Microchip Technology - DSPIC33CK64MP205T-I/PT Datasheet

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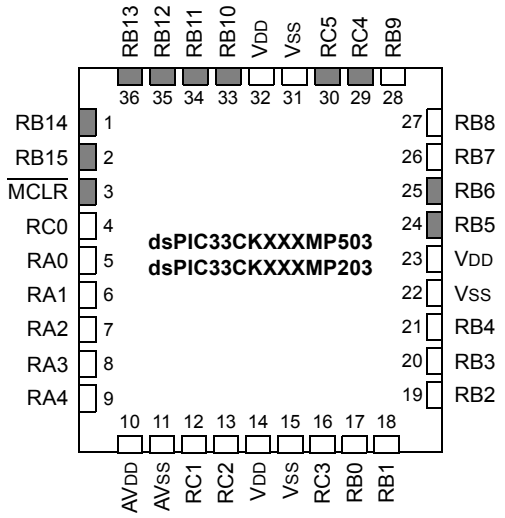
Applications of "Embedded - Microcontrollers"

Details	
Product Status	Active
Core Processor	dsPIC
Core Size	16-Bit
Speed	100MHz
Connectivity	I²C, IrDA, LINbus, SPI, UART/USART
Peripherals	Brown-out Detect/Reset, DMA, Motor Control PWM, POR, PWM, QEI, WDT
Number of I/O	39
Program Memory Size	64KB (64K x 8)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	8K x 8
Voltage - Supply (Vcc/Vdd)	3V ~ 3.6V
Data Converters	A/D 19x12b; D/A 3x12b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 85°C (TA)
Mounting Type	Surface Mount
Package / Case	48-TQFP
Supplier Device Package	48-TQFP (7x7)
Purchase URL	https://www.e-xfl.com/product-detail/microchip-technology/dspic33ck64mp205t-i-pt

Pin Diagrams (Continued)

36-Pin UQFN



Note: Shaded pins are up to 5 VDC tolerant.

TABLE 5: 36-PIN UQFN

Pin #	Function	Pin #	Function
1	**RP46**/PWM1H/RB14	19	OA2OUT/AN1/AN7/ANA0/CMP1D/CMP2D/CMP3D/**RP34**/SCL3/INT0/RB2
2	**RP47**/PWM1L/RB15	20	PGD2/OA2IN-/AN8/**RP35**/RB3
3	MCLR	21	PGC2/OA2IN+/**RP36**/RB4
4	AN12/ANN0/**RP48**/RC0	22	VSS
5	OA1OUT/AN0/CMP1A/IBIAS0/RA0	23	VDD
6	OA1IN-/ANA1/RA1	24	PGD3/**RP37**/PWM6L/SDA2/RB5
7	OA1IN+/AN9/RA2	25	PGC3/**RP38**/PWM6H/SCL2/RB6
8	DACOUT1/AN3/CMP1C/RA3	26	TDO/AN2/CMP3A/**RP39**/SDA3/RB7
9	OA3OUT/AN4/CMP3B/IBIAS3/RA4	27	PGD1/AN10/**RP40**/SCL1/RB8
10	AVDD	28	PGC1/AN11/**RP41**/SDA1/RB9
11	AVSS	29	**RP52**/PWM5H/ASDA2/RC4
12	OA3IN-/AN13/CMP1B/ISRC0/**RP49**/RC1	30	**RP53**/PWM5L/ASCL2/RC5
13	OA3IN+/AN14/CMP2B/ISRC1/**RP50**/RC2	31	VSS
14	VDD	32	VDD
15	VSS	33	TMS/**RP42**/PWM3H/RB10
16	AN15/CMP2A/IBIAS2/**RP51**/RC3	34	TCK/**RP43**/PWM3L/RB11
17	OSCI/CLKI/AN5/**RP32**/RB0	35	TDI/**RP44**/PWM2H/RB12
18	OSCO/CLKO/AN6/**RP33**/RB1	36	**RP45**/PWM2L/RB13

Note: **RPn** represents remappable peripheral functions.

REGISTER 6-1: RCON: RESET CONTROL REGISTER(1) (CONTINUED)

bit 0 **POR:** Power-on Reset Flag bit
1 = A Power-on Reset has occurred
0 = A Power-on Reset has not occurred

Note 1: All of the Reset status bits can be set or cleared in software. Setting one of these bits in software does not cause a device Reset.

