

# ALLEN AVIONICS, INC.

## Delay Equalized Lowpass Anti-Aliasing Reconstruction Custom Built LC Filters - 1 KHz to 500 MHz

delpPrinter

The **Allen Avionics** DELAY EQUALIZED LOWPASS FILTERS tabulated on this page are the result of many years of experience in the use of specialized computer programs for the design and optimization of Delay Equalized Filters. By using modern digital computers, the composite behavior of the filter and equalizer are optimized to yield the ultimate in both amplitude, delay and phase response.

This type of filter is ideally suited for use as an Anti-Aliasing Filter in analog to digital conversion. When used as a Post-Aliasing Filter in digital processing applications, the passband can be shaped to correct for  $\sin x/x$  amplitude distortion.

The filters tabulated below represent a widely used group. However, many other combinations of stopband ratio, impedance, delay distortion and size are possible. Two stopband ratios are listed in the table below, 1.375 @ 45dB and 1.575 @ 60dB.

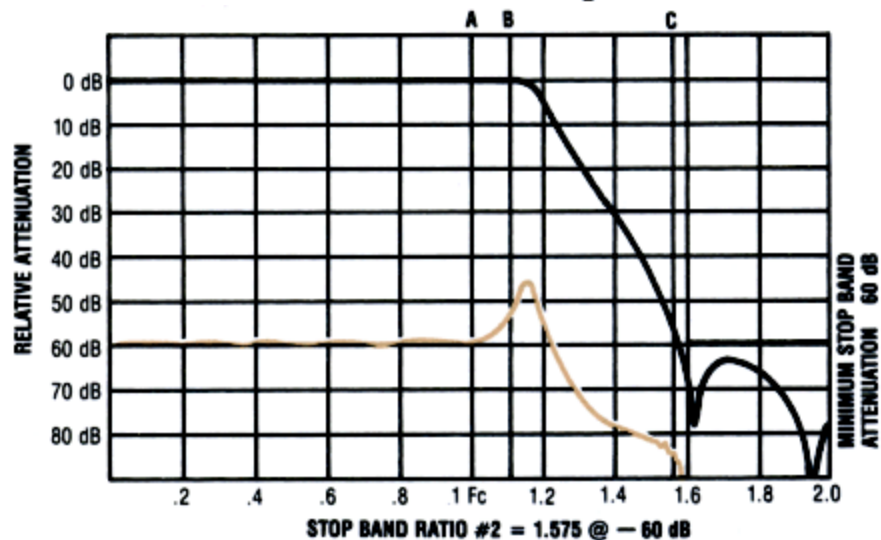
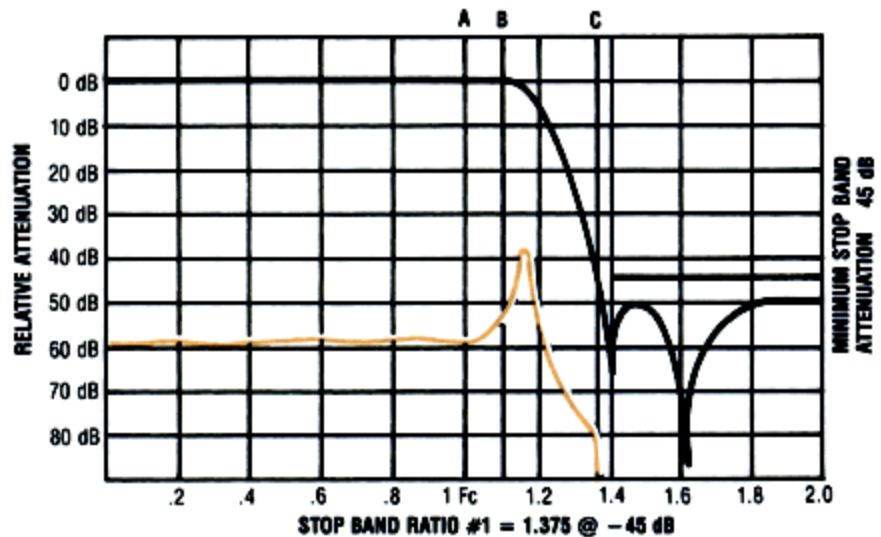
Units normally supplied in metal cans for printed circuit mounting. SMA connectors same size. BNC connectors may require larger cans.

Amplitude, phase and/or delay matching between filters is also available.

