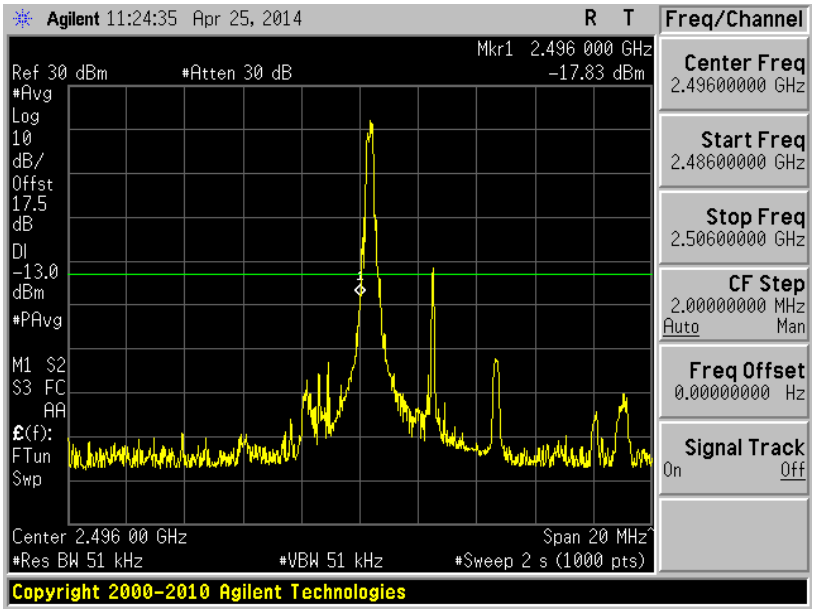
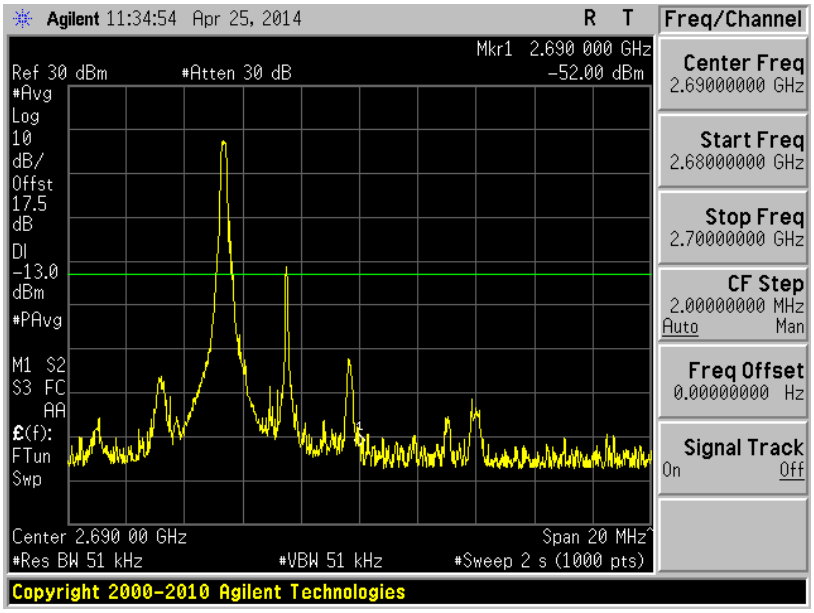
8.2.8. LTE BAND 41 BANDEDGE

QPSK, (5.0 MHz BAND WIDTH)

LOW CH, RB1-0

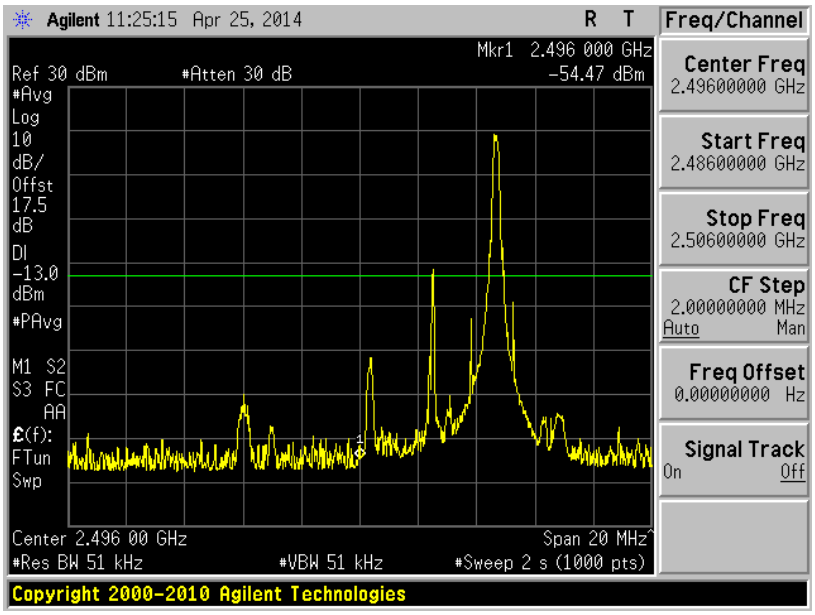


HIGH CH, RB1-0

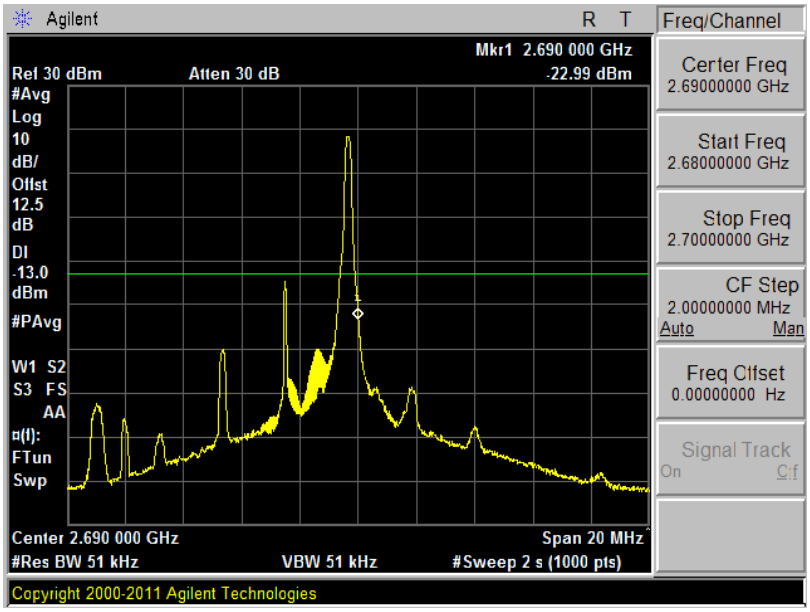


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB1-24

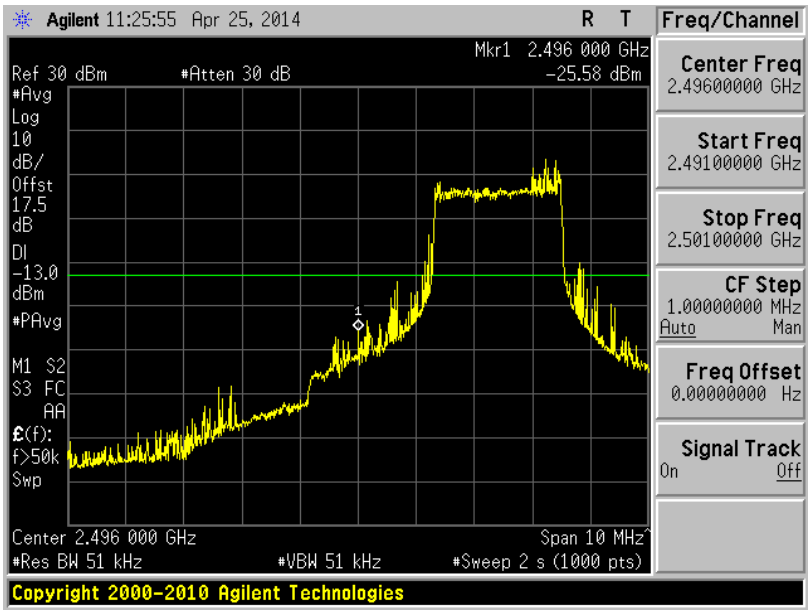


HIGH CH, RB1-24

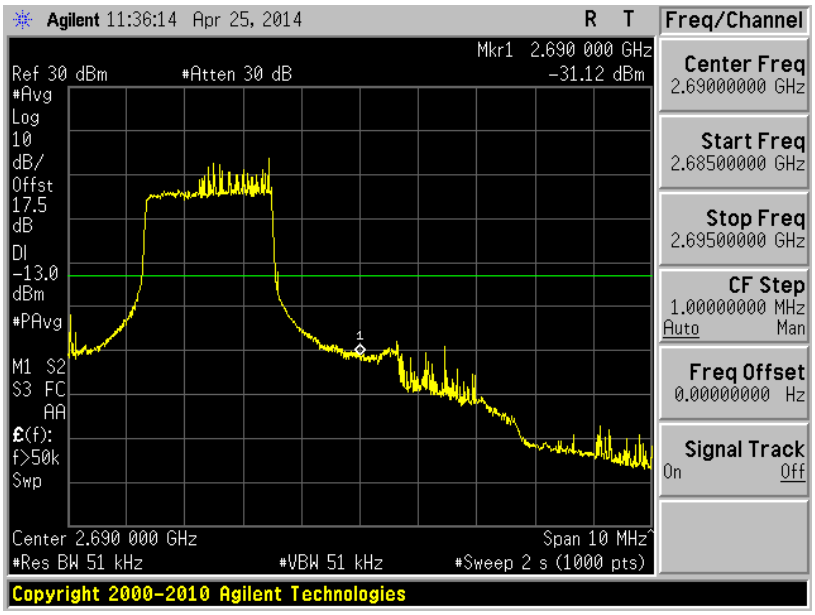


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB12-6

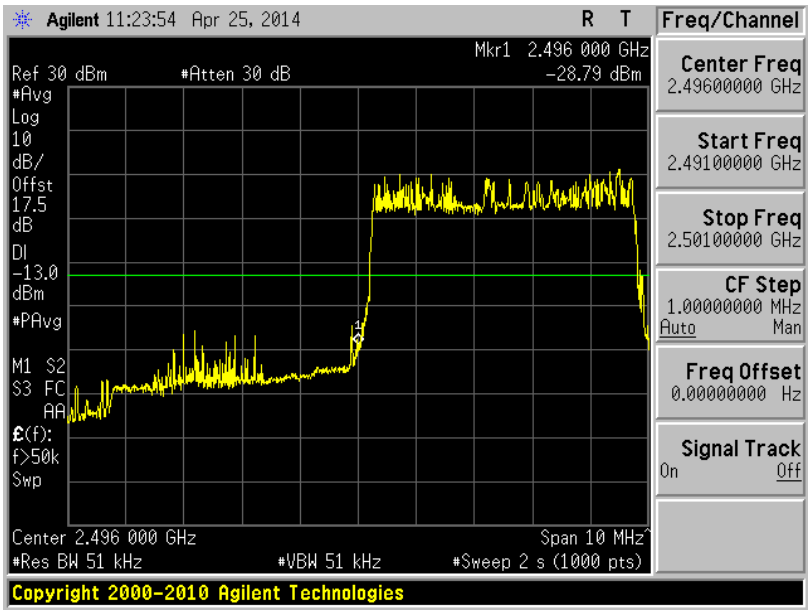


HIGH CH, RB12-6

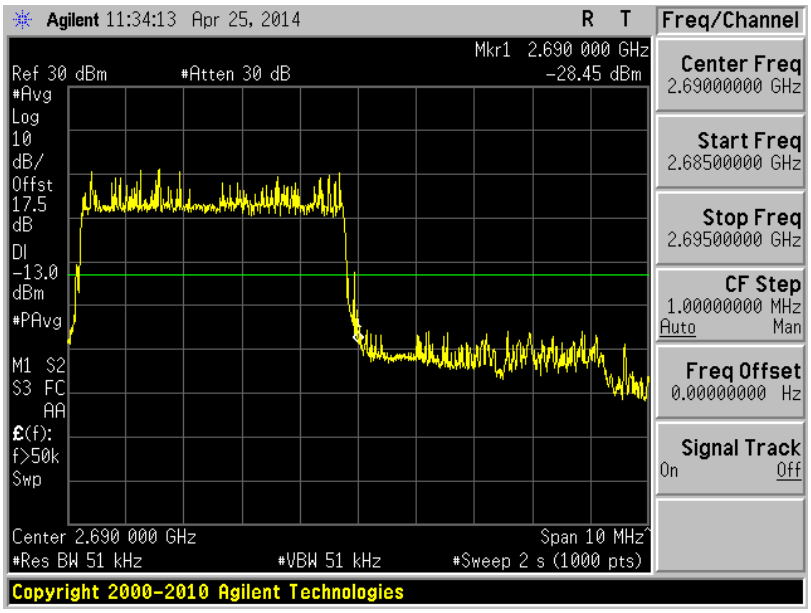


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB25-0



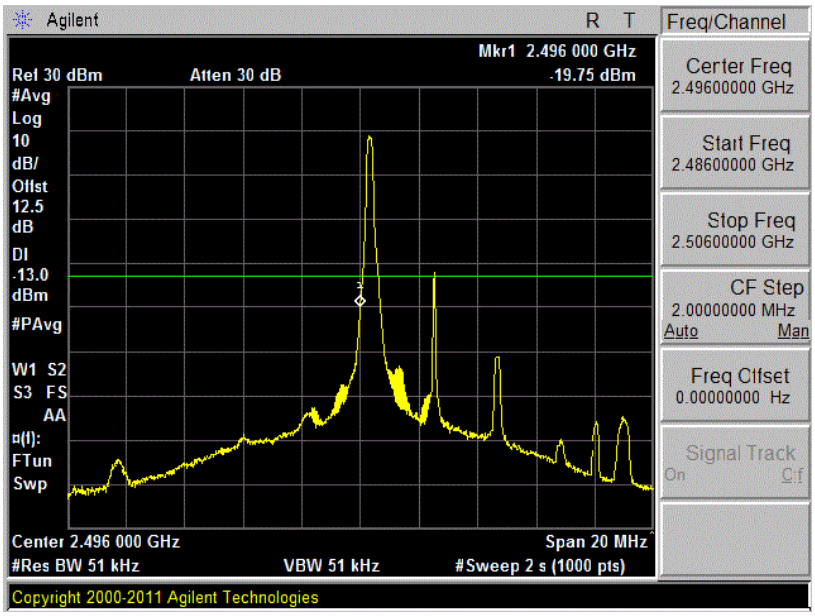
HIGH CH, RB25-0



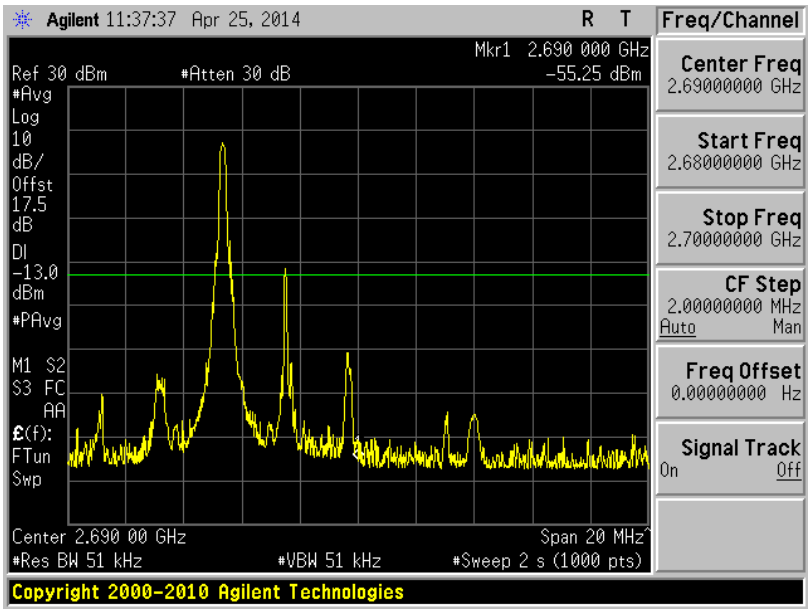
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

16QAM, (5.0 MHz BAND WIDTH)

LOW CH, RB1-0

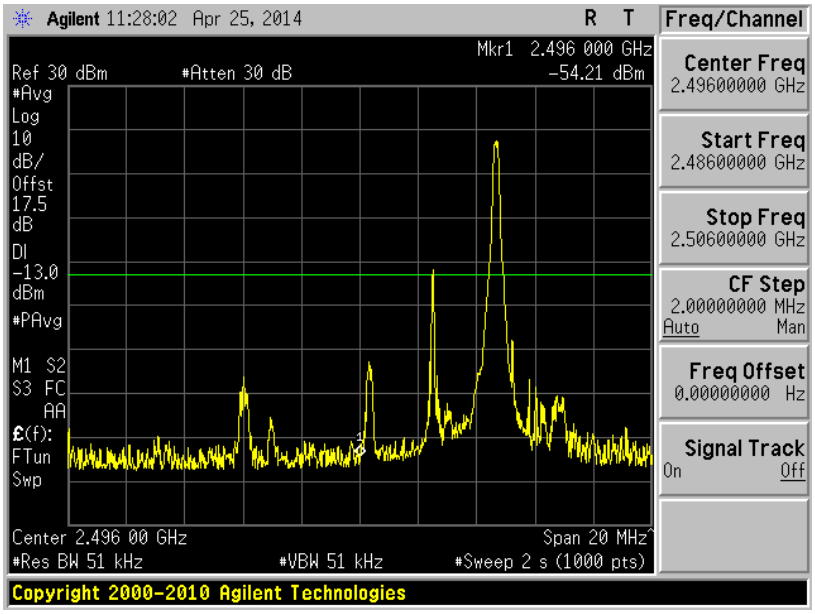


HIGH CH, RB1-0

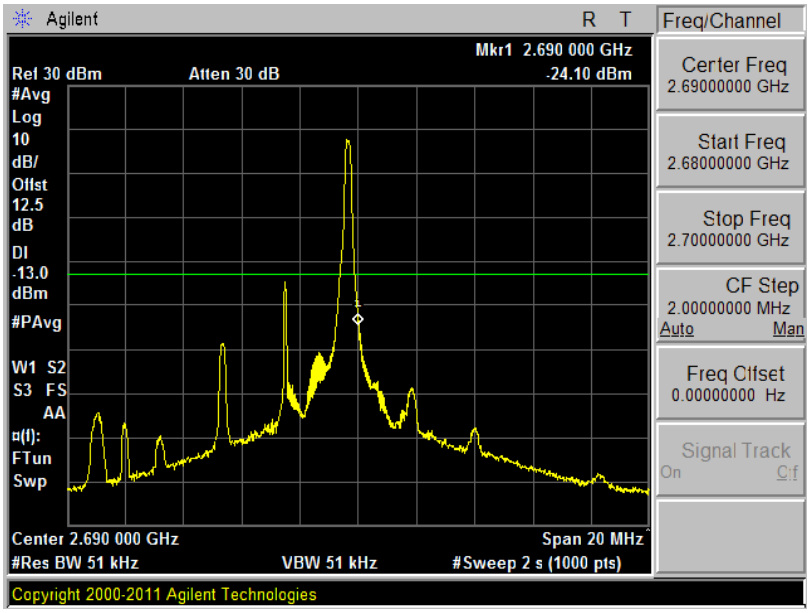


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB1-24

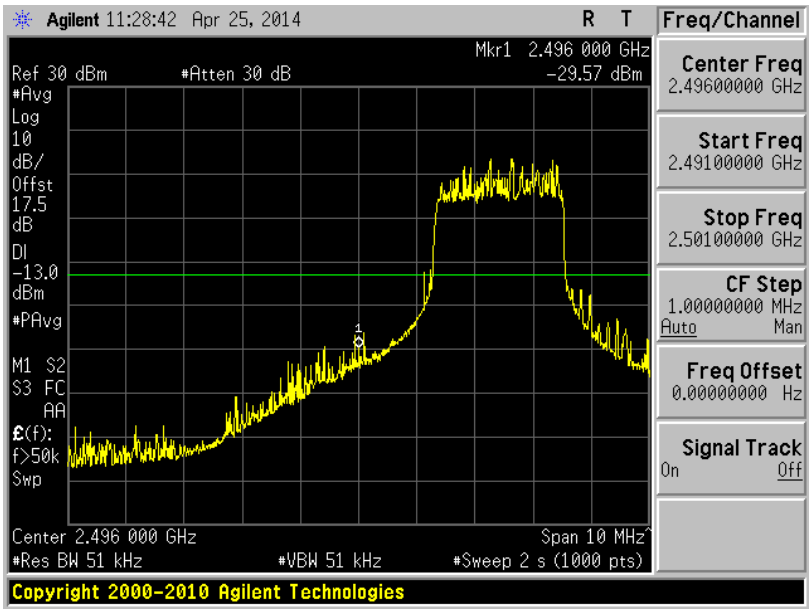


HIGH CH, RB1-24

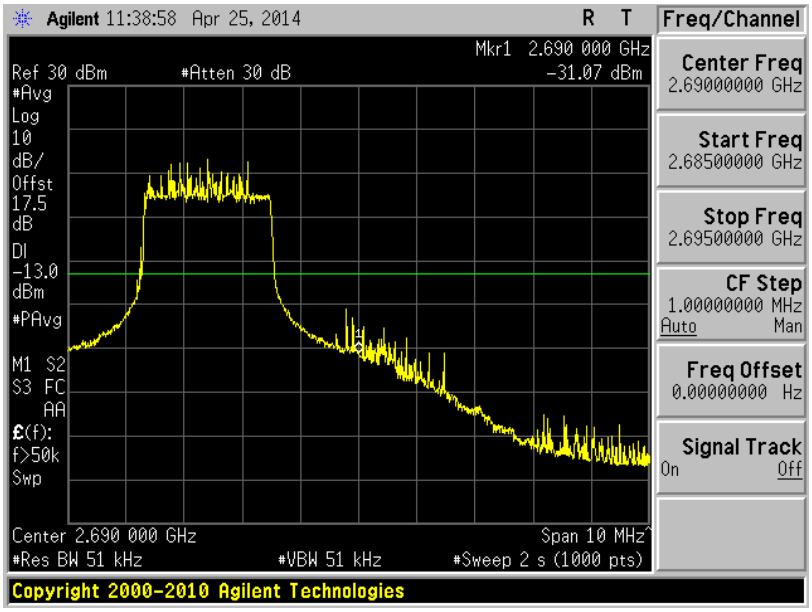


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB12-6

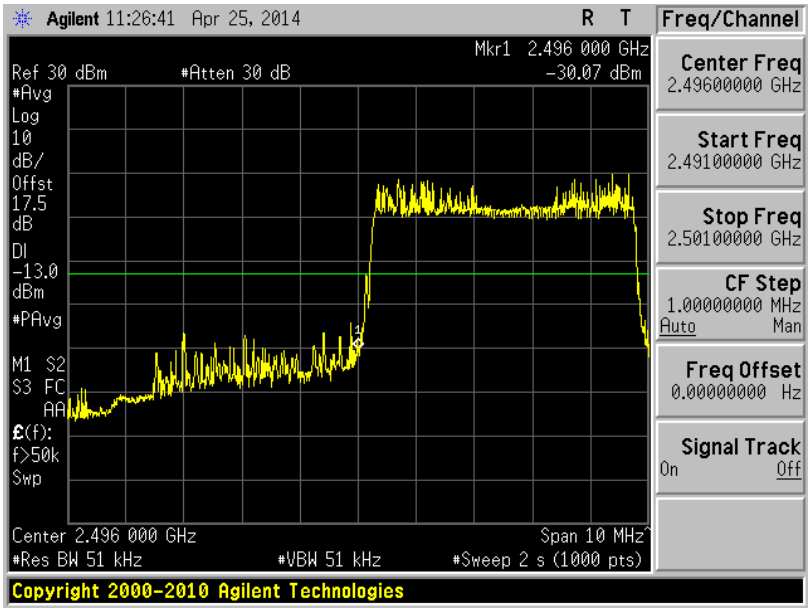


HIGH CH, RB12-6

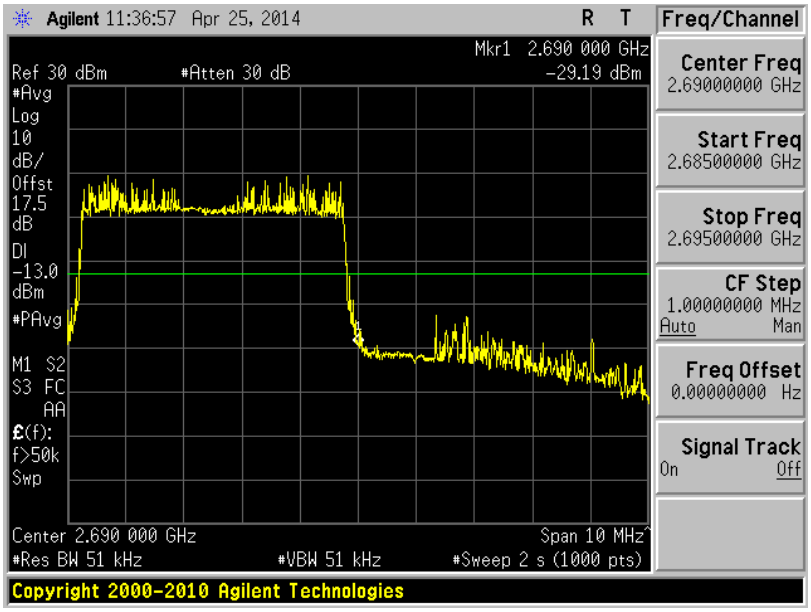


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB25-0



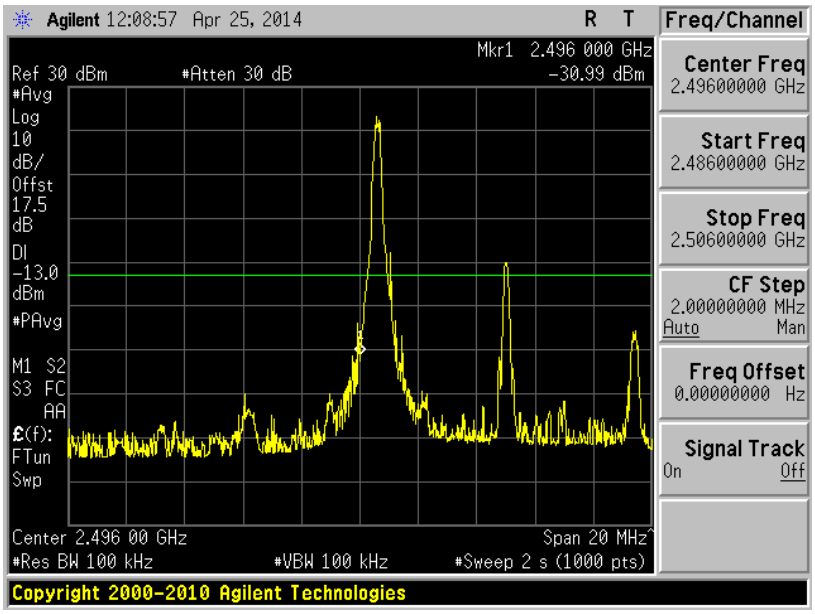
HIGH CH, RB25-0



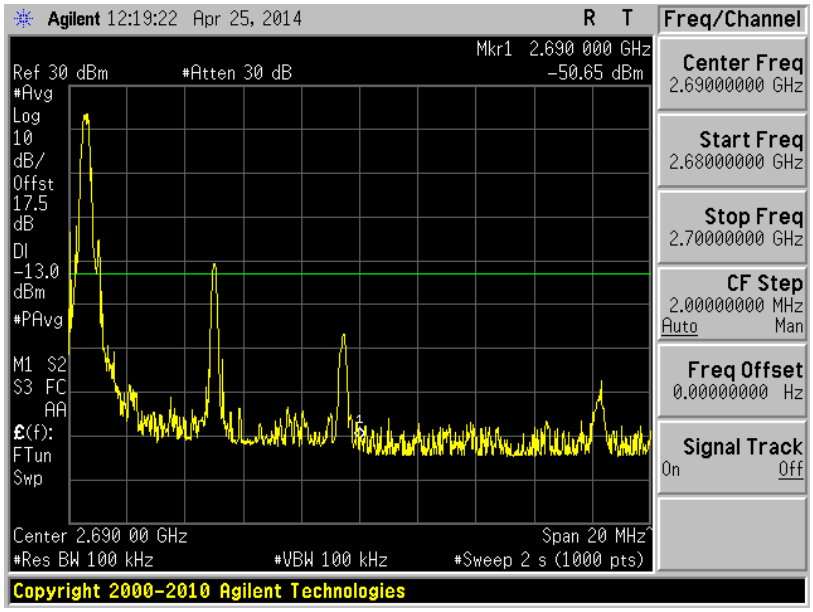
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (10.0 MHz BAND WIDTH)

LOW CH, RB1-0

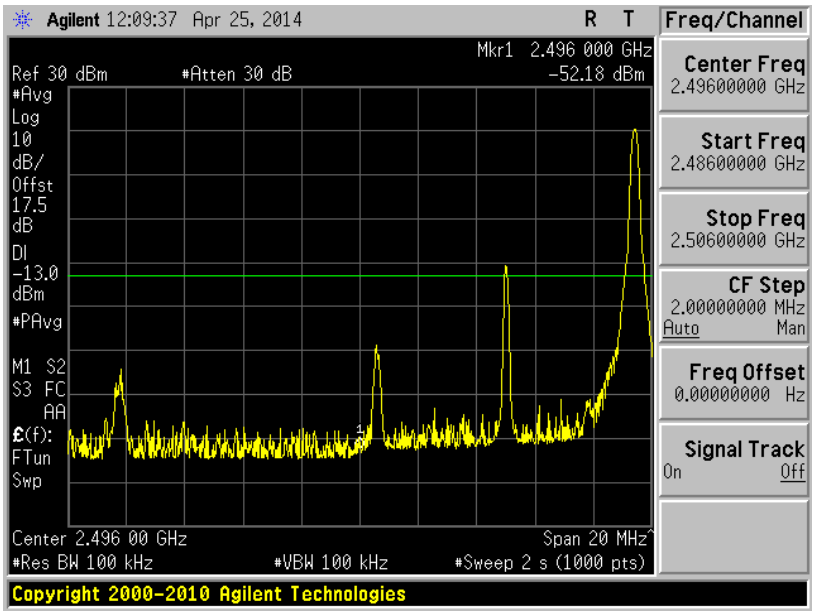


HIGH CH, RB1-0

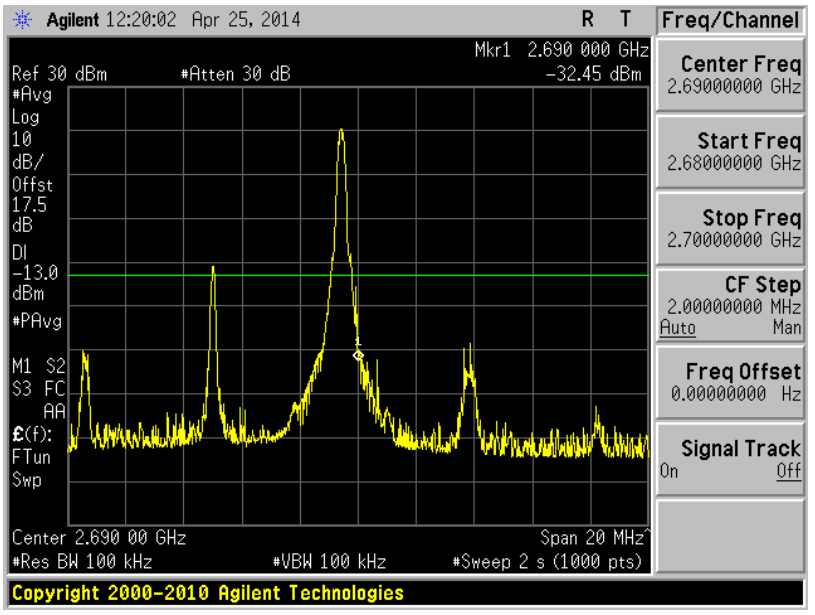


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB1-49

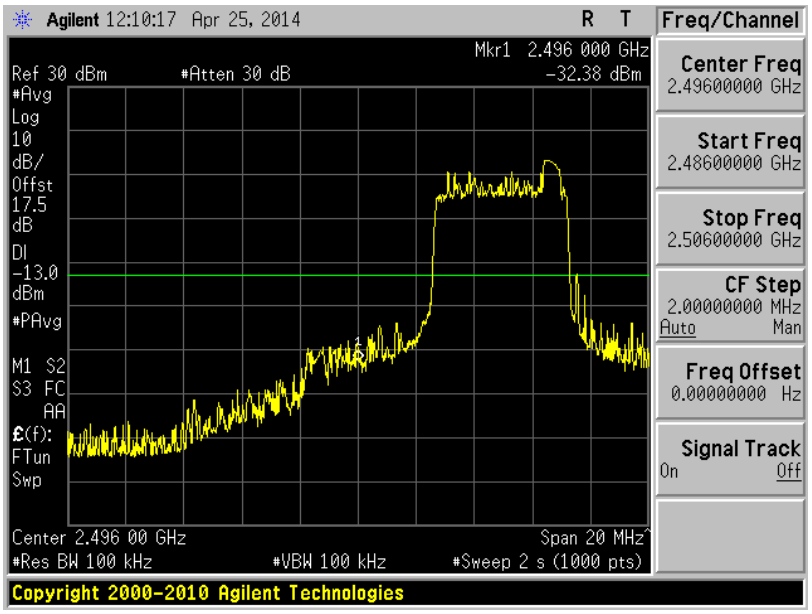


HIGH CH, RB1-49

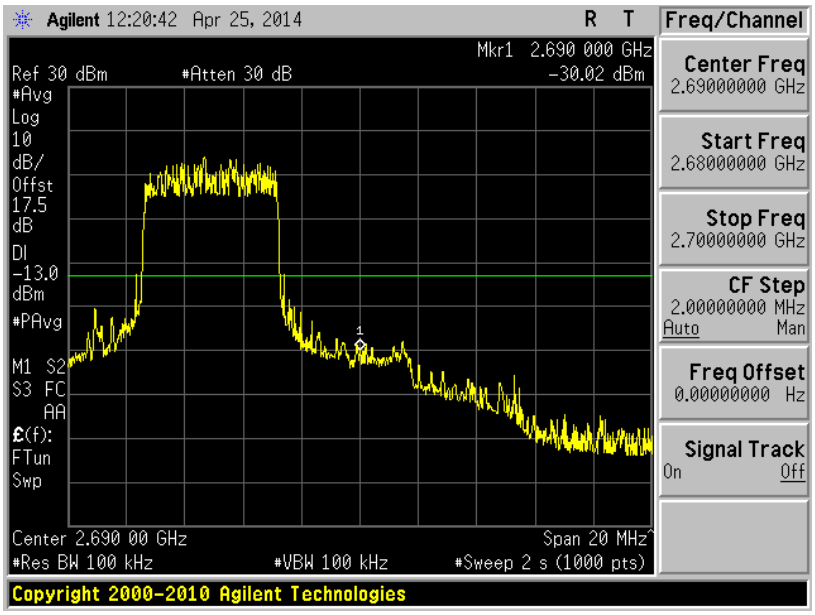


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB25-12

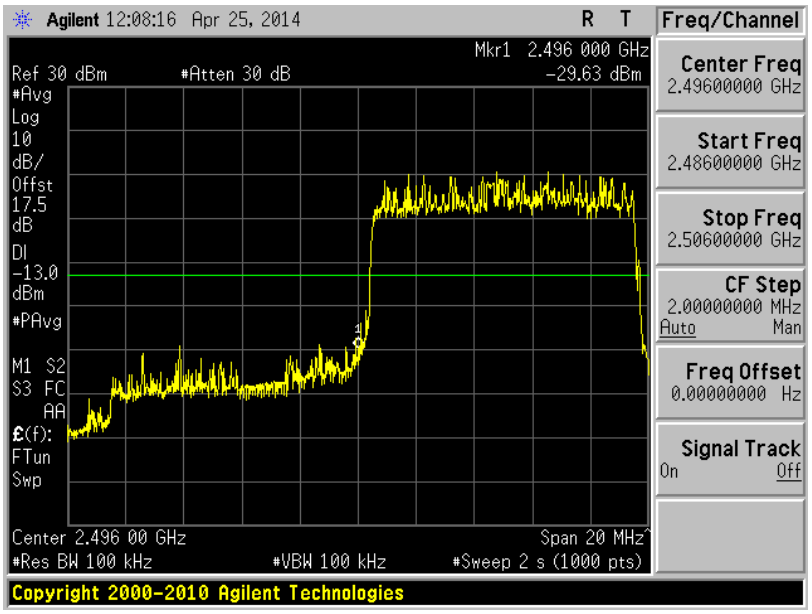


HIGH CH, RB25-12

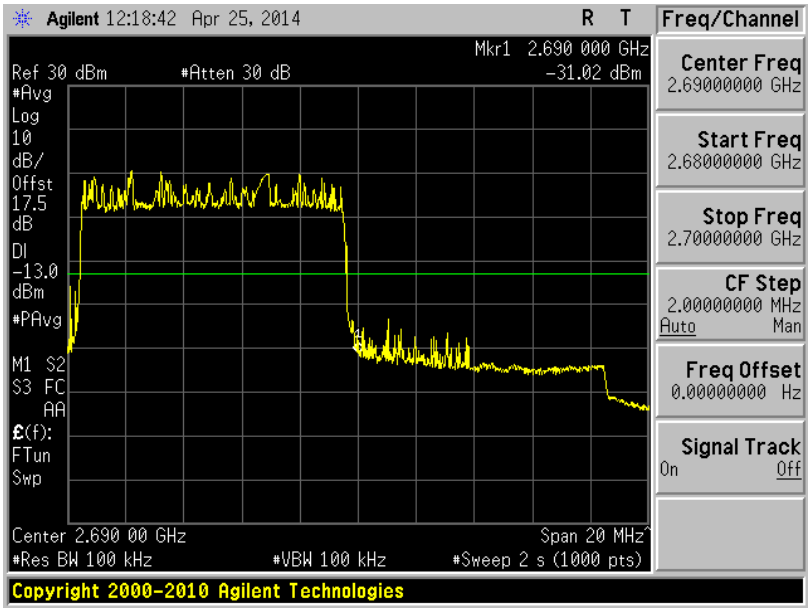


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB50-0



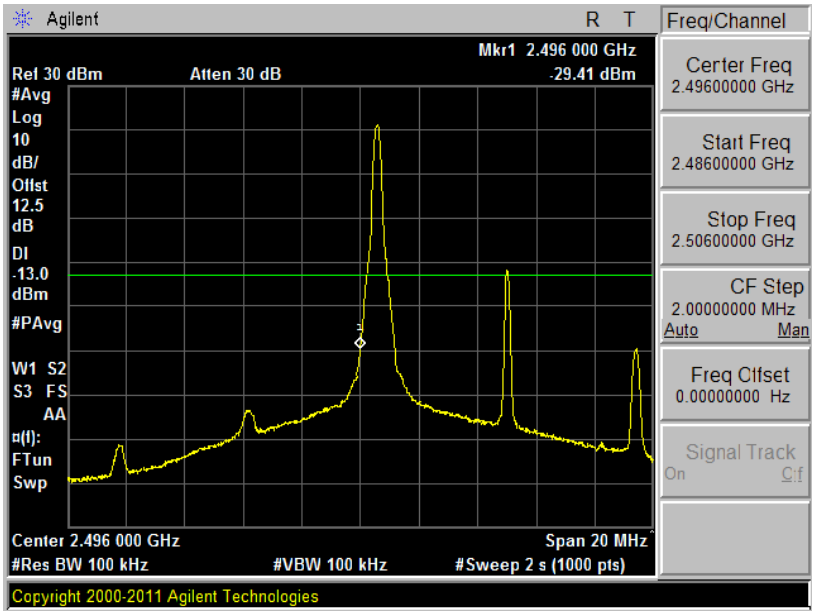
HIGH CH, RB50-0



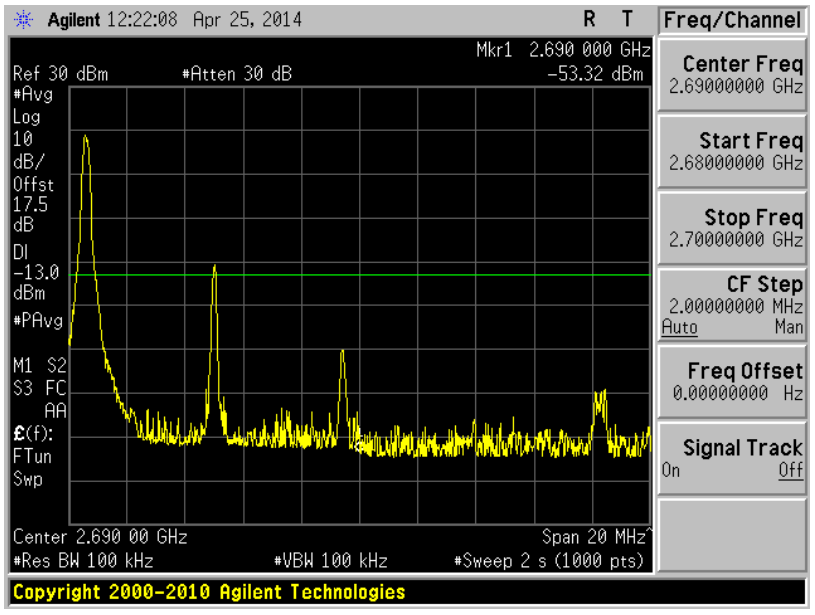
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

16QAM, (10.0 MHz BAND WIDTH)

LOW CH, RB1-0

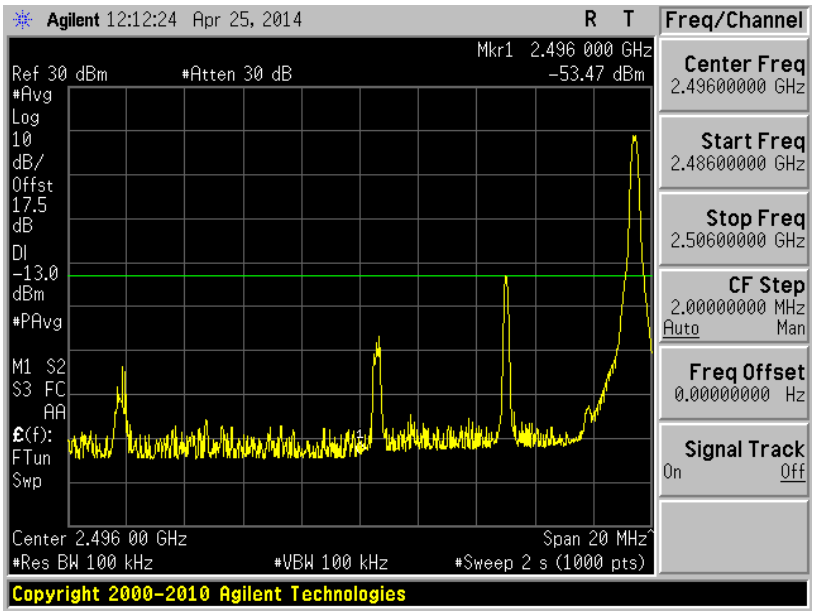


HIGH CH, RB1-0

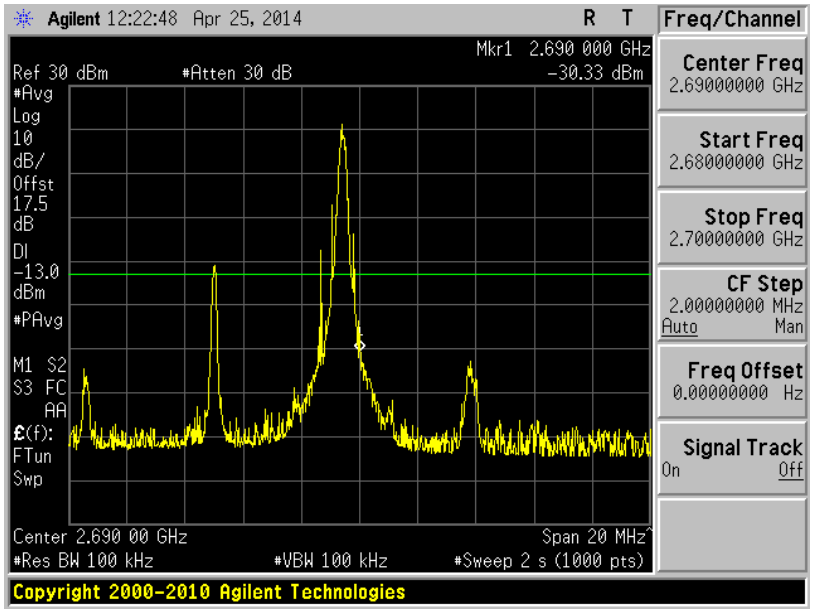


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB1-49

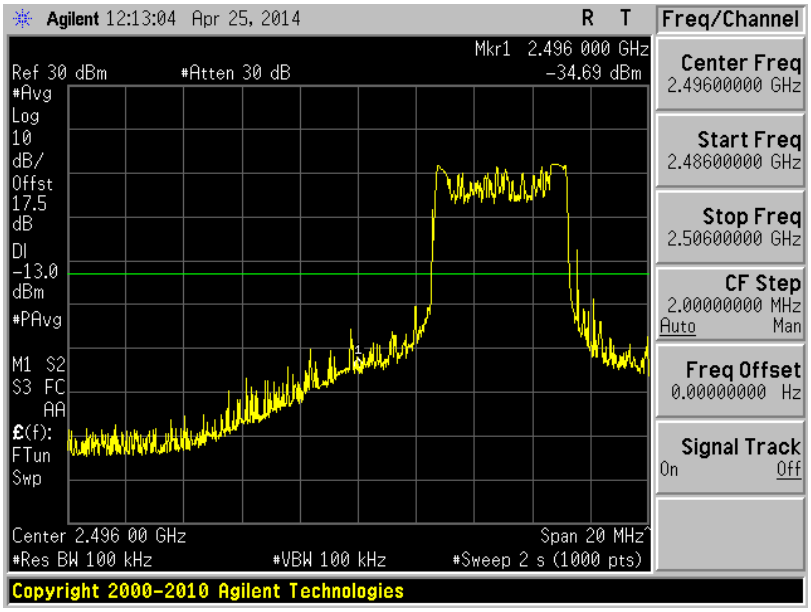


HIGH CH, RB1-49

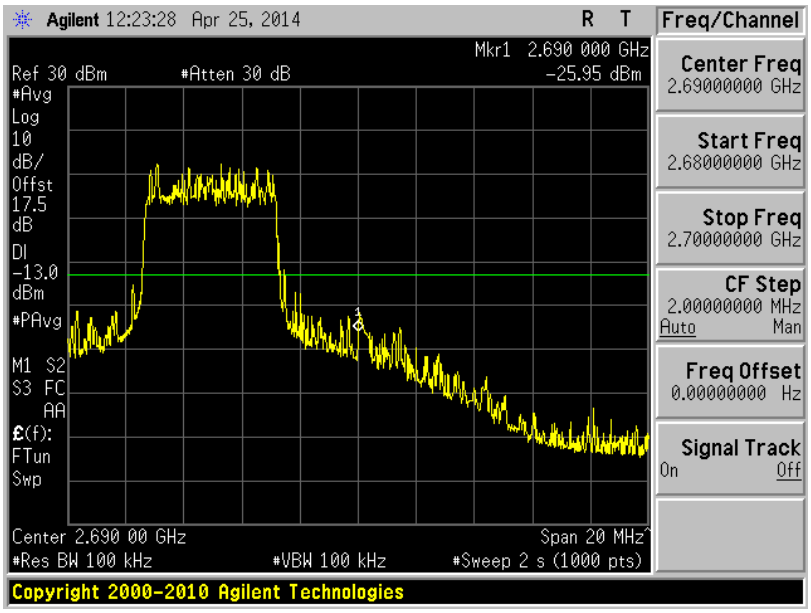


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB25-12

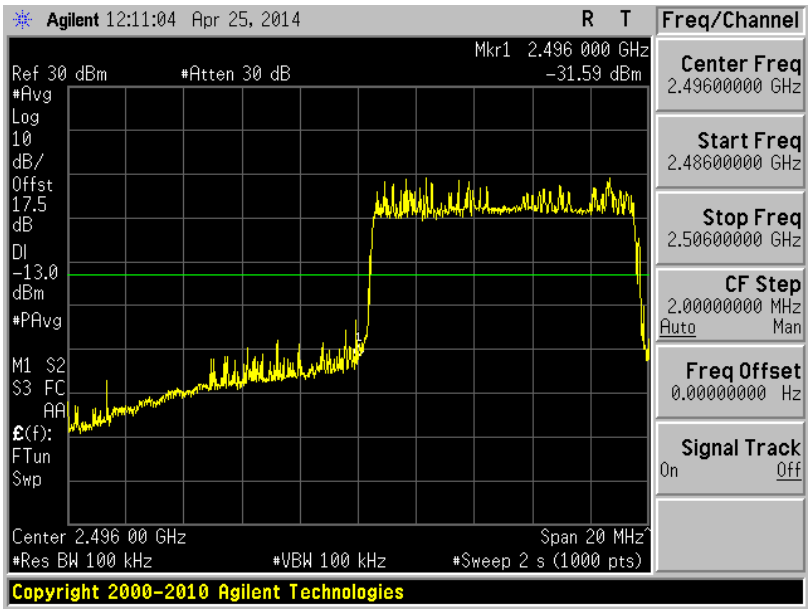


HIGH CH, RB25-12

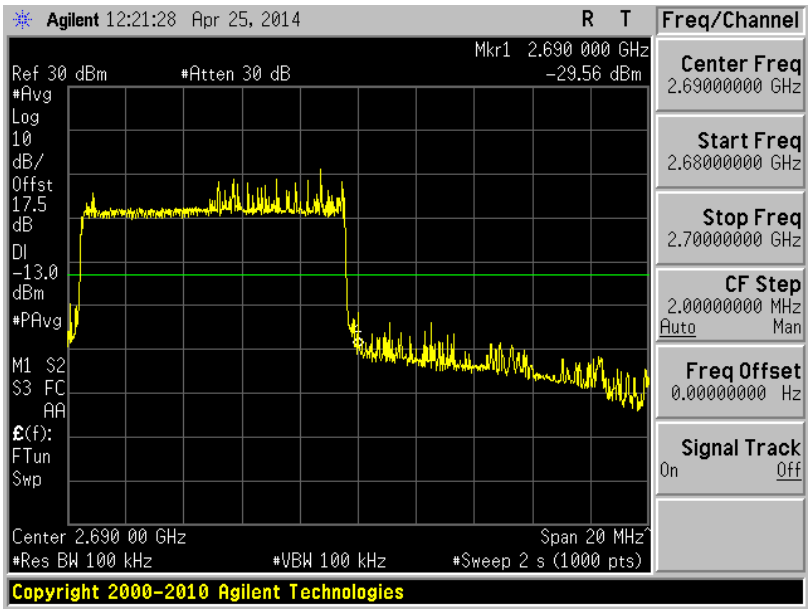


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB50-0



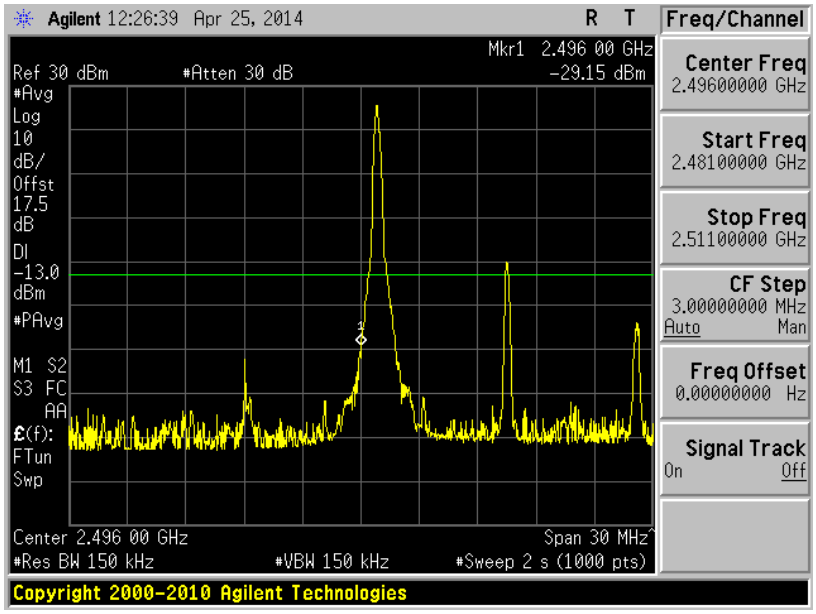
HIGH CH, RB50-0



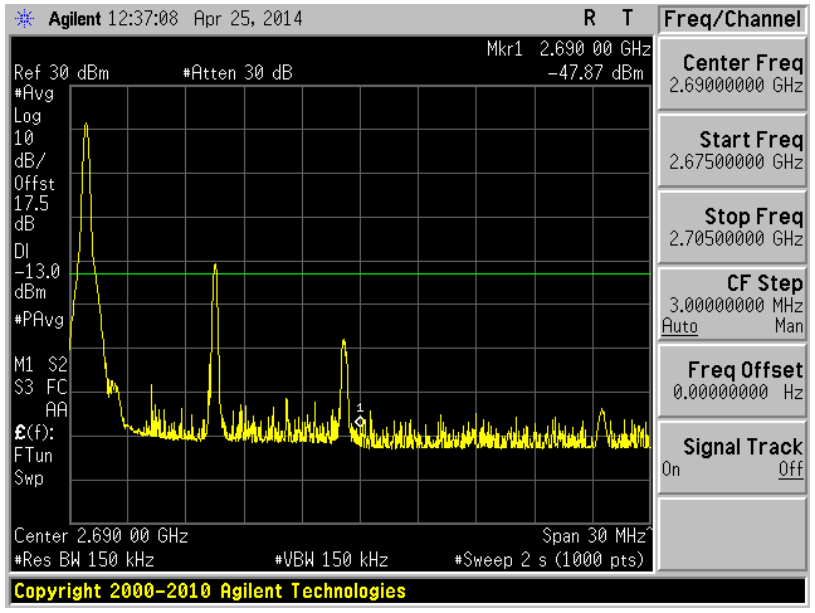
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (15.0 MHz BAND WIDTH)

LOW CH, RB1-0

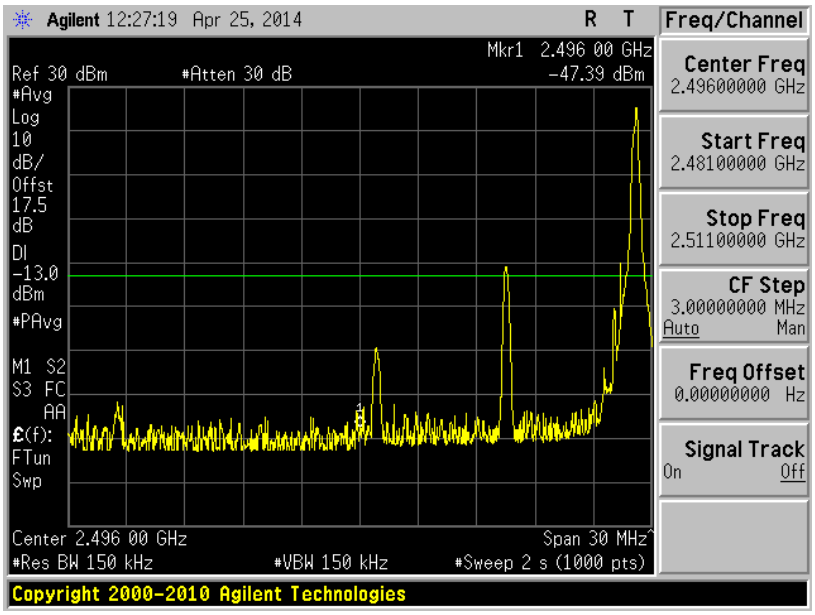


HIGH CH, RB1-0

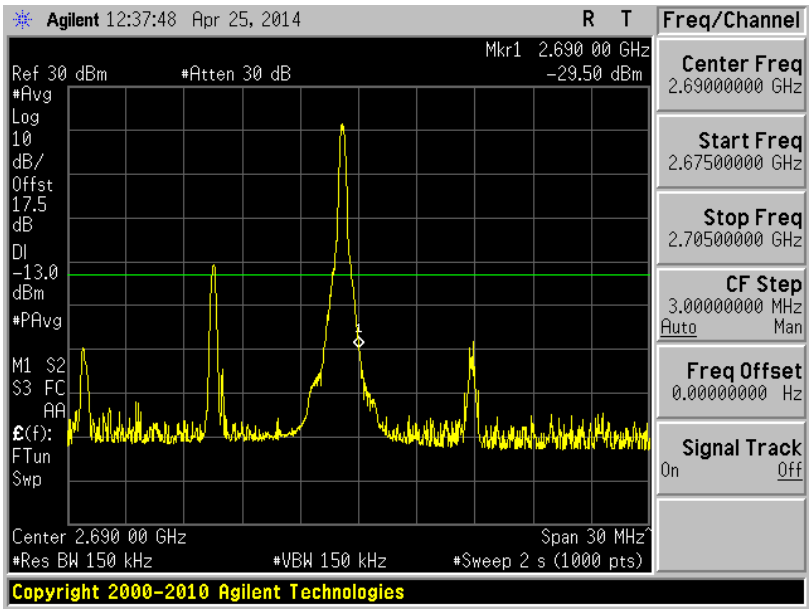


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB1-74

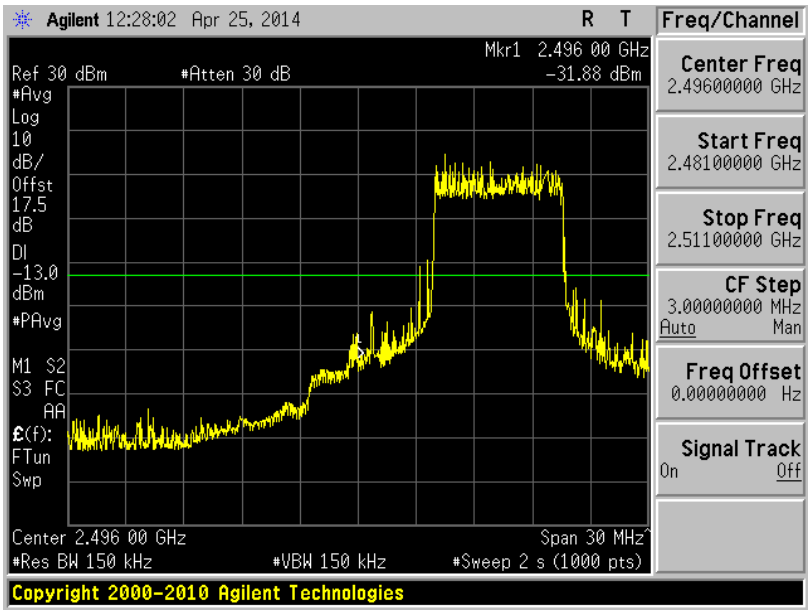


HIGH CH, RB1-74

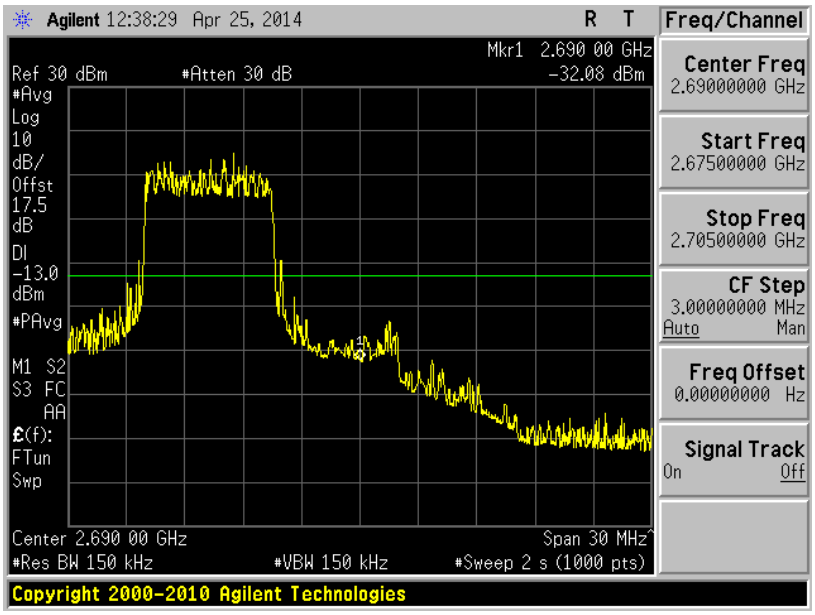


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB36-18

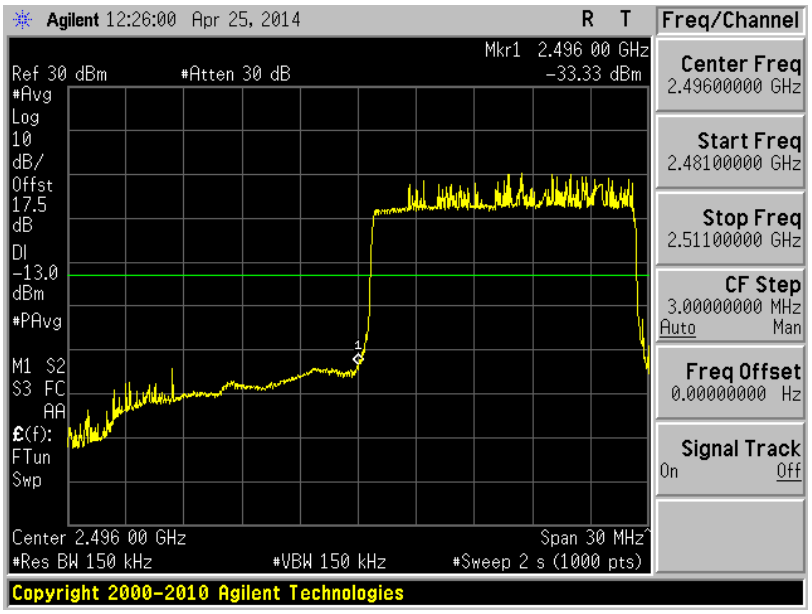


HIGH CH, RB36-18

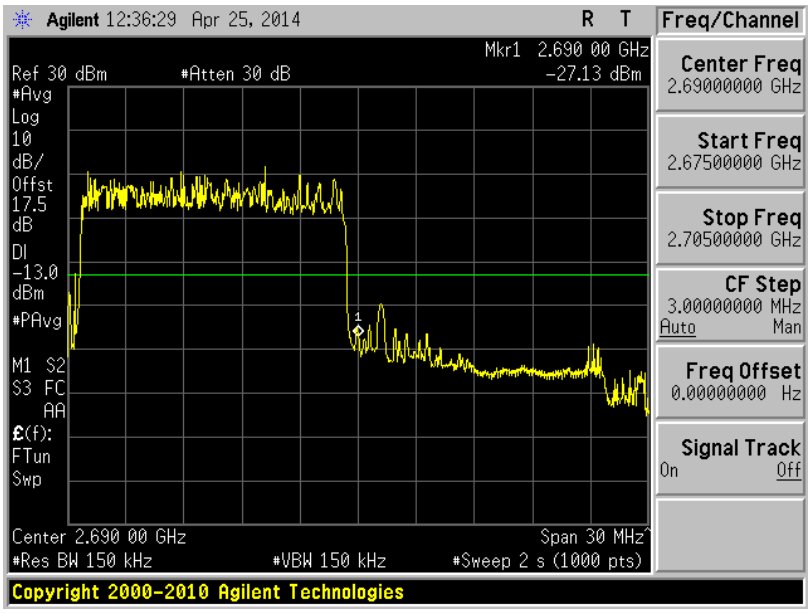


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB75-0



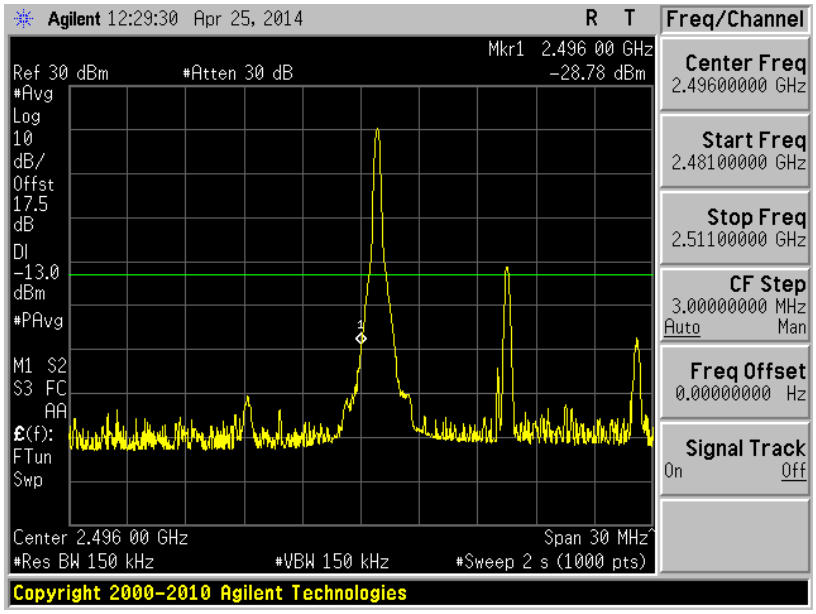
HIGH CH, RB75-0



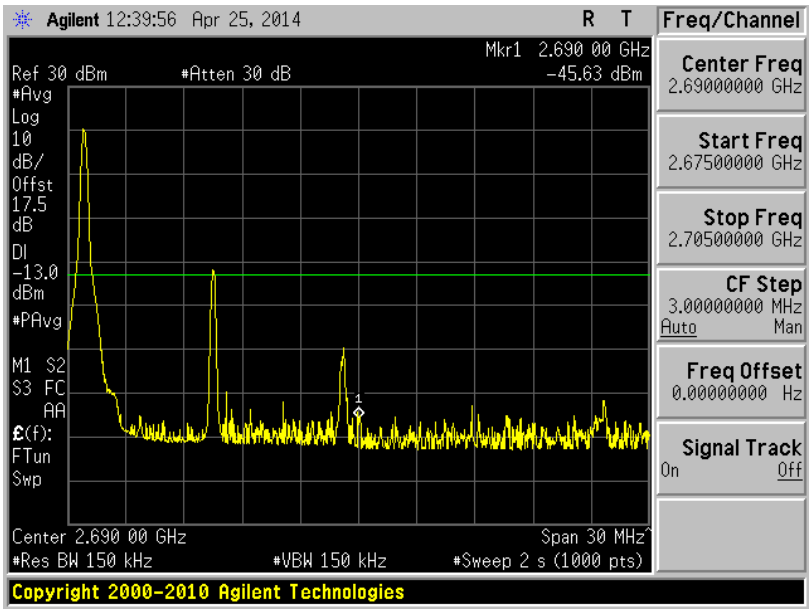
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

16QAM, (15.0 MHz BAND WIDTH)

LOW CH, RB1-0

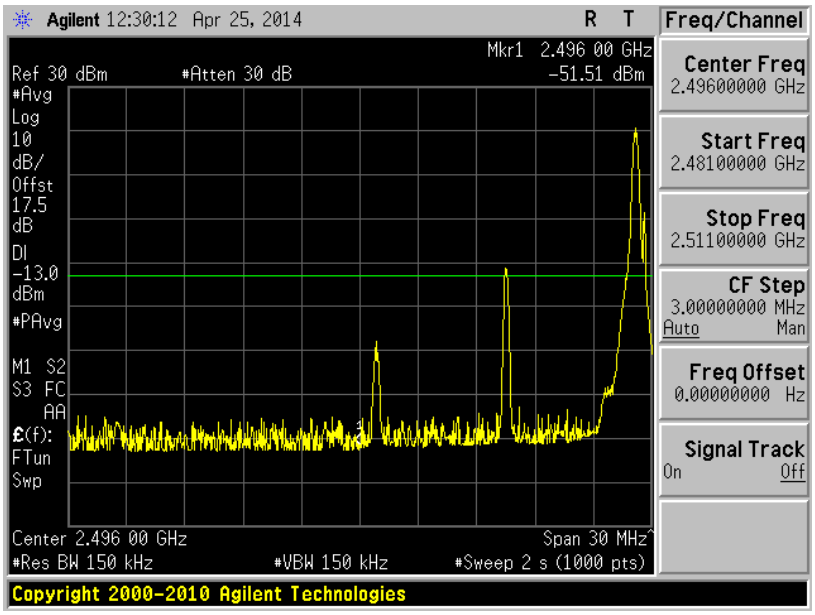


HIGH CH, RB1-0

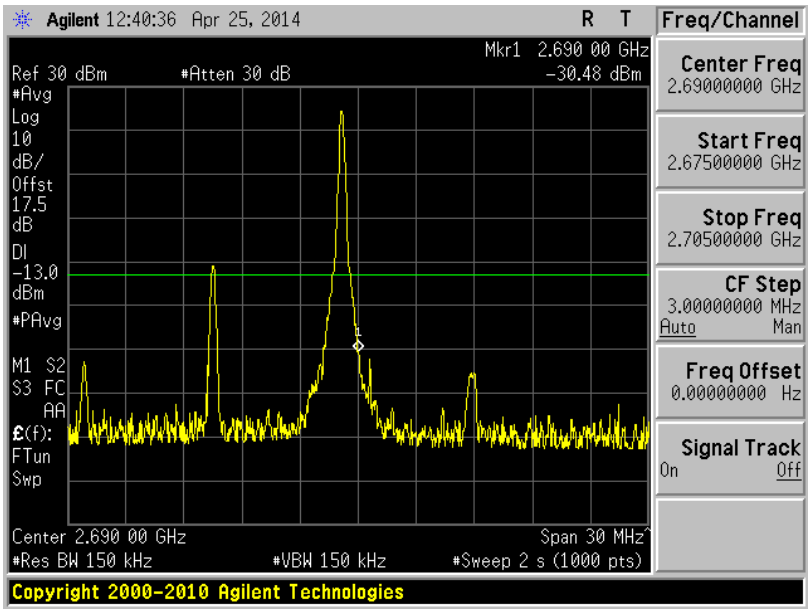


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB1-74

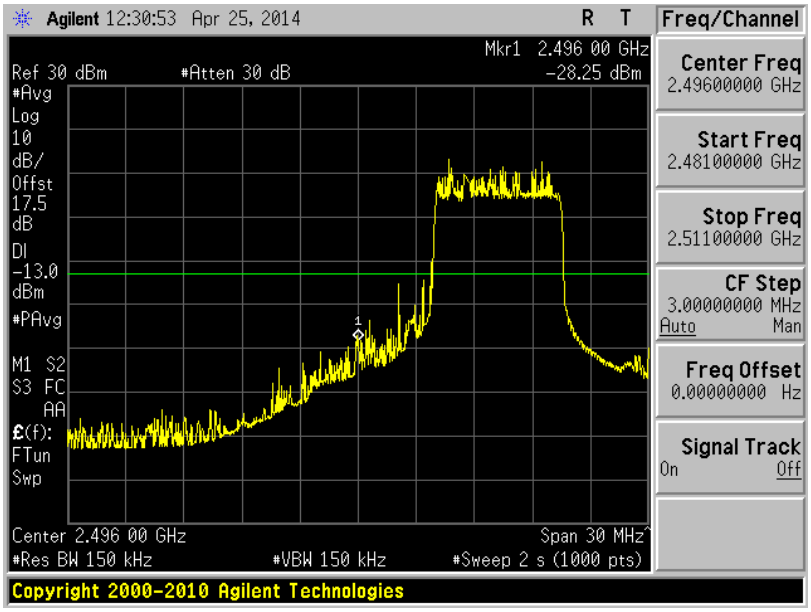


HIGH CH, RB1-74

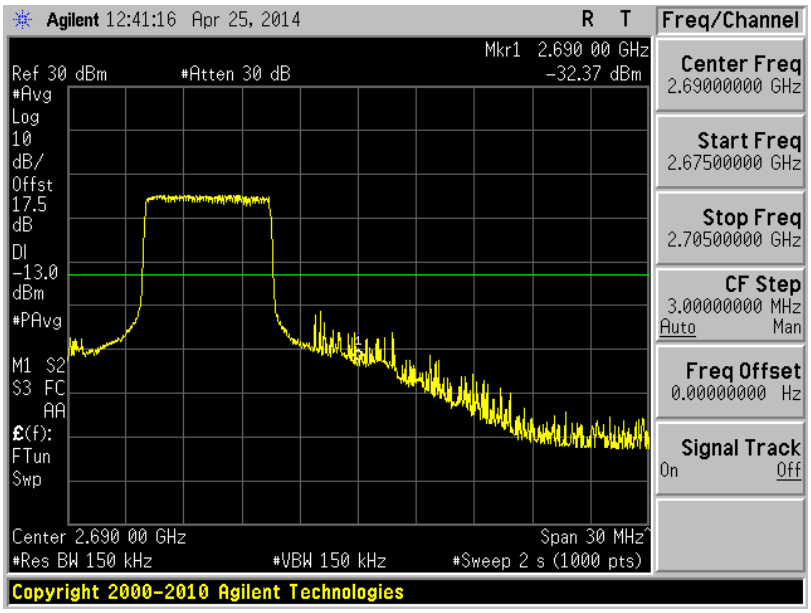


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB36-18

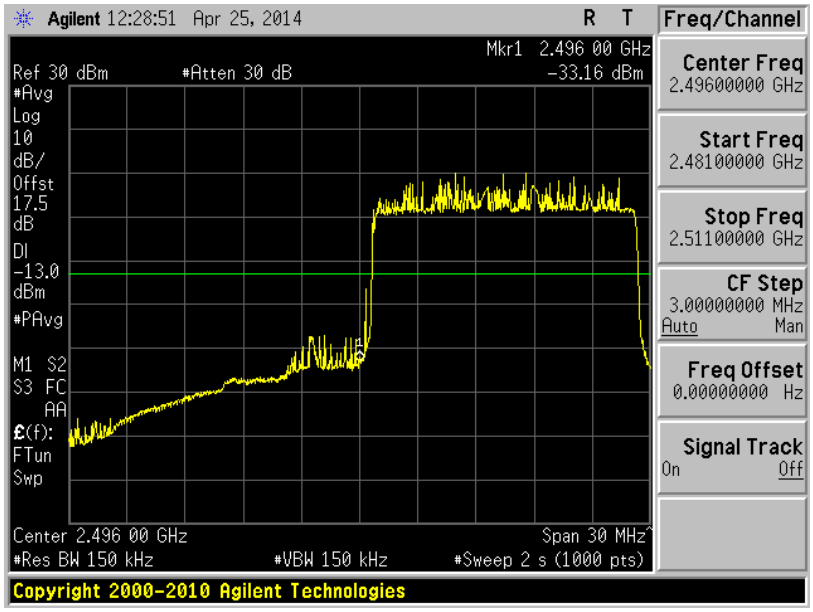


HIGH CH, RB36-18

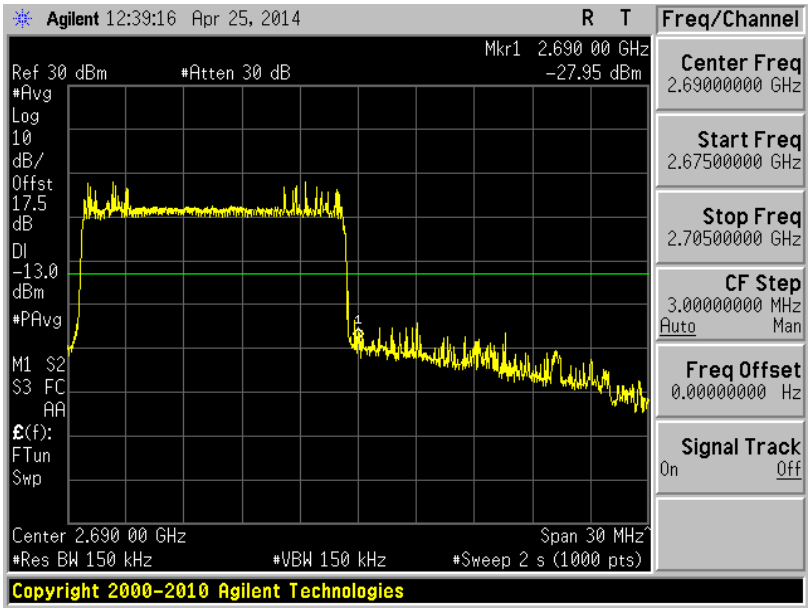


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB75-0



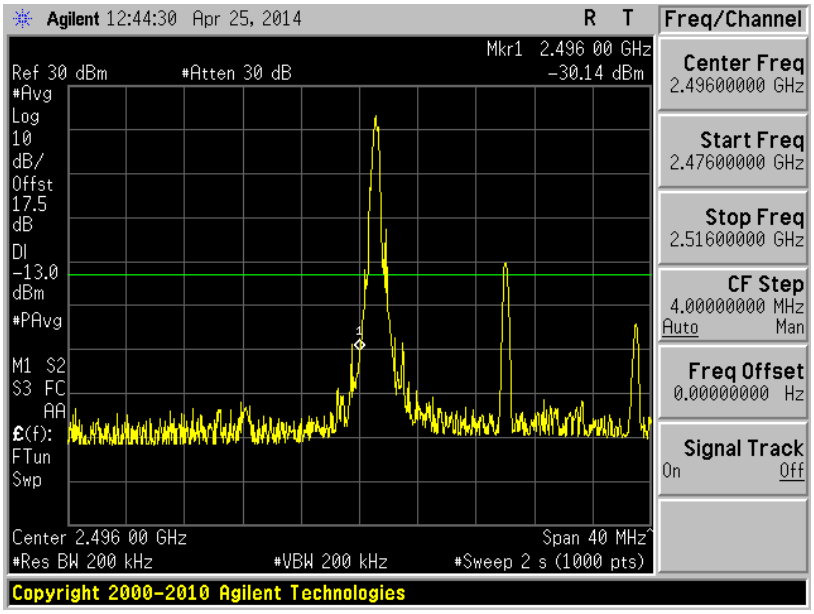
HIGH CH, RB75-0



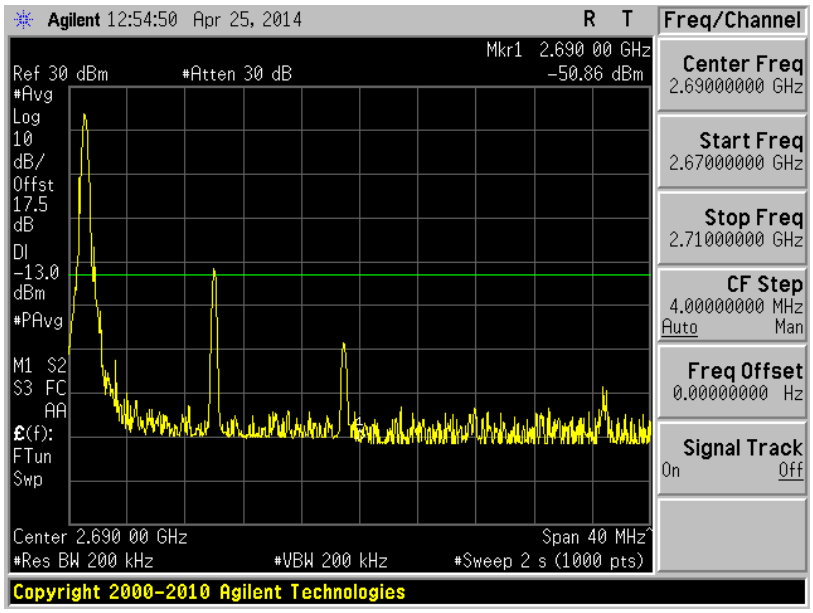
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (20.0 MHz BAND WIDTH)

