

Source: Siemens
Title: Additional information on RF filter implementation as given in WG4 Tdoc 482/99
Document for Discussion

1 Introduction

In Tdoc 482/99 "Rationales and Proposal for TDD BS Emission Mask" a proposal for the BS TDD spectrum emission mask was proposed using additional RF filtering per carrier frequency. During the discussion at WG4#7 in Tokyo it turned out that the implementation of such filter requirements was seen as rather critical. This paper aims to provide additional information on the filter that has been used and which is available today.

2 Description of the RF filter

The RF filter in Tdoc 482/99 was described as follows:

... a properly sized 6-pole Chebychev bandpass filter with high quality ceramic resonators (state of the art, $Q \approx 30000$), having the following key characteristics:

Passband frequency	+/- 2 MHz
Passband ripple	0.3 dB
Stopband frequency	+/- 3 MHz
Attenuation at stopband frequencies	33 dB.

The prototype of the filter is sized as shown in the following Figure:

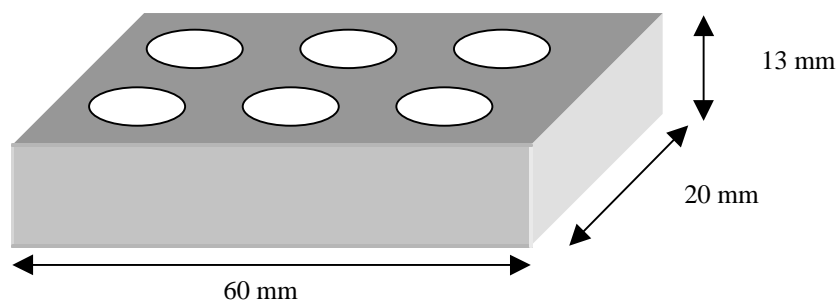


Figure 1 Size of RF filter

3 Characteristic of the RF filter

The following measurement plots of the filter characteristic are shown.

3.1 Passband and Stopband characteristic

At first the characteristic in the passband is shown (Figure 2). The insertion loss is about 1dB inside the channel, while at frequency offsets +/-2 MHz the insertion loss is about 2dB. Figure 3 illustrates the stopband attenuation. At frequency offsets +/-3 MHz the filter achieves about 30dB attenuation and at frequency offsets +/- 6 MHz the attenuation is about 70dB.

