February 21, 2000

Correspondence Reference Number: 12030
Confirmation Number: EA96011
FCC ID: MIJTELHUB-USB-01

To: Frank Coperich
From: Jim Dykema

Subject: Request for technical data

I am providing additional data to show compliance to Section 101.111(a)(2)(ii) as per your request. Subsequent to the origial filing a second modulation scheme has been implemented. I am also providing this new data for your review.

Modulation/ Symbol Rate (MS/ Sec.)	RF Tuned Frequency (GHz)	Occupied Bandwidth (MHz)
FM Pilot	31.0015	2.35
64 QAM/ 5.05941	31.0120	7.21
64 QAM/ 5.05941	31.0390	7.01
64 QAM/ 5.05941	31.0694	6.85
QPSK/ 5.0	31.0120	7.01
QPSK/ 5.0	31.0390	6.81
QPSK/ 5.0	31.0694	6.70

The Pilot frequency is a hardware set frequency and transmits at 31.0015 GHz only. While the HUB acccepts IF input over the range of 498 – 570 MHz only the range of 507 – 564.4 MHz is used. The lower edge guardband is to avoid interference with the Pilot carrier and the upper edge guardband is to meet the emission mask requirements. The following is a list of the data provided:

1. Pilot carrier compared to analog emission mask (101.111(a)(1)) – closeup of band edge
2. Pilot carrier compared to analog emission mask (101.111(a)(1)) – ± 250 % allocated bandwidth
3. 64 QAM data carrier at 31.012 GHz compared to digital emission mask (101.111(a)(2)) – closeup of band edge
4. 64 QAM data carrier at 31.012 GHz compared to digital emission mask (101.111(a)(2)) – ± 250 % allocated bandwidth
5. 64 QAM data carrier at 31.039 GHz compared to digital emission mask (101.111(a)(2)) – ± 250 % allocated bandwidth
6. 64 QAM data carrier at 31.0694 GHz compared to digital emission mask (101.111(a)(2)) – closeup of band edge
7. 64 QAM data carrier at 31.0694 GHz compared to digital emission mask (101.111(a)(2)) – ± 250 % allocated bandwidth
8. QPSK data carrier at 31.012 GHz compared to digital emission mask (101.111(a)(2)) – closeup of band edge
9. QPSK data carrier at 31.012 GHz compared to digital emission mask (101.111(a)(2)) – ± 250 % allocated bandwidth
10. QPSK data carrier at 31.039 GHz compared to digital emission mask (101.111(a)(2)) – ± 250 % allocated bandwidth
11. QPSK data carrier at 31.0694 GHz compared to digital emission mask (101.111(a)(2)) – closeup of band edge

12. QPSK data carrier at 31.0694 GHz compared to digital emission mask (101.111(a)(2)) – ± 250 % allocated bandwidth

With regards to the calculation of the emission mask, your letter states that " the emission limit at the LMDS band edge starts at - 29.75 dB and continues on a slope to - 56 dB at the frequency of 86.25 MHz removed from the band edge and stays there until 187.5 MHz removed from the LMDS band edge". While I agree with your figures of - 29.75 and –56 dBc, I was under the assumption that the 86.25 and 187.5 MHz frequencies were relative to the allocated band center frequency and independent of carrier frequency.

Limit (dBc)	Lower Absolute Freq. (GHz)	Upper Absolute Freq. (GHz)	Percent of Authorized Bandwidth	Offset Freq. From Band Edge (MHz)	Offset Freq. From band Center (MHz)
-29.75	31.00000	31.075000	50	0.0	37.5
-56	30.95073	31.112448	115.623	49.27	86.77
-56	30.85000	31.225000	250	150.0	187.5

Please, let me know if I have made an incorrect assumption.

