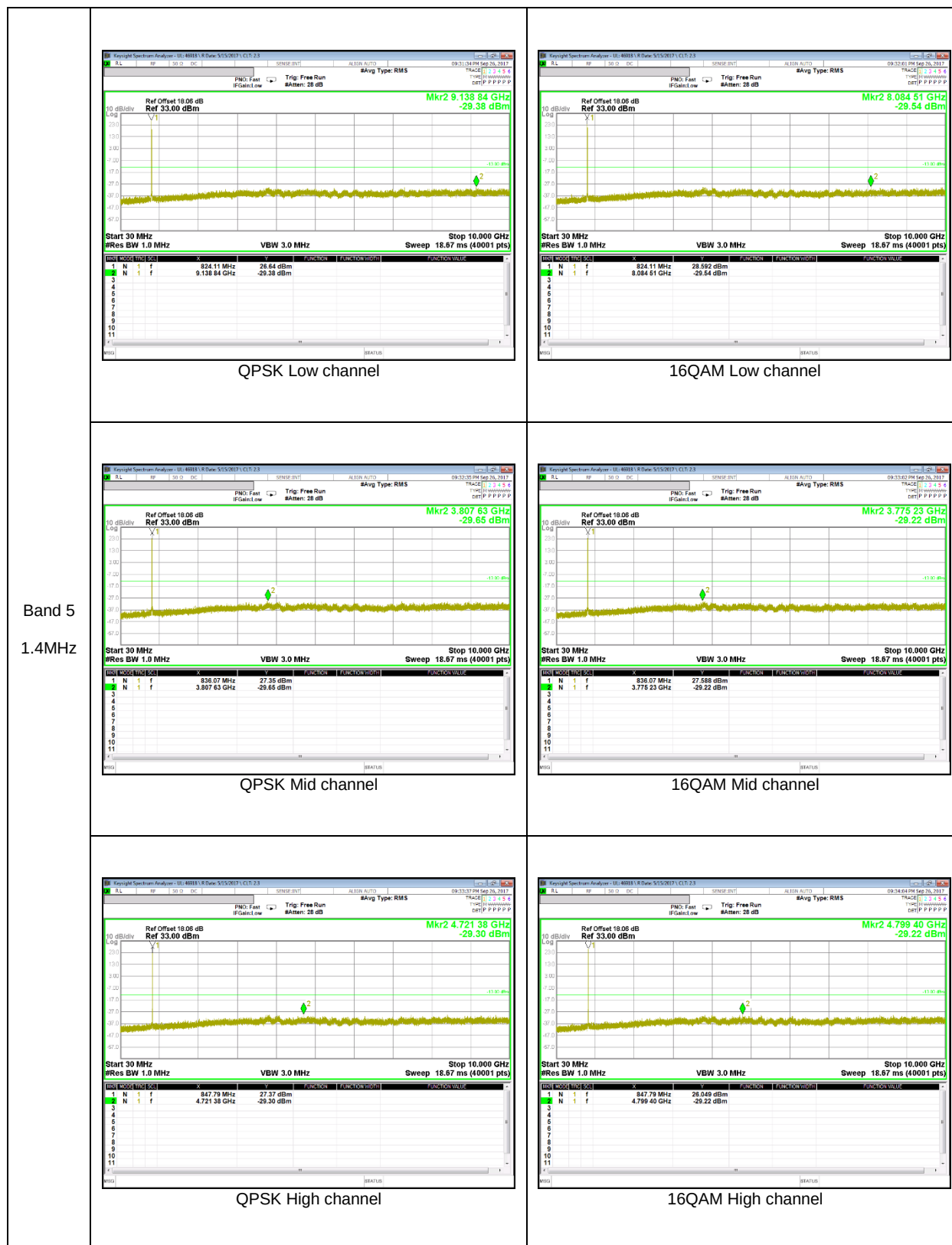
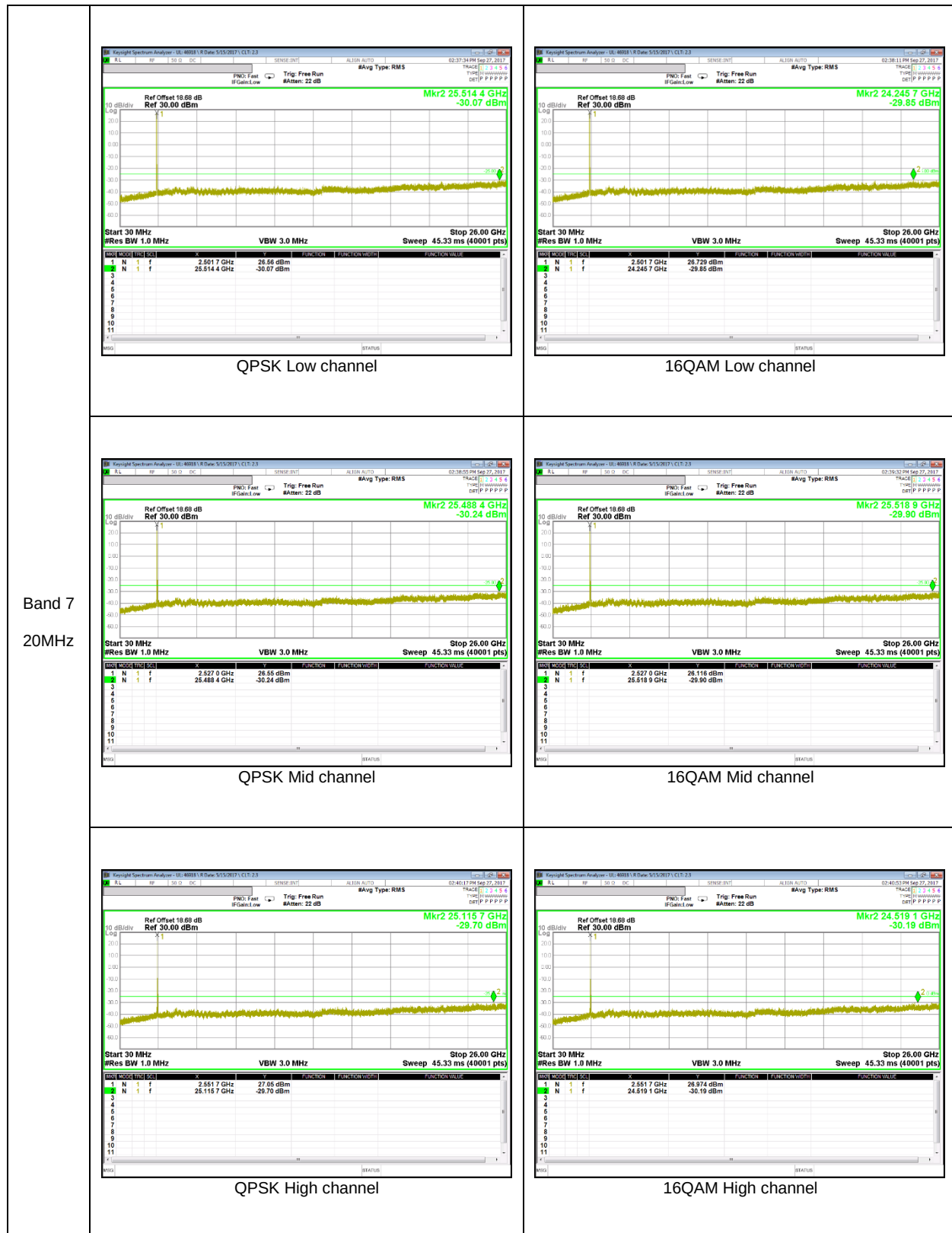
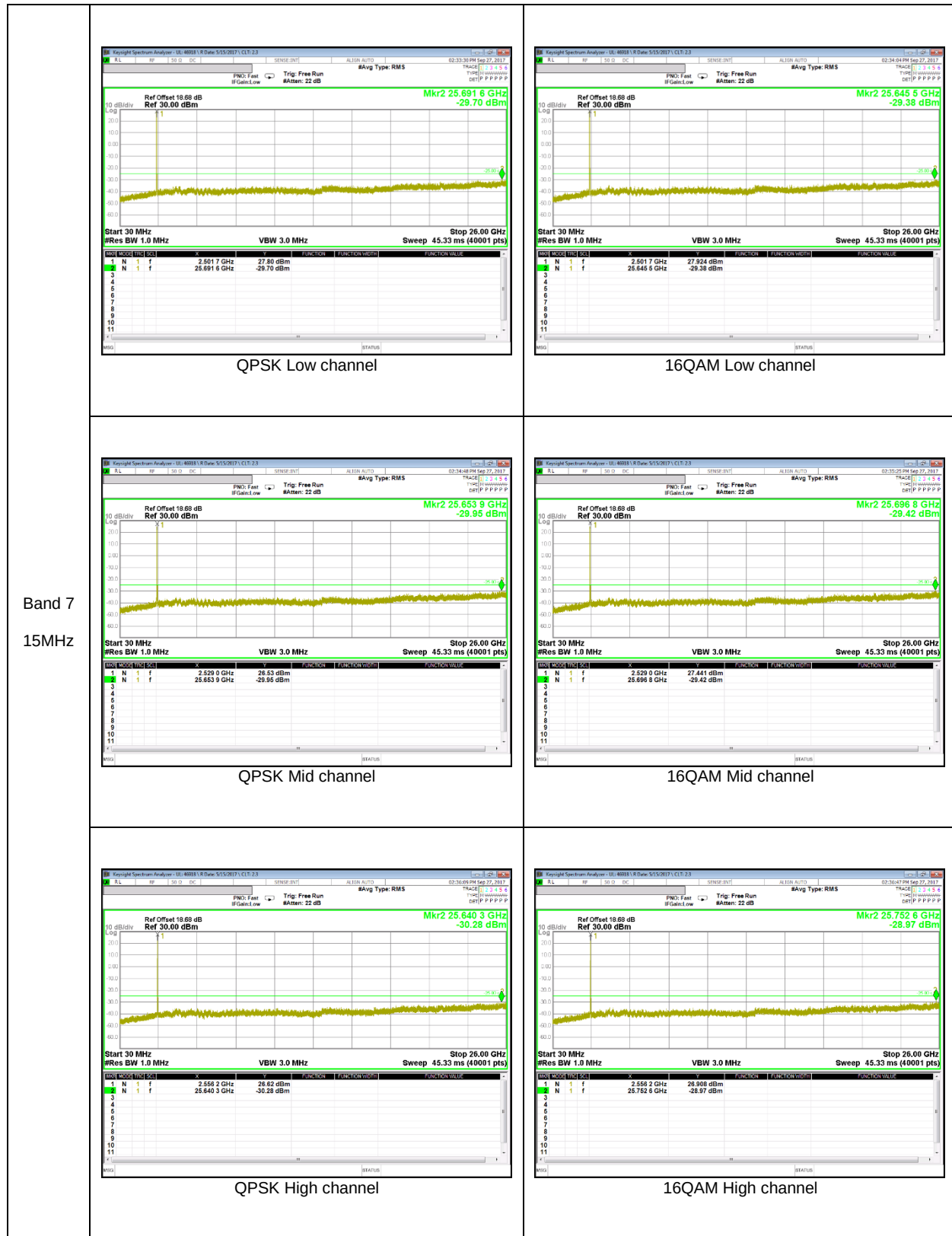
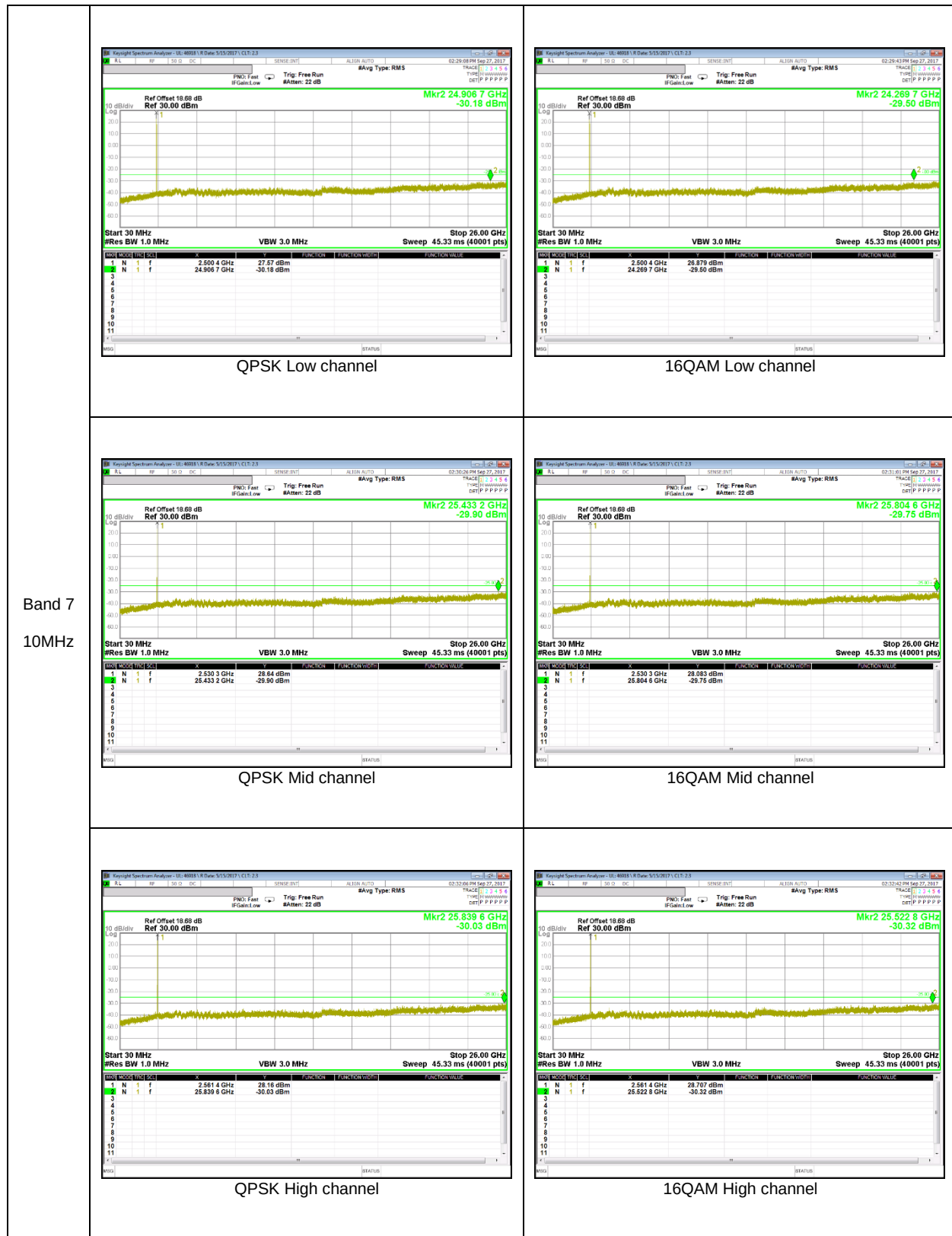


