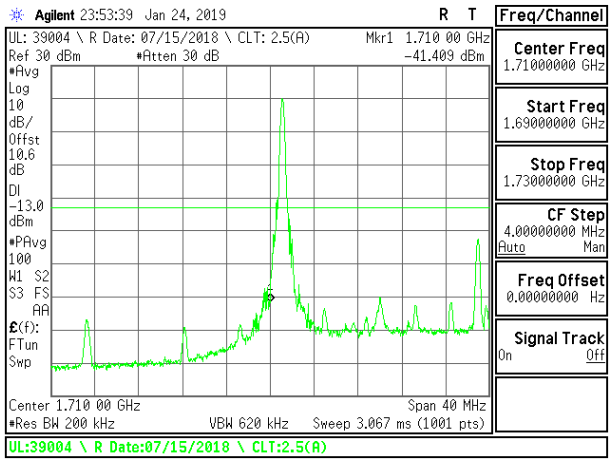
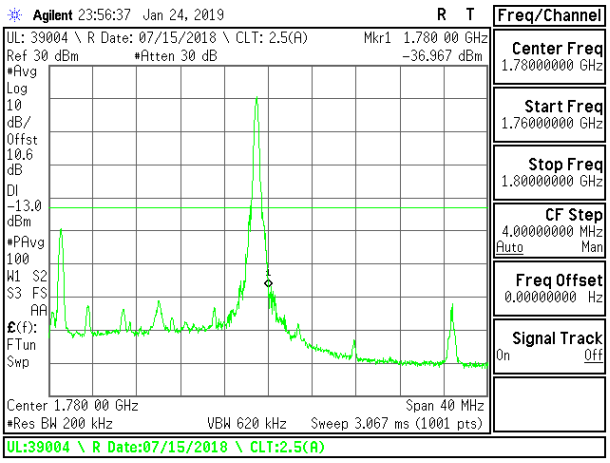
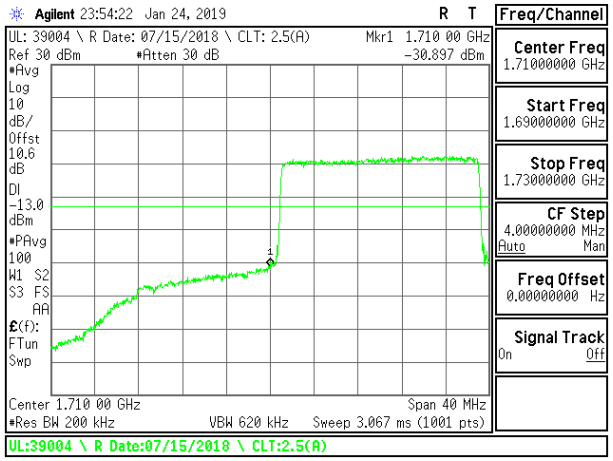


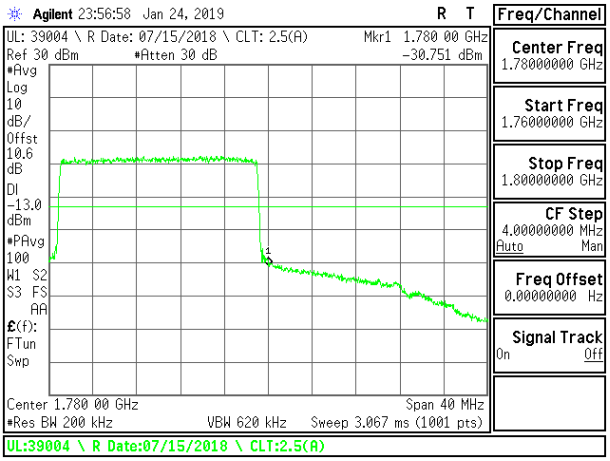
LTE B66 20MHz 16QAM Low Channel RB1-0



LTE B66 20MHz 16QAM High Channel RB1-99



LTE B66 20MHz 16QAM Low Channel RB100-0



LTE B66 20MHz 16QAM High Channel RB100-0

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA
TEL:(510) 771-1000
FAX:(510) 661-0888

FORM NO: CCSUP4031B

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

9.3. OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051, §22.901, §22.917, §24.238, and §27.53

LIMITS

FCC: §22.917, §24.238, §27.53 (c), (g), (h)
The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.

FCC: §27.53 (m) (Band 41)
The minimum permissible attenuation level of any spurious emissions is 55 + 10 log (P) dB where transmitting power (P) in Watts.

TEST PROCEDURE

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

For each out of band emissions measurement:

- Set display line at -13 dBm, -25dBm and -40dBm according to the band Limit
- Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz. (NOTE: Worst case set RBW/VBW to 1MHz/3MHz)

MODES TESTED

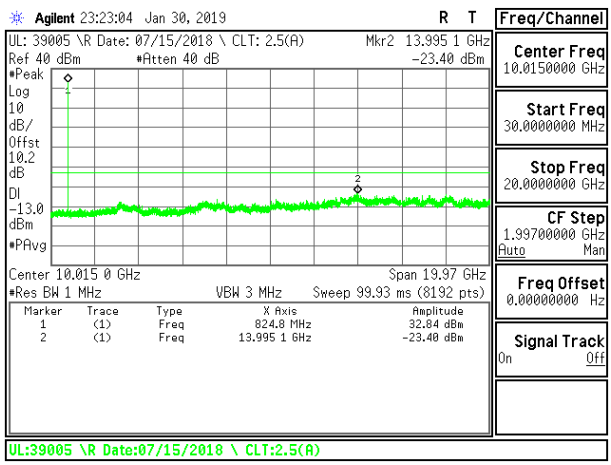
- GSM 850
- GSM 1900
- WCDMA Band 5
- WCDMA Band 2
- WCDMA Band 4
- LTE Band 2
- LTE Band 5
- LTE Band 12
- LTE Band 13
- LTE Band 41
- LTE Band 66

RESULTS

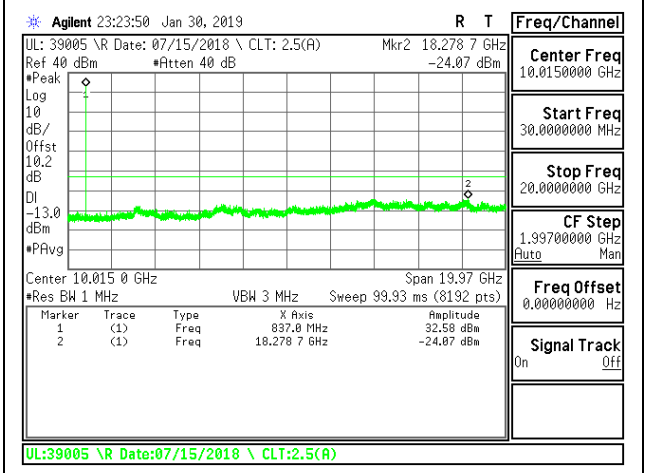
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.3.1. GSM850

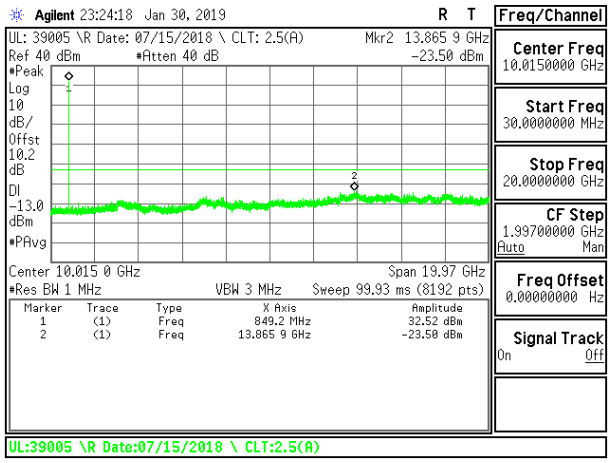
GPRS



GSM850 GPRS LOW Channel



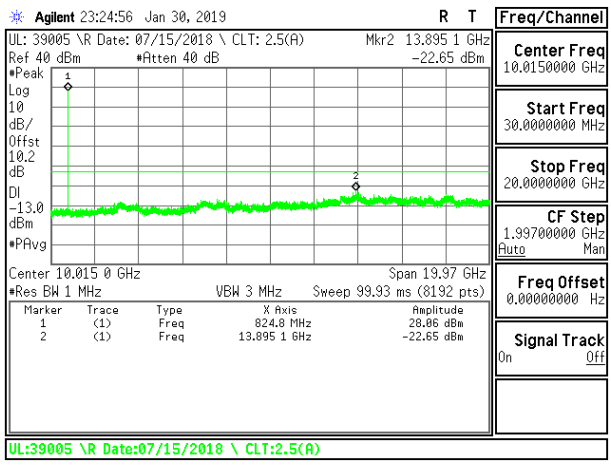
GSM850 GPRS MID Channel



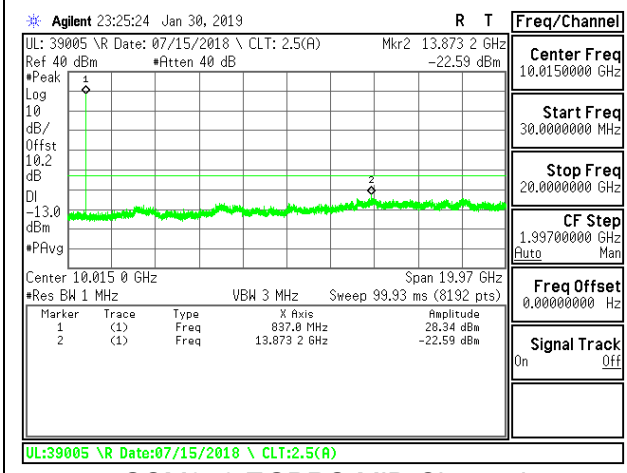
GSM850 GPRS HIGH Channel

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

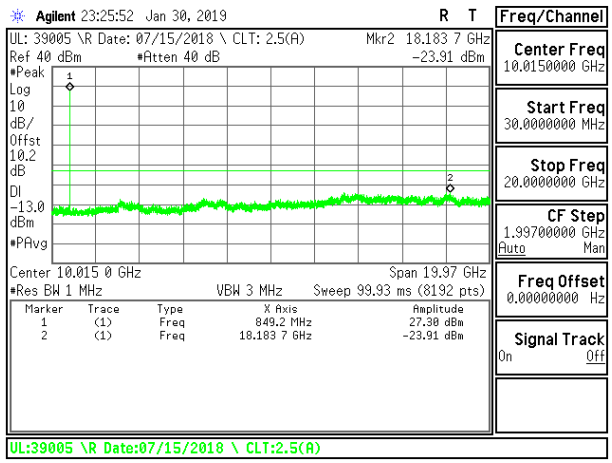
EGPRS



GSM850 EGPRS LOW Channel



GSM850 EGPRS MID Channel

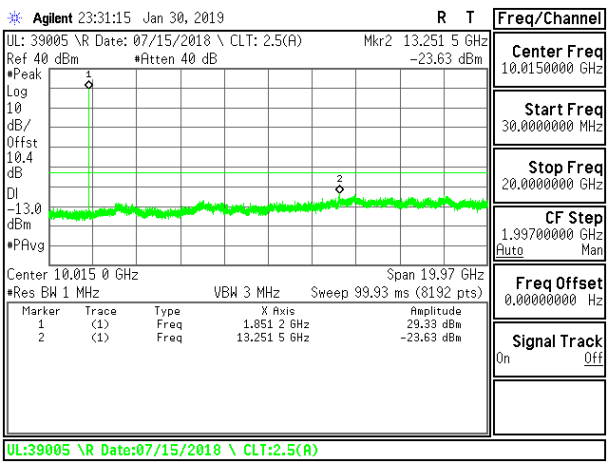


GSM850 EGPRS HIGH Channel

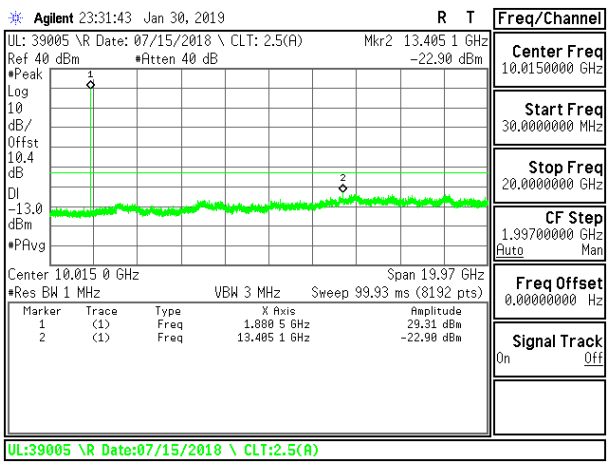
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.3.2. GSM1900

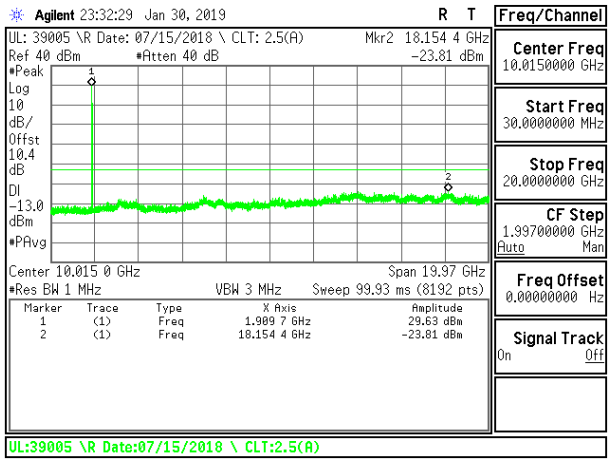
GPRS



GSM1900 GPRS LOW Channel



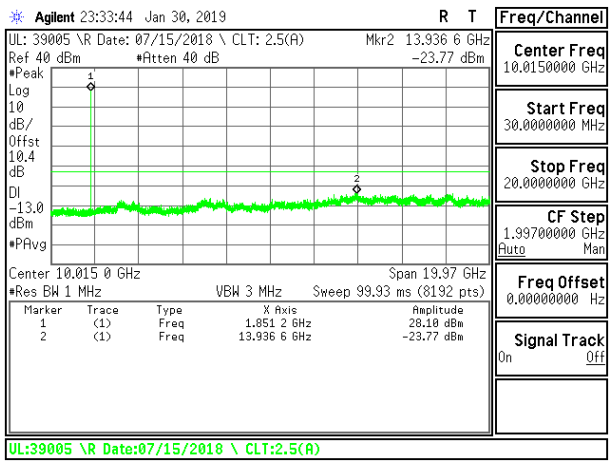
GSM1900 GPRS MID Channel



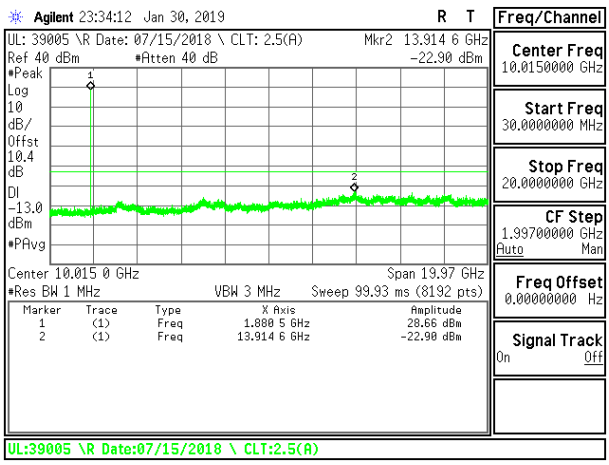
GSM1900 GPRS HIGH Channel

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

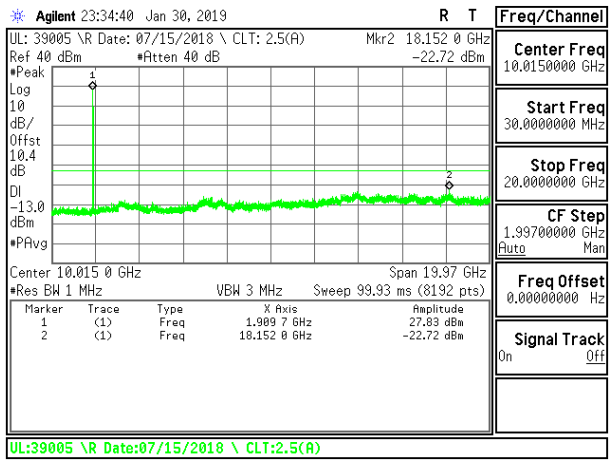
EGPRS



GSM1900 EGPRS LOW Channel



GSM1900 EGPRS MID Channel

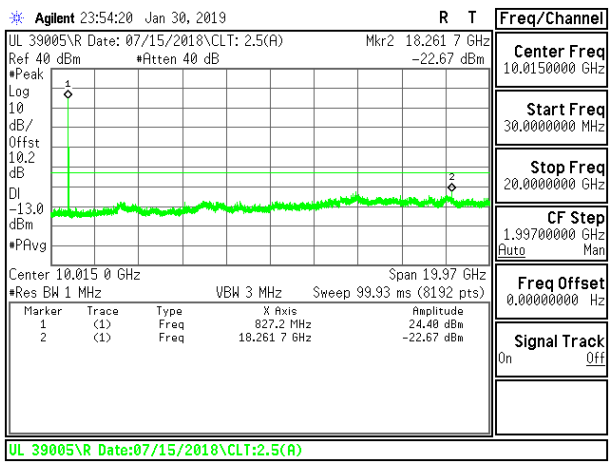


GSM1900 EGPRS HIGH Channel

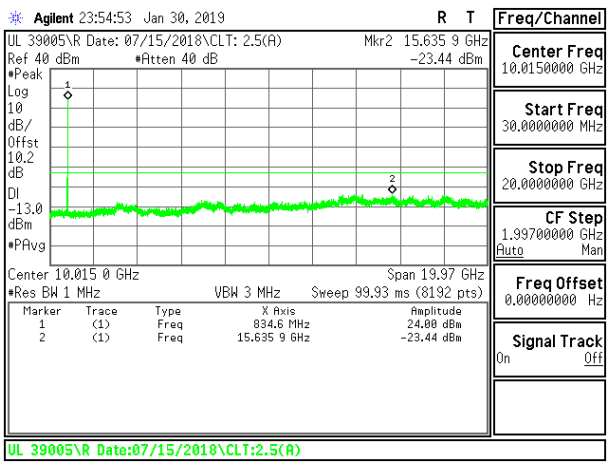
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.3.3. WCDMA BAND5

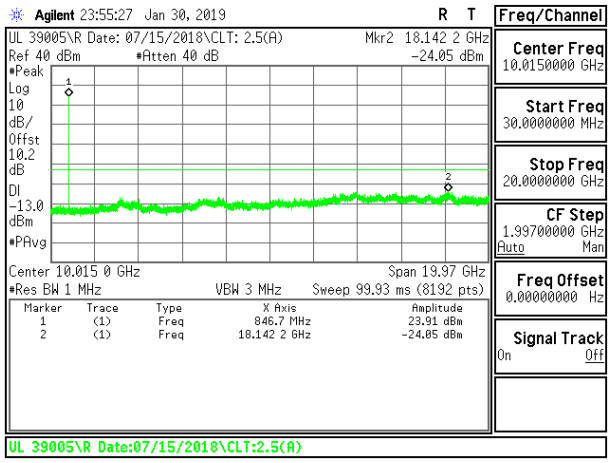
Rel99



BAND5 Rel99 LOW Channel



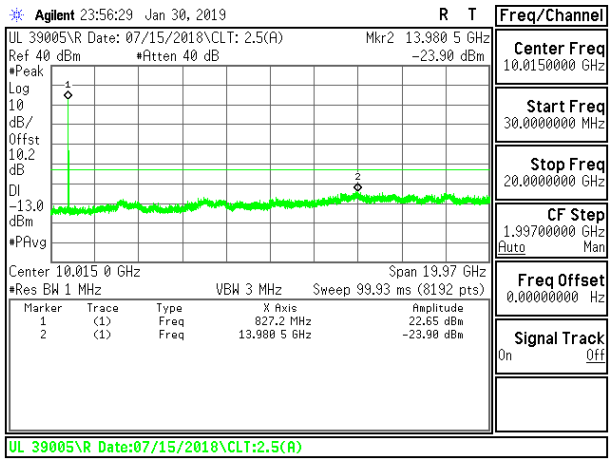
BAND5 Rel99 MID Channel



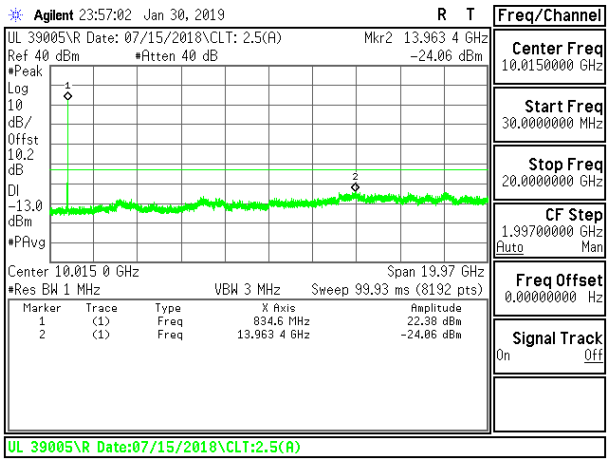
BAND5 Rel99 HIGH Channel

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

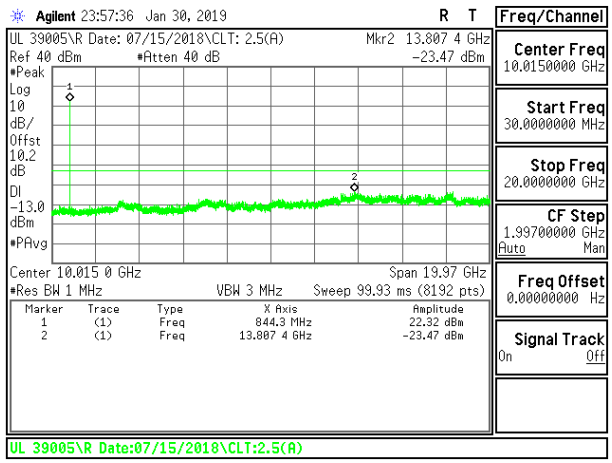
HSDPA



BAND5 HSDPA LOW Channel



BAND5 HSDPA MID Channel

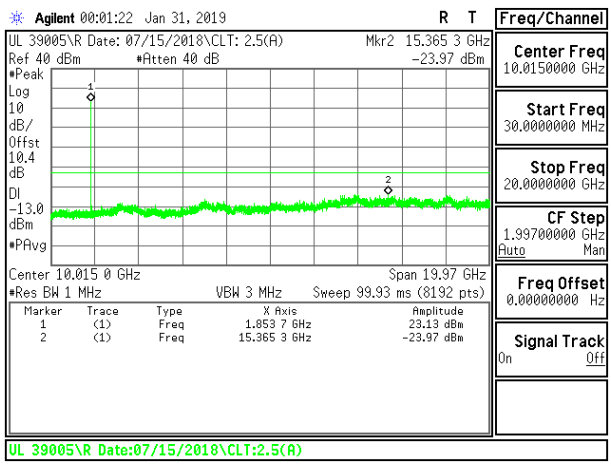


BAND5 HSDPA HIGH Channel

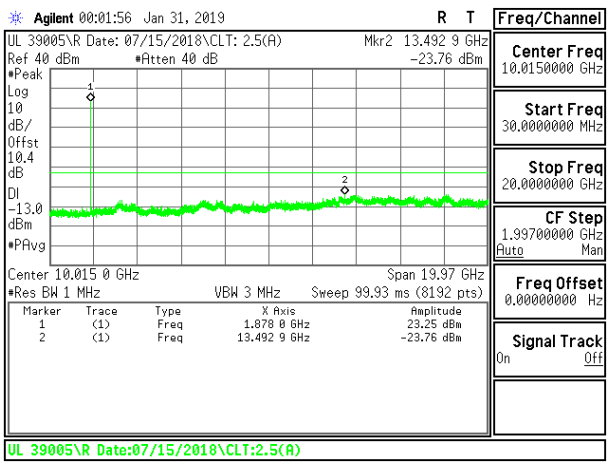
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.3.4. WCDMA BAND2

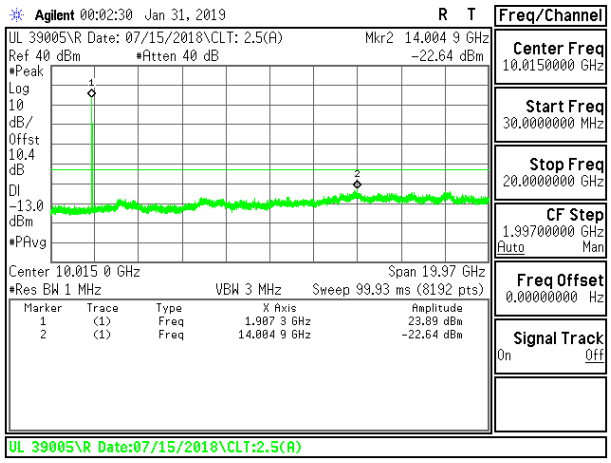
Rel99



BAND2 Rel99 LOW Channel



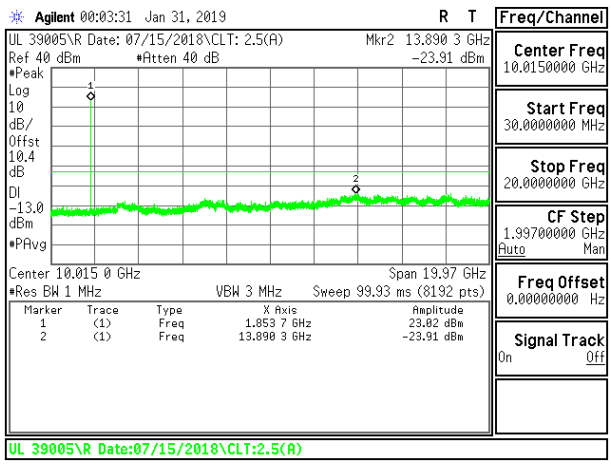
BAND2 Rel99 MID Channel



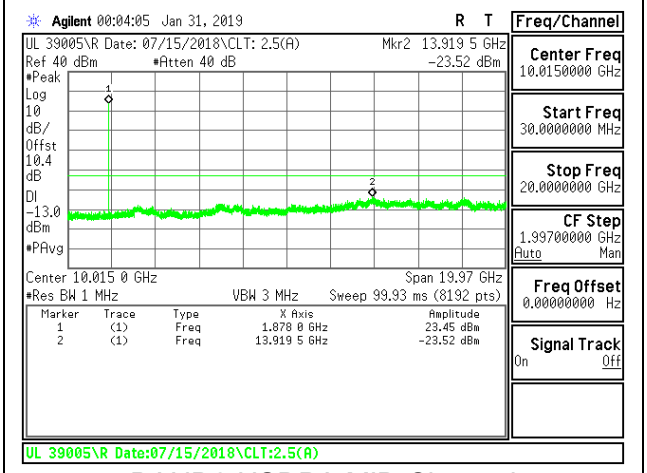
BAND2 Rel99 HIGH Channel

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

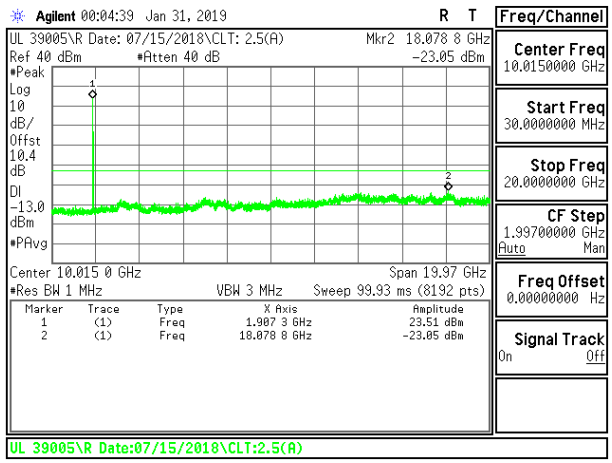
HSDPA



BAND2 HSDPA LOW Channel



BAND2 HSDPA MID Channel

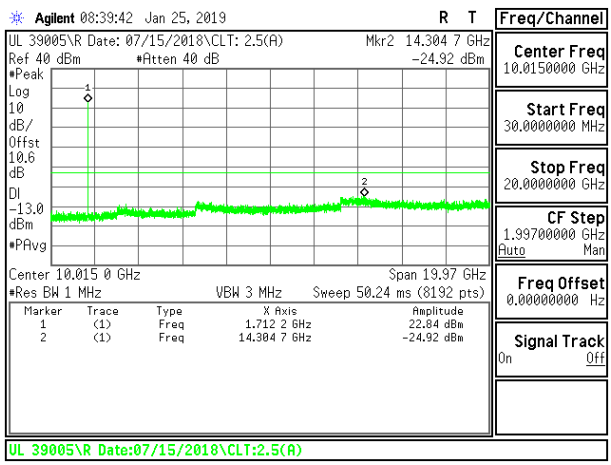


BAND2 HSDPA HIGH Channel

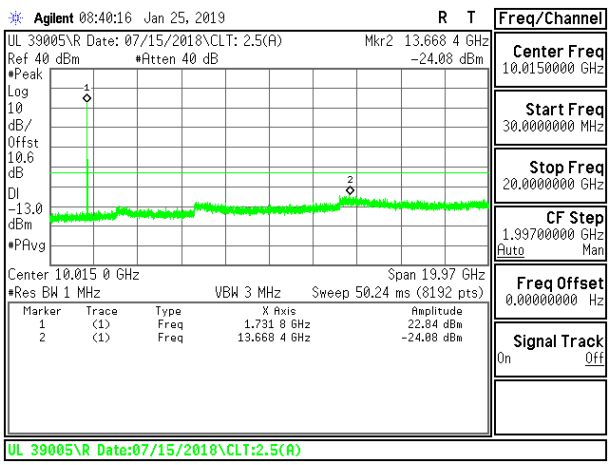
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.3.5. WCDMA BAND4

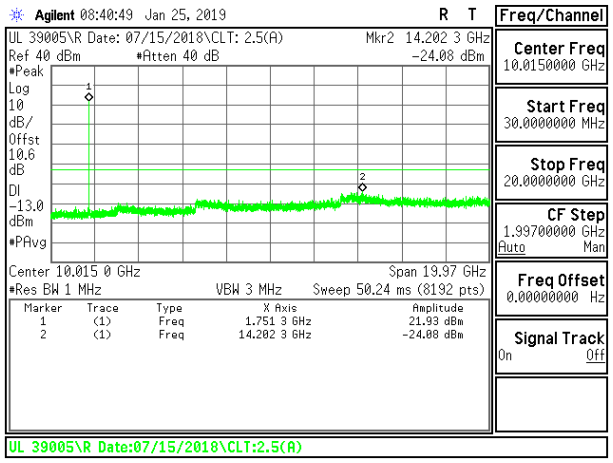
Rel99



BAND4 Rel99 LOW Channel



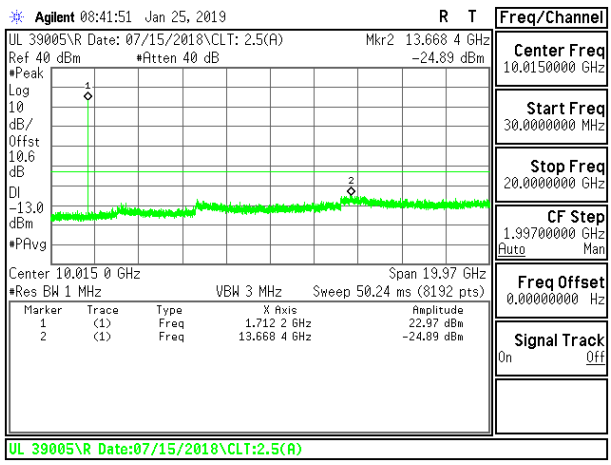
BAND4 Rel99 MID Channel



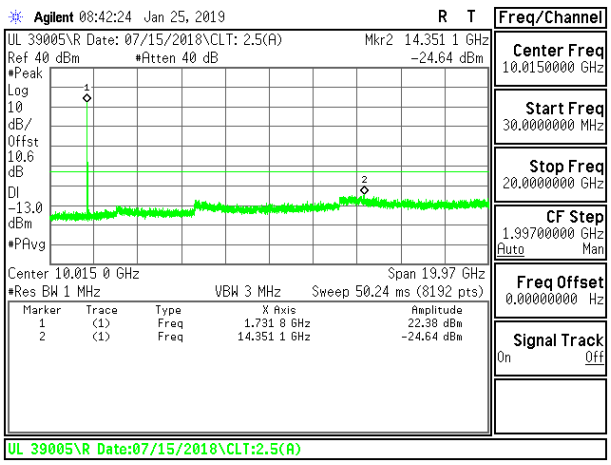
BAND4 Rel99 HIGH Channel

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

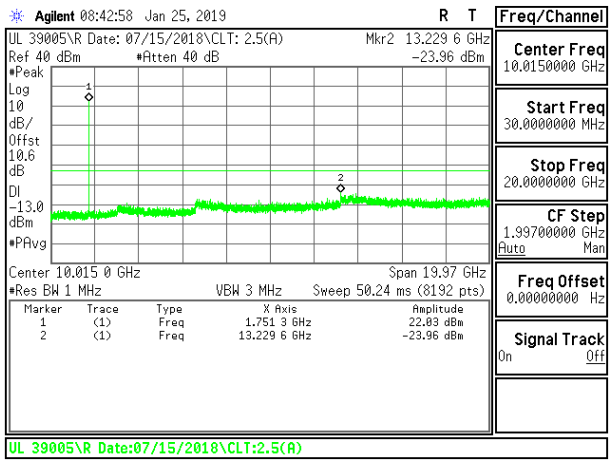
HSDPA



BAND4 HSDPA LOW Channel



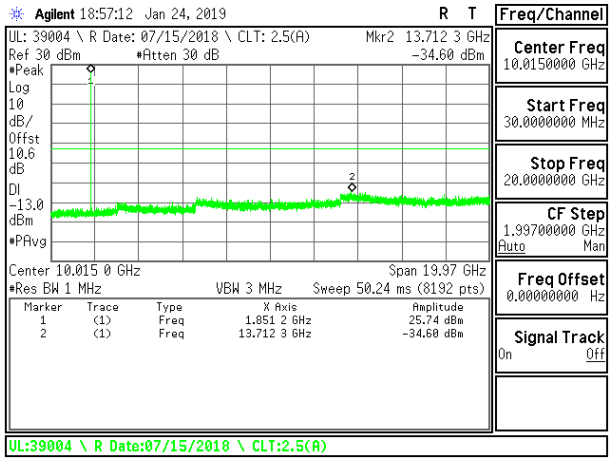
BAND4 HSDPA MID Channel



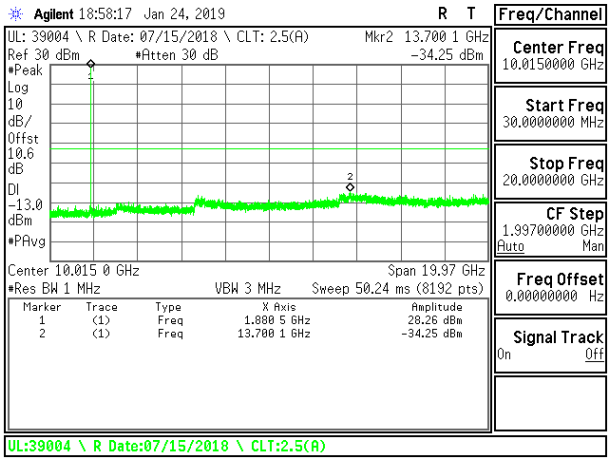
BAND4 HSDPA HIGH Channel

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

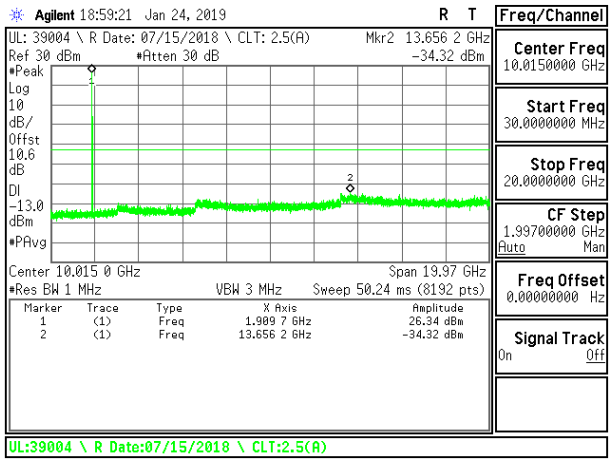
9.3.6. LTE BAND 2



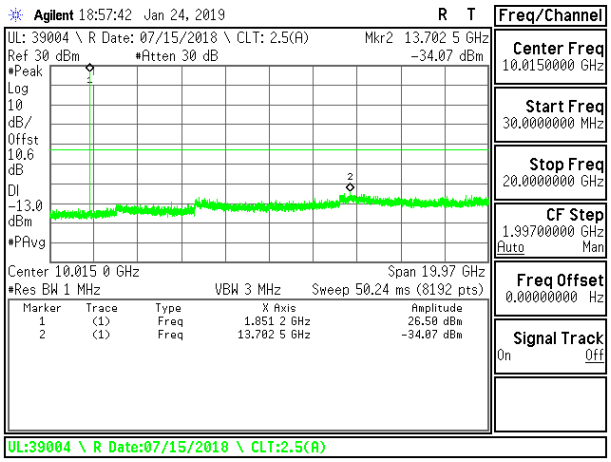
LTE B2 1.4MHz QPSK Low Channel RB1-0



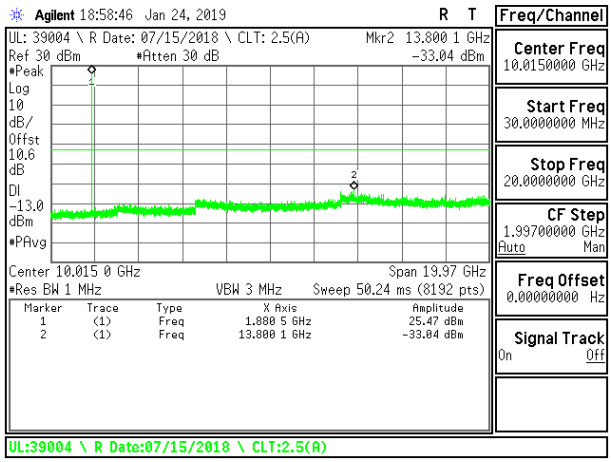
LTE B2 1.4MHz QPSK Mid Channel RB1-0



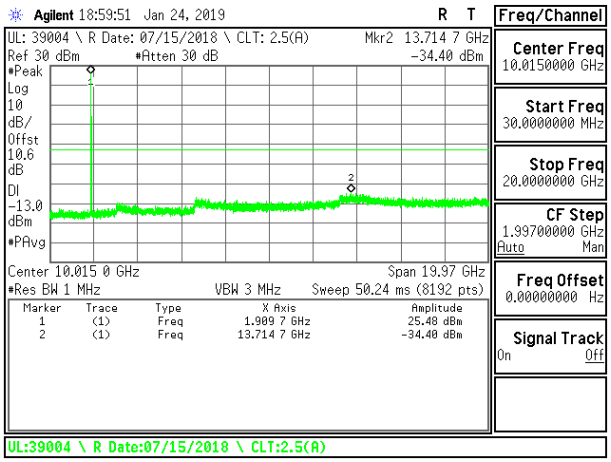
LTE B2 1.4MHz QPSK High Channel RB1-0



LTE B2 1.4MHz 16QAM Low Channel RB1-0

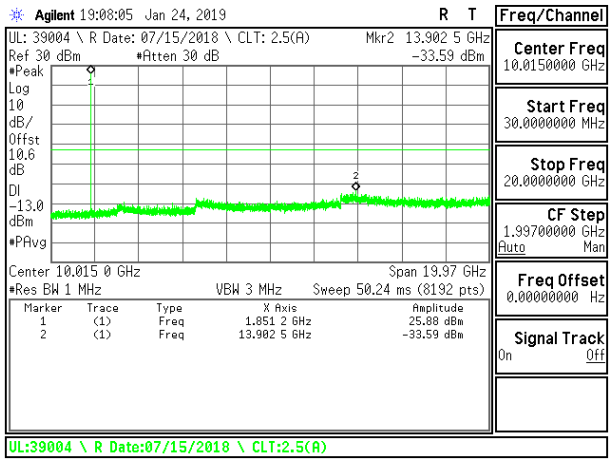


LTE B2 1.4MHz 16QAM Mid Channel RB1-0

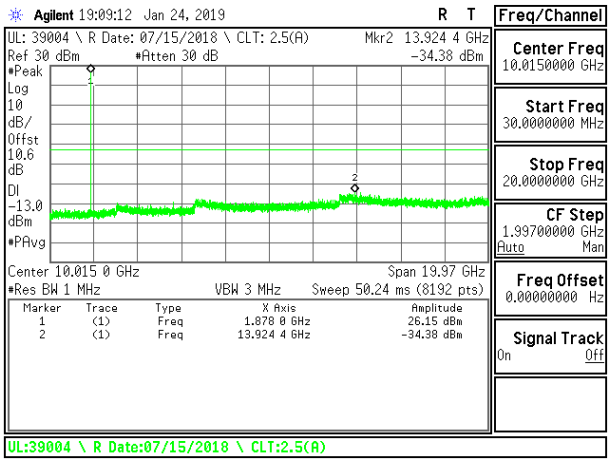


LTE B2 1.4MHz 16QAM High Channel RB1-0

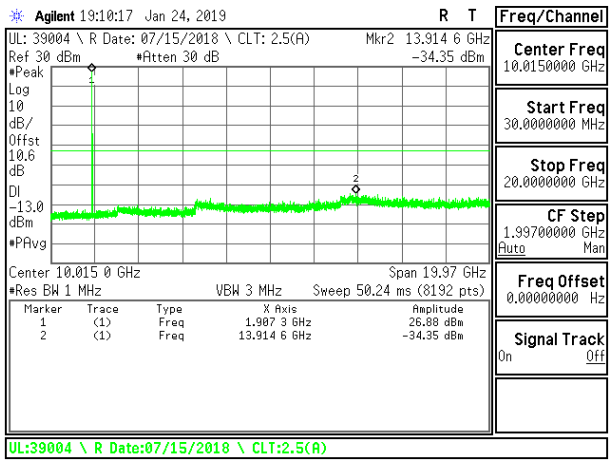
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



