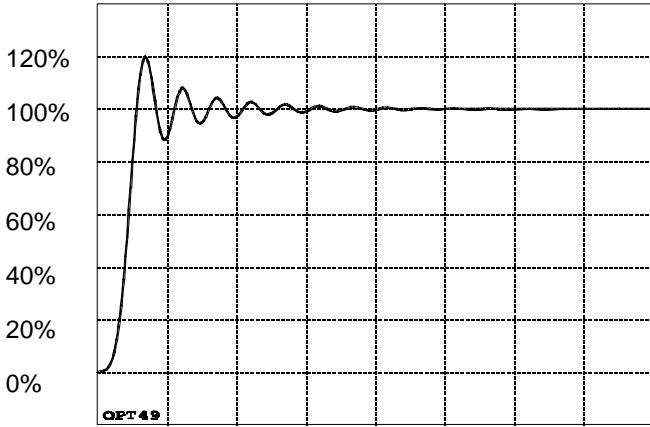




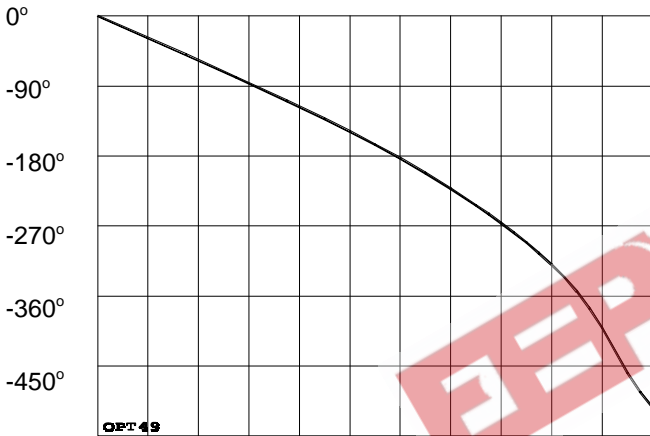
Filter Response: Opt49LP

Figure 1: step response vs. time



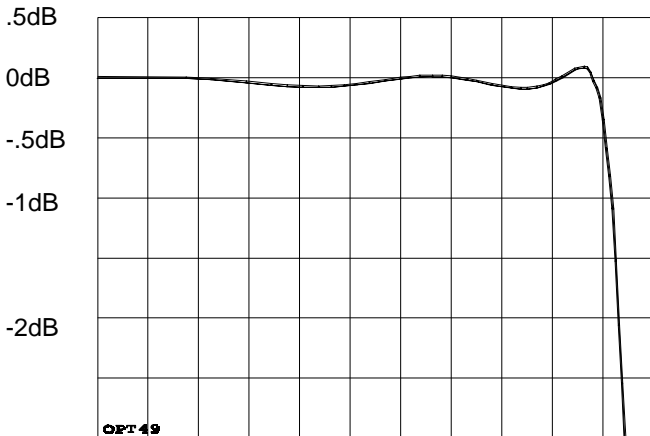
time, $2/F_c$ per division from 0 to $16/F_c$

Figure 2: passband phase response



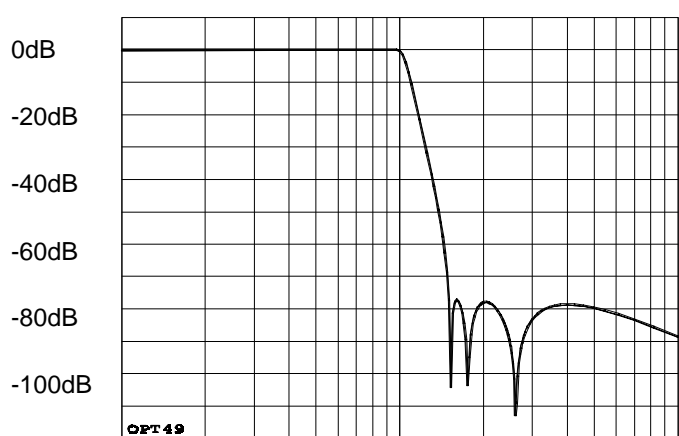
frequency, $0.1F_c$ per division from 0 to $1.1F_c$