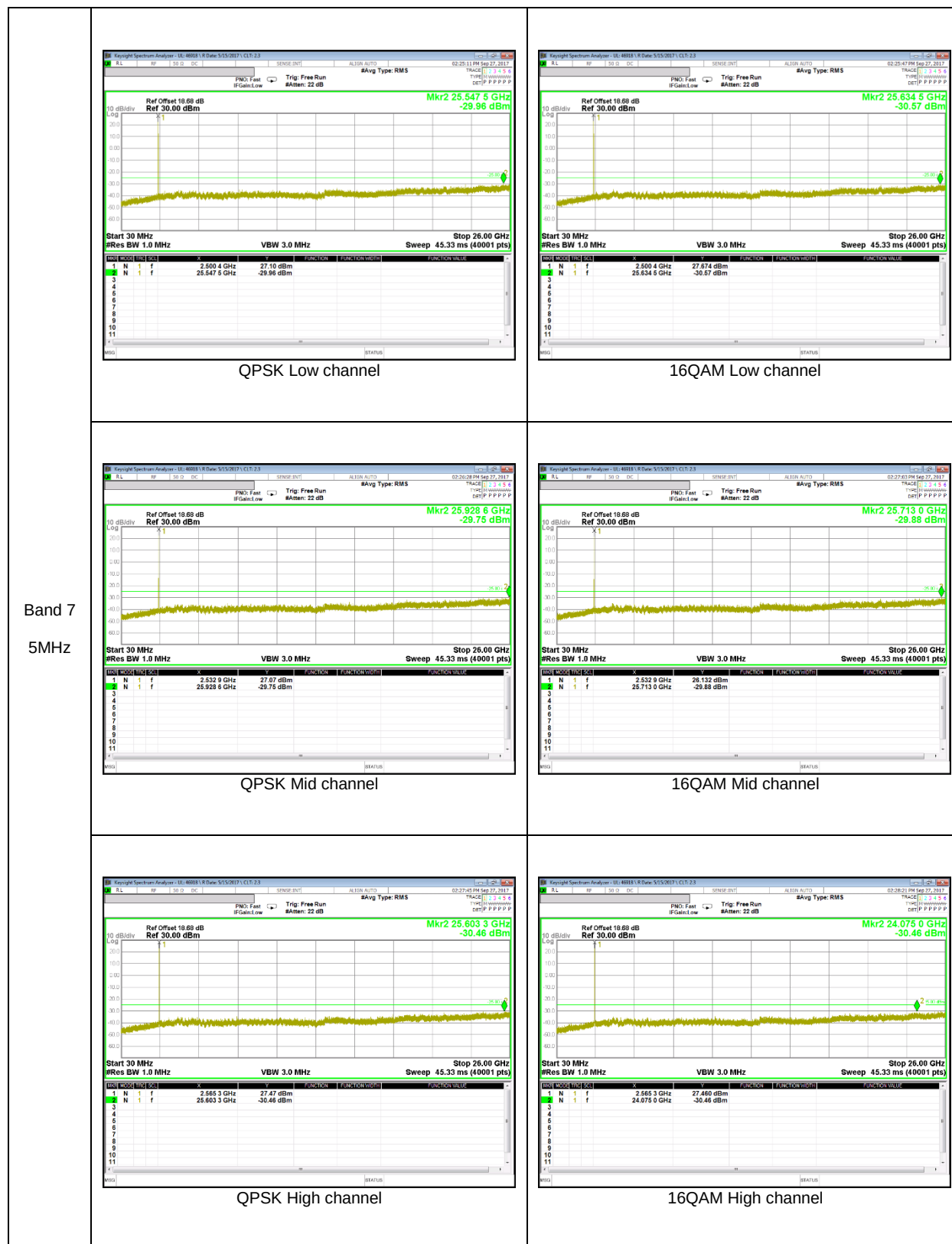


LTE Band 7

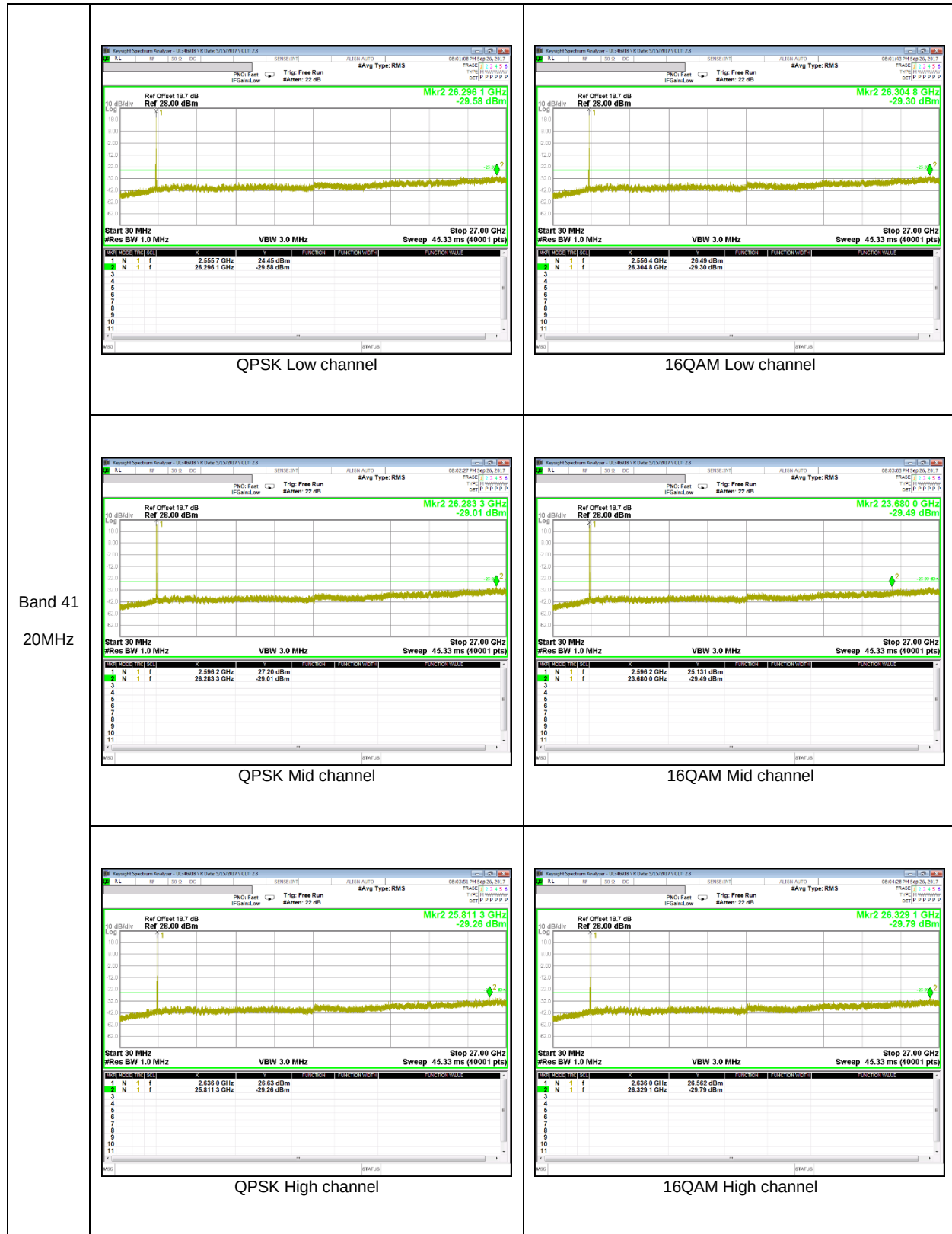


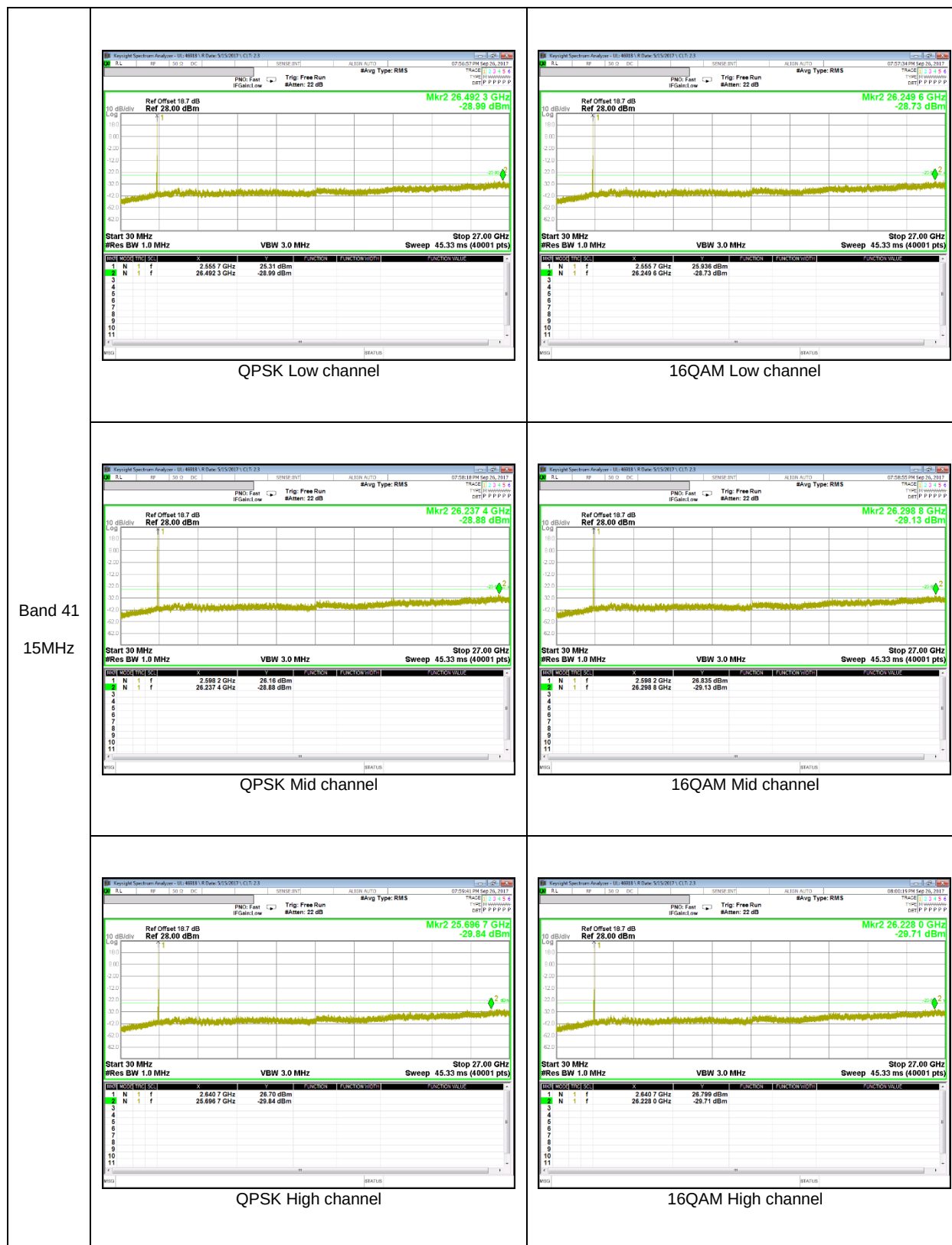


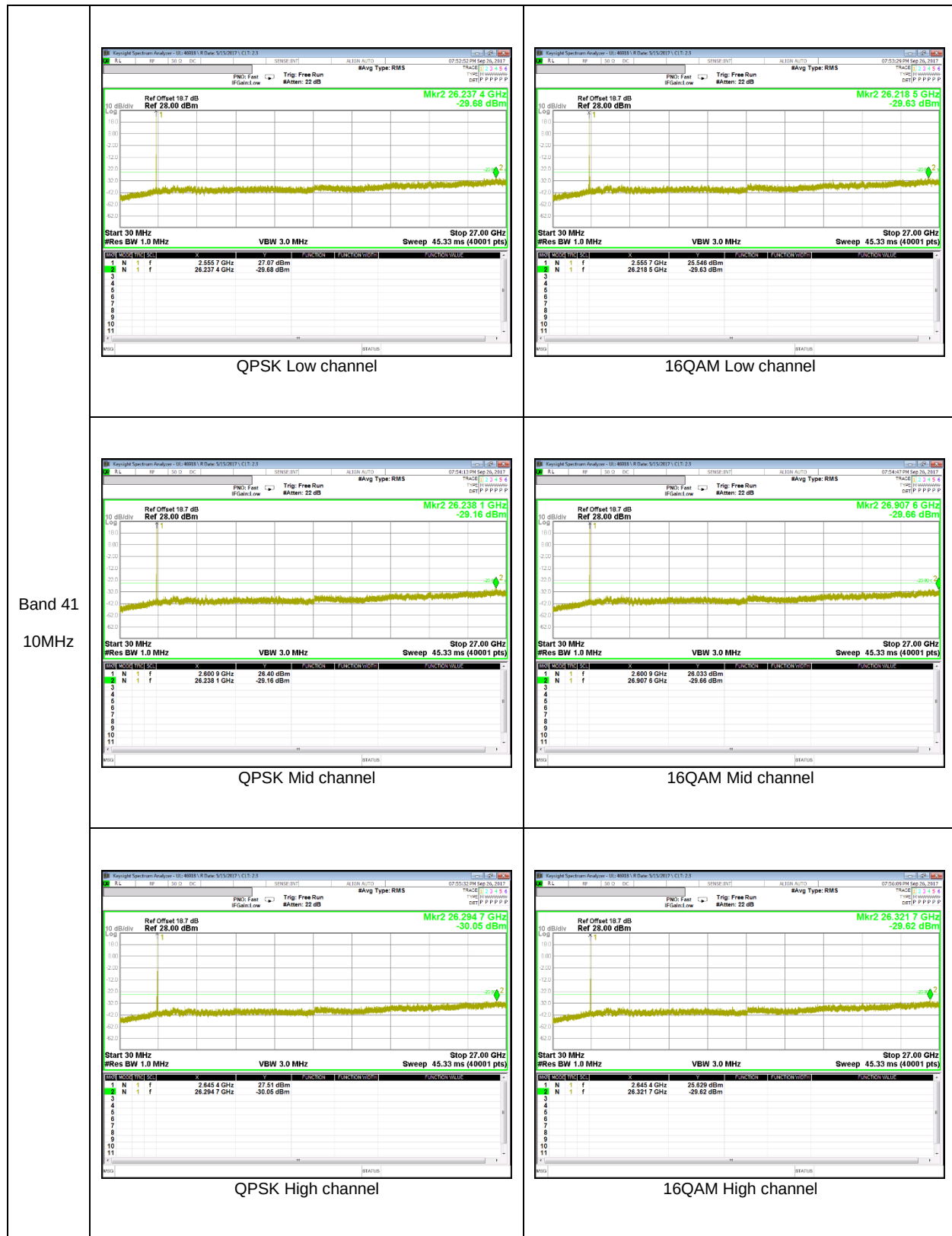


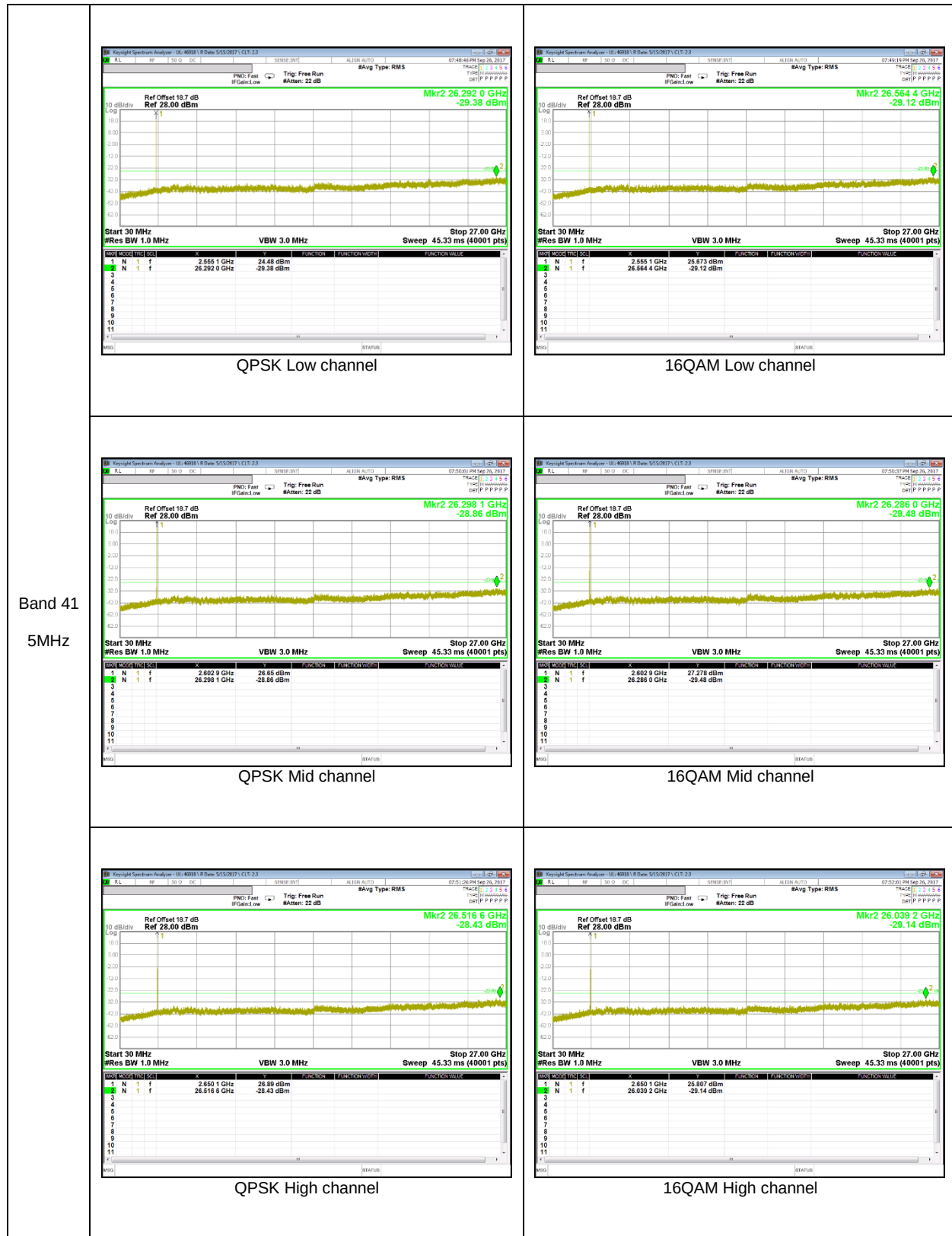


LTE Band 41









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 ± 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.

9.4.1. 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]
3.80	50	836.59997482	-0.003	2.5
3.80	40	836.59997559	-0.004	2.5
3.80	30	836.59997079	0.002	2.5
3.80	20	836.59997233	0	2.5
3.80	10	836.59997378	-0.002	2.5
3.80	0	836.59997579	-0.004	2.5
3.80	-10	836.59997701	-0.006	2.5
3.80	-20	836.59997824	-0.007	2.5
3.80	-30	836.59997763	-0.006	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]
3.80	20	836.59997233	0	2.5
4.20	20	836.59997353	-0.001	2.5
3.60	20	836.59997424	-0.002	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]
3.80	50	1879.99996594	0.005	2.5
3.80	40	1879.99997079	0.003	2.5
3.80	30	1879.99997612	0.000	2.5
3.80	20	1879.99997596	0	2.5
3.80	10	1879.99997638	0.000	2.5
3.80	0	1879.99997305	0.002	2.5
3.80	-10	1879.99997415	0.001	2.5
3.80	-20	1879.99997591	0.000	2.5
3.80	-30	1879.99997695	-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]
3.80	20	1879.99997596	0	2.5
4.20	20	1879.99997737	-0.001	2.5
3.60	20	1879.99997392	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]
3.80	50	836.59999366	0.002	2.5
3.80	40	836.59999486	0.001	2.5
3.80	30	836.59999307	0.003	2.5
3.80	20	836.59999556	0	2.5
3.80	10	836.59999510	0.001	2.5
3.80	0	836.59999461	0.001	2.5
3.80	-10	836.59999444	0.001	2.5
3.80	-20	836.59999501	0.001	2.5
3.80	-30	836.59999184	0.004	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]
3.80	20	836.59999556	0	2.5
4.20	20	836.59999632	-0.001	2.5
3.60	20	836.59999582	0.000	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]
3.80	50	1879.99998479	0.000	2.5
3.80	40	1879.99998249	0.002	2.5
3.80	30	1879.99998338	0.001	2.5
3.80	20	1879.99998554	0	2.5
3.80	10	1879.99998310	0.001	2.5
3.80	0	1879.99998101	0.002	2.5
3.80	-10	1879.99998197	0.002	2.5
3.80	-20	1879.99998735	-0.001	2.5