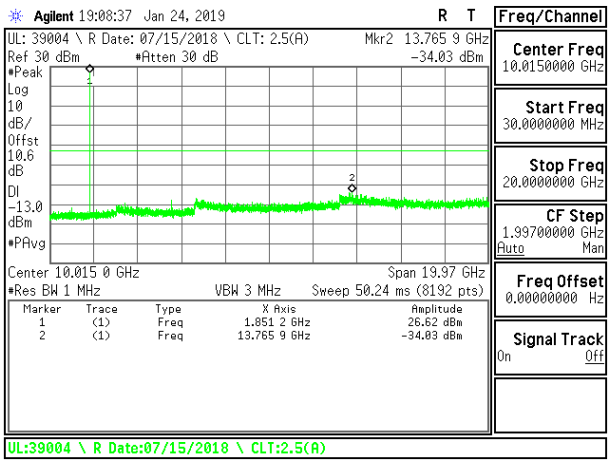
LTE B2 3MHz QPSK Low Channel RB1-0



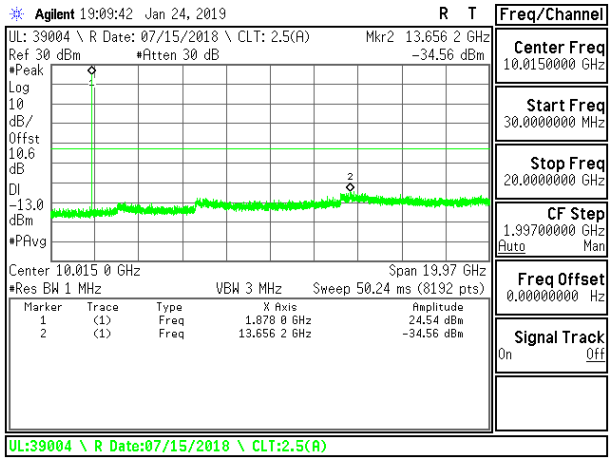
LTE B2 3MHz QPSK Mid Channel RB1-0



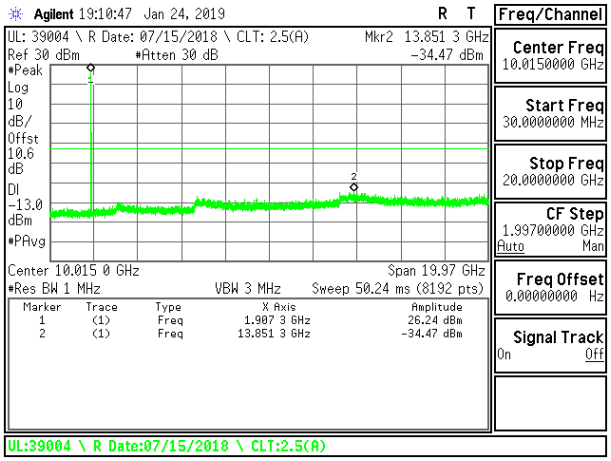
LTE B2 3MHz QPSK High Channel RB1-0



LTE B2 3MHz 16QAM Low Channel RB1-0



LTE B2 3MHz 16QAM Mid Channel RB1-0

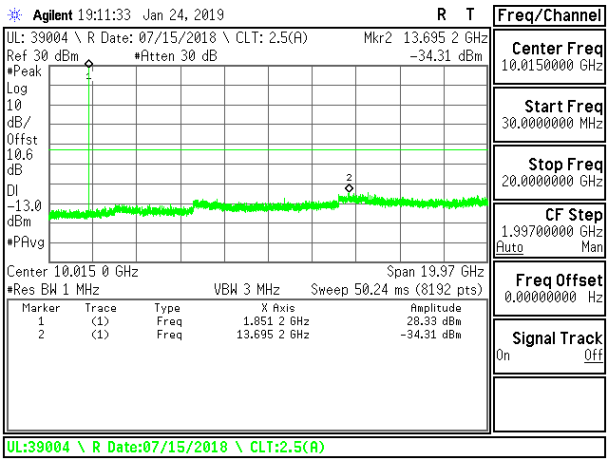


LTE B2 3MHz 16QAM High Channel RB1-0

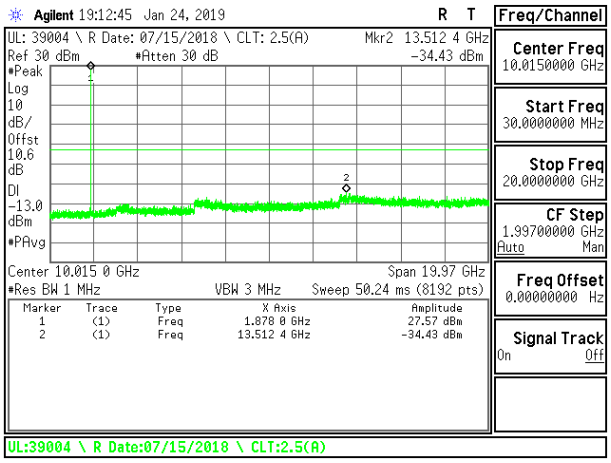
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA
TEL:(510) 771-1000
FAX:(510) 661-0888

FORM NO: CCSUP4031B

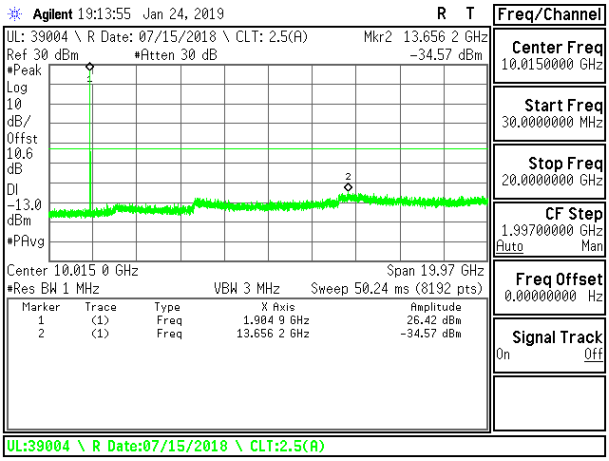
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



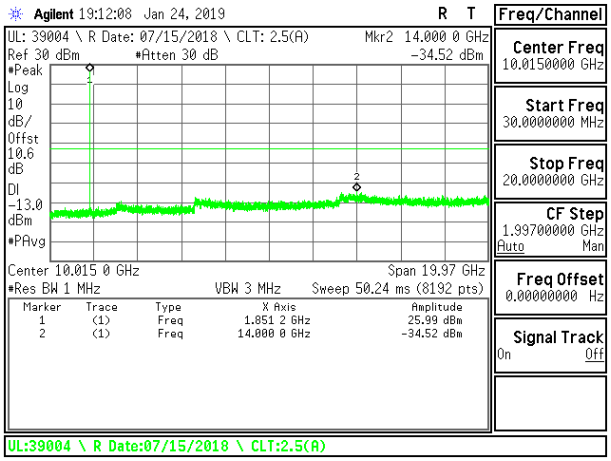
LTE B2 5MHz QPSK Low Channel RB1-0



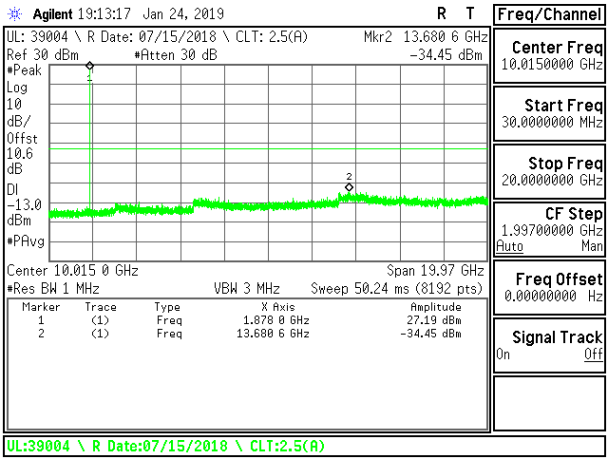
LTE B2 5MHz QPSK Mid Channel RB1-0



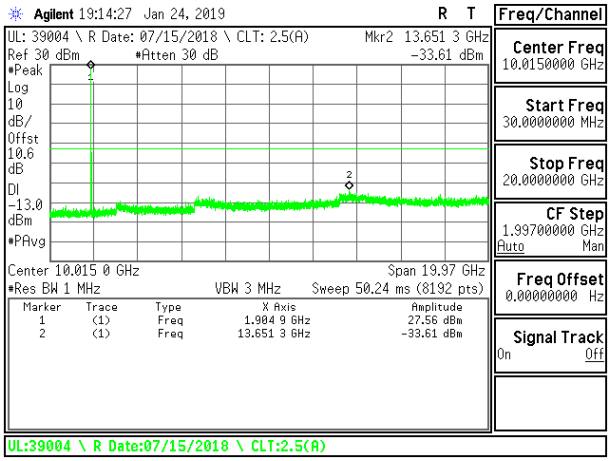
LTE B2 5MHz QPSK High Channel RB1-0



LTE B2 5MHz 16QAM Low Channel RB1-0



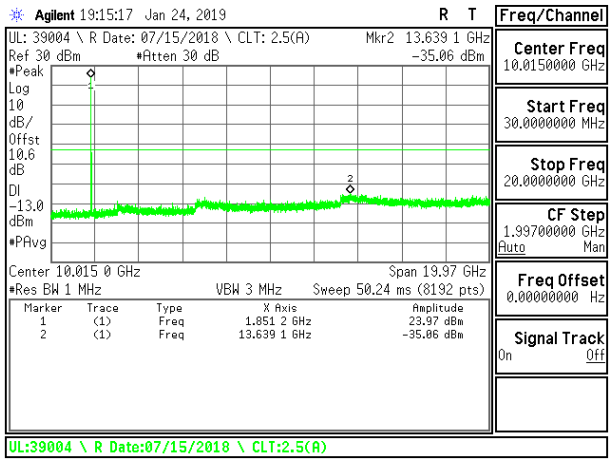
LTE B2 5MHz 16QAM Mid Channel RB1-0



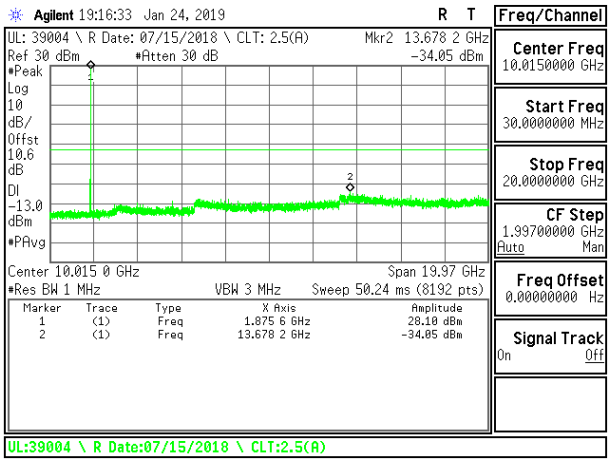
LTE B2 5MHz 16QAM High Channel RB1-0

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA
TEL:(510) 771-1000
FAX:(510) 661-0888

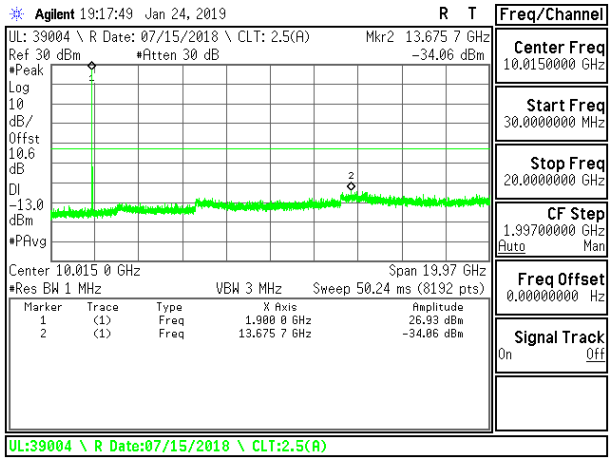
FORM NO: CCSUP4031B
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



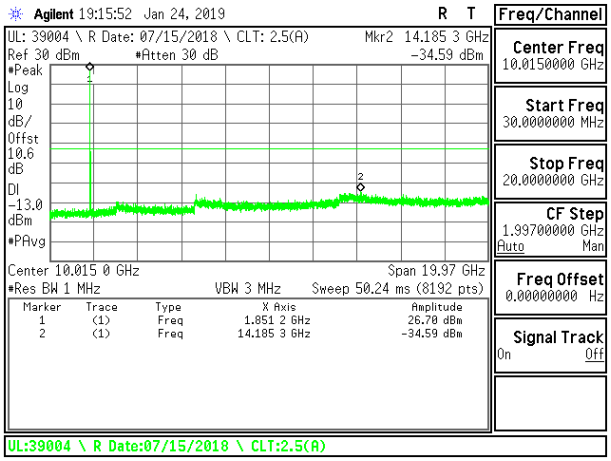
LTE B2 10MHz QPSK Low Channel RB1-0



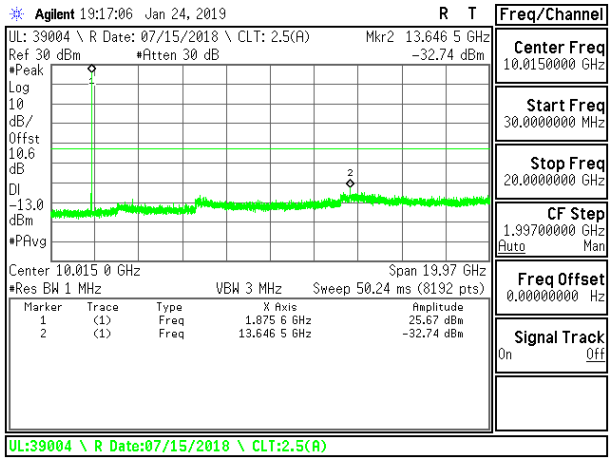
LTE B2 10MHz QPSK Mid Channel RB1-0



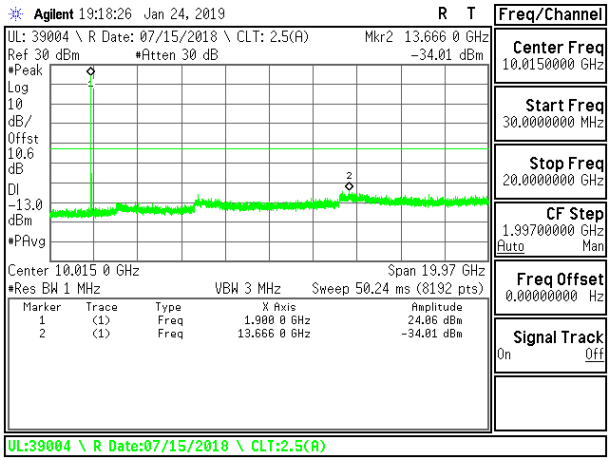
LTE B2 10MHz QPSK High Channel RB1-0



LTE B2 10MHz 16QAM Low Channel RB1-0

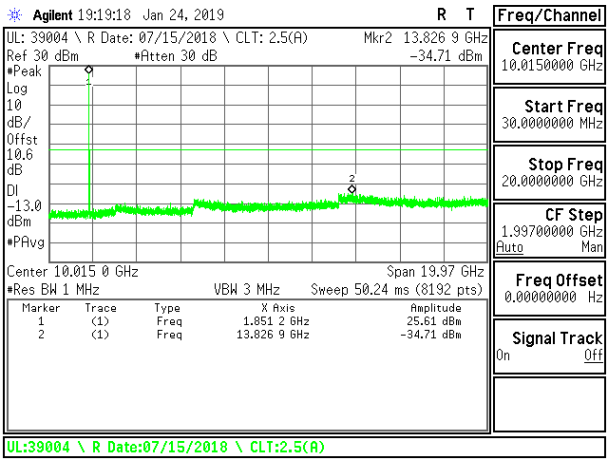


LTE B2 10MHz 16QAM Mid Channel RB1-0

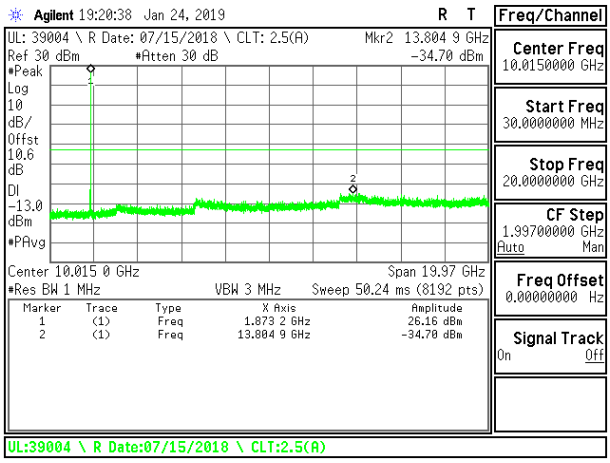


LTE B2 10MHz 16QAM High Channel RB1-0

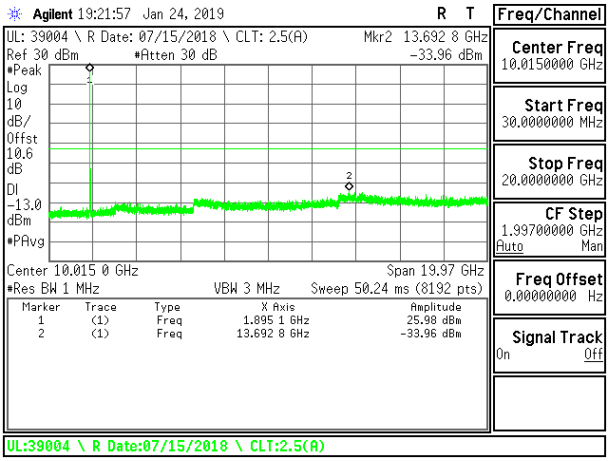
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



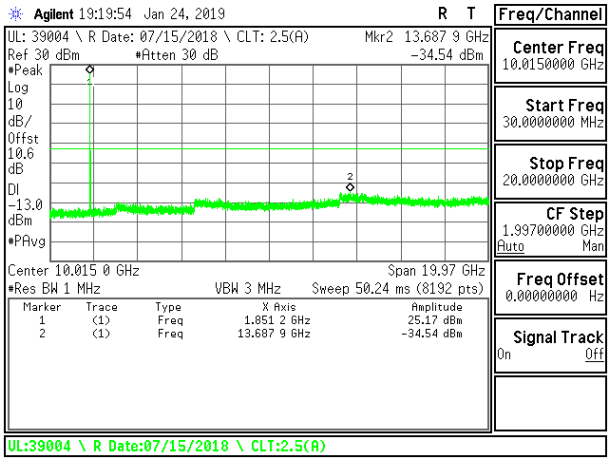
LTE B2 15MHz QPSK Low Channel RB1-0



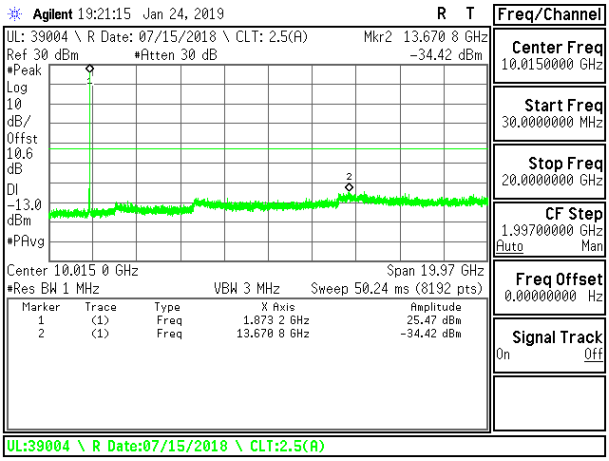
LTE B2 15MHz QPSK Mid Channel RB1-0



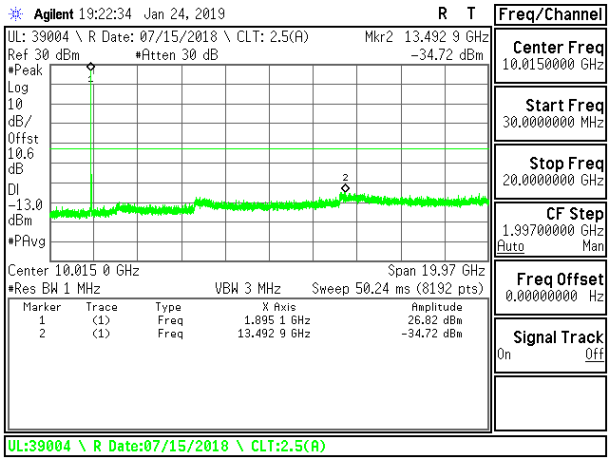
LTE B2 15MHz QPSK High Channel RB1-0



LTE B2 15MHz 16QAM Low Channel RB1-0

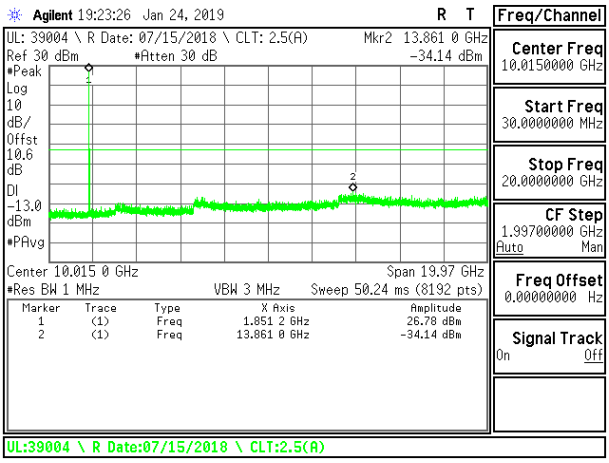


LTE B2 15MHz 16QAM Mid Channel RB1-0

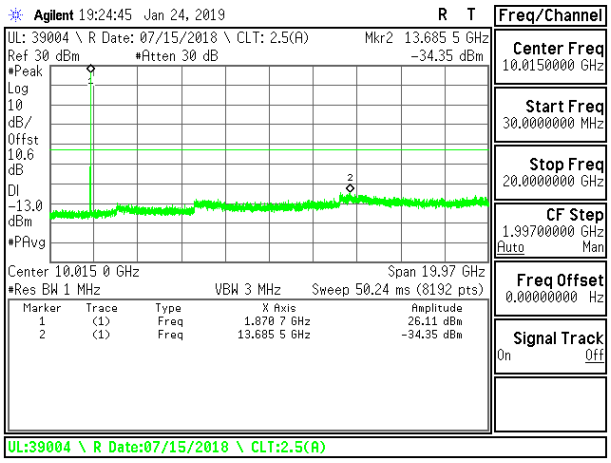


LTE B2 15MHz 16QAM High Channel RB1-0

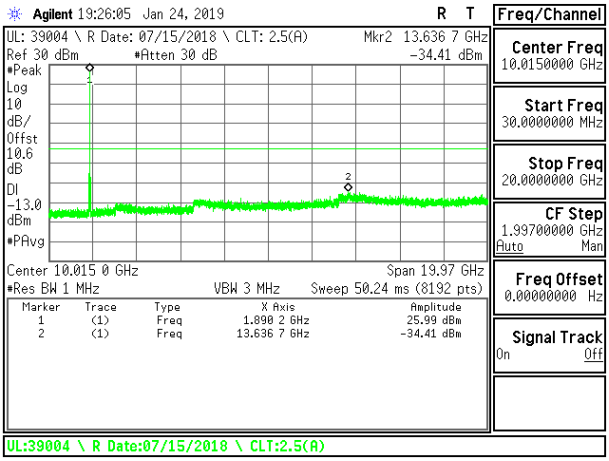
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



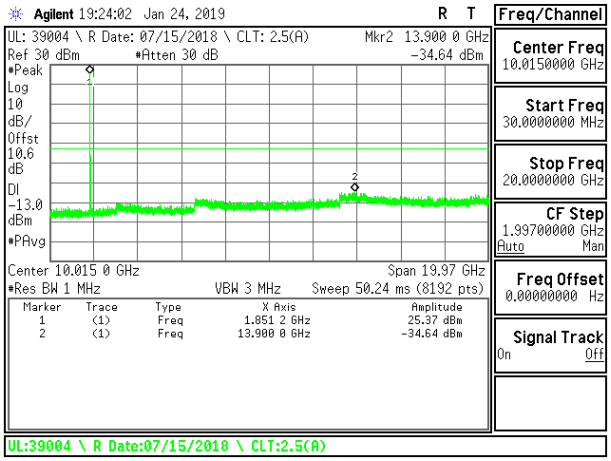
LTE B2 20MHz QPSK Low Channel RB1-0



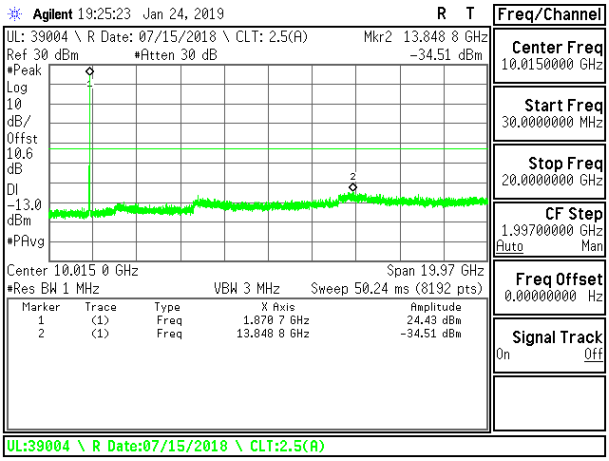
LTE B2 20MHz QPSK Mid Channel RB1-0



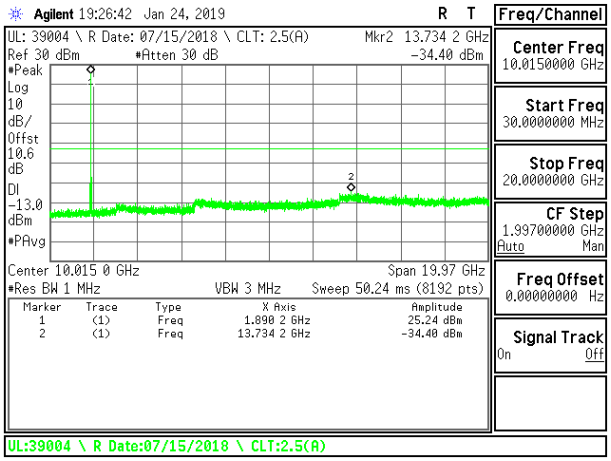
LTE B2 20MHz QPSK High Channel RB1-0



LTE B2 20MHz 16QAM Low Channel RB1-0



LTE B2 20MHz 16QAM Mid Channel RB1-0



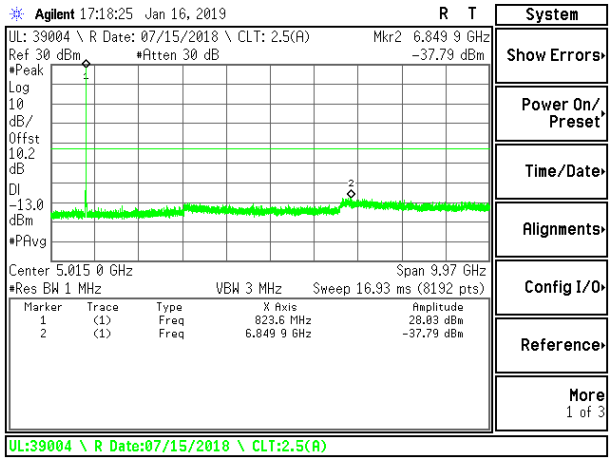
LTE B2 20MHz 16QAM High Channel RB1-0

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA
TEL:(510) 771-1000
FAX:(510) 661-0888

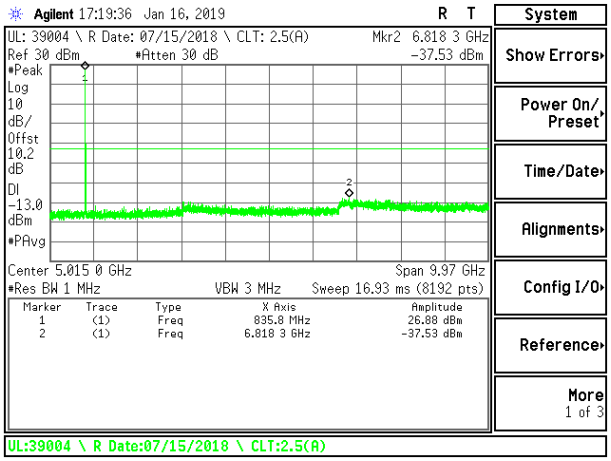
FORM NO: CCSUP4031B

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

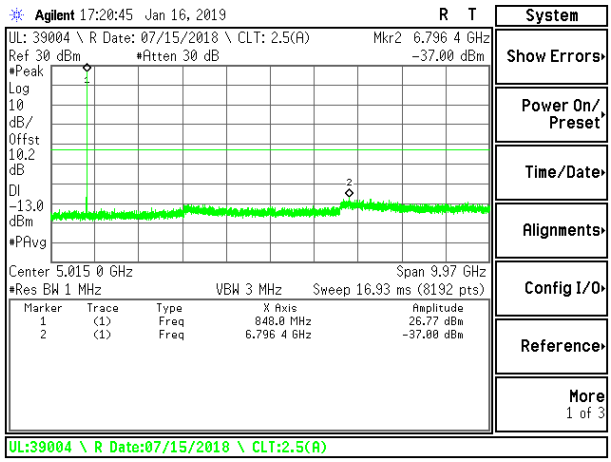
9.3.7. LTE BAND 5



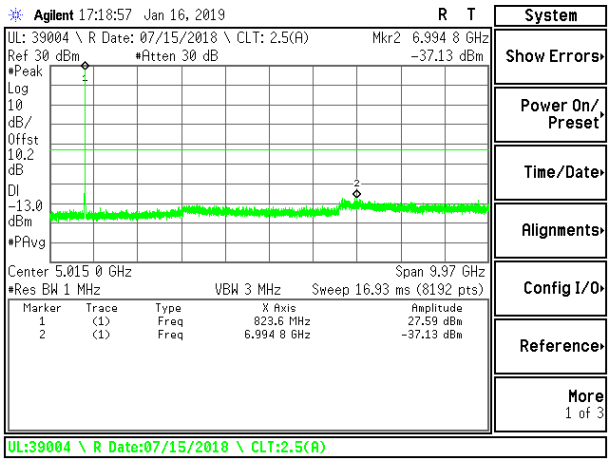
LTE B5 1.4MHz QPSK Low Channel RB1-0



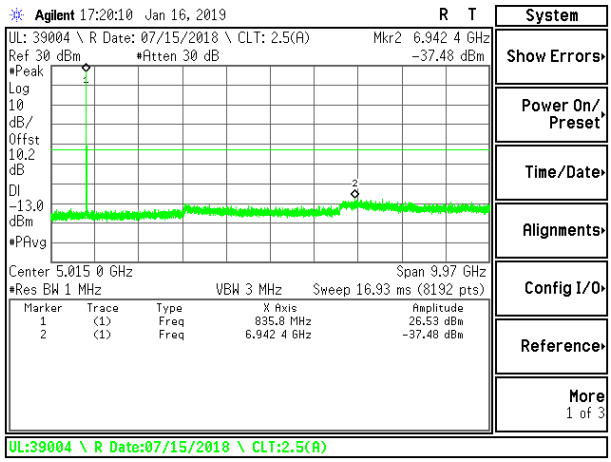
LTE B5 1.4MHz QPSK Mid Channel RB1-0



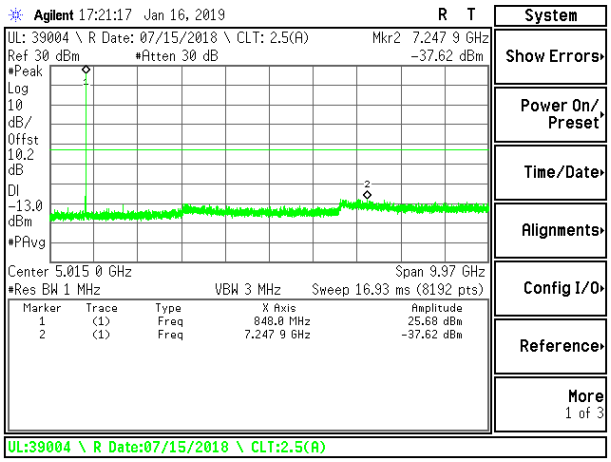
LTE B5 1.4MHz QPSK High Channel RB1-0



LTE B5 1.4MHz 16QAM Low Channel RB1-0

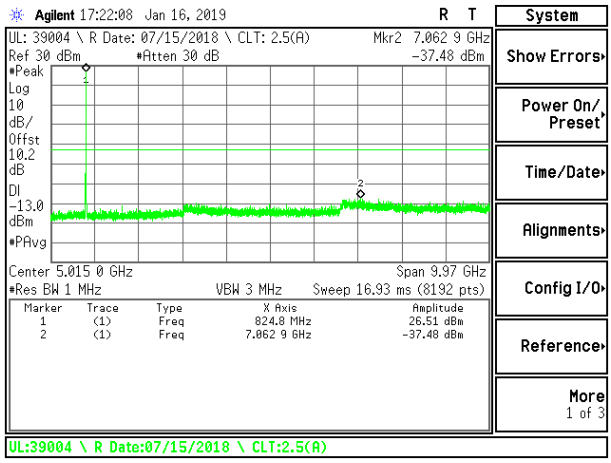


LTE B5 1.4MHz 16QAM Mid Channel RB1-0

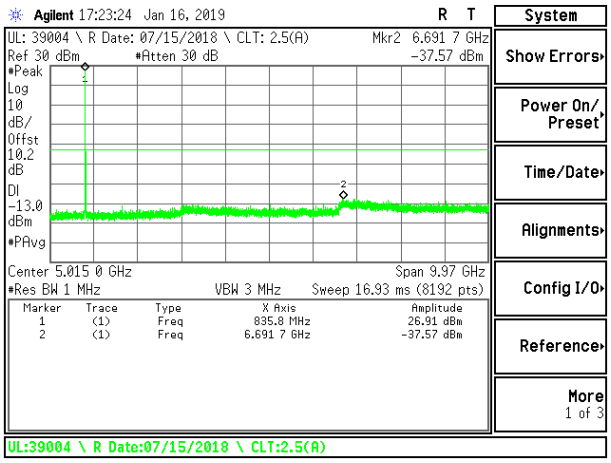


LTE B5 1.4MHz 16QAM High Channel RB1-0

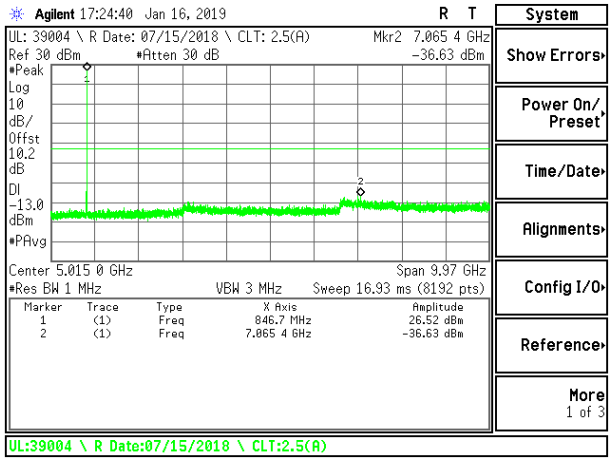
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



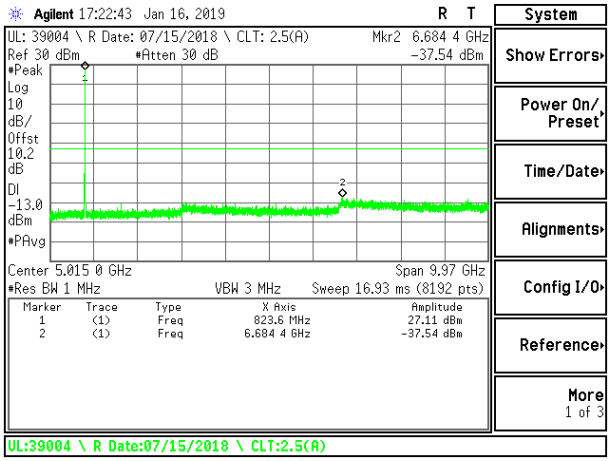
LTE B5 3MHz QPSK Low Channel RB1-0



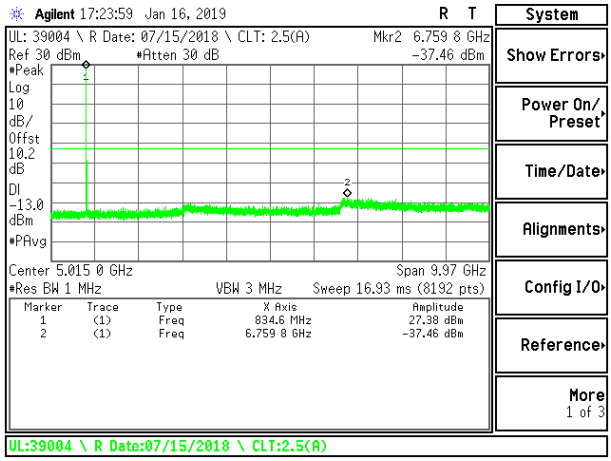
LTE B5 3MHz QPSK Mid Channel RB1-0



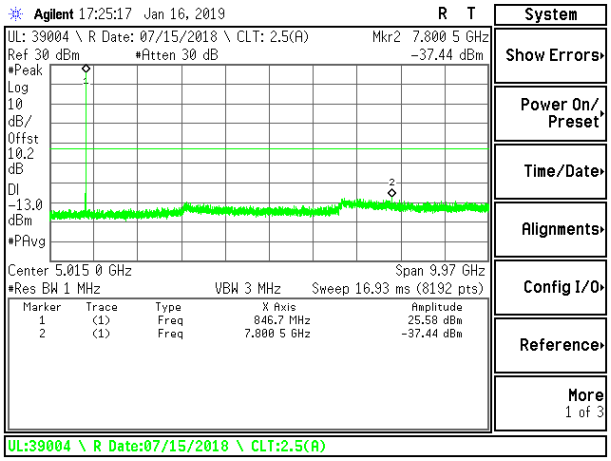
LTE B5 3MHz QPSK High Channel RB1-0



LTE B5 3MHz 16QAM Low Channel RB1-0

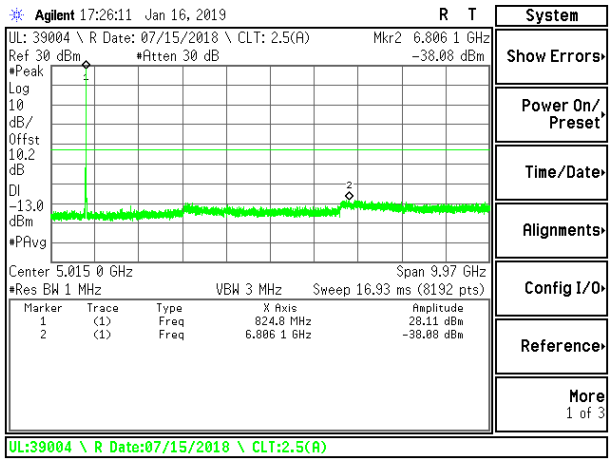


LTE B5 3MHz 16QAM Mid Channel RB1-0

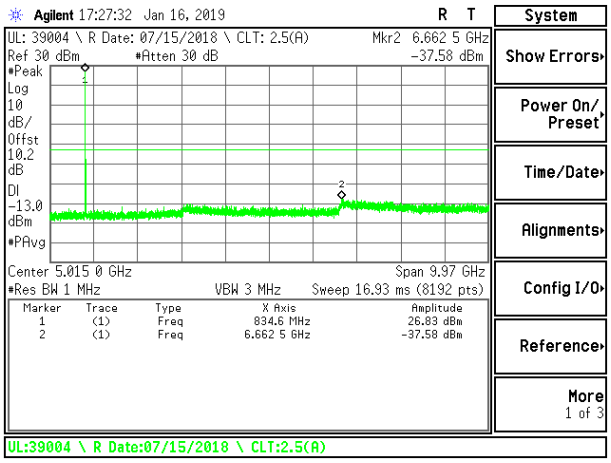


LTE B5 3MHz 16QAM High Channel RB1-0

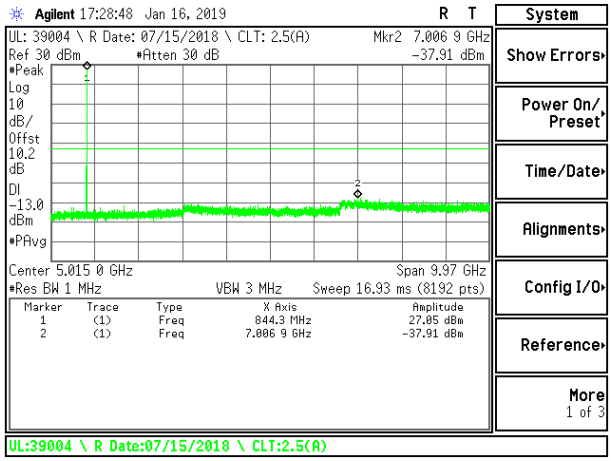
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



