Custom filter details

The Moku:Pro Digital Filter Box implements infinite impulse response (IIR) filters using 4 cascaded Direct Form I second-order stages with a final output gain stage. The total transfer function can be written:

$$H(z) = g\prod_{k=1}^{4} s_k \frac{b_{0k} + b_{1k}z^{-1} + b_{2k}z^{-2}}{1 + a_{1k}z^{-1} + a_{2k}z^{-2}}$$

To specify a filter, you must supply a text file containing the filter coefficients. The file should have six coefficients per line, with each line representing a single stage. If output scaling is required, this should be given on the first line:

g (optional)	7.8357416974,					
Stage 1	1.0000000000,	0.0044157497,	0.0088314994,	0.0044157497,	-1.6692917152,	0.9692269375
Stage 2	1.0000000000,	0.0472217267,	0.0944434535,	0.0472217267,	-1.8988580275,	0.9341904809
Stage 3	1.0000000000,	0.0375275838,	0.0750551677,	0.0375275838,	-1.9259771042,	0.9311308010
⋮	s	b_0	b_1	b_2	a_1	a_2

Each coefficient must be in the range [-4.0,+4.0). Internally, these are represented as signed 48-bit fixed-point numbers, with 45 fractional bits. The output scaling can be up to 8,000,000. Filter coefficients can be computed using signal processing toolboxes in e.g. MATLAB or SciPy.

Some coefficients may result in overflow or underflow, which degrade filter performance. Check filter responses prior to use.

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