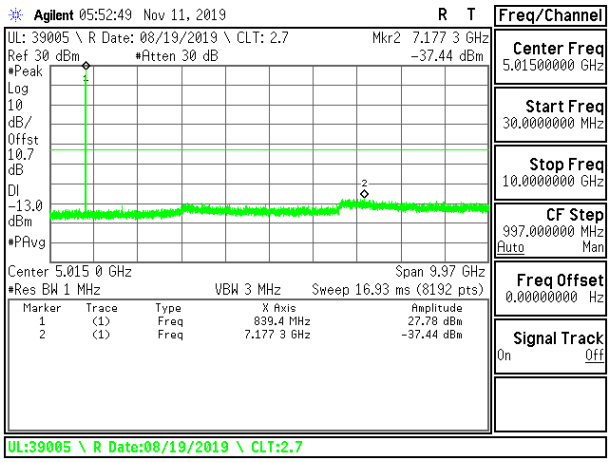
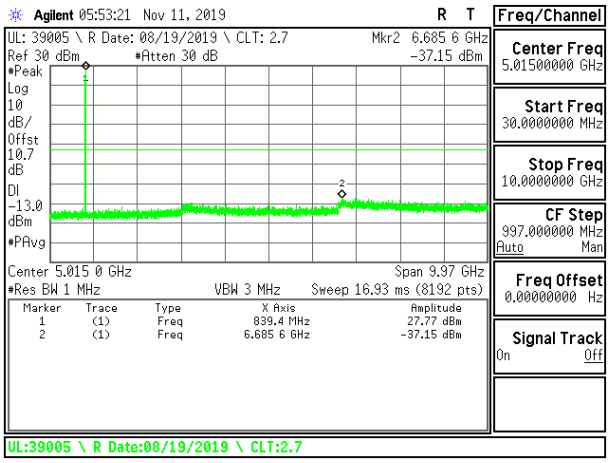


LTE B5 10MHz QPSK High Channel RB1-0



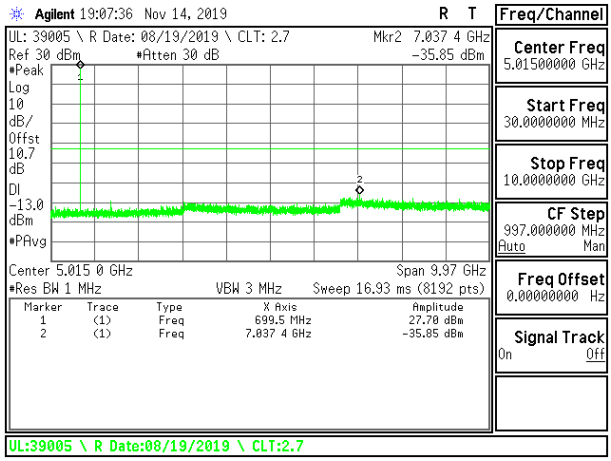
LTE B5 10MHz 16QAM High Channel RB1-0

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

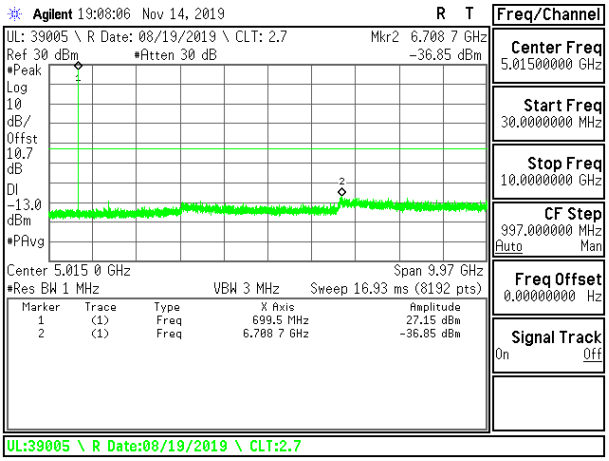
8.3.8. LTE BAND 12

LIMITS

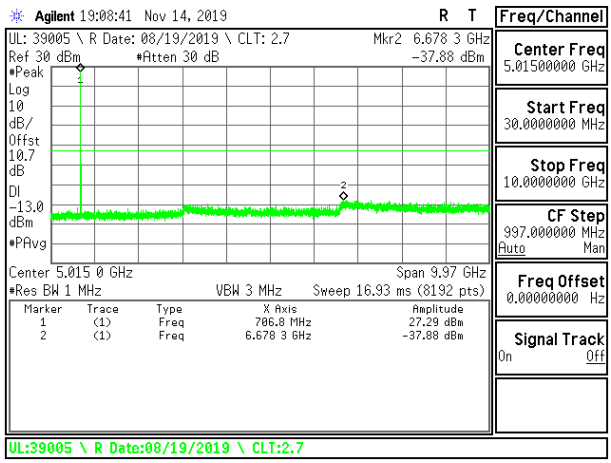
FCC: §27.53 (g)
The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.



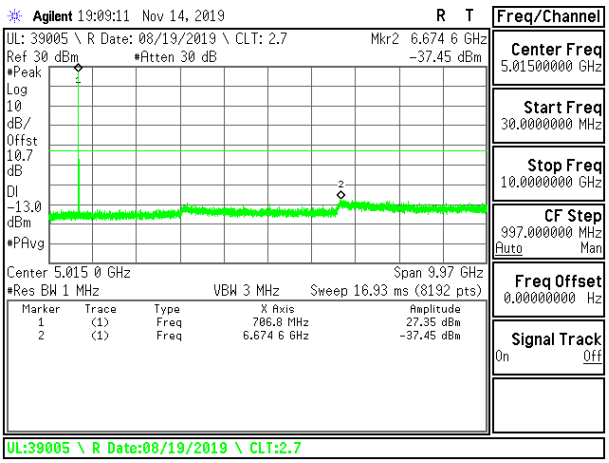
LTE B12 1.4MHz QPSK Low Channel RB1-0



LTE B12 1.4MHz 16QAM Low Channel RB1-0

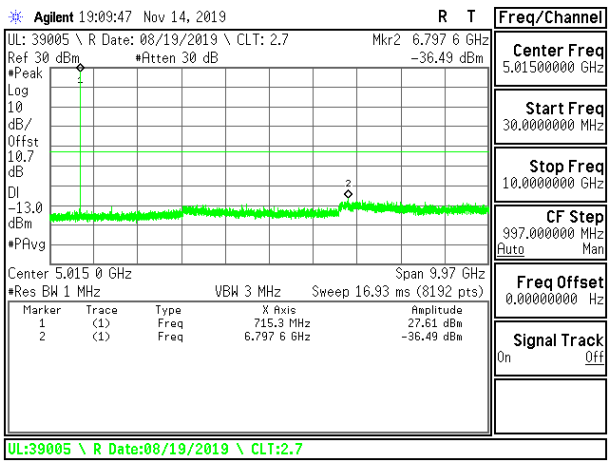


LTE B12 1.4MHz QPSK Middle Channel RB1-0

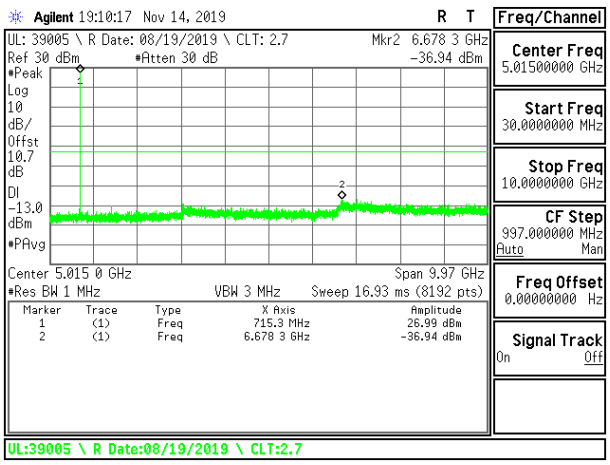


LTE B12 1.4MHz 16QAM Middle Channel RB1-0

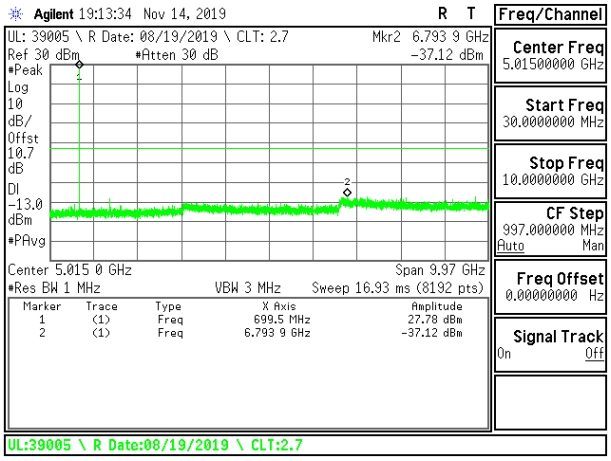
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



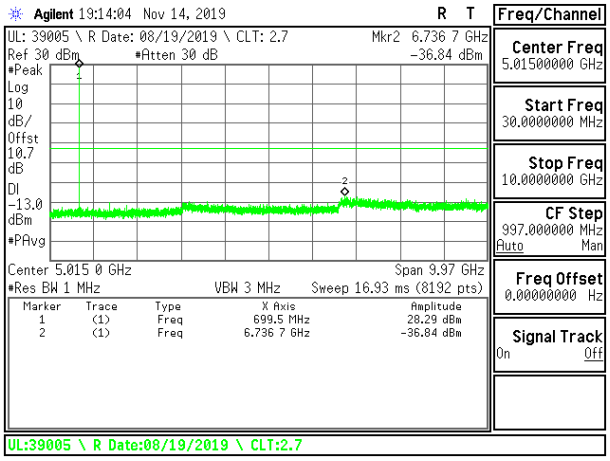
LTE B12 1.4MHz QPSK High Channel RB1-0



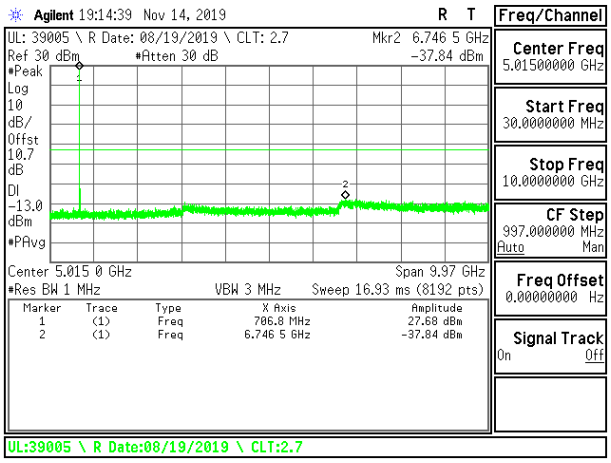
LTE B12 1.4MHz 16QAM High Channel RB1-0



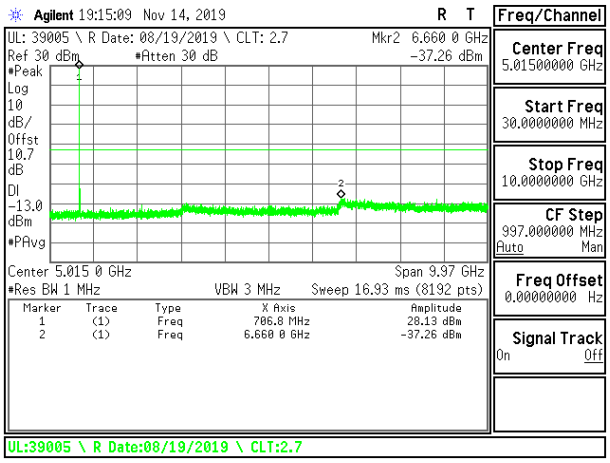
LTE B12 3MHz QPSK Low Channel RB1-0



LTE B12 3MHz 16QAM Low Channel RB1-0

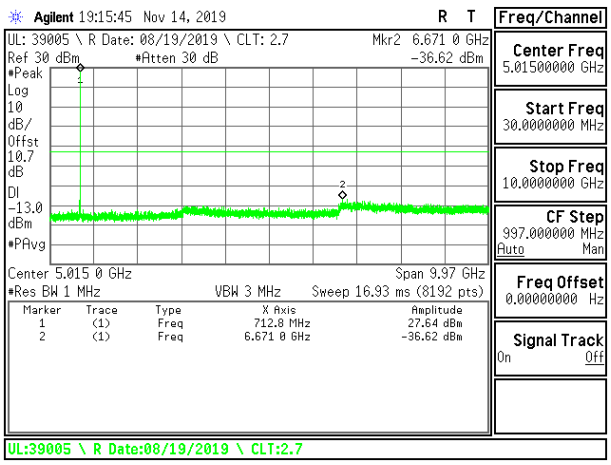


LTE B12 3MHz QPSK Middle Channel RB1-0

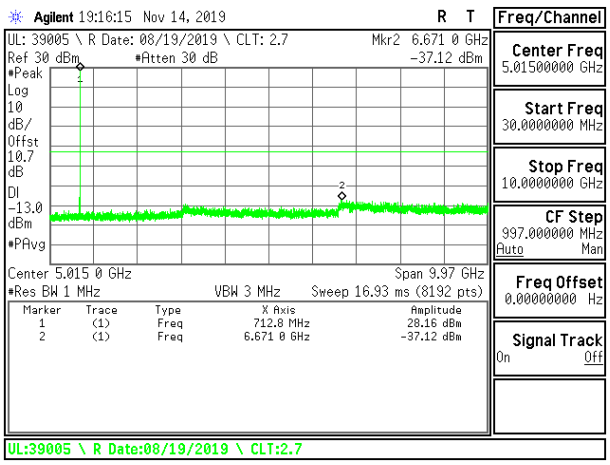


LTE B12 3MHz 16QAM Middle Channel RB1-0

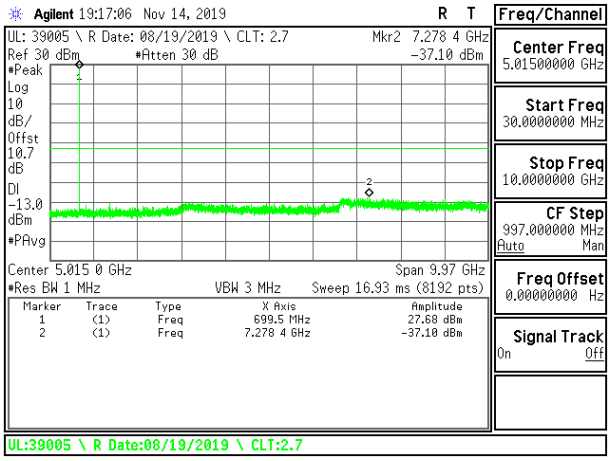
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



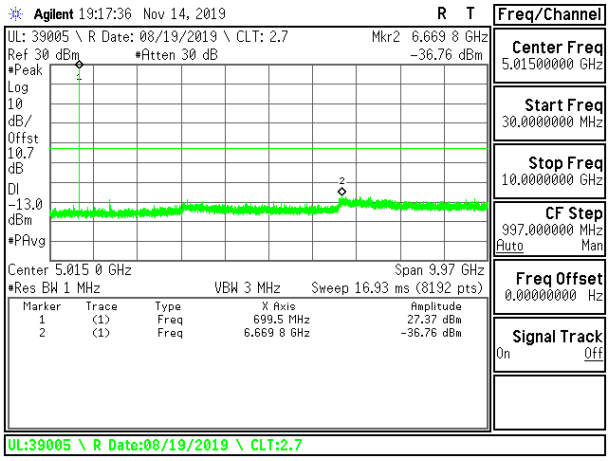
LTE B12 3MHz QPSK High Channel RB1-0



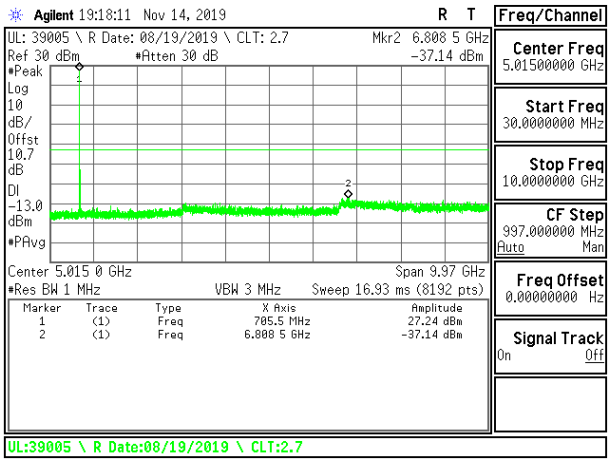
LTE B12 3MHz 16QAM High Channel RB1-0



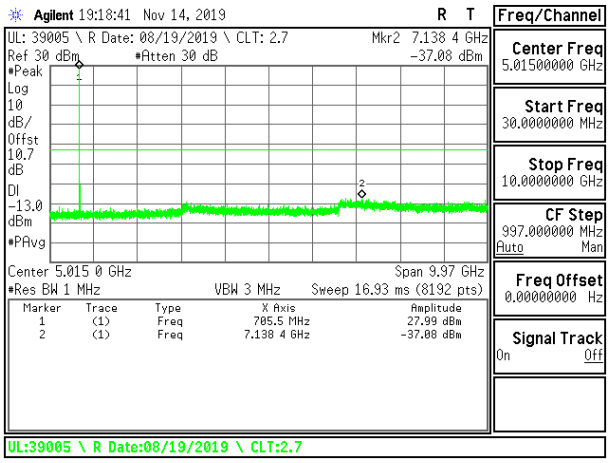
LTE B12 5MHz QPSK Low Channel RB1-0



LTE B12 5MHz 16QAM Low Channel RB1-0

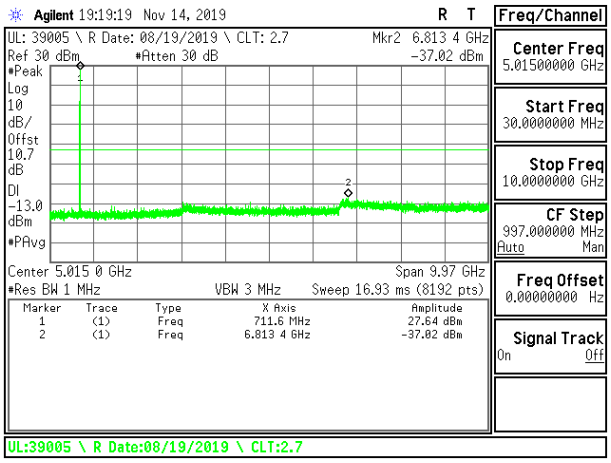


LTE B12 5MHz QPSK Middle Channel RB1-0

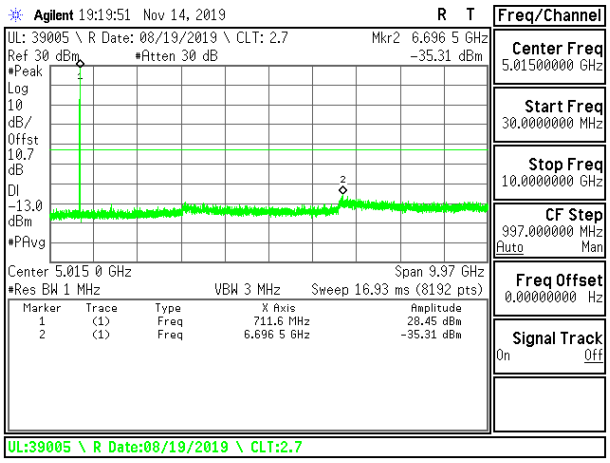


LTE B12 5MHz 16QAM Middle Channel RB1-0

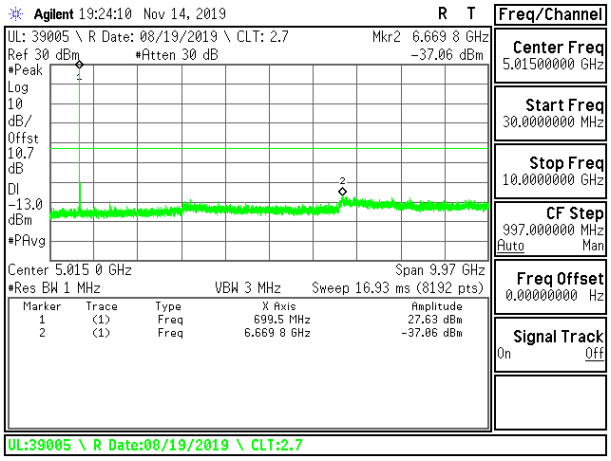
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



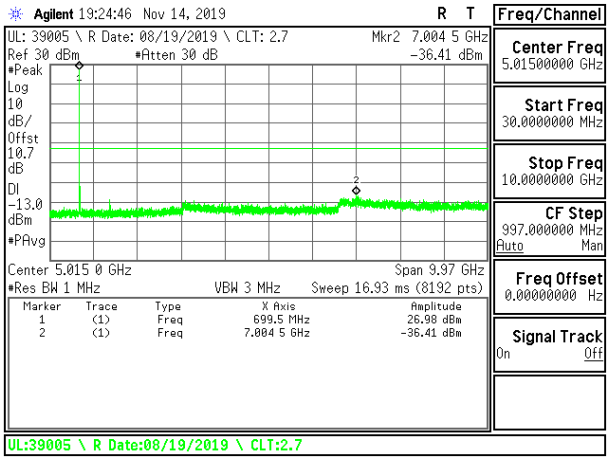
LTE B12 5MHz QPSK High Channel RB1-0



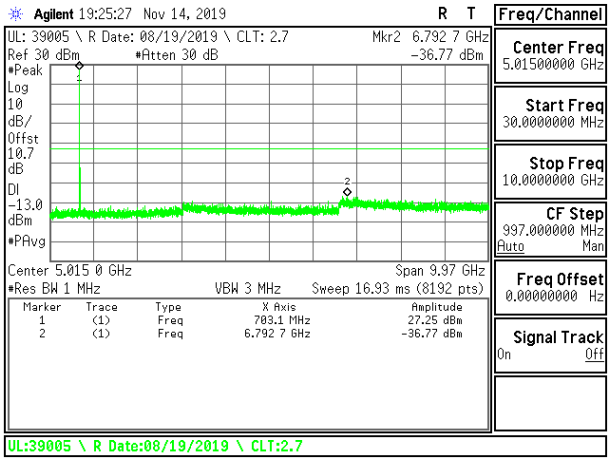
LTE B12 5MHz 16QAM High Channel RB1-0



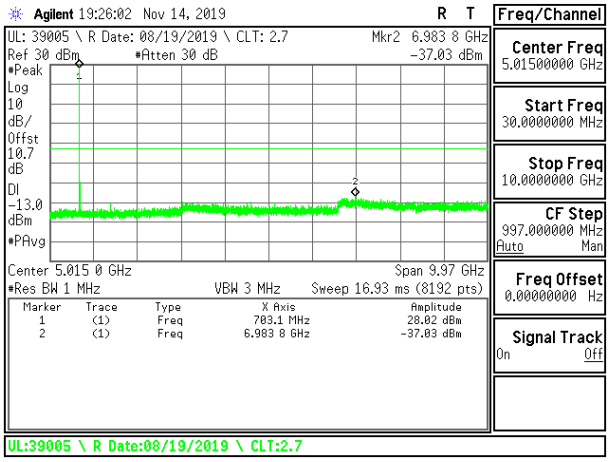
LTE B12 10MHz QPSK Low Channel RB1-0



LTE B12 10MHz 16QAM Low Channel RB1-0

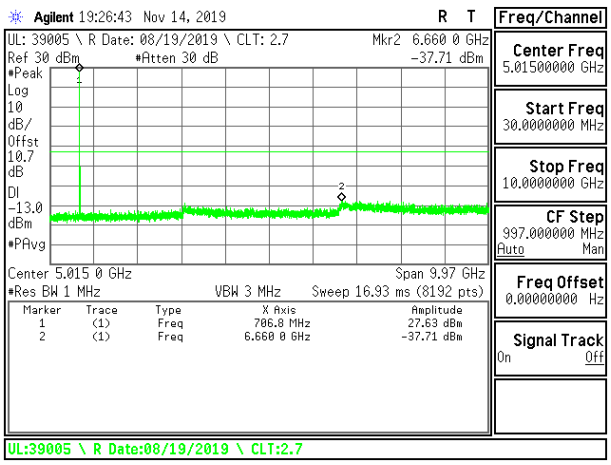


LTE B12 10MHz QPSK Middle Channel RB1-0

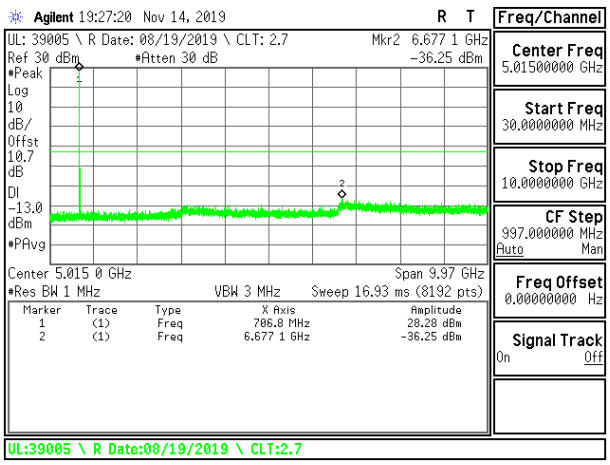


LTE B12 10MHz 16QAM Middle Channel RB1-0

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



LTE B12 10MHz QPSK High Channel RB1-0



LTE B12 10MHz 16QAM High Channel RB1-0

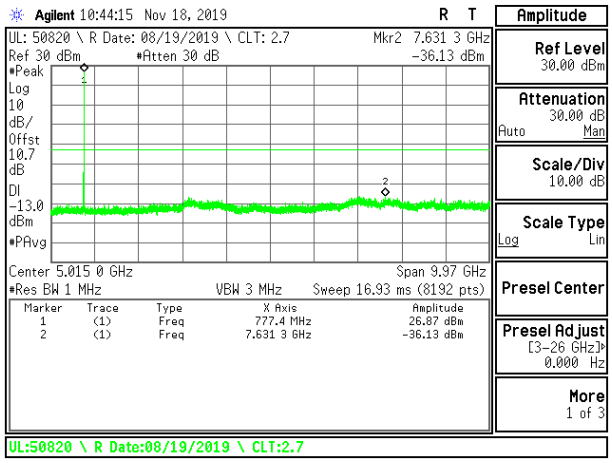
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8.3.9. LTE BAND 13

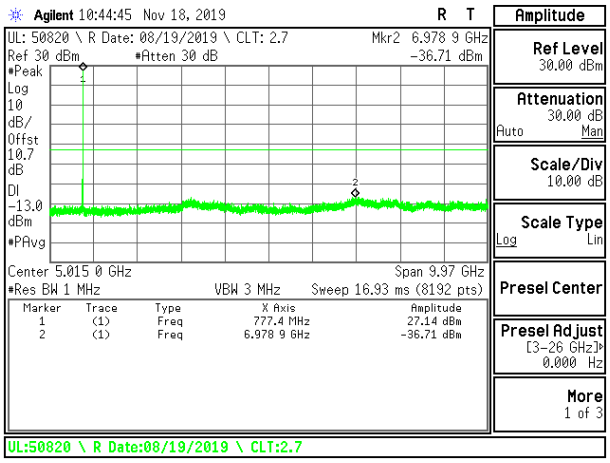
LIMITS

FCC: §27.53 (c), (f)
The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts. The band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.

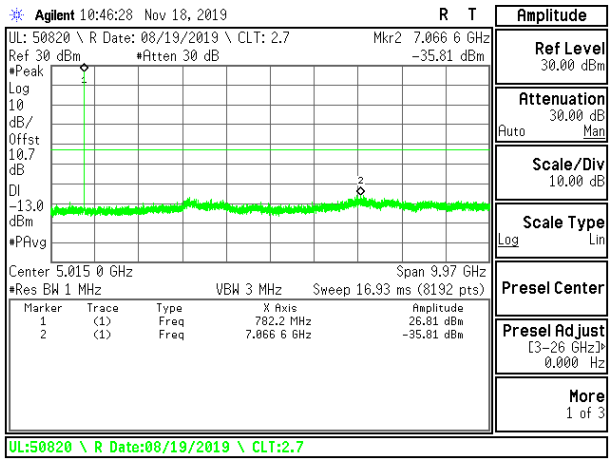
Note: Radiated data in section 9.2.9 confirms a compliance for the emissions in GPS 1559-1610 MHz band were wideband emissions therefore the -40dBm/MHz limit was used.



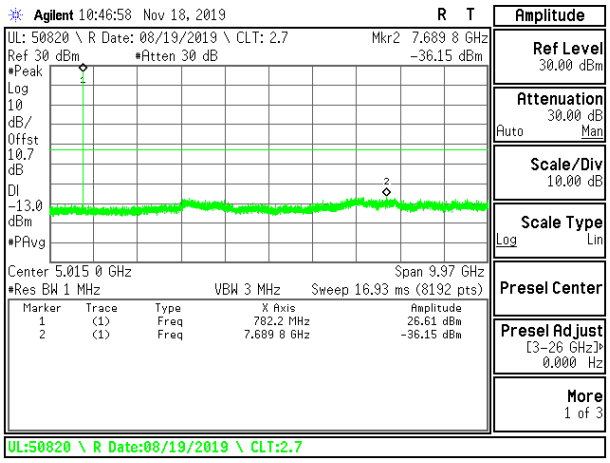
LTE B13 5MHz QPSK Low Channel RB1-0



LTE B13 5MHz 16QAM Low Channel RB1-0

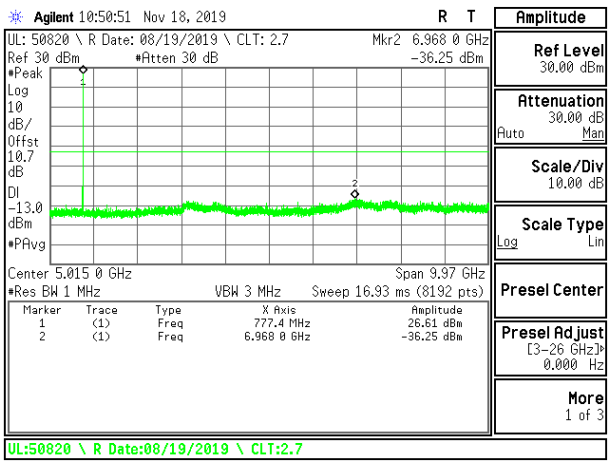


LTE B13 5MHz QPSK High Channel RB1-0

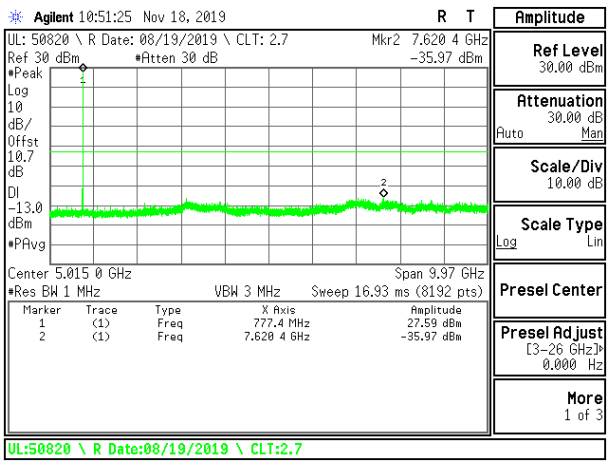


LTE B13 5MHz 16QAM High Channel RB1-0

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



LTE B13 10MHz QPSK Middle Channel RB1-0



LTE B13 10MHz 16QAM Middle Channel RB1-0

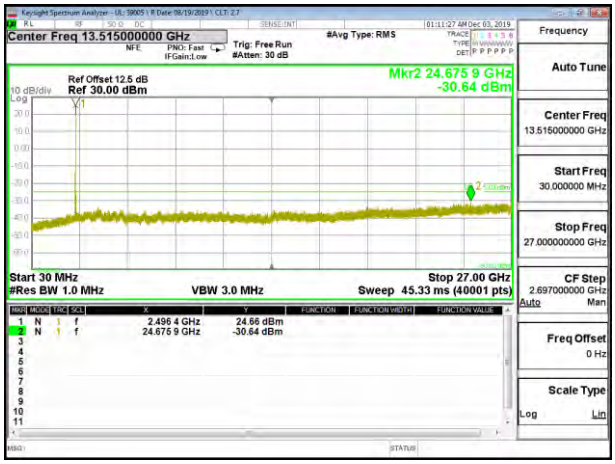
Note: Radiated data in section 9.2.9 confirms a compliance with narrowband limits for GPS1559-1610 MHz band.

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

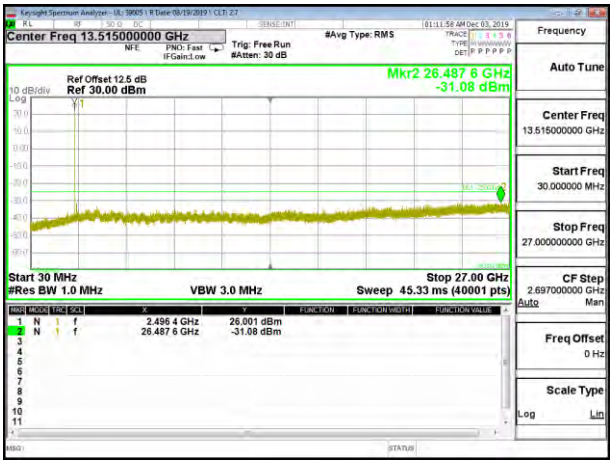
8.3.10. LTE BAND 41 (FCC)

LIMITS

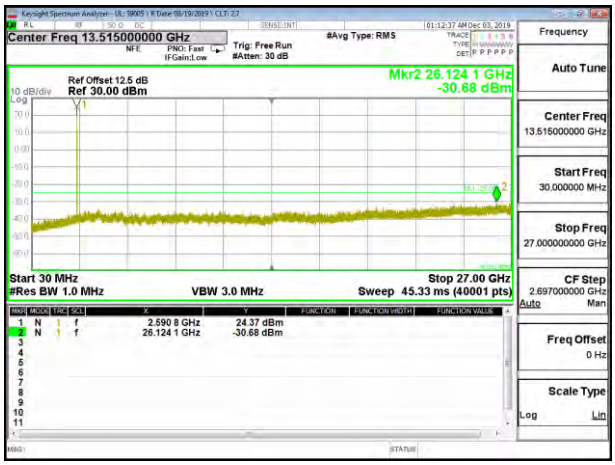
FCC: §27.53 (m)
The minimum permissible attenuation level of any spurious emissions is 55 + 10 log (P) dB where transmitting power (P) in Watts.



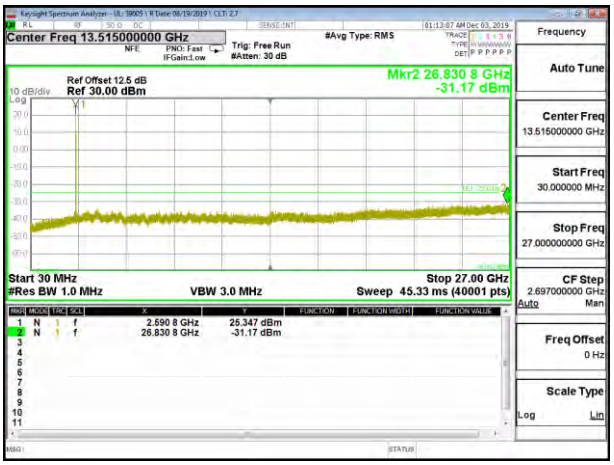
LTE B41 5MHz QPSK Low Channel RB1-0



LTE B41 5MHz 16QAM Low Channel RB1-0

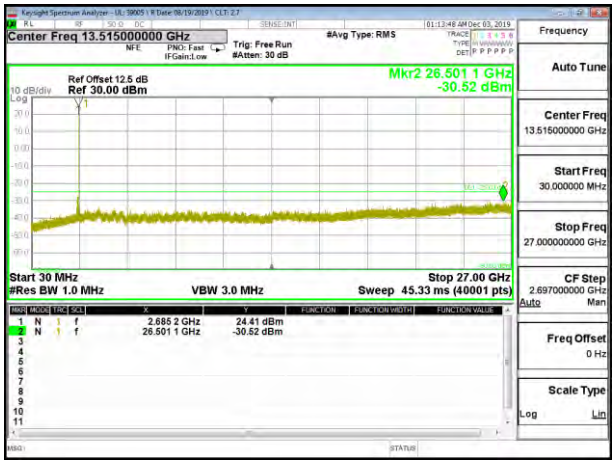


LTE B41 5MHz QPSK Middle Channel RB1-0

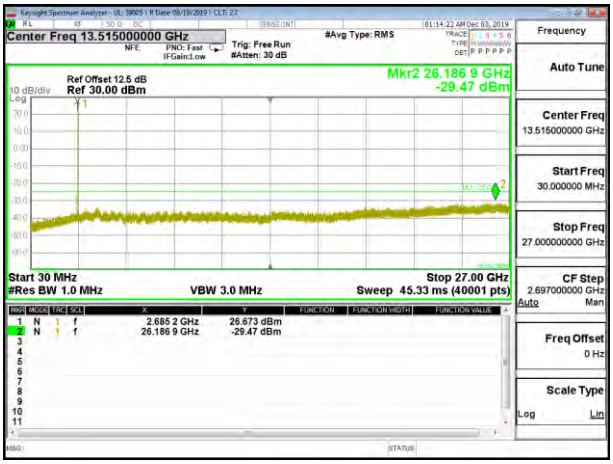


LTE B41 5MHz 16QAM Middle Channel RB1-0

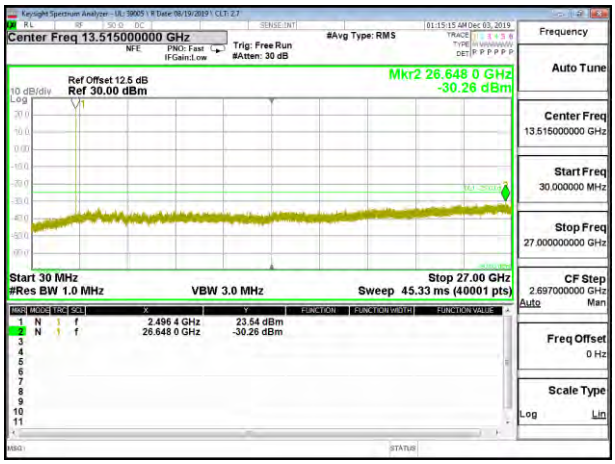
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



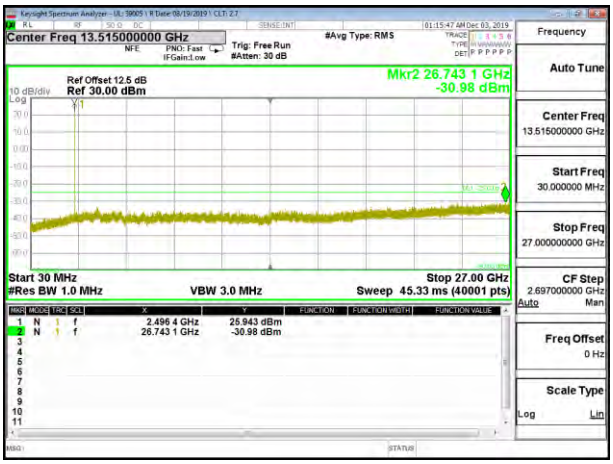
LTE B41 5MHz QPSK High Channel RB1-0



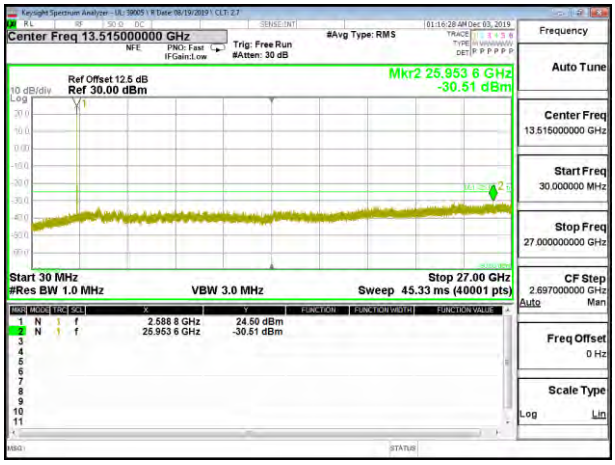
LTE B41 5MHz 16QAM High Channel RB1-0



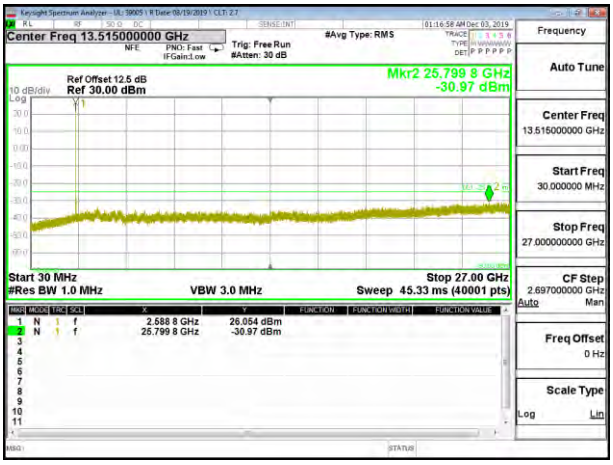
LTE B41 10MHz QPSK Low Channel RB1-0



LTE B41 10MHz 16QAM Low Channel RB1-0

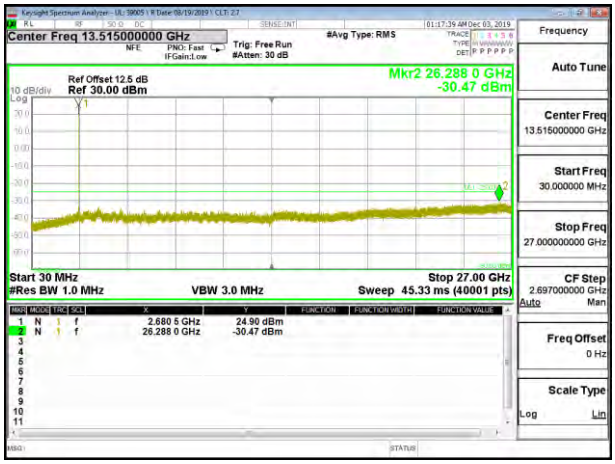


LTE B41 10MHz QPSK Middle Channel RB1-0

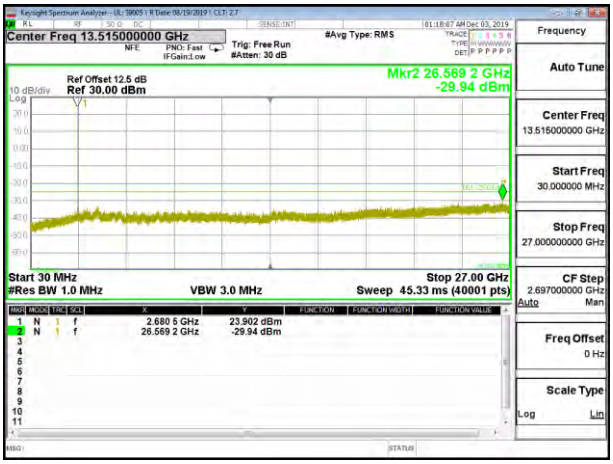


LTE B41 10MHz 16QAM Middle Channel RB1-0

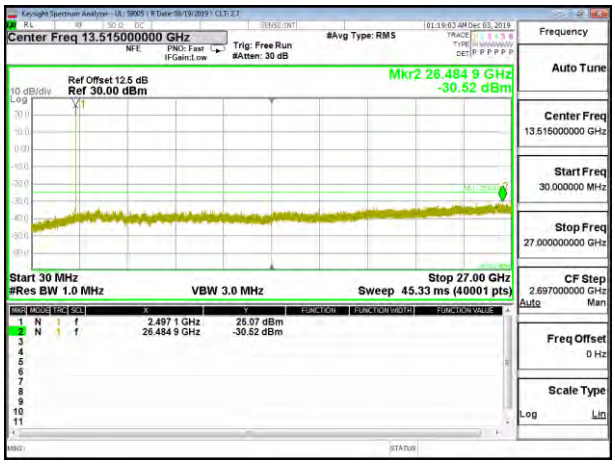
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



