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

<u>5 B M — 500 — 50 S 1 1</u> 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







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	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	

Discrete Component Specifications

* 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	Τ2	0.925		
Type N Female	N1	1.28		
Type N Male	N2	1.25		
Surface Mount	Q	**		
Gull Wing Pins	М	**		
PC Pins	Р	**		

* Dimensions are approximate and are subject to change.

** Consult factory for pin options.



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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

* Discrete Component Filter Lengths (inches)

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.





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

Frequency Ratio = <u>Rejection Frequency - Center Frequency</u> 3 dB Bandwidth

Example:

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

Frequency Ratio = $\frac{400 - 500}{50} = -2$ Rejection from Curve = 40 dB

Discrete Component Lowpass Attenuation Curves 10 20 Attenuation In dBc 30 40 50 60 70 2.5 1.0 1.1 1.2 1.3 1.6 1.8 2.0 **Frequency Ratio**

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:

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

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

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



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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:

Frequency Ratio = <u>3 dB Cutoff Frequency</u> Rejection Frequency

Example:

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

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

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

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

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

 $IL = 2.25 \ dB$

Lowpass & Highpass Filters (up to 90% F_c)

IL = (LF) (N+.5) + .25 dBwhere LF = .12 for Series 5 LF = .14 for Series 6 LF = .14 for Miniature

Example for a 4 Section Series 5 Filter

IL = (.12)(4+.5) + .25 dB

IL = .79 dB



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