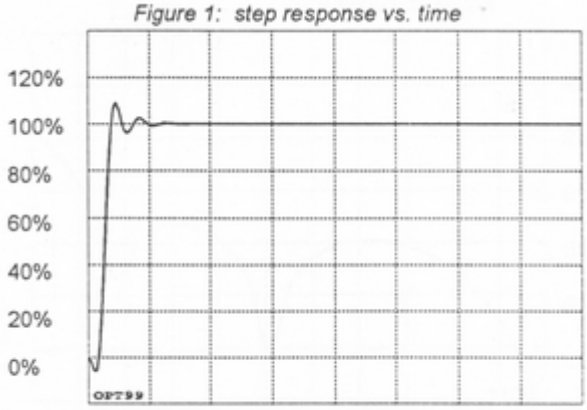
Filter Response 99

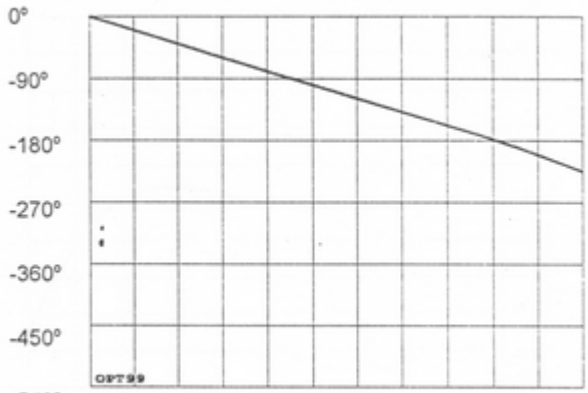
4 Pole Anti-Aliasing
Anti-Aliasing

Figure 1: step response vs. time



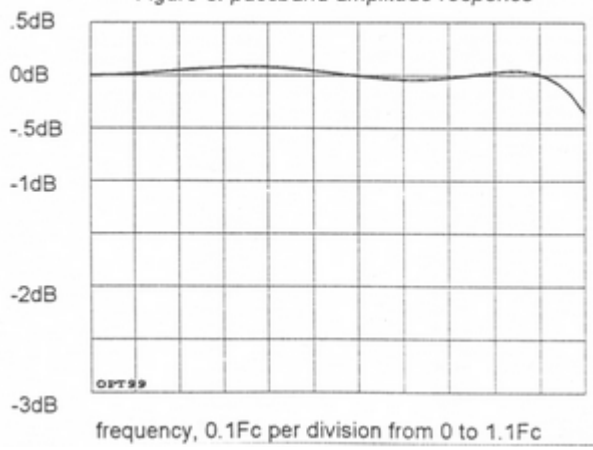
time, 2/Fc per division from 0 to 16/Fc

Figure 2: passband phase response



frequency, 0.1Fc per division from 0 to 1.1Fc

Figure 3: passband amplitude response



frequency, 0.1Fc per division from 0 to 1.1Fc

filter order and type:	n=4 lowpass
basic stopband:	-68dB at 7.2 times Fc
document number:	KT70281
this issue dated:	22 October 1997

Description

The Option 99 response is a four pole filter; it has a flat passband (ripple less than ±0.07dB theoretical), and a stopband of -68dB starting at 7.2 times cutoff (figures 3 and 4). Phase response has good linearity with less than ±2° residual error (figures 2, 6 and 9) and time response settles quickly (figures 1 and 5). Advanced computer optimisation techniques were used to reduce 'vector error', our measure of total amplitude- and phase-induced waveform distortion (see figure 8), to low levels, ensuring high waveform fidelity.

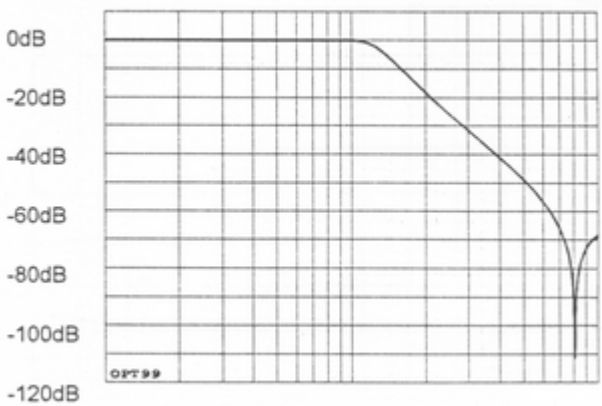
Applications

Option 99 suits applications where waveform accuracy is required, along with useful protection from aliasing, from a four pole filter; such applications may require calculation of experimental parameters from the signal time history. Sample rates of eight times the cutoff frequency or higher are recommended.

Availability

Option 99 is available on 1204 and 1604 modules with base frequencies currently up to 500Hz. It can also be supplied on 21ST20, 21CF30 and VBF64 multichannel systems, some modules in Series 38 and Model 100, and various other systems. Option 99 is not available in a highpass version.

