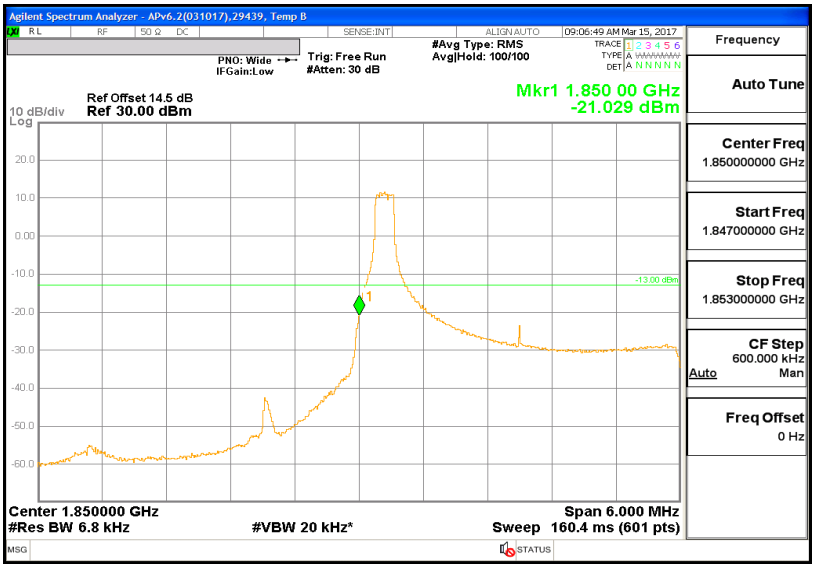
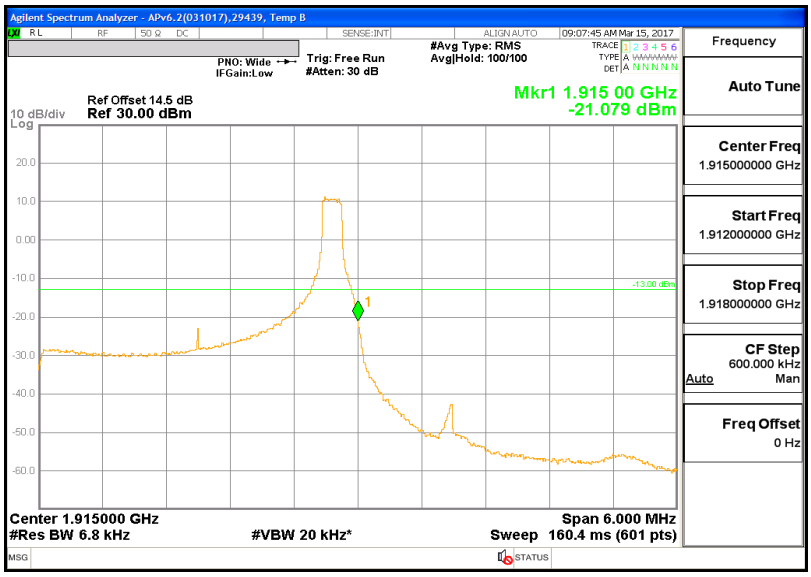
**QPSK, (3.0 MHz BAND WIDTH)**

LOW CH, RB1-0



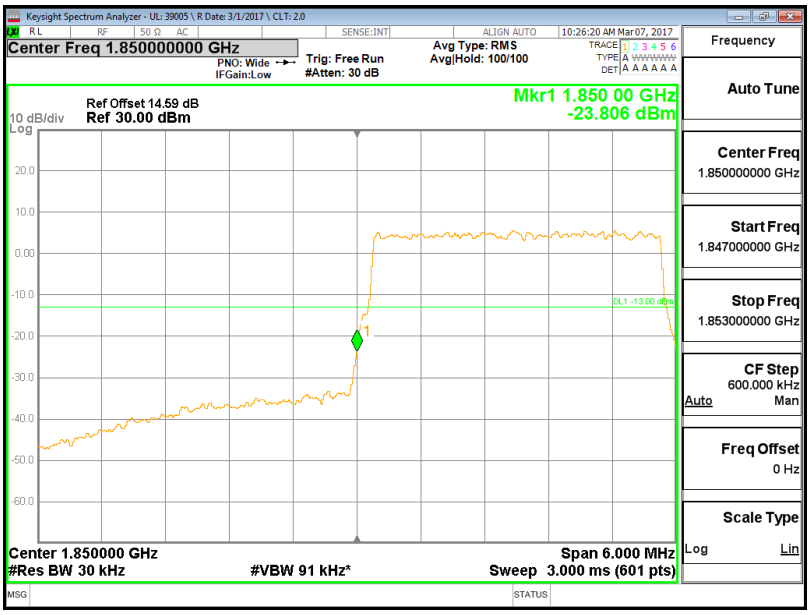

HIGH CH, RB1-14



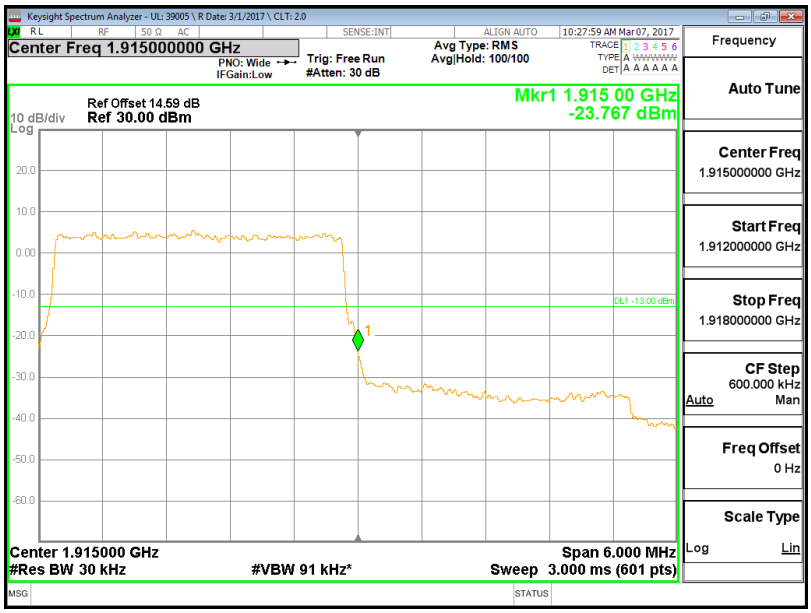


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

LOW CH, RB15-0




HIGH CH, RB15-0

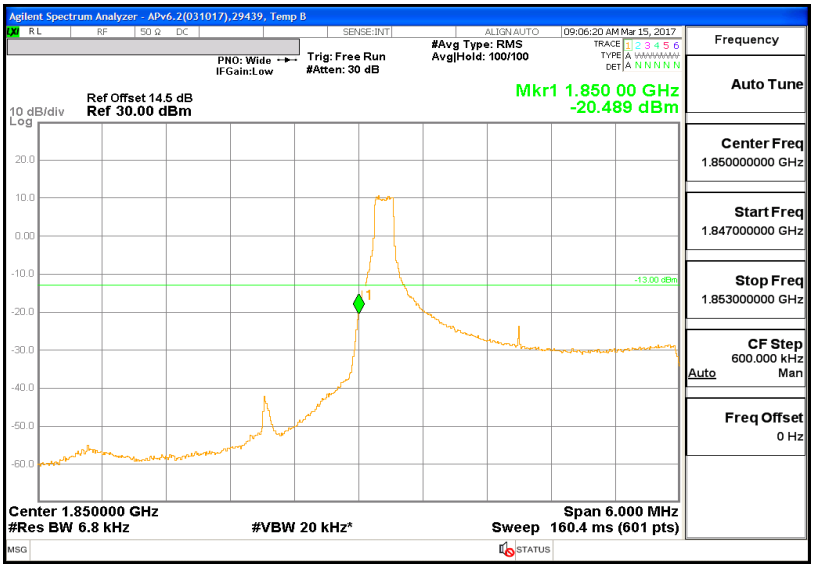




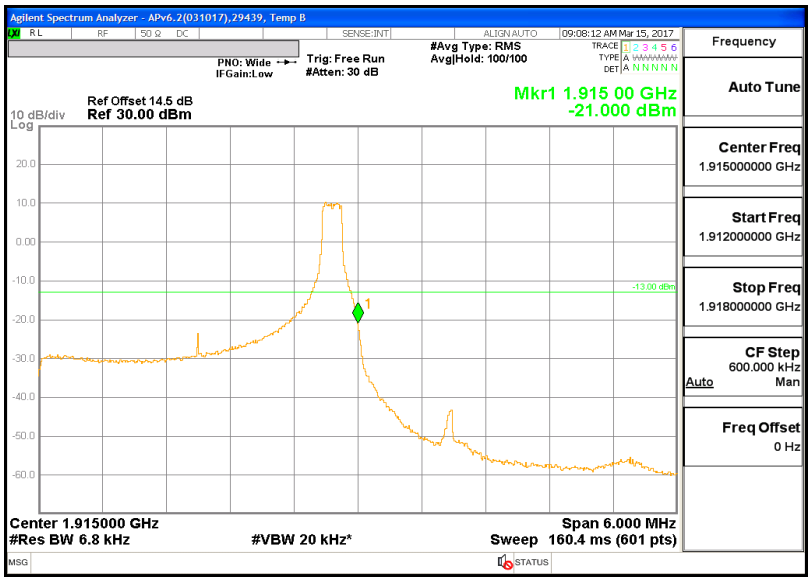

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
FORM NO: CCSUP4031B
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**16QAM, (3.0 MHz BAND WIDTH)**

LOW CH, RB1-0




HIGH CH, RB1-14

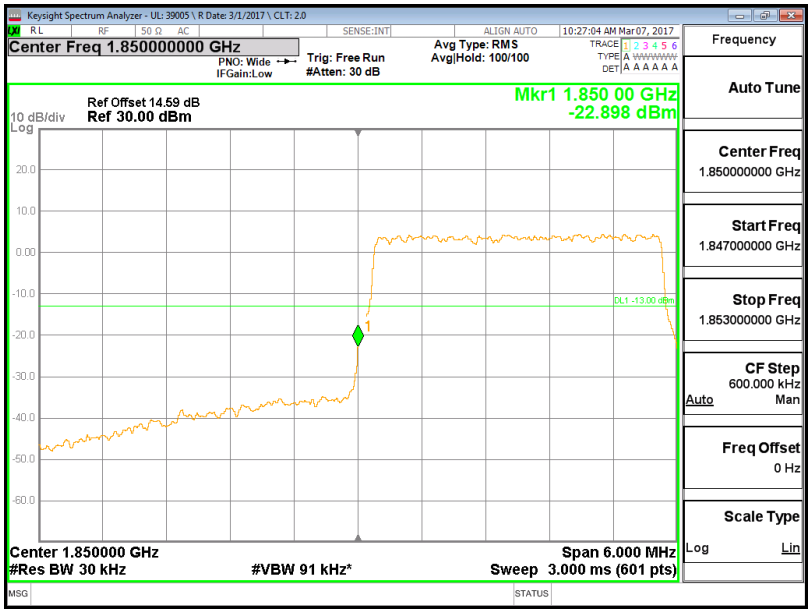




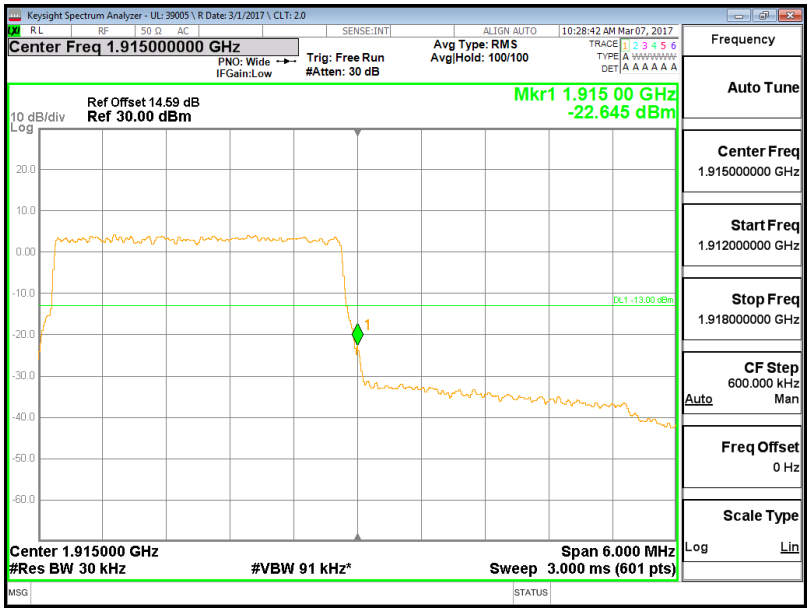


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

LOW CH, RB15-0




HIGH CH, RB15-0



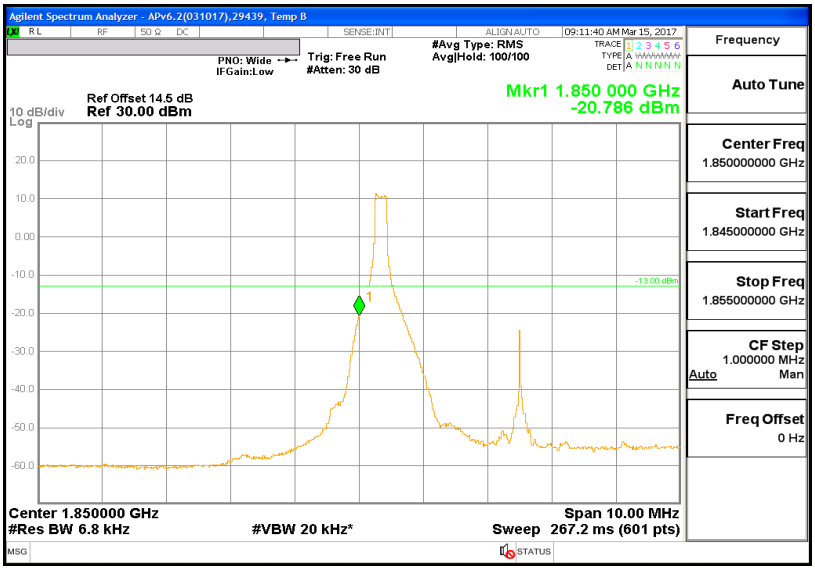




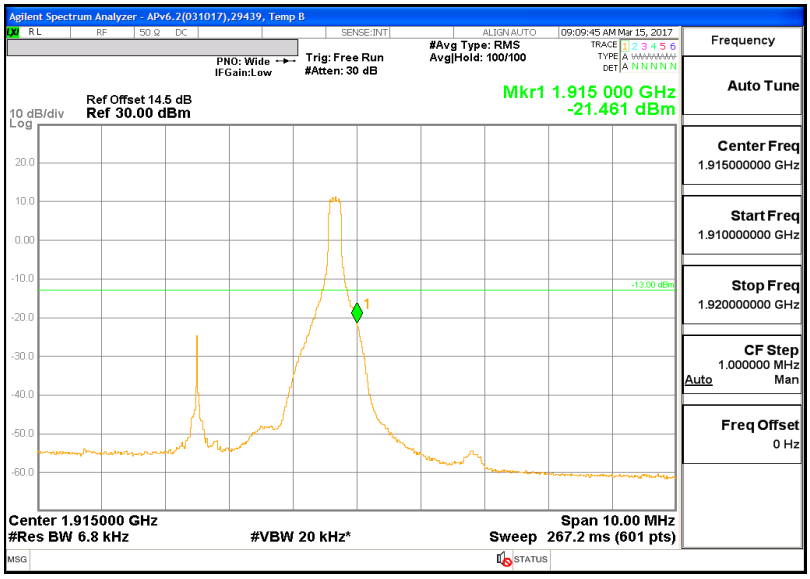
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**QPSK, (5.0 MHz BAND WIDTH)**

LOW CH, RB1-0




HIGH CH, RB1-24

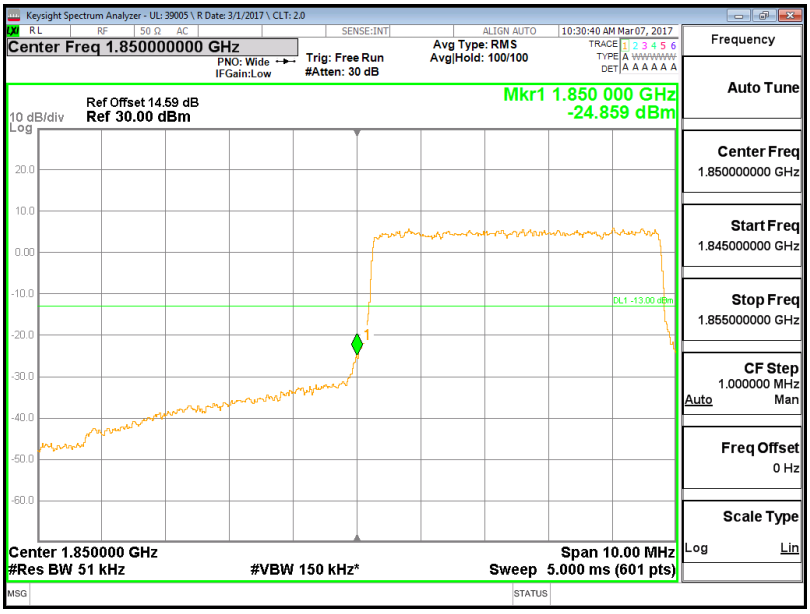




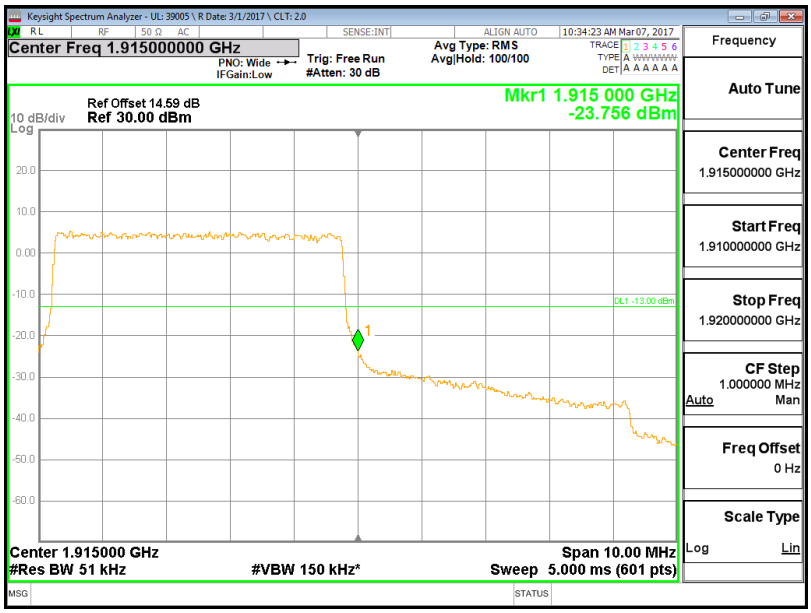


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

LOW CH, RB25-0




HIGH CH, RB25-0

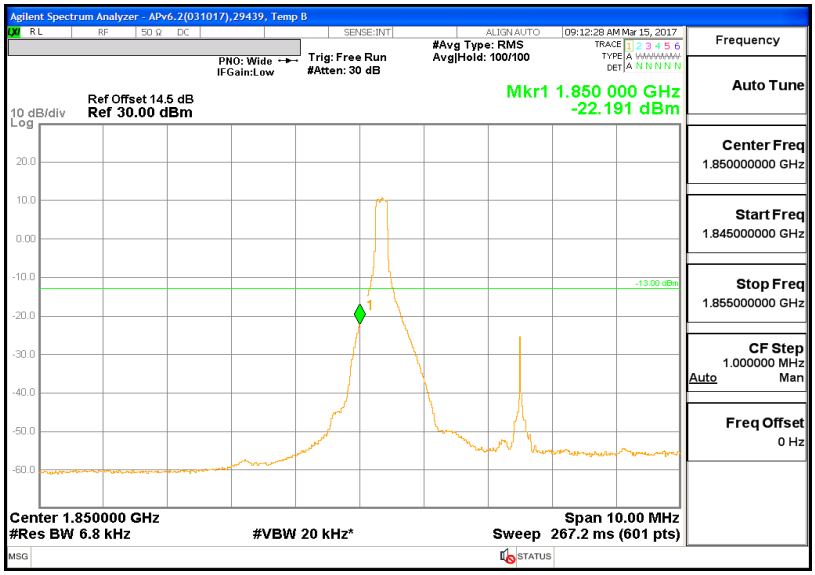




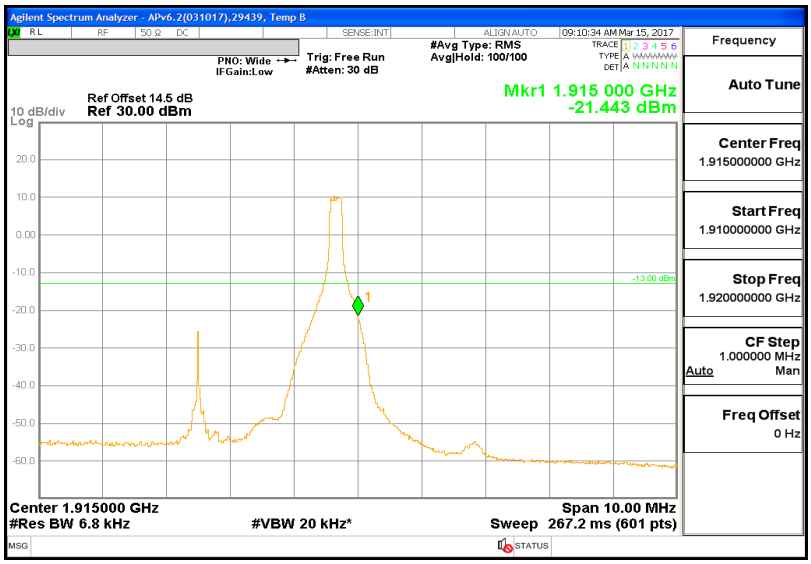

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
FORM NO: CCSUP4031B
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**16QAM, (5.0 MHz BAND WIDTH)**

LOW CH, RB1-0




HIGH CH, RB1-24

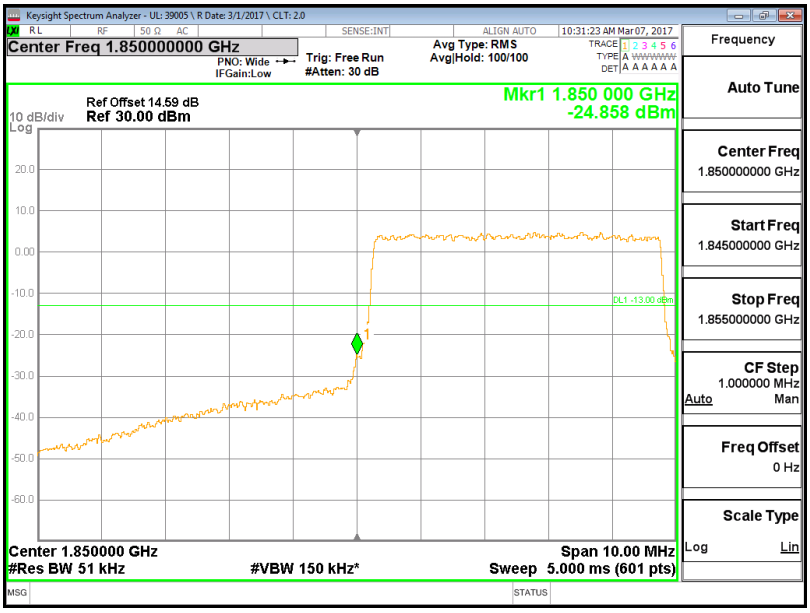




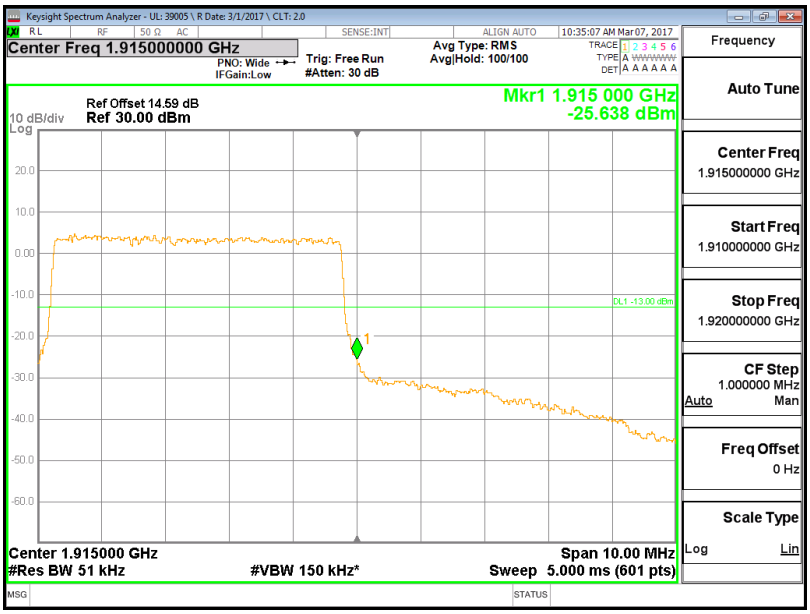


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

LOW CH, RB25-0




HIGH CH, RB25-0

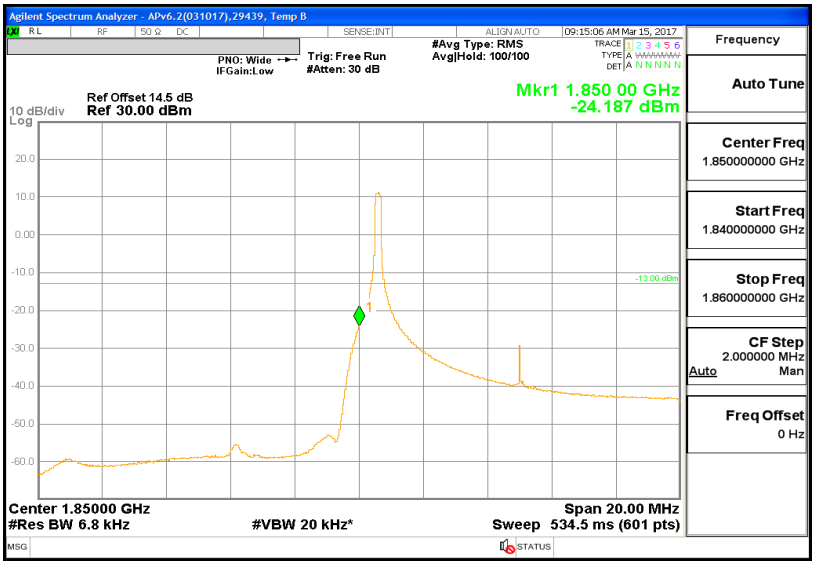




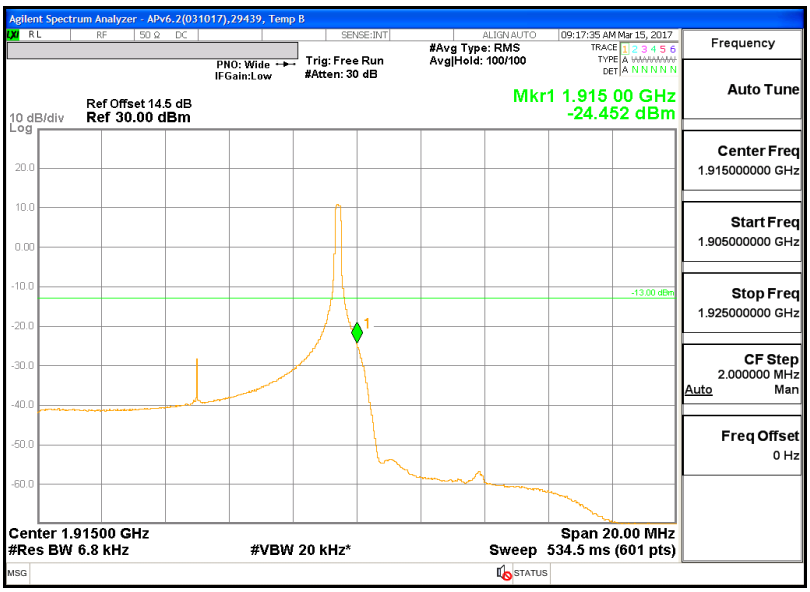

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
FORM NO: CCSUP4031B
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**QPSK, (10.0 MHz BAND WIDTH)**

LOW CH, RB1-0



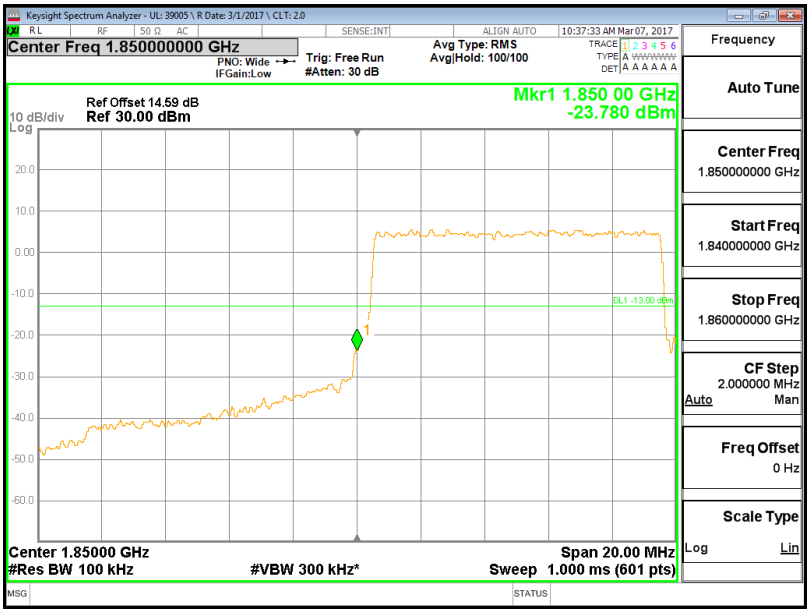

HIGH CH, RB1-49



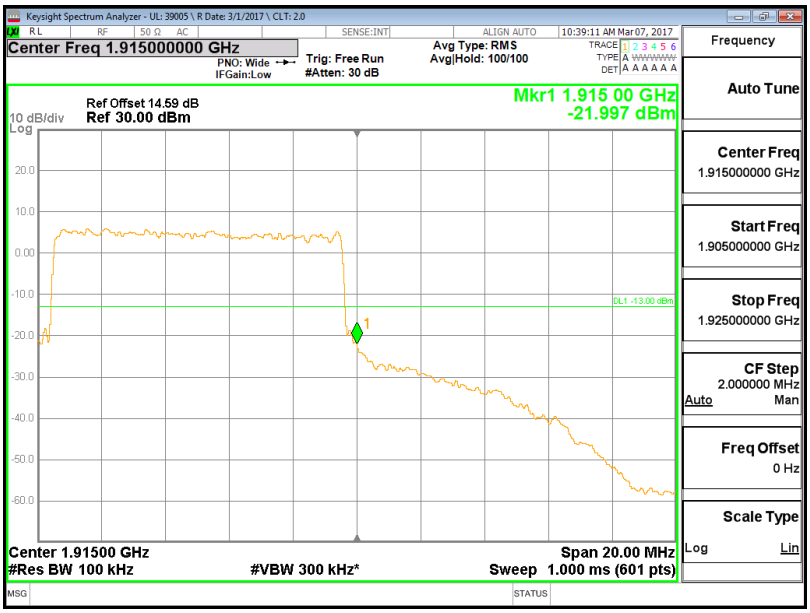



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

LOW CH, RB50-0




HIGH CH, RB50-0

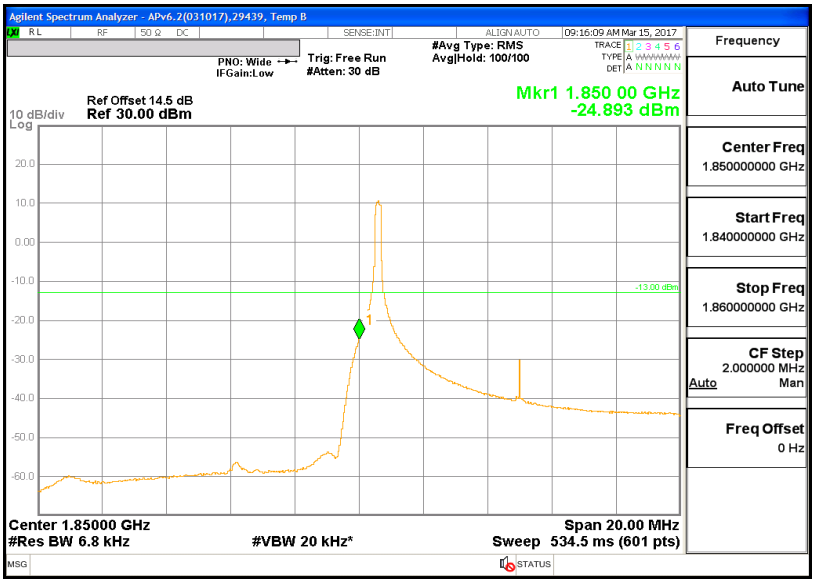




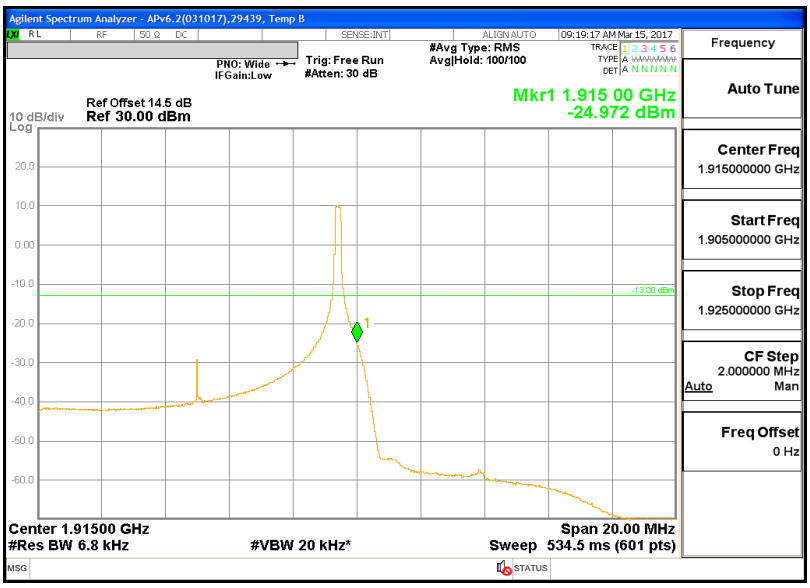

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
FORM NO: CCSUP4031B
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**16QAM, (10.0 MHz BAND WIDTH)**

LOW CH, RB1-0




HIGH CH, RB1-49

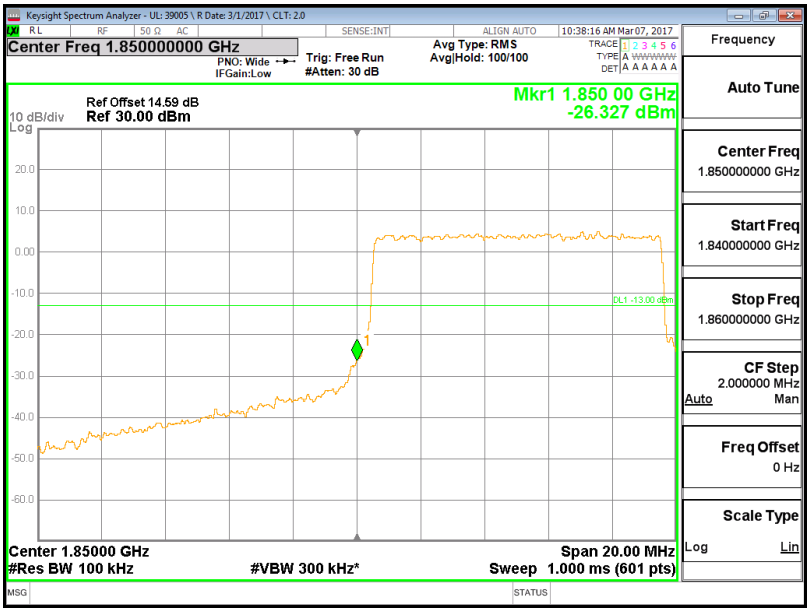




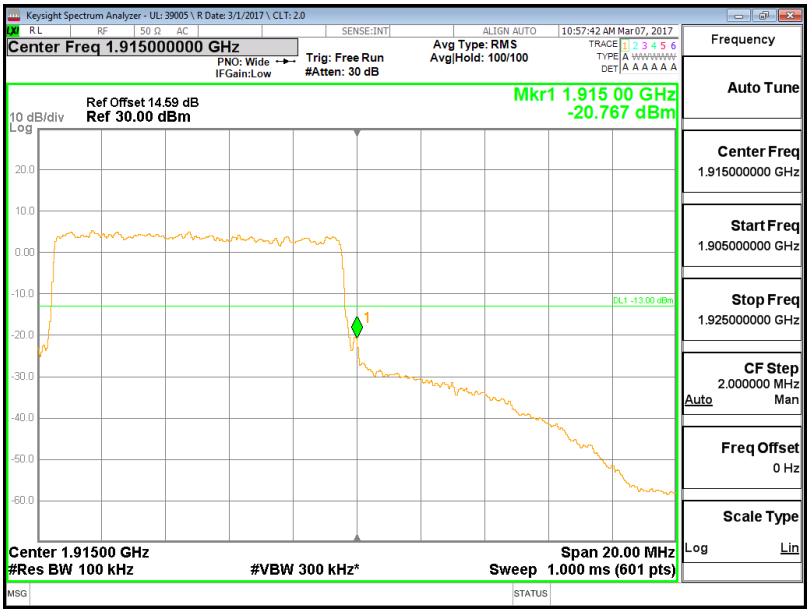


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

LOW CH, RB50-0




HIGH CH, RB50-0

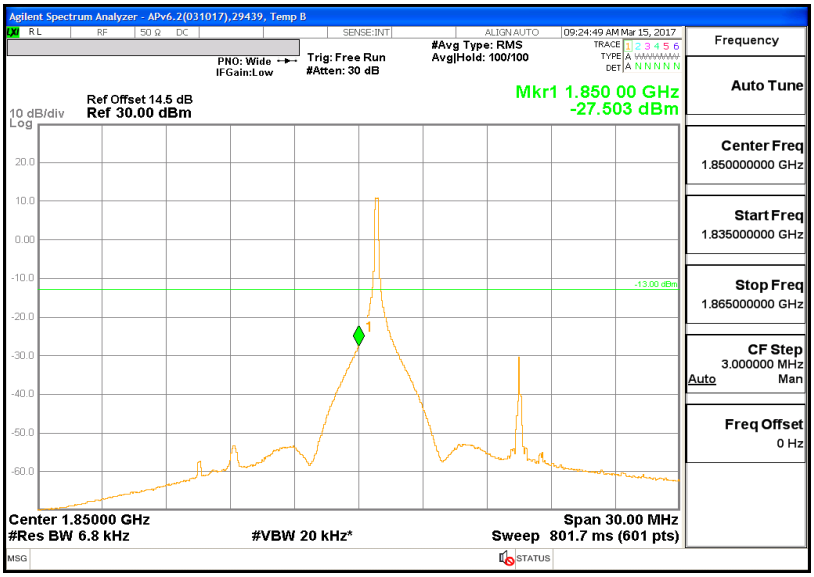




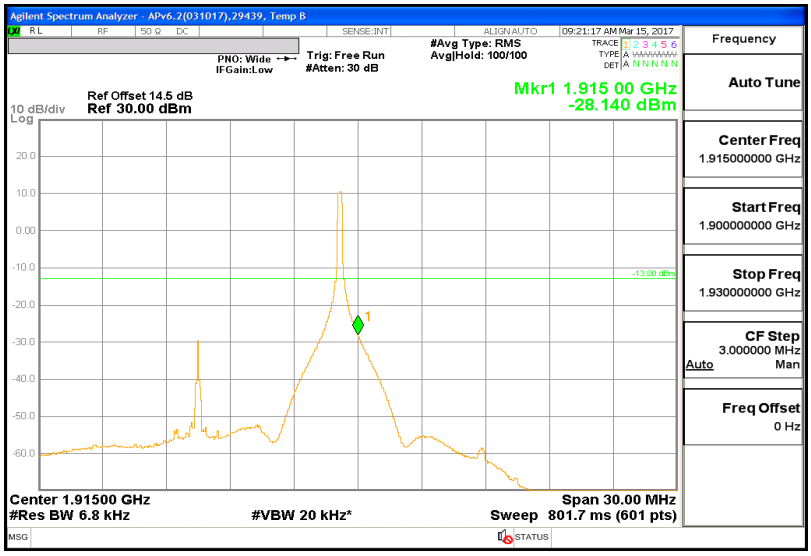
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**QPSK, (15.0 MHz BAND WIDTH)**

