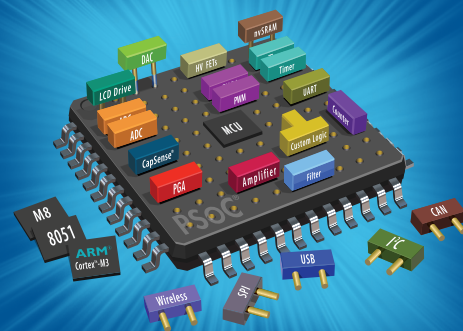


CYPRESS PSoC[®] DIGITAL FILTER



PRODUCT OVERVIEW

CYPRESS PSoC ENABLES POWERFUL DIGITAL FILTERING

Cypress's PSoC[®] programmable system-on-chip architecture gives you the freedom to design revolutionary new products, and the capability to get those products to market fast. PSoC integrates more signal conditioning and signal processing functionality than any other mixed-signal embedded solution available.

The PSoC 3 and PSoC 5 hardware filtering engine can deliver fast, high order, high accuracy filters. PSoC Creator[™] and the configuration wizard for the Filter component make the filter design process easy.

COMPARISON OF FILTER METHODS

	Analog Filtering	Firmware Filtering	PSoC Digital Filtering
Method	Utilizing discrete passives (resistors and capacitors)	Utilizing MCU processor and specialized code	Dedicated digital filter co-processor and easy-to-use graphical configuration
Pros	Hardware only – no firmware Supports a wide-range of filter frequencies	Modifying filter design is as simple as updating the firmware Abundant availability of filter code examples	PSoC Creator provides visual indication of filter design and expected performance Simple to change and update Dedicated hardware enables high-performance filtering without impacting embedded MCU functions No firmware to write
Cons	Difficult to design unless you're an analog filter expert Design changes require hardware changes	Difficult to debug the filter code design Utilizes critical CPU resources May require expensive DSP-class MCUs	Digital only solution – does not preserve the original analog signal
Performance	Dependent on the quality of the discrete analog passives	Dependent on MCU performance and available clock cycles	Independent of MCU performance or load

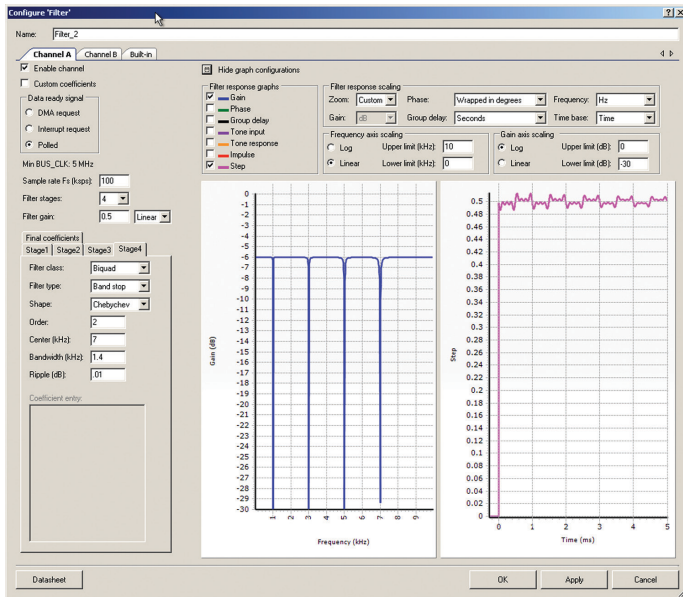
FEATURES

- Easy drag-and-drop addition of powerful hardware digital filters to your PSoC Creator project schematics
- Two independent filter channels, each of which can have up to four separately designed FIR or IIR stages in series
- Use either built-in standard FIR and IIR (biquad) filter types or enter your own filter coefficients for maximum flexibility
- Final hardware-optimized coefficient values can be extracted for further analysis

ADVANTAGES

- Dedicated 24-bit digital filtering hardware offloads filtering tasks from the CPU
- Higher filtering performance than any standard MCU solution, with single-cycle MAC and address-generation hardware running at up to 67 MHz
- Coefficient values and sequences are automatically optimized for best achievable dynamic range
- Like all other PSoC Creator components, API functions are pre-written for the Filter component - all the user has to do is to call those functions





REMOVING SIGNAL NOISE

Signal noise may be incurred in embedded designs from switching clocks that can't be sufficiently reduced just by implementing good grounding and shielding practices. Simple notch filters can remove only one frequency, but sometimes several harmonics need to be removed while preserving as much as possible of the frequency content of the desired underlying signal. The PSoC Creator Filter component can be used to create a cascade of four separate narrow notch filter stages that can be tuned to the fundamental and harmonics of an interfering switching frequency, shown below for a 1 kHz tone.

If four notches aren't enough, then the realized coefficients from the four stages can be copied out of the 'Final Coefficients' window and then pasted into a single stage. On a single signal channel, the Filter

component can implement up to 25 biquads, allowing a filter with a mostly-flat passband in which up to 25 separate frequencies can be individually notched out.

DISCOVER THE POWER OF PSoC CREATOR

One of the biggest advantages of the PSoC Filter comes from the flexibility that PSoC Creator provides:

- Configure the filter graphically using PSoC Creator without developing custom signal processing code
- Using PSoC Creator makes finding information regarding the part extremely easy. By simply right clicking on the Filter component, one can find all the necessary information through its data sheet
- Like all PSoC Creator components, the APIs are pre-written so all the user has to do is use the function calls provided
- This powerful tool allows for data from the Filter to be transferred to on-board RAM, to a communication component, or the MCU core. DMA transfer capability allows operation at the full sample rates of PSoC 3 and PSoC 5's built-in ADCs.

APPLICATIONS

Digital filters have a myriad of applications, often involving the removal of an interfering signal that's affecting your system performance, or the isolation of an interesting signal that's being swamped by noise or by intentional signals at other frequencies. PSoC 3 and PSoC 5's hardware filtering can help by cleaning these signals and extracting modulated data in voice and communications systems.

GET STARTED NOW

For more information: www.cypress.com/go/potm. Contact support@cypress.com for support.

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