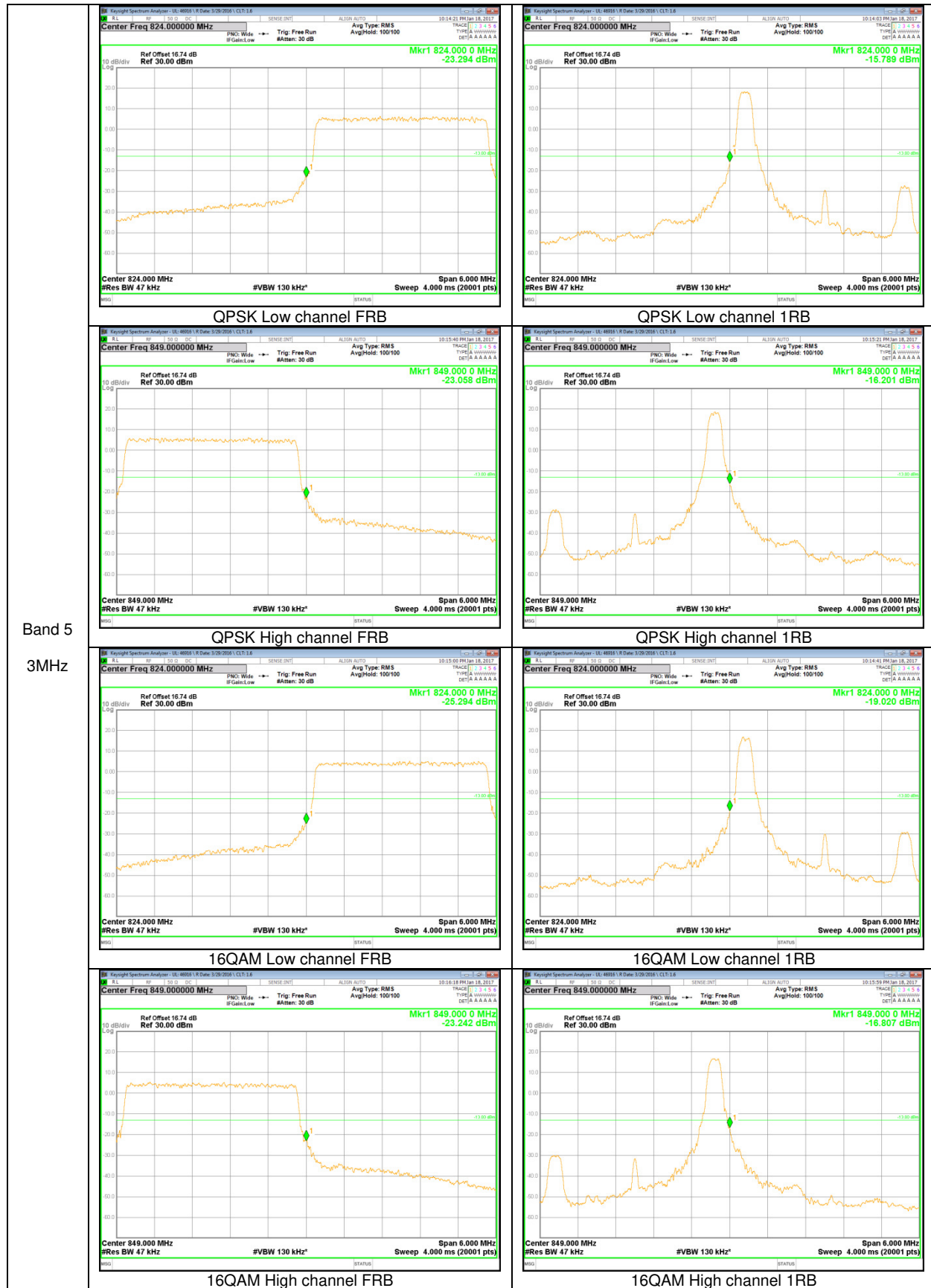
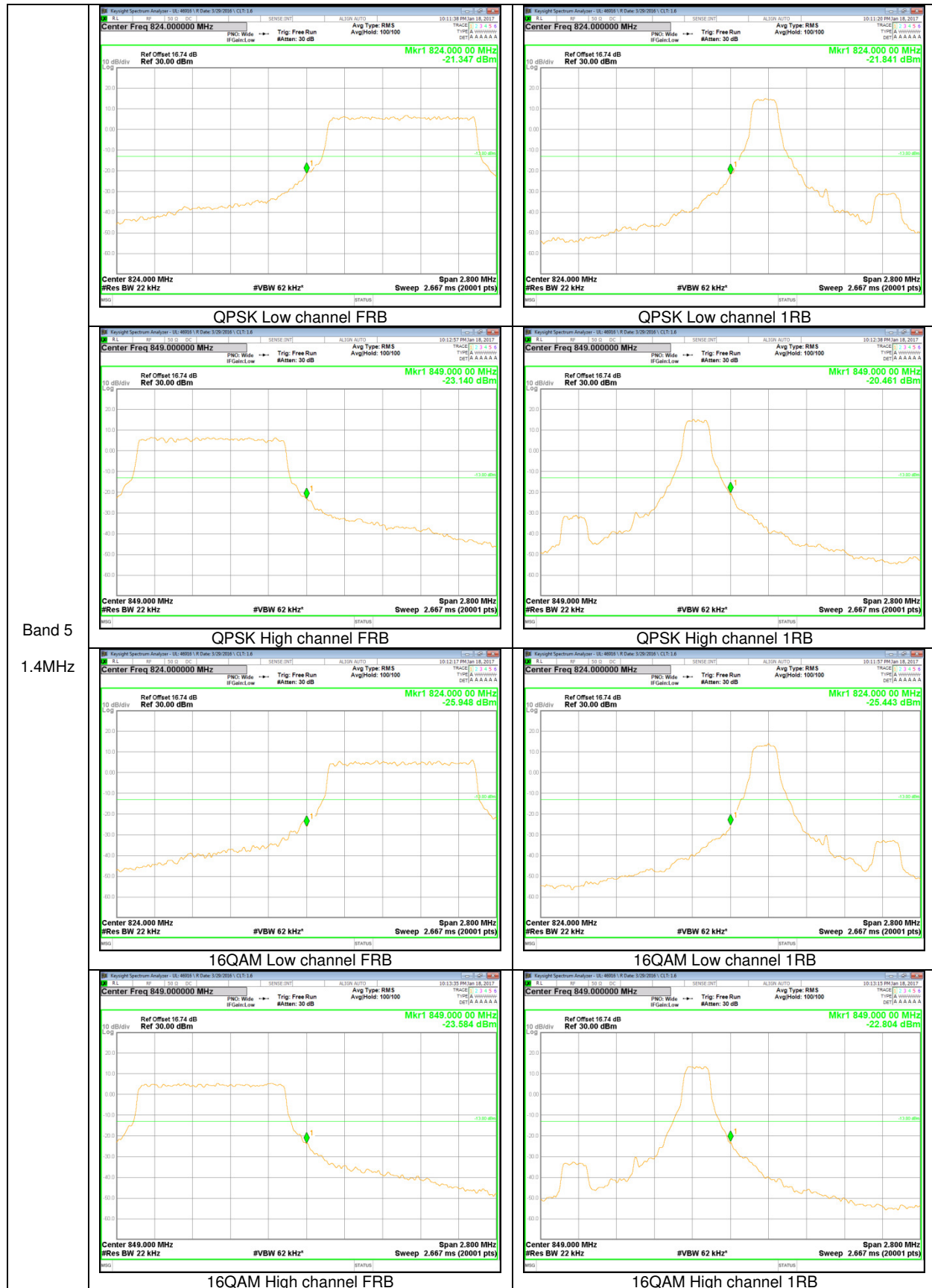


Band 5
5MHz





10.3 OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051, §22.901, §22.917 and §24.238

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.

