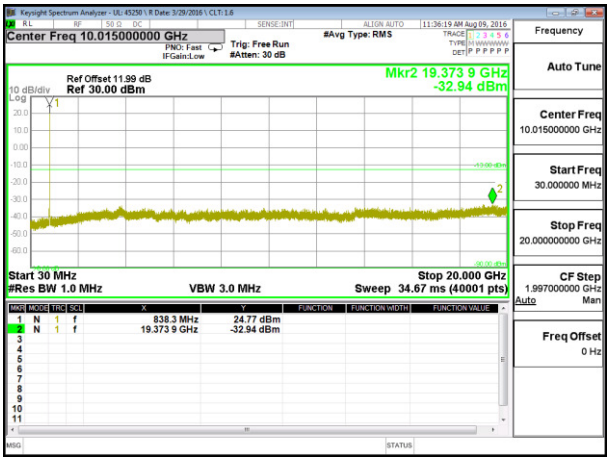
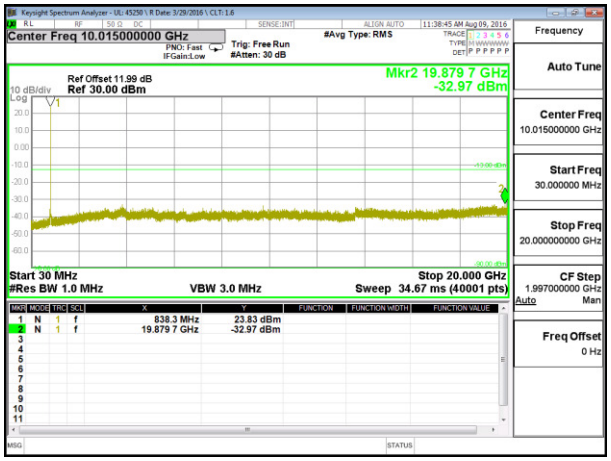
WCDMA

Band	Mode	f (MHz)	Spur (dBm)	99% BW (MHz)	Delta (dB)
Band 5	REL99	826.4	-32.88	-13	-19.88
		836.6	-32.94	-13	-19.94
		846.6	-32.44	-13	-19.44
	HSDPA	826.4	-32.40	-13	-19.40
		836.6	-32.97	-13	-19.97
		846.6	-32.88	-13	-19.88

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.



B5 REL99 Middle Channel



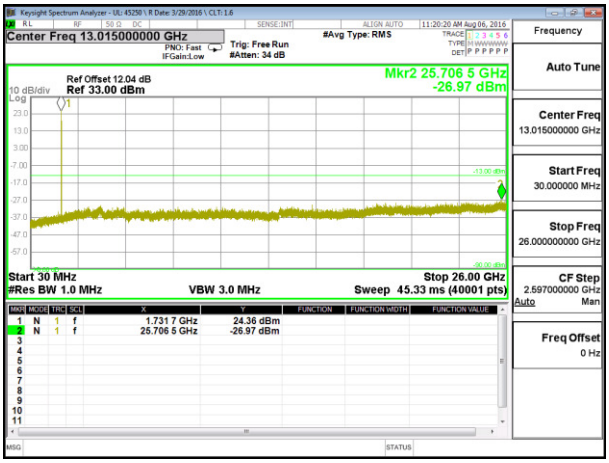
B5 HSDPA Middle Channel

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.

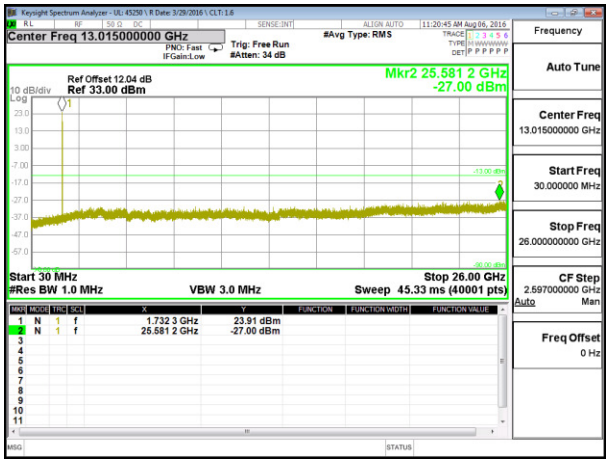
LTE Band 4

BW(MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
1.4	QPSK	1710.7	-27.46	-13	-14.46
		1732.5	-26.97	-13	-13.97
		1754.3	-27.78	-13	-14.78
	16QAM	1710.7	-26.85	-13	-13.85
		1732.5	-27.00	-13	-14.00
		1754.3	-27.08	-13	-14.08
3	QPSK	1711.5	-26.62	-13	-13.62
		1732.5	-27.18	-13	-14.18
		1753.5	-27.29	-13	-14.29
	16QAM	1711.5	-27.01	-13	-14.01
		1732.5	-27.46	-13	-14.46
		1753.5	-27.44	-13	-14.44
5	QPSK	1712.5	-27.39	-13	-14.39
		1732.5	-27.26	-13	-14.26
		1752.5	-26.90	-13	-13.90
	16QAM	1712.5	-26.42	-13	-13.42
		1732.5	-27.09	-13	-14.09
		1752.5	-27.39	-13	-14.39
10	QPSK	1715	-26.38	-13	-13.38
		1732.5	-26.85	-13	-13.85
		1750	-27.24	-13	-14.24
	16QAM	1715	-27.15	-13	-14.15
		1732.5	-26.33	-13	-13.33
		1750	-26.92	-13	-13.92
15	QPSK	1717.5	-27.49	-13	-14.49
		1732.5	-26.37	-13	-13.37
		1747.5	-27.62	-13	-14.62
	16QAM	1717.5	-27.51	-13	-14.51
		1732.5	-26.89	-13	-13.89
		1747.5	-26.51	-13	-13.51
20	QPSK	1720	-26.42	-13	-13.42
		1732.5	-26.34	-13	-13.34
		1745	-26.56	-13	-13.56
	16QAM	1720	-27.75	-13	-14.75
		1732.5	-26.63	-13	-13.63
		1745	-26.78	-13	-13.78

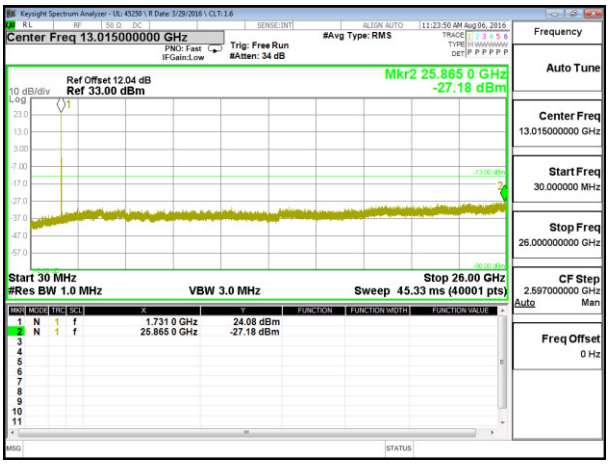
UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.



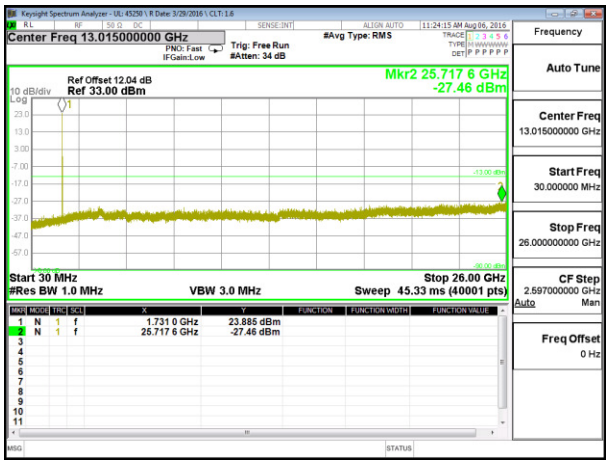
LTE B4 1.4MHz QPSK Middle Channel



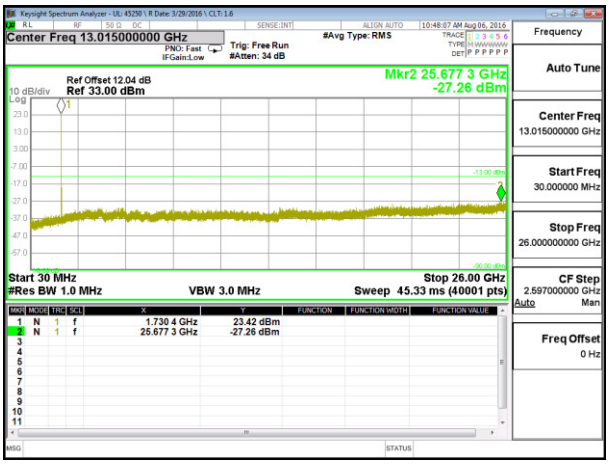
LTE B4 1.4MHz 16QAM Middle Channel



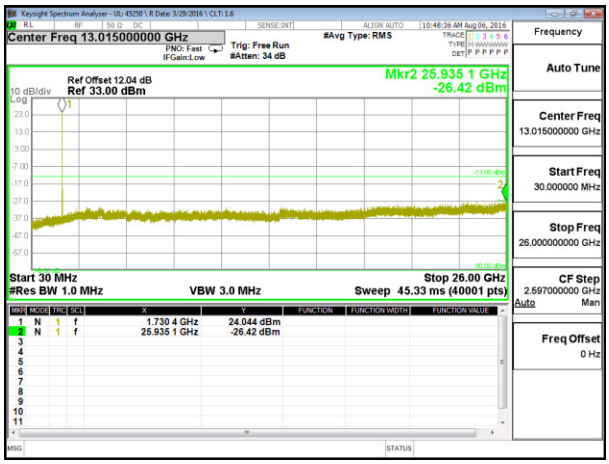
LTE B4 3MHz QPSK Middle Channel



LTE B4 3MHz 16QAM Middle Channel

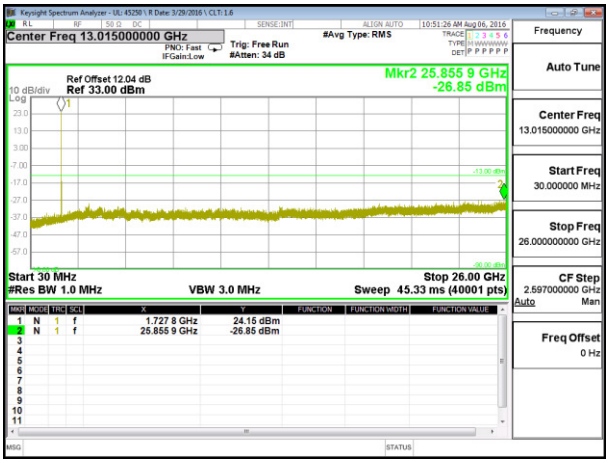


LTE B4 5MHz QPSK Middle Channel

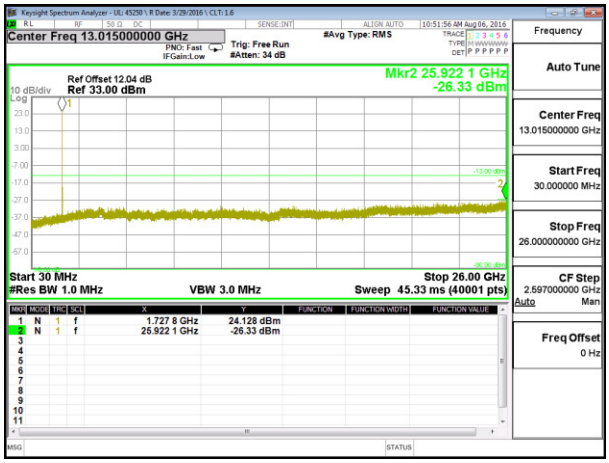


LTE B4 5MHz 16QAM Middle Channel

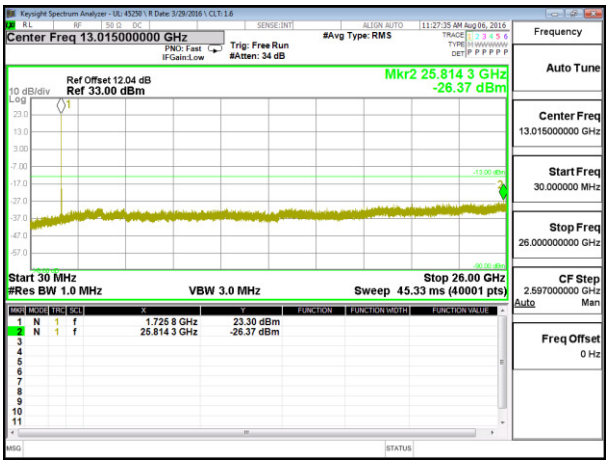
UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.