LOW CH, RB1-0

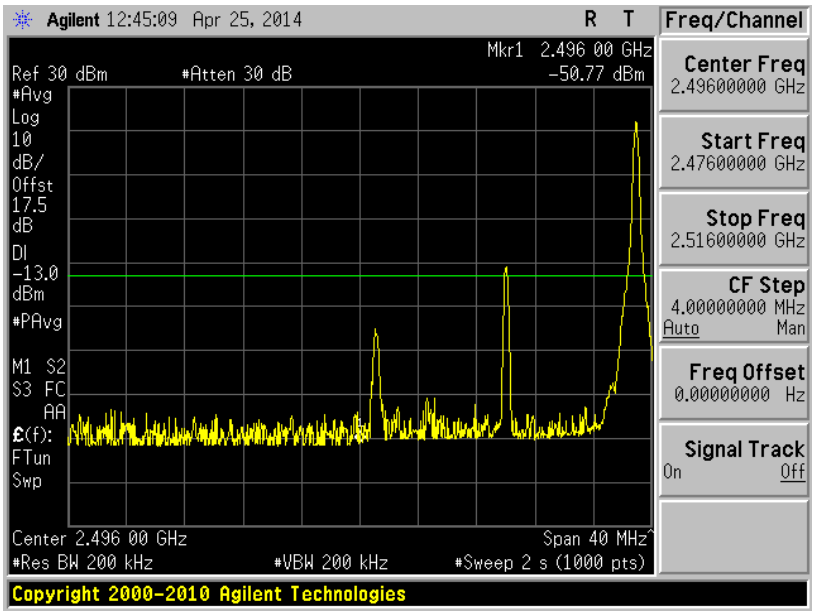


HIGH CH, RB1-0

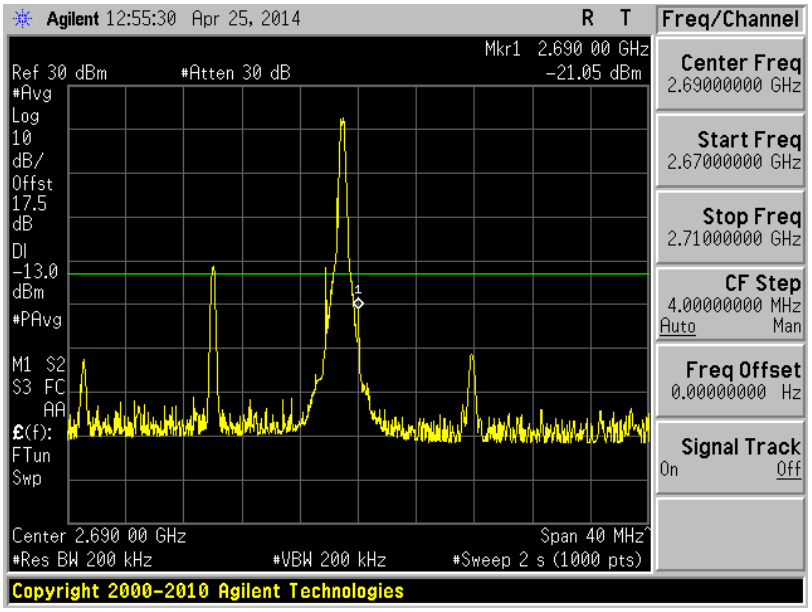


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB1-99

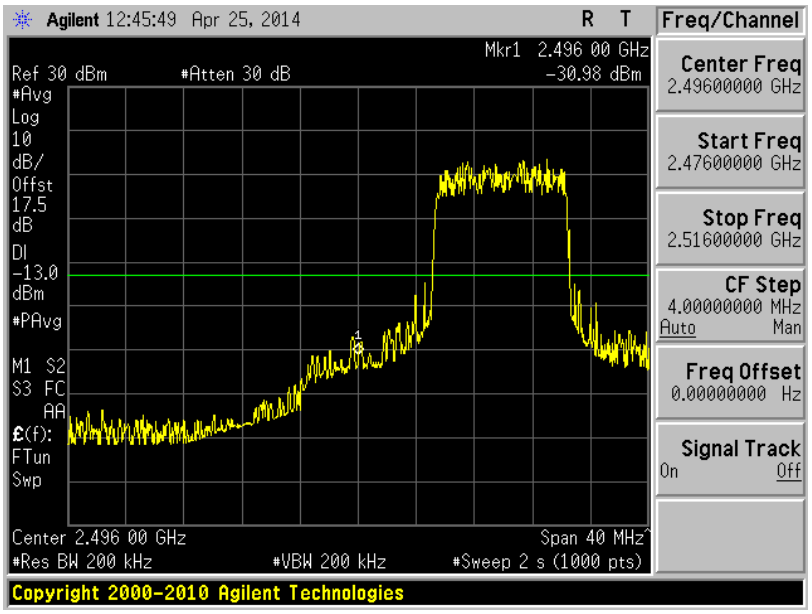


HIGH CH, RB1-99

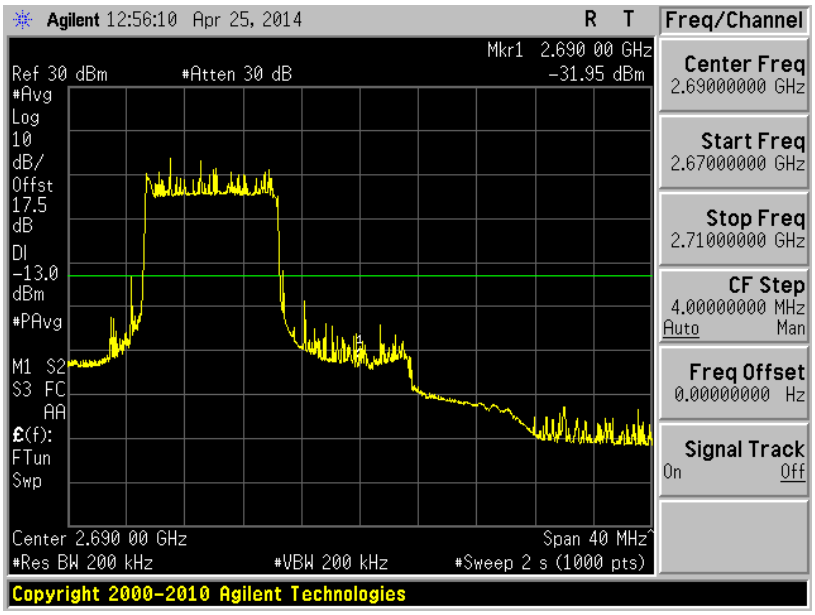


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB50-24

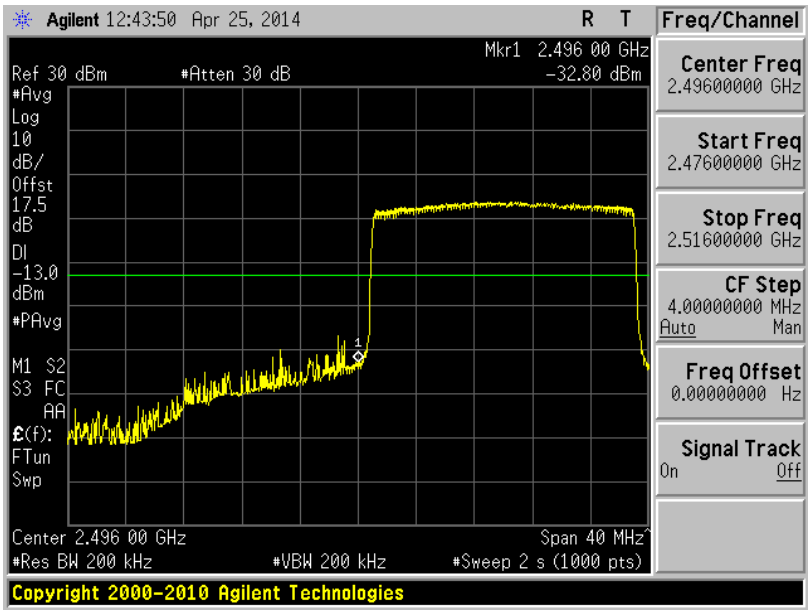


HIGH CH, RB50-24

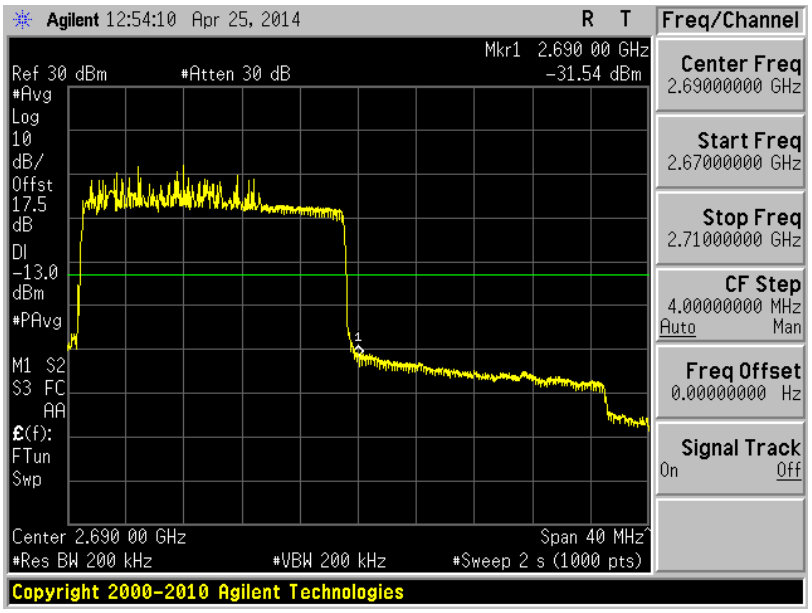


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB100-0



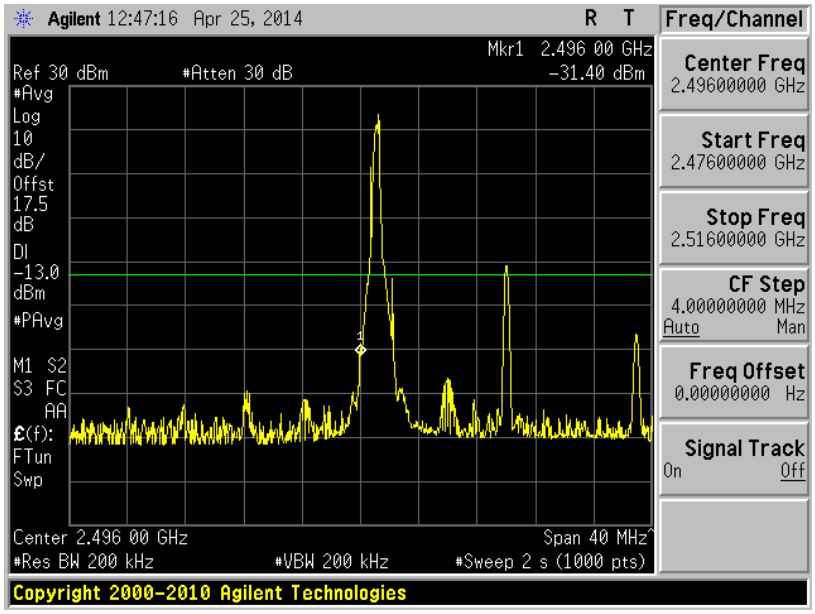
HIGH CH, RB100-0



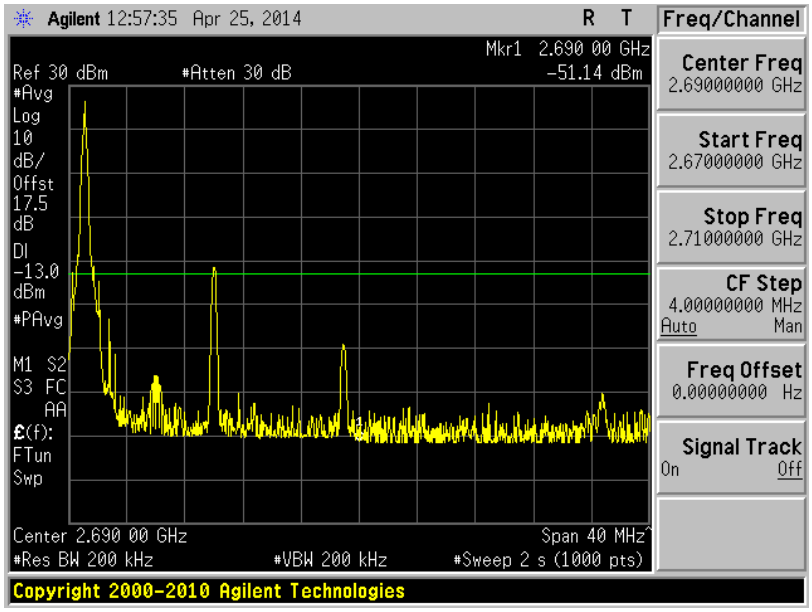
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

16QAM, (20.0 MHz BAND WIDTH)

LOW CH, RB1-0

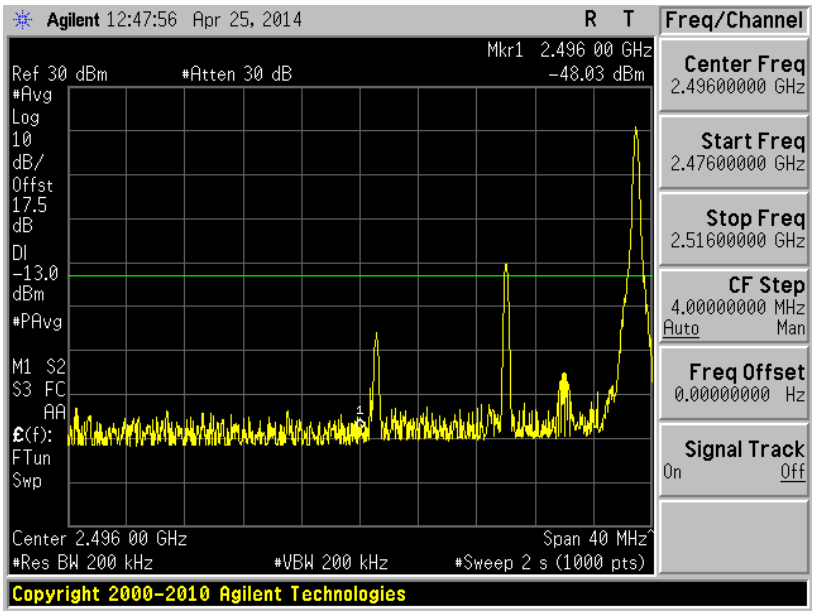


HIGH CH, RB1-0

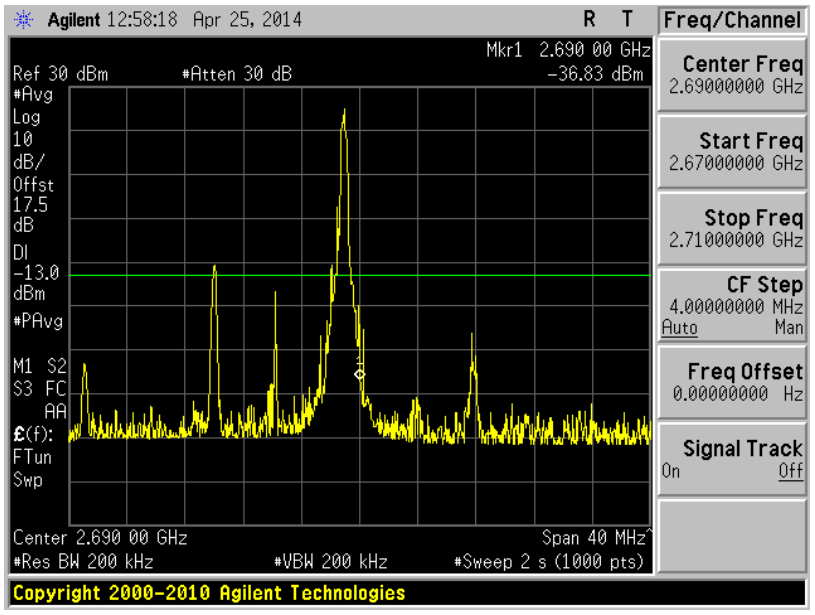


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB1-99

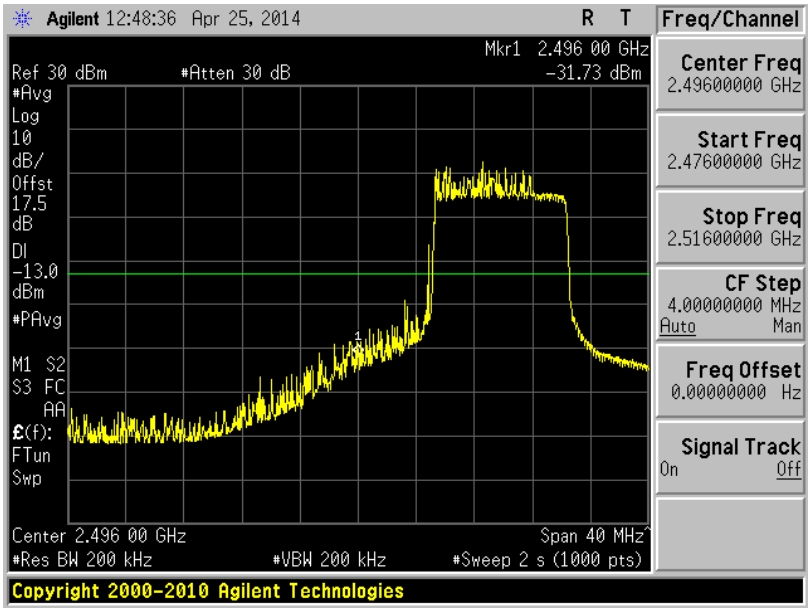


HIGH CH, RB1-99

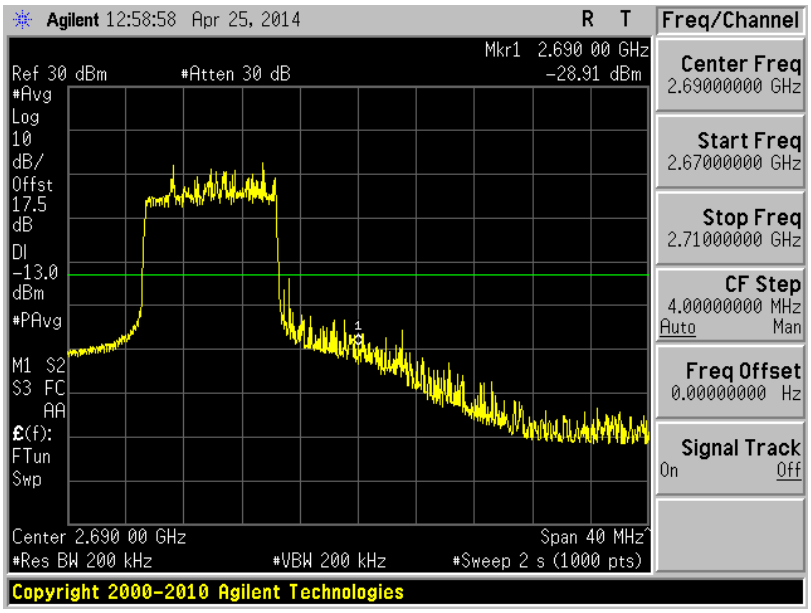


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB50-24

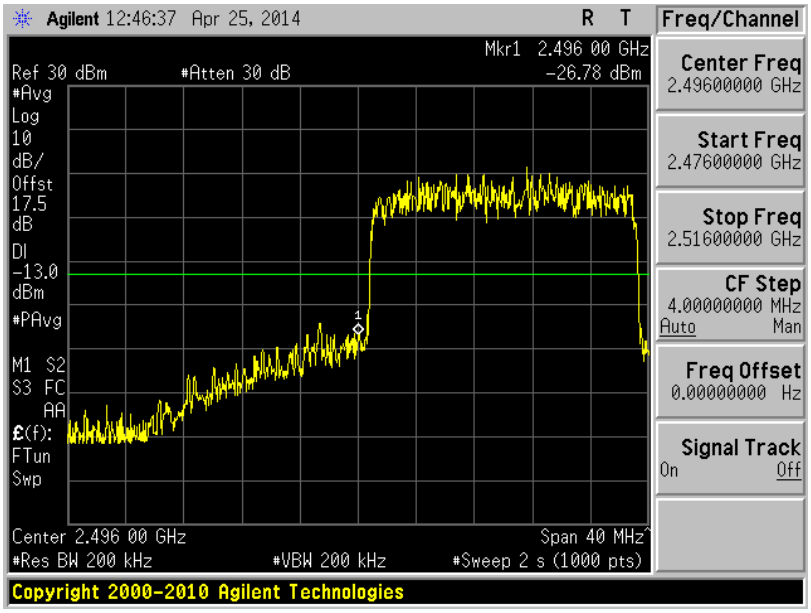


HIGH CH, RB50-24

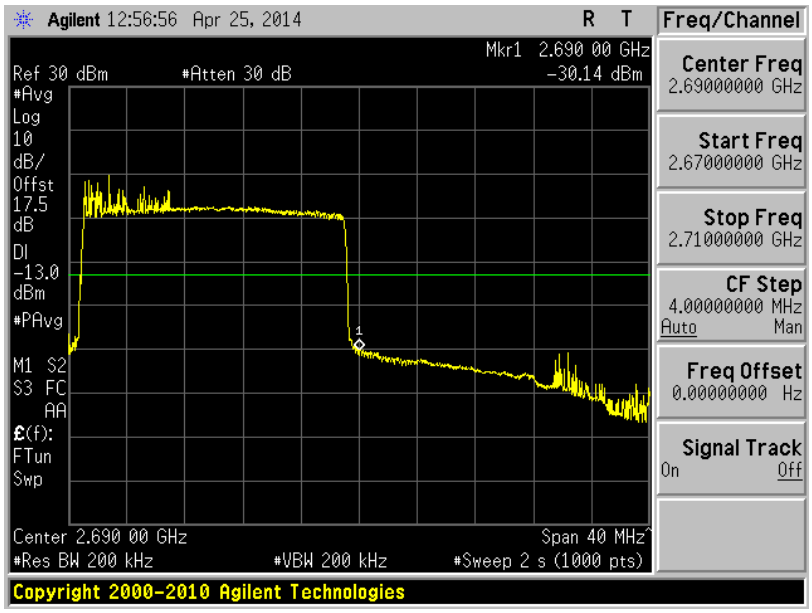


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB100-0



HIGH CH, RB100-0

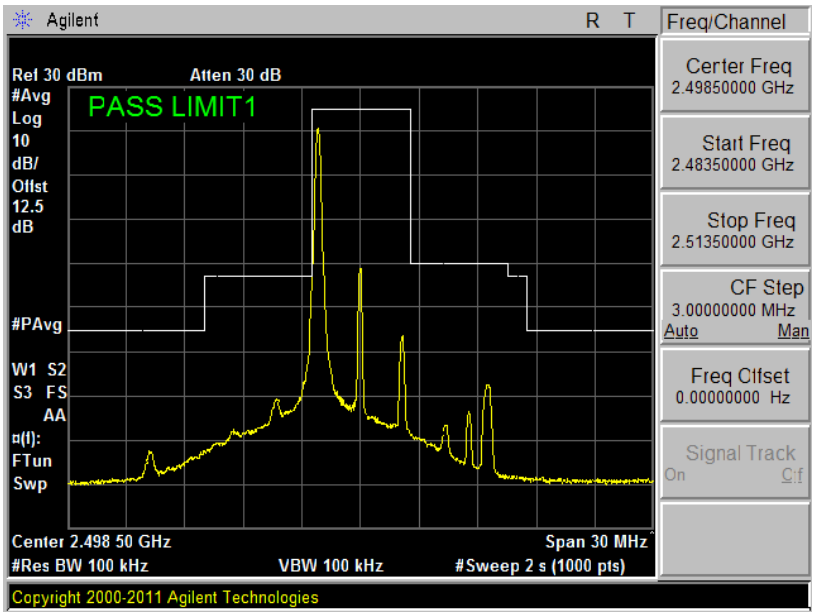


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

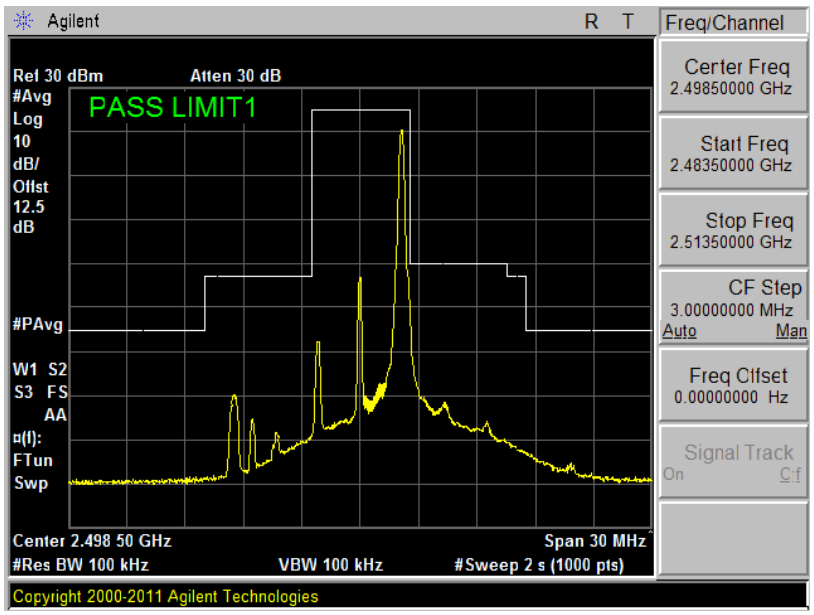
8.2.9. LTE BAND 41 EMISSION MASK

QPSK, (5.0 MHz BAND WIDTH)

LOW CH, RB1-0

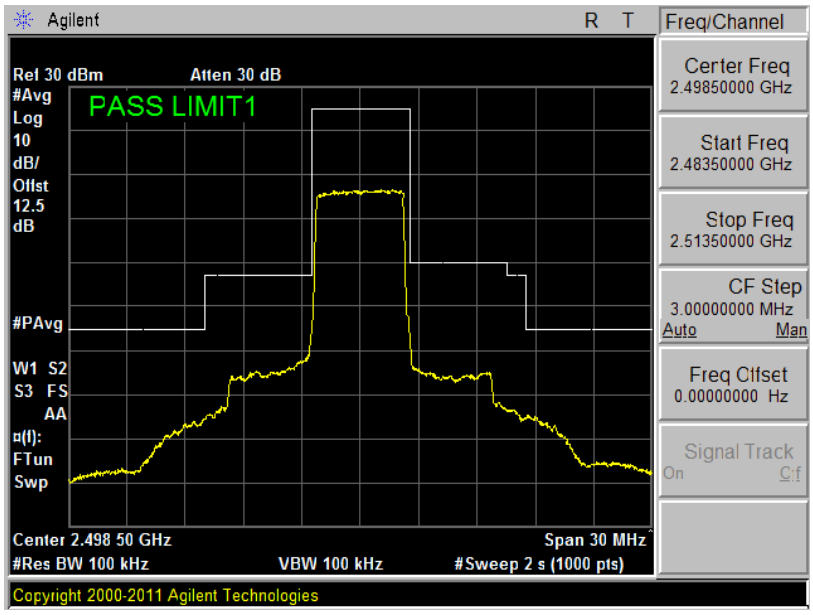


LOW CH, RB1-24

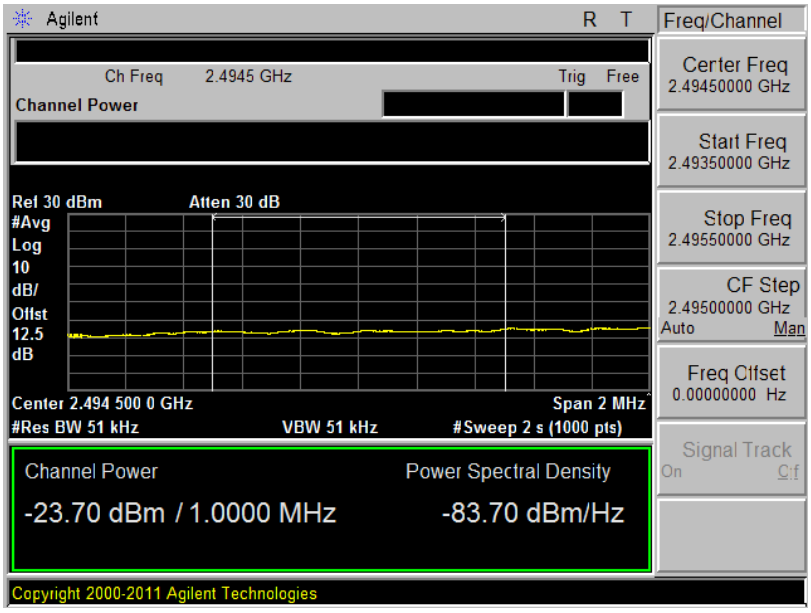


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB25-0

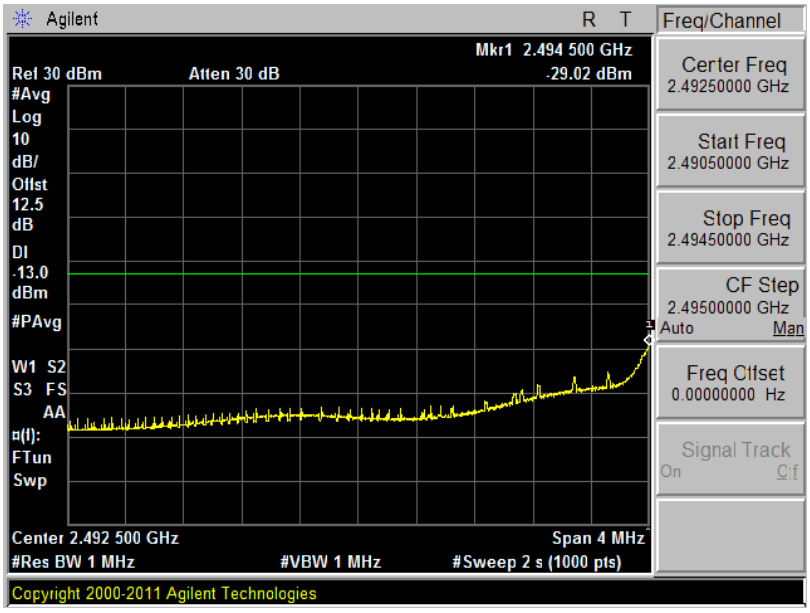


LOW CH, LOW SIDE, (RB=VB= 1%EBW, 2494–2495MHz)

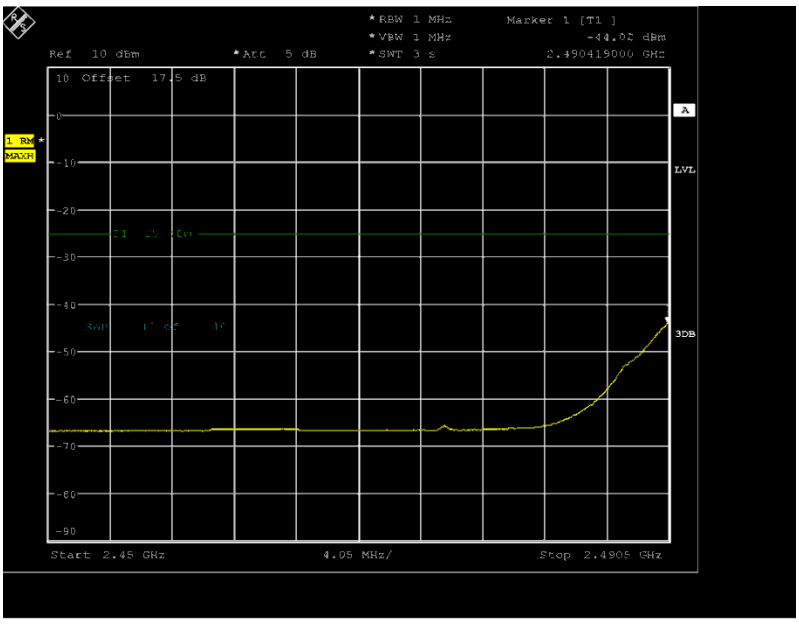


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, LOW SIDE, (RB=VB= 1MHz, 2490.5-2494.5MHz)



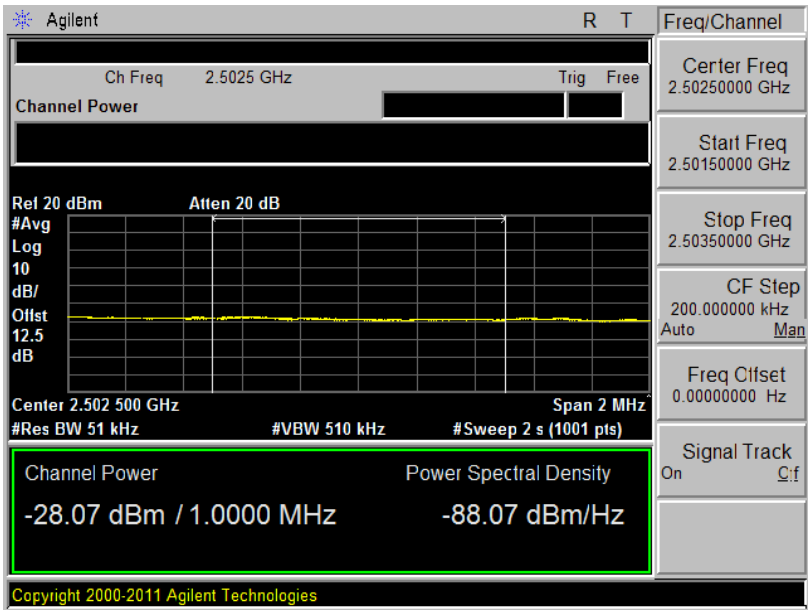
LOW CH, LOW SIDE, (RB=VB= 1MHz, -25dBm)



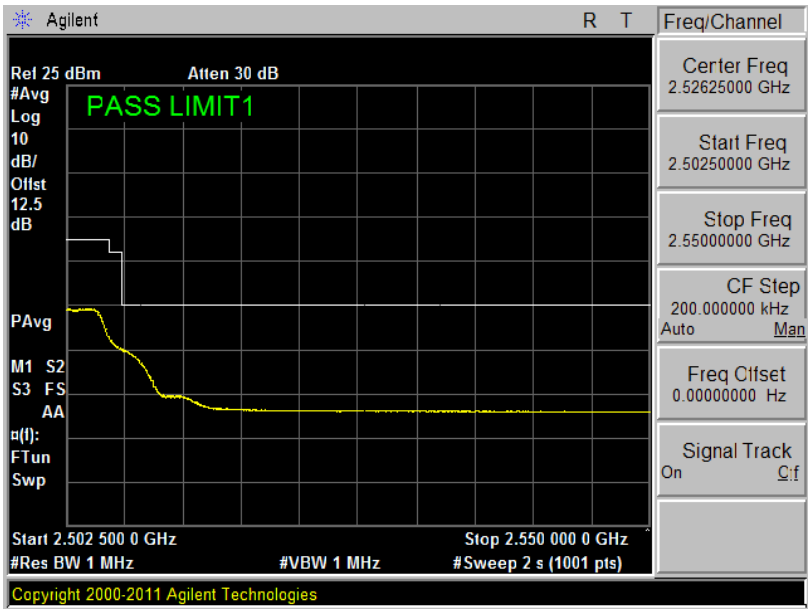
Date: 10.JUN.2014 17:50:02

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

LOW CH, HIGH SIDE, (RB=VB= 1%EBW, 2502–2503MHz)

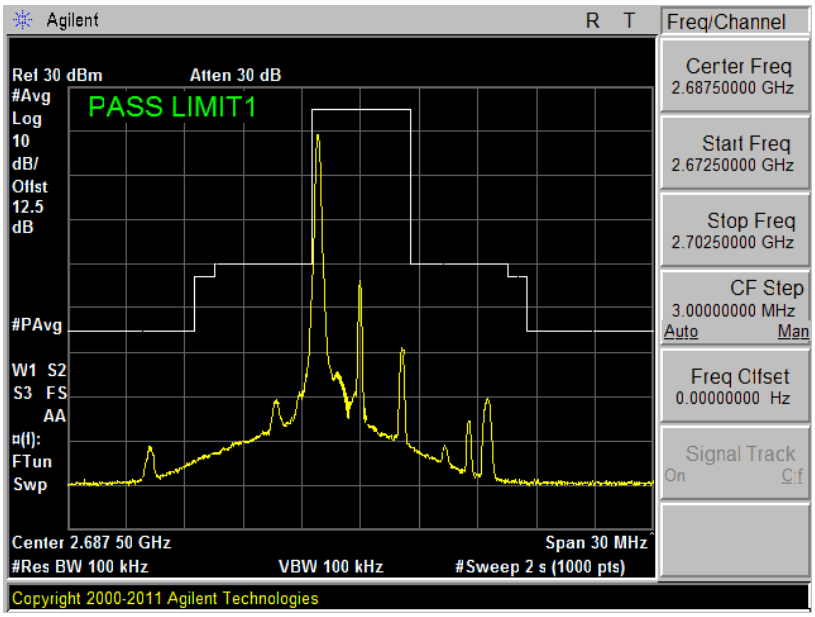


LOW CH, HIGH SIDE, (RB=VB= 1MHz, 2502.5–2550MHz)

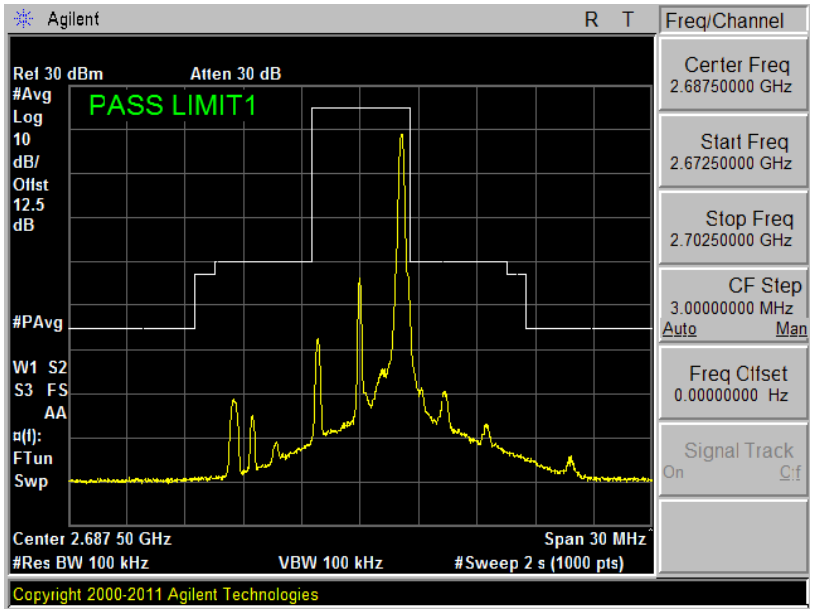


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB1-0

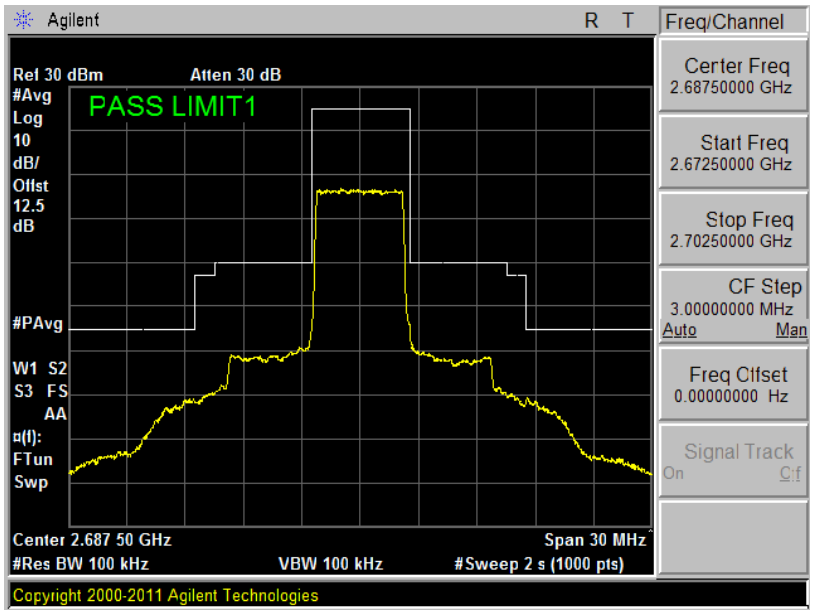


HIGH CH, RB1-24

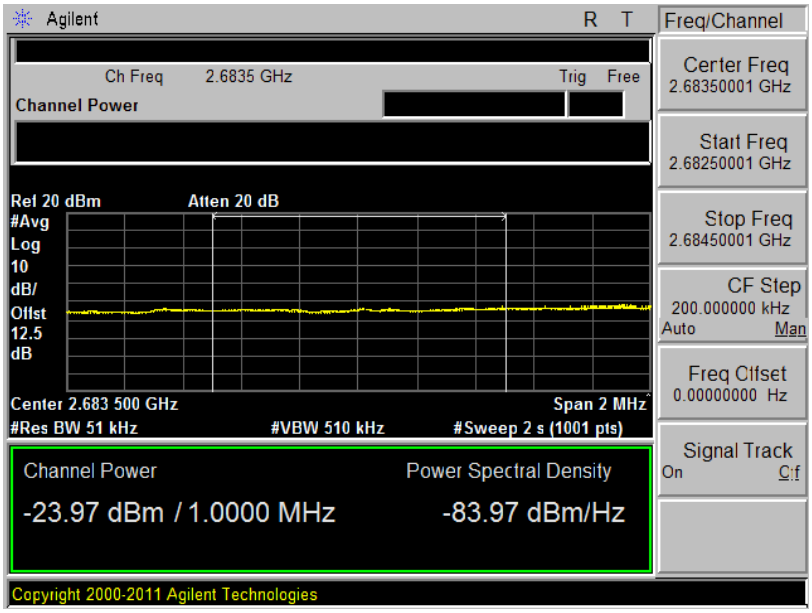


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB25-0

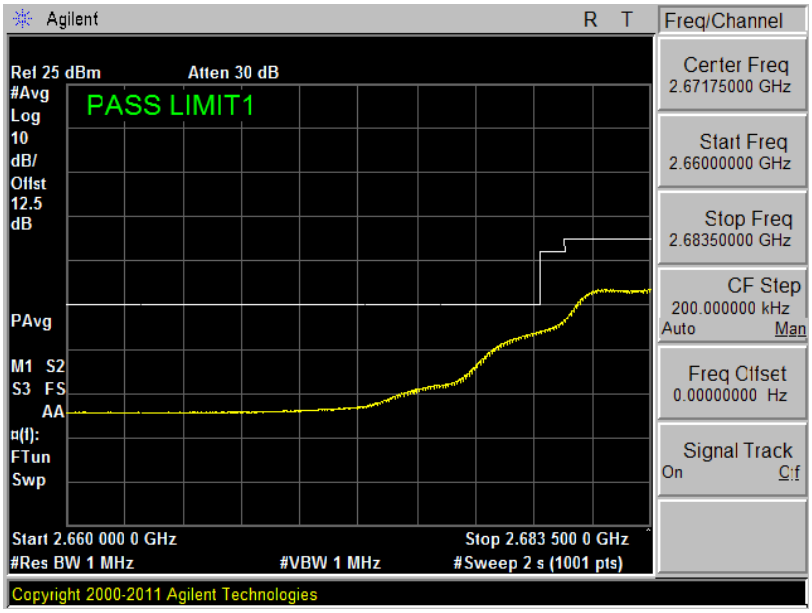


HIGH CH, LOW SIDE, (RB=VB= 1%EBW, 2683-2684MHz)

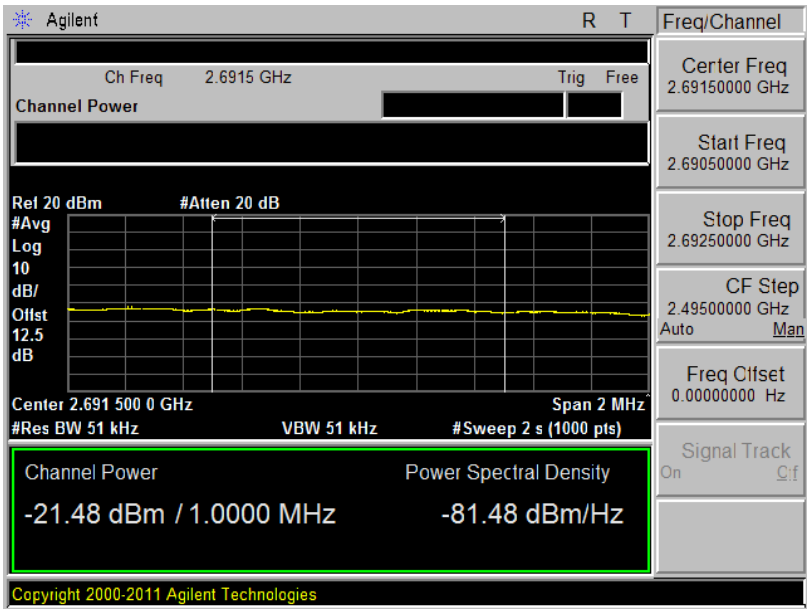


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, LOW SIDE, (RB=VB= 1MHz, 2660-2383.5MHz)

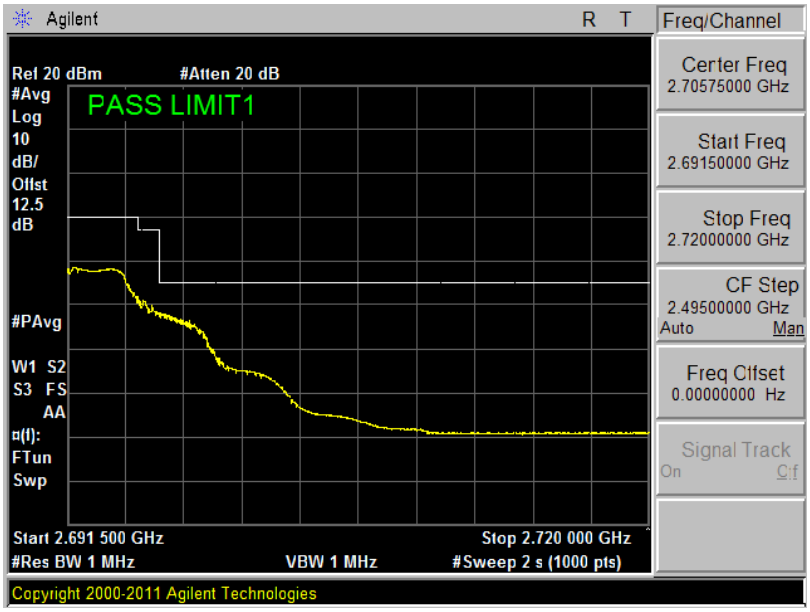


HGIH CH, HIGH SIDE, (RB=VB= 1%EBW, 2691-2692MHz)



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

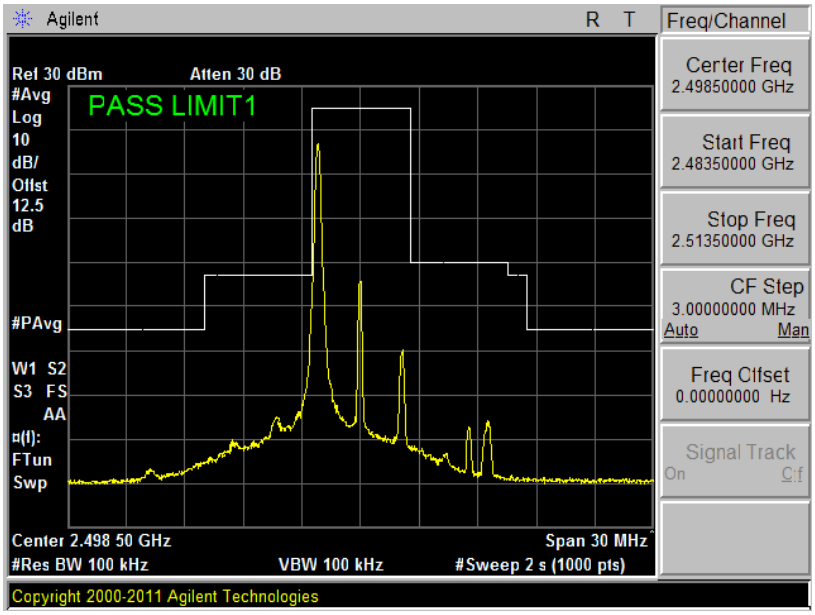
HIGH CH, HIGH SIDE, (RB=VB= 1MHz, 2691.5–2720MHz)



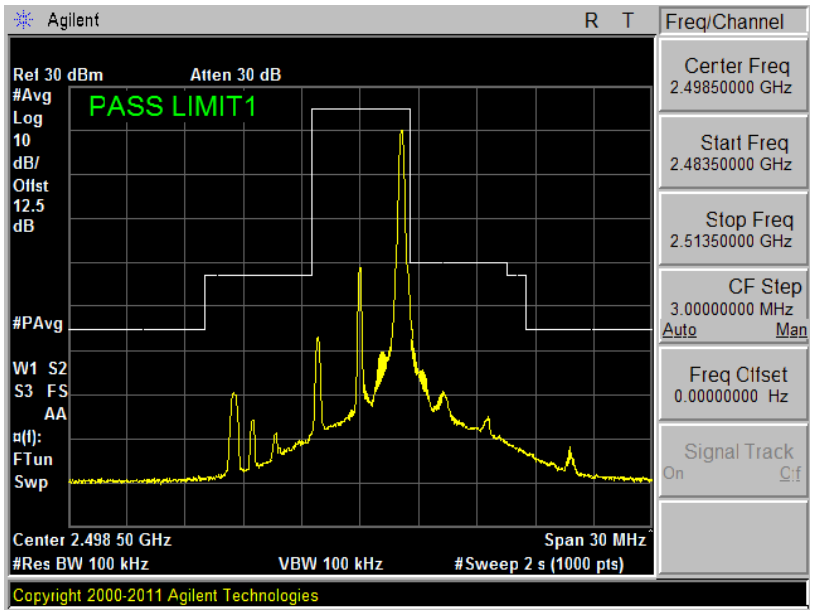
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

16QAM, (5.0 MHz BAND WIDTH)

LOW CH, RB1-0

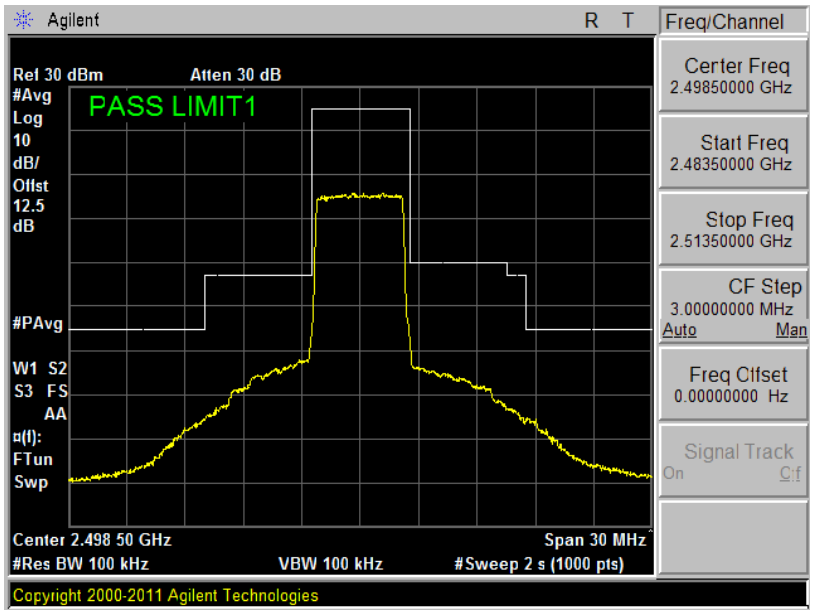


LOW CH, RB1-24

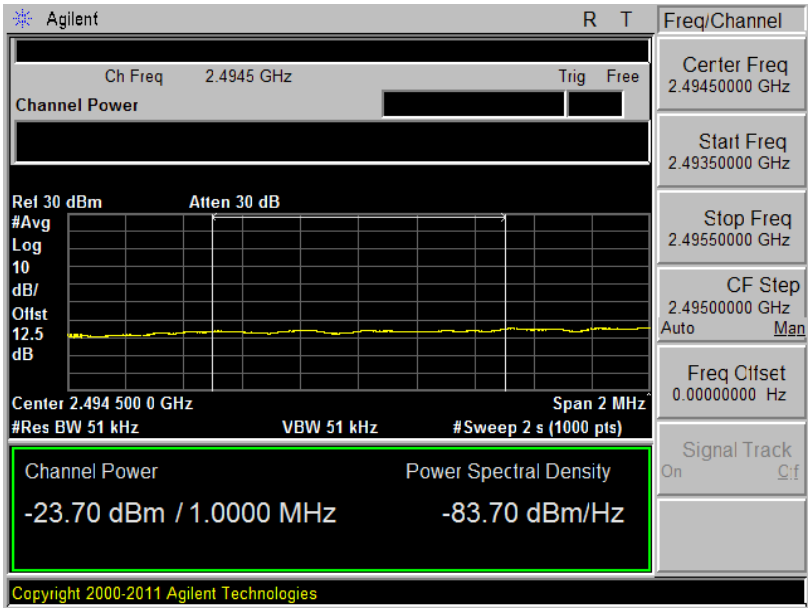


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB25-0

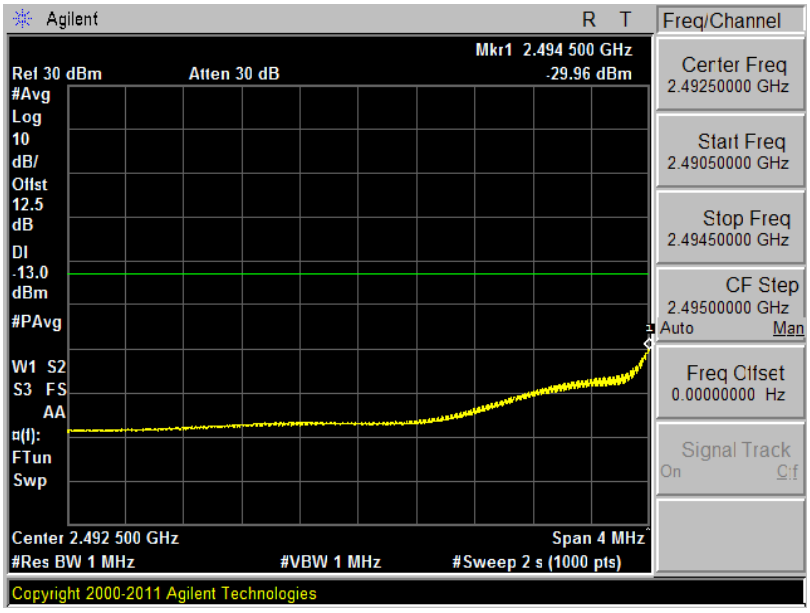


LOW CH, LOW SIDE, (RB=VB= 1%EBW, 2494–2495MHz)

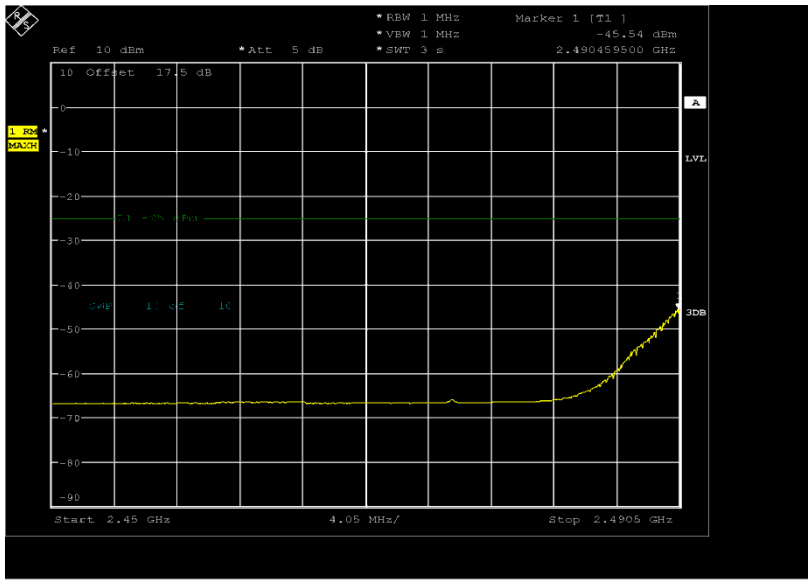


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, LOW SIDE, (RB=VB= 1MHz, 2490.5-2494.5MHz)

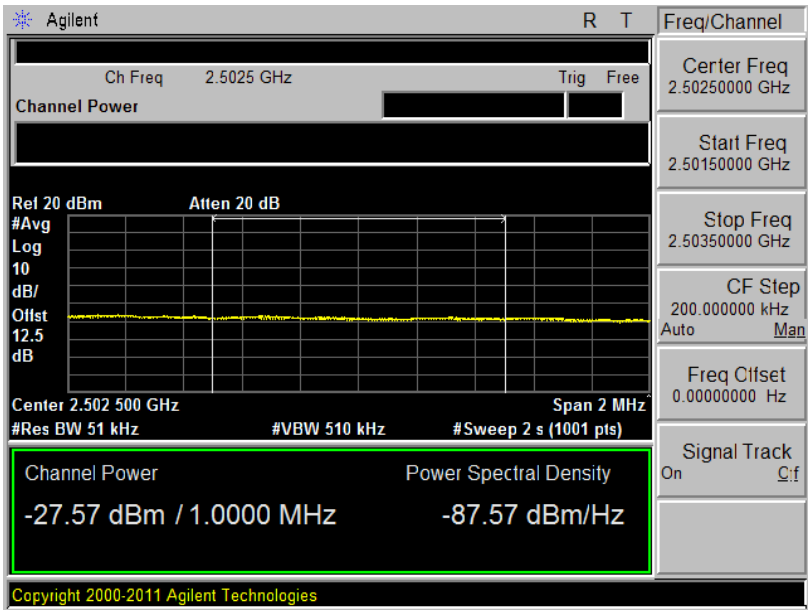


LOW CH, LOW SIDE, (RB=VB= 1MHz, -25dBm)

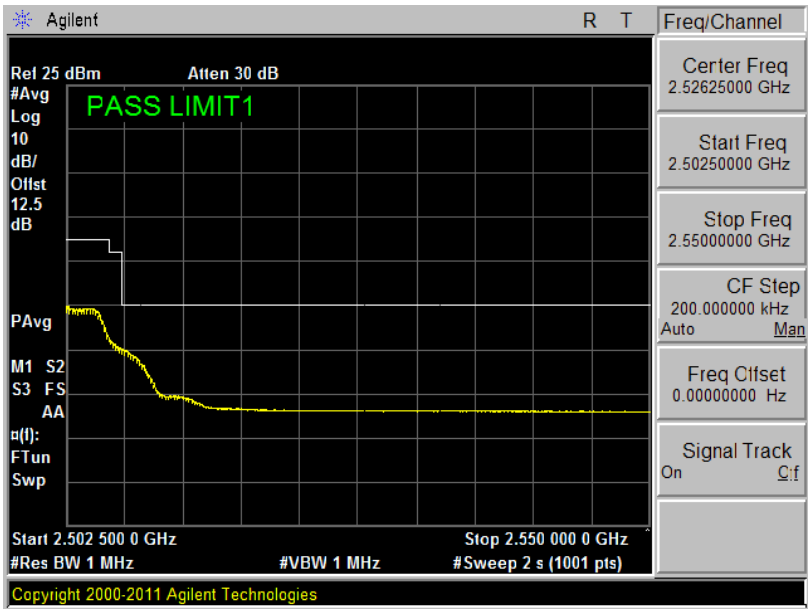


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, HIGH SIDE, (RB=VB= 1%EBW, 2502–2503MHz)

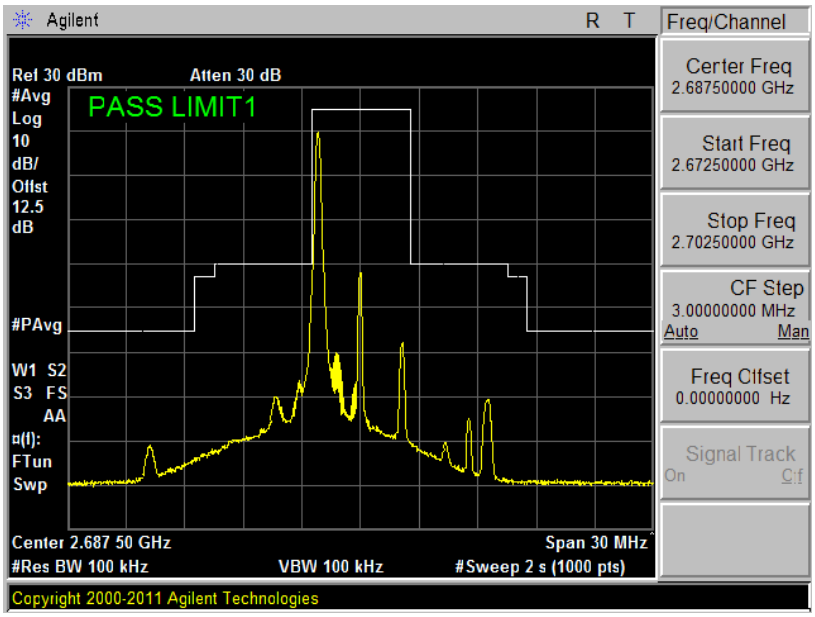


LOW CH, HIGH SIDE, (RB=VB= 1MHz, 2502.5-2550MHz)

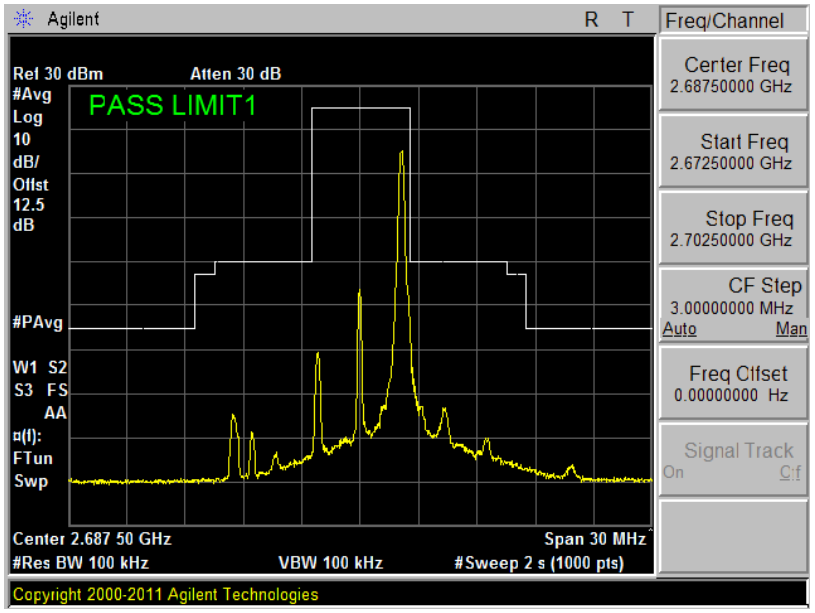


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB1-0

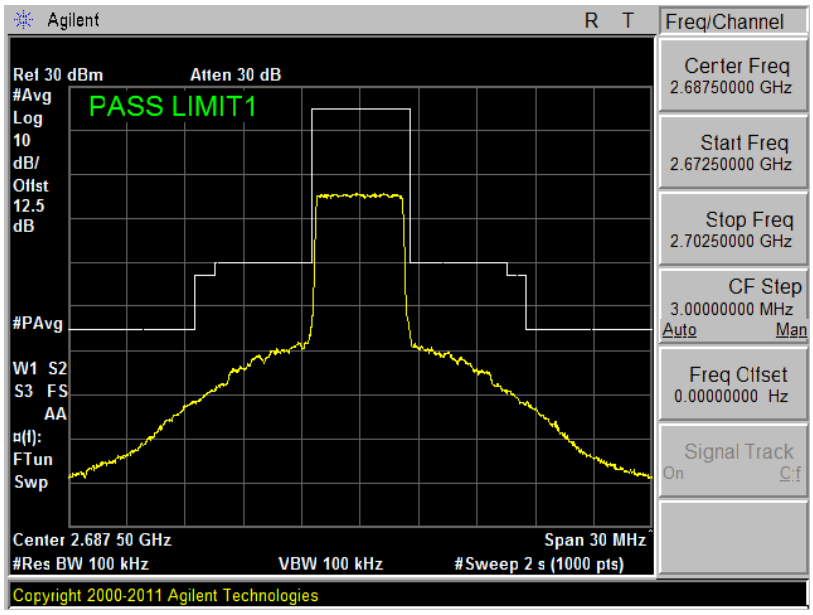


HIGH CH, RB1-24

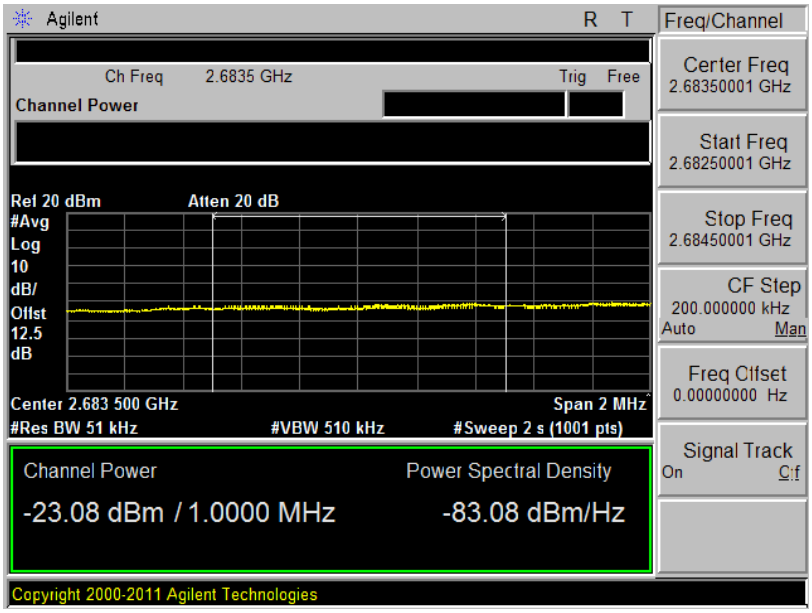


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB25-0

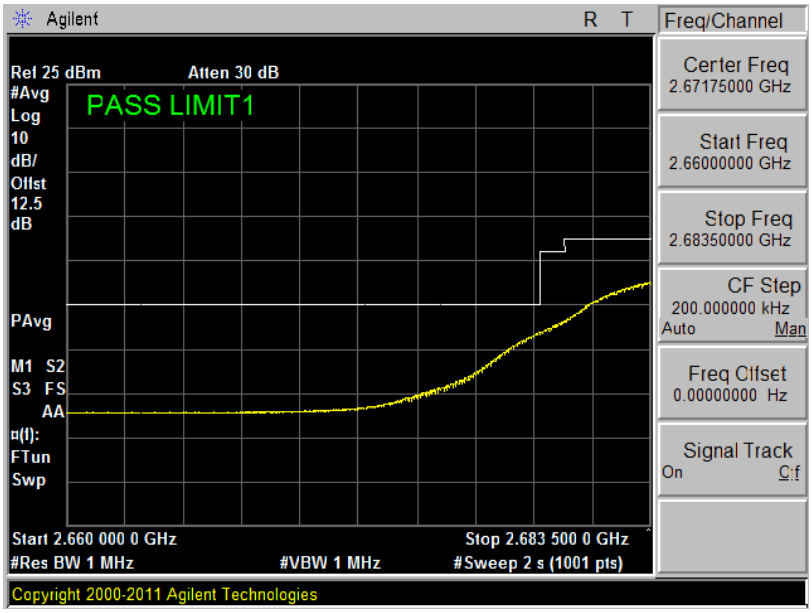


HIGH CH, LOW SIDE, (RB=VB= 1%EBW, 2683-2684MHz)

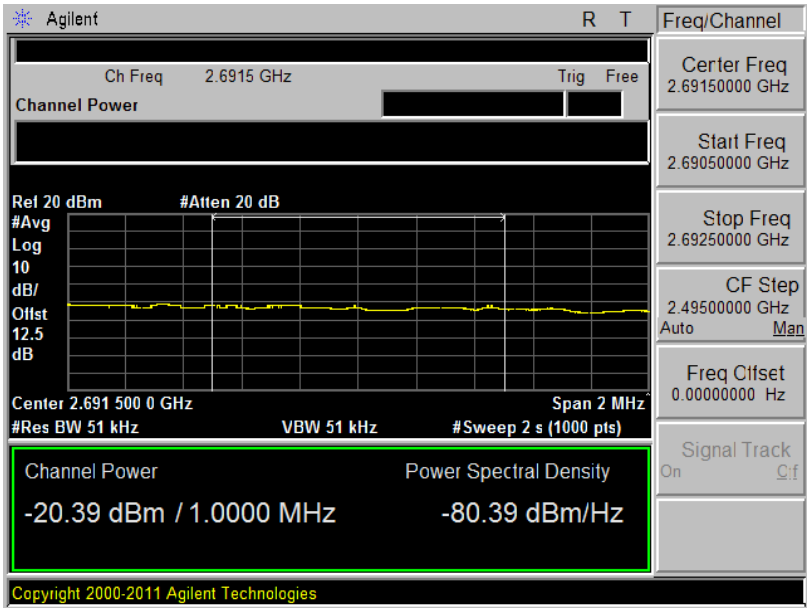


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, LOW SIDE, (RB=VB= 1MHz, 2660-2683.5MHz)

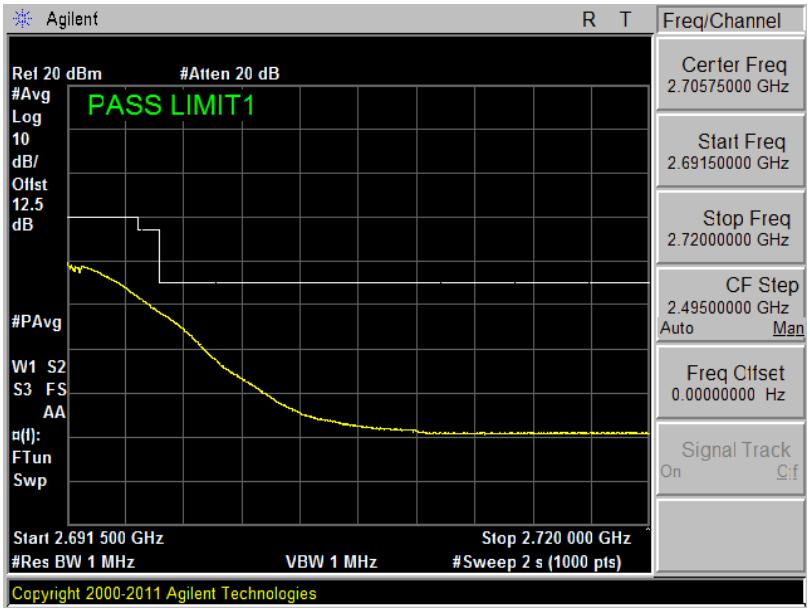


HGIH CH, HIGH SIDE, (RB=VB= 1%EBW, 2691-2692MHz)



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

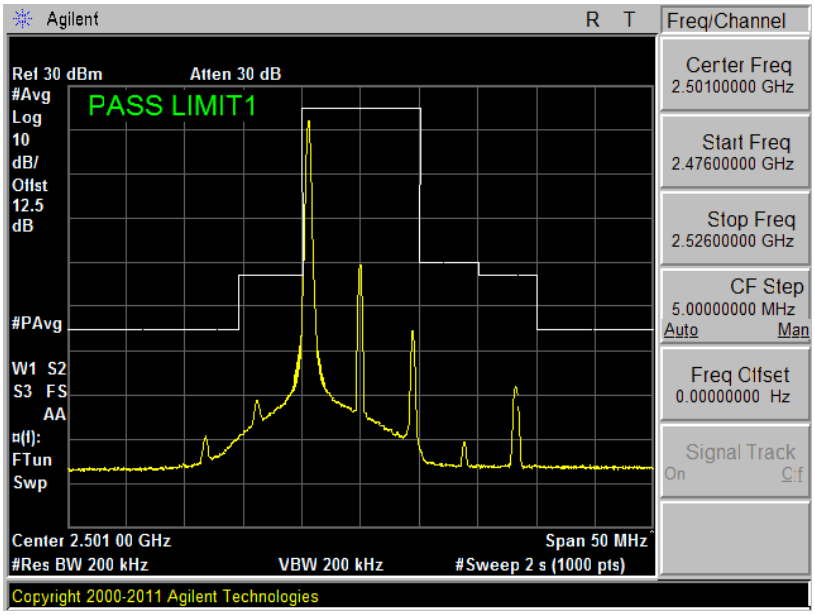
HIGH CH, HIGH SIDE, (RB=VB= 1MHz, 2691.5–2720MHz)



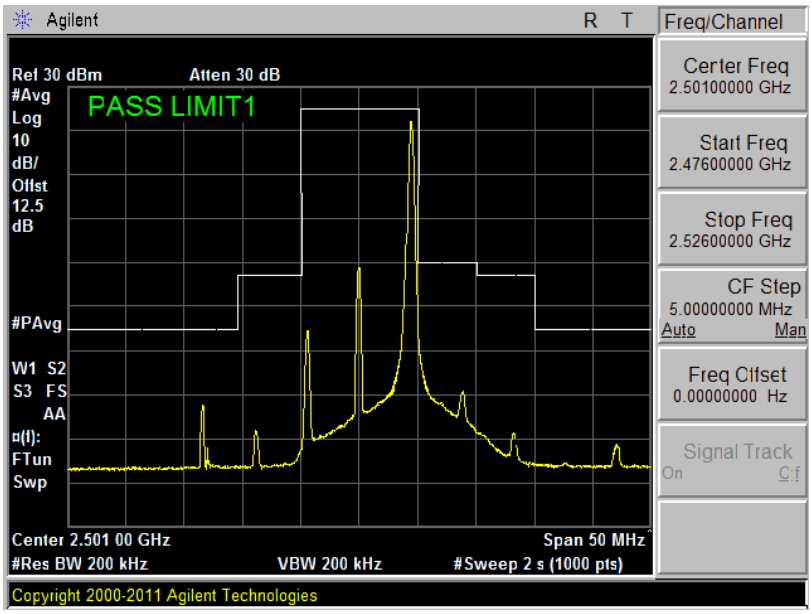
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (10.0 MHz BAND WIDTH)

