



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	I ² C, LINbus, SPI, UART/USART
Peripherals	Brown-out Detect/Reset, POR, PWM, WDT
Number of I/O	18
Program Memory Size	7KB (4K x 14)
Program Memory Type	FLASH
EEPROM Size	256 x 8
RAM Size	512 x 8
Voltage - Supply (Vcc/Vdd)	2.3V ~ 5.5V
Data Converters	A/D 17x10b; D/A 1x5b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 85°C (TA)
Mounting Type	Through Hole
Package / Case	20-DIP (0.300", 7.62mm)
Supplier Device Package	20-PDIP
Purchase URL	https://www.e-xfl.com/product-detail/microchip-technology/pic16f18344-i-p

PIC16(L)F183XX

- Peripheral Pin Select (PPS):
 - I/O pin remapping of digital peripherals
- Up to 18 I/O Pins:
 - Individually programmable pull ups
 - Slew rate control
 - Interrupt-on-change with edge-select
 - Input level selection control (ST or TTL)
 - Digital open-drain enable

Analog Peripherals

- 10-Bit Analog-to-Digital Converter (ADC):
 - Up to 17 external channels
 - Conversion available during Sleep
- Comparator:
 - Up to two comparators
 - Low and High-Speed modes
 - Fixed Voltage Reference at inverting/noninverting input(s)
 - Comparator outputs externally accessible
- 5-Bit Digital-to-Analog Converter (DAC):
 - 5-bit resolution, rail-to-rail
 - Positive Reference Selection
 - Unbuffered I/O pin output
 - Internal connections to ADCs and comparators
- Voltage Reference:
 - Fixed Voltage Reference with 1.024V, 2.048V and 4.096V output levels

Clocking Structure

- High-Precision Internal Oscillator:
 - Selectable frequency range up to 32 MHz
- x2/x4 PLL with Internal and External Sources
- Low-Power Internal 32 kHz Oscillator (LFINTOSC)
- External 32 kHz Crystal Oscillator (SOCS)
- External High-Speed Crystal Oscillators

TABLE 1: PIC16(L)F183XX Family Types

Device	Data Sheet Index	Program Memory (KB)	Program Memory (KW)	EEPROM (B)	RAM (B)	I/Os ⁽¹⁾	10-bit ADCs	Comparators	5-bit DAC	Timers 0/1/2	CCP/PWM	CWG	EUSART	SPI	I ² C	CLC	NCO	PPS	ICD ⁽²⁾
PIC16(L)F18313	(A)	3.5	2	256	256	6	5	1	1	1/1/1	2/2	1	1	1	1	2	1	Y	I
PIC16(L)F18323	(A)	3.5	2	256	256	12	11	2	1	1/1/1	2/2	1	1	1	1	2	1	Y	I
PIC16(L)F18324	(B)	7	4	256	512	12	11	2	1	1/3/3	4/2	2	1	1	1	4	1	Y	I
PIC16(L)F18325	(C)	14	8	256	1K	12	11	2	1	1/3/3	4/2	2	1	2	2	4	1	Y	I
PIC16(L)F18326	(D)	28	16	256	2K	12	11	2	1	1/3/3	4/2	2	1	2	2	4	1	Y	I
PIC16(L)F18344	(B)	7	4	256	512	18	17	2	1	1/3/3	4/2	2	1	1	1	4	1	Y	I
PIC16(L)F18345	(C)	14	8	256	1K	18	17	2	1	1/3/3	4/2	2	1	2	2	4	1	Y	I
PIC16(L)F18346	(D)	28	16	256	2K	18	17	2	1	1/3/3	4/2	2	1	2	2	4	1	Y	I

Note 1: One pin is input-only.**Note 2:** Debugging Methods: (I) – Integrated on Chip; E – using Emulation Header.**Data Sheet Index:** (Unshaded devices are described in this document.)

- A)** DS40001799 PIC16(L)F18313/18323 Data Sheet, Full-Featured, Low Pin Count Microcontrollers with XLP
B) DS40001800 PIC16(L)F18324/18344 Data Sheet, Full-Featured, Low Pin Count Microcontrollers with XLP
C) DS40001795 PIC16(L)F18325/18345 Data Sheet, Full-Featured, Low Pin Count Microcontrollers with XLP
D) Future Release PIC16(L)F18326/18346 Data Sheet, Full-Featured, Low Pin Count Microcontrollers with XLP

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

PIC16(L)F183XX

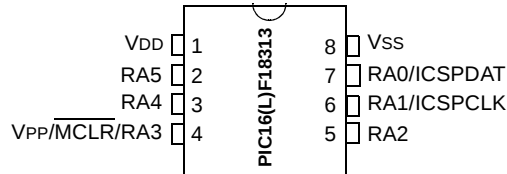
TABLE 2: PACKAGES

Packages	PDIP	SOIC	UDFN	TSSOP	UQFN	SSOP
PIC16(L)F18313	X	X	X			
PIC16(L)F18323	X	X		X	X	
PIC16(L)F18324	X	X		X	X	
PIC16(L)F18325	X	X		X	X	
PIC16(L)F18326	X	X		X	X	
PIC16(L)F18344	X	X			X	X
PIC16(L)F18345	X	X			X	X
PIC16(L)F18346	X	X			X	X

Note: Pin details are subject to change.

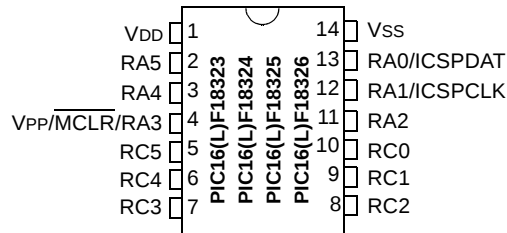
PIN DIAGRAMS

Pin Diagram – 8-Pin PDIP, SOIC, UDFN



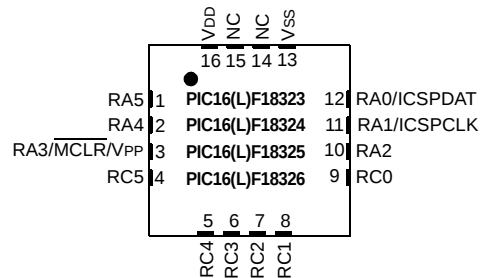
Note: See Table 3 for location of all peripheral functions.

