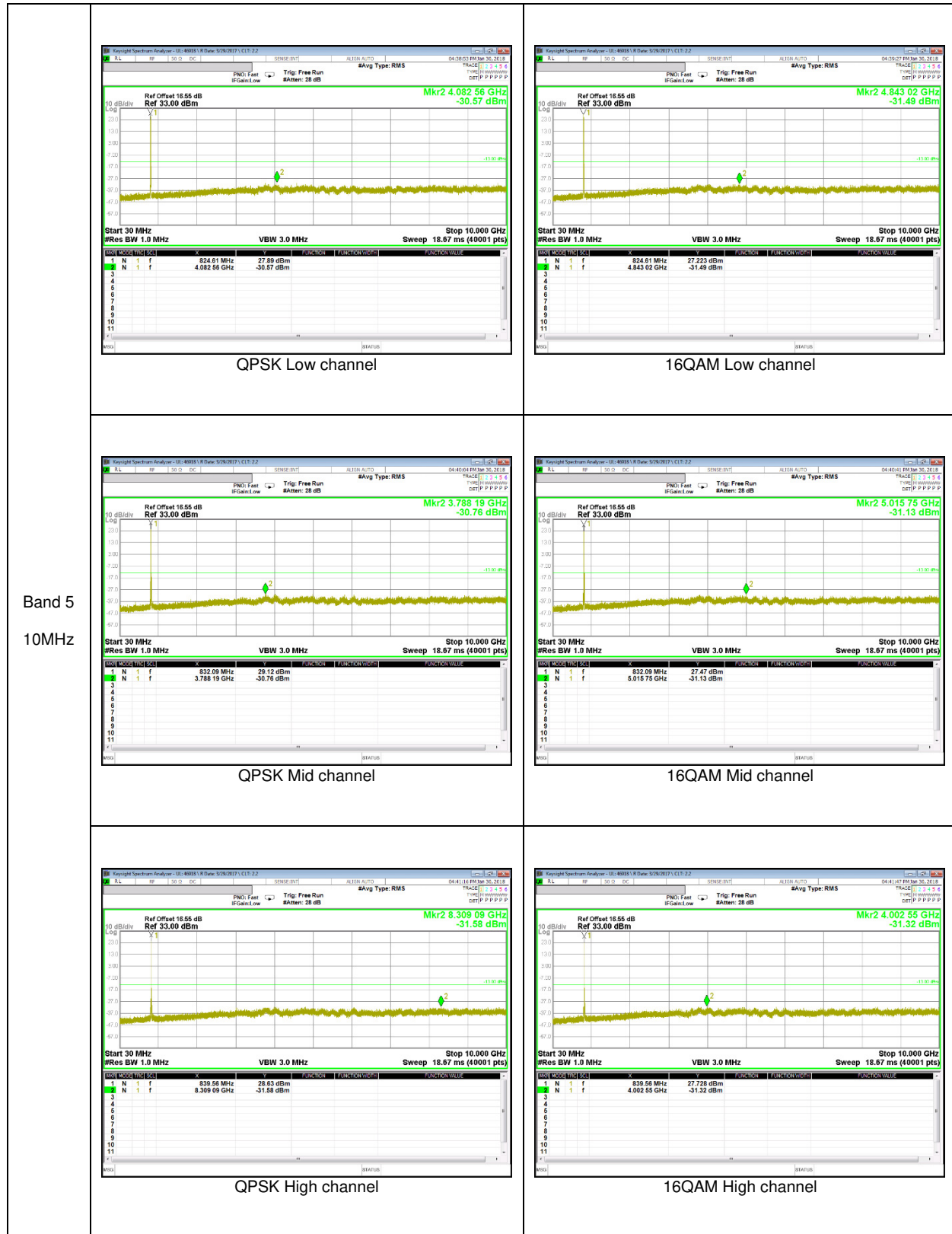
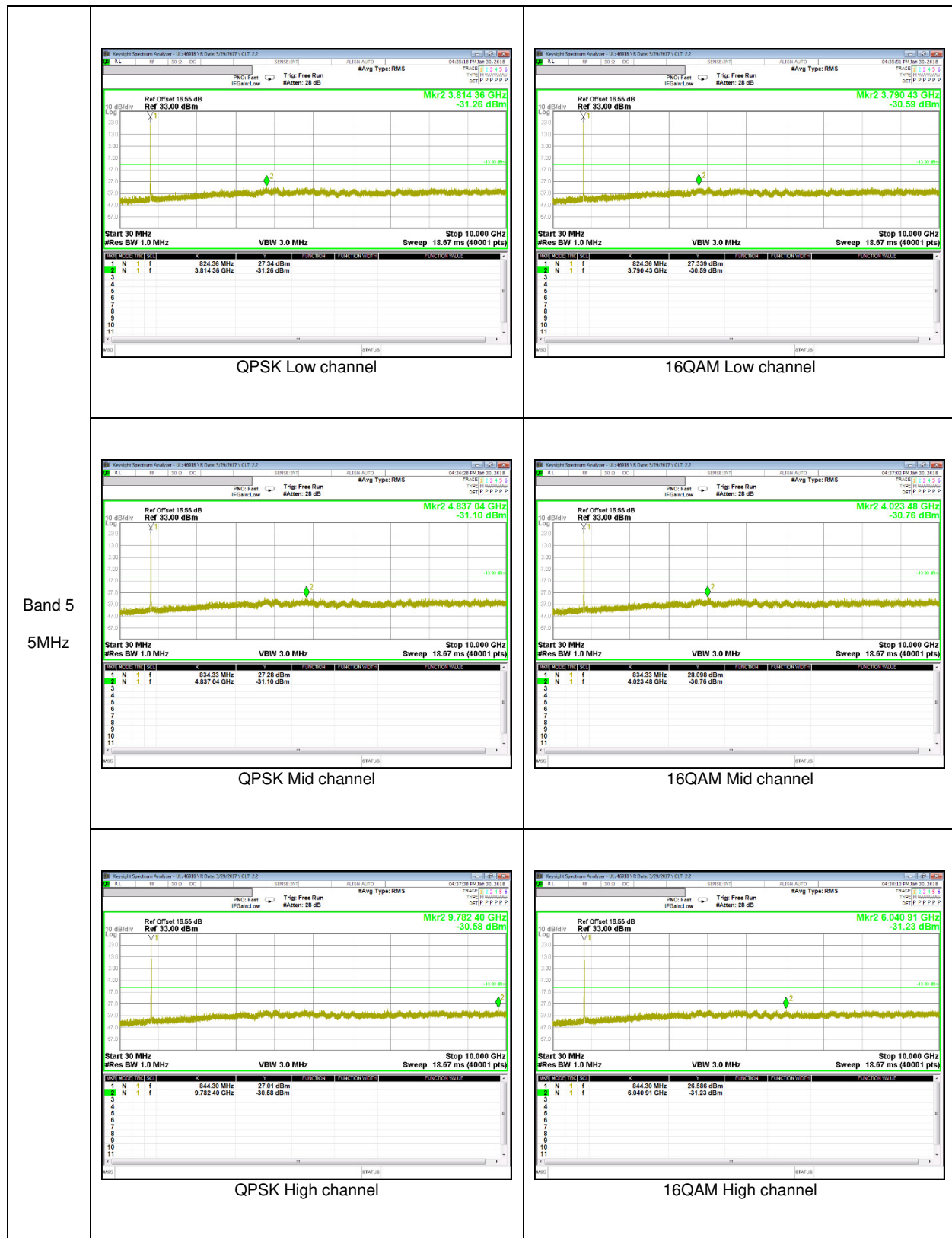
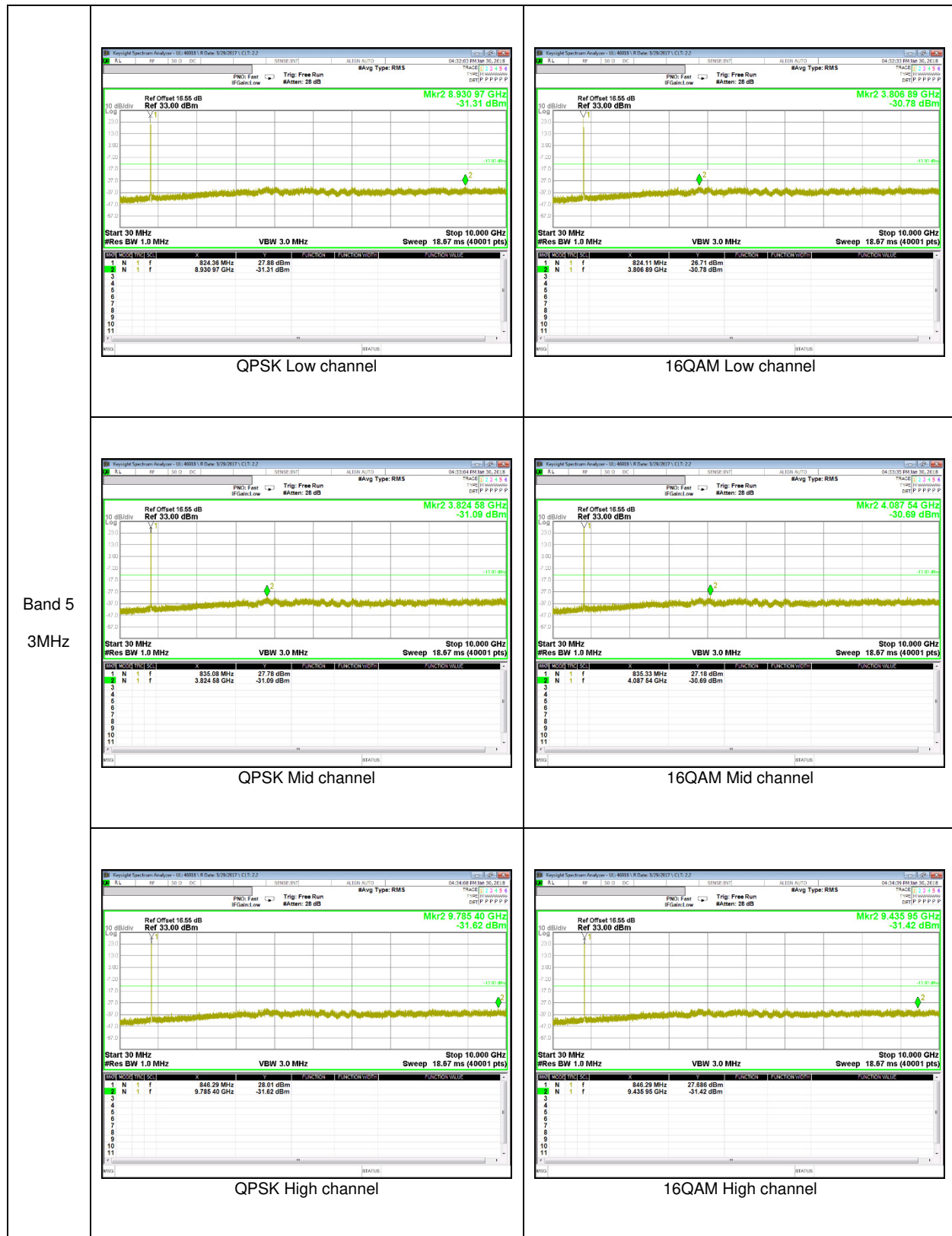
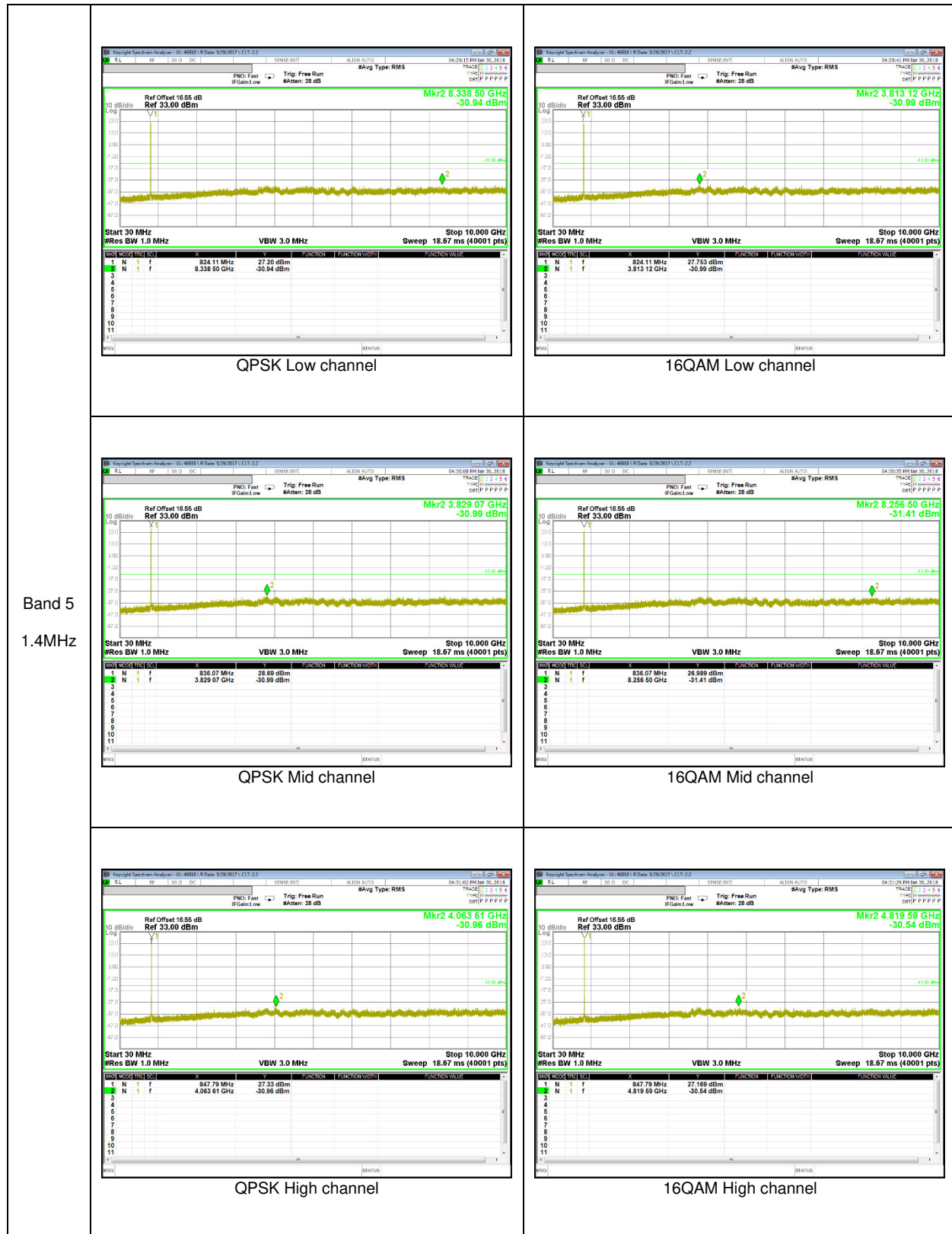