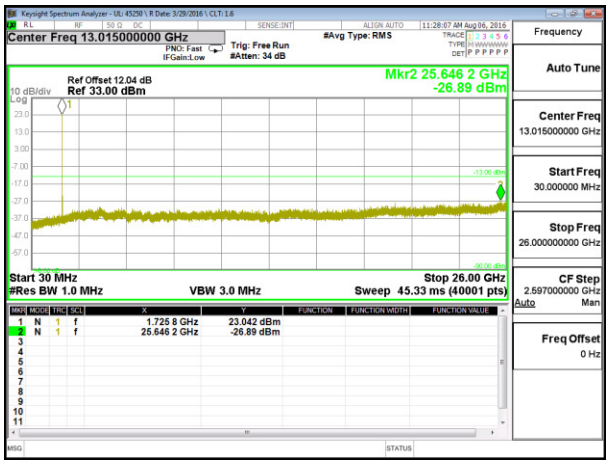
LTE B4 10MHz QPSK Middle Channel



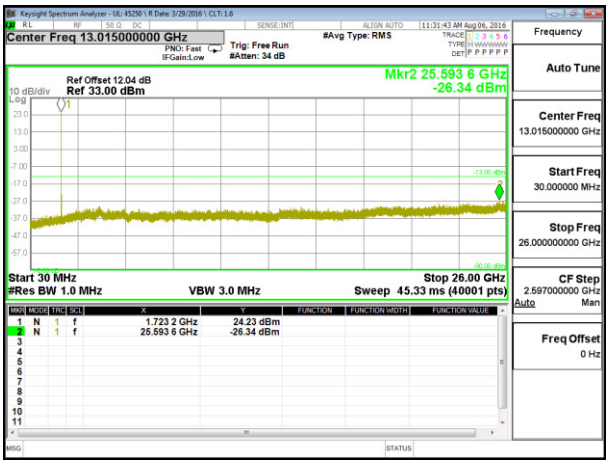
LTE B4 10MHz 16QAM Middle Channel



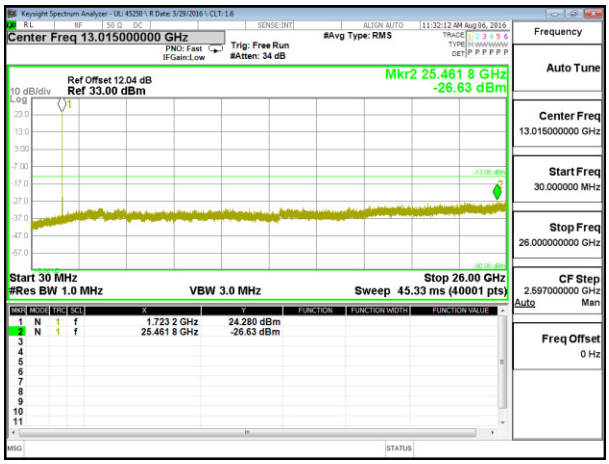
LTE B4 15MHz QPSK Middle Channel



LTE B4 15MHz 16QAM Middle Channel



LTE B4 20MHz QPSK Middle Channel



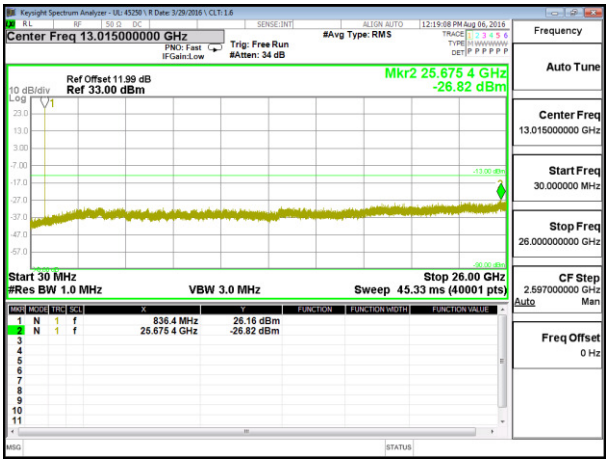
LTE B4 20MHz 16QAM Middle Channel

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.

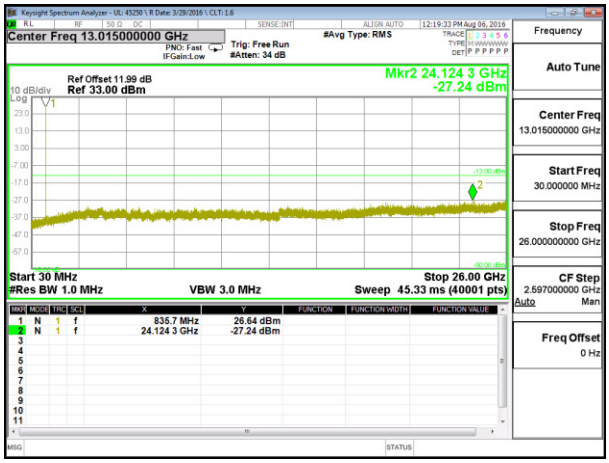
LTE Band 5

BW(MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
1.4	QPSK	824.7	-26.15	-13	-13.15
		836.5	-26.82	-13	-13.82
		848.3	-27.13	-13	-14.13
	16QAM	824.7	-27.31	-13	-14.31
		836.5	-27.24	-13	-14.24
		848.3	-27.31	-13	-14.31
3	QPSK	825.5	-27.14	-13	-14.14
		836.5	-27.61	-13	-14.61
		847.5	-27.06	-13	-14.06
	16QAM	825.5	-26.92	-13	-13.92
		836.5	-27.32	-13	-14.32
		847.5	-26.98	-13	-13.98
5	QPSK	826.5	-26.69	-13	-13.69
		836.5	-27.34	-13	-14.34
		846.5	-27.11	-13	-14.11
	16QAM	826.5	-27.21	-13	-14.21
		836.5	-27.22	-13	-14.22
		846.5	-27.32	-13	-14.32
10	QPSK	829	-27.90	-13	-14.90
		836.5	-26.78	-13	-13.78
		844	-27.20	-13	-14.20
	16QAM	829	-26.91	-13	-13.91
		836.5	-27.20	-13	-14.20
		844	-26.59	-13	-13.59

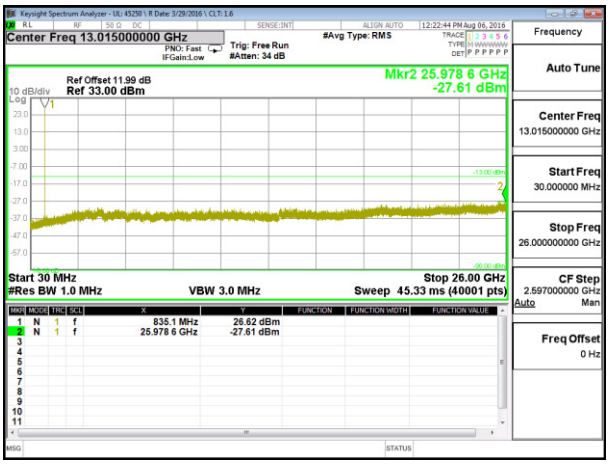
UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.



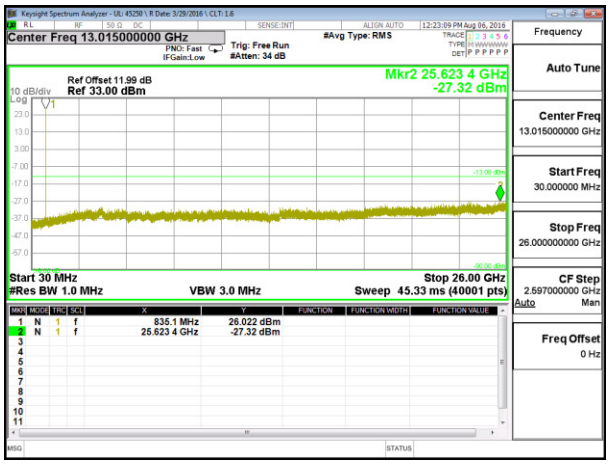
LTE B5 1.4MHz QPSK Middle Channel



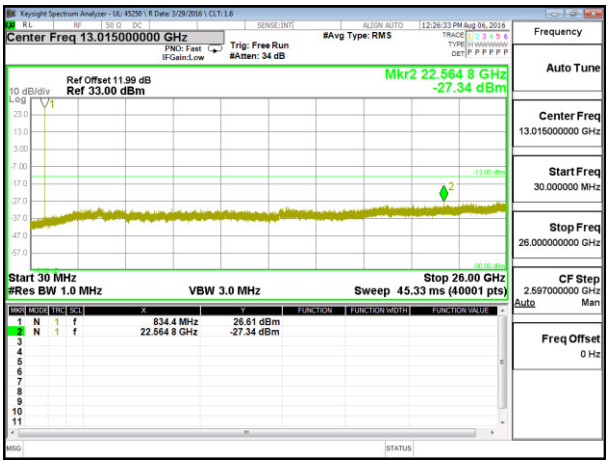
LTE B5 1.4MHz 16QAM Middle Channel



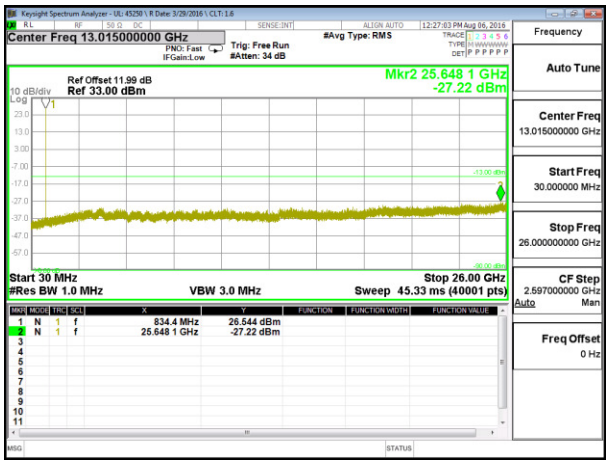
LTE B5 3MHz QPSK Middle Channel



LTE B5 3MHz 16QAM Middle Channel

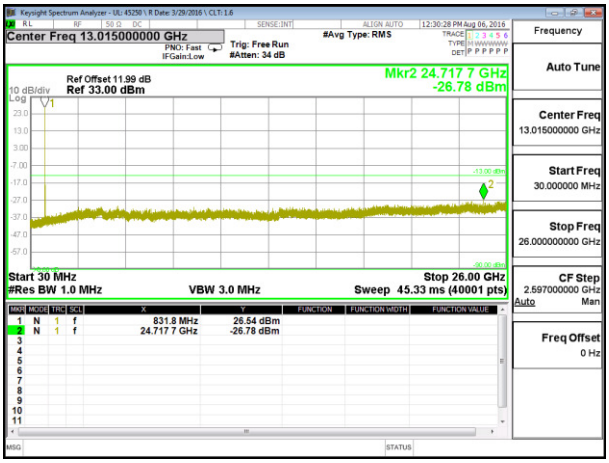


LTE B5 5MHz QPSK Middle Channel

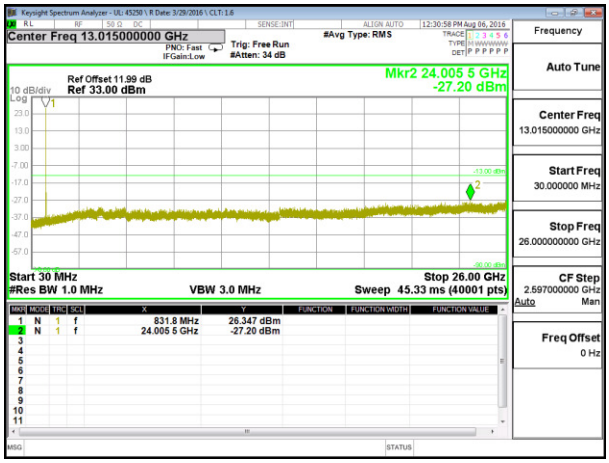


LTE B5 5MHz 16QAM Middle Channel

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.



LTE B5 10MHz QPSK Middle Channel



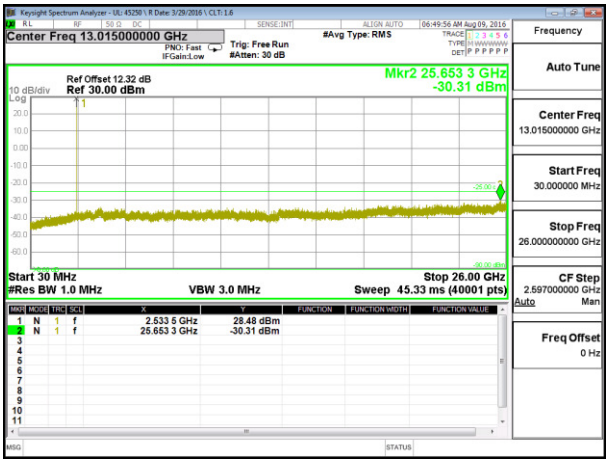
LTE B5 10MHz 16QAM Middle Channel

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.

