1. Trap Filter

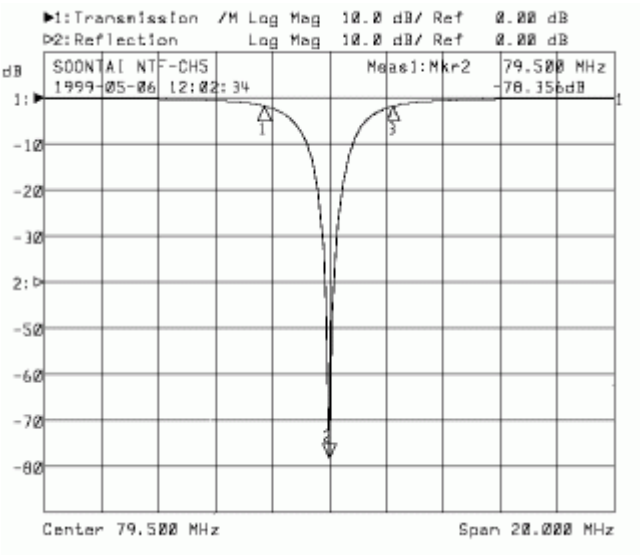


fig. 1

Trap Filter :

This kind of filter is used to filter out a single frequency (see fig. 1 for frequency response).

Owing to the V-shaped frequency response, this filter is also called a Signal Notch Filter.

Trap Filters were first used in the 1970's in Scrambling / Descrambling systems.

There are two types of Trap Filters, Negative and Positive Trap Filters.

Negative Trap Filters directly cut out the channel a CATV customer has not subscribed to, therefore eliminating it from the system.
Positive Trap Filters cut out a jamming signal that is fed into the system from the head-end. The subscribing customers can use this to descramble the channel and watch it normally.

Trap filters are still widely used all over the world for CATV pay-TV systems.

2. Tier Trap Filter

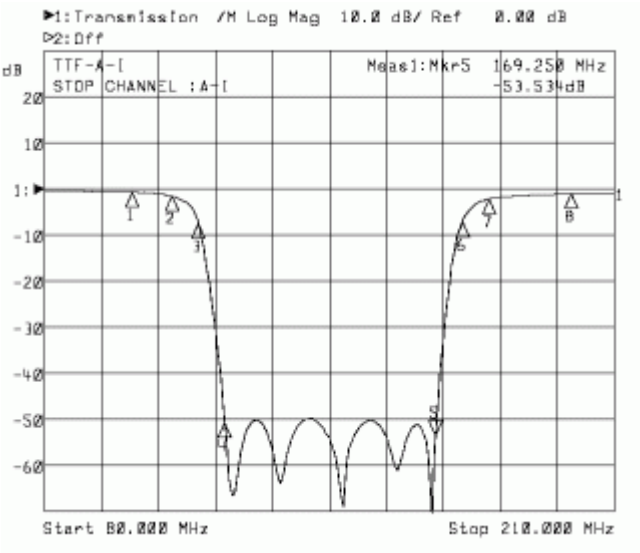


fig. 2

Tier Trap Filter :

The frequency response curve of a Tier Trap Filter is roughly U-shaped, with a number of ripples in the stop band (see fig. 2).

This effect is due to the fact that Tier Trap Filters are basically made up of a number of Notch Filters.

Tier Trap Filters have two pass bands and one reject band.

They are used to eliminate more than one channel.