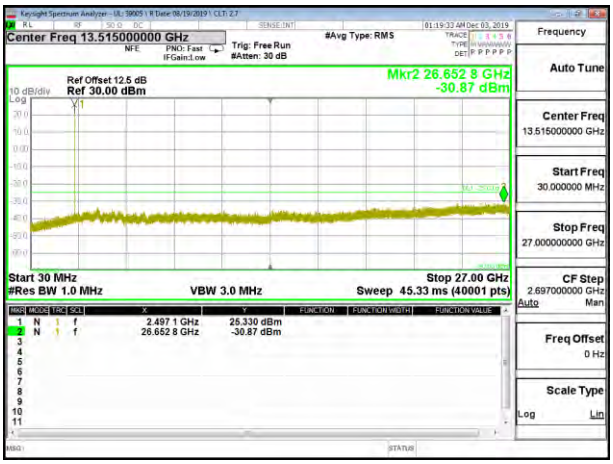
LTE B41 10MHz QPSK High Channel RB1-0



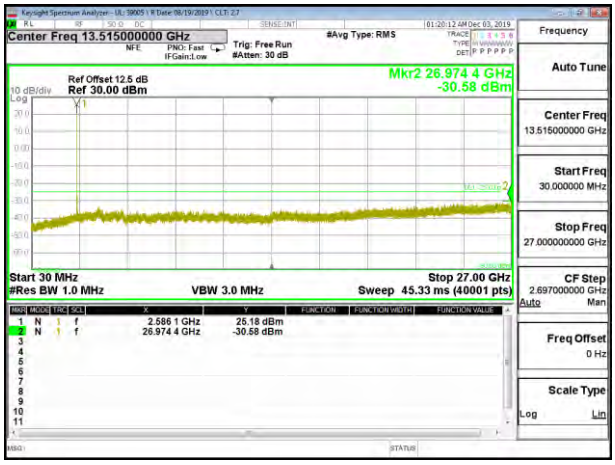
LTE B41 10MHz 16QAM High Channel RB1-0



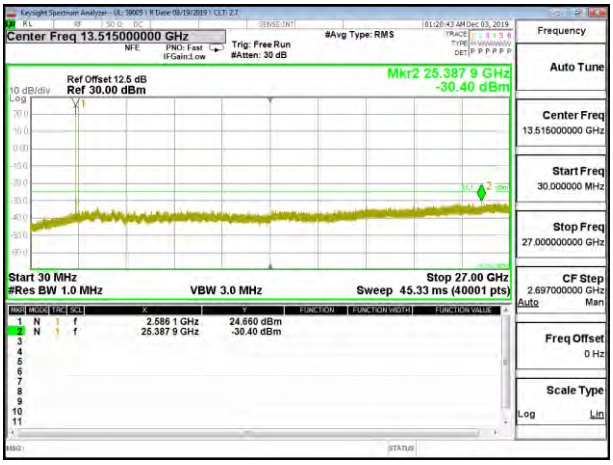
LTE B41 15MHz QPSK Low Channel RB1-0



LTE B41 15MHz 16QAM Low Channel RB1-0

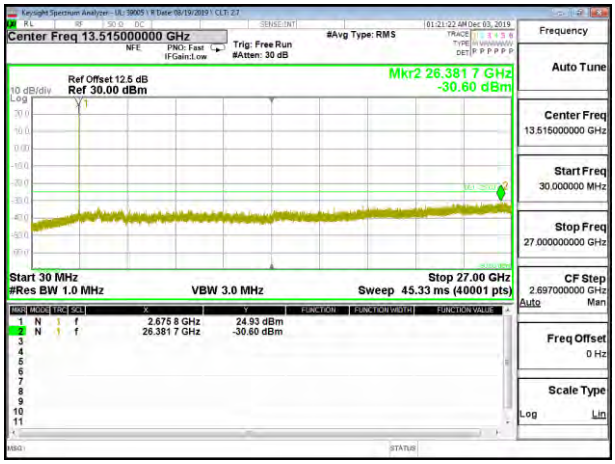


LTE B41 15MHz QPSK Middle Channel RB1-0

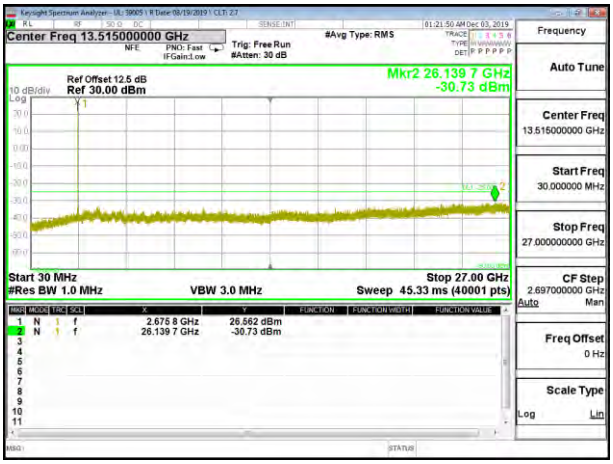


LTE B41 15MHz 16QAM Middle Channel RB1-0

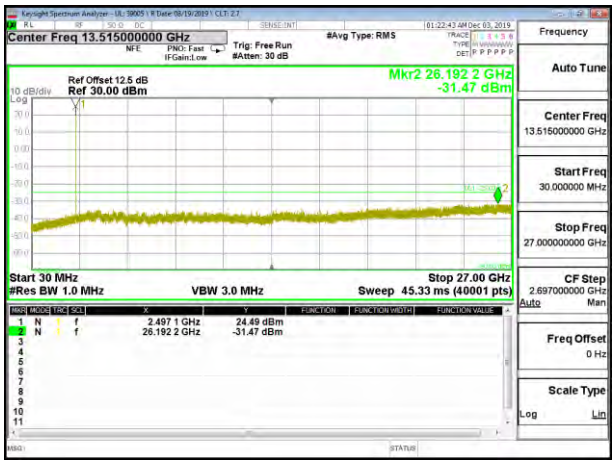
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



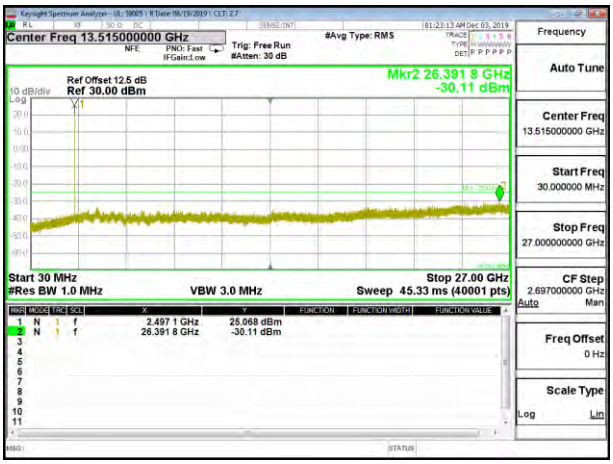
LTE B41 15MHz QPSK High Channel RB1-0



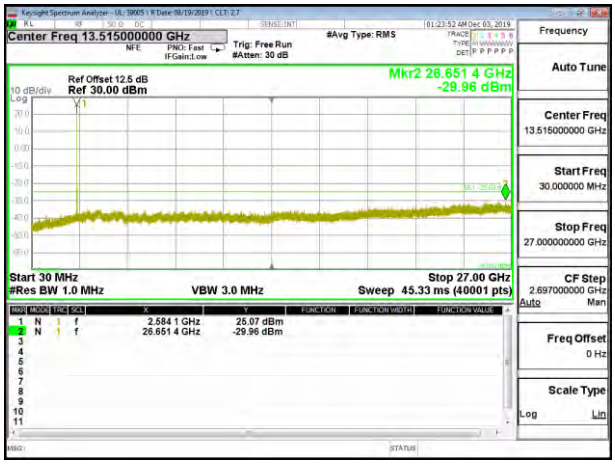
LTE B41 15MHz 16QAM High Channel RB1-0



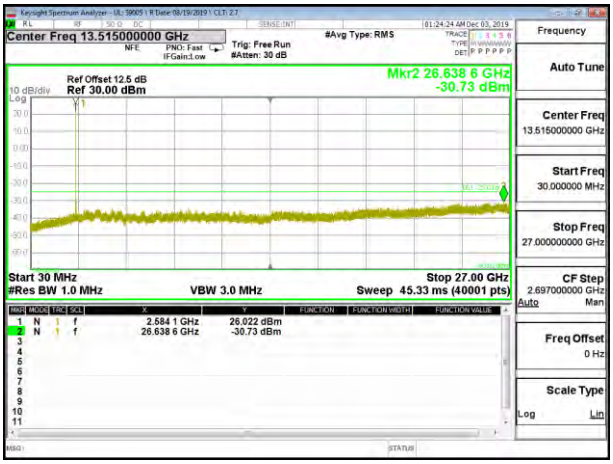
LTE B41 20MHz QPSK Low Channel RB1-0



LTE B41 20MHz 16QAM Low Channel RB1-0

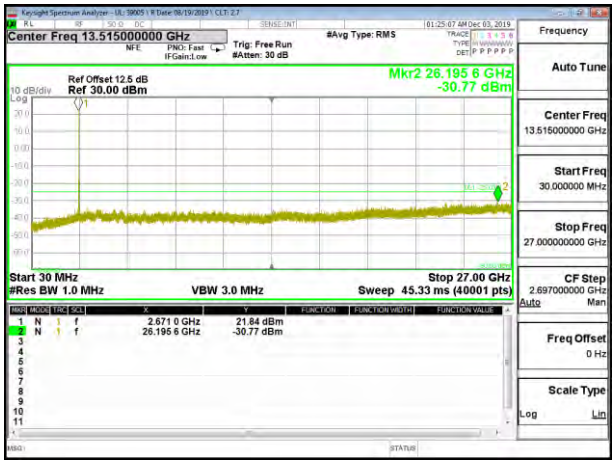


LTE B41 20MHz QPSK Middle Channel RB1-0

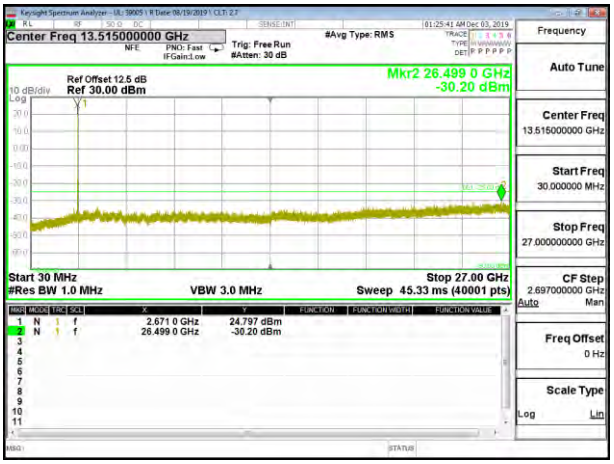


LTE B41 20MHz 16QAM Middle Channel RB1-0

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



LTE B41 20MHz QPSK High Channel RB1-0



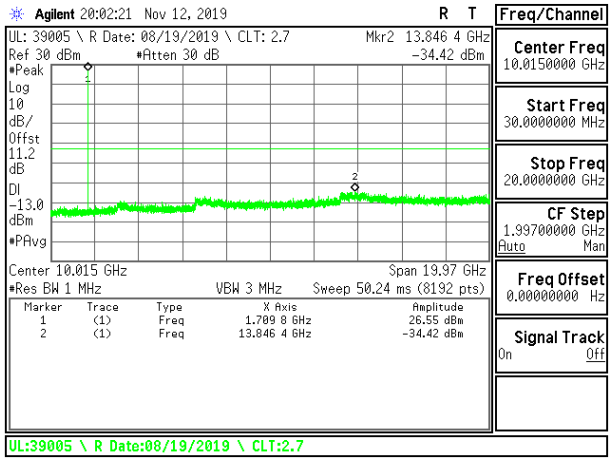
LTE B41 20MHz 16QAM High Channel RB1-0

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

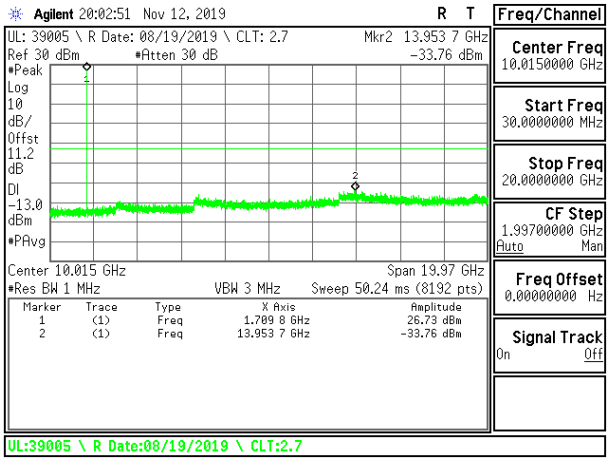
8.3.11. LTE BAND 66

LIMITS

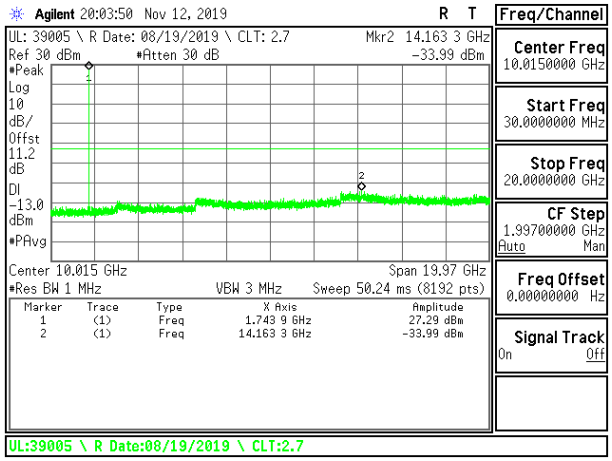
FCC: §27.53 (h)
The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.



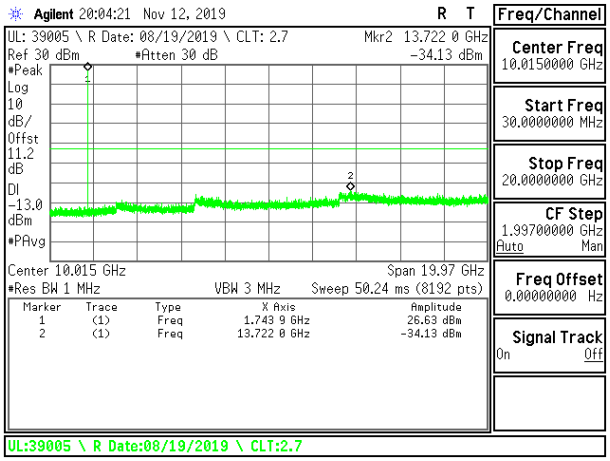
LTE B66 1.4MHz QPSK Low Channel RB1-0



LTE B66 1.4MHz 16QAM Low Channel RB1-0

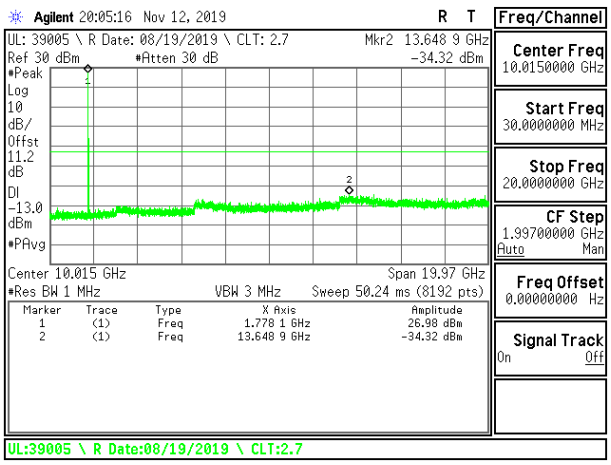


LTE B66 1.4MHz QPSK Middle Channel RB1-0

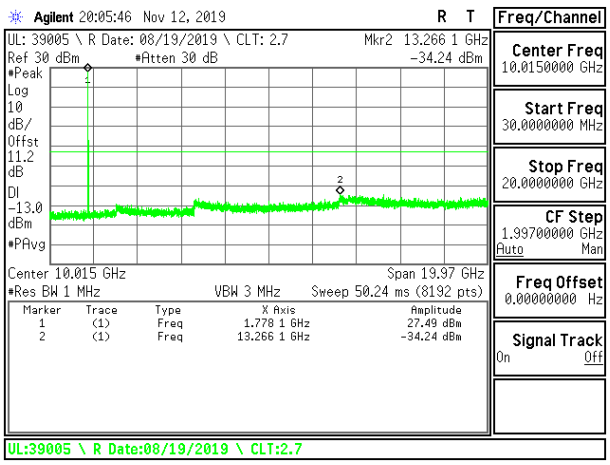


LTE B66 1.4MHz 16QAM Middle Channel RB1-0

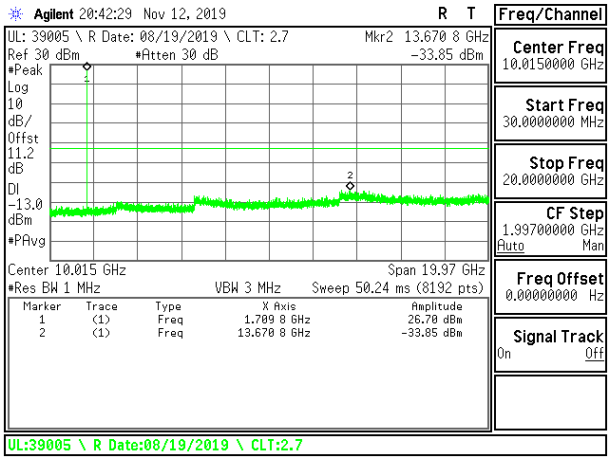
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



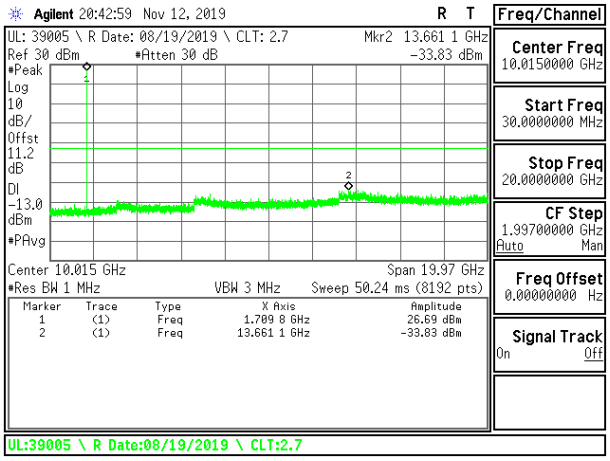
LTE B66 1.4MHz QPSK High Channel RB1-0



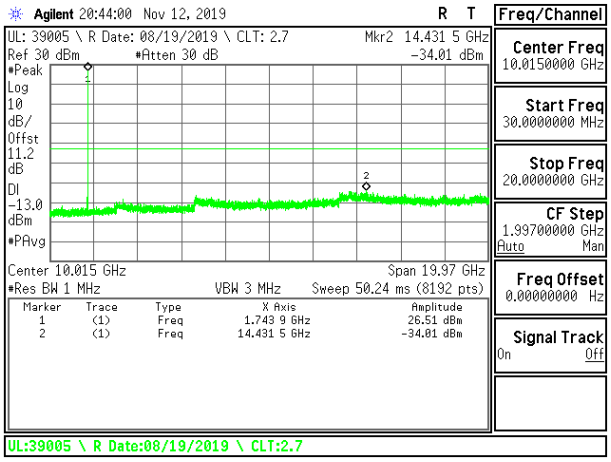
LTE B66 1.4MHz 16QAM High Channel RB1-0



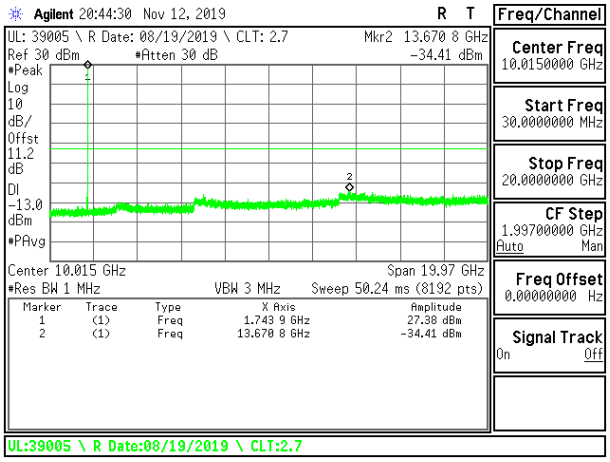
LTE B66 3MHz QPSK Low Channel RB1-0



LTE B66 3MHz 16QAM Low Channel RB1-0

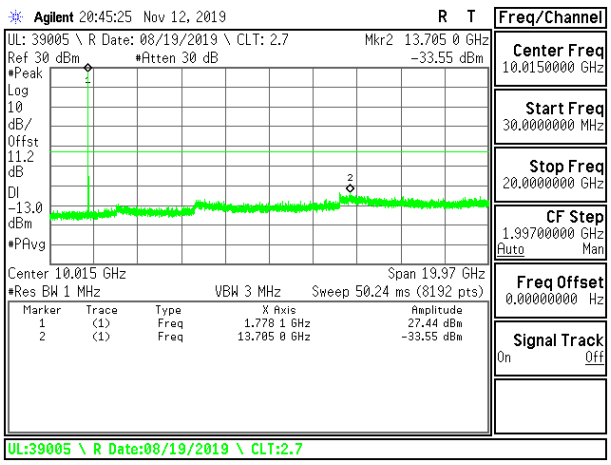


LTE B66 3MHz QPSK Middle Channel RB1-0

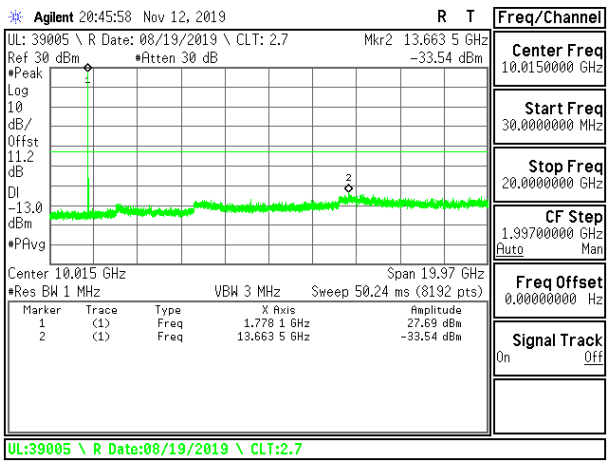


LTE B66 3MHz 16QAM Middle Channel RB1-0

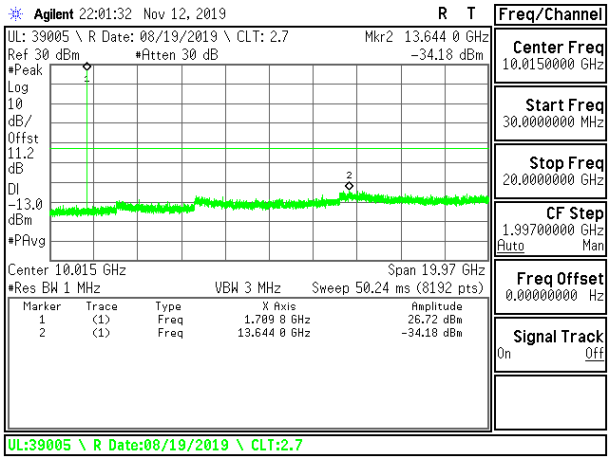
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



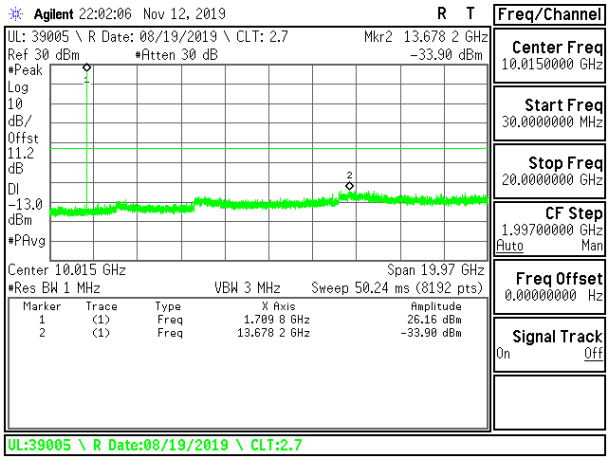
LTE B66 3MHz QPSK High Channel RB1-0



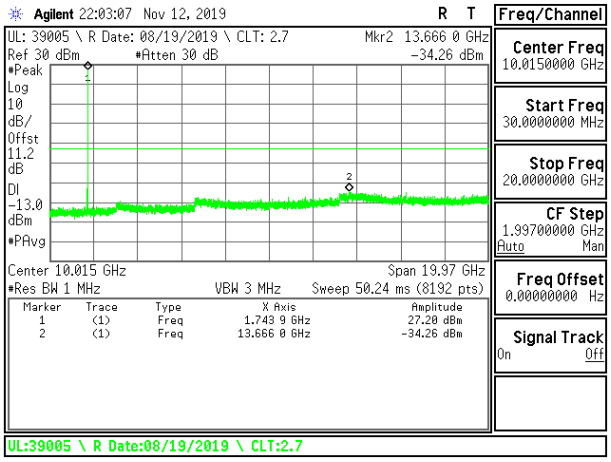
LTE B66 3MHz 16QAM High Channel RB1-0



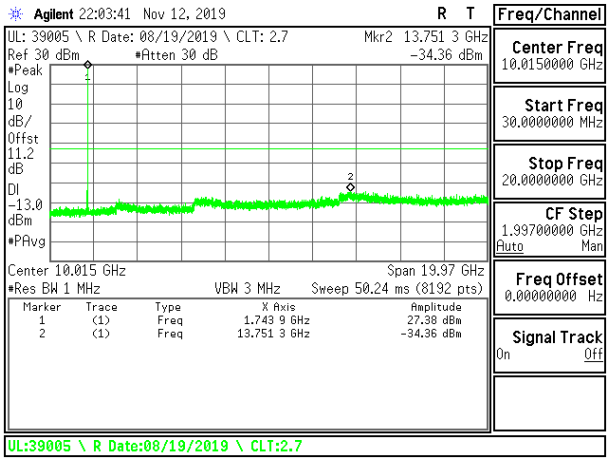
LTE B66 5MHz QPSK Low Channel RB1-0



LTE B66 5MHz 16QAM Low Channel RB1-0

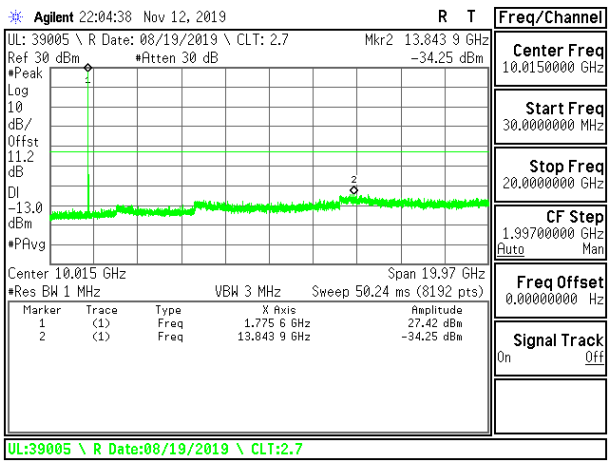


LTE B66 5MHz QPSK Middle Channel RB1-0

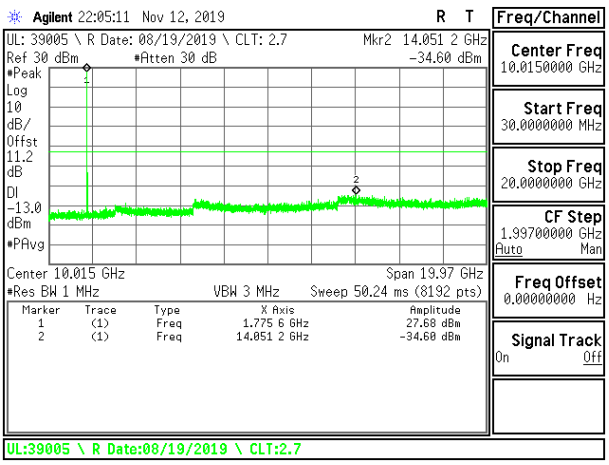


LTE B66 5MHz 16QAM Middle Channel RB1-0

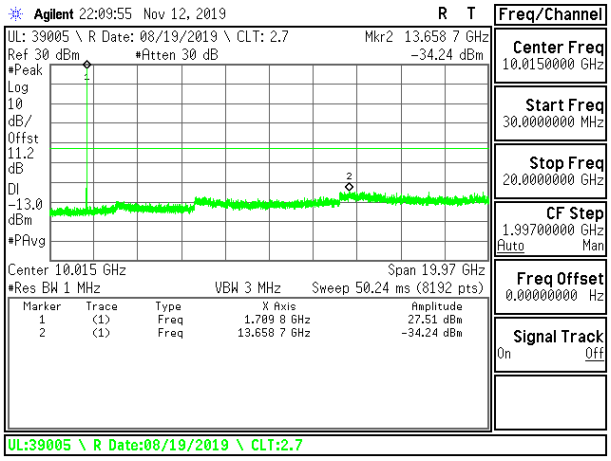
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



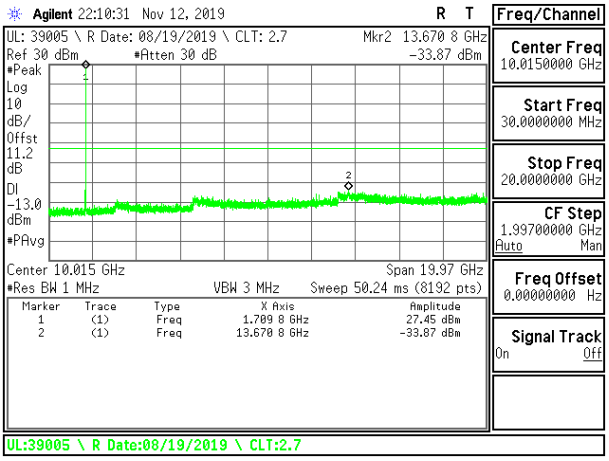
LTE B66 5MHz QPSK High Channel RB1-0



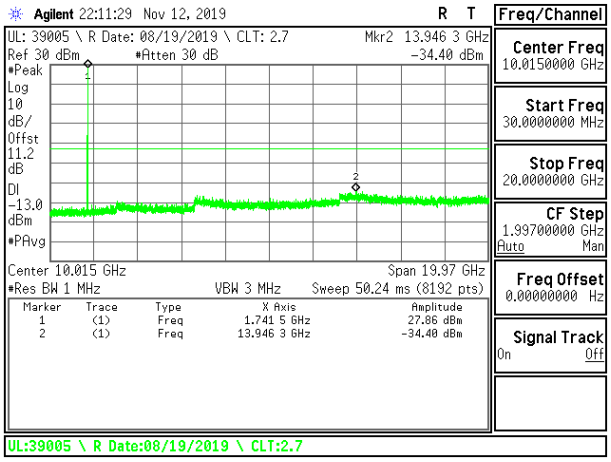
LTE B66 5MHz 16QAM High Channel RB1-0



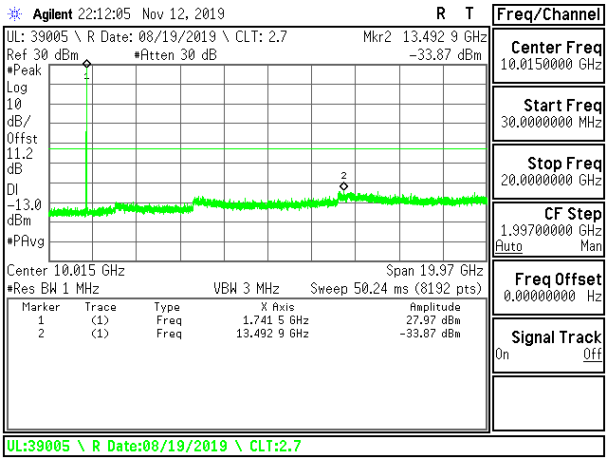
LTE B66 10MHz QPSK Low Channel RB1-0



LTE B66 10MHz 16QAM Low Channel RB1-0

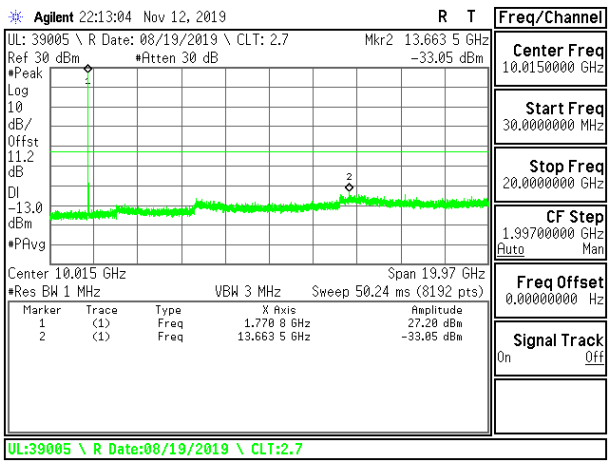


LTE B66 10MHz QPSK Middle Channel RB1-0

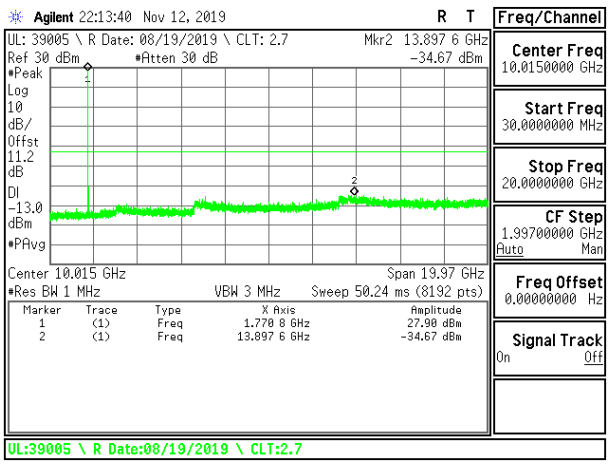


LTE B66 10MHz 16QAM Middle Channel RB1-0

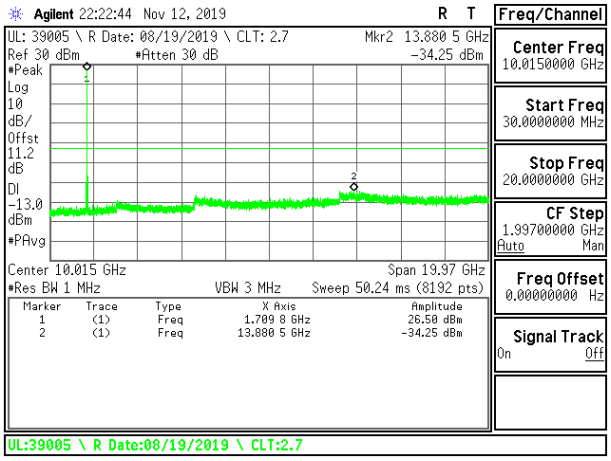
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



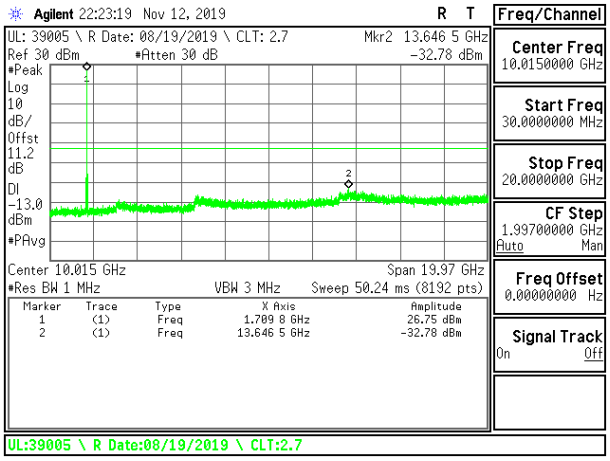
LTE B66 10MHz QPSK High Channel RB1-0



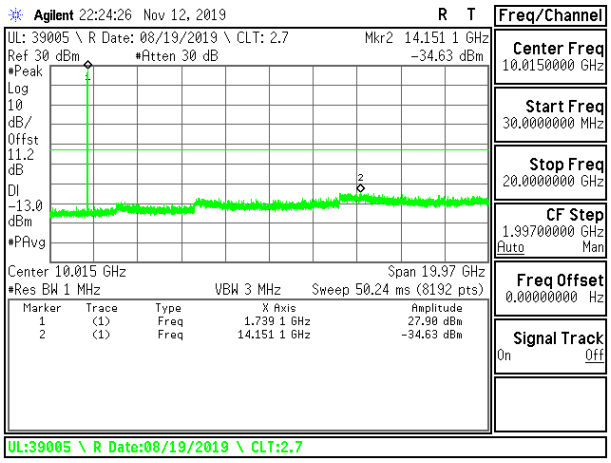
LTE B66 10MHz 16QAM High Channel RB1-0



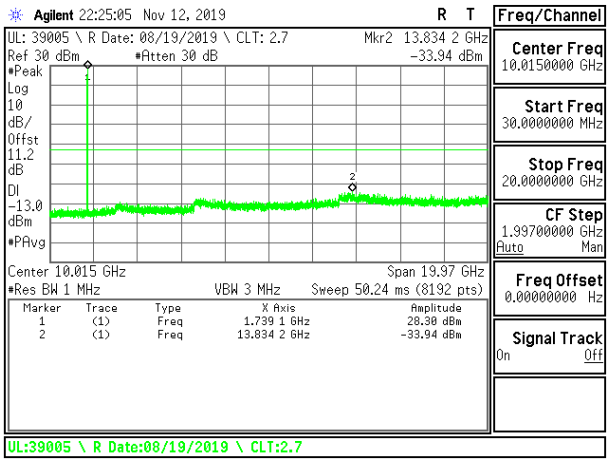
LTE B66 15MHz QPSK Low Channel RB1-0



LTE B66 15MHz 16QAM Low Channel RB1-0

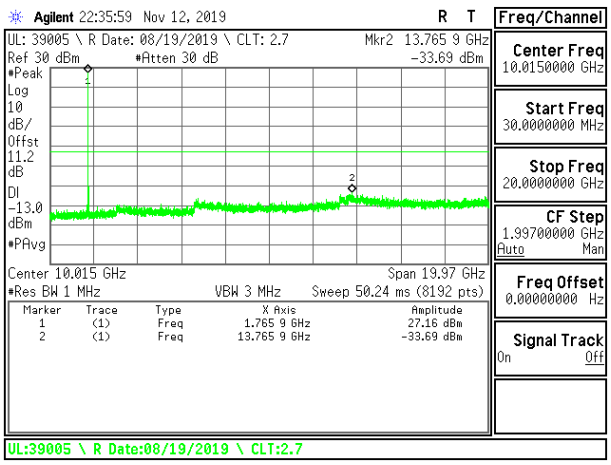


LTE B66 15MHz QPSK Middle Channel RB1-0

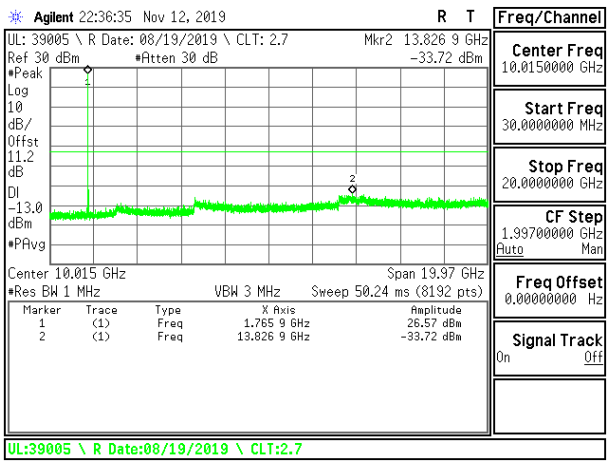


LTE B66 15MHz 16QAM Middle Channel RB1-0

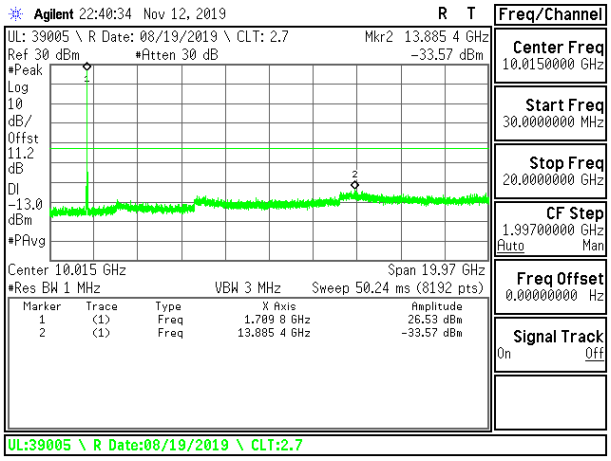
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



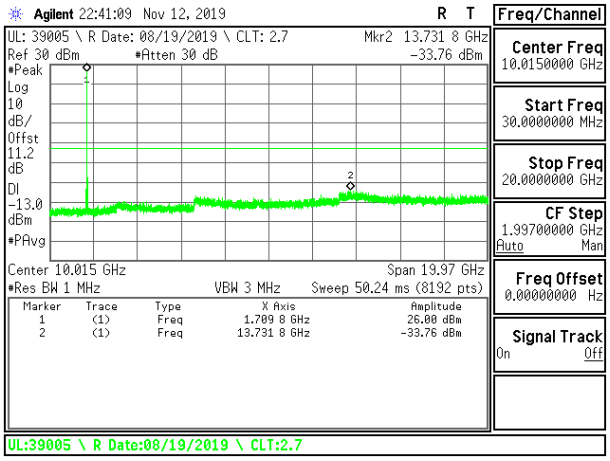
LTE B66 15MHz QPSK High Channel RB1-0



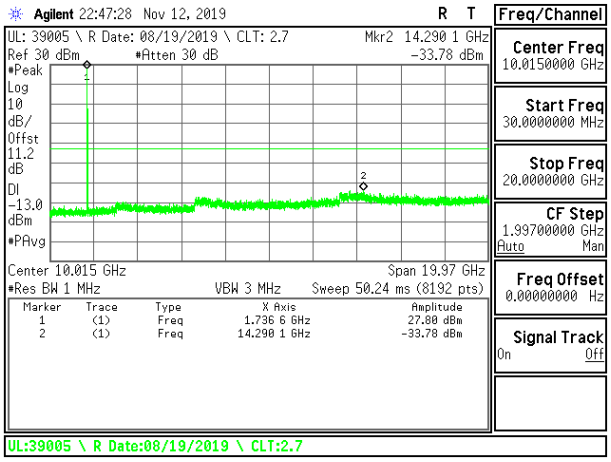
LTE B66 15MHz 16QAM High Channel RB1-0



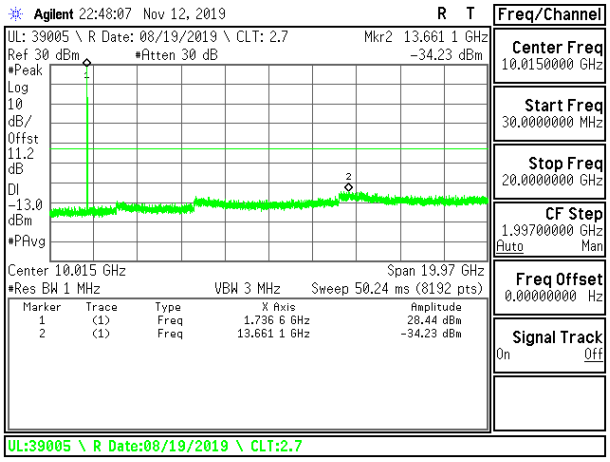
LTE B66 20MHz QPSK Low Channel RB1-0



LTE B66 20MHz 16QAM Low Channel RB1-0

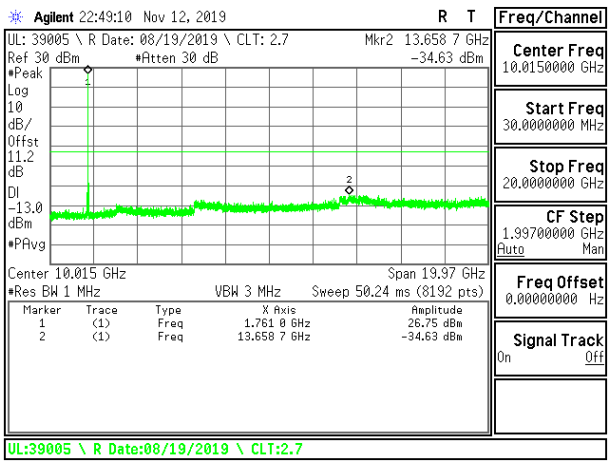


LTE B66 20MHz QPSK Middle Channel RB1-0

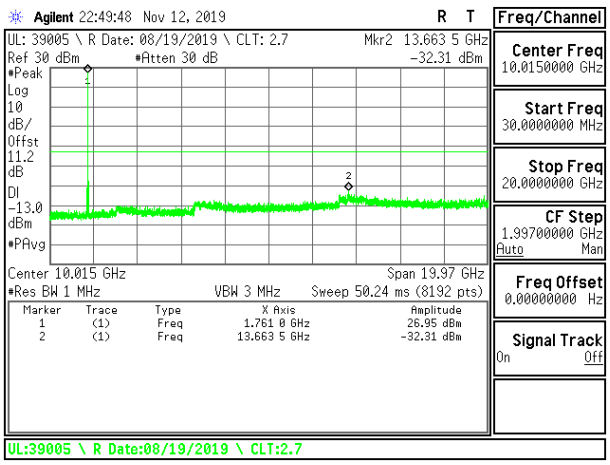


LTE B66 20MHz 16QAM Middle Channel RB1-0

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



LTE B66 20MHz QPSK High Channel RB1-0



LTE B66 20MHz 16QAM High Channel RB1-0

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8.4. FREQUENCY STABILITY

RULE PART(S)

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

LIMITS

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

FCC §24.235 & §27.54
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

TEST PROCEDURE

Use CMW 500 with Frequency Error measurement capability.

- Temp. = −30°C to +50°C
- Voltage = (85% - 115%)

  Low voltage, 3.3VDC, Normal, 3.85VDC and High voltage, 4.4VDC.
  End Voltage, 2.8VDC.

Frequency Stability vs Temperature:
The EUT is place inside a temperature chamber. The temperature is set to 20ºC and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until +50ºC is reached.

Frequency Stability vs Voltage:
The peak frequency error is recorded (worst-case).

RESULTS

See the following pages.

