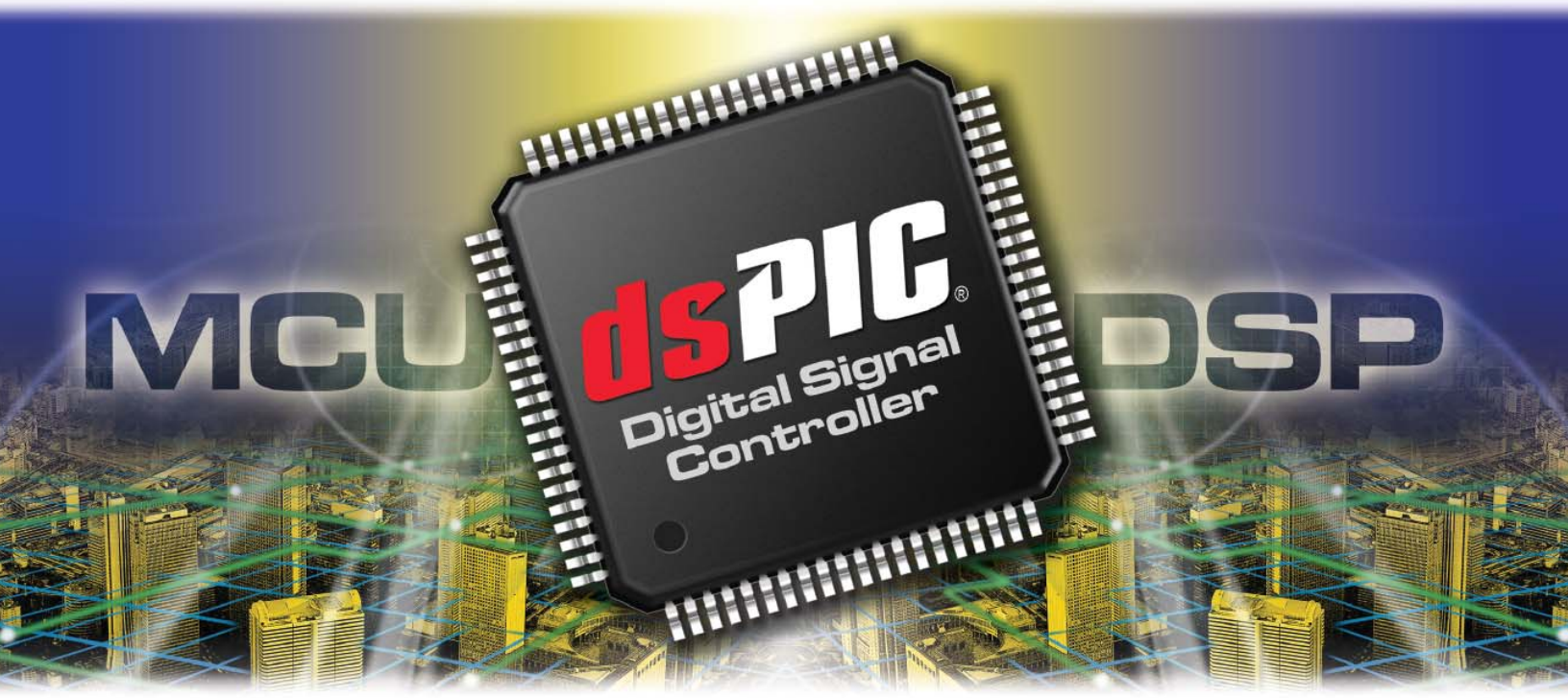
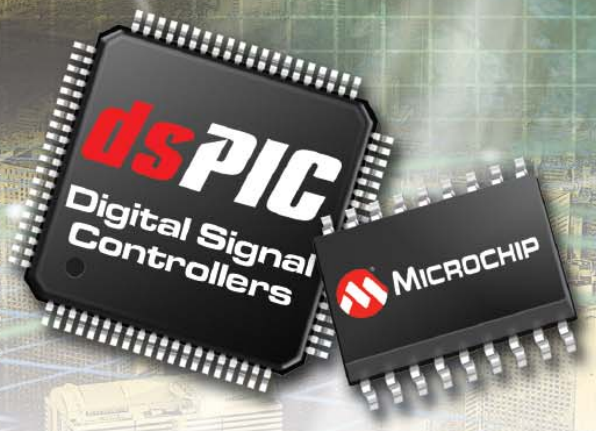
Blending a 16-bit Flash MCU with the Power of DSP

MICROCHIP

dsPIC30F Digital Signal Controllers

The Best of Both Worlds



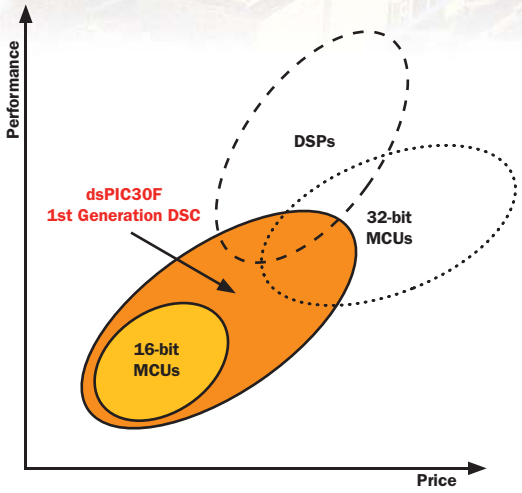


What is a Digital Signal Controller?

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

Microchip's dsPIC30F digital signal controller offers everything you would expect from a powerful 16-bit MCU: fast, sophisticated and flexible interrupt handling; a wide array of digital and analog peripheral functions; power management; flexible clocking options; power-on-reset; brown-out protection; watchdog timer; code security; full-speed real-time emulation; and full-speed in-circuit debug solutions.

By skillfully adding DSP capability to a powerful 16-bit MCU, Microchip's dsPIC30F digital signal controller achieves the best of both worlds and marks the beginning of a new era in embedded control.



The Capability You Need

Powerful 16-bit MCU:

The dsPIC30F executes most of its instructions in 1 cycle (33 ns at 30 MIPS). Combine this high instruction throughput with true DSP capabilities, such as single cycle 16-bit multiply and zero overhead looping, and you have the most powerful 16-bit MCU at your command.

Looking to Add DSP?

If you are one of the many MCU users looking to add DSP features to your system, chances are you don't like your choices. Adding a DSP chip to your existing MCU-based system can be costly and complicated. The dsPIC30F is designed to look and feel like an MCU. Adding DSP functionality in the familiar controller-like environment can be accomplished with ease.

Reliable Flash:

The dsPIC30F incorporates Microchip's PEEC Flash process technology with data retention of 40+ years at 85°C, endurance of 1 million cycles typical at 85°C and fast programming time. There is no better Flash technology for embedded control.

Additionally, the dsPIC30F can securely self-program its own Flash memory in a finished product.

DSP for the DSP Expert!

A seasoned DSP developer, will be amazed at the capabilities the dsPIC30F family offers—everything you expect from a DSP of its class: dual 40-bit accumulators, single-cycle 16x16 MAC, 40-bit barrel shifter, dual operand fetches, saturation and rounding modes and DO and REPEAT loops. Then we added a few items usually missing from DSPs: flexible interrupts, large register sets, a watchdog timer, clock fail detect and real-time emulation to name a few.

Optimized C Compiler:

The dsPIC30F architecture was co-developed by our MPLAB® C30 C Compiler team. The result is a high C code efficiency when compared to any 16-bit MCU or DSP.

C code benchmarks show that competitive 16-bit MCUs require as much as 120% more program code space for the same application program written in C.

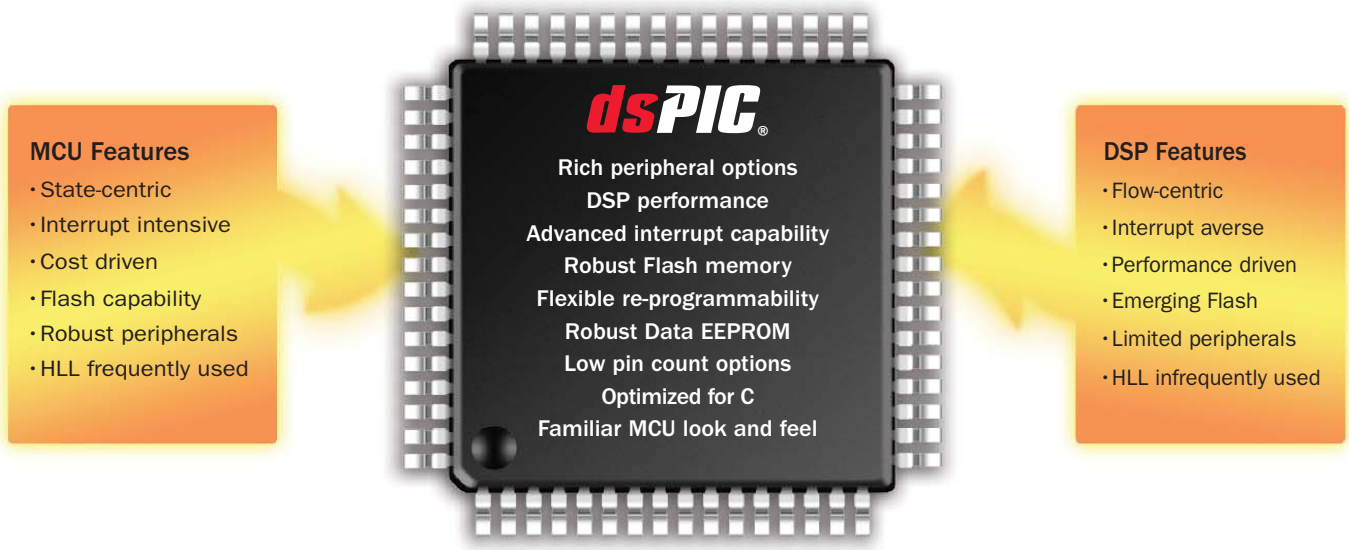
Considering a 32-bit MCU?