LOW CH, RB1-0

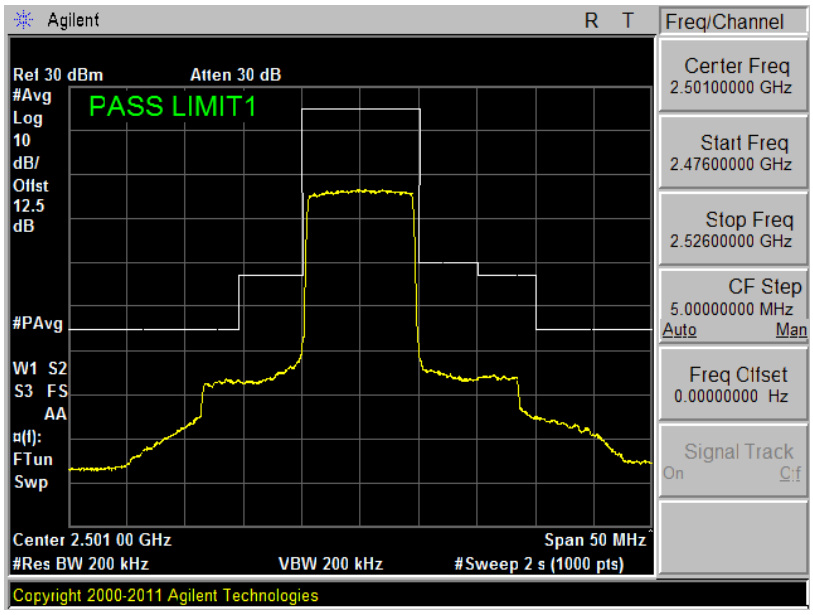


LOW CH, RB1-49

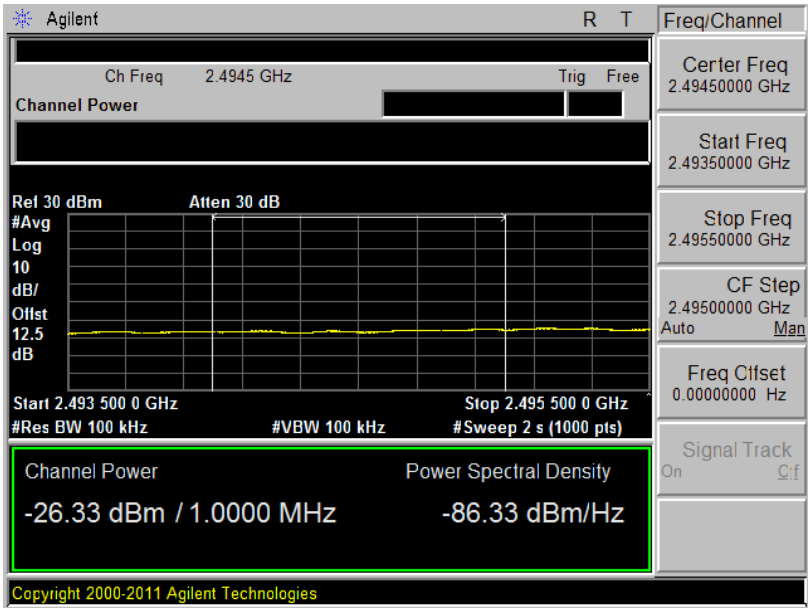


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB50-0

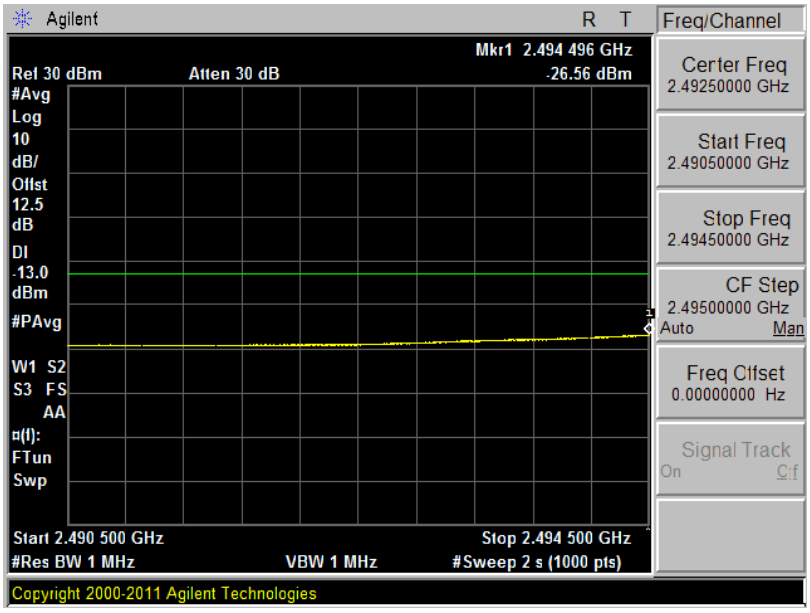


LOW CH, LOW SIDE, (RB=VB= 1%EBW, 2494–2495MHz)

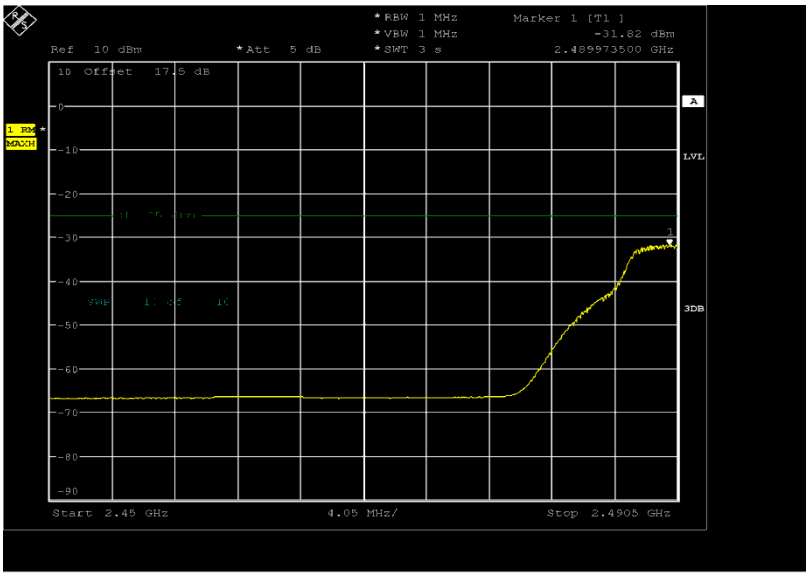


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, LOW SIDE, (RB=VB= 1MHz, 2490.5-2494.5MHz)

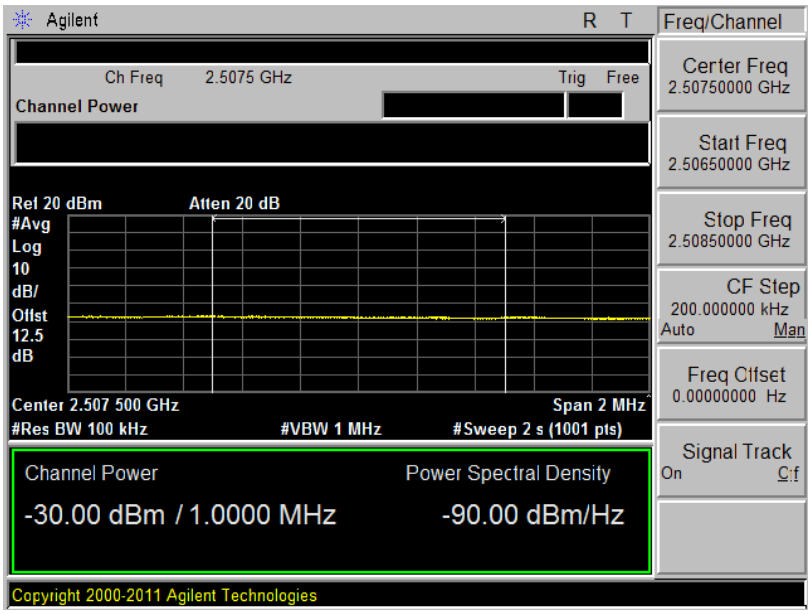


LOW CH, LOW SIDE, (RB=VB= 1MHz, -25dBm)

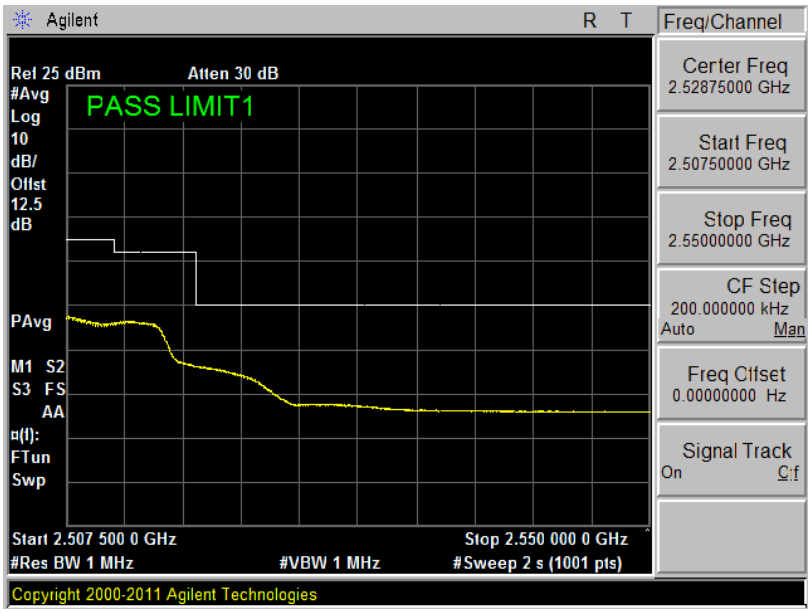


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, HIGH SIDE, (RB=VB= 1%EBW, 2507-2508MHz)

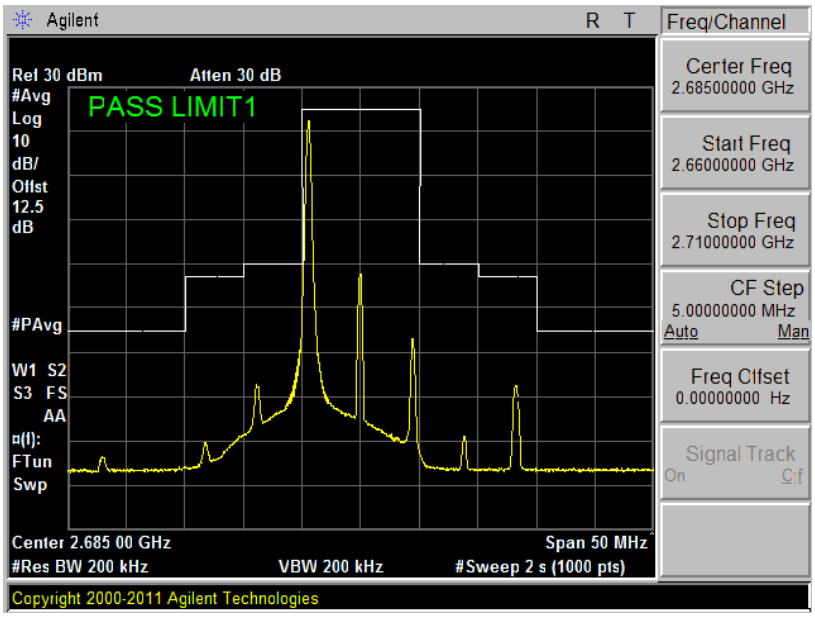


LOW CH, HIGH SIDE, (RB=VB= 1MHz, 2507.5-2550MHz)

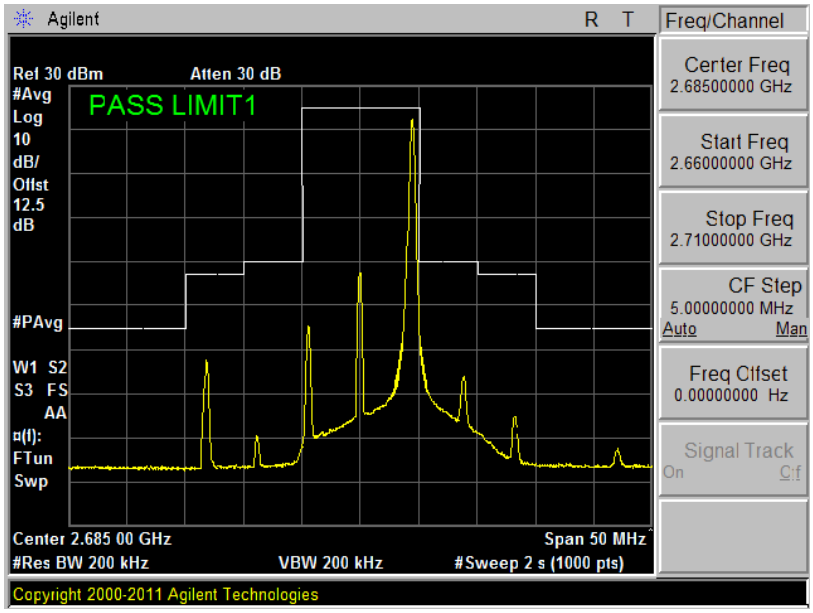


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB1-0

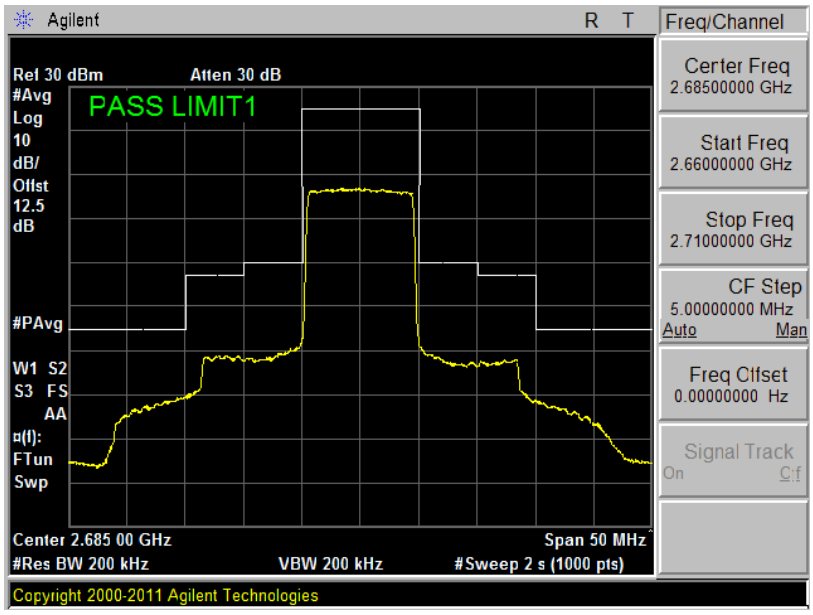


HIGH CH, RB1-49

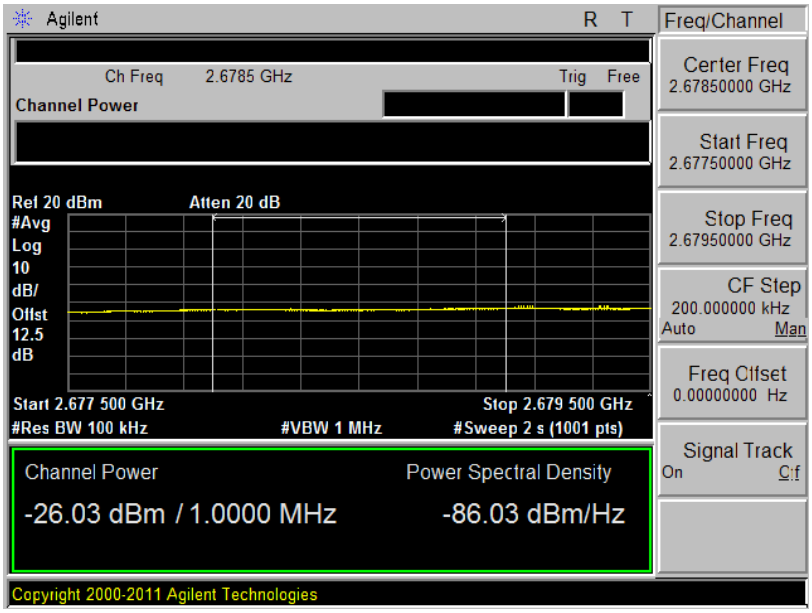


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB50-0

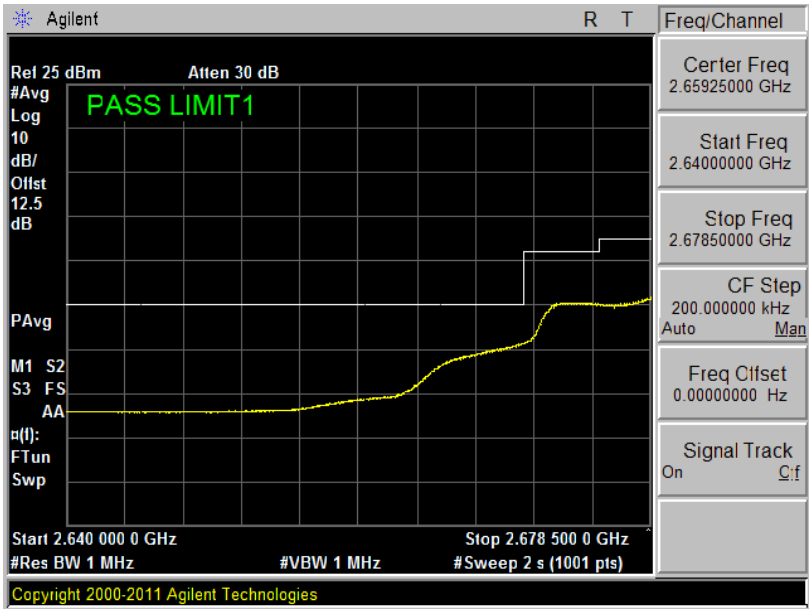


HIGH CH, LOW SIDE, (RB=VB= 1%EBW, 2678-2679MHz)

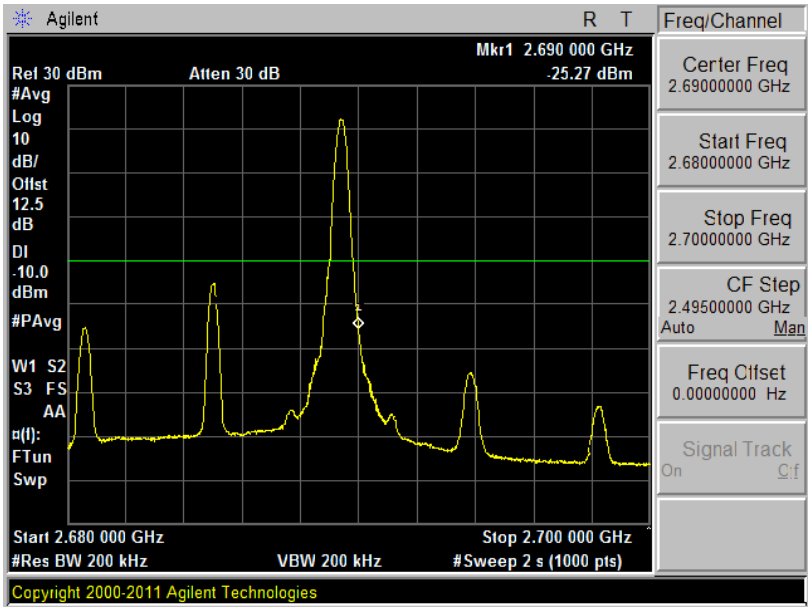


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, LOW SIDE, (RB=VB= 1MHz, 2640-2678.5MHz)

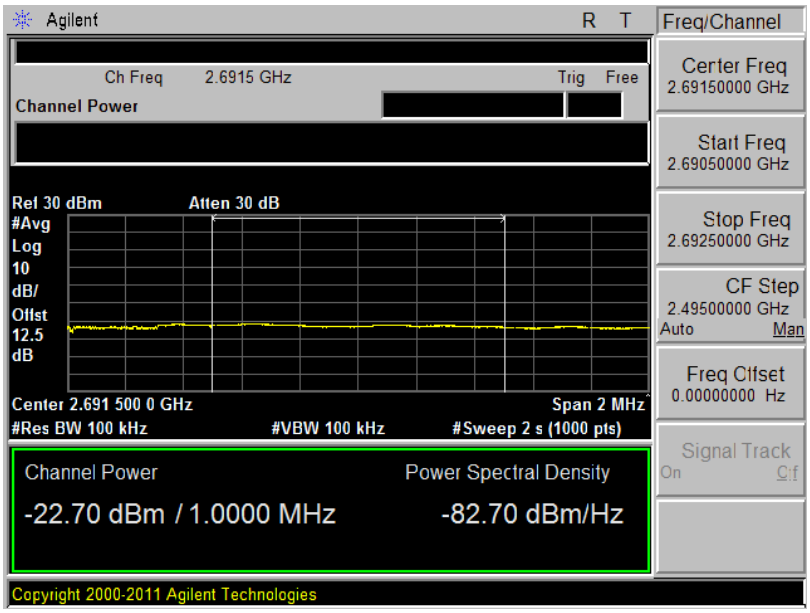


HIGH CH, HIGH SIDE, (RB=VB= 2%EBW, 2690-2691MHz)

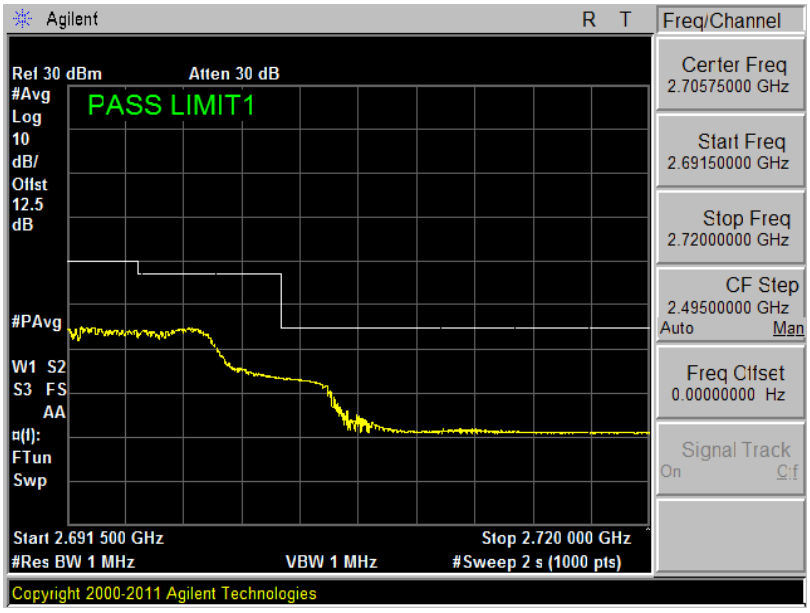


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HGIH CH, HIGH SIDE, (RB=VB= 1%EBW, 2691-2692MHz)



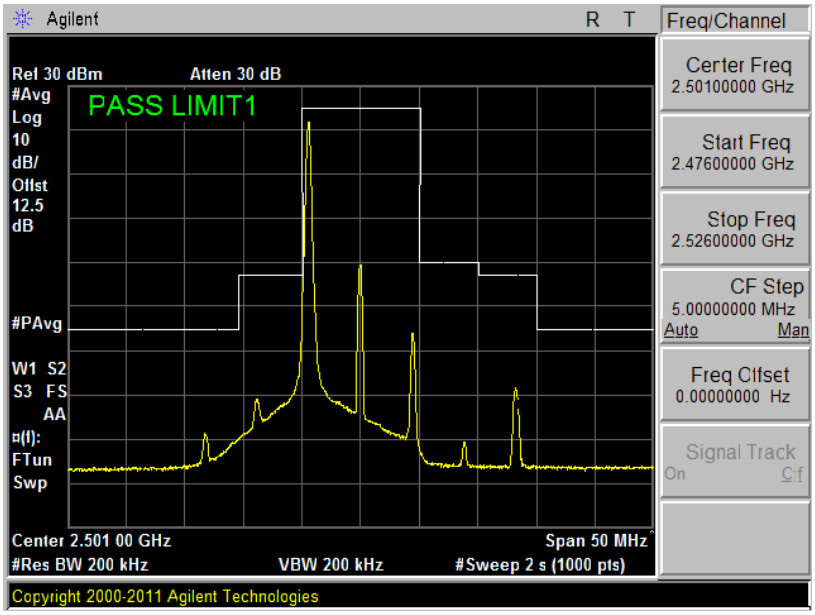
HIGH CH, HIGH SIDE, (RB=VB= 1MHz, 2691.5–2720MHz)



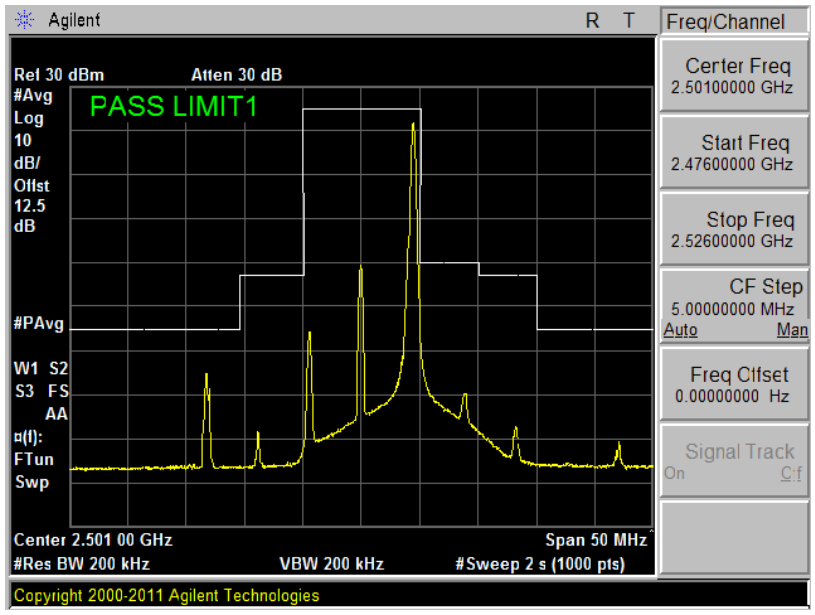
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

16QAM, (10.0 MHz BAND WIDTH)

LOW CH, RB1-0

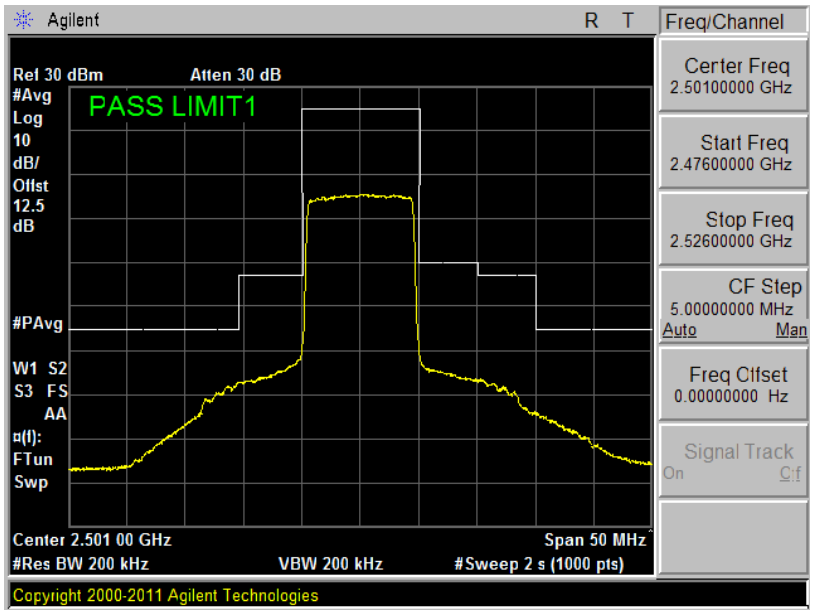


LOW CH, RB1-49

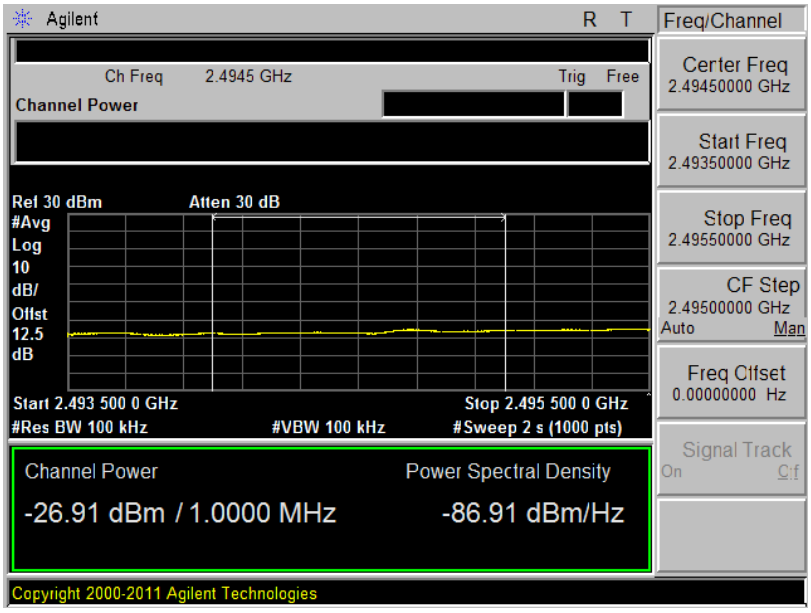


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB50-0

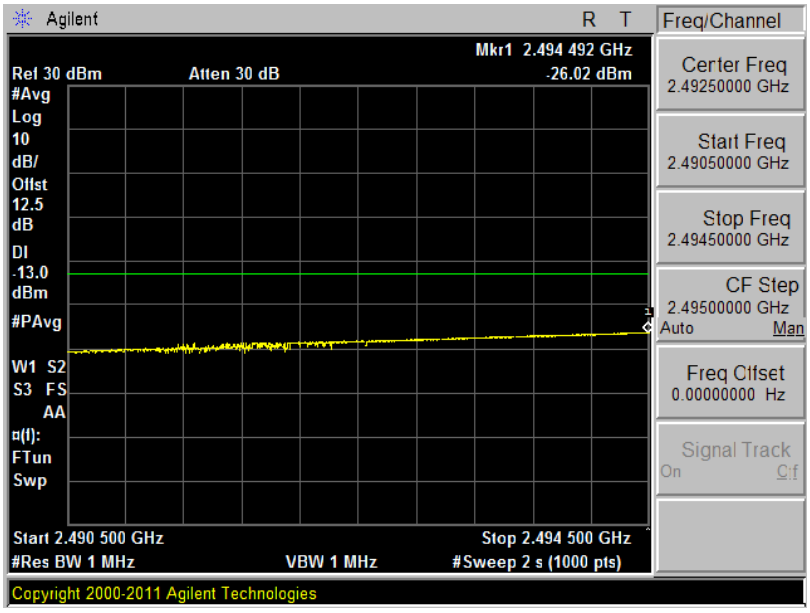


LOW CH, LOW SIDE, (RB=VB= 1%EBW, 2494–2495MHz)

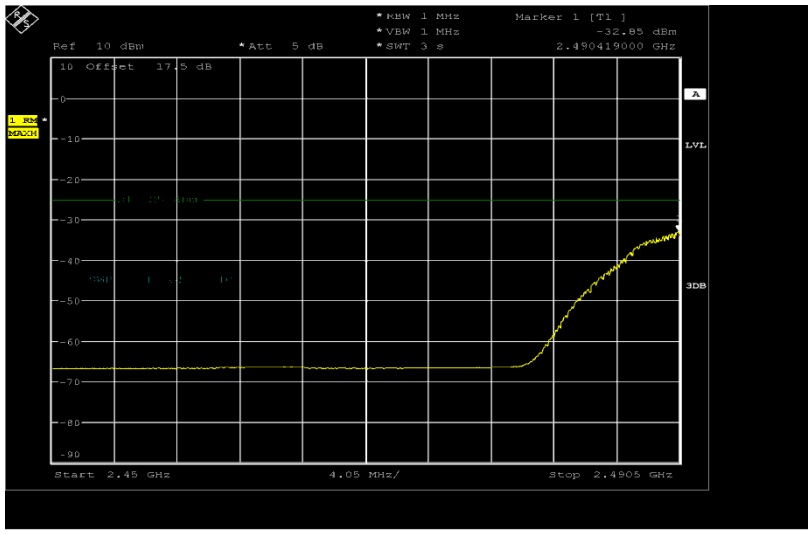


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, LOW SIDE, (RB=VB= 1MHz, 2490.5-2494.5MHz)

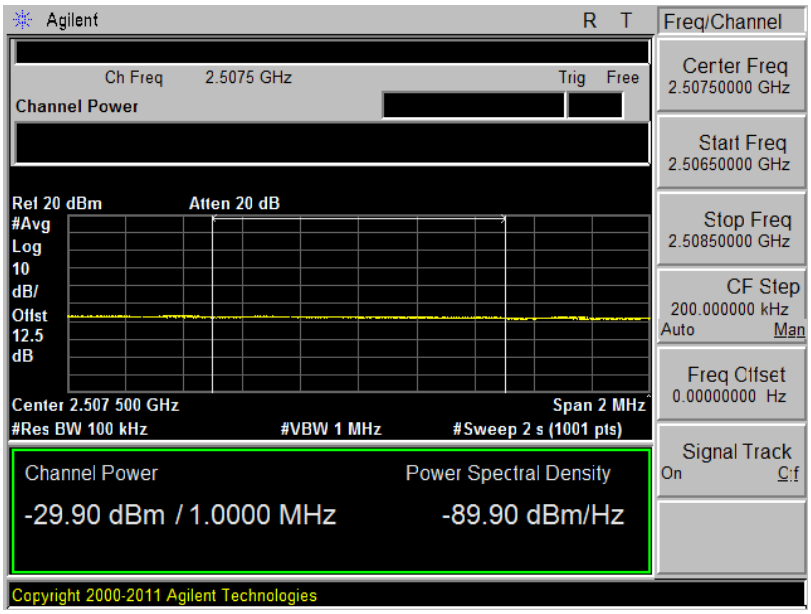


LOW CH, LOW SIDE, (RB=VB= 1MHz, -25dBm)

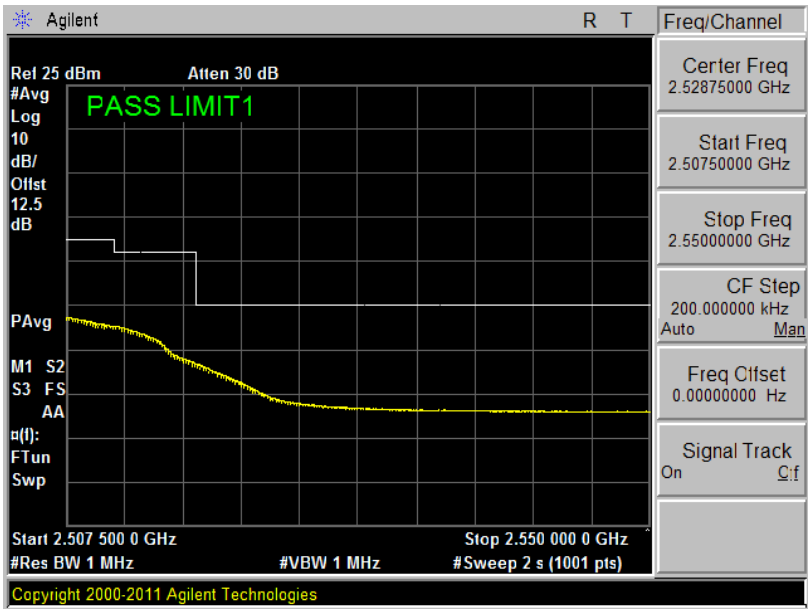


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, HIGH SIDE, (RB=VB= 1%EBW, 2507-2508MHz)

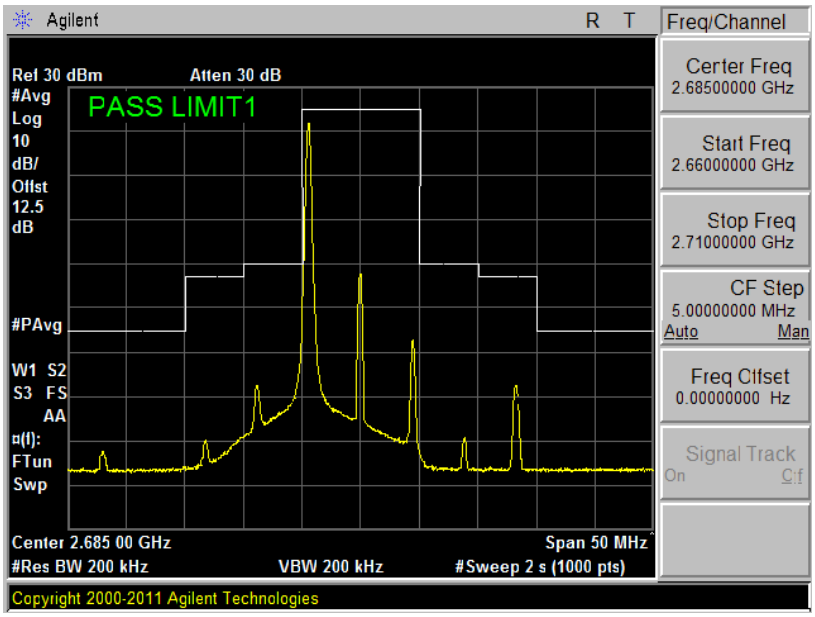


LOW CH, HIGH SIDE, (RB=VB= 1MHz, 2507.5-2550MHz)

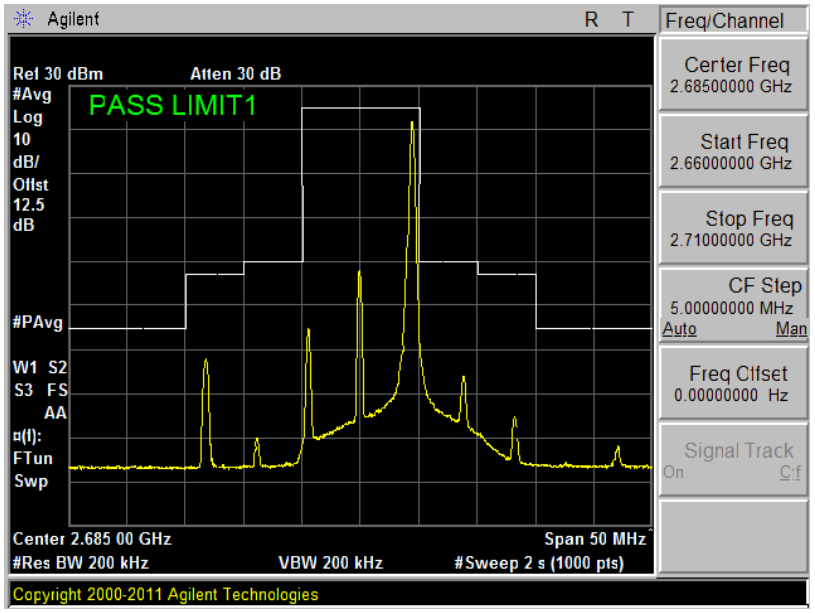


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB1-0

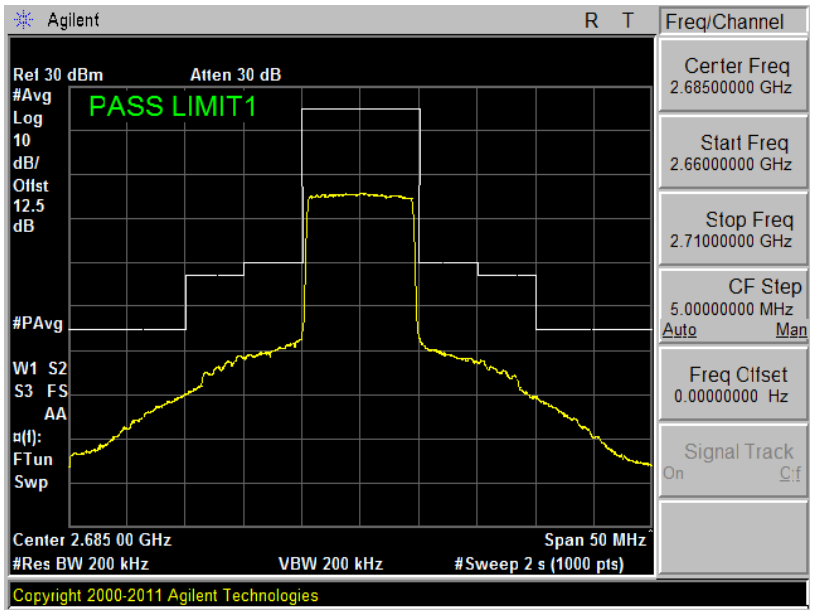


HIGH CH, RB1-49

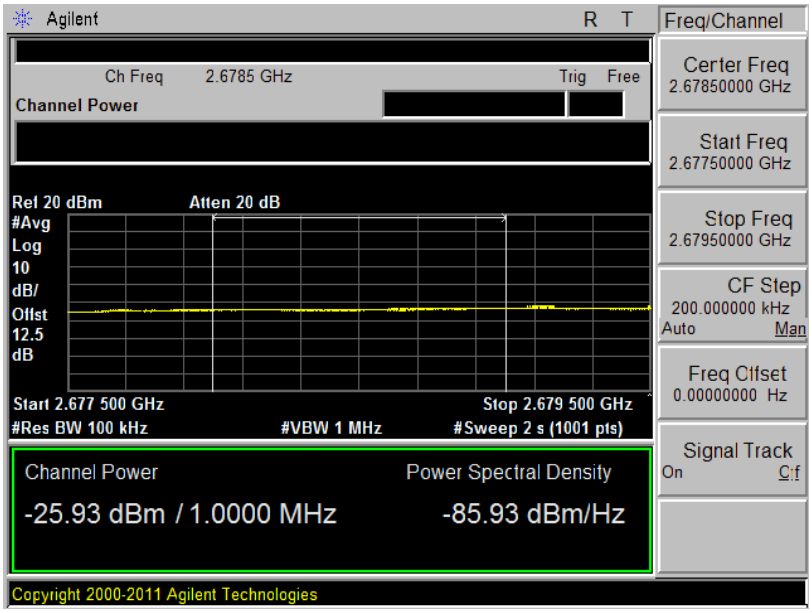


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB50-0

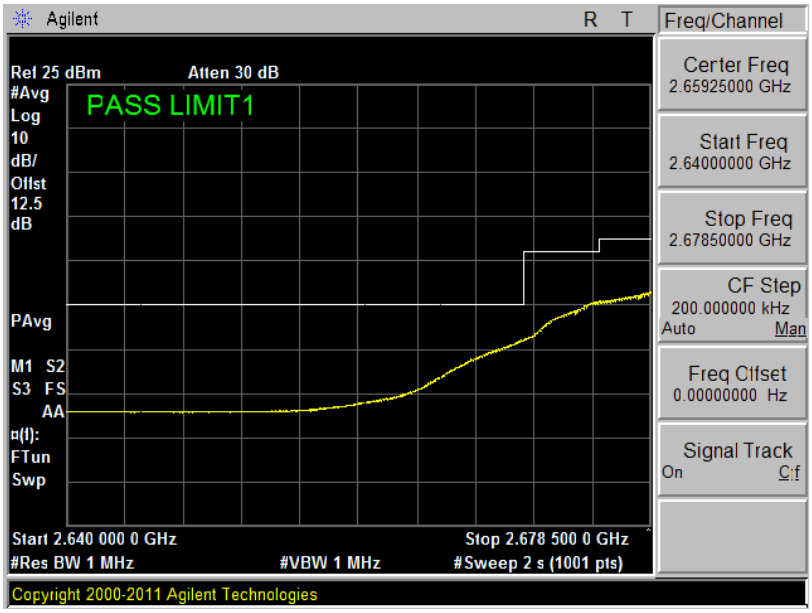


HIGH CH, LOW SIDE, (RB=VB= 1%EBW, 2678-2679MHz)

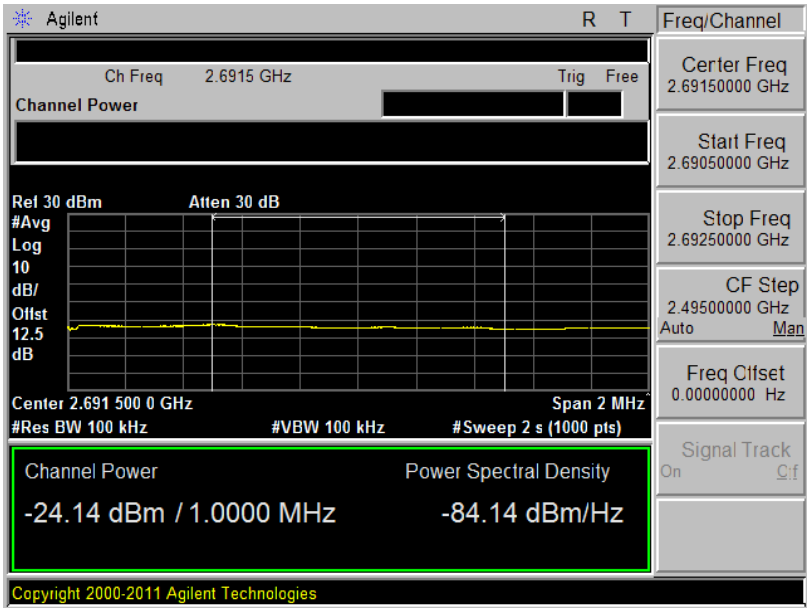


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, LOW SIDE, (RB=VB= 1MHz, 2640-2678.5MHz)

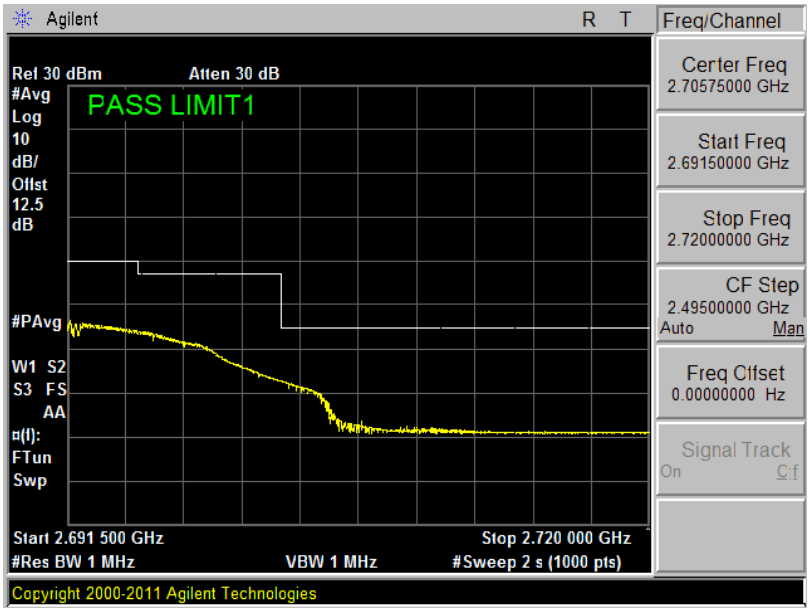


HGIH CH, HIGH SIDE, (RB=VB= 1%EBW, 2691-2692MHz)



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

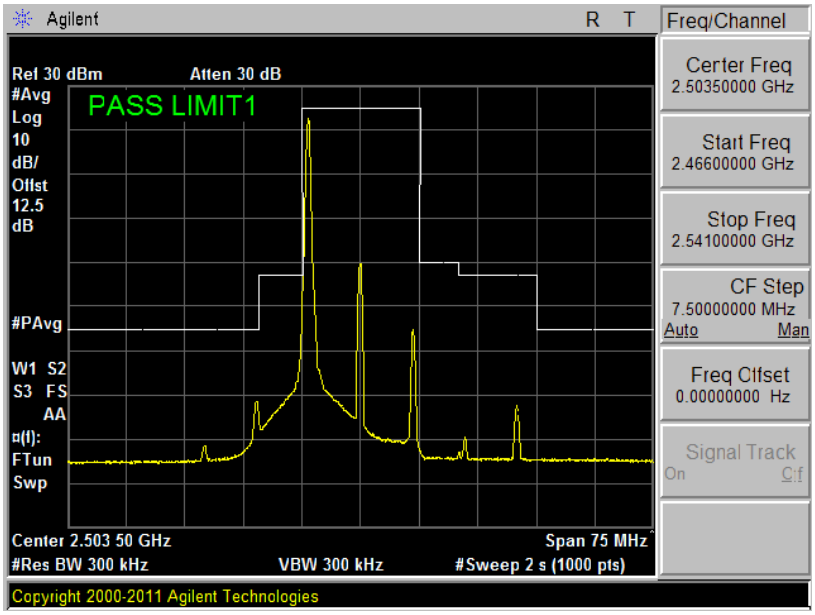
HIGH CH, HIGH SIDE, (RB=VB= 1MHz, 2691.5–2720MHz)



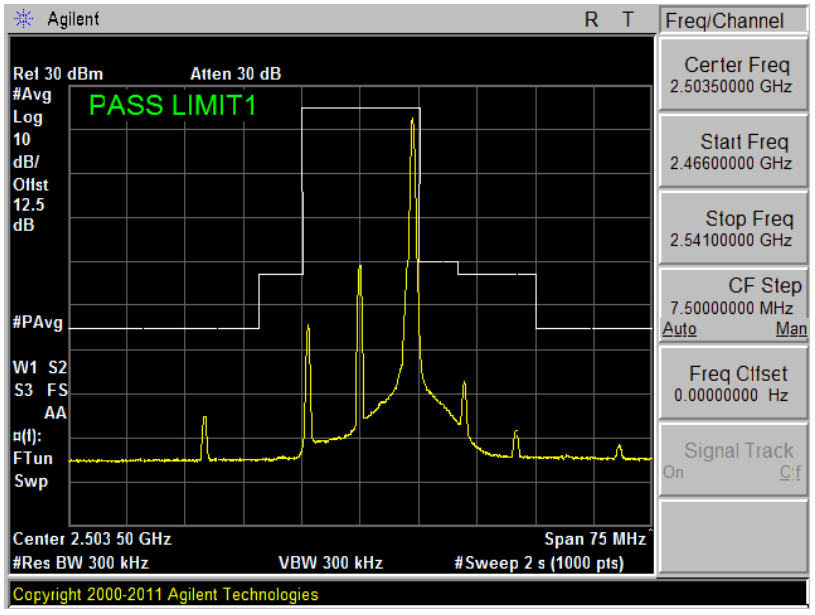
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (15.0 MHz BAND WIDTH)

LOW CH, RB1-0

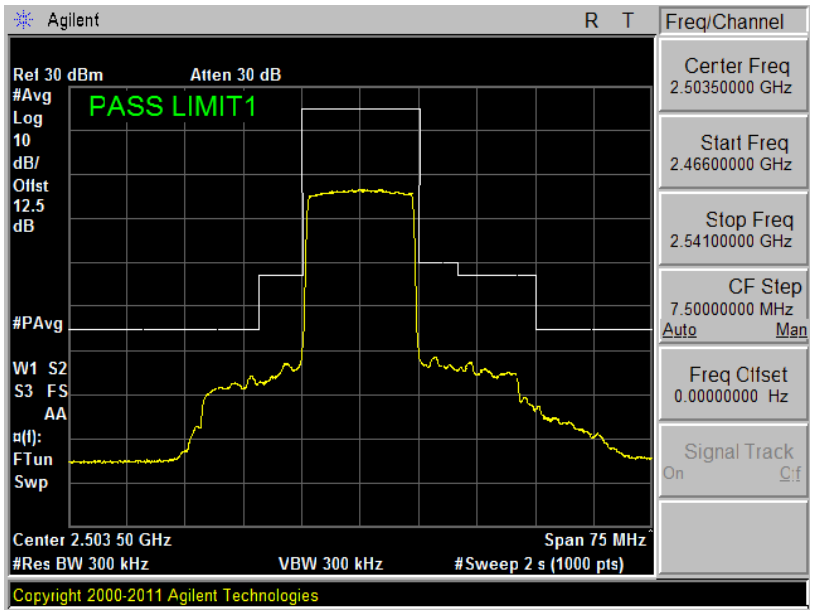


LOW CH, RB1-74

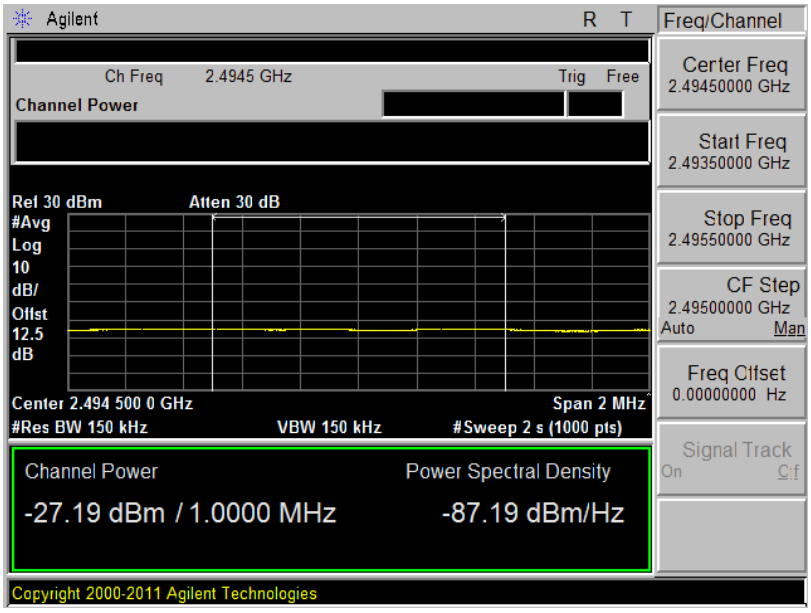


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB75-0

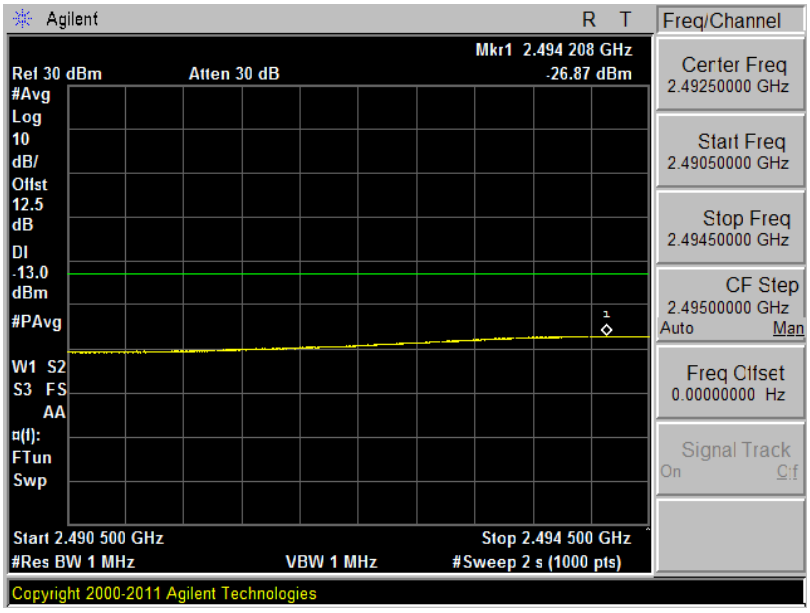


LOW CH, LOW SIDE, (RB=VB= 1%EBW, 2494–2495MHz)

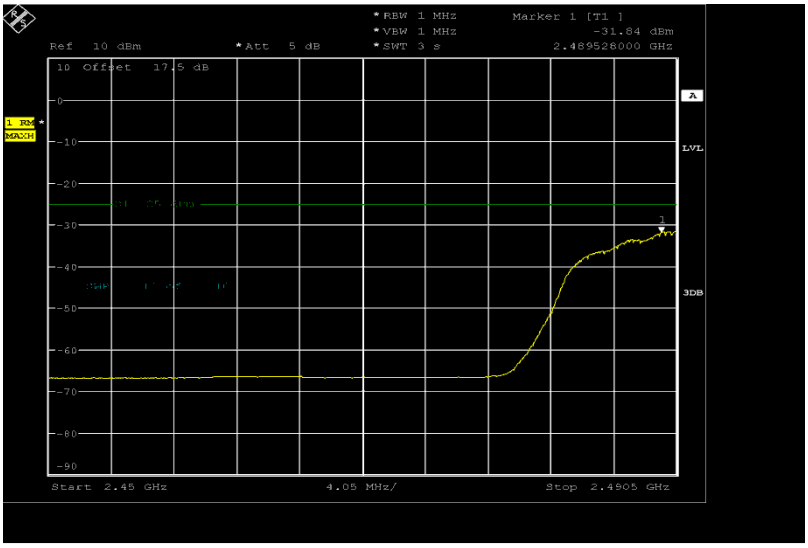


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, LOW SIDE, (RB=VB= 1MHz, 2490.5-2494.5MHz)

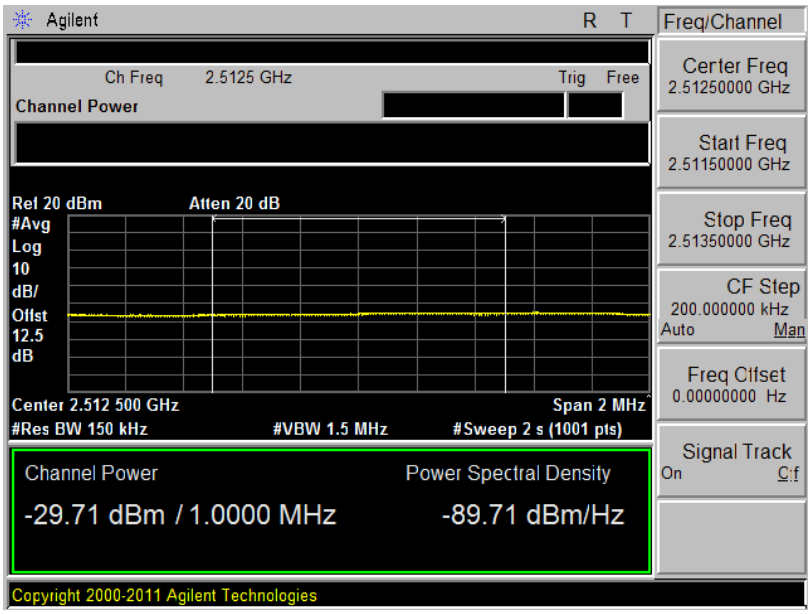


LOW CH, LOW SIDE, (RB=VB= 1MHz, -25dBm)

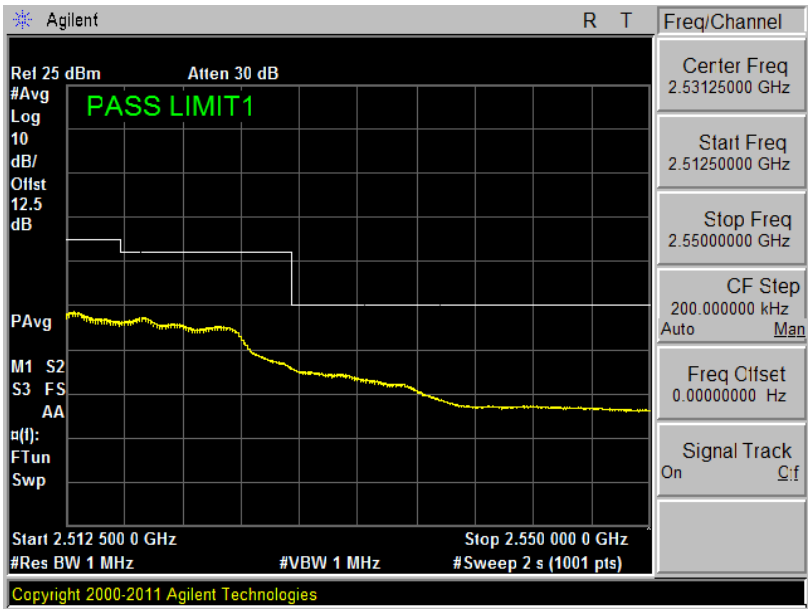


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, HIGH SIDE, (RB=VB= 1%EBW, 2512-2513MHz)

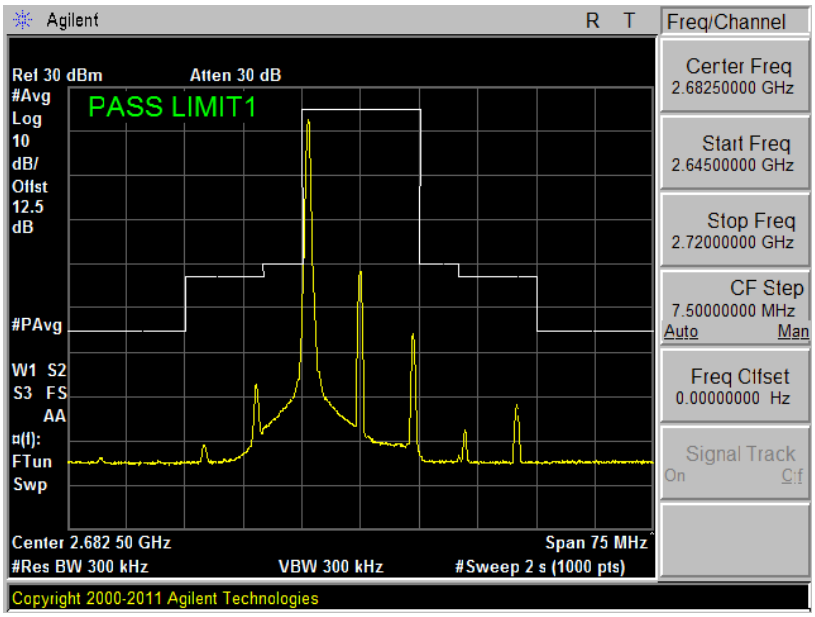


LOW CH, HIGH SIDE, (RB=VB= 1MHz, 2512.5-2550MHz)

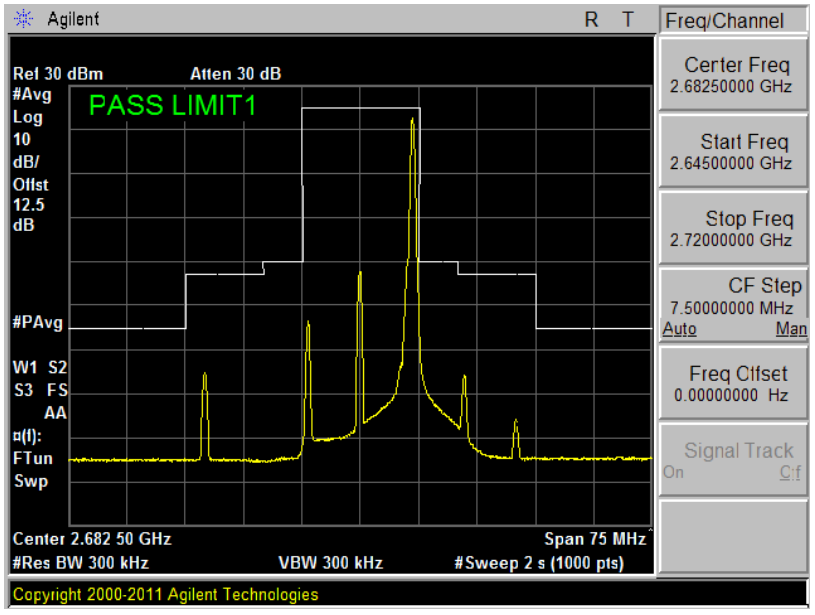


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB1-0

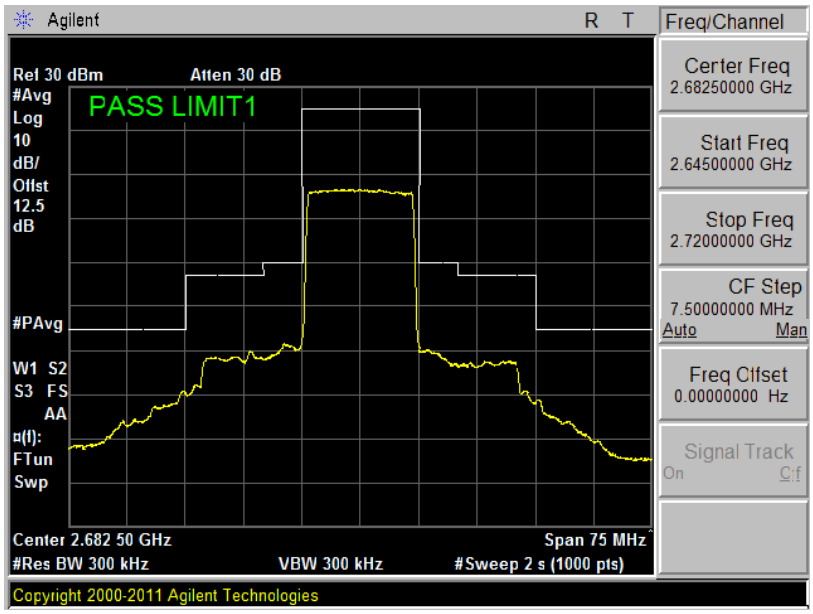


HIGH CH, RB1-74

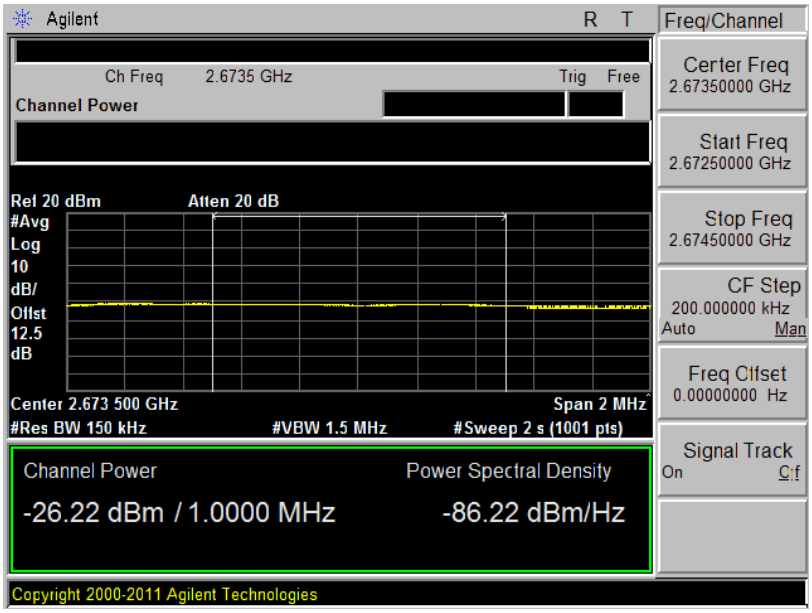


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB75-0

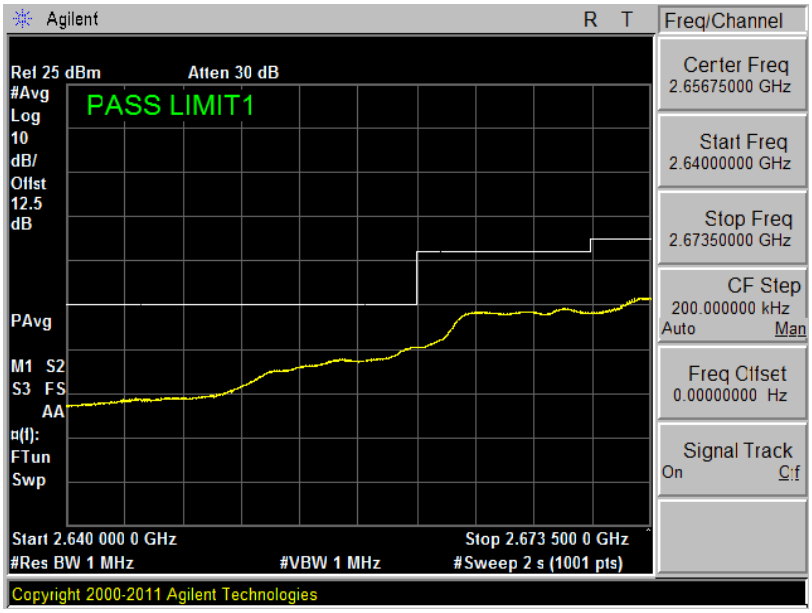


HIGH CH, LOW SIDE, (RB=VB= 1%EBW, 22673-2674MHz)

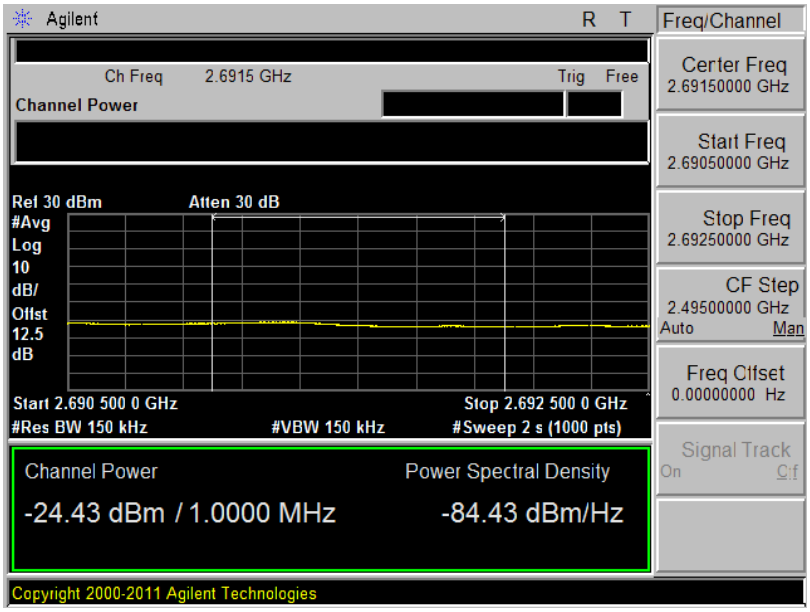


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, LOW SIDE, (RB=VB= 1MHz, 2640-2673.5MHz)

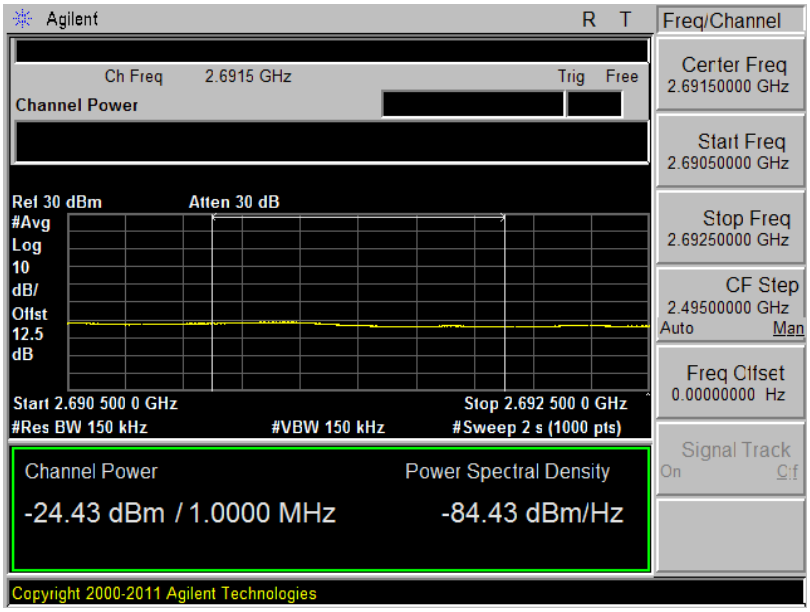


HGIH CH, HIGH SIDE, (RB=VB= 1%EBW, 2691-2692MHz)



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

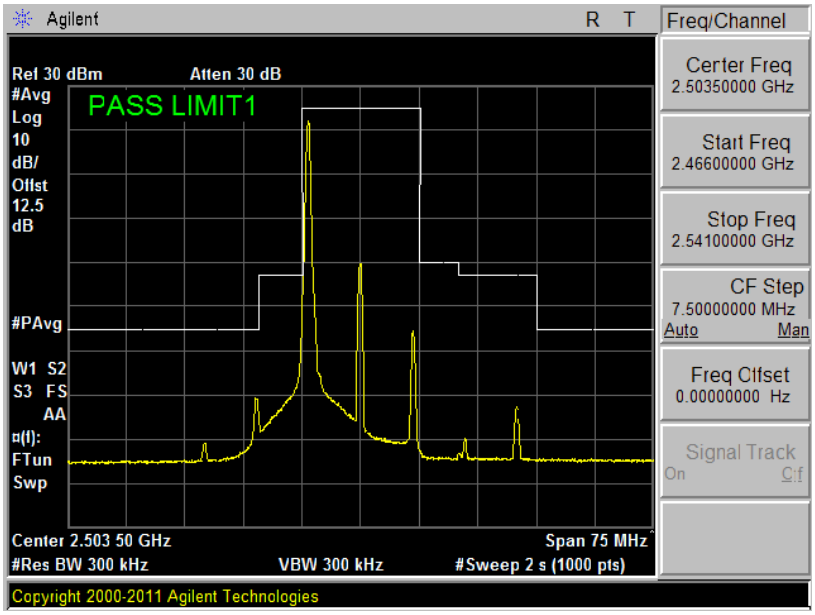
HIGH CH, HIGH SIDE, (RB=VB= 1MHz, 2691.5–2720MHz)



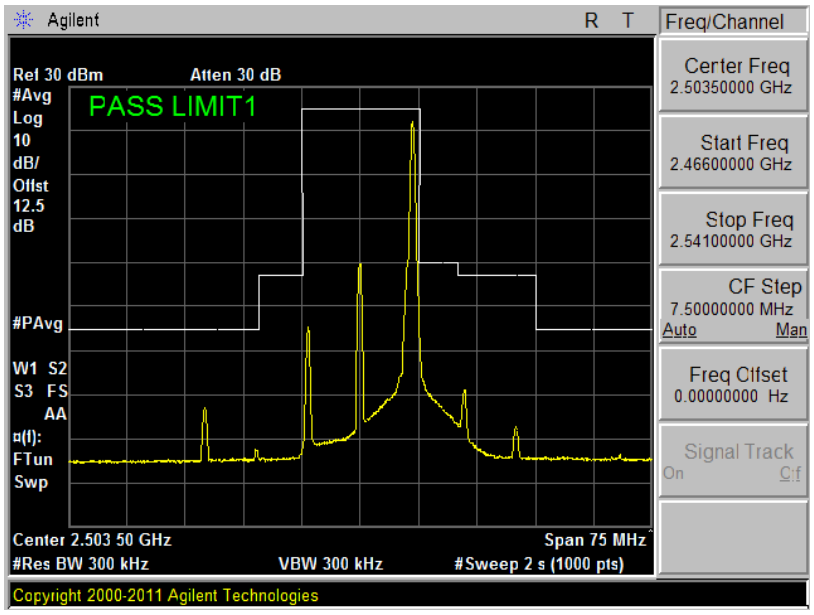
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

16QAM, (15.0 MHz BAND WIDTH)

