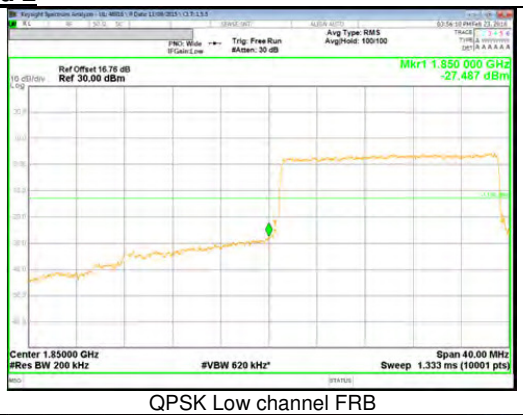
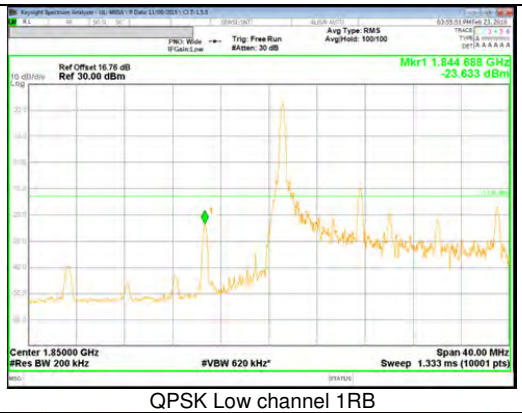
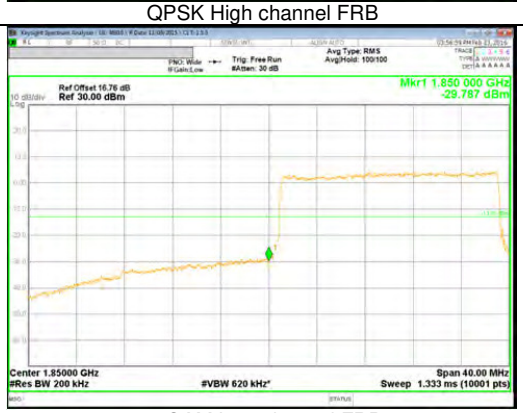
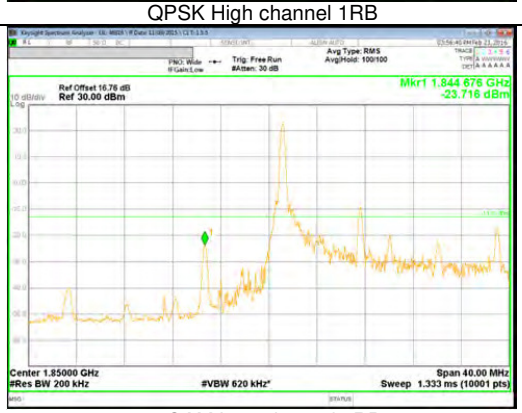
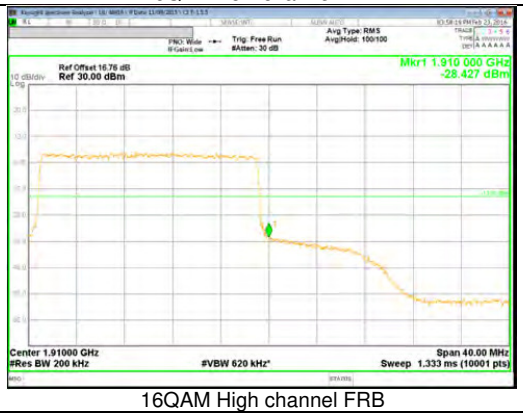
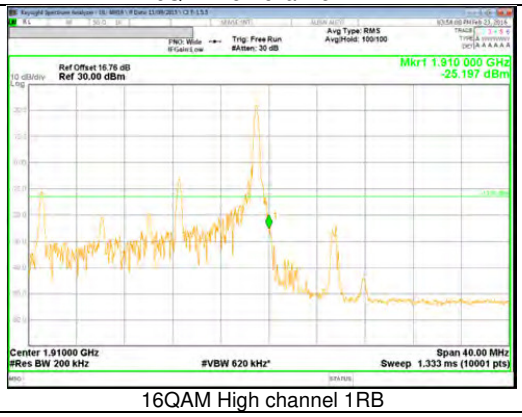
LTE Band 2

Band 2 20MHz	 QPSK Low channel FRB	 QPSK Low channel 1RB
	 QPSK High channel FRB	 QPSK High channel 1RB
	 16QAM Low channel FRB	 16QAM Low channel 1RB
	 16QAM High channel FRB	 16QAM High channel 1RB

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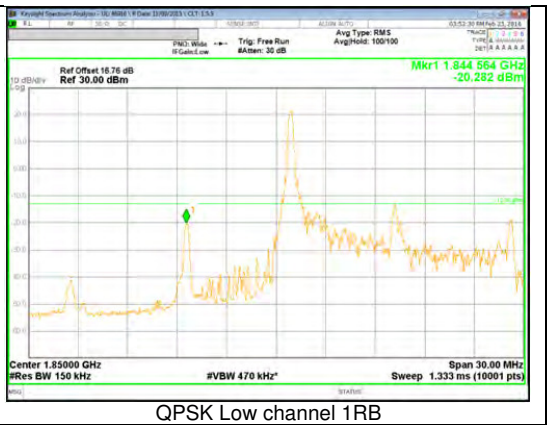
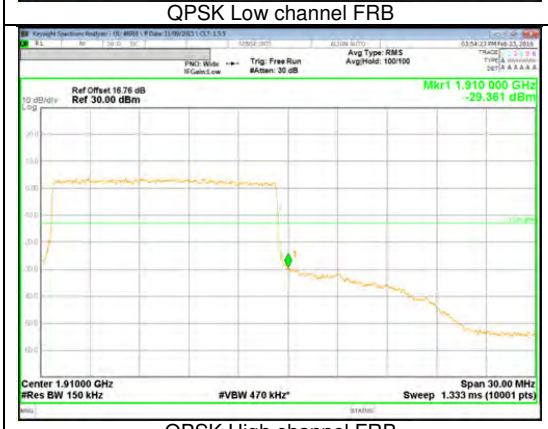
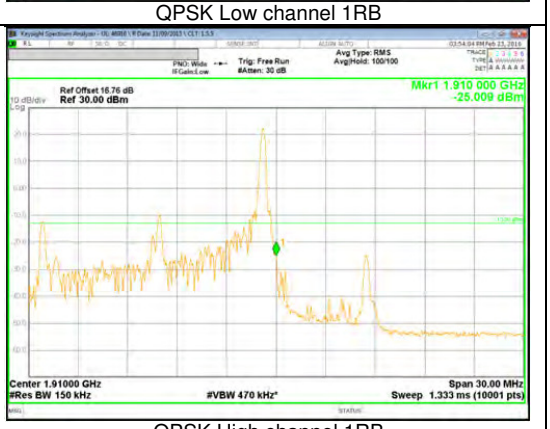
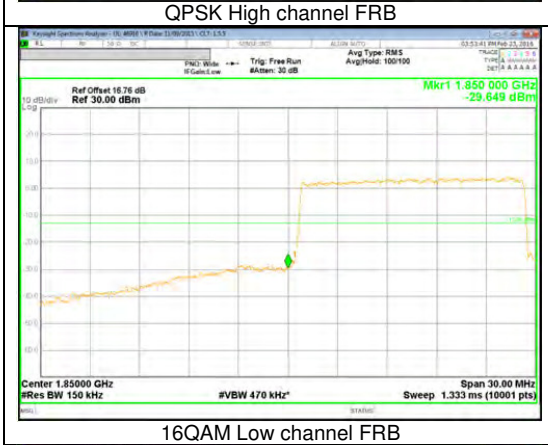
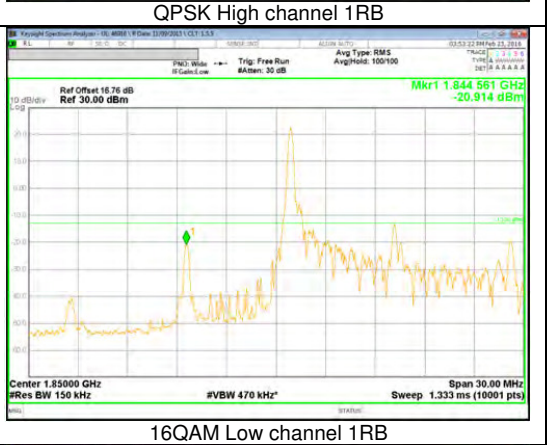
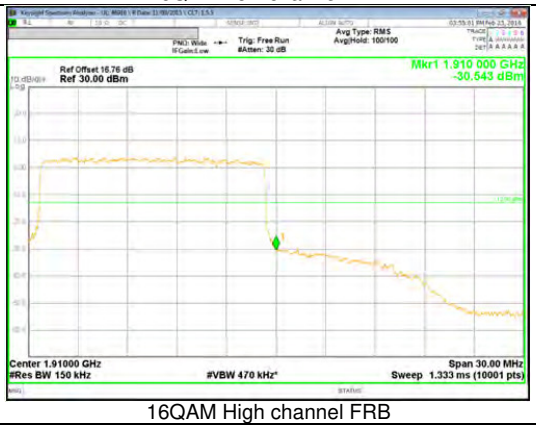
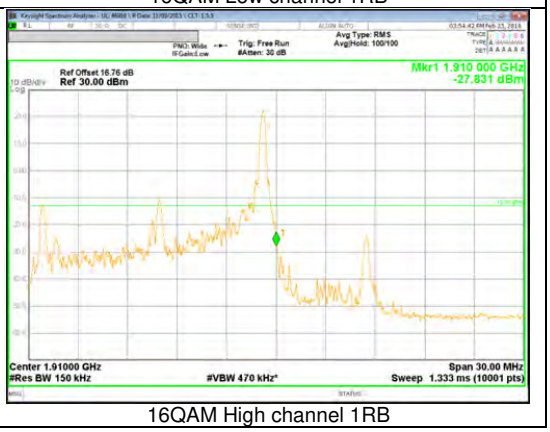
Band 2 15MHz	 QPSK Low channel FRB	 QPSK Low channel 1RB
	 QPSK High channel FRB	 QPSK High channel 1RB
	 16QAM Low channel FRB	 16QAM Low channel 1RB
	 16QAM High channel FRB	 16QAM High channel 1RB

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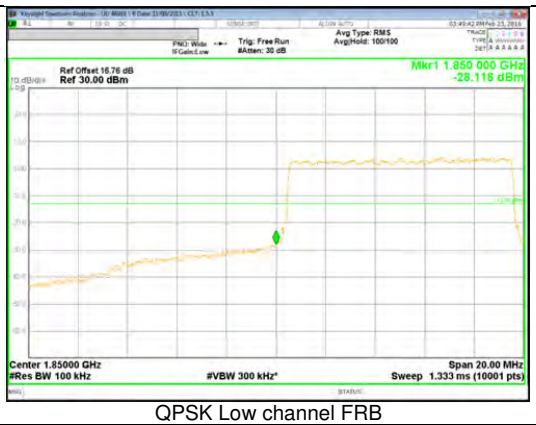
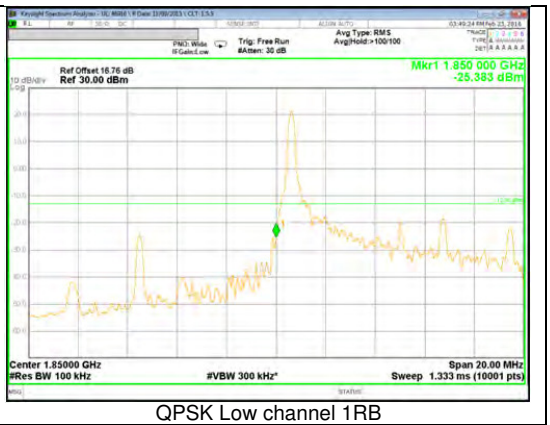
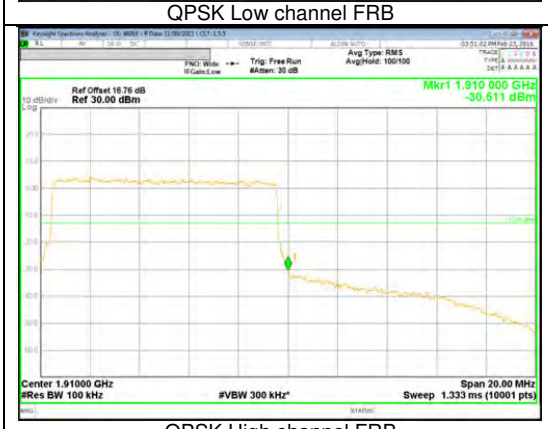
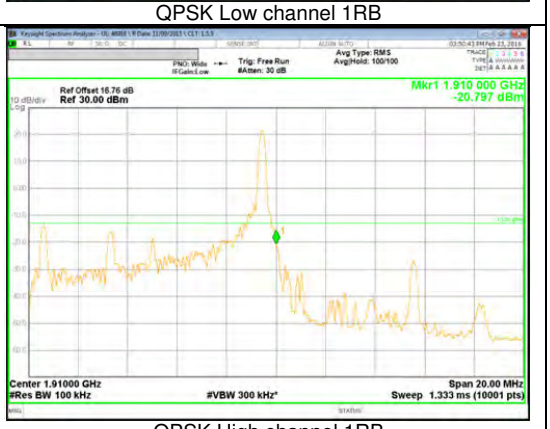
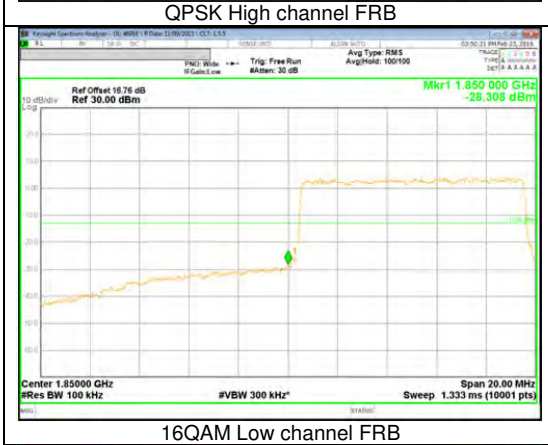
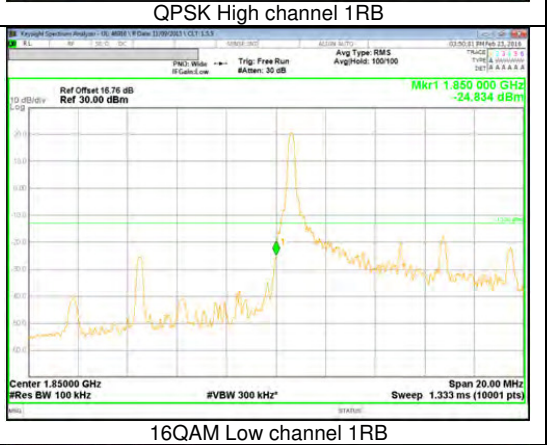
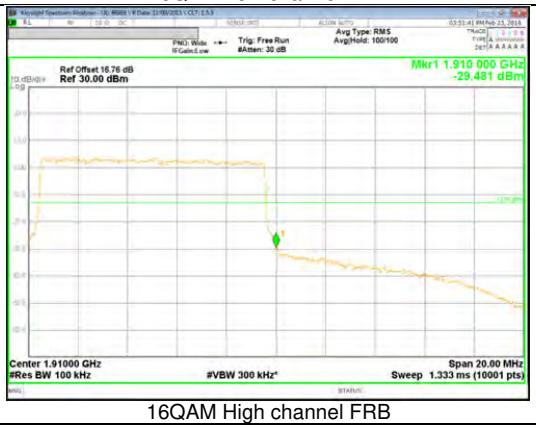
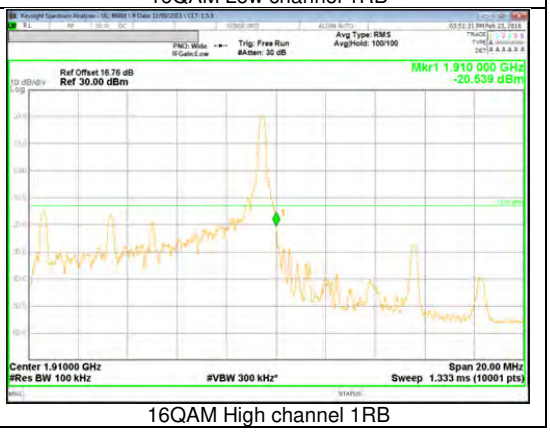
Band 2 10MHz	 QPSK Low channel FRB	 QPSK Low channel 1RB
	 QPSK High channel FRB	 QPSK High channel 1RB
	 16QAM Low channel FRB	 16QAM Low channel 1RB
	 16QAM High channel FRB	 16QAM High channel 1RB

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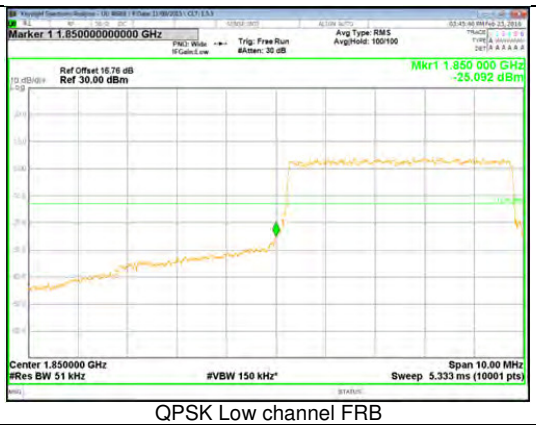
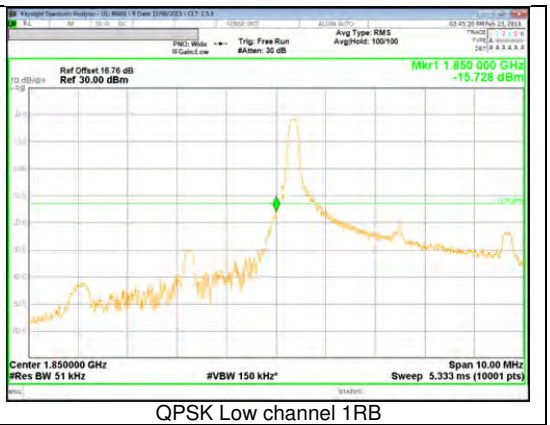
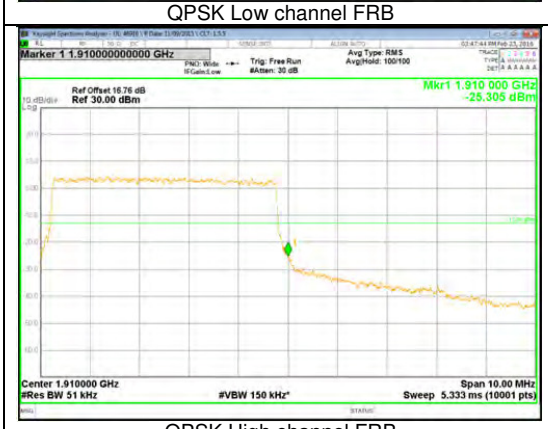
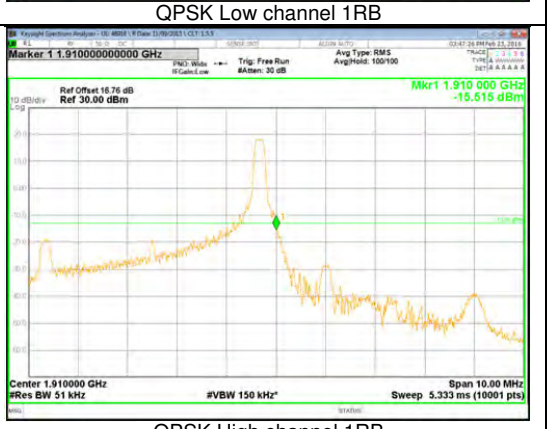
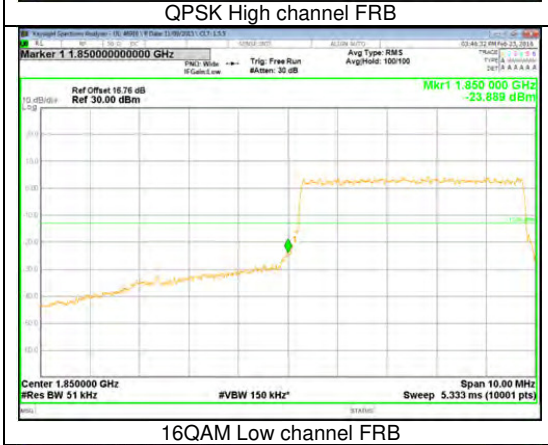
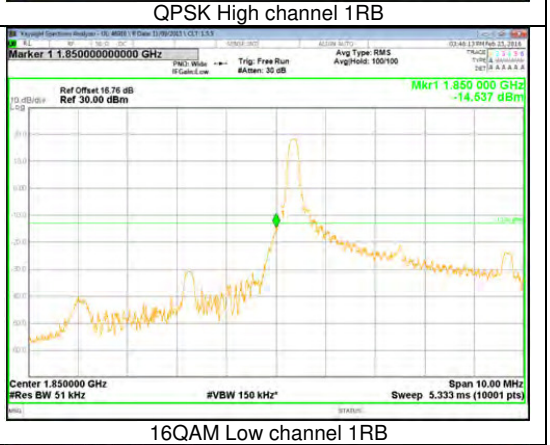
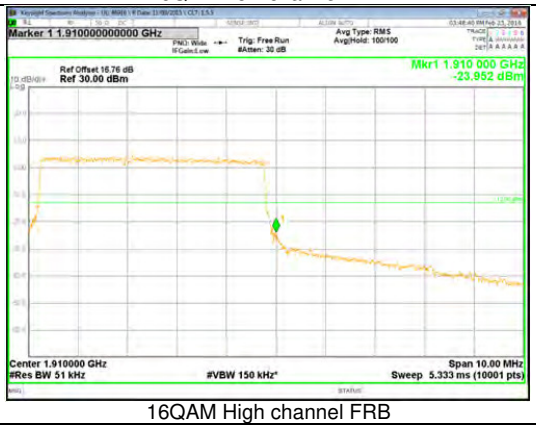
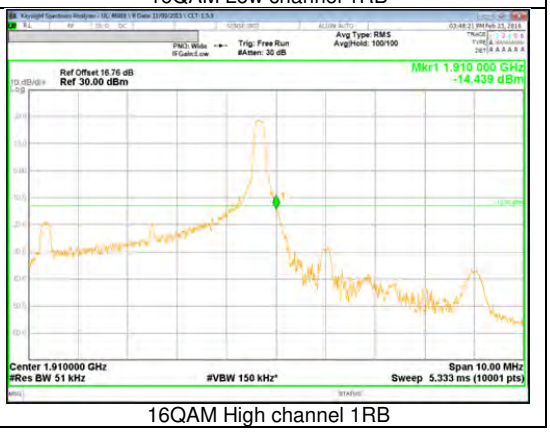
Band 2 5MHz	 QPSK Low channel FRB	 QPSK Low channel 1RB
	 QPSK High channel FRB	 QPSK High channel 1RB
	 16QAM Low channel FRB	 16QAM Low channel 1RB
	 16QAM High channel FRB	 16QAM High channel 1RB

