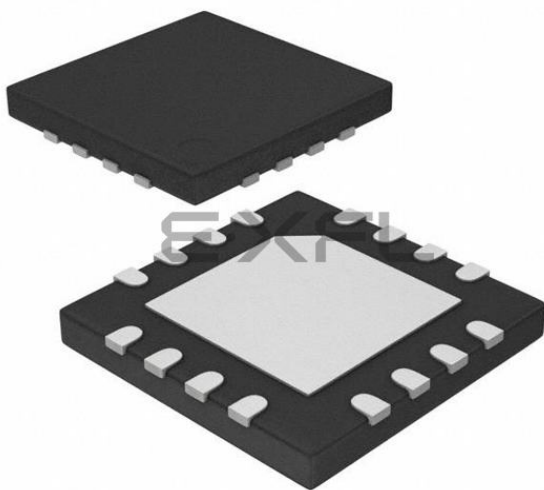




Welcome to [E-XFL.COM](https://www.e-xfl.com)

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	12
Program Memory Size	7KB (4K x 14)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	512 x 8
Voltage - Supply (Vcc/Vdd)	2.3V ~ 5.5V
Data Converters	A/D 11x10b; D/A 1x5b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 85°C (TA)
Mounting Type	Surface Mount
Package / Case	16-UQFN Exposed Pad
Supplier Device Package	16-UQFN (4x4)
Purchase URL	https://www.e-xfl.com/product-detail/microchip-technology/pic16f15324-i-jq

PIC16(L)F153XX

- Communication:
 - Up to two EUSART, RS-232, RS-485, LIN compatible
 - Up to two SPI
 - Two I²C, SMBus, PMBus™ compatible
- Up to 44 I/O Pins
 - Individually programmable pull-ups slew rate control Interrupt-on-Change with edge-select

Analog Peripherals

- Analog-to-Digital Converter (ADC):
 - 10-bit with up to 43 external channels
 - Conversion available during Sleep
- Two Comparator:
 - Low-Power/High-Speed mode
 - Fixed Voltage Reference at (non)inverting 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 level

Flexible Oscillator Structure

- High-Precision Internal Oscillator:
 - Selectable frequency range up to 32 MHz
 - $\pm 1\%$ at calibration (nominal)
- x2/x4 PLL with Internal and External Sources
- Low-Power Internal 32 kHz Oscillator (LFINTOSC)
- External 32 kHz Crystal Oscillator (SOCS)
- External Oscillator Block with:
 - Three crystal/resonator modes up to 20 MHz
 - Three external clock modes up to 20 MHz
 - Fail-Safe Clock Monitor
 - Allows for safe shutdown if peripherals clock stops
 - Oscillator Start-up Timer (OST)
 - Ensures stability of crystal oscillator sources

PIC16(L)F153XX

TABLE 1: PIC16(L)F153XX FAMILY TYPES

Device	Data Sheet Index	Program Flash Memory (KW)	Program Flash Memory (KB)	Storage Area Flash (B)	Data SRAM (bytes)	I/O Pins	10-Bit ADC	5-Bit DAC	Comparator	8-Bit/ (with HLT) Timer	16-Bit Timer	Window Watchdog Timer	CCP/10-Bit PWM	CWG	NCO	CLC	Zero Cross Detect	Temperature Sensor	Memory Access Partition	Device Information Area	EUSART/ I ² C/SPI	Peripheral Pin Select	Peripheral Module Disable	Debug ⁽¹⁾
PIC16F15313	(C)	2	3.5	224	256	6	5	1	1	1	2	Y	2/4	1	1	4	Y	Y	Y	Y	1/1	Y	Y	I
PIC16F15323	(C)	2	3.5	224	256	12	11	1	2	1	2	Y	2/4	1	1	4	Y	Y	Y	Y	1/1	Y	Y	I
PIC16F15324	(D)	4	7	224	512	12	11	1	2	1	2	Y	2/4	1	1	4	Y	Y	Y	Y	2/1	Y	Y	I
PIC16F15325	(B)	8	14	224	1024	12	11	1	2	1	2	Y	2/4	1	1	4	Y	Y	Y	Y	2/1	Y	Y	I
PIC16F15344	(D)	4	7	224	512	18	17	1	2	1	2	Y	2/4	1	1	4	Y	Y	Y	Y	2/1	Y	Y	I
PIC16F15345	(B)	8	14	224	1024	18	17	1	2	1	2	Y	2/4	1	1	4	Y	Y	Y	Y	2/1	Y	Y	I
PIC16F15354	(A)	4	7	224	512	25	24	1	2	1	2	Y	2/4	1	1	4	Y	Y	Y	Y	2/2	Y	Y	I
PIC16F15355	(A)	8	14	224	1024	25	24	1	2	1	2	Y	2/4	1	1	4	Y	Y	Y	Y	2/2	Y	Y	I
PIC16F15356	(E)	16	28	224	2048	25	24	1	2	1	2	Y	2/4	1	1	4	Y	Y	Y	Y	2/2	Y	Y	I
PIC16F15375	(F)	8	14	224	1024	36	35	1	2	1	2	Y	2/4	1	1	4	Y	Y	Y	Y	2/2	Y	Y	I
PIC16F15376	(E)	16	28	224	2048	36	35	1	2	1	2	Y	2/4	1	1	4	Y	Y	Y	Y	2/2	Y	Y	I
PIC16F15385	(F)	8	14	224	1024	44	43	1	2	1	2	Y	2/4	1	1	4	Y	Y	Y	Y	2/2	Y	Y	I
PIC16F15386	(E)	16	28	224	2048	44	43	1	2	1	2	Y	2/4	1	1	4	Y	Y	Y	Y	2/2	Y	Y	I

Note 1: I - Debugging integrated on chip.

Data Sheet Index:

A:	Future Release	PIC16(L)F15354/5 Data Sheet, 28-Pin
B:	Future Release	PIC16(L)F15325/45 Data Sheet, 14/20-Pin
C:	Future Release	PIC16(L)F15313/23 Data Sheet, 8/14-Pin
D:	Future Release	PIC16(L)F15324/44 Data Sheet, 14/20-Pin
E:	Future Release	PIC16(L)F15356/76/86 Data Sheet, 28/40/48-Pin
F:	Future Release	PIC16(L)F15375/85 Data Sheet, 40/48-Pin

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

PIC16(L)F153XX

TABLE 2: PACKAGES

Device	(S)PDIP	SOIC	SSOP	TSSOP	(U)DFN (3x3)	QFN (4x4)	QFN (6x6)	UQFN (4x4)	TQFP	QFN (8x8)	UQFN (5x5)	UQFN (6x6)
PIC16(L)F15313	X	X	—	—	X	—	—	—	—	—	—	—
PIC16(L)F15323	X	X	—	X	—	X	—	X	—	—	—	—
PIC16(L)F15324	X	X	—	X	—	X	—	X	—	—	—	—
PIC16(L)F15325	X	X	—	X	—	X	—	X	—	—	—	—
PIC16(L)F15344	X	X	X	—	—	X	—	X	—	—	—	—
PIC16(L)F15345	X	X	X	—	—	X	—	X	—	—	—	—
PIC16(L)F15354	X	X	X	—	—	—	X	X	—	—	—	—
PIC16(L)F15355	X	X	X	—	—	—	X	X	—	—	—	—
PIC16(L)F15356	X	X	X	—	—	—	X	X	—	—	—	—
PIC16(L)F15375	X	—	—	—	—	—	—	—	X	X	X	—
PIC16(L)F15376	X	—	—	—	—	—	—	—	X	X	X	—
PIC16(L)F15385	—	—	—	—	—	—	—	—	X	—	—	X
PIC16(L)F15386	—	—	—	—	—	—	—	—	X	—	—	X

Note: Pin details are subject to change.

