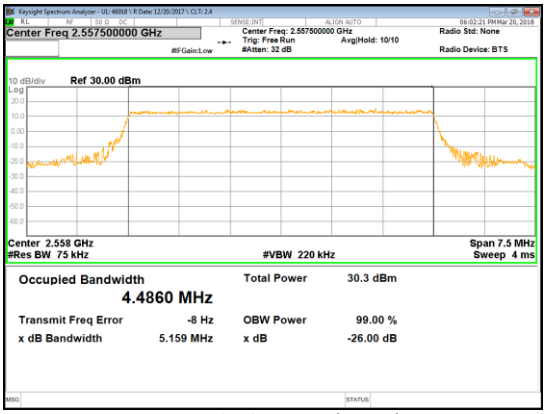
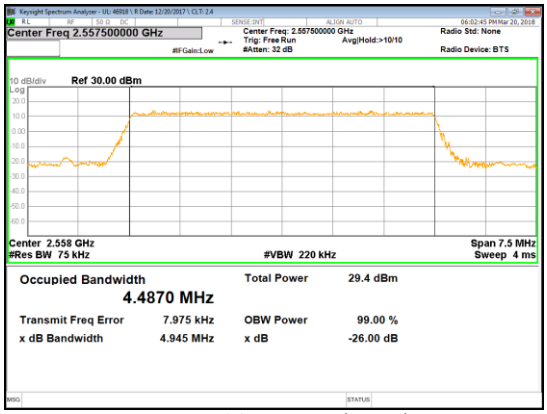
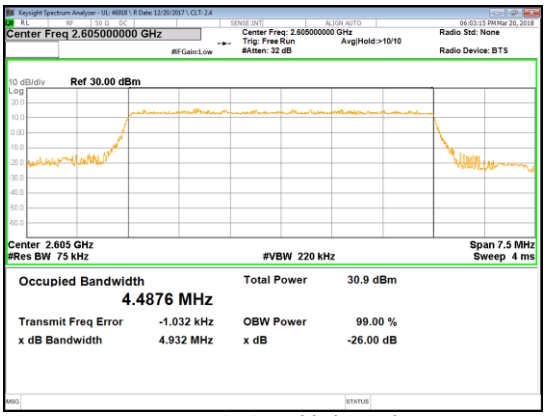
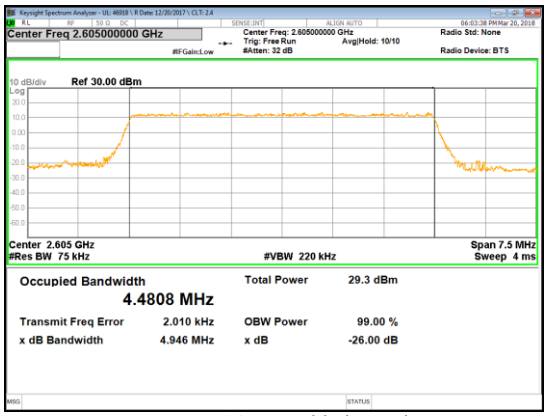
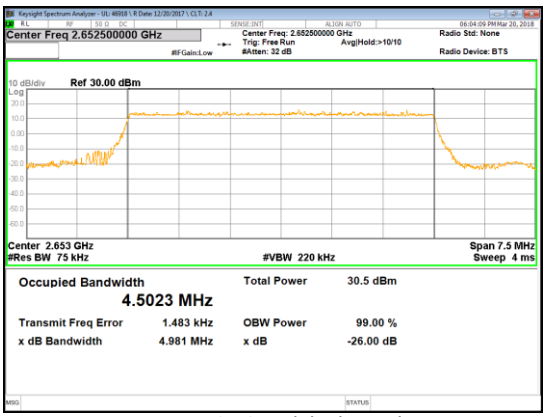
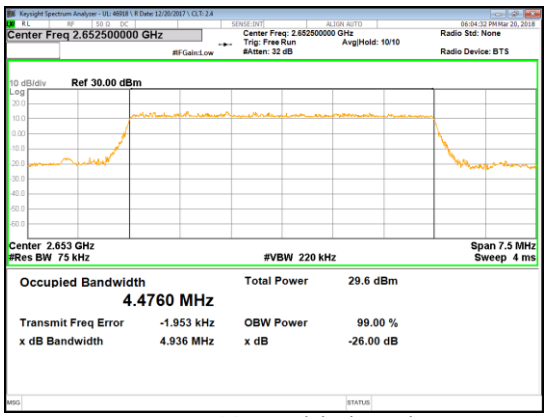
Band 41 5MHz	 5MHz QPSK Low channel	 5MHz 16QAM Low channel
	 5MHz QPSK Mid channel	 5MHz 16QAM Mid channel
	 5MHz QPSK High channel	 5MHz 16QAM High channel

9.2. BAND EDGE EMISSIONS

RULE PART(S)

FCC: §22.359, §24.238 and §27. 53(m)

LIMITS

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

Part 27.53(m) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v03
The transmitter output was connected to a CMW500 Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

GSM

a) Set the RBW = 1 ~ 5% of OBW(GSM850 – 8.2KHz, GSM1900 – 9.1KHz)

b) Set VBW ≥ 3 × RBW;

c) Set span ≥ 1.5 times the OBW;

d) Sweep time = 1S ;

e) Detector = RMS;

f) Ensure that the number of measurement points ≥ 2*Span/RBW;

g) Trace mode = Average(100);

h) Add duty cycle correction factor (9dB)

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WCDMA/LTE

a) Set the RBW = 1 ~ 1.5 % of OBW(Typically limited to a minimum RBW of 1% of the OBW)

b) Set VBW ≥ 3 × RBW;

c) Set span ≥ 1.5 times the OBW;

d) Sweep time = Auto;

e) Detector = RMS;

f) Ensure that the number of measurement points ≥ 2*Span/RBW;

g) Trace mode = Average (100);

NOTE

LTE 41 - Duty cycle correction factor(2.25dB) already applied on the plot.

RESULTS

GSM

Band	Mode	Side	f [MHz]	Level [dBm]	Limit [dBm]
GSM850	GPRS	Lower	823.982	-15.471	-13.00
		Upper	849.018	-14.954	
	EGPRS	Lower	823.982	-23.419	
		Upper	849.018	-23.359	
GSM1900	GPRS	Lower	1849.982	-17.461	
		Upper	1910.018	-17.545	
	EGPRS	Lower	1849.987	-23.139	
		Upper	1910.018	-23.665	

WCDMA

Band	Mode	Side	f [MHz]	Level [dBm]	Limit [dBm]
Band 5	REL99	Lower	824.000	-26.128	-13.00
		Upper	849.000	-26.874	
	HSDPA	Lower	824.000	-28.785	
		Upper	849.000	-28.024	
Band 2	REL99	Lower	1850.000	-26.296	
		Upper	1910.000	-25.995	
	HSDPA	Lower	1850.000	-29.987	
		Upper	1910.000	-29.345	

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LTE 5

Bandwidth	Mode	Side	RB Status	f [MHz]	Level [dBm]	Limit [dBm]
10 MHz	QPSK	Lower	1RB	824.000	-29.666	-13.00
			FRB	824.000	-32.007	
		Upper	1RB	849.000	-29.025	
			FRB	849.000	-30.974	
	16QAM	Lower	1RB	824.000	-30.350	
			FRB	824.000	-32.407	
		Upper	1RB	849.000	-31.135	
			FRB	849.000	-33.119	
5 MHz	QPSK	Lower	1RB	824.000	-21.725	
			FRB	824.000	-28.711	
		Upper	1RB	849.000	-20.575	
			FRB	849.000	-28.470	
	16QAM	Lower	1RB	824.000	-22.361	
			FRB	824.000	-32.811	
		Upper	1RB	849.000	-21.221	
			FRB	849.000	-31.134	
3 MHz	QPSK	Lower	1RB	824.000	-19.697	
			FRB	824.000	-30.350	
		Upper	1RB	849.000	-17.273	
			FRB	849.000	-27.037	
	16QAM	Lower	1RB	824.000	-20.239	
			FRB	824.000	-29.691	
		Upper	1RB	849.000	-19.249	
			FRB	849.000	-29.690	
1.4 MHz	QPSK	Lower	1RB	824.000	-24.205	
			FRB	824.000	-29.799	
		Upper	1RB	849.000	-21.675	
			FRB	849.000	-29.891	
	16QAM	Lower	1RB	824.000	-23.640	
			FRB	824.000	-32.251	
		Upper	1RB	849.000	-22.246	
			FRB	849.000	-30.375	

LTE 41

Bandwidth	Mode	f [MHz]	RB Status	Side Trace	Level [dBm]	Limit [dBm]
20 MHz	QPSK	2565.0	1RB	Lower Trace 1	-27.72	-10.00
				Lower Trace 2	-40.98	-13.00
				Lower Trace 3	-44.44	-25.00
			FRB	Lower Trace 1	-24.04	-10.00
				Lower Trace 2	-27.91	-13.00
				Lower Trace 3	-42.89	-25.00
		2645.0	1RB	Upper Trace 1	-25.22	-10.00
				Upper Trace 2	-41.43	-13.00
				Upper Trace 3	-44.22	-25.00
			FRB	Upper Trace 1	-25.61	-10.00
				Upper Trace 2	-28.48	-13.00
				Upper Trace 3	-38.78	-25.00
	16QAM	2565.0	1RB	Lower Trace 1	-27.37	-10.00
				Lower Trace 2	-41.62	-13.00
				Lower Trace 3	-44.55	-25.00
			FRB	Lower Trace 1	-24.33	-10.00
				Lower Trace 2	-27.97	-13.00
				Lower Trace 3	-43.48	-25.00
		2645.0	1RB	Upper Trace 1	-26.69	-10.00
				Upper Trace 2	-41.87	-13.00
				Upper Trace 3	-44.18	-25.00
			FRB	Upper Trace 1	-25.94	-10.00
				Upper Trace 2	-28.17	-13.00
				Upper Trace 3	-38.47	-25.00

LTE 41 (Continue)

Bandwidth	Mode	f [MHz]	RB Status	Side Trace	Level [dBm]	Limit [dBm]
15 MHz	QPSK	2562.5	1RB	Lower Trace 1	-25.09	-10.00
				Lower Trace 2	-39.07	-13.00
				Lower Trace 3	-44.35	-25.00
			FRB	Lower Trace 1	-22.94	-10.00
				Lower Trace 2	-26.70	-13.00
				Lower Trace 3	-36.60	-25.00
		2647.5	1RB	Upper Trace 1	-25.47	-10.00
				Upper Trace 2	-41.04	-13.00
				Upper Trace 3	-43.97	-25.00
			FRB	Upper Trace 1	-23.19	-10.00
				Upper Trace 2	-27.07	-13.00
				Upper Trace 3	-32.70	-25.00
	16QAM	2562.5	1RB	Lower Trace 1	-25.91	-10.00
				Lower Trace 2	-42.86	-13.00
				Lower Trace 3	-44.46	-25.00
			FRB	Lower Trace 1	-20.29	-10.00
				Lower Trace 2	-25.66	-13.00
				Lower Trace 3	-33.37	-25.00
		2647.5	1RB	Upper Trace 1	-24.74	-10.00
				Upper Trace 2	-41.56	-13.00
				Upper Trace 3	-43.90	-25.00
			FRB	Upper Trace 1	-20.93	-10.00
				Upper Trace 2	-25.26	-13.00
				Upper Trace 3	-29.90	-25.00

LTE 41 (Continue)

