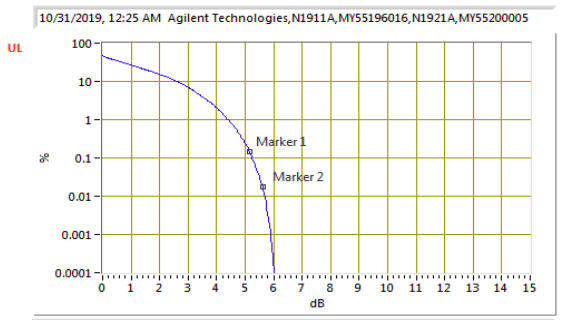
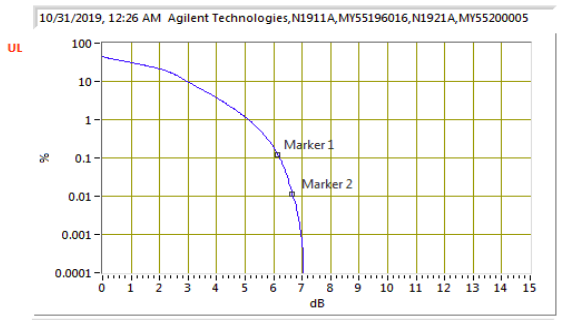
8.5.9. **LTE BAND 66**



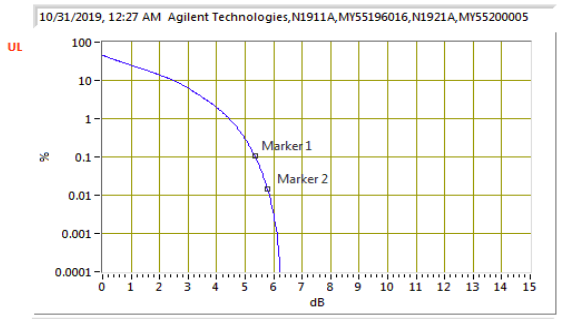
Marker 1 Power: 5.17 dB	Delta Power: 0.45 dB
Marker 1 Probability: 0.1358%	Delta Probability: 0.1197%
	Avg (A): 22.24 dBm
Marker 2 Power: 5.62 dB	Pk(A): 28.35dBm
Marker 2 Probability: 0.0161%	Pk-Avg(A): 6.11dB

LTE B66 1.4MHz QPSK Mid Channel



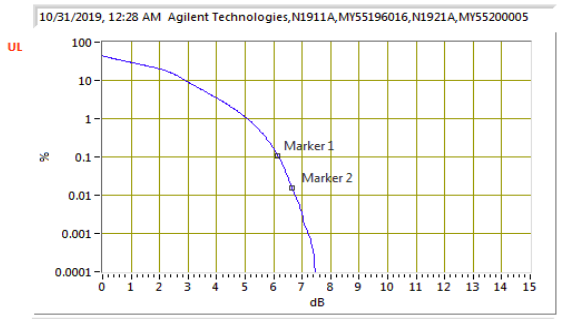
Marker 1 Power: 6.15 dB	Delta Power: 0.53 dB
Marker 1 Probability: 0.1228%	Delta Probability: 0.1123%
	Avg (A): 21.32 dBm
Marker 2 Power: 6.67 dB	Pk(A): 28.45dBm
Marker 2 Probability: 0.0105%	Pk-Avg(A): 7.12dB

LTE B66 1.4MHz 16QAM Mid Channel



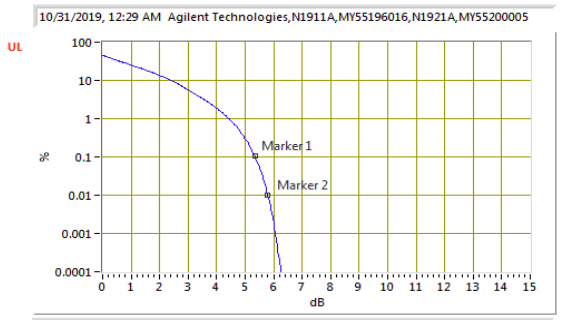
Marker 1 Power: 5.33 dB	Delta Power: 0.45 dB
Marker 1 Probability: 0.1123%	Delta Probability: 0.0968%
	Avg (A): 22.25 dBm
Marker 2 Power: 5.78 dB	Pk(A): 28.54dBm
Marker 2 Probability: 0.0155%	Pk-Avg(A): 6.29dB

LTE B66 3MHz QPSK Mid Channel



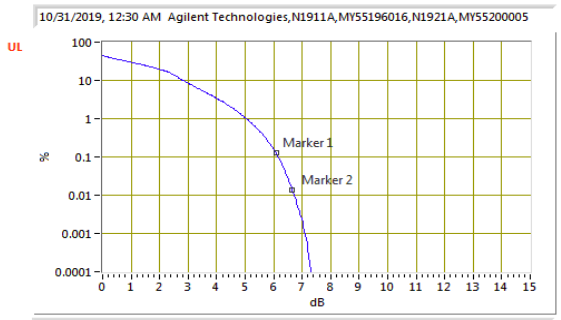
Marker 1 Power: 6.15 dB	Delta Power: 0.53 dB
Marker 1 Probability: 0.1089%	Delta Probability: 0.0943%
	Avg (A): 21.26 dBm
Marker 2 Power: 6.67 dB	Pk(A): 28.82dBm
Marker 2 Probability: 0.0146%	Pk-Avg(A): 7.56dB

LTE B66 3MHz 16QAM Mid Channel



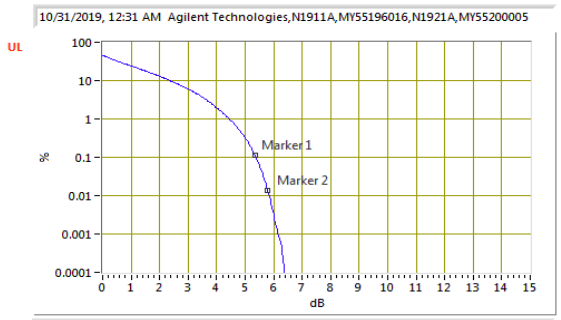
Marker 1 Power: 5.33 dB	Delta Power: 0.45 dB
Marker 1 Probability: 0.1109%	Delta Probability: 0.0996%
	Avg (A): 22.26 dBm
Marker 2 Power: 5.78 dB	Pk(A): 28.62dBm
Marker 2 Probability: 0.0112%	Pk-Avg(A): 6.37dB

LTE B66 5MHz QPSK Mid Channel

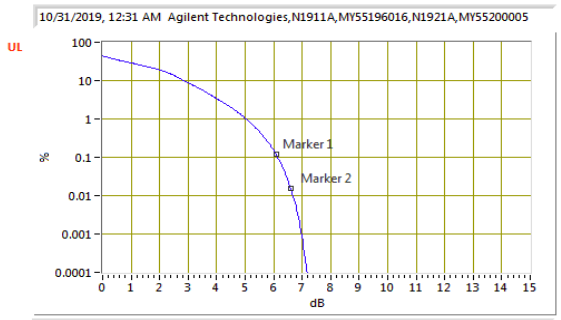


Marker 1 Power: 6.08 dB	Delta Power: 0.60 dB
Marker 1 Probability: 0.1297%	Delta Probability: 0.1168%
	Avg (A): 21.29 dBm
Marker 2 Power: 6.67 dB	Pk(A): 28.65dBm
Marker 2 Probability: 0.0129%	Pk-Avg(A): 7.36dB

