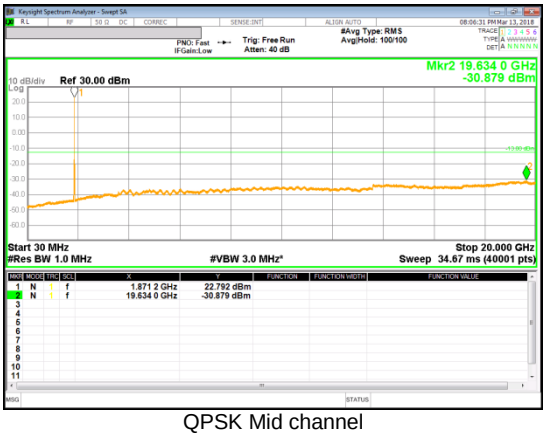
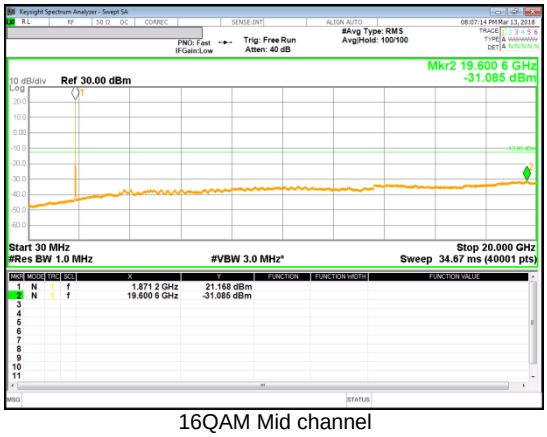
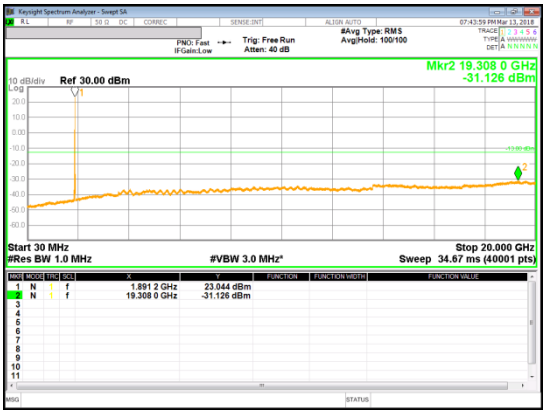
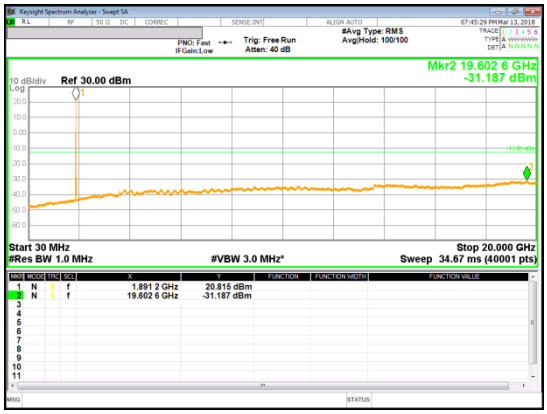
LTE Band 2

Band 2 20MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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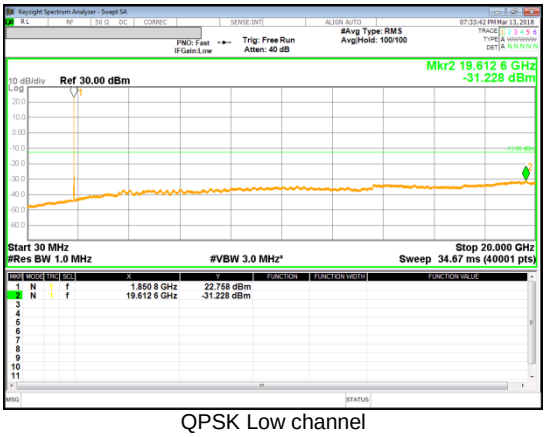
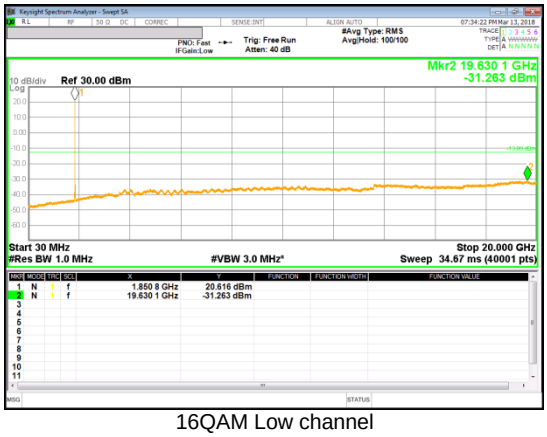
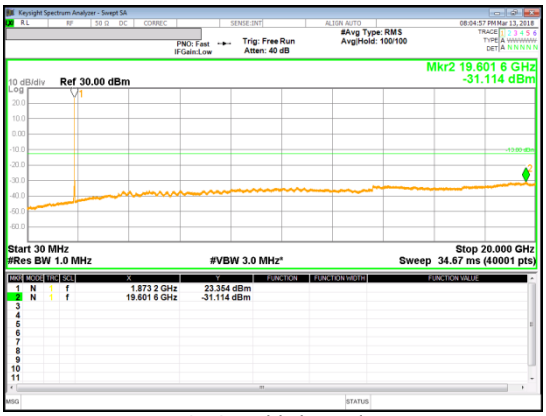
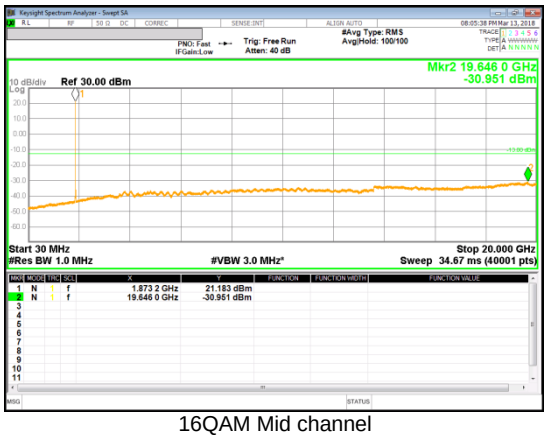
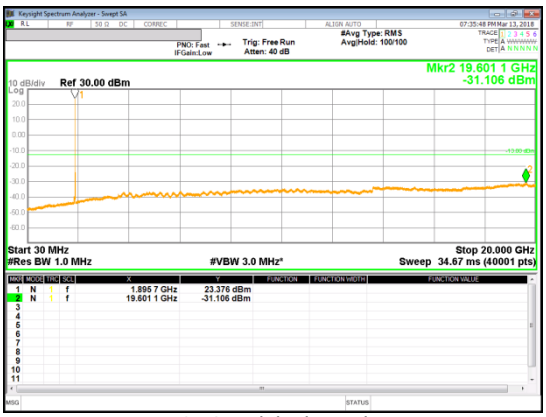
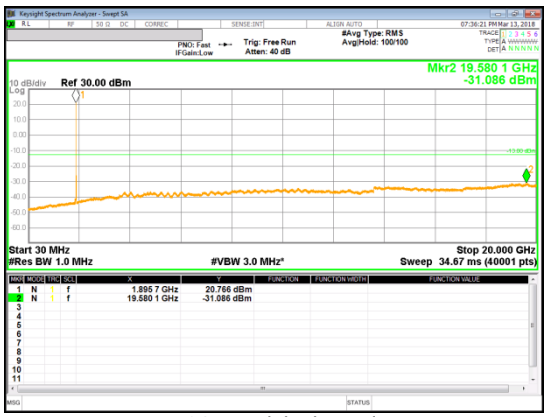
Band 2 15MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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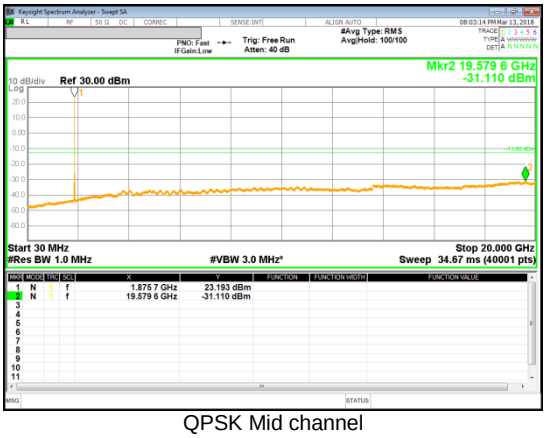
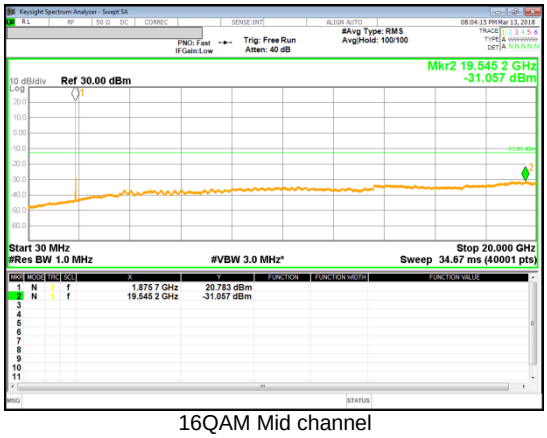
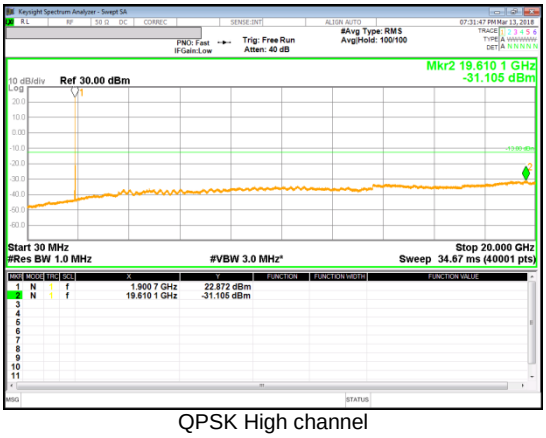
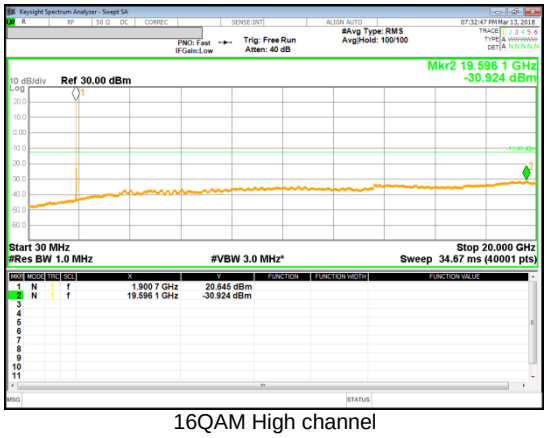
Band 2 10MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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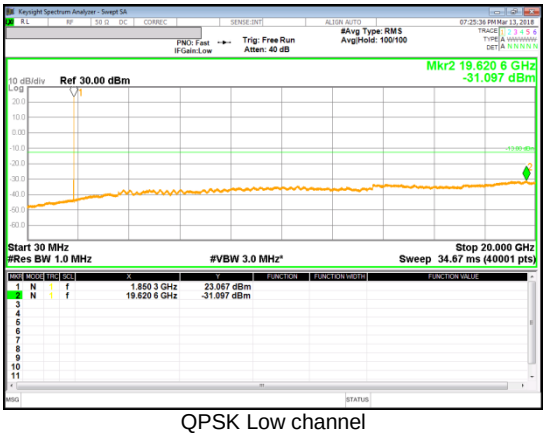
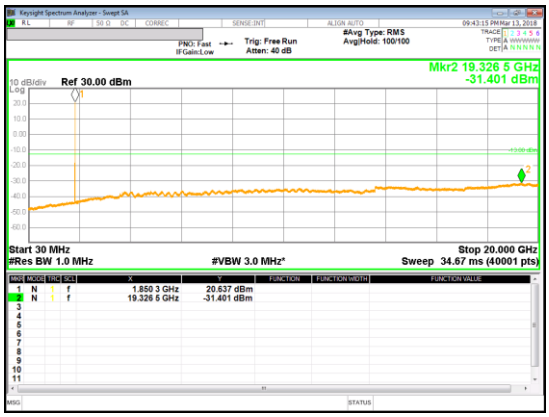
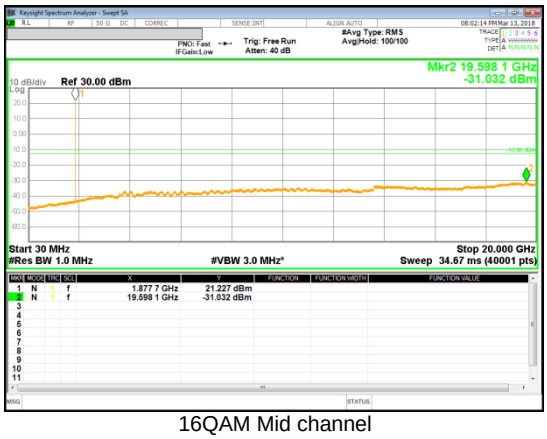
Band 2 5MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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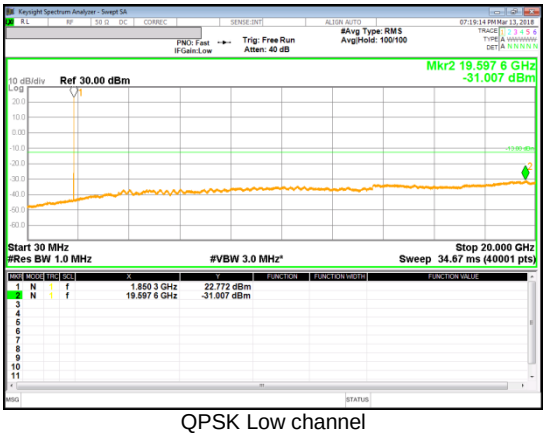
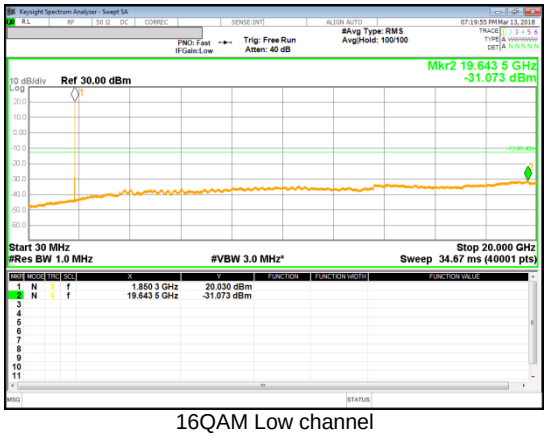
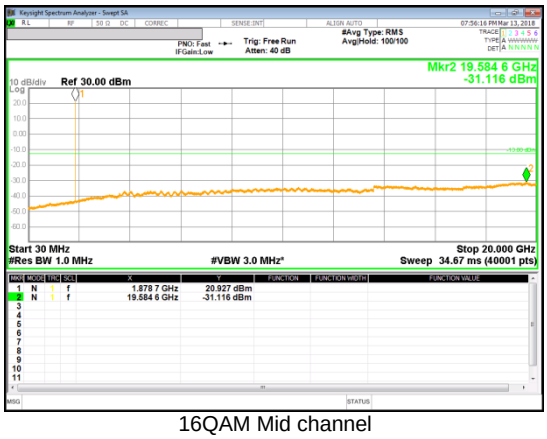
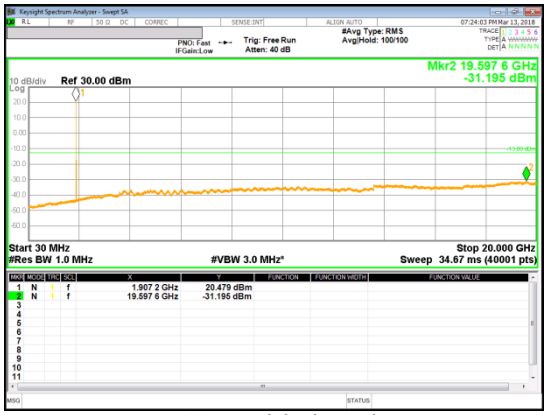
Band 2 3MHz	 QPSK Low channel	 16QAM Low channel
	  QPSK Mid channel	 16QAM Mid channel
	  QPSK High channel	 16QAM High channel

