32-bit Microcontrollers

MICROCHIP

PIC32 Microcontroller Families

www.microchip.com/pic32

Performance-Leading PIC32 Microcontrollers

Building on the heritage of Microchip Technology's world-leading 8- and 16-bit PIC® microcontrollers, the PIC32 family delivers 32-bit performance and more memory to solve increasingly complex embedded system design challenges.

Broad Portfolio

From simple USB device connectivity to RTOS-driven graphical user interface applications with advanced audio processing, there is a PIC32 device to meet your design challenges.

- Up to 200 MHz/330 DMIPS, MIPS microAptiv™ core with DSP instructions
- Up to 100 MHz/131 DMIPS, MIPS M4K core
- Fast interrupts and context switch
- Dual-panel Flash with live update
- 16 KB to 2 MB Flash
- 4 KB to 512 KB RAM for data and program execution
- Temperature range: –40 to 85ºC; –40 to 105ºC; *–40 to 125ºC (planned)*
- Low pin count devices with Peripheral Pin Select (PPS) for pin remapping of most digital I/O

Industry-Leading Compatibility

Create scalable products in a consistent environment.

- Common MPLAB® X development tools
- Pin- and peripheral-compatible with 16-bit PIC MCUs
- Common software stacks across MCUs
- Common tools environment for over 1,000 PIC MCUs

Fast, Easy Development

Shorten your project design cycle.

- Free MPLAB X Integrated Development Environment supporting all Microchip MCUs
- Free MPLAB XC32/XC32++ Compiler
- MPLAB Harmony Software Framework to get you started with communications, graphics, file system, audio and signal processing
- Work in a familiar environment with a broad third party ecosystem of IDEs, RTOS and debuggers
- Development kits starting at $34.95 with free C compiler

More Design Options

Simplify your system design through integration.

- Extensive analog and digital peripherals including 10/100 Ethernet MAC, I²C™, I²S, 10/12-bit ADCs with up to 48 analog channels, serial communications, SQI, EBI and Hi-Speed USB
- Up to 26 DMA channels
- 8/16-bit parallel master port supporting graphic interface and additional memory
- CTMU for improved human interfaces with capacitive buttons or slider control

PIC32 Software Solutions Support

www.microchip.com/harmony

USB	USB Host, Device, On-the-Go with Class Drivers
HMI	Microchip Graphics Library Capacitive Touch Software Microchip Graphics Display Designer X mTouch® Capacitive Touch Library
CAN	CAN API Library for PIC32 with Integrated CAN Controller (Included in MPLAB XC32 Compiler) Stand-alone CAN Library: includes support for MCP2515
Audio and Speech	Audio Library for PIC32MX: Speex, ADPCM and WAV; MP3 and AAC Decode Digital Audio for Apple® devices; Bluetooth® Stack for PIC32; Sample Rate Conversion (SRC) Library; PIC32 Bluetooth Audio Software Suites
Connectivity	Microchip TCP/IP with SSL and BSD IrDA® Stack IEEE 802.15.4 and Sub-GHz MiWi™ Development Environment PIC32 Bluetooth Audio Software Suites
Encryption	Cryptographic Library
Basic Libraries	File System Library DSP Library (Included in MPLAB XC32 Compiler) Floating Point Math Library Peripheral Library EEPROM Emulation IEC 60730 Class B Software Fixed Point Math Library Fixed Point DSP Library
Boot Loader	Serial Port Boot Loader USB Host Boot Loader Ethernet Boot Loader

Get the latest updates at www.microchip.com/harmony.

MPLAB Harmony Software Framework compatible.
Additional software libraries listed in the table above are planned to be included in MPLAB Harmony.

MPLAB Harmony for PIC32

Introduction

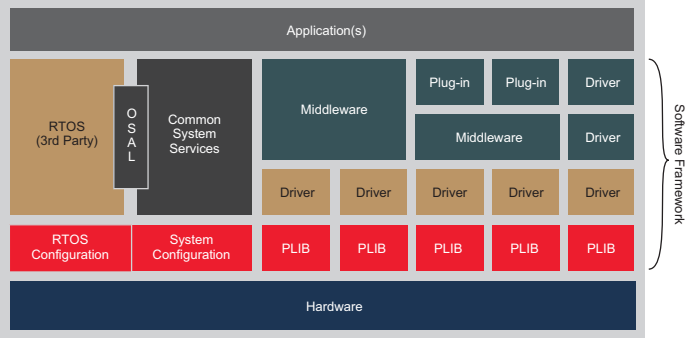
MPLAB Harmony is a flexible, abstracted, fully integrated firmware development environment for PIC32 microcontrollers. It enables robust framework development of interoperable RTOS-friendly libraries with quick and extensive Microchip support for third party software integration. MPLAB Harmony includes a set of peripheral libraries, drivers and system services that are readily accessible for application development. The code development format allows for maximum re-use and reduces time-to-market.