PIN DIAGRAMS

FIGURE 1: 8-PIN PDIP, SOIC, MSOP, FOR PIC16(L)F15313

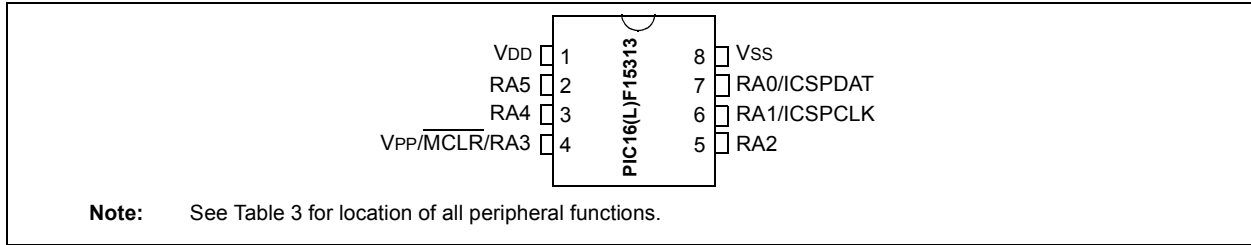


FIGURE 2: 14-PIN PDIP, SOIC, TSSOP FOR PIC16(L)F15323

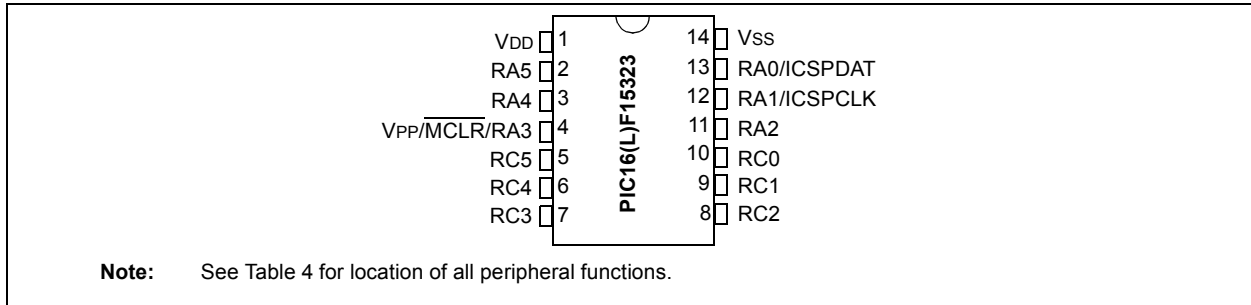


FIGURE 3: 14-PIN PDIP, TSSOP FOR PIC16(L)F15324 AND PIC16(L)F15325

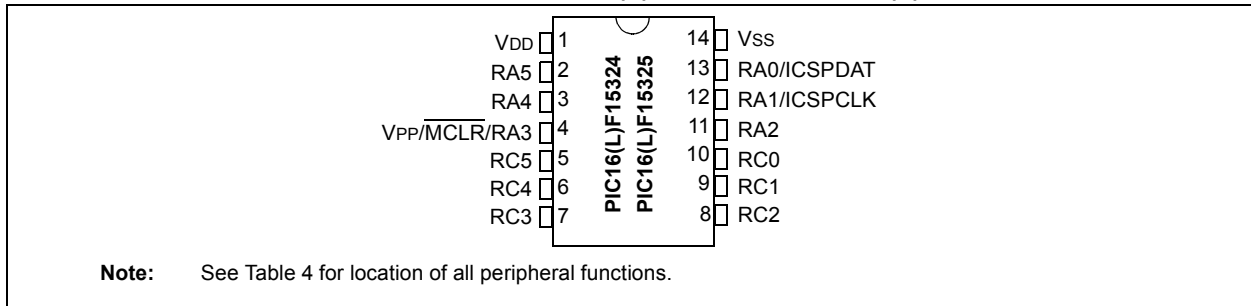


FIGURE 4: 20-PIN PDIP, SOIC, SSOP FOR PIC16(L)F15344, PIC16(L)F15345

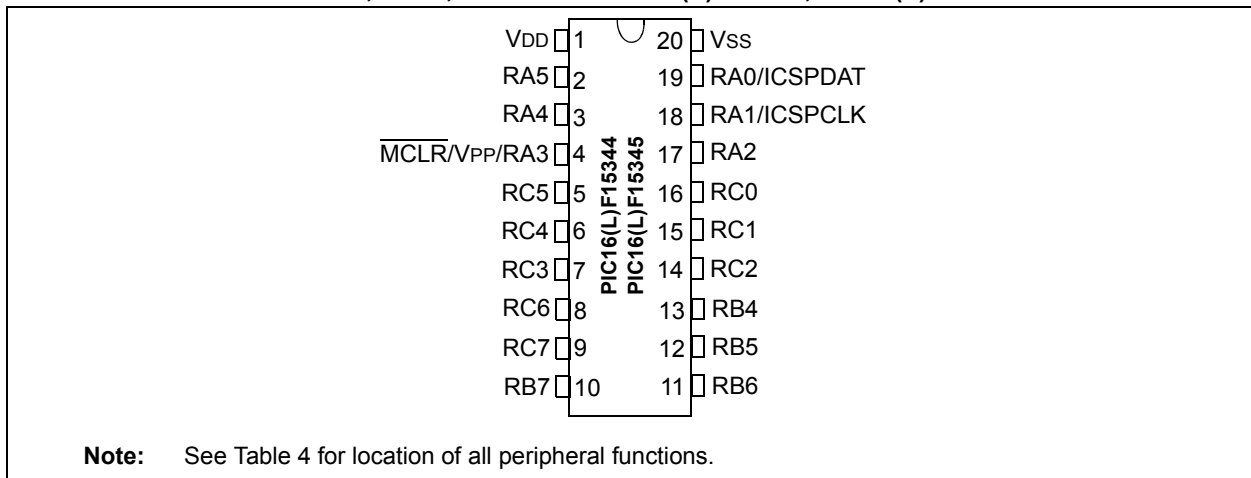


FIGURE 7: 16-PIN QFN/UQFN (4X4) FOR PIC16(L)F15323, PIC16(L)F15324, PIC16(L)F15325

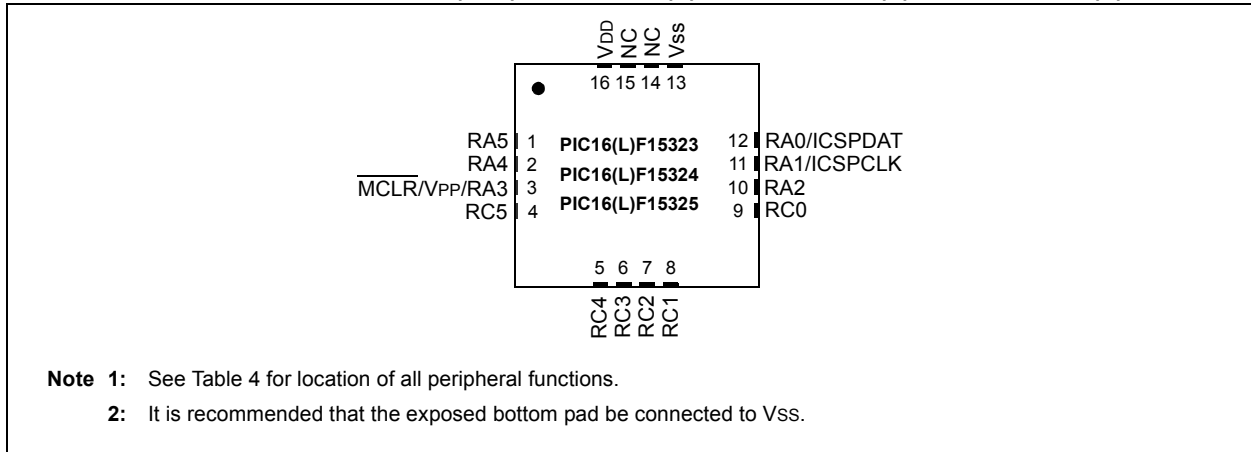
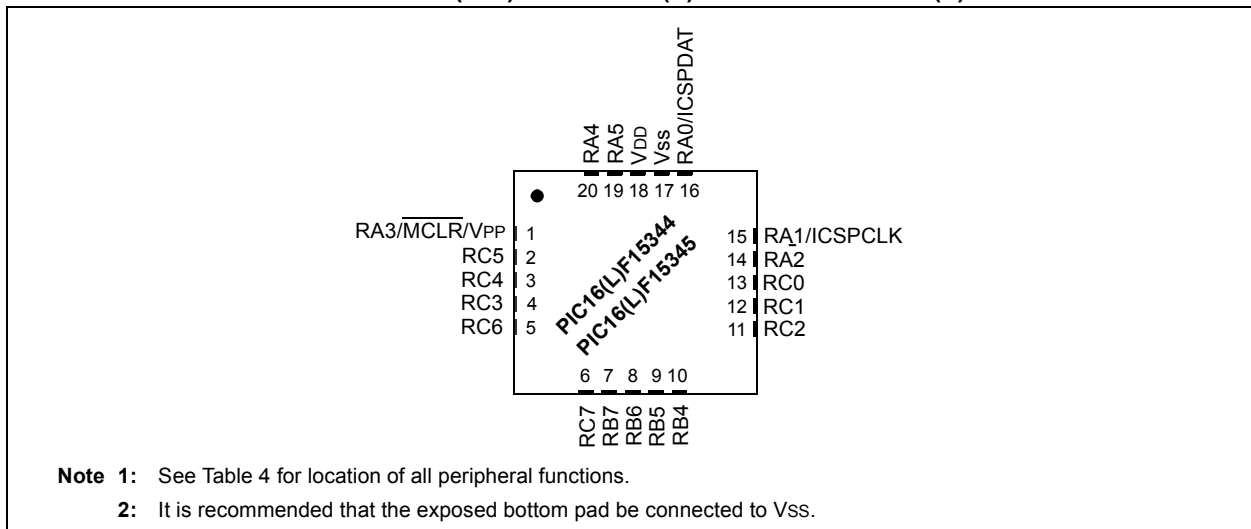