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8.4.1. GSM

LIMITS

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

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

FCC: §27.54
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Engineer ID:	39005	Test Date:	12/3/2019

GPRS 850

Limit		824	849	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	824.0235	848.9818		
Extreme (50C)		824.0235	848.9818	18.6	0.02
Extreme (40C)		824.0235	848.9818	19.2	0.02
Extreme (30C)		824.0235	848.9818	19.3	0.02
Extreme (10C)		824.0235	848.9818	18.0	0.02
Extreme (0C)		824.0235	848.9818	20.2	0.02
Extreme (-10C)		824.0235	848.9818	24.0	0.03
Extreme (-20C)		824.0235	848.9818	24.0	0.03
Extreme (-30C)		824.0235	848.9818	21.0	0.03
20C	15%	824.0235	848.9818	22.1	0.03
	-15%	824.0235	848.9818	21.0	0.03
	End Point	824.0235	848.9818	20.0	0.02

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

GPRS 1900

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	1850.0272	1909.9785		
Extreme (50C)		1850.0272	1909.9785	-19.1	-0.01
Extreme (40C)		1850.0272	1909.9785	-17.4	-0.01
Extreme (30C)		1850.0272	1909.9785	-18.6	-0.01
Extreme (10C)		1850.0272	1909.9785	-19.2	-0.01
Extreme (0C)		1850.0272	1909.9785	-17.6	-0.01
Extreme (-10C)		1850.0272	1909.9785	-12.6	-0.01
Extreme (-20C)		1850.0272	1909.9785	-11.4	-0.01
Extreme (-30C)		1850.0272	1909.9785	-15.0	-0.01
20C	15%	1850.0272	1909.9785	-13.2	-0.01
	-15%	1850.0272	1909.9785	-11.5	-0.01
	End Point	1850.0272	1909.9785	-11.4	-0.01

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8.4.2. WCDMA

LIMITS

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

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

FCC: §27.54
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Engineer ID:	39005	Test Date:	12/3/2019

WCDMA REL 99 BAND 5

Limit		824	849	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	824.1512	848.8616		
Extreme (50C)		824.1512	848.8616	-3.6	0.00
Extreme (40C)		824.1512	848.8616	-2.6	0.00
Extreme (30C)		824.1512	848.8616	-3.2	0.00
Extreme (10C)		824.1512	848.8616	-2.5	0.00
Extreme (0C)		824.1512	848.8616	-2.2	0.00
Extreme (-10C)		824.1512	848.8616	-2.3	0.00
Extreme (-20C)		824.1512	848.8616	-3.3	0.00
Extreme (-30C)		824.1512	848.8616	-2.5	0.00
20C	15%	824.1512	848.8616	-3.3	0.00
	-15%	824.1512	848.8616	-3.7	0.00
	End Point	824.1512	848.8616	-3.6	0.00

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

WCDMA REL 99 BAND 2

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	1850.1674	1909.8642		
Extreme (50C)		1850.1674	1909.8642	5.0	0.00
Extreme (40C)		1850.1674	1909.8642	4.8	0.00
Extreme (30C)		1850.1674	1909.8642	3.9	0.00
Extreme (10C)		1850.1674	1909.8642	6.5	0.00
Extreme (0C)		1850.1674	1909.8642	8.3	0.00
Extreme (-10C)		1850.1674	1909.8642	5.8	0.00
Extreme (-20C)		1850.1674	1909.8642	5.3	0.00
Extreme (-30C)		1850.1674	1909.8642	5.9	0.00
20C	15%	1850.1674	1909.8642	3.0	0.00
	-15%	1850.1674	1909.8642	3.4	0.00
	End Point	1850.1674	1909.8642	2.7	0.00

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

WCDMA REL 99 BAND 4

Limit		1710	1755	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	1710.1705	1754.8593		
Extreme (50C)		1710.1705	1754.8593	5.0	0.00
Extreme (40C)		1710.1705	1754.8593	6.6	0.00
Extreme (30C)		1710.1705	1754.8593	5.4	0.00
Extreme (10C)		1710.1705	1754.8593	5.4	0.00
Extreme (0C)		1710.1705	1754.8593	6.0	0.00
Extreme (-10C)		1710.1705	1754.8593	7.7	0.00
Extreme (-20C)		1710.1705	1754.8593	6.0	0.00
Extreme (-30C)		1710.1705	1754.8593	6.0	0.00
20C	15%	1710.1705	1754.8593	3.1	0.00
	-15%	1710.1705	1754.8593	3.6	0.00
	End Point	1710.1705	1754.8593	3.0	0.00

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8.4.3. LTE BAND 2

LIMITS

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

Test Engineer ID:	39005	Test Date:	12/4/2019

QPSK, (20MHz BANDWIDTH)

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	1850.8110	1909.1810		
Extreme (50C)		1850.8110	1909.1810	11.0	0.006
Extreme (40C)		1850.8110	1909.1810	10.5	0.006
Extreme (30C)		1850.8110	1909.1810	9.7	0.005
Extreme (10C)		1850.8110	1909.1810	8.9	0.005
Extreme (0C)		1850.8110	1909.1810	10.3	0.006
Extreme (-10C)		1850.8110	1909.1810	11.3	0.006
Extreme (-20C)		1850.8110	1909.1810	7.6	0.004
Extreme (-30C)		1850.8110	1909.1810	11.0	0.006
20C	15%	1850.8110	1909.1810	8.2	0.004
	-15%	1850.8110	1909.1810	5.8	0.003
	End Point	1850.8110	1909.1810	9.3	0.005

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8.4.4. LTE BAND 5

LIMITS

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

Test Engineer ID:	39005	Test Date:	12/4/2019

QPSK, (10MHz BANDWIDTH)

Limit		824	849	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	824.2950	848.7065		
Extreme (50C)		824.2950	848.7065	-4.3	-0.005
Extreme (40C)		824.2950	848.7065	-3.6	-0.004
Extreme (30C)		824.2950	848.7065	-5.5	-0.007
Extreme (10C)		824.2950	848.7065	-6.3	-0.008
Extreme (0C)		824.2950	848.7065	-2.9	-0.003
Extreme (-10C)		824.2950	848.7065	-3.2	-0.004
Extreme (-20C)		824.2950	848.7065	-4.3	-0.005
Extreme (-30C)		824.2950	848.7065	-5.1	-0.006
20C	15%	824.2950	848.7065	-2.1	-0.003
	-15%	824.2950	848.7065	-3.0	-0.004
	End Point	824.2950	848.7065	-2.3	-0.003

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8.4.5. LTE BAND 12

LIMITS

FCC: §27.54
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Engineer ID:	39005	Test Date:	12/4/2019

QPSK, (10MHz BANDWIDTH)

Limit		699	716	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	699.2779	715.7090		
Extreme (50C)		699.2779	715.7090	-5.6	-0.008
Extreme (40C)		699.2779	715.7090	-5.7	-0.008
Extreme (30C)		699.2779	715.7090	-8.2	-0.012
Extreme (10C)		699.2779	715.7090	-5.3	-0.008
Extreme (0C)		699.2779	715.7090	-3.1	-0.004
Extreme (-10C)		699.2779	715.7090	-2.9	-0.004
Extreme (-20C)		699.2779	715.7090	-4.2	-0.006
Extreme (-30C)		699.2779	715.7090	-6.2	-0.009
20C	15%	699.2779	715.7090	-5.3	-0.008
	-15%	699.2779	715.7090	-3.6	-0.005
	End Point	699.2779	715.7090	-2.8	-0.004

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8.4.6. LTE BAND 13

LIMITS

FCC: §27.54
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Engineer ID:	39005	Test Date:	12/4/2019

QPSK, (10MHz BANDWIDTH)

Limit		777	787	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	777.3047	786.7212		
Extreme (50C)		777.3047	786.7212	-2.2	-0.003
Extreme (40C)		777.3047	786.7212	-2.3	-0.003
Extreme (30C)		777.3047	786.7212	-4.2	-0.005
Extreme (10C)		777.3047	786.7212	-3.2	-0.004
Extreme (0C)		777.3047	786.7212	-5.2	-0.007
Extreme (-10C)		777.3047	786.7212	-4.3	-0.005
Extreme (-20C)		777.3047	786.7212	-3.2	-0.004
Extreme (-30C)		777.3047	786.7212	-4.3	-0.006
20C	15%	777.3047	786.7212	-5.0	-0.006
	-15%	777.3047	786.7212	-5.2	-0.007
	End Point	777.3047	786.7212	-7.5	-0.010

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8.4.7. LTE BAND 41 (FCC)

LIMITS

FCC: §27.54
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Engineer ID:	39005	Test Date:	12/4/2019

QPSK, (20MHz BANDWIDTH)

Limit		2496	2690	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	2496.7940	2689.4120		
Extreme (50C)		2496.7940	2689.4120	4.8	0.002
Extreme (40C)		2496.7940	2689.4120	6.2	0.002
Extreme (30C)		2496.7940	2689.4120	8.4	0.003
Extreme (10C)		2496.7940	2689.4120	10.6	0.004
Extreme (0C)		2496.7940	2689.4120	11.7	0.005
Extreme (-10C)		2496.7940	2689.4120	12.5	0.005
Extreme (-20C)		2496.7940	2689.4120	12.3	0.005
Extreme (-30C)		2496.7940	2689.4120	12.2	0.005
20C	15%	2496.7940	2689.4120	13.2	0.005
	-15%	2496.7940	2689.4120	10.5	0.004
	End Point	2496.7940	2689.4120	9.5	0.004

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8.4.8. LTE BAND 66

LIMITS

FCC: §27.54
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Engineer ID:	39005	Test Date:	12/4/2019

QPSK, (20MHz BANDWIDTH)

Limit		1710	1780	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1710.8110	1779.1870		
Extreme (50C)		1710.8110	1779.1870	10.6	0.006
Extreme (40C)		1710.8110	1779.1870	9.8	0.006
Extreme (30C)		1710.8110	1779.1870	11.3	0.006
Extreme (10C)		1710.8110	1779.1870	8.7	0.005
Extreme (0C)		1710.8110	1779.1870	9.0	0.005
Extreme (-10C)		1710.8110	1779.1870	7.5	0.004
Extreme (-20C)		1710.8110	1779.1870	7.1	0.004
Extreme (-30C)		1710.8110	1779.1870	8.2	0.005
20C	15%	1710.8110	1779.1870	7.6	0.004
	-15%	1710.8110	1779.1870	8.3	0.005
	End Point	1710.8110	1779.1870	5.8	0.003

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8.5. PEAK-TO-AVERAGE POWER RATIO

LIMITS

In addition, the peak to average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the highest PAPR during periods of continuous transmission.

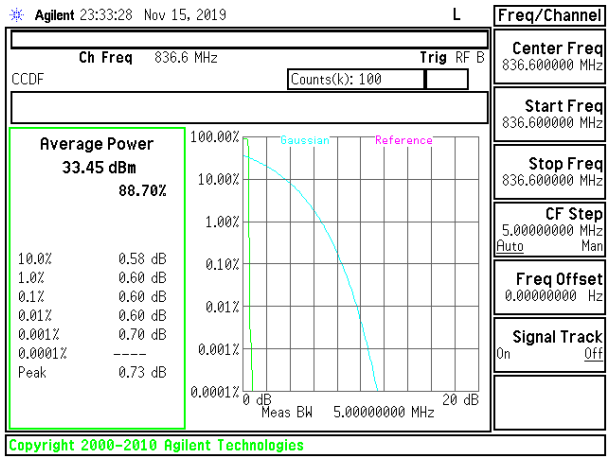
RESULT

LAT 1 antenna was used to measure as the worst case. The results from all CCDF plots are passed with 13dB peak-to-average power ratio criteria.

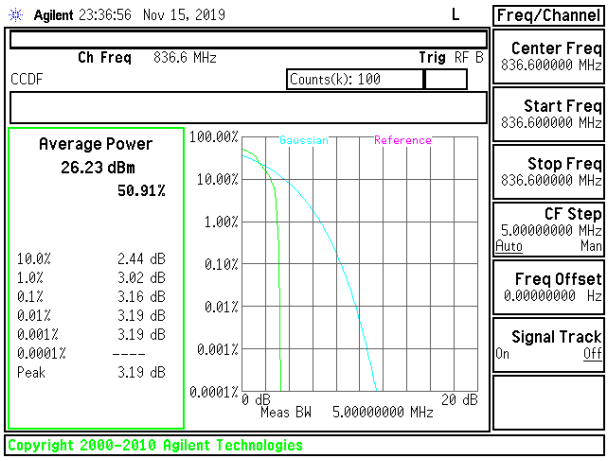
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Test Engineer ID:	39005	Test Date:	11/18/2019

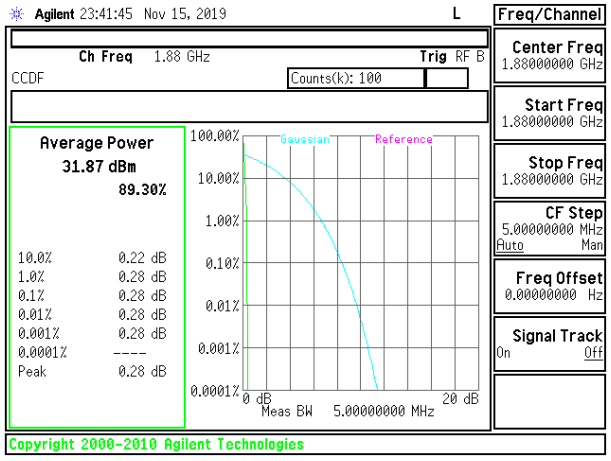
8.5.1. GSM



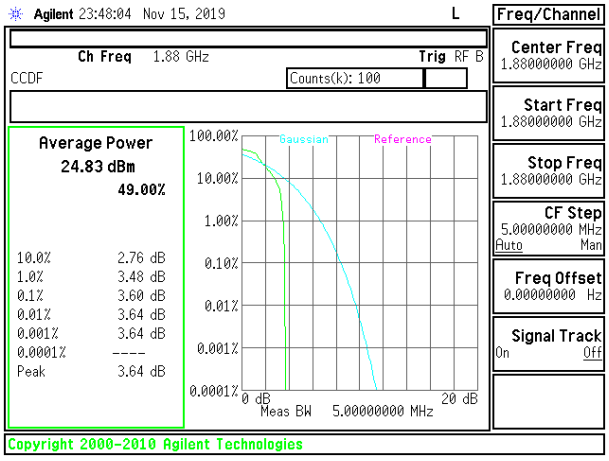
GSM 850 GPRS Middle Channel



GSM 850 EGPRS Middle Channel



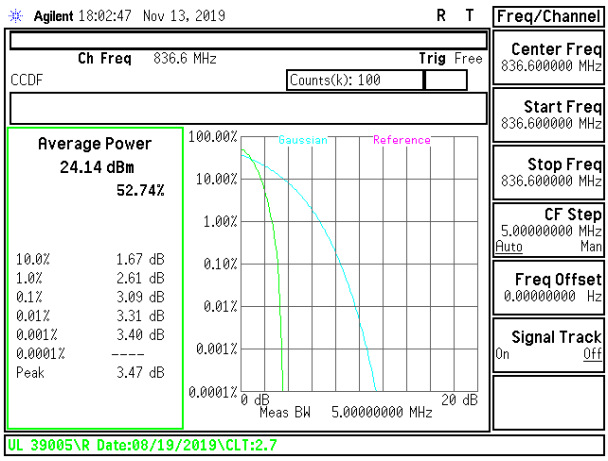
GSM 1900 GPRS Middle Channel



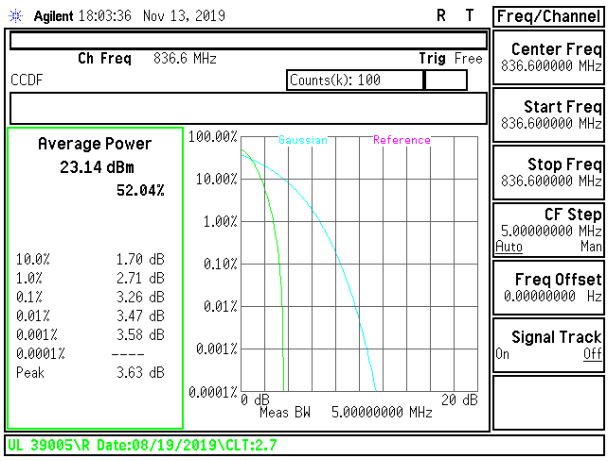
GSM 1900 EGPRS Middle Channel

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

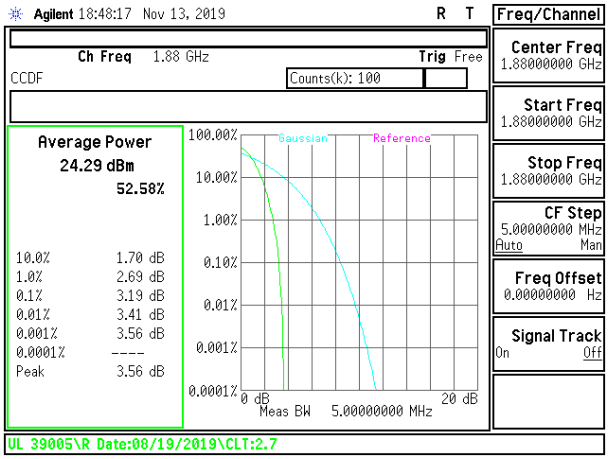
8.5.2. WCDMA



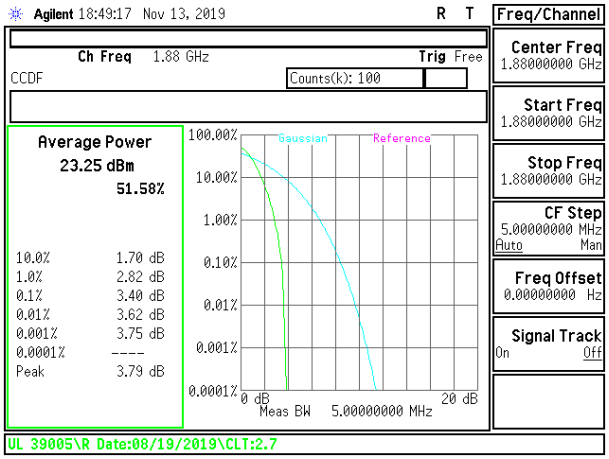
WCDMA Band 5 Rel 99 Middle Channel



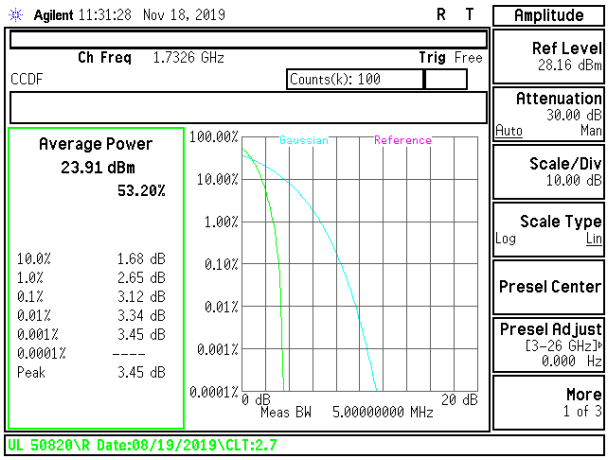
WCDMA Band 5 HSDPA Middle Channel



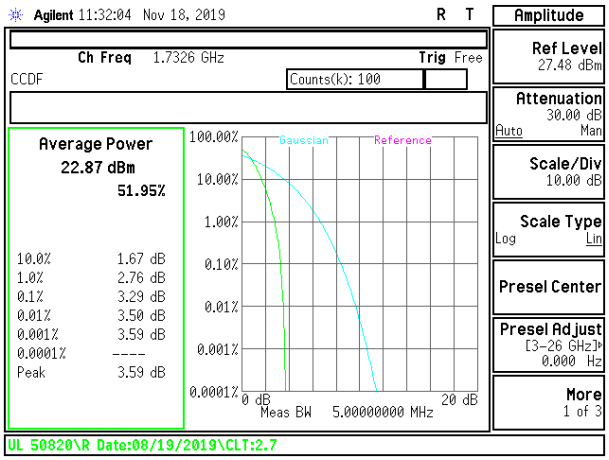
WCDMA Band 2 Rel 99 Middle Channel



WCDMA Band 2 HSDPA Middle Channel



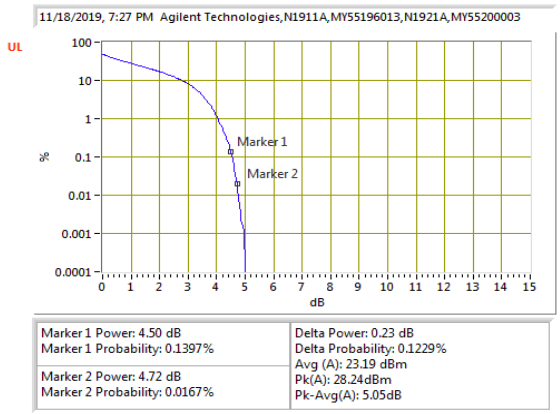
WCDMA Band 4 Rel 99 Middle Channel



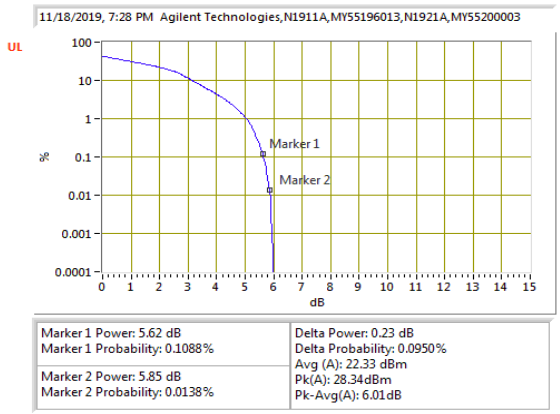
WCDMA Band 4 HSDPA Middle Channel

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

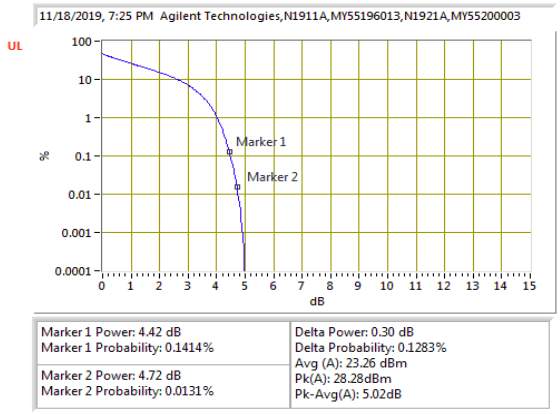
8.5.3. LTE BAND 2



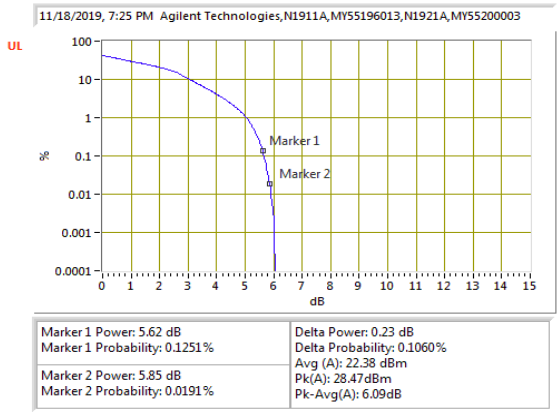
LTE B2 1.4MHz QPSK Mid Channel



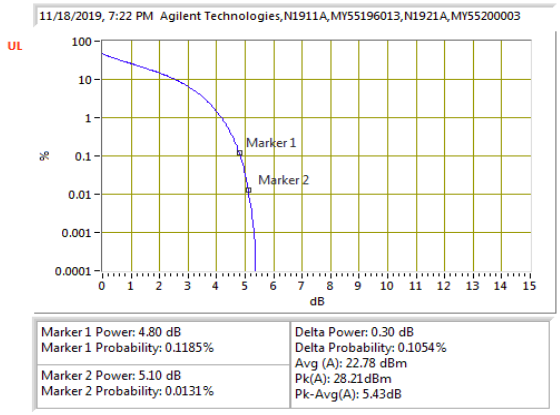
LTE B2 1.4MHz 16QAM Mid Channel



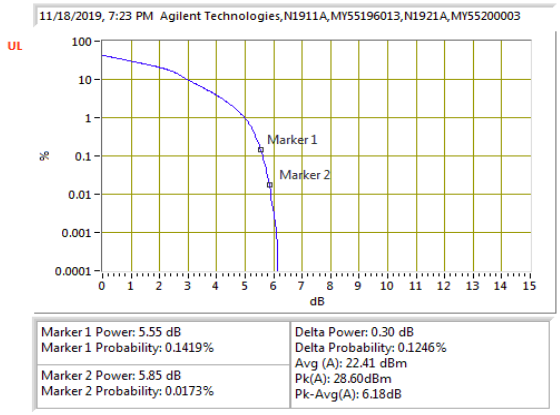
LTE B2 3MHz QPSK Mid Channel



LTE B2 3MHz 16QAM Mid Channel

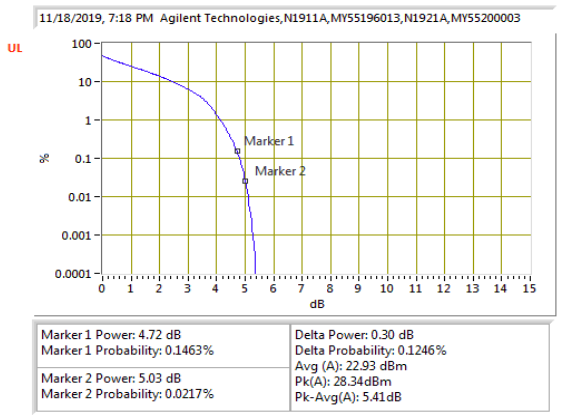


LTE B2 5MHz QPSK Mid Channel

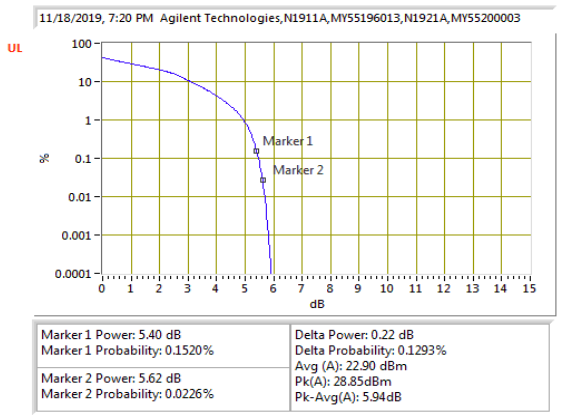


LTE B2 5MHz 16QAM Mid Channel

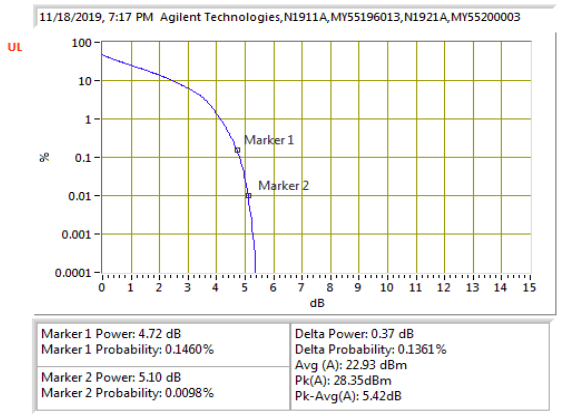
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



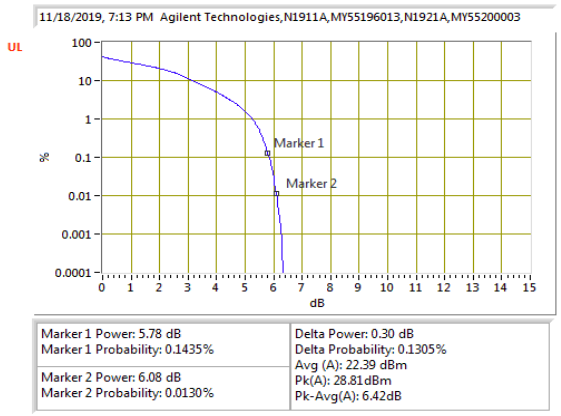
LTE B2 10MHz QPSK Mid Channel



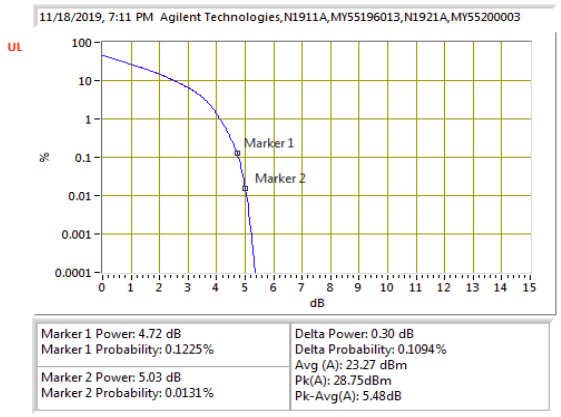
LTE B2 10MHz 16QAM Mid Channel



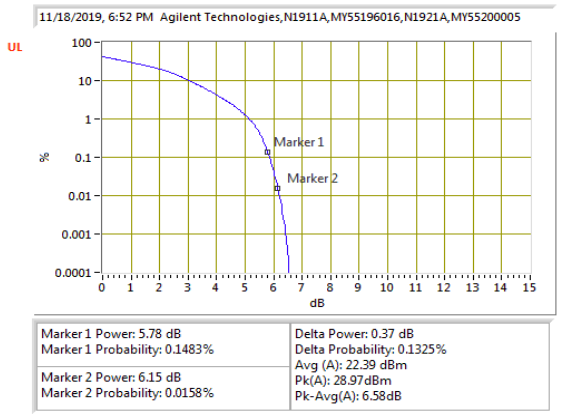
LTE B2 15MHz QPSK Mid Channel



LTE B2 15MHz 16QAM Mid Channel



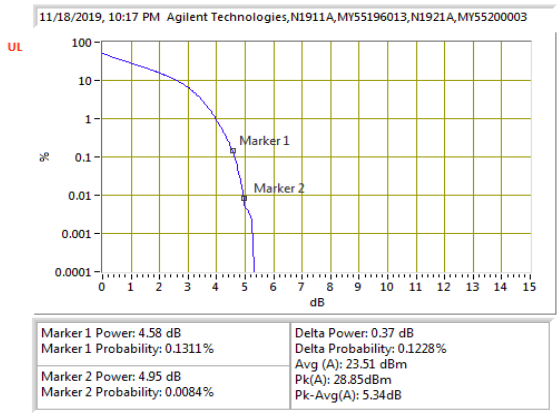
LTE B2 20MHz QPSK Mid Channel



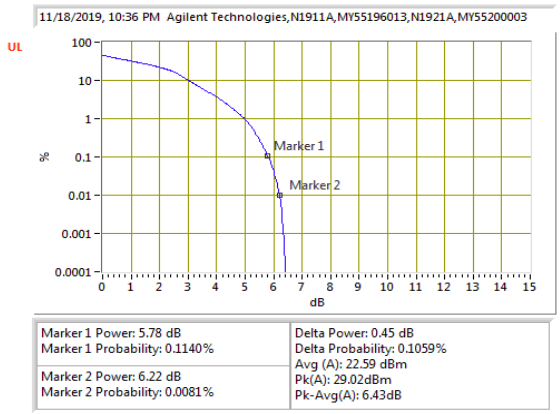
LTE B2 20MHz 16QAM Mid Channel

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

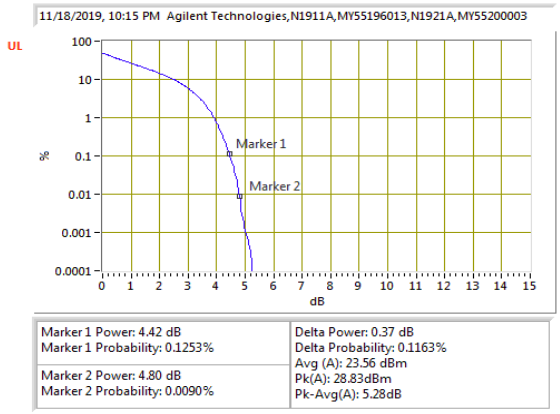
8.5.4. LTE BAND 5



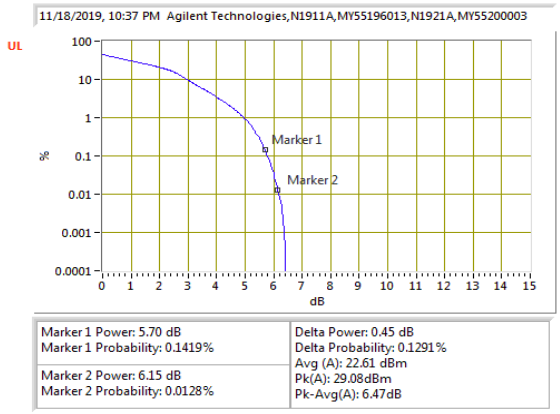
LTE B5 1.4MHz QPSK Mid Channel



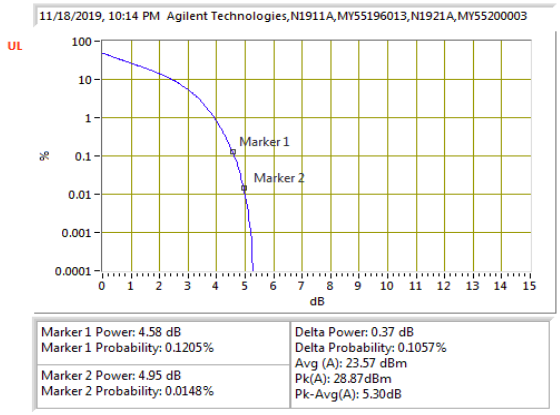
LTE B5 1.4MHz 16QAM Mid Channel



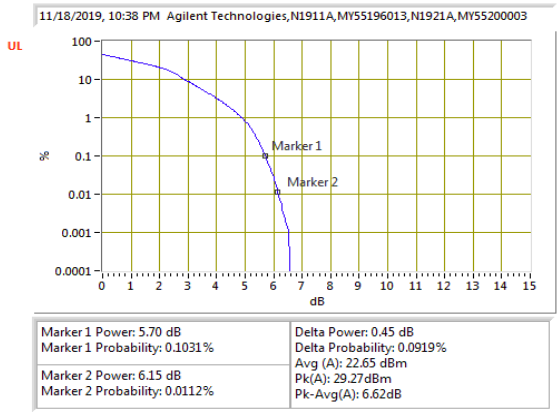
LTE B5 3MHz QPSK Mid Channel



LTE B5 3MHz 16QAM Mid Channel

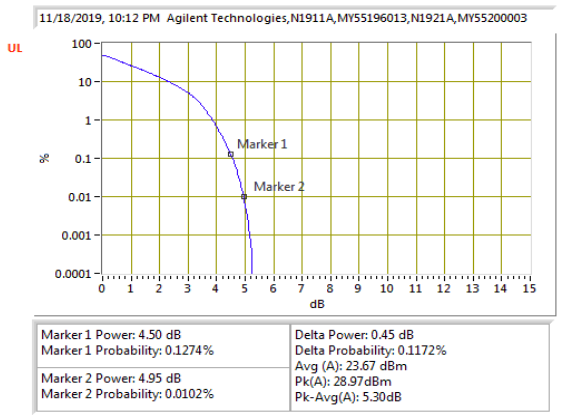


LTE B5 5MHz QPSK Mid Channel

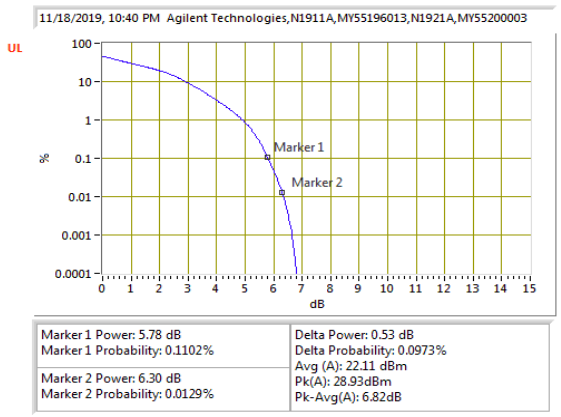


LTE B5 5MHz 16QAM Mid Channel

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



LTE B5 10MHz QPSK Mid Channel

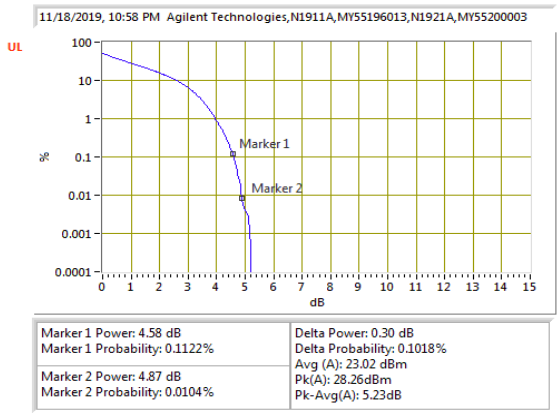


LTE B5 10MHz 16QAM Mid Channel

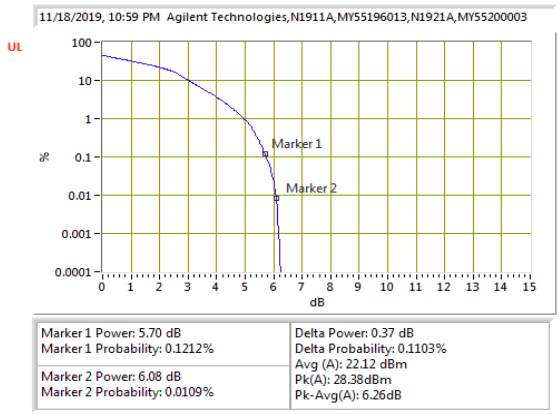
UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

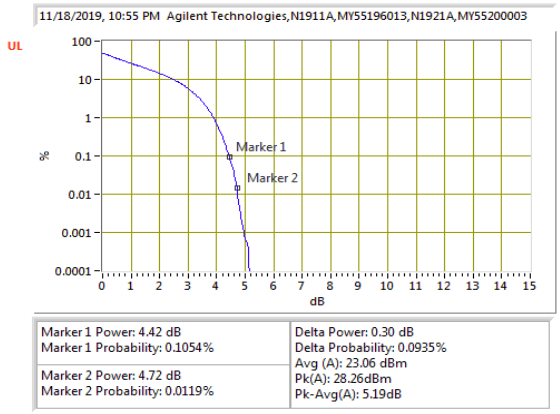
8.5.5. LTE BAND 12



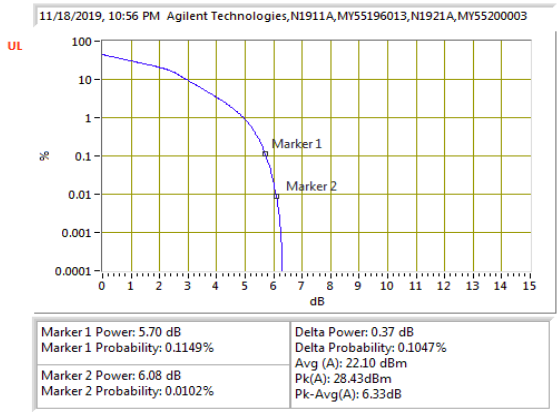
LTE B12 1.4MHz QPSK Mid Channel



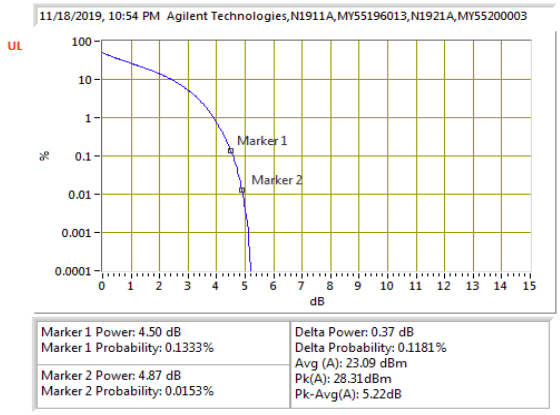
LTE B12 1.4MHz 16QAM Mid Channel



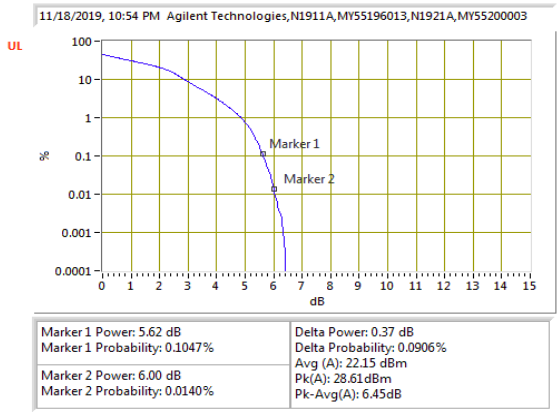
LTE B12 3MHz QPSK Mid Channel



LTE B12 3MHz 16QAM Mid Channel

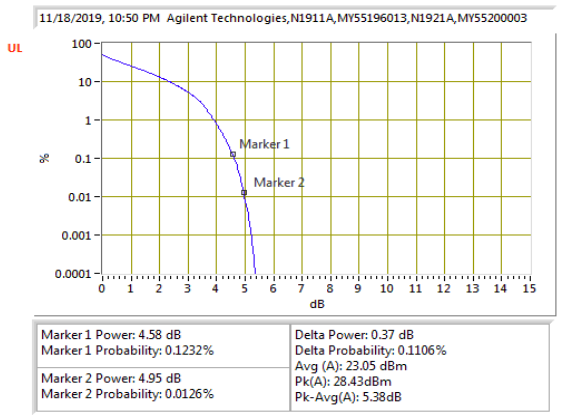


LTE B12 5MHz QPSK Mid Channel

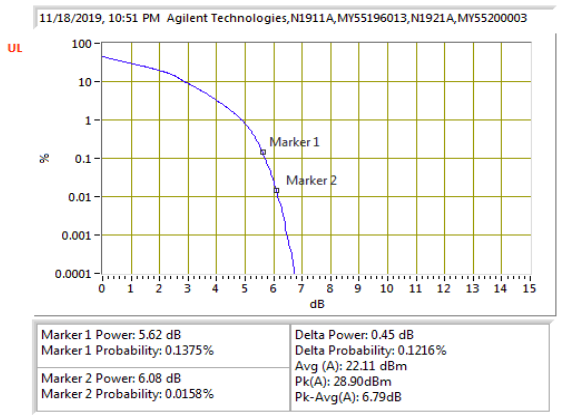


LTE B12 5MHz 16QAM Mid Channel

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



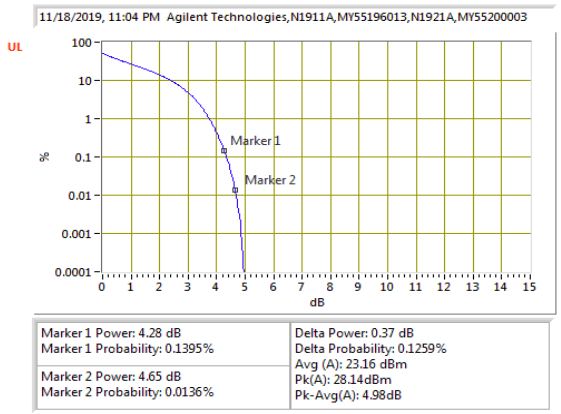
LTE B12 10MHz QPSK Mid Channel



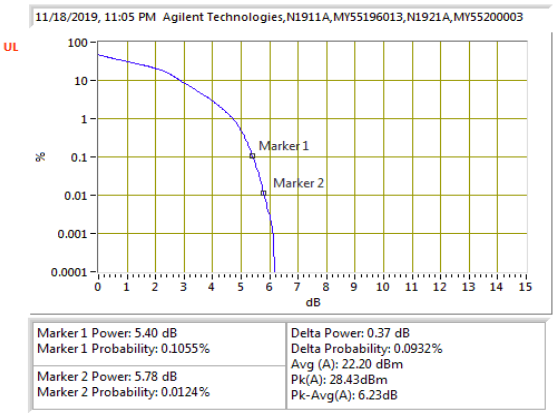
LTE B12 10MHz 16QAM Mid Channel

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

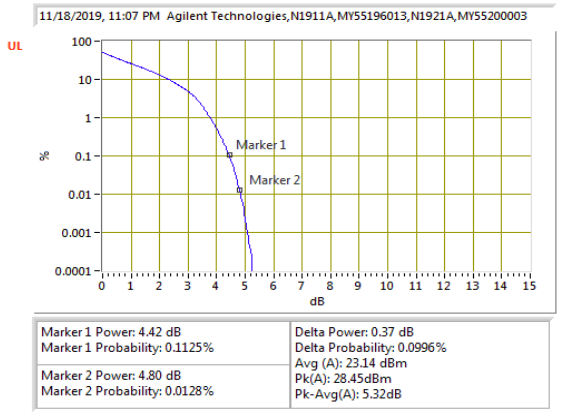
8.5.6. LTE BAND 13



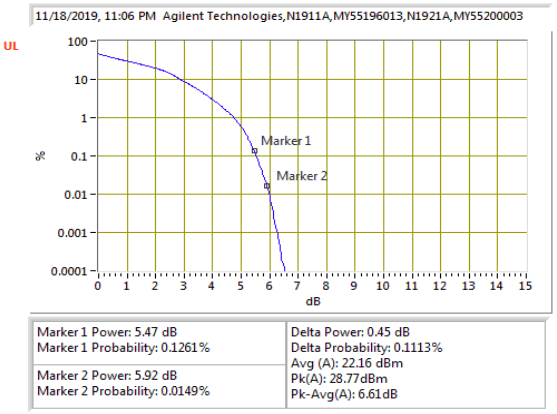
LTE B13 5MHz QPSK Mid Channel



LTE B13 5MHz 16QAM Mid Channel



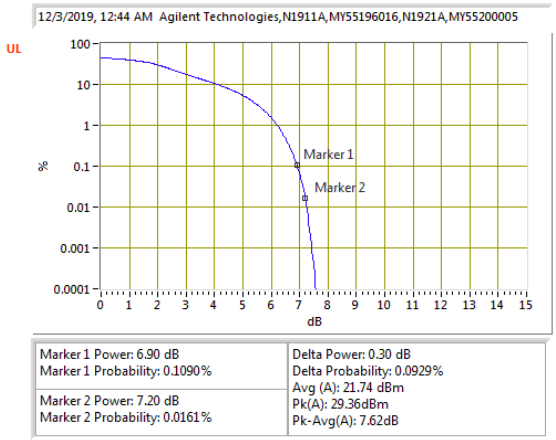
LTE B13 10MHz QPSK Mid Channel



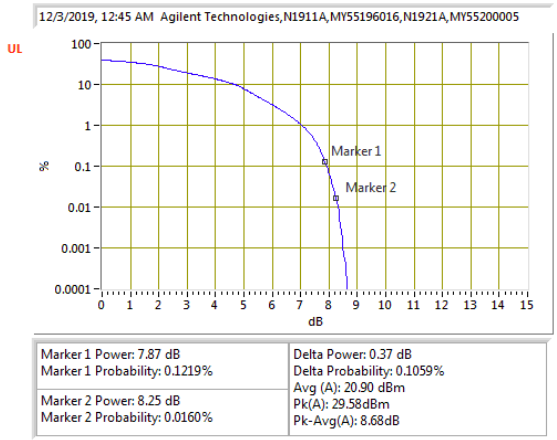
LTE B13 10MHz 16QAM Mid Channel

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

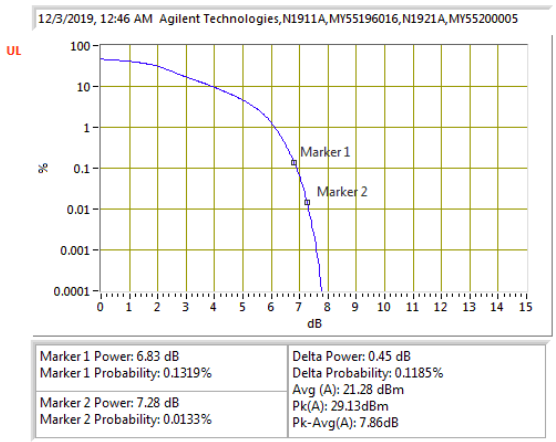
8.5.7. LTE BAND 41 (FCC)