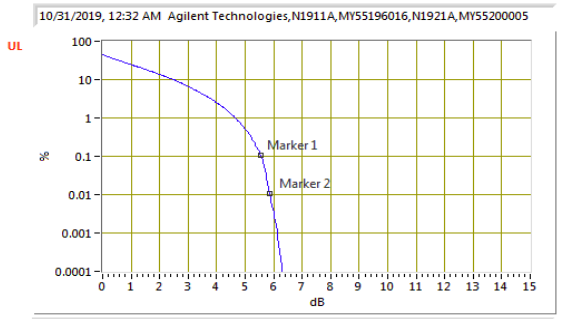
LTE B66 5MHz 16QAM Mid Channel



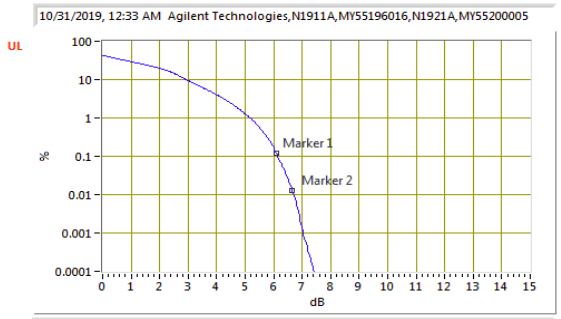
LTE B66 10MHz QPSK Mid Channel



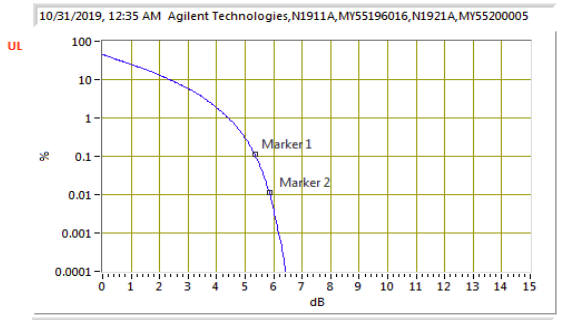
LTE B66 10MHz 16QAM Mid Channel



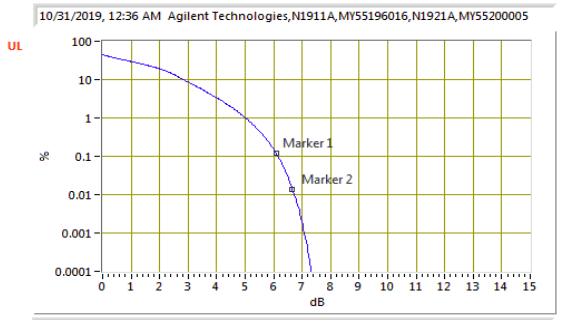
LTE B66 15MHz QPSK Mid Channel



LTE B66 15MHz 16QAM Mid Channel



LTE B66 20MHz QPSK Mid Channel



LTE B66 20MHz 16QAM Mid Channel

9. RADIATED TEST RESULTS

9.1. EFFECTIVE RADIATED POWER ERP/EIRP

RULE PART(S)

FCC: §2.1053, §22.917, §24.238 and §27.50

LIMITS

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

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

27.50(c) - (10) Portable stations (hand-held devices) are limited to 3 watts ERP; (LTE B12)

27.50(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.(Band 66)

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 (2016), Clause 2.2.17; PSA setting reference to 971168 D01 v03r01

For peak power measurement with a PSA:

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

For average power measurement with a PSA:

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 ≥ 3 x RBW; d) Set number of points in sweep ≥ 2 × span / RBW; e) Sweep time = auto-couple; f) Detector = RMS (power averaging); g) Use free run trigger If burst duty cycle ≥ 98; h) Use trigger to capture bursts If burst duty cycle < 98; i) Trace average at least 100 traces in power averaging (*i.e.*, RMS) mode. j) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function.

TEST RESULTS

GSM

Band	Mode	Channel	f(MHz)	ERP/EIRP	
				dBm	W
GSM 850	GPRS	128	824.2	25.20	0.3311
		190	836.6	26.30	0.4266
		251	848.8	27.46	0.5572
	EGPRS	128	824.2	21.28	0.1343
		190	836.6	21.99	0.1581
		251	848.8	22.93	0.1963
GSM 1900	GPRS	512	1850.2	26.76	0.4742
		661	1880.0	25.85	0.3846
		810	1909.8	25.89	0.3882
	EGPRS	512	1850.2	24.97	0.3141
		661	1880.0	24.07	0.2553
		810	1909.8	24.14	0.2594

WCDMA

Band	Mode	Channel	f(MHz)	ERP/EIRP	
				dBm	W
Band 2	REL99	9262	1852.4	20.05	0.1012
		9400	1880	20.33	0.1079
		9538	1907.6	21.36	0.1368
	HSDPA	9262	1852.4	19.01	0.0796
		9400	1880.0	19.33	0.0857
		9538	1907.6	20.31	0.1074
Band 5	REL99	4132	826.4	17.89	0.0615
		4183	836.6	17.92	0.0619
		4233	846.6	18.34	0.0682
	HSDPA	4132	826.4	16.39	0.0436
		4183	836.6	16.34	0.0431
		4233	846.6	17.22	0.0527
Band 4	REL99	1312	1712.4	20.11	0.1026
		1413	1732.6	20.01	0.1002
		1513	1752.6	20.76	0.1191
	HSDPA	1312	1712.4	19.07	0.0807
		1413	1732.6	18.96	0.0787
		1513	1752.6	19.79	0.0953

LTE Band 2

BW (MHz)	Mode	RB/RB Size	f(MHz)	EIRP	
				dBm	W
20	QPSK	1/0	1860	21.47	0.1403
		1/0	1880	22.36	0.1722
		1/0	1900	22.79	0.1901
	16QAM	1/0	1860	20.69	0.1172
		1/0	1880	21.85	0.1531
		1/0	1900	21.90	0.1549
15	QPSK	1/0	1857.5	21.65	0.1462
		1/0	1880	22.41	0.1742
		1/0	1902.5	22.32	0.1706
	16QAM	1/0	1857.5	20.79	0.1199
		1/0	1880	21.77	0.1503
		1/0	1902.5	21.43	0.1390
10	QPSK	1/0	1855	21.45	0.1396
		1/0	1880	21.78	0.1507
		1/0	1905	22.16	0.1644
	16QAM	1/0	1855	20.71	0.1178
		1/0	1880	21.04	0.1271
		1/0	1905	21.36	0.1368
5	QPSK	1/0	1852.5	21.57	0.1435
		1/0	1880	22.04	0.1600
		1/0	1907.5	21.82	0.1521
	16QAM	1/0	1852.5	20.86	0.1219
		1/0	1880	21.38	0.1374
		1/0	1907.5	21.05	0.1274
3	QPSK	1/0	1851.5	21.49	0.1409
		1/0	1880	22.75	0.1884
		1/0	1908.5	22.21	0.1663
	16QAM	1/0	1851.5	20.68	0.1169
		1/0	1880	22.00	0.1585
		1/0	1908.5	21.35	0.1365
1.4	QPSK	1/0	1850.7	21.35	0.1365
		1/0	1880	21.75	0.1496
		1/0	1909.3	21.50	0.1413
	16QAM	1/0	1850.7	20.48	0.1117
		1/0	1880	20.97	0.1250
		1/0	1909.3	20.64	0.1159

LTE Band 4

BW (MHz)	Mode	RB/RB Size	f(MHz)	EIRP	
				dBm	W
20	QPSK	1/0	1720	19.82	0.0959
		1/0	1732.5	20.25	0.1059
		1/0	1745	19.04	0.0802
	16QAM	1/0	1720	19.00	0.0794
		1/0	1732.5	19.54	0.0899
		1/0	1745	18.29	0.0675
15	QPSK	1/0	1717.5	19.55	0.0902
		1/0	1732.5	19.68	0.0929
		1/0	1747.5	19.26	0.0843
	16QAM	1/0	1717.5	18.68	0.0738
		1/0	1732.5	19.17	0.0826
		1/0	1747.5	18.37	0.0687
10	QPSK	1/0	1715	19.56	0.0904
		1/0	1732.5	20.05	0.1012
		1/0	1750	20.51	0.1125
	16QAM	1/0	1715	18.70	0.0741
		1/0	1732.5	19.28	0.0847
		1/0	1750	19.65	0.0923
5	QPSK	1/0	1712.5	19.63	0.0918
		1/0	1732.5	20.54	0.1132
		1/0	1752.5	20.17	0.1040
	16QAM	1/0	1712.5	18.88	0.0773
		1/0	1732.5	19.83	0.0962
		1/0	1752.5	19.51	0.0893
3	QPSK	1/0	1711.5	19.43	0.0877
		1/0	1732.5	20.73	0.1183
		1/0	1753.5	20.06	0.1014
	16QAM	1/0	1711.5	18.58	0.0721
		1/0	1732.5	20.01	0.1002
		1/0	1753.5	19.49	0.0889
1.4	QPSK	1/0	1710.7	19.79	0.0953
		1/0	1732.5	19.72	0.0938
		1/0	1754.3	20.47	0.1114
	16QAM	1/0	1710.7	18.88	0.0773
		1/0	1732.5	19.04	0.0802
		1/0	1754.3	19.94	0.0986