3.80	-30	1879.99998607	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]
3.80	20	1879.99998554	0	2.5
4.20	20	1879.99998335	0.001	2.5
3.60	20	1879.99998265	0.002	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]
3.80	50	836.49999428	0.000	2.5
3.80	40	836.49999464	0.000	2.5
3.80	30	836.49999458	0.000	2.5
3.80	20	836.49999426	0	2.5
3.80	10	836.49999457	0.000	2.5
3.80	0	836.49999485	-0.001	2.5
3.80	-10	836.49999505	-0.001	2.5
3.80	-20	836.49999564	-0.002	2.5
3.80	-30	836.49999545	-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]
3.80	20	836.49999426	0	2.5
4.20	20	836.49999489	-0.001	2.5
3.60	20	836.49999505	-0.001	2.5

LTE Band 7, Channel 21100, Frequency 2535.0 MHz

Reference Frequency: LTE Band 7 Mid Channel 2535 MHz @ 20°C				
Limit: +- 2.5 ppm = 6337.500 Hz				
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse		
		[MHz]	Delta [ppm]	Limit [ppm]
3.80	50	2535.00001054	-0.001	2.5
3.80	40	2535.00000900	0.000	2.5
3.80	30	2535.00000841	0.000	2.5
3.80	20	2535.00000775	0	2.5
3.80	10	2535.00001357	-0.002	2.5
3.80	0	2535.00000804	0.000	2.5
3.80	-10	2535.00000873	0.000	2.5
3.80	-20	2535.00000938	-0.001	2.5
3.80	-30	2535.00001059	-0.001	2.5

Reference Frequency: LTE Band 7 Mid Channel 2535 MHz @ 20°C				
Limit: +- 2.5 ppm = 6337.500 Hz				
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse		
		[MHz]	Delta [ppm]	Limit [ppm]
3.80	20	2535.00000775	0	2.5
4.20	20	2535.00000862	0.000	2.5
3.60	20	2535.00000791	0.000	2.5

LTE Band 41, Channel 40740, Frequency 2605.0 MHz

Reference Frequency: LTE Band 41 Mid Channel 2605 MHz @ 20°C				
Limit: +/- 2.5 ppm = 6512.500 Hz				
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse		
		[MHz]	Delta [ppm]	Limit [ppm]
3.80	50	2604.99996239	0.002	2.5
3.80	40	2604.99996055	0.002	2.5
3.80	30	2604.99996430	0.001	2.5
3.80	20	2604.99996635	0	2.5
3.80	10	2604.99996381	0.001	2.5
3.80	0	2604.99996316	0.001	2.5
3.80	-10	2604.99996637	0.000	2.5
3.80	-20	2604.99996691	0.000	2.5
3.80	-30	2604.99996478	0.001	2.5

Reference Frequency: LTE Band 41 Mid Channel 2605 MHz @ 20°C				
Limit: +/- 2.5 ppm = 6512.500 Hz				
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse		