Considering a 32-bit controller because your current MCU has run out of steam?

The dsPIC30F with integrated DSP can outperform a 32-bit controller in many applications. Outstanding C code efficiency for 32-bit data type reduces memory requirements and cost.

Future dsPIC30F variants with larger program memory are already planned to give you a long-term road map with the dsPIC® DSC architecture.

Best of Both Worlds



Bridging the Performance Gap

Microchip's dsPIC30F places unprecedented performance in the hands of 16-bit MCU designers. The dsPIC DSC has the "heart" of a 16-bit MCU with robust peripherals and fast interrupt handling capability and the "mind" of a DSP that manages high computation activities, creating the optimum single-chip solution for embedded system designs. This enables you to add powerful new features to your product and integrate functions to save board space.

Outstanding MCU Performance

The first 16-bit MCUs were developed to overcome the native 64 KB boundary imposed by 8-bit MCUs. The need for advanced performance was not contemplated in these early architectures. When the need for performance became obvious, next-generation devices were developed, but were constrained by backward compatibility requirements and legacy issues.

Developed from the ground up, the dsPIC DSC addresses traditional 16-bit requirements without sacrificing performance. It combines state-of-the-art 16-bit MCU performance in its general-purpose register-based core with all the features you need for DSP operations.

Competitive DSP Performance

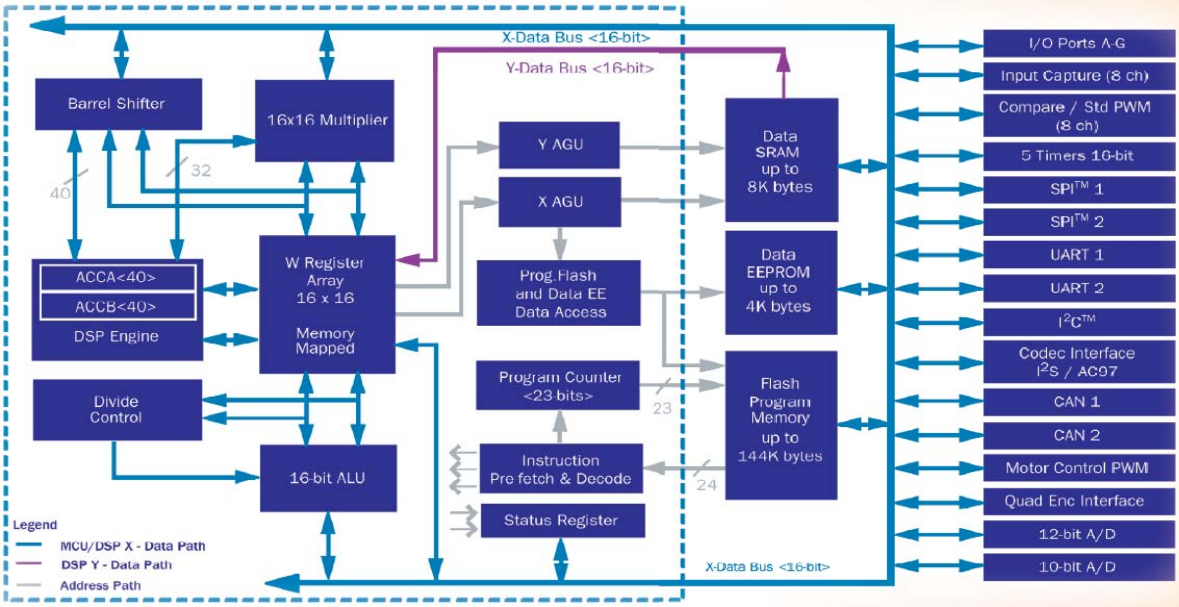
The dsPIC30F balances its outstanding MCU qualities with competitive DSP performance. All the features you require from a high performance robust DSP are effortlessly integrated in the dsPIC DSC.

Function	Cycle Count Equation	Conditions*	Number of Cycles	Execution Time @30 MIPS
Complex FFT**	—	N=64	3739	124.6 µs
Complex FFT**	—	N=128	8485	282.8 µs
Complex FFT**	—	N=256	19055	635.2 µs
Single Tap FIR	—	—	1	33 ns
Block FIR	53+N(4+M)	N=32, M=32	1205	40.2 µs
Block FIR Lattice	41+N(4+7M)	N=32, M=32	7337	244.6 µs
Block IIR Canonic	36+N(8+7S)	N=32, S=4	1188	39.6 µs
Block IIR Lattice	46+N(16+7M)	N=32, M=8	2350	78.3 µs
Matrix Add	20+3(C*R)	C=8, R=8	212	7.1 µs
Matrix Transpose	16+C(6+3(R-1))	C=8, R=8	232	7.7 µs
Vector Dot Product	17+3N	N=32	113	3.8 µs
Vector Max	19+7(N-2)	N=32	229	7.6 µs
Vector Multiply	17+4N	N=32	145	4.8 µs
Vector Power	16+2N	N=32	80	2.7 µs
PID Loop Core	—	—	7	231 ns

*C= #columns, N=# samples, M=#taps, S=#sections, R=#rows
**Complex FFT routine inherently prevents overflow

1 cycle = 33 nanoseconds @ 30 MIPS

dsPIC30F Family Block Diagram



dsPIC30F Features Overview

Operating Range

DC to 30 MIPS*
Wide VDD range: 2.5 - 5.5V
Ind.(-40 to 85°C) and ext. (-40 to 125°C)
*30 MIPS @ 4.5-5.5V, -40 to 85°C

High Performance DSC CPU

Modified Harvard architecture
C compiler optimized instruction set
16-bit wide data path
24-bit wide instructions
84 base instructions: mostly 1 word/1 cycle
16 16-bit general purpose registers
2 40-bit accumulators ·With rounding and saturation options
Flexible and powerful addressing modes ·Indirect, modulo and bit-reversed
Software stack
16 x 16 fractional/integer multiplier
32/16 and 16/16 divide
Single cycle multiply-and-accumulate
40-stage barrel shifter

Interrupt Controller

5 cycle fixed latency
Up to 45 interrupt sources, up to 5 external
7 programmable priority levels
4 processor exceptions and software traps

Digital I/O

Up to 54 programmable digital I/O pins
Wake-up/Interrupt-on-change on up to 24 pins
25 mA sink and source on all I/O pins

On-Chip Flash, Data EEPROM and SRAM

Flash program memory: up to 144K Bytes · 100K erase/write cycles typical
Data EEPROM: up to 4K Bytes · 1M erase/write cycles typical
Data SRAM: up to 8K bytes

System Management

Flexible clock options: ·External, crystal, resonator, internal RC ·Fully integrated PLL (4X, 8X, 16X) ·Extremely low jitter PLL
Programmable power-up timer
Oscillator start-up timer/stabilizer
Watchdog timer with its own RC oscillator
Clock switching/fail-safe clock monitor

Power Management

Switch between clock sources in real time
Programmable low-voltage detect
Programmable brown-out reset
IDLE and SLEEP modes with fast wake-up

Timers/Capture/Compare/PWM

Timer/counters: up to 5 16-bit timers ·Can pair up to make 32-bit timers ·1 timer can run as real time clock with external 32kHz oscillator
Input capture: up to 8 channels ·Capture on up, down or both edges ·4-deep FIFO on each capture
Output compare: up to 8 channels ·Single or dual 16-bit compare mode ·16-bit glitchless PWM mode

Communication Modules

3-wire SPI™: up to 2 modules ·Framing supports I/O interface to simple codecs
I²C™ full multi-master slave mode support ·7-bit and 10-bit addressing ·Bus collision detection and arbitration
UART: up to 2 modules ·Interrupt-on-address bit detect ·Wake-up-on-START bit from SLEEP mode ·4-character TX and RX FIFO buffers
Codec interface module ·Supports I²S and AC97 protocols
CAN 2.0B active: up to 2 modules ·3 transmit and 2 receive buffers ·Wake-up on CAN message

Motor Control Peripherals

Motor Control PWM: up to 8 outputs ·4 duty cycle generators ·Independent or complementary mode ·Programmable dead time ·Edge or center aligned ·Manual output override control ·Up to 2 fault inputs
Quadrature encoder interface module ·Phase A, Phase B and index pulse input

Analog-to-Digital Converters

10-bit 500 ksps A/D converter module ·2 or 4 simultaneous samples ·Up to 16 input channels with auto scanning ·16 deep result buffer ·Conversion possible in SLEEP mode
12-bit 100 ksps A/D converter module ·Up to 16 input channels with auto scanning ·16 deep result buffer ·Conversion possible in SLEEP mode

dsPIC30F Product Families

General Purpose Family

The dsPIC30F General Purpose Family is ideal for a wide variety of 16-bit MCU class embedded applications. In addition, the variants with codec interfaces are well suited for audio applications.