**LTE Band 5**

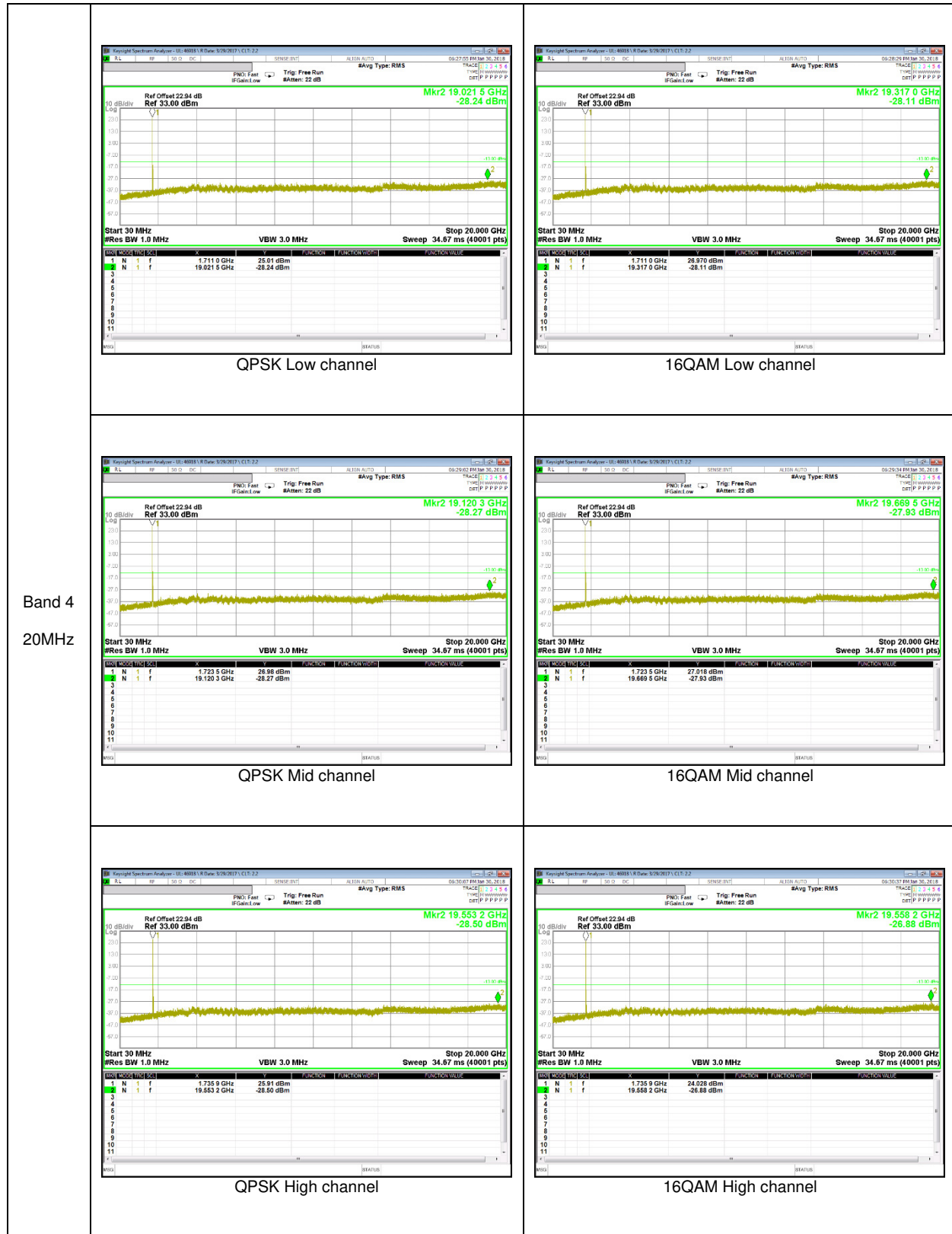


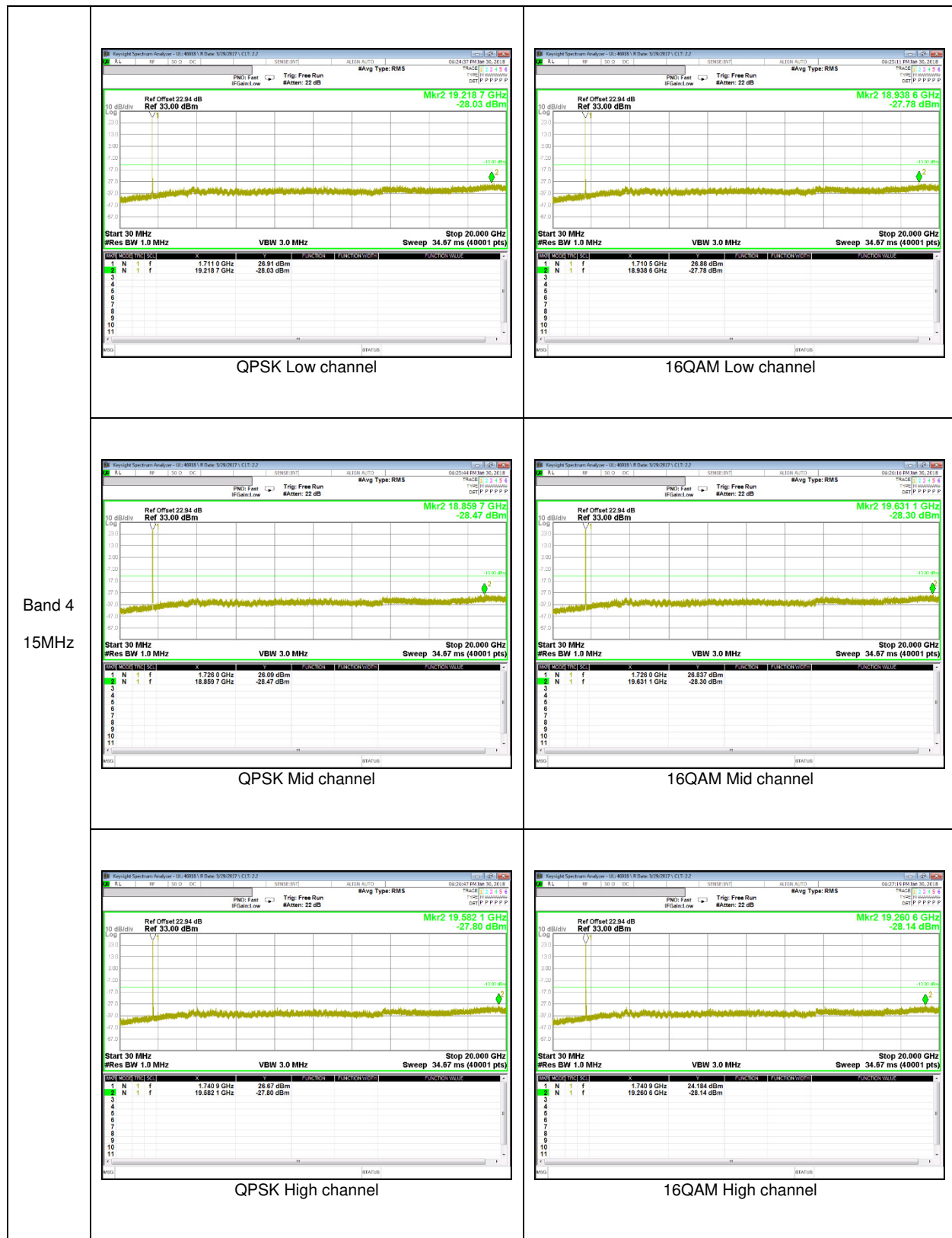


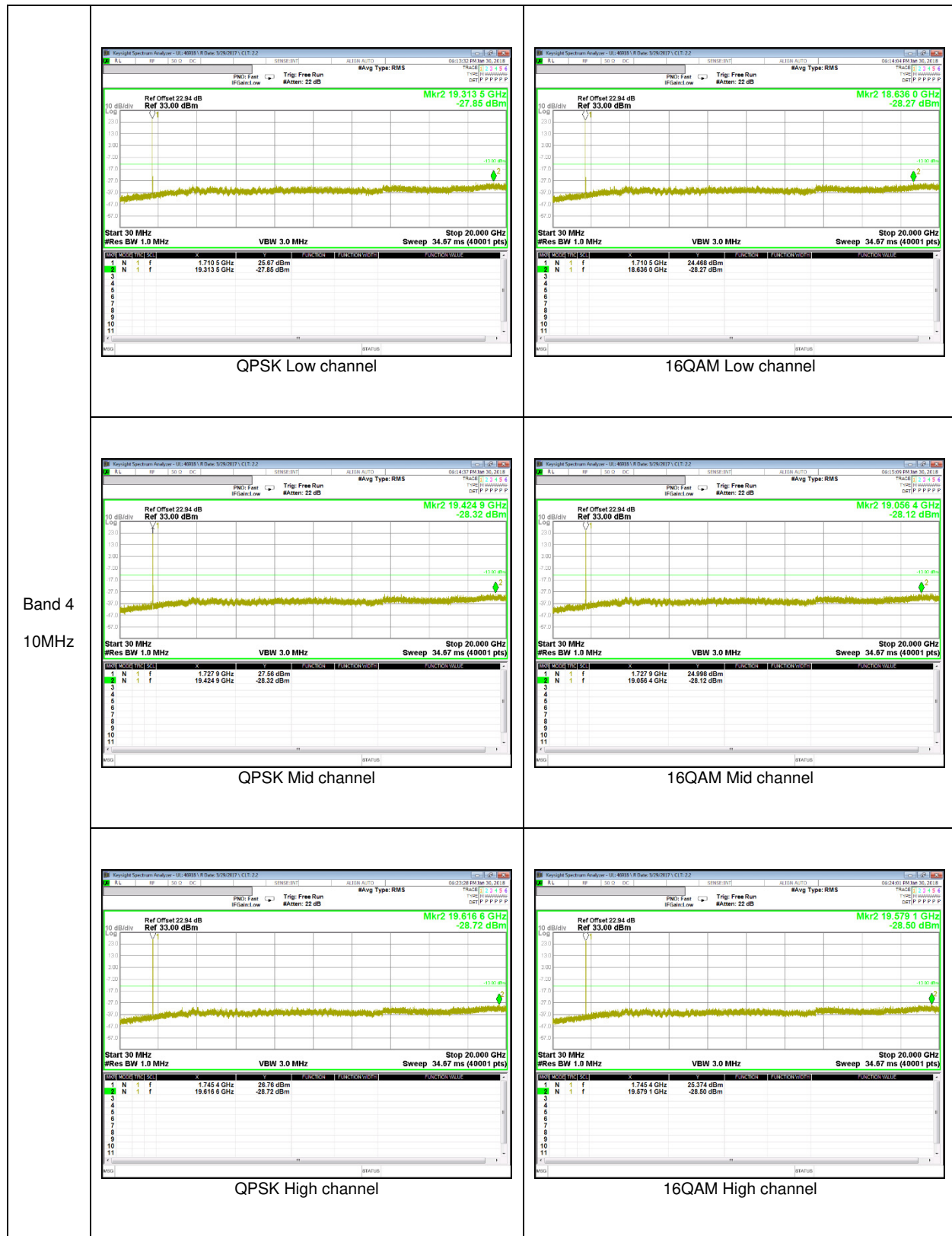


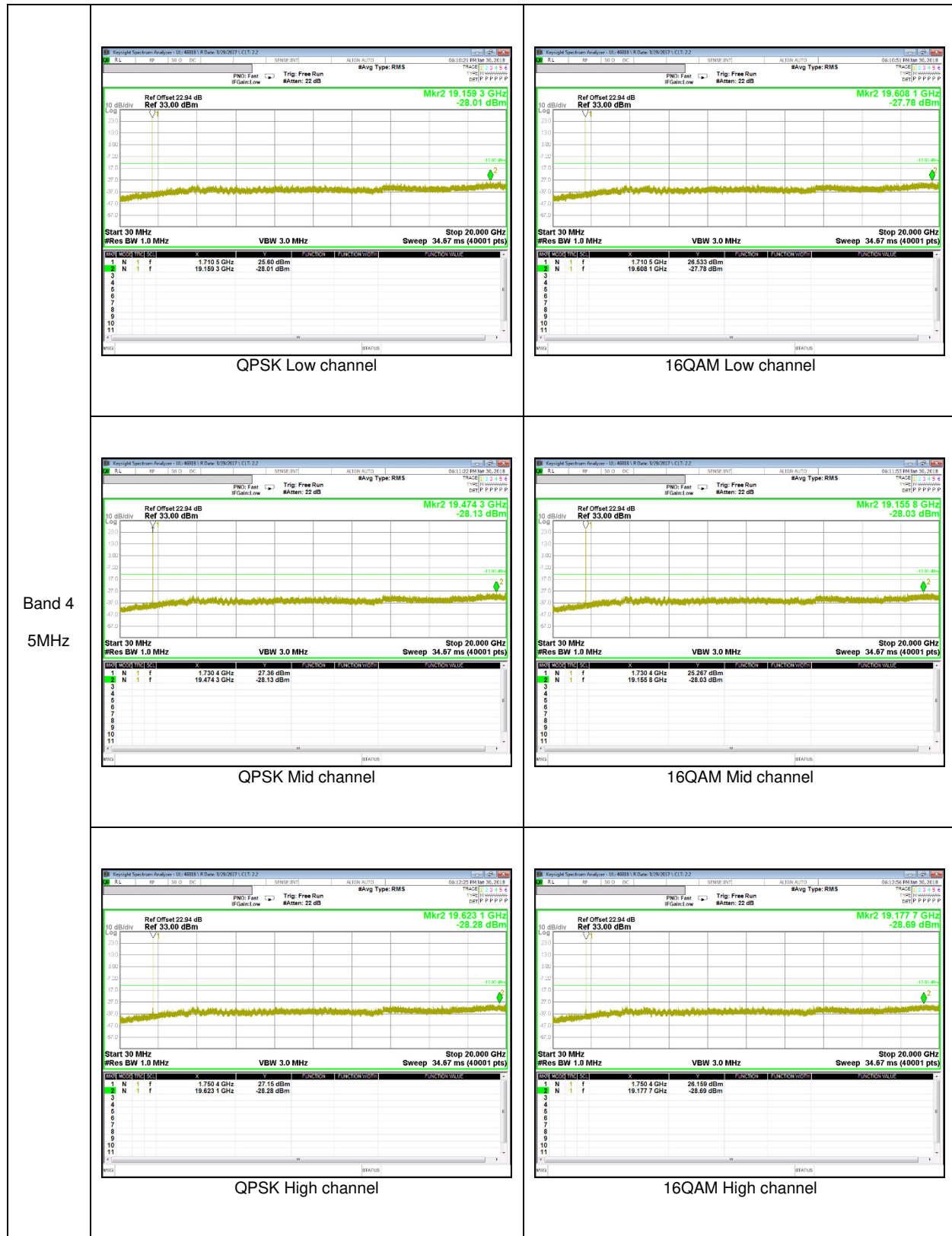


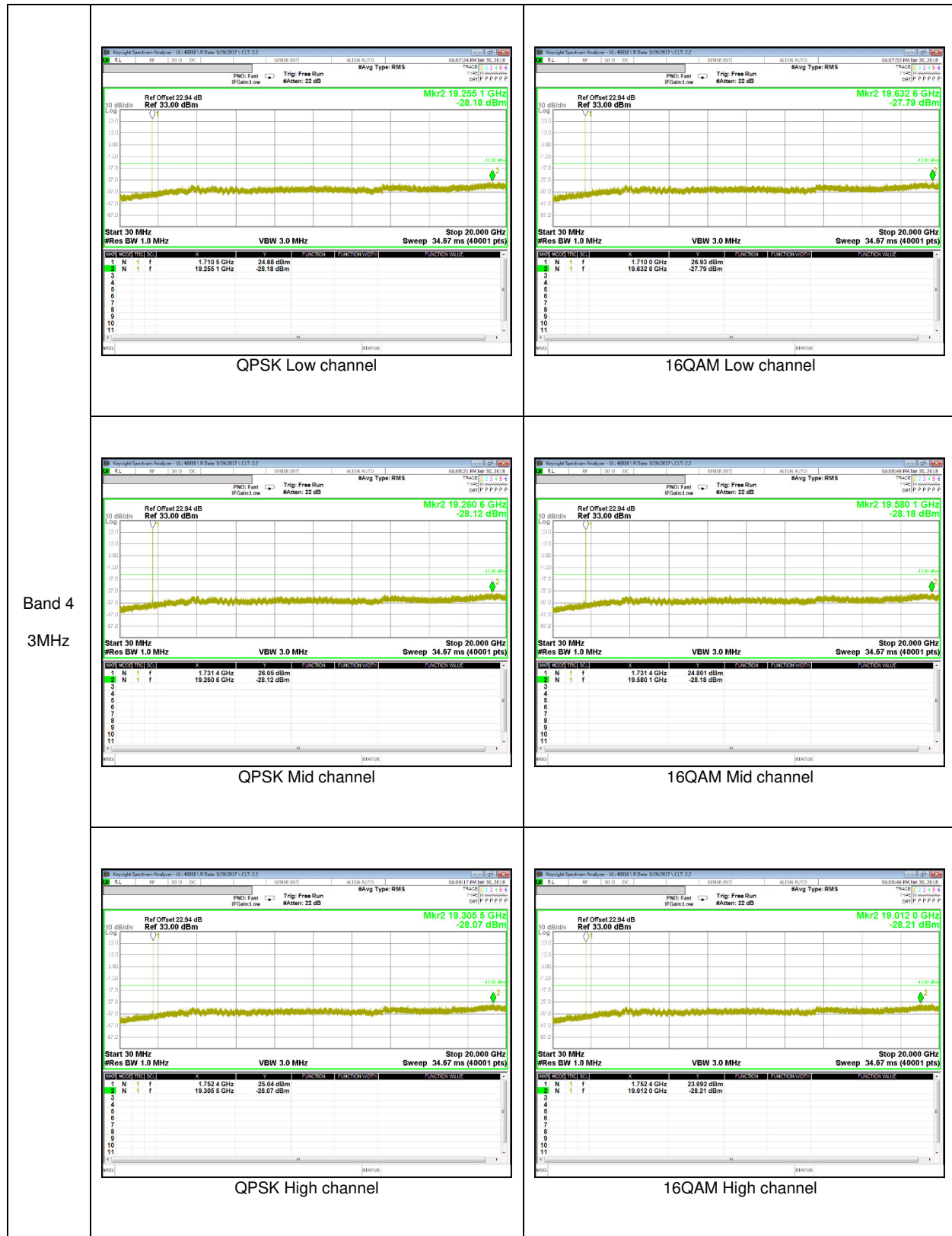
**LTE Band 4**

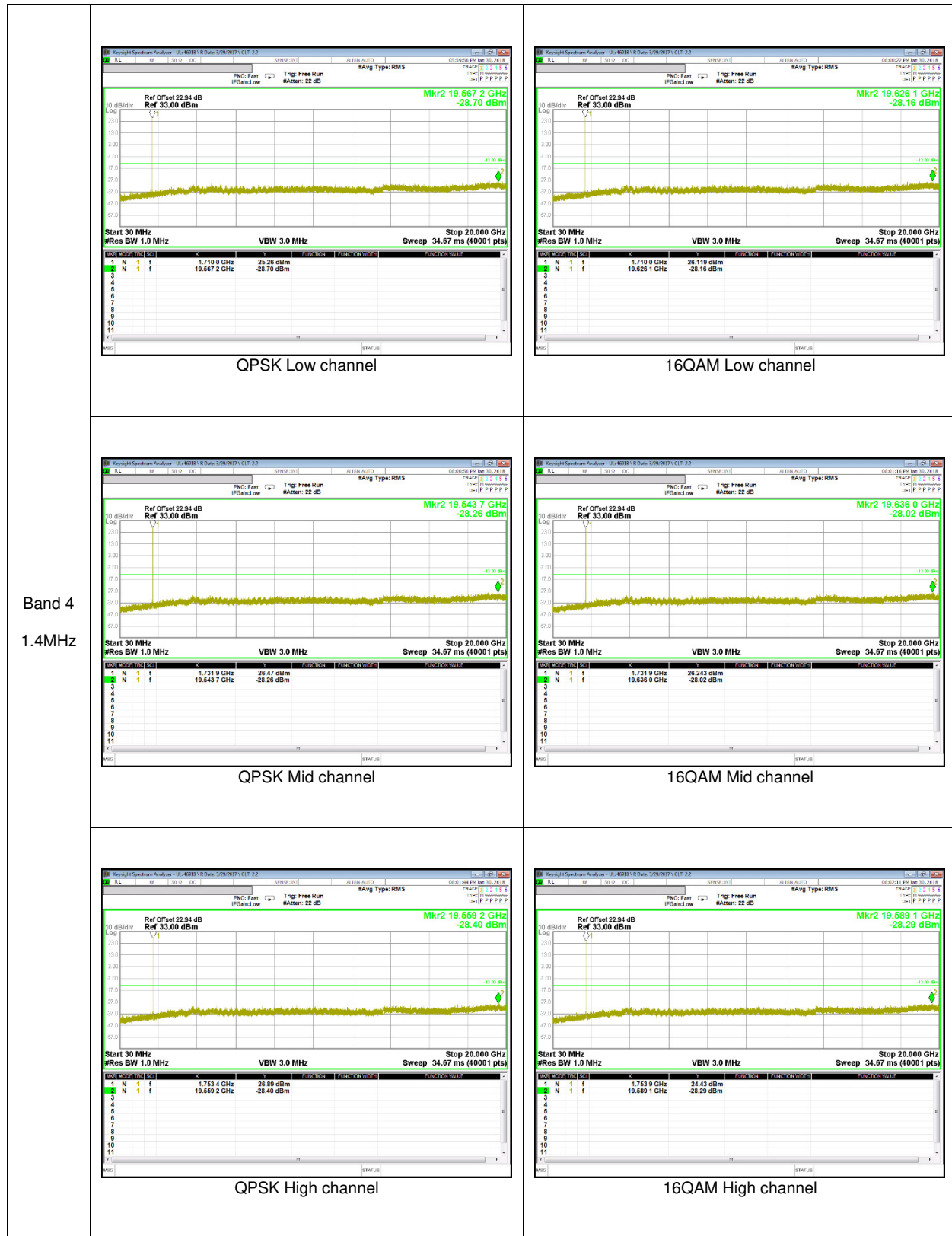




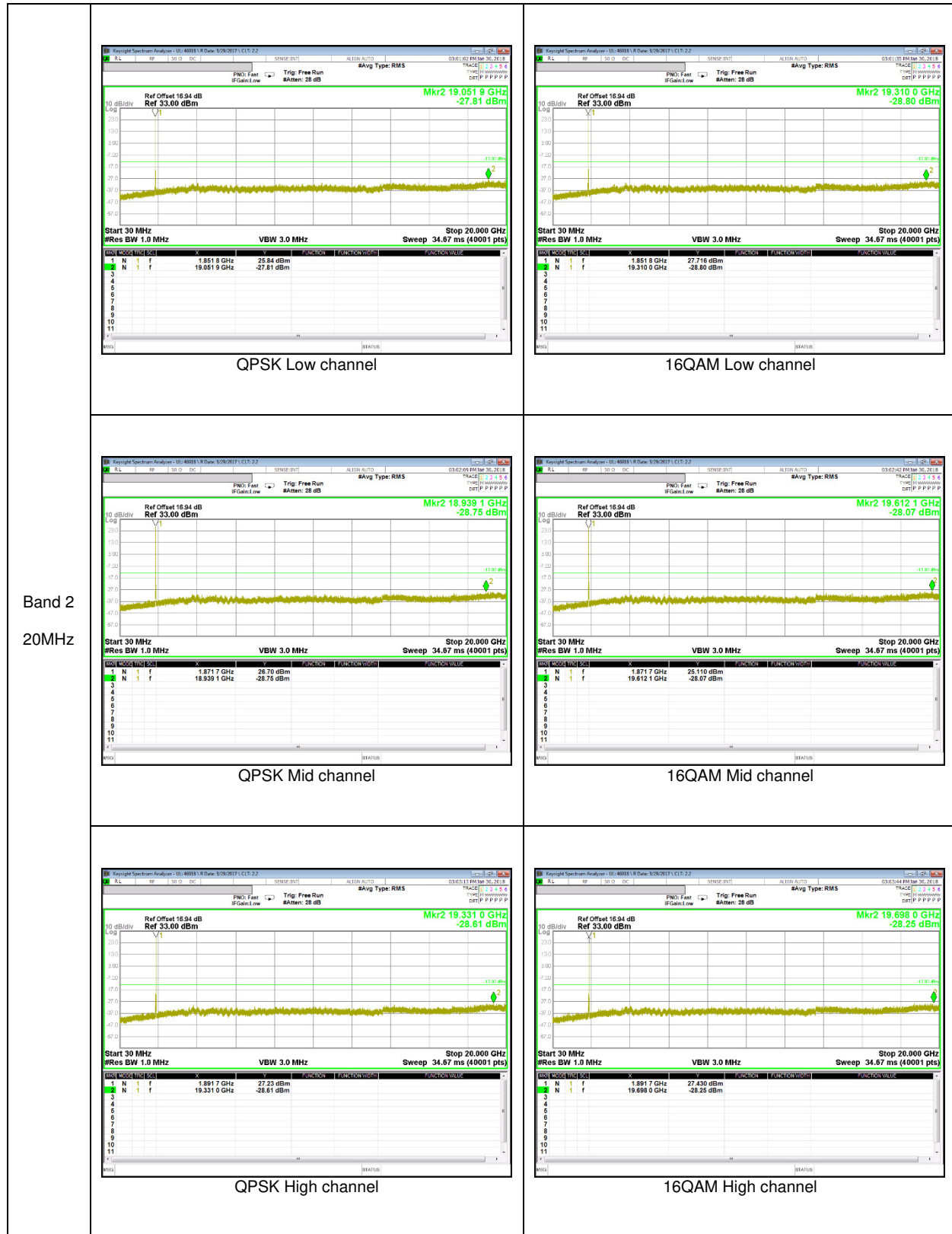


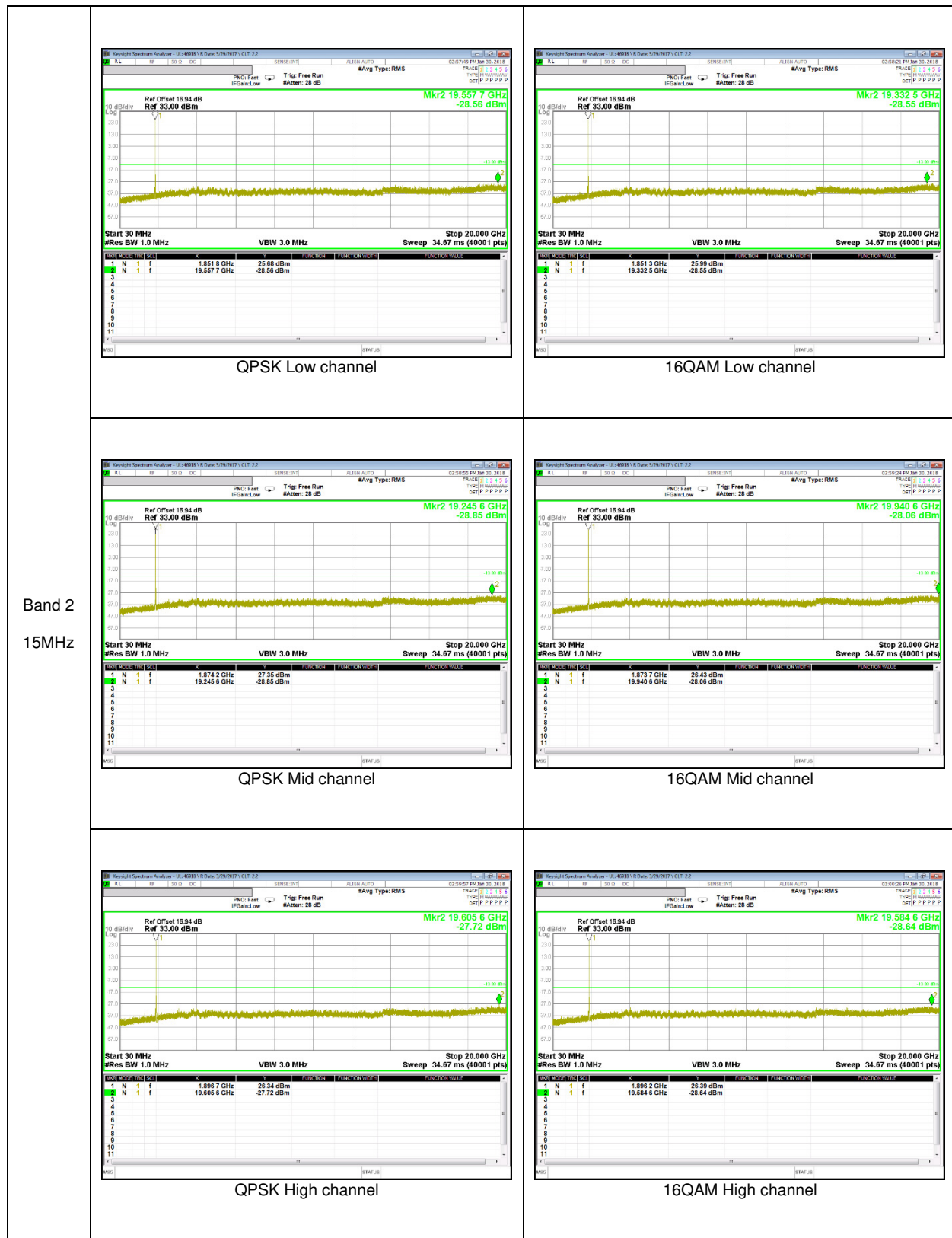


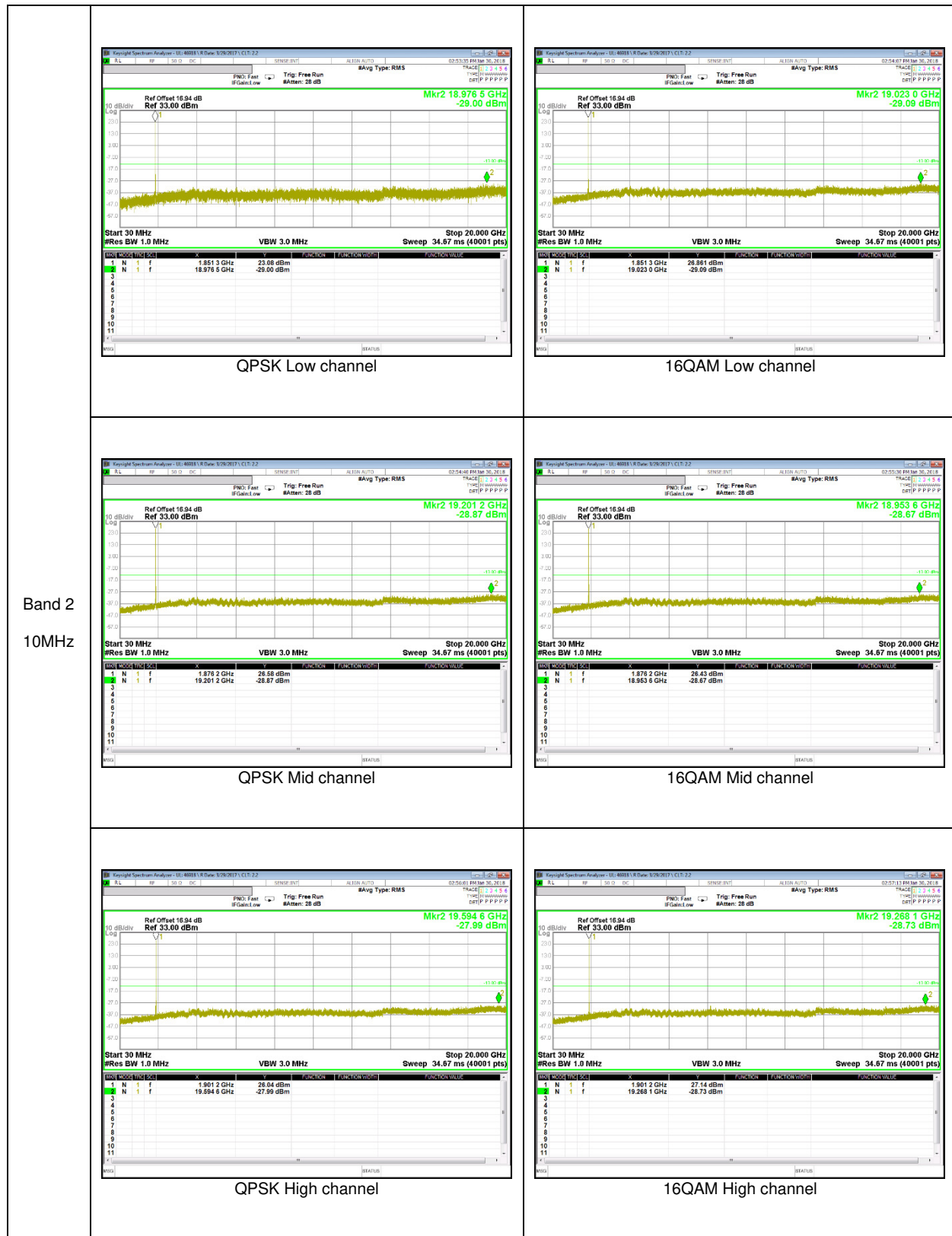


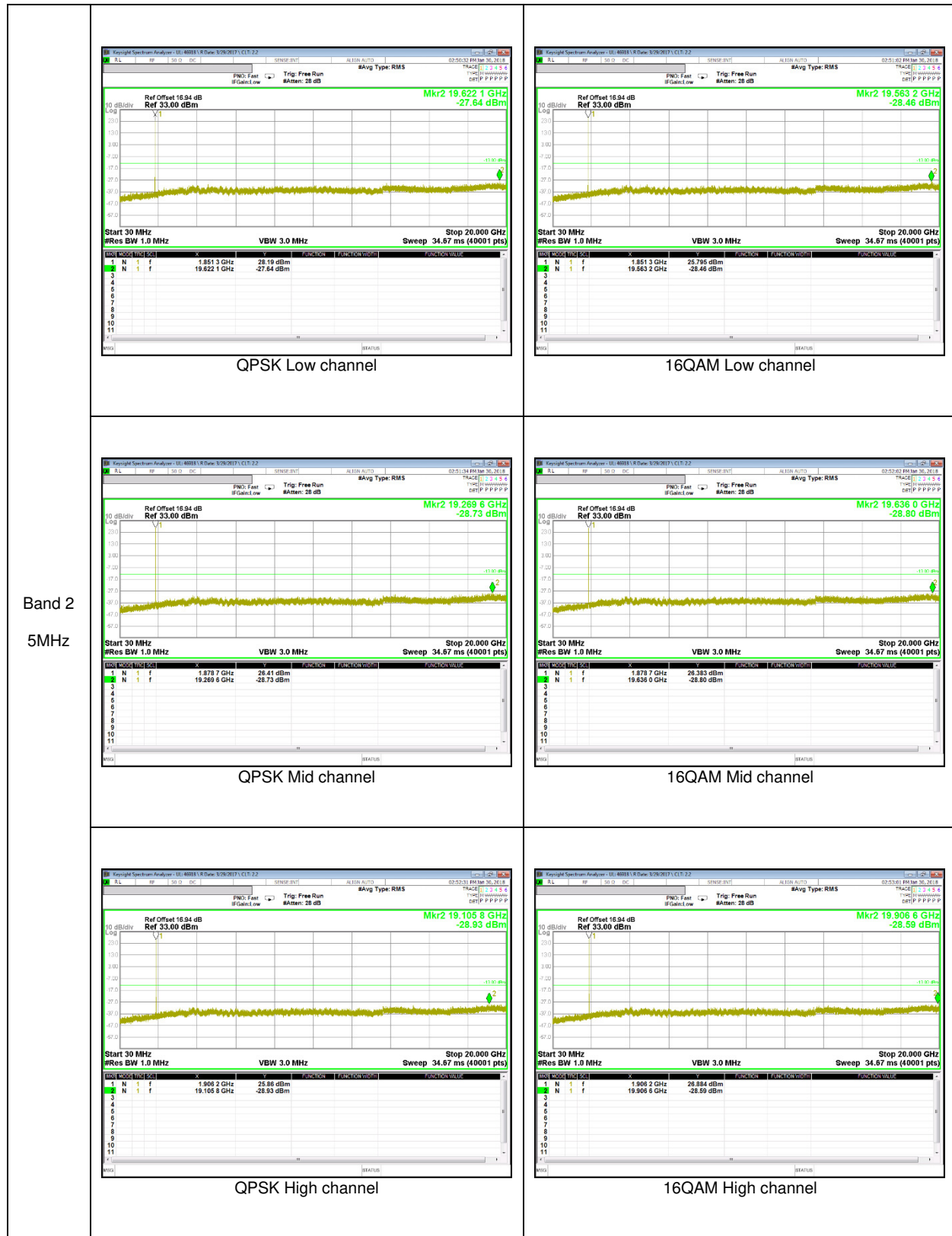


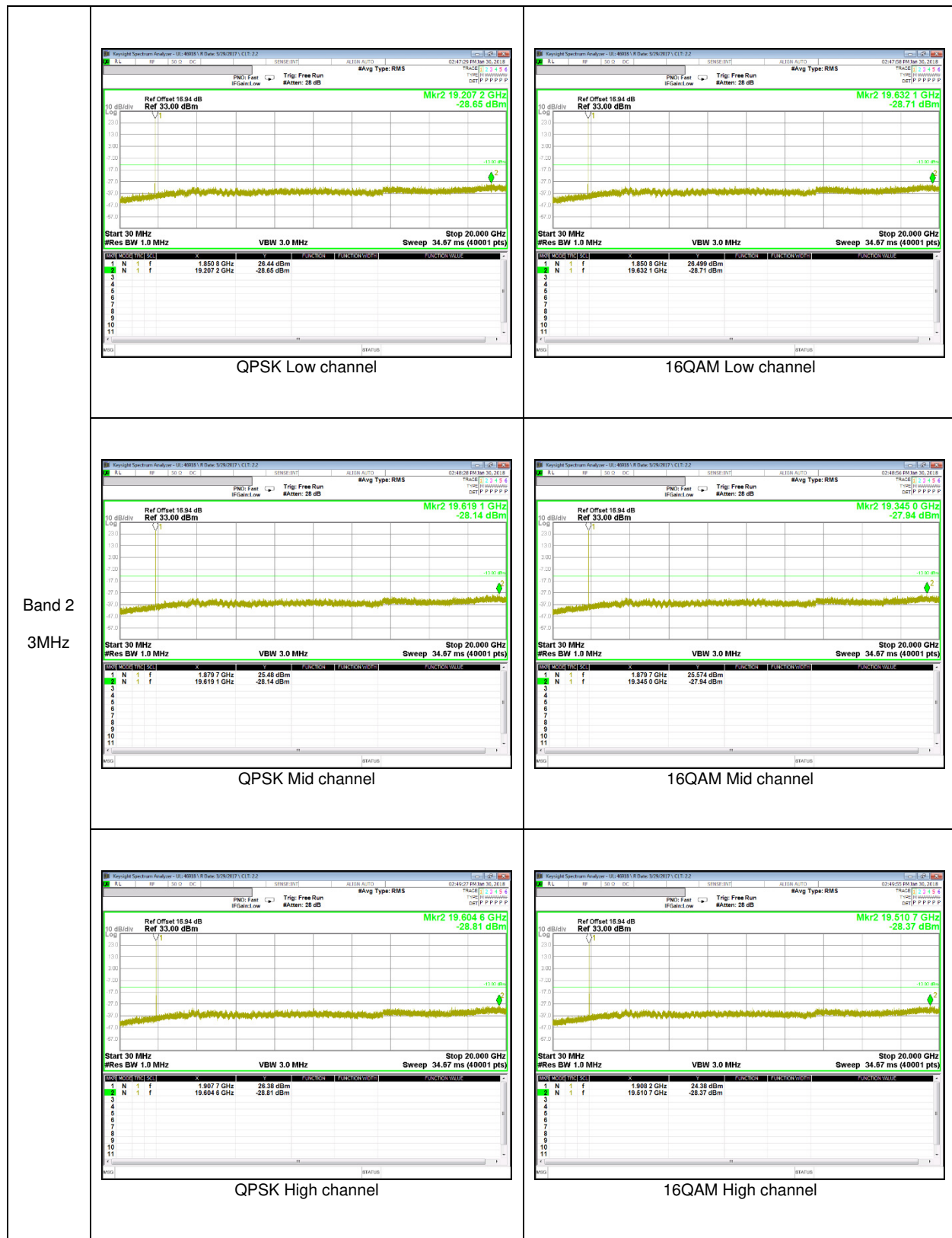
**LTE Band 2**

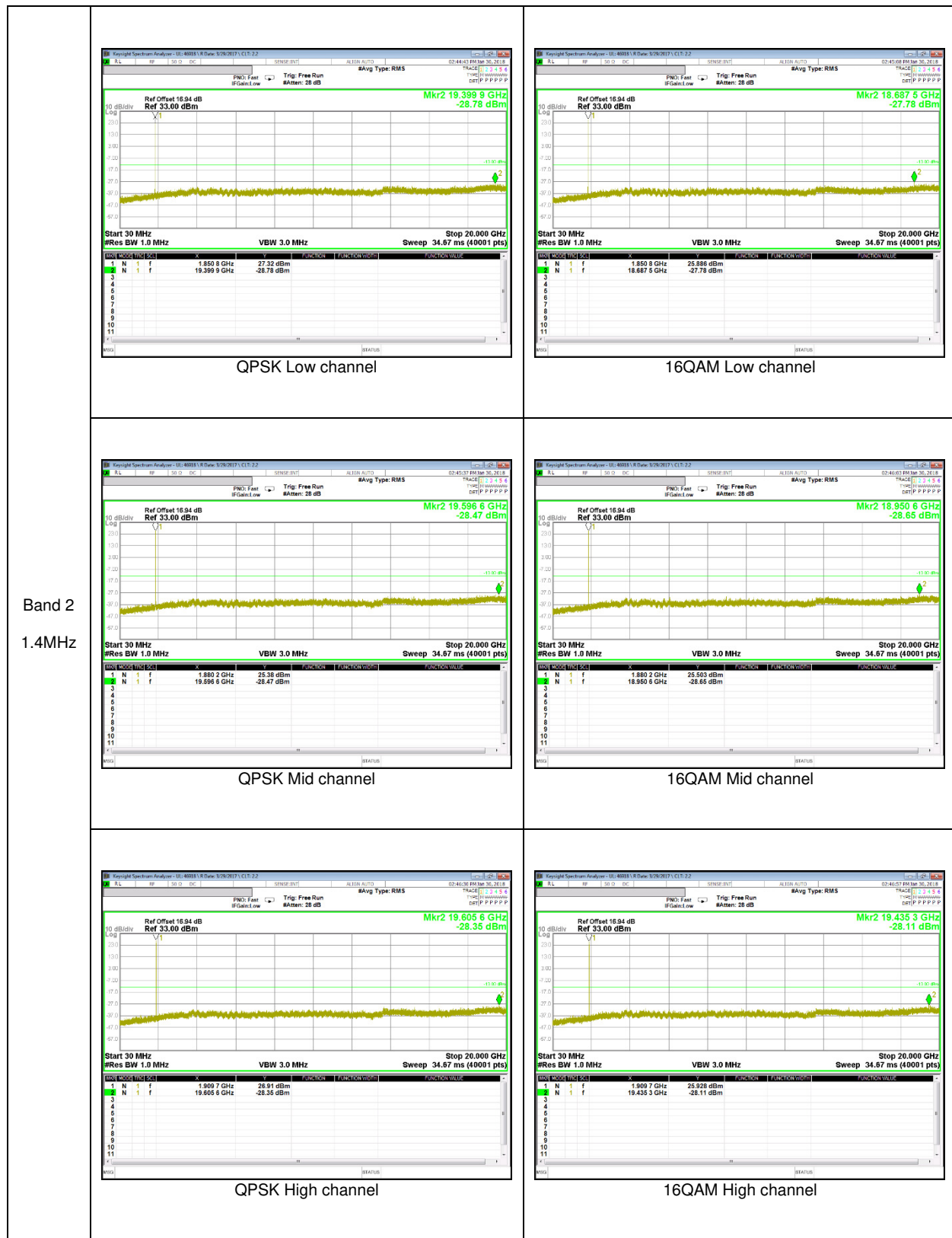












## 9.4. FREQUENCY STABILITY

### RULE PART(S)

FCC: §2.1055, §22.355, §24.235 and §27.54

### LIMITS

§22.355 - The carrier frequency shall not depart from the reference frequency in excess of  $\pm 2.5$  ppm for mobile stations.

§24.235 - The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

§27.54 - The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

### TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v03

### RESULTS

See the following pages.

### 9.4.1. FREQUENCY STABILITY RESULTS

#### WCDMA Band 5, Channel 4183, Frequency 836.6 MHz

Reference Frequency: WCDMA Band 5 Mid Channel 836.6 MHz @ 20°C				
Limit: +- 2.5 ppm = 2091.500 Hz				
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse		
		[MHz]	Delta [ppm]	Limit [ppm]
3.85	50	836.60001780	-0.001	2.5
3.85	40	836.60001694	0.000	2.5
3.85	30	836.60001662	0.000	2.5
<b>3.85</b>	<b>20</b>	836.60001703	<b>0</b>	<b>2.5</b>