3. Band Reject Filter

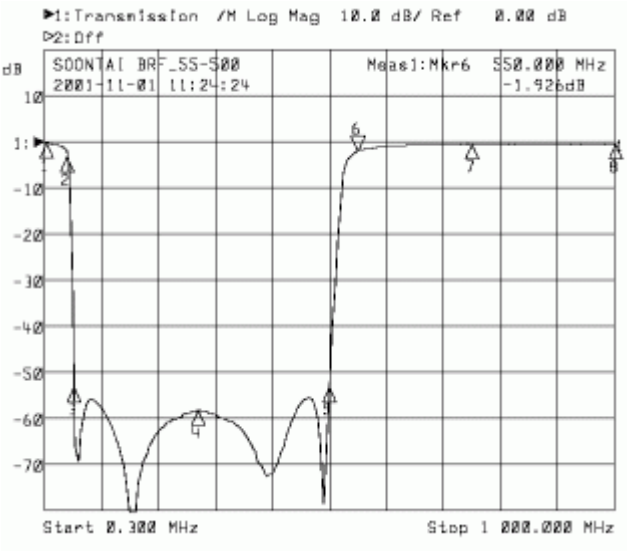


fig. 3

Band Reject Filter :

Also called Band Deletion Filter.
The Frequency Response Curve of Band Reject and Tier Trap Filters look very much alike.
Band Reject Filters are used in the same way as Tier Trap Filters to eliminate a band of more than one channel (or frequencies).

Band Reject Filters usually pass the CATV Return Path (e.g. 5-42MHz, 5-65MHz, etc.) and UHF Band signals and reject all other CATV channels (e.g. 55-500MHz, 85-450MHz, etc.).

This means the Reject Band can have a width of 300MHz, 500MHz or more.

They are therefore capable to eliminate a greater number of channels and frequencies (see fig. 3).

Tier Trap Filters in contrast are used to filter out only a limited number of CATV channels or frequencies (e.g. 20-150MHz).

Tier Trap Filters are therefore used to reject a narrow band, whereas Band Reject Filters are used if a wide Reject Band is necessary.

The reject band of Band Reject Filters can be wider than that of Tier Trap Filters.

Band Reject Filters also have two pass bands and one reject band.
Tier Trap and Band Reject Filters are widely used in CATV pay-TV systems and owe their popularity to the fact that simpler and cheaper than other encoding/decoding systems.

4. Low Pass Filter

Low Pass Filter :

Low Pass filters pass lower frequencies / channels and reject the higher ones (see fig. 4).

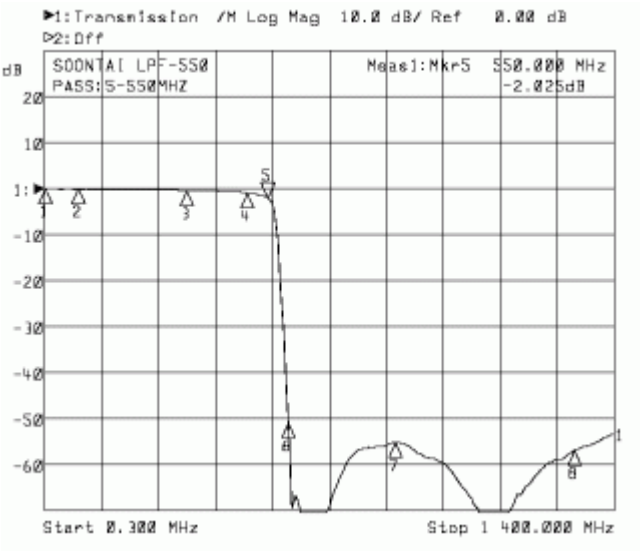


fig. 4

Low Pass filters are frequently used to filter out signals outside the CATV band or to eliminate a whole range of higher channels.