Product	Pins	Program Memory K Bytes	SRAM Bytes	EEPROM Bytes	Timer 16-bit	Input Capture	Output Compare/ Standard PWM	Codec Interface	A/D 12-bit 100 ksps	UART	SPI™	I²C™	CAN	I/O Pins (max.)*	Package Code
dsPIC30F3014	40/44	24	2048	1024	3	2	2	—	13 ch	2	1	1	—	30	P, PT, ML
dsPIC30F4013	40/44	48	2048	1024	5	4	4	AC97, I²S	13 ch	2	1	1	1	30	P, PT, ML
dsPIC30F5011	64	66	4096	1024	5	8	8	AC97, I²S	16 ch	2	2	1	2	52	PTG
dsPIC30F6011	64	132	6144	2048	5	8	8	—	16 ch	2	2	1	2	52	PF
dsPIC30F6012	64	144	8192	4096	5	8	8	AC97, I²S	16 ch	2	2	1	2	52	PF
dsPIC30F5013	80	66	4096	1024	5	8	8	AC97, I²S	16 ch	2	2	1	2	68	PT
dsPIC30F6013	80	132	6144	2048	5	8	8	—	16 ch	2	2	1	2	68	PF
dsPIC30F6014	80	144	8192	4096	5	8	8	AC97, I²S	16 ch	2	2	1	2	68	PF

Motor Control and Power Conversion Family

This dsPIC30F family supports motor control applications, such as brushless DC motors, single and 3-phase induction motors, and switch reluctance motors. These are ideal for UPS, inverters, switched mode power supplies and power factor correction.

Product	Pins	Program Memory K Bytes	SRAM Bytes	EEPROM Bytes	Timer 16-bit	Input Capture	Output Compare/ Standard PWM	Motor Control	A/D 10-bit 500 ksps	Quadrature Encoder	UART	SPI™	I²C™	CAN	I/O Pins (Max.)*	Package Code
dsPIC30F2010	28	12	512	1024	3	4	2	6 ch	6 ch	Yes	1	1	1	—	20	SPG, SOG, MMG
dsPIC30F3010	28	24	1024	1024	5	4	2	6 ch	6 ch	Yes	1	1	1	—	20	SP, SO
dsPIC30F4012	28	48	2048	1024	5	4	2	6 ch	6 ch	Yes	1	1	1	1	20	SP, SO
dsPIC30F3011	40/44	24	1024	1024	5	4	4	6 ch	9 ch	Yes	2	1	1	—	30	P, PT, ML
dsPIC30F4011	40/44	48	2048	1024	5	4	4	6 ch	9 ch	Yes	2	1	1	1	30	P, PT, ML
dsPIC30F5015	64	66	2048	1024	5	4	4	8 ch	16 ch	Yes	1	2	1	1	52	PT
dsPIC30F6010	80	144	8192	4096	5	8	8	8 ch	16 ch	Yes	2	2	1	2	68	PF

Sensor Family

The dsPIC30F Sensor Family products have features designed to support high-performance, low-cost embedded control applications. The 18- and 28-pin packages are designed to fit space-critical applications.

Product	Pins	Program Memory K Bytes	SRAM Bytes	EEPROM Bytes	Timer 16-bit	Input Capture	Output Compare/ Standard PWM	A/D 12-bit 100 ksps	UART	SPI™	I²C™	I/O Pins (Max.)*	Package Code
dsPIC30F2011	18	12	1024	—	3	2	2	8 ch	1	1	1	12	P, SO
dsPIC30F3012	18	24	2048	1024	3	2	2	8 ch	1	1	1	12	P, SO
dsPIC30F2012	28	12	1024	—	3	2	2	10 ch	1	1	1	20	SP, ML
dsPIC30F3013	28	24	2048	1024	3	2	2	10 ch	2	1	1	20	SP, SO, ML

* Maximum I/O pin count includes pins shared by the peripheral functions.

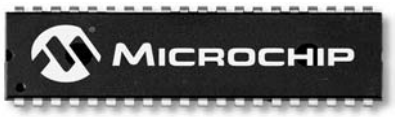
dsPIC30F Packages

P: 18-pin PDIP
(22.81 x 7.95 x 3.3 mm)

SO: 18-pin SOIC
(11.53 x 10.34 x 2.31 mm)

MM(G): 28-pin QFN
(6 mm x 6 mm x 0.9 mm)

ML: 44-pin QFN
(8 mm x 8 mm x 0.9 mm)



P: 40-pin PDIP
(52.27 x 15.24 x 3.81 mm)

PF: 64-pin TQFP
(14 mm x 14 mm x 1 mm)

PT(G): 64-pin TQFP
(10 mm x 10 mm x 1 mm)

SP(G): 28-pin SPDIP
(34.67 x 7.87 x 3.3 mm)

SO(G): 28-pin SOIC
(17.88 x 10.34 x 2.31 mm)

PT: 44-pin TQFP
(10 mm x 10 mm x 1 mm)

PT: 80-pin TQFP
(12 mm x 12 mm x 1 mm)

PF: 80-pin TQFP
(14 mm x 14 mm x 1 mm)

Images are approximately to scale.

One Architecture, Many Solutions

The versatile dsPIC30F family provides solutions for embedded control applications and offers a wide variety of digital and analog peripheral modules. Choose a large pin count, large memory dsPIC30F device as a main controller in a large, complex embedded system. Or select a small pin count, small package device to tackle a single motor or a sensor. No other 16-bit MCU or DSP family gives you so much flexibility.

Invest in the dsPIC30F family once and reap the benefit over many applications.

Motor Control

The dsPIC30F is ideal for motors requiring more than a basic microcontroller. Whether you need a little more computation power or full DSP capability, the dsPIC30F delivers.

Apply the dsPIC30F for sensorless control, precision speed/position/servo control, torque management, variable speed motors, high RPM motors, variable load applications, noise reduction or energy efficiency improvement. Brushless DC, AC induction or switch reluctance motors are ideal candidates for the dsPIC30F family of controllers.

Applications:

- Heating, ventilation and air conditioning
- Electronic hydraulic power steering
- Electronic power steering
- Industrial gate openers
- Seat belt tensioners
- Exercise equipment
- Washing machines
- Vacuum cleaners
- Industrial pumps
- Stability control
- Power tools
- Refrigeration

Enabling Features of the dsPIC30F:

- 1 or 2 fault pins
- 6 or 8 motor PWM output
- Complementary or independent PWM
- Center-aligned or edge-aligned PWM
- Two programmable dead times
- 28-, 40-, 64- and 80-pin variants
- 10-bit 500 ksps A/D converter
- 2 or 4 simultaneous A/D samples
- 5V native operation for noisy environments
- On-chip Quadrature Encoder Interface (QEI)
- Motor control algorithm reference designs
- Synchronized A/D sampling with PWM cycle

Internet Connectivity

If your embedded control system needs to be connected to the Internet or to a dial-up phone line, the dsPIC30F provides you with a single chip solution. The “ready-to-use” TCP/IP Ethernet driver and soft modem application libraries enable you to add connectivity to your design.

Applications:

- Remote diagnostics of industrial equipment
- Remote medical equipment
- Water, gas and electric meters
- Industrial gate openers
- Remote monitoring
- Vending machines
- Power line modems
- Security systems
- Set top boxes
- Electronic ballast

Enabling Features of the dsPIC30F:

- UART interface
- Full TCP/IP software library
- Soft modem library (V.32bis/V.22bis)
- RTOS for multitasking
- Ethernet driver software
- Reduced board space
- Reduced total system cost
- Encryption libraries

Speech and Audio

Often speech and audio applications use a DSP for algorithm processing and an MCU for control. The dsPIC30F can replace both in many applications and reduce total system cost. The dsPIC DSC provides enough MIPS for many speech and audio applications, such as noise and echo cancellation, speech recognition and quality speech playback.

The dsPIC DSC is also an ideal companion to a main DSP in high-end audio applications; offloading functions such as a digital tuner, satellite radio, equalizers, etc.

Applications:

- Intercom system noise cancellation
- Self-powered subwoofer control
- High quality speech playback
- Distributed speaker network
- Musical instrument effects
- Voice activated microphones
- Noise cancelling headsets
- Cabin noise cancellation
- Speech recognition
- Speakerphones
- Hands-free port

Enabling Features of the dsPIC30F:

- Ready to use DSP library
- Codec interface: AC97 and I^2S
- 12-bit, 100 ksps A/D converter
- Digital Filter Design Tool
- Speech Recognition Application Library
- Small footprint package options
- Reduced total system cost
- Reduced board space
- Noise Suppression Library
- Acoustic Echo Cancellation Library
- dsPICworks™ Data Analysis and DSP Software

Power Conversion and Monitoring

The dsPIC30F is ideal for a variety of power conversion and monitoring applications. UPSs, inverters, as well as power management units within complex equipment, such as copiers, telecom switches and routers, require advanced power management. The dsPIC30F has Pulse Width Modulation (PWM) outputs, fast analog-to-digital conversion and plenty of computation power to satisfy the needs of these applications.

Applications:

- Power and environment monitor in servers
- Power management for equipment
- Power factor correction
- Arc fault detection
- Auxiliary power unit
- AC-to-DC converters
- DC-to-DC converters
- Electric vehicles
- Circuit breakers
- Inverters
- UPS

Enabling Features of the dsPIC30F:

- 10-bit 500 ksps A/D converter
- 2 or 4 simultaneous A/D samples
- 1 or 2 fault pins
- 6 or 8 PWM output
- Complementary or independent PWM
- Center-aligned or edge-aligned PWM
- 58.6 kHz PWM frequency at 10-bit resolution
- Two programmable dead times
- 28-, 40-, 64- and 80-pin variants
- 5V native operation for noisy environments
- Synchronized A/D sampling with PWM cycle

Sensor Control

The 18- and 28-pin small footprint dsPIC30F parts are ideal for advanced sensor control. The combination of a 12-bit A/D converter, communication peripherals, power management features and DSP capability makes it possible to create intelligent sensor interface modules. These devices can also assist an overloaded central controller.