3.85	10	836.60001851	-0.002	2.5
3.85	0	836.60001701	0.000	2.5
3.85	-10	836.60001605	0.001	2.5
3.85	-20	836.60001697	0.000	2.5
3.85	-30	836.60001759	-0.001	2.5

Reference Frequency: WCDMA Band 5 Mid Channel 836.6 MHz @ 20°C				
Limit: +- 2.5 ppm = 2091.500 Hz				
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse		
		[MHz]	Delta [ppm]	Limit [ppm]
<b>3.85</b>	<b>20</b>	<b>836.60001703</b>	<b>0</b>	<b>2.5</b>
4.30	20	836.60001635	0.001	2.5
3.60	20	836.60001745	-0.001	2.5

**WCDMA Band 4, Channel 1413, Frequency 1732.6 MHz**

Reference Frequency: WCDMA Band 4 Mid Channel 1732.5 MHz @ 20°C				
Limit: +- 2.5 ppm = 4331.250 Hz				
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse		
		[MHz]	Delta [ppm]	Limit [ppm]
3.85	50	1732.50001631	-0.001	2.5
3.85	40	1732.50001459	0.000	2.5
3.85	30	1732.50001374	0.000	2.5
<b>3.85</b>	<b>20</b>	1732.50001452	<b>0</b>	<b>2.5</b>
3.85	10	1732.50001499	0.000	2.5
3.85	0	1732.50001521	0.000	2.5
3.85	-10	1732.50001847	-0.002	2.5
3.85	-20	1732.50001253	0.001	2.5
3.85	-30	1732.50001449	0.000	2.5

Reference Frequency: WCDMA Band 4 Mid Channel 1732.5 MHz @ 20°C				
Limit: +- 2.5 ppm = 4331.250 Hz				
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse		
		[MHz]	Delta [ppm]	Limit [ppm]
<b>3.85</b>	<b>20</b>	<b>1732.50001452</b>	<b>0</b>	<b>2.5</b>
4.30	20	1732.50001413	0.000	2.5
3.60	20	1732.50001878	-0.002	2.5