Sincerely,
Jim Dykema

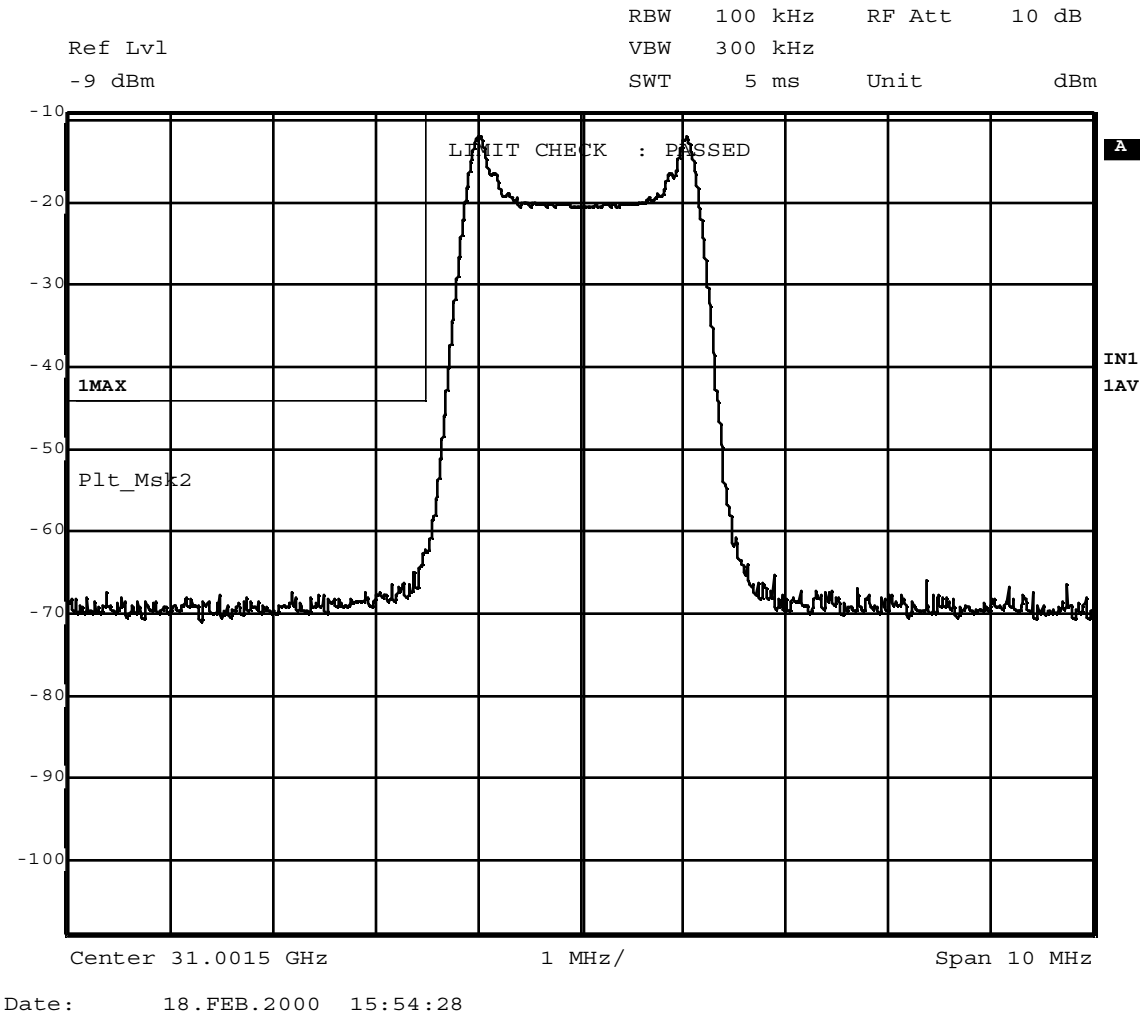

Figure 1 Pilot carrier compared to analog emission mask (101.111(a)(1)) – closeup of band edge

The emission mask is set as follows:

1. Measure the peak of the signal using 1 MHz/ 3MHz resolution bandwidth (RBW)/ video bandwidth (VBW).
2. Set reference level (RL) to the peak of the signal obtained in step 1).
3. If necessary to eliminate signal broadening, reduce the RBW maitaining the RBW/VBW ratio of 1/3. If a narrower RBW is used, adjust the emission mask by $10*\log_{10}$ (RBW in MHz).

The above figue shows that the peak of the pilot signal was measured at –9 dBm. The limit for the analog emission mask from 50% to 100% removed from the allocated band center is 25 dBc. The bandwidth correction for 100kHz RBW is –10 dB. Therefore, the mask is at –44 dBm (-9dBm –25dBc –10dB).

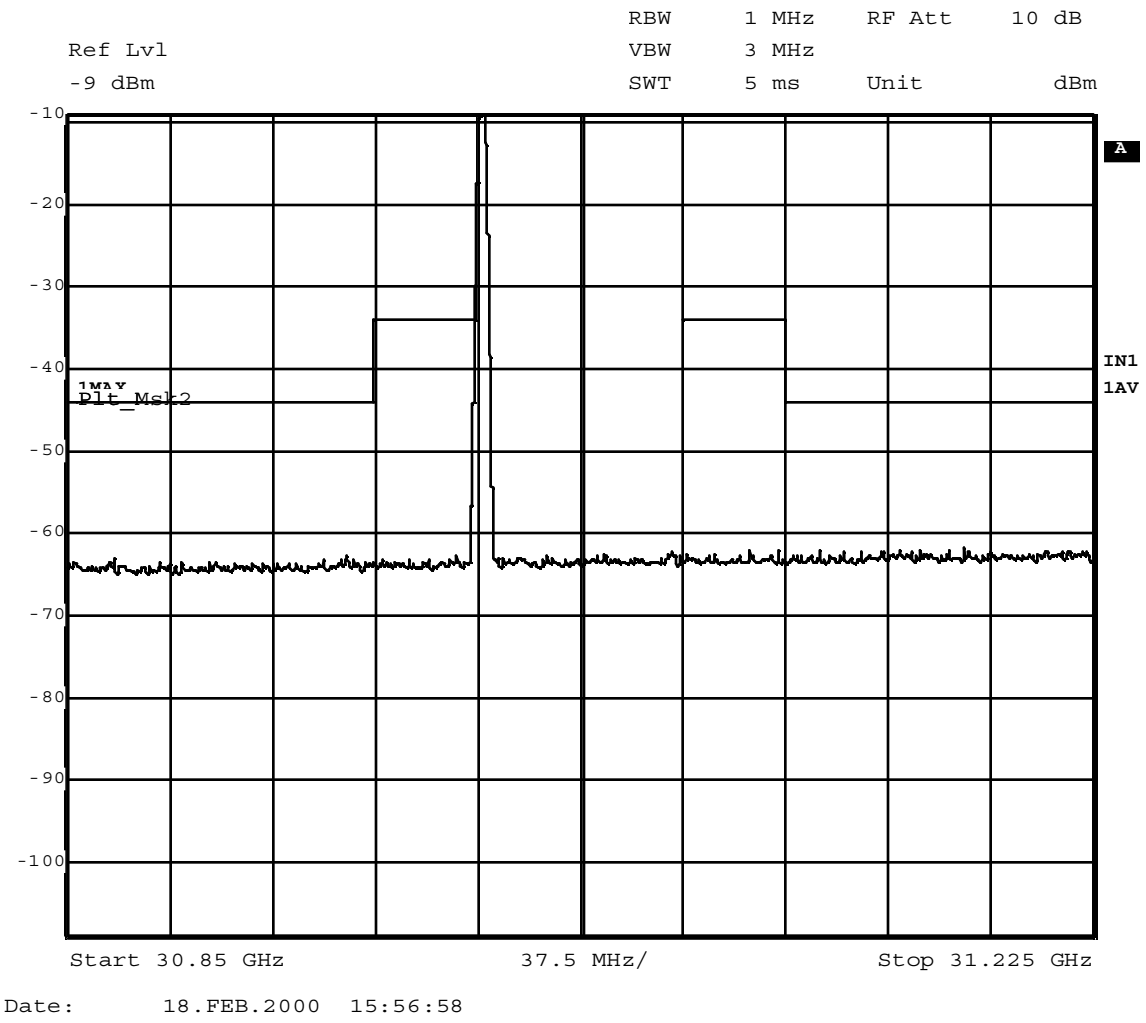

Figure 2 Pilot carrier compared to analog emission mask (101.111(a)(1)) – ± 250 % allocated bandwidth