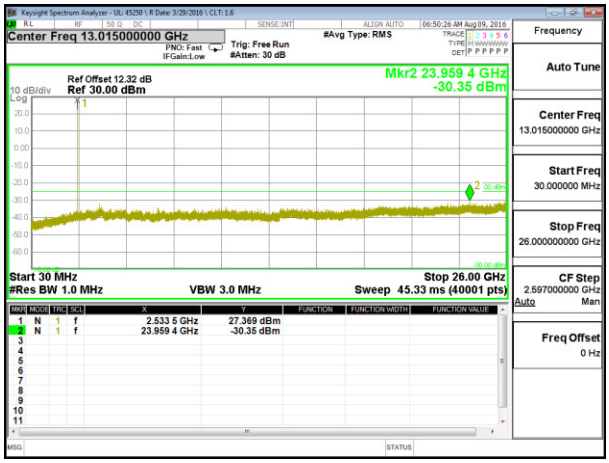
LTE Band 7

BW(MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
5	QPSK	2502.5	-30.63	-25	-5.63
		2535	-30.31	-25	-5.31
		2567.5	-30.64	-25	-5.64
	16QAM	2502.5	-30.51	-25	-5.51
		2535	-30.35	-25	-5.35
		2567.5	-30.59	-25	-5.59
10	QPSK	2505	-30.68	-25	-5.68
		2535	-31.05	-25	-6.05
		2565	-30.30	-25	-5.30
	16QAM	2505	-30.86	-25	-5.86
		2535	-30.01	-25	-5.01
		2565	-30.19	-25	-5.19
15	QPSK	2507.5	-30.70	-25	-5.70
		2535	-30.25	-25	-5.25
		2562.5	-30.75	-25	-5.75
	16QAM	2507.5	-30.14	-25	-5.14
		2535	-30.40	-25	-5.40
		2562.5	-30.32	-25	-5.32
20	QPSK	2510	-30.11	-25	-5.11
		2535	-30.89	-25	-5.89
		2560	-30.46	-25	-5.46
	16QAM	2510	-30.12	-25	-5.12
		2535	-30.57	-25	-5.57
		2560	-30.33	-25	-5.33

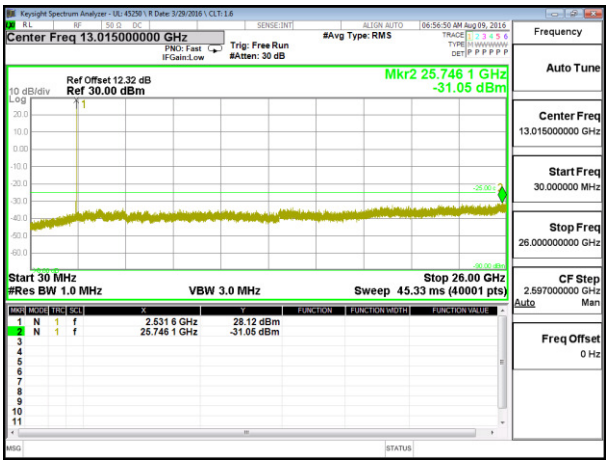
UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.



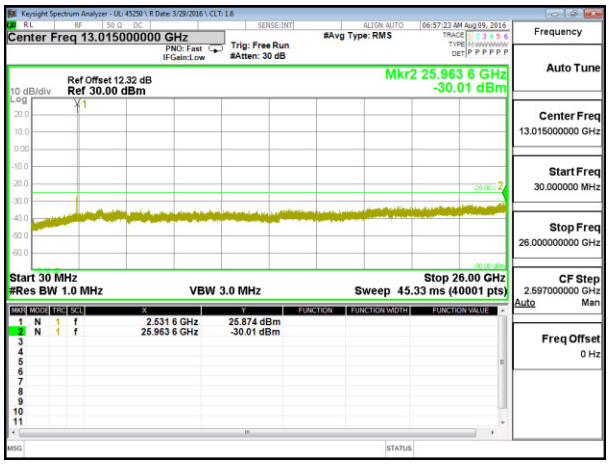
LTE B7 5MHz QPSK Middle Channel



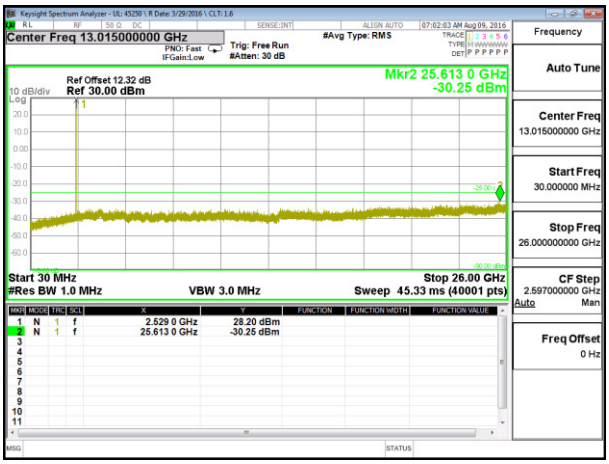
LTE B7 5MHz 16QAM Middle Channel



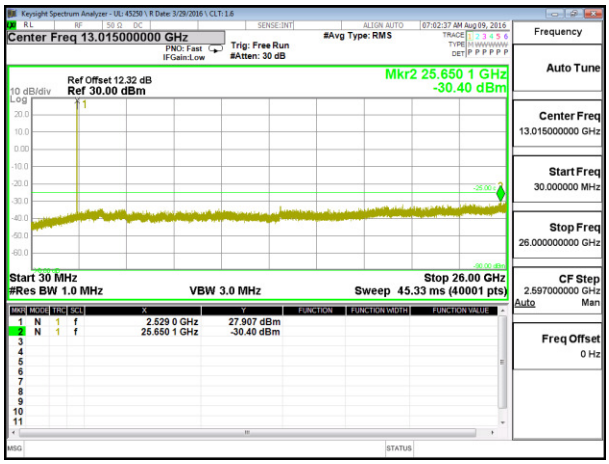
LTE B7 10MHz QPSK Middle Channel



LTE B7 10MHz 16QAM Middle Channel

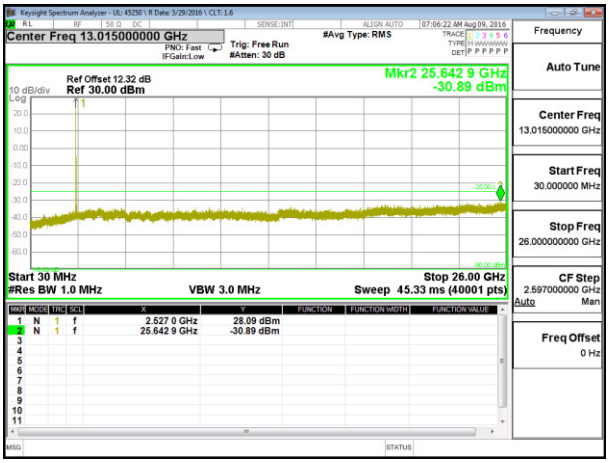


LTE B7 15MHz QPSK Middle Channel

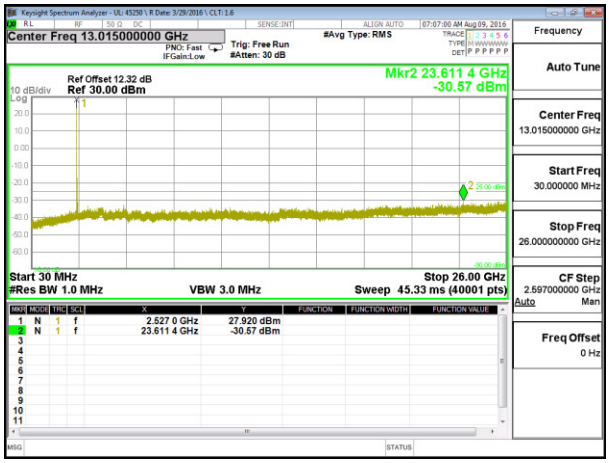


LTE B7 15MHz 16QAM Middle Channel

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.



LTE B7 20MHz QPSK Middle Channel



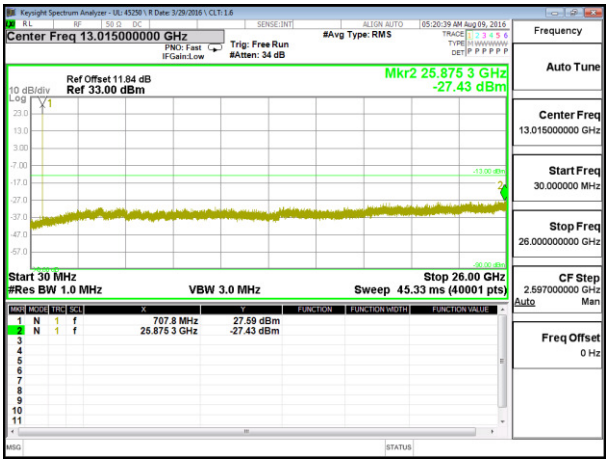
LTE B7 20MHz 16QAM Middle Channel

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.

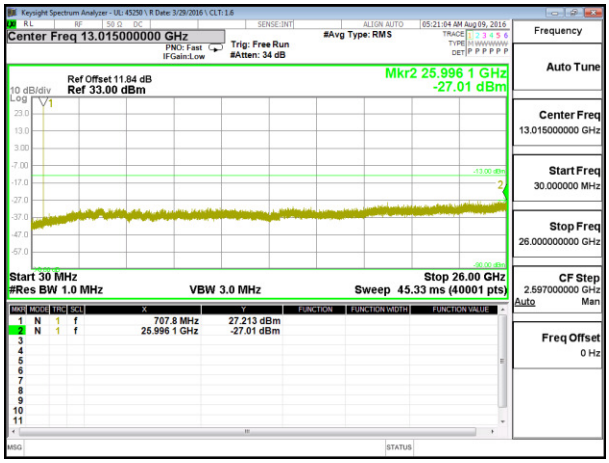
LTE Band 12

BW(MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
1.4	QPSK	699.7	-26.98	-13	-13.98
		707.5	-27.43	-13	-14.43
		715.3	-27.41	-13	-14.41
	16QAM	699.7	-27.20	-13	-14.20
		707.5	-27.01	-13	-14.01
		715.3	-27.71	-13	-14.71
3	QPSK	700.5	-26.29	-13	-13.29
		707.5	-27.84	-13	-14.84
		714.5	-27.90	-13	-14.90
	16QAM	700.5	-26.78	-13	-13.78
		707.5	-26.92	-13	-13.92
		714.5	-26.22	-13	-13.22
5	QPSK	701.5	-27.37	-13	-14.37
		707.5	-27.37	-13	-14.37
		713.5	-27.76	-13	-14.76
	16QAM	701.5	-26.82	-13	-13.82
		707.5	-27.21	-13	-14.21
		713.5	-27.33	-13	-14.33
10	QPSK	704	-27.14	-13	-14.14
		707.5	-27.23	-13	-14.23
		711	-26.98	-13	-13.98
	16QAM	704	-26.63	-13	-13.63
		707.5	-27.35	-13	-14.35
		711	-26.71	-13	-13.71

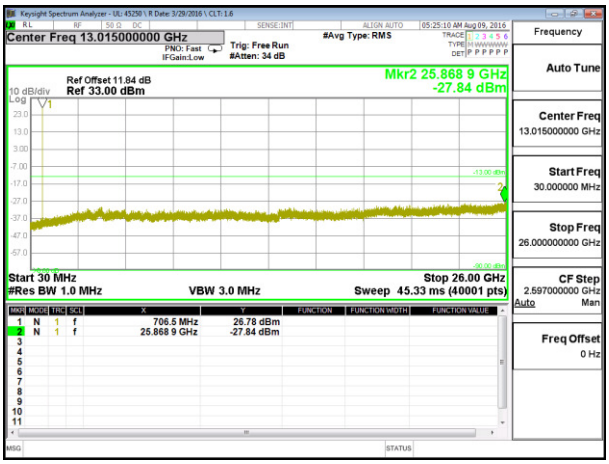
UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.