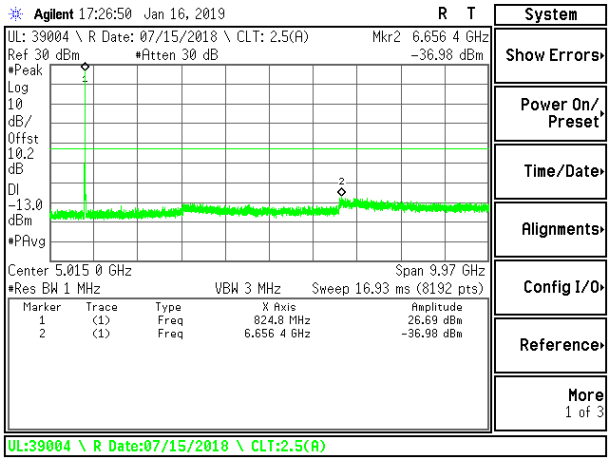
LTE B5 5MHz QPSK Low Channel RB1-0



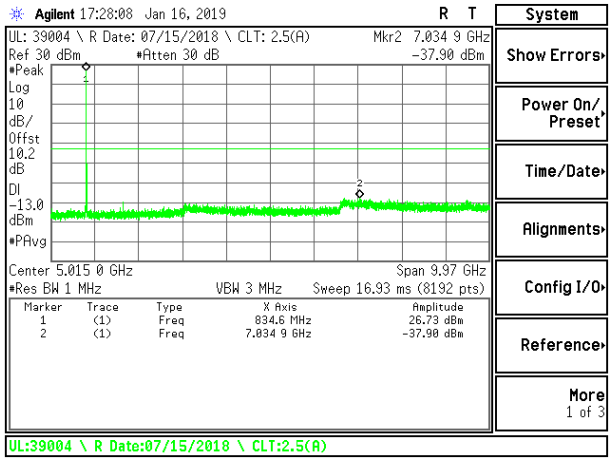
LTE B5 5MHz QPSK Mid Channel RB1-0



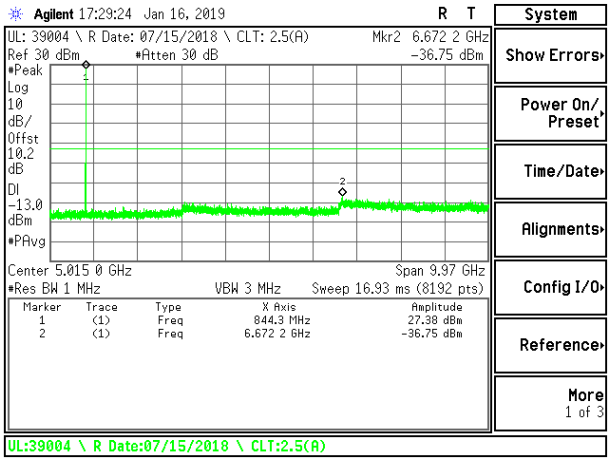
LTE B5 5MHz QPSK High Channel RB1-0



LTE B5 5MHz 16QAM Low Channel RB1-0

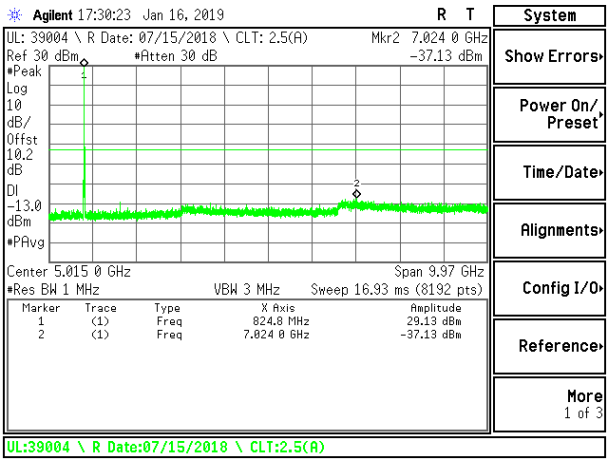


LTE B5 5MHz 16QAM Mid Channel RB1-0

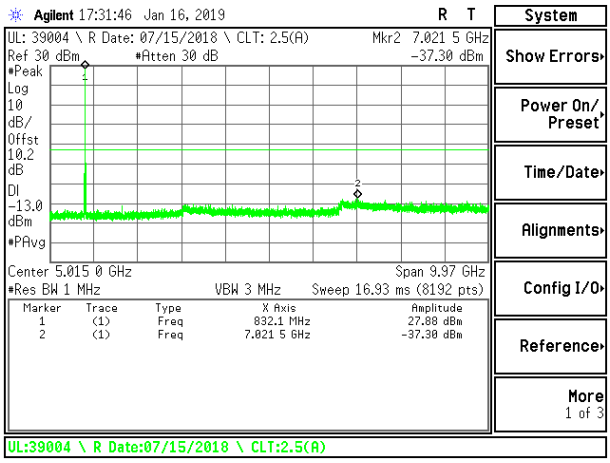


LTE B5 5MHz 16QAM High Channel RB1-0

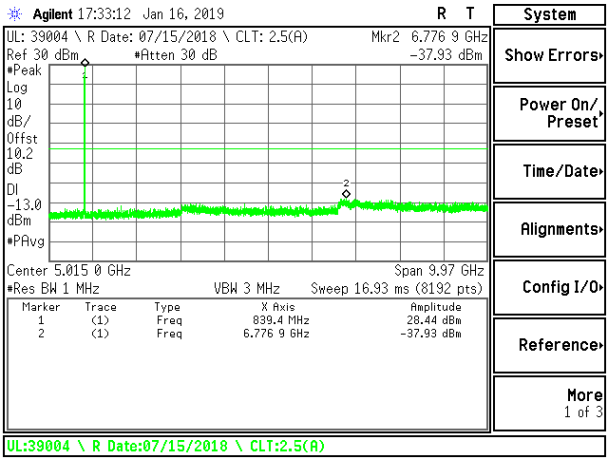
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



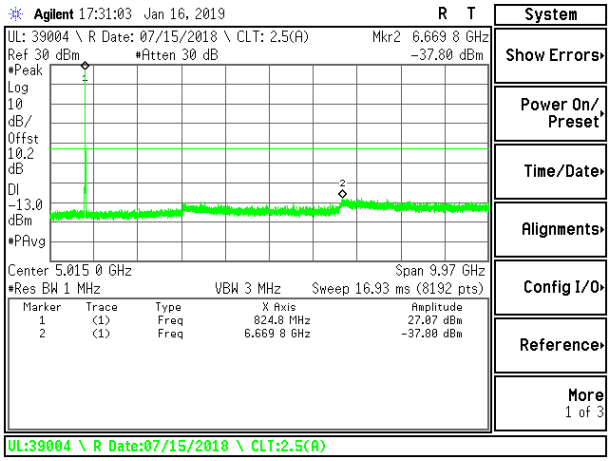
LTE B5 10MHz QPSK Low Channel RB1-0



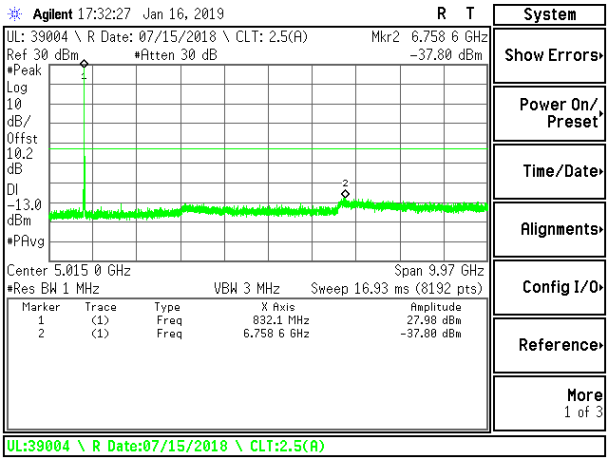
LTE B5 10MHz QPSK Mid Channel RB1-0



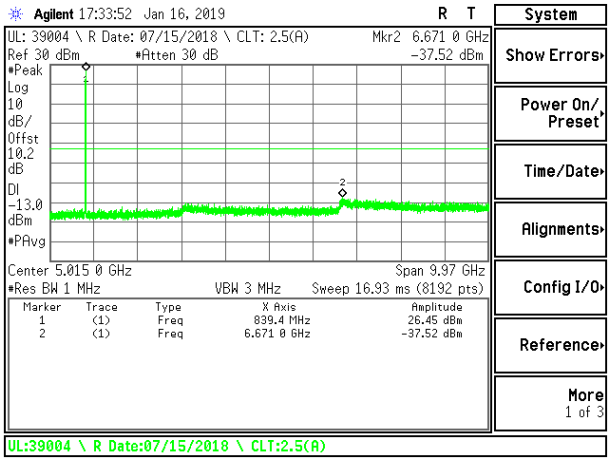
LTE B5 10MHz QPSK High Channel RB1-0



LTE B5 10MHz 16QAM Low Channel RB1-0



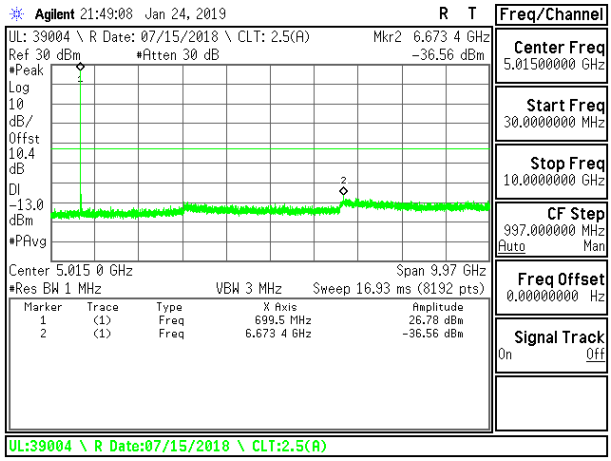
LTE B5 10MHz 16QAM Mid Channel RB1-0



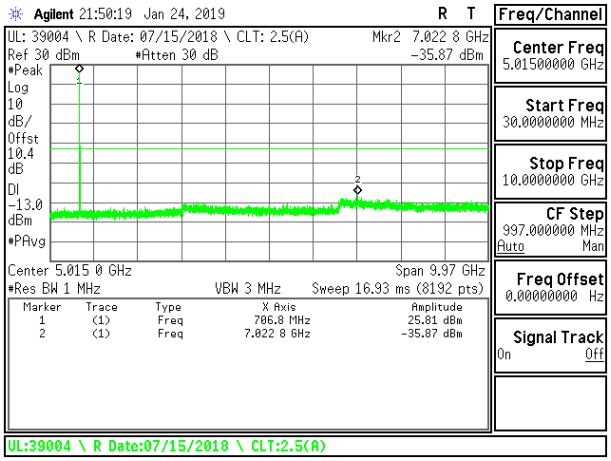
LTE B5 10MHz 16QAM High Channel RB1-0

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

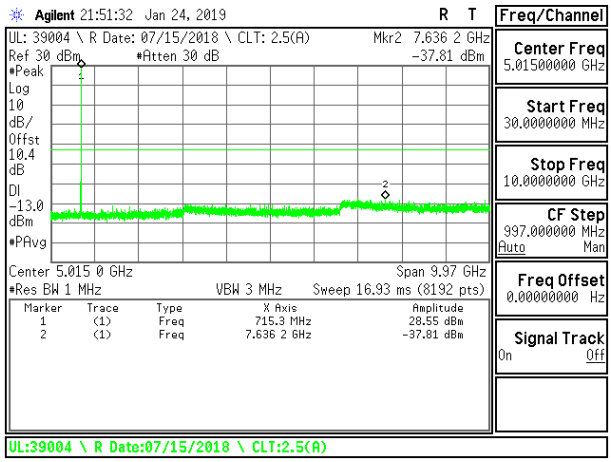
9.3.8. LTE BAND 12



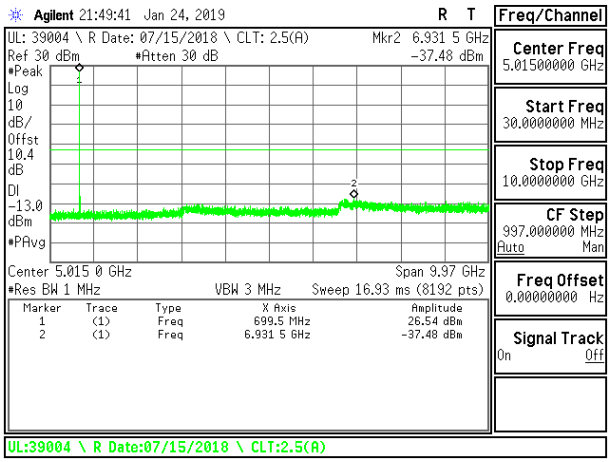
LTE B12 1.4MHz QPSK Low Channel RB1-0



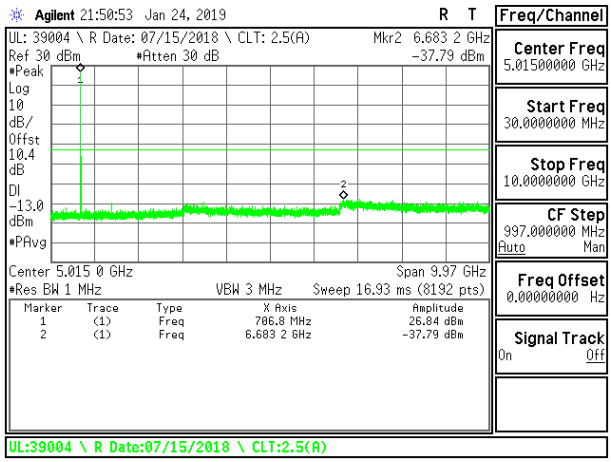
LTE B12 1.4MHz QPSK Mid Channel RB1-0



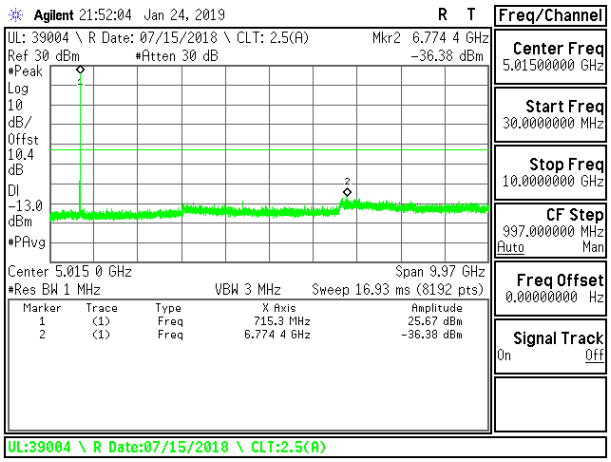
LTE B12 1.4MHz QPSK High Channel RB1-0



LTE B12 1.4MHz 16QAM Low Channel RB1-0

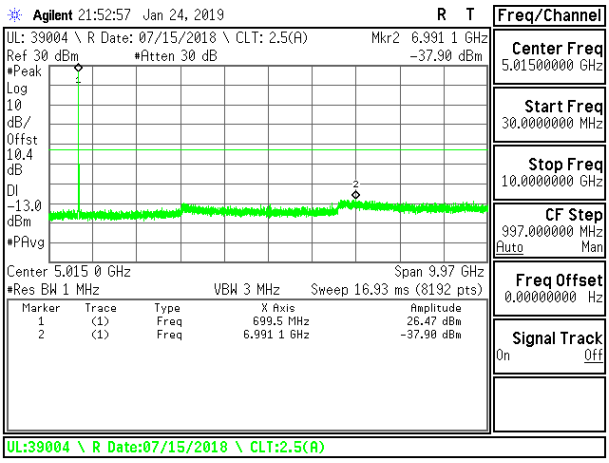


LTE B12 1.4MHz 16QAM Mid Channel RB1-0

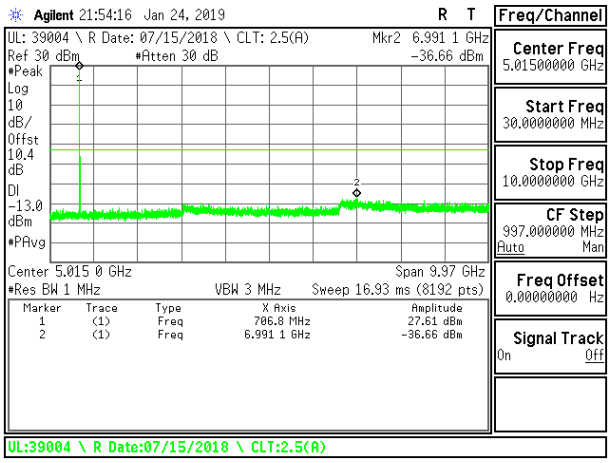


LTE B12 1.4MHz 16QAM High Channel RB1-0

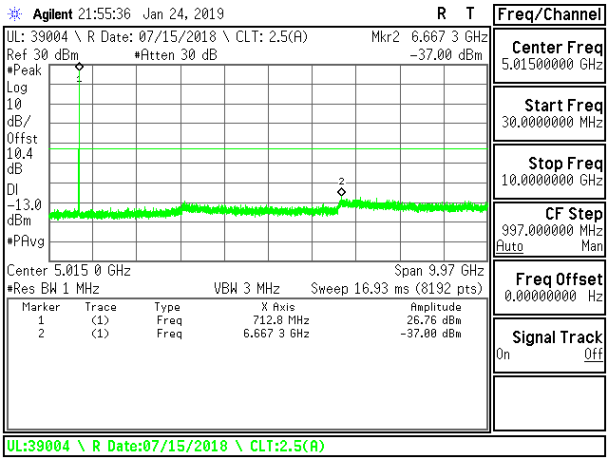
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



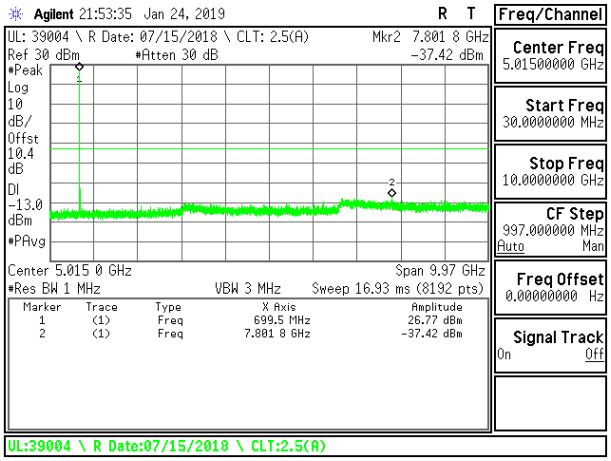
LTE B12 3MHz QPSK Low Channel RB1-0



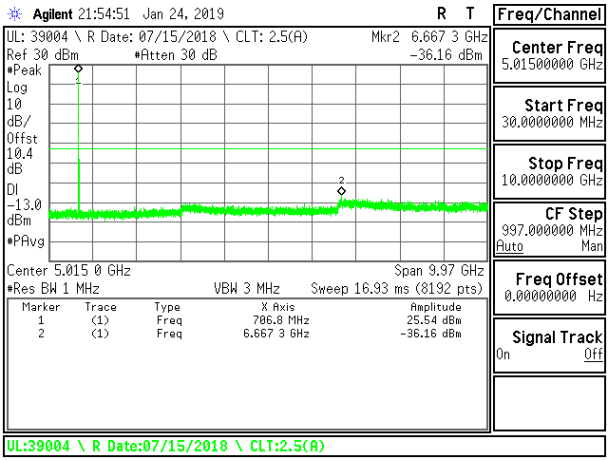
LTE B12 3MHz QPSK Mid Channel RB1-0



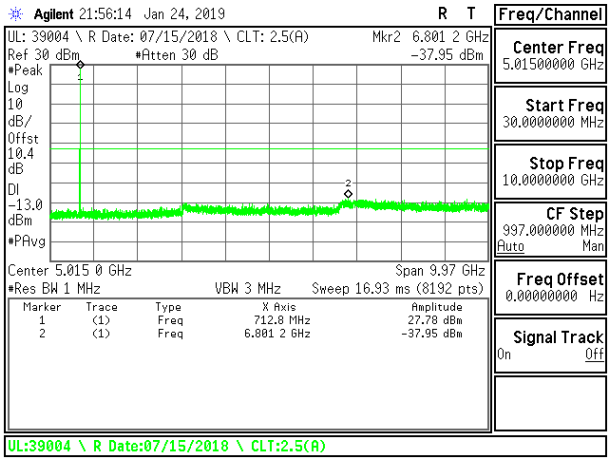
LTE B12 3MHz QPSK High Channel RB1-0



LTE B12 3MHz 16QAM Low Channel RB1-0

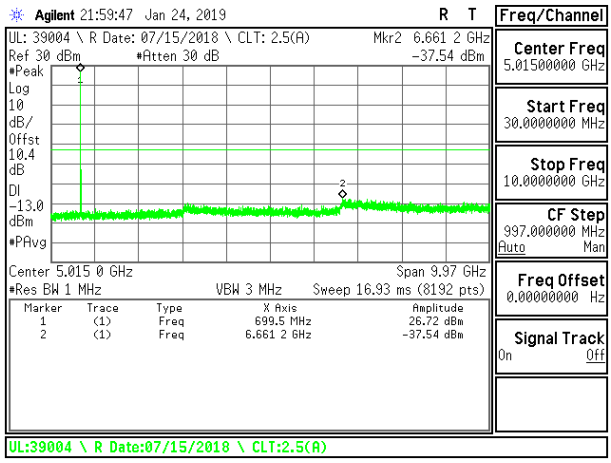


LTE B12 3MHz 16QAM Mid Channel RB1-0

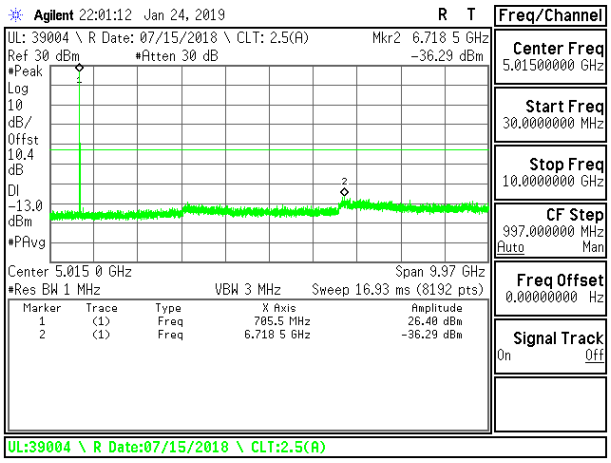


LTE B12 3MHz 16QAM High Channel RB1-0

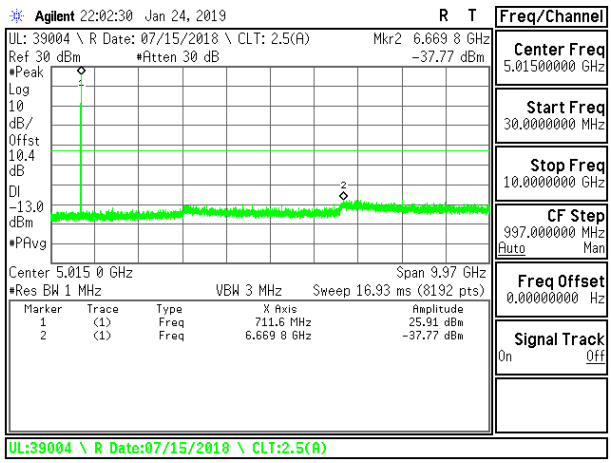
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



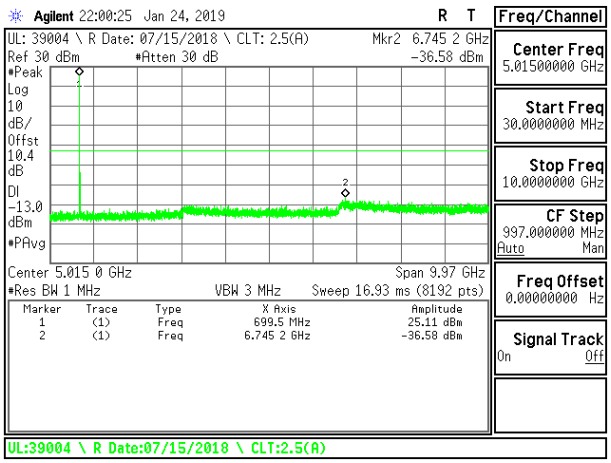
LTE B12 5MHz QPSK Low Channel RB1-0



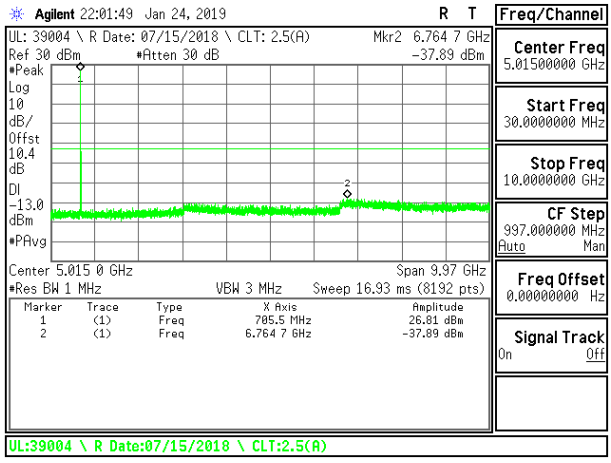
LTE B12 5MHz QPSK Mid Channel RB1-0



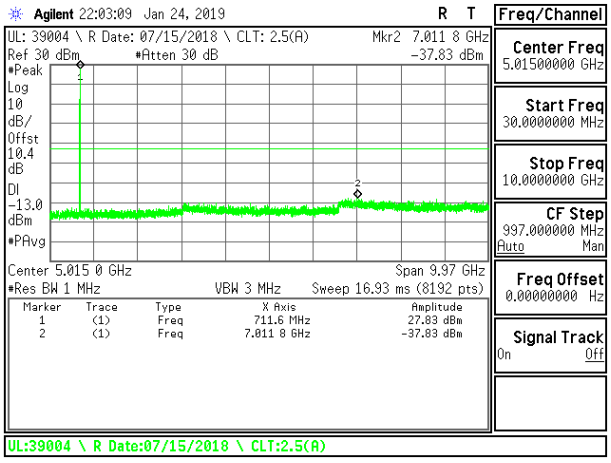
LTE B12 5MHz QPSK High Channel RB1-0



LTE B12 5MHz 16QAM Low Channel RB1-0

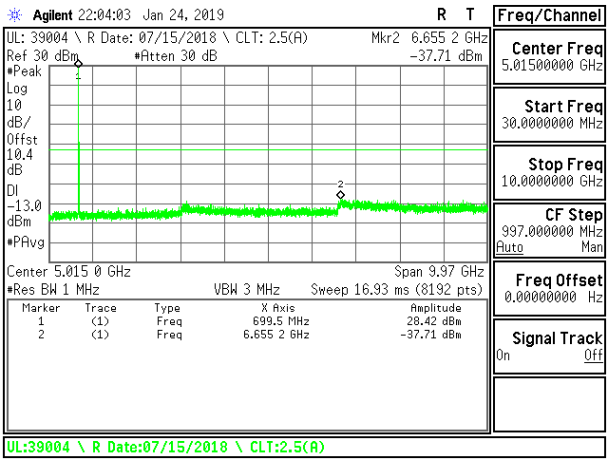


LTE B12 5MHz 16QAM Mid Channel RB1-0

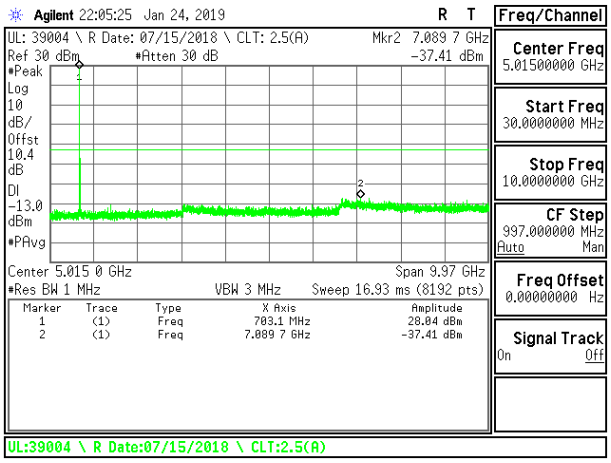


LTE B12 5MHz 16QAM High Channel RB1-0

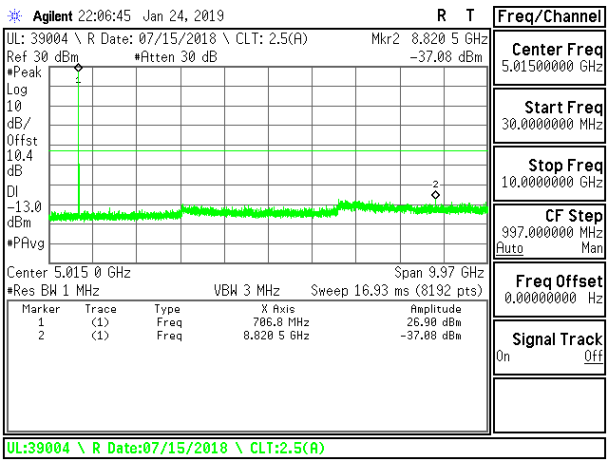
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



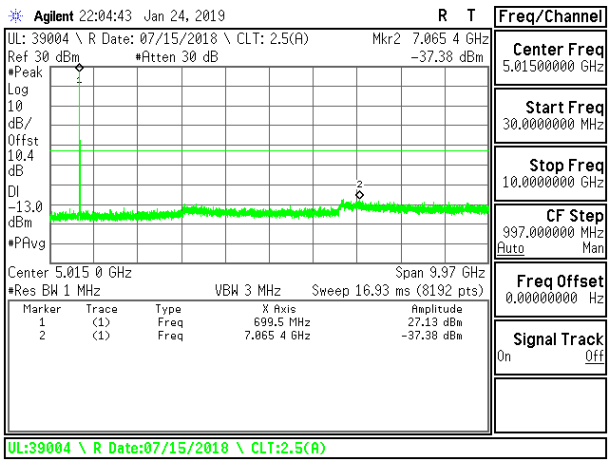
LTE B12 10MHz QPSK Low Channel RB1-0



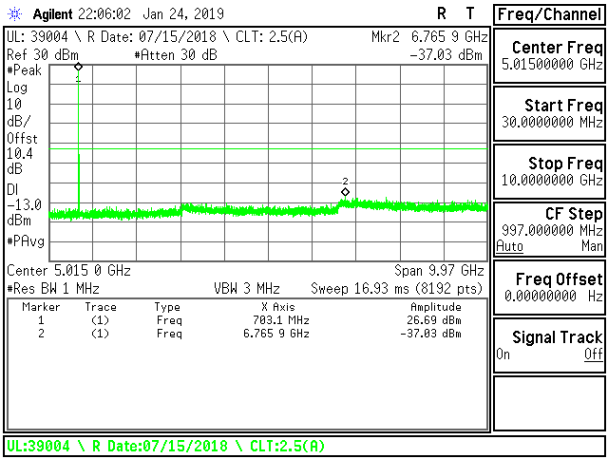
LTE B12 10MHz QPSK Mid Channel RB1-0



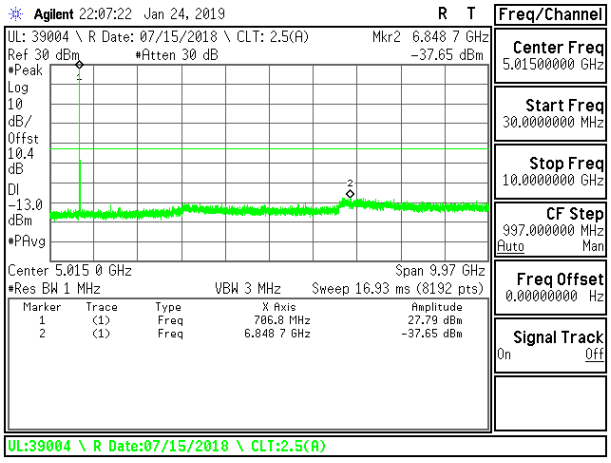
LTE B12 10MHz QPSK High Channel RB1-0



LTE B12 10MHz 16QAM Low Channel RB1-0



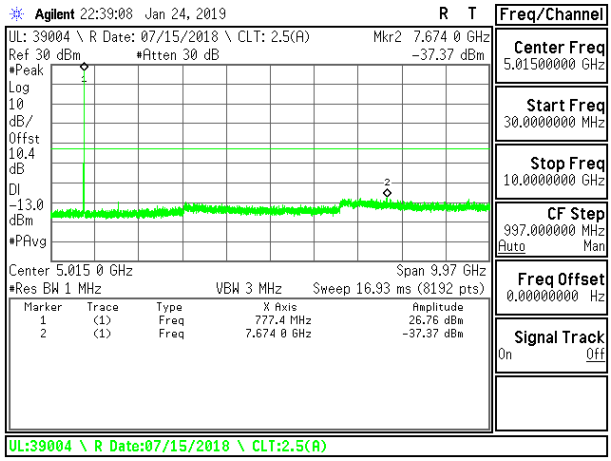
LTE B12 10MHz 16QAM Mid Channel RB1-0



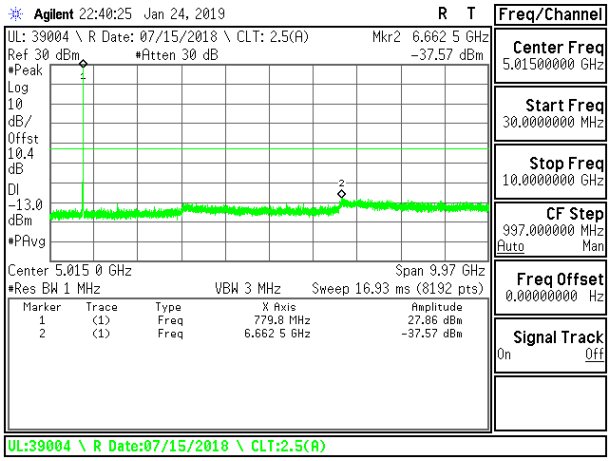
LTE B12 10MHz 16QAM High Channel RB1-0

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

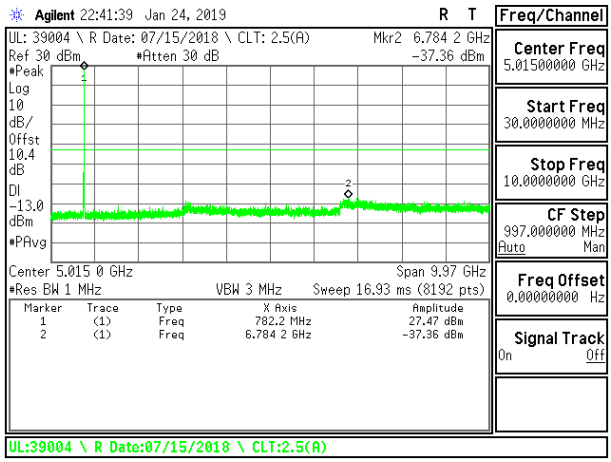
9.3.9. LTE BAND 13



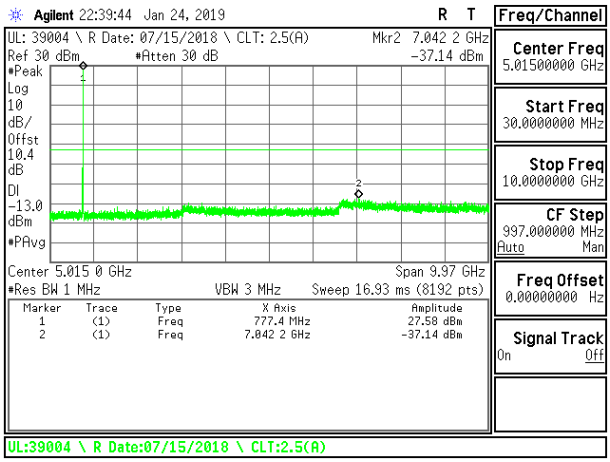
LTE B13 5MHz QPSK Low Channel RB1-0



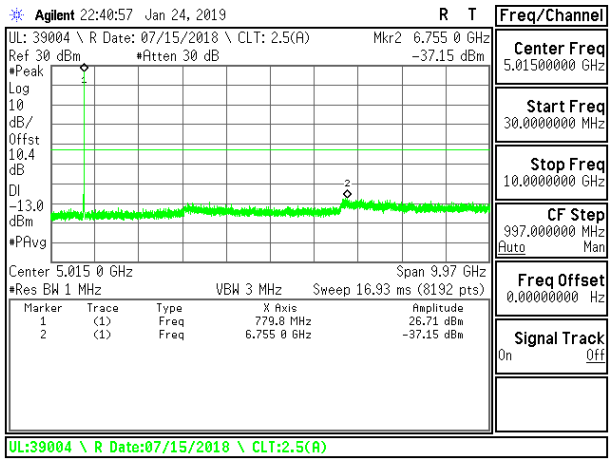
LTE B13 5MHz QPSK Mid Channel RB1-0



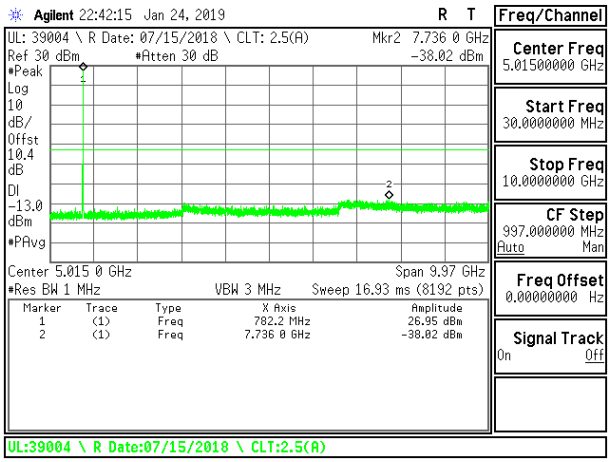
LTE B13 5MHz QPSK High Channel RB1-0



LTE B13 5MHz 16QAM Low Channel RB1-0

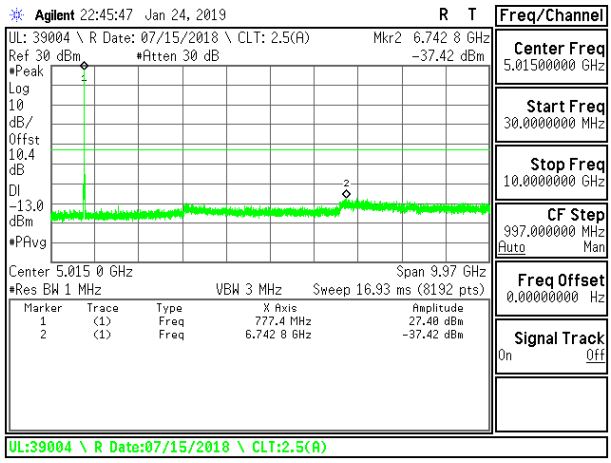


LTE B13 5MHz 16QAM Mid Channel RB1-0

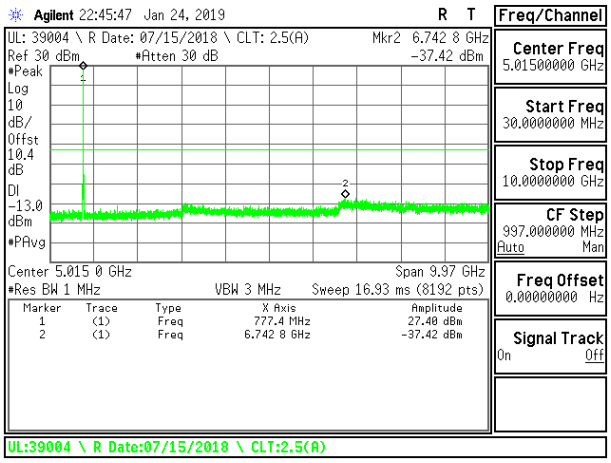


LTE B13 5MHz 16QAM High Channel RB1-0

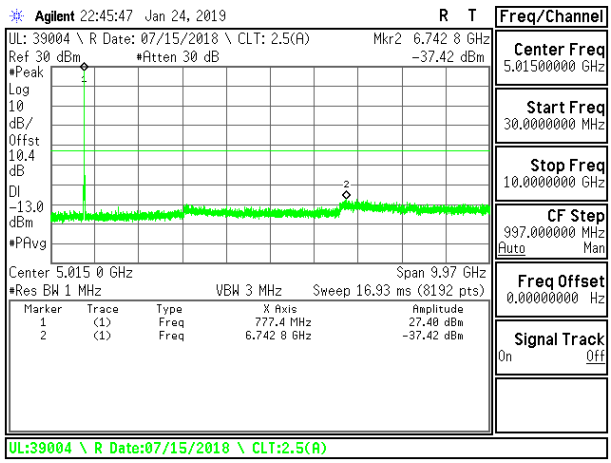
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