Bandwidth	Mode	f [MHz]	RB Status	Side Trace	Level [dBm]	Limit [dBm]
10 MHz	QPSK	2560.0	1RB	Lower Trace 1	-25.91	-10.00
				Lower Trace 2	-42.86	-13.00
				Lower Trace 3	-44.46	-25.00
			FRB	Lower Trace 1	-20.29	-10.00
				Lower Trace 2	-25.66	-13.00
				Lower Trace 3	-33.37	-25.00
		2650.0	1RB	Upper Trace 1	-24.74	-10.00
				Upper Trace 2	-41.56	-13.00
				Upper Trace 3	-43.90	-25.00
			FRB	Upper Trace 1	-20.93	-10.00
				Upper Trace 2	-25.26	-13.00
				Upper Trace 3	-29.90	-25.00
	16QAM	2560.0	1RB	Lower Trace 1	-28.13	-10.00
				Lower Trace 2	-43.23	-13.00
				Lower Trace 3	-44.47	-25.00
			FRB	Lower Trace 1	-20.71	-10.00
				Lower Trace 2	-26.43	-13.00
				Lower Trace 3	-34.92	-25.00
		2650.0	1RB	Upper Trace 1	-26.01	-10.00
				Upper Trace 2	-42.27	-13.00
				Upper Trace 3	-44.08	-25.00
			FRB	Upper Trace 1	-21.17	-10.00
				Upper Trace 2	-25.67	-13.00
				Upper Trace 3	-30.62	-25.00

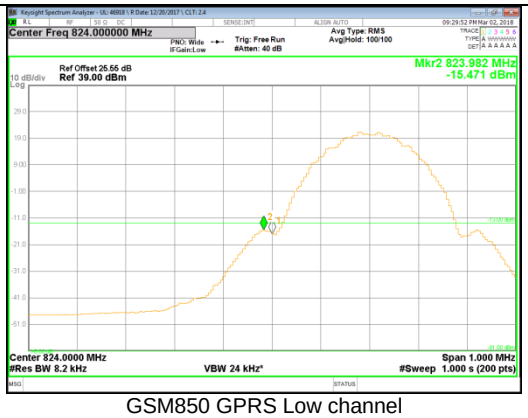
LTE 41 (Continue)

Bandwidth	Mode	f [MHz]	RB Status	Side Trace	Level [dBm]	Limit [dBm]
5 MHz	QPSK	2557.5	1RB	Lower Trace 1	-19.35	-10.00
				Lower Trace 2	-43.90	-13.00
				Lower Trace 3	-44.06	-25.00
			FRB	Lower Trace 1	-18.27	-10.00
				Lower Trace 2	-28.58	-13.00
				Lower Trace 3	-31.87	-25.00
		2652.5	1RB	Upper Trace 1	-17.02	-10.00
				Upper Trace 2	-43.03	-13.00
				Upper Trace 3	-43.24	-25.00
			FRB	Upper Trace 1	-17.99	-10.00
				Upper Trace 2	-27.27	-13.00
				Upper Trace 3	-29.40	-25.00
	16QAM	2557.5	1RB	Lower Trace 1	-20.26	-10.00
				Lower Trace 2	-43.78	-13.00
				Lower Trace 3	-44.08	-25.00
			FRB	Lower Trace 1	-18.37	-10.00
				Lower Trace 2	-30.31	-13.00
				Lower Trace 3	-33.73	-25.00
		2652.5	1RB	Upper Trace 1	-18.09	-10.00
				Upper Trace 2	-43.45	-13.00
				Upper Trace 3	-43.44	-25.00
			FRB	Upper Trace 1	-17.56	-10.00
				Upper Trace 2	-28.16	-13.00
				Upper Trace 3	-30.02	-25.00

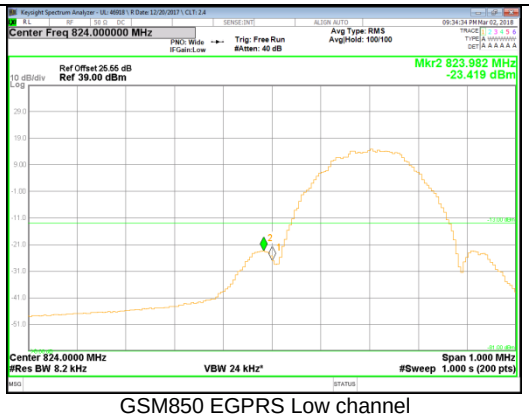
9.2.1. BAND EDGE PLOTS

GSM

GSM 850



GSM850 GPRS Low channel



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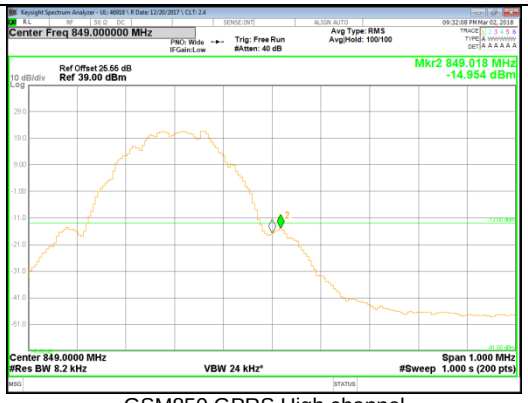
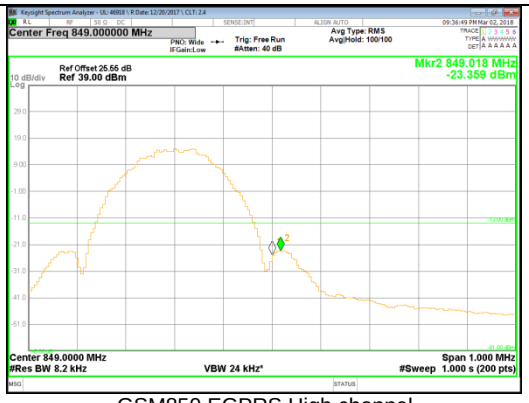
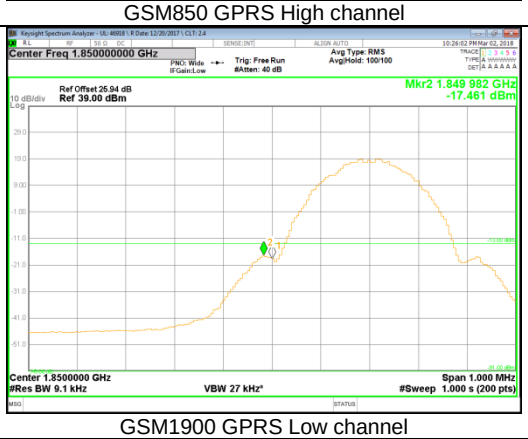


GSM850 GPRS High channel



GSM850 EGPRS High channel

GSM 1900



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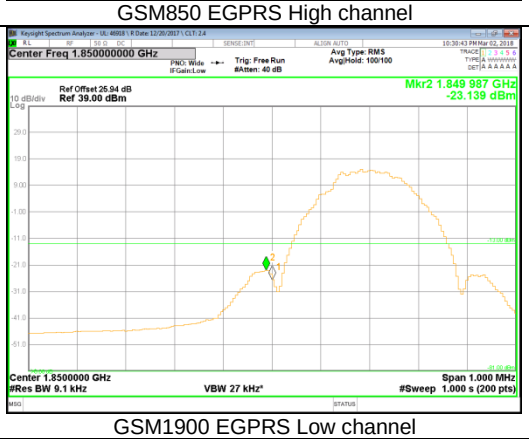

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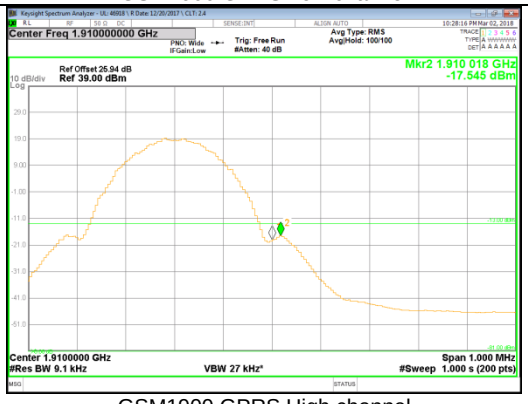
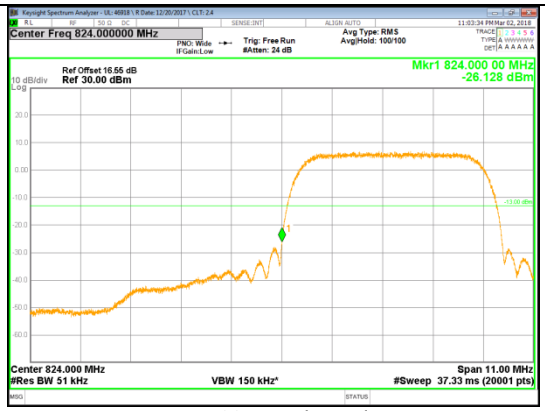
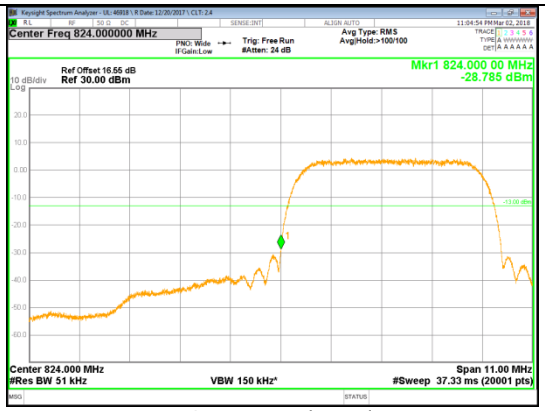
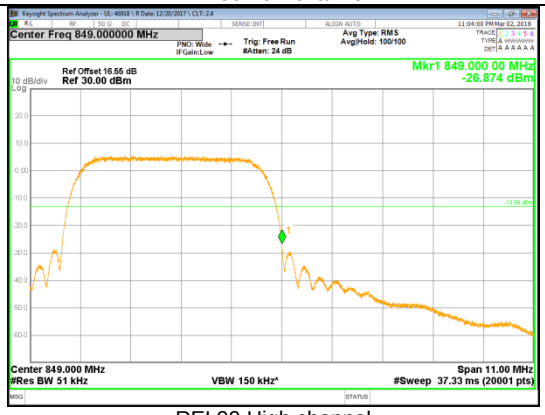
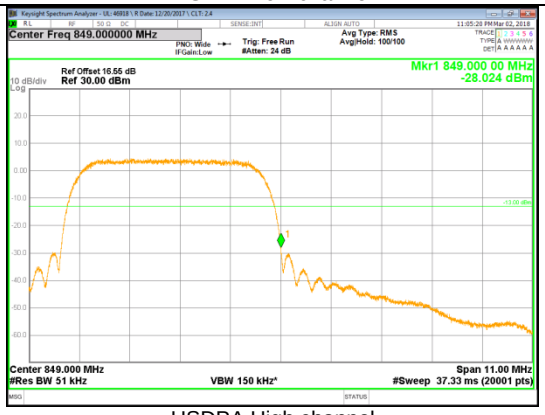
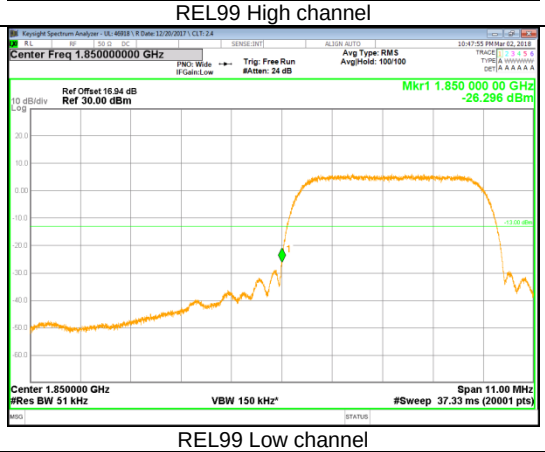
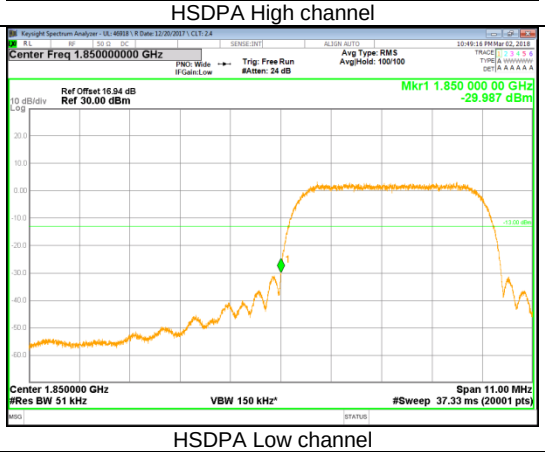
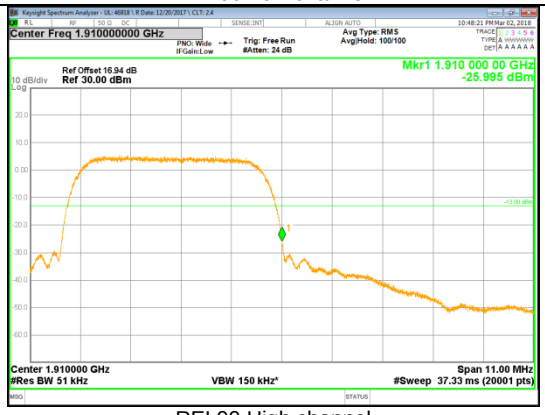
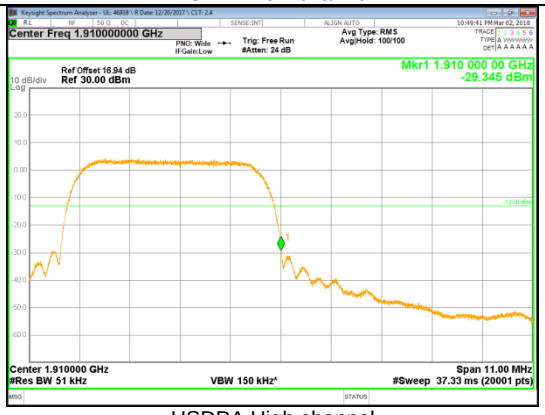