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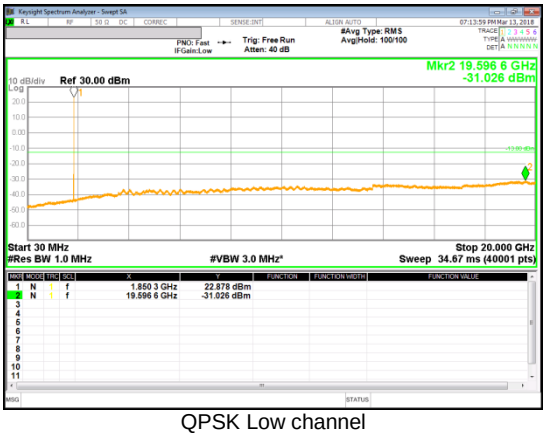
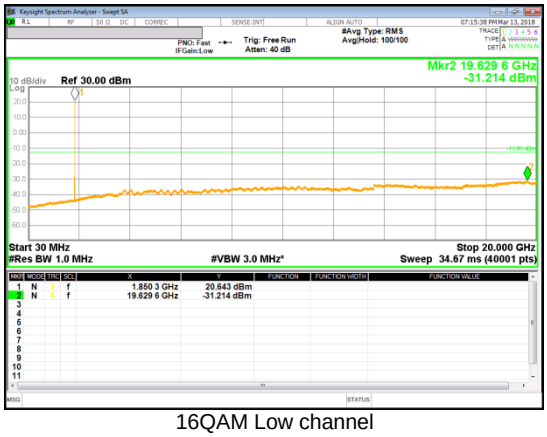
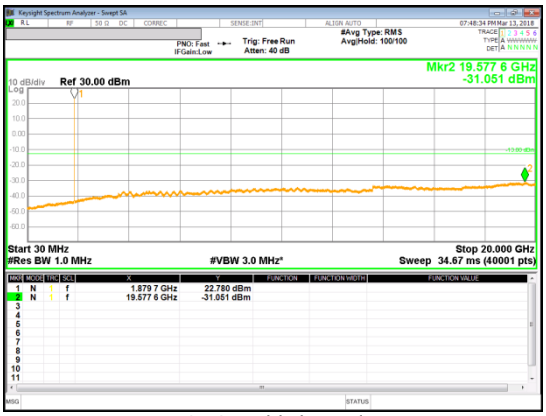
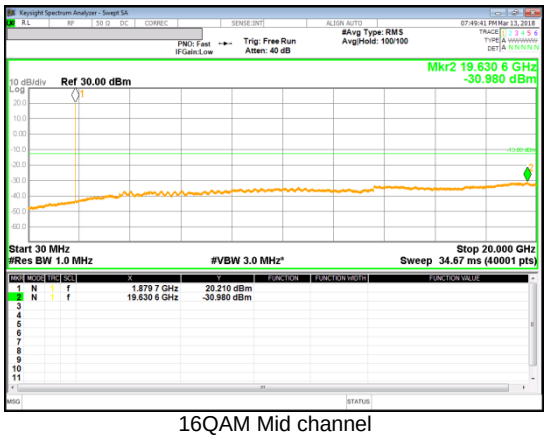
Band 2 1.4MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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LTE Band 13