5. High Pass Filter

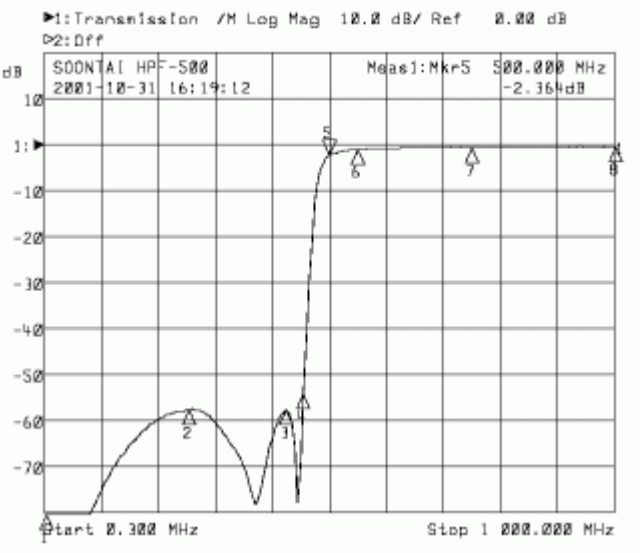


fig. 5

High Pass Filter :

High Pass Filters are basically the opposite of Low Pass Filters.

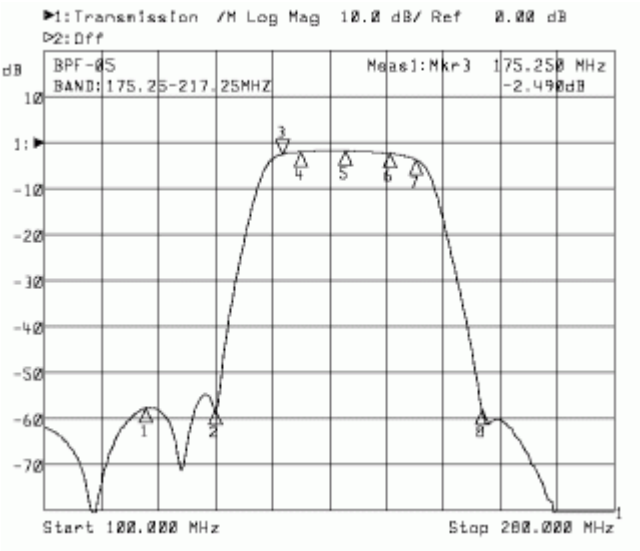
They pass only higher frequencies/channels and reject anything below the cut-off frequency (see fig. 5).

High Pass Filters are mostly used to attenuate the CATV Return Path Band (5 to 54MHz or 5 to 85MHz).

6. Band Pass Filter

Band Pass Filter :

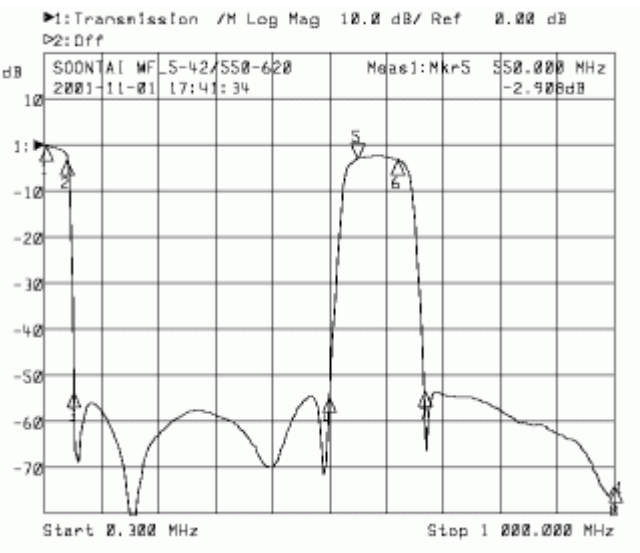
Band Pass Filters have a frequency response that is the opposite of Band Reject Filters (see fig. 6).



Band Pass Filters pass only one band of frequencies / channels, everything below and above this pass band is rejected.

fig. 6

7. Window Filter



Window Filter :

A window filter contains one band-pass and one low-pass and / or one high-pass (see fig. 7).

fig. 7

8. Double Band Pass Filter

Double Band Pass Filter :

Double Band Pass Filters are similar to Window Filters, but a DBF(Double Band Pass Filter) contains two complete pass bands. (see fig. 8).