**WCDMA Band 2, Channel 9400, Frequency 1880.0 MHz**

Reference Frequency: WCDMA Band 2 Mid Channel 1880.0 MHz @ 20°C				
Limit: +- 2.5 ppm = 4700.000 Hz				
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse		
		[MHz]	Delta [ppm]	Limit [ppm]
3.85	50	1879.99998207	0.001	2.5
3.85	40	1879.99998185	0.001	2.5
3.85	30	1879.99998274	0.000	2.5
<b>3.85</b>	<b>20</b>	1879.99998325	<b>0</b>	<b>2.5</b>
3.85	10	1879.99998291	0.000	2.5
3.85	0	1879.99998524	-0.001	2.5
3.85	-10	1879.99998492	-0.001	2.5
3.85	-20	1879.99998156	0.001	2.5
3.85	-30	1879.99998333	0.000	2.5

Reference Frequency: WCDMA Band 2 Mid Channel 1880.0 MHz @ 20°C				
Limit: +- 2.5 ppm = 4700.000 Hz				
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse		
		[MHz]	Delta [ppm]	Limit [ppm]
<b>3.85</b>	<b>20</b>	<b>1879.99998325</b>	<b>0</b>	<b>2.5</b>
4.30	20	1879.99998103	0.001	2.5
3.60	20	1879.99998422	-0.001	2.5

**LTE Band 17, Channel 23790, Frequency 710.0 MHz**

Reference Frequency: LTE Band 17 Mid Channel 710 MHz @ 20°C				
Limit: +- 2.5 ppm = 1775.000 Hz				
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse		
		[MHz]	Delta [ppm]	Limit [ppm]
3.85	50	709.99998599	-0.001	2.5
3.85	40	709.99998734	-0.003	2.5
3.85	30	709.99998665	-0.002	2.5
<b>3.85</b>	<b>20</b>	709.99998525	<b>0</b>	<b>2.5</b>
3.85	10	709.99998743	-0.003	2.5
3.85	0	709.99998634	-0.002	2.5
3.85	-10	709.99998750	-0.003	2.5
3.85	-20	709.99998705	-0.003	2.5
3.85	-30	709.99998637	-0.002	2.5

Reference Frequency: LTE Band 17 Mid Channel 710 MHz @ 20°C				