LOW CH, RB1-0




HIGH CH, RB1-74

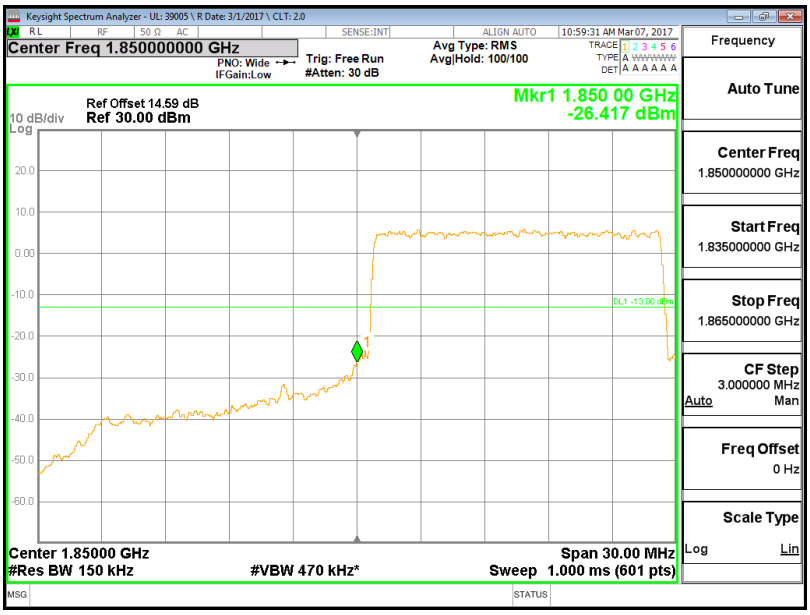




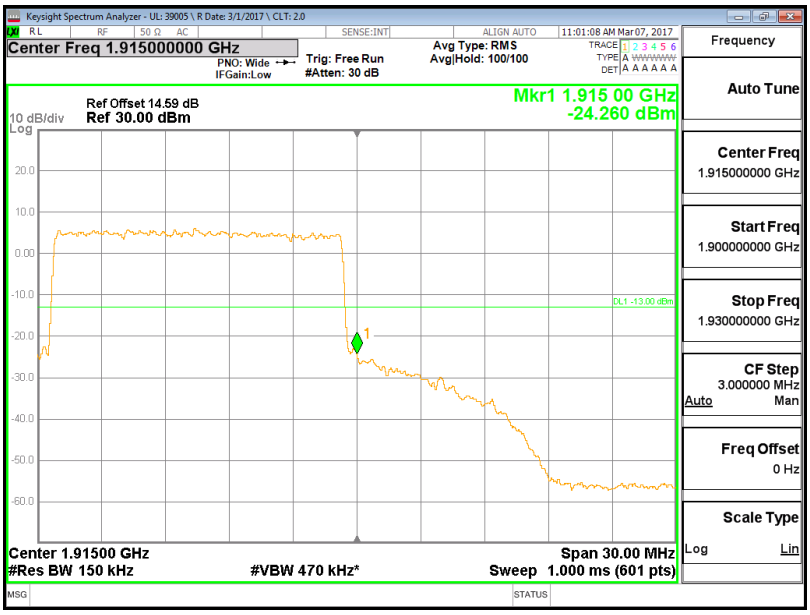


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

LOW CH, RB75-0




HIGH CH, RB75-0

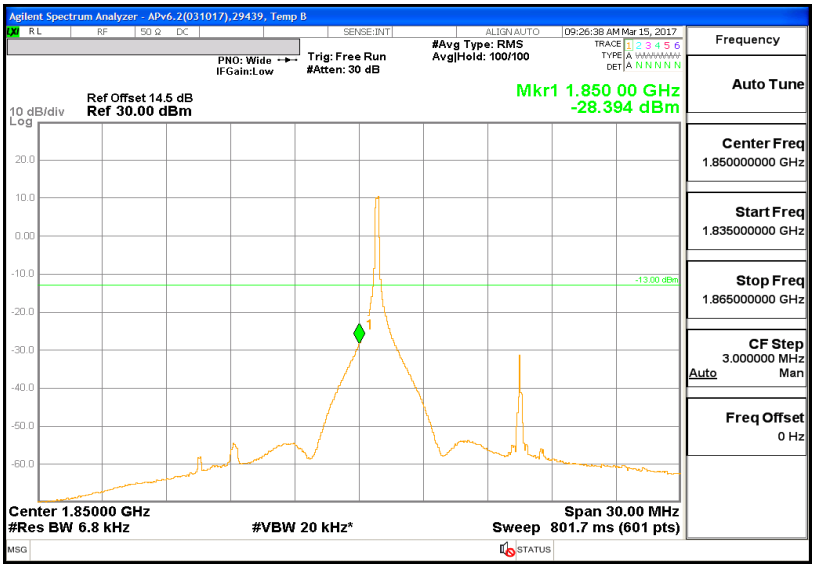




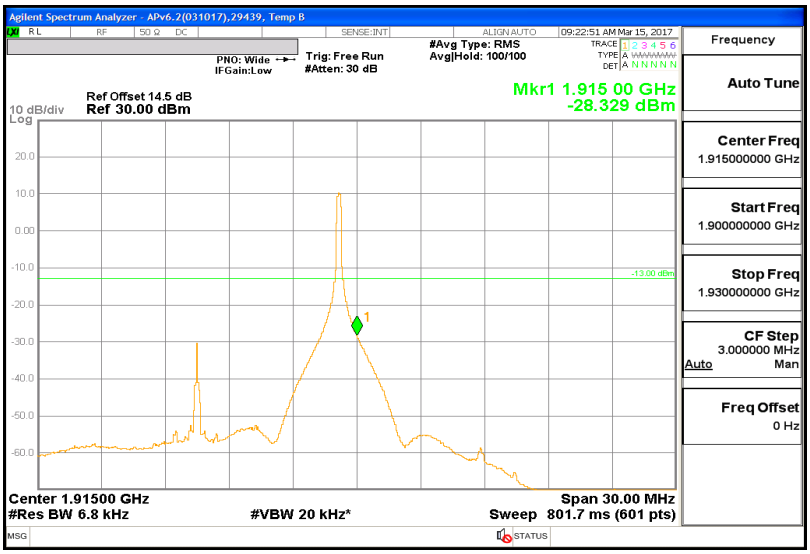

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
FORM NO: CCSUP4031B
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**16QAM, (15.0 MHz BAND WIDTH)**

LOW CH, RB1-0




HIGH CH, RB1-74

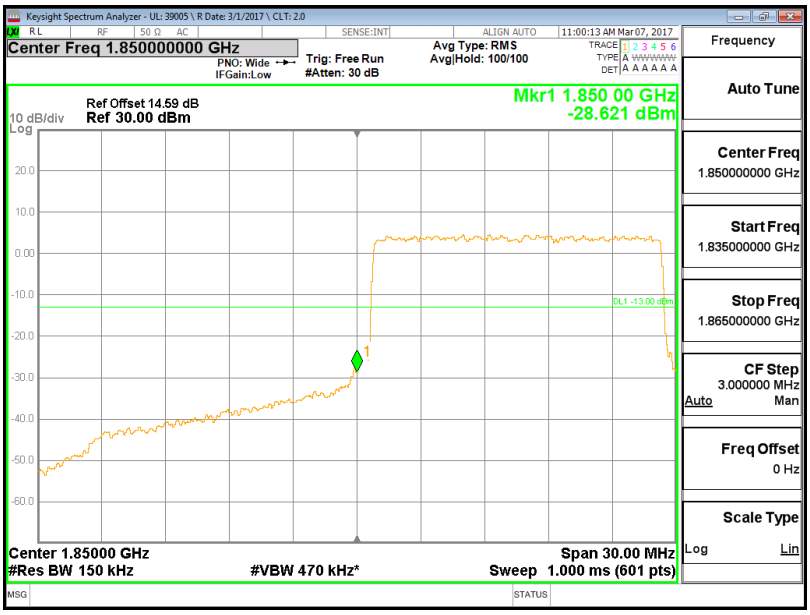




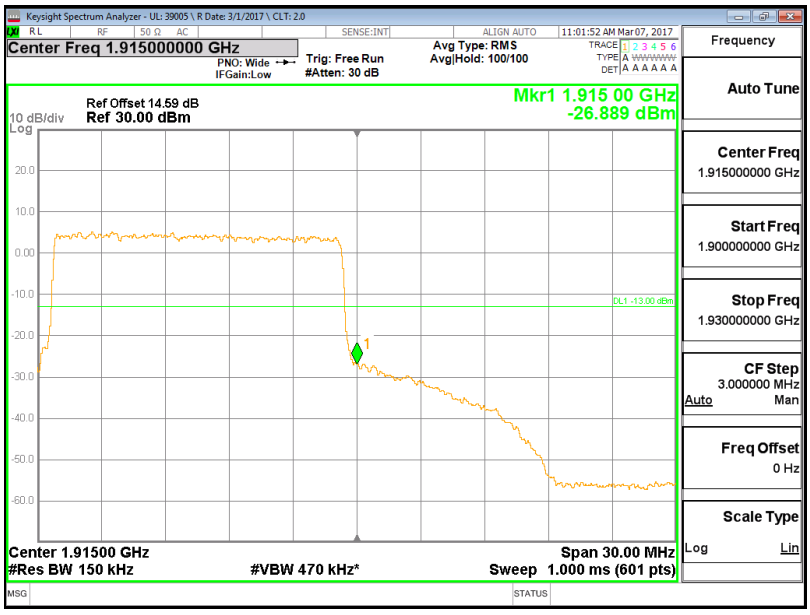


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

LOW CH, RB75-0




HIGH CH, RB75-0



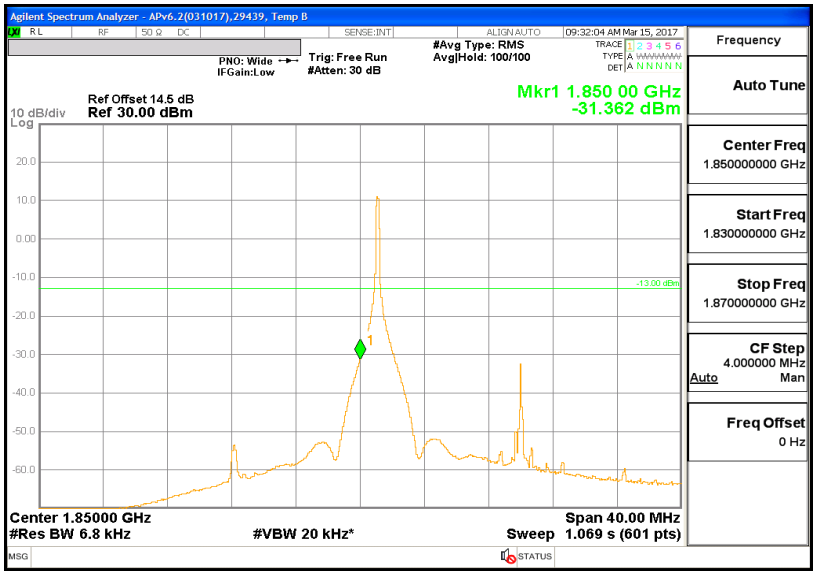




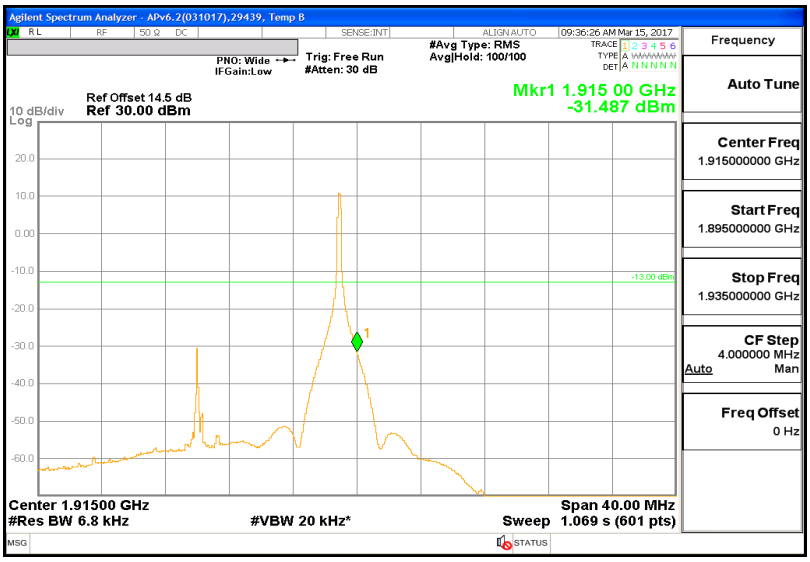
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**QPSK, (20.0 MHz BAND WIDTH)**

LOW CH, RB1-0



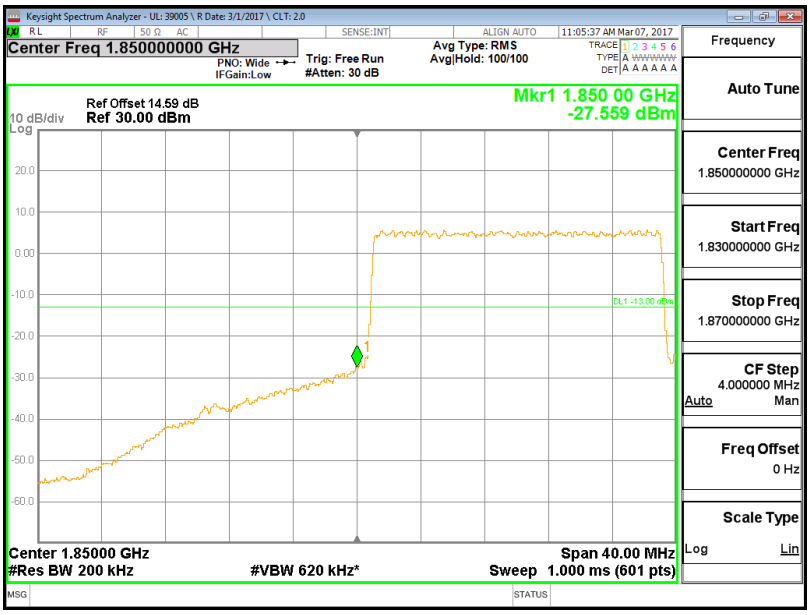

HIGH CH, RB1-99



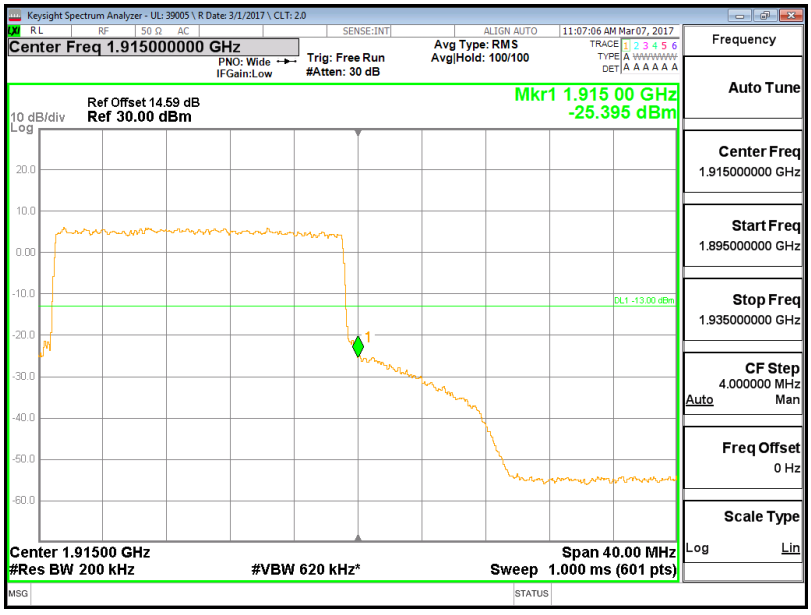


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

LOW CH, RB100-0




HIGH CH, RB100-0

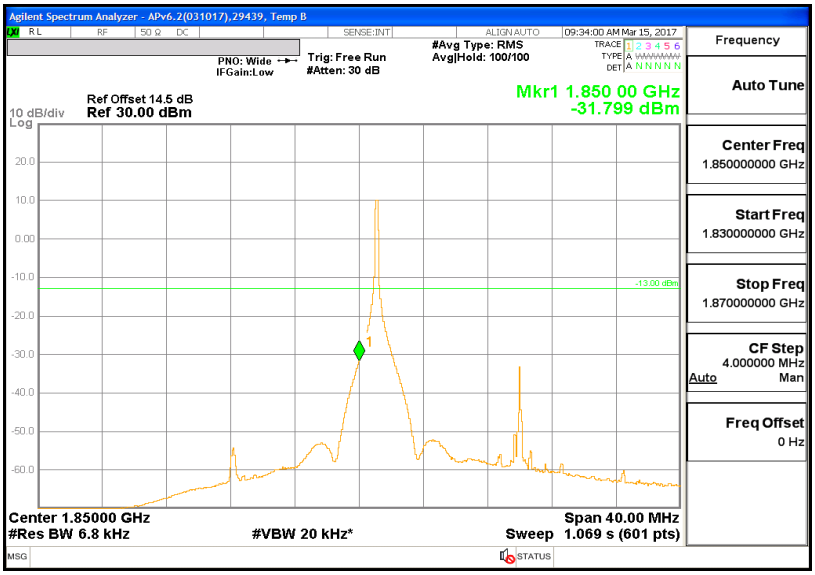




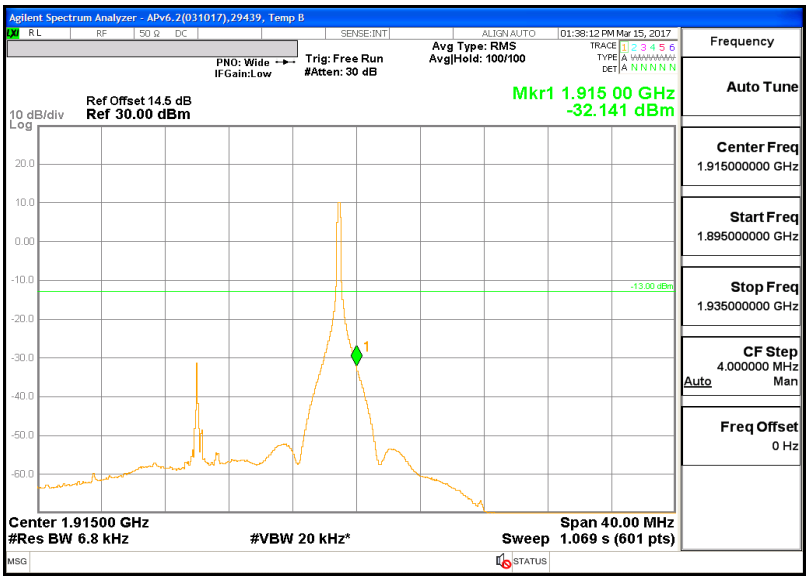

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
FORM NO: CCSUP4031B
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**16QAM, (20.0 MHz BAND WIDTH)**

LOW CH, RB1-0




HIGH CH, RB1-99

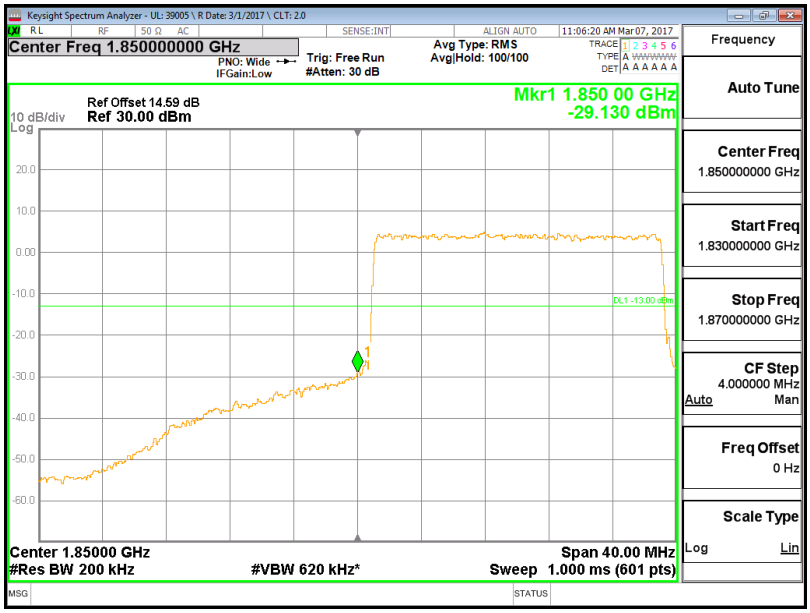




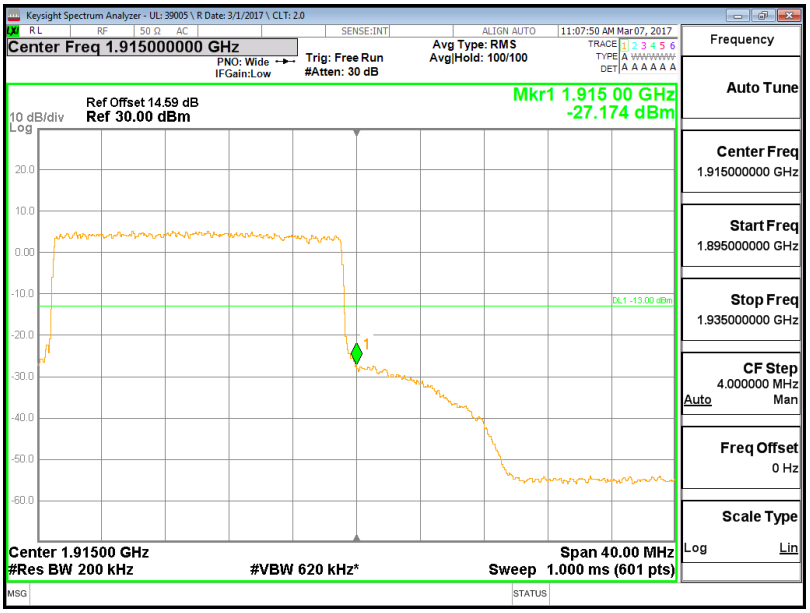


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

LOW CH, RB100-0




HIGH CH, RB100-0



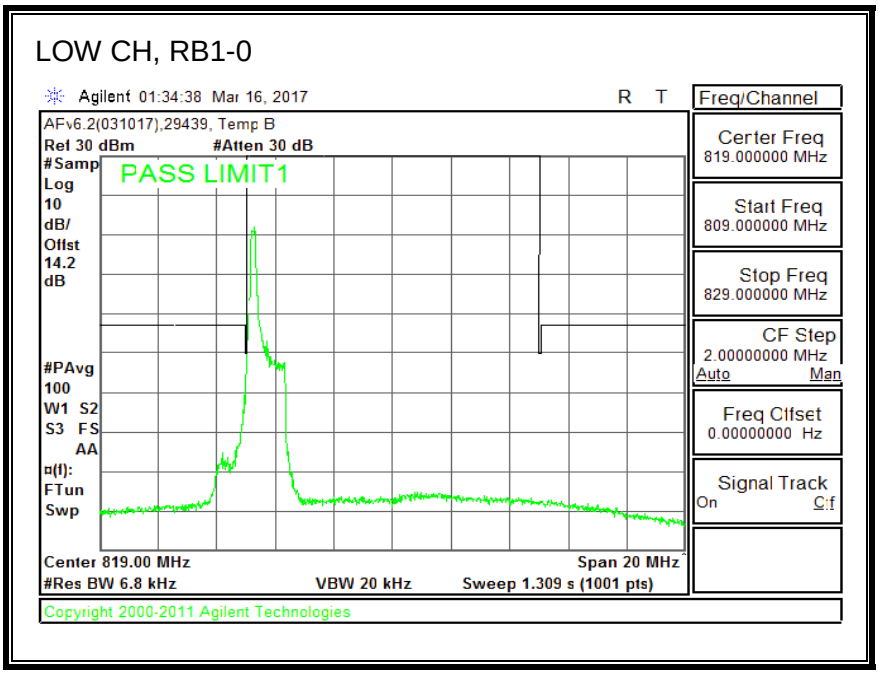


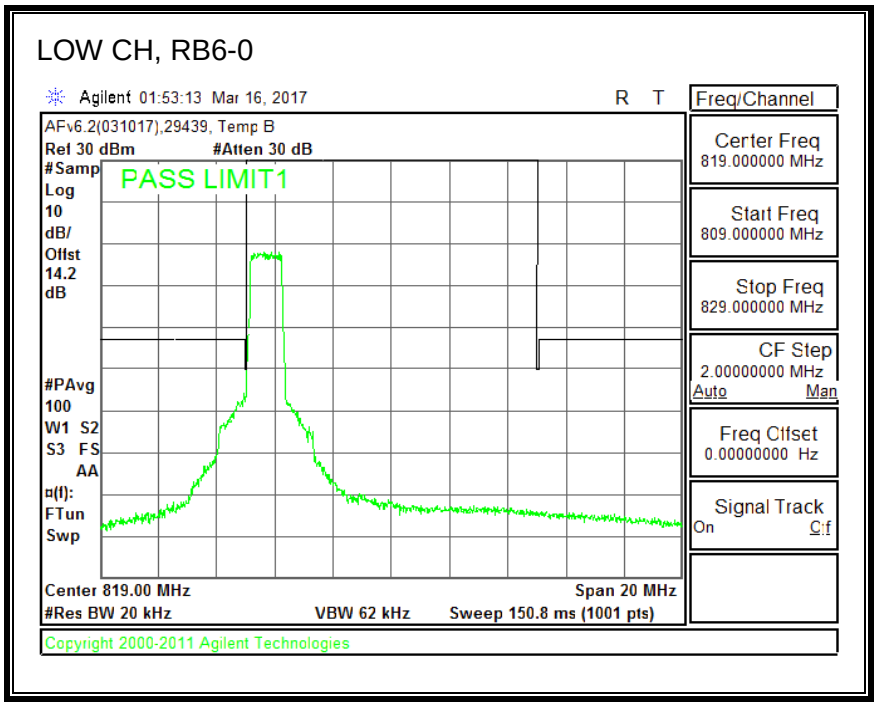


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 8.2.9. LTE BAND 26 EMISSION MASK

**QPSK, (1.4 MHz BAND WIDTH)**



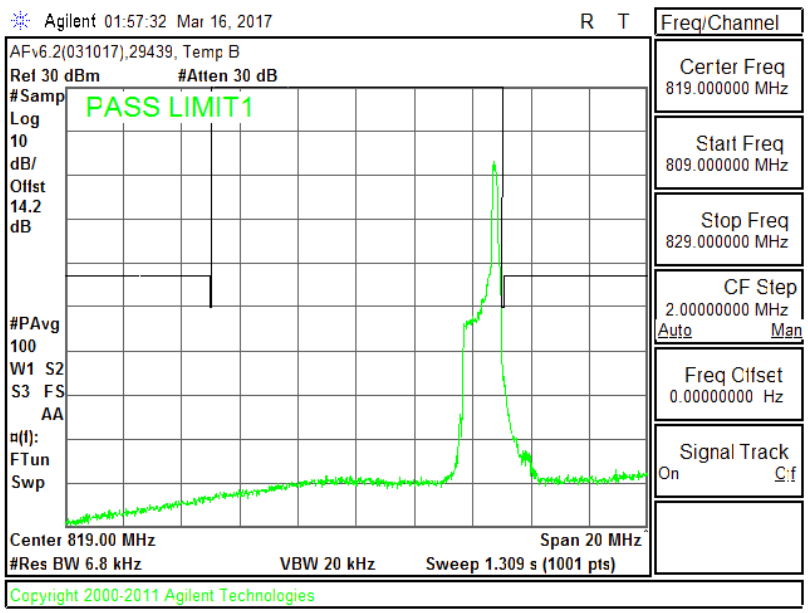





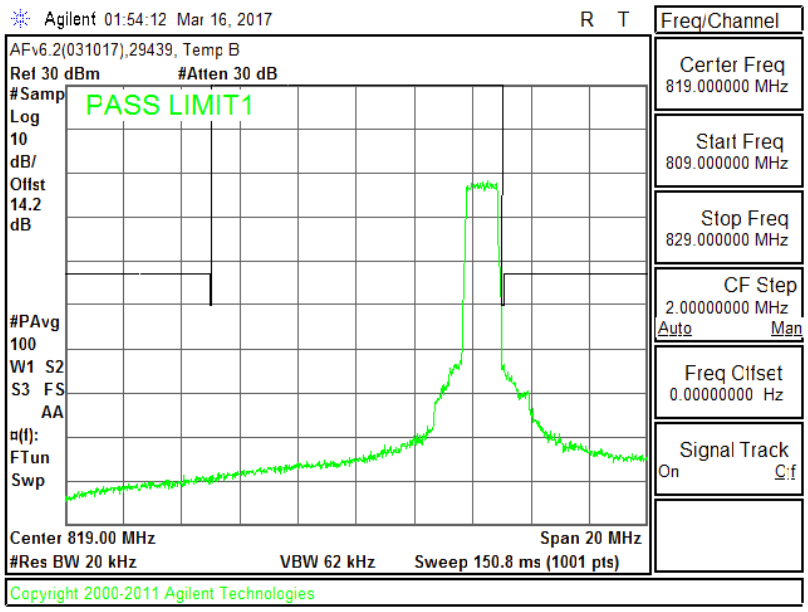


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

HIGH CH, RB1-5




HIGH CH, RB6-0

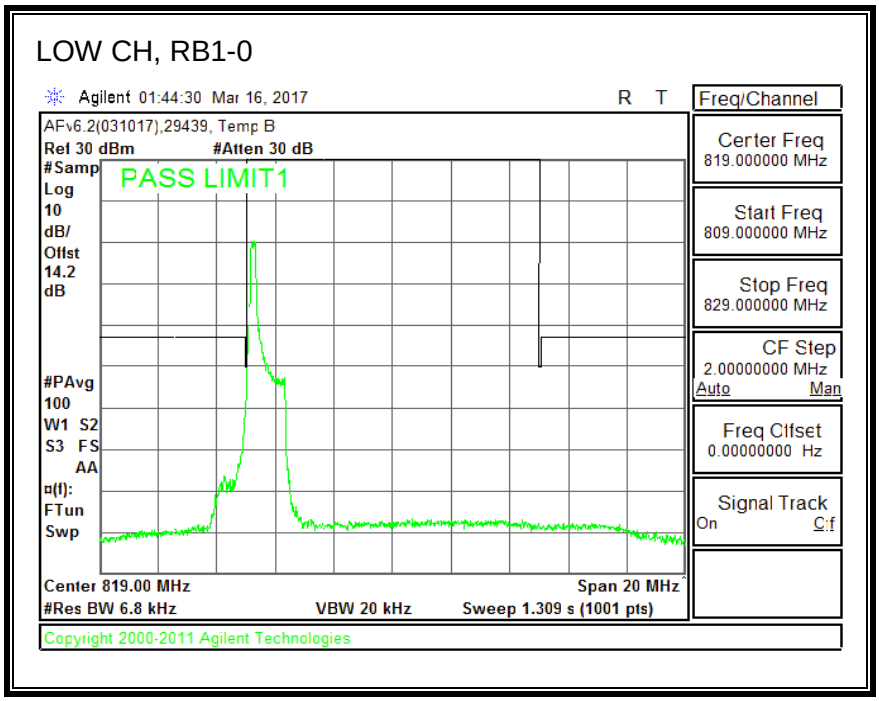


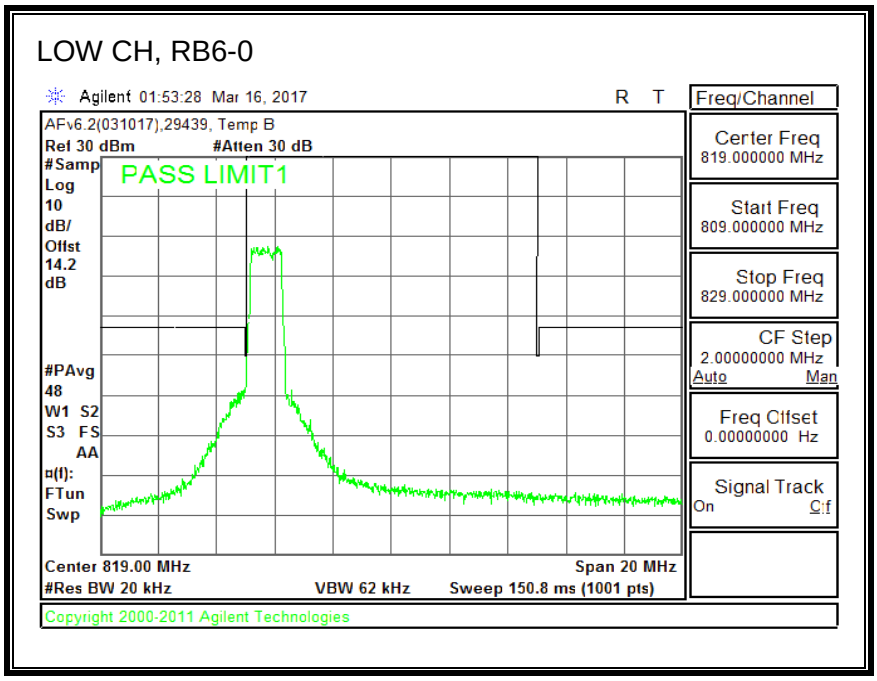




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**16QAM, (1.4 MHz BAND WIDTH)**



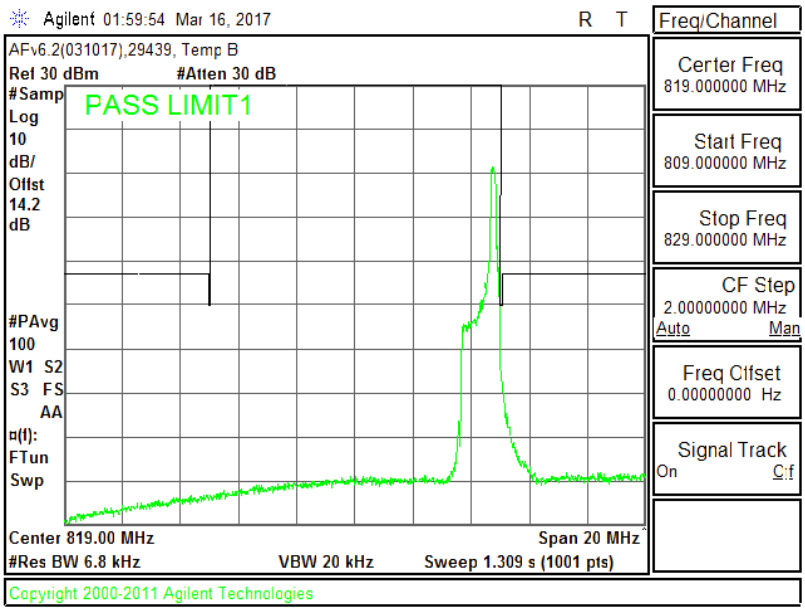





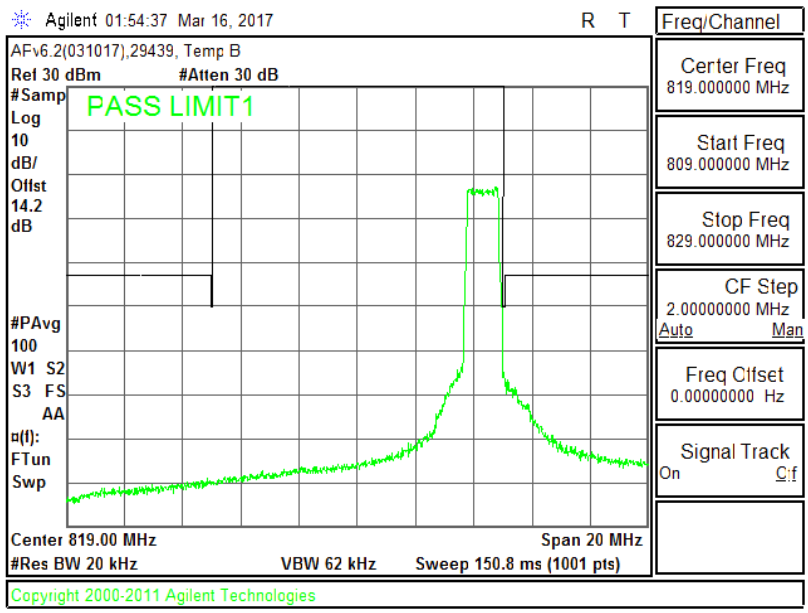


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

HIGH CH, RB1-5




HIGH CH, RB6-0



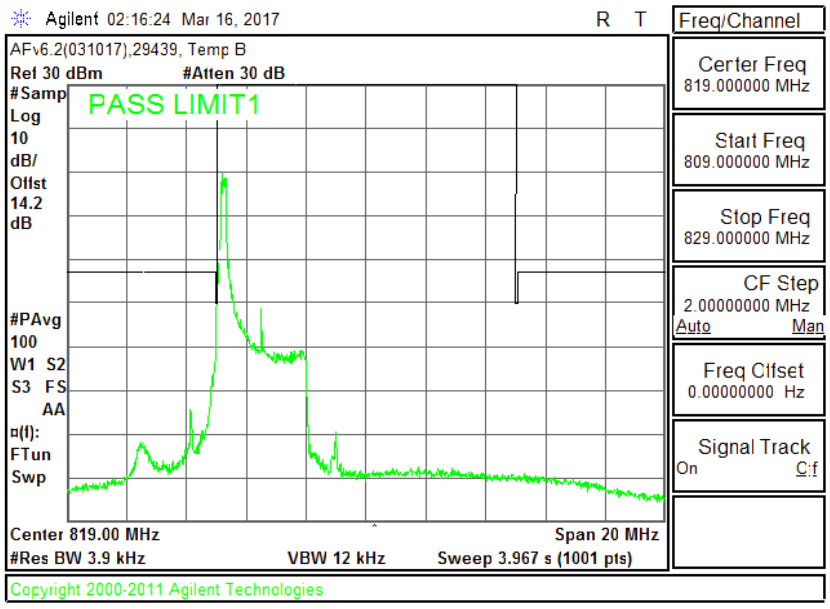




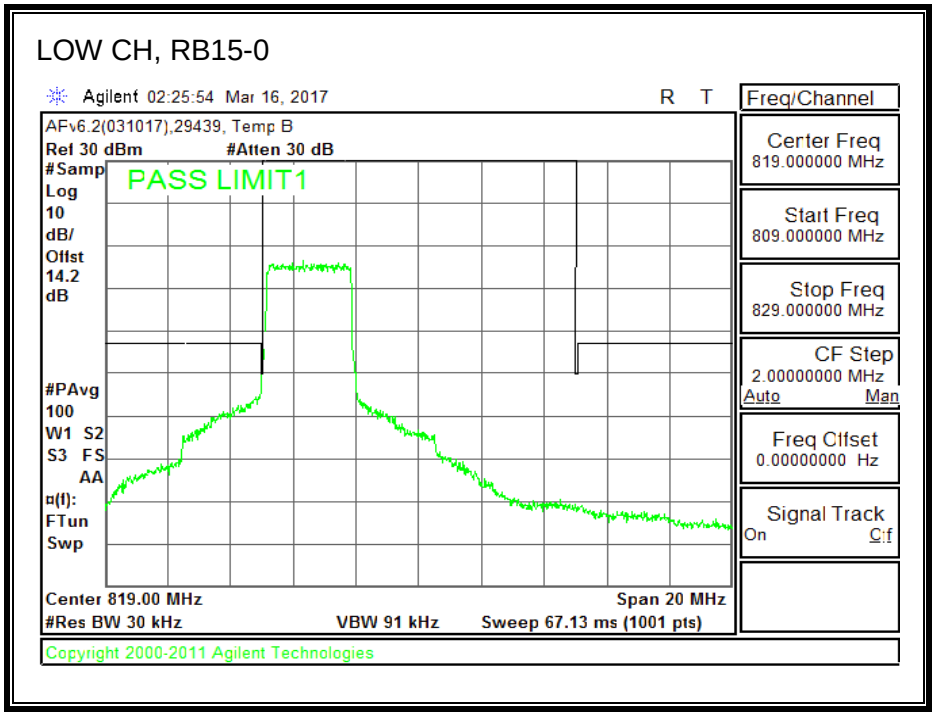
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**QPSK, (3.0 MHz BAND WIDTH)**