LOW CH, RB1-0

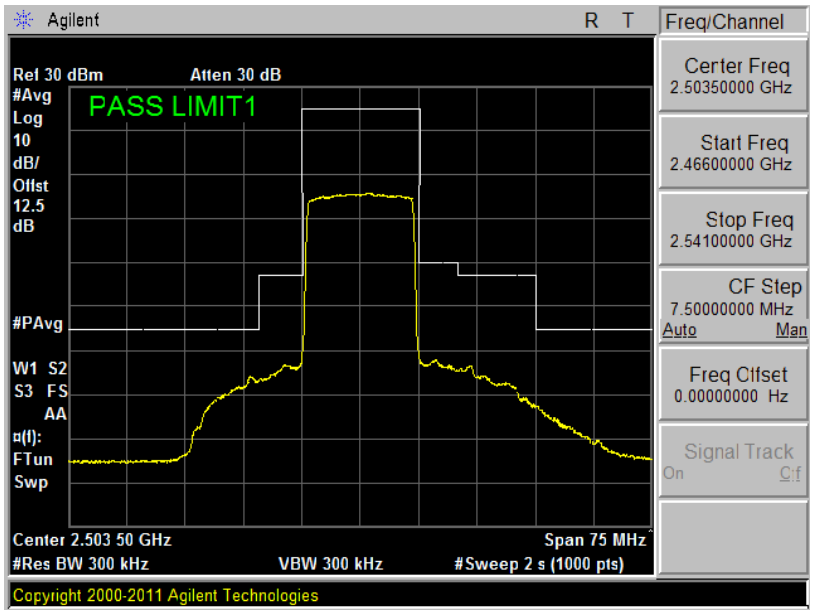


LOW CH, RB1-74

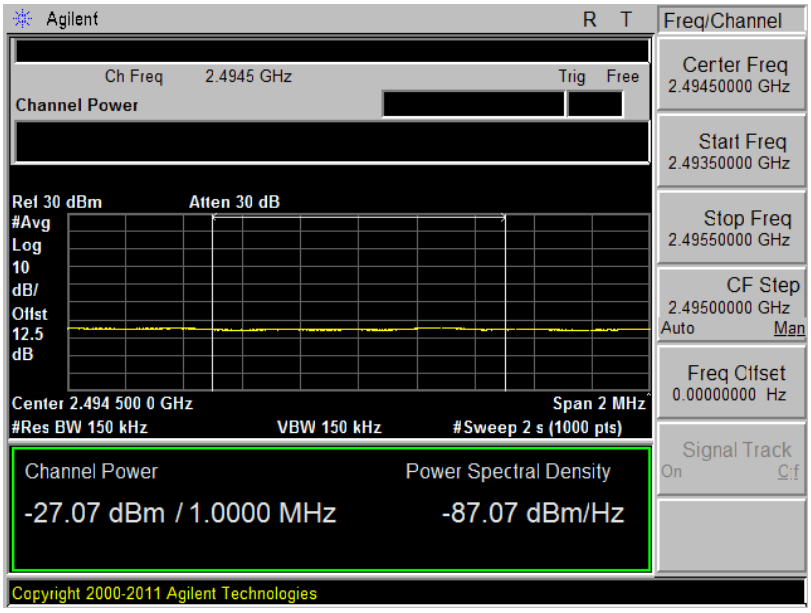


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB75-0

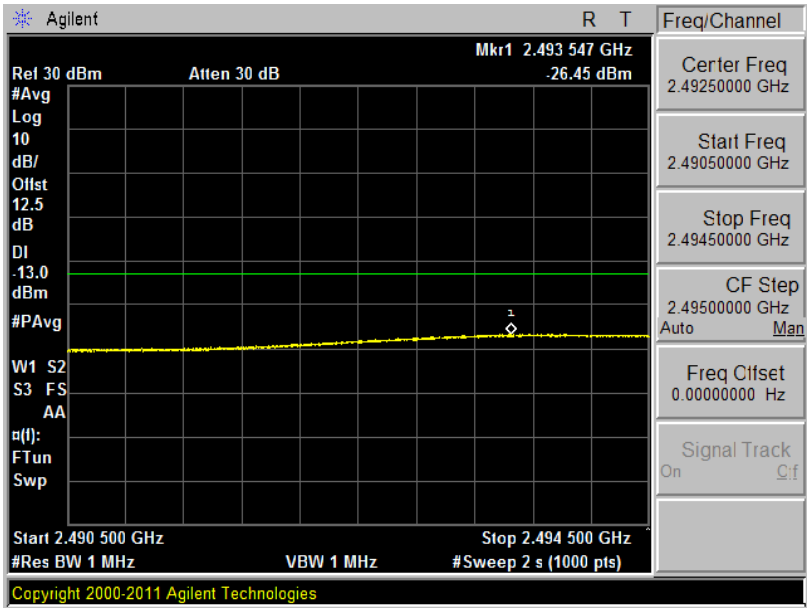


LOW CH, LOW SIDE, (RB=VB= 1%EBW, 2494–2495MHz)

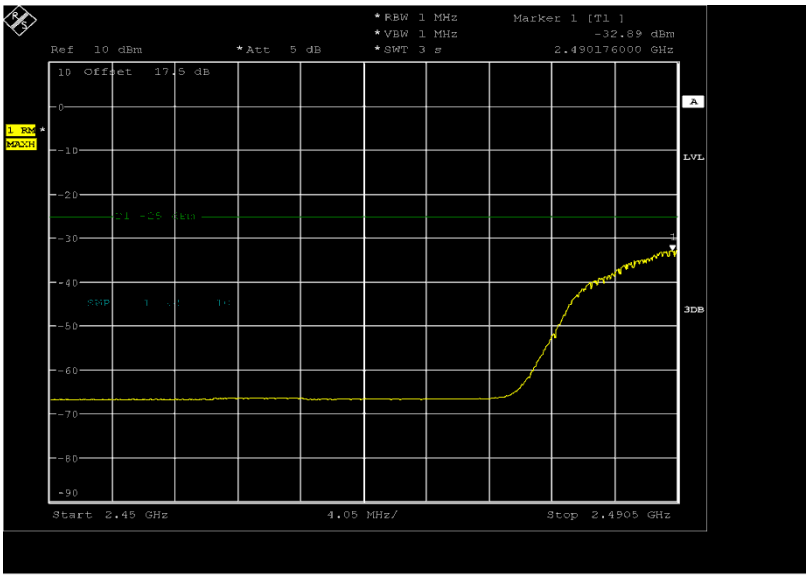


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, LOW SIDE, (RB=VB= 1MHz, 2490.5-2494.5MHz)



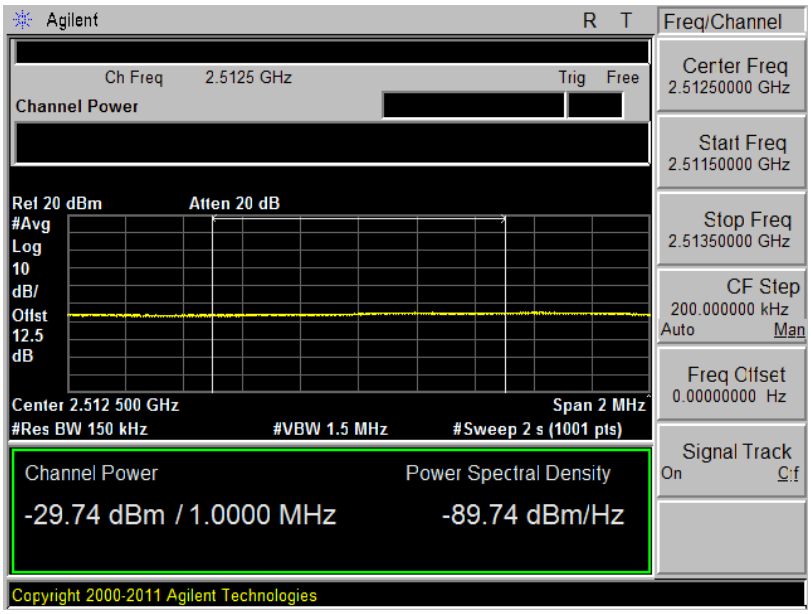
LOW CH, LOW SIDE, (RB=VB= 1MHz, -25dBm)



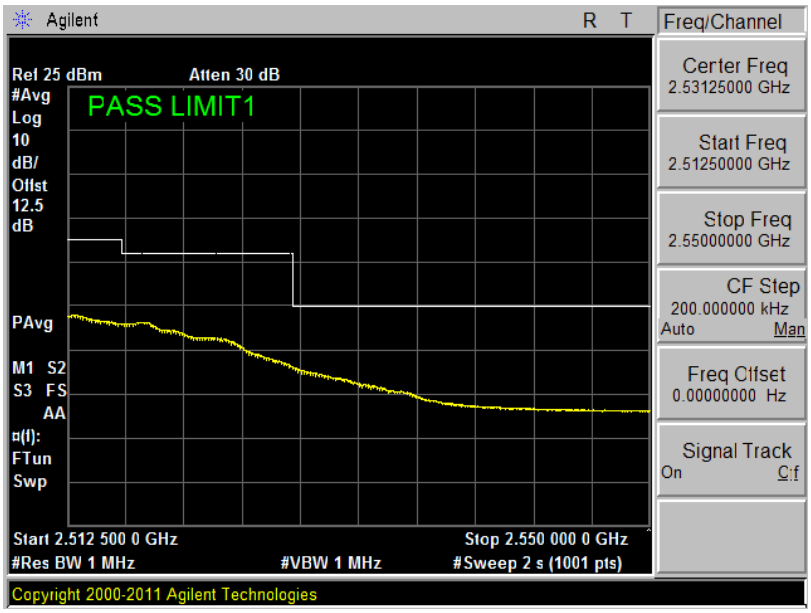
Date: 10.JUN.2014 17:44:07

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

LOW CH, HIGH SIDE, (RB=VB= 1%EBW, 2512-2513MHz)

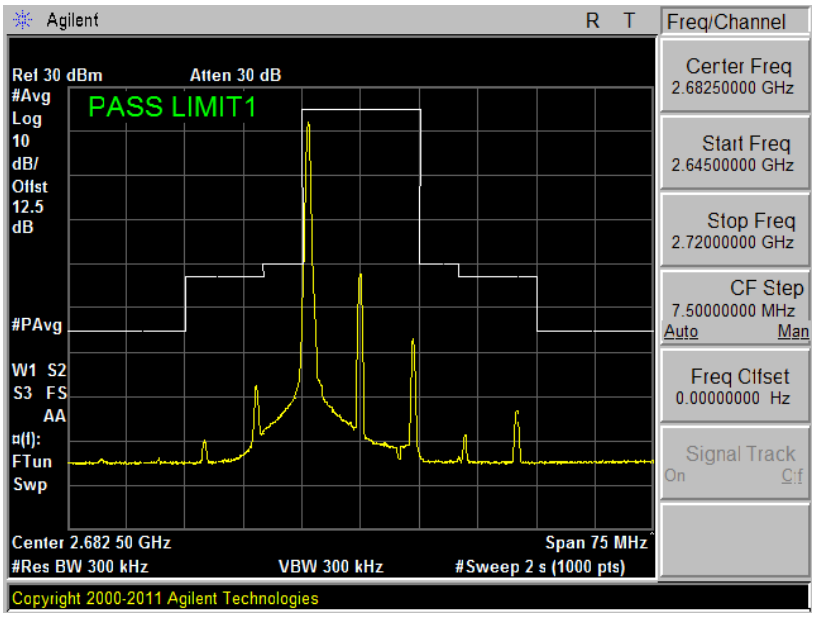


LOW CH, HIGH SIDE, (RB=VB= 1MHz, 2512.5-2550MHz)

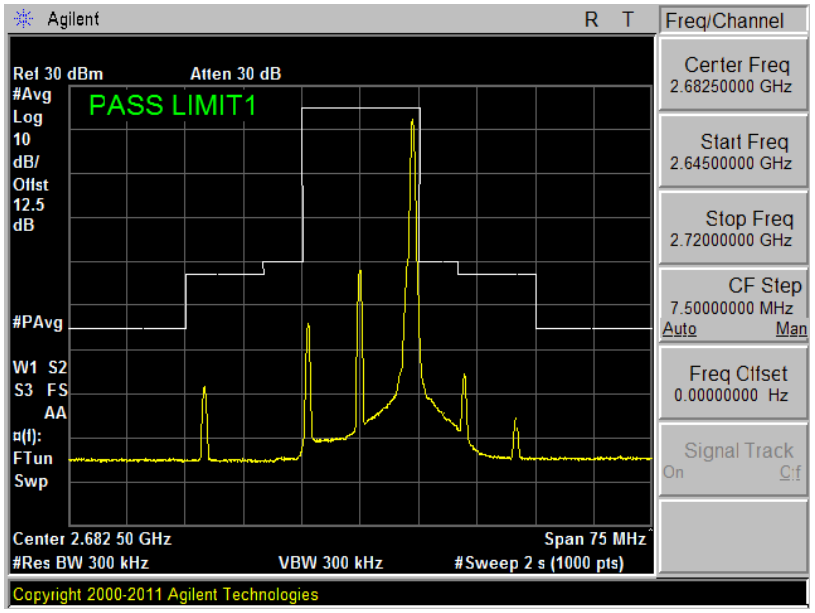


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB1-0

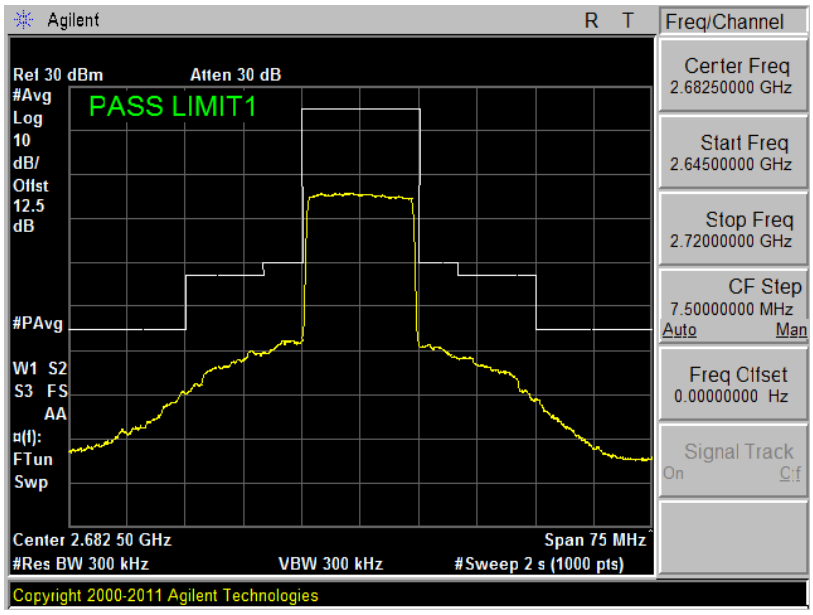


HIGH CH, RB1-74

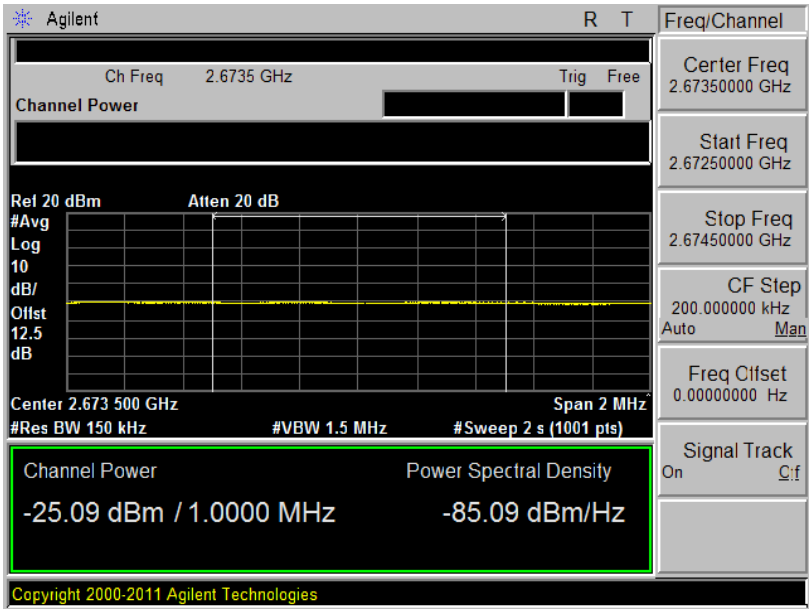


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB75-0

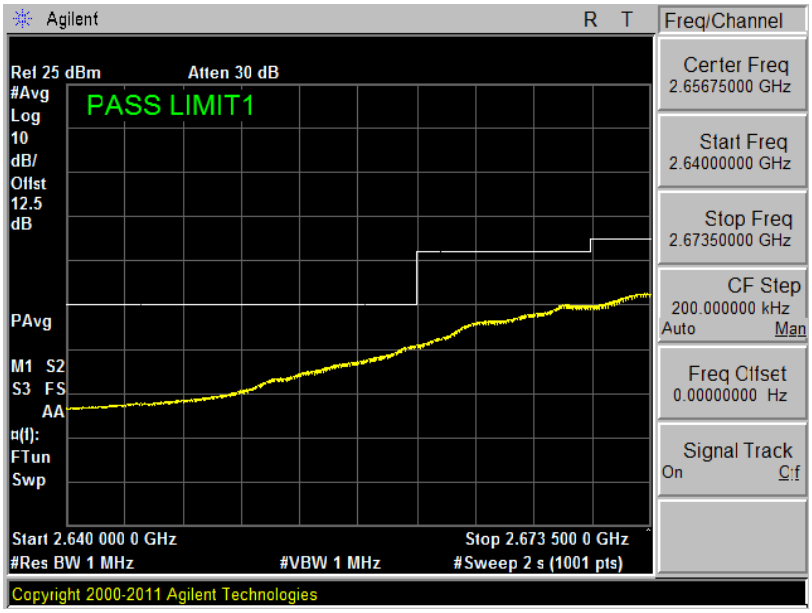


HIGH CH, LOW SIDE, (RB=VB= 1%EBW, 2673-2674MHz)

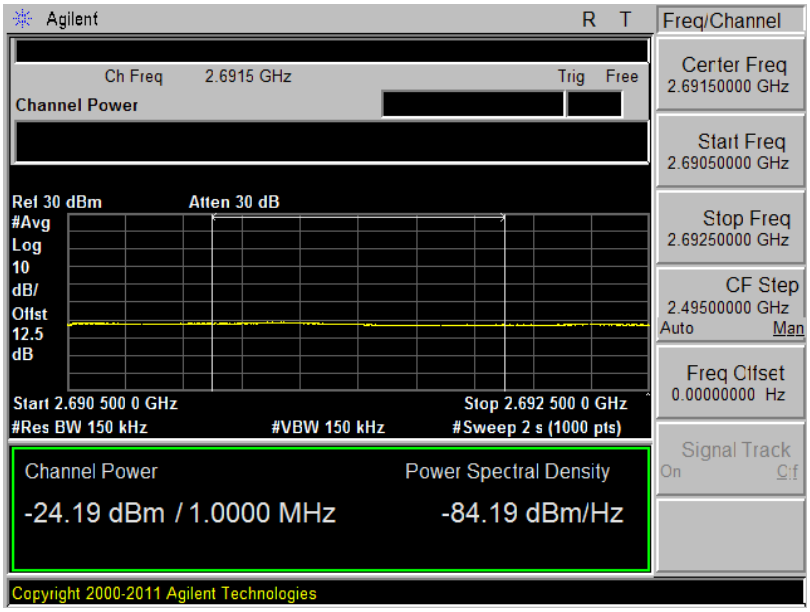


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, LOW SIDE, (RB=VB= 1MHz, 2640-2673.5MHz)

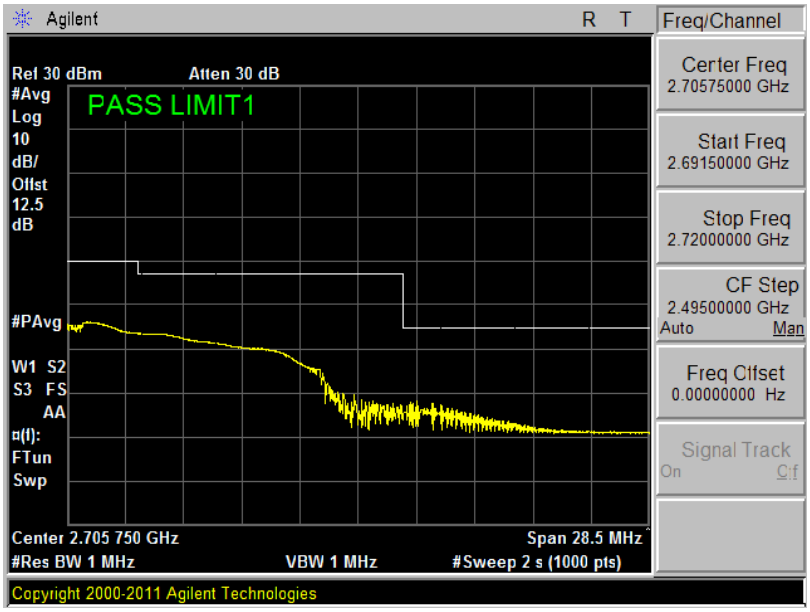


HGIH CH, HIGH SIDE, (RB=VB= 1%EBW, 2691-2692MHz)



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

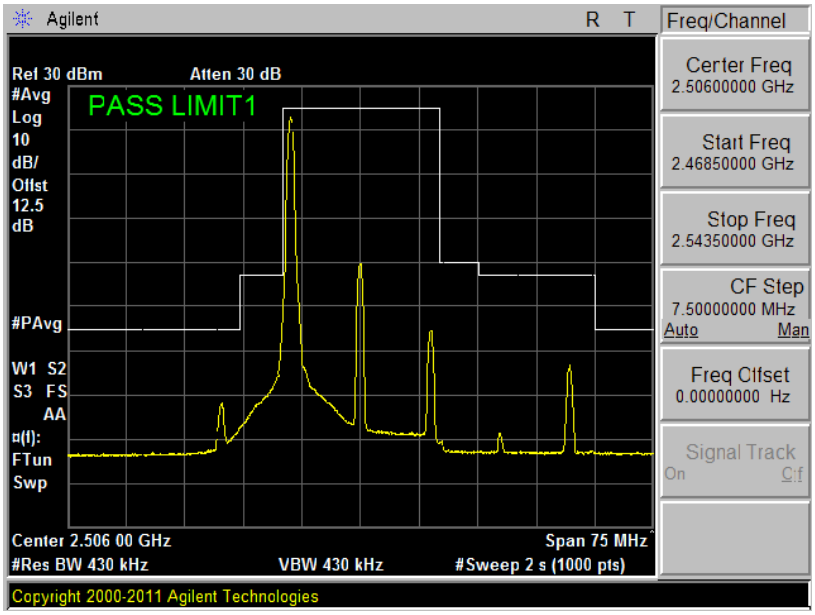
HIGH CH, HIGH SIDE, (RB=VB= 1MHz, 2691.5–2720MHz)



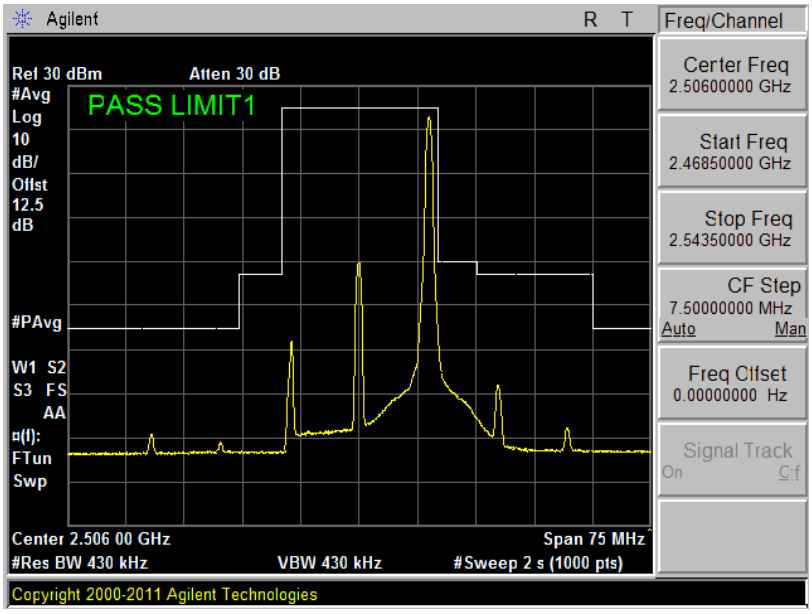
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (20.0 MHz BAND WIDTH)

LOW CH, RB1-0

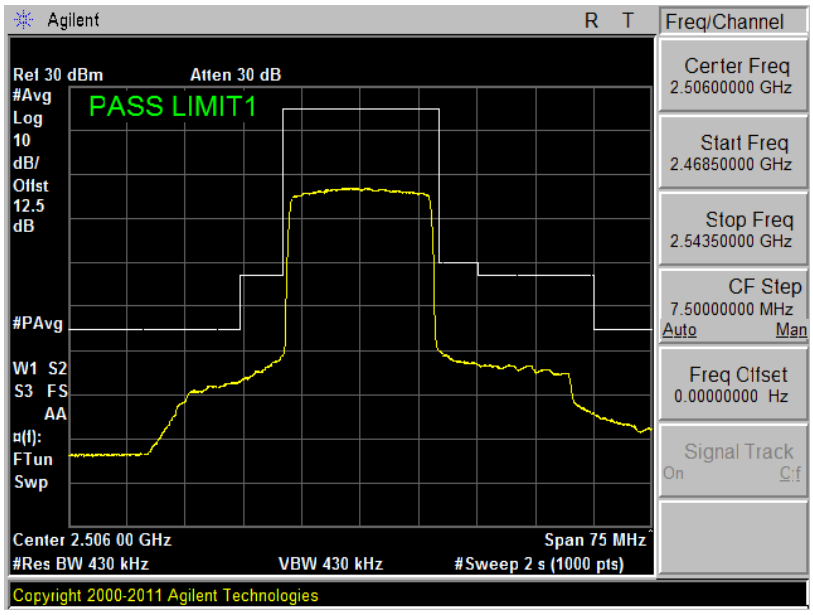


LOW CH, RB1-99

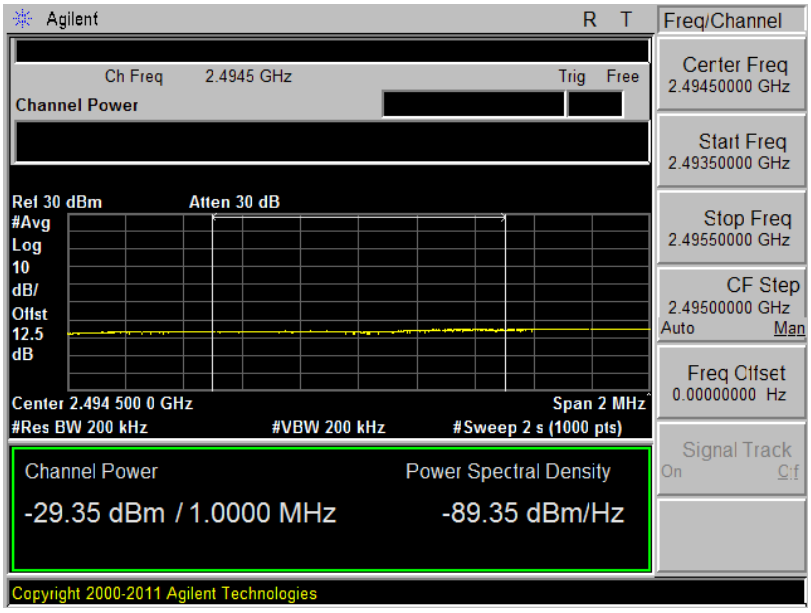


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB100-0

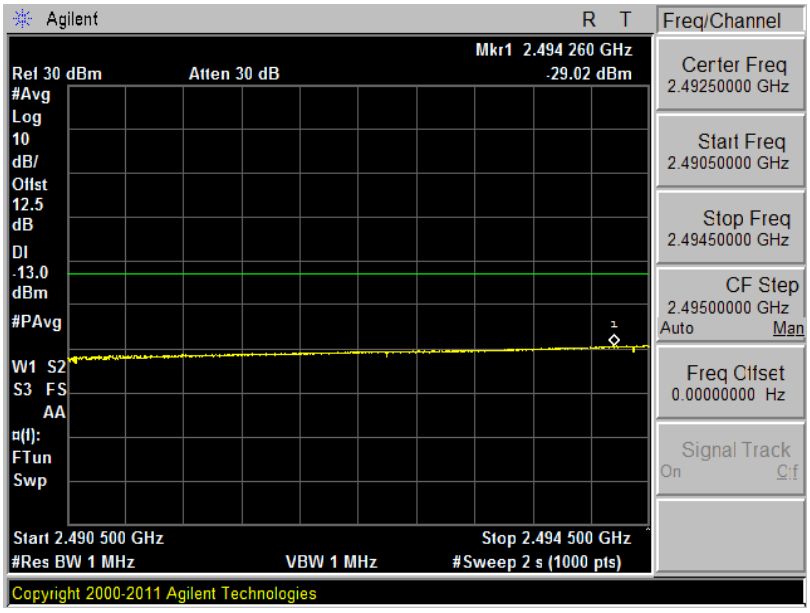


LOW CH, LOW SIDE, (RB=VB= 1%EBW, 2494–2495MHz)

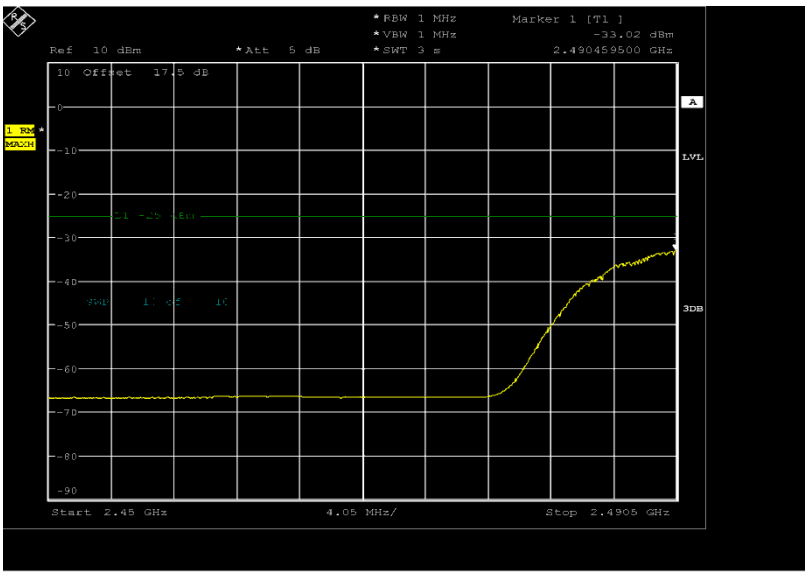


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, LOW SIDE, (RB=VB= 1MHz, 2490.5-2494.5MHz)

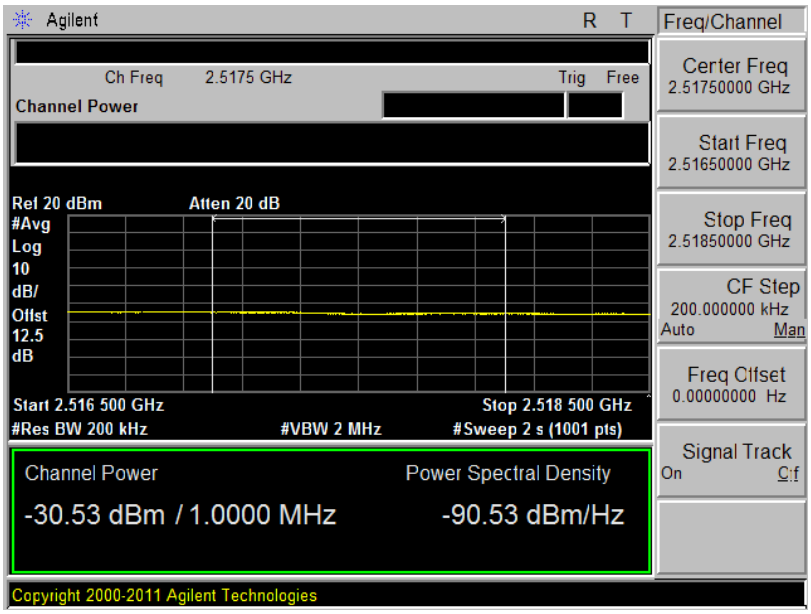


LOW CH, LOW SIDE, (RB=VB= 1MHz, -25dBm)

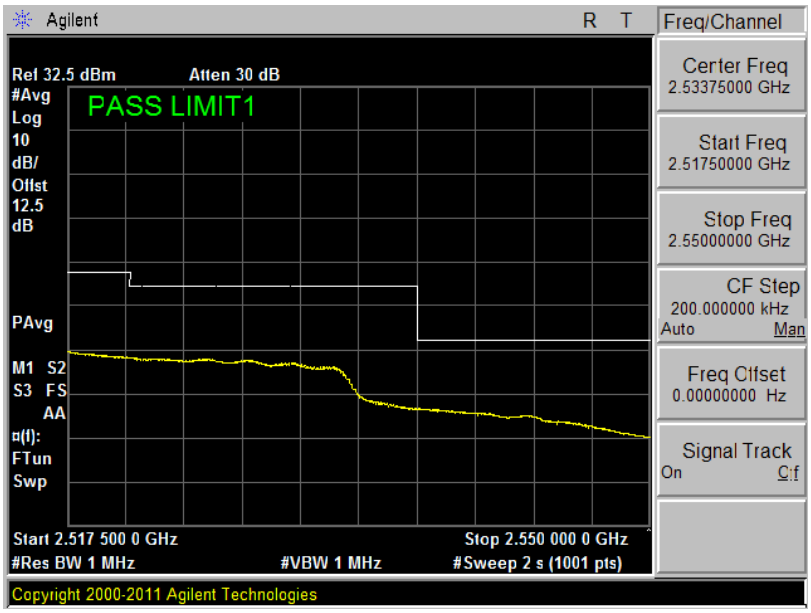


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, HIGH SIDE, (RB=VB= 1%EBW, 2517-2518MHz)

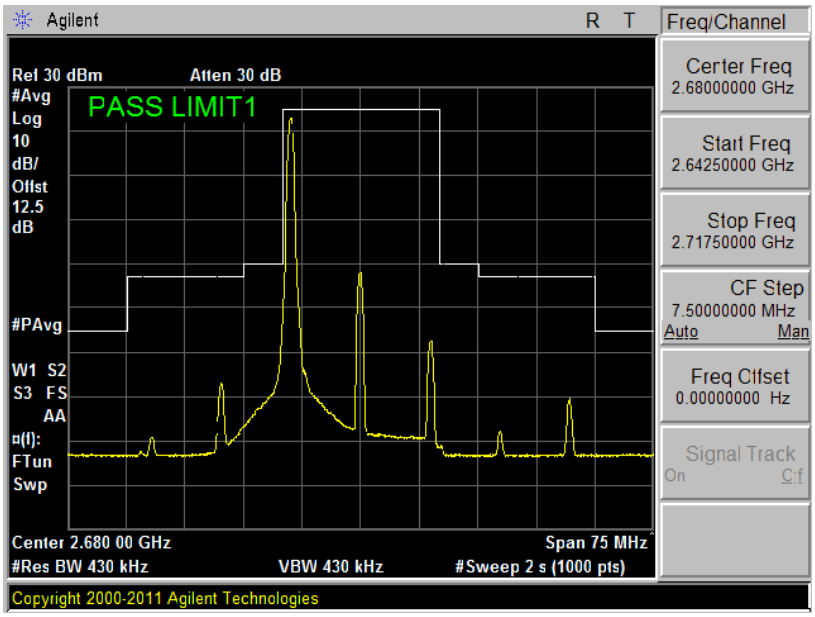


LOW CH, HIGH SIDE, (RB=VB= 1MHz, 2517.5-2550MHz)

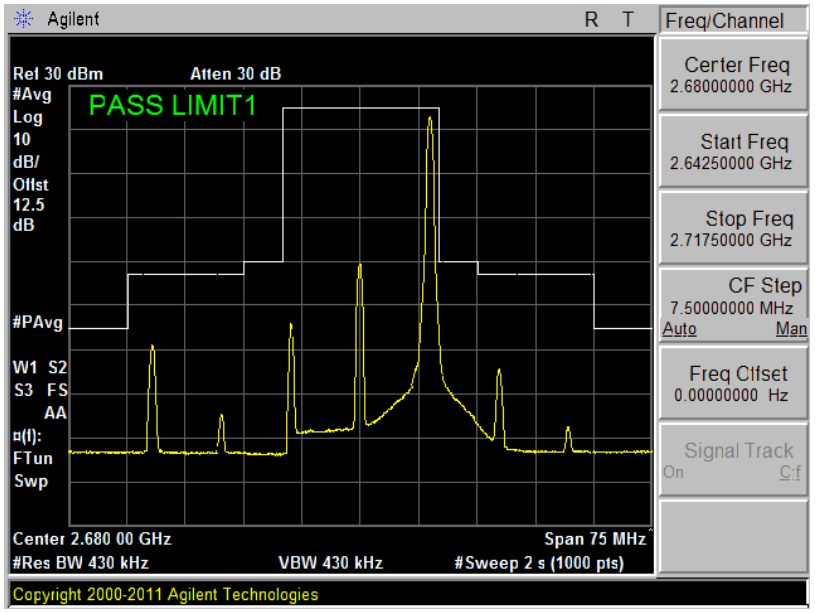


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB1-0

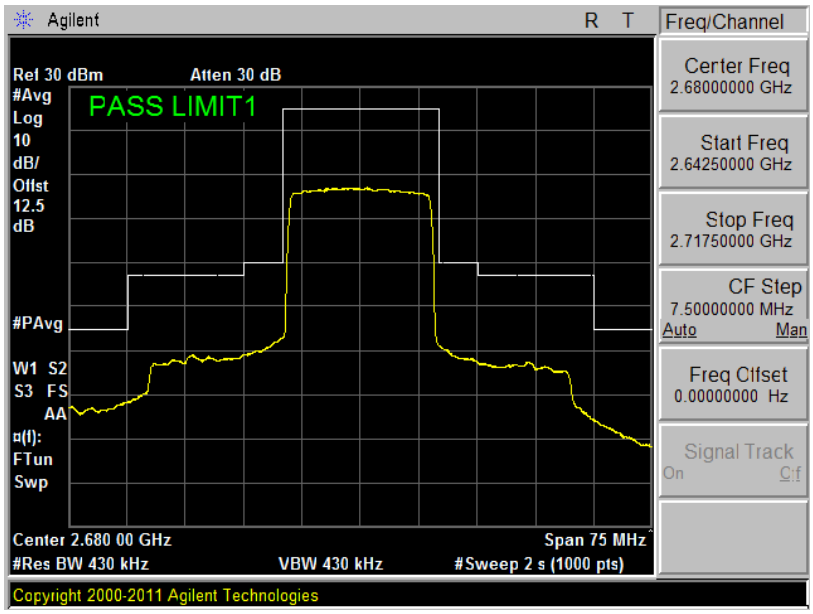


HIGH CH, RB1-99

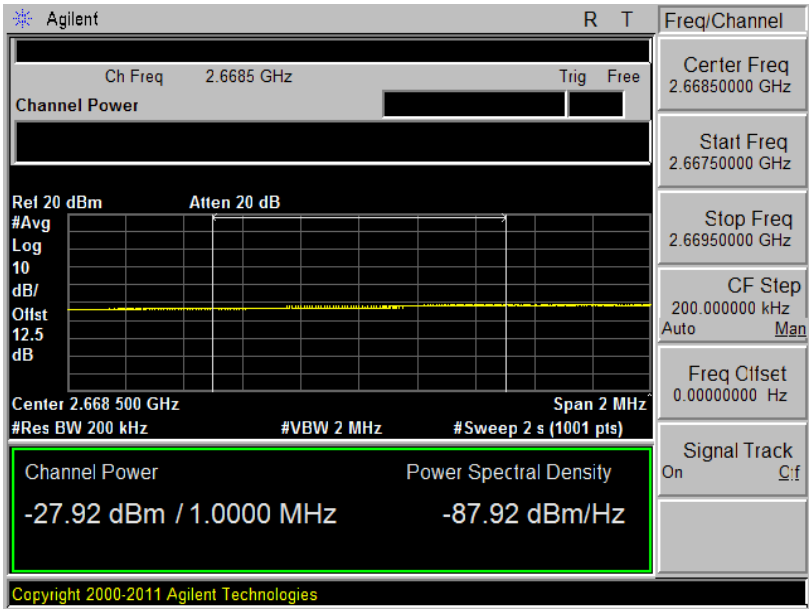


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB100-0

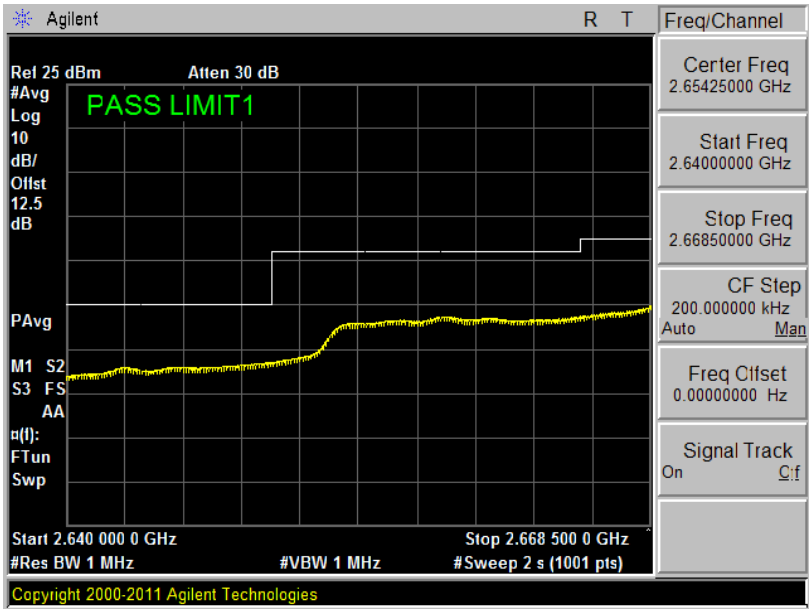


HIGH CH, LOW SIDE, (RB=VB= 1%EBW, 2668-2669MHz)

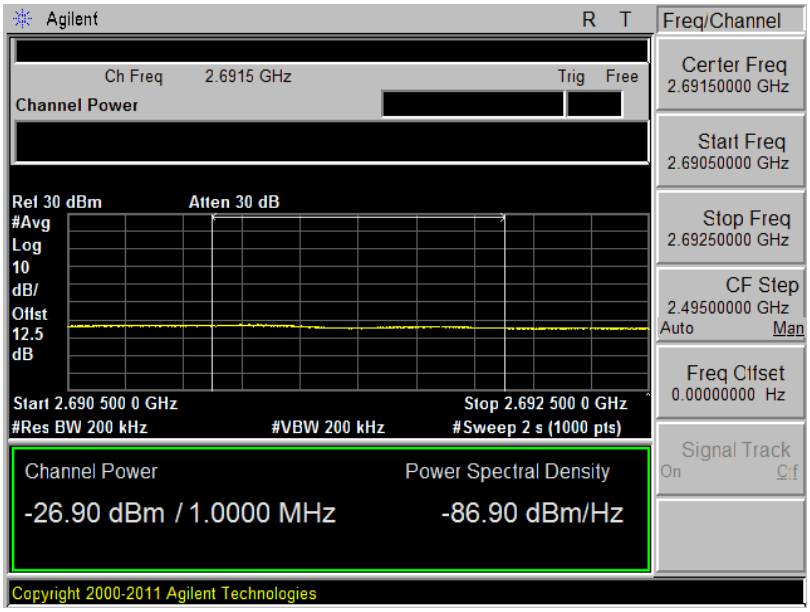


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, LOW SIDE, (RB=VB= 1MHz, 2640-2668.5MHz)

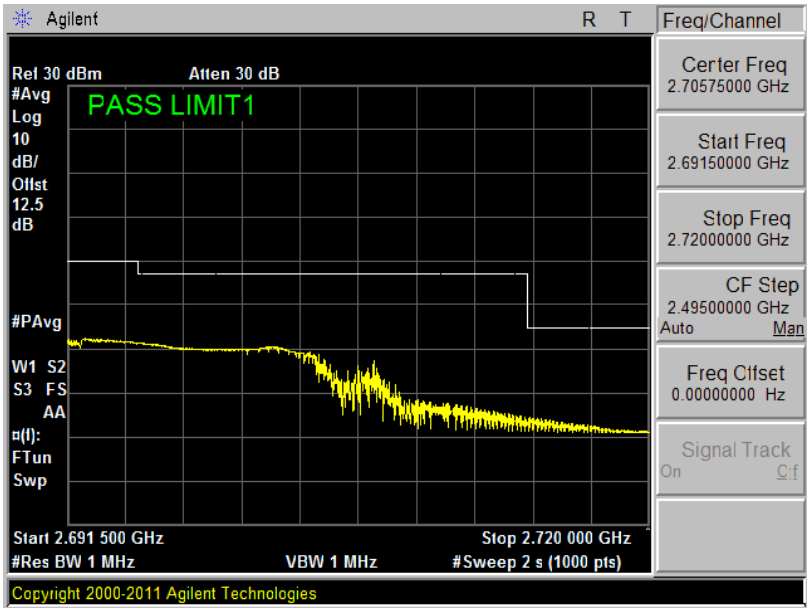


HGIH CH, HIGH SIDE, (RB=VB= 1%EBW, 2691-2692MHz)



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

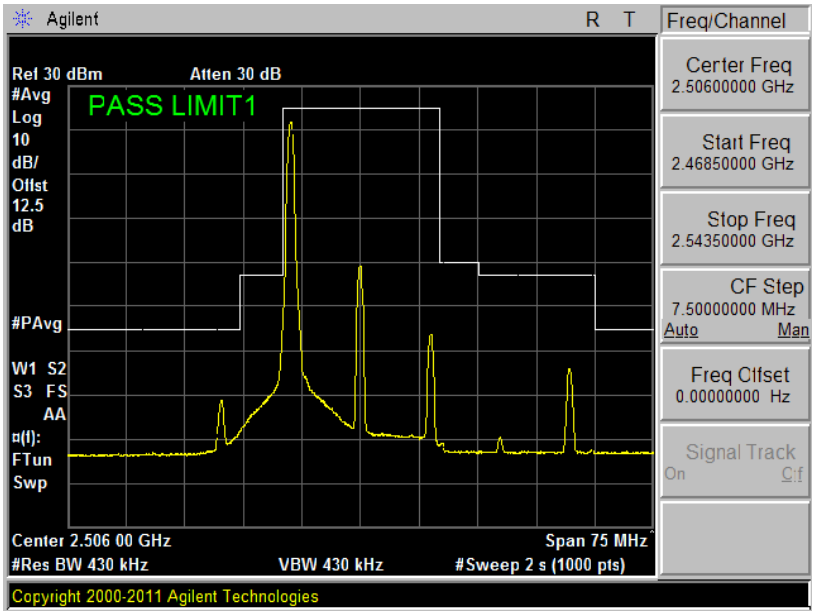
HIGH CH, HIGH SIDE, (RB=VB= 1MHz, 2691.5–2720MHz)



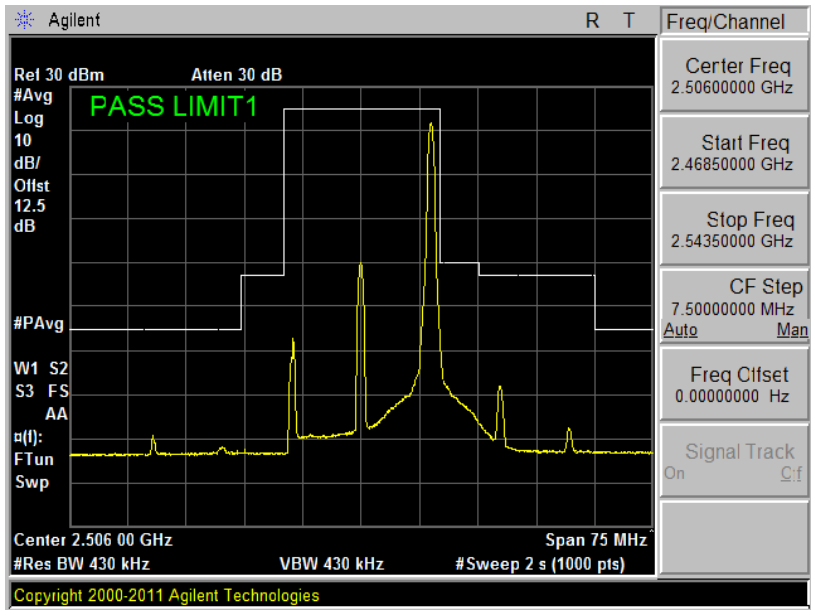
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

16QAM, (20.0 MHz BAND WIDTH)

LOW CH, RB1-0

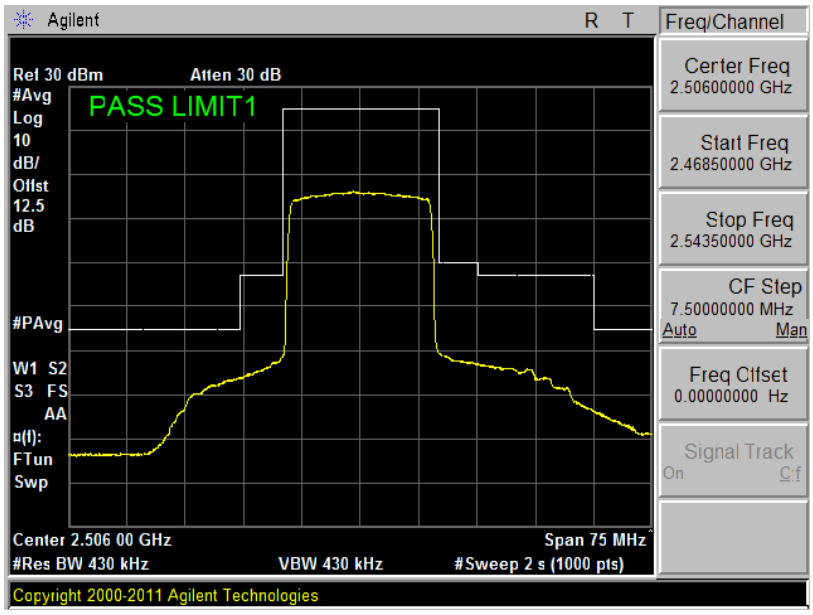


LOW CH, RB1-99

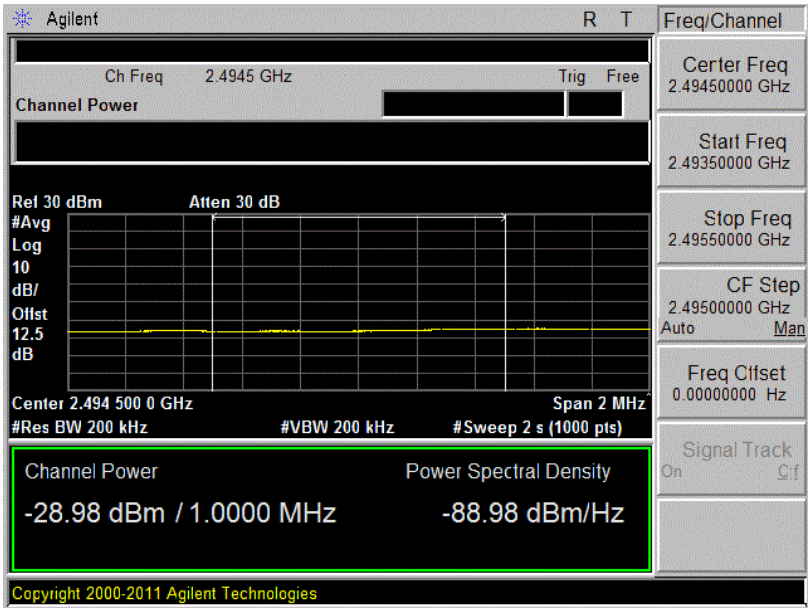


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, RB100-0

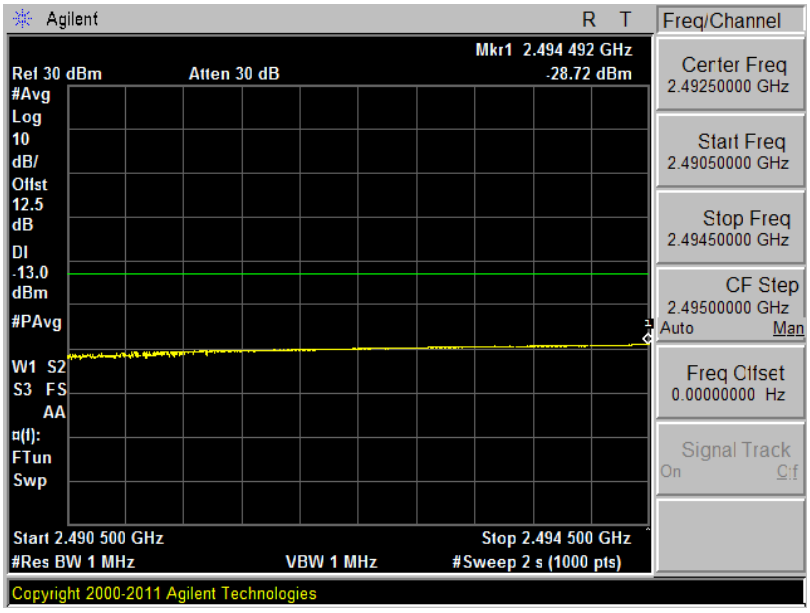


LOW CH, LOW SIDE, (RB=VB= 1%EBW, 2494–2495MHz)

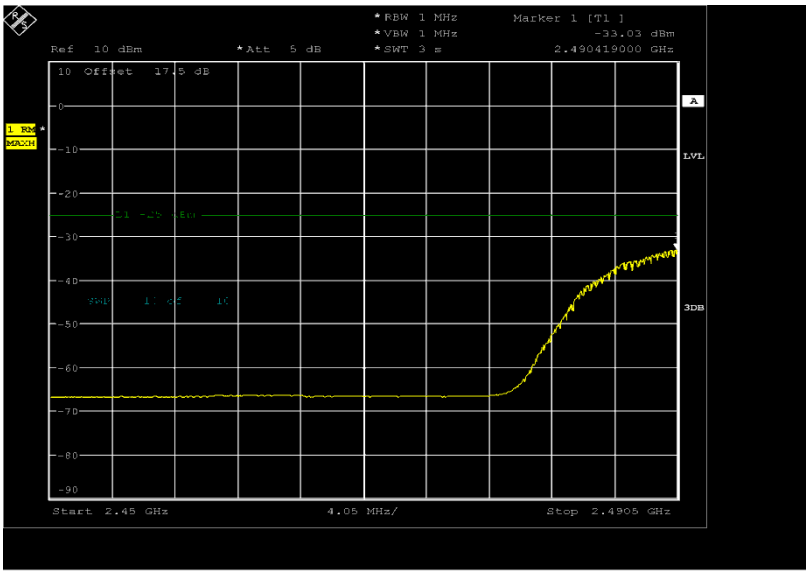


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, LOW SIDE, (RB=VB= 1MHz, 2490.5-2494.5MHz)

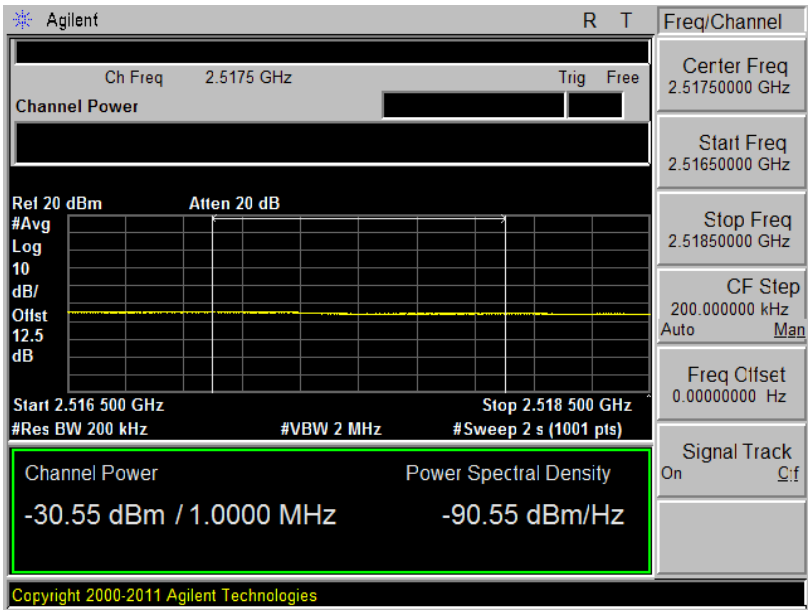


LOW CH, LOW SIDE, (RB=VB= 1MHz, -25dBm)

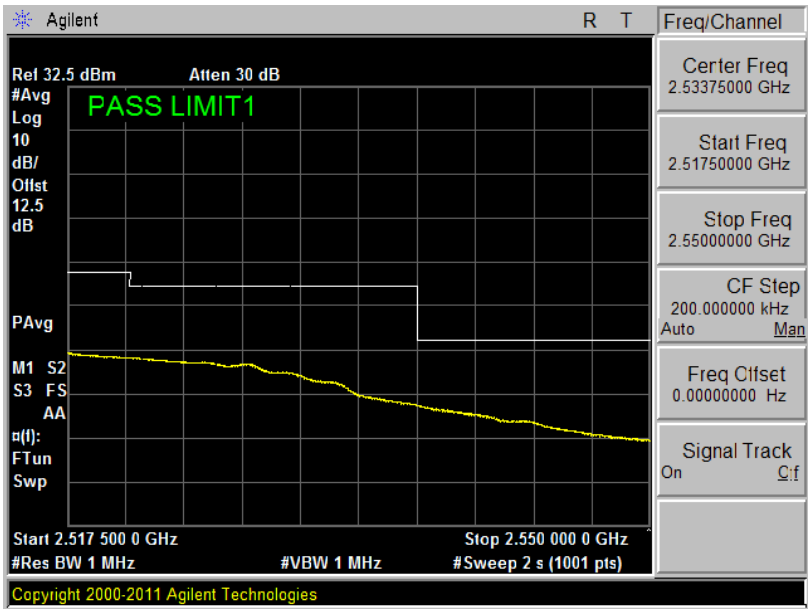


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LOW CH, HIGH SIDE, (RB=VB= 1%EBW, 2517-2518MHz)

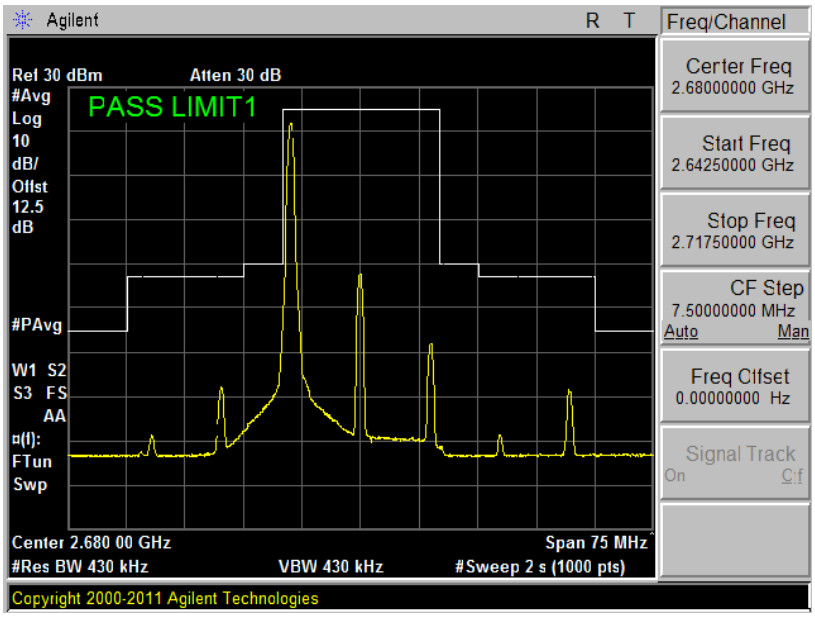


LOW CH, HIGH SIDE, (RB=VB= 1MHz, 2517.5-2550MHz)

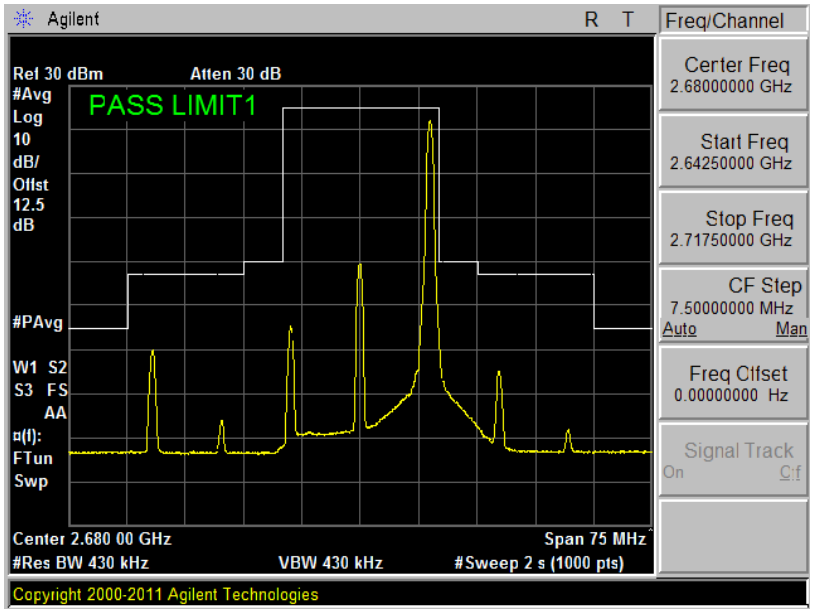


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB1-0

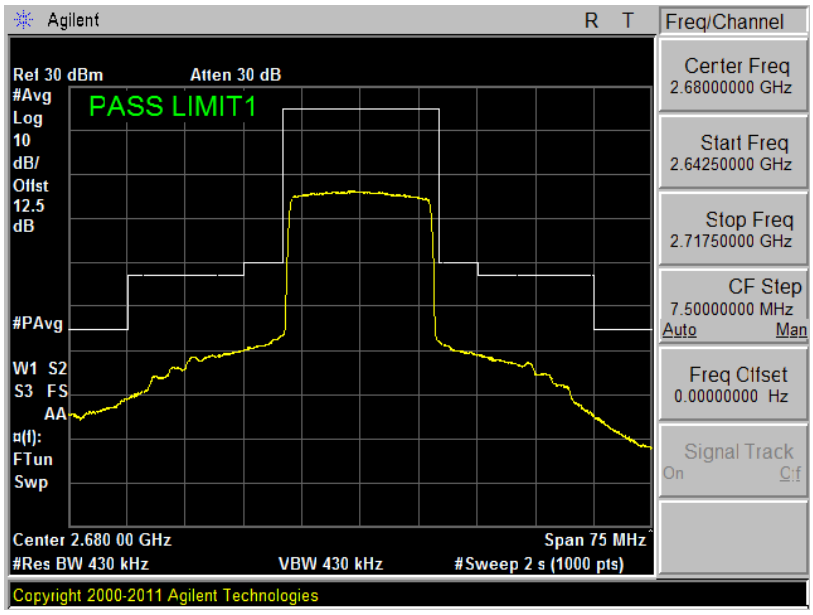


HIGH CH, RB1-99

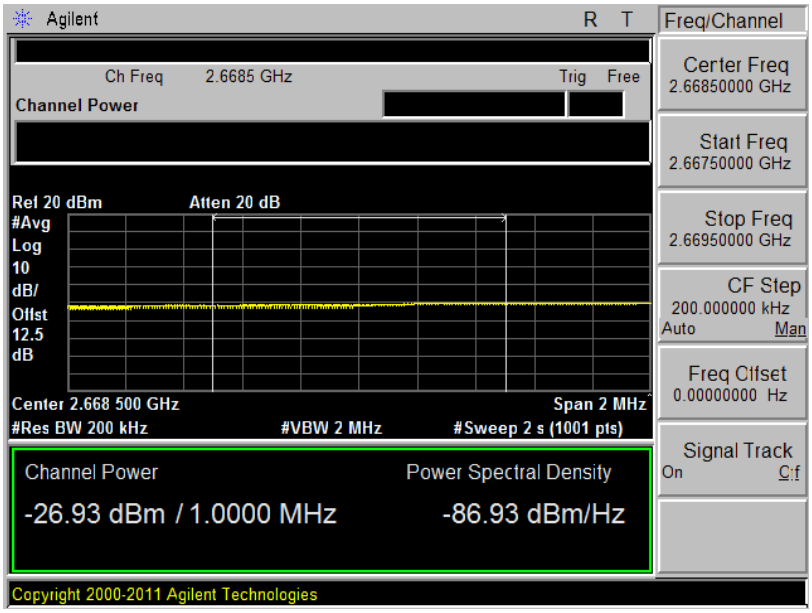


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, RB100-0

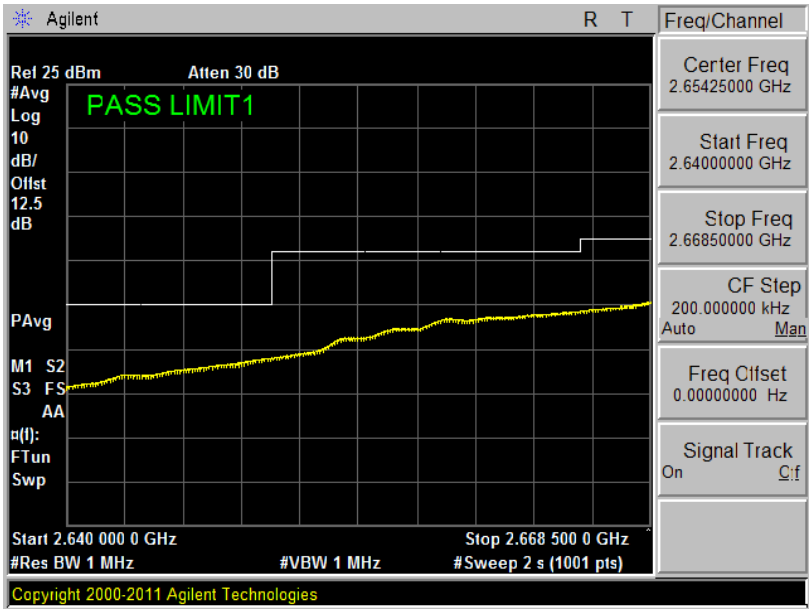


HIGH CH, LOW SIDE, (RB=VB= 1%EBW, 2668-2669MHz)

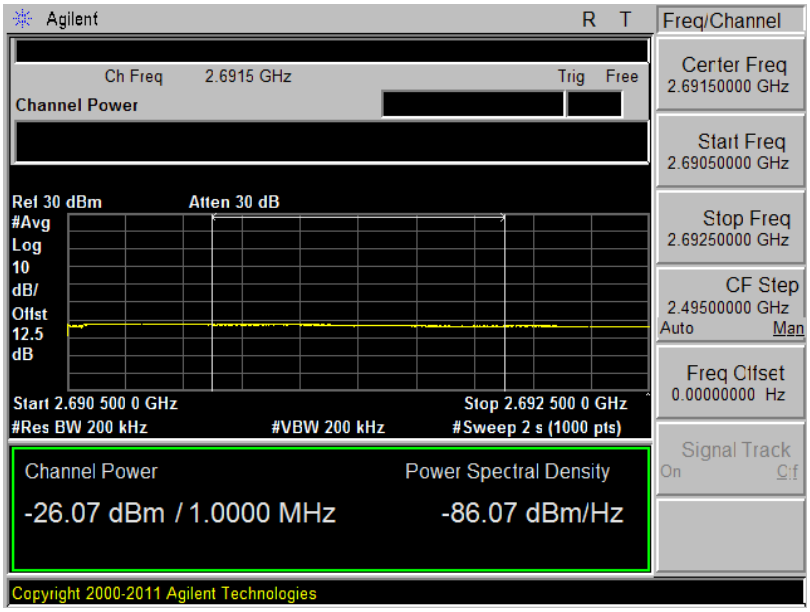


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH CH, LOW SIDE, (RB=VB= 1MHz, 2640-2668.5MHz)

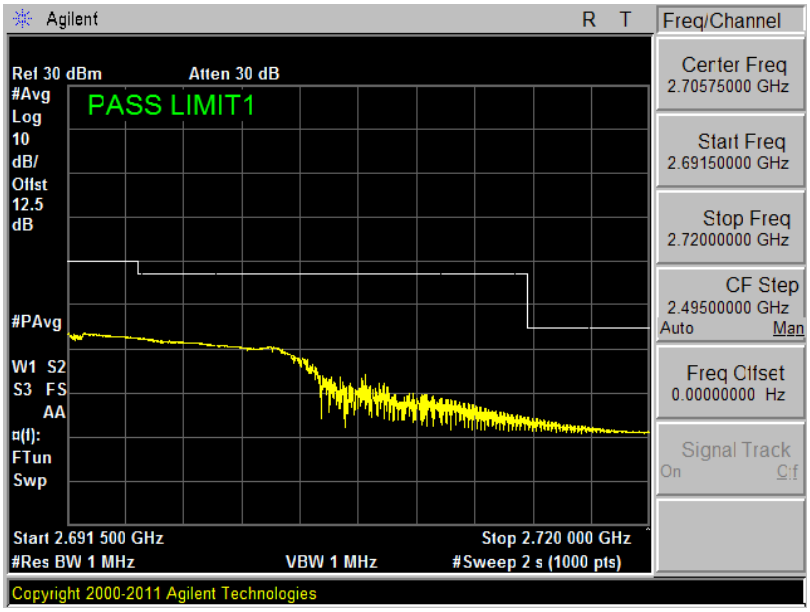


HGIH CH, HIGH SIDE, (RB=VB= 1%EBW, 2691-2692MHz)



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

HIGH CH, HIGH SIDE, (RB=VB= 1MHz, 2691.5–2720MHz)



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 and §27.53

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.

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
- Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.

