

IMPEDANCE

It is correct that the return loss requirements can not be meet with one single impedance. The optimum impedance in a single impedance design is 118.5 Ohm.

The pure resistive network gives the following return loss.

- 85 Ohm RTN = - 15.7 dB (specification limit is 16 dB)
- 165 Ohm RTN = - 15.7 dB (specification limit is 16 dB)

Stray capacitance degrades the return loss further. The degradation can be predicted by calculating the maximum allowed capacitance in a pure 150 design. The maximum allowed capacitance in a 150 Ohm design is 8 pF. (see figure 1)

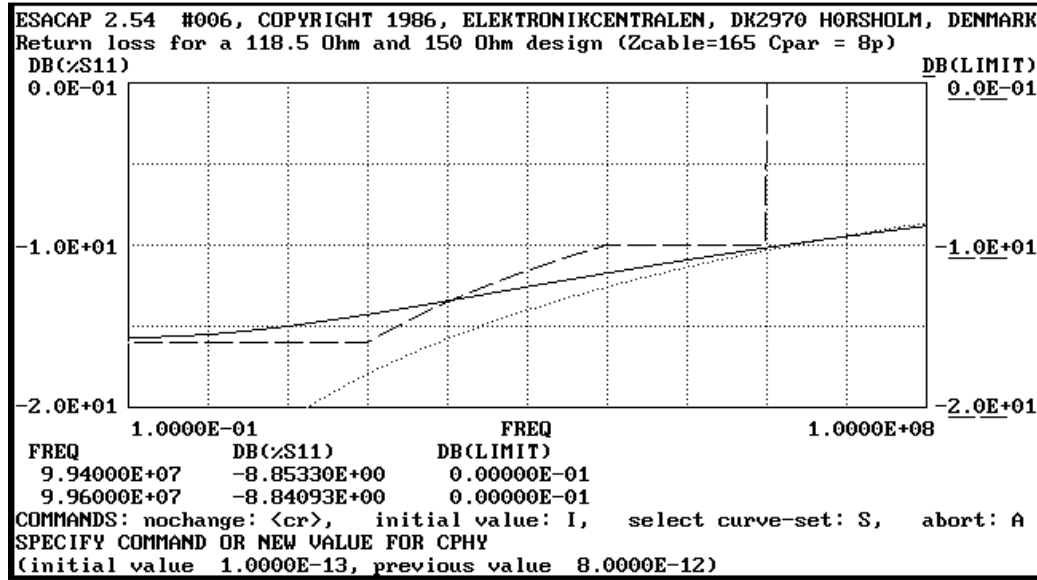


Figure 1

The return loss for a 118.5 Ohm design with 8 pF stray capacitance is also shown in figure 1. The worst degradation of return loss is at 30 MHz, where the return loss is degraded to around 14 dB.

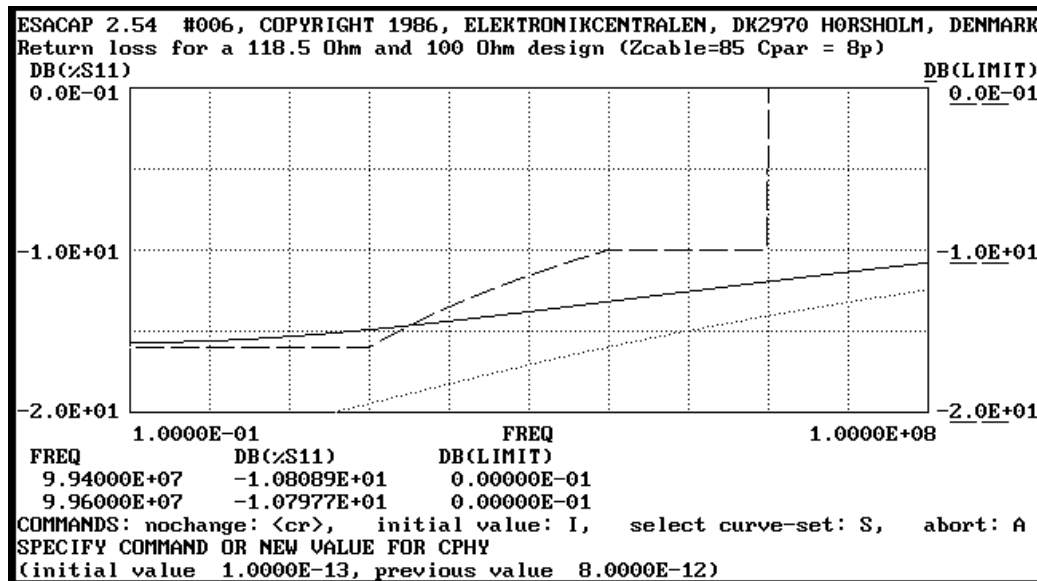


Figure 2

Fig. 2 shows the return loss with 85 Ohm, and the return loss for a 100 Ohm design. The return loss is better than with 165 Ohm impedance because the stray capacitance has less influence due to the lower impedance.

The degradation in return loss is small, but is unfortunately very difficult to make a precise calculation of the increase in jitter at the receiver. My guess is that the added jitter is small, and can be ignored. But proving this statement requires a lot of work!

A common impedance design for 150/100 Ohm requires that the return loss limit in the frequency range from 1 to 40 MHz be increased to 14 dB. Things don't get easy, but possible. Increasing the limit at low frequencies to 14 dB is basically the same as requiring the return loss to be measured at the nominal impedance level (100 +/- 1 Ohm or 150 +/- 1.5 Ohm).