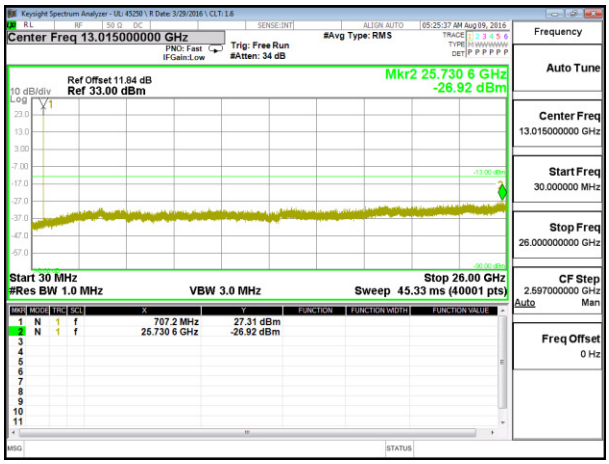
LTE B12 1.4MHz QPSK Middle Channel



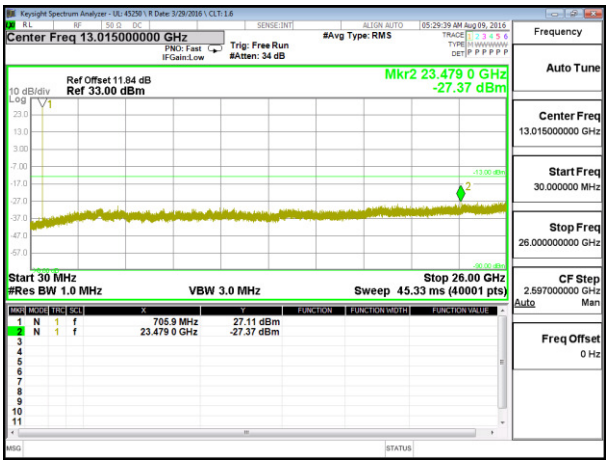
LTE B12 1.4MHz 16QAM Middle Channel



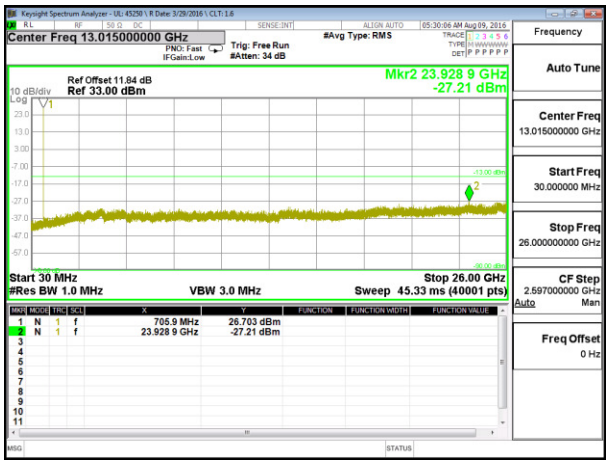
LTE B12 3MHz QPSK Middle Channel



LTE B12 3MHz 16QAM Middle Channel

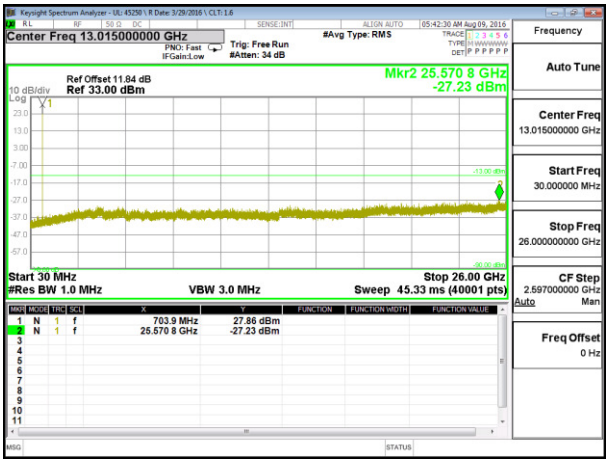


LTE B12 5MHz QPSK Middle Channel

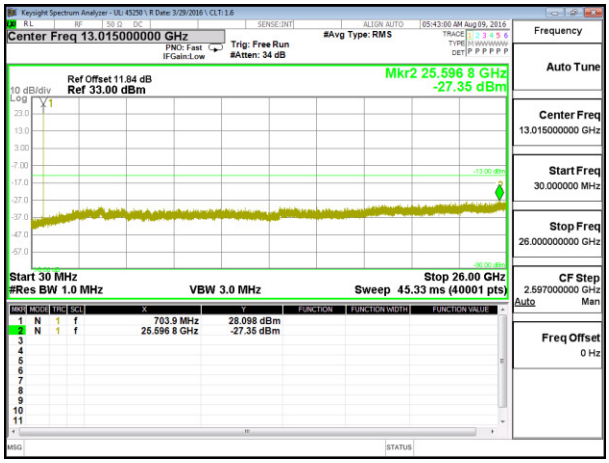


LTE B12 5MHz 16QAM Middle Channel

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.



LTE B12 10MHz QPSK Middle Channel



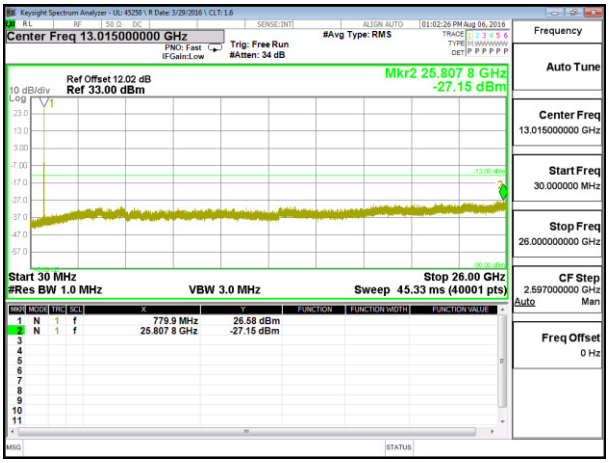
LTE B12 10MHz 16QAM Middle Channel

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.

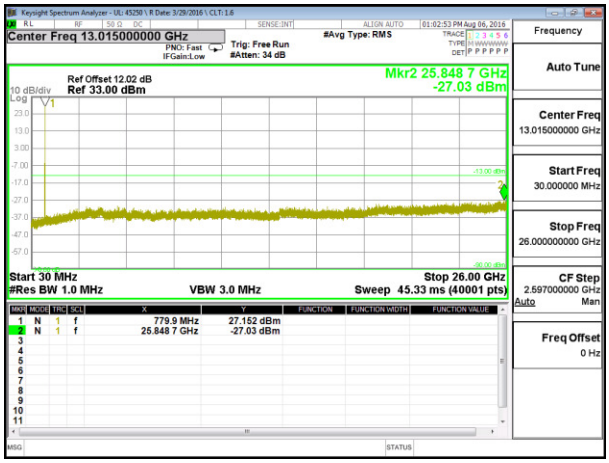
LTE Band 13

BW(MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
5	QPSK	779.5	-27.01	-13	-14.01
		782	-27.15	-13	-14.15
		784.5	-26.42	-13	-13.42
	16QAM	779.5	-27.43	-13	-14.43
		782	-27.03	-13	-14.03
		784.5	-26.84	-13	-13.84
10	QPSK	782	-26.59	-13	-13.59
	16QAM	782	-27.07	-13	-14.07

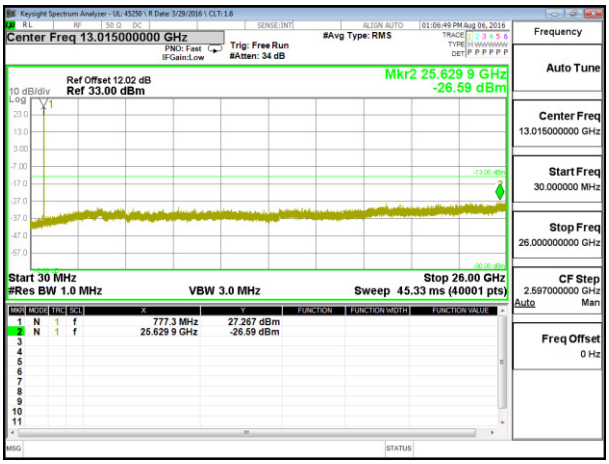
UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.



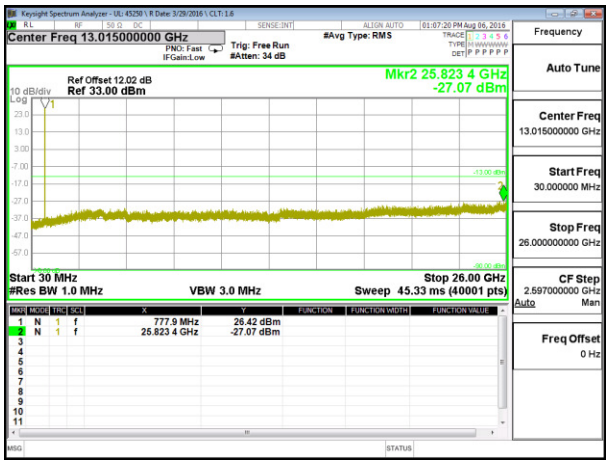
LTE B13 5MHz QPSK Middle Channel



LTE B13 5MHz 16QAM Middle Channel



LTE B13 10MHz QPSK Middle Channel



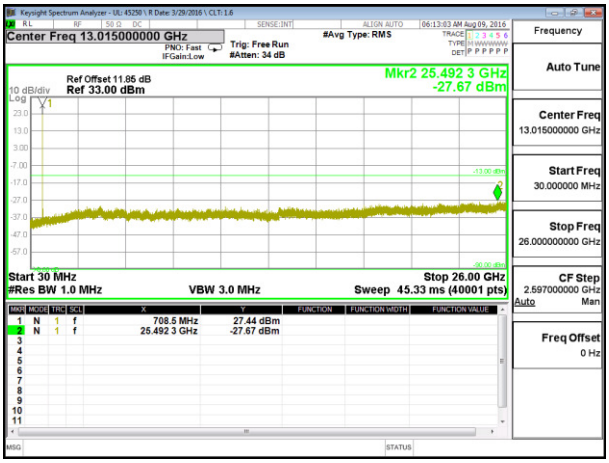
LTE B13 10MHz 16QAM Middle Channel

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.

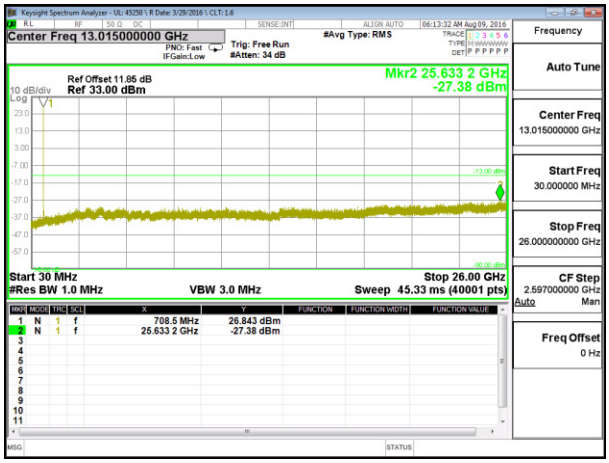
LTE Band 17

BW(MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
5	QPSK	706.5	-27.65	-13	-14.65
		710	-27.67	-13	-14.67
		713.5	-26.63	-13	-13.63
	16QAM	706.5	-26.52	-13	-13.52
		710	-27.38	-13	-14.38
		713.5	-26.99	-13	-13.99
10	QPSK	709	-27.14	-13	-14.14
		710	-27.40	-13	-14.40
		711	-26.46	-13	-13.46
	16QAM	709	-26.95	-13	-13.95
		710	-27.55	-13	-14.55
		711	-27.60	-13	-14.60

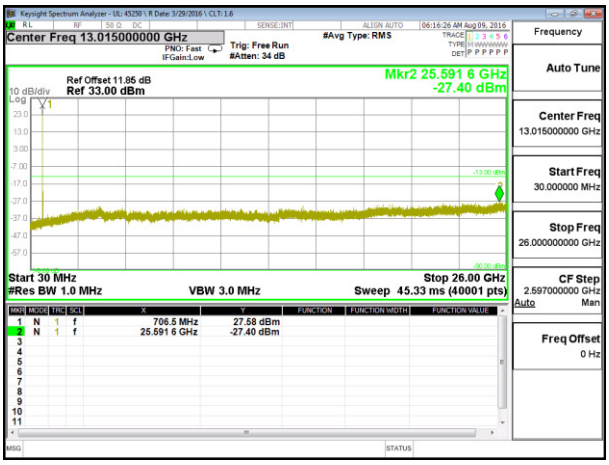
UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.



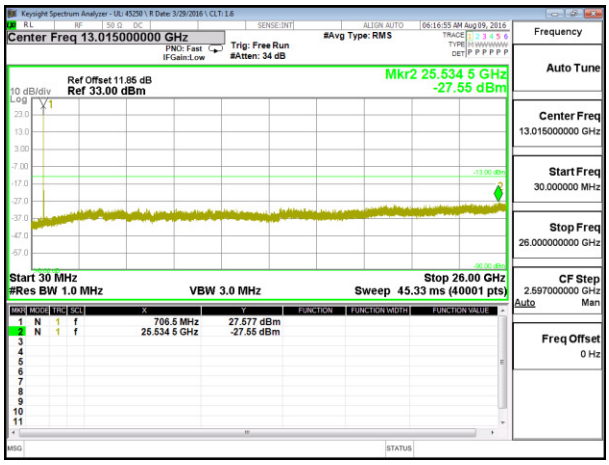
LTE B17 5MHz QPSK Middle Channel



LTE B17 5MHz 16QAM Middle Channel



LTE B17 10MHz QPSK Middle Channel



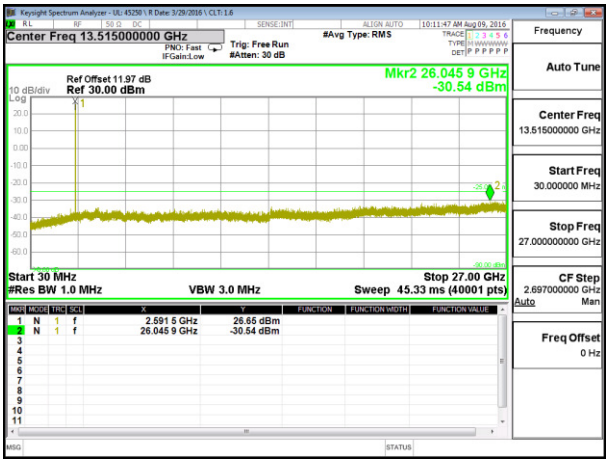
LTE B17 10MHz 16QAM Middle Channel

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.