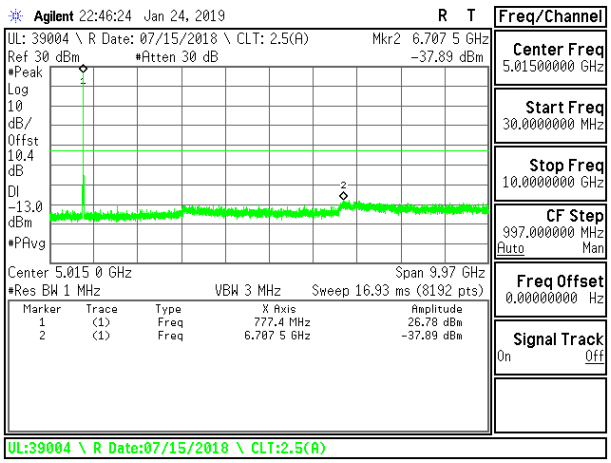
LTE B13 10MHz QPSK Low Channel RB1-0



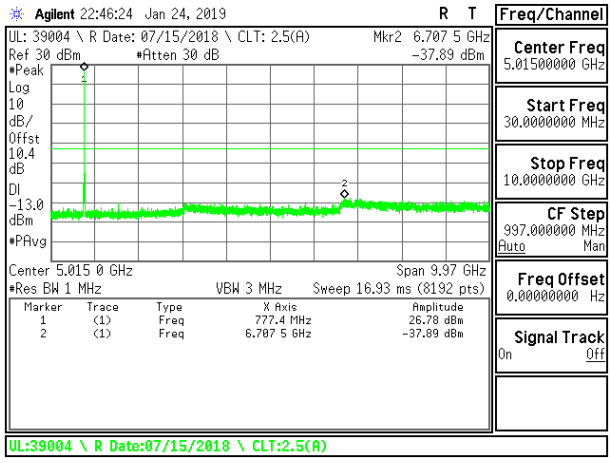
LTE B13 10MHz QPSK Mid Channel RB1-0



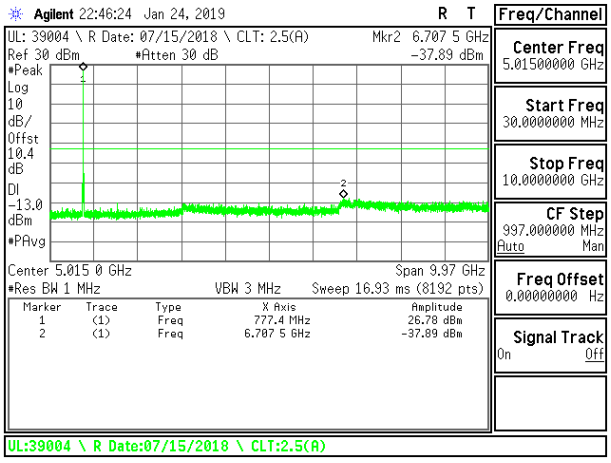
LTE B13 10MHz QPSK High Channel RB1-0



LTE B13 10MHz 16QAM Low Channel RB1-0



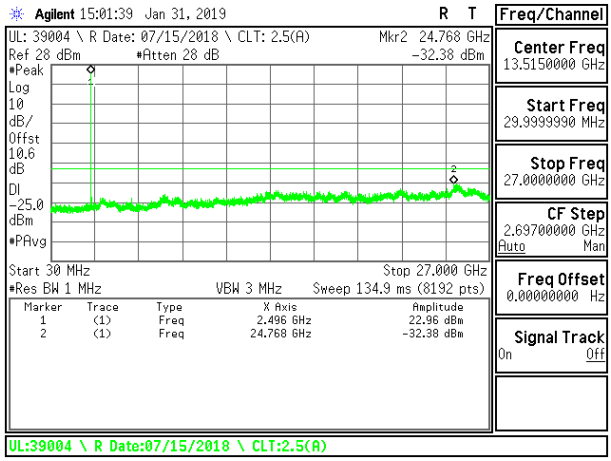
LTE B13 10MHz 16QAM Mid Channel RB1-0



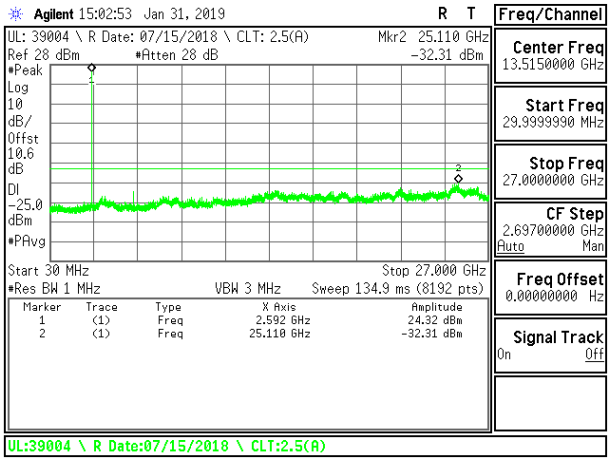
LTE B13 10MHz 16QAM High Channel RB1-0

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

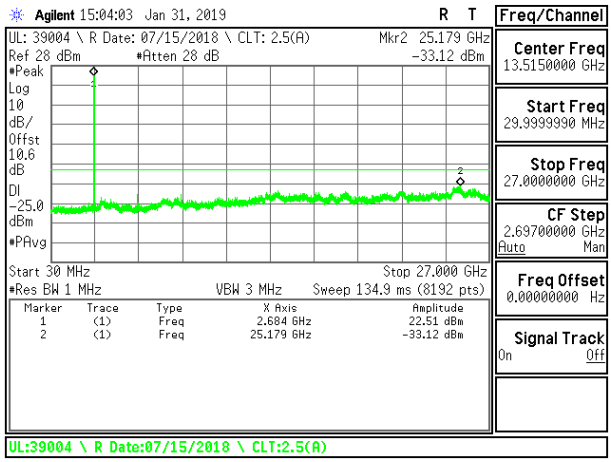
9.3.10. LTE BAND 41



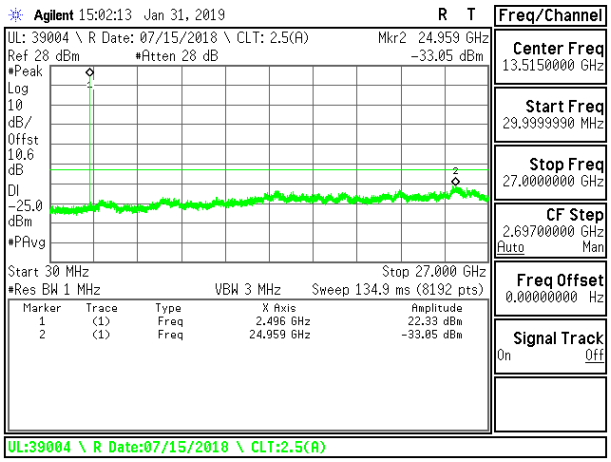
LTE B41 5MHz QPSK Low Channel RB1-0



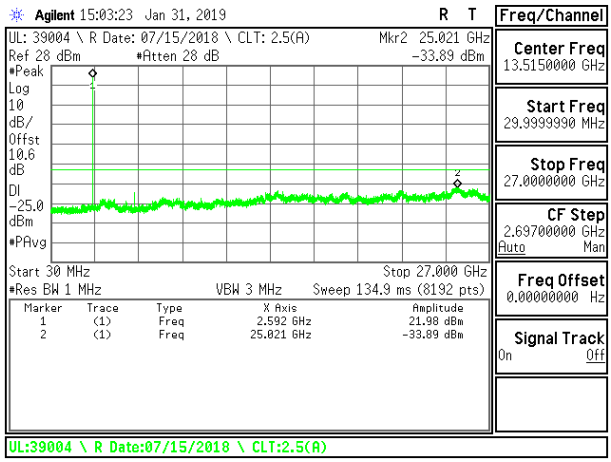
LTE B41 5MHz QPSK Mid Channel RB1-0



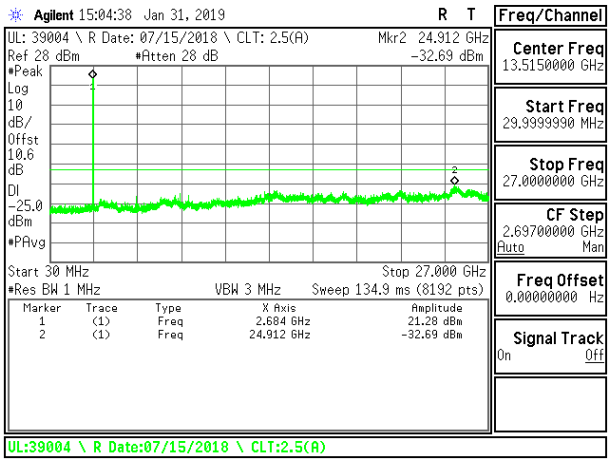
LTE B41 5MHz QPSK High Channel RB1-0



LTE B41 5MHz 16QAM Low Channel RB1-0

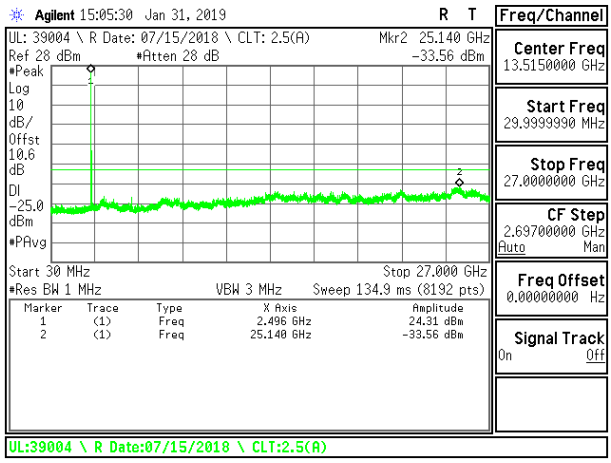


LTE B41 5MHz 16QAM Mid Channel RB1-0

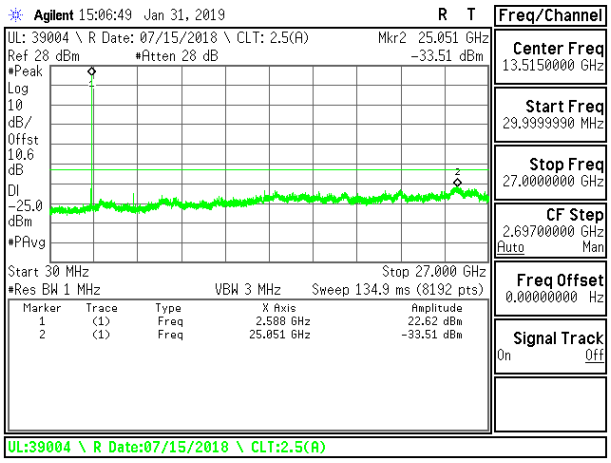


LTE B41 5MHz 16QAM High Channel RB1-0

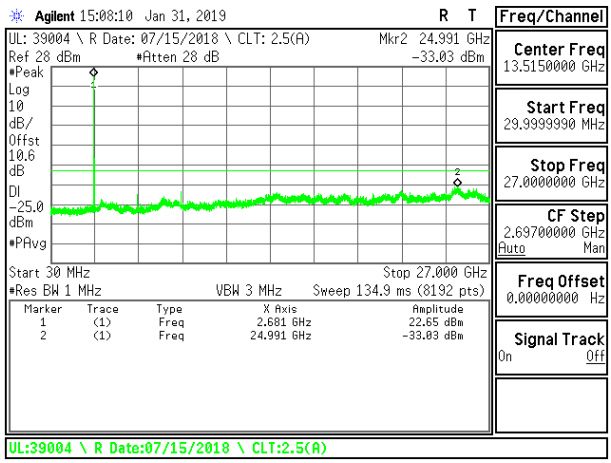
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



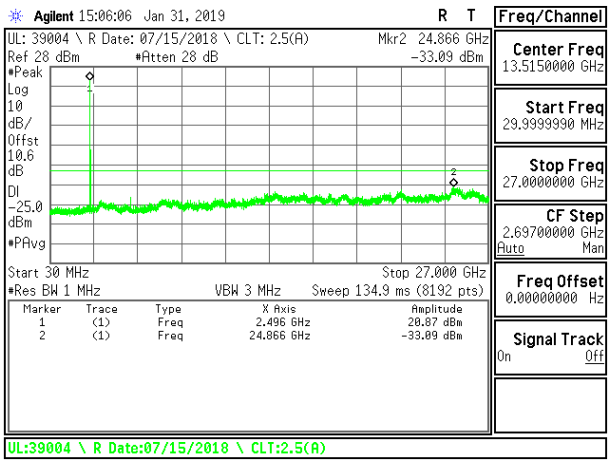
LTE B41 10MHz QPSK Low Channel RB1-0



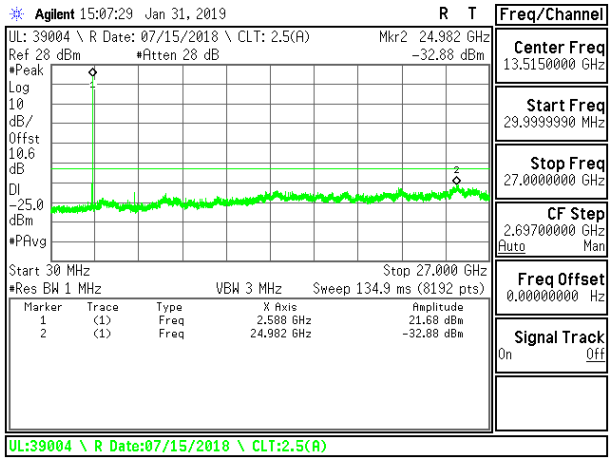
LTE B41 10MHz QPSK Mid Channel RB1-0



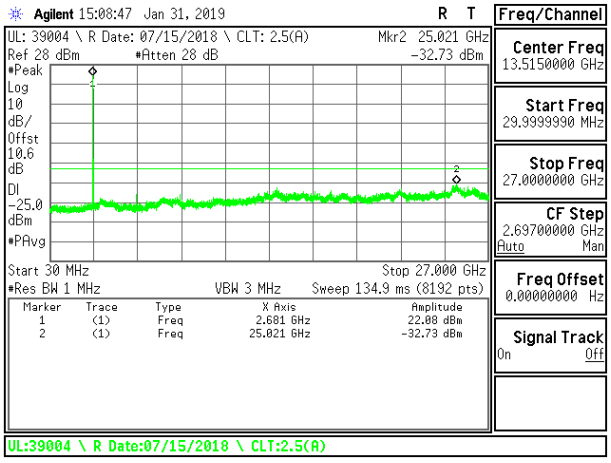
LTE B41 10MHz QPSK High Channel RB1-0



LTE B41 10MHz 16QAM Low Channel RB1-0

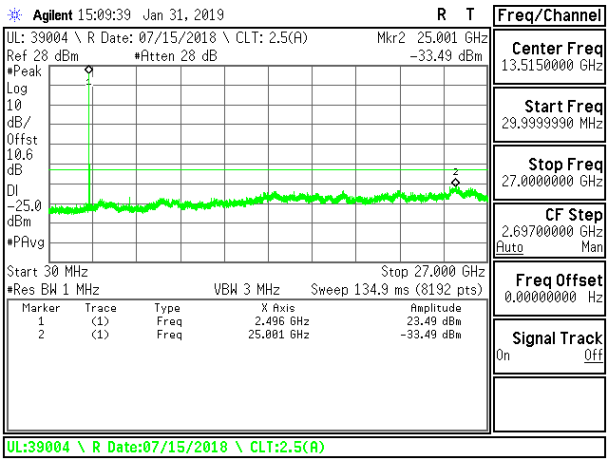


LTE B41 10MHz 16QAM Mid Channel RB1-0

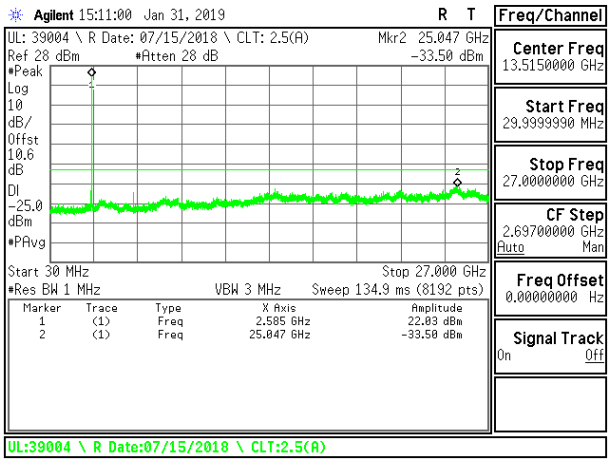


LTE B41 10MHz 16QAM High Channel RB1-0

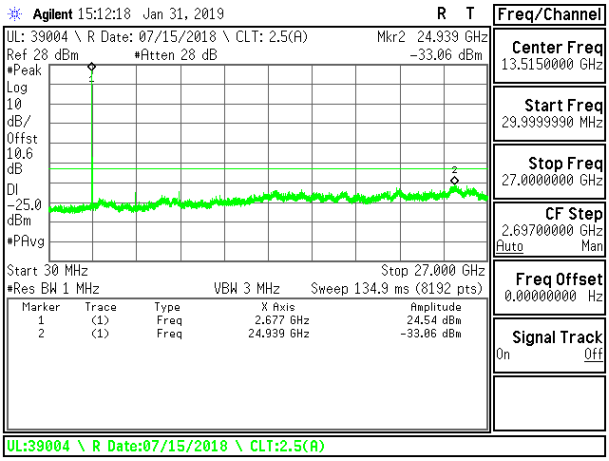
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



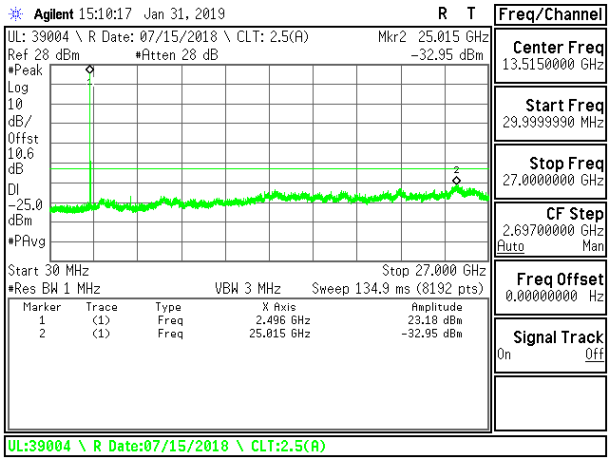
LTE B41 15MHz QPSK Low Channel RB1-0



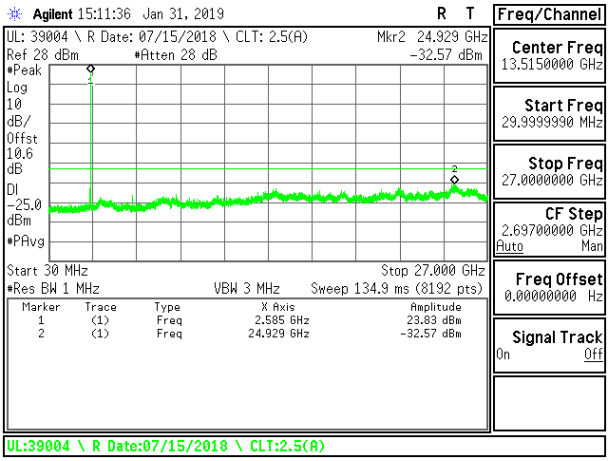
LTE B41 15MHz QPSK Mid Channel RB1-0



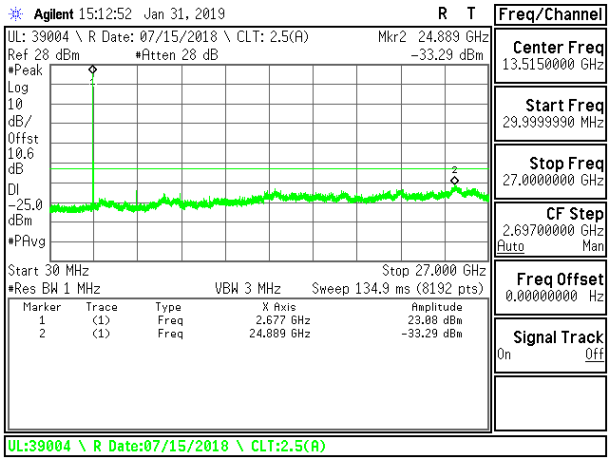
LTE B41 15MHz QPSK High Channel RB1-0



LTE B41 15MHz 16QAM Low Channel RB1-0

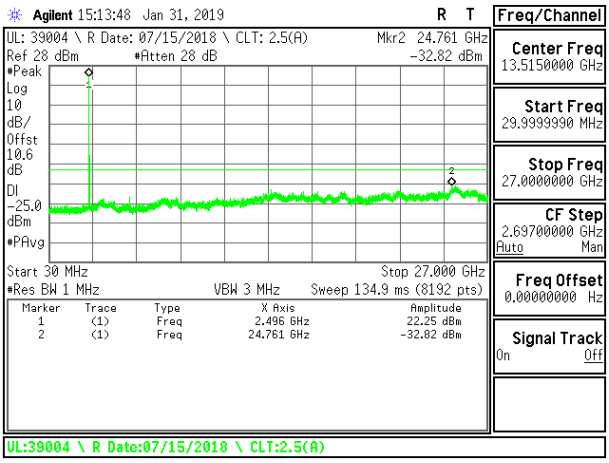


LTE B41 15MHz 16QAM Mid Channel RB1-0

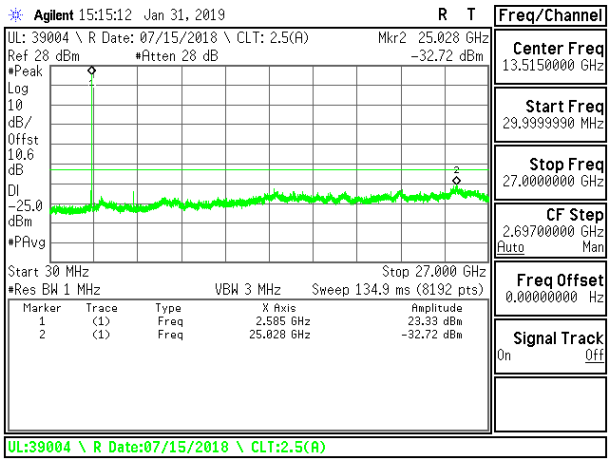


LTE B41 15MHz 16QAM High Channel RB1-0

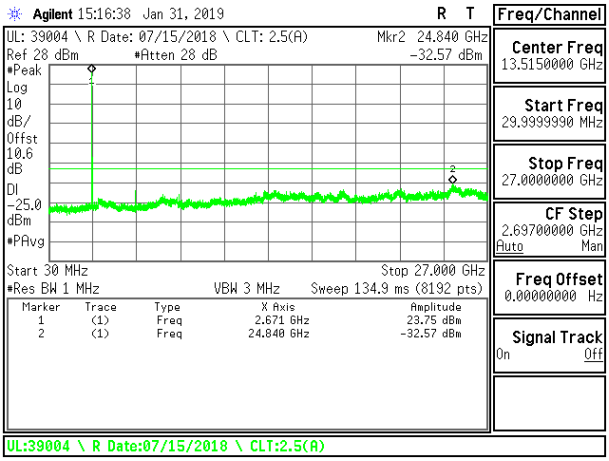
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



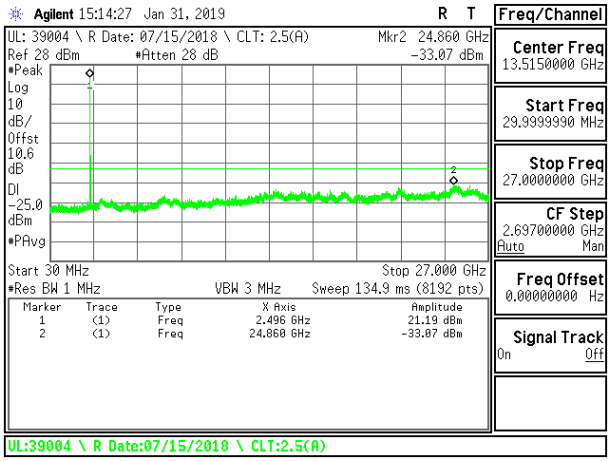
LTE B41 20MHz QPSK Low Channel RB1-0



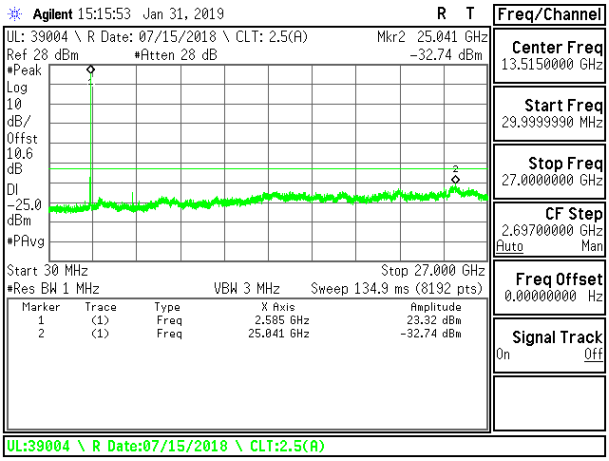
LTE B41 20MHz QPSK Mid Channel RB1-0



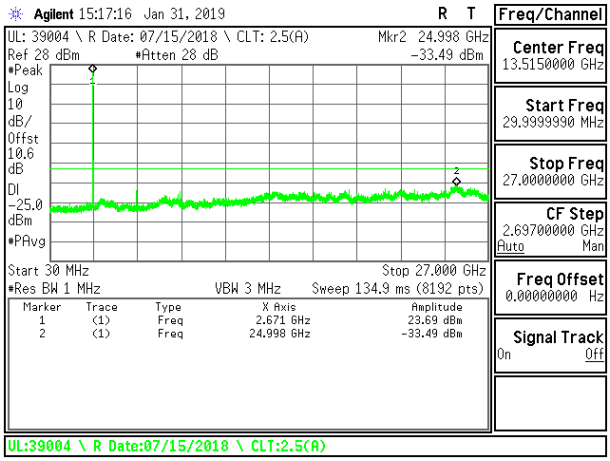
LTE B41 20MHz QPSK High Channel RB1-0



LTE B41 20MHz 16QAM Low Channel RB1-0



LTE B41 20MHz 16QAM Mid Channel RB1-0



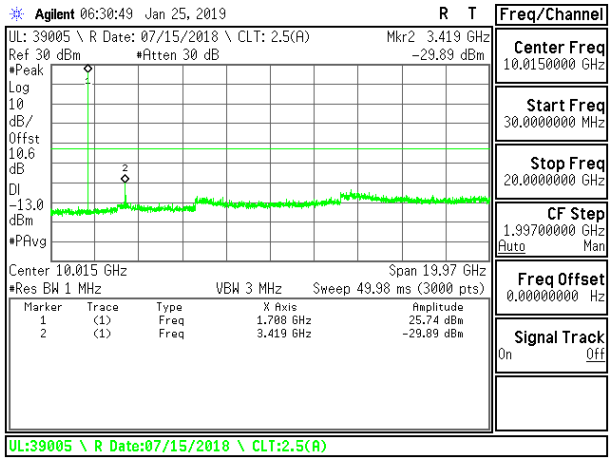
LTE B41 20MHz 16QAM High Channel RB1-0

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA
TEL:(510) 771-1000
FAX:(510) 661-0888

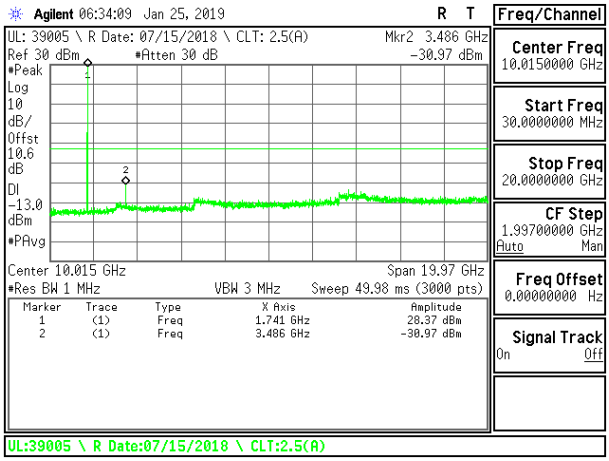
FORM NO: CCSUP4031B

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

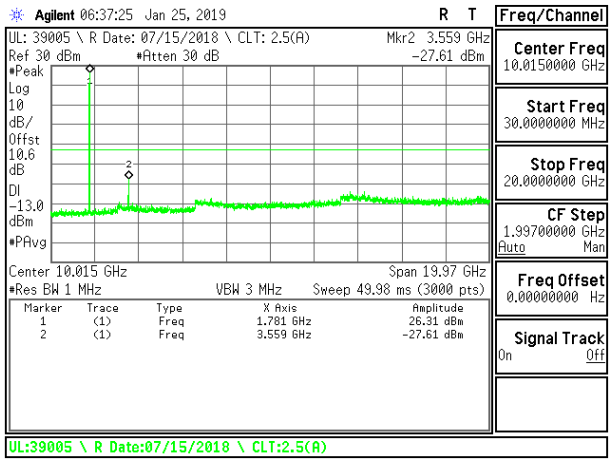
9.3.11. LTE BAND 66



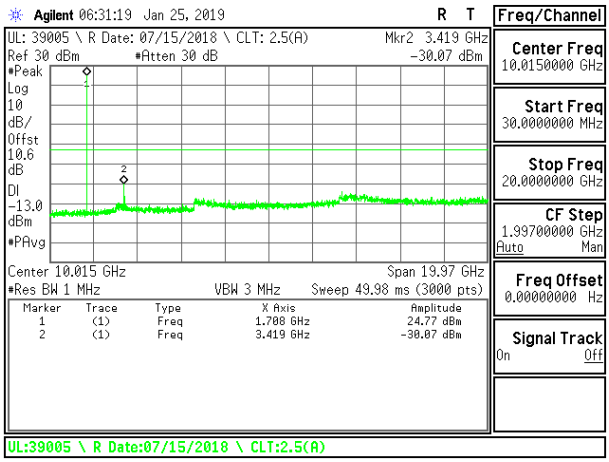
LTE B66 1.4MHz QPSK Low Channel RB1-0



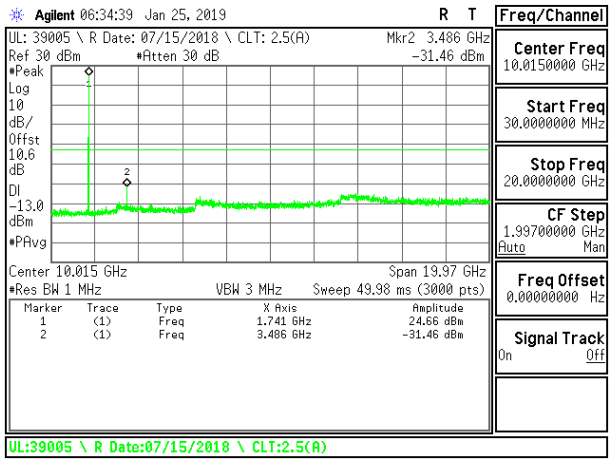
LTE B66 1.4MHz QPSK Mid Channel RB1-0



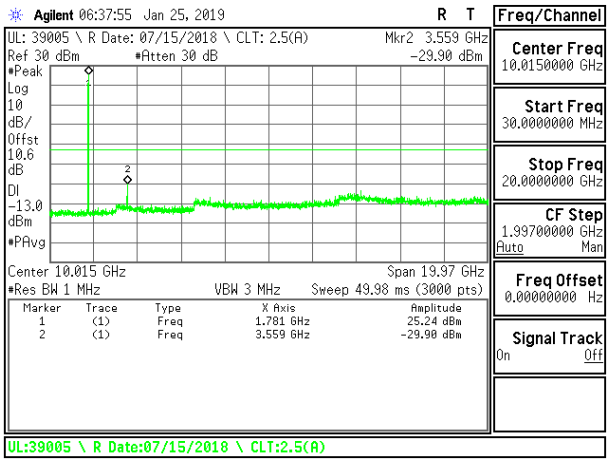
LTE B66 1.4MHz QPSK High Channel RB1-0



LTE B66 1.4MHz 16QAM Low Channel RB1-0

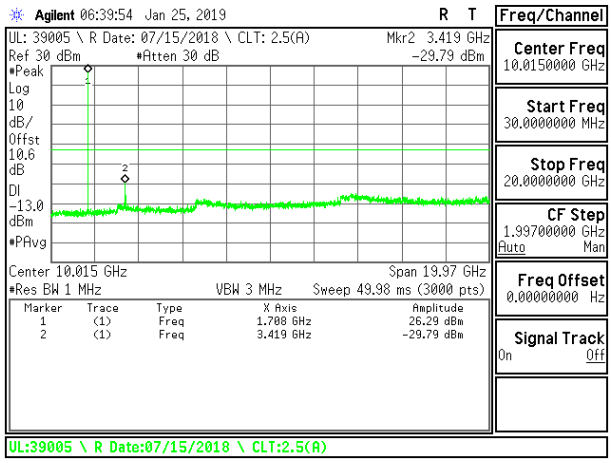


LTE B66 1.4MHz 16QAM Mid Channel RB1-0

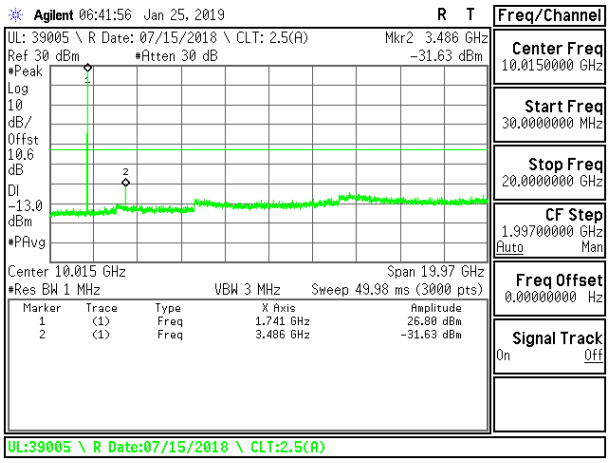


LTE B66 1.4MHz 16QAM High Channel RB1-0

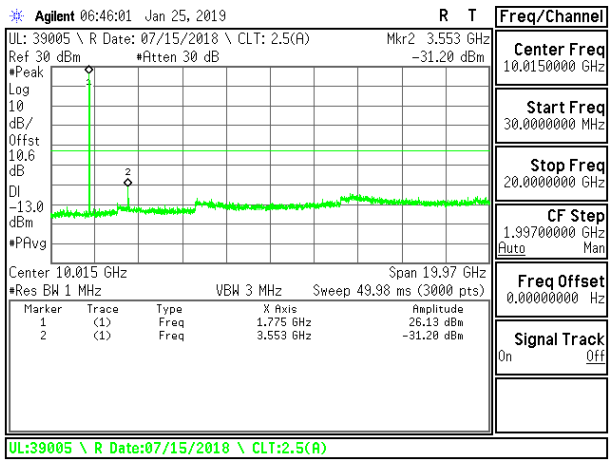
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



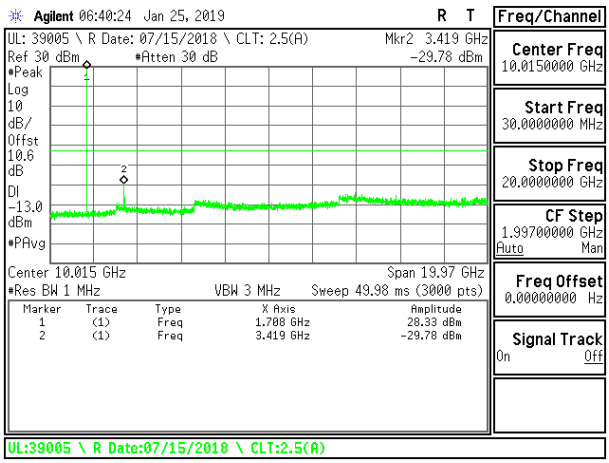
LTE B66 3MHz QPSK Low Channel RB1-0



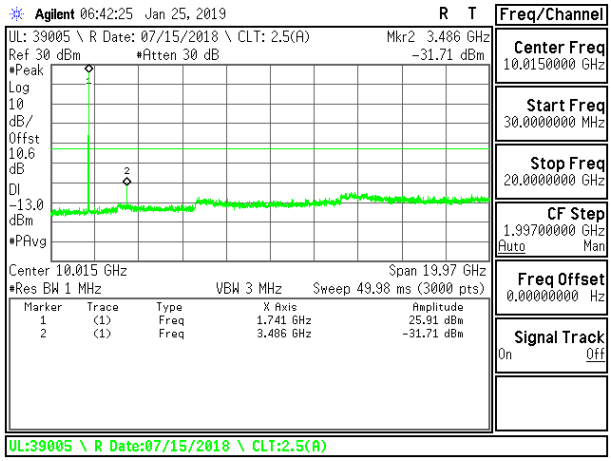
LTE B66 3MHz QPSK Mid Channel RB1-0



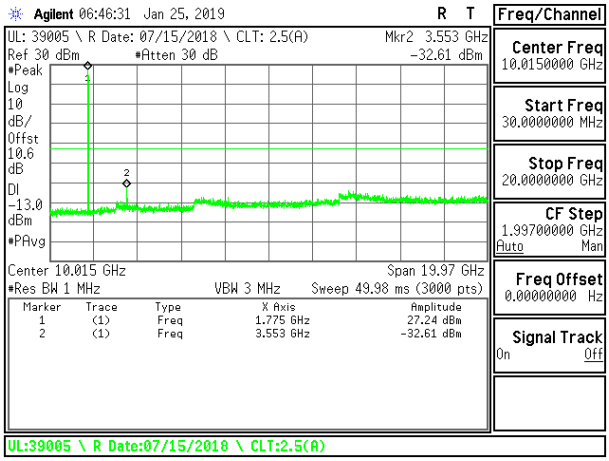
LTE B66 3MHz QPSK High Channel RB1-0



LTE B66 3MHz 16QAM Low Channel RB1-0

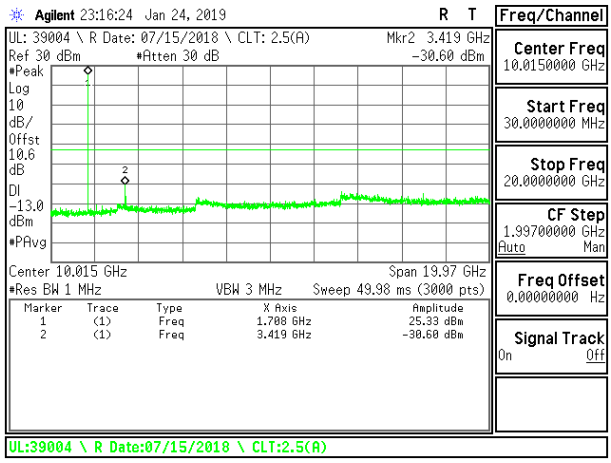


LTE B66 3MHz 16QAM Mid Channel RB1-0

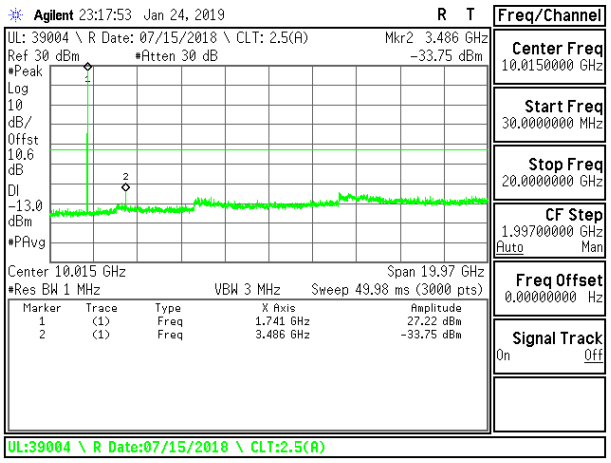


LTE B66 3MHz 16QAM High Channel RB1-0

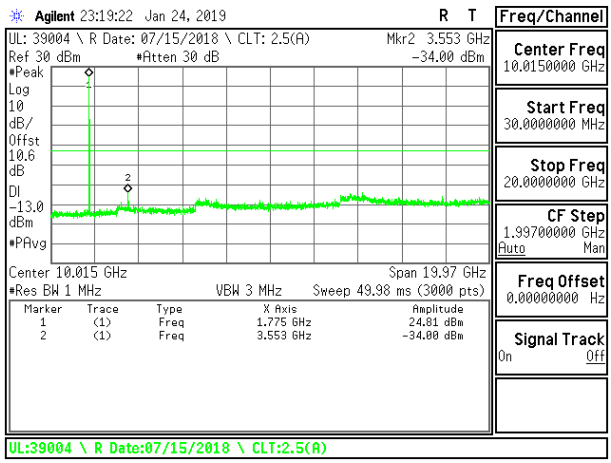
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