Benefits

- Faster time-to-market
- Improved code interoperability
- Simplified support
- Improved 32-bit scalability
- Enhanced third party software integration

MPLAB® HARMONY
Integrated Software Framework

MPLAB Harmony Block Diagram



PIC32 Software Development Tools Available with MPLAB Harmony

Applications	Operating System Abstract Layer (OSAL)	Middleware/ Software Libraries	Device Drivers	Development Software	Third Party Software
■ Graphics applications ■ TCP/IP applications and utilities ■ USB applications	■ OSAL interface with "basic" and "none" implementation ■ OSAL implementation for FreeRTOS ■ OSAL implementation for Micrium µC/OS-III	■ Graphics ■ TCP/IP ■ USB ■ Cryptographic libraries ■ File systems ■ System services	■ ADC ■ Ethernet media access controller ■ Ethernet PHY interface ■ Controllerless graphics ■ Epson LCD controller ■ Non-volatile memory ■ SPI, UART, high-speed USB ■ Timer, parallel master port	■ MPLAB® X IDE ■ MPLAB XC32++	■ FreeRTOS* ■ OpenRTOS* ■ TCP/IP* ■ SSL libraries ■ Micrium µC/OS-III

Additional software components planned
*Sold and front-line support provided directly by Microchip

Application Layer

- Implements desired overall behavior
- Abstracted hardware access
- Allows for easy port across PIC32 parts

Common System Services

- Provides common functionality to avoid duplication and conflicts
- Eliminates complex interactions and interdependencies between modules
- OSAL provides OS compatibility and interface
- Manages shared resources
- Supports low-level configuration and board support package

Middleware Layer

- Implements complex libraries and protocols (USB, TCP/IP, file systems, graphics)
- Provides a highly abstracted application program interface
- Libraries are thread-safe and RTOS-ready
- Built on drivers, PLIBS, system services
- Supports third party library integration