Pin Diagram – 14-Pin PDIP, SOIC, TSSOP



Note: See Table 4, Table 5, Table 6 and Table 7 for location of all peripheral functions.

Pin Diagram – 16-Pin UQFN (4x4)

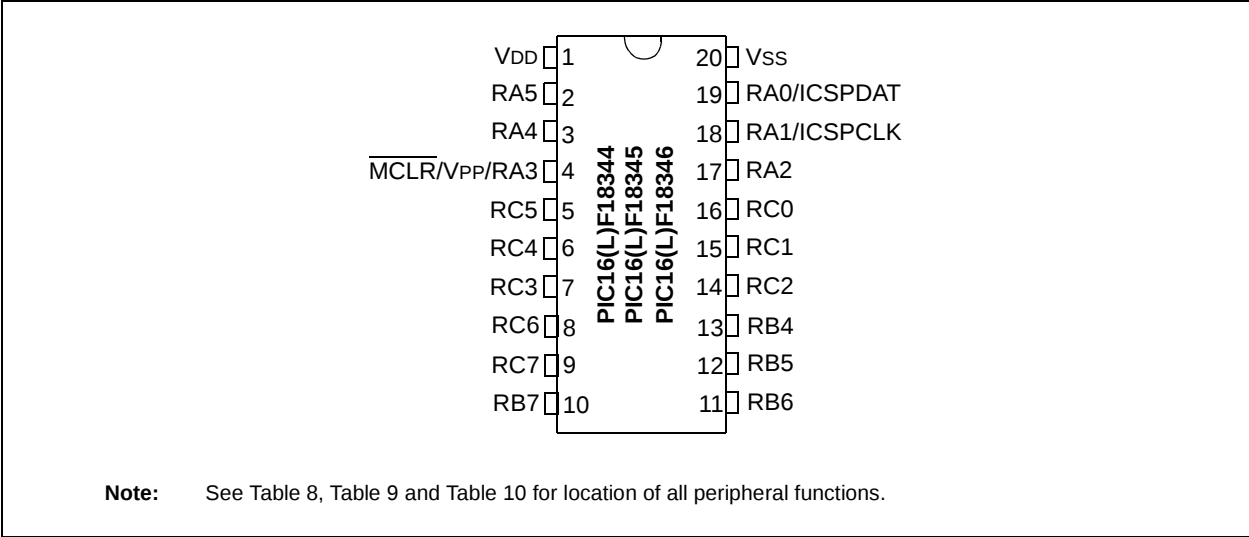


Note 1: See Table 4, Table 5, Table 6 and Table 7 for location of all peripheral functions.

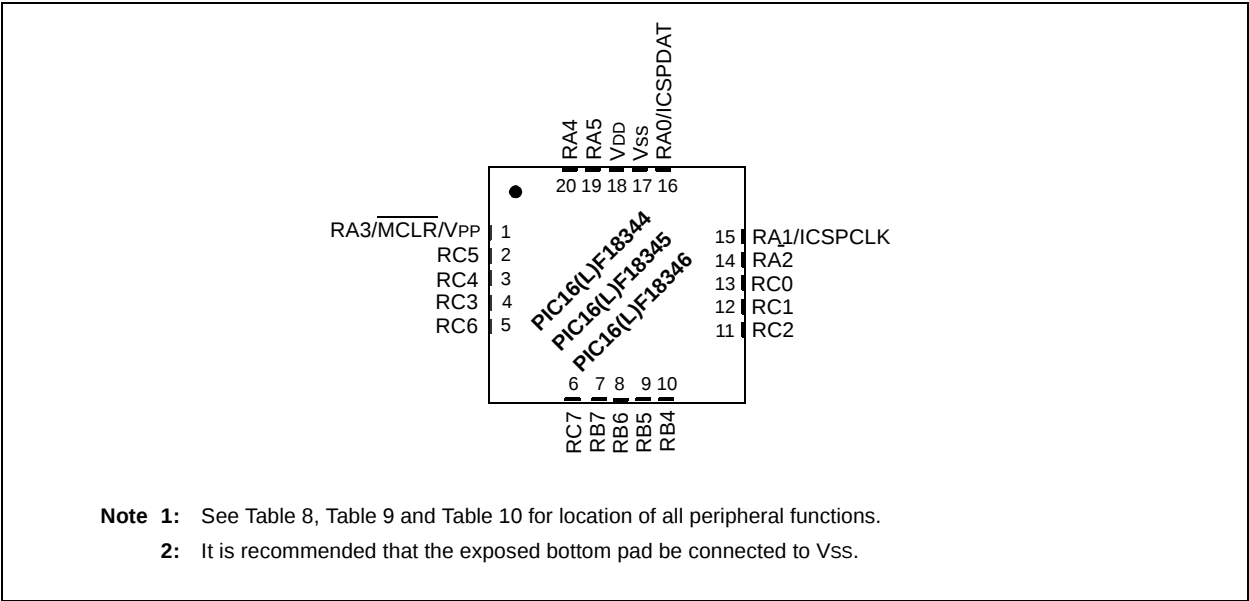
Note 2: It is recommended that the exposed bottom pad be connected to VSS.

PIC16(L)F183XX

Pin Diagram – 20-Pin PDIP, SOIC, SSOP



Pin Diagram – 20-Pin UQFN (4x4)



PIN ALLOCATION TABLES

TABLE 3: 8-PIN ALLOCATION TABLE (PIC16(L)F18313)