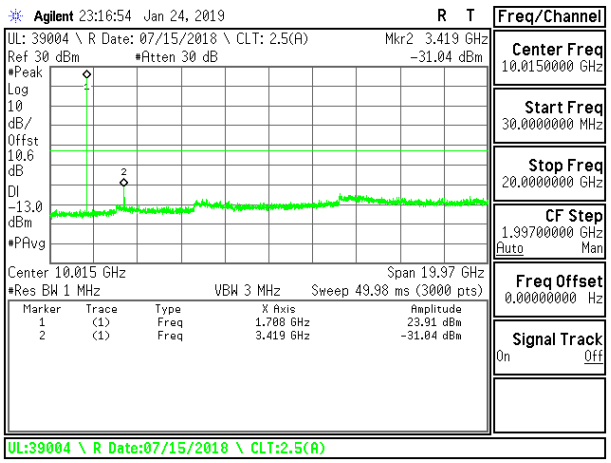
LTE B66 5MHz QPSK Low Channel RB1-0



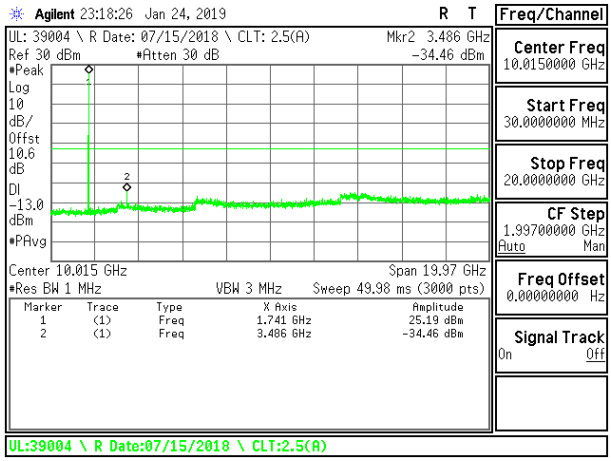
LTE B66 5MHz QPSK Mid Channel RB1-0



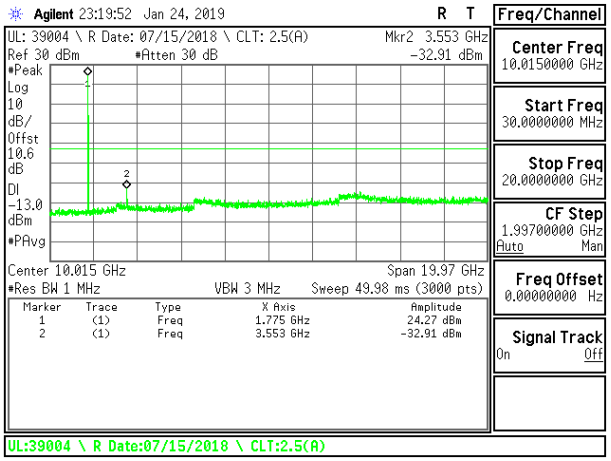
LTE B66 5MHz QPSK High Channel RB1-0



LTE B66 5MHz 16QAM Low Channel RB1-0

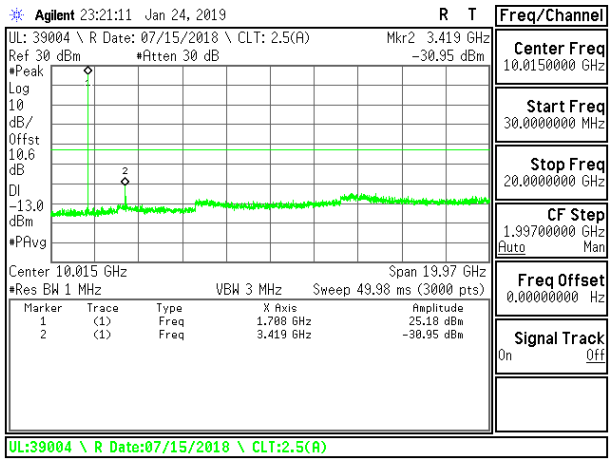


LTE B66 5MHz 16QAM Mid Channel RB1-0

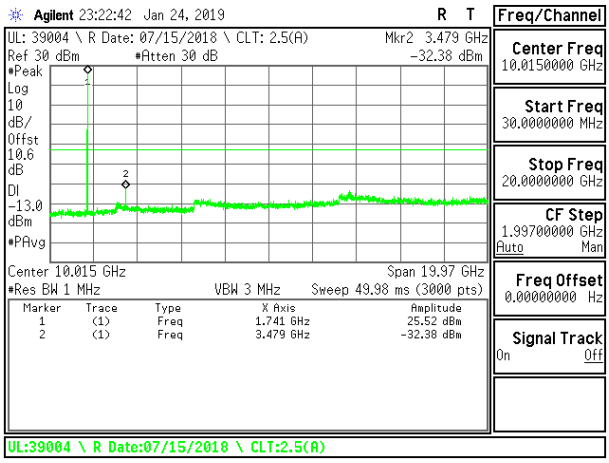


LTE B66 5MHz 16QAM High Channel RB1-0

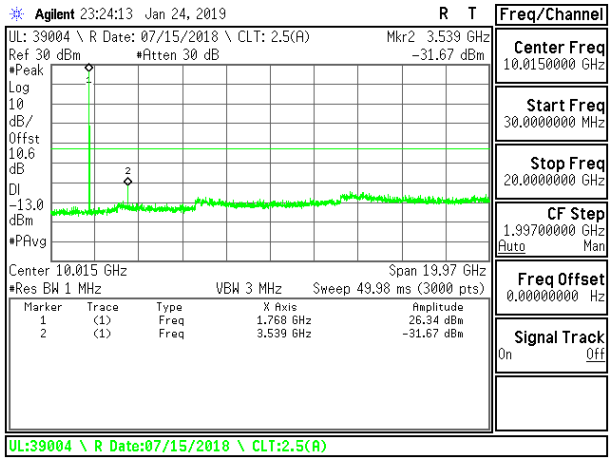
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



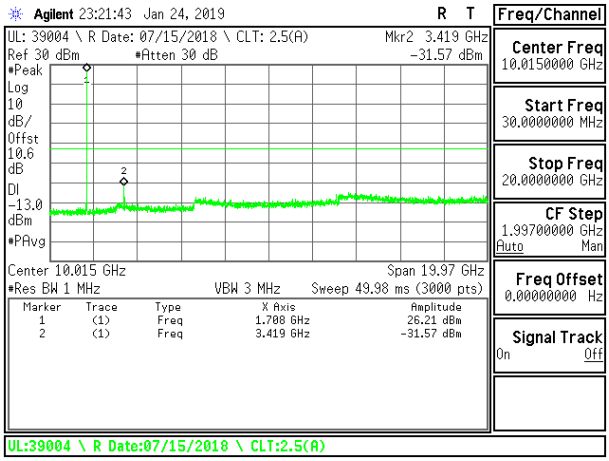
LTE B66 10MHz QPSK Low Channel RB1-0



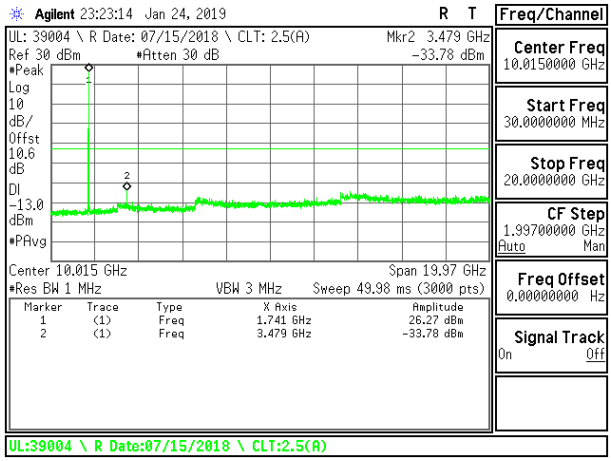
LTE B66 10MHz QPSK Mid Channel RB1-0



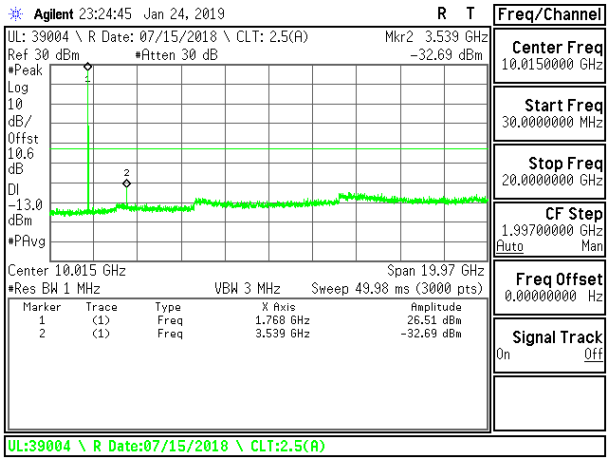
LTE B66 10MHz QPSK High Channel RB1-0



LTE B66 10MHz 16QAM Low Channel RB1-0



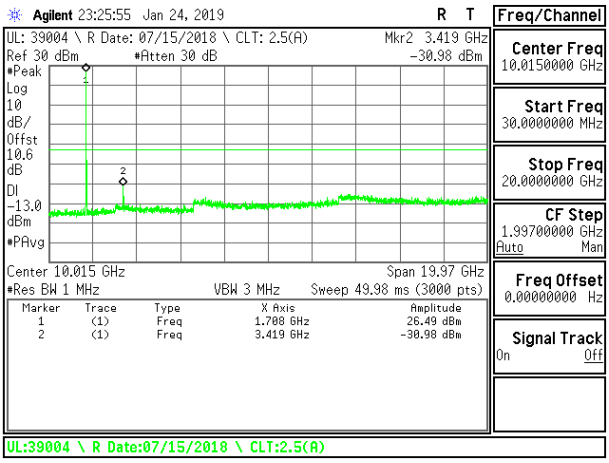
LTE B66 10MHz 16QAM Mid Channel RB1-0



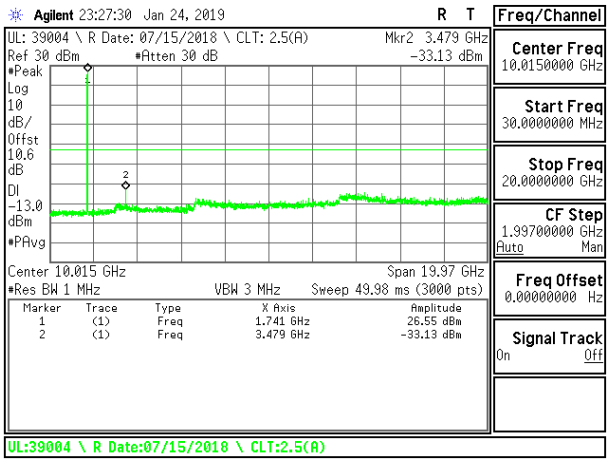
LTE B66 10MHz 16QAM High Channel RB1-0

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA
TEL:(510) 771-1000
FAX:(510) 661-0888

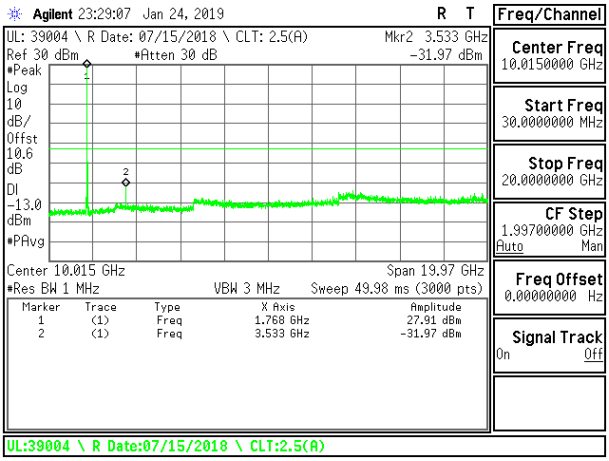
FORM NO: CCSUP4031B
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



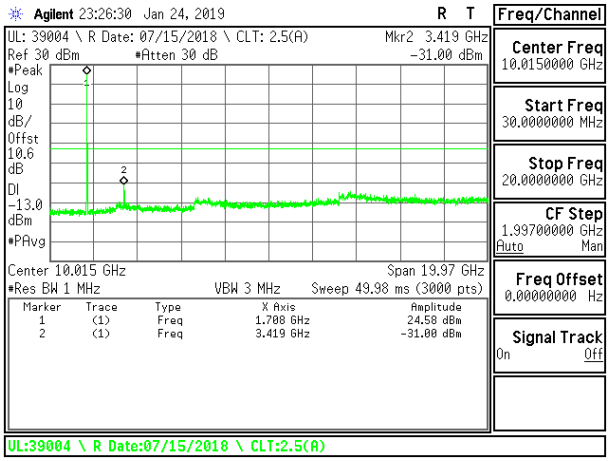
LTE B66 15MHz QPSK Low Channel RB1-0



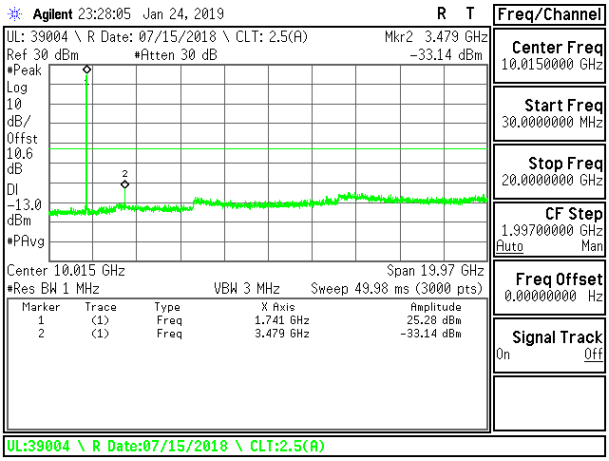
LTE B66 15MHz QPSK Mid Channel RB1-0



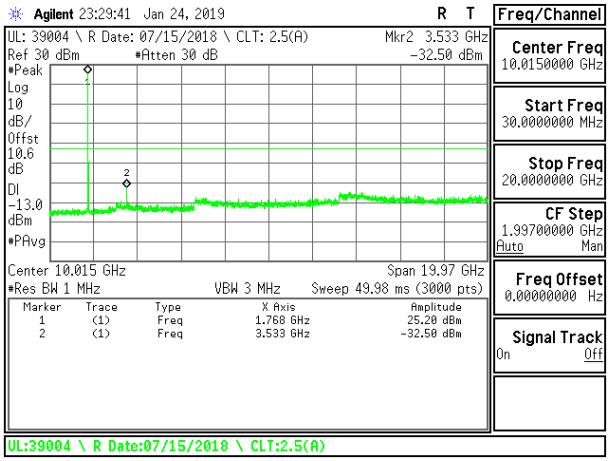
LTE B66 15MHz QPSK High Channel RB1-0



LTE B66 15MHz 16QAM Low Channel RB1-0

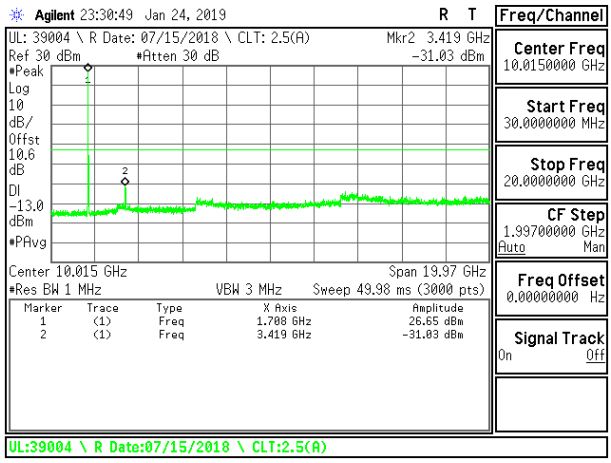


LTE B66 15MHz 16QAM Mid Channel RB1-0

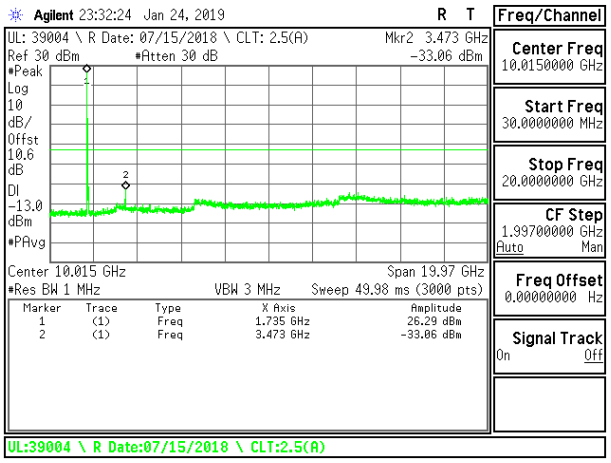


LTE B66 15MHz 16QAM High Channel RB1-0

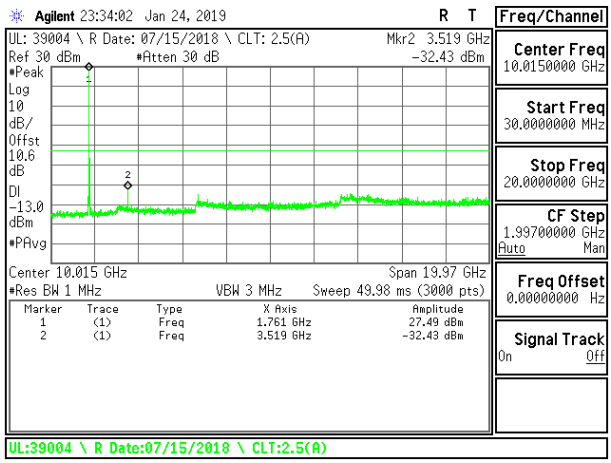
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



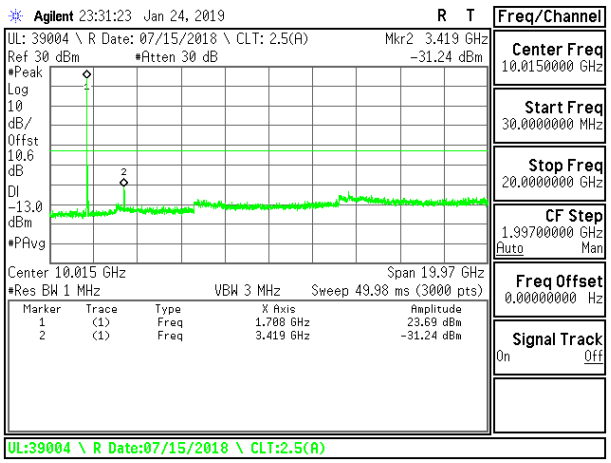
LTE B66 20MHz QPSK Low Channel RB1-0



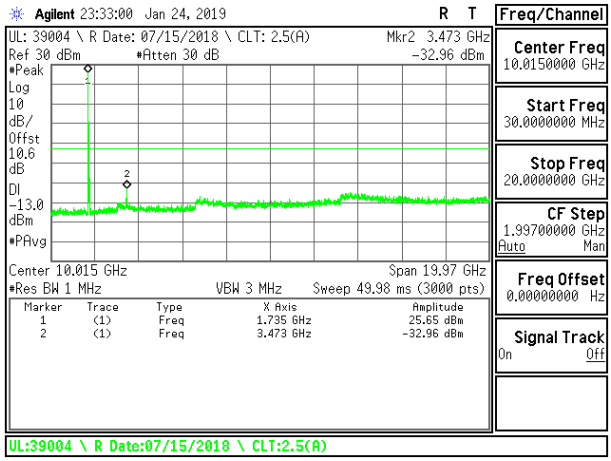
LTE B66 20MHz QPSK Mid Channel RB1-0



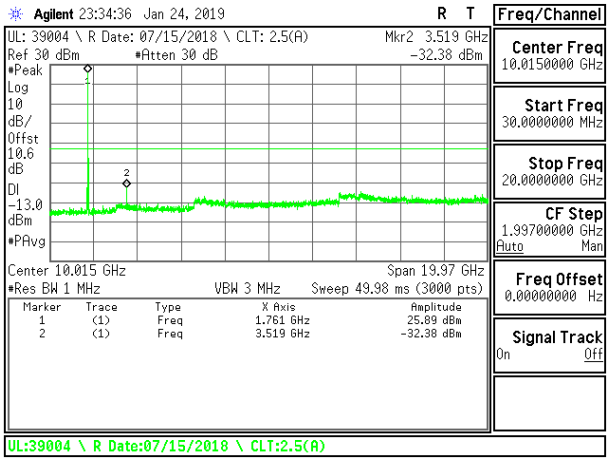
LTE B66 20MHz QPSK High Channel RB1-0



LTE B66 20MHz 16QAM Low Channel RB1-0



LTE B66 20MHz 16QAM Mid Channel RB1-0



LTE B66 20MHz 16QAM High Channel RB1-0

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA
TEL:(510) 771-1000
FAX:(510) 661-0888

FORM NO: CCSUP4031B
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.4. 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, 4.43VDC.
  End Voltage, 3.2VDC.

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).

MODES TESTED

- GSM 850
- GSM 1900
- WCDMA Band 5
- WCDMA Band 2
- WCDMA Band 4
- LTE Band 2
- LTE Band 4
- LTE Band 5
- LTE Band 12
- LTE Band 13
- LTE Band 17
- LTE Band 41
- LTE Band 66

RESULTS

See the following pages.

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.4.1. GSM

ID:	19497	Date:	1/24/19

GPRS 850MHz

Limit		824	849	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	824.0337	848.9628		
Extreme (50C)		824.0337	848.9628	5.2	0.006
Extreme (40C)		824.0337	848.9628	4.4	0.005
Extreme (30C)		824.0337	848.9628	4.8	0.006
Extreme (10C)		824.0337	848.9628	3.1	0.004
Extreme (0C)		824.0337	848.9628	6.4	0.008
Extreme (-10C)		824.0337	848.9628	5.6	0.007
Extreme (-20C)		824.0337	848.9628	6.1	0.007
Extreme (-30C)		824.0337	848.9628	4.7	0.006
20C	15%	824.0337	848.9628	5.5	0.007
	-15%	824.0337	848.9628	5.6	0.007
	End Point	824.0337	848.9628	5.2	0.006

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

GPRS 1900MHz

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	1850.0623	1909.9357		
Extreme (50C)		1850.0623	1909.9357	-2.3	-0.001
Extreme (40C)		1850.0623	1909.9357	-3.4	-0.002
Extreme (30C)		1850.0623	1909.9357	-2.7	-0.001
Extreme (10C)		1850.0623	1909.9357	-4.8	-0.003
Extreme (0C)		1850.0623	1909.9357	-3.3	-0.002
Extreme (-10C)		1850.0623	1909.9357	-4.1	-0.002
Extreme (-20C)		1850.0623	1909.9357	-4.8	-0.003
Extreme (-30C)		1850.0623	1909.9357	-3.3	-0.002
20C	15%	1850.0623	1909.9357	-5.1	-0.003
	-15%	1850.0623	1909.9357	-5.2	-0.003
	End Point	1850.0623	1909.9357	-4.9	-0.003

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.4.2. WCDMA

ID:	19497	Date:	1/25/19

UMTS REL99 BAND 5

Limit		824	849	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	824.1670	848.8170		
Extreme (50C)		824.1670	848.8170	-6.9	-0.0082
Extreme (40C)		824.1670	848.8170	-6.2	-0.0075
Extreme (30C)		824.1670	848.8170	-8.1	-0.0097
Extreme (10C)		824.1670	848.8170	-5.7	-0.0068
Extreme (0C)		824.1670	848.8170	-7.2	-0.0085
Extreme (-10C)		824.1670	848.8170	-4.4	-0.0053
Extreme (-20C)		824.1670	848.8170	-5.9	-0.0070
Extreme (-30C)		824.1670	848.8170	-4.8	-0.0057
20C	15%	824.1670	848.8170	-7.1	-0.0085
	-15%	824.1670	848.8170	-6.6	-0.0078
	End Point	824.1670	848.8170	-6.9	-0.0083

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

UMTS REL99 BAND 2

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	1850.1500	1909.8670		
Extreme (50C)		1850.1500	1909.8670	-10.2	-0.0054
Extreme (40C)		1850.1500	1909.8670	-11.3	-0.0060
Extreme (30C)		1850.1500	1909.8670	-10.7	-0.0057
Extreme (10C)		1850.1500	1909.8670	-9.5	-0.0050
Extreme (0C)		1850.1500	1909.8670	-12.6	-0.0067
Extreme (-10C)		1850.1500	1909.8670	-9.8	-0.0052
Extreme (-20C)		1850.1500	1909.8670	-11.3	-0.0060
Extreme (-30C)		1850.1500	1909.8670	-12.5	-0.0066
20C	15%	1850.1500	1909.8670	-10.3	-0.0055
	-15%	1850.1500	1909.8670	-11.1	-0.0059
	End Point	1850.1500	1909.8670	-9.5	-0.0051

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

UMTS REL99 BAND 4

Limit		1710	1755	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	1710.0340	1754.9600		
Extreme (50C)		1710.0340	1754.9600	-19.9	-0.0115
Extreme (40C)		1710.0340	1754.9600	-18.3	-0.0106
Extreme (30C)		1710.0340	1754.9600	-20.6	-0.0119
Extreme (10C)		1710.0340	1754.9600	-20.8	-0.0120
Extreme (0C)		1710.0340	1754.9600	-17.7	-0.0102
Extreme (-10C)		1710.0340	1754.9600	-18.6	-0.0107
Extreme (-20C)		1710.0340	1754.9600	-20.0	-0.0116
Extreme (-30C)		1710.0340	1754.9600	-19.7	-0.0113
20C	15%	1710.0340	1754.9600	-19.1	-0.0110
	-15%	1710.0340	1754.9600	-18.6	-0.0107
	End Point	1710.0340	1754.9600	-19.4	-0.0112

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.4.3. LTE BAND 2

ID:	10649	Date:	1/29/19

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	1850.8540	1909.1460		
Extreme (50C)		1850.8540	1909.1460	7.0	0.004
Extreme (40C)		1850.8540	1909.1460	8.0	0.004
Extreme (30C)		1850.8540	1909.1460	7.2	0.004
Extreme (10C)		1850.8540	1909.1460	6.5	0.003
Extreme (0C)		1850.8540	1909.1460	6.3	0.003
Extreme (-10C)		1850.8540	1909.1460	7.5	0.004
Extreme (-20C)		1850.8540	1909.1460	6.9	0.004
Extreme (-30C)		1850.8540	1909.1460	8.0	0.004
20C	15%	1850.8540	1909.1460	7.0	0.004
	-15%	1850.8540	1909.1460	6.0	0.003
	End Point	1850.8540	1909.1460	7.0	0.004

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.4.4. LTE BAND 4

ID:	10649	Date:	1/29/19

QPSK, (20MHz BANDWIDTH)

Limit		1710	1755	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	1710.8880	1754.1540		
Extreme (50C)		1710.8880	1754.1540	7.0	0.004
Extreme (40C)		1710.8880	1754.1540	6.5	0.004
Extreme (30C)		1710.8880	1754.1540	6.4	0.004
Extreme (10C)		1710.8880	1754.1540	5.4	0.003
Extreme (0C)		1710.8880	1754.1540	6.0	0.003
Extreme (-10C)		1710.8880	1754.1540	5.4	0.003
Extreme (-20C)		1710.8880	1754.1540	3.6	0.002
Extreme (-30C)		1710.8880	1754.1540	5.0	0.003
20C	15%	1710.8880	1754.1540	6.0	0.003
	-15%	1710.8880	1754.1540	6.2	0.004
	End Point	1710.8880	1754.1540	5.7	0.003

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.4.5. LTE BAND 5

ID:	19497	Date:	1/28/19

QPSK, (10MHz BANDWIDTH)

Limit		824	849	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	824.1970	848.7380		
Extreme (50C)		824.1970	848.7380	-16.9	-0.020
Extreme (40C)		824.1970	848.7380	-18.2	-0.022
Extreme (30C)		824.1970	848.7380	-17.4	-0.021
Extreme (10C)		824.1970	848.7380	-16.3	-0.019
Extreme (0C)		824.1970	848.7380	-16.7	-0.020
Extreme (-10C)		824.1970	848.7380	-18.6	-0.022
Extreme (-20C)		824.1970	848.7380	-17.1	-0.020
Extreme (-30C)		824.1970	848.7380	-19.4	-0.023
20C	15%	824.1970	848.7380	-18.2	-0.022
	-15%	824.1970	848.7380	-18.4	-0.022
	End Point	824.1970	848.7380	-17.9	-0.021

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.4.6. LTE BAND 12

ID:	10649	Date:	1/30/19

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	699.3380	715.6820		
Extreme (50C)		699.3380	715.6820	3.3	0.00
Extreme (40C)		699.3380	715.6820	3.5	0.00
Extreme (30C)		699.3380	715.6820	3.1	0.00
Extreme (10C)		699.3380	715.6820	4.0	0.01
Extreme (0C)		699.3380	715.6820	3.8	0.01
Extreme (-10C)		699.3380	715.6820	3.8	0.01
Extreme (-20C)		699.3380	715.6820	4.1	0.01
Extreme (-30C)		699.3380	715.6820	3.0	0.00
20C	15%	699.3380	715.6820	3.2	0.00
	-15%	699.3380	715.6820	3.4	0.00
	End Point	699.3380	715.6820	3.1	0.00

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.4.7. LTE BAND 13

ID:	10649	Date:	1/30/19

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	777.0680	786.9380		
Extreme (50C)		777.0680	786.9380	-7.3	-0.009
Extreme (40C)		777.0680	786.9380	-8.2	-0.010
Extreme (30C)		777.0680	786.9380	-7.7	-0.010
Extreme (10C)		777.0680	786.9380	-9.7	-0.012
Extreme (0C)		777.0680	786.9380	-8.6	-0.011
Extreme (-10C)		777.0680	786.9380	-8.0	-0.010
Extreme (-20C)		777.0680	786.9380	-9.2	-0.012
Extreme (-30C)		777.0680	786.9380	-7.9	-0.010
20C	15%	777.0680	786.9380	-7.5	-0.010
	-15%	777.0680	786.9380	-7.7	-0.010
	End Point	777.0680	786.9380	-7.8	-0.010

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.4.8. LTE BAND 17

ID:	10649	Date:	1/30/19

QPSK, (10MHz BANDWIDTH)

Limit		704	716	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	704.3350	715.6520		
Extreme (50C)		704.3350	715.6520	12.2	0.017
Extreme (40C)		704.3350	715.6520	15.7	0.022
Extreme (30C)		704.3350	715.6520	13.4	0.019
Extreme (10C)		704.3350	715.6520	16.5	0.023
Extreme (0C)		704.3350	715.6520	15.9	0.022
Extreme (-10C)		704.3350	715.6520	13.3	0.019
Extreme (-20C)		704.3350	715.6520	14.4	0.020
Extreme (-30C)		704.3350	715.6520	14.2	0.020
20C	15%	704.3350	715.6520	15.5	0.022
	-15%	704.3350	715.6520	15.5	0.022
	End Point	704.3350	715.6520	15.8	0.022

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.4.9. LTE BAND 41

ID:	19497	Date:	1/28/19

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	2496.7900	2689.2810		
Extreme (50C)		2496.7900	2689.2810	-19.6	-0.008
Extreme (40C)		2496.7900	2689.2810	-18.7	-0.007
Extreme (30C)		2496.7900	2689.2810	-19.1	-0.007
Extreme (10C)		2496.7900	2689.2810	-15.3	-0.006
Extreme (0C)		2496.7900	2689.2810	-17.6	-0.007
Extreme (-10C)		2496.7900	2689.2810	-20.0	-0.008
Extreme (-20C)		2496.7900	2689.2810	-18.6	-0.007
Extreme (-30C)		2496.7900	2689.2810	-16.4	-0.006
20C	15%	2496.7900	2689.2810	-19.7	-0.008
	-15%	2496.7900	2689.2810	-20.1	-0.008
	End Point	2496.7900	2689.2810	-18.9	-0.007

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.4.10. LTE BAND 66

ID:	10649	Date:	1/30/19

QPSK, (20MHz BANDWIDTH)

Limit		1710	1780	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	1710.8710	1779.1460		
Extreme (50C)		1710.8710	1779.1460	6.5	0.004
Extreme (40C)		1710.8710	1779.1460	6.3	0.004
Extreme (30C)		1710.8710	1779.1460	6.0	0.003
Extreme (10C)		1710.8710	1779.1460	5.9	0.003
Extreme (0C)		1710.8710	1779.1460	6.1	0.003
Extreme (-10C)		1710.8710	1779.1460	6.0	0.003
Extreme (-20C)		1710.8710	1779.1460	4.6	0.003
Extreme (-30C)		1710.8710	1779.1460	5.6	0.003
20C	15%	1710.8710	1779.1460	6.3	0.004
	-15%	1710.8710	1779.1460	5.9	0.003
	End Point	1710.8710	1779.1460	6.0	0.003

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9.5. PEAK TO AVERAGE RATIO

LIMITS

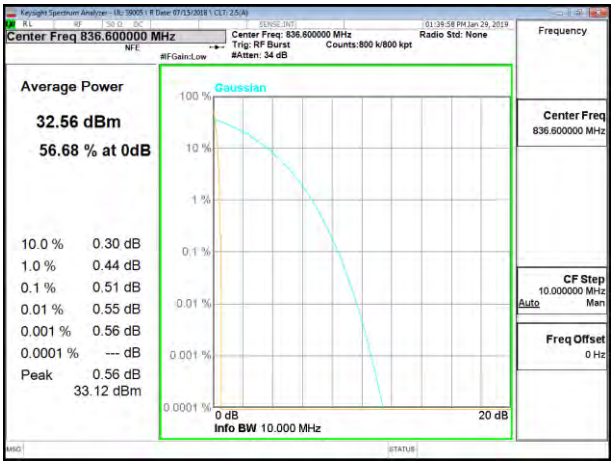
In addition, the peak to average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the highest PAPR during periods of continuous transmission.

RESULT

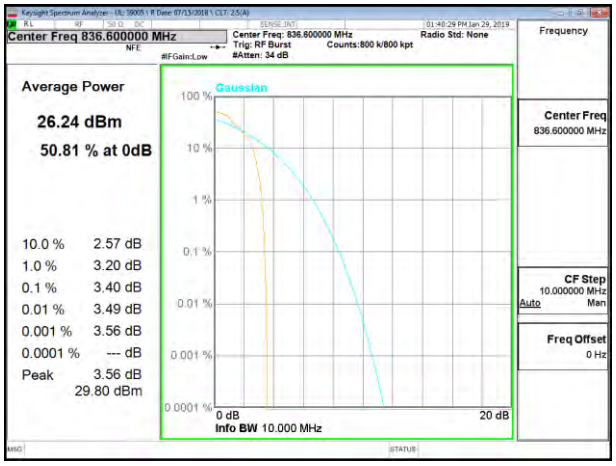
LAT 1 antenna was used to measure as the worst case. The results from all CCDF plots are passed with 13dB peak-to-average power ratio criteria.

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

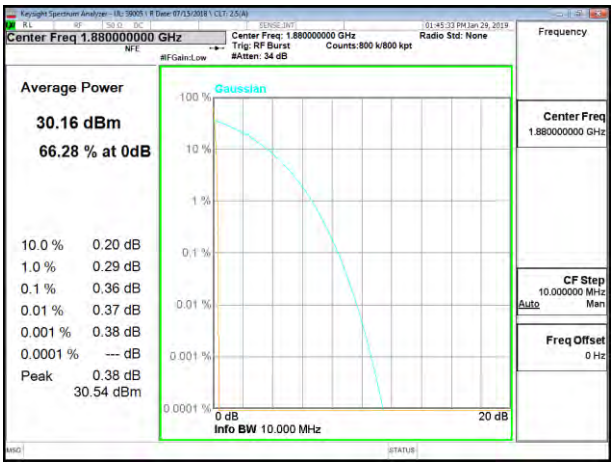
9.5.1. GSM



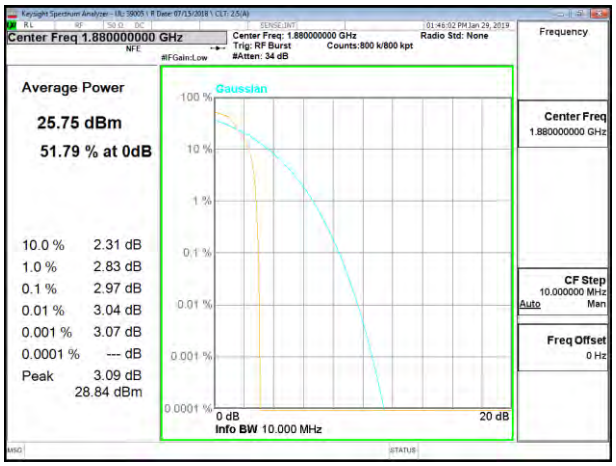
GSM 850MHz GPRS MID Channel



GSM 850MHz EGPRS MID Channel



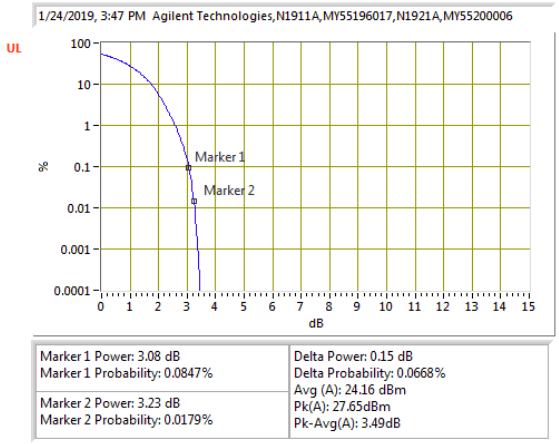
GSM 1900MHz GPRS MID Channel



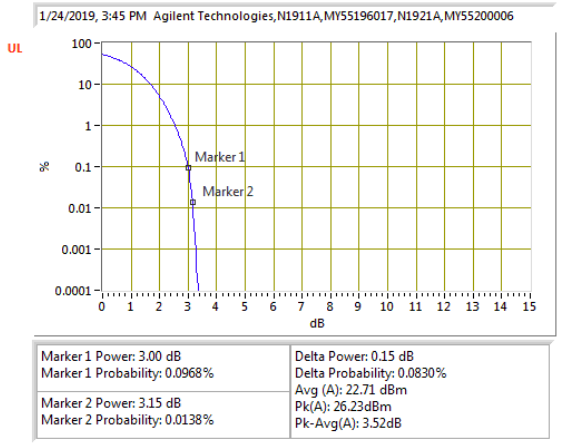
GSM 1900MHz EGPRS MID Channel

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

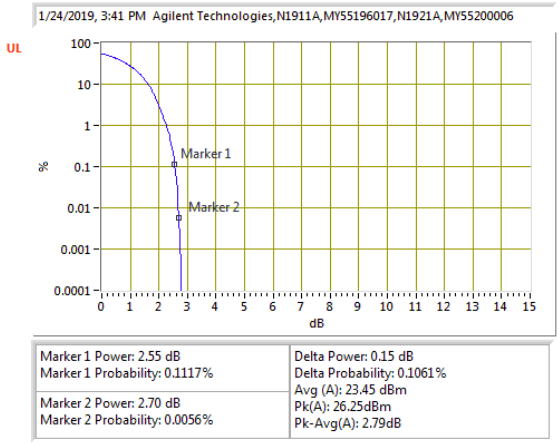
9.5.2. WCDMA



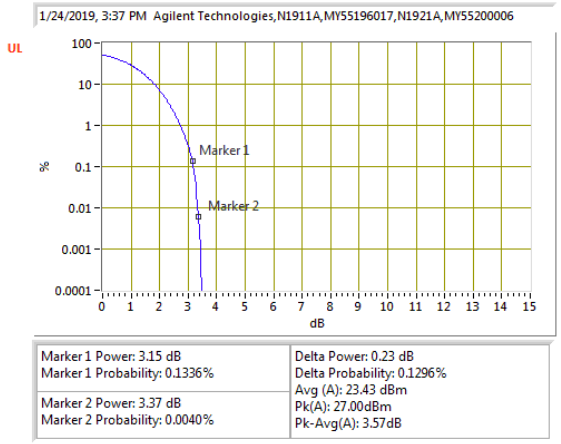
WCDMA BAND5 Rel99 MID Channel



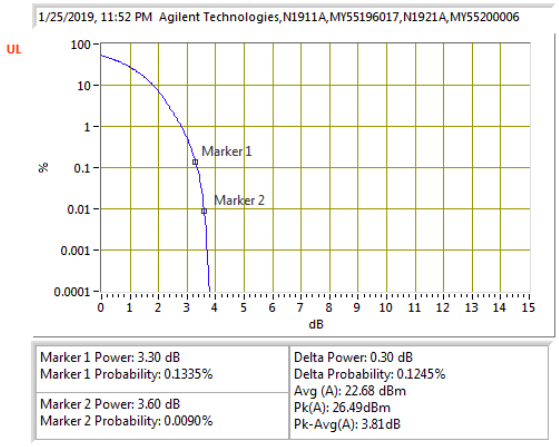
WCDMA BAND5 HSDPA MID Channel



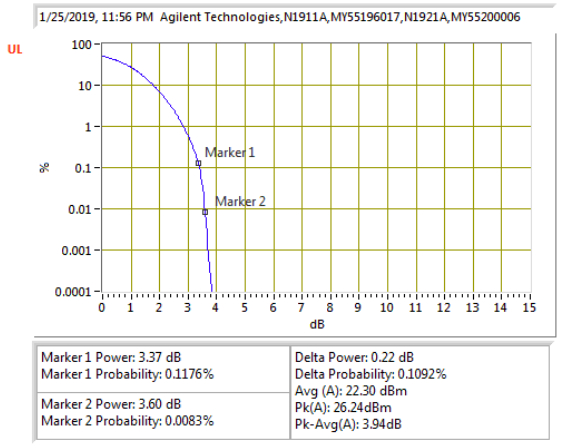
WCDMA BAND2 Rel99 MID Channel



WCDMA BAND2 HSDPA MID Channel



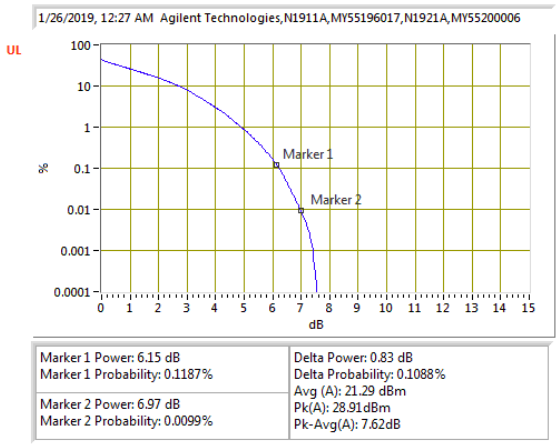
WCDMA BAND4 Rel99 MID Channel



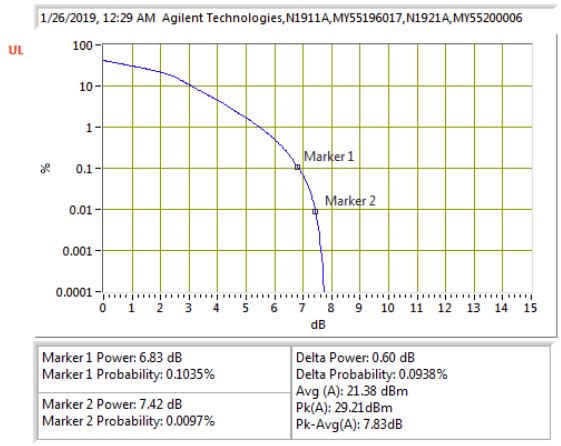
WCDMA BAND4 HSDPA MID Channel

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

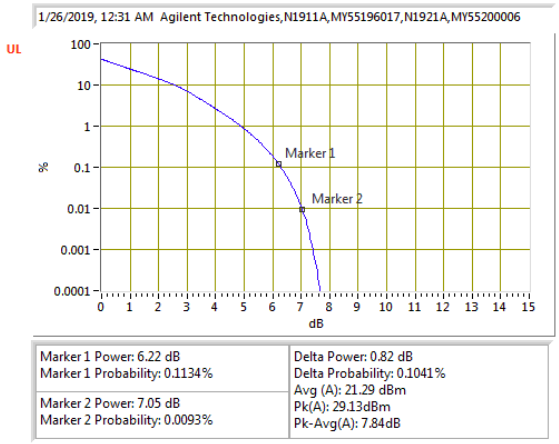
9.5.3. LTE BAND 2



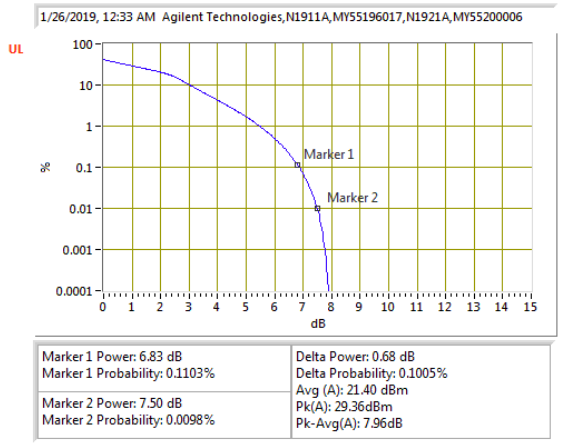
LTE B2 1.4MHz QPSK Mid Channel



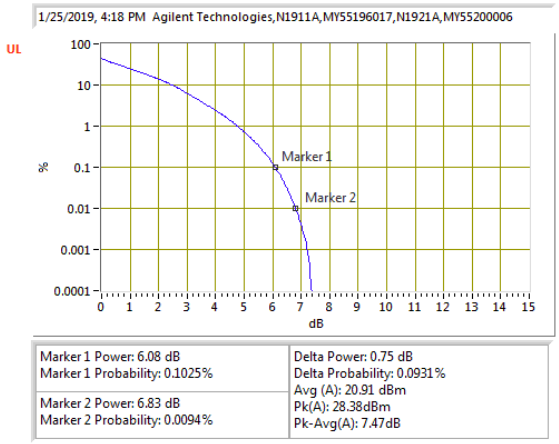
LTE B2 1.4MHz 16QAM Mid Channel



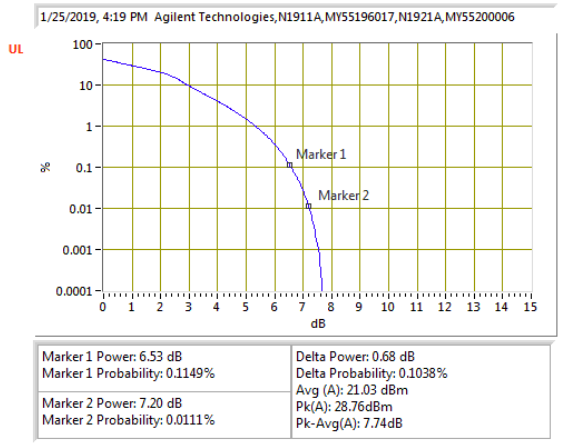
LTE B2 3MHz QPSK Mid Channel



LTE B2 3MHz 16QAM Mid Channel

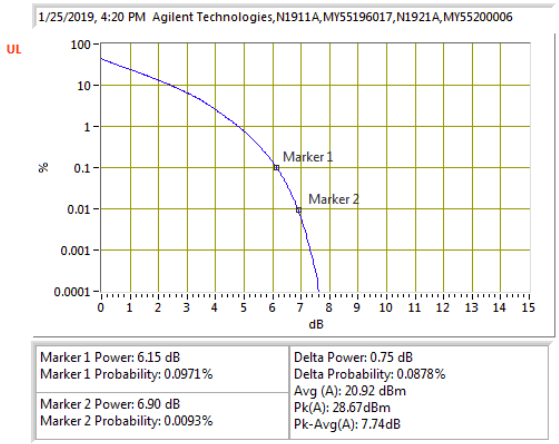


LTE B2 5MHz QPSK Mid Channel

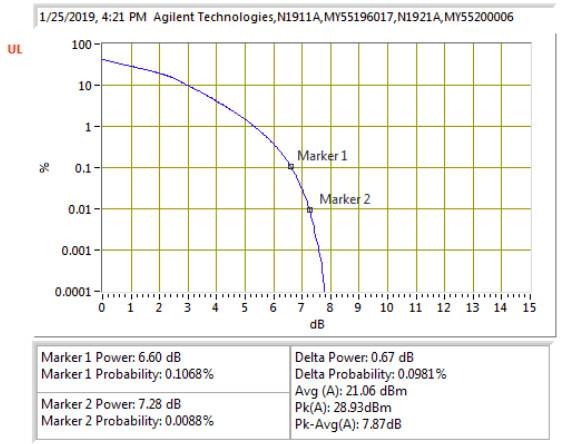


LTE B2 5MHz 16QAM Mid Channel

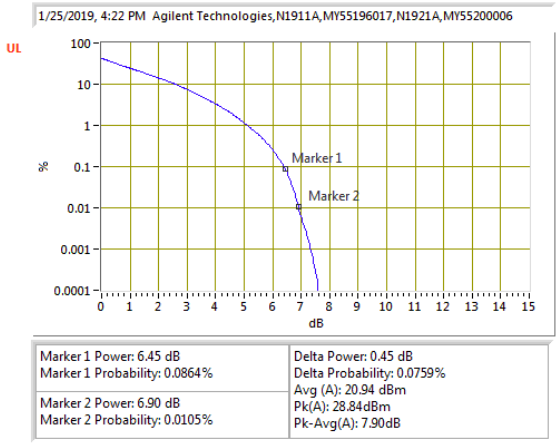
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



