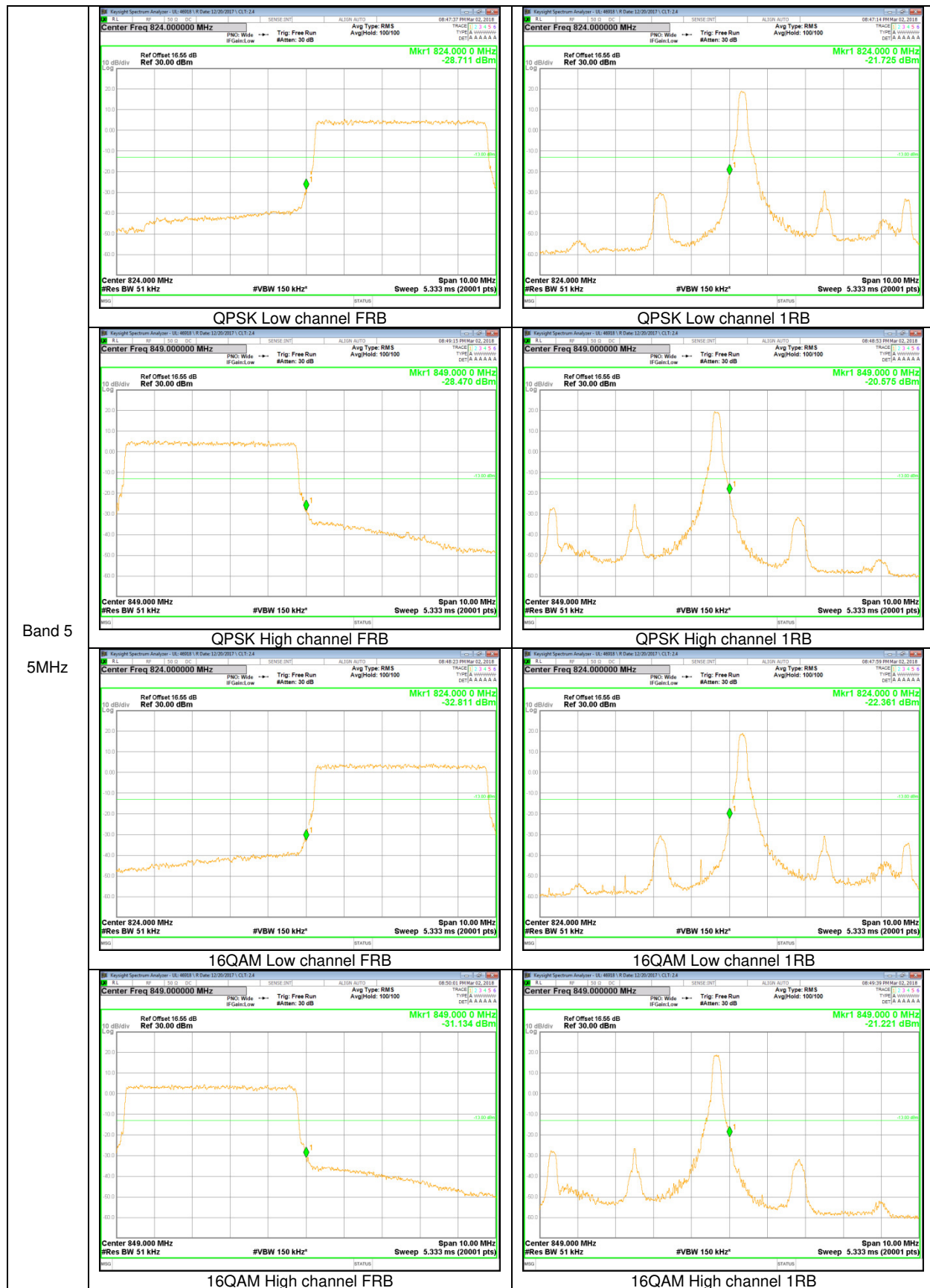
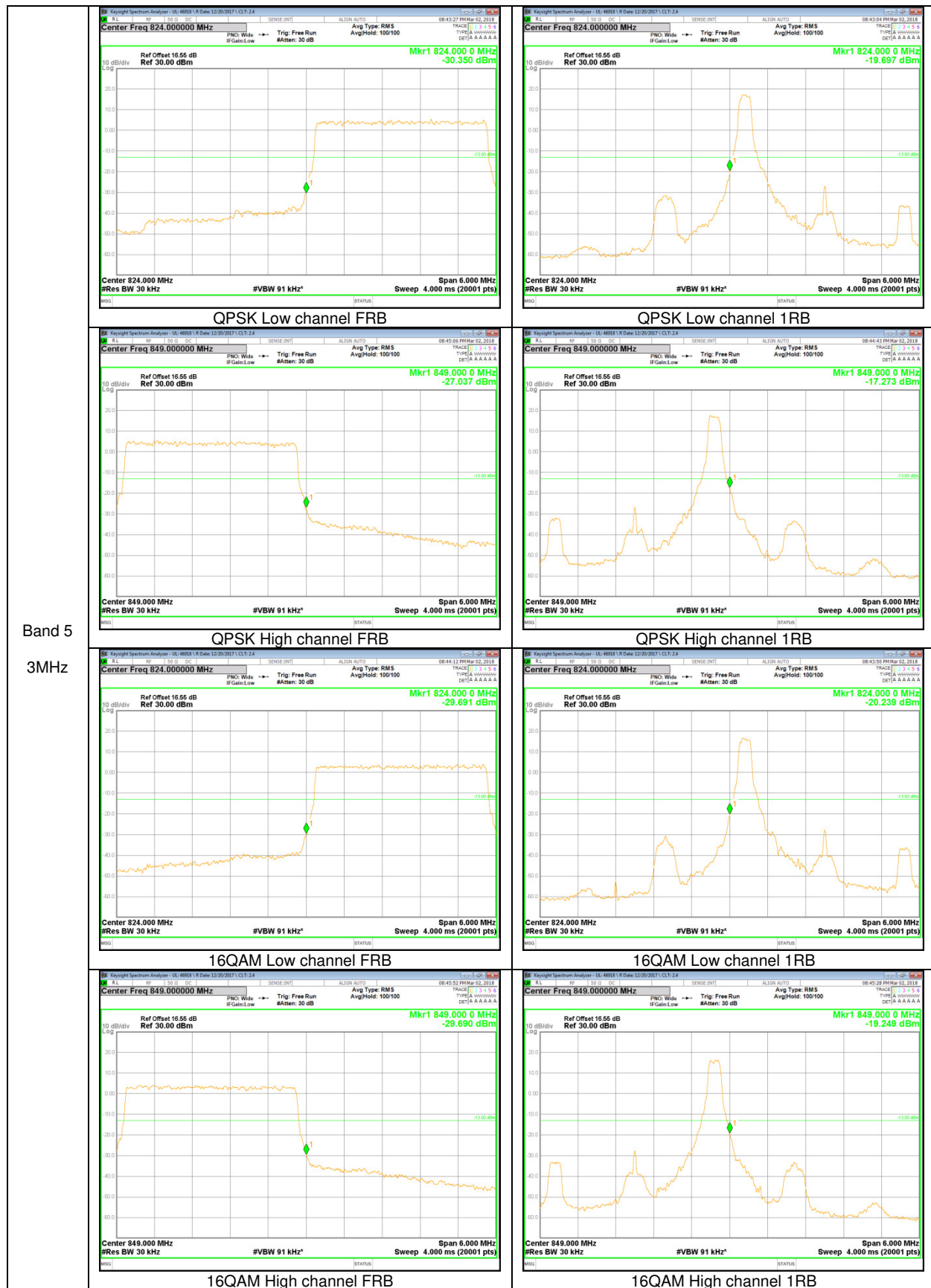
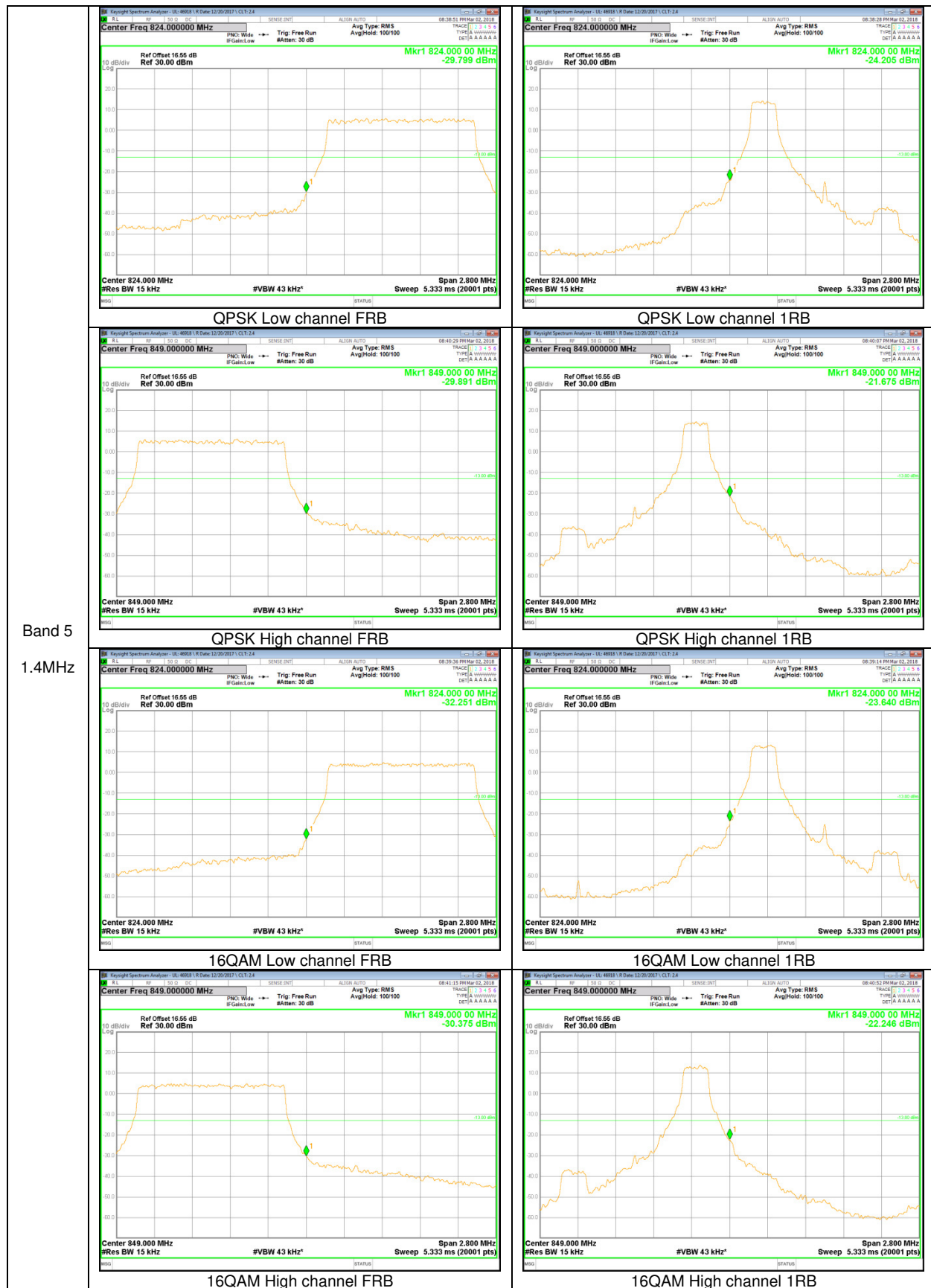








9.3. OUT OF BAND EMISSIONS

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 v03

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

- 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	-23.17	-13.00
		836.6	-23.02	
		848.8	-22.94	
	EGPRS	824.2	-22.90	
		836.6	-23.18	
		848.8	-22.38	
GSM1900	GPRS	1850.2	-22.29	
		1880.0	-21.92	
		1909.8	-22.04	
	EGPRS	1850.2	-22.82	
		1880.0	-21.90	
		1909.8	-22.16	