Limit: +- 2.5 ppm = 1775.000 Hz				
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse		
		[MHz]	Delta [ppm]	Limit [ppm]
<b>3.85</b>	<b>20</b>	<b>709.99998525</b>	<b>0</b>	<b>2.5</b>
4.30	20	709.99998538	0.000	2.5
3.60	20	709.99998714	-0.003	2.5

**LTE Band 5, Channel 20524, Frequency 836.5 MHz**

Reference Frequency: LTE Band 5 Mid Channel 836.5 MHz @ 20°C				
Limit: +- 2.5 ppm = 2091.250 Hz				
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse		
		[MHz]	Delta [ppm]	Limit [ppm]
3.85	50	836.49998357	-0.001	2.5
3.85	40	836.49998561	-0.004	2.5
3.85	30	836.49998652	-0.005	2.5
<b>3.85</b>	<b>20</b>	836.49998241	<b>0</b>	<b>2.5</b>
3.85	10	836.49998381	-0.002	2.5
3.85	0	836.49998625	-0.005	2.5
3.85	-10	836.49998536	-0.004	2.5
3.85	-20	836.49998339	-0.001	2.5
3.85	-30	836.49998622	-0.005	2.5

Reference Frequency: LTE Band 5 Mid Channel 836.5 MHz @ 20°C				
Limit: +- 2.5 ppm = 2091.250 Hz				
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse		
		[MHz]	Delta [ppm]	Limit [ppm]
<b>3.85</b>	<b>20</b>	<b>836.49998241</b>	<b>0</b>	<b>2.5</b>
4.30	20	836.49998412	-0.002	2.5
3.60	20	836.49998557	-0.004	2.5

**LTE Band 4, Channel 20174, Frequency 1732.5 MHz**

Reference Frequency: LTE Band 4 Mid Channel 1732.5 MHz @ 20°C				
Limit: +- 2.5 ppm = 4331.250 Hz				
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse		
		[MHz]	Delta [ppm]	Limit [ppm]
3.85	50	1732.50001871	-0.002	2.5
3.85	40	1732.50001676	-0.001	2.5
