

**WCDMA**

B5 REL99



B4 REL99

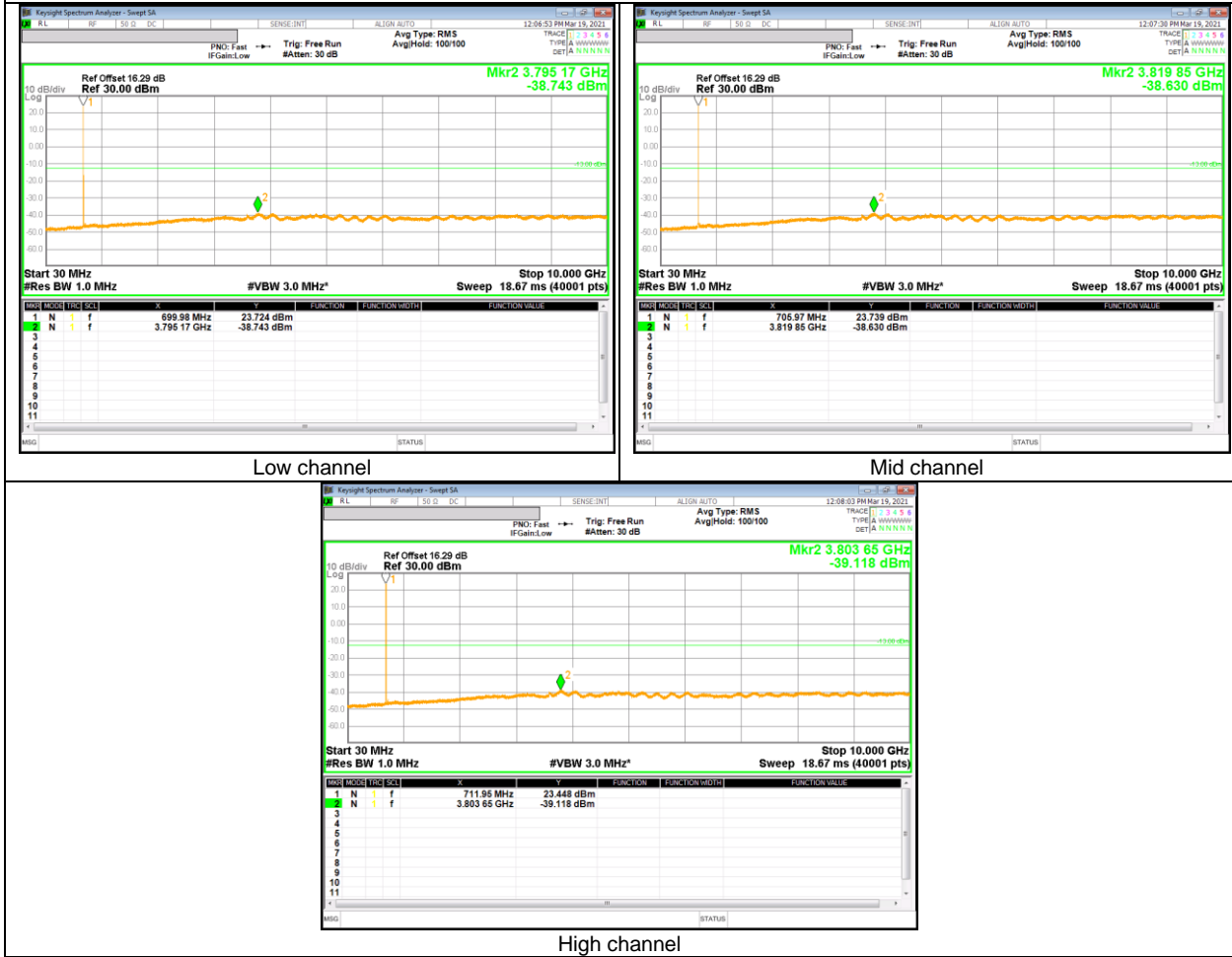


B2 REL99



**LTE Band 12**

5 MHz QPSK



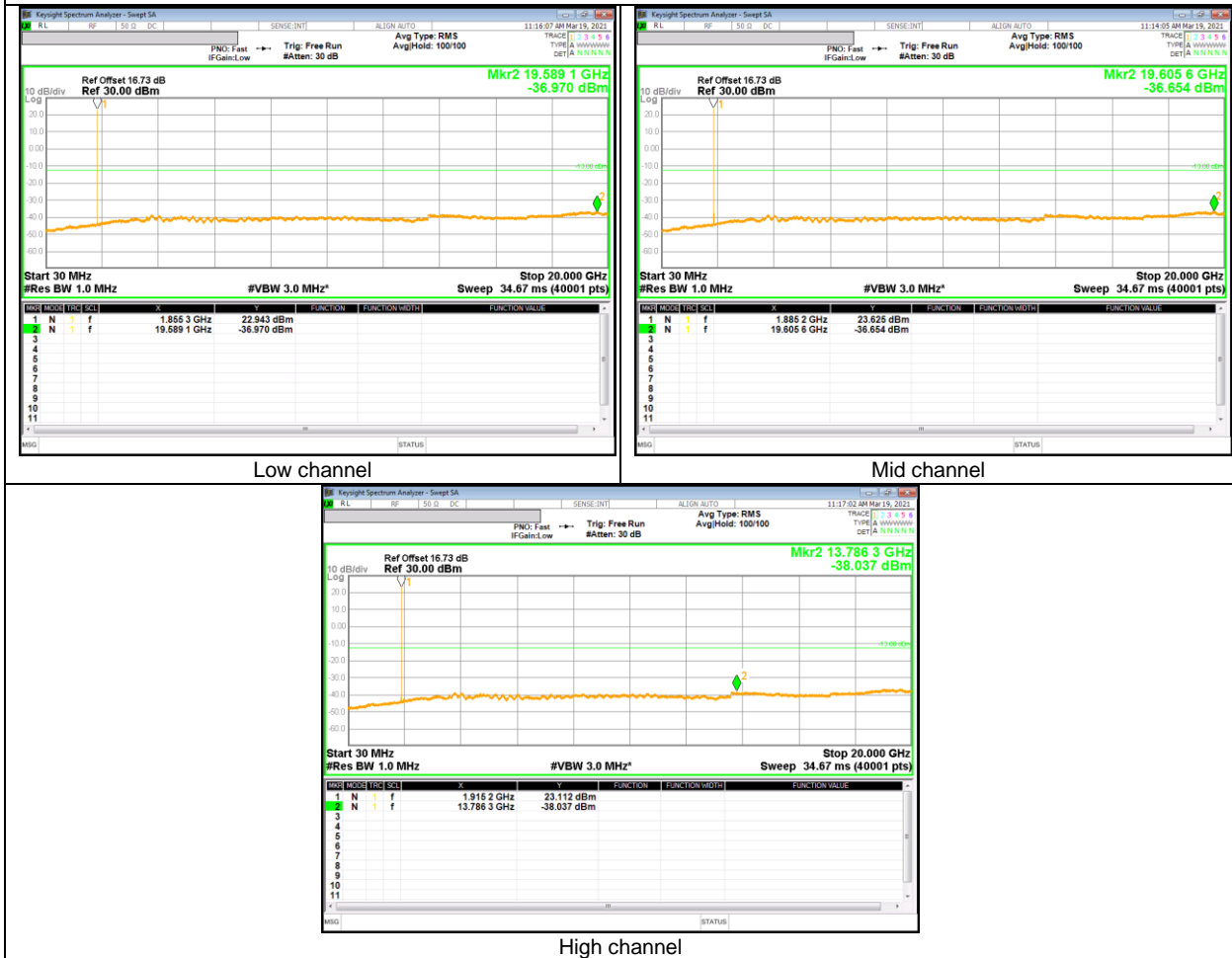
**LTE Band 13**

5 MHz QPSK



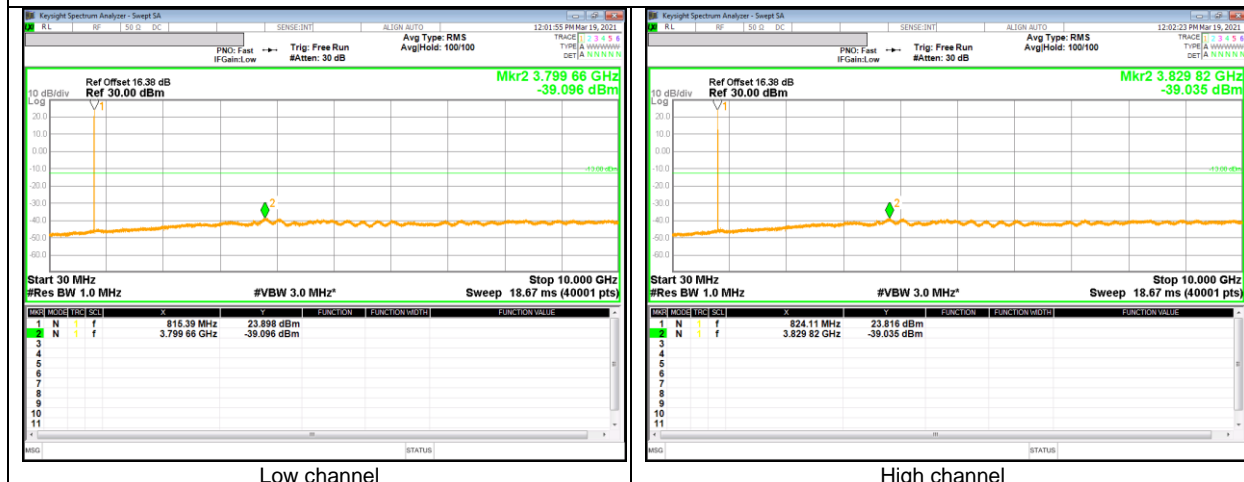
**LTE Band 25**

5 MHz QPSK



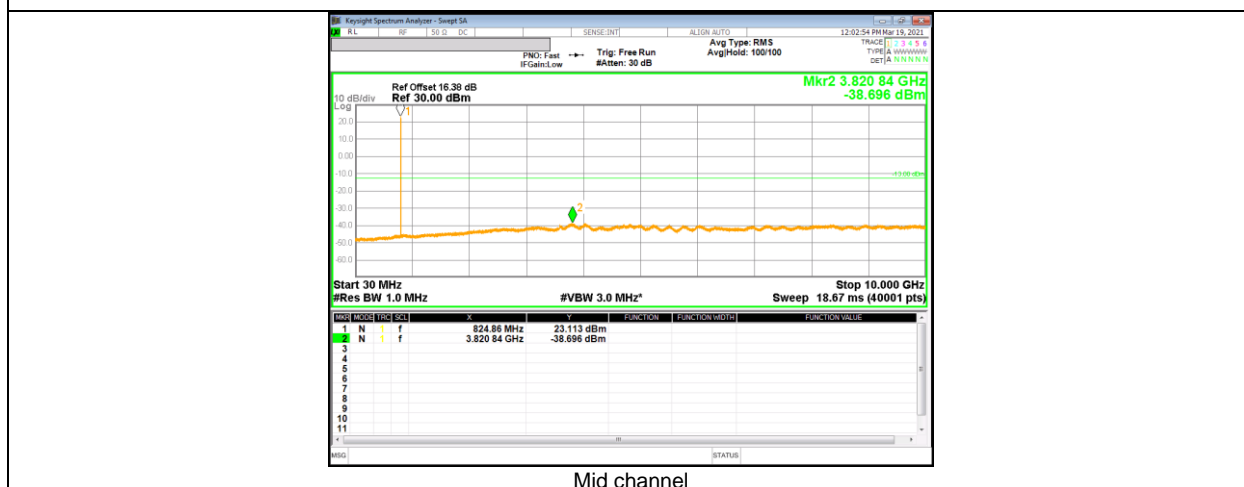
**LTE Band 26 (Part 90)**

1.4 MHz QPSK



**LTE Band 26 (Straddle)**

5 MHz QPSK



**LTE Band 26 (Part 22)**

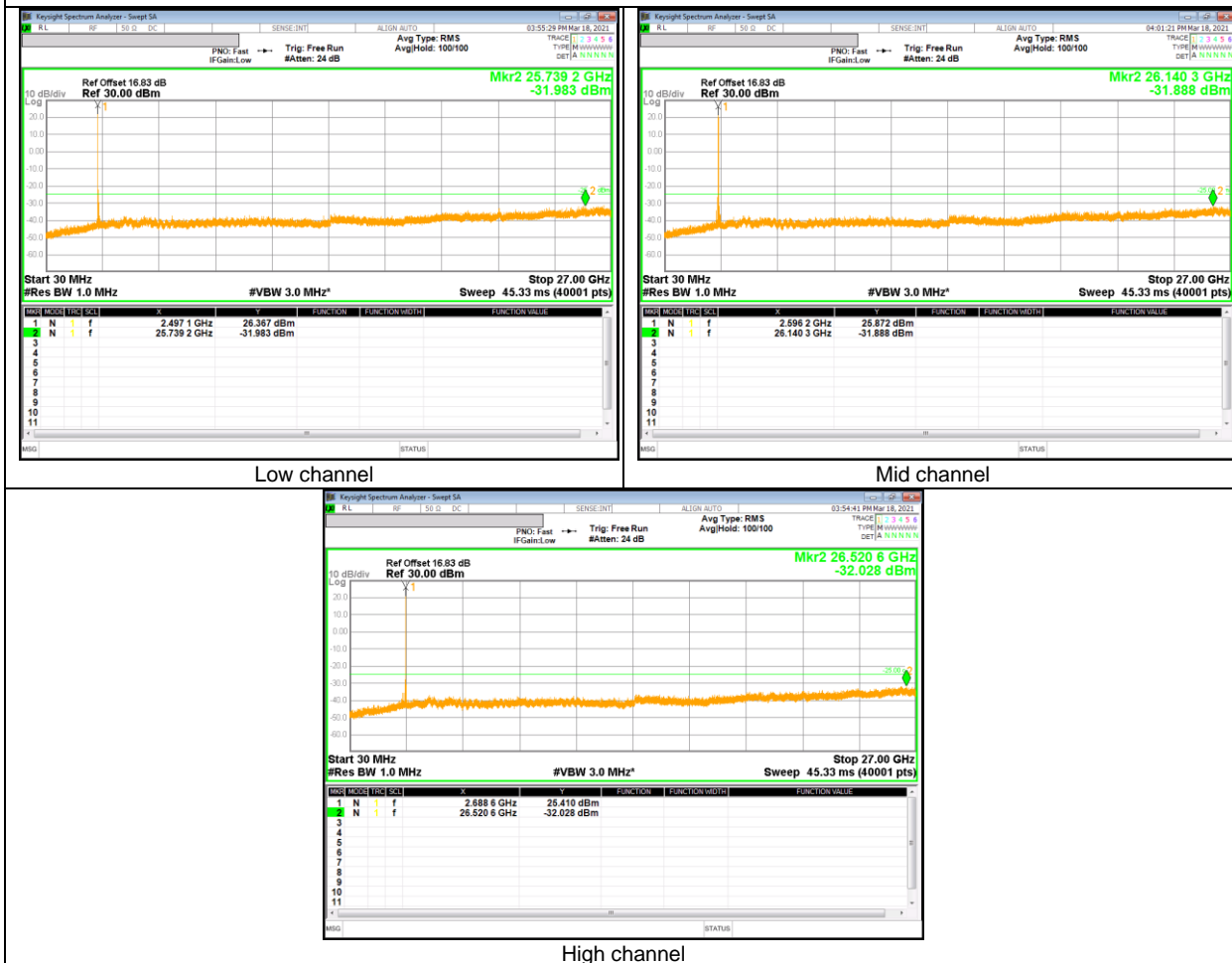
1.4 MHz QPSK





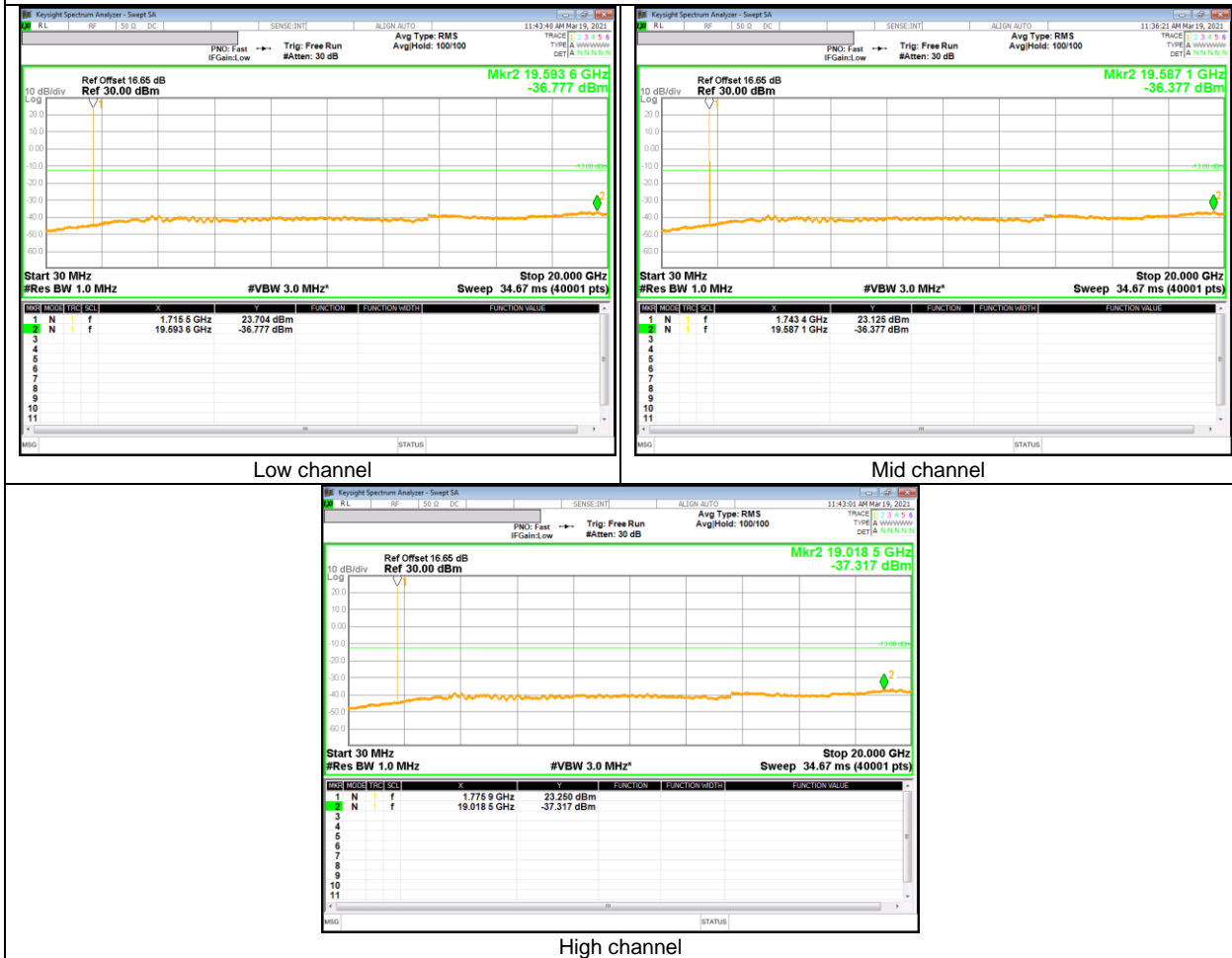
**LTE Band 41**

5 MHz QPSK5



**LTE Band 66**

5 MHz QPSK



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**LTE Band 2**

LTE Band 2(Frequency range: 1850-1910 MHz) is covered by LTE Band 25 (Frequency range: 1850-1915 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

**LTE Band 4**

LTE Band 4 (Frequency range: 1710-1755 MHz) is covered by LTE Band 66 (Frequency range: 1710-1780 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

**LTE Band 5**

LTE Band 5 (Frequency range: 824-849 MHz) is covered by LTE Band 26 (Frequency range: 814-849 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

**LTE Band 17**

LTE Band 17 (Frequency range: 704-716 MHz) is covered by LTE Band 12 (Frequency range: 699-716 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

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## 9.4. FREQUENCY STABILITY

### RULE PART(S)

FCC: §2.1055, §22.355, §24.235, §27.54 and §90.213

### LIMITS

§22.355 - The carrier frequency shall not depart from the reference frequency in excess of  $\pm 2.5$  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.

§90.213 - The carrier frequency shall not depart from the reference frequency in excess of  $\pm 2.5$  ppm for mobile stations.

### TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v03r01

### RESULTS

See the following pages.

**NOTE** : Test were performed each lowest or highest frequency on the modulation condition of more wide bandwidth.(Please refer to section 9.1.1 OBW results)

### 9.4.1. FREQUENCY STABILITY RESULTS

#### GSM 850, Channel 128/251, Frequency 824.2/848.8 MHz

Reference Frequency : GSM850 Low Channel 824.2 MHz / High Channel 848.8 MHz @ 20°C							
Limit: +/- 2.5 ppm =		Low Channel	2060.500	Hz	High Channel	2122.000	Hz
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse				Limit [ppm]	
		Low Channel		High Channel			
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]		
3.86	50	824.20009027	-0.007	848.80010128	-0.004	2.5	
3.86	40	824.20008850	-0.005	848.80009050	0.009	2.5	
3.86	30	824.20008910	-0.005	848.80009480	0.004	2.5	
<b>3.86</b>	<b>20</b>	<b>824.20008460</b>	<b>0.000</b>	<b>848.80009791</b>	<b>0.000</b>	<b>2.5</b>	
3.86	10	824.20003805	0.056	848.80003587	0.073	2.5	
3.86	0	824.20004201	0.052	848.80004412	0.063	2.5	
3.86	-10	824.20007785	0.008	848.80011361	-0.018	2.5	
3.86	-20	824.20009284	-0.010	848.80009438	0.004	2.5	
3.86	-30	824.20009532	-0.013	848.80010196	-0.005	2.5	

Reference Frequency : GSM850 Low Channel 824.2 MHz / High Channel 848.8 MHz @ 20°C							
Limit: +/- 2.5 ppm =		Low Channel	2060.500	Hz	High Channel	2122.000	Hz
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse				Limit [ppm]	
		Low Channel		High Channel			
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]		
3.65	20		0	848.80009791	0	2.5	
4.40	20	824.20000528	-1000000.006	848.80004292	0.065	2.5	
3.65	20	824.20001375	-1000000.017	848.80001255	0.101	2.5	

#### GSM 1900, Channel 512/810, Frequency 1850.0/1910.0 MHz (Lowest Frequency:EGPRS / Highest Frequency: EGPRS)

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW (MHz)	F high @ End of OBW (MHz)		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1850.0766	1909.9215		
Extreme (50C)		1850.0766	1909.9215	25.9	0.014
Extreme (40C)		1850.0766	1909.9215	26.1	0.014
Extreme (30C)		1850.0766	1909.9215	30.2	0.016
Extreme (10C)		1850.0766	1909.9215	27.3	0.015
Extreme (0C)		1850.0766	1909.9215	37.7	0.020
Extreme (-10C)		1850.0766	1909.9216	62.4	0.033
Extreme (-20C)		1850.0767	1909.9216	128.7	0.068
Extreme (-30C)		1850.0768	1909.9217	213.6	0.114
20C		15%	1850.0766	1909.9215	8.9
	-15%	1850.0766	1909.9215	8.4	0.004
	End Point	1850.0766	1909.9215	8.4	0.004

**WCDMA Band 5**

Reference Frequency : WCDMA Band 5 Low Channel 826.4 MHz / High Channel 846.6 MHz @ 20°C							
Limit: +- 2.5 ppm =		Low Channel	2066.000	Hz	High Channel	2116.500	Hz
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse				Limit [ppm]	
		Low Channel		High Channel			
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]		
3.86	50	826.40001858	0.002	846.60005469	-0.043	2.5	
3.86	40	826.40002063	-0.001	846.60004820	-0.035	2.5	
3.86	30	826.40002142	-0.002	846.60002480	-0.007	2.5	
<b>3.86</b>	<b>20</b>	<b>826.40002000</b>	<b>0.000</b>	<b>846.60001848</b>	<b>0.000</b>	<b>2.5</b>	
3.86	10	826.40002015	0.000	846.60002484	-0.008	2.5	
3.86	0	826.40001812	0.002	846.60002135	-0.003	2.5	