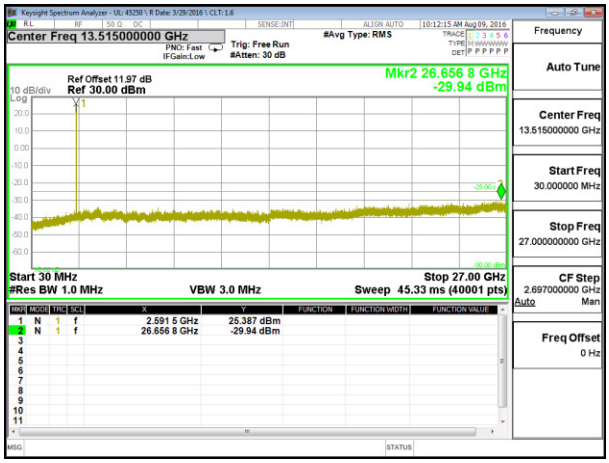
LTE Band 41

BW(MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
5	QPSK	2498.5	-30.54	-25	-5.54
		2593	-30.54	-25	-5.54
		2687.5	-30.01	-25	-5.01
	16QAM	2498.5	-29.44	-25	-4.44
		2593	-29.94	-25	-4.94
		2687.5	-30.86	-25	-5.86
10	QPSK	2501	-30.58	-25	-5.58
		2593	-30.13	-25	-5.13
		2685	-30.49	-25	-5.49
	16QAM	2501	-29.95	-25	-4.95
		2593	-30.01	-25	-5.01
		2685	-30.86	-25	-5.86
15	QPSK	2503.5	-30.50	-25	-5.50
		2593	-30.89	-25	-5.89
		2682.5	-31.07	-25	-6.07
	16QAM	2503.5	-30.97	-25	-5.97
		2593	-30.08	-25	-5.08
		2682.5	-29.22	-25	-4.22
20	QPSK	2506	-30.47	-25	-5.47
		2593	-30.26	-25	-5.26
		2680	-30.83	-25	-5.83
	16QAM	2506	-30.79	-25	-5.79
		2593	-30.17	-25	-5.17
		2680	-30.16	-25	-5.16

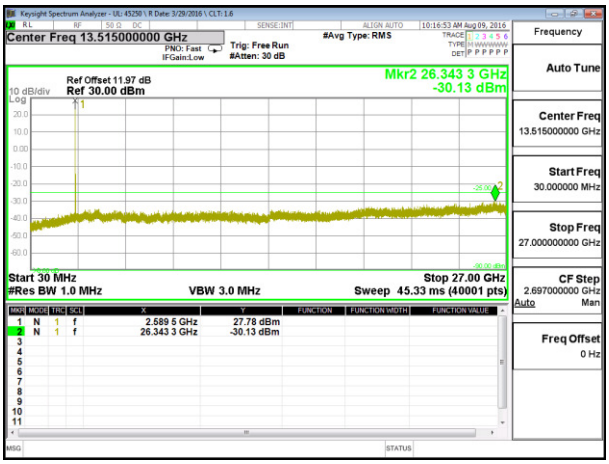
UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.



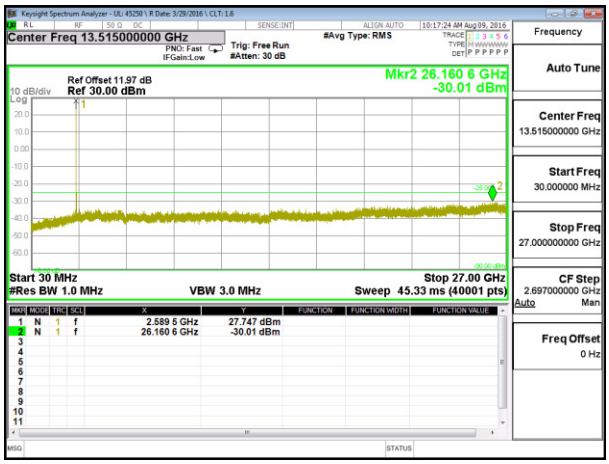
LTE B41 5MHz QPSK Middle Channel



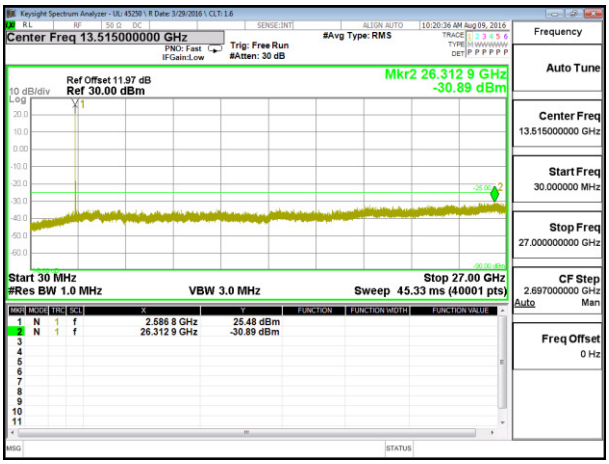
LTE B41 5MHz 16QAM Middle Channel



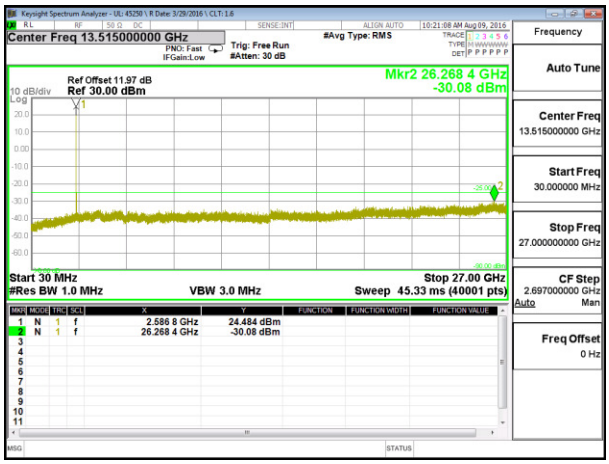
LTE B41 10MHz QPSK Middle Channel



LTE B41 10MHz 16QAM Middle Channel

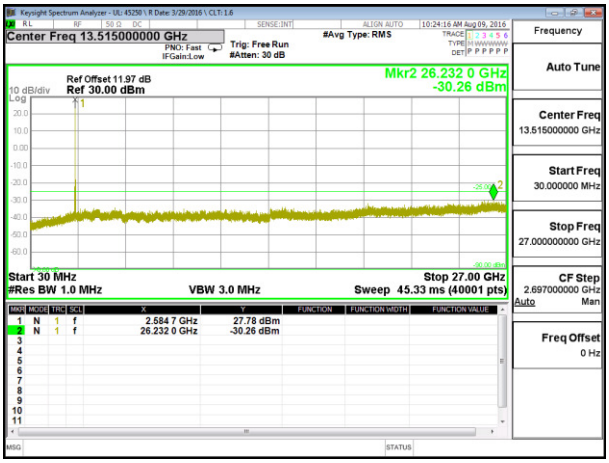


LTE B41 15MHz QPSK Middle Channel

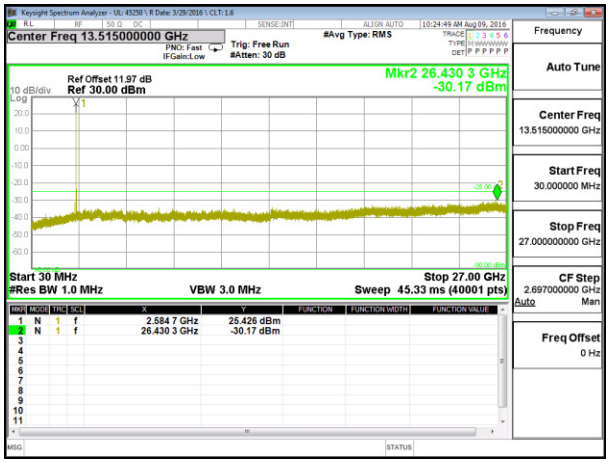


LTE B41 15MHz 16QAM Middle Channel

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.



LTE B41 20MHz QPSK Middle Channel



LTE B41 20MHz 16QAM Middle Channel

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.

13. FREQUENCY STABILITY

RULE PART(S)

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

LIMITS

§22.355 - The carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations.

§24.235 - The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

§27.54 - The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v02r02

Test Information

Date: 8/9-8/19 2016
Tester: Angel

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.

13.1. FREQUENCY STABILITY RESULTS

GSM 1900

GPRS

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (25C)	3.8 Vdc	1850.0280	1909.9670		
Extreme (50C)		1850.0280	1909.9670	-5.4	-0.003
Extreme (40C)		1850.0280	1909.9670	6.5	0.003
Extreme (30C)		1850.0280	1909.9670	-5.0	-0.003
Extreme (10C)		1850.0280	1909.9670	7.1	0.004
Extreme (0C)		1850.0280	1909.9670	7.3	0.004
Extreme (-10C)		1850.0280	1909.9670	6.6	0.004
Extreme (-20C)		1850.0280	1909.9670	7.0	0.004
Extreme (-30C)		1850.0280	1909.9670	7.8	0.004
25C	3.8 Vdc	1850.0280	1909.9670	5.3	0.003
	4.2 Vdc	1850.0280	1909.9670	-4.6	-0.002
	3.6 Vdc	1850.0280	1909.9670	5.3	0.003

EGPRS

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (25C)	3.8Vdc	1850.0380	1909.9620		
Extreme (50C)		1850.0380	1909.9620	-5.4	-0.003
Extreme (40C)		1850.0380	1909.9620	6.5	0.003
Extreme (30C)		1850.0380	1909.9620	-5.0	-0.003
Extreme (10C)		1850.0380	1909.9620	7.1	0.004
Extreme (0C)		1850.0380	1909.9620	7.3	0.004
Extreme (-10C)		1850.0380	1909.9620	6.6	0.004
Extreme (-20C)		1850.0380	1909.9620	7.0	0.004
Extreme (-30C)		1850.0380	1909.9620	7.8	0.004
25C	3.8 Vdc	1850.0380	1909.9620	5.3	0.003
	4.2 Vdc	1850.0380	1909.9620	-4.6	-0.002
	3.6 Vdc	1850.0380	1909.9620	5.3	0.003

LTE Band 4

QPSK, (20MHz BANDWIDTH)

Limit		1710	1755	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (25C)	3.8 Vdc	1710.8000	1754.3300		
Extreme (50C)		1710.8000	1754.3300	5.0	0.003
Extreme (40C)		1710.8000	1754.3300	6.5	0.004
Extreme (30C)		1710.8000	1754.3300	-5.0	-0.003
Extreme (10C)		1710.8000	1754.3300	7.1	0.004
Extreme (0C)		1710.8000	1754.3300	7.3	0.004
Extreme (-10C)		1710.8000	1754.3300	6.6	0.004
Extreme (-20C)		1710.8000	1754.3300	7.0	0.004
Extreme (-30C)		1710.8000	1754.3300	7.8	0.004
25C	3.8 Vdc	1710.8000	1754.3300	5.3	0.003
	4.2 Vdc	1710.8000	1754.3300	-4.6	-0.003
	3.6 Vdc	1710.8000	1754.3300	5.3	0.003

16QAM, (20MHz BANDWIDTH)

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.

Limit		1710	1755	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (25C)	3.8Vdc	1710.8000	1754.3300		
Extreme (50C)		1710.8000	1754.3300	5.0	0.003
Extreme (40C)		1710.8000	1754.3300	6.5	0.004
Extreme (30C)		1710.8000	1754.3300	-5.0	-0.003
Extreme (10C)		1710.8000	1754.3300	7.1	0.004
Extreme (0C)		1710.8000	1754.3300	7.3	0.004
Extreme (-10C)		1710.8000	1754.3300	6.6	0.004
Extreme (-20C)		1710.8000	1754.3300	7.0	0.004
Extreme (-30C)		1710.8000	1754.3300	7.8	0.004
25C	3.8 Vdc	1710.8000	1754.3300	5.3	0.003
	4.2 Vdc	1710.8000	1754.3300	-4.6	-0.003
	3.6 Vdc	1710.8000	1754.3300	5.3	0.003

LTE Band 5

Reference Frequency: PCS Mid Channel 836.5 MHz @ 20°C Limit: to stay +- 2.5 ppm = 2091.250 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse (MHz)	Delta (ppm)	Limit (ppm)
3.80	50	836.499997	0.010	2.5
3.80	40	836.499997	0.009	2.5
3.80	30	836.499996	0.010	2.5
3.80	***20***	**836.500005**	**0**	***2.5***
3.80	10	836.500003	0.002	2.5
3.80	0	836.500004	0.000	2.5
3.80	-10	836.500003	0.001	2.5
3.80	-20	836.500003	0.002	2.5
3.80	-30	836.499997	0.009	2.5

Reference Frequency: PCS Mid Channel 836.5 MHz @ 20°C Limit: to stay +- 2.5 ppm = 2091.250 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse (MHz)	Delta (ppm)	Limit (ppm)
3.80	***20***	***836.500005***	***0***	***2.5***
4.20	20	836.5000032	*0.002*	2.5
3.60	20	836.5000055	*-0.001*	2.5

Note: LTE B5 test data cover WCDMA B5

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.

LTE Band 7

QPSK, (20MHz BANDWIDTH)

Limit		2500	2570	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (25C)	3.8 Vdc	2500.7300	2569.3300		
Extreme (50C)		2500.7300	2569.3300	-5.8	-0.002
Extreme (40C)		2500.7300	2569.3300	-9.9	-0.004
Extreme (30C)		2500.7300	2569.3300	-8.9	-0.004
Extreme (10C)		2500.7300	2569.3300	-8.2	-0.003
Extreme (0C)		2500.7300	2569.3300	-8.8	-0.003
Extreme (-10C)		2500.7300	2569.3300	-8.0	-0.003
Extreme (-20C)		2500.7300	2569.3300	-7.9	-0.003
Extreme (-30C)		2500.7300	2569.3300	-10.7	-0.004
25C	3.8 Vdc	2500.7300	2569.3300	-8.7	-0.003
	4.2 Vdc	2500.7300	2569.3300	-9.6	-0.004
	3.6 Vdc	2500.7300	2569.3300	-7.8	-0.003

16QAM, (20MHz BANDWIDTH)

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.