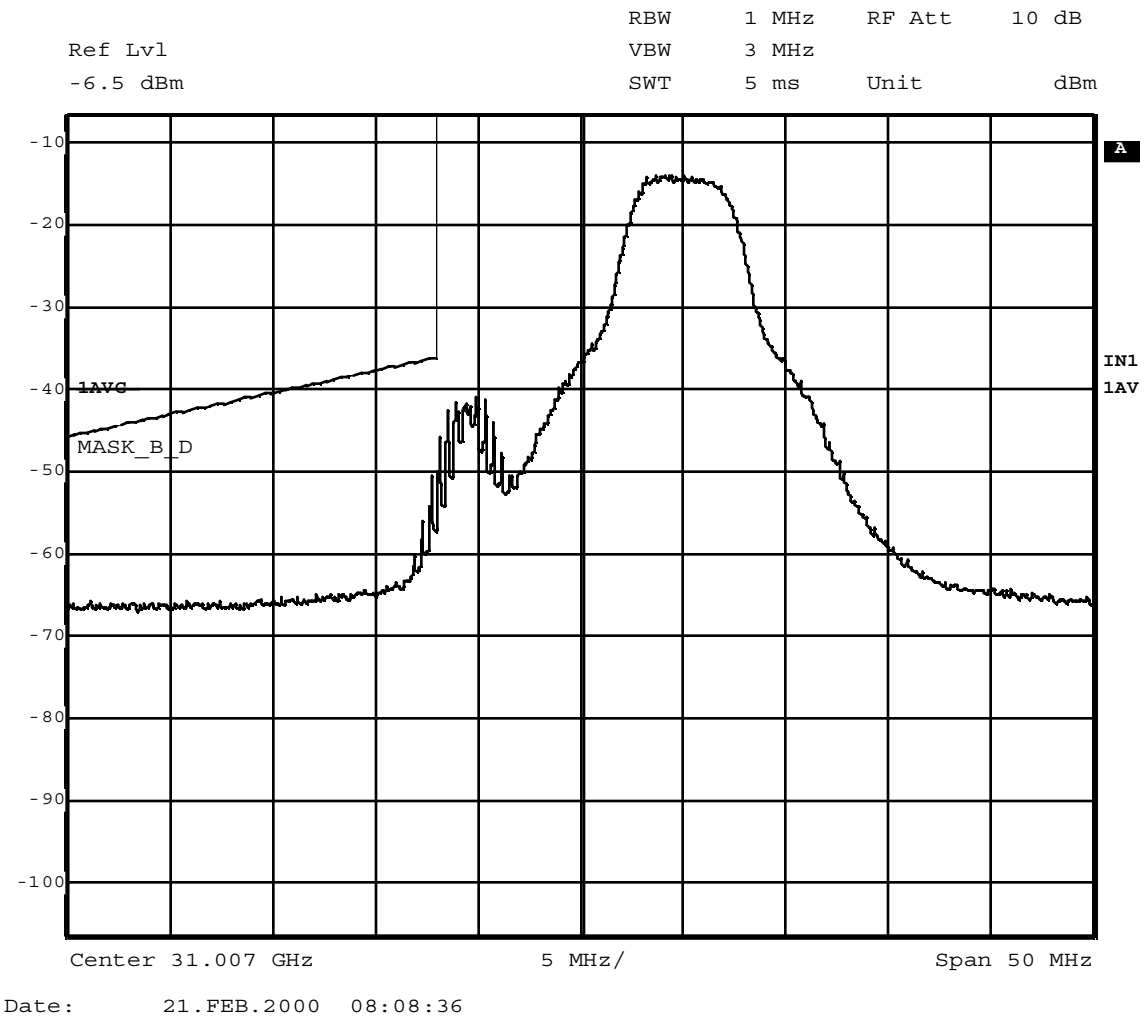

Figure 3 64 QAM data carrier at 31.012 GHz compared to digital emission mask (101.111(a)(2)) – closeup of band edge

The emission mask is set as follows:

1. Measure the peak of the signal using 1 MHz/ 3MHz resolution bandwidth (RBW)/ video bandwidth (VBW).
2. Set reference level (RL) to the peak of the signal obtained in step 1).
3. If necessary to eliminate signal broadening, reduce the RBW maitaining the RBW/VBW ratio of 1/3. If a narrower RBW is used, adjust the emission mask by $10*\log_{10}$ (RBW in MHz).

The above figue shows that the peak of the data signal was measured at –6.5 dBm. The limit for the digital emission mask at 50% removed from the allocated band center is 29.75 dBc. The bandwidth correction for 1 MHz RBW is 0 dB. Therefore, the mask is at –36.25 dBm (-6.5dBm - 29.75dBc - 0dB). Figure 4 shows that the -56 dBc level of the emission mask for this test converts to an abosltue level of – 62.5 dBm (-6.5 dBm – 56 dBc – 0 dB).