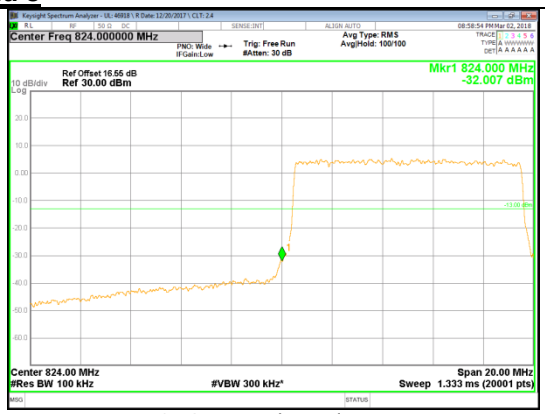
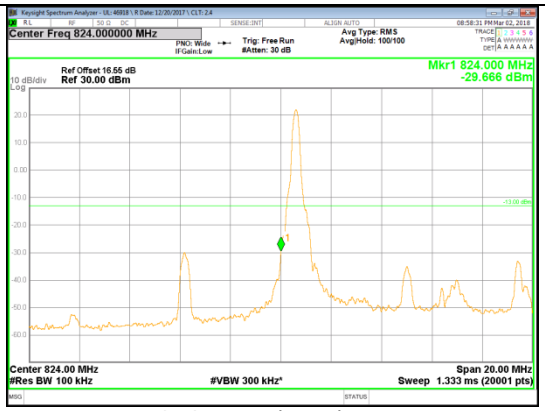
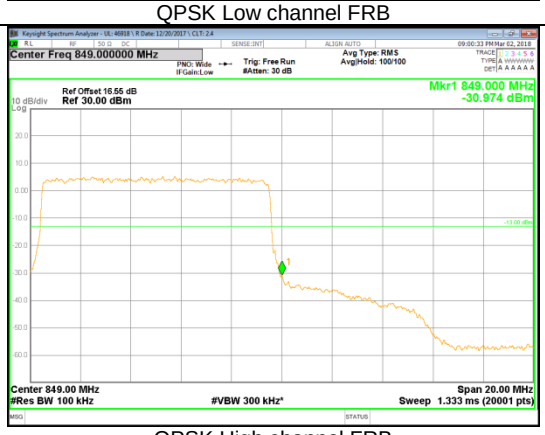
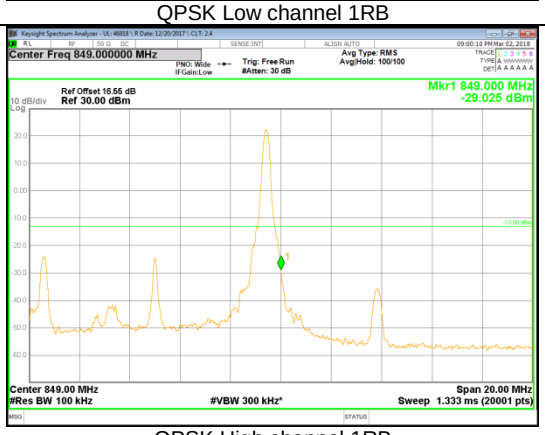
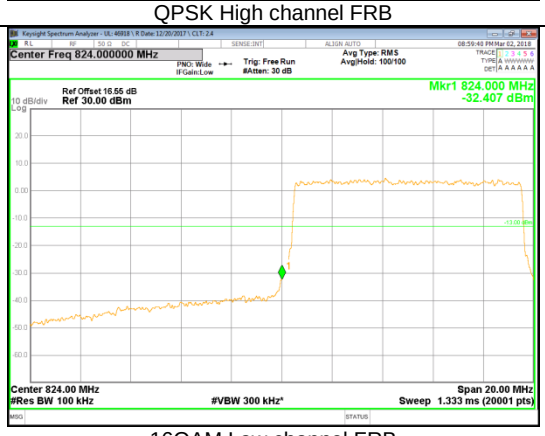
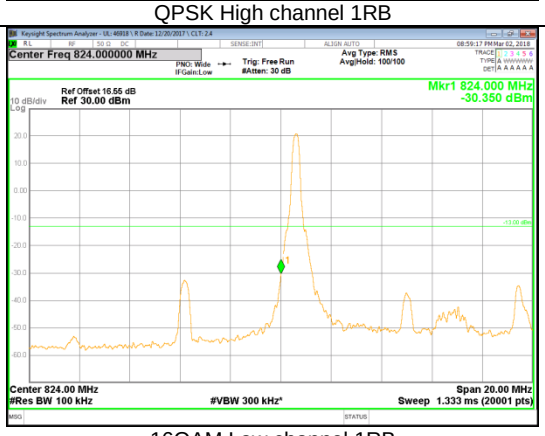
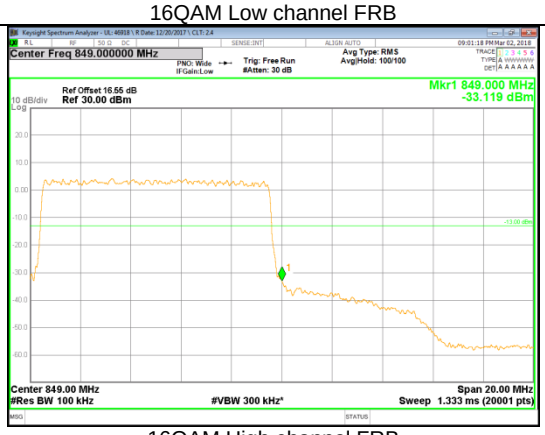
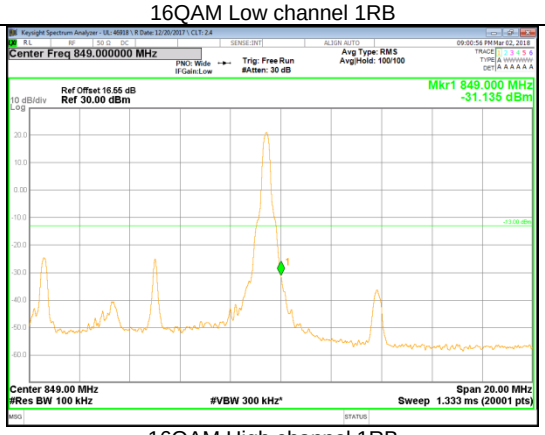
GSM1900 GPRS High channel