Applications:

- Advanced 2-D PIR detection
- Chemical and gas sensors
- Glass break detectors
- Gyroscopic modules
- Knock detection
- Vibration sensors
- Pressure sensors
- Torque sensors
- Rain sensors

Enabling Features of the dsPIC30F:

- Data EEPROM
- DSP capability
- High speed input capture
- Small footprint 18- or 28-pin packages
- 12-bit 100 ksps A/D converter
- SPI™, I²C™ and UART communication ports
- Visual digital filter design tool
- Configurable Flash memory can update algorithms

Automotive

Microchip is an ISO/TS 16949:2002 qualified supplier to major automotive manufacturers. Most of our products are available for automotive-grade temperature requirements and support a long product life cycle.

Available in 18- to 80-pin packages, the dsPIC30F family is ideal for a variety of automotive applications from a large central controller to small sensor interface or peripheral processor.

Applications:

- Electrically assisted hydraulic steering
- Electronic clutch and gearboxes
- Roll and stability controllers
- Seat belt pretensioners
- Electronic power steering
- Cabin noise cancellation
- Advanced battery monitors
- Airbag main controllers
- Ignition controllers
- Side impact airbags
- Occupant sensors
- Fuel pressure controls

Enabling Features of the dsPIC30F:

- DSP capability
- Powerful MCU core
- CAN and OSEK library
- 18- to 80-pin products
- One or two CAN 2.0B modules
- Long product life cycle supported
- Broad product selection for many applications
- High reliability Flash with typical endurance of one million erase/write cycles and data retention of >40 years

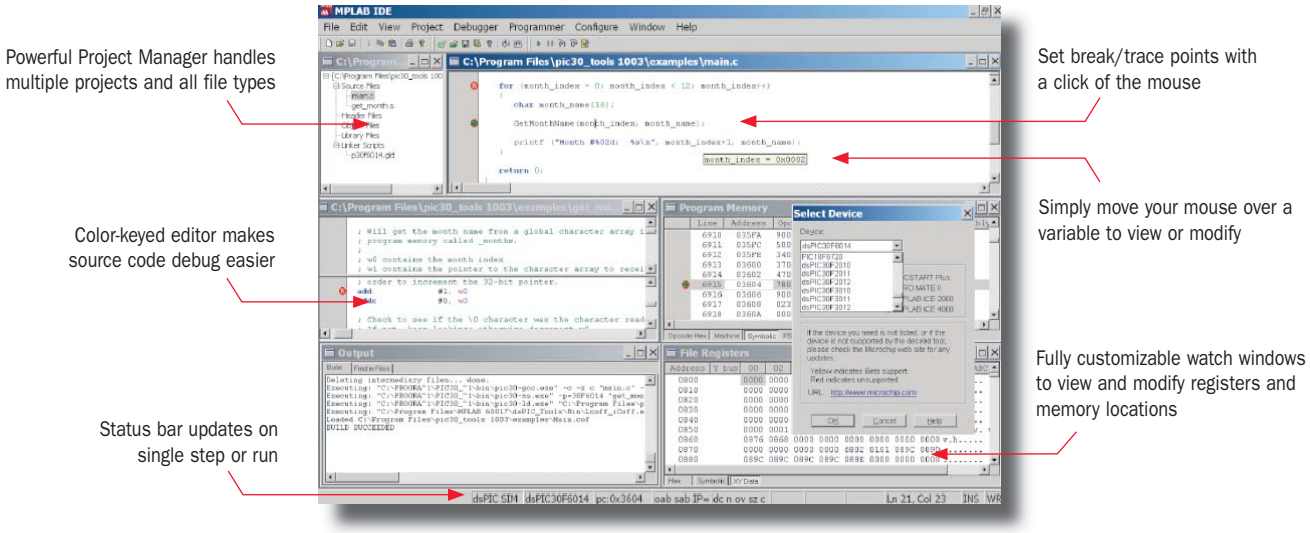
Powerful Tools and Libraries to Ease Your Development

The dsPIC30F family comes with an extensive array of development tools, application libraries, development boards and reference designs for a whole product solution.

MPLAB® Integrated Development Environment (IDE)

All dsPIC30F tools operate effortlessly under the MPLAB IDE umbrella. The powerful and yet easy-to-use MPLAB IDE has all of the advanced edit/build/debug features you would expect from a 32-bit debug environment. MPLAB IDE integrates not only software, but all of Microchip's hardware tools and many third party tools. Key features of MPLAB IDE:

- Designed for Windows® XP, 2000 and Windows NT®
- Project build and management
- Flexible watch windows
- Mouse over variable inspection
- Full feature code editor with color context
- Source level debug in ASM and C
- Searchable trace buffers
- Version control integration



The Essential Software and Hardware Development Tools

Microchip is committed to making your development as easy and efficient as possible. This commitment is the reason why Microchip develops its own software and hardware tools. You have our full technical support whether the issue is silicon or tools-related.

The dsPIC30F development tools suite provides value with many free and low-cost tools. You can get started with the MPLAB ICD 2 In-circuit Debugger and the MPLAB IDE for approximately US $160.

If you already own a PRO MATE® II, the dsPIC30F family is supported on it. If you are considering a new full-featured programmer, the MPLAB PM3 is recommended.

MPLAB® IDE	Integrated Development Environment
MPLAB® ASM30	Assembler*
MPLAB® SIM	Software Simulator*
MPLAB® C30	ANSI C Compiler
MPLAB® ICD 2	In-circuit Debugger/Development Programmer
MPLAB® ICE 4000	In-circuit Emulator
PRO MATE® II	Full Featured Device Programmer
MPLAB® PM3	Full Featured Device Programmer

*Comes with no-cost MPLAB® IDE

World Class Software Development Tools

Assembler/Linker/Librarian

The MPLAB ASM30 is a full-featured macro assembler. User defined macros, conditional assembly and a variety of assembler directives make the MPLAB ASM30 a powerful code generation tool.

The MPLAB LINK30 and MPLAB LIB30 are Linker and Librarian modules that allow efficient linking, library creation and maintenance.

Industry Leading C Code Efficiency

The dsPIC30F was designed with a robust, full-featured instruction set optimized for C compiler efficiency from the start. Coupled with Microchip's highly optimized MPLAB C30 C Compiler, this combination produces results that fit in on-chip Flash memory.

MPLAB SIM Software Simulator

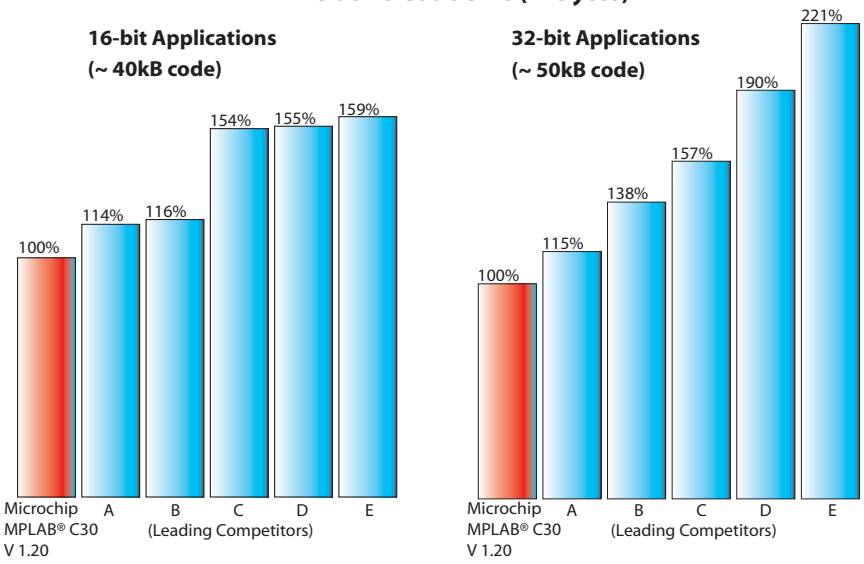
The MPLAB SIM Software Simulator is a full-featured, cycle accurate software simulator. In addition to simulating the CPU and the instruction set, it also supports key peripherals, such as timers, I/O, interrupts, UART and A/D modules. MPLAB SIM has powerful stimulus capabilities and file I/O. It is ideal for the algorithm development.

MPLAB C30 C Compiler

The MPLAB C30 C Compiler is a full-featured, ANSI compliant optimizing compiler. The MPLAB C30 C Compiler includes a complete ANSI C standard library, including string manipulation, dynamic memory allocation, data conversion, timekeeping and math libraries.

The MPLAB C30 C Compiler has a powerful code optimizer; other 16-bit MCUs generate as much as 120 percent larger code for the same application.