LOW, RB1-0




LOW CH, RB15-0

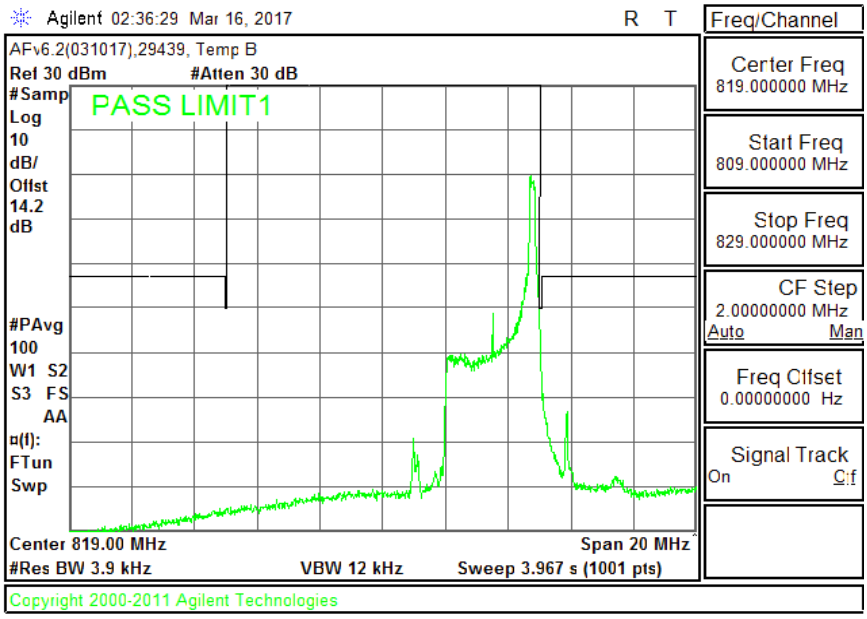




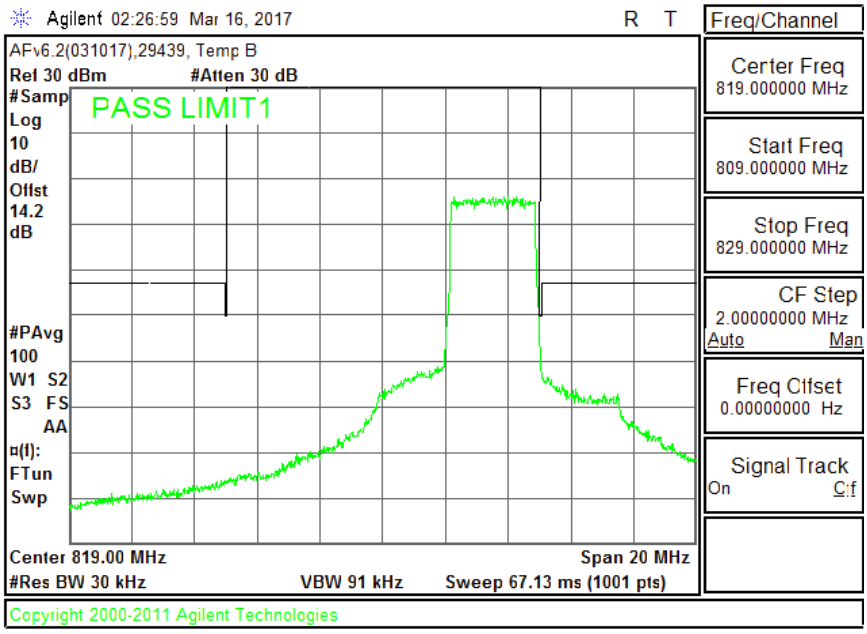


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

HIGH CH, RB1-14




HIGH CH, RB15-0

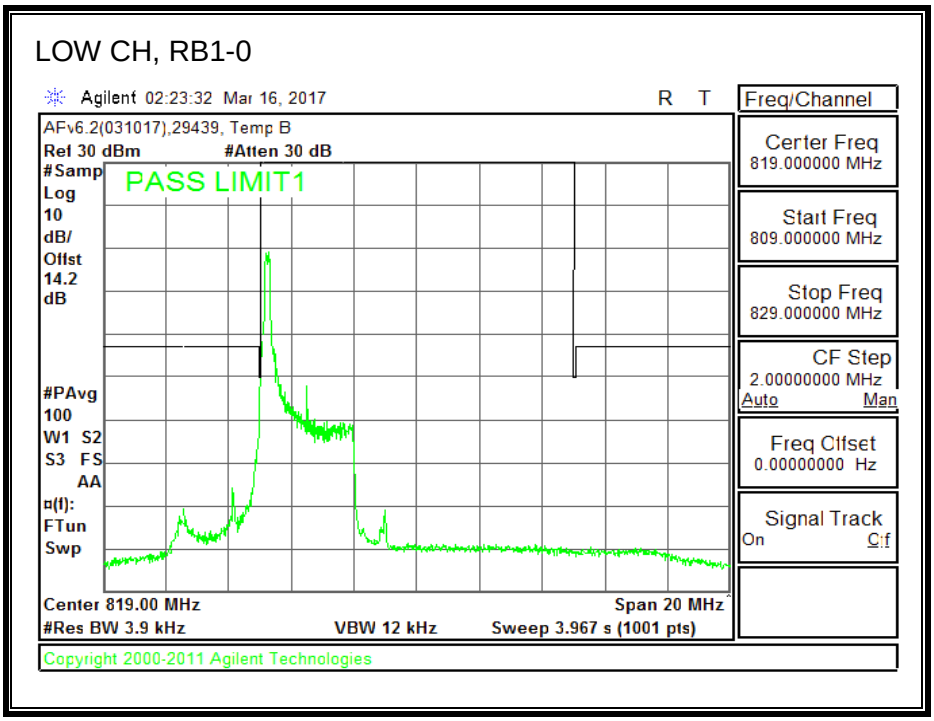


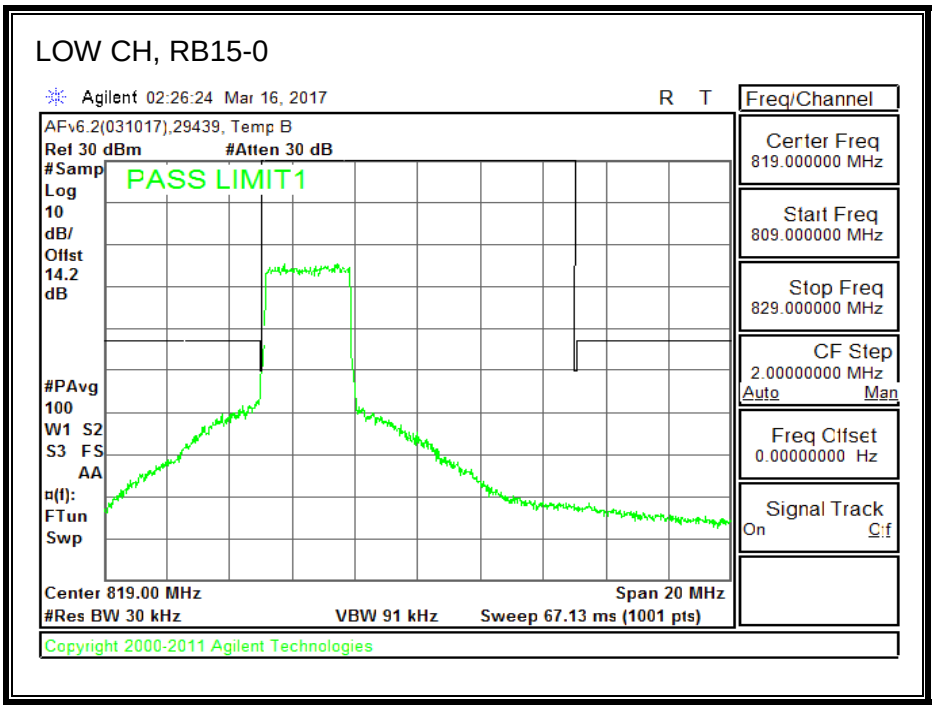




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**16QAM, (3.0 MHz BAND WIDTH)**



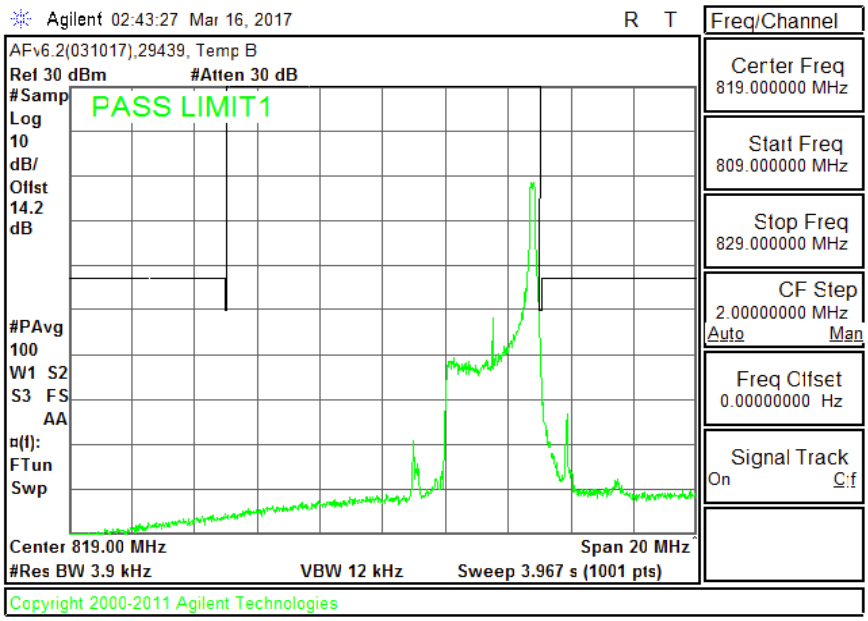





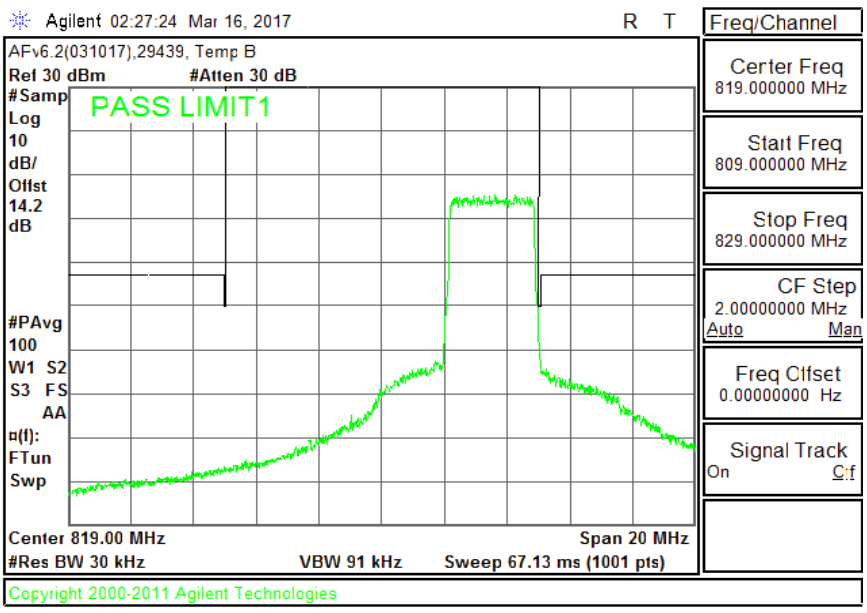


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

HIGH CH, RB1-14




HIGH CH, RB15-0



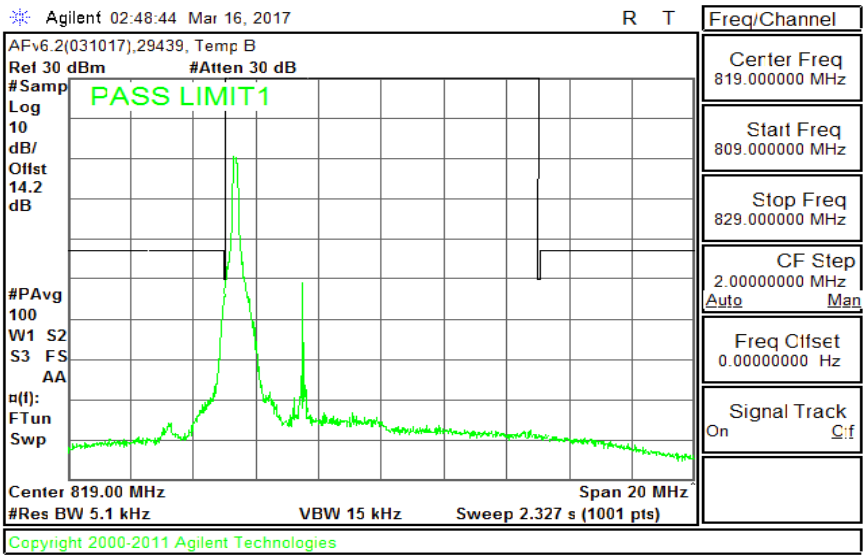




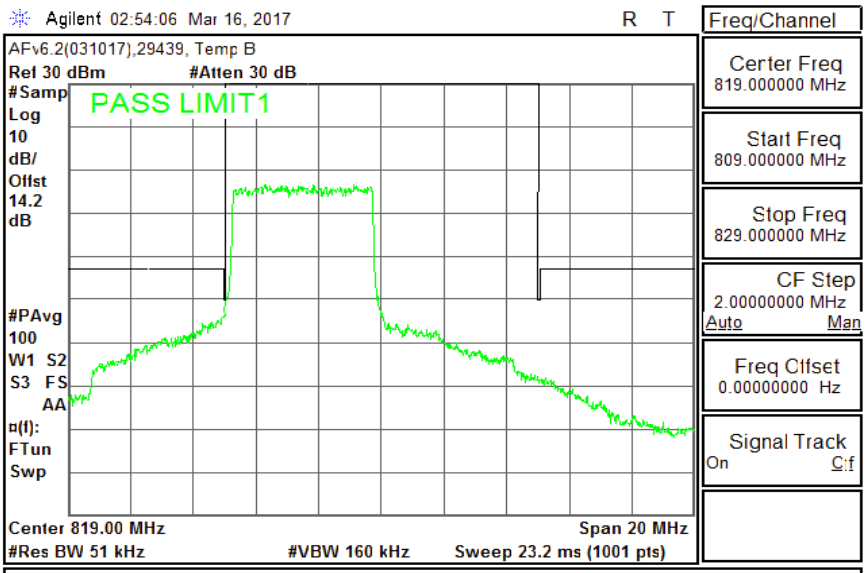
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**QPSK, (5.0 MHz BAND WIDTH)**

LOW CH, RB1-0




LOW CH, RB25-0

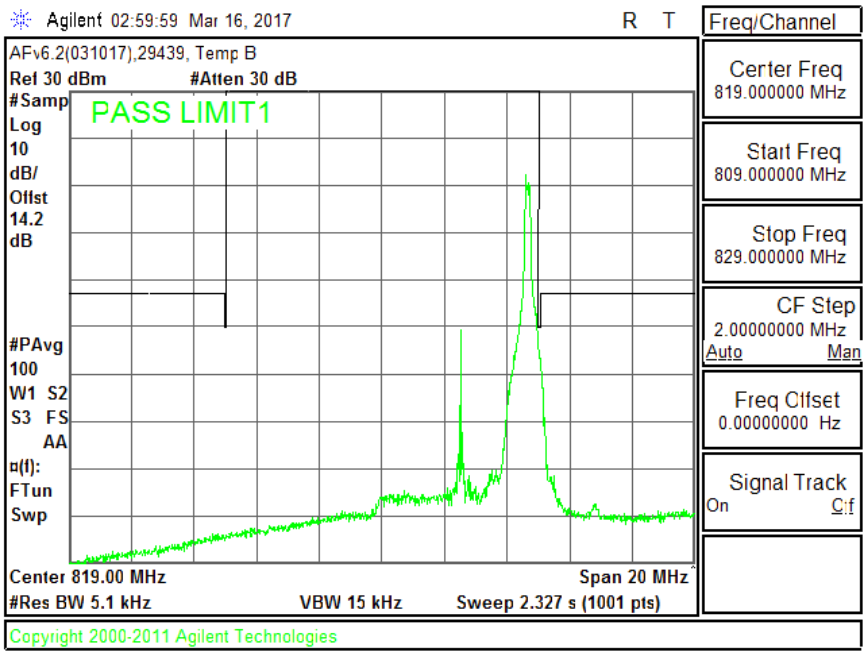




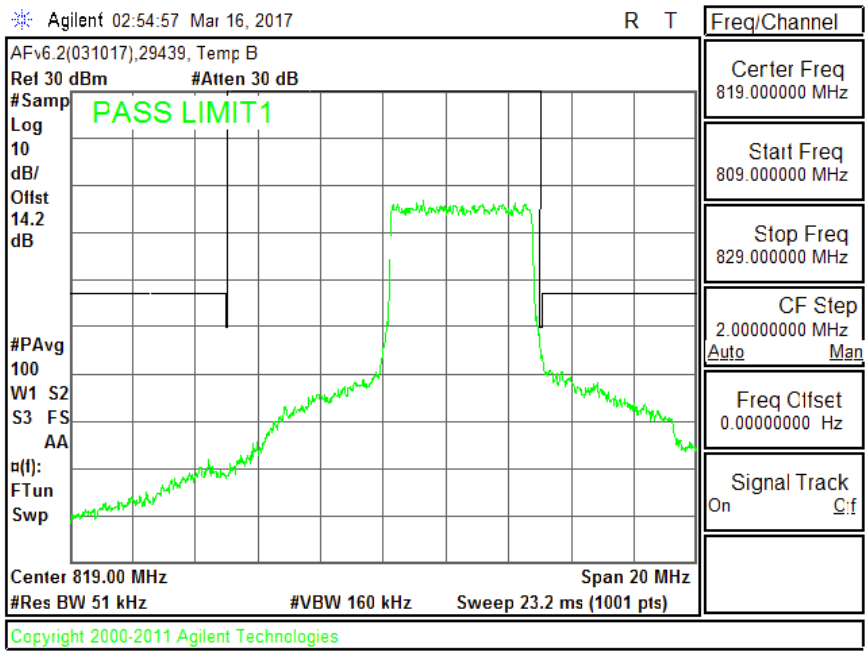


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

HIGH CH, RB1-24




HIGH CH, RB25-0

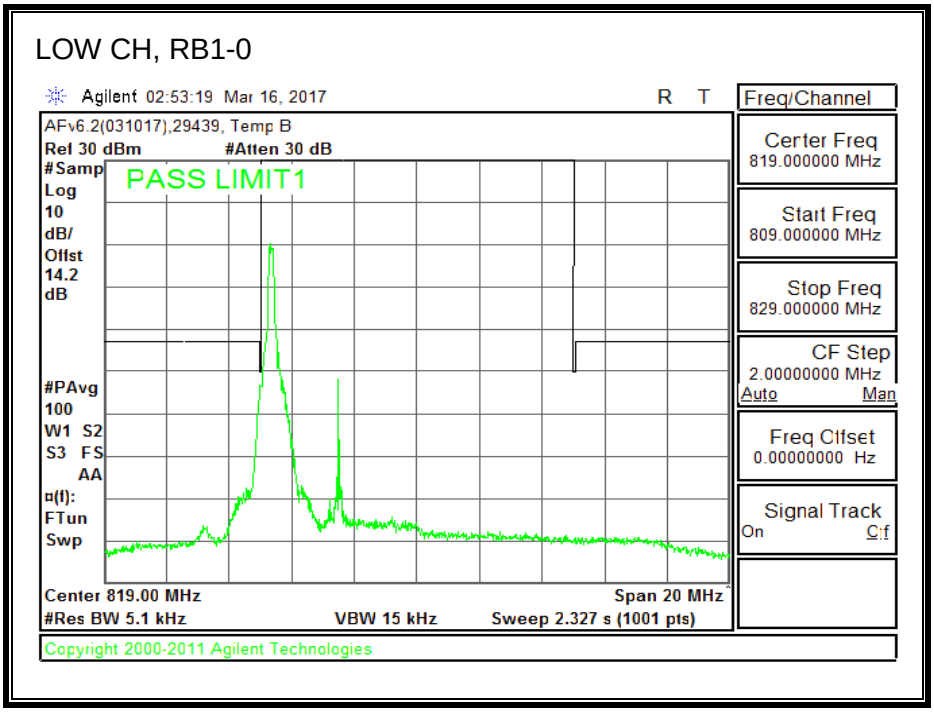


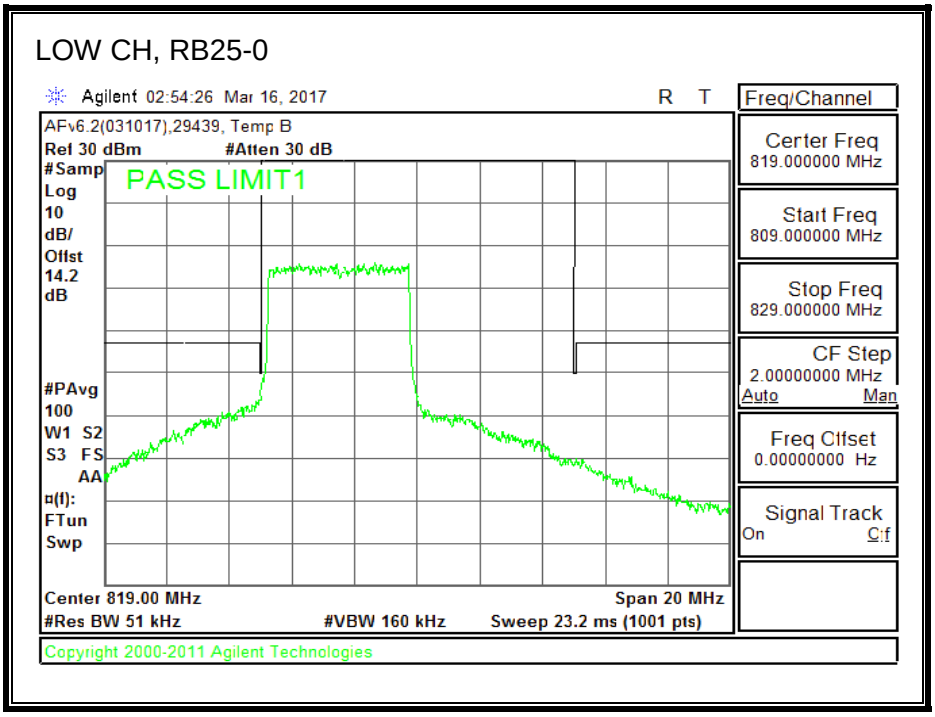




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**16QAM, (5.0 MHz BAND WIDTH)**



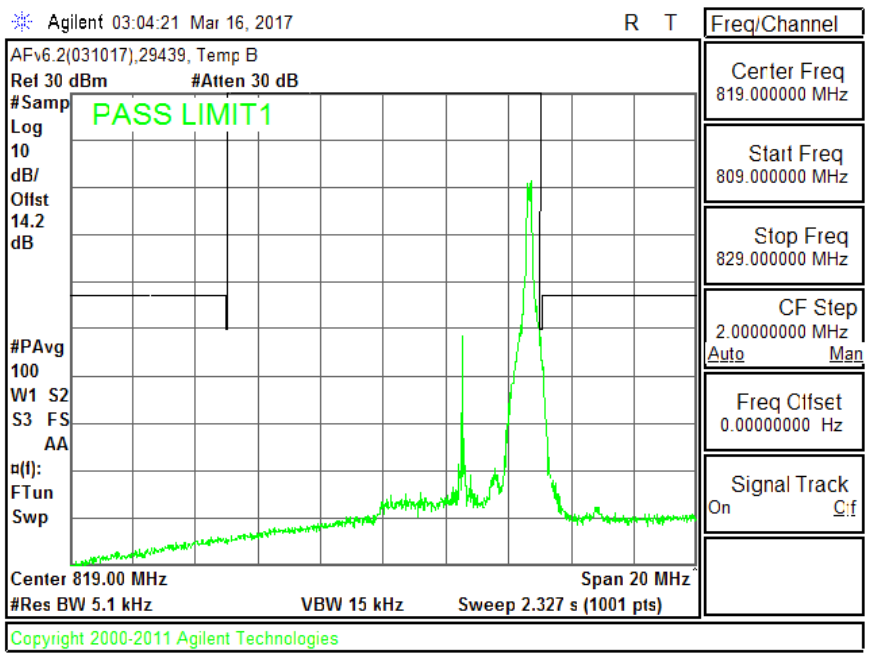





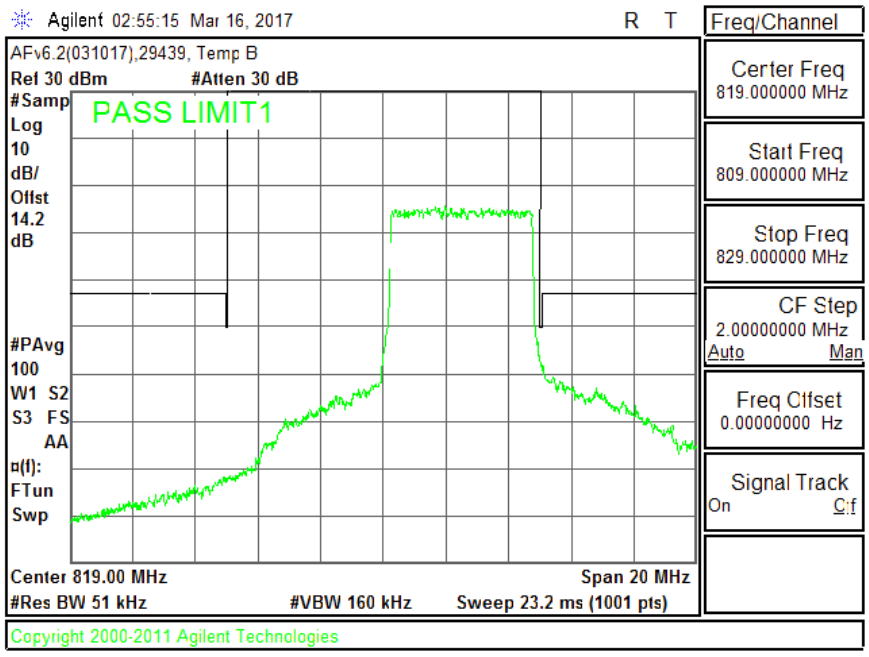


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

HIGH CH, RB1-24




HIGH CH, RB25-0

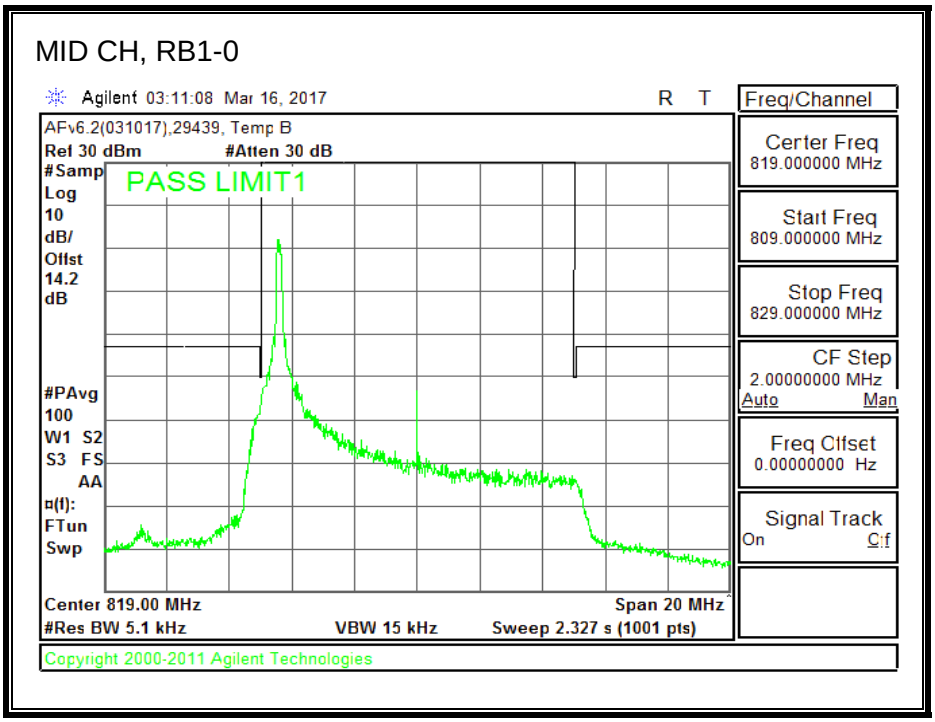


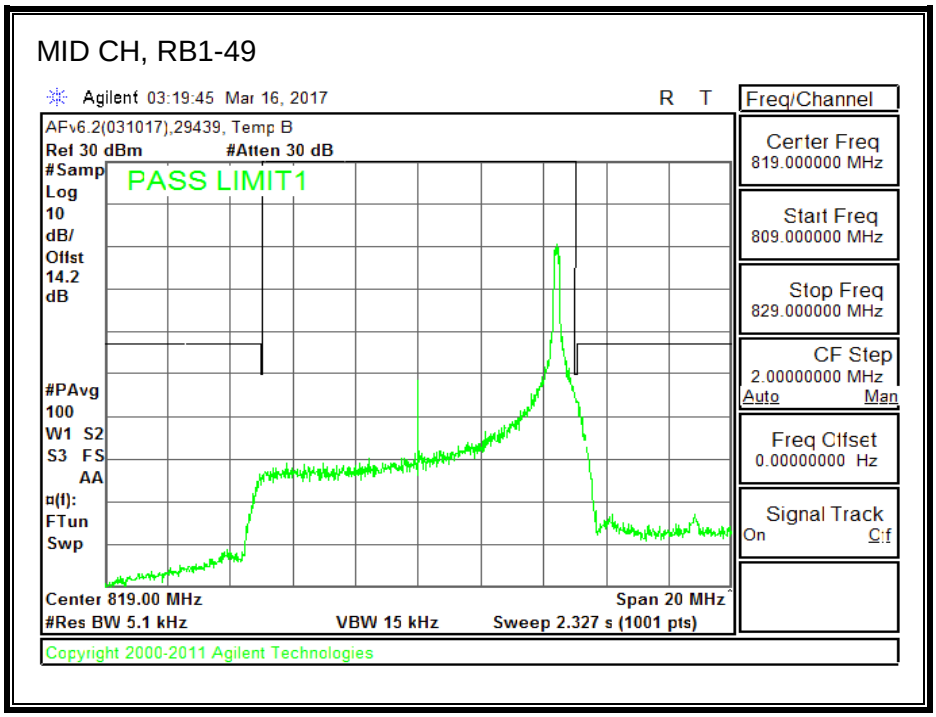




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**QPSK, (10.0 MHz BAND WIDTH)**

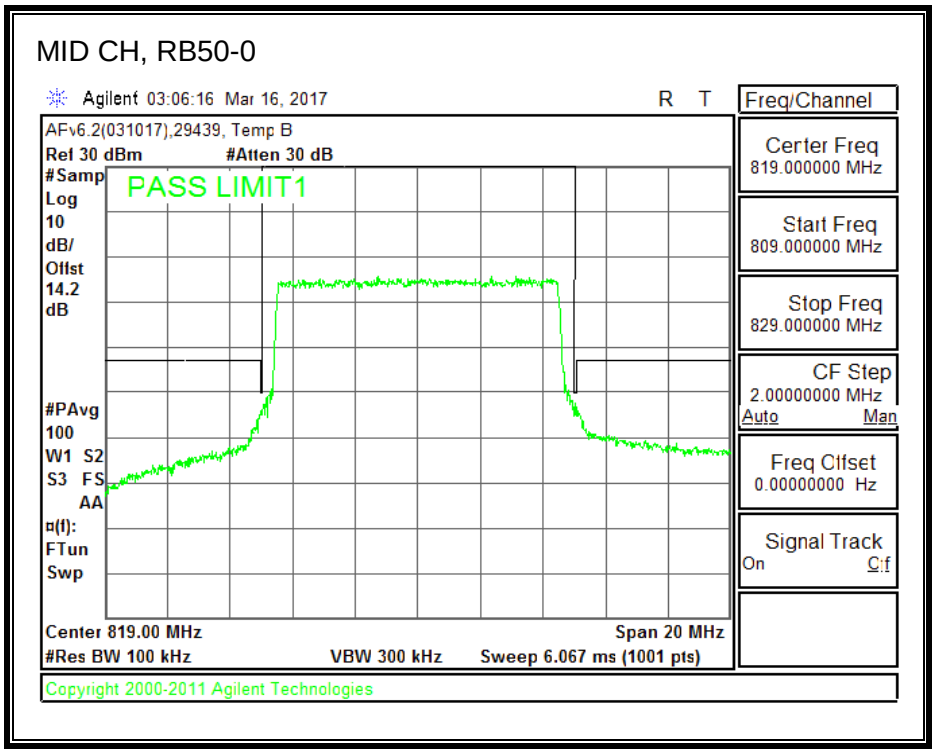


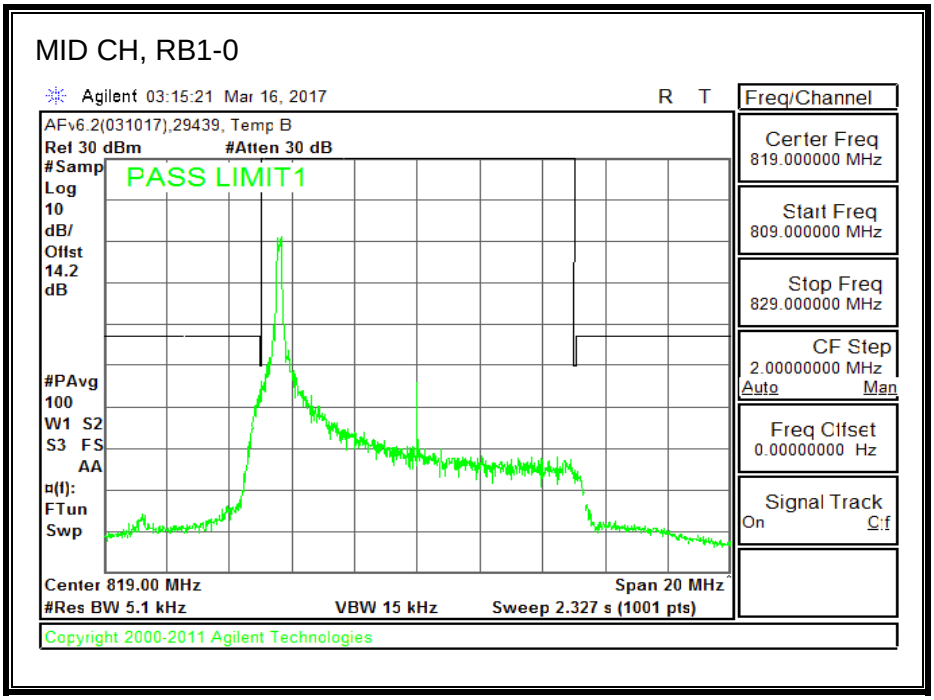




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*




**16QAM, (10.0 MHz BAND WIDTH)**

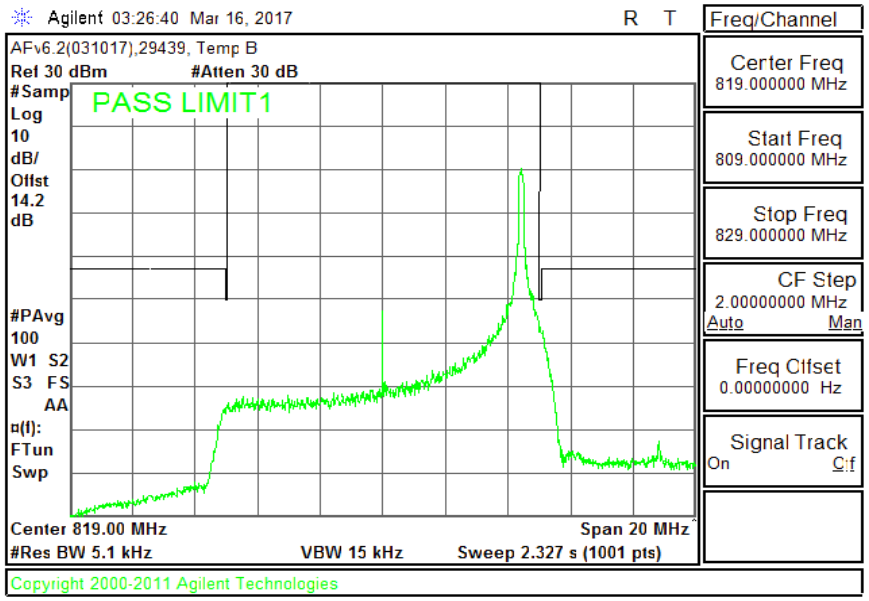




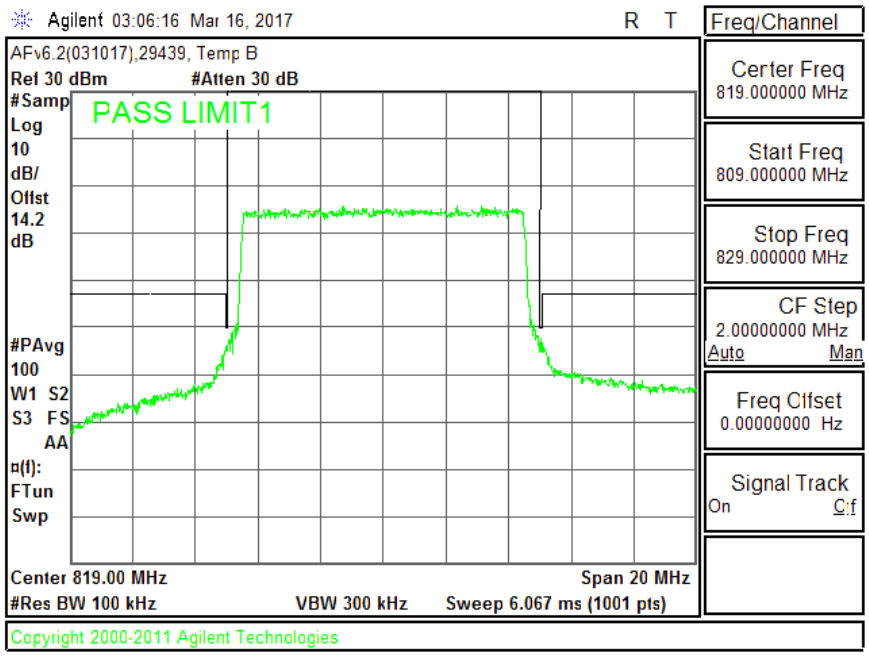


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

MID CH, RB1-49




MID CH, RB50-0

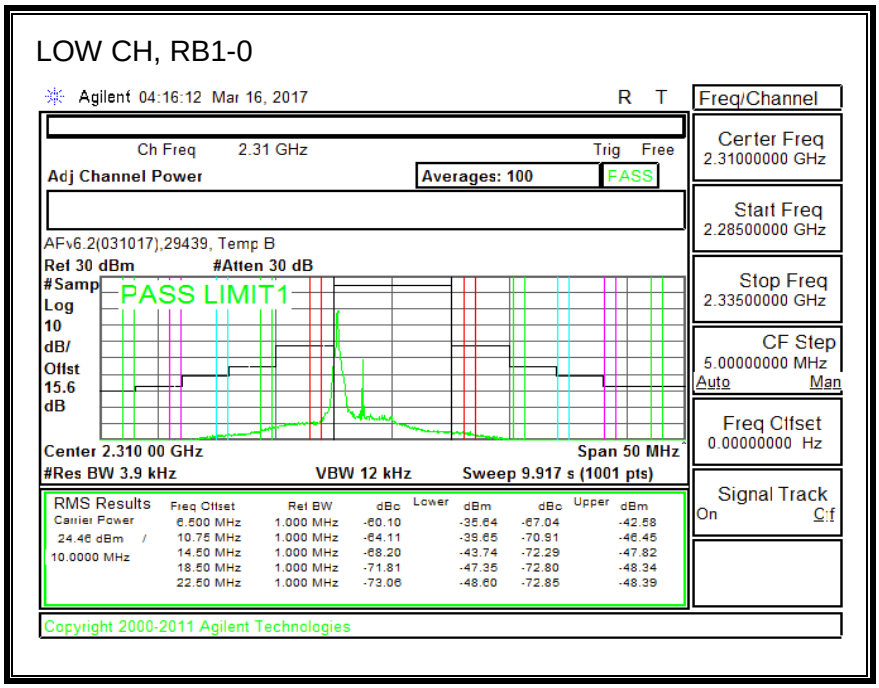


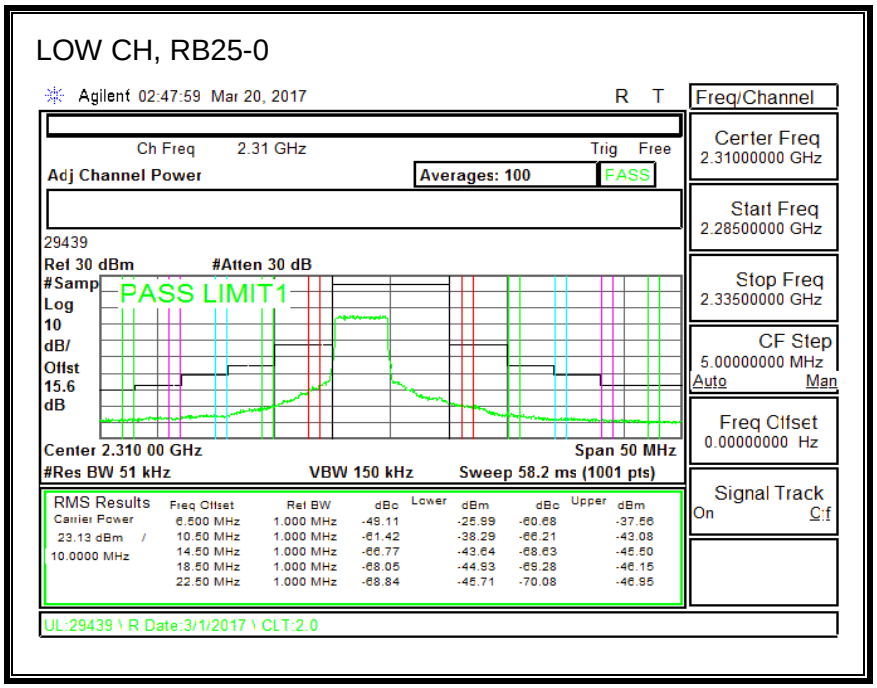



UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
FORM NO: CCSUP4031B
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 8.2.10. LTE BAND 30 ADJACENT CHANNEL POWER

