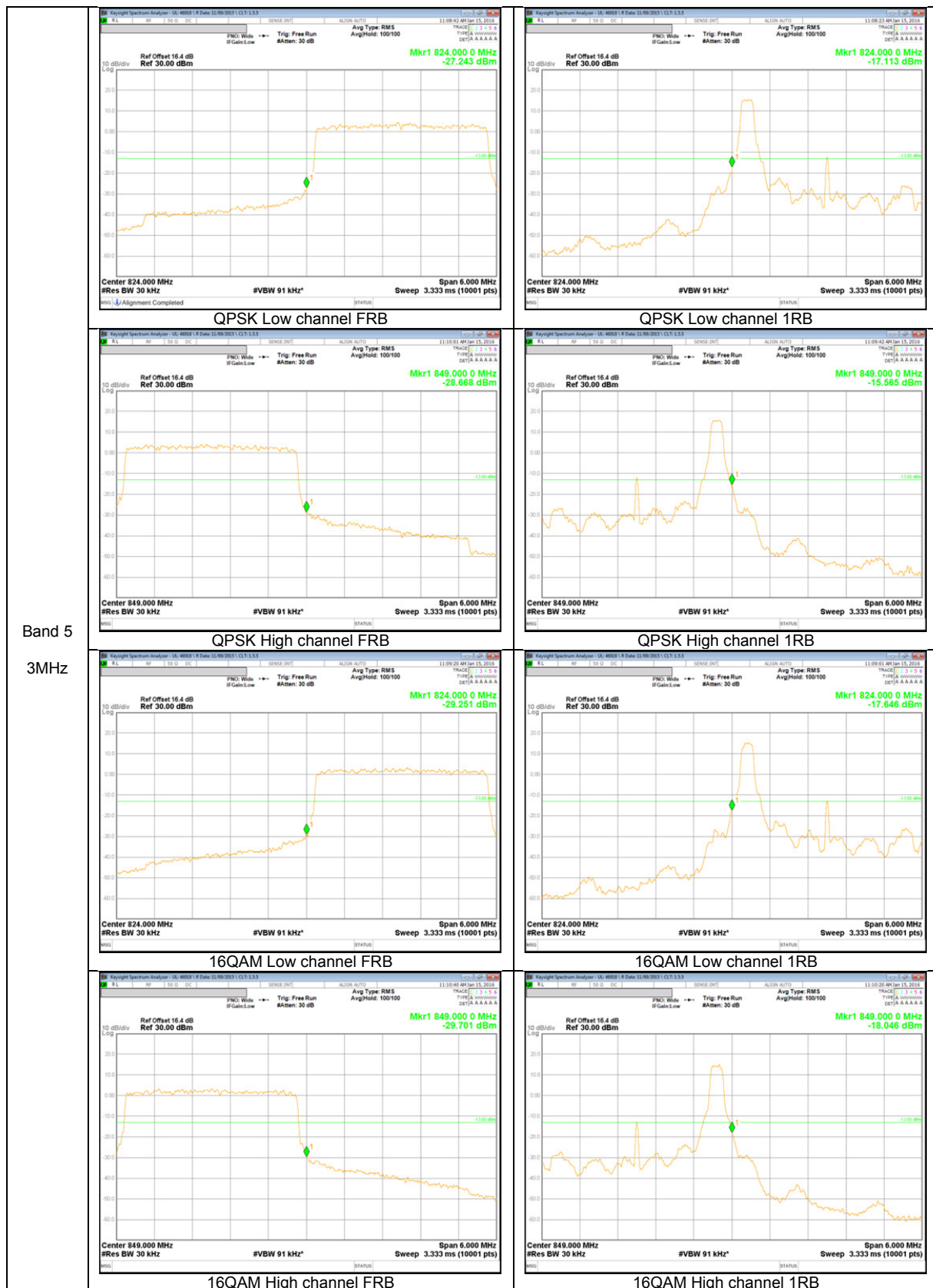
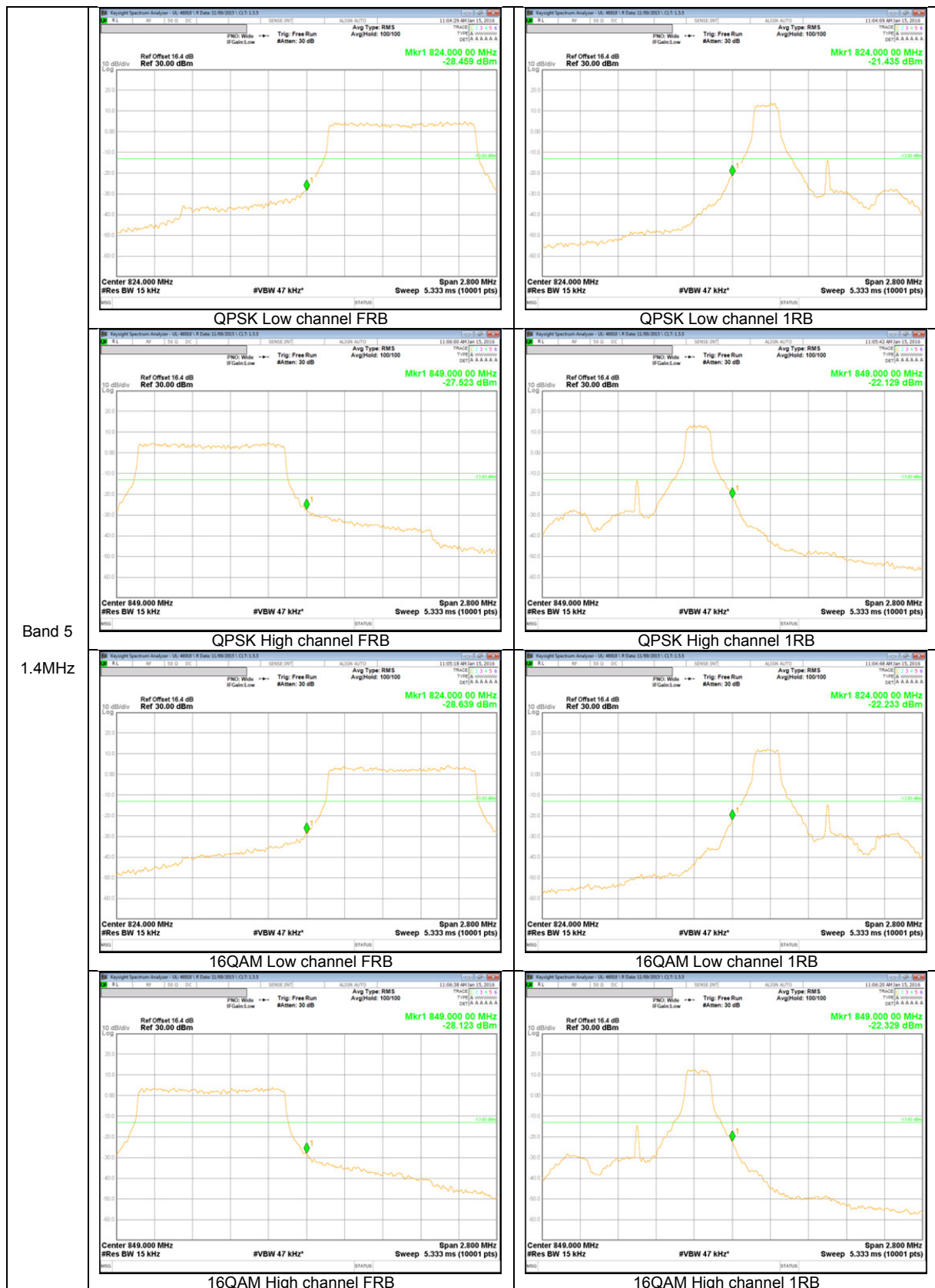






