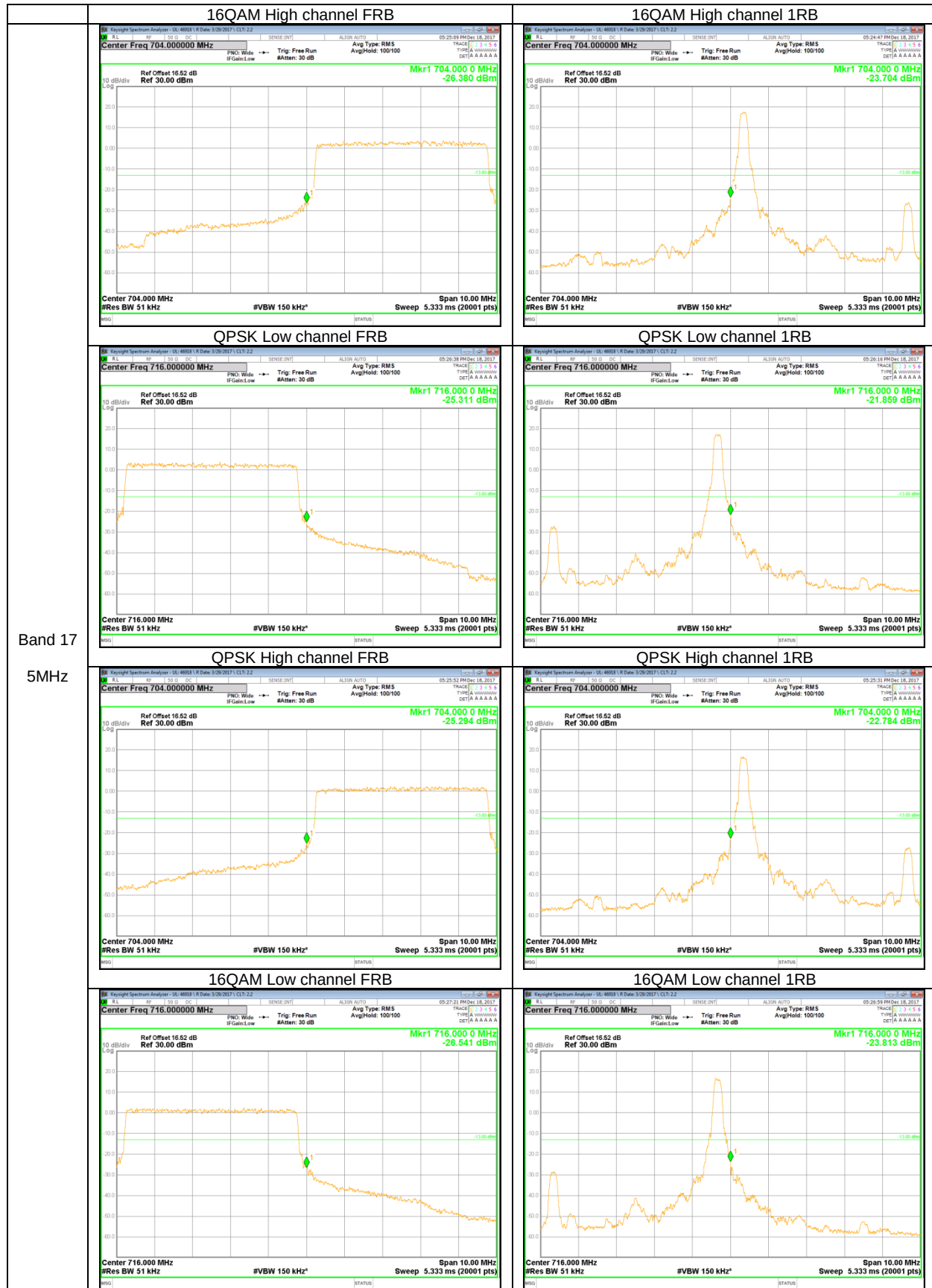
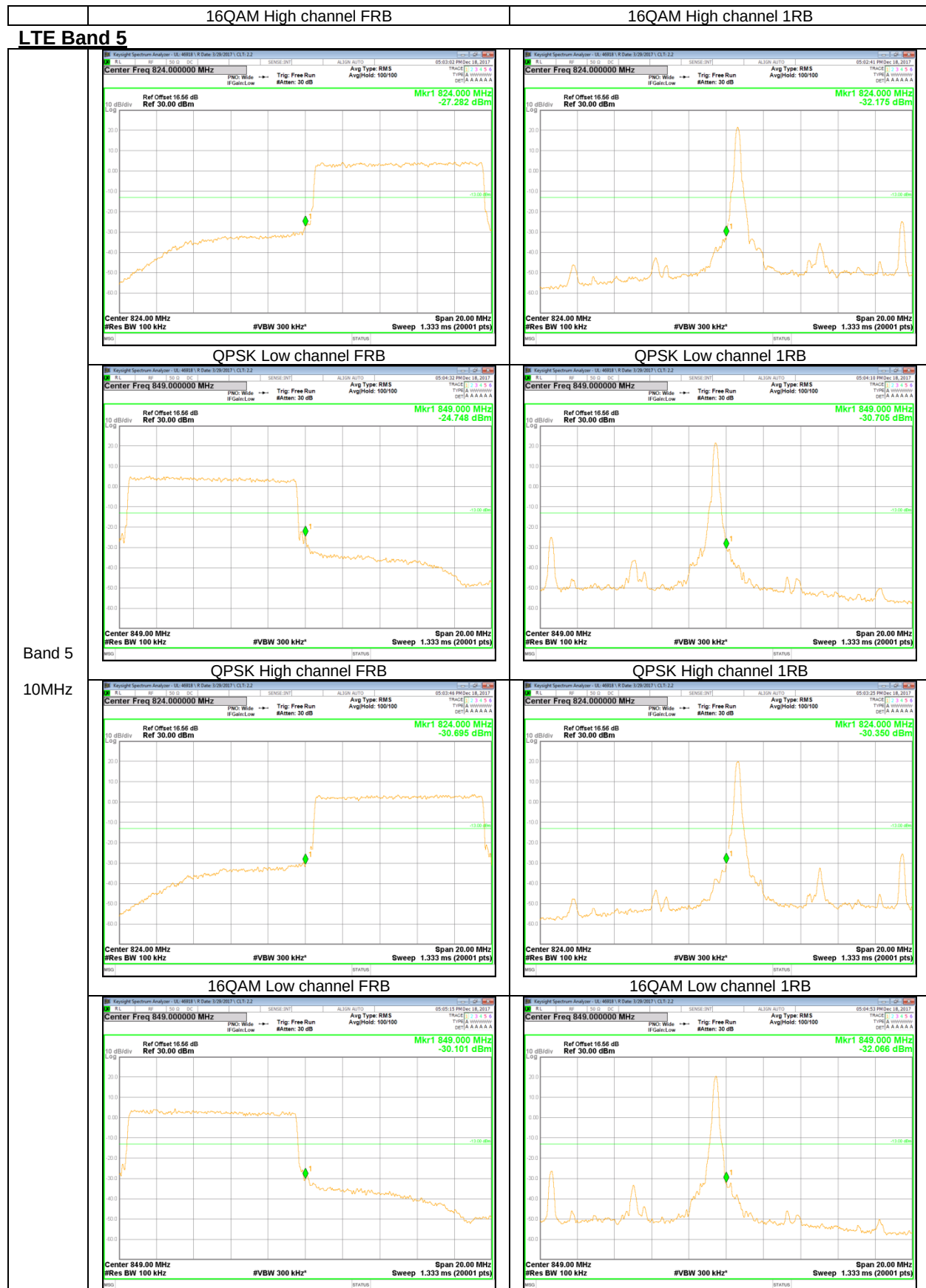
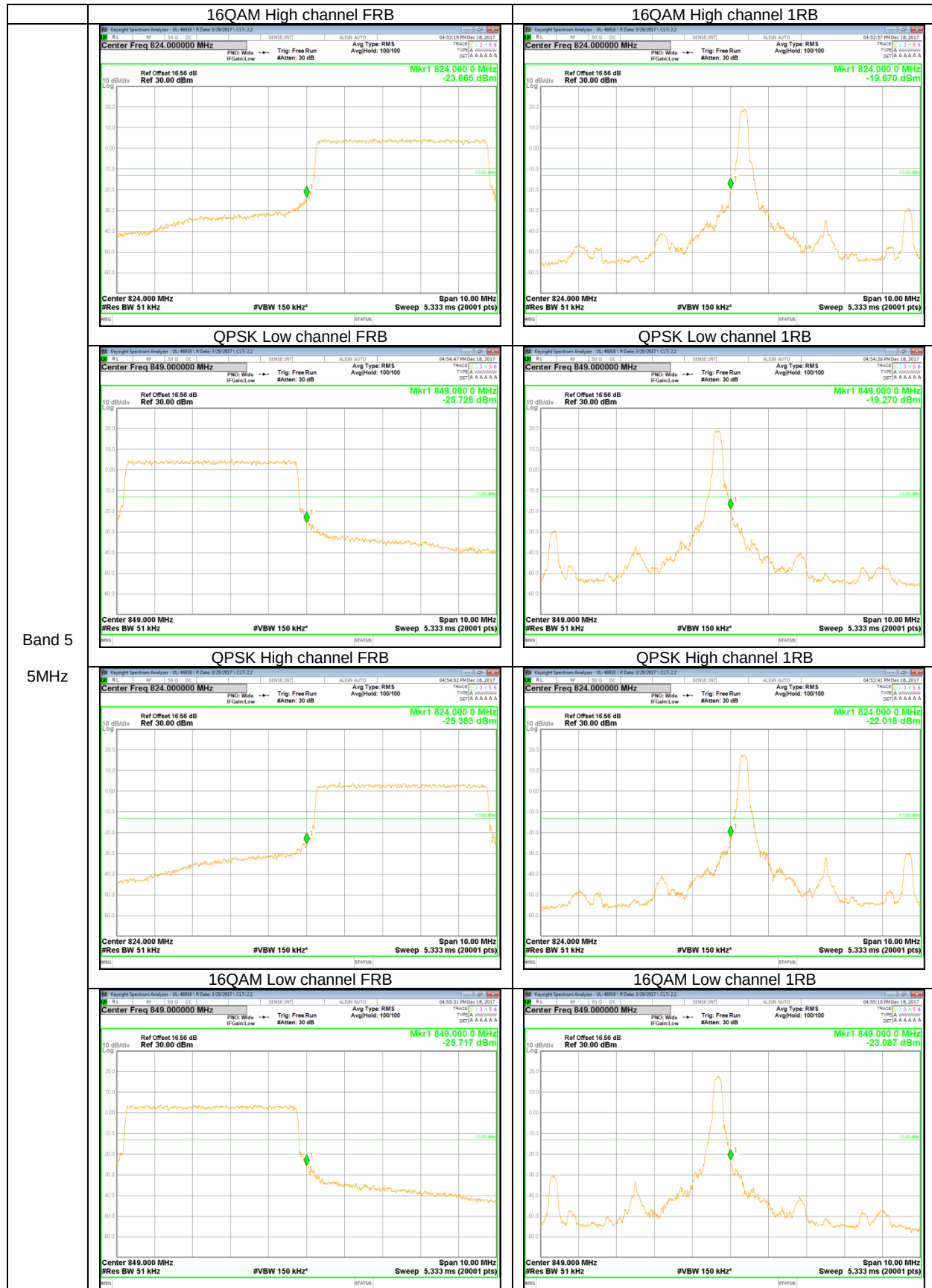