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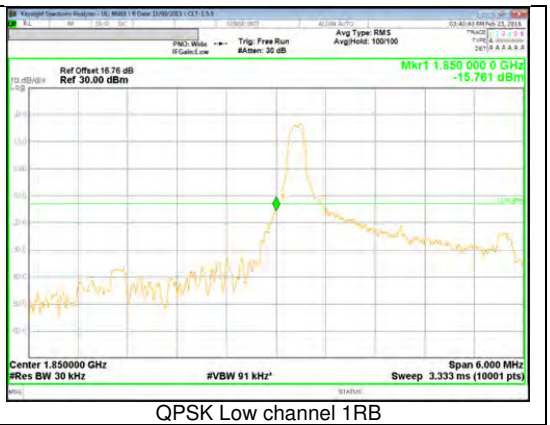
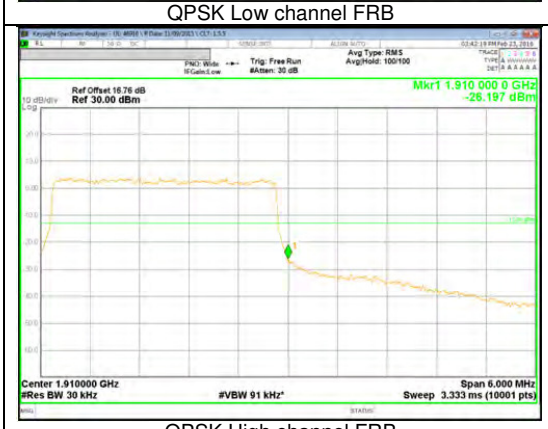
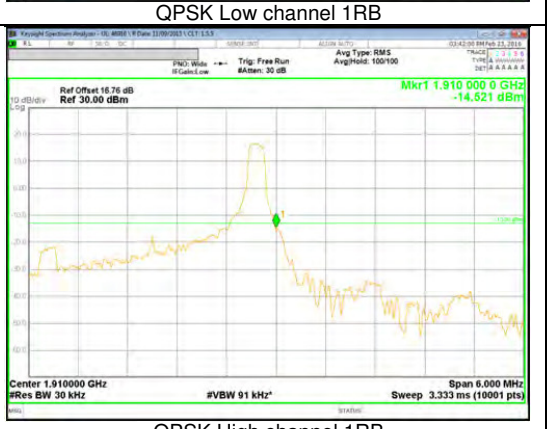
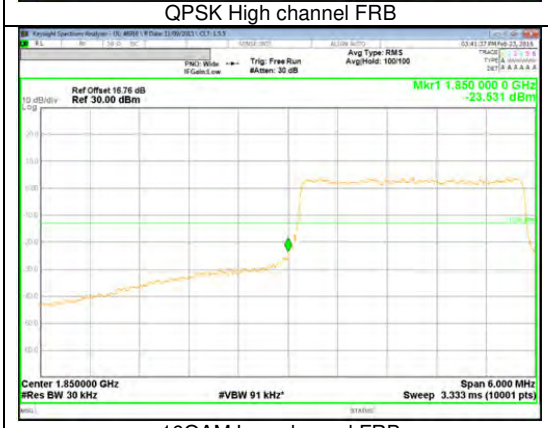
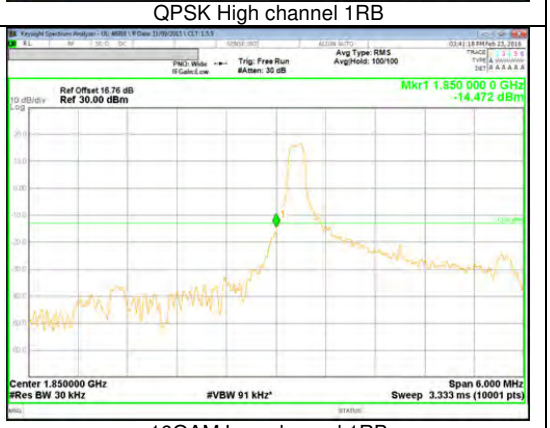
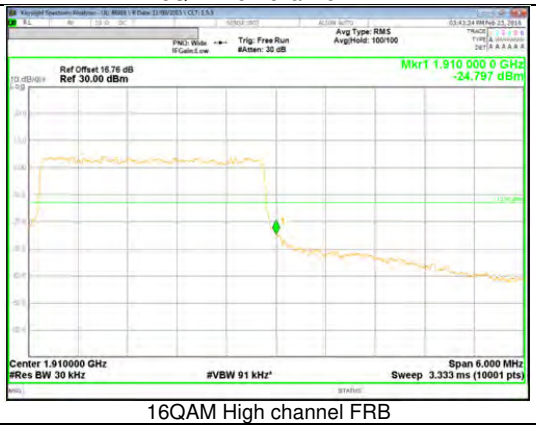
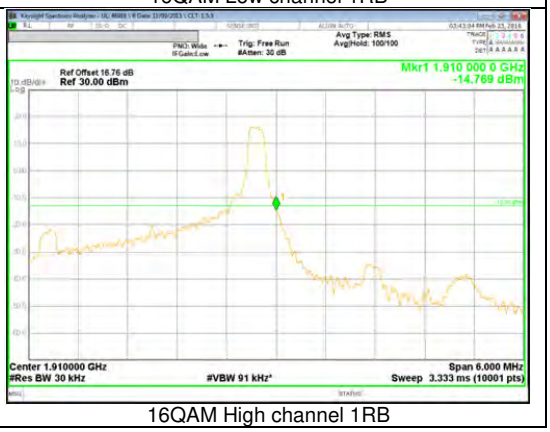
Band 2 3MHz	 QPSK Low channel FRB	 QPSK Low channel 1RB
	 QPSK High channel FRB	 QPSK High channel 1RB
	 16QAM Low channel FRB	 16QAM Low channel 1RB
	 16QAM High channel FRB	 16QAM High channel 1RB

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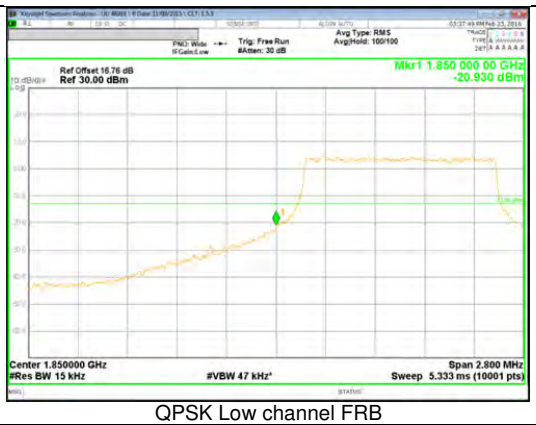
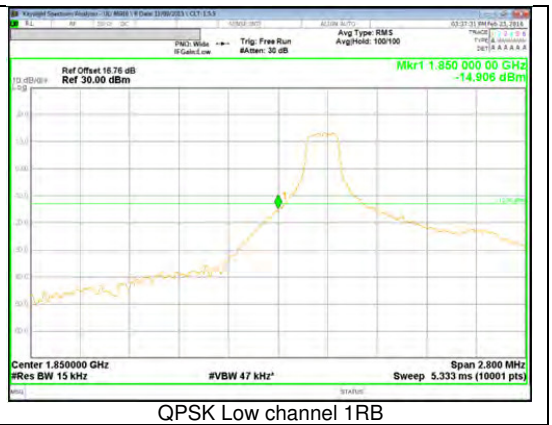
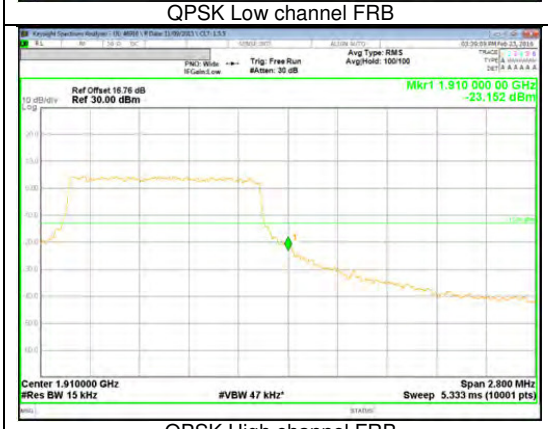
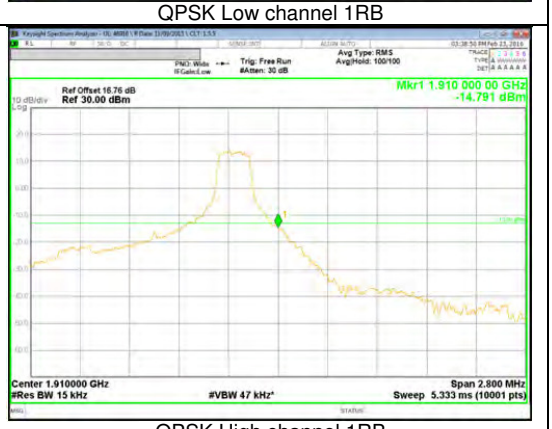
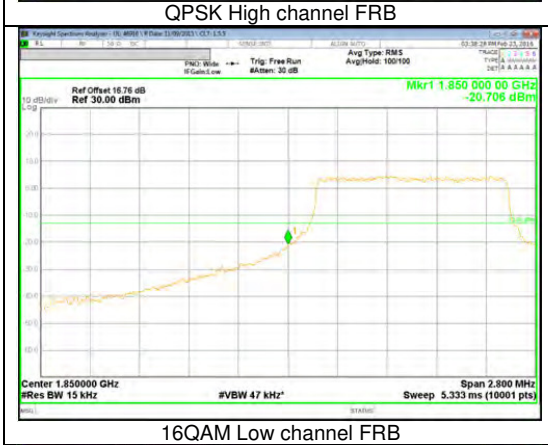
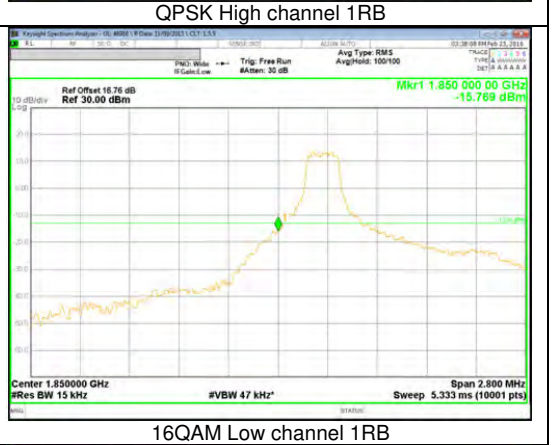
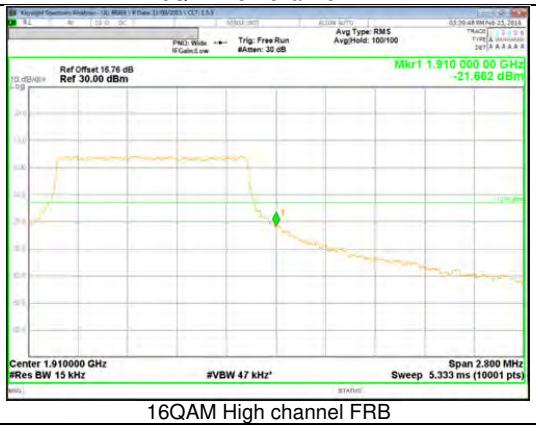
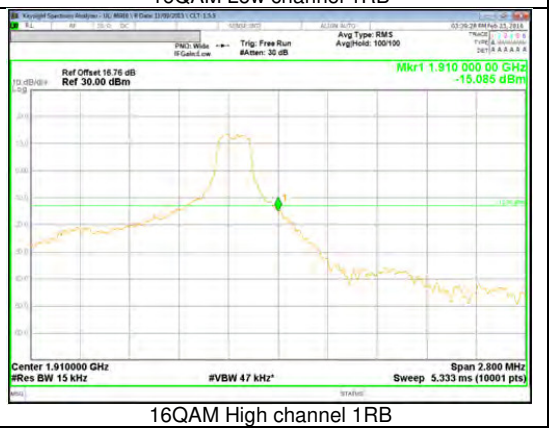
Band 2 1.4MHz	 QPSK Low channel FRB	 QPSK Low channel 1RB
	 QPSK High channel FRB	 QPSK High channel 1RB
	 16QAM Low channel FRB	 16QAM Low channel 1RB
	 16QAM High channel FRB	 16QAM High channel 1RB

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10.3 OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051, §22.901, §22.917, §24.238 and §27. 53

LIMITS

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

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v02r02
The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

RESULTS

10.3.1. OUT OF BAND EMISSIONS RESULT

GSM

Band	Mode	f [MHz]	Spurious [dBm]	Limit [dBm]	Margin [dB]
GSM850	GPRS	824.2	-22.72	-13.00	9.72
		836.6	-22.99		9.99
		848.8	-22.42		9.42
	EGPRS	824.2	-22.68		9.68
		836.6	-22.76		9.76
		848.8	-22.73		9.73
GSM1900	GPRS	1850.2	-22.45		9.45
		1880.0	-22.71		9.71
		1909.8	-22.85		9.85
	EGPRS	1850.2	-21.91		8.91
		1880.0	-22.82		9.82
		1909.8	-22.44		9.44

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WCDMA

Band	Mode	f [MHz]	Spurious [dBm]	Limit [dBm]	Margin [dB]
Band 5	REL99	826.4	-33.79	-13.00	20.79
		836.6	-31.32		18.32
		846.6	-32.93		19.93
	HSDPA	826.4	-33.00		20
		836.6	-32.89		19.89
		846.6	-31.13		18.13
Band 4	REL99	1712.4	-32.60		19.6
		1732.6	-32.98		19.98
		1752.6	-33.28		20.28
	HSDPA	1712.4	-32.69		19.69
		1732.6	-32.11		19.11
		1752.6	-33.00		20
Band 2	REL99	1852.4	-33.16		20.16
		1880.0	-32.67		19.67
		1907.6	-32.90		19.9
	HSDPA	1852.4	-32.46		19.46
		1880.0	-32.59		19.59
		1907.6	-31.67		18.67

LTE 17

Bandwidth	Mode	f [MHz]	Spurious [dBm]	Limit [dBm]	Margin [dB]
10 MHz	QPSK	709.0	-26.81	-13.00	13.81
		710.0	-27.86		14.86
		711.0	-26.77		13.77
	16QAM	709.0	-27.22		14.22
		710.0	-26.31		13.31
		711.0	-27.79		14.79
5 MHz	QPSK	706.5	-27.16		14.16
		710.0	-26.83		13.83
		713.5	-26.42		13.42
	16QAM	706.5	-26.92		13.92
		710.0	-27.68		14.68
		713.5	-27.17		14.17

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LTE 5

Bandwidth	Mode	f [MHz]	Spurious [dBm]	Limit [dBm]	Margin [dB]
10 MHz	QPSK	829.0	-27.43	-13.00	14.43
		836.5	-27.02		14.02
		844.0	-26.92		13.92
	16QAM	829.0	-26.26		13.26
		836.5	-27.91		14.91
		844.0	-27.56		14.56
5 MHz	QPSK	826.5	-26.80		13.8
		836.5	-26.46		13.46
		846.5	-27.46		14.46
	16QAM	826.5	-26.94		13.94
		836.5	-27.19		14.19
		846.5	-27.79		14.79
3 MHz	QPSK	825.5	-26.71		13.71
		836.5	-26.84		13.84
		847.5	-26.94		13.94
	16QAM	825.5	-26.63		13.63
		836.5	-26.98		13.98
		847.5	-27.64		14.64
1.4 MHz	QPSK	824.7	-26.71		13.71
		836.5	-26.85		13.85
		848.3	-26.46		13.46
	16QAM	824.7	-27.02		14.02
		836.5	-27.14		14.14
		848.3	-26.85		13.85

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LTE 4

Bandwidth	Mode	f [MHz]	Spurious [dBm]	Limit [dBm]	Margin [dB]
20 MHz	QPSK	1720.0	-26.80	-13.00	13.8
		1732.5	-27.39		14.39
		1745.0	-26.49		13.49
	16QAM	1720.0	-26.42		13.42
		1732.5	-26.71		13.71
		1745.0	-26.21		13.21
15 MHz	QPSK	1717.5	-26.78		13.78
		1732.5	-26.37		13.37
		1747.5	-26.43		13.43
	16QAM	1717.5	-26.67		13.67
		1732.5	-26.56		13.56
		1747.5	-25.43		12.43
10 MHz	QPSK	1715.0	-25.54		12.54
		1732.5	-26.85		13.85
		1750.0	-27.66		14.66
	16QAM	1715.0	-26.50		13.5
		1732.5	-27.06		14.06
		1750.0	-26.35		13.35
5 MHz	QPSK	1712.5	-27.13		14.13
		1732.5	-26.22		13.22
		1752.5	-26.97		13.97
	16QAM	1712.5	-25.92		12.92
		1732.5	-26.87		13.87
		1752.5	-25.10		12.1
3 MHz	QPSK	1711.5	-27.41		14.41
		1732.5	-26.59		13.59
		1753.5	-27.26		14.26
	16QAM	1711.5	-26.65		13.65
		1732.5	-26.33		13.33
		1753.5	-27.66		14.66
1.4 MHz	QPSK	1710.7	-26.50		13.5
		1732.5	-26.53		13.53
		1754.3	-26.71		13.71
	16QAM	1710.7	-26.46		13.46
		1732.5	-27.29		14.29
		1754.3	-26.03		13.03

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LTE 2

Bandwidth	Mode	f [MHz]	Spurious [dBm]	Limit [dBm]	Margin [dB]
20 MHz	QPSK	1860.0	-26.92	-13.00	13.92
		1880.0	-25.85		12.85
		1900.0	-27.12		14.12
	16QAM	1860.0	-26.39		13.39
		1880.0	-27.53		14.53
		1900.0	-27.19		14.19
15 MHz	QPSK	1857.5	-26.15		13.15
		1880.0	-26.58		13.58
		1902.5	26.14		-39.14
	16QAM	1857.5	-26.80		13.8
		1880.0	-26.68		13.68
		1902.5	-27.14		14.14
10 MHz	QPSK	1855.0	-26.46		13.46
		1880.0	-26.30		13.3
		1905.0	-27.67		14.67
	16QAM	1855.0	-26.33		13.33
		1880.0	-26.11		13.11
		1905.0	-26.04		13.04
5 MHz	QPSK	1852.5	-26.93		13.93
		1880.0	-26.67		13.67
		1907.5	-25.76		12.76
	16QAM	1852.5	-27.30		14.3
		1880.0	-26.15		13.15
		1907.5	-25.96		12.96
3 MHz	QPSK	1851.5	-26.03		13.03
		1880.0	-26.59		13.59
		1908.5	-26.46		13.46
	16QAM	1851.5	-26.66		13.66
		1880.0	-26.35		13.35
		1908.5	-27.42		14.42
1.4 MHz	QPSK	1850.7	-26.65		13.65
		1880.0	-27.01		14.01
		1909.3	-27.11		14.11
	16QAM	1850.7	-26.39		13.39
		1880.0	-26.56		13.56
		1909.3	-26.59		13.59

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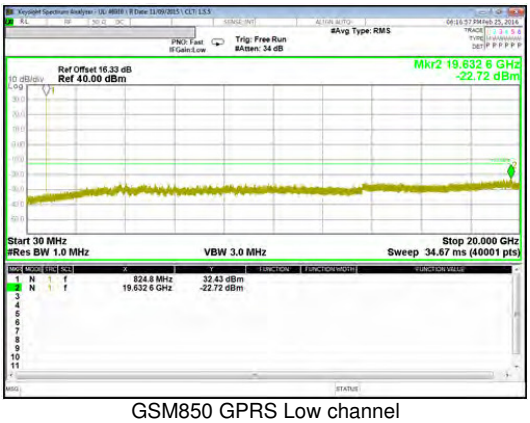
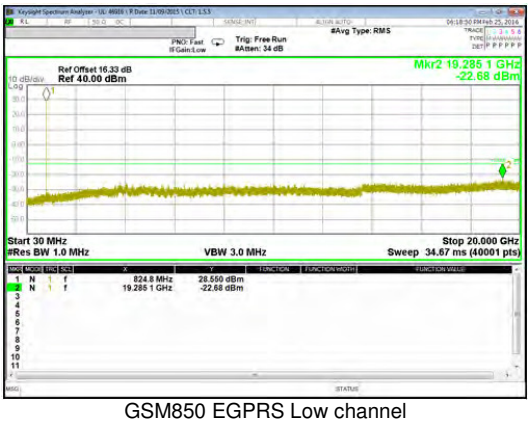
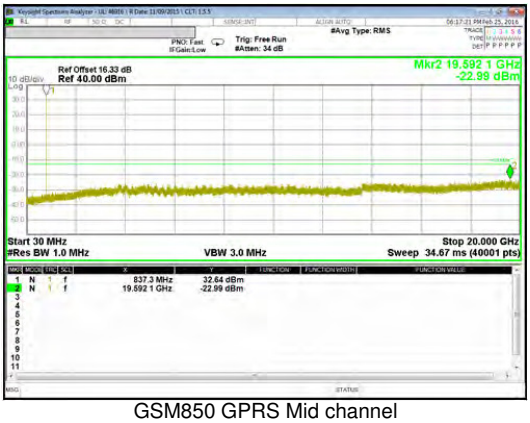
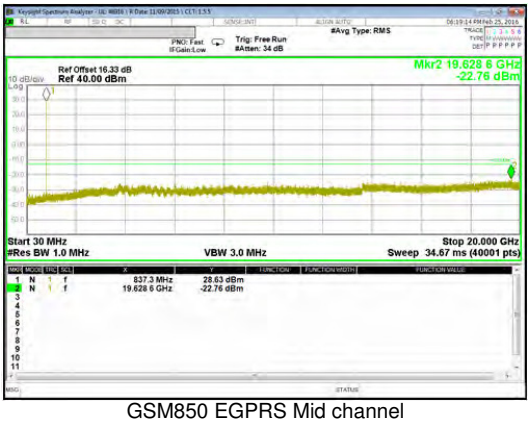
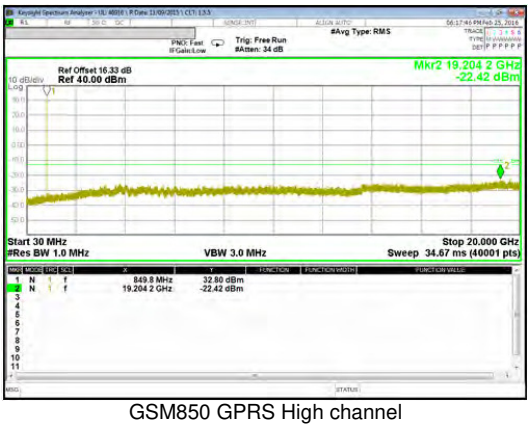
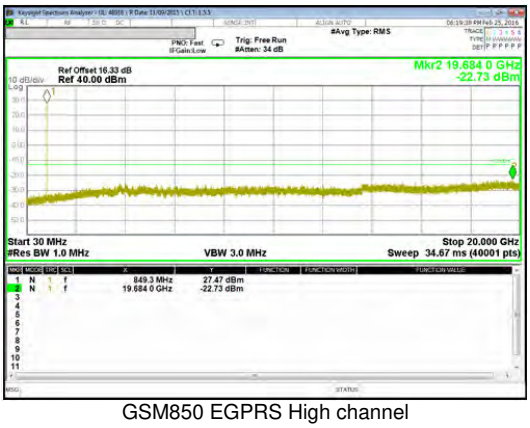
10.3.2. OUT OF BAND EMISSIONS PLOTS