I/O ⁽²⁾	8-Pin PDIP/SOIC/UDFN	ADC	Reference	Comparator	NCO	DAC	DSM	Timers	CCP	PWM	CWG	MSSP	EUSART	CLC	CLKR	Interrupt	Pull-up	Basic
RA0	7	ANA0	—	C1IN0+	—	DAC1OUT	MDCIN1 ⁽¹⁾	—	—	—	—	—	TX ⁽¹⁾ CK ⁽¹⁾	CLCIN3 ⁽¹⁾	—	IOCA0	Y	ICDDAT/ ICSPDAT
RA1	6	ANA1	VREF+	C1IN0-	—	DAC1REF+	MDMIN ⁽¹⁾	—	—	—	—	SCK ⁽¹⁾ SCL ^(1,3,4)	RX ⁽¹⁾ DT ^(1,3)	CLCIN2 ⁽¹⁾	—	IOCA1	Y	ICDCLK/ ICSPCLK
RA2	5	ANA2	VREF-	—	—	DAC1REF-	—	T0CKI ⁽¹⁾	—	—	CWG1 ⁽¹⁾	SDA ^(1,3,4) SDO ⁽¹⁾	—	—	—	INT ⁽¹⁾ IOCA2	Y	—
RA3	4	—	—	—	—	—	—	—	—	—	—	SS ⁽⁴⁾	—	CLCIN0 ⁽¹⁾	—	IOCA3	Y	MCLR V _{PP}
RA4	3	ANA4	—	C1IN1-	—	—	—	T1G ⁽¹⁾ SOSCO	—	—	—	—	—	—	—	IOCA4	Y	CLKOUT OSC2
RA5	2	ANA5	—	—	—	—	MDCIN2 ⁽¹⁾	T1CKI ⁽¹⁾ SOSCIN SOSCI	CCP1 ⁽¹⁾ CCP2 ⁽¹⁾	—	—	—	—	CLCIN1 ⁽¹⁾	—	IOCA5	Y	CLKIN OSC1
V _{DD}	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	V _{DD}
V _{SS}	8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	V _{SS}
OUT ⁽²⁾	—	—	—	C1OUT	NCO	—	DSM	TMR0	CCP1	PWM5	CWG1A	SDA ⁽³⁾	CK	CLC1OUT	CLKR	—	—	—
	—	—	—	—	—	—	—	—	CCP2	PWM6	CWG1B	SCL ⁽³⁾	DT ⁽³⁾	CLC2OUT	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	CWG1C	SDO	TX	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	CWG1D	SCK	—	—	—	—	—	—

- Note**
- 1: Default peripheral input. Input can be moved to any other pin with the PPS input selection registers.
 - 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.
 - 4: These pins are configured for I²C logic levels; clock and data signals may be assigned to any of these pins. Assignments to the other pins (e.g., RA5) will operate, but logic levels will be standard TTL/ST as selected by the INLVL register.

TABLE 4: 14/16-PIN ALLOCATION TABLE (PIC16(L)F18323)

I/O ⁽²⁾	14/16-Pin PDIP/SOIC/TSSOP	16-Pin UQFN	ADC	Reference	Comparator	NCO	DAC	DSM	Timers	CCP	PWM	CWG	MSSP	EUSART	CLC	CLKR	Interrupt	Pull-up	Basic
RA0	13	12	ANA0	—	C1IN0+	—	DAC1OUT	—	—	—	—	—	—	—	—	—	IOCA0	Y	ICDDAT/ ICSPDAT
RA1	12	11	ANA1	VREF+	C1IN0- C2IN0-	—	DAC1REF+	—	—	—	—	—	—	—	—	—	IOCA1	Y	ICDCLK/ ICSPCLK
RA2	11	10	ANA2	VREF-	—	—	DAC1REF-	—	T0CKI ⁽¹⁾	—	—	CWG1 ⁽¹⁾	—	—	—	—	INT ⁽¹⁾ IOCA2	Y	—
RA3	4	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	IOCA3	Y	MCLR VPP
RA4	3	2	ANA4	—	—	—	—	—	T1G ⁽¹⁾ SOSCO	—	—	—	—	—	—	—	IOCA4	Y	CLKOUT OSC2
RA5	2	1	ANA5	—	—	—	—	—	T1CKI ⁽¹⁾ SOSCIN SOSCI	—	—	—	—	—	CLCIN3 ⁽¹⁾	—	IOCA5	Y	CLKIN OSC1
RC0	10	9	ANC0	—	C2IN0+	—	—	—	—	—	—	—	SCK ⁽¹⁾ SCL ^(1,3,4)	—	—	—	IOCC0	Y	—
RC1	9	8	ANC1	—	C1IN1- C2IN1-	—	—	—	—	—	—	—	SDI ⁽¹⁾ SDA ^(1,3,4)	—	CLCIN2 ⁽¹⁾	—	IOCC1	Y	—
RC2	8	7	ANC2	—	C1IN2- C2IN2-	—	—	MDCIN1 ⁽¹⁾	—	—	—	—	—	—	—	—	IOCC2	Y	—
RC3	7	6	ANC3	—	C1IN3- C2IN3-	—	—	MDMIN ⁽¹⁾	—	CCP2 ⁽¹⁾	—	—	SS ⁽¹⁾	—	CLCIN0 ⁽¹⁾	—	IOCC3	Y	—
RC4	6	5	ANC4	—	—	—	—	—	—	—	—	—	—	TX ⁽¹⁾ CK ⁽¹⁾	CLCIN1 ⁽¹⁾	—	IOCC4	Y	—
RC5	5	4	ANC5	—	—	—	—	MDCIN2 ⁽¹⁾	—	CCP1 ⁽¹⁾	—	—	—	RX ⁽¹⁾ DT ^(1,3)	—	—	IOCC5	Y	—
VDD	1	16	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	VDD
VSS	14	13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	VSS

- Note**
- 1: Default peripheral input. Input can be moved to any other pin with the PPS input selection registers.
 - 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.
 - 4: These pins are configured for I²C logic levels; clock and data signals may be assigned to any of these pins. Assignments to other pins (e.g. RA5) will operate, but logic levels will be standard TTL/ST as selected by the INLVL register.

TABLE 5: 14/16-PIN ALLOCATION TABLE (PIC16(L)F18324)

