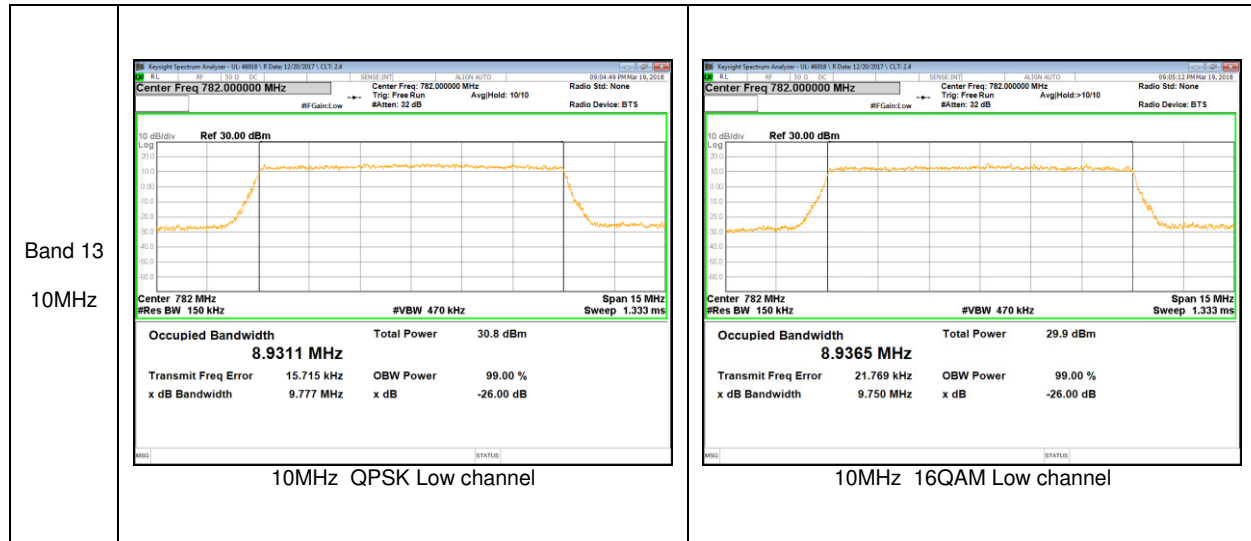
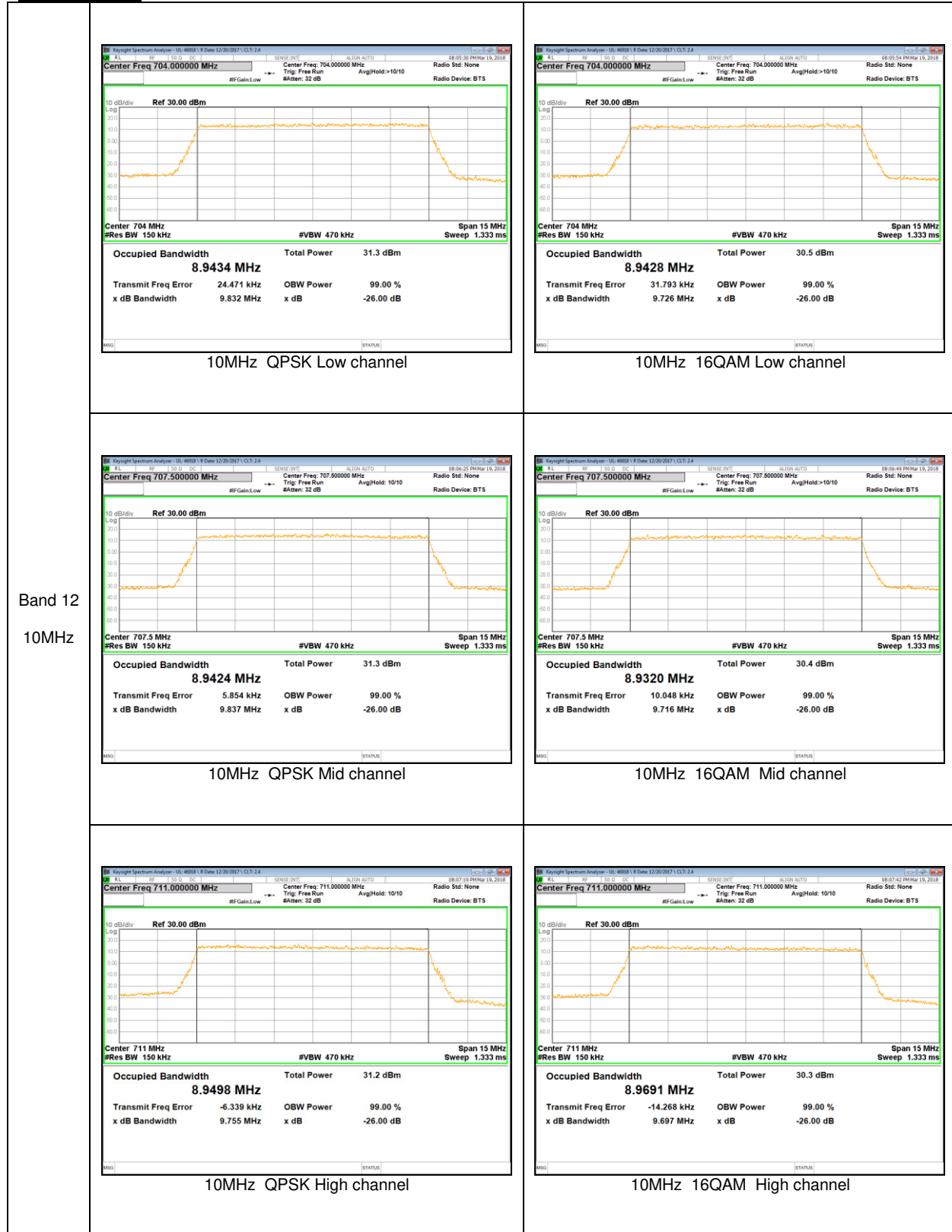