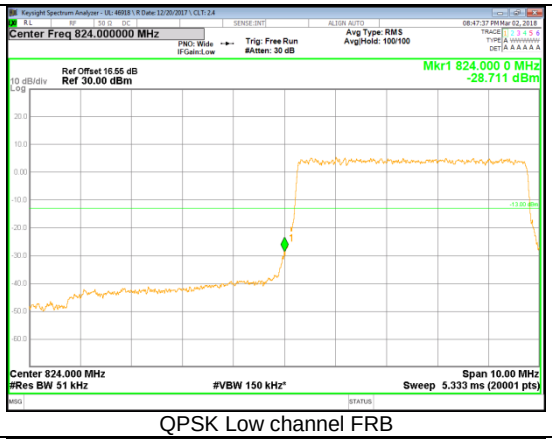
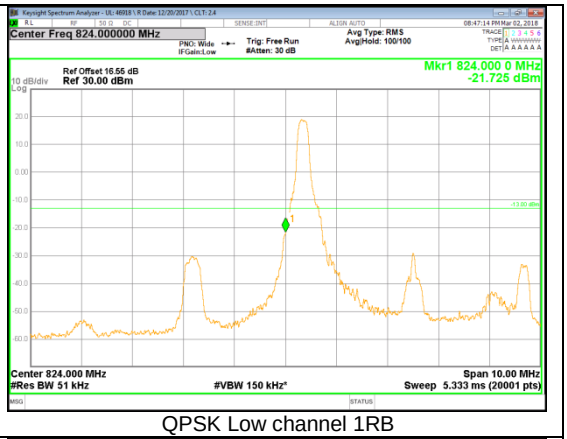
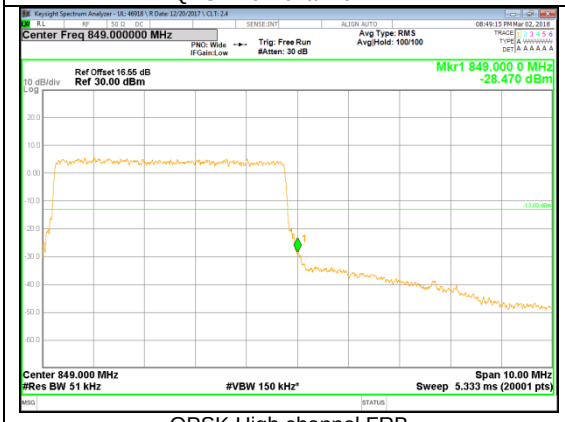
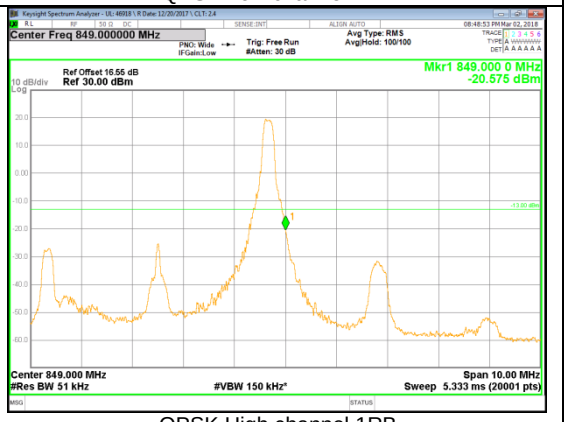
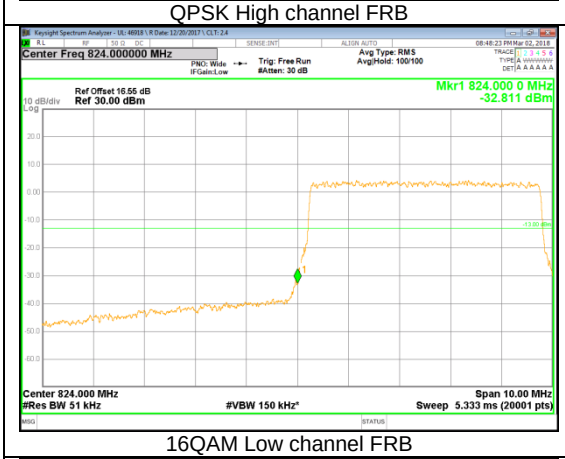
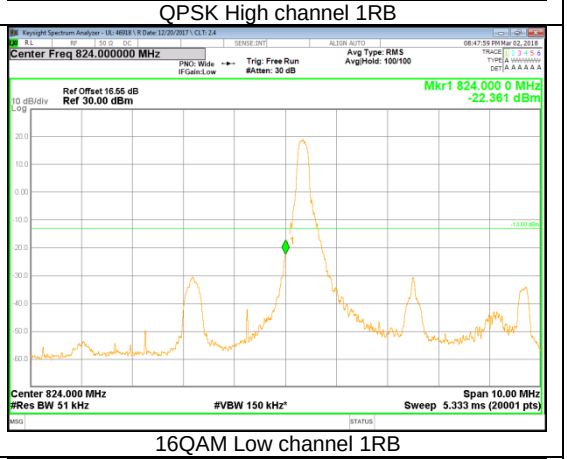
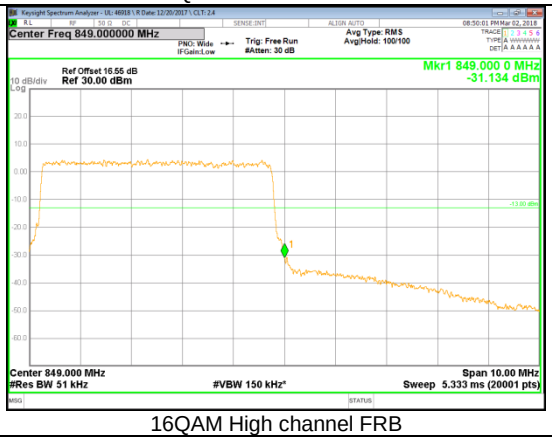
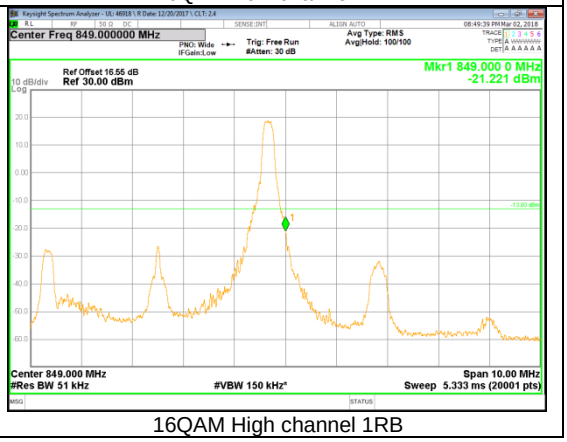
GSM1900 EGPRS High channel

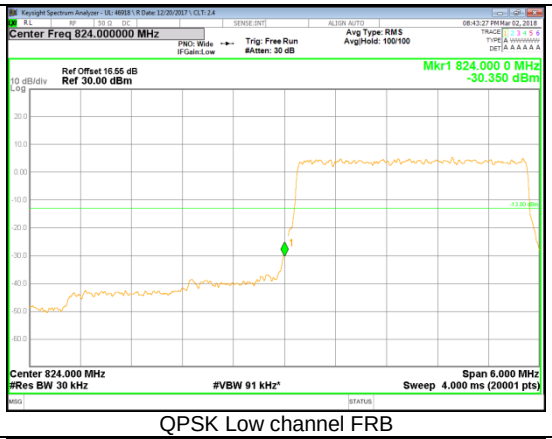
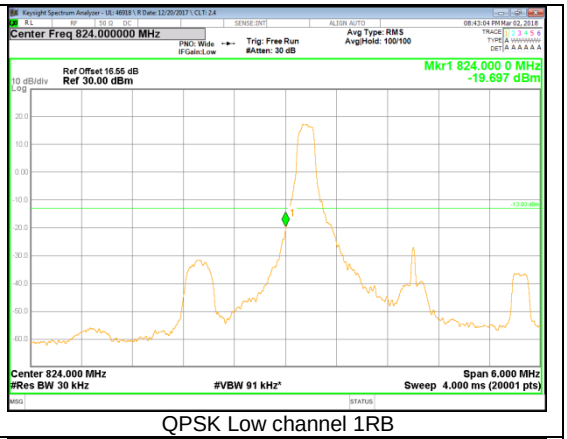
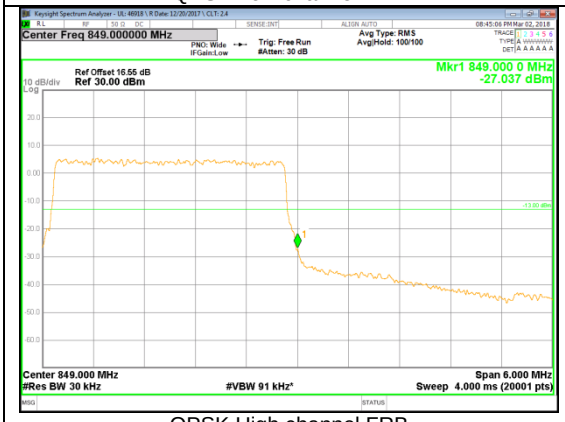
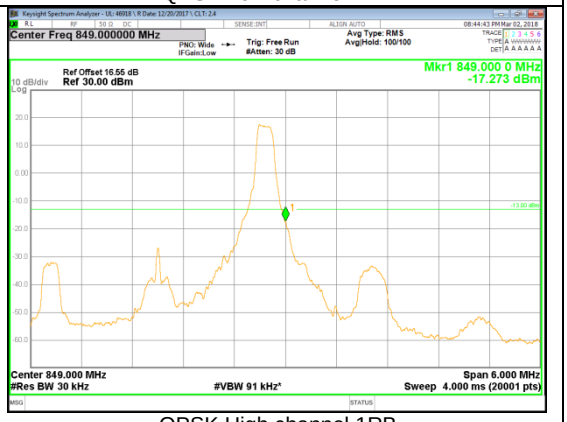
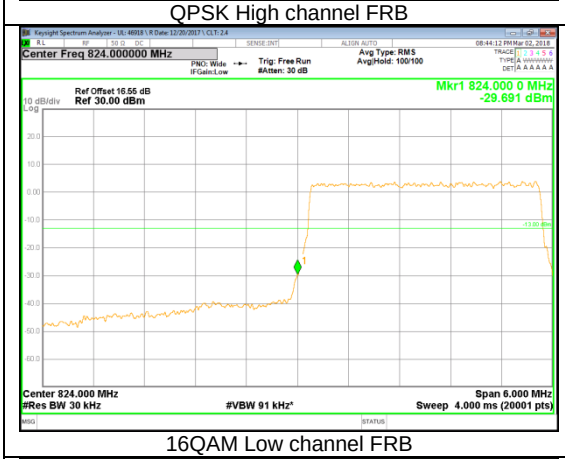
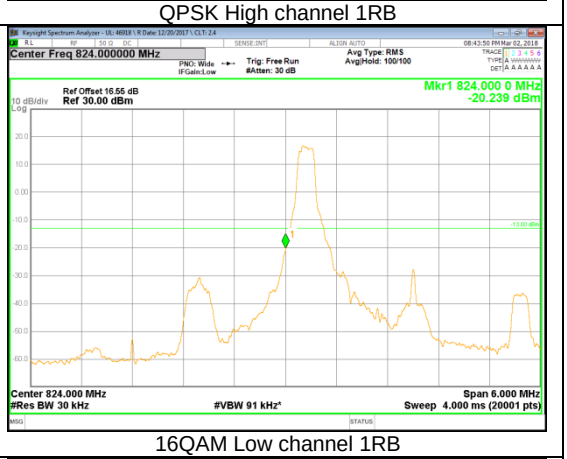
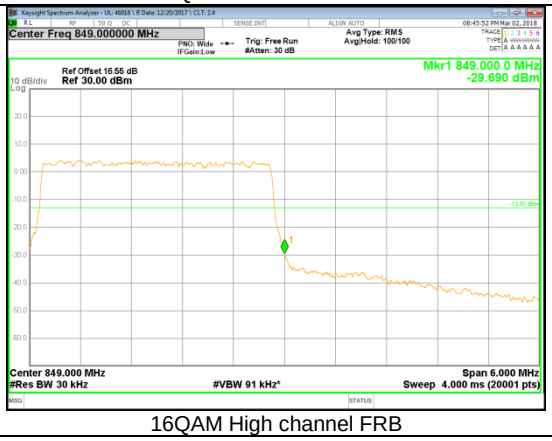
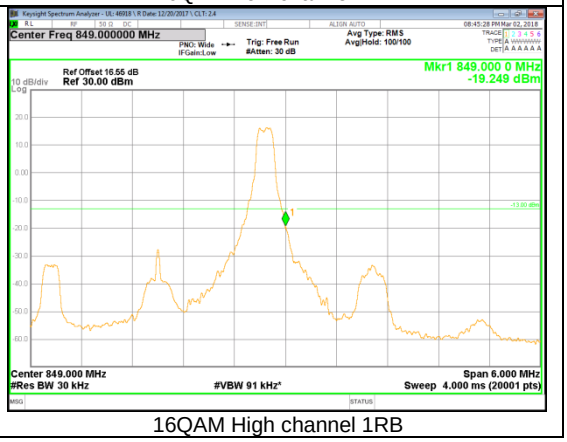
WCDMA