10.3 OUT OF BAND EMISSIONS

RULE PART(S)

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

LIMITS

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

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v02r02

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

RESULTS

10.3.1. OUT OF BAND EMISSIONS RESULT

WCDMA

Band	Mode	f [MHz]	Spurious [dBm]	Limit [dBm]	Margin [dB]
Band 5	REL99	826.4	-33.23	-13.00	20.23
		836.6	-32.82		19.82
		846.6	-33.15		20.15
	HSDPA	826.4	-33.38		20.38
		836.6	-33.37		20.37
		846.6	-33.38		20.38
Band 2	REL99	1852.4	-32.76		19.76
		1880.0	-33.14		20.14
		1907.6	-31.86		18.86
	HSDPA	1852.4	-32.63		19.63
		1880.0	-32.73		19.73
		1907.6	-32.47		19.47

LTE 17

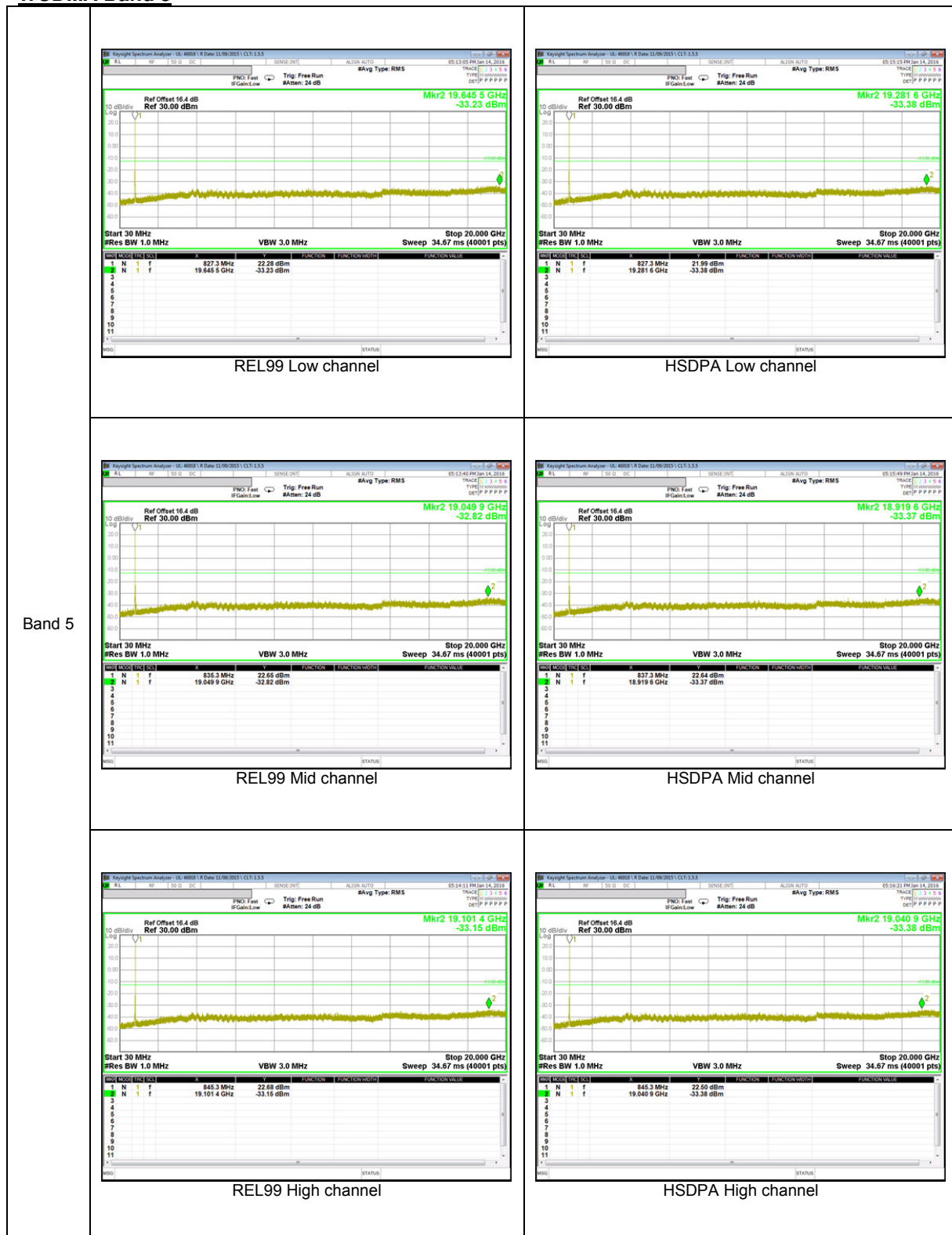
Bandwidth	Mode	f [MHz]	Spurious [dBm]	Limit [dBm]	Margin [dB]
10 MHz	QPSK	709.0	-28.16	-13.00	15.16
		710.0	-27.10		14.1
		711.0	-27.67		14.67
	16QAM	709.0	-27.29		14.29
		710.0	-27.25		14.25
		711.0	-27.18		14.18
5 MHz	QPSK	706.5	-26.76		13.76
		710.0	-26.48		13.48
		713.5	-27.35		14.35
	16QAM	706.5	-27.27		14.27
		710.0	-27.01		14.01
		713.5	-26.68		13.68