3.86	-10	826.40002236	-0.003	846.60007023	-0.061	2.5	
3.86	-20	826.40002881	-0.011	846.60004881	-0.036	2.5	
3.86	-30	826.40002091	-0.001	846.60005353	-0.041	2.5	

Reference Frequency : WCDMA Band 5 Low Channel 826.4 MHz / High Channel 846.6 MHz @ 20°C							
Limit: +- 2.5 ppm =		Low Channel	2066.000	Hz	High Channel	2116.500	Hz
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse				Limit [ppm]	
		Low Channel		High Channel			
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]		
<b>3.85</b>	<b>20</b>	<b>826.40002000</b>	<b>0</b>	<b>846.60001848</b>	<b>0</b>	<b>2.5</b>	
4.40	20	826.40000337	0.020	846.60000263	0.019	2.5	
3.65	20	826.40000330	0.020	846.60000338	0.018	2.5	

**WCDMA Band 4(Lowest Frequency: Rel99 / Highest Frequency: Rel99)**

Limit		1710	1755	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1712.4000	1754.6763		
Extreme (50C)		1712.4000	1754.6763	28.6	0.017
Extreme (40C)		1712.4000	1754.6763	29.2	0.017
Extreme (30C)		1712.4000	1754.6763	30.5	0.018
Extreme (10C)		1712.4000	1754.6763	31.9	0.018
Extreme (0C)		1712.4000	1754.6763	28.1	0.016
Extreme (-10C)		1712.4000	1754.6763	32.1	0.019
Extreme (-20C)		1712.4000	1754.6763	28.6	0.017
Extreme (-30C)		1712.4000	1754.6763	32.7	0.019
20C		15%	1712.4000	1754.6763	9.1
	-15%	1712.4000	1754.6763	10.1	0.006
	End Point	1712.4000	1754.6763	10.2	0.006

**WCDMA Band 2 (Lowest Frequency: Rel99/ Highest Frequency: Rel99)**

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1850.3179	1909.6771	35.0	0.019
Extreme (50C)		1850.3179	1909.6771		
Extreme (40C)		1850.3179	1909.6771		
Extreme (30C)		1850.3179	1909.6771		
Extreme (10C)		1850.3179	1909.6771		
Extreme (0C)		1850.3179	1909.6771		
Extreme (-10C)		1850.3179	1909.6771		
Extreme (-20C)		1850.3179	1909.6771		
Extreme (-30C)		1850.3179	1909.6771		
20C		15%	1850.3179		
	-15%	1850.3179	1909.6771	6.3	0.003
	End Point	1850.3179	1909.6771	7.8	0.004

**LTE Band 12 (Lowest Frequency: QPSK / Highest Frequency: 16QAM)**

Limit		699	716	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	699.1563	715.8418	11.5	0.016
Extreme (50C)		699.1563	715.8418		
Extreme (40C)		699.1563	715.8418		
Extreme (30C)		699.1563	715.8418		
Extreme (10C)		699.1563	715.8418		
Extreme (0C)		699.1563	715.8418		
Extreme (-10C)		699.1563	715.8418		
Extreme (-20C)		699.1563	715.8418		
Extreme (-30C)		699.1563	715.8418		
20C		15%	699.1563		
	-15%	699.1563	715.8418	4.5	0.006
	End Point	699.1563	715.8418	27.5	0.039

**LTE Band 13 (Lowest Frequency: QPSK / Highest Frequency: QPSK)**

Limit		777	787	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	777.2516	786.7468	21.6	0.028
Extreme (50C)		777.2516	786.7468		
Extreme (40C)		777.2516	786.7468		
Extreme (30C)		777.2516	786.7468		
Extreme (10C)		777.2516	786.7468		
Extreme (0C)		777.2516	786.7468		
Extreme (-10C)		777.2516	786.7468		
Extreme (-20C)		777.2516	786.7468		
Extreme (-30C)		777.2516	786.7468		
20C		15%	777.2516		
	-15%	777.2516	786.7468	14.1	0.018
	End Point	777.2516	786.7468	13.1	0.017

**LTE Band 25 (Lowest Frequency:16QAM / Highest Frequency: QPSK)**

Limit		1850	1915	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1850.1593	1914.8439	54.6	0.029
Extreme (50C)		1850.1593	1914.8439		
Extreme (40C)		1850.1593	1914.8439		
Extreme (30C)		1850.1593	1914.8439		
Extreme (10C)		1850.1593	1914.8439		
Extreme (0C)		1850.1593	1914.8439		
Extreme (-10C)		1850.1593	1914.8439		
Extreme (-20C)		1850.1593	1914.8439		
Extreme (-30C)		1850.1593	1914.8439		
20C		15%	1850.1593		
	-15%	1850.1593	1914.8439	8.6	0.005
	End Point	1850.1593	1914.8439	7.7	0.004



**LTE Band 26**

Reference Frequency : LTE Band 26 Low Channel 814.7 MHz / High Channel 848.3 MHz @ 20°C							
Limit: +/- 2.5 ppm =		Low Channel	2036.750	Hz	High Channel	2120.750	Hz
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse				Limit [ppm]	
		Low Channel		High Channel			
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]		
3.86	50	814.70005620	0.000	848.30009050	-0.035	2.5	
3.86	40	814.70005415	0.003	848.30005680	0.005	2.5	
3.86	30	814.70003309	0.028	848.30006208	-0.001	2.5	
<b>3.86</b>	<b>20</b>	<b>814.70005624</b>	<b>0.000</b>	<b>848.30006113</b>	<b>0.000</b>	<b>2.5</b>	
3.86	10	814.70005817	-0.002	848.30008348	-0.026	2.5	
3.86	0	814.70005408	0.003	848.30007312	-0.014	2.5	
3.86	-10	814.70001978	0.045	848.30002124	0.047	2.5	
3.86	-20	814.70003255	0.029	848.30009859	-0.044	2.5	
3.86	-30	814.70001607	0.049	848.30009457	-0.039	2.5	

Reference Frequency : LTE Band 26 Low Channel 814.7 MHz / High Channel 848.3 MHz @ 20°C							
Limit: +/- 2.5 ppm =		Low Channel	2036.750	Hz	High Channel	2120.750	Hz
Power Supply [Vdc]	Environment Temperature [°C]	Frequency Deviation Measured with Time Elapse				Limit [ppm]	
		Low Channel		High Channel			
		[MHz]	Delta [ppm]	[MHz]	Delta [ppm]		
3.85	20	814.70005624	0	848.30006113	0	2.5	
4.40	20	814.70001130	0.055	848.30001372	0.056	2.5	
3.65	20	814.70001270	0.053	848.30001413	0.055	2.5	