I/O ⁽²⁾	14/16-Pin PDIP/SOIC/TSSOP	16-Pin UQFN	ADC	Reference	Comparator	NCO	DAC	DSM	Timers	CCP	PWM	CWG	MSSP	EUSART	CLC	CLKR	Interrupt	Pull-up	Basic
RA0	13	12	ANA0	—	C1IN0+	—	DAC1OUT	—	—	—	—	—	—	—	—	—	IOCA0	Y	ICDDAT/ ICSPDAT
RA1	12	11	ANA1	VREF+	C1IN0- C2IN0-	—	DAC1REF+	—	—	—	—	—	—	—	—	—	IOCA1	Y	ICDCLK/ ICSPCLK
RA2	11	10	ANA2	VREF-	—	—	DAC1REF-	—	T0CKI ⁽¹⁾	CCP3 ⁽¹⁾	—	CWG1 ⁽¹⁾ CWG2 ⁽¹⁾	—	—	—	—	INT ⁽¹⁾ IOCA2	Y	—
RA3	4	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	IOCA3	Y	MCLR V _{PP}
RA4	3	2	ANA4	—	—	—	—	—	T1G ⁽⁴⁾ SOSCO	—	—	—	—	—	—	—	IOCA4	Y	CLKOUT OSC2
RA5	2	1	ANA5	—	—	—	—	—	T1CKI ⁽¹⁾ SOSCIN SOSCI	—	—	—	—	—	CLCIN3 ⁽¹⁾	—	IOCA5	Y	CLKIN OSC1
RC0	10	9	ANC0	—	C2IN0+	—	—	—	T5CKI ⁽¹⁾	—	—	—	SCK ⁽¹⁾ SCL ^(1,3,4)	—	—	—	IOCC0	Y	—
RC1	9	8	ANC1	—	C1IN1- C2IN1-	—	—	—	CCP4 ⁽¹⁾	—	—	—	SDI ⁽¹⁾ SDA ^(1,3,4)	—	CLCIN2 ⁽¹⁾	—	IOCC1	Y	—
RC2	8	7	ANC2	—	C1IN2- C2IN2-	—	—	MDCIN1 ⁽¹⁾	—	—	—	—	—	—	—	—	IOCC2	Y	—
RC3	7	6	ANC3	—	C1IN3- C2IN3-	—	—	MDMIN ⁽¹⁾	T5G ⁽¹⁾	CCP2 ⁽¹⁾	—	—	SS ⁽¹⁾	—	CLCIN0 ⁽¹⁾	—	IOCC3	Y	—
RC4	6	5	ANC4	—	—	—	—	—	T3G ⁽¹⁾	—	—	—	—	TX ⁽¹⁾ CK ⁽¹⁾	CLCIN1 ⁽¹⁾	—	IOCC4	Y	—
RC5	5	4	ANC5	—	—	—	—	MDCIN2 ⁽¹⁾	T3CKI ⁽¹⁾	CCP1 ⁽¹⁾	—	—	—	RX ⁽¹⁾ DT ^(1,3)	—	—	IOCC5	Y	—
V _{DD}	1	16	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	V _{DD}
V _{SS}	14	13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	V _{SS}

- Note**
- 1: Default peripheral input. Input can be moved to any other pin with the PPS input selection registers.
 - 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.
 - 4: These pins are configured for I²C logic levels; clock and data signals may be assigned to any of these pins. Assignments to other pins (e.g. RA5) will operate, but logic levels will be standard TTL/ST as selected by the INLVL register.

TABLE 5: 14/16-PIN ALLOCATION TABLE (PIC16(L)F18324) (CONTINUED)

I/O ⁽²⁾	14/16-Pin PDIP/SOIC/TSSOP	16-Pin UQFN	ADC	Reference	Comparator	NCO	DAC	DSM	Timers	CCP	PWM	CWG	MSSP	EUSART	CLC	CLKR	Interrupt	Pull-up	Basic
OUT ⁽²⁾	—	—	—	—	C1OUT	NCO	—	DSM	TMR0	CCP1	PWM5	CWG1A CWG2A	SDA ⁽³⁾	CK	CLC1OUT	CLKR	—	—	—
	—	—	—	—	C2OUT	—	—	—	—	CCP2	PWM6	CWG1B CWG2B	SCL ⁽³⁾	DT ⁽³⁾	CLC2OUT	—	—	—	—
	—	—	—	—	—	—	—	—	—	CCP3	—	CWG1C CWG2C	SDO	TX	CLC3OUT	—	—	—	—
	—	—	—	—	—	—	—	—	—	CCP4	—	CWG1D CWG2D	SCK	—	CLC4OUT	—	—	—	—

- Note**
- 1: Default peripheral input. Input can be moved to any other pin with the PPS input selection registers.
 - 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.
 - 4: These pins are configured for I²C logic levels; clock and data signals may be assigned to any of these pins. Assignments to other pins (e.g. RA5) will operate, but logic levels will be standard TTL/ST as selected by the INLVL register.

TABLE 6: 14/16-PIN ALLOCATION TABLE (PIC16(L)F18325)

I/O ⁽²⁾	14/16-Pin PDIP/SOIC/TSSOP	16-Pin UQFN	ADC	Reference	Comparator	NCO	DAC	DSM	Timers	CCP	PWM	CWG	MSSP	EUSART	CLC	CLKR	Interrupt	Pull-up	Basic
RA0	13	12	ANA0	—	C1IN0+	—	DAC1OUT	—	—	—	—	—	SS2 ⁽¹⁾	—	—	—	IOCA0	Y	ICDDAT/ ICSPDAT
RA1	12	11	ANA1	VREF +	C1IN0- C2IN0-	—	DAC1REF+	—	—	—	—	—	—	—	—	—	IOCA1	Y	ICDCLK/ ICSPCLK
RA2	11	10	ANA2	VREF-	—	—	DAC1REF-	—	T0CK1 ⁽¹⁾	CCP3 ⁽¹⁾	—	CWG1 ⁽¹⁾ CWG2 ⁽¹⁾	—	—	—	—	INT ⁽¹⁾ IOCA2	Y	—
RA3	4	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	IOCA3	Y	MCLR VPP
RA4	3	2	ANA4	—	—	—	—	—	T1G ⁽¹⁾ SOSCO	—	—	—	—	—	—	—	IOCA4	Y	CLKOUT OSC2
RA5	2	1	ANA5	—	—	—	—	—	T1CK1 ⁽¹⁾ SOSCIN SOSCI	—	—	—	—	—	CLCIN3 ⁽¹⁾	—	IOCA5	Y	CLKIN OSC1
RC0	10	9	ANC0	—	C2IN0+	—	—	—	T5CK1 ⁽¹⁾	—	—	—	SCK1 ⁽¹⁾ SCL1 ^(1,3,4)	—	—	—	IOCC0	Y	—
RC1	9	8	ANC1	—	C1IN1- C2IN1-	—	—	—	—	CCP4 ⁽¹⁾	—	—	SDI1 ⁽¹⁾ SDA1 ^(1,3,4)	—	CLCIN2 ⁽¹⁾	—	IOCC1	Y	—
RC2	8	7	ANC2	—	C1IN2- C2IN2-	—	—	MDCIN1 ⁽¹⁾	—	—	—	—	—	—	—	—	IOCC2	Y	—
RC3	7	6	ANC3	—	C1IN3- C2IN3-	—	—	MDMIN ⁽¹⁾	T5G ⁽¹⁾	CCP2 ⁽¹⁾	—	—	SS1 ⁽¹⁾	—	CLCIN0 ⁽¹⁾	—	IOCC3	Y	—
RC4	6	5	ANC4	—	—	—	—	—	T3G ⁽¹⁾	—	—	—	SCK2 ⁽¹⁾ SCL2 ^(1,3,4)	TX ⁽¹⁾ CK ⁽¹⁾	CLCIN1 ⁽¹⁾	—	IOCC4	Y	—
RC5	5	4	ANC5	—	—	—	—	MDCIN2 ⁽¹⁾	T3CK1 ⁽¹⁾	CCP1 ⁽¹⁾	—	—	SDI2 ⁽¹⁾ SDA2 ^(1,3,4)	RX ⁽¹⁾ DT ^(1,3)	—	—	IOCC5	Y	—
VDD	1	16	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	VDD
VSS	14	13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	VSS