REGISTER 7-1: SR: CPU STATUS REGISTER(1)

R/W-0	R/W-0	R/W-0	R/W-0	R/C-0	R/C-0	R-0	R/W-0
OA	OB	SA	SB	OAB	SAB	DA	DC
bit 15							bit 8

R/W-0(3)	R/W-0(3)	R/W-0(3)	R-0	R/W-0	R/W-0	R/W-0	R/W-0
IPL2(2)	IPL1(2)	IPL0(2)	RA	N	OV	Z	C
bit 7							bit 0

Legend:	C = Clearable bit		
R = Readable bit	W = Writable bit	U = Unimplemented bit, read as '0'	
-n = Value at POR	'1'= Bit is set	'0' = Bit is cleared	x = Bit is unknown

bit 7-5 **IPL<2:0>:** CPU Interrupt Priority Level Status bits(2,3)
111 = CPU Interrupt Priority Level is 7 (15); user interrupts are disabled
110 = CPU Interrupt Priority Level is 6 (14)
101 = CPU Interrupt Priority Level is 5 (13)
100 = CPU Interrupt Priority Level is 4 (12)
011 = CPU Interrupt Priority Level is 3 (11)
010 = CPU Interrupt Priority Level is 2 (10)
001 = CPU Interrupt Priority Level is 1 (9)
000 = CPU Interrupt Priority Level is 0 (8)

Note 1: For complete register details, see Register 3-1.
2: The IPL<2:0> bits are concatenated with the IPL<3> bit (CORCON<3>) to form the CPU Interrupt Priority Level. The value in parentheses indicates the IPL, if IPL<3> = 1. User interrupts are disabled when IPL<3> = 1.
3: The IPL<2:0> Status bits are read-only when the NSTDIS bit (INTCON1<15>) = 1.

REGISTER 7-6: INTCON4: INTERRUPT CONTROL REGISTER 4

U-0	U-0	U-0	U-0	U-0	U-0	U-0	U-0
—	—	—	—	—	—	—	—
bit 15							bit 8

U-0	U-0	U-0	U-0	U-0	U-0	R/W-0	R/W-0
—	—	—	—	—	—	ECCDBE	SGHT
bit 7							bit 0

Legend:			
R = Readable bit	W = Writable bit	U = Unimplemented bit, read as '0'	
-n = Value at POR	'1' = Bit is set	'0' = Bit is cleared	x = Bit is unknown

bit 15-2 **Unimplemented:** Read as '0'

bit 1 **ECCDBE:** ECC Double-Bit Error Trap bit
1 = ECC double-bit error trap has occurred
0 = ECC double-bit error trap has not occurred

bit 0 **SGHT:** Software Generated Hard Trap Status bit
1 = Software generated hard trap has occurred
0 = Software generated hard trap has not occurred

8.1.1 OPEN-DRAIN CONFIGURATION

In addition to the PORTx, LATx and TRISx registers for data control, port pins can also be individually configured for either digital or open-drain output. This is controlled by the Open-Drain Enable for PORTx register, ODCx, associated with each port. Setting any of the bits configures the corresponding pin to act as an open-drain output.

The open-drain feature allows the generation of outputs, other than VDD, by using external pull-up resistors. The maximum open-drain voltage allowed on any pin is the same as the maximum VIH specification for that particular pin.

8.2 Configuring Analog and Digital Port Pins

The ANSELx registers control the operation of the analog port pins. The port pins that are to function as analog inputs or outputs must have their corresponding ANSELx and TRISx bits set. In order to use port pins for I/O functionality with digital modules, such as timers, UARTs, etc., the corresponding ANSELx bit must be cleared.

The ANSELx registers have a default value of 0xFFFF; therefore, all pins that share analog functions are analog (not digital) by default.

Pins with analog functions affected by the ANSELx registers are listed with a buffer type of analog in the Pinout I/O Descriptions (see Table 1-1).

If the TRISx bit is cleared (output) while the ANSELx bit is set, the digital output level (VOH or VOL) is converted by an analog peripheral, such as the ADC module or comparator module.

When the PORTx register is read, all pins configured as analog input channels are read as cleared (a low level).

Pins configured as digital inputs do not convert an analog input. Analog levels on any pin, defined as a digital input (including the ANx pins), can cause the input buffer to consume current that exceeds the device specifications.

8.2.1 I/O PORT WRITE/READ TIMING

One instruction cycle is required between a port direction change or port write operation and a read operation of the same port. Typically, this instruction would be a NOP.

8.3 PORT Control Registers

The following registers are in the PORT module:

- Register 8-1: ANSELx (one per port)
- Register 8-2: TRISx (one per port)
- Register 8-3: PORTx (one per port)
- Register 8-4: LATx (one per port)
- Register 8-5: ODCx (one per port)
- Register 8-6: CNPUx (one per port)
- Register 8-7: CNPDx (one per port)
- Register 8-8: CNCONx (one per port – optional)
- Register 8-9: CNEN0x (one per port)
- Register 8-10: CNSTATx (one per port – optional)
- Register 8-11: CNEN1x (one per port)
- Register 8-12: CNFx (one per port)

REGISTER 8-1: ANSELx: ANALOG SELECT FOR PORTx REGISTER

R/W-1	R/W-1	R/W-1	R/W-1	R/W-1	R/W-1	R/W-1	R/W-1
ANSELx<15:8>							
bit 15							bit 8

R/W-1	R/W-1	R/W-1	R/W-1	R/W-1	R/W-1	R/W-1	R/W-1
ANSELx<7:0>							
bit 7							bit 0