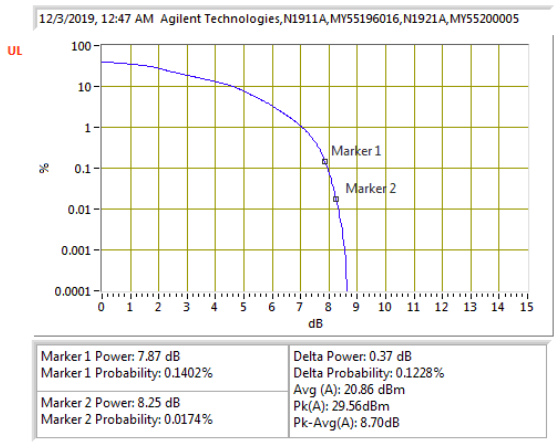
LTE B41 5MHz QPSK Middle Channel



LTE B41 5MHz 16QAM Middle Channel

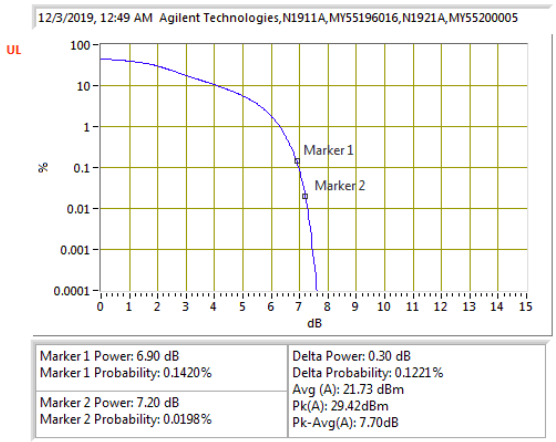


LTE B41 10MHz QPSK Middle Channel

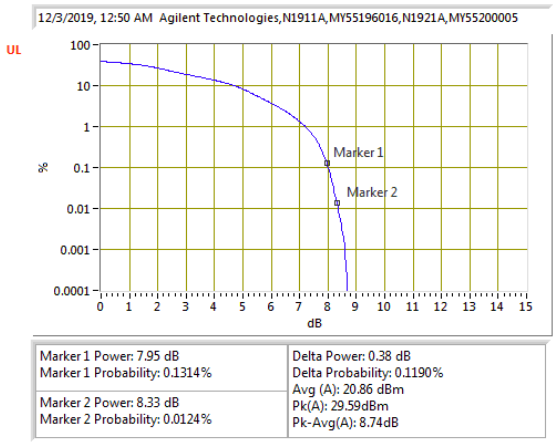


LTE B41 10MHz 16QAM Middle Channel

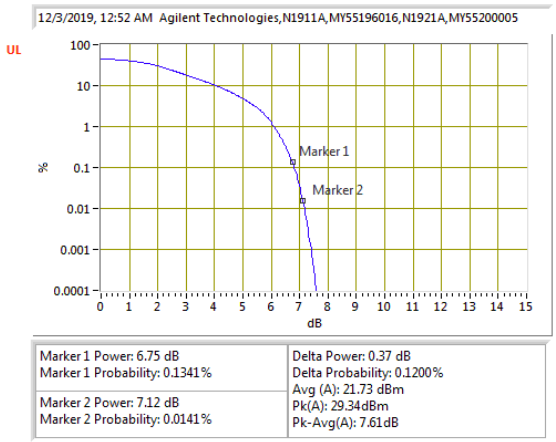
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



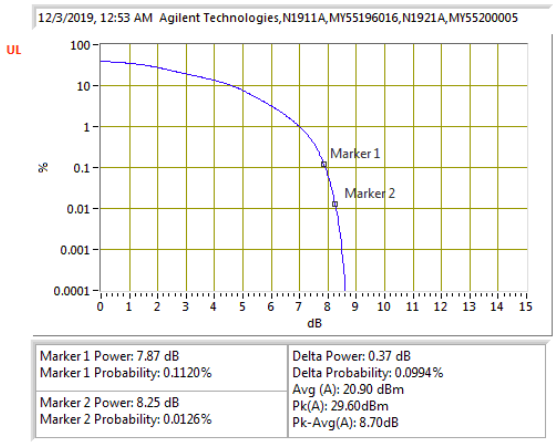
LTE B41 15MHz QPSK Middle Channel



LTE B41 15MHz 16QAM Middle Channel



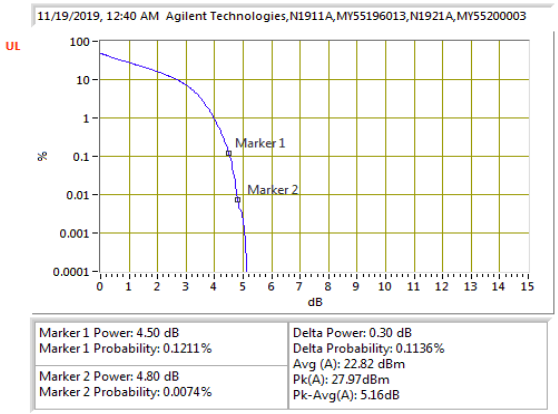
LTE B41 20MHz QPSK Middle Channel



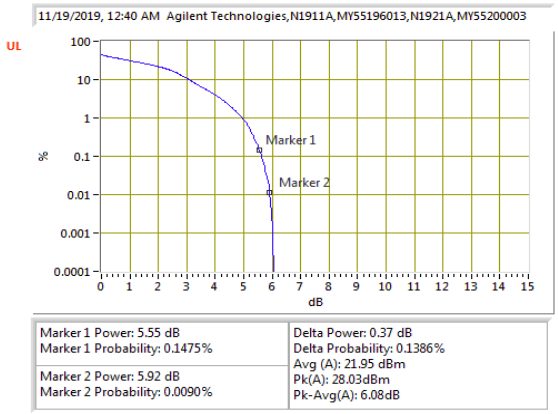
LTE B41 20MHz 16QAM Middle Channel

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

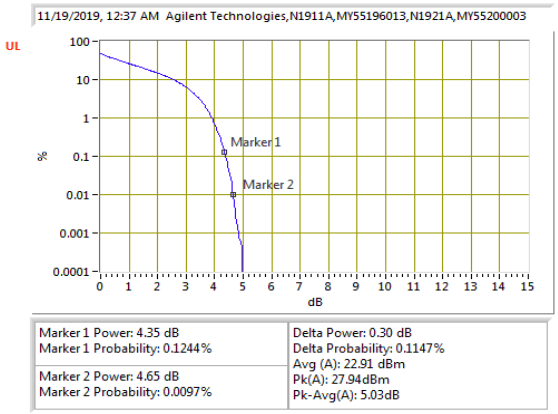
8.5.8. LTE BAND 66



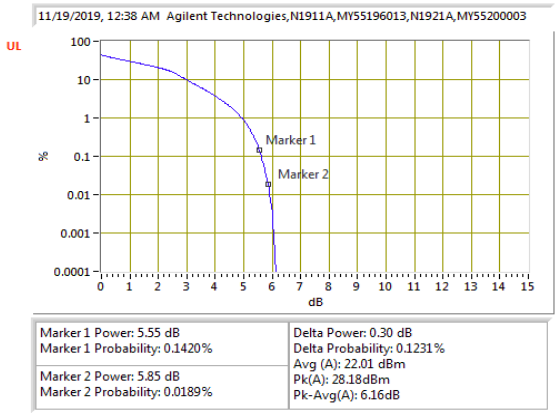
LTE B66 1.4MHz QPSK Middle Channel



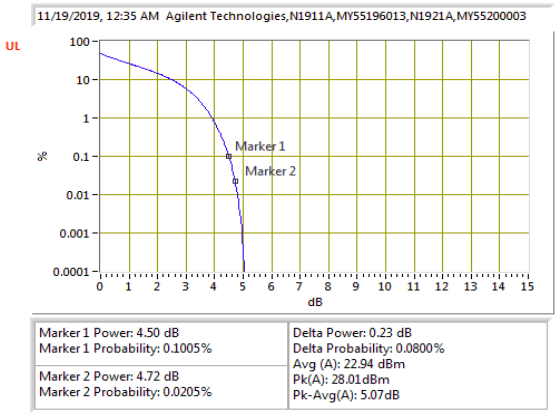
LTE B66 1.4MHz 16QAM Middle Channel



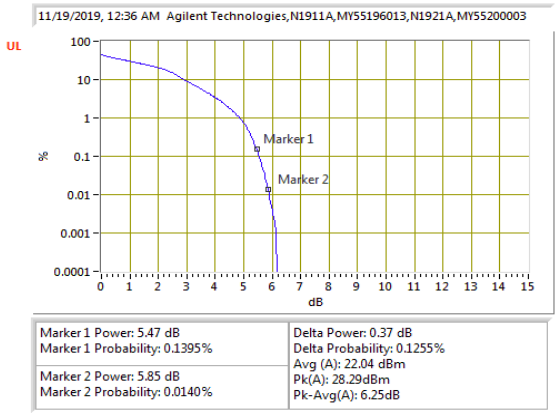
LTE B66 3MHz QPSK Middle Channel



LTE B66 3MHz 16QAM Middle Channel

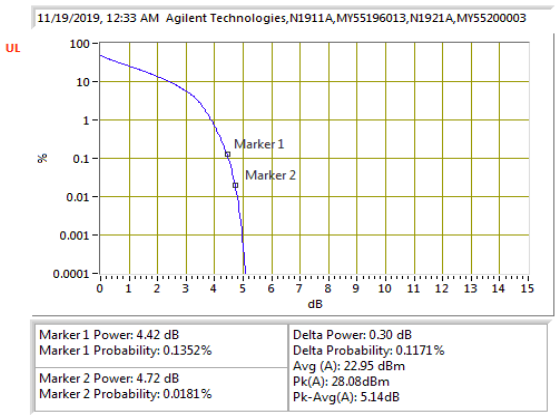


LTE B66 5MHz QPSK Middle Channel

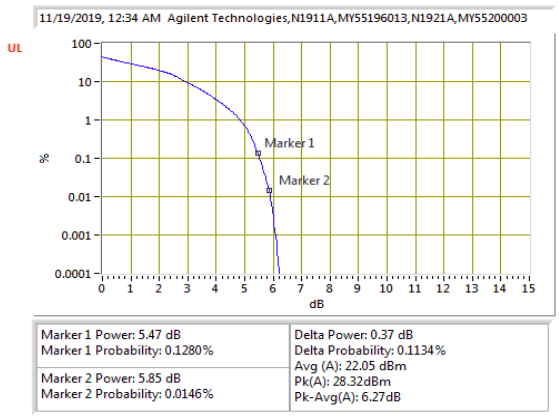


LTE B66 5MHz 16QAM Middle Channel

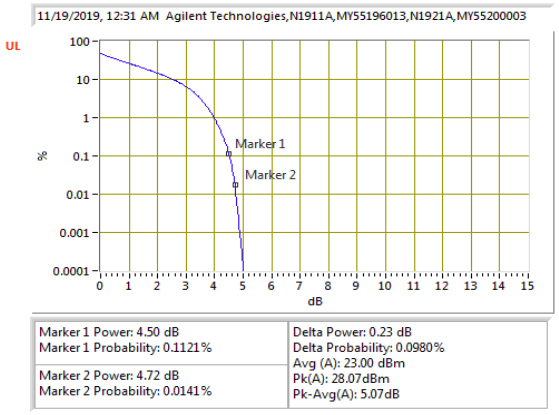
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



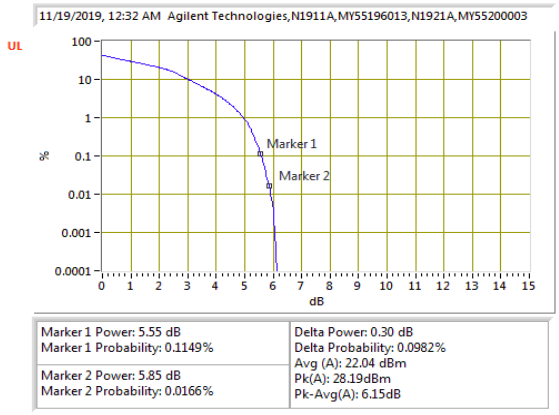
LTE B66 10MHz QPSK Middle Channel



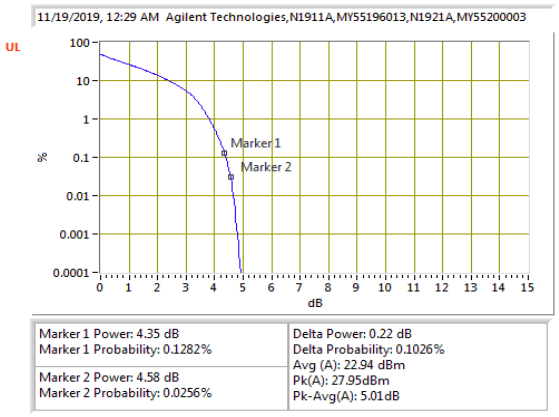
LTE B66 10MHz 16QAM Middle Channel



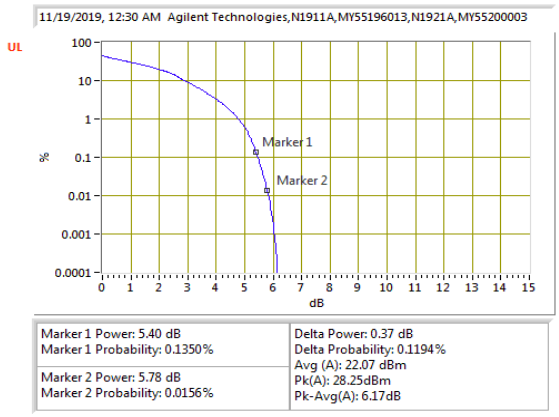
LTE B66 15MHz QPSK Middle Channel



LTE B66 15MHz 16QAM Middle Channel



LTE B66 20MHz QPSK Middle Channel



LTE B66 20MHz 16QAM Middle Channel

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

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

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

GSM

Band	Mode	Channel	f(MHz)	ERP/EIRP	
				dBm	W
GSM 850	GPRS	128	824.2	26.11	0.4083
		190	836.6	26.81	0.4797
		251	848.8	27.22	0.5272
	EGPRS	128	824.2	21.40	0.1380
		190	836.6	21.84	0.1528
		251	848.8	21.93	0.1560
GSM 1900	GPRS	512	1850.2	29.29	0.8492
		661	1880.0	28.14	0.6516
		810	1909.8	28.61	0.7261
	EGPRS	512	1850.2	25.59	0.3622
		661	1880.0	24.64	0.2911
		810	1909.8	24.77	0.2999

WCDMA

Band	Mode	Channel	f(MHz)	ERP/EIRP	
				dBm	W
Band 2	REL99	9262	1852.4	21.71	0.1483
		9400	1880	21.60	0.1445
		9538	1907.6	22.00	0.1585
	HSDPA	9262	1852.4	20.84	0.1213
		9400	1880.0	20.67	0.1167
		9538	1907.6	21.13	0.1297
Band 5	REL99	4132	826.4	17.46	0.0557
		4183	836.6	18.22	0.0664
		4233	846.6	17.46	0.0557
	HSDPA	4132	826.4	16.52	0.0449
		4183	836.6	17.31	0.0538
		4233	846.6	16.49	0.0446
Band 4	REL99	1312	1712.4	21.79	0.1510
		1413	1732.6	22.22	0.1667
		1513	1752.6	21.78	0.1507
	HSDPA	1312	1712.4	20.84	0.1213
		1413	1732.6	21.25	0.1334
		1513	1752.6	20.80	0.1202

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LTE Band 2

BW (MHz)	Mode	RB/RB Size	f(MHz)	EIRP	
				dBm	W
20	QPSK	1/0	1860	23.38	0.2178
		1/0	1880	22.45	0.1758
		1/0	1900	22.54	0.1795
	16QAM	1/0	1860	22.77	0.1892
		1/0	1880	21.86	0.1535
		1/0	1900	22.02	0.1592
15	QPSK	1/0	1857.5	22.75	0.1884
		1/0	1880	22.20	0.1660
		1/0	1902.5	22.32	0.1706
	16QAM	1/0	1857.5	22.06	0.1607
		1/0	1880	21.56	0.1432
		1/0	1902.5	21.62	0.1452
10	QPSK	1/0	1855	22.10	0.1622
		1/0	1880	22.38	0.1730
		1/0	1905	22.34	0.1714
	16QAM	1/0	1855	21.34	0.1361
		1/0	1880	21.70	0.1479
		1/0	1905	21.54	0.1426
5	QPSK	1/0	1852.5	22.75	0.1884
		1/0	1880	22.03	0.1596
		1/0	1907.5	22.13	0.1633
	16QAM	1/0	1852.5	22.04	0.1600
		1/0	1880	21.38	0.1374
		1/0	1907.5	21.38	0.1374
3	QPSK	1/0	1851.5	22.60	0.1820
		1/0	1880	22.36	0.1722
		1/0	1908.5	21.94	0.1563
	16QAM	1/0	1851.5	21.88	0.1542
		1/0	1880	21.70	0.1479
		1/0	1908.5	21.10	0.1288
1.4	QPSK	1/0	1850.7	22.32	0.1706
		1/0	1880	22.04	0.1600
		1/0	1909.3	22.72	0.1871
	16QAM	1/0	1850.7	21.62	0.1452
		1/0	1880	21.33	0.1358
		1/0	1909.3	21.90	0.1549

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LTE Band 5

BW (MHz)	Mode	RB/RB Size	f(MHz)	ERP	
				dBm	W
10	QPSK	1/0	829	18.50	0.0708
		1/0	836.5	18.09	0.0644
		1/0	844	19.39	0.0869
	16QAM	1/0	829	18.29	0.0675
		1/0	836.5	17.89	0.0615
		1/0	844	19.19	0.0830
5	QPSK	1/0	826.5	18.59	0.0723
		1/0	836.5	18.39	0.0690
		1/0	846.5	19.69	0.0931
	16QAM	1/0	826.5	18.39	0.0690
		1/0	836.5	18.09	0.0644
		1/0	846.5	19.39	0.0869
3	QPSK	1/0	825.5	18.49	0.0706
		1/0	836.5	18.39	0.0690
		1/0	847.5	19.69	0.0931
	16QAM	1/0	825.5	18.29	0.0675
		1/0	836.5	18.09	0.0644
		1/0	847.5	19.29	0.0849
1.4	QPSK	1/0	824.7	18.49	0.0706
		1/0	836.5	18.19	0.0659
		1/0	848.3	19.49	0.0889
	16QAM	1/0	824.7	18.19	0.0659
		1/0	836.5	17.99	0.0630
		1/0	848.3	19.09	0.0811

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LTE Band 12

BW (MHz)	Mode	RB/RB Size	f(MHz)	ERP	
				dBm	W
10	QPSK	1/0	704	17.86	0.0611
		1/0	707.5	17.80	0.0603
		1/0	711	17.98	0.0628
	16QAM	1/0	704	17.02	0.0504
		1/0	707.5	16.95	0.0495
		1/0	711	17.13	0.0516
5	QPSK	1/0	701.5	17.74	0.0594
		1/0	707.5	17.97	0.0627
		1/0	713.5	18.41	0.0693
	16QAM	1/0	701.5	16.90	0.0490
		1/0	707.5	17.14	0.0518
		1/0	713.5	17.64	0.0581
3	QPSK	1/0	700.5	17.74	0.0594
		1/0	707.5	18.03	0.0635
		1/0	714.5	18.39	0.0690
	16QAM	1/0	700.5	16.91	0.0491
		1/0	707.5	17.17	0.0521
		1/0	714.5	17.52	0.0565
1.4	QPSK	1/0	699.7	17.42	0.0552
		1/0	707.5	17.58	0.0573
		1/0	715.3	18.02	0.0634
	16QAM	1/0	699.7	16.55	0.0452
		1/0	707.5	16.68	0.0466
		1/0	715.3	17.16	0.0520

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LTE Band 13

BW (MHz)	Mode	RB/RB Size	f(MHz)	ERP	
				dBm	W
10	QPSK				
		1/0	782	18.71	0.0743
	16QAM				
		1/0	782	17.93	0.0621
5	QPSK	1/0	779.5	18.55	0.0716
		1/0	782	18.64	0.0731
		1/0	784.5	18.82	0.0762
	16QAM	1/0	779.5	17.79	0.0601
		1/0	782	17.75	0.0596
		1/0	784.5	17.93	0.0621

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LTE Band 41 (FCC)

BW (MHz)	Mode	RB/RB Size	f(MHz)	EIRP	
				dBm	W
20	QPSK	1/0	2506	22.50	0.1778
		1/0	2593	22.78	0.1897
		1/0	2680	21.49	0.1409
	16QAM	1/0	2506	21.39	0.1377
		1/0	2593	21.84	0.1528
		1/0	2680	20.12	0.1028
15	QPSK	1/0	2503.5	21.90	0.1549
		1/0	2593	22.99	0.1991
		1/0	2682.5	20.71	0.1178
	16QAM	1/0	2503.5	20.91	0.1233
		1/0	2593	21.97	0.1574
		1/0	2682.5	19.88	0.0973
10	QPSK	1/0	2501	21.78	0.1507
		1/0	2593	22.53	0.1791
		1/0	2685	20.92	0.1236
	16QAM	1/0	2501	20.50	0.1122
		1/0	2593	21.49	0.1409
		1/0	2685	20.20	0.1047
5	QPSK	1/0	2498.5	21.70	0.1479
		1/0	2593	22.79	0.1901
		1/0	2687.5	21.27	0.1340
	16QAM	1/0	2498.5	20.80	0.1202
		1/0	2593	21.89	0.1545
		1/0	2687.5	20.32	0.1076

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LTE Band 66

BW (MHz)	Mode	RB/RB Size	f(MHz)	EIRP	
				dBm	W
20	QPSK	1/0	1720	22.78	0.1897
		1/0	1745	22.82	0.1914
		1/0	1770	22.05	0.1603
	16QAM	1/0	1720	21.91	0.1552
		1/0	1745	22.04	0.1600
		1/0	1770	20.99	0.1256
15	QPSK	1/0	1717.5	22.79	0.1901
		1/0	1745	23.06	0.2023
		1/0	1772.5	22.07	0.1611
	16QAM	1/0	1717.5	21.86	0.1535
		1/0	1745	22.13	0.1633
		1/0	1772.5	21.18	0.1312
10	QPSK	1/0	1715	23.00	0.1995
		1/0	1745	23.15	0.2065
		1/0	1775	21.90	0.1549
	16QAM	1/0	1715	22.09	0.1618
		1/0	1745	22.20	0.1660
		1/0	1775	21.03	0.1268
5	QPSK	1/0	1712.5	23.10	0.2042
		1/0	1745	23.10	0.2042
		1/0	1777.5	22.07	0.1611
	16QAM	1/0	1712.5	22.31	0.1702
		1/0	1745	22.13	0.1633
		1/0	1777.5	21.28	0.1343
3	QPSK	1/0	1711.5	22.65	0.1841
		1/0	1745	22.97	0.1982
		1/0	1778.5	22.15	0.1641
	16QAM	1/0	1711.5	21.73	0.1489
		1/0	1745	21.99	0.1581
		1/0	1778.5	21.25	0.1334
1.4	QPSK	1/0	1710.7	21.70	0.1479
		1/0	1745	22.60	0.1820
		1/0	1779.3	22.54	0.1795
	16QAM	1/0	1710.7	20.79	0.1199
		1/0	1745	21.58	0.1439
		1/0	1779.3	21.63	0.1455

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.1.1. GSM

GPRS 850

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/2/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber K
Mode: GPRS 850 MHz Fundamentals

Test Equipment:
Receiving: Hybrid PRE0181574, and Chamber K SMA Cables
Substitution: Dipole T416, Chamber K 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	21.70	V	4.1	0.5	18.15	38.5	-20.4	
824.20	29.86	H	4.1	0.3	26.11	38.5	-12.4	
Mid Ch								
836.60	22.63	V	4.1	0.5	19.05	38.5	-19.4	
836.60	30.59	H	4.1	0.3	26.81	38.5	-11.7	
High Ch								
848.80	23.47	V	4.1	0.5	19.87	38.5	-18.6	
848.80	31.02	H	4.1	0.3	27.22	38.5	-11.3	

EGPRS 850

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/2/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber K
Mode: EGPRS 850 MHz Fundamentals

Test Equipment:
Receiving: Hybrid PRE0181574, and Chamber K SMA Cables
Substitution: Dipole T416, Chamber K 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	16.81	V	4.1	0.5	13.26	38.5	-25.2	
824.20	25.15	H	4.1	0.3	21.40	38.5	-17.1	
Mid Ch								
836.60	17.70	V	4.1	0.5	14.12	38.5	-24.4	
836.60	25.62	H	4.1	0.3	21.84	38.5	-16.7	
High Ch								
848.80	18.20	V	4.1	0.5	14.60	38.5	-23.9	
848.80	25.73	H	4.1	0.3	21.93	38.5	-16.6	

GPRS 1900

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/20/2019
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	28.99	V	5.6	4.5	27.86	33.0	-5.1	
1850.20	30.42	H	5.6	4.5	29.29	33.0	-3.7	
Mid Ch								
1880.00	28.14	V	5.7	4.6	27.04	33.0	-6.0	
1880.00	29.24	H	5.7	4.6	28.14	33.0	-4.9	
High Ch								
1909.80	27.25	V	5.7	4.6	26.15	33.0	-6.9	
1909.80	29.71	H	5.7	4.6	28.61	33.0	-4.4	

EGPRS 1900

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/20/2019
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	25.34	V	5.6	4.5	24.21	33.0	-8.8	
1850.20	26.72	H	5.6	4.5	25.59	33.0	-7.4	
Mid Ch								
1880.00	24.42	V	5.7	4.6	23.32	33.0	-9.7	
1880.00	25.74	H	5.7	4.6	24.64	33.0	-8.4	
High Ch								
1909.80	23.07	V	5.7	4.6	21.97	33.0	-11.0	
1909.80	25.87	H	5.7	4.6	24.77	33.0	-8.2	

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.1.2. WCDMA

B2 REL99

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/19/2019
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	22.89	H	5.6	4.5	21.71	33.0	-11.3	
Mid Ch								
1880.00	20.00	V	5.7	4.6	18.90	33.0	-14.1	
1880.00	22.70	H	5.7	4.6	21.60	33.0	-11.4	
High Ch								
1907.60	20.66	V	5.7	4.5	19.50	33.0	-13.5	
1907.60	23.16	H	5.7	4.5	22.00	33.0	-11.0	

B2 HSDPA

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/19/2019
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	20.12	V	5.6	4.5	18.94	33.0	-14.1	
1852.40	22.02	H	5.6	4.5	20.84	33.0	-12.2	
Mid Ch								
1880.00	18.98	V	5.7	4.6	17.88	33.0	-15.1	
1880.00	21.77	H	5.7	4.6	20.67	33.0	-12.3	
High Ch								
1907.60	19.60	V	5.7	4.5	18.44	33.0	-14.6	
1907.60	22.29	H	5.7	4.5	21.13	33.0	-11.9	

B5 REL99

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/2/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber K
Mode: Rel99 Band 5 Fundamentals

Test Equipment:
Receiving: Hybrid PRE0181574, and Chamber K SMA Cables
Substitution: Dipole T416, Chamber K 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	13.07	V	4.1	0.5	9.51	38.5	-29.0	
826.40	21.22	H	4.1	0.3	17.46	38.5	-21.0	
Mid Ch								
836.60	13.29	V	4.1	0.5	9.71	38.5	-28.8	
836.60	22.00	H	4.1	0.3	18.22	38.5	-20.3	
High Ch								
846.60	13.74	V	4.1	0.5	10.15	38.5	-28.4	
846.60	21.25	H	4.1	0.3	17.46	38.5	-21.0	

B5 HSDPA

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/2/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber K
Mode: HSDPA Band 5 Fundamentals

Test Equipment:
Receiving: Hybrid PRE0181574, and Chamber K SMA Cables
Substitution: Dipole T416, Chamber K 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	12.11	V	4.1	0.5	8.55	38.5	-29.9	
826.40	20.28	H	4.1	0.3	16.52	38.5	-22.0	
Mid Ch								
836.60	12.28	V	4.1	0.5	8.70	38.5	-29.8	
836.60	21.09	H	4.1	0.3	17.31	38.5	-21.2	
High Ch								
846.60	12.79	V	4.1	0.5	9.20	38.5	-29.3	
846.60	20.28	H	4.1	0.3	16.49	38.5	-22.0	

B4 REL99

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/19/2019
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	19.39	V	5.4	5.7	19.71	30.0	-10.3	
1712.40	21.47	H	5.4	5.7	21.79	30.0	-8.2	
Mid Ch								
1732.60	19.66	V	5.5	5.5	19.68	30.0	-10.3	
1732.60	22.20	H	5.5	5.5	22.22	30.0	-7.8	
High Ch								
1752.60	18.47	V	5.5	5.3	18.25	30.0	-11.7	
1752.60	22.00	H	5.5	5.3	21.78	30.0	-8.2	

B4 HSDPA

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/19/2019
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	18.20	V	5.4	5.7	18.52	30.0	-11.5	
1712.40	20.52	H	5.4	5.7	20.84	30.0	-9.2	
Mid Ch								
1732.60	18.73	V	5.5	5.5	18.75	30.0	-11.2	
1732.60	21.23	H	5.5	5.5	21.25	30.0	-8.7	
High Ch								
1752.60	17.18	V	5.5	5.3	16.96	30.0	-13.0	
1752.60	21.02	H	5.5	5.3	20.80	30.0	-9.2	

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.1.3. LTE Band 2

20MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/19/2019
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	21.60	V	5.6	4.6	20.56	33.0	-12.4	
1860.00	24.42	H	5.6	4.6	23.38	33.0	-9.6	
Mid Ch								
1880.00	20.61	V	5.7	4.6	19.51	33.0	-13.5	
1880.00	23.55	H	5.7	4.6	22.45	33.0	-10.6	
High Ch								
1900.00	21.90	V	5.7	4.6	20.83	33.0	-12.2	
1900.00	23.61	H	5.7	4.6	22.54	33.0	-10.5	

20MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/19/2019
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	20.97	V	5.6	4.6	19.93	33.0	-13.1	
1860.00	23.81	H	5.6	4.6	22.77	33.0	-10.2	
Mid Ch								
1880.00	19.92	V	5.7	4.6	18.82	33.0	-14.2	
1880.00	22.96	H	5.7	4.6	21.86	33.0	-11.1	
High Ch								
1900.00	21.40	V	5.7	4.6	20.33	33.0	-12.7	
1900.00	23.09	H	5.7	4.6	22.02	33.0	-11.0	

15MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/19/2019
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	21.54	V	5.6	4.5	20.43	33.0	-12.6	
1857.50	23.86	H	5.6	4.5	22.75	33.0	-10.2	
Mid Ch								
1880.00	20.73	V	5.7	4.6	19.63	33.0	-13.4	
1880.00	23.30	H	5.7	4.6	22.20	33.0	-10.8	
High Ch								
1902.50	22.53	V	5.7	4.6	21.42	33.0	-11.6	
1902.50	23.43	H	5.7	4.6	22.32	33.0	-10.7	

15MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/19/2019
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	20.78	V	5.6	4.5	19.67	33.0	-13.3	
1857.50	23.17	H	5.6	4.5	22.06	33.0	-10.9	
Mid Ch								
1880.00	20.10	V	5.7	4.6	19.00	33.0	-14.0	
1880.00	22.66	H	5.7	4.6	21.56	33.0	-11.4	
High Ch								
1902.50	21.73	V	5.7	4.6	20.62	33.0	-12.4	
1902.50	22.73	H	5.7	4.6	21.62	33.0	-11.4	

10MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/19/2019
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	21.32	V	5.6	4.5	20.14	33.0	-12.9	
1855.00	23.28	H	5.6	4.5	22.10	33.0	-10.9	
Mid Ch								
1880.00	20.65	V	5.7	4.6	19.55	33.0	-13.5	
1880.00	23.48	H	5.7	4.6	22.38	33.0	-10.6	
High Ch								
1905.00	22.54	V	5.7	4.5	21.38	33.0	-11.6	
1905.00	23.50	H	5.7	4.5	22.34	33.0	-10.7	

10MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/19/2019
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	20.55	V	5.6	4.5	19.37	33.0	-13.6	
1855.00	22.52	H	5.6	4.5	21.34	33.0	-11.7	
Mid Ch								
1880.00	20.03	V	5.7	4.6	18.93	33.0	-14.1	
1880.00	22.80	H	5.7	4.6	21.70	33.0	-11.3	
High Ch								
1905.00	21.71	V	5.7	4.5	20.55	33.0	-12.4	
1905.00	22.70	H	5.7	4.5	21.54	33.0	-11.5	

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

5MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/19/2019
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	21.29	V	5.6	4.5	20.11	33.0	-12.9	
1852.50	23.93	H	5.6	4.5	22.75	33.0	-10.2	
Mid Ch								
1880.00	20.57	V	5.7	4.6	19.47	33.0	-13.5	
1880.00	23.13	H	5.7	4.6	22.03	33.0	-11.0	
High Ch								
1907.50	21.55	V	5.7	4.5	20.38	33.0	-12.6	
1907.50	23.30	H	5.7	4.5	22.13	33.0	-10.9	

5MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/19/2019
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	20.54	V	5.6	4.5	19.36	33.0	-13.6	
1852.50	23.22	H	5.6	4.5	22.04	33.0	-11.0	
Mid Ch								
1880.00	19.91	V	5.7	4.6	18.81	33.0	-14.2	
1880.00	22.48	H	5.7	4.6	21.38	33.0	-11.6	
High Ch								
1907.50	20.72	V	5.7	4.5	19.55	33.0	-13.4	
1907.50	22.55	H	5.7	4.5	21.38	33.0	-11.6	

3MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/19/2019
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	21.18	V	5.6	4.5	20.02	33.0	-13.0	
1851.50	23.76	H	5.6	4.5	22.60	33.0	-10.4	
Mid Ch								
1880.00	21.25	V	5.7	4.6	20.15	33.0	-12.9	
1880.00	23.46	H	5.7	4.6	22.36	33.0	-10.6	
High Ch								
1908.50	22.35	V	5.7	4.5	21.20	33.0	-11.8	
1908.50	23.09	H	5.7	4.5	21.94	33.0	-11.1	

3MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/19/2019
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	20.54	V	5.6	4.5	19.38	33.0	-13.6	
1851.50	23.04	H	5.6	4.5	21.88	33.0	-11.1	
Mid Ch								
1880.00	20.55	V	5.7	4.6	19.45	33.0	-13.6	
1880.00	22.80	H	5.7	4.6	21.70	33.0	-11.3	
High Ch								
1908.50	21.46	V	5.7	4.5	20.31	33.0	-12.7	
1908.50	22.25	H	5.7	4.5	21.10	33.0	-11.9	

1.4MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/19/2019
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	21.25	V	5.6	4.5	20.11	33.0	-12.9	
1850.70	23.46	H	5.6	4.5	22.32	33.0	-10.7	
Mid Ch								
1880.00	20.86	V	5.7	4.6	19.76	33.0	-13.2	
1880.00	23.14	H	5.7	4.6	22.04	33.0	-11.0	
High Ch								
1909.30	21.76	V	5.7	4.6	20.64	33.0	-12.4	
1909.30	23.84	H	5.7	4.6	22.72	33.0	-10.3	

1.4MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/19/2019
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	20.48	V	5.6	4.5	19.34	33.0	-13.7	
1850.70	22.76	H	5.6	4.5	21.62	33.0	-11.4	
Mid Ch								
1880.00	20.15	V	5.7	4.6	19.05	33.0	-14.0	
1880.00	22.43	H	5.7	4.6	21.33	33.0	-11.7	
High Ch								
1909.30	20.93	V	5.7	4.6	19.81	33.0	-13.2	
1909.30	23.02	H	5.7	4.6	21.90	33.0	-11.1	

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.1.4. LTE Band 5

10MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/3/2019
Test Engineer: 19498 ER
Configuration: EUT Only
Location: Chamber K
Mode: LTE_QPSK Band 5 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181574, and Chamber K SMA Cables
Substitution: T416, Chamber K 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	11.40	V	0.2	0.5	11.70	38.5	-26.8	
829.00	18.40	H	0.2	0.3	18.50	38.5	-20.0	
Mid Ch								
836.50	10.90	V	0.2	0.5	11.19	38.5	-27.3	
836.50	18.00	H	0.2	0.3	18.09	38.5	-20.4	
High Ch								
844.00	11.50	V	0.2	0.5	11.79	38.5	-26.7	
844.00	19.30	H	0.2	0.3	19.39	38.5	-19.1	

10MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/3/2019
Test Engineer: 19498 ER
Configuration: EUT Only
Location: Chamber K
Mode: LTE_16QAM Band 5 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181574, and Chamber K SMA Cables
Substitution: T416, Chamber K 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	11.10	V	0.2	0.5	11.39	38.5	-27.1	
829.00	18.20	H	0.2	0.3	18.29	38.5	-20.2	
Mid Ch								
836.50	10.50	V	0.2	0.5	10.79	38.5	-27.7	
836.50	17.80	H	0.2	0.3	17.89	38.5	-20.6	
High Ch								
844.00	11.20	V	0.2	0.5	11.49	38.5	-27.0	
844.00	19.10	H	0.2	0.3	19.19	38.5	-19.3	

5MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/3/2019
Test Engineer: 19498 ER
Configuration: EUT Only
Location: Chamber K
Mode: LTE_QPSK Band 5 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181574, and Chamber K SMA Cables
Substitution: T416, Chamber K 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	11.50	V	0.2	0.5	11.79	38.5	-26.7	
826.50	18.50	H	0.2	0.3	18.59	38.5	-19.9	
Mid Ch								
836.50	11.00	V	0.2	0.5	11.29	38.5	-27.2	
836.50	18.30	H	0.2	0.3	18.39	38.5	-20.1	
High Ch								
846.50	11.40	V	0.2	0.5	11.69	38.5	-26.8	
846.50	19.60	H	0.2	0.3	19.69	38.5	-18.8	

5MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/3/2019
Test Engineer: 19498 ER
Configuration: EUT Only
Location: Chamber K
Mode: LTE_16QAM Band 5 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181574, and Chamber K SMA Cables
Substitution: T416, Chamber K 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	11.40	V	0.2	0.5	11.69	38.5	-26.8	
826.50	18.30	H	0.2	0.3	18.39	38.5	-20.1	
Mid Ch								
836.50	10.70	V	0.2	0.5	10.99	38.5	-27.5	
836.50	18.00	H	0.2	0.3	18.09	38.5	-20.4	
High Ch								
846.50	11.10	V	0.2	0.5	11.39	38.5	-27.1	
846.50	19.30	H	0.2	0.3	19.39	38.5	-19.1	

3MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/3/2019
Test Engineer: 19498 ER
Configuration: EUT Only
Location: Chamber K
Mode: LTE_QPSK Band 5 Fundamentals, 3MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181574, and Chamber K SMA Cables
Substitution: T416, Chamber K 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	11.50	V	0.2	0.5	11.79	38.5	-26.7	
825.50	18.40	H	0.2	0.3	18.49	38.5	-20.0	
Mid Ch								
836.50	10.80	V	0.2	0.5	11.09	38.5	-27.4	
836.50	18.30	H	0.2	0.3	18.39	38.5	-20.1	
High Ch								
847.50	11.30	V	0.2	0.5	11.59	38.5	-26.9	
847.50	19.60	H	0.2	0.3	19.69	38.5	-18.8	

3MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/3/2019
Test Engineer: 19498 ER
Configuration: EUT Only
Location: Chamber K
Mode: LTE_16QAM Band 5 Fundamentals, 3MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181574, and Chamber K SMA Cables
Substitution: T416, Chamber K 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	11.30	V	0.2	0.5	11.59	38.5	-26.9	
825.50	18.20	H	0.2	0.3	18.29	38.5	-20.2	
Mid Ch								
836.50	10.80	V	0.2	0.5	11.09	38.5	-27.4	
836.50	18.00	H	0.2	0.3	18.09	38.5	-20.4	
High Ch								
847.50	11.00	V	0.2	0.5	11.29	38.5	-27.2	
847.50	19.20	H	0.2	0.3	19.29	38.5	-19.2	

1.4MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/3/2019
Test Engineer: 19498 ER
Configuration: EUT Only
Location: Chamber K
Mode: LTE_QPSK Band 5 Fundamentals, 1.4MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181574, and Chamber K SMA Cables
Substitution: T416, Chamber K 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	11.20	V	0.2	0.5	11.49	38.5	-27.0	
824.70	18.40	H	0.2	0.3	18.49	38.5	-20.0	
Mid Ch								
836.50	11.00	V	0.2	0.5	11.29	38.5	-27.2	
836.50	18.10	H	0.2	0.3	18.19	38.5	-20.3	
High Ch								
848.30	11.00	V	0.2	0.5	11.29	38.5	-27.2	
848.30	19.40	H	0.2	0.3	19.49	38.5	-19.0	

1.4MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/3/2019
Test Engineer: 19498 ER
Configuration: EUT Only
Location: Chamber K
Mode: LTE_16QAM Band 5 Fundamentals, 1.4MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181574, and Chamber K SMA Cables
Substitution: T416, Chamber K 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	11.10	V	0.2	0.5	11.39	38.5	-27.1	
824.70	18.19	H	0.2	0.3	18.19	38.5	-20.3	
Mid Ch								
836.50	10.80	V	0.2	0.5	11.09	38.5	-27.4	
836.50	17.90	H	0.2	0.3	17.99	38.5	-20.5	
High Ch								
848.30	10.60	V	0.2	0.5	10.89	38.5	-27.6	
848.30	19.00	H	0.2	0.3	19.09	38.5	-19.4	

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.1.5. LTE Band 12

10MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/2/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber K
Mode: LTE_QPSK Band 12 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181574, and Chamber K SMA Cables
Substitution: Dipole T416, Chamber K 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	11.39	V	3.7	1.3	8.93	34.8	-25.9	
704.00	20.24	H	3.7	1.4	17.86	34.8	-16.9	
Mid Ch								
707.50	11.55	V	3.7	1.2	9.05	34.8	-25.8	
707.50	20.23	H	3.7	1.3	17.80	34.8	-17.0	
High Ch								
711.00	11.68	V	3.8	1.2	9.14	34.8	-25.7	
711.00	20.46	H	3.8	1.3	17.98	34.8	-16.8	

10MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/2/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber K
Mode: LTE_16QAM Band 12 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181574, and Chamber K SMA Cables
Substitution: Dipole T416, Chamber K 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	10.57	V	3.7	1.3	8.11	34.8	-26.7	
704.00	19.40	H	3.7	1.4	17.02	34.8	-17.8	
Mid Ch								
707.50	10.66	V	3.7	1.2	8.16	34.8	-26.6	
707.50	19.38	H	3.7	1.3	16.95	34.8	-17.9	
High Ch								
711.00	10.83	V	3.8	1.2	8.29	34.8	-26.5	
711.00	19.61	H	3.8	1.3	17.13	34.8	-17.7	

5MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/2/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber K
Mode: LTE_QPSK Band 12 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181574, and Chamber K SMA Cables
Substitution: Dipole T416, Chamber K 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	11.28	V	3.7	1.3	8.84	34.8	-26.0	
701.50	20.08	H	3.7	1.4	17.74	34.8	-17.1	
Mid Ch								
707.50	11.84	V	3.7	1.2	9.34	34.8	-25.5	
707.50	20.40	H	3.7	1.3	17.97	34.8	-16.8	
High Ch								
713.50	12.56	V	3.8	1.2	9.99	34.8	-24.8	
713.50	20.93	H	3.8	1.2	18.41	34.8	-16.4	

5MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/2/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber K
Mode: LTE_16QAM Band 12 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181574, and Chamber K SMA Cables
Substitution: Dipole T416, Chamber K 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	10.48	V	3.7	1.3	8.04	34.8	-26.8	
701.50	19.24	H	3.7	1.4	16.90	34.8	-17.9	
Mid Ch								
707.50	11.02	V	3.7	1.2	8.52	34.8	-26.3	
707.50	19.57	H	3.7	1.3	17.14	34.8	-17.7	
High Ch								
713.50	11.79	V	3.8	1.2	9.22	34.8	-25.6	
713.50	20.16	H	3.8	1.2	17.64	34.8	-17.2	

3MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/2/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber K
Mode: LTE_QPSK Band 12 Fundamentals, 3MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181574, and Chamber K SMA Cables
Substitution: Dipole T416, Chamber K 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	11.05	V	3.7	1.3	8.62	34.8	-26.2	
700.50	20.07	H	3.7	1.4	17.74	34.8	-17.1	
Mid Ch								
707.50	11.81	V	3.7	1.2	9.31	34.8	-25.5	
707.50	20.46	H	3.7	1.3	18.03	34.8	-16.8	
High Ch								
714.50	12.60	V	3.8	1.2	10.02	34.8	-24.8	
714.50	20.93	H	3.8	1.2	18.39	34.8	-16.4	

3MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/2/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber K
Mode: LTE_16QAM Band 12 Fundamentals, 3MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181574, and Chamber K SMA Cables
Substitution: Dipole T416, Chamber K 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	10.23	V	3.7	1.3	7.80	34.8	-27.0	
700.50	19.24	H	3.7	1.4	16.91	34.8	-17.9	
Mid Ch								
707.50	10.94	V	3.7	1.2	8.44	34.8	-26.4	
707.50	19.60	H	3.7	1.3	17.17	34.8	-17.6	
High Ch								
714.50	11.71	V	3.8	1.2	9.13	34.8	-25.7	
714.50	20.06	H	3.8	1.2	17.52	34.8	-17.3	

1.4MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/2/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber K
Mode: LTE_QPSK Band 12 Fundamentals, 1.4MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181574, and Chamber K SMA Cables
Substitution: Dipole T416, Chamber K 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	10.98	V	3.7	1.3	8.56	34.8	-26.2	
699.70	19.74	H	3.7	1.4	17.42	34.8	-17.4	
Mid Ch								
707.50	11.63	V	3.7	1.2	9.13	34.8	-25.7	
707.50	20.01	H	3.7	1.3	17.58	34.8	-17.2	
High Ch								
715.30	12.24	V	3.8	1.2	9.65	34.8	-25.1	
715.30	20.57	H	3.8	1.2	18.02	34.8	-16.8	

1.4MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/2/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber K
Mode: LTE_16QAM Band 12 Fundamentals, 1.4MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181574, and Chamber K SMA Cables
Substitution: Dipole T416, Chamber K 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	10.12	V	3.7	1.3	7.70	34.8	-27.1	
699.70	18.87	H	3.7	1.4	16.55	34.8	-18.3	
Mid Ch								
707.50	10.73	V	3.7	1.2	8.23	34.8	-26.6	
707.50	19.11	H	3.7	1.3	16.68	34.8	-18.1	
High Ch								
715.30	11.36	V	3.8	1.2	8.77	34.8	-26.0	
715.30	19.71	H	3.8	1.2	17.16	34.8	-17.6	

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.1.6. LTE Band 13

10MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/2/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber K
Mode: LTE_QPSK Band 13 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181574, and Chamber K SMA Cables
Substitution: Dipole T416, Chamber K 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	13.34	V	4.0	0.7	10.13	34.8	-24.6	
782.00	22.15	H	4.0	0.5	18.71	34.8	-16.1	

10MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/2/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber K
Mode: LTE_16QAM Band 13 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181574, and Chamber K SMA Cables
Substitution: Dipole T416, Chamber K 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	12.54	V	4.0	0.7	9.33	34.8	-25.4	
782.00	21.37	H	4.0	0.5	17.93	34.8	-16.8	

5MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/2/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber K
Mode: LTE_QPSK Band 13 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181574, and Chamber K SMA Cables
Substitution: Dipole T416, Chamber K 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	13.57	V	4.0	0.8	10.38	34.8	-24.4	
779.50	21.95	H	4.0	0.5	18.55	34.8	-16.2	
Mid Ch								
782.00	13.78	V	4.0	0.7	10.57	34.8	-24.2	
782.00	22.08	H	4.0	0.5	18.64	34.8	-16.1	
High Ch								
784.50	14.02	V	4.0	0.7	10.78	34.8	-24.0	
784.50	22.30	H	4.0	0.5	18.82	34.8	-15.9	

5MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/2/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber K
Mode: LTE_16QAM Band 13 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181574, and Chamber K SMA Cables
Substitution: Dipole T416, Chamber K 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	12.81	V	4.0	0.8	9.62	34.8	-25.1	
779.50	21.19	H	4.0	0.5	17.79	34.8	-17.0	
Mid Ch								
782.00	12.91	V	4.0	0.7	9.70	34.8	-25.1	
782.00	21.19	H	4.0	0.5	17.75	34.8	-17.0	
High Ch								
784.50	13.15	V	4.0	0.7	9.91	34.8	-24.9	
784.50	21.41	H	4.0	0.5	17.93	34.8	-16.8	

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.1.7. LTE Band 41 (FCC)

20MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/3/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber K
Mode: LTE_QPSK Band 41(FCC) Fundamentals, 20MHz Bandwidth

Test Equipment:
Receiving: Horn T344, and Chamber K SMA Cables
Substitution: T120, Chamber K 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	23.02	V	7.3	5.7	21.50	33.0	-11.5	
2506.00	24.02	H	7.3	5.7	22.50	33.0	-10.5	
Mid Ch								
2593.00	23.77	V	7.3	5.8	22.31	33.0	-10.7	
2593.00	24.24	H	7.3	5.8	22.78	33.0	-10.2	
High Ch								
2680.00	22.14	V	7.7	6.0	20.45	33.0	-12.6	
2680.00	23.18	H	7.7	6.0	21.49	33.0	-11.5	

20MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/3/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber K
Mode: LTE_16QAM Band 41(FCC) Fundamentals, 20MHz Bandwidth

Test Equipment:
Receiving: Horn T344, and Chamber K SMA Cables
Substitution: T120, Chamber K 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	22.25	V	7.3	5.7	20.73	33.0	-12.3	
2506.00	22.91	H	7.3	5.7	21.39	33.0	-11.6	
Mid Ch								
2593.00	22.67	V	7.3	5.8	21.21	33.0	-11.8	
2593.00	23.30	H	7.3	5.8	21.84	33.0	-11.2	
High Ch								
2680.00	20.78	V	7.7	6.0	19.09	33.0	-13.9	
2680.00	21.81	H	7.7	6.0	20.12	33.0	-12.9	

15MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/3/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber K
Mode: LTE_QPSK Band 41(FCC) Fundamentals, 15MHz Bandwidth

Test Equipment:
Receiving: Horn T344, and Chamber K SMA Cables
Substitution: T120, Chamber K 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	22.27	V	7.3	5.7	20.74	33.0	-12.3	
2503.50	23.43	H	7.3	5.7	21.90	33.0	-11.1	
Mid Ch								
2593.00	23.63	V	7.3	5.8	22.17	33.0	-10.8	
2593.00	24.45	H	7.3	5.8	22.99	33.0	-10.0	
High Ch								
2682.50	21.39	V	7.7	6.0	19.68	33.0	-13.3	
2682.50	22.42	H	7.7	6.0	20.71	33.0	-12.3	

15MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/3/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber K
Mode: LTE_16QAM Band 41(FCC) Fundamentals, 15MHz Bandwidth

Test Equipment:
Receiving: Horn T344, and Chamber K SMA Cables
Substitution: T120, Chamber K 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	20.94	V	7.3	5.7	19.41	33.0	-13.6	
2503.50	22.44	H	7.3	5.7	20.91	33.0	-12.1	
Mid Ch								
2593.00	22.60	V	7.3	5.8	21.14	33.0	-11.9	
2593.00	23.43	H	7.3	5.8	21.97	33.0	-11.0	
High Ch								
2682.50	20.60	V	7.7	6.0	18.89	33.0	-14.1	
2682.50	21.59	H	7.7	6.0	19.88	33.0	-13.1	

10MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/3/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber K
Mode: LTE_QPSK Band 41(FCC) Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Horn T344, and Chamber K SMA Cables
Substitution: T120, Chamber K 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	21.33	V	7.3	5.7	19.80	33.0	-13.2	
2501.00	23.31	H	7.3	5.7	21.78	33.0	-11.2	
Mid Ch								
2593.00	23.81	V	7.3	5.8	22.35	33.0	-10.7	
2593.00	23.99	H	7.3	5.8	22.53	33.0	-10.5	
High Ch								
2685.00	21.74	V	7.7	6.0	20.01	33.0	-13.0	
2685.00	22.65	H	7.7	6.0	20.92	33.0	-12.1	

10MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/3/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber K
Mode: LTE_16QAM Band 41(FCC) Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Horn T344, and Chamber K SMA Cables
Substitution: T120, Chamber K 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	20.48	V	7.3	5.7	18.95	33.0	-14.1	
2501.00	22.03	H	7.3	5.7	20.50	33.0	-12.5	
Mid Ch								
2593.00	22.55	V	7.3	5.8	21.09	33.0	-11.9	
2593.00	22.95	H	7.3	5.8	21.49	33.0	-11.5	
High Ch								
2685.00	21.06	V	7.7	6.0	19.33	33.0	-13.7	
2685.00	21.93	H	7.7	6.0	20.20	33.0	-12.8	

5MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/3/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber K
Mode: LTE_QPSK Band 41(FCC) Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Horn T344, and Chamber K SMA Cables
Substitution: , Chamber K 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	22.33	V	7.2	5.7	20.77	33.0	-12.2	
2498.50	23.26	H	7.2	5.7	21.70	33.0	-11.3	
Mid Ch								
2593.00	23.07	V	7.3	5.8	21.61	33.0	-11.4	
2593.00	24.25	H	7.3	5.8	22.79	33.0	-10.2	
High Ch								
2687.50	21.99	V	7.7	6.0	20.24	33.0	-12.8	
2687.50	23.02	H	7.7	6.0	21.27	33.0	-11.7	

5MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 12/3/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber K
Mode: LTE_16QAM Band 41(FCC) Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Horn T344, and Chamber K SMA Cables
Substitution: , Chamber K 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	21.43	V	7.2	5.7	19.87	33.0	-13.1	
2498.50	22.36	H	7.2	5.7	20.80	33.0	-12.2	
Mid Ch								
2593.00	22.14	V	7.3	5.8	20.68	33.0	-12.3	
2593.00	23.35	H	7.3	5.8	21.89	33.0	-11.1	
High Ch								
2687.50	21.04	V	7.7	6.0	19.29	33.0	-13.7	
2687.50	22.07	H	7.7	6.0	20.32	33.0	-12.7	

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.1.8. LTE Band 66

20MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/20/2019
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	19.88	V	5.4	5.6	20.01	30.0	-10.0	
1720.00	22.65	H	5.4	5.6	22.78	30.0	-7.2	
Mid Ch								
1745.00	18.97	V	5.5	5.4	18.88	30.0	-11.1	
1745.00	22.91	H	5.5	5.4	22.82	30.0	-7.2	
High Ch								
1770.00	20.21	V	5.6	5.3	19.92	30.0	-10.1	
1770.00	22.34	H	5.6	5.3	22.05	30.0	-8.0	

20MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/20/2019
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	19.02	V	5.4	5.6	19.15	30.0	-10.9	
1720.00	21.78	H	5.4	5.6	21.91	30.0	-8.1	
Mid Ch								
1745.00	18.20	V	5.5	5.4	18.11	30.0	-11.9	
1745.00	22.13	H	5.5	5.4	22.04	30.0	-8.0	
High Ch								
1770.00	19.15	V	5.6	5.3	18.86	30.0	-11.1	
1770.00	21.28	H	5.6	5.3	20.99	30.0	-9.0	

15MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/20/2019
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	19.86	V	5.4	5.6	20.01	30.0	-10.0	
1717.50	22.64	H	5.4	5.6	22.79	30.0	-7.2	
Mid Ch								
1745.00	18.79	V	5.5	5.4	18.70	30.0	-11.3	
1745.00	23.15	H	5.5	5.4	23.06	30.0	-6.9	
High Ch								
1772.50	20.25	V	5.6	5.3	19.94	30.0	-10.1	
1772.50	22.38	H	5.6	5.3	22.07	30.0	-7.9	

15MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/20/2019
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	18.84	V	5.4	5.6	18.99	30.0	-11.0	
1717.50	21.71	H	5.4	5.6	21.86	30.0	-8.1	
Mid Ch								
1745.00	17.83	V	5.5	5.4	17.74	30.0	-12.3	
1745.00	22.22	H	5.5	5.4	22.13	30.0	-7.9	
High Ch								
1772.50	19.25	V	5.6	5.3	18.94	30.0	-11.1	
1772.50	21.49	H	5.6	5.3	21.18	30.0	-8.8	

10MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/20/2019
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	19.88	V	5.4	5.6	20.11	30.0	-9.9	
1715.00	22.77	H	5.4	5.6	23.00	30.0	-7.0	
Mid Ch								
1745.00	18.35	V	5.5	5.4	18.26	30.0	-11.7	
1745.00	23.24	H	5.5	5.4	23.15	30.0	-6.8	
High Ch								
1775.00	20.50	V	5.6	5.2	20.13	30.0	-9.9	
1775.00	22.27	H	5.6	5.2	21.90	30.0	-8.1	

10MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/20/2019
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	18.91	V	5.4	5.6	19.14	30.0	-10.9	
1715.00	21.86	H	5.4	5.6	22.09	30.0	-7.9	
Mid Ch								
1745.00	17.39	V	5.5	5.4	17.30	30.0	-12.7	
1745.00	22.29	H	5.5	5.4	22.20	30.0	-7.8	
High Ch								
1775.00	19.62	V	5.6	5.2	19.25	30.0	-10.8	
1775.00	21.40	H	5.6	5.2	21.03	30.0	-9.0	

5MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/20/2019
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	20.03	V	5.4	5.7	20.35	30.0	-9.7	
1712.50	22.78	H	5.4	5.7	23.10	30.0	-6.9	
Mid Ch								
1745.00	18.14	V	5.5	5.4	18.05	30.0	-11.9	
1745.00	23.19	H	5.5	5.4	23.10	30.0	-6.9	
High Ch								
1777.50	20.13	V	5.6	5.1	19.67	30.0	-10.3	
1777.50	22.53	H	5.6	5.1	22.07	30.0	-7.9	

5MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/20/2019
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	19.18	V	5.4	5.7	19.50	30.0	-10.5	
1712.50	21.99	H	5.4	5.7	22.31	30.0	-7.7	
Mid Ch								
1745.00	17.16	V	5.5	5.4	17.07	30.0	-12.9	
1745.00	22.22	H	5.5	5.4	22.13	30.0	-7.9	
High Ch								
1777.50	19.27	V	5.6	5.1	18.81	30.0	-11.2	
1777.50	21.74	H	5.6	5.1	21.28	30.0	-8.7	

3MHz QPSK

3MHz 16QAM

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/20/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 66 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	19.84	V	5.4	5.8	20.18	30.0	-9.8	
1711.50	22.31	H	5.4	5.8	22.65	30.0	-7.3	
Mid Ch								
1745.00	18.16	V	5.5	5.4	18.07	30.0	-11.9	
1745.00	23.06	H	5.5	5.4	22.97	30.0	-7.0	
High Ch								
1778.50	19.66	V	5.6	5.1	19.17	30.0	-10.8	
1778.50	22.64	H	5.6	5.1	22.15	30.0	-7.8	

1.4MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/20/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 66 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	18.93	V	5.4	5.8	19.27	30.0	-10.7	
1711.50	21.39	H	5.4	5.8	21.73	30.0	-8.3	
Mid Ch								
1745.00	17.17	V	5.5	5.4	17.08	30.0	-12.9	
1745.00	22.08	H	5.5	5.4	21.99	30.0	-8.0	
High Ch								
1778.50	18.85	V	5.6	5.1	18.36	30.0	-11.6	
1778.50	21.74	H	5.6	5.1	21.25	30.0	-8.7	

1.4Hz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/20/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_QPSK Band 66 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	20.21	V	5.4	5.8	20.56	30.0	-9.4	
1710.70	21.35	H	5.4	5.8	21.70	30.0	-8.3	
Mid Ch								
1745.00	18.51	V	5.5	5.4	18.42	30.0	-11.6	
1745.00	22.69	H	5.5	5.4	22.60	30.0	-7.4	
High Ch								
1779.30	19.63	V	5.6	5.1	19.12	30.0	-10.9	
1779.30	23.05	H	5.6	5.1	22.54	30.0	-7.5	

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 13096868
Date: 11/20/2019
Test Engineer: 19480
Configuration: EUT Only
Location: Chamber I
Mode: LTE_16QAM Band 66 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	19.30	V	5.4	5.8	19.65	30.0	-10.3	
1710.70	20.44	H	5.4	5.8	20.79	30.0	-9.2	
Mid Ch								
1745.00	17.45	V	5.5	5.4	17.36	30.0	-12.6	
1745.00	21.67	H	5.5	5.4	21.58	30.0	-8.4	
High Ch								
1779.30	18.64	V	5.6	5.1	18.13	30.0	-11.9	
1779.30	22.14	H	5.6	5.1	21.63	30.0	-8.4	

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.2. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

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

LIMIT

FCC: §22.917(a), §24.238(a), §27.53 (g), (h)
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

FCC: §27.53 (Band 13)
(c) The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.
(f) Emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals. (-70 dBW/MHz = -40dBm/MHz).

FCC: §27.53 (m) (Band 41)
At least 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section.

TEST PROCEDURE

KDB 971168 D01 v03r01/D02 v02/r01

All tests above 1GHz were done with a Resolution Bandwidth of 1MHz, and a Video Bandwidth of 3MHz.

RESULTS

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.2.1. GSM 850

LIMITS

FCC: §22.917(a)
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

GPRS MODE

Company:	Samsung
Project #:	13096868
Date:	11/21/19
Test Engineer:	19480
Configuration:	EUT + Support Equipment
Mode:	GPRS 850
Chamber #:	Chamber K

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF EMC4294 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	824.2 MHz											
1	1.64813	-54.29	Pk	28.6	-35.5	10.1	-51.09	-13	-38.09	0-360	150	H
2	2.47209	-57.26	Pk	32.3	-35.4	11	-49.36	-13	-36.36	0-360	150	H
3	3.29447	-68.49	Pk	32.8	-33.6	10.6	-58.69	-13	-45.69	0-360	150	H
4	1.64813	-50.37	Pk	28.6	-35.5	10.9	-46.37	-13	-33.37	0-360	150	V
5	2.47263	-59.35	Pk	32.3	-35.3	11.1	-51.25	-13	-38.25	0-360	150	V
6	3.29659	-67.32	Pk	32.8	-33.5	10.8	-57.22	-13	-44.22	0-360	150	V
	836.6 MHz											
1	1.67256	-60.14	Pk	28.8	-35.5	9.9	-56.94	-13	-43.94	0-360	150	H
2	2.50928	-53.12	Pk	32.3	-35.3	10.1	-46.02	-13	-33.02	0-360	150	H
3	3.34653	-67.42	Pk	32.9	-33.5	10.6	-57.42	-13	-44.42	0-360	150	H
4	1.67309	-52.08	Pk	28.8	-35.5	11.3	-47.48	-13	-34.48	0-360	150	V
5	2.50928	-56.35	Pk	32.3	-35.3	11.5	-47.85	-13	-34.85	0-360	150	V
6	3.34388	-68.74	Pk	32.9	-33.4	10.8	-58.44	-13	-45.44	0-360	150	V
	848.8 MHz											
1	1.69753	-57.98	Pk	29	-35.5	11.5	-52.98	-13	-39.98	0-360	150	H
2	2.54594	-57.74	Pk	32.4	-35.3	10.1	-50.54	-13	-37.54	0-360	150	H
3	3.39647	-67.48	Pk	32.9	-33.4	11	-56.98	-13	-43.98	0-360	150	H
4	1.697	-51.16	Pk	29	-35.5	11.7	-45.96	-13	-32.96	0-360	150	V
5	2.54594	-57.18	Pk	32.4	-35.3	10.9	-49.18	-13	-36.18	0-360	150	V
6	3.39434	-68.24	Pk	32.9	-33.4	11.2	-57.54	-13	-44.54	0-360	150	V

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

EGPRS MODE

Company:	Samsung
Project #:	13096868
Date:	11/21/19
Test Engineer:	19480
Configuration:	EUT + Support Equipment
Mode:	EGPRS 850
Chamber #:	Chamber K

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF EMC4294 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	824.2 MHz											
1	1.64813	-65.84	Pk	28.6	-35.5	10.1	-62.64	-13	-49.64	0-360	150	H
2	2.47634	-66.84	Pk	32.4	-35.3	10.8	-58.94	-13	-45.94	0-360	150	H
3	3.29713	-67.75	Pk	32.8	-33.4	10.5	-57.85	-13	-44.85	0-360	150	H
4	1.64813	-52.71	Pk	28.6	-35.5	10.9	-48.71	-13	-35.71	0-360	150	V
5	2.47634	-65.68	Pk	32.4	-35.3	10.9	-57.68	-13	-44.68	0-360	150	V
6	3.30031	-68.03	Pk	32.8	-33.4	11	-57.63	-13	-44.63	0-360	150	V
	836.6 MHz											
1	1.67788	-65.7	Pk	28.8	-35.5	9.9	-62.5	-13	-49.5	0-360	150	H
2	2.50981	-57.42	Pk	32.3	-35.3	10.1	-50.32	-13	-37.32	0-360	150	H
3	3.34919	-68.92	Pk	32.9	-33.5	10.5	-59.02	-13	-46.02	0-360	150	H
4	1.67256	-59.36	Pk	28.8	-35.5	11.3	-54.76	-13	-41.76	0-360	150	V
5	2.50397	-64.44	Pk	32.4	-35.2	11.2	-56.04	-13	-43.04	0-360	150	V
6	3.346	-69.12	Pk	32.9	-33.5	10.8	-58.92	-13	-45.92	0-360	150	V
	848.8 MHz											
1	1.70338	-66.04	Pk	29.2	-35.5	11.5	-60.84	-13	-47.84	0-360	150	H
2	2.54594	-59.85	Pk	32.4	-35.3	10.1	-52.65	-13	-39.65	0-360	150	H
3	3.39541	-67.7	Pk	32.9	-33.4	11.1	-57.1	-13	-44.1	0-360	150	H
4	1.70497	-67.13	Pk	29.3	-35.5	12	-61.33	-13	-48.33	0-360	150	V
5	2.54859	-66.65	Pk	32.4	-35.3	11	-58.55	-13	-45.55	0-360	150	V
6	3.39434	-66.89	Pk	32.9	-33.4	11.2	-56.19	-13	-43.19	0-360	150	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.2.2. GSM 1900

LIMITS

FCC: §24.238(a)
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

GPRS MODE

Company:	Samsung
Project #:	13096868
Date:	11/18/19
Test Engineer:	19480
Configuration:	EUT + Support Equipment
Mode:	GPRS 1900
Chamber #:	Chamber I

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1850.2 MHz											
1	3.68388	-74.29	Pk	33	-28.9	11.9	-58.29	-13	-45.29	0-360	148	H
2	5.60806	-76.52	Pk	35.2	-26.8	12.2	-55.92	-13	-42.92	0-360	148	H
3	7.32241	-77.63	Pk	35.6	-24	11.9	-54.13	-13	-41.13	0-360	148	H
4	3.70991	-75.98	Pk	33	-28.5	11.8	-59.68	-13	-46.68	0-360	148	V
5	5.52253	-76.08	Pk	35	-26.6	11.9	-55.78	-13	-42.78	0-360	148	V
6	7.38616	-77.39	Pk	35.6	-24.2	12	-53.99	-13	-40.99	0-360	148	V
	1880 MHz											
1	3.75984	-75.35	Pk	32.9	-28.4	11.8	-59.05	-13	-46.05	0-360	149	H
2	5.64631	-76.03	Pk	35.1	-26.6	11.9	-55.63	-13	-42.63	0-360	149	H
3	7.56731	-78.47	Pk	35.6	-23.9	12.2	-54.57	-13	-41.57	0-360	149	H
4	3.74284	-75.16	Pk	32.9	-28.3	12	-58.56	-13	-45.56	0-360	149	V
5	5.63463	-75.67	Pk	35	-26.5	12	-55.17	-13	-42.17	0-360	149	V
6	7.46744	-77.5	Pk	35.5	-24.2	11.8	-54.4	-13	-41.4	0-360	149	V
	1909.8 MHz											
1	3.78136	-74.82	Pk	33	-28.2	11.3	-58.72	-13	-45.72	0-360	148	H
2	5.79613	-76.88	Pk	35.1	-26.2	11.3	-56.68	-13	-43.68	0-360	148	H
3	7.72509	-78.5	Pk	35.7	-23.6	12	-54.4	-13	-41.4	0-360	148	H
4	3.80606	-76.28	Pk	32.9	-28.3	11.5	-60.18	-13	-47.18	0-360	148	V
5	5.76478	-77.29	Pk	35	-26.2	12	-56.49	-13	-43.49	0-360	148	V
6	7.62309	-78.08	Pk	35.7	-24.1	12	-54.48	-13	-41.48	0-360	148	V

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

EGPRS MODE

Company:	Samsung
Project #:	13096868
Date:	11/18/19
Test Engineer:	19480
Configuration:	EUT + Support Equipment
Mode:	EGPRS 1900
Chamber #:	Chamber I

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1850.2 MHz											
1	3.73966	-75.66	Pk	32.9	-28.4	11.6	-59.56	-13	-46.56	0-360	148	H
2	5.48428	-75.59	Pk	34.9	-26.6	12.3	-54.99	-13	-41.99	0-360	148	H
3	7.31656	-77.55	Pk	35.5	-24	11.8	-54.25	-13	-41.25	0-360	148	H
4	3.68228	-75.37	Pk	33	-28.8	11.8	-59.37	-13	-46.37	0-360	148	V
5	5.58894	-77.06	Pk	35.2	-26.7	12	-56.56	-13	-43.56	0-360	148	V
6	7.37394	-77.67	Pk	35.6	-24.2	11.8	-54.47	-13	-41.47	0-360	148	V
	1880 MHz											
1	3.72372	-74.87	Pk	32.9	-28.5	11.6	-58.87	-13	-45.87	0-360	149	H
2	5.61656	-75.81	Pk	35.1	-26.8	11.8	-55.71	-13	-42.71	0-360	149	H
3	7.56041	-78.77	Pk	35.6	-23.8	12.2	-54.77	-13	-41.77	0-360	149	H
4	3.76781	-76.29	Pk	33	-28.2	11.5	-59.99	-13	-46.99	0-360	149	V
5	5.60541	-76.4	Pk	35.2	-26.8	12.2	-55.8	-13	-42.8	0-360	149	V
6	7.49081	-77.7	Pk	35.6	-24	12	-54.1	-13	-41.1	0-360	149	V
	1909.8 MHz											
1	3.85972	-75.46	Pk	33	-28.3	11.6	-59.16	-13	-46.16	0-360	148	H
2	5.79559	-76.15	Pk	35.1	-26.2	11.4	-55.85	-13	-42.85	0-360	148	H
3	7.63584	-77.05	Pk	35.6	-24.1	11.9	-53.65	-13	-40.65	0-360	148	H
4	3.79597	-75.28	Pk	33	-28.3	11.4	-59.18	-13	-46.18	0-360	148	V
5	5.76372	-77.46	Pk	35	-26.2	12	-56.66	-13	-43.66	0-360	148	V
6	7.64222	-77.57	Pk	35.6	-24.1	11.8	-54.27	-13	-41.27	0-360	148	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.2.3. WCDMA BAND 5

LIMITS

FCC: §22.917(a)
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

REL 99 MODE

Company:	Samsung
Project #:	13096868
Date:	11/21/19
Test Engineer:	19480
Configuration:	EUT + Support Equipment
Mode:	REL 99 Band 5
Chamber #:	Chamber K

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF EMC4294 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	826.4 MHz											
1	1.65397	-64.11	Pk	28.7	-35.5	10.2	-60.71	-13	-47.71	0-360	150	H
2	2.47555	-66.81	Pk	32.4	-35.3	10.9	-58.81	-13	-45.81	0-360	150	H
3	3.30138	-67.76	Pk	32.8	-33.4	10.6	-57.76	-13	-44.76	0-360	150	H
4	1.65025	-59.61	Pk	28.6	-35.5	10.9	-55.61	-13	-42.61	0-360	150	V
5	2.47741	-66.64	Pk	32.4	-35.3	10.7	-58.84	-13	-45.84	0-360	150	V
6	3.30403	-68.23	Pk	32.8	-33.5	11.2	-57.73	-13	-44.73	0-360	150	V
	836.6 MHz											
1	1.67363	-65.55	Pk	28.8	-35.5	9.9	-62.35	-13	-49.35	0-360	150	H
2	2.50716	-65.95	Pk	32.3	-35.3	10	-58.95	-13	-45.95	0-360	150	H
3	3.346	-68.07	Pk	32.9	-33.5	10.6	-58.07	-13	-45.07	0-360	150	H
4	1.6715	-60.16	Pk	28.8	-35.5	11.3	-55.56	-13	-42.56	0-360	150	V
5	2.50716	-66.44	Pk	32.3	-35.3	11.3	-58.14	-13	-45.14	0-360	150	V
6	3.34228	-68.42	Pk	32.9	-33.3	10.8	-58.02	-13	-45.02	0-360	150	V
	846.6 MHz											
1	1.69381	-65.05	Pk	29	-35.5	11.4	-60.15	-13	-47.15	0-360	151	H
2	2.54063	-66.6	Pk	32.4	-35.3	9.9	-59.6	-13	-46.6	0-360	151	H
3	3.39063	-67.91	Pk	32.9	-33.3	11.1	-57.21	-13	-44.21	0-360	151	H
4	1.69063	-64.28	Pk	29	-35.4	11.9	-58.78	-13	-45.78	0-360	151	V
5	2.53956	-66.84	Pk	32.4	-35.3	10.5	-59.24	-13	-46.24	0-360	151	V
6	3.38903	-67.94	Pk	32.9	-33.4	11.1	-57.34	-13	-44.34	0-360	151	V

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HSDPA MODE

Company:	Samsung
Project #:	13096868
Date:	11/21/19
Test Engineer:	19480
Configuration:	EUT + Support Equipment
Mode:	HSDPA Band 5
Chamber #:	Chamber K

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF EMC4294 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	826.4 MHz											
1	1.65716	-66.12	Pk	28.7	-35.4	10.3	-62.52	-13	-49.52	0-360	150	H
2	2.47688	-66.71	Pk	32.4	-35.3	10.8	-58.81	-13	-45.81	0-360	150	H
3	3.30244	-67.89	Pk	32.8	-33.5	10.7	-57.89	-13	-44.89	0-360	150	H
4	1.65078	-61.75	Pk	28.6	-35.5	11	-57.65	-13	-44.65	0-360	150	V
5	2.47688	-65.59	Pk	32.4	-35.3	10.8	-57.69	-13	-44.69	0-360	150	V
6	3.30881	-67.72	Pk	32.8	-33.4	11.3	-57.02	-13	-44.02	0-360	150	V
	836.6 MHz											
1	1.67097	-65.98	Pk	28.8	-35.5	10	-62.68	-13	-49.68	0-360	150	H
2	2.51088	-67.13	Pk	32.4	-35.3	10.2	-59.83	-13	-46.83	0-360	150	H
3	3.34334	-67.52	Pk	32.9	-33.4	10.6	-57.42	-13	-44.42	0-360	150	H
4	1.6715	-63.05	Pk	28.8	-35.5	11.3	-58.45	-13	-45.45	0-360	150	V
5	2.50875	-66.42	Pk	32.3	-35.3	11.5	-57.92	-13	-44.92	0-360	150	V
6	3.33856	-68.44	Pk	32.9	-33.4	10.8	-58.14	-13	-45.14	0-360	150	V
	846.6 MHz											
1	1.69381	-66.5	Pk	29	-35.5	11.4	-61.6	-13	-48.6	0-360	151	H
2	2.54381	-65.97	Pk	32.4	-35.3	10	-58.87	-13	-45.87	0-360	151	H
3	3.39009	-68.41	Pk	32.9	-33.3	11.1	-57.71	-13	-44.71	0-360	151	H
4	1.69063	-65.11	Pk	29	-35.4	11.9	-59.61	-13	-46.61	0-360	151	V
5	2.54594	-66.89	Pk	32.4	-35.3	10.9	-58.89	-13	-45.89	0-360	151	V
6	3.39328	-68.58	Pk	32.9	-33.3	11.2	-57.78	-13	-44.78	0-360	151	V

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.2.4. WCDMA BAND 2

LIMITS

FCC: §24.238(a)
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

REL 99 MODE

Company:	Samsung
Project #:	13096868
Date:	11/15/19
Test Engineer:	19480
Configuration:	EUT + Support Equipment
Mode:	REL 99 Band 2
Chamber #:	Chamber I

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1852.4 MHz											
1	3.70938	-75.01	Pk	33	-28.5	11.7	-58.81	-13	-45.81	0-360	149	H
2	5.56609	-75.48	Pk	35.2	-26.7	11.6	-55.38	-13	-42.38	0-360	149	H
3	7.39678	-78.13	Pk	35.5	-24.3	11.9	-55.03	-13	-42.03	0-360	149	H
4	3.70725	-75.11	Pk	33	-28.6	11.9	-58.81	-13	-45.81	0-360	149	V
5	5.54963	-76.95	Pk	35.1	-26.8	12.2	-56.45	-13	-43.45	0-360	149	V
6	7.40581	-78.29	Pk	35.5	-24.4	11.8	-55.39	-13	-42.39	0-360	149	V
	1880 MHz											
1	3.75878	-75.16	Pk	32.9	-28.4	11.8	-58.86	-13	-45.86	0-360	149	H
2	5.63834	-76.09	Pk	35	-26.5	11.8	-55.79	-13	-42.79	0-360	149	H
3	7.53172	-77.3	Pk	35.6	-23.9	11.5	-54.1	-13	-41.1	0-360	149	H
4	3.75931	-76.06	Pk	32.9	-28.3	11.8	-59.66	-13	-46.66	0-360	149	V
5	5.63728	-75.81	Pk	35	-26.5	12	-55.31	-13	-42.31	0-360	149	V
6	7.53119	-78.29	Pk	35.6	-23.8	11.6	-54.89	-13	-41.89	0-360	149	V
	1907.6 MHz											
1	3.81616	-74.87	Pk	32.9	-28.3	11.7	-58.57	-13	-45.57	0-360	149	H
2	5.71006	-76.71	Pk	34.9	-26.6	12	-56.41	-13	-43.41	0-360	149	H
3	7.62575	-78.18	Pk	35.7	-24.2	11.8	-54.88	-13	-41.88	0-360	149	H
4	3.81881	-75.49	Pk	32.9	-28.4	11.3	-59.69	-13	-46.69	0-360	149	V
5	5.72706	-77.47	Pk	34.9	-26.7	11.8	-57.47	-13	-44.47	0-360	149	V
6	7.63744	-77.82	Pk	35.6	-24.1	11.9	-54.42	-13	-41.42	0-360	149	V

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HSDPA MODE

Company:	Samsung
Project #:	13096868
Date:	11/15/19
Test Engineer:	19480
Configuration:	EUT + Support Equipment
Mode:	HSDPA Band 2
Chamber #:	Chamber I

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1852.4 MHz											
1	3.69822	-75.72	Pk	33	-28.8	11.9	-59.62	-13	-46.62	0-360	149	H
2	5.55122	-76.71	Pk	35.1	-26.8	12	-56.41	-13	-43.41	0-360	149	H
3	7.392	-78.75	Pk	35.5	-24.2	12.1	-55.35	-13	-42.35	0-360	149	H
4	3.70725	-75.03	Pk	33	-28.6	11.9	-58.73	-13	-45.73	0-360	149	V
5	5.55281	-75.9	Pk	35.1	-26.8	12.1	-55.5	-13	-42.5	0-360	149	V
6	7.42122	-78.55	Pk	35.6	-24.4	11.6	-55.75	-13	-42.75	0-360	149	V
	1880 MHz											
1	3.76516	-76.23	Pk	33	-28.2	11.6	-59.83	-13	-46.83	0-360	149	H
2	5.65534	-76.15	Pk	35	-26.7	12.3	-55.55	-13	-42.55	0-360	149	H
3	7.52003	-78.06	Pk	35.5	-23.9	11.9	-54.56	-13	-41.56	0-360	149	H
4	3.76091	-75.7	Pk	33	-28.4	11.8	-59.3	-13	-46.3	0-360	149	V
5	5.64684	-76.94	Pk	35.1	-26.5	12.1	-56.24	-13	-43.24	0-360	149	V
6	7.51738	-78.62	Pk	35.5	-23.9	12.1	-54.92	-13	-41.92	0-360	149	V
	1907.6 MHz											
1	3.81669	-73.92	Pk	32.9	-28.3	11.7	-57.62	-13	-44.62	0-360	149	H
2	5.71006	-76.82	Pk	34.9	-26.6	12	-56.52	-13	-43.52	0-360	149	H
3	7.63266	-78.08	Pk	35.6	-24.1	11.9	-54.68	-13	-41.68	0-360	149	H
4	3.8135	-75.81	Pk	32.9	-28.3	11.4	-59.81	-13	-46.81	0-360	149	V
5	5.73291	-77.11	Pk	35	-26.5	11.5	-57.11	-13	-44.11	0-360	149	V
6	7.63372	-78.32	Pk	35.6	-24.1	12	-54.82	-13	-41.82	0-360	149	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.2.5. WCDMA BAND 4

LIMITS

FCC: §27.53 (h)
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

REL 99 MODE

Company:	Samsung
Project #:	13096868
Date:	11/16/19
Test Engineer:	19480
Configuration:	EUT + Support Equipment
Mode:	REL 99 Band 4
Chamber #:	Chamber I

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1712.4 MHz											
1	3.43525	-75.38	Pk	32.7	-29.2	11.9	-59.98	-13	-46.98	0-360	149	H
2	5.13313	-77.26	Pk	34.4	-26.9	11.8	-57.96	-13	-44.96	0-360	149	H
3	6.83259	-77.72	Pk	35.5	-25.2	11.6	-55.82	-13	-42.82	0-360	149	H
4	3.431	-74.78	Pk	32.8	-29.2	11.7	-59.48	-13	-46.48	0-360	149	V
5	5.14109	-77.25	Pk	34.4	-27	12	-57.85	-13	-44.85	0-360	149	V
6	6.85438	-77.48	Pk	35.5	-25.2	11.7	-55.48	-13	-42.48	0-360	149	V
	1732.6 MHz											
1	3.46394	-75.81	Pk	32.8	-29.2	12	-60.21	-13	-47.21	0-360	149	H
2	5.20378	-76.82	Pk	34.3	-26.8	12.3	-57.02	-13	-44.02	0-360	149	H
3	6.93991	-76.76	Pk	35.6	-24.6	11.7	-54.06	-13	-41.06	0-360	149	H
4	3.46819	-75.54	Pk	32.8	-29	11.6	-60.14	-13	-47.14	0-360	149	V
5	5.19953	-77.6	Pk	34.4	-26.9	12.5	-57.6	-13	-44.6	0-360	149	V
6	6.92928	-77.97	Pk	35.6	-24.7	12	-55.07	-13	-42.07	0-360	149	V
	1752.6 MHz											
1	3.50856	-75.64	Pk	32.8	-28.7	11.8	-59.74	-13	-46.74	0-360	149	H
2	5.24097	-76.76	Pk	34.4	-26.8	12.1	-57.06	-13	-44.06	0-360	149	H
3	6.98666	-77.24	Pk	35.6	-24.8	11.8	-54.64	-13	-41.64	0-360	149	H
4	3.50697	-75.42	Pk	32.9	-28.9	11.8	-59.62	-13	-46.62	0-360	149	V
5	5.26116	-77.26	Pk	34.5	-26.8	12.3	-57.26	-13	-44.26	0-360	149	V
6	7.01694	-77.83	Pk	35.6	-24.8	11.8	-55.23	-13	-42.23	0-360	149	V

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HSDPA MODE

Company:	Samsung
Project #:	13096868
Date:	11/16/19
Test Engineer:	19480
Configuration:	EUT + Support Equipment
Mode:	HSDPA Band 4
Chamber #:	Chamber I

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1712.4 MHz											
1	3.43047	-75.28	Pk	32.8	-29.2	11.8	-59.88	-13	-46.88	0-360	150	H
2	5.15278	-75.05	Pk	34.4	-27	11.8	-55.85	-13	-42.85	0-360	150	H
3	6.85438	-76.95	Pk	35.5	-25.2	11.6	-55.05	-13	-42.05	0-360	150	H
4	3.42994	-75.38	Pk	32.8	-29.2	11.7	-60.08	-13	-47.08	0-360	150	V
5	5.1395	-76.65	Pk	34.5	-27.1	12	-57.25	-13	-44.25	0-360	150	V
6	6.84641	-77.46	Pk	35.5	-25.3	11.6	-55.66	-13	-42.66	0-360	150	V
	1732.6 MHz											
1	3.46713	-75.39	Pk	32.8	-29.1	12	-59.69	-13	-46.69	0-360	148	H
2	5.19581	-76.82	Pk	34.4	-27	12.1	-57.32	-13	-44.32	0-360	148	H
3	6.93513	-76.93	Pk	35.7	-24.6	11.7	-54.13	-13	-41.13	0-360	148	H
4	3.46766	-75.78	Pk	32.8	-29	11.6	-60.38	-13	-47.38	0-360	148	V
5	5.19156	-75.7	Pk	34.4	-27	12.3	-56	-13	-43	0-360	148	V
6	6.92928	-76.28	Pk	35.6	-24.7	12	-53.38	-13	-40.38	0-360	148	V
	1752.6 MHz											
1	3.49794	-74.92	Pk	32.9	-28.8	12.1	-58.72	-13	-45.72	0-360	148	H
2	5.26806	-76.4	Pk	34.5	-26.7	12.1	-56.5	-13	-43.5	0-360	148	H
3	7.00472	-77.29	Pk	35.7	-24.8	11.6	-54.79	-13	-41.79	0-360	148	H
4	3.499	-76.22	Pk	32.9	-28.9	11.9	-60.32	-13	-47.32	0-360	148	V
5	5.25956	-76.26	Pk	34.5	-26.8	12.3	-56.26	-13	-43.26	0-360	148	V
6	6.99622	-77.69	Pk	35.6	-24.8	11.9	-54.99	-13	-41.99	0-360	148	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.2.6. LTE BAND 2

LIMITS

FCC: §24.238(a)
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

QPSK LTE BAND 2 (20.0MHZ BANDWIDTH)

Company:	Samsung
Project #:	13096868
Date:	11/15/19
Test Engineer:	19480
Configuration:	EUT + Support Equipment
Mode:	LTE 2 QPSK 20MHz
Chamber #:	Chamber I

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1860 MHz											
1	3.69503	-74.86	Pk	33	-28.8	11.9	-58.76	-13	-45.76	0-360	149	H
2	5.54538	-75.01	Pk	35.1	-26.8	12.1	-54.61	-13	-41.61	0-360	149	H
3	7.39147	-78.36	Pk	35.5	-24.2	12.1	-54.96	-13	-41.96	0-360	149	H
4	3.70247	-75.7	Pk	33	-28.7	12.1	-59.3	-13	-46.3	0-360	149	V
5	5.55759	-76.36	Pk	35.1	-26.8	12	-56.06	-13	-43.06	0-360	149	V
6	7.4005	-78.63	Pk	35.6	-24.3	11.8	-55.53	-13	-42.53	0-360	149	V
	1880 MHz											
1	3.74178	-75.69	Pk	32.9	-28.3	11.7	-59.39	-13	-46.39	0-360	149	H
2	5.62613	-75.67	Pk	35.2	-26.6	11.4	-55.67	-13	-42.67	0-360	149	H
3	7.49559	-78.37	Pk	35.6	-23.9	12	-54.67	-13	-41.67	0-360	149	H
4	3.74125	-75.56	Pk	32.9	-28.4	11.9	-59.16	-13	-46.16	0-360	149	V
5	5.60753	-76.4	Pk	35.2	-26.8	12.2	-55.8	-13	-42.8	0-360	149	V
6	7.48178	-77.61	Pk	35.5	-24	11.7	-54.41	-13	-41.41	0-360	149	V
	1900 MHz											
1	3.78216	-74.92	Pk	33	-28.2	11.3	-58.82	-13	-45.82	0-360	149	H
2	5.66491	-75.89	Pk	35	-26.8	12.2	-55.49	-13	-42.49	0-360	149	H
3	7.54766	-77.78	Pk	35.6	-23.9	11.9	-54.18	-13	-41.18	0-360	149	H
4	3.78163	-76.15	Pk	33	-28.2	11.4	-59.95	-13	-46.95	0-360	149	V
5	5.66916	-76.64	Pk	35	-26.8	11.9	-56.54	-13	-43.54	0-360	149	V
6	7.562	-78.72	Pk	35.6	-23.9	12.3	-54.72	-13	-41.72	0-360	149	V

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

16QAM LTE BAND 2 (20.0MHZ BANDWIDTH)

Company:	Samsung
Project #:	13096868
Date:	11/15/19
Test Engineer:	19480
Configuration:	EUT + Support Equipment
Mode:	LTE 2 16QAM 20MHz
Chamber #:	Chamber I

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1860 MHz											
1	3.70194	-72.97	Pk	33	-28.8	11.9	-56.87	-13	-43.87	0-360	148	H
2	5.53847	-76.86	Pk	35.1	-26.7	12.1	-56.36	-13	-43.36	0-360	148	H
3	7.38775	-78.12	Pk	35.5	-24.2	12	-54.82	-13	-41.82	0-360	148	H
4	3.69875	-75.19	Pk	33	-28.8	12.1	-58.89	-13	-45.89	0-360	148	V
5	5.54803	-77.28	Pk	35.1	-26.8	12.3	-56.68	-13	-43.68	0-360	148	V
6	7.40528	-78.54	Pk	35.6	-24.4	11.8	-55.54	-13	-42.54	0-360	148	V
	1880 MHz											
1	3.74497	-75.67	Pk	32.9	-28.4	11.6	-59.57	-13	-46.57	0-360	149	H
2	5.61338	-75.81	Pk	35.2	-26.8	12	-55.41	-13	-42.41	0-360	149	H
3	7.47222	-77.04	Pk	35.6	-24.2	11.5	-54.14	-13	-41.14	0-360	149	H
4	3.74178	-75.35	Pk	32.9	-28.3	12	-58.75	-13	-45.75	0-360	149	V
5	5.61338	-76.78	Pk	35.2	-26.8	12.1	-56.28	-13	-43.28	0-360	149	V
6	7.49241	-77.19	Pk	35.6	-23.9	12	-53.49	-13	-40.49	0-360	149	V
	1900 MHz											
1	3.78216	-71.94	Pk	33	-28.2	11.3	-55.84	-13	-42.84	0-360	149	H
2	5.67394	-75.54	Pk	35	-26.8	11.9	-55.44	-13	-42.44	0-360	149	H
3	7.54606	-77.96	Pk	35.6	-23.9	11.9	-54.36	-13	-41.36	0-360	149	H
4	3.78216	-74.8	Pk	33	-28.2	11.4	-58.6	-13	-45.6	0-360	149	V
5	5.67447	-76.6	Pk	35	-26.8	11.8	-56.6	-13	-43.6	0-360	149	V
6	7.55297	-78.72	Pk	35.6	-23.8	12.1	-54.82	-13	-41.82	0-360	149	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.2.7. LTE BAND 5