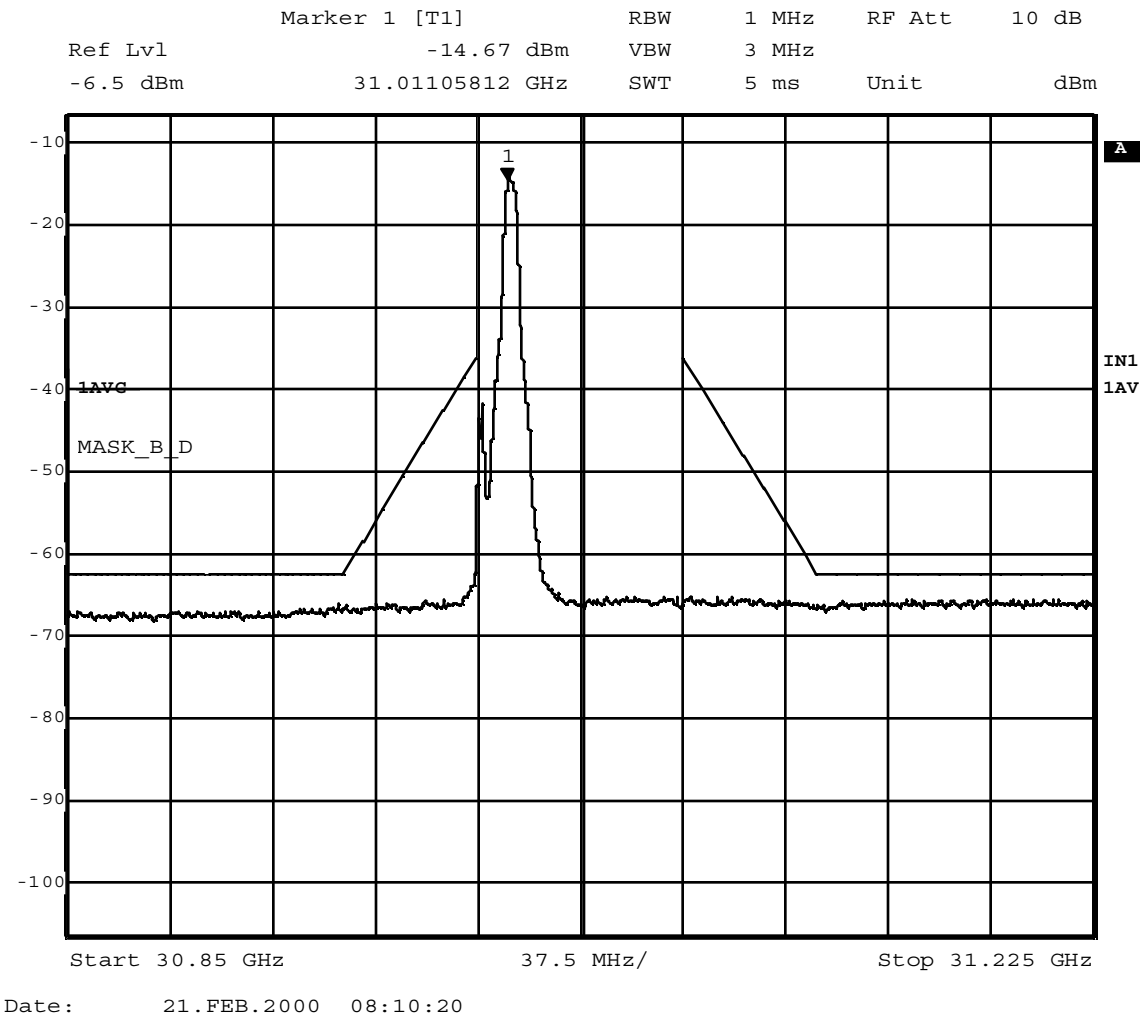

Figure 4 64 QAM data carrier at 31.012 GHz compared to digital emission mask (101.111(a)(2)) – ± 250 % allocated bandwidth

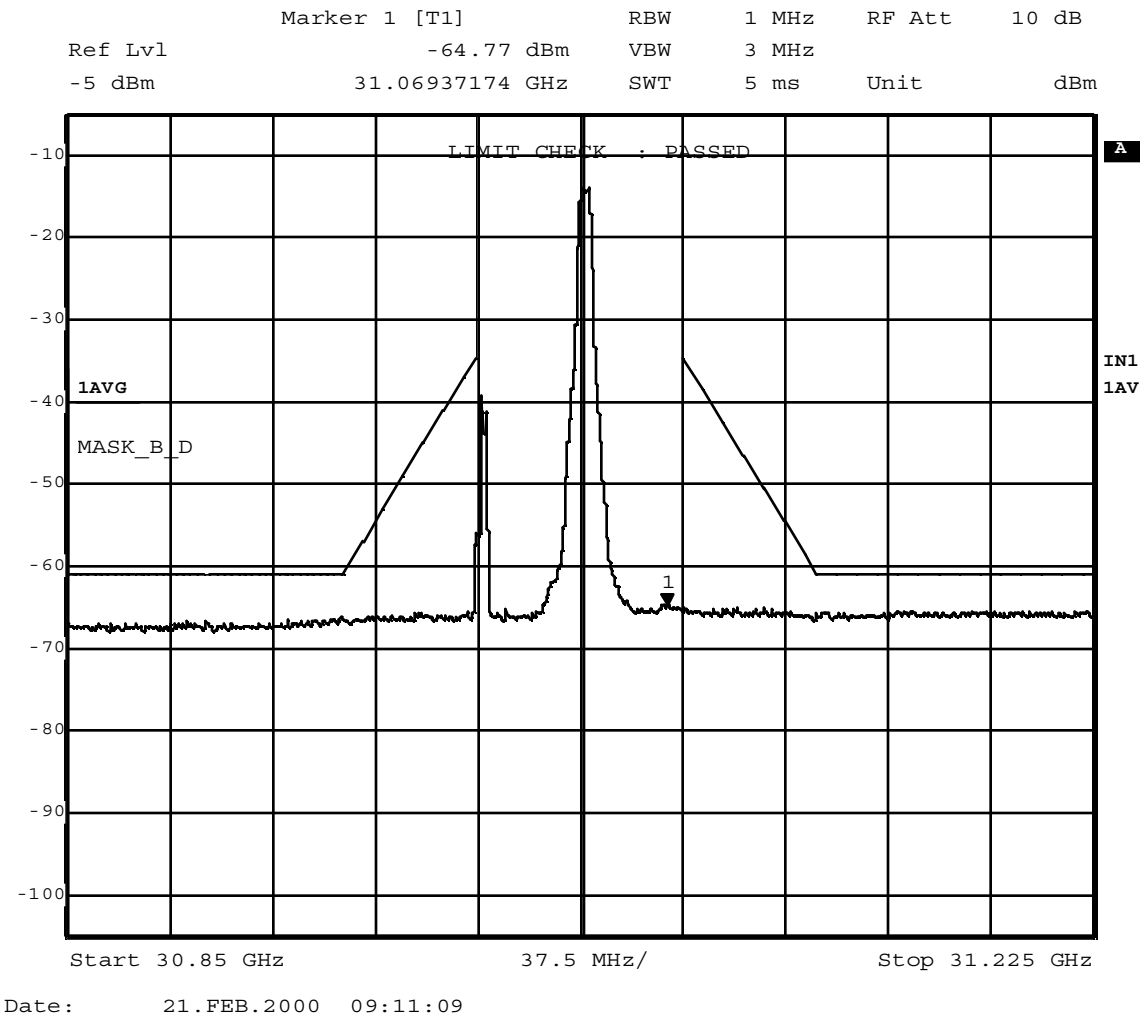

Figure 5 64 QAM data carrier at 31.039 GHz compared to digital emission mask (101.111(a)(2)) – ± 250 % allocated bandwidth