GSM 850

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

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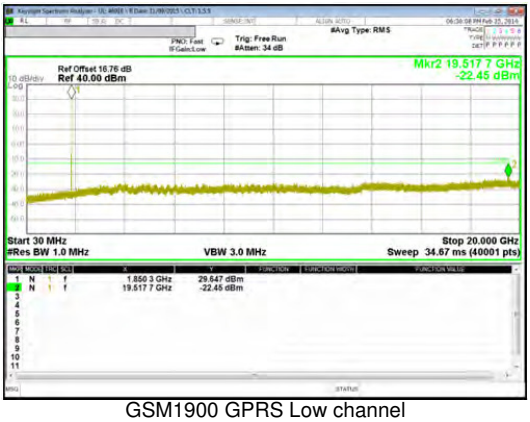
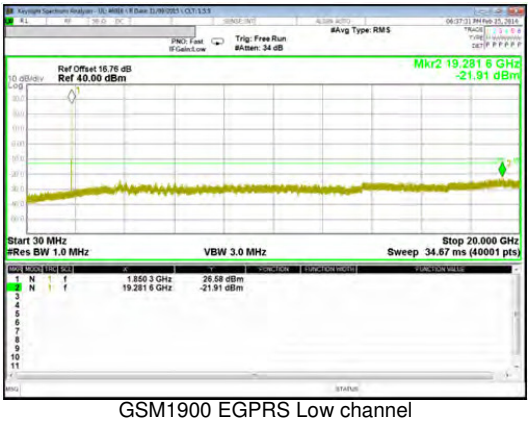
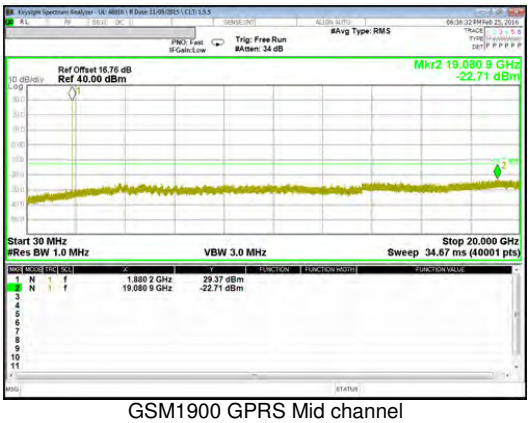
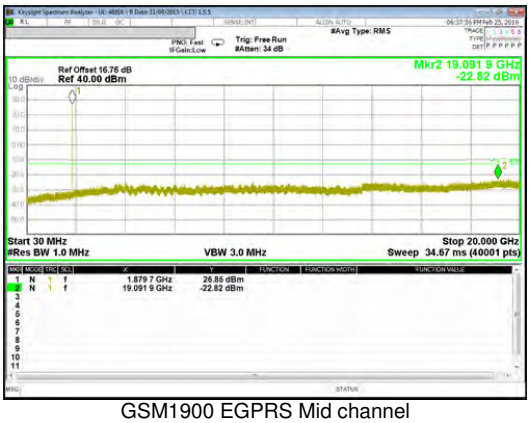
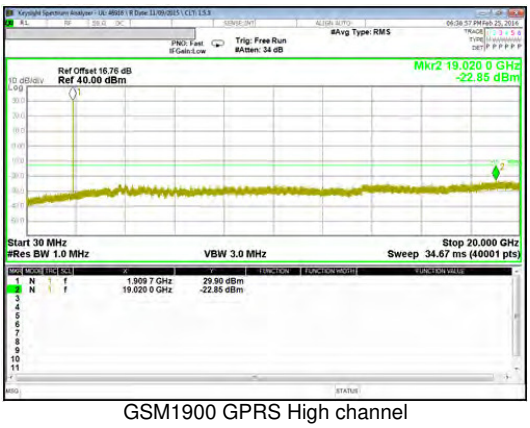
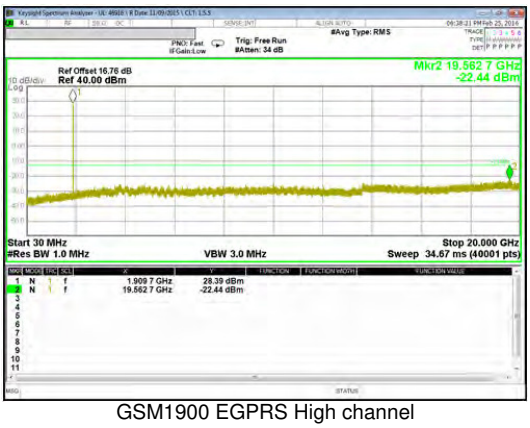
GSM 1900

GSM 1900	 GSM1900 GPRS Low channel	 GSM1900 EGPRS Low channel
	 GSM1900 GPRS Mid channel	 GSM1900 EGPRS Mid channel
	 GSM1900 GPRS High channel	 GSM1900 EGPRS High channel

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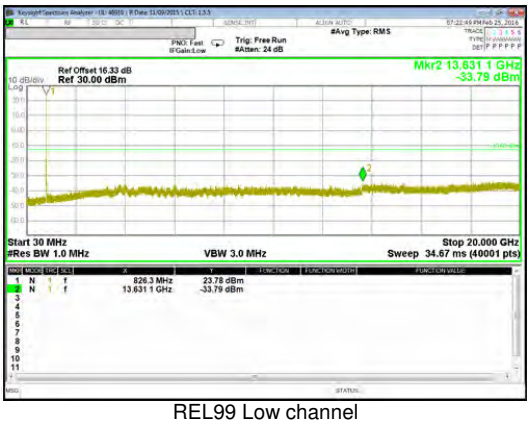
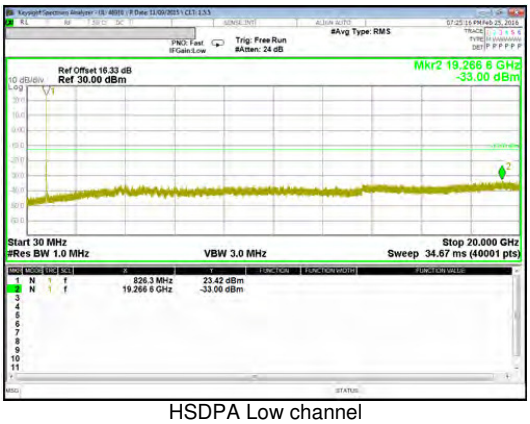
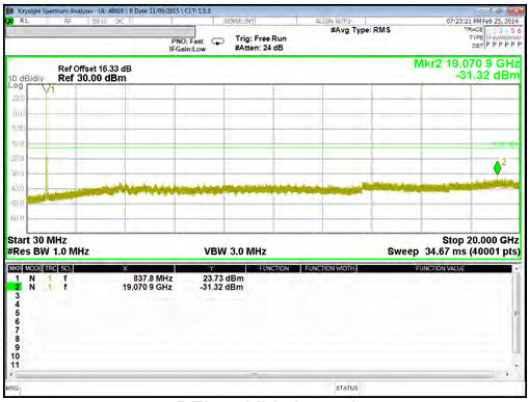
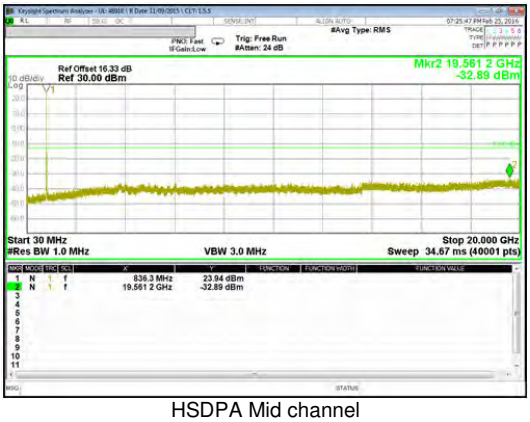
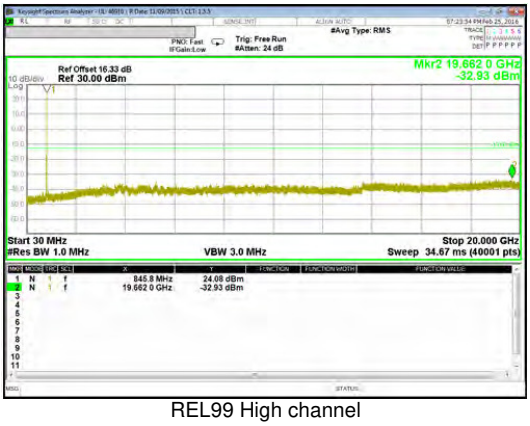
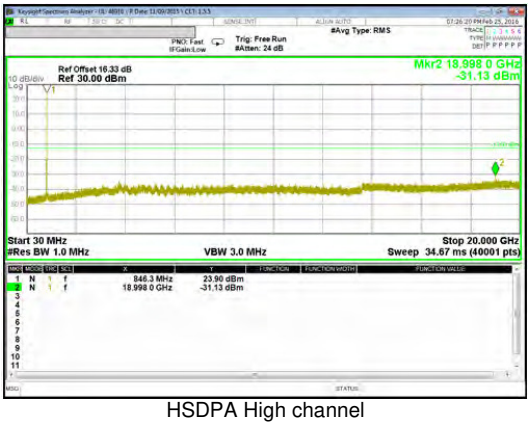
WCDMA Band 5

Band 5	 REL99 Low channel	 HSDPA Low channel
	 REL99 Mid channel	 HSDPA Mid channel
	 REL99 High channel	 HSDPA High channel

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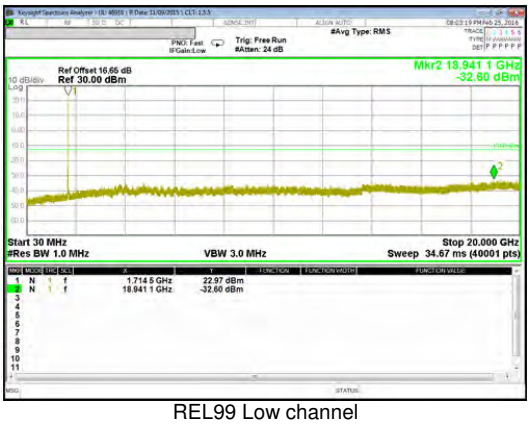
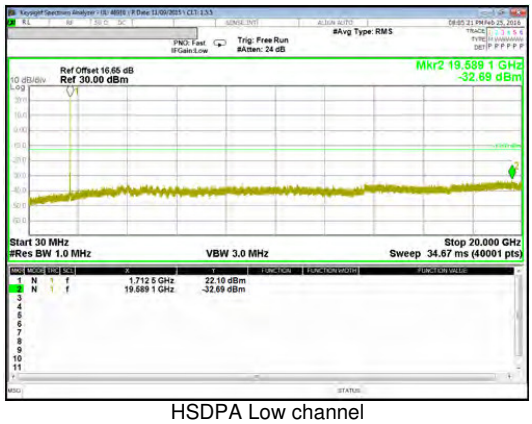
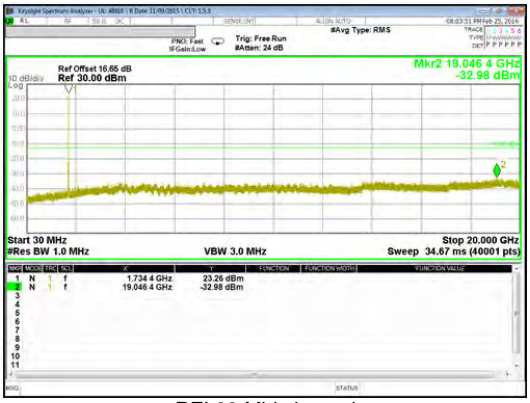
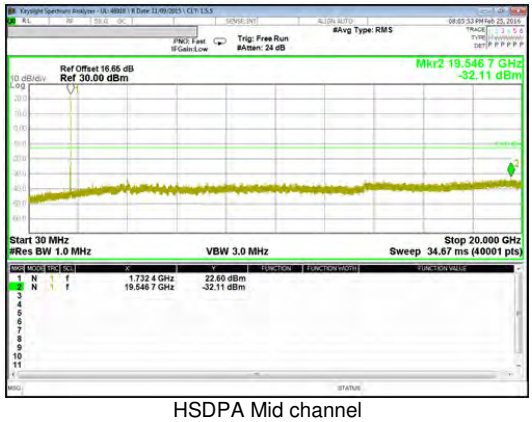
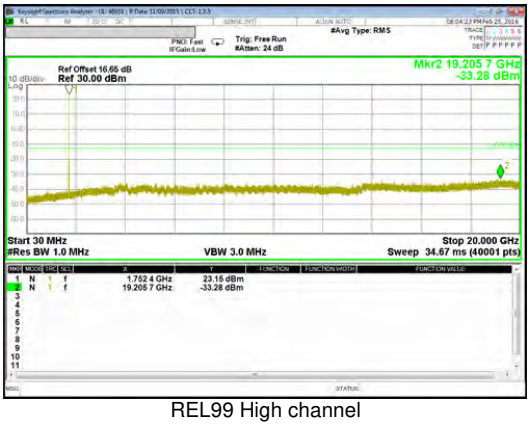
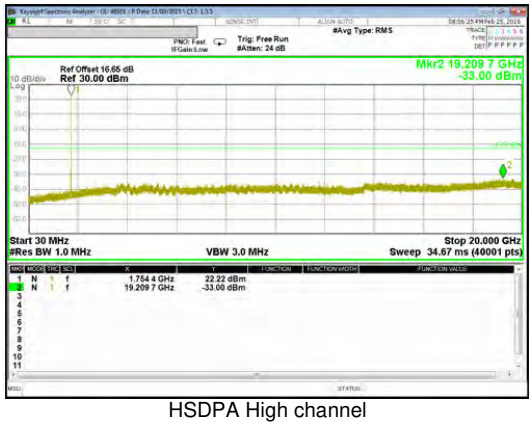
WCDMA Band 4

Band 4	 REL99 Low channel	 HSDPA Low channel
	 REL99 Mid channel	 HSDPA Mid channel
	 REL99 High channel	 HSDPA High channel

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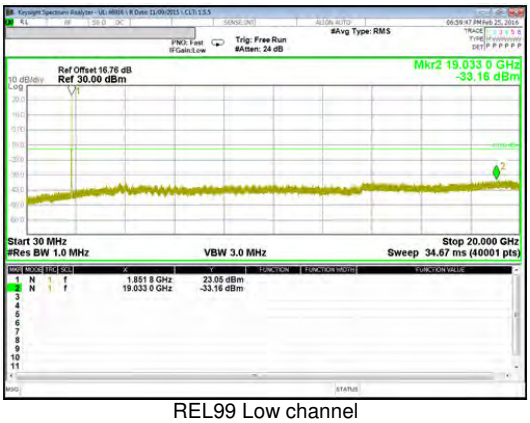
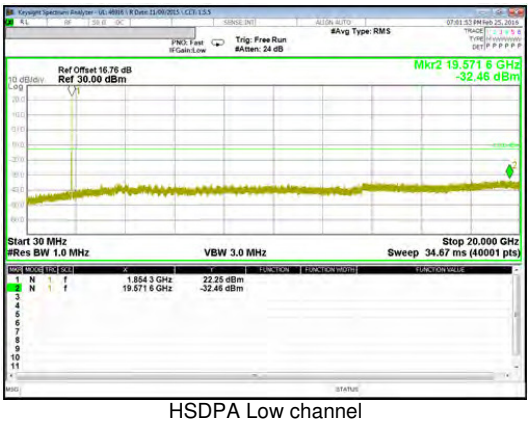
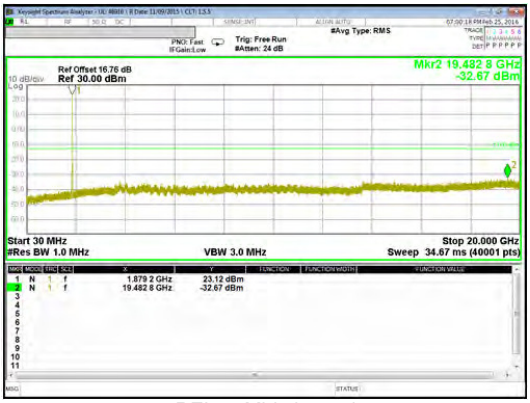
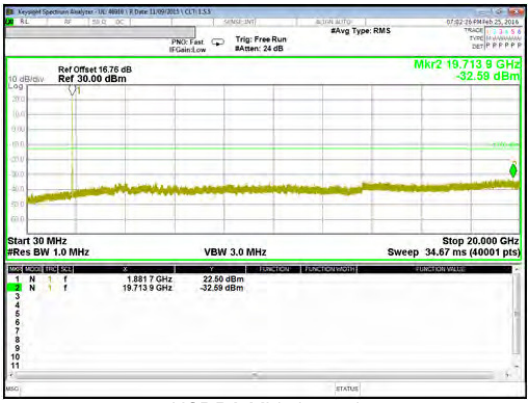
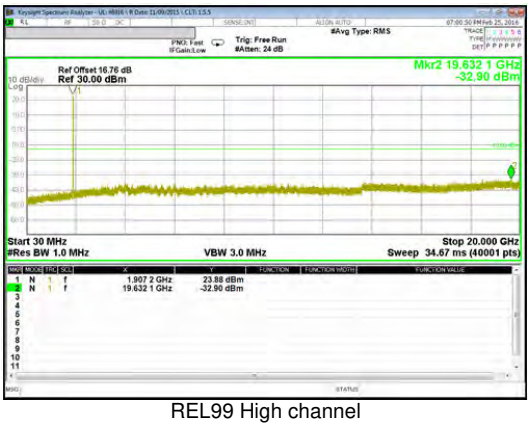
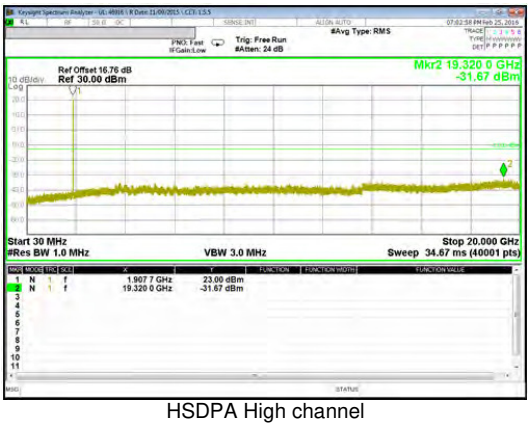
WCDMA Band 2

Band 2	 REL99 Low channel	 HSDPA Low channel
	 REL99 Mid channel	 HSDPA Mid channel
	 REL99 High channel	 HSDPA High channel