FIGURE 8: 20-PIN QFN/UQFN (4x4) FOR PIC16(L)F15344 AND PIC16(L)F15345



PIC16(L)F153XX

FIGURE 9: 28-PIN UQFN (4X4) FOR PIC16(L)F15354, PIC16(L)F15355, PIC16(L)F15356

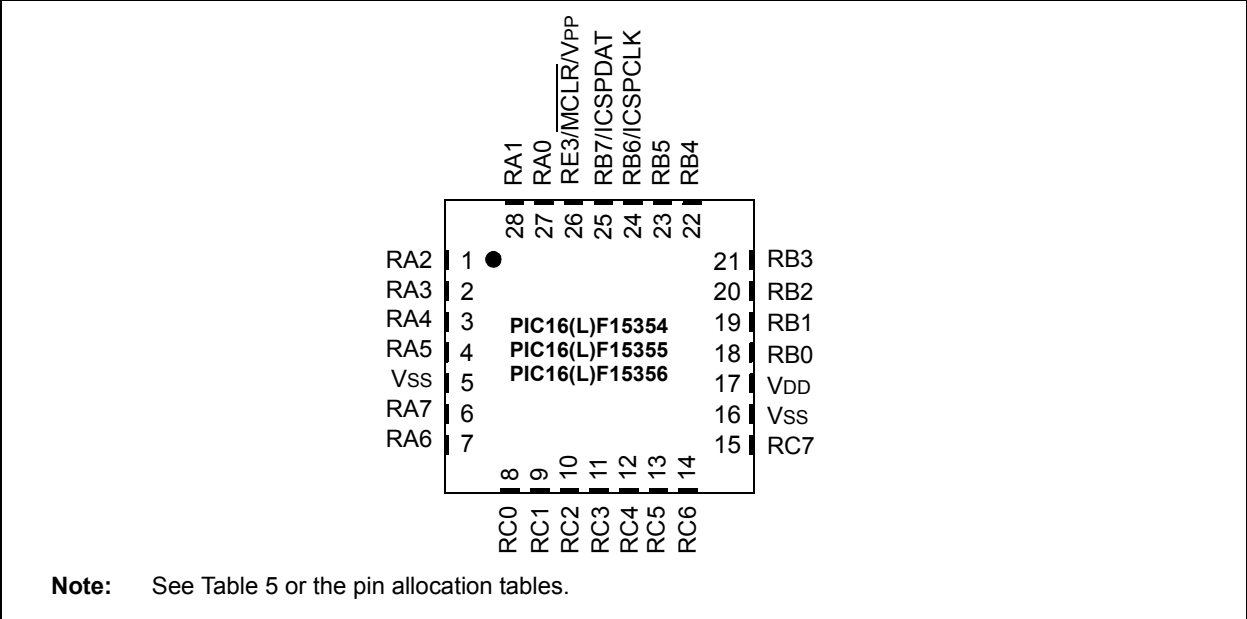


FIGURE 10: 28-PIN QFN (6X6) FOR PIC16(L)F15354, PIC16(L)F15355, PIC16(L)F15356

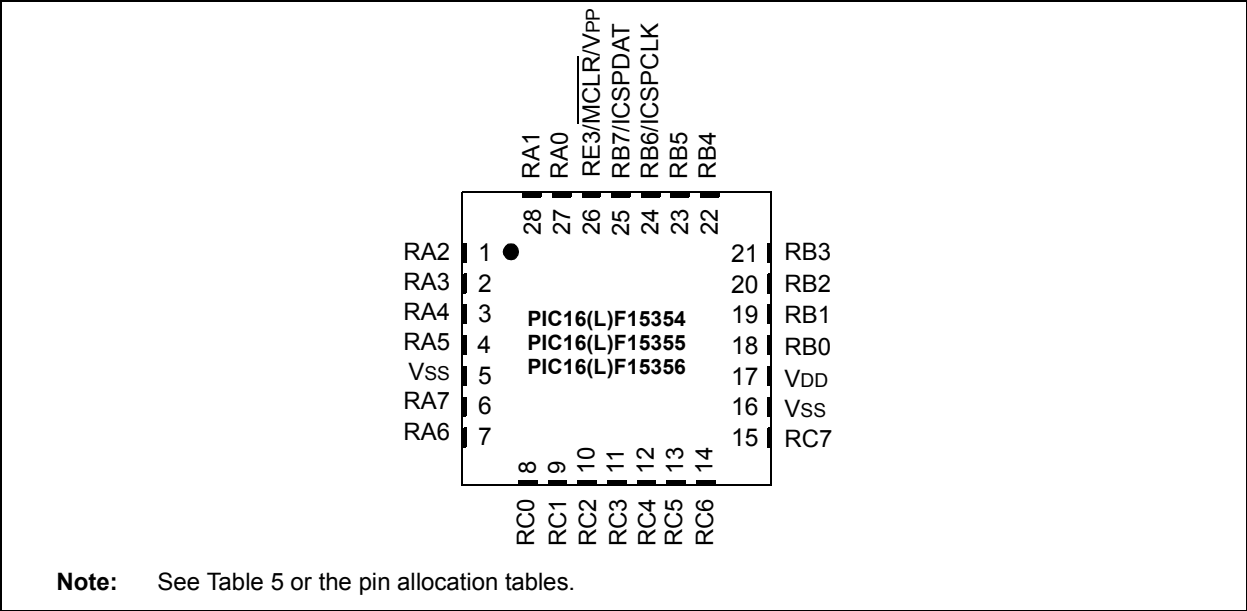


FIGURE 11: 40-PIN UQFN (5X5) FOR PIC16(L)F15375, PIC16(L)F15376

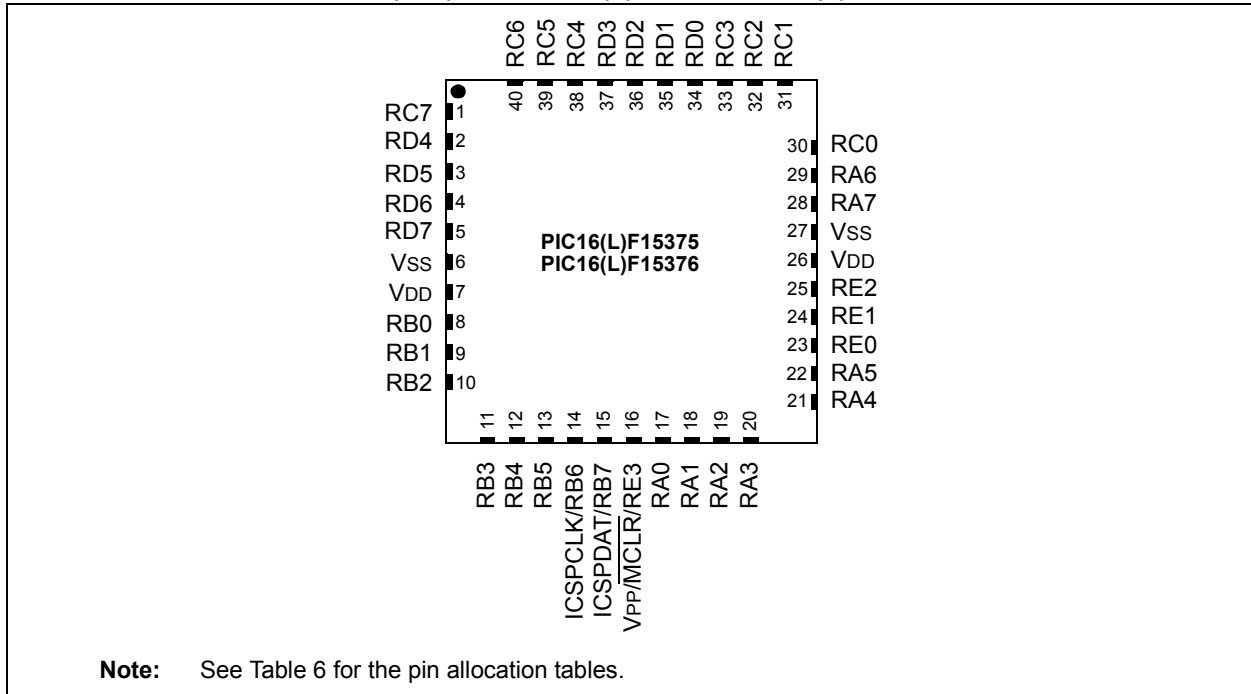
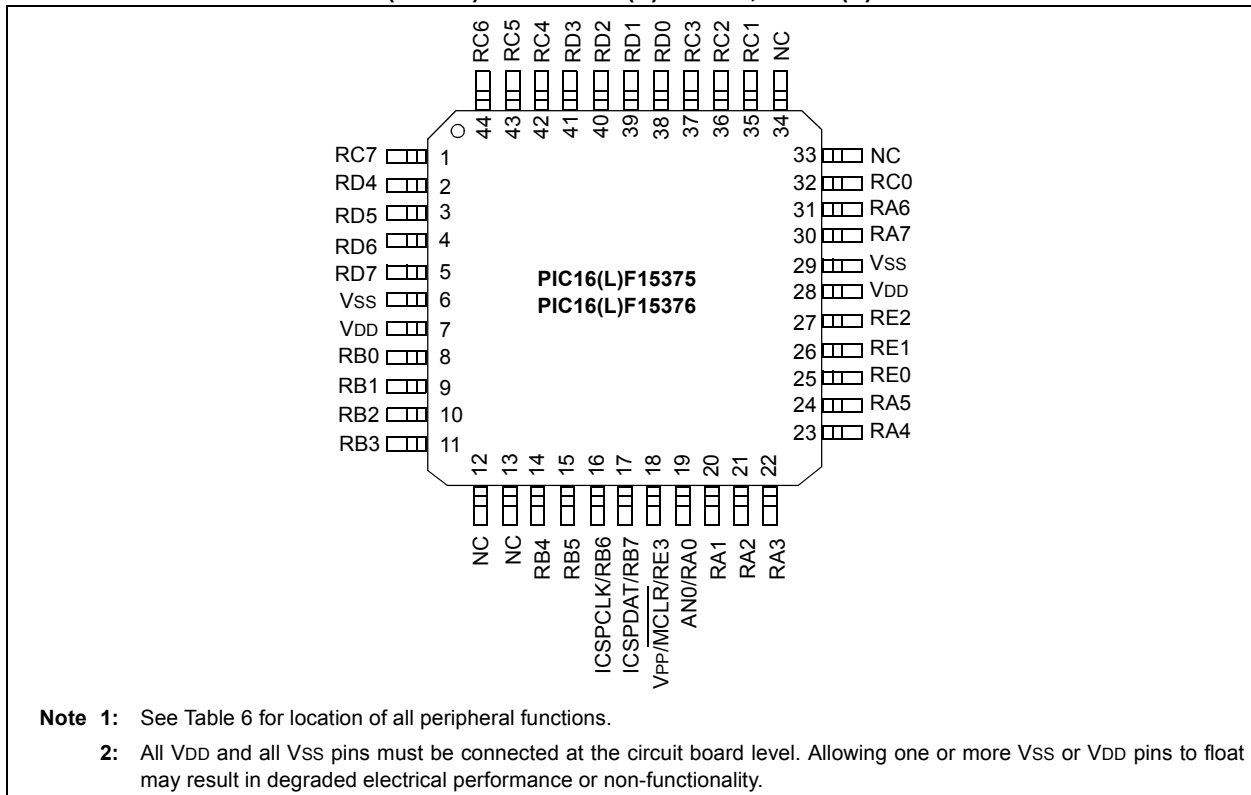


