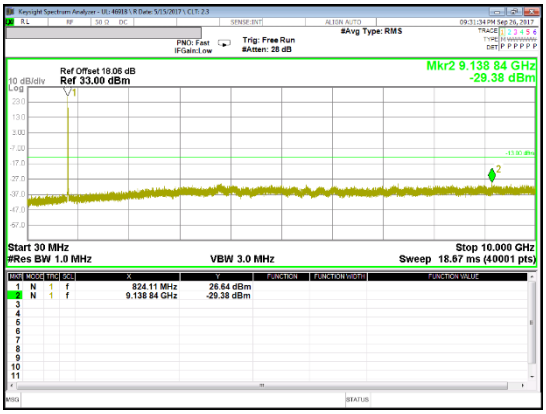
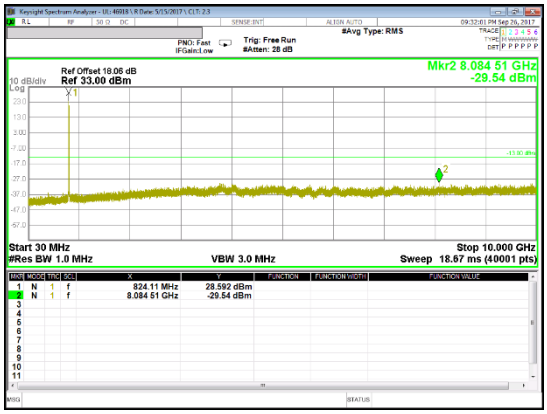
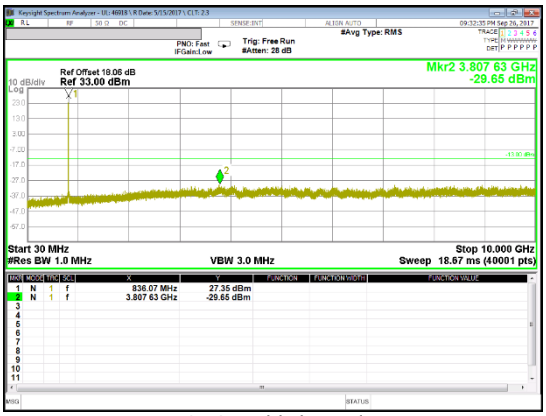
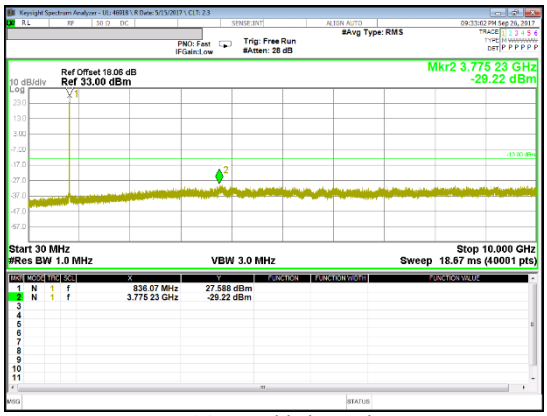
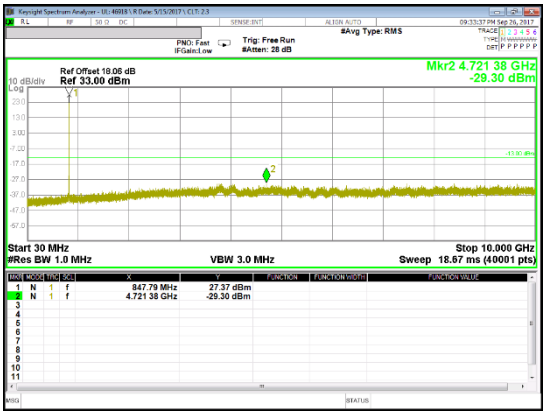
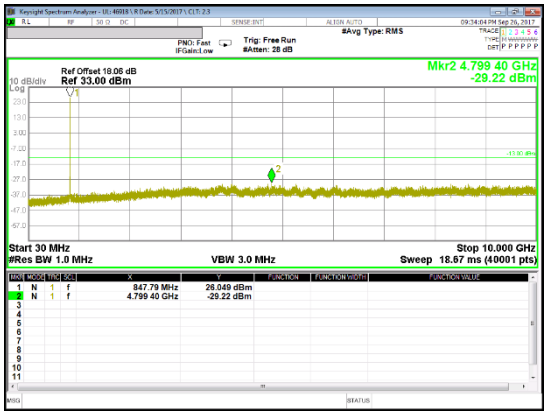
Band 5 1.4MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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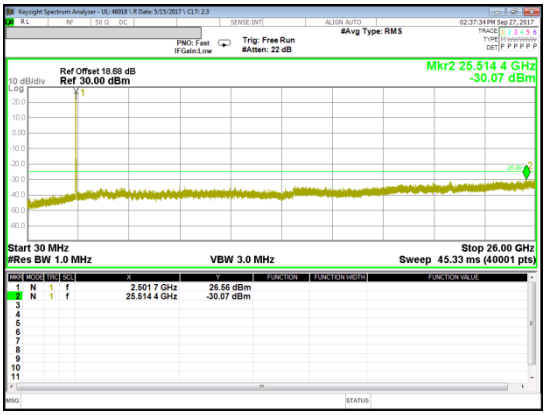
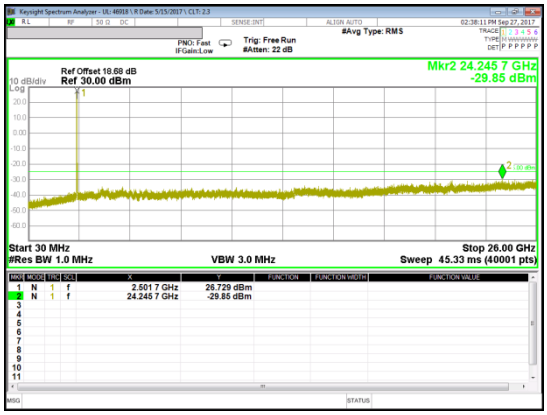
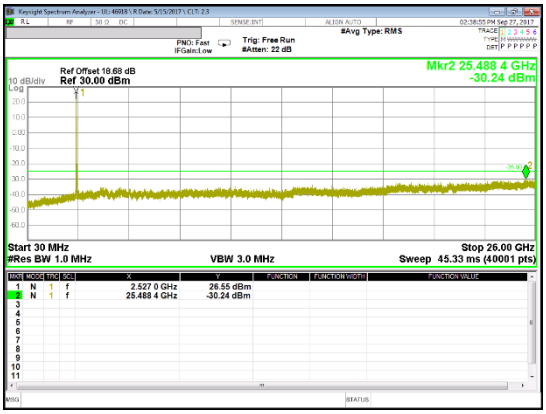
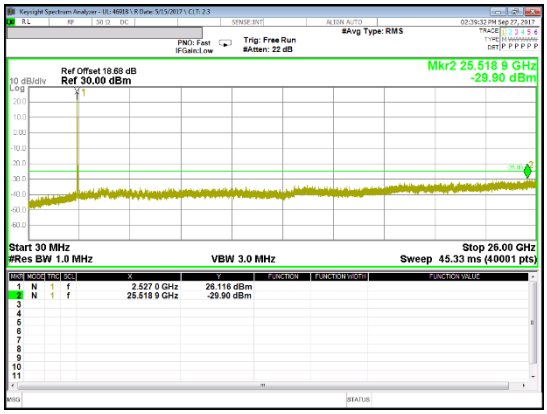
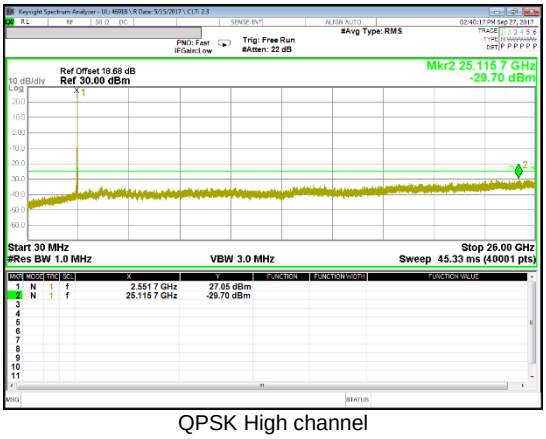
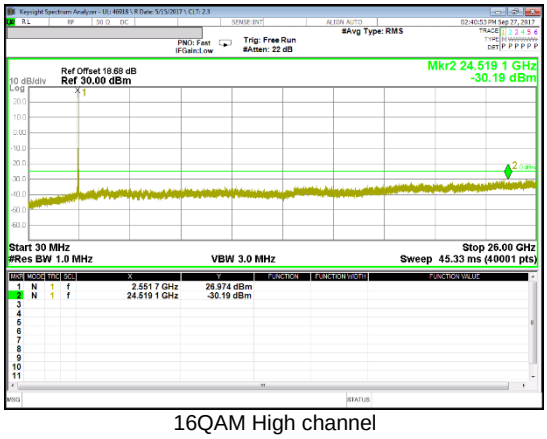
LTE Band 7