LIMITS

FCC: §22.917(a)
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

QPSK LTE BAND 5 (10.0MHZ BANDWIDTH)

Company:	Samsung
Project #:	13096868
Date:	11/19/19
Test Engineer:	19480
Configuration:	EUT + Support Equipment
Mode:	LTE 5 QPSK 10MHz
Chamber #:	Chamber I

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	829 MHz											
1	1.64228	-73.45	Pk	28.5	-31.7	12.3	-64.35	-13	-51.35	0-360	149	H
2	2.45244	-73.27	Pk	32.2	-30.4	11.6	-59.87	-13	-46.87	0-360	149	H
3	3.28809	-76	Pk	32.8	-29.1	12.2	-60.1	-13	-47.1	0-360	149	H
4	1.64653	-73.39	Pk	28.5	-31.6	11.4	-65.09	-13	-52.09	0-360	149	V
5	2.47422	-71.44	Pk	32.3	-30.4	11.5	-58.04	-13	-45.04	0-360	149	V
6	3.27322	-75.28	Pk	32.8	-29.2	11.7	-59.98	-13	-46.98	0-360	149	V
	836.5 MHz											
1	1.64972	-72.28	Pk	28.5	-31.7	12.5	-62.98	-13	-49.98	0-360	149	H
2	2.52894	-73.45	Pk	32.3	-30.2	12.7	-58.65	-13	-45.65	0-360	149	H
3	3.33484	-74.55	Pk	32.8	-29.2	11.6	-59.35	-13	-46.35	0-360	149	H
4	1.66088	-72.87	Pk	28.7	-31.6	11.4	-64.37	-13	-51.37	0-360	149	V
5	2.49653	-71.54	Pk	32.3	-30.3	11.4	-58.14	-13	-45.14	0-360	149	V
6	3.31413	-75.13	Pk	32.7	-29.4	11.7	-60.13	-13	-47.13	0-360	149	V
	844 MHz											
1	1.67947	-73.31	Pk	28.9	-31.6	12	-64.01	-13	-51.01	0-360	149	H
2	2.53584	-74.81	Pk	32.2	-30.2	12.7	-60.11	-13	-47.11	0-360	149	H
3	3.35663	-75.04	Pk	32.6	-29.2	11.5	-60.14	-13	-47.14	0-360	149	H
4	1.69859	-73.29	Pk	29.2	-31.6	12.1	-63.59	-13	-50.59	0-360	149	V
5	2.52841	-74.62	Pk	32.3	-30.2	11.6	-60.92	-13	-47.92	0-360	149	V
6	3.36991	-74.77	Pk	32.7	-29.3	11.7	-59.67	-13	-46.67	0-360	149	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

16QAM LTE BAND 5 (10.0MHZ BANDWIDTH)

Company:	Samsung
Project #:	13096868
Date:	11/19/19
Test Engineer:	19480
Configuration:	EUT + Support Equipment
Mode:	LTE 5 16QAM 10MHz
Chamber #:	Chamber I

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	829 MHz											
1	1.64919	-74.34	Pk	28.5	-31.7	12.5	-65.04	-13	-52.04	0-360	148	H
2	2.47369	-69.88	Pk	32.3	-30.4	11.3	-56.68	-13	-43.68	0-360	148	H
3	3.27534	-75.52	Pk	32.8	-29.1	12.1	-59.72	-13	-46.72	0-360	148	H
4	1.64919	-71.89	Pk	28.5	-31.7	11.4	-63.69	-13	-50.69	0-360	148	V
5	2.47369	-71.34	Pk	32.3	-30.4	11.5	-57.94	-13	-44.94	0-360	148	V
6	3.29819	-75	Pk	32.7	-29.2	12	-59.5	-13	-46.5	0-360	148	V
	836.5 MHz											
1	1.64972	-73.86	Pk	28.5	-31.7	12.5	-64.56	-13	-51.56	0-360	149	H
2	2.49653	-71.47	Pk	32.3	-30.3	11.3	-58.17	-13	-45.17	0-360	149	H
3	3.32794	-74.5	Pk	32.7	-29.2	11.6	-59.4	-13	-46.4	0-360	149	H
4	1.646	-73.39	Pk	28.5	-31.6	11.4	-65.09	-13	-52.09	0-360	149	V
5	2.496	-70.08	Pk	32.3	-30.3	11.4	-56.68	-13	-43.68	0-360	149	V
6	3.30456	-75.27	Pk	32.7	-29.3	11.9	-59.97	-13	-46.97	0-360	149	V
	844 MHz											
1	1.67947	-73.41	Pk	28.9	-31.6	12	-64.11	-13	-51.11	0-360	149	H
2	2.52575	-75.16	Pk	32.3	-30.1	12.6	-60.36	-13	-47.36	0-360	149	H
3	3.40922	-74.52	Pk	32.7	-29.2	12.1	-58.92	-13	-45.92	0-360	149	H
4	1.67841	-71.31	Pk	28.9	-31.7	11.2	-62.91	-13	-49.91	0-360	149	V
5	2.51884	-74.31	Pk	32.3	-30.2	11.6	-60.61	-13	-47.61	0-360	149	V
6	3.38	-74.68	Pk	32.7	-29.3	12	-59.28	-13	-46.28	0-360	149	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.2.8. LTE BAND 12

LIMITS

FCC: §27.53 (g)
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

QPSK LTE BAND 12 (10.0MHZ BANDWIDTH)

Company:	Samsung
Project #:	13096868
Date:	11/19/19
Test Engineer:	19480
Configuration:	EUT + Support Equipment
Mode:	LTE 12 QPSK 10MHz
Chamber #:	Chamber I

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	704 MHz											
1	1.425	-73.34	Pk	28.6	-32.1	12.5	-64.34	-13	-51.34	0-360	149	H
2	2.09809	-71.01	Pk	31.1	-30.9	11.8	-59.01	-13	-46.01	0-360	149	H
3	2.82272	-74.09	Pk	32.2	-29.9	12.1	-59.69	-13	-46.69	0-360	149	H
4	1.42925	-72.61	Pk	28.5	-32	12	-64.11	-13	-51.11	0-360	149	V
5	2.09863	-69.05	Pk	31.1	-30.9	11.3	-57.55	-13	-44.55	0-360	149	V
6	2.82166	-74.62	Pk	32.2	-29.8	12	-60.22	-13	-47.22	0-360	149	V
	707.5 MHz											
1	1.41703	-73.64	Pk	28.7	-32.2	12.2	-64.94	-13	-51.94	0-360	149	H
2	2.10925	-71.62	Pk	31.1	-30.9	12.1	-59.32	-13	-46.32	0-360	149	H
3	2.78819	-74.32	Pk	32.3	-29.9	11.9	-60.02	-13	-47.02	0-360	149	H
4	1.42925	-71.94	Pk	28.5	-32	12	-63.44	-13	-50.44	0-360	149	V
5	2.10925	-70.25	Pk	31.1	-30.9	11.7	-58.35	-13	-45.35	0-360	149	V
6	2.77544	-75.08	Pk	32.5	-30.1	11.7	-60.98	-13	-47.98	0-360	149	V
	711 MHz											
1	1.41969	-73.67	Pk	28.7	-32.1	12.4	-64.67	-13	-51.67	0-360	149	H
2	2.11988	-70.29	Pk	31.1	-31	12.3	-57.89	-13	-44.89	0-360	149	H
3	2.79563	-74.29	Pk	32.3	-29.9	11.8	-60.09	-13	-47.09	0-360	149	H
4	1.41225	-73.1	Pk	28.8	-32.2	11.6	-64.9	-13	-51.9	0-360	149	V
5	2.11934	-68.86	Pk	31.1	-31.1	11.6	-57.26	-13	-44.26	0-360	149	V
6	2.79403	-73.98	Pk	32.3	-29.8	12	-59.48	-13	-46.48	0-360	149	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

16QAM LTE BAND 12 (10.0MHZ BANDWIDTH)

Company:	Samsung
Project #:	13096868
Date:	11/19/19
Test Engineer:	19480
Configuration:	EUT + Support Equipment
Mode:	LTE 12 16QAM 10MHz
Chamber #:	Chamber I

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	704 MHz											
1	1.42447	-72.9	Pk	28.6	-32.1	12.5	-63.9	-13	-50.9	0-360	148	H
2	2.09863	-70.98	Pk	31.1	-30.9	11.8	-58.98	-13	-45.98	0-360	148	H
3	2.79138	-74.9	Pk	32.3	-29.9	11.9	-60.6	-13	-47.6	0-360	148	H
4	1.41756	-72.96	Pk	28.7	-32.1	12.2	-64.16	-13	-51.16	0-360	148	V
5	2.09916	-69.72	Pk	31.1	-30.9	11.4	-58.12	-13	-45.12	0-360	148	V
6	2.79403	-74.35	Pk	32.3	-29.8	12	-59.85	-13	-46.85	0-360	148	V
	707.5 MHz											
1	1.41916	-73.35	Pk	28.7	-32.1	12.3	-64.45	-13	-51.45	0-360	149	H
2	2.10925	-72.42	Pk	31.1	-30.9	12.1	-60.12	-13	-47.12	0-360	149	H
3	2.81528	-73.85	Pk	32.2	-29.8	12.2	-59.25	-13	-46.25	0-360	149	H
4	1.40694	-71.84	Pk	28.8	-32.2	11.2	-64.04	-13	-51.04	0-360	149	V
5	2.10925	-67.27	Pk	31.1	-30.9	11.7	-55.37	-13	-42.37	0-360	149	V
6	2.8105	-73.49	Pk	32.3	-29.8	11.8	-59.19	-13	-46.19	0-360	149	V
	711 MHz											
1	1.43297	-72.67	Pk	28.4	-32.1	12	-64.37	-13	-51.37	0-360	149	H
2	2.11934	-70.22	Pk	31.1	-31.1	12.3	-57.92	-13	-44.92	0-360	149	H
3	2.80094	-74.49	Pk	32.3	-29.8	11.8	-60.19	-13	-47.19	0-360	149	H
4	1.41331	-72.29	Pk	28.8	-32.2	11.7	-63.99	-13	-50.99	0-360	149	V
5	2.11934	-68.05	Pk	31.1	-31.1	11.6	-56.45	-13	-43.45	0-360	149	V
6	2.7935	-74.13	Pk	32.3	-29.9	12	-59.73	-13	-46.73	0-360	149	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.2.9. LTE BAND 13

LIMITS

FCC: §27.53
(c) The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.
(f) Emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.

QPSK LTE BAND 13 (10.0MHZ BANDWIDTH)

Company:	Samsung
Project #:	13096868
Date:	11/19/19
Test Engineer:	19498
Configuration:	EUT + Support Equipment
Mode:	LTE 13 QPSK 10MHz
Chamber #:	Chamber I

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	782MHz											
1	1.5646	-73.47	Pk	28	-31.8	11.5	-65.77	-40	-25.77	0-360	149	H
2	2.33238	-73.56	Pk	31.5	-30.6	12.1	-60.56	-13	-47.56	0-360	149	H
3	3.15103	-74.45	Pk	32.7	-29	11.9	-58.85	-13	-45.85	0-360	149	H
4	1.5646	-73.78	Pk	28.1	-31.8	12.5	-64.98	-40	-24.98	0-360	149	V
5	2.326	-74.55	Pk	31.5	-30.6	12	-61.65	-13	-48.65	0-360	149	V
6	3.12659	-75.67	Pk	32.7	-29.2	11.7	-60.47	-13	-47.47	0-360	149	V

*** Emissions in the GPS band were wideband emissions therefore the -40dBm/MHz limit was used.**

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

16QAM LTE BAND 13 (10.0MHZ BANDWIDTH)

Company:	Samsung
Project #:	13096868
Date:	11/19/19
Test Engineer:	19498
Configuration:	EUT + Support Equipment
Mode:	LTE 13 16QAM 10MHz
Chamber #:	Chamber I

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	782MHz											
1	1.56462	-73.1	Pk	28	-31.8	11.4	-65.5	-40	-25.5	0-360	149	H
2	2.31644	-73.16	Pk	31.5	-30.6	12.4	-59.86	-13	-46.86	0-360	149	H
3	3.13775	-75.07	Pk	32.7	-29.1	11.5	-59.97	-13	-46.97	0-360	149	H
4	1.56462	-73.16	Pk	28	-31.8	12	-64.96	-40	-24.96	0-360	149	V
5	2.32228	-75.12	Pk	31.5	-30.5	11.8	-62.32	-13	-49.32	0-360	149	V
6	3.12819	-74.63	Pk	32.7	-29.3	11.7	-59.53	-13	-46.53	0-360	149	V

**NOTE for test engineer to check test data: if emissions in 1559-1610 MHz bandwidth is less than 700Hz BW, then the limit is -50dBm/MHz. If more than 700Hz BW, then shall be limited to −40 dBm/MHz.

*** Emissions in the GPS band were wideband emissions therefore the -40dBm/MHz limit was used.**

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.2.10. LTE BAND 41 (FCC)

LIMITS

FCC: §27.53 (m)
At least 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section.

QPSK LTE BAND 41 (20.0MHZ BANDWIDTH)

Company:	Samsung
Project #:	13096868
Date:	11/19/19
Test Engineer:	19497
Configuration:	EUT + Support Equipment
Mode:	LTE 41 QPSK 20MHz
Chamber #:	Chamber K

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF EMC4294 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	2506 MHz											
1	4.98544	-70.07	Pk	34.1	-30.9	10.5	-56.37	-25	-31.37	0-360	150	H
2	7.49134	-64.26	Pk	35.7	-26.8	10.4	-44.96	-25	-19.96	0-360	150	H
3	9.98875	-72.63	Pk	37.1	-24	10.3	-49.23	-25	-24.23	0-360	150	H
4	5.00138	-70.01	Pk	34.2	-30.8	10.7	-55.91	-25	-30.91	0-360	150	V
5	7.49134	-62.39	Pk	35.7	-26.8	10.6	-42.89	-25	-17.89	0-360	150	V
6	9.98875	-74.67	Pk	37.1	-24	10.7	-50.87	-25	-25.87	0-360	150	V
	2593 MHz											
1	5.21281	-69.57	Pk	34.3	-30.5	10.9	-54.87	-25	-29.87	0-360	150	H
2	7.75272	-65.57	Pk	35.9	-26.4	10.3	-45.77	-25	-20.77	0-360	150	H
3	10.36859	-73.91	Pk	37.5	-23.5	10.4	-49.51	-25	-24.51	0-360	150	H
4	5.16766	-67.96	Pk	34.2	-30.5	10.7	-53.56	-25	-28.56	0-360	150	V
5	7.75219	-64.05	Pk	35.9	-26.4	10.6	-43.95	-25	-18.95	0-360	150	V
6	10.33672	-72.29	Pk	37.5	-23.6	10.8	-47.59	-25	-22.59	0-360	150	V
	2680 MHz											
1	5.34244	-66.15	Pk	34.3	-30.3	11	-51.15	-25	-26.15	0-360	150	H
2	8.01356	-55.52	Pk	35.8	-26.1	10.3	-35.52	-25	-10.52	0-360	150	H
3	10.68416	-73.11	Pk	37.9	-23	9.9	-48.31	-25	-23.31	0-360	150	H
4	5.34191	-66.82	Pk	34.3	-30.3	10.9	-51.92	-25	-26.92	0-360	150	V
5	8.01356	-57.88	Pk	35.8	-26.1	10.5	-37.68	-25	-12.68	0-360	150	V
6	10.68469	-72.83	Pk	37.9	-23.1	10.2	-47.83	-25	-22.83	0-360	150	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

16QAM LTE BAND 41 (20.0MHZ BANDWIDTH)

Company:	Samsung
Project #:	13096868
Date:	11/19/19
Test Engineer:	19497
Configuration:	EUT + Support Equipment
Mode:	LTE 41 16QAM 20MHz
Chamber #:	Chamber K

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF EMC4294 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	2506 MHz											
1	4.96578	-68.45	Pk	34.1	-30.9	10.2	-55.05	-25	-30.05	0-360	150	H
2	7.49134	-63.41	Pk	35.7	-26.8	10.4	-44.11	-25	-19.11	0-360	150	H
3	9.98875	-72.69	Pk	37.1	-24	10.3	-49.29	-25	-24.29	0-360	150	H
4	4.99447	-68.12	Pk	34.1	-30.8	10.7	-54.12	-25	-29.12	0-360	150	V
5	7.49134	-62.62	Pk	35.7	-26.8	10.6	-43.12	-25	-18.12	0-360	150	V
6	9.98875	-70.85	Pk	37.1	-24	10.7	-47.05	-25	-22.05	0-360	150	V
	2593 MHz											
1	5.22238	-70.08	Pk	34.3	-30.3	10.8	-55.28	-25	-30.28	0-360	150	H
2	7.75219	-63.52	Pk	35.9	-26.4	10.4	-43.62	-25	-18.62	0-360	150	H
3	10.37284	-73.77	Pk	37.5	-23.5	10.3	-49.47	-25	-24.47	0-360	150	H
4	5.17775	-69.66	Pk	34.2	-30.4	10.5	-55.36	-25	-30.36	0-360	150	V
5	7.75219	-65.71	Pk	35.9	-26.4	10.6	-45.61	-25	-20.61	0-360	150	V
6	10.39303	-73.61	Pk	37.5	-23.4	10.4	-49.11	-25	-24.11	0-360	150	V
	2680 MHz											
1	5.34191	-69.03	Pk	34.3	-30.3	10.9	-54.13	-25	-29.13	0-360	150	H
2	8.01356	-55.36	Pk	35.8	-26.1	10.3	-35.36	-25	-10.36	0-360	150	H
3	10.68469	-73.65	Pk	37.9	-23.1	9.9	-48.95	-25	-23.95	0-360	150	H
4	5.34191	-67.4	Pk	34.3	-30.3	10.9	-52.5	-25	-27.5	0-360	150	V
5	8.01356	-60.39	Pk	35.8	-26.1	10.5	-40.19	-25	-15.19	0-360	150	V
6	10.68469	-70.91	Pk	37.9	-23.1	10.2	-45.91	-25	-20.91	0-360	150	V

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.2.11. LTE BAND 66

LIMITS

FCC: §27.53 (h)
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

QPSK LTE BAND 66 (20.0MHZ BANDWIDTH)

Company:	Samsung
Project #:	13096868
Date:	11/18/19
Test Engineer:	19480
Configuration:	EUT + Support Equipment
Mode:	LTE 66 QPSK 20MHz
Chamber #:	Chamber I

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1720 MHz											
1	3.42144	-73.29	Pk	32.7	-29.2	12	-57.79	-13	-44.79	0-360	149	H
2	5.19263	-77.15	Pk	34.4	-27	12.1	-57.65	-13	-44.65	0-360	149	H
3	6.76034	-76.71	Pk	35.6	-24.8	11.9	-54.01	-13	-41.01	0-360	149	H
4	3.42091	-74.62	Pk	32.7	-29.2	11.8	-59.32	-13	-46.32	0-360	149	V
5	5.12834	-76.93	Pk	34.4	-27.1	11.8	-57.83	-13	-44.83	0-360	149	V
6	6.83206	-77.16	Pk	35.5	-25.2	11.5	-55.36	-13	-42.36	0-360	149	V
	1745 MHz											
1	3.47191	-74.82	Pk	32.8	-29	11.8	-59.22	-13	-46.22	0-360	149	H
2	5.20644	-77.04	Pk	34.4	-26.7	12.2	-57.14	-13	-44.14	0-360	149	H
3	6.93831	-77.7	Pk	35.6	-24.6	11.7	-55	-13	-42	0-360	149	H
4	3.47244	-75.98	Pk	32.8	-29	11.7	-60.48	-13	-47.48	0-360	149	V
5	5.20059	-77.9	Pk	34.4	-27	12.5	-58	-13	-45	0-360	149	V
6	6.94788	-77.25	Pk	35.6	-24.6	11.6	-54.65	-13	-41.65	0-360	149	V
	1770 MHz											
1	3.52184	-74.27	Pk	32.9	-28.6	11.7	-58.27	-13	-45.27	0-360	148	H
2	5.26434	-75.71	Pk	34.5	-26.7	12	-55.91	-13	-42.91	0-360	148	H
3	6.99463	-76.13	Pk	35.6	-24.8	11.8	-53.53	-13	-40.53	0-360	148	H
4	3.53353	-75.58	Pk	32.9	-28.5	11.7	-59.48	-13	-46.48	0-360	148	V
5	5.284	-76.92	Pk	34.6	-26.7	12.1	-56.92	-13	-43.92	0-360	148	V
6	7.02331	-76.9	Pk	35.7	-24.9	11.7	-54.4	-13	-41.4	0-360	148	V

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

16QAM LTE BAND 66 (20.0MHZ BANDWIDTH)

Company:	Samsung
Project #:	13096868
Date:	11/18/19
Test Engineer:	19480
Configuration:	EUT + Support Equipment
Mode:	LTE 66 16QAM 20MHz
Chamber #:	Chamber I

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1720 MHz											
1	3.42197	-73.7	Pk	32.7	-29.3	12	-58.3	-13	-45.3	0-360	149	H
2	5.09859	-76.75	Pk	34.3	-26.8	11.9	-57.35	-13	-44.35	0-360	149	H
3	6.74866	-76.99	Pk	35.7	-24.9	11.9	-54.29	-13	-41.29	0-360	149	H
4	3.43684	-74.25	Pk	32.7	-29.3	11.6	-59.25	-13	-46.25	0-360	149	V
5	5.10975	-76.62	Pk	34.4	-26.9	11.7	-57.42	-13	-44.42	0-360	149	V
6	6.82463	-76.96	Pk	35.6	-25.1	11.6	-54.86	-13	-41.86	0-360	149	V
	1745 MHz											
1	3.46447	-75.43	Pk	32.8	-29.2	12	-59.83	-13	-46.83	0-360	149	H
2	5.22238	-76.67	Pk	34.4	-26.8	11.8	-57.27	-13	-44.27	0-360	149	H
3	6.92769	-77.26	Pk	35.6	-24.8	11.8	-54.66	-13	-41.66	0-360	149	H
4	3.46606	-75.99	Pk	32.8	-29.2	11.6	-60.79	-13	-47.79	0-360	149	V
5	5.20591	-78.16	Pk	34.3	-26.7	12.3	-58.26	-13	-45.26	0-360	149	V
6	6.93459	-76.93	Pk	35.7	-24.7	11.8	-54.13	-13	-41.13	0-360	149	V
	1770 MHz											
1	3.52131	-75.69	Pk	32.9	-28.6	11.7	-59.69	-13	-46.69	0-360	149	H
2	5.32278	-76.13	Pk	34.7	-26.8	12.1	-56.13	-13	-43.13	0-360	149	H
3	7.12903	-76.65	Pk	35.6	-24.4	11.6	-53.85	-13	-40.85	0-360	149	H
4	3.51228	-76.16	Pk	32.8	-28.6	11.9	-60.06	-13	-47.06	0-360	149	V
5	5.26541	-76.95	Pk	34.5	-26.7	12.3	-56.85	-13	-43.85	0-360	149	V
6	6.99675	-76.89	Pk	35.6	-24.8	11.9	-54.19	-13	-41.19	0-360	149	V

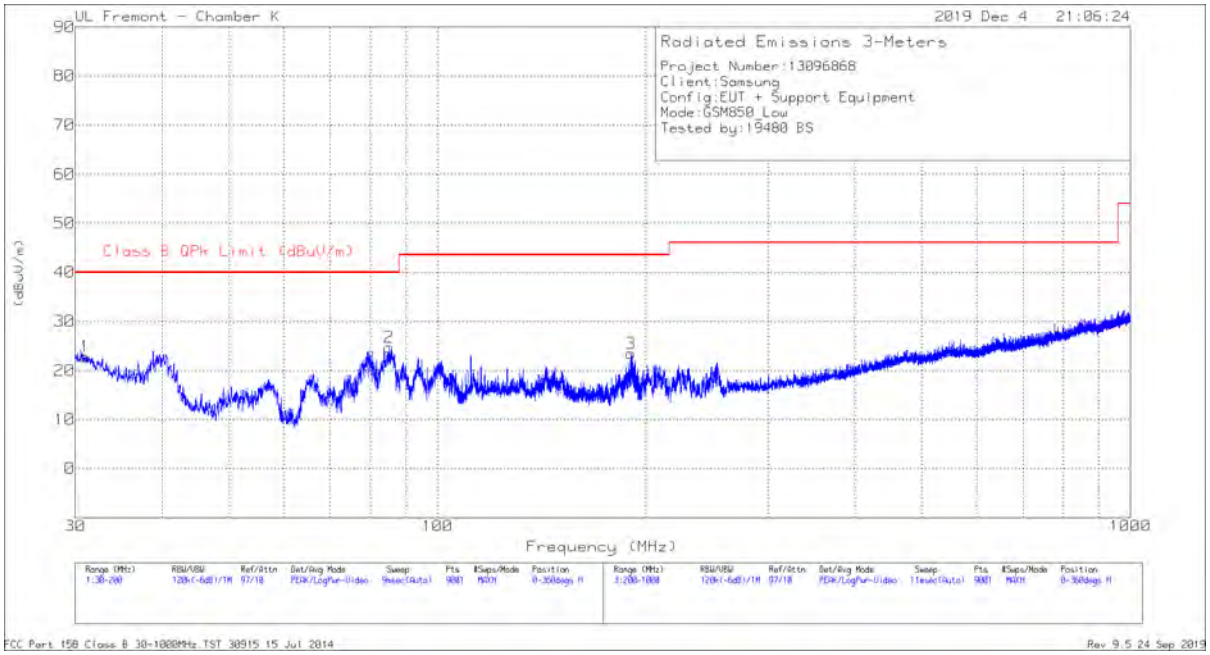
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

10. APPENDIX A: PRE-SCAN DATA FOR 15B RECEIVER MODE

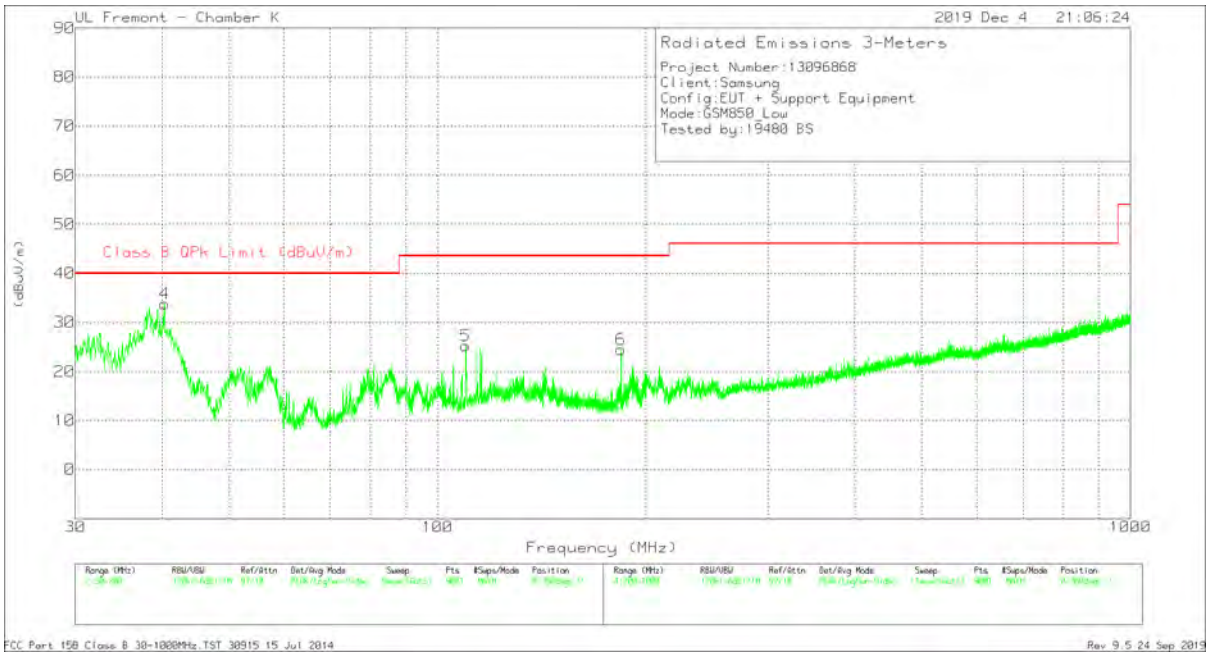
10.1. GSM 850

10.1.1. BELOW 1GHz

LOW CHANNEL



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

RADIATED EMISSIONS

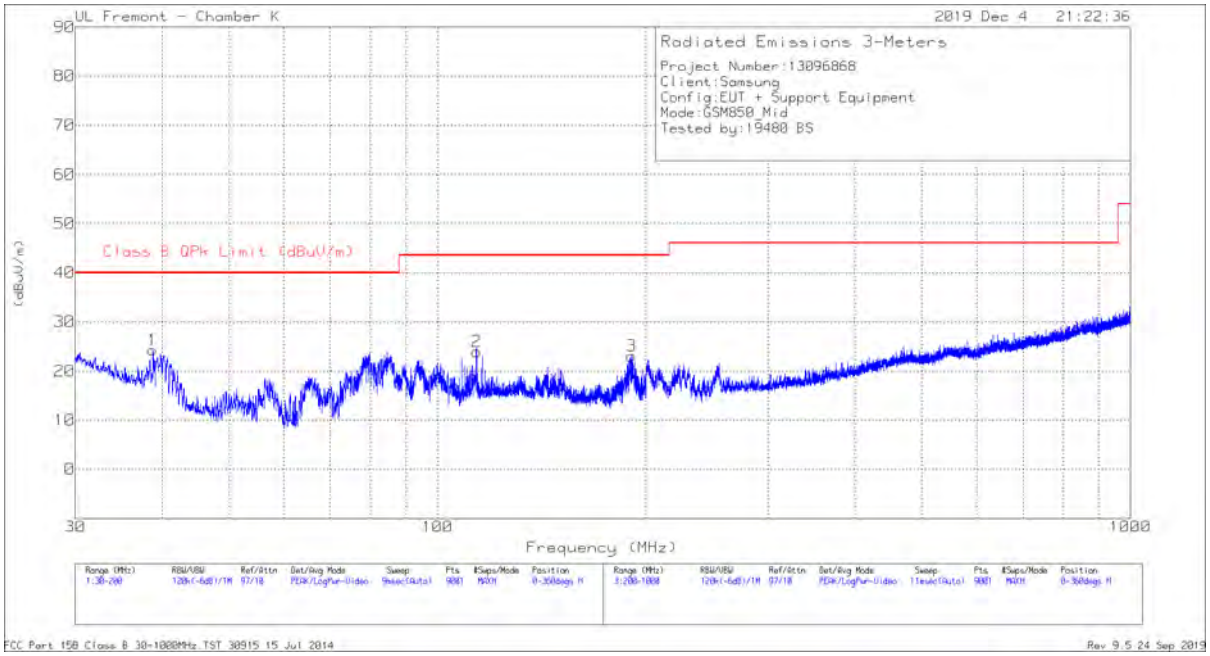
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	30.9633	27.99	Pk	26.4	-31.5	22.89	40	-17.11	0-360	399	H
2	85.0992	42.6	Pk	13.2	-31.1	24.7	40	-15.3	0-360	199	H
3	189.9898	36.7	Pk	17.2	-30.4	23.5	43.52	-20.02	0-360	100	H
4	40.3323	45.96	Pk	19.4	-31.5	33.86	40	-6.14	0-360	100	V
5	109.806	37.72	Pk	18.5	-30.9	25.32	43.52	-18.2	0-360	100	V
6	184.0587	37.88	Pk	17	-30.4	24.48	43.52	-19.04	0-360	100	V

Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
40.3026	43.31	Pk	19.4	-31.5	31.21	40	-8.79	54	110	V
40.3026	39.32	Qp	19.4	-31.5	27.22	40	-12.78	54	110	V

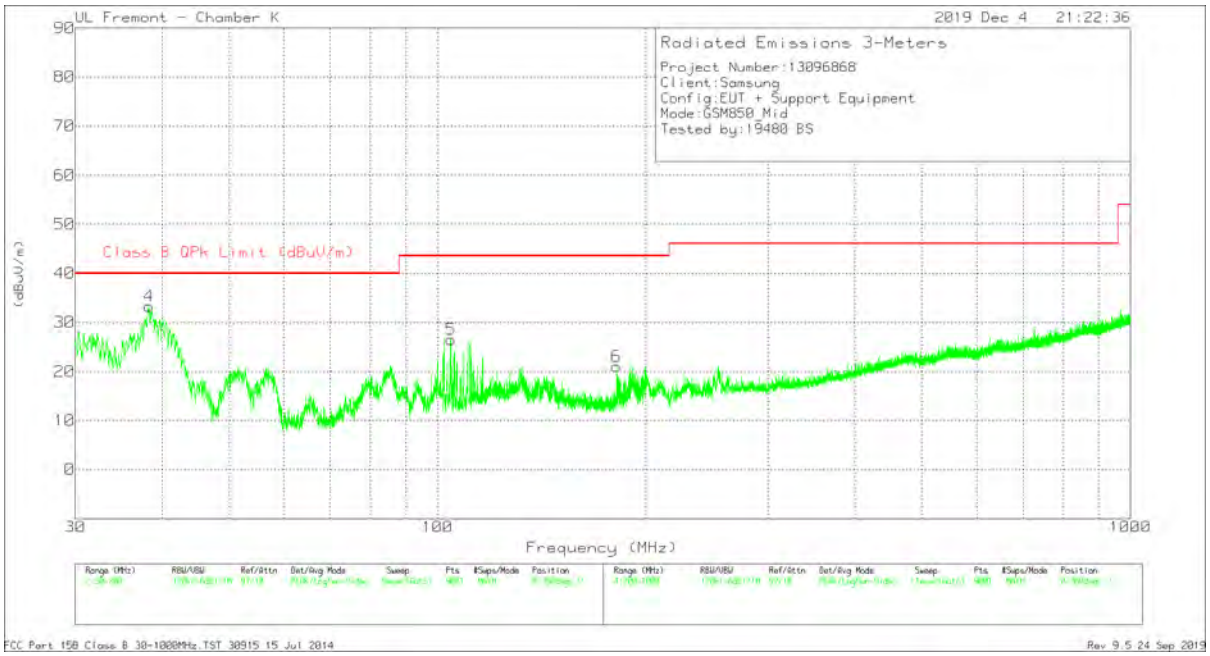
Pk - Peak detector
Qp - Quasi-Peak detector

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID CHANNEL



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

RADIATED EMISSIONS

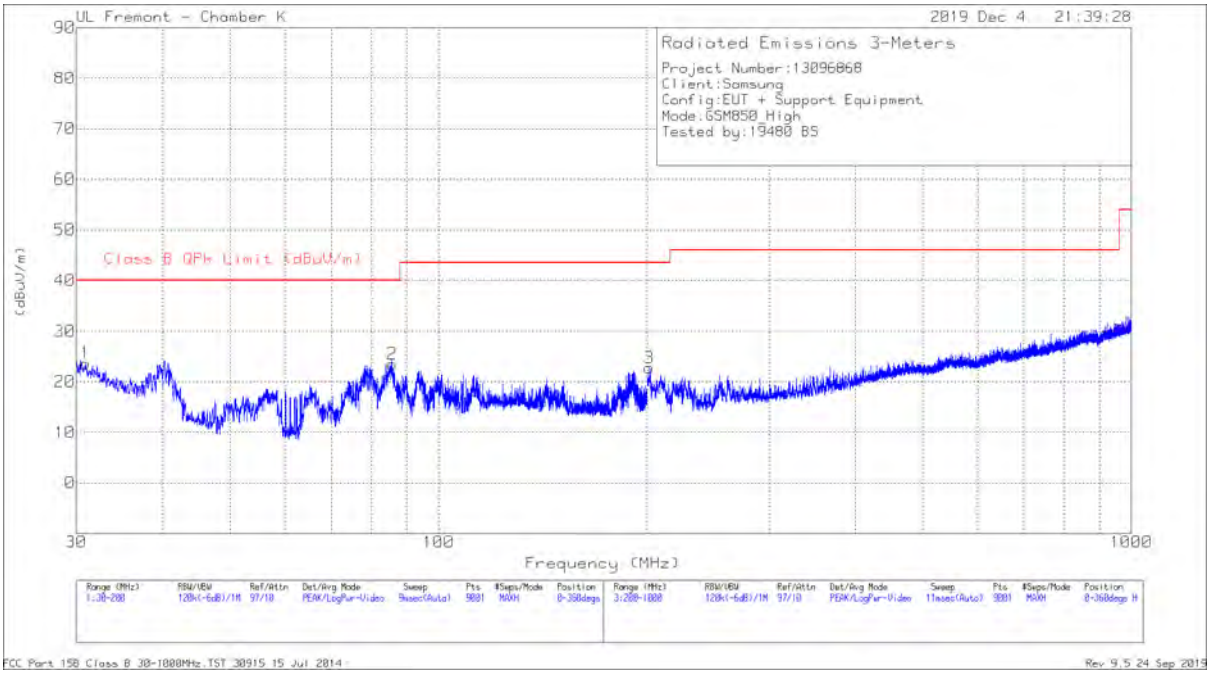
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	38.8401	35.3	Pk	20.5	-31.5	24.3	40	-15.7	0-360	399	H
2	113.8105	35.7	Pk	19.1	-30.8	24	43.52	-19.52	0-360	100	H
3	190.6509	36.19	Pk	17.3	-30.4	23.09	43.52	-20.43	0-360	100	H
4	38.3112	43.76	Pk	21	-31.5	33.26	40	-6.74	0-360	100	V
5	104.4793	40.04	Pk	17.4	-30.9	26.54	43.52	-16.98	0-360	100	V
6	181.2253	34.34	Pk	17.1	-30.4	21.04	43.52	-22.48	0-360	100	V

Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
38.3265	44.51	Pk	20.9	-31.5	33.91	40	-6.09	190	100	V
38.3265	39.07	Qp	20.9	-31.5	28.47	40	-11.53	190	100	V

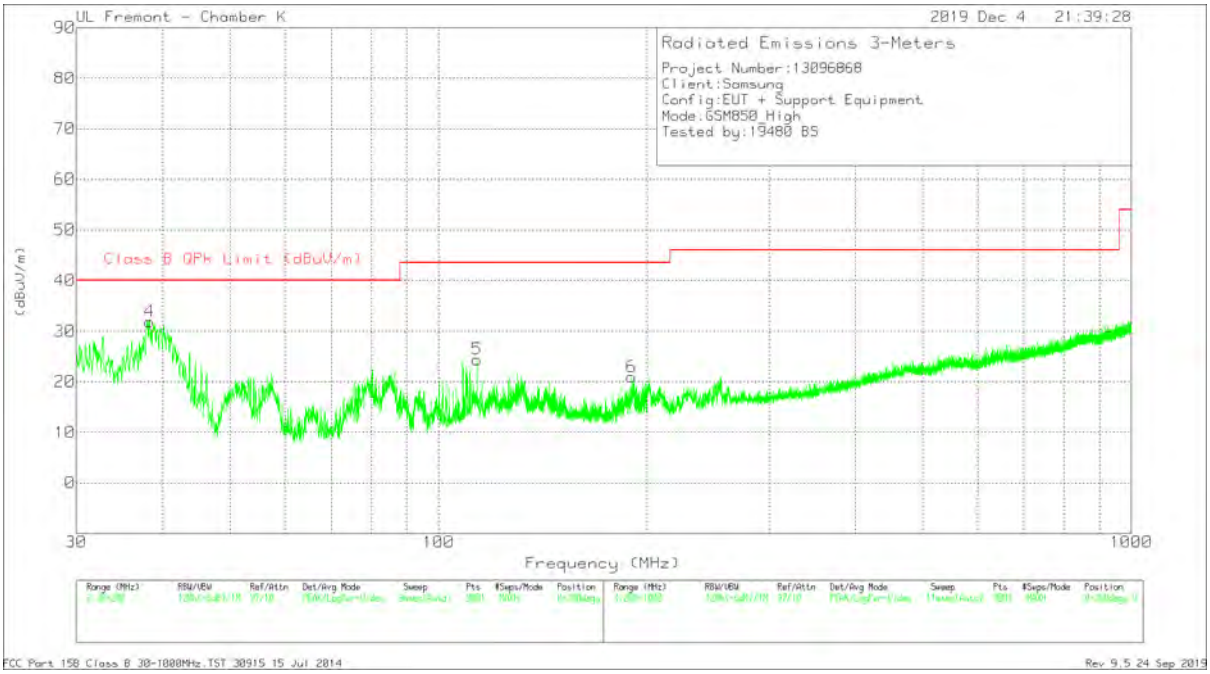
Pk - Peak detector
Qp - Quasi-Peak detector

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CHANNEL



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

RADIATED EMISSIONS

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	30.9633	28.77	Pk	26.4	-31.5	23.67	40	-16.33	0-360	399	H
2	85.6848	41.3	Pk	13.2	-31	23.5	40	-16.5	0-360	199	H
4	38.2734	42.39	Pk	21	-31.5	31.89	40	-8.11	0-360	100	V
5	113.6783	36.12	Pk	19.1	-30.8	24.42	43.52	-19.1	0-360	100	V
6	189.8765	34.2	Pk	17.2	-30.4	21	43.52	-22.52	0-360	100	V
3	201.4222	34.74	Pk	18.3	-30.3	22.74	43.52	-20.78	0-360	100	H

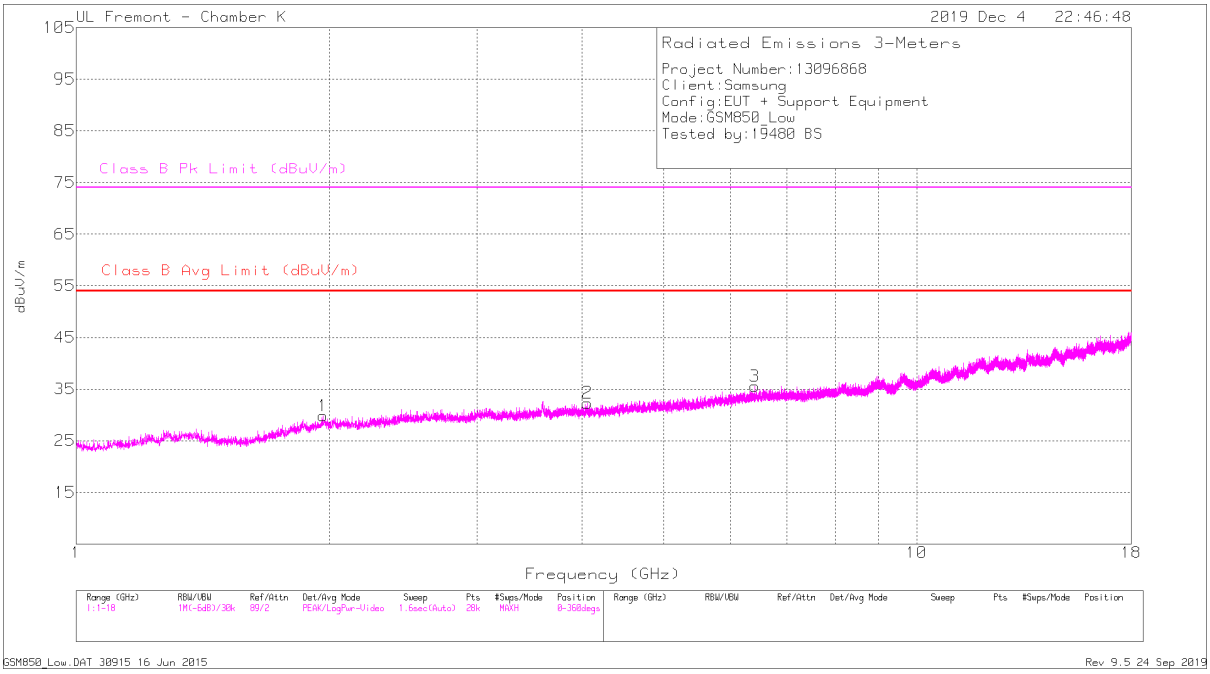
Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
38.3684	44.6	Pk	20.9	-31.5	34	40	-6	186	98	V
38.3684	39.52	Qp	20.9	-31.5	28.92	40	-11.08	186	98	V

