## FILTER TYPE

下面的表列出了所有的滤波器类型和可以配置的参数，YES表示可配，NO表示不可配。当对应的参数不能配置时，GUI应显示为灰色

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Filter Type** | **Fc** | **BW** | **Gain(DB)** | **Q** |
| Peaking | YES | YES | YES | Q = Fc/BW |
| Low Shelving | YES | NO | YES | NO |
| High shelving | YES | NO | YES | NO |
| Notch | YES | YES | NO | Q=Fc/BW |
| Low pass (Butterworth) | YES | NO | NO | NO |
| High pass (Butterworth) | YES | NO | NO | NO |

## Coefficient Calculations

### Peak Filter Setting

With fS as the input signal sampling frequency, fC as the required peak filter center frequency, BW as the bandwidth, and G (dB) as the gain, use the following steps for coefficient calculation:

1. Transfer the gain in decibels (dB) to decimal domain.



1. Calculate the double precision coefficients.















1. Transfer the double precision coefficients to integer values represented by registers.

*p0* = *round*(*p0* × 2^23)  
*p1* = *round*(*p1* × 2^23)  
*p2* = *round*(*p2* × 2^23)  
*d1* = *round*(*d1* × 2^23)  
*d2* = *round*(*d2* × 2^23)

1. Transfer the decimal integer values to 26-bit, twos complement hex values.

### Low-Pass Shelving Filter

The low-pass shelving filter transfer function is



With fS as the input signal sampling frequency, fC as the required peak filter center frequency, and G (dB) as the gain, use the following steps for coefficient calculation:

1. Transfer the gain in decibels (dB) to decimal domain.



1. Calculate the double precision coefficients.









1. Transfer the double precision coefficients to integer values represented by registers.

*p0* = *round*(*p0* × 2^23)  
*p1* = *round*(*p1* × 2^23)  
*d1* = *round*(*d1* × 2^23)

1. Transfer the decimal integer values to 26-bit twos complement hex values.

### High-Pass Shelving Filter

The high-pass shelving filter transfer function is



With fS as the input signal sampling frequency, fC as the required peak filter center frequency, and G (dB) as the gain, use the following steps for coefficient calculation:

1. Transfer the gain in decibels (dB) to decimal domain.



1. Calculate the double precision coefficients.









1. Transfer the double precision coefficients to integer values represented by registers.

*p0* = *round*(*p0* × 2^23)

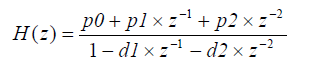
*p1* = *round*(*p1* × 2^23)

*d1* = *round*(*d1* × 2^23)

1. Transfer the decimal integer values to 26-bit twos complement hexadecimal values.

### Notch Filter

The notch filter transfer function is



With fS as the input signal sampling frequency, fC as the required notch filter center frequency, and bw(Hz) as the bandwidth, use the following steps for coefficient calculation:













And all coefficients are rounded to Q3.23

*Example: when fc = 1KHz, fs = 48KHz, bw = 200Hz,*

*P0\*2^23 = 8500362*

*P1\*2^23 = -16855280*

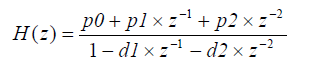
*P2\*2^23 = 8500362*

*D1\*2^23 = 16855280*

*D2\*2^23= -8612116*

### Low Pass Filter

The notch filter transfer function is



With fS as the input signal sampling frequency, fC as the required notch filter center frequency, use the following steps for coefficient calculation:





*Example: when fc = 1KHz, fs = 48KHz,*

*P0\*2^23 = 32851*

*P1\*2^23 = 65702*

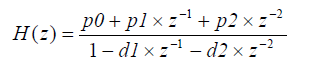
*P2\*2^23 = 32851*

*D1\*2^23 = 15228185*

*D2\*2^23= -6970980*

### High Pass Filter

The notch filter transfer function is



With fS as the input signal sampling frequency, fC as the required notch filter center frequency , use the following steps for coefficient calculation:





*Example: when fc = 1KHz, fs = 48KHz,*

*P0\*2^23 = 7646943*

*P1\*2^23 = -15293886*

*P2\*2^23 = 7646943*

*D1\*2^23 = 15228185*

*D2\*2^23= -6970980*