Figure 3: passband amplitude response



frequency, $0.1F_c$ per division from 0 to $1.1F_c$

Figure 4: overall frequency response



frequency, logarithmic scale from $0.1F_c$ to $10F_c$

filter order and type: n=8 lowpass
basic stopband: -77dB at 1.5 times F_c
document number: KT70180
this issue dated: 23 October 1997

Description

The Option 49LP response is a modified elliptic filter; it has a flat passband with ripple of less than $\pm 0.1\text{dB}$ up to the cutoff frequency, and a stopband of -77dB starting at 1.5 times cutoff (figures 3 and 4). The phase response of such filters is quite non-linear (shown in figures 2,6,7 and 9). See figures 1 and 5, and the table overleaf, for details of overshoot and settling behaviour.

Applications

This response shape has found wide acceptance as an alias protection filter for applications where analysis is carried out in the frequency domain (e.g. FFT analysis), and wide sampled bandwidth is more important than the time history of the waveform. Minimum suggested sample rate is 2.5 times the filter cutoff frequency.

Availability

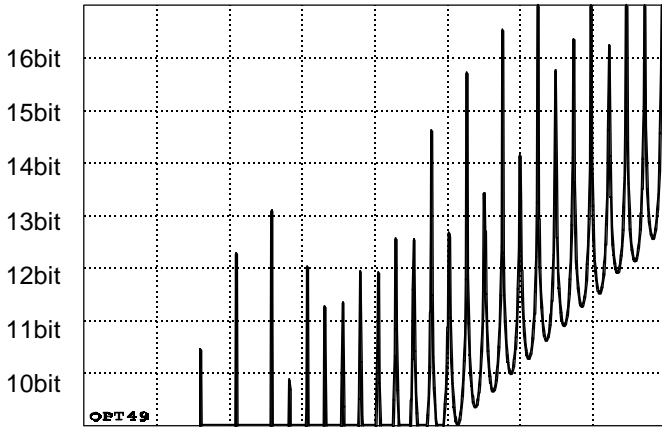
Option 49LP was designed for, and is primarily used on the VBF10M laboratory filter instrument and the VBF35 multichannel system, though it can be supplied on some other Kemo products. For a similar, industry-standard response on most multi-channel Kemo products, see Option 01LP (document number KT70086).

UK: Kemo Ltd, 3 Brook Court, Blakeney Road
Beckenham, Kent, BR3 1HG
tel (+44) 181 658 3838
fax (+44) 181 658 4084

US: Kemo, Inc, 190 Raven Road
Landrum, SC 29356
tel 864 895 8100
fax 864 895 8900

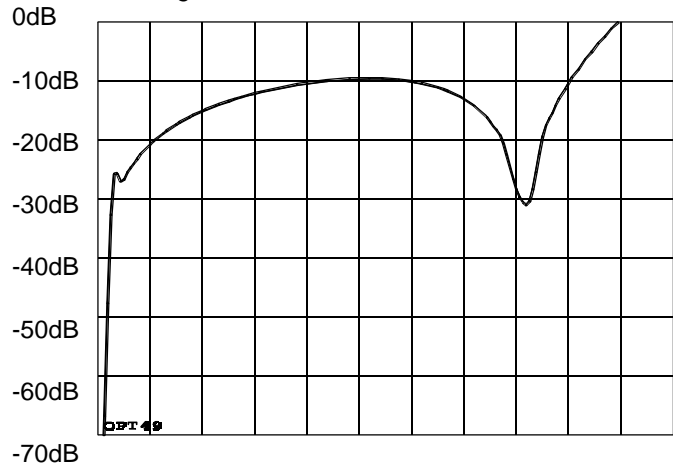
Filter Response

Figure 5: accuracy vs. time



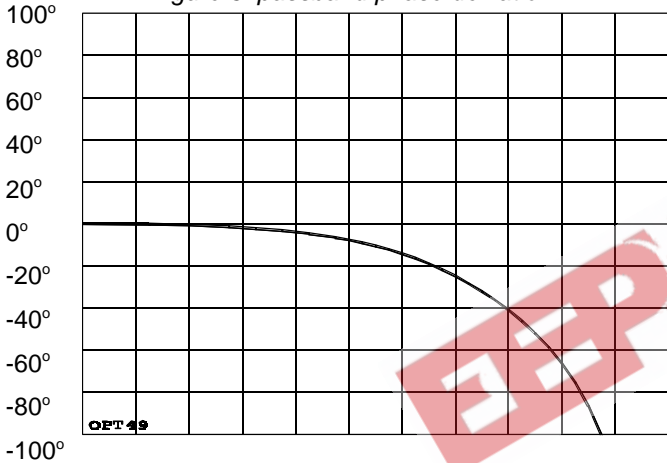
time, $2/F_c$ per division from 0 to $16/F_c$