Pk - Peak detector
Qp - Quasi-Peak detector

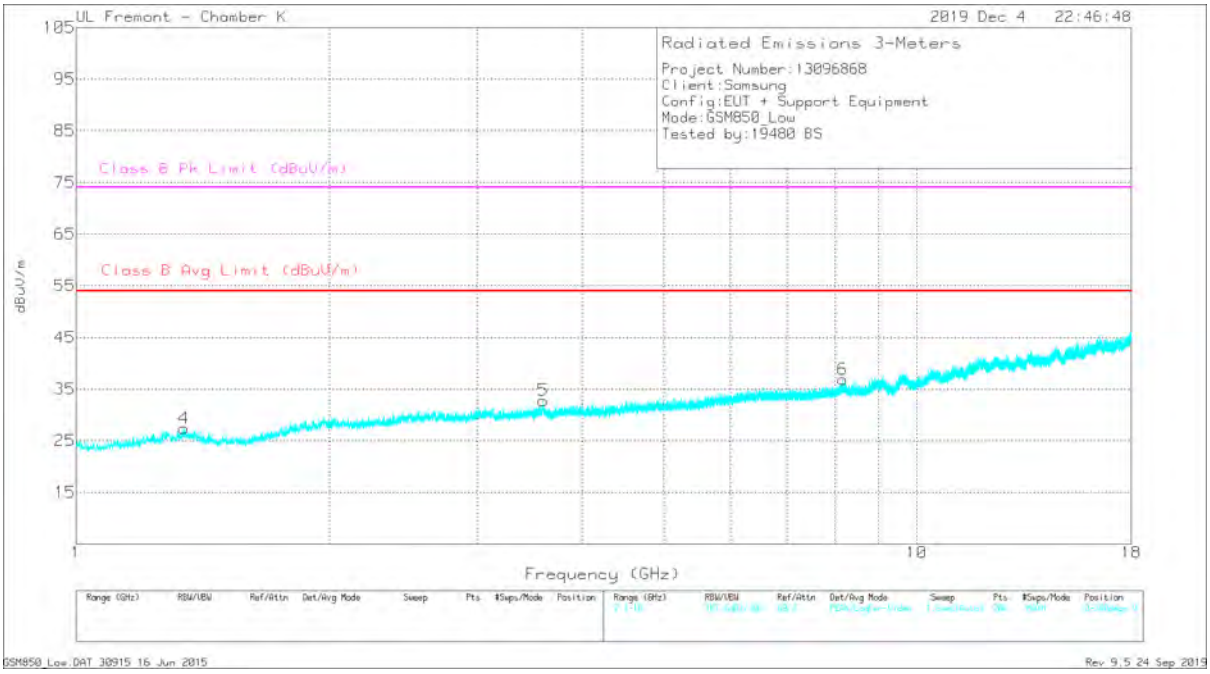
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

10.1.2. ABOVE 1GHz

LOW CHANNEL



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

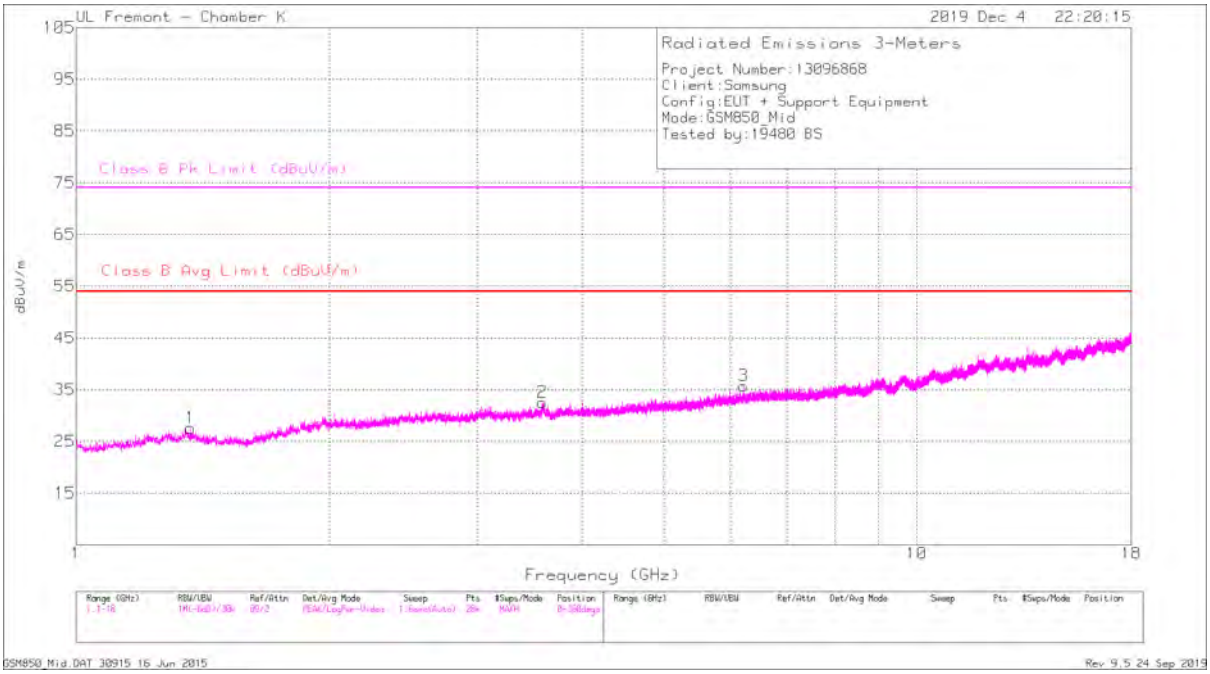
RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dB/m)	Amp/Cbl (dB)	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.96657	43.07	Pk	31.5	-35.4	39.17	54		74	-34.83	92	164	H
	1.96657	29.38	Av	31.5	-35.4	25.48	54	-28.52	-	-	92	164	H
2	4.05709	39.21	Pk	33.4	-31.8	40.81	54		74	-33.19	229	207	H
	4.05709	25.99	Av	33.4	-31.8	27.59	54	-26.41	-	-	229	207	H
3	6.41834	36.13	Pk	35.7	-28	43.83	54		74	-30.17	345	152	H
	6.41834	22.45	Av	35.7	-28	30.15	54	-23.85	-	-	345	152	H
4	3.59586	41.48	Pk	33.8	-32.9	42.38	54		74	-31.62	167	280	V
	3.59586	27.48	Av	33.8	-32.9	28.38	54	-25.62	-	-	167	280	V
5	8.16172	35	Pk	35.8	-25.6	45.2	54		74	-28.8	303	123	V
	8.16172	21.88	Av	35.8	-25.6	32.08	54	-21.92	-	-	303	123	V
6	1.34437	43.04	Pk	29.4	-35.4	37.04	54		74	-36.96	128	105	V
	1.34437	29.27	Av	29.4	-35.4	23.27	54	-30.73	-	-	128	105	V

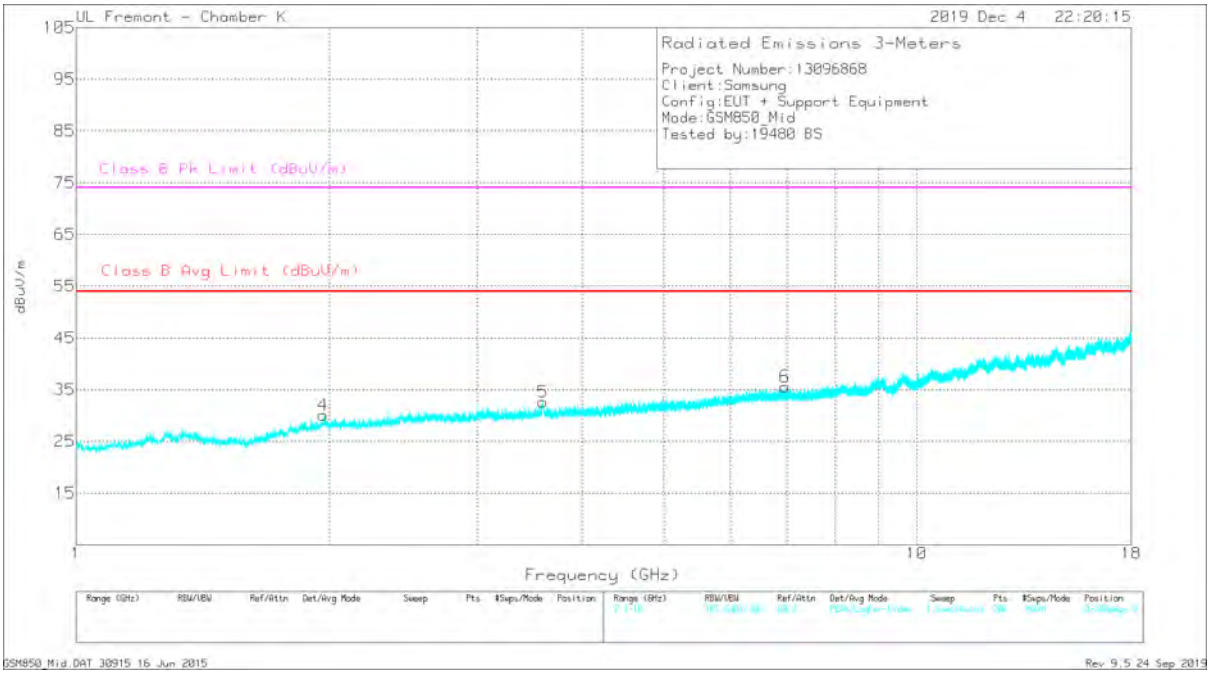
Pk - Peak detector
Av - Average detection

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID CHANNEL



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

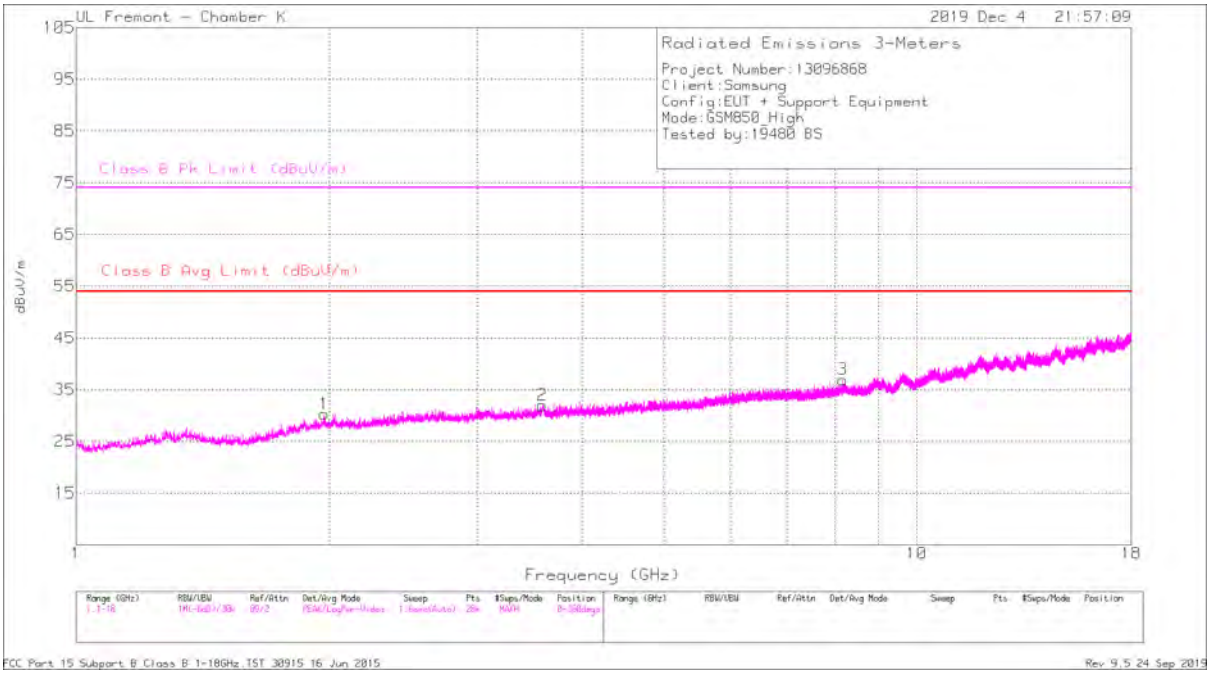
RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dB/m)	Amp/Cbl (dB)	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.36532	42.62	Pk	29.6	-35.4	36.82	54		74	-37.18	195	139	H
	1.36532	28.65	Av	29.6	-35.4	22.85	54	-31.15	-	-	195	139	H
2	3.58882	40.22	Pk	34.2	-33	41.42	54		74	-32.58	311	144	H
	3.58882	27.41	Av	34.2	-33	28.61	54	-25.39	-	-	311	144	H
3	6.22151	36.15	Pk	35.8	-28.3	43.65	54		74	-30.35	0	138	H
	6.22151	22.98	Av	35.8	-28.3	30.48	54	-23.52	-	-	0	138	H
4	1.96674	43.53	Pk	31.5	-35.4	39.63	54		74	-34.37	105	334	V
	1.96674	29.54	Av	31.5	-35.4	25.64	54	-28.36	-	-	105	334	V
5	3.59116	41.22	Pk	34.2	-33	42.42	54		74	-31.58	329	140	V
	3.59116	27.57	Av	34.2	-33	28.77	54	-25.23	-	-	329	140	V
6	6.96806	35.76	Pk	35.8	-27.3	44.26	54		74	-29.74	243	179	V
	6.96806	22.29	Av	35.8	-27.3	30.79	54	-23.21	-	-	243	179	V

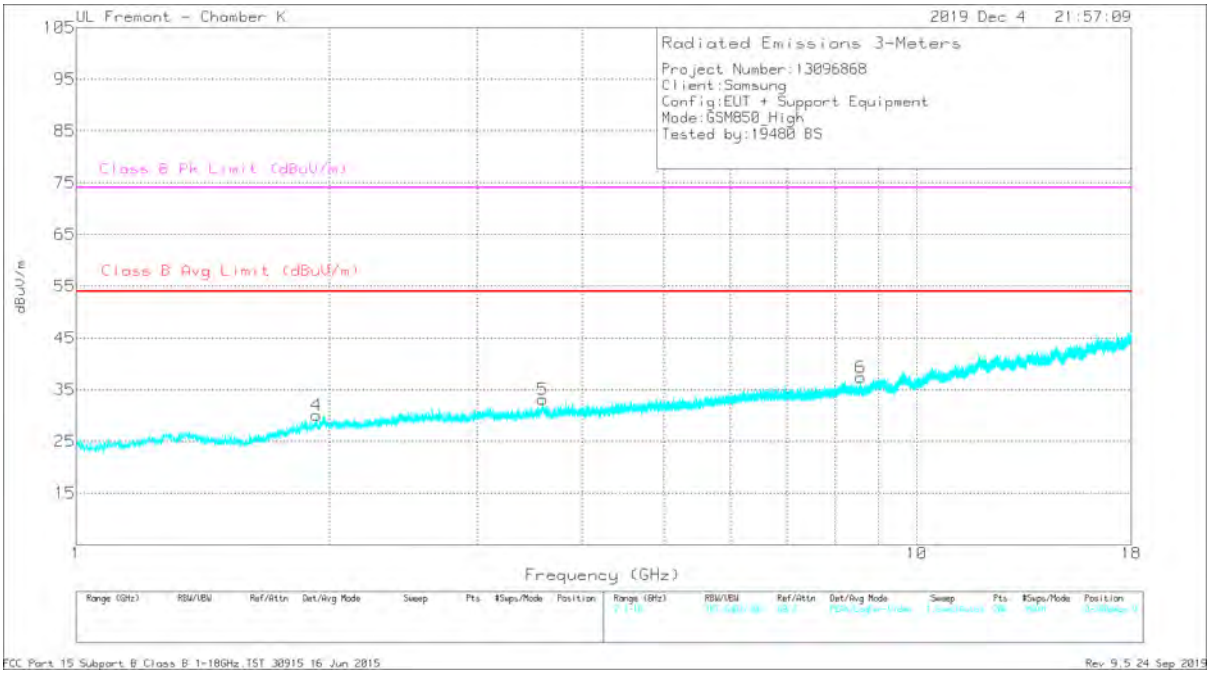
Pk - Peak detector
Av - Average detection

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CHANNEL



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dB/m)	Amp/Cbl (dB)	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.97431	44.58	Pk	31.6	-35.4	40.78	54		74	-33.22	312	200	H
	1.97431	31.04	Av	31.6	-35.4	27.24	54	-26.76	-	-	312	200	H
2	3.58642	42.62	Pk	34.1	-33	43.72	54		74	-30.28	291	201	H
	3.58642	28.93	Av	34.1	-33	30.03	54	-23.97	-	-	291	201	H
3	8.17288	36.91	Pk	35.8	-25.6	47.11	54		74	-26.89	36	126	H
	8.17288	23.62	Av	35.8	-25.6	33.82	54	-20.18	-	-	36	126	H
4	1.93289	42.79	Pk	31.1	-35.4	38.49	54		74	-35.51	136	309	V
	1.93289	29.39	Av	31.1	-35.4	25.09	54	-28.91	-	-	136	309	V
5	3.59038	41.32	Pk	34.2	-33	42.52	54		74	-31.48	136	375	V
	3.59038	27.63	Av	34.2	-33	28.83	54	-25.17	-	-	136	375	V
6	8.57591	32.92	Pk	35.9	-25.1	43.72	54		74	-30.28	347	237	V
	8.57591	20.31	Av	35.9	-25.1	31.11	54	-22.89	-	-	347	237	V

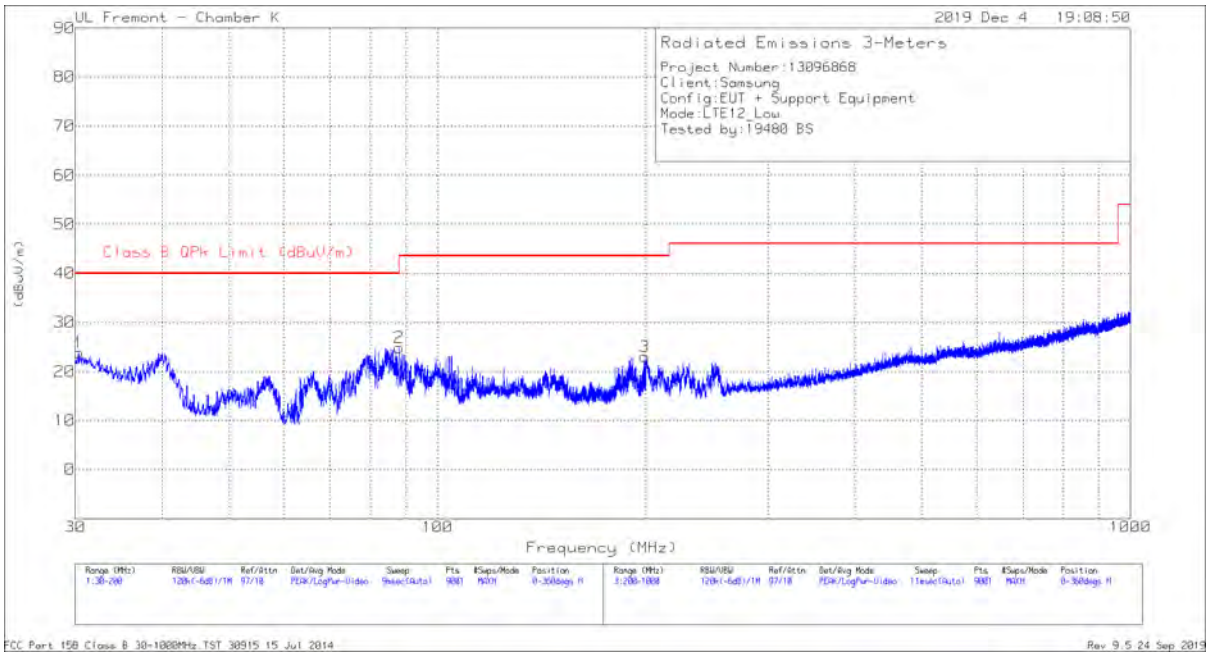
Pk - Peak detector
Av - Average detection

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

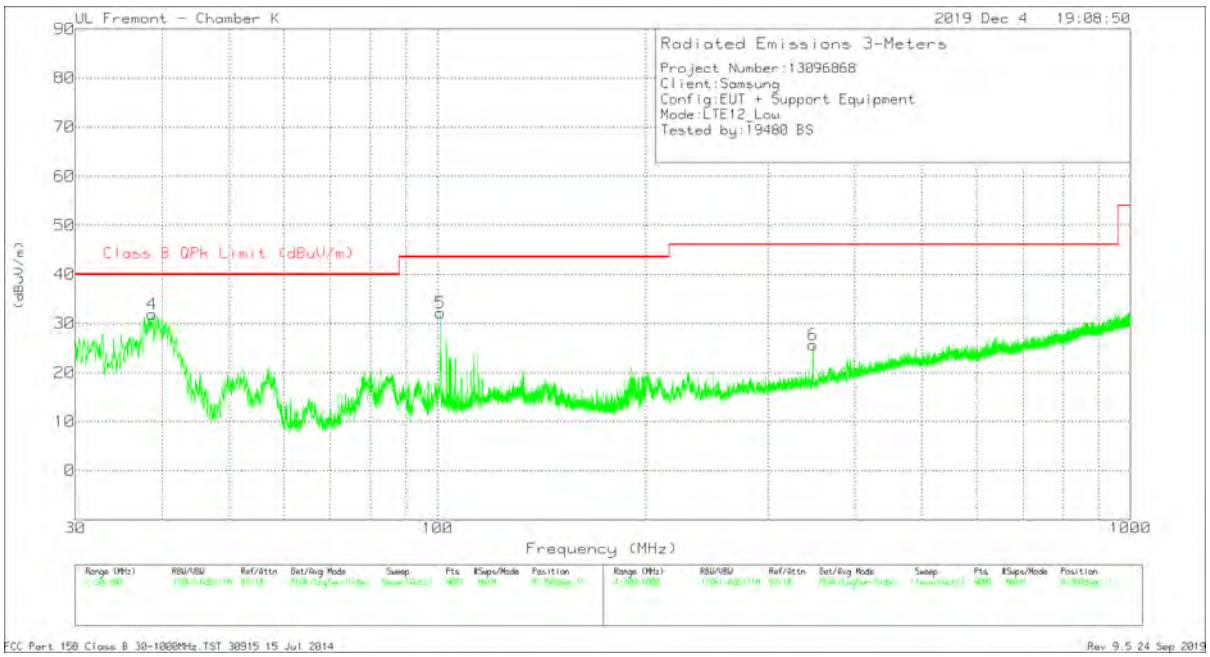
10.2. LTE Band 12

10.2.1. BELOW 1GHz

LOW CHANNEL



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

RADIATED EMISSIONS

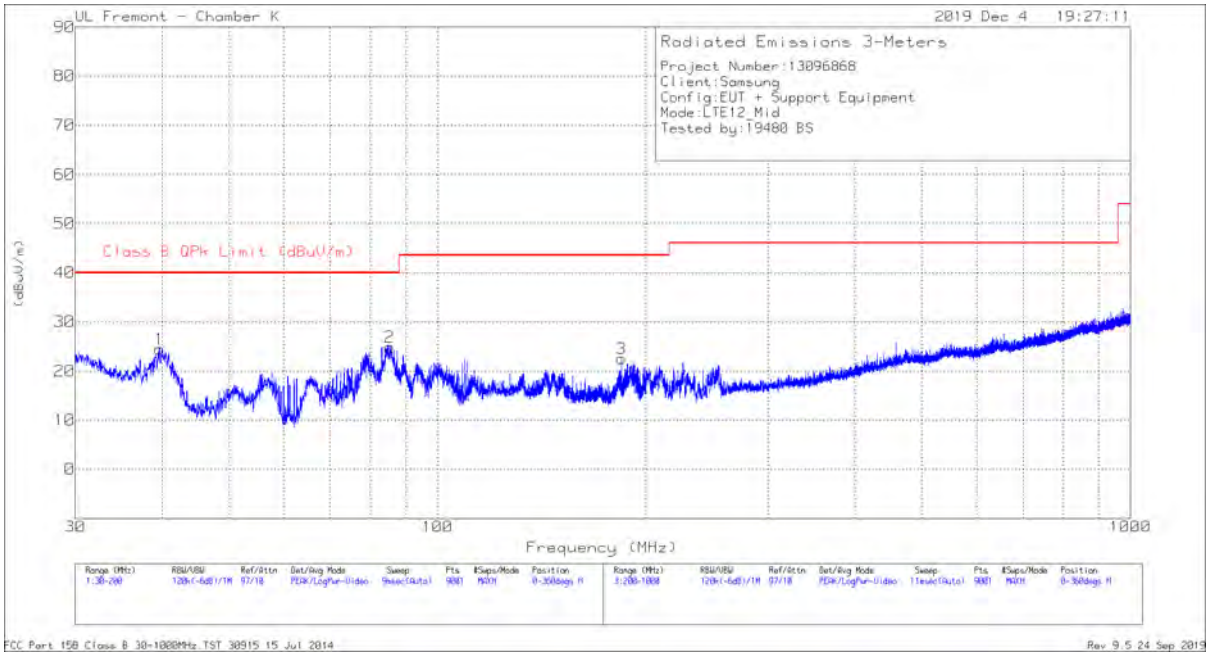
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	30.3778	28.88	Pk	26.6	-31.6	23.88	40	-16.12	0-360	299	H
2	87.9703	42.63	Pk	13.3	-31	24.93	40	-15.07	0-360	199	H
3	198.8488	34.73	Pk	18.6	-30.3	23.03	43.52	-20.49	0-360	100	H
4	38.7456	42.81	Pk	20.6	-31.5	31.91	40	-8.09	0-360	100	V
5	100.966	46.58	Pk	16.5	-30.9	32.18	43.52	-11.34	0-360	100	V
6	348.178	35.31	Pk	20	-29.7	25.61	46.02	-20.41	0-360	100	V

Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
38.9475	44.54	Pk	20.4	-31.5	33.44	40	-6.56	204	159	V
38.9475	38.43	Qp	20.4	-31.5	27.33	40	-12.67	204	159	V

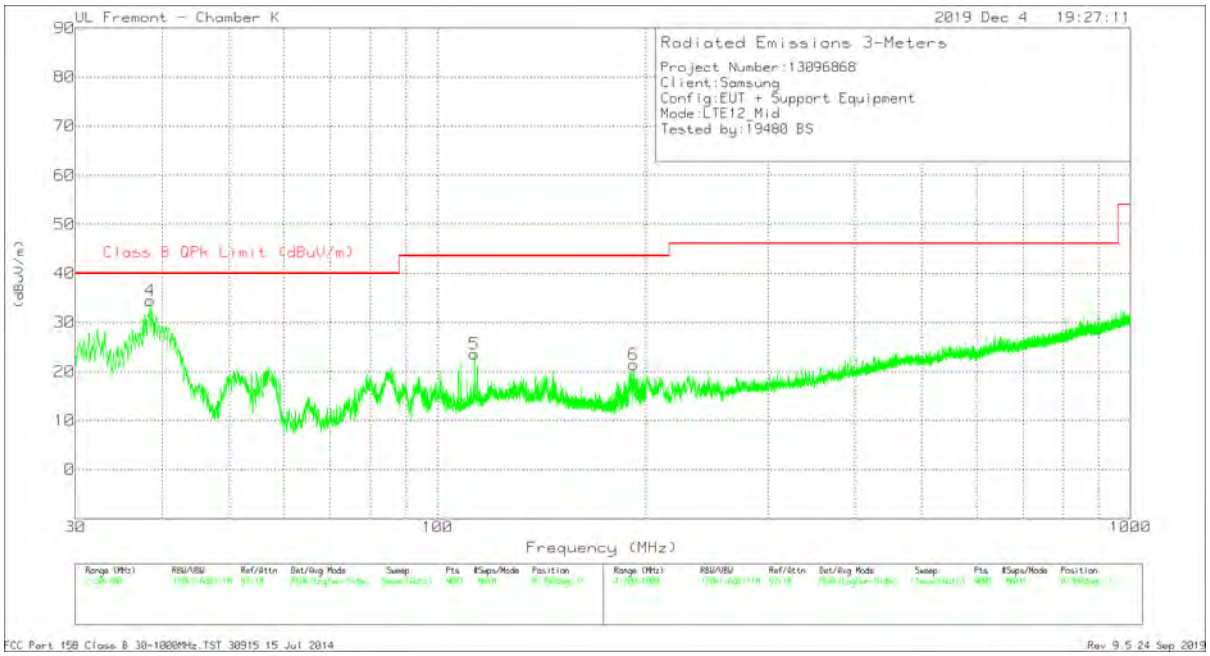
Pk - Peak detector
Qp - Quasi-Peak detector

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID CHANNEL



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

RADIATED EMISSIONS

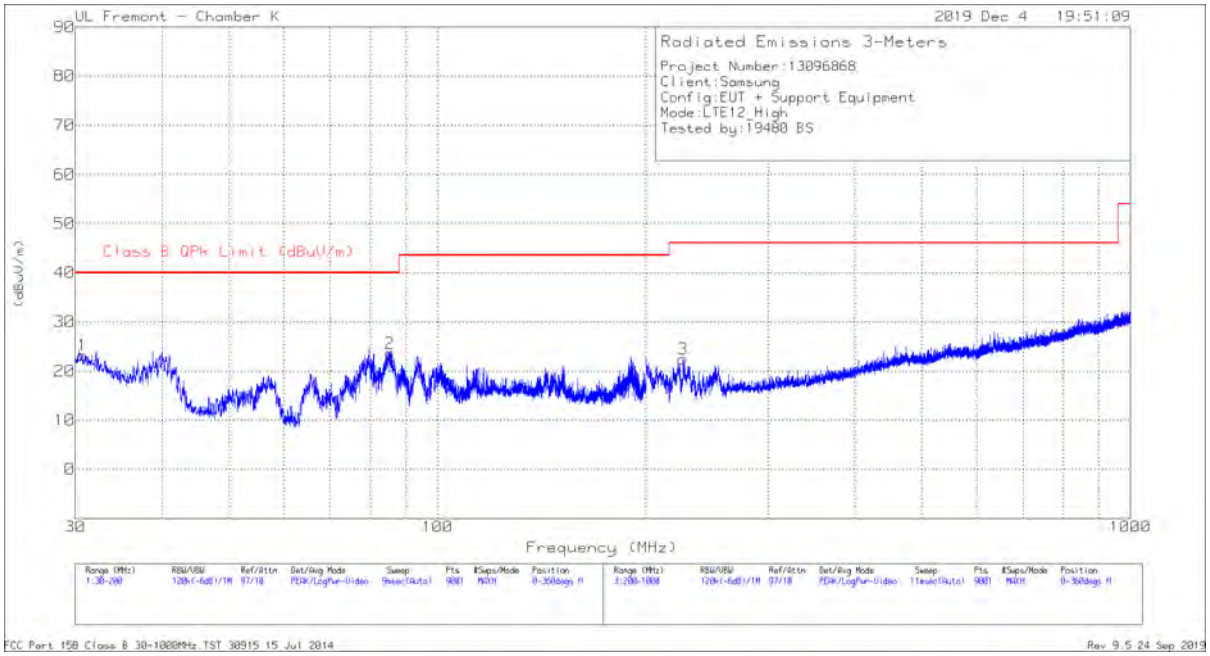
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	39.6901	36.14	Pk	19.8	-31.5	24.44	40	-15.56	0-360	299	H
2	85.2503	42.77	Pk	13.2	-31.1	24.87	40	-15.13	0-360	199	H
3	184.1909	35.92	Pk	17	-30.4	22.52	43.52	-21	0-360	100	H
4	38.4812	45.14	Pk	20.8	-31.5	34.44	40	-5.56	0-360	100	V
5	113.0549	35.41	Pk	19	-30.8	23.61	43.52	-19.91	0-360	100	V
6	191.7465	34.38	Pk	17.4	-30.4	21.38	43.52	-22.14	0-360	100	V

Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
38.5114	46.24	Pk	20.8	-31.5	35.54	40	-4.46	191	95	V
38.5114	36.98	Qp	20.8	-31.5	26.28	40	-13.72	191	95	V

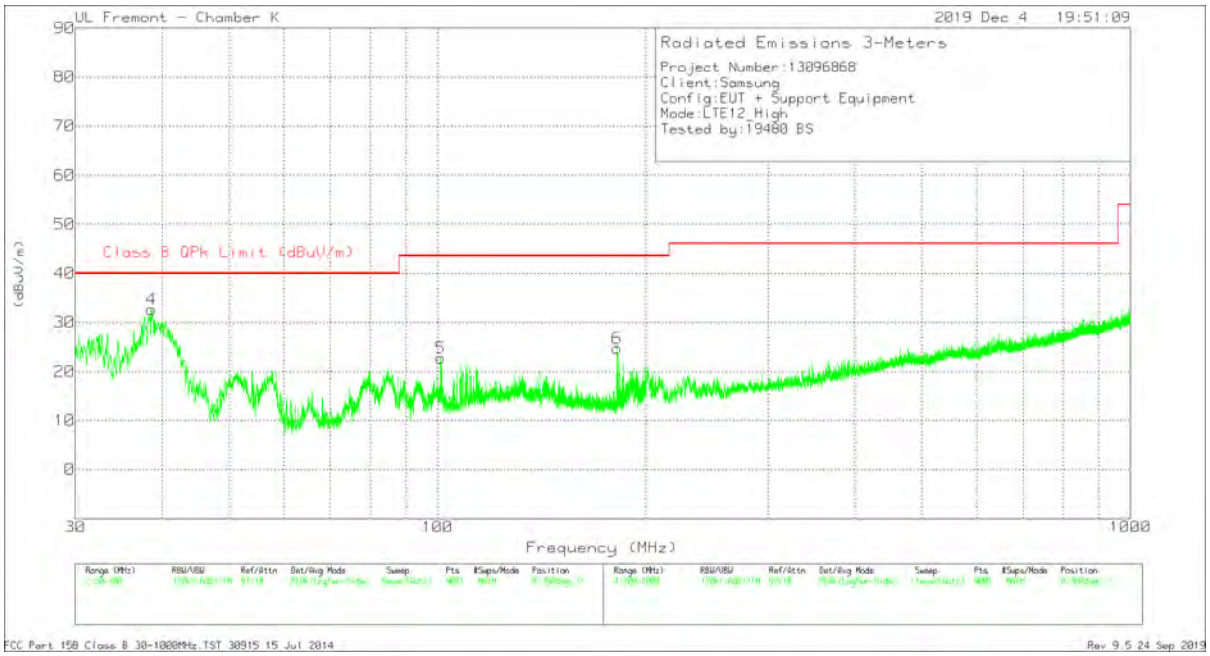
Pk - Peak detector
Qp - Quasi-Peak detector

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CHANNEL



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

RADIATED EMISSIONS

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	30.6989	28.36	Pk	26.5	-31.6	23.26	40	-16.74	0-360	199	H
2	85.3542	41.55	Pk	13.2	-31.1	23.65	40	-16.35	0-360	199	H
4	38.6134	43.48	Pk	20.7	-31.5	32.68	40	-7.32	0-360	100	V
5	101.0415	37.09	Pk	16.5	-30.9	22.69	43.52	-20.83	0-360	100	V
6	181.7353	38.08	Pk	17.1	-30.4	24.78	43.52	-18.74	0-360	100	V
3	226.2223	35.9	Pk	16.8	-30.2	22.5	46.02	-23.52	0-360	100	H

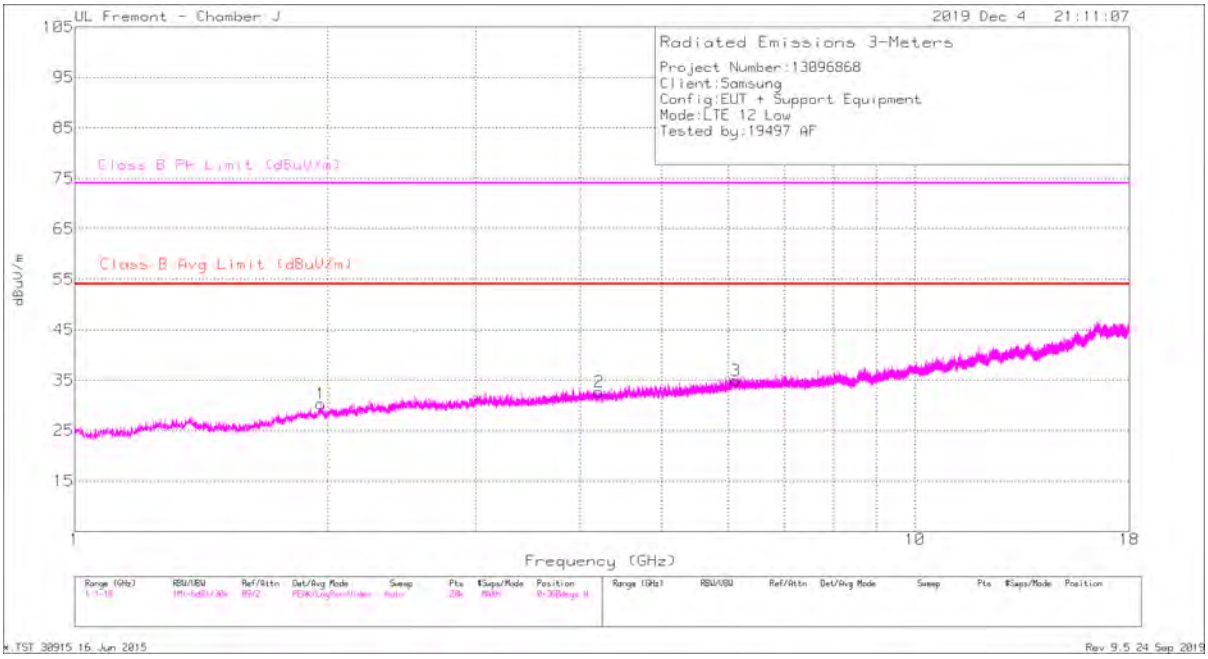
Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
38.3871	44.47	Pk	20.9	-31.5	33.87	40	-6.13	185	97	V
38.3871	41.02	Qp	20.9	-31.5	30.42	40	-9.58	185	97	V

Pk - Peak detector
Qp - Quasi-Peak detector

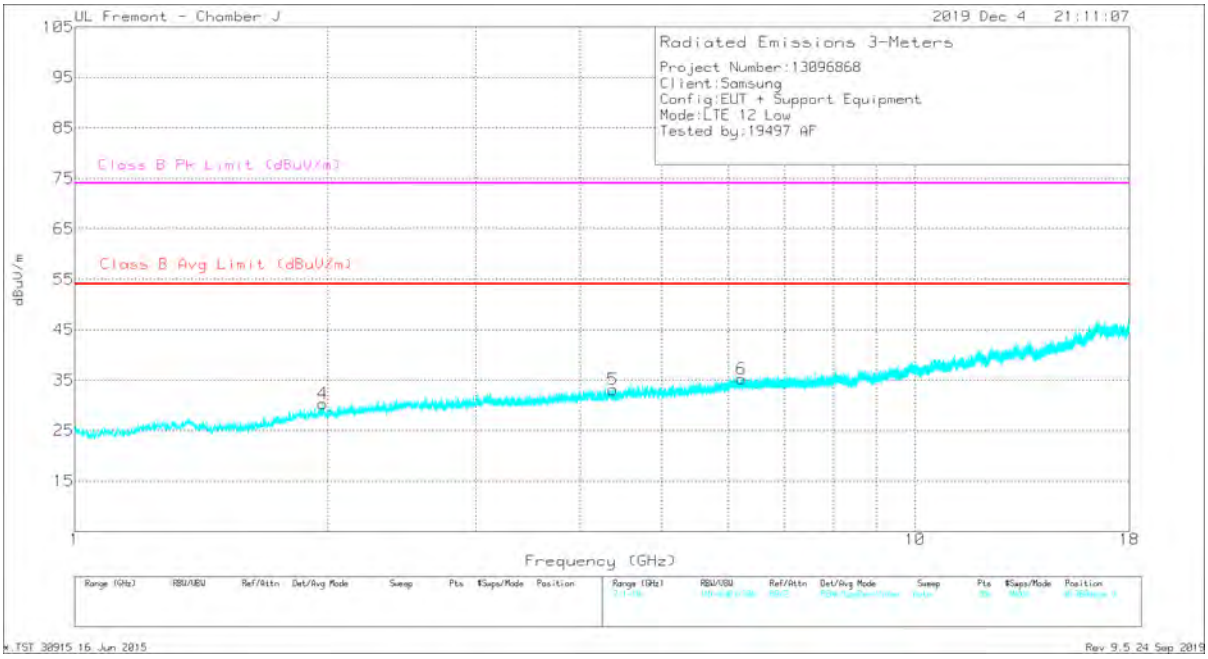
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

10.2.2. ABOVE 1GHz

LOW CHANNEL



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

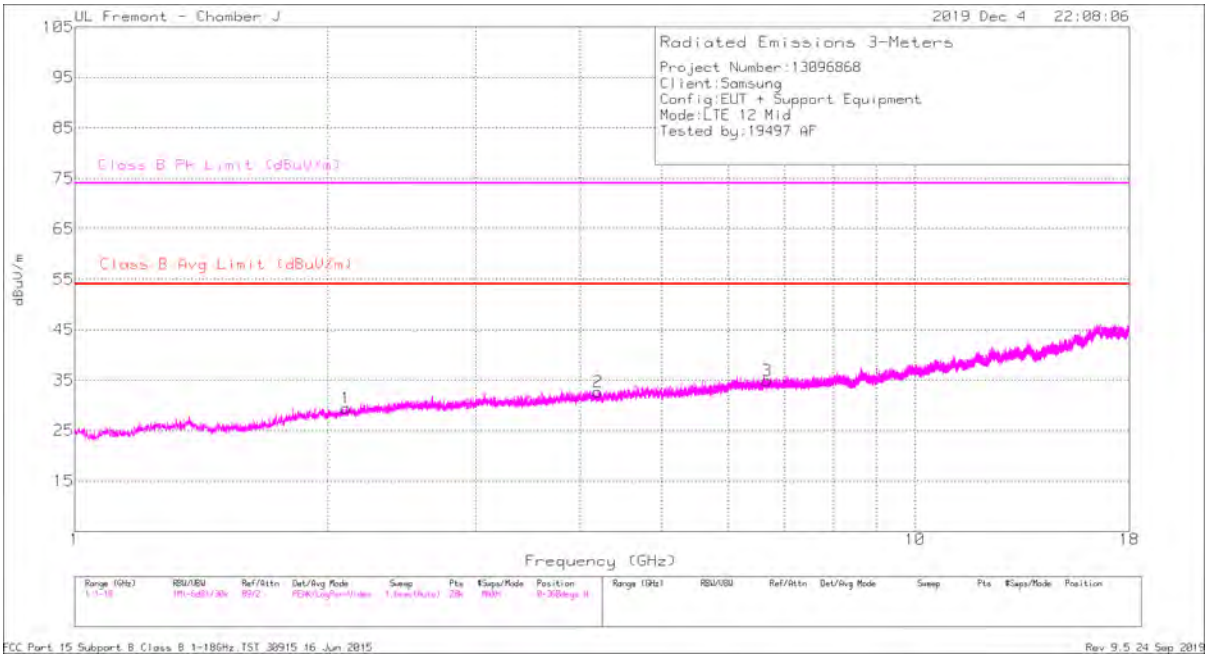
RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.96273	34.06	Pk	31	-35.7	29.36	54		74	-44.64	178	180	H
1.96273	21.18	Av	31	-35.7	16.48	54	-37.52	-	-	178	180	H
4.20836	31.58	Pk	33.6	-32	33.18	54		74	-40.82	229	383	H
4.20836	18.03	Av	33.6	-32	19.63	54	-34.37	-	-	229	383	H
6.11748	29.31	Pk	35.6	-29.3	35.61	54		74	-38.39	192	115	H
6.11748	15.5	Av	35.6	-29.3	21.8	54	-32.2	-	-	192	115	H
1.97343	44.35	Pk	31.1	-35.7	39.75	54		74	-34.25	119	118	V
1.97343	30.13	Av	31.1	-35.7	25.53	54	-28.47	-	-	119	118	V
4.37054	41.12	Pk	33.6	-31.8	42.92	54		74	-31.08	58	308	V
4.37054	26.85	Av	33.6	-31.8	28.65	54	-25.35	-	-	58	308	V
6.21702	36.04	Pk	35.6	-29.2	42.44	54		74	-31.56	302	302	V
6.21702	24.52	Av	35.6	-29.2	30.92	54	-23.08	-	-	302	302	V

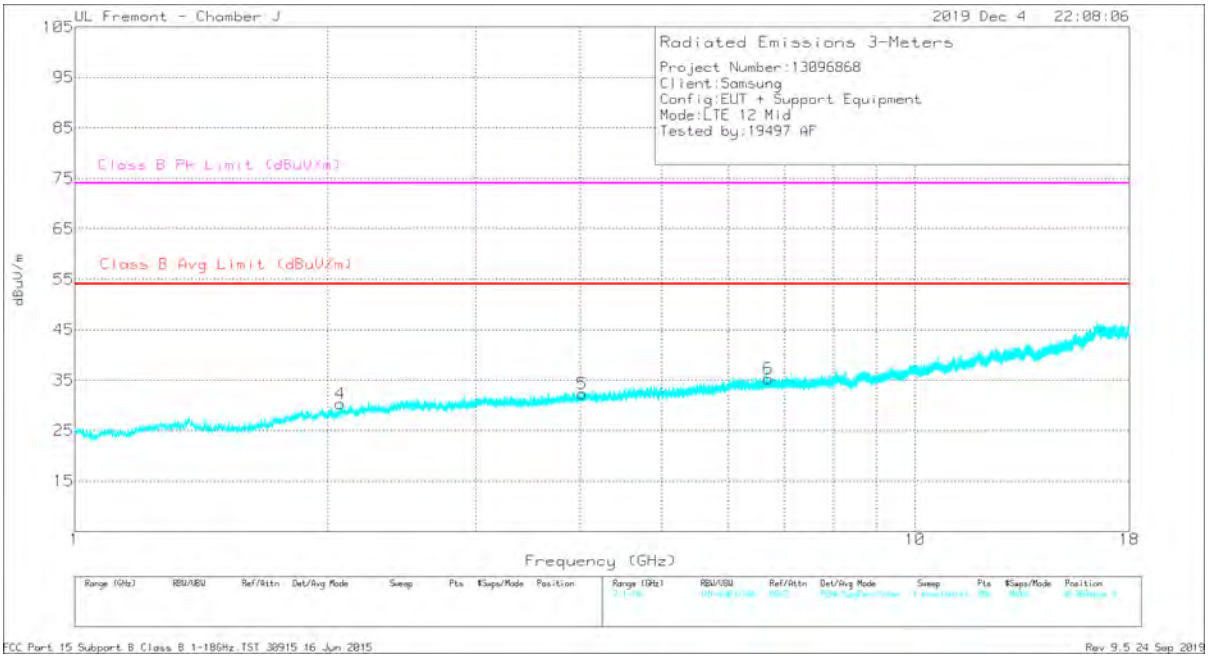
Pk - Peak detector
Av - Average detection