Band 7 20MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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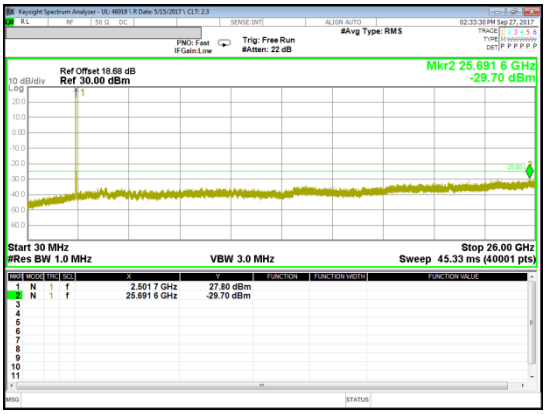
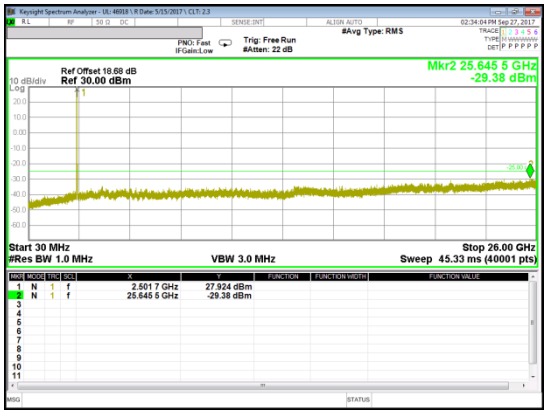
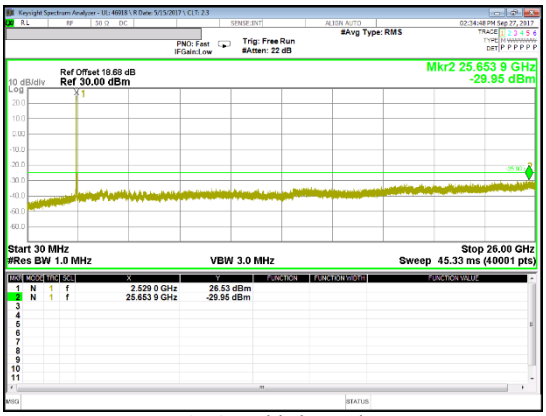
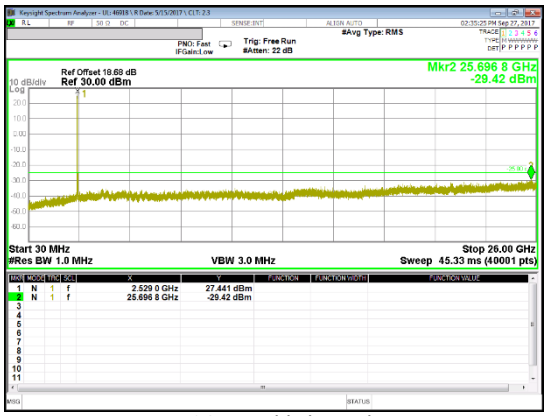
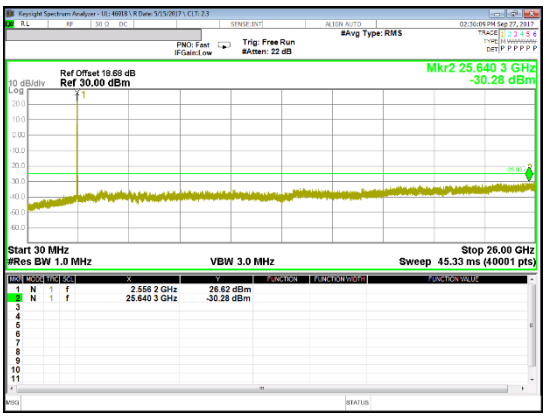
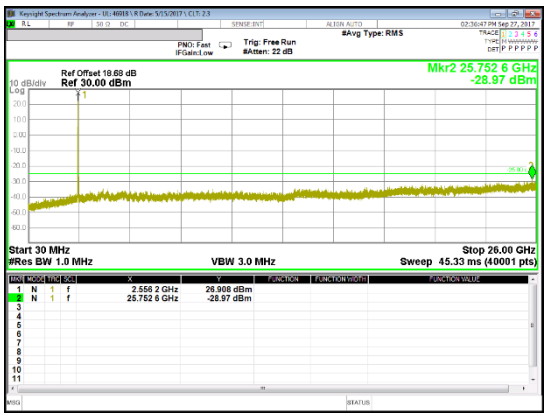
	 QPSK Low channel	 16QAM Low channel
Band 7 15MHz	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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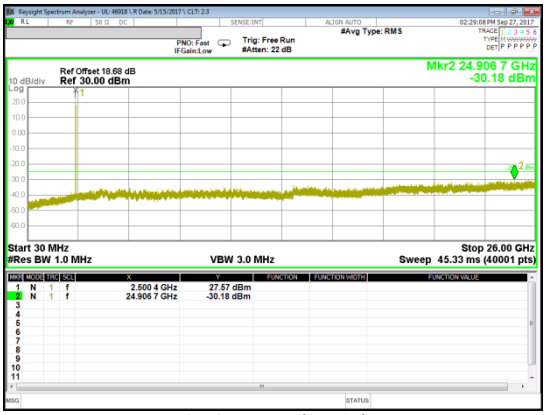
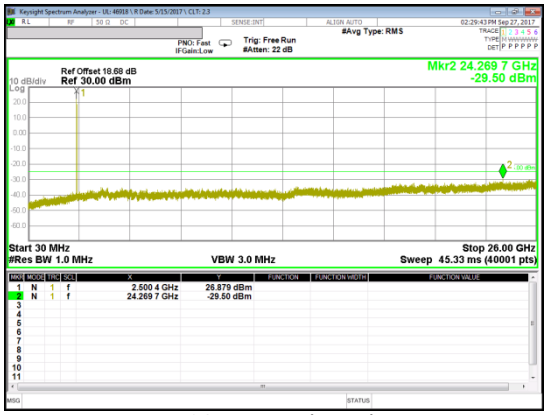
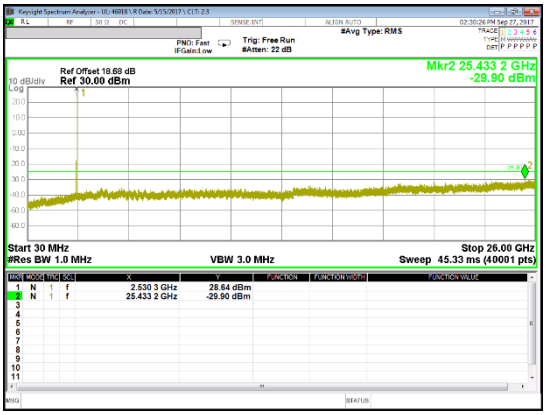
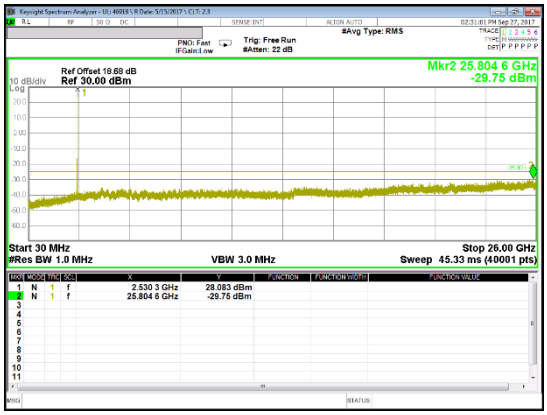
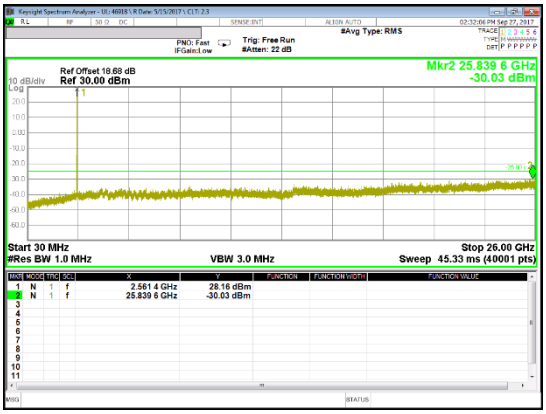
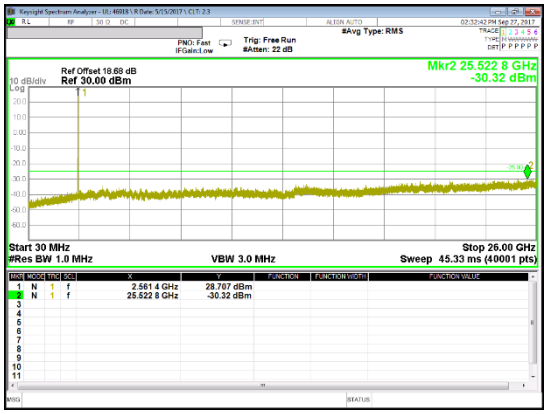
Band 7 10MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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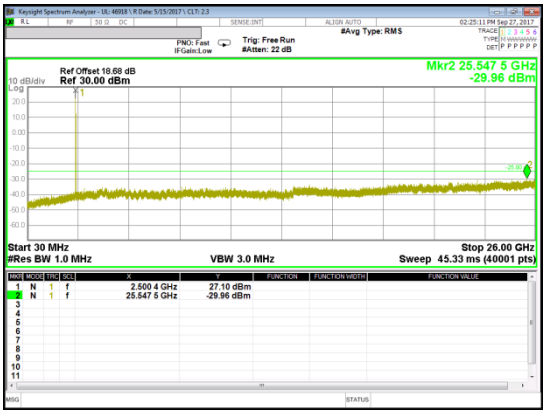
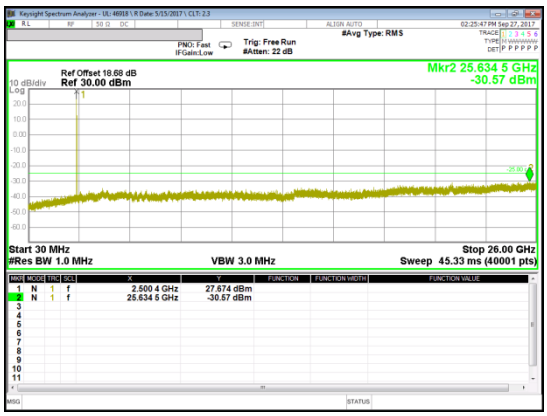
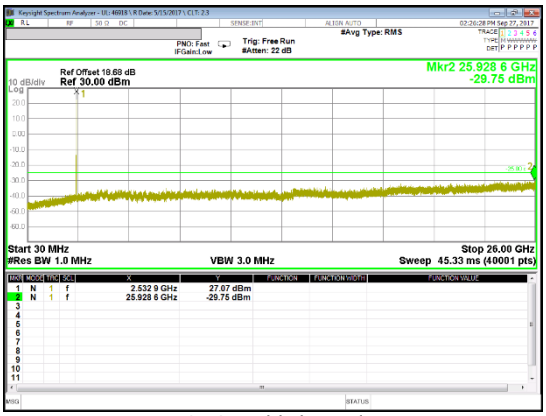
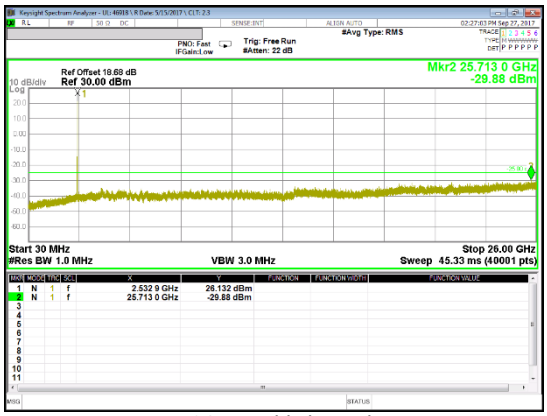
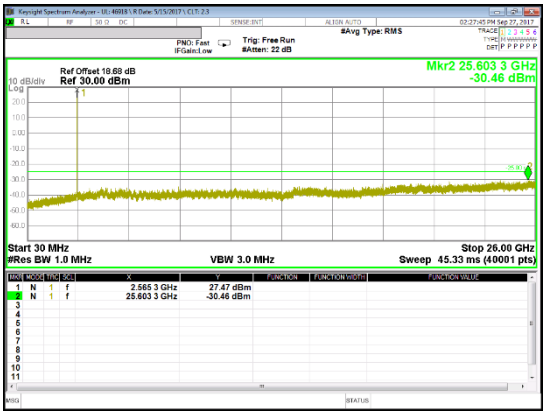
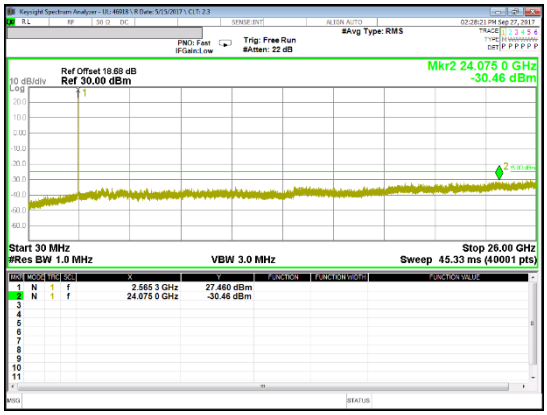
Band 7 5MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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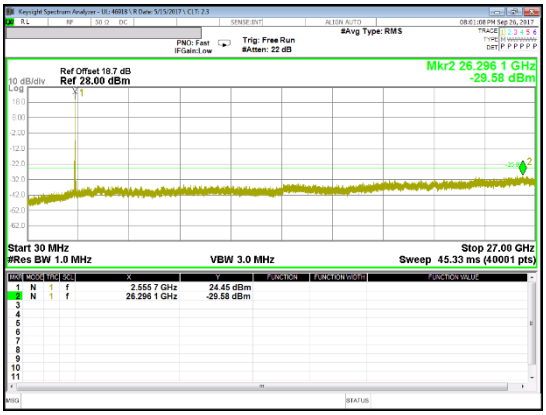
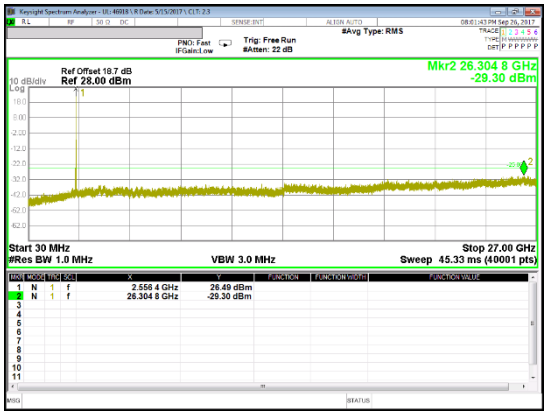
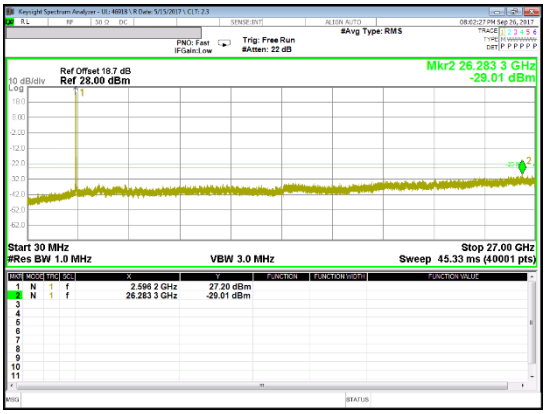
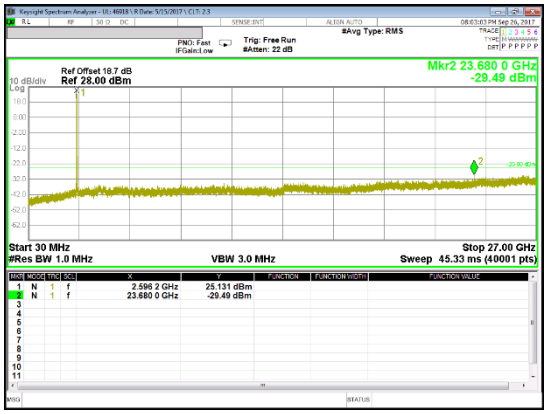
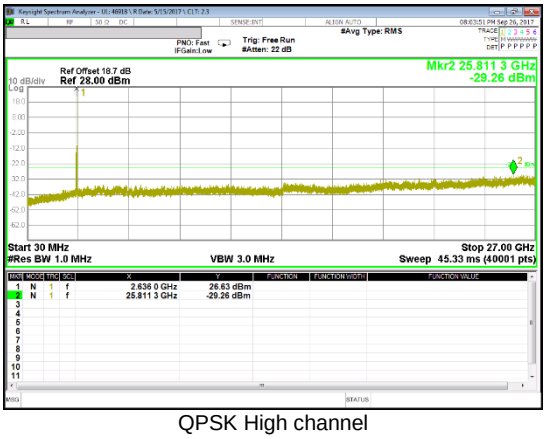
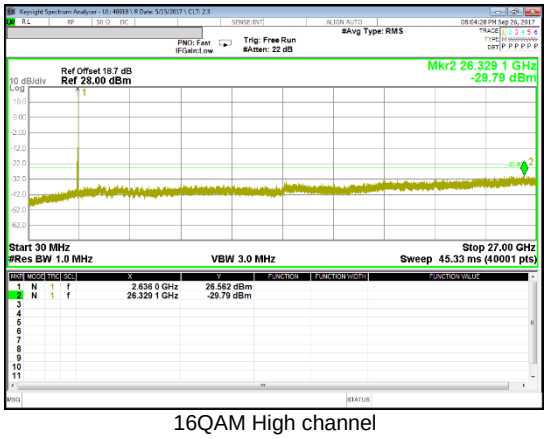
LTE Band 41