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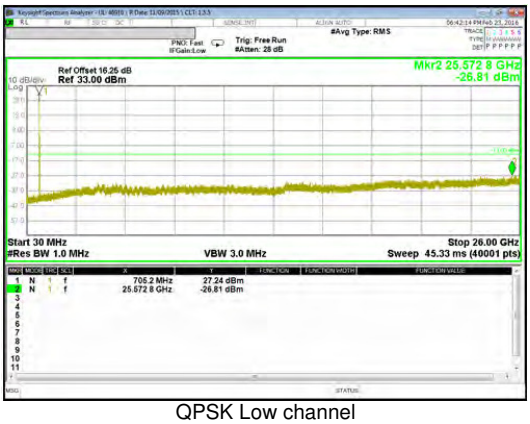
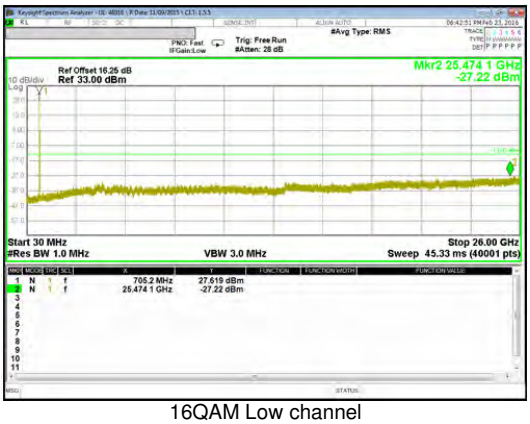
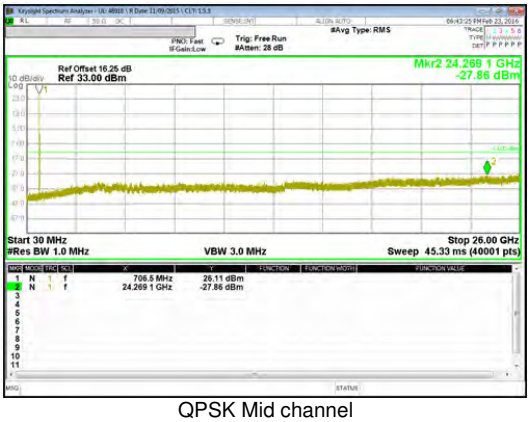
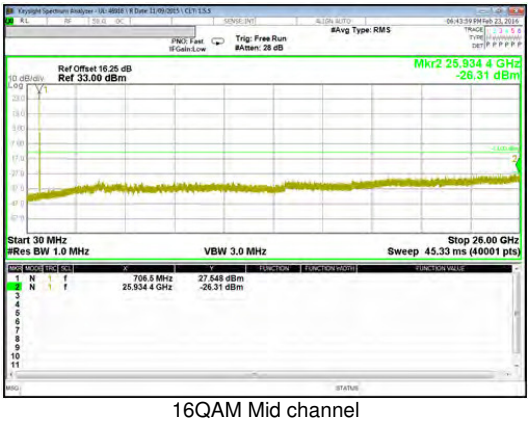
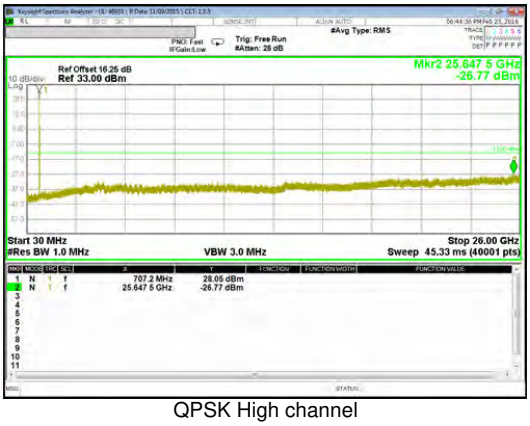
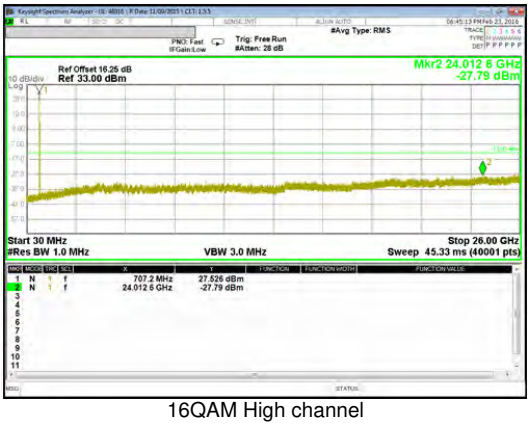
LTE Band 17

Band 17 10MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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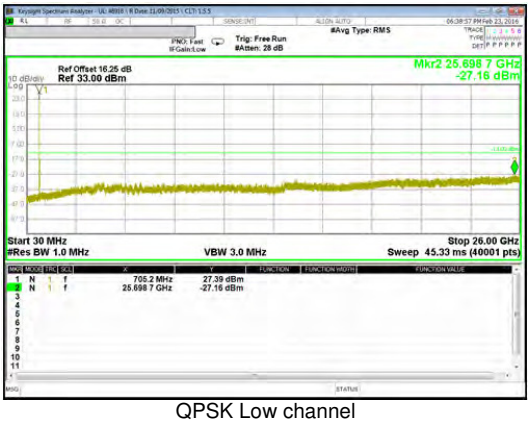
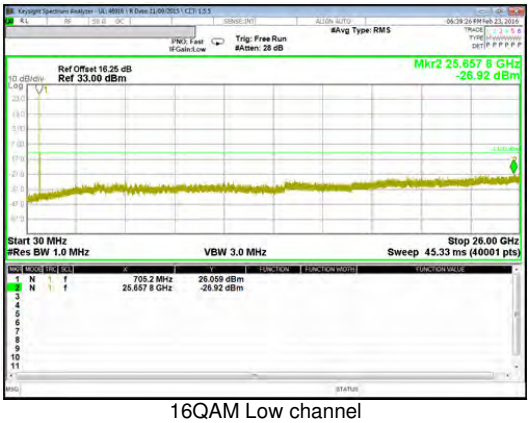
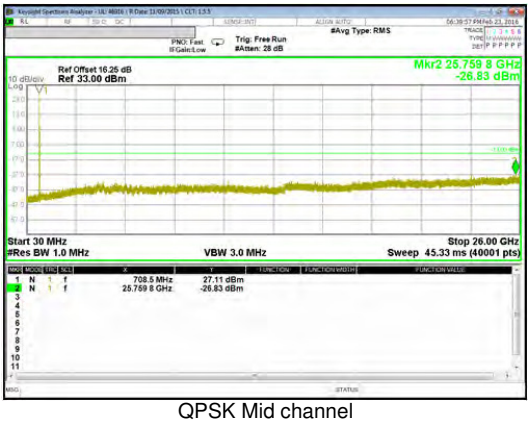
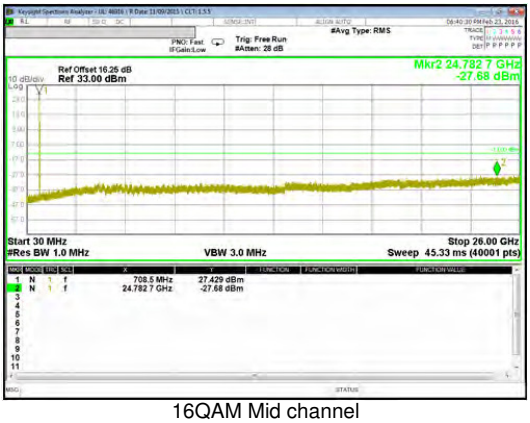
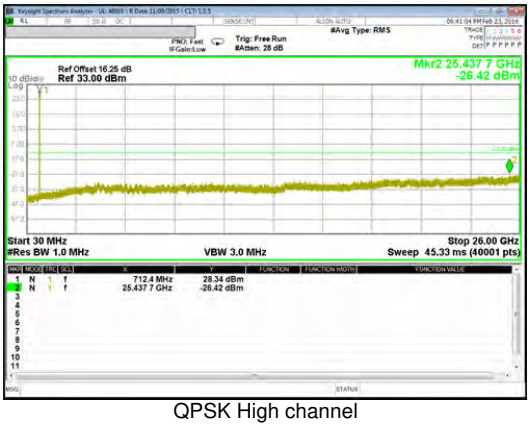
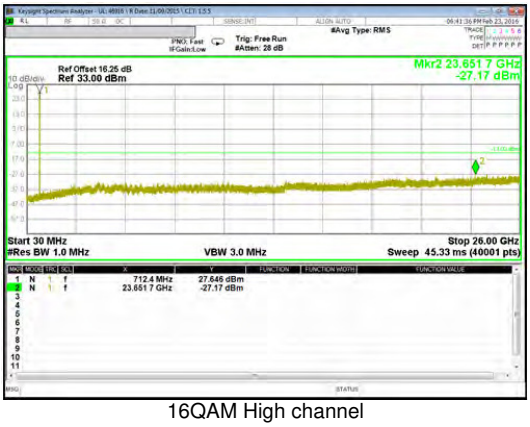
Band 17 5MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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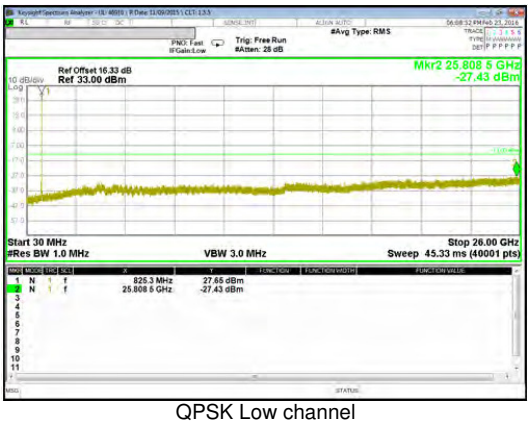
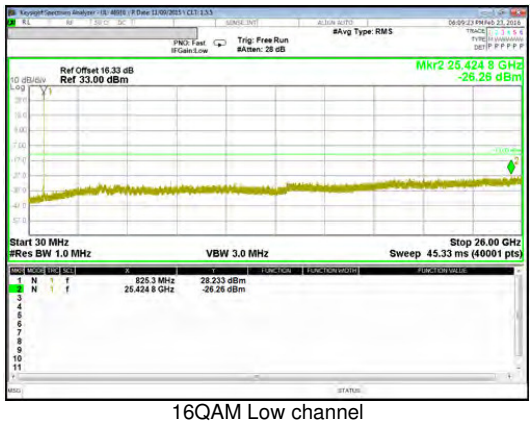
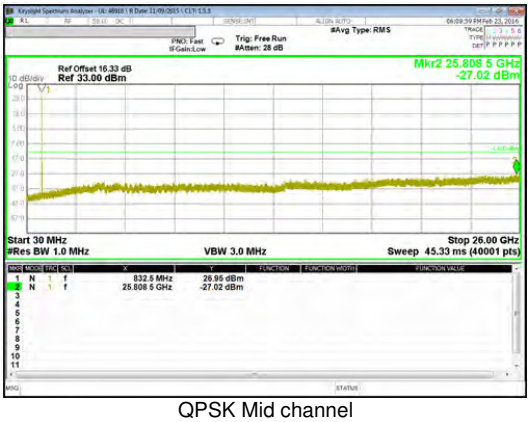
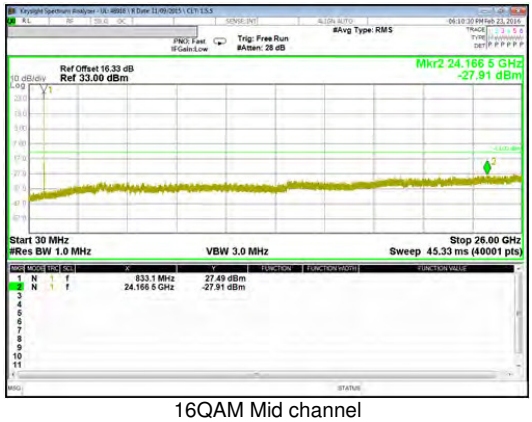
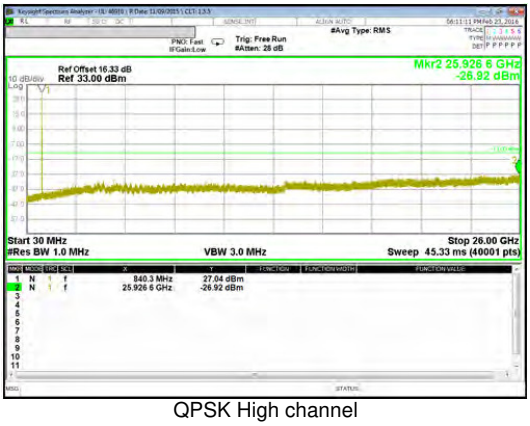
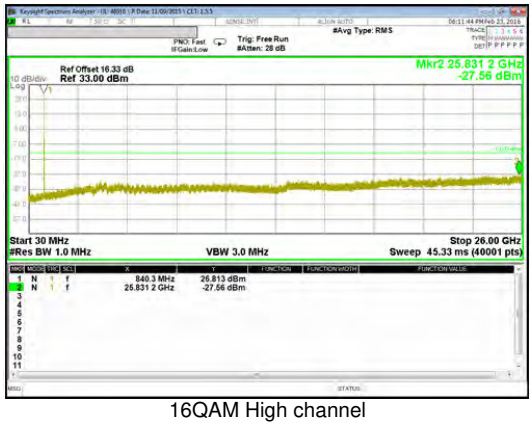
LTE Band 5

Band 5 10MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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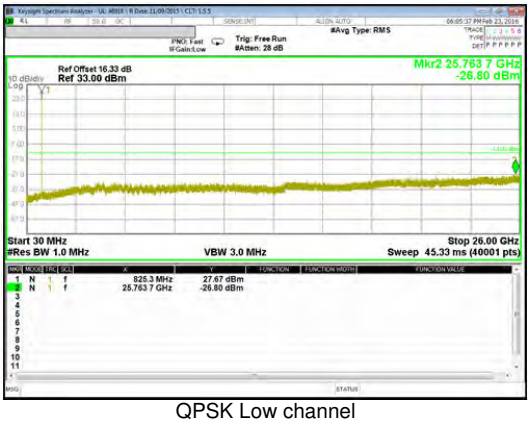
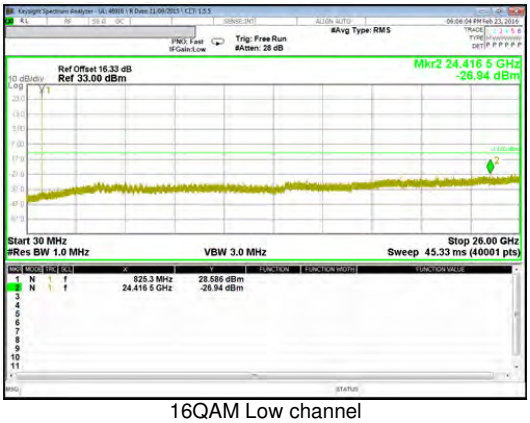
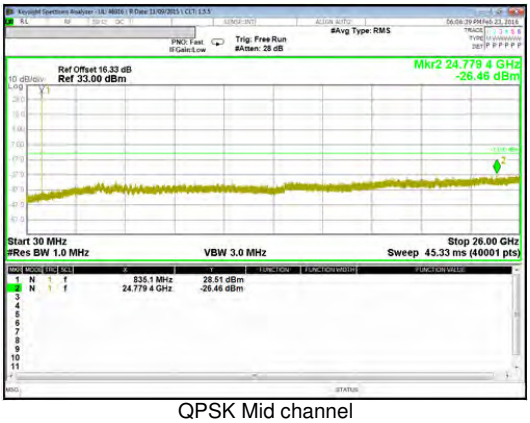
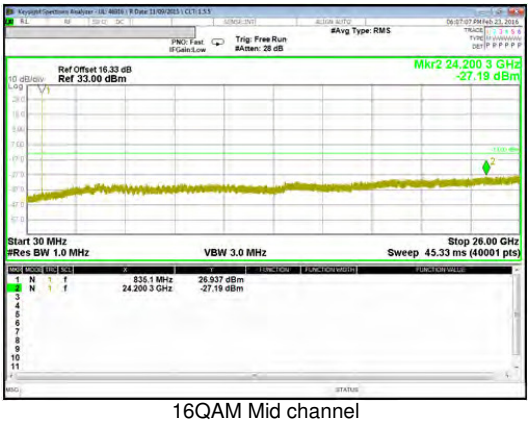
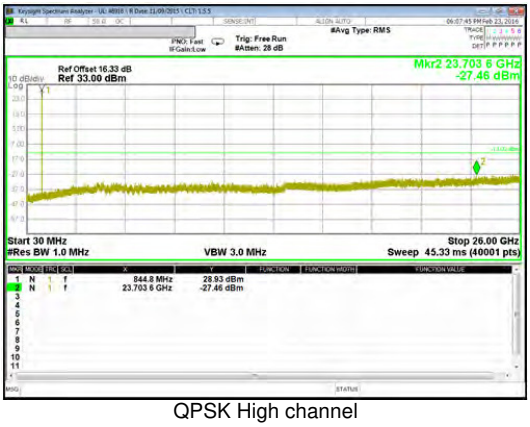
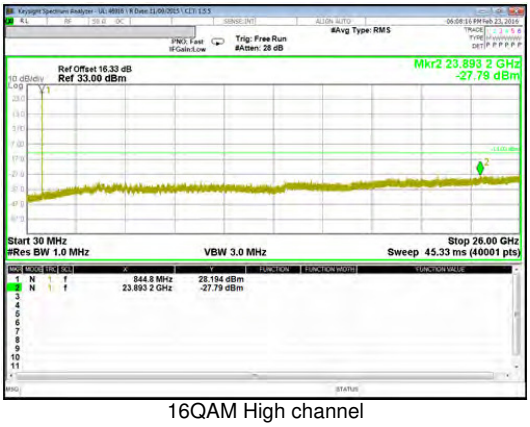
Band 5 5MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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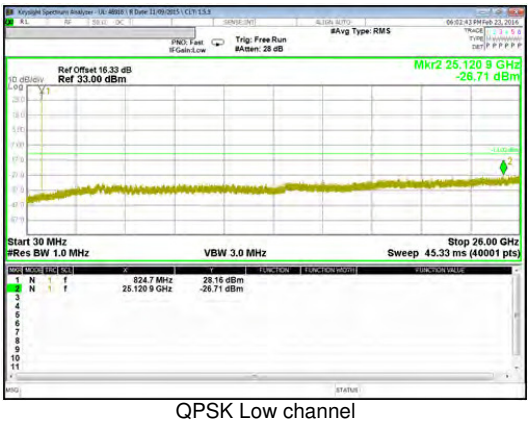
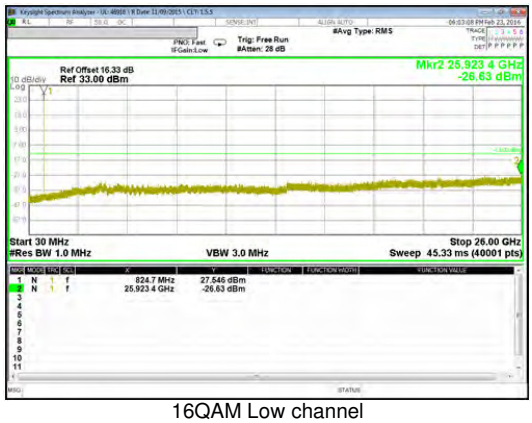
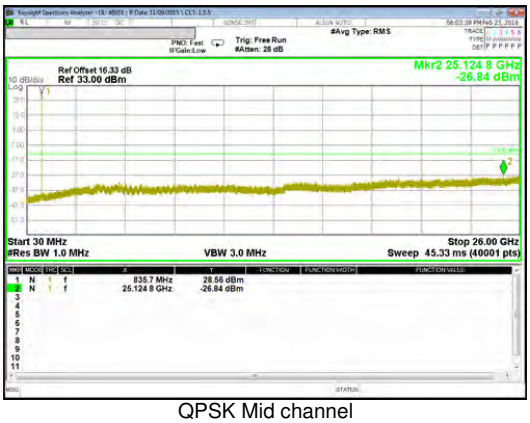
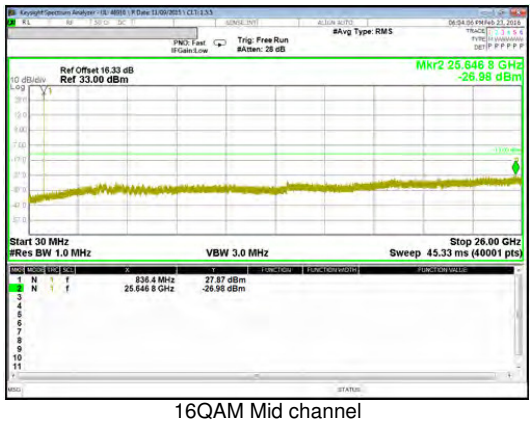
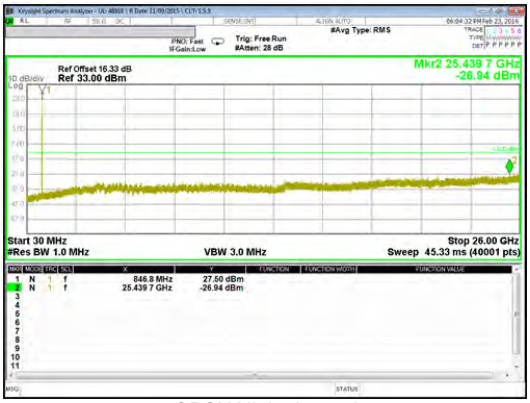
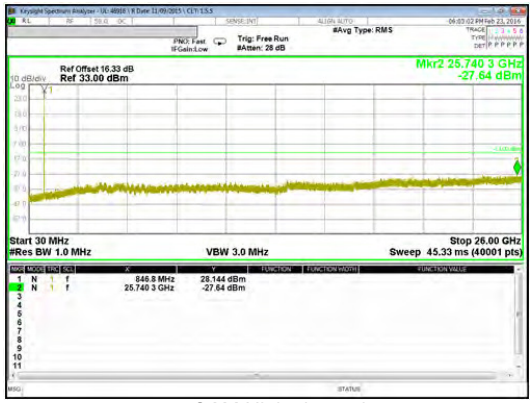
Band 5 3MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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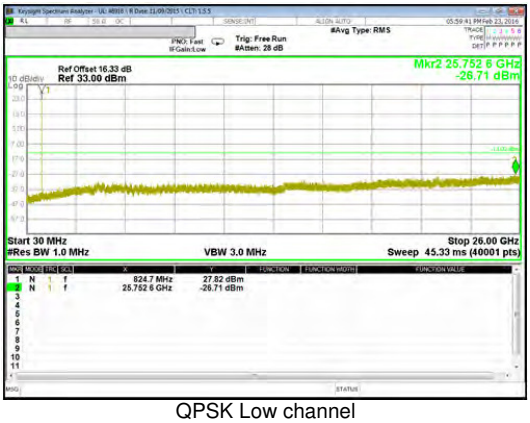
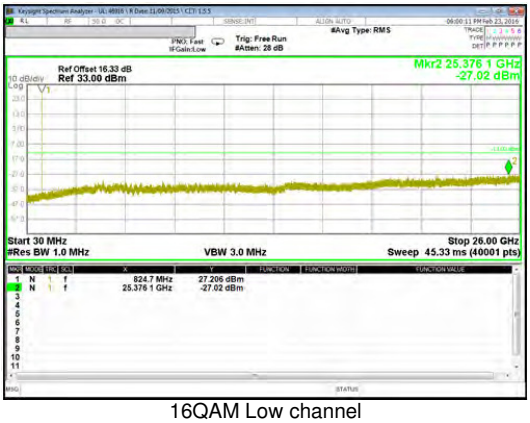
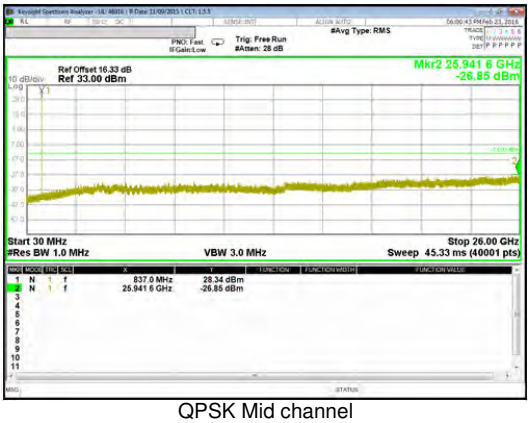
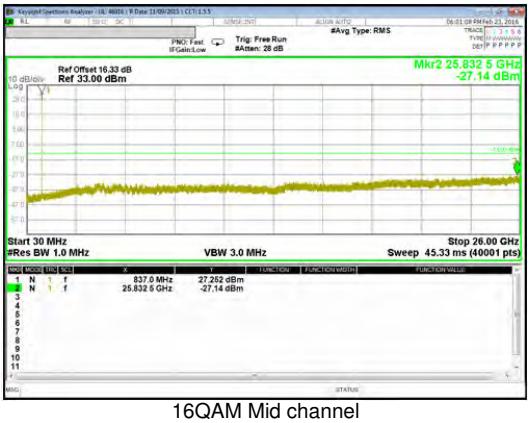
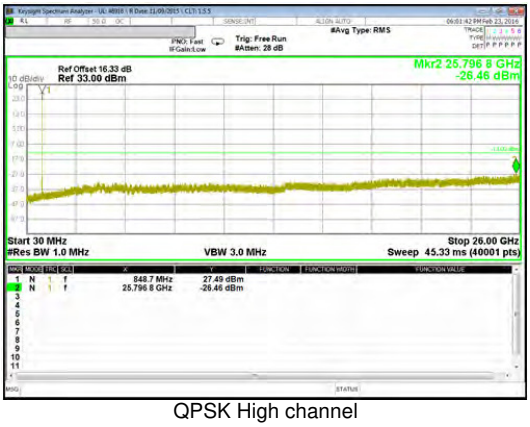
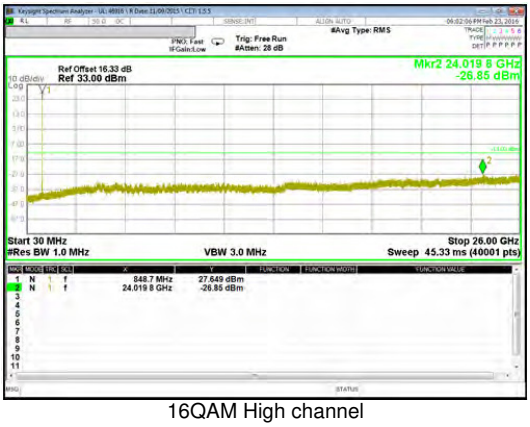
Band 5 1.4MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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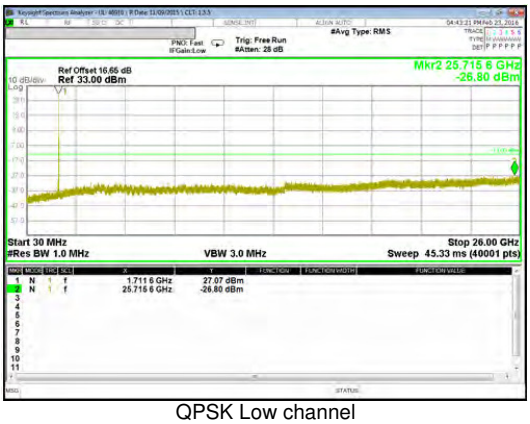
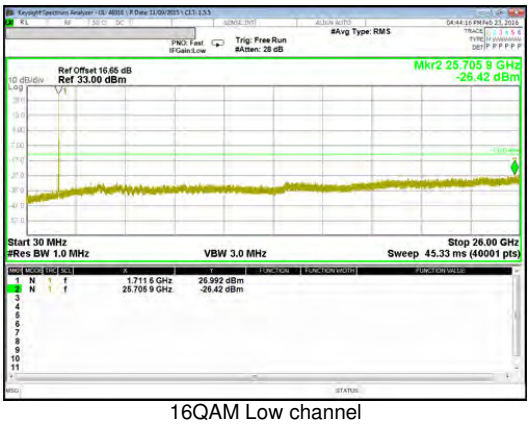
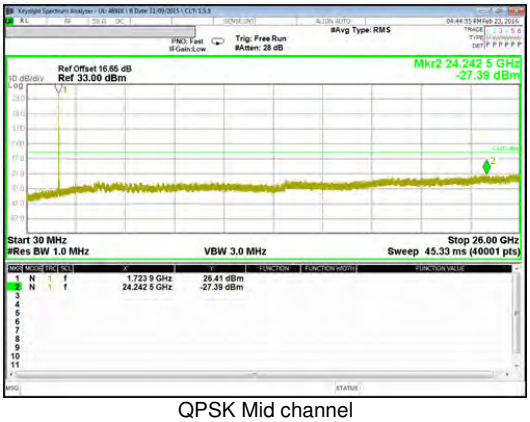
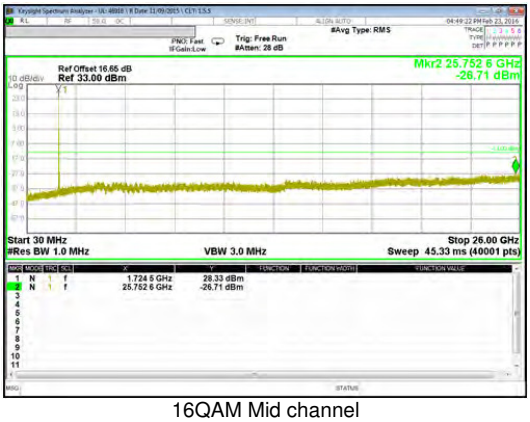
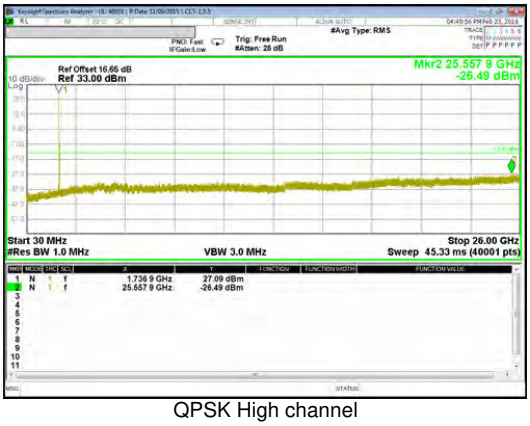
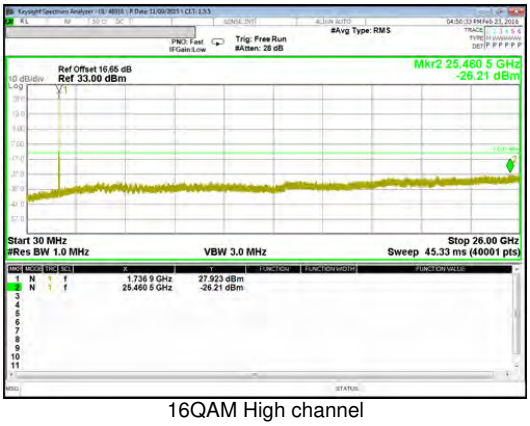
LTE Band 4

