	-14.3	
2593.00	14.99	H	5.4	10.1	19.66	33.0	-13.3	
High Ch								
2687.50	13.81	V	5.5	10.2	18.44	33.0	-14.6	
2687.50	14.76	H	5.5	10.2	19.39	33.0	-13.6	

LTE

Band 41

5MHz

16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788397759
Date: 2018-04-03
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 41 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2498.50	13.89	V	5.3	10.3	18.89	33.0	-14.1	
2498.50	13.15	H	5.3	10.3	18.15	33.0	-14.9	
Mid Ch								
2593.00	13.15	V	5.4	10.1	17.82	33.0	-15.2	
2593.00	13.81	H	5.4	10.1	18.48	33.0	-14.5	
High Ch								
2687.50	12.80	V	5.5	10.2	17.43	33.0	-15.6	
2687.50	13.73	H	5.5	10.2	18.36	33.0	-14.6	

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10.2. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

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

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.

Part 27.53 (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.

Part 27.53 (h) AWS emission limits—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 log10 (P) dB.

TEST PROCEDURE

ANSI / TIA / EIA 603 E Clause 2.2.12; ESU40 setting reference to 971168 D01 v03

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 = peak;
f) Ensure that the number of measurement points ≥ span/RBW;
g) Trace mode = max hold;

NOTE : Radiated spurious emissions were investigated below 30MHz, 30MHz – 1GHz and above 1GHz. There were no emissions found on below 30MHz and 30MHz – 1GHz.

RESULTS

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10.2.1. SPURIOUS RADIATION PLOTS

GSM 850

GSM

GSM850
GPRS

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

Company: Samsung
Project #: 4788397760
Date: 2018-04-06
Test Engineer: 47989
Configuration: EUT / AC Adapter / Earphone, Z-Position
Location: Chamber 2
Mode: GPRS 850 MHz Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 824.2MHz									
1648.40	-4.3	V	3.0	38.2	1.0	-41.5	-13.0	-28.5	
2472.60	-7.6	V	3.0	38.8	1.0	-45.4	-13.0	-32.4	
3296.80	-14.5	V	3.0	39.4	1.0	-53.0	-13.0	-40.0	
1648.40	-3.4	H	3.0	38.2	1.0	-40.6	-13.0	-27.6	
2472.60	-6.9	H	3.0	38.8	1.0	-44.7	-13.0	-31.7	
3296.80	-11.8	H	3.0	39.4	1.0	-50.2	-13.0	-37.2	
Mid Ch, 836.6MHz									
1673.20	-7.1	V	3.0	38.2	1.0	-44.3	-13.0	-31.3	
2509.80	-8.0	V	3.0	38.8	1.0	-45.8	-13.0	-32.8	
3346.40	-14.2	V	3.0	39.5	1.0	-52.7	-13.0	-39.7	
1673.20	-3.6	H	3.0	38.2	1.0	-40.8	-13.0	-27.8	
2509.80	-7.5	H	3.0	38.8	1.0	-45.3	-13.0	-32.3	
3346.40	-13.1	H	3.0	39.5	1.0	-51.6	-13.0	-38.6	
High Ch, 848.8MHz									
1697.60	-5.8	V	3.0	38.2	1.0	-43.0	-13.0	-30.0	
2546.40	-7.3	V	3.0	38.9	1.0	-45.2	-13.0	-32.2	
3395.20	-13.4	V	3.0	39.5	1.0	-51.9	-13.0	-38.9	
1697.60	-4.5	H	3.0	38.2	1.0	-41.7	-13.0	-28.7	
2546.40	-6.2	H	3.0	38.9	1.0	-44.1	-13.0	-31.1	
3395.20	-13.7	H	3.0	39.5	1.0	-52.2	-13.0	-39.2	

GSM

GSM850
EGPRS

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

Company: Samsung
Project #: 4788397760
Date: 2018-04-06
Test Engineer: 47989
Configuration: EUT / AC Adapter / Earphone, Z-Position
Location: Chamber 2
Mode: EGPRS 850 MHz Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 824.2MHz									
1648.40	-7.1	V	3.0	38.2	1.0	-44.3	-13.0	-31.3	
2472.60	-11.8	V	3.0	38.8	1.0	-49.6	-13.0	-36.6	
3296.80	-14.7	V	3.0	39.4	1.0	-53.1	-13.0	-40.1	
1648.40	-8.9	H	3.0	38.2	1.0	-46.1	-13.0	-33.1	
2472.60	-12.0	H	3.0	38.8	1.0	-49.8	-13.0	-36.8	
3296.80	-13.9	H	3.0	39.4	1.0	-52.4	-13.0	-39.4	
Mid Ch, 836.6MHz									
1673.20	-10.3	V	3.0	38.2	1.0	-47.5	-13.0	-34.5	
2509.80	-11.9	V	3.0	38.8	1.0	-49.7	-13.0	-36.7	
3346.40	-14.7	V	3.0	39.5	1.0	-53.2	-13.0	-40.2	
1673.20	-7.8	H	3.0	38.2	1.0	-45.0	-13.0	-32.0	
2509.80	-11.6	H	3.0	38.8	1.0	-49.4	-13.0	-36.4	
3346.40	-15.5	H	3.0	39.5	1.0	-53.9	-13.0	-40.9	
High Ch, 848.8MHz									
1697.60	-8.2	V	3.0	38.2	1.0	-45.4	-13.0	-32.4	
2546.40	-11.1	V	3.0	38.9	1.0	-48.9	-13.0	-35.9	
3395.20	-14.2	V	3.0	39.5	1.0	-52.7	-13.0	-39.7	
1697.60	-7.3	H	3.0	38.2	1.0	-44.6	-13.0	-31.6	
2546.40	-11.9	H	3.0	38.9	1.0	-49.8	-13.0	-36.8	
3395.20	-12.9	H	3.0	39.5	1.0	-51.4	-13.0	-38.4	