- Note**
- 1: Default peripheral input. Input can be moved to any other pin with the PPS input selection registers.
 - 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.
 - 4: These pins are configured for I²C logic levels; clock and data signals may be assigned to any of these pins. Assignments to other pins (e.g. RA5) will operate, but logic levels will be standard TTL/ST as selected by the INLVL register.

TABLE 6: 14/16-PIN ALLOCATION TABLE (PIC16(L)F18325) (CONTINUED)

I/O ⁽²⁾	14/16-Pin PDIP/SOIC/TSSOP	16-Pin UQFN	ADC	Reference	Comparator	NCO	DAC	DSM	Timers	CCP	PWM	CWG	MSSP	EUSART	CLC	CLKR	Interrupt	Pull-up	Basic
OUT ⁽²⁾	—	—	—	—	C1OUT	DDS	—	DSM	TMR0	CCP1	PWM5	CWG1A CWG2A	SDA1 ⁽³⁾ SDA2 ⁽³⁾	CK	CLC1OUT	CLKR	—	—	—
	—	—	—	—	C2OUT	—	—	—	—	CCP2	PWM6	CWG1B CWG2B	SCL1 ⁽³⁾ SCL2 ⁽³⁾	DT ⁽³⁾	CLC2OUT	—	—	—	—
	—	—	—	—	—	—	—	—	—	CCP3	—	CWG1C CWG2C	SDO1 SDO2	TX	CLC3OUT	—	—	—	—
	—	—	—	—	—	—	—	—	—	CCP4	—	CWG1D CWG2D	SCK1 SCK2	—	CLC4OUT	—	—	—	—

- Note**
- 1: Default peripheral input. Input can be moved to any other pin with the PPS input selection registers.
 - 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.
 - 4: These pins are configured for I²C logic levels; clock and data signals may be assigned to any of these pins. Assignments to other pins (e.g. RA5) will operate, but logic levels will be standard TTL/ST as selected by the INLVL register.

TABLE 7: 14/16-PIN ALLOCATION TABLE (PIC16(L)F18326)

I/O ⁽²⁾	14/16-Pin PDIP/SOIC/TSSOP	16-Pin UQFN	ADC	Reference	Comparator	NCO	DAC	DSM	Timers	CCP	PWM	CWG	MSSP	EUSART	CLC	CLKR	Interrupt	Pull-up	Basic
RA0	13	12	ANA0	—	C1IN0+	—	DAC1OUT	—	—	—	—	—	SS2 ⁽¹⁾	—	—	—	IOCA0	Y	ICDDAT/ ICSPDAT
RA1	12	11	ANA1	VREF +	C1IN0- C2IN0-	—	DAC1REF+	—	—	—	—	—	—	—	—	—	IOCA1	Y	ICDCLK/ ICSPCLK
RA2	11	10	ANA2	VREF-	—	—	DAC1REF-	—	T0CK1 ⁽¹⁾	CCP3 ⁽¹⁾	—	CWG1 ⁽¹⁾ CWG2 ⁽¹⁾	—	—	—	—	INT ⁽¹⁾ IOCA2	Y	—
RA3	4	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	IOCA3	Y	MCLR VPP
RA4	3	2	ANA4	—	—	—	—	—	T1G ⁽¹⁾ SOSCO	—	—	—	—	—	—	—	IOCA4	Y	CLKOUT OSC2
RA5	2	1	ANA5	—	—	—	—	—	T1CK1 ⁽¹⁾ SOSCIN SOSCI	—	—	—	—	—	CLCIN3 ⁽¹⁾	—	IOCA5	Y	CLKIN OSC1
RC0	10	9	ANC0	—	C2IN0+	—	—	—	T5CK1 ⁽¹⁾	—	—	—	SCK1 ⁽¹⁾ SCL1 ^(1,3,4)	—	—	—	IOCC0	Y	—
RC1	9	8	ANC1	—	C1IN1- C2IN1-	—	—	—	—	CCP4 ⁽¹⁾	—	—	SDI1 ⁽¹⁾ SDA1 ^(1,3,4)	—	CLCIN2 ⁽¹⁾	—	IOCC1	Y	—
RC2	8	7	ANC2	—	C1IN2- C2IN2-	—	—	MDCIN1 ⁽¹⁾	—	—	—	—	—	—	—	—	IOCC2	Y	—
RC3	7	6	ANC3	—	C1IN3- C2IN3-	—	—	MDMIN ⁽¹⁾	T5G ⁽¹⁾	CCP2 ⁽¹⁾	—	—	SS1 ⁽¹⁾	—	CLCIN0 ⁽¹⁾	—	IOCC3	Y	—
RC4	6	5	ANC4	—	—	—	—	—	T3G ⁽¹⁾	—	—	—	SCK2 ⁽¹⁾ SCL2 ^(1,3,4)	TX ⁽¹⁾ CK ⁽¹⁾	CLCIN1 ⁽¹⁾	—	IOCC4	Y	—
RC5	5	4	ANC5	—	—	—	—	MDCIN2 ⁽¹⁾	T3CK1 ⁽¹⁾	CCP1 ⁽¹⁾	—	—	SDI2 ⁽¹⁾ SDA2 ^(1,3,4)	RX ⁽¹⁾ DT ^(1,3)	—	—	IOCC5	Y	—
VDD	1	16	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	VDD
VSS	14	13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	VSS

- Note**
- 1: Default peripheral input. Input can be moved to any other pin with the PPS input selection registers.
 - 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.
 - 4: These pins are configured for I²C logic levels; clock and data signals may be assigned to any of these pins. Assignments to other pins (e.g. RA5) will operate, but logic levels will be standard TTL/ST as selected by the INLVL register.

