



**dsPIC® Digital Signal Controllers**

A large, stylized graphic of the text 'dsPIC' in a metallic, 3D font. The 'ds' is red, and 'PIC' is silver. Below it, the words 'Digital Signal Controllers' are written in a bold, white, sans-serif font with a black outline. The background is a dynamic, abstract pattern of purple and orange wavy lines.

**dsPIC®**  
**Digital Signal Controllers**

# Digital Signal Controller Solutions

Building on the legacy of Microchip's world-leading 8-bit PIC® microcontrollers, 16-bit dsPIC® Digital Signal Controllers (DSCs) deliver a large product portfolio to make your demanding applications more competitive by providing lower system cost and improved efficiency.

A Digital Signal Controller (DSC) is a single-chip embedded controller that seamlessly integrates the control attributes of a microcontroller (MCU) with the computation and throughput capabilities of a Digital Signal Processor (DSP).

## Reduce Development Risk

*Natural step up for 8-bit MCU users needing more performance/memory*

- Industry's largest DSC portfolio for optimal product fit
- Extensive software and application design support
- Same Integrated Development Environment for 8/16/32-bit MCUs
- Extensive web seminars and training courses

## Discover New Design Options

*Transform ideas into reality*

- Add powerful features with DSC capabilities
- Employ advanced algorithms to improve efficiency
- Explore innovative ways to protect your design
- Use industry's smallest DSC to shrink product size

## Save System Cost

*Simplify your design through integration and efficiency*

- Best in class 'C' efficiency enables reduced Flash size
- Low pin count packages provide lower product cost
- Replace complex analog filters with digital filters
- Highly Integrated DSCs reduce external components

## Complete Project on Schedule

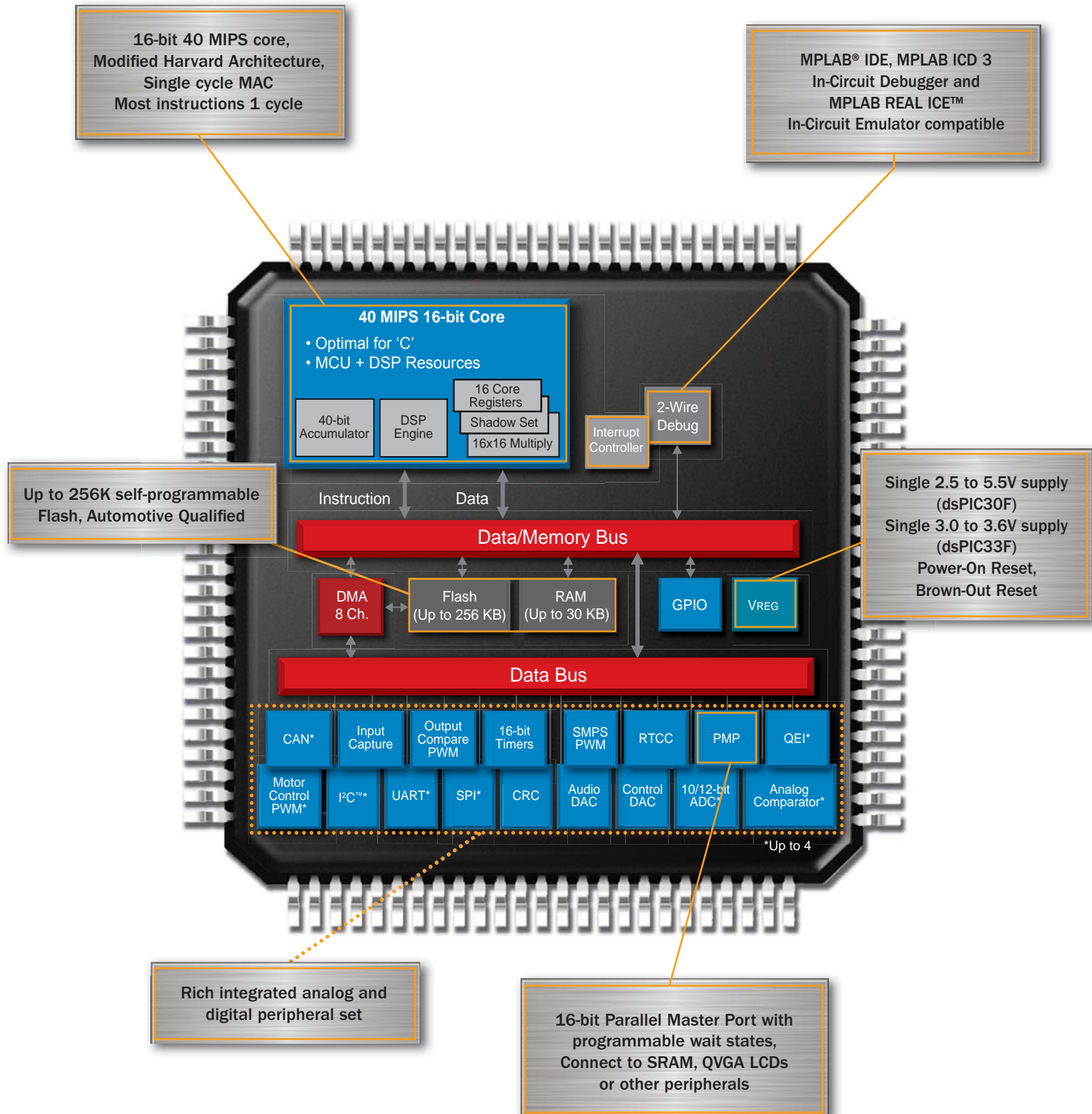
*Leverage existing software, unprecedented compatibility and powerful graphical tools*