**LTE Band 41 (Lowest Frequency: 16QAM / Highest Frequency: 16QAM)**

Limit		2496	2690	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW (MHz)	F high @ End of OBW (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	2496.2512	2689.7440		
Extreme (50C)		2496.2512	2689.7440	20.5	0.008
Extreme (40C)		2496.2512	2689.7440	21.9	0.008
Extreme (30C)		2496.2512	2689.7440	18.7	0.007
Extreme (10C)		2496.2512	2689.7440	19.8	0.008
Extreme (0C)		2496.2512	2689.7440	22.4	0.009
Extreme (-10C)		2496.2512	2689.7440	10.8	0.004
Extreme (-20C)		2496.2512	2689.7440	18.6	0.007
Extreme (-30C)		2496.2512	2689.7440	21.9	0.008
20C	15%	2496.2512	2689.7440	10.9	0.004
	-15%	2496.2512	2689.7440	11.3	0.004
	End Point	2496.2512	2689.7440	13.8	0.005

**LTE Band 66 (Lowest Frequency: 16QAM / Highest Frequency: 16QAM)**

Limit		1710	1780	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1710.1566	1779.8414		
Extreme (50C)		1710.1566	1779.8414	55.0	0.032
Extreme (40C)		1710.1566	1779.8414	64.9	0.037
Extreme (30C)		1710.1567	1779.8415	103.2	0.059
Extreme (10C)		1710.1566	1779.8414	66.9	0.038
Extreme (0C)		1710.1566	1779.8414	54.8	0.031
Extreme (-10C)		1710.1567	1779.8415	104.2	0.060
Extreme (-20C)		1710.1567	1779.8415	120.1	0.069
Extreme (-30C)		1710.1566	1779.8414	98.5	0.056
20C	15%	1710.1566	1779.8414	6.4	0.004
	-15%	1710.1566	1779.8414	6.5	0.004
	End Point	1710.1567	1779.8414	6.8	0.004

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**LTE Band 2**

LTE Band 2(Frequency range: 1850-1910 MHz) is covered by LTE Band 25 (Frequency range: 1850-1915 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

**LTE Band 4**

LTE Band 4 (Frequency range: 1710-1755 MHz) is covered by LTE Band 66 (Frequency range: 1710-1780 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

**LTE Band 5**

LTE Band 5 (Frequency range: 824-849 MHz) is covered by LTE Band 26 (Frequency range: 814-849 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

**LTE Band 17**

LTE Band 17 (Frequency range: 704-716 MHz) is covered by LTE Band 12 (Frequency range: 699-716 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

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## 9.5. RADIATED POWER (ERP & EIRP)

### RULE PART(S)

FCC: §2.1046, §22.913, §24.232, §27.50, §27.53 and §90.635

### 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:

(a)(3) Mobile and portable stations. (i) For mobile and portable stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, except that for mobile and portable stations compliant with 3GPP LTE standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth. For mobile and portable stations using time division duplexing (TDD) technology, the duty cycle must not exceed 38 percent in the 2305-2315 MHz and 2350-2360 MHz bands. Mobile and portable stations using FDD technology are restricted to transmitting in the 2305-2315 MHz band. Power averaging shall not include intervals in which the transmitter is off.

(b)(10) Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.

(c) (10) - Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.

(d) (4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.

(h) The following power limits shall apply in the BRS and EBS:

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

90.635(b) – The maximum output power of the transmitter for mobile stations is 100 watts (20dBw).

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**TEST PROCEDURE**

ANSI / TIA / EIA 603 E Clause 2.2.17; ESU40 setting reference to 971168 D01 v03r01

For radiated output 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 = rms;
- f) Ensure that the number of measurement points  $\geq$  2  $\times$  span/RBW;
- g) Trace mode = max hold(GSM, WCDMA), average(LTE);

**TEST RESULTS**

**9.5.1. ERP/EIRP Results**

**GSM**

Band	Mode	Channel	f [MHz]	ERP / EIRP	
				[dBm]	[mW]
GSM850	GPRS	128	824.2	<b>32.32</b>	<b>1706.08</b>
		190	836.6	31.57	1435.49
		251	848.8	30.80	1202.26
	EGPRS	128	824.2	<b>29.21</b>	<b>833.68</b>
		190	836.6	28.92	779.83
		251	848.8	27.76	597.04
GSM1900	GPRS	512	1850.2	30.63	1156.11
		661	1880.0	<b>31.70</b>	<b>1479.11</b>
		810	1909.8	30.57	1140.25
	EGPRS	512	1850.2	27.68	586.14
		661	1880.0	<b>28.81</b>	<b>760.33</b>
		810	1909.8	27.32	539.51

**WCDMA**

Band	Mode	Channel	f [MHz]	ERP / EIRP	
				[dBm]	[mW]
Band 5	REL99	4132	826.4	21.21	132.13
		4183	836.6	22.20	165.96
		4233	846.6	<b>22.57</b>	<b>180.72</b>
	HSDPA	4132	826.4	20.76	119.12
		4183	836.6	21.44	139.32
		4233	846.6	<b>21.48</b>	<b>140.60</b>
Band 4	REL99	1312	1712.4	22.59	181.55
		1413	1732.6	23.50	223.87
		1513	1752.6	<b>23.63</b>	<b>230.67</b>
	HSDPA	1312	1712.4	21.59	144.21
		1413	1732.6	22.24	167.49
		1513	1752.6	<b>22.67</b>	<b>184.93</b>
Band 2	REL99	9262	1852.4	22.06	160.69
		9400	1880.0	23.43	220.29
		9538	1907.6	<b>23.51</b>	<b>224.39</b>
	HSDPA	9262	1852.4	21.07	127.94
		9400	1880.0	22.41	174.18
		9538	1907.6	<b>22.63</b>	<b>183.23</b>

**LTE Band 12**

Band	BW [MHz]	Mode	RB Size/ RB Offset	f [MHz]	ERP / EIRP	
					[dBm]	[mW]
Band 12	10	QPSK	1/0	704.0	<b>20.05</b>	<b>101.16</b>
			1/0	707.5	19.73	93.97
			1/0	711.0	20.00	100.00
		16QAM	1/0	704.0	<b>19.13</b>	<b>81.85</b>
			1/0	707.5	18.83	76.38
			1/0	711.0	18.83	76.38
	5	QPSK	1/0	701.5	<b>20.20</b>	<b>104.71</b>
			1/0	707.5	19.95	98.86
			1/0	713.5	19.75	94.41
		16QAM	1/0	701.5	<b>19.47</b>	<b>88.51</b>
			1/0	707.5	18.82	76.21
			1/0	713.5	18.82	76.21
	3	QPSK	1/8	700.5	<b>20.11</b>	<b>102.57</b>
			1/0	707.5	19.98	99.54
			1/0	714.5	20.01	100.23
		16QAM	1/0	700.5	18.77	75.34
			1/0	707.5	18.90	77.62
			1/0	714.5	<b>18.91</b>	<b>77.80</b>
	1.4	QPSK	1/3	699.7	<b>19.98</b>	<b>99.54</b>
			1/3	707.5	19.91	97.95
			1/3	715.3	18.64	73.11
16QAM		1/3	699.7	<b>19.12</b>	<b>81.66</b>	
		1/3	707.5	18.48	70.47	
		1/3	715.3	17.63	57.94	

**LTE Band 13**

Band	BW [MHz]	Mode	RB size / RB Offset	f [MHz]	ERP / EIRP	
					[dBm]	[mW]
Band 13	10	QPSK	1/49	782.0	<b>21.96</b>	<b>157.04</b>
		16QAM	1/0	782.0	21.23	132.74
	5	QPSK	1/24	779.5	<b>22.08</b>	<b>161.44</b>
			1/24	782.0	21.90	154.88
			1/24	784.5	21.85	153.11
	16QAM	1/24	779.5	<b>21.08</b>	<b>128.23</b>	
		1/24	782.0	21.06	127.64	
		1/24	784.5	21.03	126.77	

**LTE Band 25**

Band	BW [MHz]	Mode	RB Size/	f [MHz]	ERP / EIRP	
			RB Offset		[dBm]	[mW]
Band 25	20	QPSK	1/99	1860.0	<b>23.58</b>	<b>228.03</b>
			1/49	1882.5	23.10	204.17
			1/0	1905.0	23.42	219.79
		16QAM	1/0	1860.0	<b>23.33</b>	<b>215.28</b>
			1/49	1882.5	21.86	153.46
			1/0	1905.0	22.40	173.78
	15	QPSK	1/37	1857.5	23.48	222.84
			1/74	1882.5	23.09	203.70
			1/0	1907.5	<b>23.74</b>	<b>236.59</b>
		16QAM	1/37	1857.5	<b>22.71</b>	<b>186.64</b>
			1/37	1882.5	21.86	153.46
			1/0	1907.5	22.45	175.79
	10	QPSK	1/25	1855.0	<b>23.98</b>	<b>250.03</b>
			1/25	1882.5	23.04	201.37
			1/0	1910.0	23.24	210.86
		16QAM	1/25	1855.0	<b>22.83</b>	<b>191.87</b>
			1/25	1882.5	22.19	165.58
			1/0	1910.0	22.45	175.79
	5	QPSK	1/24	1852.5	<b>23.72</b>	<b>235.50</b>
			1/24	1882.5	23.22	209.89
			1/24	1912.5	23.19	208.45
		16QAM	1/24	1852.5	<b>22.95</b>	<b>197.24</b>
			1/24	1882.5	21.78	150.66
			1/24	1912.5	22.43	174.98
	3	QPSK	1/14	1851.5	<b>23.88</b>	<b>244.34</b>
			1/14	1882.5	22.98	198.61
			1/14	1913.5	23.23	210.38
		16QAM	1/14	1851.5	<b>22.93</b>	<b>196.34</b>
			1/14	1882.5	22.26	168.27
			1/14	1913.5	22.64	183.65
1.4	QPSK	1/3	1850.7	<b>23.75</b>	<b>237.14</b>	
		1/3	1882.5	23.23	210.38	
		1/3	1914.3	23.20	208.93	
	16QAM	1/3	1850.7	<b>22.53</b>	<b>179.06</b>	
		1/3	1882.5	22.04	159.96	
		1/3	1914.3	22.11	162.55	



**LTE Band 26**

Band	BW [MHz]	Mode	RB Size/	f [MHz]	ERP/EIRP	
			RB Offset		[dBm]	[mW]
Band 26	15	QPSK	1/0	821.5	22.63	183.23
			1/0	831.5	<b>23.89</b>	<b>244.91</b>
			1/0	841.5	23.82	240.99
		16QAM	1/0	821.5	21.72	148.59
			1/0	831.5	<b>23.40</b>	<b>218.78</b>
			1/0	841.5	22.77	189.23
	10	QPSK	1/0	819.0	22.44	175.39
			1/49	829.0	<b>23.53</b>	<b>225.42</b>
			1/0	831.5	23.42	219.79
			1/0	844.0	23.24	210.86
		16QAM	1/0	819.0	21.16	130.62
			1/49	829.0	<b>22.58</b>	<b>181.13</b>
			1/0	831.5	22.39	173.38
			1/0	844.0	22.59	181.55
	5	QPSK	1/12	816.5	21.81	151.71
			1/12	821.5	23.36	216.77
			1/12	826.5	<b>23.66</b>	<b>232.27</b>
			1/12	831.5	23.18	207.97
			1/0	846.5	22.48	177.01
		16QAM	1/24	816.5	20.95	124.45
			1/12	821.5	22.57	180.72
			1/12	826.5	<b>22.79</b>	<b>190.11</b>
			1/0	831.5	22.28	169.04
			1/0	846.5	21.62	145.21
	3	QPSK	1/14	815.5	21.65	146.22
			1/8	822.5	23.42	219.79
			1/8	825.5	<b>23.79</b>	<b>239.33</b>
			1/0	831.5	23.36	216.77
			1/0	847.5	22.19	165.58
		16QAM	1/0	815.5	20.67	116.68
			1/8	822.5	22.85	192.75
			1/8	825.5	<b>23.17</b>	<b>207.49</b>
			1/14	831.5	22.16	164.44
			1/0	847.5	21.63	145.55
	1.4	QPSK	1/3	814.7	21.49	140.93
			1/3	823.3	23.46	221.82
			1/3	824.7	<b>23.68</b>	<b>233.35</b>
			1/3	831.5	23.30	213.80
			1/3	848.3	22.34	171.40
		16QAM	1/3	814.7	20.52	112.72
1/3			823.3	22.22	166.72	
1/3			824.7	<b>22.77</b>	<b>189.23</b>	
1/3			831.5	22.11	162.55	
1/3			848.3	21.33	135.83	

**LTE Band 26 (Straddle)**

Band	BW [MHz]	Mode	RB Size/ RB Offset	f [MHz]	ERP/EIRP	
					[dBm]	[mW]
Band 26 Straddle	15	QPSK	1/37	824	23.04	201.37
		16QAM	1/37		22.55	179.89
	10	QPSK	1/49	824	23.44	220.80
		16QAM	1/25		22.94	196.79
	5	QPSK	1/24	824	23.29	213.30
		16QAM	1/24		22.66	184.50
	3	QPSK	1/8	824	23.59	228.56
		16QAM	1/8		22.49	177.42
	1.4	QPSK	1/3	824	23.48	222.84
		16QAM	1/3		22.69	185.78

**LTE Band 41**

Band	BW [MHz]	Mode	RB Size/ RB Offset	f [MHz]	ERP / EIRP	
					[dBm]	[mW]
Band 41	20	QPSK	1/0	2506.0	23.26	211.84
			1/49	2593.0	24.50	281.84
			1/0	2680.0	<b>24.99</b>	<b>315.50</b>
		16QAM	1/0	2506.0	22.61	182.39
			1/49	2593.0	24.10	257.04
			1/49	2680.0	<b>25.29</b>	<b>338.06</b>
	15	QPSK	1/37	2503.5	23.19	208.45
			1/37	2593.0	24.75	298.54
			1/37	2682.5	<b>25.48</b>	<b>353.18</b>
		16QAM	1/37	2503.5	23.12	205.12
			1/37	2593.0	<b>24.43</b>	<b>277.33</b>
			1/37	2682.5	23.50	223.87
	10	QPSK	1/25	2501.0	22.88	194.09
			1/25	2593.0	24.70	295.12
			1/25	2685.0	<b>25.47</b>	<b>352.37</b>
		16QAM	1/0	2501.0	23.16	207.01
			1/25	2593.0	24.24	265.46
			1/25	2685.0	<b>25.50</b>	<b>354.81</b>
	5	QPSK	1/0	2498.5	23.77	238.23
			1/24	2593.0	24.85	305.49
			1/24	2687.5	<b>25.69</b>	<b>370.68</b>
		16QAM	1/12	2498.5	23.90	245.47
			1/12	2593.0	24.44	277.97
			1/12	2687.5	<b>25.51</b>	<b>355.63</b>