TABLE 7: 14/16-PIN ALLOCATION TABLE (PIC16(L)F18326) (CONTINUED)

I/O ⁽²⁾	14/16-Pin PDIP/SOIC/TSSOP	16-Pin UQFN	ADC	Reference	Comparator	NCO	DAC	DSM	Timers	CCP	PWM	CWG	MSSP	EUSART	CLC	CLKR	Interrupt	Pull-up	Basic
OUT ⁽²⁾	—	—	—	—	C1OUT	DDS	—	DSM	TMR0	CCP1	PWM5	CWG1A CWG2A	SDA1 ⁽³⁾ SDA2 ⁽³⁾	CK	CLC1OUT	CLKR	—	—	—
	—	—	—	—	C2OUT	—	—	—	—	CCP2	PWM6	CWG1B CWG2B	SCL1 ⁽³⁾ SCL2 ⁽³⁾	DT ⁽³⁾	CLC2OUT	—	—	—	—
	—	—	—	—	—	—	—	—	—	CCP3	—	CWG1C CWG2C	SDO1 SDO2	TX	CLC3OUT	—	—	—	—
	—	—	—	—	—	—	—	—	—	CCP4	—	CWG1D CWG2D	SCK1 SCK2	—	CLC4OUT	—	—	—	—

- Note**
- 1: Default peripheral input. Input can be moved to any other pin with the PPS input selection registers.
 - 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.
 - 4: These pins are configured for I²C logic levels; clock and data signals may be assigned to any of these pins. Assignments to other pins (e.g. RA5) will operate, but logic levels will be standard TTL/ST as selected by the INLVL register.

TABLE 8: 20-PIN ALLOCATION TABLE (PIC16(L)F18344)

I/O ⁽²⁾	20-Pin PDIP/SOIC/SSOP	20-Pin UQFN	ADC	Reference	Comparator	NCO	DAC	DSM	Timers	CCP	PWM	CWG	MSSP	EUSART	CLC	CLKR	Interrupt	Pull-up	Basic
RA0	19	16	ANA0	—	C1IN0+	—	DAC1OUT	—	—	—	—	—	—	—	—	—	IOCA0	Y	ICDDAT/ ICSPDAT
RA1	18	15	ANA1	VREF +	C1IN0- C2IN0-	—	DAC1REF+	—	—	—	—	—	—	—	—	—	IOCA1	Y	ICDCLK/ ICSPCLK
RA2	17	14	ANA2	VREF-	—	—	DAC1REF-	—	T0CKI ⁽¹⁾	CCP3 ⁽¹⁾	—	CWG1 ⁽¹⁾ CWG2 ⁽¹⁾	—	—	CLCIN0 ⁽¹⁾	—	INT ⁽¹⁾ IOCA2	Y	—
RA3	4	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	IOCA3	Y	MCLR VPP
RA4	3	20	ANA4	—	—	—	—	—	T1G ⁽¹⁾ T3G ⁽¹⁾ T5G ⁽¹⁾ SOSCO	CCP4 ⁽¹⁾	—	—	—	—	—	—	IOCA4	Y	CLKOUT OSC2
RA5	2	19	ANA5	—	—	—	—	—	T1CKI ⁽¹⁾ T3CKI ⁽¹⁾ T5CKI ⁽¹⁾ SOSCIN SOSCI	—	—	—	—	—	—	—	IOCA5	Y	CLKIN OSC1
RB4	13	10	ANB4	—	—	—	—	—	—	—	—	—	SDI ⁽¹⁾ SDA ^(1,3,4)	—	CLCIN2 ⁽¹⁾	—	IOCB4	Y	—
RB5	12	9	ANB5	—	—	—	—	—	—	—	—	—	—	RX ⁽¹⁾ DT ⁽¹⁾	CLCIN3 ⁽¹⁾	—	IOCB5	Y	—
RB6	11	8	ANB6	—	—	—	—	—	—	—	—	—	SCK ⁽¹⁾ SCL ^(1,3,4)	—	—	—	IOCB6	Y	—
RB7	10	7	ANB7	—	—	—	—	—	—	—	—	—	—	TX ⁽¹⁾ CK ⁽¹⁾	—	—	IOCB7	Y	—
RC0	16	13	ANC0	—	C2IN0+	—	—	—	—	—	—	—	—	—	—	—	IOCC0	Y	—
RC1	15	12	ANC1	—	C1IN1- C2IN1-	—	—	—	—	—	—	—	—	—	—	—	IOCC1	Y	—
RC2	14	11	ANC2	—	C1IN2- C2IN2-	—	—	MDCIN1 ⁽¹⁾	—	—	—	—	—	—	—	—	IOCC2	Y	—

- Note**
- 1: Default peripheral input. Input can be moved to any other pin with the PPS input selection registers.
 - 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.
 - 4: These pins are configured for I²C logic levels; clock and data signals may be assigned to any of these pins. Assignments to other pins (e.g., RA5) will operate, but logic levels will be standard TTL/ST as selected by the INLVL register.

TABLE 9: 20-PIN ALLOCATION TABLE (PIC16(L)F18345)