LTE Band 5

BW (MHz)	Mode	RB/RB Size	f(MHz)	ERP	
				dBm	W
10	QPSK	1/0	829	18.56	0.0718
		1/0	836.5	18.64	0.0731
		1/0	844	18.92	0.0780
	16QAM	1/0	829	17.68	0.0586
		1/0	836.5	17.68	0.0586
		1/0	844	18.06	0.0640
5	QPSK	1/0	826.5	18.26	0.0670
		1/0	836.5	18.60	0.0724
		1/0	846.5	19.03	0.0800
	16QAM	1/0	826.5	17.41	0.0551
		1/0	836.5	17.74	0.0594
		1/0	846.5	18.25	0.0668
3	QPSK	1/0	825.5	18.27	0.0671
		1/0	836.5	18.36	0.0685
		1/0	847.5	19.05	0.0804
	16QAM	1/0	825.5	17.40	0.0550
		1/0	836.5	17.45	0.0556
		1/0	847.5	18.14	0.0652
1.4	QPSK	1/0	824.7	17.76	0.0597
		1/0	836.5	18.27	0.0671
		1/0	848.3	19.22	0.0836
	16QAM	1/0	824.7	16.91	0.0491
		1/0	836.5	17.40	0.0550
		1/0	848.3	18.24	0.0667

LTE Band 12

BW (MHz)	Mode	RB/RB Size	f(MHz)	ERP	
				dBm	W
10	QPSK	1/0	704	17.87	0.0612
		1/0	707.5	17.53	0.0566
		1/0	711	17.65	0.0582
	16QAM	1/0	704	16.92	0.0492
		1/0	707.5	16.68	0.0466
		1/0	711	16.85	0.0484
5	QPSK	1/0	701.5	18.07	0.0641
		1/0	707.5	17.43	0.0553
		1/0	713.5	17.95	0.0624
	16QAM	1/0	701.5	17.23	0.0528
		1/0	707.5	16.64	0.0461
		1/0	713.5	17.13	0.0516
3	QPSK	1/0	700.5	18.25	0.0668
		1/0	707.5	17.78	0.0600
		1/0	714.5	18.09	0.0644
	16QAM	1/0	700.5	17.42	0.0552
		1/0	707.5	16.94	0.0494
		1/0	714.5	17.18	0.0522
1.4	QPSK	1/0	699.7	17.90	0.0617
		1/0	707.5	17.68	0.0586
		1/0	715.3	17.75	0.0596
	16QAM	1/0	699.7	17.02	0.0504
		1/0	707.5	16.79	0.0478
		1/0	715.3	16.88	0.0488

LTE Band 13

BW (MHz)	Mode	RB/RB Size	f(MHz)	ERP	
				dBm	W
10	QPSK				
		1/0	782	16.02	0.0400
	16QAM				
		1/0	782	15.10	0.0324
5	QPSK	1/0	779.5	15.93	0.0392
		1/0	782	15.99	0.0397
		1/0	784.5	15.75	0.0376
	16QAM	1/0	779.5	15.10	0.0324
		1/0	782	15.14	0.0327
		1/0	784.5	15.00	0.0316

LTE Band 41 (FCC)

BW (MHz)	Mode	RB/RB Size	f(MHz)	EIRP	
				dBm	W
20	QPSK	1/0	2506	19.24	0.0839
		1/0	2593	21.54	0.1426
		1/0	2680	21.31	0.1352
	16QAM	1/0	2506	18.76	0.0752
		1/0	2593	21.05	0.1274
		1/0	2680	20.61	0.1151
15	QPSK	1/0	2503.5	19.39	0.0869
		1/0	2593	21.97	0.1574
		1/0	2682.5	21.40	0.1380
	16QAM	1/0	2503.5	18.72	0.0745
		1/0	2593	21.46	0.1400
		1/0	2682.5	20.73	0.1183
10	QPSK	1/0	2501	19.61	0.0914
		1/0	2593	21.91	0.1552
		1/0	2685	21.71	0.1483
	16QAM	1/0	2501	18.86	0.0769
		1/0	2593	21.28	0.1343
		1/0	2685	21.09	0.1285
5	QPSK	1/0	2498.5	19.09	0.0811
		1/0	2593	21.85	0.1531
		1/0	2687.5	21.86	0.1535
	16QAM	1/0	2498.5	18.45	0.0700
		1/0	2593	21.16	0.1306
		1/0	2687.5	21.23	0.1327

LTE Band 66

BW (MHz)	Mode	RB/RB Size	f(MHz)	EIRP	
				dBm	W
20	QPSK	1/0	1720	19.52	0.0895
		1/0	1745	19.43	0.0877
		1/0	1770	20.63	0.1156
	16QAM	1/0	1720	18.77	0.0753
		1/0	1745	18.67	0.0736
		1/0	1770	19.94	0.0986
15	QPSK	1/0	1717.5	19.84	0.0964
		1/0	1745	19.58	0.0908
		1/0	1772.5	20.36	0.1086
	16QAM	1/0	1717.5	19.02	0.0798
		1/0	1745	18.80	0.0759
		1/0	1772.5	19.60	0.0912
10	QPSK	1/0	1715	19.60	0.0912
		1/0	1745	19.03	0.0800
		1/0	1775	20.17	0.1040
	16QAM	1/0	1715	18.79	0.0757
		1/0	1745	18.28	0.0673
		1/0	1775	19.45	0.0881
5	QPSK	1/0	1712.5	19.70	0.0933
		1/0	1745	19.73	0.0940
		1/0	1777.5	19.90	0.0977
	16QAM	1/0	1712.5	18.92	0.0780
		1/0	1745	19.01	0.0796
		1/0	1777.5	19.32	0.0855
3	QPSK	1/0	1711.5	20.09	0.1021
		1/0	1745	19.77	0.0948
		1/0	1778.5	19.90	0.0977
	16QAM	1/0	1711.5	19.32	0.0855
		1/0	1745	18.94	0.0783
		1/0	1778.5	19.22	0.0836
1.4	QPSK	1/0	1710.7	19.71	0.0935
		1/0	1745	19.71	0.0935
		1/0	1779.3	19.95	0.0989
	16QAM	1/0	1710.7	18.87	0.0771
		1/0	1745	18.95	0.0785
		1/0	1779.3	19.24	0.0839

9.1.1. **GSM**

GPRS 850

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/5/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: GPRS 850 MHz Fundamentals

Test Equipment:
Receiving: Hybrid PRE0184971, and Chamber I SMA Cables
Substitution: Dipole T416, Chamber I Passthrough Cables

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	21.97	V	3.7	0.5	18.78	38.5	-19.7	
824.20	28.60	H	3.7	0.3	25.20	38.5	-13.3	
Mid Ch								
836.60	22.53	V	3.7	0.5	19.31	38.5	-19.2	
836.60	29.72	H	3.7	0.3	26.30	38.5	-12.2	
High Ch								
848.80	23.87	V	3.8	0.5	20.62	38.5	-17.9	
848.80	30.91	H	3.8	0.3	27.46	38.5	-11.0	

EGPRS 850

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/5/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: EGPRS 850 MHz Fundamentals

Test Equipment:
Receiving: Hybrid PRE0184971, and Chamber I SMA Cables
Substitution: Dipole T416, Chamber I Passthrough Cables