3.85	30	1732.50001568	-0.001	2.5
<b>3.85</b>	<b>20</b>	1732.50001456	<b>0</b>	<b>2.5</b>
3.85	10	1732.50001517	0.000	2.5
3.85	0	1732.50001624	-0.001	2.5
3.85	-10	1732.50001609	-0.001	2.5
3.85	-20	1732.50001793	-0.002	2.5
3.85	-30	1732.50001643	-0.001	2.5

Reference Frequency: LTE Band 4 Mid Channel 1732.5 MHz @ 20°C				
Limit: +- 2.5 ppm = 4331.250 Hz				
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse		
		[MHz]	Delta [ppm]	Limit [ppm]
<b>3.85</b>	<b>20</b>	<b>1732.50001456</b>	<b>0</b>	<b>2.5</b>
4.30	20	1732.50001580	-0.001	2.5
3.60	20	1732.50001472	0.000	2.5

**LTE Band 2, Channel 18900, Frequency 1880.0 MHz**

Reference Frequency: LTE Band 2 Mid Channel 1880 MHz @ 20°C				
Limit: +- 2.5 ppm = 4700.000 Hz				
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse		
		[MHz]	Delta [ppm]	Limit [ppm]
3.85	50	1880.00001963	-0.001	2.5
3.85	40	1880.00001611	0.001	2.5
3.85	30	1880.00001729	0.001	2.5
<b>3.85</b>	<b>20</b>	1880.00001848	<b>0</b>	<b>2.5</b>
3.85	10	1880.00001737	0.001	2.5
3.85	0	1880.00001924	0.000	2.5
3.85	-10	1880.00001765	0.000	2.5
3.85	-20	1880.00001832	0.000	2.5
3.85	-30	1880.00001607	0.001	2.5

Reference Frequency: LTE Band 2 Mid Channel 1880 MHz @ 20°C				
Limit: +- 2.5 ppm = 4700.000 Hz				
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse		
		[MHz]	Delta [ppm]	Limit [ppm]
<b>3.85</b>	<b>20</b>	<b>1880.00001848</b>	<b>0</b>	<b>2.5</b>
4.30	20	1880.00001723	0.001	2.5
3.60	20	1880.00001916	0.000	2.5