Limit		2500	2570	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (25C)	3.8Vdc	2500.7300	2569.3300		
Extreme (50C)		2500.7300	2569.3300	-5.8	-0.002
Extreme (40C)		2500.7300	2569.3300	-9.9	-0.004
Extreme (30C)		2500.7300	2569.3300	-8.9	-0.004
Extreme (10C)		2500.7300	2569.3300	-8.2	-0.003
Extreme (0C)		2500.7300	2569.3300	-8.8	-0.003
Extreme (-10C)		2500.7300	2569.3300	-8.0	-0.003
Extreme (-20C)		2500.7300	2569.3300	-7.9	-0.003
Extreme (-30C)		2500.7300	2569.3300	-10.7	-0.004
25C	3.8 Vdc	2500.7300	2569.3300	-8.7	-0.003
	4.2 Vdc	2500.7300	2569.3300	-9.6	-0.004
	3.6 Vdc	2500.7300	2569.3300	-7.8	-0.003

LTE Band 12

QPSK, (10MHz BANDWIDTH)

Limit		699	716	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (25C)	3.8 Vdc	699.3700	715.7000		
Extreme (50C)		699.3700	715.7000	-2.5	-0.004
Extreme (40C)		699.3700	715.7000	-3.2	-0.005
Extreme (30C)		699.3700	715.7000	-4.3	-0.006
Extreme (10C)		699.3700	715.7000	3.2	0.005
Extreme (0C)		699.3700	715.7000	-2.9	-0.004
Extreme (-10C)		699.3700	715.7000	2.6	0.004
Extreme (-20C)		699.3700	715.7000	-2.9	-0.004
Extreme (-30C)		699.3700	715.7000	-3.2	-0.004
25C	3.8 Vdc	699.3700	715.7000	3.5	0.005
	4.2 Vdc	699.3700	715.7000	3.5	0.005
	3.6 Vdc	699.3700	715.7000	3.1	0.004

16QAM, (10MHz BANDWIDTH)

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.

Limit		699	716	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (25C)	3.8Vdc	699.4000	715.6700		
Extreme (50C)		699.4000	715.6700	5.0	0.007
Extreme (40C)		699.4000	715.6700	6.5	0.009
Extreme (30C)		699.4000	715.6700	-5.0	-0.007
Extreme (10C)		699.4000	715.6700	7.1	0.010
Extreme (0C)		699.4000	715.6700	7.3	0.010
Extreme (-10C)		699.4000	715.6700	6.6	0.009
Extreme (-20C)		699.4000	715.6700	7.0	0.010
Extreme (-30C)		699.4000	715.6700	7.8	0.011
25C	3.8 Vdc	699.4000	715.6700	5.3	0.007
	4.2 Vdc	699.4000	715.6700	-4.6	-0.006
	3.6 Vdc	699.4000	715.6700	5.3	0.007

LTE Band 13

QPSK, (10MHz BANDWIDTH)

Limit		777	787	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (25C)	3.8 Vdc	777.3700	786.7000		
Extreme (50C)		777.3700	786.7000	-3.4	-0.004
Extreme (40C)		777.3700	786.7000	-4.4	-0.006
Extreme (30C)		777.3700	786.7000	-4.0	-0.005
Extreme (10C)		777.3700	786.7000	3.7	0.005
Extreme (0C)		777.3700	786.7000	4.5	0.006
Extreme (-10C)		777.3700	786.7000	3.0	0.004
Extreme (-20C)		777.3700	786.7000	3.4	0.004
Extreme (-30C)		777.3700	786.7000	-3.6	-0.005
25C	3.8 Vdc	777.3700	786.7000	-3.2	-0.004
	4.2 Vdc	777.3700	786.7000	-3.4	-0.004
	3.6 Vdc	777.3700	786.7000	3.0	0.004

16QAM, (10MHz BANDWIDTH)

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.

Limit		777	2570	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (25C)	3.8Vdc	777.3700	786.6700		
Extreme (50C)		777.3700	786.6700	-5.8	-0.003
Extreme (40C)		777.3700	786.6700	-9.9	-0.006
Extreme (30C)		777.3700	786.6700	-8.9	-0.005
Extreme (10C)		777.3700	786.6700	-8.2	-0.005
Extreme (0C)		777.3700	786.6700	-8.8	-0.005
Extreme (-10C)		777.3700	786.6700	-8.0	-0.005
Extreme (-20C)		777.3700	786.6700	-7.9	-0.005
Extreme (-30C)		777.3700	786.6700	-10.7	-0.006
25C	3.8 Vdc	777.3700	786.6700	-8.7	-0.005
	4.2 Vdc	777.3700	786.6700	-9.6	-0.006
	3.6 Vdc	777.3700	786.6700	-7.8	-0.005

LTE Band 17

QPSK, (10MHz BANDWIDTH)

Limit		704	716	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (25C)	3.8 Vdc	704.3700	715.7000		
Extreme (50C)		704.3700	715.7000	-2.3	-0.003
Extreme (40C)		704.3700	715.7000	-2.2	-0.003
Extreme (30C)		704.3700	715.7000	-3.1	-0.004
Extreme (10C)		704.3700	715.7000	3.8	0.005
Extreme (0C)		704.3700	715.7000	3.7	0.005
Extreme (-10C)		704.3700	715.7000	3.4	0.005
Extreme (-20C)		704.3700	715.7000	3.2	0.004
Extreme (-30C)		704.3700	715.7000	-3.1	-0.004
25C	3.8 Vdc	704.3700	715.7000	3.7	0.005
	4.2 Vdc	704.3700	715.7000	3.4	0.005
	3.6 Vdc	704.3700	715.7000	3.9	0.006

16QAM, (10MHz BANDWIDTH)

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.

Limit		704	716	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (25C)	3.8Vdc	704.4000	715.7000		
Extreme (50C)		704.4000	715.7000	-2.3	-0.003
Extreme (40C)		704.4000	715.7000	-2.2	-0.003
Extreme (30C)		704.4000	715.7000	-3.1	-0.004
Extreme (10C)		704.4000	715.7000	3.8	0.005
Extreme (0C)		704.4000	715.7000	3.7	0.005
Extreme (-10C)		704.4000	715.7000	3.4	0.005
Extreme (-20C)		704.4000	715.7000	3.2	0.004
Extreme (-30C)		704.4000	715.7000	-3.1	-0.004
25C	3.8 Vdc	704.4000	715.7000	3.7	0.005
	4.2 Vdc	704.4000	715.7000	3.4	0.005
	3.6 Vdc	704.4000	715.7000	3.9	0.006

LTE Band 41

QPSK, (20MHz BANDWIDTH)

Limit		2496	2690	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (25C)	3.8 Vdc	2496.8000	2689.3300		
Extreme (50C)		2496.8000	2689.3300	-5.8	-0.002
Extreme (40C)		2496.8000	2689.3300	-9.9	-0.004
Extreme (30C)		2496.8000	2689.3300	-8.9	-0.003
Extreme (10C)		2496.8000	2689.3300	-8.2	-0.003
Extreme (0C)		2496.8000	2689.3300	-8.8	-0.003
Extreme (-10C)		2496.8000	2689.3300	-8.0	-0.003
Extreme (-20C)		2496.8000	2689.3300	-7.9	-0.003
Extreme (-30C)		2496.8000	2689.3300	-10.7	-0.004
25C	3.8 Vdc	2496.8000	2689.3300	-8.7	-0.003
	4.2 Vdc	2496.8000	2689.3300	-9.6	-0.004
	3.6 Vdc	2496.8000	2689.3300	-7.8	-0.003

16QAM, (20MHz BANDWIDTH)

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.

Limit		2496	2690	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (25C)	3.8Vdc	2496.8000	2689.3300		
Extreme (50C)		2496.8000	2689.3300	-5.8	-0.002
Extreme (40C)		2496.8000	2689.3300	-9.9	-0.004
Extreme (30C)		2496.8000	2689.3300	-8.9	-0.003
Extreme (10C)		2496.8000	2689.3300	-8.2	-0.003
Extreme (0C)		2496.8000	2689.3300	-8.8	-0.003
Extreme (-10C)		2496.8000	2689.3300	-8.0	-0.003
Extreme (-20C)		2496.8000	2689.3300	-7.9	-0.003
Extreme (-30C)		2496.8000	2689.3300	-10.7	-0.004
25C	3.8 Vdc	2496.8000	2689.3300	-8.7	-0.003
	4.2 Vdc	2496.8000	2689.3300	-9.6	-0.004
	3.6 Vdc	2496.8000	2689.3300	-7.8	-0.003

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.

14. RADIATED TEST RESULTS

14.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2. 1046, §22. 913, §24. 232, §27

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 (b) - (10) Portable stations (handheld devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP. (LTE B13)

27.50 (c) - (10) Portable stations (handheld devices) are limited to 3 watts ERP; (LTE B17)

27.50 (d) - (4) Fixed, mobile, and portable (handheld) 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 4)

27.50 (h) - (2) Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power. (LTE B41 & 7)

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13dB.

TEST PROCEDURE

ANSI / TIA / EIA 603D Clause 2.2.17; PSA setting reference to 971168 D01 v02r02

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.

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.

14.1.1. ERP/EIRP RESULTS AND TABLE

GSM

Band	Mode	Channel	f(MHz)	ERP/EIRP	
				dBm	mW
GSM850	GPRS	128	824.2	25.40	346.82
		190	836.6	27.33	540.80
		251	848.8	27.07	509.37
	EGPRS	128	824.2	21.07	127.97
		190	836.6	22.92	195.90
		251	848.8	22.82	191.44
GSM1900	GPRS	512	1850.2	22.62	182.93
		661	1880	24.10	257.19
		810	1909.8	24.57	286.31
	EGPRS	512	1850.2	19.96	99.15
		661	1880	21.58	143.96
		810	1909.8	22.03	159.53

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.

Fundamental Substitution Measurement (Fc < 1GHz)
UL LLC, Chamber N

Company: SOMC
Project #: 16J23633
Date: 08/09/2016
Test Engineer: Mark Nolting
Configuration: Standalone (GSM/UMTS sample)
Mode: GPRS850

Test Equipment:
Substitution: Dipole antenna AT0016, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch									
824.20	31.96	V	5.1	0.7	-1.45	25.40	38.5	-13.0	
824.20	22.04	H	5.1	0.7	-1.45	15.48	38.5	-23.0	
Mid Ch									
836.60	33.95	V	5.2	0.7	-1.45	27.33	38.5	-11.1	
836.60	23.36	H	5.2	0.7	-1.45	16.74	38.5	-21.7	
High Ch									
848.80	33.71	V	5.2	0.7	-1.45	27.07	38.5	-11.4	
848.80	23.79	H	5.2	0.7	-1.45	17.15	38.5	-21.3	

Rev. 11.02.2015
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

GSM850 GPRS

Fundamental Substitution Measurement (Fc < 1GHz)
UL LLC, Chamber N

Company: SOMC
Project #: 16J23633
Date: 08/09/2016
Test Engineer: Mark Nolting
Configuration: Standalone (GSM/UMTS sample)
Mode: EGPRS850

Test Equipment:
Substitution: Dipole antenna AT0016, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch									
824.20	27.63	V	5.1	0.7	-1.45	21.07	38.5	-17.4	
824.20	17.33	H	5.1	0.7	-1.45	10.77	38.5	-27.7	
Mid Ch									
836.60	29.54	V	5.2	0.7	-1.45	22.92	38.5	-15.5	
836.60	18.58	H	5.2	0.7	-1.45	11.96	38.5	-26.5	
High Ch									
848.80	29.46	V	5.2	0.7	-1.45	22.82	38.5	-15.6	
848.80	19.16	H	5.2	0.7	-1.45	12.52	38.5	-25.9	

Rev. 11.02.2015
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

GSM850 EGPRS

Fundamental Substitution Measurement (Fc > 1GHz)
UL LLC, Chamber N

Company: SOMC
Project #: 16J23633
Date: 08/06/2016
Test Engineer: Mark Nolting
Configuration: Standalone (GSM/UMTS sample)
Mode: GPRS1900

Test Equipment:
Substitution: Horn antenna AT0078, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1850.20	26.36	V	8.1	4.4	22.62	33.0	-10.4	
1850.20	19.45	H	8.1	4.4	15.71	33.0	-17.3	
Mid Ch								
1880.00	27.97	V	8.2	4.3	24.10	33.0	-8.9	
1880.00	20.53	H	8.2	4.3	16.66	33.0	-16.3	
High Ch								
1909.80	28.59	V	8.2	4.2	24.57	33.0	-8.4	
1909.80	20.93	H	8.2	4.2	16.91	33.0	-16.1	

Rev. 11.02.2015
Note: For Band 4 EIRP limit is 30dBm

GSM1900 GPRS

Fundamental Substitution Measurement (Fc > 1GHz)
UL LLC, Chamber N

Company: SOMC
Project #: 16J23633
Date: 08/06/2016
Test Engineer: Mark Nolting
Configuration: Standalone (GSM/UMTS sample)
Mode: EGPRS1900

Test Equipment:
Substitution: Horn antenna AT0078, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1850.20	23.70	V	8.1	4.4	19.96	33.0	-13.0	
1850.20	16.83	H	8.1	4.4	13.09	33.0	-19.9	
Mid Ch								
1880.00	25.45	V	8.2	4.3	21.58	33.0	-11.4	
1880.00	18.11	H	8.2	4.3	14.24	33.0	-18.8	
High Ch								
1909.80	26.05	V	8.2	4.2	22.03	33.0	-11.0	
1909.80	18.23	H	8.2	4.2	14.21	33.0	-18.8	

Rev. 11.02.2015
Note: For Band 4 EIRP limit is 30dBm

GSM1900 EGPRS

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.