		[MHz]	Delta [ppm]	Limit [ppm]
3.80	20	2604.99996635	0	2.5
4.20	20	2604.99996490	0.001	2.5
3.60	20	2604.99996320	0.001	2.5

LTE Band 38

Due to frequency range and same output power setting, test was carried in LTE Band 41 to cover both LTE Band 41 and LTE Band 38.

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(h) - (2) Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

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 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. (RBW/VBW are automatically set for LTE B41)

TEST RESULTS

10.1.1. ERP/EIRP Results

GSM

Band	Mode	Channel	f [MHz]	ERP / EIRP	
				[dBm]	[mW]
GSM850	GPRS	512	824.2	28.88	772.68
		661	836.6	29.88	972.75
		810	848.8	30.24	1056.82
	EGPRS	512	824.2	24.44	277.97
		661	836.6	25.60	363.08
		810	848.8	25.98	396.28
GSM1900	GPRS	512	1850.2	29.81	957.19
		661	1880.0	30.26	1061.70
		810	1909.8	28.81	760.33
	EGPRS	512	1850.2	27.28	534.56
		661	1880.0	27.46	557.19
		810	1909.8	26.05	402.72

WCDMA

Band	Mode	Channel	f [MHz]	ERP / EIRP	
				[dBm]	[mW]
Band 5	REL99	4132	826.4	19.72	93.76
		4183	836.6	20.43	110.41
		4233	846.6	20.45	110.92
	HSDPA	4132	826.4	19.51	89.33
		4183	836.6	20.51	112.46
		4233	846.6	20.71	117.76
Band 2	REL99	9262	1852.4	23.63	230.67
		9400	1880.0	24.00	251.19
		9538	1907.6	22.34	171.40
	HSDPA	9262	1852.4	23.70	234.42
		9400	1880.0	24.33	271.02
		9538	1907.6	22.96	197.70

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	18.95	78.52
			50/0	836.5	19.48	88.72
			50/0	844.0	19.78	95.06
		16QAM	50/0	829.0	17.83	60.67
			50/0	836.5	18.46	70.15
			50/0	844.0	18.68	73.79
	5	QPSK	25/0	826.5	18.01	63.24
			25/0	836.5	18.96	78.70
			25/0	846.5	18.66	73.45
		16QAM	25/0	826.5	16.85	48.42
			25/0	836.5	17.86	61.09
			25/0	846.5	18.09	64.42
	3	QPSK	15/0	825.5	17.85	60.95
			15/0	836.5	19.03	79.98
			15/0	847.5	18.34	68.23
		16QAM	15/0	825.5	16.68	46.56
			15/0	836.5	17.92	61.94
			15/0	847.5	17.72	59.16
	1.4	QPSK	6/0	824.7	15.79	37.93
			6/0	836.5	16.60	45.71
			6/0	848.3	16.50	44.67
		16QAM	6/0	824.7	14.75	29.85
			6/0	836.5	15.58	36.14
			6/0	848.3	15.92	39.08