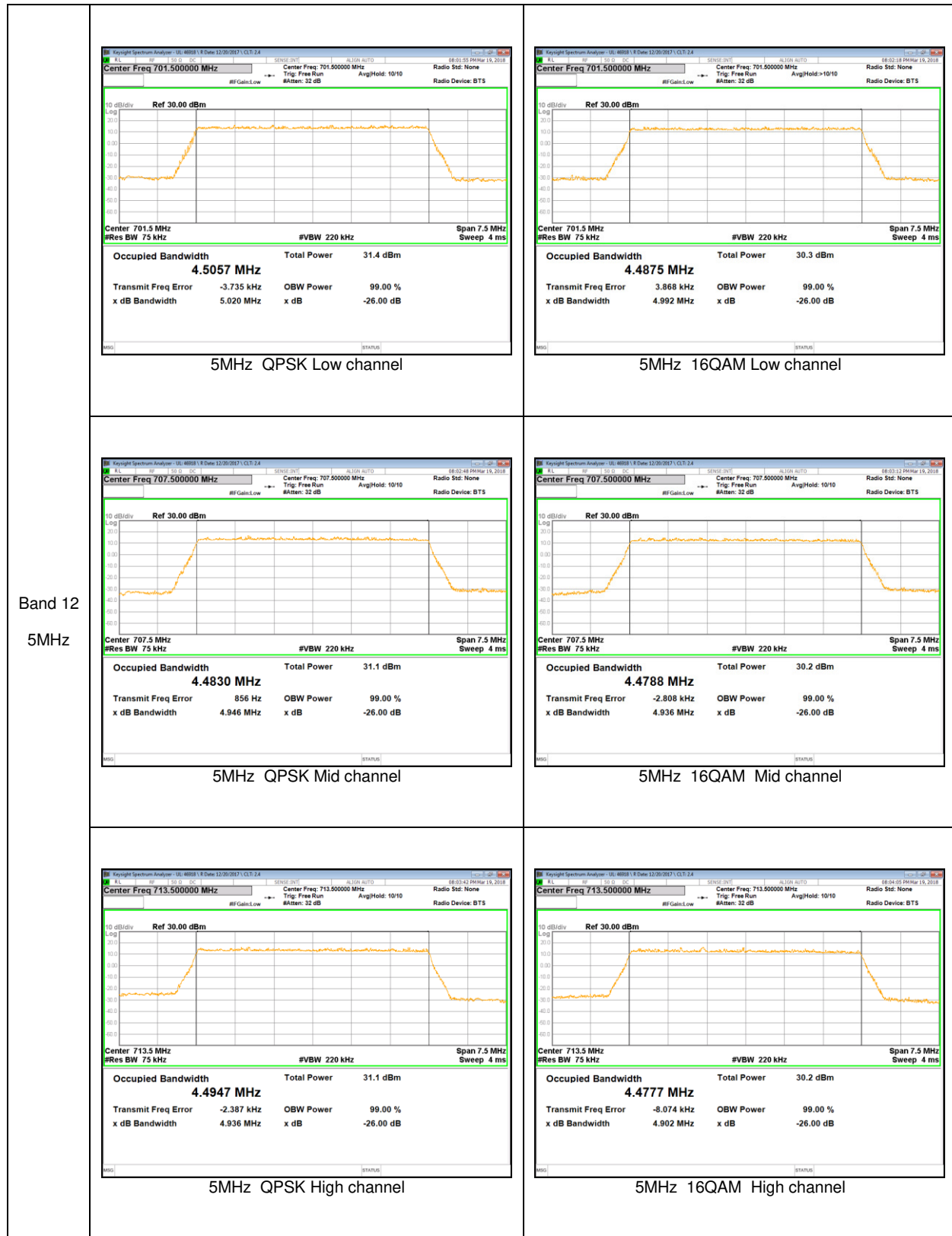
**LTE Band 13**

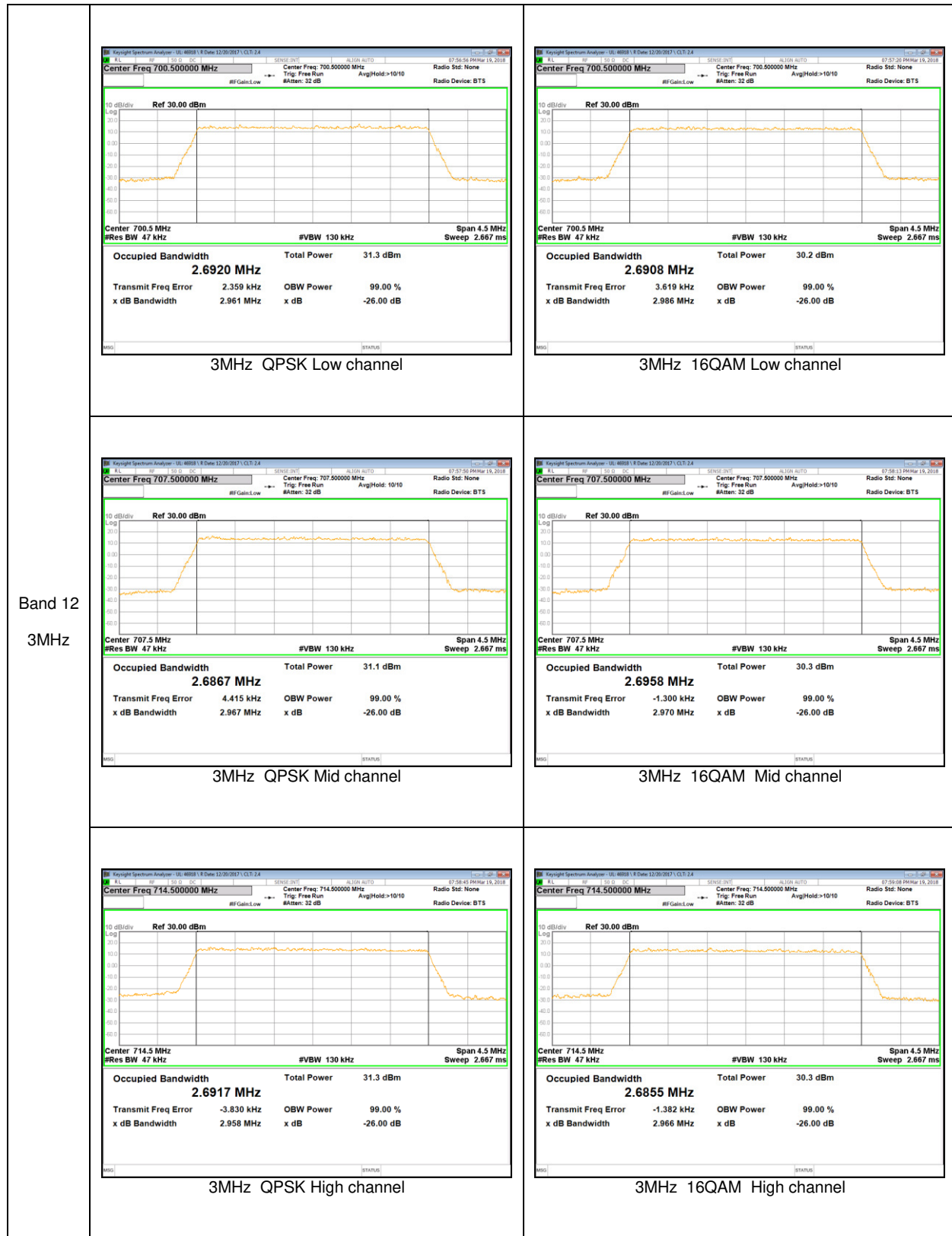


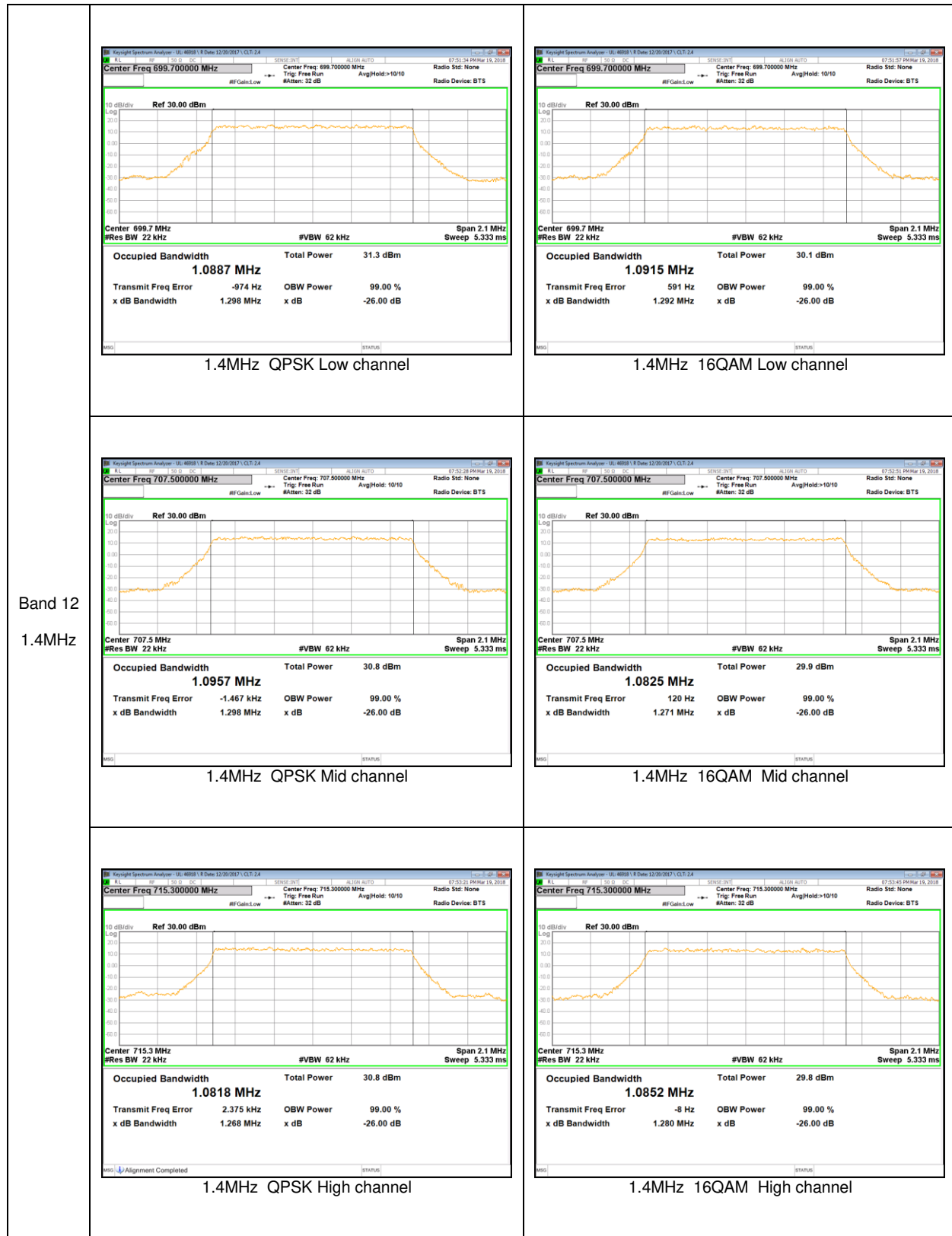


**LTE Band 12**









## 9.2. BAND EDGE EMISSIONS

### RULE PART(S)

FCC: §22.359, §24.238, §27.53(m) and §27.53(c)(2),(4)/ (g), (h)

### 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 than  $43 + 10 \log (P)$  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.

(c) For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB;

(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than  $65 + 10 \log (P)$  dB in a 6.25 kHz band segment, for mobile and portable stations;

(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least  $43 + 10 \log (P)$  dB.

(h) The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10} (P)$  dB.

### 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  $\geq 3 \times$  RBW;
- c) Set span  $\geq 1.5$  times the OBW;
- d) Sweep time = 1 S ;
- e) Detector = RMS;
- f) Ensure that the number of measurement points  $\geq 2 \times$  Span/RBW;
- g) Trace mode = Average(100);
- h) Add duty cycle correction factor (9dB)

**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  $\geq 3 \times$  RBW;
- c) Set span  $\geq 1.5$  times the OBW;
- d) Sweep time = Auto;
- e) Detector = RMS;
- f) Ensure that the number of measurement points  $\geq 2 \times$  Span/RBW;
- g) Trace mode = Average (100);

**NOTE1**

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

**NOTE2:** For frequency range of 763-775 MHz and 793-805 MHz,

- a) Set the RBW = 6.2kHz
- b) Set VBW  $\geq 3 \times$  RBW;
- c) Sweep time = 1 second ;
- d) Detector = RMS;
- e) Ensure that the number of measurement points  $\geq 2 \times$  Span/RBW;
- f) Trace mode = Maxhold;