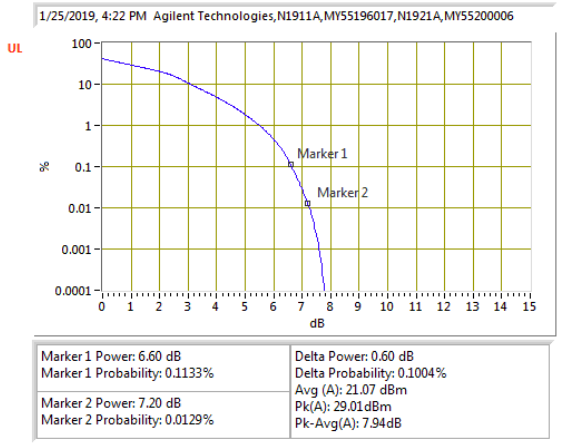
LTE B2 10MHz QPSK Mid Channel



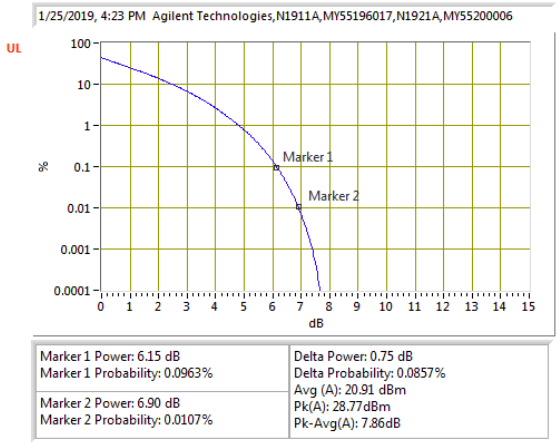
LTE B2 10MHz 16QAM Mid Channel



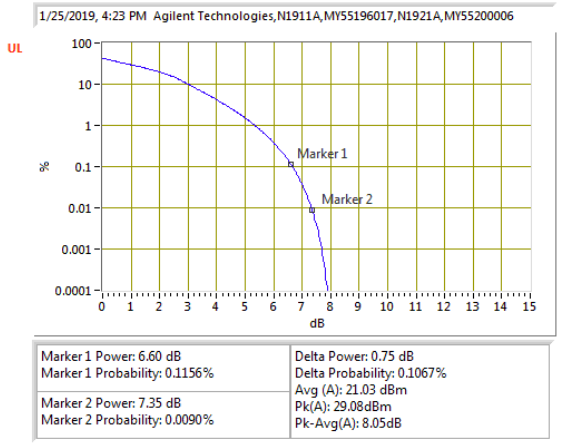
LTE B2 15MHz QPSK Mid Channel



LTE B2 15MHz 16QAM Mid Channel



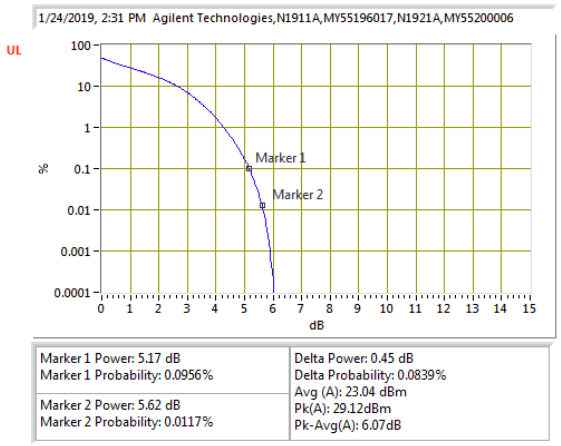
LTE B2 20MHz QPSK Mid Channel



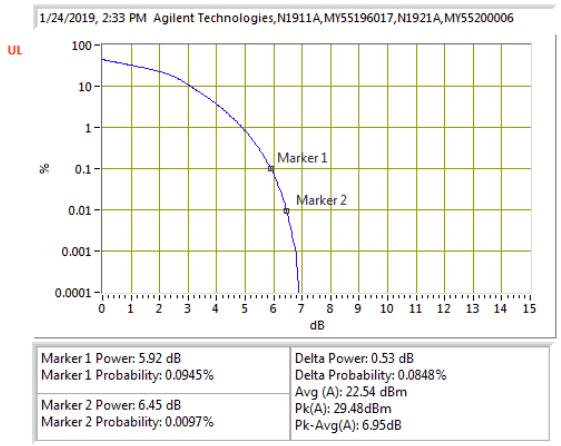
LTE B2 20MHz 16QAM Mid Channel

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

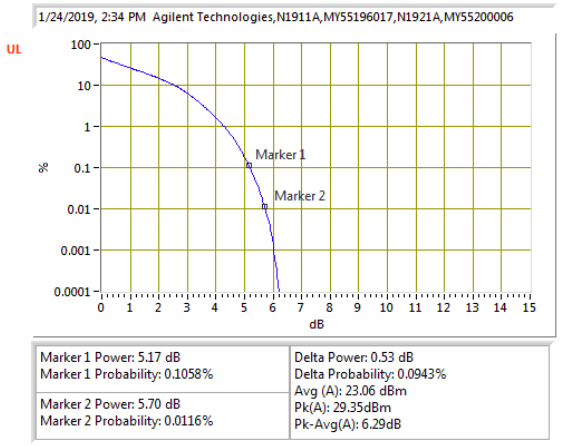
9.5.4. LTE BAND 5



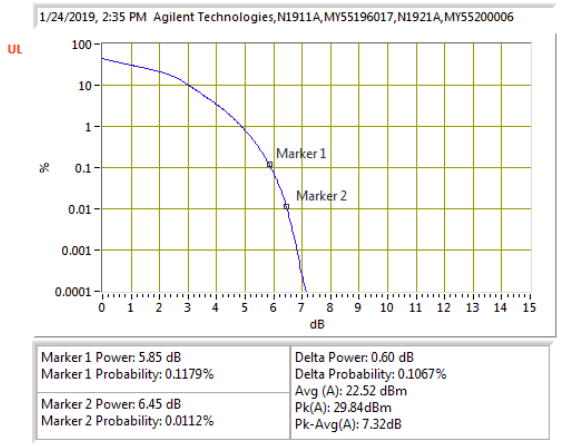
LTE B5 1.4MHz QPSK Mid Channel



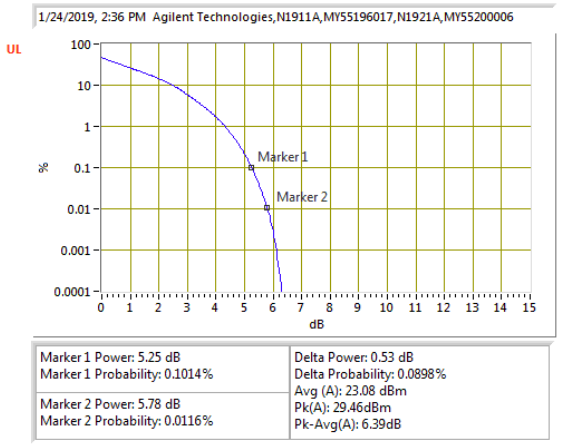
LTE B5 1.4MHz 16QAM Mid Channel



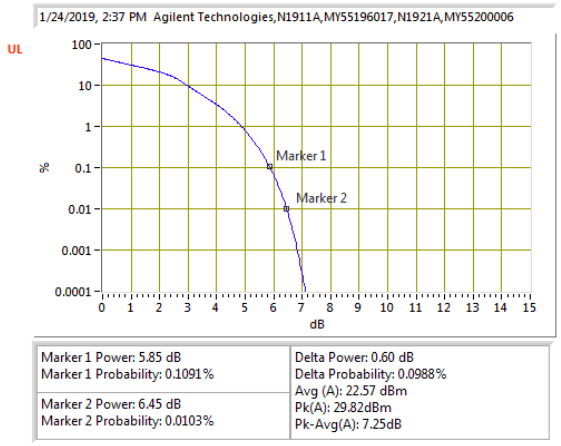
LTE B5 3MHz QPSK Mid Channel



LTE B5 3MHz 16QAM Mid Channel

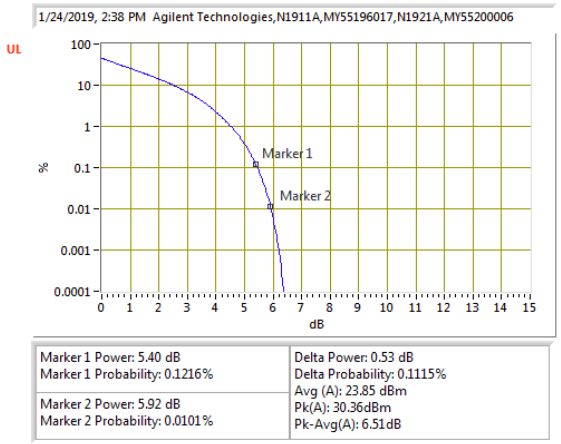


LTE B5 5MHz QPSK Mid Channel

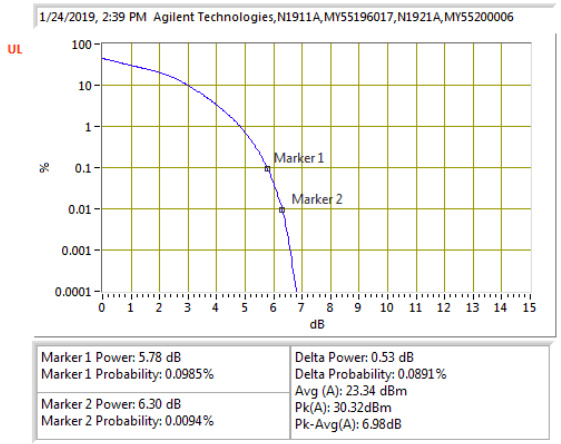


LTE B5 5MHz 16QAM Mid Channel

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



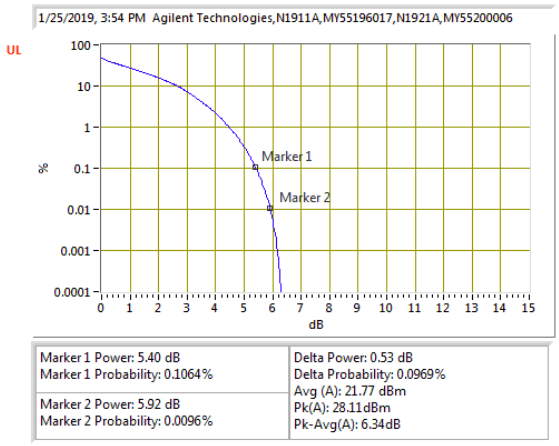
LTE B5 10MHz QPSK Mid Channel



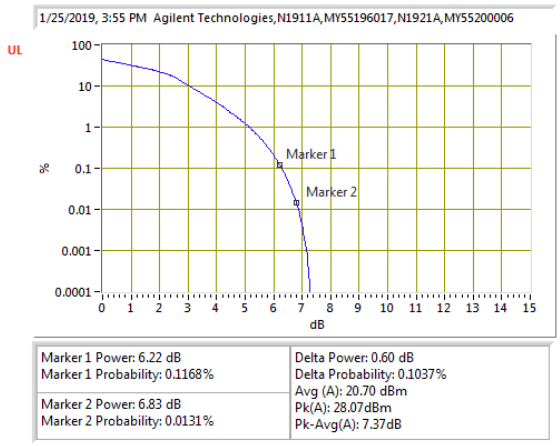
LTE B5 10MHz 16QAM Mid Channel

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

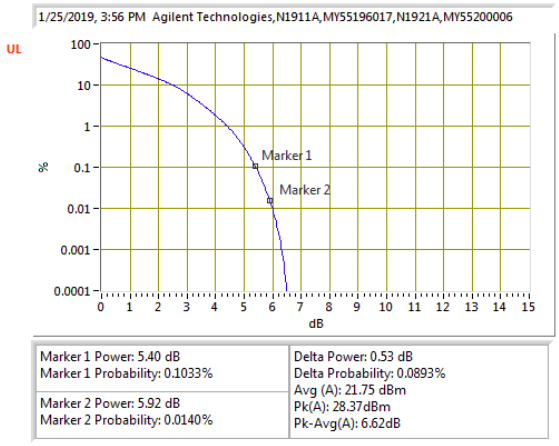
9.5.5. LTE BAND 12



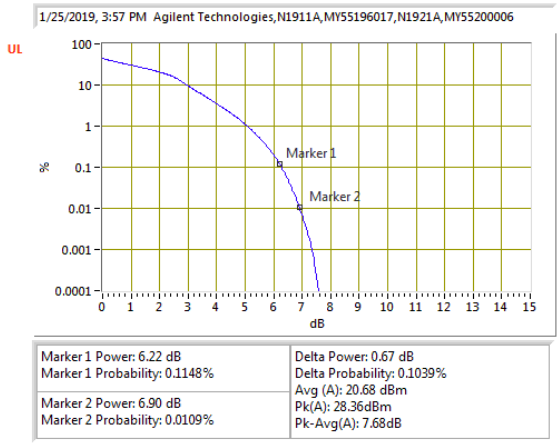
LTE B12 1.4MHz QPSK Mid Channel



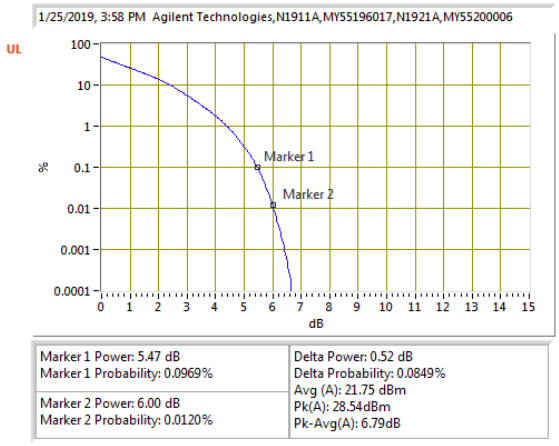
LTE B12 1.4MHz 16QAM Mid Channel



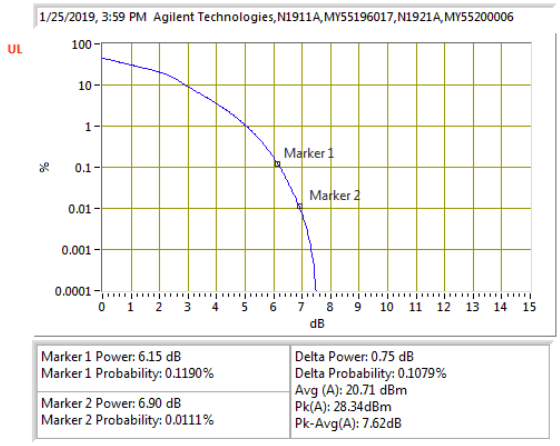
LTE B12 3MHz QPSK Mid Channel



LTE B12 3MHz 16QAM Mid Channel

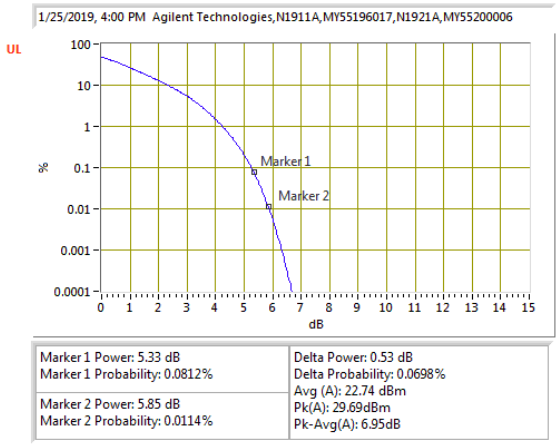


LTE B12 5MHz QPSK Mid Channel

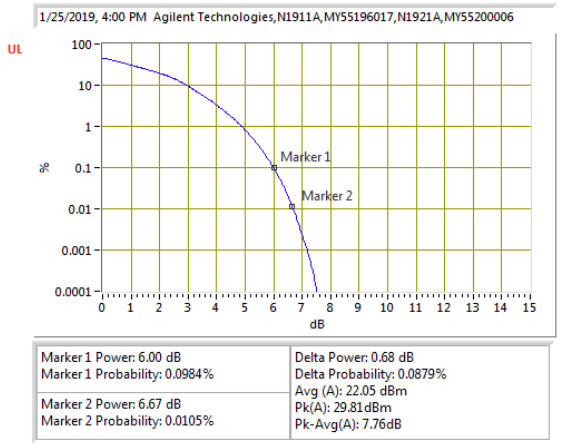


LTE B12 5MHz 16QAM Mid Channel

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



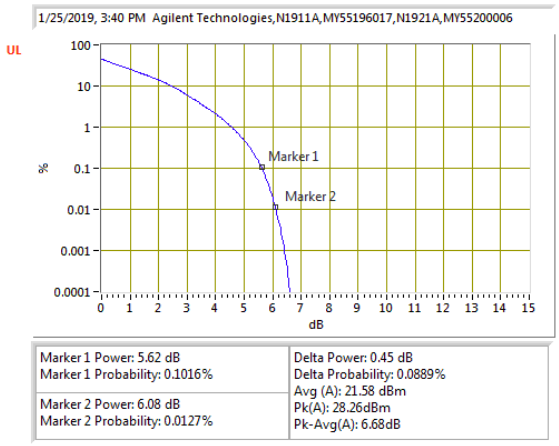
LTE B12 10MHz QPSK Mid Channel



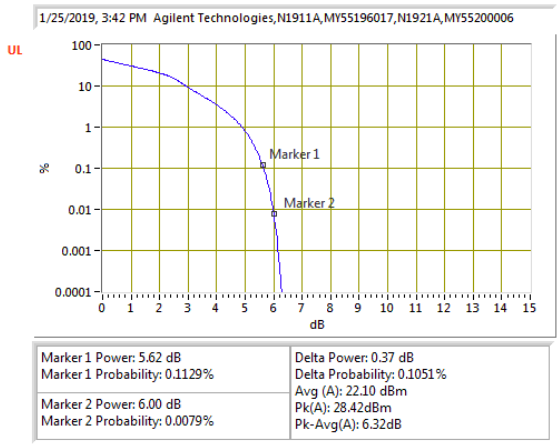
LTE B12 10MHz 16QAM Mid Channel

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

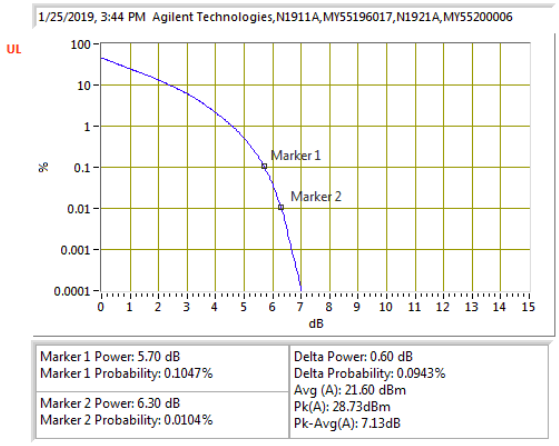
9.5.6. LTE BAND 13



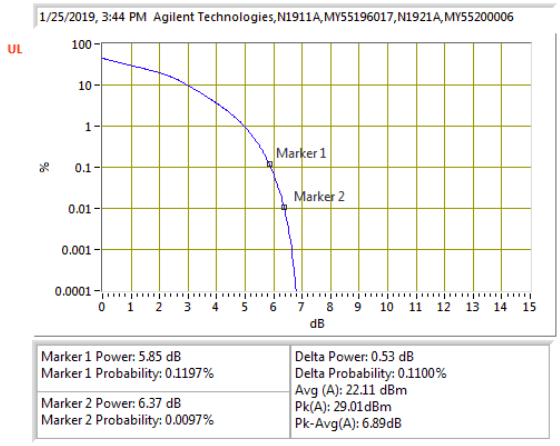
LTE B13 5MHz QPSK Mid Channel



LTE B13 5MHz 16QAM Mid Channel



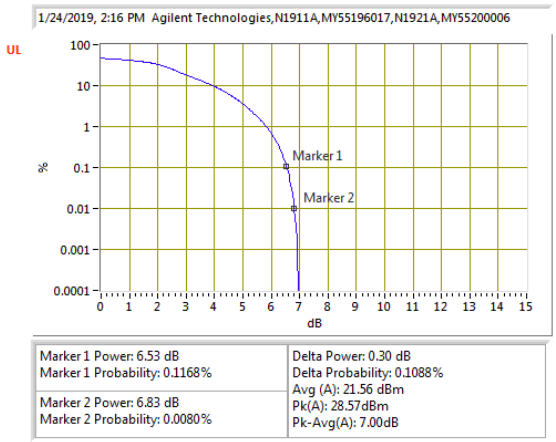
LTE B13 10MHz QPSK Mid Channel



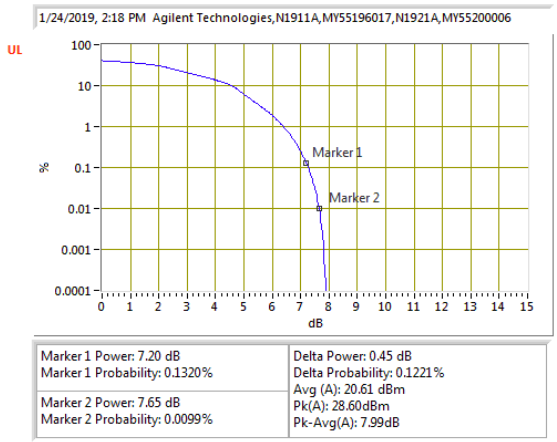
LTE B13 10MHz 16QAM Mid Channel

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

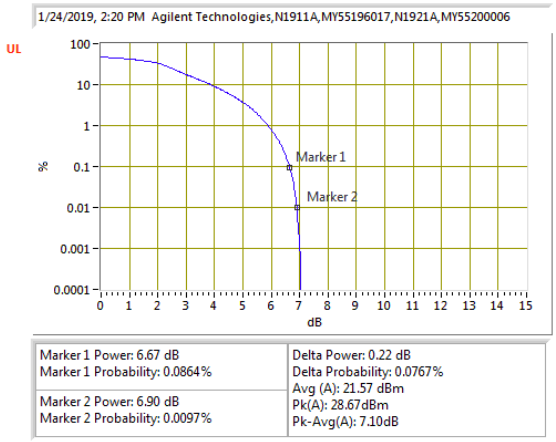
9.5.7. LTE BAND 41



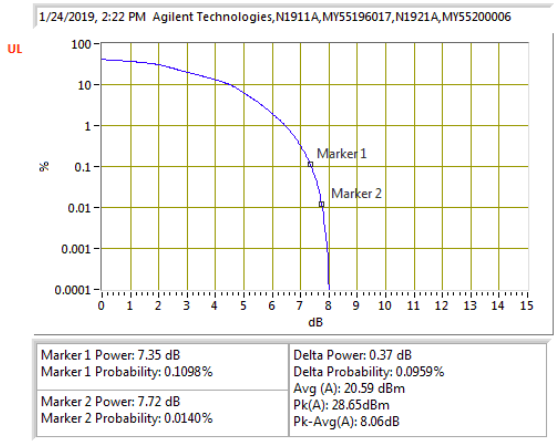
LTE B41 5MHz QPSK Middle Channel



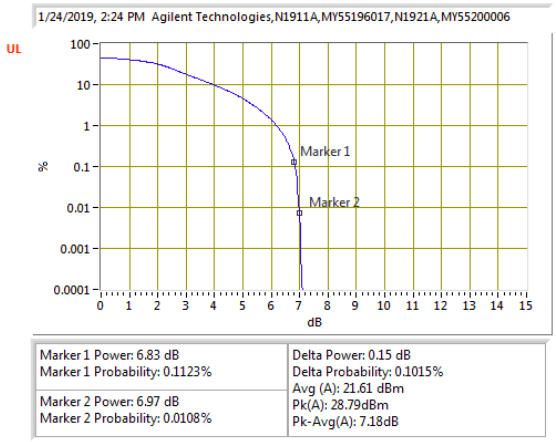
LTE B41 5MHz 16QAM Middle Channel



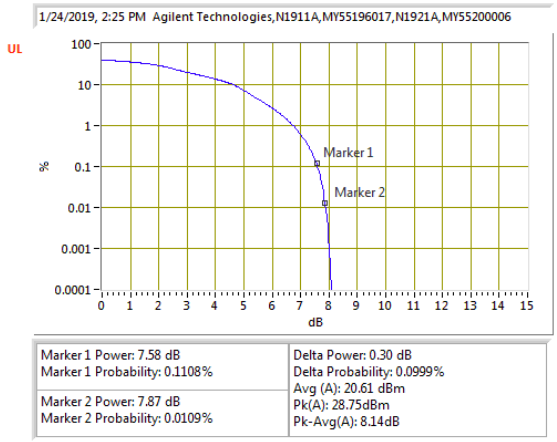
LTE B41 10MHz QPSK Middle Channel



LTE B41 10MHz 16QAM Middle Channel

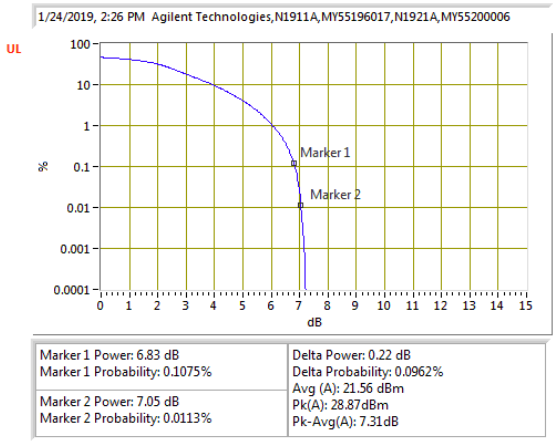


LTE B41 15MHz QPSK Middle Channel

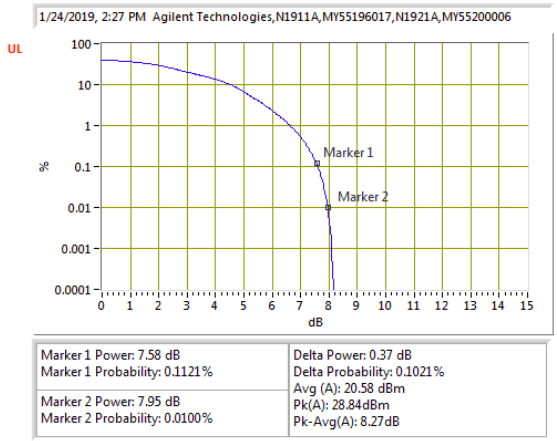


LTE B41 15MHz 16QAM Middle Channel

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



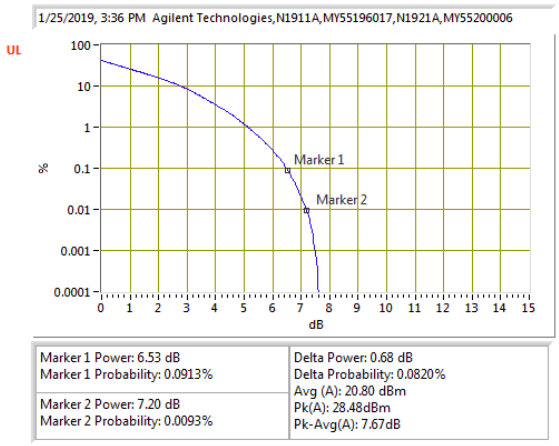
LTE B41 20MHz QPSK Middle Channel



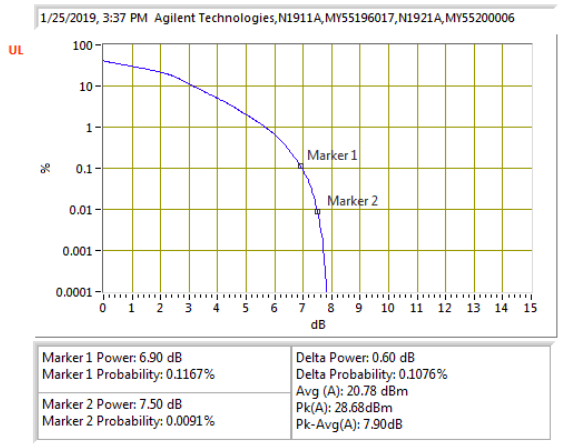
LTE B41 20MHz 16QAM Middle Channel

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

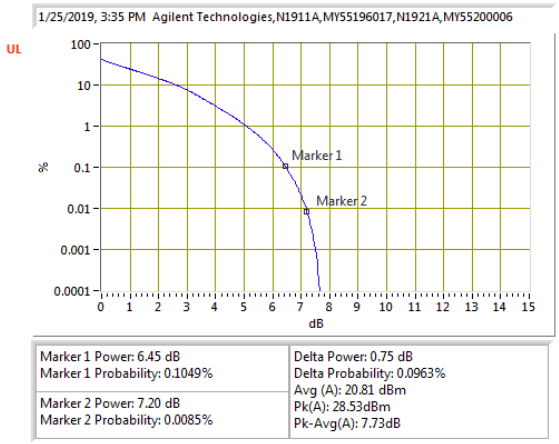
9.5.8. LTE BAND 66



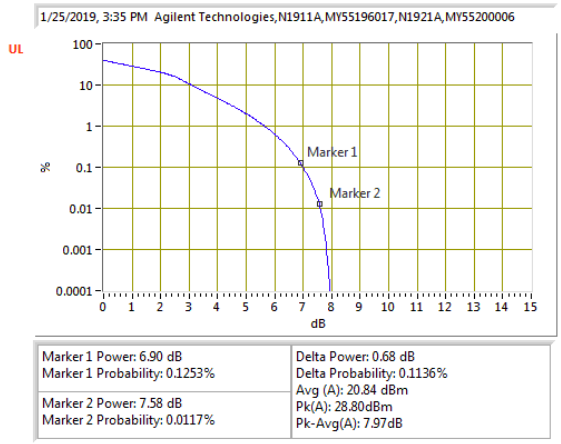
LTE B66 1.4MHz QPSK Mid Channel



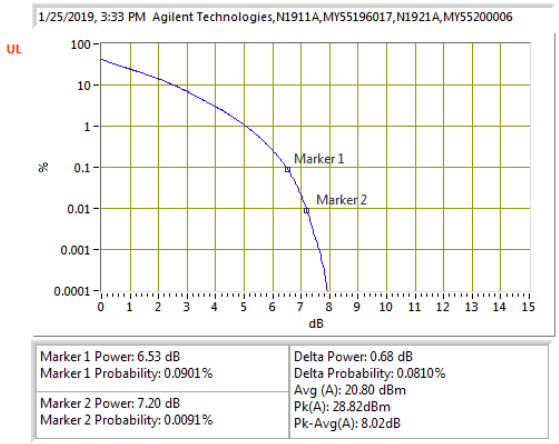
LTE B66 1.4MHz 16QAM Mid Channel



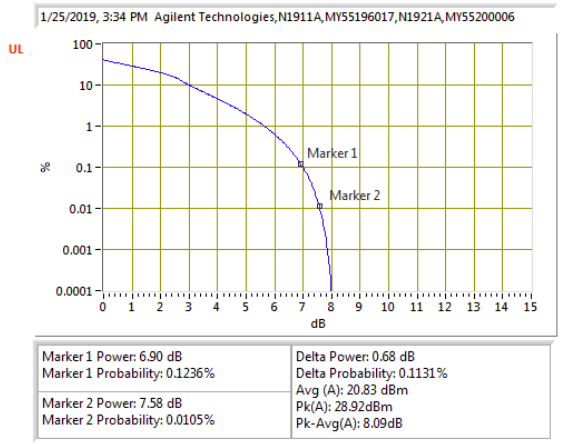
LTE B66 3MHz QPSK Mid Channel



LTE B66 3MHz 16QAM Mid Channel

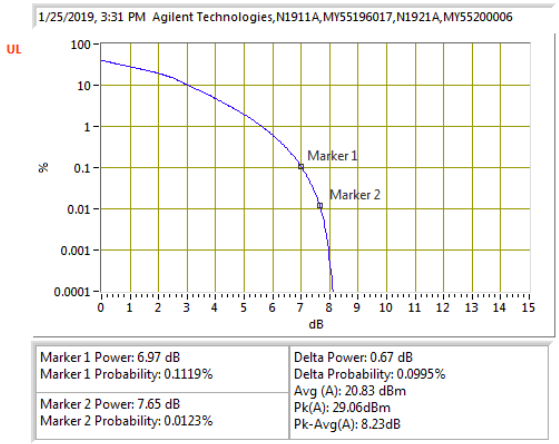


LTE B66 5MHz QPSK Mid Channel

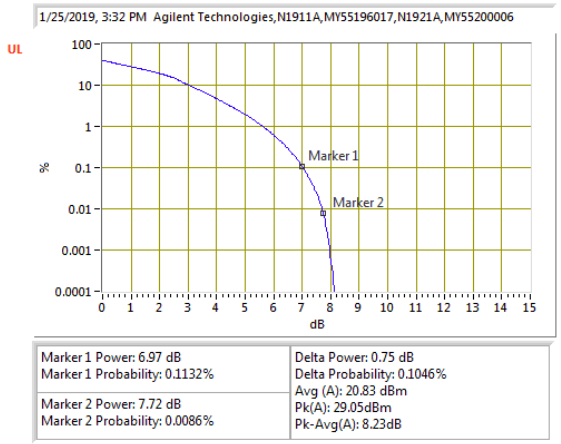


LTE B66 5MHz 16QAM Mid Channel

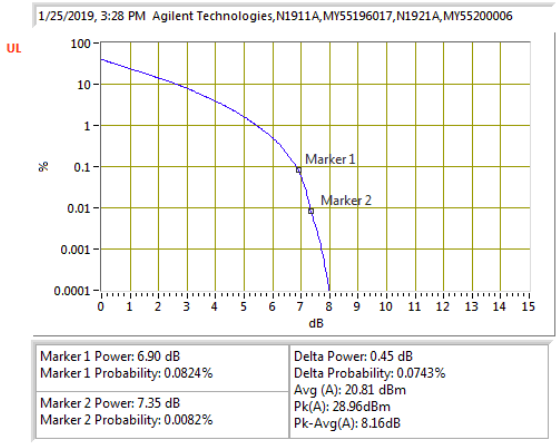
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.



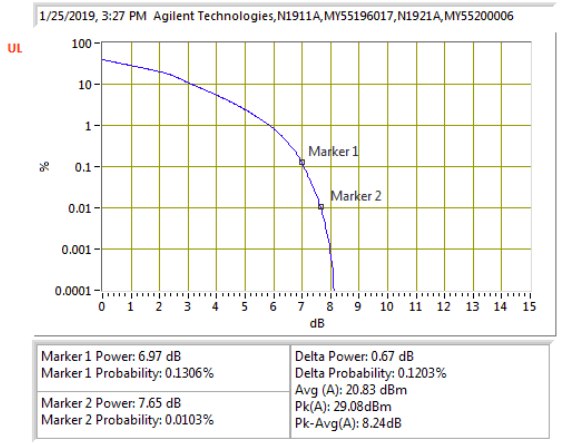
LTE B66 10MHz QPSK Mid Channel



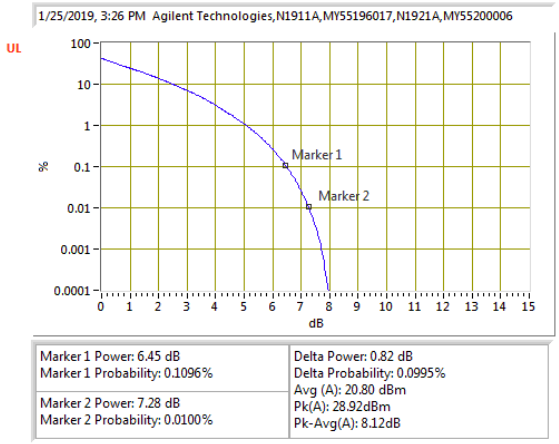
LTE B66 10MHz 16QAM Mid Channel



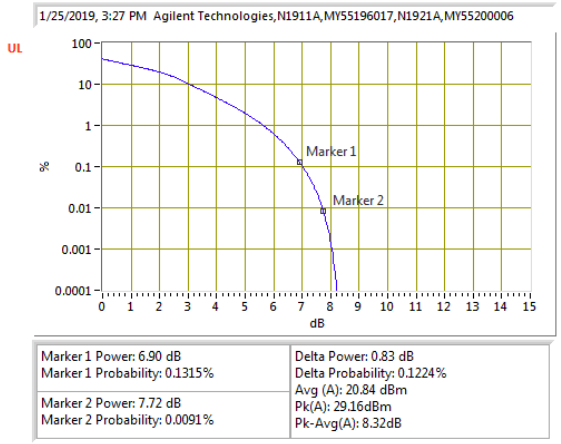
LTE B66 15MHz QPSK Mid Channel



LTE B66 15MHz 16QAM Mid Channel



LTE B66 20MHz QPSK Mid Channel



LTE B66 20MHz 16QAM Mid Channel

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

10. RADIATED TEST RESULTS

10.1. EFFECTIVE RADIATED POWER ERP/EIRP

RULE PART(S)

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

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 and 4)

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.

MODES TESTED

- GSM 850
- GSM 1900
- WCDMA Band 5
- WCDMA Band 2
- WCDMA Band 4
- LTE Band 2
- LTE Band 5
- LTE Band 12
- LTE Band 13
- LTE Band 41
- LTE Band 66

Note: This testing was performed to confirm that the measured radiated powers were consistent with the calculated ERP/EIRP test data given device-to-device variations in output power and the measurement uncertainties associated with the radiated tests. Measured ERP/EIRP test results are for reference only. Please refer to Section 5.2 for the final ERP/EIRP results.