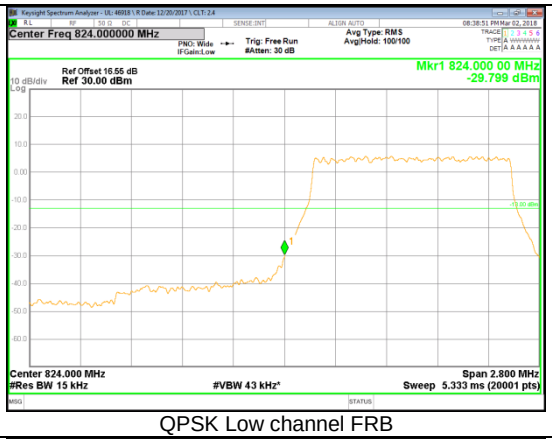
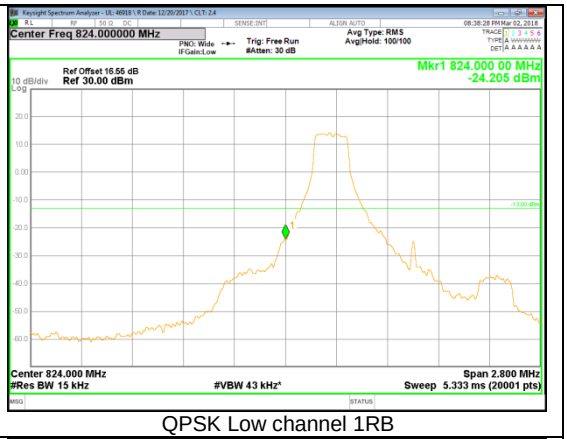
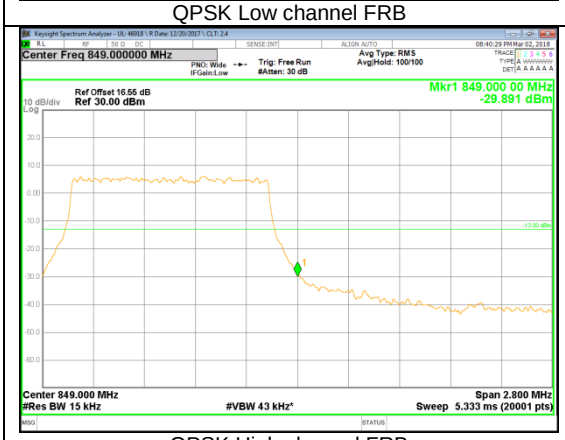
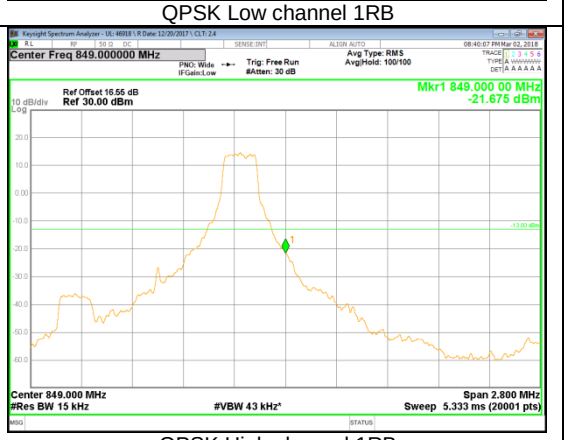
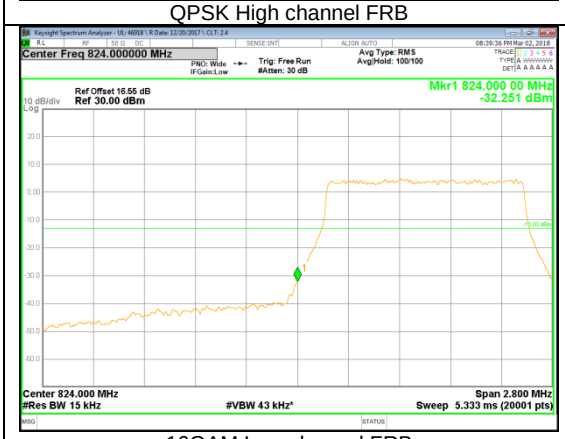
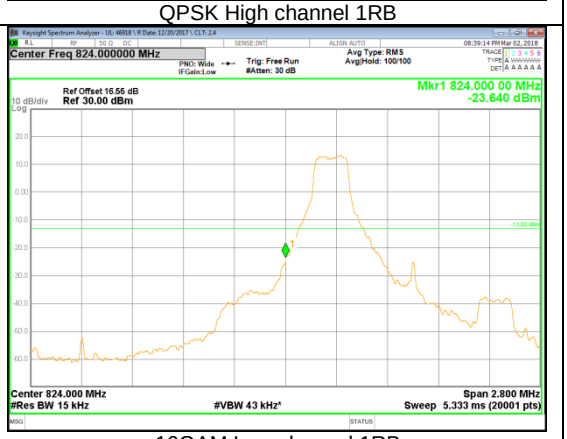
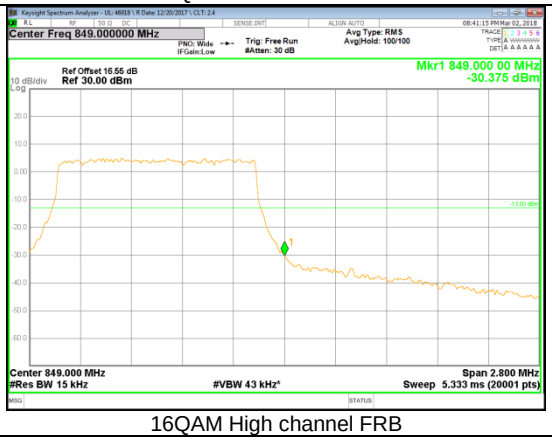
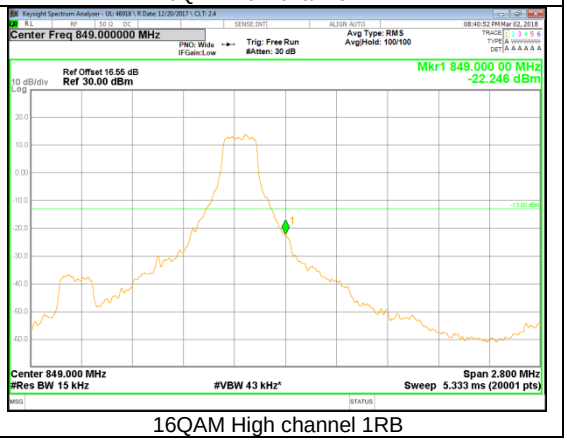
Band 5	 REL99 Low channel	 HSDPA Low channel
	 REL99 High channel	 HSDPA High channel
Band 2	 REL99 Low channel	 HSDPA Low channel
	 REL99 High channel	 HSDPA High channel

LTE Band 5

Band 5 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

Band 5 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

Band 5 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

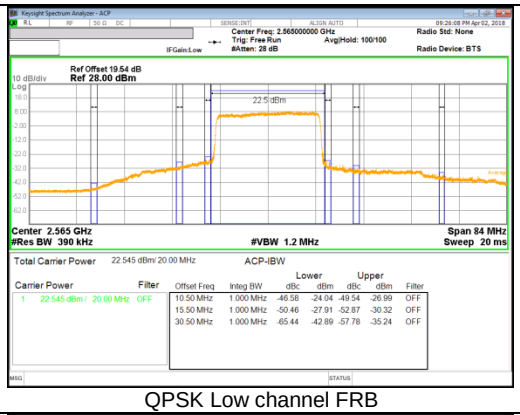
Band 5 1.4MHz	 QPSK Low channel FRB	 QPSK Low channel 1RB
	 QPSK High channel FRB	 QPSK High channel 1RB
	 16QAM Low channel FRB	 16QAM Low channel 1RB
	 16QAM High channel FRB	 16QAM High channel 1RB