Band 4 20MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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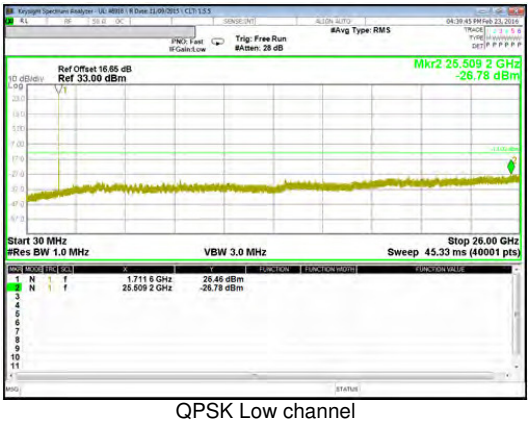
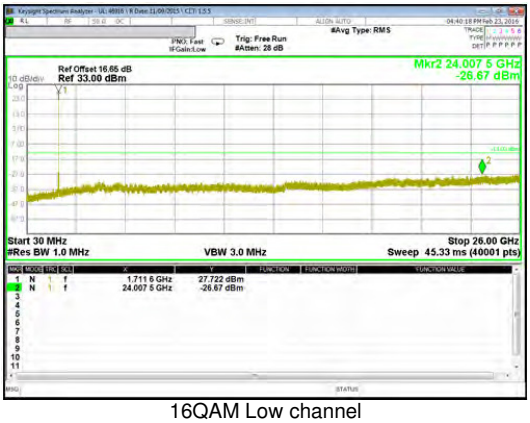
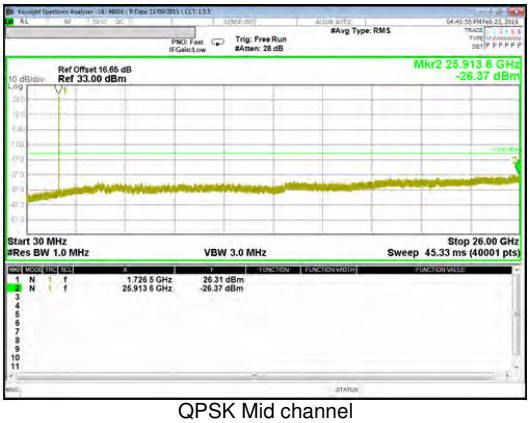
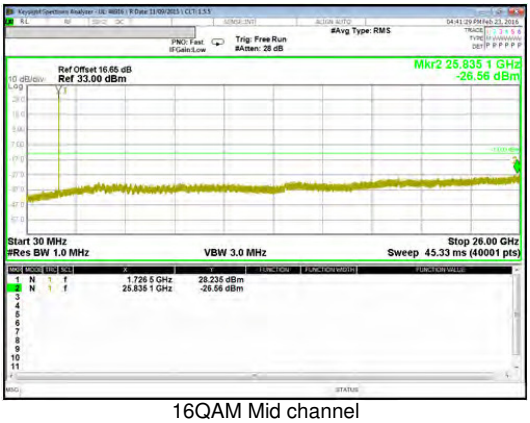
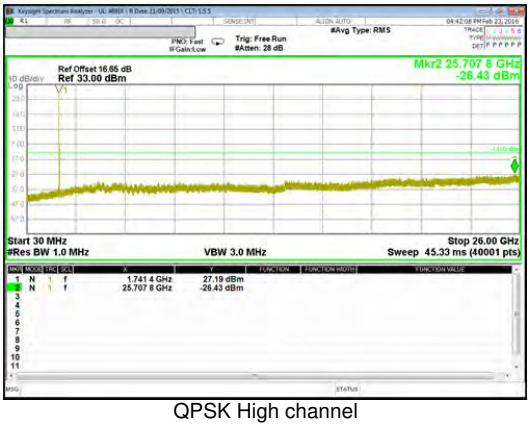
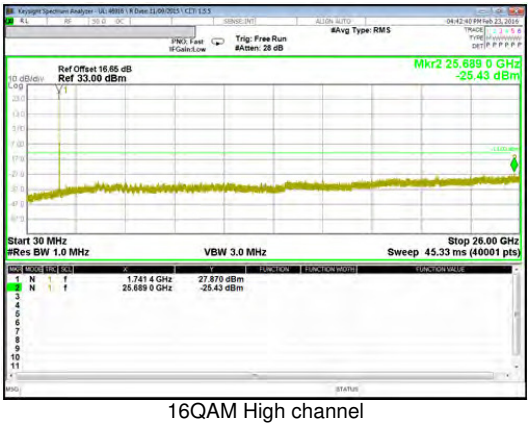
Band 4 15MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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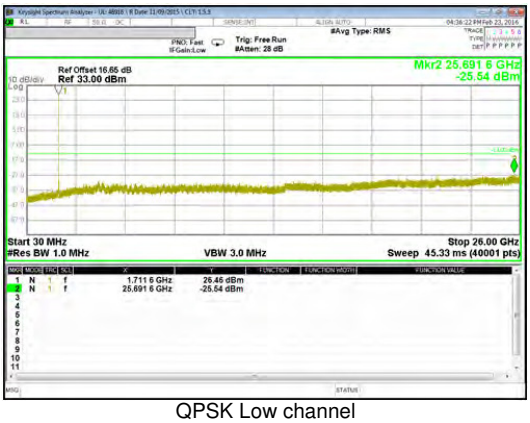
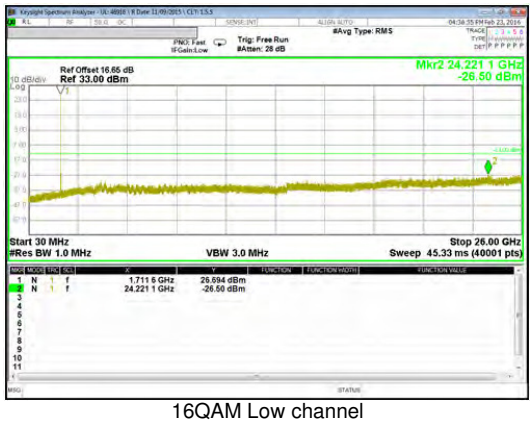
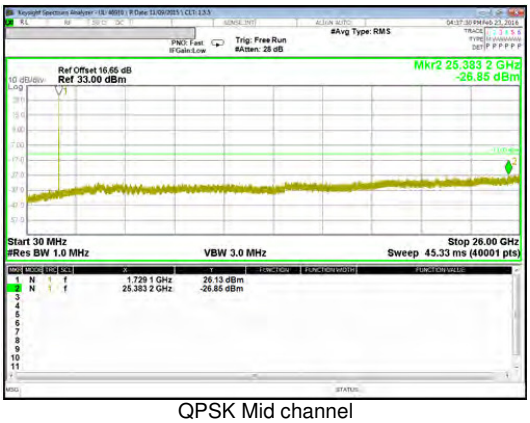
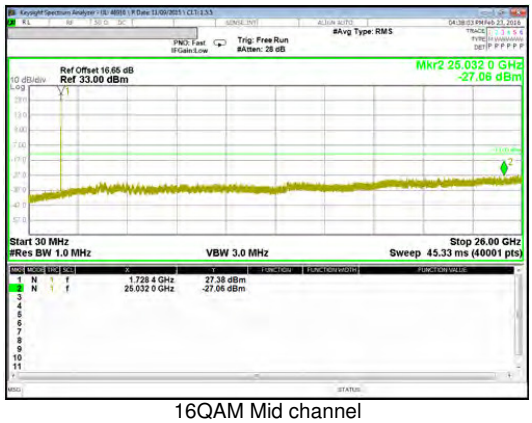
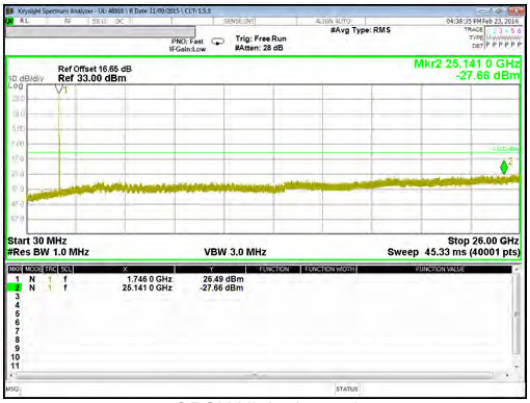
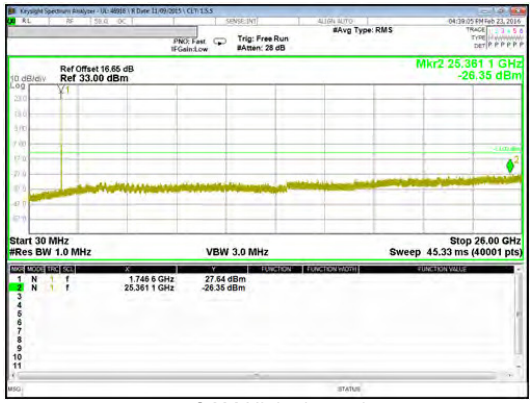
Band 4 10MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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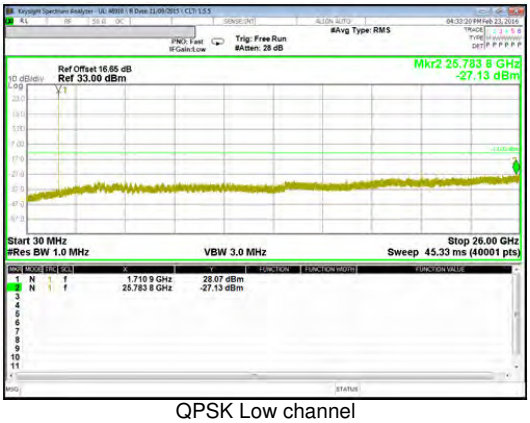
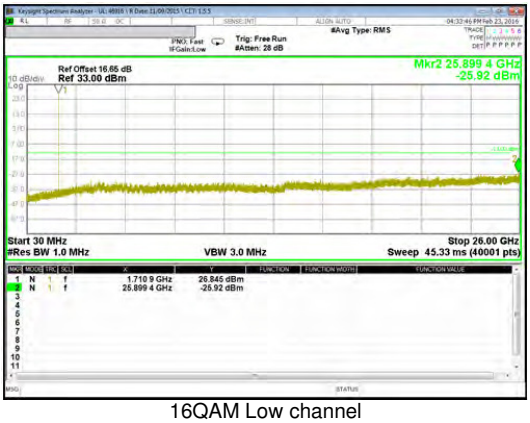
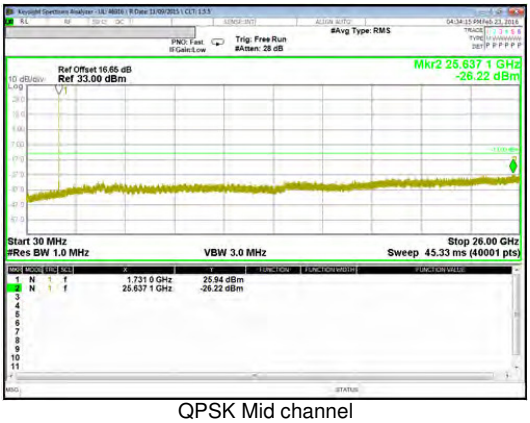
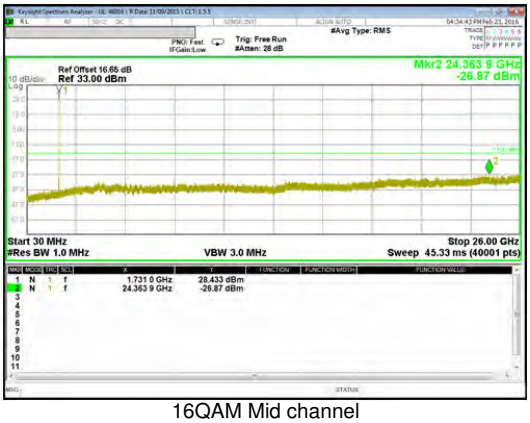
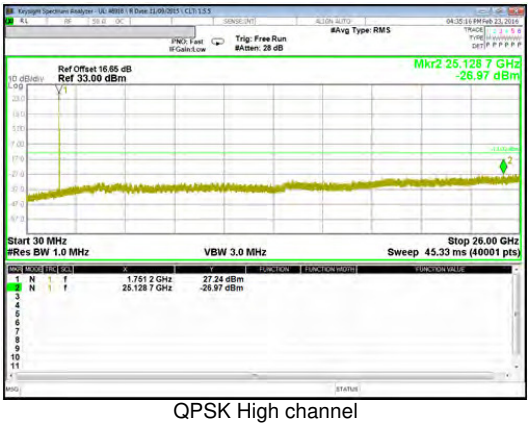
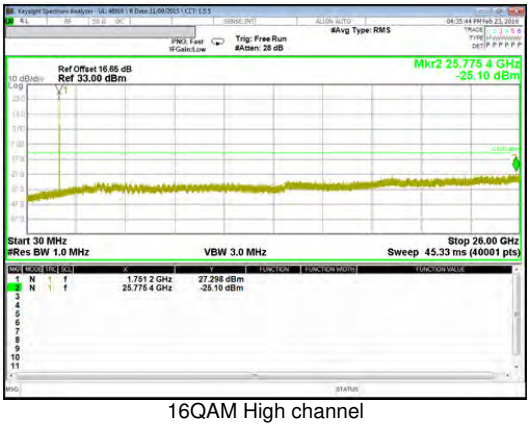
Band 4 5MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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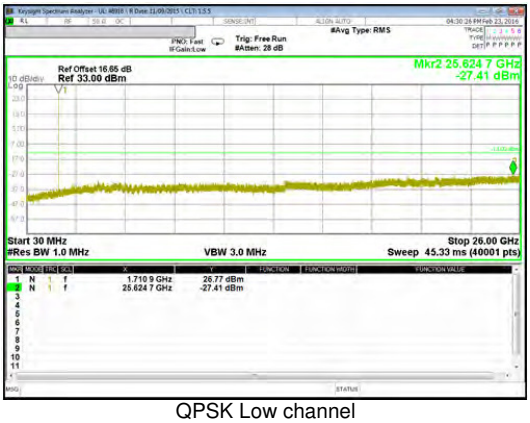
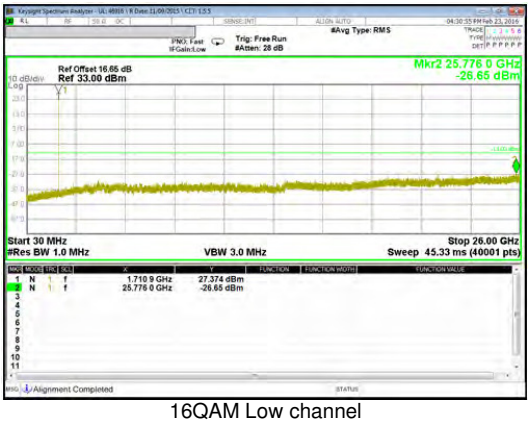
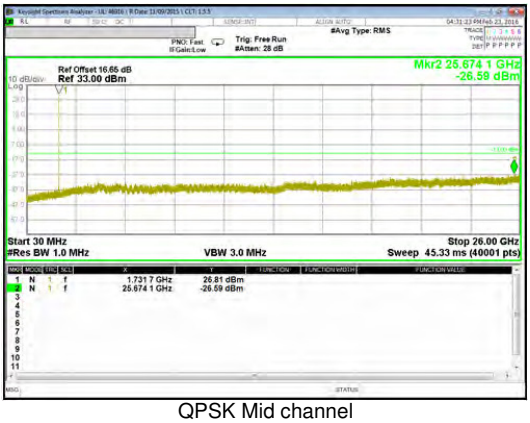
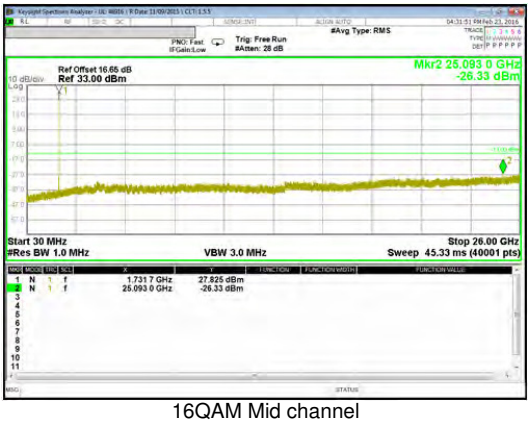
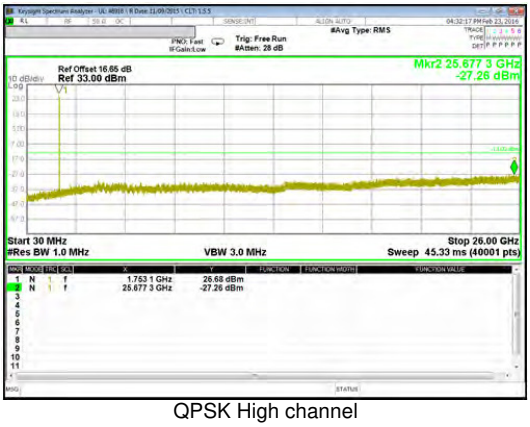
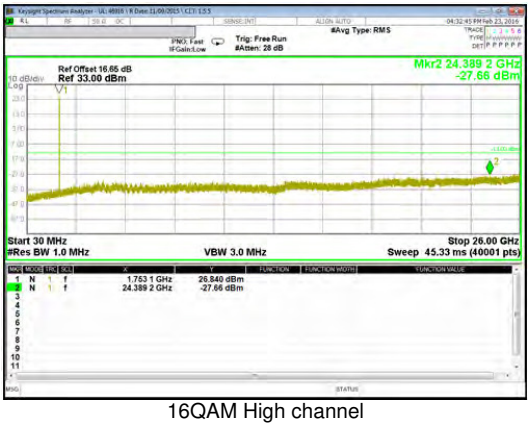
Band 4 3MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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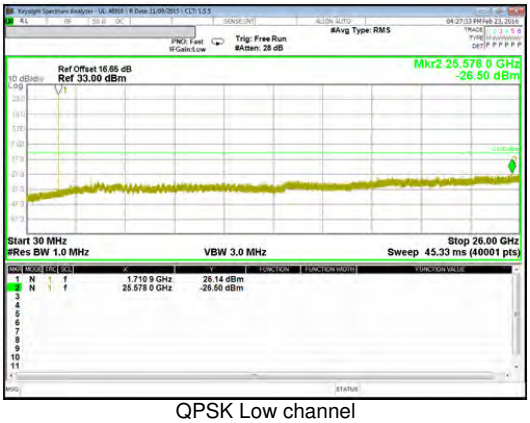
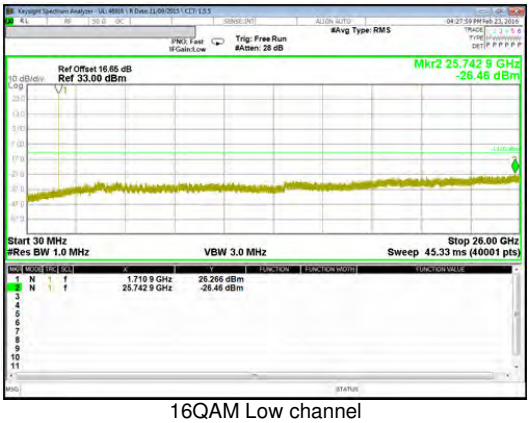
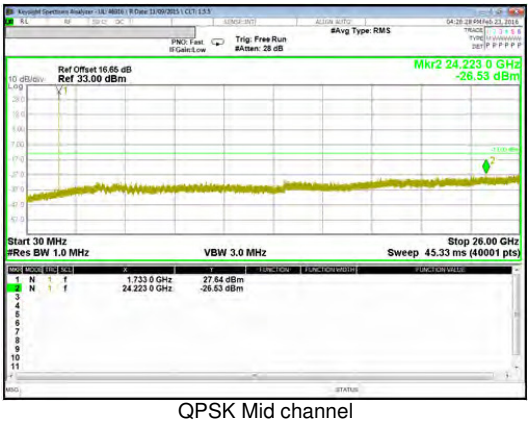
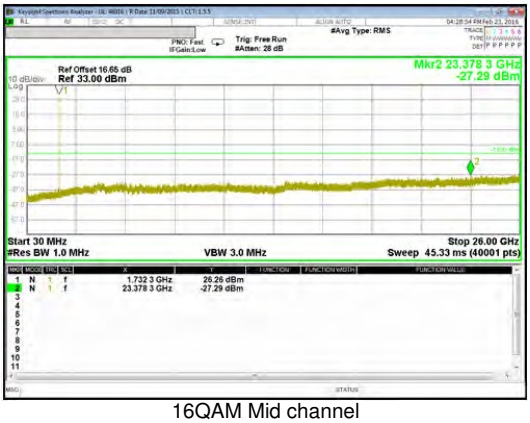
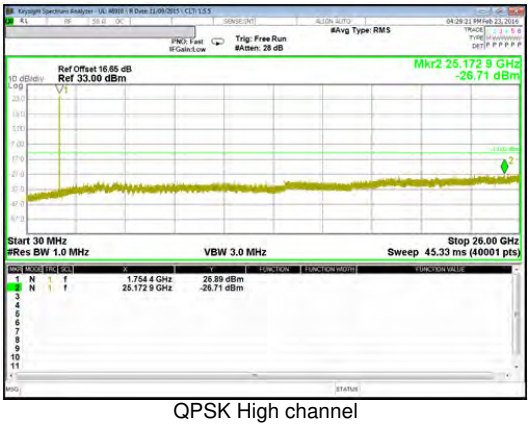
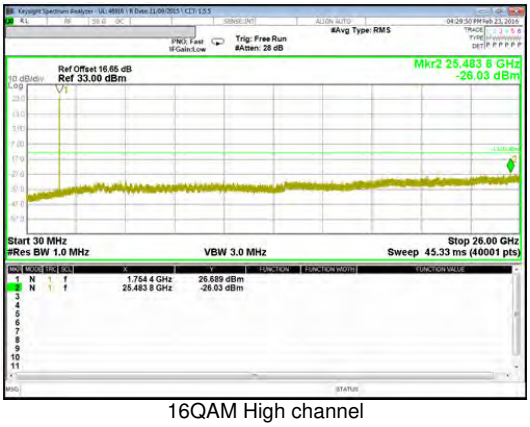
Band 4 1.4MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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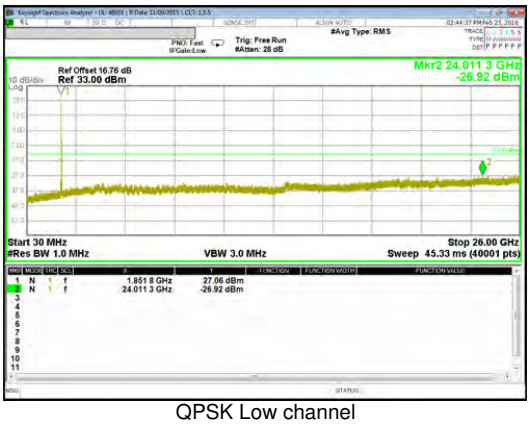
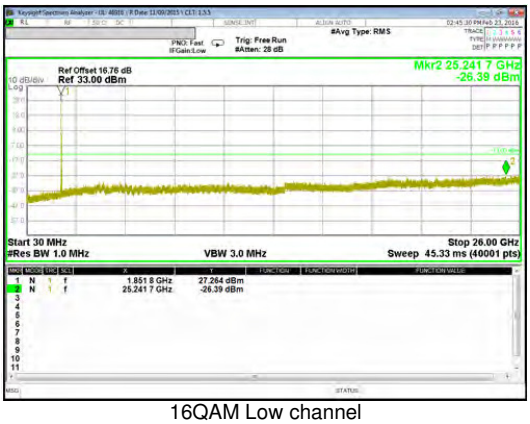
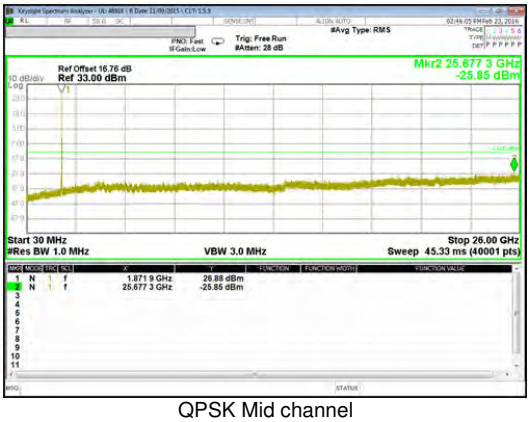
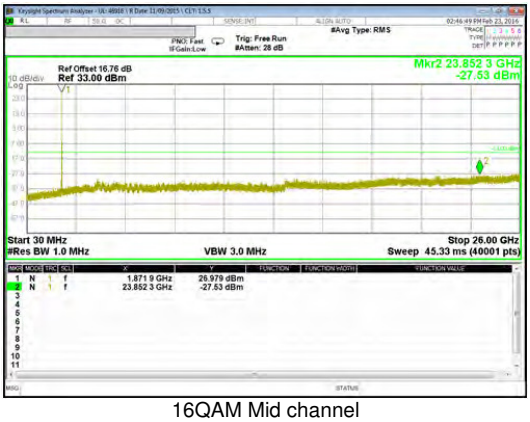
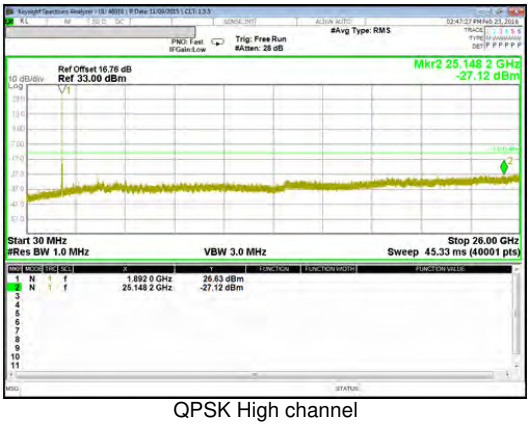
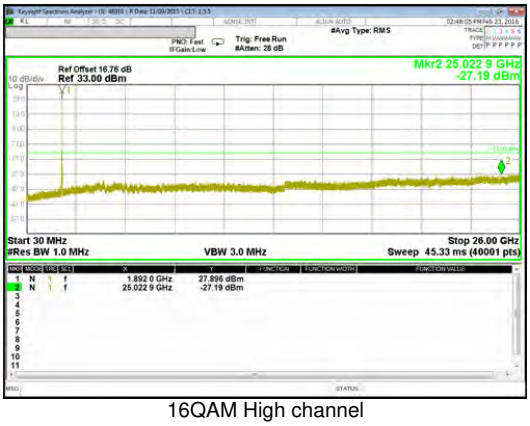
LTE Band 2