MODES TESTED

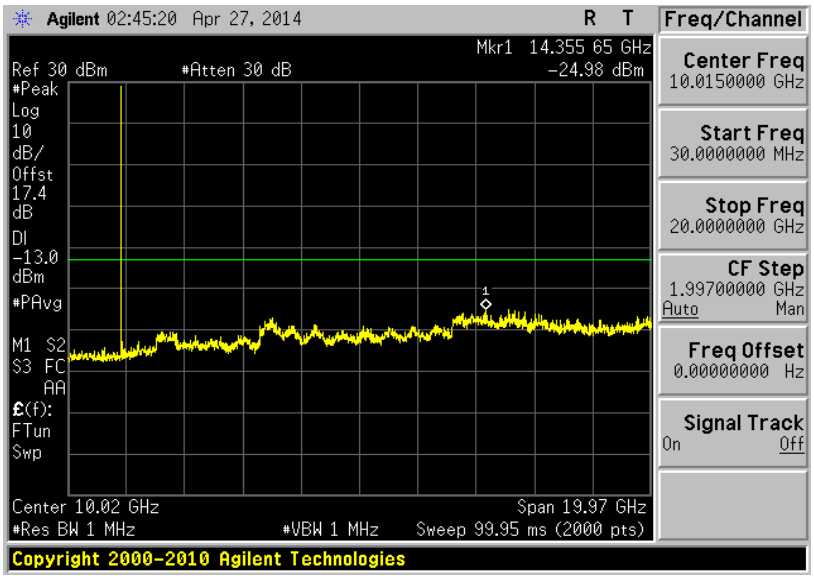
- LTE Band 2
- LTE Band 4
- LTE Band 5
- LTE Band 13
- LTE Band 17
- LTE Band 25
- LTE Band 26
- LTE Band 41

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

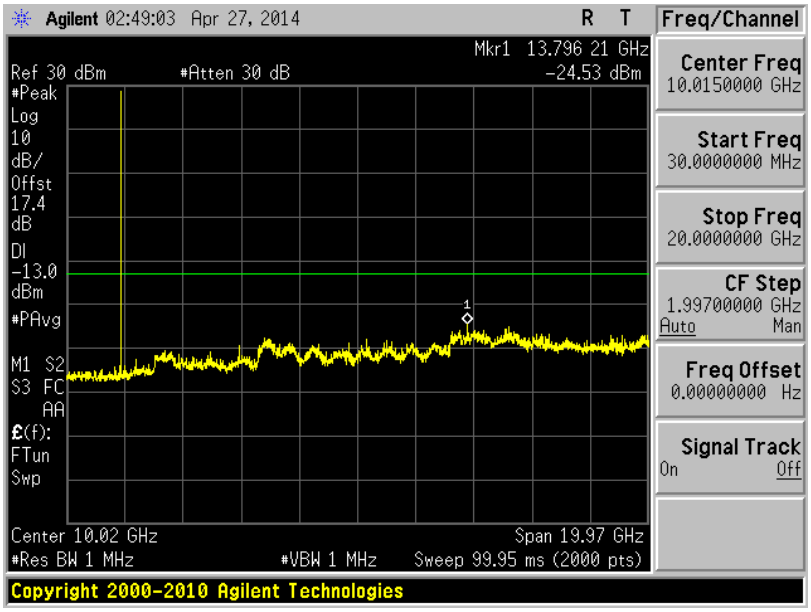
8.3.1. LTE BAND 2

QPSK, (1.4 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

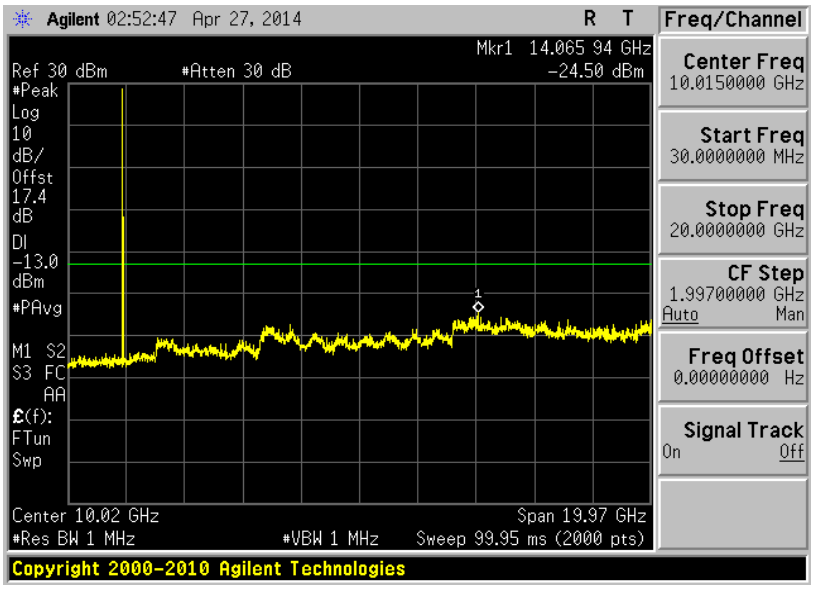


MID, RB1-0, 30 TO 20000 MHz



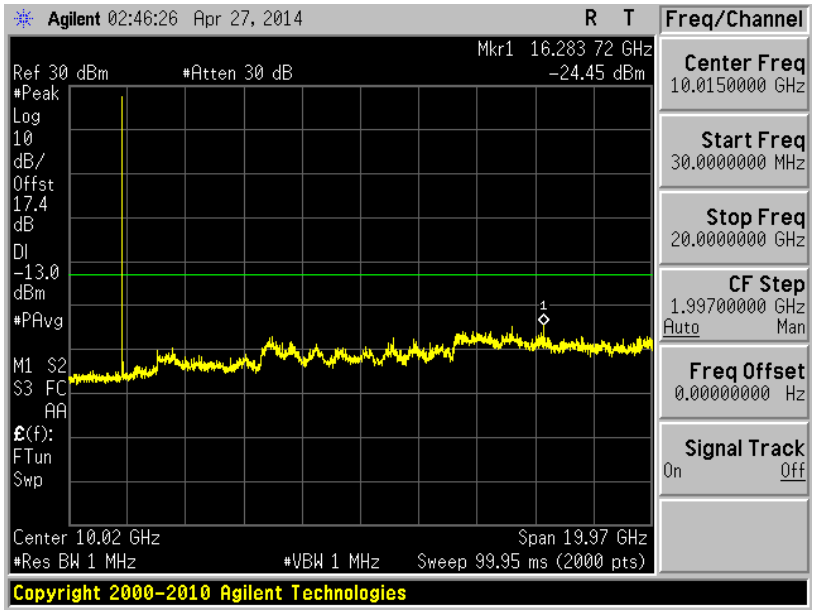
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 20000 MHz



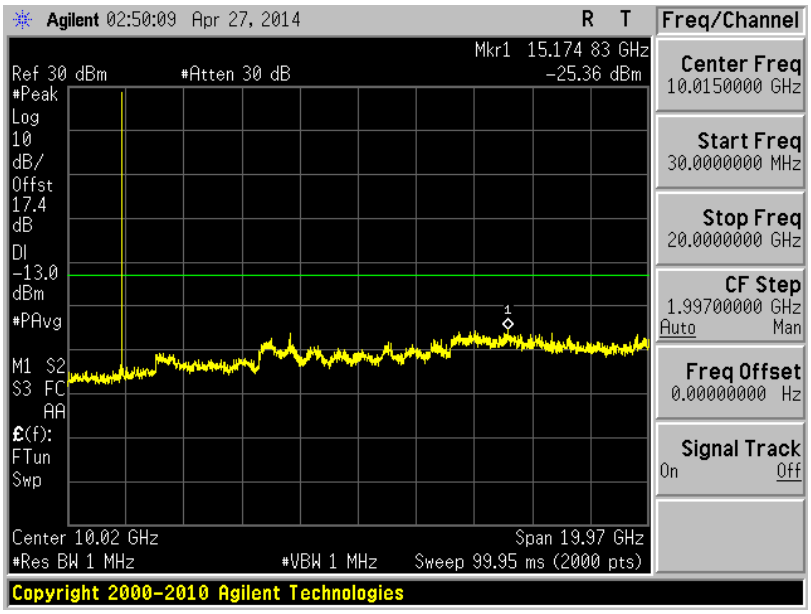
16QAM, (1.4 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

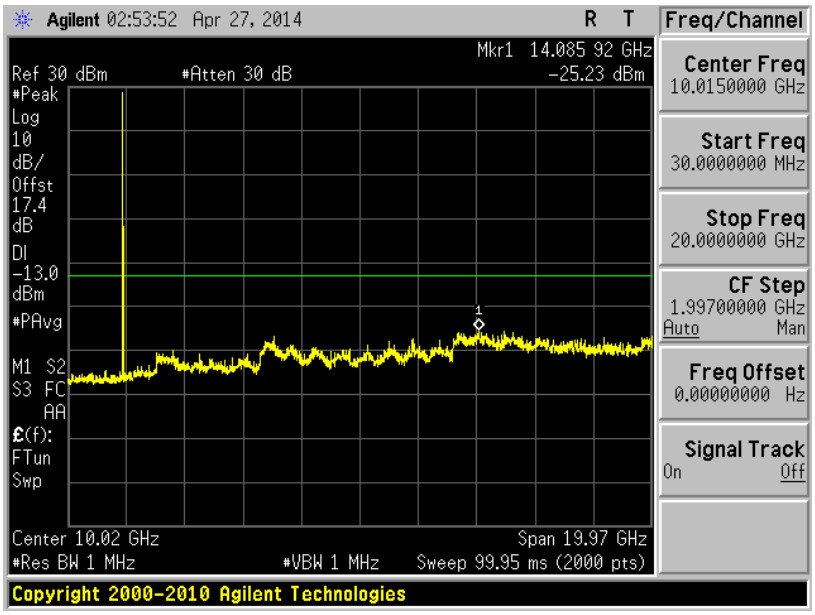


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 20000 MHz



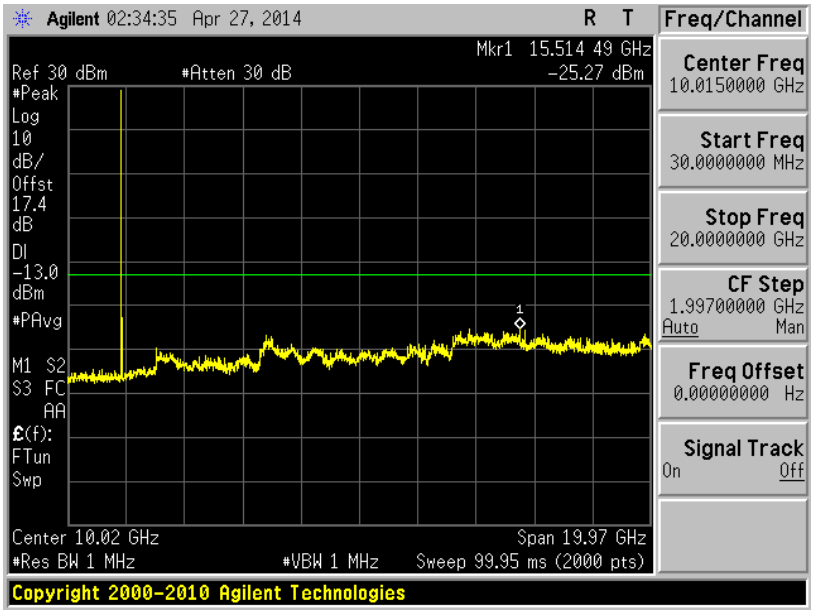
HIGH, RB1-0, 30 TO 20000 MHz



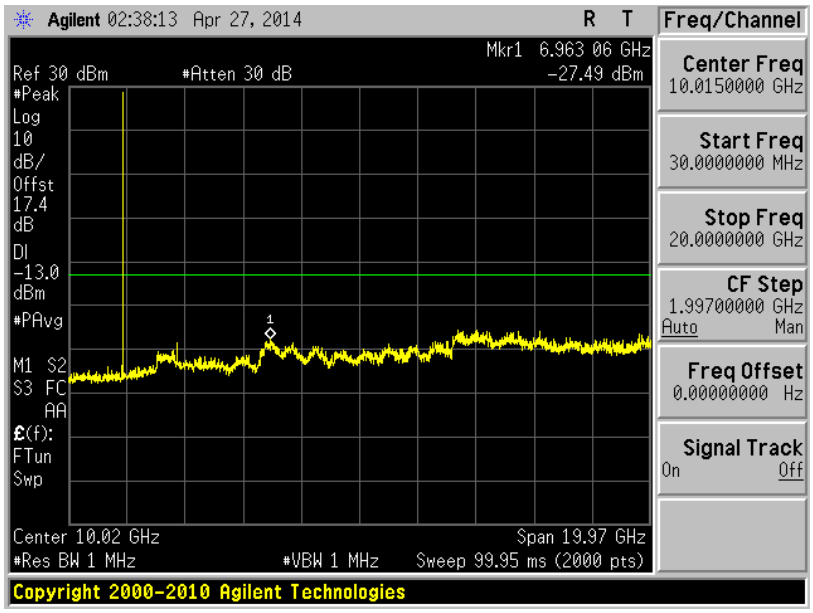
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (3.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

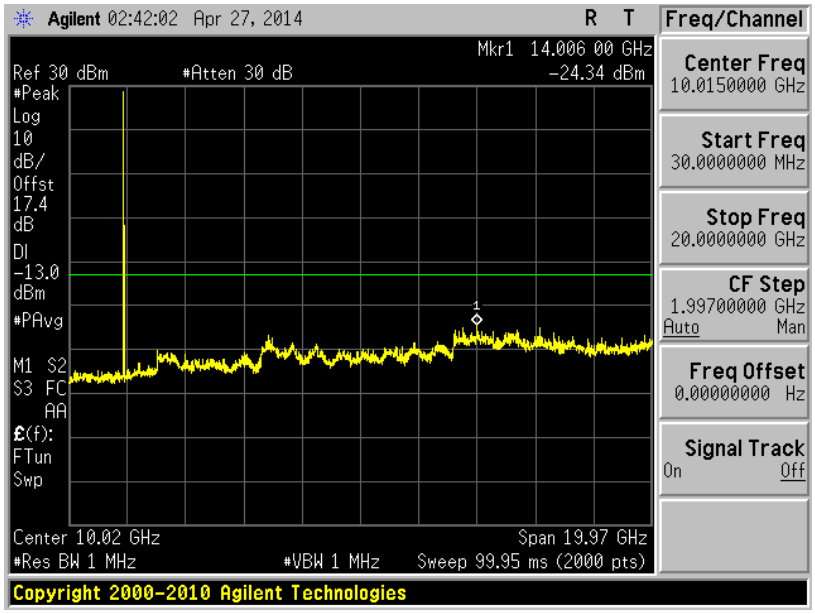


MID, RB1-0, 30 TO 20000 MHz



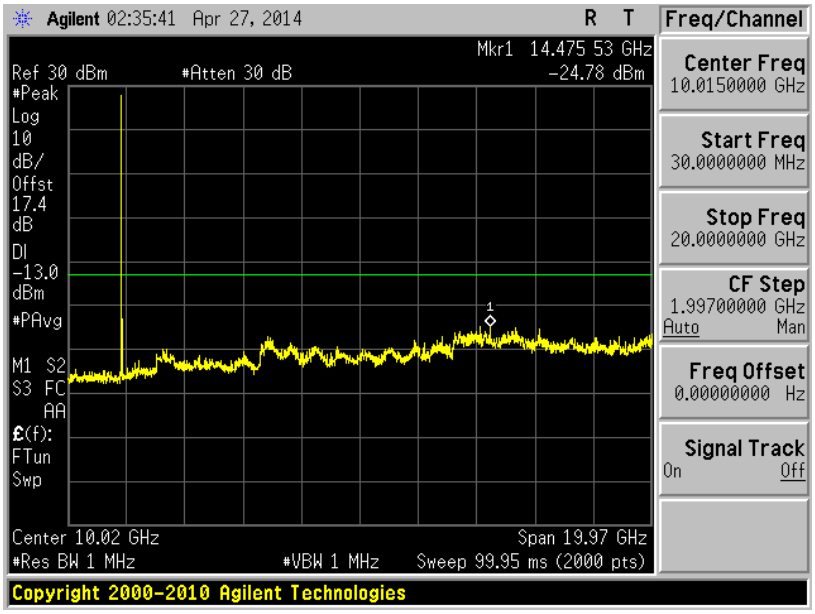
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 20000 MHz



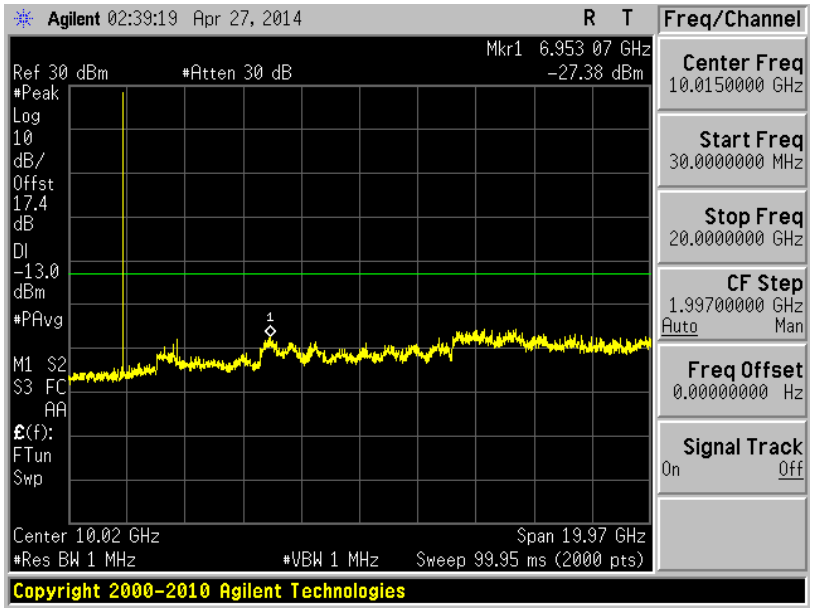
16QAM, (3.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

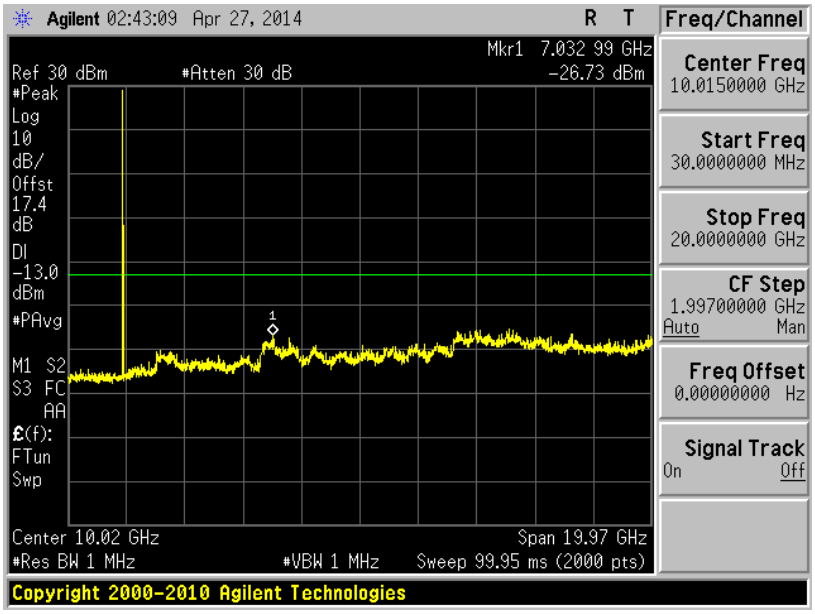


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 20000 MHz



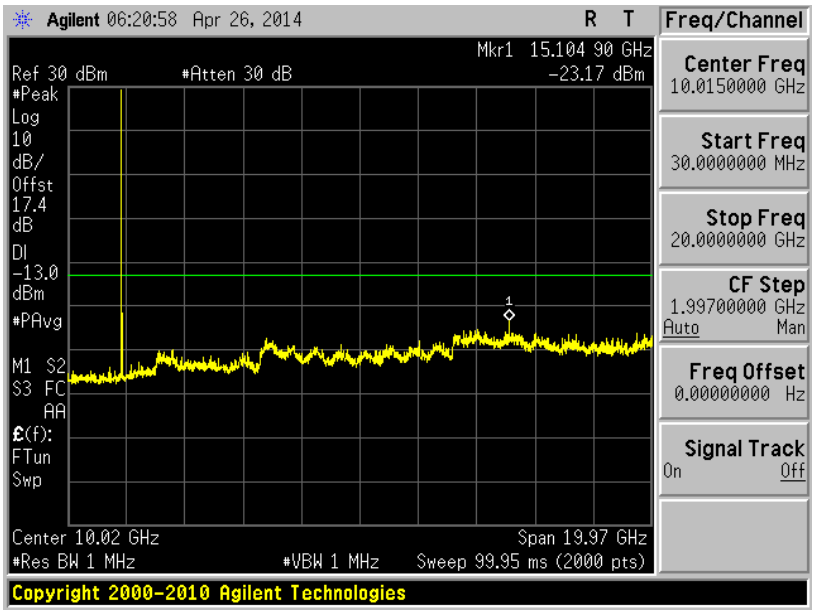
HIGH, RB1-0, 30 TO 20000 MHz



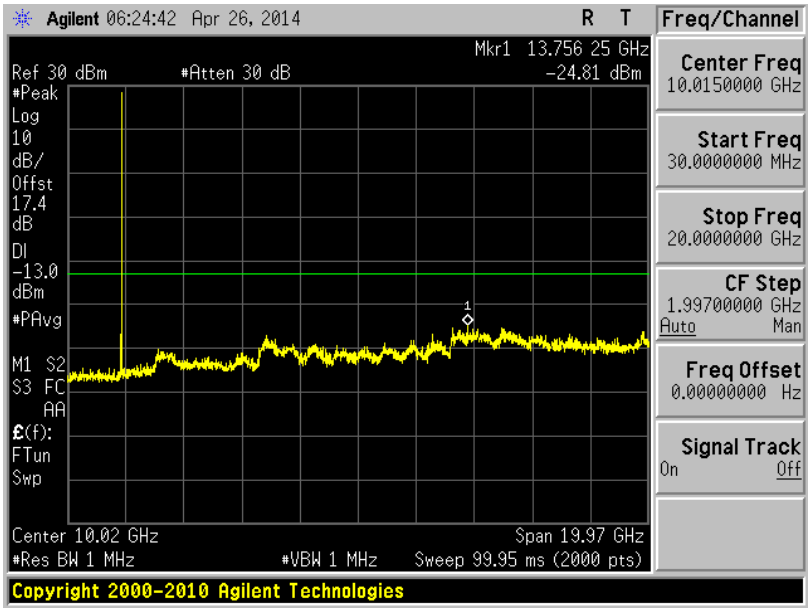
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (5.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

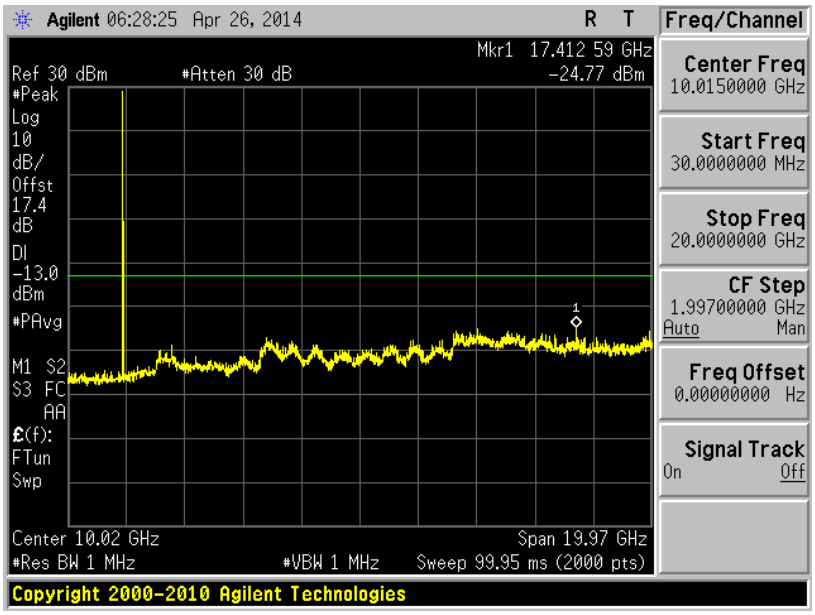


MID, RB1-0, 30 TO 20000 MHz



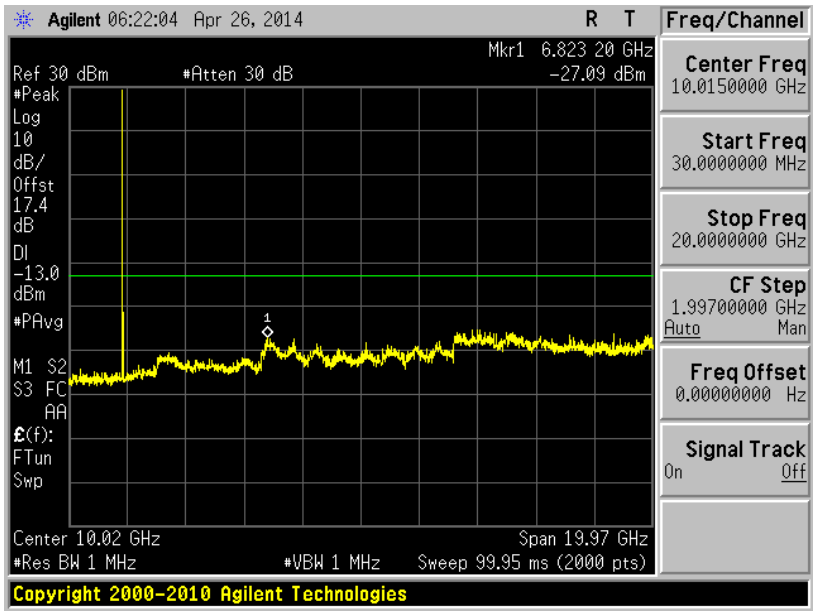
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 20000 MHz



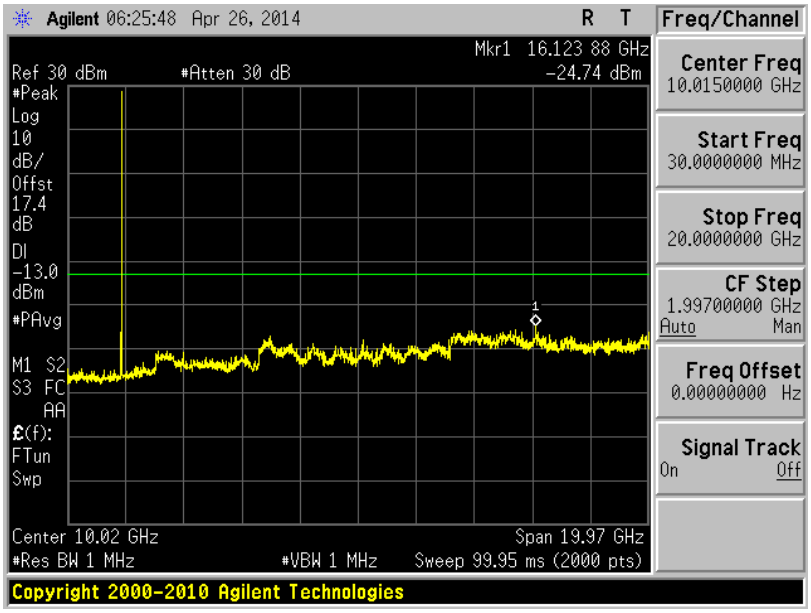
16QAM, (5.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

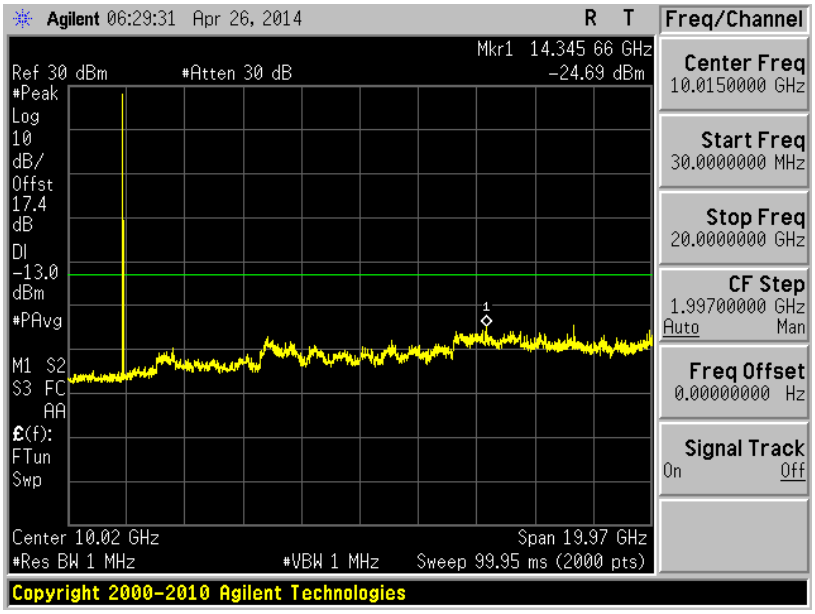


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 20000 MHz



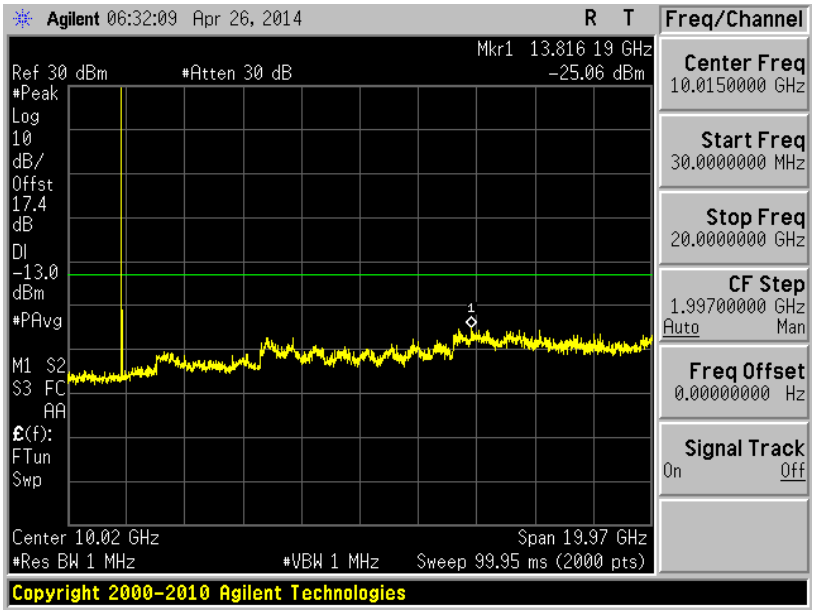
HIGH, RB1-0, 30 TO 20000 MHz



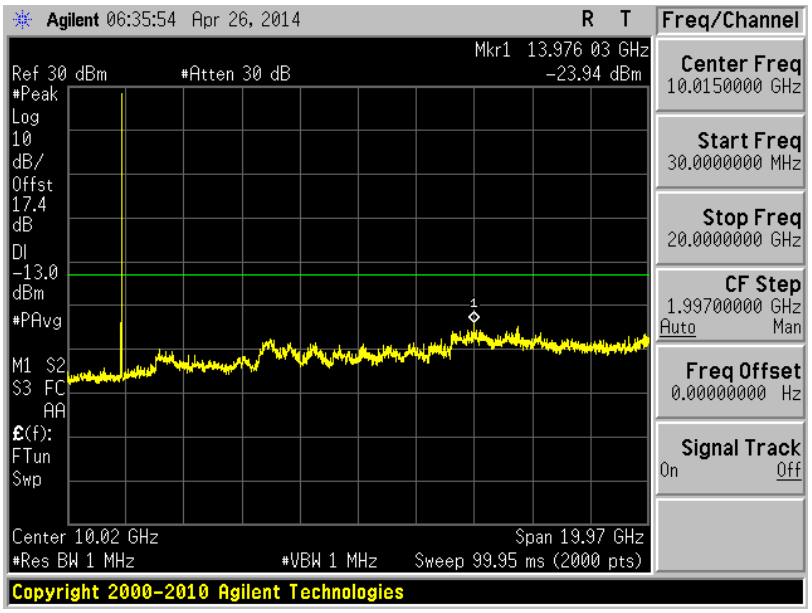
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (10.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

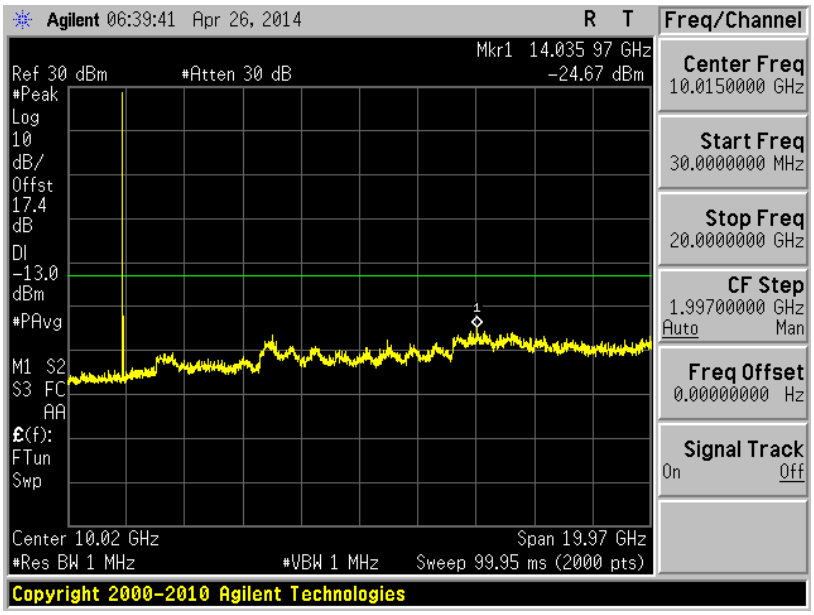


MID, RB1-0, 30 TO 20000 MHz



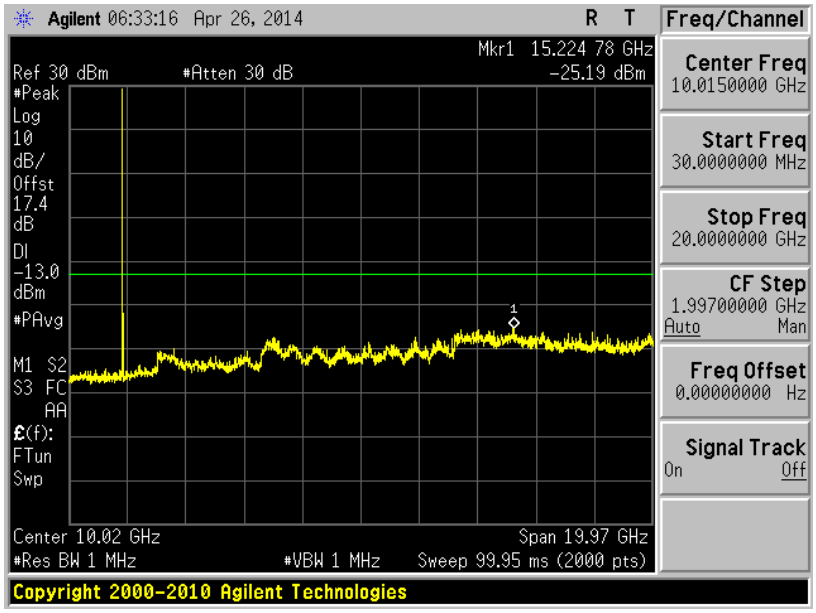
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 20000 MHz



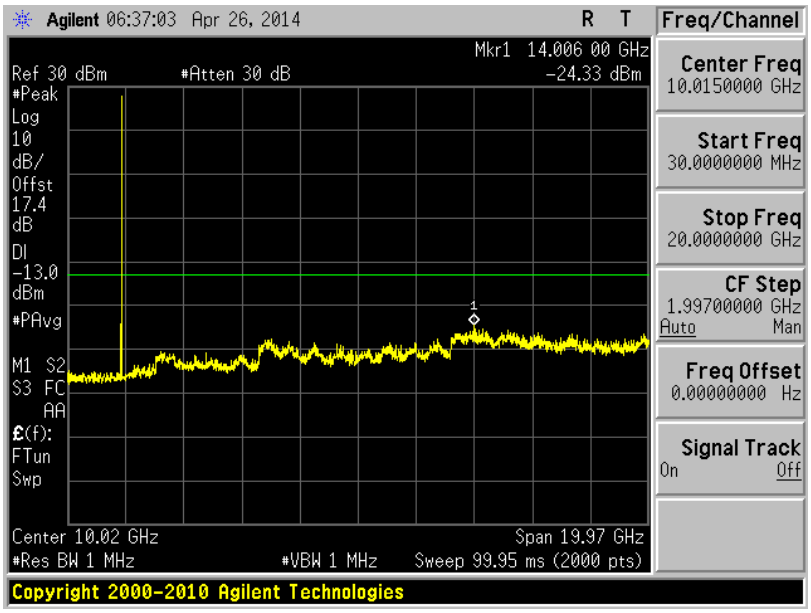
16QAM, (10.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

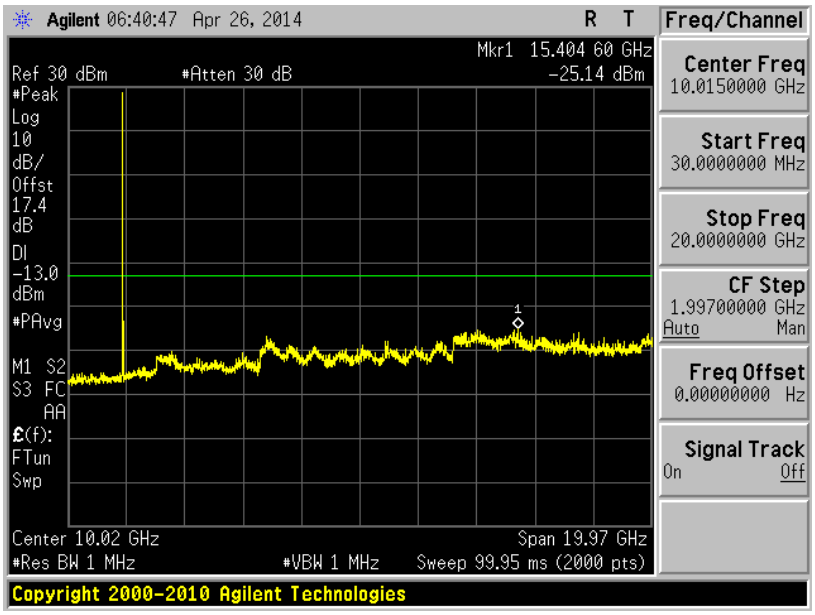


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 20000 MHz



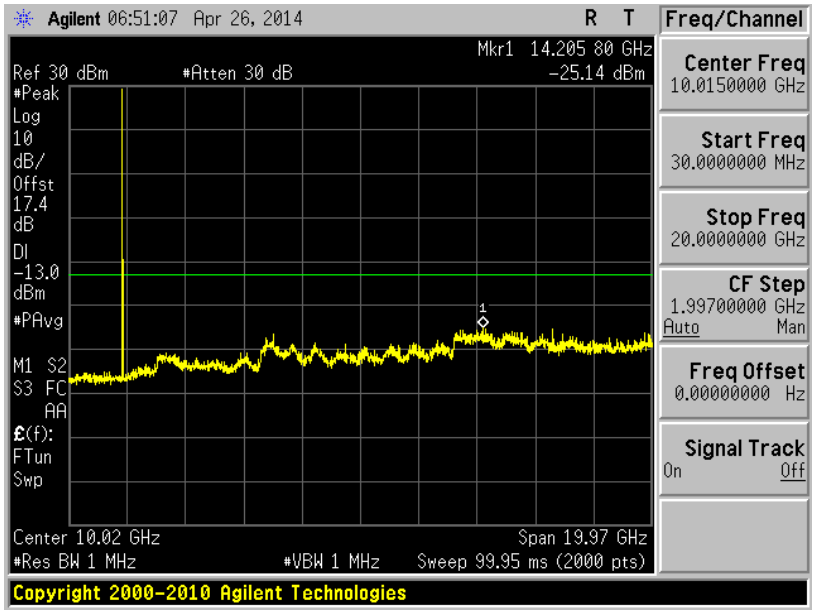
HIGH, RB1-0, 30 TO 20000 MHz



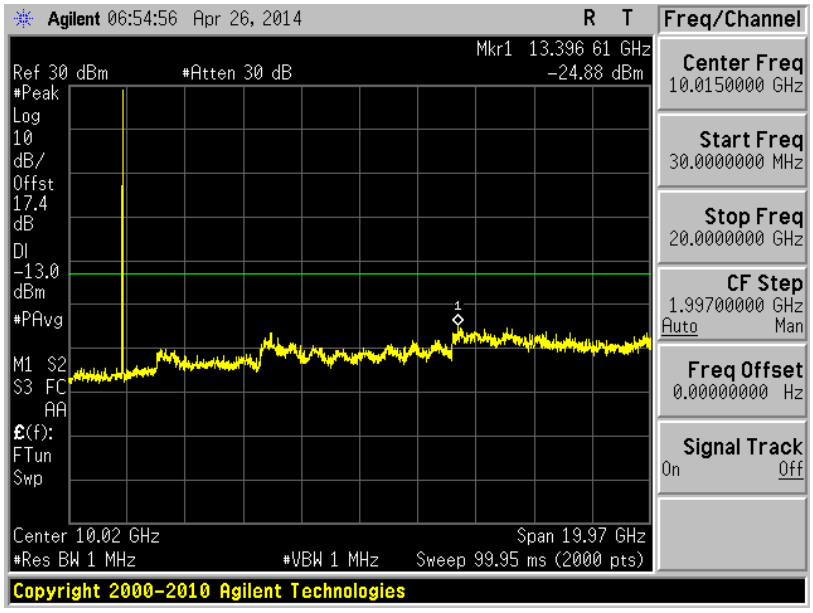
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (15.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

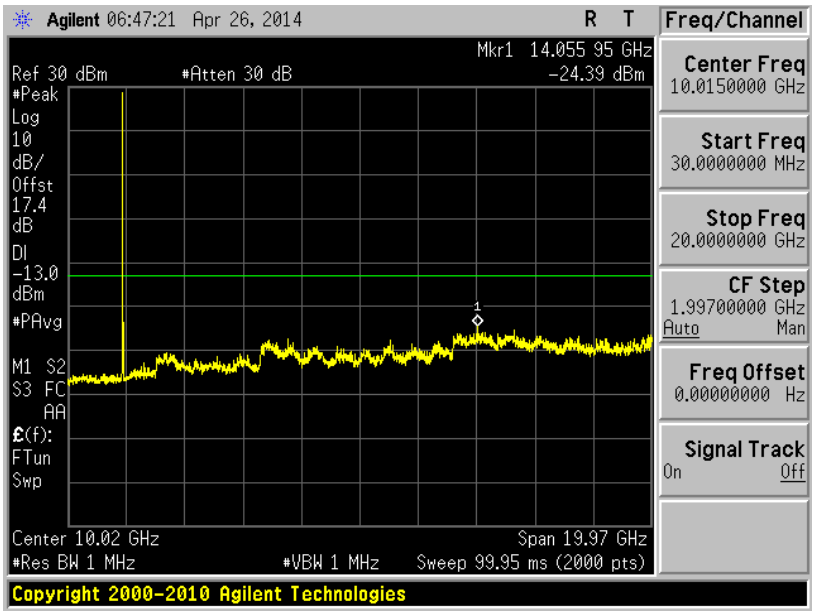


MID, RB1-0, 30 TO 20000 MHz



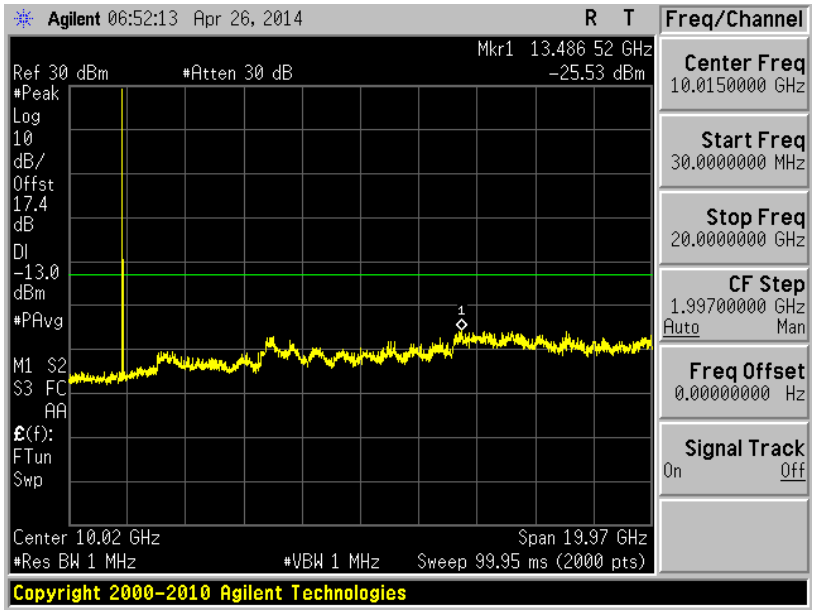
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 20000 MHz



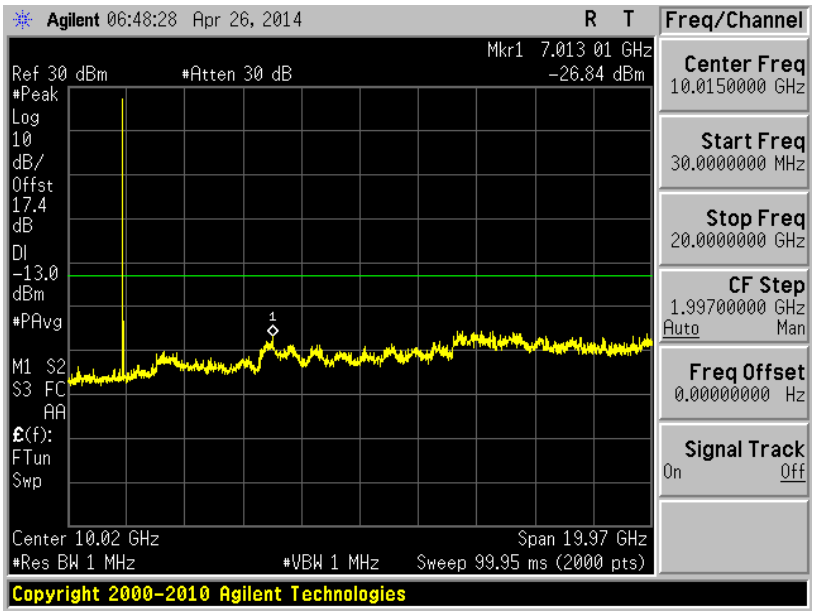
16QAM, (15.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

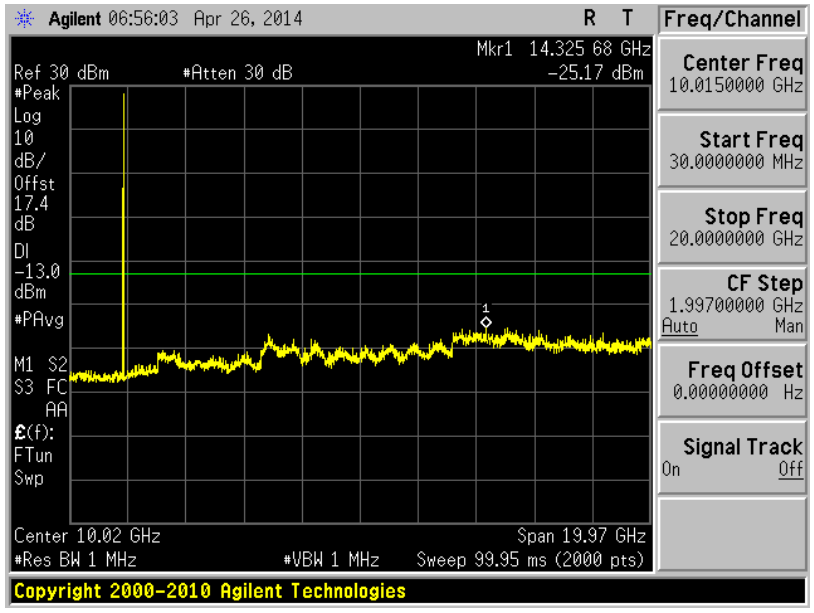


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 20000 MHz



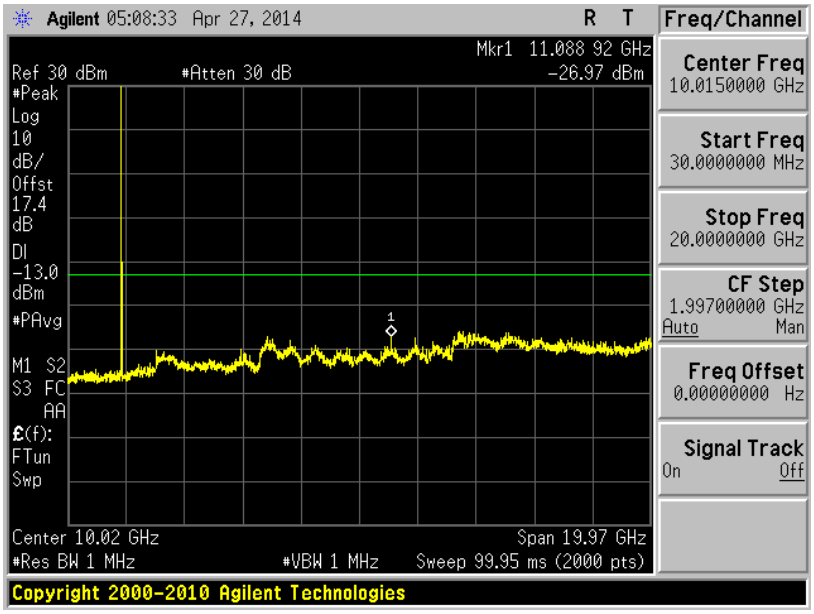
HIGH, RB1-0, 30 TO 20000 MHz



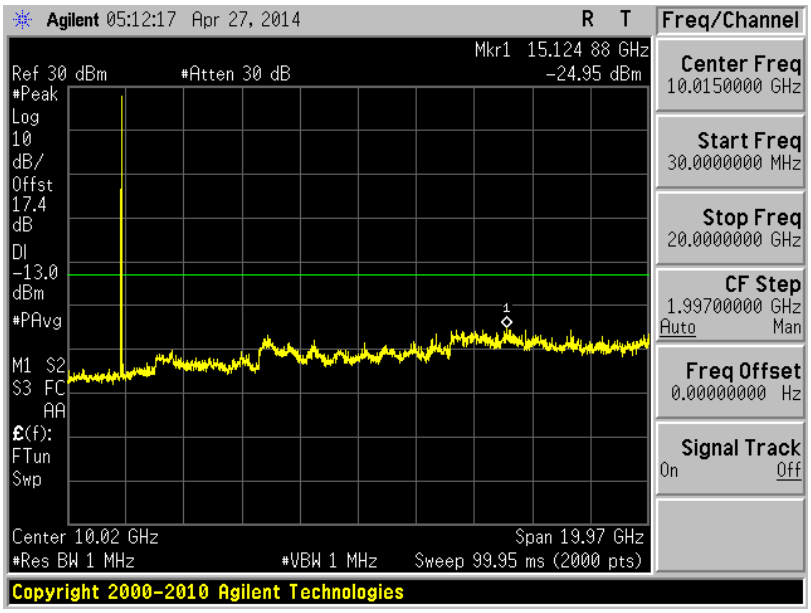
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (20.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

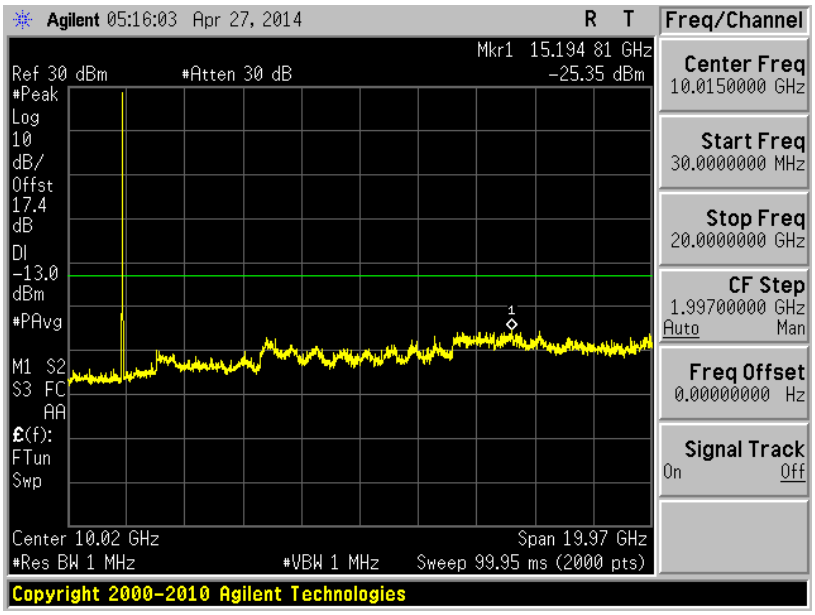


MID, RB1-0, 30 TO 20000 MHz



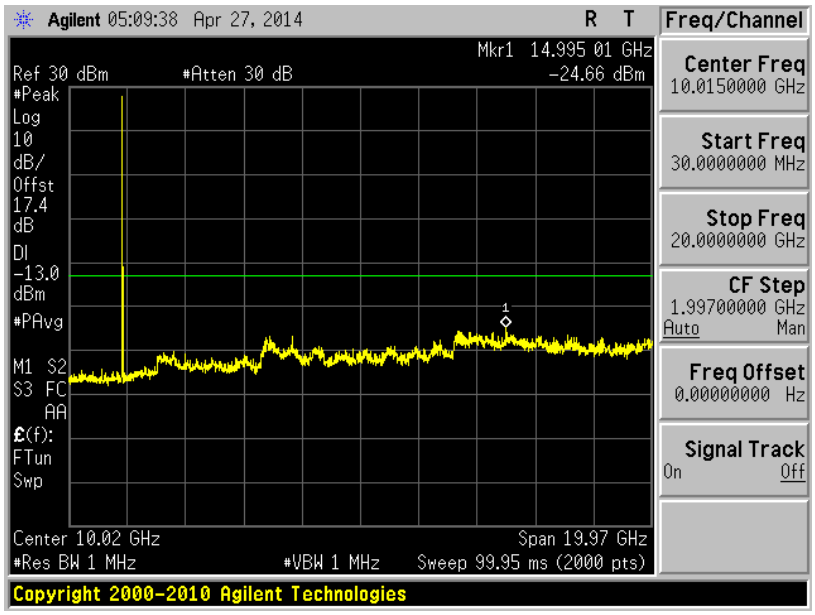
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 20000 MHz



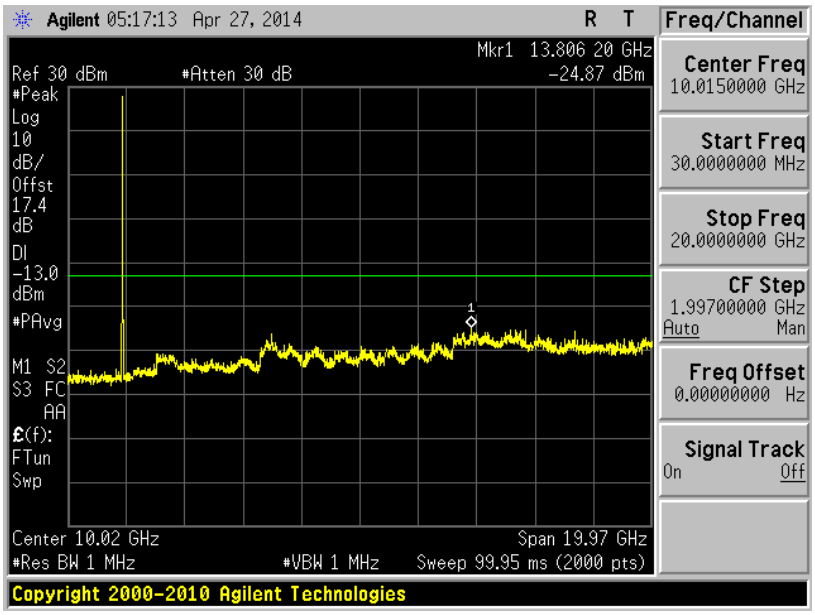
16QAM, (20.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

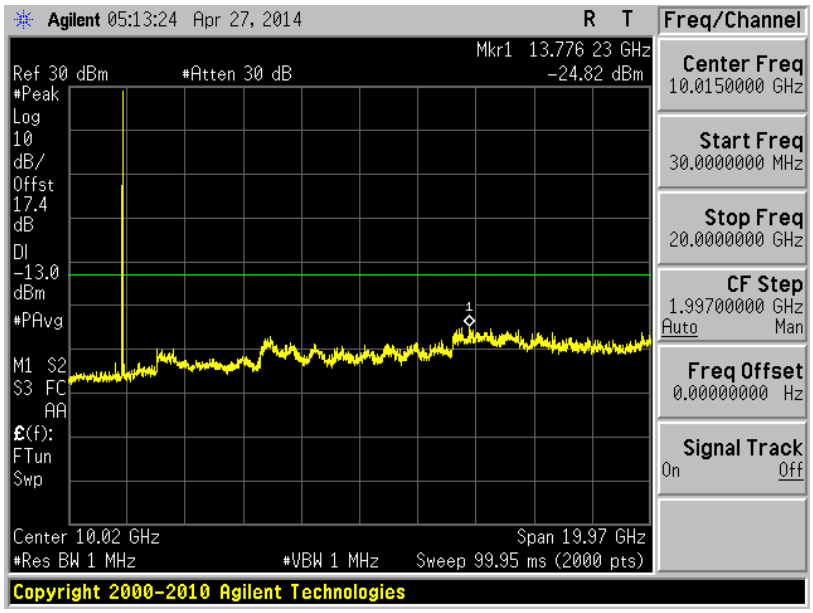


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 20000 MHz



HIGH, RB1-0, 30 TO 20000 MHz

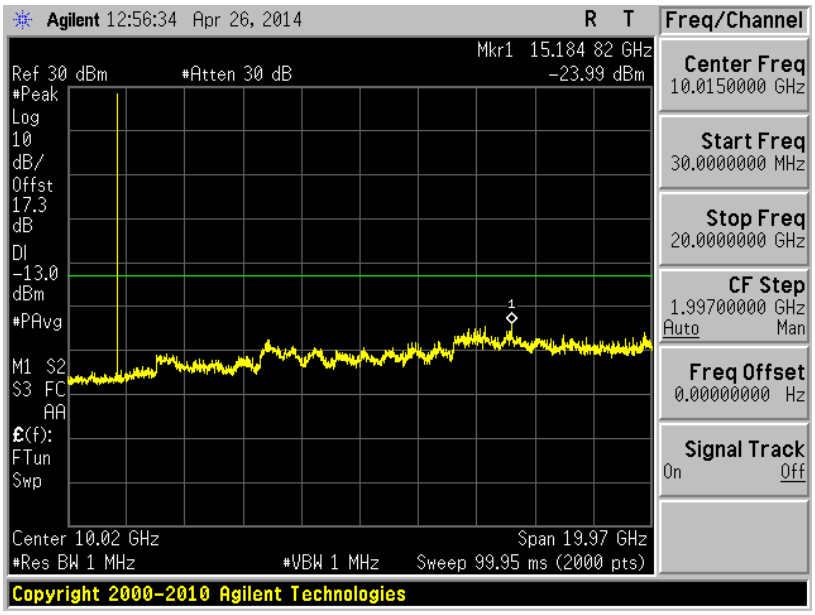


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

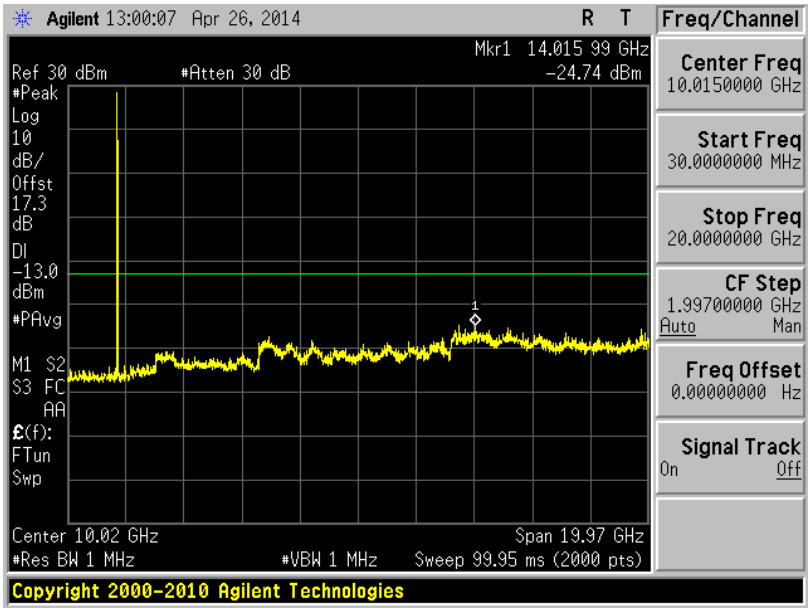
8.3.2. LTE BAND 4

QPSK, (1.4 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

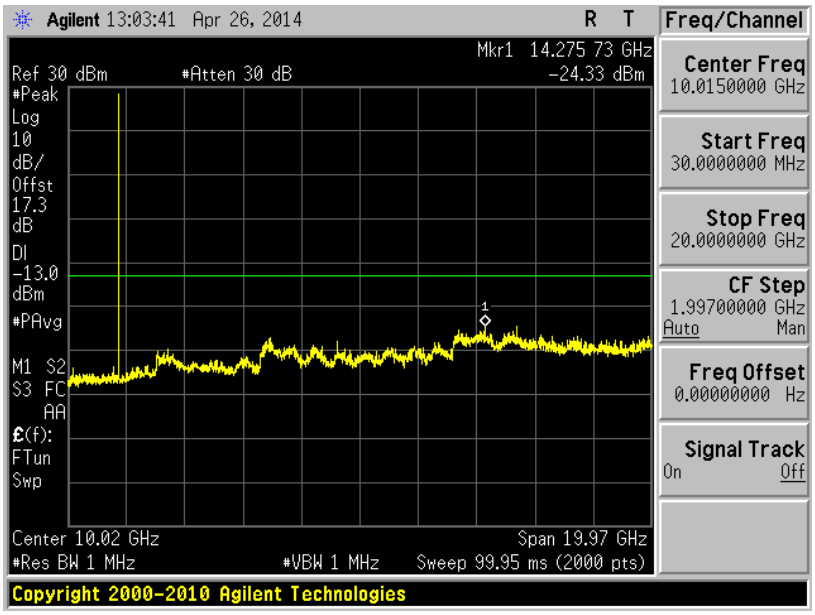


MID, RB1-0, 30 TO 20000 MHz



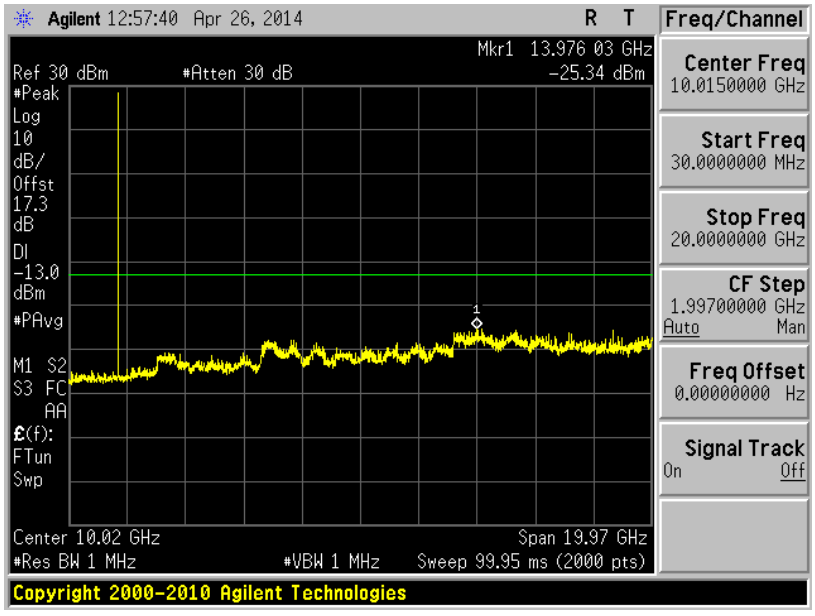
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 20000 MHz



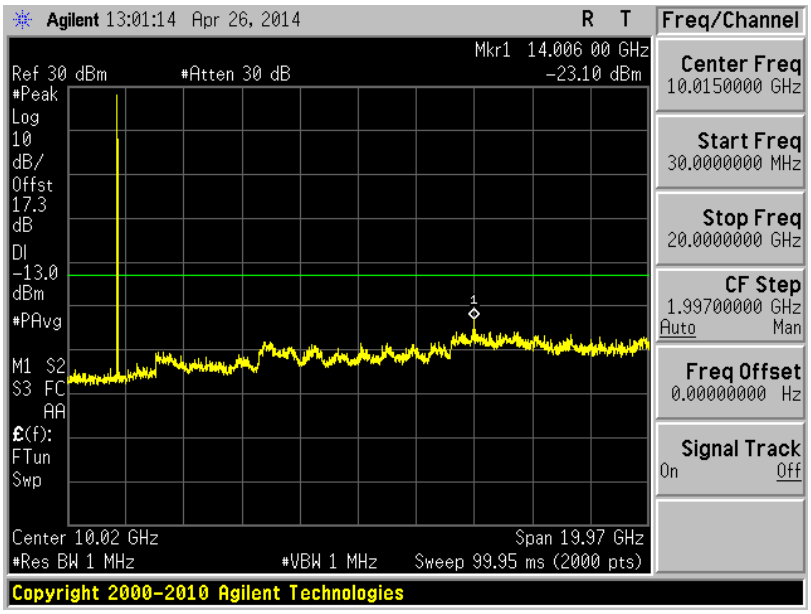
16QAM, (1.4 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

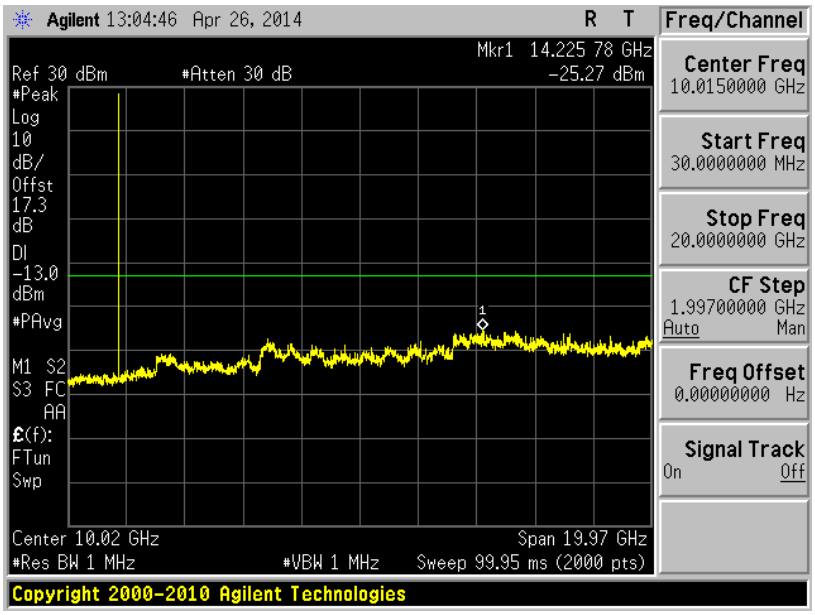


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 20000 MHz



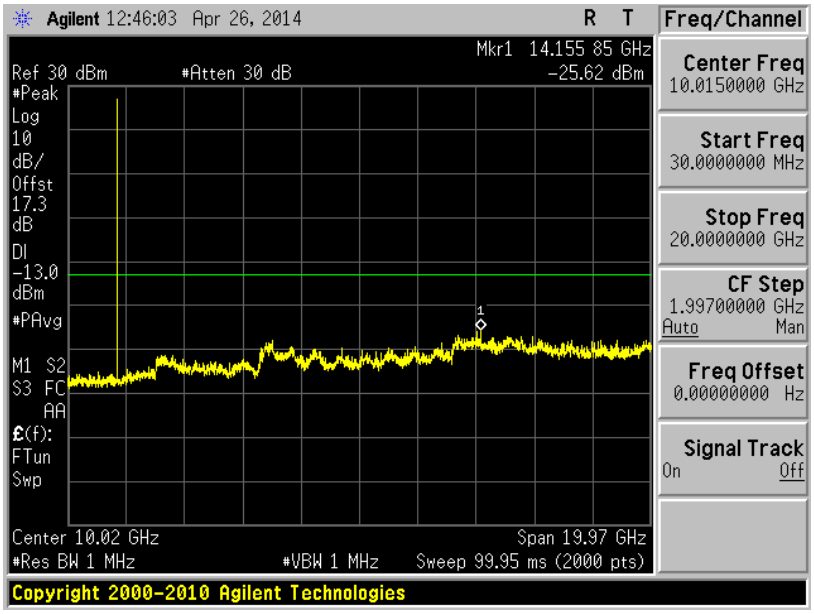
HIGH, RB1-0, 30 TO 20000 MHz



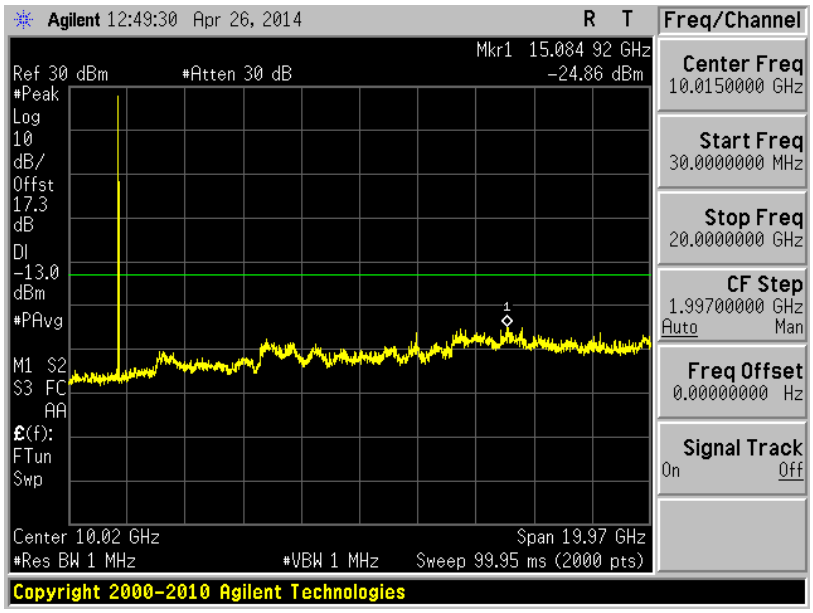
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (3.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

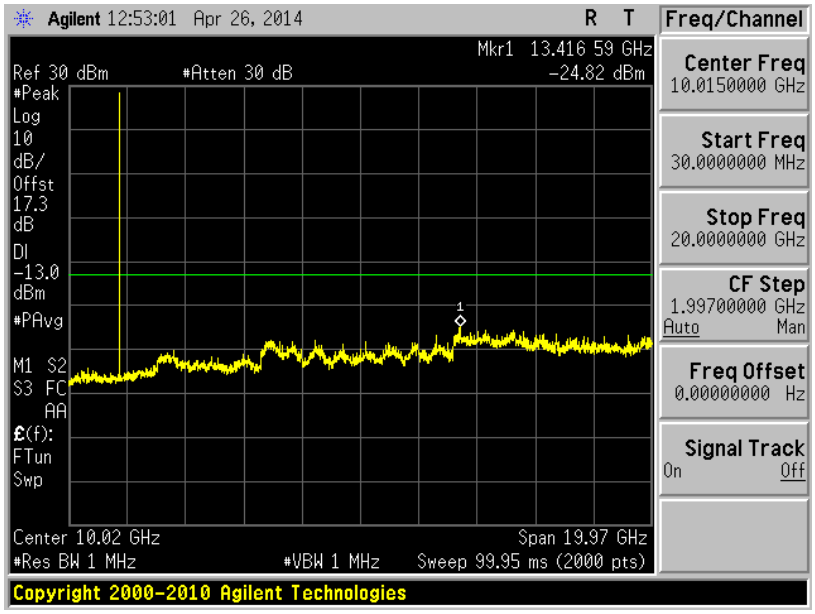


MID, RB1-0, 30 TO 20000 MHz



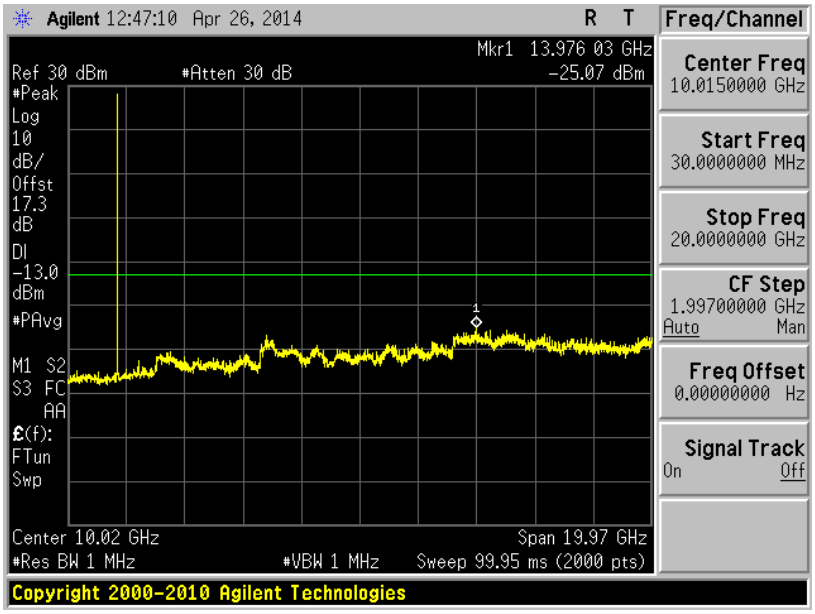
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 20000 MHz



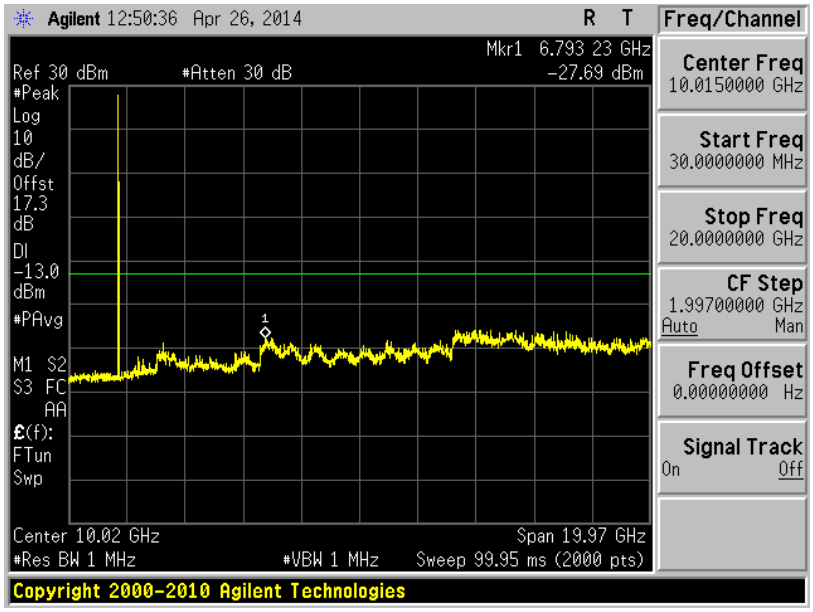
16QAM, (3.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

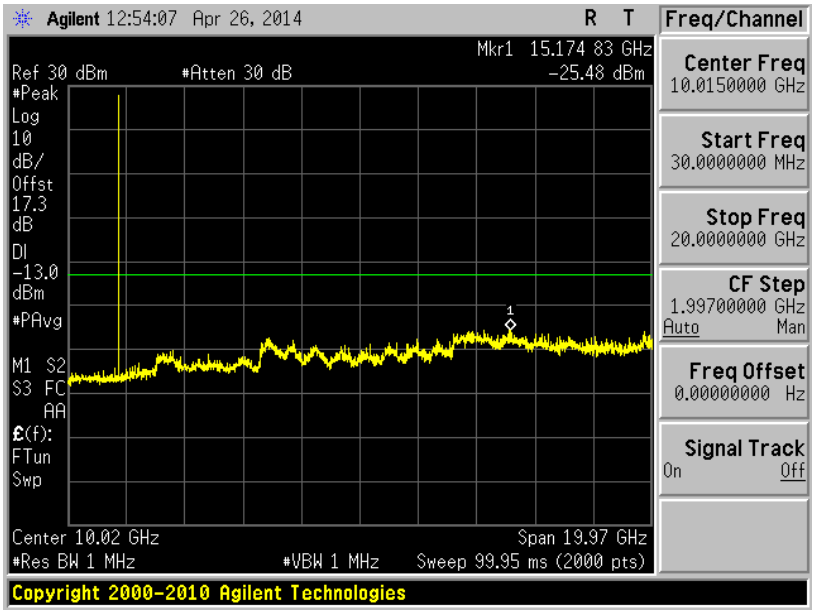


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 20000 MHz



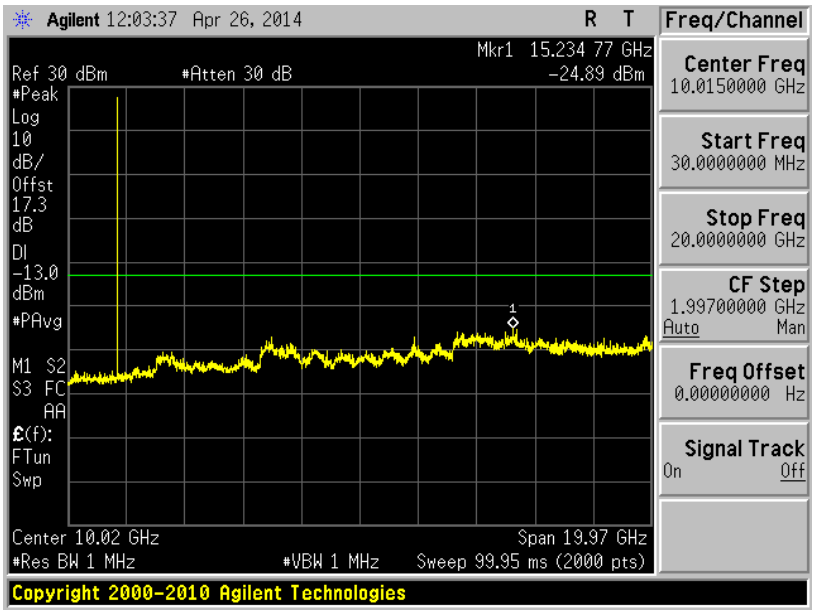
HIGH, RB1-0, 30 TO 20000 MHz



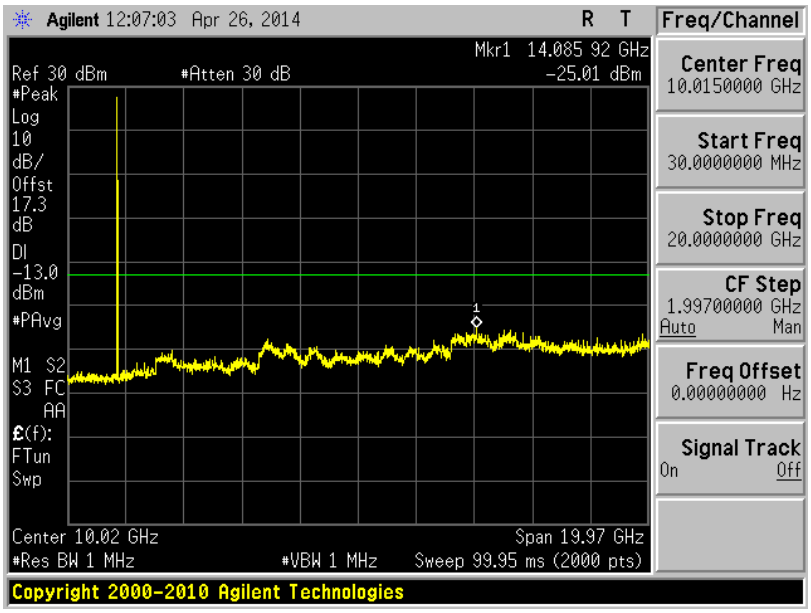
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (5.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

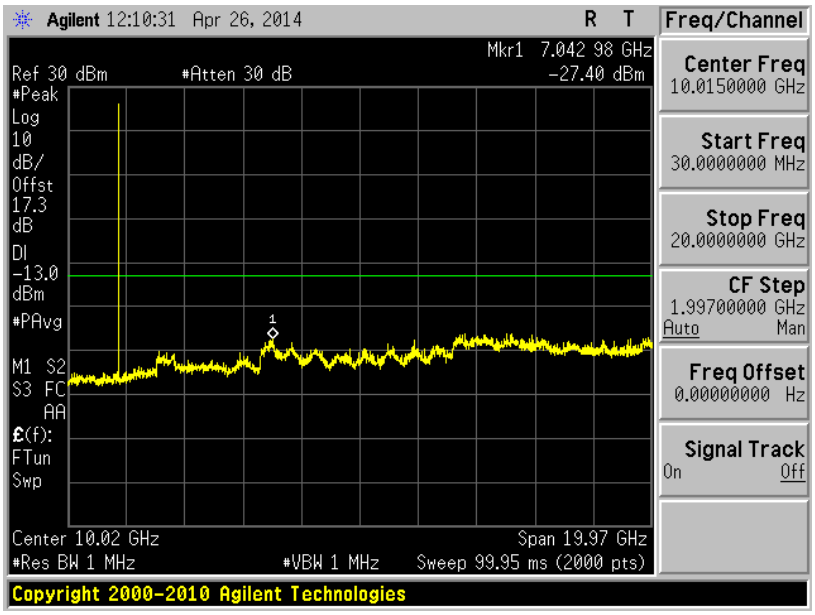


MID, RB1-0, 30 TO 20000 MHz



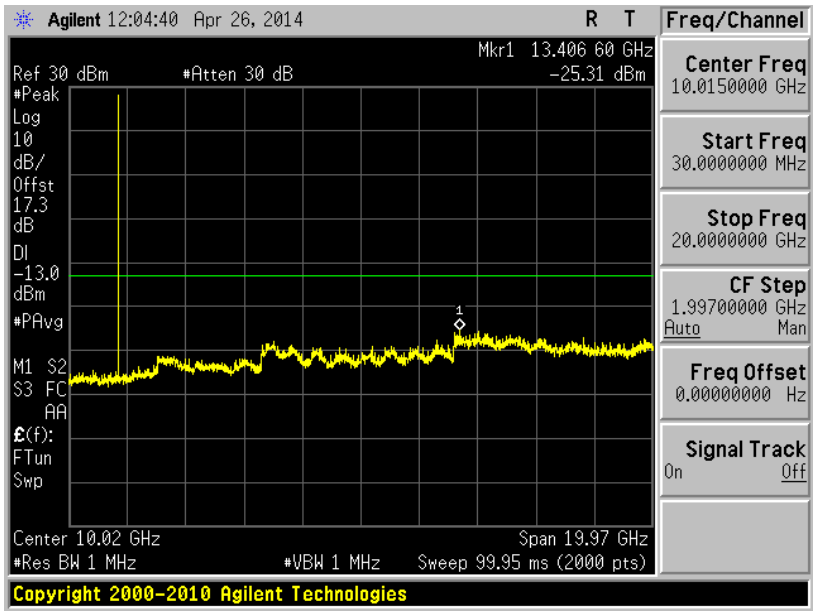
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 20000 MHz



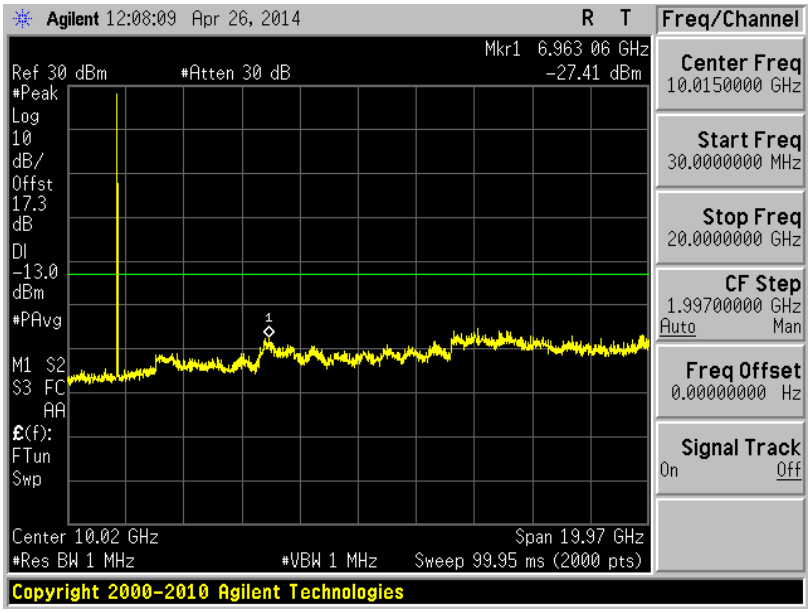
16QAM, (5.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