9.2.2. EMISSION MASK PLOTS

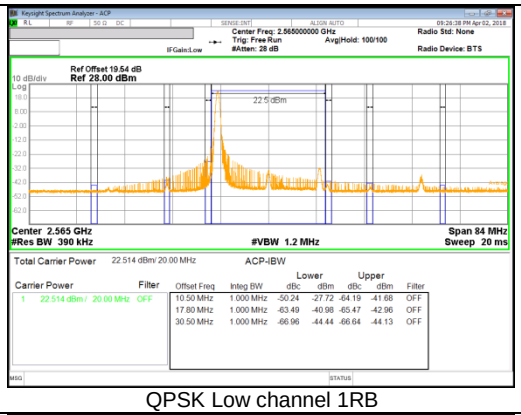
LTE Band 41

Band 41

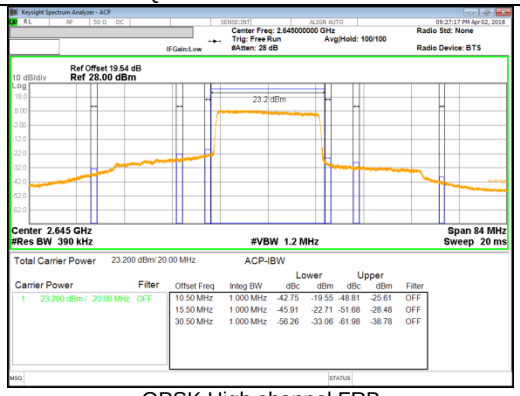
20MHz



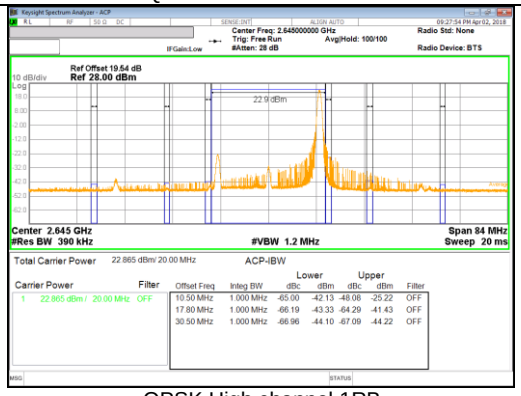
QPSK Low channel FRB



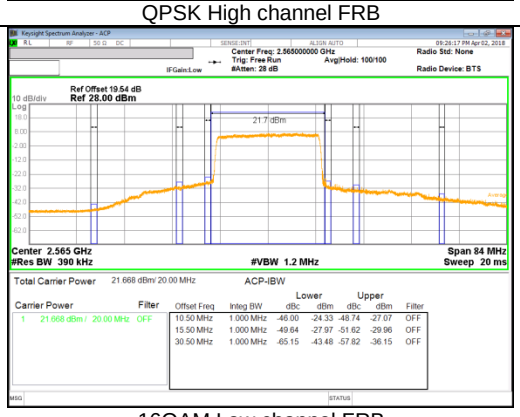
QPSK Low channel 1RB



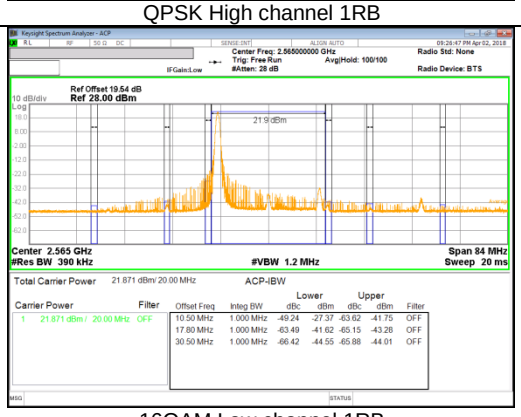
QPSK High channel FRB



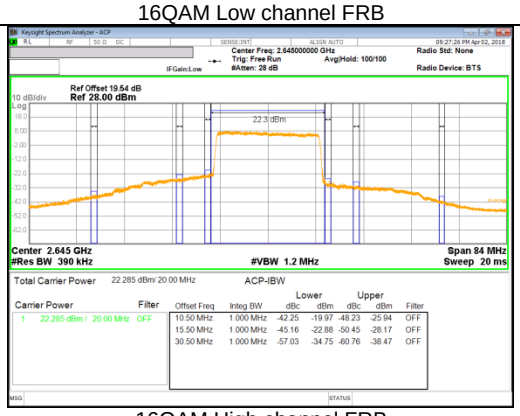
QPSK High channel 1RB



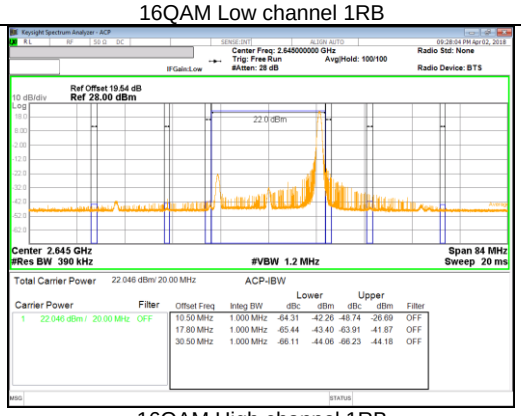
16QAM Low channel FRB



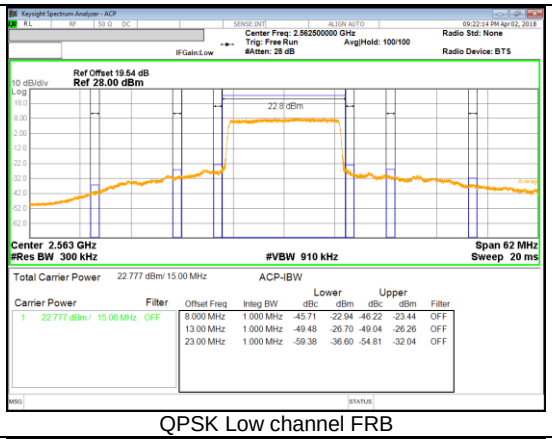
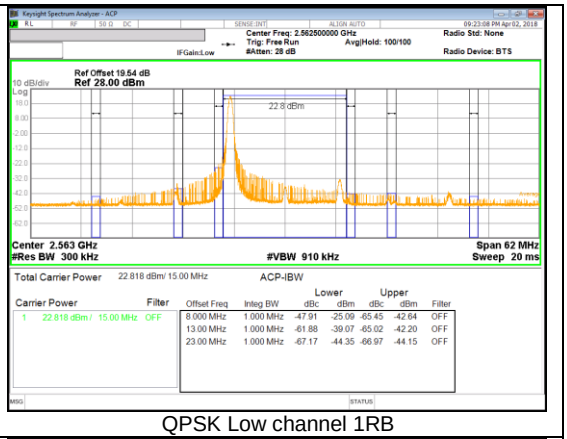
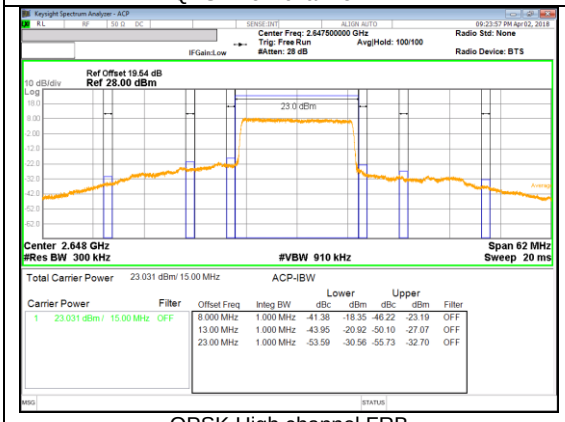
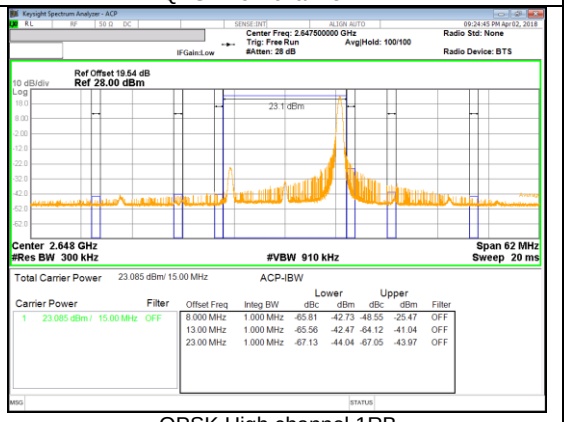
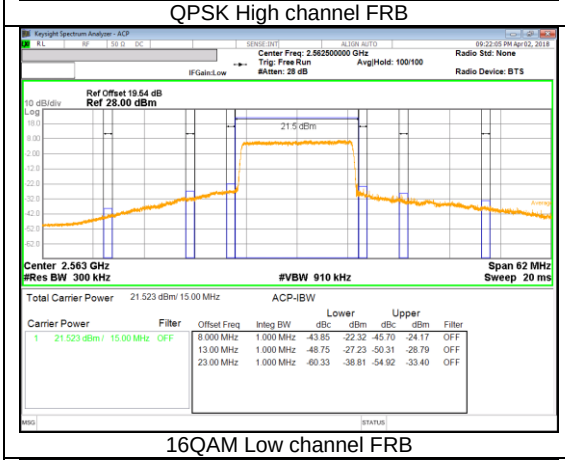
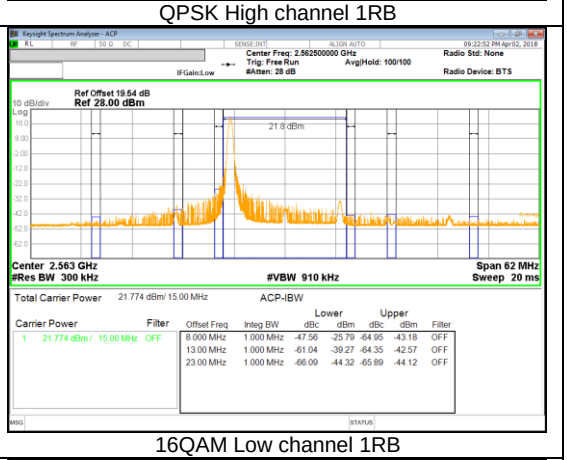
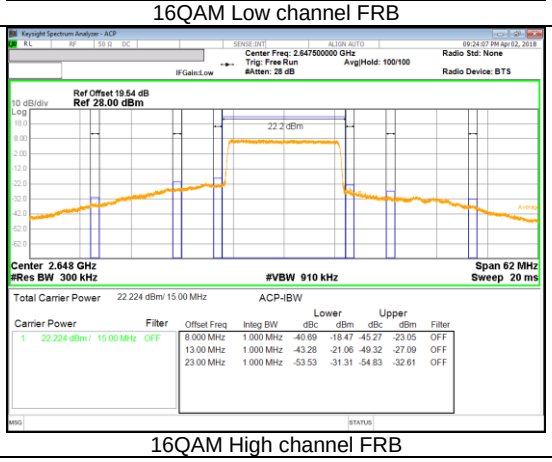
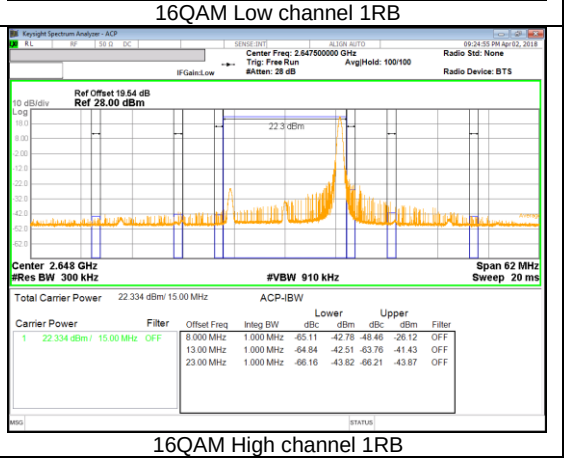
16QAM Low channel 1RB



16QAM High channel FRB

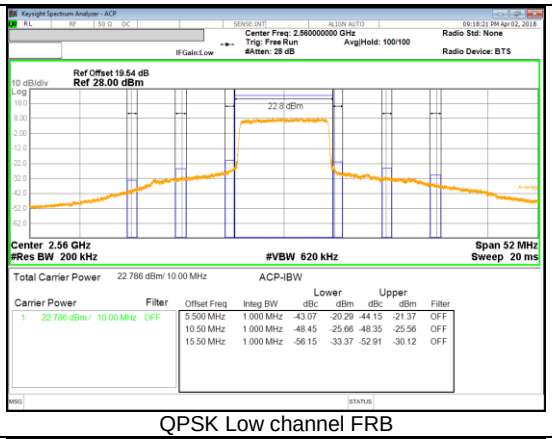


16QAM High channel 1RB

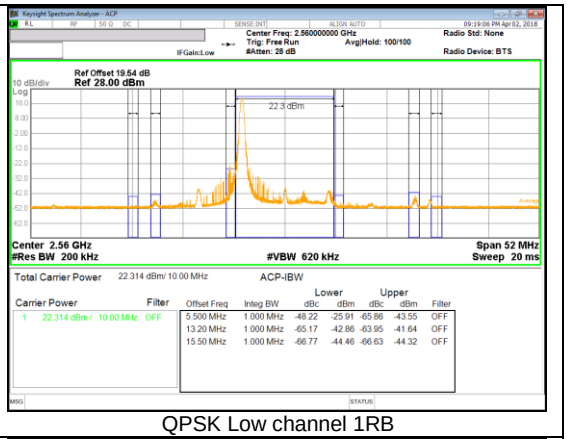
Band 41 15MHz	 QPSK Low channel FRB	 QPSK Low channel 1RB
	 QPSK High channel FRB	 QPSK High channel 1RB
	 16QAM Low channel FRB	 16QAM Low channel 1RB
	 16QAM High channel FRB	 16QAM High channel 1RB