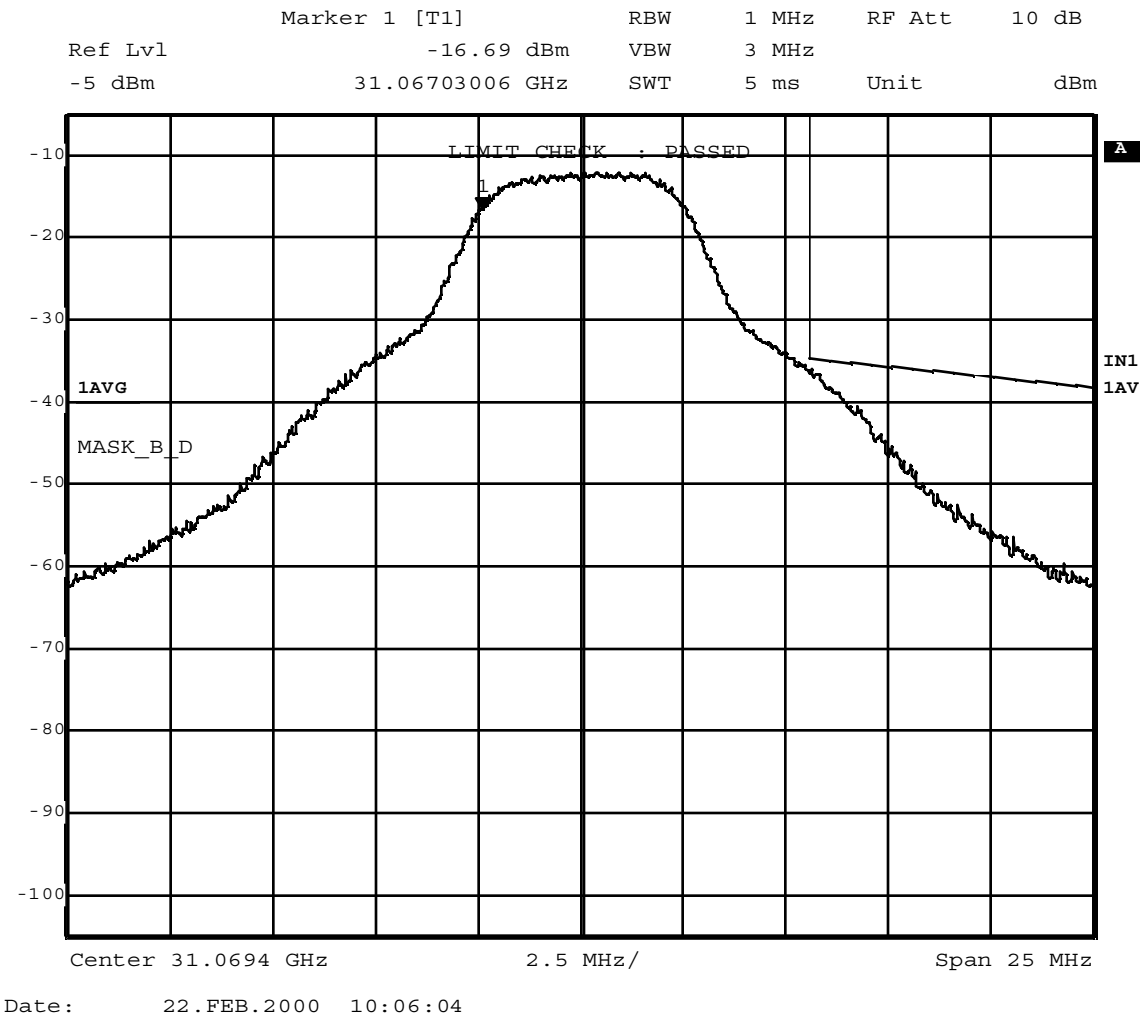

Figure 6 64 QAM data carrier at 31.0694 GHz compared to digital emission mask (101.111(a)(2)) – closeup of band edge

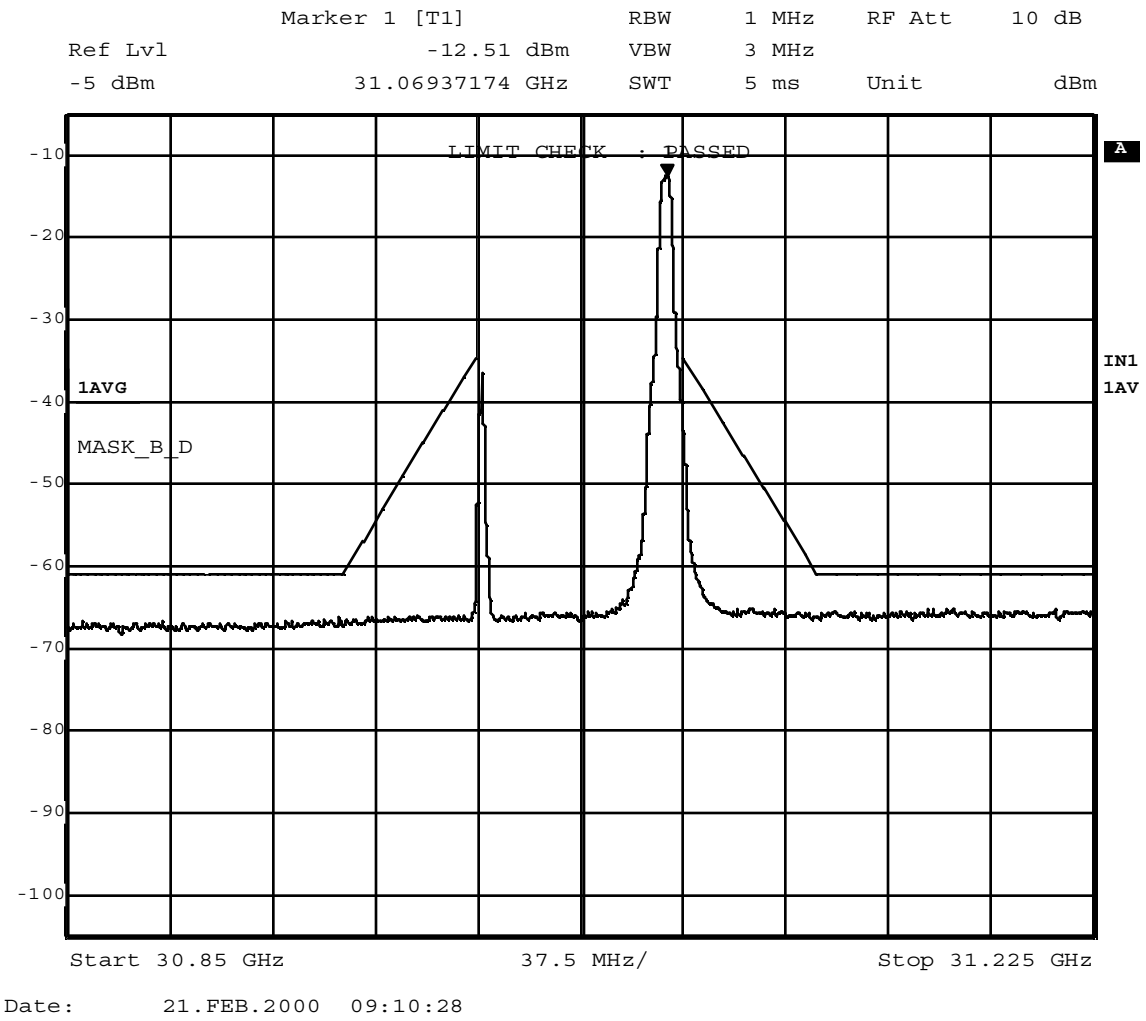

Figure 7 64 QAM data carrier at 31.0694 GHz compared to digital emission mask (101.111(a)(2)) – ± 250 % allocated bandwidth