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

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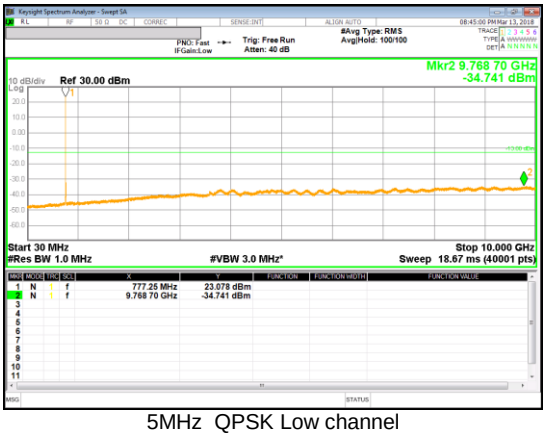
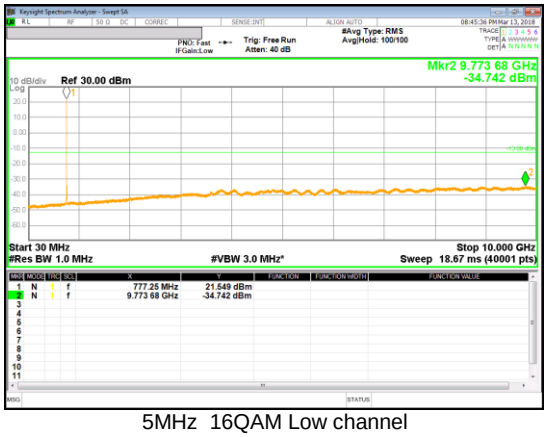
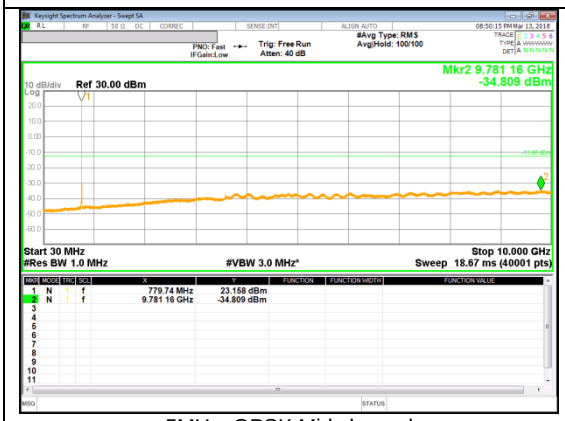
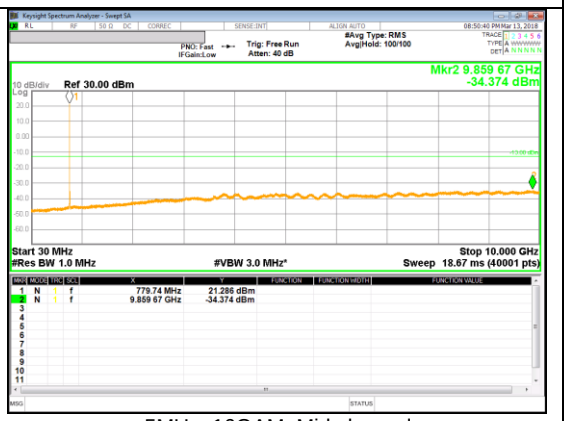
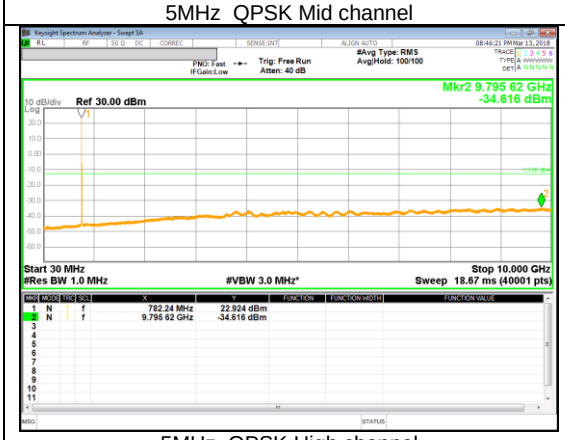
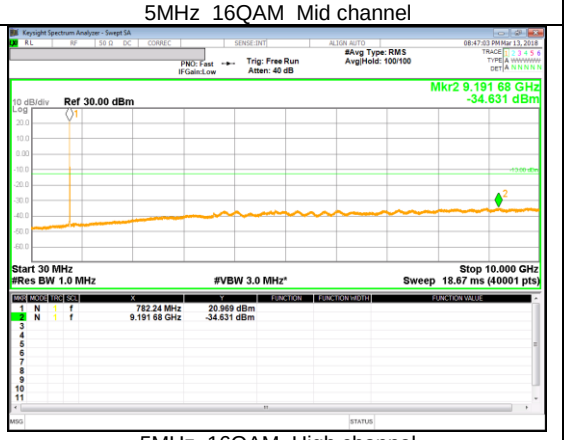
	 5MHz QPSK Low channel	 5MHz 16QAM Low channel
Band 13 5MHz	 5MHz QPSK Mid channel	 5MHz 16QAM Mid channel
	 5MHz QPSK High channel	 5MHz 16QAM High channel

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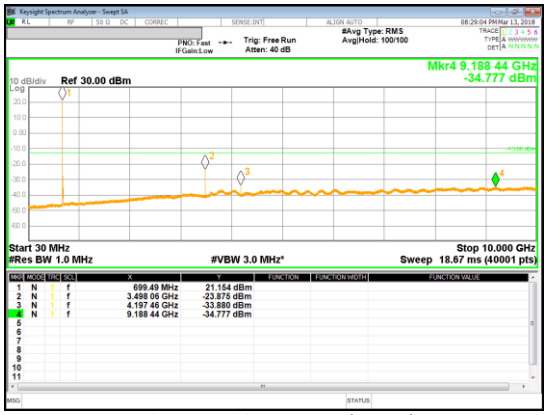
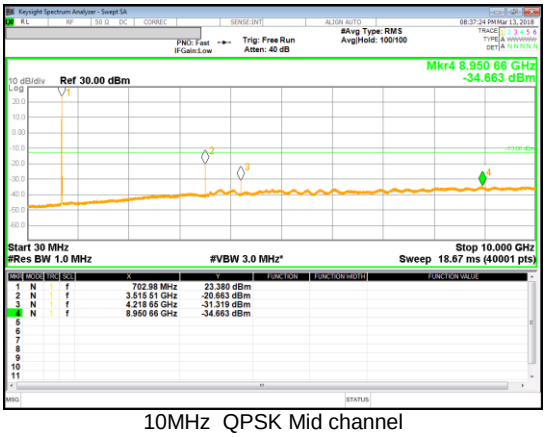
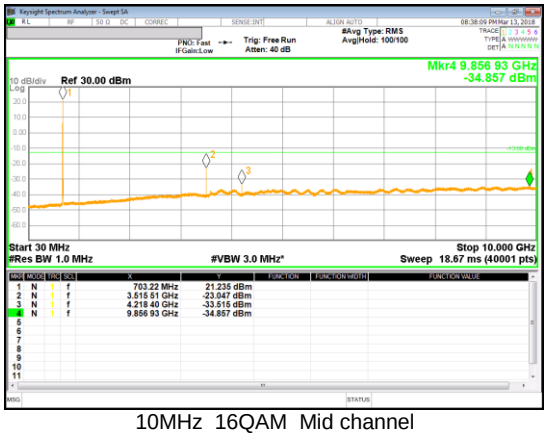
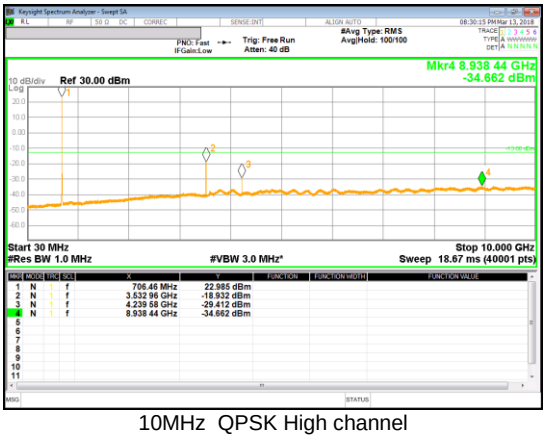
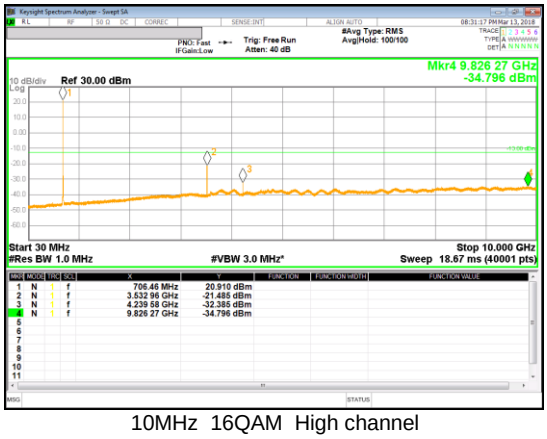
LTE Band 12

Band 12 10MHz	 10MHz QPSK Low channel	 10MHz 16QAM Low channel
	 10MHz QPSK Mid channel	 10MHz 16QAM Mid channel
	 10MHz QPSK High channel	 10MHz 16QAM High channel