**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 4	REL99	Lower	1710.000	-26.221	
		Upper	1755.000	-27.881	
	HSDPA	Lower	1710.000	-29.187	
		Upper	1755.000	-29.864	
Band 2	REL99	Lower	1850.000	-26.296	
		Upper	1910.000	-25.995	
	HSDPA	Lower	1850.000	-29.987	
		Upper	1910.000	-29.345	

**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	2506.0	1RB	Lower Trace 1	-27.39	-13.00
				Lower Trace 2	-41.71	-25.00
		FRB	Lower Trace 1	-30.85	-13.00	
			Lower Trace 2	-33.37	-25.00	
		2680.0	1RB	Upper Trace 1	-27.39	-10.00
				Upper Trace 2	-39.13	-13.00
	Upper Trace 3			-44.14	-25.00	
	FRB	Upper Trace 1	-27.60	-10.00		
		Upper Trace 2	-30.05	-13.00		
		Upper Trace 3	-39.07	-25.00		
	16QAM	2506.0	1RB	Lower Trace 1	-26.76	-13.00
				Lower Trace 2	-42.08	-25.00
		FRB	Lower Trace 1	-33.23	-13.00	
			Lower Trace 2	-36.30	-25.00	
		2680.0	1RB	Upper Trace 1	-30.09	-10.00
				Upper Trace 2	-39.93	-13.00
	Upper Trace 3			-44.19	-25.00	
	FRB	Upper Trace 1	-29.54	-10.00		
Upper Trace 2		-31.42	-13.00			
Upper Trace 3		-39.00	-25.00			
15 MHz	QPSK	2503.5	1RB	Lower Trace 1	-24.26	-13.00
				Lower Trace 2	-39.97	-25.00
		FRB	Lower Trace 1	-28.86	-13.00	
			Lower Trace 2	-33.09	-25.00	
		2682.5	1RB	Upper Trace 1	-25.03	-10.00
				Upper Trace 2	-39.27	-13.00
	Upper Trace 3			-44.27	-25.00	
	FRB	Upper Trace 1	-24.69	-10.00		
		Upper Trace 2	-27.87	-13.00		
		Upper Trace 3	-36.13	-25.00		
	16QAM	2503.5	1RB	Lower Trace 1	-25.97	-13.00
				Lower Trace 2	-40.81	-25.00
		FRB	Lower Trace 1	-31.77	-13.00	
			Lower Trace 2	-35.90	-25.00	
		2682.5	1RB	Upper Trace 1	-27.14	-10.00
				Upper Trace 2	-40.09	-13.00
	Upper Trace 3			-44.17	-25.00	
	FRB	Upper Trace 1	-27.27	-10.00		
Upper Trace 2		-29.95	-13.00			
Upper Trace 3		-36.71	-25.00			