WCDMA

Band	Mode	Channel	f(MHz)	ERP/EIRP	
				dBm	mW
Band 5	REL99	4132	826.4	19.14	82.04
		4183	836.6	20.46	111.18
		4233	846.6	20.23	105.34
	HSDPA	4132	826.4	18.69	73.96
		4183	836.6	20.09	102.10
		4233	846.6	19.57	90.49

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.

Fundamental Substitution Measurement (Fc < 1GHz)
UL LLC, Chamber N

Company: SOMC
Project #: 16J23633
Date: 08/09/2016
Test Engineer: Brian Kiewra / John Manser
Configuration: Standalone (GSM/UMTS sample)
Mode: WCDMA5, REL99

Test Equipment:
Substitution: Dipole antenna AT0016, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch									
826.40	25.71	V	5.1	0.7	-1.45	19.14	38.5	-19.3	
826.40	15.55	H	5.1	0.7	-1.45	8.98	38.5	-29.5	
Mid Ch									
836.60	27.08	V	5.2	0.7	-1.45	20.46	38.5	-18.0	
836.60	16.38	H	5.2	0.7	-1.45	9.76	38.5	-28.7	
High Ch									
846.60	26.86	V	5.2	0.7	-1.45	20.23	38.5	-18.2	
846.60	15.81	H	5.2	0.7	-1.45	9.18	38.5	-29.3	

Rev. 11.02.2015
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

B5 REL99

Fundamental Substitution Measurement (Fc < 1GHz)
UL LLC, Chamber N

Company: SOMC
Project #: 16J23633
Date: 08/09/2016
Test Engineer: Brian Kiewra / John Manser
Configuration: Standalone (GSM/UMTS sample)
Mode: WCDMA5, HSDPA

Test Equipment:
Substitution: Dipole antenna AT0016, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch									
826.40	25.26	V	5.1	0.7	-1.45	18.69	38.5	-19.8	
826.40	14.06	H	5.1	0.7	-1.45	7.49	38.5	-31.0	
Mid Ch									
836.60	26.71	V	5.2	0.7	-1.45	20.09	38.5	-18.4	
836.60	15.00	H	5.2	0.7	-1.45	8.38	38.5	-30.1	
High Ch									
846.60	26.20	V	5.2	0.7	-1.45	19.57	38.5	-18.9	
846.60	14.67	H	5.2	0.7	-1.45	8.04	38.5	-30.4	

Rev. 11.02.2015
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

B5 HSDPA

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.

LTE Band 4

BW (MHz)	Mode	RB/RB Size	f(MHz)	EIRP	
				dBm	mW
1.4	QPSK	1/0	1710.7	14.60	28.86
		1/0	1732.5	14.94	31.19
		1/0	1754.3	15.11	32.47
	16QAM	1/0	1710.7	13.67	23.30
		1/0	1732.5	14.05	25.41
		1/0	1754.3	14.32	27.07
3	QPSK	1/0	1711.5	14.34	27.16
		1/0	1732.5	14.04	25.36
		1/0	1753.5	15.14	32.65
	16QAM	1/0	1711.5	13.53	22.54
		1/0	1732.5	13.31	21.43
		1/0	1753.5	14.32	27.04
5	QPSK	1/0	1712.5	14.66	29.27
		1/0	1732.5	14.92	31.05
		1/0	1752.5	14.92	31.08
	16QAM	1/0	1712.5	13.83	24.18
		1/0	1732.5	14.35	27.23
		1/0	1752.5	14.20	26.33
10	QPSK	1/0	1715	14.11	25.79
		1/0	1732.5	14.99	31.56
		1/0	1750	15.11	32.43
	16QAM	1/0	1715	13.36	21.70
		1/0	1732.5	14.06	25.47
		1/0	1750	14.42	27.67
15	QPSK	1/0	1717.5	14.08	25.60
		1/0	1732.5	14.81	30.27
		1/0	1747.5	15.10	32.39
	16QAM	1/0	1717.5	13.32	21.49
		1/0	1732.5	14.05	25.41
		1/0	1747.5	14.38	27.44
20	QPSK	1/0	1720	13.94	24.78
		1/0	1732.5	14.89	30.84
		1/0	1745	15.29	33.79
	16QAM	1/0	1720	13.18	20.80
		1/0	1732.5	14.12	25.83
		1/0	1745	14.41	27.59

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.

Fundamental Substitution Measurement (Fc > 1GHz)
UL LLC, Chamber N

Company: SOMC
Project #: 16J23633
Date: 08/05/2016
Test Engineer: Mark Nolting
Configuration: Standalone (LTE sample #1)
Mode: LTE 4, 1.4M, QPSK

Test Equipment:
Substitution: Horn antenna AT0078, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1710.70	17.62	V	7.7	4.7	14.60	30.0	-15.4	
1710.70	7.90	H	7.7	4.7	4.88	30.0	-25.1	
Mid Ch								
1732.50	18.06	V	7.8	4.6	14.94	30.0	-15.1	
1732.50	8.71	H	7.8	4.6	5.59	30.0	-24.4	
High Ch								
1754.30	18.35	V	7.8	4.6	15.11	30.0	-14.9	
1754.30	8.27	H	7.8	4.6	5.03	30.0	-25.0	

Rev. 11.02.2015
Note: For Band 4 EIRP limit is 30dBm

LTE B4 1.4MHz QPSK

Fundamental Substitution Measurement (Fc > 1GHz)
UL LLC, Chamber N

Company: SOMC
Project #: 16J23633
Date: 08/05/2016
Test Engineer: Mark Nolting
Configuration: Standalone (LTE sample #1)
Mode: LTE 4, 1.4M, 16QAM

Test Equipment:
Substitution: Horn antenna AT0078, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1710.70	16.69	V	7.7	4.7	13.67	30.0	-16.3	
1710.70	6.93	H	7.7	4.7	3.91	30.0	-26.1	
Mid Ch								
1732.50	17.17	V	7.8	4.6	14.05	30.0	-15.9	
1732.50	7.77	H	7.8	4.6	4.65	30.0	-25.3	
High Ch								
1754.30	17.56	V	7.8	4.6	14.32	30.0	-15.7	
1754.30	7.38	H	7.8	4.6	4.14	30.0	-25.9	

Rev. 11.02.2015
Note: For Band 4 EIRP limit is 30dBm

LTE B4 1.4MHz 16QAM

Fundamental Substitution Measurement (Fc > 1GHz)
UL LLC, Chamber N

Company: SOMC
Project #: 16J23633
Date: 08/06/2016
Test Engineer: Mark Nolting
Configuration: Standalone (LTE sample #1)
Mode: LTE 4, 3M, QPSK

Test Equipment:
Substitution: Horn antenna AT0078, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1711.50	17.36	V	7.7	4.7	14.34	30.0	-15.7	
1711.50	8.04	H	7.7	4.7	5.02	30.0	-25.0	
Mid Ch								
1732.50	17.16	V	7.8	4.6	14.04	30.0	-16.0	
1732.50	8.64	H	7.8	4.6	5.52	30.0	-24.5	
High Ch								
1753.50	18.37	V	7.8	4.6	15.14	30.0	-14.9	
1753.50	9.21	H	7.8	4.6	5.98	30.0	-24.0	

Rev. 11.02.2015
Note: For Band 4 EIRP limit is 30dBm

LTE B4 3MHz QPSK

Fundamental Substitution Measurement (Fc > 1GHz)
UL LLC, Chamber N

Company: SOMC
Project #: 16J23633
Date: 08/06/2016
Test Engineer: Mark Nolting
Configuration: Standalone (LTE sample #1)
Mode: LTE 4, 3M, 16QAM

Test Equipment:
Substitution: Horn antenna AT0078, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1711.50	16.55	V	7.7	4.7	13.53	30.0	-16.5	
1711.50	7.23	H	7.7	4.7	4.21	30.0	-25.8	
Mid Ch								
1732.50	16.43	V	7.8	4.6	13.31	30.0	-16.7	
1732.50	7.83	H	7.8	4.6	4.71	30.0	-25.3	
High Ch								
1753.50	17.55	V	7.8	4.6	14.32	30.0	-15.7	
1753.50	8.41	H	7.8	4.6	5.18	30.0	-24.8	

Rev. 11.02.2015
Note: For Band 4 EIRP limit is 30dBm

LTE B4 3MHz 16QAM

Fundamental Substitution Measurement (Fc > 1GHz)
UL LLC, Chamber N

Company: SOMC
Project #: 16J23633
Date: 08/06/2016
Test Engineer: Mark Nolting
Configuration: Standalone (LTE sample #1)
Mode: LTE 4, 5M, QPSK

Test Equipment:
Substitution: Horn antenna AT0078, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1712.50	17.69	V	7.7	4.7	14.66	30.0	-15.3	
1712.50	7.71	H	7.7	4.7	4.68	30.0	-25.3	
Mid Ch								
1732.50	18.04	V	7.8	4.6	14.92	30.0	-15.1	
1732.50	9.69	H	7.8	4.6	6.57	30.0	-23.4	
High Ch								
1752.50	18.15	V	7.8	4.6	14.92	30.0	-15.1	
1752.50	9.50	H	7.8	4.6	6.27	30.0	-23.7	

Rev. 11.02.2015
Note: For Band 4 EIRP limit is 30dBm

LTE B4 5MHz QPSK

Fundamental Substitution Measurement (Fc > 1GHz)
UL LLC, Chamber N

Company: SOMC
Project #: 16J23633
Date: 08/06/2016
Test Engineer: Mark Nolting
Configuration: Standalone (LTE sample #1)
Mode: LTE 4, 5M, 16QAM

Test Equipment:
Substitution: Horn antenna AT0078, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1712.50	16.86	V	7.7	4.7	13.83	30.0	-16.2	
1712.50	6.95	H	7.7	4.7	3.92	30.0	-26.1	
Mid Ch								
1732.50	17.47	V	7.8	4.6	14.35	30.0	-15.6	
1732.50	8.94	H	7.8	4.6	5.82	30.0	-24.2	
High Ch								
1752.50	17.43	V	7.8	4.6	14.20	30.0	-15.8	
1752.50	8.84	H	7.8	4.6	5.61	30.0	-24.4	

Rev. 11.02.2015
Note: For Band 4 EIRP limit is 30dBm

LTE B4 5MHz 16QAM

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.

Fundamental Substitution Measurement (Fc > 1GHz)
UL LLC, Chamber N

Company: SOMC
Project #: 16J23633
Date: 08/06/2016
Test Engineer: Mark Nolting
Configuration: Standalone (LTE sample #1)
Mode: LTE 4, 10M, QPSK

Test Equipment:
Substitution: Horn antenna AT0078, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1715.00	17.15	V	7.7	4.7	14.11	30.0	-15.9	
1715.00	8.66	H	7.7	4.7	5.62	30.0	-24.4	
Mid Ch								
1732.50	18.11	V	7.8	4.6	14.99	30.0	-15.0	
1732.50	9.71	H	7.8	4.6	6.59	30.0	-23.4	
High Ch								
1750.00	18.32	V	7.8	4.6	15.11	30.0	-14.9	
1750.00	10.24	H	7.8	4.6	7.03	30.0	-23.0	

Rev. 11.02.2015
Note: For Band 4 EIRP limit is 30dBm

LTE B4 10MHz QPSK

Fundamental Substitution Measurement (Fc > 1GHz)
UL LLC, Chamber N

Company: SOMC
Project #: 16J23633
Date: 08/06/2016
Test Engineer: Mark Nolting
Configuration: Standalone (LTE sample #1)
Mode: LTE 4, 10M, 16QAM

Test Equipment:
Substitution: Horn antenna AT0078, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1715.00	16.40	V	7.7	4.7	13.36	30.0	-16.6	
1715.00	7.84	H	7.7	4.7	4.80	30.0	-25.2	
Mid Ch								
1732.50	17.18	V	7.8	4.6	14.06	30.0	-15.9	
1732.50	8.82	H	7.8	4.6	5.70	30.0	-24.3	
High Ch								
1750.00	17.63	V	7.8	4.6	14.42	30.0	-15.6	
1750.00	9.48	H	7.8	4.6	6.27	30.0	-23.7	

Rev. 11.02.2015
Note: For Band 4 EIRP limit is 30dBm

LTE B4 10MHz 16QAM

Fundamental Substitution Measurement (Fc > 1GHz)
UL LLC, Chamber N

Company: SOMC
Project #: 16J23633
Date: 08/06/2016
Test Engineer: Mark Nolting
Configuration: Standalone (LTE sample #1)
Mode: LTE 4, 15M, QPSK

Test Equipment:
Substitution: Horn antenna AT0078, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1717.50	17.13	V	7.7	4.7	14.08	30.0	-15.9	
1717.50	9.11	H	7.7	4.7	6.06	30.0	-23.9	
Mid Ch								
1732.50	17.93	V	7.8	4.6	14.81	30.0	-15.2	
1732.50	9.45	H	7.8	4.6	6.33	30.0	-23.7	
High Ch								
1747.50	18.30	V	7.8	4.6	15.10	30.0	-14.9	
1747.50	10.25	H	7.8	4.6	7.05	30.0	-22.9	

Rev. 11.02.2015
Note: For Band 4 EIRP limit is 30dBm

LTE B4 15MHz QPSK

Fundamental Substitution Measurement (Fc > 1GHz)
UL LLC, Chamber N

Company: SOMC
Project #: 16J23633
Date: 08/06/2016
Test Engineer: Mark Nolting
Configuration: Standalone (LTE sample #1)
Mode: LTE 4, 15M, 16QAM