**GSM 850 , Channel 190, Frequency 836.6 MHz**

Reference Frequency : GSM850 Mid Channel 836.6 MHz @ 20°C				
Limit: +- 2.5 ppm = 2091.500 Hz				
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse		
		[MHz]	Delta [ppm]	Limit [ppm]
3.85	50	836.59995380	0.008	2.5
3.85	40	836.59995653	0.005	2.5
3.85	30	836.59995886	0.002	2.5
<b>3.85</b>	<b>20</b>	836.59996078	<b>0</b>	<b>2.5</b>
3.85	10	836.59996186	-0.001	2.5
3.85	0	836.59996283	-0.002	2.5
3.85	-10	836.59995899	0.002	2.5
3.85	-20	836.59996836	-0.009	2.5
3.85	-30	836.59995947	0.002	2.5

Reference Frequency : GSM850 Mid Channel 836.6 MHz @ 20°C				
Limit: +- 2.5 ppm = 2091.500 Hz				
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse		
		[MHz]	Delta [ppm]	Limit [ppm]
<b>3.85</b>	<b>20</b>	<b>836.59996078</b>	<b>0</b>	<b>2.5</b>
4.30	20	836.59995763	0.004	2.5
3.60	20	836.59996017	0.001	2.5

**GSM 1900, Channel 661, Frequency 1880.0 MHz**

Reference Frequency: GSM1900 Mid Channel 1880.0 MHz @ 20°C				
Limit: +- 2.5 ppm = 4700.000 Hz				
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse		
		[MHz]	Delta [ppm]	Limit [ppm]
3.85	50	1879.99994870	-0.001	2.5
3.85	40	1879.99995328	-0.003	2.5
3.85	30	1879.99995034	-0.001	2.5
<b>3.85</b>	<b>20</b>	1879.99994763	<b>0</b>	<b>2.5</b>
3.85	10	1879.99995206	-0.002	2.5
3.85	0	1879.99995118	-0.002	2.5
3.85	-10	1879.99995354	-0.003	2.5
3.85	-20	1879.99995174	-0.002	2.5
3.85	-30	1879.99995022	-0.001	2.5

Reference Frequency: GSM1900 Mid Channel 1880.0 MHz @ 20°C				
Limit: +- 2.5 ppm = 4700.000 Hz				
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse		
		[MHz]	Delta [ppm]	Limit [ppm]
<b>3.85</b>	<b>20</b>	<b>1879.99994763</b>	<b>0</b>	<b>2.5</b>
4.30	20	1879.99995174	-0.002	2.5
3.60	20	1879.99995049	-0.002	2.5

## 10. RADIATED TEST RESULTS

### 10.1. RADIATED POWER (ERP & EIRP)

#### RULE PART(S)

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

#### LIMITS

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

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

27.50(c) (10) - Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.

27.50(d) - (4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.(Band 4)

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13dB.

#### TEST PROCEDURE

ANSI / TIA / EIA 603E Clause 2.2.17; ESU40 setting reference to 971168 D01 v03

For peak power measurement with a ESU40:

a) Set the RBW  $\geq$  OBW; b) Set VBW  $\geq 3 \times$  RBW; c) Set span  $\geq 2 \times$  RBW; d) Sweep time = auto couple; e) Detector = peak; f) Ensure that the number of measurement points  $\geq$  span/RBW; g) Trace mode = max hold;

For average power measurement with a ESU40:

a) Set span to at least 1.5 times the OBW; b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz; c) Set VBW  $\geq 3 \times$  RBW; d) Set number of points in sweep  $\geq 2 \times$  span / RBW; e) Sweep time = auto-couple; f) Detector = RMS (power averaging); g) Use free run trigger If burst duty cycle  $\geq 98$ ; 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

**10.1.1. ERP/EIRP Results**

**GSM**

Band	Mode	Channel	f [MHz]	ERP / EIRP	
				[dBm]	[mW]
GSM850	GPRS	512	824.2	29.65	922.57
		661	836.6	28.58	721.11
		810	848.8	28.04	636.80
	EGPRS	512	824.2	26.35	431.52
		661	836.6	24.88	307.61
		810	848.8	24.62	289.73
GSM1900	GPRS	512	1850.2	28.72	744.73
		661	1880.0	27.97	626.61
		810	1909.8	26.50	446.68
	EGPRS	512	1850.2	25.95	393.55
		661	1880.0	24.96	313.33
		810	1909.8	23.99	250.61

**WCDMA**

Band	Mode	Channel	f [MHz]	ERP / EIRP	
				[dBm]	[mW]
Band 5	REL99	4132	826.4	20.76	119.12
		4183	836.6	19.43	87.70
		4233	846.6	19.33	85.70
	HSDPA	4132	826.4	20.94	124.17
		4183	836.6	19.87	97.05
		4233	846.6	19.33	85.70
Band 4	REL99	1312	1712.4	20.81	120.50
		1413	1732.6	21.90	154.88
		1513	1752.6	22.25	167.88
	HSDPA	1312	1712.4	21.45	139.64
		1413	1732.6	21.29	134.59
		1513	1752.6	22.76	188.80
Band 2	REL99	9262	1852.4	22.05	160.32
		9400	1880.0	20.77	119.40
		9538	1907.6	19.73	93.97
	HSDPA	9262	1852.4	22.04	159.96
		9400	1880.0	21.04	127.06
		9538	1907.6	20.03	100.69

**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	14.05	25.41
			50/0	710.0	15.16	32.81
			50/0	711.0	15.44	34.99
		16QAM	50/0	709.0	15.29	33.81
			50/0	710.0	14.00	25.12
			50/0	711.0	14.21	26.36
	5	QPSK	25/0	706.5	14.85	30.55
			25/0	710.0	15.16	32.81
			25/0	713.5	15.43	34.91
		16QAM	25/0	706.5	14.15	26.00
			25/0	710.0	13.99	25.06
			25/0	713.5	14.21	26.36

**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	20.06	101.39
			50/0	836.5	19.35	86.10
			50/0	844.0	18.76	75.16
		16QAM	50/0	829.0	18.43	69.66
			50/0	836.5	18.36	68.55
			50/0	844.0	17.63	57.94
	5	QPSK	25/0	826.5	19.68	92.90
			25/0	836.5	18.77	75.34
			25/0	846.5	17.76	59.70
		16QAM	25/0	826.5	18.71	74.30
			25/0	836.5	17.76	59.70
			25/0	846.5	16.97	49.77
	3	QPSK	15/0	825.5	19.77	94.84
			15/0	836.5	18.84	76.56
			15/0	847.5	17.74	59.43
		16QAM	15/0	825.5	18.82	76.21
			15/0	836.5	18.34	68.23
			15/0	847.5	16.95	49.55
	1.4	QPSK	6/0	824.7	17.63	57.94
			6/0	836.5	16.03	40.09
			6/0	848.3	15.49	35.40
		16QAM	6/0	824.7	16.69	46.67
			6/0	836.5	14.92	31.05
			6/0	848.3	14.68	29.38

**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	19.79	95.28
			100/0	1732.5	20.24	105.68
			100/0	1745.0	20.41	109.90
		16QAM	100/0	1720.0	18.88	77.27
			100/0	1732.5	19.25	84.14
			100/0	1745.0	19.45	88.10
	15	QPSK	75/0	1717.5	19.99	99.77
			75/0	1732.5	19.51	89.33
			75/0	1747.5	20.41	109.90
		16QAM	75/0	1717.5	19.00	79.43
			75/0	1732.5	20.48	111.69
			75/0	1747.5	19.44	87.90
	10	QPSK	50/0	1715.0	19.81	95.72
			50/0	1732.5	20.42	110.15
			50/0	1750.0	20.53	112.98
		16QAM	50/0	1715.0	18.78	75.51
			50/0	1732.5	19.44	87.90
			50/0	1750.0	19.52	89.54
	5	QPSK	25/0	1712.5	18.66	73.45
			25/0	1732.5	20.11	102.57
			25/0	1752.5	20.29	106.91
		16QAM	25/0	1712.5	17.57	57.15
			25/0	1732.5	19.15	82.22
			25/0	1752.5	19.27	84.53
	3	QPSK	15/0	1711.5	19.25	84.14
			15/0	1732.5	19.88	97.27
			15/0	1753.5	20.43	110.41
		16QAM	15/0	1711.5	18.25	66.83
			15/0	1732.5	18.84	76.56
			15/0	1753.5	19.34	85.90
1.4	QPSK	6/0	1710.7	16.53	44.98	
		6/0	1732.5	18.04	63.68	
		6/0	1754.3	18.31	67.76	
	16QAM	6/0	1710.7	16.10	40.74	
		6/0	1732.5	17.02	50.35	
		6/0	1754.3	17.34	54.20	

**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	19.00	79.43
			100/0	1880.0	19.68	92.90
			100/0	1900.0	19.91	97.95
		16QAM	100/0	1860.0	18.05	63.83
			100/0	1880.0	18.70	74.13
			100/0	1900.0	18.98	79.07
	15	QPSK	75/0	1857.5	20.30	107.15
			75/0	1880.0	19.69	93.11
			75/0	1902.5	18.87	77.09
		16QAM	75/0	1857.5	19.31	85.31
			75/0	1880.0	18.67	73.62
			75/0	1902.5	17.96	62.52
	10	QPSK	50/0	1955.0	20.50	112.20
			50/0	1880.0	19.62	91.62
			50/0	1905.0	18.70	74.13
		16QAM	50/0	1955.0	19.48	88.72
			50/0	1880.0	18.66	73.45
			50/0	1905.0	17.74	59.43
	5	QPSK	25/0	1852.5	20.54	113.24
			25/0	1880.0	18.83	76.38
			25/0	1907.5	18.03	63.53
		16QAM	25/0	1852.5	19.56	90.36
			25/0	1880.0	17.90	61.66
			25/0	1907.5	17.07	50.93
	3	QPSK	15/0	1815.5	18.70	74.13
			15/0	1880.0	17.85	60.95
			15/0	1908.5	18.21	66.22
		16QAM	15/0	1815.5	17.71	59.02
			15/0	1880.0	16.75	47.32
			15/0	1908.5	17.18	52.24
1.4	QPSK	6/0	1850.7	16.50	44.67	
		6/0	1880.0	15.89	38.82	
		6/0	1909.3	14.02	25.23	
	16QAM	6/0	1850.7	15.60	36.31	
		6/0	1880.0	14.87	30.69	
		6/0	1909.3	12.96	19.77	

**10.1.2. ERP/EIRP DATA**

**GSM 850**

		UL Verification Services, Inc. High Frequency Substitution Measurement									
		Company: Samsung Project #: 4788312331 Date: 2018-01-22 Test Engineer: 47989 Configuration: EUT / Z-Position Location: Chamber 2 Mode: GPRS 850 MHz Fundamentals  <u>Test Equipment:</u> Receiving: VULB9163-749, and Chamber 2 SMA Cables Substitution: Dipole 3121_DB4, 3m N-type Cable									
		f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
GSM GSM850 GPRS	Low Ch	824.20	32.08	V	1.0	-1.5	29.65	38.5	-8.8		
		824.20	14.51	H	1.0	-1.5	12.08	38.5	-26.4		
	Mid Ch	836.60	30.96	V	1.0	-1.4	28.58	38.5	-9.9		
		836.60	13.72	H	1.0	-1.4	11.34	38.5	-27.2		
	High Ch	848.80	30.39	V	1.0	-1.4	28.04	38.5	-10.5		
		848.80	13.80	H	1.0	-1.4	11.45	38.5	-27.0		
	GSM GSM850 EGPRS	Low Ch	824.20	28.78	V	1.0	-1.5	26.35	38.5	-12.1	
			824.20	10.98	H	1.0	-1.5	8.55	38.5	-29.9	
		Mid Ch	836.60	27.26	V	1.0	-1.4	24.88	38.5	-13.6	
			836.60	10.30	H	1.0	-1.4	7.92	38.5	-30.6	
High Ch		848.80	26.97	V	1.0	-1.4	24.62	38.5	-13.9		
		848.80	10.71	H	1.0	-1.4	8.36	38.5	-30.1		