Legend:			
R = Readable bit	W = Writable bit	U = Unimplemented bit, read as ‘0’	
-n = Value at POR	‘1’ = Bit is set	‘0’ = Bit is cleared	x = Bit is unknown

bit 15-0 **ANSELx<15:0>:** Analog Select for PORTx bits

1 = Analog input is enabled and digital input is disabled on the PORTx[n] pin

0 = Analog input is disabled and digital input is enabled on the PORTx[n] pin

REGISTER 8-17: RPINR3: PERIPHERAL PIN SELECT INPUT REGISTER 3

R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0
ICM1R7	ICM1R6	ICM1R5	ICM1R4	ICM1R3	ICM1R2	ICM1R1	ICM1R0
bit 15							bit 8

R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0
TCKI1R7	TCKI1R6	TCKI1R5	TCKI1R4	TCKI1R3	TCKI1R2	TCKI1R1	TCKI1R0
bit 7							bit 0

Legend:			
R = Readable bit	W = Writable bit	U = Unimplemented bit, read as '0'	
-n = Value at POR	'1' = Bit is set	'0' = Bit is cleared	x = Bit is unknown

bit 15-8 **ICM1R<7:0>:** Assign SCCP Capture 1 (ICM1) Input to the Corresponding RPn Pin bits
See Table 8-4.

bit 7-0 **TCKI1<7:0>:** Assign SCCP Timer1 (TCKI1) Input to the Corresponding RPn Pin bits
See Table 8-4.

REGISTER 8-18: RPINR4: PERIPHERAL PIN SELECT INPUT REGISTER 4

R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0
ICM2R7	ICM2R6	ICM2R5	ICM2R4	ICM2R3	ICM2R2	ICM2R1	ICM2R0
bit 15							bit 8

R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0
TCKI2R7	TCKI2R6	TCKI2R5	TCKI2R4	TCKI2R3	TCKI2R2	TCKI2R1	TCKI2R0
bit 7							bit 0

Legend:			
R = Readable bit	W = Writable bit	U = Unimplemented bit, read as '0'	
-n = Value at POR	'1' = Bit is set	'0' = Bit is cleared	x = Bit is unknown

bit 15-8 **ICM2R<7:0>:** Assign SCCP Capture 2 (ICM2) Input to the Corresponding RPn Pin bits
See Table 8-4.

bit 7-0 **TCKI2R<7:0>:** Assign SCCP Timer2 (TCKI2) Input to the Corresponding RPn Pin bits
See Table 8-4.

REGISTER 8-29: RPINR15: PERIPHERAL PIN SELECT INPUT REGISTER 15

R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0
QEIHOM1R7	QEIHOM1R6	QEIHOM1R5	QEIHOM1R4	QEIHOM1R3	QEIHOM1R2	QEIHOM1R1	QEIHOM1R0
bit 15							bit 8

R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0
QEINDX1R7	QEINDX1R6	QEINDX1R5	QEINDX1R4	QEINDX1R3	QEINDX1R2	QEINDX1R1	QEINDX1R0
bit 7							bit 0

Legend:			
R = Readable bit	W = Writable bit	U = Unimplemented bit, read as '0'	
-n = Value at POR	'1' = Bit is set	'0' = Bit is cleared	x = Bit is unknown

bit 15-8 **QEIHOM1R<7:0>:** Assign QEI Home 1 Input (QEIHOM1) to the Corresponding RPn Pin bits
See Table 8-4.

bit 7-0 **QEINDX1R<7:0>:** Assign QEI Index 1 Input (QEINDX1) to the Corresponding RPn Pin bits
See Table 8-4.

REGISTER 8-30: RPINR16: PERIPHERAL PIN SELECT INPUT REGISTER 16

R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0
QEIB2R7	QEIB2R6	QEIB2R5	QEIB2R4	QEIB2R3	QEIB2R2	QEIB2R1	QEIB2R0
bit 15							bit 8

R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0
QEIA2R7	QEIA2R6	QEIA2R5	QEIA2R4	QEIA2R3	QEIA2R2	QEIA2R1	QEIA2R0
bit 7							bit 0

Legend:			
R = Readable bit	W = Writable bit	U = Unimplemented bit, read as '0'	
-n = Value at POR	'1' = Bit is set	'0' = Bit is cleared	x = Bit is unknown

bit 15-8 **QEIB2R<7:0>:** Assign QEI2 Input B (QEIB2) to the Corresponding RPn Pin bits
See Table 8-4.

bit 7-0 **QEIA2R<7:0>:** Assign QEI2 Input A (QEIA2) to the Corresponding RPn Pin bits
See Table 8-4.