LTE Band 7

Band	BW [MHz]	Mode	RB/RB Size	f [MHz]	ERP / EIRP	
			Full RB		[dBm]	[mW]
Band 7	20	QPSK	100/0	2510.0	17.59	57.41
			100/0	2535.0	19.03	79.98
			100/0	2560.0	18.14	65.16
		16QAM	100/0	2510.0	16.58	45.50
			100/0	2535.0	18.07	64.12
			100/0	2560.0	17.19	52.36
	15	QPSK	75/0	2507.5	17.91	61.80
			75/0	2535.0	17.77	59.84
			75/0	2562.5	17.52	56.49
		16QAM	75/0	2507.5	16.90	48.98
			75/0	2535.0	16.81	47.97
			75/0	2562.5	16.21	41.78
	10	QPSK	50/0	2505.0	18.61	72.61
			50/0	2535.0	19.13	81.85
			50/0	2565.0	18.07	64.12
		16QAM	50/0	2505.0	17.63	57.94
			50/0	2535.0	18.19	65.92
			50/0	2565.0	16.46	44.26
	5	QPSK	25/0	2502.5	16.37	43.35
			25/0	2535.0	18.37	68.71
			25/0	2567.5	17.74	59.43
		16QAM	25/0	2502.5	15.32	34.04
			25/0	2535.0	17.41	55.08
			25/0	2567.5	16.73	47.10

LTE Band 41

Band	BW [MHz]	Mode	RB/RB Size	f [MHz]	ERP / EIRP	
			Full RB		[dBm]	[mW]
Band 41	20	QPSK	100/0	2565.0	16.79	47.75
			100/0	2605.0	17.67	58.48
			100/0	2645.0	17.94	62.23
		16QAM	100/0	2565.0	15.86	38.55
			100/0	2605.0	16.80	47.86
			100/0	2645.0	17.07	50.93
	15	QPSK	75/0	2562.5	17.39	54.58
			75/0	2605.0	17.92	61.94
			75/0	2647.5	16.82	48.08
		16QAM	75/0	2562.5	16.49	44.57
			75/0	2605.0	17.02	50.35
			75/0	2647.5	15.89	38.82
	10	QPSK	50/0	2560.0	17.64	58.08
			50/0	2605.0	18.60	72.44
			50/0	2650.0	17.96	62.52
		16QAM	50/0	2560.0	16.72	46.99
			50/0	2605.0	17.88	61.38
			50/0	2650.0	17.07	50.93
	5	QPSK	25/0	2557.5	16.93	49.32
			25/0	2605.0	19.20	83.18
			25/0	2652.5	19.10	81.28
		16QAM	25/0	2557.5	16.06	40.36
			25/0	2605.0	18.41	69.34
			25/0	2652.5	18.08	64.27

LTE Band 38

Due to frequency range and same output power setting, test was carried in LTE Band 41 to cover both LTE Band 41 and LTE Band 38.

10.1.2. ERP/EIRP DATA

GSM 850

GSM GSM850 GPRS	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2								
	Company: Samsung Project #: 4788148881 Date: 09-20-17 Test Engineer: YH Lim Configuration: EUT ONLY, X Position Mode: GPRS 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.								
	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	25.14	V	1.1	-1.6	22.52	38.5	-15.9	
	824.20	31.50	H	1.1	-1.6	28.88	38.5	-9.6	
	Mid Ch								
	836.60	26.20	V	1.1	-1.4	23.71	38.5	-14.7	
	836.60	32.37	H	1.1	-1.4	29.88	38.5	-8.6	
	High Ch								
	848.80	25.89	V	1.1	-1.3	23.53	38.5	-14.9	
	848.80	32.60	H	1.1	-1.3	30.24	38.5	-8.2	
	Rev. 3.17.11 Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm								
GSM GSM850 EGPRS	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2								
	Company: Samsung Project #: 4788148881 Date: 09-20-17 Test Engineer: YH Lim Configuration: EUT ONLY, X Position Mode: EGPRS 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.								
	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	20.85	V	1.1	-1.6	18.23	38.5	-20.2	
	824.20	27.06	H	1.1	-1.6	24.44	38.5	-14.0	
	Mid Ch								
	836.60	21.55	V	1.1	-1.4	19.06	38.5	-19.4	
	836.60	28.09	H	1.1	-1.4	25.60	38.5	-12.9	
	High Ch								
	848.80	22.18	V	1.1	-1.3	19.82	38.5	-18.6	
	848.80	28.34	H	1.1	-1.3	25.98	38.5	-12.5	
	Rev. 3.17.11 Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm								

GSM 1900

GSM GSM1900 GPRS	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2																																																																																																	
	Company:		Samsung																																																																																															
	Project #:		4788148881																																																																																															
	Date:		09-13-17																																																																																															
	Test Engineer:		YH Lim																																																																																															
	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																																																																																																	
<table><tr><th>f GHz</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>17.6</td><td>V</td><td>1.60</td><td>8.80</td><td>24.76</td><td>33.0</td><td>-8.2</td><td></td></tr><tr><td>1850.20</td><td>22.6</td><td>H</td><td>1.60</td><td>8.80</td><td>29.81</td><td>33.0</td><td>-3.2</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>21.5</td><td>V</td><td>1.62</td><td>8.62</td><td>28.53</td><td>33.0</td><td>-4.5</td><td></td></tr><tr><td>1880.00</td><td>23.3</td><td>H</td><td>1.62</td><td>8.62</td><td>30.26</td><td>33.0</td><td>-2.7</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>20.3</td><td>V</td><td>1.63</td><td>8.44</td><td>27.06</td><td>33.0</td><td>-5.9</td><td></td></tr><tr><td>1909.80</td><td>22.0</td><td>H</td><td>1.63</td><td>8.44</td><td>28.81</td><td>33.0</td><td>-4.2</td><td></td></tr></table>									f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	Low Ch									1850.20	17.6	V	1.60	8.80	24.76	33.0	-8.2		1850.20	22.6	H	1.60	8.80	29.81	33.0	-3.2		Mid Ch									1880.00	21.5	V	1.62	8.62	28.53	33.0	-4.5		1880.00	23.3	H	1.62	8.62	30.26	33.0	-2.7		High Ch									1909.80	20.3	V	1.63	8.44	27.06	33.0	-5.9		1909.80	22.0	H	1.63	8.44	28.81	33.0	-4.2	
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes																																																																																										
Low Ch																																																																																																		
1850.20	17.6	V	1.60	8.80	24.76	33.0	-8.2																																																																																											
1850.20	22.6	H	1.60	8.80	29.81	33.0	-3.2																																																																																											
Mid Ch																																																																																																		
1880.00	21.5	V	1.62	8.62	28.53	33.0	-4.5																																																																																											
1880.00	23.3	H	1.62	8.62	30.26	33.0	-2.7																																																																																											
High Ch																																																																																																		
1909.80	20.3	V	1.63	8.44	27.06	33.0	-5.9																																																																																											
1909.80	22.0	H	1.63	8.44	28.81	33.0	-4.2																																																																																											
Rev. 3.17.11																																																																																																		

GSM GSM1900 EGPRS	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2																																																																																																	
	Company:		Samsung																																																																																															
	Project #:		4788148881																																																																																															
	Date:		09-13-17																																																																																															
	Test Engineer:		YH Lim																																																																																															
	Configuration:		EUT ONLY, Z Position																																																																																															
	Mode:		EGPRS 1900MHz																																																																																															
	Test Equipment:																																																																																																	
	Receiving: 3117[00168724] and Chamber 1 SMA Cables																																																																																																	
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f GHz	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	15.8	V	1.60	8.80	23.00	33.0	-10.0																																																																																											
1850.20	20.1	H	1.60	8.80	27.28	33.0	-5.7																																																																																											
Mid Ch																																																																																																		
1880.00	19.5	V	1.62	8.62	26.46	33.0	-6.5																																																																																											
1880.00	20.5	H	1.62	8.62	27.46	33.0	-5.5																																																																																											
High Ch																																																																																																		
1909.80	17.2	V	1.63	8.44	23.97	33.0	-9.0																																																																																											
1909.80	19.2	H	1.63	8.44	26.05	33.0	-6.9																																																																																											
Rev. 3.17.11																																																																																																		

WCDMA Band 5

WCDMA Band 5 REL99		High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2							
		Company: Samsung Project #: 4788148881 Date: 09-20-17 Test Engineer: YH Lim Configuration: EUT ONLY, X Position 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.							
		f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	ERP	Limit	Notes
		MHz	(dBm)	(H/V)	(dB)	(dBd)	(dBm)	(dBm)	(dB)
		Low Ch							
		826.40	15.39	V	1.1	-1.5	12.78	38.5	-25.7
		826.40	22.33	H	1.1	-1.5	19.72	38.5	-18.7
		Mid Ch							
		836.60	15.96	V	1.1	-1.4	13.47	38.5	-25.0
		836.60	22.92	H	1.1	-1.4	20.43	38.5	-18.0
		High Ch							
		846.60	16.17	V	1.1	-1.3	13.79	38.5	-24.7
		846.60	22.83	H	1.1	-1.3	20.45	38.5	-18.0
		Rev. 3.17.11							
WCDMA Band 5 HSDPA		High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2							
		Company: Samsung Project #: 4788148881 Date: 09-20-17 Test Engineer: YH Lim Configuration: EUT ONLY, X Position 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.							
		f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	ERP	Limit	Notes
		MHz	(dBm)	(H/V)	(dB)	(dBd)	(dBm)	(dBm)	(dB)
		Low Ch							
		826.40	15.14	V	1.1	-1.5	12.53	38.5	-25.9
		826.40	22.12	H	1.1	-1.5	19.51	38.5	-18.9
		Mid Ch							
		836.60	15.22	V	1.1	-1.4	12.73	38.5	-25.7
		836.60	23.00	H	1.1	-1.4	20.51	38.5	-17.9
		High Ch							
		846.60	15.63	V	1.1	-1.3	13.25	38.5	-25.2
		846.60	23.09	H	1.1	-1.3	20.71	38.5	-17.7
		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 #: 4788148881 Date: 09-14-17 Test Engineer: JH Park Configuration: EUT ONLY, Z Position Mode: REL99_1900 MHz								
	Test Equipment: Receiving: 3117[00168724] and Chamber 1 SMA Cables Substitution: 3115[00161451] Substitution, 3m SMA Cable Ware house								
	f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	EIRP	Limit	Margin	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBi)	(dBm)	(dBm)	(dB)	
	Low Ch								
	1852.40	15.88	V	1.60	8.79	23.07	33.0	-9.9	
	1852.40	16.44	H	1.60	8.79	23.63	33.0	-9.4	
	Mid Ch								
	1880.00	15.45	V	1.62	8.62	22.45	33.0	-10.5	
	1880.00	17.00	H	1.62	8.62	24.00	33.0	-9.0	
	High Ch								
	1907.60	15.31	V	1.63	8.45	22.13	33.0	-10.9	
	1907.60	15.52	H	1.63	8.45	22.34	33.0	-10.7	
	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 #: 4788148881 Date: 09-14-17 Test Engineer: JH Park Configuration: EUT ONLY, Z Position Mode: HSDPA_1900 MHz								
	Test Equipment: Receiving: 3117[00168724] and Chamber 1 SMA Cables Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse								
	f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	EIRP	Limit	Margin	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBi)	(dBm)	(dBm)	(dB)	
	Low Ch								
	1852.40	15.99	V	1.60	8.79	23.18	33.0	-9.8	
	1852.40	16.51	H	1.60	8.79	23.70	33.0	-9.3	
	Mid Ch								
	1880.00	15.91	V	1.62	8.62	22.91	33.0	-10.1	
	1880.00	17.33	H	1.62	8.62	24.33	33.0	-8.7	
	High Ch								
	1907.60	15.77	V	1.63	8.45	22.59	33.0	-10.4	
	1907.60	16.14	H	1.63	8.45	22.96	33.0	-10.0	
	Rev. 3.17.11 Note: For Band 4 EIRP limit is 30dBm								