WCDMA

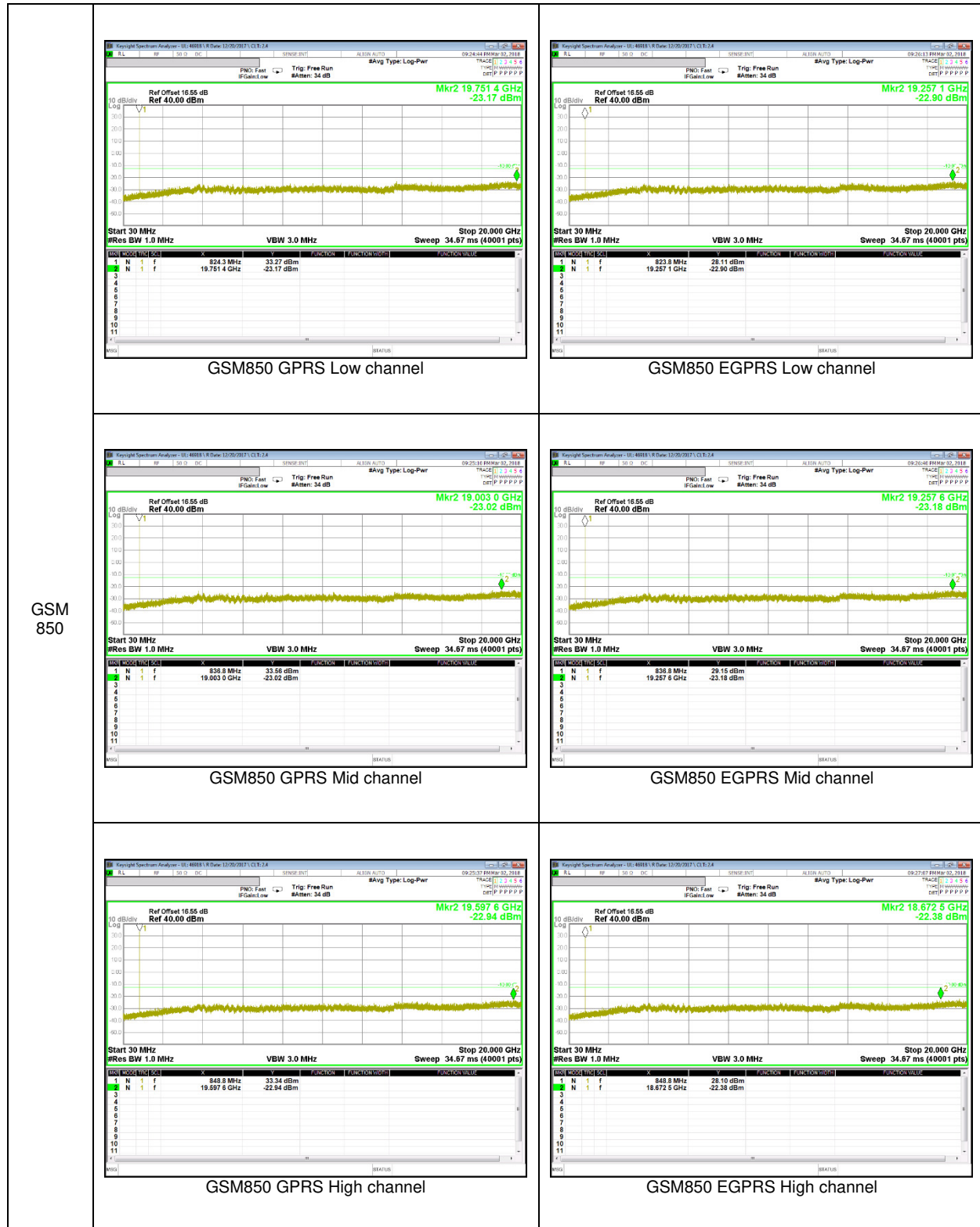
Band	Mode	f [MHz]	Spurious [dBm]	Limit [dBm]
Band 5	REL99	826.4	-32.66	-13.00
		836.6	-32.79	
		846.6	-32.55	
	HSDPA	826.4	-32.38	
		836.6	-32.86	
		846.6	-32.42	
Band 2	REL99	1852.4	-33.06	
		1880.0	-32.70	
		1907.6	-32.54	
	HSDPA	1852.4	-32.03	
		1880.0	-31.62	
		1907.6	-31.76	

LTE 5

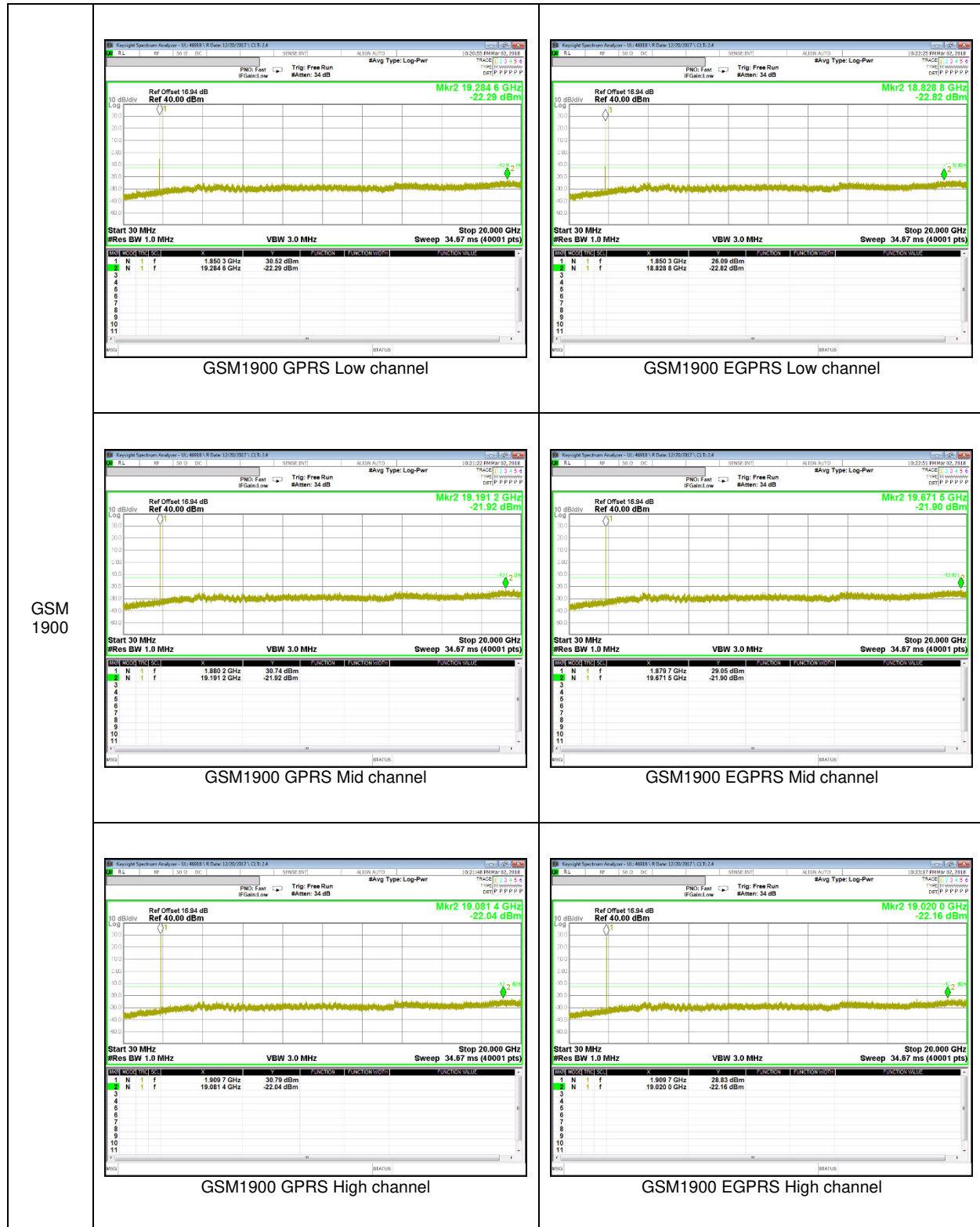
Bandwidth	Mode	f [MHz]	Spurious [dBm]	Limit [dBm]
10 MHz	QPSK	829.0	-30.88	-13.00
		836.5	-31.13	
		844.0	-30.65	
	16QAM	829.0	-31.12	
		836.5	-31.18	
		844.0	-31.51	
5 MHz	QPSK	826.5	-31.07	
		836.5	-30.38	
		846.5	-30.49	
	16QAM	826.5	-30.86	
		836.5	-30.82	
		846.5	-31.15	
3 MHz	QPSK	825.5	-31.17	
		836.5	-30.65	
		847.5	-31.64	
	16QAM	825.5	-31.14	
		836.5	-31.42	
		847.5	-30.43	
1.4 MHz	QPSK	824.7	-31.76	
		836.5	-29.54	
		848.3	-30.50	
	16QAM	824.7	-31.49	
		836.5	-30.76	
		848.3	-30.68	