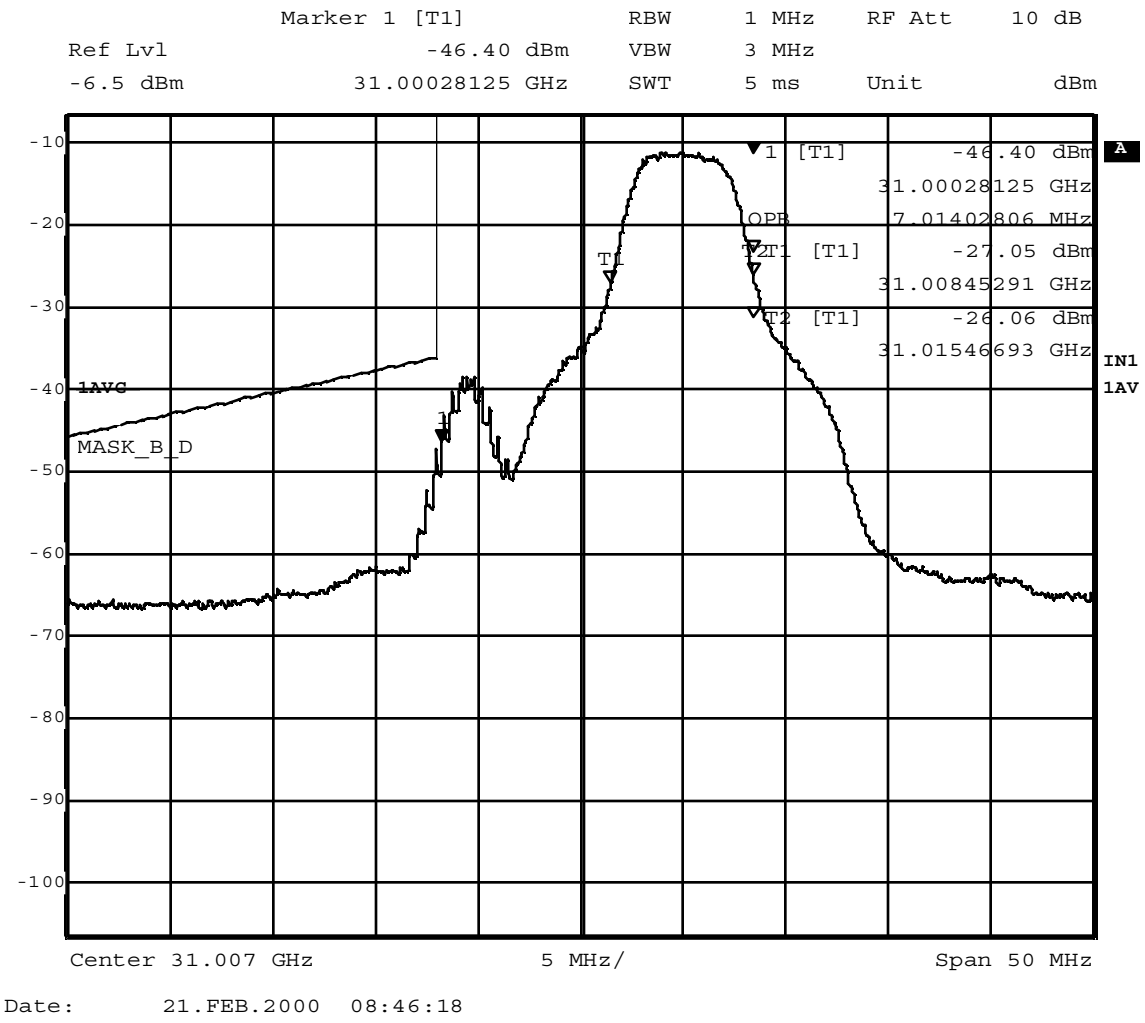

Figure 8 QPSK data carrier at 31.012 GHz compared to digital emission mask (101.111(a)(2)) – closeup of band edge