Test Equipment:
Substitution: Horn antenna AT0078, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1717.50	16.37	V	7.7	4.7	13.32	30.0	-16.7	
1717.50	8.38	H	7.7	4.7	5.33	30.0	-24.7	
Mid Ch								
1732.50	17.17	V	7.8	4.6	14.05	30.0	-15.9	
1732.50	8.76	H	7.8	4.6	5.64	30.0	-24.4	
High Ch								
1747.50	17.58	V	7.8	4.6	14.38	30.0	-15.6	
1747.50	9.43	H	7.8	4.6	6.23	30.0	-23.8	

Rev. 11.02.2015
Note: For Band 4 EIRP limit is 30dBm

LTE B4 15MHz 16QAM

Fundamental Substitution Measurement (Fc > 1GHz)
UL LLC, Chamber N

Company: SOMC
Project #: 16J23633
Date: 08/06/2016
Test Engineer: Mark Nolting
Configuration: Standalone (LTE sample #1)
Mode: LTE 4, 20M, QPSK

Test Equipment:
Substitution: Horn antenna AT0078, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1720.00	17.00	V	7.7	4.7	13.94	30.0	-16.1	
1720.00	9.56	H	7.7	4.7	6.50	30.0	-23.5	
Mid Ch								
1732.50	18.01	V	7.8	4.6	14.89	30.0	-15.1	
1732.50	9.62	H	7.8	4.6	6.50	30.0	-23.5	
High Ch								
1745.00	18.47	V	7.8	4.6	15.29	30.0	-14.7	
1745.00	10.19	H	7.8	4.6	7.01	30.0	-23.0	

Rev. 11.02.2015
Note: For Band 4 EIRP limit is 30dBm

LTE B4 20MHz QPSK

Fundamental Substitution Measurement (Fc > 1GHz)
UL LLC, Chamber N

Company: SOMC
Project #: 16J23633
Date: 08/06/2016
Test Engineer: Mark Nolting
Configuration: Standalone (LTE sample #1)
Mode: LTE 4, 20M, 16QAM

Test Equipment:
Substitution: Horn antenna AT0078, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
1720.00	16.24	V	7.7	4.7	13.18	30.0	-16.8	
1720.00	8.71	H	7.7	4.7	5.65	30.0	-24.3	
Mid Ch								
1732.50	17.24	V	7.8	4.6	14.12	30.0	-15.9	
1732.50	8.86	H	7.8	4.6	5.74	30.0	-24.3	
High Ch								
1745.00	17.59	V	7.8	4.6	14.41	30.0	-15.6	
1745.00	9.31	H	7.8	4.6	6.13	30.0	-23.9	

Rev. 11.02.2015
Note: For Band 4 EIRP limit is 30dBm

LTE B4 20MHz 16QAM

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.

LTE Band 5

BW (MHz)	Mode	RB/RB Size	f(MHz)	ERP	
				dBm	mW
1.4	QPSK	1/0	824.7	19.06	80.51
		1/0	836.5	20.21	104.97
		1/0	848.3	19.57	90.61
	16QAM	1/0	824.7	18.18	65.75
		1/0	836.5	19.35	86.11
		1/0	848.3	18.55	71.64
3	QPSK	1/0	825.5	19.01	79.70
		1/0	836.5	20.26	106.19
		1/0	847.5	19.61	91.49
	16QAM	1/0	825.5	18.16	65.54
		1/0	836.5	19.40	87.11
		1/0	847.5	18.74	74.88
5	QPSK	1/0	826.5	19.17	82.60
		1/0	836.5	20.20	104.73
		1/0	846.5	19.82	95.86
	16QAM	1/0	826.5	18.35	68.38
		1/0	836.5	19.45	88.12
		1/0	846.5	18.95	78.45
10	QPSK	1/0	829	19.18	82.70
		1/0	836.5	20.38	109.16
		1/0	844	19.79	95.28
	16QAM	1/0	829	18.29	67.38
		1/0	836.5	19.67	92.70
		1/0	844	19.03	79.99

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.

Fundamental Substitution Measurement (Fc < 1GHz)
UL LLC, Chamber N

Company: SOMC
Project #: 16J23633
Date: 08/09/2016
Test Engineer: Mark Nolting
Configuration: Standalone (LTE Sample #1)
Mode: LTE 5, 1.4MHz, QPSK

Test Equipment:
Substitution: Dipole antenna AT0016, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low									
824.70	25.62	V	5.1	0.7	-1.45	19.06	38.5	-19.4	
824.70	15.26	H	5.1	0.7	-1.45	8.70	38.5	-29.8	
Mid Ch									
836.50	26.83	V	5.2	0.7	-1.45	20.21	38.5	-18.2	
836.50	16.33	H	5.2	0.7	-1.45	9.71	38.5	-28.7	
High Ch									
848.30	26.21	V	5.2	0.7	-1.45	19.57	38.5	-18.9	
848.30	16.21	H	5.2	0.7	-1.45	9.57	38.5	-28.9	

Rev. 11.02.2015
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

LTE B5 1.4MHz QPSK

Fundamental Substitution Measurement (Fc < 1GHz)
UL LLC, Chamber N

Company: SOMC
Project #: 16J23633
Date: 08/09/2016
Test Engineer: Mark Nolting
Configuration: Standalone (LTE Sample #1)
Mode: LTE 5, 1.4MHz, 16QAM

Test Equipment:
Substitution: Dipole antenna AT0016, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low									
824.70	24.74	V	5.1	0.7	-1.45	18.18	38.5	-20.3	
824.70	14.23	H	5.1	0.7	-1.45	7.67	38.5	-30.8	
Mid Ch									
836.50	25.97	V	5.2	0.7	-1.45	19.35	38.5	-19.1	
836.50	15.42	H	5.2	0.7	-1.45	8.80	38.5	-29.6	
High Ch									
848.30	25.19	V	5.2	0.7	-1.45	18.55	38.5	-19.9	
848.30	15.30	H	5.2	0.7	-1.45	8.66	38.5	-29.8	

Rev. 11.02.2015
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

LTE B5 1.4MHz 16QAM

Fundamental Substitution Measurement (Fc < 1GHz)
UL LLC, Chamber N

Company: SOMC
Project #: 16J23633
Date: 08/09/2016
Test Engineer: Mark Nolting
Configuration: Standalone (LTE Sample #1)
Mode: LTE 5, 3MHz, QPSK

Test Equipment:
Substitution: Dipole antenna AT0016, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low									
825.50	25.58	V	5.1	0.7	-1.45	19.01	38.5	-19.4	
825.50	15.33	H	5.1	0.7	-1.45	8.76	38.5	-29.7	
Mid Ch									
836.50	26.88	V	5.2	0.7	-1.45	20.26	38.5	-18.2	
836.50	16.21	H	5.2	0.7	-1.45	9.59	38.5	-28.9	
High Ch									
847.50	26.25	V	5.2	0.7	-1.45	19.61	38.5	-18.8	
847.50	16.31	H	5.2	0.7	-1.45	9.67	38.5	-28.8	

Rev. 11.02.2015
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

LTE B5 3MHz QPSK

Fundamental Substitution Measurement (Fc < 1GHz)
UL LLC, Chamber N

Company: SOMC
Project #: 16J23633
Date: 08/09/2016
Test Engineer: Mark Nolting
Configuration: Standalone (LTE Sample #1)
Mode: LTE 5, 3MHz, 16QAM

Test Equipment:
Substitution: Dipole antenna AT0016, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low									
825.50	24.73	V	5.1	0.7	-1.45	18.16	38.5	-20.3	
825.50	14.34	H	5.1	0.7	-1.45	7.77	38.5	-30.7	
Mid Ch									
836.50	26.02	V	5.2	0.7	-1.45	19.40	38.5	-19.0	
836.50	15.47	H	5.2	0.7	-1.45	8.85	38.5	-29.6	
High Ch									
847.50	25.38	V	5.2	0.7	-1.45	18.74	38.5	-19.7	
847.50	15.44	H	5.2	0.7	-1.45	8.80	38.5	-29.6	

Rev. 11.02.2015
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

LTE B5 3MHz 16QAM

Fundamental Substitution Measurement (Fc < 1GHz)
UL LLC, Chamber N

Company: SOMC
Project #: 16J23633
Date: 08/09/2016
Test Engineer: Mark Nolting
Configuration: Standalone (LTE Sample #1)
Mode: LTE 5, 5MHz, QPSK

Test Equipment:
Substitution: Dipole antenna AT0016, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low									
826.50	25.74	V	5.1	0.7	-1.45	19.17	38.5	-19.3	
826.50	15.40	H	5.1	0.7	-1.45	8.83	38.5	-29.6	
Mid Ch									
836.50	26.82	V	5.2	0.7	-1.45	20.20	38.5	-18.2	
836.50	16.32	H	5.2	0.7	-1.45	9.70	38.5	-28.7	
High Ch									
846.50	26.45	V	5.2	0.7	-1.45	19.82	38.5	-18.6	
846.50	16.47	H	5.2	0.7	-1.45	9.84	38.5	-28.6	

Rev. 11.02.2015
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

LTE B5 5MHz QPSK

Fundamental Substitution Measurement (Fc < 1GHz)
UL LLC, Chamber N

Company: SOMC
Project #: 16J23633
Date: 08/09/2016
Test Engineer: Mark Nolting
Configuration: Standalone (LTE Sample #1)
Mode: LTE 5, 5MHz, 16QAM

Test Equipment:
Substitution: Dipole antenna AT0016, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low									
826.50	24.92	V	5.1	0.7	-1.45	18.35	38.5	-20.1	
826.50	14.77	H	5.1	0.7	-1.45	8.20	38.5	-30.3	
Mid Ch									
836.50	26.07	V	5.2	0.7	-1.45	19.45	38.5	-19.0	
836.50	15.51	H	5.2	0.7	-1.45	8.89	38.5	-29.6	
High Ch									
846.50	25.58	V	5.2	0.7	-1.45	18.95	38.5	-19.5	
846.50	15.80	H	5.2	0.7	-1.45	9.17	38.5	-29.3	

Rev. 11.02.2015
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

LTE B5 5MHz 16QAM

Fundamental Substitution Measurement (Fc < 1GHz)
UL LLC, Chamber N

Company: SOMC
Project #: 16J23633
Date: 08/09/2016
Test Engineer: Mark Nolting
Configuration: Standalone (LTE Sample #1)
Mode: LTE 5, 10MHz, QPSK

Test Equipment:
Substitution: Dipole antenna AT0016, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low									
829.00	25.76	V	5.1	0.7	-1.45	19.18	38.5	-19.3	
829.00	15.70	H	5.1	0.7	-1.45	9.12	38.5	-29.3	
Mid Ch									
836.50	27.00	V	5.2	0.7	-1.45	20.38	38.5	-18.1	
836.50	16.24	H	5.2	0.7	-1.45	9.62	38.5	-28.8	
High Ch									
844.00	26.42	V	5.2	0.7	-1.45	19.79	38.5	-18.7	
844.00	16.37	H	5.2	0.7	-1.45	9.74	38.5	-28.7	

Rev. 11.02.2015
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

LTE B5 10MHz QPSK

Fundamental Substitution Measurement (Fc < 1GHz)
UL LLC, Chamber N

Company: SOMC
Project #: 16J23633
Date: 08/09/2016
Test Engineer: Mark Nolting
Configuration: Standalone (LTE Sample #1)
Mode: LTE 5, 10MHz, 16QAM

Test Equipment:
Substitution: Dipole antenna AT0016, cable CBL055, and signal-source T374

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low									
829.00	24.87	V	5.1	0.7	-1.45	18.29	38.5	-20.2	
829.00	14.93	H	5.1	0.7	-1.45	8.35	38.5	-30.1	
Mid Ch									
836.50	26.29	V	5.2	0.7	-1.45	19.67	38.5	-18.8	
836.50	15.49	H	5.2	0.7	-1.45	8.87	38.5	-29.6	
High Ch									
844.00	25.66	V	5.2	0.7	-1.45	19.03	38.5	-19.4	
844.00	15.54	H	5.2	0.7	-1.45	8.91	38.5	-29.5	

Rev. 11.02.2015
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

LTE B5 10MHz 16QAM

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.

LTE Band 7

BW (MHz)	Mode	RB/RB Size	f(MHz)	EIRP	
				dBm	mW
5	QPSK	1/0	2502.5	24.84	304.85
		1/0	2535	21.91	155.30
		1/0	2567.5	16.69	46.71
	16QAM	1/0	2502.5	24.81	302.75
		1/0	2535	21.51	141.63
		1/0	2567.5	16.43	43.99
10	QPSK	1/0	2505	20.48	111.74
		1/0	2535	20.86	121.94
		1/0	2565	16.52	44.83
	16QAM	1/0	2505	20.42	110.21
		1/0	2535	20.81	120.55
		1/0	2565	16.46	44.21
15	QPSK	1/0	2507.5	22.32	170.70
		1/0	2535	20.42	110.19
		1/0	2562.5	17.28	53.42
	16QAM	1/0	2507.5	22.30	169.92
		1/0	2535	20.30	107.19
		1/0	2562.5	17.17	52.08
20	QPSK	1/0	2510	22.00	158.59
		1/0	2535	20.56	113.80
		1/0	2560	18.44	69.78
	16QAM	1/0	2510	21.97	157.50
		1/0	2535	20.54	113.28
		1/0	2560	18.39	68.99

UL LLC.
12 LABORATORY DR. RESEARCH TRIANGLE PARK, NC 27709 USA TEL: (919) 549-1400
This report shall not be reproduced except in full, without the written approval of UL LLC.