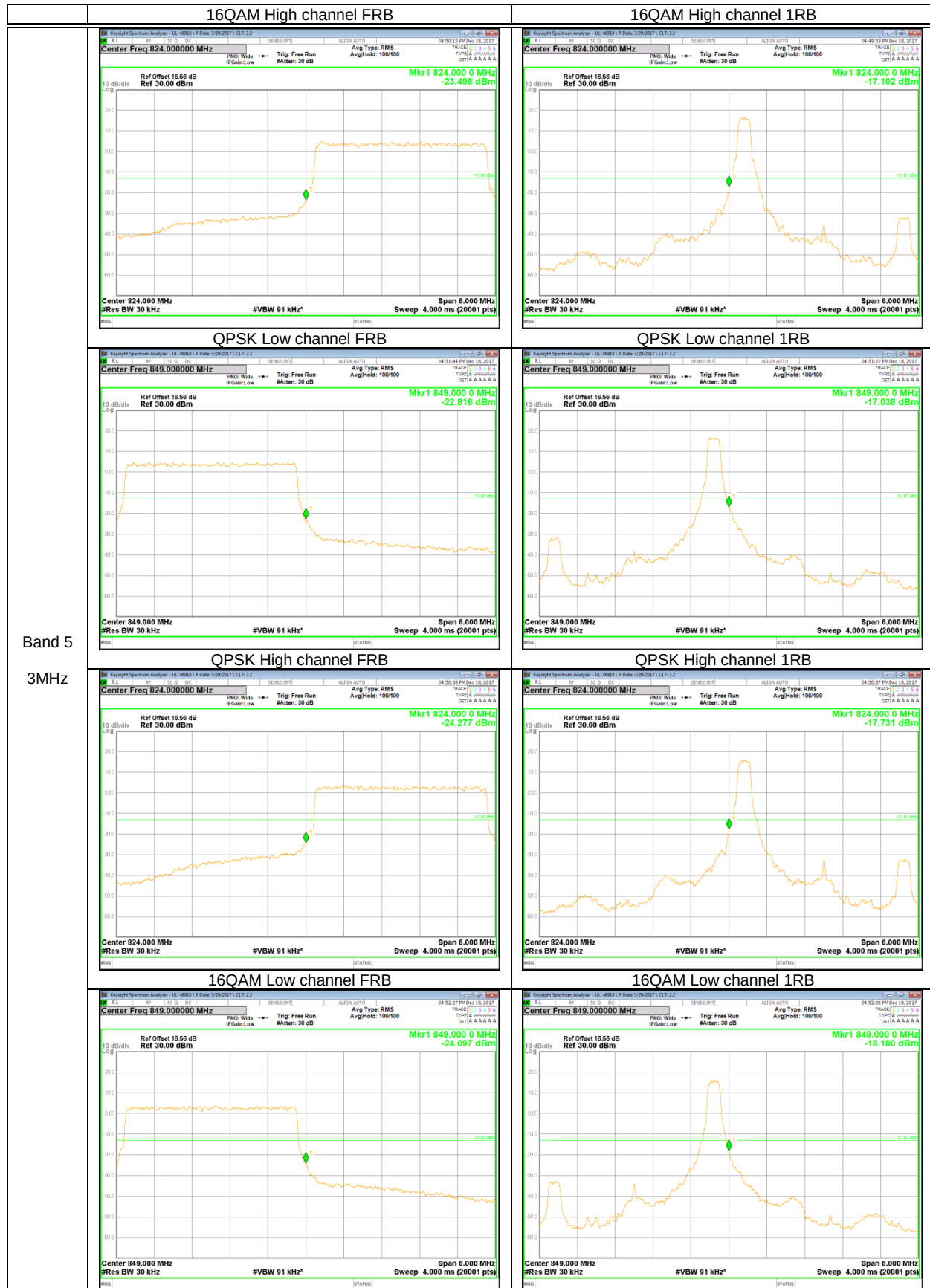
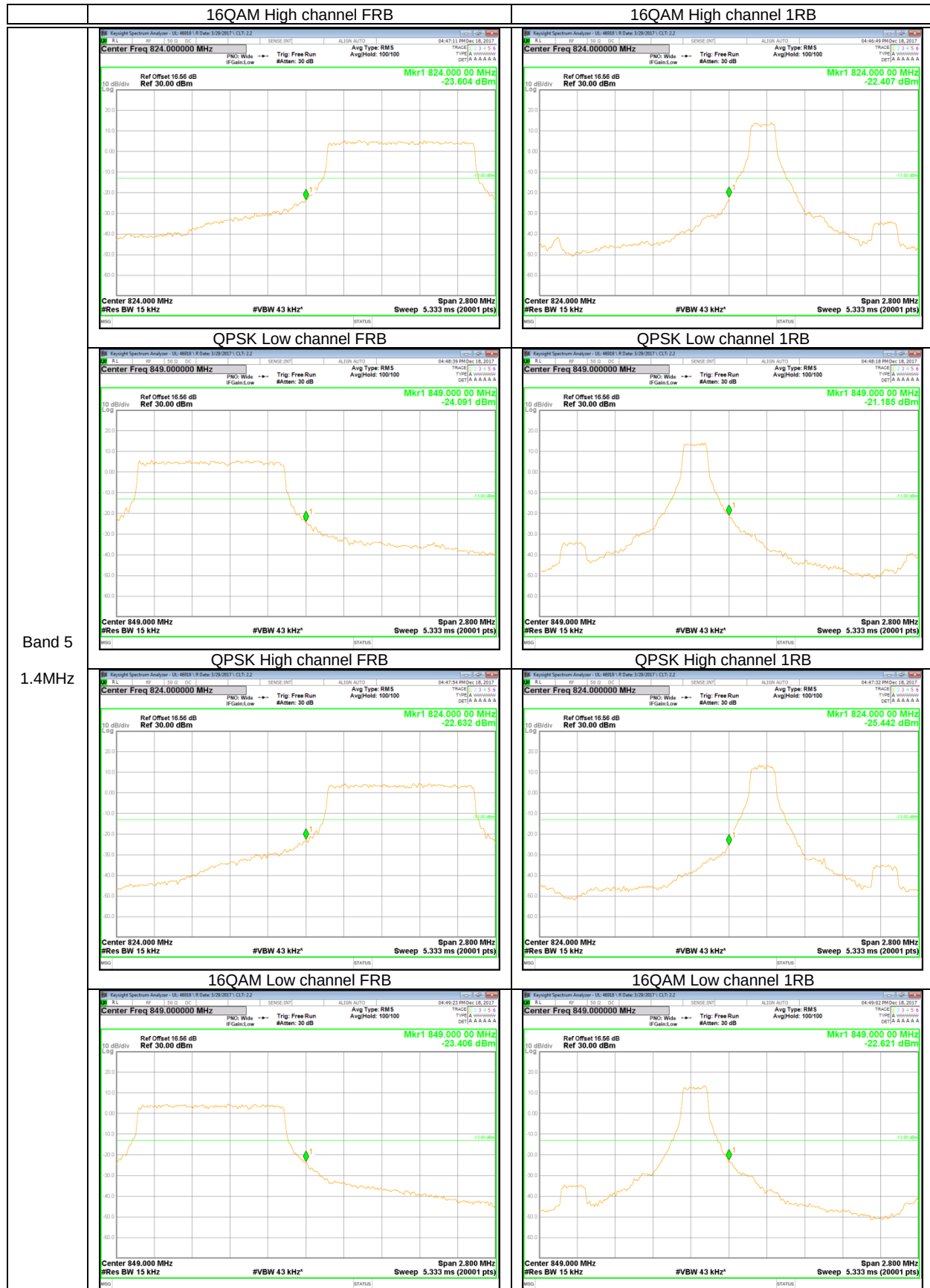












