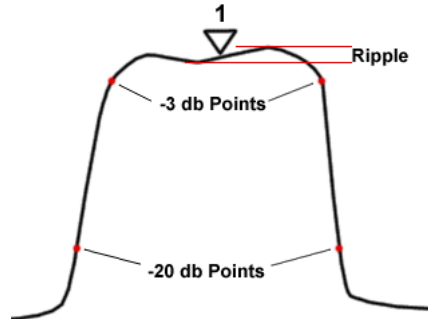# FILTER ANALYSIS

The following diagram will help understand how the MSA performs Filter Analysis. The diagram shows the profile of the frequency response of a filter centered at marker 1.


All the user has to do to perform Filter Analysis is place the marker at the center of the filter response and select the menu item Analysis->Filter. The user will have the option to specify the center marker and the desired filter points to mark. Typically, the -3 db points are of interest. Sometimes, points further down on the response are of interest. The user can select two different db levels to mark. In the above diagram, to mark the -3 db and -20 db points, the user would enter 3 and 20 (the negative sign is not necessary). Markers will appear at the indicated points, and in the area below the graph the marker information will be displayed, along with various statistics about the filter:

1. The bandwidth at the selected points. If the -3 db points were not selected, the bandwidth at the -3 db points will also be displayed.
2. Q, which is the 3 db bandwidth divided by the center frequency.
3. The shape factor, which is the bandwidth at the lower set of points divided by the bandwidth at the higher set of points.
4. Ripple, which is the difference in db between the maximum and minimum values within the ripple band. The ripple band extends from the center outward to the points where the response starts a monotonic decline to the -3 db points.
5. In TG or VNA Transmission Mode, Insertion Loss is also displayed.

Below is an example of Filter Analysis, performed on simulated input data. The P+ marker was used as the center marker, which causes the peak to be automatically selected as the center frequency.

Spect. Analyzer

06/02/09; 15:24:43

Magnitude (dBm)
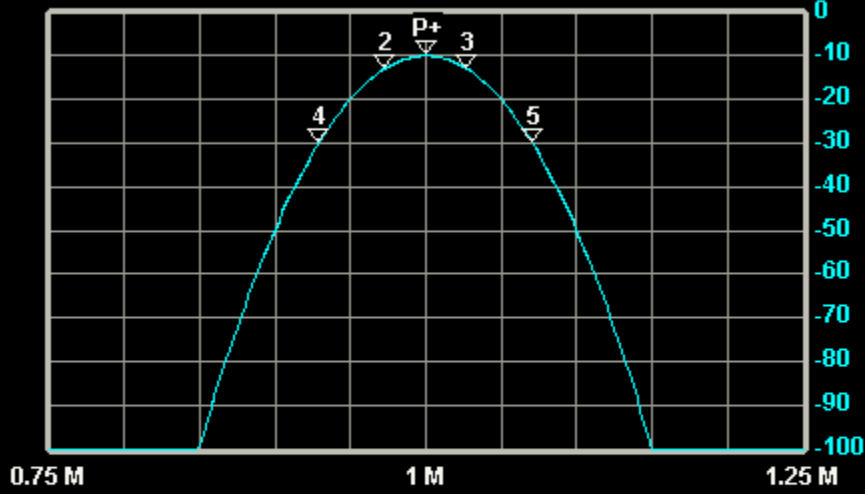
RBW=15KHz
Video=Wide
Wait=0 ms
Steps=200
2.5KHz/Step
50KHz/Div

0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100

0.75 M   1 M   1.25 M

Mark	Freq (MHz)	dBm
P+	1.000000	-10.00
2	0.972321	-13.00
3	1.027123	-13.00
4	0.928926	-30.00
5	1.070524	-30.00

BW(3db)=54.8 KHz
BW(20db)=141.6 KHz
Q=18.2
SF(20db/3db)=2.58
Ripple=0.00 db