- Free software, code examples and peripheral libraries
- Extensive family compatibility maximizes reuse
- Powerful graphical tools for rapid product development
- High-level application libraries provide innovative features





# Inside the dsPIC® Digital Signal Controller



# Products, Libraries and Reference Designs

## 16-Bit dsPIC® Digital Signal Controller (DSC) Products

Family	Program Memory (Kbytes)	RAM (Bytes)	Pins	Max Speed	A/D Ch.	A/D Res. (bits)	A/D Sample (ksps)	Comp	8/16/32-bit Timers (x8, x16, x32)	Communication Peripherals	PWM Ch.	PWM Type	Other Features
<b>16-Bit DSCs – General Purpose (24-bit Instruction Word), ICSP™, Self-Write</b>													
dsPIC30FXXX	12-144	1K-8K	18-80	30 MIPS	8-16	12	200	–	3-5 x16	UART, I <sup>2</sup> C™, SPI, CAN, DCI (AC97/I <sup>2</sup> S)*	2-8	Standard	Flash Security, EEPROM
dsPIC33FXXX/A**	12-256	1K-30K	18-100	40 MIPS	6-32	10 or 12	500 or 1.1M	0-2	3-9 x16	UART w/IrDA, I <sup>2</sup> C, SPI, ECAN, DCI	2-8	Standard	Flash Security, JTAG, DMA*, PMP*, RTCC*, DAC*, CRC*
<b>16-Bit DSCs – Motor Control (24-bit Instruction Word), ICSP, Self-Write</b>													
dsPIC30FXXX	12-144	512-8K	28-80	30 MIPS	6-16	10	1.0M	–	3-5 x16	UART, I <sup>2</sup> C/SPI, CAN	6-8	Motor Ctrl.	Flash Security, EEPROM, QEI*
dsPIC33FXXX/A**	12-256	1K-30K	20-100	40 MIPS	4-24	10 or 12	500 or 1.1M	0-2	3-9 x16	UART w/IrDA, I <sup>2</sup> C, SPI, ECAN	6-8	Motor Ctrl.	Flash Security, JTAG, DMA*, PMP*, RTCC*, CRC*, QEI*
<b>16-Bit DSCs – Digital Power Conversion and Motor Control (24-bit Instruction Word), ICSP, Self-Write</b>													
dsPIC30FXXX	6-12	256-512	28-44	30 MIPS	6-12	10	2.0M	2-4	2-3 x16	UART, I <sup>2</sup> C, SPI	4-8	High-speed	Flash Security
dsPIC33FJXXGSXXX	6-64	256-9K	18-100	40 MIPS	6-24	10	2.0M or 4.0M	0-4	2-3 x16	UART, I <sup>2</sup> C, SPI	4-18	High-speed	Flash Security, JTAG, 10-bit DAC Output*, CAN, DMA*

\*Availability of listed feature dependent on product.