FIGURE 12: 44-PIN TQFP (10X10) FOR PIC16(L)F15375, PIC16(L)F15376



PIC16(L)F153XX

FIGURE 13: 44-PIN QFN (8X8X0.9) FOR PIC16(L)F15375, PIC16(L)F15376

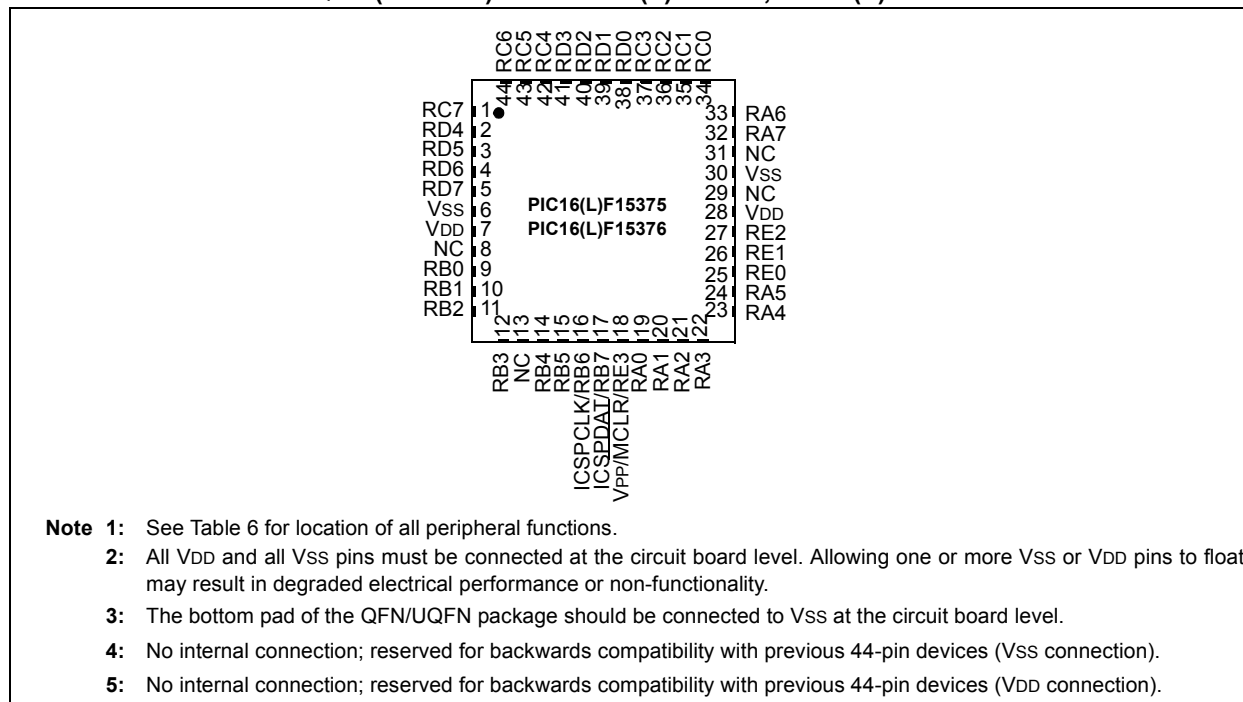


FIGURE 14: 48-PIN UQFN (6X6) FOR PIC16(L)F15385, PIC16(L)F15386

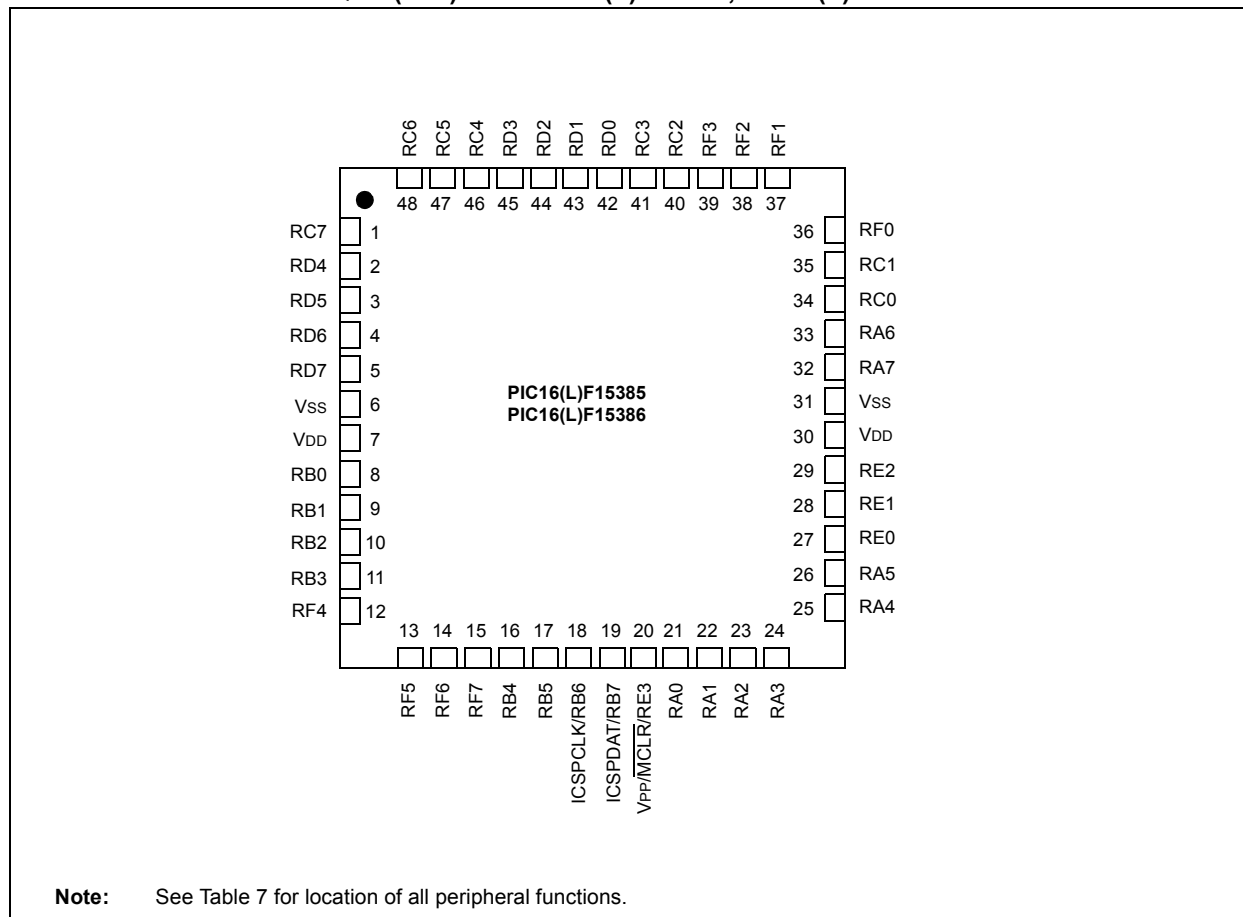
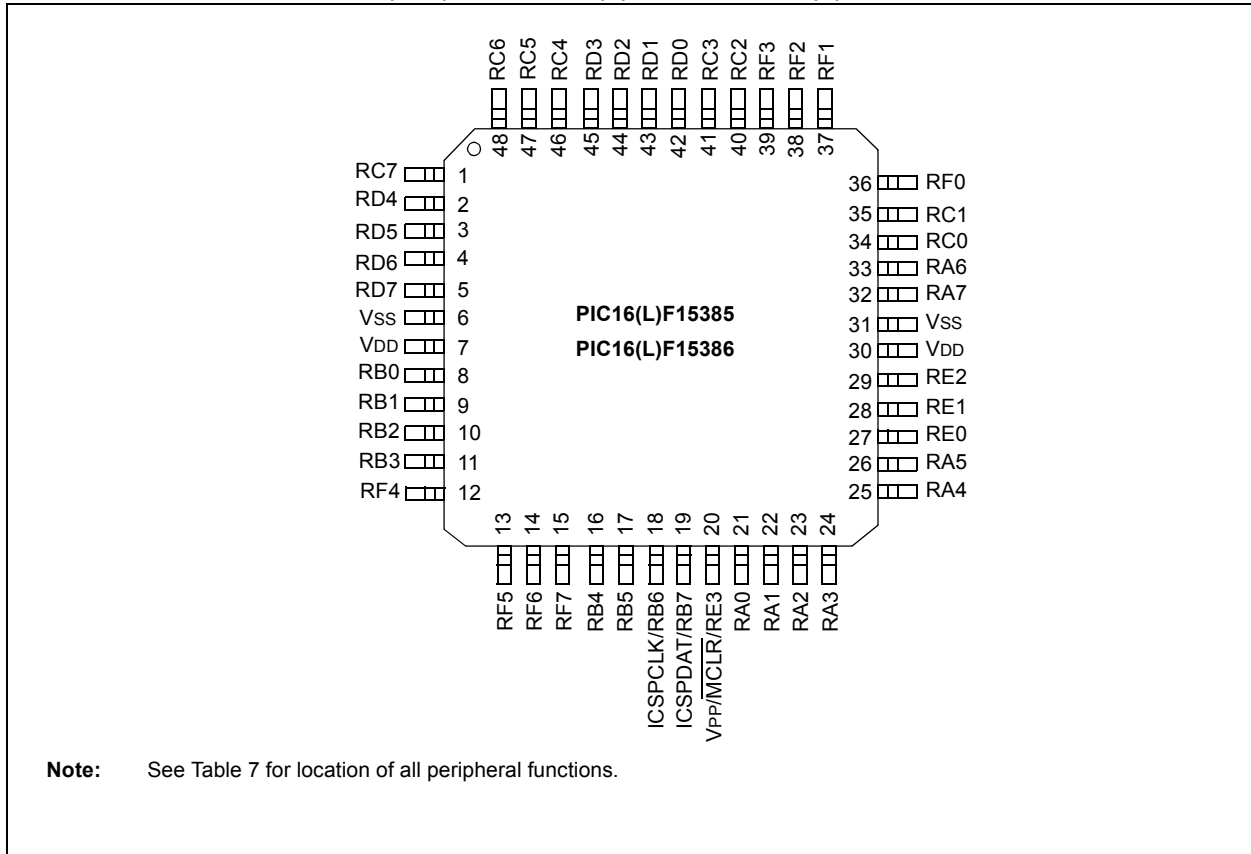


FIGURE 15: 48-PIN TQFP (7X7) FOR PIC16(L)F15385, PIC16(L)F15386



PIN ALLOCATION TABLES

TABLE 3: 8-PIN ALLOCATION TABLE (PIC16(L)F15313)

I/O I ⁽²⁾	8-Pin PDIP/SOIC/MSOP	ADC	Reference	Comparator	NCO	DAC	Timers	CCP	PWM	CWG	MSSP	ZCD	EUSART	CLC	CLKR	Interrupt	Pull-up	Basic
RA0	7	ANA0	—	C1IN0+	—	DAC1OUT	—	—	—	—	—	—	TX/CK ⁽¹⁾	CLCIN3 ⁽¹⁾	—	IOCA0	Y	ICDDAT/ ICSPDAT
RA1	6	ANA1	V _{REF+}	C1IN0-	—	DA1 _{REF+}	T0CKI ⁽¹⁾	—	—	—	SSP1CLK ^{(1),(4)} SSP1DAT ^{(1),(4)}	—	RX/DT ⁽¹⁾	CLCIN2 ⁽¹⁾	—	IOCA1	Y	ICDCLK/ ICSPCLK
RA2	5	ANA2	V _{REF-}	—	—	DAC1 _{REF-}	—	—	—	CWG1 ⁽¹⁾	SSP1CLK ^{(1),(4)} SSP1DAT ^{(1),(4)}	ZCD1	—	—	—	INT ⁽¹⁾ IOCA2	Y	—
RA3	4	—	—	—	—	—	—	—	—	—	SSP1SS ⁽¹⁾	—	—	CLCIN0 ⁽¹⁾	—	IOCA3	Y	MCLR V _{PP}
RA4	3	ANA4	—	C1IN1-	—	—	T1G ⁽¹⁾ SOSCO	—	—	—	—	—	—	—	—	IOCA4	Y	CLKOUT OSC2
RA5	2	ANA5 ADACT ⁽¹⁾	—	—	—	—	T1CKI ⁽¹⁾ T2IN ⁽¹⁾ SOSCIN SOSCI	CCP1 ⁽¹⁾ CCP2 ⁽¹⁾	—	—	—	—	—	CLCIN1 ⁽¹⁾	—	IOCA5	Y	CLKIN OSC1 EIN