LTE Band 5

LTE Band 5 10MHz QPSK	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2								
	Company: Samsung Project #: 4788148881 Date: 09-20-17 Test Engineer: YH Lim 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	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	ERP	Limit	Margin	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBd)	(dBm)	(dBm)	(dB)	
	Low Ch								
	829.00	14.70	V	1.1	-1.5	12.12	38.5	-26.3	
	829.00	21.53	H	1.1	-1.5	18.95	38.5	-19.5	
	Mid Ch								
	836.50	14.87	V	1.1	-1.4	12.38	38.5	-26.1	
	836.50	21.97	H	1.1	-1.4	19.48	38.5	-19.0	
	High Ch								
	844.00	14.26	V	1.1	-1.3	11.87	38.5	-26.6	
	844.00	22.20	H	1.1	-1.3	19.78	38.5	-18.7	
	Rev. 3.17.11 Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm								
LTE Band 5 10MHz 16QAM	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2								
	Company: Samsung Project #: 4788148881 Date: 09-20-17 Test Engineer: YH Lim 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	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	ERP	Limit	Margin	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBd)	(dBm)	(dBm)	(dB)	
	Low Ch								
	829.00	13.64	V	1.1	-1.5	11.06	38.5	-27.4	
	829.00	20.41	H	1.1	-1.5	17.83	38.5	-20.6	
	Mid Ch								
	836.50	13.81	V	1.1	-1.4	11.30	38.5	-27.1	
	836.50	20.97	H	1.1	-1.4	18.46	38.5	-20.0	
	High Ch								
	844.00	13.19	V	1.1	-1.3	10.77	38.5	-27.7	
	844.00	21.10	H	1.1	-1.3	18.68	38.5	-19.8	
	Rev. 3.17.11 Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm								

LTE Band 5 5MHz QPSK	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2 Company: Samsung Project #: 4788148881 Date: 09-20-17 Test Engineer: YH Lim 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	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	ERP	Limit	Margin	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBd)	(dBm)	(dBm)	(dB)	
	Low Ch								
	826.50	14.10	V	1.1	-1.5	11.50	38.5	-27.0	
	826.50	20.61	H	1.1	-1.5	18.01	38.5	-20.4	
	Mid Ch								
	836.50	14.70	V	1.1	-1.4	12.21	38.5	-26.2	
	836.50	21.45	H	1.1	-1.4	18.96	38.5	-19.5	
	High Ch								
	846.50	14.31	V	1.6	-1.3	11.43	38.5	-27.0	
	846.50	21.54	H	1.6	-1.3	18.66	38.5	-19.8	
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	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2 Company: Samsung Project #: 4788148881 Date: 09-20-17 Test Engineer: YH Lim 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	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	ERP	Limit	Margin	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBd)	(dBm)	(dBm)	(dB)	
	Low Ch								
	826.50	13.00	V	1.1	-1.5	10.40	38.5	-28.1	
	826.50	19.45	H	1.1	-1.5	16.85	38.5	-21.6	
	Mid Ch								
	836.50	13.52	V	1.1	-1.4	11.03	38.5	-27.4	
	836.50	20.35	H	1.1	-1.4	17.86	38.5	-20.6	
	High Ch								
	846.50	13.18	V	1.1	-1.3	10.80	38.5	-27.7	
	846.50	20.47	H	1.1	-1.3	18.09	38.5	-20.4	
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 Project #: 4788148881 Date: 09-20-17 Test Engineer: YH Lim Configuration: EUT ONLY, X Position Mode: LTE5 3MHz 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	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	ERP	Limit	Margin	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBd)	(dBm)	(dBm)	(dB)	
	Low Ch								
	825.50	13.28	V	1.1	-1.5	10.68	38.5	-27.8	
	825.50	20.45	H	1.1	-1.5	17.85	38.5	-20.6	
	Mid Ch								
	836.50	14.05	V	1.1	-1.4	11.56	38.5	-26.9	
	836.50	21.52	H	1.1	-1.4	19.03	38.5	-19.4	
	High Ch								
	847.50	14.15	V	1.6	-1.3	11.27	38.5	-27.2	
	847.50	21.22	H	1.6	-1.3	18.34	38.5	-20.1	
Rev. 3.17.11 Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm									
LTE Band 5 3MHz 16QAM	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2 Company: Samsung Project #: 4788148881 Date: 09-20-17 Test Engineer: YH Lim Configuration: EUT ONLY, X Position Mode: LTE5 3MHz 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	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	ERP	Limit	Margin	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBd)	(dBm)	(dBm)	(dB)	
	Low Ch								
	825.50	12.15	V	1.1	-1.5	9.55	38.5	-28.9	
	825.50	19.28	H	1.1	-1.5	16.68	38.5	-21.8	
	Mid Ch								
	836.50	12.95	V	1.1	-1.4	10.46	38.5	-28.0	
	836.50	20.41	H	1.1	-1.4	17.92	38.5	-20.5	
	High Ch								
	847.50	13.02	V	1.1	-1.3	10.64	38.5	-27.8	
	847.50	20.10	H	1.1	-1.3	17.72	38.5	-20.7	
Rev. 3.17.11 Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm									

LTE Band 5 1.4MHz QPSK	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2 Company: Samsung Project #: 4788148881 Date: 09-20-17 Test Engineer: YH Lim Configuration: EUT ONLY, X Position Mode: LTE5 1.4MHz 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	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	11.21	V	1.1	-1.5	8.61	38.5	-29.8	
	824.70	18.39	H	1.1	-1.5	15.79	38.5	-22.7	
	Mid Ch								
	836.50	11.95	V	1.1	-1.4	9.46	38.5	-29.0	
	836.50	19.09	H	1.1	-1.4	16.60	38.5	-21.9	
	High Ch								
	848.30	11.86	V	1.6	-1.3	8.98	38.5	-29.5	
	848.30	19.38	H	1.6	-1.3	16.50	38.5	-21.9	
Rev. 3.17.11 Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm									
LTE Band 5 1.4MHz 16QAM	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2 Company: Samsung Project #: 4788148881 Date: 09-20-17 Test Engineer: YH Lim Configuration: EUT ONLY, X Position Mode: LTE5 1.4MHz 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	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	10.12	V	1.1	-1.5	7.52	38.5	-30.9	
	824.70	17.35	H	1.1	-1.5	14.75	38.5	-23.7	
	Mid Ch								
	836.50	10.87	V	1.1	-1.4	8.38	38.5	-30.1	
	836.50	18.07	H	1.1	-1.4	15.58	38.5	-22.9	
	High Ch								
	848.30	10.73	V	1.1	-1.3	8.35	38.5	-30.1	
	848.30	18.30	H	1.1	-1.3	15.92	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 7

LTE Band 7 20MHz QPSK	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2								
	Company: Samsung Project #: 4788148881 Date: 09-15-17 Test Engineer: JH Park Configuration: EUT / Z-Position Mode: LTE Band 7, QPSK, 20MHz								
	Test Equipment: Receiving: 3117[00168724] and Chamber 1 SMA Cables Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse								
	f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	EIRP	Limit	Margin	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBi)	(dBm)	(dBm)	(dB)	
	Low Ch								
	2510.00	8.93	V	1.9	9.1	16.19	33.0	-16.8	
	2510.00	10.33	H	1.9	9.1	17.59	33.0	-15.4	
	Mid Ch								
	2535.00	8.46	V	1.9	10.4	16.95	33.0	-16.1	
	2535.00	10.54	H	1.9	10.4	19.03	33.0	-14.0	
	High Ch								
	2560.00	8.13	V	1.9	10.3	16.57	33.0	-16.4	
	2560.00	9.70	H	1.9	10.3	18.14	33.0	-14.9	
	Rev. 3.17.11 Note: For Band 4 EIRP limit is 30dBm								
LTE Band 7 20MHz 16QAM	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2								
	Company: Samsung Project #: 4788148881 Date: 09-15-17 Test Engineer: JH Park Configuration: EUT / Z-Position Mode: LTE Band 7, 16QAM, 20MHz								
	Test Equipment: Receiving: 3117[00168724] and Chamber 1 SMA Cables Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse								
	f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	EIRP	Limit	Margin	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBi)	(dBm)	(dBm)	(dB)	
	Low Ch								
	2510.00	7.98	V	1.9	9.1	15.24	33.0	-17.8	
	2510.00	9.32	H	1.9	9.1	16.58	33.0	-16.4	
	Mid Ch								
	2535.00	7.51	V	1.9	10.4	16.00	33.0	-17.0	
	2535.00	9.58	H	1.9	10.4	18.07	33.0	-14.9	
	High Ch								
	2560.00	7.18	V	1.9	10.3	15.62	33.0	-17.4	
	2560.00	8.75	H	1.9	10.3	17.19	33.0	-15.8	
	Rev. 3.17.11 Note: For Band 4 EIRP limit is 30dBm								