Band 41

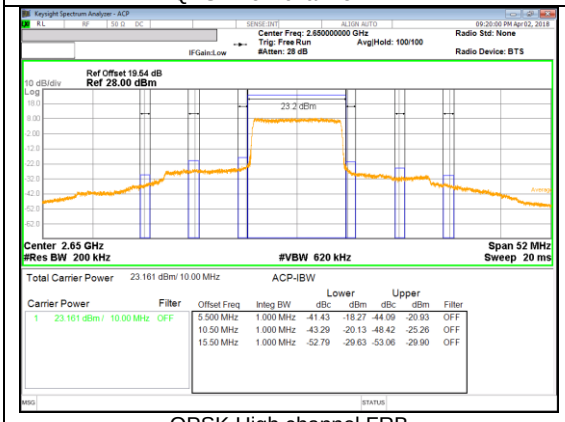
10MHz



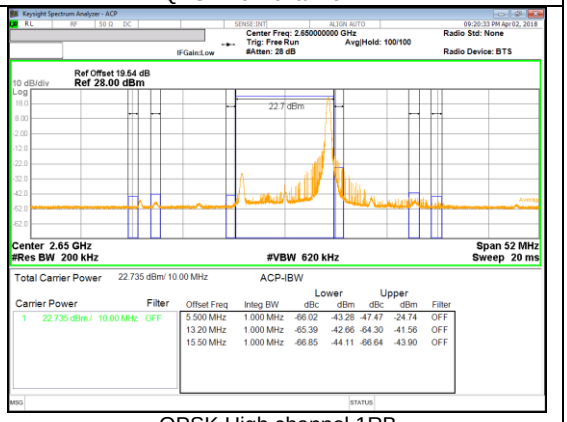
QPSK Low channel FRB



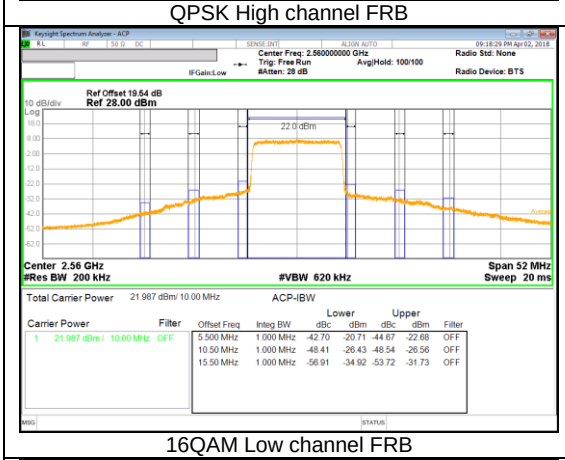
QPSK Low channel 1RB



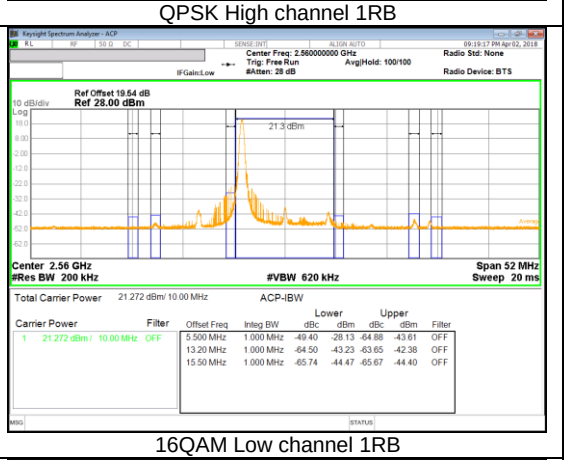
QPSK High channel FRB



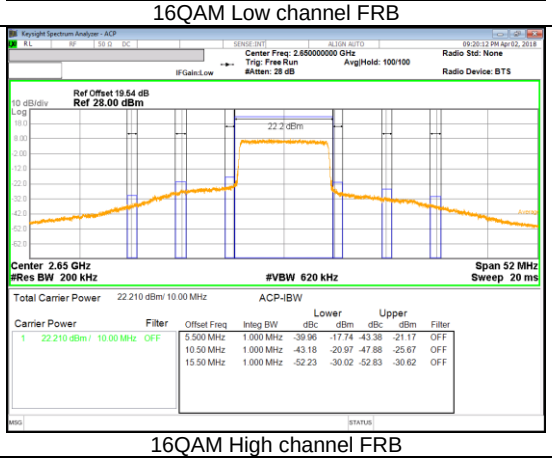
QPSK High channel 1RB



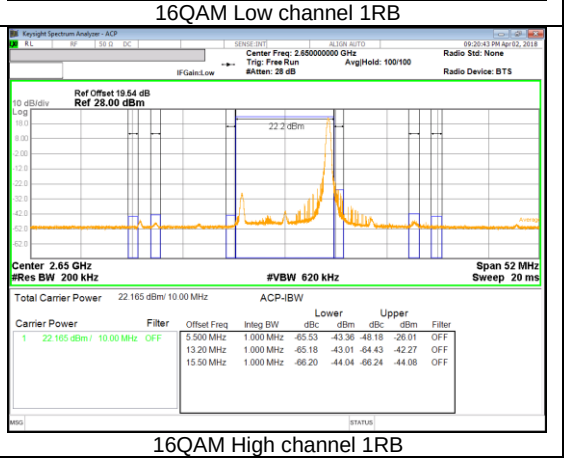
16QAM Low channel FRB



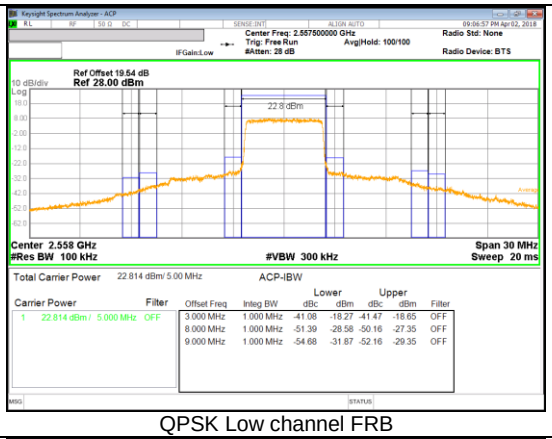
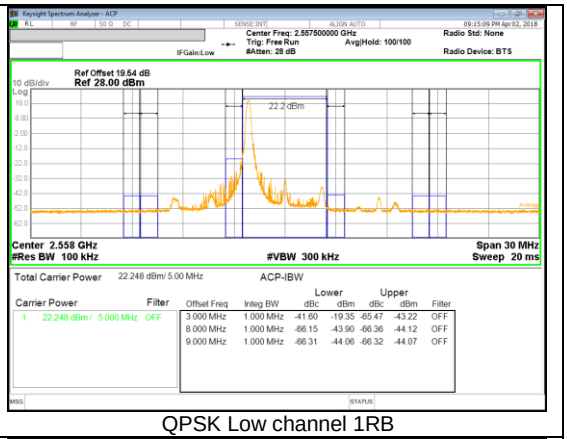
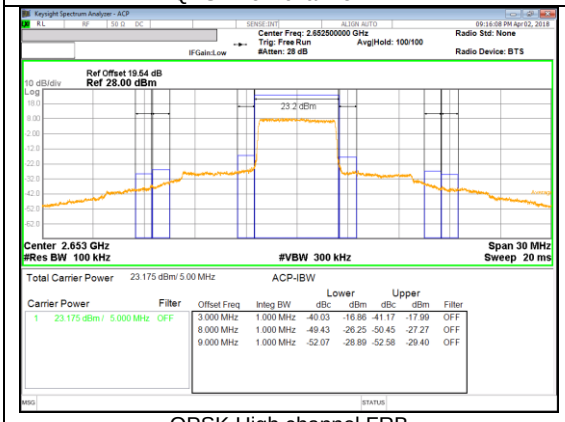
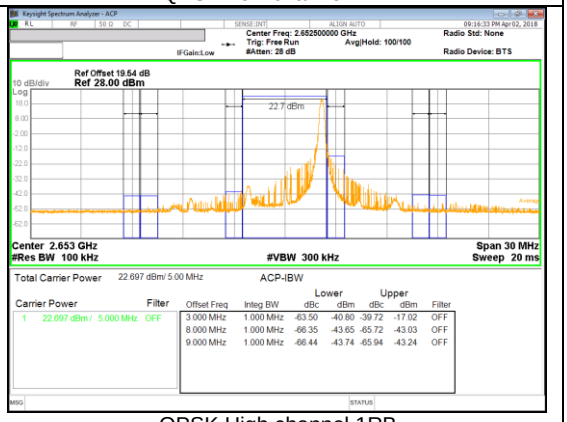
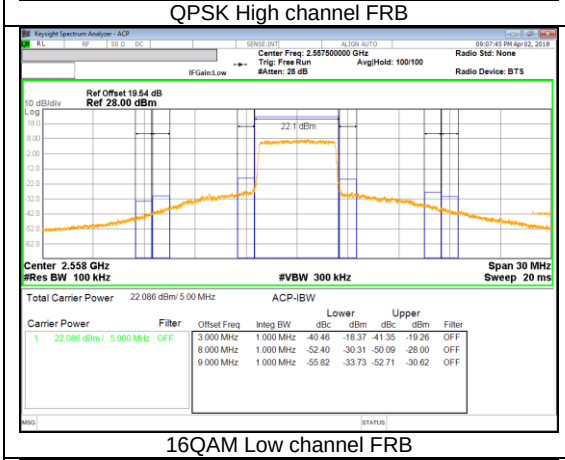
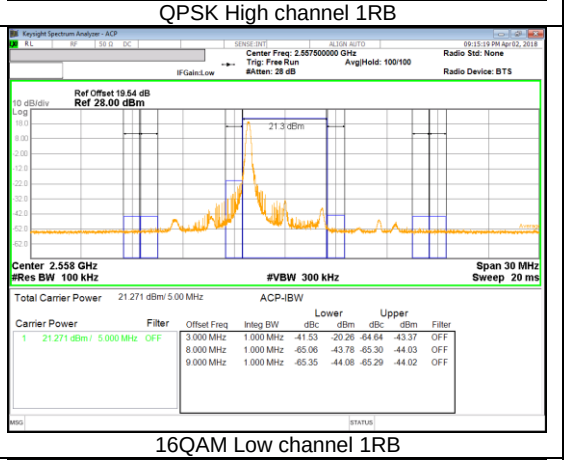
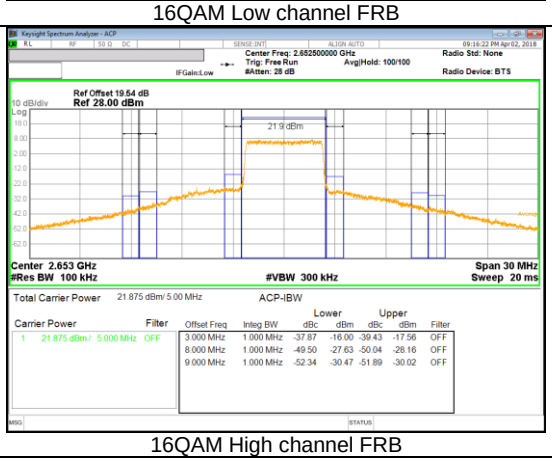
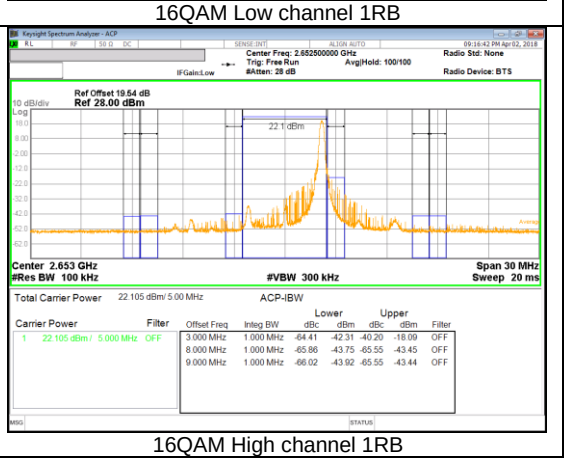
16QAM Low channel 1RB



16QAM High channel FRB



16QAM High channel 1RB

Band 41 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

9.3. 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 v03
The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

a) Set the RBW = 100KHz for emission below 1GHz and 1MHz for emissions above 1GHz (Tests were performed 1MHz [Worst case], to sweep 1 time for all frequency range)

b) Set VBW ≥ 3 × RBW;

c) Set span ≥ 1.5 times the OBW;

d) Sweep time = auto couple;

e) Detector = peak;

f) Ensure that the number of measurement points = Max (40001);

g) Trace mode = max hold;

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RESULTS

GSM

Band	Mode	f [MHz]	Spurious [dBm]	Limit [dBm]
GSM850	GPRS	824.2	-23.17	-13.00
		836.6	-23.02	
		848.8	-22.94	
	EGPRS	824.2	-22.90	
		836.6	-23.18	
		848.8	-22.38	
GSM1900	GPRS	1850.2	-22.29	
		1880.0	-21.92	
		1909.8	-22.04	
	EGPRS	1850.2	-22.82	
		1880.0	-21.90	
		1909.8	-22.16	