**CALL FACTORY FOR SPECIAL SIZES AND DELIVERY INFORMATION.**

**ORDER ANY CUT-OFF FREQUENCY FROM 1KHz TO 20MHz. INTERPOLATION BETWEEN TABULATED DATA ALLOWABLE.**

[Mechanical Specs available on the WEB Site](#)



Normalized Plot of Amplitude & Delay Response of Delay Equalized Lowpass Filter

A = -25dB Frequency, B = -3dB Frequency, C = -45dB Frequency or -60dB

Stopband Ratio #1 = 1.375 @ 45dB - Delay (D) = 18.63  
 Stopband Ratio #2 = 1.575 @ 60dB - Delay (D) = 17.83

APPROXIMATE PASSBAND DELAY (seconds) =  $\frac{\text{Delay (D)}}{2 \times \pi \times \text{Frequency A(Hz)}}$

**Delay Equalized Lowpass Anti-Aliasing Reconstruction Filters**

± .25dB MAXIMUM RIPPLE —2dB MAXIMUM INSERTION LOSS  
 MAXIMUM DELAY VARIATION 3% TO -.25dB FREQUENCY

| Maximum 25dB Cut-Off Frequency (Last point that delay flatness is specified) (Graph location A) | Maximum 3dB Attenuation Frequency (Graph location B) B = 1.1 x A | Attenuation Frequency Graph Location C |                             | Impedance Range (Ohms) | Approximate Passband Delay Micro-Seconds |          | Standard Size (Inches) | "Space-Saving" Size (Inches) |
|---|--|--|-----------------------------|------------------------|--|----------|------------------------|------------------------------|
|   |  | 45dB Ratio #1 C = 1.375 x A            | 60dB Ratio #2 C = 1.575 x A |                        | Ratio #1                                 | Ratio #2 |                        |                              |
| 1.0 KHz   | 1.10 KHz   | 1.38 KHz                               | 1.58 KHz                    | 500-2.5K               | 2965                                     | 2837     | 6 x 2 x 1-1/4          | ---                          |
| 2.5 KHz   | 2.75 KHz   | 3.44 KHz                               | 3.94 KHz                    | 500-2.5K               | 1186                                     | 1135     | 6 x 2 x 1-1/4          | ---                          |
| 5.0 KHz   | 5.50 KHz   | 6.88 KHz                               | 7.88 KHz                    | 500-2.5K               | 593                                      | 567      | 6 x 2 x 1-1/4          | ---                          |
| 10.0 KHz  | 11.00 KHz  | 13.75 KHz                              | 15.75 KHz                   | 500-2.5K               | 297                                      | 284      | 6 x 2 x 1-1/4          | 5 x 2 x 1-1/4                |
| 25.0 KHz  | 27.50 KHz  | 34.37 KHz                              | 39.38 KHz                   | 100-1.0K               | 119                                      | 114      | 5 x 2 x 1-1/4          | 4 x 2 x 1-1/4                |
| 50.0 KHz  | 55.00 KHz  | 68.75 KHz                              | 78.80 KHz                   | 50-600                 | 59                                       | 57       | 5 x 2 x 1-1/4          | 4 x 2 x 1-1/4                |
| 100.0 KHz   | 110.00 KHz   | 137.50 KHz                             | 157.50 KHz                  | 50-200                 | 30                                       | 28       | 5 x 2 x 1-1/4          | 4 x 2 x 1-1/4                |
| 250.0 KHz   | 275.00 KHz   | 343.75 KHz                             | 393.75 KHz                  | 50-100                 | 12                                       | 11       | 4 x 2 x 1-1/4          | 4 x 2 x 3/4                  |
| 500.0 KHz   | 550.00 KHz   | 687.50 KHz                             | 787.50 KHz                  | 50-100                 | 5.94                                     | 5.67     | 4 x 2 x 1-1/4          | 4 x 2 x 3/4                  |
| 1.0 MHz   | 1.10 MHz   | 1.38MHz                                | 1.58MHz                     | 50-75                  | 2.97                                     | 2.84     | 4 x 2 x 1-1/4          | 4 x 2 x 3/4                  |
| 2.5 MHz   | 2.75 MHz   | 3.44 MHz                               | 3.94 MHz                    | 50-75                  | 1.19                                     | 1.14     | 4 x 2 x 1-1/4          | 3 x 1-5/8 x 1-1/8            |
| 5.0 MHz   | 5.50 MHz   | 6.88 MHz                               | 7.88 MHz                    | 50-75                  | 0.590                                    | 0.567    | 4 x 1-1/2 x 1-1/4      | 3 x 1-5/8 x 1-1/8            |
| 7.5 MHz   | 8.25 MHz   | 10.31 MHz                              | 11.82 MHz                   | 50-75                  | 0.395                                    | 0.378    | 4 x 1-1/2 x 1-1/4      | 3 x 1-5/8 x 1-1/8            |
| 10.0 MHz  | 11.00 MHz  | 13.75 MHz                              | 15.75 MHz                   | 50-75                  | 0.296                                    | 0.284    | 4 x 1-1/2 x 1-1/4      | 3 x 1-5/8 x 1-1/8            |
| 12.5 MHz  | 13.75 MHz  | 17.18 MHz                              | 19.69 MHz                   | 50-75                  | 0.237                                    | 0.226    | 4 x 1-1/2 x 1-1/4      | 3 x 1-5/8 x 1-1/8            |