LTE 5

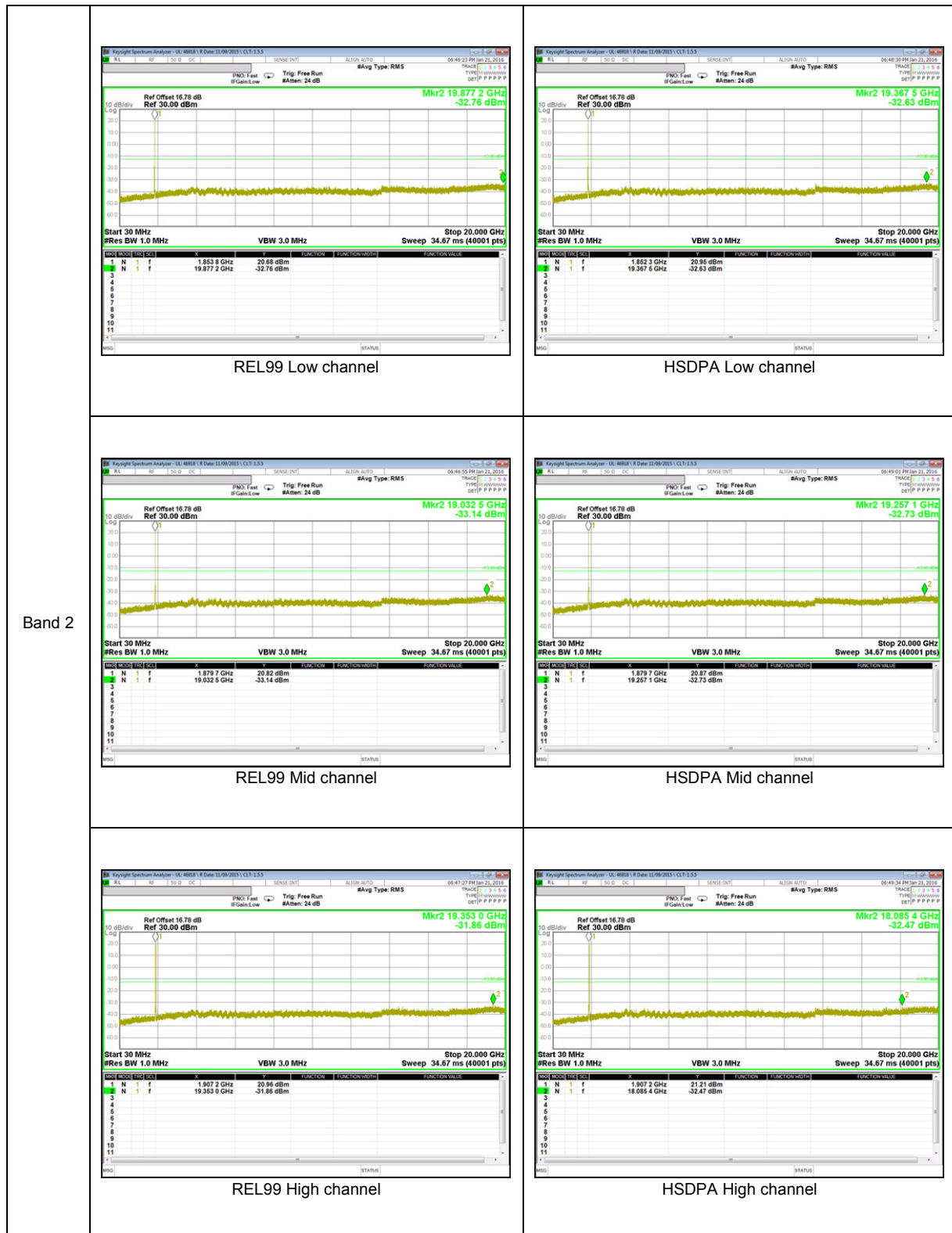
Bandwidth	Mode	f [MHz]	Spurious [dBm]	Limit [dBm]	Margin [dB]
10 MHz	QPSK	829.0	-26.72	-13.00	13.72
		836.5	-27.71		14.71
		844.0	-26.80		13.8
	16QAM	829.0	-26.71		13.71
		836.5	-26.50		13.5
		844.0	-27.09		14.09
5 MHz	QPSK	826.5	-26.86		13.86
		836.5	-27.75		14.75
		846.5	-27.01		14.01
	16QAM	826.5	-27.10		14.1
		836.5	-26.50		13.5
		846.5	-26.93		13.93
3 MHz	QPSK	825.5	-26.41		13.41
		836.5	-26.37		13.37
		847.5	-27.51		14.51
	16QAM	825.5	-27.15		14.15
		836.5	-25.83		12.83
		847.5	-27.62		14.62
1.4 MHz	QPSK	824.7	-27.78		14.78
		836.5	-27.60		14.6
		848.3	-26.86		13.86
	16QAM	824.7	-27.23		14.23
		836.5	-28.11		15.11
		848.3	-27.29		14.29