- 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 $\geq 3 \times$ 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;

RESULTS

GSM

Band	Mode	f [MHz]	Spurious [dBm]	Limit [dBm]
GSM850	GPRS	824.2	-22.86	-13.00
		836.6	-22.34	
		848.8	-22.78	
	EGPRS	824.2	-21.93	
		836.6	-22.40	
		848.8	-22.32	
GSM1900	GPRS	1850.2	-22.11	
		1880.0	-22.12	
		1909.8	-22.17	
	EGPRS	1850.2	-22.13	
		1880.0	-21.85	
		1909.8	-21.06	

WCDMA

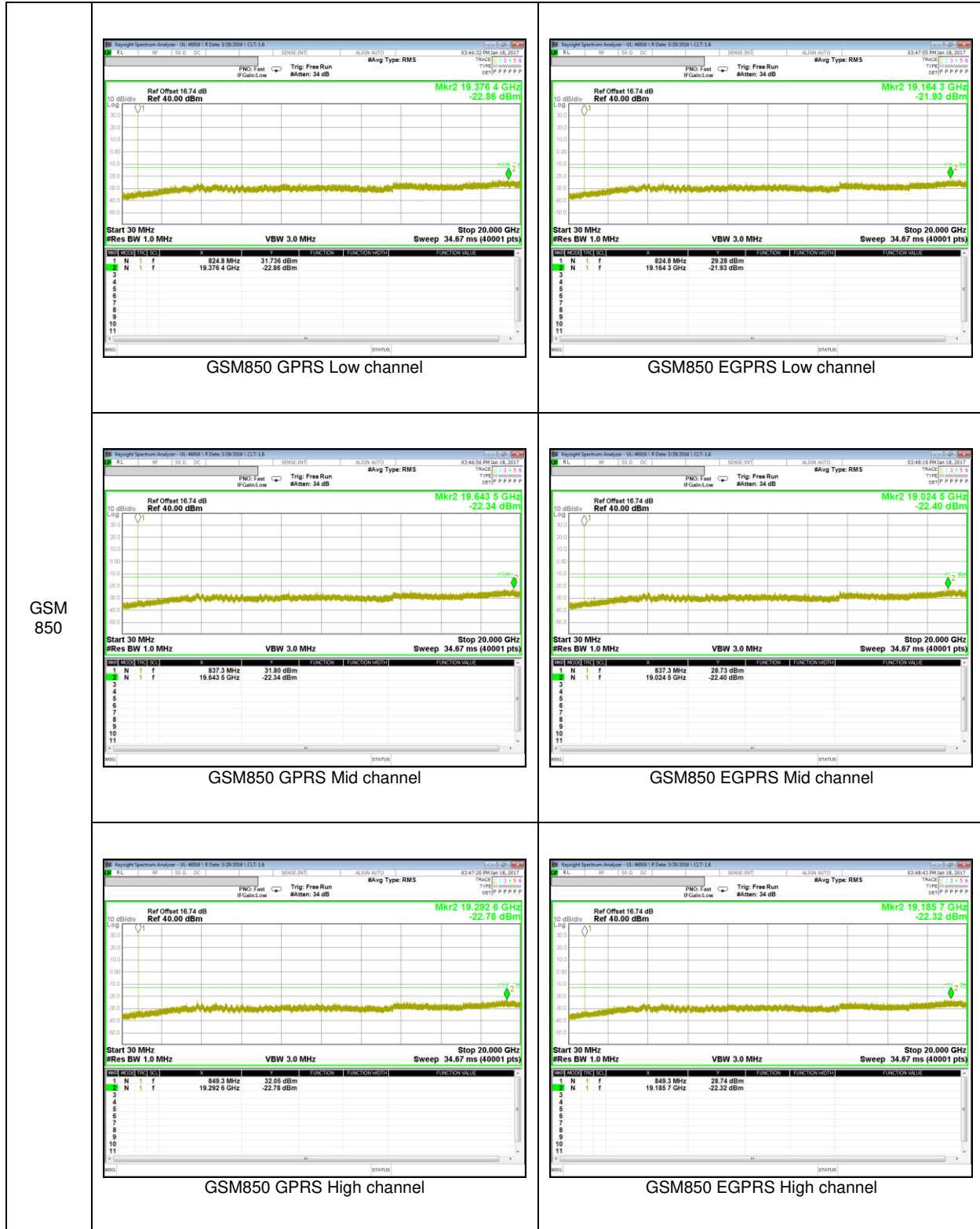
Band	Mode	f [MHz]	Spurious [dBm]	Limit [dBm]
Band 5	REL99	826.4	-32.97	-13.00
		836.6	-33.01	
		846.6	-33.06	
	HSDPA	826.4	-32.63	
		836.6	-32.73	
		846.6	-31.98	
Band 2	REL99	1852.4	-32.39	
		1880.0	-32.69	
		1907.6	-32.47	
	HSDPA	1852.4	-31.70	
		1880.0	-31.30	
		1907.6	-32.39	

LTE 5

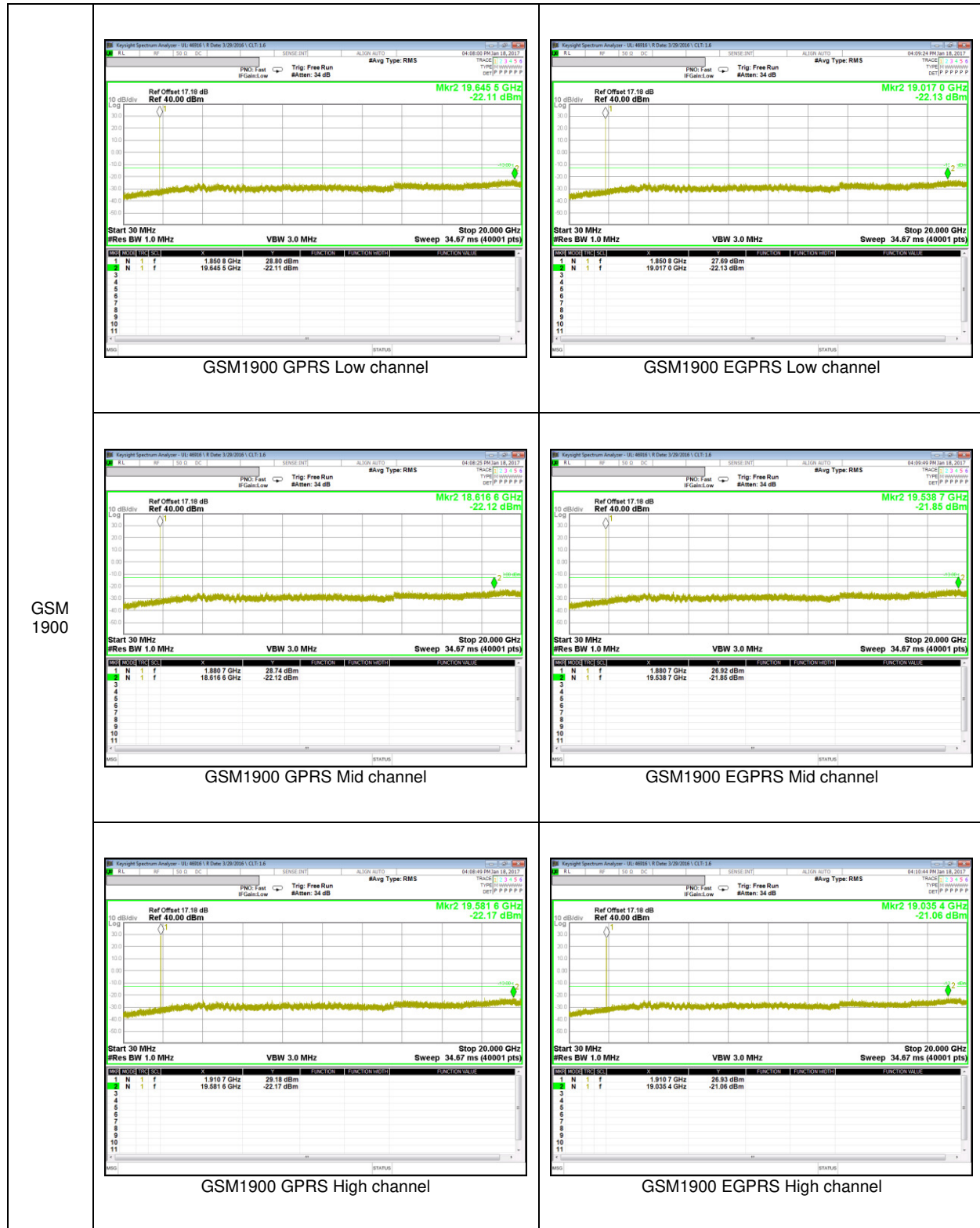
Bandwidth	Mode	f [MHz]	Spurious [dBm]	Limit [dBm]
10 MHz	QPSK	829.0	-26.75	-13.00
		836.5	-26.10	
		844.0	-26.51	
	16QAM	829.0	-26.79	
		836.5	-26.63	
		844.0	-25.42	
5 MHz	QPSK	826.5	-26.31	
		836.5	-27.30	
		846.5	-26.32	
	16QAM	826.5	-25.48	
		836.5	-26.88	
		846.5	-26.85	
3 MHz	QPSK	825.5	-26.27	
		836.5	-26.63	
		847.5	-25.90	
	16QAM	825.5	-26.55	
		836.5	-27.09	
		847.5	-26.46	
1.4 MHz	QPSK	824.7	-26.50	
		836.5	-26.86	
		848.3	-26.35	
	16QAM	824.7	-26.83	
		836.5	-26.46	
		848.3	-26.19	