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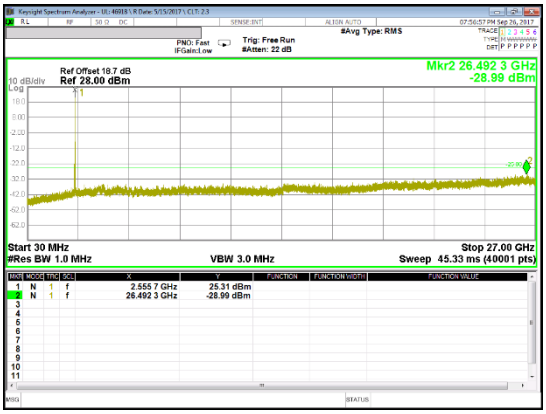
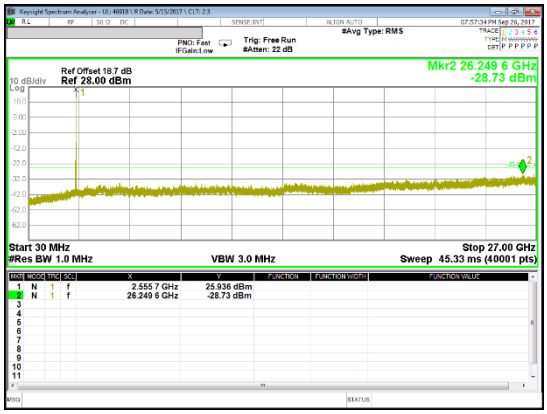
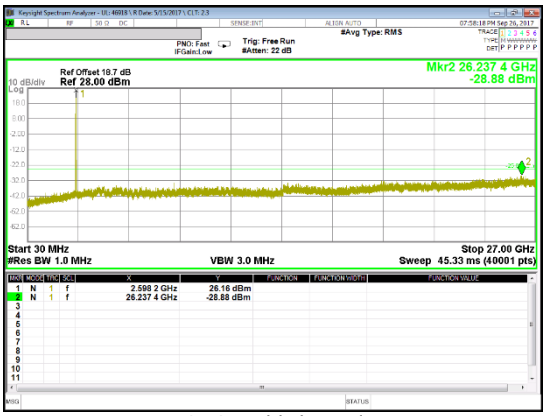
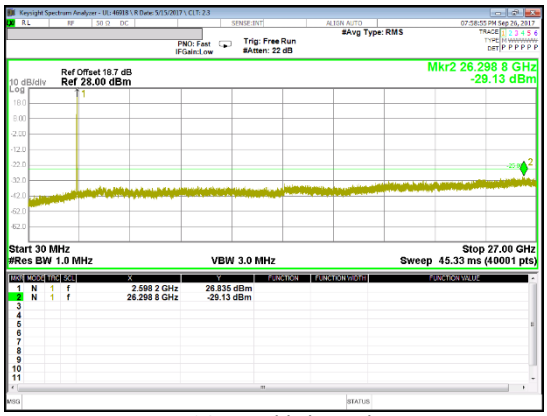
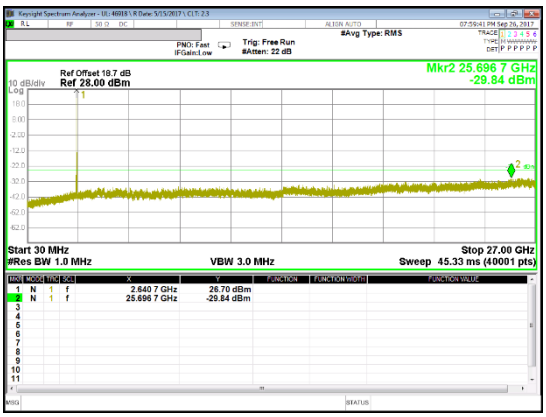
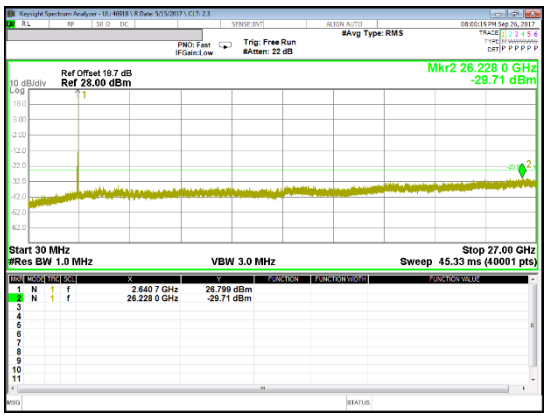
Band 41 15MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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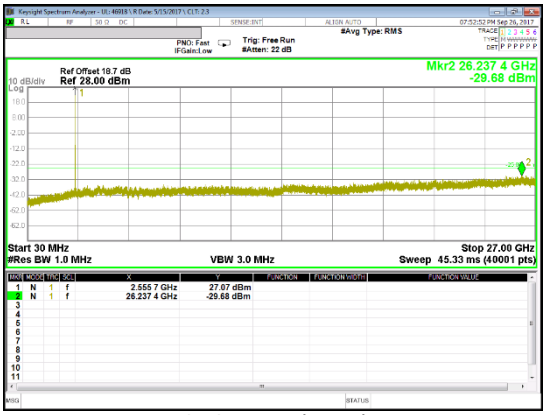
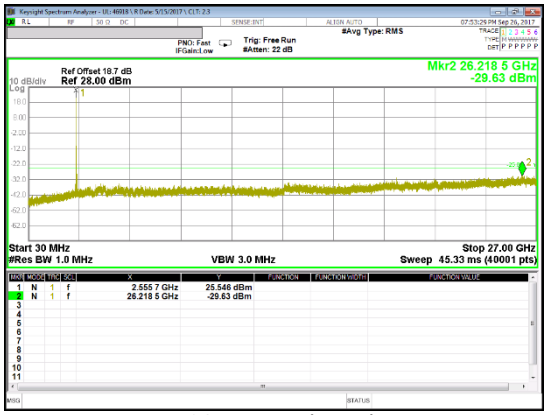
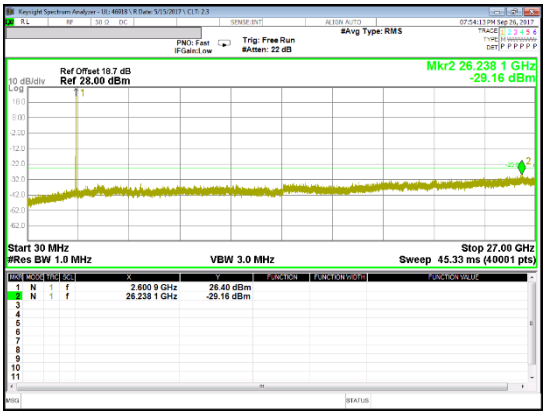
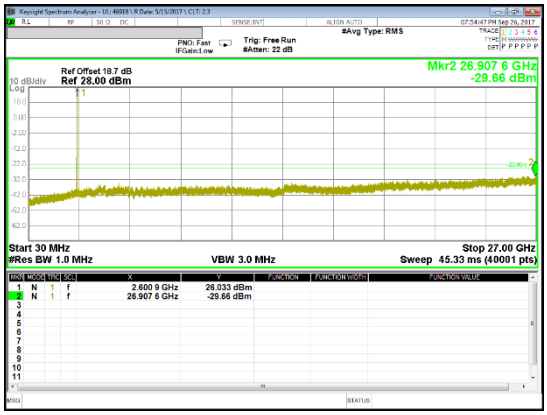
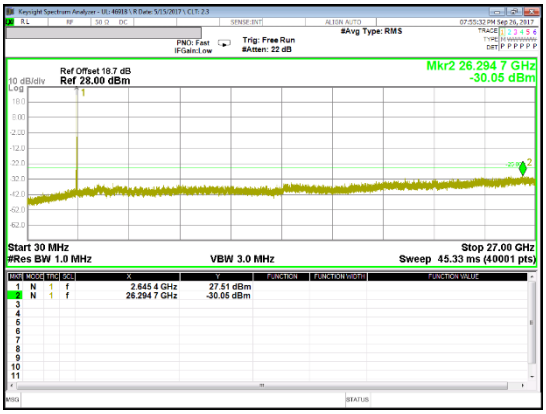
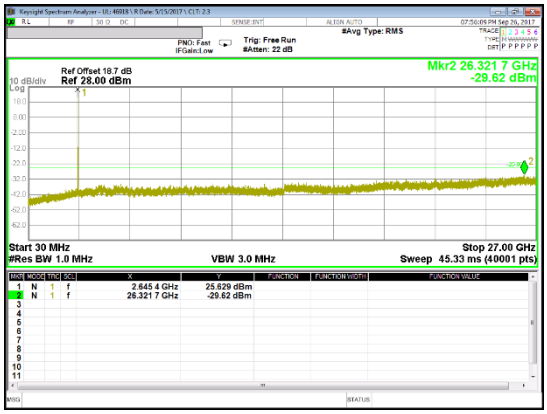
Band 41 10MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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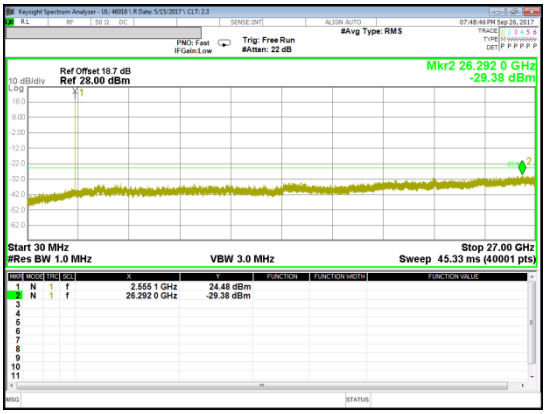
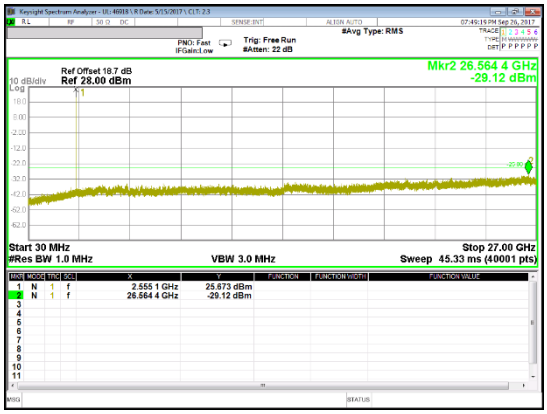
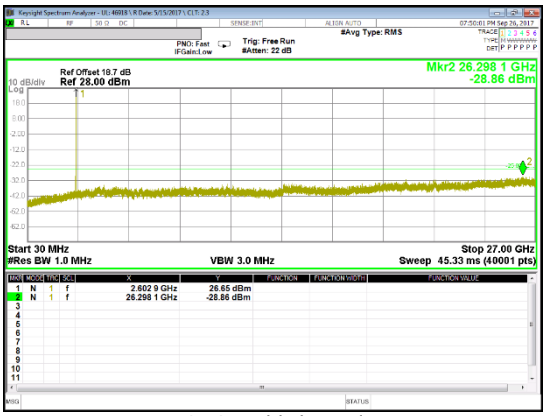
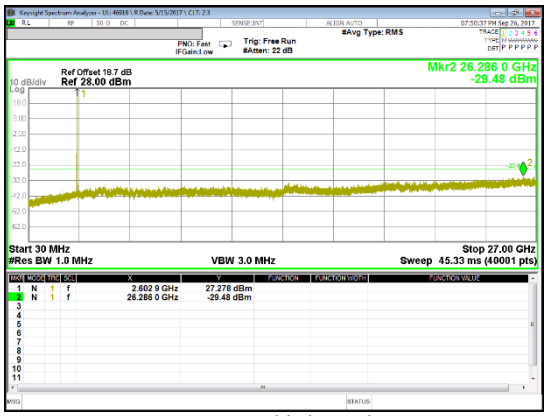
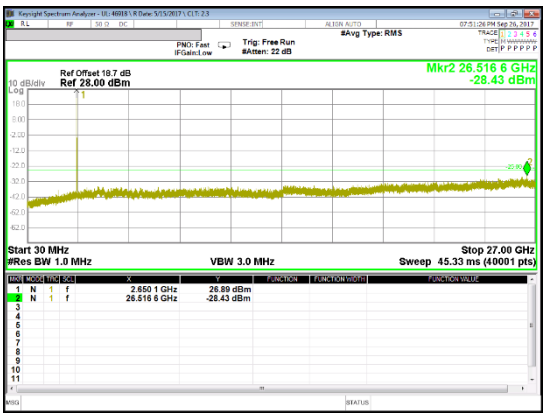
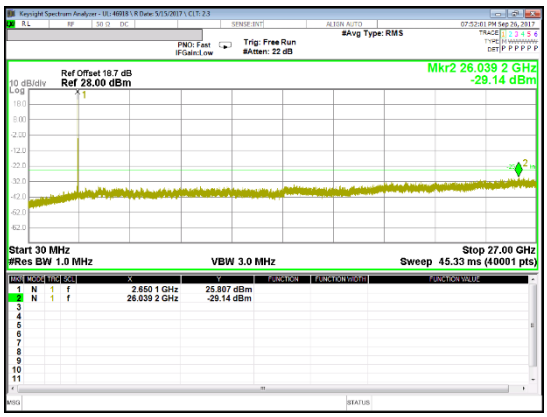
Band 41 5MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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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 v02r02