9.3.1. OUT OF BAND EMISSIONS PLOTS

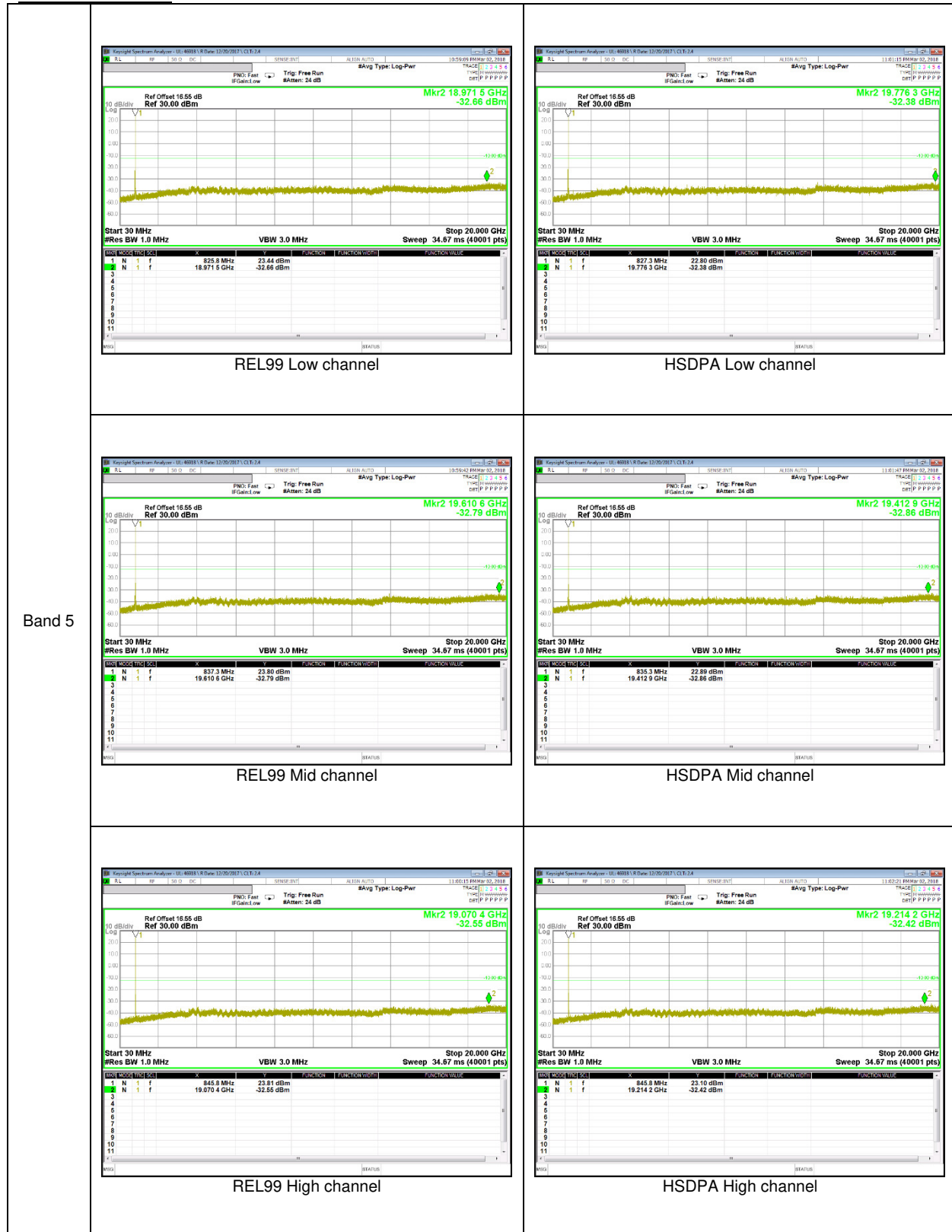
GSM 850



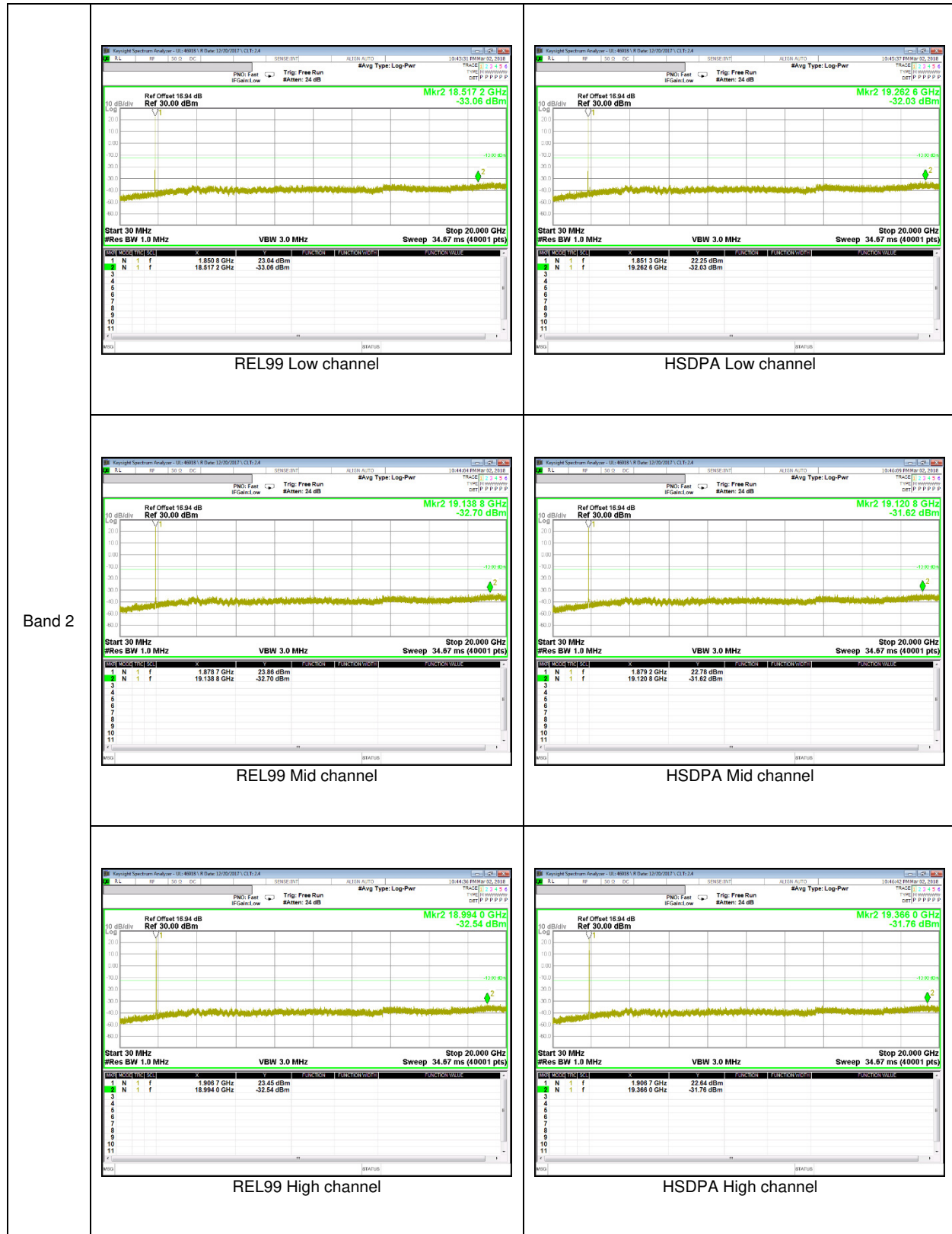
GSM 1900



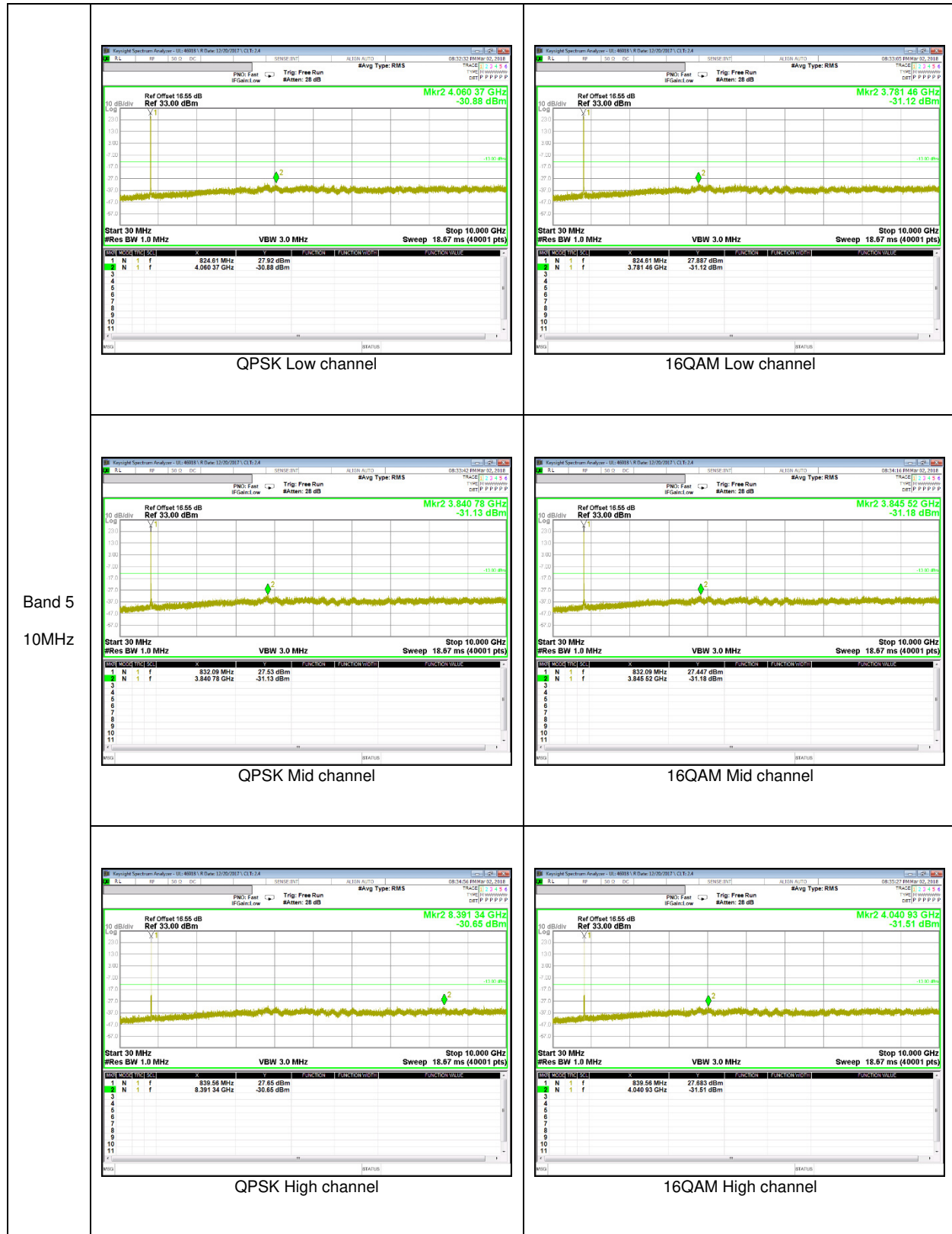
WCDMA Band 5

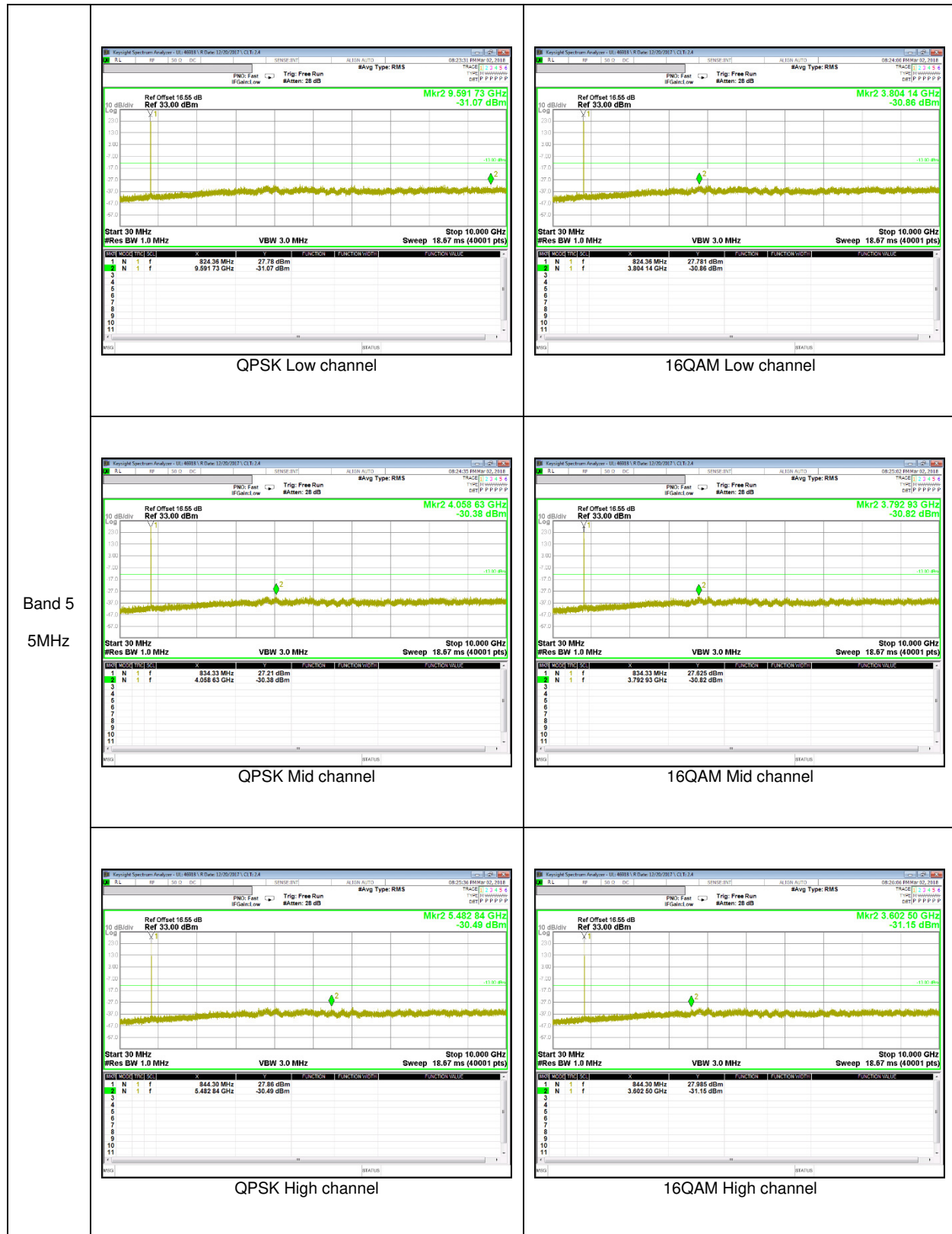


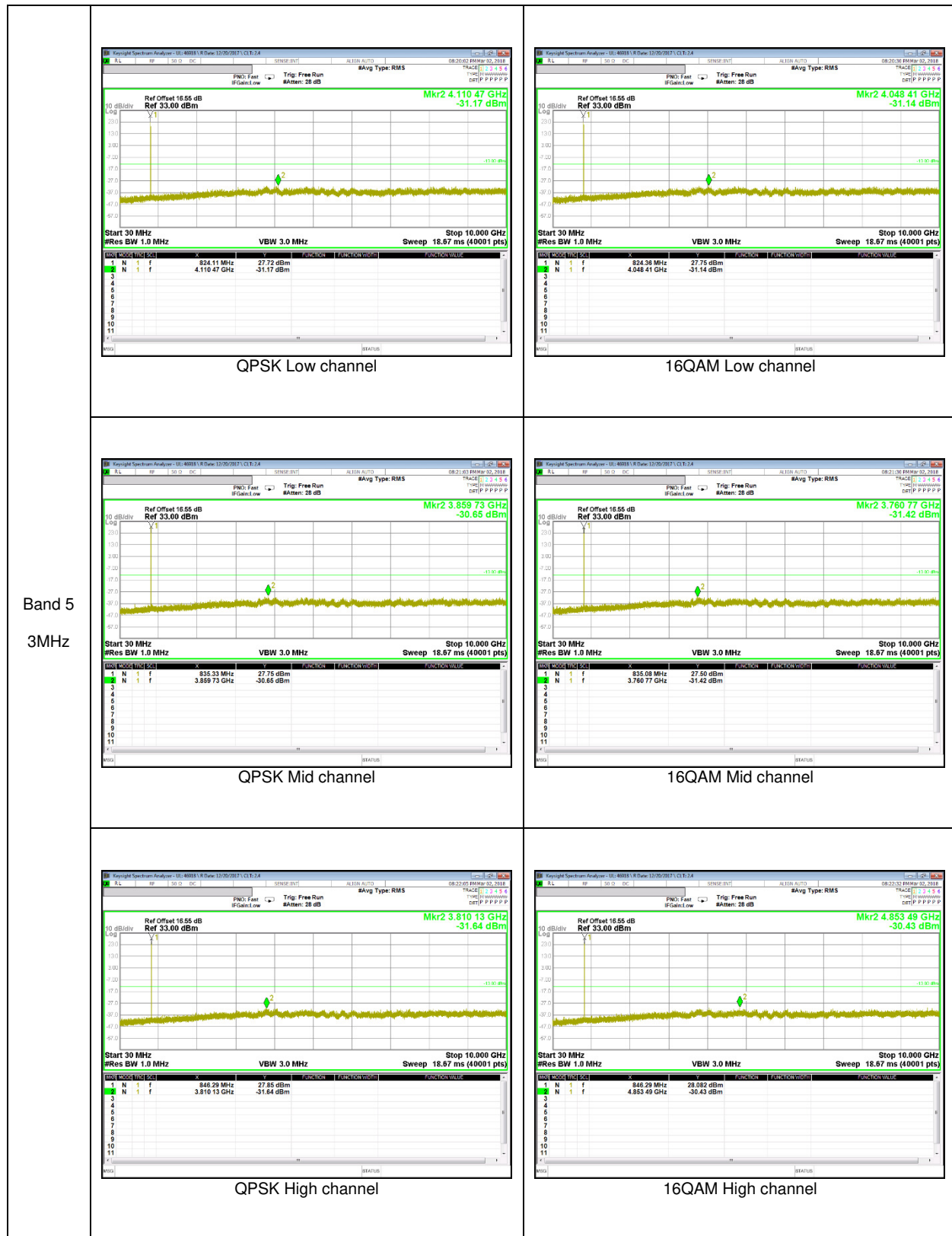
WCDMA Band 2

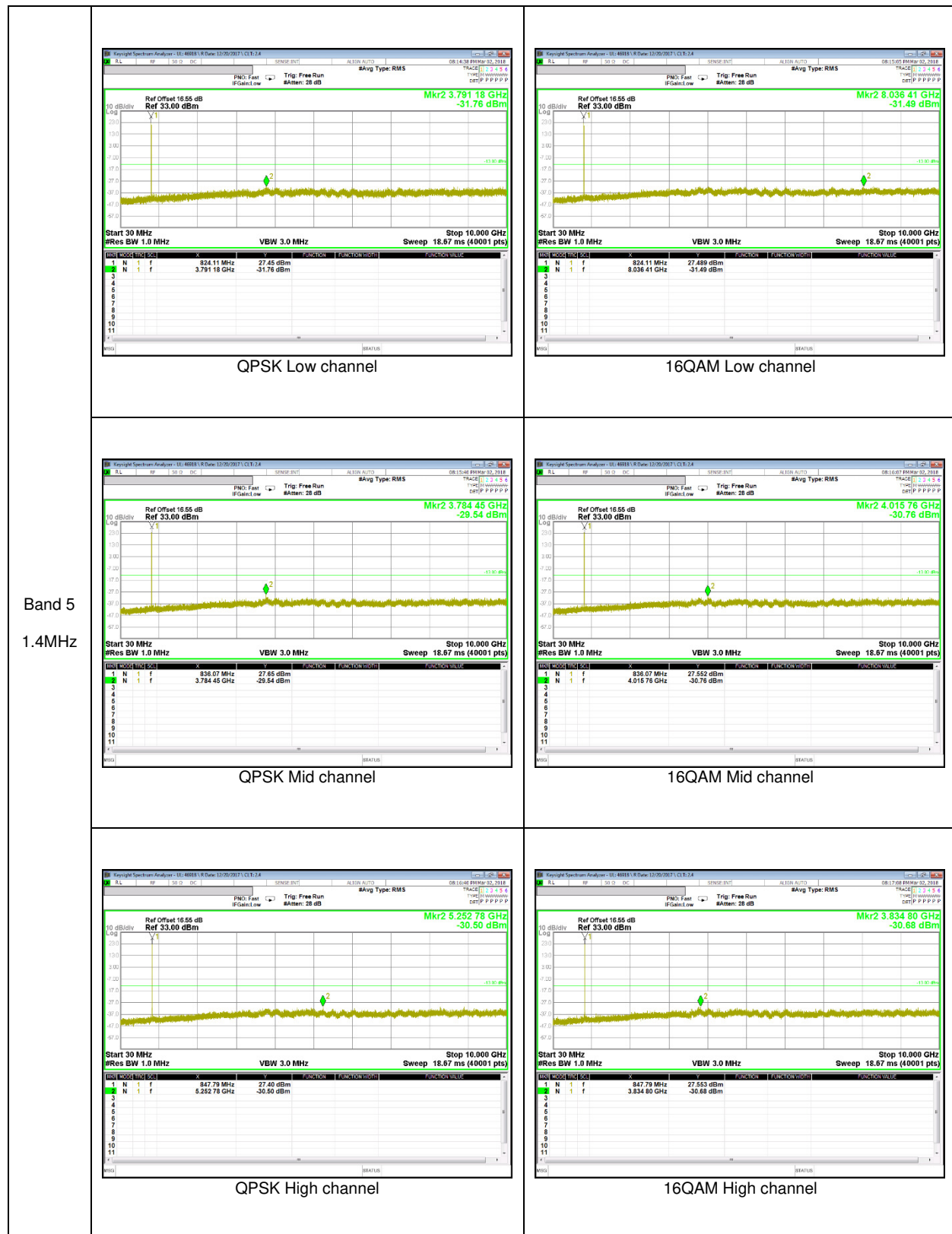


LTE Band 5









9.4. 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 v03

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]
3.85	50	836.60004136	-0.001	2.5
3.85	40	836.60003925	0.001	2.5
3.85	30	836.60004888	-0.010	2.5
3.85	20	836.60004033	0	2.5
3.85	10	836.60004642	-0.007	2.5
3.85	0	836.60004678	-0.008	2.5
3.85	-10	836.60004510	-0.006	2.5
3.85	-20	836.60004891	-0.010	2.5
3.85	-30	836.60004155	-0.001	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	836.60004033	0	2.5
4.40	20	836.60004628	-0.007	2.5
3.60	20	836.60004502	-0.006	2.5

GSM 1900, Channel 661, Frequency 1880.0 MHz

Reference Frequency: GSM1900 Mid Channel 1880.0 MHz @ 20°C				
Limit: +- 2.5 ppm = 4700.000 Hz				
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse		
		[MHz]	Delta [ppm]	Limit [ppm]
3.85	50	1880.00005530	0.003	2.5
3.85	40	1880.00006105	0.000	2.5
3.85	30	1880.00006001	0.000	2.5
3.85	20	1880.00006080	0	2.5
3.85	10	1880.00005942	0.001	2.5
3.85	0	1880.00005630	0.002	2.5
3.85	-10	1880.00006087	0.000	2.5
3.85	-20	1880.00006284	-0.001	2.5
3.85	-30	1880.00006174	-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]
3.85	20	1880.00006080	0	2.5
4.40	20	1880.00005441	0.003	2.5
3.60	20	1880.00006231	-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	836.60001509	0.001	2.5
3.85	40	836.60001702	-0.002	2.5
3.85	30	836.60001061	0.006	2.5
3.85	20	836.60001558	0	2.5
3.85	10	836.60001471	0.001	2.5
3.85	0	836.60000956	0.007	2.5
3.85	-10	836.60001194	0.004	2.5
3.85	-20	836.60001620	-0.001	2.5
3.85	-30	836.60001574	0.000	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	836.60001558	0	2.5
4.40	20	836.60001907	-0.004	2.5
3.60	20	836.60001322	0.003	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	1879.99997194	-0.002	2.5