10.3.2. OUT OF BAND EMISSIONS PLOTS

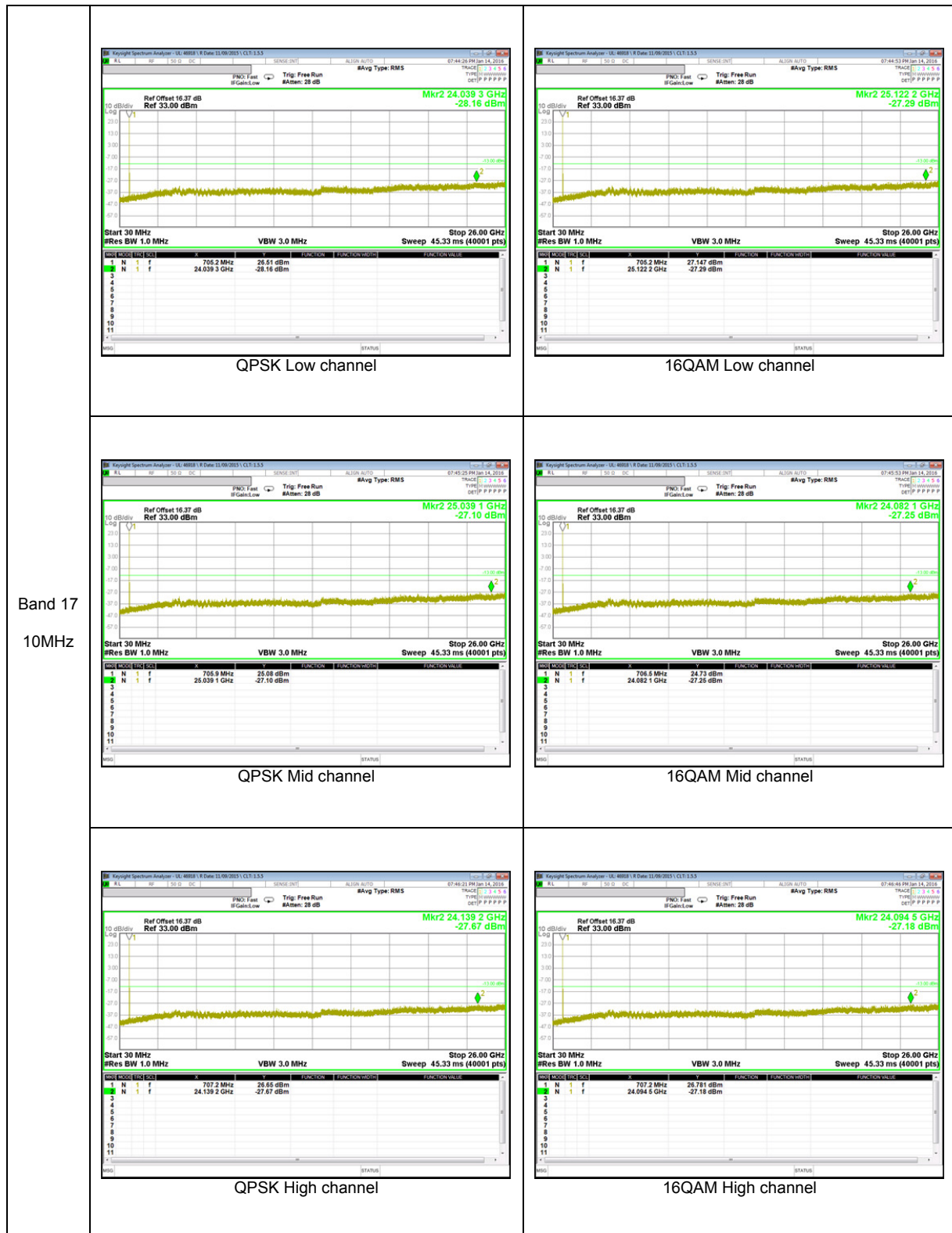
WCDMA Band 5

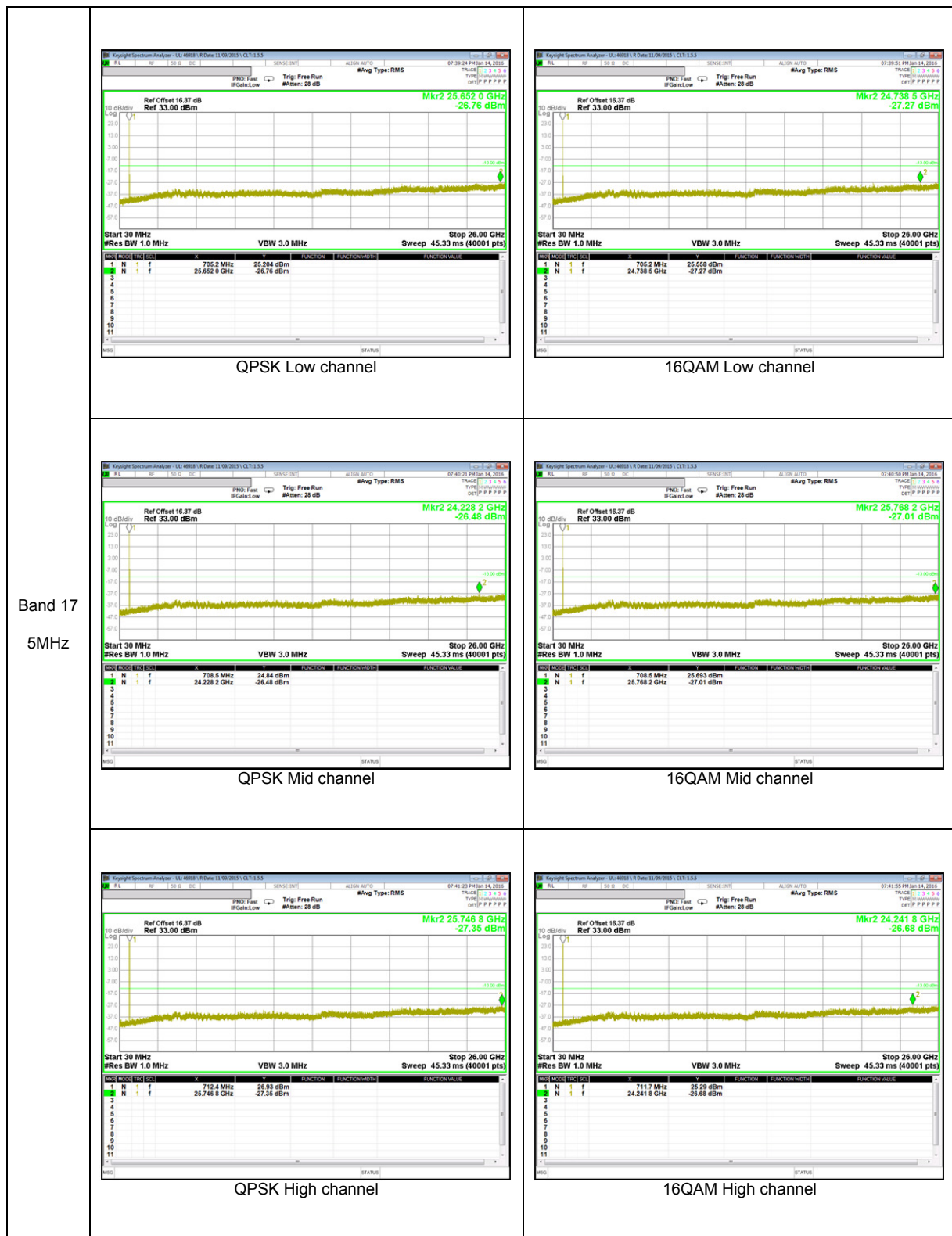


WCDMA Band 2

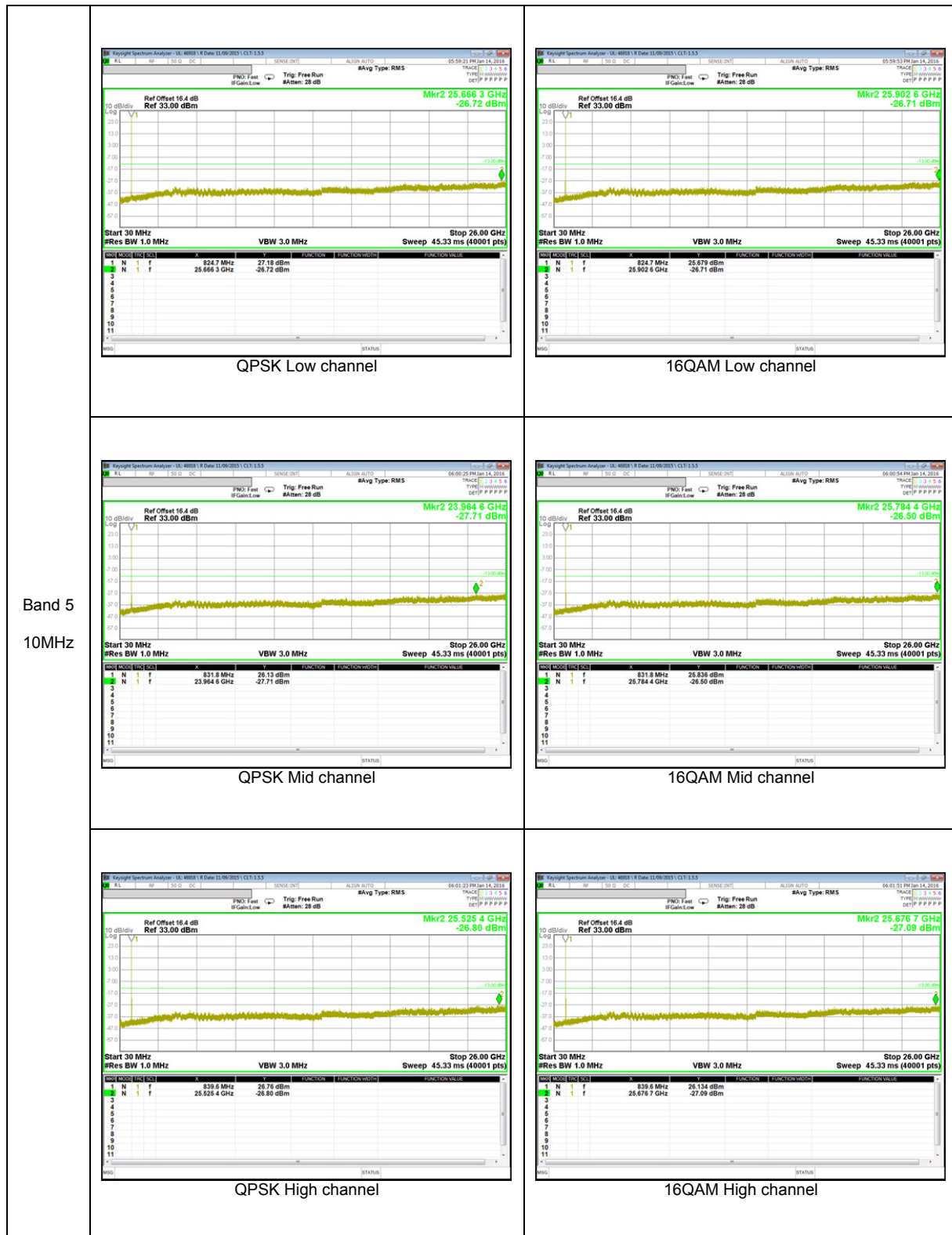


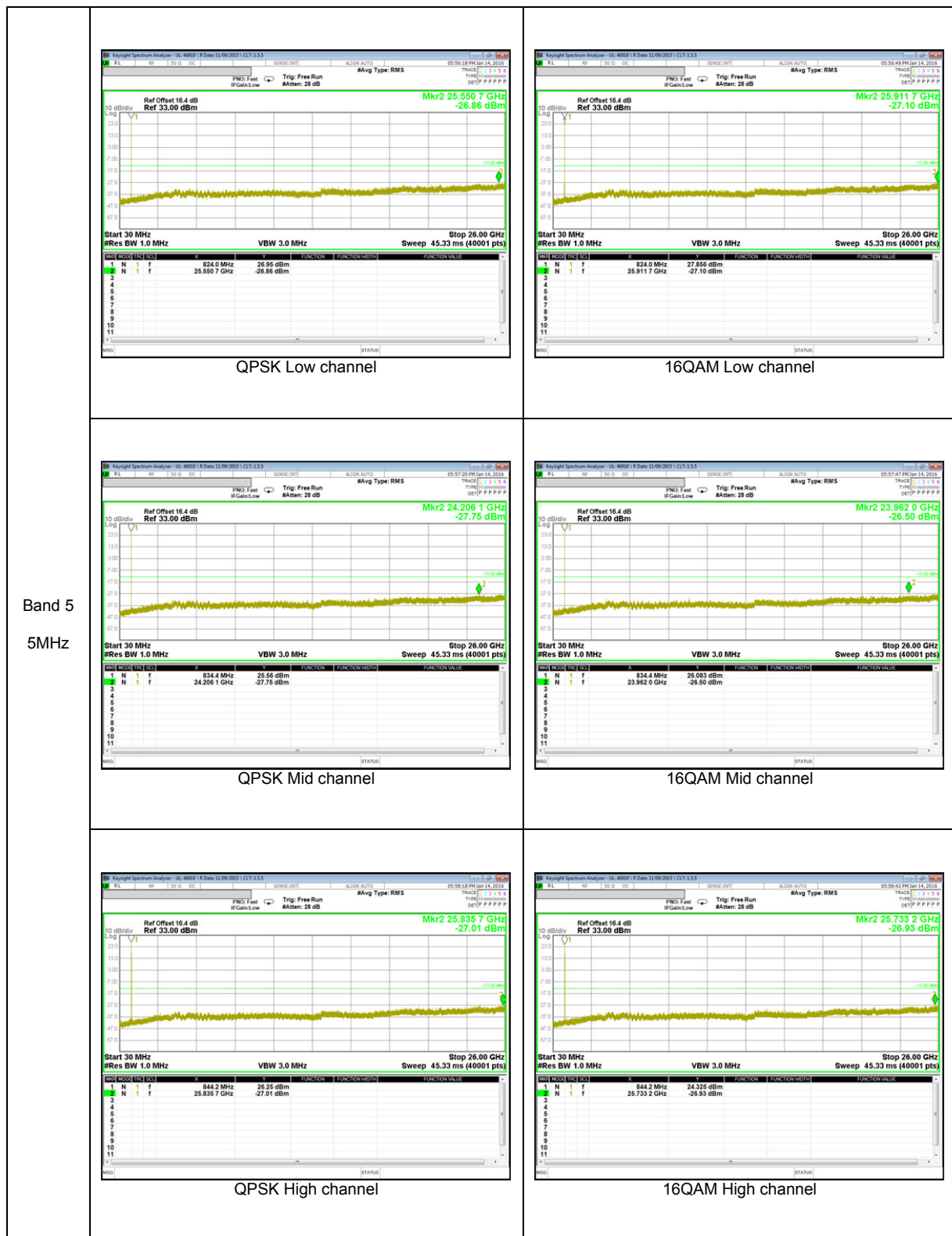
LTE Band 17

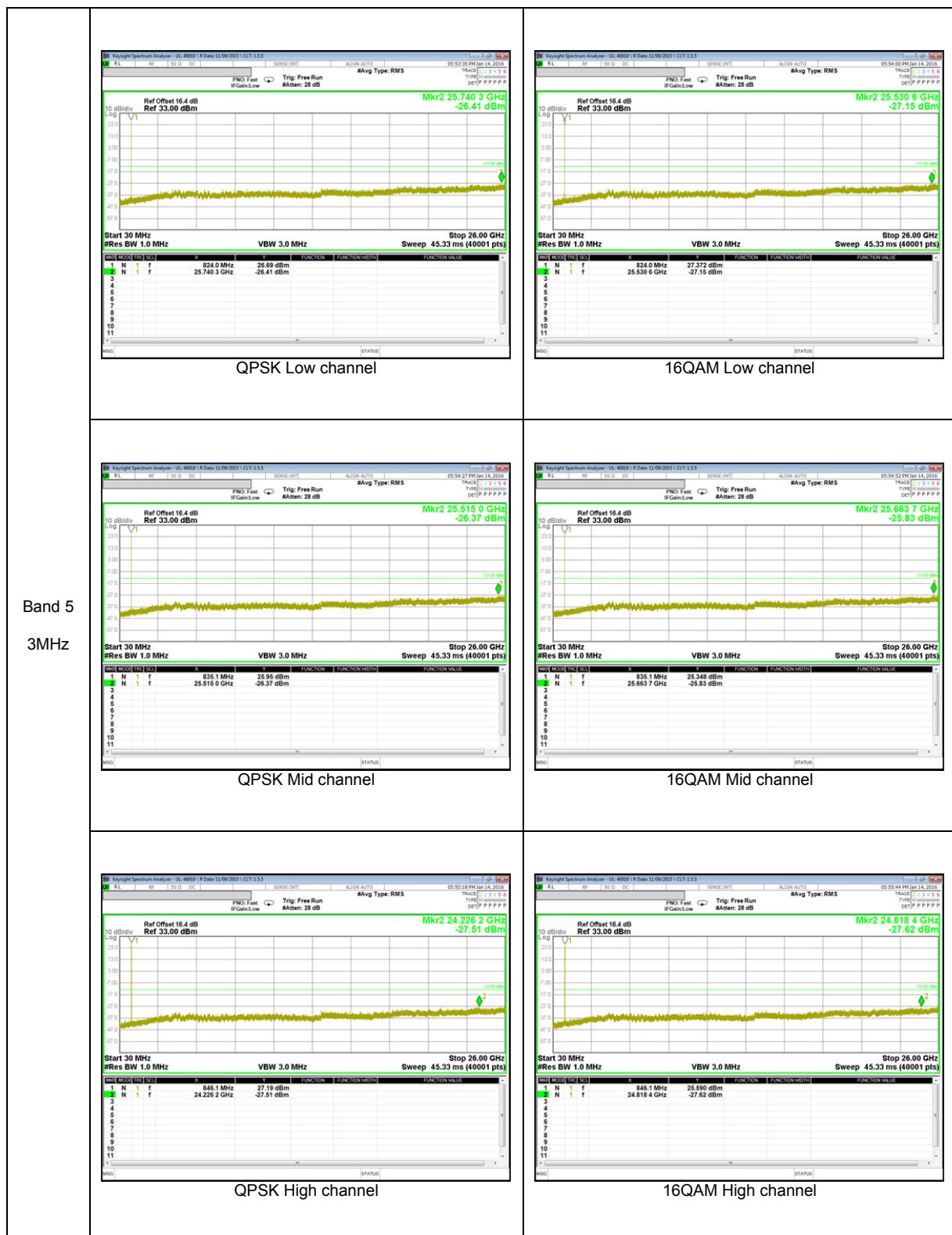


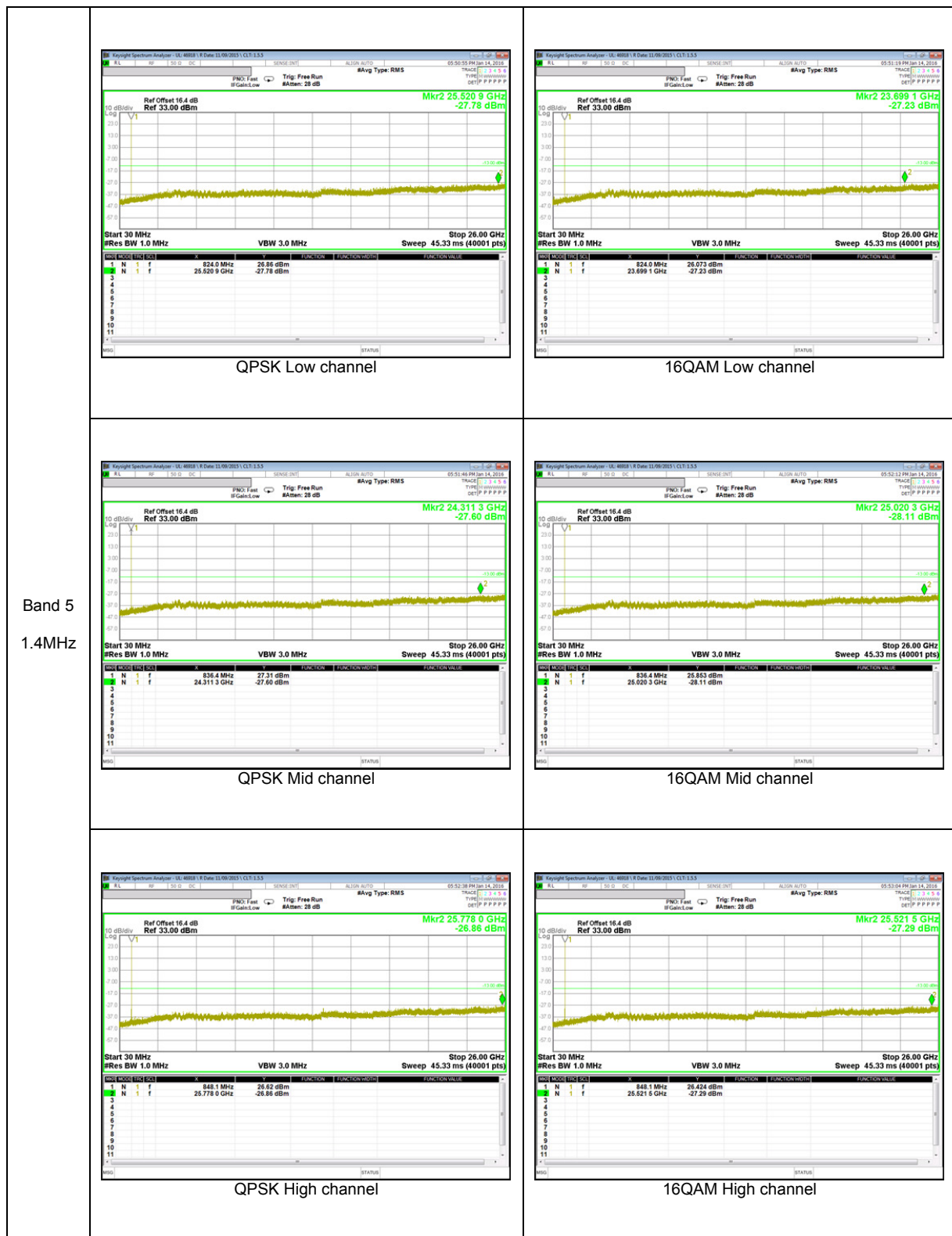


LTE Band 5









10.4. FREQUENCY STABILITY

RULE PART(S)

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

LIMITS

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

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

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

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v02r02

RESULTS

See the following pages.

10.4.1. FREQUENCY STABILITY RESULTS

LTE Band 17, Channel 23790, Frequency 710.0 MHz

Reference Frequency: LTE Band 17 Mid Channel 710.0 MHz @ 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]
7.60	50	710.00000791	-0.003	2.5