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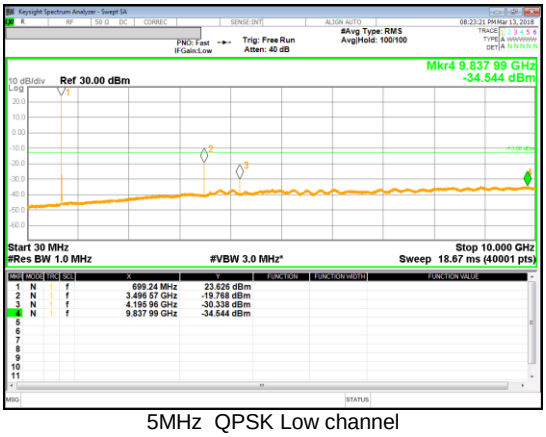
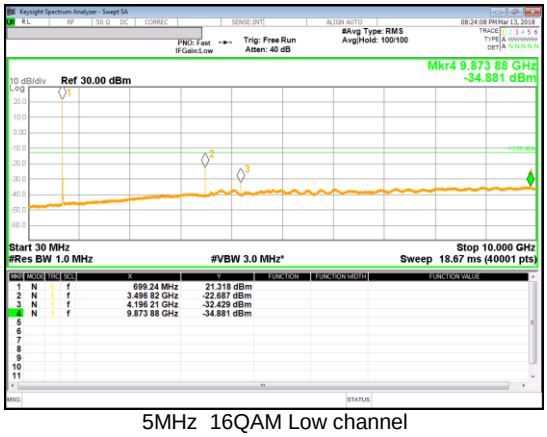
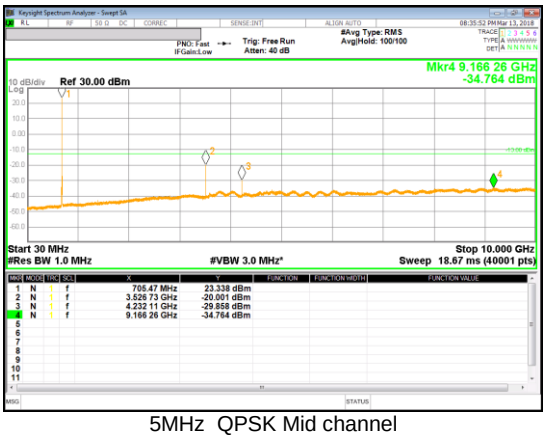
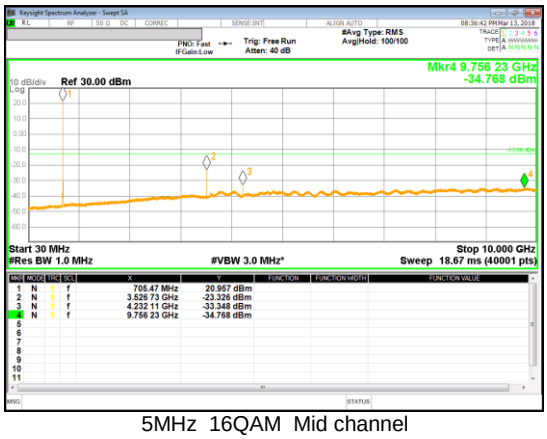
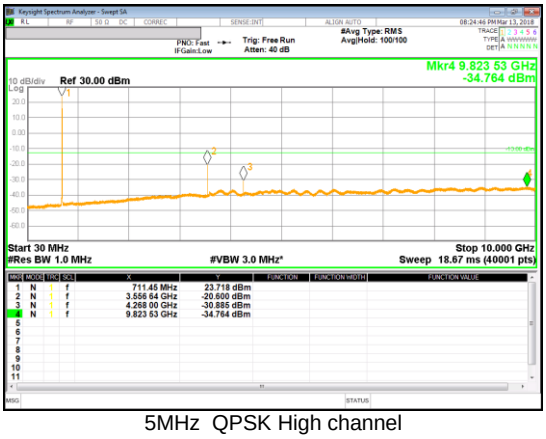
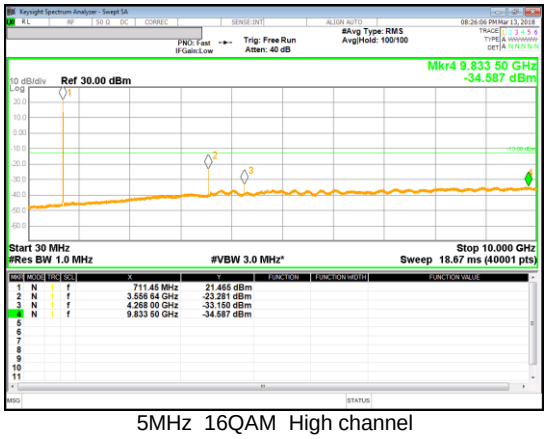
Band 12 5MHz	 5MHz QPSK Low channel	 5MHz 16QAM Low channel
	 5MHz QPSK Mid channel	 5MHz 16QAM Mid channel
	 5MHz QPSK High channel	 5MHz 16QAM High channel

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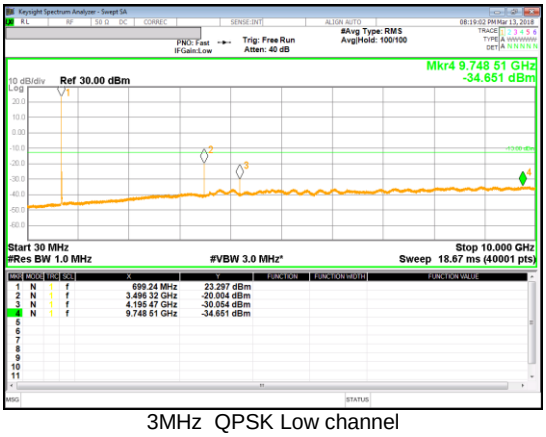
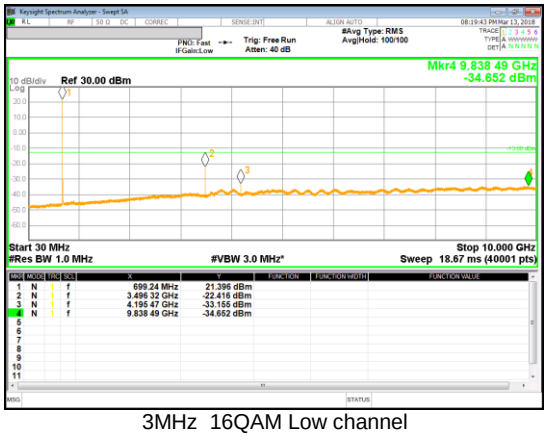
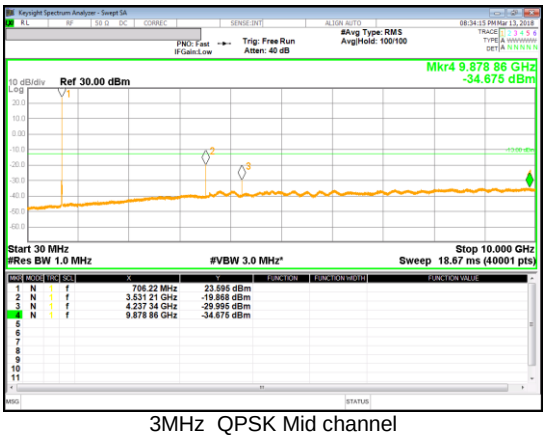
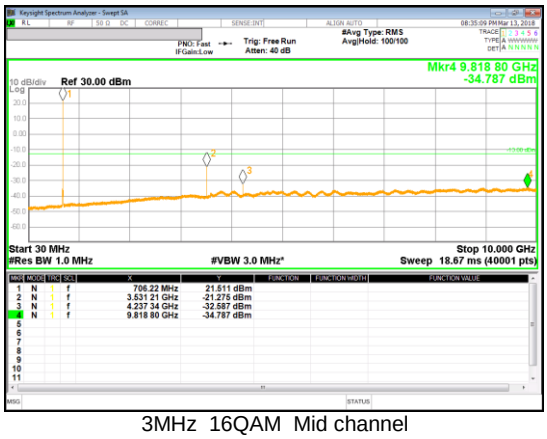
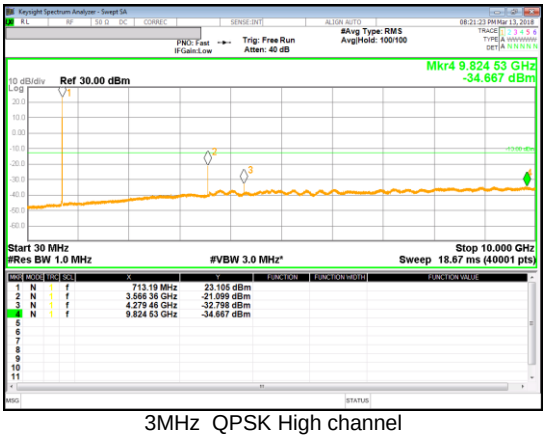
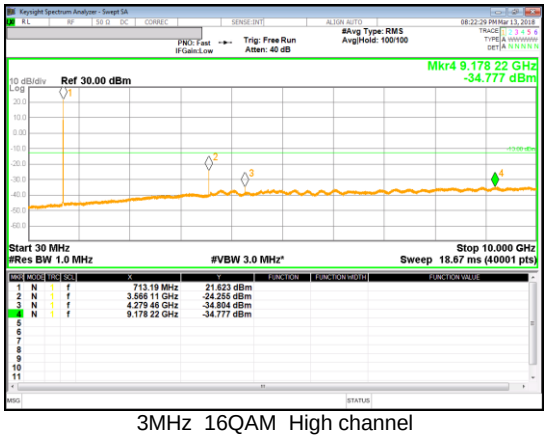
Band 12 3MHz	 3MHz QPSK Low channel	 3MHz 16QAM Low channel
	 3MHz QPSK Mid channel	 3MHz 16QAM Mid channel
	 3MHz QPSK High channel	 3MHz 16QAM High channel

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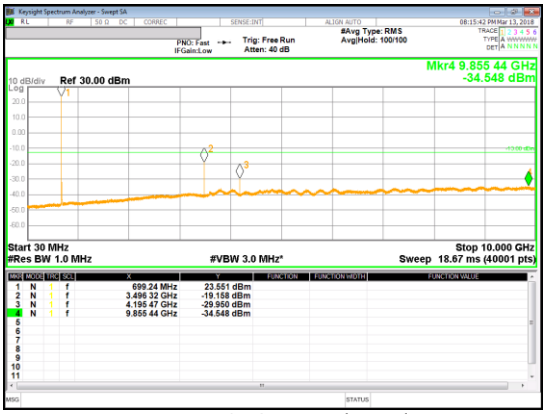
Band 12