	16QAM High channel FRB	16QAM High channel 1RB
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10.3 OUT OF BAND EMISSIONS

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 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.

- 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)
- Set VBW $\geq 3 \times$ RBW;
- Set span ≥ 1.5 times the OBW;
- Sweep time = auto couple;
- Detector = peak;
- Ensure that the number of measurement points = Max (40001);
- Trace mode = max hold;

RESULTS

GSM

Band	Mode	f [MHz]	Spurious [dBm]	Limit [dBm]
GSM1900	GPRS	1850.2	-23.03	-13.00
		1880.0	-22.84	
		1909.8	-22.67	
	EGPRS	1850.2	-22.71	
		1880.0	-22.36	
		1909.8	-22.88	

WCDMA

Band	Mode	f [MHz]	Spurious [dBm]	Limit [dBm]
Band 5	REL99	826.4	-31.66	-13.00
		836.6	-32.99	
		846.6	-32.76	
	HSDPA	826.4	-32.46	
		836.6	-33.36	
		846.6	-30.79	
Band 2	REL99	1852.4	-32.79	
		1880.0	-32.27	
		1907.6	-31.68	
	HSDPA	1852.4	-31.68	
		1880.0	-32.62	
		1907.6	-32.83	

LTE 17

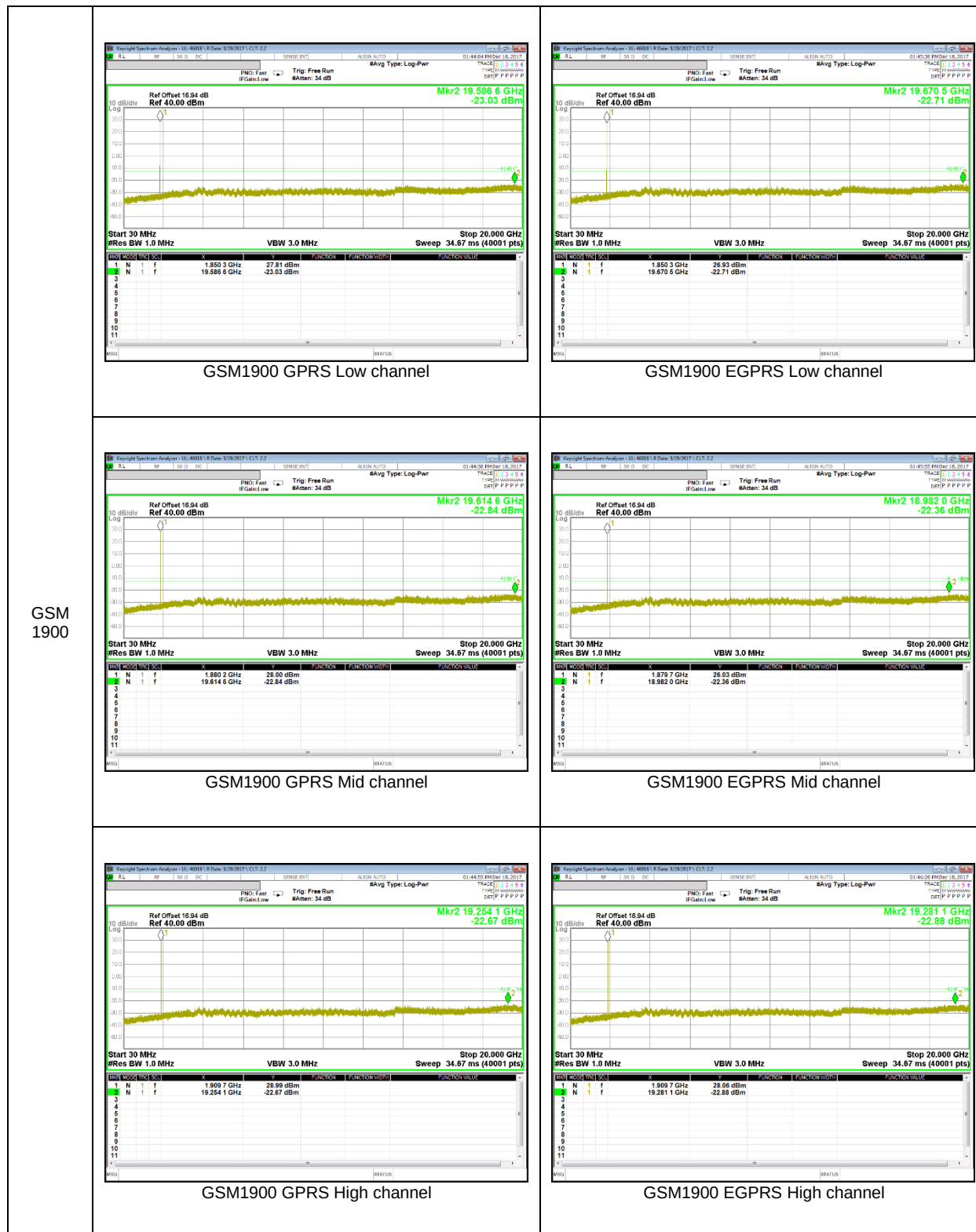
Bandwidth	Mode	f [MHz]	Spurious [dBm]	Limit [dBm]
10 MHz	QPSK	709.0	-31.17	-13.00
		710.0	-30.35	
		711.0	-31.59	
	16QAM	709.0	-31.20	
		710.0	-31.40	
		711.0	-31.11	
5 MHz	QPSK	706.5	-31.52	
		710.0	-31.58	
		713.5	-31.28	
	16QAM	706.5	-30.52	
		710.0	-31.10	
		713.5	-30.31	

LTE 5

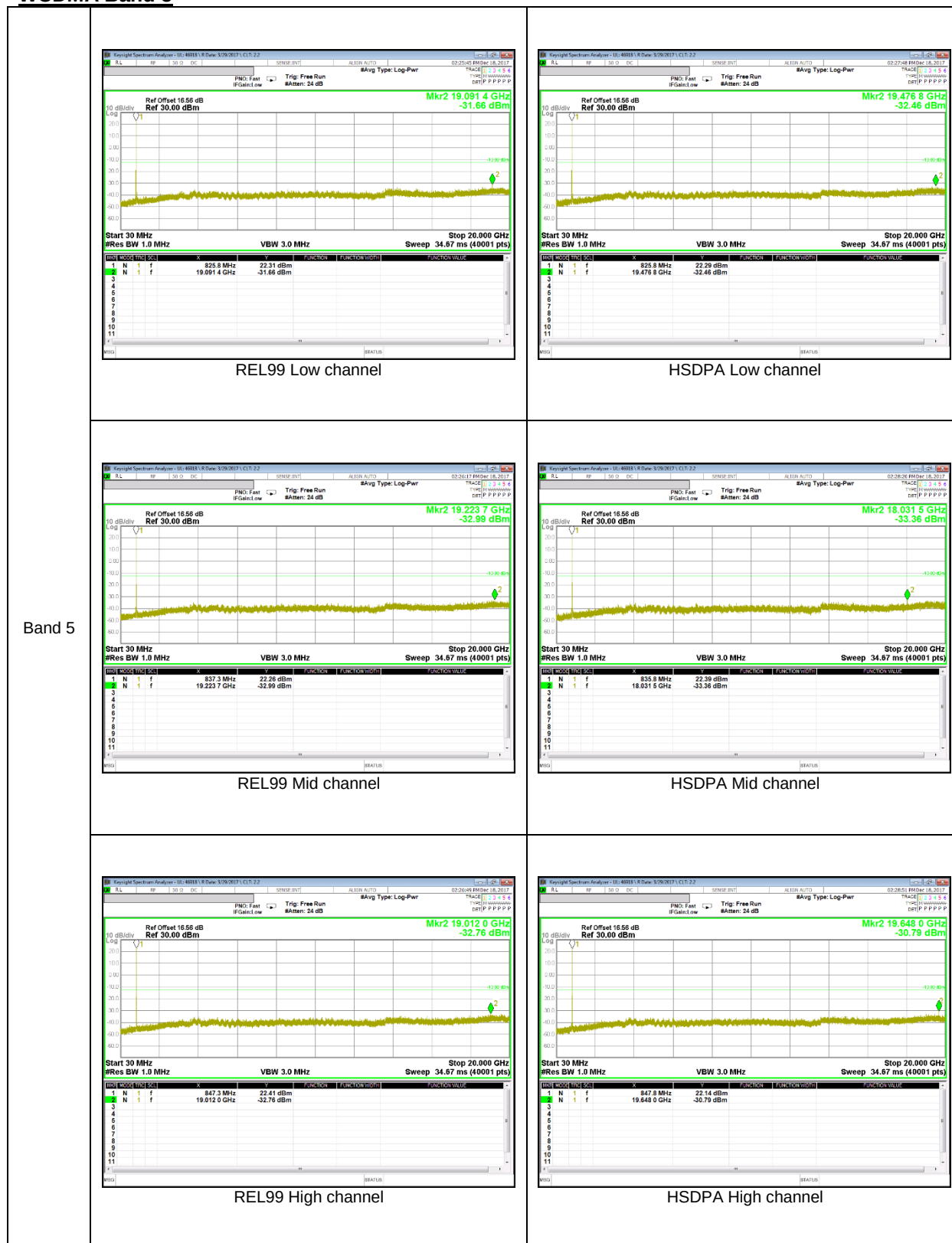
Bandwidth	Mode	f [MHz]	Spurious [dBm]	Limit [dBm]
10 MHz	QPSK	829.0	-30.67	-13.00
		836.5	-30.56	
		844.0	-30.77	
	16QAM	829.0	-31.06	
		836.5	-31.66	
		844.0	-31.45	
5 MHz	QPSK	826.5	-30.16	
		836.5	-31.19	
		846.5	-31.38	
	16QAM	826.5	-30.03	
		836.5	-31.47	
		846.5	-31.48	
3 MHz	QPSK	825.5	-30.81	
		836.5	-31.36	
		847.5	-30.94	
	16QAM	825.5	-31.50	
		836.5	-31.42	
		847.5	-30.70	
1.4 MHz	QPSK	824.7	-31.47	
		836.5	-31.35	
		848.3	-30.52	
	16QAM	824.7	-31.12	
		836.5	-30.58	
		848.3	-31.50	