**LTE 41 (continued)**

Bandwidth	Mode	f [MHz]	RB Status	Side Trace	Level [dBm]	Limit [dBm]
10 MHz	QPSK	2501.0	1RB	Lower Trace 1	-27.75	-13.00
				Lower Trace 2	-41.23	-25.00
		FRB	Lower Trace 1	-28.25	-13.00	
			Lower Trace 2	-35.19	-25.00	
		2685.0	1RB	Upper Trace 1	-25.21	-10.00
				Upper Trace 2	-39.26	-13.00
	Upper Trace 3			-44.03	-25.00	
	FRB	Upper Trace 1	-25.47	-10.00		
		Upper Trace 2	-29.43	-13.00		
		Upper Trace 3	-36.02	-25.00		
	16QAM	2501.0	1RB	Lower Trace 1	-26.22	-13.00
				Lower Trace 2	-42.02	-25.00
		FRB	Lower Trace 1	-30.19	-13.00	
			Lower Trace 2	-37.62	-25.00	
		2685.0	1RB	Upper Trace 1	-27.69	-10.00
				Upper Trace 2	-40.59	-13.00
	Upper Trace 3			-44.21	-25.00	
	FRB	Upper Trace 1	-26.79	-10.00		
Upper Trace 2		-30.98	-13.00			
Upper Trace 3		-36.64	-25.00			
5 MHz	QPSK	2498.5	1RB	Lower Trace 1	-17.78	-13.00
				Lower Trace 2	-42.45	-25.00
		FRB	Lower Trace 1	-22.22	-13.00	
			Lower Trace 2	-36.48	-25.00	
		2687.5	1RB	Upper Trace 1	-18.48	-10.00
				Upper Trace 2	-43.15	-13.00
	Upper Trace 3			-43.26	-25.00	
	FRB	Upper Trace 1	-22.12	-10.00		
		Upper Trace 2	-32.41	-13.00		
		Upper Trace 3	-33.30	-25.00		
	16QAM	2498.5	1RB	Lower Trace 1	-19.90	-13.00
				Lower Trace 2	-42.88	-25.00
		FRB	Lower Trace 1	-24.80	-13.00	
			Lower Trace 2	-38.00	-25.00	
		2687.5	1RB	Upper Trace 1	-20.01	-10.00
				Upper Trace 2	-42.86	-13.00
	Upper Trace 3			-43.20	-25.00	
	FRB	Upper Trace 1	-23.41	-10.00		
Upper Trace 2		-33.76	-13.00			
Upper Trace 3		-35.39	-25.00			

**LTE 66**

Bandwidth	Mode	Side	RB Status	f [MHz]	Level [dBm]	Limit [dBm]
20 MHz	QPSK	Lower	1RB	1710.000	-33.977	-13.00
			FRB	1710.000	-33.197	
		Upper	1RB	1780.000	-32.795	
			FRB	1780.000	-35.268	
	16QAM	Lower	1RB	1710.000	-32.186	
			FRB	1710.000	-34.178	
		Upper	1RB	1780.000	-33.084	
			FRB	1780.000	-35.249	
15 MHz	QPSK	Lower	1RB	1710.000	-29.206	
			FRB	1710.000	-33.560	
		Upper	1RB	1780.000	-29.665	
			FRB	1780.000	-34.309	
	16QAM	Lower	1RB	1710.000	-30.726	
			FRB	1710.000	-34.216	
		Upper	1RB	1780.000	-26.994	
			FRB	1780.000	-34.708	
10 MHz	QPSK	Lower	1RB	1710.000	-33.553	
			FRB	1710.000	-30.467	
		Upper	1RB	1780.000	-32.255	
			FRB	1780.000	-33.602	
	16QAM	Lower	1RB	1710.000	-32.587	
			FRB	1710.000	-32.004	
		Upper	1RB	1780.000	-33.602	
			FRB	1780.000	-34.657	
5 MHz	QPSK	Lower	1RB	1710.000	-23.363	
			FRB	1710.000	-29.337	
		Upper	1RB	1780.000	-22.748	
			FRB	1780.000	-28.859	
	16QAM	Lower	1RB	1710.000	-21.803	
			FRB	1710.000	-30.173	
		Upper	1RB	1780.000	-23.677	
			FRB	1780.000	-29.805	

Bandwidth	Mode	Side	RB Status	f [MHz]	Level [dBm]	Limit [dBm]
3 MHz	QPSK	Lower	1RB	1710.000	-20.660	-13.00
			FRB	1710.000	-30.000	
		Upper	1RB	1780.000	-18.749	
			FRB	1780.000	-28.482	
	16QAM	Lower	1RB	1710.000	-21.165	
			FRB	1710.000	-29.536	
		Upper	1RB	1780.000	-20.957	
			FRB	1780.000	-29.030	
1.4 MHz	QPSK	Lower	1RB	1710.000	-25.206	-13.00
			FRB	1710.000	-29.098	
		Upper	1RB	1780.000	-22.437	
			FRB	1780.000	-30.055	
	16QAM	Lower	1RB	1710.000	-25.437	
			FRB	1710.000	-30.821	
		Upper	1RB	1780.000	-23.242	
			FRB	1780.000	-30.339	

**LTE 2**

Bandwidth	Mode	Side	RB Status	f [MHz]	Level [dBm]	Limit [dBm]
20 MHz	QPSK	Lower	1RB	1850.000	-35.003	-13.00
			FRB	1850.000	-32.898	
		Upper	1RB	1910.000	-31.312	
			FRB	1910.000	-29.177	
	16QAM	Lower	1RB	1850.000	-34.672	
			FRB	1850.000	-33.110	
		Upper	1RB	1910.000	-33.147	
			FRB	1910.000	-30.631	
15 MHz	QPSK	Lower	1RB	1850.000	-30.618	-13.00
			FRB	1850.000	-32.133	
		Upper	1RB	1910.000	-27.604	
			FRB	1910.000	-29.428	
	16QAM	Lower	1RB	1850.000	-31.439	
			FRB	1850.000	-33.426	
		Upper	1RB	1910.000	-29.104	
			FRB	1910.000	-30.527	

Bandwidth	Mode	Side	RB Status	f [MHz]	Level [dBm]	Limit [dBm]
10 MHz	QPSK	Lower	1RB	1850.000	-31.748	-13.00
			FRB	1850.000	-32.007	
		Upper	1RB	1910.000	-29.377	
			FRB	1910.000	-28.493	
	16QAM	Lower	1RB	1850.000	-30.562	
			FRB	1850.000	-33.201	
		Upper	1RB	1910.000	-29.126	
			FRB	1910.000	-29.793	
5 MHz	QPSK	Lower	1RB	1850.000	-21.305	-13.00
			FRB	1850.000	-28.434	
		Upper	1RB	1910.000	-20.732	
			FRB	1910.000	-26.917	
	16QAM	Lower	1RB	1850.000	-22.086	
			FRB	1850.000	-31.578	
		Upper	1RB	1910.000	-19.904	
			FRB	1910.000	-28.167	
3 MHz	QPSK	Lower	1RB	1850.000	-21.574	-13.00
			FRB	1850.000	-26.119	
		Upper	1RB	1910.000	-18.074	
			FRB	1910.000	-24.891	
	16QAM	Lower	1RB	1850.000	-20.069	
			FRB	1850.000	-27.262	
		Upper	1RB	1910.000	-19.333	
			FRB	1910.000	-25.305	
1.4 MHz	QPSK	Lower	1RB	1850.000	-23.373	-13.00
			FRB	1850.000	-25.037	
		Upper	1RB	1910.000	-20.426	
			FRB	1910.000	-22.644	
	16QAM	Lower	1RB	1850.000	-25.319	
			FRB	1850.000	-28.064	
		Upper	1RB	1910.000	-22.273	
			FRB	1910.000	-23.630	