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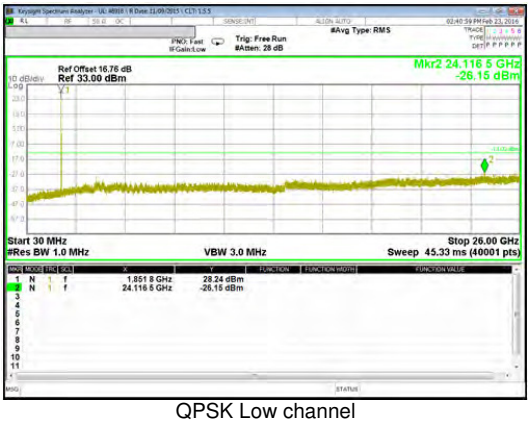
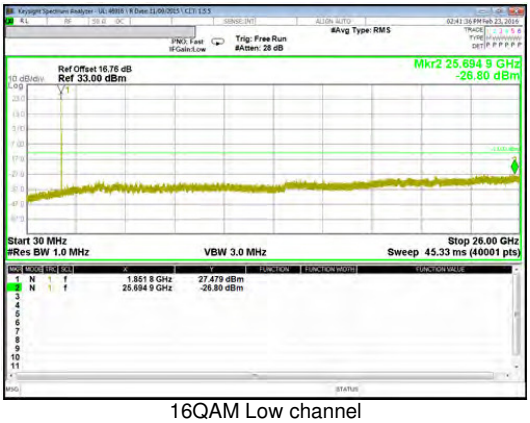
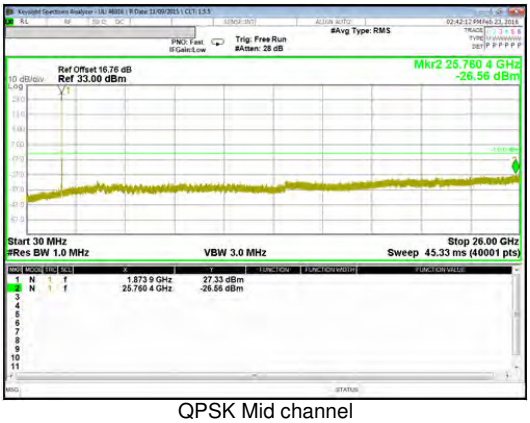
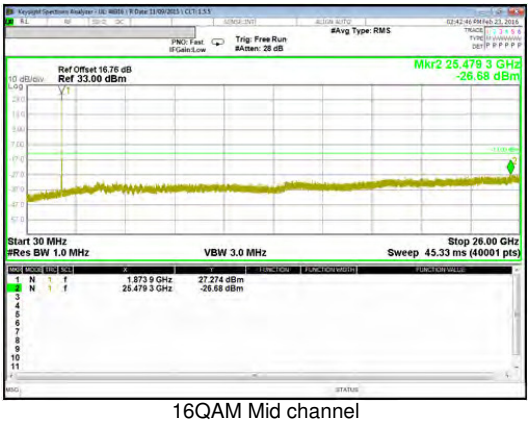
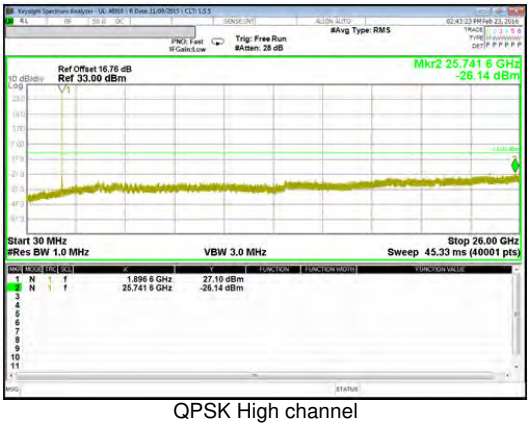
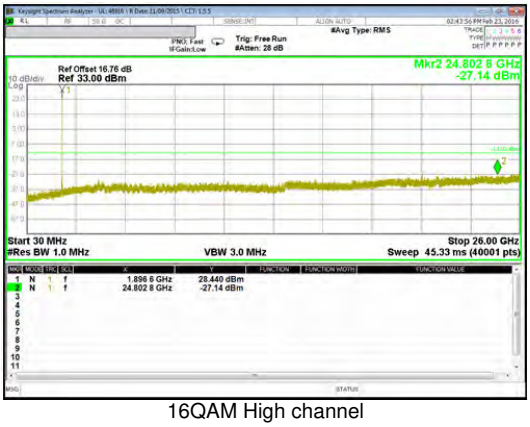
Band 2 15MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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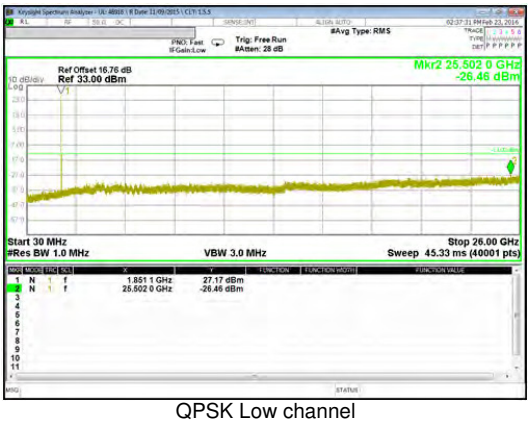
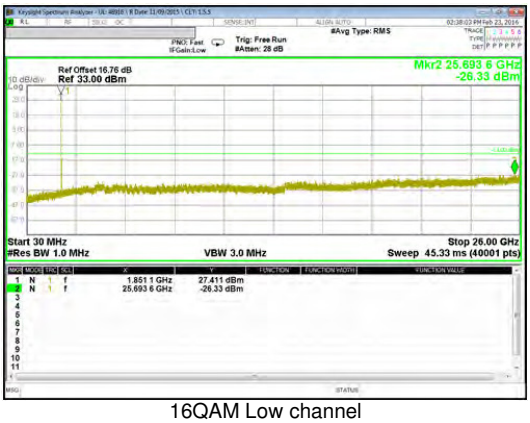
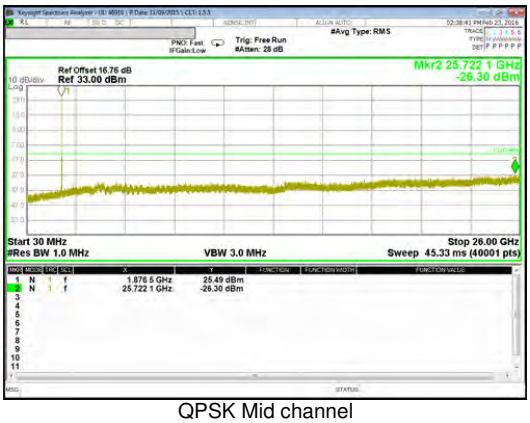
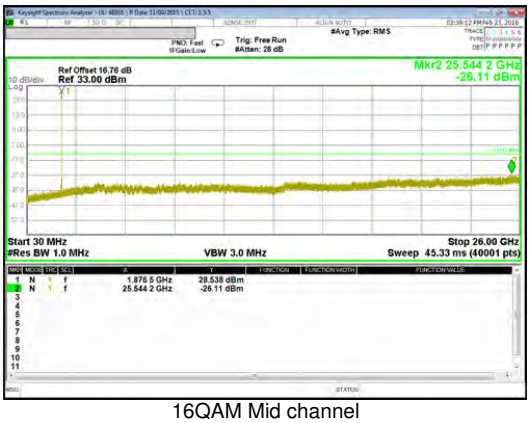
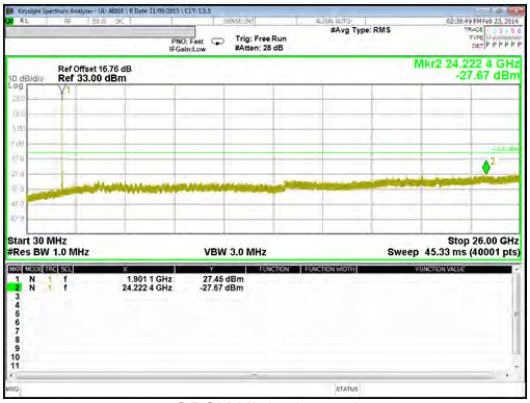
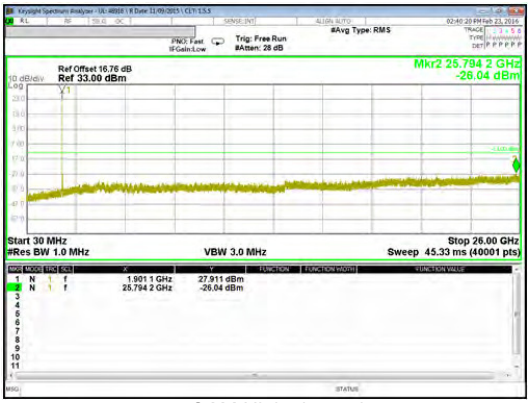
Band 2 10MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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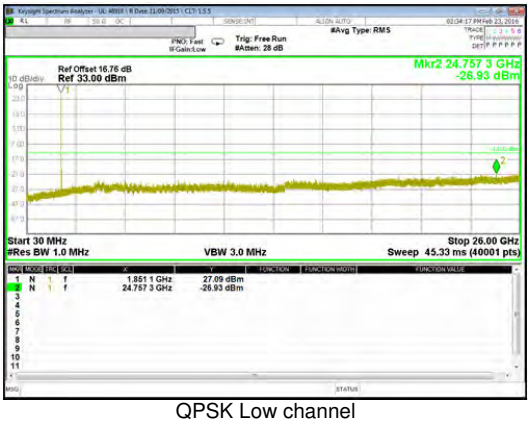
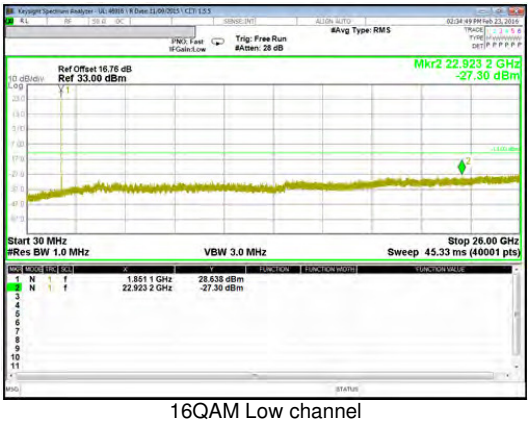
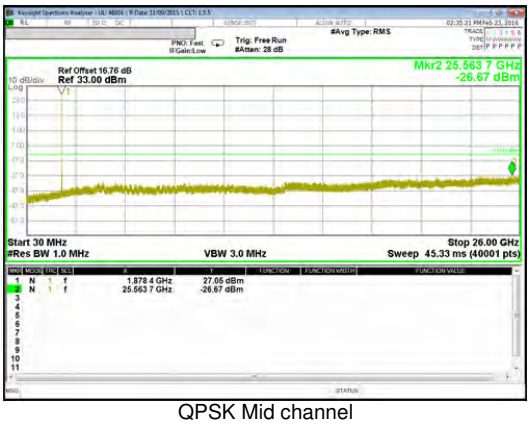
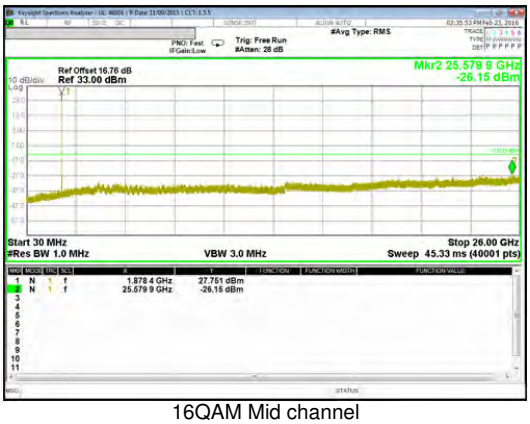
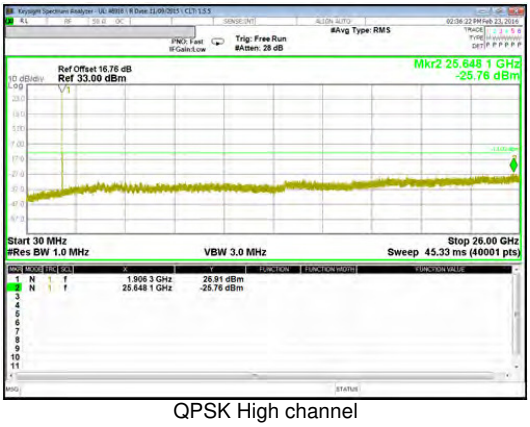
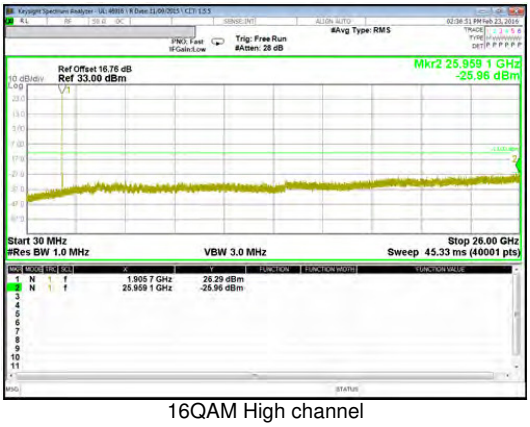
Band 2 5MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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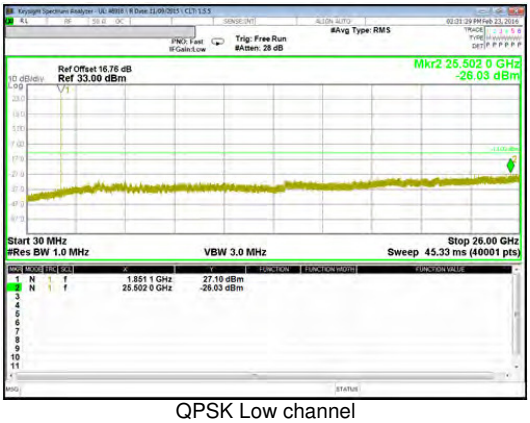
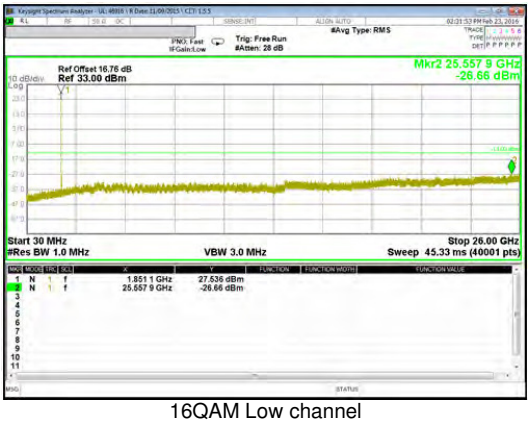
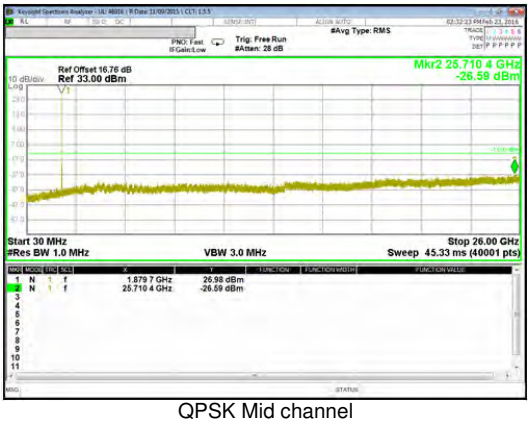
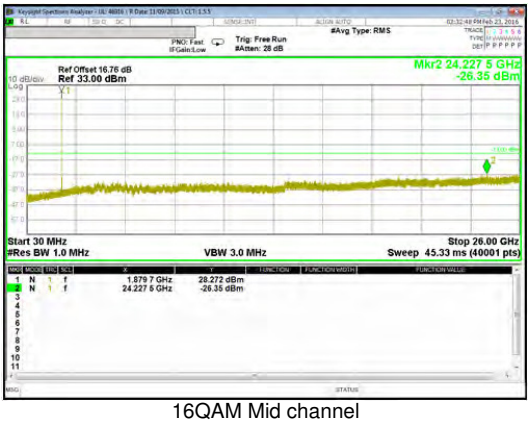
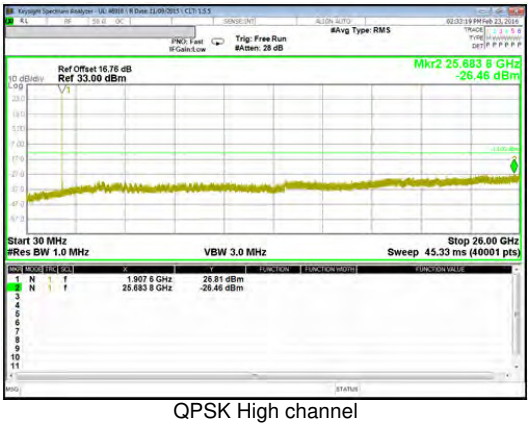
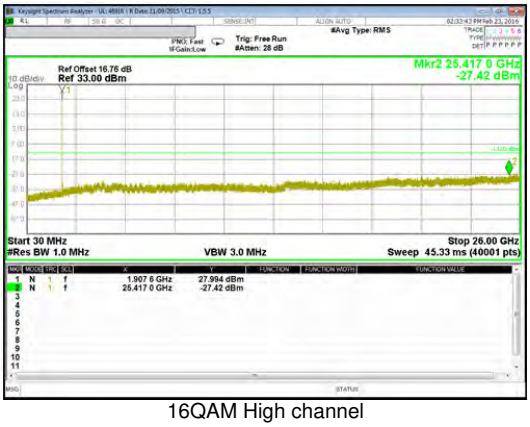
Band 2 3MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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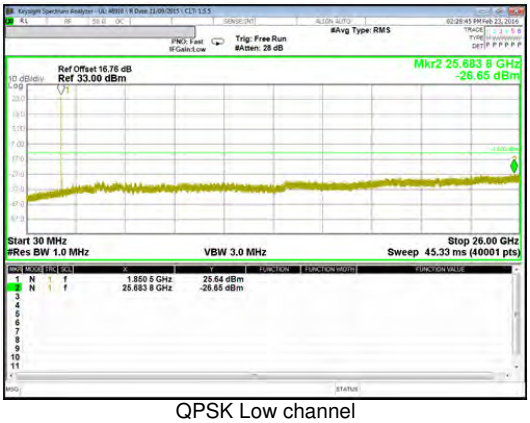
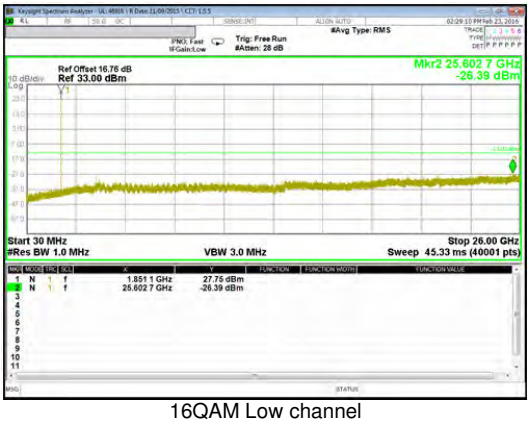
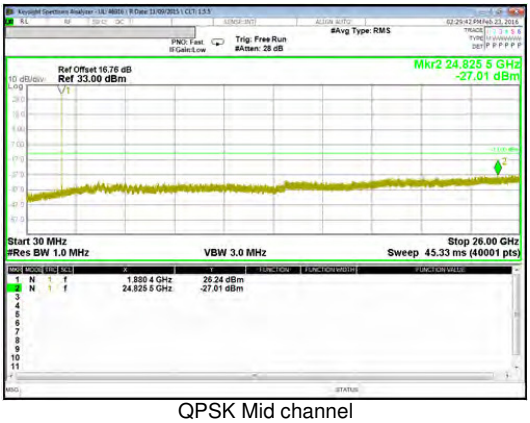
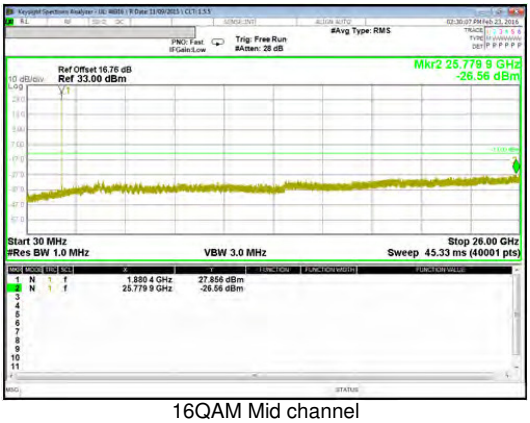
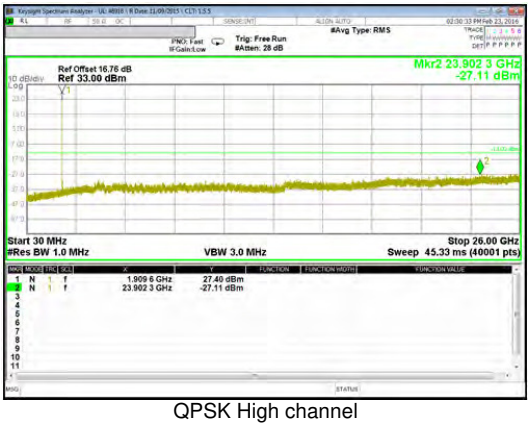
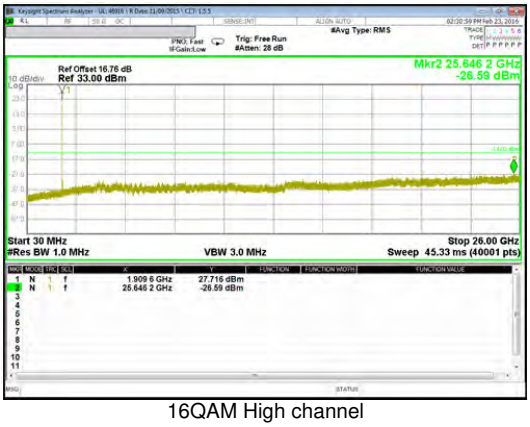
Band 2 1.4MHz	 QPSK Low channel	 16QAM Low channel
	 QPSK Mid channel	 16QAM Mid channel
	 QPSK High channel	 16QAM High channel