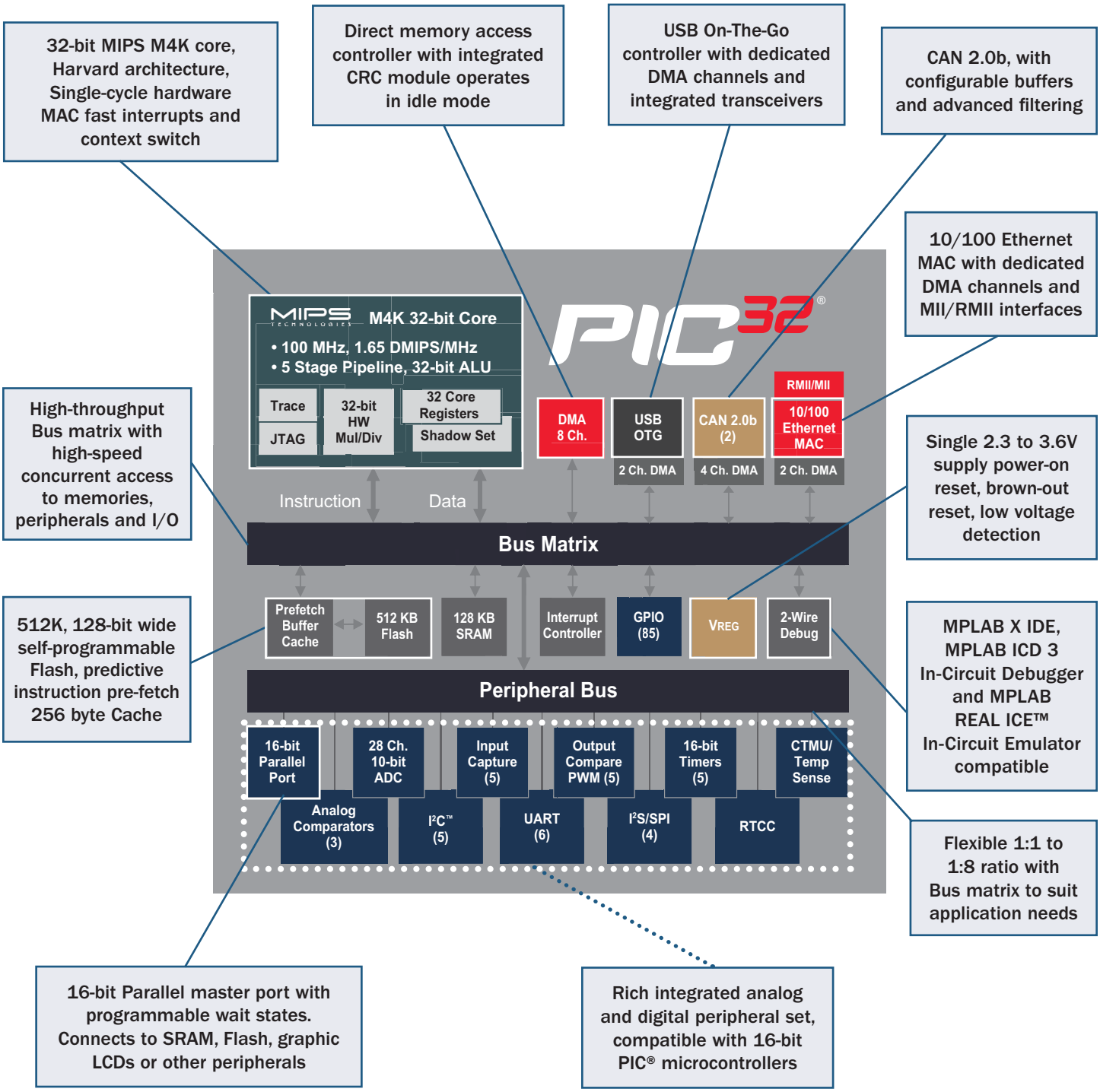
Device Driver Layer

- Provides highly abstracted interface to peripheral
- Controls access to the peripheral
- Manages multiple hardware instances and software clients with select drivers
- Manages peripheral state and multiple peripheral instances
- Accesses hardware via PLIB
- Supports blocking or non-blocking code

Peripheral Libraries (PLIB) Layer

- Provide functional interface for Microchip PIC32 scalability
- Implements part-specific features

Inside the MIPS® M4K Core PIC32 MCU



Note: Not all features are available on all PIC32 devices. Please see product family table for more information.

Inside the MIPS32® microAptiv Core PIC32 MCU

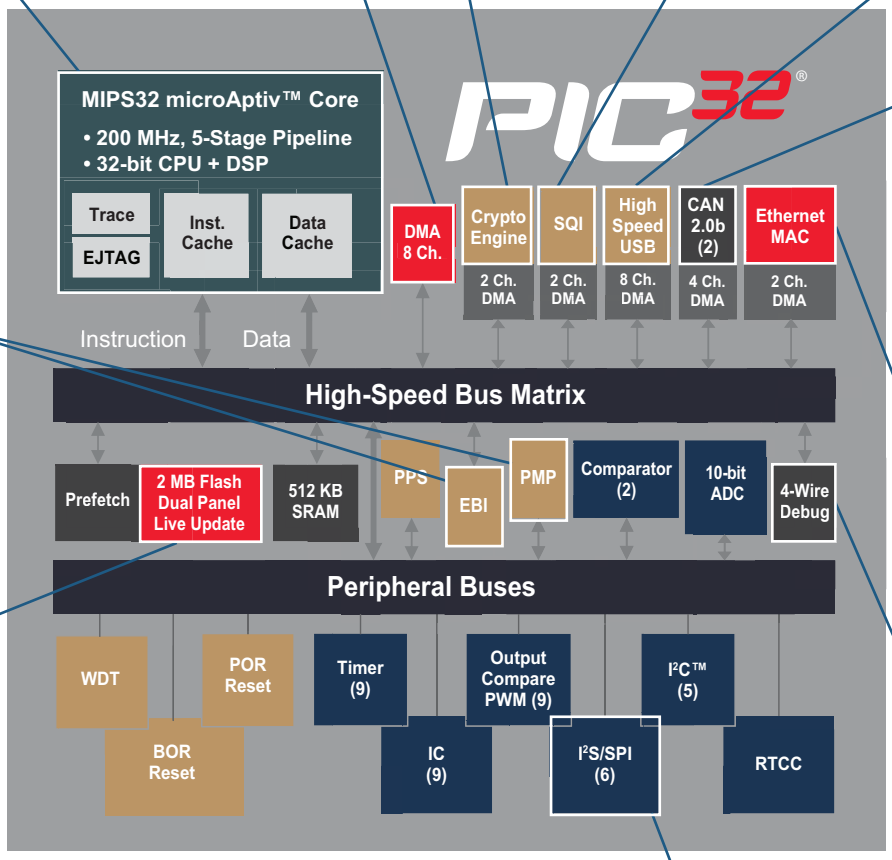
High-performance, real-time embedded MCU core with DSP functionality offers up to 35% code size reduction operating at near-full rate