REGISTER 11-34: C1FIFOSTAx: CAN FIFO STATUS REGISTER x (x = 1 TO 7) (CONTINUED)

bit 2 **TFERFFIF:** Transmit/Receive FIFO Empty/Full Interrupt Flag bit
TXEN = 1 (FIFO configured as a transmit FIFO):
Transmit FIFO Empty Interrupt Flag
1 = FIFO is empty
0 = FIFO is not empty, at least 1 message is queued to be transmitted
TXEN = 0 (FIFO configured as a receive FIFO):
Receive FIFO Full Interrupt Flag
1 = FIFO is full
0 = FIFO is not full

bit 1 **TFHRFHIF:** Transmit/Receive FIFO Half Empty/Half Full Interrupt Flag bit
TXEN = 1 (FIFO configured as a transmit FIFO):
Transmit FIFO Half Empty Interrupt Flag
1 = FIFO is ≤ half full
0 = FIFO is > half full
TXEN = 0 (FIFO configured as a receive FIFO):
Receive FIFO Half Full Interrupt Flag
1 = FIFO is ≥ half full
0 = FIFO is < half full

bit 0 **TFNRFNIF:** Transmit/Receive FIFO Not Full/Not Empty Interrupt Flag bit
TXEN = 1 (FIFO configured as a transmit FIFO):
Transmit FIFO Not Full Interrupt Flag
1 = FIFO is not full
0 = FIFO is full
TXEN = 0 (FIFO configured as a receive FIFO):
Receive FIFO Not Empty Interrupt Flag
1 = FIFO is not empty, has at least 1 message
0 = FIFO is empty

Note 1: FIFOCI<4:0> gives a zero-indexed value to the message in the FIFO. If the FIFO is 4 messages deep (FSIZE<4:0> = 3), FIFOCIx will take on a value of 0 to 3, depending on the state of the FIFO.
2: These bits are updated when a message completes (or aborts) or when the FIFO is reset.
3: This bit is reset on any read of this register or when the TXQ is reset. The bits are cleared when TXREQ is set or using an SPI write.

REGISTER 12-2: FSCL: FREQUENCY SCALE REGISTER

R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0
FSCL<15:8>							
bit 15							bit 8

R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0
FSCL<7:0>							
bit 7							bit 0

Legend:			
R = Readable bit	W = Writable bit	U = Unimplemented bit, read as '0'	
-n = Value at POR	'1' = Bit is set	'0' = Bit is cleared	x = Bit is unknown

bit 15-0 **FSCL<15:0>:** Frequency Scale Register bits
The value in this register is added to the frequency scaling accumulator at each pwm_master_clk. When the accumulated value exceeds the value of FSMINPER, a clock pulse is produced.

REGISTER 12-3: FSMINPER: FREQUENCY SCALING MINIMUM PERIOD REGISTER

R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0
FSMINPER<15:8>							
bit 15							bit 8

R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0
FSMINPER<7:0>							
bit 7							bit 0

Legend:			
R = Readable bit	W = Writable bit	U = Unimplemented bit, read as '0'	
-n = Value at POR	'1' = Bit is set	'0' = Bit is cleared	x = Bit is unknown

bit 15-0 **FSMINPER<15:0>:** Frequency Scaling Minimum Period Register bits
This register holds the minimum clock period (maximum clock frequency) that can be produced by the frequency scaling circuit.

REGISTER 13-27: ADTRIGnL/ADTRIGnH: ADC CHANNEL TRIGGER n(x) SELECTION REGISTERS LOW AND HIGH (x = 0 TO 25; n = 0 TO 6)

U-0	U-0	U-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0
—	—	—	TRGSRC(x+1)4	TRGSRC(x+1)3	TRGSRC(x+1)2	TRGSRC(x+1)1	TRGSRC(x+1)0
bit 15							bit 8

U-0	U-0	U-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0
—	—	—	TRGSRCx4	TRGSRCx3	TRGSRCx2	TRGSRCx1	TRGSRCx0
bit 7							bit 0

Legend:			
R = Readable bit	W = Writable bit	U = Unimplemented bit, read as '0'	
-n = Value at POR	'1' = Bit is set	'0' = Bit is cleared	x = Bit is unknown

bit 15-13 **Unimplemented:** Read as '0'

bit 12-8 **TRGSRC(x+1)<4:0>:** Trigger Source Selection for Corresponding Analog Inputs bits (TRGSRC1 to TRGSRC25 – Odd)

11111 = ADTRG31 (PPS input)
11110 = PTG
11101 = CLC2
11100 = CLC1
11011 = MCCP9
11010 = SCCP7
11001 = SCCP6
11000 = SCCP5
10111 = SCCP4
10110 = SCCP3
10101 = SCCP2
10100 = SCCP1
10011 = PWM8 Trigger 2
10010 = PWM8 Trigger 1
10001 = PWM7 Trigger 2
10000 = PWM7 Trigger 1
01111 = PWM6 Trigger 2
01110 = PWM6 Trigger 1
01101 = PWM5 Trigger 2
01100 = PWM5 Trigger 1
01011 = PWM4 Trigger 2
01010 = PWM4 Trigger 1
01001 = PWM3 Trigger 2
01000 = PWM3 Trigger 1
00111 = PWM2 Trigger 2
00110 = PWM2 Trigger 1
00101 = PWM1 Trigger 2
00100 = PWM1 Trigger 1
00011 = Reserved
00010 = Level software trigger
00001 = Common software trigger
00000 = No trigger is enabled

bit 7-5 **Unimplemented:** Read as '0'

REGISTER 16-3: UxSTA: UARTx STATUS REGISTER

R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0
TXMTIE	PERIE	ABDOVE	CERIE	FERIE	RXBKIE	OERIE	TXCIE
bit 15							bit 8