| 15.0 MHz  | 16.50 MHz  | 20.63 MHz                              | 23.63 MHz                   | 50-75                  | 0.197                                    | 0.188    | 4 x 1-1/2 x 1-1/4      | 3 x 1-1/4 x 3/4              |
| 17.5 MHz  | 19.25 MHz  | 24.06 MHz                              | 27.57 MHz                   | 50-75                  | 0.169                                    | 0.162    | 4 x 1-1/2 x 1-1/4      | 3 x 1-1/4 x 3/4              |
| 20.0 MHz  | 22.00 MHz  | 27.50 MHz                              | 31.50 MHz                   | 50                     | 0.148                                    | 0.141    | 4 x 1-1/2 x 1-1/4      | 3 x 1-1/4 x 3/4              |
| 25.0MHz   | 27.50MHz   | 34.38MHz                               | 39.38MHz                    | 50                     | 0.118                                    | 0.113    | 4 X 1.5 X 1.25         | 3 x 1-1/4 x 3/4              |
| 30.0MHz   | 33.00  | 41.25MHz                               | 47.25MHz                    | 50                     | 0.099                                    | 0.095    | 4 x 1.5 x 1.25         | 3 x 1-1/4 x 3/4              |
| 35.0MHz   | 38.5   | 48.12MHz                               | 55.12MHz                    | 50                     | 0.840                                    | 0.081    | 4 x 1.5 x 1.25         | 3 x 1-1/4 x 3/4              |
| 40.0MHz   | 44.0   | 55.00MHz                               | 63.00MHz                    | 50                     | 0.740                                    | 0.071    | 4 x 1.5 x 1.25         | 3 x 1-1/4 x 3/4              |
| 45.0MHz   | 49.50  | 61.88MHz                               | 70.87MHz                    | 50                     | 0.066                                    | 0.063    | 4 x 1.5 x 1.25         | 3 x 1-1/4 x 3/4              |
| 50.0MHz   | 55.00  | 68.75MHz                               | 78.75MHz                    | 50                     | 0.059                                    | 0.056    | 4 x 1.5 x 1.25         | 3 x 1-1/4 x 3/4              |
| 60.0MHz   | 66.00  | 82.50MHz                               | 94.50MHz                    | 50                     | 0.049                                    | 0.047    | 4 x 1.5 x 1.25         | 3 x 1-1/4 x 1/2              |
| 70.0MHz   | 77.00  | 96.25MHz                               | 110.3MHz                    | 50                     | 0.042                                    | 0.040    | 4 x 1.5 x 1.25         | 3 x 1-1/4 x 1/2              |
| 80.0MHz   | 88.00  | 110.0MHz                               | 126.0MHz                    | 50                     | 0.037                                    | 0.035    | 4 x 1.5 x 1.25         | 3 x 1-1/4 x 1/2              |
| 90.0MHz   | 99.00  | 123.8MHz                               | 141.8MHz                    | 50                     | 0.033                                    | 0.031    | 4 x 1.5 x 1.25         | 3 x 1-1/4 x 1/2              |
| 100.0MHz  | 110.00   | 137.MHz                                | 157.5MHz                    | 50                     | 0.029                                    | 0.028    | 4 x 1.5 x 1.25         | 3 x 1-1/4 x 1/2              |
| * 150.0 MHz   | 165.00   | 206.3MHz                               | 236.2MHz                    | 50                     | 0.019                                    | 0.019    | 4 x 1.5 x 1.25         | 3 x 1-1/4 x 1/2              |
| * 200.0 MHz   | 220.00   | 275.0MHz                               | 315.0MHz                    | 50                     | 0.014                                    | 0.014    | 4 x 1.5 x 1.25         | 3 x 1-1/4 x 1/2              |
| * 250.0 MHz   | 275.00   | 343.8MHz                               | 393.8MHz                    | 50                     | 0.011                                    | 0.011    | 4 x 1.5 x 1.25         | 3 x 1-1/4 x 1/2              |
| * 300.0 MHz   | 330.00   | 412.5MHz                               | 472.5MHz                    | 50                     | 0.009                                    | 0.009    | 4 x 1.5 x 1.25         | 3 x 1-1/4 x 1/2              |
| * 400.0 MHz   | 440.00   | 550.0MHz                               | 630.0MHz                    | 50                     | 0.007                                    | 0.007    | 4 x 1.5 x 1.25         | 3 x 1-1/4 x 1/2              |
| * 500.0 MHz   | 550.00   | 687.5MHz                               | 787.5MHz                    | 50                     | 0.005                                    | 0.005    | 4 x 1.5 x 1.25         | 3 x 1-1/4 x 1/2              |

\*At frequencies above 100MHz, the maximum attenuation at location A becomes .5dB and the delay variation up to location A becomes ± 5%.

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We are pleased to accept