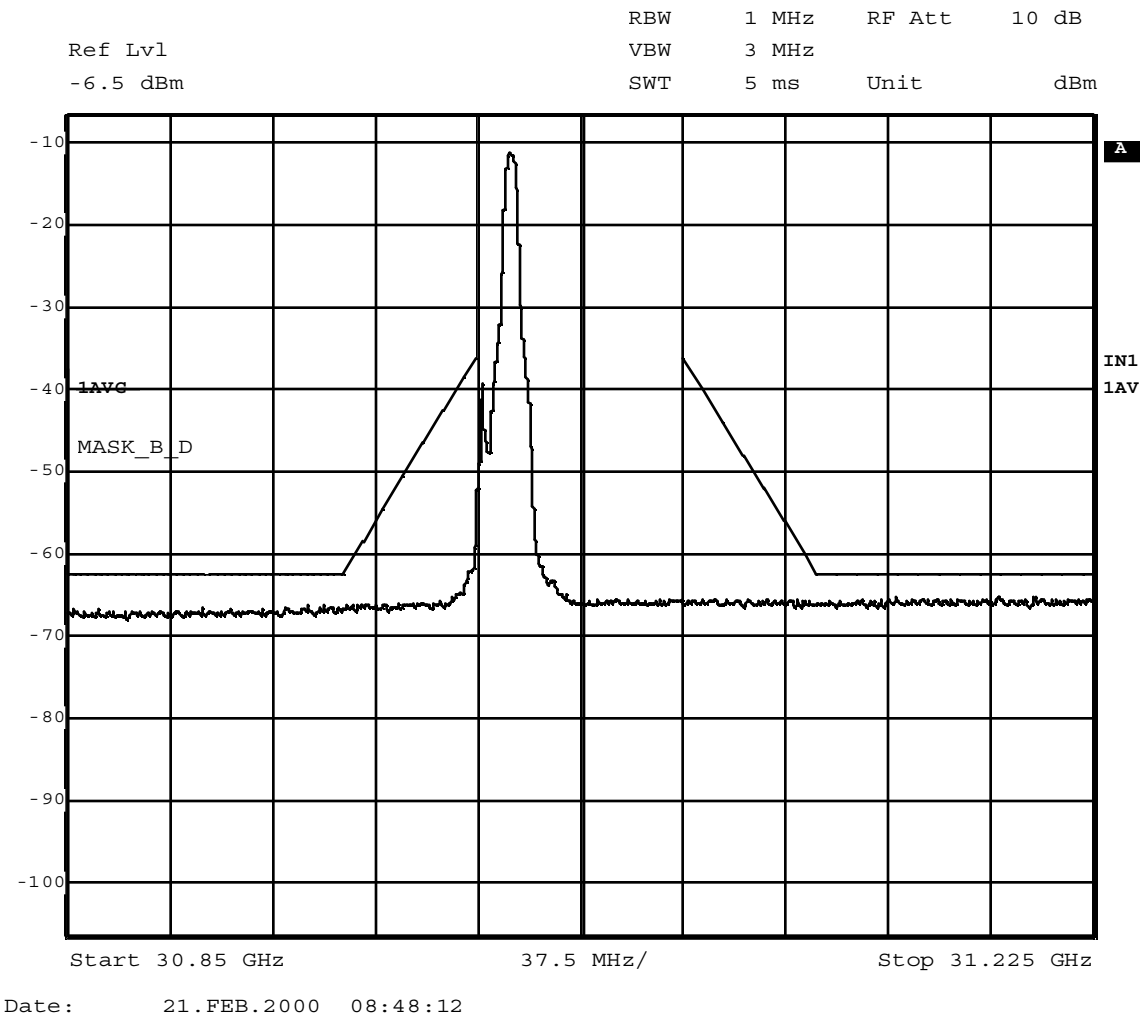

Figure 9 QPSK data carrier at 31.012 GHz compared to digital emission mask (101.111(a)(2)) – ± 250 % allocated bandwidth

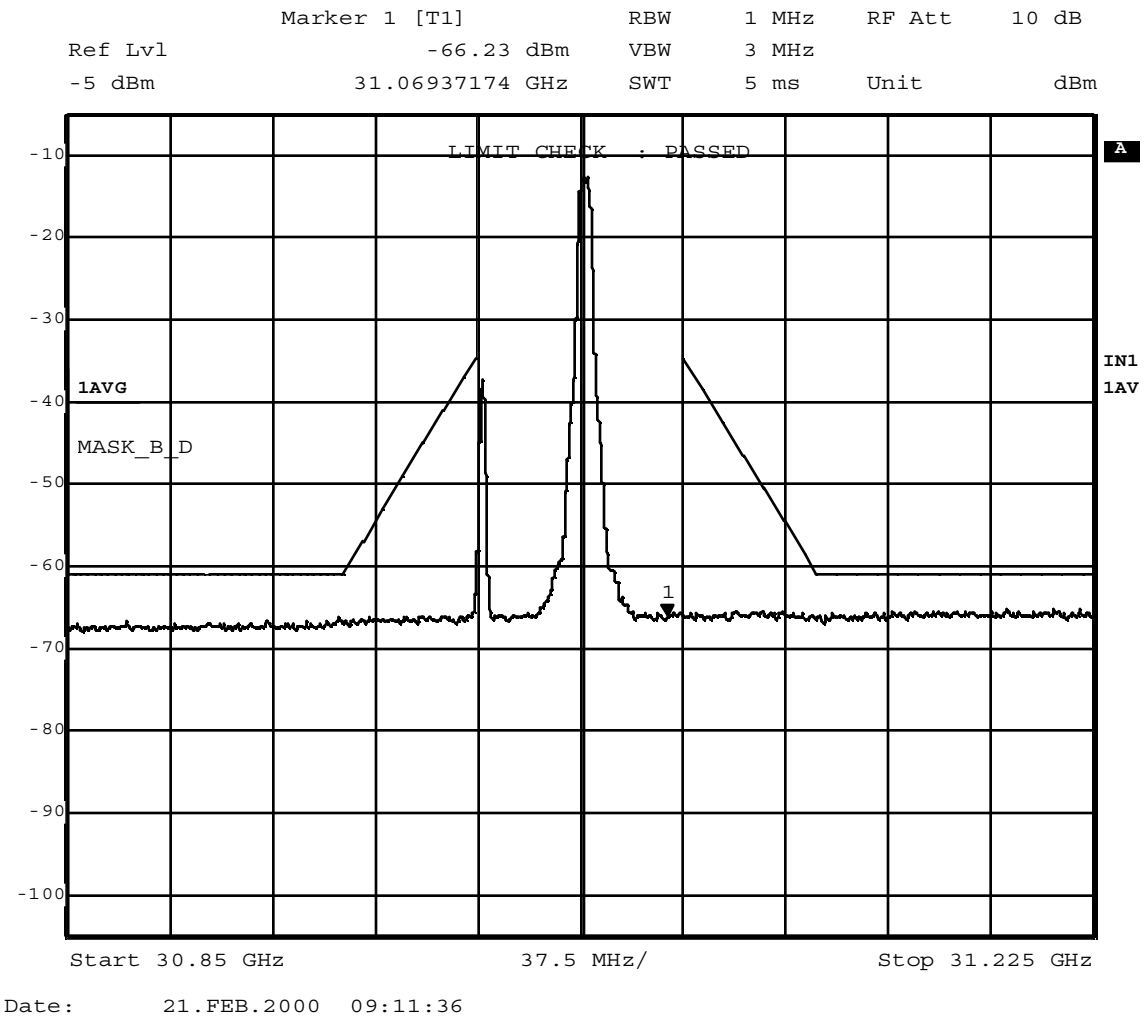

Figure 10 QPSK data carrier at 31.039 GHz compared to digital emission mask (101.111(a)(2)) – ± 250 % allocated bandwidth