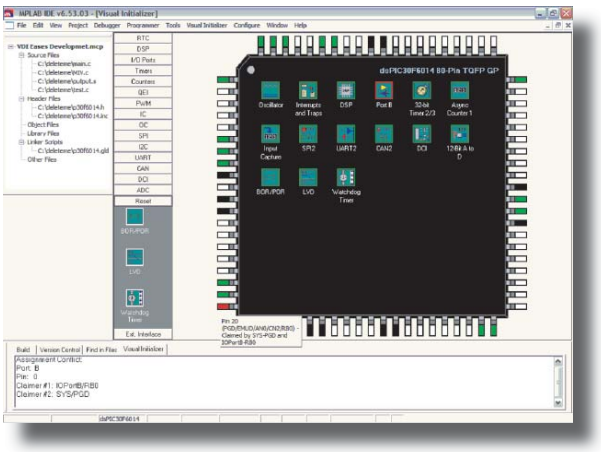
Relative Code Size (in Bytes)



Download a full-featured, time-restricted demonstration version of the MPLAB C30 C Compiler fom the Microchip web site for your evaluation.

MPLAB VDI Visual Device Initializer

Configuring a powerful 16-bit MCU or DSP can be a complex and challenging task, but not with the dsPIC30F devices. Our MPLAB VDI Visual Device Initializer allows you to configure the entire processor graphically and when complete, a mouse click generates initialization code usable in Assembly or C programs.



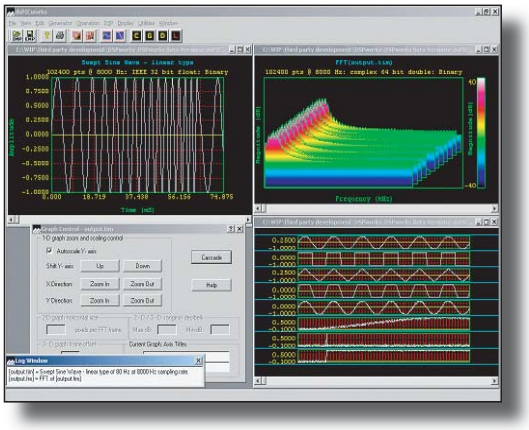
The MPLAB VDI Visual Device Initializer does extensive error checking on assignments and conflicts on pins, memories and interrupts, as well as a selection of operating conditions. The generated code files are effortlessly integrated with the rest of your application code through MPLAB Project.

The detailed reports on resource assignment and configuration simplify project documentation. Key features of the MPLAB VDI Visual Device Initializer:

- Drag-and-drop feature selection
- One click configuration
- Extensive error checking
- Generates initialization code
- Integrates effortlessly in MPLAB Project
- Printed reports ease project documentation requirements

Develop DSP Algorithms: The Easy Way

dsPICworks™ Data Analysis and DSP Software



The dsPICworks Data Analysis tool makes it easy to evaluate and analyze DSP algorithms. You can run a variety of DSP and arithmetic operations and analyze your data in both time and frequency domain. Key features of the dsPICworks Data Analysis and DSP Software:

- Visually analyze time and frequency domain data
- DSP operations: FFT, convolution, correlation, DCT and filtering
- Waveform synthesis
- Tool generates one-, two- and three-dimensional frequency graphs
- Data import/export options to interface with MPLAB IDE and MPLAB ASM30
- Support for fractional, integer and IEEE floating point data in decimal and hexadecimal notation

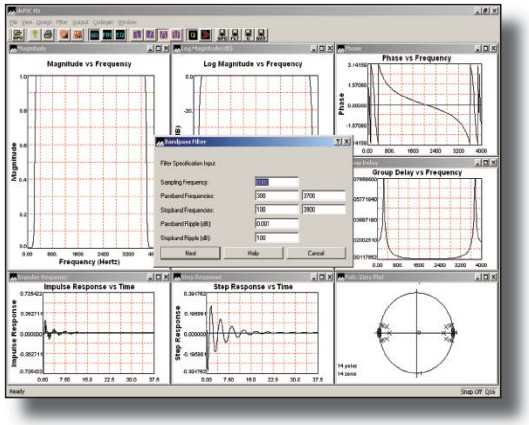
Digital Filter Design Tool

The Digital Filter Design Tool makes designing and analyzing FIR and IIR filters easy. Enter frequency specifications and filter code and coefficients are generated automatically. Graphical output windows provide the desired filter's characteristics.

Digital Filter Design Lite Tool

Not ready to purchase the whole Digital Filter package? Why not start Lite? The Digital Filter Design Lite Tool includes most of the features of the full-featured version at a fraction of the cost.

	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	√	—



Jumpstart Your Design with Proven and Optimized Building Block Libraries

Math Library

This IEEE-754 compliant library provides single and double precision floating point ANSI C standard math functions. These routines have been optimized to provide the smallest code size. The library can be used in Assembly or C. Key functions in the Math Library:

- sin, cos, tan
- asin, acos, atan
- ln, log10, sqrt, power
- ceil, floor, mod, frexp

DSP Algorithm Library

This extensive DSP building block library is fully optimized in Assembly code for execution speed. The DSP functions can be used in Assembly or C. Some key algorithms addressed in the DSP Algorithm Library:

- Cascaded IIR filters
- FIR filters and LMS filters
- Correlation, convolution
- FFT and window functions
- Matrix and vector operations

Peripheral Driver Library

This library of over 270 C utility functions helps you set up and operate the hardware peripheral modules in various modes. Functions covered in the Peripheral Driver Library:

- 10-bit and 12-bit A/D converters
- UART, SPI™ and I^2C™
- Motor control PWM and QEI
- General purpose timers
- Input capture and output compare

Plug and Play with Our Connectivity Libraries

TCP/IP Protocol Stack

Connect to the Internet using proven, professional quality TCP/IP software libraries. CMX-MicroNet™ is an embedded TCP/IP stack that is specifically designed for optimized use of Flash and RAM resources on Microchip's 16-bit DSC. The software runs directly on the processor with no gateways or PCs required. The stack can be run in stand alone mode or work in conjunction with an RTOS. Using only industry standard protocols, CMX-MicroNet™ offers true TCP/IP networking via direct, dial-up or Ethernet connectivity and wireless Ethernet (802.11b) as well.

Up to 127 sockets can be open at a time. They can be Ethernet sockets and/or PPP or SLIP sockets. PPP and SLIP cannot be used at the same time. An HTTP Web server, FTP server, SMTP client and DHCP client are also available. The RS-232 link, if used, can either be a direct cable link or through a modem. This library can be readily implemented on the dsPICDEM.net™ Connectivity Board.

MicroNet™ TCP/IP Stack by CMX
- RFC Compliant Protocol Stack
- Supports CMX RTOS
- Ethernet NIC Driver
- Small Flash/RAM Footprint
- Source Code Provided

Soft Modem Libraries

V.22bis/V.22 Soft Modem Library
This library is available free of charge from the Microchip web site. The V.22bis Soft Modem Library is a collection of algorithms for ITU-T compliant V.21/Bell 103, V.22 and V.22bis modems and V.42 recommendations. The V.22bis library comes with full source code and archives that contain object code modules required for linking with your application. The transmit and receive data pump code modules are coded in Assembly language for optimal speed and smallest code size, while the AT, V.42 and Data Pump APIs are coded in C. Hardware component drivers, such as UART and Data Converter Interface (DCI) for Analog Front End (AFE) I/O are provided. This library can be readily implemented on the dsPICDEM.net Connectivity Board.

V.32bis/V.22bis by Microchip
- Data Pump Coded In Assembly for Optimal Size and Speed
- V.32bis (14,400 thru 4800 bps)
- V.22bis (2400/1200 bps)
- V.42 (LAPM, Error Correction Procedure)

V.32bis Soft Modem Library
The V.32bis Soft Modem Library is a collection of algorithms for ITU-T compliant V.21/Bell 103, V.22, V.22bis, V.32 and V.32bis modems and V.42 recommendations. The V.32bis library is provided with archives that contain object code modules required for linking with your application. The transmit and receive data pump code modules are coded in Assembly language for optimal speed and smallest code size, while the AT, V.42 and Data Pump APIs are coded in C. Hardware component drivers, such as UART and Data Converter Interface (DCI) for Analog Front End (AFE) I/O are provided. This library can be readily implemented on the dsPICDEM.net Connectivity Board.

V.32/V.22/V22bis Soft Modem Library by VOCAL Technologies, LTD
The Soft Modem Library is a collection of data modulations and protocols (V.32, V.22, V.22bis, V.23, V.21, Bell 103, Bell 212A and Bell 202). This library is provided with archives that contain object code modules, which link to your application. The data modulation is coded in C with inline Assembly language optimization for speed and code size. Hardware component drivers, such as UART and Data Converter Interface (DCI) for Analog Front End (AFE) I/O are provided. This library can be readily implemented on the dsPICDEM.net Connectivity Board.

V.32/V.22/V.22bis by VOCAL Technologies, LTD
- VOCAL's Proven Solution on a dsPIC30F
- V.32 (9600 and 4800 bps, Non-trellis Encoding)
- V.22/V.22bis (2400, 1200 and 600 bps)
- V.42 (LAPM, Error Correction Procedure)

More Application Libraries: Ready to Use

Encryption Libraries

Implement reliable secure applications using the Symmetric and Asymmetric Key Embedded Encryption Libraries. Developed for Microchip by NTRU Cryptosystems Inc., Burlington, MA, a leader in encryption solutions, these libraries are both proven and optimized. These library functions can be easily called by your C or Assembly code.

The algorithms included in these libraries have emerged as de facto standards for many large scale secure applications such as web access (SSL/TLS), e-mail (S-MIME), secure XML transactions and virtual private networks (IPsec). These algorithms are also recommended by Federal Information Processing Standards (FIPS) and the Internet Engineering Task Force (IETF).