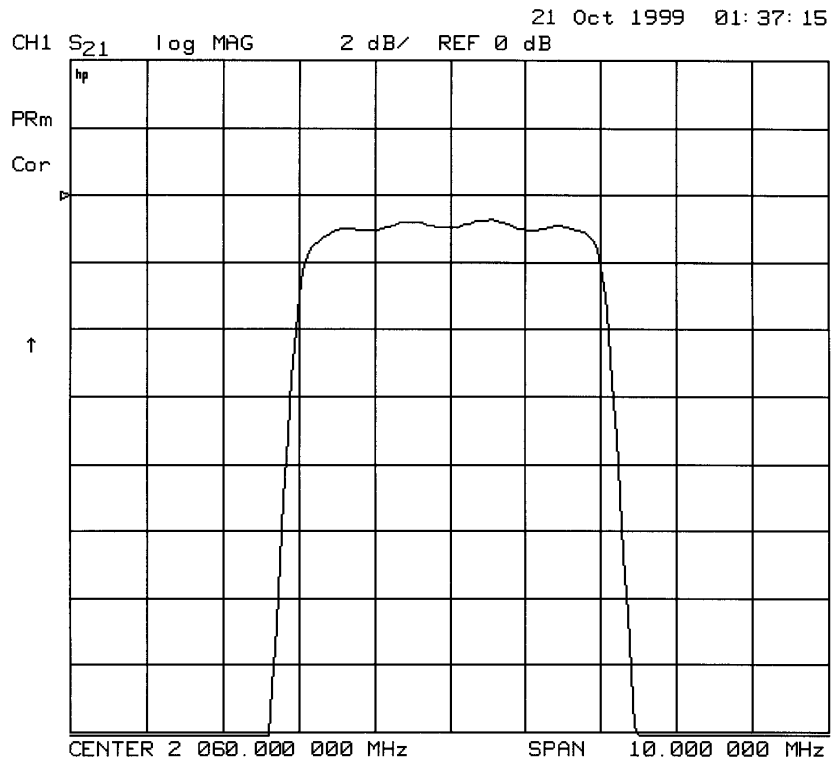


Figure 2 Measured passband attenuation

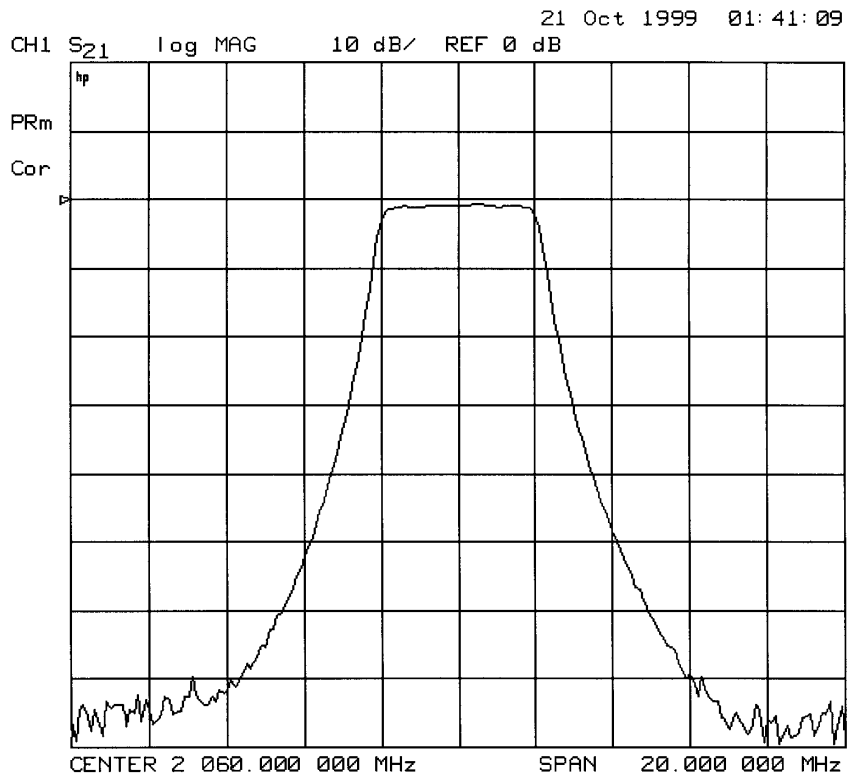


Figure 3 Measured stopband attenuation

4 Group Delay

Furthermore the group delay characteristic of the filter is depicted in Figure 4. At the carrier frequency edges, group delay is about 500ns. Although this will not cause much performance degradation in the TDD receiver, it is certainly possible to compensate the basic characteristic of this filter by digital allpass filtering in the baseband.

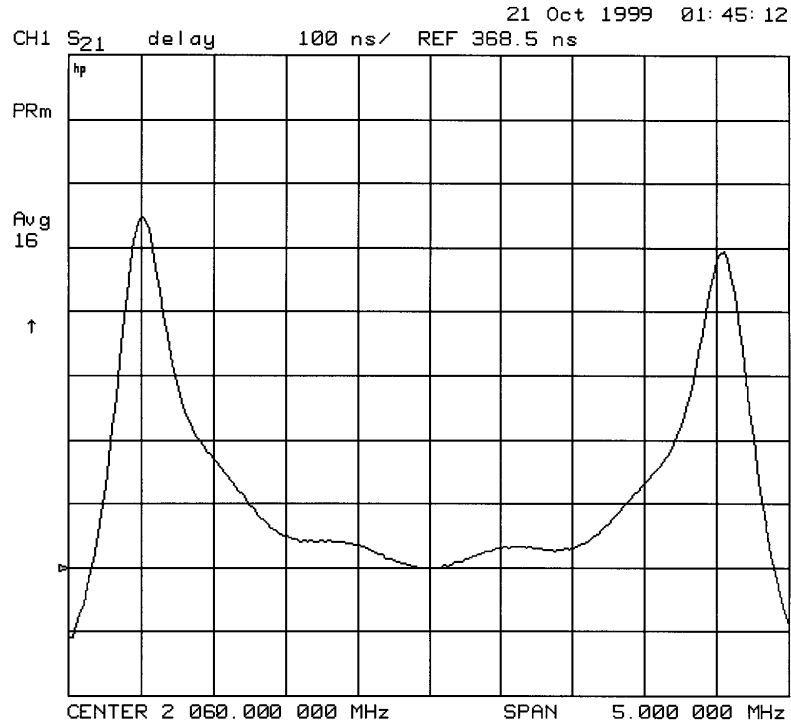


Figure 4 Measurement plot of the group delay of the filter

5 Conclusion

Additional information on the RF filtering implementation according to the requirements described in Tdoc 482/99 is provided. It should be emphasized that this RF filter is still not optimized concerning size and RF characteristics.