\*\*Parts available with High Temperature options.

All parts available with Industrial and Extended Temperature options.

## Microchip Software Libraries, Application Algorithms and Reference Designs

For a complete list of software libraries visit: [www.microchip.com/libraries](http://www.microchip.com/libraries)

Application	Application Library	Part Number
Speech, Audio and Communication	dsPIC DSC Noise Suppression Library	SW300040-5K*
		SW300040-EVAL
	dsPIC DSC Acoustic Echo Cancellation Library	SW300060-5K*
		SW300060-EVAL
	dsPIC DSC Line Echo Cancellation Library	SW300080-5K*
		SW300080-EVAL
	dsPIC DSC Equalizer Library	–
	dsPIC DSC Automatic Gain Control Library	–
	PIC24/dsPIC DSC G.711 Speech Encoding/Decoding Library	SW300026
	dsPIC DSC G.726A Speech Encoding/Decoding Library	SW300090-5K*
Encryption and Security	dsPIC DSC Symmetric Key Embedded Encryption Library	SW300050-5K*
		SW300050-EVAL
	dsPIC DSC Asymmetric Key Embedded Encryption Library	SW300055-5K*
		SW300055-EVAL
	Triple DES/AES Encryption Libraries	SW300052
DSP and Math	dsPIC DSC DSP Library	Included in MPLAB C Compiler
	PIC24/dsPIC DSC Math Library	Included in MPLAB C Compiler
	PIC24/dsPIC DSC Fixed Point Math Library	Included in MPLAB C Compiler
Peripherals	PIC24/dsPIC DSC Peripheral Library	SW300021
Graphics	Microchip Graphics Library	–
Wired and Wireless Connectivity	Microchip TCP/IP Stack Software (ENC28J60/ENC628J600 Driver)	SW300024
	Microchip USB Framework	–
	IEEE 802.15.4: MiWi™ and MiWi P2P	–
	IEEE 802.15.4: ZigBee®, ZigBee PRO, ZigBee Smart Energy Profile Suite	–
File System and Memory	Microchip FAT File System for PIC24 & PIC32 MCUs and dsPIC DSCs	SW300027
	Data EEPROM Emulation for PIC18, PIC24 & PIC32 MCUs and dsPIC DSCs	–
Other	PMBus Stack	–
	Class B Safety Software Library for PIC® MCUs and dsPIC DSCs	–

\*Software library license up to 5K units

# Developing with dsPIC® Digital Signal Controllers

Microchip is the only silicon vendor with a full 8-, 16- and 32-bit microcontroller portfolio supported by a unified development environment. Our MPLAB® IDE is free and easy to use.

## MPLAB® C Compiler

The MPLAB C Compiler for dsPIC DSCs is a full-featured, ANSI compliant optimizing compiler. The Compiler includes a complete ANSI C standard library, including string manipulation, dynamic memory allocation, data conversion, timekeeping and math libraries. The MPLAB C Compiler has a powerful code optimizer; other 16-bit MCUs generate as much as 165 percent larger code for the same application.

## HI-TECH C® Compilers

HI-TECH C ANSI C compilers are enabled with Omniscient Code Generation™ (OCG), a whole-program compilation technology, to facilitate more intelligent, state-of-the-art code generation and enhance product usability. HI-TECH C compilers integrate into MPLAB IDE and are fully compatible with all Microchip debuggers and emulators.