I/O ⁽²⁾	20-Pin PDIP/28-Pin UQFN	20-Pin UQFN	ADC	Reference	Comparator	NCO	DAC	DSM	Timers	CCP	PWM	CWG	MSSP	EUSART	CLC	CLKR	Interrupt	Pull-up	Basic
RA0	19	16	ANA0	—	C1IN0+	—	DAC1OUT	—	—	—	—	—	—	—	—	—	IOCA0	Y	ICDDAT/ ICSPDAT
RA1	18	15	ANA1	VREF +	C1IN0- C2IN0-	—	DAC1REF+	—	—	—	—	—	SS2 ⁽¹⁾	—	—	—	IOCA1	Y	ICDCLK/ ICSPCLK
RA2	17	14	ANA2	VREF-	—	—	DAC1REF-	—	T0CKI ⁽¹⁾	CCP3 ⁽¹⁾	—	CWG1 ⁽¹⁾ CWG2 ⁽¹⁾	—	—	CLCIN0 ⁽¹⁾	—	INT ⁽¹⁾ IOCA2	Y	—
RA3	4	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	IOCA3	Y	MCLR VPP
RA4	3	20	ANA4	—	—	—	—	—	T1G ⁽¹⁾ T3G ⁽¹⁾ T5G ⁽¹⁾ SOSCO	CCP4 ⁽¹⁾	—	—	—	—	—	—	IOCA4	Y	CLKOUT OSC2
RA5	2	19	ANA5	—	—	—	—	—	T1CKI ⁽¹⁾ T3CKI ⁽¹⁾ T5CKI ⁽¹⁾ SOSCIN SOSCI	—	—	—	—	—	—	—	IOCA5	Y	CLKIN OSC1
RB4	13	10	ANB4	—	—	—	—	—	—	—	—	—	SDI1 ⁽¹⁾ SDA1 ^(1,3,4)	—	CLCIN2 ⁽¹⁾	—	IOCB4	Y	—
RB5	12	9	ANB5	—	—	—	—	—	—	—	—	—	SDI2 ⁽¹⁾ SDA2 ^(1,3,4)	RX ⁽¹⁾ DT ⁽¹⁾	CLCIN3 ⁽¹⁾	—	IOCB5	Y	—
RB6	11	8	ANB6	—	—	—	—	—	—	—	—	—	SCK1 ⁽¹⁾ SCL1 ^(1,3,4)	—	—	—	IOCB6	Y	—
RB7	10	7	ANB7	—	—	—	—	—	—	—	—	—	SCK2 ⁽¹⁾ SCL2 ^(1,3,4)	TX ⁽¹⁾ CK ⁽¹⁾	—	—	IOCB7	Y	—
RC0	16	13	ANC0	—	C2IN0+	—	—	—	—	—	—	—	—	—	—	—	IOCC0	Y	—
RC1	15	12	ANC1	—	C1IN1- C2IN1-	—	—	—	—	—	—	—	—	—	—	—	IOCC1	Y	—
RC2	14	11	ANC2	—	C1IN2- C2IN2-	—	—	MDCIN1 ⁽¹⁾	—	—	—	—	—	—	—	—	IOCC2	Y	—
RC3	7	4	ANC3	—	C1IN3- C2IN3-	—	—	MDMIN ⁽¹⁾	—	CCP2 ⁽¹⁾	—	—	—	—	CLCIN1 ⁽¹⁾	—	IOCC3	Y	—

- Note**
- 1: Default peripheral input. Input can be moved to any other pin with the PPS input selection registers.
 - 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.
 - 4: These pins are configured for I²C logic levels; clock and data signals may be assigned to any of these pins. Assignments to other pins (e.g., RA5) will operate, but logic levels will be standard TTL/ST as selected by the INLVL register.

I/O ⁽²⁾	20-Pin PDIP/SOIC/SSOP	20-Pin UQFN	ADC	Reference	Comparator	NCO	DAC	DSM	Timers	CCP	PWM	CWG	MSSP	EUSART	CLC	CLKR	Interrupt	Pull-up	Basic
RC4	6	3	ANC4	—	—	—	—	—	—	—	—	—	—	—	—	—	IOCC4	Y	—
RC5	5	2	ANC5	—	—	—	—	MDCIN2 ⁽¹⁾	—	CCP1 ⁽¹⁾	—	—	—	—	—	—	IOCC5	Y	—
RC6	8	5	ANC6	—	—	—	—	—	—	—	—	—	SS ⁽¹⁾	—	—	—	IOCC6	Y	—
RC7	9	6	ANC7	—	—	—	—	—	—	—	—	—	—	—	—	—	IOCC7	Y	—
VDD	1	18	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	VDD
VSS	20	17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	VSS
OUT ⁽²⁾	—	—	—	—	C1OUT	NCO	—	DSM	TMR0	CCP1	PWM5	CWG1A CWG2A	SDO1 SDO2	DT ⁽³⁾	CLC1OUT	CLKR	—	—	—
	—	—	—	—	C2OUT	—	—	—	—	CCP2	PWM6	CWG1B CWG2B	SCK1 SCK2	CK	CLC2OUT	—	—	—	—
	—	—	—	—	—	—	—	—	—	CCP3	—	CWG1C CWG2C	SCL1 ⁽³⁾ SCL2 ⁽³⁾	TX	CLC3OUT	—	—	—	—
	—	—	—	—	—	—	—	—	—	CCP4	—	CWG1D CWG2D	SDA1 ⁽³⁾ SDA2 ⁽³⁾	—	CLC4OUT	—	—	—	—

- | | | |
|-------------|-----------|---|
| Note | 1: | Default peripheral input. Input can be moved to any other pin with the PPS input selection registers. |
| | 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. |
| | 4: | These pins are configured for I ² C logic levels; clock and data signals may be assigned to any of these pins. Assignments to other pins (e.g., RA5) will operate, but logic levels will be standard TTL/ST as selected by the INLVL register. |

TABLE 10: 20-PIN ALLOCATION TABLE (PIC16(L)F18346)