Figure 8: vector error



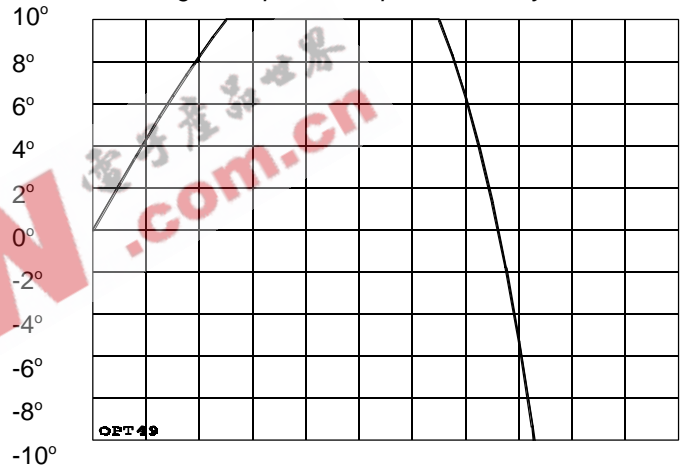
frequency, $0.1F_c$ per division from 0 to $1.1F_c$

Figure 6: passband phase deviation



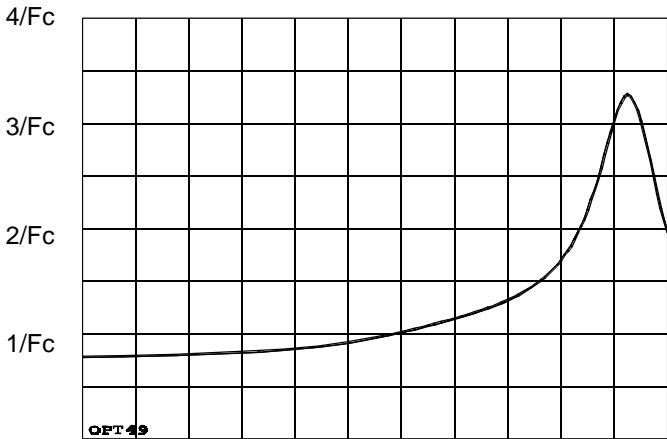
frequency, $0.1F_c$ per division from 0 to $1.1F_c$

Figure 9: passband phase linearity



frequency, $0.1F_c$ per division from 0 to $1.1F_c$

Figure 7: passband group delay



frequency, $0.1F_c$ per division from 0 to $1.1F_c$

Response information for: OPT49

stopband response	-77.23dB at $1.525F_c$
equivalent attenuation slope	126.84 dB per octave
zero frequency delay	$0.7831/F_c$
z.f. phase line (used in Figure 6)	$-281.92\text{deg} \times f/F_c$
mean phase line (used in Figure 9)	$-326.32\text{deg} \times f/F_c$
best phase line (used in Figure 8)	$-335.64\text{deg} \times f/F_c$
attenuation:	
0.1dB	$0.989F_c$
0.25dB	$0.996F_c$
0.5dB	$1.005F_c$
1dB	$1.016F_c$
3dB	$1.042F_c$
6dB	$1.068F_c$
12dB	$1.11F_c$
18dB	$1.151F_c$
24dB	$1.194F_c$
36dB	$1.282F_c$
48dB	$1.366F_c$
60dB	$1.438F_c$
72dB	$1.487F_c$
84dB	$[2.367F_c]$
96dB	$[2.544F_c]$
overshoot	19.81% at $1.4/F_c$
risetime to 0.996Vin	$1.142/F_c$
approximate settling time to 9 bits	$9.9/F_c$
add on for each subsequent bit:	$1.427/F_c$