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

**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

**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

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

<table>
<thead>
<tr>
<th>Family</th>
<th>Program Memory (Kbytes)</th>
<th>RAM (Bytes)</th>
<th>Pins</th>
<th>Max Speed</th>
<th>A/D Ch.</th>
<th>A/D Res. (bits)</th>
<th>A/D Sample (kops)</th>
<th>Comp</th>
<th>8/16/32-bit Timers (x8, x16, x32)</th>
<th>Communication Peripherals</th>
<th>PWM Ch.</th>
<th>PWM Type</th>
<th>Other Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>16-Bit DSCs – General Purpose (24-bit Instruction Word), ICSP™, Self-Write</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>dsPIC30FXXX</td>
<td>12-144</td>
<td>1K-8K</td>
<td>18-30</td>
<td>30 MOPS</td>
<td>6:16</td>
<td>12</td>
<td>200</td>
<td>-</td>
<td>3.5 ±16</td>
<td>UART, I²C, SPI, CAN, DCC</td>
<td>2-8</td>
<td>Standard</td>
<td>Flash Security, EEPROM</td>
</tr>
<tr>
<td>dsPIC33FXXX/A**</td>
<td>12-256</td>
<td>1K-30K</td>
<td>18-100</td>
<td>40 MOPS</td>
<td>6:32</td>
<td>10 or 12</td>
<td>500 or 1.1M</td>
<td>0-2</td>
<td>3.9 ±16</td>
<td>UART w/iQI, I²C, SPI, ECAN, DCC</td>
<td>2-8</td>
<td>Standard</td>
<td>Flash Security, JTAG, DMA*, PMP*, RTCC*, DAC*, CRC*</td>
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</table>

16-Bit DSCs – Motor Control (24-bit Instruction Word), ICSP, Self-Write

<table>
<thead>
<tr>
<th>Family</th>
<th>Program Memory (Kbytes)</th>
<th>RAM (Bytes)</th>
<th>Pins</th>
<th>Max Speed</th>
<th>A/D Ch.</th>
<th>A/D Res. (bits)</th>
<th>A/D Sample (kops)</th>
<th>Comp</th>
<th>8/16/32-bit Timers (x8, x16, x32)</th>
<th>Communication Peripherals</th>
<th>PWM Ch.</th>
<th>PWM Type</th>
<th>Other Features</th>
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</thead>
<tbody>
<tr>
<td>dsPIC30FXXX</td>
<td>12-144</td>
<td>512-8K</td>
<td>28-80</td>
<td>30 MOPS</td>
<td>6:16</td>
<td>10</td>
<td>1.0M</td>
<td>-</td>
<td>3.5 ±16</td>
<td>UART, I²C/SPI, CAN</td>
<td>6-8</td>
<td>Motor Ctrl</td>
<td>Flash Security, EEPROM, QEI*</td>
</tr>
<tr>
<td>dsPIC33FXXX/A**</td>
<td>12-256</td>
<td>1K-30K</td>
<td>20-100</td>
<td>40 MOPS</td>
<td>6:42</td>
<td>10 or 12</td>
<td>500 or 1.1M</td>
<td>0-2</td>
<td>3.9 ±16</td>
<td>UART, I²C, SPI</td>
<td>6-8</td>
<td>Motor Ctrl</td>
<td>Flash Security, JTAG, DMA*, PMP*, RTCC*, DAC*, CRC*, QEI*</td>
</tr>
</tbody>
</table>

16-Bit DSCs – Digital Power Conversion and Motor Control (24-bit Instruction Word), ICSP, Self-Write

<table>
<thead>
<tr>
<th>Family</th>
<th>Program Memory (Kbytes)</th>
<th>RAM (Bytes)</th>
<th>Pins</th>
<th>Max Speed</th>
<th>A/D Ch.</th>
<th>A/D Res. (bits)</th>
<th>A/D Sample (kops)</th>
<th>Comp</th>
<th>8/16/32-bit Timers (x8, x16, x32)</th>
<th>Communication Peripherals</th>
<th>PWM Ch.</th>
<th>PWM Type</th>
<th>Other Features</th>
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<tbody>
<tr>
<td>dsPIC30FXXX</td>
<td>6-12</td>
<td>256-512</td>
<td>28-44</td>
<td>30 MOPS</td>
<td>6:16</td>
<td>10</td>
<td>2.0M</td>
<td>2-4</td>
<td>2.3 ±16</td>
<td>UART, I²C, SPI</td>
<td>4-8</td>
<td>High-speed</td>
<td>Flash Security</td>
</tr>
<tr>
<td>dsPIC33FXXX/GXXX</td>
<td>6-64</td>
<td>256-9K</td>
<td>18-100</td>
<td>40 MOPS</td>
<td>6:24</td>
<td>10</td>
<td>2.0M or 4.0M</td>
<td>0-4</td>
<td>2.3 ±16</td>
<td>UART, I²C, SPI</td>
<td>4-18</td>
<td>High-speed</td>
<td>Flash Security, JTAG, 10-bit DAC Output*, CAN, DMA*</td>
</tr>
</tbody>
</table>

*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

<table>
<thead>
<tr>
<th>Application</th>
<th>Application Library</th>
<th>Part Number</th>
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</thead>
<tbody>
<tr>
<td>Speech, Audio and Communication</td>
<td>dsPIC DSC Noise Suppression Library</td>
<td>SW300040-5K*</td>
</tr>
<tr>
<td></td>
<td>dsPIC DSC Acoustic Echo Cancellation Library</td>
<td>SW300060-5K*</td>
</tr>
<tr>
<td></td>
<td>dsPIC DSC Line Echo Cancellation Library</td>
<td>SW300080-5K*</td>
</tr>
<tr>
<td></td>
<td>dsPIC DSC Equalizer Library</td>
<td>SW300080-EVAL</td>
</tr>
<tr>
<td></td>
<td>dsPIC DSC Automatic Gain Control Library</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>PIC24/dsPIC DSC G.711 Speech Encoding/Decoding Library</td>
<td>SW300026</td>
</tr>
<tr>
<td></td>
<td>dsPIC DSC G.726A Speech Encoding/Decoding Library</td>
<td>SW300090-5K*</td>
</tr>
<tr>
<td></td>
<td>dsPIC DSC Speex Speech Encoding/Decoding Library</td>
<td>SW300070-5K*</td>
</tr>
<tr>
<td>Encryption and Security</td>
<td>dsPIC DSC Symmetric Key Embedded Encryption Library</td>
<td>SW300050-5K*</td>
</tr>
<tr>
<td></td>
<td>dsPIC DSC Asymmetric Key Embedded Encryption Library</td>
<td>SW300055-5K*</td>
</tr>
<tr>
<td></td>
<td>Triple DES/AES Encryption Libraries</td>
<td>SW300055-EVAL</td>
</tr>
<tr>
<td>DSP and Math</td>
<td>dsPIC DSC DSP Library</td>
<td>Included in MPLAB C Compiler</td>
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<td></td>
<td>PIC24/dsPIC DSC Math Library</td>
<td>Included in MPLAB C Compiler</td>
</tr>
<tr>
<td></td>
<td>PIC24/dsPIC DSC Fixed Point Math Library</td>
<td>Included in MPLAB C Compiler</td>
</tr>
<tr>
<td>Peripherals</td>
<td>PIC24/dsPIC DSC Peripheral Library</td>
<td>SW300021</td>
</tr>
<tr>
<td>Graphics</td>
<td>Microchip Graphics Library</td>
<td>–</td>
</tr>
<tr>
<td>Wired and Wireless Connectivity</td>
<td>Microchip TCP/IP Stack Software (ENC28J60/ENC628J600 Driver)</td>
<td>SW300024</td>
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<tr>
<td></td>
<td>Microchip USB Framework</td>
<td>–</td>
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<tr>
<td></td>
<td>IEEE 802.15.4: MIWI™ and MiWi P2P</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>IEEE 802.15.4: ZigBee*, ZigBee PRO, ZigBee Smart Energy Profile Suite</td>
<td>–</td>
</tr>
<tr>
<td>File System and Memory</td>
<td>Microchip FAT File System for PIC24 &amp; PIC32 MCUs and dsPIC DSCs</td>
<td>SW300027</td>
</tr>
<tr>
<td>Other</td>
<td>PMBus Stack</td>
<td>–</td>
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<tr>
<td></td>
<td>Class B Safety Software Library for PIC® MCUs and dsPIC DSCs</td>
<td>–</td>
</tr>
</tbody>
</table>

*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 converters, Uninterruptible Power Supply (UPS), Interleaved Power Factor Correction (PFC) and LED lighting.

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.

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.

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wireless PICtail Plus Daughter Board – 2.4 GHz daughter card with the Microchip MRF24J40 transceiver</td>
<td>AC163027</td>
</tr>
<tr>
<td>ECAN/LIN PICtail Plus Daughter Board – Two ECAN MCP2551 transceivers and two LIN MCP2021-330 transceivers</td>
<td>AC163140</td>
</tr>
<tr>
<td>PICtail Plus Daughter Board for SD/MMC – SPI to SD/MMC interface</td>
<td>AC164122</td>
</tr>
<tr>
<td>Ethernet PICtail Plus Daughter Board – Stand Alone ENC24J60 10Base-T Ethernet controller</td>
<td>AC164123</td>
</tr>
<tr>
<td>IrDA® PICtail Plus Daughter Board – IrDA transceiver for IrDA enabled UART</td>
<td>AC164124</td>
</tr>
<tr>
<td>Speech Playback PICtail Plus Daughter Board – Low cost PWM-based speech playback</td>
<td>AC164125</td>
</tr>
<tr>
<td>Prototype PICtail Plus Daughter Board – PICtail Plus expansion board</td>
<td>AC164126</td>
</tr>
<tr>
<td>Graphic PICtail Plus Daughter Board – Enables Graphics display via PMP</td>
<td>AC164127</td>
</tr>
<tr>
<td>Audio PICtail Plus Daughter Board – Full Duplex Speech and Audio applications</td>
<td>AC164129</td>
</tr>
<tr>
<td>Buck/Boost Converter PICtail Plus Daughter Board – Two independent DC/DC synchronous buck converters and independent DC/DC boost converter</td>
<td>AC164133</td>
</tr>
<tr>
<td>Thermal/Linear Intelligent Sensor PICtail Plus Daughter Board – Signal input and conditioning for thermocouples and linear sensors and TC1047/1047A Temperature to Voltage Converter</td>
<td>AC164135</td>
</tr>
<tr>
<td>MCP2515 PICtail Plus Daughter Board – Stand Alone CAN Controller expansion board</td>
<td>MCP2515DM</td>
</tr>
<tr>
<td>MCP42XX PICtail Plus Daughter Board – MCP42XX Digital Potentiometer expansion board</td>
<td>MCP42XXDM</td>
</tr>
<tr>
<td>MCP4725 PICtail Plus Daughter Board – 12-bit DAC + nonvolatile memory</td>
<td>MCP4725DM</td>
</tr>
</tbody>
</table>

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:

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