V _{DD}	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	V _{DD}
V _{SS}	8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	V _{SS}
OUT ⁽²⁾	—	—	—	C1OUT	NCO1OUT	—	TMR0	CCP1	PWM3	CWG1A	SDO1	—	DT1 ⁽³⁾	CLC1OUT	CLKR	—	—	—
	—	—	—	C2OUT	—	—	—	CCP2	PWM4	CWG1B	SCK1	—	CK1	CLC2OUT	—	—	—	—
	—	—	—	—	—	—	—	—	PWM5	CWG1C	SCL1 ^{(3),(4)}	—	TX1	CLC3OUT	—	—	—	—
	—	—	—	—	—	—	—	—	PWM6	CWG1D	SDA1 ^{(3),(4)}	—	—	CLC4OUT	—	—	—	—

- Note**
- 1: This is a PPS remappable input signal. The input function may be moved from the default location shown to one of several other PORTx pins.
 - 2: All digital output signals shown in this row are PPS re-mappable. These signals may be mapped to output onto one of several PORTx pin options.
 - 3: This is a bidirectional signal. For normal module operation, the firmware should map this signal to the same pin in both the PPS input and PPS output registers.
 - 4: These pins are configured for I²C logic levels. PPS assignments to the other pins will operate, but input logic levels will be standard TTL/ST as selected by the INLV_L register, instead of the I²C specific or SMBUS input buffer thresholds.