3.85	40	1879.99996782	0.000	2.5
3.85	30	1879.99997467	-0.004	2.5
3.85	20	1879.99996772	0	2.5
3.85	10	1879.99997184	-0.002	2.5
3.85	0	1879.99997203	-0.002	2.5
3.85	-10	1879.99996391	0.002	2.5
3.85	-20	1879.99996398	0.002	2.5
3.85	-30	1879.99997464	-0.004	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	1879.99996772	0	2.5
4.40	20	1879.99996981	-0.001	2.5
3.60	20	1879.99997019	-0.001	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	836.49997515	-0.001	2.5
3.85	40	836.49997189	0.003	2.5
3.85	30	836.49996726	0.009	2.5
3.85	20	836.49997463	0	2.5
3.85	10	836.49997574	-0.001	2.5
3.85	0	836.49996854	0.007	2.5
3.85	-10	836.49997573	-0.001	2.5
3.85	-20	836.49996624	0.010	2.5
3.85	-30	836.49996737	0.009	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	836.49997463	0	2.5
4.40	20	836.49997578	-0.001	2.5
3.60	20	836.49996556	0.011	2.5

10. RADIATED TEST RESULTS

10.1. 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 603 E Clause 2.2.17; ESU40 setting reference to 971168 D01 v03

For peak power measurement with a ESU40:

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

For average power measurement with a ESU40:

a) Set span to at least 1.5 times the OBW; b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz; c) Set VBW $\geq 3 \times$ RBW; d) Set number of points in sweep $\geq 2 \times$ span / RBW; e) Sweep time = auto-couple; f) Detector = RMS (power averaging); g) Use free run trigger If burst duty cycle ≥ 98 ; h) Use trigger to capture bursts If burst duty cycle < 98 ; i) Trace average at least 100 traces in power averaging (*i.e.*, RMS) mode. j) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function. (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	25.53	357.27
		661	836.6	27.04	505.82
		810	848.8	25.38	345.14
	EGPRS	512	824.2	18.66	73.45
		661	836.6	20.78	119.67
		810	848.8	18.60	72.44
GSM1900	GPRS	512	1850.2	29.54	899.50
		661	1880.0	29.66	924.70
		810	1909.8	28.92	779.83
	EGPRS	512	1850.2	26.06	403.65
		661	1880.0	26.30	426.58
		810	1909.8	25.26	335.74