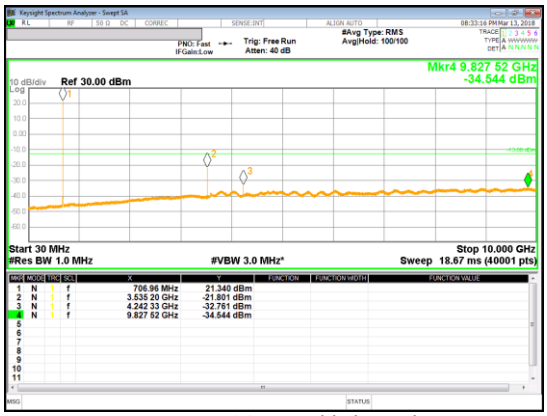
1.4MHz



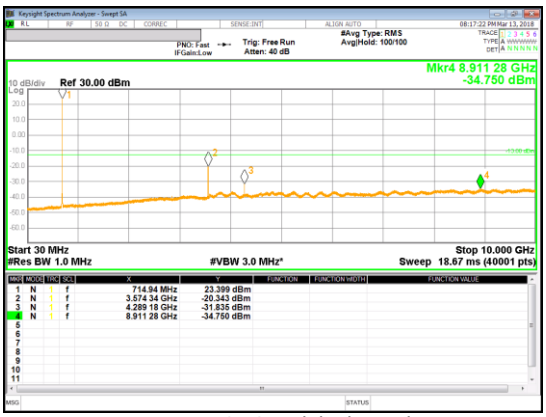
1.4MHz QPSK Low channel

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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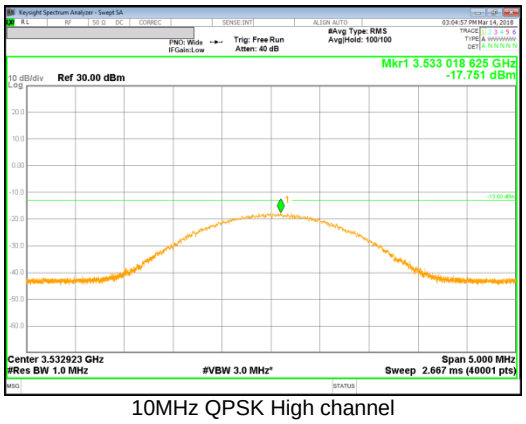
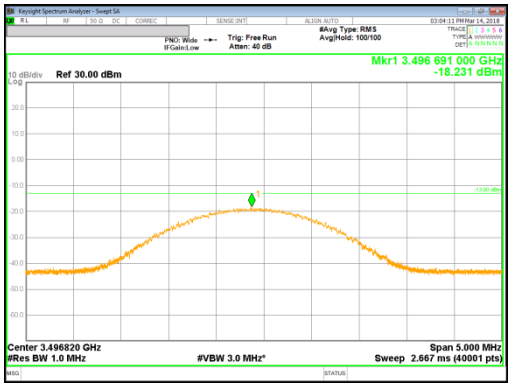
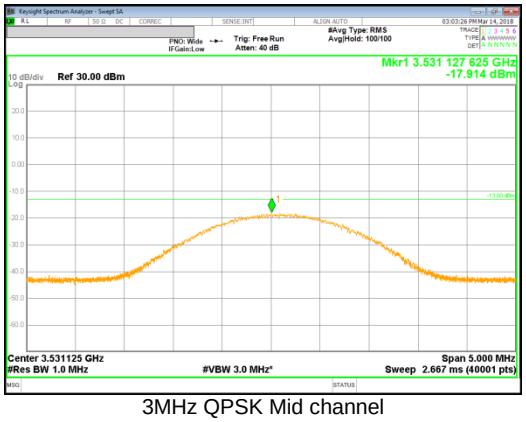
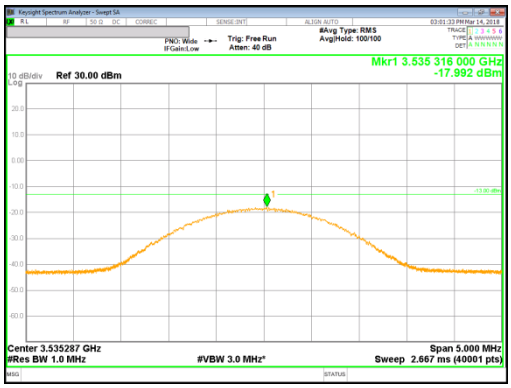
LTE Band12 5th Harmonic Span 5MHz	 10MHz QPSK High channel	 5MHz QPSK Low channel
	 3MHz QPSK Mid channel	 1.4MHz QPSK MId channel

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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	836.59997155	0.006	2.5
3.85	40	836.59997074	0.007	2.5
3.85	30	836.59996728	0.011	2.5
3.85	***20***	836.59997627	***0***	***2.5***
3.85	10	836.59997590	0.000	2.5
3.85	0	836.59997183	0.005	2.5
3.85	-10	836.59997352	0.003	2.5
3.85	-20	836.59997610	0.000	2.5
3.85	-30	836.59997317	0.004	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***	**836.59997627**	***0***	***2.5***
4.40	20	836.59997237	0.005	2.5
3.60	20	836.59997656	0.000	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	1880.00001950	0.000	2.5
3.85	40	1880.00002383	-0.002	2.5
3.85	30	1880.00001980	0.000	2.5
3.85	***20***	1880.00001918	***0***	***2.5***
3.85	10	1880.00002108	-0.001	2.5
3.85	0	1880.00002592	-0.004	2.5
3.85	-10	1880.00002138	-0.001	2.5
3.85	-20	1880.00002693	-0.004	2.5
3.85	-30	1880.00001935	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***	**1880.00001918**	***0***	***2.5***
4.40	20	1880.00001703	0.001	2.5
3.60	20	1880.00002713	-0.004	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	836.59997477	-0.008	2.5
3.85	40	836.59997384	-0.007	2.5
3.85	30	836.59997158	-0.004	2.5
3.85	***20***	836.59996784	***0***	***2.5***
3.85	10	836.59997148	-0.004	2.5
3.85	0	836.59997488	-0.008	2.5
3.85	-10	836.59997745	-0.011	2.5
3.85	-20	836.59997381	-0.007	2.5
3.85	-30	836.59997322	-0.006	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***	**836.59996784**	***0***	***2.5***
4.40	20	836.59997374	-0.007	2.5
3.60	20	836.59997102	-0.004	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	1880.00002183	0.003	2.5
3.85	40	1880.00002373	0.002	2.5
3.85	30	1880.00002629	0.000	2.5
3.85	***20***	1880.00002692	***0***	***2.5***
3.85	10	1880.00002788	-0.001	2.5
3.85	0	1880.00002848	-0.001	2.5
3.85	-10	1880.00002280	0.002	2.5
3.85	-20	1880.00001979	0.004	2.5
3.85	-30	1880.00001926	0.004	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***	**1880.00002692**	***0***	***2.5***
4.40	20	1880.00002621	0.000	2.5
3.60	20	1880.00002885	-0.001	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	1732.59998347	0.000	2.5
3.85	40	1732.59998088	0.002	2.5
3.85	30	1732.59997486	0.005	2.5
3.85	***20***	1732.59998350	***0***	***2.5***
3.85	10	1732.59998019	0.002	2.5
3.85	0	1732.59997978	0.002	2.5
3.85	-10	1732.59997561	0.005	2.5
3.85	-20	1732.59997457	0.005	2.5
3.85	-30	1732.59997365	0.006	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***	**1732.59998350**	***0***	***2.5***
4.40	20	1732.59997510	0.005	2.5
3.60	20	1732.59997326	0.006	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	1744.99998159	-0.002	2.5
3.85	40	1744.99997741	0.001	2.5
3.85	30	1744.99997841	0.000	2.5
3.85	***20***	1744.99997886	***0***	***2.5***
3.85	10	1744.99997231	0.004	2.5
3.85	0	1744.99997931	0.000	2.5
3.85	-10	1744.99997256	0.004	2.5
3.85	-20	1744.99997436	0.003	2.5
3.85	-30	1744.99997728	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***	**1744.99997886**	***0***	***2.5***
4.40	20	1744.99997415	0.003	2.5
3.60	20	1744.99997746	0.001	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	1880.00002503	-0.003	2.5
3.85	40	1880.00002698	-0.004	2.5
3.85	30	1880.00002053	-0.001	2.5
3.85	***20***	1880.00001954	***0***	***2.5***
3.85	10	1880.00002270	-0.002	2.5
3.85	0	1880.00002267	-0.002	2.5
3.85	-10	1880.00002681	-0.004	2.5
3.85	-20	1880.00002012	0.000	2.5
3.85	-30	1880.00002117	-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***	**1880.00001954**	***0***	***2.5***
4.40	20	1880.00002390	-0.002	2.5
3.60	20	1880.00002644	-0.004	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	782.00000902	0.006	2.5
3.85	40	782.00000881	0.006	2.5
3.85	30	782.00001351	0.000	2.5
3.85	***20***	782.00001336	***0***	***2.5***
3.85	10	782.00000413	0.012	2.5
3.85	0	782.00000675	0.008	2.5
3.85	-10	782.00000664	0.009	2.5
3.85	-20	782.00000742	0.008	2.5
3.85	-30	782.00000467	0.011	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***	**782.00001336**	***0***	***2.5***
4.40	20	782.00000988	0.004	2.5
3.60	20	782.00000989	0.004	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	707.50001675	-0.001	2.5
3.85	40	707.50001739	-0.002	2.5
3.85	30	707.50002159	-0.008	2.5
3.85	***20***	707.50001573	***0***	***2.5***
3.85	10	707.50002364	-0.011	2.5
3.85	0	707.50002281	-0.010	2.5
3.85	-10	707.50001915	-0.005	2.5
3.85	-20	707.50002166	-0.008	2.5
3.85	-30	707.50001597	0.000	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***	**707.50001573**	***0***	***2.5***
4.40	20	707.50002002	-0.006	2.5
3.60	20	707.50002364	-0.011	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	2592.99993394	0.002	2.5
3.85	40	2592.99993269	0.002	2.5
3.85	30	2592.99994272	-0.002	2.5
3.85	***20***	2592.99993858	***0***	***2.5***
3.85	10	2592.99993286	0.002	2.5
3.85	0	2592.99994185	-0.001	2.5
3.85	-10	2592.99993660	0.001	2.5
3.85	-20	2592.99993804	0.000	2.5
3.85	-30	2592.99993469	0.002	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***	**2592.99993858**	***0***	***2.5***
4.40	20	2592.99993465	0.002	2.5
3.60	20	2592.99993909	0.000	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	836.50001642	0.007	2.5
3.85	40	836.50002343	-0.002	2.5
3.85	30	836.50002051	0.002	2.5
3.85	***20***	836.50002198	***0***	***2.5***
3.85	10	836.50001627	0.007	2.5
3.85	0	836.50001772	0.005	2.5
3.85	-10	836.50002133	0.001	2.5
3.85	-20	836.50002177	0.000	2.5
3.85	-30	836.50002254	-0.001	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***	**836.50002198**	***0***	***2.5***
4.40	20	836.50001931	0.003	2.5
3.60	20	836.50001630	0.007	2.5

LTE Band 4

Due to frequency range and same output power setting, test was carried in LTE Band 66 to cover both LTE Band 66 and LTE Band 4.

