dsPIC[®] Digital Signal Controllers

Spring 2011



dsPIC® Digital Signal Controllers



www.microchip.com/DSC

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



www.microchip.com/DSC

Inside the dsPIC[®] Digital Signal Controller



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
16-Bit DSCs – Gene	ral Purpose (2	4-bit Instructi	on Word), I	CSP™, Self-Wr	ite								
dsPIC30FXXX	12-144	1K-8K	18-80	30 MIPS	8-16	12	200	-	3-5 x16	UART, I²C™, SPI, CAN, DCI (AC97/I²S)*	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 ² C, SPI, ECAN, DCI	2-8	Standard	Flash Security, JTAG, DMA*, PMP*, RTCC*, DAC*, CRC*
16-Bit DSCs – Motor Control (24-bit Instruction Word), ICSP, Self-Write													
dsPIC30FXXX	12-144	512-8K	28-80	30 MIPS	6-16	10	1.0M	-	3-5 x16	UART, I ² 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 ² C, SPI, ECAN	6-8	Motor Ctrl.	Flash Security, JTAG, DMA*, PMP*, RTCC*, CRC*, QEI*
dsPIC33EPXXX MUXXX	280-536	28K-52K	64-144	60 MIPS	24-32	10 or 12	500 or 1.1M	3	9x16	UART, I²C™, SPI, ECAN, USB-OTG	14	High-speed	Flash Security, JTAG, DMA, PMP, RTCC, CRC, QEI
16-Bit DSCs – Digital Power Conversion and Motor Control (24-bit Instruction Word), ICSP, Self-Write													
dsPIC30FXXX	6-12	256-512	28-44	30 MIPS	6-12	10	2.0M	2-4	2-3 x16	UART, I ² 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 ² C, SPI	4-18	High-speed	Flash Security, JTAG, DMA*, 10-bit DAC Output*, CAN

*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

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
	dsPIC DSC Speex Speech Encoding/Decoding Library	SW300070
	dsPIC DSC Speech and Audio Fast Forward (SAFF) Tool	-
	DTMF (Generation & Detection) Library	-
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 Floating Point 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	Included in MPLAB C Compiler
Graphics	Microchip Graphics Library	_
Wired and Wireless Connectivity	Microchip TCP/IP Stack Software	-
	Microchip USB Framework	-
	IEEE 802.15.4: MiWi™ and MiWi P2P	-
	IEEE 802.15.4: ZigBee®, ZigBee PRO, ZigBee Smart Energy Profile Suite	_
	IrDA® Stack	-
	Bluetooth®Stack	SW500151
File System and Memory	Microchip FAT File System for PIC24 & PIC32 MCUs and dsPIC DSCs	-
	Data EEPROM Emulation for PIC18, PIC24 & PIC32 MCUs and dsPIC DSCs	_
	SD/MMC Library	-
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.



dsPIC33E USB Starter Kit (DM330012)

This starter kit provides a low-cost modular development system for Microchip's high performance dsPIC33E Digital Signal Controllers. The starter kit features:

- dsPIC33E USB starter board with integrated debugger
- MPLAB IDE and MPLAB C compiler for dsPIC DSCs
- Code examples, tutorials and sample projects

Motor Control and Digital Power Development Systems for dsPIC33



Microchip offers complete Motor Control development systems to develop and prototype BLDC, PMSM and ACIM applications. Microchip 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), solar micro inverter, HID 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 un-solder and re-solder parts.

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
Consumer-band BPSK 7.2 kbps PLM PICtail Plus Daughter Boards (includes 2 daughter boards and 2 HV Adapters)	AC164142
Wireless PICtail Plus Daughter Board – 2.4 GHz daughter card with the Microchip MRF24J40 transceiver	AC163027
CAN/LIN PICtail Plus Daughter Board – Two CAN MCP2551 transceivers and two LIN MCP2021-330 transceivers	AC164130-2
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

www.microchip.com/DSC

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:

- Support link provides a way to get questions answered fast: http://support.microchip.com
- Sample link offers evaluation samples of any Microchip device: http://sample.microchip.com
- Forum link provides access to knowledge base and peer help: http://forum.microchip.com
- Buy link provides locations of Microchip Sales Channel Partners: www.microchip.com/sales

Sales Office Listing

AMERICAS

Atlanta Tel: 678-957-9614

Boston Tel: 774-760-0087

Chicago Tel: 630-285-0071

Cleveland Tel: 216-447-0464

Dallas Tel: 972-818-7423

Detroit Tel: 248-538-2250

Indianapolis Tel: 317-773-8323

Los Angeles Tel: 949-462-9523

Santa Clara Tel: 408-961-6444

Toronto Mississauga, Ontario Tel: 905-673-0699

EUROPE

Austria - Wels Tel: 43-7242-2244-39 Denmark - Copenhagen Tel: 45-4450-2828 France - Paris Tel: 33-1-69-53-63-20 Germany - Munich

Tel: 49-89-627-144-0 Italy - Milan Tel: 39-0331-742611 Netherlands - Drunen Tel: 31-416-690399 Spain - Madrid Tel: 34-91-708-08-90

UK - Wokingham Tel: 44-118-921-5869

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.

- Technical Training Centers: www.microchip.com/training
- MASTERs Conferences: www.microchip.com/masters
- Worldwide Seminars: www.microchip.com/seminars
- eLearning: www.microchip.com/webseminars
- Resources from our Distribution and Third Party Partners www.microchip.com/training

ASIA/PACIFIC

Australia - Sydney Tel: 61-2-9868-6733 China - Beijing Tel: 86-10-8528-2100

China - Chengdu Tel: 86-28-8665-5511

China - Chongqing Tel: 86-23-8980-9588

China - Hong Kong SAR Tel: 852-2401-1200

China - Nanjing Tel: 86-25-8473-2460

China - Qingdao Tel: 86-532-8502-7355

China - Shanghai Tel: 86-21-5407-5533

China - Shenyang Tel: 86-24-2334-2829

China - Shenzhen Tel: 86-755-8203-2660 China - Wuhan

Tel: 86-27-5980-5300

China - Xiamen Tel: 86-592-2388138 China - Xian

Tel: 86-29-8833-7252 China - Zhuhai Tel: 86-756-3210040

ASIA/PACIFIC

India - Bangalore Tel: 91-80-3090-4444 India - New Delhi Tel: 91-11-4160-8631

India - Pune Tel: 91-20-2566-1512

Japan - Yokohama Tel: 81-45-471- 6166

Korea - Daegu Tel: 82-53-744-4301

Korea - Seoul Tel: 82-2-554-7200

Malaysia - Kuala Lumpur Tel: 60-3-6201-9857

Malaysia - Penang Tel: 60-4-227-8870

Philippines - Manila Tel: 63-2-634-9065

Singapore Tel: 65-6334-8870

Taiwan - Hsin Chu Tel: 886-3-6578-300

Taiwan - Kaohsiung Tel: 886-7-213-7830 Taiwan - Taipei

Tel: 886-2-2500-6610

Thailand - Bangkok Tel: 66-2-694-1351 2/18/11



Microchip Technology Inc. 2355 W. Chandler Blvd. Chandler, AZ 85224-6199

Microcontrollers • Digital Signal Controllers • Analog • Memory • Wireless

Information subject to change. The Microchip name and logo, the Microchip logo, MPLAB, dsPIC and PIC are registered trademarks and ECAN, ICSP, MIWI, PICtail and REAL ICE are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries. All other trademarks mentioned herein are property of their respective companies. © 2011, Microchip Technology Incorporated. All Rights Reserved. Printed in the U.S.A. 4/11 DS70324D