**QPSK, (5.0 MHz BAND WIDTH)**



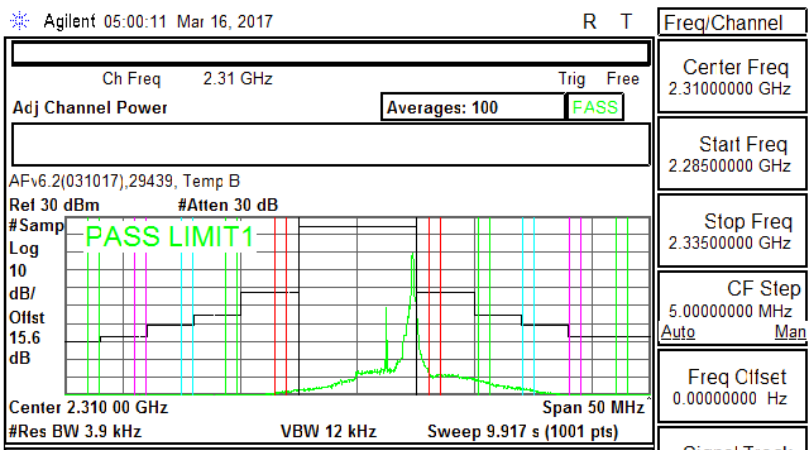





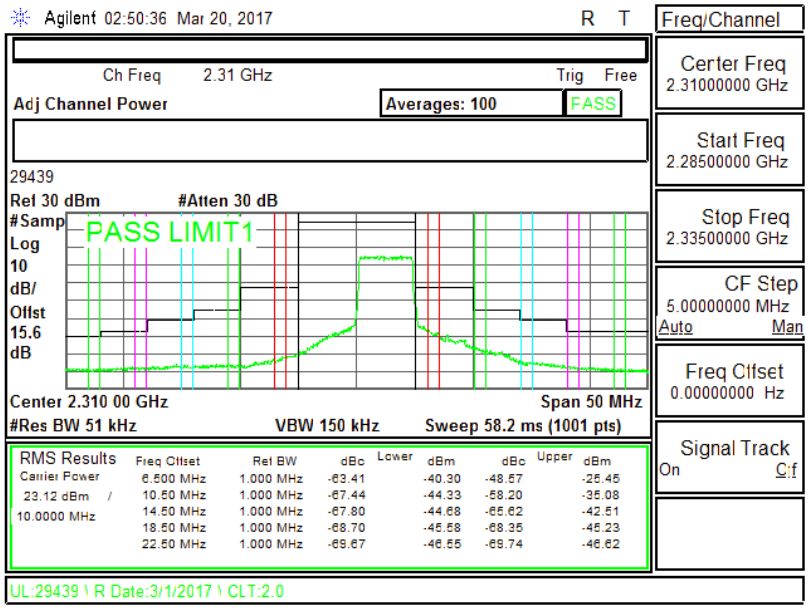


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

HIGH CH, RB1-24




HIGH CH, RB25-0

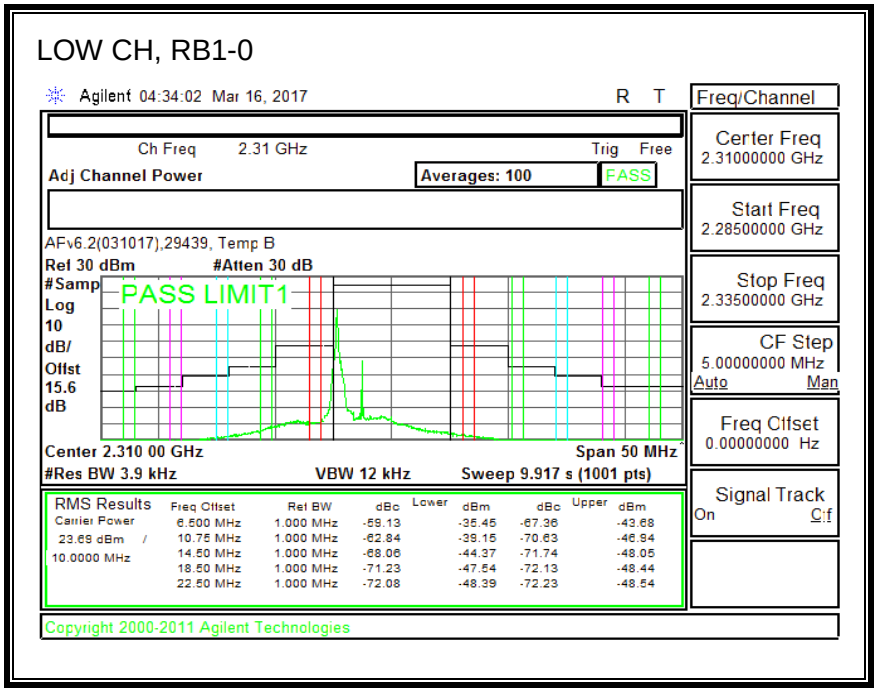


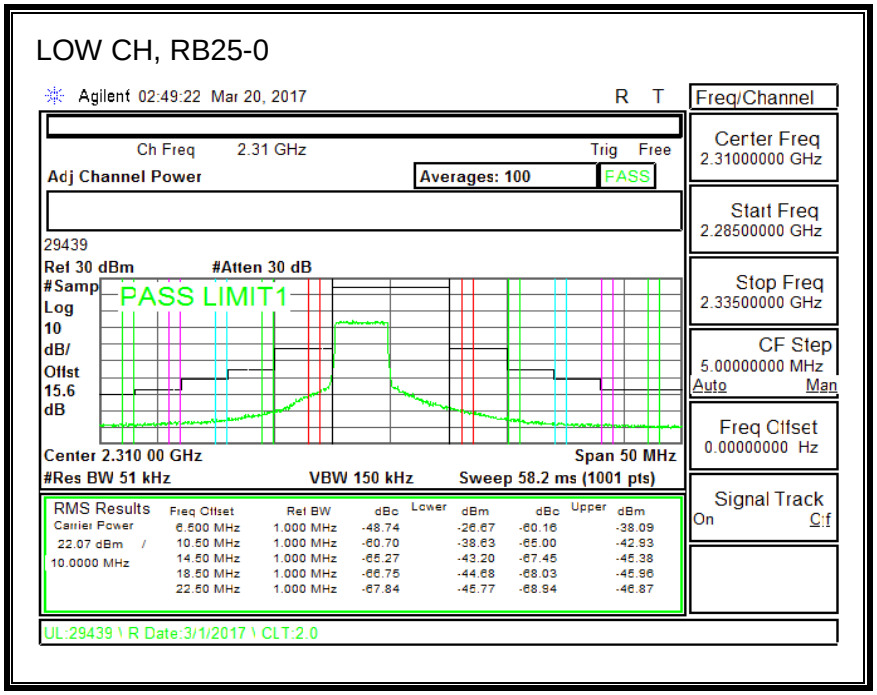




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**16QAM, (5.0 MHz BAND WIDTH)**



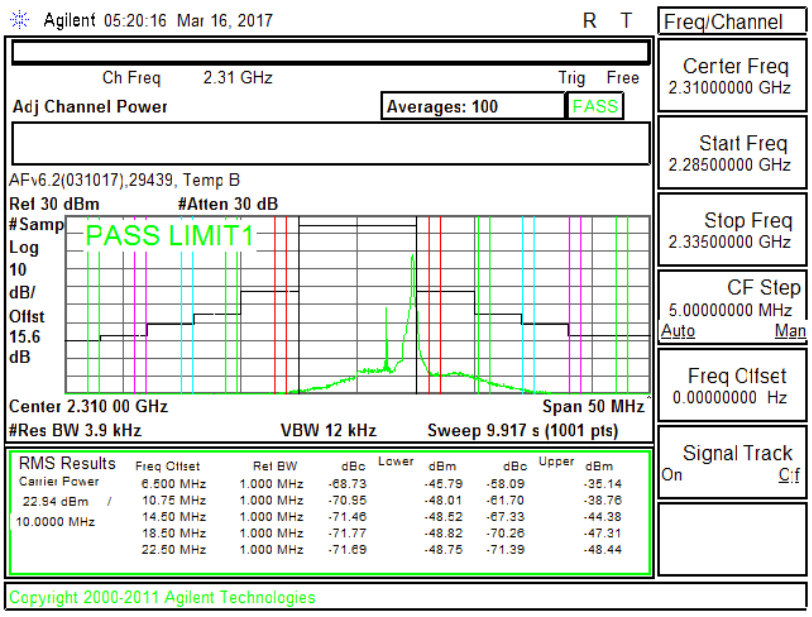





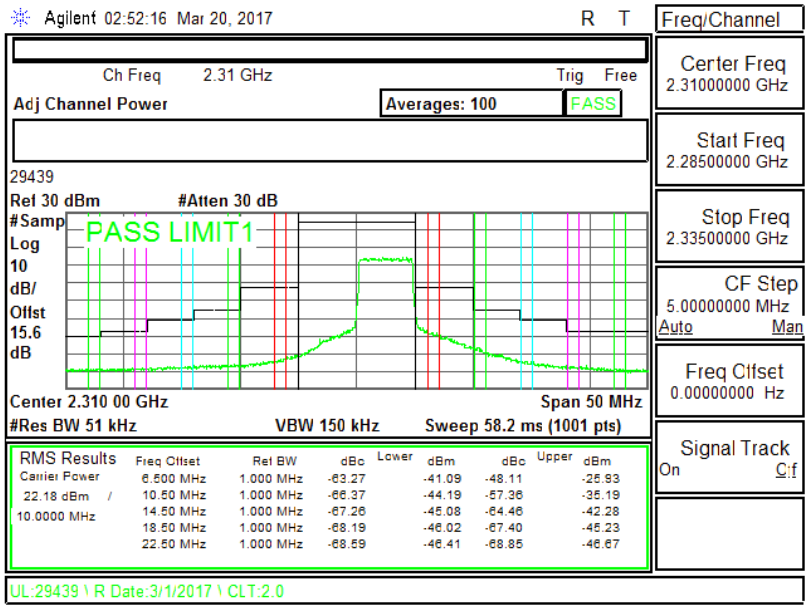


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

HIGH CH, RB1-24




HIGH CH, RB25-0

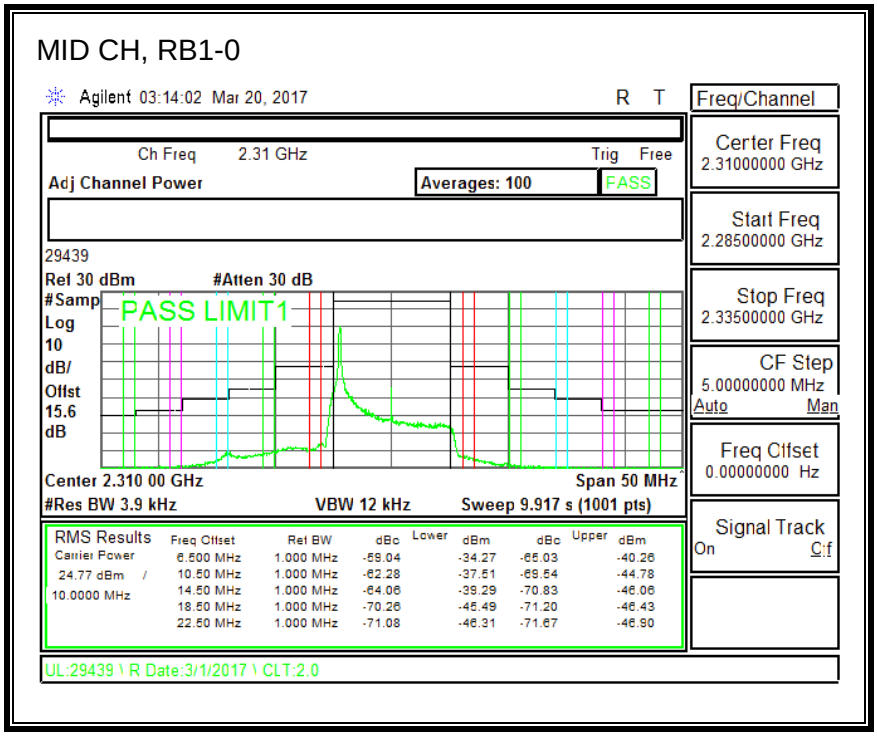


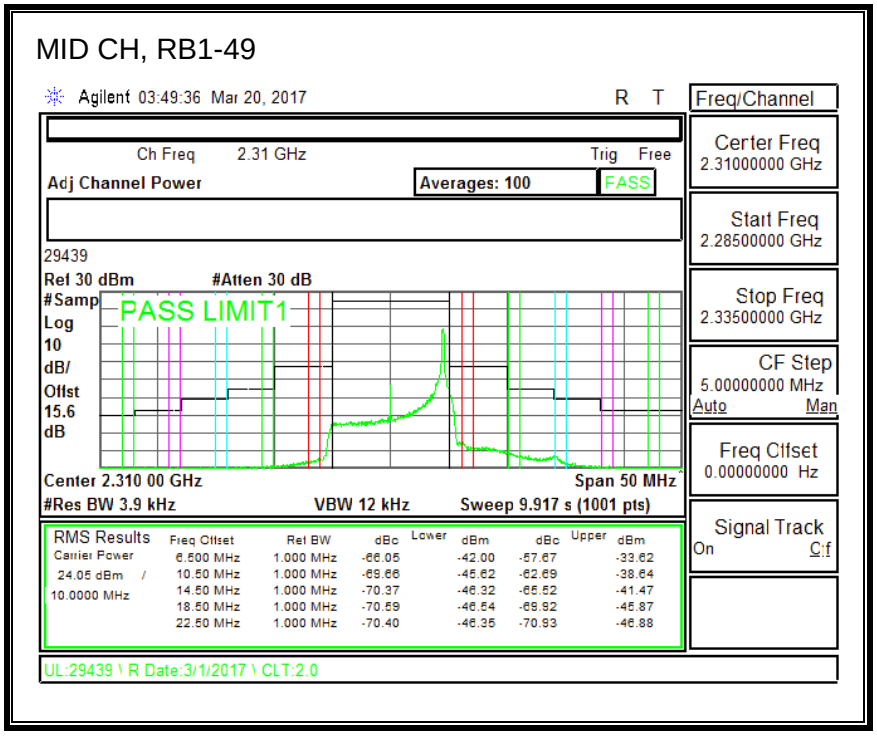




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**QPSK, (10.0 MHz BAND WIDTH)**

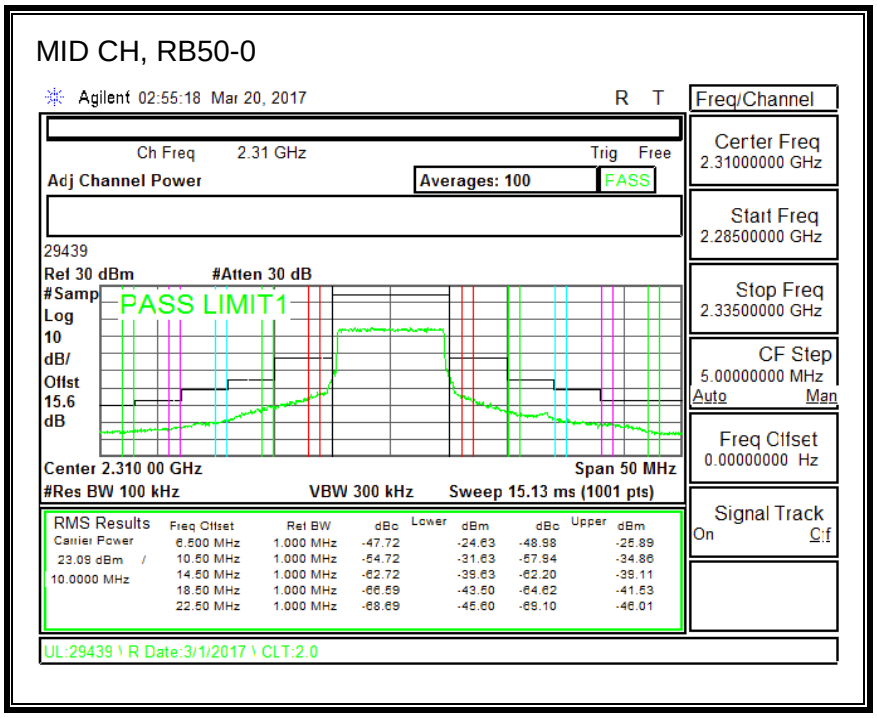


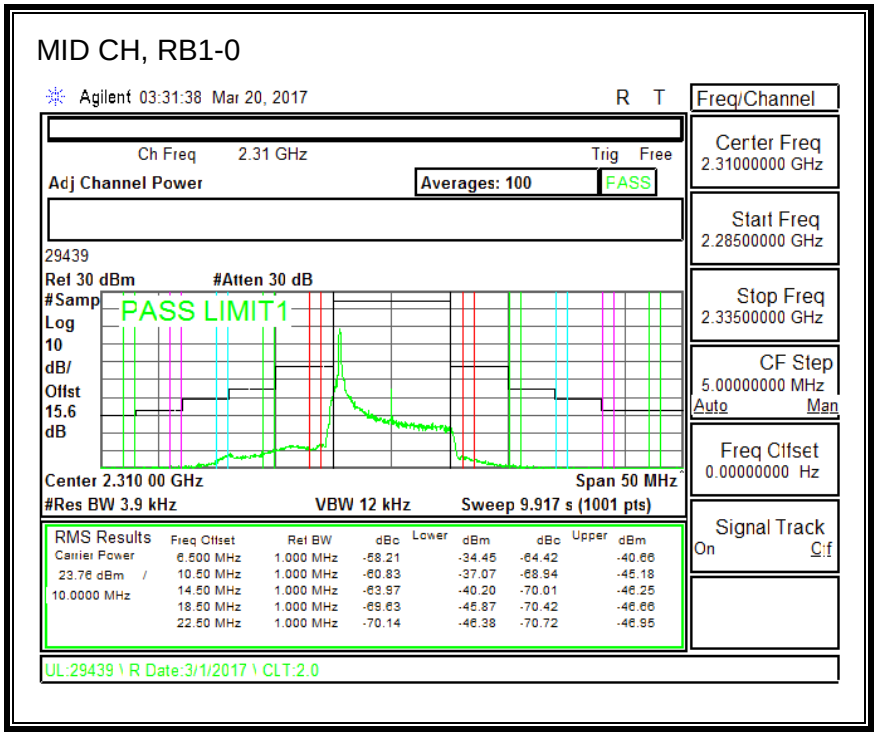




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*




**16QAM, (10.0 MHz BAND WIDTH)**

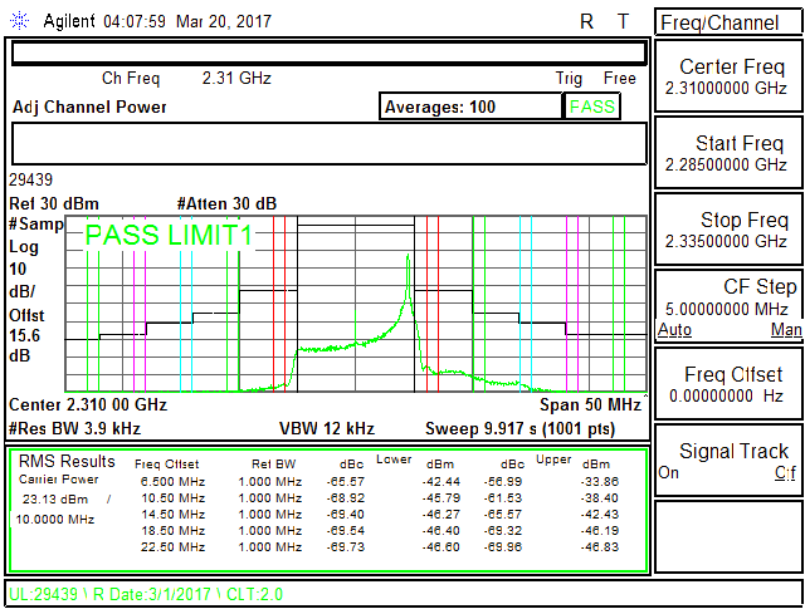




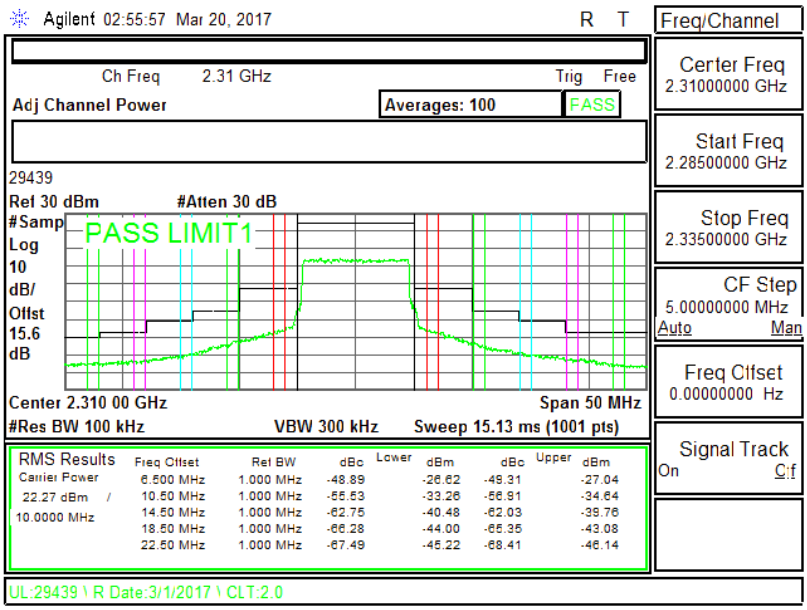


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

MID CH, RB1-49




MID CH, RB50-0



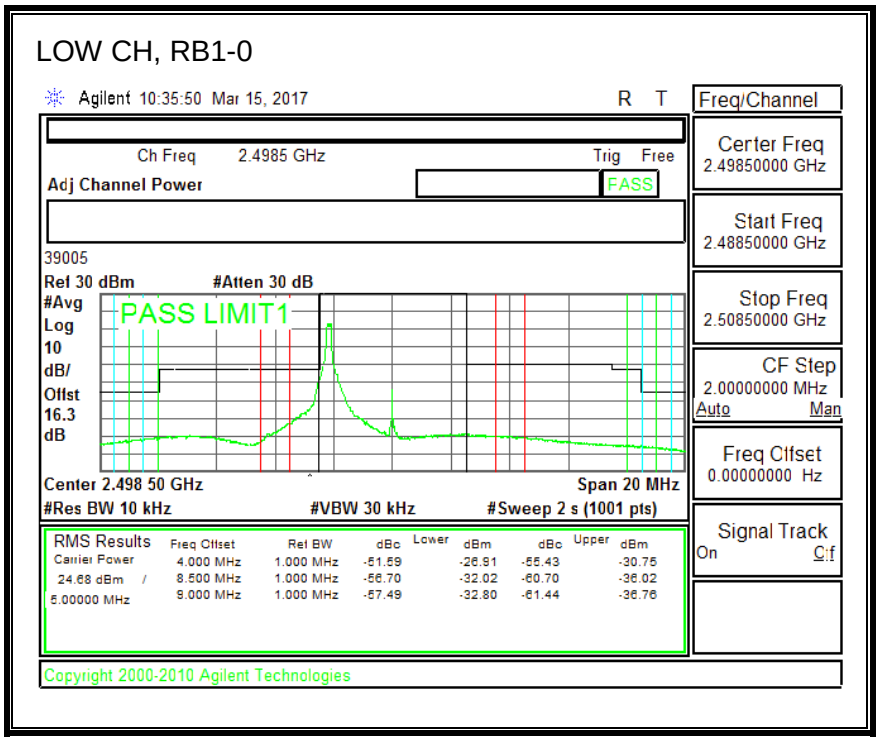


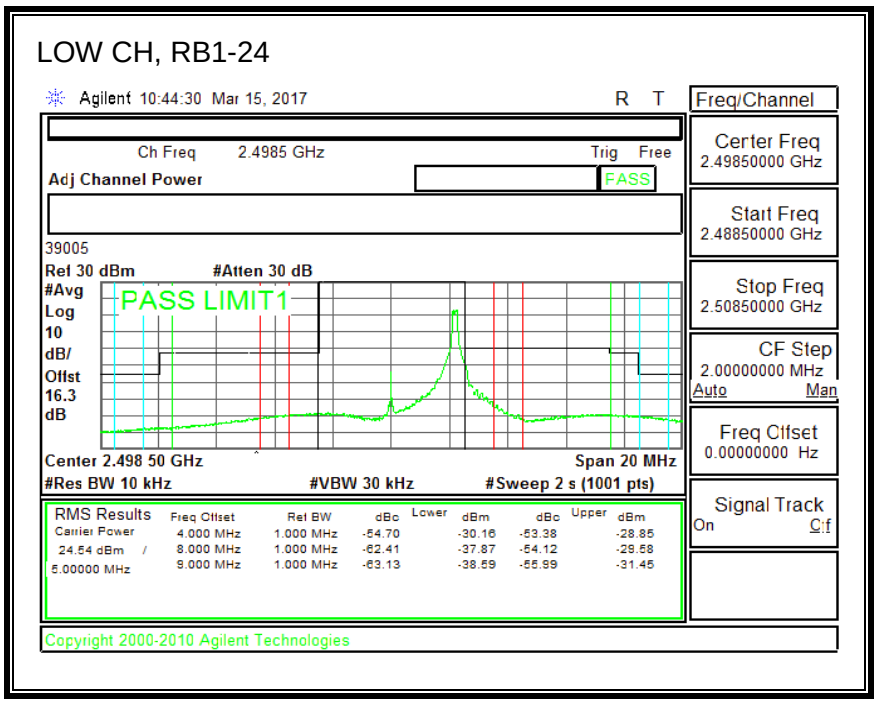


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

## 8.2.11. LTE BAND 41 ADJACENT CHANNEL POWER

**QPSK, (5.0 MHz BAND WIDTH)**



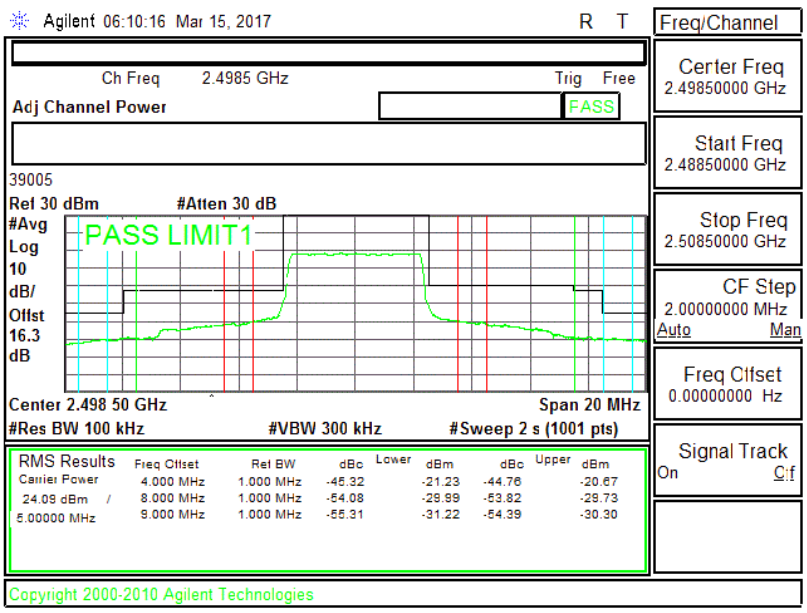





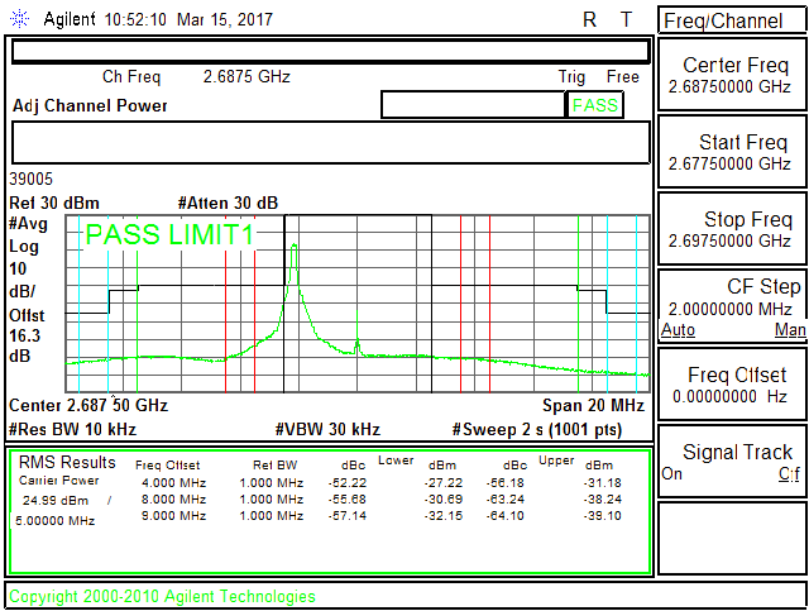


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

LOW CH, RB25-0




HIGH CH, RB1-0

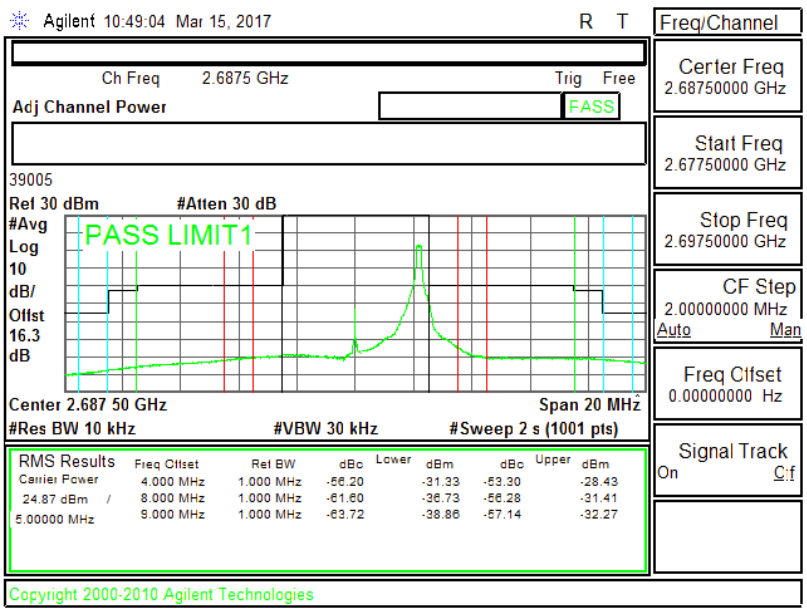




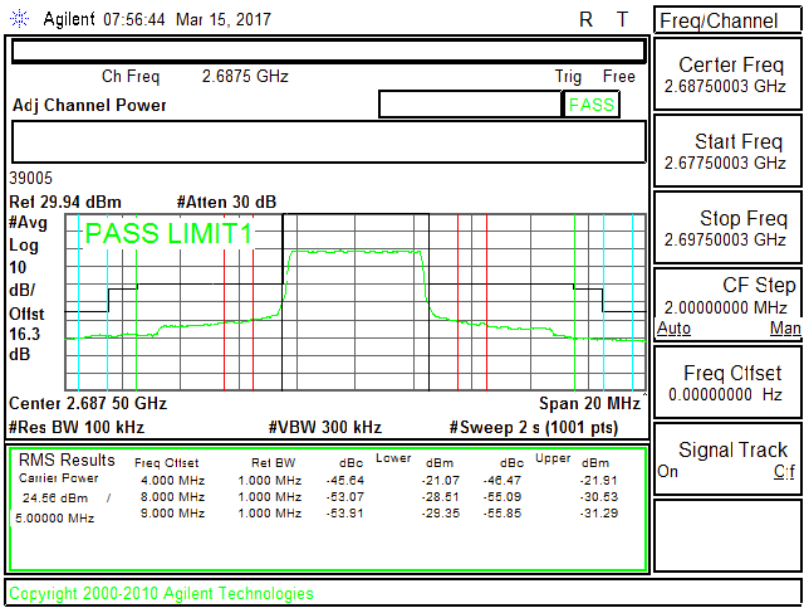


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

HIGH CH, RB1-24



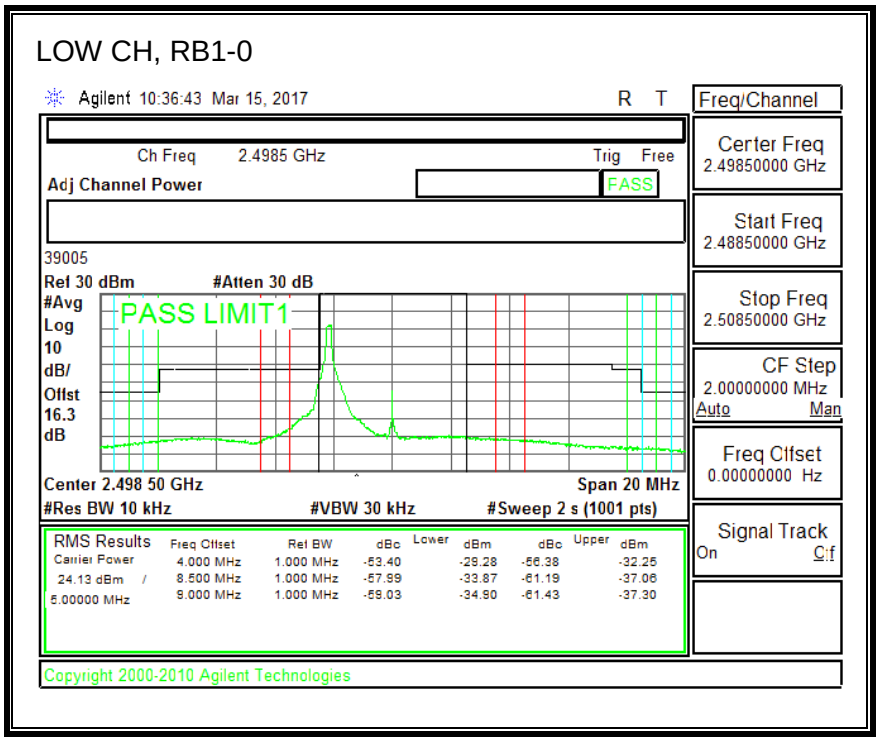

HIGH CH, RB25-0

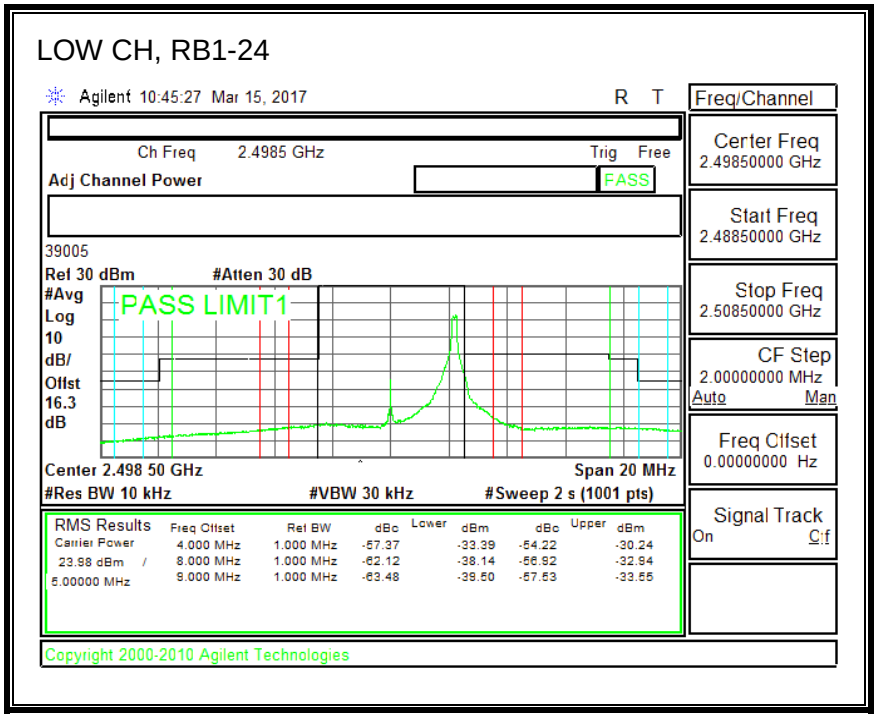





UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**16QAM, (5.0 MHz BAND WIDTH)**