9.1.2. OUT OF BAND EMISSIONS PLOTS

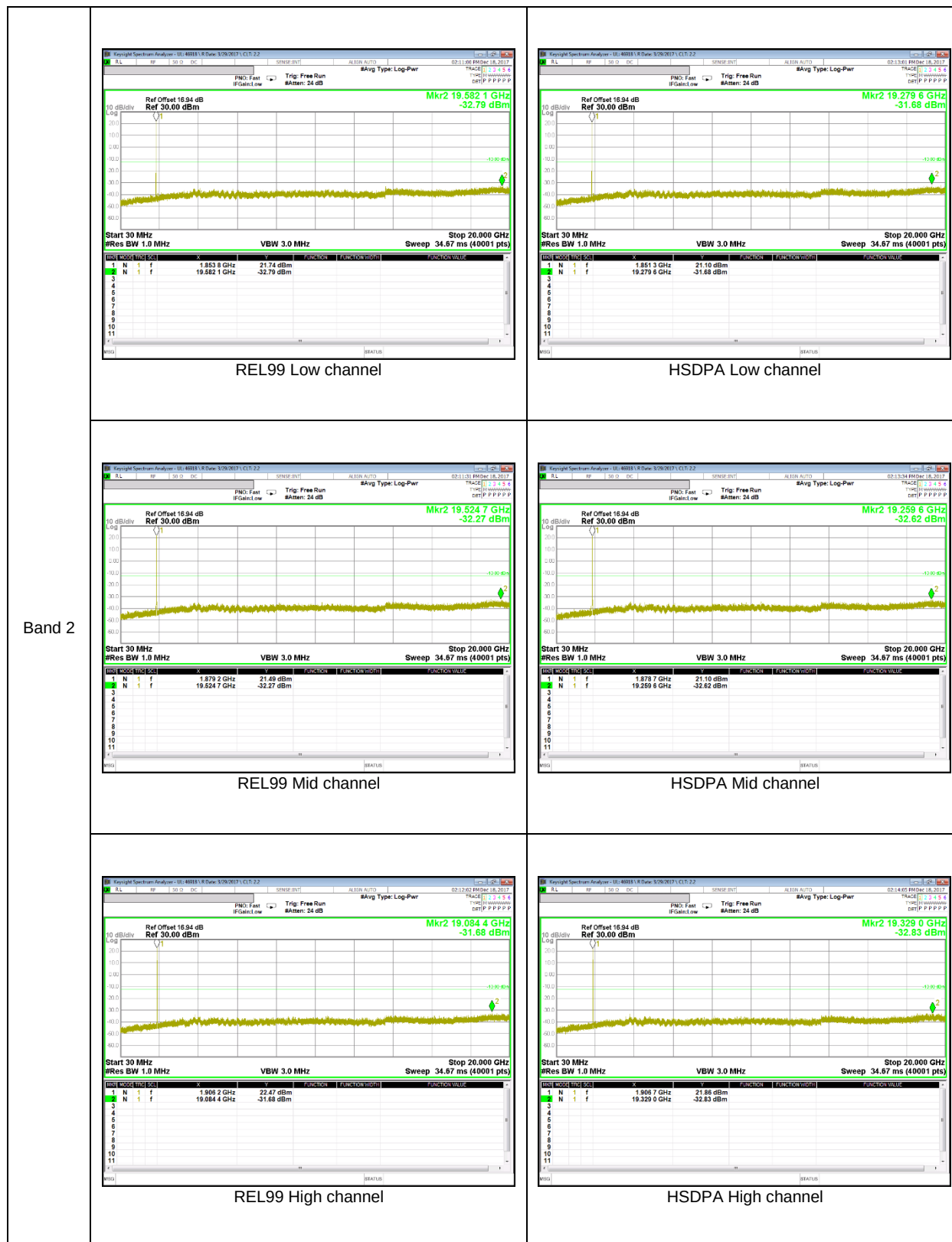
GSM 1900



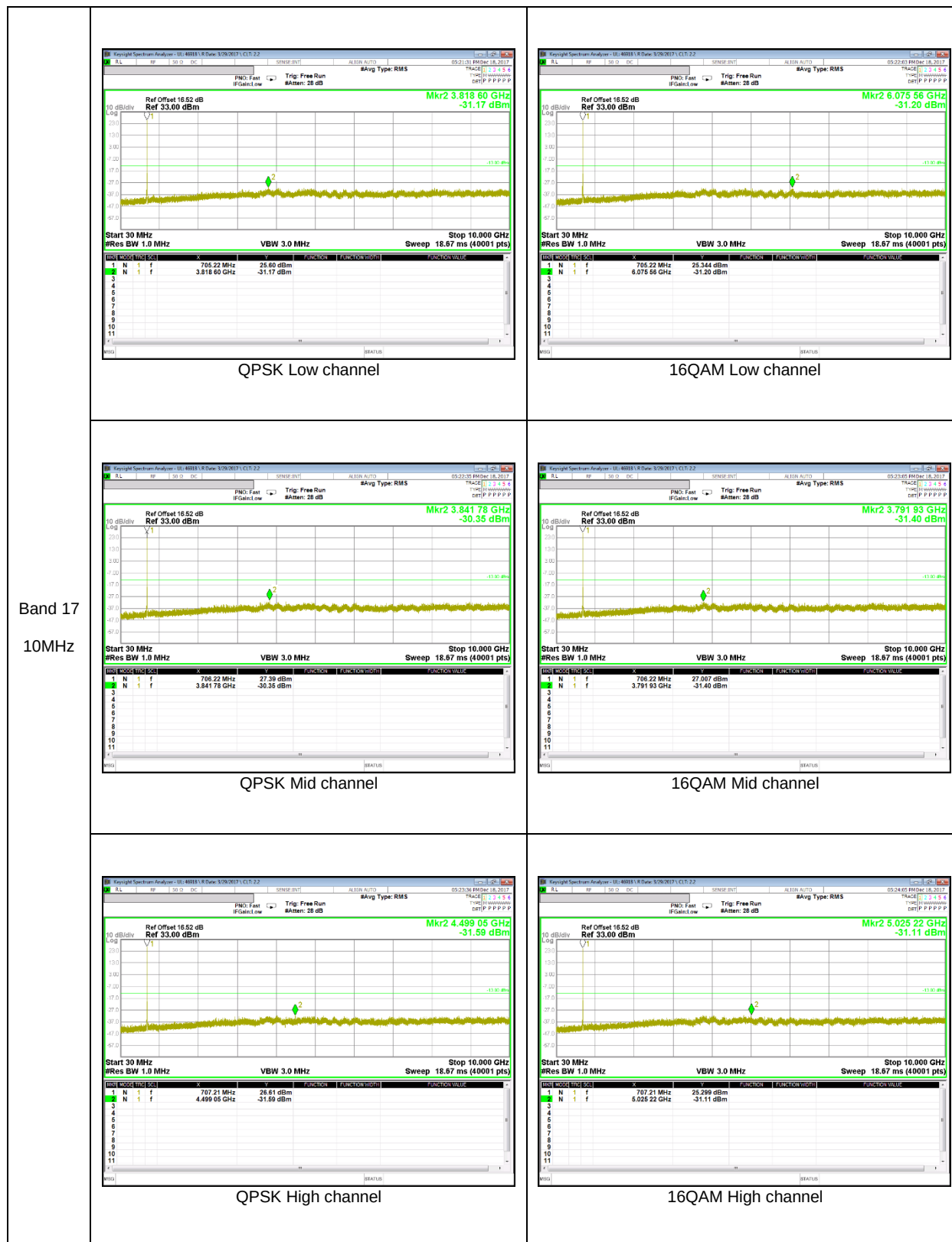
WCDMA Band 5

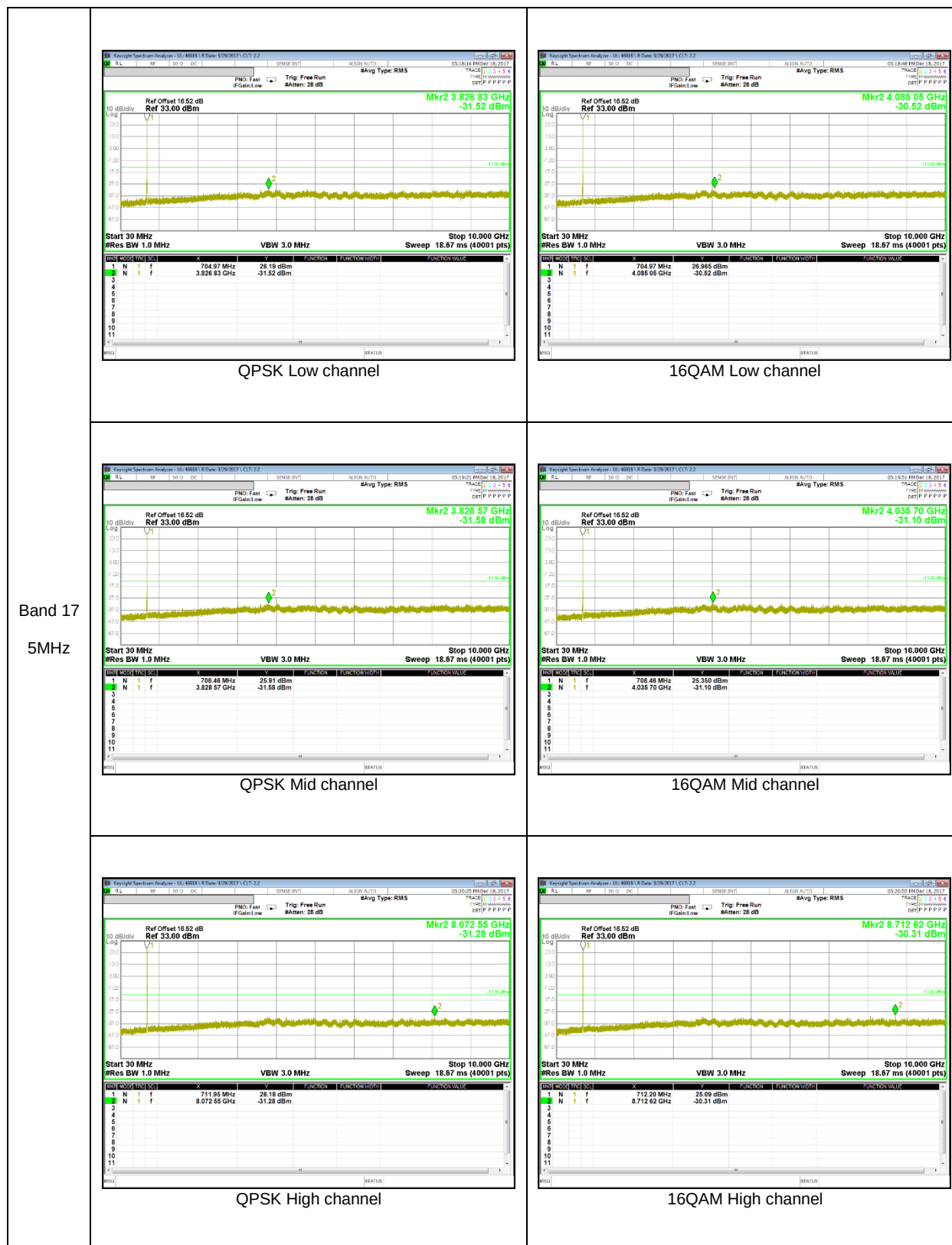


