16-bit PIC® Microcontroller Peripheral Integration

Quick Reference Guide

Product Family	Maximum MIPS	Program Flash Memory (KB)	RAM (KB)	Pin Count	Peripheral Function Focus: Integrated Analog: ADC (resolution)[1]	DAC (resolution)[2]	CV_{REF}	HS Comp	OPA/PGA	Waveform Control: CCP/ECCP	SCCP	MCCP	PWM	MC PWM	SMPS PWM	IC and OC	PWM Resolution (ns)	16-bit Timer	32-bit Timer	RTCC	QEI	Safety and Monitoring: Flash Error Correction Code	RAM MBIST	LVD	WDT	DMT	CRC	Functional Safety	Communications: USB	CAN/CAN FD	UART	LIN	IrDA®	I²C	SPI	I²S™	SENT	Parallel Port	User Interface: CTMU and mTouch® Sensing	LCD (Segments)	GFX	Secure Data: Cryptographic Engine	Secure Key Storage	RNG	System Flexibility: Dual Partition Flash	CLC	PPS	PTG	DMA	DOZE, IDLE, SLEEP and PMD	XLP	V_{BAT}
PIC24 Family																																																					
PIC24F04KA20X[5V]	8	4	0.5	14–20	10		✓	✓					✓			✓	62.5	✓	✓					✓	✓			L1			✓	✓	✓	✓	✓				✓										✓	✓	
PIC24F04KL10X	16	4	0.5	14–20			✓	✓		✓			✓			✓	83.3	✓	✓					✓	✓			L1			✓	✓	✓	✓	✓														✓	✓	
PIC24F08KL20X	16	8	0.5	14–20	10		✓	✓		✓			✓			✓	83.3	✓	✓					✓	✓			L1			✓	✓	✓	✓	✓														✓	✓	
PIC24F08KL30X	16	8	1	20–28			✓	✓		✓			✓			✓	83.3	✓	✓					✓	✓			L1			✓	✓	✓	✓	✓														✓	✓	
PIC24FXXKL40X	16	8–16	1	20–28	10		✓	✓		✓			✓			✓	83.3	✓	✓					✓	✓			L1			✓	✓	✓	✓	✓														✓	✓	
PIC24FXXKA10X	16	8–16	1.5	20–28	10		✓	✓					✓			✓	62.5	✓	✓					✓	✓		✓	L2			✓	✓	✓	✓	✓					✓									✓	✓	
PIC24FXXKM10X[5V]	16	8–16	1	20–44	12		✓	✓			✓	✓	✓			✓	62.5	✓	✓					✓	✓		✓	L2			✓	✓	✓	✓	✓					✓				✓					✓	✓	
PIC24FXXKM20X[5V]	16	8–16	2	20–44	12	8	✓	✓	✓		✓	✓	✓			✓	62.5	✓	✓					✓	✓		✓	L2			✓	✓	✓	✓	✓					✓					✓				✓	✓	
PIC24FXXKA30X[5V]	16	16–32	2	20–44	12		✓	✓					✓			✓	62.5	✓	✓					✓	✓		✓	L2			✓	✓	✓	✓	✓					✓									✓	✓	
PIC24FJXXGA00X	16	16–64	4–8	28–44	10			✓					✓			✓	62.5	✓	✓					✓	✓		✓	L2			✓	✓	✓	✓	✓				✓						✓				✓		
PIC24FJXXMC10X	16	16–32	1–2	20–44	10	4		✓					✓	✓	✓	✓	31	✓	✓	✓					✓				L1			✓	✓	✓	✓	✓				✓						✓				✓		
PIC24EPXXXGP20X	70	32–512	4–48	28–64	12	4		✓	✓				✓			✓	14	✓	✓					✓			✓	L2			✓	✓	✓	✓	✓					✓						✓	✓	✓	✓		
PIC24EPXXXMC20X	70	32–512	4–48	28–64	12	4		✓	✓				✓	✓	✓	✓	7	✓	✓		✓				✓		✓	L2			✓	✓	✓	✓	✓					✓						✓	✓	✓	✓		
PIC24FJXXGA10X	16	32–64	8	28–44	10			✓					✓			✓	62.5	✓	✓					✓	✓		✓	L2			✓	✓	✓	✓	✓				✓							✓			✓	✓	
PIC24FJXXGB00X	16	32–64	8	28–44	10			✓					✓			✓	62.5	✓	✓					✓	✓		✓	L2	✓		✓	✓	✓	✓	✓				✓							✓			✓	✓	
PIC24FJXXXGA0XX	16	64–128	8	64–100	10			✓					✓			✓	62.5	✓	✓						✓		✓	L2			✓	✓	✓	✓	✓				✓										✓		

1: 16-bit PIC® MCU offers SAR ADC, high-speed ADC and Delta-Sigma ADC **2:** 16-bit PIC MCU offers general-purpose DAC and audio DAC

3: Functional Safety Features:

L1: Includes WDT, oscillator fail-safe, illegal opcode detect, TRAP, reset trace, register lock, frequency check, CodeGuard™ security, PWM lock* L2: Includes features of L1 + CRC L3: Includes features of L2 + Flash ECC and/or DMT L4: Includes features of L3 + RAM MBIST

*PWM lock available in devices with MC PWM/SMPS PWM peripheral

(5V) 16-bit PIC MCUs and dsPIC DSCs with 5V operating Voltage

Note: Similar family of devices with fewer variations are grouped with the same color coding

Peripheral Function Focus

Product Family	Maximum MIPS	Program Flash Memory (KB)	RAM (KB)	Pin Count	Integrated Analog					Waveform Control												Safety and Monitoring							Communications										User Interface			Secure Data			System Flexibility							
					ADC (resolution)[1]	DAC (resolution)[2]	CV_{REF}	HS Comp	OPA/PGA	CCP/ECCP	SCCP	MCCP	PWM	MC PWM	SMPS PWM	IC and OC	PWM Resolution (ns)	16-bit Timer	32-bit Timer	RTCC	QEI	Flash Error Correction Code	RAM MBIST	LVD	WDT	DMT	CRC	Functional Safety	USB	CAN/CAN FD	UART	LIN	IrDA®	I^2C	SPI	I^2S™	SENT	Parallel Port	CTMU and mTouch® Sensing	LCD (Segments)	GFX	Cryptographic Engine	Secure Key Storage	RNG	Dual Partition Flash	CLC	PPS	PTG	DMA	DOZE, IDLE, SLEEP and PMD	XLP	V_{BAT}
PIC24 Family (Continued)																																																				
PIC24FJXXXGA1XX	16	64–256	16	64–100	10			✓					✓			✓	62.5	✓	✓					✓	✓		✓	L2			✓	✓	✓	✓	✓			✓	✓								✓			✓		
PIC24FJXXXGB1XX	16	64–256	16	64–100	10			✓					✓			✓	62.5	✓	✓					✓	✓		✓	L2	✓		✓	✓	✓	✓	✓			✓	✓								✓			✓		
PIC24FJXXXGA20X	16	64–128	8	28–44	12			✓					✓			✓	62.5	✓	✓	✓				✓	✓		✓	L2			✓			✓	✓	✓		✓	✓			✓	✓	✓			✓		✓	✓	✓	✓
PIC24FJXXXGB20X	16	64–128	8	28–44	12			✓					✓			✓	62.5	✓	✓	✓				✓	✓		✓	L2	✓		✓			✓	✓	✓		✓	✓			✓	✓	✓			✓		✓	✓	✓	✓
PIC24FJXXXGA3XX	16	64–128	8	64–100	12		✓	✓					✓			✓	62.5	✓	✓	✓				✓	✓		✓	L2			✓	✓	✓	✓	✓				✓	Up to 480							✓		✓	✓	✓	✓
PIC24FJXXXGC0XX	16	64–128	8	64–100	16	10	✓	✓					✓			✓	62.5	✓	✓	✓				✓	✓		✓	L2	✓		✓	✓	✓	✓	✓			✓	✓	Up to 472							✓		✓	✓	✓	✓
PIC24FJXXXDA2XX	16	128–256	24-96	64–100	10			✓					✓			✓	62.5	✓	✓					✓	✓		✓	L2	✓		✓	✓	✓	✓	✓			✓	✓		✓						✓		✓	✓		
PIC24FJXXXGA2XX	16	128–256	96	64–100	10			✓					✓			✓	62.5	✓	✓					✓	✓		✓	L2			✓	✓	✓	✓	✓			✓	✓								✓			✓		
PIC24FJXXXGB2XX	16	128–256	96	64–100	10			✓					✓			✓	62.5	✓	✓					✓	✓		✓	L2	✓		✓	✓	✓	✓	✓			✓	✓								✓			✓		
PIC24FJXXXGA4XX	16	64–256	8-16	64–121	12	10	✓	✓			✓	✓	✓			✓	15	✓	✓	✓				✓	✓		✓	L2			✓			✓	✓	✓		✓	✓	Up to 512		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
PIC24FJXXXGB4XX	16	64–256	8-16	64–121	12	10	✓	✓			✓	✓	✓			✓	15	✓	✓	✓				✓	✓		✓	L2	✓		✓			✓	✓	✓		✓	✓	Up to 512		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
PIC24FJXXXGA7XX	16	64–256	16	24–48	12		✓	✓				✓	✓			✓	15	✓	✓	✓		✓		✓	✓		✓	L3			✓	✓	✓	✓	✓	✓		✓	✓							✓	✓		✓	✓		
PIC24EPXXXGU81X	60	256–512	28–52	100–144	12	4		✓					✓			✓	14	✓	✓						✓		✓	L2	✓	✓	✓	✓	✓	✓	✓	✓		✓							✓		✓		✓	✓		
PIC24EP512GP806	70	512	52	64	12	4		✓					✓			✓	14	✓	✓						✓		✓	L2		✓	✓	✓	✓	✓	✓	✓		✓							✓		✓		✓	✓		
PIC24FJXXXXGA6XX	16	128–1024	32	64–100	12		✓	✓			✓	✓	✓			✓	15	✓	✓	✓		✓		✓	✓		✓	L3			✓			✓	✓	✓		✓	✓						✓	✓	✓			✓		
PIC24FJXXXXGB6XX	16	128–1024	32	64–100	12		✓	✓			✓	✓	✓			✓	15	✓	✓	✓		✓		✓	✓		✓	L3	✓		✓			✓	✓	✓		✓	✓						✓	✓	✓			✓		
dsPIC33CH Family - Dual Core (M – Master Core, S – Slave Core) and dsPIC33CK Family – Single Core																																																				
dsPIC33CH128MP5/20x Dual Core	M: 90 S: 100	M: 64–128 S: 24	M: 16 S: 4	28–80	12	12	✓	✓	✓		✓	✓	✓	✓	✓	✓	0.25	✓	✓		✓	✓		✓	✓	✓	✓	L3		✓	✓	✓	✓	✓	✓	✓	✓								✓	✓	✓	✓	✓	✓		
dsPIC33CH512MP5/20x Dual Core	M: 90 S: 100	M: 256–512 S: 72	M: 32–48 S: 16	48–80	12	12	✓	✓	✓		✓	✓	✓	✓	✓	✓	0.25	✓	✓		✓	✓	✓	✓	✓	✓	✓	L4		✓	✓	✓	✓	✓	✓	✓	✓								✓	✓	✓	✓	✓	✓		
dsPIC33CK256MP5/20x	100	64–256	24	28–80	12	12	✓	✓	✓		✓	✓	✓	✓	✓	✓	0.25	✓	✓		✓	✓	✓	✓	✓	✓	✓	L4		✓	✓	✓	✓	✓	✓	✓	✓	✓							✓	✓	✓	✓	✓	✓		
dsPIC33CK64MP10x	100	32–64	8	28–48	12	12	✓	✓	✓		✓	✓	✓	✓	✓	✓	0.25	✓	✓		✓	✓	✓	✓	✓	✓	✓	L4			✓	✓	✓	✓	✓	✓	✓	✓							✓	✓	✓	✓	✓	✓		
dsPIC33EV Family																																																				
dsPIC33EVXXXGM00X[5V]	70	32–256	4–16	28–64	12	7		✓	✓				✓	✓		✓	7	✓	✓			✓			✓	✓		L3			✓	✓	✓	✓	✓		✓		✓								✓		✓	✓		
dsPIC33EVXXXGM10X[5V]	70	32–256	4–16	28–64	12	7		✓	✓				✓	✓		✓	7	✓	✓			✓			✓	✓		L3		✓	✓	✓	✓	✓	✓		✓		✓								✓		✓	✓		
dsPIC33EP Family																																																				
dsPIC33EPXXGS2/50X	70	16–64	2–8	28–64	12	12	✓	✓	✓				✓		✓	✓	1	✓	✓						✓			L1			✓			✓	✓	✓									✓		✓			✓		
dsPIC33EPXXXGS80X	70	64–128	8	28–80	12	12	✓	✓	✓				✓		✓	✓	1	✓	✓	✓					✓			L1		✓	✓	✓	✓	✓	✓	✓									✓	✓	✓	✓	✓	✓		
dsPIC33EPXXGP50X	70	32–512	4–48	28–64	12	4		✓	✓				✓			✓	14	✓	✓						✓		✓	L2		✓	✓	✓	✓	✓	✓				✓								✓	✓	✓	✓		
dsPIC33EPXXXMC20X	70	32–256	4–48	28–64	12	4		✓	✓				✓	✓	✓	✓	7	✓	✓		✓				✓		✓	L2			✓	✓	✓	✓	✓				✓								✓	✓	✓	✓		
dsPIC33EPXXXMC50X	70	32–512	4–48	28–64	12	4		✓	✓				✓	✓	✓	✓	7	✓	✓		✓				✓		✓	L2		✓	✓	✓	✓	✓	✓				✓								✓	✓	✓	✓		

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(5V) 16-bit PIC MCUs and dsPIC DSCs with 5V operating Voltage

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Product Family	Maximum MIPS	Program Flash Memory (KB)	RAM (KB)	Pin Count	Integrated Analog					Waveform Control												Safety and Monitoring							Communications										User Interface			Secure Data			System Flexibility							
					ADC (resolution)[1]	DAC (resolution)[2]	CV_{REF}	HS Comp	OPA/PGA	CCP/ECCP	SCCP	MCCP	PWM	MC PWM	SMPS PWM	IC and OC	PWM Resolution (ns)	16-bit Timer	32-bit Timer	RTCC	QEI	Flash Error Correction Code	RAM MBIST	LVD	WDT	DMT	CRC	Functional Safety	USB	CAN/CAN FD	UART	LIN	IrDA®	I²C	SPI	I²S™	SENT	Parallel Port	CTMU and mTouch® Sensing	LCD (Segments)	GFX	Cryptographic Engine	Secure Key Storage	RNG	Dual Partition Flash	CLC	PPS	PTG	DMA	DOZE, IDLE, SLEEP and PMD	XLP	V_{BAT}
dsPIC33EP Family (Continuted)																																																				
dsPIC33EPXXXGM3XX	70	128–512	16-48	44–100	12	4		✓	✓				✓	✓	✓	✓	7	✓	✓		✓				✓		✓	L2			✓	✓	✓	✓	✓	✓		✓	✓								✓	✓	✓	✓		
dsPIC33EPXXXGM6/7XX	70	128–512	16-48	44–100	12	4		✓	✓				✓	✓	✓	✓	7	✓	✓		✓				✓		✓	L2		✓	✓	✓	✓	✓	✓	✓		✓	✓								✓	✓	✓	✓		
dsPIC33EPXXXMU8XX	70	256–512	28-52	64–144	12	4		✓					✓	✓	✓	✓	7	✓	✓		✓				✓		✓	L2	✓	✓	✓	✓	✓	✓	✓	✓		✓							✓		✓		✓	✓		
dsPIC33EP512GP806	70	512	52	64	12	4		✓					✓			✓	14	✓	✓						✓		✓	L2		✓	✓	✓	✓	✓	✓	✓		✓							✓		✓		✓	✓		

(Column groups: all columns from Integrated Analog to System Flexibility are under "Peripheral Function Focus". The group over 16-bit Timer, 32-bit Timer, RTCC and QEI has no printed label.)

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INTEGRATED ANALOG: Sensor Interfacing and Signal Conditioning	
ADC: Analog-to-Digital Converter	General-purpose ADC with up to 10-/12-/16-bit resolution
HS ADC: High-Speed Analog-to-Digital Converter	High-speed SAR ADC with 12-bit resolution and sampling speed of 10 Msps
ΔΣ ADC: Delta-Sigma Analog-to-Digital Converter	Bipolar differential inputs configurable gain integrated PGA Delta-Sigma ADC
DAC: Digital-to-Analog Converter	General-purpose DAC with resolution up 16-bit resolution
ΔΣ DAC: Delta-Sigma Digital-to-Analog Converter	Second-order digital bipolar, two output channel Delta-Sigma DAC with stereo operation support
CVREF: Internal Voltage Reference	Programmable voltage reference with multiple internal and external connections
HS Comp: High-Speed Comparator	General-purpose rail-to-rail comparator with <1 ns response time
OPA/PGA: Operational Amplifier and Programmable Gain Amplifiers	General-purpose op amp and PGAs for internal and external signal source conditioning
WAVEFORM CONTROL: PWM Drive and Waveform Generation	
CCP/ECCP: (Enhanced) Capture/Compare/PWM	Multi-purpose timers with functionality of the comparable input capture, output compare and PWM with four outputs
SCCP: Single Capture/Compare/PWM	Multi-purpose 16-/32-bit input capture, output compare and PWM
MCCP: Multiple Capture/Compare/PWM	Multi-purpose 16-/32-bit input capture, output compare and PWM with up to six outputs and an extended range of output control features
PWM: Pulse Width Modulation	16-bit PWM with up to nine independent time bases
MC PWM: Motor Control Pulse Width Modulation	Motor control 16-bit PWM with multiple synchronized pulse-width modulation, up to six outputs with four duty cycle generators and resolution up to 1 ns
SMPS PWM: Power Supply Pulse Width Modulation	Power supply 16-bit PWM with multiple synchronized pulse-width modulation, up to eight outputs with four independent time bases and resolution up to 1 ns
IC: Input Capture	Input capture with an independent timer base to capture an external event
OC: Output Compare	Output compare with an independent time base to compare value with compare registers and generate a single output pulse, or a train of output pulses on a compare match event
CLOCKS AND TIMERS: Signal Measurement with Timing and Counter Control	
16-/32-bit Timer	General-purpose 16-/32-bit timer/counter with compare capability
RTCC: Real-Time Clock/Calendar	Real-time clock and calendar with a Binary-Coded Decimal (BCD) clock calendar to maintain accurate timing with external 32/768 kHz crystal
QEI: Quadrature Encoder Interface	Quadrature encoder interface to increment encoders for obtaining mechanical position data
SAFETY AND MONITORING: Hardware Monitoring and Fault Detection	
Flash ECC: Error Correction Code	ECC detects the presence of single and double bit errors, and corrects single bit error automatically
RAM MBIST: Memory Built-In Self-Test	RAM MBIST tests for functional correctness of all memory locations
LVD: Low-Voltage Detection	LVD detects drops in system operating voltage using an internal reference voltage for comparison, especially in battery-powered applications
WDT: Watch Dog Timer	System supervisory circuit that generates a reset when software timing anomalies are detected within a configurable critical window
DMT: Dead Man Timer	System supervisory circuit that generates a reset when instruction sequence anomalies are detected within a configurable critical window
CRC: Cyclical Redundancy Check with Memory Scan	Automatically calculates CRC checksum of Program/DataEE memory for NVM integrity and a general-purpose 16-bit CRC for use with memory and communications data
Functional Safety	Hardware Functional Safety support with Flash error correction, RAM MBIST, backup system oscillator, WDT, DMT, CRC scan, etc.

COMMUNICATIONS: General, Industrial, Lighting and Automotive	
USB OTG: Universal Serial Bus	USB 2.0 full-speed (host and device), low-speed (host) and On-The-Go (OTG) support
CAN/CAN FD: Controller Area Network	Industrial- and automotive-centric communication bus
UART: Universal Asynchronous Receiver Transceiver	General-purpose full-duplex, 8-bit or 9-bit data serial communications with optional ISO 7816 Smart Card support
LIN: Local Interconnect Network	1. Industrial- and automotive-centric communication bus 2. Support for LIN when using the EUSART
IrDA: Infrared Data Association	IrDA encoder and decoder logic support through UART
I²C: Inter-Integrated Circuit	General purpose 2-wire inter IC serial interface for communicating with other peripherals or microcontroller devices
SPI: Serial Peripheral Interface	General-purpose 4-wire synchronous serial interface for communicating with other peripherals or microcontroller devices
I²S: Data Converter Interface	3-wire synchronous half duplex serial interface to handle the stereo data
SENT: Single-Edge Nibble Transmission	SENT is an unidirectional, single-wire serial communications protocol designed for point-to-point transmission of signal values
Parallel Port	General-purpose parallel communication interface
USER INTERFACE: Capacitive Touch Sensing and LCD Control	
CTMU and mTouch Sensing: Microchip Proprietary Capacitive Touch Technology Using Charge Time Measurement Unit	Capacitive sensing for touch buttons, sliders and system measurements and detection (e.g. water level, intrusion detection, etc.) using an analog CTMU that provides accurate differential time measurement between pulse sources and asynchronous pulse generation
LCD: Liquid Crystal Display	Highly integrated segmented LCD controller
GFX: Graphics Controller	Highly integrated graphics controller supporting direct interface with display glasses with built-in analog drive for individual pixel control
SECURE DATA: Hardware Integrated Cryptographic Engine	
Cryptographic Engine	Independent NIST-standard encryption and decryption engine
Secure Key Storage	Multiple option for key storage, selection and management
RNG: Random Number Generator	Hardware true random number generation
SYSTEM FLEXIBILITY: System Peripherals and Interconnects	
Dual Partition Flash	Dual partition Flash operation, allowing the support of robust bootloader systems and fail-safe storage of application code, with options designed to enhance code security
CLC: Configurable Logic Cell	Integrated combinational and sequential logic with custom interconnection and re-routing of digital peripherals
PPS: Peripheral Pin Select	I/O pin remapping of digital peripherals for greater design flexibility and improved EMI board layout
PTG: Peripheral Trigger Generator	User-programmable sequencer, capable of generating complex trigger signal sequences to coordinate the operation of other peripherals
DMA: Direct Memory Access	Direct memory access for transfer of data between the CPU and its peripherals without CPU assistance
DOZE, IDLE, SLEEP and PMD	Low-power saving modes
XLP: eXtreme Low Power Technology	XLP technology devices with extreme low-power operation modes for battery/low power applications
VBAT	Hardware-based power mode that maintains only the most critical operations when a power loss occurs on VDD

Learn more about 16-bit PIC microcontrollers at www.microchip.com/16bit.

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