**LTE 13**

Bandwidth	Mode	Side	RB Status	f [MHz]	Level [dBm]	Limit [dBm]
10 MHz	QPSK	Lower	1RB	777.000	-31.231	-13.00
			FRB	777.000	-34.241	
		Upper	1RB	787.000	-26.160	
			FRB	787.000	-31.801	
	16QAM	Lower	1RB	777.000	-32.782	
			FRB	777.000	-33.777	
		Upper	1RB	787.000	-29.545	
			FRB	787.000	-32.593	
5 MHz	QPSK	Lower	1RB	777.000	-22.381	
			FRB	777.000	-28.646	
		Upper	1RB	787.000	-20.219	
			FRB	787.000	-29.821	
	16QAM	Lower	1RB	777.000	-22.566	
			FRB	777.000	-29.969	
		Upper	1RB	787.000	-24.432	
			FRB	787.000	-29.512	

**LTE Band 4**

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

**LTE Band 17**

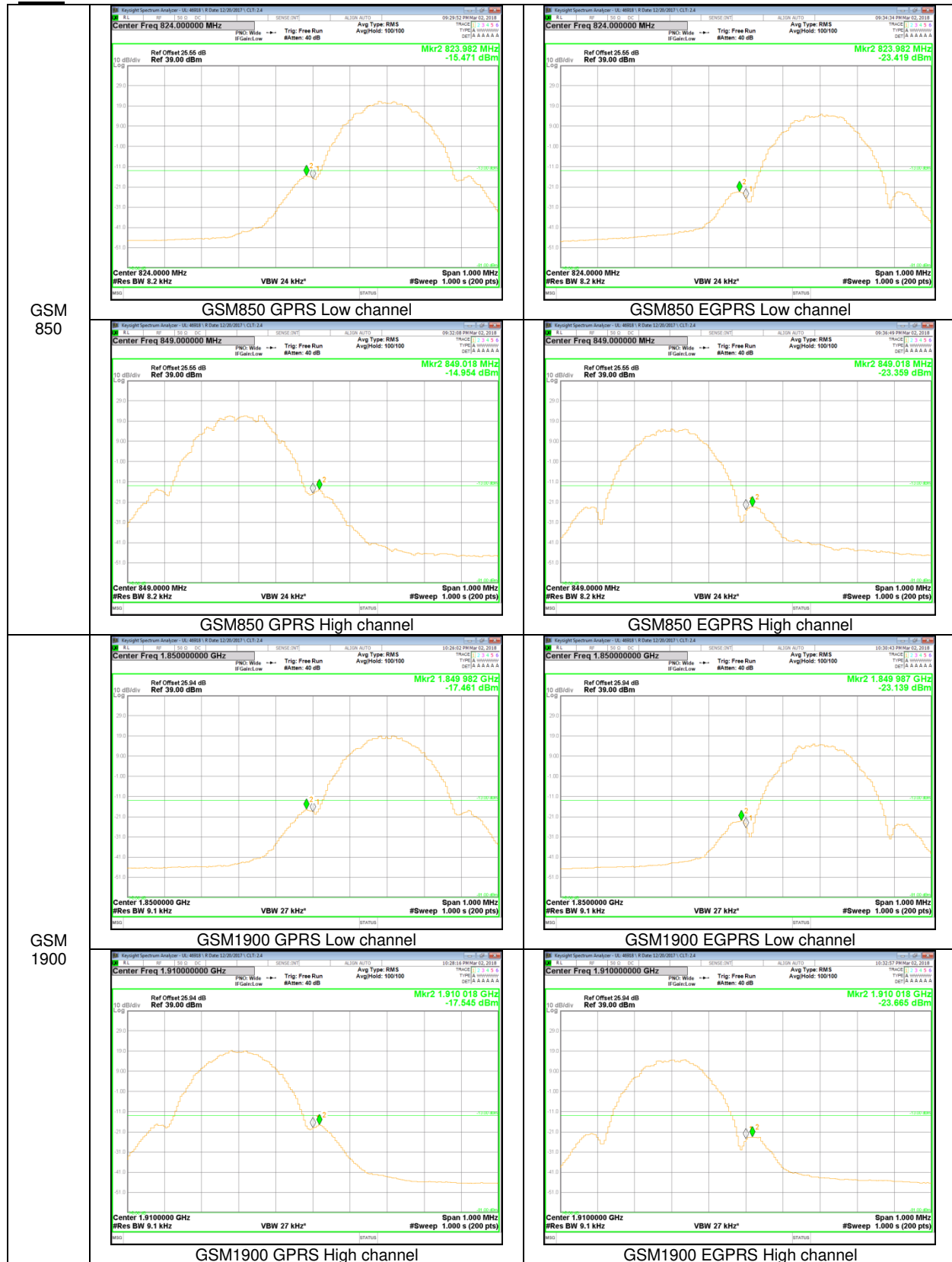
Due to frequency range and same output power setting, test was carried in LTE Band 12 to cover both LTE Band 12 and LTE Band 17.