WCDMA Band 2

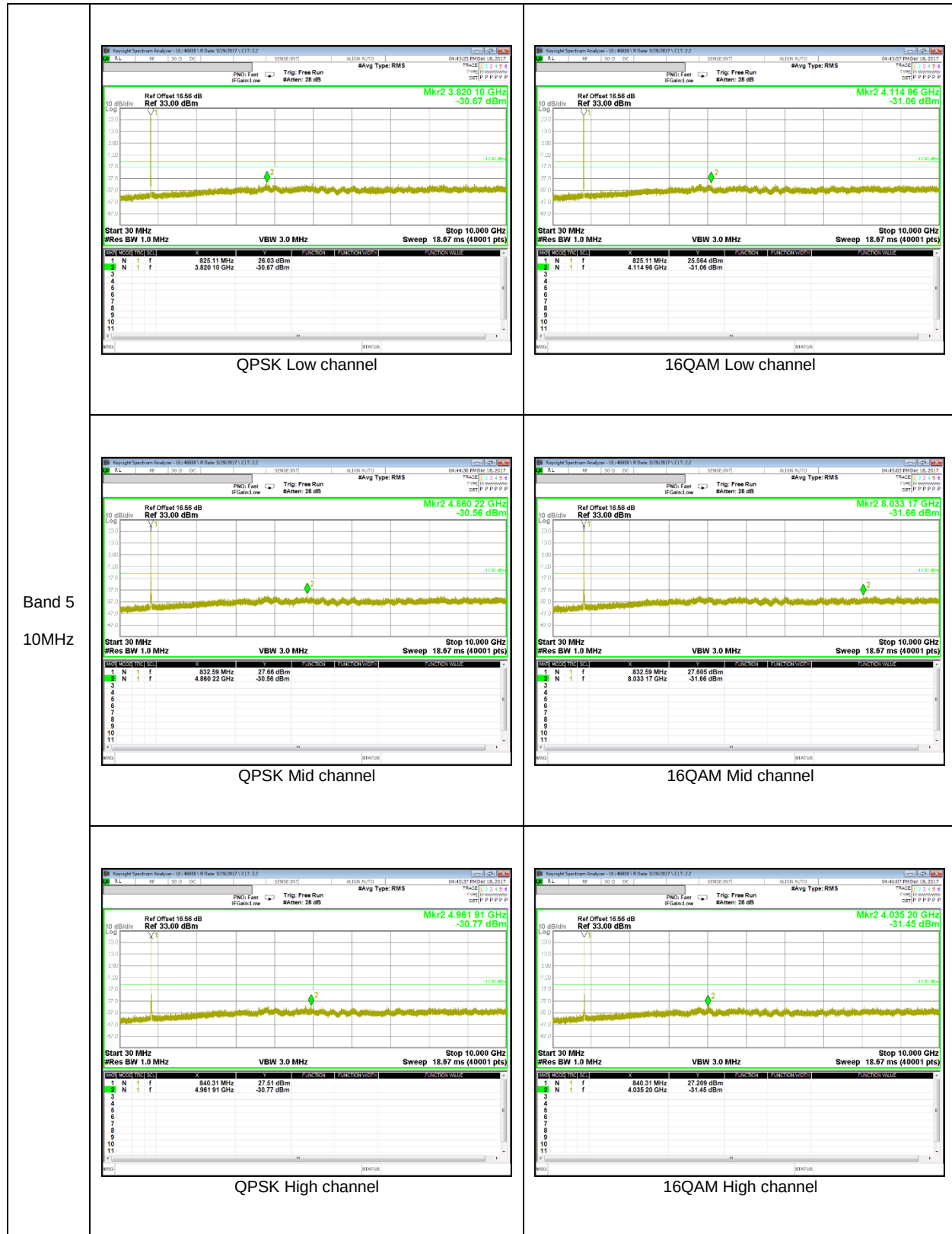


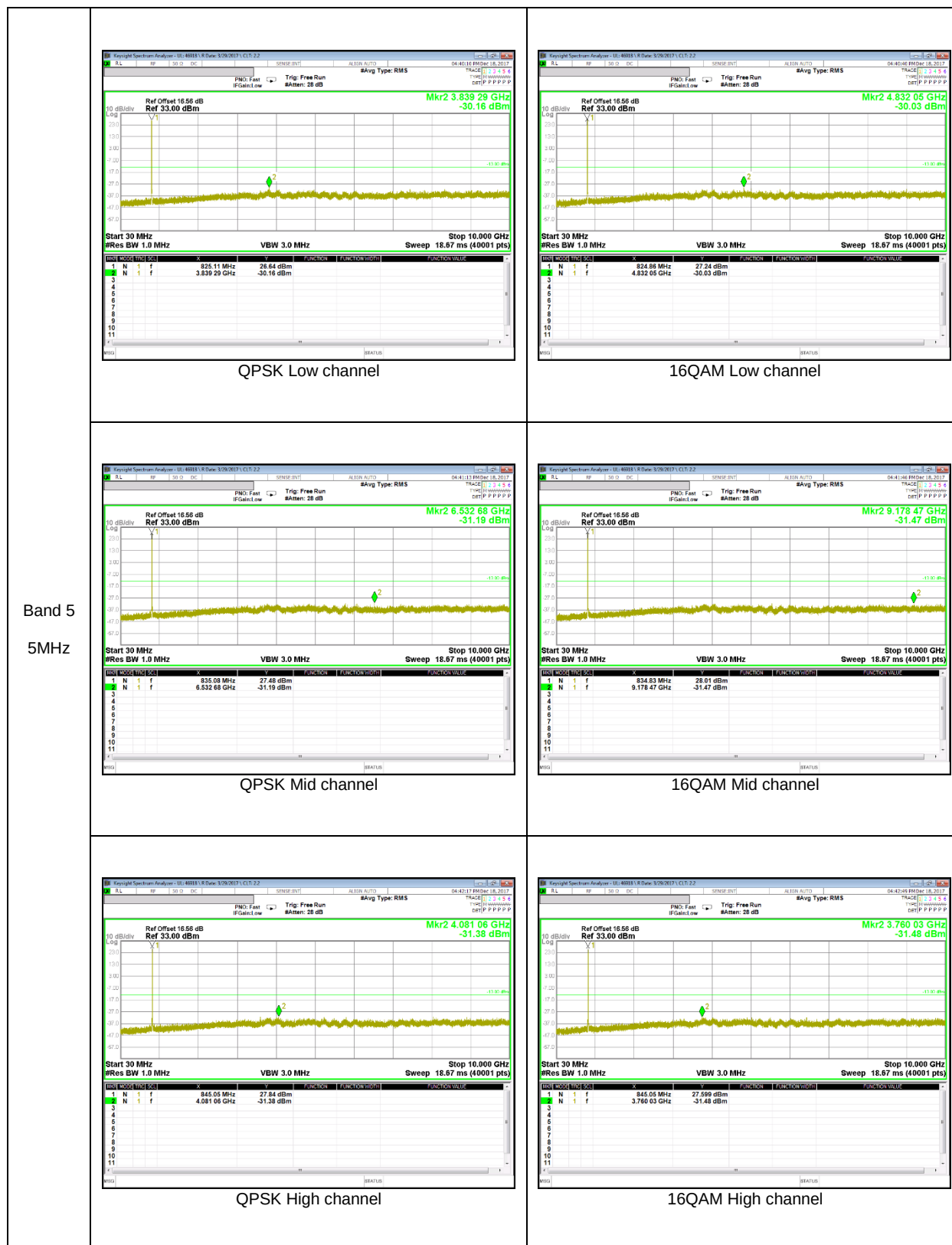
LTE Band 17

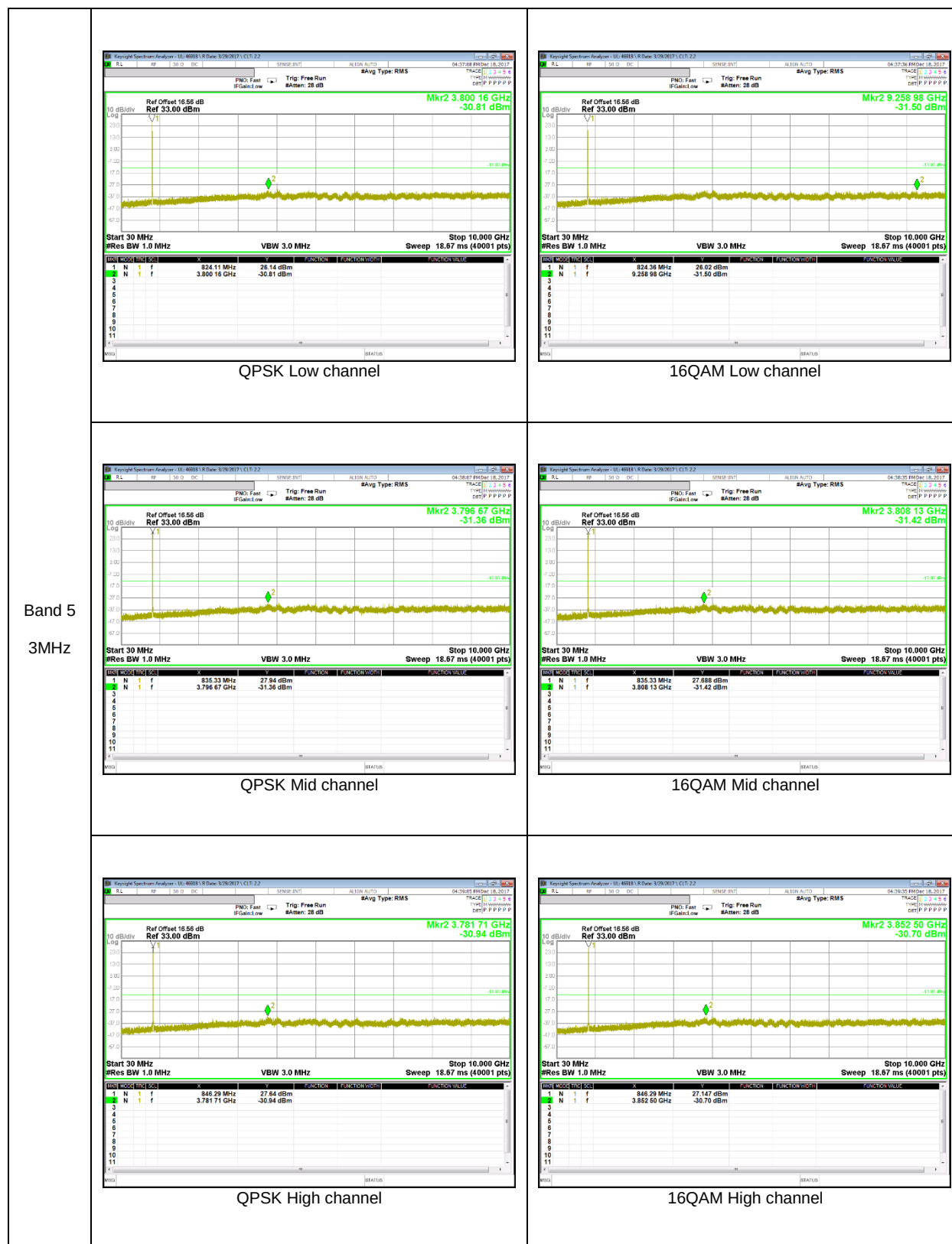