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10.4. 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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10.4.1. FREQUENCY STABILITY RESULTS

LTE Band 17, Channel 23790, Frequency 710.0 MHz

Reference Frequency: LTE Band 17 Mid Channel 710.0 MHz @ 20ºC Limit: +- 2.5 ppm = 1775.000 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
[Vdc]	Temperature [*C]	[MHz]	Delta [ppm]	Limit [ppm]
3.85	50	710.00000589	-0.001	2.5
3.85	40	710.00000438	0.001	2.5
3.85	30	710.00000435	0.002	2.5
3.85	***20***	710.00000544	***0***	***2.5***
3.85	10	710.00000305	0.003	2.5
3.85	0	710.00000552	0.000	2.5
3.85	-10	710.00000636	-0.001	2.5
3.85	-20	710.00000273	0.004	2.5
3.85	-30	710.00000441	0.001	2.5

Reference Frequency: LTE Band 17 Mid Channel 710.0 MHz @ 20ºC Limit: +- 2.5 ppm = 1775.000 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
[Vdc]	Temperature [*C]	[MHz]	Delta [ppm]	Limit [ppm]
3.85	***20***	**710.00000544**	***0***	***2.5***
4.40	20	710.00000872	-0.005	2.5
3.60	20	710.00000459	0.001	2.5

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LTE Band 5, Channel 20524, Frequency 836.5 MHz

WCDMA Band 5, Channel 4183, Frequency 836.6 MHz

GSM 850, Channel 190, Frequency 836.6 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	836.50000525	0.001	2.5
3.85	40	836.50000829	-0.002	2.5
3.85	30	836.50000678	0.000	2.5
3.85	***20***	836.50000641	***0***	***2.5***
3.85	10	836.50000707	-0.001	2.5
3.85	0	836.50000588	0.001	2.5
3.85	-10	836.50001222	-0.007	2.5
3.85	-20	836.50000599	0.001	2.5
3.85	-30	836.50000484	0.002	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***	**836.50000641**	***0***	***2.5***
4.40	20	836.50000859	-0.003	2.5
3.60	20	836.50000606	0.000	2.5

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LTE Band 4, Channel 20174, Frequency 1732.5 MHz

WCDMA Band 4, Channel 1413, Frequency 1732.6 MHz

Reference Frequency: LTE Band 4 Mid Channel 1732.5 MHz @ 20ºC Limit: +- 2.5 ppm = 4331.250 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
[Vdc]	Temperature [*C]	[MHz]	Delta [ppm]	Limit [ppm]
3.85	50	1732.49998870	0.002	2.5
3.85	40	1732.49999154	0.000	2.5
3.85	30	1732.49999021	0.001	2.5
3.85	***20***	1732.49999190	***0***	***2.5***
3.85	10	1732.49999003	0.001	2.5
3.85	0	1732.49999476	-0.002	2.5
3.85	-10	1732.49999508	-0.002	2.5
3.85	-20	1732.49999260	0.000	2.5
3.85	-30	1732.49999083	0.001	2.5

Reference Frequency: LTE Band 4 Mid Channel 1732.5 MHz @ 20ºC Limit: +- 2.5 ppm = 4331.250 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
[Vdc]	Temperature [*C]	[MHz]	Delta [ppm]	Limit [ppm]
3.85	***20***	**1732.49999190**	***0***	***2.5***
4.40	20	1732.49999286	-0.001	2.5
3.60	20	1732.49998907	0.002	2.5

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LTE Band 2, Channel 18900, Frequency 1880.0 MHz

WCDMA Band 2, Channel 9400, Frequency 1880.0 MHz

GSM 1900, Channel 661, Frequency 1880.0 MHz

Reference Frequency: LTE 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	1880.00001875	-0.004	2.5
3.85	40	1880.00001763	-0.004	2.5
3.85	30	1880.00001456	-0.002	2.5
3.85	***20***	1880.00001034	***0***	***2.5***
3.85	10	1880.00000851	0.001	2.5
3.85	0	1880.00000921	0.001	2.5
3.85	-10	1880.00000850	0.001	2.5
3.85	-20	1880.00001233	-0.001	2.5
3.85	-30	1880.00001358	-0.002	2.5

Reference Frequency: LTE 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***	**1880.00001034**	***0***	***2.5***
4.40	20	1880.00001232	-0.001	2.5
3.60	20	1880.00000859	0.001	2.5

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11. RADIATED TEST RESULTS

11.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

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

LIMITS

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

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

27.50(c) - (10) Portable stations (hand-held devices) are limited to 3 watts ERP; (LTE B17)

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 603D Clause 2.2.17; MXA setting reference to 971168 D01 v02r02

For peak power measurement with a MXA:

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 MXA:

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

TEST RESULTS

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11.1.1. ERP/EIRP Results

GSM

Band	Mode	Channel	f [MHz]	ERP / EIRP	
				[dBm]	[mW]
GSM850	GPRS	512	824.2	28.63	729.46
		661	836.6	27.35	543.25
		810	848.8	26.94	494.31
	EGPRS	512	824.2	23.42	219.79
		661	836.6	22.10	162.18
		810	848.8	20.88	122.46
GSM1900	GPRS	512	1850.2	29.53	897.43
		661	1880.0	29.61	914.11
		810	1909.8	30.00	1000.00
	EGPRS	512	1850.2	26.05	402.72
		661	1880.0	26.35	431.52
		810	1909.8	26.59	456.04

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WCDMA

Band	Mode	Channel	f [MHz]	ERP / EIRP	
				[dBm]	[mW]
Band 5	REL99	4132	826.4	16.15	41.21
		4183	836.6	16.15	41.21
		4233	846.6	17.05	50.70
	HSDPA	4132	826.4	17.36	54.45
		4183	836.6	15.41	34.75
		4233	846.6	15.86	38.55
Band 4	REL99	1312	1712.4	21.71	148.25
		1413	1732.6	22.41	174.18
		1513	1752.6	22.45	175.79
	HSDPA	1312	1712.4	22.23	167.11
		1413	1732.6	20.08	101.86
		1513	1752.6	22.99	199.07
Band 2	REL99	9262	1852.4	21.97	157.40
		9400	1880.0	22.23	167.11
		9538	1907.6	23.26	211.84
	HSDPA	9262	1852.4	18.86	76.91
		9400	1880.0	20.56	113.76
		9538	1907.6	21.67	146.89

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LTE Band 17

Band	BW [MHz]	Mode	RB/RB Size	f [MHz]	ERP / EIRP	
			Full RB		[dBm]	[mW]
Band 17	10	QPSK	50/0	709.0	11.10	12.88
			50/0	710.0	10.81	12.05
			50/0	711.0	11.22	13.24
		16QAM	50/0	709.0	10.64	11.59
			50/0	710.0	10.43	11.04
			50/0	711.0	10.74	11.86
	5	QPSK	25/0	706.5	11.08	12.82
			25/0	710.0	10.96	12.47
			25/0	713.5	10.64	11.59
		16QAM	25/0	706.5	10.56	11.38
			25/0	710.0	10.70	11.75
			25/0	713.5	10.20	10.47

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	14.21	26.36
			50/0	836.5	11.69	14.76
			50/0	844.0	14.49	28.12
		16QAM	50/0	829.0	13.88	24.43
			50/0	836.5	13.38	21.78
			50/0	844.0	14.24	26.55
	5	QPSK	25/0	826.5	14.66	29.24
			25/0	836.5	13.89	24.49
			25/0	846.5	14.18	26.18
		16QAM	25/0	826.5	14.25	26.61
			25/0	836.5	13.41	21.93
			25/0	846.5	14.33	27.10
	3	QPSK	15/0	825.5	14.53	28.38
			15/0	836.5	14.03	25.29
			15/0	847.5	14.59	28.77
		16QAM	15/0	825.5	14.16	26.06
			15/0	836.5	13.62	23.01
			15/0	847.5	14.82	30.34
	1.4	QPSK	6/0	824.7	12.62	18.28
			6/0	836.5	11.83	15.24
			6/0	848.3	11.78	15.07
		16QAM	6/0	824.7	12.30	16.98
			6/0	836.5	11.33	13.58
			6/0	848.3	11.69	14.76

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LTE Band 4

Band	BW [MHz]	Mode	RB/RB Size	f [MHz]	ERP / EIRP	
			Full RB		[dBm]	[mW]
Band 4	20	QPSK	100/0	1720.0	19.87	97.05
			100/0	1732.5	19.39	86.90
			100/0	1745.0	19.28	84.72
		16QAM	100/0	1720.0	19.50	89.13
			100/0	1732.5	19.09	81.10
			100/0	1745.0	18.85	76.74
	15	QPSK	75/0	1717.5	19.76	94.62
			75/0	1732.5	19.45	88.10
			75/0	1747.5	19.08	80.91
		16QAM	75/0	1717.5	19.49	88.92
			75/0	1732.5	19.12	81.66
			75/0	1747.5	18.80	75.86
	10	QPSK	50/0	1715.0	19.95	98.86
			50/0	1732.5	19.51	89.33
			50/0	1750.0	19.07	80.72
		16QAM	50/0	1715.0	19.63	91.83
			50/0	1732.5	19.16	82.41
			50/0	1750.0	18.73	74.64
	5	QPSK	25/0	1712.5	20.07	101.62
			25/0	1732.5	19.62	91.62
			25/0	1752.5	18.94	78.34
		16QAM	25/0	1712.5	19.73	93.97
			25/0	1732.5	19.27	84.53
			25/0	1752.5	18.66	73.45
	3	QPSK	15/0	1711.5	20.16	103.75
			15/0	1732.5	19.71	93.54
			15/0	1753.5	19.03	79.98
		16QAM	15/0	1711.5	19.80	95.50
			15/0	1732.5	19.51	89.33
			15/0	1753.5	18.77	75.34
	1.4	QPSK	6/0	1710.7	17.73	59.29
			6/0	1732.5	17.42	55.21
			6/0	1754.3	16.48	44.46
		16QAM	6/0	1710.7	17.38	54.70
			6/0	1732.5	16.95	49.55
			6/0	1754.3	16.25	42.17

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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	19.43	87.70
			100/0	1880.0	19.12	81.66
			100/0	1900.0	19.90	97.72
		16QAM	100/0	1860.0	19.53	89.74
			100/0	1880.0	19.15	82.22
			100/0	1900.0	19.90	97.72
	15	QPSK	75/0	1857.5	19.68	92.90
			75/0	1880.0	19.73	93.97
			75/0	1902.5	20.84	121.34
		16QAM	75/0	1857.5	19.79	95.28
			75/0	1880.0	19.74	94.19
			75/0	1902.5	20.91	123.31
	10	QPSK	50/0	1955.0	20.33	107.89
			50/0	1880.0	19.48	88.72
			50/0	1905.0	20.30	107.15
		16QAM	50/0	1955.0	20.29	106.91
			50/0	1880.0	19.54	89.95
			50/0	1905.0	20.42	110.15
	5	QPSK	25/0	1852.5	20.01	100.23
			25/0	1880.0	20.08	101.86
			25/0	1907.5	20.85	121.62
		16QAM	25/0	1852.5	20.04	100.93
			25/0	1880.0	20.03	100.69
			25/0	1907.5	20.95	124.45
	3	QPSK	15/0	1815.5	20.02	100.46
			15/0	1880.0	19.32	85.51
			15/0	1908.5	20.31	107.40
		16QAM	15/0	1815.5	20.06	101.39
			15/0	1880.0	19.44	87.90
			15/0	1908.5	20.59	114.55
	1.4	QPSK	6/0	1850.7	19.59	90.99
			6/0	1880.0	20.07	101.62
			6/0	1909.3	21.62	145.21
		16QAM	6/0	1850.7	19.49	88.92
			6/0	1880.0	19.96	99.08
			6/0	1909.3	21.69	147.57