LTE Band 7 15MHz QPSK	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2 Company: Samsung Project #: 4788148881 Date: 09-14-17 Test Engineer: JH Park Configuration: EUT / Z-Position Mode: LTE Band 7, QPSK, 15MHz Test Equipment: Receiving: 3117[00168724] and Chamber 1 SMA Cables Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse								
	f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	EIRP	Limit	Margin	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBi)	(dBm)	(dBm)	(dB)	
	Low Ch								
	2507.50	8.74	V	1.9	9.1	16.00	33.0	-17.0	
	2507.50	10.65	H	1.9	9.1	17.91	33.0	-15.1	
	Mid Ch								
	2535.00	9.28	V	1.9	10.4	17.77	33.0	-15.2	
	2535.00	7.61	H	1.9	10.4	16.10	33.0	-16.9	
	High Ch								
	2562.50	9.08	V	1.9	10.3	17.52	33.0	-15.5	
	2562.50	8.76	H	1.9	10.3	17.20	33.0	-15.8	
	Rev. 3.17.11 Note: For Band 4 EIRP limit is 30dBm								
LTE Band 7 15MHz 16QAM	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2 Company: Samsung Project #: 4788148881 Date: 09-14-17 Test Engineer: JH Park Configuration: EUT / Z-Position Mode: LTE Band 7, 16QAM, 15MHz Test Equipment: Receiving: 3117[00168724] and Chamber 1 SMA Cables Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse								
	f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	EIRP	Limit	Margin	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBi)	(dBm)	(dBm)	(dB)	
	Low Ch								
	2507.50	7.76	V	1.9	9.1	15.02	33.0	-18.0	
	2507.50	9.64	H	1.9	9.1	16.90	33.0	-16.1	
	Mid Ch								
	2535.00	8.32	V	1.9	10.4	16.81	33.0	-16.2	
	2535.00	6.62	H	1.9	10.4	15.11	33.0	-17.9	
	High Ch								
	2562.50	7.63	V	1.9	10.3	16.07	33.0	-16.9	
	2562.50	7.77	H	1.9	10.3	16.21	33.0	-16.8	
	Rev. 3.17.11 Note: For Band 4 EIRP limit is 30dBm								

LTE Band 7 10MHz QPSK	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2								
	Company: Samsung Project #: 4788148881 Date: 09-14-17 Test Engineer: JH Park Configuration: EUT / Z-Position Mode: LTE Band 7, QPSK, 10MHz								
	Test Equipment: Receiving: 3117[00168724] and Chamber 1 SMA Cables Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse								
	f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	EIRP	Limit	Margin	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBi)	(dBm)	(dBm)	(dB)	
	Low Ch								
	2505.00	9.55	V	1.9	9.1	16.81	33.0	-16.2	
	2505.00	11.35	H	1.9	9.1	18.61	33.0	-14.4	
	Mid Ch								
	2535.00	8.19	V	1.9	10.4	16.68	33.0	-16.3	
	2535.00	10.64	H	1.9	10.4	19.13	33.0	-13.9	
	High Ch								
	2565.00	9.63	V	1.9	10.3	18.07	33.0	-14.9	
	2565.00	9.02	H	1.9	10.3	17.46	33.0	-15.5	
	Rev. 3.17.11 Note: For Band 4 EIRP limit is 30dBm								
LTE Band 7 10MHz 16QAM	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2								
	Company: Samsung Project #: 4788148881 Date: 09-14-17 Test Engineer: JH Park Configuration: EUT / Z-Position Mode: LTE Band 7 16QAM, 10MHz								
	Test Equipment: Receiving: 3117[00168724] and Chamber 1 SMA Cables Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse								
	f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	EIRP	Limit	Margin	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBi)	(dBm)	(dBm)	(dB)	
	Low Ch								
	2505.00	8.54	V	1.9	9.1	15.80	33.0	-17.2	
	2505.00	10.37	H	1.9	9.1	17.63	33.0	-15.4	
	Mid Ch								
	2535.00	7.25	V	1.9	10.4	15.74	33.0	-17.3	
	2535.00	9.70	H	1.9	10.4	18.19	33.0	-14.8	
	High Ch								
	2565.00	8.67	V	1.9	10.3	17.11	33.0	-15.9	
	2565.00	8.02	H	1.9	10.3	16.46	33.0	-16.5	
	Rev. 3.17.11 Note: For Band 4 EIRP limit is 30dBm								

LTE Band 7 5MHz QPSK	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2								
	Company: Samsung Project #: 4788148881 Date: 09-14-17 Test Engineer: JH Park Configuration: EUT / Z-Position Mode: LTE Band 7, QPSK , 5MHz								
	Test Equipment: Receiving: 3117[00168724] and Chamber 1 SMA Cables Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse								
	f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	EIRP	Limit	Margin	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBi)	(dBm)	(dBm)	(dB)	
	Low Ch								
	2502.50	8.04	V	1.9	9.1	15.30	33.0	-17.7	
	2502.50	9.11	H	1.9	9.1	16.37	33.0	-16.6	
	Mid Ch								
	2535.00	8.70	V	1.9	10.4	17.19	33.0	-15.8	
	2535.00	9.88	H	1.9	10.4	18.37	33.0	-14.6	
	High Ch								
	2567.50	9.28	V	1.9	10.3	17.72	33.0	-15.3	
	2567.50	9.30	H	1.9	10.3	17.74	33.0	-15.3	
	Rev. 3.17.11 Note: For Band 4 EIRP limit is 30dBm								
LTE Band 7 5MHz 16QAM	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2								
	Company: Samsung Project #: 4788148881 Date: 09-14-17 Test Engineer: JH Park Configuration: EUT / Z-Position Mode: LTE Band 7 16QAM, 5MHz								
	Test Equipment: Receiving: 3117[00168724] and Chamber 1 SMA Cables Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse								
	f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	EIRP	Limit	Margin	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBi)	(dBm)	(dBm)	(dB)	
	Low Ch								
	2502.50	6.96	V	1.9	9.1	14.22	33.0	-18.8	
	2502.50	8.06	H	1.9	9.1	15.32	33.0	-17.7	
	Mid Ch								
	2535.00	7.70	V	1.9	10.4	16.19	33.0	-16.8	
	2535.00	8.92	H	1.9	10.4	17.41	33.0	-15.6	
	High Ch								
	2567.50	8.25	V	1.9	10.3	16.69	33.0	-16.3	
	2567.50	8.29	H	1.9	10.3	16.73	33.0	-16.3	
	Rev. 3.17.11 Note: For Band 4 EIRP limit is 30dBm								

LTE Band 41

LTE Band 41 20MHz QPSK	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2								
	Company: Samsung Project #: 4788148881 Date: 09-18-17 Test Engineer: JH Park Configuration: EUT / Z-Position Mode: LTE Band 41, QPSK, 20MHz								
	Test Equipment: Receiving: 3117[00168724] and Chamber 1 SMA Cables Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse								
	f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	EIRP	Limit	Margin	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBi)	(dBm)	(dBm)	(dB)	
	Low Ch								
	2565.00	9.53	V	1.9	9.1	16.79	33.0	-16.2	
	2565.00	8.62	H	1.9	9.1	15.88	33.0	-17.1	
	Mid Ch								
	2605.00	9.18	V	1.9	10.4	17.67	33.0	-15.3	
	2605.00	8.89	H	1.9	10.4	17.38	33.0	-15.6	
	High Ch								
	2645.00	9.50	V	1.9	10.3	17.94	33.0	-15.1	
	2645.00	8.62	H	1.9	10.3	17.06	33.0	-15.9	
	Rev. 3.17.11 Note: For Band 4 EIRP limit is 30dBm								
LTE Band 41 20MHz 16QAM	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2								
	Company: Samsung Project #: 4788148881 Date: 09-18-17 Test Engineer: JH Park Configuration: EUT / Z-Position Mode: LTE Band 41, 16QAM, 20MHz								
	Test Equipment: Receiving: 3117[00168724] and Chamber 1 SMA Cables Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse								
	f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	EIRP	Limit	Margin	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBi)	(dBm)	(dBm)	(dB)	
	Low Ch								
	2565.00	8.60	V	1.9	9.1	15.86	33.0	-17.1	
	2565.00	7.68	H	1.9	9.1	14.94	33.0	-18.1	
	Mid Ch								
	2605.00	8.31	V	1.9	10.4	16.80	33.0	-16.2	
	2605.00	7.99	H	1.9	10.4	16.48	33.0	-16.5	
	High Ch								
	2645.00	8.63	V	1.9	10.3	17.07	33.0	-15.9	
	2645.00	7.74	H	1.9	10.3	16.18	33.0	-16.8	
	Rev. 3.17.11 Note: For Band 4 EIRP limit is 30dBm								

LTE Band 41 15MHz QPSK	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2								
	Company: Samsung Project #: 4788148881 Date: 09-18-17 Test Engineer: JH Park Configuration: EUT / Z-Position Mode: LTE Band 41, QPSK, 15MHz								
	Test Equipment: Receiving: 3117[00168724] and Chamber 1 SMA Cables Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse								
	f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	EIRP	Limit	Margin	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBi)	(dBm)	(dBm)	(dB)	
	Low Ch								
	2562.50	8.40	V	1.9	9.1	15.66	33.0	-17.3	
	2562.50	10.13	H	1.9	9.1	17.39	33.0	-15.6	
	Mid Ch								
	2605.00	9.43	V	1.9	10.4	17.92	33.0	-15.1	
	2605.00	8.94	H	1.9	10.4	17.43	33.0	-15.6	
	High Ch								
	2647.50	8.23	V	1.9	10.3	16.67	33.0	-16.3	
	2647.50	8.38	H	1.9	10.3	16.82	33.0	-16.2	
	Rev. 3.17.11 Note: For Band 4 EIRP limit is 30dBm								
LTE Band 41 15MHz 16QAM	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2								
	Company: Samsung Project #: 4788148881 Date: 09-18-17 Test Engineer: JH Park Configuration: EUT / Z-Position Mode: LTE Band 41, 16QAM, 15MHz								
	Test Equipment: Receiving: 3117[00168724] and Chamber 1 SMA Cables Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse								
	f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	EIRP	Limit	Margin	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBi)	(dBm)	(dBm)	(dB)	
	Low Ch								
	2562.50	7.45	V	1.9	9.1	14.71	33.0	-18.3	
	2562.50	9.23	H	1.9	9.1	16.49	33.0	-16.5	
	Mid Ch								
	2605.00	8.53	V	1.9	10.4	17.02	33.0	-16.0	
	2605.00	8.03	H	1.9	10.4	16.52	33.0	-16.5	
	High Ch								
	2647.50	7.31	V	1.9	10.3	15.75	33.0	-17.2	
	2647.50	7.45	H	1.9	10.3	15.89	33.0	-17.1	
	Rev. 3.17.11 Note: For Band 4 EIRP limit is 30dBm								