7.60	40	710.00000824	-0.003	2.5
7.60	30	709.99999130	0.021	2.5
7.60	20	710.00000609	0	2.5
7.60	10	710.00000771	-0.002	2.5
7.60	0	710.00000934	-0.005	2.5
7.60	-10	710.00001340	-0.010	2.5
7.60	-20	710.00001286	-0.010	2.5
7.60	-30	709.99998854	0.025	2.5

Reference Frequency: LTE Band 17 Mid Channel 710.0 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]
7.60	20	710.00000609	0	2.5
8.70	20	709.99999292	0.019	2.5
7.20	20	710.00000865	-0.004	2.5

LTE Band 5, Channel 20524, Frequency 836.5 MHz

WCDMA Band 5, Channel 4183, Frequency 836.6 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]
7.60	50	836.49999102	-0.002	2.5
7.60	40	836.50001406	-0.029	2.5
7.60	30	836.49998917	0.001	2.5
7.60	20	836.49998976	0	2.5
7.60	10	836.50001463	-0.030	2.5
7.60	0	836.49999032	-0.001	2.5
7.60	-10	836.49998841	0.002	2.5
7.60	-20	836.49999149	-0.002	2.5
7.60	-30	836.49998906	0.001	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]
7.60	20	836.49998976	0	2.5
8.70	20	836.49999129	-0.002	2.5
7.20	20	836.50000948	-0.024	2.5

WCDMA Band 2, Channel 9400, Frequency 1880.0 MHz

Reference Frequency: PCS 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]
7.60	50	1880.00001443	0.004	2.5
7.60	40	1880.00001204	0.005	2.5
7.60	30	1880.00001143	0.005	2.5
7.60	20	1880.00002168	0	2.5
7.60	10	1880.00002189	0.000	2.5
7.60	0	1880.00002214	0.000	2.5
7.60	-10	1880.00002112	0.000	2.5
7.60	-20	1880.00001809	0.002	2.5
7.60	-30	1880.00000863	0.007	2.5

Reference Frequency: PCS 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]
7.60	20	1880.00002168	0	2.5
8.70	20	1880.00001171	0.005	2.5
7.20	20	1880.00001557	0.003	2.5

11. RADIATED TEST RESULTS

11.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

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

LIMITS

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

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

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

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

TEST PROCEDURE

ANSI / TIA / EIA 603D Clause 2.2.17; MXA setting reference to 971168 D01 v02r02

For peak power measurement with a MXA:

a) Set the RBW $\geq$ 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 MXA:

a) Set span to at least 1.5 times the OBW; b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz; c) Set VBW $\geq 3 \times$ 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

11.1.1. ERP/EIRP Results

WCDMA

Band	Mode	Channel	f [MHz]	ERP / EIRP	
				[dBm]	[mW]
Band 5	REL99	4132	826.4	20.63	115.61
		4183	836.6	21.21	132.13
		4233	846.6	21.18	131.22
	HSDPA	4132	826.4	20.67	116.68
		4183	836.6	21.15	130.32
		4233	846.6	21.20	131.83
Band 2	REL99	9262	1852.4	17.71	59.02
		9400	1880.0	15.99	39.72
		9538	1907.6	16.79	47.75
	HSDPA	9262	1852.4	16.56	45.29
		9400	1880.0	16.14	41.11
		9538	1907.6	16.06	40.36