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]
3.80	50	836.59997482	-0.003	2.5
3.80	40	836.59997559	-0.004	2.5
3.80	30	836.59997079	0.002	2.5
3.80	***20***	836.59997233	***0***	***2.5***
3.80	10	836.59997378	-0.002	2.5
3.80	0	836.59997579	-0.004	2.5
3.80	-10	836.59997701	-0.006	2.5
3.80	-20	836.59997824	-0.007	2.5
3.80	-30	836.59997763	-0.006	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]
3.80	***20***	**836.59997233**	***0***	***2.5***
4.20	20	836.59997353	-0.001	2.5
3.60	20	836.59997424	-0.002	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]**
3.80	50	1879.99996594	0.005	2.5
3.80	40	1879.99997079	0.003	2.5
3.80	30	1879.99997612	0.000	2.5
3.80	***20***	1879.99997596	***0***	***2.5***
3.80	10	1879.99997638	0.000	2.5
3.80	0	1879.99997305	0.002	2.5
3.80	-10	1879.99997415	0.001	2.5
3.80	-20	1879.99997591	0.000	2.5
3.80	-30	1879.99997695	-0.001	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]**
3.80	***20***	**1879.99997596**	***0***	***2.5***
4.20	20	1879.99997737	-0.001	2.5
3.60	20	1879.99997392	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]**
3.80	50	836.59999366	0.002	2.5
3.80	40	836.59999486	0.001	2.5
3.80	30	836.59999307	0.003	2.5
3.80	***20***	836.59999556	***0***	***2.5***
3.80	10	836.59999510	0.001	2.5
3.80	0	836.59999461	0.001	2.5
3.80	-10	836.59999444	0.001	2.5
3.80	-20	836.59999501	0.001	2.5
3.80	-30	836.59999184	0.004	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]**
3.80	***20***	**836.59999556**	***0***	***2.5***
4.20	20	836.59999632	-0.001	2.5
3.60	20	836.59999582	0.000	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]**
3.80	50	1879.99998479	0.000	2.5
3.80	40	1879.99998249	0.002	2.5
3.80	30	1879.99998338	0.001	2.5
3.80	***20***	1879.99998554	***0***	***2.5***
3.80	10	1879.99998310	0.001	2.5
3.80	0	1879.99998101	0.002	2.5
3.80	-10	1879.99998197	0.002	2.5
3.80	-20	1879.99998735	-0.001	2.5
3.80	-30	1879.99998607	0.000	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]**
3.80	***20***	**1879.99998554**	***0***	***2.5***
4.20	20	1879.99998335	0.001	2.5
3.60	20	1879.99998265	0.002	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]**
3.80	50	836.49999428	0.000	2.5
3.80	40	836.49999464	0.000	2.5
3.80	30	836.49999458	0.000	2.5
3.80	***20***	836.49999426	***0***	***2.5***
3.80	10	836.49999457	0.000	2.5
3.80	0	836.49999485	-0.001	2.5
3.80	-10	836.49999505	-0.001	2.5
3.80	-20	836.49999564	-0.002	2.5
3.80	-30	836.49999545	-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]**
3.80	***20***	**836.49999426**	***0***	***2.5***
4.20	20	836.49999489	-0.001	2.5
3.60	20	836.49999505	-0.001	2.5