**LTE Band 66**

Band	BW [MHz]	Mode	RB Size/	f [MHz]	ERP / EIRP	
			RB Offset		[dBm]	[mW]
Band 66	20	QPSK	1/49	1720.0	23.20	208.93
			1/49	1745.0	<b>23.97</b>	<b>249.46</b>
			1/0	1770.0	23.53	225.42
		16QAM	1/49	1720.0	21.85	153.11
			1/49	1745.0	<b>23.00</b>	<b>199.53</b>
			1/0	1770.0	22.43	174.98
	15	QPSK	1/37	1717.5	23.18	207.97
			1/37	1747.5	<b>24.07</b>	<b>255.27</b>
			1/0	1772.5	23.32	214.78
		16QAM	1/37	1717.5	22.21	166.34
			1/37	1747.5	<b>23.05</b>	<b>201.84</b>
			1/0	1772.5	22.40	173.78
	10	QPSK	1/25	1715.0	23.35	216.27
			1/25	1745.0	<b>24.02</b>	<b>252.35</b>
			1/25	1775.0	23.84	242.10
		16QAM	1/25	1715.0	22.18	165.20
			1/25	1745.0	<b>23.33</b>	<b>215.28</b>
			1/25	1775.0	22.64	183.65
	5	QPSK	1/24	1712.5	23.73	236.05
			1/12	1745.0	<b>24.71</b>	<b>295.80</b>
			1/0	1777.5	23.72	235.50
		16QAM	1/12	1712.5	22.78	189.67
			1/12	1745.0	<b>22.87</b>	<b>193.64</b>
			1/0	1777.5	22.69	185.78
	3	QPSK	1/14	1711.5	23.52	224.91
			1/0	1745.0	<b>24.29</b>	<b>268.53</b>
			1/0	1778.5	23.76	237.68
		16QAM	1/0	1711.5	22.32	170.61
			1/0	1745.0	<b>23.45</b>	<b>221.31</b>
			1/0	1778.5	22.84	192.31
1.4	QPSK	1/3	1710.7	23.53	225.42	
		1/3	1745.0	<b>24.34</b>	<b>271.64</b>	
		1/3	1779.3	23.40	218.78	
	16QAM	1/3	1710.7	22.56	180.30	
		1/3	1745.0	<b>23.41</b>	<b>219.28</b>	
		1/3	1779.3	22.32	170.61	

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**LTE Band 2**

LTE Band 2(Frequency range: 1850-1910 MHz) is covered by LTE Band 25 (Frequency range: 1850-1915 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

**LTE Band 66**

LTE Band 4 (Frequency range: 1710-1755 MHz) is covered by LTE Band 66 (Frequency range: 1710-1780 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

**LTE Band 5**

LTE Band 5 (Frequency range: 824-849 MHz) is covered by LTE Band 26 (Frequency range: 814-849 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

**LTE Band 17**

LTE Band 17 (Frequency range: 704-716 MHz) is covered by LTE Band 12 (Frequency range: 699-716 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

**9.5.2. ERP/EIRP DATA**

**GSM**

GSM850  GPRS	<p style="text-align: center;"><b>UL Verification Services, Inc.</b>  <b>High Frequency Substitution Measurement</b></p> <p><b>Company:</b> Samsung  <b>Project #:</b> 4789841431  <b>Date:</b> 2021-03-09  <b>Test Engineer:</b> 20890  <b>Configuration:</b> EUT, Y-Position  <b>Location:</b> Chamber 1  <b>Mode:</b> GPRS 850 MHz Fundamentals</p> <p><b>Test Equipment:</b>                  Receiving: VULB9163-750, and Chamber 1 SMA Cables                  Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable</p> <table border="1"> <thead> <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> </thead> <tbody> <tr> <td colspan="9"><b>Low Ch</b></td> </tr> <tr> <td>824.20</td> <td>36.31</td> <td>V</td> <td>3.0</td> <td>-1.0</td> <td>32.32</td> <td>38.5</td> <td>-6.2</td> <td></td> </tr> <tr> <td>824.20</td> <td>27.13</td> <td>H</td> <td>3.0</td> <td>-1.0</td> <td>23.13</td> <td>38.5</td> <td>-15.4</td> <td></td> </tr> <tr> <td colspan="9"><b>Mid Ch</b></td> </tr> <tr> <td>836.60</td> <td>35.54</td> <td>V</td> <td>3.1</td> <td>-0.9</td> <td>31.57</td> <td>38.5</td> <td>-6.9</td> <td></td> </tr> <tr> <td>836.60</td> <td>26.28</td> <td>H</td> <td>3.1</td> <td>-0.9</td> <td>22.32</td> <td>38.5</td> <td>-16.2</td> <td></td> </tr> <tr> <td colspan="9"><b>High Ch</b></td> </tr> <tr> <td>848.80</td> <td>34.74</td> <td>V</td> <td>3.1</td> <td>-0.9</td> <td>30.80</td> <td>38.5</td> <td>-7.7</td> <td></td> </tr> <tr> <td>848.80</td> <td>25.84</td> <td>H</td> <td>3.1</td> <td>-0.9</td> <td>21.90</td> <td>38.5</td> <td>-16.6</td> <td></td> </tr> </tbody> </table>								f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes	<b>Low Ch</b>									824.20	36.31	V	3.0	-1.0	32.32	38.5	-6.2		824.20	27.13	H	3.0	-1.0	23.13	38.5	-15.4		<b>Mid Ch</b>									836.60	35.54	V	3.1	-0.9	31.57	38.5	-6.9		836.60	26.28	H	3.1	-0.9	22.32	38.5	-16.2		<b>High Ch</b>									848.80	34.74	V	3.1	-0.9	30.80	38.5	-7.7		848.80	25.84	H	3.1	-0.9	21.90	38.5	-16.6	
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824.20	23.34	H	3.0	-1.0	19.34	38.5	-19.2																																																																																											
<b>Mid Ch</b>																																																																																																		
836.60	32.89	V	3.1	-0.9	28.92	38.5	-9.6																																																																																											
836.60	24.23	H	3.1	-0.9	20.27	38.5	-18.2																																																																																											
<b>High Ch</b>																																																																																																		
848.80	31.70	V	3.1	-0.9	27.76	38.5	-10.7																																																																																											
848.80	22.78	H	3.1	-0.9	18.84	38.5	-19.7																																																																																											

GSM1900  GPRS	<b>UL Verification Services, Inc.</b> <b>High Frequency Substitution Measurement</b>								
	<b>Company:</b> Samsung <b>Project #:</b> 4789841420 <b>Date:</b> 2021-03-11 <b>Test Engineer:</b> 20881 <b>Configuration:</b> EUT, Z-Position <b>Location:</b> Chamber 1 <b>Mode:</b> GPRS 1900 MHz Fundamentals  <b>Test Equipment:</b> Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables Substitution: Horn 3115[00167211], 8.5m SMA-type Cable								
	<b>f</b>	<b>SG reading</b>	<b>Ant. Pol.</b>	<b>Cable Loss</b>	<b>Antenna Gain</b>	<b>EIRP</b>	<b>Limit</b>	<b>Delta</b>	<b>Notes</b>
	<b>MHz</b>	<b>(dBm)</b>	<b>(H/V)</b>	<b>(dB)</b>	<b>(dBi)</b>	<b>(dBm)</b>	<b>(dBm)</b>	<b>(dB)</b>	
	Low Ch								
	1850.20	22.99	V	4.5	9.6	28.06	33.0	-4.9	
	1850.20	25.56	H	4.5	9.6	30.63	33.0	-2.4	
	Mid Ch								
	1880.00	23.92	V	4.6	9.4	28.73	33.0	-4.3	
	1880.00	26.89	H	4.6	9.4	31.70	33.0	-1.3	
	High Ch								
	1909.80	24.03	V	4.6	9.1	28.55	33.0	-4.5	
	1909.80	26.05	H	4.6	9.1	30.57	33.0	-2.4	
GSM1900  EGPRS	<b>UL Verification Services, Inc.</b> <b>High Frequency Substitution Measurement</b>								
	<b>Company:</b> Samsung <b>Project #:</b> 4789841420 <b>Date:</b> 2021-03-11 <b>Test Engineer:</b> 20881 <b>Configuration:</b> EUT, Z-Position <b>Location:</b> Chamber 1 <b>Mode:</b> EGPRS 1900 MHz Fundamentals  <b>Test Equipment:</b> Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables Substitution: Horn 3115[00167211], 8.5m SMA-type Cable								
	<b>f</b>	<b>SG reading</b>	<b>Ant. Pol.</b>	<b>Cable Loss</b>	<b>Antenna Gain</b>	<b>EIRP</b>	<b>Limit</b>	<b>Delta</b>	<b>Notes</b>
	<b>MHz</b>	<b>(dBm)</b>	<b>(H/V)</b>	<b>(dB)</b>	<b>(dBi)</b>	<b>(dBm)</b>	<b>(dBm)</b>	<b>(dB)</b>	
	Low Ch								
	1850.20	20.47	V	4.5	9.6	25.54	33.0	-7.5	
	1850.20	22.61	H	4.5	9.6	27.68	33.0	-5.3	
	Mid Ch								
	1880.00	20.89	V	4.6	9.4	25.70	33.0	-7.3	
	1880.00	24.00	H	4.6	9.4	28.81	33.0	-4.2	
	High Ch								
	1909.80	21.02	V	4.6	9.1	25.54	33.0	-7.5	
	1909.80	22.80	H	4.6	9.1	27.32	33.0	-5.7	

**WCDMA**

Band 5 REL99	<b>UL Verification Services, Inc. High Frequency Substitution Measurement</b>																																																																																																	
	<b>Company:</b>		Samsung																																																																																															
	<b>Project #:</b>		4789841420																																																																																															
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	<b>Test Engineer:</b>		20882																																																																																															
	<b>Configuration:</b>		EUT, Y-Position																																																																																															
	<b>Location:</b>		Chamber 2																																																																																															
	<b>Mode:</b>		Rel99 Band 5 Fundamentals																																																																																															
	<b>Test Equipment:</b>		Receiving: VULB9163-749, and Chamber 2 SMA Cables Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable																																																																																															
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Band 5 HSDPA	<b>UL Verification Services, Inc. High Frequency Substitution Measurement</b>																																																																																																	
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Band 4 REL99	<b>UL Verification Services, Inc.</b> <b>High Frequency Substitution Measurement</b>								
	<b>Company:</b> Samsung <b>Project #:</b> 4789841420 <b>Date:</b> 2021-03-15 <b>Test Engineer:</b> 20882 <b>Configuration:</b> EUT, X-Position <b>Location:</b> Chamber 2 <b>Mode:</b> Rel99 Band 4 Fundamentals  <b>Test Equipment:</b> Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables Substitution: Horn 3115[00161451], 8.5m SMA-type Cable								
	<b>f</b>	<b>SG reading</b>	<b>Ant. Pol.</b>	<b>Cable Loss</b>	<b>Antenna Gain</b>	<b>EIRP</b>	<b>Limit</b>	<b>Delta</b>	<b>Notes</b>
	<b>MHz</b>	<b>(dBm)</b>	<b>(H/V)</b>	<b>(dB)</b>	<b>(dBi)</b>	<b>(dBm)</b>	<b>(dBm)</b>	<b>(dB)</b>	
	Low Ch								
	1712.40	15.23	V	4.4	9.6	20.45	30.0	-9.5	
	1712.40	17.37	H	4.4	9.6	22.59	30.0	-7.4	
	Mid Ch								
	1732.60	16.59	V	4.4	9.6	21.84	30.0	-8.2	
	1732.60	18.25	H	4.4	9.6	23.50	30.0	-6.5	
	High Ch								
	1752.60	17.27	V	4.4	9.7	22.56	30.0	-7.4	
	1752.60	18.34	H	4.4	9.7	23.63	30.0	-6.4	
Band 4 HSDPA	<b>UL Verification Services, Inc.</b> <b>High Frequency Substitution Measurement</b>								
	<b>Company:</b> Samsung <b>Project #:</b> 4789841420 <b>Date:</b> 2021-03-15 <b>Test Engineer:</b> 20882 <b>Configuration:</b> EUT, X-Position <b>Location:</b> Chamber 2 <b>Mode:</b> HSDPA Band 4 Fundamentals  <b>Test Equipment:</b> Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables Substitution: Horn 3115[00161451], 8.5m SMA-type Cable								
	<b>f</b>	<b>SG reading</b>	<b>Ant. Pol.</b>	<b>Cable Loss</b>	<b>Antenna Gain</b>	<b>EIRP</b>	<b>Limit</b>	<b>Delta</b>	<b>Notes</b>
	<b>MHz</b>	<b>(dBm)</b>	<b>(H/V)</b>	<b>(dB)</b>	<b>(dBi)</b>	<b>(dBm)</b>	<b>(dBm)</b>	<b>(dB)</b>	
	Low Ch								
	1712.40	14.25	V	4.4	9.6	19.47	30.0	-10.5	
	1712.40	16.37	H	4.4	9.6	21.59	30.0	-8.4	
	Mid Ch								
	1732.60	15.15	V	4.4	9.6	20.40	30.0	-9.6	
	1732.60	16.99	H	4.4	9.6	22.24	30.0	-7.8	
	High Ch								
	1752.60	16.23	V	4.4	9.7	21.52	30.0	-8.5	
	1752.60	17.38	H	4.4	9.7	22.67	30.0	-7.3	



Band 2 REL99	<b>UL Verification Services, Inc.</b> <b>High Frequency Substitution Measurement</b>																																																																																																
	<p> <b>Company:</b> Samsung  <b>Project #:</b> 4789841420  <b>Date:</b> 2021-03-15  <b>Test Engineer:</b> 20890  <b>Configuration:</b> EUT / X-Position  <b>Location:</b> Chamber 2  <b>Mode:</b> Rel99 Band 2 Fundamentals                 </p> <p> <b>Test Equipment:</b>                      Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables                      Substitution: Horn 3115[00161451], 8.5m SMA-type Cable                 </p> <table border="1"> <thead> <tr> <th>f MHz</th> <th>SG reading (dBm)</th> <th>Ant. Pol. (H/V)</th> <th>Cable Loss (dB)</th> <th>Antenna Gain (dBi)</th> <th>EIRP (dBm)</th> <th>Limit (dBm)</th> <th>Delta (dB)</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td colspan="9"><b>Low Ch</b></td> </tr> <tr> <td>1852.40</td> <td>16.72</td> <td>V</td> <td>4.5</td> <td>9.6</td> <td>21.80</td> <td>33.0</td> <td>-11.2</td> <td></td> </tr> <tr> <td>1852.40</td> <td>16.98</td> <td>H</td> <td>4.5</td> <td>9.6</td> <td>22.06</td> <td>33.0</td> <td>-10.9</td> <td></td> </tr> <tr> <td colspan="9"><b>Mid Ch</b></td> </tr> <tr> <td>1880.00</td> <td>14.75</td> <td>V</td> <td>4.6</td> <td>9.4</td> <td>19.54</td> <td>33.0</td> <td>-13.5</td> <td></td> </tr> <tr> <td>1880.00</td> <td>18.64</td> <td>H</td> <td>4.6</td> <td>9.4</td> <td>23.43</td> <td>33.0</td> <td>-9.6</td> <td></td> </tr> <tr> <td colspan="9"><b>High Ch</b></td> </tr> <tr> <td>1907.60</td> <td>16.92</td> <td>V</td> <td>4.6</td> <td>9.1</td> <td>21.41</td> <td>33.0</td> <td>-11.6</td> <td></td> </tr> <tr> <td>1907.60</td> <td>19.02</td> <td>H</td> <td>4.6</td> <td>9.1</td> <td>23.51</td> <td>33.0</td> <td>-9.5</td> <td></td> </tr> </tbody> </table>								f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	<b>Low Ch</b>									1852.40	16.72	V	4.5	9.6	21.80	33.0	-11.2		1852.40	16.98	H	4.5	9.6	22.06	33.0	-10.9		<b>Mid Ch</b>									1880.00	14.75	V	4.6	9.4	19.54	33.0	-13.5		1880.00	18.64	H	4.6	9.4	23.43	33.0	-9.6		<b>High Ch</b>									1907.60	16.92	V	4.6	9.1	21.41	33.0	-11.6		1907.60	19.02	H	4.6	9.1	23.51	33.0	-9.5
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**LTE Band 12**