TEST RESULTS

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	mW
GSM 850	GPRS	128	824.2	29.11	814.70
		190	836.6	28.45	699.84
		251	848.8	28.50	707.95
	EGPRS	128	824.2	26.46	442.59
		190	836.6	26.43	439.54
		251	848.8	26.49	445.66
GSM 1900	GPRS	512	1850.2	30.75	1188.50
		661	1880.0	31.01	1261.83
		810	1909.8	31.91	1552.39
	EGPRS	512	1850.2	29.26	843.33
		661	1880.0	29.65	922.57
		810	1909.8	30.43	1104.08

WCDMA

Band	Mode	Channel	f(MHz)	ERP/EIRP	
				dBm	mW
Band 2	REL99	9262	1852.4	26.54	450.82
		9400	1880	26.63	460.26
		9538	1907.6	27.04	505.82
	HSDPA	9262	1852.4	26.83	481.95
		9400	1880.0	26.96	496.59
		9538	1907.6	27.64	580.76
Band 5	REL99	4132	826.4	22.02	159.22
		4183	836.6	21.90	154.88
		4233	846.6	22.25	167.88
	HSDPA	4132	826.4	20.85	121.62
		4183	836.6	20.47	111.43
		4233	846.6	20.36	108.64
Band 4	REL99	1312	1712.4	20.40	109.65
		1413	1732.6	20.17	103.99
		1513	1752.6	21.05	127.35
	HSDPA	1312	1712.4	20.40	109.65
		1413	1732.6	19.84	96.38
		1513	1752.6	20.69	117.22

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 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	mW
20	QPSK	1/0	1860	21.78	150.66
		1/0	1880	22.14	163.68
		1/0	1900	23.53	225.42
	16QAM	1/0	1860	20.98	125.31
		1/0	1880	20.96	124.74
		1/0	1900	22.50	177.83
1.4	QPSK	1/0	1850.7	20.84	121.34
		1/0	1880	20.92	123.59
		1/0	1909.3	20.28	106.66
3	16QAM	1/0	1851.5	19.55	90.16
		1/0	1880	19.34	85.90
		1/0	1908.5	19.87	97.05

LTE Band 5

BW (MHz)	Mode	RB/RB Size	f(MHz)	ERP	
				dBm	mW
10	QPSK	1/0	829	22.11	162.55
		1/0	836.5	21.12	129.42
		1/0	844	22.45	175.79
	16QAM	1/0	829	21.84	152.76
		1/0	836.5	20.51	112.46
		1/0	844	22.05	160.32
3	QPSK	1/0	825.5	22.45	175.79
		1/0	836.5	22.18	165.20
		1/0	847.5	22.13	163.31
	16QAM	1/0	825.5	21.84	152.76
		1/0	836.5	21.49	140.93
		1/0	847.5	21.69	147.57

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 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	mW
10	QPSK	1/0	704	9.50	8.91
		1/0	707.5	8.36	6.85
		1/0	711	6.19	4.16
	16QAM	1/0	704	5.40	3.47
		1/0	707.5	6.36	4.33
		1/0	711	5.51	3.56
5	QPSK	1/0	701.5	5.38	3.45
		1/0	707.5	5.16	3.28
		1/0	713.5	4.97	3.14
	16QAM	1/0	701.5	3.78	2.39
		1/0	707.5	3.26	2.12
		1/0	713.5	3.67	2.33

LTE Band 13

BW (MHz)	Mode	RB/RB Size	f(MHz)	ERP	
				dBm	mW
10					
	QPSK	1/0	782	13.28	21.28
	16QAM	1/0	782	12.18	16.52
5	QPSK	1/0	779.5	13.23	21.04
		1/0	782	13.78	23.88
		1/0	784.5	14.34	27.16
	16QAM	1/0	779.5	14.33	27.10
		1/0	782	12.18	16.52
		1/0	784.5	12.64	18.37

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LTE Band 41

BW (MHz)	Mode	RB/RB Size	f(MHz)	EIRP	
				dBm	mW
20	QPSK	1/0	2506	22.04	159.96
		1/0	2593	22.50	177.83
		1/0	2680	20.62	115.35
	16QAM	1/0	2506	21.78	150.66
		1/0	2593	22.22	166.72
		1/0	2680	20.45	110.92
15	QPSK	1/0	2503.5	21.38	137.40
		1/0	2593	20.76	119.12
		1/0	2682.5	20.46	111.17
	16QAM	1/0	2503.5	21.26	133.66
		1/0	2593	20.43	110.41
		1/0	2682.5	20.29	106.91

LTE Band 66

BW (MHz)	Mode	RB/RB Size	f(MHz)	EIRP	
				dBm	mW
20	QPSK	1/0	1720	20.12	102.80
		1/0	1745	21.36	136.77
		1/0	1770	21.95	156.68
	16QAM	1/0	1720	19.15	82.22
		1/0	1745	20.12	102.80
		1/0	1770	21.02	126.47
10	QPSK	1/0	1715	19.84	96.38
		1/0	1745	20.64	115.88
		1/0	1775	21.15	130.32
15	16QAM	1/0	1717.5	19.14	82.04
		1/0	1745	20.05	101.16
		1/0	1772.5	20.83	121.06

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

10.1.1. GSM

GPRS 850

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lens
Project #: 12678287
Date: 1/31/2019
Test Engineer: HMB BS
Configuration: EUT Only
Location: Chamber J
Mode: GPRS 850 MHz Fundamentals

Test Equipment:
Receiving: Hybrid PRE0181575, and Chamber J SMA Cables
Substitution: Dipole T416, Chamber J 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	22.60	V	3.1	0.1	19.61	38.5	18.9	
824.20	32.01	H	3.1	0.2	29.11	38.5	-9.4	
Mid Ch								
836.60	21.87	V	3.1	0.1	18.88	38.5	19.7	
836.60	31.32	H	3.1	0.2	28.45	38.5	10.1	
High Ch								
848.80	22.00	V	3.2	0.0	18.85	38.5	19.6	
848.80	31.55	H	3.2	0.1	28.50	38.5	10.0	

EGPRS 850

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lens
Project #: 12678287
Date: 1/31/2019
Test Engineer: HMB BS
Configuration: EUT Only
Location: Chamber J
Mode: EGPRS 850 MHz Fundamentals

Test Equipment:
Receiving: Hybrid PRE0181575, and Chamber J SMA Cables
Substitution: Dipole T416, Chamber J 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	19.85	V	3.1	0.1	16.86	38.5	-21.6	
824.20	29.36	H	3.1	0.2	26.46	38.5	-12.0	
Mid Ch								
836.60	19.85	V	3.1	0.1	16.78	38.5	-21.7	
836.60	29.80	H	3.1	0.2	26.43	38.5	-12.1	
High Ch								
848.80	19.91	V	3.2	0.0	16.76	38.5	-21.7	
848.80	29.54	H	3.2	0.1	26.49	38.5	-12.0	

GPRS 1900

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lens
Project #: 12678287
Date: 1/31/2019
Test Engineer: HMB BS
Configuration: EUT Only
Location: Chamber J
Mode: GPRS 1900 MHz Fundamentals

Test Equipment:
Receiving: Horn PRE0101793, and Chamber J SMA Cables
Substitution: Horn PRE0181258, Chamber J Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1850.20	12.19	V	5.0	9.8	16.96	33.0	-16.0	
1850.20	25.97	H	5.0	9.8	30.75	33.0	-2.3	
Mid Ch								
1880.00	12.78	V	5.1	10.0	17.66	33.0	-15.3	
1880.00	26.13	H	5.1	10.0	31.01	33.0	-2.0	
High Ch								
1909.80	12.82	V	5.2	10.1	17.77	33.0	-15.2	
1909.80	26.96	H	5.2	10.1	31.91	33.0	-1.1	

EGPRS 1900

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lens
Project #: 12678287
Date: 1/31/2019
Test Engineer: HMB BS
Configuration: EUT Only
Location: Chamber J
Mode: EGPRS 1900 MHz Fundamentals

Test Equipment:
Receiving: Horn PRE0101793, and Chamber J SMA Cables
Substitution: Horn PRE0181258, Chamber J Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1850.20	10.24	V	5.0	9.8	15.01	33.0	-18.0	
1850.20	24.49	H	5.0	9.8	29.26	33.0	-3.7	
Mid Ch								
1880.00	11.13	V	5.1	10.0	16.01	33.0	-17.0	
1880.00	24.77	H	5.1	10.0	29.65	33.0	-3.4	
High Ch								
1909.80	12.42	V	5.2	10.1	17.37	33.0	-15.6	
1909.80	25.48	H	5.2	10.1	30.43	33.0	-2.6	

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

10.1.2. WCDMA

B2 REL99

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lions
Project #: 12678287
Date: 1/31/2019
Test Engineer: 19480 BS
Configuration: EUT Only
Location: Chamber J
Mode: Rel99 Band 2 Fundamentals

Test Equipment:
Receiving: Horn PRE0101793, and Chamber J SMA Cables
Substitution: Horn PRE0181258, Chamber J Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1852.40	11.39	V	5.0	9.8	16.17	33.0	-16.8	
1852.40	21.76	H	5.0	9.8	26.54	33.0	-6.5	
Mid Ch								
1880.00	8.63	V	5.1	10.0	13.51	33.0	-19.5	
1880.00	21.73	H	5.1	10.0	26.63	33.0	-6.4	
High Ch								
1907.60	7.39	V	5.2	10.1	12.34	33.0	-20.7	
1907.60	22.09	H	5.2	10.1	27.04	33.0	-6.0	

B2 HSDPA

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lions
Project #: 12678287
Date: 1/31/2019
Test Engineer: 19480 BS
Configuration: EUT Only
Location: Chamber J
Mode: HSDPA Band 2 Fundamentals

Test Equipment:
Receiving: Horn PRE0101793, and Chamber J SMA Cables
Substitution: Horn PRE0181258, Chamber J Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1852.40	11.67	V	5.0	9.8	16.45	33.0	-16.6	
1852.40	22.05	H	5.0	9.8	26.85	33.0	-6.2	
Mid Ch								
1880.00	8.95	V	5.1	10.0	13.82	33.0	-19.2	
1880.00	22.08	H	5.1	10.0	26.96	33.0	-6.0	
High Ch								
1907.60	7.97	V	5.2	10.1	12.92	33.0	-20.1	
1907.60	22.69	H	5.2	10.1	27.64	33.0	-5.4	

B5 REL99

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lions
Project #: 12678287
Date: 1/31/2019
Test Engineer: 19480 BS
Configuration: EUT Only
Location: Chamber J
Mode: Rel99 Band 5 Fundamentals

Test Equipment:
Receiving: Hybrid PRE0181575, and Chamber J SMA Cables
Substitution: Dipole T416, Chamber J 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	15.01	V	3.1	0.1	12.00	38.5	-26.5	
826.40	24.93	H	3.1	0.2	22.02	38.5	-16.5	
Mid Ch								
836.60	14.94	V	3.1	0.1	11.87	38.5	-26.6	
836.60	24.87	H	3.1	0.2	21.90	38.5	-16.6	
High Ch								
846.60	15.72	V	3.1	0.0	12.59	38.5	-25.9	
846.60	25.28	H	3.1	0.1	22.25	38.5	-16.3	

B5 HSDPA

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lions
Project #: 12678287
Date: 1/31/2019
Test Engineer: 19480 BS
Configuration: EUT Only
Location: Chamber J
Mode: HSDPA Band 5 Fundamentals

Test Equipment:
Receiving: Hybrid PRE0181575, and Chamber J SMA Cables
Substitution: Dipole T416, Chamber J 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	11.76	V	3.1	0.1	10.75	38.5	-27.7	
826.40	21.76	H	3.1	0.2	20.85	38.5	-17.6	
Mid Ch								
836.60	13.54	V	3.1	0.1	10.47	38.5	-28.0	
836.60	23.44	H	3.1	0.2	20.47	38.5	-18.0	
High Ch								
846.60	14.01	V	3.1	0.0	10.88	38.5	-27.6	
846.60	23.39	H	3.1	0.1	20.36	38.5	-18.1	

B4 REL99

High Frequency Substitution Measurement

Company: Lions
Project #: 12678284
Date: 2/1/2019
Test Engineer: 19480 BS
Configuration: EUT Only
Location: Chamber J
Mode: Rel99 Band 4 Fundamentals

Test Equipment:
Receiving: Horn PRE0101793, and Chamber J SMA Cables
Substitution: Horn PRE0181258, Chamber J Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1712.40	12.00	V	4.8	9.3	16.52	30.0	-13.5	
1712.40	15.88	H	4.8	9.3	20.40	30.0	-9.6	
Mid Ch								
1732.60	13.41	V	4.8	9.3	17.90	30.0	-12.1	
1732.60	15.68	H	4.8	9.3	20.17	30.0	-9.8	
High Ch								
1752.60	13.42	V	4.8	9.3	17.89	30.0	-12.1	
1752.60	16.58	H	4.8	9.3	21.05	30.0	-8.9	

B4 HSDPA

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lions
Project #: 12678284
Date: 2/1/2019
Test Engineer: 19480 BS
Configuration: EUT Only
Location: Chamber J
Mode: HSDPA Band 4 Fundamentals

Test Equipment:
Receiving: Horn PRE0101793, and Chamber J SMA Cables
Substitution: Horn PRE0181258, Chamber J Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1712.40	11.92	V	4.8	9.3	16.44	30.0	-13.6	
1712.40	15.88	H	4.8	9.3	20.40	30.0	-9.6	
Mid Ch								
1732.60	13.01	V	4.8	9.3	17.50	30.0	-12.5	
1732.60	15.35	H	4.8	9.3	19.84	30.0	-10.2	
High Ch								
1752.60	13.20	V	4.8	9.3	17.67	30.0	-12.3	
1752.60	16.22	H	4.8	9.3	20.69	30.0	-9.3	

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

10.1.3. LTE Band 2

20MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lions
Project #: 12678284
Date: 2/1/2019
Test Engineer: 19480 BS
Configuration: EUT Only
Location: Chamber J
Mode: LTE_QPSK Band 2 Fundamentals, 20MHz Bandwidth

Test Equipment:
Receiving: Horn PRE0101793, and Chamber J SMA Cables
Substitution: Horn PRE0181258, Chamber J Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1860.00	15.09	V	5.0	9.8	19.90	33.0	-13.1	
1860.00	16.97	H	5.0	9.8	21.78	33.0	-11.2	
Mid Ch								
1880.00	14.55	V	5.1	10.0	19.43	33.0	-13.6	
1880.00	17.26	H	5.1	10.0	22.14	33.0	-10.9	
High Ch								
1900.00	15.67	V	5.1	10.1	20.62	33.0	-12.4	
1900.00	18.58	H	5.1	10.1	23.53	33.0	-9.5	

20MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lions
Project #: 12678284
Date: 2/1/2019
Test Engineer: 19480 BS
Configuration: EUT Only
Location: Chamber J
Mode: LTE_16QAM Band 2 Fundamentals, 20MHz Bandwidth

Test Equipment:
Receiving: Horn PRE0101793, and Chamber J SMA Cables
Substitution: Horn PRE0181258, Chamber J Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1860.00	13.97	V	5.0	9.8	18.78	33.0	-14.2	
1860.00	16.17	H	5.0	9.8	20.98	33.0	-12.0	
Mid Ch								
1880.00	13.48	V	5.1	10.0	18.36	33.0	-14.6	
1880.00	16.08	H	5.1	10.0	20.96	33.0	-12.0	
High Ch								
1900.00	14.70	V	5.1	10.1	19.65	33.0	-13.4	
1900.00	17.55	H	5.1	10.1	22.50	33.0	-10.5	

1.4MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lions
Project #: 12678242
Date: 2/1/2019
Test Engineer: 19480 BS
Configuration: EUT Only
Location: Chamber J
Mode: LTE_QPSK Band 2 Fundamentals, 1.4MHz Bandwidth

Test Equipment:
Receiving: Horn PRE0101793, and Chamber J SMA Cables
Substitution: Horn PRE0181258, Chamber J Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1850.70	13.16	V	5.0	9.8	17.93	33.0	-15.1	
1850.70	16.07	H	5.0	9.8	20.84	33.0	-12.2	
Mid Ch								
1880.00	12.60	V	5.1	10.0	17.48	33.0	-15.5	
1880.00	16.04	H	5.1	10.0	20.92	33.0	-12.1	
High Ch								
1909.30	11.72	V	5.2	10.1	16.67	33.0	-16.3	
1909.30	15.33	H	5.2	10.1	20.28	33.0	-12.7	

3MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lions
Project #: 12678284
Date: 2/1/2019
Test Engineer: 19480 BS
Configuration: EUT Only
Location: Chamber J
Mode: LTE_16QAM Band 2 Fundamentals, 3MHz Bandwidth

Test Equipment:
Receiving: Horn PRE0101793, and Chamber J SMA Cables
Substitution: Horn PRE0181258, Chamber J Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1851.50	12.88	V	5.0	9.8	17.66	33.0	-15.3	
1851.50	14.77	H	5.0	9.8	19.55	33.0	-13.5	
Mid Ch								
1880.00	12.61	V	5.1	10.0	17.49	33.0	-15.5	
1880.00	14.46	H	5.1	10.0	19.34	33.0	-13.7	
High Ch								
1908.50	12.05	V	5.2	10.1	17.00	33.0	-16.0	
1908.50	14.92	H	5.2	10.1	19.87	33.0	-13.1	

10.1.4. LTE Band 5

10MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lions
Project #: 12678282
Date: 2/1/2019
Test Engineer: 19480 BS
Configuration: EUT Only
Location: Chamber J
Mode: LTE_QPSK Band 5 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181575, and Chamber J SMA Cables
Substitution: Dipole T416, Chamber J 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	17.11	V	3.1	0.1	14.09	38.5	-24.4	
829.00	25.03	H	3.1	0.2	22.11	38.5	-16.4	
Mid Ch								
836.50	17.03	V	3.1	0.1	13.96	38.5	-24.5	
836.50	24.09	H	3.1	0.2	21.12	38.5	-17.4	
High Ch								
844.00	16.96	V	3.1	0.0	13.84	38.5	-24.7	
844.00	25.47	H	3.1	0.1	22.45	38.5	-16.0	

10MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lions
Project #: 12678282
Date: 2/1/2019
Test Engineer: 19480 BS
Configuration: EUT Only
Location: Chamber J
Mode: LTE_16QAM Band 5 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181575, and Chamber J SMA Cables
Substitution: Dipole T416, Chamber J 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	16.44	V	3.1	0.1	13.42	38.5	-25.1	
829.00	24.76	H	3.1	0.2	21.84	38.5	-16.7	
Mid Ch								
836.50	16.86	V	3.1	0.1	13.79	38.5	-24.7	
836.50	23.48	H	3.1	0.2	20.51	38.5	-18.0	
High Ch								
844.00	16.93	V	3.1	0.0	13.81	38.5	-24.7	
844.00	25.07	H	3.1	0.1	22.05	38.5	-16.4	

3MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lions
Project #: 12678282
Date: 2/1/2019
Test Engineer: 19480 BS
Configuration: EUT Only
Location: Chamber J
Mode: LTE_QPSK Band 5 Fundamentals, 3MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181575, and Chamber J SMA Cables
Substitution: Dipole T416, Chamber J 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	16.50	V	3.1	0.1	13.50	38.5	-25.0	
825.50	25.35	H	3.1	0.2	22.45	38.5	-16.1	
Mid Ch								
836.50	15.12	V	3.1	0.1	12.06	38.5	-26.4	
836.50	25.15	H	3.1	0.2	22.18	38.5	-16.3	
High Ch								
847.50	15.45	V	3.1	0.0	12.31	38.5	-26.2	
847.50	25.17	H	3.1	0.1	22.13	38.5	-16.4	

3MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lions
Project #: 12678282
Date: 2/1/2019
Test Engineer: 19480 BS
Configuration: EUT Only
Location: Chamber J
Mode: LTE_16QAM Band 5 Fundamentals, 3MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181575, and Chamber J SMA Cables
Substitution: Dipole T416, Chamber J 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	16.07	V	3.1	0.1	13.07	38.5	-25.4	
825.50	24.74	H	3.1	0.2	21.84	38.5	-16.7	
Mid Ch								
836.50	14.32	V	3.1	0.1	11.75	38.5	-26.7	
836.50	24.46	H	3.1	0.2	21.49	38.5	-17.0	
High Ch								
847.50	15.05	V	3.1	0.0	11.91	38.5	-26.6	
847.50	24.73	H	3.1	0.1	21.69	38.5	-16.8	

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

10.1.5. LTE Band 12

10MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lions
Project #: 12678284
Date: 2/4/2019
Test Engineer: 19498 ER
Configuration: EUT + Support Equipment
Location: Chamber J
Mode: LTE_QPSK Band 12 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181575, and Chamber J SMA Cables
Substitution: Dipole T416, Chamber J 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	2.10	V	2.8	1.2	0.42	34.8	-34.4	
704.00	10.80	H	2.8	1.6	9.50	34.8	-25.3	
Mid Ch								
707.50	0.90	V	2.9	1.1	-0.81	34.8	-35.6	
707.50	9.70	H	2.9	1.5	8.36	34.8	-26.4	
High Ch								
711.00	-1.40	V	2.9	1.1	-3.15	34.8	-38.0	
711.00	7.58	H	2.9	1.5	6.19	34.8	-28.6	

10MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lions
Project #: 12678284
Date: 2/4/2019
Test Engineer: 19498 ER
Configuration: EUT + Support Equipment
Location: Chamber J
Mode: LTE_16QAM Band 12 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181575, and Chamber J SMA Cables
Substitution: Dipole T416, Chamber J 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	2.20	V	2.8	1.2	0.52	34.8	-34.3	
704.00	6.70	H	2.8	1.6	5.40	34.8	-29.4	
Mid Ch								
707.50	-0.40	V	2.9	1.1	-2.12	34.8	-36.9	
707.50	7.70	H	2.9	1.5	6.36	34.8	-28.4	
High Ch								
711.00	-2.10	V	2.9	1.1	-3.85	34.8	-38.7	
711.00	6.90	H	2.9	1.5	5.51	34.8	-29.3	

5MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lions
Project #: 12678284
Date: 2/4/2019
Test Engineer: 19498 ER
Configuration: EUT + Support Equipment
Location: Chamber J
Mode: LTE_QPSK Band 12 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181575, and Chamber J SMA Cables
Substitution: Dipole T416, Chamber J 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	3.22	V	2.8	1.2	1.57	34.8	-33.2	
701.50	6.84	H	2.8	1.6	5.38	34.8	-29.4	
Mid Ch								
707.50	2.20	V	2.9	1.1	0.49	34.8	-34.3	
707.50	6.50	H	2.9	1.5	5.16	34.8	-29.6	
High Ch								
713.50	0.10	V	2.9	1.1	-1.68	34.8	-36.5	
713.50	6.40	H	2.9	1.4	4.97	34.8	-29.8	

5MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lions
Project #: 12678284
Date: 2/4/2019
Test Engineer: 19498 ER
Configuration: EUT Support Equipment
Location: Chamber J
Mode: LTE_16QAM Band 12 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181575, and Chamber J SMA Cables
Substitution: Dipole T416, Chamber J 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	0.82	V	2.8	1.2	-0.84	34.8	-35.6	
701.50	5.04	H	2.8	1.6	3.78	34.8	-31.0	
Mid Ch								
707.50	0.40	V	2.9	1.1	-1.31	34.8	-36.1	
707.50	4.60	H	2.9	1.5	3.26	34.8	-31.5	
High Ch								
713.50	-1.80	V	2.9	1.1	-3.58	34.8	-38.4	
713.50	5.10	H	2.9	1.4	3.67	34.8	-31.1	

10.1.6. LTE Band 13

10MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lions
Project #: 12678284
Date: 2/5/2019
Test Engineer: 19498 ER
Configuration: EUT Only
Location: Chamber J
Mode: LTE_QPSK Band 13 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181575, and Chamber J SMA Cables
Substitution: Dipole T416, Chamber J 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								
782.00	0.00	V	3.0	0.3	0.00	34.8	0.0	
782.00	0.00	H	3.0	0.5	0.00	34.8	0.0	
Mid Ch								
782.00	7.60	V	3.0	0.3	4.94	34.8	-29.8	
782.00	15.80	H	3.0	0.5	13.28	34.8	-21.5	
High Ch								
782.00	0.00	V	3.0	0.3	0.00	34.8	0.0	
782.00	0.00	H	3.0	0.5	0.00	34.8	0.0	

10MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lions
Project #: 12678284
Date: 2/5/2019
Test Engineer: 19498 ER
Configuration: EUT Only
Location: Chamber J
Mode: LTE_16QAM Band 13 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181575, and Chamber J SMA Cables
Substitution: Dipole T416, Chamber J 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								
782.00	0.00	V	3.0	0.3	0.00	34.8	0.0	
782.00	0.00	H	3.0	0.5	0.00	34.8	0.0	
Mid Ch								
782.00	6.00	V	3.0	0.3	3.34	34.8	-31.4	
782.00	14.70	H	3.0	0.5	12.18	34.8	-22.6	
High Ch								
782.00	0.00	V	3.0	0.3	0.00	34.8	0.0	
782.00	0.00	H	3.0	0.5	0.00	34.8	0.0	

5MHz QPSK

5MHz 16QAM

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 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: Lions
Project #: 12678284
Date: 2/5/2019
Test Engineer: 19498 ER
Configuration: EUT Only
Location: Chamber J
Mode: LTE_QPSK Band 13 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181575, and Chamber J SMA Cables
Substitution: Dipole T416, Chamber J Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
779.50	11.50	V	3.0	0.4	8.87	34.8	-25.9	
779.50	15.70	H	3.0	0.5	13.23	34.8	-21.5	
Mid Ch								
782.00	7.80	V	3.0	0.3	5.14	34.8	-29.6	
782.00	16.30	H	3.0	0.5	13.78	34.8	-21.0	
High Ch								
784.50	7.70	V	3.0	0.3	5.02	34.8	-29.8	
784.50	16.90	H	3.0	0.4	14.34	34.8	-20.4	

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lions
Project #: 12678284
Date: 2/5/2019
Test Engineer: 19498 ER
Configuration: EUT Only
Location: Chamber J
Mode: LTE_16QAM Band 13 Fundamentals, 5MHz Bandwidth

Test Equipment:
Receiving: Hybrid PRE0181575, and Chamber J SMA Cables
Substitution: Dipole T416, Chamber J 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	9.90	V	3.0	0.4	7.27	34.8	-27.5	
779.50	16.80	H	3.0	0.5	14.33	34.8	-20.4	
Mid Ch								
782.00	6.90	V	3.0	0.3	4.24	34.8	-30.5	
782.00	14.70	H	3.0	0.5	12.18	34.8	-22.6	
High Ch								
784.50	7.70	V	3.0	0.3	5.02	34.8	-29.8	
784.50	15.20	H	3.0	0.4	12.64	34.8	-22.1	

10.1.7. LTE Band 41

20MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lions
Project #: 12678282
Date: 2/1/2019
Test Engineer: 19480 BS
Configuration: EUT Only
Location: Chamber J
Mode: LTE_QPSK Band 41(FCC) Fundamentals, 20MHz Bandwidth

Test Equipment:
Receiving: Horn PRE0101793, and Chamber J SMA Cables
Substitution: Horn PRE0181258, Chamber J Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2506.00	18.33	V	5.9	9.6	22.04	33.0	-11.0	
2506.00	16.08	H	5.9	9.6	19.79	33.0	-13.2	
Mid Ch								
2593.00	18.71	V	6.1	9.9	22.50	33.0	-10.5	
2593.00	17.30	H	6.1	9.9	21.09	33.0	-11.9	
High Ch								
2680.00	17.09	V	6.3	9.9	20.62	33.0	-12.4	
2680.00	16.73	H	6.3	9.9	20.26	33.0	-12.7	

20MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lions
Project #: 12678282
Date: 2/1/2019
Test Engineer: 19480 BS
Configuration: EUT Only
Location: Chamber J
Mode: LTE_16QAM Band 41(FCC) Fundamentals, 20MHz Bandwidth

Test Equipment:
Receiving: Horn PRE0101793, and Chamber J SMA Cables
Substitution: Horn PRE0181258, Chamber J Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2506.00	18.07	V	5.9	9.6	21.78	33.0	-11.2	
2506.00	15.98	H	5.9	9.6	19.69	33.0	-13.3	
Mid Ch								
2593.00	18.43	V	6.1	9.9	22.22	33.0	-10.8	
2593.00	16.91	H	6.1	9.9	20.70	33.0	-12.3	
High Ch								
2680.00	16.92	V	6.3	9.9	20.45	33.0	-12.6	
2680.00	16.42	H	6.3	9.9	19.95	33.0	-13.1	

15MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lions
Project #: 12678282
Date: 2/1/2019
Test Engineer: 19480 BS
Configuration: EUT Only
Location: Chamber J
Mode: LTE_QPSK Band 41(FCC) Fundamentals, 15MHz Bandwidth

Test Equipment:
Receiving: Horn PRE0101793, and Chamber J SMA Cables
Substitution: Horn PRE0181258, Chamber J Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2503.50	17.68	V	5.9	9.6	21.38	33.0	-11.6	
2503.50	15.48	H	5.9	9.6	19.18	33.0	-13.8	
Mid Ch								
2593.00	16.97	V	6.1	9.9	20.76	33.0	-12.2	
2593.00	15.23	H	6.1	9.9	19.02	33.0	-14.0	
High Ch								
2682.50	16.48	V	6.3	9.9	20.00	33.0	-13.0	
2682.50	16.94	H	6.3	9.9	20.46	33.0	-12.5	

15MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lions
Project #: 12678282
Date: 2/1/2019
Test Engineer: 19480 BS
Configuration: EUT Only
Location: Chamber J
Mode: LTE_16QAM Band 41(FCC) Fundamentals, 15MHz Bandwidth

Test Equipment:
Receiving: Horn PRE0101793, and Chamber J SMA Cables
Substitution: Horn PRE0181258, Chamber J Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
2503.50	17.56	V	5.9	9.6	21.26	33.0	-11.7	
2503.50	15.25	H	5.9	9.6	18.95	33.0	-14.0	
Mid Ch								
2593.00	16.64	V	6.1	9.9	20.43	33.0	-12.6	
2593.00	15.01	H	6.1	9.9	18.80	33.0	-14.2	
High Ch								
2682.50	16.19	V	6.3	9.9	19.71	33.0	-13.3	
2682.50	16.77	H	6.3	9.9	20.29	33.0	-12.7	

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

10.1.8. LTE Band 66

20MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lions
Project #: 12678284
Date: 2/1/2019
Test Engineer: 19480 BS
Configuration: EUT Only
Location: Chamber J
Mode: LTE_QPSK Band 66 Fundamentals, 20MHz Bandwidth

Test Equipment:
Receiving: Horn PRE0101793, and Chamber J SMA Cables
Substitution: Horn PRE0181258, Chamber J Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1720.00	10.97	V	4.8	9.3	15.48	30.0	-14.5	
1720.00	15.61	H	4.8	9.3	20.12	30.0	-9.9	
Mid Ch								
1745.00	13.98	V	4.8	9.3	18.45	30.0	-11.6	
1745.00	16.89	H	4.8	9.3	21.36	30.0	-8.6	
High Ch								
1770.00	14.99	V	4.9	9.4	19.55	30.0	-10.5	
1770.00	17.39	H	4.9	9.4	21.95	30.0	-8.1	

20MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lions
Project #: 12678284
Date: 2/1/2019
Test Engineer: 19480 BS
Configuration: EUT Only
Location: Chamber J
Mode: LTE_16QAM Band 66 Fundamentals, 20MHz Bandwidth

Test Equipment:
Receiving: Horn PRE0101793, and Chamber J SMA Cables
Substitution: Horn PRE0181258, Chamber J Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1720.00	9.77	V	4.8	9.3	14.28	30.0	-15.7	
1720.00	14.64	H	4.8	9.3	19.15	30.0	-10.8	
Mid Ch								
1745.00	12.75	V	4.8	9.3	17.22	30.0	-12.8	
1745.00	15.65	H	4.8	9.3	20.12	30.0	-9.9	
High Ch								
1770.00	13.85	V	4.9	9.4	18.41	30.0	-11.6	
1770.00	16.46	H	4.9	9.4	21.02	30.0	-9.0	

10MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lions
Project #: 12678284
Date: 2/2/2019
Test Engineer: 19480 BS
Configuration: EUT Only
Location: Chamber J
Mode: LTE_QPSK Band 66 Fundamentals, 10MHz Bandwidth

Test Equipment:
Receiving: Horn PRE0101793, and Chamber J SMA Cables
Substitution: Horn PRE0181258, Chamber J Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1715.00	12.21	V	4.8	9.3	16.73	30.0	-13.3	
1715.00	15.32	H	4.8	9.3	19.84	30.0	-10.2	
Mid Ch								
1745.00	13.22	V	4.8	9.3	17.69	30.0	-12.3	
1745.00	16.17	H	4.8	9.3	20.64	30.0	-9.4	
High Ch								
1775.00	13.91	V	4.9	9.4	18.49	30.0	-11.5	
1775.00	16.57	H	4.9	9.4	21.15	30.0	-8.8	

15MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Lions
Project #: 12678284
Date: 2/2/2019
Test Engineer: 19480 BS
Configuration: EUT Only
Location: Chamber J
Mode: LTE_16QAM Band 66 Fundamentals, 15MHz Bandwidth

Test Equipment:
Receiving: Horn PRE0101793, and Chamber J SMA Cables
Substitution: Horn PRE0181258, Chamber J Passthrough Cables

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1717.50	10.27	V	4.8	9.3	14.78	30.0	-15.2	
1717.50	14.63	H	4.8	9.3	19.14	30.0	-10.9	
Mid Ch								
1745.00	11.67	V	4.8	9.3	16.14	30.0	-13.9	
1745.00	15.58	H	4.8	9.3	20.05	30.0	-10.0	
High Ch								
1772.50	12.76	V	4.9	9.4	17.33	30.0	-12.7	
1772.50	16.26	H	4.9	9.4	20.83	30.0	-9.2	

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

10.2. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

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

LIMITS

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
TIA-603-E, Section 2.2.12.

MODES TESTED

- GSM 850
- GSM 1900
- WCDMA Band 5
- WCDMA Band 2
- WCDMA Band 4
- LTE Band 2
- LTE Band 5
- LTE Band 12
- LTE Band 13
- LTE Band 41
- LTE Band 66

RESULTS

No spurious emissions were detected above system noise floor from 18-26GHz.

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

10.2.1. GSM

Company:	Samsung
Project #:	12678282
Date:	1/30/2019
Test Engineer:	19480
Configuration:	EUT+ Support Equipment
Mode:	GPRS 850
Chamber #:	Chamber B

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T863 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	824.2MHz											
1	1.649	-68.39	Pk	28.6	-33.4	10.9	-62.29	-13	-49.29	0-360	149	H
2	1.649	-68.16	Pk	28.6	-33.4	10.2	-62.76	-13	-49.76	0-360	149	V
4	2.472	-68.62	Pk	32.6	-32.4	9	-59.42	-13	-46.42	0-360	149	V
3	2.474	-68.88	Pk	32.6	-32.4	8.9	-59.78	-13	-46.78	0-360	149	H
6	3.296	-72.21	Pk	32.9	-31.1	9.7	-60.71	-13	-47.71	0-360	149	V
5	3.297	-70.67	Pk	32.9	-31.1	9.7	-59.17	-13	-46.17	0-360	149	H
	836.6MHz											
1	1.673	-69.71	Pk	29	-33.2	10.6	-63.31	-13	-50.31	0-360	149	H
2	1.673	-68.36	Pk	29	-33.2	9	-63.56	-13	-50.56	0-360	149	V
3	2.509	-69.58	Pk	32.7	-32.2	9.1	-59.98	-13	-46.98	0-360	149	H
4	2.51	-69.6	Pk	32.7	-32.2	9.3	-59.8	-13	-46.8	0-360	149	V
5	3.345	-70.71	Pk	32.9	-31	9.1	-59.71	-13	-46.71	0-360	149	H
6	3.345	-71.96	Pk	32.9	-31	9.3	-60.76	-13	-47.76	0-360	149	V
	848.8MHz											
1	1.698	-67.68	Pk	29.5	-33.3	10	-61.48	-13	-48.48	0-360	149	H
2	1.698	-68.58	Pk	29.5	-33.3	9.3	-63.08	-13	-50.08	0-360	149	V
3	2.546	-69	Pk	32.7	-32	9.2	-59.1	-13	-46.1	0-360	149	H
4	2.546	-70.64	Pk	32.7	-32	8.9	-61.04	-13	-48.04	0-360	149	V
5	3.396	-69.28	Pk	32.8	-31.3	8.7	-59.08	-13	-46.08	0-360	149	H
6	3.396	-70.96	Pk	32.8	-31.3	8.9	-60.56	-13	-47.56	0-360	149	V

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

Company:	Samsung
Project #:	12678282
Date:	1/30/2019
Test Engineer:	19480
Configuration:	EUT+ Support Equipment
Mode:	EGPRS 850
Chamber #:	Chamber B

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T863 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	824.2MHz											
2	1.648	-68.01	Pk	28.6	-33.4	10.4	-62.41	-13	-49.41	0-360	149	V
1	1.649	-69.27	Pk	28.6	-33.4	10.9	-63.17	-13	-50.17	0-360	149	H
4	2.473	-69.68	Pk	32.6	-32.4	9	-60.48	-13	-47.48	0-360	149	V
3	2.474	-68.74	Pk	32.6	-32.4	8.9	-59.64	-13	-46.64	0-360	149	H
5	3.297	-69.98	Pk	32.9	-31.1	9.7	-58.48	-13	-45.48	0-360	149	H
6	3.297	-69.57	Pk	32.9	-31.1	9.8	-57.97	-13	-44.97	0-360	149	V
	836.6MHz											
1	1.674	-68.29	Pk	29.1	-33.2	10.5	-61.89	-13	-48.89	0-360	149	H
2	1.674	-68.21	Pk	29.1	-33.2	9	-63.31	-13	-50.31	0-360	149	V
3	2.51	-69.9	Pk	32.7	-32.2	9.1	-60.3	-13	-47.3	0-360	149	H
4	2.51	-69.4	Pk	32.7	-32.2	9.3	-59.6	-13	-46.6	0-360	149	V
6	3.344	-69.69	Pk	32.9	-31	9.3	-58.49	-13	-45.49	0-360	149	V
5	3.347	-69.47	Pk	32.9	-31	9.1	-58.47	-13	-45.47	0-360	149	H
	848.8MHz											
1	1.696	-67.9	Pk	29.5	-33.3	10.2	-61.5	-13	-48.5	0-360	149	H
2	1.698	-67.62	Pk	29.5	-33.3	9.3	-62.12	-13	-49.12	0-360	149	V
3	2.547	-69.65	Pk	32.7	-31.9	9.2	-59.65	-13	-46.65	0-360	149	H
4	2.548	-69.41	Pk	32.7	-31.9	9	-59.61	-13	-46.61	0-360	149	V
6	3.394	-70.26	Pk	32.8	-31.3	8.8	-59.96	-13	-46.96	0-360	149	V
5	3.395	-69.31	Pk	32.8	-31.3	8.7	-59.11	-13	-46.11	0-360	149	H

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Company:	Samsung
Project #:	12678282
Date:	1/24/2019
Test Engineer:	10649
Configuration:	EUT+ Support Equipment
Mode:	GPRS 1900
Chamber #:	Chamber K

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1852.2MHz											
1	3.7	-66.77	Pk	33.2	-32.5	10.8	-55.27	-13	-42.27	0-360	150	H
2	5.552	-70.55	Pk	34.6	-29.9	10.7	-55.15	-13	-42.15	0-360	150	H
3	7.399	-74.19	Pk	35.6	-26.9	10.5	-54.99	-13	-41.99	0-360	150	H
5	5.557	-71.06	Pk	34.6	-29.9	10.9	-55.46	-13	-42.46	0-360	150	V
6	7.4	-73.83	Pk	35.6	-26.9	10.6	-54.53	-13	-41.53	0-360	150	V
4	3.7	-68.81	Pk	33.2	-32.5	11.1	-57.01	-13	-44.01	0-360	150	V
	1880MHz											
1	3.759	-68.5	Pk	33.3	-32.5	10.4	-57.3	-13	-44.3	0-360	150	H
2	5.638	-71.09	Pk	34.6	-29.5	10.4	-55.59	-13	-42.59	0-360	150	H
3	7.515	-73.38	Pk	35.6	-26.8	10.5	-54.08	-13	-41.08	0-360	150	H
4	3.737	-69.76	Pk	33.3	-32.5	10.7	-58.26	-13	-45.26	0-360	150	V
5	5.618	-71.47	Pk	34.6	-29.6	10.8	-55.67	-13	-42.67	0-360	150	V
6	7.515	-73.82	Pk	35.6	-26.8	10.8	-54.22	-13	-41.22	0-360	150	V
	1909.8MHz											
1	3.819	-65.97	Pk	33.4	-32.2	10	-54.77	-13	-41.77	0-360	150	H
2	5.73	-71.66	Pk	34.9	-29.4	10.4	-55.76	-13	-42.76	0-360	150	H
3	7.638	-73.34	Pk	35.6	-26.6	10.3	-54.04	-13	-41.04	0-360	150	H
4	3.819	-67.87	Pk	33.4	-32.2	10.3	-56.37	-13	-43.37	0-360	150	V
5	5.713	-71.44	Pk	34.9	-29.3	10.4	-55.44	-13	-42.44	0-360	150	V
6	7.612	-73.39	Pk	35.6	-26.6	10.6	-53.79	-13	-40.79	0-360	150	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Company:	Samsung
Project #:	12678282
Date:	1/24/2019
Test Engineer:	10649
Configuration:	EUT+ Support Equipment
Mode:	EGPRS 1900
Chamber #:	Chamber K