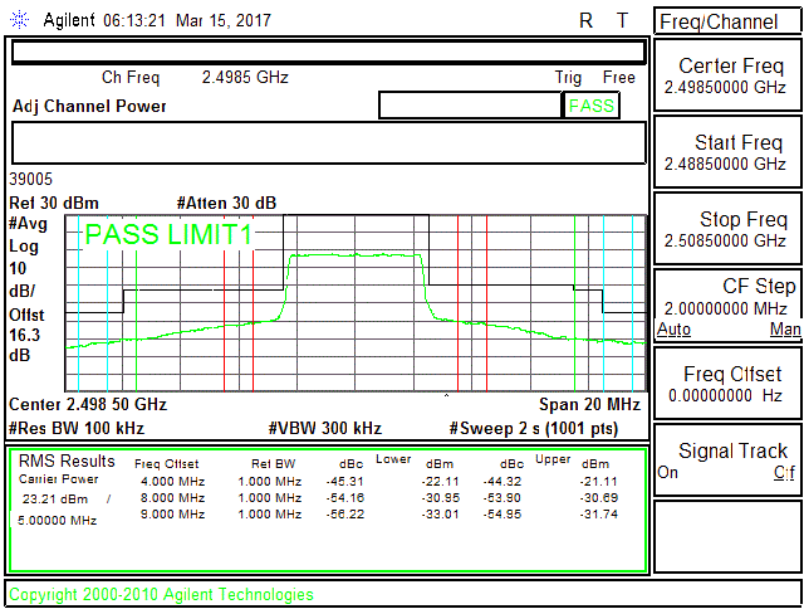





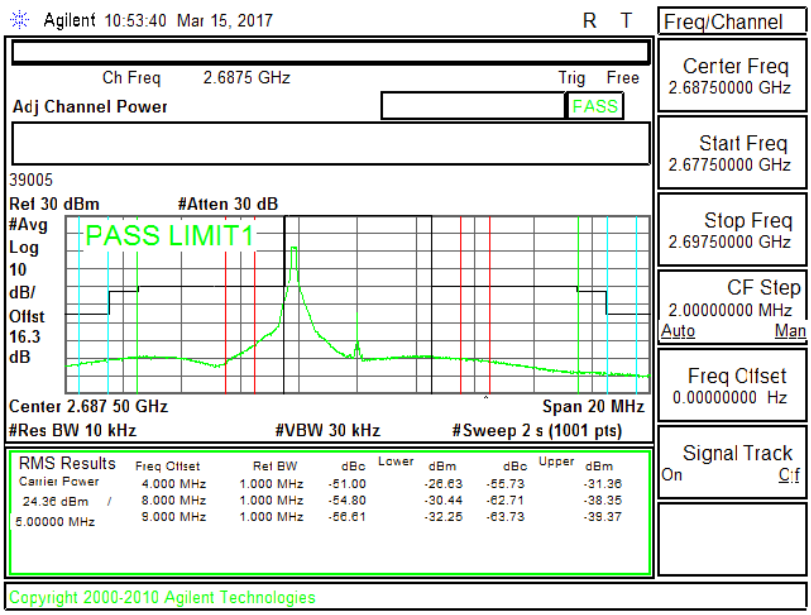


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

LOW CH, RB25-0



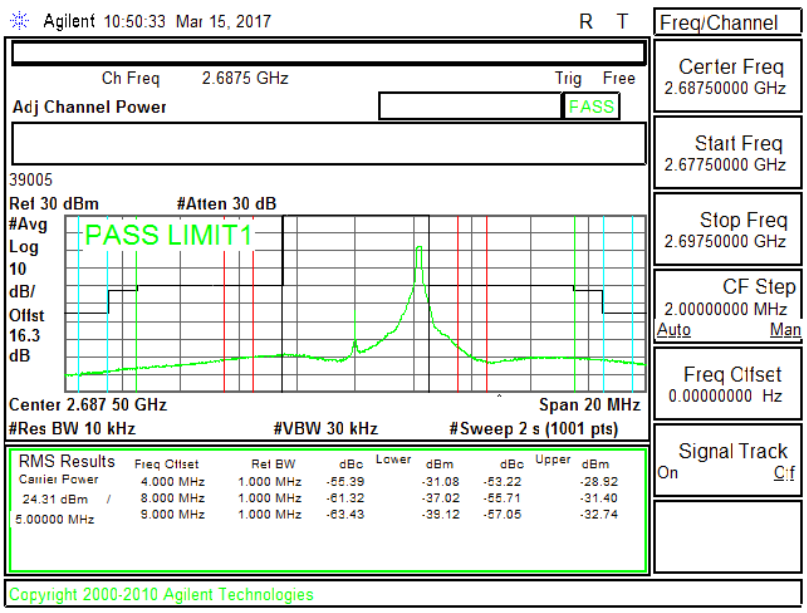

HIGH CH, RB1-0



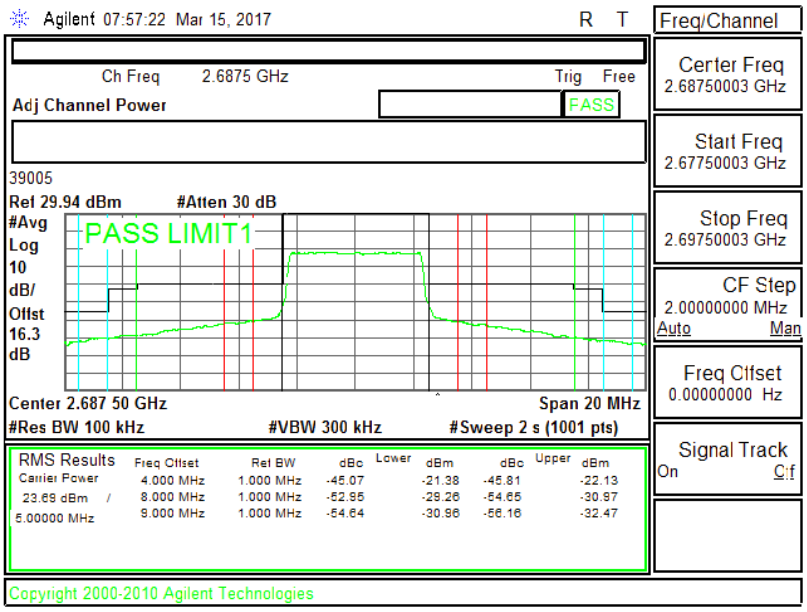


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

HIGH CH, RB1-24




HIGH CH, RB25-0

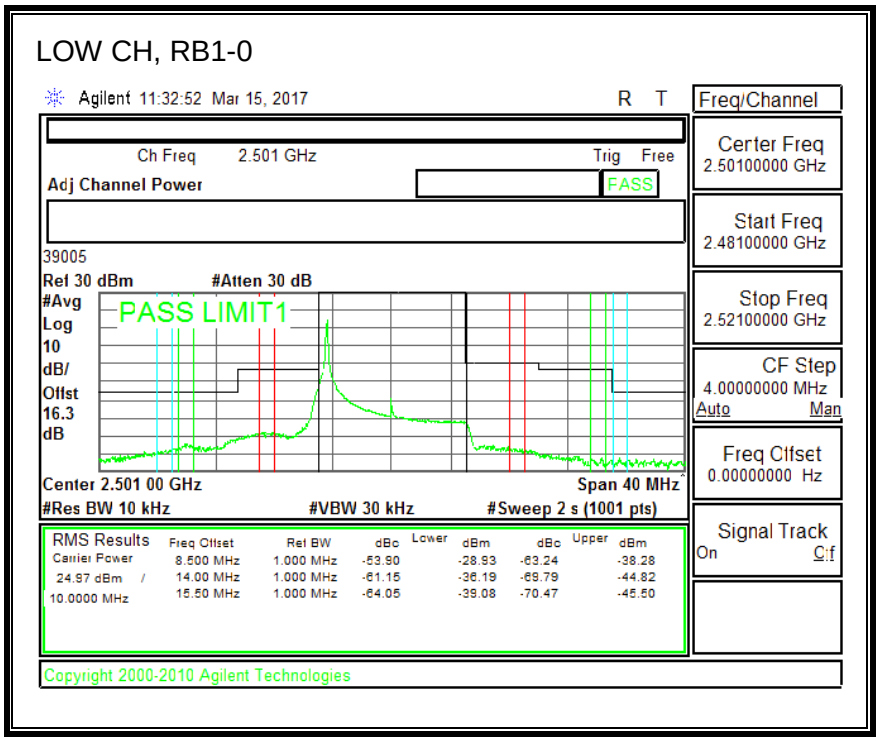


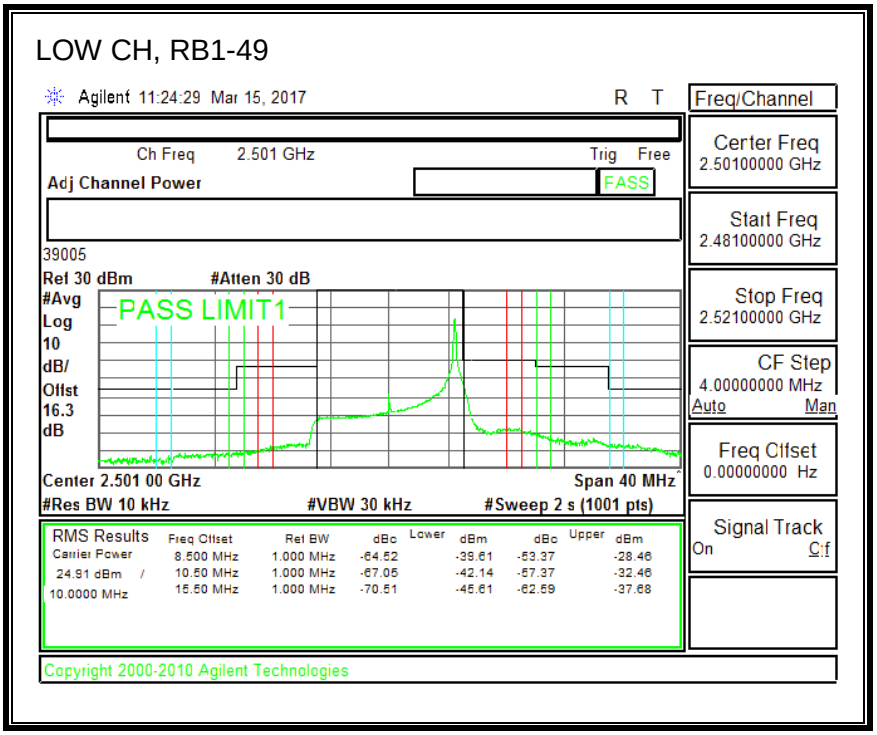




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**QPSK, (10.0 MHz BAND WIDTH)**



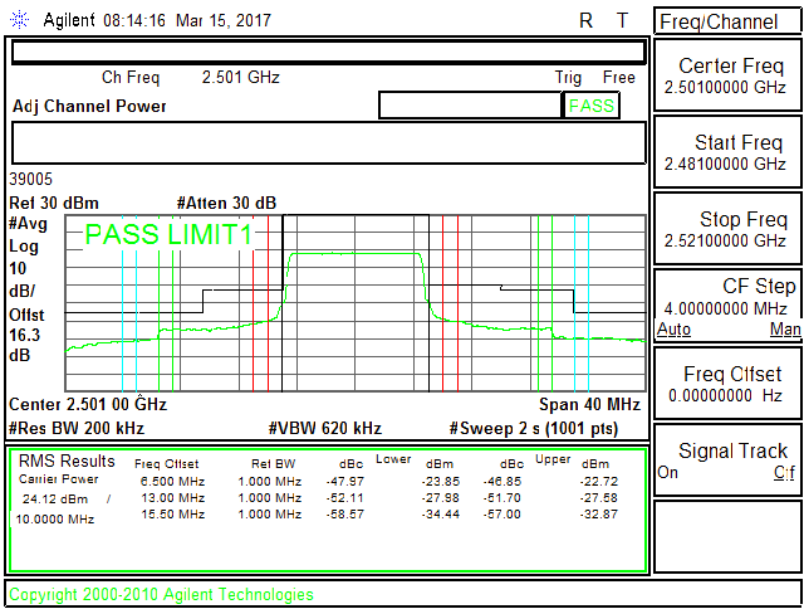





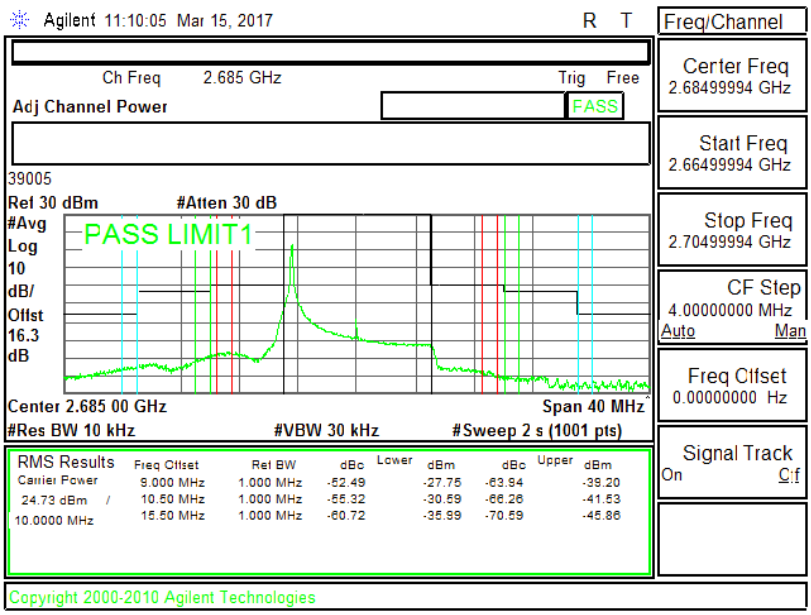


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

LOW CH, RB50-0



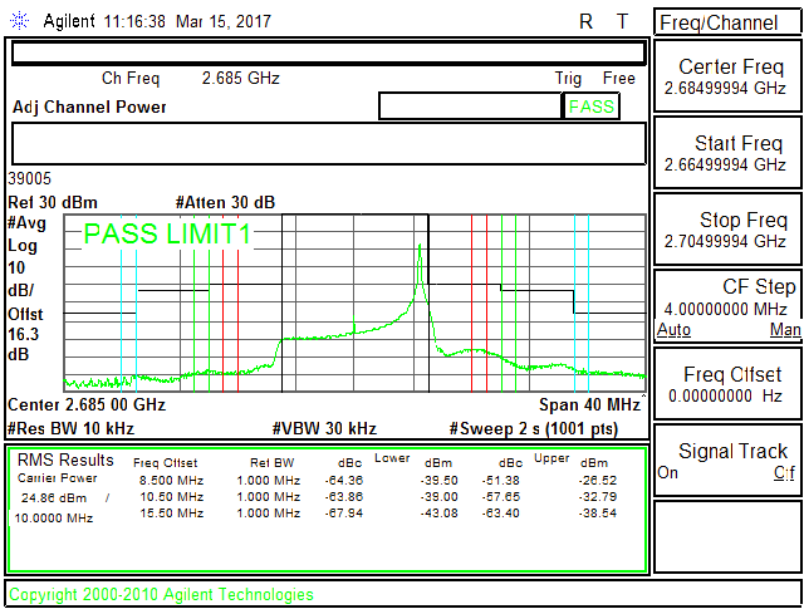

HIGH CH, RB1-0



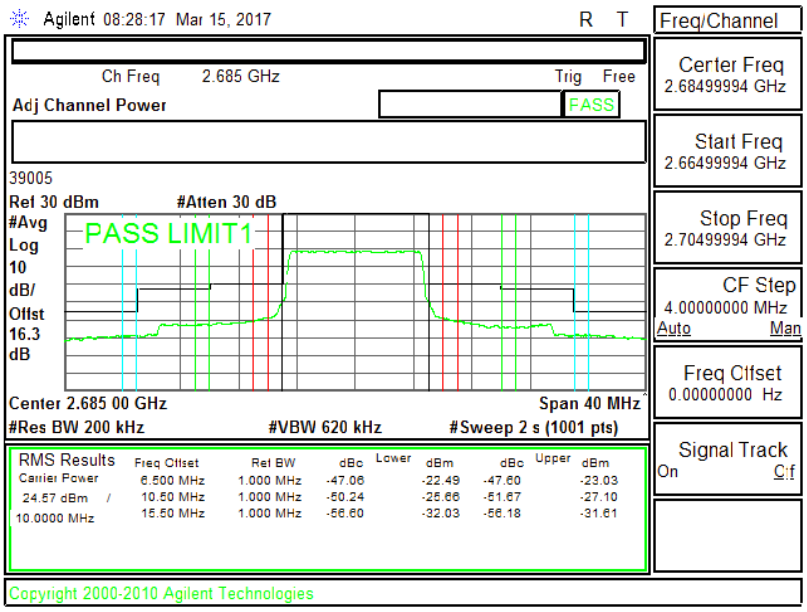


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

HIGH CH, RB1-49



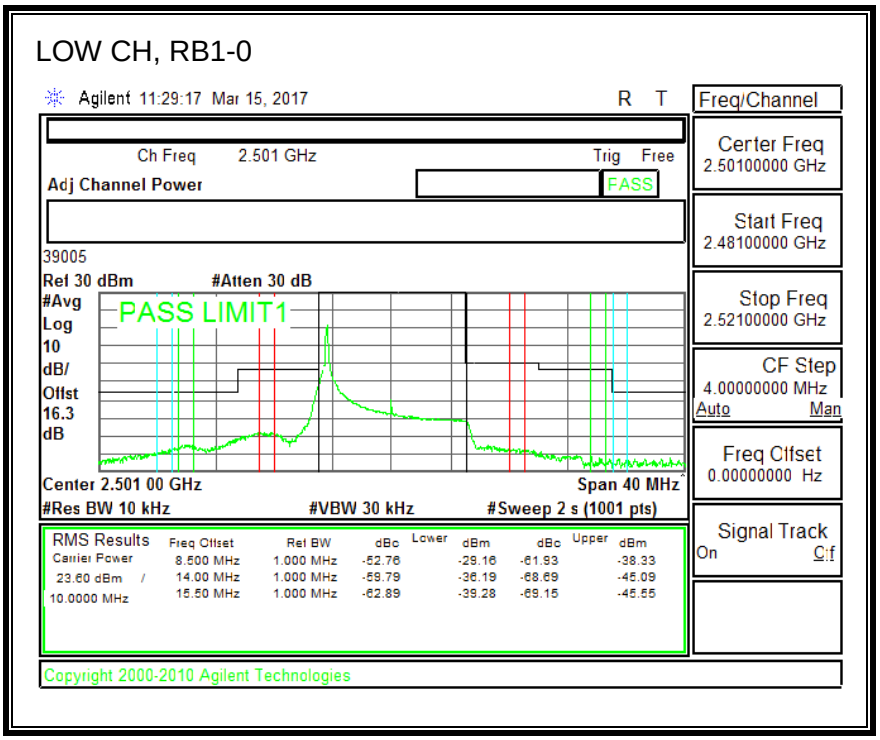

HIGH CH, RB50-0

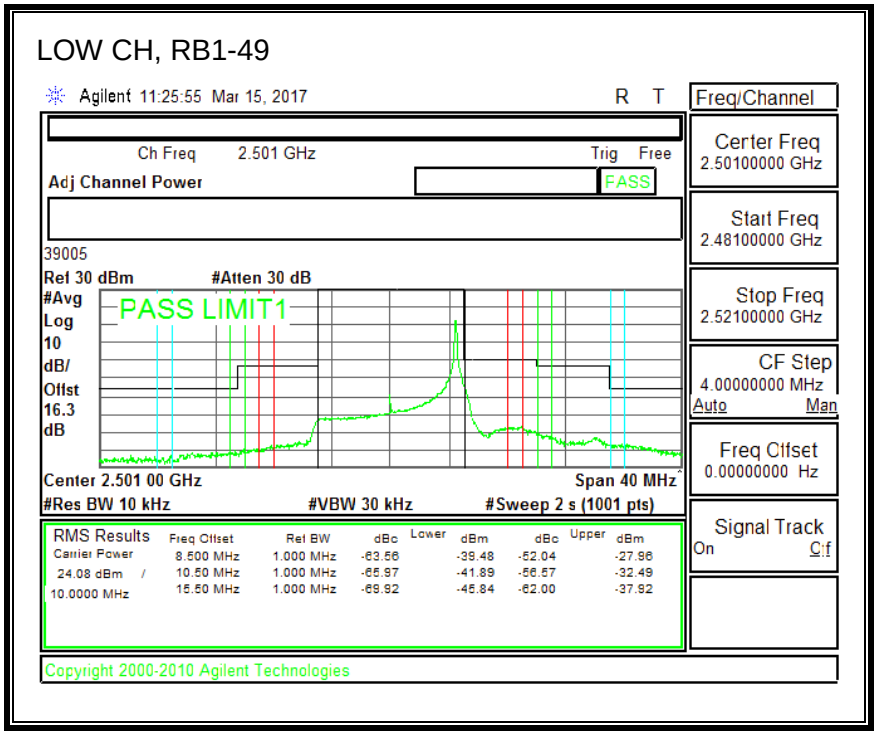





UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**16QAM, (10.0 MHz BAND WIDTH)**



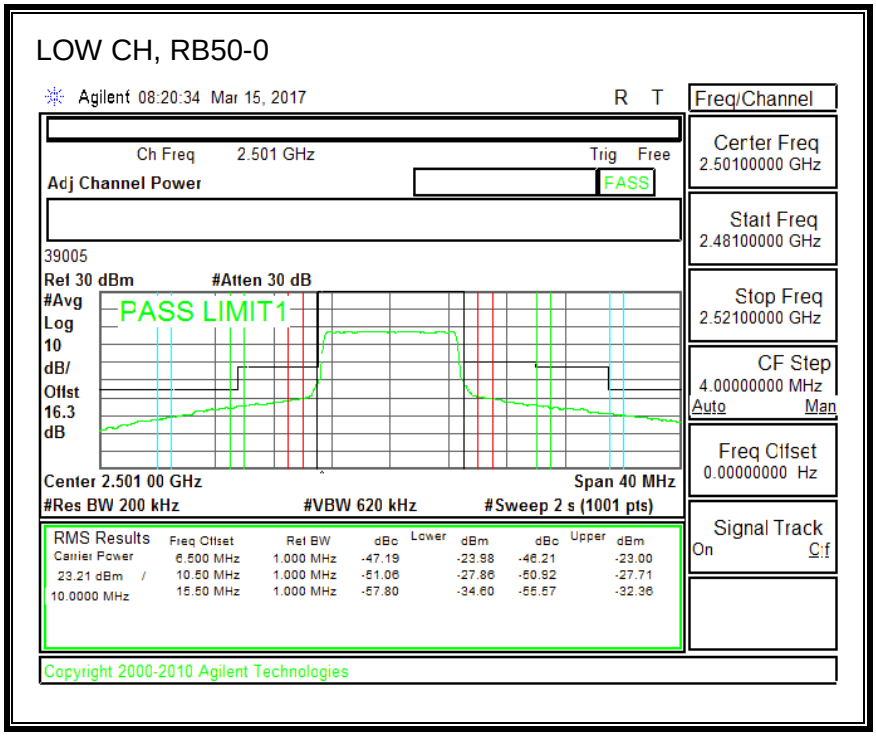





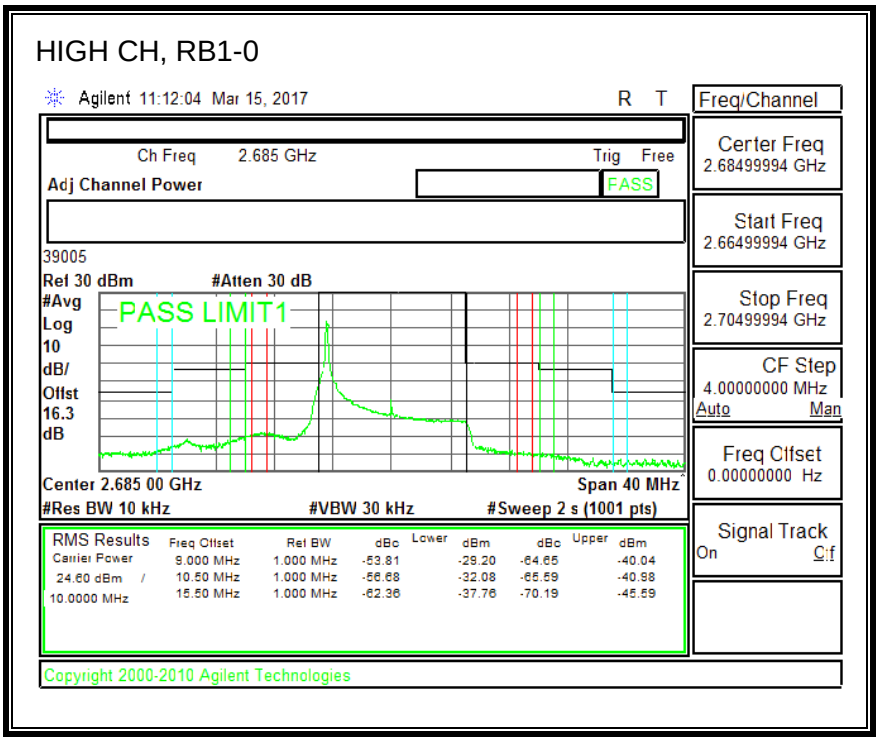


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

LOW CH, RB50-0



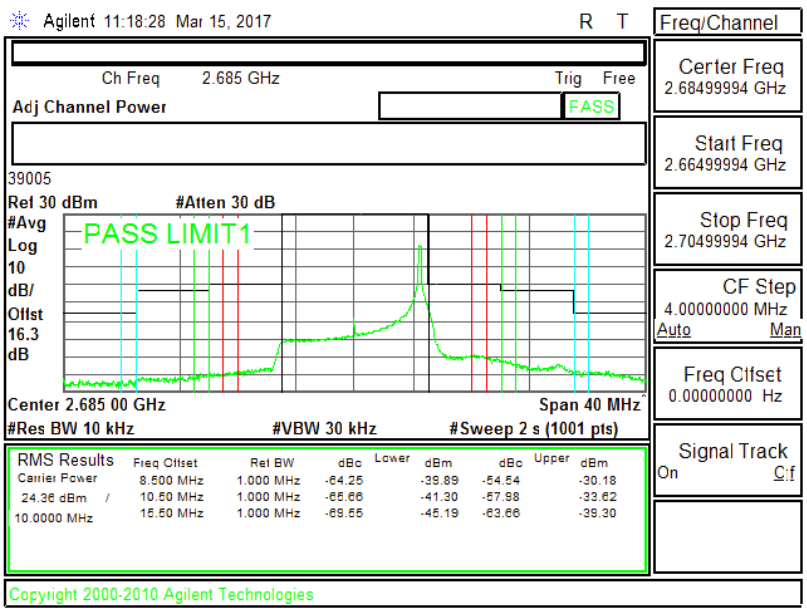

HIGH CH, RB1-0



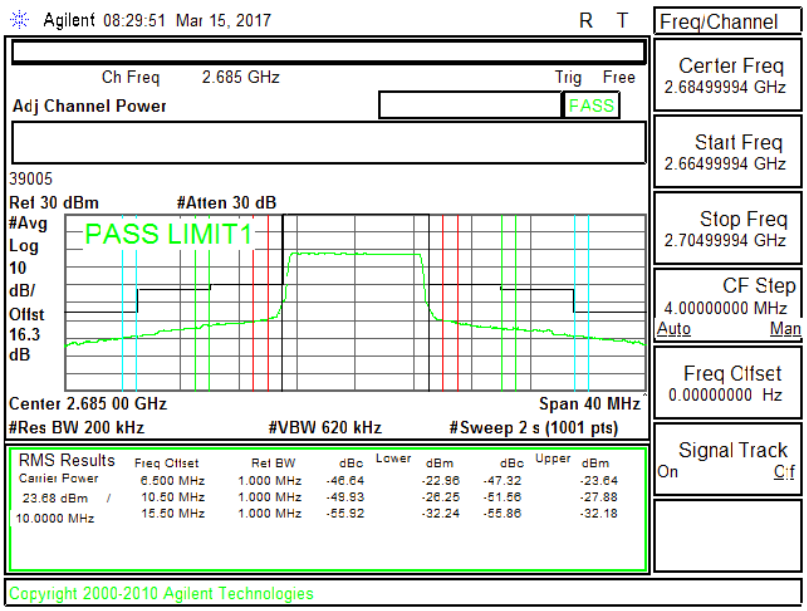



UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
FORM NO: CCSUP4031B
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

HIGH CH, RB1-49



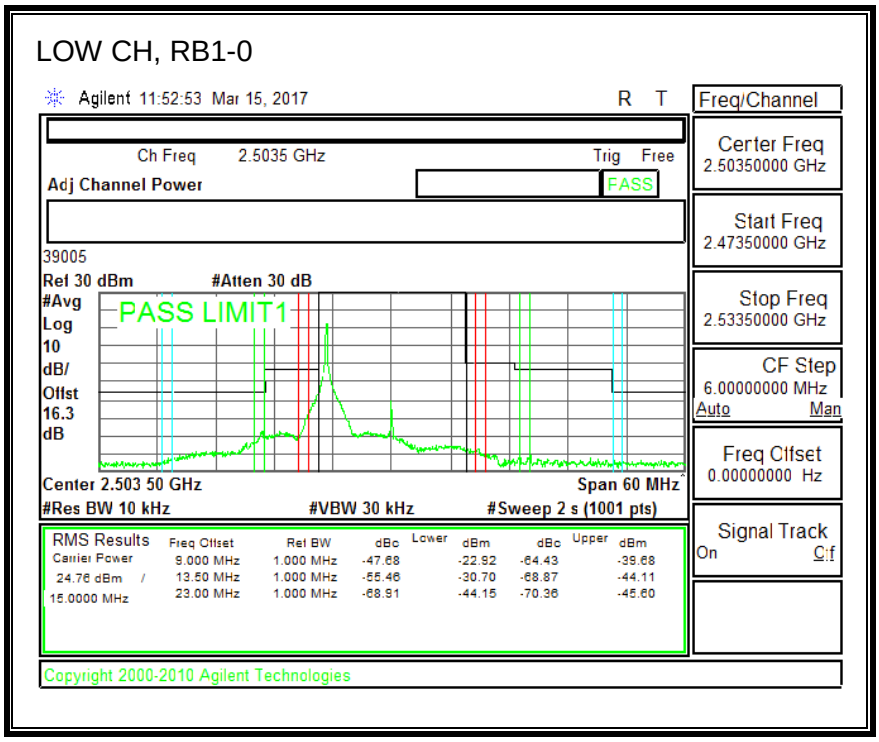

HIGH CH, RB50-0

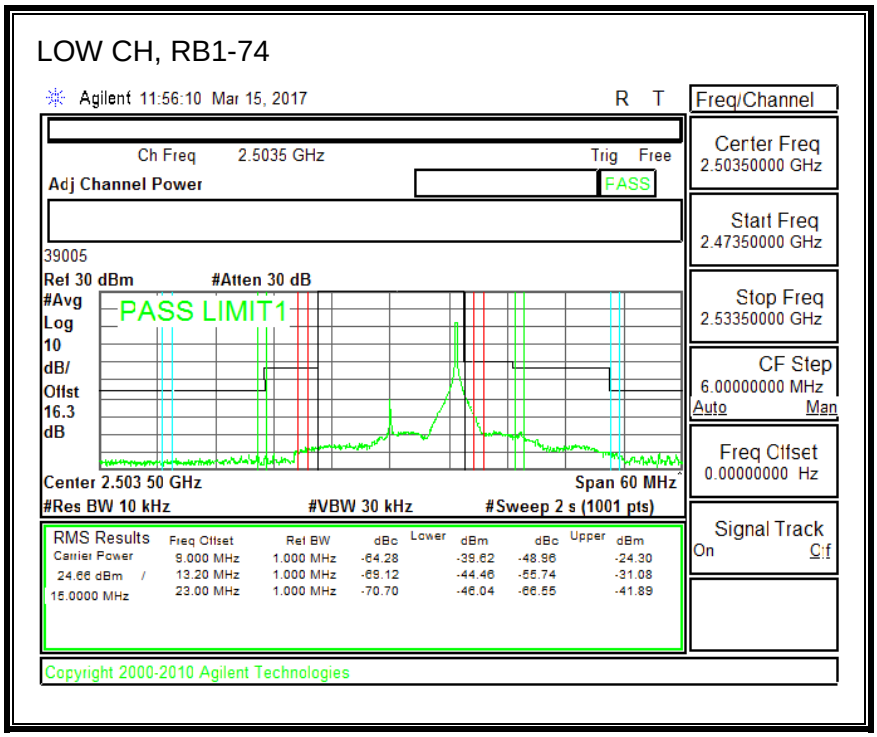




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**QPSK, (15.0 MHz BAND WIDTH)**