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**LTE Band 13**

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**LTE Band 25**

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	<b>MHz</b>	<b>(dBm)</b>	<b>(H/V)</b>	<b>(dB)</b>	<b>(dBi)</b>	<b>(dBm)</b>	<b>(dBm)</b>	<b>(dB)</b>	
	Low Ch								
	1857.50	15.79	V	4.5	9.6	20.82	33.0	-12.2	
	1857.50	18.45	H	4.5	9.6	23.48	33.0	-9.5	
	Mid Ch								
	1882.50	15.25	V	4.6	9.3	20.02	33.0	-13.0	
	1882.50	18.32	H	4.6	9.3	23.09	33.0	-9.9	
	High Ch								
	1907.50	15.30	V	4.6	9.1	19.79	33.0	-13.2	
	1907.50	19.25	H	4.6	9.1	23.74	33.0	-9.3	
15MHz  16QAM	<b>UL Verification Services, Inc.</b> <b>High Frequency Substitution Measurement</b>								
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	<b>MHz</b>	<b>(dBm)</b>	<b>(H/V)</b>	<b>(dB)</b>	<b>(dBi)</b>	<b>(dBm)</b>	<b>(dBm)</b>	<b>(dB)</b>	
	Low Ch								
	1857.50	14.78	V	4.5	9.6	19.81	33.0	-13.2	
	1857.50	17.68	H	4.5	9.6	22.71	33.0	-10.3	
	Mid Ch								
	1882.50	14.07	V	4.6	9.3	18.84	33.0	-14.2	
	1882.50	17.09	H	4.6	9.3	21.86	33.0	-11.1	
	High Ch								
	1907.50	14.05	V	4.6	9.1	18.54	33.0	-14.5	
	1907.50	17.96	H	4.6	9.1	22.45	33.0	-10.6	

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**LTE Band 26 (Part 90)**

15MHz QPSK	<p><b>UL Verification Services, Inc.</b>  <b>High Frequency Substitution Measurement</b></p> <p><b>Company:</b> Samsung  <b>Project #:</b> 4789841420  <b>Date:</b> 2021-03-15  <b>Test Engineer:</b> 20882  <b>Configuration:</b> EUT, Y-Position  <b>Location:</b> Chamber 1  <b>Mode:</b> LTE_QPSK Band 26 Fundamentals, 15MHz Bandwidth</p> <p><b>Test Equipment:</b>                  Receiving: VULB9163-750, and Chamber 1 SMA Cables                  Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable</p> <table border="1"> <thead> <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> </thead> <tbody> <tr> <td>Low Ch</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>821.50</td> <td>26.64</td> <td>V</td> <td>3.0</td> <td>-1.0</td> <td>22.63</td> <td>50.0</td> <td>-27.4</td> <td>Part 90</td> </tr> <tr> <td>821.50</td> <td>17.58</td> <td>H</td> <td>3.0</td> <td>-1.0</td> <td>13.57</td> <td>50.0</td> <td>-36.4</td> <td>Part 90</td> </tr> </tbody> </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									821.50	26.64	V	3.0	-1.0	22.63	50.0	-27.4	Part 90	821.50	17.58	H	3.0	-1.0	13.57	50.0	-36.4	Part 90
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**LTE Band 26 (Straddle & Part 22)**

15MHz  QPSK	<b>UL Verification Services, Inc.</b> <b>High Frequency Substitution Measurement</b>																																																																																																
	<p> <b>Company:</b> Samsung  <b>Project #:</b> 4789841420  <b>Date:</b> 2021-03-15  <b>Test Engineer:</b> 20882  <b>Configuration:</b> EUT, Y-Position  <b>Location:</b> Chamber 1  <b>Mode:</b> LTE_QPSK Band 26 Fundamentals, 15MHz Bandwidth                 </p> <p> <b>Test Equipment:</b>                      Receiving: VULB9163-750, and Chamber 1 SMA Cables                      Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable                 </p> <table border="1"> <thead> <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> </thead> <tbody> <tr> <td colspan="9"><b>Straddle Ch</b></td> </tr> <tr> <td>824.00</td> <td>27.04</td> <td>V</td> <td>3.0</td> <td>-1.0</td> <td>23.04</td> <td>38.5</td> <td>-15.5</td> <td></td> </tr> <tr> <td>824.00</td> <td>17.03</td> <td>H</td> <td>3.0</td> <td>-1.0</td> <td>13.04</td> <td>38.5</td> <td>-25.5</td> <td></td> </tr> <tr> <td colspan="9"><b>Mid Ch</b></td> </tr> <tr> <td>831.50</td> <td>27.87</td> <td>V</td> <td>3.1</td> <td>-0.9</td> <td>23.89</td> <td>38.5</td> <td>-14.6</td> <td></td> </tr> <tr> <td>831.50</td> <td>17.07</td> <td>H</td> <td>3.1</td> <td>-0.9</td> <td>13.09</td> <td>38.5</td> <td>-25.4</td> <td></td> </tr> <tr> <td colspan="9"><b>High Ch</b></td> </tr> <tr> <td>841.50</td> <td>27.78</td> <td>V</td> <td>3.1</td> <td>-0.9</td> <td>23.82</td> <td>38.5</td> <td>-14.7</td> <td></td> </tr> <tr> <td>841.50</td> <td>18.28</td> <td>H</td> <td>3.1</td> <td>-0.9</td> <td>14.32</td> <td>38.5</td> <td>-24.2</td> <td></td> </tr> </tbody> </table>								f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes	<b>Straddle Ch</b>									824.00	27.04	V	3.0	-1.0	23.04	38.5	-15.5		824.00	17.03	H	3.0	-1.0	13.04	38.5	-25.5		<b>Mid Ch</b>									831.50	27.87	V	3.1	-0.9	23.89	38.5	-14.6		831.50	17.07	H	3.1	-0.9	13.09	38.5	-25.4		<b>High Ch</b>									841.50	27.78	V	3.1	-0.9	23.82	38.5	-14.7		841.50	18.28	H	3.1	-0.9	14.32	38.5	-24.2
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		UL Verification Services, Inc. High Frequency Substitution Measurement							
10MHz QPSK	Company: Samsung Project #: 4789841420 Date: 2021-03-11 Test Engineer: 20882 Configuration: EUT, Y-Position Location: Chamber 1 Mode: LTE_QPSK Band 26 Fundamentals, 10MHz Bandwidth								
	<b>Test Equipment:</b> Receiving: VULB9163-750, and Chamber 1 SMA Cables Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable								
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Straddle Ch								
	824.00	27.44	V	3.0	-1.0	23.44	38.5	-15.1	
	824.00	17.07	H	3.0	-1.0	13.08	38.5	-25.4	
	Low Ch								
	829.00	27.51	V	3.1	-0.9	23.53	38.5	-15.0	
	829.00	16.49	H	3.1	-0.9	12.50	38.5	-26.0	
	Mid Ch								
	831.50	27.40	V	3.1	-0.9	23.42	38.5	-15.1	
	831.50	17.22	H	3.1	-0.9	13.24	38.5	-25.3	
	High Ch								
	844.00	27.19	V	3.1	-0.9	23.24	38.5	-15.3	
	844.00	17.53	H	3.1	-0.9	13.58	38.5	-24.9	
		UL Verification Services, Inc. High Frequency Substitution Measurement							
10MHz 16QAM	Company: Samsung Project #: 4789841420 Date: 2021-03-11 Test Engineer: 20882 Configuration: EUT, Y-Position Location: Chamber 1 Mode: LTE_16QAM Band 26 Fundamentals, 10MHz Bandwidth								
	<b>Test Equipment:</b> Receiving: VULB9163-750, and Chamber 1 SMA Cables Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable								
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Straddle Ch								
	824.00	26.94	V	3.0	-1.0	22.94	38.5	-15.6	
	824.00	17.15	H	3.0	-1.0	13.16	38.5	-25.3	
	Low Ch								
	829.00	26.56	V	3.1	-0.9	22.58	38.5	-15.9	
	829.00	15.38	H	3.1	-0.9	11.39	38.5	-27.1	
	Mid Ch								
	831.50	26.37	V	3.1	-0.9	22.39	38.5	-16.1	
	831.50	16.18	H	3.1	-0.9	12.20	38.5	-26.3	
	High Ch								
	844.00	26.54	V	3.1	-0.9	22.59	38.5	-15.9	
	844.00	16.86	H	3.1	-0.9	12.91	38.5	-25.6	

		UL Verification Services, Inc. High Frequency Substitution Measurement							
5MHz QPSK	Company: Samsung Project #: 4789841420 Date: 2021-03-11 Test Engineer: 20882 Configuration: EUT, Y-Position Location: Chamber 1 Mode: LTE_QPSK Band 26 Fundamentals, 5MHz Bandwidth								
	<b>Test Equipment:</b> Receiving: VULB9163-750, and Chamber 1 SMA Cables Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable								
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Straddle Ch								
	824.00	27.29	V	3.0	-1.0	23.29	38.5	-15.2	
	824.00	17.00	H	3.0	-1.0	13.01	38.5	-25.5	
	Low Ch								
	826.50	27.65	V	3.0	-0.9	23.66	38.5	-14.8	
	826.50	17.05	H	3.0	-0.9	13.05	38.5	-25.4	
	Mid Ch								
	831.50	27.16	V	3.1	-0.9	23.18	38.5	-15.3	
	831.50	16.55	H	3.1	-0.9	12.57	38.5	-25.9	
	High Ch								
	846.50	26.42	V	3.1	-0.9	22.48	38.5	-16.0	
	846.50	17.37	H	3.1	-0.9	13.42	38.5	-25.1	
5MHz 16QAM	Company: Samsung Project #: 4789841420 Date: 2021-03-11 Test Engineer: 20882 Configuration: EUT, Y-Position Location: Chamber 1 Mode: LTE_16QAM Band 26 Fundamentals, 5MHz Bandwidth								
	<b>Test Equipment:</b> Receiving: VULB9163-750, and Chamber 1 SMA Cables Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable								
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Straddle Ch								
	824.00	26.66	V	3.0	-1.0	22.66	38.5	-15.8	
	824.00	16.14	H	3.0	-1.0	12.15	38.5	-26.4	
	Low Ch								
	826.50	26.78	V	3.0	-0.9	22.79	38.5	-15.7	
	826.50	16.26	H	3.0	-0.9	12.26	38.5	-26.2	
	Mid Ch								
	831.50	26.26	V	3.1	-0.9	22.28	38.5	-16.2	
	831.50	15.82	H	3.1	-0.9	11.84	38.5	-26.7	
	High Ch								
	846.50	25.56	V	3.1	-0.9	21.62	38.5	-16.9	
	846.50	16.32	H	3.1	-0.9	12.37	38.5	-26.1	

		UL Verification Services, Inc. High Frequency Substitution Measurement							
3MHz QPSK	Company: Samsung Project #: 4789841420 Date: 2021-03-11 Test Engineer: 20882 Configuration: EUT, Y-Position Location: Chamber 1 Mode: LTE_QPSK Band 26 Fundamentals, 3MHz Bandwidth								
	<b>Test Equipment:</b> Receiving: VULB9163-750, and Chamber 1 SMA Cables Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable								
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Straddle Ch								
	824.00	27.59	V	3.0	-1.0	23.59	38.5	-14.9	
	824.00	17.53	H	3.0	-1.0	13.54	38.5	-25.0	
	Low Ch								
	825.50	27.78	V	3.0	-0.9	23.79	38.5	-14.7	
	825.50	17.52	H	3.0	-0.9	13.53	38.5	-25.0	
	Mid Ch								
	831.50	27.34	V	3.1	-0.9	23.36	38.5	-15.1	
	831.50	16.46	H	3.1	-0.9	12.48	38.5	-26.0	
	High Ch								
	847.50	26.13	V	3.1	-0.9	22.19	38.5	-16.3	
	847.50	17.10	H	3.1	-0.9	13.16	38.5	-25.3	
		UL Verification Services, Inc. High Frequency Substitution Measurement							
3MHz 16QAM	Company: Samsung Project #: 4789841420 Date: 2021-03-11 Test Engineer: 20882 Configuration: EUT, Y-Position Location: Chamber 1 Mode: LTE_16QAM Band 26 Fundamentals, 3MHz Bandwidth								
	<b>Test Equipment:</b> Receiving: VULB9163-750, and Chamber 1 SMA Cables Substitution: Dipole 3121_DB4, 8.5m SMA-type Cable								
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Straddle Ch								
	824.00	26.49	V	3.0	-1.0	22.49	38.5	-16.0	
	824.00	16.52	H	3.0	-1.0	12.53	38.5	-26.0	
	Low Ch								
	825.50	27.16	V	3.0	-0.9	23.17	38.5	-15.3	
	825.50	16.98	H	3.0	-0.9	12.99	38.5	-25.5	
	Mid Ch								
	831.50	26.14	V	3.1	-0.9	22.16	38.5	-16.3	
	831.50	15.28	H	3.1	-0.9	11.30	38.5	-27.2	
	High Ch								
	847.50	25.57	V	3.1	-0.9	21.63	38.5	-16.9	
	847.50	16.44	H	3.1	-0.9	12.50	38.5	-26.0	

		UL Verification Services, Inc. High Frequency Substitution Measurement							
1.4MHz QPSK	Company:		Samsung						
	Project #:		4789841420						
	Date:		2021-03-11						
	Test Engineer:		20882						
	Configuration:		EUT, Y-Position						
	Location:		Chamber 1						
	Mode:		LTE_QPSK Band 26 Fundamentals, 1.4MHz Bandwidth						
	<b>Test Equipment:</b>								
	Receiving:		VULB9163-750, and Chamber 1 SMA Cables						
	Substitution:		Dipole 3121_DB4, 8.5m SMA-type Cable						
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Straddle Ch								
	824.00	27.48	V	3.0	-1.0	23.48	38.5	-15.0	
	824.00	17.70	H	3.0	-1.0	13.71	38.5	-24.8	
	Low Ch								
824.70	27.67	V	3.0	-1.0	23.68	38.5	-14.8		
824.70	17.46	H	3.0	-1.0	13.46	38.5	-25.0		
Mid Ch									
831.50	27.28	V	3.1	-0.9	23.30	38.5	-15.2		
831.50	17.09	H	3.1	-0.9	13.11	38.5	-25.4		
High Ch									
848.30	26.28	V	3.1	-0.9	22.34	38.5	-16.2		
848.30	16.52	H	3.1	-0.9	12.58	38.5	-25.9		
		UL Verification Services, Inc. High Frequency Substitution Measurement							
1.4MHz 16QAM	Company:		Samsung						
	Project #:		4789841420						
	Date:		2021-03-11						
	Test Engineer:		20882						
	Configuration:		EUT, Y-Position						
	Location:		Chamber 1						
	Mode:		LTE_16QAM Band 26 Fundamentals, 1.4MHz Bandwidth						
	<b>Test Equipment:</b>								
	Receiving:		VULB9163-750, and Chamber 1 SMA Cables						
	Substitution:		Dipole 3121_DB4, 8.5m SMA-type Cable						
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Straddle Ch								
	824.00	26.69	V	3.0	-1.0	22.69	38.5	-15.8	
	824.00	16.75	H	3.0	-1.0	12.76	38.5	-25.7	
	Low Ch								
824.70	26.76	V	3.0	-1.0	22.77	38.5	-15.7		
824.70	16.36	H	3.0	-1.0	12.36	38.5	-26.1		
Mid Ch									
831.50	26.09	V	3.1	-0.9	22.11	38.5	-16.4		
831.50	15.28	H	3.1	-0.9	11.30	38.5	-27.2		
High Ch									
848.30	25.27	V	3.1	-0.9	21.33	38.5	-17.2		
848.30	15.57	H	3.1	-0.9	11.63	38.5	-26.9		