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LTE Band 7, Channel 21100, Frequency 2535.0 MHz

Reference Frequency: LTE Band 7 Mid Channel 2535 MHz @ 20ºC Limit: +- 2.5 ppm = 6337.500 Hz				
Power Supply	**Environment**	**Frequency Deviation Measureed with Time Elapse**		
[Vdc]	**Temperature [*C]**	**[MHz]**	**Delta [ppm]**	**Limit [ppm]**
3.80	50	2535.00001054	-0.001	2.5
3.80	40	2535.00000900	0.000	2.5
3.80	30	2535.00000841	0.000	2.5
3.80	***20***	2535.00000775	***0***	***2.5***
3.80	10	2535.00001357	-0.002	2.5
3.80	0	2535.00000804	0.000	2.5
3.80	-10	2535.00000873	0.000	2.5
3.80	-20	2535.00000938	-0.001	2.5
3.80	-30	2535.00001059	-0.001	2.5

Reference Frequency: LTE Band 7 Mid Channel 2535 MHz @ 20ºC Limit: +- 2.5 ppm = 6337.500 Hz				
Power Supply	**Environment**	**Frequency Deviation Measureed with Time Elapse**		
[Vdc]	**Temperature [*C]**	**[MHz]**	**Delta [ppm]**	**Limit [ppm]**
3.80	***20***	**2535.00000775**	***0***	***2.5***
4.20	20	2535.00000862	0.000	2.5
3.60	20	2535.00000791	0.000	2.5

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LTE Band 41, Channel 40740, Frequency 2605.0 MHz

Reference Frequency: LTE Band 41 Mid Channel 2605 MHz @ 20ºC Limit: +- 2.5 ppm = 6512.500 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
[Vdc]	Temperature [*C]	[MHz]	Delta [ppm]	Limit [ppm]
3.80	50	2604.99996239	0.002	2.5
3.80	40	2604.99996055	0.002	2.5
3.80	30	2604.99996430	0.001	2.5
3.80	***20***	2604.99996635	***0***	***2.5***
3.80	10	2604.99996381	0.001	2.5
3.80	0	2604.99996316	0.001	2.5
3.80	-10	2604.99996637	0.000	2.5
3.80	-20	2604.99996691	0.000	2.5
3.80	-30	2604.99996478	0.001	2.5

Reference Frequency: LTE Band 41 Mid Channel 2605 MHz @ 20ºC Limit: +- 2.5 ppm = 6512.500 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
[Vdc]	Temperature [*C]	[MHz]	Delta [ppm]	Limit [ppm]
3.80	***20***	**2604.99996635**	***0***	***2.5***
4.20	20	2604.99996490	0.001	2.5
3.60	20	2604.99996320	0.001	2.5

LTE Band 38

Due to frequency range and same output power setting, test was carried in LTE Band 41 to cover both LTE Band 41 and LTE Band 38.

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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.

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 603E Clause 2.2.17; ESU40 setting reference to 971168 D01 v02r02

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	28.88	772.68
		661	836.6	29.88	972.75
		810	848.8	30.24	1056.82
	EGPRS	512	824.2	24.44	277.97
		661	836.6	25.60	363.08
		810	848.8	25.98	396.28
GSM1900	GPRS	512	1850.2	29.81	957.19
		661	1880.0	30.26	1061.70
		810	1909.8	28.81	760.33
	EGPRS	512	1850.2	27.28	534.56
		661	1880.0	27.46	557.19
		810	1909.8	26.05	402.72

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WCDMA

Band	Mode	Channel	f [MHz]	ERP / EIRP	
				[dBm]	[mW]
Band 5	REL99	4132	826.4	19.72	93.76
		4183	836.6	20.43	110.41
		4233	846.6	20.45	110.92
	HSDPA	4132	826.4	19.51	89.33
		4183	836.6	20.51	112.46
		4233	846.6	20.71	117.76
Band 2	REL99	9262	1852.4	23.63	230.67
		9400	1880.0	24.00	251.19
		9538	1907.6	22.34	171.40
	HSDPA	9262	1852.4	23.70	234.42
		9400	1880.0	24.33	271.02
		9538	1907.6	22.96	197.70

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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	18.95	78.52
			50/0	836.5	19.48	88.72
			50/0	844.0	**19.78**	95.06
		16QAM	50/0	829.0	17.83	60.67
			50/0	836.5	18.46	70.15
			50/0	844.0	**18.68**	73.79
	5	QPSK	25/0	826.5	18.01	63.24
			25/0	836.5	18.96	78.70
			25/0	846.5	18.66	73.45
		16QAM	25/0	826.5	16.85	48.42
			25/0	836.5	17.86	61.09
			25/0	846.5	18.09	64.42
	3	QPSK	15/0	825.5	17.85	60.95
			15/0	836.5	19.03	79.98
			15/0	847.5	18.34	68.23
		16QAM	15/0	825.5	16.68	46.56
			15/0	836.5	17.92	61.94
			15/0	847.5	17.72	59.16
	1.4	QPSK	6/0	824.7	15.79	37.93
			6/0	836.5	16.60	45.71
			6/0	848.3	16.50	44.67
		16QAM	6/0	824.7	14.75	29.85
			6/0	836.5	15.58	36.14
			6/0	848.3	15.92	39.08

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LTE Band 7

Band	BW [MHz]	Mode	RB/RB Size	f [MHz]	ERP / EIRP	
			Full RB		[dBm]	[mW]
Band 7	20	QPSK	100/0	2510.0	17.59	57.41
			100/0	2535.0	**19.03**	79.98
			100/0	2560.0	18.14	65.16
		16QAM	100/0	2510.0	16.58	45.50
			100/0	2535.0	**18.07**	64.12
			100/0	2560.0	17.19	52.36
	15	QPSK	75/0	2507.5	17.91	61.80
			75/0	2535.0	17.77	59.84
			75/0	2562.5	17.52	56.49
		16QAM	75/0	2507.5	16.90	48.98
			75/0	2535.0	16.81	47.97
			75/0	2562.5	16.21	41.78
	10	QPSK	50/0	2505.0	18.61	72.61
			50/0	2535.0	**19.13**	81.85
			50/0	2565.0	18.07	64.12
		16QAM	50/0	2505.0	17.63	57.94
			50/0	2535.0	**18.19**	65.92
			50/0	2565.0	16.46	44.26
	5	QPSK	25/0	2502.5	16.37	43.35
			25/0	2535.0	18.37	68.71
			25/0	2567.5	17.74	59.43
		16QAM	25/0	2502.5	15.32	34.04
			25/0	2535.0	17.41	55.08
			25/0	2567.5	16.73	47.10

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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	2565.0	16.79	47.75
			100/0	2605.0	17.67	58.48
			100/0	2645.0	**17.94**	62.23
		16QAM	100/0	2565.0	15.86	38.55
			100/0	2605.0	16.80	47.86
			100/0	2645.0	**17.07**	50.93
	15	QPSK	75/0	2562.5	17.39	54.58
			75/0	2605.0	17.92	61.94
			75/0	2647.5	16.82	48.08
		16QAM	75/0	2562.5	16.49	44.57
			75/0	2605.0	17.02	50.35
			75/0	2647.5	15.89	38.82
	10	QPSK	50/0	2560.0	17.64	58.08
			50/0	2605.0	18.60	72.44
			50/0	2650.0	17.96	62.52
		16QAM	50/0	2560.0	16.72	46.99
			50/0	2605.0	17.88	61.38
			50/0	2650.0	17.07	50.93
	5	QPSK	25/0	2557.5	16.93	49.32
			25/0	2605.0	**19.20**	83.18
			25/0	2652.5	19.10	81.28
		16QAM	25/0	2557.5	16.06	40.36
			25/0	2605.0	**18.41**	69.34
			25/0	2652.5	18.08	64.27

LTE Band 38

Due to frequency range and same output power setting, test was carried in LTE Band 41 to cover both LTE Band 41 and LTE Band 38.