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11.1.2. ERP/EIRP DATA

GSM 850

GSM

GSM850
GPRS

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

Company: Samsung
Project #: 16K22923
Date: 02-25-16
Test Engineer: Steven Kim
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	31.25	V	1.1	-1.6	28.63	38.5	-9.8	
824.20	20.46	H	1.1	-1.6	17.84	38.5	-20.6	
Mid Ch								
836.60	29.84	V	1.1	-1.4	27.35	38.5	-11.1	
836.60	19.45	H	1.1	-1.4	16.96	38.5	-21.5	
High Ch								
848.80	29.30	V	1.1	-1.3	26.94	38.5	-11.5	
848.80	19.06	H	1.1	-1.3	16.70	38.5	-21.8	

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 #: 16K22923
Date: 02-25-16
Test Engineer: Steven Kim
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	26.04	V	1.1	-1.6	23.42	38.5	-15.0	
824.20	15.56	H	1.1	-1.6	12.94	38.5	-25.5	
Mid Ch								
836.60	24.59	V	1.1	-1.4	22.10	38.5	-16.4	
836.60	13.91	H	1.1	-1.4	11.42	38.5	-27.0	
High Ch								
848.80	23.24	V	1.1	-1.3	20.88	38.5	-17.6	
848.80	13.09	H	1.1	-1.3	10.73	38.5	-27.7	

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

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GSM 1900

GSM

GSM1900
GPRS

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

Company: Samsung
Project #: 16K22923
Date: 02-22-16
Test Engineer: Steven Kim
Configuration: EUT ONLY, X 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	12.3	V	1.60	8.80	19.47	33.0	-13.5	
1850.20	22.3	H	1.60	8.80	29.53	33.0	-3.5	
Mid Ch								
1880.00	7.0	V	1.62	8.62	13.99	33.0	-19.0	
1880.00	22.6	H	1.62	8.62	29.61	33.0	-3.4	
High Ch								
1909.80	7.6	V	1.63	8.44	14.38	33.0	-18.6	
1909.80	23.2	H	1.63	8.44	30.00	33.0	-3.0	

Rev. 3.17.11

GSM

GSM1900
EGPRS

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

Company: Samsung
Project #: 16K22923
Date: 02-22-16
Test Engineer: Steven Kim
Configuration: EUT ONLY, X 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	9.5	V	1.60	8.80	16.67	33.0	-16.3	
1850.20	18.9	H	1.60	8.80	26.05	33.0	-7.0	
Mid Ch								
1880.00	4.1	V	1.62	8.62	11.13	33.0	-21.9	
1880.00	19.4	H	1.62	8.62	26.35	33.0	-6.6	
High Ch								
1909.80	4.1	V	1.63	8.44	10.87	33.0	-22.1	
1909.80	19.8	H	1.63	8.44	26.59	33.0	-6.4	

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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 #: 16K22923
Date: 02-25-16
Test Engineer: Steven Kim
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	18.56	V	1.1	-1.5	15.95	38.5	-22.5	
826.40	18.76	H	1.1	-1.5	16.15	38.5	-22.3	
Mid Ch								
836.60	11.72	V	1.1	-1.4	9.23	38.5	-29.2	
836.60	18.64	H	1.1	-1.4	16.15	38.5	-22.3	
High Ch								
846.60	11.13	V	1.1	-1.3	8.75	38.5	-29.7	
846.60	19.43	H	1.1	-1.3	17.05	38.5	-21.4	

Rev. 3.17.11

WCDMA

Band 5
HSDPA

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

Company: Samsung
Project #: 16K22923
Date: 02-25-16
Test Engineer: Steven Kim
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	14.48	V	1.1	-1.5	11.87	38.5	-26.6	
826.40	19.97	H	1.1	-1.5	17.36	38.5	-21.1	
Mid Ch								
836.60	10.85	V	1.1	-1.4	8.36	38.5	-30.1	
836.60	17.90	H	1.1	-1.4	15.41	38.5	-23.0	
High Ch								
846.60	9.30	V	1.1	-1.3	6.92	38.5	-31.5	
846.60	18.24	H	1.1	-1.3	15.86	38.5	-22.6	

Rev. 3.17.11

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WCDMA Band 4

WCDMA

Band 4
REL99

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

Company: Samsung
Project #: 16K22923
Date: 02-26-16
Test Engineer: Steven Kim
Configuration: EUT ONLY, X Position
Mode: Rel 99_1700 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								
1712.40	6.62	V	1.54	9.20	14.28	30.0	-15.7	
1712.40	14.05	H	1.54	9.20	21.71	30.0	-8.3	
Mid Ch								
1732.60	9.44	V	1.55	9.31	17.20	30.0	-12.8	
1732.60	14.65	H	1.55	9.31	22.41	30.0	-7.6	
High Ch								
1752.60	8.88	V	1.56	9.38	16.70	30.0	-13.3	
1752.60	14.63	H	1.56	9.38	22.45	30.0	-7.6	

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

WCDMA

Band 4
HSDPA

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

Company: Samsung
Project #: 16K22923
Date: 02-26-16
Test Engineer: Steven Kim
Configuration: EUT ONLY, X Position
Mode: HSDPA_1700 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								
1712.40	6.73	V	1.54	9.20	14.39	30.0	-15.6	
1712.40	14.57	H	1.54	9.20	22.23	30.0	-7.8	
Mid Ch								
1732.60	7.89	V	1.55	9.31	15.65	30.0	-14.4	
1732.60	12.32	H	1.55	9.31	20.08	30.0	-9.9	
High Ch								
1752.60	10.52	V	1.56	9.38	18.34	30.0	-11.7	
1752.60	15.17	H	1.56	9.38	22.99	30.0	-7.0	

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

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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 #: 16K22923
Date: 02-22-16
Test Engineer: Steven.Kim
Configuration: EUT ONLY, X 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	4.79	V	1.60	8.79	11.98	33.0	-21.0	
1852.40	14.78	H	1.60	8.79	21.97	33.0	-11.0	
Mid Ch								
1880.00	0.65	V	1.62	8.62	7.65	33.0	-25.3	
1880.00	15.23	H	1.62	8.62	22.23	33.0	-10.8	
High Ch								
1907.60	6.04	V	1.63	8.45	12.86	33.0	-20.1	
1907.60	16.44	H	1.63	8.45	23.26	33.0	-9.7	

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 #: 16K22923
Date: 02-22-16
Test Engineer: Steven.Kim
Configuration: EUT ONLY, X 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	1.22	V	1.60	8.79	8.41	33.0	-24.6	
1852.40	11.67	H	1.60	8.79	18.86	33.0	-14.1	
Mid Ch								
1880.00	-1.10	V	1.62	8.62	5.90	33.0	-27.1	
1880.00	13.56	H	1.62	8.62	20.56	33.0	-12.4	
High Ch								
1907.60	-0.25	V	1.63	8.45	6.57	33.0	-26.4	
1907.60	14.85	H	1.63	8.45	21.67	33.0	-11.3	

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

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LTE Band 17

LTE Band 17 10MHz QPSK

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

Company: Samsung
Project #: 16K22923
Date: 02-24-16
Test Engineer: Steven Kim
Configuration: EUT / X-Position
Mode: LTE Band 17, QPSK, 10MHz

Test Equipment:
Receiving: VULB9163-750, 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)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
709.00	3.27	V	1.0	-1.6	0.67	34.8	-34.1	
709.00	13.70	H	1.0	-1.6	11.10	34.8	-23.7	
Mid Ch								
710.00	6.12	V	1.0	-1.6	3.52	34.8	-31.3	
710.00	13.41	H	1.0	-1.6	10.81	34.8	-24.0	
High Ch								
711.00	6.55	V	1.0	-1.6	3.95	34.8	-30.8	
711.00	13.82	H	1.0	-1.6	11.22	34.8	-23.6	

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

LTE Band 17 10MHz 16QAM

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

Company: Samsung
Project #: 16K22923
Date: 02-24-16
Test Engineer: Steven Kim
Configuration: EUT / X-Position
Mode: LTE Band 17 16QAM, 10MHz

Test Equipment:
Receiving: VULB9163-750, 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)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
709.00	2.85	V	1.0	-1.6	0.25	34.8	-34.5	
709.00	13.24	H	1.0	-1.6	10.64	34.8	-24.1	
Mid Ch								
710.00	5.75	V	1.0	-1.6	3.15	34.8	-31.6	
710.00	13.03	H	1.0	-1.6	10.43	34.8	-24.3	
High Ch								
711.00	6.02	V	1.0	-1.6	3.42	34.8	-31.4	
711.00	13.34	H	1.0	-1.6	10.74	34.8	-24.0	

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 17
5MHz
QPSK

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

Company: Samsung
Project #: 16K22923
Date: 02-24-16
Test Engineer: Steven Kim
Configuration: EUT / X-Position
Mode: LTE Band 17, QPSK , 5MHz

Test Equipment:
Receiving: VULB9163-750, 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)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
706.50	6.23	V	1.0	-1.6	3.63	34.8	-31.1	
706.50	13.68	H	1.0	-1.6	11.08	34.8	-23.7	
Mid Ch								
710.00	6.71	V	1.0	-1.6	4.11	34.8	-30.7	
710.00	13.56	H	1.0	-1.6	10.96	34.8	-23.8	
High Ch								
713.50	5.38	V	1.0	-1.6	2.78	34.8	-32.0	
713.50	13.24	H	1.0	-1.6	10.64	34.8	-24.1	

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

LTE
Band 17
5MHz
16QAM

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

Company: Samsung
Project #: 16K22923
Date: 02-24-16
Test Engineer: Steven Kim
Configuration: EUT / X-Position
Mode: LTE Band 17 16QAM, 5MHz

Test Equipment:
Receiving: VULB9163-750, 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)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
706.50	5.75	V	1.0	-1.6	3.15	34.8	-31.6	
706.50	13.16	H	1.0	-1.6	10.56	34.8	-24.2	
Mid Ch								
710.00	6.35	V	1.0	-1.6	3.75	34.8	-31.0	
710.00	13.30	H	1.0	-1.6	10.70	34.8	-24.1	
High Ch								
713.50	4.90	V	1.0	-1.6	2.30	34.8	-32.5	
713.50	12.80	H	1.0	-1.6	10.20	34.8	-24.6	

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

LTE Band 5 10MHz QPSK

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

Company: Samsung
Project #: 16K22923
Date: 02-27-16
Test Engineer: Steven Kim
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	11.38	V	1.1	-1.5	8.80	38.5	-29.7	
829.00	16.79	H	1.1	-1.5	14.21	38.5	-24.2	
Mid Ch								
836.50	10.54	V	1.1	-1.4	8.04	38.5	-30.4	
836.50	14.18	H	1.1	-1.4	11.69	38.5	-26.8	
High Ch								
844.00	10.44	V	1.1	-1.3	8.05	38.5	-30.4	
844.00	16.91	H	1.1	-1.3	14.49	38.5	-24.0	

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 #: 16K22923
Date: 02-27-16
Test Engineer: Steven Kim
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	10.99	V	1.1	-1.5	8.41	38.5	-30.0	
829.00	16.46	H	1.1	-1.5	13.88	38.5	-24.6	
Mid Ch								
836.50	10.22	V	1.1	-1.4	7.71	38.5	-30.7	
836.50	15.89	H	1.1	-1.4	13.38	38.5	-25.1	
High Ch								
844.00	10.15	V	1.1	-1.3	7.73	38.5	-30.7	
844.00	16.66	H	1.1	-1.3	14.24	38.5	-24.2	

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 #: 16K22923
Date: 02-27-16
Test Engineer: Steven Kim
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	11.42	V	1.1	-1.5	8.82	38.5	-29.6	
826.50	17.26	H	1.1	-1.5	14.66	38.5	-23.8	
Mid Ch								
836.50	10.75	V	1.1	-1.4	8.26	38.5	-30.2	
836.50	16.38	H	1.1	-1.4	13.89	38.5	-24.6	
High Ch								
846.50	10.56	V	1.6	-1.3	7.68	38.5	-30.8	
846.50	17.06	H	1.6	-1.3	14.18	38.5	-24.3	

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 #: 16K22923
Date: 02-27-16
Test Engineer: Steven Kim
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	10.99	V	1.1	-1.5	8.39	38.5	-30.1	
826.50	16.85	H	1.1	-1.5	14.25	38.5	-24.2	
Mid Ch								
836.50	10.36	V	1.1	-1.4	7.87	38.5	-30.6	
836.50	15.90	H	1.1	-1.4	13.41	38.5	-25.0	
High Ch								
846.50	10.21	V	1.1	-1.3	7.83	38.5	-30.6	
846.50	16.71	H	1.1	-1.3	14.33	38.5	-24.1	

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 #: 16K22923
Date: 02-27-16
Test Engineer: Steven Kim
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	11.61	V	1.1	-1.5	9.01	38.5	-29.4	
825.50	17.13	H	1.1	-1.5	14.53	38.5	-23.9	
Mid Ch								
836.50	10.90	V	1.1	-1.4	8.40	38.5	-30.0	
836.50	16.52	H	1.1	-1.4	14.03	38.5	-24.4	
High Ch								
847.50	10.12	V	1.6	-1.3	7.24	38.5	-31.2	
847.50	17.47	H	1.6	-1.3	14.59	38.5	-23.9	

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 #: 16K22923
Date: 02-27-16
Test Engineer: Steven Kim
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	11.26	V	1.1	-1.5	8.66	38.5	-29.8	
825.50	16.76	H	1.1	-1.5	14.16	38.5	-24.3	
Mid Ch								
836.50	10.43	V	1.1	-1.4	7.94	38.5	-30.5	
836.50	16.11	H	1.1	-1.4	13.62	38.5	-24.8	
High Ch								
847.50	9.94	V	1.1	-1.3	7.56	38.5	-30.9	
847.50	17.20	H	1.1	-1.3	14.82	38.5	-23.6	

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 #: 16K22923
Date: 02-27-16
Test Engineer: Steven Kim
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	8.88	V	1.1	-1.5	6.28	38.5	-32.2	
824.70	15.22	H	1.1	-1.5	12.62	38.5	-25.8	
Mid Ch								
836.50	8.30	V	1.1	-1.4	5.81	38.5	-32.6	
836.50	14.32	H	1.1	-1.4	11.83	38.5	-26.6	
High Ch								
848.30	7.97	V	1.6	-1.3	5.09	38.5	-33.4	
848.30	14.66	H	1.6	-1.3	11.78	38.5	-26.7	

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 #: 16K22923
Date: 02-27-16
Test Engineer: Steven Kim
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	8.40	V	1.1	-1.5	5.80	38.5	-32.7	
824.70	14.90	H	1.1	-1.5	12.30	38.5	-26.2	
Mid Ch								
836.50	8.01	V	1.1	-1.4	5.52	38.5	-32.9	
836.50	13.82	H	1.1	-1.4	11.33	38.5	-27.1	
High Ch								
848.30	7.43	V	1.1	-1.3	5.05	38.5	-33.4	
848.30	14.07	H	1.1	-1.3	11.69	38.5	-26.8	

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 4

LTE Band 4 20MHz QPSK

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

Company: Samsung
Project #: 16K22923
Date: 02-28-16
Test Engineer: Steven.Kim
Configuration: EUT / X-Position
Mode: LTE Band 4, 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								
1720.00	7.87	V	1.54	9.12	15.45	30.0	-14.6	
1720.00	12.29	H	1.54	9.12	19.87	30.0	-10.1	
Mid Ch								
1732.50	7.93	V	1.55	9.31	15.69	30.0	-14.3	
1732.50	11.63	H	1.55	9.31	19.39	30.0	-10.6	
High Ch								
1745.00	6.40	V	1.56	9.37	14.21	30.0	-15.8	
1745.00	11.47	H	1.56	9.37	19.28	30.0	-10.7	

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

LTE Band 4 20MHz 16QAM

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

Company: Samsung
Project #: 16K22923
Date: 02-28-16
Test Engineer: Steven.Kim
Configuration: EUT / X-Position
Mode: LTE Band 4, 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								
1720.00	7.53	V	1.54	9.12	15.11	30.0	-14.9	
1720.00	11.92	H	1.54	9.12	19.50	30.0	-10.5	
Mid Ch								
1732.50	7.64	V	1.55	9.31	15.40	30.0	-14.6	
1732.50	11.33	H	1.55	9.31	19.09	30.0	-10.9	
High Ch								
1745.00	5.94	V	1.56	9.37	13.75	30.0	-16.3	
1745.00	11.04	H	1.56	9.37	18.85	30.0	-11.2	

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

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LTE
Band 4
15MHz
QPSK

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

Company: Samsung
Project #: 16K22923
Date: 02-28-16
Test Engineer: Steven.Kim
Configuration: EUT / X-Position
Mode: LTE Band 4, 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								
1717.50	7.60	V	1.54	9.12	15.18	30.0	-14.8	
1717.50	12.18	H	1.54	9.12	19.76	30.0	-10.2	
Mid Ch								
1732.50	8.05	V	1.55	9.31	15.81	30.0	-14.2	
1732.50	11.69	H	1.55	9.31	19.45	30.0	-10.6	
High Ch								
1747.50	6.18	V	1.56	9.39	14.01	30.0	-16.0	
1747.50	11.25	H	1.56	9.39	19.08	30.0	-10.9	

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

LTE
Band 4
15MHz
16QAM

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

Company: Samsung
Project #: 16K22923
Date: 02-28-16
Test Engineer: Steven.Kim
Configuration: EUT / X-Position
Mode: LTE Band 4, 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								
1717.50	7.33	V	1.54	9.12	14.91	30.0	-15.1	
1717.50	11.91	H	1.54	9.12	19.49	30.0	-10.5	
Mid Ch								
1732.50	7.77	V	1.55	9.31	15.53	30.0	-14.5	
1732.50	11.36	H	1.55	9.31	19.12	30.0	-10.9	
High Ch								
1747.50	5.79	V	1.56	9.39	13.62	30.0	-16.4	
1747.50	10.97	H	1.56	9.39	18.80	30.0	-11.2	

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

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LTE Band 4 10MHz QPSK

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

Company: Samsung
Project #: 16K22923
Date: 02-28-16
Test Engineer: Steven.Kim
Configuration: EUT / X-Position
Mode: LTE Band 4, 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								
1715.00	7.54	V	1.54	9.12	15.12	30.0	-14.9	
1715.00	12.37	H	1.54	9.12	19.95	30.0	-10.1	
Mid Ch								
1732.50	8.13	V	1.55	9.31	15.89	30.0	-14.1	
1732.50	11.75	H	1.55	9.31	19.51	30.0	-10.5	
High Ch								
1750.00	5.88	V	1.56	9.40	13.72	30.0	-16.3	
1750.00	11.23	H	1.56	9.40	19.07	30.0	-10.9	

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

LTE Band 4 10MHz 16QAM

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

Company: Samsung
Project #: 16K22923
Date: 02-28-16
Test Engineer: Steven.Kim
Configuration: EUT / X-Position
Mode: LTE Band 4 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								
1715.00	7.19	V	1.54	9.12	14.77	30.0	-15.2	
1715.00	12.05	H	1.54	9.12	19.63	30.0	-10.4	
Mid Ch								
1732.50	7.79	V	1.55	9.31	15.55	30.0	-14.5	
1732.50	11.40	H	1.55	9.31	19.16	30.0	-10.8	
High Ch								
1750.00	5.55	V	1.56	9.40	13.39	30.0	-16.6	
1750.00	10.89	H	1.56	9.40	18.73	30.0	-11.3	

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

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LTE Band 4 5MHz QPSK

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

Company: Samsung
Project #: 16K22923
Date: 02-28-16
Test Engineer: Steven.Kim
Configuration: EUT / X-Position
Mode: LTE Band 4, 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								
1712.50	7.56	V	1.54	9.12	15.14	30.0	-14.9	
1712.50	12.49	H	1.54	9.12	20.07	30.0	-9.9	
Mid Ch								
1732.50	8.13	V	1.55	9.31	15.89	30.0	-14.1	
1732.50	11.86	H	1.55	9.31	19.62	30.0	-10.4	
High Ch								
1752.50	5.69	V	1.56	9.39	13.52	30.0	-16.5	
1752.50	11.11	H	1.56	9.39	18.94	30.0	-11.1	

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

LTE Band 4 5MHz 16QAM

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

Company: Samsung
Project #: 16K22923
Date: 02-28-16
Test Engineer: Steven.Kim
Configuration: EUT / X-Position
Mode: LTE Band 4 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								
1712.50	7.14	V	1.54	9.12	14.72	30.0	-15.3	
1712.50	12.15	H	1.54	9.12	19.73	30.0	-10.3	
Mid Ch								
1732.50	7.98	V	1.55	9.31	15.74	30.0	-14.3	
1732.50	11.51	H	1.55	9.31	19.27	30.0	-10.7	
High Ch								
1752.50	5.37	V	1.56	9.39	13.20	30.0	-16.8	
1752.50	10.83	H	1.56	9.39	18.66	30.0	-11.3	

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

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LTE Band 4 3MHz QPSK

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

Company: Samsung
Project #: 16K22923
Date: 02-28-16
Test Engineer: Steven.Kim
Configuration: EUT / X-Position
Mode: LTE Band 4, QPSK , 3MHz

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								
1711.50	7.55	V	1.54	9.12	15.13	30.0	-14.9	
1711.50	12.58	H	1.54	9.12	20.16	30.0	-9.8	
Mid Ch								
1732.50	8.41	V	1.55	9.31	16.17	30.0	-13.8	
1732.50	11.95	H	1.55	9.31	19.71	30.0	-10.3	
High Ch								
1753.50	5.61	V	1.56	9.38	13.43	30.0	-16.6	
1753.50	11.21	H	1.56	9.38	19.03	30.0	-11.0	

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

LTE Band 4 3MHz 16QAM

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

Company: Samsung
Project #: 16K22923
Date: 02-28-16
Test Engineer: Steven.Kim
Configuration: EUT / X-Position
Mode: LTE Band 4 16QAM, 3MHz

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								
1711.50	7.23	V	1.54	9.12	14.81	30.0	-15.2	
1711.50	12.22	H	1.54	9.12	19.80	30.0	-10.2	
Mid Ch								
1732.50	8.06	V	1.55	9.31	15.82	30.0	-14.2	
1732.50	11.75	H	1.55	9.31	19.51	30.0	-10.5	
High Ch								
1753.50	5.31	V	1.56	9.38	13.13	30.0	-16.9	
1753.50	10.95	H	1.56	9.38	18.77	30.0	-11.2	

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

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