LTE Band 17

Due to frequency range and same output power setting, test was carried in LTE Band 12 to cover both LTE Band 12 and LTE Band 17.

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

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

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. (RBW/VBW are automatically set for LTE B41)

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	27.80	602.56
		661	836.6	26.61	458.14
		810	848.8	25.59	362.24
	EGPRS	512	824.2	22.75	188.36
		661	836.6	21.09	128.53
		810	848.8	19.51	89.33
GSM1900	GPRS	512	1850.2	27.25	530.88
		661	1880.0	27.41	550.81
		810	1909.8	27.89	615.18
	EGPRS	512	1850.2	24.26	266.69
		661	1880.0	24.10	257.04
		810	1909.8	24.79	301.30

WCDMA

Band	Mode	Channel	f [MHz]	ERP / EIRP	
				[dBm]	[mW]
Band 5	REL99	4132	826.4	17.37	54.58
		4183	836.6	17.31	53.83
		4233	846.6	16.91	49.09
	HSDPA	4132	826.4	15.55	35.89
		4183	836.6	14.83	30.41
		4233	846.6	14.49	28.12
Band 2	REL99	9262	1852.4	19.07	80.72
		9400	1880.0	19.16	82.41
		9538	1907.6	18.26	66.99
	HSDPA	9262	1852.4	18.77	75.34
		9400	1880.0	18.64	73.11
		9538	1907.6	18.28	67.30

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WCDMA

Band	Mode	Channel	f [MHz]	ERP / EIRP	
				[dBm]	[mW]
Band 4	REL99	1312	1712.4	22.33	171.00
		1413	1732.6	22.43	174.98
		1513	1752.6	20.33	107.89
	HSDPA	1312	1712.4	21.70	147.91
		1413	1732.6	21.49	140.93
		1513	1752.6	19.80	95.50

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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	14.72	29.65
			50/0	836.5	14.54	28.44
			50/0	844.0	14.20	26.30
		16QAM	50/0	829.0	13.63	23.07
			50/0	836.5	13.48	22.28
			50/0	844.0	13.11	20.46
	5	QPSK	25/0	826.5	14.96	31.33
			25/0	836.5	14.10	25.70
			25/0	846.5	13.99	25.06
		16QAM	25/0	826.5	13.80	23.99
			25/0	836.5	13.03	20.09
			25/0	846.5	12.83	19.19
	3	QPSK	15/0	825.5	14.55	28.51
			15/0	836.5	13.71	23.50
			15/0	847.5	13.87	24.38
		16QAM	15/0	825.5	13.42	21.98
			15/0	836.5	12.62	18.28
			15/0	847.5	12.73	18.75
	1.4	QPSK	6/0	824.7	11.91	15.52
			6/0	836.5	11.59	14.42
			6/0	848.3	11.78	15.07
		16QAM	6/0	824.7	10.81	12.05
			6/0	836.5	10.43	11.04
			6/0	848.3	10.66	11.64

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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	15.18	32.96
			100/0	2593.0	18.15	65.31
			100/0	2680.0	17.22	52.72
		16QAM	100/0	2506.0	14.23	26.49
			100/0	2593.0	17.22	52.72
			100/0	2680.0	16.27	42.36
	15	QPSK	75/0	2503.5	15.37	34.43
			75/0	2593.0	17.00	50.12
			75/0	2682.5	17.74	59.43
		16QAM	75/0	2503.5	14.42	27.67
			75/0	2593.0	16.09	40.64
			75/0	2682.5	16.79	47.75
	10	QPSK	50/0	2501.0	14.32	27.04
			50/0	2593.0	17.55	56.89
			50/0	2685.0	17.42	55.21
		16QAM	50/0	2501.0	13.38	21.78
			50/0	2593.0	16.64	46.13
			50/0	2685.0	16.61	45.81
	5	QPSK	25/0	2498.5	15.79	37.93
			25/0	2593.0	17.75	59.57
			25/0	2687.5	17.94	62.23
		16QAM	25/0	2498.5	14.86	30.62
			25/0	2593.0	16.89	48.87
			25/0	2687.5	16.86	48.53

LTE Band 4

Due to frequency range and same output power setting, test was carried in LTE Band 66 to cover both LTE Band 66 and LTE Band 4.

LTE Band 17

Due to frequency range and same output power setting, test was carried in LTE Band 12 to cover both LTE Band 12 and LTE Band 17.

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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	19.58	90.78
			100/0	1745.0	18.77	75.34
			100/0	1770.0	19.33	85.70
		16QAM	100/0	1720.0	19.01	79.62
			100/0	1745.0	17.80	60.26
			100/0	1770.0	18.22	66.37
	15	QPSK	75/0	1717.5	20.22	105.20
			75/0	1745.0	18.96	78.70
			75/0	1772.5	19.55	90.16
		16QAM	75/0	1717.5	19.19	82.99
			75/0	1745.0	17.90	61.66
			75/0	1772.5	18.39	69.02
	10	QPSK	50/0	1715.0	19.43	87.70
			50/0	1745.0	19.07	80.72
			50/0	1775.0	19.23	83.75
		16QAM	50/0	1715.0	18.33	68.08
			50/0	1745.0	18.06	63.97
			50/0	1775.0	18.17	65.61
	5	QPSK	25/0	1712.5	19.03	79.98
			25/0	1745.0	19.37	86.50
			25/0	1777.5	18.98	79.07
		16QAM	25/0	1712.5	18.06	63.97
			25/0	1745.0	18.59	72.28
			25/0	1777.5	17.86	61.09
	3	QPSK	15/0	1711.5	19.51	89.33
			15/0	1745.0	18.47	70.31
			15/0	1778.5	18.43	69.66
		16QAM	15/0	1711.5	18.45	69.98
			15/0	1745.0	17.27	53.33
			15/0	1778.5	17.36	54.45
	1.4	QPSK	6/0	1710.7	17.14	51.76
			6/0	1745.0	15.86	38.55
			6/0	1779.3	16.13	41.02
		16QAM	6/0	1710.7	16.02	39.99
			6/0	1745.0	14.83	30.41
			6/0	1779.3	15.20	33.11

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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	18.33	68.08
			100/0	1880.0	17.61	57.68
			100/0	1900.0	18.04	63.68
		16QAM	100/0	1860.0	17.70	58.88
			100/0	1880.0	16.68	46.56
			100/0	1900.0	17.10	51.29
	15	QPSK	75/0	1857.5	18.73	74.64
			75/0	1880.0	17.91	61.80
			75/0	1902.5	17.47	55.85
		16QAM	75/0	1857.5	17.73	59.29
			75/0	1880.0	16.92	49.20
			75/0	1902.5	16.48	44.46
	10	QPSK	50/0	1855.0	16.67	46.45
			50/0	1880.0	17.40	54.95
			50/0	1905.0	16.03	40.09
		16QAM	50/0	1855.0	15.76	37.67
			50/0	1880.0	16.23	41.98
			50/0	1905.0	14.95	31.26
	5	QPSK	25/0	1852.5	17.44	55.46
			25/0	1880.0	16.83	48.19
			25/0	1907.5	15.65	36.73
		16QAM	25/0	1852.5	16.67	46.45
			25/0	1880.0	15.59	36.22
			25/0	1907.5	14.65	29.17
	3	QPSK	15/0	1851.5	17.63	57.94
			15/0	1880.0	17.76	59.70
			15/0	1908.5	16.89	48.87
		16QAM	15/0	1851.5	16.76	47.42
			15/0	1880.0	16.74	47.21
			15/0	1908.5	15.86	38.55
	1.4	QPSK	6/0	1850.7	15.94	39.26
			6/0	1880.0	15.46	35.16
			6/0	1909.3	14.45	27.86
		16QAM	6/0	1850.7	14.95	31.26
			6/0	1880.0	14.57	28.64
			6/0	1909.3	13.44	22.08

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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	12.01	15.89
		16QAM	50/0	782.0	10.91	12.33
	5	QPSK	25/0	779.5	9.49	8.89
			25/0	782.0	8.40	6.92
			25/0	784.5	9.33	8.57
		16QAM	25/0	779.5	8.29	6.75
			25/0	782.0	9.46	8.83
			25/0	784.5	8.12	6.49

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	11.77	15.03
			50/0	707.5	11.65	14.62
			50/0	711.0	11.57	14.35
		16QAM	50/0	704.0	10.36	10.86
			50/0	707.5	10.19	10.45
			50/0	711.0	10.16	10.38
	5	QPSK	25/0	701.5	11.46	14.00
			25/0	707.5	11.28	13.43
			25/0	713.5	11.16	13.06
		16QAM	25/0	701.5	10.02	10.05
			25/0	707.5	9.79	9.53
			25/0	713.5	9.73	9.40
	3	QPSK	15/0	700.5	11.51	14.16
			15/0	707.5	11.15	13.03
			15/0	714.5	11.27	13.40
		16QAM	15/0	700.5	10.05	10.12
			15/0	707.5	9.68	9.29
			15/0	714.5	9.76	9.46
	1.4	QPSK	6/0	699.7	9.15	8.22
			6/0	707.5	8.86	7.69
			6/0	715.3	9.14	8.20
		16QAM	6/0	699.7	7.66	5.83
			6/0	707.5	7.32	5.40
			6/0	715.3	7.70	5.89

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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 #: 4788371662
Date: 2018-03-13
Test Engineer: 47989
Configuration: EUT / X-Position
Location: Chamber 2
Mode: GPRS 850 MHz 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								
824.20	23.92	V	1.0	-1.5	21.49	38.5	-17.0	
824.20	30.23	H	1.0	-1.5	27.80	38.5	-10.7	
Mid Ch								
836.60	22.88	V	1.0	-1.4	20.50	38.5	-18.0	
836.60	28.99	H	1.0	-1.4	26.61	38.5	-11.9	
High Ch								
848.80	22.62	V	1.0	-1.4	20.27	38.5	-18.2	
848.80	27.94	H	1.0	-1.4	25.59	38.5	-12.9	