10.3.1. OUT OF BAND EMISSIONS PLOTS

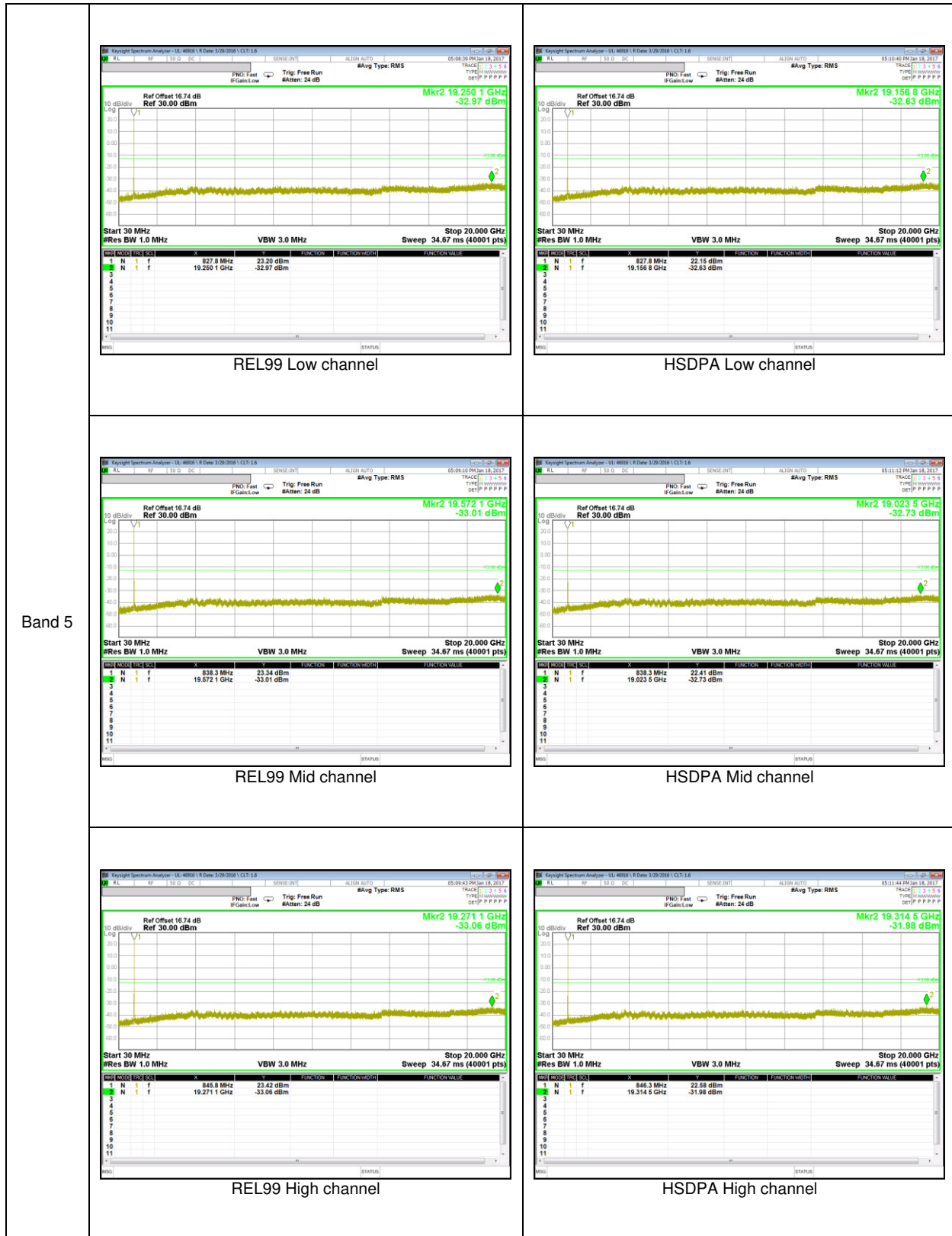
GSM 850



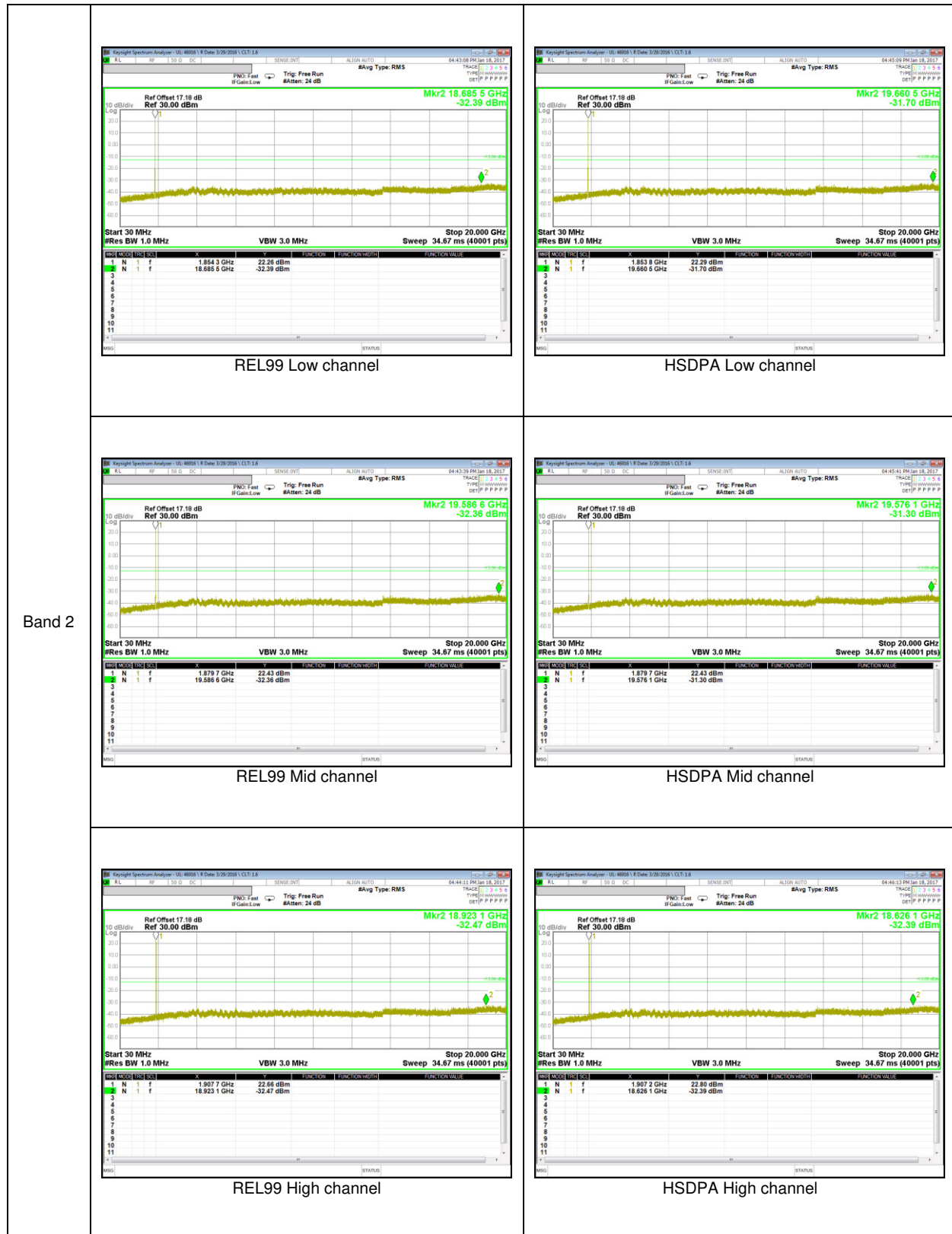
GSM 1900



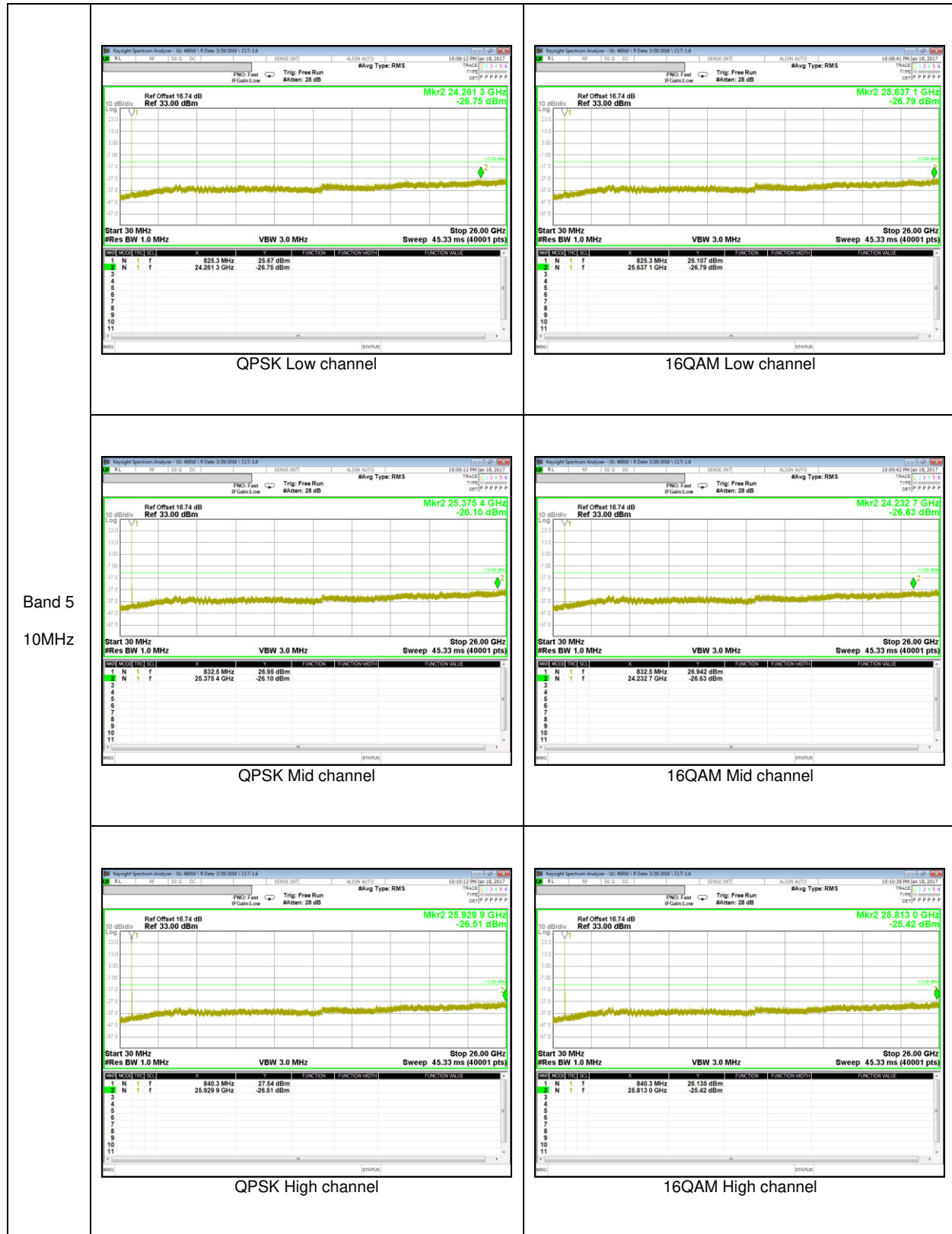
WCDMA Band 5

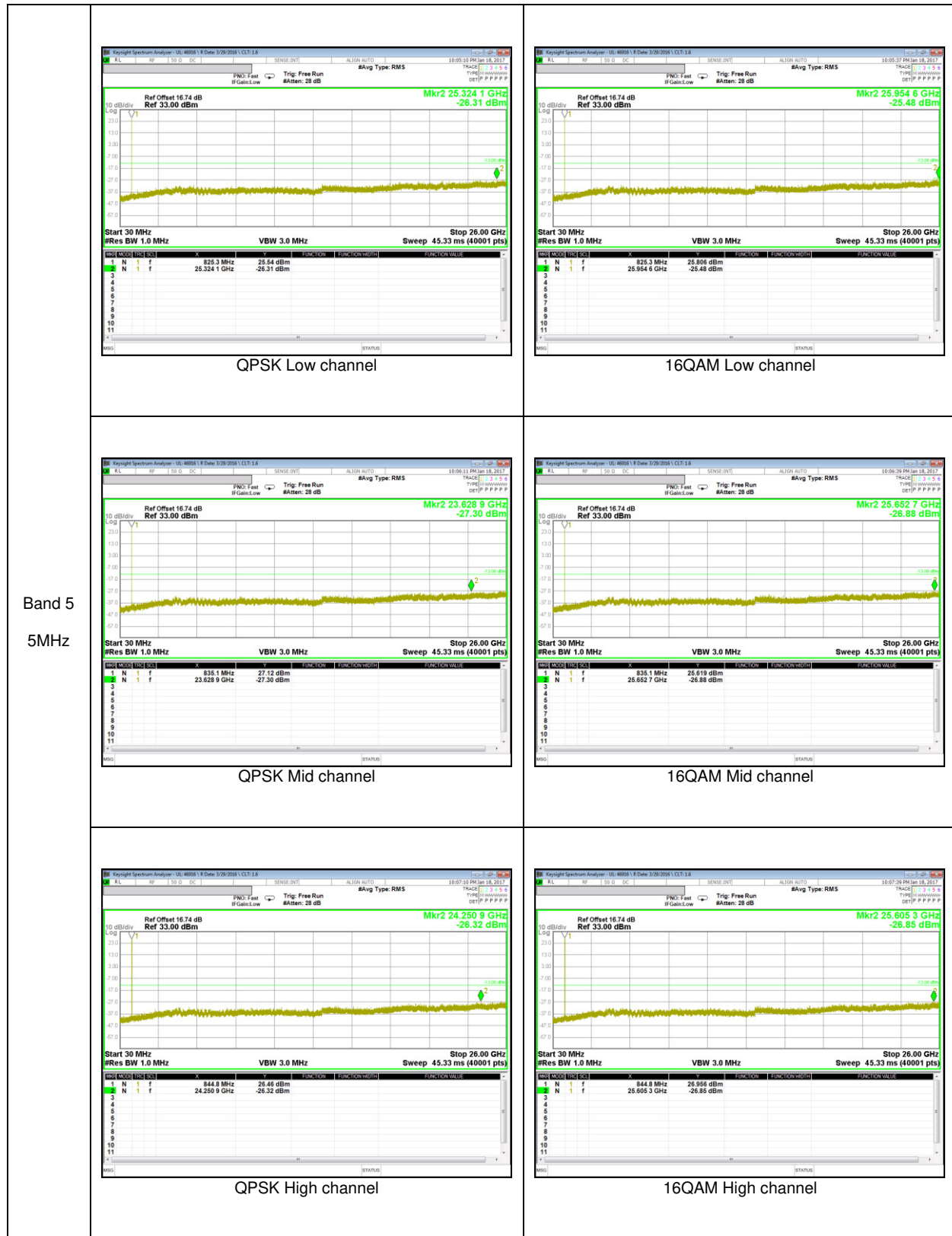


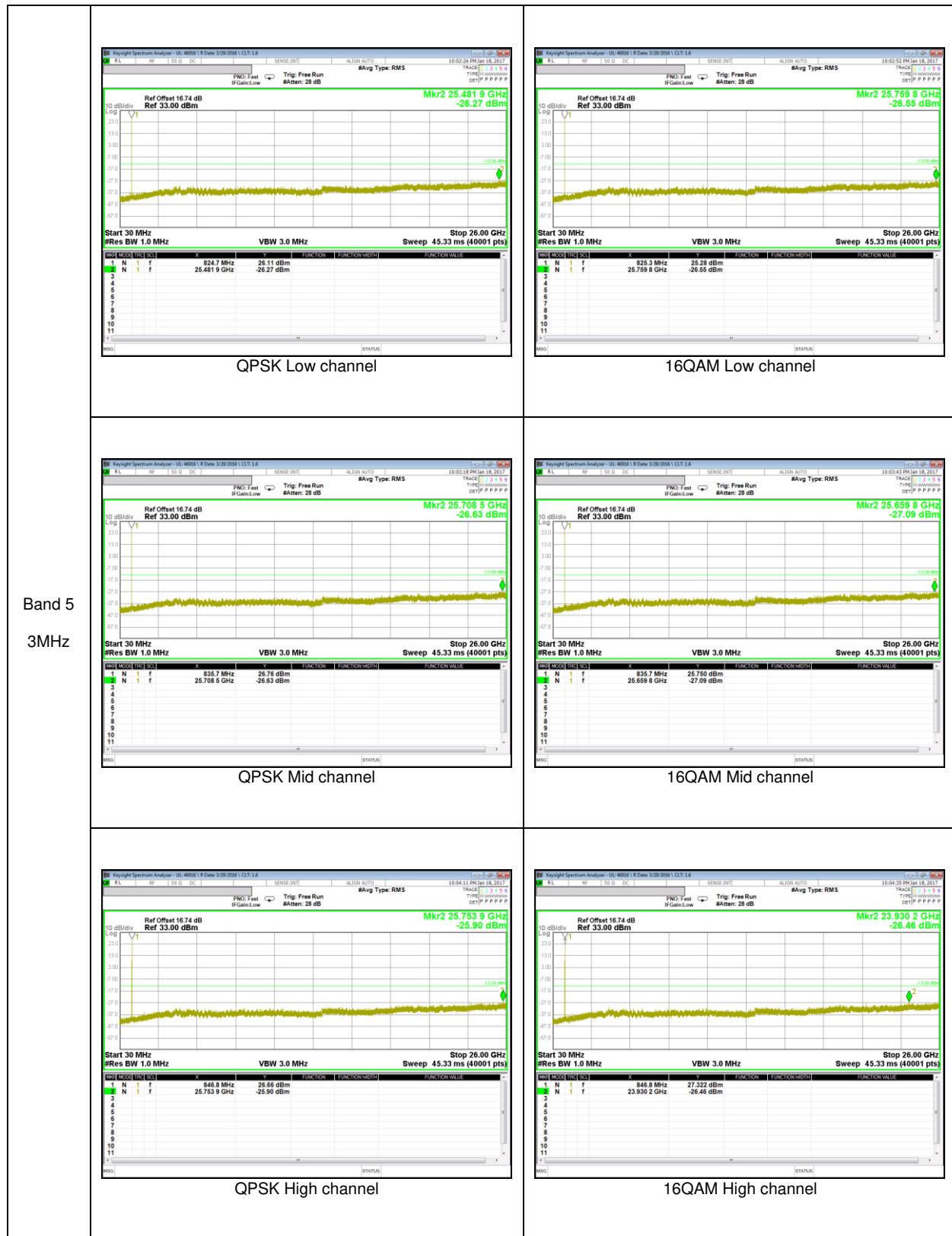
WCDMA Band 2

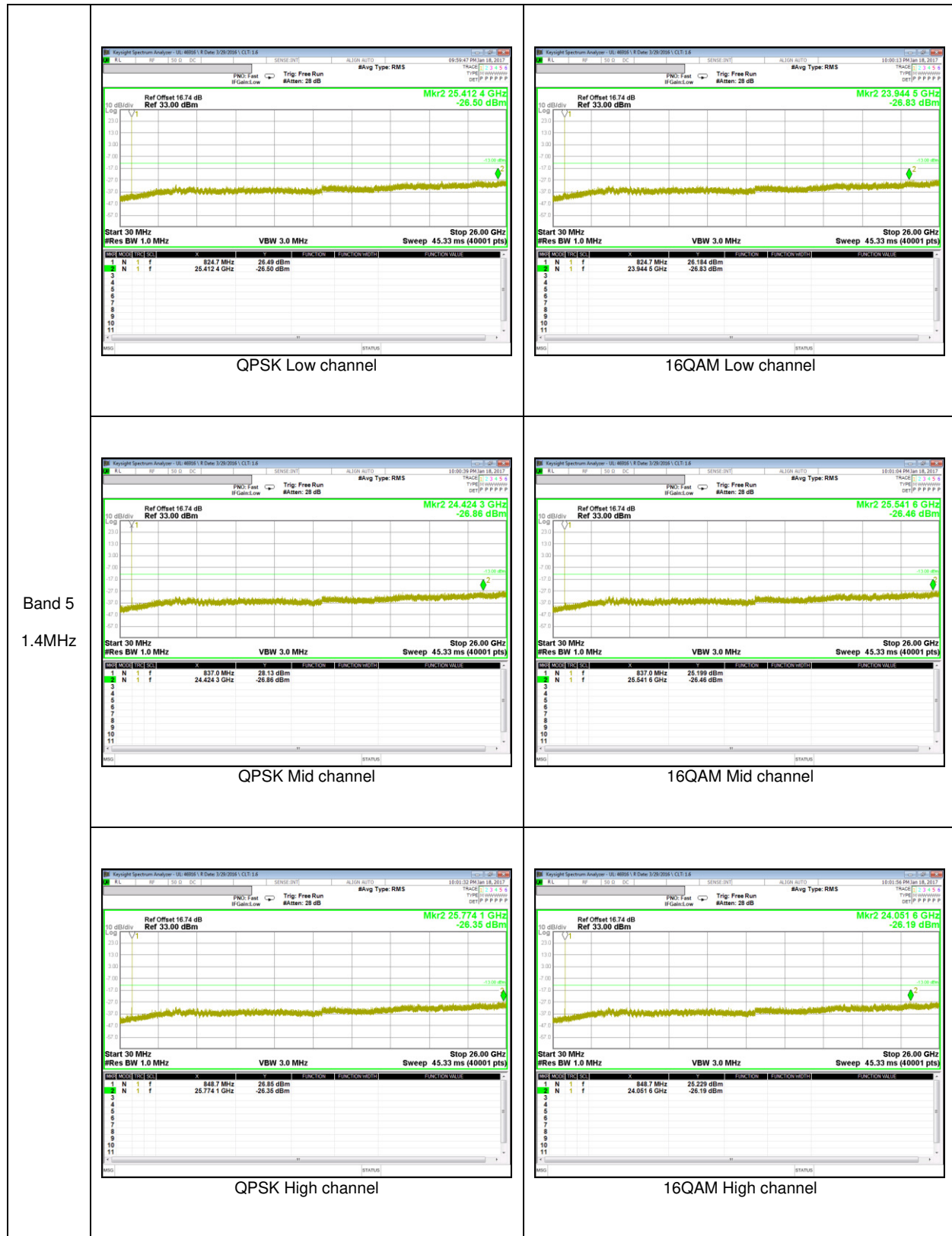


LTE Band 5









10.4. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §22.355 and §24.235

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.

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v02r02

RESULTS

See the following pages.

10.4.1. FREQUENCY STABILITY RESULTS