LTE Band 41 10MHz QPSK	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2								
	Company: Samsung Project #: 4788148881 Date: 09-18-17 Test Engineer: JH Park Configuration: EUT / Z-Position Mode: LTE Band 41, QPSK, 10MHz								
	Test Equipment: Receiving: 3117[00168724] and Chamber 1 SMA Cables Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse								
	f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	EIRP	Limit	Margin	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBi)	(dBm)	(dBm)	(dB)	
	Low Ch								
	2560.00	9.67	V	1.9	9.1	16.93	33.0	-16.1	
	2560.00	10.38	H	1.9	9.1	17.64	33.0	-15.4	
	Mid Ch								
	2605.00	9.85	V	1.9	10.4	18.34	33.0	-14.7	
	2605.00	10.11	H	1.9	10.4	18.60	33.0	-14.4	
	High Ch								
	2650.00	8.62	V	1.9	10.3	17.06	33.0	-15.9	
	2650.00	9.52	H	1.9	10.3	17.96	33.0	-15.0	
	Rev. 3.17.11 Note: For Band 4 EIRP limit is 30dBm								
LTE Band 41 10MHz 16QAM	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2								
	Company: Samsung Project #: 4788148881 Date: 09-18-17 Test Engineer: JH Park Configuration: EUT / Z-Position Mode: LTE Band 41 16QAM, 10MHz								
	Test Equipment: Receiving: 3117[00168724] and Chamber 1 SMA Cables Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse								
	f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	EIRP	Limit	Margin	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBi)	(dBm)	(dBm)	(dB)	
	Low Ch								
	2560.00	8.72	V	1.9	9.1	15.98	33.0	-17.0	
	2560.00	9.46	H	1.9	9.1	16.72	33.0	-16.3	
	Mid Ch								
	2605.00	8.85	V	1.9	10.4	17.34	33.0	-15.7	
	2605.00	9.39	H	1.9	10.4	17.88	33.0	-15.1	
	High Ch								
	2650.00	7.69	V	1.9	10.3	16.13	33.0	-16.9	
	2650.00	8.63	H	1.9	10.3	17.07	33.0	-15.9	
	Rev. 3.17.11 Note: For Band 4 EIRP limit is 30dBm								

LTE Band 41 5MHz QPSK	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2								
	Company: Samsung Project #: 4788148881 Date: 09-18-17 Test Engineer: JH Park Configuration: EUT / Z-Position Mode: LTE Band 41, QPSK , 5MHz								
	Test Equipment: Receiving: 3117[00168724] and Chamber 1 SMA Cables Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse								
	f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	EIRP	Limit	Margin	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBi)	(dBm)	(dBm)	(dB)	
	Low Ch								
	2557.50	7.58	V	1.9	9.1	14.84	33.0	-18.2	
	2557.50	9.67	H	1.9	9.1	16.93	33.0	-16.1	
	Mid Ch								
	2605.00	6.49	V	1.9	10.4	14.98	33.0	-18.0	
	2605.00	10.71	H	1.9	10.4	19.20	33.0	-13.8	
	High Ch								
	2652.50	4.17	V	1.9	10.3	12.61	33.0	-20.4	
	2652.50	10.66	H	1.9	10.3	19.10	33.0	-13.9	
	Rev. 3.17.11 Note: For Band 4 EIRP limit is 30dBm								
LTE Band 41 5MHz 16QAM	High Frequency Substitution Measurement UL Korea, Ltd. Suwon Laboratory Chamber 2								
	Company: Samsung Project #: 4788148881 Date: 09-18-17 Test Engineer: JH Park Configuration: EUT / Z-Position Mode: LTE Band 41 16QAM, 5MHz								
	Test Equipment: Receiving: 3117[00168724] and Chamber 1 SMA Cables Substitution: 3115[00161451] Substitution, 3m SMA Cable Warehouse								
	f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	EIRP	Limit	Margin	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBi)	(dBm)	(dBm)	(dB)	
	Low Ch								
	2557.50	6.69	V	1.9	9.1	13.95	33.0	-19.1	
	2557.50	8.80	H	1.9	9.1	16.06	33.0	-16.9	
	Mid Ch								
	2605.00	5.53	V	1.9	10.4	14.02	33.0	-19.0	
	2605.00	9.92	H	1.9	10.4	18.41	33.0	-14.6	
	High Ch								
	2652.50	3.12	V	1.9	10.3	11.56	33.0	-21.4	
	2652.50	9.64	H	1.9	10.3	18.08	33.0	-14.9	
	Rev. 3.17.11 Note: For Band 4 EIRP limit is 30dBm								

10.2. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053, §22.917, §24.238 and §27. 53

LIMIT

Part 22.917(a) & Part 24.238(a) & Part 27.53(g) The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB.

Part 27: (m)(4) For mobile station, the attenuation factor shall be not less than $43 + 10 \log (P)$ dB at the channel edge and $(55 + 10 \log (P))$ dB at the 5.5 MHz from the channel edges.

TEST PROCEDURE

ANSI / TIA / EIA 603E 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;
- f) Ensure that the number of measurement points $\geq$ span/RBW;
- g) Trace mode = max hold;

RESULTS

10.2.1. SPURIOUS RADIATION PLOTS

GSM 850

GSM

GSM850

GPRS

UL Korea, Ltd Suwon Laboratory

Above 1GHz High Frequency Substitution Measurement

Company: Samsung

Project #: 4788148881

Date: 09-20-17

Test Engineer: YH Lim

Configuration: EUT / AC Adapter / Earphone, XPosition

Mode: GPRS 850 MHz

Chamber

Chamber 2

Pre-amplifier

AFS42

Filter

Filter 1

Limit

Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 824.2MHz									
1.6484	-13.6	V	3.0	38.2	1.0	-50.9	-13.0	-37.9	
2.4726	-13.0	V	3.0	38.8	1.0	-50.8	-13.0	-37.8	
3.2968	-14.7	V	3.0	39.4	1.0	-53.1	-13.0	-40.1	
1.6484	-6.7	H	3.0	38.2	1.0	-43.9	-13.0	-30.9	
2.4726	-9.0	H	3.0	38.8	1.0	-46.8	-13.0	-33.8	
3.2968	-14.7	H	3.0	39.4	1.0	-53.1	-13.0	-40.1	
Mid Ch, 836.6MHz									
1.6730	-9.1	V	3.0	38.2	1.0	-46.3	-13.0	-33.3	
2.5098	-10.2	V	3.0	38.8	1.0	-48.0	-13.0	-35.0	
3.3464	-13.5	V	3.0	39.5	1.0	-52.0	-13.0	-39.0	
1.6730	-3.3	H	3.0	38.2	1.0	-40.5	-13.0	-27.5	
2.5098	-6.7	H	3.0	38.8	1.0	-44.6	-13.0	-31.6	
3.3464	-14.3	H	3.0	39.5	1.0	-52.7	-13.0	-39.7	
High Ch, 848.8MHz									
1.6976	-7.3	V	3.0	38.2	1.0	-44.6	-13.0	-31.6	
2.5466	-9.5	V	3.0	38.9	1.0	-47.3	-13.0	-34.3	
3.3952	-12.3	V	3.0	39.5	1.0	-50.8	-13.0	-37.8	
1.6976	0.7	H	3.0	38.2	1.0	-36.6	-13.0	-23.6	
2.5466	-5.1	H	3.0	38.9	1.0	-42.9	-13.0	-29.9	
3.3952	-14.2	H	3.0	39.5	1.0	-52.7	-13.0	-39.7	

Rev. 03.03.09

Note: No other emissions were detected above the system noise floor.

GSM

GSM850

EGPRS

UL Korea, Ltd Suwon Laboratory

Above 1GHz High Frequency Substitution Measurement

Company: Samsung

Project #: 4788148881

Date: 09-20-17

Test Engineer: YH Lim

Configuration: EUT / AC Adapter / Earphone, XPosition

Mode: EGPRS 850 MHz

Chamber

Chamber 2

Pre-amplifier

AFS42

Filter

Filter 1

Limit

Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 824.2MHz									
1.6484	-17.1	V	3.0	38.2	1.0	-54.4	-13.0	-41.4	
2.4726	-15.9	V	3.0	38.8	1.0	-53.7	-13.0	-40.7	
3.2968	-15.0	V	3.0	39.4	1.0	-53.4	-13.0	-40.4	
1.6484	-14.4	H	3.0	38.2	1.0	-51.6	-13.0	-38.6	
2.4726	-13.1	H	3.0	38.8	1.0	-50.9	-13.0	-37.9	
3.2968	-15.0	H	3.0	39.4	1.0	-53.4	-13.0	-40.4	
Mid Ch, 836.6MHz									
1.6730	-12.2	V	3.0	38.2	1.0	-49.5	-13.0	-36.5	
2.5098	-13.4	V	3.0	38.8	1.0	-51.2	-13.0	-38.2	
3.3464	-15.2	V	3.0	39.5	1.0	-53.6	-13.0	-40.6	
1.6730	-9.8	H	3.0	38.2	1.0	-47.0	-13.0	-34.0	
2.5098	-11.4	H	3.0	38.8	1.0	-49.3	-13.0	-36.3	
3.3464	-14.7	H	3.0	39.5	1.0	-53.2	-13.0	-40.2	
High Ch, 848.8MHz									
1.6976	-10.4	V	3.0	38.2	1.0	-47.6	-13.0	-34.6	
2.5466	-13.6	V	3.0	38.9	1.0	-51.5	-13.0	-38.5	
3.3952	-14.5	V	3.0	39.5	1.0	-53.0	-13.0	-40.0	
1.6976	-4.5	H	3.0	38.2	1.0	-41.7	-13.0	-28.7	
2.5466	-9.8	H	3.0	38.9	1.0	-47.7	-13.0	-34.7	
3.3952	-14.2	H	3.0	39.5	1.0	-52.7	-13.0	-39.7	

Rev. 03.03.09

Note: No other emissions were detected above the system noise floor.