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10.1.2. ERP/EIRP DATA

GSM 850

GSM

GSM850
GPRS

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-20-17
Test Engineer: YH Lim
Configuration: EUT ONLY, X Position
Mode: GPRS 850 MHz

Test Equipment:
Receiving: VULB9163-749, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
824.20	25.14	V	1.1	-1.6	22.52	38.5	-15.9	
824.20	31.50	H	1.1	-1.6	28.88	38.5	-9.6	
Mid Ch								
836.60	26.20	V	1.1	-1.4	23.71	38.5	-14.7	
836.60	32.37	H	1.1	-1.4	29.88	38.5	-8.6	
High Ch								
848.80	25.89	V	1.1	-1.3	23.53	38.5	-14.9	
848.80	32.60	H	1.1	-1.3	30.24	38.5	-8.2	

Rev. 3.17.11
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

GSM

GSM850
EGPRS

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-20-17
Test Engineer: YH Lim
Configuration: EUT ONLY, X Position
Mode: EGPRS 850 MHz

Test Equipment:
Receiving: VULB9163-749, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
824.20	20.85	V	1.1	-1.6	18.23	38.5	-20.2	
824.20	27.06	H	1.1	-1.6	24.44	38.5	-14.0	
Mid Ch								
836.60	21.55	V	1.1	-1.4	19.06	38.5	-19.4	
836.60	28.09	H	1.1	-1.4	25.60	38.5	-12.9	
High Ch								
848.80	22.18	V	1.1	-1.3	19.82	38.5	-18.6	
848.80	28.34	H	1.1	-1.3	25.98	38.5	-12.5	

Rev. 3.17.11
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

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GSM 1900

GSM

GSM1900
GPRS

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-13-17
Test Engineer: YH Lim
Configuration: EUT ONLY, Z Position
Mode: GPRS 1900MHz

Test Equipment:
Receiving: 3117[00168724] and Chamber 1 SMA Cables
Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1850.20	17.6	V	1.60	8.80	24.76	33.0	-8.2	
1850.20	22.6	H	1.60	8.80	29.81	33.0	-3.2	
Mid Ch								
1880.00	21.5	V	1.62	8.62	28.53	33.0	-4.5	
1880.00	23.3	H	1.62	8.62	30.26	33.0	-2.7	
High Ch								
1909.80	20.3	V	1.63	8.44	27.06	33.0	-5.9	
1909.80	22.0	H	1.63	8.44	28.81	33.0	-4.2	

Rev. 3.17.11

GSM

GSM1900
EGPRS

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-13-17
Test Engineer: YH Lim
Configuration: EUT ONLY, Z Position
Mode: EGPRS 1900MHz

Test Equipment:
Receiving: 3117[00168724] and Chamber 1 SMA Cables
Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1850.20	15.8	V	1.60	8.80	23.00	33.0	-10.0	
1850.20	20.1	H	1.60	8.80	27.28	33.0	-5.7	
Mid Ch								
1880.00	19.5	V	1.62	8.62	26.46	33.0	-6.5	
1880.00	20.5	H	1.62	8.62	27.46	33.0	-5.5	
High Ch								
1909.80	17.2	V	1.63	8.44	23.97	33.0	-9.0	
1909.80	19.2	H	1.63	8.44	26.05	33.0	-6.9	

Rev. 3.17.11

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WCDMA Band 5

WCDMA

Band 5
REL99

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-20-17
Test Engineer: YH Lim
Configuration: EUT ONLY, X Position
Mode: Rel 99_850 MHz

Test Equipment:
Receiving: VULB9163-749, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
826.40	15.39	V	1.1	-1.5	12.78	38.5	-25.7	
826.40	22.33	H	1.1	-1.5	19.72	38.5	-18.7	
Mid Ch								
836.60	15.96	V	1.1	-1.4	13.47	38.5	-25.0	
836.60	22.92	H	1.1	-1.4	20.43	38.5	-18.0	
High Ch								
846.60	16.17	V	1.1	-1.3	13.79	38.5	-24.7	
846.60	22.83	H	1.1	-1.3	20.45	38.5	-18.0	

Rev. 3.17.11

WCDMA

Band 5
HSDPA

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-20-17
Test Engineer: YH Lim
Configuration: EUT ONLY, X Position
Mode: HSDPA_850 MHz

Test Equipment:
Receiving: VULB9163-749, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
826.40	15.14	V	1.1	-1.5	12.53	38.5	-25.9	
826.40	22.12	H	1.1	-1.5	19.51	38.5	-18.9	
Mid Ch								
836.60	15.22	V	1.1	-1.4	12.73	38.5	-25.7	
836.60	23.00	H	1.1	-1.4	20.51	38.5	-17.9	
High Ch								
846.60	15.63	V	1.1	-1.3	13.25	38.5	-25.2	
846.60	23.09	H	1.1	-1.3	20.71	38.5	-17.7	

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WCDMA Band 2

WCDMA

Band 2
REL99

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-14-17
Test Engineer: JH Park
Configuration: EUT ONLY, Z Position
Mode: REL99_1900 MHz

Test Equipment:
Receiving: 3117[00168724] and Chamber 1 SMA Cables
Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1852.40	15.88	V	1.60	8.79	23.07	33.0	-9.9	
1852.40	16.44	H	1.60	8.79	23.63	33.0	-9.4	
Mid Ch								
1880.00	15.45	V	1.62	8.62	22.45	33.0	-10.5	
1880.00	17.00	H	1.62	8.62	24.00	33.0	-9.0	
High Ch								
1907.60	15.31	V	1.63	8.45	22.13	33.0	-10.9	
1907.60	15.52	H	1.63	8.45	22.34	33.0	-10.7	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

WCDMA

Band 2
HSDPA

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-14-17
Test Engineer: JH Park
Configuration: EUT ONLY, Z Position
Mode: HSDPA_1900 MHz

Test Equipment:
Receiving: 3117[00168724] and Chamber 1 SMA Cables
Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1852.40	15.99	V	1.60	8.79	23.18	33.0	-9.8	
1852.40	16.51	H	1.60	8.79	23.70	33.0	-9.3	
Mid Ch								
1880.00	15.91	V	1.62	8.62	22.91	33.0	-10.1	
1880.00	17.33	H	1.62	8.62	24.33	33.0	-8.7	
High Ch								
1907.60	15.77	V	1.63	8.45	22.59	33.0	-10.4	
1907.60	16.14	H	1.63	8.45	22.96	33.0	-10.0	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

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LTE Band 5

LTE Band 5 10MHz QPSK

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-20-17
Test Engineer: YH Lim
Configuration: EUT ONLY, X Position
Mode: TX, LTE BAND 5, 10MHz BW,QPSK

Test Equipment:
Receiving: VULB9163-749, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
829.00	14.70	V	1.1	-1.5	12.12	38.5	-26.3	
829.00	21.53	H	1.1	-1.5	18.95	38.5	-19.5	
Mid Ch								
836.50	14.87	V	1.1	-1.4	12.38	38.5	-26.1	
836.50	21.97	H	1.1	-1.4	19.48	38.5	-19.0	
High Ch								
844.00	14.26	V	1.1	-1.3	11.87	38.5	-26.6	
844.00	22.20	H	1.1	-1.3	19.78	38.5	-18.7	

Rev. 3.17.11
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

LTE Band 5 10MHz 16QAM

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-20-17
Test Engineer: YH Lim
Configuration: EUT ONLY, X Position
Mode: LTE5 10MHz FUND 16QAM

Test Equipment:
Receiving: VULB9163-749, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
829.00	13.64	V	1.1	-1.5	11.06	38.5	-27.4	
829.00	20.41	H	1.1	-1.5	17.83	38.5	-20.6	
Mid Ch								
836.50	13.81	V	1.1	-1.4	11.30	38.5	-27.1	
836.50	20.97	H	1.1	-1.4	18.46	38.5	-20.0	
High Ch								
844.00	13.19	V	1.1	-1.3	10.77	38.5	-27.7	
844.00	21.10	H	1.1	-1.3	18.68	38.5	-19.8	

Rev. 3.17.11
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

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LTE Band 5 5MHz QPSK

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-20-17
Test Engineer: YH Lim
Configuration: EUT ONLY, X Position
Mode: LTE5 5MHz FUND QPSK

Test Equipment:
Receiving: VULB9163-749, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
826.50	14.10	V	1.1	-1.5	11.50	38.5	-27.0	
826.50	20.61	H	1.1	-1.5	18.01	38.5	-20.4	
Mid Ch								
836.50	14.70	V	1.1	-1.4	12.21	38.5	-26.2	
836.50	21.45	H	1.1	-1.4	18.96	38.5	-19.5	
High Ch								
846.50	14.31	V	1.6	-1.3	11.43	38.5	-27.0	
846.50	21.54	H	1.6	-1.3	18.66	38.5	-19.8	

Rev. 3.17.11
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

LTE Band 5 5MHz 16QAM

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-20-17
Test Engineer: YH Lim
Configuration: EUT ONLY, X Position
Mode: LTE5 5MHz FUND 16QAM

Test Equipment:
Receiving: VULB9163-749, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
826.50	13.00	V	1.1	-1.5	10.40	38.5	-28.1	
826.50	19.45	H	1.1	-1.5	16.85	38.5	-21.6	
Mid Ch								
836.50	13.52	V	1.1	-1.4	11.03	38.5	-27.4	
836.50	20.35	H	1.1	-1.4	17.86	38.5	-20.6	
High Ch								
846.50	13.18	V	1.1	-1.3	10.80	38.5	-27.7	
846.50	20.47	H	1.1	-1.3	18.09	38.5	-20.4	

Rev. 3.17.11
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

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LTE Band 5 3MHz QPSK

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-20-17
Test Engineer: YH Lim
Configuration: EUT ONLY, X Position
Mode: LTE5 3MHz FUND QPSK

Test Equipment:
Receiving: VULB9163-749, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
825.50	13.28	V	1.1	-1.5	10.68	38.5	-27.8	
825.50	20.45	H	1.1	-1.5	17.85	38.5	-20.6	
Mid Ch								
836.50	14.05	V	1.1	-1.4	11.56	38.5	-26.9	
836.50	21.52	H	1.1	-1.4	19.03	38.5	-19.4	
High Ch								
847.50	14.15	V	1.6	-1.3	11.27	38.5	-27.2	
847.50	21.22	H	1.6	-1.3	18.34	38.5	-20.1	