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	836.60000833	-0.003	2.5
3.85	40	836.60000793	-0.002	2.5
3.85	30	836.60000752	-0.002	2.5
3.85	20	836.60000623	0	2.5
3.85	10	836.60000814	-0.002	2.5
3.85	0	836.60000468	0.002	2.5
3.85	-10	836.60000545	0.001	2.5
3.85	-20	836.60000797	-0.002	2.5
3.85	-30	836.60000349	0.003	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)
3.85	20	836.60000623	0	2.5
4.43	20	836.60000484	0.002	2.5
3.60	20	836.60000535	0.001	2.5

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	836.59999571	0.002	2.5
3.85	40	836.59999679	0.001	2.5
3.85	30	836.59999740	0.000	2.5
3.85	20	836.59999745	0	2.5
3.85	10	836.59999655	0.001	2.5
3.85	0	836.59999784	0.000	2.5
3.85	-10	836.59999625	0.001	2.5
3.85	-20	836.59999548	0.002	2.5
3.85	-30	836.59999661	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]
3.85	20	836.59999745	0	2.5
4.43	20	836.59999666	0.001	2.5
3.60	20	836.59999775	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	836.5000744	-0.002	2.5
3.85	40	836.5000686	-0.002	2.5
3.85	30	836.5000648	-0.001	2.5
3.85	20	836.5000539	0	2.5
3.85	10	836.5000574	0.000	2.5
3.85	0	836.5000479	0.001	2.5
3.85	-10	836.5000494	0.001	2.5
3.85	-20	836.5000587	-0.001	2.5
3.85	-30	836.5000561	0.000	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	836.5000539	0	2.5
4.43	20	836.5000584	-0.001	2.5
3.60	20	836.5000566	0.000	2.5