Symmetric Key Embedded Encryption Library features:

- 128-bit AES in ECB, CTR, CBC, CBC-MAC and CCM Modes
- Triple DES in ECB, CTR, CBC and CBC–MAC Modes
- SHA-1
- MD5
- Random Number Generator (DRBG X9.82)

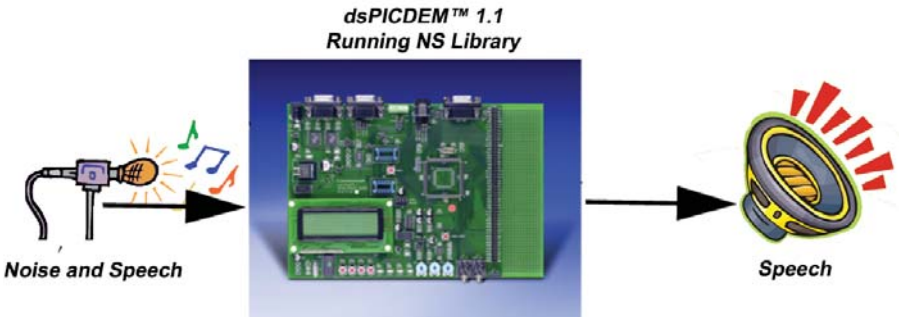
Asymmetric Key Embedded Encryption Library features:

- RSA (1024-bit and 2048-bit Modulus)
  - Encyption/Decryption
  - Signing/Verification
- DSA (1024-bit Modulus)
  - Private/Public Key Generation
  - Signing/Verification
- Diffie-Hellman Key Agreement (1024-bit and 2048-bit modulus)
  - Private/Public Key Generation
  - Shared-key Generation
- SHA-1
- MD5
- Random Number Generator (DRBG X9.82)

Noise Suppression Library

This application library suppresses the noise interference in a speech signal, such as ambient noise picked up by a microphone while capturing speech. This algorithm is particularly useful for systems where isolated noise reference is not available—such as hands-free phones, speakerphones, intercoms and headsets.

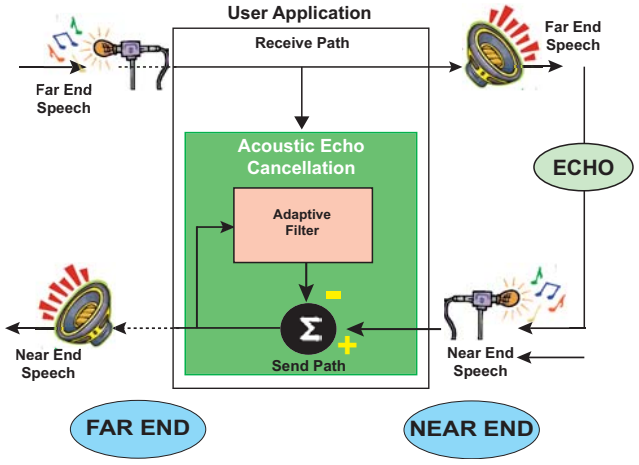
The library is written in Assembly language for maximum optimization of code size and execution speed. It can be easily integrated in C or Assembly code. The algorithm handles 0-4kHz audio bandwidth (8kHz sampling of 16-bit speech data) and provides 10-20 dB noise reduction.



Acoustic Echo Cancellation Library

This library provides a function to eliminate the echo generated in the acoustic path between a speaker and a microphone - such as in a speakerphone or an intercom system.

This library is fully compliant with the G.167 standard, supports cancellation and provides 16, 32 or 64 ms echo delays. It handles 0-4kHz audio bandwidth (8kHz sampling of 16-bit speech data) and provides echo cancellation of 40-50 dB. Written in Assembly language for optimal code size and execution speed, this library can be easily integrated in C or Assembly code.



Additional Application Libraries Ready to Use

Speech Recognition

Automatic Speech Recognition (ASR) for the dsPIC30F family can support a wide range of voice-activated applications. A Speech Word Library Builder and a Speech Recognition Software Library make up the ASR software suite. Key features of the ASR application software:

- Speaker independent recognition
- PC-based word library builder
- Up to 100 word vocabulary (American English)
- Supports multiple noise profiles
- Suitable for many voice control applications

Motor Control Application Software

The dsPIC30F motor control family of devices is suited for advanced AC Induction Motor (ACIM), Brushless DC (BLDC) and Switched Reluctance (SR) motor applications. Two advanced applications are currently available that run on the dsPIC30F Motor Control Development System.

ACIM

This application note describes a fully-tested vector, or field oriented, control algorithm for a 3-phase ACIM. The motor currents, torque and velocity are regulated in control loops. Full documentation and source code are available for free on the Microchip web site (Application Note: AN 908).

BLDC

This application note describes a fully-tested sensorless control algorithm for a 3-phase BLDC motor. Motor current, motor velocity and bus voltage are regulated in control loops. A LCD menu interface provides adjustment of all sensorless motor control parameters. Full documentation and source code are available for free on the Microchip web site (Application Note: AN 901).

Operating Systems and Communication Drivers

RTOS

If you need a real-time operating system to handle multitasking, we have a three-tier solution for you.

- CMX-RTX™: Full-featured fully preemptive multi-tasking OS
- CMX-Tiny+™: Fully preemptive scaled-down version of the RTX OS
- CMX-Scheduler™: Fully preemptive multi-tasking mini OS (FREE)

All three operating systems are fully preemptive and written in Assembly language optimized for maximum performance. These RTOS products are developed by CMX and available from Microchip and CMX.

RTOS featues:

- Small Program Memory Footprints
- The Fastest Context Switch Times
- The Lowest Interrupt Latency Times
- True Preemption

OSEK and CAN Drivers

Vector Informatik GmbH provides automotive operating systems, sometimes labeled as an OSEK operating system. The Vector Informatik osCAN operating system, which is based on the OSEK/VDX® standard, provides a multitasking operating system with optimal features for use on MCUs. This product represents a small, sturdy operating system kernel.

The companion support for managing the CAN interface drivers on the dsPIC30F family of products is the CANbedded CAN driver suite from Vector Informatik. This product consists of a number of adaptive source code modules that cover the basic communication requirements in automotive applications.

Some of the CAN functions supported:

- Initialize CAN Module
- Set CAN Operational Mode
- Set CAN Baud Rate
- Set CAN Mask
- Set CAN Filter
- Send CAN Message
- Receive CAN Message
- Abort CAN Sequence
- Random Number Generator
- Provide Error Notification

Hardware Development Tools

MPLAB ICD 2
In-circuit Debugger

The MPLAB ICD 2 In-circuit Debugger is a powerful, low-cost development tool. Running under MPLAB IDE, MPLAB ICD 2 can debug ASM or C source code, watch and modify variables, single step and set breakpoints. Key features of the MPLAB ICD 2:

- Full speed operation
- USB or serial port connection to PC
- Supports full dsPIC DSC supply voltage range
- Can be used as an inexpensive programmer
- Smart watch variable windows
- Advanced breakpoint features

MPLAB PM3
Device Programmer

MPLAB PM3 is a full-featured, production quality universal device programmer. Using interchangeable socket modules, the MPLAB PM3 supports virtually all programmable devices from Microchip. MPLAB PM3 has improved programming time for many devices and offers built-in interface for robust In-circuit Serial Programming™ (ICSP™).

If you already own a PRO MATE® II Device Programmer, the dsPIC30F family is fully supported on the PRO MATE II programmer through a new set of socket modules.

MPLAB ICE 4000
In-circuit Emulator

The powerful, full-featured real-time MPLAB ICE 4000 In-circuit Emulator is capable of debugging the most demanding real-time systems. Key features of the MPLAB ICE 4000 In-circuit Emulator:

- Full-speed, real-time emulation
- Supports full dsPIC DSC supply voltage range
- 64K deep by 216-bit wide trace memory
- Unlimited breakpoints
- Complex break, trace and trigger logic
- Multi-level trigger up to four levels
- 48-bit time stamp
- USB or LPT port connection to PC
- Stopwatch

Hardware Development Boards: Jumpstart Your Design

A variety of hardware development boards are available for the dsPIC30F, enabling you to shorten your design cycle. These boards are designed to allow easy plug-in of an MPLAB ICD 2 or an MPLAB ICE 4000 emulator.

dsPICDEM™ Starter Demonstration Board

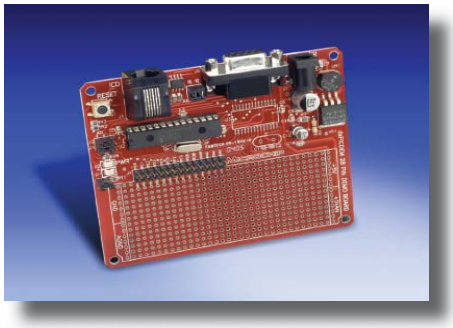
DM300016

Key features of the dsPICDEM Starter Demonstration Board:

- Includes a 64-pin dsPIC30F6012 plug-in module (MA300012)
- Power input from 9V supply
- MPLAB ICD 2 and MPLAB ICE 4000 emulator support
- LEDs, switches, potentiometer, UART interface
- A/D input filter circuit for speech-band signal input
- On-board DAC and filter for speech-band signal output
- Circuit prototyping area
- Assembly language demonstration program and tutorial

dsPICDEM 28-Pin Starter Demonstration Board

DM300017



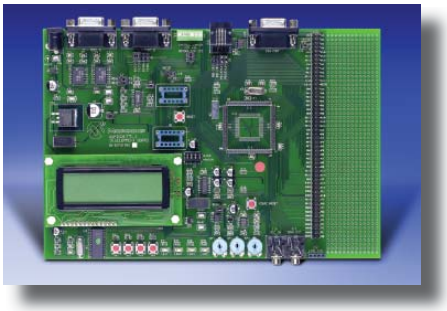
Key features of the dsPICDEM 28-Pin Starter Demonstration Board:

- Includes a 28-pin dsPIC30F2010 plug-in device
- Power input from 9V supply
- MPLAB ICD 2 and MPLAB ICE 4000 emulator support
- UART interface
- Header for access to all device I/O pins
- Circuit prototyping area
- Assembly language demonstration program and tutorial
- Accommodates all dsPIC30F 28-pin devices

Advanced Development Boards: Complex Designs Made Simple

dsPICDEM 1.1 General Purpose Development Board

DM300014

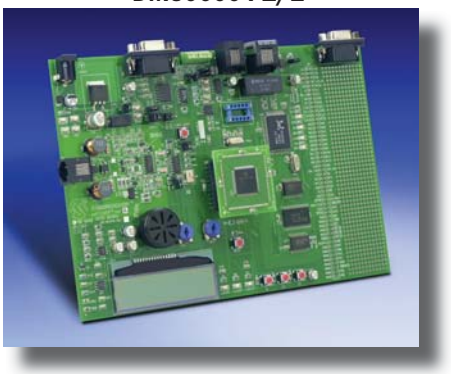


Key features of the dsPICDEM General Purpose Development Board are:

- Includes a dsPIC30F6014 plug-in module (MA300011)
- Serial communication channels (two UART, SPI™, CAN)
- Si3000 codec with MIC IN/speaker OUT
- General purpose prototyping area and expansion header
- 122x32 dot addressable LCD
- Digital potentiometer for DAC capability
- LEDs, switches, potentiometers and temperature sensor
- MPLAB ICD 2 and MPLAB ICE 4000 emulator support

dsPICDEM.net™ Connectivity Development Boards

DM300004-1/2



Key features of the dsPICDEM.net Connectivity Development Boards are:

- Includes a dsPIC30F6014 plug-in module (MA300011)
- 10-Base T Ethernet MAC and PHY interface
- PSTN interface with DAA/AFE chipset
- Serial communication channels (UART and CAN)
- External EEPROM memory for storing constants
- External 64K x 16 SRAM memory
- General purpose prototyping area and expansion header
- LEDs, switches, potentiometers and temperature sensor
- 2x16 LCD display
- MPLAB ICD 2 and MPLAB ICE 4000 emulator support
- dsPICDEM.net 1 (DM300004-1)
- Support for FCC/JATE PSTN countries
- dsPICDEM.net 2 (DM300004-2)
- Support for non-FCC/JATE PSTN countries

Motor Control Development System

The Motor Control Development System provides you with a method for quick prototyping and validation of BLDC, SR, PMAC, ACIM and UPS applications. The system consists of the dsPICDEM MC1 Motor Control Development Board and one of two optional power modules. The dsPICDEM MC1H 3-Phase High-Voltage Power Module (DM300021) supports AC line-powered applications, while the dsPICDEM MC1L 3-Phase Low-Voltage Power Module (DM300022) supports DC-powered applications up to 48V. Some key features of the Motor Control Development System:

- Heat sink for ambient cooling of power sections
- Full automatic protection of power circuits
- Electrical isolation from power circuits
- Many options for motor feedback signals
- MPLAB ICD 2 and MPLAB ICE 4000 emulator support

DM300021/22

Note: Power module shown with dsPICDEM MC1 Development Board DM300020

DM300020

Includes a dsPIC30F6010 plug-in module (MA300013)

Essential Software Tools

Development Tool	Description	Part#	Available From	List Price (1)
MPLAB® IDE	Integrated Development Environment	SW007002	Microchip	Free
MPLAB® ASM30	Assembler (included in MPLAB® IDE)	SW007002	Microchip	Free
MPLAB® SIM	Software Simulator (included in MPLAB® IDE)	SW007002	Microchip	Free
MPLAB® VDI	Visual Device Initializer for dsPIC30F	SW007010	Microchip	Free
MPLAB® C30	ANSI C Compiler, Assembler, Linker and Librarian	SW006012	Microchip	$895

Essential Hardware Tools

Development Tool	Description	Part#	Available From	List Price (1)
MPLAB® ICD 2	In-circuit Debugger and Device Programmer	DV164005	Microchip	$159
	In-circuit Debugger and Device Programmer with dsPICDEM™ Starter Demo Board	DV164030	Microchip	$209
	In-circuit Debugger and Device Programmer with dsPICDEM™ 1.1 General Purpose Board	DV164032	Microchip	$399
MPLAB® ICE 4000	In-circuit Emulator Pod	ICE4000	Microchip	$2560
	Processor Module for dsPIC30F	PMF30XA1	Microchip	$595
	Device Adapter for 80L/64L TQFP Devices	DAF30-2	Microchip	$295
	Device Adapter for 44L TQFP Devices	DAF30-3	Microchip	$225
	Device Adapter for 40L/28L/18L DIP and SOIC Devices	DAF30-4	Microchip	$225
	Transition Socket for 18L SOIC	XLT18SO	Microchip	$75
	Transition Socket for 18L DIP	ACICE0202	Microchip	$20
	Transition Socket for 28L SOIC	XLT28SO	Microchip	$75
	Transition Socket for 28L DIP	ACICE0204	Microchip	$30
	Transition Socket for 40L DIP	ACICE0206	Microchip	$40
	Transition Socket for 44L TQFP	XLT44PT or XLT44PT3	Microchip	$125
	Transition Socket for 64L TQFP (PF Package)	XLT64PT3 or XLT64PT4	Microchip	$125
	Transition Socket for 64L TQFP (PT Package)	XLT64PT2 or XLT64PT5	Microchip	$125
	Transition Socket for 80L TQFP (PF Package)	XLT80PT2	Microchip	$125
	Transition Socket for 80L TQFP (PT Package)	XLT80PT or XLT80PT3	Microchip	$125
MPLAB® PRO MATE® II	Full Featured Device Programmer, Base Unit	DV007003	Microchip	$695
	Socket Module for 18L DIP/SOIC Devices	AC30F005	Microchip	$189
	Socket Module for 28L DIP/SOIC Devices	AC30F004	Microchip	$189
	Socket Module for 40L DIP Devices	AC30F003	Microchip	$159
	Socket Module for 44L TQFP Devices	AC30F006	Microchip	$159
	Socket Module for 64L TQFP Devices (PF Package)	AC30F002	Microchip	$159
	Socket Module for 64L TQFP Devices (PT Package)	AC30F008	Microchip	$159
	Socket Module for 80L TQFP Devices (PF Package)	AC30F001	Microchip	$159
	Socket Module for 80L TQFP Devices (PT Package)	AC30F007	Microchip	$159
MPLAB® PM3	Full Featured Device Programmer, Base Unit	DV007004	Microchip	$895
	Socket Module for 18L/28L/40L DIP Devices	AC164301	Microchip	$189
	Socket Module for 16L(.150)/28L(.300) SOIC Devices	AC164302	Microchip	$189
	Socket Module for 44L TQFP Devices	AC164305	Microchip	$189
	Socket Module for 64L TQFP Devices (PF Package)	AC164313	Microchip	$189
	Socket Module for 64L TQFP Devices (PT Package)	AC164303	Microchip	$189
	Socket Module for 80L TQFP Devices (PF Package)	AC164314	Microchip	$189
	Socket Module for 80L TQFP Devices (PT Package)	AC164304	Microchip	$189

Development Boards and Reference Designs

Development Tool	Description	Part#	Available From	List Price(1)
General Purpose Development Board	dsPICDEM™ 1.1 Development Board for 80L TQFP devices	DM300014	Microchip	$299
Starter Development Boards	dsPICDEM™ Starter Demo Board	DM300016	Microchip	$79
	dsPICDEM™ 28-Pin Starter Demo Board	DM300017	Microchip	$79
Motor Control Development Boards	dsPICDEM™ MC1 Motor Control Development Board	DM300020	Microchip	$300
	dsPICDEM™ MC1H 3-Phase High Voltage Power Module	DM300021	Microchip	$800
	3-Phase ACIM High Voltage Motor (208/460V)	AC300021	Microchip	$120
	dsPICDEM™ MC1L 3-Phase Low Voltage Power Module	DM300022	Microchip	$700
	3-Phase BLDC Low Voltage Motor (24V)	AC300020	Microchip	$120
Connectivity Development Boards	dsPICDEM.net™ 1 with FCC/JATE compliant and Ethernet NIC support	DM300004-1	Microchip	$389
	dsPICDEM.net™ 2 with PSTN compliant and Ethernet NIC support	DM300004-2	Microchip	$389

Plug-in Modules

Development Tool	Description	Part#	Available From	List Price(1)
Plug-in Modules	Daughter PC board with 80-pin dsPIC30F6014 general purpose MCU sample. Easy to plug in to/remove from a development board	MA300011	Microchip	$25
	Daughter PC board with 64-pin dsPIC30F6012 general purpose MCU sample. Easy to plug in to/remove from a development board	MA300012	Microchip	$25
	Daughter PC board with 80-pin dsPIC30F6010 motor control MCU sample. Easy to plug in to/remove from a development board	MA300013	Microchip	$25

(1) List price may change without notice.