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GSM 1900

GSM

GSM1900
GPRS

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

Company: Samsung
Project #: 4788397760
Date: 2018-04-05
Test Engineer: 47989
Configuration: EUT / AC Adapter / Earphone, X-Position
Location: Chamber 2
Mode: GPRS 1900 MHz Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1850.2MHz									
3700.40	-12.4	V	3.0	39.7	1.0	-51.1	-13.0	-38.1	
5550.60	-8.7	V	3.0	39.9	1.0	-47.6	-13.0	-34.6	
7400.80	-10.6	V	3.0	39.4	1.0	-49.0	-13.0	-36.0	
3700.40	-12.5	H	3.0	39.7	1.0	-51.1	-13.0	-38.1	
5550.60	-9.3	H	3.0	39.9	1.0	-48.3	-13.0	-35.3	
7400.80	-10.7	H	3.0	39.4	1.0	-49.2	-13.0	-36.2	
Mid Ch, 1880MHz									
3760.00	-10.8	V	3.0	39.7	1.0	-49.5	-13.0	-36.5	
5640.00	-10.4	V	3.0	40.0	1.0	-49.3	-13.0	-36.3	
7520.00	-10.1	V	3.0	39.4	1.0	-48.5	-13.0	-35.5	
3760.00	-12.1	H	3.0	39.7	1.0	-50.7	-13.0	-37.7	
5640.00	-9.9	H	3.0	40.0	1.0	-48.9	-13.0	-35.9	
7520.00	-9.8	H	3.0	39.4	1.0	-48.2	-13.0	-35.2	
High Ch, 1909.8MHz									
3819.60	-13.0	V	3.0	39.7	1.0	-51.7	-13.0	-38.7	
5729.40	-10.9	V	3.0	40.0	1.0	-49.9	-13.0	-36.9	
7639.20	-9.7	V	3.0	39.3	1.0	-48.0	-13.0	-35.0	
3819.60	-11.9	H	3.0	39.7	1.0	-50.6	-13.0	-37.6	
5729.40	-11.6	H	3.0	40.0	1.0	-50.6	-13.0	-37.6	
7639.20	-9.8	H	3.0	39.3	1.0	-48.2	-13.0	-35.2	

GSM

GSM1900
EGPRS

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

Company: Samsung
Project #: 4788397760
Date: 2018-04-05
Test Engineer: 47989
Configuration: EUT / AC Adapter / Earphone, X-Position
Location: Chamber 2
Mode: EGPRS 1900 MHz Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1850.2MHz									
3700.40	-13.9	V	3.0	39.7	1.0	-52.5	-13.0	-39.5	
5550.60	-10.0	V	3.0	39.9	1.0	-49.0	-13.0	-36.0	
7400.80	-10.6	V	3.0	39.4	1.0	-49.0	-13.0	-36.0	
3700.40	-14.0	H	3.0	39.7	1.0	-52.7	-13.0	-39.7	
5550.60	-11.9	H	3.0	39.9	1.0	-50.8	-13.0	-37.8	
7400.80	-10.6	H	3.0	39.4	1.0	-49.0	-13.0	-36.0	
Mid Ch, 1880MHz									
3760.00	-12.7	V	3.0	39.7	1.0	-51.4	-13.0	-38.4	
5640.00	-10.0	V	3.0	40.0	1.0	-48.9	-13.0	-35.9	
7520.00	-10.5	V	3.0	39.4	1.0	-48.9	-13.0	-35.9	
3760.00	-13.1	H	3.0	39.7	1.0	-51.8	-13.0	-38.8	
5640.00	-11.0	H	3.0	40.0	1.0	-50.0	-13.0	-37.0	
7520.00	-9.7	H	3.0	39.4	1.0	-48.1	-13.0	-35.1	
High Ch, 1909.8MHz									
3819.60	-14.0	V	3.0	39.7	1.0	-52.7	-13.0	-39.7	
5729.40	-11.9	V	3.0	40.0	1.0	-50.8	-13.0	-37.8	
7639.20	-10.2	V	3.0	39.3	1.0	-48.6	-13.0	-35.6	
3819.60	-13.0	H	3.0	39.7	1.0	-51.7	-13.0	-38.7	
5729.40	-12.1	H	3.0	40.0	1.0	-51.1	-13.0	-38.1	
7639.20	-10.0	H	3.0	39.3	1.0	-48.3	-13.0	-35.3	