GSM 1900, Channel 661, Frequency 1880.0 MHz

Reference Frequency: GSM1900 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	1879.99998476	-0.004	2.5
3.85	40	1879.99998131	-0.002	2.5
3.85	30	1879.99997972	-0.001	2.5
3.85	20	1879.99997737	0	2.5
3.85	10	1879.99997692	0.000	2.5
3.85	0	1879.99997626	0.001	2.5
3.85	-10	1879.99997539	0.001	2.5
3.85	-20	1879.99997245	0.003	2.5
3.85	-30	1879.99997052	0.004	2.5

Reference Frequency: GSM1900 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	20	1879.99997737	0	2.5
4.43	20	1880.00000000	-0.012	2.5
3.60	20	1880.00000000	-0.012	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	1879.99999306	0.001	2.5
3.85	40	1879.99999385	0.000	2.5
3.85	30	1879.99999509	-0.001	2.5
3.85	20	1879.99999415	0	2.5
3.85	10	1879.99999368	0.000	2.5
3.85	0	1879.99999298	0.001	2.5
3.85	-10	1879.99999112	0.002	2.5
3.85	-20	1879.99999209	0.001	2.5
3.85	-30	1879.99999145	0.001	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	1879.99999415	0	2.5
4.43	20	1879.99999312	0.001	2.5
3.60	20	1879.99999488	0.000	2.5

11. RADIATED TEST RESULTS

11.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §22.913 and §24.232

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.

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; ESU40 setting reference to 971168 D01 v02r02

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

11.1.1. ERP/EIRP Results

GSM

Band	Mode	Channel	f [MHz]	ERP / EIRP	
				[dBm]	[mW]
GSM850	GPRS	512	824.2	28.54	714.50
		661	836.6	28.41	693.43
		810	848.8	28.58	721.11
	EGPRS	512	824.2	24.16	260.62
		661	836.6	24.36	272.90
		810	848.8	23.57	227.51
GSM1900	GPRS	512	1850.2	29.63	918.33
		661	1880.0	29.04	801.68
		810	1909.8	28.54	714.50
	EGPRS	512	1850.2	26.78	476.43
		661	1880.0	25.74	374.97
		810	1909.8	25.51	355.63

WCDMA

Band	Mode	Channel	f [MHz]	ERP / EIRP	
				[dBm]	[mW]
Band 5	REL99	4132	826.4	19.75	94.41
		4183	836.6	19.14	82.04
		4233	846.6	18.75	74.99
	HSDPA	4132	826.4	20.29	106.91
		4183	836.6	19.59	90.99
		4233	846.6	19.15	82.22
Band 2	REL99	9262	1852.4	23.33	215.28
		9400	1880.0	23.38	217.77
		9538	1907.6	21.88	154.17
	HSDPA	9262	1852.4	23.13	205.59
		9400	1880.0	22.97	198.15
		9538	1907.6	21.92	155.60

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	17.14	51.76
			50/0	836.5	16.40	43.65
			50/0	844.0	16.47	44.36
		16QAM	50/0	829.0	16.18	41.50
			50/0	836.5	15.39	34.59
			50/0	844.0	15.49	35.40
	5	QPSK	25/0	826.5	18.04	63.68
			25/0	836.5	17.11	51.40
			25/0	846.5	15.93	39.17
		16QAM	25/0	826.5	17.04	50.58
			25/0	836.5	16.10	40.74
			25/0	846.5	15.46	35.16
	3	QPSK	15/0	825.5	17.77	59.84
			15/0	836.5	17.71	59.02
			15/0	847.5	16.28	42.46
		16QAM	15/0	825.5	16.79	47.75
			15/0	836.5	16.71	46.88
			15/0	847.5	15.76	37.67
	1.4	QPSK	6/0	824.7	16.34	43.05
			6/0	836.5	15.60	36.31
			6/0	848.3	13.84	24.21
		16QAM	6/0	824.7	15.35	34.28
			6/0	836.5	14.57	28.64
			6/0	848.3	13.23	21.04

11.1.2. ERP/EIRP DATA

GSM 850

		High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2								
		Company: Samsung Project #: 4787833362 Date: 01-19-17 Test Engineer: JH Park Configuration: EUT ONLY, X Position Mode: GPRS 850 MHz <u>Test Equipment:</u> Receiving: VULB9163-749, and 3m Chamber N-type Cable (Setup this one for testing EUT) Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.								
GSM	GSM850 GPRS	f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	ERP	Limit	Margin	Notes
		MHz	(dBm)	(H/V)	(dB)	(dBd)	(dBm)	(dBm)	(dB)	
		Low Ch								
		824.20	24.97	V	1.1	-1.6	22.35	38.5	-16.1	
		824.20	31.16	H	1.1	-1.6	28.54	38.5	-9.9	
		Mid Ch								
		836.60	22.18	V	1.1	-1.4	19.69	38.5	-18.8	
		836.60	30.90	H	1.1	-1.4	28.41	38.5	-10.0	
		High Ch								
		848.80	19.07	V	1.1	-1.3	16.71	38.5	-21.7	
		848.80	30.94	H	1.1	-1.3	28.58	38.5	-9.9	
		Rev. 3.17.11 Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm								
		High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2								
		Company: Samsung Project #: 4787833362 Date: 01-19-17 Test Engineer: JH Park Configuration: EUT ONLY, X Position Mode: EGPRS 850 MHz <u>Test Equipment:</u> Receiving: VULB9163-749, and 3m Chamber N-type Cable (Setup this one for testing EUT) Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.								
GSM	GSM850 EGPRS	f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	ERP	Limit	Margin	Notes
		MHz	(dBm)	(H/V)	(dB)	(dBd)	(dBm)	(dBm)	(dB)	
		Low Ch								
		824.20	21.41	V	1.1	-1.6	18.79	38.5	-19.7	
		824.20	26.78	H	1.1	-1.6	24.16	38.5	-14.3	
		Mid Ch								
		836.60	18.33	V	1.1	-1.4	15.84	38.5	-22.6	
		836.60	26.85	H	1.1	-1.4	24.36	38.5	-14.1	
		High Ch								
		848.80	15.30	V	1.1	-1.3	12.94	38.5	-25.5	
		848.80	25.93	H	1.1	-1.3	23.57	38.5	-14.9	
		Rev. 3.17.11 Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm								

GSM 1900

		High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2								
		f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
GSM GSM1900 GPRS	Company: Samsung Project #: 4787833362 Date: 01-18-17 Test Engineer: JH Park Configuration: EUT ONLY, Z Position Mode: GPRS 1900MHz Test Equipment: Receiving: 3117[00168724] and Chamber 1 SMA Cables Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse									
	Low Ch									
	1850.20	18.1	V	1.60	8.80	25.25	33.0	-7.8		
	1850.20	22.4	H	1.60	8.80	29.63	33.0	-3.4		
	Mid Ch									
	1880.00	18.6	V	1.62	8.62	25.59	33.0	-7.4		
	1880.00	22.0	H	1.62	8.62	29.04	33.0	-4.0		
	High Ch									
	1909.80	18.7	V	1.63	8.44	25.46	33.0	-7.5		
	1909.80	21.7	H	1.63	8.44	28.54	33.0	-4.5		
	Rev. 3.17.11									
	GSM GSM1900 EGPRS	Company: Samsung Project #: 4787833362 Date: 01-18-17 Test Engineer: JH Park Configuration: EUT ONLY, Z Position Mode: EGPRS 1900MHz Test Equipment: Receiving: 3117[00168724] and Chamber 1 SMA Cables Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse								
		Low Ch								
1850.20		15.4	V	1.60	8.80	22.55	33.0	-10.5		
1850.20		19.6	H	1.60	8.80	26.78	33.0	-6.2		
Mid Ch										
1880.00		15.0	V	1.62	8.62	21.96	33.0	-11.0		
1880.00		18.7	H	1.62	8.62	25.74	33.0	-7.3		
High Ch										
1909.80		15.7	V	1.63	8.44	22.55	33.0	-10.4		
1909.80		18.7	H	1.63	8.44	25.51	33.0	-7.5		
Rev. 3.17.11										

