Digital Filter Design/Digital Filter Design Lite

Summary

The Digital Filter Design tool for the dsPIC® 16-bit Digital Signal Controllers makes designing, analyzing and implementing Finite Impulse Response (FIR) and Infinite Impulse Response (IIR) digital filters easy through a menu-driven and intuitive user interface. The filter design tool performs complex mathematical computations for filter design, provides superior graphical displays and generates comprehensive design reports. Desired filter frequency specifications are entered and the tool automatically generates the filter code and coefficient files ready to use in the MPLAB® Integrated Development Environment (IDE). System analysis of the filter transfer function is supported with multiple generated graphs such as: magnitude, phase, group delay, log magnitude, impulse response and pole/zero locations.

Finite Impulse Response Filter Design

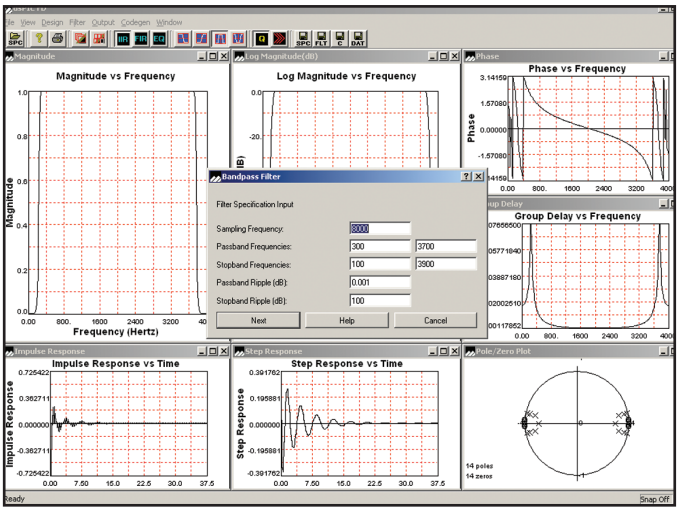
- Design Method Selection
  - FIR Windows Design
  - FIR Equiripple Design (Parks-McClellan)
- Lowpass, Highpass, Bandpass and Bandstop filters
- FIR filters can have up to 513 taps
- Following window functions are supported:

Rectangular	4 Term Cosine
Hanning (Hann)	4 Term Cosine with continuous 5th Derivative
Hamming	Minimum 4 Term Cosine
Triangular	Good 4 Term Blackman Harris
Blackman	Harris Flat Top
Exact Blackman	Kaiser
3 Term Cosine	Dolph-Tschebyscheff
3 Term Cosine with continuous 3rd Derivative	Taylor
Minimum 3 Term Cosine	Gaussian

- Reports show design details such as window coefficients and Impulse Response prior to multiplying by the window function
- Filters are designed for a maximum gain of 1

Comparison - Filter Design vs. Filter Design Lite

	Filter Design	Filter Design Lite
Low-pass	✔	✔
High-pass	✔	✔
Band-pass	✔	✔
Band-stop	✔	✔
FIR Taps	Up to 513	Up to 64
IIR Taps for LP, HP	Up to 10	Up to 4
IIR Taps for BP, BS	Up to 20	Up to 8
Generate ASM Code	✔	✔
Export to MPLAB® IDE	✔	✔
Export to MPLAB® C30 C Compiler	✔	✔
MATLAB® Support	✔	—



Infinite Impulse Response Filter Design

- Lowpass, Highpass, Bandpass and Bandstop Filters
- Filter orders up to 10 for Lowpass and Highpass Filters
- Filter orders up to 20 for Bandpass and Bandstop Filters
- Five Analog Prototype Filters are available:
  - Butterworth
  - Tschebyscheff
  - Inverse Tschebyscheff
  - Elliptic
  - Bessel
- Digital Transformations are performed by Bilinear Transformation Method
- Reports show design details such as all transformations from normalized lowpass filter to desired filter

Code Generation Features

- Generated files are compliant with the Microchip dsPIC30F C30 Compiler, Assembler and Linker
- Choice of placement of coefficients in Program Space or Data Space
- C wrapper/header code generation

Graphs

- Magnitude Response vs. Frequency
- Log Magnitude vs. Frequency
- Phase Response vs. Frequency
- Group Delay vs. Frequency
- Impulse Response vs. Time (per sample)
- Step Response vs. Time (per sample)
- Pole and Zero Locations (IIR only)

MICROCHIP
Development Systems

Microchip Technology Incorporated

Host System Requirements

- PC-compatible system with an Intel Pentium® class or higher processor, or equivalent
- A minimum of 16 MB RAM
- A minimum of 40 MB available hard drive space
- CD ROM drive
- Microsoft Windows® 98, Windows 2000, Windows XP or Windows NT®

Part Numbers and Ordering Information:

Digital Filter Design/Digital Filter Design Lite		
Part Number	**Description**	**Availability**
SW300001	Digital Filter Design	Now
SW300001-LT	Digital Filter Design Lite	Now

Development Tools from Microchip	
MPLAB® IDE	Integrated Development Environment (IDE)
MPASM™ Assembler	Universal PICmicro® Macro-Assembler
MPLINK™ Linker/MPLIB™ Librarian	Linker/Librarian
MPLAB SIM Simulator	Software Simulator
MPLAB C18	C Compiler for PIC18CXXX MCUs
MPLAB C30	C Compiler for dsPIC30F MCUs
PICkit™ 1	Flash Starter Kit
MPLAB ICD 2	In-Circuit Debugger
MPLAB ICE 2000	Full-featured Modular In-Circuit Emulator for PIC12, PIC16 and PIC18 MCUs
MPLAB ICE 4000	Full-featured Modular In-Circuit Emulator for PIC18 and dsPIC MCUs
PICSTART® Plus Programmer	Entry-level Development Kit with Programmer
MPLAB PM3 Device Programmer	Full-featured, Modular Device Programmer
KEELOQ® Evaluation Kit	Encoder/Decoder Evaluator
microID® Developer's Kit	125 kHz and 13.56 MHz RFID Development Tools

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