

Discrete Component Filters

Reactel Discrete Component Filters can satisfy a variety of filter requirements. These versatile units cover the broad frequency range of 2 kHz to 5 GHz, and are available in either tubular or rectangular packages, connectorized or surface mount, and standard or high power versions. All standard discrete component filters utilize a low ripple Chebyshev design which offers the best compromise of low loss, low VSWR, and high selectivity. Each filter situation is unique, and the data provided on the following pages offers only a small glimpse of our capabilities. Should a different design become necessary to meet your requirements, we can provide these units with Bessel, Butterworth, Elliptic, Gaussian or Linear Phase responses. Please contact the factory for filters designed to your unique requirement.

- 2 kHz to 5 GHz
- Bandwidths up to 150%
- Low Profile
- Connectorized or Surface Mount
- Lowpass, Bandpass, Highpass, Notch and Multiplexer Designs Available

Part Numbering System

5 B M — 500 — 50 S 1 1
1 2 3 4 5 6 7 8

Part Number Definition:

- 1 - Number of Sections
- 2 - Filter Type Designation
- 3 - Series Identification (See Page 6)
- 4 - Center Frequency
- 5 - 3 dB Bandwidth in MHz
- 6 - Connector Definition (See Page 6)
- 7 - Input Connector Type
- 8 - Output Connector Type



Reactel, Incorporated — Reacting First to Your Filter Requirements

8031 Cessna Avenue ♦ Gaithersburg, Maryland 20879

Phone: 301-519-3660 ♦ Fax: 301-519-2447 ♦ reactel@reactel.com ♦ www.reactel.com

Discrete Component Filters

Discrete Component Specifications

	Package Type		
	Series 5 (Tubular)	Series 6 (Rectangular)	Series M (Rectangular)
3 dB BW for Bandpass (% of CF)	1 - 150%	1 - 150%	1 - 150%
Available Impedances	50Ω, 75Ω, 93Ω	50Ω, 75Ω, 93Ω	50Ω, 75Ω, 93Ω
Maximum VSWR @ CF	1.5:1	1.5:1	1.5:1
Size (inches)	1.25 od x *L	0.75 x 1.0 x *L	0.2 x 0.3 x *L
** Standard Input Power	5 Watts	5 Watts	5 Watts
Shock	30G @ 11 mS	30G @ 11 mS	30G @ 11 mS
Vibration	10G	10G	10G
Humidity	up to 95%	up to 95%	up to 95
Altitude	Space Rated	Space Rated	Space Rated
Temperature	-55° to +125° C	-55° to +125° C	-55° to +125° C

* See length table on page 7.

** Higher power is available, please consult the factory.

Discrete Component Connectors

Connector Type	Connector Code	* Connector Length (inches)
BNC Female	B1	1.00
BNC Male	B2	0.930
SMA Female	S1	0.400
SMA Male	S2	0.500
TNC Female	T1	1.00
TNC Male	T2	0.925
Type N Female	N1	1.28
Type N Male	N2	1.25
Surface Mount	Q	**
Gull Wing Pins	M	**
PC Pins	P	**

* Dimensions are approximate and are subject to change.

** Consult factory for pin options.



Reactel, Incorporated — Reacting First to Your Filter Requirements

8031 Cessna Avenue ♦ Gaithersburg, Maryland 20879

Phone: 301-519-3660 ♦ Fax: 301-519-2447 ♦ reactel@reactel.com ♦ www.reactel.com

Discrete Component Filters

* Discrete Component Filter Lengths (inches)

Series	Number of Sections								
	2	3	4	5	6	7	8	9	10
Series 5 (Tubular)	3.25	4.05	4.85	5.65	6.45	7.25	8.05	8.85	9.65
Series 6 (Rectangular)	2.75	2.75	2.75	2.75	2.75	4.00	4.00	4.00	4.00
Series M (Rectangular)	0.75	0.75	1.00	1.00	1.00	1.00	1.50	1.50	1.50

The lengths listed above do not include connectors, see page 6 for connector lengths.

For filters in the frequency range of 2 kHz to 2 MHz, the length will be approximately 1.5 times the values given above.

* Dimensions are approximate and are subject to change.



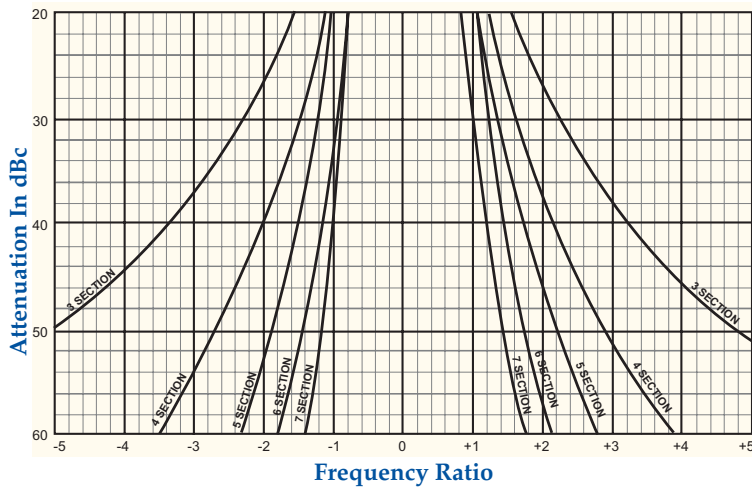
Reactel, Incorporated — Reacting First to Your Filter Requirements