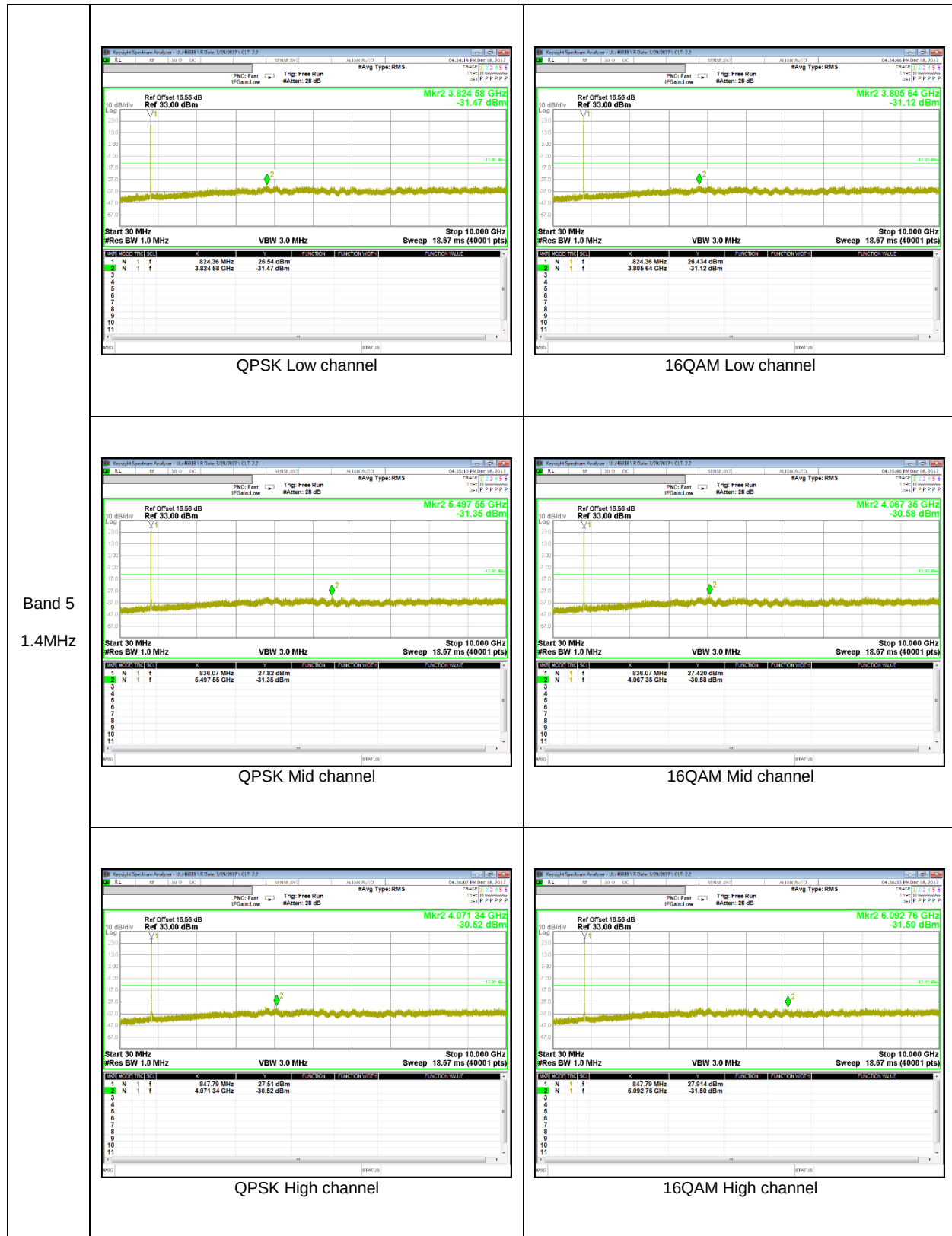


LTE Band 5









9.2. 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 v03

RESULTS

See the following pages.