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1852.2MHz											
1	3.702	-68.93	Pk	33.2	-32.5	10.7	-57.53	-13	-44.53	0-360	150	H
2	5.555	-70.76	Pk	34.6	-29.9	10.8	-55.26	-13	-42.26	0-360	150	H
3	7.396	-73.31	Pk	35.6	-27	10.6	-54.11	-13	-41.11	0-360	150	H
4	3.717	-68.64	Pk	33.2	-32.6	10.7	-57.34	-13	-44.34	0-360	150	V
5	5.55	-65.27	Pk	34.6	-29.9	10.9	-49.67	-13	-36.67	0-360	150	V
6	7.386	-74	Pk	35.5	-26.9	10.7	-54.7	-13	-41.7	0-360	150	V
	1880MHz											
1	3.761	-67.79	Pk	33.3	-32.5	10.3	-56.69	-13	-43.69	0-360	150	H
2	5.638	-70.98	Pk	34.6	-29.5	10.3	-55.58	-13	-42.58	0-360	150	H
3	7.521	-73.76	Pk	35.6	-26.8	10.5	-54.46	-13	-41.46	0-360	150	H
4	3.758	-68.89	Pk	33.3	-32.5	10.7	-57.39	-13	-44.39	0-360	150	V
5	5.634	-71.13	Pk	34.6	-29.5	10.7	-55.33	-13	-42.33	0-360	150	V
6	7.511	-73.74	Pk	35.6	-26.8	10.8	-54.14	-13	-41.14	0-360	150	V
	1909.8MHz											
1	3.819	-65.36	Pk	33.4	-32.2	10	-54.16	-13	-41.16	0-360	150	H
2	5.726	-71.69	Pk	34.9	-29.3	10.5	-55.59	-13	-42.59	0-360	150	H
3	7.639	-73.33	Pk	35.6	-26.6	10.3	-54.03	-13	-41.03	0-360	150	H
4	3.819	-67.69	Pk	33.4	-32.2	10.3	-56.19	-13	-43.19	0-360	150	V
5	5.725	-71.21	Pk	34.9	-29.3	10.5	-55.11	-13	-42.11	0-360	150	V
6	7.64	-73.07	Pk	35.6	-26.6	10.5	-53.57	-13	-40.57	0-360	150	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

10.2.2. WCDMA

Company:	Samsung
Project #:	12678282
Date:	1/24/2019
Test Engineer:	10649
Configuration:	EUT+ Support Equipment
Mode:	REL99 B5
Chamber #:	Chamber K

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	826.4MHz											
1	1.651	-57.46	Pk	28.5	-35.5	10.1	-54.36	-13	-41.36	0-360	150	H
2	2.474	-64.73	Pk	32.3	-35.3	10.9	-56.83	-13	-43.83	0-360	150	H
3	3.312	-66.7	Pk	32.8	-33.4	10.8	-56.5	-13	-43.5	0-360	150	H
4	1.651	-62.38	Pk	28.5	-35.5	11	-58.38	-13	-45.38	0-360	150	V
5	2.471	-64.4	Pk	32.2	-35.4	11.1	-56.5	-13	-43.5	0-360	150	V
6	3.309	-67.52	Pk	32.8	-33.4	11.2	-56.92	-13	-43.92	0-360	150	V
	836.6MHz											
1	1.674	-59.8	Pk	28.6	-35.5	9.8	-56.9	-13	-43.9	0-360	150	H
2	2.477	-64.61	Pk	32.3	-35.3	10.8	-56.81	-13	-43.81	0-360	150	H
3	3.382	-66.38	Pk	32.7	-33.4	11	-56.08	-13	-43.08	0-360	150	H
4	1.675	-64.44	Pk	28.6	-35.5	11.3	-60.04	-13	-47.04	0-360	150	V
5	2.517	-65.15	Pk	32.3	-35.4	11.2	-57.05	-13	-44.05	0-360	150	V
6	3.263	-66.06	Pk	32.9	-33.4	11.1	-55.46	-13	-42.46	0-360	150	V
	846.6MHz											
1	1.791	-64.37	Pk	30	-35.4	12.1	-57.67	-13	-44.67	0-360	150	H
2	2.537	-65.4	Pk	32.3	-35.3	9.7	-58.7	-13	-45.7	0-360	150	H
3	3.391	-68.57	Pk	32.6	-33.3	11.1	-58.17	-13	-45.17	0-360	150	H
4	1.865	-63.86	Pk	30.4	-35.4	11.3	-57.56	-13	-44.56	0-360	150	V
5	2.539	-65.03	Pk	32.3	-35.3	10.4	-57.63	-13	-44.63	0-360	150	V
6	3.383	-68.06	Pk	32.7	-33.4	11.1	-57.66	-13	-44.66	0-360	150	V

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

Company:	Samsung
Project #:	12678282
Date:	1/24/2019
Test Engineer:	10649
Configuration:	EUT+ Support Equipment
Mode:	HSDPA B5
Chamber #:	Chamber K

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	826.4MHz											
1	1.651	-59.29	Pk	28.5	-35.5	10.1	-56.19	-13	-43.19	0-360	150	H
2	2.473	-66.3	Pk	32.3	-35.3	10.9	-58.4	-13	-45.4	0-360	150	H
3	3.306	-67.93	Pk	32.8	-33.5	10.8	-57.83	-13	-44.83	0-360	150	H
4	1.651	-63.43	Pk	28.5	-35.5	11	-59.43	-13	-46.43	0-360	150	V
5	2.478	-66.16	Pk	32.3	-35.3	10.7	-58.46	-13	-45.46	0-360	150	V
6	3.306	-67.72	Pk	32.8	-33.5	11.3	-57.12	-13	-44.12	0-360	150	V
	836.6MHz											
1	1.675	-62.99	Pk	28.6	-35.5	9.8	-60.09	-13	-47.09	0-360	150	H
2	2.51	-65.22	Pk	32.3	-35.3	10.1	-58.12	-13	-45.12	0-360	150	H
3	3.348	-67.77	Pk	32.8	-33.5	10.5	-57.97	-13	-44.97	0-360	150	H
4	1.737	-64.68	Pk	29.4	-35.5	12.6	-58.18	-13	-45.18	0-360	150	V
5	2.514	-65.71	Pk	32.3	-35.3	11.3	-57.41	-13	-44.41	0-360	150	V
6	3.389	-66.83	Pk	32.6	-33.4	11.1	-56.53	-13	-43.53	0-360	150	V
	846.6MHz											
1	1.763	-65.41	Pk	29.7	-35.5	13	-58.21	-13	-45.21	0-360	150	H
2	2.537	-63.4	Pk	32.3	-35.3	9.7	-56.7	-13	-43.7	0-360	150	H
3	3.39	-67.03	Pk	32.6	-33.3	11.1	-56.63	-13	-43.63	0-360	150	H
4	1.69	-65.08	Pk	28.7	-35.4	11.8	-59.98	-13	-46.98	0-360	150	V
5	2.506	-64.37	Pk	32.3	-35.2	11.2	-56.07	-13	-43.07	0-360	150	V
6	3.387	-68.3	Pk	32.6	-33.4	11.1	-58	-13	-45	0-360	150	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Company:	Samsung
Project #:	12678282
Date:	1/24/2019
Test Engineer:	10649
Configuration:	EUT+ Support Equipment
Mode:	REL99 B2
Chamber #:	Chamber K

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1852.4MHz											
1	3.701	-68.95	Pk	33.2	-32.5	10.7	-57.55	-13	-44.55	0-360	151	H
4	5.561	-70.1	Pk	34.6	-30	10.8	-54.7	-13	-41.7	0-360	151	H
5	7.404	-73.59	Pk	35.6	-26.9	10.4	-54.49	-13	-41.49	0-360	151	H
2	3.705	-68.14	Pk	33.2	-32.6	11	-56.54	-13	-43.54	0-360	151	V
3	5.562	-69.51	Pk	34.6	-30	11	-53.91	-13	-40.91	0-360	151	V
6	7.404	-74.15	Pk	35.6	-26.9	10.6	-54.85	-13	-41.85	0-360	151	V
	1880MHz											
1	3.761	-67.28	Pk	33.3	-32.5	10.3	-56.18	-13	-43.18	0-360	150	H
3	5.637	-70.86	Pk	34.6	-29.5	10.4	-55.36	-13	-42.36	0-360	150	H
5	7.511	-73.4	Pk	35.6	-26.8	10.5	-54.1	-13	-41.1	0-360	150	H
2	3.761	-68.76	Pk	33.3	-32.5	10.6	-57.36	-13	-44.36	0-360	150	V
4	5.637	-70.49	Pk	34.6	-29.5	10.6	-54.79	-13	-41.79	0-360	150	V
6	7.51	-73.12	Pk	35.6	-26.8	10.8	-53.52	-13	-40.52	0-360	150	V
	1907.6MHz											
1	3.812	-67.93	Pk	33.4	-32.3	10.2	-56.63	-13	-43.63	0-360	150	H
4	5.725	-71.49	Pk	34.9	-29.3	10.4	-55.49	-13	-42.49	0-360	150	H
5	7.635	-72.99	Pk	35.6	-26.6	10.4	-53.59	-13	-40.59	0-360	150	H
2	3.814	-68.68	Pk	33.4	-32.3	10.3	-57.28	-13	-44.28	0-360	150	V
3	5.724	-71.6	Pk	34.9	-29.3	10.5	-55.5	-13	-42.5	0-360	150	V
6	7.633	-73.9	Pk	35.6	-26.6	10.7	-54.2	-13	-41.2	0-360	150	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Company:	Samsung
Project #:	12678282
Date:	1/24/2019
Test Engineer:	10649
Configuration:	EUT+ Support Equipment
Mode:	HSDPA B2
Chamber #:	Chamber K

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1852.4MHz											
1	3.702	-66.76	Pk	33.2	-32.5	10.7	-55.36	-13	-42.36	0-360	150	H
3	5.555	-70.6	Pk	34.6	-29.9	10.8	-55.1	-13	-42.1	0-360	150	H
5	7.407	-73.78	Pk	35.6	-26.9	10.4	-54.68	-13	-41.68	0-360	150	H
2	3.698	-68.13	Pk	33.2	-32.5	11.1	-56.33	-13	-43.33	0-360	150	V
4	5.554	-70.92	Pk	34.6	-29.9	10.9	-55.32	-13	-42.32	0-360	150	V
6	7.404	-73.45	Pk	35.6	-26.9	10.6	-54.15	-13	-41.15	0-360	150	V
	1880MHz											
1	3.757	-66.19	Pk	33.3	-32.5	10.4	-54.99	-13	-41.99	0-360	150	H
4	5.64	-72.13	Pk	34.6	-29.4	10.2	-56.73	-13	-43.73	0-360	150	H
5	7.515	-73.52	Pk	35.6	-26.8	10.5	-54.22	-13	-41.22	0-360	150	H
2	3.758	-68.46	Pk	33.3	-32.5	10.7	-56.96	-13	-43.96	0-360	150	V
3	5.642	-70.09	Pk	34.6	-29.4	10.4	-54.49	-13	-41.49	0-360	150	V
6	7.513	-74.04	Pk	35.6	-26.8	10.8	-54.44	-13	-41.44	0-360	150	V
	1907.6MHz											
1	3.813	-67.67	Pk	33.4	-32.3	10.2	-56.37	-13	-43.37	0-360	150	H
3	5.728	-72.43	Pk	34.9	-29.4	10.5	-56.43	-13	-43.43	0-360	150	H
5	7.632	-74.03	Pk	35.6	-26.6	10.5	-54.53	-13	-41.53	0-360	150	H
2	3.815	-67.79	Pk	33.4	-32.2	10.3	-56.29	-13	-43.29	0-360	150	V
4	5.723	-71.57	Pk	34.9	-29.3	10.4	-55.57	-13	-42.57	0-360	150	V
6	7.631	-72.56	Pk	35.6	-26.6	10.6	-52.96	-13	-39.96	0-360	150	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Company:	Samsung
Project #:	12678284
Date:	1/23/19
Test Engineer:	16069
Configuration:	EUT+ Support Equipment
Mode:	REL99 B4
Chamber #:	Chamber K

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Harmonic Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1712.4MHz											
1	3.423	-57.91	Pk	32.6	-33.4	11	-47.71	-13	-34.71	0-360	150	H
2	5.151	-69.02	Pk	34.4	-30.6	10.4	-54.82	-13	-41.82	0-360	150	H
3	6.848	-72.47	Pk	35.5	-27.4	10.5	-53.87	-13	-40.87	0-360	150	H
4	3.422	-58.84	Pk	32.6	-33.4	11.2	-48.44	-13	-35.44	0-360	150	V
5	5.14	-69.97	Pk	34.4	-30.6	10.4	-55.77	-13	-42.77	0-360	150	V
6	6.853	-69.67	Pk	35.5	-27.3	10.5	-50.97	-13	-37.97	0-360	150	V
	1732.6MHz											
1	3.462	-58	Pk	32.6	-33.3	11	-47.7	-13	-34.7	0-360	150	H
2	5.206	-69.52	Pk	34.4	-30.4	10.9	-54.62	-13	-41.62	0-360	150	H
3	6.925	-72.33	Pk	35.5	-27.3	10.4	-53.73	-13	-40.73	0-360	150	H
4	3.462	-61.84	Pk	32.6	-33.3	10.9	-51.64	-13	-38.64	0-360	150	V
5	5.19	-69.57	Pk	34.4	-30.4	10.6	-54.97	-13	-41.97	0-360	150	V
6	6.931	-71.51	Pk	35.5	-27.4	10.4	-53.01	-13	-40.01	0-360	150	V
	1752.6MHz											
1	3.508	-57.74	Pk	32.7	-33.2	10.9	-47.34	-13	-34.34	0-360	150	H
2	5.243	-70.38	Pk	34.4	-30.2	10.5	-55.68	-13	-42.68	0-360	150	H
3	7.022	-73.05	Pk	35.5	-27.3	10.1	-54.75	-13	-41.75	0-360	150	H
4	3.507	-60.42	Pk	32.7	-33.2	10.7	-50.22	-13	-37.22	0-360	150	V
5	5.261	-71.16	Pk	34.4	-30.1	10.8	-56.06	-13	-43.06	0-360	150	V
6	7.003	-72.61	Pk	35.5	-27.3	10.7	-53.71	-13	-40.71	0-360	150	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Company:	Samsung
Project #:	12678284
Date:	1/23/19
Test Engineer:	16069
Configuration:	EUT+ Support Equipment
Mode:	HSDPA B4
Chamber #:	Chamber K

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Harmonic Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1712.4MHz											
1	3.427	-56.48	Pk	32.6	-33.3	11	-46.18	-13	-33.18	0-360	150	H
2	5.141	-69.2	Pk	34.4	-30.6	10.2	-55.2	-13	-42.2	0-360	150	H
3	6.851	-72.45	Pk	35.5	-27.4	10.5	-53.85	-13	-40.85	0-360	150	H
4	3.412	-67.75	Pk	32.6	-33.4	11.2	-57.35	-13	-44.35	0-360	150	V
5	5.113	-70.5	Pk	34.4	-30.5	10.8	-55.8	-13	-42.8	0-360	150	V
6	6.811	-73.34	Pk	35.5	-27.5	10.6	-54.74	-13	-41.74	0-360	150	V
	1732.6MHz											
1	3.463	-59.38	Pk	32.6	-33.3	11	-49.08	-13	-36.08	0-360	150	H
2	5.185	-69.86	Pk	34.4	-30.4	10.5	-55.36	-13	-42.36	0-360	150	H
3	6.927	-73.29	Pk	35.5	-27.4	10.4	-54.79	-13	-41.79	0-360	150	H
4	3.462	-62.02	Pk	32.6	-33.3	10.9	-51.82	-13	-38.82	0-360	150	V
5	5.202	-70.07	Pk	34.4	-30.4	10.6	-55.47	-13	-42.47	0-360	150	V
6	6.927	-71.43	Pk	35.5	-27.4	10.4	-52.93	-13	-39.93	0-360	150	V
	1752.6MHz											
1	3.504	-59.1	Pk	32.7	-33.2	11.1	-48.5	-13	-35.5	0-360	150	H
2	5.265	-70.53	Pk	34.4	-30.1	10.7	-55.53	-13	-42.53	0-360	150	H
3	7.003	-72.31	Pk	35.5	-27.3	10.2	-53.91	-13	-40.91	0-360	150	H
4	3.503	-59.9	Pk	32.7	-33.2	10.8	-49.6	-13	-36.6	0-360	150	V
5	5.262	-70.56	Pk	34.4	-30	10.8	-55.36	-13	-42.36	0-360	150	V
6	7.014	-71.06	Pk	35.5	-27.3	10.4	-52.46	-13	-39.46	0-360	150	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

10.2.3. LTE BAND 2

Company:	Samsung
Project #:	12678284
Date:	1/24/19
Test Engineer:	16069
Configuration:	EUT+ Support Equipment
Mode:	LTE 2 QPSK 20MHz
Chamber #:	Chamber I

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Harmonic Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1860MHz											
1	3.702	-60.74	Pk	33.2	-32.5	10.7	-49.34	-13	-36.34	0-360	150	H
3	5.576	-71.73	Pk	34.6	-29.7	10.4	-56.43	-13	-43.43	0-360	150	H
5	7.438	-72.41	Pk	35.5	-26.8	10.4	-53.31	-13	-40.31	0-360	150	H
2	3.702	-65.66	Pk	33.2	-32.5	11	-53.96	-13	-40.96	0-360	150	V
4	5.57	-71.81	Pk	34.6	-29.9	10.9	-56.21	-13	-43.21	0-360	150	V
6	7.439	-72.51	Pk	35.5	-26.7	10.6	-53.11	-13	-40.11	0-360	150	V
	1880MHz											
1	3.742	-63	Pk	33.3	-32.6	10.4	-51.9	-13	-38.9	0-360	150	H
3	5.637	-71.3	Pk	34.6	-29.5	10.4	-55.8	13	-42.8	0-360	150	H
5	7.521	-73.39	Pk	35.6	-26.8	10.5	-54.09	-13	-41.09	0-360	150	H
2	3.742	-66.67	Pk	33.3	-32.6	10.7	-55.27	-13	-42.27	0-360	150	V
4	5.643	-70.52	Pk	34.6	-29.4	10.4	-54.92	-13	-41.92	0-360	150	V
6	7.522	-73.65	Pk	35.6	-26.8	10.7	-54.15	-13	-41.15	0-360	150	V
	1900MHz											
1	3.796	-68.42	Pk	33.4	-32.4	10.6	-56.82	-13	-43.82	0-360	150	H
3	5.696	-72.63	Pk	34.9	-29.3	10	-57.03	-13	-44.03	0-360	150	H
5	7.601	-74.11	Pk	35.5	-26.6	10.3	-54.91	-13	-41.91	0-360	150	H
2	3.793	-69.66	Pk	33.4	-32.3	10.5	-58.06	-13	-45.06	0-360	150	V
4	5.694	-70.97	Pk	34.8	-29.3	10.5	-54.97	-13	-41.97	0-360	150	V
6	7.601	-74.49	Pk	35.5	-26.6	10.6	-54.99	-13	-41.99	0-360	150	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Company:	Samsung
Project #:	12678284
Date:	1/24/19
Test Engineer:	16069
Configuration:	EUT+ Support Equipment
Mode:	LTE 2 16QAM 20MHz
Chamber #:	Chamber I

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Harmonic Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1860MHz											
1	3.702	-61.12	Pk	33.2	-32.5	10.7	-49.72	-13	-36.72	0-360	150	H
3	5.578	-71.42	Pk	34.6	-29.6	10.3	-56.12	-13	-43.12	0-360	150	H
5	7.441	-73.35	Pk	35.5	-26.7	10.4	-54.15	-13	-41.15	0-360	150	H
2	3.702	-63.92	Pk	33.2	-32.5	11	-52.22	-13	-39.22	0-360	150	V
4	5.574	-71.6	Pk	34.6	-29.8	10.8	-56	-13	-43	0-360	150	V
6	7.44	-73.42	Pk	35.5	-26.7	10.6	-54.02	-13	-41.02	0-360	150	V
	1880MHz											
1	3.742	-63	Pk	33.3	-32.6	10.4	-51.9	-13	-38.9	0-360	150	H
3	5.644	-70.35	Pk	34.6	-29.4	10.1	-55.05	-13	-44.05	0-360	150	H
5	7.515	-74.71	Pk	35.6	-26.8	10.5	-55.41	-13	-42.41	0-360	150	H
2	3.742	-67.34	Pk	33.3	-32.6	10.7	-55.94	-13	-42.94	0-360	150	V
4	5.645	-71.69	Pk	34.6	-29.4	10.5	-55.99	-13	-42.99	0-360	150	V
6	7.515	-72.63	Pk	35.6	-26.8	10.8	-53.03	-13	-40.03	0-360	150	V
	1900MHz											
1	3.799	-69.84	Pk	33.4	-32.3	10.4	-58.34	-13	-45.34	0-360	150	H
3	5.701	-70.9	Pk	34.9	-29.3	9.9	-55.4	-13	-42.4	0-360	150	H
5	7.605	-72.88	Pk	35.5	-26.6	10.3	-53.68	-13	-40.68	0-360	150	H
2	3.802	-68.31	Pk	33.4	-32.3	10.4	-56.81	-13	-43.81	0-360	150	V
4	5.7	-72.03	Pk	34.9	-29.3	10.3	-56.13	-13	-43.13	0-360	150	V
6	7.605	-73.28	Pk	35.5	-26.6	10.5	-53.88	-13	-40.88	0-360	150	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

10.2.4. LTE BAND 5

Company:	Samsung
Project #:	12678282
Date:	1/15/2019
Test Engineer:	10649
Configuration:	EUT+ Support Equipment
Mode:	LTE 5 QPSK 10MHz
Chamber #:	Chamber K

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	829MHz											
1	1.649	-55.39	Pk	28.5	-35.5	10.1	-52.29	-13	-39.29	0-360	150	H
2	2.474	-55.38	Pk	32.3	-35.3	10.9	-47.48	-13	-34.48	0-360	150	H
3	3.314	-67.8	Pk	32.8	-33.4	10.9	-57.5	-13	-44.5	0-360	150	H
4	1.649	-58.05	Pk	28.5	-35.5	10.9	-54.15	-13	-41.15	0-360	150	V
5	2.474	-58.18	Pk	32.3	-35.3	11	-50.18	-13	-37.18	0-360	150	V
6	3.311	-68.38	Pk	32.8	-33.4	11.2	-57.78	-13	-44.78	0-360	150	V
	836.5MHz											
1	1.664	-53.5	Pk	28.9	-33.1	10.2	-47.5	-13	-34.5	0-360	149	H
2	1.664	-52.35	Pk	28.9	-33.1	8.5	-48.05	-13	-35.05	0-360	149	V
4	2.496	-64.23	Pk	32.7	-32	9	-54.53	-13	-41.53	0-360	149	V
3	2.497	-62.7	Pk	32.7	-32	8.6	-53.4	-13	-40.4	0-360	149	H
6	3.328	-69.85	Pk	32.9	-30.9	9.2	-58.65	-13	-45.65	0-360	149	V
5	3.33	-70.11	Pk	32.9	-31	8.9	-59.31	-13	-46.31	0-360	149	H
	844MHz											
1	1.679	-53.85	Pk	28.6	-35.5	10	-50.75	-13	-37.75	0-360	150	H
2	2.519	-62.42	Pk	32.3	-35.4	10.5	-55.02	-13	-42.02	0-360	150	H
3	3.372	-67.66	Pk	32.7	-33.4	10.8	-57.56	-13	-44.56	0-360	150	H
4	1.679	-57.73	Pk	28.6	-35.5	11.2	-53.43	-13	-40.43	0-360	150	V
5	2.532	-66.42	Pk	32.3	-35.3	10.8	-58.62	-13	-45.62	0-360	150	V
6	3.376	-68.86	Pk	32.7	-33.4	11.1	-58.46	-13	-45.46	0-360	150	V

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

Company:	Samsung
Project #:	12678282
Date:	1/15/2019
Test Engineer:	10649
Configuration:	EUT+ Support Equipment
Mode:	LTE 5 16QAM 10MHz
Chamber #:	Chamber K

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	829MHz											
1	1.649	-53.73	Pk	28.5	-35.5	10.1	-50.63	-13	-37.63	0-360	150	H
2	2.474	-54.13	Pk	32.3	-35.3	10.9	-46.23	-13	-33.23	0-360	150	H
3	3.314	-67.29	Pk	32.8	-33.4	10.9	-56.99	-13	-43.99	0-360	150	H
4	1.649	-56.93	Pk	28.5	-35.5	10.9	-53.03	-13	-40.03	0-360	150	V
5	2.474	-58.87	Pk	32.3	-35.3	11	-50.87	-13	-37.87	0-360	150	V
6	3.309	-68.34	Pk	32.8	-33.4	11.2	-57.74	-13	-44.74	0-360	150	V
	836.5MHz											
1	1.664	-53.48	Pk	28.6	-35.5	10.3	-50.08	-13	-37.08	0-360	150	H
2	2.497	-59.93	Pk	32.3	-35.3	9.8	-53.13	-13	-40.13	0-360	150	H
3	3.351	-67.87	Pk	32.8	-33.5	10.5	-58.07	-13	-45.07	0-360	150	H
4	1.664	-57.76	Pk	28.6	-35.5	11	-53.66	-13	-40.66	0-360	150	V
5	2.497	-59.67	Pk	32.3	-35.3	10.9	-51.77	-13	-38.77	0-360	150	V
6	3.344	-67.67	Pk	32.8	-33.4	10.8	-57.47	-13	-44.47	0-360	150	V
	844MHz											
1	1.679	-59.42	Pk	28.6	-35.5	10	-56.32	-13	-43.32	0-360	150	H
2	2.519	-61.14	Pk	32.3	-35.4	10.5	-53.74	-13	-40.74	0-360	150	H
3	3.381	-67.76	Pk	32.7	-33.4	11	-57.46	-13	-44.46	0-360	150	H
4	1.679	-56.22	Pk	28.6	-35.5	11.2	-51.92	-13	-38.92	0-360	150	V
5	2.534	-66.87	Pk	32.3	-35.3	10.7	-59.17	-13	-46.17	0-360	150	V
6	3.378	-68.61	Pk	32.7	-33.4	11.2	-58.11	-13	-45.11	0-360	150	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

10.2.5. LTE BAND 12

Company:	Samsung
Project #:	12678284
Date:	1/24/19
Test Engineer:	19498
Configuration:	EUT+ Support Equipment
Mode:	LTE 12 QPSK 10MHz
Chamber #:	Chamber J

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF AT0067 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Harmonic Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	704MHz											
1	1.399	-63.58	Pk	28.9	-36.2	12.5	-58.38	-13	-45.38	0-360	148	H
2	2.099	-63.71	Pk	31.8	-35.9	12.3	-55.51	-13	-42.51	0-360	148	H
3	2.803	-65.52	Pk	32.5	-35.5	12.2	-56.32	-13	-43.32	0-360	148	H
4	1.399	-61.88	Pk	28.9	-36.2	10.7	-58.48	-13	-45.48	0-360	148	V
5	2.099	-60.02	Pk	31.8	-35.9	11	-53.12	-13	-40.12	0-360	148	V
6	2.802	-64.44	Pk	32.5	-35.6	11.5	-56.04	-13	-43.04	0-360	148	V
	707.5MHz											
1	1.406	-57.93	Pk	28.9	-36.1	12.5	-52.63	-13	-39.63	0-360	148	H
2	2.109	-62.4	Pk	31.8	-35.9	12.2	-54.3	-13	-41.3	0-360	148	H
3	2.837	-65.75	Pk	32.5	-35.6	12	-56.85	-13	-43.85	0-360	148	H
4	1.406	-58.73	Pk	28.9	-36.1	11.2	-54.73	-13	-41.73	0-360	148	V
5	2.109	-61.67	Pk	31.8	-35.9	11.1	-54.67	-13	-41.67	0-360	148	V
6	2.836	-66.25	Pk	32.5	-35.6	12	-57.35	-13	-44.35	0-360	148	V
	711MHz											
1	1.413	-63.58	Pk	28.8	-36.2	12.3	-58.68	-13	-45.68	0-360	148	H
2	2.12	-65.03	Pk	31.8	-35.9	11.8	-57.33	-13	-44.33	0-360	148	H
3	2.843	-65.43	Pk	32.5	-35.5	12.2	-56.23	-13	-43.23	0-360	148	H
4	1.413	-63.01	Pk	28.8	-36.2	11.5	-58.91	-13	-45.91	0-360	148	V
5	2.119	-64.61	Pk	31.8	-35.9	11.6	-57.11	-13	-44.11	0-360	148	V
6	2.839	-64.85	Pk	32.5	-35.6	11.9	-56.05	-13	-43.05	0-360	148	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Company:	Samsung
Project #:	12678284
Date:	1/24/19
Test Engineer:	19498
Configuration:	EUT+ Support Equipment
Mode:	LTE 12 16QAM 10MHz
Chamber #:	Chamber J

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF AT0067 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Harmonic Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	704MHz											
1	1.399	-64.67	Pk	28.9	-36.2	12.5	-59.47	-13	-46.47	0-360	148	H
2	2.099	-63.41	Pk	31.8	-35.9	12.3	-55.21	-13	-42.21	0-360	148	H
3	2.799	-64.92	Pk	32.5	-35.6	11.9	-56.12	-13	-43.12	0-360	148	H
4	1.399	-61.13	Pk	28.9	-36.2	10.7	-57.73	-13	-44.73	0-360	148	V
5	2.099	-60.73	Pk	31.8	-35.9	11	-53.83	-13	-40.83	0-360	148	V
6	2.798	-64.83	Pk	32.5	-35.6	11.5	-56.43	-13	-43.43	0-360	148	V
	707.5MHz											
1	1.406	-60.48	Pk	28.9	-36.1	12.5	-55.18	-13	-42.18	0-360	148	H
2	2.109	-63.91	Pk	31.8	-35.9	12.2	-55.81	-13	-42.81	0-360	148	H
3	2.832	-64.66	Pk	32.5	-35.5	11.8	-55.86	-13	-42.86	0-360	148	H
4	1.406	-60.42	Pk	28.9	-36.1	11.2	-56.42	-13	-43.42	0-360	148	V
5	2.109	-61.93	Pk	31.8	-35.9	11.1	-54.93	-13	-41.93	0-360	148	V
6	2.828	-66.13	Pk	32.5	-35.6	11.8	-57.43	-13	-44.43	0-360	148	V
	711MHz											
1	1.413	-64.18	Pk	28.8	-36.2	12.3	-59.28	-13	-46.28	0-360	148	H
2	2.12	-64.18	Pk	31.8	-35.9	11.9	-56.38	-13	-43.38	0-360	148	H
3	2.837	-64.32	Pk	32.5	-35.6	12	-55.42	-13	-42.42	0-360	148	H
4	1.413	-64.34	Pk	28.8	-36.1	11.5	-60.14	-13	-47.14	0-360	148	V
5	2.119	-64.81	Pk	31.8	-35.9	11.6	-57.31	-13	-44.31	0-360	148	V
6	2.834	-65.59	Pk	32.5	-35.5	12	-56.59	-13	-43.59	0-360	148	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

10.2.6. LTE BAND 13

Company:	Samsung
Project #:	12678284
Date:	1/24/19
Test Engineer:	19498
Configuration:	EUT+ Support Equipment
Mode:	LTE 13 QPSK 10MHz
Chamber #:	Chamber J

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF AT0067 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	782MHz											
1	1.555	-56.15	Pk	28.1	-36.1	10.9	-53.25	-13	-40.25	0-360	148	H
2	2.333	-62.68	Pk	31.9	-35.9	12.5	-54.18	-13	-41.18	0-360	148	H
3	3.127	-66.37	Pk	33	-35.2	11.4	-57.17	-13	-44.17	0-360	148	H
4	1.555	-55.9	Pk	28.1	-36.1	12.4	-51.5	-13	-38.5	0-360	148	V
5	2.333	-60.73	Pk	31.9	-35.9	12.3	-52.43	-13	-39.43	0-360	148	V
6	3.125	-65.46	Pk	33	-35.1	11.4	-56.16	-13	-43.16	0-360	148	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Company:	Samsung
Project #:	12678284
Date:	1/24/19
Test Engineer:	19498
Configuration:	EUT+ Support Equipment
Mode:	LTE 13 16QAM 10MHz
Chamber #:	Chamber J

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF AT0067 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	782MHz											
1	1.555	-58.93	Pk	28.1	-36.1	10.9	-56.03	-13	-43.03	0-360	148	H
2	2.333	-61.49	Pk	31.9	-35.9	12.5	-52.99	-13	-39.99	0-360	148	H
3	3.134	-66.15	Pk	33	-35.1	11.4	-56.85	-13	-43.85	0-360	148	H
4	1.555	-55.05	Pk	28.1	-36.1	12.4	-50.65	-13	-37.65	0-360	148	V
5	2.333	-61.63	Pk	31.9	-35.9	12.3	-53.33	-13	-40.33	0-360	148	V
6	3.137	-66.2	Pk	33	-35.1	11.7	-56.6	-13	-43.6	0-360	148	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

10.2.7. LTE BAND 41

Company:	Samsung
Project #:	12678282
Date:	1/31/2019
Test Engineer:	39339
Configuration:	EUT+ Support Equipment
Mode:	LTE 41 QPSK 20MHz
Chamber #:	Chamber K

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	2506MHz											
1	4.994	-64.47	Pk	34.3	-30.8	10.4	-50.57	-25	-25.57	0-360	150	H
2	7.491	-62.65	Pk	35.6	-26.8	10.4	-43.45	-25	-18.45	0-360	150	H
3	9.989	-73.06	Pk	37	-24	10.3	-49.76	-25	-24.76	0-360	150	H
4	4.994	-66.33	Pk	34.3	-30.8	10.7	-52.13	-25	-27.13	0-360	150	V
5	7.491	-62.89	Pk	35.6	-26.8	10.6	-43.49	-25	-18.49	0-360	150	V
6	9.988	-73.91	Pk	37	-24	10.7	-50.21	-25	-25.21	0-360	150	V
	2593MHz											
1	5.168	-59.71	Pk	34.4	-30.5	10.5	-45.31	-25	-20.31	0-360	150	H
2	7.752	-62.27	Pk	35.7	-26.4	10.4	-42.57	-25	-17.57	0-360	150	H
3	10.335	-74.48	Pk	37.4	-23.6	10.6	-50.08	-25	-25.08	0-360	150	H
4	5.168	-63.27	Pk	34.4	-30.5	10.7	-48.67	-25	-23.67	0-360	150	V
5	7.752	-60.16	Pk	35.7	-26.4	10.6	-40.26	-25	-15.26	0-360	150	V
6	10.336	-73.27	Pk	37.4	-23.6	10.8	-48.67	-25	-23.67	0-360	150	V
	2680MHz											
1	5.342	-59.68	Pk	34.5	-30.3	11	-44.48	-25	-19.48	0-360	150	H
2	8.013	-65.28	Pk	35.7	-26.1	10.2	-45.48	-25	-20.48	0-360	150	H
3	10.721	-75.29	Pk	37.9	-23.1	9.9	-50.59	-25	-25.59	0-360	150	H
4	5.342	-60.88	Pk	34.5	-30.3	10.9	-45.78	-25	-20.78	0-360	150	V
5	8.013	-67.69	Pk	35.7	-26.1	10.5	-47.59	-25	-22.59	0-360	150	V
6	10.713	-75.33	Pk	37.9	-23.1	10.1	-50.43	-25	-25.43	0-360	150	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Company:	Samsung
Project #:	12678282
Date:	1/31/2019
Test Engineer:	39339
Configuration:	EUT+ Support Equipment
Mode:	LTE 41 16QAM 20MHz
Chamber #:	Chamber K

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	2506MHz											
1	4.994	-62.07	Pk	34.3	-30.8	10.4	-48.17	-25	-23.17	0-360	150	H
2	7.491	-63.37	Pk	35.6	-26.8	10.4	-44.17	-25	-19.17	0-360	150	H
3	9.972	-74	Pk	37	-24.1	10.3	-50.8	-25	-25.8	0-360	150	H
4	4.994	-64.81	Pk	34.3	-30.8	10.7	-50.61	-25	-25.61	0-360	150	V
5	7.491	-69.25	Pk	35.6	-26.8	10.6	-49.85	-25	-24.85	0-360	150	V
6	9.988	-71.4	Pk	37	-24	10.7	-47.7	-25	-22.7	0-360	150	V
	2593MHz											
1	5.168	-61.96	Pk	34.4	-30.5	10.5	-47.56	-25	-22.56	0-360	150	H
2	7.752	-64.82	Pk	35.7	-26.4	10.4	-45.12	-25	-20.12	0-360	150	H
3	10.331	-73.81	Pk	37.4	-23.7	10.6	-49.51	-25	-24.51	0-360	150	H
4	5.168	-64.2	Pk	34.4	-30.5	10.7	-49.6	-25	-24.6	0-360	150	V
5	7.752	-65.68	Pk	35.7	-26.4	10.6	-45.78	-25	-20.78	0-360	150	V
6	10.343	-73.28	Pk	37.4	-23.6	10.7	-48.78	-25	-23.78	0-360	150	V
	2680MHz											
1	5.342	-61.07	Pk	34.5	-30.3	10.9	-45.97	-25	-20.97	0-360	150	H
2	8.013	-68.25	Pk	35.7	-26.1	10.2	-48.45	-25	-23.45	0-360	150	H
3	10.689	-75.17	Pk	37.8	-23	9.9	-50.47	-25	-25.47	0-360	150	H
4	5.342	-61.39	Pk	34.5	-30.3	10.9	-46.29	-25	-21.29	0-360	150	V
5	8.013	-68.3	Pk	35.7	-26.1	10.5	-48.2	-25	-23.2	0-360	150	V
6	10.227	-72.3	Pk	37.3	-23.6	10.5	-48.1	-25	-23.1	0-360	150	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

10.2.8. LTE BAND 66

Company:	Samsung
Project #:	12678284
Date:	1/25/19
Test Engineer:	10649
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)	Harmonic Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1720MHz											
1	3.422	-58.43	Pk	32.7	-30.9	12	-44.63	-13	-31.63	0-360	149	H
3	5.163	-73.02	Pk	34.3	-29	11.8	-55.92	-13	-42.92	0-360	149	H
5	6.844	-70.38	Pk	35.6	-27.1	11.5	-50.38	-13	-37.38	0-360	149	H
2	3.422	-62.74	Pk	32.7	-30.9	11.8	-49.14	-13	-36.14	0-360	149	V
4	5.161	-72.95	Pk	34.3	-28.9	11.7	-55.85	-13	-42.85	0-360	149	V
6	6.844	-70.04	Pk	35.6	-27.1	11.6	-49.94	-13	-36.94	0-360	149	V
	1745MHz											
1	3.472	-63.69	Pk	32.7	-30.7	11.8	-49.89	-13	-36.89	0-360	149	H
2	5.208	-70.18	Pk	34.3	-28.8	12.1	-52.58	-13	-39.58	0-360	149	H
3	6.978	-74.28	Pk	35.5	-26.7	11.8	-53.68	-13	-40.68	0-360	149	H
4	3.472	-67.2	Pk	32.7	-30.7	11.7	-53.5	-13	-40.5	0-360	149	V
5	5.218	-71.65	Pk	34.3	-28.8	12.1	-54.05	-13	-41.05	0-360	149	V
6	6.989	-72.75	Pk	35.6	-26.7	11.9	-51.95	-13	-38.95	0-360	149	V
	1770MHz											
1	* 3.522	-61.71	Pk	33	-30.1	11.7	-47.11	-13	-34.11	0-360	149	H
3	5.305	-73.09	Pk	34.5	-29	12.1	-55.49	-13	-42.49	0-360	149	H
5	7.076	-74.69	Pk	35.6	-26.3	11.7	-53.69	-13	-40.69	0-360	149	H
2	* 3.522	-66.3	Pk	33	-30.1	11.9	-51.5	-13	-38.5	0-360	149	V
4	5.306	-73.65	Pk	34.5	-29	12.3	-55.85	-13	-42.85	0-360	149	V
6	7.072	-73.72	Pk	35.6	-26.3	11.4	-53.02	-13	-40.02	0-360	149	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Company:	Samsung
Project #:	12678284
Date:	1/25/19
Test Engineer:	10649
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)	Harmonic Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
	1720MHz											
1	3.422	-59.37	Pk	32.7	-30.9	12	-45.57	-13	-32.57	0-360	149	H
3	5.163	-72.09	Pk	34.3	-29	11.8	-54.99	-13	-41.99	0-360	149	H
5	6.83	-72.08	Pk	35.5	-27	11.6	-51.98	-13	-38.98	0-360	149	H
2	3.422	-63.3	Pk	32.7	-30.9	11.8	-49.7	-13	-36.7	0-360	149	V
4	5.158	-72.75	Pk	34.4	-28.9	11.7	-55.55	-13	-42.55	0-360	149	V
6	6.844	-70.55	Pk	35.6	-27.1	11.6	-50.45	-13	-37.45	0-360	149	V
	1745MHz											
1	3.472	-62.5	Pk	32.7	-30.7	11.8	-48.7	-13	-35.7	0-360	148	H
3	5.24	-72.59	Pk	34.3	-29	12	-55.29	-13	-42.29	0-360	148	H
5	6.977	-73.81	Pk	35.6	-26.6	11.8	-53.01	-13	-40.01	0-360	148	H
2	3.472	-67.44	Pk	32.7	-30.7	11.7	-53.74	-13	-40.74	0-360	149	V
4	5.245	-73.65	Pk	34.4	-28.9	12.2	-55.95	-13	-42.95	0-360	149	V
6	6.98	-74.7	Pk	35.5	-26.7	12.1	-53.8	-13	-40.8	0-360	149	V
	1770MHz											
1	* 3.522	-64	Pk	33	-30.1	11.7	-49.4	-13	-36.4	0-360	148	H
3	5.311	-72.89	Pk	34.5	-28.9	12	-55.29	-13	-42.29	0-360	148	H
5	7.071	-74.81	Pk	35.6	-26.4	11.5	-54.11	-13	-41.11	0-360	148	H
2	* 3.522	-65.61	Pk	33	-30.1	11.9	-50.81	-13	-37.81	0-360	149	V
4	5.31	-73.72	Pk	34.5	-28.9	12.3	-55.82	-13	-42.82	0-360	149	V
6	7.075	-74.88	Pk	35.6	-26.3	11.6	-53.98	-13	-40.98	0-360	149	V

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 771-1000 FAX:(510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.