WCDMA

Band	Mode	f [MHz]	Spurious [dBm]	Limit [dBm]
Band 5	REL99	826.4	-32.66	-13.00
		836.6	-32.79	
		846.6	-32.55	
	HSDPA	826.4	-32.38	
		836.6	-32.86	
		846.6	-32.42	
Band 2	REL99	1852.4	-33.06	
		1880.0	-32.70	
		1907.6	-32.54	
	HSDPA	1852.4	-32.03	
		1880.0	-31.62	
		1907.6	-31.76	

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LTE 5

Bandwidth	Mode	f [MHz]	Spurious [dBm]	Limit [dBm]
10 MHz	QPSK	829.0	-30.88	-13.00
		836.5	-31.13	
		844.0	-30.65	
	16QAM	829.0	-31.12	
		836.5	-31.18	
		844.0	-31.51	
5 MHz	QPSK	826.5	-31.07	
		836.5	-30.38	
		846.5	-30.49	
	16QAM	826.5	-30.86	
		836.5	-30.82	
		846.5	-31.15	
3 MHz	QPSK	825.5	-31.17	
		836.5	-30.65	
		847.5	-31.64	
	16QAM	825.5	-31.14	
		836.5	-31.42	
		847.5	-30.43	
1.4 MHz	QPSK	824.7	-31.76	
		836.5	-29.54	
		848.3	-30.50	
	16QAM	824.7	-31.49	
		836.5	-30.76	
		848.3	-30.68	

LTE 41

Bandwidth	Mode	f [MHz]	Spurious [dBm]	Limit [dBm]
20 MHz	QPSK	2565.0	-30.95	-25.00
		2605.0	-30.78	
		2645.0	-30.51	
	16QAM	2565.0	-30.63	
		2605.0	-30.44	
		2645.0	-30.44	
15 MHz	QPSK	2562.5	-30.39	
		2605.0	-30.78	
		2647.5	-30.46	
	16QAM	2562.5	-30.60	
		2605.0	-30.94	
		2647.5	-30.48	
10 MHz	QPSK	2560.0	-31.00	
		2605.0	-30.62	
		2650.0	-29.69	
	16QAM	2560.0	-30.62	
		2605.0	-31.02	
		2650.0	-30.91	
5 MHz	QPSK	2557.5	-30.81	
		2605.0	-30.12	
		2652.5	-30.41	
	16QAM	2557.5	-30.68	
		2605.0	-29.92	
		2652.5	-30.17	

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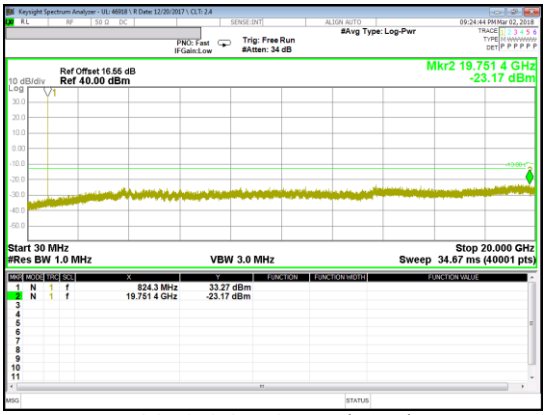
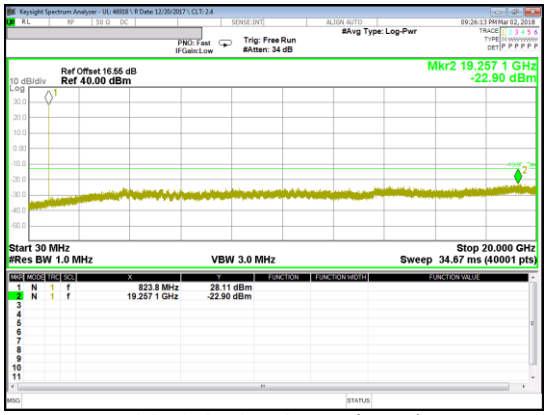
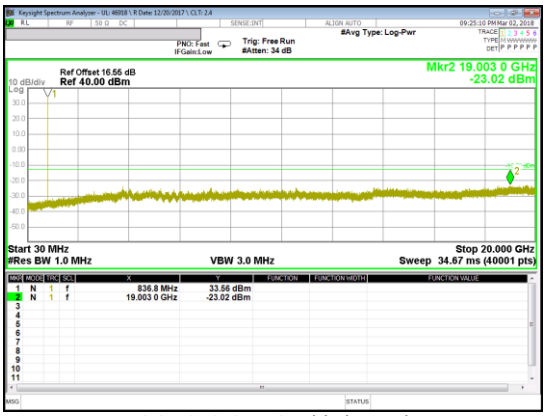
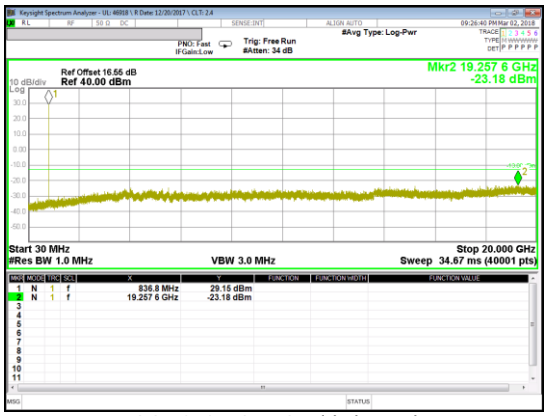
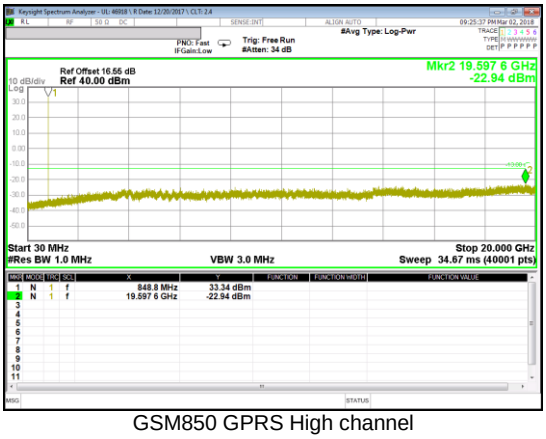
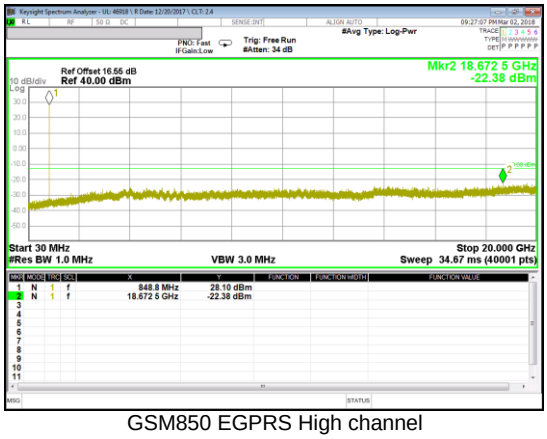
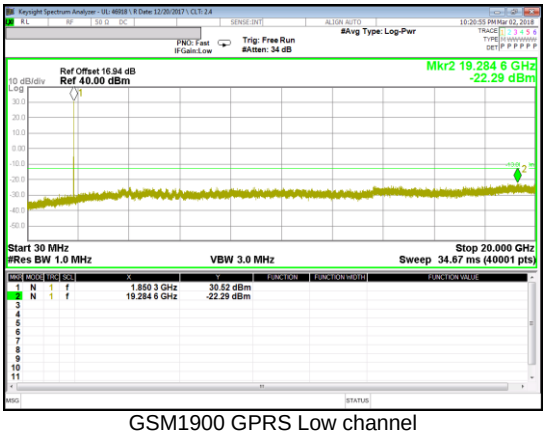
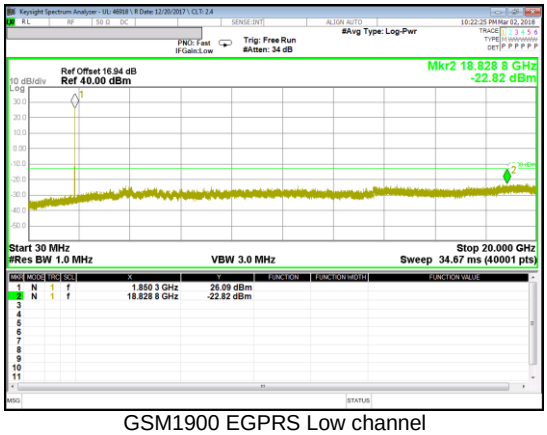
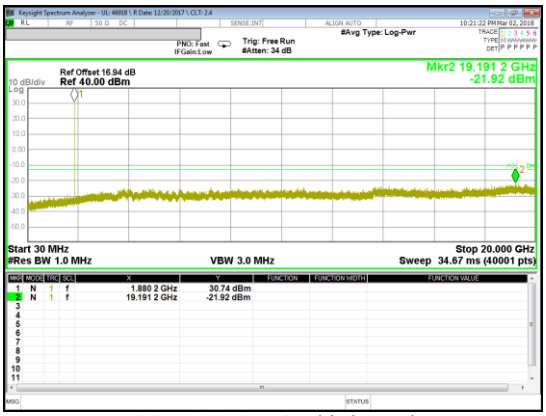
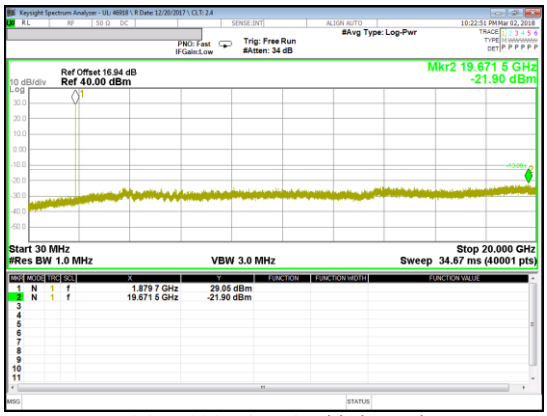
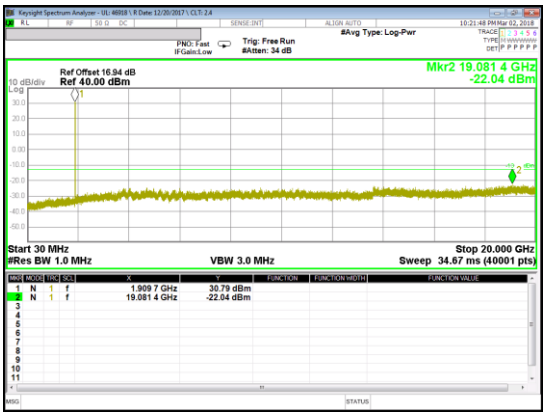
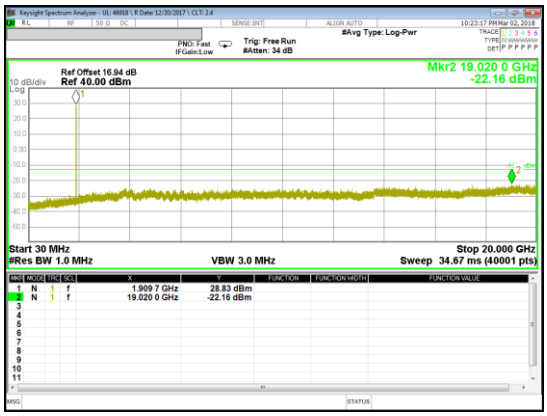
9.3.1. OUT OF BAND EMISSIONS PLOTS

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

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