**LTE Band 41**

20MHz  QPSK	<b>UL Verification Services, Inc.</b> <b>High Frequency Substitution Measurement</b>																																																																																									
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**LTE Band 66**

20MHz QPSK	<p style="text-align: center;"><b>UL Verification Services, Inc.</b>  <b>High Frequency Substitution Measurement</b></p> <p><b>Company:</b> Samsung  <b>Project #:</b> 4789841420  <b>Date:</b> 2021-03-16  <b>Test Engineer:</b> 20882  <b>Configuration:</b> EUT/ Keyboard, covered X  <b>Location:</b> Chamber 2  <b>Mode:</b> LTE_QPSK Band 66 Fundamentals, 20MHz Bandwidth</p> <p><b>Test Equipment:</b>                  Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables                  Substitution: Horn 3115[00161451], 8.5m SMA-type Cable</p> <table border="1"> <thead> <tr> <th>f MHz</th> <th>SG reading (dBm)</th> <th>Ant. Pol. (H/V)</th> <th>Cable Loss (dB)</th> <th>Antenna Gain (dBi)</th> <th>EIRP (dBm)</th> <th>Limit (dBm)</th> <th>Delta (dB)</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td colspan="9">Low Ch</td> </tr> <tr> <td>1720.00</td> <td>16.61</td> <td>V</td> <td>4.4</td> <td>9.6</td> <td>21.85</td> <td>30.0</td> <td>-8.2</td> <td></td> </tr> <tr> <td>1720.00</td> <td>17.97</td> <td>H</td> <td>4.4</td> <td>9.6</td> <td>23.20</td> <td>30.0</td> <td>-6.8</td> <td></td> </tr> <tr> <td colspan="9">Mid Ch</td> </tr> <tr> <td>1745.00</td> <td>17.87</td> <td>V</td> <td>4.4</td> <td>9.7</td> <td>23.15</td> <td>30.0</td> <td>-6.9</td> <td></td> </tr> <tr> <td>1745.00</td> <td>18.69</td> <td>H</td> <td>4.4</td> <td>9.7</td> <td>23.97</td> <td>30.0</td> <td>-6.0</td> <td></td> </tr> <tr> <td colspan="9">High Ch</td> </tr> <tr> <td>1770.00</td> <td>17.70</td> <td>V</td> <td>4.4</td> <td>9.7</td> <td>22.97</td> <td>30.0</td> <td>-7.0</td> <td></td> </tr> <tr> <td>1770.00</td> <td>18.25</td> <td>H</td> <td>4.4</td> <td>9.7</td> <td>23.53</td> <td>30.0</td> <td>-6.5</td> <td></td> </tr> </tbody> </table>									f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	Low Ch									1720.00	16.61	V	4.4	9.6	21.85	30.0	-8.2		1720.00	17.97	H	4.4	9.6	23.20	30.0	-6.8		Mid Ch									1745.00	17.87	V	4.4	9.7	23.15	30.0	-6.9		1745.00	18.69	H	4.4	9.7	23.97	30.0	-6.0		High Ch									1770.00	17.70	V	4.4	9.7	22.97	30.0	-7.0		1770.00	18.25	H	4.4	9.7	23.53	30.0	-6.5	
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## 9.6. FIELD STRENGTH OF SPURIOUS RADIATION

### RULE PART(S)

FCC: §2.1053, §22.917, §24.238, §27.53 and §90.691

### 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.

Part 27.53:

(c)(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least  $43 + 10 \log(P)$  dB.

(f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to  $-70$  dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and  $-80$  dBW EIRP for discrete emissions of less than 700 Hz bandwidth.

(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least  $43 + 10 \log(P)$  dB.

(h) The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10}(P)$  dB.

(m) (4) For mobile digital stations, the attenuation factor shall be not less than  $40 + 10 \log(P)$  dB on all frequencies between the channel edge and 5 megahertz from the channel edge,  $43 + 10 \log(P)$  dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and  $55 + 10 \log(P)$  dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than  $43 + 10 \log(P)$  dB on all frequencies between 2490.5 MHz and 2496 MHz and  $55 + 10 \log(P)$  dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

Part 90.691:

(a) Out-of-band emission requirement shall apply only to the "outer" channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $116 \log_{10}(f/6.1)$  decibels or  $50 + 10 \log_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

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**TEST PROCEDURE**

ANSI / TIA / EIA 603 E Clause 2.2.12; ESU40 setting reference to 971168 D01 v03r01

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) Sweep time = auto couple;
- d) Detector = rms;
- e) Ensure that the number of measurement points  $\geq$  span/RBW;
- f) Trace mode = average(FDD), Max hold(TDD);

**RESULTS**

See the following pages.

NOTE : Please refer to section 5.4 for bandwidth and RB setting about LTE.

**9.6.1. SPURIOUS RADIATION PLOTS**

**GSM**

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement										
		Company: Samsung Project #: 4789841420 Date: 2021-03-16 Test Engineer: 20881 Configuration: EUT / AC Adapter / Keyboard, laptop mode Location: Chamber 1 Mode: GPRS 850 MHz Harmonics Test Voltage: AC 120 V, 60 Hz								
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
850 GPRS										
<b>Low Ch, 824.2MHz</b>										
1648.40	-5.5	V	3.0	45.3	1.0	-49.8	-13.0	-36.8		
2472.60	4.5	V	3.0	45.1	1.0	-39.6	-13.0	-26.6		
3296.80	-7.4	V	3.0	45.3	1.0	-51.7	-13.0	-38.7		
1648.40	-9.7	H	3.0	45.3	1.0	-54.0	-13.0	-41.0		
2472.60	3.0	H	3.0	45.1	1.0	-41.0	-13.0	-28.0		
3296.80	-7.4	H	3.0	45.3	1.0	-51.7	-13.0	-38.7		
<b>Mid Ch, 836.6MHz</b>										
1673.20	-4.8	V	3.0	45.3	1.0	-49.1	-13.0	-36.1		
2509.80	4.8	V	3.0	45.1	1.0	-39.3	-13.0	-26.3		
3346.40	-8.4	V	3.0	45.3	1.0	-52.7	-13.0	-39.7		
1673.20	-8.9	H	3.0	45.3	1.0	-53.1	-13.0	-40.1		
2509.80	3.0	H	3.0	45.1	1.0	-41.1	-13.0	-28.1		
3346.40	-8.3	H	3.0	45.3	1.0	-52.7	-13.0	-39.7		
<b>High Ch, 848.8MHz</b>										
1697.60	-4.5	V	3.0	45.2	1.0	-48.8	-13.0	-35.8		
2546.40	4.3	V	3.0	45.1	1.0	-39.8	-13.0	-26.8		
3395.20	-8.2	V	3.0	45.3	1.0	-52.6	-13.0	-39.6		
1697.60	-7.8	H	3.0	45.2	1.0	-52.0	-13.0	-39.0		
2546.40	3.8	H	3.0	45.1	1.0	-40.3	-13.0	-27.3		
3395.20	-7.8	H	3.0	45.3	1.0	-52.2	-13.0	-39.2		

		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement								
850 EGPRS	Company:	Samsung								
	Project #:	4789841420								
	Date:	2021-03-16								
	Test Engineer:	20881								
	Configuration:	EUT / AC Adapter / Keyboard, laptop mode								
	Location:	Chamber 1								
	Mode:	EGPRS 850 MHz Harmonics								
	Test Voltage:	AC 120 V, 60 Hz								
	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Low Ch, 824.2MHz									
	1648.40	-8.7	V	3.0	45.3	1.0	-53.0	-13.0	-40.0	
	2472.60	-2.1	V	3.0	45.1	1.0	-46.2	-13.0	-33.2	
	3296.80	-8.6	V	3.0	45.3	1.0	-53.0	-13.0	-40.0	
	1648.40	-12.8	H	3.0	45.3	1.0	-57.1	-13.0	-44.1	
	2472.60	-2.3	H	3.0	45.1	1.0	-46.4	-13.0	-33.4	
	3296.80	-8.3	H	3.0	45.3	1.0	-52.6	-13.0	-39.6	
	Mid Ch, 836.6MHz									
	1673.20	-8.6	V	3.0	45.3	1.0	-52.9	-13.0	-39.9	
	2509.80	-4.3	V	3.0	45.1	1.0	-48.4	-13.0	-35.4	
	3346.40	-8.4	V	3.0	45.3	1.0	-52.8	-13.0	-39.8	
1673.20	-11.3	H	3.0	45.3	1.0	-55.5	-13.0	-42.5		
2509.80	-4.2	H	3.0	45.1	1.0	-48.3	-13.0	-35.3		
3346.40	-8.3	H	3.0	45.3	1.0	-52.7	-13.0	-39.7		
High Ch, 848.8MHz										
1697.60	-7.9	V	3.0	45.2	1.0	-52.1	-13.0	-39.1		
2546.40	-4.8	V	3.0	45.1	1.0	-48.9	-13.0	-35.9		
3395.20	-8.2	V	3.0	45.3	1.0	-52.5	-13.0	-39.5		
1697.60	-10.9	H	3.0	45.2	1.0	-55.1	-13.0	-42.1		
2546.40	-4.1	H	3.0	45.1	1.0	-48.2	-13.0	-35.2		
3395.20	-8.0	H	3.0	45.3	1.0	-52.3	-13.0	-39.3		
		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement								
1900 GPRS	Company:	Samsung								
	Project #:	4789841420								
	Date:	2021-03-11								
	Test Engineer:	20881								
	Configuration:	EUT / AC Adapter / Keyboard, covered X								
	Location:	Chamber 1								
	Mode:	GPRS 1900 MHz Harmonics								
	Test Voltage:	AC 120 V, 60 Hz								
	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	-10.6	V	3.0	45.5	1.0	-55.0	-13.0	-42.0	
	5550.60	5.0	V	3.0	45.4	1.0	-39.4	-13.0	-26.4	
	7400.80	-5.2	V	3.0	44.2	1.0	-48.4	-13.0	-35.4	
	3700.40	-10.2	H	3.0	45.5	1.0	-54.6	-13.0	-41.6	
	5550.60	4.8	H	3.0	45.4	1.0	-39.6	-13.0	-26.6	
	7400.80	-5.1	H	3.0	44.2	1.0	-48.3	-13.0	-35.3	
	Mid Ch, 1880MHz									
	3760.00	-10.2	V	3.0	45.5	1.0	-54.6	-13.0	-41.6	
	5640.00	19.5	V	3.0	45.4	1.0	-24.9	-13.0	-11.9	
	7520.00	-5.3	V	3.0	44.1	1.0	-48.4	-13.0	-35.4	
3760.00	-9.9	H	3.0	45.5	1.0	-54.4	-13.0	-41.4		
5640.00	14.1	H	3.0	45.4	1.0	-30.3	-13.0	-17.3		
7520.00	-5.1	H	3.0	44.1	1.0	-48.2	-13.0	-35.2		
High Ch, 1909.8MHz										
3819.60	-7.8	V	3.0	45.5	1.0	-52.3	-13.0	-39.3		
5729.40	6.8	V	3.0	45.4	1.0	-37.5	-13.0	-24.5		
7639.20	-5.2	V	3.0	44.1	1.0	-48.3	-13.0	-35.3		
3819.60	-10.0	H	3.0	45.5	1.0	-54.5	-13.0	-41.5		
5729.40	9.4	H	3.0	45.4	1.0	-35.0	-13.0	-22.0		
7639.20	-5.0	H	3.0	44.1	1.0	-48.1	-13.0	-35.1		

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4789841420							
Date:		2021-03-11							
Test Engineer:		20881							
Configuration:		EUT / AC Adapter / Keyboard, covered X							
Location:		Chamber 1							
Mode:		EGPRS 1900 MHz Harmonics							
Test Voltage:		AC 120 V, 60 Hz							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1900 EGPRS									
Low Ch, 1850.2MHz									
3700.40	-10.5	V	3.0	45.5	1.0	-54.9	-13.0	-41.9	
5550.60	-2.1	V	3.0	45.4	1.0	-46.5	-13.0	-33.5	
7400.80	-5.2	V	3.0	44.2	1.0	-48.4	-13.0	-35.4	
3700.40	-10.3	H	3.0	45.5	1.0	-54.8	-13.0	-41.8	
5550.60	-4.2	H	3.0	45.4	1.0	-48.6	-13.0	-35.6	
7400.80	-5.0	H	3.0	44.2	1.0	-48.2	-13.0	-35.2	
Mid Ch, 1880MHz									
3760.00	-10.2	V	3.0	45.5	1.0	-54.7	-13.0	-41.7	
5640.00	-3.0	V	3.0	45.4	1.0	-47.4	-13.0	-34.4	
7520.00	-5.4	V	3.0	44.1	1.0	-48.6	-13.0	-35.6	
3760.00	-9.9	H	3.0	45.5	1.0	-54.4	-13.0	-41.4	
5640.00	-7.3	H	3.0	45.4	1.0	-51.7	-13.0	-38.7	
7520.00	-5.0	H	3.0	44.1	1.0	-48.2	-13.0	-35.2	
High Ch, 1909.8MHz									
3819.60	-10.3	V	3.0	45.5	1.0	-54.8	-13.0	-41.8	
5729.40	-3.2	V	3.0	45.4	1.0	-47.6	-13.0	-34.6	
7639.20	-5.1	V	3.0	44.1	1.0	-48.1	-13.0	-35.1	
3819.60	-9.9	H	3.0	45.5	1.0	-54.4	-13.0	-41.4	
5729.40	-7.2	H	3.0	45.4	1.0	-51.6	-13.0	-38.6	
7639.20	-4.9	H	3.0	44.1	1.0	-48.0	-13.0	-35.0	