**LTE 12**

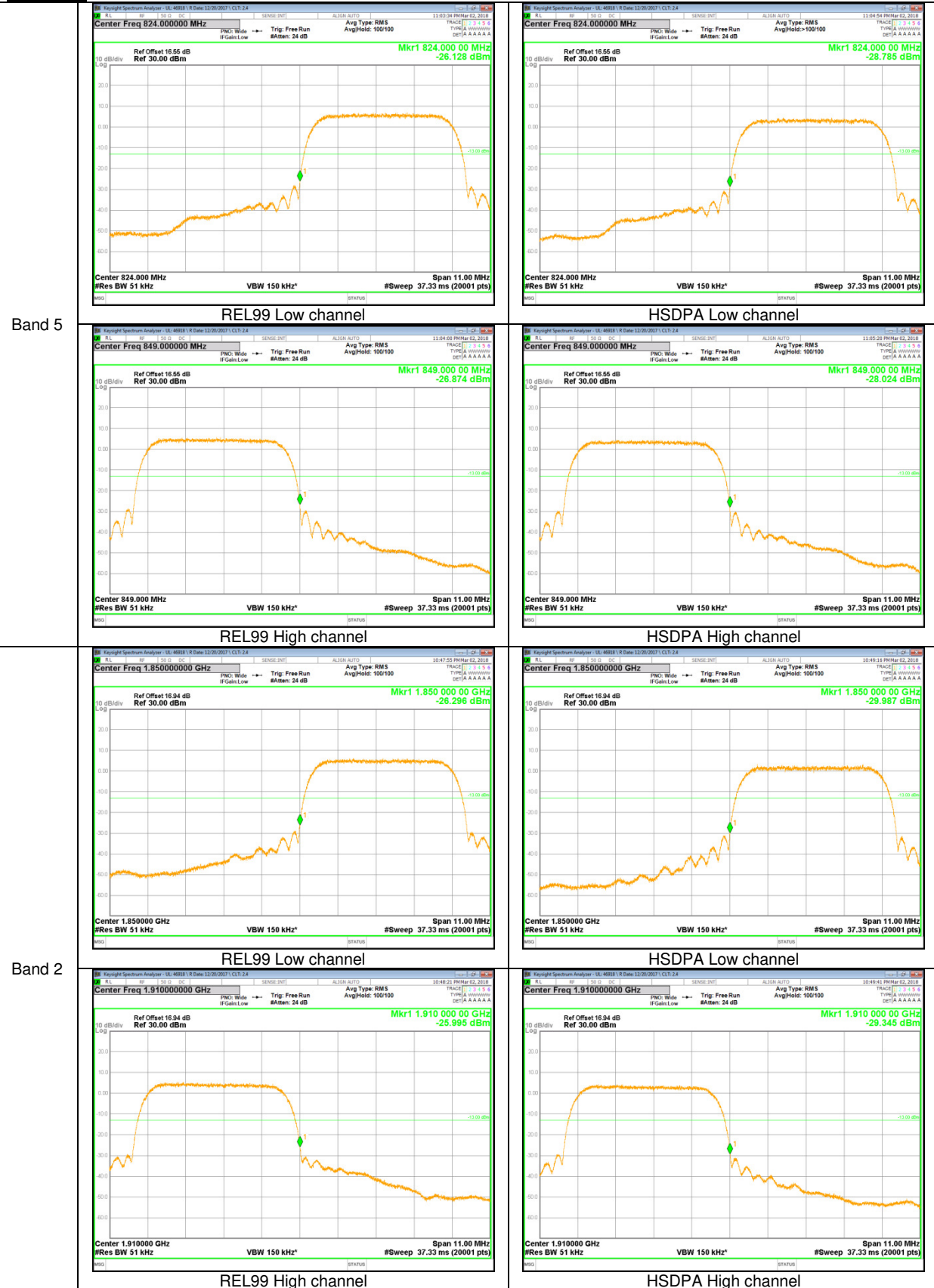
Bandwidth	Mode	Side	RB Status	f [MHz]	Level [dBm]	Limit [dBm]
10 MHz	QPSK	Lower	1RB	699.000	-32.044	-13.00
			FRB	699.000	-31.664	
		Upper	1RB	716.000	-30.700	
			FRB	716.000	-34.680	
	16QAM	Lower	1RB	699.000	-35.953	
			FRB	699.000	-34.694	
		Upper	1RB	716.000	-30.944	
			FRB	716.000	-34.594	
5 MHz	QPSK	Lower	1RB	699.000	-22.698	-13.00
			FRB	699.000	-31.690	
		Upper	1RB	716.000	-19.689	
			FRB	716.000	-29.624	
	16QAM	Lower	1RB	699.000	-20.896	
			FRB	699.000	-28.667	
		Upper	1RB	716.000	-20.164	
			FRB	716.000	-30.676	
3 MHz	QPSK	Lower	1RB	699.000	-20.731	-13.00
			FRB	699.000	-27.851	
		Upper	1RB	716.000	-24.031	
			FRB	716.000	-29.330	
	16QAM	Lower	1RB	699.000	-21.337	
			FRB	699.000	-29.593	
		Upper	1RB	716.000	-21.059	
			FRB	716.000	-30.454	
1.4 MHz	QPSK	Lower	1RB	699.000	-25.029	-13.00
			FRB	699.000	-32.058	
		Upper	1RB	716.000	-26.175	
			FRB	716.000	-31.222	
	16QAM	Lower	1RB	699.000	-25.752	
			FRB	699.000	-32.448	
		Upper	1RB	716.000	-27.448	
			FRB	716.000	-32.702	