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	18.27	V	3.7	0.5	15.08	38.5	-23.4	
824.20	24.68	H	3.7	0.3	21.28	38.5	-17.2	
Mid Ch								
836.60	18.37	V	3.7	0.5	15.15	38.5	-23.4	
836.60	25.41	H	3.7	0.3	21.99	38.5	-16.5	
High Ch								
848.80	19.41	V	3.8	0.5	16.16	38.5	-22.3	
848.80	26.38	H	3.8	0.3	22.93	38.5	-15.6	

GPRS 1900

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: GPRS 1900 MHz Fundamentals

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

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	27.89	V	5.6	4.5	26.76	33.0	-6.2	
1850.20	22.37	H	5.6	4.5	21.24	33.0	-11.8	
Mid Ch								
1880.00	26.95	V	5.7	4.6	25.85	33.0	-7.2	
1880.00	22.95	H	5.7	4.6	21.85	33.0	-11.2	
High Ch								
1909.80	26.99	V	5.7	4.6	25.89	33.0	-7.1	
1909.80	20.58	H	5.7	4.6	19.48	33.0	-13.5	

EGPRS 1900

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: EGPRS 1900 MHz Fundamentals

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

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	26.10	V	5.6	4.5	24.97	33.0	-8.0	
1850.20	20.36	H	5.6	4.5	19.23	33.0	-13.8	
Mid Ch								
1880.00	25.17	V	5.7	4.6	24.07	33.0	-8.9	
1880.00	20.84	H	5.7	4.6	19.74	33.0	-13.3	
High Ch								
1909.80	25.24	V	5.7	4.6	24.14	33.0	-8.9	
1909.80	19.14	H	5.7	4.6	18.04	33.0	-15.0	

9.1.2. **WCDMA**

B2 REL99

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/6/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: Rel99 Band 2 Fundamentals

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

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	21.23	V	5.6	4.5	20.05	33.0	-12.9	
1852.40	15.77	H	5.6	4.5	14.59	33.0	-18.4	
Mid Ch								
1880.00	21.43	V	5.7	4.6	20.33	33.0	-12.7	
1880.00	17.02	H	5.7	4.6	15.92	33.0	-17.1	
High Ch								
1907.60	22.52	V	5.7	4.5	21.36	33.0	-11.6	
1907.60	15.89	H	5.7	4.5	14.73	33.0	-18.3	

B2 HSDPA

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/6/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: HSDPA Band 2 Fundamentals

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

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	20.19	V	5.6	4.5	19.01	33.0	-14.0	
1852.40	14.72	H	5.6	4.5	13.54	33.0	-19.5	
Mid Ch								
1880.00	20.43	V	5.7	4.6	19.33	33.0	-13.7	
1880.00	15.97	H	5.7	4.6	14.87	33.0	-18.1	
High Ch								
1907.60	21.47	V	5.7	4.5	20.31	33.0	-12.7	
1907.60	14.91	H	5.7	4.5	13.75	33.0	-19.3	

B5 REL99

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/4/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: Rel99 Band 5 Fundamentals

Test Equipment:
Receiving: Hybrid PRE0184971, and Chamber I SMA Cables
Substitution: Dipole T416, Chamber I Passthrough Cables

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	14.16	V	3.7	0.5	10.96	38.5	-27.5	
826.40	21.29	H	3.7	0.3	17.89	38.5	-20.6	
Mid Ch								
836.60	14.05	V	3.7	0.5	10.83	38.5	-27.7	
836.60	21.34	H	3.7	0.3	17.92	38.5	-20.6	
High Ch								
846.60	14.45	V	3.7	0.5	11.20	38.5	-27.3	
846.60	21.79	H	3.7	0.3	18.34	38.5	-20.2	

B5 HSDPA

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/4/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: HSDPA Band 5 Fundamentals

Test Equipment:
Receiving: Hybrid PRE0184971, and Chamber I SMA Cables
Substitution: Dipole T416, Chamber I Passthrough Cables

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	13.05	V	3.7	0.5	9.85	38.5	-28.7	
826.40	19.79	H	3.7	0.3	16.39	38.5	-22.1	
Mid Ch								
836.60	12.91	V	3.7	0.5	9.69	38.5	-28.8	
836.60	19.76	H	3.7	0.3	16.34	38.5	-22.2	
High Ch								
846.60	13.42	V	3.7	0.5	10.17	38.5	-28.3	
846.60	20.67	H	3.7	0.3	17.22	38.5	-21.3	

B4 REL99

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: Rel99 Band 4 Fundamentals

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1712.40	19.79	V	5.4	5.7	20.11	30.0	-9.9	
1712.40	13.01	H	5.4	5.7	13.33	30.0	-16.7	
Mid Ch								
1732.60	19.99	V	5.5	5.5	20.01	30.0	-10.0	
1732.60	14.48	H	5.5	5.5	14.50	30.0	-15.5	
High Ch								
1752.60	20.98	V	5.5	5.3	20.76	30.0	-9.2	
1752.60	14.58	H	5.5	5.3	14.36	30.0	-15.6	

B4 HSDPA

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: HSDPA Band 4 Fundamentals

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1712.40	18.75	V	5.4	5.7	19.07	30.0	-10.9	
1712.40	11.99	H	5.4	5.7	12.31	30.0	-17.7	
Mid Ch								
1732.60	18.94	V	5.5	5.5	18.96	30.0	-11.0	
1732.60	13.47	H	5.5	5.5	13.49	30.0	-16.5	
High Ch								
1752.60	20.01	V	5.5	5.3	19.79	30.0	-10.2	
1752.60	13.50	H	5.5	5.3	13.28	30.0	-16.7	

9.1.3. **LTE Band 2**

20MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/6/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 2 Fundamentals, 20MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1860.00	22.51	V	5.6	4.6	21.47	33.0	-11.5	
1860.00	16.59	H	5.6	4.6	15.55	33.0	-17.4	
Mid Ch								
1880.00	23.46	V	5.7	4.6	22.36	33.0	-10.6	
1880.00	18.14	H	5.7	4.6	17.04	33.0	-16.0	
High Ch								
1900.00	23.86	V	5.7	4.6	22.79	33.0	-10.2	
1900.00	18.79	H	5.7	4.6	17.72	33.0	-15.3	

20MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/6/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 2 Fundamentals, 20MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1860.00	21.73	V	5.6	4.6	20.69	33.0	-12.3	
1860.00	15.78	H	5.6	4.6	14.74	33.0	-18.3	
Mid Ch								
1880.00	22.95	V	5.7	4.6	21.85	33.0	-11.2	
1880.00	17.43	H	5.7	4.6	16.33	33.0	-16.7	
High Ch								
1900.00	22.97	V	5.7	4.6	21.90	33.0	-11.1	
1900.00	17.89	H	5.7	4.6	16.82	33.0	-16.2	

15MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/6/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 2 Fundamentals, 15MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1857.50	22.76	V	5.6	4.5	21.65	33.0	-11.3	
1857.50	15.51	H	5.6	4.5	14.40	33.0	-18.6	
Mid Ch								
1880.00	23.51	V	5.7	4.6	22.41	33.0	-10.6	
1880.00	15.78	H	5.7	4.6	14.68	33.0	-18.3	
High Ch								
1902.50	23.43	V	5.7	4.6	22.32	33.0	-10.7	
1902.50	18.23	H	5.7	4.6	17.12	33.0	-15.9	

15MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/6/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 2 Fundamentals, 15MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1857.50	21.90	V	5.6	4.5	20.79	33.0	-12.2	
1857.50	14.65	H	5.6	4.5	13.54	33.0	-19.5	
Mid Ch								
1880.00	22.87	V	5.7	4.6	21.77	33.0	-11.2	
1880.00	15.09	H	5.7	4.6	13.99	33.0	-19.0	
High Ch								
1902.50	22.54	V	5.7	4.6	21.43	33.0	-11.6	
1902.50	17.30	H	5.7	4.6	16.19	33.0	-16.8	

10MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/6/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 2 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1855.00	22.63	V	5.6	4.5	21.45	33.0	-11.6	
1855.00	16.22	H	5.6	4.5	15.04	33.0	-18.0	
Mid Ch								
1880.00	22.88	V	5.7	4.6	21.78	33.0	-11.2	
1880.00	17.46	H	5.7	4.6	16.36	33.0	-16.6	
High Ch								
1905.00	23.32	V	5.7	4.5	22.16	33.0	-10.8	
1905.00	16.77	H	5.7	4.5	15.61	33.0	-17.4	

10MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/6/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 2 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1855.00	21.89	V	5.6	4.5	20.71	33.0	-12.3	
1855.00	15.37	H	5.6	4.5	14.19	33.0	-18.8	
Mid Ch								
1880.00	22.14	V	5.7	4.6	21.04	33.0	-12.0	
1880.00	16.67	H	5.7	4.6	15.57	33.0	-17.4	
High Ch								
1905.00	22.52	V	5.7	4.5	21.36	33.0	-11.6	
1905.00	15.89	H	5.7	4.5	14.73	33.0	-18.3	

5MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/6/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 2 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1852.50	22.75	V	5.6	4.5	21.57	33.0	-11.4	
1852.50	16.43	H	5.6	4.5	15.25	33.0	-17.7	
Mid Ch								
1880.00	23.14	V	5.7	4.6	22.04	33.0	-11.0	
1880.00	17.67	H	5.7	4.6	16.57	33.0	-16.4	
High Ch								
1907.50	22.99	V	5.7	4.5	21.82	33.0	-11.2	
1907.50	16.92	H	5.7	4.5	15.75	33.0	-17.2	

5MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/6/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 2 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1852.50	22.04	V	5.6	4.5	20.86	33.0	-12.1	
1852.50	15.66	H	5.6	4.5	14.48	33.0	-18.5	
Mid Ch								
1880.00	22.48	V	5.7	4.6	21.38	33.0	-11.6	
1880.00	16.96	H	5.7	4.6	15.86	33.0	-17.1	
High Ch								
1907.50	22.22	V	5.7	4.5	21.05	33.0	-11.9	
1907.50	16.07	H	5.7	4.5	14.90	33.0	-18.1	

3MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/6/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 2 Fundamentals, 3MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1851.50	22.65	V	5.6	4.5	21.49	33.0	-11.5	
1851.50	16.65	H	5.6	4.5	15.49	33.0	-17.5	
Mid Ch								
1880.00	23.85	V	5.7	4.6	22.75	33.0	-10.3	
1880.00	17.21	H	5.7	4.6	16.11	33.0	-16.9	
High Ch								
1908.50	23.36	V	5.7	4.5	22.21	33.0	-10.8	
1908.50	17.26	H	5.7	4.5	16.11	33.0	-16.9	

3MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/6/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 2 Fundamentals, 3MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1851.50	21.84	V	5.6	4.5	20.68	33.0	-12.3	
1851.50	15.73	H	5.6	4.5	14.57	33.0	-18.4	
Mid Ch								
1880.00	23.10	V	5.7	4.6	22.00	33.0	-11.0	
1880.00	16.40	H	5.7	4.6	15.30	33.0	-17.7	
High Ch								
1908.50	22.50	V	5.7	4.5	21.35	33.0	-11.6	
1908.50	16.28	H	5.7	4.5	15.13	33.0	-17.9	

1.4MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/6/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 2 Fundamentals, 1.4MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1850.70	22.49	V	5.6	4.5	21.35	33.0	-11.7	
1850.70	16.22	H	5.6	4.5	15.08	33.0	-17.9	
Mid Ch								
1880.00	22.85	V	5.7	4.6	21.75	33.0	-11.3	
1880.00	17.99	H	5.7	4.6	16.89	33.0	-16.1	
High Ch								
1909.30	22.62	V	5.7	4.6	21.50	33.0	-11.5	
1909.30	17.51	H	5.7	4.6	16.39	33.0	-16.6	

1.4MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/6/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 2 Fundamentals, 1.4MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1850.70	21.62	V	5.6	4.5	20.48	33.0	-12.5	
1850.70	15.28	H	5.6	4.5	14.14	33.0	-18.9	
Mid Ch								
1880.00	22.07	V	5.7	4.6	20.97	33.0	-12.0	
1880.00	17.11	H	5.7	4.6	16.01	33.0	-17.0	
High Ch								
1909.30	21.76	V	5.7	4.6	20.64	33.0	-12.4	
1909.30	16.58	H	5.7	4.6	15.46	33.0	-17.5	

9.1.4. **LTE Band 4**

20MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 4 Fundamentals, 20MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

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	19.69	V	5.4	5.6	19.82	30.0	-10.2	
1720.00	14.01	H	5.4	5.6	14.14	30.0	-15.9	
Mid Ch								
1732.50	20.22	V	5.5	5.5	20.25	30.0	-9.8	
1732.50	13.50	H	5.5	5.5	13.53	30.0	-16.5	
High Ch								
1745.00	19.13	V	5.5	5.4	19.04	30.0	-11.0	
1745.00	13.23	H	5.5	5.4	13.14	30.0	-16.9	

20MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 4 Fundamentals, 20MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

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	18.87	V	5.4	5.6	19.00	30.0	-11.0	
1720.00	13.21	H	5.4	5.6	13.34	30.0	-16.7	
Mid Ch								
1732.50	19.51	V	5.5	5.5	19.54	30.0	-10.5	
1732.50	12.76	H	5.5	5.5	12.79	30.0	-17.2	
High Ch								
1745.00	18.38	V	5.5	5.4	18.29	30.0	-11.7	
1745.00	12.42	H	5.5	5.4	12.33	30.0	-17.7	

15MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 4 Fundamentals, 15MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1717.50	19.40	V	5.4	5.6	19.55	30.0	-10.5	
1717.50	13.97	H	5.4	5.6	14.12	30.0	-15.9	
Mid Ch								
1732.50	19.65	V	5.5	5.5	19.68	30.0	-10.3	
1732.50	13.27	H	5.5	5.5	13.30	30.0	-16.7	
High Ch								
1747.50	19.44	V	5.5	5.3	19.26	30.0	-10.7	
1747.50	12.82	H	5.5	5.3	12.64	30.0	-17.4	

15MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 4 Fundamentals, 15MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1717.50	18.53	V	5.4	5.6	18.68	30.0	-11.3	
1717.50	13.10	H	5.4	5.6	13.25	30.0	-16.8	
Mid Ch								
1732.50	19.14	V	5.5	5.5	19.17	30.0	-10.8	
1732.50	12.76	H	5.5	5.5	12.79	30.0	-17.2	
High Ch								
1747.50	18.55	V	5.5	5.3	18.37	30.0	-11.6	
1747.50	11.88	H	5.5	5.3	11.70	30.0	-18.3	

10MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 4 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1715.00	19.33	V	5.4	5.6	19.56	30.0	-10.4	
1715.00	13.48	H	5.4	5.6	13.71	30.0	-16.3	
Mid Ch								
1732.50	20.02	V	5.5	5.5	20.05	30.0	-10.0	
1732.50	13.58	H	5.5	5.5	13.61	30.0	-16.4	
High Ch								
1750.00	20.74	V	5.5	5.3	20.51	30.0	-9.5	
1750.00	12.82	H	5.5	5.3	12.59	30.0	-17.4	

10MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 4 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1715.00	18.47	V	5.4	5.6	18.70	30.0	-11.3	
1715.00	12.52	H	5.4	5.6	12.75	30.0	-17.3	
Mid Ch								
1732.50	19.25	V	5.5	5.5	19.28	30.0	-10.7	
1732.50	12.88	H	5.5	5.5	12.91	30.0	-17.1	
High Ch								
1750.00	19.88	V	5.5	5.3	19.65	30.0	-10.4	
1750.00	11.87	H	5.5	5.3	11.64	30.0	-18.4	

5MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 4 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1712.50	19.31	V	5.4	5.7	19.63	30.0	-10.4	
1712.50	13.70	H	5.4	5.7	14.02	30.0	-16.0	
Mid Ch								
1732.50	20.51	V	5.5	5.5	20.54	30.0	-9.5	
1732.50	13.66	H	5.5	5.5	13.69	30.0	-16.3	
High Ch								
1752.50	20.39	V	5.5	5.3	20.17	30.0	-9.8	
1752.50	14.13	H	5.5	5.3	13.91	30.0	-16.1	

5MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 4 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1712.50	18.56	V	5.4	5.7	18.88	30.0	-11.1	
1712.50	12.89	H	5.4	5.7	13.21	30.0	-16.8	
Mid Ch								
1732.50	19.80	V	5.5	5.5	19.83	30.0	-10.2	
1732.50	13.02	H	5.5	5.5	13.05	30.0	-17.0	
High Ch								
1752.50	19.73	V	5.5	5.3	19.51	30.0	-10.5	
1752.50	13.38	H	5.5	5.3	13.16	30.0	-16.8	

3MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 4 Fundamentals, 3MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1711.50	19.09	V	5.4	5.8	19.43	30.0	-10.6	
1711.50	13.81	H	5.4	5.8	14.15	30.0	-15.8	
Mid Ch								
1732.50	20.70	V	5.5	5.5	20.73	30.0	-9.3	
1732.50	13.85	H	5.5	5.5	13.88	30.0	-16.1	
High Ch								
1753.50	20.26	V	5.5	5.3	20.06	30.0	-9.9	
1753.50	13.65	H	5.5	5.3	13.45	30.0	-16.6	

3MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 4 Fundamentals, 3MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1711.50	18.24	V	5.4	5.8	18.58	30.0	-11.4	
1711.50	12.84	H	5.4	5.8	13.18	30.0	-16.8	
Mid Ch								
1732.50	19.98	V	5.5	5.5	20.01	30.0	-10.0	
1732.50	13.11	H	5.5	5.5	13.14	30.0	-16.9	
High Ch								
1753.50	19.69	V	5.5	5.3	19.49	30.0	-10.5	
1753.50	12.93	H	5.5	5.3	12.73	30.0	-17.3	

1.4MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 4 Fundamentals, 1.4MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1710.70	19.44	V	5.4	5.8	19.79	30.0	-10.2	
1710.70	11.57	H	5.4	5.8	11.92	30.0	-18.1	
Mid Ch								
1732.50	19.69	V	5.5	5.5	19.72	30.0	-10.3	
1732.50	14.07	H	5.5	5.5	14.10	30.0	-15.9	
High Ch								
1754.30	20.66	V	5.5	5.3	20.47	30.0	-9.5	
1754.30	13.31	H	5.5	5.3	13.12	30.0	-16.9	

1.4MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 4 Fundamentals, 1.4MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1710.70	18.53	V	5.4	5.8	18.88	30.0	-11.1	
1710.70	10.59	H	5.4	5.8	10.94	30.0	-19.1	
Mid Ch								
1732.50	19.01	V	5.5	5.5	19.04	30.0	-11.0	
1732.50	13.41	H	5.5	5.5	13.44	30.0	-16.6	
High Ch								
1754.30	20.13	V	5.5	5.3	19.94	30.0	-10.1	
1754.30	12.84	H	5.5	5.3	12.65	30.0	-17.3	

9.1.5. **LTE Band 5**

10MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/5/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 5 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0184971, and Chamber I SMA Cables
Substitution: Dipole T416, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
829.00	14.88	V	3.7	0.5	11.67	38.5	-26.8	
829.00	21.97	H	3.7	0.3	18.56	38.5	-19.9	
Mid Ch								
836.50	14.58	V	3.7	0.5	11.36	38.5	-27.1	
836.50	22.06	H	3.7	0.3	18.64	38.5	-19.9	
High Ch								
844.00	15.18	V	3.7	0.5	11.94	38.5	-26.6	
844.00	22.36	H	3.7	0.3	18.92	38.5	-19.6	

10MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/5/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 5 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0184971, and Chamber I SMA Cables
Substitution: Dipole T416, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
829.00	14.01	V	3.7	0.5	10.80	38.5	-27.7	
829.00	21.09	H	3.7	0.3	17.68	38.5	-20.8	
Mid Ch								
836.50	13.67	V	3.7	0.5	10.45	38.5	-28.1	
836.50	21.10	H	3.7	0.3	17.68	38.5	-20.8	
High Ch								
844.00	14.31	V	3.7	0.5	11.07	38.5	-27.4	
844.00	21.50	H	3.7	0.3	18.06	38.5	-20.4	

5MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/5/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 5 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0184971, and Chamber I SMA Cables
Substitution: Dipole T416, Chamber I Passthrough Cables

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	14.99	V	3.7	0.5	11.79	38.5	-26.7	
826.50	21.66	H	3.7	0.3	18.26	38.5	-20.2	
Mid Ch								
836.50	14.55	V	3.7	0.5	11.33	38.5	-27.2	
836.50	22.02	H	3.7	0.3	18.60	38.5	-19.9	
High Ch								
846.50	15.57	V	3.7	0.5	12.32	38.5	-26.2	
846.50	22.48	H	3.7	0.3	19.03	38.5	-19.5	

5MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/5/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 5 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0184971, and Chamber I SMA Cables
Substitution: Dipole T416, Chamber I Passthrough Cables

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	14.13	V	3.7	0.5	10.93	38.5	-27.6	
826.50	20.81	H	3.7	0.3	17.41	38.5	-21.1	
Mid Ch								
836.50	13.68	V	3.7	0.5	10.46	38.5	-28.0	
836.50	21.16	H	3.7	0.3	17.74	38.5	-20.8	
High Ch								
846.50	14.80	V	3.7	0.5	11.55	38.5	-26.9	
846.50	21.70	H	3.7	0.3	18.25	38.5	-20.2	

3MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/5/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 5 Fundamentals, 3MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0184971, and Chamber I SMA Cables
Substitution: Dipole T416, Chamber I Passthrough Cables

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	15.09	V	3.7	0.5	11.89	38.5	-26.6	
825.50	21.67	H	3.7	0.3	18.27	38.5	-20.2	
Mid Ch								
836.50	14.71	V	3.7	0.5	11.49	38.5	-27.0	
836.50	21.78	H	3.7	0.3	18.36	38.5	-20.1	
High Ch								
847.50	15.39	V	3.7	0.5	12.14	38.5	-26.4	
847.50	22.50	H	3.7	0.3	19.05	38.5	-19.4	

3MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/5/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 5 Fundamentals, 3MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0184971, and Chamber I SMA Cables
Substitution: Dipole T416, Chamber I Passthrough Cables

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	14.23	V	3.7	0.5	11.03	38.5	-27.5	
825.50	20.80	H	3.7	0.3	17.40	38.5	-21.1	
Mid Ch								
836.50	13.80	V	3.7	0.5	10.58	38.5	-27.9	
836.50	20.87	H	3.7	0.3	17.45	38.5	-21.1	
High Ch								
847.50	14.49	V	3.7	0.5	11.24	38.5	-27.3	
847.50	21.59	H	3.7	0.3	18.14	38.5	-20.4	

1.4MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/5/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 5 Fundamentals, 1.4MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0184971, and Chamber I SMA Cables
Substitution: Dipole T416, Chamber I Passthrough Cables

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	14.89	V	3.7	0.5	11.69	38.5	-26.8	
824.70	21.16	H	3.7	0.3	17.76	38.5	-20.7	
Mid Ch								
836.50	14.36	V	3.7	0.5	11.14	38.5	-27.4	
836.50	21.69	H	3.7	0.3	18.27	38.5	-20.2	
High Ch								
848.30	15.32	V	3.8	0.5	12.07	38.5	-26.4	
848.30	22.67	H	3.8	0.3	19.22	38.5	-19.3	

1.4MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/5/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 5 Fundamentals, 1.4MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0184971, and Chamber I SMA Cables
Substitution: Dipole T416, Chamber I Passthrough Cables

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	14.05	V	3.7	0.5	10.85	38.5	-27.6	
824.70	20.31	H	3.7	0.3	16.91	38.5	-21.6	
Mid Ch								
836.50	13.48	V	3.7	0.5	10.26	38.5	-28.2	
836.50	20.82	H	3.7	0.3	17.40	38.5	-21.1	
High Ch								
848.30	14.35	V	3.8	0.5	11.10	38.5	-27.4	
848.30	21.69	H	3.8	0.3	18.24	38.5	-20.3	