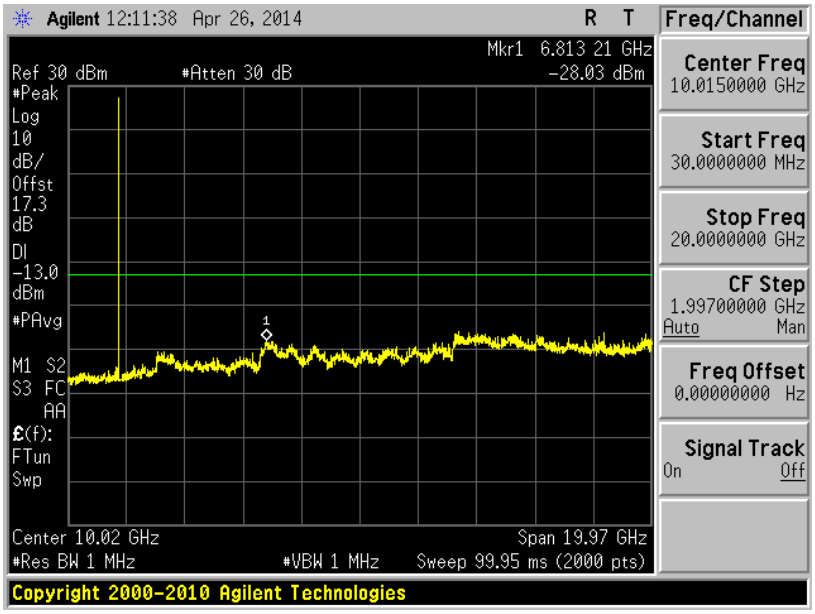


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 20000 MHz



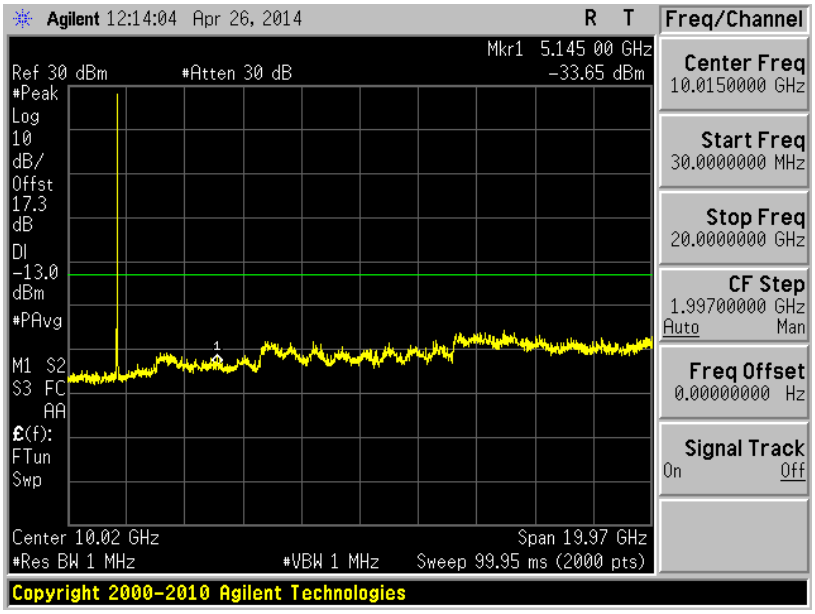
HIGH, RB1-0, 30 TO 20000 MHz



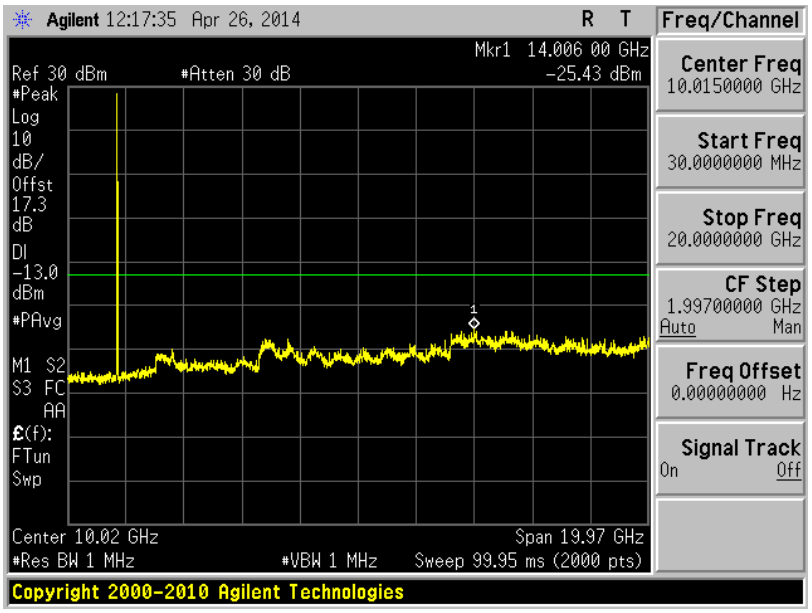
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (10.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

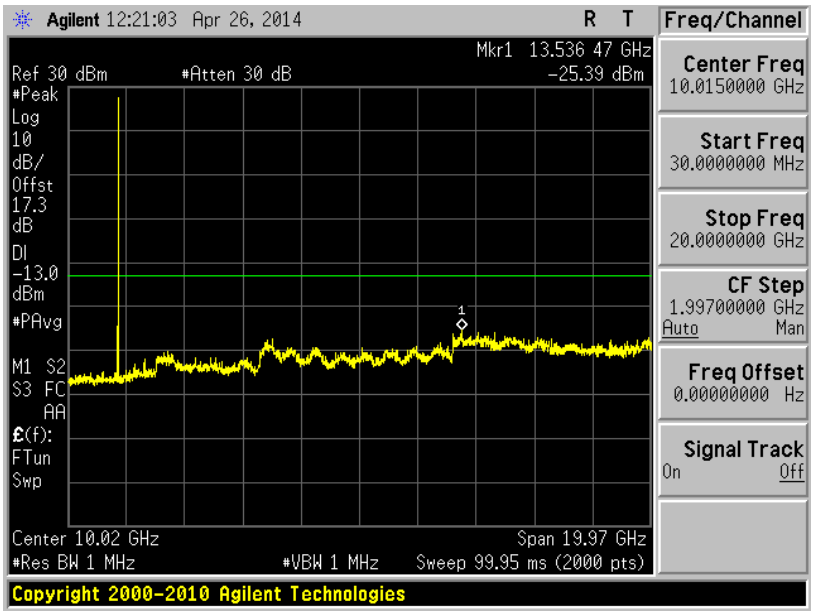


MID, RB1-0, 30 TO 20000 MHz



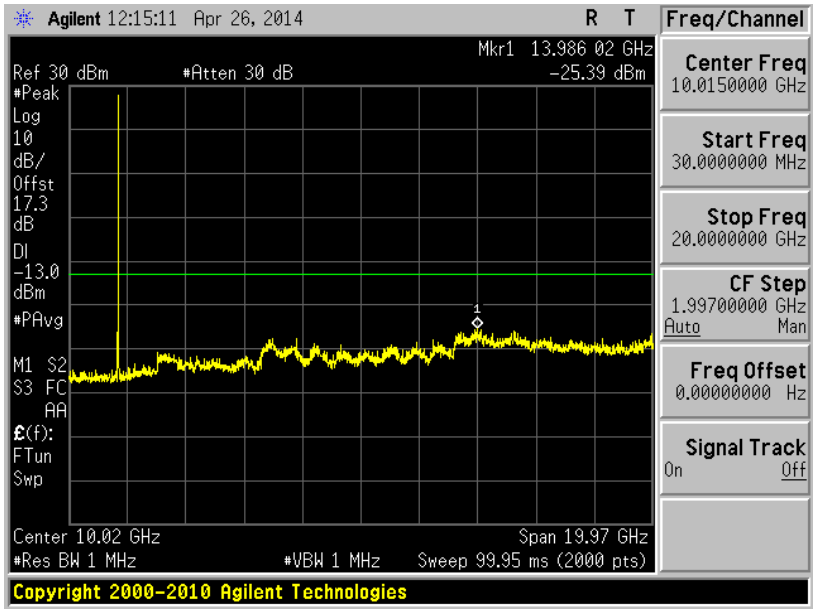
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 20000 MHz



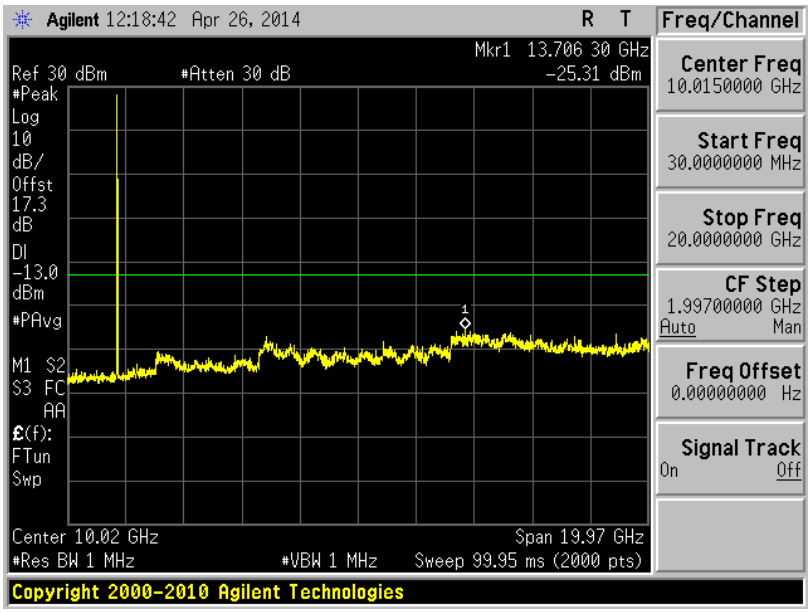
16QAM, (10.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

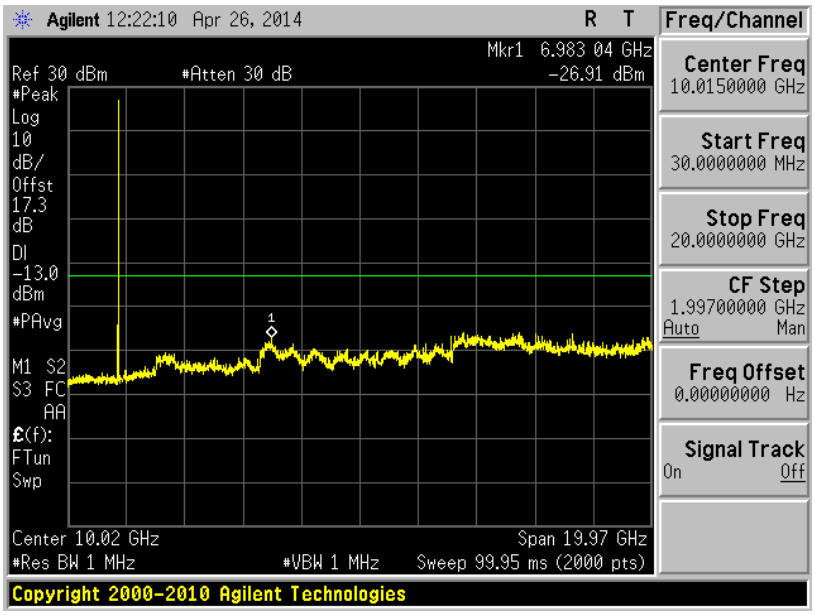


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 20000 MHz



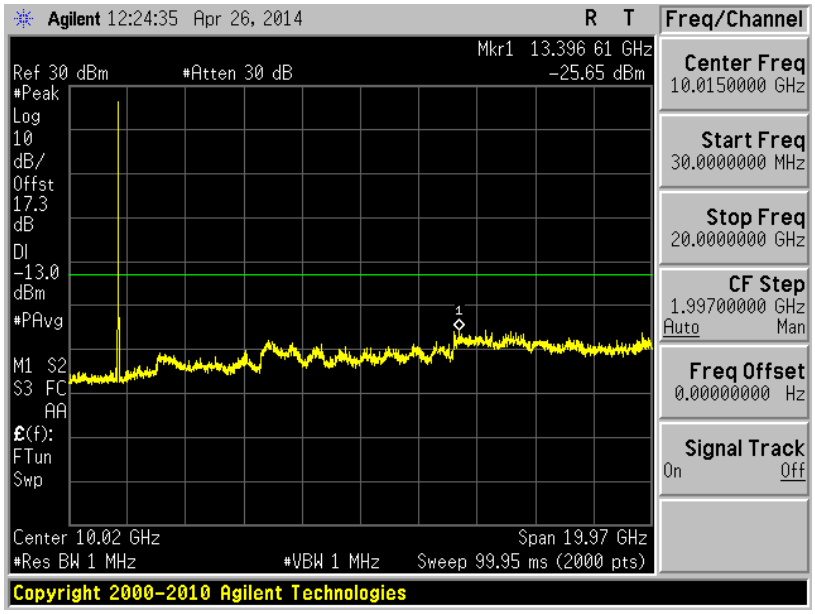
HIGH, RB1-0, 30 TO 20000 MHz



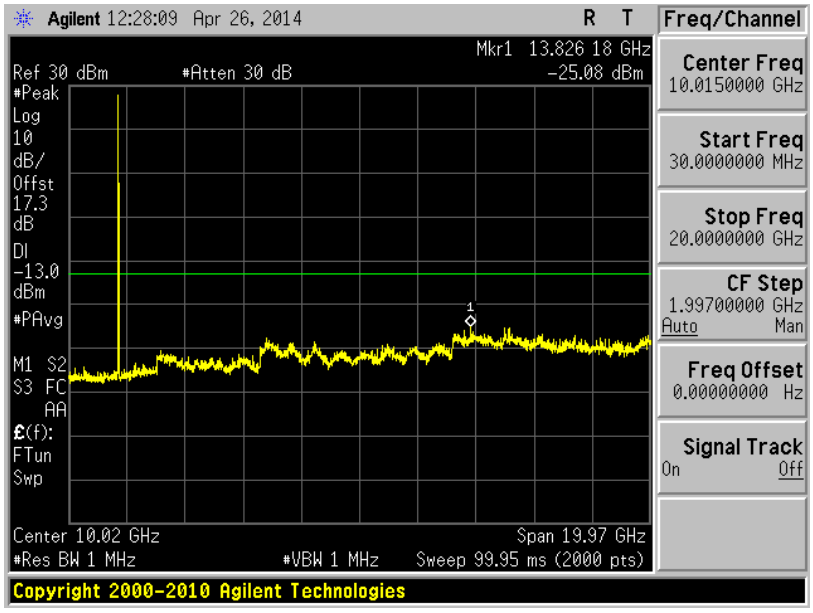
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (15.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

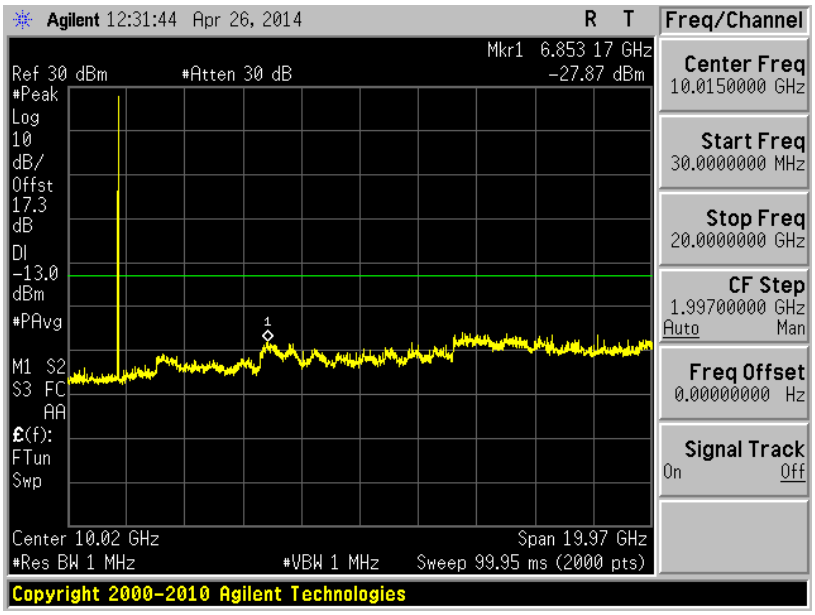


MID, RB1-0, 30 TO 20000 MHz



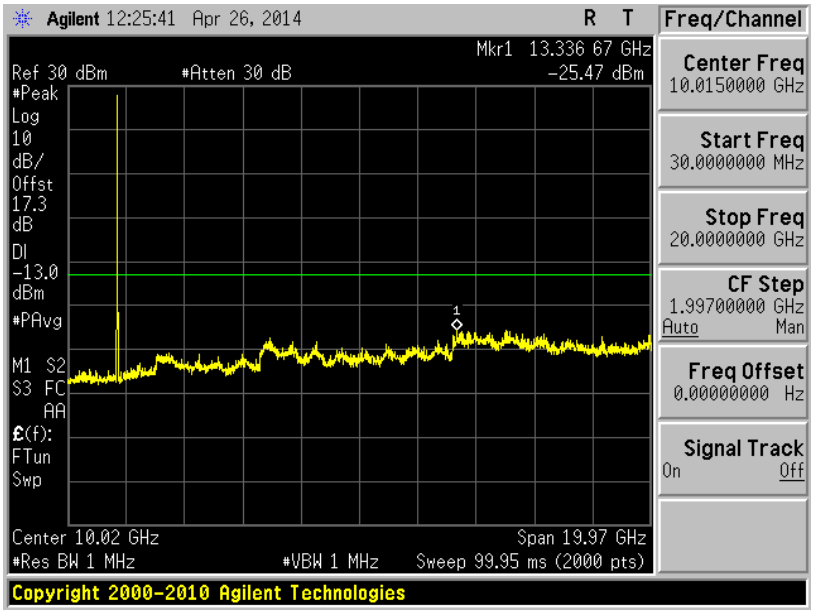
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 20000 MHz



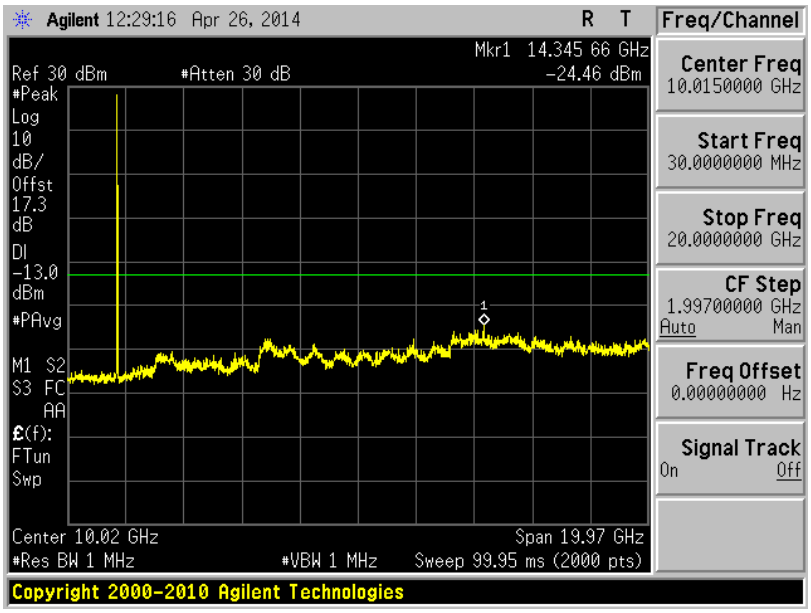
16QAM, (15.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

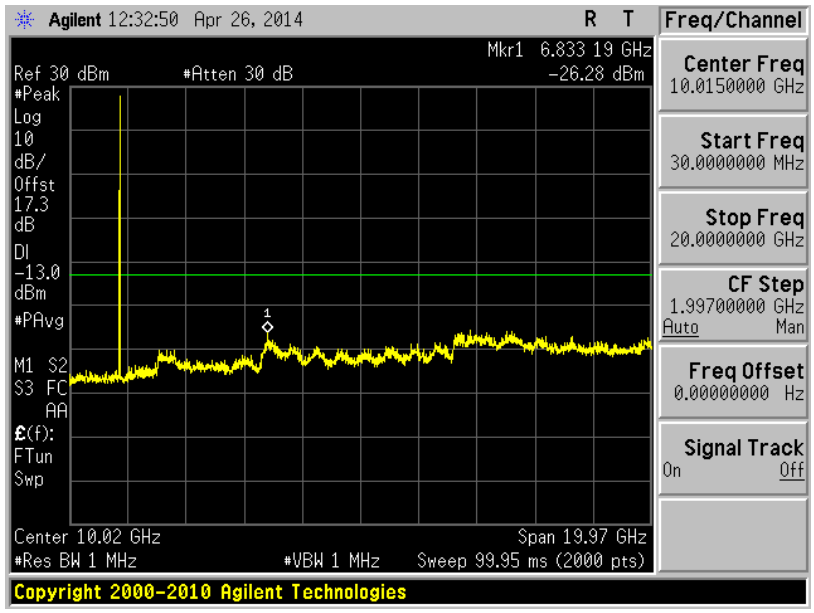


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 20000 MHz



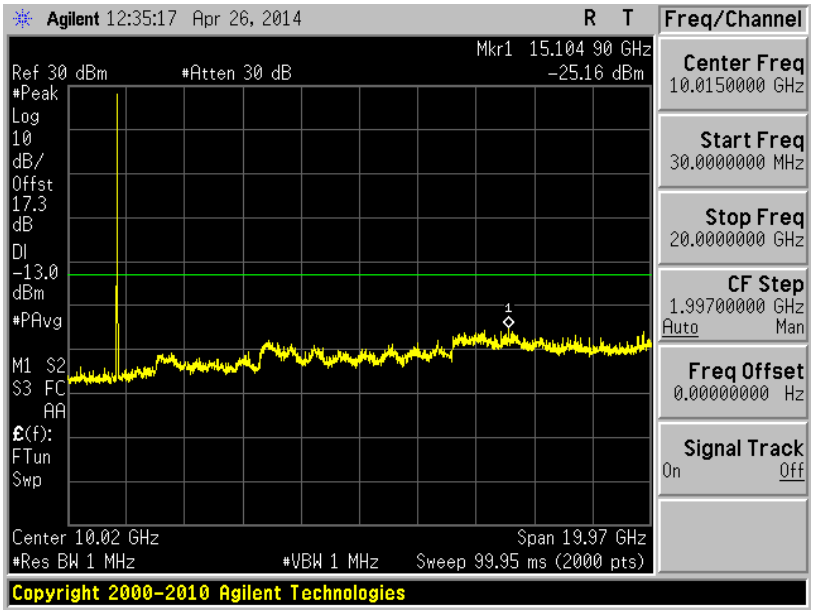
HIGH, RB1-0, 30 TO 20000 MHz



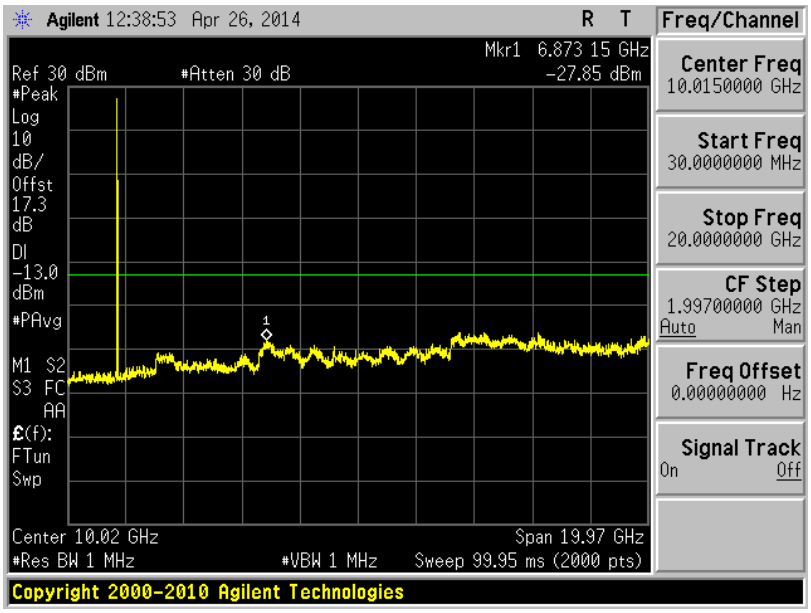
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (20.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

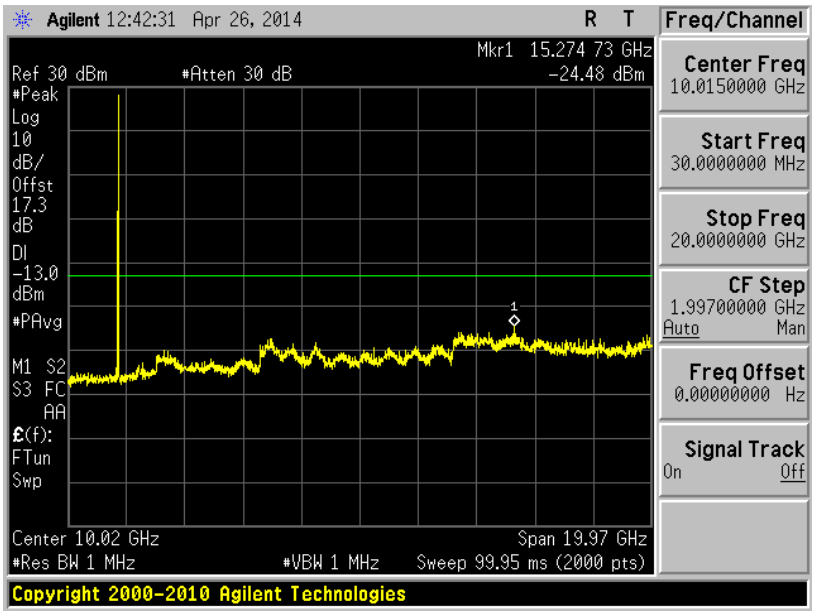


MID, RB1-0, 30 TO 20000 MHz



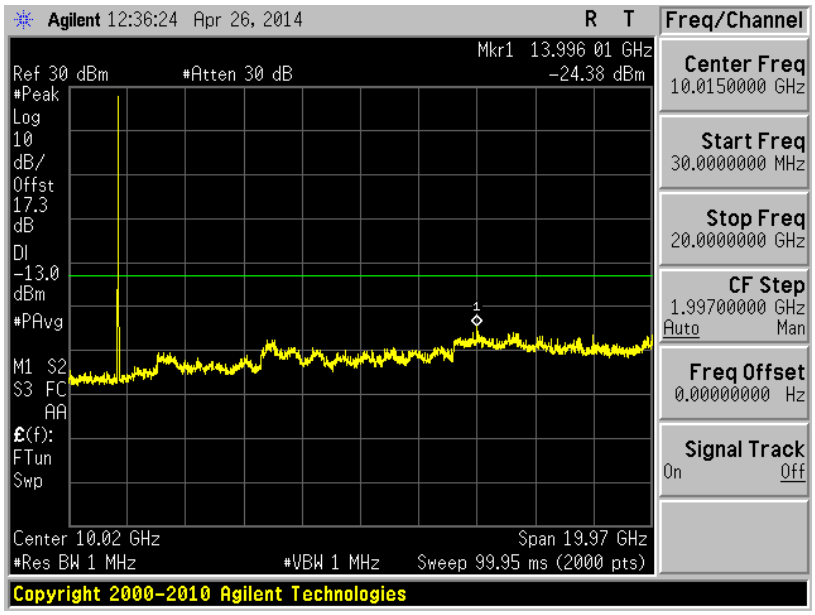
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 20000 MHz



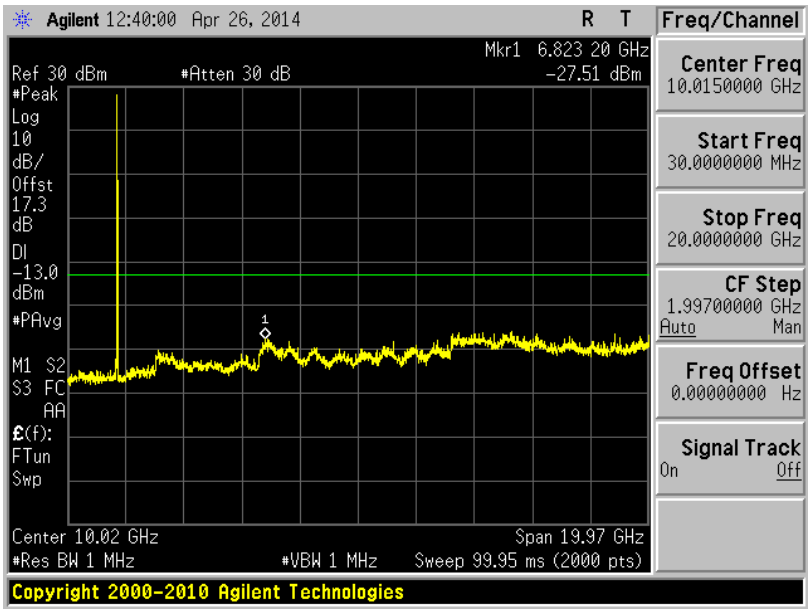
16QAM, (20.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

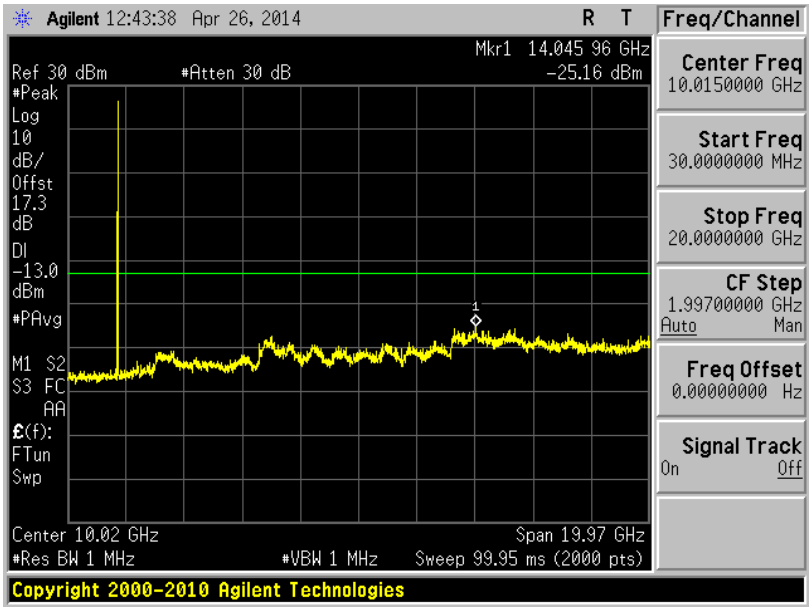


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 20000 MHz



HIGH, RB1-0, 30 TO 20000 MHz

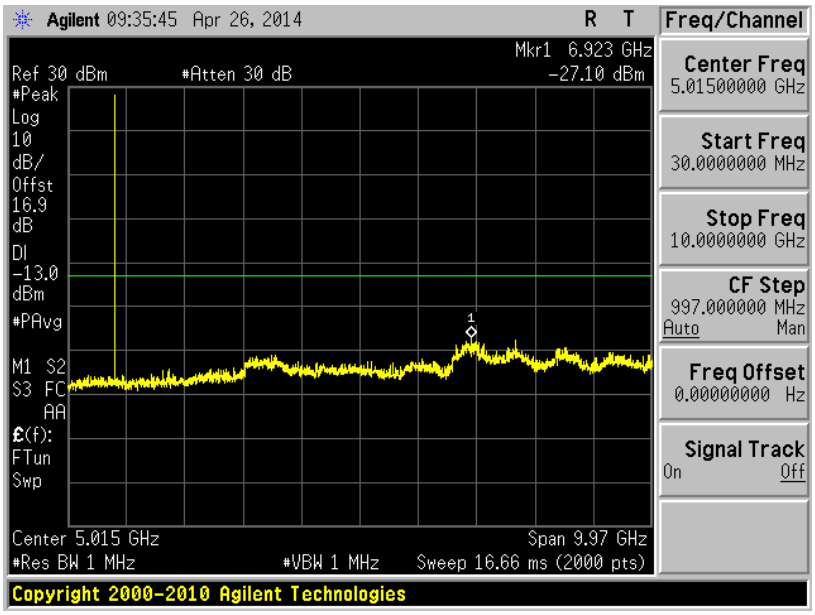


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

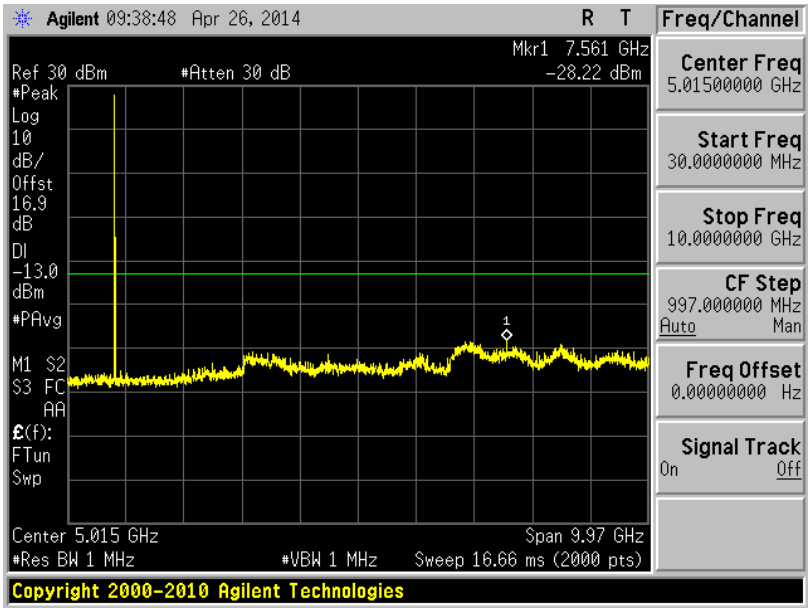
8.3.3. LTE BAND 5

QPSK, (1.4 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 10000 MHz

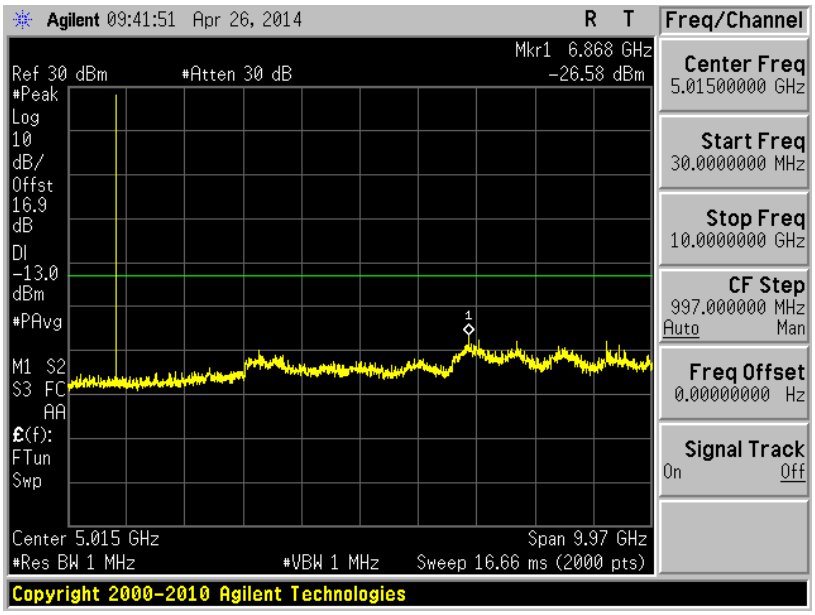


MID, RB1-0, 30 TO 10000 MHz



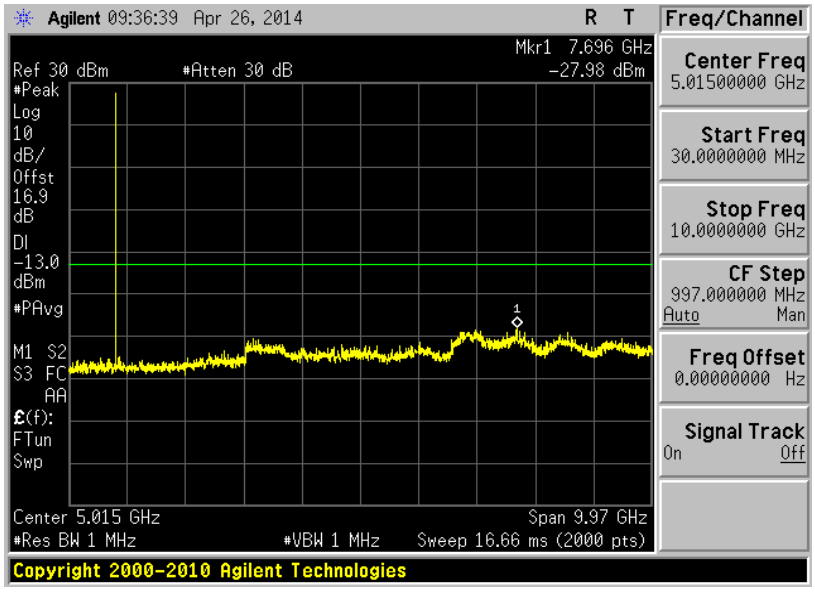
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 10000 MHz



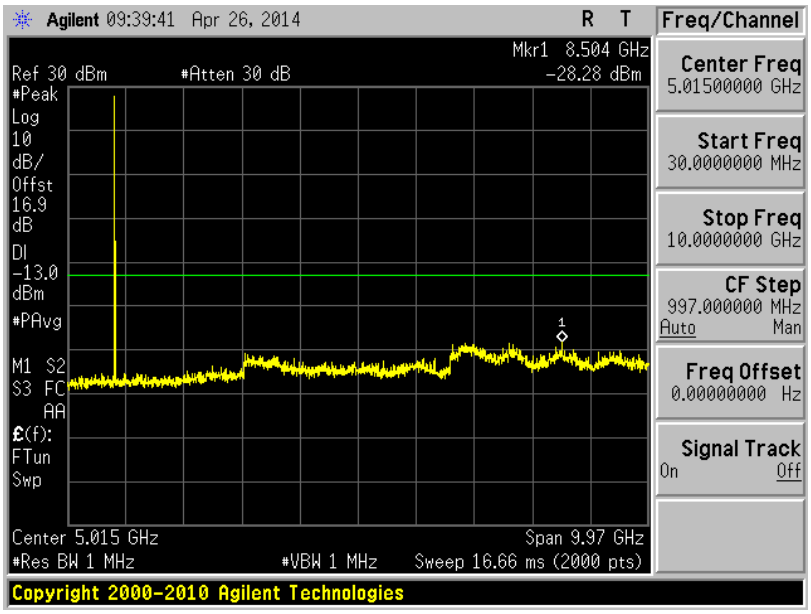
16QAM, (1.4 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 10000 MHz

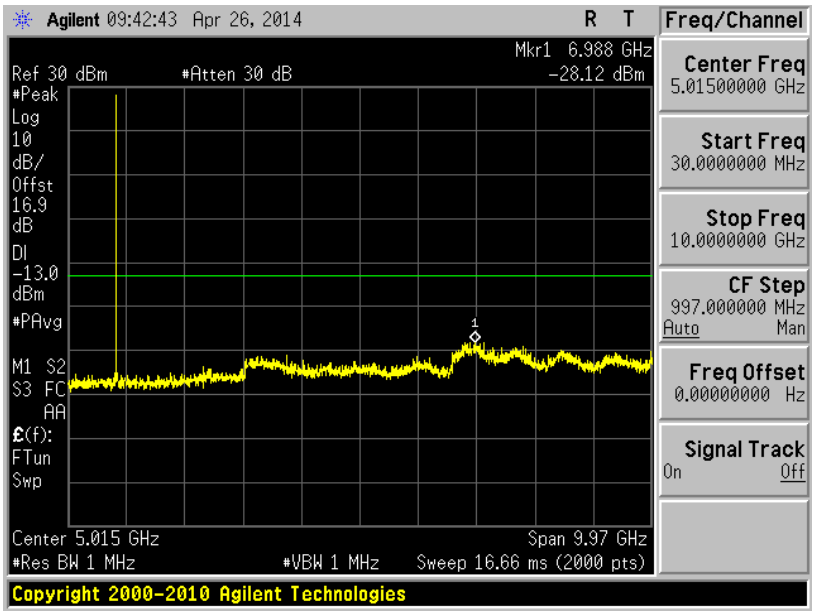


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 10000 MHz



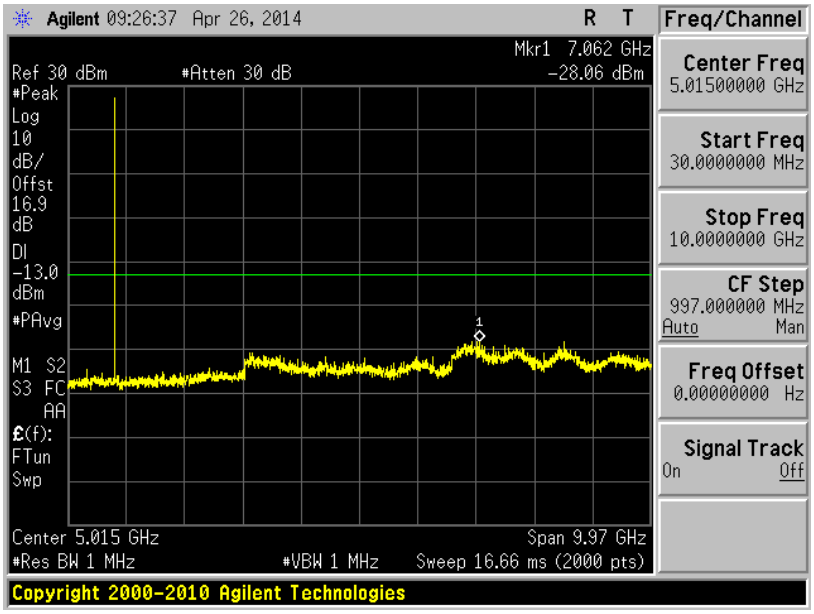
HIGH, RB1-0, 30 TO 10000 MHz



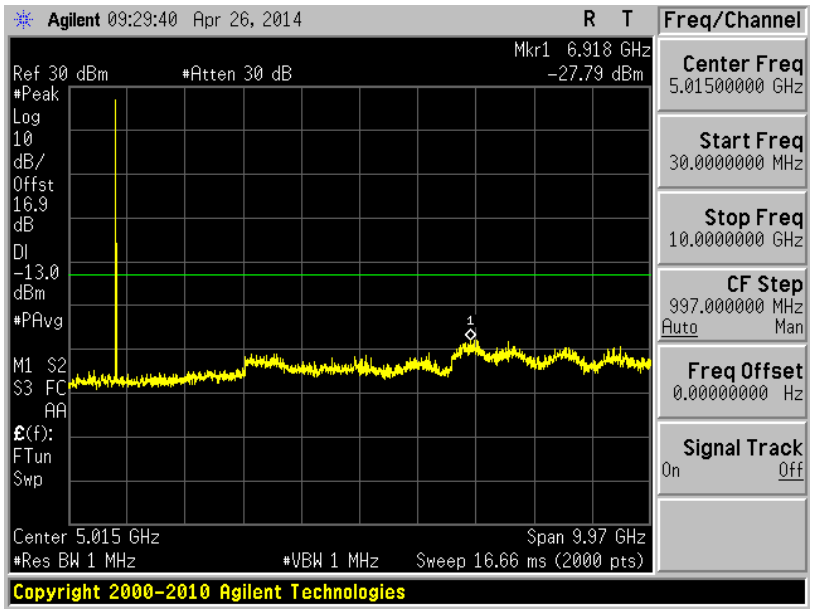
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (3.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 10000 MHz

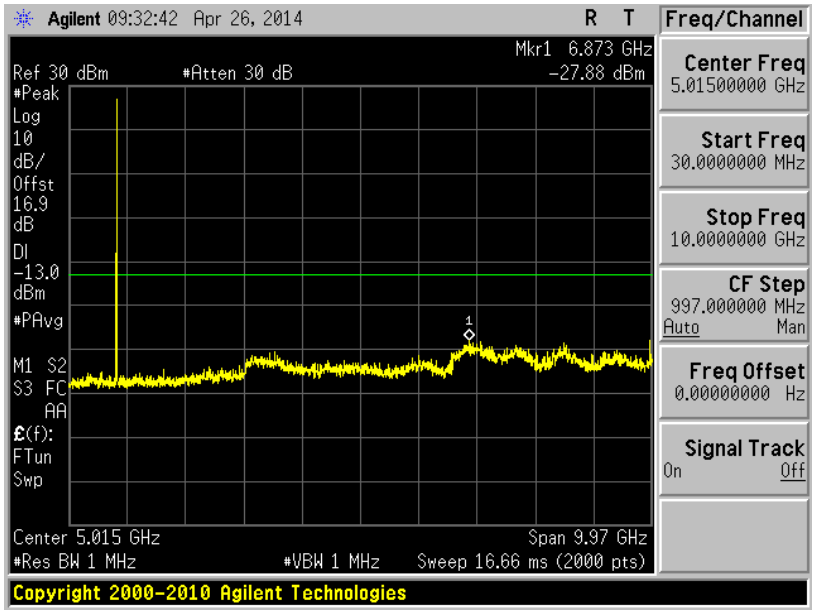


MID, RB1-0, 30 TO 10000 MHz



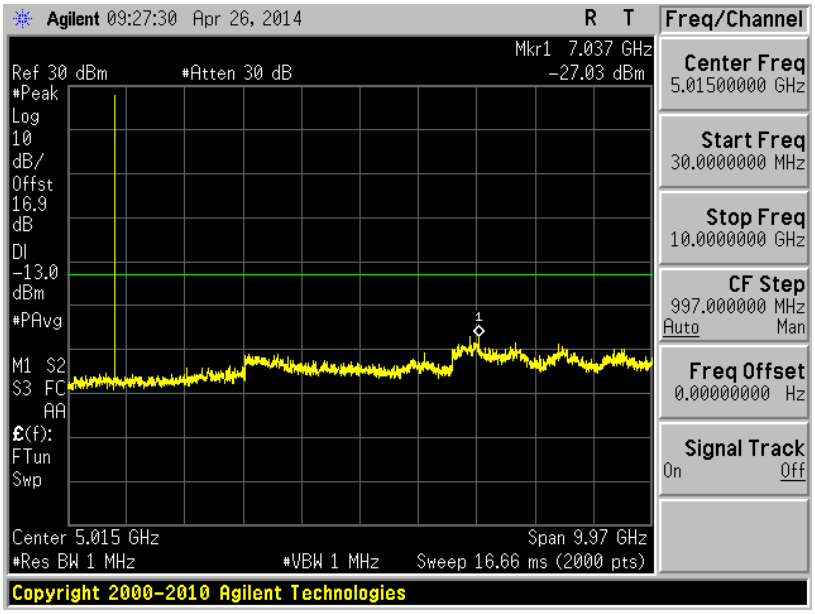
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 10000 MHz



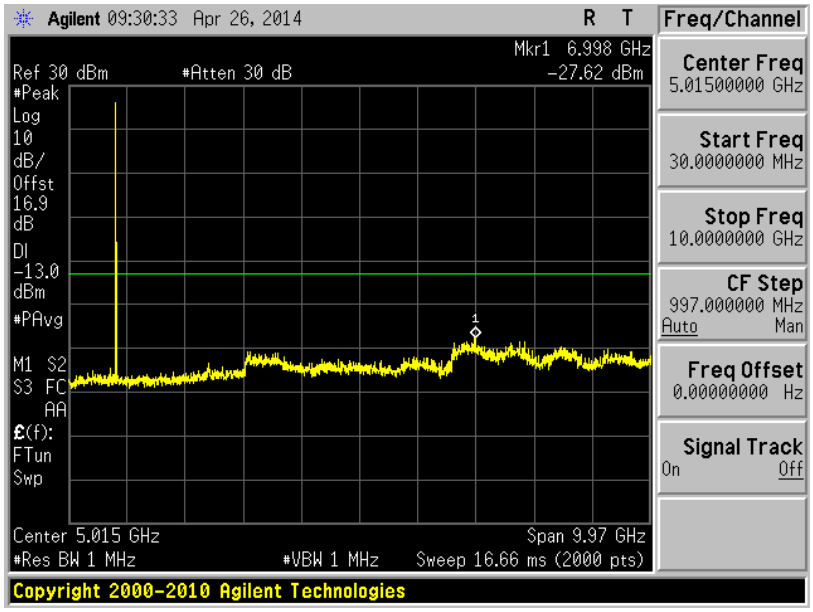
16QAM, (3.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 10000 MHz

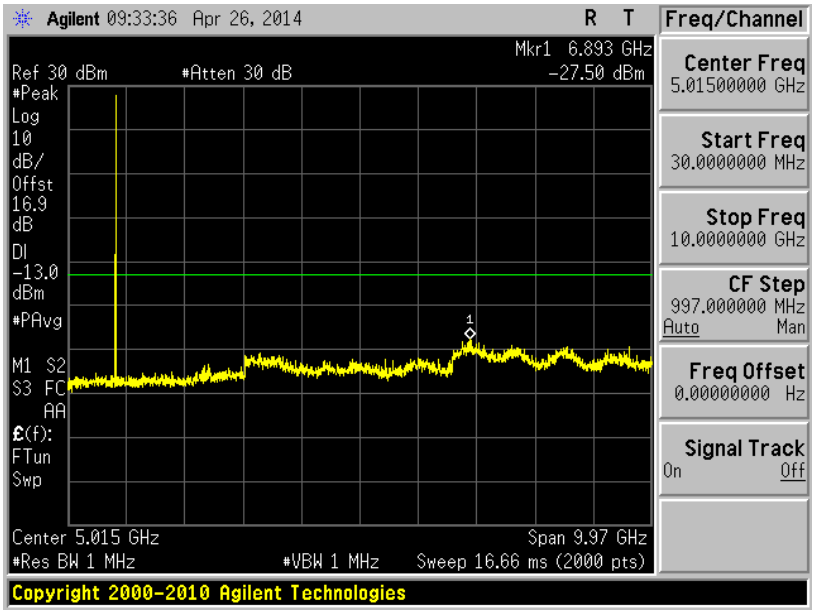


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 10000 MHz



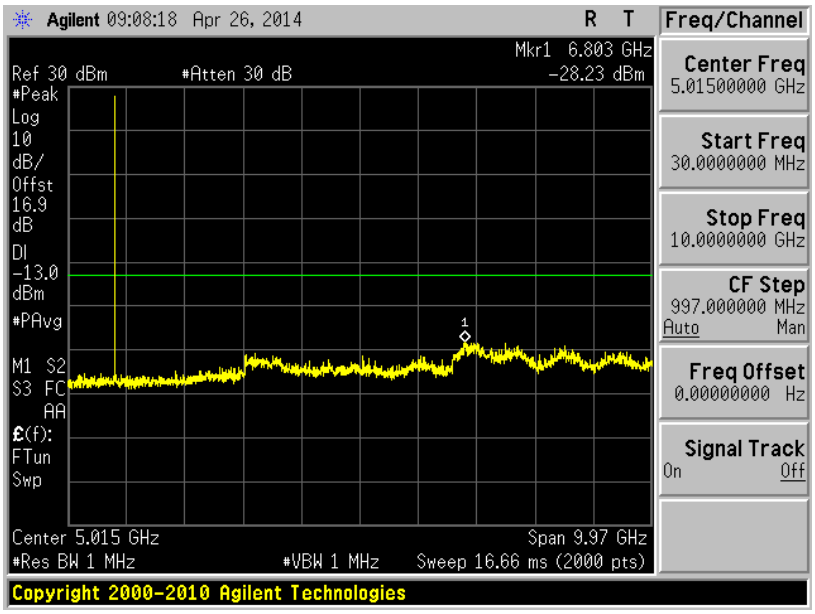
HIGH, RB1-0, 30 TO 10000 MHz



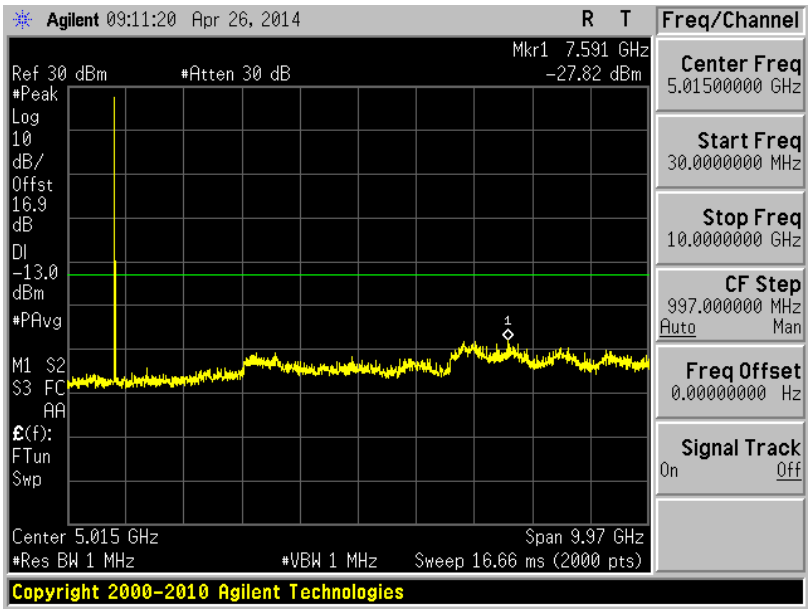
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (5.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 10000 MHz

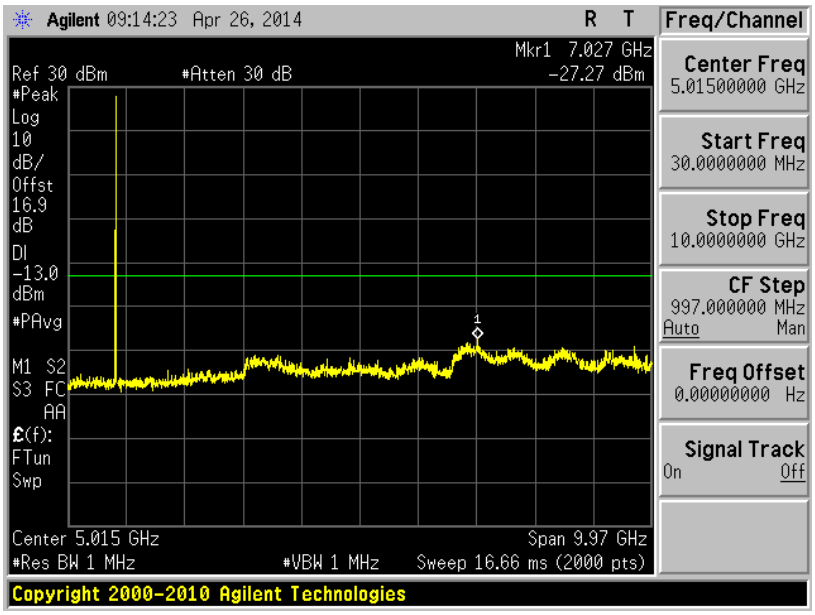


MID, RB1-0, 30 TO 10000 MHz



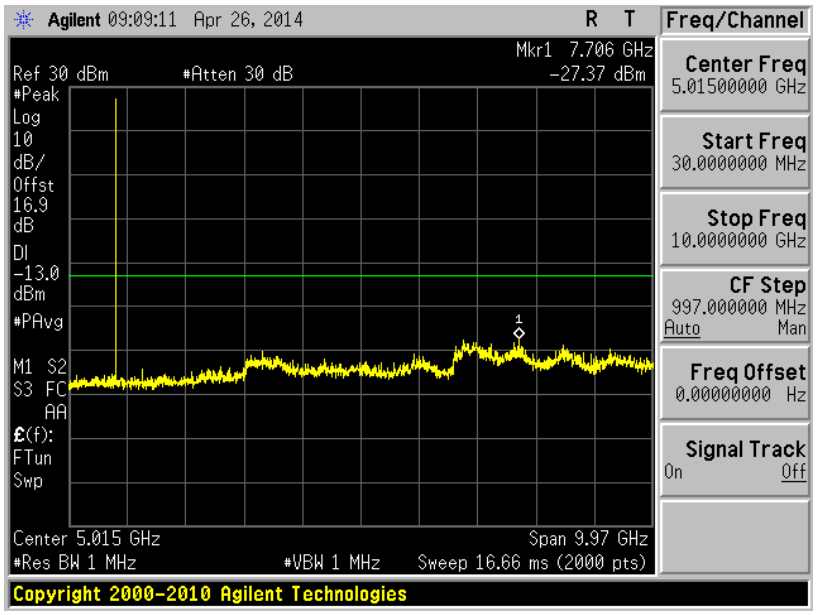
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 10000 MHz



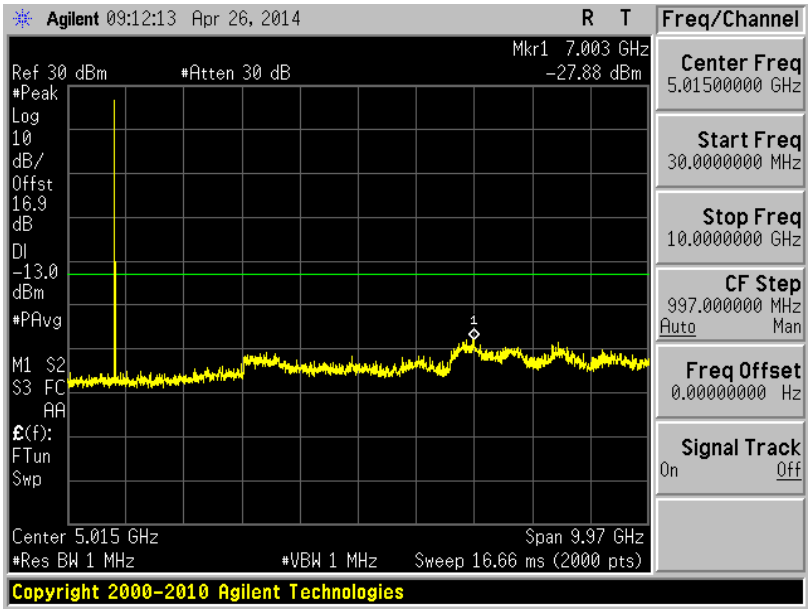
16QAM, (5.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 10000 MHz

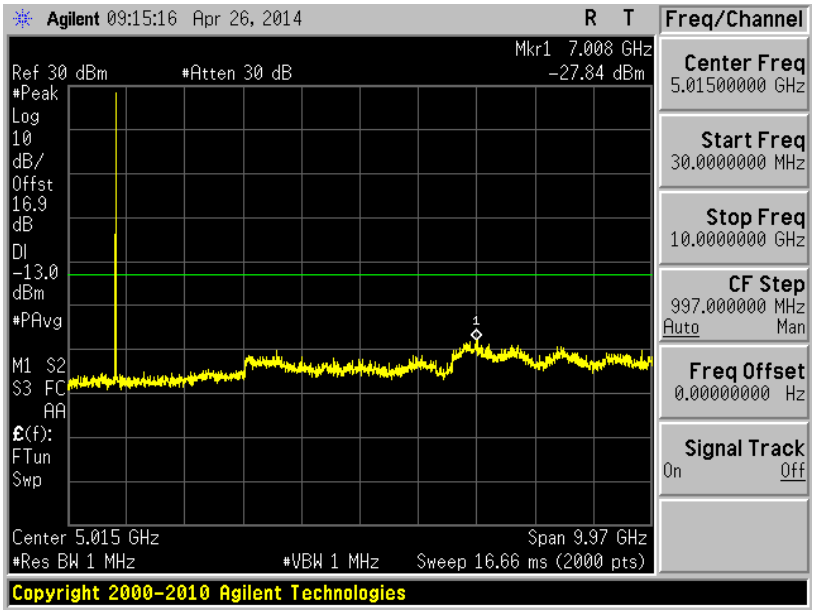


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 10000 MHz



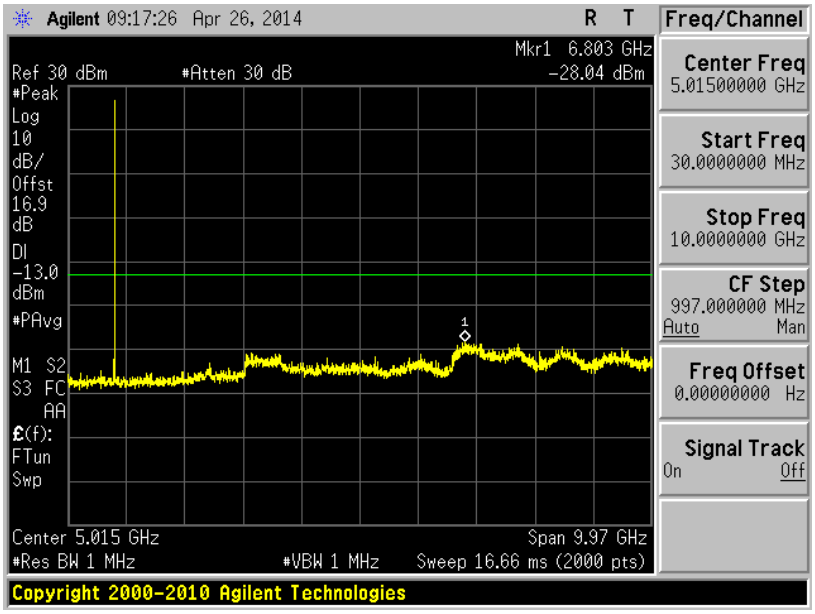
HIGH, RB1-0, 30 TO 10000 MHz



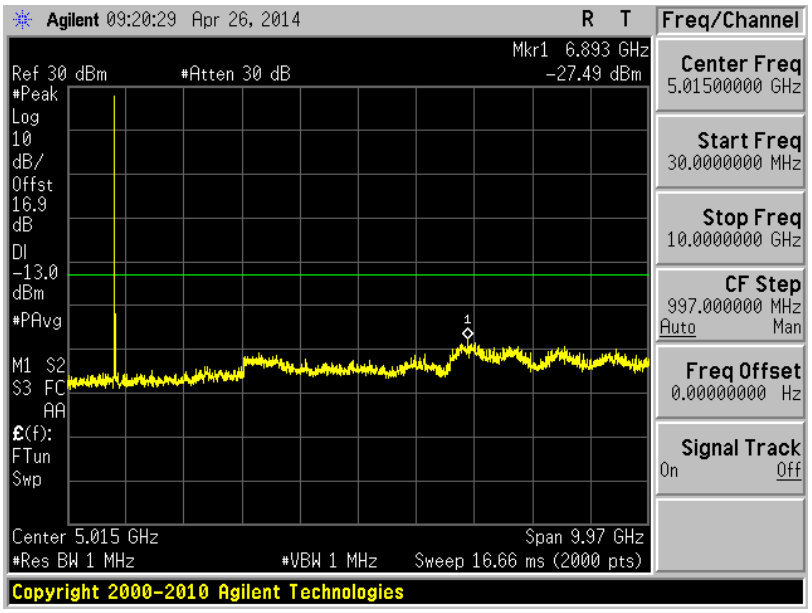
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (10.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 10000 MHz

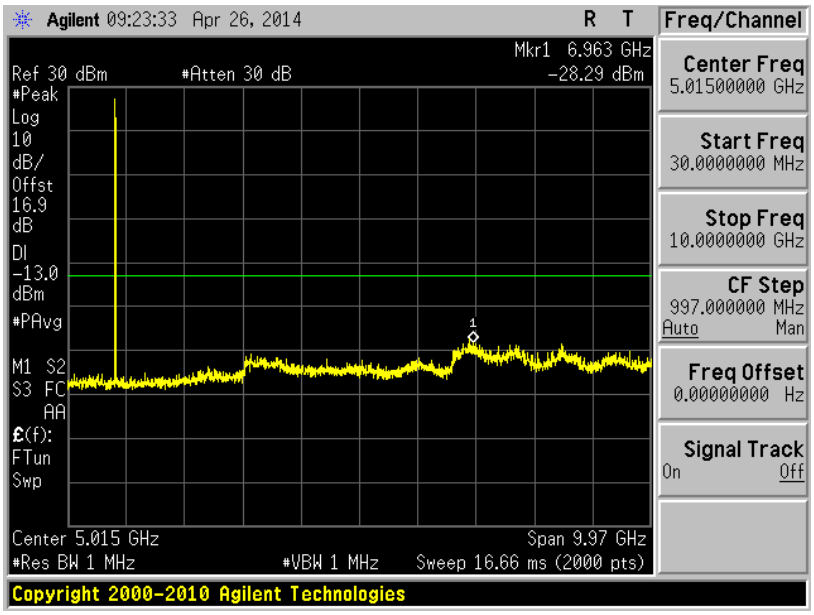


MID, RB1-0, 30 TO 10000 MHz



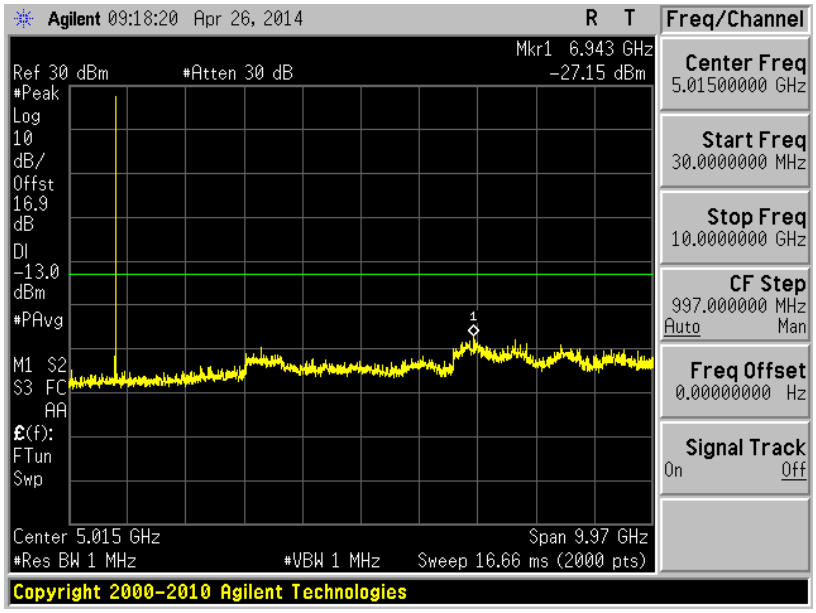
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 10000 MHz



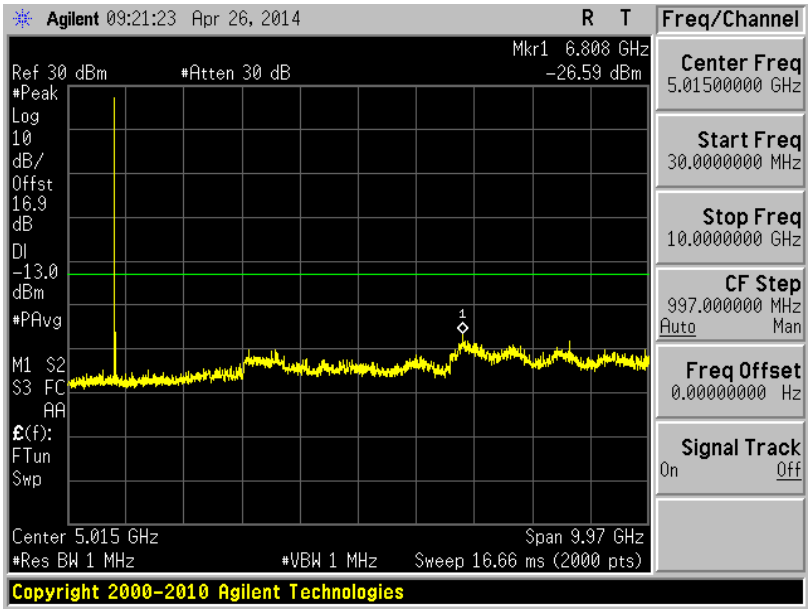
16QAM, (10.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 10000 MHz

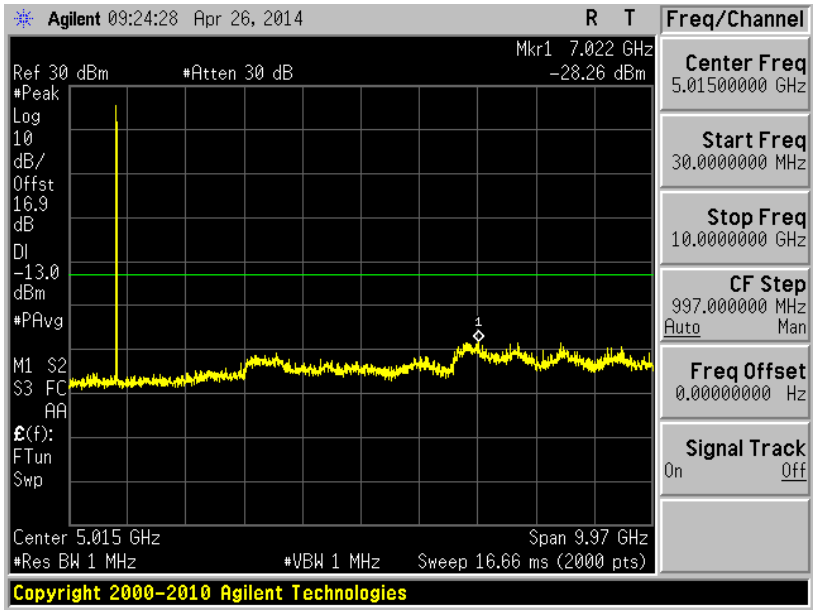


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 10000 MHz



HIGH, RB1-0, 30 TO 10000 MHz

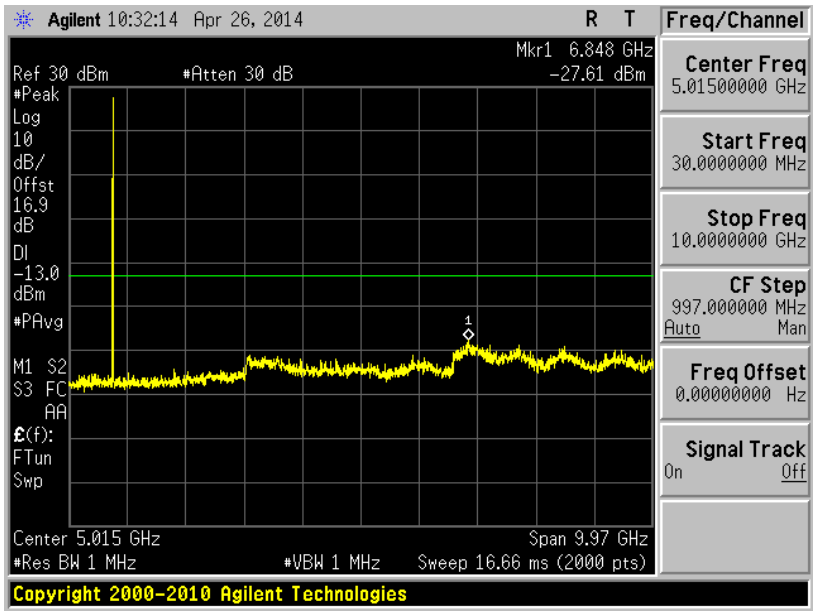


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

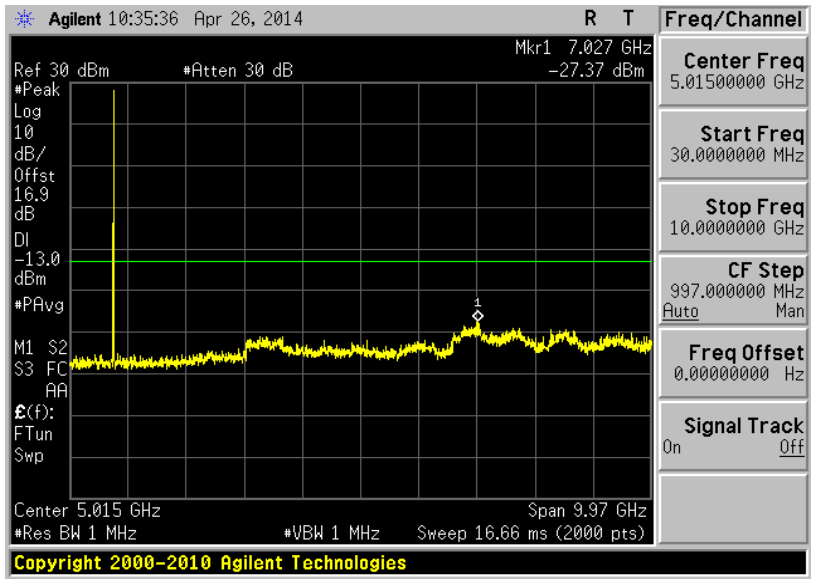
8.3.4. LTE BAND 13

QPSK, (5.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 10000 MHz

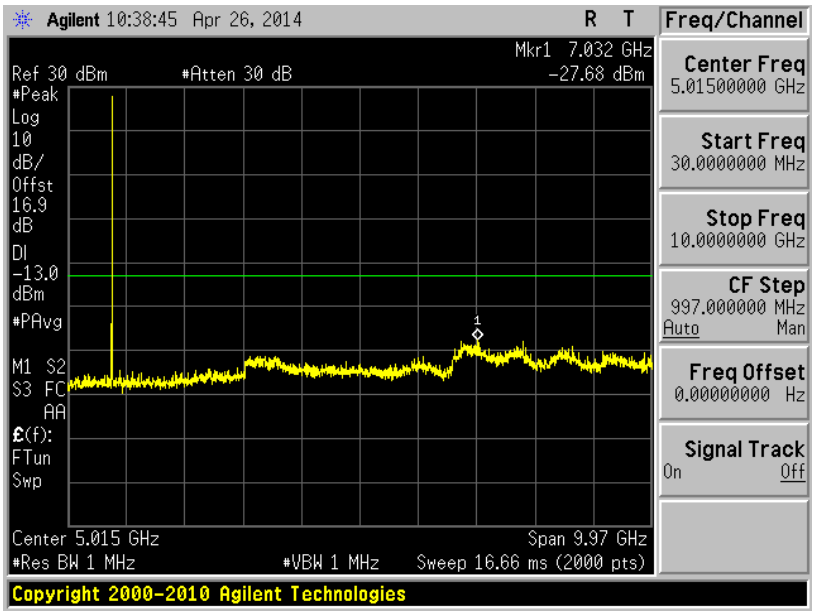


MID, RB1-0, 30 TO 10000 MHz



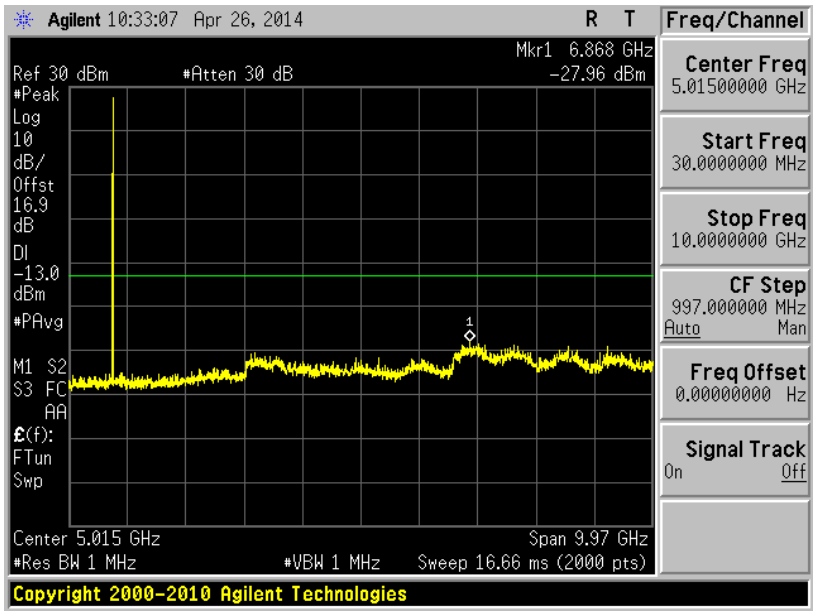
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 10000 MHz