9.2.1. 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	836.60002826	-0.001	2.5
3.85	40	836.60002689	0.001	2.5
3.85	30	836.60002987	-0.003	2.5
3.85	20	836.60002766	0	2.5
3.85	10	836.60002824	-0.001	2.5
3.85	0	836.60002946	-0.002	2.5
3.85	-10	836.60002833	-0.001	2.5
3.85	-20	836.60002758	0.000	2.5
3.85	-30	836.60000000	0.033	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]
3.85	20	836.60002766	0	2.5
4.30	20	836.60002704	0.001	2.5
3.60	20	836.60002876	-0.001	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	1880.00002268	0.004	2.5
3.85	40	1880.00002765	0.001	2.5
3.85	30	1880.00002882	0.000	2.5
3.85	20	1880.00002934	0	2.5
3.85	10	1880.00002645	0.002	2.5
3.85	0	1880.00002726	0.001	2.5
3.85	-10	1880.00002744	0.001	2.5
3.85	-20	1880.00002949	0.000	2.5
3.85	-30	1880.00002854	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]
3.85	20	1880.00002934	0	2.5
4.30	20	1880.00002736	0.001	2.5
3.60	20	1880.00002982	0.000	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	710.00002678	-0.001	2.5
3.85	40	710.00002589	0.000	2.5
3.85	30	710.00002546	0.001	2.5
3.85	20	710.00002598	0	2.5
3.85	10	710.00002625	0.000	2.5
3.85	0	710.00002784	-0.003	2.5
3.85	-10	710.00002863	-0.004	2.5
3.85	-20	710.00002764	-0.002	2.5
3.85	-30	710.00000000	0.037	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]
3.85	20	710.00002598	0	2.5
4.30	20	710.00002649	-0.001	2.5
3.60	20	710.00002575	0.000	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	836.50002682	-0.002	2.5
3.85	40	836.50002456	0.001	2.5
3.85	30	836.50002571	0.000	2.5
3.85	20	836.50002543	0	2.5
3.85	10	836.50002749	-0.002	2.5
3.85	0	836.50002861	-0.004	2.5
3.85	-10	836.50002836	-0.004	2.5
3.85	-20	836.50002725	-0.002	2.5
3.85	-30	836.50000000	0.030	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]
3.85	20	836.50002543	0	2.5
4.30	20	836.50002667	-0.001	2.5
3.60	20	836.50002488	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	1879.99995458	0.002	2.5
3.85	40	1879.99995838	0.000	2.5
3.85	30	1879.99995603	0.001	2.5
3.85	20	1879.99995796	0	2.5
3.85	10	1879.99995113	0.004	2.5
3.85	0	1879.99995271	0.003	2.5
3.85	-10	1879.99995544	0.001	2.5
3.85	-20	1879.99995174	0.003	2.5
3.85	-30	1879.99995060	0.004	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]
3.85	20	1879.99995796	0	2.5
4.30	20	1879.99995517	0.001	2.5
3.60	20	1879.99995675	0.001	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.

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 ≥ 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]
GSM1900	GPRS	512	1850.2	25.48	353.18
		661	1880.0	26.37	433.51
		810	1909.8	26.92	492.04
	EGPRS	512	1850.2	23.31	214.29
		661	1880.0	24.36	272.90
		810	1909.8	23.55	226.46

WCDMA

Band	Mode	Channel	f [MHz]	ERP / EIRP	
				[dBm]	[mW]
Band 5	REL99	4132	826.4	18.45	69.98
		4183	836.6	18.57	71.94
		4233	846.6	18.85	76.74
	HSDPA	4132	826.4	18.39	69.02
		4183	836.6	18.78	75.51
		4233	846.6	19.01	79.62
Band 2	REL99	9262	1852.4	18.72	74.47
		9400	1880.0	18.57	71.94
		9538	1907.6	19.73	93.97
	HSDPA	9262	1852.4	19.15	82.22
		9400	1880.0	18.86	76.91
		9538	1907.6	19.87	97.05

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	6.34	4.31
			50/0	710.0	6.41	4.38
			50/0	711.0	6.38	4.35
		16QAM	50/0	709.0	5.10	3.24
			50/0	710.0	5.24	3.34
			50/0	711.0	5.16	3.28
	5	QPSK	25/0	706.5	5.22	3.33
			25/0	710.0	6.19	4.16
			25/0	713.5	6.79	4.78
		16QAM	25/0	706.5	4.01	2.52
			25/0	710.0	4.92	3.10
			25/0	713.5	5.58	3.61

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	16.92	49.20
			50/0	836.5	17.30	53.70
			50/0	844.0	17.77	59.84
		16QAM	50/0	829.0	16.93	49.32
			50/0	836.5	17.29	53.58
			50/0	844.0	17.78	59.98
	5	QPSK	25/0	826.5	18.35	68.39
			25/0	836.5	19.04	80.17
			25/0	846.5	19.02	79.80
		16QAM	25/0	826.5	18.29	67.45
			25/0	836.5	19.05	80.35
			25/0	846.5	19.01	79.62
	3	QPSK	15/0	825.5	18.39	69.02
			15/0	836.5	18.78	75.51
			15/0	847.5	18.92	77.98
		16QAM	15/0	825.5	18.33	68.08
			15/0	836.5	18.71	74.30
			15/0	847.5	18.85	76.74
	1.4	QPSK	6/0	824.7	17.12	51.52
			6/0	836.5	16.79	47.75
			6/0	848.3	18.09	64.42
		16QAM	6/0	824.7	17.05	50.70
			6/0	836.5	16.69	46.67
			6/0	848.3	18.05	63.83

10.1.2. ERP/EIRP DATA

GSM 1900

GSM GSM1900 GPRS	UL Verification Services, Inc. High Frequency Substitution Measurement																																																																																																	
	Company:		Samsung																																																																																															
	Project #:		4788269334																																																																																															
	Date:		2017-12-19																																																																																															
	Test Engineer:		45585																																																																																															
	Configuration:		EUT / X-Position																																																																																															
	Location:		Chamber 2																																																																																															
	Mode:		GPRS 1900 MHz Fundamentals																																																																																															
	Test Equipment:																																																																																																	
	Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables																																																																																																	
Substitution: Horn 3115[00161451], 3m N-type Cable																																																																																																		
<table><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><tr><td>Low Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1850.20</td><td>19.27</td><td>V</td><td>4.5</td><td>9.5</td><td>24.28</td><td>33.0</td><td>-8.7</td><td></td></tr><tr><td>1850.20</td><td>20.47</td><td>H</td><td>4.5</td><td>9.5</td><td>25.48</td><td>33.0</td><td>-7.5</td><td></td></tr><tr><td>Mid Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1880.00</td><td>20.41</td><td>V</td><td>4.5</td><td>9.2</td><td>25.09</td><td>33.0</td><td>-7.9</td><td></td></tr><tr><td>1880.00</td><td>21.69</td><td>H</td><td>4.5</td><td>9.2</td><td>26.37</td><td>33.0</td><td>-6.6</td><td></td></tr><tr><td>High Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1909.80</td><td>20.00</td><td>V</td><td>4.6</td><td>8.9</td><td>24.31</td><td>33.0</td><td>-8.7</td><td></td></tr><tr><td>1909.80</td><td>22.61</td><td>H</td><td>4.6</td><td>8.9</td><td>26.92</td><td>33.0</td><td>-6.1</td><td></td></tr></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									1850.20	19.27	V	4.5	9.5	24.28	33.0	-8.7		1850.20	20.47	H	4.5	9.5	25.48	33.0	-7.5		Mid Ch									1880.00	20.41	V	4.5	9.2	25.09	33.0	-7.9		1880.00	21.69	H	4.5	9.2	26.37	33.0	-6.6		High Ch									1909.80	20.00	V	4.6	8.9	24.31	33.0	-8.7		1909.80	22.61	H	4.6	8.9	26.92	33.0	-6.1	
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes																																																																																										
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1850.20	20.47	H	4.5	9.5	25.48	33.0	-7.5																																																																																											
Mid Ch																																																																																																		
1880.00	20.41	V	4.5	9.2	25.09	33.0	-7.9																																																																																											
1880.00	21.69	H	4.5	9.2	26.37	33.0	-6.6																																																																																											
High Ch																																																																																																		
1909.80	20.00	V	4.6	8.9	24.31	33.0	-8.7																																																																																											
1909.80	22.61	H	4.6	8.9	26.92	33.0	-6.1																																																																																											
GSM GSM1900 EGPRS	UL Verification Services, Inc. High Frequency Substitution Measurement																																																																																																	
	Company:		Samsung																																																																																															
	Project #:		4788269334																																																																																															
	Date:		2017-12-19																																																																																															
	Test Engineer:		45585																																																																																															
	Configuration:		EUT / X-Position																																																																																															
	Location:		Chamber 2																																																																																															
	Mode:		EGPRS 1900 MHz Fundamentals																																																																																															
	Test Equipment:																																																																																																	
	Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables																																																																																																	
Substitution: Horn 3115[00161451], 3m N-type Cable																																																																																																		
<table><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><tr><td>Low Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1850.20</td><td>17.43</td><td>V</td><td>4.5</td><td>9.5</td><td>22.44</td><td>33.0</td><td>-10.6</td><td></td></tr><tr><td>1850.20</td><td>18.30</td><td>H</td><td>4.5</td><td>9.5</td><td>23.31</td><td>33.0</td><td>-9.7</td><td></td></tr><tr><td>Mid Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1880.00</td><td>18.34</td><td>V</td><td>4.5</td><td>9.2</td><td>23.02</td><td>33.0</td><td>-10.0</td><td></td></tr><tr><td>1880.00</td><td>19.68</td><td>H</td><td>4.5</td><td>9.2</td><td>24.36</td><td>33.0</td><td>-8.6</td><td></td></tr><tr><td>High Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1909.80</td><td>17.66</td><td>V</td><td>4.6</td><td>8.9</td><td>21.97</td><td>33.0</td><td>-11.0</td><td></td></tr><tr><td>1909.80</td><td>19.24</td><td>H</td><td>4.6</td><td>8.9</td><td>23.55</td><td>33.0</td><td>-9.5</td><td></td></tr></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									1850.20	17.43	V	4.5	9.5	22.44	33.0	-10.6		1850.20	18.30	H	4.5	9.5	23.31	33.0	-9.7		Mid Ch									1880.00	18.34	V	4.5	9.2	23.02	33.0	-10.0		1880.00	19.68	H	4.5	9.2	24.36	33.0	-8.6		High Ch									1909.80	17.66	V	4.6	8.9	21.97	33.0	-11.0		1909.80	19.24	H	4.6	8.9	23.55	33.0	-9.5	
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	17.43	V	4.5	9.5	22.44	33.0	-10.6																																																																																											
1850.20	18.30	H	4.5	9.5	23.31	33.0	-9.7																																																																																											
Mid Ch																																																																																																		
1880.00	18.34	V	4.5	9.2	23.02	33.0	-10.0																																																																																											
1880.00	19.68	H	4.5	9.2	24.36	33.0	-8.6																																																																																											
High Ch																																																																																																		
1909.80	17.66	V	4.6	8.9	21.97	33.0	-11.0																																																																																											
1909.80	19.24	H	4.6	8.9	23.55	33.0	-9.5																																																																																											