WCDMA

Band	Mode	Channel	f [MHz]	ERP / EIRP	
				[dBm]	[mW]
Band 5	REL99	4132	826.4	17.93	62.09
		4183	836.6	17.48	55.98
		4233	846.6	16.64	46.13
	HSDPA	4132	826.4	17.43	55.34
		4183	836.6	17.09	51.17
		4233	846.6	16.35	43.15
Band 2	REL99	9262	1852.4	21.40	138.04
		9400	1880.0	21.31	135.21
		9538	1907.6	20.99	125.60
	HSDPA	9262	1852.4	19.88	97.27
		9400	1880.0	20.43	110.41
		9538	1907.6	19.87	97.05

LTE Band 5

Band	BW [MHz]	Mode	RB/RB Size	f [MHz]	ERP / EIRP	
			Full RB		[dBm]	[mW]
Band 5	10	QPSK	50/0	829.0	16.32	42.85
			50/0	836.5	16.02	39.99
			50/0	844.0	15.57	36.06
		16QAM	50/0	829.0	15.50	35.48
			50/0	836.5	15.05	31.99
			50/0	844.0	14.39	27.48
	5	QPSK	25/0	826.5	16.08	40.55
			25/0	836.5	15.69	37.07
			25/0	846.5	14.76	29.92
		16QAM	25/0	826.5	15.07	32.14
			25/0	836.5	14.77	29.99
			25/0	846.5	13.83	24.15
	3	QPSK	15/0	825.5	16.45	44.16
			15/0	836.5	15.57	36.06
			15/0	847.5	14.48	28.05
		16QAM	15/0	825.5	15.42	34.83
			15/0	836.5	14.59	28.77
			15/0	847.5	13.51	22.44
	1.4	QPSK	6/0	824.7	13.98	25.00
			6/0	836.5	12.45	17.58
			6/0	848.3	12.33	17.10
		16QAM	6/0	824.7	13.14	20.61
			6/0	836.5	11.51	14.16
			6/0	848.3	11.40	13.80

10.1.2. ERP/EIRP DATA

GSM 850

GSM GSM850 GPRS	UL Verification Services, Inc. High Frequency Substitution Measurement																																																																																																	
	Company:		Samsung																																																																																															
	Project #:		4788372835																																																																																															
	Date:		2018-03-19																																																																																															
	Test Engineer:		47989																																																																																															
	Configuration:		EUT / X-Position																																																																																															
	Location:		Chamber 1																																																																																															
	Mode:		GPRS 850 MHz Fundamentals																																																																																															
	Test Equipment:																																																																																																	
	Receiving: VULB9163-845, and Chamber 2 SMA Cables																																																																																																	
Substitution: Dipole 3121_DB4, 3m N-type Cable																																																																																																		
<table><tr><th>f MHz</th><th>SG reading (dBm)</th><th>Ant. Pol. (H/V)</th><th>Cable Loss (dB)</th><th>Antenna Gain (dBd)</th><th>ERP (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>824.20</td><td>21.21</td><td>V</td><td>1.0</td><td>-1.5</td><td>18.78</td><td>38.5</td><td>-19.7</td><td></td></tr><tr><td>824.20</td><td>27.96</td><td>H</td><td>1.0</td><td>-1.5</td><td>25.53</td><td>38.5</td><td>-13.0</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>836.60</td><td>22.14</td><td>V</td><td>1.0</td><td>-1.4</td><td>19.76</td><td>38.5</td><td>-18.7</td><td></td></tr><tr><td>836.60</td><td>29.42</td><td>H</td><td>1.0</td><td>-1.4</td><td>27.04</td><td>38.5</td><td>-11.5</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>848.80</td><td>20.65</td><td>V</td><td>1.0</td><td>-1.4</td><td>18.31</td><td>38.5</td><td>-20.2</td><td></td></tr><tr><td>848.80</td><td>27.72</td><td>H</td><td>1.0</td><td>-1.4</td><td>25.38</td><td>38.5</td><td>-13.1</td><td></td></tr></table>									f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes	Low Ch									824.20	21.21	V	1.0	-1.5	18.78	38.5	-19.7		824.20	27.96	H	1.0	-1.5	25.53	38.5	-13.0		Mid Ch									836.60	22.14	V	1.0	-1.4	19.76	38.5	-18.7		836.60	29.42	H	1.0	-1.4	27.04	38.5	-11.5		High Ch									848.80	20.65	V	1.0	-1.4	18.31	38.5	-20.2		848.80	27.72	H	1.0	-1.4	25.38	38.5	-13.1	
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes																																																																																										
Low Ch																																																																																																		
824.20	21.21	V	1.0	-1.5	18.78	38.5	-19.7																																																																																											
824.20	27.96	H	1.0	-1.5	25.53	38.5	-13.0																																																																																											
Mid Ch																																																																																																		
836.60	22.14	V	1.0	-1.4	19.76	38.5	-18.7																																																																																											
836.60	29.42	H	1.0	-1.4	27.04	38.5	-11.5																																																																																											
High Ch																																																																																																		
848.80	20.65	V	1.0	-1.4	18.31	38.5	-20.2																																																																																											
848.80	27.72	H	1.0	-1.4	25.38	38.5	-13.1																																																																																											
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	Receiving: VULB9163-845, and Chamber 2 SMA Cables																																																																																																	
Substitution: Dipole 3121_DB4, 3m N-type Cable																																																																																																		
<table><tr><th>f MHz</th><th>SG reading (dBm)</th><th>Ant. Pol. (H/V)</th><th>Cable Loss (dB)</th><th>Antenna Gain (dBd)</th><th>ERP (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>824.20</td><td>15.29</td><td>V</td><td>1.0</td><td>-1.5</td><td>12.86</td><td>38.5</td><td>-25.6</td><td></td></tr><tr><td>824.20</td><td>21.09</td><td>H</td><td>1.0</td><td>-1.5</td><td>18.66</td><td>38.5</td><td>-19.8</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>836.60</td><td>15.83</td><td>V</td><td>1.0</td><td>-1.4</td><td>13.45</td><td>38.5</td><td>-25.1</td><td></td></tr><tr><td>836.60</td><td>23.16</td><td>H</td><td>1.0</td><td>-1.4</td><td>20.78</td><td>38.5</td><td>-17.7</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>848.80</td><td>14.08</td><td>V</td><td>1.0</td><td>-1.4</td><td>11.74</td><td>38.5</td><td>-26.8</td><td></td></tr><tr><td>848.80</td><td>20.94</td><td>H</td><td>1.0</td><td>-1.4</td><td>18.60</td><td>38.5</td><td>-19.9</td><td></td></tr></table>									f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes	Low Ch									824.20	15.29	V	1.0	-1.5	12.86	38.5	-25.6		824.20	21.09	H	1.0	-1.5	18.66	38.5	-19.8		Mid Ch									836.60	15.83	V	1.0	-1.4	13.45	38.5	-25.1		836.60	23.16	H	1.0	-1.4	20.78	38.5	-17.7		High Ch									848.80	14.08	V	1.0	-1.4	11.74	38.5	-26.8		848.80	20.94	H	1.0	-1.4	18.60	38.5	-19.9	
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes																																																																																										
Low Ch																																																																																																		
824.20	15.29	V	1.0	-1.5	12.86	38.5	-25.6																																																																																											
824.20	21.09	H	1.0	-1.5	18.66	38.5	-19.8																																																																																											
Mid Ch																																																																																																		
836.60	15.83	V	1.0	-1.4	13.45	38.5	-25.1																																																																																											
836.60	23.16	H	1.0	-1.4	20.78	38.5	-17.7																																																																																											
High Ch																																																																																																		
848.80	14.08	V	1.0	-1.4	11.74	38.5	-26.8																																																																																											
848.80	20.94	H	1.0	-1.4	18.60	38.5	-19.9																																																																																											

GSM 1900

GSM

GSM1900

GPRS

UL Verification Services, Inc.

High Frequency Substitution Measurement

Company:

Project #:

Date:

Test Engineer:

Configuration:

Location:

Mode:

Samsung

4788372835

2018-02-25

45585

EUT / Z-Position

Chamber 1

GPRS 1900 MHz Fundamentals

Test Equipment:

Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables

Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1850.20	17.10	V	4.5	9.5	22.11	33.0	-10.9	
1850.20	24.53	H	4.5	9.5	29.54	33.0	-3.5	
Mid Ch								
1880.00	18.02	V	4.5	9.2	22.70	33.0	-10.3	
1880.00	24.98	H	4.5	9.2	29.66	33.0	-3.3	
High Ch								
1909.80	19.01	V	4.6	8.9	23.31	33.0	-9.7	
1909.80	24.62	H	4.6	8.9	28.92	33.0	-4.1	

GSM

GSM1900

EGPRS

UL Verification Services, Inc.

High Frequency Substitution Measurement

Company:

Project #:

Date:

Test Engineer:

Configuration:

Location:

Mode:

Samsung

4788372835

2018-02-25

45585

EUT / Z-Position

Chamber 1

EGPRS 1900 MHz Fundamentals

Test Equipment:

Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables

Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1850.20	13.32	V	4.5	9.5	18.33	33.0	-14.7	
1850.20	21.05	H	4.5	9.5	26.06	33.0	-6.9	
Mid Ch								
1880.00	14.57	V	4.5	9.2	19.25	33.0	-13.8	
1880.00	21.62	H	4.5	9.2	26.30	33.0	-6.7	
High Ch								
1909.80	15.23	V	4.6	8.9	19.53	33.0	-13.5	
1909.80	20.96	H	4.6	8.9	25.26	33.0	-7.7	