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID CHANNEL



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

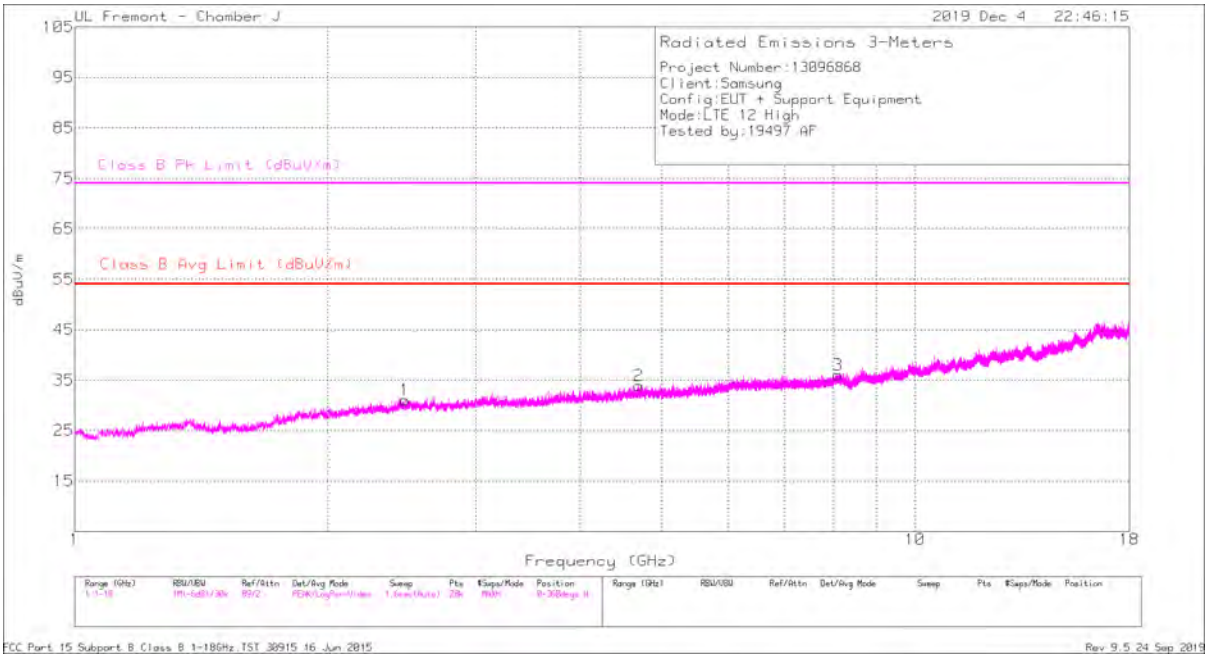
RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2.10322	43.32	Pk	31.2	-35.6	38.92	54		74	-35.08	98	267	H
2.10322	29.99	Av	31.2	-35.6	25.59	54	-28.41	-	-	98	267	H
4.20002	41.07	Pk	33.4	-32	42.47	54		74	-31.53	105	380	H
4.20002	26.98	Av	33.4	-32	28.38	54	-25.62	-	-	105	380	H
6.67112	37.87	Pk	35.6	-28.2	45.27	54		74	-28.73	3	186	H
6.66861	23.98	Av	35.5	-28.2	31.28	54	-22.72	-	-	3	186	H
2.07238	43.89	Pk	31	-35.6	39.29	54		74	-34.71	190	360	V
2.07238	30.32	Av	31	-35.6	25.72	54	-28.28	-	-	190	360	V
4.02122	41.85	Pk	33.5	-32.7	42.65	54		74	-31.35	63	335	V
4.02122	27.68	Av	33.5	-32.7	28.48	54	-25.52	-	-	63	335	V
6.69066	37.58	Pk	35.6	-28.1	45.08	54		74	-28.92	161	288	V
6.69066	23.71	Av	35.6	-28.1	31.21	54	-22.79	-	-	161	288	V

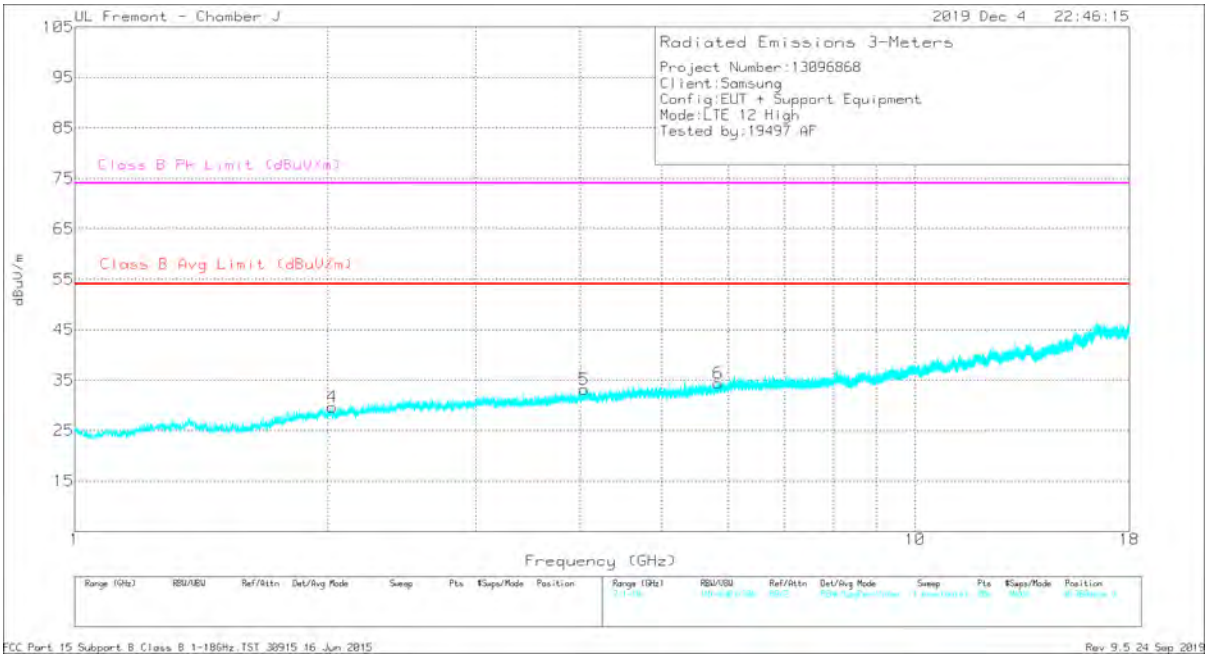
Pk - Peak detector
Av - Average detection

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CHANNEL



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2.47239	43.75	Pk	32.3	-35.5	40.55	54		74	-33.45	127	319	H
2.47239	30.15	Av	32.3	-35.5	26.95	54	-27.05	-	-	127	319	H
4.69033	40.67	Pk	34.1	-31.6	43.17	54		74	-30.83	238	248	H
4.69033	26.98	Av	34.1	-31.6	29.48	54	-24.52	-	-	238	248	H
8.09427	38.09	Pk	35.7	-27.3	46.49	54		74	-27.51	130	235	H
8.09427	23.73	Av	35.7	-27.3	32.13	54	-21.87	-	-	130	235	H
2.023	44.12	Pk	30.9	-35.7	39.32	54		74	-34.68	294	139	V
2.023	30.31	Av	30.9	-35.7	25.51	54	-28.49	-	-	294	139	V
4.04081	40.91	Pk	33.5	-32.6	41.81	54		74	-32.19	178	299	V
4.04081	27.93	Av	33.5	-32.6	28.83	54	-25.17	-	-	178	299	V
5.82996	39.36	Pk	35	-29.8	44.56	54		74	-29.44	344	179	V
5.82996	25.39	Av	35	-29.8	30.59	54	-23.41	-	-	344	179	V

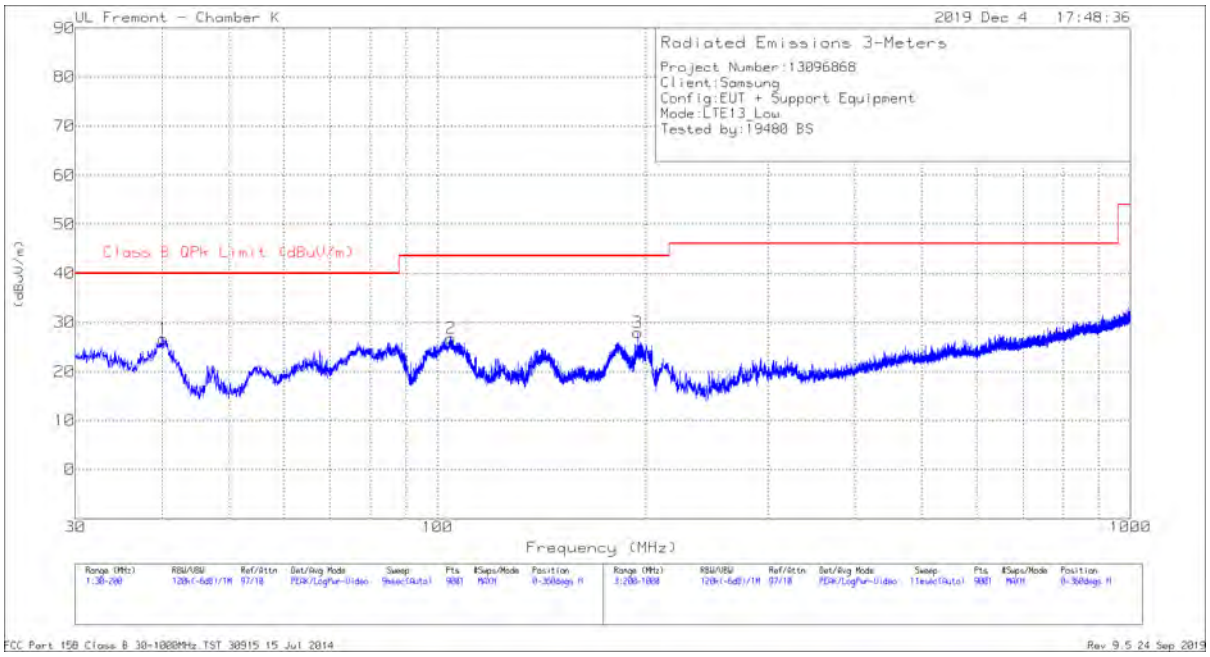
Pk - Peak detector
Av - Average detection

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

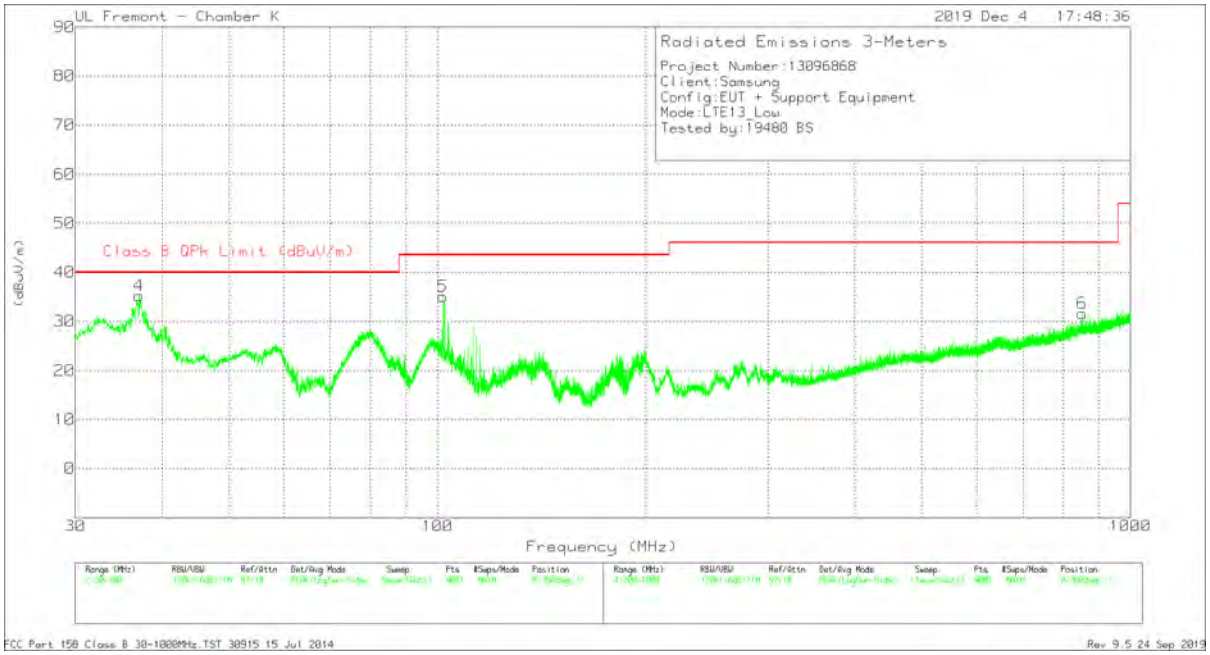
10.3. LTE Band 13

10.3.1. BELOW 1GHz

LOW CHANNEL



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

RADIATED EMISSIONS

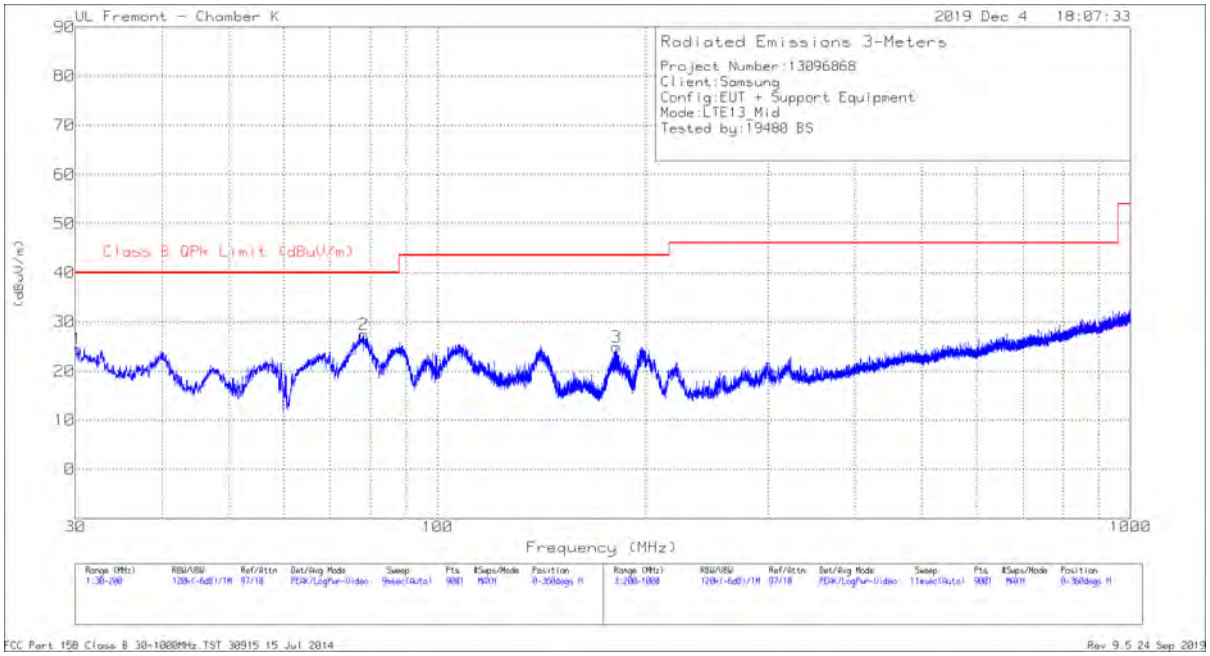
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	40.2378	38.76	Pk	19.4	-31.5	26.66	40	-13.34	0-360	399	H
2	104.6493	40.14	Pk	17.5	-30.9	26.74	43.52	-16.78	0-360	299	H
3	194.4665	40.48	Pk	17.8	-30.3	27.98	43.52	-15.54	0-360	100	H
4	37.0834	44.86	Pk	21.9	-31.5	35.26	40	-4.74	0-360	100	V
5	101.7593	49.31	Pk	16.7	-30.9	35.11	43.52	-8.41	0-360	100	V
6	851.2897	31.46	Pk	27.7	-27.5	31.66	46.02	-14.36	0-360	199	V

Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
37.105	43.27	Pk	21.9	-31.5	33.67	40	-6.33	175	99	V
37.105	39.44	Qp	21.9	-31.5	29.84	40	-10.16	175	99	V

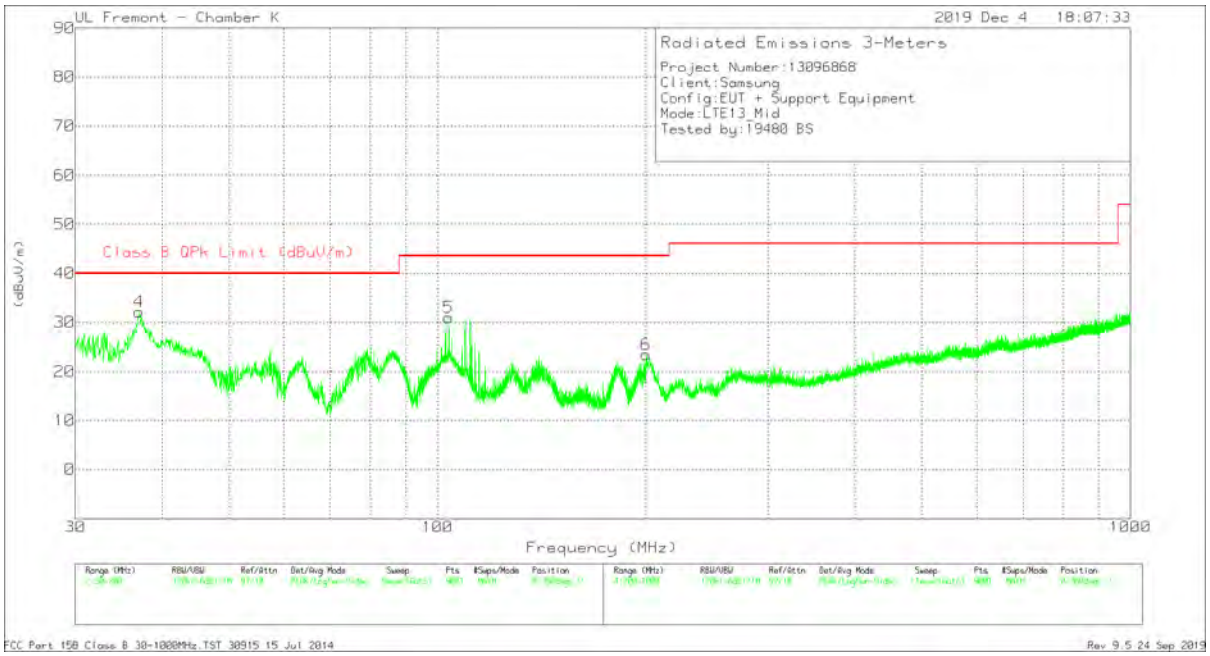
Pk - Peak detector
Qp - Quasi-Peak detector

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID CHANNEL



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

RADIATED EMISSIONS

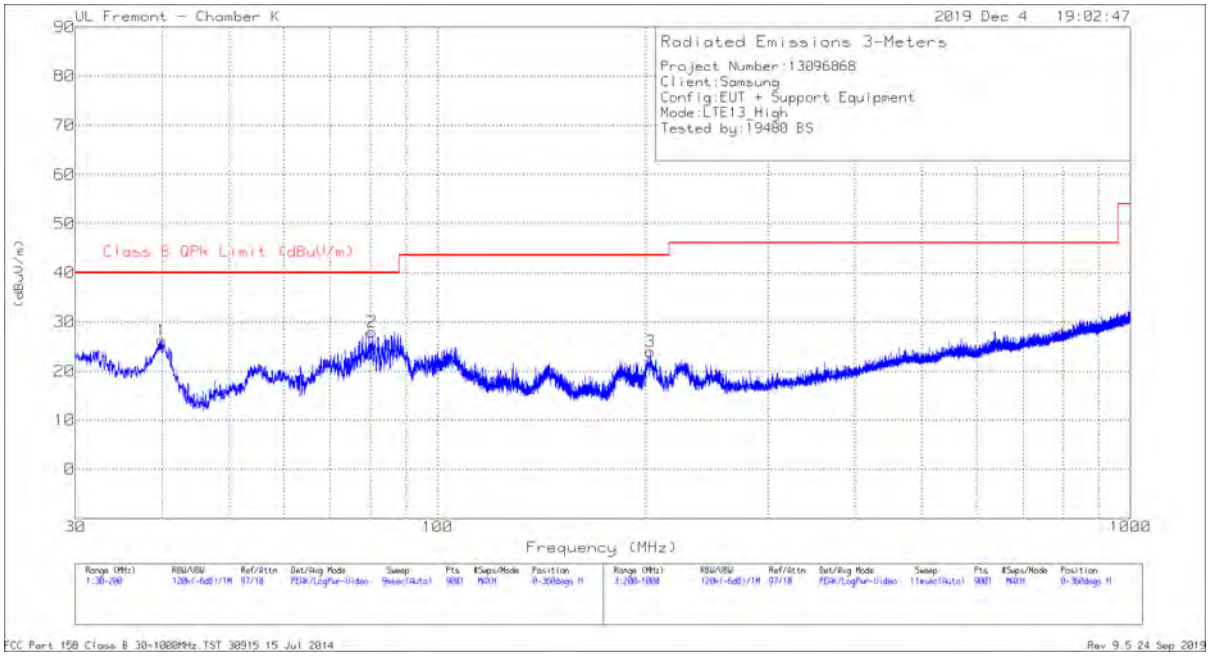
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	30.2456	29.44	Pk	26.7	-31.6	24.54	40	-15.46	0-360	299	H
2	78.2614	44.83	Pk	13.7	-31.1	27.43	40	-12.57	0-360	299	H
3	181.3198	38.23	Pk	17.1	-30.4	24.93	43.52	-18.59	0-360	99	H
4	37.0834	41.79	Pk	21.9	-31.5	32.19	40	-7.81	0-360	100	V
5	103.7615	44.71	Pk	17.2	-30.9	31.01	43.52	-12.51	0-360	100	V
6	199.9632	35.15	Pk	18.6	-30.3	23.45	43.52	-20.07	0-360	100	V

Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
37.2383	44.45	Pk	21.8	-31.5	34.75	40	-5.25	170	99	V
37.2383	40.06	Qp	21.8	-31.5	30.36	40	-9.64	170	99	V

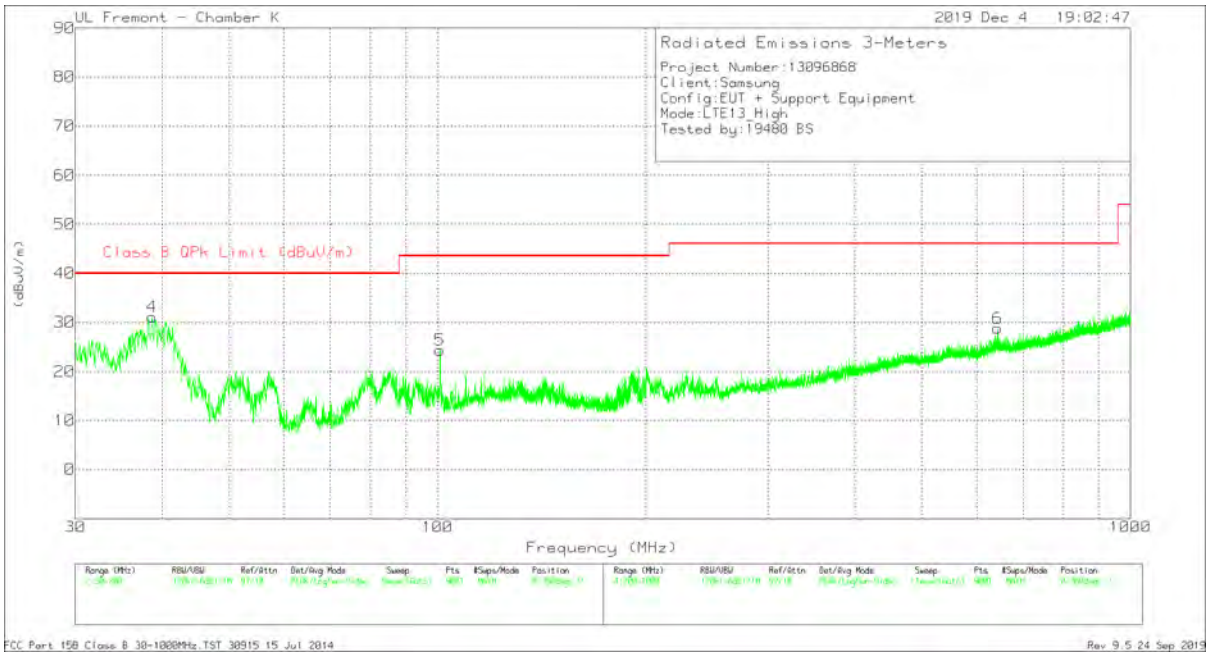
Pk - Peak detector
Qp - Quasi-Peak detector

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CHANNEL



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

RADIATED EMISSIONS

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	39.9923	38.19	Pk	19.6	-31.5	26.29	40	-13.71	0-360	299	H
2	80.4714	45.41	Pk	13.5	-31	27.91	40	-12.09	0-360	199	H
4	38.7267	42.03	Pk	20.6	-31.5	31.13	40	-8.87	0-360	95	V
5	100.8149	38.85	Pk	16.4	-30.9	24.35	43.52	-19.17	0-360	95	V
3	202.6667	36.5	Pk	17.8	-30.3	24	43.52	-19.52	0-360	100	H
6	643.2894	31.78	Pk	25.7	-28.7	28.78	46.02	-17.24	0-360	99	V

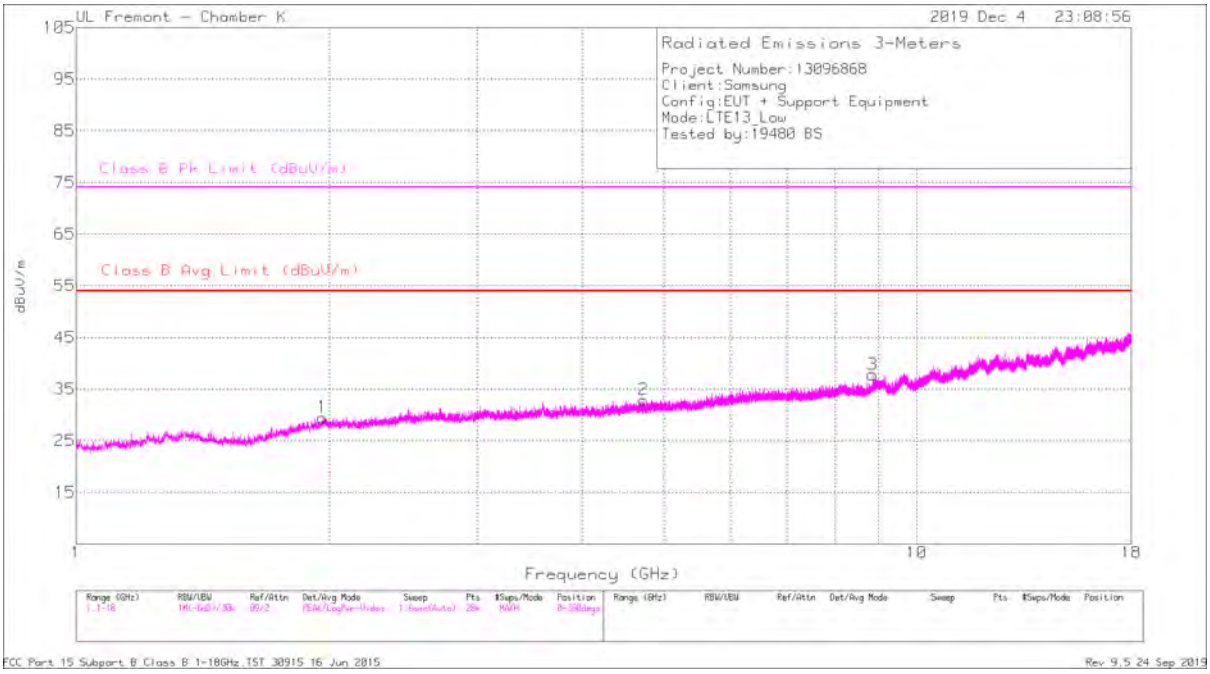
Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
38.6821	43.11	Pk	20.7	-31.5	32.31	40	-7.69	179	171	V
38.6821	38.46	Qp	20.7	-31.5	27.66	40	-12.34	179	171	V

Pk - Peak detector
Qp - Quasi-Peak detector

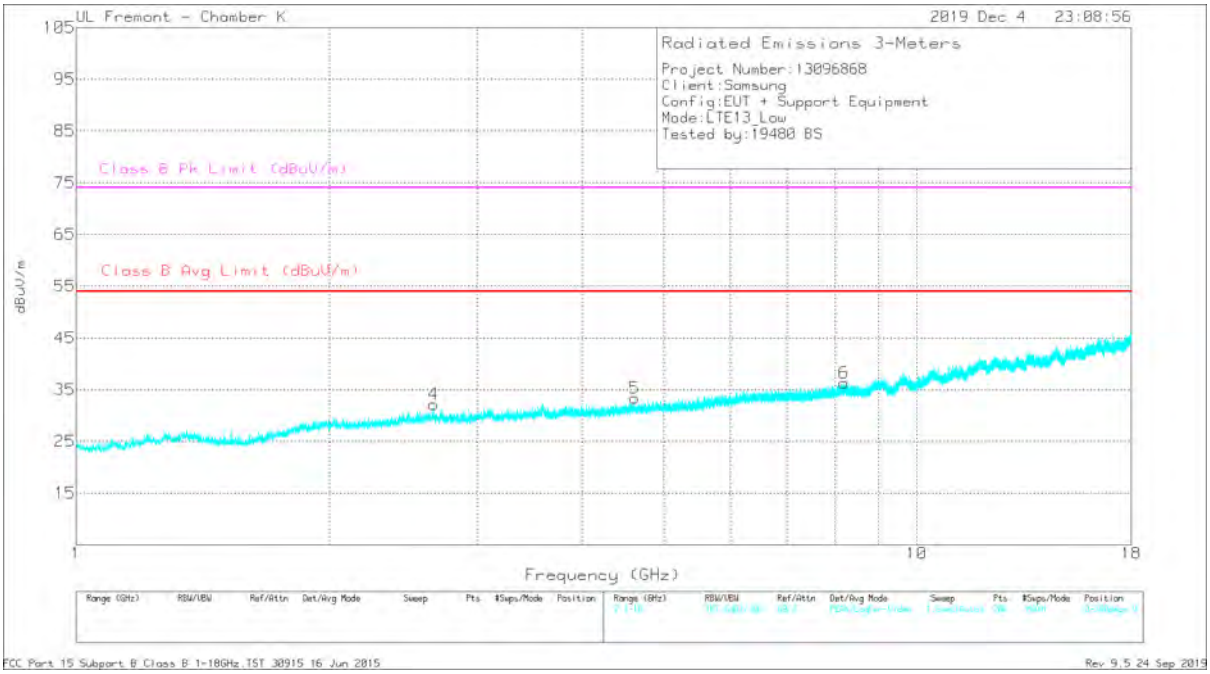
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

10.3.2. ABOVE 1GHz

LOW CHANNEL



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

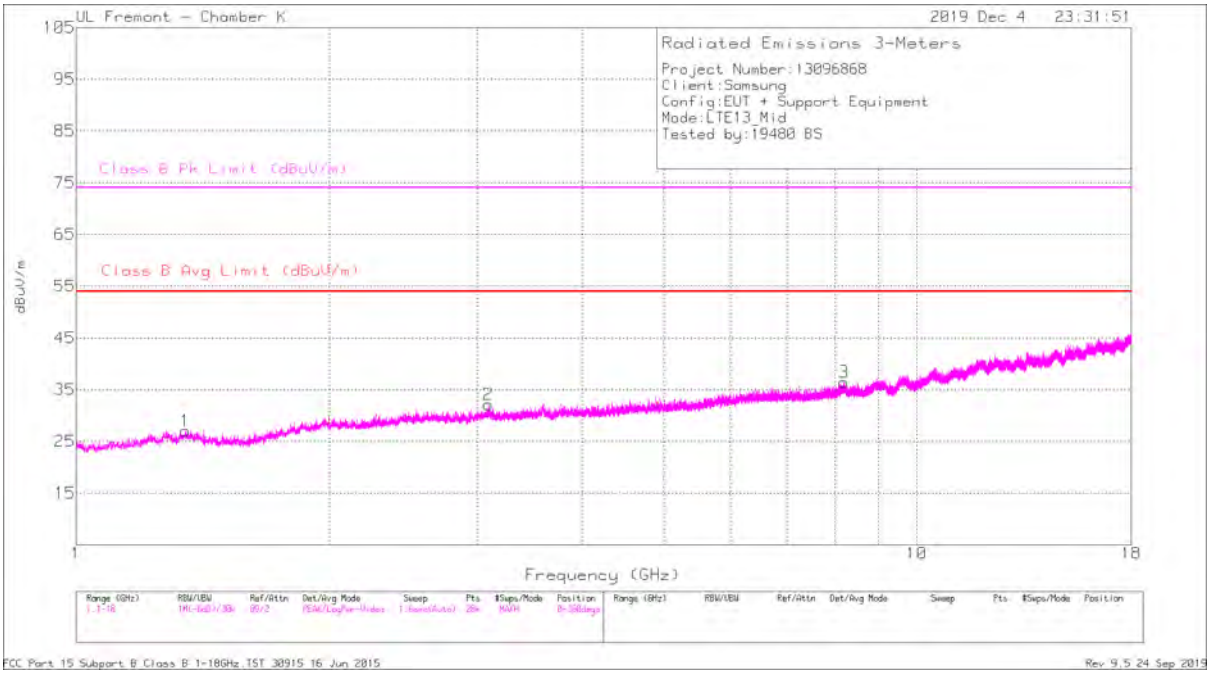
RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dB/m)	Amp/Cbl (dB)	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.96358	45.08	Pk	31.6	-35.4	41.28	54		74	-32.72	225	120	H
	1.96358	30.87	Av	31.6	-35.4	27.07	54	-26.93	-	-	225	120	H
2	4.73492	41.43	Pk	33.9	-31	44.33	54		74	-29.67	326	199	H
	4.73492	27.15	Av	33.9	-31	30.05	54	-23.95	-	-	326	199	H
3	8.86247	36.04	Pk	36.1	-24.6	47.54	54		74	-26.46	344	240	H
	8.86247	22.43	Av	36.1	-24.6	33.93	54	-20.07	-	-	344	240	H
4	2.66511	42.6	Pk	32.7	-35.2	40.1	54		74	-33.9	42	345	V
	2.66511	29.33	Av	32.7	-35.2	26.83	54	-27.17	-	-	42	345	V
5	4.62081	38.73	Pk	34	-31.2	41.53	54		74	-32.47	275	216	V
	4.62081	25.69	Av	34	-31.2	28.49	54	-25.51	-	-	275	216	V
6	8.1952	35.29	Pk	35.9	-25.6	45.59	54		74	-28.41	100	140	V
	8.1952	21.98	Av	35.9	-25.6	32.28	54	-21.72	-	-	100	140	V

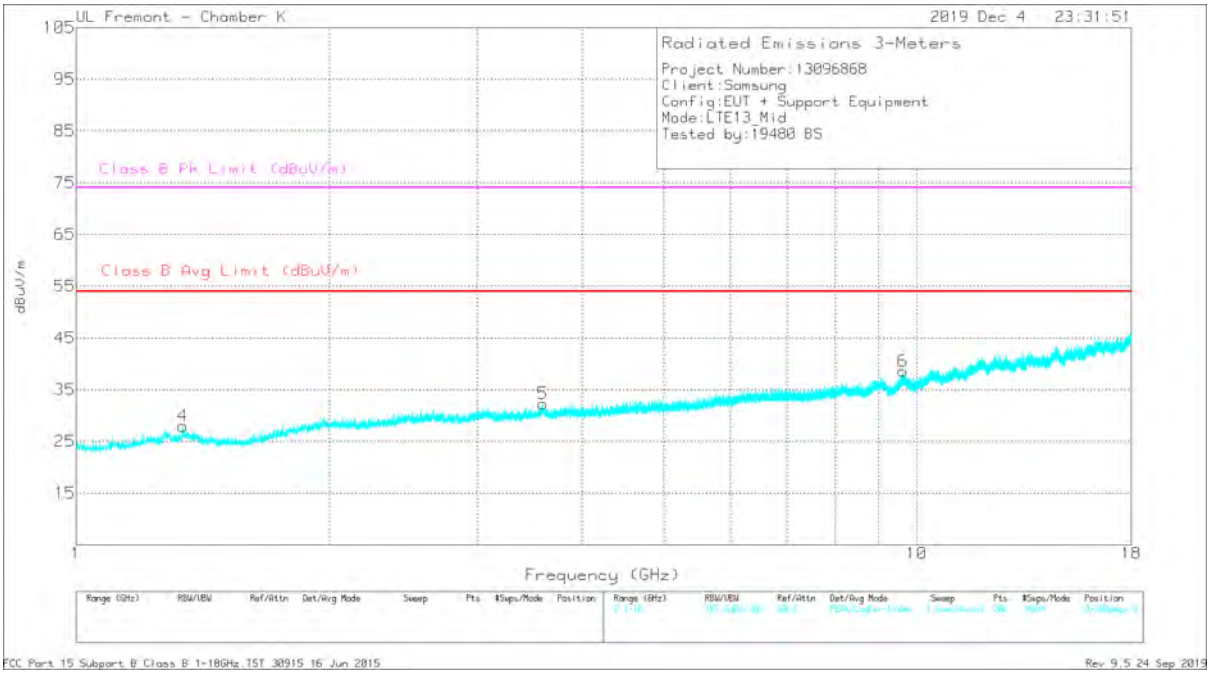
Pk - Peak detector
Av - Average detection

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID CHANNEL



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

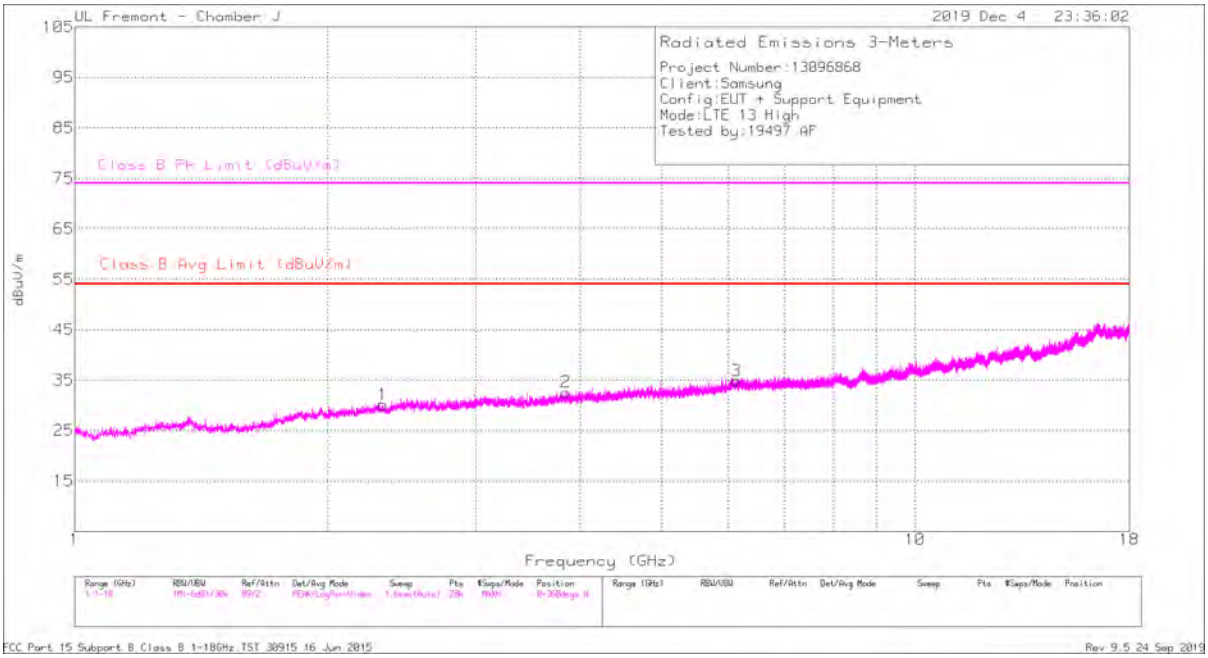
RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dB/m)	Amp/Cbl (dB)	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.3497	42.64	Pk	29.6	-35.5	36.74	54		74	-37.26	277	199	H
	1.3497	29.18	Av	29.6	-35.5	23.28	54	-30.72	-	-	277	199	H
2	3.09243	40.94	Pk	33.5	-34.1	40.34	54		74	-33.66	102	147	H
	3.09243	27.99	Av	33.5	-34.1	27.39	54	-26.61	-	-	102	147	H
3	8.18938	35.37	Pk	35.8	-25.6	45.57	54		74	-28.43	229	279	H
	8.18938	21.96	Av	35.8	-25.6	32.16	54	-21.84	-	-	229	279	H
4	1.33813	42.58	Pk	29.4	-35.5	36.48	54		74	-37.52	205	369	V
	1.33813	29.39	Av	29.4	-35.5	23.29	54	-30.71	-	-	205	369	V
5	3.59379	41.04	Pk	34	-33	42.04	54		74	-31.96	125	190	V
	3.59379	27.48	Av	34	-33	28.48	54	-25.52	-	-	125	190	V
6	9.63878	33.67	Pk	37.1	-23.8	46.97	54		74	-27.03	228	254	V
	9.63878	20.74	Av	37.1	-23.8	34.04	54	-19.96	-	-	228	254	V

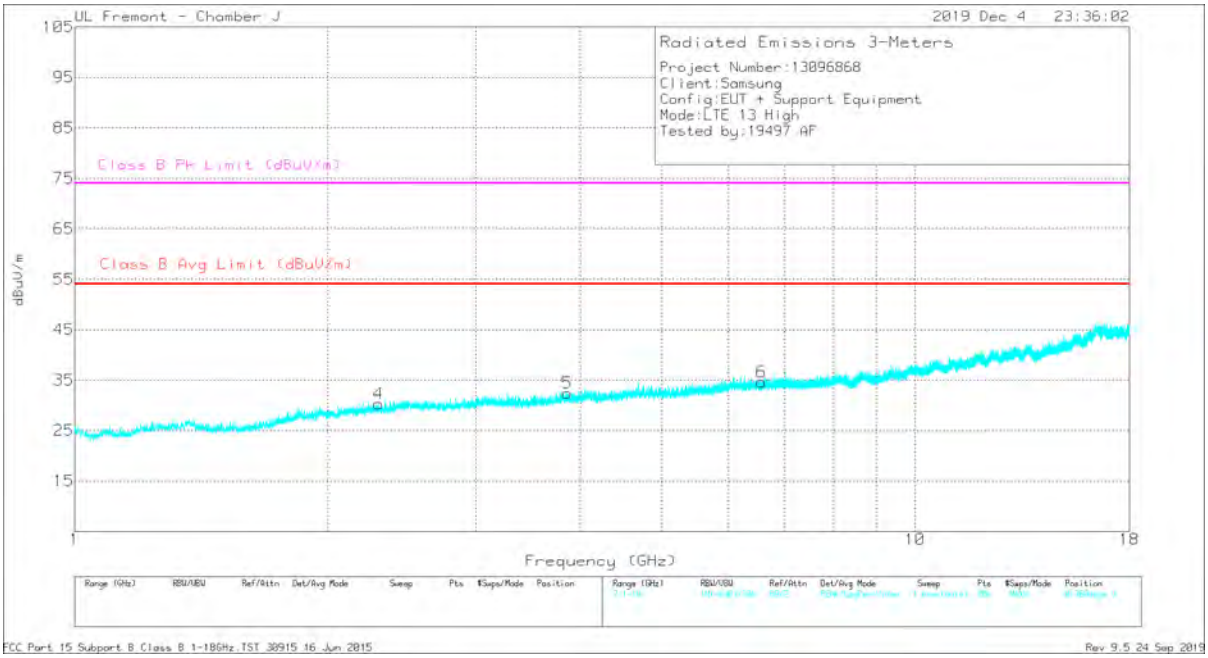
Pk - Peak detector
Av - Average detection

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CHANNEL



HORIZONTAL



VERTICAL

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2.32771	34.33	Pk	31.6	-35.6	30.33	54		74	-43.67	349	255	H
2.32771	21.02	Av	31.6	-35.6	17.02	54	-36.98	-	-	349	255	H
3.84622	32.71	Pk	33.6	-33	33.31	54		74	-40.69	305	105	H
3.84622	18.74	Av	33.6	-33	19.34	54	-34.66	-	-	305	105	H
6.13056	28.57	Pk	35.7	-29.2	35.07	54		74	-38.93	280	178	H
6.13056	15.47	Av	35.7	-29.2	21.97	54	-32.03	-	-	280	178	H
2.29874	43.56	Pk	31.8	-35.5	39.86	54		74	-34.14	30	187	V
2.29874	30.22	Av	31.8	-35.5	26.52	54	-27.48	-	-	30	187	V
6.56686	37.67	Pk	35.5	-28.5	44.67	54		74	-29.33	30	353	V
6.56686	23.86	Av	35.5	-28.5	30.86	54	-23.14	-	-	30	353	V
3.85343	35.92	Pk	33.6	-33	36.52	54		74	-37.48	2	314	V
3.85543	28.02	Av	33.6	-33	28.62	54	-25.38	-	-	2	314	V

Pk - Peak detector
Av - Average detection

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.