WCDMA Band 5

WCDMA

Band 5
REL99

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788269334
Date: 2017-12-18
Test Engineer: 45585
Configuration: EUT
Location: Chamber 2
Mode: Rel99 Band 5 Fundamentals

Test Equipment:
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
Low Ch								
826.40	16.11	V	1.0	-1.5	13.69	38.5	-24.8	
826.40	20.87	H	1.0	-1.5	18.45	38.5	-20.1	
Mid Ch								
836.60	15.11	V	1.0	-1.4	12.73	38.5	-25.8	
836.60	20.95	H	1.0	-1.4	18.57	38.5	-19.9	
High Ch								
846.60	13.16	V	1.0	-1.4	10.81	38.5	-27.7	
846.60	21.20	H	1.0	-1.4	18.85	38.5	-19.6	

WCDMA

Band 5
HSDPA

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4788269334
Date: 2017-12-18
Test Engineer: 45585
Configuration: EUT
Location: Chamber 2
Mode: HSDPA Band 5 Fundamentals

Test Equipment:
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
Low Ch								
826.40	16.11	V	1.0	-1.5	13.69	38.5	-24.8	
826.40	20.81	H	1.0	-1.5	18.39	38.5	-20.1	
Mid Ch								
836.60	15.21	V	1.0	-1.4	12.83	38.5	-25.7	
836.60	21.16	H	1.0	-1.4	18.78	38.5	-19.7	
High Ch								
846.60	13.26	V	1.0	-1.4	10.91	38.5	-27.6	
846.60	21.36	H	1.0	-1.4	19.01	38.5	-19.5	

WCDMA Band 2

WCDMA

Band 2
REL99

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung

Project #: 4788269334

Date: 2017-12-22

Test Engineer: 45585

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	12.98	V	4.5	9.5	17.97	33.0	-15.0	
1852.40	13.73	H	4.5	9.5	18.72	33.0	-14.3	
Mid Ch								
1880.00	13.39	V	4.5	9.2	18.07	33.0	-14.9	
1880.00	13.89	H	4.5	9.2	18.57	33.0	-14.4	
High Ch								
1907.60	7.55	V	4.6	8.9	11.89	33.0	-21.1	
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 #: 4788269334

Date: 2017-12-22

Test Engineer: 45585

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	13.61	V	4.5	9.5	18.60	33.0	-14.4	
1852.40	14.16	H	4.5	9.5	19.15	33.0	-13.9	
Mid Ch								
1880.00	13.66	V	4.5	9.2	18.34	33.0	-14.7	
1880.00	14.18	H	4.5	9.2	18.86	33.0	-14.1	
High Ch								
1907.60	7.91	V	4.6	8.9	12.25	33.0	-20.8	
1907.60	15.53	H	4.6	8.9	19.87	33.0	-13.1	

LTE Band 17

LTE

Band 17

10MHz

QPSK

UL Verification Services, Inc.

High Frequency Substitution Measurement

Company:

Samsung

Project #:

4788269334

Date:

2017-12-19

Test Engineer:

45585

Configuration:

EUT

Location:

Chamber 2

Mode:

LTE_QPSK Band 17 Fundamentals, 10MHz Bandwidth

Test Equipment:

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
Low Ch								
709.00	2.02	V	0.9	-1.6	-0.44	34.8	-35.2	
709.00	8.80	H	0.9	-1.6	6.34	34.8	-28.4	
Mid Ch								
710.00	2.64	V	0.9	-1.6	0.17	34.8	-34.6	
710.00	8.88	H	0.9	-1.6	6.41	34.8	-28.4	
High Ch								
711.00	2.83	V	0.9	-1.6	0.36	34.8	-34.4	
711.00	8.85	H	0.9	-1.6	6.38	34.8	-28.4	

LTE

Band 17

10MHz

16QAM

UL Verification Services, Inc.

High Frequency Substitution Measurement

Company:

Samsung

Project #:

4788269334

Date:

2017-12-19

Test Engineer:

45585

Configuration:

EUT

Location:

Chamber 2

Mode:

LTE_16QAM Band 17 Fundamentals, 10MHz Bandwidth

Test Equipment:

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
Low Ch								
709.00	0.85	V	0.9	-1.6	-1.61	34.8	-36.4	
709.00	7.56	H	0.9	-1.6	5.10	34.8	-29.7	
Mid Ch								
710.00	1.40	V	0.9	-1.6	-1.07	34.8	-35.8	
710.00	7.71	H	0.9	-1.6	5.24	34.8	-29.5	
High Ch								
711.00	1.63	V	0.9	-1.6	-0.84	34.8	-35.6	
711.00	7.63	H	0.9	-1.6	5.16	34.8	-29.6	

LTE

Band 17

5MHz

QPSK

UL Verification Services, Inc.

High Frequency Substitution Measurement

Company:

Samsung

Project #:

4788269334

Date:

2017-12-19

Test Engineer:

45585

Configuration:

EUT

Location:

Chamber 2

Mode:

LTE_QPSK Band 17 Fundamentals, 5MHz Bandwidth

Test Equipment:

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
Low Ch								
706.50	1.28	V	0.9	-1.6	-1.18	34.8	-36.0	
706.50	7.68	H	0.9	-1.6	5.22	34.8	-29.6	
Mid Ch								
710.00	2.13	V	0.9	-1.6	-0.34	34.8	-35.1	
710.00	8.66	H	0.9	-1.6	6.19	34.8	-28.6	
High Ch								
713.50	2.34	V	0.9	-1.6	-0.13	34.8	-34.9	
713.50	9.27	H	0.9	-1.6	6.79	34.8	-28.0	

LTE

Band 17

5MHz

16QAM

UL Verification Services, Inc.

High Frequency Substitution Measurement

Company:

Samsung

Project #:

4788269334

Date:

2017-12-19

Test Engineer:

45585

Configuration:

EUT

Location:

Chamber 2

Mode:

LTE_16QAM Band 17 Fundamentals, 5MHz Bandwidth

Test Equipment:

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
Low Ch								
706.50	0.05	V	0.9	-1.6	-2.41	34.8	-37.2	
706.50	6.47	H	0.9	-1.6	4.01	34.8	-30.8	
Mid Ch								
710.00	0.92	V	0.9	-1.6	-1.55	34.8	-36.3	
710.00	7.39	H	0.9	-1.6	4.92	34.8	-29.8	
High Ch								
713.50	1.22	V	0.9	-1.6	-1.25	34.8	-36.0	
713.50	8.06	H	0.9	-1.6	5.58	34.8	-29.2	