WCDMA Band 5

WCDMA Band 5 REL99	UL Verification Services, Inc. High Frequency Substitution Measurement Company: Samsung Project #: 4788372835 Date: 2018-02-25 Test Engineer: 45585 Configuration: EUT / X-Position Location: Chamber 1 Mode: Rel99 Band 5 Fundamentals Test Equipment: Receiving: VULB9163-845, and Chamber 2 SMA Cables Substitution: Dipole 3121_DB4, 3m N-type Cable <table><tr><th>f MHz</th><th>SG reading (dBm)</th><th>Ant. Pol. (H/V)</th><th>Cable Loss (dB)</th><th>Antenna Gain (dBd)</th><th>ERP (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></tr><tr><td>826.40</td><td>10.30</td><td>V</td><td>1.0</td><td>-1.5</td><td>7.88</td><td>38.5</td><td>-30.6</td></tr><tr><td>826.40</td><td>20.35</td><td>H</td><td>1.0</td><td>-1.5</td><td>17.93</td><td>38.5</td><td>-20.6</td></tr><tr><td>Mid Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>836.60</td><td>10.34</td><td>V</td><td>1.0</td><td>-1.4</td><td>7.96</td><td>38.5</td><td>-30.5</td></tr><tr><td>836.60</td><td>19.86</td><td>H</td><td>1.0</td><td>-1.4</td><td>17.48</td><td>38.5</td><td>-21.0</td></tr><tr><td>High Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>846.60</td><td>9.87</td><td>V</td><td>1.0</td><td>-1.4</td><td>7.52</td><td>38.5</td><td>-31.0</td></tr><tr><td>846.60</td><td>18.99</td><td>H</td><td>1.0</td><td>-1.4</td><td>16.64</td><td>38.5</td><td>-21.9</td></tr></table>									f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes	Low Ch								826.40	10.30	V	1.0	-1.5	7.88	38.5	-30.6	826.40	20.35	H	1.0	-1.5	17.93	38.5	-20.6	Mid Ch								836.60	10.34	V	1.0	-1.4	7.96	38.5	-30.5	836.60	19.86	H	1.0	-1.4	17.48	38.5	-21.0	High Ch								846.60	9.87	V	1.0	-1.4	7.52	38.5	-31.0	846.60	18.99	H	1.0	-1.4	16.64	38.5	-21.9
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes																																																																																	
	Low Ch																																																																																									
	826.40	10.30	V	1.0	-1.5	7.88	38.5	-30.6																																																																																		
	826.40	20.35	H	1.0	-1.5	17.93	38.5	-20.6																																																																																		
	Mid Ch																																																																																									
	836.60	10.34	V	1.0	-1.4	7.96	38.5	-30.5																																																																																		
	836.60	19.86	H	1.0	-1.4	17.48	38.5	-21.0																																																																																		
	High Ch																																																																																									
	846.60	9.87	V	1.0	-1.4	7.52	38.5	-31.0																																																																																		
846.60	18.99	H	1.0	-1.4	16.64	38.5	-21.9																																																																																			
WCDMA Band 5 HSDPA	UL Verification Services, Inc. High Frequency Substitution Measurement Company: Samsung Project #: 4788372835 Date: 2018-02-25 Test Engineer: 45585 Configuration: EUT / X-Position Location: Chamber 1 Mode: HSDPA Band 5 Fundamentals Test Equipment: Receiving: VULB9163-845, and Chamber 2 SMA Cables Substitution: Dipole 3121_DB4, 3m N-type Cable <table><tr><th>f MHz</th><th>SG reading (dBm)</th><th>Ant. Pol. (H/V)</th><th>Cable Loss (dB)</th><th>Antenna Gain (dBd)</th><th>ERP (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></tr><tr><td>826.40</td><td>10.10</td><td>V</td><td>1.0</td><td>-1.5</td><td>7.68</td><td>38.5</td><td>-30.8</td></tr><tr><td>826.40</td><td>19.85</td><td>H</td><td>1.0</td><td>-1.5</td><td>17.43</td><td>38.5</td><td>-21.1</td></tr><tr><td>Mid Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>836.60</td><td>9.78</td><td>V</td><td>1.0</td><td>-1.4</td><td>7.40</td><td>38.5</td><td>-31.1</td></tr><tr><td>836.60</td><td>19.47</td><td>H</td><td>1.0</td><td>-1.4</td><td>17.09</td><td>38.5</td><td>-21.4</td></tr><tr><td>High Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>846.60</td><td>9.28</td><td>V</td><td>1.0</td><td>-1.4</td><td>6.93</td><td>38.5</td><td>-31.6</td></tr><tr><td>846.60</td><td>18.70</td><td>H</td><td>1.0</td><td>-1.4</td><td>16.35</td><td>38.5</td><td>-22.1</td></tr></table>									f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes	Low Ch								826.40	10.10	V	1.0	-1.5	7.68	38.5	-30.8	826.40	19.85	H	1.0	-1.5	17.43	38.5	-21.1	Mid Ch								836.60	9.78	V	1.0	-1.4	7.40	38.5	-31.1	836.60	19.47	H	1.0	-1.4	17.09	38.5	-21.4	High Ch								846.60	9.28	V	1.0	-1.4	6.93	38.5	-31.6	846.60	18.70	H	1.0	-1.4	16.35	38.5	-22.1
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes																																																																																	
	Low Ch																																																																																									
	826.40	10.10	V	1.0	-1.5	7.68	38.5	-30.8																																																																																		
	826.40	19.85	H	1.0	-1.5	17.43	38.5	-21.1																																																																																		
	Mid Ch																																																																																									
	836.60	9.78	V	1.0	-1.4	7.40	38.5	-31.1																																																																																		
	836.60	19.47	H	1.0	-1.4	17.09	38.5	-21.4																																																																																		
	High Ch																																																																																									
	846.60	9.28	V	1.0	-1.4	6.93	38.5	-31.6																																																																																		
846.60	18.70	H	1.0	-1.4	16.35	38.5	-22.1																																																																																			

WCDMA Band 2

WCDMA

Band 2

REL99

UL Verification Services, Inc.

High Frequency Substitution Measurement

Company:

Samsung

Project #:

4788372835

Date:

2018-02-25

Test Engineer:

45585

Configuration:

EUT / Z-Position

Location:

Chamber 1

Mode:

Rel99 Band 2 Fundamentals

Test Equipment:

Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables

Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1852.40	9.39	V	4.5	9.5	14.38	33.0	-18.6	
1852.40	16.41	H	4.5	9.5	21.40	33.0	-11.6	
Mid Ch								
1880.00	10.72	V	4.5	9.2	15.40	33.0	-17.6	
1880.00	16.63	H	4.5	9.2	21.31	33.0	-11.7	
High Ch								
1907.60	10.09	V	4.6	8.9	14.43	33.0	-18.6	
1907.60	16.65	H	4.6	8.9	20.99	33.0	-12.0	

WCDMA

Band 2

HSDPA

UL Verification Services, Inc.

High Frequency Substitution Measurement

Company:

Samsung

Project #:

4788372835

Date:

2018-02-25

Test Engineer:

45585

Configuration:

EUT / Z-Position

Location:

Chamber 1

Mode:

HSDPA Band 2 Fundamentals

Test Equipment:

Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables

Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1852.40	8.28	V	4.5	9.5	13.27	33.0	-19.7	
1852.40	14.89	H	4.5	9.5	19.88	33.0	-13.1	
Mid Ch								
1880.00	9.69	V	4.5	9.2	14.37	33.0	-18.6	
1880.00	15.75	H	4.5	9.2	20.43	33.0	-12.6	
High Ch								
1907.60	9.46	V	4.6	8.9	13.80	33.0	-19.2	
1907.60	15.53	H	4.6	8.9	19.87	33.0	-13.1	

LTE Band 5

LTE Band 5 10MHz QPSK	UL Verification Services, Inc. High Frequency Substitution Measurement								
	Company: Samsung Project #: 4788372835 Date: 2018-03-19 Test Engineer: 47989 Configuration: EUT / X-Position Location: Chamber 1 Mode: LTE_QPSK Band 5 Fundamentals, 10MHz Bandwidth								
	Test Equipment: Receiving: VULB9163-845, and Chamber 2 SMA Cables Substitution: Dipole 3121_DB4, 3m N-type Cable								
	f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	ERP	Limit	Delta	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBd)	(dBm)	(dBm)	(dB)	
	Low Ch								
	829.00	12.21	V	1.0	-1.5	9.80	38.5	-28.7	
	829.00	18.73	H	1.0	-1.5	16.32	38.5	-22.2	
	Mid Ch								
	836.50	11.17	V	1.0	-1.4	8.79	38.5	-29.7	
LTE Band 5 10MHz 16QAM	836.50	18.40	H	1.0	-1.4	16.02	38.5	-22.5	
	High Ch								
	844.00	10.75	V	1.0	-1.4	8.39	38.5	-30.1	
	844.00	17.92	H	1.0	-1.4	15.57	38.5	-22.9	
LTE Band 5 10MHz 16QAM	UL Verification Services, Inc. High Frequency Substitution Measurement								
	Company: Samsung Project #: 4788372835 Date: 2018-03-19 Test Engineer: 47989 Configuration: EUT / X-Position Location: Chamber 1 Mode: LTE_16QAM Band 5 Fundamentals, 10MHz Bandwidth								
	Test Equipment: Receiving: VULB9163-845, and Chamber 2 SMA Cables Substitution: Dipole 3121_DB4, 3m N-type Cable								
	f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	ERP	Limit	Delta	Notes
	MHz	(dBm)	(H/V)	(dB)	(dBd)	(dBm)	(dBm)	(dB)	
	Low Ch								
	829.00	11.24	V	1.0	-1.5	8.83	38.5	-29.7	
	829.00	17.91	H	1.0	-1.5	15.50	38.5	-23.0	
	Mid Ch								
	836.50	10.19	V	1.0	-1.4	7.81	38.5	-30.7	
	836.50	17.43	H	1.0	-1.4	15.05	38.5	-23.5	
LTE Band 5 10MHz 16QAM	High Ch								
	844.00	9.66	V	1.0	-1.4	7.30	38.5	-31.2	
	844.00	16.74	H	1.0	-1.4	14.39	38.5	-24.1	