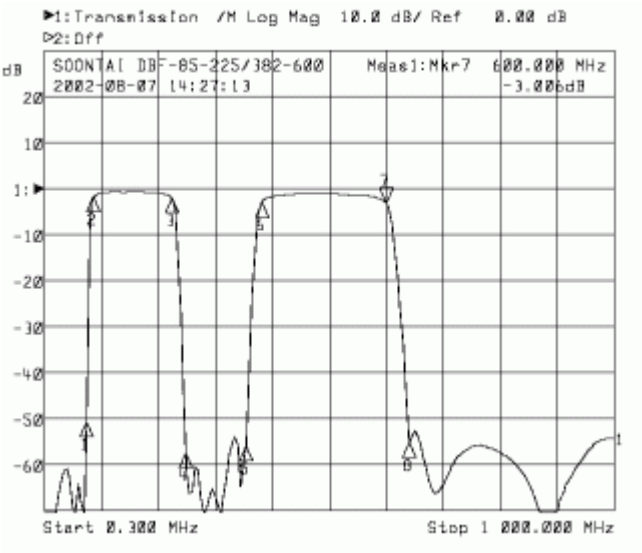


fig. 8

9. Triple Band Pass Filter

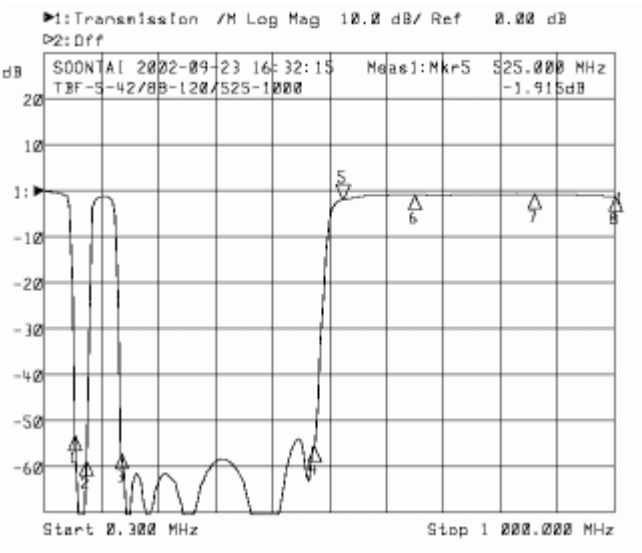


fig. 9

Triple Band Pass Filter :

This type of TBF(Triple Band Pass Filter) contains one complete pass bands, one low pass and one high pass bands. (see fig. 9).

10. Filter Quality

Filter Quality : Insertion Loss, Rejection and Return Loss are usually regarded as being the three most important factors in deciding about a filter's quality.

a. Insertion Loss :

Insertion Loss is the Attenuation of the Pass Band caused by the insertion of the filter.
Usually Insertion Loss values are provided for typical and maximum values.

Typical Insertion Loss is the average loss for the filter's pass band.
Maximum Insertion Loss refers to the point where maximum Insertion Loss occurs.
The lower the value for Insertion Loss, the better the filter.

b. Rejection :

Rejection refers to the Reject Band attenuation, the value by which the filter actually deletes the frequency / channel that is supposed to be cut out.
The Rejection value indicated on the filter is usually the minimum rejection value for the specified reject band (see fig. 2 Mark 4 and 5, fig. 4 Mark 6, fig. 6 Mark 2 and 8 and fig. 7 Mark 3, 4 and 8).
The higher this minimum value, the steeper the slope between Pass and Reject Band.
A higher Rejection is usually better, but also increases the Insertion Loss and cost of the filter.

c. Return Loss :

A filter's Return Loss refers to the attenuation of reflected signals within the Pass Band.
The higher the Return Loss, the better the filter's impedance match and the lower the reflected signals that occur when signals pass from the line through the filter. Return Loss values are usually provided in Minimum and Typical or only Minimum values.
The Minimum Return Loss of any filter should be at least 10dB.
The higher the Return Loss, the better the filter.