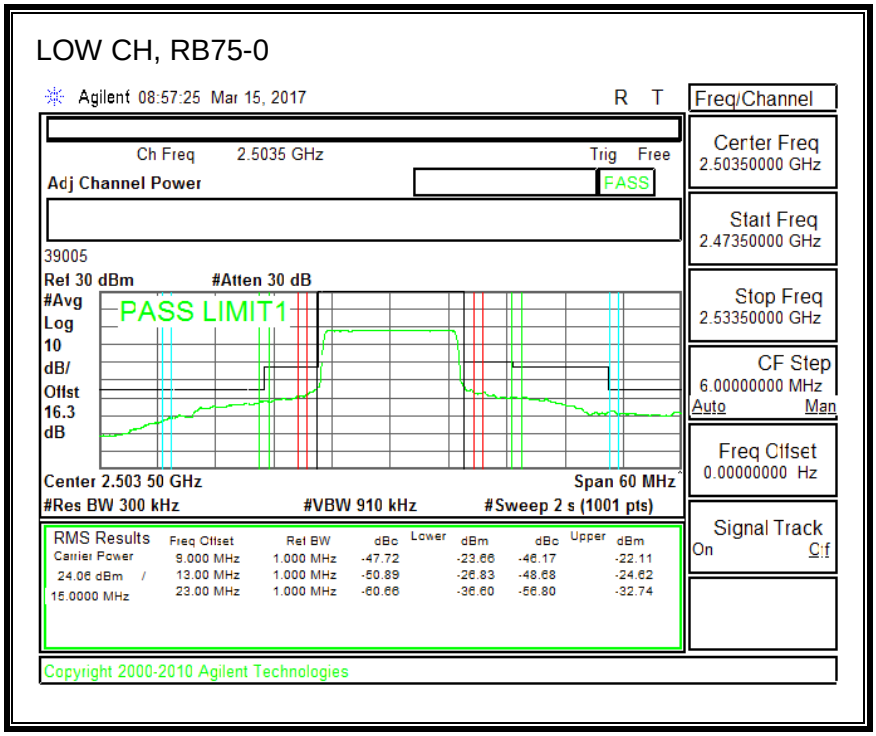





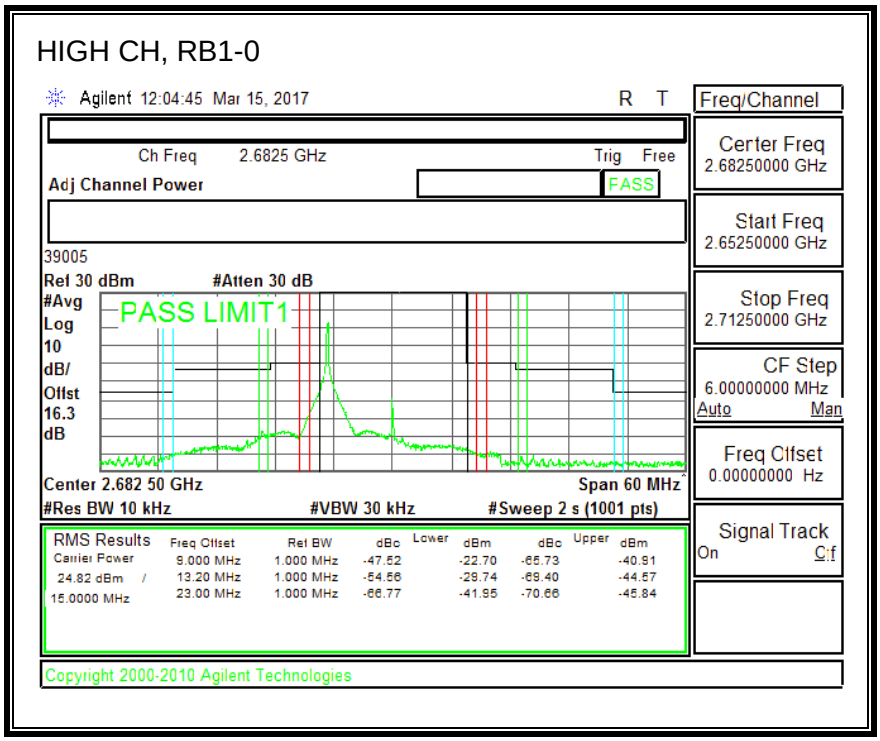


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

LOW CH, RB75-0




HIGH CH, RB1-0

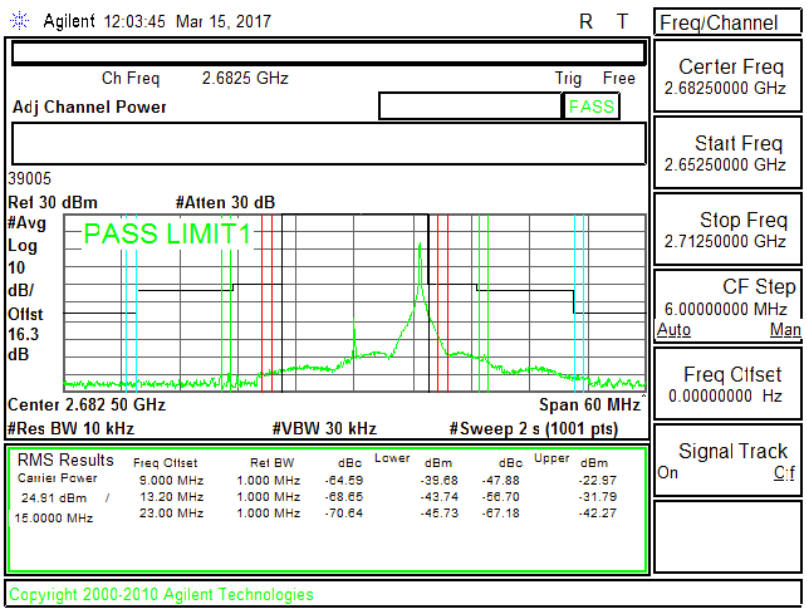




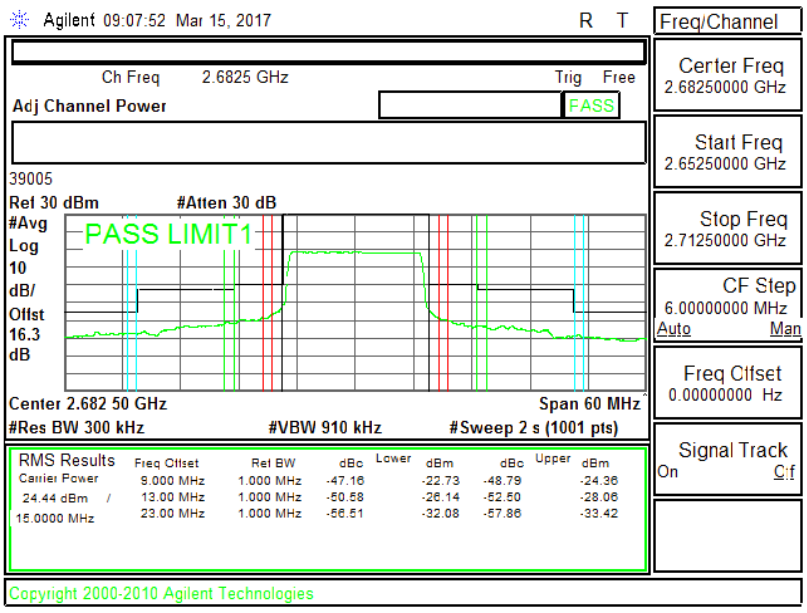


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

HIGH CH, RB1-74




HIGH CH, RB75-0

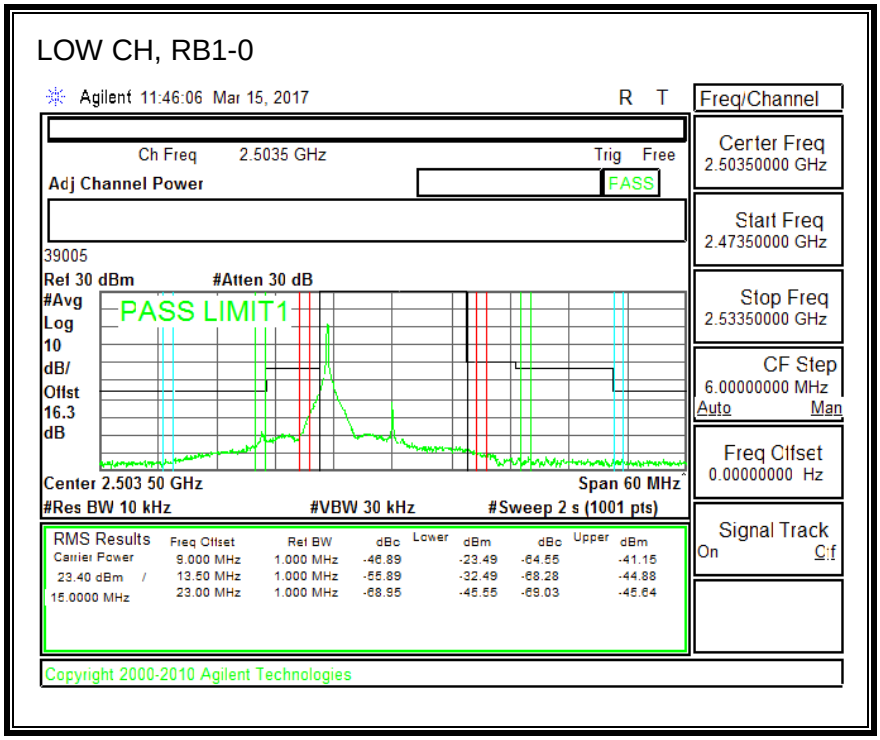


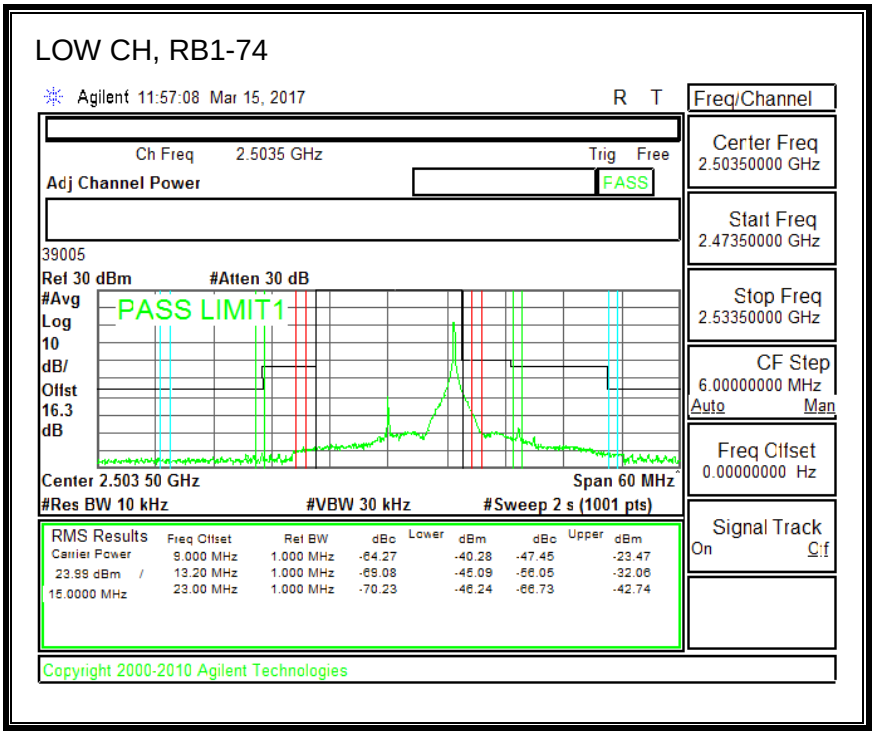




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**16QAM, (15.0 MHz BAND WIDTH)**



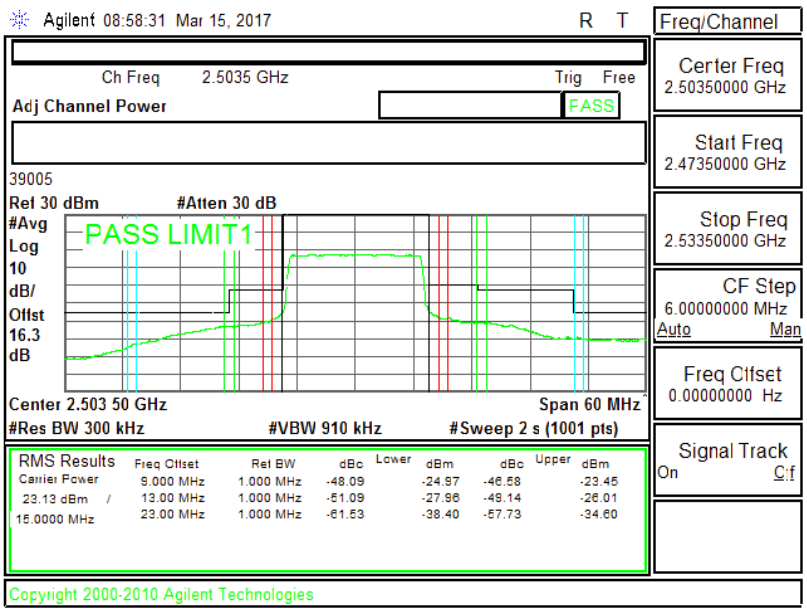





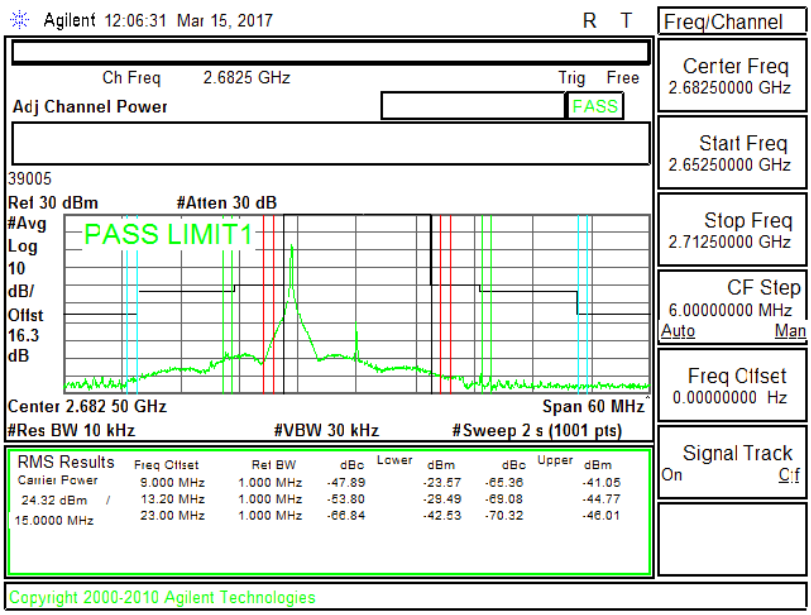


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

LOW CH, RB75-0




HIGH CH, RB1-0

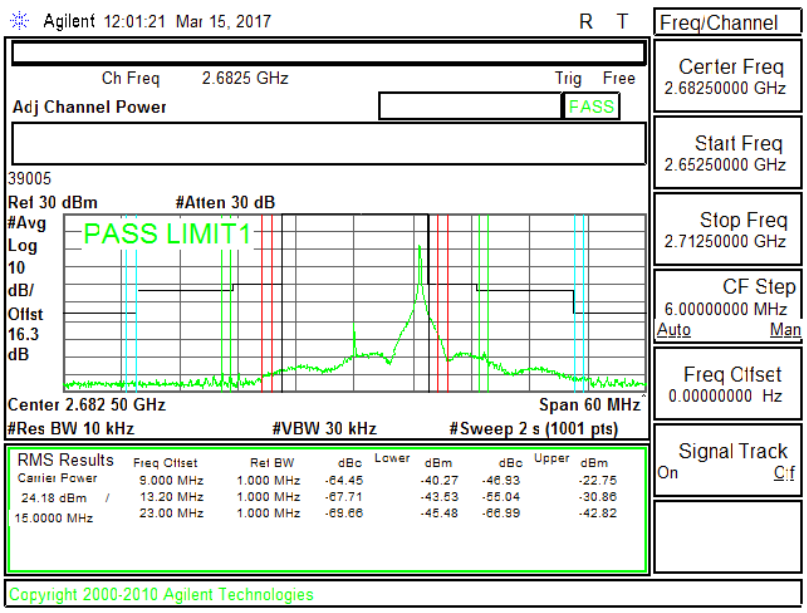




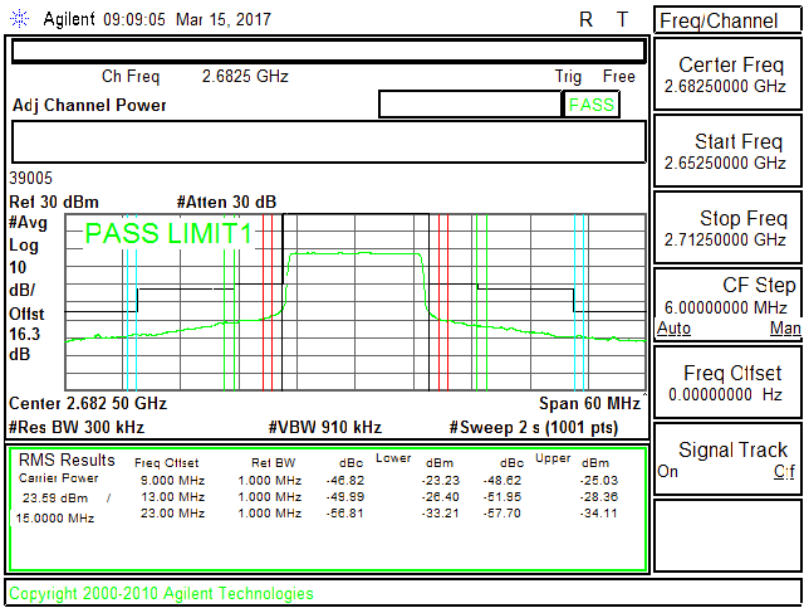


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

HIGH CH, RB1-74




HIGH CH, RB75-0

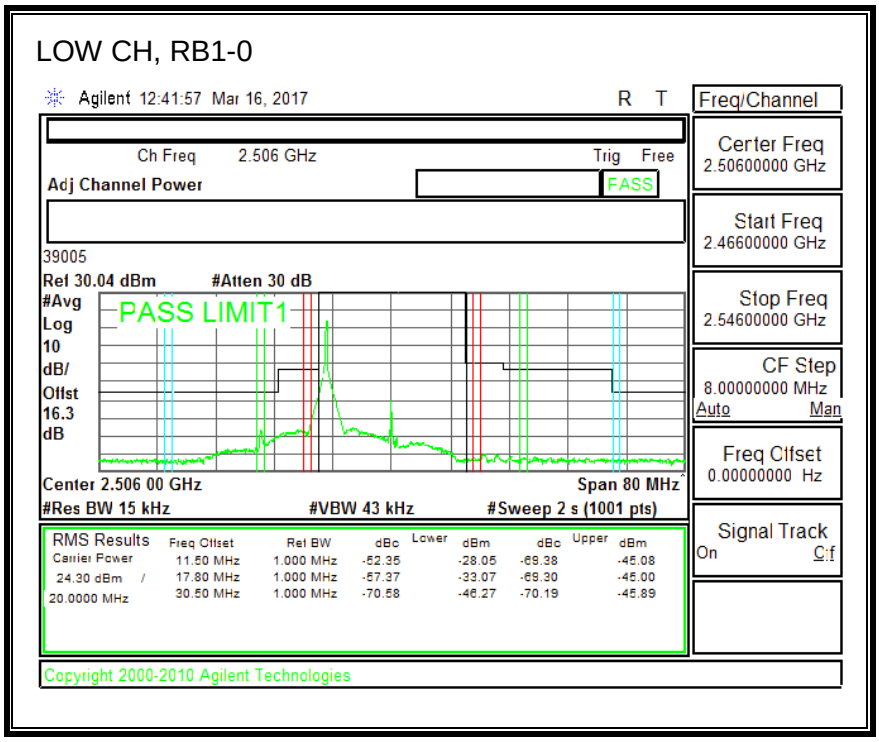


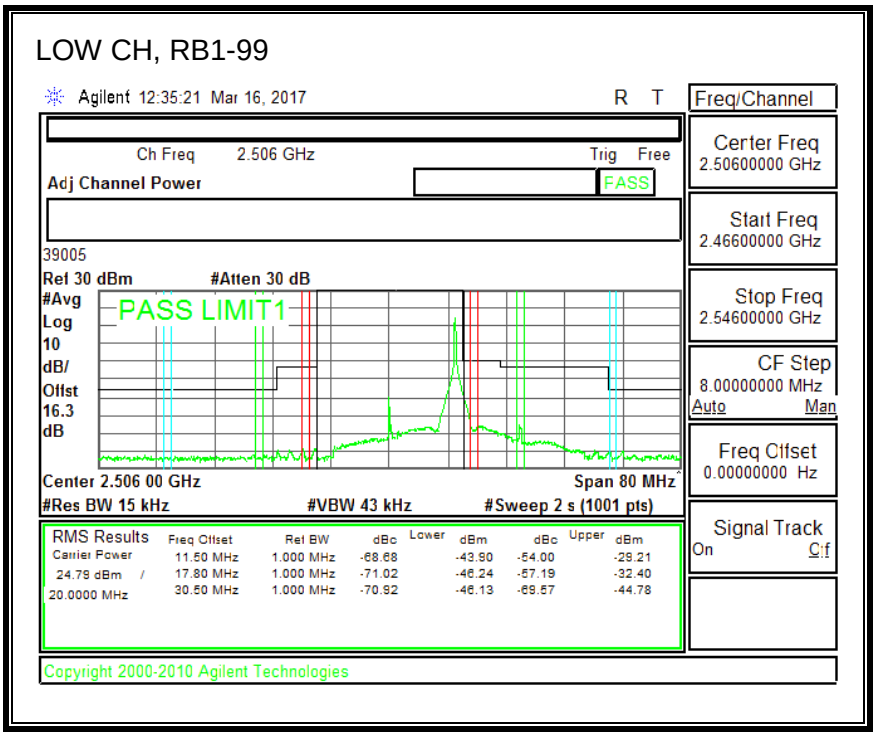




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**QPSK, (20.0 MHz BAND WIDTH)**



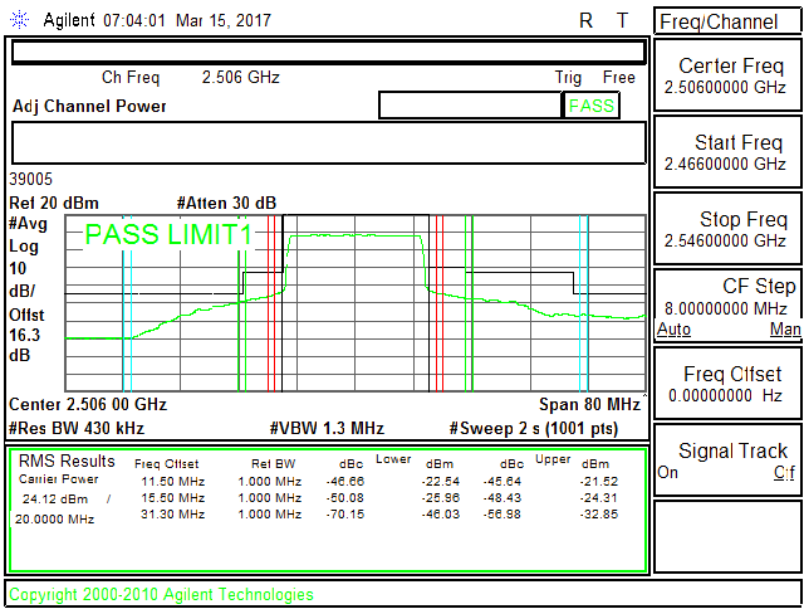





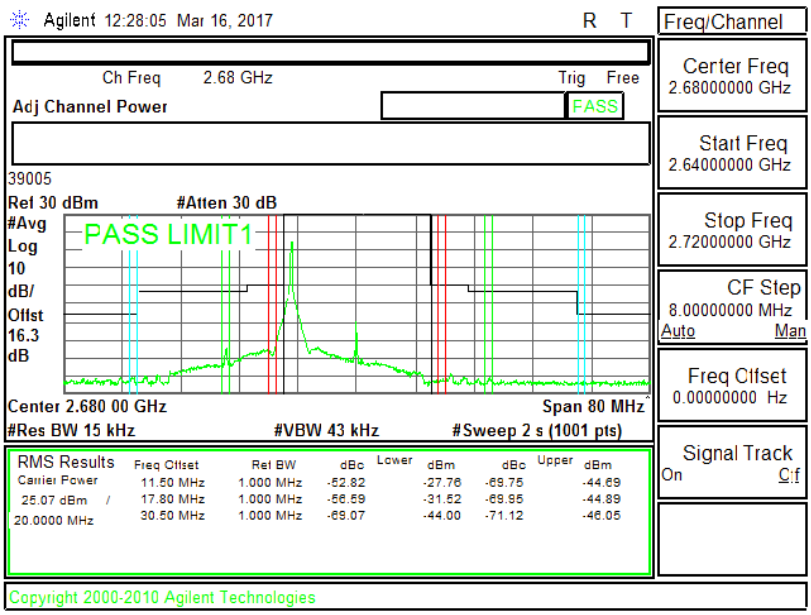


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

LOW CH, RB100-0




HIGH CH, RB1-0

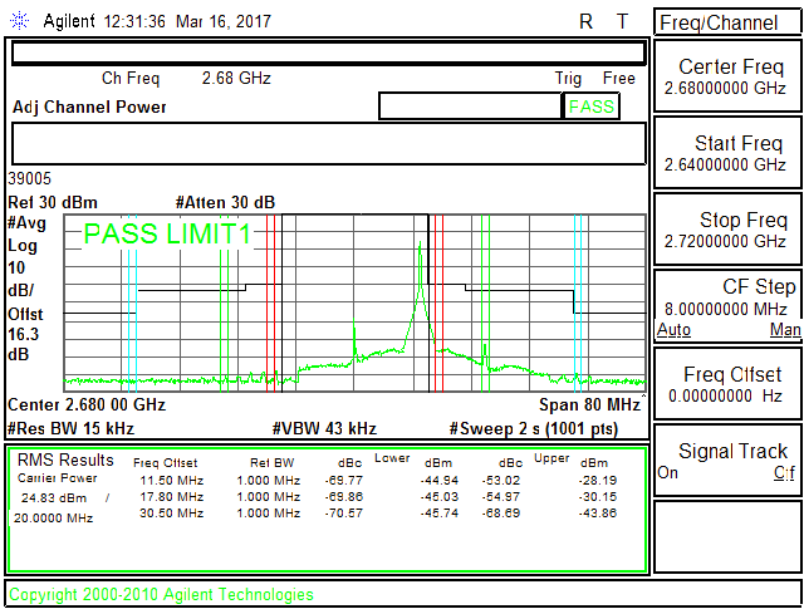




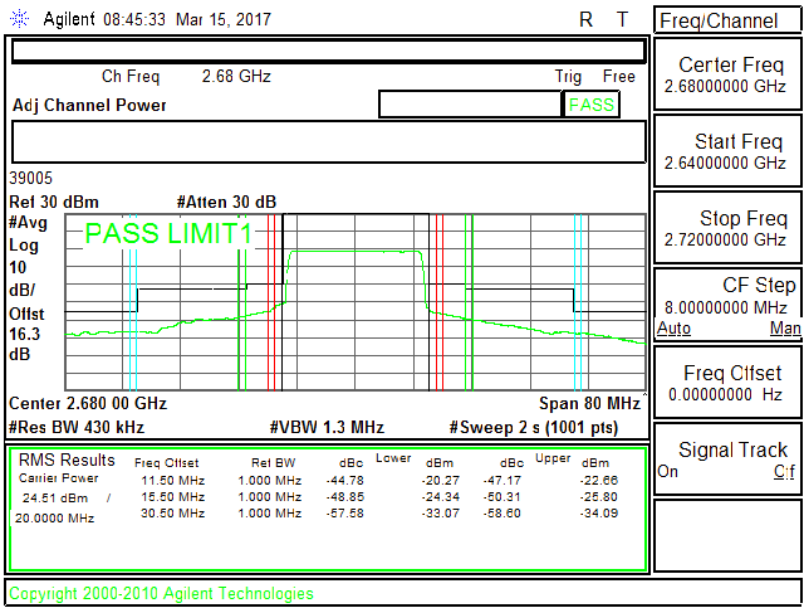


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

HIGH CH, RB1-99



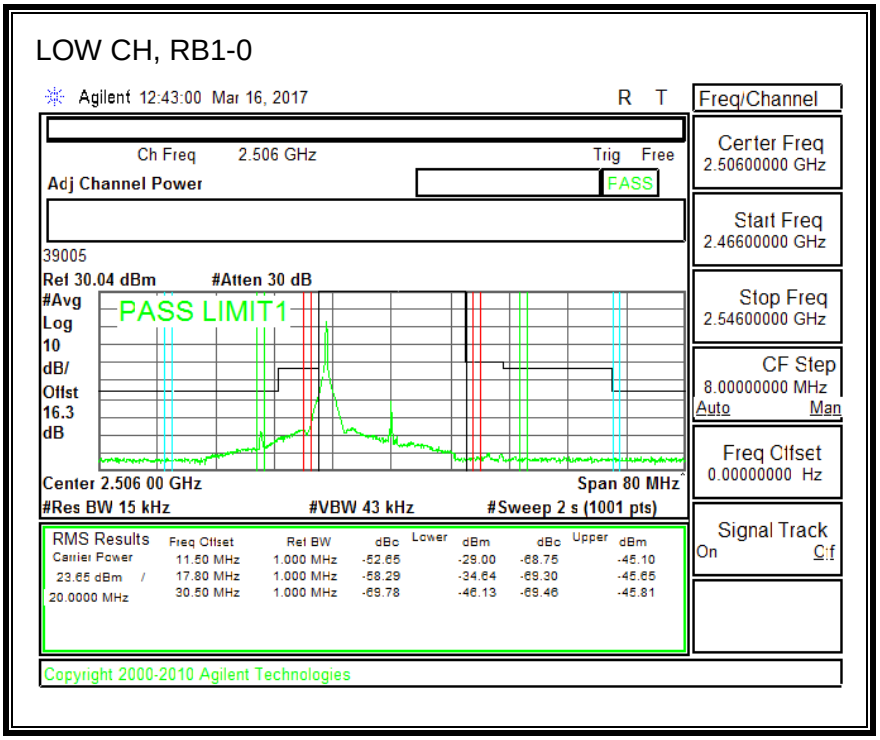

HIGH CH, RB100-0

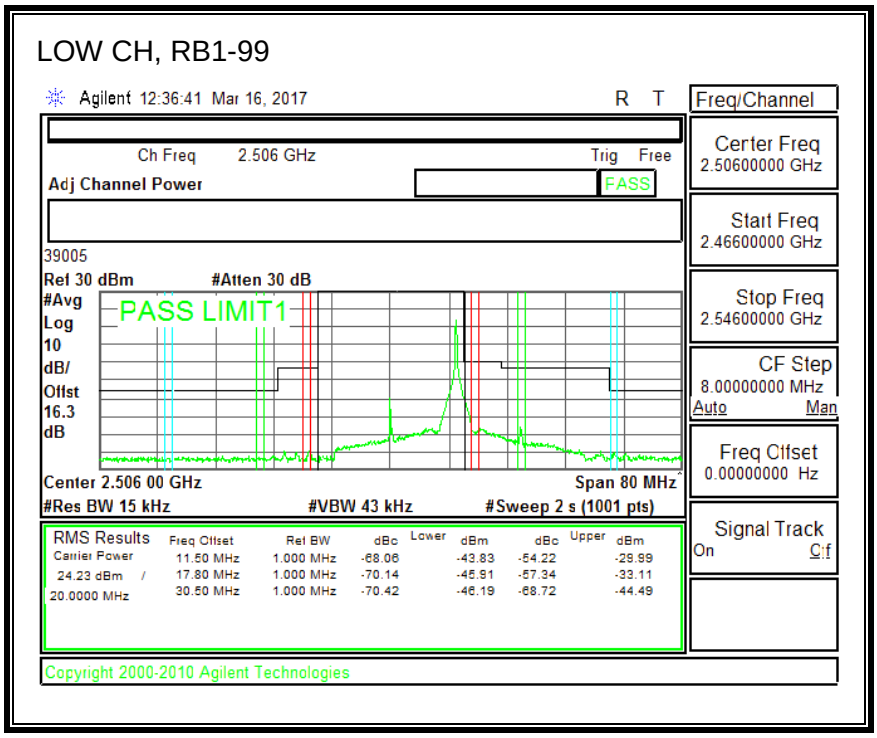





UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**16QAM, (20.0 MHz BAND WIDTH)**



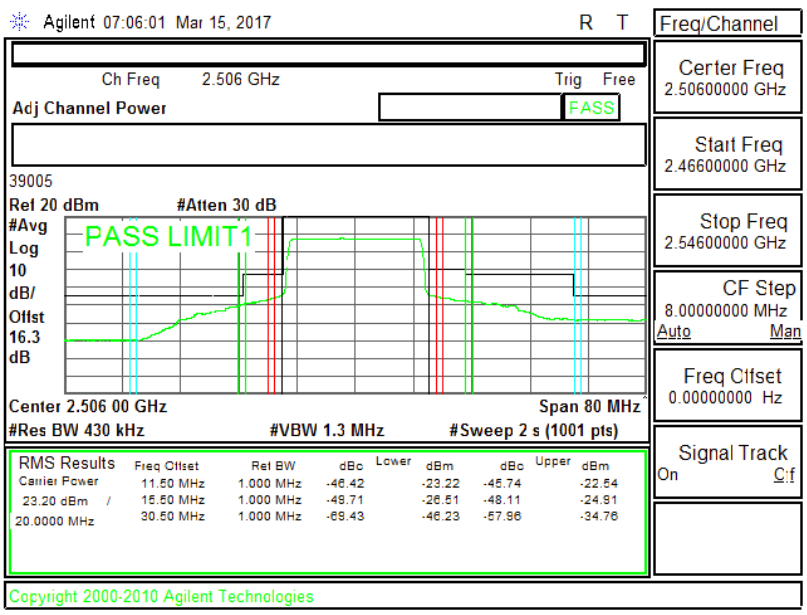





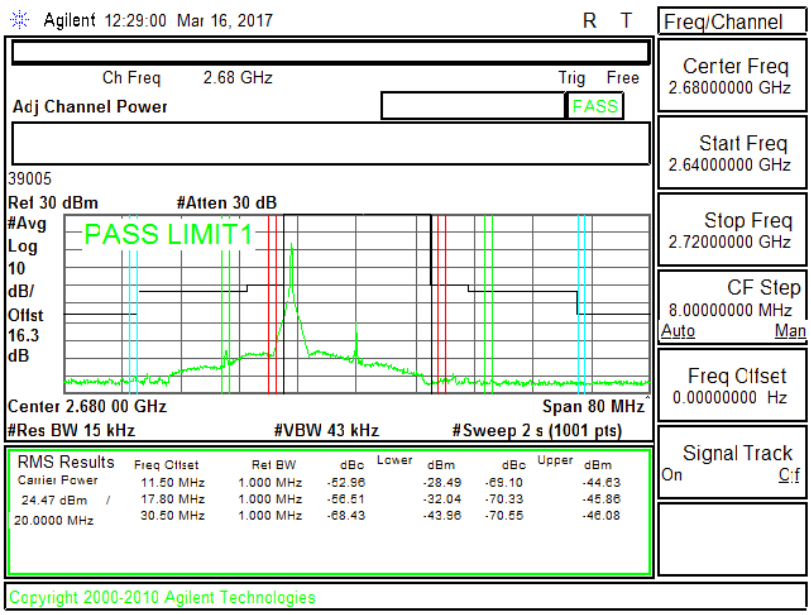


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

LOW CH, RB100-0



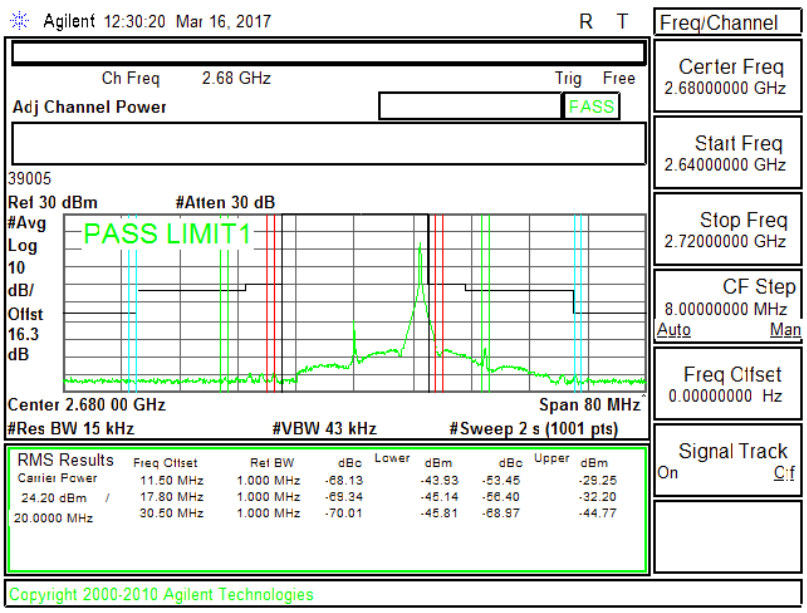

HIGH CH, RB1-0



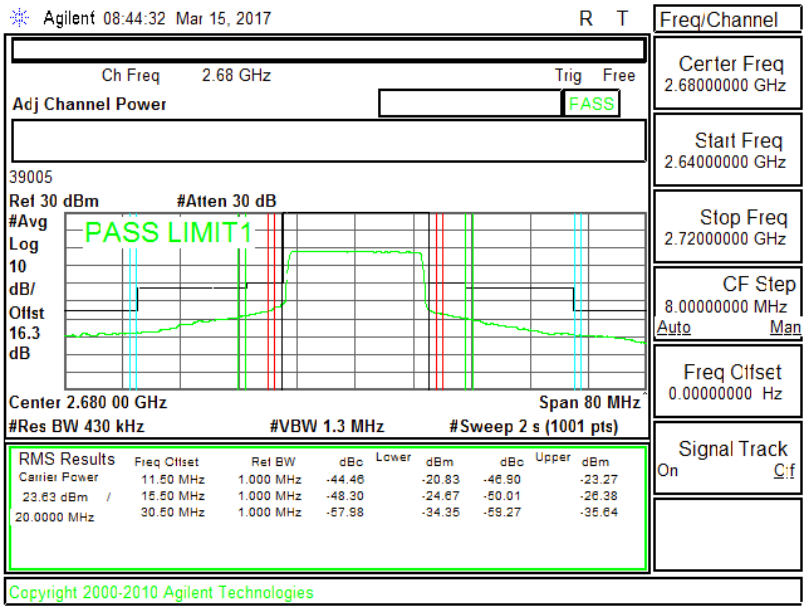


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

HIGH CH, RB1-99




HIGH CH, RB100-0





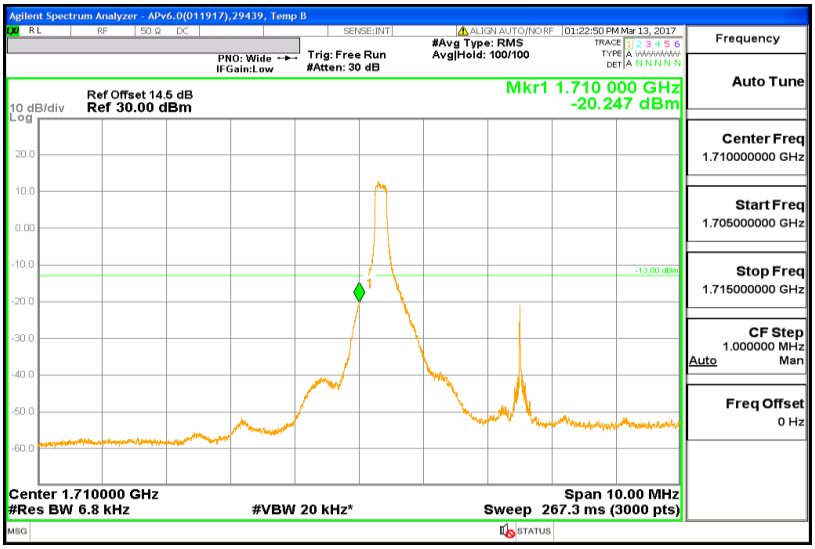


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

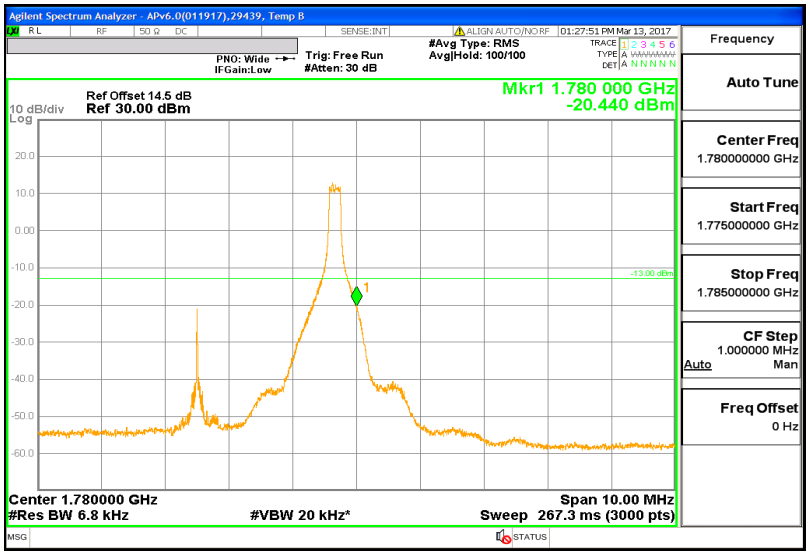
## 8.2.12. LTE BAND 66 BANDEDGE

**QPSK, (5.0 MHz BAND WIDTH)**

LOW CH, RB1-0




HIGH CH, RB1-24

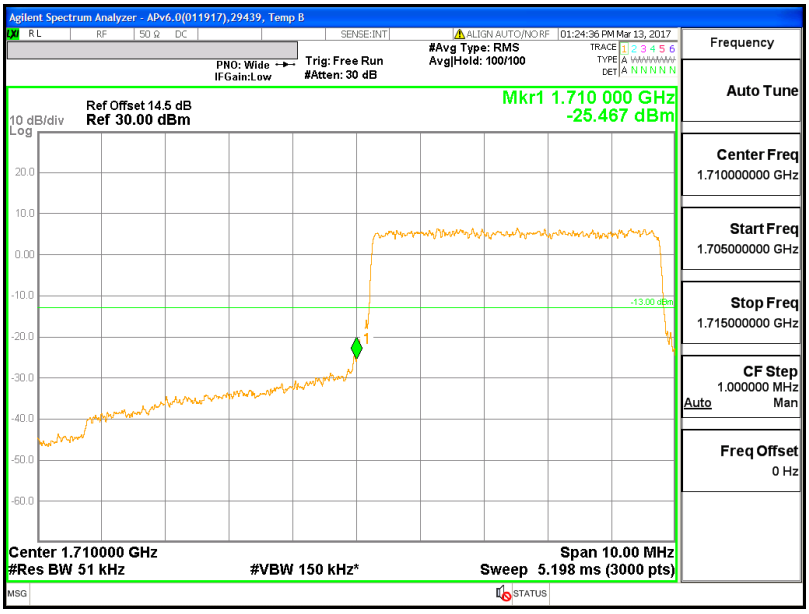




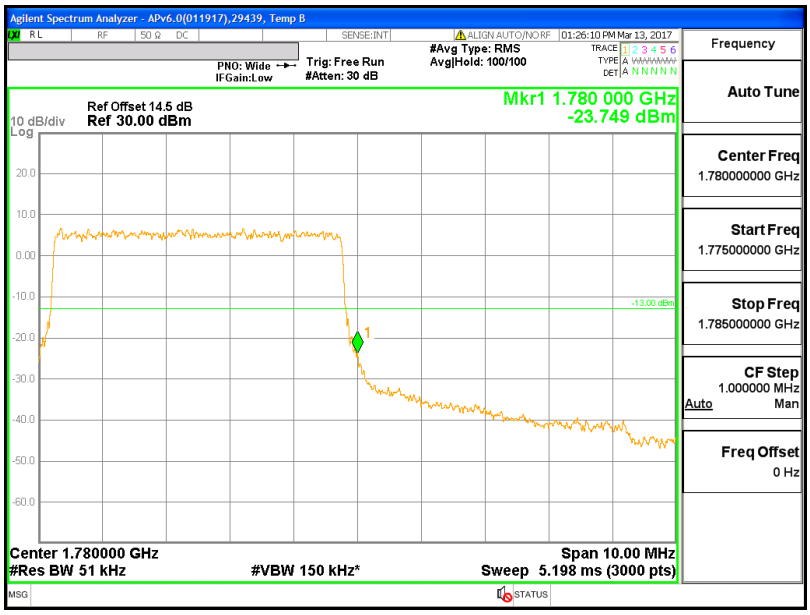


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

LOW CH, RB25-0




HIGH CH, RB25-0



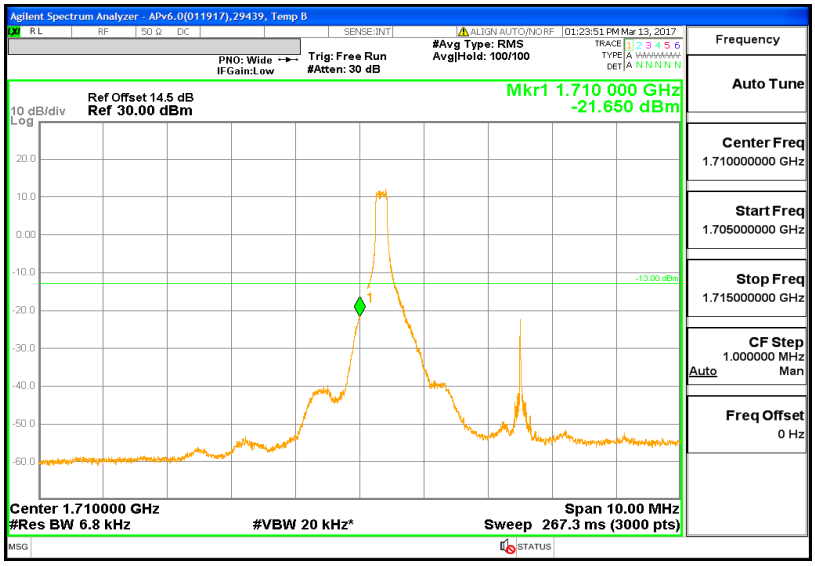




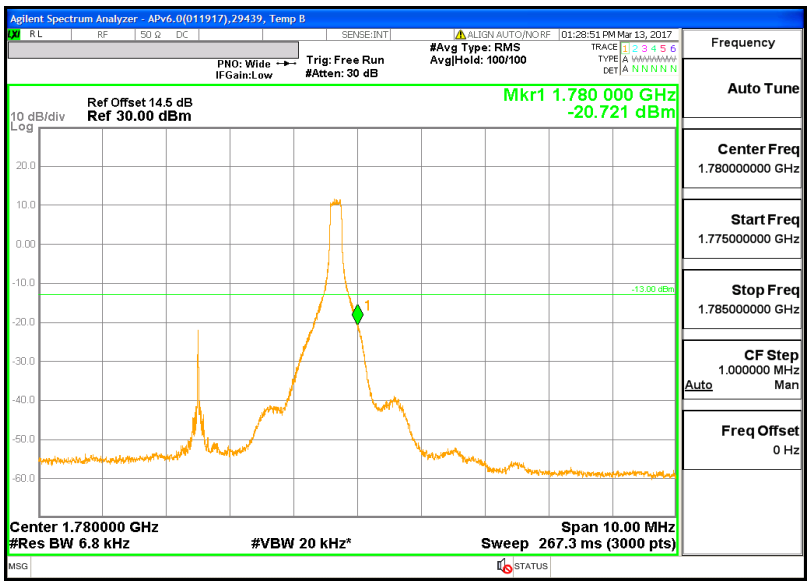
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**16QAM, (5.0 MHz BAND WIDTH)**