GSM

GSM850
EGPRS

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371662
Date: 2018-03-13
Test Engineer: 47989
Configuration: EUT / X-Position
Location: Chamber 2
Mode: EGPRS 850 MHz 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								
824.20	18.89	V	1.0	-1.5	16.46	38.5	-22.0	
824.20	25.18	H	1.0	-1.5	22.75	38.5	-15.7	
Mid Ch								
836.60	17.53	V	1.0	-1.4	15.15	38.5	-23.3	
836.60	23.47	H	1.0	-1.4	21.09	38.5	-17.4	
High Ch								
848.80	16.77	V	1.0	-1.4	14.42	38.5	-24.1	
848.80	21.86	H	1.0	-1.4	19.51	38.5	-19.0	

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GSM 1900

GSM

GSM1900
GPRS

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371662
Date: 2018-03-12
Test Engineer: 47989
Configuration: EUT / Y-Position
Location: Chamber 2
Mode: GPRS 1900 MHz Fundamentals

Test Equpment:
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								
1850.20	22.24	V	4.5	9.5	27.25	33.0	-5.7	
1850.20	18.30	H	4.5	9.5	23.31	33.0	-9.7	
Mid Ch								
1880.00	22.73	V	4.5	9.2	27.41	33.0	-5.6	
1880.00	17.06	H	4.5	9.2	21.74	33.0	-11.3	
High Ch								
1909.80	23.58	V	4.6	8.9	27.89	33.0	-5.1	
1909.80	17.11	H	4.6	8.9	21.42	33.0	-11.6	

GSM

GSM1900
EGPRS

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371662
Date: 2018-03-12
Test Engineer: 47989
Configuration: EUT / Y-Position
Location: Chamber 2
Mode: EGPRS 1900 MHz Fundamentals

Test Equpment:
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								
1850.20	19.25	V	4.5	9.5	24.26	33.0	-8.7	
1850.20	15.56	H	4.5	9.5	20.57	33.0	-12.4	
Mid Ch								
1880.00	19.42	V	4.5	9.2	24.10	33.0	-8.9	
1880.00	15.19	H	4.5	9.2	19.87	33.0	-13.1	
High Ch								
1909.80	20.48	V	4.6	8.9	24.79	33.0	-8.2	
1909.80	15.38	H	4.6	8.9	19.69	33.0	-13.3	

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WCDMA Band 5

WCDMA

Band 5
REL99

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371662
Date: 2018-02-22
Test Engineer: 47989
Configuration: EUT / X-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	11.81	V	1.0	-1.5	9.39	38.5	-29.1	
826.40	19.79	H	1.0	-1.5	17.37	38.5	-21.1	
Mid Ch								
836.60	11.20	V	1.0	-1.4	8.82	38.5	-29.7	
836.60	19.69	H	1.0	-1.4	17.31	38.5	-21.2	
High Ch								
846.60	10.69	V	1.0	-1.4	8.34	38.5	-30.2	
846.60	19.26	H	1.0	-1.4	16.91	38.5	-21.6	

WCDMA

Band 5
HSDPA

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371662
Date: 2018-02-22
Test Engineer: 47989
Configuration: EUT / X-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	9.49	V	1.0	-1.5	7.07	38.5	-31.4	
826.40	17.97	H	1.0	-1.5	15.55	38.5	-23.0	
Mid Ch								
836.60	8.30	V	1.0	-1.4	5.92	38.5	-32.6	
836.60	17.21	H	1.0	-1.4	14.83	38.5	-23.7	
High Ch								
846.60	7.94	V	1.0	-1.4	5.59	38.5	-32.9	
846.60	16.84	H	1.0	-1.4	14.49	38.5	-24.0	

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WCDMA Band 2

WCDMA

Band 2
REL99

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371662
Date: 2018-03-01
Test Engineer: 47989
Configuration: EUT / Y-Position
Location: Chamber 1
Mode: Rel99 Band 2 Fundamentals

Test Equpment:
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								
1852.40	14.08	V	4.5	9.5	19.07	33.0	-13.9	
1852.40	9.44	H	4.5	9.5	14.43	33.0	-18.6	
Mid Ch								
1880.00	14.48	V	4.5	9.2	19.16	33.0	-13.8	
1880.00	9.56	H	4.5	9.2	14.24	33.0	-18.8	
High Ch								
1907.60	13.92	V	4.6	8.9	18.26	33.0	-14.7	
1907.60	10.32	H	4.6	8.9	14.66	33.0	-18.3	

WCDMA

Band 2
HSDPA

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371662
Date: 2018-03-01
Test Engineer: 47989
Configuration: EUT / Y-Position
Location: Chamber 1
Mode: HSDPA Band 2 Fundamentals

Test Equpment:
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								
1852.40	13.78	V	4.5	9.5	18.77	33.0	-14.2	
1852.40	8.63	H	4.5	9.5	13.62	33.0	-19.4	
Mid Ch								
1880.00	13.96	V	4.5	9.2	18.64	33.0	-14.4	
1880.00	9.19	H	4.5	9.2	13.87	33.0	-19.1	
High Ch								
1907.60	13.94	V	4.6	8.9	18.28	33.0	-14.7	
1907.60	9.87	H	4.6	8.9	14.21	33.0	-18.8	

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WCDMA Band 4

WCDMA

Band 4
REL99

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371667
Date: 2018-03-27
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 2
Mode: Rel99 Band 4 Fundamentals

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[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	11.60	V	4.3	9.5	16.75	30.0	-13.2	
1712.40	17.18	H	4.3	9.5	22.33	30.0	-7.7	
Mid Ch								
1732.60	10.13	V	4.3	9.5	15.33	30.0	-14.7	
1732.60	17.24	H	4.3	9.5	22.43	30.0	-7.6	
High Ch								
1752.60	10.53	V	4.4	9.6	15.77	30.0	-14.2	
1752.60	15.09	H	4.4	9.6	20.33	30.0	-9.7	

WCDMA

Band 4
HSDPA

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371667
Date: 2018-03-27
Test Engineer: 45585
Configuration: EUT / X-Position
Location: Chamber 2
Mode: HSDPA Band 4 Fundamentals

Test Equpment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[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	10.65	V	4.3	9.5	15.80	30.0	-14.2	
1712.40	16.55	H	4.3	9.5	21.70	30.0	-8.3	
Mid Ch								
1732.60	9.24	V	4.3	9.5	14.44	30.0	-15.6	
1732.60	16.30	H	4.3	9.5	21.49	30.0	-8.5	
High Ch								
1752.60	9.37	V	4.4	9.6	14.61	30.0	-15.4	
1752.60	14.56	H	4.4	9.6	19.80	30.0	-10.2	

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LTE Band 5

LTE Band 5 10MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371662
Date: 2018-02-22
Test Engineer: 47989
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 5 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								
829.00	9.35	V	1.0	-1.5	6.94	38.5	-31.6	
829.00	17.13	H	1.0	-1.5	14.72	38.5	-23.8	
Mid Ch								
836.50	8.77	V	1.0	-1.4	6.39	38.5	-32.1	
836.50	16.92	H	1.0	-1.4	14.54	38.5	-24.0	
High Ch								
844.00	8.27	V	1.0	-1.4	5.92	38.5	-32.6	
844.00	16.56	H	1.0	-1.4	14.20	38.5	-24.3	

LTE Band 5 10MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371662
Date: 2018-02-22
Test Engineer: 47989
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 5 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								
829.00	8.30	V	1.0	-1.5	5.89	38.5	-32.6	
829.00	16.04	H	1.0	-1.5	13.63	38.5	-24.9	
Mid Ch								
836.50	7.66	V	1.0	-1.4	5.28	38.5	-33.2	
836.50	15.86	H	1.0	-1.4	13.48	38.5	-25.0	
High Ch								
844.00	7.17	V	1.0	-1.4	4.82	38.5	-33.7	
844.00	15.47	H	1.0	-1.4	13.11	38.5	-25.4	

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LTE
Band 5
5MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371662
Date: 2018-02-22
Test Engineer: 47989
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 5 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								
826.50	9.23	V	1.0	-1.5	6.81	38.5	-31.7	
826.50	17.38	H	1.0	-1.5	14.96	38.5	-23.5	
Mid Ch								
836.50	8.15	V	1.0	-1.4	5.77	38.5	-32.7	
836.50	16.48	H	1.0	-1.4	14.10	38.5	-24.4	
High Ch								
846.50	7.70	V	1.0	-1.4	5.35	38.5	-33.1	
846.50	16.34	H	1.0	-1.4	13.99	38.5	-24.5	

LTE
Band 5
5MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371662
Date: 2018-02-22
Test Engineer: 47989
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 5 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								
826.50	8.14	V	1.0	-1.5	5.72	38.5	-32.8	
826.50	16.22	H	1.0	-1.5	13.80	38.5	-24.7	
Mid Ch								
836.50	7.06	V	1.0	-1.4	4.68	38.5	-33.8	
836.50	15.41	H	1.0	-1.4	13.03	38.5	-25.5	
High Ch								
846.50	6.62	V	1.0	-1.4	4.27	38.5	-34.2	
846.50	15.18	H	1.0	-1.4	12.83	38.5	-25.7	

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LTE
Band 5
3MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371662
Date: 2018-02-22
Test Engineer: 47989
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 5 Fundamentals, 3MHz 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								
825.50	9.02	V	1.0	-1.5	6.60	38.5	-31.9	
825.50	16.97	H	1.0	-1.5	14.55	38.5	-24.0	
Mid Ch								
836.50	8.07	V	1.0	-1.4	5.69	38.5	-32.8	
836.50	16.09	H	1.0	-1.4	13.71	38.5	-24.8	
High Ch								
847.50	7.35	V	1.0	-1.4	5.01	38.5	-33.5	
847.50	16.22	H	1.0	-1.4	13.87	38.5	-24.6	

LTE
Band 5
3MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371662
Date: 2018-02-22
Test Engineer: 47989
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 5 Fundamentals, 3MHz 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								
825.50	7.88	V	1.0	-1.5	5.46	38.5	-33.0	
825.50	15.84	H	1.0	-1.5	13.42	38.5	-25.1	
Mid Ch								
836.50	6.86	V	1.0	-1.4	4.48	38.5	-34.0	
836.50	15.00	H	1.0	-1.4	12.62	38.5	-25.9	
High Ch								
847.50	6.23	V	1.0	-1.4	3.89	38.5	-34.6	
847.50	15.08	H	1.0	-1.4	12.73	38.5	-25.8	