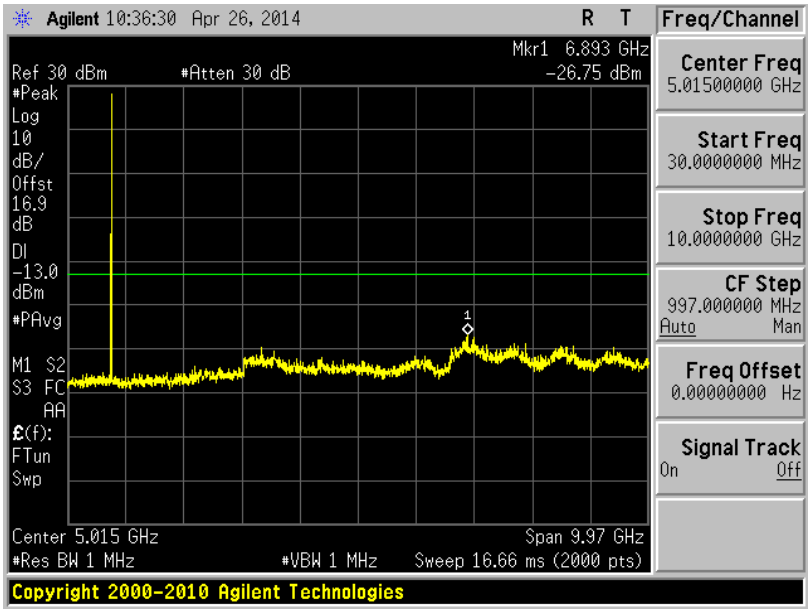
16QAM, (5.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 10000 MHz

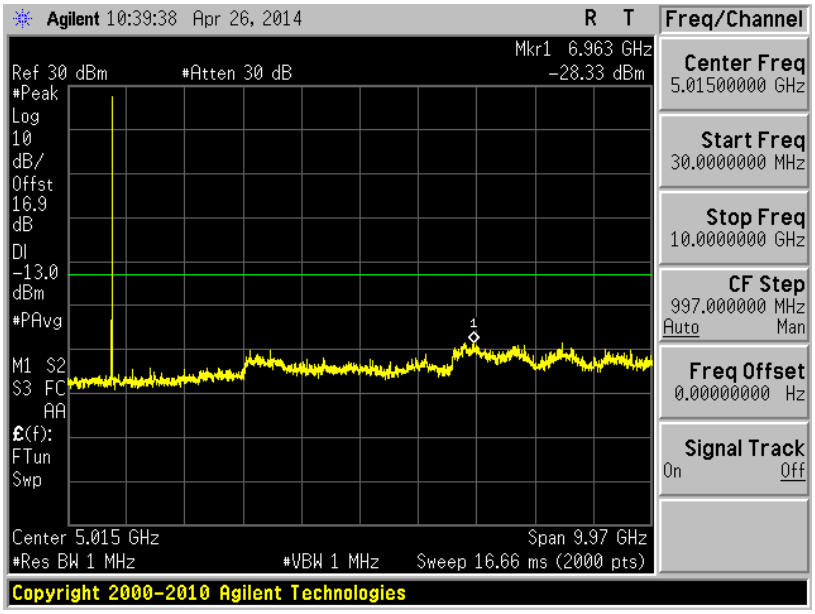


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 10000 MHz



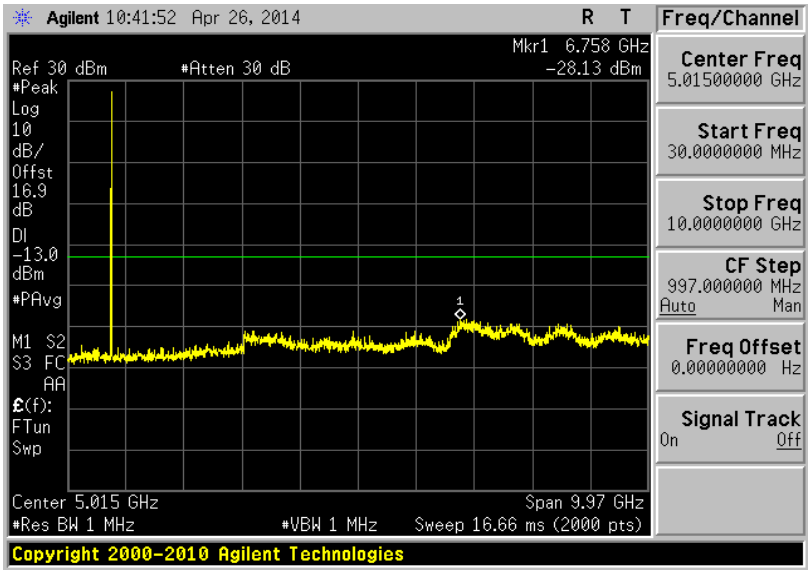
HIGH, RB1-0, 30 TO 10000 MHz



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

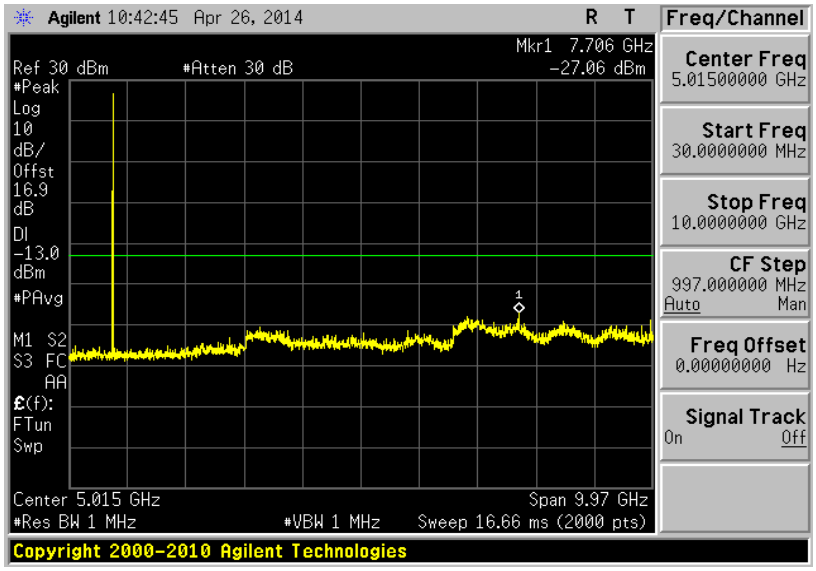
QPSK, (10.0 MHz BAND WIDTH)

MID, RB1-0, 30 TO 10000 MHz



16QAM, (10.0 MHz BAND WIDTH)

MID, RB1-0, 30 TO 10000 MHz

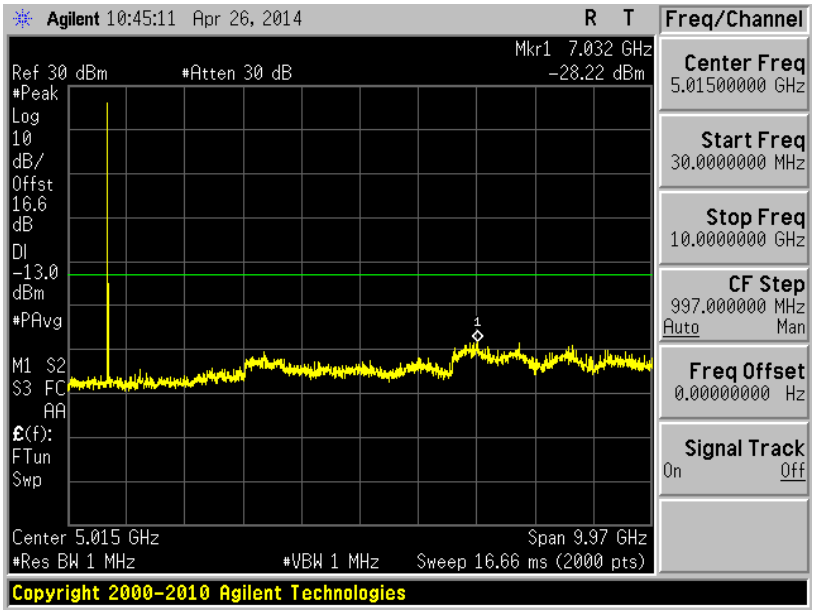


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

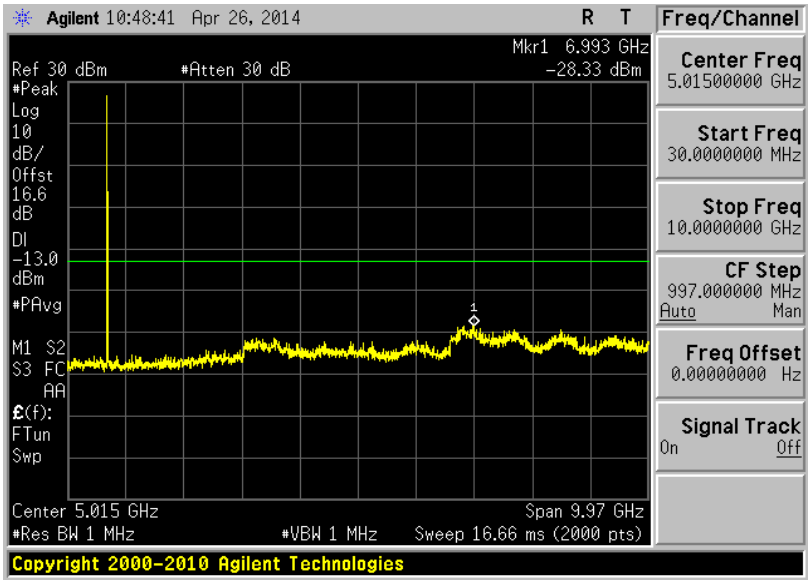
8.3.5. LTE BAND 17

QPSK, (5.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 10000 MHz

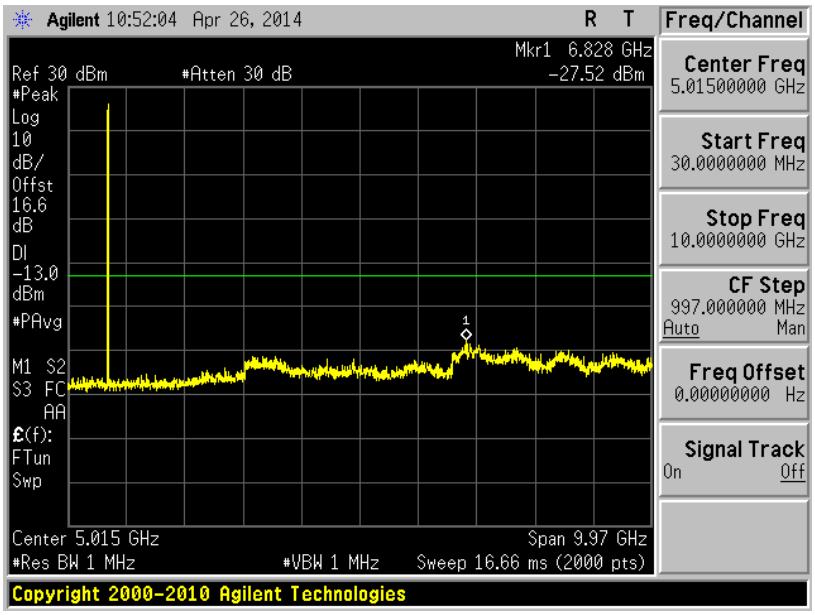


MID, RB1-0, 30 TO 10000 MHz



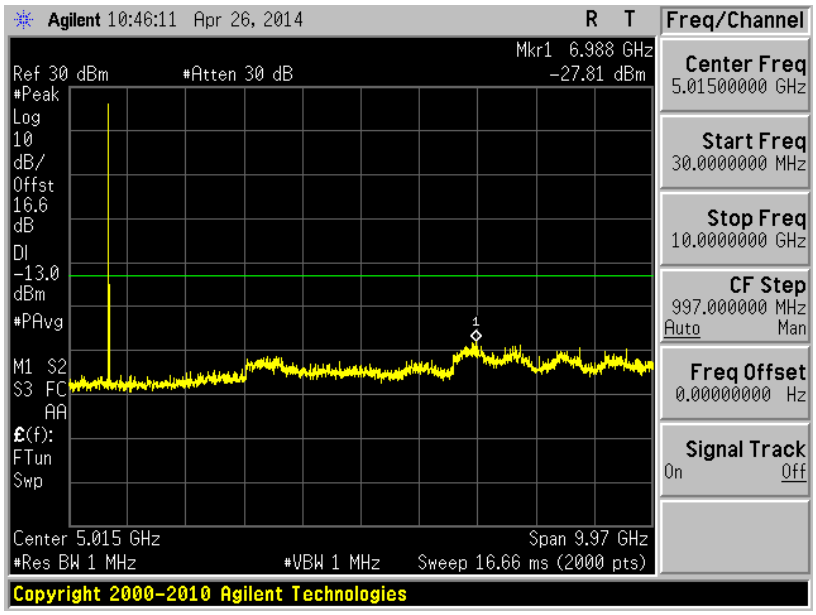
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 10000 MHz



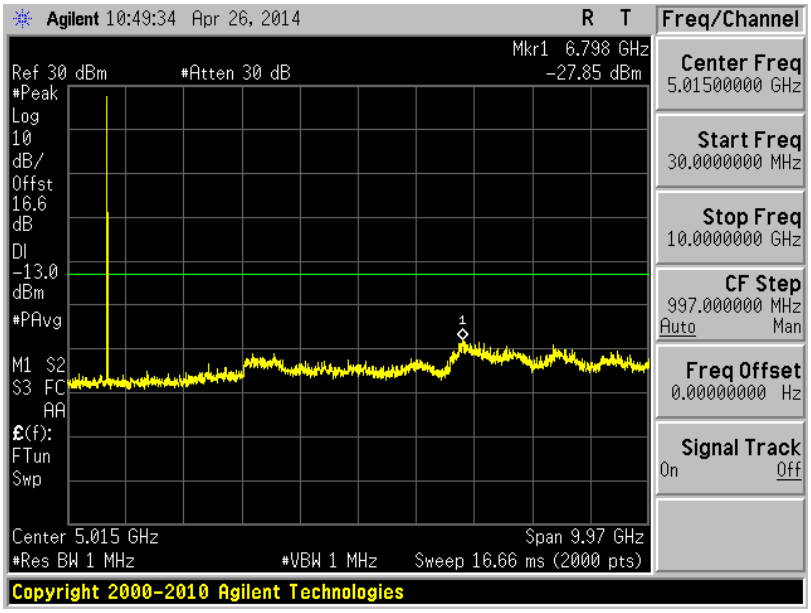
16QAM, (5.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 10000 MHz

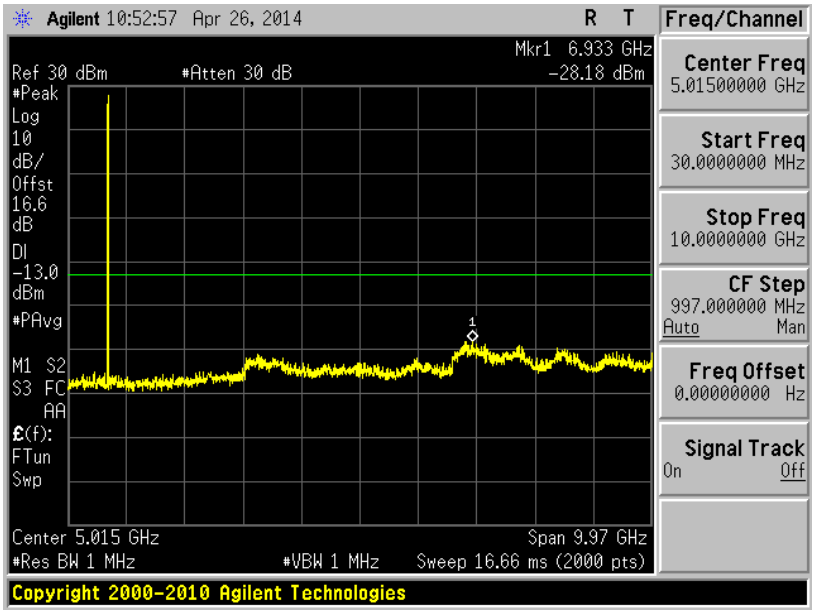


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 10000 MHz



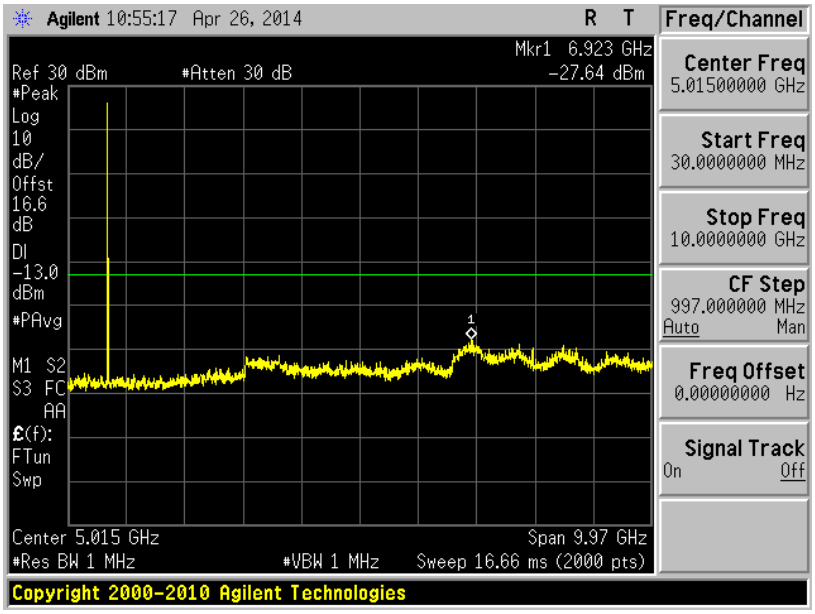
HIGH, RB1-0, 30 TO 10000 MHz



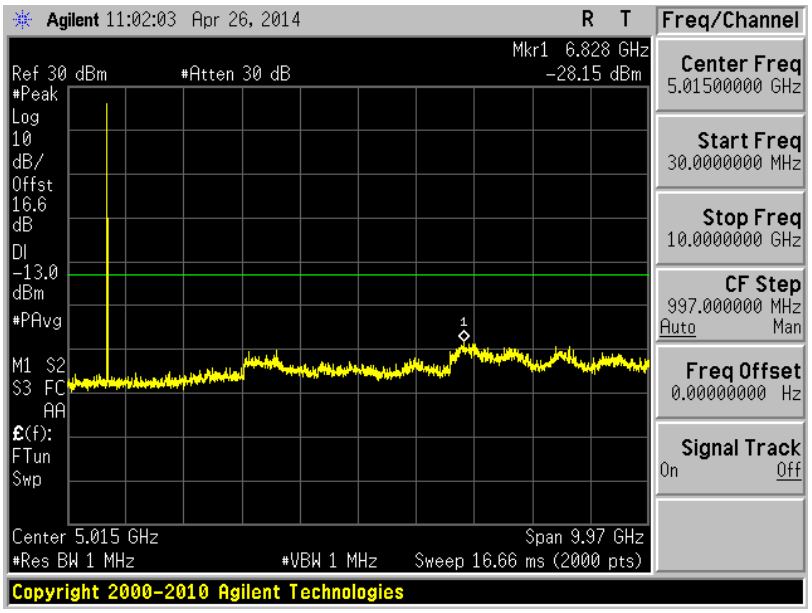
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (10.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 10000 MHz

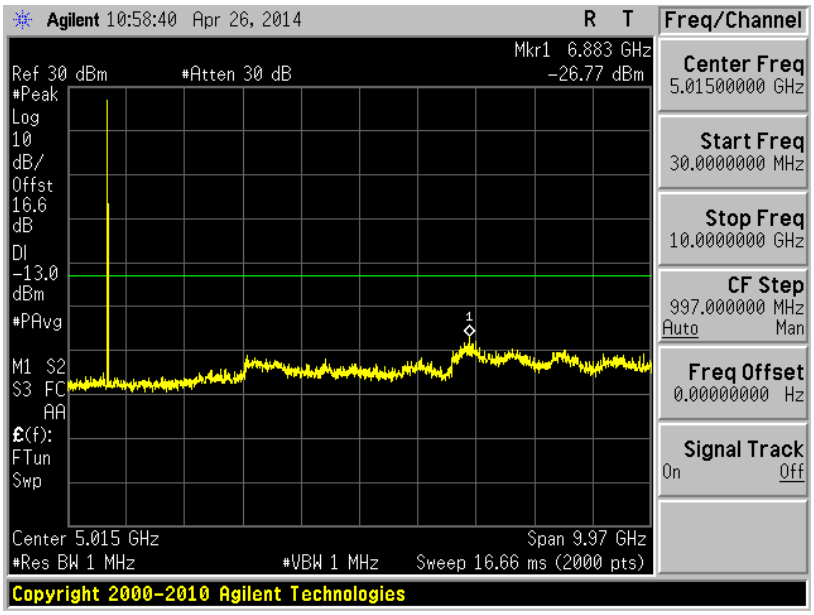


MID, RB1-0, 30 TO 10000 MHz



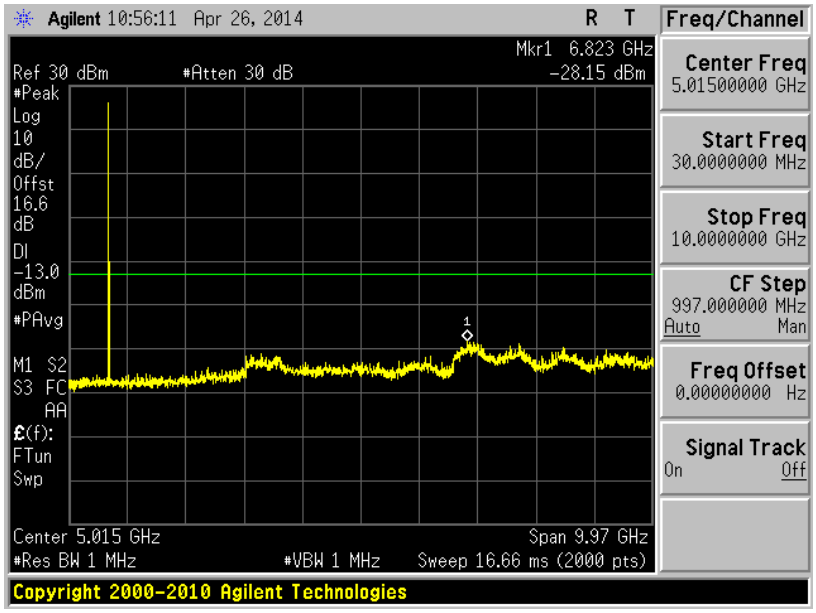
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 10000 MHz



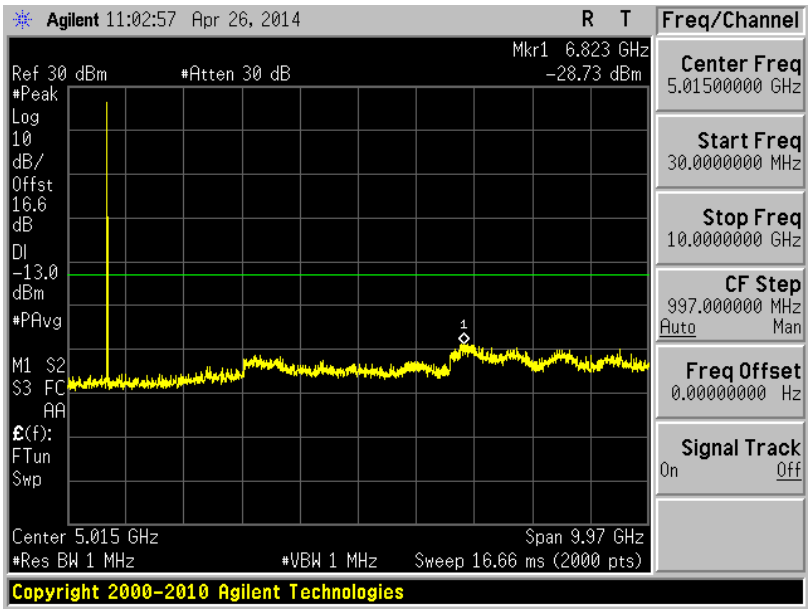
16QAM, (10.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 10000 MHz

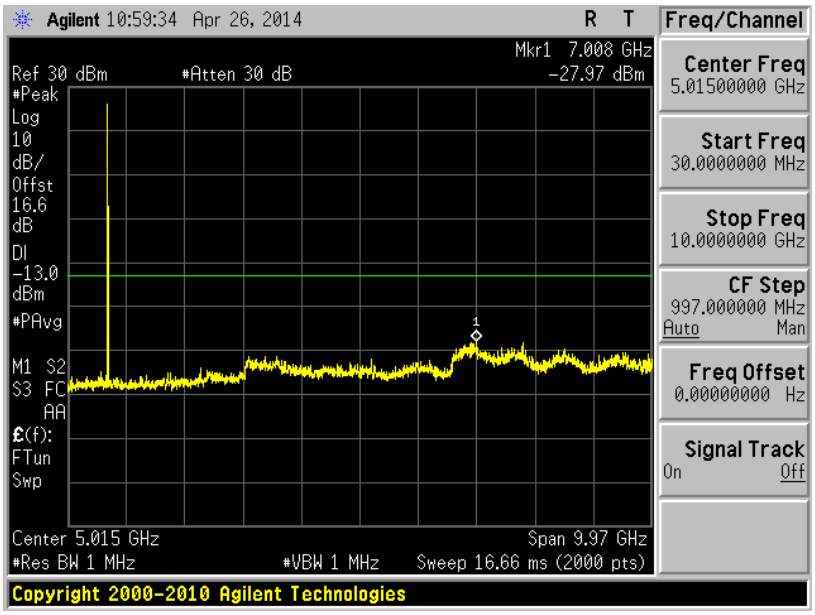


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 10000 MHz



HIGH, RB1-0, 30 TO 10000 MHz

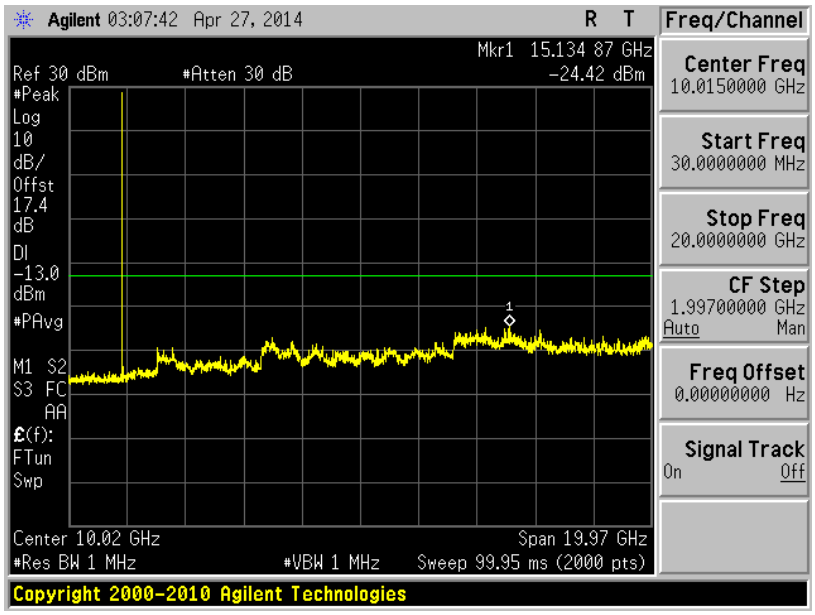


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

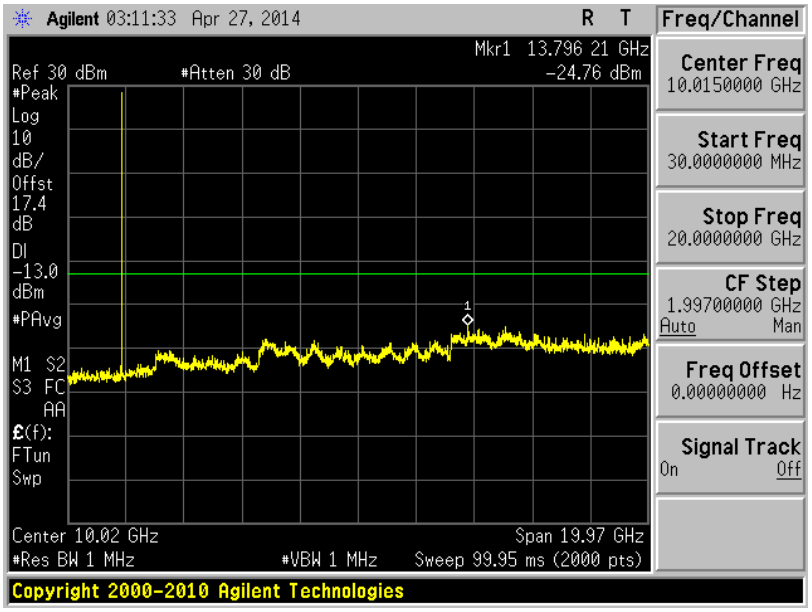
8.3.6. LTE BAND 25

QPSK, (1.4 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

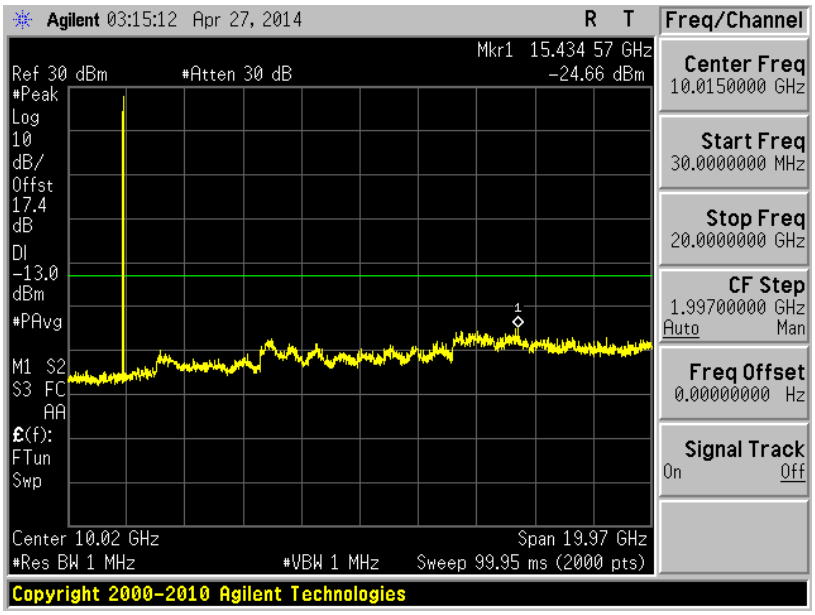


MID, RB1-0, 30 TO 20000 MHz



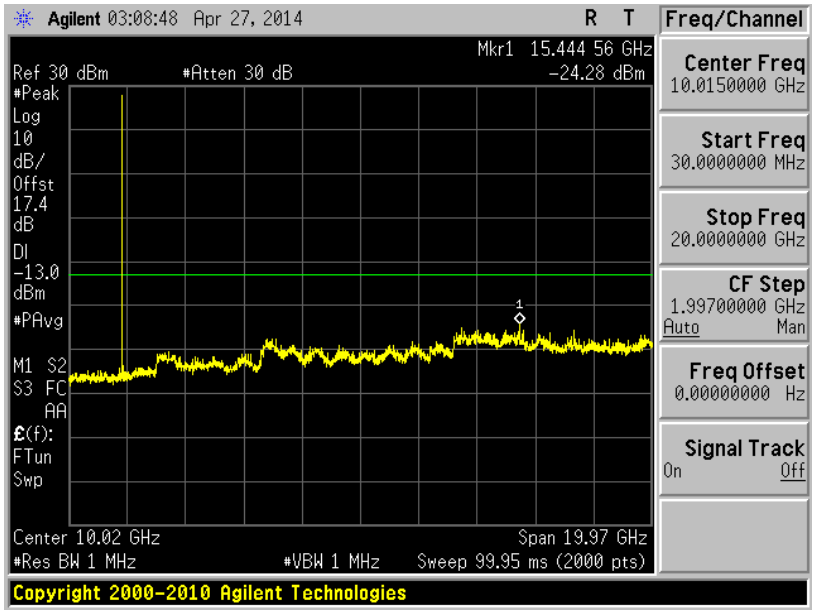
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 20000 MHz



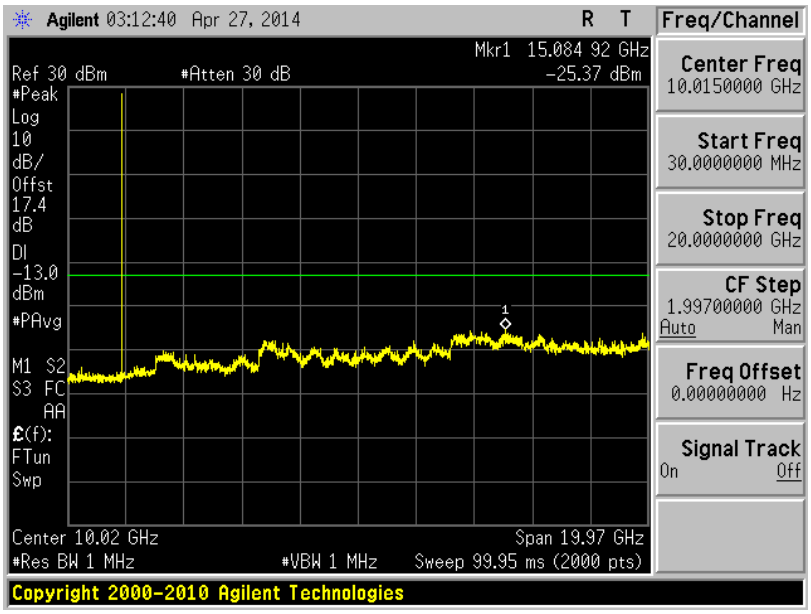
16QAM, (1.4 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

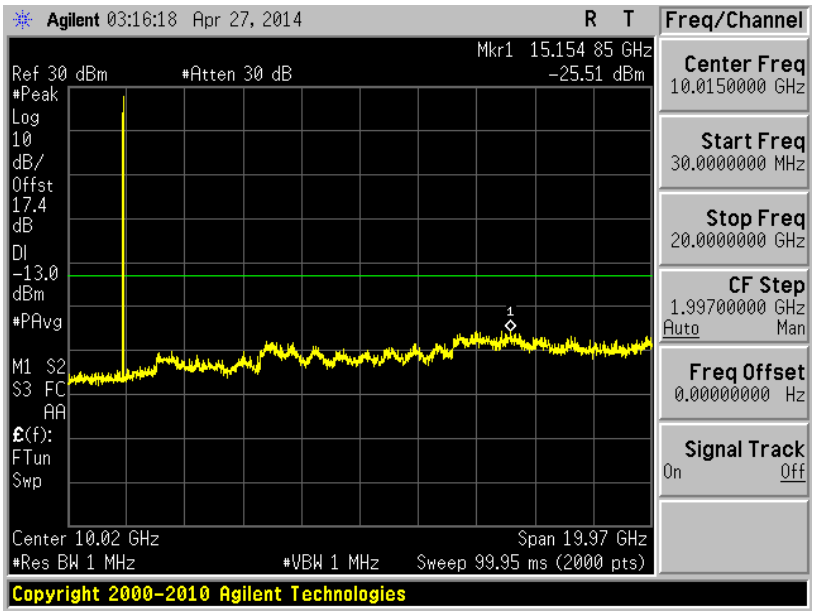


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 20000 MHz



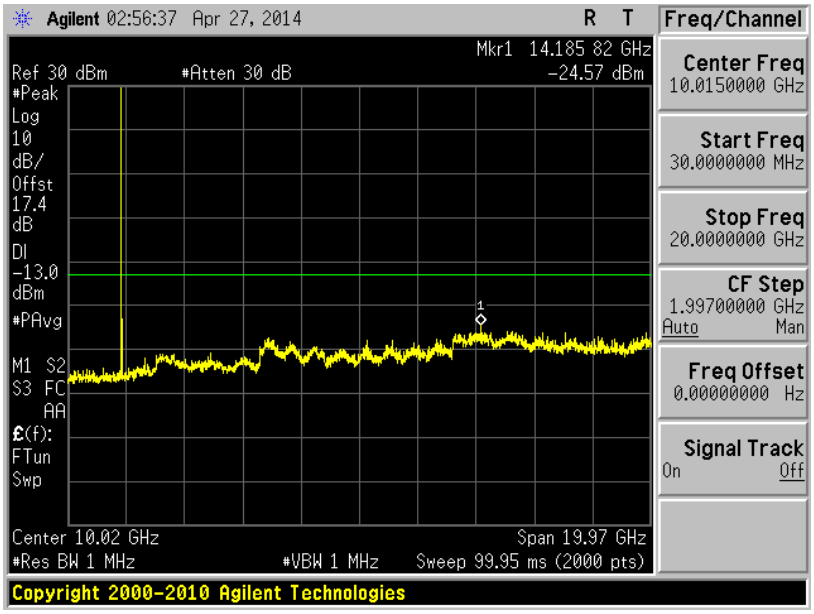
HIGH, RB1-0, 30 TO 20000 MHz



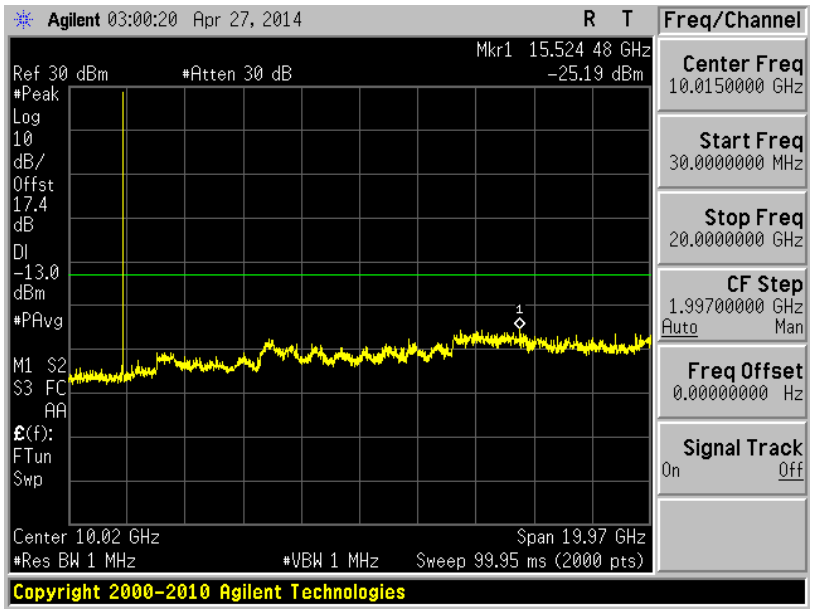
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (3.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

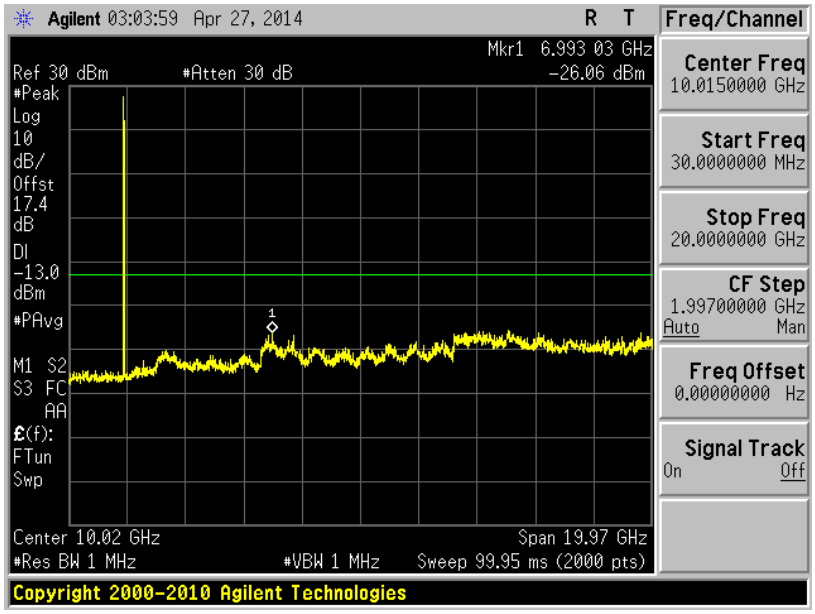


MID, RB1-0, 30 TO 20000 MHz



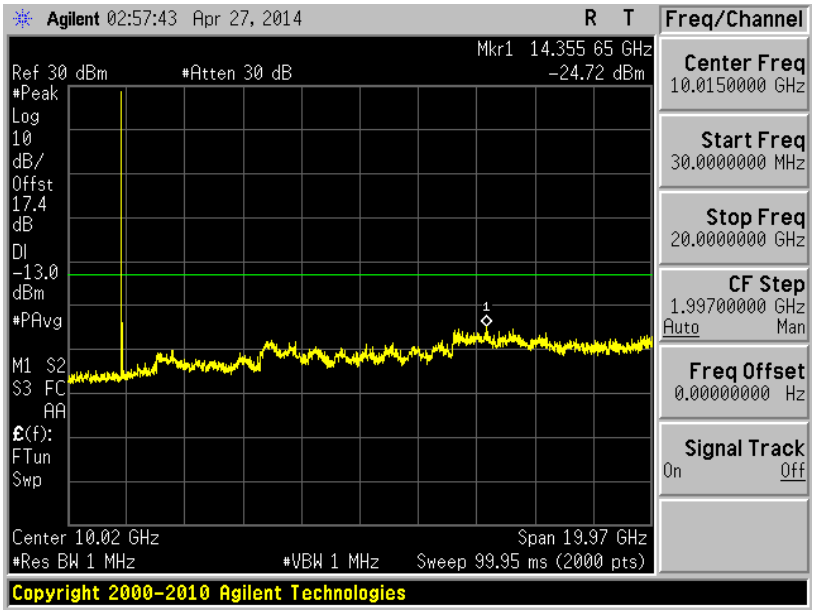
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 20000 MHz



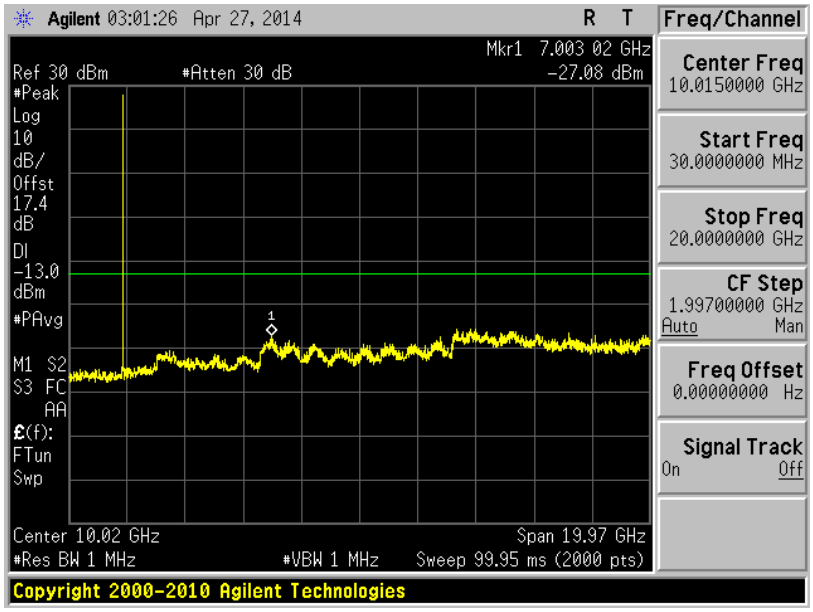
16QAM, (3.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

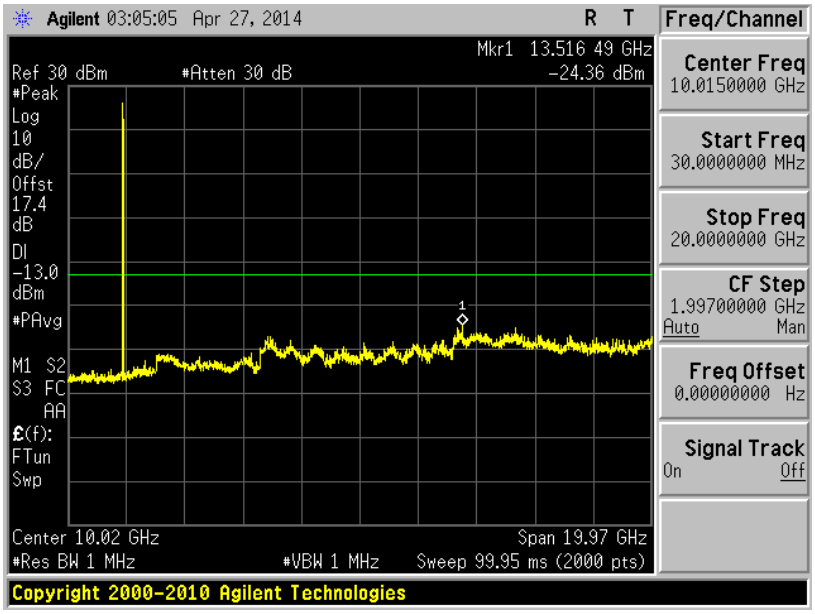


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 20000 MHz



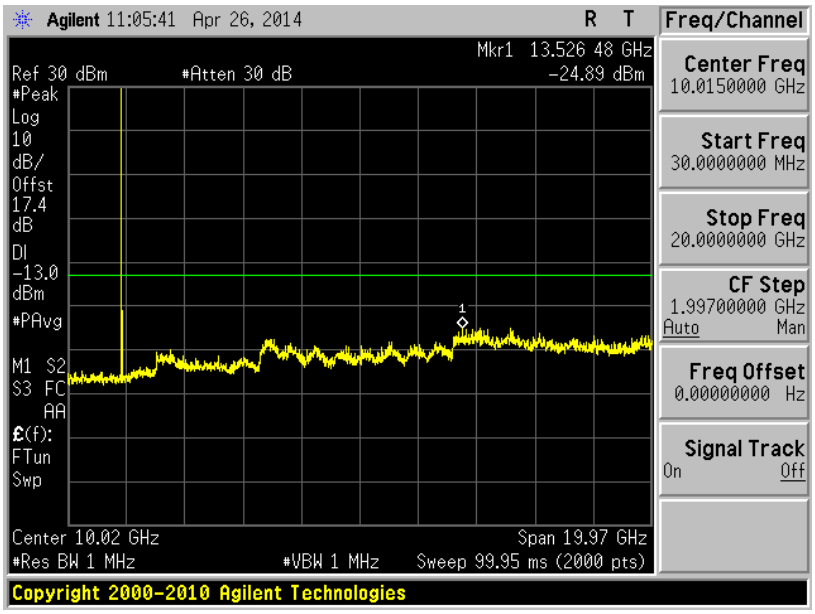
HIGH, RB1-0, 30 TO 20000 MHz



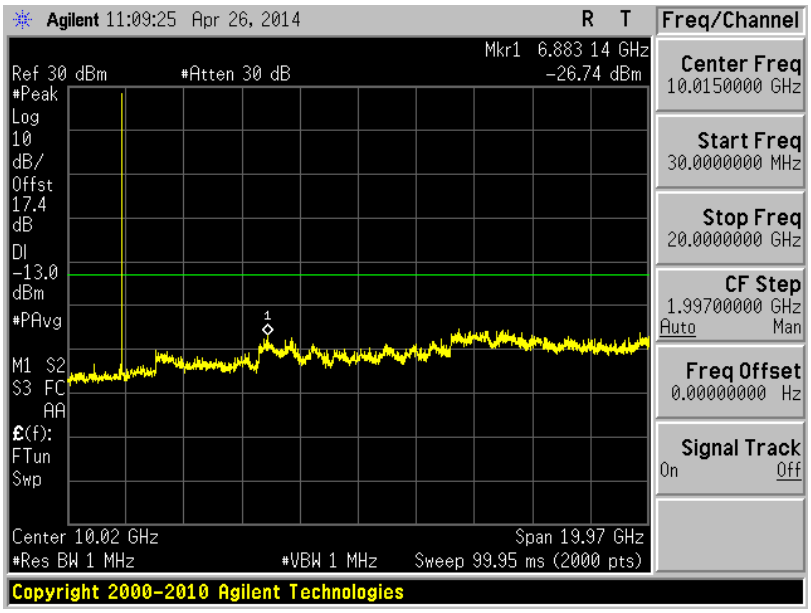
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (5.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

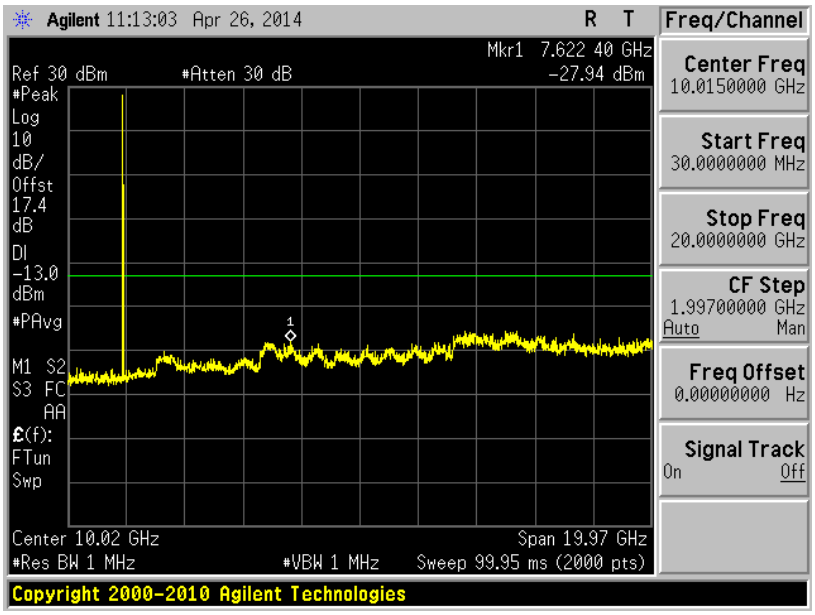


MID, RB1-0, 30 TO 20000 MHz



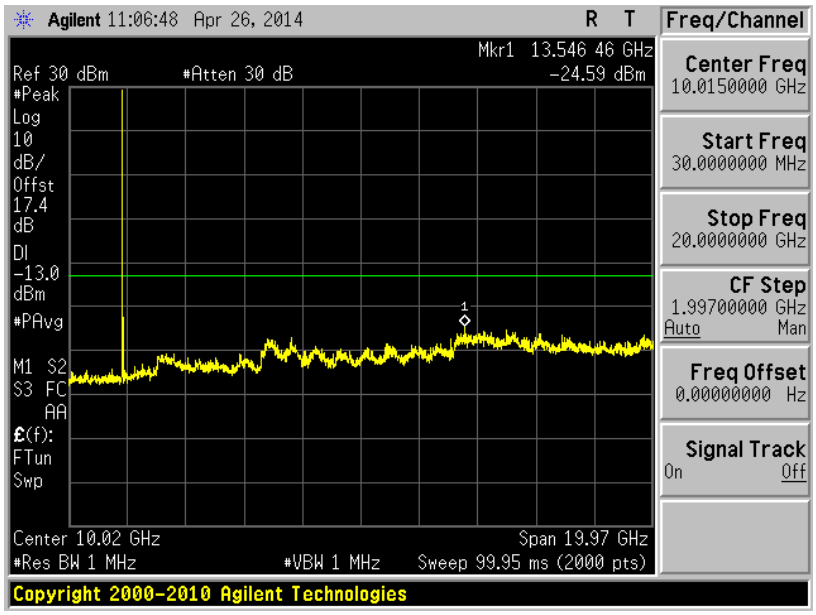
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 20000 MHz



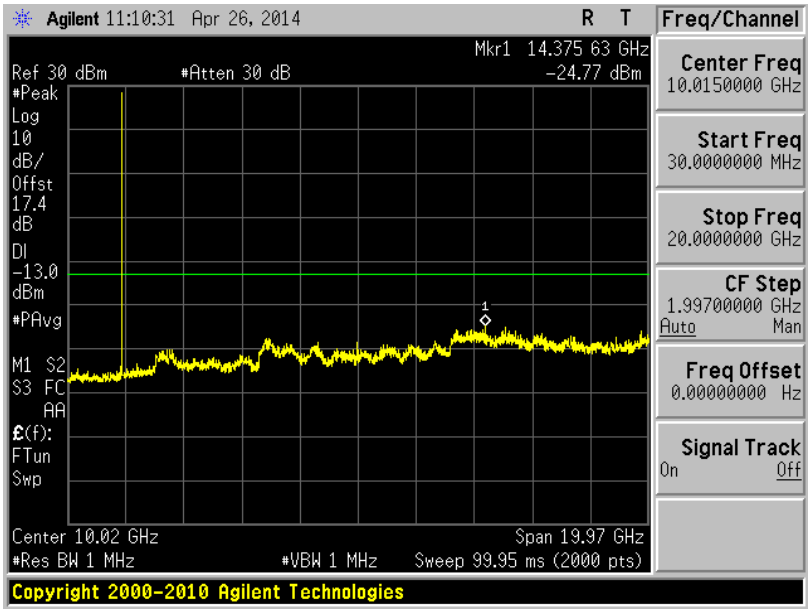
16QAM, (5.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

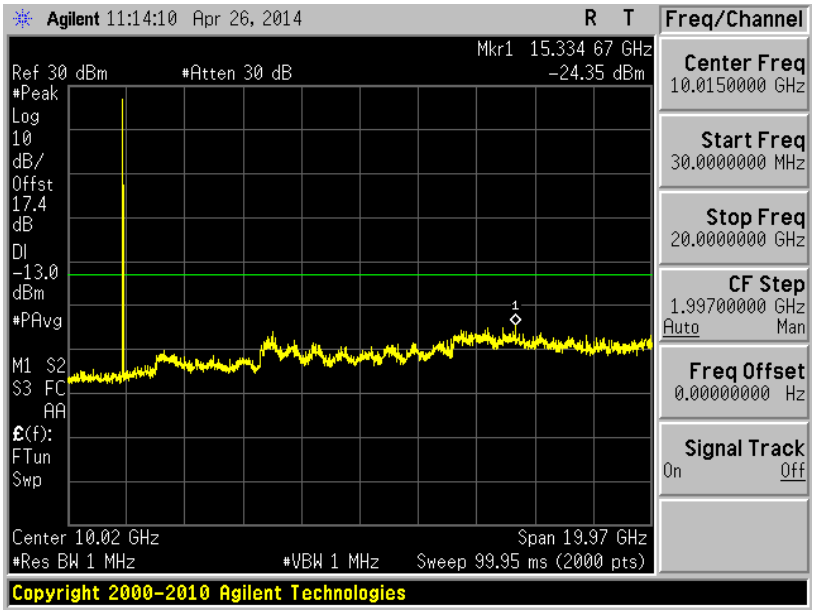


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 20000 MHz



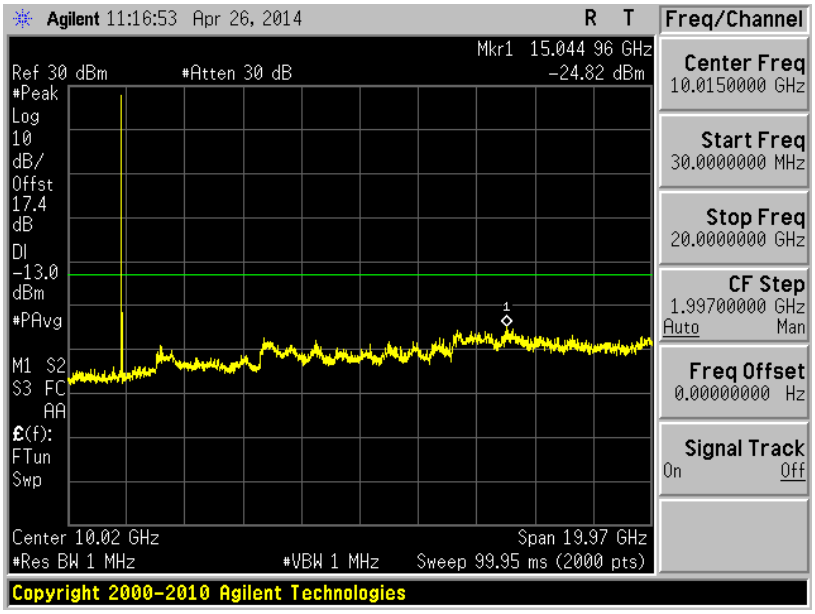
HIGH, RB1-0, 30 TO 20000 MHz



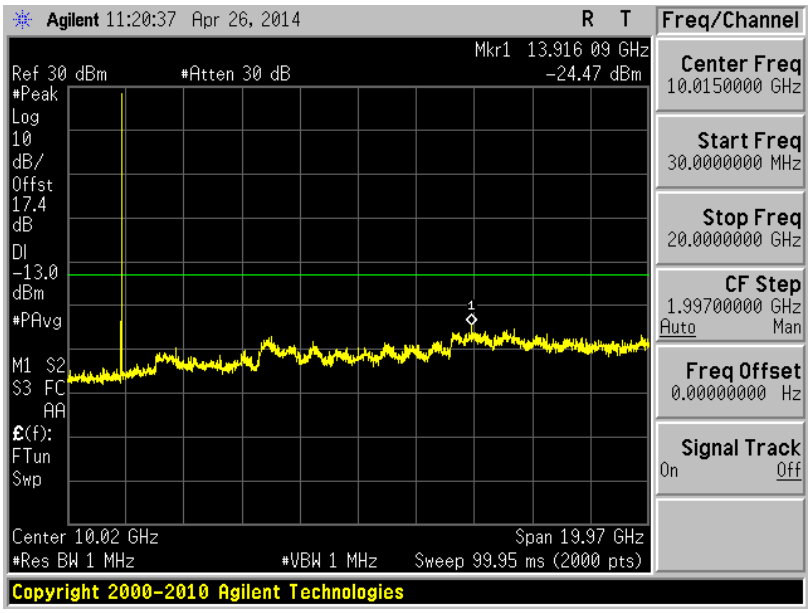
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (10.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

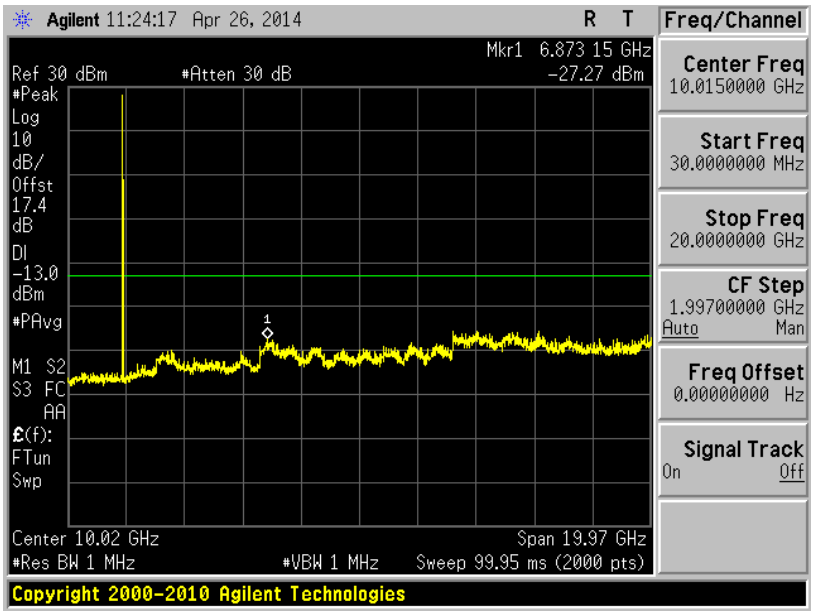


MID, RB1-0, 30 TO 20000 MHz



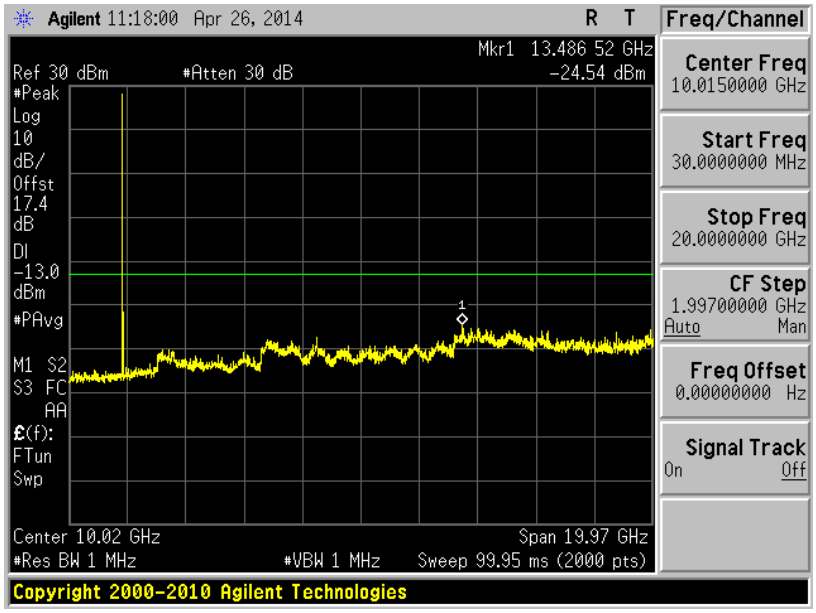
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 20000 MHz



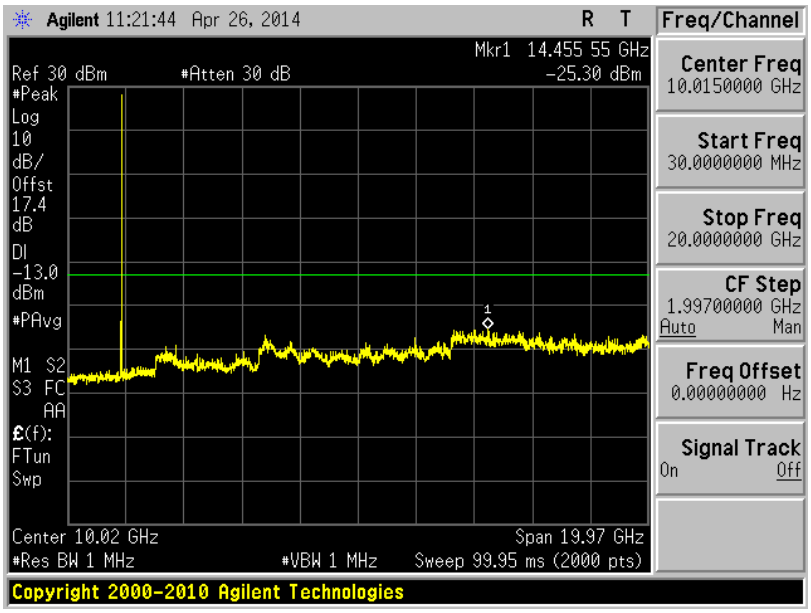
16QAM, (10.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

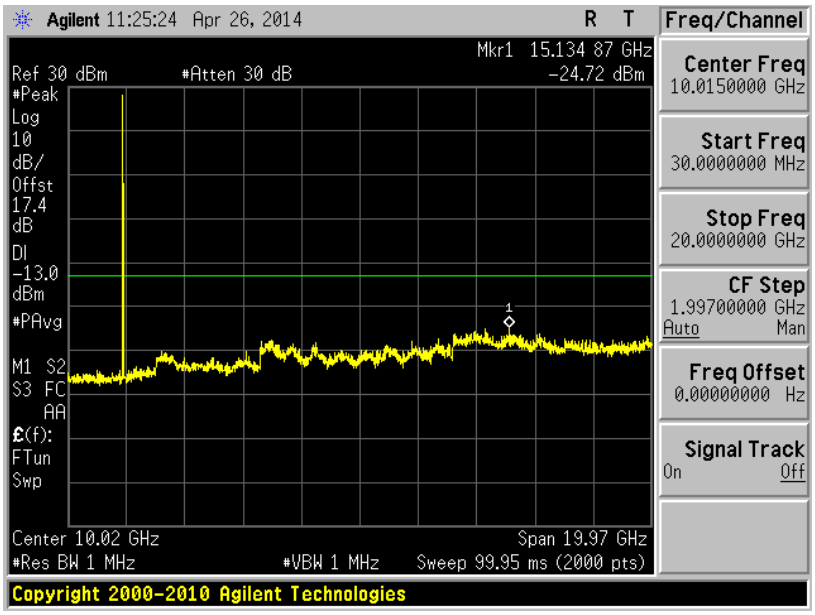


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 20000 MHz



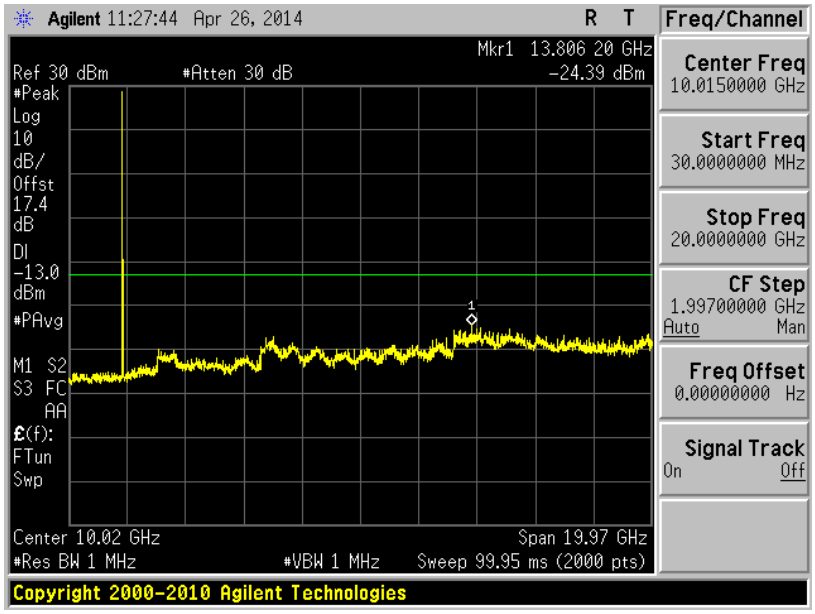
HIGH, RB1-0, 30 TO 20000 MHz



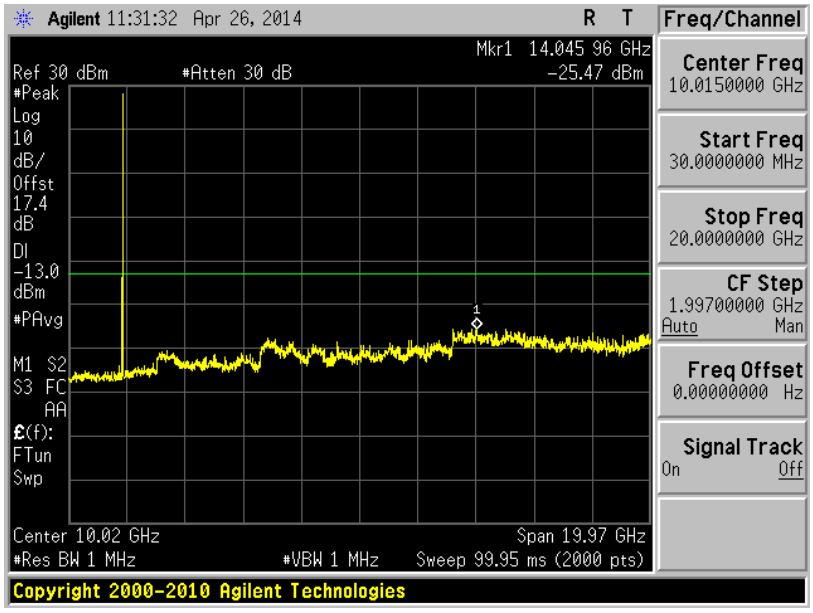
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (15.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

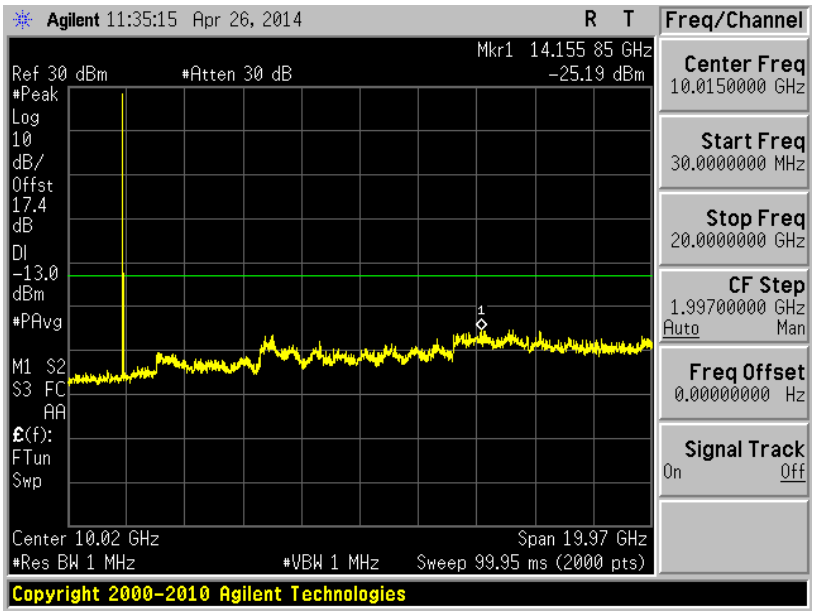


MID, RB1-0, 30 TO 20000 MHz



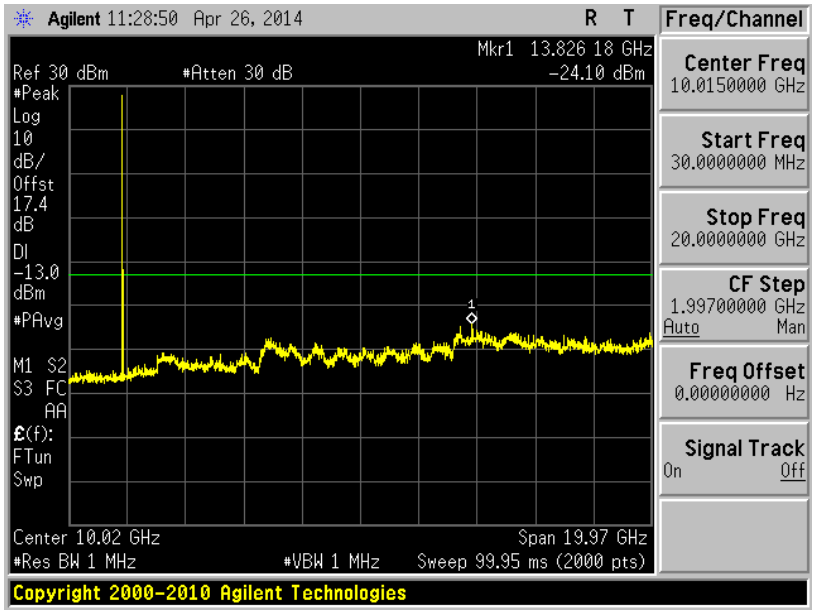
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 20000 MHz



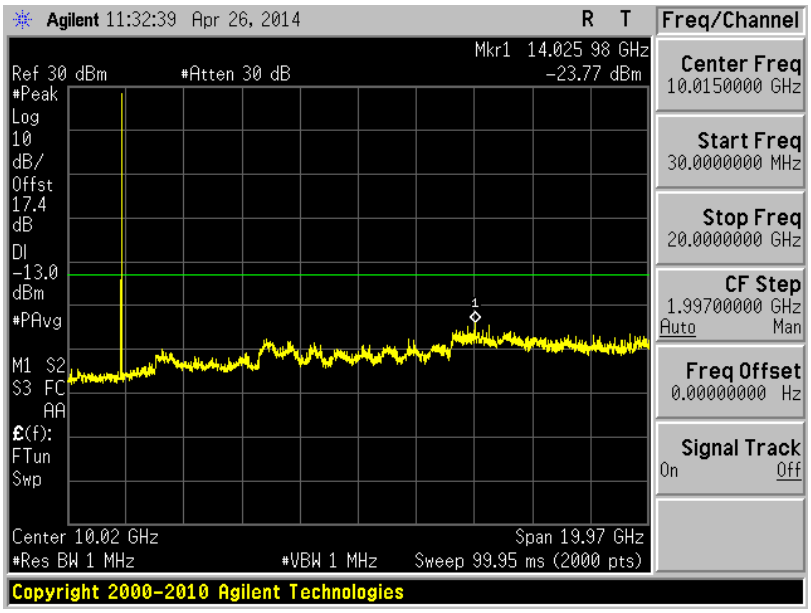
16QAM, (15.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

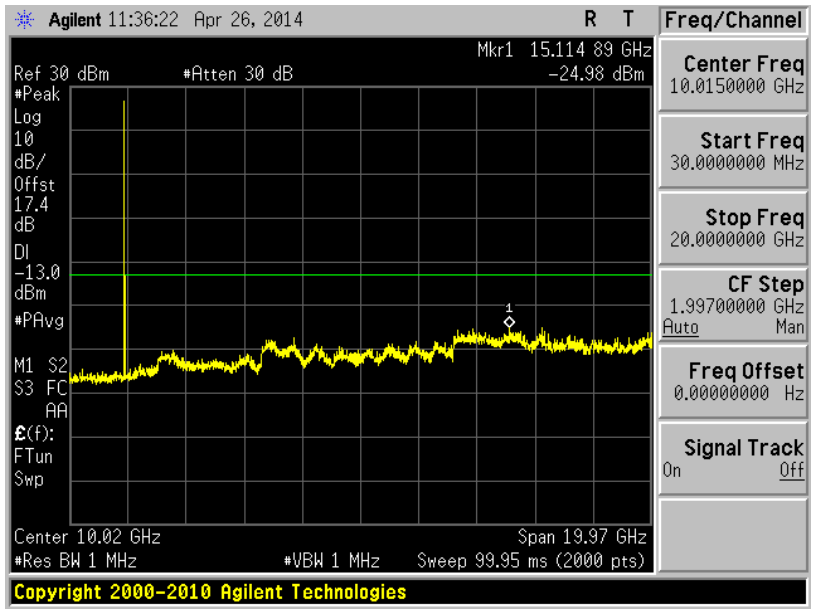


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 20000 MHz



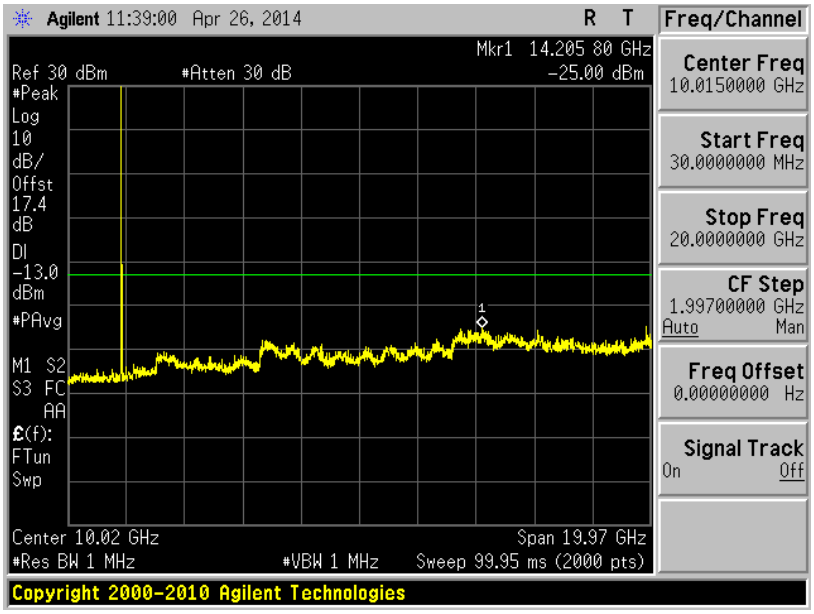
HGIH, RB1-0, 30 TO 20000 MHz



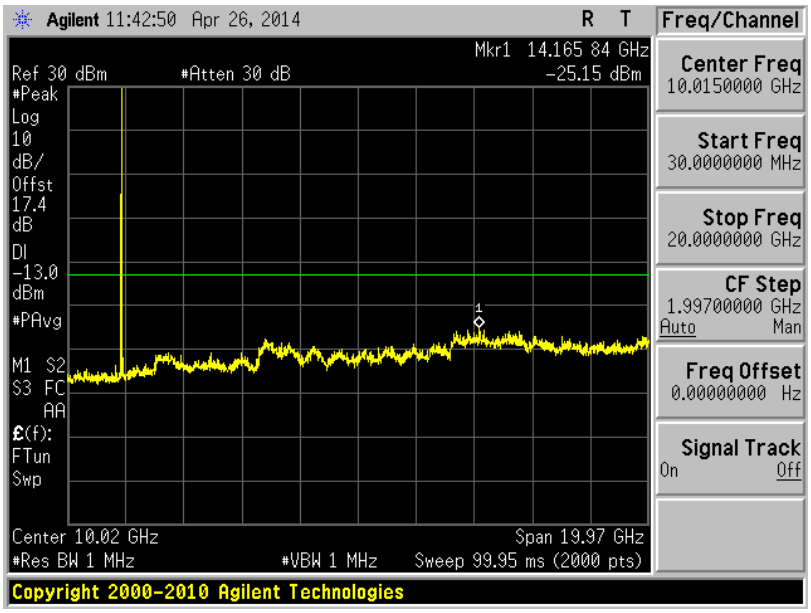
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (20.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