WCDMA Band 5

WCDMA Band 5 REL99		High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2							
		f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
WCDMA Band 5 REL99		Company: Samsung Project #: 4787833362 Date: 01-19-17 Test Engineer: JH Park Configuration: EUT ONLY, XPosition Mode: Rel 99_850 MHz Test Equipment: Receiving: VULB9163-749, and 3m Chamber N-type Cable (Setup this one for testing EUT) Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.							
		Rev. 3.17.11							
		Company: Samsung Project #: 4787833362 Date: 01-19-17 Test Engineer: JH Park Configuration: EUT ONLY, XPosition Mode: HSDPA_850 MHz Test Equipment: Receiving: VULB9163-749, and 3m Chamber N-type Cable (Setup this one for testing EUT) Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.							
		Rev. 3.17.11							
		Company: Samsung Project #: 4787833362 Date: 01-19-17 Test Engineer: JH Park Configuration: EUT ONLY, XPosition Mode: HSDPA_850 MHz Test Equipment: Receiving: VULB9163-749, and 3m Chamber N-type Cable (Setup this one for testing EUT) Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.							
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		Company: Samsung Project #: 4787833362 Date: 01-19-17 Test Engineer: JH Park Configuration: EUT ONLY, XPosition Mode: HSDPA_850 MHz Test Equipment: Receiving: VULB9163-749, and 3m Chamber N-type Cable (Setup this one for testing EUT) Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.							
		Rev. 3.17.11							
		Company: Samsung Project #: 4787833362 Date: 01-19-17 Test Engineer: JH Park Configuration: EUT ONLY, XPosition Mode: HSDPA_850 MHz Test Equipment: Receiving: VULB9163-749, and 3m Chamber N-type Cable (Setup this one for testing EUT) Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.							
		Rev. 3.17.11							

WCDMA Band 2

WCDMA Band 2 REL99		High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2							
		Company: Samsung Project #: 4787833362 Date: 01-18-17 Test Engineer: JH Park Configuration: EUT ONLY, Z Position Mode: REL99_1900 MHz <u>Test Equipment:</u> Receiving: 3117[00168724] and Chamber 1 SMA Cables Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes	
Low Ch									
1852.40	11.36	V	1.60	8.79	18.55	33.0	-14.5		
1852.40	16.14	H	1.60	8.79	23.33	33.0	-9.7		
Mid Ch									
1880.00	13.00	V	1.62	8.62	20.00	33.0	-13.0		
1880.00	16.38	H	1.62	8.62	23.38	33.0	-9.6		
High Ch									
1907.60	11.29	V	1.63	8.45	18.11	33.0	-14.9		
1907.60	15.06	H	1.63	8.45	21.88	33.0	-11.1		
Rev. 3.17.11 Note: For Band 4 EIRP limit is 30dBm									

WCDMA Band 2 HSDPA		High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2							
		Company: Samsung Project #: 4787833362 Date: 01-18-17 Test Engineer: JH Park Configuration: EUT ONLY, Z Position Mode: HSDPA_1900 MHz <u>Test Equipment:</u> Receiving: 3117[00168724] and Chamber 1 SMA Cables Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Note:	
Low Ch									
1852.40	11.27	V	1.60	8.79	18.46	33.0	-14.5		
1852.40	15.94	H	1.60	8.79	23.13	33.0	-9.9		
Mid Ch									
1880.00	12.96	V	1.62	8.62	19.96	33.0	-13.0		
1880.00	15.97	H	1.62	8.62	22.97	33.0	-10.0		
High Ch									
1907.60	11.43	V	1.63	8.45	18.25	33.0	-14.7		
1907.60	15.10	H	1.63	8.45	21.92	33.0	-11.1		
Rev. 3.17.11 Note: For Band 4 EIRP limit is 30dBm									

LTE Band 5

		High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2								
LTE Band 5 10MHz QPSK	Company:	Samsung								
	Project #:	4787833362								
	Date:	01-19-17								
	Test Engineer:	JH Park								
	Configuration:	EUT ONLY, X Position								
	Mode:	TX, LTE BAND 5, 10MHz BW,QPSK								
	Test Equipment:		Receiving: VULB9163-749, and 3m Chamber N-type Cable (Setup this one for testing EUT) Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.							
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes	
	Low Ch									
	829.00	13.91	V	1.1	-1.5	11.33	38.5	-27.1		
	829.00	19.72	H	1.1	-1.5	17.14	38.5	-21.3		
	Mid Ch									
	836.50	10.23	V	1.1	-1.4	7.74	38.5	-30.7		
	836.50	18.89	H	1.1	-1.4	16.40	38.5	-22.1		
High Ch										
844.00	7.50	V	1.1	-1.3	5.11	38.5	-33.3			
844.00	18.89	H	1.1	-1.3	16.47	38.5	-22.0			
Rev. 3.17.11		Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm								
		High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2								
LTE Band 5 10MHz 16QAM	Company:	Samsung								
	Project #:	4787833362								
	Date:	01-19-17								
	Test Engineer:	JH Park								
	Configuration:	EUT ONLY, X Position								
	Mode:	LTE5 10MHz FUND 16QAM								
	Test Equipment:		Receiving: VULB9163-749, and 3m Chamber N-type Cable (Setup this one for testing EUT) Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.							
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes	
	Low Ch									
	829.00	12.91	V	1.1	-1.5	10.33	38.5	-28.1		
	829.00	18.76	H	1.1	-1.5	16.18	38.5	-22.3		
	Mid Ch									
	836.50	9.25	V	1.1	-1.4	6.74	38.5	-31.7		
	836.50	17.90	H	1.1	-1.4	15.39	38.5	-23.1		
High Ch										
844.00	6.51	V	1.1	-1.3	4.09	38.5	-34.4			
844.00	17.91	H	1.1	-1.3	15.49	38.5	-23.0			
Rev. 3.17.11		Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm								

		High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2							
LTE Band 5 5MHz QPSK	Company: Samsung Project #: 4787833362 Date: 01-19-17 Test Engineer: JH Park Configuration: EUT ONLY, X Position Mode: LTE5 5MHz FUND QPSK								
	Test Equipment: Receiving: VULB9163-749, and 3m Chamber N-type Cable (Setup this one for testing EUT) Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.								
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
	Low Ch								
	826.50	14.88	V	1.1	-1.5	12.28	38.5	-26.2	
	826.50	20.64	H	1.1	-1.5	18.04	38.5	-20.4	
	Mid Ch								
	836.50	13.62	V	1.1	-1.4	11.13	38.5	-27.3	
	836.50	19.60	H	1.1	-1.4	17.11	38.5	-21.3	
	High Ch								
	846.50	12.31	V	1.6	-1.3	9.43	38.5	-29.0	
	846.50	18.81	H	1.6	-1.3	15.93	38.5	-22.5	
Rev. 3.17.11 Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm									
LTE Band 5 5MHz 16QAM	Company: Samsung Project #: 4787833362 Date: 01-19-17 Test Engineer: JH Park Configuration: EUT ONLY, X Position Mode: LTE5 5MHz FUND 16QAM								
	Test Equipment: Receiving: VULB9163-749, and 3m Chamber N-type Cable (Setup this one for testing EUT) Substitution: Dipole S/N: 00164753, 3m SMA Cable Warehouse.								
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
	Low Ch								
	826.50	13.88	V	1.1	-1.5	11.28	38.5	-27.2	
	826.50	19.64	H	1.1	-1.5	17.04	38.5	-21.4	
	Mid Ch								
	836.50	12.63	V	1.1	-1.4	10.14	38.5	-28.3	
	836.50	18.59	H	1.1	-1.4	16.10	38.5	-22.4	
	High Ch								
	846.50	11.32	V	1.1	-1.3	8.94	38.5	-29.5	
	846.50	17.84	H	1.1	-1.3	15.46	38.5	-23.0	
Rev. 3.17.11 Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm									