Software Libraries and Application Development Tools

Development Tool	Description	Part#	Available From	List Price(1)
dsPIC30F Math Library	Basic and Floating Point Library (ASM, C Wrapper)	SW300020	Microchip	Free
dsPIC30F Peripheral Library	Peripheral Initialization, Control and Utility Routines (C)	SW300021	Microchip	Free
dsPIC30F DSP Library	Essential DSP algorithm suite (Filters, FFT)	SW300022	Microchip	Free
dsPICworks™	Data Analysis and DSP Software	SW300023	Microchip	Free
Digital Filter Design	Graphical IIR and FIR filter design package for dsPIC30F	SW300001	Microchip	$249
Digital Filter Design Lite	Graphical IIR and FIR filter design package for dsPIC30F	SW300001-LT	Microchip	$29
CMX-Tiny+™ for dsPIC® DSC	Preemptive Real Time Operating System (RTOS) for dsPIC30F (from CMX)	CMX-Tiny+ for dsPIC30F	CMX	$3000
	Preemptive Real Time Operating System (RTOS) for dsPIC30F	SW300032	Microchip	$3000
CMX-RTX™ for dsPIC® DSC	Fully preemptive Real Time Operating System (RTOS) for dsPIC30F (from CMX)	CMX-RTX for dsPIC30F	CMX	$4000
	Fully preesmptive Real Time Operating System (RTOS) for dsPIC30F	SW300031	Microchip	$4000
CMX Scheduler™	Multi-tasking, preemptive scheduler for dsPIC30F	SW300030	CMX	Free
Symmetric Key Embedded Encryption Library	Security encryption software support for AES, triple-DES, SHA-1, RNG and MD5	SW300050 - 5K*	Microchip	$2500
	Evaluation copy of security encryption software support for AES, triple-DES, SHA-1, RNG and MD5	SW300050-EVAL	Microchip	$5
Asymmetric Key Embedded Encryption Library	Security encryption software support for RSA, DSA, Diffe Hellman, SHA-1, RNG and MD5	SW300055 - 5K*	Microchip	$2500
	Evaluation copy of security encryption software support for RSA, DSA, Diffe Hellman, SHA-1, RNG and MD5	SW300055-EVAL	Microchip	$5
Noise Suppression Library	Function to suppress noise interference in speech signals	SW300040 - 5K*	Microchip	$2500
	Evaluation copy of function to suppress noise interference in speech signals	SW300040-EVAL	Microchip	$5
Acoustic Echo Cancellation Library	Function to eliminate echo generated from a speaker to a microphone	SW300060 - 5K*	Microchip	$2500
	Evaluation copy of function to eliminate echo generated from a speaker to a microphone	SW300060-EVAL	Microchip	$5
Acoustic Accessory Kit	Accessory Kit (includes: audio cable, headset, oscillators, microphone, speaker, DB9 M/F RS-232 cable, DB9M-DB9M Null Modem Adapter)	AC300030	Microchip	$87.50
TCP/IP Library	TCP/IP connectivity and protocol support	CMX-MicroNet for dsPIC30F	CMX	Contact Vendor
Soft Modem Library	V.22bis/V.22 Soft Modem Library	SW300002	Microchip	Free
	V.32bis Soft Modem Library	SW300003*	Microchip	$2500
	Evaluation copy of V.32bis Soft Modem Library	SW300003-EVAL	Microchip	$5
	V.32 (non-trellis) Soft Modem Library		VOCAL Technologies, LTD	Contact Vendor
Speech Recognition System	Automatic speech recognition system including a PC-based speech training sub-system and a speech recognizer software library	SW300010*	Microchip	$2500
	Evaluation copy of automatic speech recognition system including a PC-based speech training sub-system and a speech recognizer software library	SW300010-EVAL	Microchip	$5
CANbedded for dsPIC® DSC	CAN Driver Library for dsPIC30F		Vector Informatik	Contact Vendor
osCAN for dsPIC® DSC	OSEK/VDX v2.2		Vector Informatik	Contact Vendor

* To license for production quantities greater than 5000 pieces for a project's lifetime—contact Microchip.

C, C++ Compilers and IDE from Development Partners

Development Tool	Description	Part#	Available From	List Price(1)
Embedded Workbench for dsPIC30F	ISO/ANSI C and Embedded C++ compiler in a professional, extensible IDE (Windows® NT/2000/Windows XP®) Special DSP support included.	EWdsPIC 1	IAR	Contact Vendor
C compiler	ANSI C compiler for dsPIC30F	dsPICC	HI-TECH	$950

Documentation(2)

Document Type	Document Title	Document Number
Overview Documents	dsPIC30F High Performance 16-bit Digital Signal Controller Family Overview	DS70043
	dsPIC30F Data Sheet, General Purpose and Sensor Families	DS70083
	dsPIC30F Data Sheet, Motor Control and Power Conversion Family	DS70082
Data Sheets	dsPIC30F2010 Data Sheet	DS70118
	dsPIC30F4011, dsPIC30F4012 Data Sheet	DS70135
	dsPIC30F5011, dsPIC30F5013 Data Sheet	DS70116
	dsPIC30F6010 Data Sheet	DS70119
	dsPIC30F6011, dsPIC30F6012, dsPIC30F6013, dsPIC30F6014 Data Sheet	DS70117
Reference Manuals	dsPIC30F Programmer's Reference Manual	DS70030
	dsPIC30F Family Reference Manual	DS70046
Application Notes	AN901 - Using the dsPIC30F for Sensorless BLDC Control	DS00901
	AN908 - Using the dsPIC30F for Vector Control of an AC Induction Motor	DS00908
Technical CD	dsPIC30F Technical CD-ROM (contains all of the above)	DS70084

(1) List price may change without notice
(2) Note that all the latest revisions of these documents are always available from the Microchip web site.

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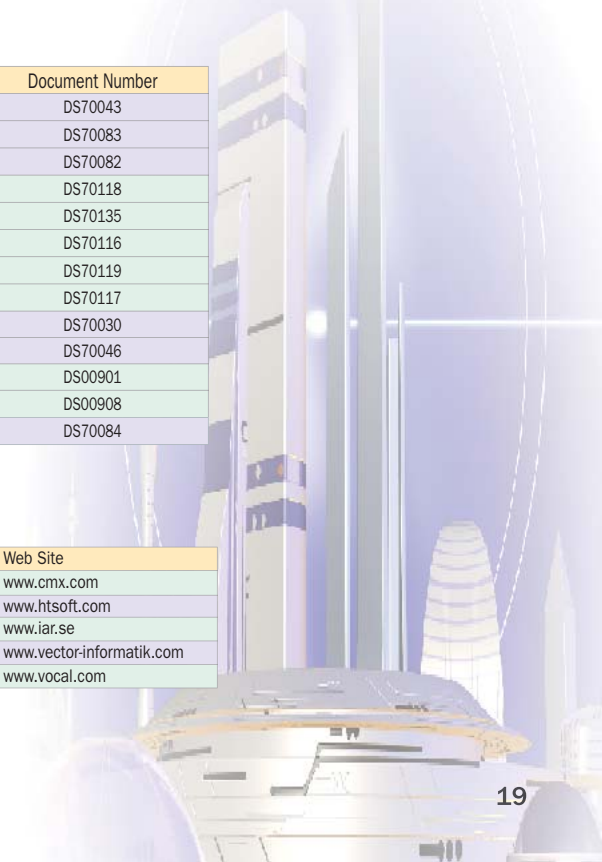
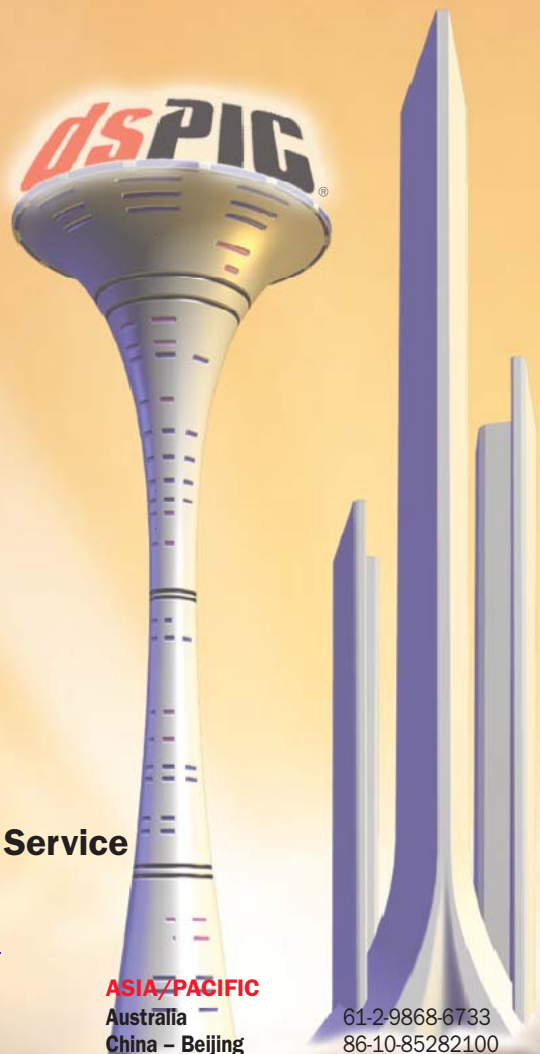
Vector Informatik GmbH	+49 711 80670 0	info@vector-informatik.com	www.vector-informatik.com
VOCAL Technologies, LTD	+1 716 688 4675	sales@vocal.com	www.vocal.com





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