TABLE 4: 14/16/20-PIN ALLOCATION TABLE (PIC16(L)F15323, PIC16(L)F15324, PIC16(L)F15325, PIC16(L)F15344, PIC16(L)F15345)

I/O(2)	14-Pin PDIP/SSOP	16-Pin QFN/UQFN	20-Pin PDIP/SSOP	20-Pin QFN	ADC	Reference	Comparator	NCO	DAC	Timers	CCP	PWM	CWG	MSSP	ZCD	EUSART	CLC	CLKR	Interrupt	Pull-up	Basic
RA0	13	12	19	16	ANA0	—	C1IN0+	—	DAC1OUT	—	—	—	—	—	—	—	—	—	IOCA0	Y	ICDDAT/ ICSPDAT
RA1	12	11	18	15	ANA1	V _{REF+}	C1IN0-	—	DA1 _{REF+}	T0CKI ⁽¹⁾	—	—	—	—	—	—	—	—	IOCA1	Y	ICDCLK/ ICSPCLK
RA2	11	10	17	14	ANA2	V _{REF-}	—	—	DAC1 _{REF-}	—	—	—	CWG1 ⁽¹⁾	—	ZCD1	—	CLCIN0 ^{(1),(6)}	—	INT ⁽¹⁾ IOCA2	Y	—
RA3	4	3	4	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	IOCA3	Y	MCLR V _{PP}
RA4	3	2	3	20	ANA4	—	C1IN1-	—	—	T1G ⁽¹⁾ SOSCO	—	—	—	—	—	—	—	—	IOCA4	Y	CLKOUT OSC2
RA5	2	1	2	19	ANA5	—	—	—	—	T1CKI ⁽¹⁾ T2IN SOSCIN SOSCI	—	—	—	—	—	—	CLCIN3 ^{(1),(5)}	—	IOCA5	Y	CLKIN OSC1 EIN
RC0	10	9	16	13	ANC0	—	C2IN0+	—	—	—	—	—	—	SSP1CLK ^{(1),(5)} SSP1DAT ^{(1),(5)}	—	—	—	—	IOCC0	Y	—
RC1	9	8	15	12	ANC1	—	C1IN1- C2IN1-	—	—	—	—	—	—	SSP1CLK ^{(1),(5)} SSP1DAT ^{(1),(5)}	—	—	CLCIN2 ^{(1),(5)}	—	IOCC1	Y	—
RC2	8	7	14	11	ANC2	—	C1IN2- C2IN2-	—	—	—	—	—	—	—	—	—	—	—	IOCC2	Y	—
RC3	7	6	7	4	ANC3	—	C1IN3- C2IN3-	—	—	—	CCP2	—	—	SSP1SS ⁽⁵⁾	—	—	CLCIN1 ^{(1),(6)} CLCIN0 ^{(1),(5)}	—	IOCC3	Y	—
RC4	6	5	6	3	ANC4	—	—	—	—	—	—	—	—	SSP2CLK ^{(1),(5)} SSP2DAT ^{(1),(5)}	—	TX1/CK1 ⁽⁵⁾	CLCIN1 ^{(1),(5)}	—	IOCC4	Y	—
RC5	5	4	5	2	ANC5	—	—	—	—	—	CCP1	—	—	SSP1CLK ^{(1),(5)} SSP1DAT ^{(1),(5)}	—	RX1/DT1 ⁽⁵⁾	—	—	IOCC5	Y	—
RC6	—	—	8	5	ANC6	—	—	—	—	—	—	—	—	SSP1SS1 ⁽⁶⁾	—	—	—	—	IOCC6	Y	—
RC7	—	—	9	6	ANC7	—	—	—	—	—	—	—	—	—	—	—	—	—	IOCC7	Y	—
RB4	—	—	13	10	ANB4 ADACT ⁽¹⁾	—	—	—	—	—	—	—	—	SSP1CLK ^{(1),(6)} SSP1DAT ^{(1),(6)}	—	—	CLCIN2 ^{(1),(6)}	—	IOCB4	—	—
RB5	—	—	12	9	ANB5	—	—	—	—	—	—	—	—	SSP2CLK ^{(1),(6)} SSP2DAT ^{(1),(6)}	—	RX1/DT1 ⁽⁶⁾	CLCIN3 ^{(1),(6)}	—	IOCB5	—	—

PIC16(L)F153XX

TABLE 4: 14/16/20-PIN ALLOCATION TABLE (PIC16(L)F15323, PIC16(L)F15324, PIC16(L)F15325, PIC16(L)F15344, PIC16(L)F15345)

I/O ⁽²⁾	14-Pin PDIP/SOIC/TSSOP	16-Pin QFN/UQFN	20-Pin PDIP/SOIC/SSOP	20-Pin QFN	ADC	Reference	Comparator	NCO	DAC	Timers	CCP	PWM	CWG	MSSP	ZCD	EUSART	CLC	CLKR	Interrupt	Pull-up	Basic
RB6	—	—	11	8	ANB6	—	—	—	—	—	—	—	—	SSP1CLK ^{(1),(6)} SSP1DAT ^{(1),(6)}	—	—	—	—	IOCB6	Y	—
RB7	—	—	10	7	ANB7	—	—	—	—	—	—	—	—	SSP2CLK ^{(1),(6)} SSP2DAT ^{(1),(6)}	—	TX1/CK1 ⁽⁶⁾	—	—	IOCB7	Y	—
V _{DD}	1	16	1	18	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	V _{DD}
V _{SS}	14	13	20	17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	V _{SS}
OUT ⁽²⁾	—	—	—	—	—	—	C1OUT	NCO1OUT	—	TMR0	CCP1	PWM3	CWG1A	SDO1 SDO2	—	DT1 ⁽³⁾	CLC1OUT	CLKR	—	—	—
	—	—	—	—	—	—	C2OUT	—	—	—	CCP2	PWM4	CWG1B	SCK1 SCK2	—	CK1	CLC2OUT	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	PWM5	CWG1C	SCL1 ^{(3),(4)} SCL2 ^{(3),(4)}	—	TX1	CLC3OUT	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	PWM6	CWG1D	SDA1 ^{(3),(4)} SDA2 ^{(3),(4)}	—	—	CLC4OUT	—	—	—	—

- Note**
- 1: This is a PPS re-mappable input signal. The input function may be moved from the default location shown to one of several other PORTx pins.
 - 2: All digital output signals shown in this row are PPS re-mappable. These signals may be mapped to output onto one of several PORTx pin options.
 - 3: This is a bidirectional signal. For normal module operation, the firmware should map this signal to the same pin in both the PPS input and PPS output registers.
 - 4: These pins are configured for I²C logic levels. PPS assignments to the other pins will operate, but input logic levels will be standard TTL/ST as selected by the INLVL register, instead of the I²C specific or SMBUS input buffer thresholds.
 - 5: For 14 and 16-pin package only.
 - 6: For 20-pin package only.