R-1	R-0	R/W-0, HS	R/W-0, HC	R-0	R/W-0, HC	R/W-0, HC	R/W-0, HC
TRMT	PERR	ABDOVF	CERIF	FERR	RXBKIF	OERR	TXCIF
bit 7							bit 0

Legend:	HS = Hardware Settable bit	HC = Hardware Clearable bit	
R = Readable bit	W = Writable bit	U = Unimplemented bit, read as '0'	
-n = Value at POR	'1' = Bit is set	'0' = Bit is cleared	x = Bit is unknown

bit 15 **TXMTIE:** Transmit Shifter Empty Interrupt Enable bit
1 = Interrupt is enabled
0 = Interrupt is disabled

bit 14 **PERIE:** Parity Error Interrupt Enable bit
1 = Interrupt is enabled
0 = Interrupt is disabled

bit 13 **ABDOVE:** Auto-Baud Rate Acquisition Interrupt Enable bit
1 = Interrupt is enabled
0 = Interrupt is disabled

bit 12 **CERIE:** Checksum Error Interrupt Enable bit
1 = Interrupt is enabled
0 = Interrupt is disabled

bit 11 **FERIE:** Framing Error Interrupt Enable bit
1 = Interrupt is enabled
0 = Interrupt is disabled

bit 10 **RXBKIE:** Receive Break Interrupt Enable bit
1 = Interrupt is enabled
0 = Interrupt is disabled

bit 9 **OERIE:** Receive Buffer Overflow Interrupt Enable bit
1 = Interrupt is enabled
0 = Interrupt is disabled

bit 8 **TXCIE:** Transmit Collision Interrupt Enable bit
1 = Interrupt is enabled
0 = Interrupt is disabled

bit 7 **TRMT:** Transmit Shifter Empty Interrupt Flag bit (read-only)
1 = Transmit Shift Register (TSR) is empty (end of last Stop bit when STPMD = 1 or middle of first Stop bit when STPMD = 0)
0 = Transmit Shift Register is not empty

bit 6 **PERR:** Parity Error/Address Received/Forward Frame Interrupt Flag bit
LIN and Parity Modes:
1 = Parity error detected
0 = No parity error detected
Address Mode:
1 = Address received
0 = No address detected
All Other Modes:
Not used.

FIGURE 17-6: SPIx MASTER, FRAME SLAVE CONNECTION DIAGRAM

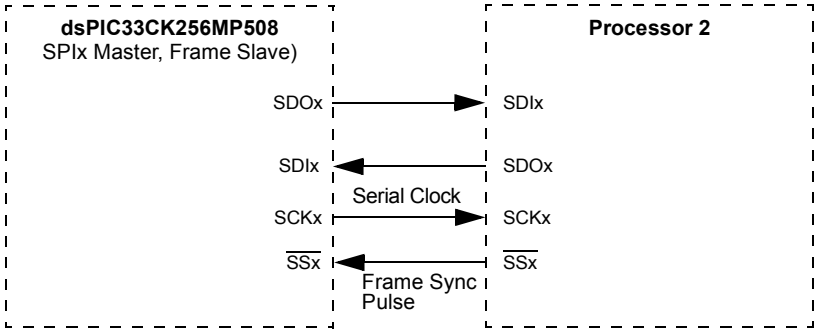


FIGURE 17-7: SPIx SLAVE, FRAME MASTER CONNECTION DIAGRAM

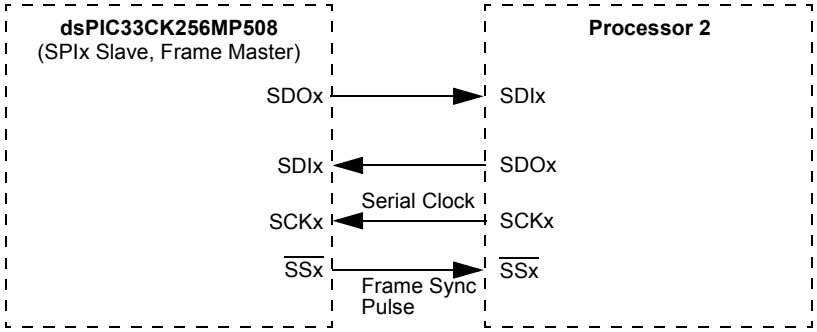
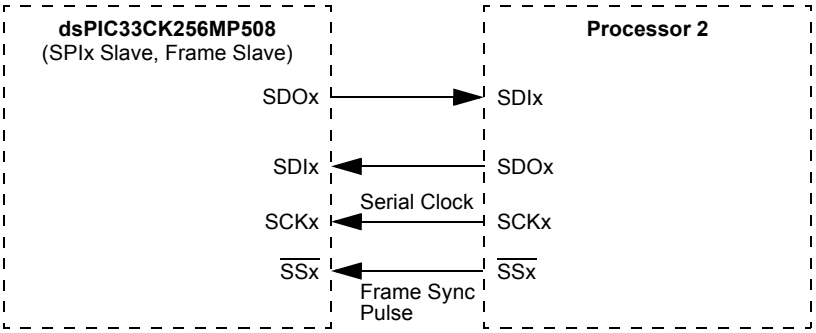


FIGURE 17-8: SPIx SLAVE, FRAME SLAVE CONNECTION DIAGRAM



EQUATION 17-1: RELATIONSHIP BETWEEN DEVICE AND SPIx CLOCK SPEED

$$Baud\ Rate = \frac{FPB}{(2 * (SPIxBRG + 1))}$$

Where:

FPB is the Peripheral Bus Clock Frequency.