Figure 4: overall frequency response



frequency, logarithmic scale from 0.1Fc to 10Fc

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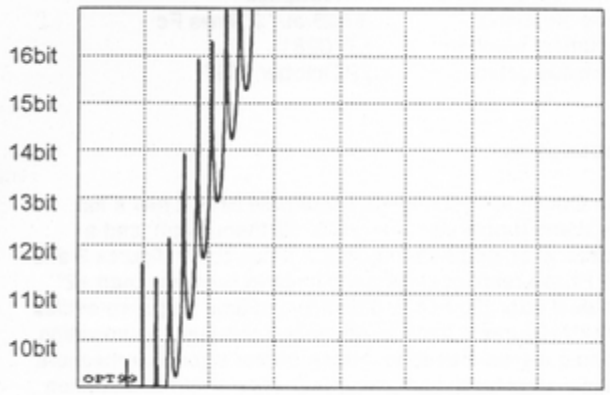
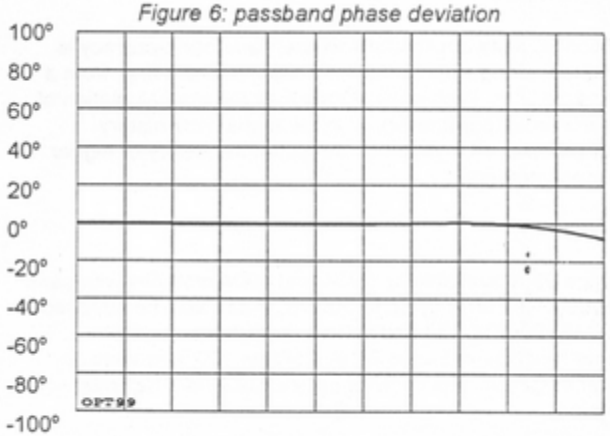
Figure 5: accuracy vs. time



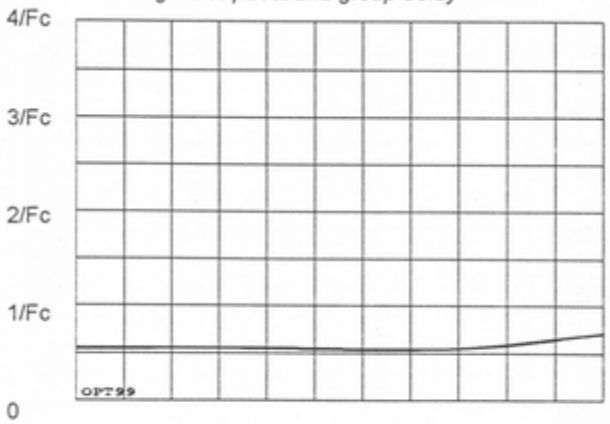
time, 2/Fc per division from 0 to 16/Fc

Figure 6: passband phase deviation



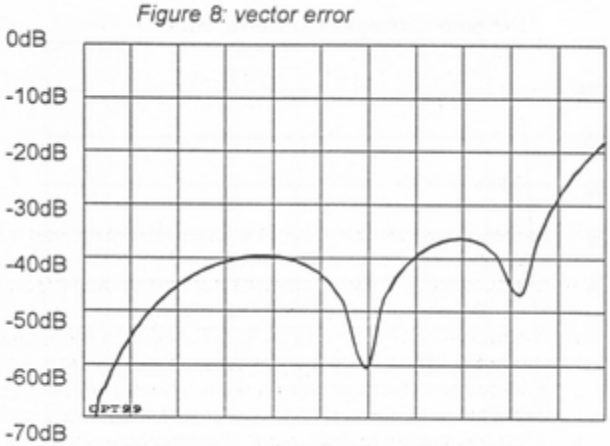
frequency, 0.1Fc per division from 0 to 1.1Fc

Figure 7: passband group delay



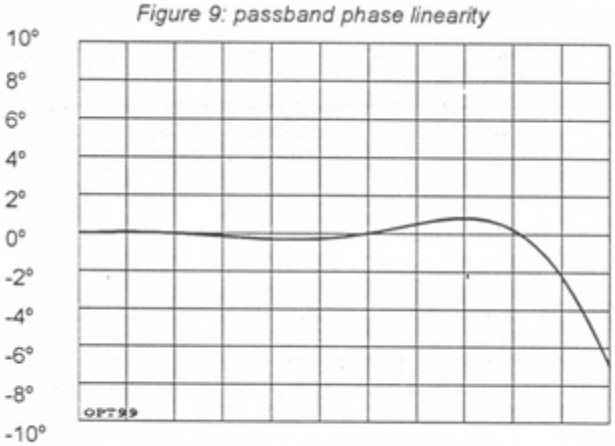
frequency, 0.1Fc per division from 0 to 1.1Fc

Figure 8: vector error



frequency, 0.1Fc per division from 0 to 1.1Fc

Figure 9: passband phase linearity



frequency, 0.1Fc per division from 0 to 1.1Fc

Response information for:	OPT99
stopband response	-68.56dB at 7.225Fc
equivalent attenuation slope	24.03 dB per octave
zero frequency delay	0.5481/Fc
z.f. phase line (used in Figure 6)	-197.34deg x f/Fc
mean phase line (used in Figure 9)	-198.02deg x f/Fc
best phase line (used in Figure 8)	-198.02deg x f/Fc
attenuation: 0.1dB	1.049Fc
0.25dB	1.084Fc
0.5dB	1.122Fc
1dB	1.173Fc
3dB	1.294Fc
6dB	1.427Fc
12dB	1.686Fc
18dB	1.995Fc
24dB	2.381Fc
36dB	3.442Fc
48dB	4.883Fc
60dB	6.399Fc
72dB	[7.44Fc]
84dB	[7.878Fc]
96dB	[8.011Fc]
overshoot	9.05% at 0.9/Fc
risetime to 0.996Vin	0.768/Fc
approximate settling time to 9 bits	2.725/Fc
add on for each subsequent bit:	0.37/Fc

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