LOW CH, RB1-0




HIGH CH, RB1-24

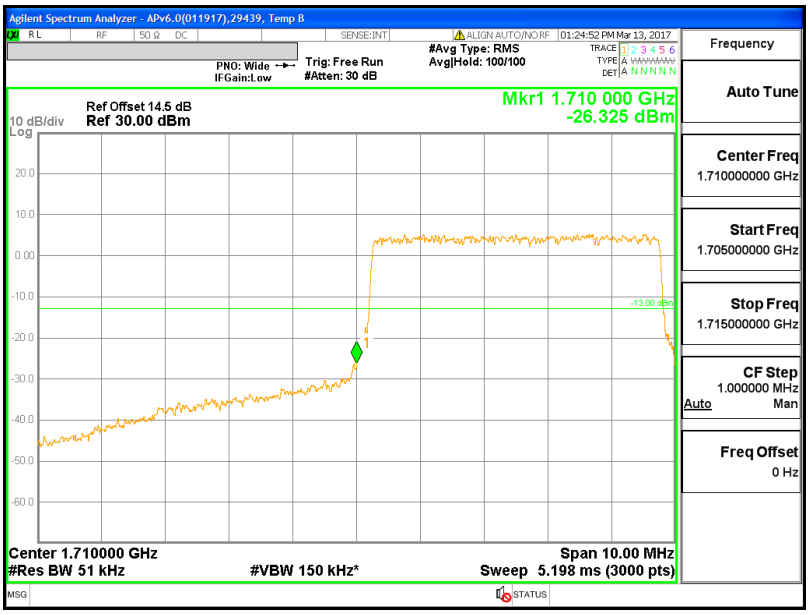




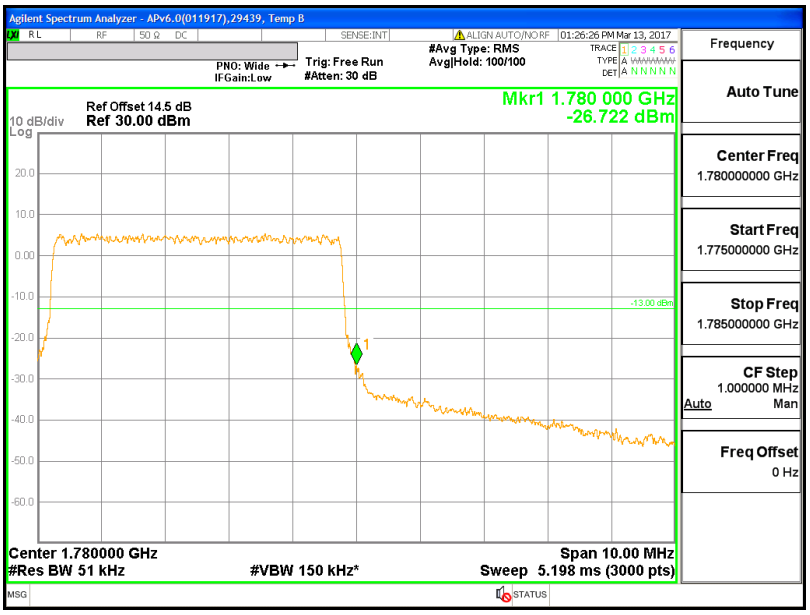


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

LOW CH, RB25-0




HIGH CH, RB25-0



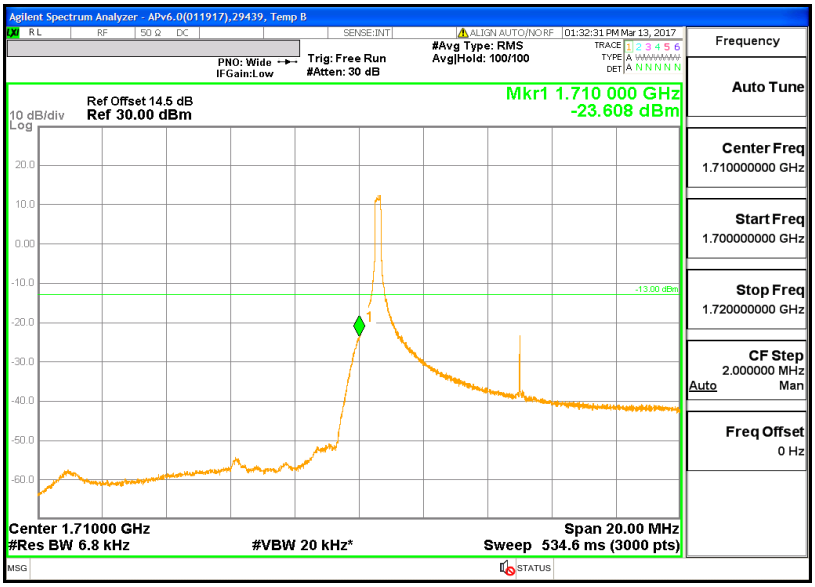




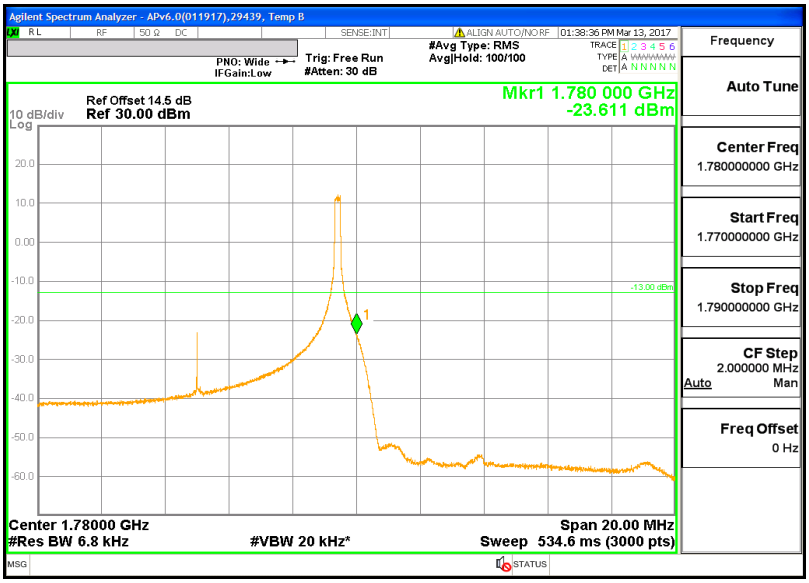
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**QPSK, (10.0 MHz BAND WIDTH)**

LOW CH, RB1-0




HIGH CH, RB1-49

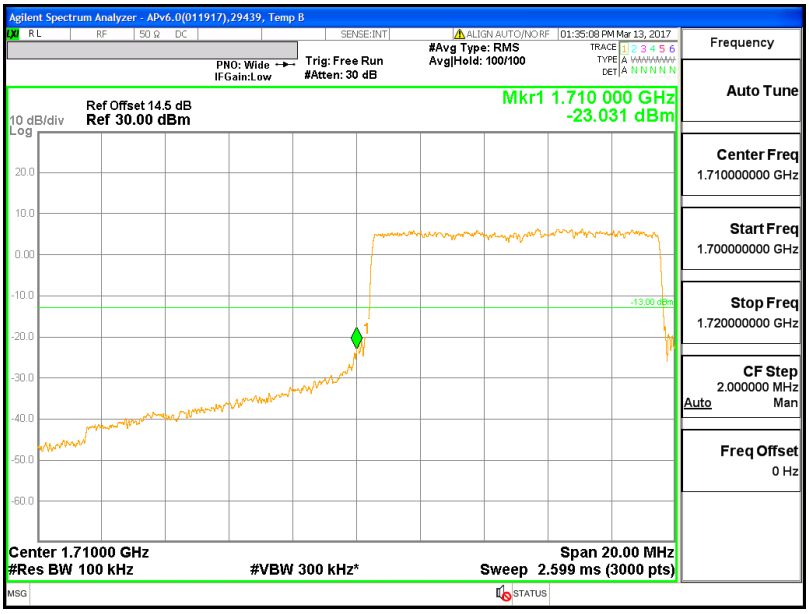




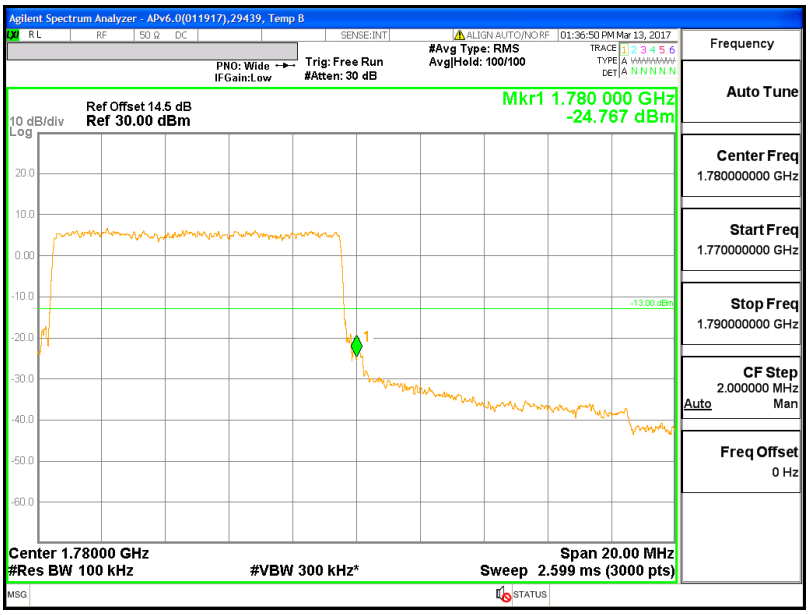


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

LOW CH, RB50-0




HIGH CH, RB50-0



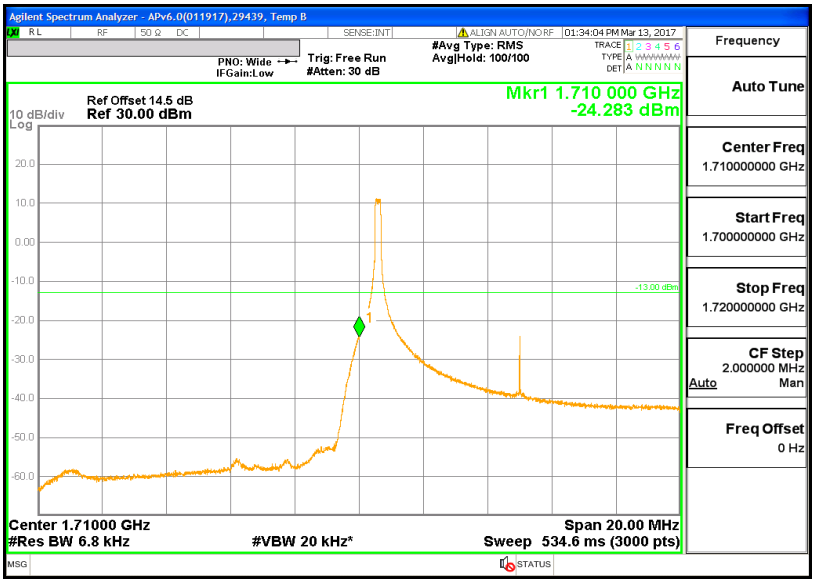




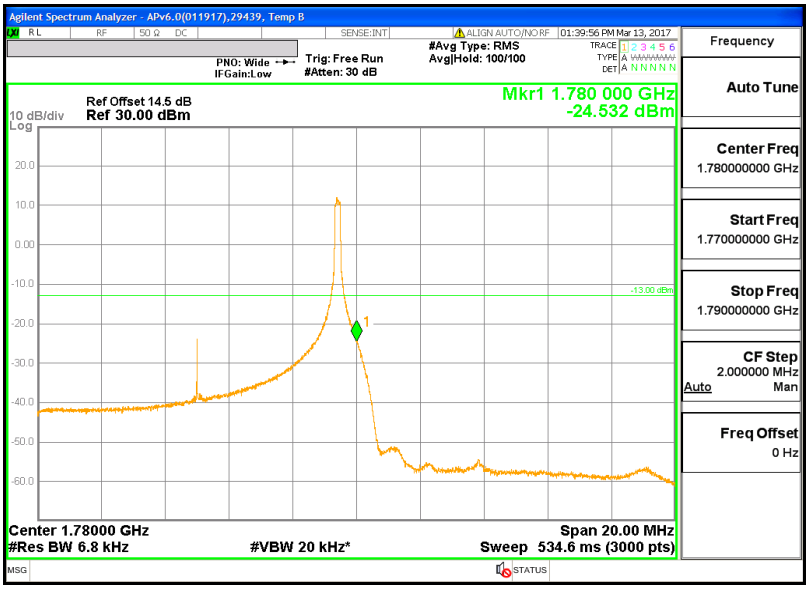
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**16QAM, (10.0 MHz BAND WIDTH)**

LOW CH, RB1-0




HIGH CH, RB1-49

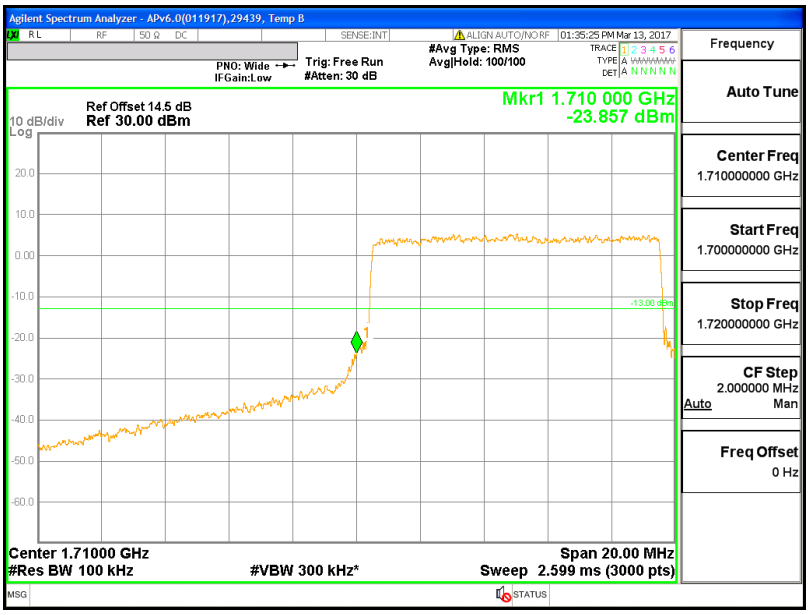




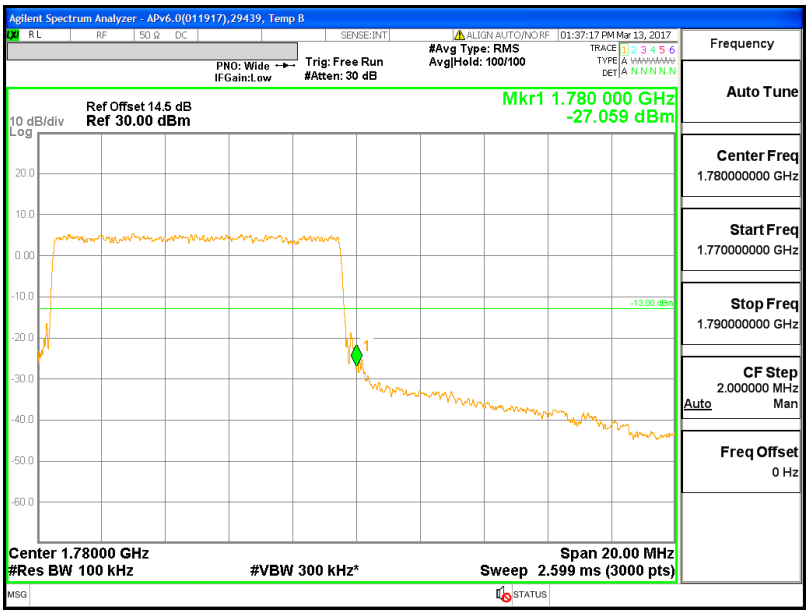


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

LOW CH, RB50-0




HIGH CH, RB50-0



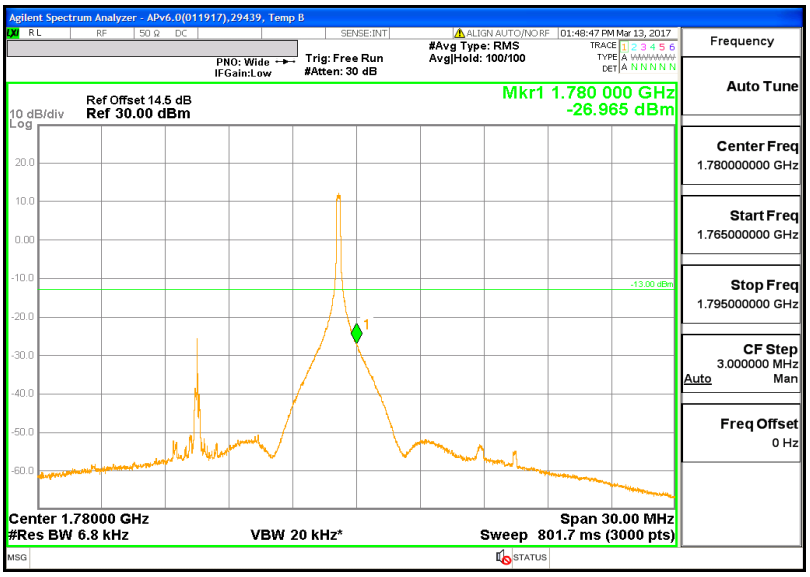



UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
FORM NO: CCSUP4031B
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**QPSK, (15.0 MHz BAND WIDTH)**

LOW CH, RB1-0

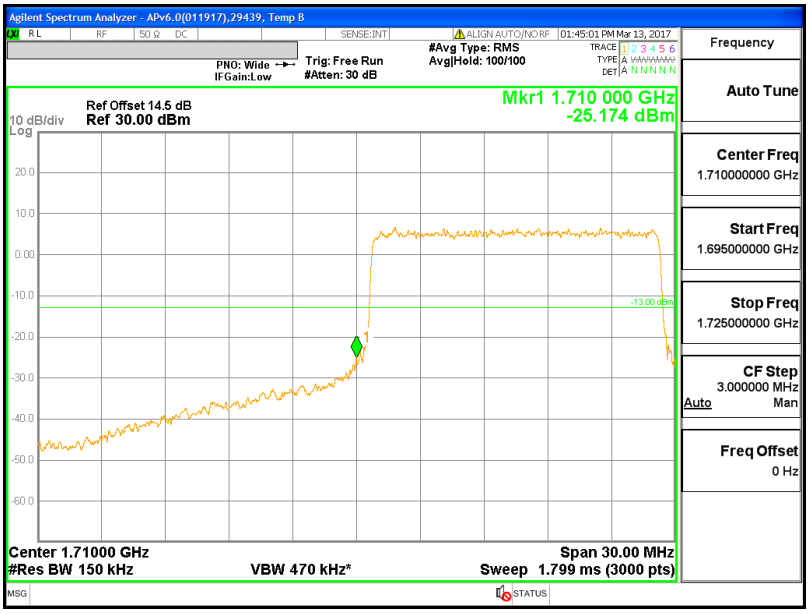
HIGH CH, RB1-74



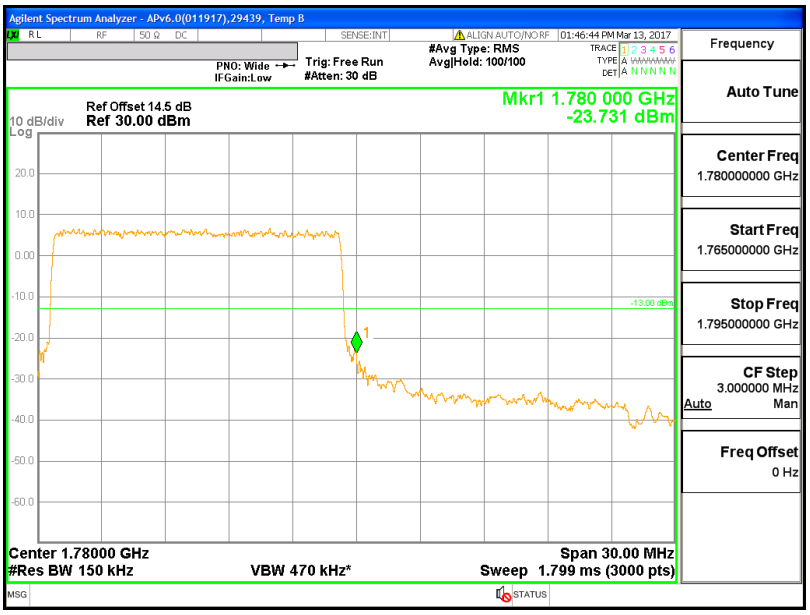



UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
FORM NO: CCSUP4031B
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

LOW CH, RB75-0




HIGH CH, RB75-0



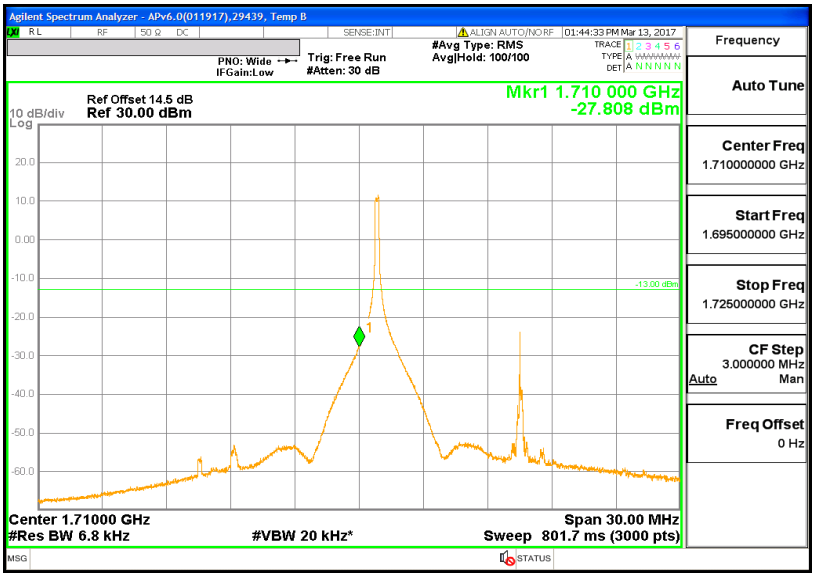




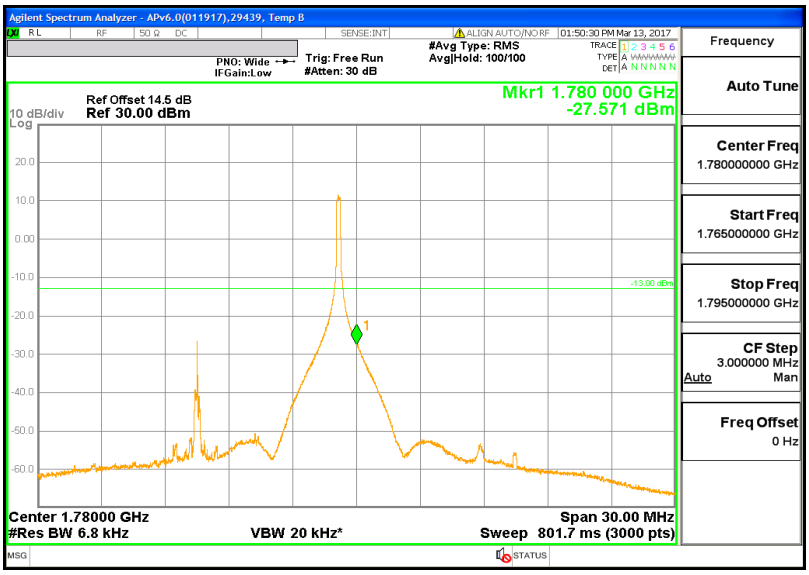
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**16QAM, (15.0 MHz BAND WIDTH)**

LOW CH, RB1-0




HIGH CH, RB1-74

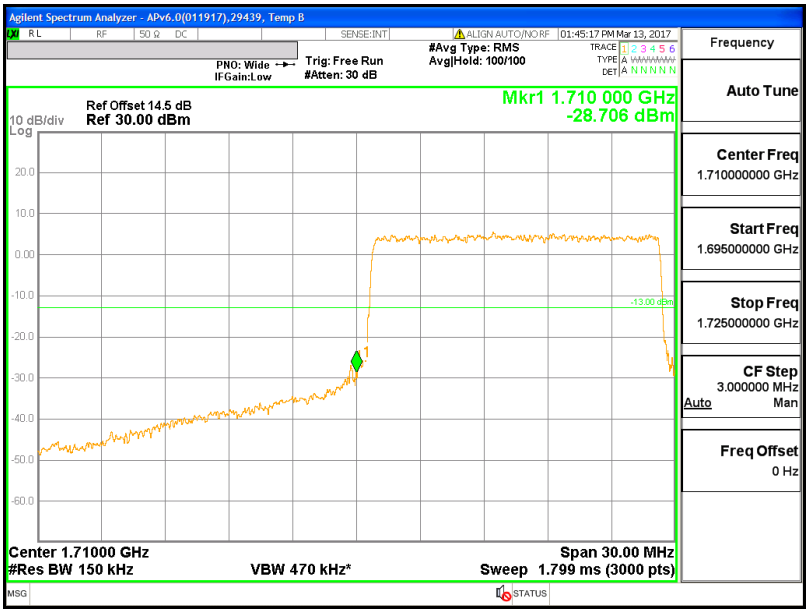




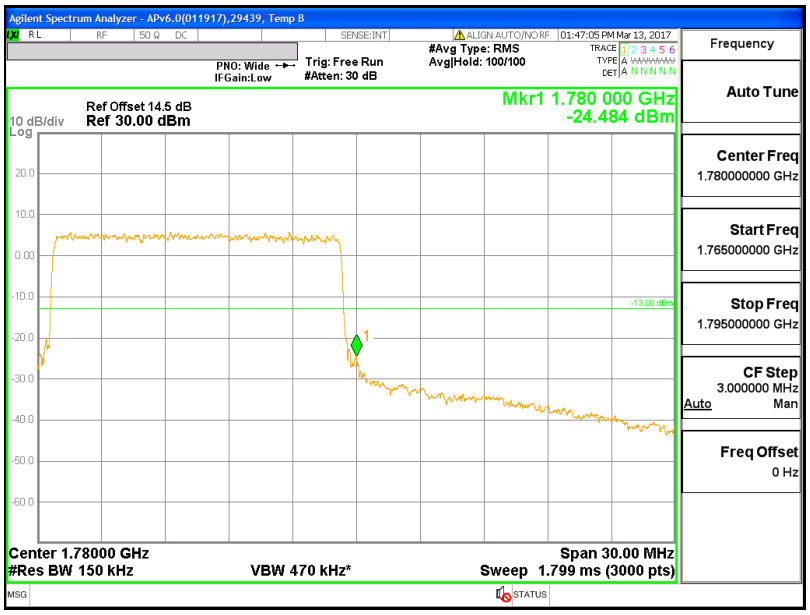


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

LOW CH, RB75-0




HIGH CH, RB75-0

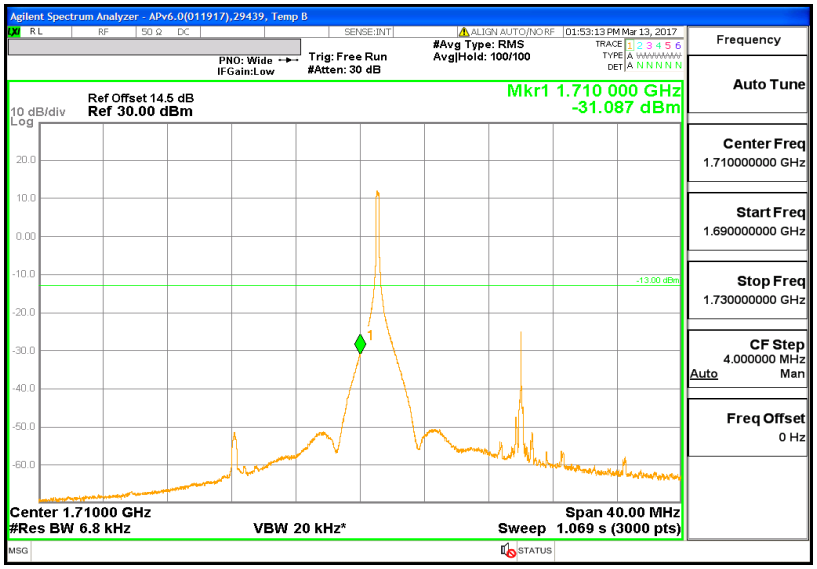




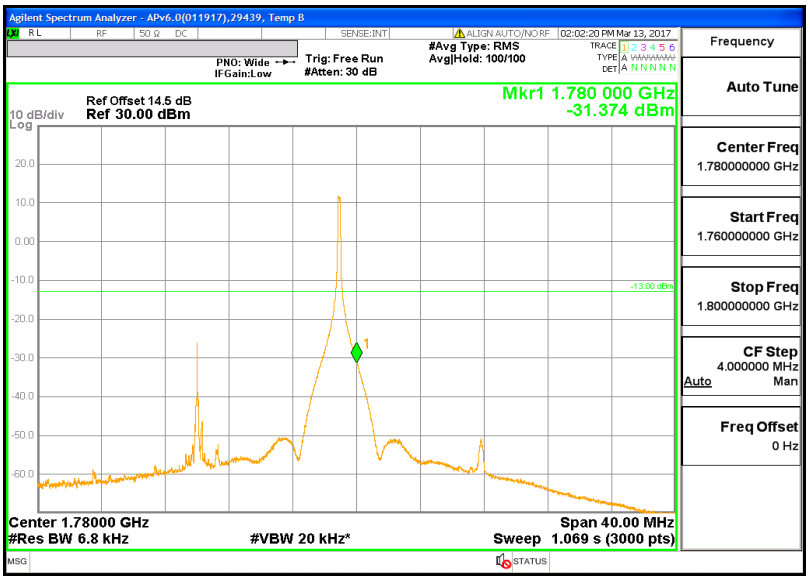
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**QPSK, (20.0 MHz BAND WIDTH)**

LOW CH, RB1-0




HIGH CH, RB1-99

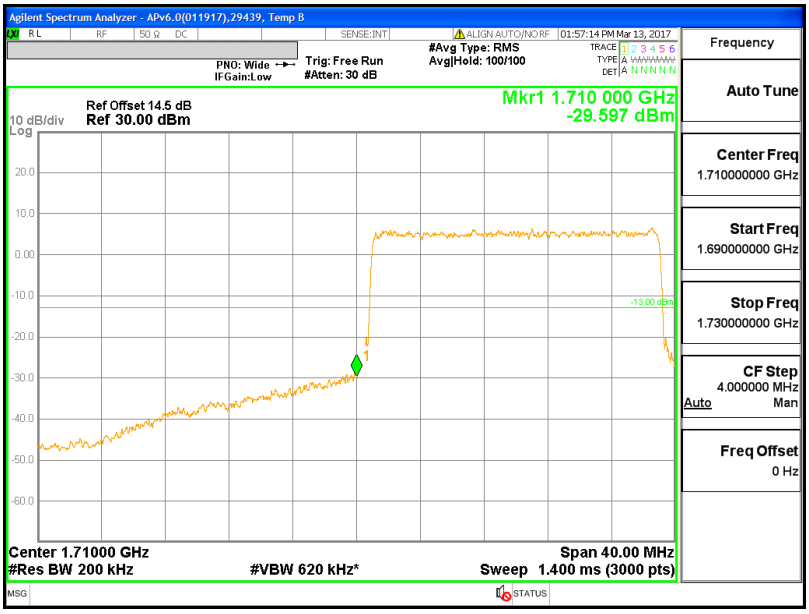




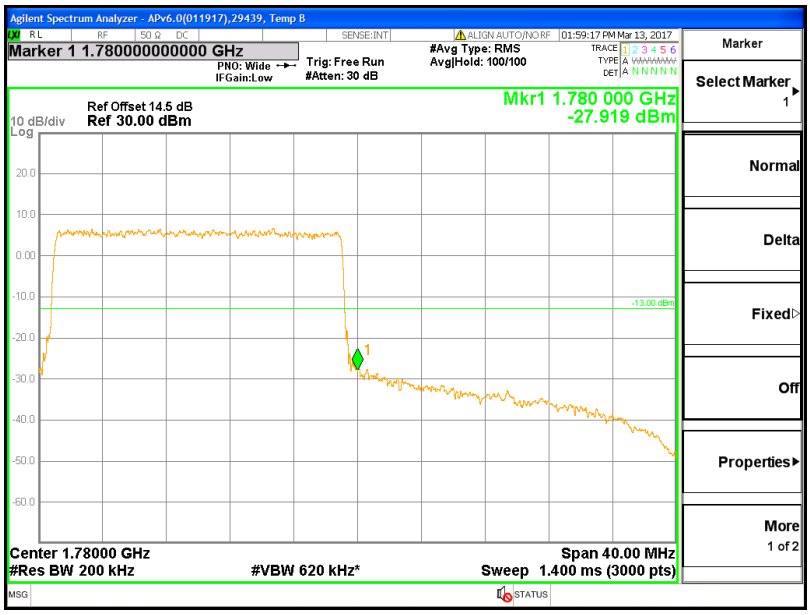


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

LOW CH, RB100-0




HIGH CH, RB100-0



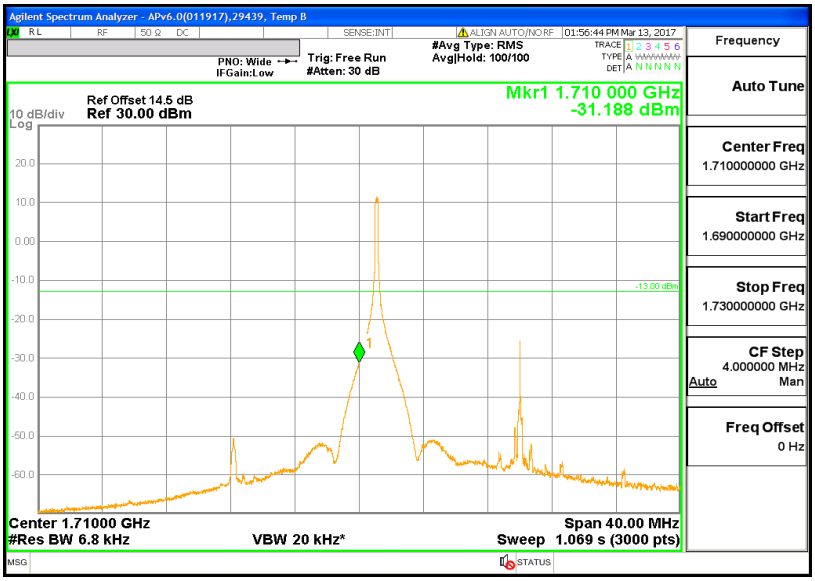




*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**16QAM, (20.0 MHz BAND WIDTH)**

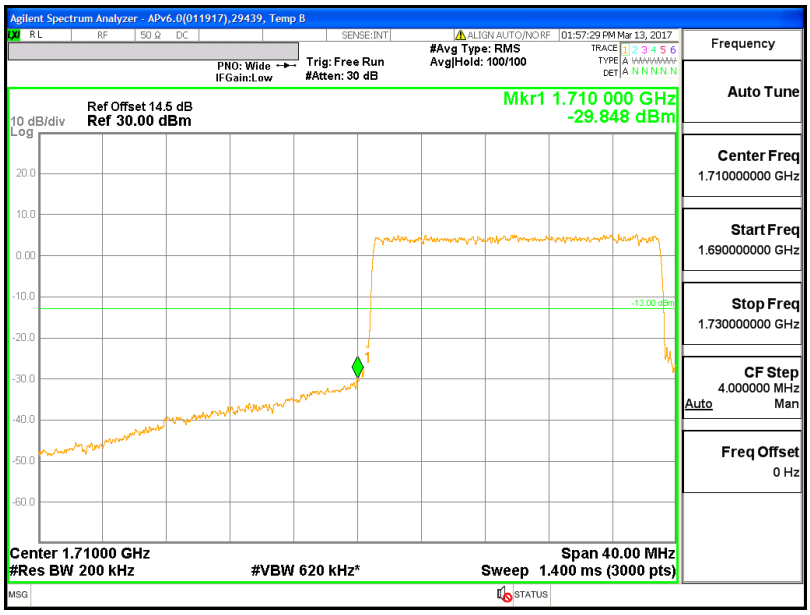
LOW CH, RB1-0



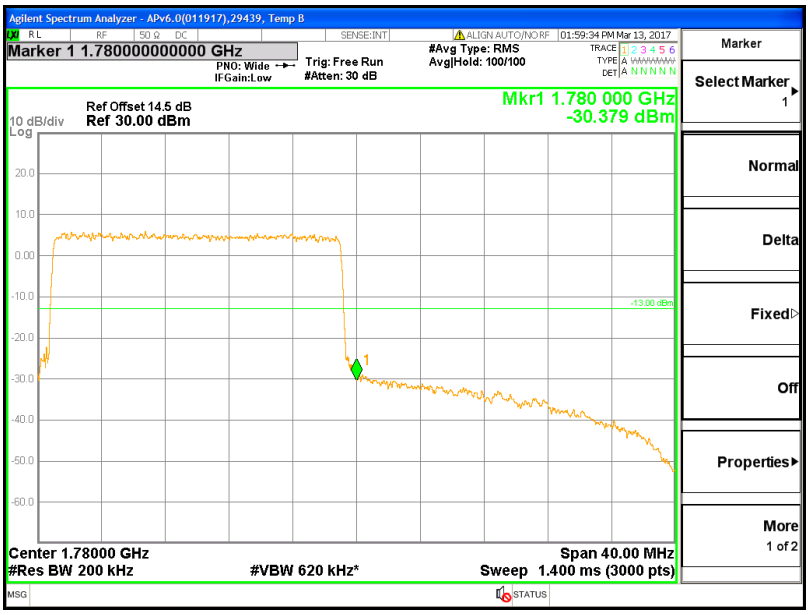

HIGH CH, RB1-99

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

LOW CH, RB100-0




HIGH CH, 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.*

## 8.3. OUT OF BAND EMISSIONS

**RULE PART(S)**

FCC: §2.1051, §22.901, §22.917, §24.238, §27.53, §90.691

**LIMITS**

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.