Rev. 3.17.11
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

LTE Band 5 3MHz 16QAM

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-20-17
Test Engineer: YH Lim
Configuration: EUT ONLY, X Position
Mode: LTE5 3MHz FUND 16QAM

Test Equipment:
Receiving: VULB9163-749, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
825.50	12.15	V	1.1	-1.5	9.55	38.5	-28.9	
825.50	19.28	H	1.1	-1.5	16.68	38.5	-21.8	
Mid Ch								
836.50	12.95	V	1.1	-1.4	10.46	38.5	-28.0	
836.50	20.41	H	1.1	-1.4	17.92	38.5	-20.5	
High Ch								
847.50	13.02	V	1.1	-1.3	10.64	38.5	-27.8	
847.50	20.10	H	1.1	-1.3	17.72	38.5	-20.7	

Rev. 3.17.11
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

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LTE Band 5 1.4MHz QPSK

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-20-17
Test Engineer: YH Lim
Configuration: EUT ONLY, X Position
Mode: LTE5 1.4MHz FUND QPSK

Test Equipment:
Receiving: VULB9163-749, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
824.70	11.21	V	1.1	-1.5	8.61	38.5	-29.8	
824.70	18.39	H	1.1	-1.5	15.79	38.5	-22.7	
Mid Ch								
836.50	11.95	V	1.1	-1.4	9.46	38.5	-29.0	
836.50	19.09	H	1.1	-1.4	16.60	38.5	-21.9	
High Ch								
848.30	11.86	V	1.6	-1.3	8.98	38.5	-29.5	
848.30	19.38	H	1.6	-1.3	16.50	38.5	-21.9	

Rev. 3.17.11
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

LTE Band 5 1.4MHz 16QAM

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-20-17
Test Engineer: YH Lim
Configuration: EUT ONLY, X Position
Mode: LTE5 1.4MHz FUND 16QAM

Test Equipment:
Receiving: VULB9163-749, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
824.70	10.12	V	1.1	-1.5	7.52	38.5	-30.9	
824.70	17.35	H	1.1	-1.5	14.75	38.5	-23.7	
Mid Ch								
836.50	10.87	V	1.1	-1.4	8.38	38.5	-30.1	
836.50	18.07	H	1.1	-1.4	15.58	38.5	-22.9	
High Ch								
848.30	10.73	V	1.1	-1.3	8.35	38.5	-30.1	
848.30	18.30	H	1.1	-1.3	15.92	38.5	-22.5	

Rev. 3.17.11
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

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LTE Band 7

LTE Band 7 20MHz QPSK

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-15-17
Test Engineer: JH Park
Configuration: EUT / Z-Position
Mode: LTE Band 7, QPSK, 20MHz

Test Equipment:
Receiving: 3117[00168724] and Chamber 1 SMA Cables
Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
2510.00	8.93	V	1.9	9.1	16.19	33.0	-16.8	
2510.00	10.33	H	1.9	9.1	17.59	33.0	-15.4	
Mid Ch								
2535.00	8.46	V	1.9	10.4	16.95	33.0	-16.1	
2535.00	10.54	H	1.9	10.4	19.03	33.0	-14.0	
High Ch								
2560.00	8.13	V	1.9	10.3	16.57	33.0	-16.4	
2560.00	9.70	H	1.9	10.3	18.14	33.0	-14.9	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

LTE Band 7 20MHz 16QAM

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-15-17
Test Engineer: JH Park
Configuration: EUT / Z-Position
Mode: LTE Band 7, 16QAM, 20MHz

Test Equipment:
Receiving: 3117[00168724] and Chamber 1 SMA Cables
Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
2510.00	7.98	V	1.9	9.1	15.24	33.0	-17.8	
2510.00	9.32	H	1.9	9.1	16.58	33.0	-16.4	
Mid Ch								
2535.00	7.51	V	1.9	10.4	16.00	33.0	-17.0	
2535.00	9.58	H	1.9	10.4	18.07	33.0	-14.9	
High Ch								
2560.00	7.18	V	1.9	10.3	15.62	33.0	-17.4	
2560.00	8.75	H	1.9	10.3	17.19	33.0	-15.8	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

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LTE Band 7 15MHz QPSK

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-14-17
Test Engineer: JH Park
Configuration: EUT / Z-Position
Mode: LTE Band 7, QPSK, 15MHz

Test Equipment:
Receiving: 3117[00168724] and Chamber 1 SMA Cables
Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
2507.50	8.74	V	1.9	9.1	16.00	33.0	-17.0	
2507.50	10.65	H	1.9	9.1	17.91	33.0	-15.1	
Mid Ch								
2535.00	9.28	V	1.9	10.4	17.77	33.0	-15.2	
2535.00	7.61	H	1.9	10.4	16.10	33.0	-16.9	
High Ch								
2562.50	9.08	V	1.9	10.3	17.52	33.0	-15.5	
2562.50	8.76	H	1.9	10.3	17.20	33.0	-15.8	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

LTE Band 7 15MHz 16QAM

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-14-17
Test Engineer: JH Park
Configuration: EUT / Z-Position
Mode: LTE Band 7, 16QAM, 15MHz

Test Equipment:
Receiving: 3117[00168724] and Chamber 1 SMA Cables
Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
2507.50	7.76	V	1.9	9.1	15.02	33.0	-18.0	
2507.50	9.64	H	1.9	9.1	16.90	33.0	-16.1	
Mid Ch								
2535.00	8.32	V	1.9	10.4	16.81	33.0	-16.2	
2535.00	6.62	H	1.9	10.4	15.11	33.0	-17.9	
High Ch								
2562.50	7.63	V	1.9	10.3	16.07	33.0	-16.9	
2562.50	7.77	H	1.9	10.3	16.21	33.0	-16.8	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

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LTE Band 7 10MHz QPSK

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-14-17
Test Engineer: JH Park
Configuration: EUT / Z-Position
Mode: LTE Band 7, QPSK, 10MHz

Test Equipment:
Receiving: 3117[00168724] and Chamber 1 SMA Cables
Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
2505.00	9.55	V	1.9	9.1	16.81	33.0	-16.2	
2505.00	11.35	H	1.9	9.1	18.61	33.0	-14.4	
Mid Ch								
2535.00	8.19	V	1.9	10.4	16.68	33.0	-16.3	
2535.00	10.64	H	1.9	10.4	19.13	33.0	-13.9	
High Ch								
2565.00	9.63	V	1.9	10.3	18.07	33.0	-14.9	
2565.00	9.02	H	1.9	10.3	17.46	33.0	-15.5	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

LTE Band 7 10MHz 16QAM

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-14-17
Test Engineer: JH Park
Configuration: EUT / Z-Position
Mode: LTE Band 7 16QAM, 10MHz

Test Equipment:
Receiving: 3117[00168724] and Chamber 1 SMA Cables
Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
2505.00	8.54	V	1.9	9.1	15.80	33.0	-17.2	
2505.00	10.37	H	1.9	9.1	17.63	33.0	-15.4	
Mid Ch								
2535.00	7.25	V	1.9	10.4	15.74	33.0	-17.3	
2535.00	9.70	H	1.9	10.4	18.19	33.0	-14.8	
High Ch								
2565.00	8.67	V	1.9	10.3	17.11	33.0	-15.9	
2565.00	8.02	H	1.9	10.3	16.46	33.0	-16.5	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

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LTE Band 7 5MHz QPSK

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-14-17
Test Engineer: JH Park
Configuration: EUT / Z-Position
Mode: LTE Band 7, QPSK , 5MHz

Test Equipment:
Receiving: 3117[00168724] and Chamber 1 SMA Cables
Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
2502.50	8.04	V	1.9	9.1	15.30	33.0	-17.7	
2502.50	9.11	H	1.9	9.1	16.37	33.0	-16.6	
Mid Ch								
2535.00	8.70	V	1.9	10.4	17.19	33.0	-15.8	
2535.00	9.88	H	1.9	10.4	18.37	33.0	-14.6	
High Ch								
2567.50	9.28	V	1.9	10.3	17.72	33.0	-15.3	
2567.50	9.30	H	1.9	10.3	17.74	33.0	-15.3	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

LTE Band 7 5MHz 16QAM

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-14-17
Test Engineer: JH Park
Configuration: EUT / Z-Position
Mode: LTE Band 7 16QAM, 5MHz

Test Equipment:
Receiving: 3117[00168724] and Chamber 1 SMA Cables
Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
2502.50	6.96	V	1.9	9.1	14.22	33.0	-18.8	
2502.50	8.06	H	1.9	9.1	15.32	33.0	-17.7	
Mid Ch								
2535.00	7.70	V	1.9	10.4	16.19	33.0	-16.8	
2535.00	8.92	H	1.9	10.4	17.41	33.0	-15.6	
High Ch								
2567.50	8.25	V	1.9	10.3	16.69	33.0	-16.3	
2567.50	8.29	H	1.9	10.3	16.73	33.0	-16.3	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

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LTE Band 41

LTE Band 41 20MHz QPSK

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-18-17
Test Engineer: JH Park
Configuration: EUT / Z-Position
Mode: LTE Band 41, QPSK, 20MHz

Test Equipment:
Receiving: 3117[00168724] and Chamber 1 SMA Cables
Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
2565.00	9.53	V	1.9	9.1	16.79	33.0	-16.2	
2565.00	8.62	H	1.9	9.1	15.88	33.0	-17.1	
Mid Ch								
2605.00	9.18	V	1.9	10.4	17.67	33.0	-15.3	
2605.00	8.89	H	1.9	10.4	17.38	33.0	-15.6	
High Ch								
2645.00	9.50	V	1.9	10.3	17.94	33.0	-15.1	
2645.00	8.62	H	1.9	10.3	17.06	33.0	-15.9	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

LTE Band 41 20MHz 16QAM

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-18-17
Test Engineer: JH Park
Configuration: EUT / Z-Position
Mode: LTE Band 41, 16QAM, 20MHz