### 9.2.1. BAND EDGE PLOTS

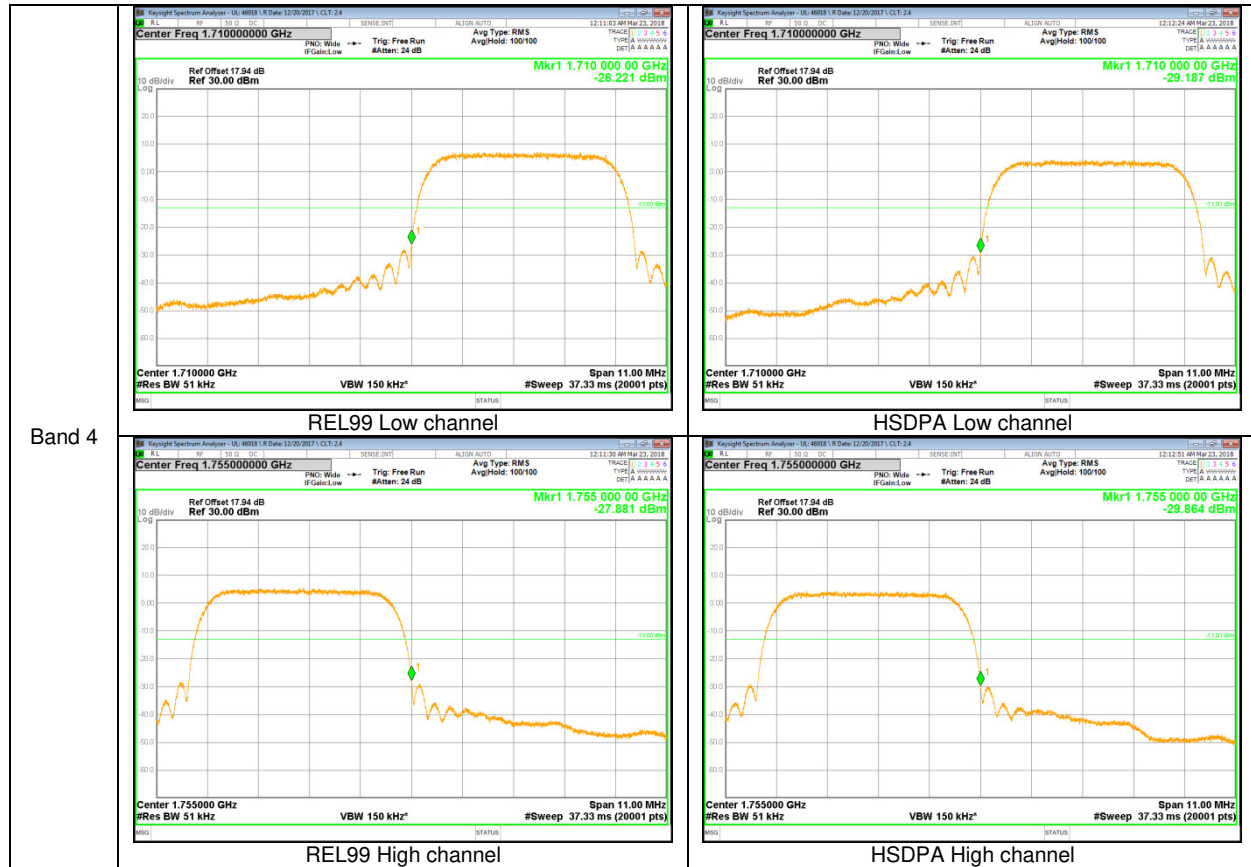
#### GSM



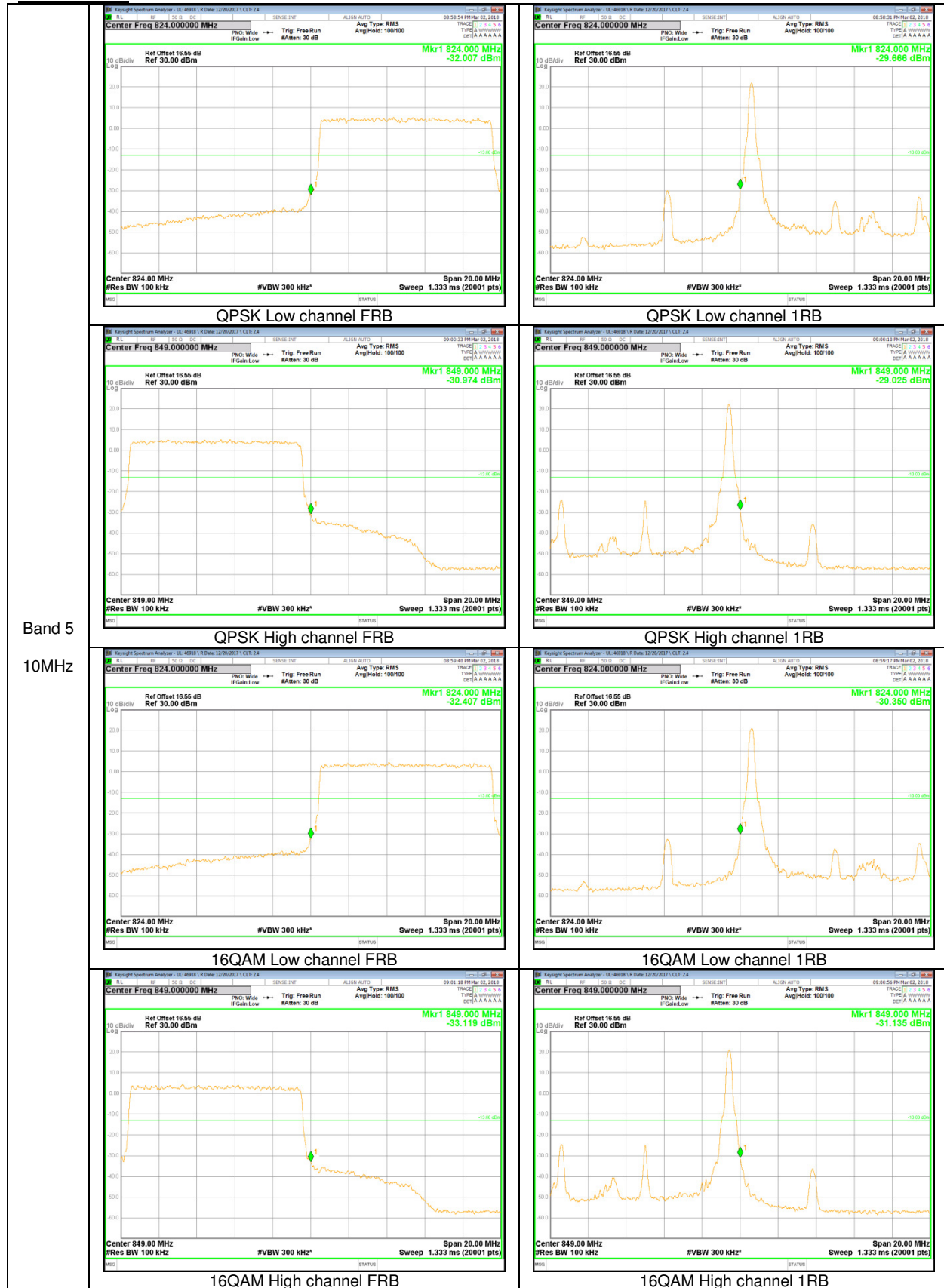
WCDMA



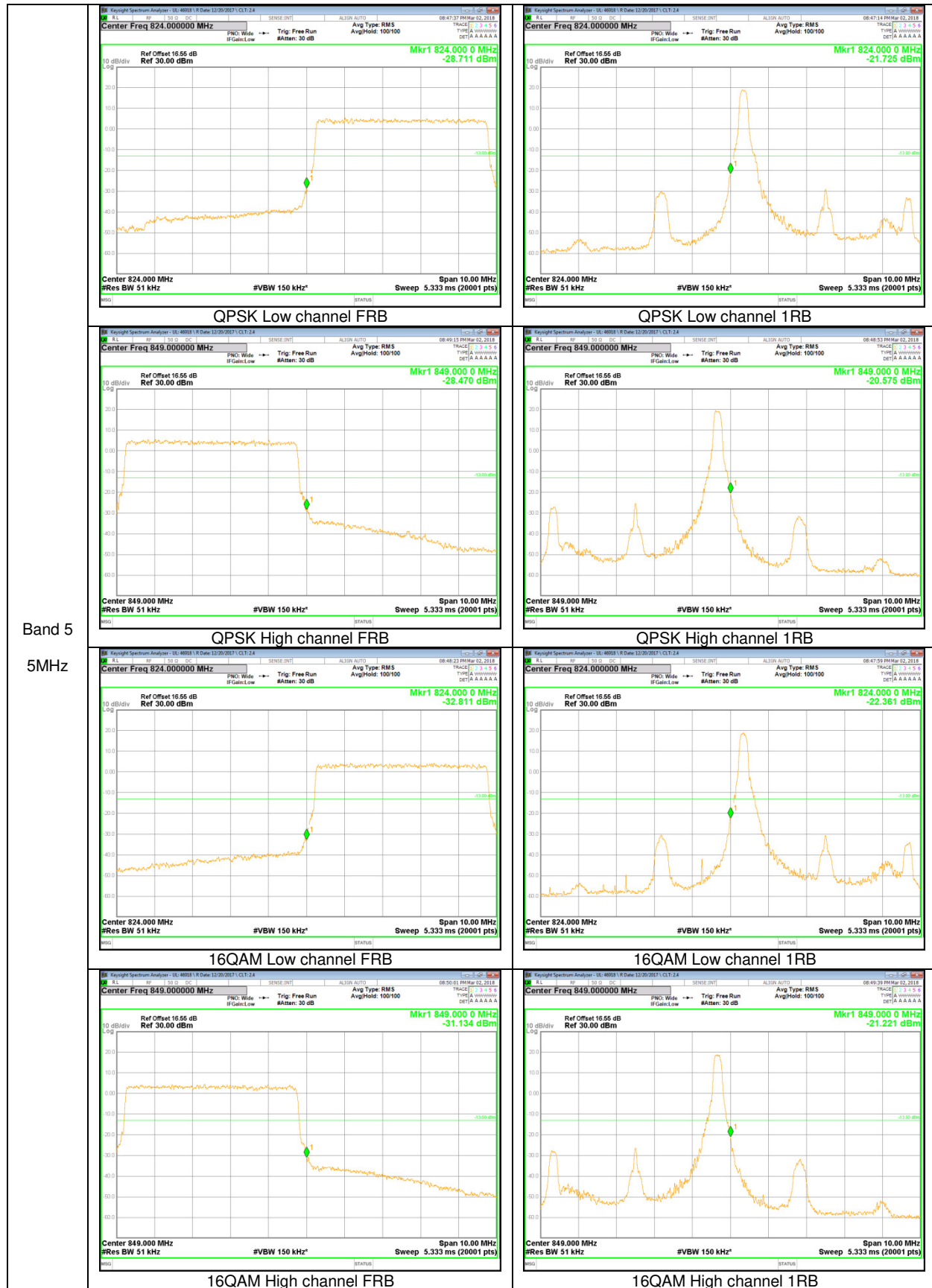