REGISTER 18-3: I2CxSTAT: I2Cx STATUS REGISTER (CONTINUED)

bit 3 **S:** I2Cx Start bit
Updated when Start, Reset or Stop is detected; cleared when the I^2C module is disabled, I2CEN = 0.
1 = Indicates that a Start (or Repeated Start) bit has been detected last
0 = Start bit was not detected last

bit 2 **R/$\overline{W}$:** Read/$\overline{Write}$ Information bit (when operating as I^2C Slave)
1 = Read: Indicates the data transfer is output from the Slave
0 = Write: Indicates the data transfer is input to the Slave

bit 1 **RBF:** Receive Buffer Full Status bit
1 = Receive is complete, I2CxRCV is full
0 = Receive is not complete, I2CxRCV is empty

bit 0 **TBF:** Transmit Buffer Full Status bit
1 = Transmit is in progress, I2CxTRN is full (8-bits of data)
0 = Transmit is complete, I2CxTRN is empty

REGISTER 18-4: I2CxMSK: I2Cx SLAVE MODE ADDRESS MASK REGISTER

U-0	U-0	U-0	U-0	U-0	U-0	R/W-0	R/W-0
—	—	—	—	—	—	MSK<9:8>	
bit 15							bit 8

R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0
MSK<7:0>							
bit 7							bit 0

Legend:			
R = Readable bit	W = Writable bit	U = Unimplemented bit, read as '0'	
-n = Value at POR	'1' = Bit is set	'0' = Bit is cleared	x = Bit is unknown

bit 15-10 **Unimplemented:** Read as '0'

bit 9-0 **MSK<9:0>:** I2Cx Mask for Address Bit x Select bits
1 = Enables masking for bit x of the incoming message address; bit match is not required in this position
0 = Disables masking for bit x; bit match is required in this position

REGISTER 19-11: PMWADDR: PARALLEL MASTER PORT WRITE ADDRESS REGISTER(2)

R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0
WCS2(1)	WCS1(1)	WADDR<13:8>					
WADDR15(1)	WADDR14(1)						
bit 15							bit 8

R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0
WADDR<7:0>							
bit 7							bit 0

Legend:			
R = Readable bit	W = Writable bit	U = Unimplemented bit, read as '0'	
-n = Value at POR	'1' = Bit is set	'0' = Bit is cleared	x = Bit is unknown

bit 15 **WCS2:** Chip Select 2 bit(1)
1 = Chip Select 2 is active
0 = Chip Select 2 is inactive (WADDR15 function is selected)

bit 15 **WADDR15:** Target Write Address bit 15(1)

bit 14 **WCS1:** Chip Select 1 bit(1)
1 = Chip Select 1 is active
0 = Chip Select 1 is inactive (WADDR14 function is selected)

bit 14 **WADDR14:** Target Write Address bit 14(1)

bit 13-0 **WADDR<13:0>:** Target Write Address bits

Note 1: The use of these pins as PMA15/PMA14 or WCS2/WCS1 is selected by the CSF<1:0> bits (PMCON<7:6>).

2: This register is only used when the DUALBUF bit (PMCONH<1>) is set to '1'.

REGISTER 22-7: CCPxSTATL: CCPx STATUS REGISTER

U-0	U-0	U-0	U-0	U-0	U-0	U-0	U-0
—	—	—	—	—	—	—	—
bit 15							bit 8

R-0	W1-0	W1-0	R/C-0	R/C-0	R/C-0	R/C-0	R/C-0
CCPTRIG	TRSET	TRCLR	ASEVT	SCEVT	ICDIS	ICOV	ICBNE
bit 7							bit 0

Legend:	C = Clearable bit		
R = Readable bit	W1 = Write '1' Only bit	U = Unimplemented bit, read as '0'	
-n = Value at POR	'1' = Bit is set	'0' = Bit is cleared	x = Bit is unknown

bit 15-8 **Unimplemented:** Read as '0'

bit 7 **CCPTRIG:** CCPx Trigger Status bit
1 = Timer has been triggered and is running
0 = Timer has not been triggered and is held in Reset

bit 6 **TRSET:** CCPx Trigger Set Request bit
Writes '1' to this location to trigger the timer when TRIGEN = 1 (location always reads as '0').

bit 5 **TRCLR:** CCPx Trigger Clear Request bit
Writes '1' to this location to cancel the timer trigger when TRIGEN = 1 (location always reads as '0').