8031 Cessna Avenue ♦ Gaithersburg, Maryland 20879

Phone: 301-519-3660 ♦ Fax: 301-519-2447 ♦ reactel@reactel.com ♦ www.reactel.com

Discrete Component Filters

Discrete Component Bandpass Attenuation Curves



The rejection for bandpass filters can be determined from the curves. Calculate the frequency ratio as follows:

$$\text{Frequency Ratio} = \frac{\text{Rejection Frequency} - \text{Center Frequency}}{\text{3 dB Bandwidth}}$$

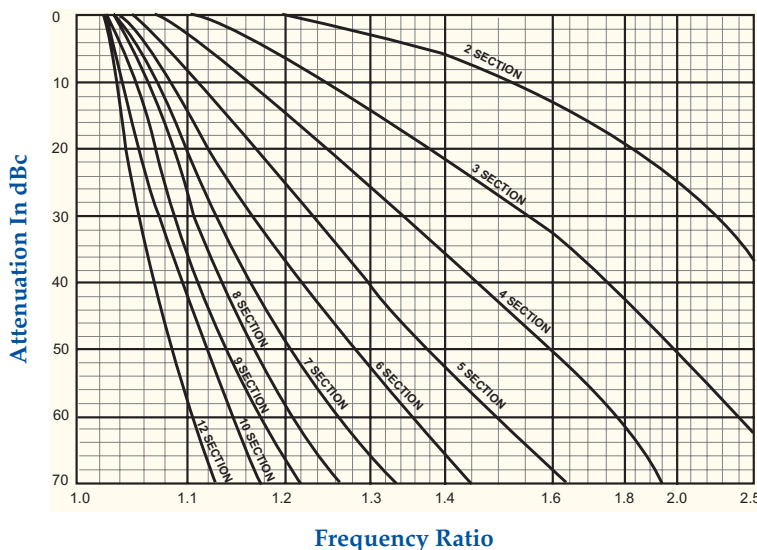
Example:

Center Frequency = 500 MHz
 3 dB Bandwidth = 50 MHz
 Number of Sections = 4
 Reject Frequencies = 400 & 600 MHz

$$\text{Frequency Ratio} = \frac{400 - 500}{50} = -2$$

Rejection from Curve = 40 dB

Discrete Component Lowpass Attenuation Curves



The rejection for lowpass filters can be determined from the curves. For frequencies above the 3 dB cutoff frequency, calculate the frequency ratio as follows:

$$\text{Frequency Ratio} = \frac{\text{Rejection Frequency}}{\text{3 dB Cutoff Frequency}}$$

Example:

Rejection Frequency = 100 MHz
 3 dB Cutoff Frequency = 65 MHz
 Number of Sections = 5

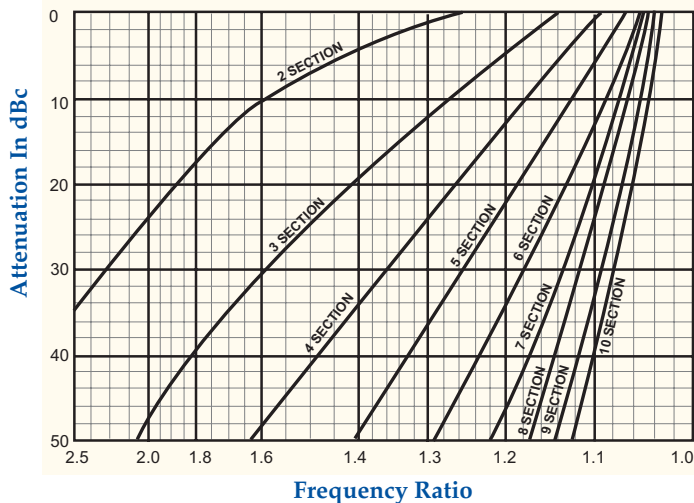
$$\text{Frequency Ratio} = \frac{100}{65} = 1.54$$

Rejection from Curve = 63.8 dB



Discrete Component Filters

Discrete Component Highpass Attenuation Curves



The rejection for highpass filters can be determined from the curves. For frequencies below the 3 dB cutoff frequency, calculate the frequency ratio as follows:

$$\text{Frequency Ratio} = \frac{3 \text{ dB Cutoff Frequency}}{\text{Rejection Frequency}}$$

Example:

Rejection Frequency = 75 MHz
 3 dB Cutoff Frequency = 100 MHz
 Number of Sections = 5

$$\text{Frequency Ratio} = \frac{100}{75} = 1.33$$

Rejection from Curve = 41.3 dB

Insertion Loss

Insertion loss can be calculated for discrete component filters using the following formulas and loss factors (LF).

Bandpass Filters

$$\text{IL} = \frac{(\text{LF})(\text{N}+.5)}{\% \text{ 3 dB BW}} + .4$$

Loss Factors

% 3 dB BW	Series 5	Series 6	Series M
1 to 15	3.9	4.8	5.1
15 and Up	5.8	6.0	6.4

Example for a 5 Section Series 6 Filter with 14.3% 3 dB BW

$$\text{IL} = \frac{(4.8)(5+.5)}{14.3} + .4$$

IL = 2.25 dB

Lowpass & Highpass Filters (up to 90% F_c)

$$\text{IL} = (\text{LF})(\text{N}+.5) + .25 \text{ dB}$$

where LF = .12 for Series 5

LF = .14 for Series 6

LF = .14 for Miniature

Example for a 4 Section Series 5 Filter

$$\text{IL} = (.12)(4+.5) + .25 \text{ dB}$$

IL = .79 dB



Reactel, Incorporated — Reacting First to Your Filter Requirements

8031 Cessna Avenue ♦ Gaithersburg, Maryland 20879

Phone: 301-519-3660 ♦ Fax: 301-519-2447 ♦ reactel@reactel.com ♦ www.reactel.com