## Motor Control and Digital Power Development Systems for dsPIC33F



Microchip offers complete Motor Control development systems to develop and prototype BLDC, PMSM and ACIM applications. Microchip's also offers digital power conversion reference

designs for applications in AC to DC converters, DC to DC convertors, Uninterruptible Power Supply (UPS), Interleaved Power Factor Correction (PFC) and LED lighting.

## dsPIC® Starter Kit (DM330011)



Getting started is easy with the fully integrated dsPIC Starter Kit featuring simple installation, getting started tutorial and dsPIC Starter Kit board with easy USB connection to your PC.

The Starter Kit features:

- MPLAB IDE and MPLAB C Compiler for dsPIC DSCs
- dsPIC Starter Kit Board with Integrated Debugger
- Code Examples, Tutorials and Sample Projects

## Explorer 16 Development Board (DM240001)



A low-cost modular development system for Microchip's 16- and 32-bit microcontrollers. Add MPLAB® ICD 3 or MPLAB REAL ICE™ in-circuit debugger/programmer for software development.

## Microstick for dsPIC33F and PIC24H (DM330013)



The Microstick for dsPIC33F devices is designed to provide designers with an easy to use, economical development environment for 16-bit Digital Signal Controllers. It has an integrated programmer/debugger and can be used stand-alone or plugged into a prototyping board for extremely flexible development.

## Plug-in Modules Supporting Explorer 16 Development and Other Development Boards

A Plug-in Module (PIM) is a daughter board with a PIC MCU or dsPIC DSC soldered on top and header socket strips on the bottom. This method allows for easy swapping of devices onto the various development boards, without having to unsolder and resolder parts. For a complete list of available Plug-In Modules, visit the Microchip web site at: [www.microchip.com/devtools](http://www.microchip.com/devtools).

## PICtail™ Plus Daughter Boards

PICtail Plus daughter boards allow for the easy addition of complex hardware and easy evaluation of software libraries. These daughter boards also provide expansion for application specific hardware.

Description	Part Number
Wireless PICtail Plus Daughter Board – 2.4 GHz daughter card with the Microchip MRF24J40 transceiver	AC163027
ECAN/LIN PICtail Plus Daughter Board – Two ECAN MCP2551 transceivers and two LIN MCP2021-330 transceivers	AC163130
PICtail Plus Daughter Board for SD/MMC – SPI to SD/MMC interface	AC164122
Ethernet PICtail Plus Daughter Board – Stand Alone ENC24J60 10Base-T Ethernet controller	AC164123
IrDA® PICtail Plus Daughter Board – IrDA transceiver for IrDA enabled UART	AC164124
Speech Playback PICtail Plus Daughter Board – Low cost PWM-based speech playback	AC164125
Prototype PICtail Plus Daughter Board – PICtail Plus expansion board	AC164126
Graphic PICtail Plus Daughter Board – Enables Graphics display via PMP	AC164127
Audio PICtail Plus Daughter Board – Full Duplex Speech and Audio applications	AC164129
Buck/Boost Converter PICtail Plus Daughter Board – Two independent DC/DC synchronous buck converters and independent DC/DC boost converter	AC164133
Thermal/Linear Intelligent Sensor PICtail Plus Daughter Board – Signal input and conditioning for thermocouples and linear sensors and TC1047/1047A Temperature to Voltage Converter	AC164135
MCP2515 PICtail Plus Daughter Board – Stand Alone CAN Controller expansion board	MCP2515DM
MCP42XX PICtail Plus Daughter Board – MCP42XX Digital Potentiometer expansion board	MCP42XXDM
MCP4725 PICtail Plus Daughter Board – 12-bit DAC + non-volatile memory	MCP4725DM

## Support

Microchip is committed to supporting its customers in developing products faster and more efficiently. We maintain a worldwide network of field applications engineers and technical support ready to provide product and system assistance. In addition, the following service areas are available at [www.microchip.com](http://www.microchip.com):

- **Support** link provides a way to get questions answered fast: <http://support.microchip.com>
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## Training

If additional training interests you, then Microchip can help. We continue to expand our technical training options, offering a growing list of courses and in-depth curriculum locally, as well as significant online resources – whenever you want to use them.

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