bit 4 **ASEVT:** CCPx Auto-Shutdown Event Status/Control bit
1 = A shutdown event is in progress; CCPx outputs are in the shutdown state
0 = CCPx outputs operate normally

bit 3 **SCEVT:** Single Edge Compare Event Status bit
1 = A single edge compare event has occurred
0 = A single edge compare event has not occurred

bit 2 **ICDIS:** Input Capture x Disable bit
1 = Event on Input Capture x pin (ICx) does not generate a capture event
0 = Event on Input Capture x pin will generate a capture event

bit 1 **ICOV:** Input Capture x Buffer Overflow Status bit
1 = The Input Capture x FIFO buffer has overflowed
0 = The Input Capture x FIFO buffer has not overflowed

bit 0 **ICBNE:** Input Capture x Buffer Status bit
1 = Input Capture x buffer has data available
0 = Input Capture x buffer is empty

26.1 Current Bias Generator Control Registers

REGISTER 26-1: BIASCON: CURRENT BIAS GENERATOR CONTROL REGISTER

R/W-0	U-0	U-0	U-0	U-0	U-0	U-0	U-0
ON	—	—	—	—	—	—	—
bit 15							bit 8

U-0	U-0	U-0	U-0	R/W-0	R/W-0	R/W-0	R/W-0
—	—	—	—	I10EN3	I10EN2	I10EN1	I10EN0
bit 7							bit 0

Legend:			
R = Readable bit	W = Writable bit	U = Unimplemented bit, read as '0'	
-n = Value at POR	'1' = Bit is set	'0' = Bit is cleared	x = Bit is unknown

bit 15 **ON:** Current Bias Module Enable bit
1 = Module is enabled
0 = Module is disabled

bit 14-4 **Unimplemented:** Read as '0'

bit 3 **I10EN3:** 10 µA Enable for Output 3 bit
1 = 10 µA output is enabled
0 = 10 µA output is disabled

bit 2 **I10EN2:** 10 µA Enable for Output 2 bit
1 = 10 µA output is enabled
0 = 10 µA output is disabled

bit 1 **I10EN1:** 10 µA Enable for Output 1 bit
1 = 10 µA output is enabled
0 = 10 µA output is disabled

bit 0 **I10EN0:** 10 µA Enable for Output 0 bit
1 = 10 µA output is enabled
0 = 10 µA output is disabled

REGISTER 28-5: DMTCNTL: DEADMAN TIMER COUNT REGISTER LOW

R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0
COUNTER<15:8>							
bit 15							bit 8

R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0
COUNTER<7:0>							
bit 7							bit 0

Legend:			
R = Readable bit	W = Writable bit	U = Unimplemented bit, read as '0'	
-n = Value at POR	'1' = Bit is set	'0' = Bit is cleared	x = Bit is unknown

bit 15-0 **COUNTER<15:0>:** Read Current Contents of Lower DMT Counter bits

REGISTER 28-6: DMTCNTH: DEADMAN TIMER COUNT REGISTER HIGH

R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0
COUNTER<31:24>							
bit 15							bit 8

R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0
COUNTER<23:16>							
bit 7							bit 0

Legend:			
R = Readable bit	W = Writable bit	U = Unimplemented bit, read as '0'	
-n = Value at POR	'1' = Bit is set	'0' = Bit is cleared	x = Bit is unknown

bit 15-0 **COUNTER<31:16>:** Read Current Contents of Higher DMT Counter bits

TABLE 33-16: I/O PIN INPUT INJECTION CURRENT SPECIFICATIONS

Operating Conditions: 3.0V to 3.6V (unless otherwise stated) Operating temperature -40°C ≤ TA ≤ +85°C for Industrial -40°C ≤ TA ≤ +125°C for Extended						
Param No.	**Symbol**	**Characteristic**	**Min.**	**Max.**	**Units**	**Conditions**
DI60a	IICL	**Input Low Injection Current**	0	-5(1,4)	mA	All pins
DI60b	IICH	**Input High Injection Current**	0	+5(2,3,4)	mA	All pins, excepting all 5V tolerant pins and SOSCI
DI60c	∑IICT	**Total Input Injection Current (sum of all I/O and control pins)(5)**	-20	+20	mA	Absolute instantaneous sum of all ± input injection currents from all I/O pins (| IICL | + | IICH |) ≤ ∑IICT

Note 1: VIL Source < (VSS – 0.3).

2: VIH Source > (VDD + 0.3) for non-5V tolerant pins only.

3: 5V tolerant pins do not have an internal high-side diode to VDD, and therefore, cannot tolerate any "positive" input injection current.

4: Injection currents can affect the ADC results.

5: Any number and/or combination of I/O pins, not excluded under IICL or IICH conditions, are permitted in the sum.

TABLE 33-17: I/O PIN OUTPUT SPECIFICATIONS

Operating Conditions: 3.0V to 3.6V (unless otherwise stated) Operating temperature -40°C ≤ TA ≤ +85°C for Industrial -40°C ≤ TA ≤ +125°C for Extended							
Param.	**Symbol**	**Characteristic**	**Min.**	**Typ.**	**Max.**	**Units**	**Conditions**
DO10	VOL	**Output Low Voltage** 4x Sink Driver Pins	—	—	0.42	V	VDD = 3.6V, IOL < 9 mA
		Output Low Voltage 8x Sink Driver Pins(1)	—	—	0.4	V	VDD = 3.6V, IOL < 11 mA
DO20	VOH	**Output High Voltage** 4x Source Driver Pins	2.4	—	—	V	VDD = 3.6V, IOH > -8 mA
		Output High Voltage 8x Source Driver Pins(1)	2.4	—	—	V	VDD = 3.6V, IOH > -12 mA

Note 1: 8x sink/source pins are RB1, RC8, RC9 and RD8.