TABLE 5: 28-PIN ALLOCATION TABLE (PIC16(L)F15354, PIC16(L)F15355, PIC16(L)F15356)

I/O ⁽²⁾	28-Pin PDIP/SSOP	28-Pin (U)QFN	ADC	Reference	Comparator	NCO	DAC	Timers	CCP	PWM	CWG	MSSP	ZCD	EUSART	CLC	CLKR	Interrupt	Pull-up	Basic
RA0	2	27	ANA0	—	C1IN0- C2IN0-	—	—	—	—	—	—	—	—	—	CLCIN0 ⁽¹⁾	—	IOCA0	Y	—
RA1	3	28	ANA1	—	C1IN1- C2IN1-	—	—	—	—	—	—	—	—	—	CLCIN1 ⁽¹⁾	—	IOCA1	Y	—
RA2	4	1	ANA2	—	C1IN0+ C2IN0+	—	—	—	—	—	—	—	—	—	—	—	IOCA2	Y	—
RA3	5	2	ANA3	VREF+	C1IN1+	—	DACREF+	—	—	—	—	—	—	—	—	—	IOCA3	Y	—
RA4	6	3	ANA4	—	—	—	—	T0CKI	—	—	—	—	—	—	—	—	IOCA4	Y	—
RA5	7	4	ANA5	—	—	—	—	T1G ⁽¹⁾	—	—	—	SSP1SS ⁽¹⁾	—	—	—	—	IOCA5	Y	—
RA6	10	7	ANA6	—	—	—	—	—	—	—	—	—	—	—	—	—	IOCA6	Y	CLKOUT
RA7	9	6	ANA7	—	—	—	—	—	—	—	—	—	—	—	—	—	IOCA7	Y	CLKIN
RB0	21	18	ANB0	—	C2IN1+	—	—	—	—	—	CWG1 ⁽¹⁾	SSP2SS ⁽¹⁾	ZCD1	—	—	—	INT ⁽¹⁾ IOCB0	Y	—
RB1	22	19	ANB1	—	C1IN3- C2IN3-	—	—	—	—	—	—	SSP1CLK ⁽¹⁾ SSP1DAT ⁽¹⁾	—	—	—	—	IOCB1	Y	—
RB2	23	20	ANB2	—	—	—	—	—	—	—	—	SSP1CLK ⁽¹⁾ SSP1DAT ⁽¹⁾	—	—	—	—	IOCB2	Y	—
RB3	24	21	ANB3	—	C1IN2- C2IN2-	—	—	—	—	—	—	—	—	—	—	—	IOCB3	Y	—
RB4	25	22	ANB4 ADACT ⁽¹⁾	—	—	—	—	—	—	—	—	—	—	—	—	—	IOCB4	Y	—
RB5	26	23	ANB5	—	—	—	—	—	—	—	—	—	—	—	—	—	IOCB5	Y	—
RB6	27	24	ANB6	—	—	—	—	—	—	—	—	—	—	TX2 CK2 ⁽¹⁾	CLCIN2 ⁽¹⁾	—	IOCB6	Y	ICDCLK ICSPCLK
RB7	28	25	ANB7	—	—	—	DAC1OUT2	—	—	—	—	—	—	RX2 DT2 ⁽¹⁾	CLCIN3 ⁽¹⁾	—	IOCB7	Y	ICDDAT ICSPDAT
RC0	11	8	ANC0	—	—	—	—	SOSCO T1CKI	—	—	—	—	—	—	—	—	IOCC0	Y	—
RC1	12	9	ANC1	—	—	—	—	SOSCI	CCP2 ⁽¹⁾	—	—	—	—	—	—	—	IOCC1	Y	—
RC2	13	10	ANC2	—	—	—	—	—	CCP1 ⁽¹⁾	—	—	—	—	—	—	—	IOCC2	Y	—
RC3	14	11	ANC3	—	—	—	—	T2IN ⁽¹⁾	—	—	—	SSP1CLK ⁽¹⁾ SSP1DAT ⁽¹⁾	—	—	—	—	IOCC3	Y	—
RC4	15	12	ANC4	—	—	—	—	—	—	—	—	SSP1CLK ⁽¹⁾ SSP1DAT ⁽¹⁾	—	—	—	—	IOCC4	Y	—

TABLE 5: 28-PIN ALLOCATION TABLE (PIC16(L)F15354, PIC16(L)F15355, PIC16(L)F15356) (CONTINUED)

I/O ⁽²⁾	28-Pin PDIP/SSOP	28-Pin (U)QFN	ADC	Reference	Comparator	NCO	DAC	Timers	CCP	PWM	CWG	MSSP	ZCD	EUSART	CLC	CLKR	Interrupt	Pull-up	Basic
RC5	16	13	ANC5	—	—	—	—	—	—	—	—	—	—	—	—	—	IOCC5	Y	—
RC6	17	14	ANC6	—	—	—	—	—	—	—	—	—	—	TX1 CK1 ⁽¹⁾	—	—	IOCC6	Y	—
RC7	18	15	ANC7	—	—	—	—	—	—	—	—	—	—	RX1 DT1 ⁽¹⁾	—	—	IOCC7	Y	—
RE3	1	26	ANE3	—	—	—	—	—	—	—	—	—	—	—	—	—	IOCE3	Y	MCLR V _{PP}
VDD	20	17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	VDD
VSS	8	16	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	VSS
VSS	19	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	VSS
VSEL0	19	17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
OUT ⁽²⁾	—	—	—	—	C1OUT	NCO1OUT	—	TMR0	CCP1	PWM3	CWG1A CWG2A	SDO	—	DT ⁽³⁾	CLC1OUT	CLKR	—	—	—
	—	—	—	—	C2OUT	—	—	—	CCP2	PWM4	CWG1B CWG2B	SCK	—	CK	CLC2OUT	—	—	—	—
	—	—	—	—	—	—	—	—	—	PWM5	CWG1C CWG2C	SCL ^{(3),(4)}	—	TX	CLC3OUT	—	—	—	—
	—	—	—	—	—	—	—	—	—	PWM6	CWG1D CWG2D	SDA ^{(3),(4)}	—	—	CLC4OUT	—	—	—	—

- Note**
- 1: This is a PPS re-mappable input signal. The input function may be moved from the default location shown to one of several other PORTx pins.
 - 2: All digital output signals shown in this row are PPS re-mappable. These signals may be mapped to output onto one of several PORTx pin options.
 - 3: This is a bidirectional signal. For normal module operation, the firmware should map this signal to the same pin in both the PPS input and PPS output registers.
 - 4: These pins are configured for I²C logic levels. PPS assignments to the other pins will operate, but input logic levels will be standard TTL/ST as selected by the INLVL register, instead of the I²C specific or SMBUS input buffer thresholds.

TABLE 6: 40/44-PIN ALLOCATION TABLE (PIC16(L)F15375, PIC16(L)F15376) (CONTINUED)

I/O ⁽²⁾	40-Pin PDIP	40-Pin UQFN	44-Pin QFN	44-Pin TQFP	ADC	Reference	Comparator	NCO	DAC	Timers	CCP	PWM	CWG	MSSP	ZCD	EUSART	CLC	CLKR	Interrupt	Pull-up	Basic
RC5	24	39	43	43	ANC5	—	—	—	—	—	—	—	—	—	—	—	—	—	IOCC5	Y	—
RC6	25	40	44	44	ANC6	—	—	—	—	—	—	—	—	—	—	TX1 CK1 ⁽¹⁾	—	—	IOCC6	Y	—
RC7	26	1	1	1	ANC7	—	—	—	—	—	—	—	—	—	—	RX1 DT1 ⁽¹⁾	—	—	IOCC7	Y	—
RD0	19	34	38	38	AND0	—	—	—	—	—	—	—	—	SSP2CLK ⁽¹⁾ SSP2DAT ⁽¹⁾	—	—	—	—	—	—	—
RD1	20	35	39	39	AND1	—	—	—	—	—	—	—	—	SSP2CLK ⁽¹⁾ SSP2DAT ⁽¹⁾	—	—	—	—	—	—	—
RD2	21	36	40	40	AND2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RD3	22	37	41	41	AND3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RD4	27	2	2	2	AND4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RD5	28	3	3	3	AND5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RD6	29	4	4	4	AND6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RD7	30	5	5	5	AND7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE0	8	23	25	25	ANE0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE1	9	24	26	26	ANE1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE2	10	25	27	27	ANE2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE3	1	16	18	18	ANE3	—	—	—	—	—	—	—	—	—	—	—	—	—	IOCE3	Y	MCLR V _{PP}
VDD	11	26	7	7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	VDD
VDD	32	7	28	28	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	VDD
VSS	12	27	6	6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	VSS
VSS	31	6	30	29	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	VSS
VSEL0	31	6	6	6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

TABLE 6: 40/44-PIN ALLOCATION TABLE (PIC16(L)F15375, PIC16(L)F15376) (CONTINUED)

I/O ⁽²⁾	40-Pin PDIP	40-Pin UQFN	44-Pin QFN	44-Pin TQFP	ADC	Reference	Comparator	NCO	DAC	Timers	CCP	PWM	CWG	MSSP	ZCD	EUSART	CLC	CLKR	Interrupt	Pull-up	Basic
OUT ⁽²⁾	—	—	—	—	—	—	C1OUT	NCO1OUT	—	TMR0	CCP1	PWM3	CWG1A CWG2A	SDO1 SDO2	—	DT ⁽³⁾	CLC1OUT	CLKR	—	—	—
	—	—	—	—	—	—	C2OUT	—	—	—	CCP2	PWM4	CWG1B CWG2B	SCK1 SCK2	—	CK1 CK2	CLC2OUT	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	PWM5	CWG1C CWG2C	SCK1 ^{(3),(4)} SCL2 ^{(3),(4)}	—	TX1 TX2	CLC3OUT	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	PWM6	CWG1D CWG2D	SDA1 ^{(3),(4)} SDA2 ^{(3),(4)}	—	—	CLC4OUT	—	—	—	—

- Note**
- 1: This is a PPS re-mappable input signal. The input function may be moved from the default location shown to one of several other PORTx pins.
 - 2: All digital output signals shown in this row are PPS remappable. These signals may be mapped to output onto one of several PORTx pin options.
 - 3: This is a bidirectional signal. For normal module operation, the firmware should map this signal to the same pin in both the PPS input and PPS output registers.
 - 4: These pins are configured for I²C logic levels. PPS assignments to the other pins will operate, but input logic levels will be standard TTL/ST as selected by the INLVL register, instead of the I²C specific or SMBUS input buffer thresholds.