**GSM 1900**

GSM GSM1900 GPRS	UL Verification Services, Inc. High Frequency Substitution Measurement								
	<b>Company:</b>		Samsung						
	<b>Project #:</b>		4788312331						
	<b>Date:</b>		2018-01-22						
	<b>Test Engineer:</b>		45585						
	<b>Configuration:</b>		EUTX-Position						
	<b>Location:</b>		Chamber 1						
	<b>Mode:</b>		GPRS 1900 MHz Fundamentals						
	<b>Test Equipment:</b>		Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables Substitution: Horn 3115[00161451], 3m N-type Cable						
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch									
1850.20	20.09	V	4.5	9.5	25.10	33.0	-7.9		
1850.20	23.71	H	4.5	9.5	28.72	33.0	-4.3		
Mid Ch									
1880.00	20.67	V	4.5	9.2	25.35	33.0	-7.7		
1880.00	23.29	H	4.5	9.2	27.97	33.0	-5.0		
High Ch									
1909.80	19.87	V	4.6	8.9	24.17	33.0	-8.8		
1909.80	22.20	H	4.6	8.9	26.50	33.0	-6.5		

GSM GSM1900 EGPRS	UL Verification Services, Inc. High Frequency Substitution Measurement								
	<b>Company:</b>		Samsung						
	<b>Project #:</b>		4788312331						
	<b>Date:</b>		2018-01-22						
	<b>Test Engineer:</b>		45585						
	<b>Configuration:</b>		EUTX-Position						
	<b>Location:</b>		Chamber 1						
	<b>Mode:</b>		EGPRS 1900 MHz Fundamentals						
	<b>Test Equipment:</b>		Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables Substitution: Horn 3115[00161451], 3m N-type Cable						
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch									
1850.20	17.38	V	4.5	9.5	22.39	33.0	-10.6		
1850.20	20.94	H	4.5	9.5	25.95	33.0	-7.0		
Mid Ch									
1880.00	17.95	V	4.5	9.2	22.63	33.0	-10.4		
1880.00	20.28	H	4.5	9.2	24.96	33.0	-8.0		
High Ch									
1909.80	16.52	V	4.6	8.9	20.82	33.0	-12.2		
1909.80	19.69	H	4.6	8.9	23.99	33.0	-9.0		

**WCDMA Band 5**

WCDMA  Band 5 REL99	<b>UL Verification Services, Inc.</b> <b>High Frequency Substitution Measurement</b>																																																																																										
	Company: Samsung Project #: 4788312331 Date: 2018-01-22 Test Engineer: 47989 Configuration: EUT / Z-Position Location: Chamber 2 Mode: Rel99 Band 5 Fundamentals  <b>Test Equipment:</b> Receiving: VULB9163-749, and Chamber 2 SMA Cables Substitution: Dipole 3121_DB4, 3m N-type Cable																																																																																										
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WCDMA  Band 5 HSDPA	<b>UL Verification Services, Inc.</b> <b>High Frequency Substitution Measurement</b>																																																																																										
	Company: Samsung Project #: 4788312331 Date: 2018-01-22 Test Engineer: 47989 Configuration: EUT / Z-Position Location: Chamber 2 Mode: HSDPA Band 5 Fundamentals  <b>Test Equipment:</b> Receiving: VULB9163-749, and Chamber 2 SMA Cables Substitution: Dipole 3121_DB4, 3m N-type Cable																																																																																										
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**WCDMA Band 4**

WCDMA Band 4 REL99	<p style="text-align: center;"><b>UL Verification Services, Inc.</b>  <b>High Frequency Substitution Measurement</b></p> <p>Company: Samsung                  Project #: 4788312331                  Date: 2018-01-23                  Test Engineer: 47989                  Configuration: EUT / X-Position                  Location: Chamber 2                  Mode: Rel99 Band 4 Fundamentals</p> <p><b>Test Equipment:</b>                  Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables                  Substitution: Horn 3115[00161451], 3m N-type Cable</p> <table border="1"> <thead> <tr> <th>f MHz</th> <th>SG reading (dBm)</th> <th>Ant. Pol. (H/V)</th> <th>Cable Loss (dB)</th> <th>Antenna Gain (dBi)</th> <th>EIRP (dBm)</th> <th>Limit (dBm)</th> <th>Delta (dB)</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td colspan="9">Low Ch</td> </tr> <tr> <td>1712.40</td> <td>13.89</td> <td>V</td> <td>4.3</td> <td>9.5</td> <td>19.04</td> <td>30.0</td> <td>-11.0</td> <td></td> </tr> <tr> <td>1712.40</td> <td>15.66</td> <td>H</td> <td>4.3</td> <td>9.5</td> <td>20.81</td> <td>30.0</td> <td>-9.2</td> <td></td> </tr> <tr> <td colspan="9">Mid Ch</td> </tr> <tr> <td>1732.60</td> <td>12.87</td> <td>V</td> <td>4.3</td> <td>9.5</td> <td>18.07</td> <td>30.0</td> <td>-11.9</td> <td></td> </tr> <tr> <td>1732.60</td> <td>16.71</td> <td>H</td> <td>4.3</td> <td>9.5</td> <td>21.90</td> <td>30.0</td> <td>-8.1</td> <td></td> </tr> <tr> <td colspan="9">High Ch</td> </tr> <tr> <td>1752.60</td> <td>14.92</td> <td>V</td> <td>4.4</td> <td>9.6</td> <td>20.16</td> <td>30.0</td> <td>-9.8</td> <td></td> </tr> <tr> <td>1752.60</td> <td>17.01</td> <td>H</td> <td>4.4</td> <td>9.6</td> <td>22.25</td> <td>30.0</td> <td>-7.7</td> <td></td> </tr> </tbody> </table>									f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	Low Ch									1712.40	13.89	V	4.3	9.5	19.04	30.0	-11.0		1712.40	15.66	H	4.3	9.5	20.81	30.0	-9.2		Mid Ch									1732.60	12.87	V	4.3	9.5	18.07	30.0	-11.9		1732.60	16.71	H	4.3	9.5	21.90	30.0	-8.1		High Ch									1752.60	14.92	V	4.4	9.6	20.16	30.0	-9.8		1752.60	17.01	H	4.4	9.6	22.25	30.0	-7.7	
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WCDMA Band 4 HSDPA	<p style="text-align: center;"><b>UL Verification Services, Inc.</b>  <b>High Frequency Substitution Measurement</b></p> <p>Company: Samsung                  Project #: 4788312331                  Date: 2018-01-23                  Test Engineer: 47989                  Configuration: EUT / X-Position                  Location: Chamber 2                  Mode: HSDPA Band 4 Fundamentals</p> <p><b>Test Equipment:</b>                  Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables                  Substitution: Horn 3115[00161451], 3m N-type Cable</p> <table border="1"> <thead> <tr> <th>f MHz</th> <th>SG reading (dBm)</th> <th>Ant. Pol. (H/V)</th> <th>Cable Loss (dB)</th> <th>Antenna Gain (dBi)</th> <th>EIRP (dBm)</th> <th>Limit (dBm)</th> <th>Delta (dB)</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td colspan="9">Low Ch</td> </tr> <tr> <td>1712.40</td> <td>14.14</td> <td>V</td> <td>4.3</td> <td>9.5</td> <td>19.29</td> <td>30.0</td> <td>-10.7</td> <td></td> </tr> <tr> <td>1712.40</td> <td>16.30</td> <td>H</td> <td>4.3</td> <td>9.5</td> <td>21.45</td> <td>30.0</td> <td>-8.6</td> <td></td> </tr> <tr> <td colspan="9">Mid Ch</td> </tr> <tr> <td>1732.60</td> <td>13.70</td> <td>V</td> <td>4.3</td> <td>9.5</td> <td>18.90</td> <td>30.0</td> <td>-11.1</td> <td></td> </tr> <tr> <td>1732.60</td> <td>16.10</td> <td>H</td> <td>4.3</td> <td>9.5</td> <td>21.29</td> <td>30.0</td> <td>-8.7</td> <td></td> </tr> <tr> <td colspan="9">High Ch</td> </tr> <tr> <td>1752.60</td> <td>15.25</td> <td>V</td> <td>4.4</td> <td>9.6</td> <td>20.49</td> <td>30.0</td> <td>-9.5</td> <td></td> </tr> <tr> <td>1752.60</td> <td>17.52</td> <td>H</td> <td>4.4</td> <td>9.6</td> <td>22.76</td> <td>30.0</td> <td>-7.2</td> <td></td> </tr> </tbody> </table>									f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	Low Ch									1712.40	14.14	V	4.3	9.5	19.29	30.0	-10.7		1712.40	16.30	H	4.3	9.5	21.45	30.0	-8.6		Mid Ch									1732.60	13.70	V	4.3	9.5	18.90	30.0	-11.1		1732.60	16.10	H	4.3	9.5	21.29	30.0	-8.7		High Ch									1752.60	15.25	V	4.4	9.6	20.49	30.0	-9.5		1752.60	17.52	H	4.4	9.6	22.76	30.0	-7.2	
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**WCDMA Band 2**

WCDMA Band 2 REL99		UL Verification Services, Inc. High Frequency Substitution Measurement								
		Company: Samsung Project #: 4788312331 Date: 2018-01-30 Test Engineer: 47989 Configuration: EUT / X-Position Location: Chamber 2 Mode: Rel99 Band 2 Fundamentals								
		Test Equipment: Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables Substitution: Horn 3115[00161451], 3m N-type Cable								
		f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
		Low Ch								
		1852.40	16.24	V	4.5	9.5	21.23	33.0	-11.8	
		1852.40	17.06	H	4.5	9.5	22.05	33.0	-11.0	
		Mid Ch								
		1880.00	16.09	V	4.5	9.2	20.77	33.0	-12.2	
		1880.00	15.21	H	4.5	9.2	19.89	33.0	-13.1	
		High Ch								
		1907.60	15.17	V	4.6	8.9	19.51	33.0	-13.5	
		1907.60	15.39	H	4.6	8.9	19.73	33.0	-13.3	

WCDMA Band 2 HSDPA		UL Verification Services, Inc. High Frequency Substitution Measurement								
		Company: Samsung Project #: 4788312331 Date: 2018-01-30 Test Engineer: 47989 Configuration: EUT / X-Position Location: Chamber 2 Mode: HSDPA Band 2 Fundamentals								
		Test Equipment: Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables Substitution: Horn 3115[00161451], 3m N-type Cable								
		f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
		Low Ch								
		1852.40	15.63	V	4.5	9.5	20.62	33.0	-12.4	
		1852.40	17.05	H	4.5	9.5	22.04	33.0	-11.0	
		Mid Ch								
		1880.00	16.36	V	4.5	9.2	21.04	33.0	-12.0	
		1880.00	15.11	H	4.5	9.2	19.79	33.0	-13.2	
		High Ch								
		1907.60	15.68	V	4.6	8.9	20.02	33.0	-13.0	
		1907.60	15.69	H	4.6	8.9	20.03	33.0	-13.0	