FIGURE 33-17: UARTx MODULE I/O TIMING CHARACTERISTICS

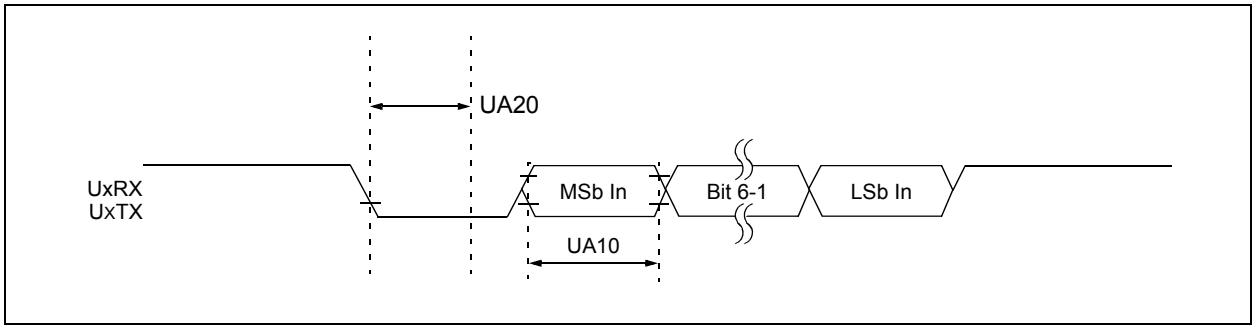


TABLE 33-35: UARTx MODULE I/O TIMING REQUIREMENTS

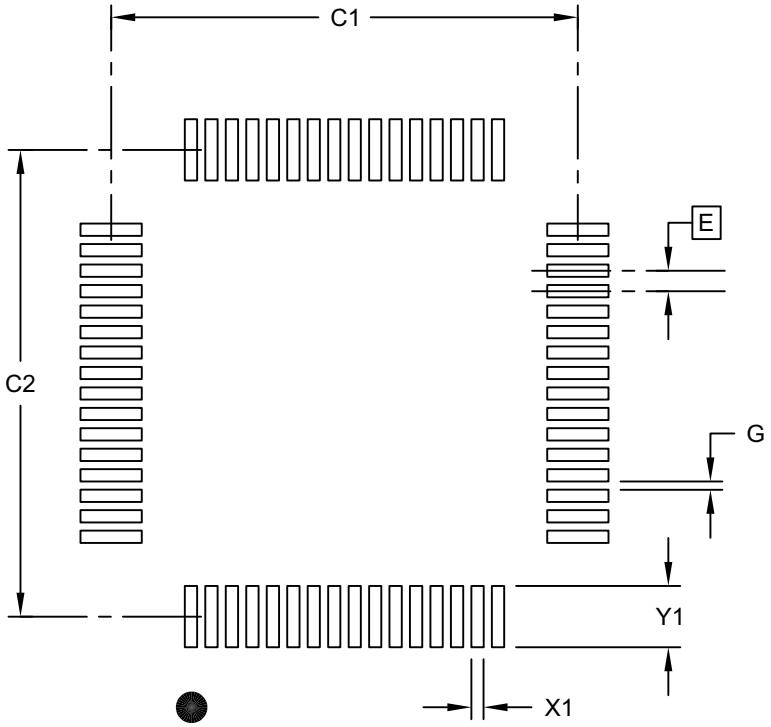
Operating Conditions: 3.0V to 3.6V (unless otherwise stated) Operating temperature -40°C ≤ TA ≤ +125°C							
Param No.	**Symbol**	**Characteristic(1)**	**Min.**	**Typ.(2)**	**Max.**	**Units**	**Conditions**
UA10	TUABAUD	UARTx Baud Time	40	—	—	ns	
UA11	FBAUD	UARTx Baud Frequency	—	—	25	Mbps	
UA20	TCWF	Start Bit Pulse Width to Trigger UARTx Wake-up	50	—	—	ns	

Note 1: These parameters are characterized but not tested in manufacturing.

2: Data in “Typ.” column is at 3.3V, +25°C unless otherwise stated. Parameters are for design guidance only and are not tested.

64-Lead Plastic Thin Quad Flatpack (PT)-10x10x1 mm Body, 2.00 mm Footprint [TQFP]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E	0.50 BSC		
Contact Pad Spacing	C1		11.40	
Contact Pad Spacing	C2		11.40	
Contact Pad Width (X28)	X1			0.30
Contact Pad Length (X28)	Y1			1.50
Distance Between Pads	G	0.20		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-2085B Sheet 1 of 1