TABLE 7: 48-PIN ALLOCATION TABLE (PIC16(L)F15385, PIC16(L)F15386)

I/O ⁽²⁾	48-Pin UQFN/TQFP	ADC	Reference	Comparator	NCO	DAC	Timers	CCP	PWM	CWG	MSSP	ZCD	EUSART	CLC	CLKR	Interrupt	Pull-up	Basic
RA0	21	ANA0	—	C1IN0- C2IN0-	—	—	—	—	—	—	—	—	—	CLCIN0 ⁽¹⁾	—	IOCA0	Y	—
RA1	22	ANA1	—	C1IN1- C2IN1-	—	—	—	—	—	—	—	—	—	CLCIN1 ⁽¹⁾	—	IOCA1	Y	—
RA2	23	ANA2	—	C1IN0+ C2IN0+	—	—	—	—	—	—	—	—	—	—	—	IOCA2	Y	—
RA3	24	ANA3	VREF+	C1IN1+	—	DACREF+	—	—	—	—	—	—	—	—	—	IOCA3	Y	—
RA4	25	ANA4	—	C1IN1-	—	—	T0CKI ⁽¹⁾	—	—	—	—	—	—	—	—	IOCA4	Y	—
RA5	26	ANA5 ADACT	—	—	—	—	T1G ⁽¹⁾	—	—	—	SSP1SS ⁽¹⁾	—	—	—	—	IOCA5	Y	—
RA6	33	ANA6	—	—	—	—	—	—	—	—	—	—	—	—	—	IOCA6	Y	CLKOUT
RA7	32	ANA7	—	—	—	—	—	—	—	—	—	—	—	—	—	IOCA7	Y	CLKIN
RB0	8	ANB0	—	C2IN1+	—	—	—	—	—	CWG1 ⁽¹⁾	SSP2SS ⁽¹⁾	ZCD1	—	—	—	INT ⁽¹⁾ IOCB0	Y	—
RB1	9	ANB1	—	C1IN3- C2IN3-	—	—	—	—	—	—	SSP1CLK ⁽¹⁾ SSP1DAT ⁽¹⁾	—	—	—	—	IOCB1	Y	—
RB2	10	ANB2	—	—	—	—	—	—	—	—	SSP1CLK ⁽¹⁾ SSP1DAT ⁽¹⁾	—	—	—	—	IOCB2	Y	—
RB3	11	ANB3	—	C1IN3- C2IN3-	—	—	—	—	—	—	—	—	—	—	—	IOCB3	Y	—
RB4	16	ANB4 ADACT ⁽¹⁾	—	—	—	—	—	—	—	—	—	—	—	—	—	IOCB4	Y	—
RB5	17	ANB5	—	—	—	—	—	—	—	—	—	—	—	—	—	IOCB5	Y	—
RB6	18	ANB6	—	—	—	—	—	—	—	—	—	—	TX2 CK2 ⁽¹⁾	CLCIN2 ⁽¹⁾	—	IOCB6	Y	ICDCLK ICSPCLK
RB7	19	ANB7	—	—	—	DAC1OUT2	—	—	—	—	—	—	RX2 DT2 ⁽¹⁾	CLCIN3 ⁽¹⁾	—	IOCB7	Y	ICDDAT ICSPDAT
RC0	34	ANC0	—	—	—	—	SOSCO T1CKI ⁽¹⁾	—	—	—	—	—	—	—	—	IOCC0	Y	—
RC1	35	ANC1	—	—	—	—	SOSCI	CCP2 ⁽¹⁾	—	—	—	—	—	—	—	IOCC1	Y	—
RC2	40	ANC2	—	—	—	—	—	CCP1 ⁽¹⁾	—	—	—	—	—	—	—	IOCC2	Y	—
RC3	41	ANC3	—	—	—	—	T2IN ⁽¹⁾	—	—	—	SSP1CLK ⁽¹⁾ SSP1DAT ⁽¹⁾	—	—	—	—	IOCC3	Y	—

TABLE 7: 48-PIN ALLOCATION TABLE (PIC16(L)F15385, PIC16(L)F15386) (CONTINUED)

I/O ⁽²⁾	48-Pin UQFN/TQFP	ADC	Reference	Comparator	NCO	DAC	Timers	CCP	PWM	CWG	MSSP	ZCD	EUSART	CLC	CLKR	Interrupt	Pull-up	Basic
RC4	46	ANC4	—	—	—	—	—	—	—	—	SSP1CLK ⁽¹⁾ SSP1DAT ⁽¹⁾	—	—	—	—	IOCC4	Y	—
RC5	47	ANC5	—	—	—	—	—	—	—	—	—	—	—	—	—	IOCC5	Y	—
RC6	48	ANC6	—	—	—	—	—	—	—	—	—	—	TX1 CK1 ⁽¹⁾	—	—	IOCC6	Y	—
RC7	1	ANC7	—	—	—	—	—	—	—	—	—	—	RX1 DT1 ⁽¹⁾	—	—	IOCC7	Y	—
RD0	42	AND0	—	—	—	—	—	—	—	—	SSP2CLK ⁽¹⁾ SSP2DAT ⁽¹⁾	—	—	—	—	—	Y	—
RD1	43	AND1	—	—	—	—	—	—	—	—	SSP2CLK ⁽¹⁾ SSP2DAT ⁽¹⁾	—	—	—	—	—	Y	—
RD2	44	AND2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Y	—
RD3	45	AND3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Y	—
RD4	2	AND4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Y	—
RD5	3	AND5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Y	—
RD6	4	AND6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Y	—
RD7	5	AND7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Y	—
RE0	27	ANE0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Y	—
RE1	28	ANE1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Y	—
RE2	29	ANE2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Y	—
RE3	20	ANE3	—	—	—	—	—	—	—	—	—	—	—	—	—	IOCE3	Y	MCLR V _{PP}
RF0	36	ANF0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Y	—
RF1	37	ANF1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Y	—
RF2	38	ANF2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Y	—
RF3	39	ANF3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Y	—
RF4	12	ANF4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Y	—
RF5	13	ANF5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Y	—
RF6	14	ANF6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Y	—
RF7	15	ANF7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Y	—
V _{DD}	30	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Y	V _{DD}
V _{DD}	7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	V _{DD}

PIC16(L)F153XX

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.

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.

QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
== ISO/TS 16949 ==

Trademarks

The Microchip name and logo, the Microchip logo, AnyRate, dsPIC, FlashFlex, flexPWR, Helder, JukeBlox, KEELOQ, KEELOQ logo, Klear, LANCheck, LINK MD, 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.

ClockWorks, The Embedded Control Solutions Company, ETHERSYNCH, Hyper Speed Control, HyperLight Load, IntelliMOS, mTouch, Precision Edge, and QUIET-WIRE are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Analog-for-the-Digital Age, Any Capacitor, AnyIn, AnyOut, BodyCom, chipKIT, chipKIT logo, CodeGuard, dsPICDEM, dsPICDEM.net, Dynamic Average Matching, DAM, ECAN, EtherGREEN, In-Circuit Serial Programming, ICSP, Inter-Chip Connectivity, JitterBlocker, KlearNet, KlearNet logo, MiWi, motorBench, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, MultiTRAK, NetDetach, Omniscient Code Generation, PICDEM, PICDEM.net, PICkit, PICtail, PureSilicon, RightTouch logo, REAL ICE, Ripple Blocker, Serial Quad I/O, SQL, SuperSwitcher, SuperSwitcher II, 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 trademarks 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.

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

ISBN: 978-1-5224-0407-1

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