I/O	20-Pin PDIP/SOIC/SSOP	20-Pin UQFN	ADC	Reference	Comparator	NCO	DAC	DSM	Timers	CCP	PWM	CWG	MSSP	EUSART	CLC	CLKR	Interrupt	Pull-up	Basic
RA0	19	16	ANA0	—	C1IN0+	—	DAC1OUT	—	—	—	—	—	—	—	—	—	IOCA0	Y	ICDDAT/ ICSPDAT
RA1	18	15	ANA1	VREF +	C1IN0- C2IN0-	—	DAC1REF+	—	—	—	—	—	SS2 ⁽¹⁾	—	—	—	IOCA1	Y	ICDCLK/ ICSPCLK
RA2	17	14	ANA2	VREF- —	—	—	DAC1REF-	—	T0CK1 ⁽¹⁾	CCP3 ⁽¹⁾	—	CWG1 ⁽¹⁾ CWG2 ⁽¹⁾	—	—	CLCIN0 ⁽¹⁾	—	INT ⁽¹⁾ IOCA2	Y	—
RA3	4	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	IOCA3	Y	MCLR VPP
RA4	3	20	ANA4	—	—	—	—	—	T1G ⁽¹⁾ T3G ⁽¹⁾ T5G ⁽¹⁾ SOSCO	CCP4 ⁽¹⁾	—	—	—	—	—	—	IOCA4	Y	CLKOUT OSC2
RA5	2	19	ANA5	—	—	—	—	—	T1CK1 ⁽¹⁾ T3CK1 ⁽¹⁾ T5CK1 ⁽¹⁾ SOSCIN SOSCI	—	—	—	—	—	—	—	IOCA5	Y	CLKIN OSC1
RB4	13	10	ANB4	—	—	—	—	—	—	—	—	—	SDI1 ⁽¹⁾ SDA1 ^(1,3,4)	—	CLCIN2 ⁽¹⁾	—	IOCB4	Y	—
RB5	12	9	ANB5	—	—	—	—	—	—	—	—	—	SDI2 ⁽¹⁾ SDA2 ^(1,3,4)	RX ⁽¹⁾ DT ⁽¹⁾	CLCIN3 ⁽¹⁾	—	IOCB5	Y	—
RB6	11	8	ANB6	—	—	—	—	—	—	—	—	—	SCK1 ⁽¹⁾ SCL1 ^(1,3,4)	—	—	—	IOCB6	Y	—
RB7	10	7	ANB7	—	—	—	—	—	—	—	—	—	SCK2 ⁽¹⁾ SCL2 ^(1,3,4)	TX ⁽¹⁾ CK ⁽¹⁾	—	—	IOCB7	Y	—
RC0	16	13	ANC0	—	C2IN0+	—	—	—	—	—	—	—	—	—	—	—	IOCC0	Y	—
RC1	15	12	ANC1	—	C1IN1- C2IN1-	—	—	—	—	—	—	—	—	—	—	—	IOCC1	Y	—
RC2	14	11	ANC2	—	C1IN2- C2IN2-	—	—	MDCIN1 ⁽¹⁾	—	—	—	—	—	—	—	—	IOCC2	Y	—

- Note**
- 1: Default peripheral input. Input can be moved to any other pin with the PPS input selection registers.
 - 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.
 - 4: These pins are configured for I²C logic levels; clock and data signals may be assigned to any of these pins. Assignments to other pins (e.g., RA5) will operate, but logic levels will be standard TTL/ST as selected by the INLVL register.

TABLE 10: 20-PIN ALLOCATION TABLE (PIC16(L)F18346) (CONTINUED)

I/O ⁽²⁾	20-Pin PDI/SS/CI/OC/ID/IO	20-Pin UQFN	ADC	Reference	Comparator	NCO	DAC	DSM	Timers	CCP	PWM	CWG	MSSP	EUSART	CLC	CLKR	Interrupt	Pull-up	Basic
RC3	7	4	ANC3	—	C1IN3- C2IN3-	—	—	MDMIN ⁽¹⁾	—	CCP2 ⁽¹⁾	—	—	—	—	CLCIN1 ⁽¹⁾	—	IOCC3	Y	—
RC4	6	3	ANC4	—	—	—	—	—	—	—	—	—	—	—	—	—	IOCC4	Y	—
RC5	5	2	ANC5	—	—	—	—	MDCIN2 ⁽¹⁾	—	CCP1 ⁽¹⁾	—	—	—	—	—	—	IOCC5	Y	—
RC6	8	5	ANC6	—	—	—	—	—	—	—	—	—	SS ⁽⁴⁾	—	—	—	IOCC6	Y	—
RC7	9	6	ANC7	—	—	—	—	—	—	—	—	—	—	—	—	—	IOCC7	Y	—
VDD	1	18	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	VDD
VSS	20	17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	VSS
OUT ⁽²⁾	—	—	—	—	C1OUT	NCO	—	DSM	TMR0	CCP1	PWM5	CWG1A CWG2A	SDO1 SDO2	DT ⁽³⁾	CLC1OUT	CLKR	—	—	—
	—	—	—	—	C2OUT	—	—	—	—	CCP2	PWM6	CWG1B CWG2B	SCK1 SCK2	CK	CLC2OUT	—	—	—	—
	—	—	—	—	—	—	—	—	—	CCP3	—	CWG1C CWG2C	SCL1 ⁽³⁾ SCL2 ⁽³⁾	TX	CLC3OUT	—	—	—	—
	—	—	—	—	—	—	—	—	—	CCP4	—	CWG1D CWG2D	SDA1 ⁽³⁾ SDA2 ⁽³⁾	—	CLC4OUT	—	—	—	—

- Note**
- 1: Default peripheral input. Input can be moved to any other pin with the PPS input selection registers.
 - 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.
 - 4: These pins are configured for I²C logic levels; clock and data signals may be assigned to any of these pins. Assignments to other pins (e.g., RA5) will operate, but logic levels will be standard TTL/ST as selected by the INLVL register.

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.

Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO ITS CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE. Microchip disclaims all liability arising from this information and its use. Use of Microchip devices in life support and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights unless otherwise stated.

Trademarks

The Microchip name and logo, the Microchip logo, dsPIC, FlashFlex, flexPWR, JukeBlox, KEELoQ, KEELoQ logo, Kleer, LANCheck, MediaLB, MOST, MOST logo, MPLAB, OptoLyzer, PIC, PICSTART, PIC³² logo, RightTouch, SpyNIC, SST, SST Logo, SuperFlash and UNI/O are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

The Embedded Control Solutions Company and mTouch are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Analog-for-the-Digital Age, BodyCom, chipKIT, chipKIT logo, CodeGuard, dsPICDEM, dsPICDEM.net, ECAN, In-Circuit Serial Programming, ICSP, Inter-Chip Connectivity, KleerNet, KleerNet logo, MiWi, motorBench, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, MultiTRAK, NetDetach, Omniscient Code Generation, PICDEM, PICDEM.net, PICKit, PICtail, RightTouch logo, REAL ICE, SQI, Serial Quad I/O, Total Endurance, TSHARC, USBCheck, VariSense, ViewSpan, WiperLock, Wireless DNA, and ZENA are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

Silicon Storage Technology is a registered trademark of Microchip Technology Inc. in other countries.

GestIC is a registered trademark of Microchip Technology Germany II GmbH & Co. KG, a subsidiary of Microchip Technology Inc., in other countries.

All other trademarks mentioned herein are property of their respective companies.

© 2014-2016, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

ISBN: 978-1-5224-0183-4

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 - Karlsruhe

Tel: 49-721-625370

Germany - Munich

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

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

07/14/15