LTE Band 5 3MHz QPSK	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2																																																																																																		
	Company:		Samsung																																																																																																
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		High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2									
LTE Band 5 1.4MHz QPSK	Company:		Samsung								
	Project #:		4787833362								
	Date:		01-19-17								
	Test Engineer:		JH Park								
	Configuration:		EUT ONLY, X Position								
	Mode:		LTE5 1.4MHz FUND QPSK								
	<u>Test Equipment:</u>		Receiving: VULB9163-749, 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	ERP	Limit	Margin	Notes
			MHz	(dBm)	(H/V)	(dB)	(dBd)	(dBm)	(dBm)	(dB)	
			Low Ch								
			824.70	12.66	V	1.1	-1.5	10.06	38.5	-28.4	
			824.70	18.94	H	1.1	-1.5	16.34	38.5	-22.1	
			Mid Ch								
			836.50	11.82	V	1.1	-1.4	9.33	38.5	-29.1	
		836.50	18.09	H	1.1	-1.4	15.60	38.5	-22.9		
		High Ch									
		848.30	8.47	V	1.6	-1.3	5.59	38.5	-32.9		
		848.30	16.72	H	1.6	-1.3	13.84	38.5	-24.6		
		Rev. 3.17.11 Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm									
		High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2									
LTE Band 5 1.4MHz 16QAM	Company:		Samsung								
	Project #:		4787833362								
	Date:		01-19-17								
	Test Engineer:		JH Park								
	Configuration:		EUT ONLY, X Position								
	Mode:		LTE5 1.4MHz FUND 16QAM								
	<u>Test Equipment:</u>		Receiving: VULB9163-749, 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	ERP	Limit	Margin	Notes
			MHz	(dBm)	(H/V)	(dB)	(dBd)	(dBm)	(dBm)	(dB)	
			Low Ch								
			824.70	11.70	V	1.1	-1.5	9.10	38.5	-29.4	
			824.70	17.95	H	1.1	-1.5	15.35	38.5	-23.1	
			Mid Ch								
			836.50	10.81	V	1.1	-1.4	8.32	38.5	-30.1	
		836.50	17.06	H	1.1	-1.4	14.57	38.5	-23.9		
		High Ch									
		848.30	7.35	V	1.1	-1.3	4.97	38.5	-33.5		
		848.30	15.61	H	1.1	-1.3	13.23	38.5	-25.2		
		Rev. 3.17.11 Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm									

11.2. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053, §22.917 and §24.238

LIMIT

Part 22.917(a) & Part 24.238(a) 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

ANSI / TIA / EIA 603D Clause 2.2.12; ESU40 setting reference to 971168 D01 v02r02

For peak power measurement with a ESU40:

- a) Set the RBW = 100 KHz for emission below 1GHz and 1MHz for emissions above 1GHz
- b) Set VBW $\geq 3 \times$ RBW;
- c) Set span ≥ 1.5 times the OBW;
- d) Sweep time = auto couple;
- e) Detector = peak (RMS for average measurement);
- f) Ensure that the number of measurement points \geq span/RBW;
- g) Trace mode = max hold;

RESULTS

11.2.1. SPURIOUS RADIATION PLOTS

GSM 850

		UL Korea, Ltd Suwon Laboratory Above 1GHz High Frequency Substitution Measurement																																																																																																																																																																																																																													
GSM GSM850 GPRS	Company: Samsung Project #: 4787833362 Date: 01-19-17 Test Engineer: Chan Park Configuration: EUT / AC Adapter / Earphone, X Position Mode: GPRS 850 MHz																																																																																																																																																																																																																														
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2.5466	-17.6	V	3.0	38.9	1.0	-55.5	-13.0	-42.5																																																																																																																																																																																																																							
3.3952	-21.6	V	3.0	39.5	1.0	-60.0	-13.0	-47.0																																																																																																																																																																																																																							
1.6976	-11.4	H	3.0	38.2	1.0	-48.7	-13.0	-35.7																																																																																																																																																																																																																							
2.5466	-9.6	H	3.0	38.9	1.0	-47.4	-13.0	-34.4																																																																																																																																																																																																																							
3.3952	-21.4	H	3.0	39.5	1.0	-59.9	-13.0	-46.9																																																																																																																																																																																																																							
	Rev. 03.03.09 Note: No other emissions were detected above the system noise floor.																																																																																																																																																																																																																														

GSM 1900

		UL Korea, Ltd Suwon Laboratory Above 1GHz High Frequency Substitution Measurement									
GSM GSM1900 GPRS	Company: Samsung Project #: 4787833362 Date: 01-18-17 Test Engineer: JH Park Configuration: EUT / AC Adapter / Earphone, Z Position Mode: GPRS 1900 MHz		Chamber Chamber 2		Pre-amplifier AFS42		Filter Filter 1		Limit Part 24		
		f	SG reading	Ant. Pol.	Distance	Preamp	Filter	EIRP	Limit	Delta	Notes
		GHz	(dBm)	(H/V)	(m)	(dB)	(dB)	(dBm)	(dBm)	(dB)	
		Low Ch, 1850.2MHz									
		3.7004	-14.3	V	3.0	39.7	1.0	-52.9	-13.0	-39.9	
		5.5506	-11.2	V	3.0	39.9	1.0	-50.2	-13.0	-37.2	
		7.4008	-14.3	V	3.0	39.4	1.0	-52.7	-13.0	-39.7	
		3.7000	-13.5	H	3.0	39.7	1.0	-52.2	-13.0	-39.2	
		5.5500	-8.8	H	3.0	39.9	1.0	-47.7	-13.0	-34.7	
		7.4000	-14.6	H	3.0	39.4	1.0	-53.1	-13.0	-40.1	
	Mid Ch, 1880.0MHz										
	3.7600	-16.2	V	3.0	39.7	1.0	-54.9	-13.0	-41.9		
	5.6400	-12.5	V	3.0	40.0	1.0	-51.5	-13.0	-38.5		
	7.5200	-14.5	V	3.0	39.4	1.0	-52.9	-13.0	-39.9		
	3.7600	-11.6	H	3.0	39.7	1.0	-50.3	-13.0	-37.3		
	5.6400	-13.7	H	3.0	40.0	1.0	-52.7	-13.0	-39.7		
	7.5200	-15.6	H	3.0	39.4	1.0	-54.0	-13.0	-41.0		
	High Ch, 1909.8 MHz										
	3.8196	-15.8	V	3.0	39.7	1.0	-54.5	-13.0	-41.5		
	5.7294	-7.9	V	3.0	40.0	1.0	-46.9	-13.0	-33.9		
	7.6392	-13.2	V	3.0	39.3	1.0	-51.5	-13.0	-38.5		
	3.8196	-14.6	H	3.0	39.7	1.0	-53.3	-13.0	-40.3		
	5.7294	-9.9	H	3.0	40.0	1.0	-48.9	-13.0	-35.9		
	7.6392	-11.2	H	3.0	39.3	1.0	-49.5	-13.0	-36.5		
	Rev. 03.03.09 Note: No other emissions were detected above the system noise floor.										
GSM GSM1900 EGPRS	Company: Samsung Project #: 4787833362 Date: 01-18-17 Test Engineer: JH Park Configuration: EUT / AC Adapter / Earphone, Z Position Mode: EGPRS 1900 MHz		Chamber Chamber 2		Pre-amplifier AFS42		Filter Filter 1		Limit Part 24		
		f	SG reading	Ant. Pol.	Distance	Preamp	Filter	EIRP	Limit	Delta	Notes
		GHz	(dBm)	(H/V)	(m)	(dB)	(dB)	(dBm)	(dBm)	(dB)	
		Low Ch, 1850.2MHz									
		3.7004	-19.5	V	3.0	39.7	1.0	-58.2	-13.0	-45.2	
		5.5506	-17.9	V	3.0	39.9	1.0	-56.8	-13.0	-43.8	
		7.4008	-17.8	V	3.0	39.4	1.0	-56.2	-13.0	-43.2	
		3.7000	-17.5	H	3.0	39.7	1.0	-56.1	-13.0	-43.1	
		5.5500	-16.5	H	3.0	39.9	1.0	-55.4	-13.0	-42.4	
		7.4000	-18.2	H	3.0	39.4	1.0	-56.6	-13.0	-43.6	
	Mid Ch, 1880.0MHz										
	3.7600	-22.3	V	3.0	39.7	1.0	-60.9	-13.0	-47.9		
	5.6400	-18.2	V	3.0	40.0	1.0	-57.2	-13.0	-44.2		
	7.5200	-17.8	V	3.0	39.4	1.0	-56.1	-13.0	-43.1		
	3.7600	-15.0	H	3.0	39.7	1.0	-53.6	-13.0	-40.6		
	5.6400	-19.6	H	3.0	40.0	1.0	-58.5	-13.0	-45.5		
	7.5200	-18.2	H	3.0	39.4	1.0	-56.6	-13.0	-43.6		
	High Ch, 1909.8 MHz										
	3.8196	-19.3	V	3.0	39.7	1.0	-58.0	-13.0	-45.0		
	5.7294	-17.8	V	3.0	40.0	1.0	-56.8	-13.0	-43.8		
	7.6392	-17.0	V	3.0	39.3	1.0	-55.3	-13.0	-42.3		
	3.8196	-15.6	H	3.0	39.7	1.0	-54.3	-13.0	-41.3		
	5.7294	-18.4	H	3.0	40.0	1.0	-57.4	-13.0	-44.4		
	7.6392	-13.9	H	3.0	39.3	1.0	-52.2	-13.0	-39.2		
	Rev. 03.03.09 Note: No other emissions were detected above the system noise floor.										