Test Equipment:
Receiving: 3117[00168724] and Chamber 1 SMA Cables
Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
2565.00	8.60	V	1.9	9.1	15.86	33.0	-17.1	
2565.00	7.68	H	1.9	9.1	14.94	33.0	-18.1	
Mid Ch								
2605.00	8.31	V	1.9	10.4	16.80	33.0	-16.2	
2605.00	7.99	H	1.9	10.4	16.48	33.0	-16.5	
High Ch								
2645.00	8.63	V	1.9	10.3	17.07	33.0	-15.9	
2645.00	7.74	H	1.9	10.3	16.18	33.0	-16.8	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

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LTE
Band 41
15MHz
QPSK

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-18-17
Test Engineer: JH Park
Configuration: EUT / Z-Position
Mode: LTE Band 41, QPSK, 15MHz

Test Equipment:
Receiving: 3117[00168724] and Chamber 1 SMA Cables
Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
2562.50	8.40	V	1.9	9.1	15.66	33.0	-17.3	
2562.50	10.13	H	1.9	9.1	17.39	33.0	-15.6	
Mid Ch								
2605.00	9.43	V	1.9	10.4	17.92	33.0	-15.1	
2605.00	8.94	H	1.9	10.4	17.43	33.0	-15.6	
High Ch								
2647.50	8.23	V	1.9	10.3	16.67	33.0	-16.3	
2647.50	8.38	H	1.9	10.3	16.82	33.0	-16.2	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

LTE
Band 41
15MHz
16QAM

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-18-17
Test Engineer: JH Park
Configuration: EUT / Z-Position
Mode: LTE Band 41, 16QAM, 15MHz

Test Equipment:
Receiving: 3117[00168724] and Chamber 1 SMA Cables
Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
2562.50	7.45	V	1.9	9.1	14.71	33.0	-18.3	
2562.50	9.23	H	1.9	9.1	16.49	33.0	-16.5	
Mid Ch								
2605.00	8.53	V	1.9	10.4	17.02	33.0	-16.0	
2605.00	8.03	H	1.9	10.4	16.52	33.0	-16.5	
High Ch								
2647.50	7.31	V	1.9	10.3	15.75	33.0	-17.2	
2647.50	7.45	H	1.9	10.3	15.89	33.0	-17.1	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

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LTE
Band 41
10MHz
QPSK

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-18-17
Test Engineer: JH Park
Configuration: EUT / Z-Position
Mode: LTE Band 41, QPSK, 10MHz

Test Equipment:
Receiving: 3117[00168724] and Chamber 1 SMA Cables
Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
2560.00	9.67	V	1.9	9.1	16.93	33.0	-16.1	
2560.00	10.38	H	1.9	9.1	17.64	33.0	-15.4	
Mid Ch								
2605.00	9.85	V	1.9	10.4	18.34	33.0	-14.7	
2605.00	10.11	H	1.9	10.4	18.60	33.0	-14.4	
High Ch								
2650.00	8.62	V	1.9	10.3	17.06	33.0	-15.9	
2650.00	9.52	H	1.9	10.3	17.96	33.0	-15.0	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

LTE
Band 41
10MHz
16QAM

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-18-17
Test Engineer: JH Park
Configuration: EUT / Z-Position
Mode: LTE Band 41 16QAM, 10MHz

Test Equipment:
Receiving: 3117[00168724] and Chamber 1 SMA Cables
Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
2560.00	8.72	V	1.9	9.1	15.98	33.0	-17.0	
2560.00	9.46	H	1.9	9.1	16.72	33.0	-16.3	
Mid Ch								
2605.00	8.85	V	1.9	10.4	17.34	33.0	-15.7	
2605.00	9.39	H	1.9	10.4	17.88	33.0	-15.1	
High Ch								
2650.00	7.69	V	1.9	10.3	16.13	33.0	-16.9	
2650.00	8.63	H	1.9	10.3	17.07	33.0	-15.9	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

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LTE
Band 41
5MHz
QPSK

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-18-17
Test Engineer: JH Park
Configuration: EUT / Z-Position
Mode: LTE Band 41, QPSK , 5MHz

Test Equipment:
Receiving: 3117[00168724] and Chamber 1 SMA Cables
Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
2557.50	7.58	V	1.9	9.1	14.84	33.0	-18.2	
2557.50	9.67	H	1.9	9.1	16.93	33.0	-16.1	
Mid Ch								
2605.00	6.49	V	1.9	10.4	14.98	33.0	-18.0	
2605.00	10.71	H	1.9	10.4	19.20	33.0	-13.8	
High Ch								
2652.50	4.17	V	1.9	10.3	12.61	33.0	-20.4	
2652.50	10.66	H	1.9	10.3	19.10	33.0	-13.9	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

LTE
Band 41
5MHz
16QAM

High Frequency Substitution Measurement
UL Korea, Ltd. Suwon Laboratory Chamber 2

Company: Samsung
Project #: 4788148881
Date: 09-18-17
Test Engineer: JH Park
Configuration: EUT / Z-Position
Mode: LTE Band 41 16QAM, 5MHz

Test Equipment:
Receiving: 3117[00168724] and Chamber 1 SMA Cables
Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
2557.50	6.69	V	1.9	9.1	13.95	33.0	-19.1	
2557.50	8.80	H	1.9	9.1	16.06	33.0	-16.9	
Mid Ch								
2605.00	5.53	V	1.9	10.4	14.02	33.0	-19.0	
2605.00	9.92	H	1.9	10.4	18.41	33.0	-14.6	
High Ch								
2652.50	3.12	V	1.9	10.3	11.56	33.0	-21.4	
2652.50	9.64	H	1.9	10.3	18.08	33.0	-14.9	

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm

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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(g) 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: (m)(4) For mobile station, the attenuation factor shall be not less than 43 + 10 log (P) dB at the channel edge and (55 + 10 log (P)dB) at the 5.5 MHz from the channel edges.

TEST PROCEDURE

ANSI / TIA / EIA 603E Clause 2.2.12; ESU40 setting reference to 971168 D01 v02r02

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;

RESULTS

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10.2.1. SPURIOUS RADIATION PLOTS

GSM 850

GSM

GSM850
GPRS

UL Korea, Ltd Suwon Laboratory
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 4788148881
Date: 09-20-17
Test Engineer: YH Lim
Configuration: EUT / AC Adapter / Earphone, X Position
Mode: GPRS 850 MHz

Chamber	Pre-amplifer	Filter	Limit
Chamber 2	AFS42	Filter 1	Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 824.2MHz									
1.6484	-13.6	V	3.0	38.2	1.0	-50.9	-13.0	-37.9	
2.4726	-13.0	V	3.0	38.8	1.0	-50.8	-13.0	-37.8	
3.2968	-14.7	V	3.0	39.4	1.0	-53.1	-13.0	-40.1	
1.6484	-6.7	H	3.0	38.2	1.0	-43.9	-13.0	-30.9	
2.4726	-9.0	H	3.0	38.8	1.0	-46.8	-13.0	-33.8	
3.2968	-14.7	H	3.0	39.4	1.0	-53.1	-13.0	-40.1	
Mid Ch, 836.6MHz									
1.6730	-9.1	V	3.0	38.2	1.0	-46.3	-13.0	-33.3	
2.5098	-10.2	V	3.0	38.8	1.0	-48.0	-13.0	-35.0	
3.3464	-13.5	V	3.0	39.5	1.0	-52.0	-13.0	-39.0	
1.6730	-3.3	H	3.0	38.2	1.0	-40.5	-13.0	-27.5	
2.5098	-6.7	H	3.0	38.8	1.0	-44.6	-13.0	-31.6	
3.3464	-14.3	H	3.0	39.5	1.0	-52.7	-13.0	-39.7	
High Ch, 848.8MHz									
1.6976	-7.3	V	3.0	38.2	1.0	-44.6	-13.0	-31.6	
2.5466	-9.5	V	3.0	38.9	1.0	-47.3	-13.0	-34.3	
3.3952	-12.3	V	3.0	39.5	1.0	-50.8	-13.0	-37.8	
1.6976	0.7	H	3.0	38.2	1.0	-36.6	-13.0	-23.6	
2.5466	-5.1	H	3.0	38.9	1.0	-42.9	-13.0	-29.9	
3.3952	-14.2	H	3.0	39.5	1.0	-52.7	-13.0	-39.7	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

GSM

GSM850
EGPRS

UL Korea, Ltd Suwon Laboratory
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 4788148881
Date: 09-20-17
Test Engineer: YH Lim
Configuration: EUT / AC Adapter / Earphone, X Position
Mode: EGPRS 850 MHz

Chamber	Pre-amplifer	Filter	Limit
Chamber 2	AFS42	Filter 1	Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 824.2MHz									
1.6484	-17.1	V	3.0	38.2	1.0	-54.4	-13.0	-41.4	
2.4726	-15.9	V	3.0	38.8	1.0	-53.7	-13.0	-40.7	
3.2968	-15.0	V	3.0	39.4	1.0	-53.4	-13.0	-40.4	
1.6484	-14.4	H	3.0	38.2	1.0	-51.6	-13.0	-38.6	
2.4726	-13.1	H	3.0	38.8	1.0	-50.9	-13.0	-37.9	
3.2968	-15.0	H	3.0	39.4	1.0	-53.4	-13.0	-40.4	
Mid Ch, 836.6MHz									
1.6730	-12.2	V	3.0	38.2	1.0	-49.5	-13.0	-36.5	
2.5098	-13.4	V	3.0	38.8	1.0	-51.2	-13.0	-38.2	
3.3464	-15.2	V	3.0	39.5	1.0	-53.6	-13.0	-40.6	
1.6730	-9.8	H	3.0	38.2	1.0	-47.0	-13.0	-34.0	
2.5098	-11.4	H	3.0	38.8	1.0	-49.3	-13.0	-36.3	
3.3464	-14.7	H	3.0	39.5	1.0	-53.2	-13.0	-40.2	
High Ch, 848.8MHz									
1.6976	-10.4	V	3.0	38.2	1.0	-47.6	-13.0	-34.6	
2.5466	-13.6	V	3.0	38.9	1.0	-51.5	-13.0	-38.5	
3.3952	-14.5	V	3.0	39.5	1.0	-53.0	-13.0	-40.0	
1.6976	-4.5	H	3.0	38.2	1.0	-41.7	-13.0	-28.7	
2.5466	-9.8	H	3.0	38.9	1.0	-47.7	-13.0	-34.7	
3.3952	-14.2	H	3.0	39.5	1.0	-52.7	-13.0	-39.7	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

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