Direct memory access controller with integrated CRC module operates in idle mode

Reduces software overhead and actions such as encryption, decryption and authentication are executed more quickly

A synchronous serial interface that provides access to serial Flash memories and other serial devices

Hi-Speed USB Device/Host/OTG controller with dedicated DMA channels and integrated transceivers



PMP/EBI provides a high-speed and convenient interface to external parallel memory devices, camera sensors and LCDs

CAN 2.0b, with configurable buffers and advanced filtering

10/100 Ethernet MAC with dedicated DMA channels and MII/RMII interfaces

High-endurance, flexible and secure Flash with dual Flash banks for live update

MPLAB X IDE, MPLAB ICD 3 In-Circuit Debugger and MPLAB REAL ICE In-Circuit Emulator compatible

Convenient standard CODEC interface for high-quality audio

Note: Not all features are available on all PIC32 devices. Please see product family table for more information.

Developing with the PIC32 Microcontroller

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

PIC32 Starter Kits

Getting started is easy with any of the fully integrated PIC32 Starter Kits. They feature simple installation, a getting started tutorial and a PIC32 starter board which easily connects to your PC via USB. The starter kits include:

- MPLAB X IDE and MPLAB XC 32 C Compiler†
- PIC32 starter board with integrated programmer and debugger
- Code examples, documentation, tutorials and sample projects; optional I/O expansion board allows signal breakouts and connections for PICtail™ Plus daughter cards

†Lite version has **no code size limit** and full optimizations. After 60 days some optimizations are disabled.

PIC32 Development Tools

Choose a Platform: *Starter Kit Platform* OR *Explorer 16 Platform*

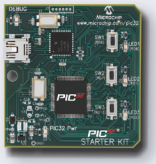
Starter Kit Platform

Microstick II (DM330013-2)

PIC32 USB Starter Kit II (DM320003-2)

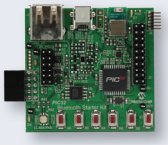
PIC32 USB Starter Kit III (DM320003-3)

PIC32 Starter Kit (DM320001)

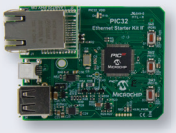


Wi-Fi® G Demo Board (DV102412)

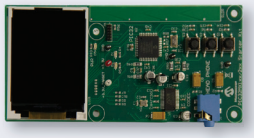
PIC32 Bluetooth Starter Kit (DM320018)



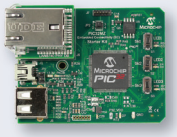
PIC32 Ethernet Starter Kit II (DM320004-2)



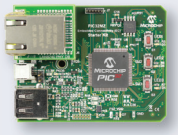
MPLAB Starter Kit for PIC32MX1XX/2XX (DM320013)



PIC32MZ Embedded Connectivity Starter Kit (DM320006)



PIC32MZ Embedded Connectivity Starter Kit with Crypto Engine (DM320006-C)



OPTIONAL

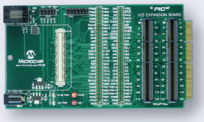
Multimedia Expansion Board (DM320005)

Multimedia Expansion Board II (DM320005-2)

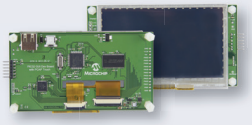
PIC32MX270F256D Plug-in Module for Bluetooth Audio Development Kit (MA320013)*

PIC32 Bluetooth® Audio Development Kit (DV320032)

PIC32 I/O Expansion Board (DM320002)



PIC32 GUI Development Board with Projected Capacitive Touch (DM320015)

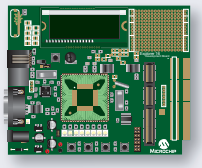


*MA320013 does not work with the Explorer 16 Development Board

Developing with the PIC32 Microcontroller

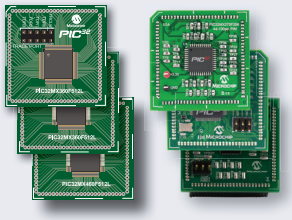
Explorer 16 Platform

Explorer 16 Development Board (DM240001)



+

PIC32 Plug-in Modules (MA320001/2/3/11/12/14) (MA320002-2)



AND

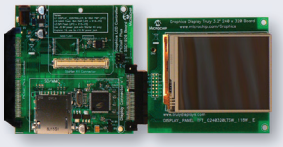
MPLAB ICD 3 In-Circuit Debugger (DV164035)

OR

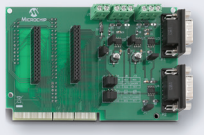
MPLAB REAL ICE In-Circuit Emulation System (DV244005)

PICtail™ Boards Common to Both Development Platforms

Graphics Daughter Board with 3.2" Display Kit (AC164127-3)

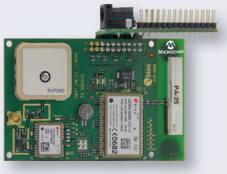


CAN/LIN PICtail Plus Daughter Board (AC164130-2)

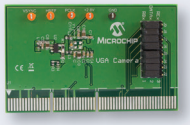


Low-Cost Controllerless (LCC) Graphics PICtail Plus Board (AC164144)

M2M PICtail Daughter Board (AC320011)



PIC32 VGA Camera Sensor (VCS) PICtail Plus Board (AC164150)

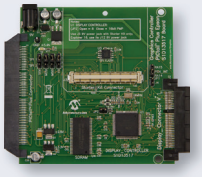


MRF24WB0MA Wi-Fi Daughter Board (AC164136-4)

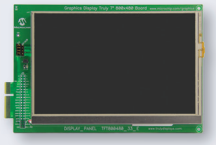
MRF24J40MA PICtail Plus 2.4 GHz RF Card (AC164134)

PIC32MX CTMU Evaluation Board (AC323027)

Graphics Controller PICtail Plus Epson S1D13517 Board (AC164127-7)



Graphics Display Truly 7" 800 × 480 (WVGA) PICtail Plus Board (AC164127-9)



... and many more!

Third Party Application Software and Hardware Support

- Ashling Microsystems
- AVIX-RT
- chipKIT.net
- CMX Systems
- Digilent Inc.
- E.E. Tools
- EasyCode
- easyGUI
- eflightworks
- ELNEC
- expresslogic
- FreeRTOS
- Fubarino
- Green Hills Software Inc.
- HCC-Embedded
- Interniche Technologies Inc.
- Lauterbach
- Macraigor Systems
- Micriμm
- Micro/sys Inc.
- OLIMEX Ltd.
- OpenRTOS
- Pumpkinl
- RoweBots Research Inc.
- Schmalzhaus
- SEGGER
- Serious Integrated
- Softlog
- SparkFun Electronics
- TechToys Company
- Virtual Fab
- woflSSL

MPLAB Harmony Software Framework compatible.

For up-to-date information about our 32-bit portfolio, related development tools and technical support, visit: www.microchip.com/PIC32.

PIC32 Microcontroller Product Families

PIC32MX Devices

Device	Flash KB + Boot Flash (KB)	SRAM (KB)	Pin Count	Speed (MHz)	I²S/SPI	I²C™	UARTs	DMA Channels General/Dedicated	CTMU/PPS	USB (Full/Hi-Speed)	10/100 Ethernet	CAN 2.0b	IC/OC/PWM	10-bit ADC 1 Msps	Analog Comparator	Timers 16b/32b	RTCC	Parallel Master Port	JTAG Program, Debug, Boundary Scan	Temp. Range (°C)
PIC32MX110F016B	16 + 3	4	28	40	2/2	2	2	4/0	Y	N	N	N	5/5/5	10	3	5/2	Y	Y	Y	–40 to +105
PIC32MX110F016C	16 + 3	4	36											12						
PIC32MX110F016D	16 + 3	4	44											13						
PIC32MX120F032B	32 + 3	8	28	40/50										10						
PIC32MX120F032C	32 + 3	8	36											12						
PIC32MX120F032D	32 + 3	8	44											13						
PIC32MX130F064B	64 + 3	16	28	40	2/2	2	2	4/0	Y	N	N	N	5/5/5	10	3	5/2	Y	Y	Y	–40 to +105
PIC32MX130F064C	64 + 3	16	36											12						
PIC32MX130F064D	64 + 3	16	44											13						
PIC32MX150F128B	128 + 3	32	28	40/50										10						
PIC32MX150F128C	128 + 3	32	36											12						
PIC32MX150F128D	128 + 3	32	44											13						
PIC32MX170F256B	256 + 3	64	28											10						
PIC32MX170F256D	256 + 3	64	44											13						
PIC32MX210F016B	16 + 3	4	28	40	2/2	2	2	4/2	Y	FS	N	N	5/5/5	9	3	5/2	Y	Y	Y	–40 to +105
PIC32MX210F016C	16 + 3	4	36											12						
PIC32MX210F016D	16 + 3	4	44											13						
PIC32MX220F032B	32 + 3	8	28	40/50										9						
PIC32MX220F032C	32 + 3	8	36											12						
PIC32MX220F032D	32 + 3	8	44											13						
PIC32MX230F064B	64 + 3	16	28	40	2/2	2	2	4/2	Y	FS	N	N	5/5/5	9	3	5/2	Y	Y	Y	–40 to +105
PIC32MX230F064C	64 + 3	16	36											12						
PIC32MX230F064D	64 + 3	16	44											13						
PIC32MX250F128B	128 + 3	32	28	40/50										9						
PIC32MX250F128C	128 + 3	32	36											12						
PIC32MX250F128D	128 + 3	32	44											13						
PIC32MX270F256B	256 + 3	64	28											9						
PIC32MX270F256D	256 + 3	64	44											13						
PIC32MX320F032H	32 + 12	8	64	40	2/2	2	2	0/0	N	N	N	N	5/5/5	16 ch	2	5/2	Y	Y	Y	–40 to +105
PIC32MX320F064H	64 + 12	16	64	40																
PIC32MX320F064H				80																
PIC32MX320F128H	128 + 12	16	64	80																
PIC32MX320F128L			100																	
PIC32MX330F064H	64 + 12	16	64	100			4	4/0	Y					28 ch						
PIC32MX330F064L			100				5													
PIC32MX340F128H	128 + 12	32	64	80	2/2	2	2	4/0	N	N	N	N	5/5/5	16 ch	2	5/2	Y	Y	Y	–40 to +105
PIC32MX340F128L			100																	
PIC32MX340F256H	256 + 12	32	64	80																
PIC32MX360F256L			100																	
PIC32MX340F512H	512 + 12	32	64	80																
PIC32MX360F512L			100																	
PIC32MX350F128H	128 + 12	32	64	100	2/2	2	4	4/0	Y	N	N	N	5/5/5	28 ch	2	5/2	Y	Y	Y	–40 to +105
PIC32MX350F128L			100/124				5													
PIC32MX350F526H	256 + 12	64	64				4													
PIC32MX350F526L			100/124				5													
PIC32MX370F512H	512 + 12	128	64				4													
PIC32MX370F512L			100/124				5													

AEC-Q100 qualified for grade 2 and 3. Check individual product pages for details.

PIC32 Microcontroller Product Families

PIC32MX Devices (Continued)

Device	Flash KB + Boot Flash (KB)	SRAM (KB)	Pin Count	Speed (MHz)	I²S/SPI	I²C™	UARTs	DMA Channels General/Dedicated	CTMU/PPS	USB (Full/Hi-Speed)	10/100 Ethernet	CAN 2.0b	IC/OC/PWM	10-bit ADC 1 Msps	Analog Comparator	Timers 16b/32b	RTCC	Parallel Master Port	JTAG Program, Debug, Boundary Scan	Temp. Range (°C)
PIC32MX420F032H	32 + 12	8	64	40	0/1	2	2	0/2	N	FS	N	N	5/5/5	16 ch	2	5/2	Y	Y	Y	–40 to +105
PIC32MX430F064H	64 + 12	16	64	100	2/2		4	4/2	Y					28 ch						
PIC32MX430F064L			100		2/2		5													
PIC32MX440F128H	128 + 12	32	64	80	0/1		2	4/2	N					16 ch						
PIC32MX440F128L			100		0/2															
PIC32MX440F256H	256 + 12	32	64	80	0/1															
PIC32MX460F256L			100		0/2															
PIC32MX440F512H	512 + 12	32	64	80	0/1															
PIC32MX460F512L			100		0/2															
PIC32MX450F128H	128 + 12	32	64	100	2/2		4		Y					28 ch						
PIC32MX450F128L			100/124				5													
PIC32MX450F256H	256 + 12	64	64				4													
PIC32MX450F256L			100/124				5													
PIC32MX470F512H	512 + 12	128	64				4													
PIC32MX470F512L			100/124				5													
PIC32MX534F064H	64 + 12	16	64	80	0/3	4	6	4/4	N	FS	N	1	5/5/5	16 ch	2	5/2	Y	Y	Y	–40 to +105
PIC32MX534F064L			100		0/4	5														
PIC32MX564F064H		32	64	80	0/3	4														
PIC32MX564F064L			100		0/4	5														
PIC32MX564F128H	128 + 12	32	64	80	0/3	4														
PIC32MX564F128L			100		0/4	5														
PIC32MX575F256H	256 + 12	64	64	80	0/3	4		8/4												
PIC32MX575F256L			100		0/4	5														
PIC32MX575F512H	512 + 12	64	64	80	0/3	4														
PIC32MX575F512L			100		0/4	5														
PIC32MX664F064H	64 + 12	32	64	80	0/3	4	6	4/4	N	FS	Y	N	5/5/5	16 ch	2	5/2	Y	Y	Y	–40 to +105
PIC32MX664F064L			100		0/4	5														
PIC32MX664F128H	128 + 12	32	64	80	0/3	4														
PIC32MX664F128L			100		0/4	5														
PIC32MX675F256H	256 + 12	64	64	80	0/3	4		8/4												
PIC32MX675F256L			100		0/4	5														
PIC32MX675F512H	512 + 12	64	64	80	0/3	4														
PIC32MX675F512L			100		0/4	5														
PIC32MX695F512H		128	64	80	0/3	4														
PIC32MX695F512L			100		0/4	5														
PIC32MX764F128H	128 + 12	32	64	80	0/3	4	6	4/6	N	FS	Y	1	5/5/5	16 ch	2	5/2	Y	Y	Y	–40 to +105
PIC32MX764F128L			100		0/4	5														
PIC32MX775F256H	256 + 12	64	64	80	0/3	4		8/8				2								
PIC32MX775F256L			100		0/4	5														
PIC32MX775F512H	512 + 12	64	64	80	0/3	4														
PIC32MX775F512L			100		0/4	5														
PIC32MX795F512H		128	64	80	0/3	4														
PIC32MX795F512L			100		0/4	5														

AEC-Q100 qualified for grade 2 and 3. Check individual product pages for details.

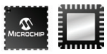
PIC32 Microcontroller Product Families

PIC32MZ Devices

Device	Flash KB + Boot Flash (KB)	SRAM (KB)	Pin Count	Speed (MHz)	I²S/SPI	I²C™	UARTs	DMA Channels General/Dedicated	PPS	USB (Full/Hi-Speed)	10/100 Ethernet	CAN 2.0b	IC/OC/PWM	10-bit ADC	ADC S/H	Analog Comparator	Timers 16b/32b	RTCC	SQI	EBI	Parallel Master Port	JTAG Program, Debug, Boundary Scan	Encryption	Temp. Range (°C)
PIC32MZ2048ECG144	2048 + 160	512	144	200	6	5	6	8/12	Y	HS	Y	N	9/9/9	48 ch	1	2	9/4	Y	Y	Y	Y	Y	N	–40 to +85
PIC32MZ2048ECH144	2048 + 160							8/16				2												
PIC32MZ2048ECG124	2048 + 160	512	124	200	6	5	6	8/12	Y	HS	Y	N	9/9/9	48 ch	1	2	9/4	Y	Y	Y	Y	Y	N	–40 to +85
PIC32MZ2048ECH124	2048 + 160							8/16				2												
PIC32MZ2048ECG100	2048 + 160	512	100	200	6	5	6	8/12	Y	HS	Y	N	9/9/9	40 ch	1	2	9/4	Y	Y	Y	Y	Y	N	–40 to +85
PIC32MZ2048ECH100	2048 + 160							8/16				2												
PIC32MZ2048ECG064	2048 + 160	512	64	200	4	4	6	8/12	Y	HS	Y	N	9/9/9	24 ch	1	2	9/4	Y	Y	N	Y	Y	N	–40 to +85
PIC32MZ2048ECH064	2048 + 160							8/16				2												
PIC32MZ1024ECG144	1024 +160	512	144	200	6	5	6	8/12	Y	HS	Y	N	9/9/9	48 ch	1	2	9/4	Y	Y	Y	Y	Y	N	–40 to +85
PIC32MZ1024ECH144	1024 +160							8/16				2												
PIC32MZ1024ECG124	1024 +160	512	124	200	6	5	6	8/12	Y	HS	Y	N	9/9/9	48 ch	1	2	9/4	Y	Y	Y	Y	Y	N	–40 to +85
PIC32MZ1024ECH124	1024 +160							8/16				2												
PIC32MZ1024ECG100	1024 +160	512	100	200	6	5	6	8/12	Y	HS	Y	N	9/9/9	40 ch	1	2	9/4	Y	Y	Y	Y	Y	N	–40 to +85
PIC32MZ1024ECH100	1024 +160							8/16				2												
PIC32MZ1024ECG064	1024 +160	512	64	200	4	4	6	8/12	Y	HS	Y	N	9/9/9	24 ch	1	2	9/4	Y	Y	N	Y	Y	N	–40 to +85
PIC32MZ1024ECH064	1024 +160							8/16				2												
PIC32MZ2048ECM144	2048 + 160	512	144	200	6	5	6	8/18	Y	HS	Y	2	9/9/9	48 ch	1	2	9/4	Y	Y	Y	Y	Y	Y	–40 to +85
PIC32MZ2048ECM124	2048 + 160																							
PIC32MZ2048ECM100	2048 + 160	512	100	200	6	5	6	8/18	Y	HS	Y	2	9/9/9	40 ch	1	2	9/4	Y	Y	Y	Y	Y	Y	–40 to +85
PIC32MZ2048ECM064	2048 + 160		64		4	4								24 ch						N				
PIC32MZ1024ECM144	1024 +160	512	144	200	6	5	6	8/18	Y	HS	Y	2	9/9/9	48 ch	1	2	9/4	Y	Y	Y	Y	Y	Y	–40 to +85
PIC32MZ1024ECM124	1024 +160		124																					
PIC32MZ1024ECM100	1024 +160	512	100	200	6	5	6	8/18	Y	HS	Y	2	9/9/9	40 ch	1	2	9/4	Y	Y	Y	Y	Y	Y	–40 to +85
PIC32MZ1024ECM064	1024 +160		64		4	4								24 ch						N				

Please contact your Microchip representative for availability.

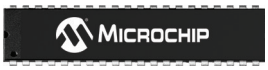
Package Options



28-pin QFN
6 × 6 mm (ML)

28-pin SSOP
10.2 × 7.8 mm (SS)

28-pin SOIC
17.9 × 10.3 mm (SO)



28-pin SPDIP
36 × 7.5 mm (SP)

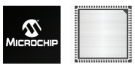
36-pin VTLA
5 × 5 mm (TL)

44-pin VTLA
6 × 6 mm (TL)

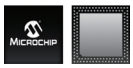
44-pin TQFP
10 × 10 mm (PT)

44-pin QFN
8 × 8 mm (ML)

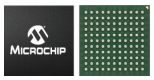
64-lead TQFP
10 × 10 mm (PT)



64-lead QFN
9 × 9 mm (MR)



124-lead VTLA (TL)
9 × 9 mm



121-ball BGA
10 × 10 mm (BG)

100-lead TQFP
12 × 12 mm (PT)

100-lead TQFP
14 × 14 mm (PF)

144-lead TQFP (PH)
16 × 16 × 1 mm

144-lead LQFP (PL)
20 × 20 × 1.4 mm

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