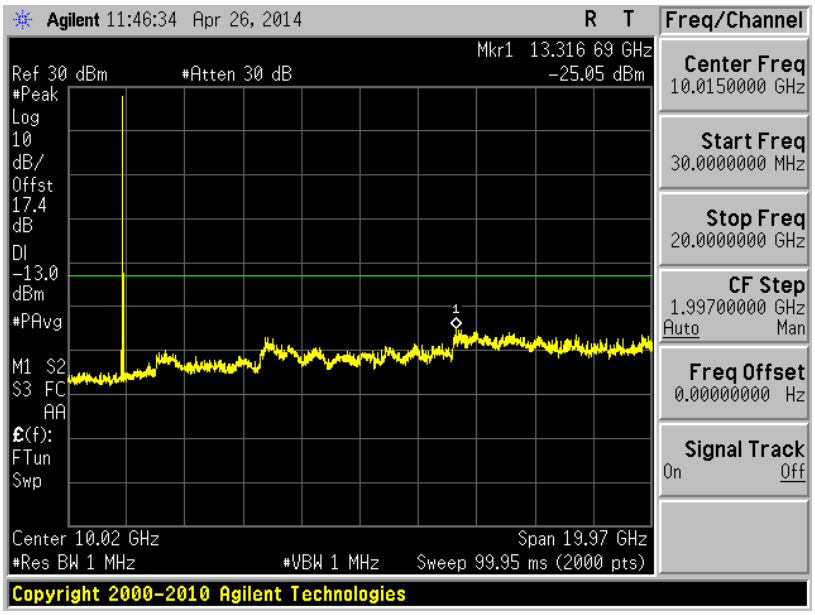


MID, RB1-0, 30 TO 20000 MHz



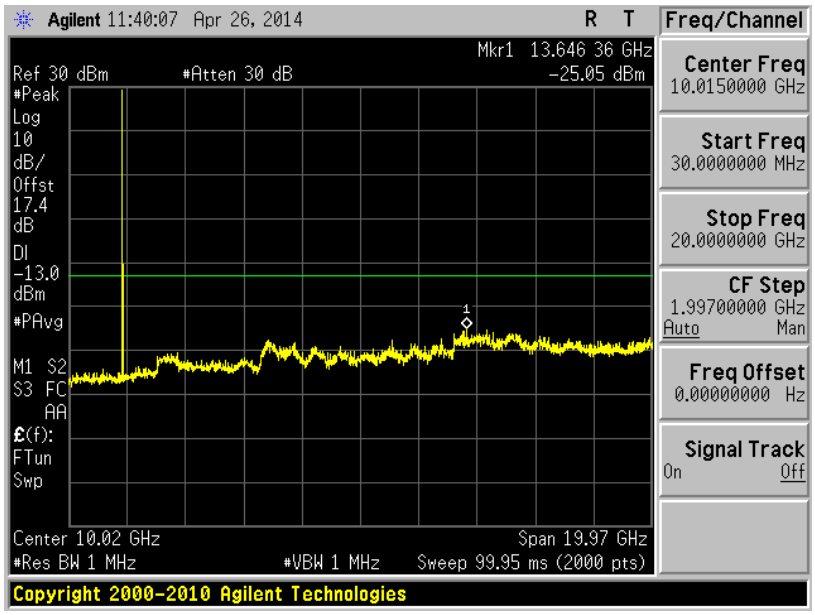
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 20000 MHz



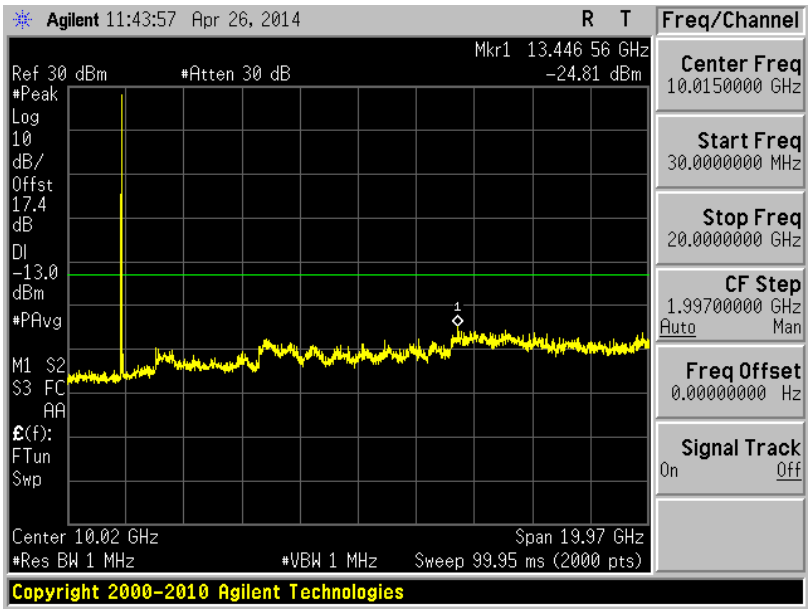
16QAM, (20.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 20000 MHz

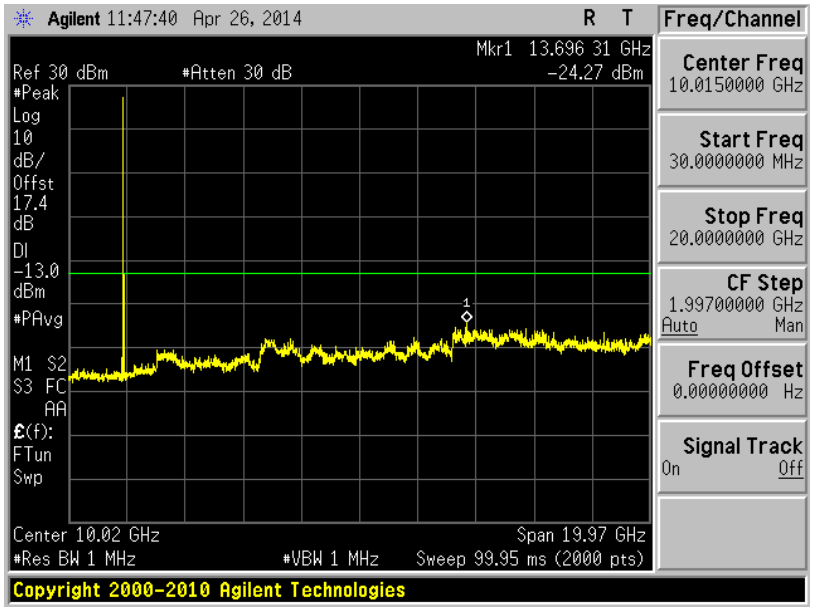


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 20000 MHz



HIGH, RB1-0, 30 TO 20000 MHz

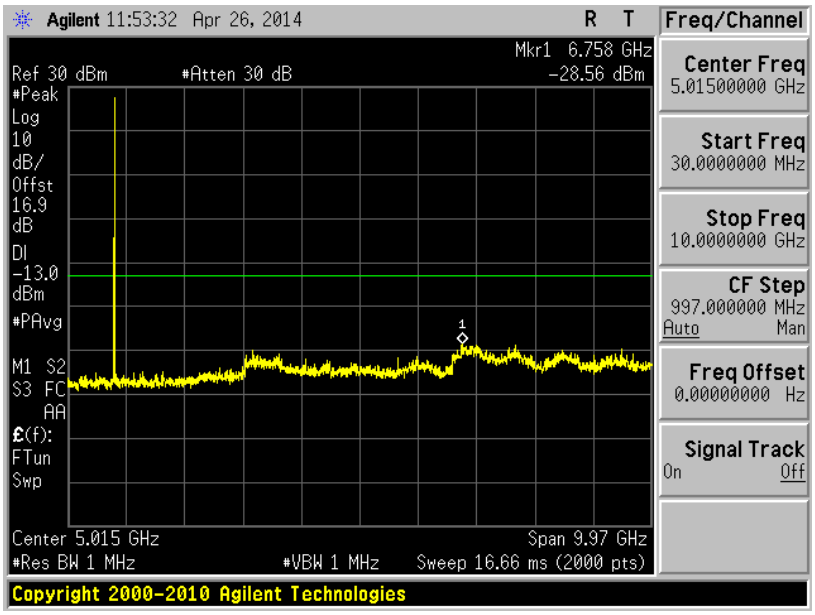


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

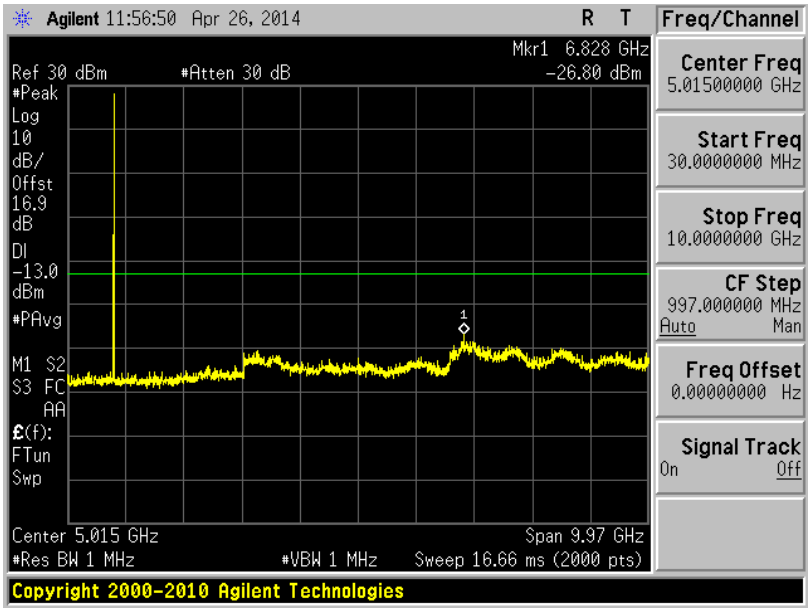
8.3.7. LTE BAND 26

QPSK, (3.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 10000 MHz

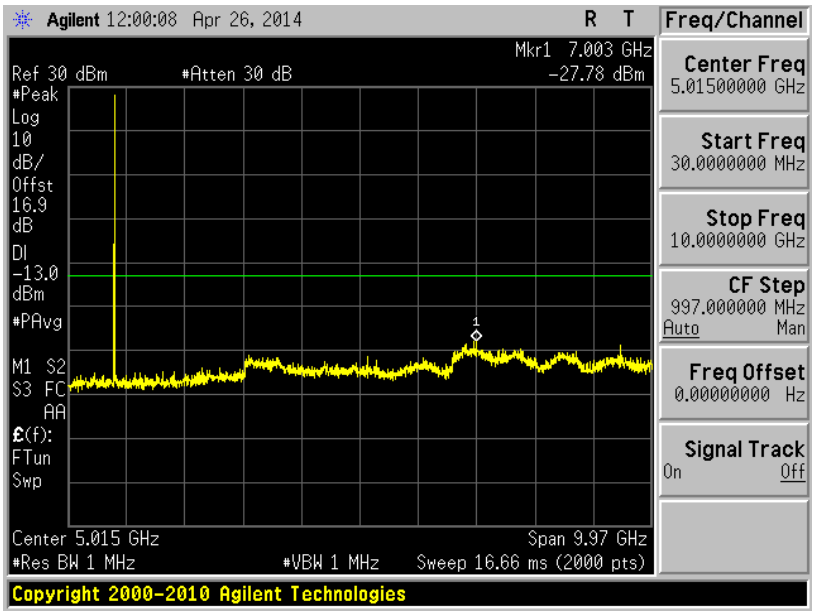


MID, RB1-0, 30 TO 10000 MHz



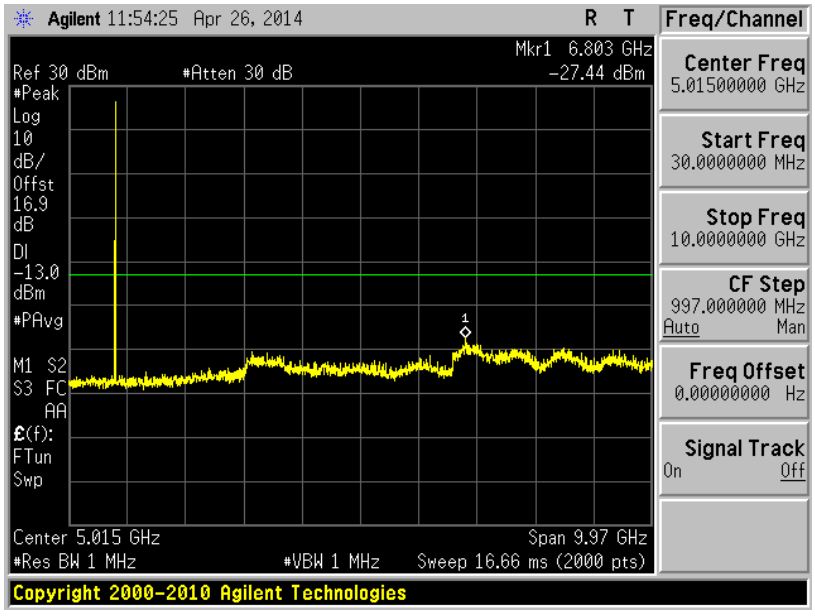
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 10000 MHz



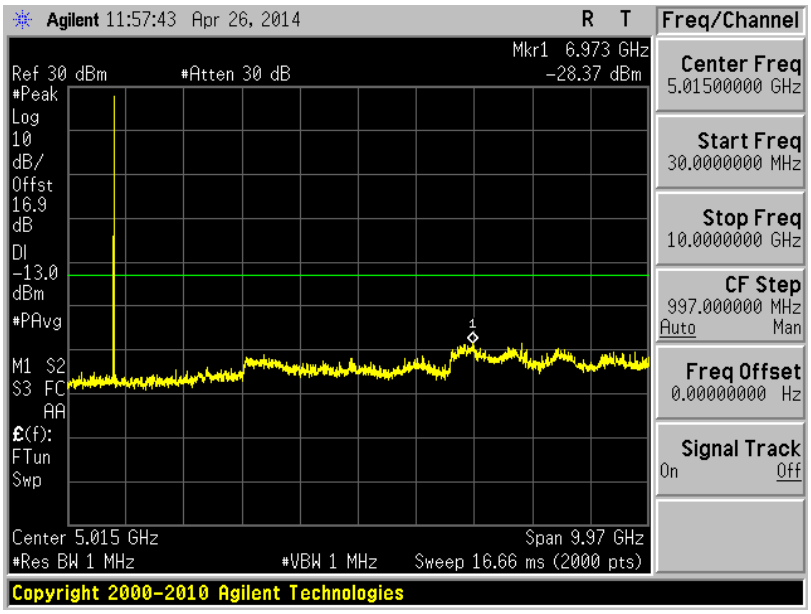
16QAM, (3.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 10000 MHz

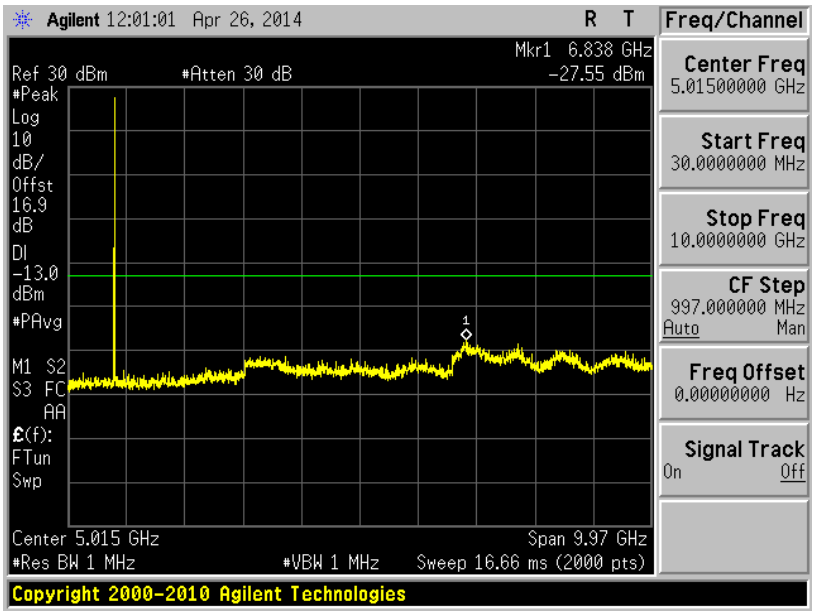


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 10000 MHz



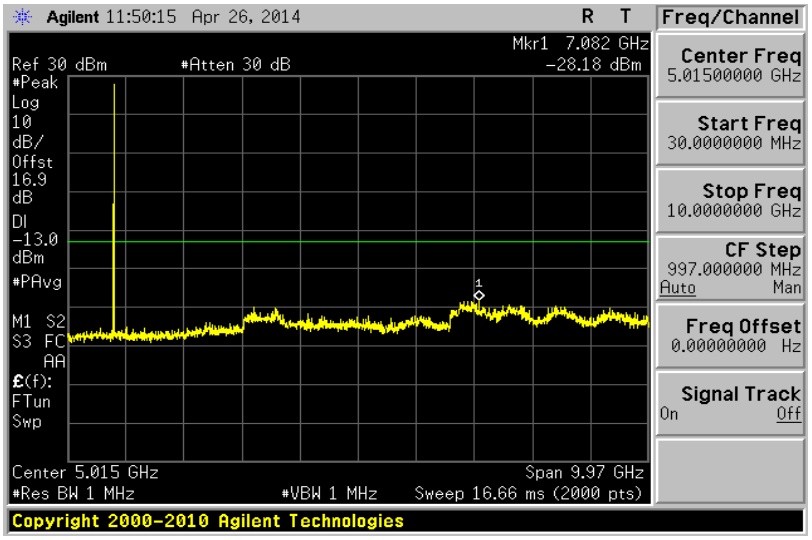
HIGH, RB1-0, 30 TO 10000 MHz



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

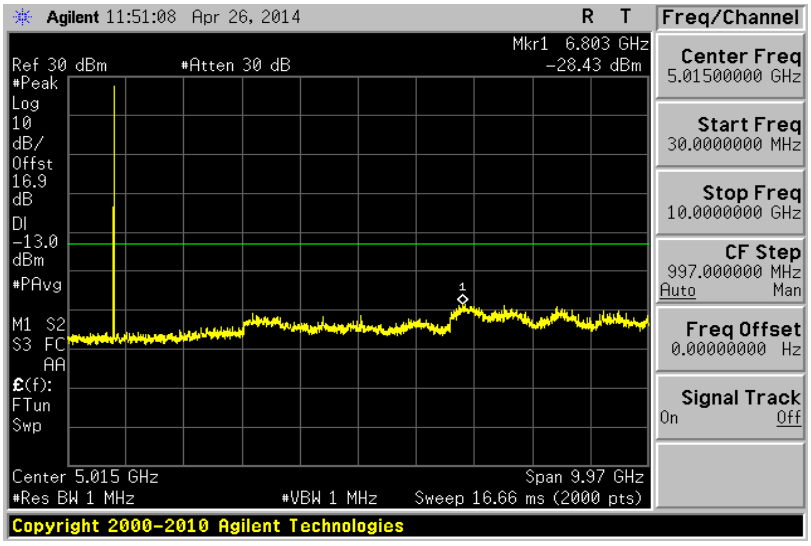
QPSK, (5.0 MHz BAND WIDTH)

MID, RB1-0, 30 TO 10000 MHz



16QAM, (5.0 MHz BAND WIDTH)

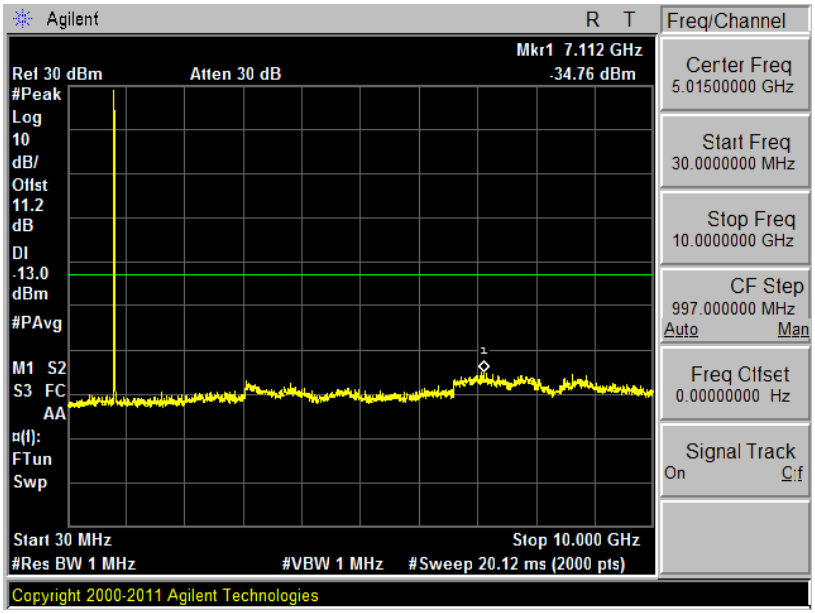
MID, RB1-0, 30 TO 10000 MHz



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

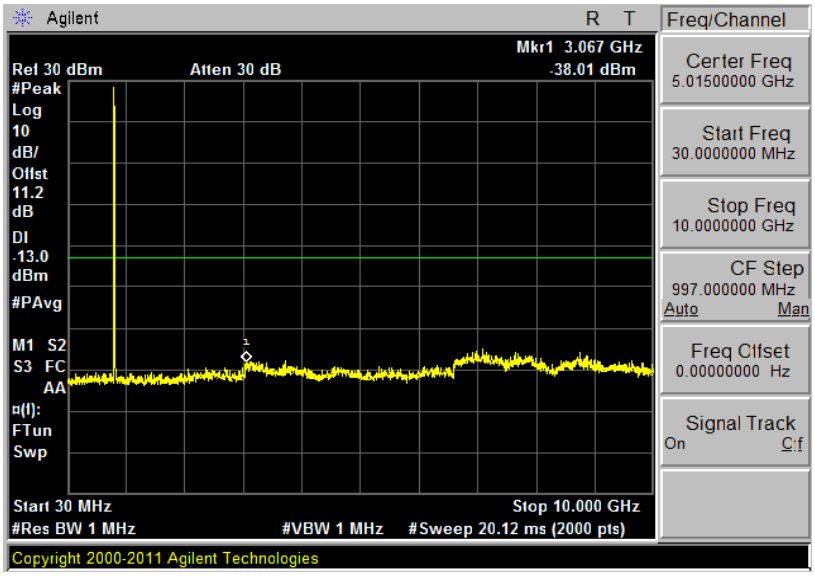
QPSK, (10.0 MHz BAND WIDTH)

MID, RB1-0, 30 TO 10000 MHz



16QAM, (10.0 MHz BAND WIDTH)

MID, RB1-0, 30 TO 10000 MHz

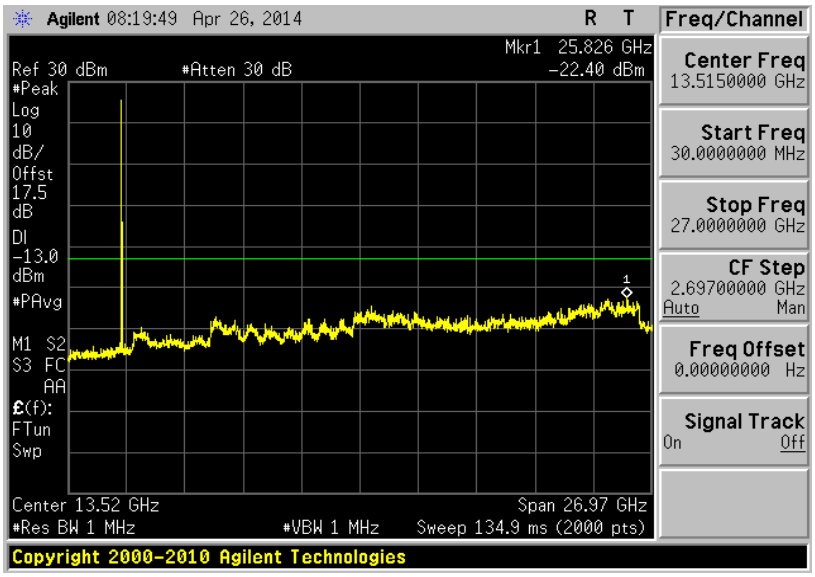


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

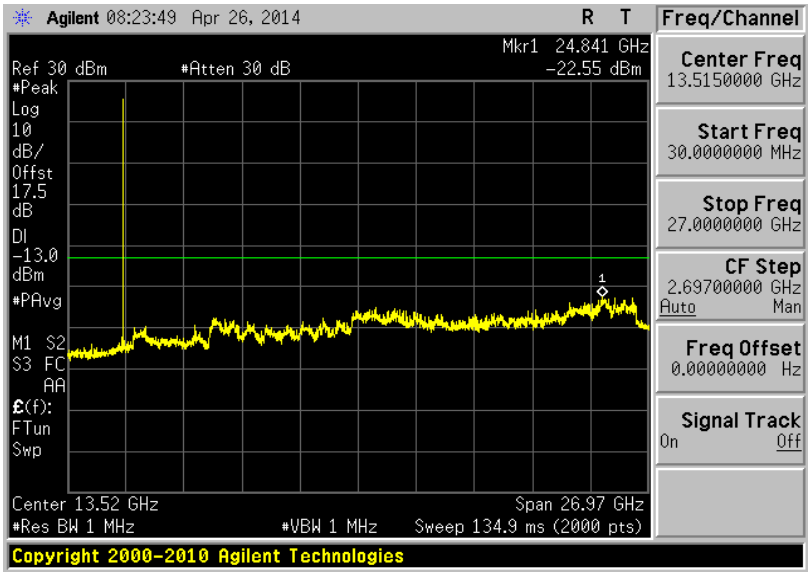
8.3.8. LTE BAND 41

QPSK, (5.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 26000 MHz

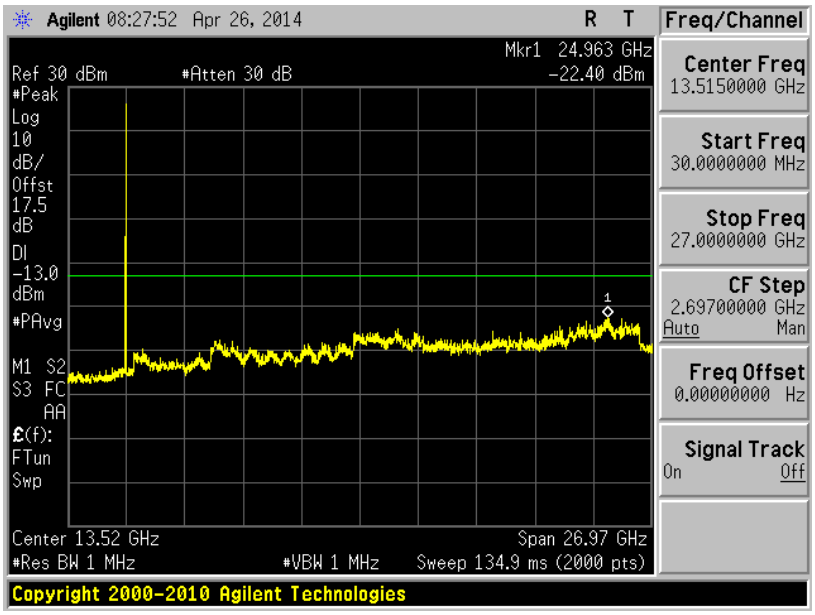


MID, RB1-0, 30 TO 26000 MHz



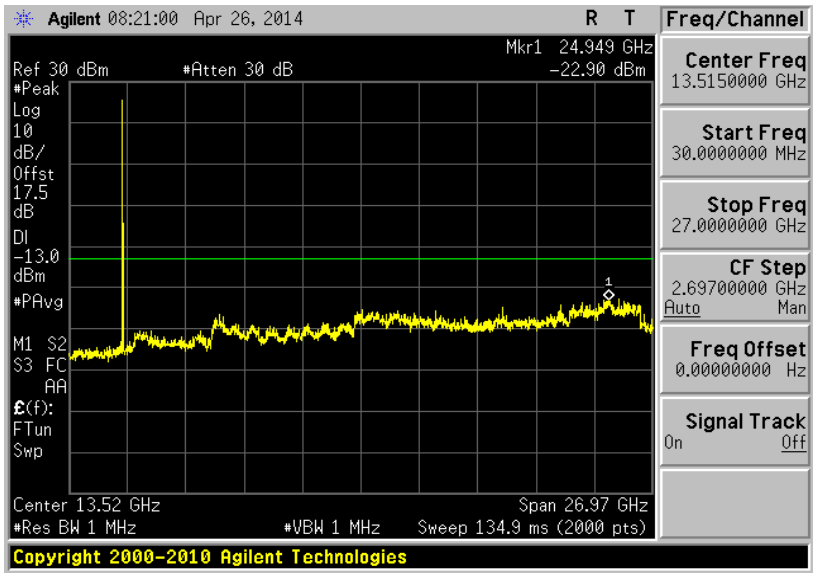
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 26000 MHz



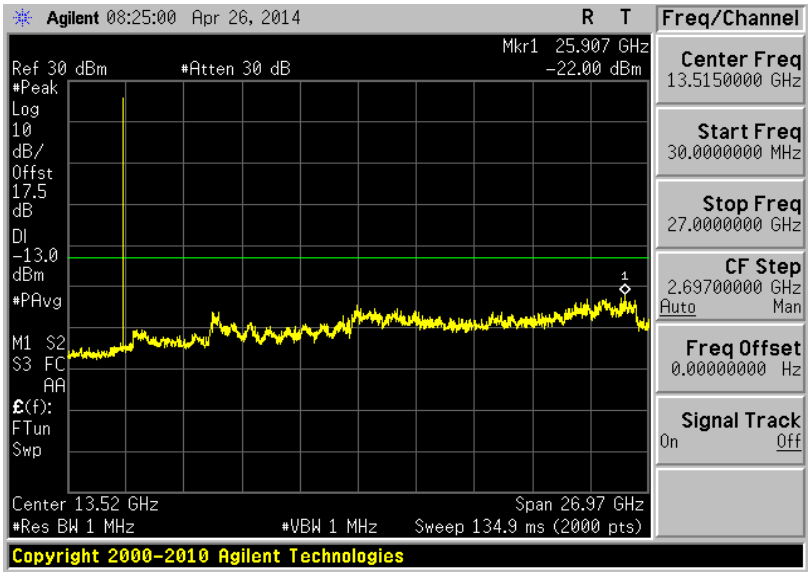
16QAM, (5.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 26000 MHz

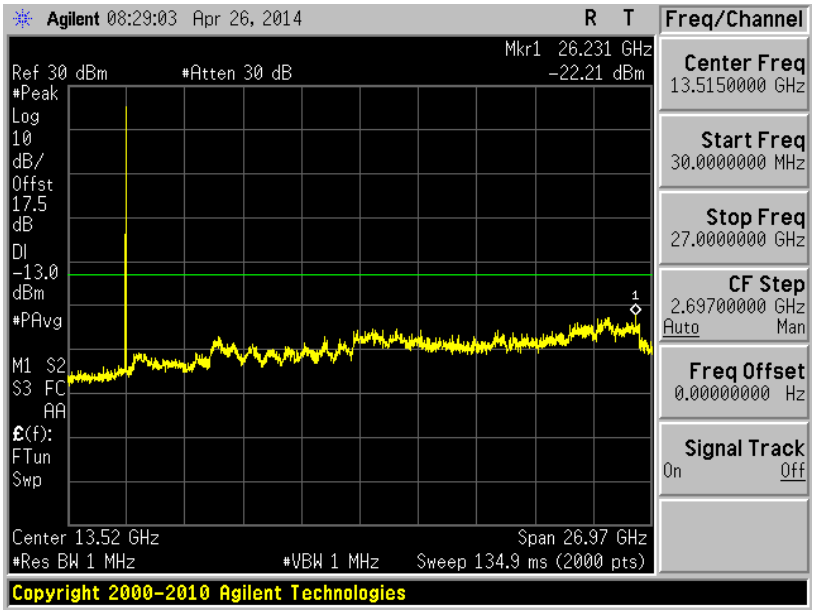


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 26000 MHz



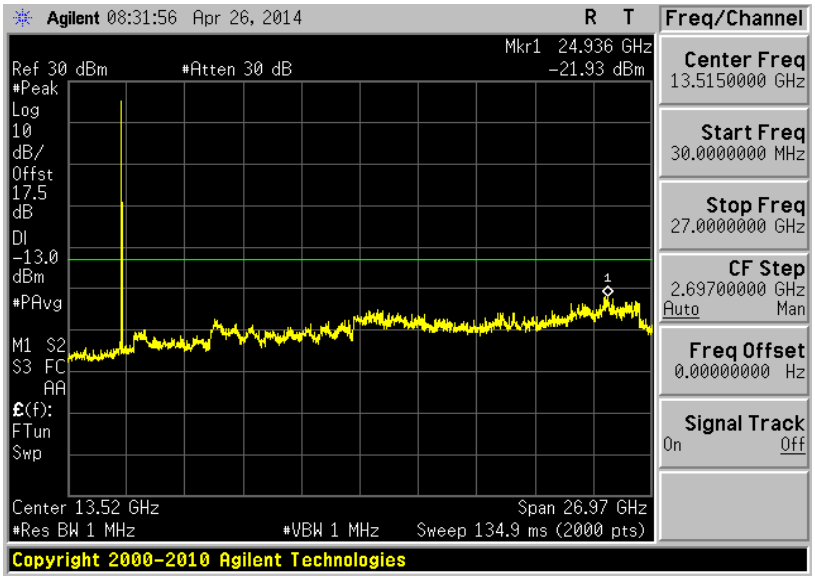
HIGH, RB1-0, 30 TO 26000 MHz



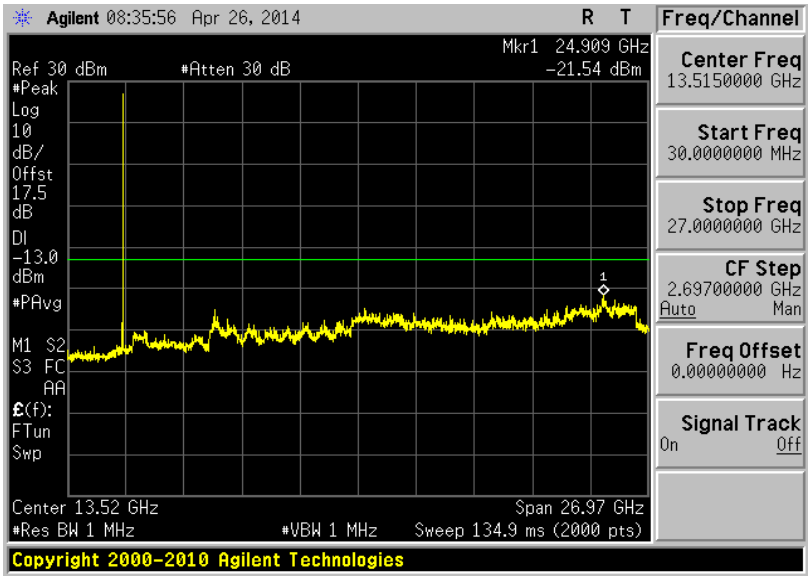
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (10.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 26000 MHz

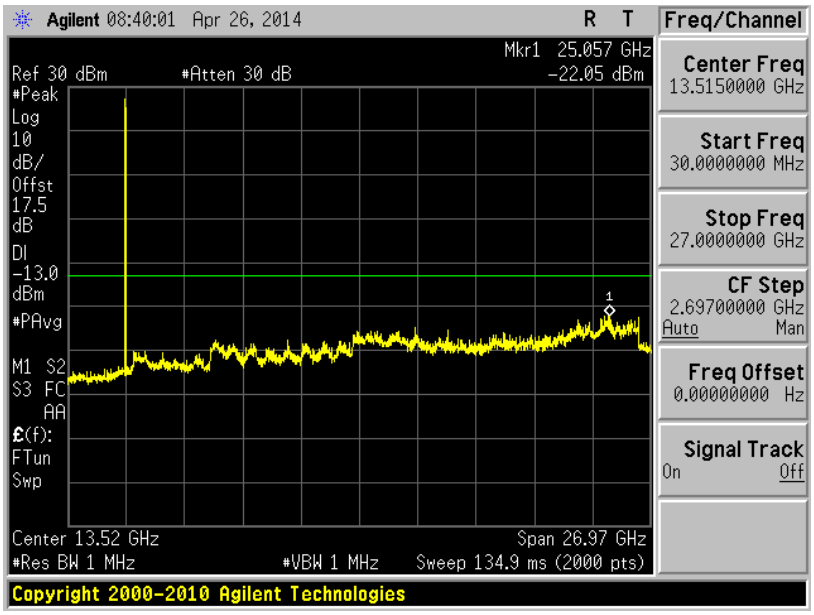


MID, RB1-0, 30 TO 26000 MHz



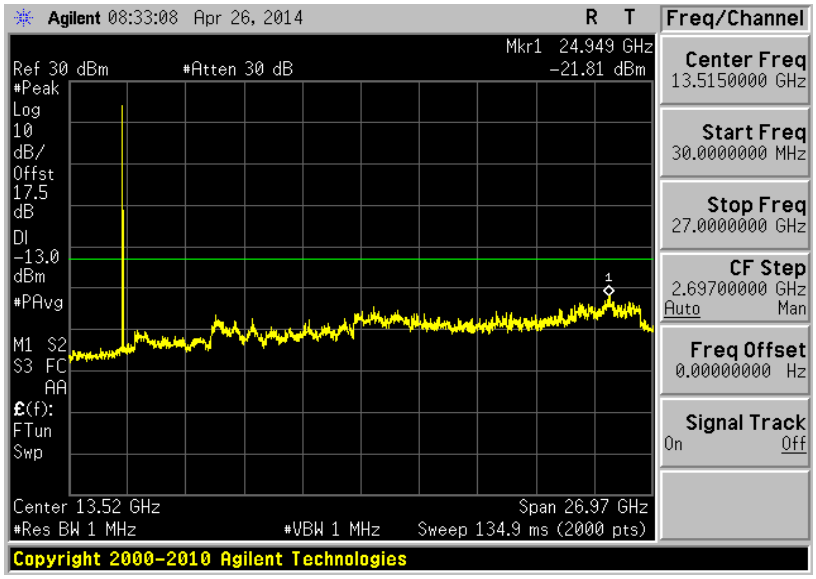
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 26000 MHz



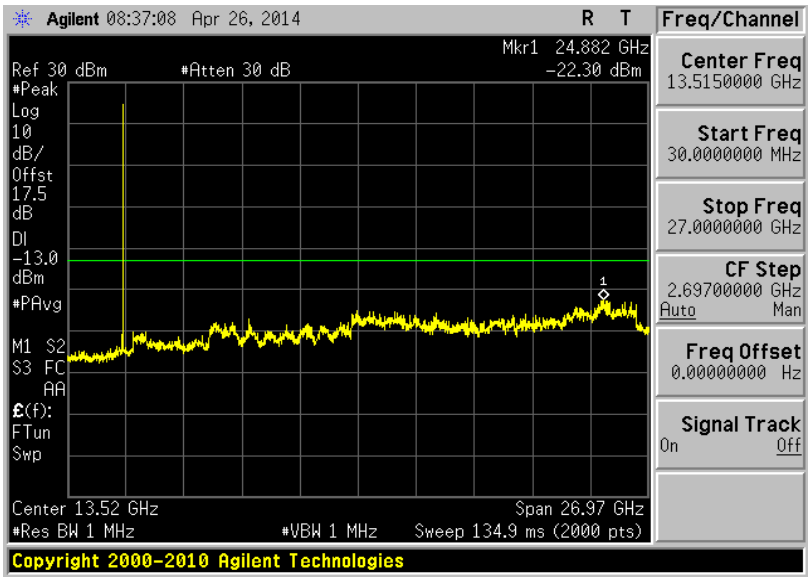
16QAM, (10.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 26000 MHz

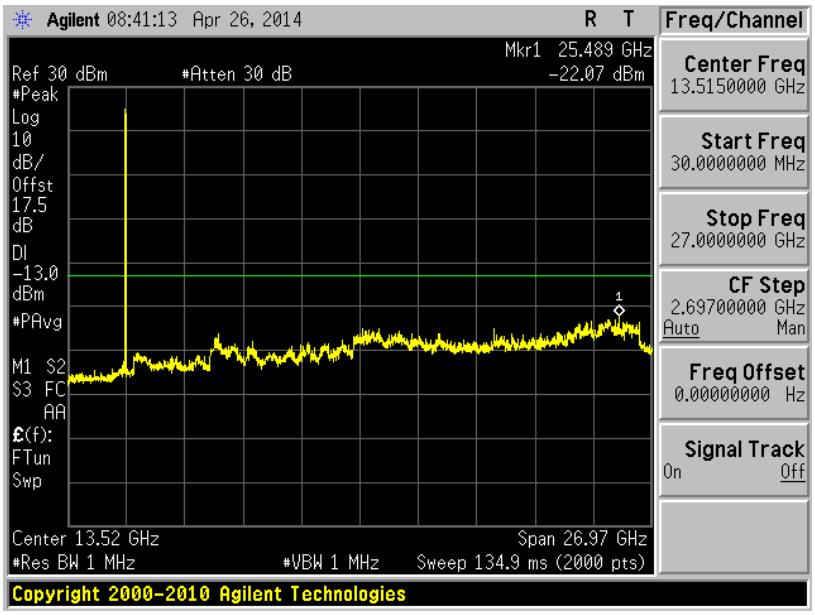


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 26000 MHz



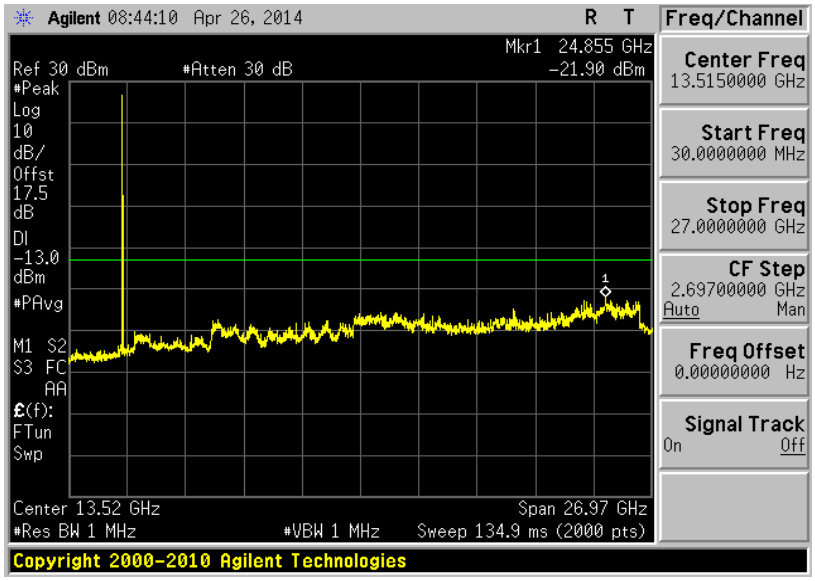
HIGH, RB1-0, 30 TO 26000 MHz



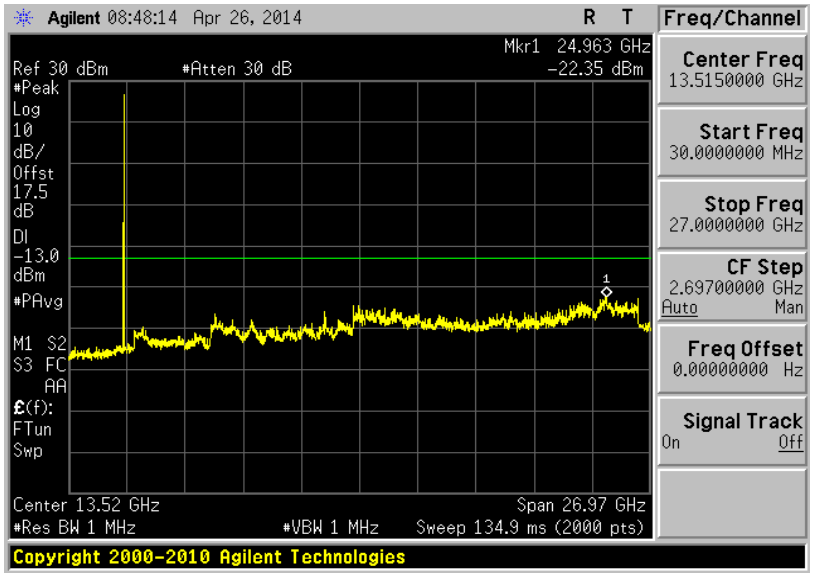
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (15.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 26000 MHz

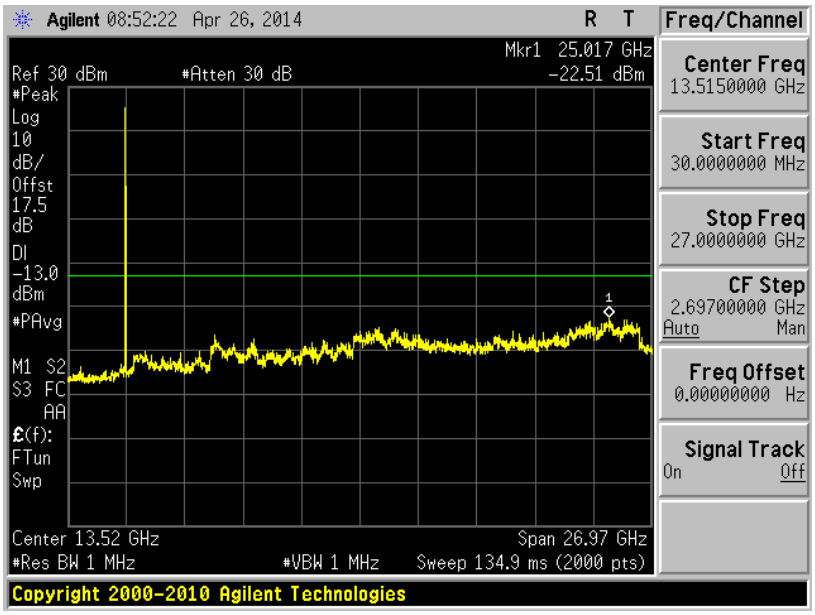


MID, RB1-0, 30 TO 26000 MHz



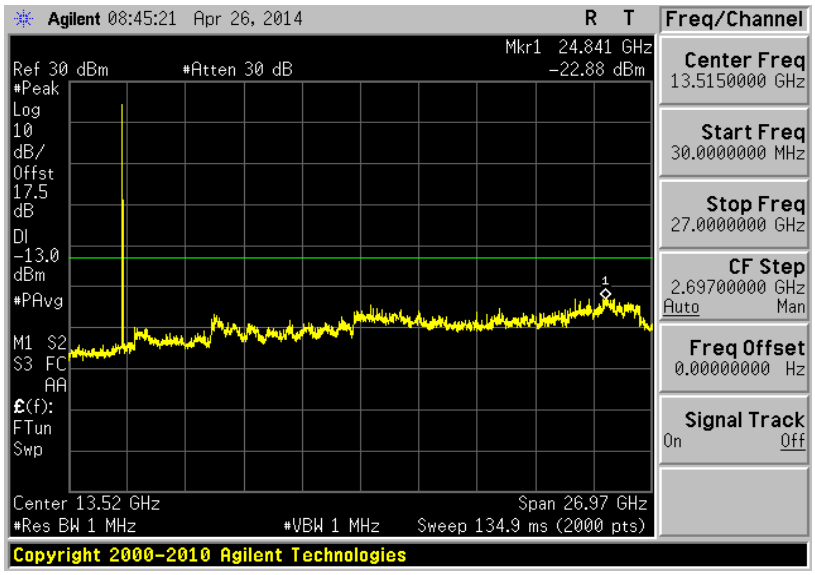
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 26000 MHz



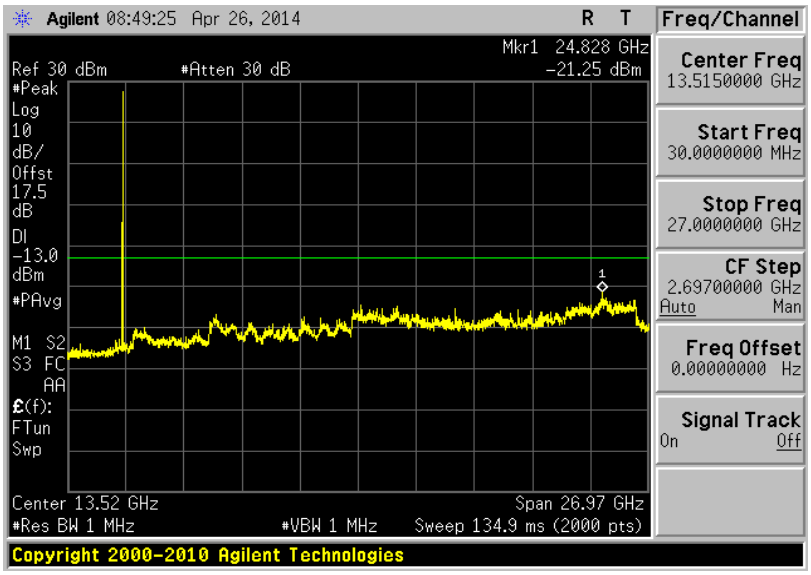
16QAM, (15.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 26000 MHz

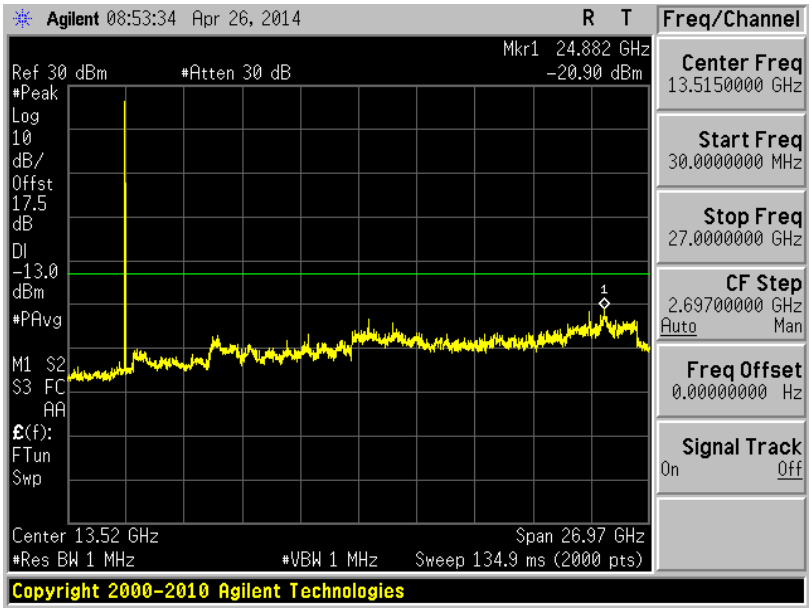


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

MID, RB1-0, 30 TO 26000 MHz



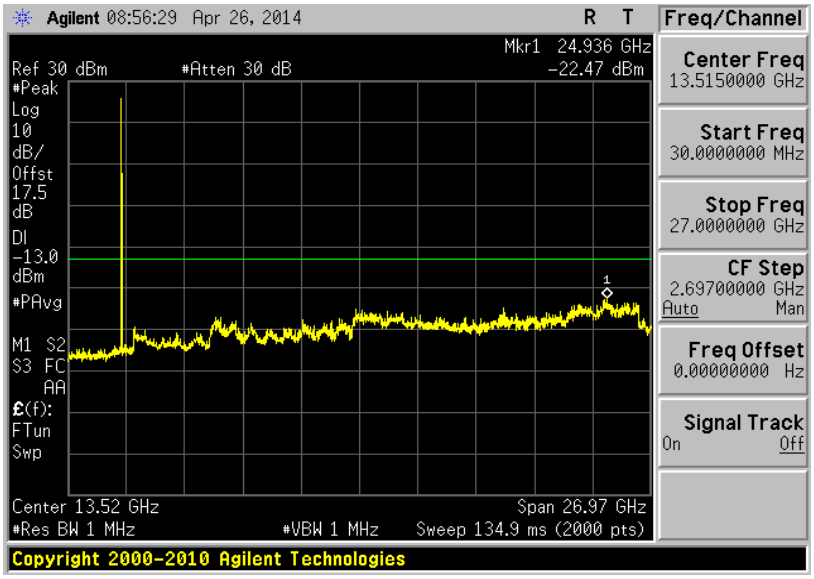
HIGH, RB1-0, 30 TO 26000 MHz



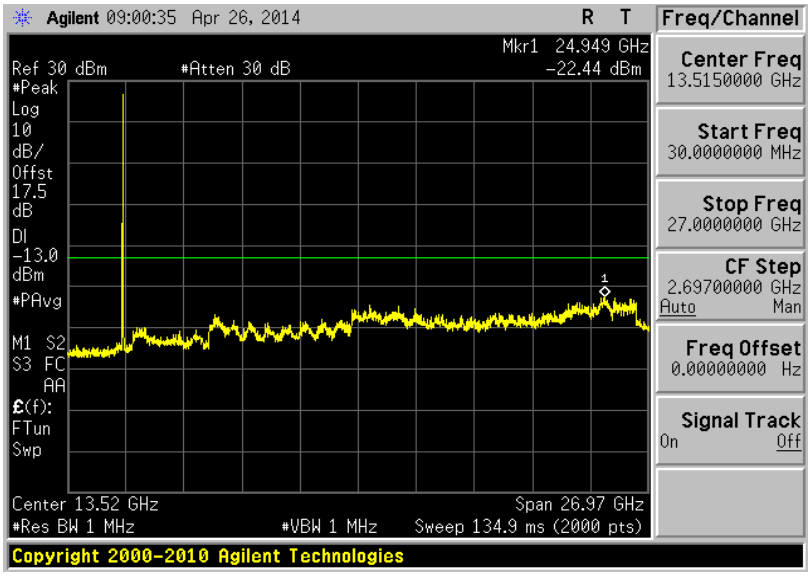
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

QPSK, (20.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 26000 MHz

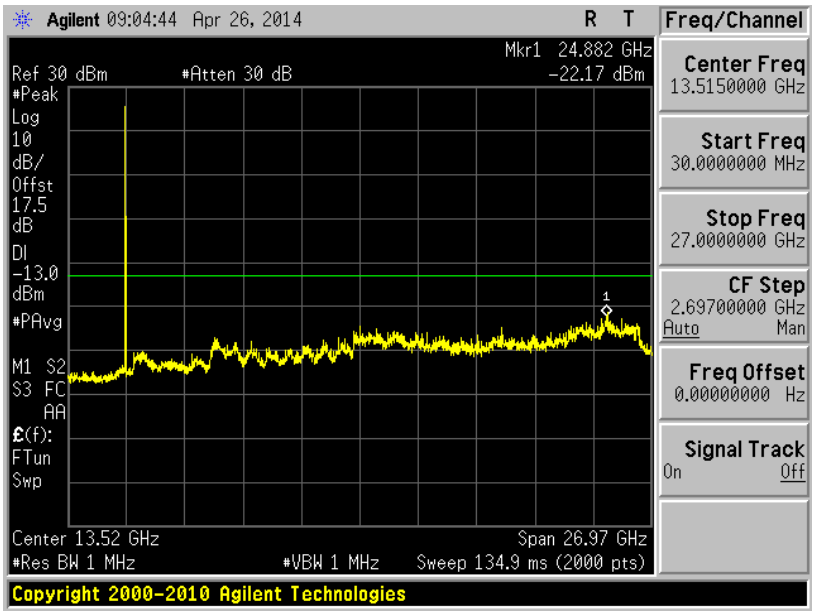


MID, RB1-0, 30 TO 26000 MHz



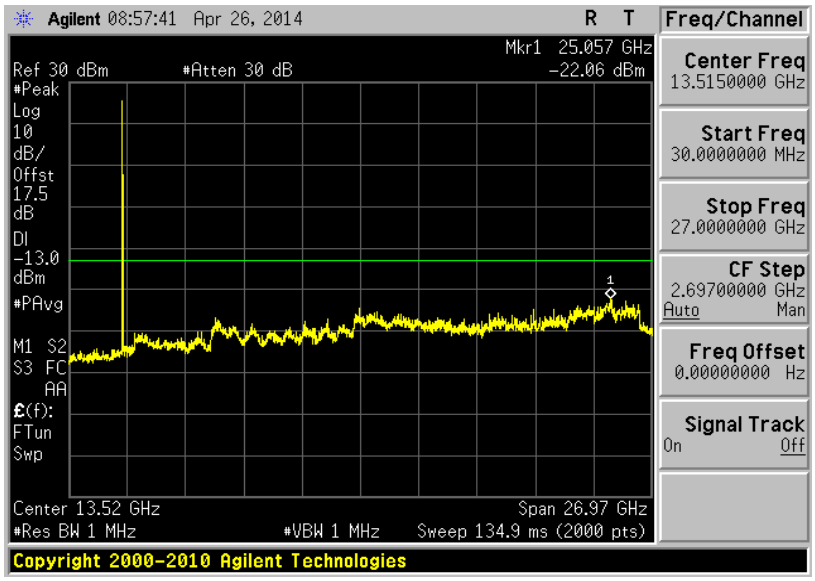
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

HIGH, RB1-0, 30 TO 26000 MHz



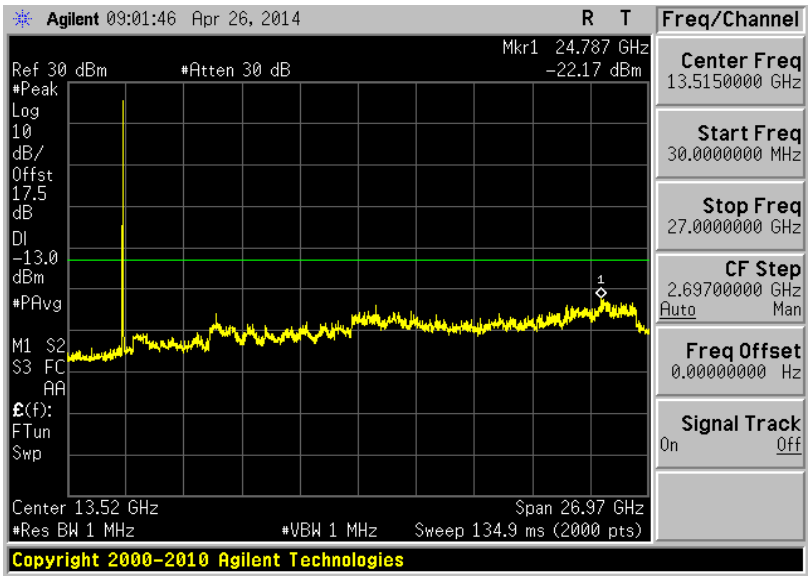
16QAM, (20.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 26000 MHz

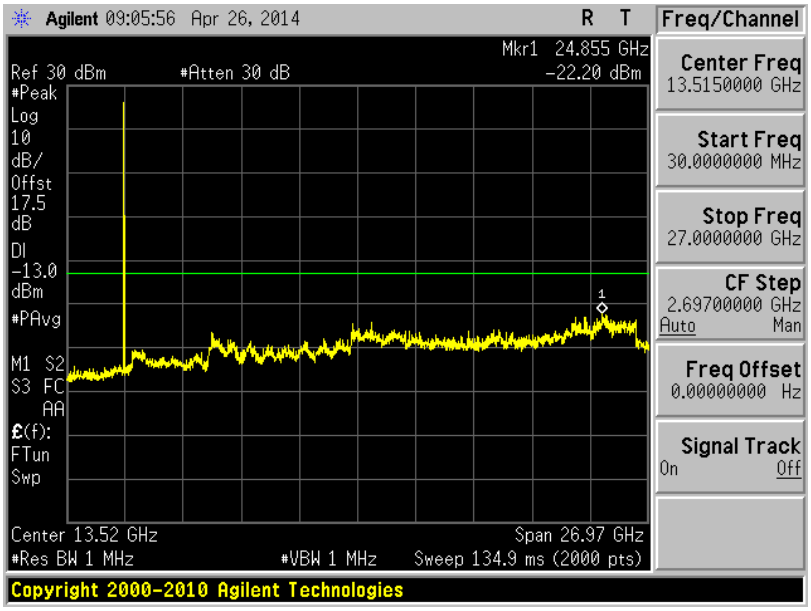


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

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.

8.4. FREQUENCY STABILITY

RULE PART(S)

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

LIMITS

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

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

TEST PROCEDURE

Use CMW 500 with Frequency Error measurement capability.

- Temp. = −30° to +50°C
- Voltage =low voltage, 3.4VDC, Normal, 3.8VDC and High voltage, 4.3VDC.

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

- LTE Band 2
- LTE Band 4
- LTE Band 5
- LTE Band 13
- LTE Band 17
- LTE Band 25
- LTE Band 26
- LTE Band 41

RESULTS

See the following pages.

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

8.4.1. LTE BAND 2

QPSK, (10MHz BANDWIDTH)

Limit		1850	1910	Delta (Hz)	Margin (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (25C)	Normal	1851.0032	1908.9923		
Extreme (50C)		1851.0032	1908.9923	-6.4	-0.003
Extreme (40C)		1851.0032	1908.9923	-7.6	-0.004
Extreme (30C)		1851.0032	1908.9923	-7.5	-0.004
Extreme (10C)		1851.0032	1908.9923	-5.6	-0.003
Extreme (0C)		1851.0032	1908.9923	-8.0	-0.004
Extreme (-10C)		1851.0032	1908.9923	-8.2	-0.004
Extreme (-20C)		1851.0032	1908.9923	-7.0	-0.004
Extreme (-30C)		1851.0032	1908.9923	-5.8	-0.003
25C	10%	1851.0032	1908.9923	-5.0	-0.003
	-10%	1851.0032	1908.9923	9.3	0.005
	End Point	1851.0032	1908.9923	8.8	0.005

16QAM, (10MHz BANDWIDTH)

Limit		1850	1910	Delta (Hz)	Margin (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (25C)	Normal	1851.0120	1908.9923		
Extreme (50C)		1851.0119	1908.9923	-11.0	-0.006
Extreme (40C)		1851.0120	1908.9923	-7.0	-0.004
Extreme (30C)		1851.0120	1908.9923	-7.6	-0.004
Extreme (10C)		1851.0120	1908.9923	-7.2	-0.004
Extreme (0C)		1851.0120	1908.9923	-5.5	-0.003
Extreme (-10C)		1851.0120	1908.9923	-10.0	-0.005
Extreme (-20C)		1851.0120	1908.9923	-4.8	-0.003
Extreme (-30C)		1851.0120	1908.9923	-7.5	-0.004
25C	10%	1851.0120	1908.9923	-8.3	-0.004
	-10%	1851.0119	1908.9923	-10.6	-0.006
	End Point	1851.0120	1908.9923	-9.4	-0.005

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

8.4.2. LTE BAND 4

QPSK, (10MHz BANDWIDTH)

Limit		1710	1755	Delta (Hz)	Margin (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (25C)	Normal	1711.0065	1753.9949		
Extreme (50C)		1711.0065	1753.9949	-8.3	-0.005
Extreme (40C)		1711.0065	1753.9949	-8.0	-0.005
Extreme (30C)		1711.0065	1753.9949	-7.1	-0.004
Extreme (10C)		1711.0065	1753.9949	-7.9	-0.005
Extreme (0C)		1711.0065	1753.9949	-7.9	-0.005
Extreme (-10C)		1711.0065	1753.9949	5.2	0.003
Extreme (-20C)		1711.0065	1753.9949	-6.8	-0.004
Extreme (-30C)		1711.0065	1753.9949	-5.5	-0.003
25C	10%	1711.0065	1753.9949	-6.2	-0.004
	-10%	1711.0065	1753.9949	-6.5	-0.004
	End Point	1711.0065	1753.9949	-5.5	-0.003

16QAM, (10MHz BANDWIDTH)

Limit		1710	1755	Delta (Hz)	Margin (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (25C)	Normal	1711.0068	1753.9968		
Extreme (50C)		1711.0068	1753.9968	-7.2	-0.004
Extreme (40C)		1711.0068	1753.9968	-12.0	-0.007
Extreme (30C)		1711.0068	1753.9968	-8.3	-0.005
Extreme (10C)		1711.0068	1753.9968	-6.8	-0.004
Extreme (0C)		1711.0068	1753.9968	-7.0	-0.004
Extreme (-10C)		1711.0068	1753.9968	-7.3	-0.004
Extreme (-20C)		1711.0068	1753.9968	-9.0	-0.005
Extreme (-30C)		1711.0068	1753.9968	-5.2	-0.003
25C	10%	1711.0068	1753.9968	-9.5	-0.005
	-10%	1711.0068	1753.9968	-7.8	-0.004
	End Point	1711.0068	1753.9968	-8.4	-0.005

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

8.4.3. LTE BAND 5

QPSK, (10MHz BANDWIDTH)

Limit		824	849	Delta (Hz)	Margin (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (25C)	Normal	824.4964	848.5041		
Extreme (50C)		824.4964	848.5041	-4.2	-0.005
Extreme (40C)		824.4964	848.5041	-7.4	-0.009
Extreme (30C)		824.4964	848.5041	-5.0	-0.006
Extreme (10C)		824.4964	848.5041	3.2	0.004
Extreme (0C)		824.4964	848.5041	-3.8	-0.005
Extreme (-10C)		824.4964	848.5041	5.2	0.006
Extreme (-20C)		824.4964	848.5041	4.4	0.005
Extreme (-30C)		824.4964	848.5041	3.7	0.004
25C	10%	824.4964	848.5041	-3.6	-0.004
	-10%	824.4964	848.5041	-4.1	-0.005
	End Point	824.4964	848.5041	-3.4	-0.004

16QAM, (10MHz BANDWIDTH)

Limit		824	849	Delta (Hz)	Margin (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (25C)	Normal	824.4973	848.4921		
Extreme (50C)		824.4973	848.4921	-6.0	-0.007
Extreme (40C)		824.4973	848.4921	-6.9	-0.008
Extreme (30C)		824.4973	848.4921	-3.7	-0.004
Extreme (10C)		824.4973	848.4921	-6.0	-0.007
Extreme (0C)		824.4973	848.4921	-6.2	-0.007
Extreme (-10C)		824.4973	848.4921	3.8	0.004
Extreme (-20C)		824.4973	848.4921	-4.2	-0.005
Extreme (-30C)		824.4973	848.4921	-5.6	-0.007
25C	10%	824.4973	848.4921	2.4	0.003
	-10%	824.4973	848.4921	-5.5	-0.007
	End Point	824.4973	848.4921	4.1	0.005

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

8.4.4. LTE BAND 13

QPSK, (10MHz BANDWIDTH)

Limit		777	787	Delta (Hz)	Margin (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (25C)	Normal	777.4995	786.4963		
Extreme (50C)		777.4995	786.4963	-4.2	-0.005
Extreme (40C)		777.4995	786.4963	-5.0	-0.006
Extreme (30C)		777.4995	786.4963	-4.0	-0.005
Extreme (10C)		777.4995	786.4963	-5.7	-0.007
Extreme (0C)		777.4995	786.4963	3.1	0.004
Extreme (-10C)		777.4995	786.4963	-3.7	-0.005
Extreme (-20C)		777.4995	786.4963	3.8	0.005
Extreme (-30C)		777.4995	786.4963	-3.3	-0.004
25C	10%	777.4995	786.4963	4.2	0.005
	-10%	777.4995	786.4963	-3.2	-0.004
	End Point	777.4995	786.4963	1.7	0.002

16QAM, (10MHz BANDWIDTH)

Limit		777	787	Delta (Hz)	Margin (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (25C)	Normal	777.5017	786.4963		
Extreme (50C)		777.5017	786.4963	3.7	0.005
Extreme (40C)		777.5017	786.4963	-4.0	-0.005
Extreme (30C)		777.5016	786.4963	-6.8	-0.009
Extreme (10C)		777.5017	786.4963	-2.1	-0.003
Extreme (0C)		777.5017	786.4963	3.8	0.005
Extreme (-10C)		777.5017	786.4963	2.2	0.003
Extreme (-20C)		777.5017	786.4963	3.9	0.005
Extreme (-30C)		777.5017	786.4963	8.8	0.011
25C	10%	777.5017	786.4963	-3.1	-0.004
	-10%	777.5017	786.4963	-3.8	-0.005
	End Point	777.5017	786.4963	-2.4	-0.003

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

8.4.5. LTE BAND 17

QPSK, (10MHz BANDWIDTH)

Limit		704	716	Delta (Hz)	Margin (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (25C)	Normal	704.5012	715.4976		
Extreme (50C)		704.5012	715.4976	4.7	0.007
Extreme (40C)		704.5012	715.4976	-3.7	-0.005
Extreme (30C)		704.5012	715.4976	-3.8	-0.005
Extreme (10C)		704.5012	715.4976	2.8	0.004
Extreme (0C)		704.5012	715.4976	3.8	0.005
Extreme (-10C)		704.5012	715.4976	4.2	0.006
Extreme (-20C)		704.5012	715.4976	3.0	0.004
Extreme (-30C)		704.5012	715.4976	3.3	0.005
25C	10%	704.5012	715.4976	3.7	0.005
	-10%	704.5012	715.4976	3.9	0.005
	End Point	704.5012	715.4976	3.6	0.005

16QAM, (10MHz BANDWIDTH)

Limit		704	716	Delta (Hz)	Margin (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (25C)	Normal	704.5036	715.5045		
Extreme (50C)		704.5036	715.5045	14.2	0.020
Extreme (40C)		704.5036	715.5045	-2.1	-0.003
Extreme (30C)		704.5036	715.5045	3.1	0.004
Extreme (10C)		704.5036	715.5045	2.8	0.004
Extreme (0C)		704.5036	715.5045	4.0	0.006
Extreme (-10C)		704.5036	715.5045	5.1	0.007
Extreme (-20C)		704.5036	715.5045	4.3	0.006
Extreme (-30C)		704.5036	715.5045	-4.2	-0.006
25C	10%	704.5036	715.5045	5.1	0.007
	-10%	704.5036	715.5045	3.3	0.005
	End Point	704.5036	715.5045	3.4	0.005

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

8.4.6. LTE BAND 25

QPSK, (10MHz BANDWIDTH)

Limit		1850	1915	Delta (Hz)	Margin (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (25C)	Normal	1851.0102	1913.9929		
Extreme (50C)		1851.0102	1913.9929	10.2	0.005
Extreme (40C)		1851.0102	1913.9929	11.3	0.006
Extreme (30C)		1851.0102	1913.9929	10.0	0.005
Extreme (10C)		1851.0102	1913.9929	7.9	0.004
Extreme (0C)		1851.0102	1913.9929	12.6	0.007
Extreme (-10C)		1851.0102	1913.9929	2.3	0.001
Extreme (-20C)		1851.0102	1913.9929	8.2	0.004
Extreme (-30C)		1851.0102	1913.9929	11.7	0.006
25C	10%	1851.0102	1913.9929	5.7	0.003
	-10%	1851.0102	1913.9929	7.1	0.004
	End Point	1851.0102	1913.9929	6.4	0.003

16QAM, (10MHz BANDWIDTH)

Limit		1850	1915	Delta (Hz)	Margin (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (25C)	Normal	1850.9923	1913.9943		
Extreme (50C)		1850.9923	1913.9943	2.4	0.001
Extreme (40C)		1850.9923	1913.9943	5.7	0.003
Extreme (30C)		1850.9923	1913.9943	14.0	0.007
Extreme (10C)		1850.9923	1913.9943	9.7	0.005
Extreme (0C)		1850.9923	1913.9943	11.4	0.006
Extreme (-10C)		1850.9923	1913.9943	10.5	0.006
Extreme (-20C)		1850.9923	1913.9943	11.2	0.006
Extreme (-30C)		1850.9923	1913.9943	10.2	0.005
25C	10%	1850.9923	1913.9943	7.3	0.004
	-10%	1850.9923	1913.9943	8.3	0.004
	End Point	1850.9923	1913.9943	7.5	0.004

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

8.4.7. LTE BAND 26

QPSK, (10MHz BANDWIDTH)

Limit		814	824	Delta (Hz)	Margin (ppm)
Condition		F low @ -20dBm	F high @ -20Bm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (25C)	Normal	814.4429	823.5190		
Extreme (50C)		814.4429	823.5190	4.0	0.005
Extreme (40C)		814.4429	823.5190	-4.5	-0.005
Extreme (30C)		814.4429	823.5190	3.2	0.004
Extreme (10C)		814.4429	823.5190	3.6	0.004
Extreme (0C)		814.4429	823.5190	3.9	0.005
Extreme (-10C)		814.4429	823.5190	5.0	0.006
Extreme (-20C)		814.4429	823.5190	8.7	0.011
Extreme (-30C)		814.4429	823.5190	3.6	0.004
25C	10%	814.4429	823.5190	1.3	0.002
	-10%	814.4429	823.5190	-3.3	-0.004
	End Point	814.4429	823.5190	-3.0	-0.004

16QAM, (10MHz BANDWIDTH)

Limit		814	824	Delta (Hz)	Margin (ppm)
Condition		F low @ -20dBm	F high @ -20dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (25C)	Normal	814.4190	823.5540		
Extreme (50C)		814.4190	823.5540	2.2	0.003
Extreme (40C)		814.4191	823.5540	3.2	0.004
Extreme (30C)		814.4190	823.5540	-4.3	-0.005
Extreme (10C)		814.4191	823.5540	8.9	0.011
Extreme (0C)		814.4191	823.5540	4.8	0.006
Extreme (-10C)		814.4191	823.5540	3.6	0.004
Extreme (-20C)		814.4191	823.5540	3.9	0.005
Extreme (-30C)		814.4191	823.5540	3.8	0.005
25C	10%	814.4191	823.5540	4.2	0.005
	-10%	814.4191	823.5540	4.7	0.006
	End Point	814.4191	823.5540	4.5	0.005

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

8.4.8. LTE BAND 41

QPSK, (10MHz BANDWIDTH)

Limit		2496	2690	Delta (Hz)	Margin (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (25C)	Normal	2496.9930	2689.0073		
Extreme (50C)		2496.9930	2689.0073	4.0	0.002
Extreme (40C)		2496.9930	2689.0073	-4.5	-0.002
Extreme (30C)		2496.9930	2689.0073	3.2	0.001
Extreme (10C)		2496.9930	2689.0073	3.6	0.001
Extreme (0C)		2496.9930	2689.0073	3.9	0.001
Extreme (-10C)		2496.9930	2689.0073	5.0	0.002
Extreme (-20C)		2496.9930	2689.0073	8.7	0.003
Extreme (-30C)		2496.9930	2689.0073	3.6	0.001
25C	10%	2496.9930	2689.0073	1.3	0.000
	-10%	2496.9930	2689.0073	-3.3	-0.001
	End Point	2496.9930	2689.0073	2.0	0.001

16QAM, (10MHz BANDWIDTH)

Limit		2496	2690	Delta (Hz)	Margin (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (25C)	Normal	2496.9930	2689.0178		
Extreme (50C)		2496.9930	2689.0178	2.2	0.001
Extreme (40C)		2496.9930	2689.0178	3.2	0.001
Extreme (30C)		2496.9930	2689.0177	-4.3	-0.002
Extreme (10C)		2496.9930	2689.0178	8.9	0.003
Extreme (0C)		2496.9930	2689.0178	4.8	0.002
Extreme (-10C)		2496.9930	2689.0178	3.6	0.001
Extreme (-20C)		2496.9930	2689.0178	3.9	0.002
Extreme (-30C)		2496.9930	2689.0178	3.8	0.001
25C	10%	2496.9930	2689.0178	4.2	0.002
	-10%	2496.9930	2689.0178	4.7	0.002
	End Point	2496.9930	2689.0178	4.5	0.002

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

9. RADIATED TEST RESULTS

9.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §22.913, §24.232 and §27.50

LIMITS:

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

27.50 (c) (10) the following power and antenna height requirements apply to stations transmitting in the 698–746 MHz band, the portable stations (hand-held devices) are limited to 3 watts ERP.

27.50 (b)(10) Portable stations (hand-held devices) transmitting in the 746–757 MHz, 758–763 MHz, 776–793 MHz, and 805–806 MHz bands are limited to 3 watts ERP.

27.50 (d)(4) The following power and antenna height requirements apply to stations transmitting in the 1710–1755 MHz and 2110–2155 MHz bands: Fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP.

TEST PROCEDURE

ANSI / TIA / EIA 603C Clause 2.2.17
KDB 971168 v02r01 RF power output using broadband peak and average power meter method.
KDB 971168 D01 Power Meas License Digital Systems v02r01, “Measurement Guidance for Certification of Licensed Digital Transmitters”

MODES TESTED

- LTE Band 2
- LTE Band 4
- LTE Band 5
- LTE Band 13
- LTE Band 17
- LTE Band 25
- LTE Band 26
- LTE Band 41

RESULTS

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