9.1.6. **LTE Band 12**

10MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/5/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 12 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0184971, and Chamber I SMA Cables
Substitution: Dipole T416, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
704.00	11.92	V	3.4	1.3	9.82	34.8	-25.0	
704.00	19.89	H	3.4	1.4	17.87	34.8	-16.9	
Mid Ch								
707.50	12.50	V	3.4	1.2	10.36	34.8	-24.4	
707.50	19.60	H	3.4	1.3	17.53	34.8	-17.3	
High Ch								
711.00	13.15	V	3.4	1.2	10.97	34.8	-23.8	
711.00	19.77	H	3.4	1.3	17.65	34.8	-17.2	

10MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/5/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 12 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0184971, and Chamber I SMA Cables
Substitution: Dipole T416, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
704.00	11.02	V	3.4	1.3	8.92	34.8	-25.9	
704.00	18.94	H	3.4	1.4	16.92	34.8	-17.9	
Mid Ch								
707.50	11.66	V	3.4	1.2	9.52	34.8	-25.3	
707.50	18.75	H	3.4	1.3	16.68	34.8	-18.1	
High Ch								
711.00	12.34	V	3.4	1.2	10.16	34.8	-24.6	
711.00	18.97	H	3.4	1.3	16.85	34.8	-18.0	

5MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/5/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 12 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0184971, and Chamber I SMA Cables
Substitution: Dipole T416, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
701.50	12.20	V	3.4	1.3	10.12	34.8	-24.7	
701.50	20.05	H	3.4	1.4	18.07	34.8	-16.7	
Mid Ch								
707.50	12.50	V	3.4	1.2	10.36	34.8	-24.4	
707.50	19.50	H	3.4	1.3	17.43	34.8	-17.4	
High Ch								
713.50	13.65	V	3.4	1.2	11.44	34.8	-23.4	
713.50	20.11	H	3.4	1.2	17.95	34.8	-16.8	

5MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/5/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 12 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0184971, and Chamber I SMA Cables
Substitution: Dipole T416, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
701.50	11.36	V	3.4	1.3	9.28	34.8	-25.5	
701.50	19.21	H	3.4	1.4	17.23	34.8	-17.6	
Mid Ch								
707.50	11.76	V	3.4	1.2	9.62	34.8	-25.2	
707.50	18.71	H	3.4	1.3	16.64	34.8	-18.2	
High Ch								
713.50	12.82	V	3.4	1.2	10.61	34.8	-24.2	
713.50	19.29	H	3.4	1.2	17.13	34.8	-17.7	

3MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/5/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 12 Fundamentals, 3MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0184971, and Chamber I SMA Cables
Substitution: Dipole T416, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
700.50	11.25	V	3.4	1.3	9.18	34.8	-25.6	
700.50	20.22	H	3.4	1.4	18.25	34.8	-16.5	
Mid Ch								
707.50	12.39	V	3.4	1.2	10.25	34.8	-24.6	
707.50	19.85	H	3.4	1.3	17.78	34.8	-17.0	
High Ch								
714.50	14.20	V	3.4	1.2	11.98	34.8	-22.8	
714.50	20.26	H	3.4	1.2	18.09	34.8	-16.7	

3MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/5/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 12 Fundamentals, 3MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0184971, and Chamber I SMA Cables
Substitution: Dipole T416, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
700.50	10.43	V	3.4	1.3	8.36	34.8	-26.4	
700.50	19.39	H	3.4	1.4	17.42	34.8	-17.4	
Mid Ch								
707.50	11.53	V	3.4	1.2	9.39	34.8	-25.4	
707.50	19.01	H	3.4	1.3	16.94	34.8	-17.9	
High Ch								
714.50	13.28	V	3.4	1.2	11.06	34.8	-23.7	
714.50	19.35	H	3.4	1.2	17.18	34.8	-17.6	

1.4MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/5/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 12 Fundamentals, 1.4MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0184971, and Chamber I SMA Cables
Substitution: Dipole T416, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
699.70	10.61	V	3.4	1.3	8.55	34.8	-26.3	
699.70	19.86	H	3.4	1.4	17.90	34.8	-16.9	
Mid Ch								
707.50	11.76	V	3.4	1.2	9.62	34.8	-25.2	
707.50	19.75	H	3.4	1.3	17.68	34.8	-17.1	
High Ch								
715.30	13.55	V	3.4	1.2	11.32	34.8	-23.5	
715.30	19.94	H	3.4	1.2	17.75	34.8	-17.0	

1.4MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/5/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 12 Fundamentals, 1.4MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0184971, and Chamber I SMA Cables
Substitution: Dipole T416, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
699.70	9.69	V	3.4	1.3	7.63	34.8	-27.2	
699.70	18.98	H	3.4	1.4	17.02	34.8	-17.8	
Mid Ch								
707.50	10.95	V	3.4	1.2	8.81	34.8	-26.0	
707.50	18.86	H	3.4	1.3	16.79	34.8	-18.0	
High Ch								
715.30	12.67	V	3.4	1.2	10.44	34.8	-24.4	
715.30	19.07	H	3.4	1.2	16.88	34.8	-17.9	

9.1.7. **LTE Band 13**

10MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/5/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 13 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: Hybrid PRE0184971, and Chamber I SMA Cables
Substitution: Dipole T416, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Mid Ch								
782.00	12.57	V	3.6	0.7	9.72	34.8	-25.0	
782.00	19.09	H	3.6	0.5	16.02	34.8	-18.8	

10MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/5/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 13 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: Hybrid PRE0184971, and Chamber I SMA Cables
Substitution: Dipole T416, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Mid Ch								
782.00	11.65	V	3.6	0.7	8.80	34.8	-26.0	
782.00	18.17	H	3.6	0.5	15.10	34.8	-19.7	

5MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/5/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 13 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: Hybrid PRE0184971, and Chamber I SMA Cables
Substitution: Dipole T416, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
779.50	12.65	V	3.6	0.8	9.83	34.8	-24.9	
779.50	18.97	H	3.6	0.5	15.93	34.8	-18.8	
Mid Ch								
782.00	12.94	V	3.6	0.7	10.09	34.8	-24.7	
782.00	19.06	H	3.6	0.5	15.99	34.8	-18.8	
High Ch								
784.50	12.18	V	3.6	0.7	9.31	34.8	-25.5	
784.50	18.86	H	3.6	0.5	15.75	34.8	-19.0	

5MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/5/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 13 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: Hybrid PRE0184971, and Chamber I SMA Cables
Substitution: Dipole T416, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
779.50	11.83	V	3.6	0.8	9.01	34.8	-25.8	
779.50	18.14	H	3.6	0.5	15.10	34.8	-19.7	
Mid Ch								
782.00	12.11	V	3.6	0.7	9.26	34.8	-25.5	
782.00	18.21	H	3.6	0.5	15.14	34.8	-19.6	
High Ch								
784.50	21.42	V	3.6	0.7	18.55	34.8	-16.2	
784.50	18.11	H	3.6	0.5	15.00	34.8	-19.8	

9.1.8. **LTE Band 41 (FCC)**

20MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 41(FCC) Fundamentals, 20MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2506.00	13.58	V	6.6	5.7	12.72	33.0	-20.3	
2506.00	20.10	H	6.6	5.7	19.24	33.0	-13.8	
Mid Ch								
2593.00	15.22	V	6.9	5.8	14.12	33.0	-18.9	
2593.00	22.64	H	6.9	5.8	21.54	33.0	-11.5	
High Ch								
2680.00	18.09	V	6.9	6.0	17.18	33.0	-15.8	
2680.00	22.22	H	6.9	6.0	21.31	33.0	-11.7	

20MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 41(FCC) Fundamentals, 20MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2506.00	13.32	V	6.6	5.7	12.46	33.0	-20.5	
2506.00	19.62	H	6.6	5.7	18.76	33.0	-14.2	
Mid Ch								
2593.00	14.61	V	6.9	5.8	13.51	33.0	-19.5	
2593.00	22.15	H	6.9	5.8	21.05	33.0	-12.0	
High Ch								
2680.00	17.14	V	6.9	6.0	16.23	33.0	-16.8	
2680.00	21.52	H	6.9	6.0	20.61	33.0	-12.4	

15MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 41(FCC) Fundamentals, 15MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2503.50	16.15	V	6.6	5.7	15.29	33.0	-17.7	
2503.50	20.25	H	6.6	5.7	19.39	33.0	-13.6	
Mid Ch								
2593.00	17.72	V	6.9	5.8	16.62	33.0	-16.4	
2593.00	23.07	H	6.9	5.8	21.97	33.0	-11.0	
High Ch								
2682.50	18.42	V	6.9	6.0	17.50	33.0	-15.5	
2682.50	22.32	H	6.9	6.0	21.40	33.0	-11.6	

15MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 41(FCC) Fundamentals, 15MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2503.50	15.38	V	6.6	5.7	14.52	33.0	-18.5	
2503.50	19.58	H	6.6	5.7	18.72	33.0	-14.3	
Mid Ch								
2593.00	17.12	V	6.9	5.8	16.02	33.0	-17.0	
2593.00	22.56	H	6.9	5.8	21.46	33.0	-11.5	
High Ch								
2682.50	17.49	V	6.9	6.0	16.57	33.0	-16.4	
2682.50	21.65	H	6.9	6.0	20.73	33.0	-12.3	

10MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 41(FCC) Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2501.00	15.46	V	6.6	5.7	14.61	33.0	-18.4	
2501.00	20.46	H	6.6	5.7	19.61	33.0	-13.4	
Mid Ch								
2593.00	17.11	V	6.9	5.8	16.01	33.0	-17.0	
2593.00	23.01	H	6.9	5.8	21.91	33.0	-11.1	
High Ch								
2685.00	19.14	V	6.9	6.0	18.21	33.0	-14.8	
2685.00	22.64	H	6.9	6.0	21.71	33.0	-11.3	

10MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 41(FCC) Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2501.00	14.87	V	6.6	5.7	14.02	33.0	-19.0	
2501.00	19.71	H	6.6	5.7	18.86	33.0	-14.1	
Mid Ch								
2593.00	16.44	V	6.9	5.8	15.34	33.0	-17.7	
2593.00	22.38	H	6.9	5.8	21.28	33.0	-11.7	
High Ch								
2685.00	18.46	V	6.9	6.0	17.53	33.0	-15.5	
2685.00	22.02	H	6.9	6.0	21.09	33.0	-11.9	

5MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 41(FCC) Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2498.50	15.63	V	6.6	5.7	14.75	33.0	-18.2	
2498.50	19.97	H	6.6	5.7	19.09	33.0	-13.9	
Mid Ch								
2593.00	16.55	V	6.9	5.8	15.45	33.0	-17.6	
2593.00	22.95	H	6.9	5.8	21.85	33.0	-11.2	
High Ch								
2687.50	18.85	V	6.9	6.0	17.92	33.0	-15.1	
2687.50	22.79	H	6.9	6.0	21.86	33.0	-11.1	

5MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 41(FCC) Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2498.50	14.97	V	6.6	5.7	14.09	33.0	-18.9	
2498.50	19.33	H	6.6	5.7	18.45	33.0	-14.5	
Mid Ch								
2593.00	15.83	V	6.9	5.8	14.73	33.0	-18.3	
2593.00	22.26	H	6.9	5.8	21.16	33.0	-11.8	
High Ch								
2687.50	17.80	V	6.9	6.0	16.87	33.0	-16.1	
2687.50	22.16	H	6.9	6.0	21.23	33.0	-11.8	

9.1.9. **LTE Band 66**

20MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 66 Fundamentals, 20MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

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	19.39	V	5.4	5.6	19.52	30.0	-10.5	
1720.00	13.44	H	5.4	5.6	13.57	30.0	-16.4	
Mid Ch								
1745.00	19.52	V	5.5	5.4	19.43	30.0	-10.6	
1745.00	13.00	H	5.5	5.4	12.91	30.0	-17.1	
High Ch								
1770.00	20.92	V	5.6	5.3	20.63	30.0	-9.4	
1770.00	13.47	H	5.6	5.3	13.18	30.0	-16.8	

20MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 66 Fundamentals, 20MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

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	18.64	V	5.4	5.6	18.77	30.0	-11.2	
1720.00	12.66	H	5.4	5.6	12.79	30.0	-17.2	
Mid Ch								
1745.00	18.76	V	5.5	5.4	18.67	30.0	-11.3	
1745.00	12.27	H	5.5	5.4	12.18	30.0	-17.8	
High Ch								
1770.00	20.23	V	5.6	5.3	19.94	30.0	-10.1	
1770.00	12.77	H	5.6	5.3	12.48	30.0	-17.5	

15MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 66 Fundamentals, 15MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1717.50	19.69	V	5.4	5.6	19.84	30.0	-10.2	
1717.50	12.12	H	5.4	5.6	12.27	30.0	-17.7	
Mid Ch								
1745.00	19.67	V	5.5	5.4	19.58	30.0	-10.4	
1745.00	13.06	H	5.5	5.4	12.97	30.0	-17.0	
High Ch								
1772.50	20.67	V	5.6	5.3	20.36	30.0	-9.6	
1772.50	12.62	H	5.6	5.3	12.31	30.0	-17.7	

15MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 66 Fundamentals, 15MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1717.50	18.87	V	5.4	5.6	19.02	30.0	-11.0	
1717.50	11.19	H	5.4	5.6	11.34	30.0	-18.7	
Mid Ch								
1745.00	18.89	V	5.5	5.4	18.80	30.0	-11.2	
1745.00	12.31	H	5.5	5.4	12.22	30.0	-17.8	
High Ch								
1772.50	19.91	V	5.6	5.3	19.60	30.0	-10.4	
1772.50	11.82	H	5.6	5.3	11.51	30.0	-18.5	

10MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 66 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1715.00	19.37	V	5.4	5.6	19.60	30.0	-10.4	
1715.00	12.85	H	5.4	5.6	13.08	30.0	-16.9	
Mid Ch								
1745.00	19.12	V	5.5	5.4	19.03	30.0	-11.0	
1745.00	12.63	H	5.5	5.4	12.54	30.0	-17.5	
High Ch								
1775.00	20.54	V	5.6	5.2	20.17	30.0	-9.8	
1775.00	13.14	H	5.6	5.2	12.77	30.0	-17.2	

10MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 66 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1715.00	18.56	V	5.4	5.6	18.79	30.0	-11.2	
1715.00	12.03	H	5.4	5.6	12.26	30.0	-17.7	
Mid Ch								
1745.00	18.37	V	5.5	5.4	18.28	30.0	-11.7	
1745.00	11.89	H	5.5	5.4	11.80	30.0	-18.2	
High Ch								
1775.00	19.82	V	5.6	5.2	19.45	30.0	-10.6	
1775.00	12.28	H	5.6	5.2	11.91	30.0	-18.1	

5MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 66 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1712.50	19.38	V	5.4	5.7	19.70	30.0	-10.3	
1712.50	13.25	H	5.4	5.7	13.57	30.0	-16.4	
Mid Ch								
1745.00	19.82	V	5.5	5.4	19.73	30.0	-10.3	
1745.00	13.08	H	5.5	5.4	12.99	30.0	-17.0	
High Ch								
1777.50	20.36	V	5.6	5.1	19.90	30.0	-10.1	
1777.50	13.32	H	5.6	5.1	12.86	30.0	-17.1	

5MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13094578
Date: 11/7/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 66 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Horn T862, and Chamber I SMA Cables
Substitution: T120, Chamber I Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1712.50	18.60	V	5.4	5.7	18.92	30.0	-11.1	
1712.50	12.39	H	5.4	5.7	12.71	30.0	-17.3	
Mid Ch								
1745.00	19.10	V	5.5	5.4	19.01	30.0	-11.0	
1745.00	12.34	H	5.5	5.4	12.25	30.0	-17.7	
High Ch								
1777.50	19.78	V	5.6	5.1	19.32	30.0	-10.7	
1777.50	12.64	H	5.6	5.1	12.18	30.0	-17.8	

3MHz QPSK

3MHz 16QAM