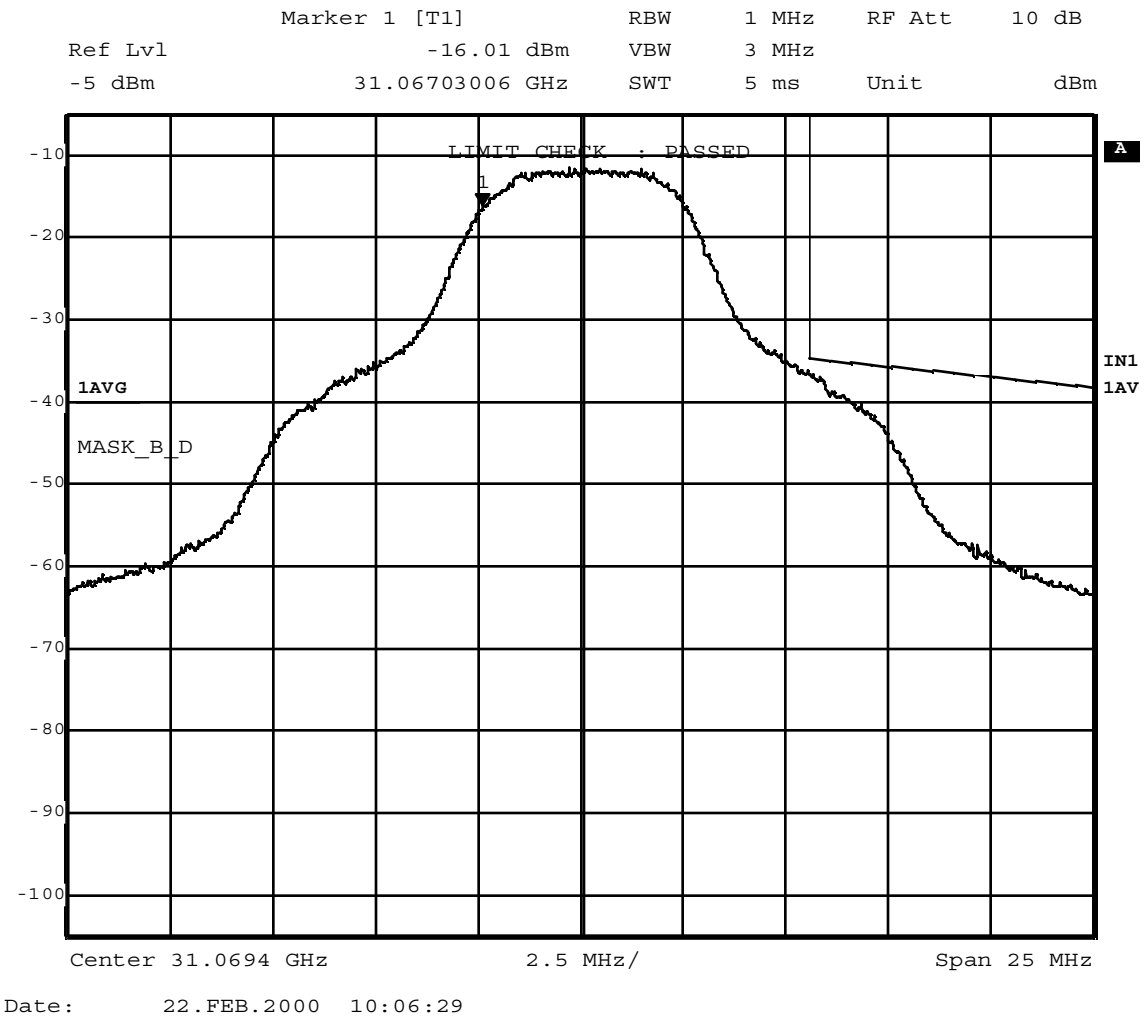

Figure 11 QPSK data carrier at 31.0694 GHz compared to digital emission mask (101.111(a)(2)) – closeup of band edge

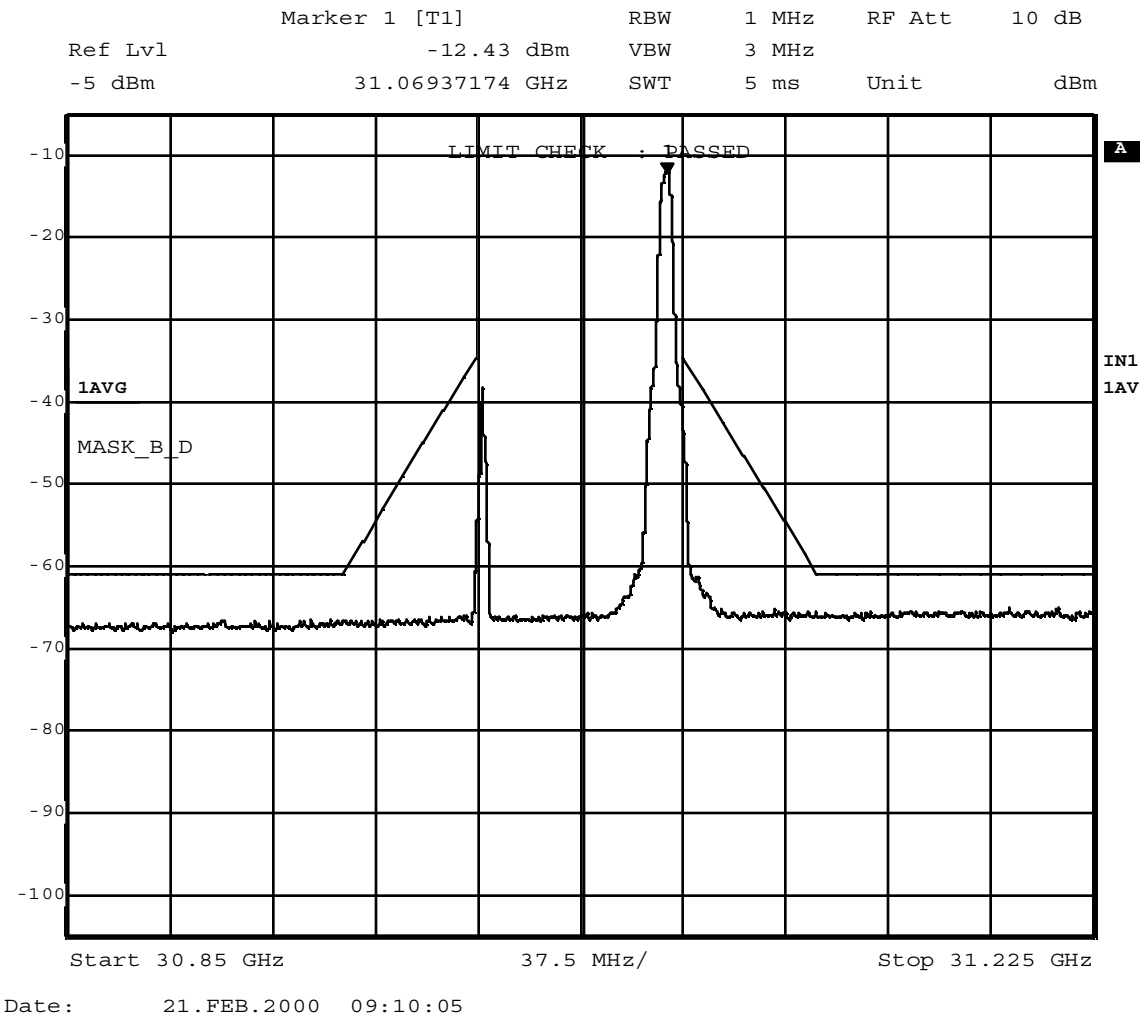

Figure 12 QPSK data carrier at 31.0694 GHz compared to digital emission mask (101.111(a)(2)) – ± 250 % allocated bandwidth