**WCDMA**

		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement								
		Company: Samsung Project #: 4789841420 Date: 2021-03-15 Test Engineer: 20882 Configuration: EUT / AC Adapter, Y-Position Location: Chamber 2 Mode: Rel99 Band 5 Harmonics Test Voltage: AC 120 V, 60 Hz								
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
<b>Band 5</b>										
<b>REL99</b>										
<b>Low Ch, 826.4MHz</b>										
1652.80	-14.9	V	3.0	40.7	1.0	-54.6	-13.0	-41.6		
2479.20	-12.7	V	3.0	41.3	1.0	-53.0	-13.0	-40.0		
3305.60	-9.3	V	3.0	42.1	1.0	-50.4	-13.0	-37.4		
1652.80	-15.0	H	3.0	40.7	1.0	-54.7	-13.0	-41.7		
2479.20	-11.8	H	3.0	41.3	1.0	-52.2	-13.0	-39.2		
3305.60	-9.4	H	3.0	42.1	1.0	-50.5	-13.0	-37.5		
<b>Mid Ch, 836.6MHz</b>										
1673.20	-14.9	V	3.0	40.7	1.0	-54.6	-13.0	-41.6		
2509.80	-12.6	V	3.0	41.4	1.0	-52.9	-13.0	-39.9		
3346.40	-9.3	V	3.0	42.1	1.0	-50.3	-13.0	-37.3		
1673.20	-15.6	H	3.0	40.7	1.0	-55.3	-13.0	-42.3		
2509.80	-12.2	H	3.0	41.4	1.0	-52.6	-13.0	-39.6		
3346.40	-9.6	H	3.0	42.1	1.0	-50.7	-13.0	-37.7		
<b>High Ch, 846.6MHz</b>										
1693.20	-15.3	V	3.0	40.7	1.0	-55.0	-13.0	-42.0		
2539.80	-12.8	V	3.0	41.4	1.0	-53.2	-13.0	-40.2		
3386.40	-10.7	V	3.0	42.1	1.0	-51.8	-13.0	-38.8		
1693.20	-15.4	H	3.0	40.7	1.0	-55.1	-13.0	-42.1		
2539.80	-11.7	H	3.0	41.4	1.0	-52.1	-13.0	-39.1		
3386.40	-9.1	H	3.0	42.1	1.0	-50.1	-13.0	-37.1		
		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement								
		Company: Samsung Project #: 4789841420 Date: 2021-03-15 Test Engineer: 20882 Configuration: EUT / AC Adapter, Y-Position Location: Chamber 2 Mode: HSDPA Band 5 Harmonics Test Voltage: AC 120 V, 60 Hz								
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
<b>Band 5</b>										
<b>HSDPA</b>										
<b>Low Ch, 826.4MHz</b>										
1652.80	-14.6	V	3.0	40.7	1.0	-54.3	-13.0	-41.3		
2479.20	-12.5	V	3.0	41.3	1.0	-52.8	-13.0	-39.8		
3305.60	-10.1	V	3.0	42.1	1.0	-51.2	-13.0	-38.2		
1652.80	-15.6	H	3.0	40.7	1.0	-55.3	-13.0	-42.3		
2479.20	-12.4	H	3.0	41.3	1.0	-52.7	-13.0	-39.7		
3305.60	-9.5	H	3.0	42.1	1.0	-50.5	-13.0	-37.5		
<b>Mid Ch, 836.6MHz</b>										
1673.20	-15.6	V	3.0	40.7	1.0	-55.3	-13.0	-42.3		
2509.80	-12.7	V	3.0	41.4	1.0	-53.0	-13.0	-40.0		
3346.40	-9.9	V	3.0	42.1	1.0	-50.9	-13.0	-37.9		
1673.20	-15.6	H	3.0	40.7	1.0	-55.3	-13.0	-42.3		
2509.80	-12.5	H	3.0	41.4	1.0	-52.9	-13.0	-39.9		
3346.40	-9.8	H	3.0	42.1	1.0	-50.9	-13.0	-37.9		
<b>High Ch, 846.6MHz</b>										
1693.20	-15.7	V	3.0	40.7	1.0	-55.3	-13.0	-42.3		
2539.80	-12.4	V	3.0	41.4	1.0	-52.8	-13.0	-39.8		
3386.40	-9.7	V	3.0	42.1	1.0	-50.7	-13.0	-37.7		
1693.20	-14.9	H	3.0	40.7	1.0	-54.6	-13.0	-41.6		
2539.80	-12.3	H	3.0	41.4	1.0	-52.7	-13.0	-39.7		
3386.40	-9.5	H	3.0	42.1	1.0	-50.6	-13.0	-37.6		

		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement								
		Company: Samsung Project #: 4789841420 Date: 2021-03-15 Test Engineer: 20882 Configuration: EUT / AC Adapter, X-Position Location: Chamber 2 Mode: Rel99 Band 4 Harmonics Test Voltage: AC 120 V, 60 Hz								
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
Band 4 REL99										
Low Ch, 1712.4MHz										
3424.80	-9.4	V	3.0	42.1	1.0	-50.5	-13.0	-37.5		
5137.20	-9.0	V	3.0	42.8	1.0	-50.9	-13.0	-37.9		
6849.60	-6.3	V	3.0	42.7	1.0	-48.1	-13.0	-35.1		
3424.80	-9.5	H	3.0	42.1	1.0	-50.6	-13.0	-37.6		
5137.20	-8.7	H	3.0	42.8	1.0	-50.5	-13.0	-37.5		
6849.60	-6.6	H	3.0	42.7	1.0	-48.3	-13.0	-35.3		
Mid Ch, 1732.6MHz										
3465.20	-9.1	V	3.0	42.1	1.0	-50.2	-13.0	-37.2		
5197.80	-8.9	V	3.0	42.8	1.0	-50.7	-13.0	-37.7		
6930.40	-6.5	V	3.0	42.7	1.0	-48.2	-13.0	-35.2		
3465.20	-8.8	H	3.0	42.1	1.0	-49.9	-13.0	-36.9		
5197.80	-8.1	H	3.0	42.8	1.0	-49.9	-13.0	-36.9		
6930.40	-6.2	H	3.0	42.7	1.0	-47.9	-13.0	-34.9		
High Ch, 1752.6MHz										
3505.20	-8.7	V	3.0	42.1	1.0	-49.8	-13.0	-36.8		
5257.80	-8.8	V	3.0	42.8	1.0	-50.6	-13.0	-37.6		
7010.40	-6.2	V	3.0	42.7	1.0	-47.9	-13.0	-34.9		
3505.20	-8.4	H	3.0	42.1	1.0	-49.5	-13.0	-36.5		
5257.80	-8.1	H	3.0	42.8	1.0	-50.0	-13.0	-37.0		
7010.40	-5.9	H	3.0	42.7	1.0	-47.6	-13.0	-34.6		
		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement								
		Company: Samsung Project #: 4789841420 Date: 2021-03-15 Test Engineer: 20882 Configuration: EUT / AC Adapter, X-Position Location: Chamber 2 Mode: HSDPA Band 4 Harmonics Test Voltage: AC 120 V, 60 Hz								
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
Band 4 HSDPA										
Low Ch, 1712.4MHz										
3424.80	-9.3	V	3.0	42.1	1.0	-50.4	-13.0	-37.4		
5137.20	-8.8	V	3.0	42.8	1.0	-50.6	-13.0	-37.6		
6849.60	-6.1	V	3.0	42.7	1.0	-47.8	-13.0	-34.8		
3424.80	-9.2	H	3.0	42.1	1.0	-50.3	-13.0	-37.3		
5137.20	-8.4	H	3.0	42.8	1.0	-50.2	-13.0	-37.2		
6849.60	-6.1	H	3.0	42.7	1.0	-47.9	-13.0	-34.9		
Mid Ch, 1732.6MHz										
3465.20	-9.0	V	3.0	42.1	1.0	-50.0	-13.0	-37.0		
5197.80	-8.3	V	3.0	42.8	1.0	-50.1	-13.0	-37.1		
6930.40	-6.0	V	3.0	42.7	1.0	-47.7	-13.0	-34.7		
3465.20	-8.8	H	3.0	42.1	1.0	-49.9	-13.0	-36.9		
5197.80	-8.2	H	3.0	42.8	1.0	-50.1	-13.0	-37.1		
6930.40	-6.2	H	3.0	42.7	1.0	-47.9	-13.0	-34.9		
High Ch, 1752.6MHz										
3505.20	-8.0	V	3.0	42.1	1.0	-49.1	-13.0	-36.1		
5257.80	-8.7	V	3.0	42.8	1.0	-50.5	-13.0	-37.5		
7010.40	-6.0	V	3.0	42.7	1.0	-47.7	-13.0	-34.7		
3505.20	-8.7	H	3.0	42.1	1.0	-49.7	-13.0	-36.7		
5257.80	-8.0	H	3.0	42.8	1.0	-49.9	-13.0	-36.9		
7010.40	-6.3	H	3.0	42.7	1.0	-48.0	-13.0	-35.0		



		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement								
		<b>Company:</b>	Samsung							
		<b>Project #:</b>	4789841420							
		<b>Date:</b>	2021-03-15							
		<b>Test Engineer:</b>	20890							
		<b>Configuration:</b>	EUT / AC Adapter, X-Position							
		<b>Location:</b>	Chamber 2							
		<b>Mode:</b>	Rel99 Band 2 Harmonics							
		<b>Test Voltage:</b>	AC 120 V, 60 Hz							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
Band 2 REL99										
Low Ch, 1852.4MHz										
3704.80	-11.8	V	3.0	42.1	1.0	-52.9	-13.0	-39.9		
5557.20	-8.4	V	3.0	42.9	1.0	-50.3	-13.0	-37.3		
7409.60	-6.5	V	3.0	42.5	1.0	-47.9	-13.0	-34.9		
3704.80	-11.8	H	3.0	42.1	1.0	-52.9	-13.0	-39.9		
5557.20	-8.1	H	3.0	42.9	1.0	-50.0	-13.0	-37.0		
7409.60	-6.6	H	3.0	42.5	1.0	-48.1	-13.0	-35.1		
Mid Ch, 1880MHz										
3760.00	-11.6	V	3.0	42.1	1.0	-52.7	-13.0	-39.7		
5640.00	-8.0	V	3.0	42.9	1.0	-49.9	-13.0	-36.9		
7520.00	-6.6	V	3.0	42.4	1.0	-48.0	-13.0	-35.0		
3760.00	-11.7	H	3.0	42.1	1.0	-52.7	-13.0	-39.7		
5640.00	-7.8	H	3.0	42.9	1.0	-49.8	-13.0	-36.8		
7520.00	-6.7	H	3.0	42.4	1.0	-48.2	-13.0	-35.2		
High Ch, 1907.6MHz										
3815.20	-11.7	V	3.0	42.1	1.0	-52.8	-13.0	-39.8		
5722.80	-8.2	V	3.0	42.9	1.0	-50.2	-13.0	-37.2		
7630.40	-6.3	V	3.0	42.4	1.0	-47.7	-13.0	-34.7		
3815.20	-11.6	H	3.0	42.1	1.0	-52.7	-13.0	-39.7		
5722.80	-8.1	H	3.0	42.9	1.0	-50.0	-13.0	-37.0		
7630.40	-6.5	H	3.0	42.4	1.0	-47.9	-13.0	-34.9		
		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement								
		<b>Company:</b>	Samsung							
		<b>Project #:</b>	4789841420							
		<b>Date:</b>	2021-03-15							
		<b>Test Engineer:</b>	20890							
		<b>Configuration:</b>	EUT / AC Adapter, X-Position							
		<b>Location:</b>	Chamber 2							
		<b>Mode:</b>	HSDPA Band 2 Harmonics							
		<b>Test Voltage:</b>	AC 120 V, 60 Hz							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
Band 2 HSDPA										
Low Ch, 1852.4MHz										
3704.80	-11.8	V	3.0	42.1	1.0	-52.8	-13.0	-39.8		
5557.20	-8.3	V	3.0	42.9	1.0	-50.2	-13.0	-37.2		
7409.60	-6.4	V	3.0	42.5	1.0	-47.9	-13.0	-34.9		
3704.80	-11.8	H	3.0	42.1	1.0	-52.9	-13.0	-39.9		
5557.20	-8.0	H	3.0	42.9	1.0	-49.9	-13.0	-36.9		
7409.60	-6.5	H	3.0	42.5	1.0	-48.0	-13.0	-35.0		
Mid Ch, 1880MHz										
3760.00	-11.6	V	3.0	42.1	1.0	-52.7	-13.0	-39.7		
5640.00	-7.9	V	3.0	42.9	1.0	-49.9	-13.0	-36.9		
7520.00	-6.6	V	3.0	42.4	1.0	-48.0	-13.0	-35.0		
3760.00	-11.6	H	3.0	42.1	1.0	-52.7	-13.0	-39.7		
5640.00	-7.8	H	3.0	42.9	1.0	-49.7	-13.0	-36.7		
7520.00	-6.6	H	3.0	42.4	1.0	-48.1	-13.0	-35.1		
High Ch, 1907.6MHz										
3815.20	-11.7	V	3.0	42.1	1.0	-52.8	-13.0	-39.8		
5722.80	-8.2	V	3.0	42.9	1.0	-50.2	-13.0	-37.2		
7630.40	-6.4	V	3.0	42.4	1.0	-47.8	-13.0	-34.8		
3815.20	-11.7	H	3.0	42.1	1.0	-52.7	-13.0	-39.7		
5722.80	-8.0	H	3.0	42.9	1.0	-49.9	-13.0	-36.9		
7630.40	-6.6	H	3.0	42.4	1.0	-48.0	-13.0	-35.0		

**LTE Band 12**

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
<b>Company:</b>		Samsung							
<b>Project #:</b>		4789841420							
<b>Date:</b>		2021-03-11							
<b>Test Engineer:</b>		20882							
<b>Configuration:</b>		EUT/ AC Adapter, Y-Position							
<b>Location:</b>		Chamber 2							
<b>Mode:</b>		LTE_QPSK Band 12 Harmonics, 5MHz Bandwidth							
<b>Test Voltage:</b>		AC 120 V, 60 Hz							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, 701.5MHz</b>									
1403.00	-16.9	V	3.0	40.7	1.0	-56.6	-13.0	-43.6	
2104.50	-14.3	V	3.0	40.8	1.0	-54.1	-13.0	-41.1	
2806.00	-11.7	V	3.0	41.8	1.0	-52.5	-13.0	-39.5	
1403.00	-17.0	H	3.0	40.7	1.0	-56.8	-13.0	-43.8	
2104.50	-13.9	H	3.0	40.8	1.0	-53.6	-13.0	-40.6	
2806.00	-11.6	H	3.0	41.8	1.0	-52.4	-13.0	-39.4	
<b>Mid Ch, 707.5MHz</b>									
1415.00	-16.7	V	3.0	40.7	1.0	-56.5	-13.0	-43.5	
2122.50	-14.3	V	3.0	40.8	1.0	-54.1	-13.0	-41.1	
2830.00	-11.7	V	3.0	41.8	1.0	-52.5	-13.0	-39.5	
1415.00	-16.9	H	3.0	40.7	1.0	-56.6	-13.0	-43.6	
2122.50	-13.8	H	3.0	40.8	1.0	-53.6	-13.0	-40.6	
2830.00	-11.5	H	3.0	41.8	1.0	-52.3	-13.0	-39.3	
<b>High Ch, 713.5MHz</b>									
1427.00	-16.8	V	3.0	40.7	1.0	-56.5	-13.0	-43.5	
2140.50	-14.2	V	3.0	40.8	1.0	-54.0	-13.0	-41.0	
2854.00	-11.5	V	3.0	41.8	1.0	-52.3	-13.0	-39.3	
1427.00	-17.0	H	3.0	40.7	1.0	-56.8	-13.0	-43.8	
2140.50	-13.9	H	3.0	40.8	1.0	-53.7	-13.0	-40.7	
2854.00	-11.9	H	3.0	41.8	1.0	-52.7	-13.0	-39.7	