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	17.83	60.67
			50/0	710.0	17.57	57.15
			50/0	711.0	18.01	63.24
		16QAM	50/0	709.0	16.89	48.87
			50/0	710.0	16.64	46.13
			50/0	711.0	17.04	50.58
	5	QPSK	25/0	706.5	17.43	55.34
			25/0	710.0	18.03	63.53
			25/0	713.5	18.44	69.82
		16QAM	25/0	706.5	16.46	44.26
			25/0	710.0	17.06	50.82
			25/0	713.5	17.50	56.23

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	19.94	98.63
			50/0	836.5	20.89	122.74
			50/0	844.0	20.83	121.06
		16QAM	50/0	829.0	18.80	75.86
			50/0	836.5	19.84	96.38
			50/0	844.0	19.76	94.62
	5	QPSK	25/0	826.5	17.55	56.89
			25/0	836.5	20.91	123.31
			25/0	846.5	18.82	76.21
		16QAM	25/0	826.5	16.45	44.16
			25/0	836.5	19.93	98.40
			25/0	846.5	18.18	65.77
	3	QPSK	15/0	825.5	20.14	103.28
			15/0	836.5	21.06	127.64
			15/0	847.5	20.84	121.34
		16QAM	15/0	825.5	18.93	78.16
			15/0	836.5	20.03	100.69
			15/0	847.5	20.24	105.68
	1.4	QPSK	6/0	824.7	18.02	63.39
			6/0	836.5	18.19	65.92
			6/0	848.3	17.89	61.52
		16QAM	6/0	824.7	17.01	50.23
			6/0	836.5	17.09	51.17
			6/0	848.3	17.33	54.08

LTE Band 17

LTE Band 17 10MHz QPSK	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2								
	Company: Samsung Project #: 16K22598 Date: 01-18-16 Test Engineer: Steven.Kim Configuration: EUT / X-Position Mode: LTE Band 17, QPSK, 10MHz								
	Test Equipment: Receiving: VULB9163-750, and 3m Chamber N-type Cable (Setup this one for testing EUT) Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.								
	f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	EIRP	Limit	Margin	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBd)	(dBm)	(dBm)	(dB)	
	Low Ch								
	709.00	14.07	V	1.0	-1.6	11.47	34.8	-23.3	
	709.00	20.43	H	1.0	-1.6	17.83	34.8	-16.9	
	Mid Ch								
	710.00	13.30	V	1.0	-1.6	10.70	34.8	-24.1	
	710.00	20.17	H	1.0	-1.6	17.57	34.8	-17.2	
	High Ch								
	711.00	13.84	V	1.0	-1.6	11.24	34.8	-23.5	
	711.00	20.61	H	1.0	-1.6	18.01	34.8	-16.8	
	Rev. 3.17.11 Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm								
LTE Band 17 10MHz 16QAM	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2								
	Company: Samsung Project #: 16K22598 Date: 01-18-16 Test Engineer: Steven.Kim Configuration: EUT / X-Position Mode: LTE Band 17 16QAM, 10MHz								
	Test Equipment: Receiving: VULB9163-750, and 3m Chamber N-type Cable (Setup this one for testing EUT) Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.								
	f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	EIRP	Limit	Margin	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBd)	(dBm)	(dBm)	(dB)	
	Low Ch								
	709.00	13.13	V	1.0	-1.6	10.53	34.8	-24.2	
	709.00	19.49	H	1.0	-1.6	16.89	34.8	-17.9	
	Mid Ch								
	710.00	12.37	V	1.0	-1.6	9.77	34.8	-25.0	
	710.00	19.24	H	1.0	-1.6	16.64	34.8	-18.1	
	High Ch								
	711.00	12.86	V	1.0	-1.6	10.26	34.8	-24.5	
	711.00	19.64	H	1.0	-1.6	17.04	34.8	-17.7	
	Rev. 3.17.11 Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm								

LTE Band 17 5MHz QPSK	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2 Company: Samsung Project #: 16K22598 Date: 01-18-16 Test Engineer: Steven.Kim Configuration: EUT / X-Position Mode: LTE Band 17, QPSK , 5MHz Test Equipment: Receiving: VULB9163-750, and 3m Chamber N-type Cable (Setup this one for testing EUT) Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.								
	f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	EIRP	Limit	Margin	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBd)	(dBm)	(dBm)	(dB)	
	Low Ch								
	706.50	13.53	V	1.0	-1.6	10.93	34.8	-23.8	
	706.50	20.03	H	1.0	-1.6	17.43	34.8	-17.3	
	Mid Ch								
	710.00	13.41	V	1.0	-1.6	10.81	34.8	-24.0	
	710.00	20.63	H	1.0	-1.6	18.03	34.8	-16.7	
	High Ch								
	713.50	13.39	V	1.0	-1.6	10.79	34.8	-24.0	
	713.50	21.04	H	1.0	-1.6	18.44	34.8	-16.3	
	Rev. 3.17.11								
	Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm								
LTE Band 17 5MHz 16QAM	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2 Company: Samsung Project #: 16K22598 Date: 01-18-16 Test Engineer: Steven.Kim Configuration: EUT / X-Position Mode: LTE Band 17 16QAM, 5MHz Test Equipment: Receiving: VULB9163-750, and 3m Chamber N-type Cable (Setup this one for testing EUT) Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.								
	f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	EIRP	Limit	Margin	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBd)	(dBm)	(dBm)	(dB)	
	Low Ch								
	706.50	12.60	V	1.0	-1.6	10.00	34.8	-24.8	
	706.50	19.06	H	1.0	-1.6	16.46	34.8	-18.3	
	Mid Ch								
	710.00	12.54	V	1.0	-1.6	9.94	34.8	-24.8	
	710.00	19.66	H	1.0	-1.6	17.06	34.8	-17.7	
	High Ch								
	713.50	12.42	V	1.0	-1.6	9.82	34.8	-25.0	
	713.50	20.10	H	1.0	-1.6	17.50	34.8	-17.3	
	Rev. 3.17.11								
	Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm								