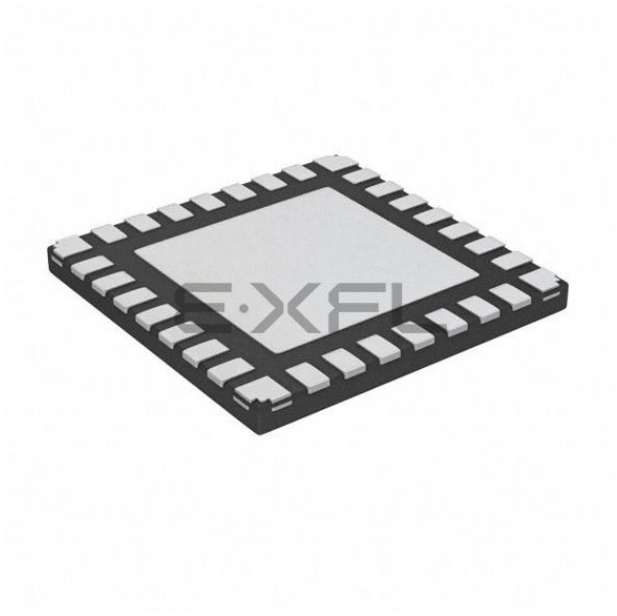


Welcome to E-XFL.COM

What is "Embedded - Microcontrollers"?

"Embedded - Microcontrollers" refer to small, integrated circuits designed to perform specific tasks within larger systems. These microcontrollers are essentially compact computers on a single chip, containing a processor core, memory, and programmable input/output peripherals. They are called "embedded" because they are embedded within electronic devices to control various functions, rather than serving as standalone computers. Microcontrollers are crucial in modern electronics, providing the intelligence and control needed for a wide range of applications.

Applications of "Embedded - Microcontrollers"

Details	
Product Status	Active
Core Processor	PIC
Core Size	8-Bit
Speed	32MHz
Connectivity	I²C, LINbus, SPI, UART/USART
Peripherals	Brown-out Detect/Reset, POR, PWM, WDT
Number of I/O	25
Program Memory Size	7KB (4K x 14)
Program Memory Type	FLASH
EEPROM Size	128 x 8
RAM Size	512 x 8
Voltage - Supply (Vcc/Vdd)	1.8V ~ 3.6V
Data Converters	A/D 17x10b; D/A 3x5b, 3x10b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 125°C (TA)
Mounting Type	Surface Mount
Package / Case	28-UQFN Exposed Pad
Supplier Device Package	28-UQFN (6x6)
Purchase URL	https://www.e-xfl.com/product-detail/microchip-technology/pic16lf1773-e-mx

PIC16(L)F1773/6/7/8/9

28/40/44-Pin, 8-Bit Flash Microcontroller Product Brief

Description

PIC16(L)F177X microcontrollers feature a high level of integration of intelligent analog and digital peripherals for a wide range of applications, such as lighting, power supplies, battery charging, motor control and other general purpose applications. These devices deliver multiple op amps, 5-/10-bit DACs, high-speed comparators, 10-bit ADC, 10-/16-bit PWMs, programmable ramp generator (PRG) and other peripherals that can be connected internally to create closed loop systems without using pins or PCB area. The 10-/16-bit PWMs, digital signal modulators and tri-state output op amp can be used together to create a LED dimming engine for lighting applications. The peripheral pin select (PPS) functionality provides flexibility, eases PCB layout and peripheral utilization by allowing digital peripheral pin mapping to an I/O.

Core Features

- C Compiler Optimized RISC Architecture
- Only 49 Instructions
- Operating Speed:
  - DC – 32 MHz clock input
  - 125 ns minimum instruction cycle
- Interrupt Capability
- 16-Level Deep Hardware Stack
- Five 8-Bit Timers
- Three 16-Bit Timers
- Low-Current Power-on Reset (POR)
- Configurable Power-up Timer (PWRT)
- Brown-out Reset (BOR) with Selectable Trip Point
- Extend Watchdog Timer (EWDT):
  - Low-power 31 kHz WDT
  - Software selectable pre-scaler
  - Software selectable enable

Memory

- Up to 28 Kbytes Program Flash Memory (PFM)
- Up to 2 Kbytes Data RAM
- Direct, Indirect and Relative Addressing modes
- High-Endurance Flash (HEF):
  - 128B of nonvolatile data storage
  - 100K Erase/Write cycles

Operating Characteristics

- Operating Voltage Range:
  - 1.8V to 3.6V (PIC16LF1773/6/7/8/9)
  - 2.3V to 5.5V (PIC16F1773/6/7/8/9)
- Temperature Range:
  - Industrial: -40°C to 85°C
  - Extended: -40°C to 125°C

eXtreme Low-Power (XLP) Features

- Sleep mode: 50 nA @ 1.8V, typical
- Watchdog Timer: 500 nA @ 1.8V, typical
- Secondary Oscillator: 500 nA @ 32 kHz
- Operating Current:
  - 8 uA @ 31 kHz, 1.8V, typical
  - 32 uA/MHz @ 1.8V, typical

Intelligent Analog Peripherals

- 10-Bit Analog-to-Digital Converter (ADC):
  - Up to 28 external channels
  - Conversion available during Sleep
- Up to Four Operational Amplifiers (OPA):
  - Selectable internal and external channels
  - Tri-state output
  - Part of LED dimming engine
  - Selectable internal and external channels
- Up to Eight High-Speed Comparators (HS Comp):
  - Up to nine external inverting inputs
  - Up to 12 external noninverting inputs
  - Fixed voltage reference at inverting and noninverting input(s)
  - Comparator outputs externally accessible
- Digital-to-Analog Converters (DAC):
  - Up to four 10-bit resolution DACs
  - 10-bit resolution, rail-to-rail
  - Conversion during Sleep
  - Internal connections to ADCs and HS Comparators
- Voltage Reference:
  - Fixed Voltage Reference (FVR)
  - 1.024V, 2.048V and 4.096V output levels
- Zero-Cross Detector (ZCD):
  - Detect high-voltage AC signal
- Up to Four Programmable Ramp Generators (PRG):
  - Slope compensation
  - Ramp generation
- Two High-Current Drive I/Os:
  - Up to 100 mA sink or source @ 5V

Digital Peripherals

- Up to Four Configurable Logic Cells (CLC):
  - Integrated combinational and state logic
- Up to Four Complementary Output Generators (COG):
  - Push-pull, Full-Bridge and Steering modes
- Up to Four Capture/Compare/PWM (CCP) Modules
- Pulse-Width Modulator (PWM):
  - Up to four 16-bit PWMs
  - Independent timers
  - Multiple output modes (edge-, center-aligned, set and toggle on register match)
  - User settings for phase, duty cycle, period, offset and polarity
  - 16-bit timer capability
  - Up to four 10-bit PWMs
- Up to Four Data Signal Modulators (DSM):
  - Modulates a carrier signal with a digital data to create custom carrier synchronized output waveforms
  - Part of LED dimming engine
- Peripheral Pin Select (PPS):
  - I/O remapping of digital peripherals
- Serial Communications:
  - Enhanced USART (EUSART)
  - SPI, I^2C™, RS-232, RS-485, LIN compatible
  - Auto-Baud Detect, auto-wake-up on start
- Up to 38 I/O Pins:
  - Individually programmable pull-ups
  - Slew rate control
  - Interrupt-on-change with edge-select

Clocking Structure

- Precision Internal Oscillator:
  - ±1% at calibration
  - Selectable frequency range 32 MHz to 31 kHz
- 31 kHz Low-Power Internal Oscillator
- 4x Phase-Locked Loop (PLL) for up to 32 MHz Internal Operation
- External Oscillator Block with Three External Clock modes up to 32 MHz

TABLE 1: PIC16(L)F1773/6/7/8/9 FAMILY TYPES

Device	Data Sheet Index	Program Flash Memory (bytes)	Program Flash Memory (word)	High Endurance Flash (B)	Data SRAM (Bytes)	I/O Pins(1)	8-Bit/16-Bit Timers	High-Speed Comparator	10-bit ADC (ch)	5/10-bit DAC	CCP	10-bit/16-bit PWM	COG	CLC	Op Amp	Zero Cross Detect	Data Signal Modulator	Programmable Ramp Gen	High-Current I/Os	Peripheral Pin Select	EUSART	I^2C™/SPI	Debug(2)
PIC16(L)F1773	**(A)**	7K	4K	128	512	25	5/3	6	17	3/3	3	3/3	3	4	3	1	3	3	2	Y	1	1	I
PIC16(L)F1776	**(A)**	14K	8K	128	1K	25	5/3	6	17	3/3	3	3/3	3	4	3	1	3	3	2	Y	1	1	I
PIC16(L)F1777	**(B)**	14K	8K	128	1K	36	5/3	8	28	4/4	4	4/4	4	4	4	1	4	4	2	Y	1	1	I
PIC16(L)F1778	**(B)**	28K	16K	128	2K	25	5/3	6	17	3/3	3	3/3	3	4	3	1	3	3	2	Y	1	1	I
PIC16(L)F1779	**(B)**	28K	16K	128	2K	36	5/3	8	28	4/4	4	4/4	4	4	4	1	4	4	2	Y	1	1	I

Note 1: One pin is input-only.
2: I – Debugging integrated on chip

Data Sheet Index:

A: Future Release PIC16(L)F1773/6 Data Sheet, 24-Pin, 8-bit Flash Microcontrollers
B: Future Release PIC16(L)F1777/8/9 Data Sheet, 24/40/44-Pin, 8-bit Flash Microcontrollers

Note: For other small form-factor package availability and marking information, please visit **http://www.microchip.com/packaging** or contact your local sales office.

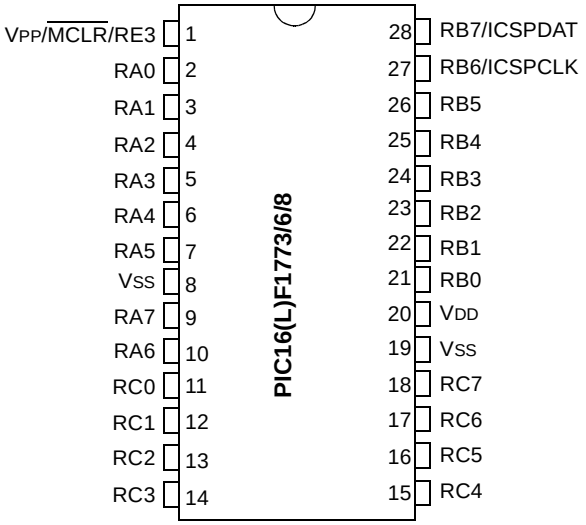
TABLE 2: PACKAGES

Packages	SPDIP	PDIP	SOIC	SSOP	UQFN	TQFP
PIC16(L)F1773	X		X	X	X	
PIC16(L)F1776	X		X	X	X	
PIC16(L)F1777		X			X	X
PIC16(L)F1778	X		X	X	X	
PIC16(L)F1779		X			X	X

Note: Pin details are subject to change.

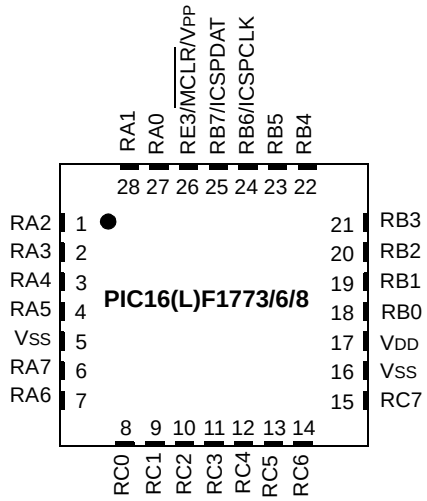
PIN DIAGRAMS

FIGURE 1: 28-PIN SPDIP, SOIC, SSOP



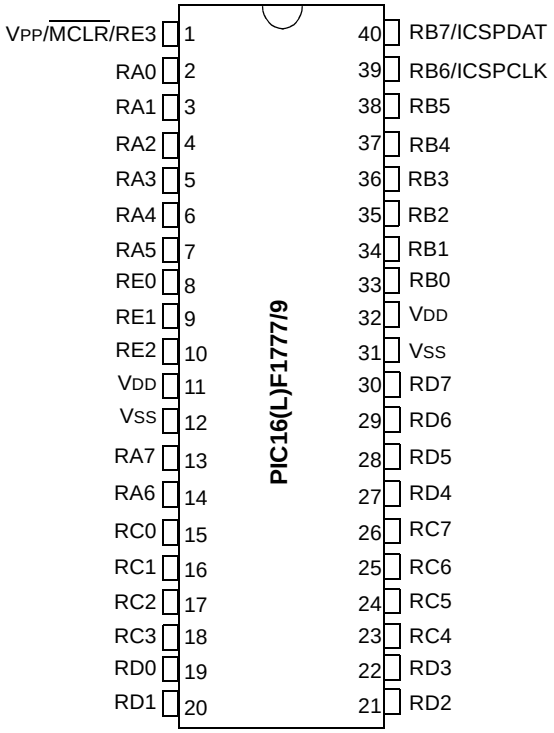
Note: See Table 3 for location of all peripheral functions.

FIGURE 2: 28-PIN UQFN (6x6x0.5 mm)



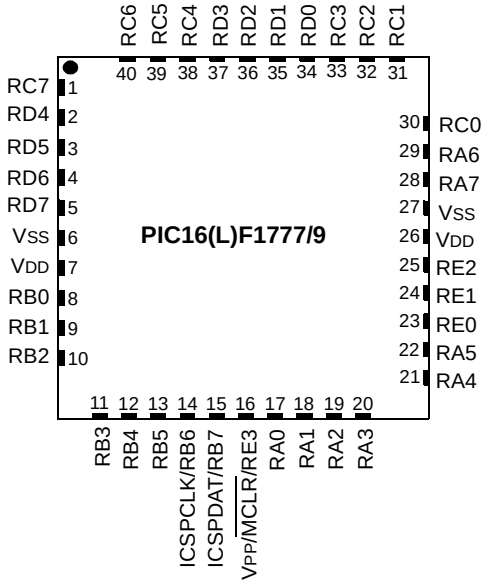
Note: See Table 3 for location of all peripheral functions.

FIGURE 3: 40-PIN PDIP



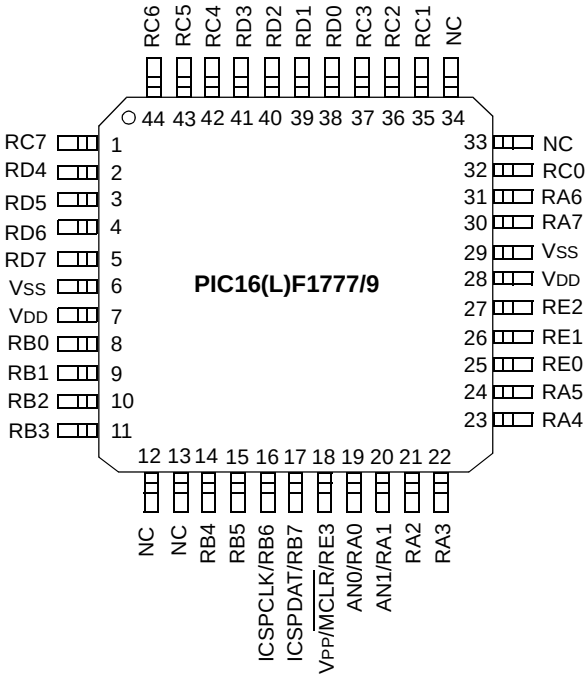
Note: See Table 4 for location of all peripheral functions.

FIGURE 4: 40-PIN UQFN (5x5x0.5 mm)



Note: See Table 4 for location of all peripheral functions.

FIGURE 5: 44-PIN TQFP (4x4 mm)



Note: See Table 4 for location of all peripheral functions.

PIN ALLOCATION TABLES

TABLE 3: 28-PIN ALLOCATION TABLE (PIC16(L)F1773/6/8)

I/O	28-Pin SPDIP/SOIC/SSOP	28-Pin UQFN	ADC	Voltage Reference	DAC	Op Amp	Comparator	Zero Cross	Programmable Ramp Generator	Timer	PWM	CCP	COG	CLC	Modulator	EUSART	MSSP	Interrupts	Pull-ups	High Current	Basic
RA0	2	27	AN0	—	—	—	C1IN0- C2IN0- C3IN0- C4IN0- C5IN0- C6IN0-	—	—	—	—	—	—	CLCIN1(1)	—	—	—	IOC	—	—	—
RA1	3	28	AN1	—	—	OPA1OUT OPA2IN1+ OPA2IN1-	C1IN1- C2IN1- C3IN1- C4IN1-	—	PRG1IN0 PRG2IN1	—	—	—	—	CLCIN2(1)	—	—	—	IOC	—	—	—
RA2	4	1	AN2 VREF-	DAC1REF0- DAC2REF0- DAC3REF0- DAC4REF0- DAC5REF0- DAC7REF0-	DAC1OUT1	—	C1IN0+ C2IN0+ C3IN0+ C4IN0+ C5IN0+ C6IN0+	—	—	—	—	—	—	—	—	—	—	IOC	—	—	—
RA3	5	2	AN3 VREF+	DAC1REF0+ DAC2REF0+ DAC3REF0+ DAC4REF0+ DAC5REF0+ DAC7REF0+	—	—	C1IN1+	—	—	—	—	—	—	—	MD1CL(1)	—	—	IOC	—	—	—
RA4	6	3	—	—	DAC4OUT1	OPA1IN0+	—	—	PRG1R(1)	T0CKI(1)	—	—	—	—	MD1CH(1)	—	—	IOC	—	—	—
RA5	7	4	AN4	—	DAC2OUT1	OPA1IN0-	—	—	PRG1F(1)	—	—	—	—	—	MD1MOD(1)	—	$\overline{SS}$	IOC	—	—	—
RA6	10	7	—	—	—	—	CLKOUT C6IN1+	—	—	—	—	—	—	—	—	—	—	IOC	—	—	OSC2
RA7	9	6	—	—	—	—	CLKIN	—	—	—	—	—	—	—	—	—	—	IOC	—	—	OSC1

Note 1: Default peripheral input. Input can be moved to any other pin with the PPS input selection register.
2: All pin outputs default to PORT latch data. Any pin can be selected as a digital peripheral output with the PPS output selection registers.
3: These peripheral functions are bidirectional. The output pin selections must be the same as the input pin selections.

TABLE 3: 28-PIN ALLOCATION TABLE (PIC16(L)F1773/6/8) (CONTINUED)

I/O	28-Pin SPDIP/SOIC/SSOP	28-Pin UQFN	ADC	Voltage Reference	DAC	Op Amp	Comparator	Zero Cross	Programmable Ramp Generator	Timer	PWM	CCP	COG	CLC	Modulator	EUSART	MSSP	Interrupts	Pull-ups	High Current	Basic
RB0	21	18	AN12	HIB0	—	—	C2IN1+	ZCD	—	—	—	—	COG1IN(1)	—	—	—	—	IOC	—	—	—
RB1	22	19	AN10	HIB1	—	OPA2OUT OPA1IN1+ OPA1IN1-	C1IN3- C2IN3- C3IN3- C4IN3-	—	PRG1IN1 PRG2IN0	—	—	—	COG2IN(1)	—	—	—	—	IOC	—	—	—
RB2	23	20	AN8	—	DAC3OUT1	OPA2IN0-	—	—	—	—	—	—	COG3IN(1)	—	—	—	—	IOC	—	—	—
RB3	24	21	AN9	—	—	OPA2IN0+	C1IN2- C2IN2- C3IN2-	—	—	—	—	—	—	—	MD3CL(1)	—	—	IOC	—	—	—
RB4	25	22	ADCACT	—	—	—	C3IN1+	—	—	T5G(1)	—	—	—	—	MD3CH(1)	—	—	IOC	—	—	—
RB5	26	23	AN13	DAC5REF1- DAC7REF1-	—	—	C4IN2-	—	—	T1G(1)	—	CCP3(1)	—	—	MD3MOD(1)	—	—	IOC	—	—	—
RB6	27	24	—	DAC5REF1+ DAC7REF1+	—	—	C4IN1+	—	—	—	—	—	—	CLCIN3(1)	—	—	—	IOC	—	—	ICSPCLK ICDCLK
RB7	28	25	—	—	DAC1OUT2 DAC2OUT2 DAC5OUT2 DAC3OUT2 DAC4OUT2 DAC7OUT2	—	C5IN1+	—	—	T6CKI(1)	—	—	—	CLCIN4(1)	—	—	—	IOC	—	—	ICSPDAT ICDDAT

Note 1: Default peripheral input. Input can be moved to any other pin with the PPS input selection register.
2: All pin outputs default to PORT latch data. Any pin can be selected as a digital peripheral output with the PPS output selection registers.
3: These peripheral functions are bidirectional. The output pin selections must be the same as the input pin selections.

TABLE 3: 28-PIN ALLOCATION TABLE (PIC16(L)F1773/6/8) (CONTINUED)

I/O	28-Pin SPDIP/SOIC/SSOP	28-Pin UQFN	ADC	Voltage Reference	DAC	Op Amp	Comparator	Zero Cross	Programmable Ramp Generator	Timer	PWM	CCP	COG	CLC	Modulator	EUSART	MSSP	Interrupts	Pull-ups	High Current	Basic
RC0	11	8	—	—	DAC5OUT1	—	—	—	—	T1CKI(1) T3CKI(1) T3G(1)	—	—	—	—	—	—	—	IOC	—	—	—
RC1	12	9	—	—	DAC7OUT1	—	—	—	PRG2R(2)	—	—	CCP2(1)	—	—	—	—	—	IOC	—	—	—
RC2	13	10	AN14	—	—	—	C5IN2- C6IN2-	—	PRG2F(1)	T5CKI(1)	—	CCP1(1)	—	—	—	—	—	IOC	—	—	—
RC3	14	11	AN15	—	—	—	C1IN4- C2IN4- C3IN4- C4IN4- C5IN4- C6IN4-	—	—	T2CKI(1)	—	—	—	—	MD2CL(1)	—	SDI(1), SDA(1,3)	IOC	—	—	—
RC4	15	12	AN16	—	—	—	C5IN3- C6IN3-	—	PRG3R(1)	T8CKI(1)	—	—	—	—	MD2CH(1)	—	SCL(1), SCK(1,3)	IOC	—	—	—
RC5	16	13	AN17	—	—	OPA3IN0+	—	—	PRG3F(1)	T4CKI(1)	—	—	—	—	MD2MOD(1)	—	—	IOC	—	—	—
RC6	17	14	AN18	—	—	OPA3OUT	C5IN1- C6IN1-	—	PRG3IN0	—	—	—	—	—	—	CK(1)	—	IOC	—	—	—
RC7	18	15	AN19	—	—	OPA3IN0-	—	—	—	—	—	—	—	—	—	RX(1,3)	—	IOC	—	—	—
RE3	1	26	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	IOC	—	—	$\overline{MCLR}$ ICD
VDD	20	17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	VDD
VSS	8	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	VSS
VSS	19	16	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	VSS
OUT(2)	—	—	—	—	—	—	C1OUT C2OUT C3OUT C4OUT C5OUT C6OUT	—	—	—	PWM1 PWM2 PWM3 PWM4 PWM5 PWM6	CCP1 CCP2 CCP3	COG1A COG1B COG1C COG1D COG2A COG2B COG2C COG2D COG3A COG3B COG3C COG3D	CLC1OUT CLC2OUT CLC3OUT CLC4OUT	MD1OUT MD2OUT MD3OUT	DT(3) TX CK	SDO SDA(3) SCK SCL(3)	—	—	—	—

Note 1: Default peripheral input. Input can be moved to any other pin with the PPS input selection register.
2: All pin outputs default to PORT latch data. Any pin can be selected as a digital peripheral output with the PPS output selection registers.
3: These peripheral functions are bidirectional. The output pin selections must be the same as the input pin selections.

TABLE 4: 40/44-PIN ALLOCATION TABLE (PIC16(L)F1777/9)

I/O	40-Pin PDIP	40-Pin UQFN	44-Pin TQFP	ADC	Voltage Reference	DAC	Op Amp	Comparator	Zero Cross	Programmable Ramp Generator	Timers	PWM	CCP	COG	CLC	Modulator	EUSART	MSSP	Interrupt	Pull-ups	High Current	Basic
RA0	2	17	19	AN0	—	—	—	C1IN0- C2IN0- C3IN0- C4IN0- C5IN0- C6IN0- C7IN0- C8IN0-	—	—	—	—	—	—	—	—	—	—	IOC	—	—	—
RA1	3	18	20	AN1	—	—	OPA1OUT OPA2IN1+ OPA2IN1-	C1IN1- C2IN1- C3IN1- C4IN1-	—	PRG1IN0 PRG2IN1	—	—	—	—	—	—	—	—	IOC	—	—	—
RA2	4	19	21	AN2	DAC1REF0- DAC2REF0- DAC3REF0- DAC4REF0- DAC5REF0- DAC6REF0- DAC7REF0- DAC8REF0-	DAC1OUT1	—	C1IN0+ C2IN0+ C3IN0+ C4IN0+ C5IN0+ C6IN0+ C7IN0+ C8IN0+	—	—	—	—	—	—	—	—	—	—	IOC	—	—	—
RA3	5	20	22	AN3	DAC1REF0+ DAC2REF0+ DAC3REF0+ DAC4REF0+ DAC5REF0+ DAC6REF0+ DAC7REF0+ DAC8REF0+	—	—	C1IN1+	—	—	—	—	—	—	—	MD1CL(1)	—	—	IOC	—	—	—
RA4	6	21	23	—	—	—	OPA1IN0+	—	—	PRG1R(1)	T0CKI(1)	—	—	—	—	MD1CH(1)	—	—	IOC	—	—	—
RA5	7	22	24	AN4	—	DAC2OUT1	OPA1IN0-	—	—	PRG1F(1)	—	—	—	—	—	MD1MOD(1)	—	$\overline{SS}$	IOC	—	—	—
RA6	14	29	31	—	—	—	—	CLKOUT C6IN1+	—	—	—	—	—	—	—	—	—	—	IOC	—	—	OSC2
RA7	13	28	30	—	—	—	—	CLKIN	—	—	—	—	—	—	—	—	—	—	IOC	—	—	OSC1

Note 1: Default peripheral input. Input can be moved to any other pin with the PPS input selection register.
2: All pin outputs default to PORT latch data. Any pin can be selected as a digital peripheral output with the PPS output selection registers.
3: These peripheral functions are bidirectional. The output pin selections must be the same as the input pin selections.

TABLE 4: 40/44-PIN ALLOCATION TABLE (PIC16(L)F1777/9) (CONTINUED)

I/O	40-Pin PDIP	40-Pin UQFN	44-Pin TQFP	ADC	Voltage Reference	DAC	Op Amp	Comparator	Zero Cross	Programmable Ramp Generator	Timers	PWM	CCP	COG	CLC	Modulator	EUSART	MSSP	Interrupt	Pull-ups	High Current	Basic
RB0	33	8	8	AN12	HIB0	—	—	C2IN1+	ZCD	—	—	—	CCP4(1)	COG1IN(1)	—	MD4CL(1)	—	—	IOC INT	—	—	—
RB1	34	9	9	AN10	HIB1	—	OPA2OUT OPA1IN1+ OPA1IN1-	C1IN3- C2IN3- C3IN3- C4IN3-	—	PRG4R(1)	—	—	—	COG2IN(1)	—	MD4CH(1)	—	—	IOC	—	—	—
RB2	35	10	10	AN8	—	—	OPA2IN0-	—	—	PRG4F(1)	—	—	—	COG3IN(1)	—	MD4MOD(1)	—	—	IOC	—	—	—
RB3	36	11	11	AN9	—	—	OPA2IN0+	C1IN2- C2IN2- C3IN2-	—	—	—	—	—	COG4IN(1)	—	MD3CL(1)	—	—	IOC	—	—	—
RB4	37	12	14	ADCACT	—	—	—	C3IN1+	—	—	T5G(1)	—	—	—	—	MD3CH(1)	—	—	IOC	—	—	—
RB5	38	13	15	AN13	DAC5REF1- DAC7REF1-	—	—	C4IN2-	—	—	T1G(1)	—	CCP3(1)	—	—	MD3MOD(1)	—	—	IOC	—	—	—
RB6	39	14	16	—	DAC5REF1+ DAC7REF1+	—	—	C4IN1+	—	—	—	—	—	—	—	—	—	—	IOC	—	—	ICSPCLK ICDCLK
RB7	40	15	17	—	—	DACxOUT2	—	C5IN1+	—	—	T6CKI(1)	—	—	—	—	—	—	—	IOC	—	—	ICSPDAT ICDDAT
RC0	15	30	32	—	—	DAC5OUT1	—	—	—	—	T1CKI(1) T3CKI(1) T3G(1)	—	—	—	—	—	—	—	IOC	—	—	—
RC1	16	31	35	—	—	DAC7OUT1	—	—	—	PRG2R(1)	SOSCO	—	CCP2(1)	—	—	—	—	—	IOC	—	—	—
RC2	17	32	36	AN14	—	—	—	C5IN2- C6IN2-	—	PRG2F(1)	T5CKI(1)	—	CCP1(1)	—	—	—	—	—	IOC	—	—	—
RC3	18	33	37	AN15	—	—	—	—	—	—	T2CKI(1)	—	—	—	—	MD2CL(1)	—	SDI(1), SDA(1,3)	IOC	—	—	—
RC4	23	38	42	AN16	—	—	—	C5IN3- C6IN3-	—	PRG3R(1)	T8CKI(1)	—	—	—	—	MD2CH(1)	—	SCL(1), SCK(1,3)	IOC	—	—	—

Note 1: Default peripheral input. Input can be moved to any other pin with the PPS input selection register.
2: All pin outputs default to PORT latch data. Any pin can be selected as a digital peripheral output with the PPS output selection registers.
3: These peripheral functions are bidirectional. The output pin selections must be the same as the input pin selections.

TABLE 4: 40/44-PIN ALLOCATION TABLE (PIC16(L)F1777/9) (CONTINUED)

I/O	40-Pin PDIP	40-Pin UQFN	44-Pin TQFP	ADC	Voltage Reference	DAC	Op Amp	Comparator	Zero Cross	Programmable Ramp Generator	Timers	PWM	CCP	COG	CLC	Modulator	EUSART	MSSP	Interrupt	Pull-ups	High Current	Basic
RC5	24	39	43	AN17	—	—	OPA3IN0+	—	—	PRG3F(1)	T4CKI(1)	—	—	—	—	MD2MOD(1)	—	—	IOC	—	—	—
RC6	25	40	44	AN18	—	—	OPA3OUT OPA4IN1+ OPA4IN1-	C5IN1- C6IN1- C7IN1- C8IN1-	—	PRG3IN0 PRG4IN1	—	—	—	—	—	—	—	CK(1)	IOC	—	—	—
RC7	26	1	1	AN19	—	—	OPA3IN0-	—	—	—	—	—	—	—	—	—	—	RX(1,3)	IOC	—	—	—
RD0	19	34	38	AN20	—	—	OPA4IN0+	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RD1	20	35	39	AN21	—	—	OPA4OUT OPA3IN1+ OPA3IN1-	C1IN4- C2IN4- C3IN4- C4IN4- C5IN4- C6IN4- C7IN4- C8IN4-	—	PRG3IN1 PRG4IN0	—	—	—	—	—	—	—	—	—	—	—	—
RD2	21	36	40	AN22	—	—	OPA4IN0-	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RD3	22	37	41	AN23	—	—	—	C8IN2-	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RD4	27	2	2	AN24	—	—	—	C7IN2-	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RD5	28	3	3	AN25	—	—	—	C7IN3- C8IN3-	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RD6	29	4	4	AN26	—	—	—	C7IN1+	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RD7	30	5	5	AN27	—	—	—	C8IN1+	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE0	8	23	25	AN5	DAC6REF1+ DAC8REF1+	—	—	—	—	—	—	—	—	—	—	—	—	—	IOC	—	—	—
RE1	9	24	26	AN6	DAC6REF1- DAC8REF1-	—	—	—	—	—	—	—	—	—	—	—	—	—	IOC	—	—	—
RE2	10	25	27	AN7	—	DAC6OUT1	—	—	—	—	—	—	—	—	—	—	—	—	IOC	—	—	—
RE3	1	16	18	—	—	DAC8OUT1	—	—	—	—	—	—	—	—	—	—	—	—	IOC	—	—	$\overline{MCLR}$ $\overline{ICD}$
VDD	11	7	7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	VDD
VDD	32	26	28	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	VDD
VSS	12	6	6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	VSS
VSS	31	27	29	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	VSS

Note 1: Default peripheral input. Input can be moved to any other pin with the PPS input selection register.
2: All pin outputs default to PORT latch data. Any pin can be selected as a digital peripheral output with the PPS output selection registers.
3: These peripheral functions are bidirectional. The output pin selections must be the same as the input pin selections.

TABLE 4: 40/44-PIN ALLOCATION TABLE (PIC16(L)F1777/9) (CONTINUED)

I/O	40-Pin PDIP	40-Pin UQFN	44-Pin TQFP	ADC	Voltage Reference	DAC	Op Amp	Comparator	Zero Cross	Programmable Ramp Generator	Timers	PWM	CCP	COG	CLC	Modulator	EUSART	MSSP	Interrupt	Pull-ups	High Current	Basic
OUT(2)	—	—	—	—	—	—	—	C1OUT C2OUT C3OUT C4OUT C5OUT C6OUT C7OUT C8OUT	—	—	—	PWM1 PWM2 PWM3 PWM4 PWM5 PWM6 PWM7 PWM8	CCP1 CCP2 CCP3 CCP4	COG1A COG1B COG1C COG1D COG2A COG2B COG2C COG2D COG3A COG3B COG3C COG3D COG4A COG4B COG4C COG4D	CLC1OUT CLC2OUT CLC3OUT CLC4OUT	MD1OUT MD2OUT MD3OUT MD4OUT	DT(3) TX CK	SDO SDA(3) SCK SCL(3)	—	—	—	—

Note **1:** Default peripheral input. Input can be moved to any other pin with the PPS input selection register.
2: All pin outputs default to PORT latch data. Any pin can be selected as a digital peripheral output with the PPS output selection registers.
3: These peripheral functions are bidirectional. The output pin selections must be the same as the input pin selections.

NOTES:

Note the following details of the code protection feature on Microchip devices:

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as "unbreakable."

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

Trademarks

ISBN: 978-1-63277-450-7

QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
ISO/TS 16949

Microchip received ISO/TS-16949:2009 certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona; Gresham, Oregon and design centers in California and India. The Company's quality system processes and procedures are for its PIC® MCUs and dsPIC® DSCs, KEELOQ® code hopping devices, Serial EEPROMs, microperipherals, nonvolatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001:2000 certified.

Worldwide Sales and Service

AMERICAS

Corporate Office
2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 480-792-7200
Fax: 480-792-7277
Technical Support:
http://www.microchip.com/support
Web Address:
www.microchip.com

Atlanta
Duluth, GA
Tel: 678-957-9614
Fax: 678-957-1455

Austin, TX
Tel: 512-257-3370

Boston
Westborough, MA
Tel: 774-760-0087
Fax: 774-760-0088

Chicago
Itasca, IL
Tel: 630-285-0071
Fax: 630-285-0075

Cleveland
Independence, OH
Tel: 216-447-0464
Fax: 216-447-0643

Dallas
Addison, TX
Tel: 972-818-7423
Fax: 972-818-2924

Detroit
Novi, MI
Tel: 248-848-4000

Houston, TX
Tel: 281-894-5983

Indianapolis
Noblesville, IN
Tel: 317-773-8323
Fax: 317-773-5453

Los Angeles
Mission Viejo, CA
Tel: 949-462-9523
Fax: 949-462-9608

New York, NY
Tel: 631-435-6000

San Jose, CA
Tel: 408-735-9110

Canada - Toronto
Tel: 905-673-0699
Fax: 905-673-6509

ASIA/PACIFIC

Asia Pacific Office
Suites 3707-14, 37th Floor
Tower 6, The Gateway
Harbour City, Kowloon
Hong Kong
Tel: 852-2943-5100
Fax: 852-2401-3431

Australia - Sydney
Tel: 61-2-9868-6733
Fax: 61-2-9868-6755

China - Beijing
Tel: 86-10-8569-7000
Fax: 86-10-8528-2104

China - Chengdu
Tel: 86-28-8665-5511
Fax: 86-28-8665-7889

China - Chongqing
Tel: 86-23-8980-9588
Fax: 86-23-8980-9500

China - Dongguan
Tel: 86-769-8702-9880

China - Hangzhou
Tel: 86-571-8792-8115
Fax: 86-571-8792-8116

China - Hong Kong SAR
Tel: 852-2943-5100
Fax: 852-2401-3431

China - Nanjing
Tel: 86-25-8473-2460
Fax: 86-25-8473-2470

China - Qingdao
Tel: 86-532-8502-7355
Fax: 86-532-8502-7205

China - Shanghai
Tel: 86-21-5407-5533
Fax: 86-21-5407-5066

China - Shenyang
Tel: 86-24-2334-2829
Fax: 86-24-2334-2393

China - Shenzhen
Tel: 86-755-8864-2200
Fax: 86-755-8203-1760

China - Wuhan
Tel: 86-27-5980-5300
Fax: 86-27-5980-5118

China - Xian
Tel: 86-29-8833-7252
Fax: 86-29-8833-7256

ASIA/PACIFIC

China - Xiamen
Tel: 86-592-2388138
Fax: 86-592-2388130

China - Zhuhai
Tel: 86-756-3210040
Fax: 86-756-3210049

India - Bangalore
Tel: 91-80-3090-4444
Fax: 91-80-3090-4123

India - New Delhi
Tel: 91-11-4160-8631
Fax: 91-11-4160-8632

India - Pune
Tel: 91-20-3019-1500

Japan - Osaka
Tel: 81-6-6152-7160
Fax: 81-6-6152-9310

Japan - Tokyo
Tel: 81-3-6880- 3770
Fax: 81-3-6880-3771

Korea - Daegu
Tel: 82-53-744-4301
Fax: 82-53-744-4302

Korea - Seoul
Tel: 82-2-554-7200
Fax: 82-2-558-5932 or
82-2-558-5934

Malaysia - Kuala Lumpur
Tel: 60-3-6201-9857
Fax: 60-3-6201-9859

Malaysia - Penang
Tel: 60-4-227-8870
Fax: 60-4-227-4068

Philippines - Manila
Tel: 63-2-634-9065
Fax: 63-2-634-9069

Singapore
Tel: 65-6334-8870
Fax: 65-6334-8850

Taiwan - Hsin Chu
Tel: 886-3-5778-366
Fax: 886-3-5770-955

Taiwan - Kaohsiung
Tel: 886-7-213-7828

Taiwan - Taipei
Tel: 886-2-2508-8600
Fax: 886-2-2508-0102

Thailand - Bangkok
Tel: 66-2-694-1351
Fax: 66-2-694-1350

EUROPE

Austria - Wels
Tel: 43-7242-2244-39
Fax: 43-7242-2244-393

Denmark - Copenhagen
Tel: 45-4450-2828
Fax: 45-4485-2829

France - Paris
Tel: 33-1-69-53-63-20
Fax: 33-1-69-30-90-79

Germany - Dusseldorf
Tel: 49-2129-3766400

Germany - Munich
Tel: 49-89-627-144-0
Fax: 49-89-627-144-44

Germany - Pforzheim
Tel: 49-7231-424750

Italy - Milan
Tel: 39-0331-742611
Fax: 39-0331-466781

Italy - Venice
Tel: 39-049-7625286

Netherlands - Drunen
Tel: 31-416-690399
Fax: 31-416-690340

Poland - Warsaw
Tel: 48-22-3325737

Spain - Madrid
Tel: 34-91-708-08-90
Fax: 34-91-708-08-91

Sweden - Stockholm
Tel: 46-8-5090-4654

UK - Wokingham
Tel: 44-118-921-5800
Fax: 44-118-921-5820

01/27/15