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WCDMA Band 5

WCDMA

Band 5
REL99

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

Company: Samsung
Project #: 4788397760
Date: 2018-04-05
Test Engineer: 45585
Configuration: EUT / Adapter / Earphone, Z-Position
Location: Chamber 3
Mode: Rel99 Band 5 Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 826.4MHz									
1652.80	-18.6	V	3.0	41.8	1.0	-59.5	-13.0	-46.5	
2479.20	-8.9	V	3.0	41.7	1.0	-49.6	-13.0	-36.6	
3305.60	-15.1	V	3.0	41.1	1.0	-55.3	-13.0	-42.3	
1652.80	-19.1	H	3.0	41.8	1.0	-60.0	-13.0	-47.0	
2479.20	-7.4	H	3.0	41.7	1.0	-48.1	-13.0	-35.1	
3305.60	-15.6	H	3.0	41.1	1.0	-55.7	-13.0	-42.7	
Mid Ch, 836.6MHz									
1673.20	-18.4	V	3.0	41.8	1.0	-59.3	-13.0	-46.3	
2509.80	-5.2	V	3.0	41.7	1.0	-45.9	-13.0	-32.9	
3346.40	-15.9	V	3.0	41.1	1.0	-56.0	-13.0	-43.0	
1673.20	-19.4	H	3.0	41.8	1.0	-60.2	-13.0	-47.2	
2509.80	-0.8	H	3.0	41.7	1.0	-41.4	-13.0	-28.4	
3346.40	-16.5	H	3.0	41.1	1.0	-56.6	-13.0	-43.6	
High Ch, 846.6MHz									
1693.20	-18.9	V	3.0	41.8	1.0	-59.8	-13.0	-46.8	
2539.80	-2.7	V	3.0	41.6	1.0	-43.3	-13.0	-30.3	
3386.40	-15.9	V	3.0	41.1	1.0	-56.0	-13.0	-43.0	
1693.20	-18.7	H	3.0	41.8	1.0	-59.5	-13.0	-46.5	
2539.80	1.0	H	3.0	41.6	1.0	-39.7	-13.0	-26.7	
3386.40	-16.4	H	3.0	41.1	1.0	-56.5	-13.0	-43.5	

WCDMA

Band 5
HSDPA

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

Company: Samsung
Project #: 4788397760
Date: 2018-04-05
Test Engineer: 45585
Configuration: EUT / Adapter / Earphone, Z-Position
Location: Chamber 3
Mode: HSDPA Band 5 Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 826.4MHz									
1652.80	-20.1	V	3.0	41.8	1.0	-60.9	-13.0	-47.9	
2479.20	-17.3	V	3.0	41.7	1.0	-58.0	-13.0	-45.0	
3305.60	-15.4	V	3.0	41.1	1.0	-55.5	-13.0	-42.5	
1652.80	-19.7	H	3.0	41.8	1.0	-60.6	-13.0	-47.6	
2479.20	-17.3	H	3.0	41.7	1.0	-58.0	-13.0	-45.0	
3305.60	-16.6	H	3.0	41.1	1.0	-56.7	-13.0	-43.7	
Mid Ch, 836.6MHz									
1673.20	-19.3	V	3.0	41.8	1.0	-60.2	-13.0	-47.2	
2509.80	-17.0	V	3.0	41.7	1.0	-57.6	-13.0	-44.6	
3346.40	-16.0	V	3.0	41.1	1.0	-56.1	-13.0	-43.1	
1673.20	-19.5	H	3.0	41.8	1.0	-60.3	-13.0	-47.3	
2509.80	-17.4	H	3.0	41.7	1.0	-58.1	-13.0	-45.1	
3346.40	-16.9	H	3.0	41.1	1.0	-57.0	-13.0	-44.0	
High Ch, 846.6MHz									
1693.20	-19.0	V	3.0	41.8	1.0	-59.8	-13.0	-46.8	
2539.80	-16.5	V	3.0	41.6	1.0	-57.2	-13.0	-44.2	
3386.40	-16.0	V	3.0	41.1	1.0	-56.1	-13.0	-43.1	
1693.20	-19.7	H	3.0	41.8	1.0	-60.6	-13.0	-47.6	
2539.80	-17.0	H	3.0	41.6	1.0	-57.7	-13.0	-44.7	
3386.40	-15.6	H	3.0	41.1	1.0	-55.6	-13.0	-42.6	

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