5MHz  
QPSK

**LTE Band 13**

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement										
		<b>Company:</b>	Samsung							
		<b>Project #:</b>	4789841420							
		<b>Date:</b>	2021-03-10							
		<b>Test Engineer:</b>	22943							
		<b>Configuration:</b>	EUT / AC Adapter / Keyboard, covered X							
		<b>Location:</b>	Chamber 2							
		<b>Mode:</b>	LTE_QPSK Band 13 Harmonics, 5MHz Bandwidth							
		<b>Test Voltage:</b>	AC 120 V, 60 Hz							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
<b>Low Ch, 779.5MHz</b>										
1559.00	-24.3	V	3.0	40.7	1.0	-64.0	-40.0	-24.0		
2338.50	-13.4	V	3.0	41.1	1.0	-53.5	-13.0	-40.5		
3118.00	-10.4	V	3.0	42.1	1.0	-51.5	-13.0	-38.5		
1559.00	-26.2	H	3.0	40.7	1.0	-65.9	-40.0	-25.9		
2338.50	-13.0	H	3.0	41.1	1.0	-53.1	-13.0	-40.1		
3118.00	-10.2	H	3.0	42.1	1.0	-51.3	-13.0	-38.3		
<b>Mid Ch, 782MHz</b>										
1564.00	-29.0	V	3.0	40.7	1.0	-68.7	-40.0	-28.7		
2346.00	-13.3	V	3.0	41.1	1.0	-53.4	-13.0	-40.4		
3128.00	-10.3	V	3.0	42.1	1.0	-51.3	-13.0	-38.3		
1564.00	-30.2	H	3.0	40.7	1.0	-69.9	-40.0	-29.9		
2346.00	-12.9	H	3.0	41.1	1.0	-53.0	-13.0	-40.0		
3128.00	-10.3	H	3.0	42.1	1.0	-51.3	-13.0	-38.3		
<b>High Ch, 784.5MHz</b>										
1569.00	-30.6	V	3.0	40.7	1.0	-70.3	-40.0	-30.3		
2353.50	-13.3	V	3.0	41.1	1.0	-53.4	-13.0	-40.4		
3138.00	-11.1	V	3.0	42.1	1.0	-52.1	-13.0	-39.1		
1569.00	-30.6	H	3.0	40.7	1.0	-70.3	-40.0	-30.3		
2353.50	-13.0	H	3.0	41.1	1.0	-53.1	-13.0	-40.1		
3138.00	-10.3	H	3.0	42.1	1.0	-51.3	-13.0	-38.3		

Note : No narrowband emissions so only applied the -70dBW/MHz (-40dBm/MHz) wideband emission limit for the 1559-1610 MHz band

**LTE Band 25**

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement											
5MHz  QPSK		Company: Samsung Project #: 4789841420 Date: 2021-03-17 Test Engineer: 20882 Configuration: EUT / AC Adapter, X-Position Location: Chamber 2 Mode: LTE_QPSK Band 25 Harmonics, 5MHz Bandwidth Test Voltage: AC 120 V, 60 Hz									
		f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
		<b>Low Ch, 1852.5MHz</b>									
		3705.00	-10.8	V	3.0	42.1	1.0	-51.8	-13.0	-38.8	
		5557.50	-7.3	V	3.0	42.9	1.0	-49.2	-13.0	-36.2	
		7410.00	-5.7	V	3.0	42.5	1.0	-47.2	-13.0	-34.2	
		3705.00	-11.0	H	3.0	42.1	1.0	-52.1	-13.0	-39.1	
		5557.50	-6.9	H	3.0	42.9	1.0	-48.8	-13.0	-35.8	
		7410.00	-5.9	H	3.0	42.5	1.0	-47.4	-13.0	-34.4	
		<b>Mid Ch, 1882.5MHz</b>									
3765.00	-10.7	V	3.0	42.1	1.0	-51.8	-13.0	-38.8			
5647.50	-5.2	V	3.0	42.9	1.0	-47.1	-13.0	-34.1			
7530.00	-5.8	V	3.0	42.4	1.0	-47.3	-13.0	-34.3			
3765.00	-10.7	H	3.0	42.1	1.0	-51.8	-13.0	-38.8			
5647.50	-7.1	H	3.0	42.9	1.0	-49.0	-13.0	-36.0			
7530.00	-5.9	H	3.0	42.4	1.0	-47.3	-13.0	-34.3			
<b>High Ch, 1912.5MHz</b>											
3825.00	-10.6	V	3.0	42.1	1.0	-51.7	-13.0	-38.7			
5737.50	-7.3	V	3.0	43.0	1.0	-49.3	-13.0	-36.3			
7650.00	-5.8	V	3.0	42.4	1.0	-47.2	-13.0	-34.2			
3825.00	-10.6	H	3.0	42.1	1.0	-51.7	-13.0	-38.7			
5737.50	-7.2	H	3.0	43.0	1.0	-49.1	-13.0	-36.1			
7650.00	-5.8	H	3.0	42.4	1.0	-47.2	-13.0	-34.2			

**LTE Band 26 (Part 90)**

1.4MHz QPSK		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
		f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
		Company: Samsung Project #: 4789841420 Date: 2021-03-16 Test Engineer: 22943 Configuration: EUT / AC Adapter, Y-Position Location: Chamber 2 Mode: LTE_QPSK Band 26 Harmonics, 1.4MHz Bandwidth Test Votage: AC 120 V, 60 Hz									
		<b>Low Ch, 814.7MHz</b>									
		1629.40	-15.8	V	3.0	40.7	1.0	-55.5	-13.0	-42.5	
		2444.10	-12.9	V	3.0	41.3	1.0	-53.2	-13.0	-40.2	
		3258.80	-10.4	V	3.0	42.1	1.0	-51.5	-13.0	-38.5	
		1629.40	-15.8	H	3.0	40.7	1.0	-55.5	-13.0	-42.5	
		2444.10	-12.7	H	3.0	41.3	1.0	-52.9	-13.0	-39.9	
		3258.80	-10.2	H	3.0	42.1	1.0	-51.2	-13.0	-38.2	
		<b>Mid Ch, 823.3MHz</b>									
		1646.60	-15.7	V	3.0	40.7	1.0	-55.4	-13.0	-42.4	
		2469.90	-13.0	V	3.0	41.3	1.0	-53.2	-13.0	-40.2	
		3293.20	-10.3	V	3.0	42.1	1.0	-51.4	-13.0	-38.4	
		1646.60	-15.7	H	3.0	40.7	1.0	-55.4	-13.0	-42.4	
		2469.90	-12.7	H	3.0	41.3	1.0	-53.0	-13.0	-40.0	
		3293.20	-10.1	H	3.0	42.1	1.0	-51.2	-13.0	-38.2	

**LTE Band 26 (Straddle)**

5MHz QPSK		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
		f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
		Company: Samsung Project #: 4789841420 Date: 2021-03-16 Test Engineer: 22943 Configuration: EUT / AC Adapter, Y-Position Location: Chamber 2 Mode: LTE_QPSK Band 26 Harmonics, 5MHz Bandwidth Test Votage: AC 120 V, 60 Hz									
		<b>Straddle Ch, 824MHz</b>									
		1648.00	-15.7	V	3.0	40.7	1.0	-55.4	-13.0	-42.4	
		2472.00	-12.9	V	3.0	41.3	1.0	-53.2	-13.0	-40.2	
		3296.00	-10.2	V	3.0	42.1	1.0	-51.3	-13.0	-38.3	
		1648.00	-15.8	H	3.0	40.7	1.0	-55.5	-13.0	-42.5	
		2472.00	-12.7	H	3.0	41.3	1.0	-53.0	-13.0	-40.0	
		3296.00	-10.2	H	3.0	42.1	1.0	-51.2	-13.0	-38.2	

**LTE Band 26 (Part 22)**

		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement							
		<b>Company:</b>	Samsung						
		<b>Project #:</b>	4789841420						
		<b>Date:</b>	2021-03-16						
		<b>Test Engineer:</b>	20882						
		<b>Configuration:</b>	EUT / AC Adapter, Y-Position						
		<b>Location:</b>	Chamber 2						
		<b>Mode:</b>	LTE_QPSK Band 26 Harmonics, 1.4MHz Bandwidth						
		<b>Test Voltage:</b>	AC 120 V, 60 Hz						
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, 824.7MHz</b>									
1649.40	-15.8	V	3.0	40.7	1.0	-55.4	-13.0	-42.4	
2474.10	-12.9	V	3.0	41.3	1.0	-53.2	-13.0	-40.2	
3298.80	-10.1	V	3.0	42.1	1.0	-51.2	-13.0	-38.2	
1649.40	-15.7	H	3.0	40.7	1.0	-55.4	-13.0	-42.4	
2474.10	-12.6	H	3.0	41.3	1.0	-52.9	-13.0	-39.9	
3298.80	-10.1	H	3.0	42.1	1.0	-51.2	-13.0	-38.2	
<b>Mid Ch, 831.5MHz</b>									
1663.00	-15.5	V	3.0	40.7	1.0	-55.2	-13.0	-42.2	
2494.50	-12.8	V	3.0	41.3	1.0	-53.1	-13.0	-40.1	
3326.00	-10.1	V	3.0	42.1	1.0	-51.1	-13.0	-38.1	
1663.00	-15.7	H	3.0	40.7	1.0	-55.4	-13.0	-42.4	
2494.50	-12.5	H	3.0	41.3	1.0	-52.8	-13.0	-39.8	
3326.00	-10.1	H	3.0	42.1	1.0	-51.1	-13.0	-38.1	
<b>High Ch, 848.3MHz</b>									
1696.60	-15.6	V	3.0	40.7	1.0	-55.3	-13.0	-42.3	
2544.90	-12.6	V	3.0	41.4	1.0	-53.0	-13.0	-40.0	
3393.20	-9.9	V	3.0	42.1	1.0	-51.0	-13.0	-38.0	
1696.60	-15.6	H	3.0	40.7	1.0	-55.3	-13.0	-42.3	
2544.90	-12.3	H	3.0	41.4	1.0	-52.7	-13.0	-39.7	
3393.20	-9.8	H	3.0	42.1	1.0	-50.8	-13.0	-37.8	

1.4MHz  
QPSK

**LTE Band 41**

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement											
5MHz  QPSK		Company: Samsung Project #: 4789841420 Date: 2021-03-23 Test Engineer: 22943 Configuration: EUT / AC Adapter, X-Position Location: Chamber 2 Mode: LTE_QPSK Band 41 Harmonics, 5MHz Bandwidth Test Voltage: AC 120 V, 60 Hz									
		f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
		Low Ch, 2498.5MHz									
		4997.00	-16.8	V	3.0	42.8	1.0	-58.6	-25.0	-33.6	
		7495.50	-15.0	V	3.0	42.5	1.0	-56.4	-25.0	-31.4	
		9994.00	-11.8	V	3.0	40.9	1.0	-51.7	-25.0	-26.7	
		4997.00	-16.3	H	3.0	42.8	1.0	-58.1	-25.0	-33.1	
		7495.50	-15.0	H	3.0	42.5	1.0	-56.5	-25.0	-31.5	
		9994.00	-11.7	H	3.0	40.9	1.0	-51.6	-25.0	-26.6	
		Mid Ch, 2593MHz									
5186.00	-16.6	V	3.0	42.8	1.0	-58.4	-25.0	-33.4			
7779.00	-15.1	V	3.0	42.3	1.0	-56.4	-25.0	-31.4			
10372.00	-11.5	V	3.0	41.0	1.0	-51.5	-25.0	-26.5			
5186.00	-16.1	H	3.0	42.8	1.0	-57.9	-25.0	-32.9			
7779.00	-15.2	H	3.0	42.3	1.0	-56.5	-25.0	-31.5			
10372.00	-11.4	H	3.0	41.0	1.0	-51.4	-25.0	-26.4			
High Ch, 2687.5MHz											
5375.00	-16.0	V	3.0	42.9	1.0	-57.8	-25.0	-32.8			
8062.50	-14.9	V	3.0	42.2	1.0	-56.1	-25.0	-31.1			
10750.00	-10.5	V	3.0	41.2	1.0	-50.7	-25.0	-25.7			
5375.00	-15.6	H	3.0	42.9	1.0	-57.5	-25.0	-32.5			
8062.50	-15.1	H	3.0	42.2	1.0	-56.3	-25.0	-31.3			
10750.00	-10.4	H	3.0	41.2	1.0	-50.6	-25.0	-25.6			

**LTE Band 66**

		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement								
		<b>Company:</b>	Samsung							
		<b>Project #:</b>	4789841420							
		<b>Date:</b>	2021-03-16							
		<b>Test Engineer:</b>	20881							
		<b>Configuration:</b>	EUT / AC Adapter / Keyboard, covered X							
		<b>Location:</b>	Chamber 2							
		<b>Mode:</b>	LTE_QPSK Band 66 Harmonics, 5MHz Bandwidth							
		<b>Test Voltage:</b>	AC 120 V, 60 Hz							
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
<b>Low Ch, 1712.5MHz</b>										
3425.00	-9.7	V	3.0	42.1	1.0	-50.8	-13.0	-37.8		
5137.50	-9.0	V	3.0	42.8	1.0	-50.9	-13.0	-37.9		
6850.00	-6.4	V	3.0	42.7	1.0	-48.1	-13.0	-35.1		
3425.00	-9.6	H	3.0	42.1	1.0	-50.6	-13.0	-37.6		
5137.50	-8.7	H	3.0	42.8	1.0	-50.5	-13.0	-37.5		
6850.00	-6.5	H	3.0	42.7	1.0	-48.2	-13.0	-35.2		
<b>Mid Ch, 1745MHz</b>										
3490.00	-9.1	V	3.0	42.1	1.0	-50.1	-13.0	-37.1		
5235.00	-8.9	V	3.0	42.8	1.0	-50.8	-13.0	-37.8		
6980.00	-6.3	V	3.0	42.7	1.0	-48.0	-13.0	-35.0		
3490.00	-9.1	H	3.0	42.1	1.0	-50.1	-13.0	-37.1		
5235.00	-8.4	H	3.0	42.8	1.0	-50.2	-13.0	-37.2		
6980.00	-6.3	H	3.0	42.7	1.0	-48.0	-13.0	-35.0		
<b>High Ch, 1777.5MHz</b>										
3555.00	-8.4	V	3.0	42.1	1.0	-49.5	-13.0	-36.5		
5332.50	-8.4	V	3.0	42.9	1.0	-50.2	-13.0	-37.2		
7110.00	-6.1	V	3.0	42.6	1.0	-47.7	-13.0	-34.7		
3555.00	-8.3	H	3.0	42.1	1.0	-49.4	-13.0	-36.4		
5332.50	-8.0	H	3.0	42.9	1.0	-49.9	-13.0	-36.9		
7110.00	-6.3	H	3.0	42.6	1.0	-48.0	-13.0	-35.0		

1.4MHz  
QPSK



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**LTE Band 2**

LTE Band 2(Frequency range: 1850-1910 MHz) is covered by LTE Band 25 (Frequency range: 1850-1915 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

**LTE Band 4**

LTE Band 4 (Frequency range: 1710-1755 MHz) is covered by LTE Band 66 (Frequency range: 1710-1780 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

**LTE Band 5**

LTE Band 5 (Frequency range: 824-849 MHz) is covered by LTE Band 26 (Frequency range: 814-849 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

**LTE Band 17**

LTE Band 17 (Frequency range: 704-716 MHz) is covered by LTE Band 12 (Frequency range: 699-716 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

## **END OF TEST REPORT**