**WCDMA**



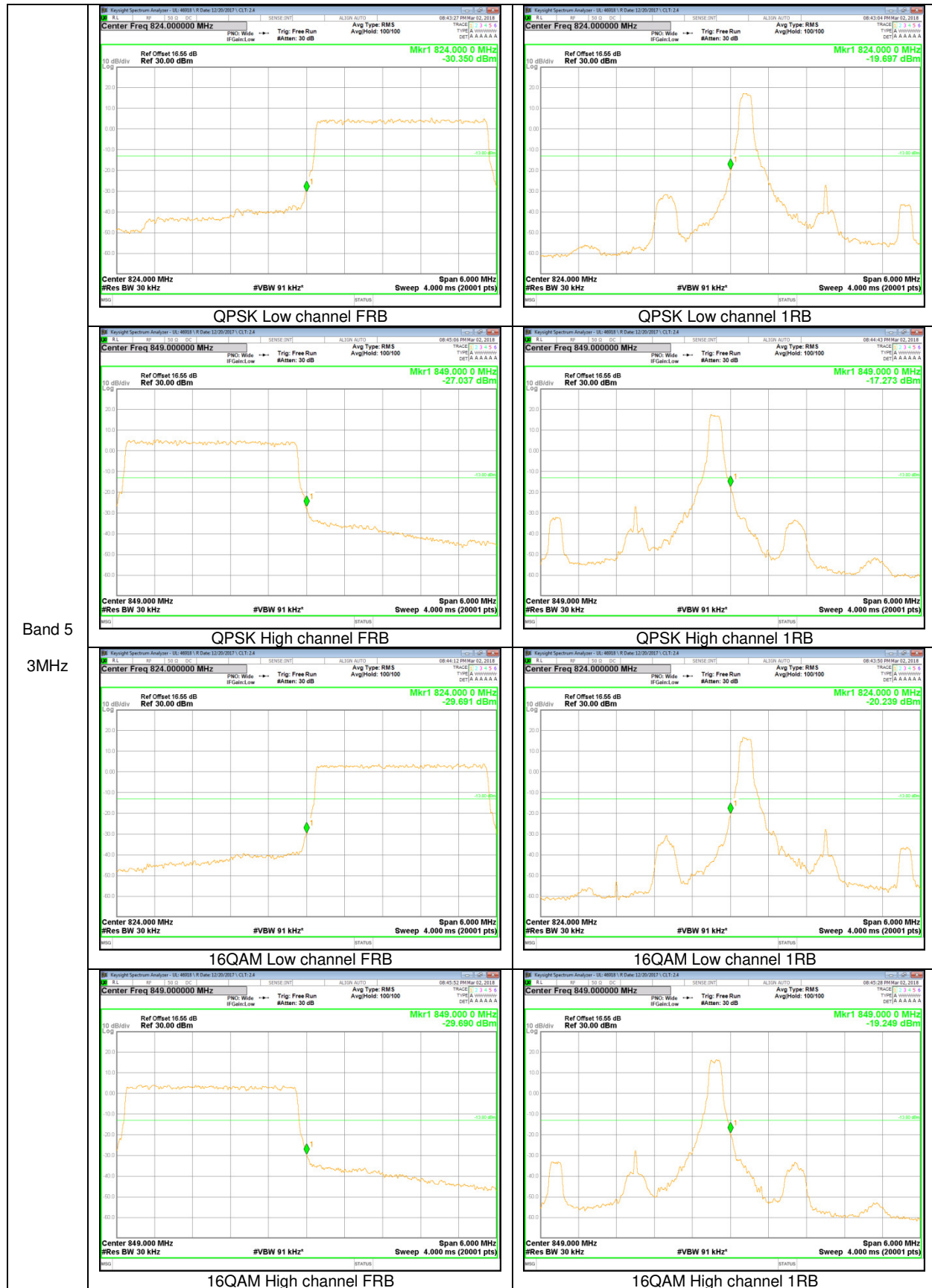
LTE Band 5



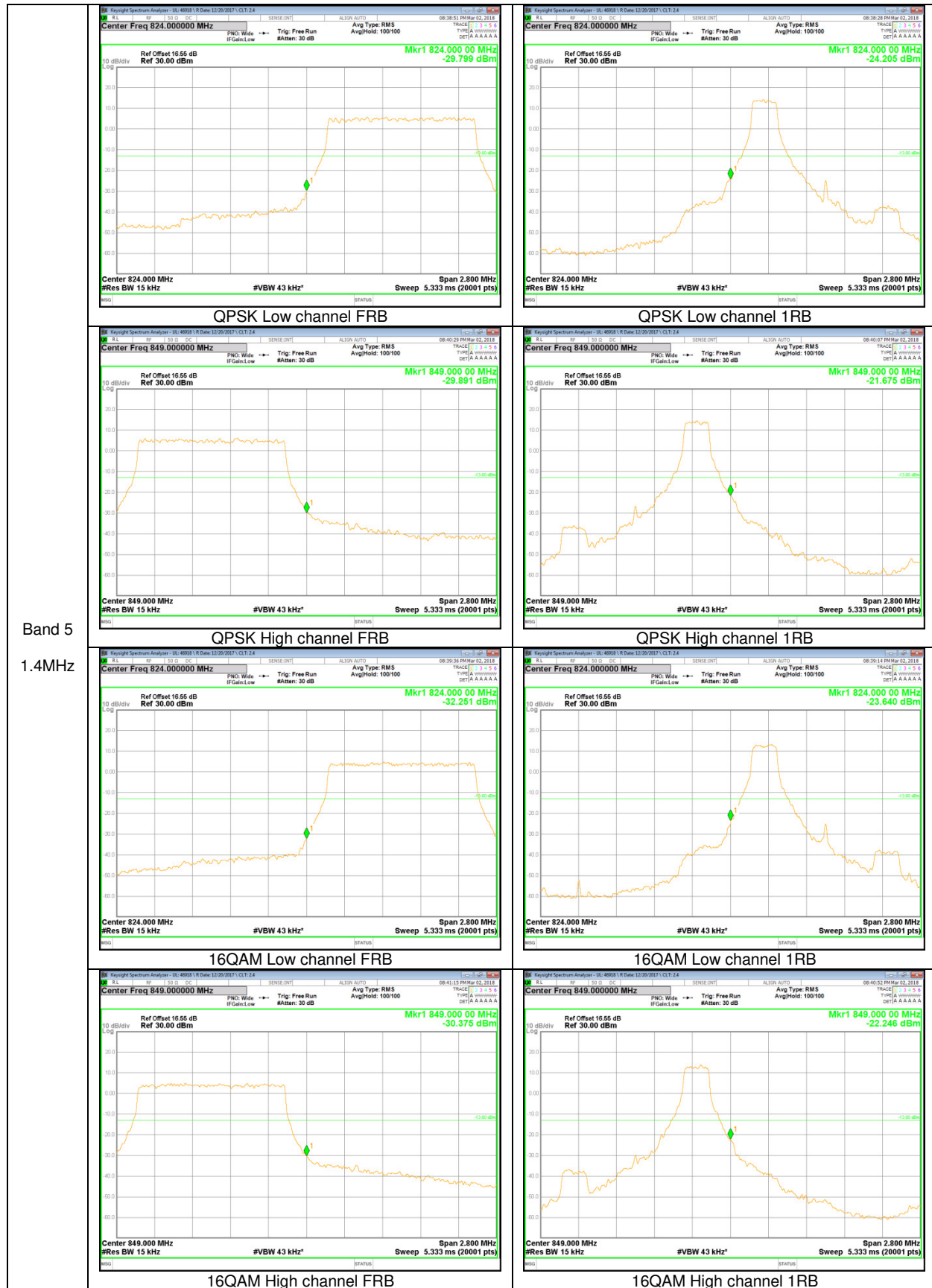
Band 5  
10MHz



Band 5  
5MHz



Band 5  
 3MHz



Band 5  
1.4MHz