LTE Band 5 5MHz QPSK	UL Verification Services, Inc. High Frequency Substitution Measurement Company: Samsung Project #: 4788372835 Date: 2018-03-19 Test Engineer: 47989 Configuration: EUT / X-Position Location: Chamber 1 Mode: LTE_QPSK Band 5 Fundamentals, 5MHz Bandwidth Test Equipment: Receiving: VULB9163-845, and Chamber 2 SMA Cables Substitution: Dipole 3121_DB4, 3m N-type Cable <table><tr><th>f MHz</th><th>SG reading (dBm)</th><th>Ant. Pol. (H/V)</th><th>Cable Loss (dB)</th><th>Antenna Gain (dBd)</th><th>ERP (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></tr><tr><td>826.50</td><td>12.27</td><td>V</td><td>1.0</td><td>-1.5</td><td>9.85</td><td>38.5</td><td>-28.6</td></tr><tr><td>826.50</td><td>18.50</td><td>H</td><td>1.0</td><td>-1.5</td><td>16.08</td><td>38.5</td><td>-22.4</td></tr><tr><td>Mid Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>836.50</td><td>11.23</td><td>V</td><td>1.0</td><td>-1.4</td><td>8.85</td><td>38.5</td><td>-29.6</td></tr><tr><td>836.50</td><td>18.07</td><td>H</td><td>1.0</td><td>-1.4</td><td>15.69</td><td>38.5</td><td>-22.8</td></tr><tr><td>High Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>846.50</td><td>9.34</td><td>V</td><td>1.0</td><td>-1.4</td><td>6.99</td><td>38.5</td><td>-31.5</td></tr><tr><td>846.50</td><td>17.11</td><td>H</td><td>1.0</td><td>-1.4</td><td>14.76</td><td>38.5</td><td>-23.7</td></tr></table>									f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes	Low Ch								826.50	12.27	V	1.0	-1.5	9.85	38.5	-28.6	826.50	18.50	H	1.0	-1.5	16.08	38.5	-22.4	Mid Ch								836.50	11.23	V	1.0	-1.4	8.85	38.5	-29.6	836.50	18.07	H	1.0	-1.4	15.69	38.5	-22.8	High Ch								846.50	9.34	V	1.0	-1.4	6.99	38.5	-31.5	846.50	17.11	H	1.0	-1.4	14.76	38.5	-23.7
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes																																																																																	
	Low Ch																																																																																									
	826.50	12.27	V	1.0	-1.5	9.85	38.5	-28.6																																																																																		
	826.50	18.50	H	1.0	-1.5	16.08	38.5	-22.4																																																																																		
	Mid Ch																																																																																									
	836.50	11.23	V	1.0	-1.4	8.85	38.5	-29.6																																																																																		
	836.50	18.07	H	1.0	-1.4	15.69	38.5	-22.8																																																																																		
	High Ch																																																																																									
	846.50	9.34	V	1.0	-1.4	6.99	38.5	-31.5																																																																																		
846.50	17.11	H	1.0	-1.4	14.76	38.5	-23.7																																																																																			
LTE Band 5 5MHz 16QAM	UL Verification Services, Inc. High Frequency Substitution Measurement Company: Samsung Project #: 4788372835 Date: 2018-03-19 Test Engineer: 47989 Configuration: EUT / X-Position Location: Chamber 1 Mode: LTE_16QAM Band 5 Fundamentals, 5MHz Bandwidth Test Equipment: Receiving: VULB9163-845, and Chamber 2 SMA Cables Substitution: Dipole 3121_DB4, 3m N-type Cable <table><tr><th>f MHz</th><th>SG reading (dBm)</th><th>Ant. Pol. (H/V)</th><th>Cable Loss (dB)</th><th>Antenna Gain (dBd)</th><th>ERP (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></tr><tr><td>826.50</td><td>11.26</td><td>V</td><td>1.0</td><td>-1.5</td><td>8.84</td><td>38.5</td><td>-29.7</td></tr><tr><td>826.50</td><td>17.49</td><td>H</td><td>1.0</td><td>-1.5</td><td>15.07</td><td>38.5</td><td>-23.4</td></tr><tr><td>Mid Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>836.50</td><td>9.94</td><td>V</td><td>1.0</td><td>-1.4</td><td>7.56</td><td>38.5</td><td>-30.9</td></tr><tr><td>836.50</td><td>17.15</td><td>H</td><td>1.0</td><td>-1.4</td><td>14.77</td><td>38.5</td><td>-23.7</td></tr><tr><td>High Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>846.50</td><td>8.34</td><td>V</td><td>1.0</td><td>-1.4</td><td>5.99</td><td>38.5</td><td>-32.5</td></tr><tr><td>846.50</td><td>16.18</td><td>H</td><td>1.0</td><td>-1.4</td><td>13.83</td><td>38.5</td><td>-24.7</td></tr></table>									f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes	Low Ch								826.50	11.26	V	1.0	-1.5	8.84	38.5	-29.7	826.50	17.49	H	1.0	-1.5	15.07	38.5	-23.4	Mid Ch								836.50	9.94	V	1.0	-1.4	7.56	38.5	-30.9	836.50	17.15	H	1.0	-1.4	14.77	38.5	-23.7	High Ch								846.50	8.34	V	1.0	-1.4	5.99	38.5	-32.5	846.50	16.18	H	1.0	-1.4	13.83	38.5	-24.7
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes																																																																																	
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LTE Band 5 3MHz QPSK	UL Verification Services, Inc. High Frequency Substitution Measurement Company: Samsung Project #: 4788372835 Date: 2018-03-19 Test Engineer: 47989 Configuration: EUT / X-Position Location: Chamber 1 Mode: LTE_QPSK Band 5 Fundamentals, 3MHz Bandwidth Test Equipment: Receiving: VULB9163-845, and Chamber 2 SMA Cables Substitution: Dipole 3121_DB4, 3m N-type Cable <table><tr><th>f MHz</th><th>SG reading (dBm)</th><th>Ant. Pol. (H/V)</th><th>Cable Loss (dB)</th><th>Antenna Gain (dBd)</th><th>ERP (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></tr><tr><td>825.50</td><td>12.48</td><td>V</td><td>1.0</td><td>-1.5</td><td>10.05</td><td>38.5</td><td>-28.4</td></tr><tr><td>825.50</td><td>18.87</td><td>H</td><td>1.0</td><td>-1.5</td><td>16.45</td><td>38.5</td><td>-22.0</td></tr><tr><td>Mid Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>836.50</td><td>11.26</td><td>V</td><td>1.0</td><td>-1.4</td><td>8.88</td><td>38.5</td><td>-29.6</td></tr><tr><td>836.50</td><td>17.95</td><td>H</td><td>1.0</td><td>-1.4</td><td>15.57</td><td>38.5</td><td>-22.9</td></tr><tr><td>High Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>847.50</td><td>9.79</td><td>V</td><td>1.0</td><td>-1.4</td><td>7.45</td><td>38.5</td><td>-31.1</td></tr><tr><td>847.50</td><td>16.82</td><td>H</td><td>1.0</td><td>-1.4</td><td>14.48</td><td>38.5</td><td>-24.0</td></tr></table>									f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes	Low Ch								825.50	12.48	V	1.0	-1.5	10.05	38.5	-28.4	825.50	18.87	H	1.0	-1.5	16.45	38.5	-22.0	Mid Ch								836.50	11.26	V	1.0	-1.4	8.88	38.5	-29.6	836.50	17.95	H	1.0	-1.4	15.57	38.5	-22.9	High Ch								847.50	9.79	V	1.0	-1.4	7.45	38.5	-31.1	847.50	16.82	H	1.0	-1.4	14.48	38.5	-24.0
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes																																																																																	
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	836.50	11.26	V	1.0	-1.4	8.88	38.5	-29.6																																																																																		
	836.50	17.95	H	1.0	-1.4	15.57	38.5	-22.9																																																																																		
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LTE Band 5 3MHz 16QAM	UL Verification Services, Inc. High Frequency Substitution Measurement Company: Samsung Project #: 4788372835 Date: 2018-03-19 Test Engineer: 47989 Configuration: EUT / X-Position Location: Chamber 1 Mode: LTE_16QAM Band 5 Fundamentals, 3MHz Bandwidth Test Equipment: Receiving: VULB9163-845, and Chamber 2 SMA Cables Substitution: Dipole 3121_DB4, 3m N-type Cable <table><tr><th>f MHz</th><th>SG reading (dBm)</th><th>Ant. Pol. (H/V)</th><th>Cable Loss (dB)</th><th>Antenna Gain (dBd)</th><th>ERP (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></tr><tr><td>825.50</td><td>11.38</td><td>V</td><td>1.0</td><td>-1.5</td><td>8.95</td><td>38.5</td><td>-29.5</td></tr><tr><td>825.50</td><td>17.84</td><td>H</td><td>1.0</td><td>-1.5</td><td>15.42</td><td>38.5</td><td>-23.1</td></tr><tr><td>Mid Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>836.50</td><td>10.35</td><td>V</td><td>1.0</td><td>-1.4</td><td>7.97</td><td>38.5</td><td>-30.5</td></tr><tr><td>836.50</td><td>16.97</td><td>H</td><td>1.0</td><td>-1.4</td><td>14.59</td><td>38.5</td><td>-23.9</td></tr><tr><td>High Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>847.50</td><td>8.91</td><td>V</td><td>1.0</td><td>-1.4</td><td>6.57</td><td>38.5</td><td>-31.9</td></tr><tr><td>847.50</td><td>15.85</td><td>H</td><td>1.0</td><td>-1.4</td><td>13.51</td><td>38.5</td><td>-25.0</td></tr></table>									f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes	Low Ch								825.50	11.38	V	1.0	-1.5	8.95	38.5	-29.5	825.50	17.84	H	1.0	-1.5	15.42	38.5	-23.1	Mid Ch								836.50	10.35	V	1.0	-1.4	7.97	38.5	-30.5	836.50	16.97	H	1.0	-1.4	14.59	38.5	-23.9	High Ch								847.50	8.91	V	1.0	-1.4	6.57	38.5	-31.9	847.50	15.85	H	1.0	-1.4	13.51	38.5	-25.0
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes																																																																																	
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	836.50	10.35	V	1.0	-1.4	7.97	38.5	-30.5																																																																																		
	836.50	16.97	H	1.0	-1.4	14.59	38.5	-23.9																																																																																		
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LTE Band 5 1.4MHz QPSK	UL Verification Services, Inc. High Frequency Substitution Measurement								
	Company: Samsung Project #: 4788372835 Date: 2018-03-19 Test Engineer: 47989 Configuration: EUT / X-Position Location: Chamber 1 Mode: LTE_QPSK Band 5 Fundamentals, 1.4MHz Bandwidth								
	Test Equipment: Receiving: VULB9163-845, and Chamber 2 SMA Cables Substitution: Dipole 3121_DB4, 3m N-type Cable								
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Low Ch								
	824.70	10.61	V	1.0	-1.5	8.19	38.5	-30.3	
	824.70	16.40	H	1.0	-1.5	13.98	38.5	-24.5	
	Mid Ch								
	836.50	8.96	V	1.0	-1.4	6.58	38.5	-31.9	
	836.50	14.83	H	1.0	-1.4	12.45	38.5	-26.1	
LTE Band 5 1.4MHz 16QAM	High Ch								
	848.30	6.70	V	1.0	-1.4	4.36	38.5	-34.1	
	848.30	14.67	H	1.0	-1.4	12.33	38.5	-26.2	
LTE Band 5 1.4MHz 16QAM	UL Verification Services, Inc. High Frequency Substitution Measurement								
	Company: Samsung Project #: 4788372835 Date: 2018-03-19 Test Engineer: 47989 Configuration: EUT / X-Position Location: Chamber 1 Mode: LTE_16QAM Band 5 Fundamentals, 1.4MHz Bandwidth								
	Test Equipment: Receiving: VULB9163-845, and Chamber 2 SMA Cables Substitution: Dipole 3121_DB4, 3m N-type Cable								
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Low Ch								
	824.70	9.64	V	1.0	-1.5	7.22	38.5	-31.3	
	824.70	15.56	H	1.0	-1.5	13.14	38.5	-25.4	
	Mid Ch								
	836.50	7.98	V	1.0	-1.4	5.60	38.5	-32.9	
	836.50	13.89	H	1.0	-1.4	11.51	38.5	-27.0	
LTE Band 5 1.4MHz 16QAM	High Ch								
	848.30	5.66	V	1.0	-1.4	3.32	38.5	-35.2	
	848.30	13.74	H	1.0	-1.4	11.40	38.5	-27.1	

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(h) 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 603 E Clause 2.2.12; ESU40 setting reference to 971168 D01 v03

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;

NOTE : Radiated spurious emissions were investigated 30MHz – 1GHz and above 1GHz. There were no emissions found on below 30MHz and 30MHz – 1GHz.

RESULTS

GSM 850

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GSM 1900

GSM GSM1900 GPRS	UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement Company: Samsung Project #: 4788372835 Date: 2018-03-09 Test Engineer: 45585 Configuration: EUT / Adapter / Earphone, Z-Position Location: Chamber 1 Mode: GPRS 1900 MHz Harmonics									
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
GSM GSM1900 EGPRS	Low Ch, 1850.2MHz									
	3700.40	-4.9	V	3.0	43.8	1.0	-47.7	-13.0	-34.7	
	5550.60	-5.5	V	3.0	43.7	1.0	-48.2	-13.0	-35.2	
	7400.80	-5.5	V	3.0	42.5	1.0	-47.1	-13.0	-34.1	
	3700.40	-5.4	H	3.0	43.8	1.0	-48.2	-13.0	-35.2	
	5550.60	-6.0	H	3.0	43.7	1.0	-48.7	-13.0	-35.7	
	7400.80	-4.8	H	3.0	42.5	1.0	-46.4	-13.0	-33.4	
	Mid Ch, 1880MHz									
	3760.00	-4.7	V	3.0	43.8	1.0	-47.5	-13.0	-34.5	
	5640.00	-5.3	V	3.0	43.7	1.0	-48.0	-13.0	-35.0	
	7520.00	-4.4	V	3.0	42.5	1.0	-45.9	-13.0	-32.9	
	3760.00	-6.0	H	3.0	43.8	1.0	-48.8	-13.0	-35.8	
	5640.00	-5.8	H	3.0	43.7	1.0	-48.5	-13.0	-35.5	
	7520.00	-2.3	H	3.0	42.5	1.0	-43.8	-13.0	-30.8	
	High Ch, 1909.8MHz									
	3819.60	-4.6	V	3.0	43.8	1.0	-47.4	-13.0	-34.4	
	5729.40	-4.2	V	3.0	43.7	1.0	-46.9	-13.0	-33.9	
	7639.20	-3.6	V	3.0	42.4	1.0	-45.0	-13.0	-32.0	
	3819.60	-5.2	H	3.0	43.8	1.0	-48.0	-13.0	-35.0	
	5729.40	-4.8	H	3.0	43.7	1.0	-47.5	-13.0	-34.5	
	7639.20	-3.3	H	3.0	42.4	1.0	-44.7	-13.0	-31.7	
GSM GSM1900 EGPRS	UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement Company: Samsung Project #: 4788372835 Date: 2018-03-09 Test Engineer: 45585 Configuration: EUT / Adapter / Earphone, Z-Position Location: Chamber 1 Mode: EGPRS 1900 MHz Harmonics									
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Low Ch, 1850.2MHz									
	3700.40	-7.2	V	3.0	43.8	1.0	-50.0	-13.0	-37.0	
	5550.60	-5.5	V	3.0	43.7	1.0	-48.2	-13.0	-35.2	
	7400.80	-6.0	V	3.0	42.5	1.0	-47.5	-13.0	-34.5	
	3700.40	-7.7	H	3.0	43.8	1.0	-50.4	-13.0	-37.4	
	5550.60	-5.5	H	3.0	43.7	1.0	-48.2	-13.0	-35.2	
	7400.80	-3.4	H	3.0	42.5	1.0	-45.0	-13.0	-32.0	
	Mid Ch, 1880MHz									
	3760.00	-7.1	V	3.0	43.8	1.0	-49.9	-13.0	-36.9	
	5640.00	-5.5	V	3.0	43.7	1.0	-48.2	-13.0	-35.2	
	7520.00	-5.1	V	3.0	42.5	1.0	-46.6	-13.0	-33.6	
	3760.00	-7.3	H	3.0	43.8	1.0	-50.1	-13.0	-37.1	
	5640.00	-4.6	H	3.0	43.7	1.0	-47.3	-13.0	-34.3	
	7520.00	-5.3	H	3.0	42.5	1.0	-46.7	-13.0	-33.7	
	High Ch, 1909.8MHz									
	3819.60	-5.3	V	3.0	43.8	1.0	-48.1	-13.0	-35.1	
	5729.40	-4.2	V	3.0	43.7	1.0	-46.9	-13.0	-33.9	
	7639.20	-4.5	V	3.0	42.4	1.0	-45.9	-13.0	-32.9	
	3819.60	-6.4	H	3.0	43.8	1.0	-49.2	-13.0	-36.2	
	5729.40	-4.6	H	3.0	43.7	1.0	-47.3	-13.0	-34.3	
	7639.20	-4.3	H	3.0	42.4	1.0	-45.7	-13.0	-32.7	