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LTE
Band 5
1.4MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371662
Date: 2018-02-22
Test Engineer: 47989
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_QPSK Band 5 Fundamentals, 1.4MHz 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								
824.70	5.42	V	1.0	-1.5	2.99	38.5	-35.5	
824.70	14.34	H	1.0	-1.5	11.91	38.5	-26.6	
Mid Ch								
836.50	5.37	V	1.0	-1.4	2.99	38.5	-35.5	
836.50	13.97	H	1.0	-1.4	11.59	38.5	-26.9	
High Ch								
848.30	5.10	V	1.0	-1.4	2.75	38.5	-35.7	
848.30	14.13	H	1.0	-1.4	11.78	38.5	-26.7	

LTE
Band 5
1.4MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371662
Date: 2018-02-22
Test Engineer: 47989
Configuration: EUT / X-Position
Location: Chamber 2
Mode: LTE_16QAM Band 5 Fundamentals, 1.4MHz 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								
824.70	4.42	V	1.0	-1.5	1.99	38.5	-36.5	
824.70	13.24	H	1.0	-1.5	10.81	38.5	-27.7	
Mid Ch								
836.50	4.28	V	1.0	-1.4	1.90	38.5	-36.6	
836.50	12.81	H	1.0	-1.4	10.43	38.5	-28.1	
High Ch								
848.30	3.96	V	1.0	-1.4	1.61	38.5	-36.9	
848.30	13.01	H	1.0	-1.4	10.66	38.5	-27.8	

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LTE Band 41

LTE Band 41 20MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371667
Date: 2018-03-17
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	7.56	V	5.3	10.3	12.50	33.0	-20.5	
2506.00	10.25	H	5.3	10.3	15.18	33.0	-17.8	
Mid Ch								
2593.00	9.13	V	5.4	10.1	13.80	33.0	-19.2	
2593.00	13.48	H	5.4	10.1	18.15	33.0	-14.9	
High Ch								
2680.00	10.88	V	5.5	10.2	15.51	33.0	-17.5	
2680.00	12.59	H	5.5	10.2	17.22	33.0	-15.8	

LTE Band 41 20MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371667
Date: 2018-03-17
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	6.65	V	5.3	10.3	11.59	33.0	-21.4	
2506.00	9.30	H	5.3	10.3	14.23	33.0	-18.8	
Mid Ch								
2593.00	8.21	V	5.4	10.1	12.88	33.0	-20.1	
2593.00	12.55	H	5.4	10.1	17.22	33.0	-15.8	
High Ch								
2680.00	9.98	V	5.5	10.2	14.61	33.0	-18.4	
2680.00	11.64	H	5.5	10.2	16.27	33.0	-16.7	

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LTE
Band 41
15MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371667
Date: 2018-03-17
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	7.22	V	5.3	10.3	12.18	33.0	-20.8	
2503.50	10.42	H	5.3	10.3	15.37	33.0	-17.6	
Mid Ch								
2593.00	9.05	V	5.4	10.1	13.72	33.0	-19.3	
2593.00	12.33	H	5.4	10.1	17.00	33.0	-16.0	
High Ch								
2682.50	9.46	V	5.5	10.2	14.09	33.0	-18.9	
2682.50	13.11	H	5.5	10.2	17.74	33.0	-15.3	

LTE
Band 41
15MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371667
Date: 2018-03-17
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	6.29	V	5.3	10.3	11.25	33.0	-21.8	
2503.50	9.47	H	5.3	10.3	14.42	33.0	-18.6	
Mid Ch								
2593.00	8.16	V	5.4	10.1	12.83	33.0	-20.2	
2593.00	11.42	H	5.4	10.1	16.09	33.0	-16.9	
High Ch								
2682.50	8.53	V	5.5	10.2	13.16	33.0	-19.8	
2682.50	12.16	H	5.5	10.2	16.79	33.0	-16.2	

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LTE
Band 41
10MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371667
Date: 2018-03-17
Test Engineer: 47989
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	7.13	V	5.3	10.3	12.09	33.0	-20.9	
2501.00	9.35	H	5.3	10.3	14.32	33.0	-18.7	
Mid Ch								
2593.00	8.96	V	5.4	10.1	13.63	33.0	-19.4	
2593.00	12.88	H	5.4	10.1	17.55	33.0	-15.5	
High Ch								
2685.00	11.54	V	5.5	10.2	16.17	33.0	-16.8	
2685.00	12.79	H	5.5	10.2	17.42	33.0	-15.6	

LTE
Band 41
10MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371667
Date: 2018-03-17
Test Engineer: 47989
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	6.50	V	5.3	10.3	11.46	33.0	-21.5	
2501.00	8.41	H	5.3	10.3	13.38	33.0	-19.6	
Mid Ch								
2593.00	8.05	V	5.4	10.1	12.72	33.0	-20.3	
2593.00	11.97	H	5.4	10.1	16.64	33.0	-16.4	
High Ch								
2685.00	10.70	V	5.5	10.2	15.33	33.0	-17.7	
2685.00	11.98	H	5.5	10.2	16.61	33.0	-16.4	

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LTE
Band 41
5MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371667
Date: 2018-03-17
Test Engineer: 47989
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	7.18	V	5.3	10.3	12.18	33.0	-20.8	
2498.50	10.79	H	5.3	10.3	15.79	33.0	-17.2	
Mid Ch								
2593.00	9.74	V	5.4	10.1	14.41	33.0	-18.6	
2593.00	13.08	H	5.4	10.1	17.75	33.0	-15.3	
High Ch								
2687.50	11.68	V	5.5	10.2	16.30	33.0	-16.7	
2687.50	13.32	H	5.5	10.2	17.94	33.0	-15.1	

LTE
Band 41
5MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371667
Date: 2018-03-17
Test Engineer: 47989
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	6.35	V	5.3	10.3	11.35	33.0	-21.7	
2498.50	9.86	H	5.3	10.3	14.86	33.0	-18.1	
Mid Ch								
2593.00	8.41	V	5.4	10.1	13.08	33.0	-19.9	
2593.00	12.22	H	5.4	10.1	16.89	33.0	-16.1	
High Ch								
2687.50	10.54	V	5.5	10.2	15.16	33.0	-17.8	
2687.50	12.24	H	5.5	10.2	16.86	33.0	-16.1	

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LTE Band 66

LTE Band 66 20MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371671
Date: 2018-03-30
Test Engineer: 47989
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 66 Fundamentals, 20MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[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	8.53	V	4.3	9.5	13.70	30.0	-16.3	
1720.00	14.41	H	4.3	9.5	19.58	30.0	-10.4	
Mid Ch								
1745.00	7.77	V	4.4	9.6	12.99	30.0	-17.0	
1745.00	13.55	H	4.4	9.6	18.77	30.0	-11.2	
High Ch								
1770.00	7.96	V	4.4	9.6	13.20	30.0	-16.8	
1770.00	14.10	H	4.4	9.6	19.33	30.0	-10.7	

LTE Band 66 20MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371671
Date: 2018-03-30
Test Engineer: 47989
Configuration: EUT / X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 66 Fundamentals, 20MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[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	7.49	V	4.3	9.5	12.66	30.0	-17.3	
1720.00	13.84	H	4.3	9.5	19.01	30.0	-11.0	
Mid Ch								
1745.00	6.77	V	4.4	9.6	11.99	30.0	-18.0	
1745.00	12.58	H	4.4	9.6	17.80	30.0	-12.2	
High Ch								
1770.00	7.03	V	4.4	9.6	12.27	30.0	-17.7	
1770.00	12.99	H	4.4	9.6	18.22	30.0	-11.8	

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LTE
Band 66
15MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371671
Date: 2018-03-30
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	8.28	V	4.3	9.5	13.45	30.0	-16.6	
1717.50	15.05	H	4.3	9.5	20.22	30.0	-9.8	
Mid Ch								
1745.00	7.92	V	4.4	9.6	13.14	30.0	-16.9	
1745.00	13.74	H	4.4	9.6	18.96	30.0	-11.0	
High Ch								
1772.50	8.20	V	4.4	9.6	13.43	30.0	-16.6	
1772.50	14.31	H	4.4	9.6	19.55	30.0	-10.4	

LTE
Band 66
15MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371671
Date: 2018-03-30
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	6.78	V	4.3	9.5	11.95	30.0	-18.1	
1717.50	14.02	H	4.3	9.5	19.19	30.0	-10.8	
Mid Ch								
1745.00	6.51	V	4.4	9.6	11.73	30.0	-18.3	
1745.00	12.68	H	4.4	9.6	17.90	30.0	-12.1	
High Ch								
1772.50	6.95	V	4.4	9.6	12.18	30.0	-17.8	
1772.50	13.15	H	4.4	9.6	18.39	30.0	-11.6	

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LTE
Band 66
10MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371671
Date: 2018-03-30
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	8.49	V	4.3	9.5	13.65	30.0	-16.4	
1715.00	14.28	H	4.3	9.5	19.43	30.0	-10.6	
Mid Ch								
1745.00	7.29	V	4.4	9.6	12.51	30.0	-17.5	
1745.00	13.85	H	4.4	9.6	19.07	30.0	-10.9	
High Ch								
1775.00	7.62	V	4.4	9.6	12.86	30.0	-17.1	
1775.00	13.99	H	4.4	9.6	19.23	30.0	-10.8	

LTE
Band 66
10MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788371671
Date: 2018-03-30
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	8.26	V	4.3	9.5	13.42	30.0	-16.6	
1715.00	13.18	H	4.3	9.5	18.33	30.0	-11.7	
Mid Ch								
1745.00	6.23	V	4.4	9.6	11.45	30.0	-18.5	
1745.00	12.84	H	4.4	9.6	18.06	30.0	-11.9	
High Ch								
1775.00	6.61	V	4.4	9.6	11.85	30.0	-18.2	
1775.00	12.93	H	4.4	9.6	18.17	30.0	-11.8	

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