For mobile and portable stations operating in the 2305-2315 MHz: by a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2365 MHz, and not less than 70 + 10 log (P) dB above 2365 MHz

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




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

**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**

- LTE Band 2
- LTE Band 4
- LTE Band 5
- LTE Band 7
- LTE Band 12
- LTE Band 13
- LTE Band 17
- LTE Band 25
- LTE Band 26
- LTE Band 30
- LTE Band 41
- LTE Band 66

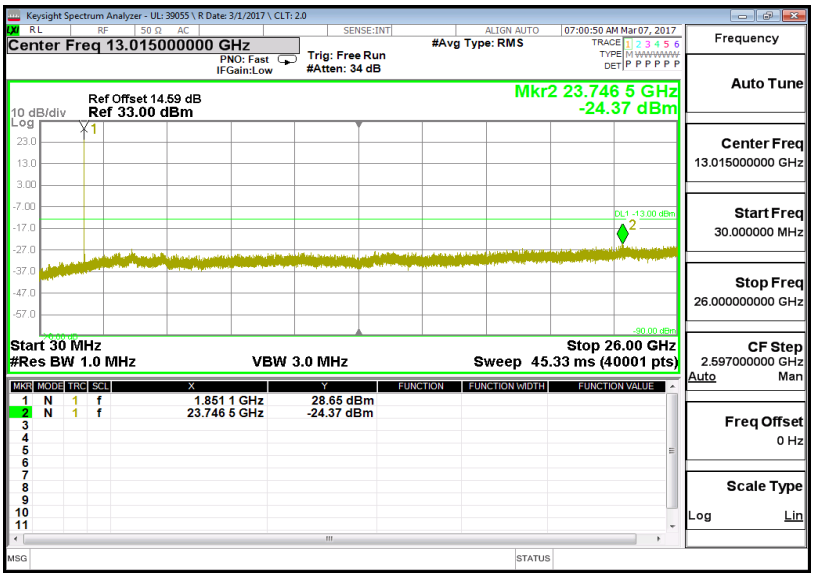



*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

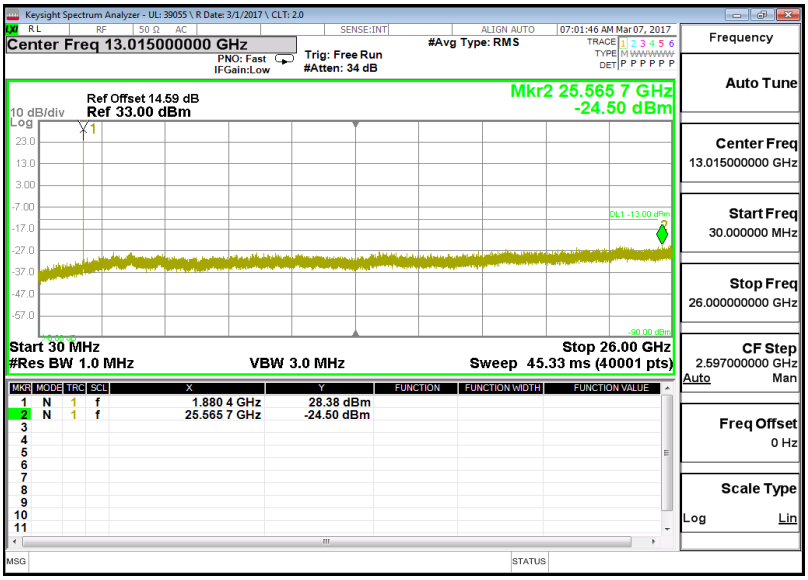
## 8.3.1. LTE BAND 2

**QPSK, (1.4 MHz BAND WIDTH)**

LOW, RB1-0, 30 TO 26000 MHz




MID, RB1-0, 30 TO 26000 MHz

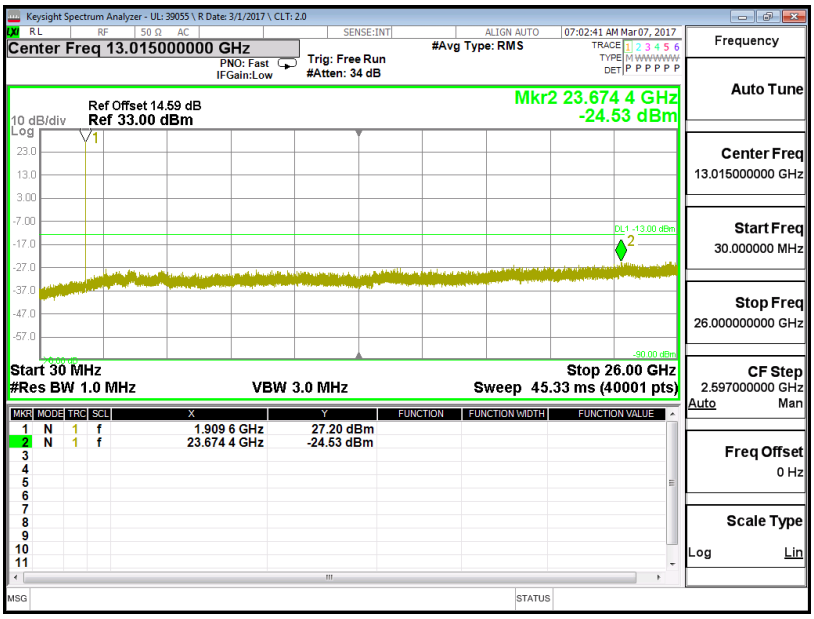






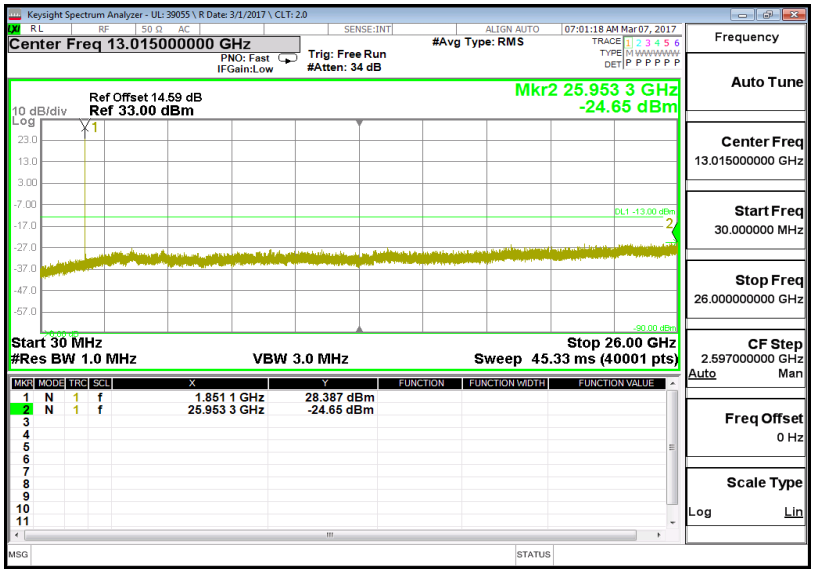
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

HIGH, RB1-0, 30 TO 26000 MHz




## 16QAM, (1.4 MHz BAND WIDTH)

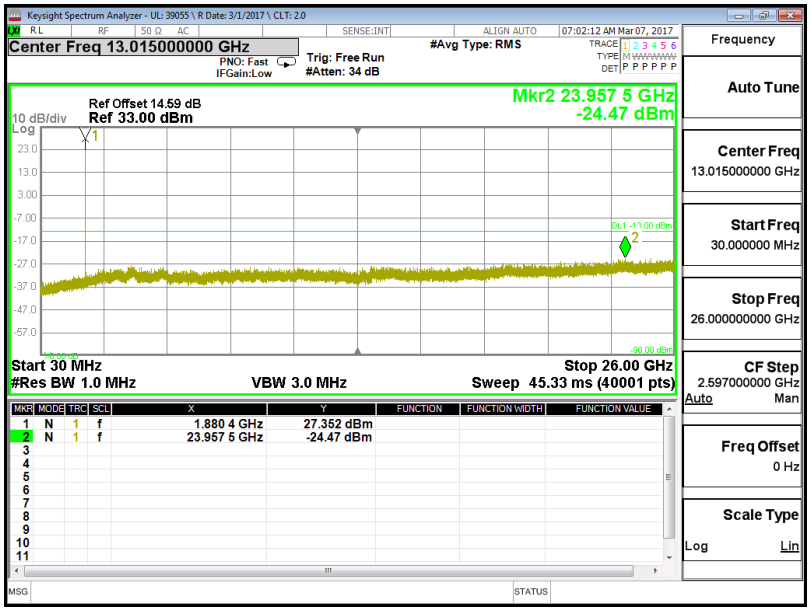
LOW, RB1-0, 30 TO 26000 MHz



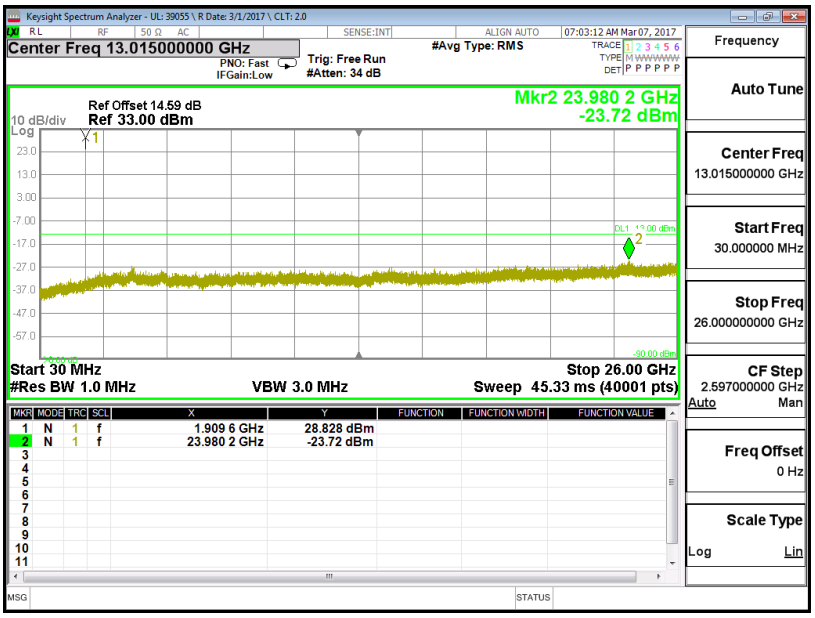


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

MID, RB1-0, 30 TO 26000 MHz




HIGH, RB1-0, 30 TO 26000 MHz



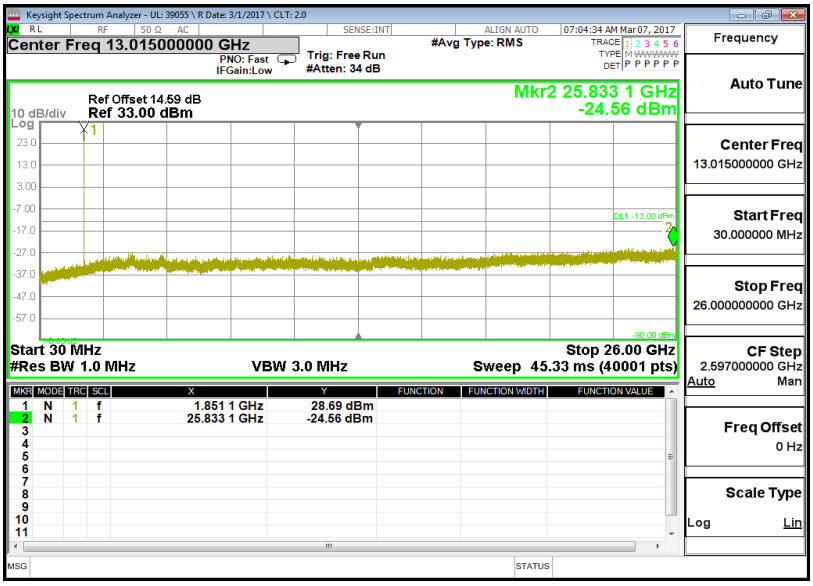




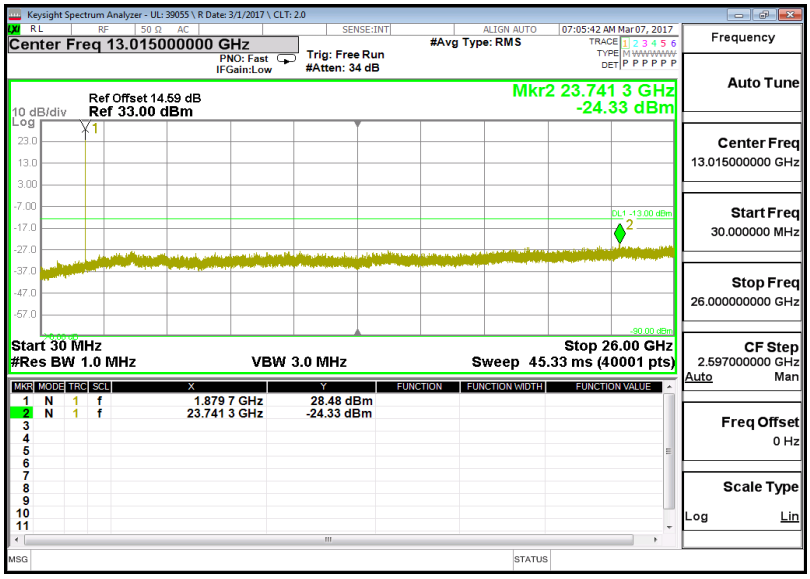
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**QPSK, (3.0 MHz BAND WIDTH)**

LOW, RB1-0, 30 TO 26000 MHz




MID, RB1-0, 30 TO 26000 MHz

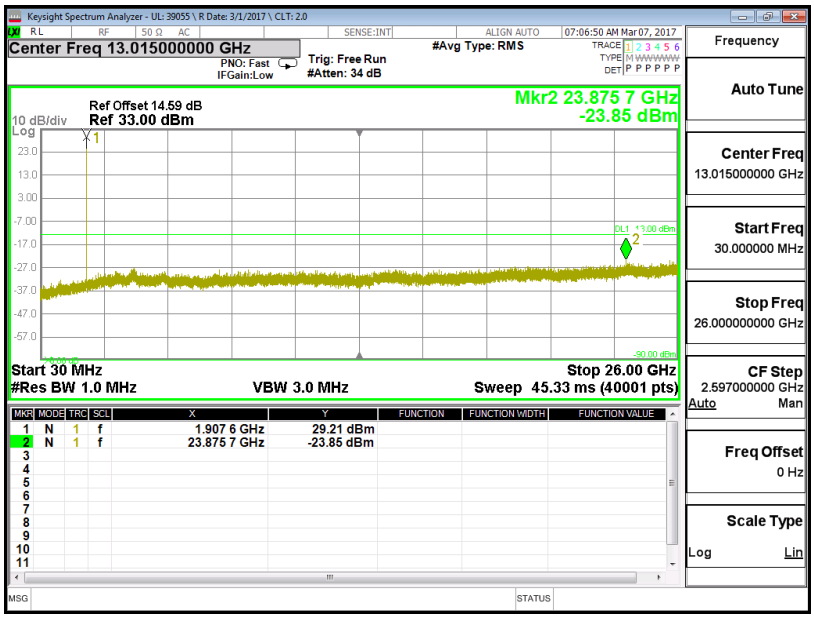






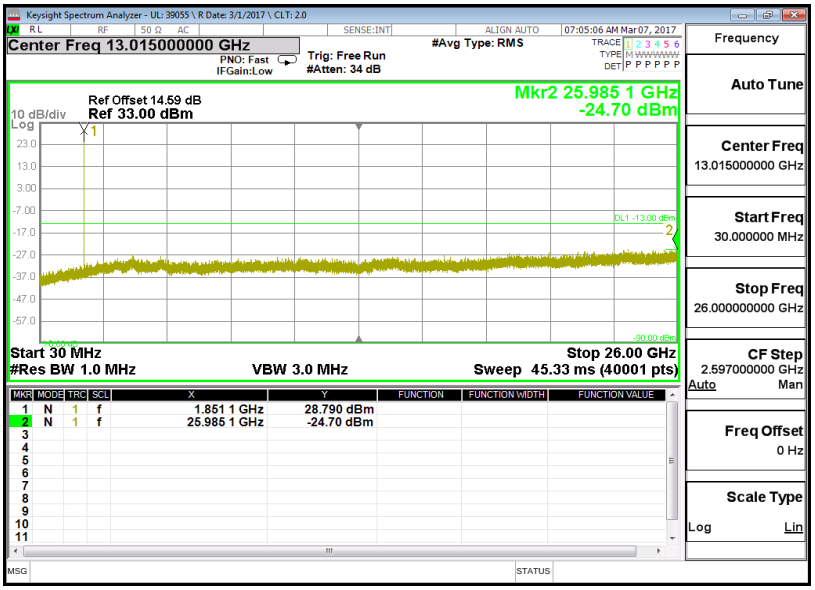
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

HIGH, RB1-0, 30 TO 26000 MHz




**16QAM, (3.0 MHz BAND WIDTH)**

LOW, RB1-0, 30 TO 26000 MHz

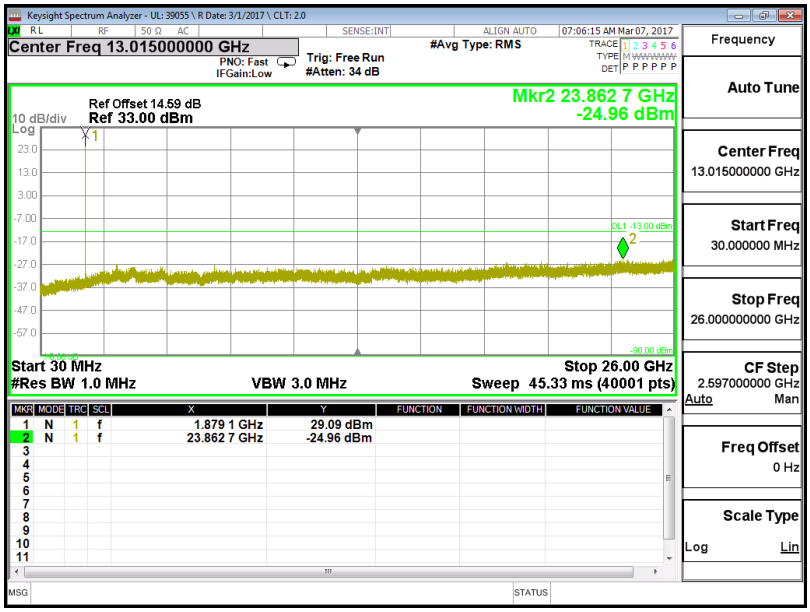




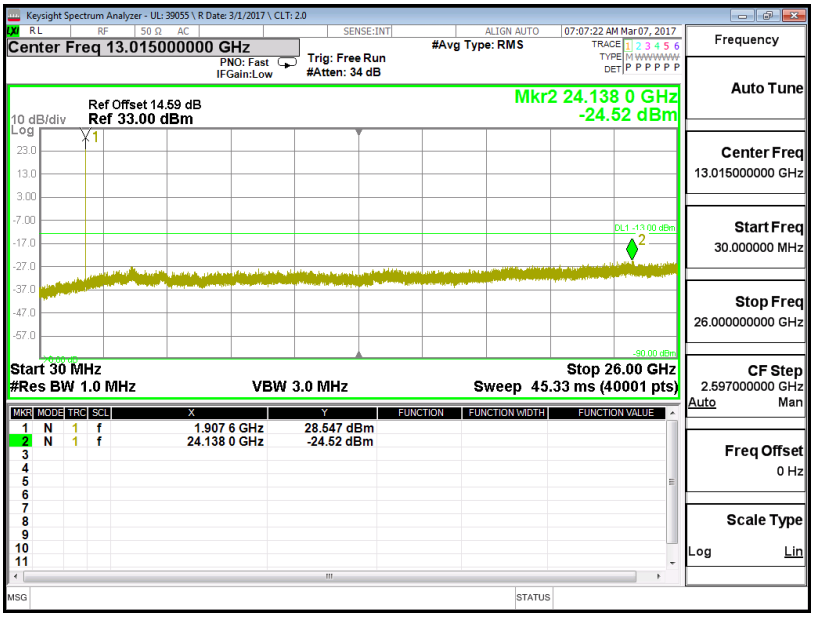


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

MID, RB1-0, 30 TO 26000 MHz




HIGH, RB1-0, 30 TO 26000 MHz



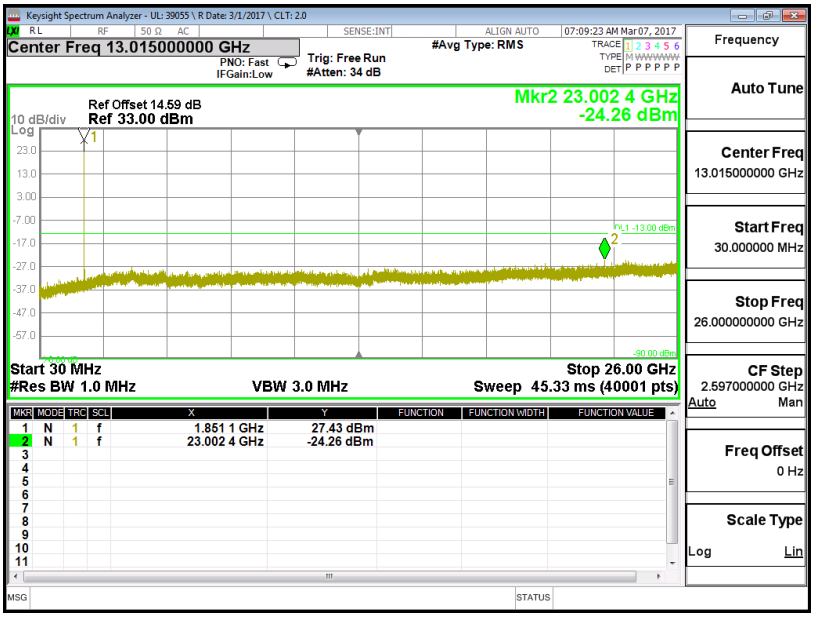




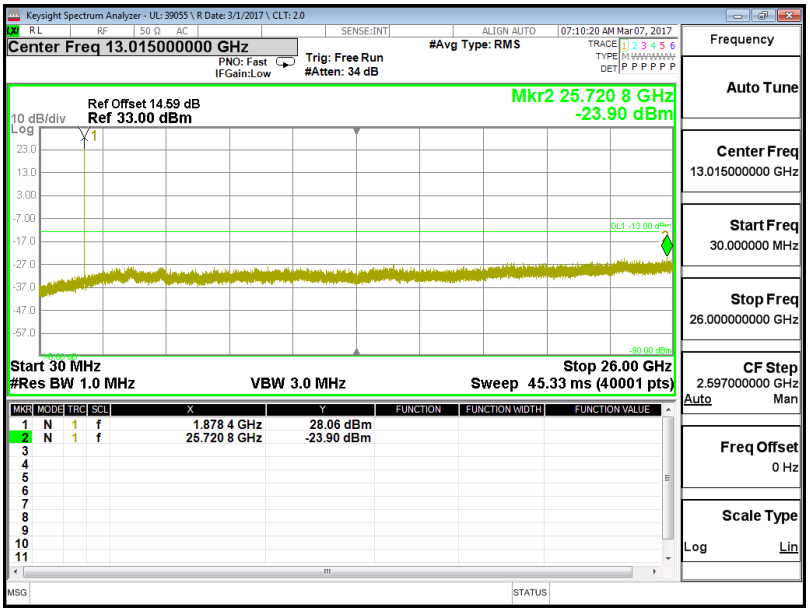
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**QPSK, (5.0 MHz BAND WIDTH)**

LOW, RB1-0, 30 TO 26000 MHz




MID, RB1-0, 30 TO 26000 MHz

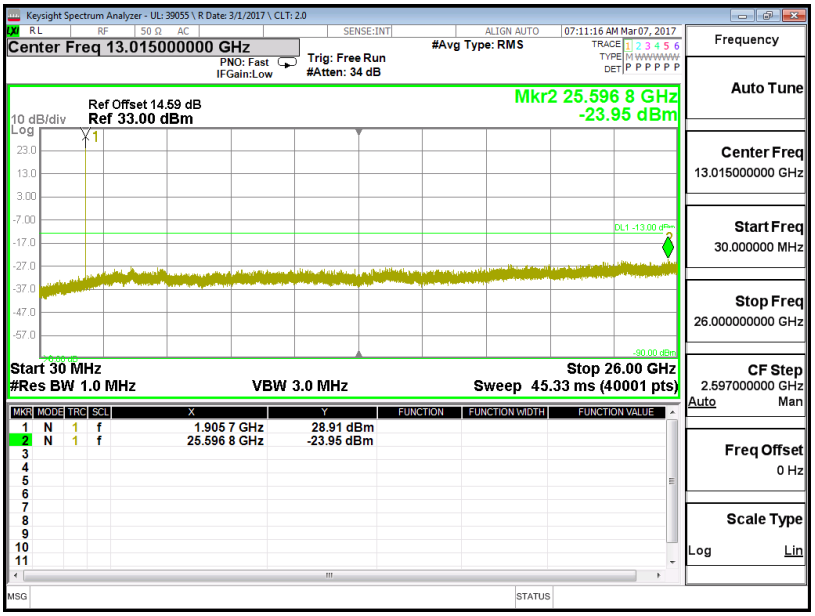






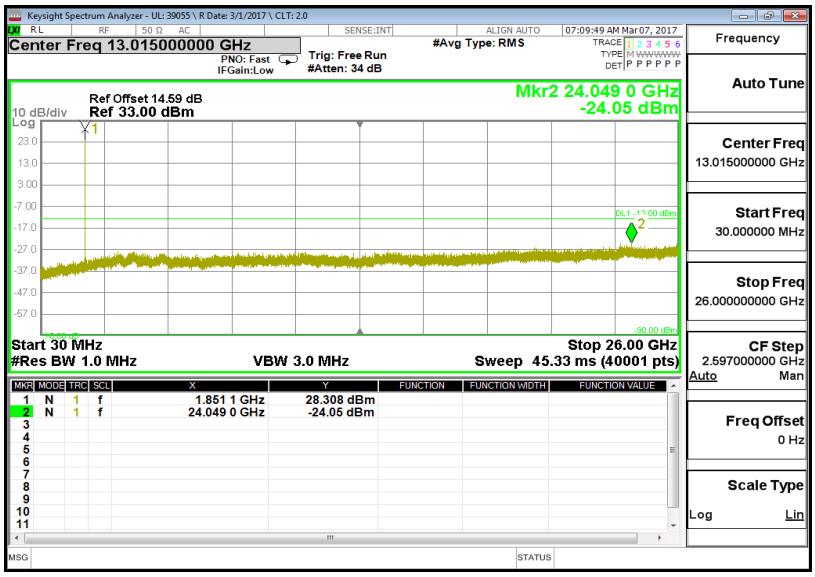
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

HIGH, RB1-0, 30 TO 26000 MHz




## 16QAM, (5.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 26000 MHz

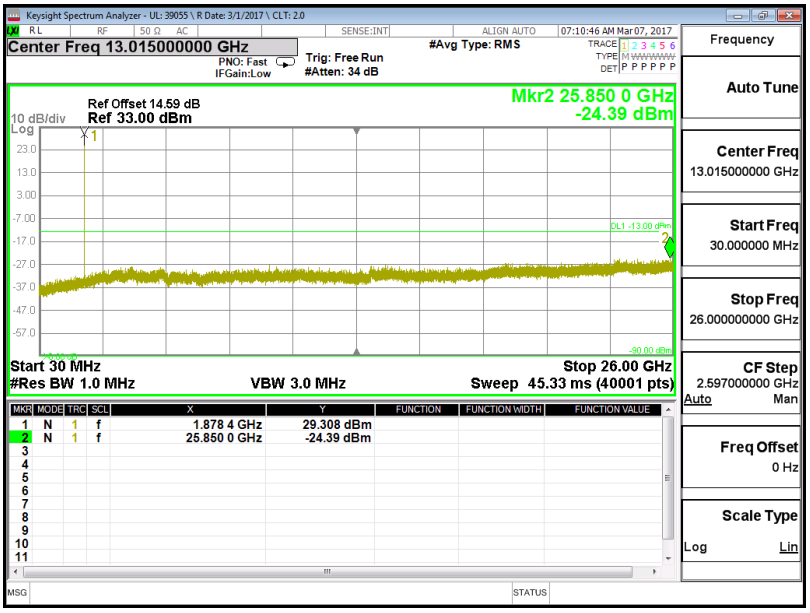




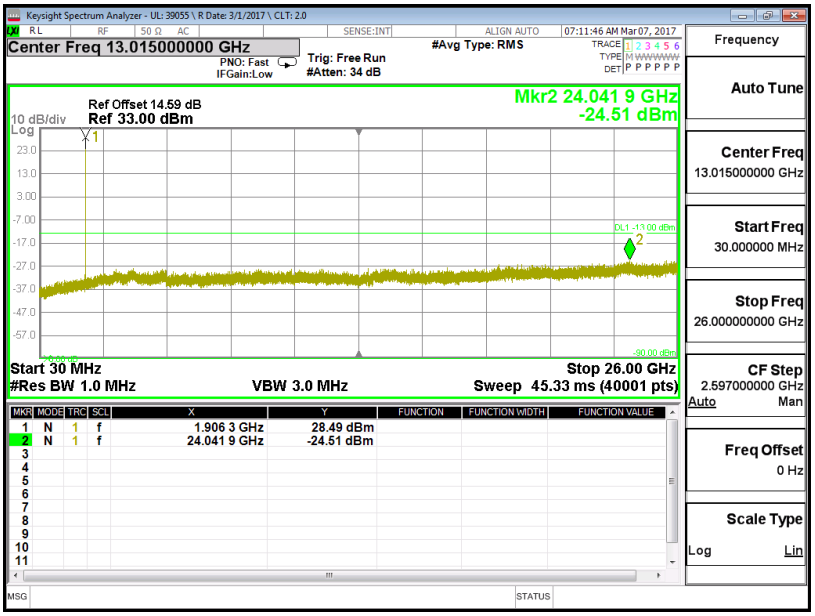


*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

MID, RB1-0, 30 TO 26000 MHz




HIGH, RB1-0, 30 TO 26000 MHz

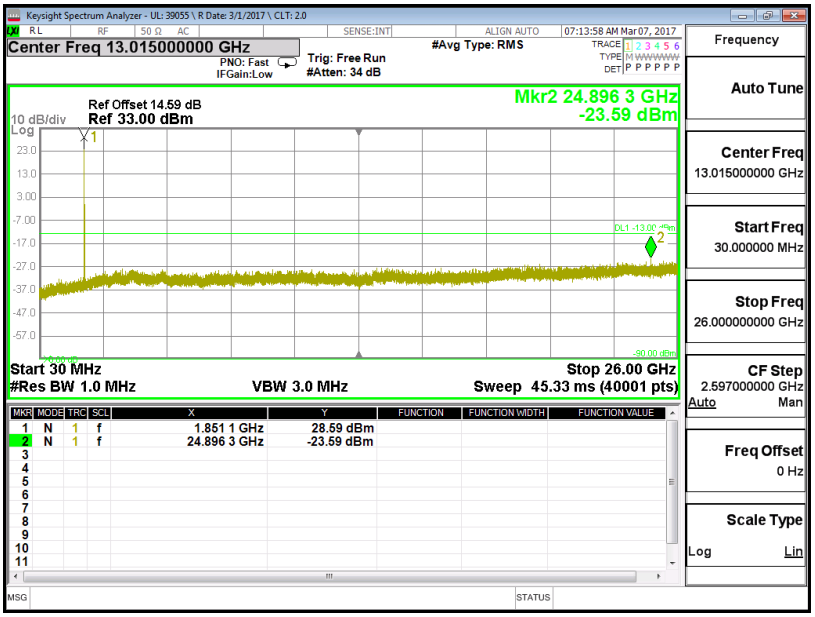




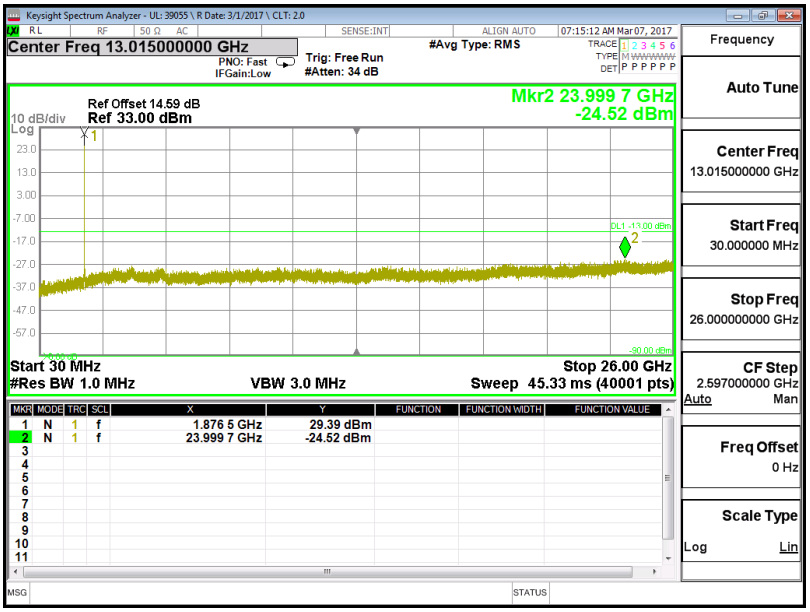
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

**QPSK, (10.0 MHz BAND WIDTH)**

LOW, RB1-0, 30 TO 26000 MHz



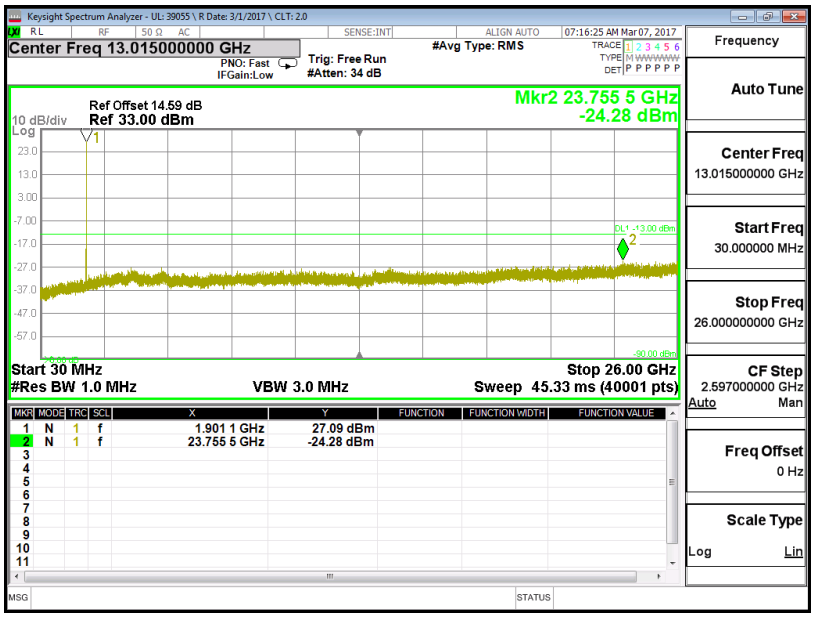

MID, RB1-0, 30 TO 26000 MHz





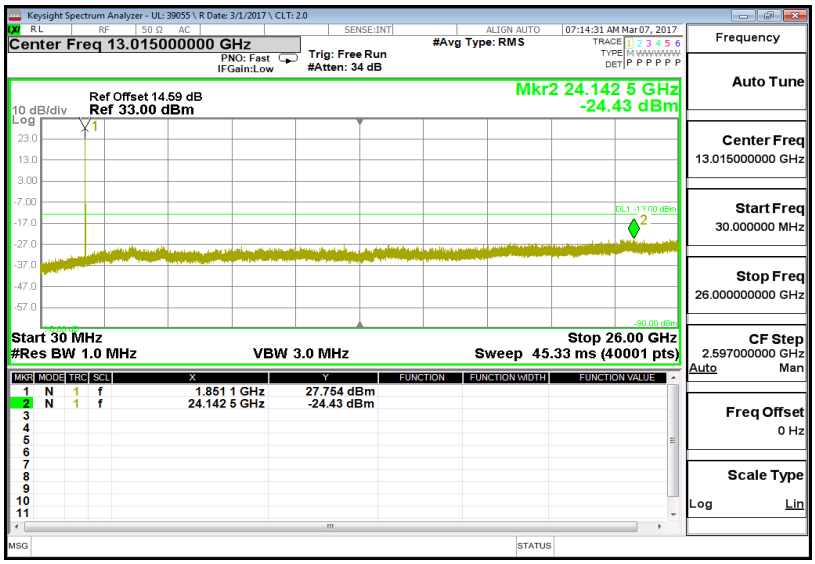
*This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.*

HIGH, RB1-0, 30 TO 26000 MHz




**16QAM, (10.0 MHz BAND WIDTH)**

LOW, RB1-0, 30 TO 26000 MHz







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