WCDMA Band 5

WCDMA Band 5 REL99	UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement Company: Samsung Project #: 4788372835 Date: 2018-02-27 Test Engineer: 45585 Configuration: EUT / Adapter / Earphone , X-Position Location: Chamber 1 Mode: Rel99 Band 5 Harmonics									
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
WCDMA Band 5 HSDPA	UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement Company: Samsung Project #: 4788372835 Date: 2018-02-27 Test Engineer: 45585 Configuration: EUT / Adapter / Earphone , X-Position Location: Chamber 1 Mode: HSDPA Band 5 Harmonics									
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes

WCDMA Band 2

WCDMA Band 2 REL99	UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement Company: Samsung Project #: 4788372835 Date: 2018-02-25 Test Engineer: 45585 Configuration: EUT / Adapter / Earphone, Z-Position Location: Chamber 1 Mode: Rel99 Band 2 Harmonics									
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
WCDMA Band 2 HSDPA	UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement Company: Samsung Project #: 4788372835 Date: 2018-03-08 Test Engineer: 45585 Configuration: EUT / Adapter / Earphone, Z-Position Location: Chamber 1 Mode: HSDPA Band 2 Harmonics									
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes

LTE Band 5

LTE Band 5 10MHz QPSK	UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement Company: Samsung Project #: 4788372835 Date: 2018-03-05 Test Engineer: 45585 Configuration: EUT / Adapter / Earphone, X-Position Location: Chamber 1 Mode: LTE_QPSK Band 5 Harmonics, 10MHz Bandwidth									
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Low Ch, 829MHz									
	1658.00	-8.9	V	3.0	43.6	1.0	-51.5	-13.0	-38.5	
	2487.00	-8.4	V	3.0	43.4	1.0	-50.9	-13.0	-37.9	
	3316.00	-9.0	V	3.0	43.6	1.0	-51.6	-13.0	-38.6	
	1658.00	-8.4	H	3.0	43.6	1.0	-51.0	-13.0	-38.0	
	2487.00	-9.2	H	3.0	43.4	1.0	-51.6	-13.0	-38.6	
	3316.00	-8.1	H	3.0	43.6	1.0	-50.7	-13.0	-37.7	
	Mid Ch, 836.5MHz									
	1673.00	-10.1	V	3.0	43.6	1.0	-52.7	-13.0	-39.7	
	2509.50	-6.4	V	3.0	43.4	1.0	-48.8	-13.0	-35.8	
	3346.00	-8.4	V	3.0	43.6	1.0	-51.1	-13.0	-38.1	
	1673.00	-9.9	H	3.0	43.6	1.0	-52.4	-13.0	-39.4	
	2509.50	-7.6	H	3.0	43.4	1.0	-50.1	-13.0	-37.1	
	3346.00	-8.1	H	3.0	43.6	1.0	-50.8	-13.0	-37.8	
	High Ch, 844MHz									
	1688.00	-9.8	V	3.0	43.6	1.0	-52.4	-13.0	-39.4	
	2532.00	-9.5	V	3.0	43.4	1.0	-52.0	-13.0	-39.0	
	3376.00	-8.7	V	3.0	43.7	1.0	-51.4	-13.0	-38.4	
	1688.00	-9.4	H	3.0	43.6	1.0	-51.9	-13.0	-38.9	
	2532.00	-8.8	H	3.0	43.4	1.0	-51.2	-13.0	-38.2	
	3376.00	-8.7	H	3.0	43.7	1.0	-51.4	-13.0	-38.4	
LTE Band 5 10MHz 16QAM	UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement Company: Samsung Project #: 4788372835 Date: 2018-03-05 Test Engineer: 45585 Configuration: EUT / Adapter / Earphone, X-Position Location: Chamber 1 Mode: LTE_16QAM Band 5 Harmonics, 10MHz Bandwidth									
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Low Ch, 829MHz									
	1658.00	-8.5	V	3.0	43.6	1.0	-51.1	-13.0	-38.1	
	2487.00	-9.3	V	3.0	43.4	1.0	-51.7	-13.0	-38.7	
	3316.00	-8.9	V	3.0	43.6	1.0	-51.6	-13.0	-38.6	
	1658.00	-7.6	H	3.0	43.6	1.0	-50.2	-13.0	-37.2	
	2487.00	-8.3	H	3.0	43.4	1.0	-50.7	-13.0	-37.7	
	3316.00	-8.2	H	3.0	43.6	1.0	-50.8	-13.0	-37.8	
	Mid Ch, 836.5MHz									
	1673.00	-9.9	V	3.0	43.6	1.0	-52.4	-13.0	-39.4	
	2509.50	-6.2	V	3.0	43.4	1.0	-48.6	-13.0	-35.6	
	3346.00	-8.3	V	3.0	43.6	1.0	-51.0	-13.0	-38.0	
	1673.00	-9.6	H	3.0	43.6	1.0	-52.2	-13.0	-39.2	
	2509.50	-7.0	H	3.0	43.4	1.0	-49.4	-13.0	-36.4	
	3346.00	-7.6	H	3.0	43.6	1.0	-50.2	-13.0	-37.2	
	High Ch, 844MHz									
	1688.00	-9.7	V	3.0	43.6	1.0	-52.2	-13.0	-39.2	
	2532.00	-9.1	V	3.0	43.4	1.0	-51.6	-13.0	-38.6	
	3376.00	-9.1	V	3.0	43.7	1.0	-51.7	-13.0	-38.7	
	1688.00	-9.5	H	3.0	43.6	1.0	-52.1	-13.0	-39.1	
	2532.00	-8.7	H	3.0	43.4	1.0	-51.2	-13.0	-38.2	
	3376.00	-8.4	H	3.0	43.7	1.0	-51.0	-13.0	-38.0	

LTE Band 5 5MHz QPSK	UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
	Company: Samsung									
	Project #: 4788372835									
	Date: 2018-03-05									
	Test Engineer: 45585									
	Configuration: EUT / Adapter / Earphone, X-Position									
	Location: Chamber 1									
	Mode: LTE_QPSK Band 5 Harmonics, 5MHz Bandwidth									
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Low Ch, 826.5MHz									
	1653.00	-8.8	V	3.0	43.6	1.0	-51.3	-13.0	-38.3	
	2479.50	-9.3	V	3.0	43.4	1.0	-51.7	-13.0	-38.7	
	3306.00	-8.4	V	3.0	43.6	1.0	-51.0	-13.0	-38.0	
	1653.00	-7.0	H	3.0	43.6	1.0	-49.5	-13.0	-36.5	
	2479.50	-7.9	H	3.0	43.4	1.0	-50.3	-13.0	-37.3	
	3306.00	-8.1	H	3.0	43.6	1.0	-50.8	-13.0	-37.8	
	Mid Ch, 836.5MHz									
	1673.00	-9.9	V	3.0	43.6	1.0	-52.4	-13.0	-39.4	
	2509.50	-7.0	V	3.0	43.4	1.0	-49.4	-13.0	-36.4	
	3346.00	-9.2	V	3.0	43.6	1.0	-51.9	-13.0	-38.9	
1673.00	-9.7	H	3.0	43.6	1.0	-52.2	-13.0	-39.2		
2509.50	-7.4	H	3.0	43.4	1.0	-49.8	-13.0	-36.8		
3346.00	-7.8	H	3.0	43.6	1.0	-50.4	-13.0	-37.4		
High Ch, 846.5MHz										
1693.00	-11.1	V	3.0	43.6	1.0	-53.7	-13.0	-40.7		
2539.50	-8.6	V	3.0	43.4	1.0	-51.0	-13.0	-38.0		
3386.00	-7.1	V	3.0	43.7	1.0	-49.7	-13.0	-36.7		
1693.00	-11.2	H	3.0	43.6	1.0	-53.8	-13.0	-40.8		
2539.50	-8.3	H	3.0	43.4	1.0	-50.7	-13.0	-37.7		
3386.00	-8.7	H	3.0	43.7	1.0	-51.4	-13.0	-38.4		
LTE Band 5 5MHz 16QAM	UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
	Company: Samsung									
	Project #: 4788372835									
	Date: 2018-03-05									
	Test Engineer: 45585									
	Configuration: EUT / Adapter / Earphone, X-Position									
	Location: Chamber 1									
	Mode: LTE_16QAM Band 5 Harmonics, 5MHz Bandwidth									
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Low Ch, 826.5MHz									
	1653.00	-8.1	V	3.0	43.6	1.0	-50.7	-13.0	-37.7	
	2479.50	-8.7	V	3.0	43.4	1.0	-51.1	-13.0	-38.1	
	3306.00	-8.6	V	3.0	43.6	1.0	-51.2	-13.0	-38.2	
	1653.00	-7.5	H	3.0	43.6	1.0	-50.1	-13.0	-37.1	
	2479.50	-7.6	H	3.0	43.4	1.0	-50.0	-13.0	-37.0	
	3306.00	-7.8	H	3.0	43.6	1.0	-50.4	-13.0	-37.4	
	Mid Ch, 836.5MHz									
	1673.00	-9.8	V	3.0	43.6	1.0	-52.4	-13.0	-39.4	
	2509.50	-6.9	V	3.0	43.4	1.0	-49.3	-13.0	-36.3	
	3346.00	-9.3	V	3.0	43.6	1.0	-51.9	-13.0	-38.9	
1673.00	-9.7	H	3.0	43.6	1.0	-52.3	-13.0	-39.3		
2509.50	-7.4	H	3.0	43.4	1.0	-49.9	-13.0	-36.9		
3346.00	-8.2	H	3.0	43.6	1.0	-50.9	-13.0	-37.9		
High Ch, 846.5MHz										
1693.00	-11.1	V	3.0	43.6	1.0	-53.7	-13.0	-40.7		
2539.50	-8.5	V	3.0	43.4	1.0	-50.9	-13.0	-37.9		
3386.00	-8.4	V	3.0	43.7	1.0	-51.1	-13.0	-38.1		
1693.00	-10.5	H	3.0	43.6	1.0	-53.1	-13.0	-40.1		
2539.50	-8.8	H	3.0	43.4	1.0	-51.2	-13.0	-38.2		
3386.00	-9.0	H	3.0	43.7	1.0	-51.7	-13.0	-38.7		