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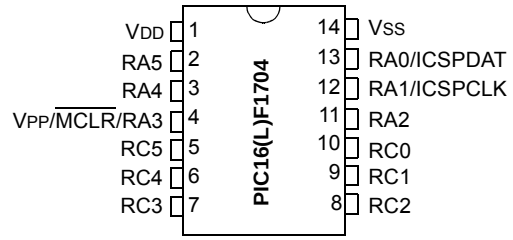
"Embedded - Microcontrollers" refer to small, integrated circuits designed to perform specific tasks within larger systems. These microcontrollers are essentially compact computers on a single chip, containing a processor core, memory, and programmable input/output peripherals. They are called "embedded"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

Applications of "Embedded - Microcontrollers"

Details	
Product Status	Active
Core Processor	PIC
Core Size	8-Bit
Speed	32MHz
Connectivity	I²C, LINbus, SPI, UART/USART
Peripherals	Brown-out Detect/Reset, POR, PWM, WDT
Number of I/O	18
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 12x10b; D/A 1x8b
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/pic16f1708-i-p

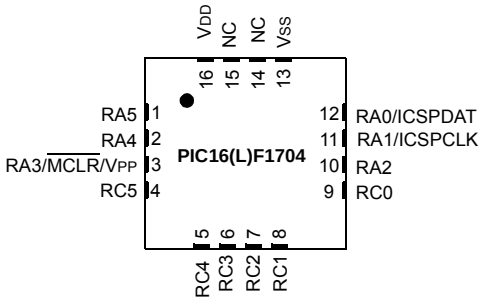
PIN DIAGRAMS

FIGURE 1: 14-PIN PDIP, SOIC, TSSOP DIAGRAM FOR PIC16(L)F1704



Note: See Table 1 for the pin allocation table.

FIGURE 2: 16-PIN QFN



Note: See Table 1 for the pin allocation table.

3.4.5 CORE FUNCTION REGISTERS SUMMARY

The Core Function registers listed in Table 3-9 can be addressed from any Bank.

TABLE 3-9: CORE FUNCTION REGISTERS SUMMARY

Addr	Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Value on POR, BOR	Value on all other Resets
Bank 0-31											
x00h or x80h	INDF0	Addressing this location uses contents of FSR0H/FSR0L to address data memory (not a physical register)								xxxx xxxx	uuuu uuuu
x01h or x81h	INDF1	Addressing this location uses contents of FSR1H/FSR1L to address data memory (not a physical register)								xxxx xxxx	uuuu uuuu
x02h or x82h	PCL	Program Counter (PC) Least Significant Byte								0000 0000	0000 0000
x03h or x83h	STATUS	—	—	—	$\overline{TO}$	$\overline{PD}$	Z	DC	C	---1 1000	---q quuu
x04h or x84h	FSR0L	Indirect Data Memory Address 0 Low Pointer								0000 0000	uuuu uuuu
x05h or x85h	FSR0H	Indirect Data Memory Address 0 High Pointer								0000 0000	0000 0000
x06h or x86h	FSR1L	Indirect Data Memory Address 1 Low Pointer								0000 0000	uuuu uuuu
x07h or x87h	FSR1H	Indirect Data Memory Address 1 High Pointer								0000 0000	0000 0000
x08h or x88h	BSR	—	—	—	BSR4	BSR3	BSR2	BSR1	BSR0	---0 0000	---0 0000
x09h or x89h	WREG	Working Register								0000 0000	uuuu uuuu
x0Ah or x8Ah	PCLATH	—	Write Buffer for the upper 7 bits of the Program Counter							-000 0000	-000 0000
x0Bh or x8Bh	INTCON	GIE	PEIE	TMR0IE	INTE	IOCIE	TMR0IF	INTF	IOCIF	0000 0000	0000 0000

Legend: x = unknown, u = unchanged, q = value depends on condition, - = unimplemented, read as '0', r = reserved. Shaded locations are unimplemented, read as '0'.

Note 1: These registers can be addressed from any bank.

4.0 DEVICE CONFIGURATION

Device configuration consists of Configuration Words, Code Protection and Device ID.

4.1 Configuration Words

There are several Configuration Word bits that allow different oscillator and memory protection options. These are implemented as Configuration Word 1 at 8007h and Configuration Word 2 at 8008h.

Note:	The $\overline{\text{DEBUG}}$ bit in Configuration Words is managed automatically by device development tools including debuggers and programmers. For normal device operation, this bit should be maintained as a '1'.

4.6 Device ID and Revision ID

The 14-bit device ID word is located at 8006h and the 14-bit revision ID is located at 8005h. These locations are read-only and cannot be erased or modified. See **Section 10.4 "User ID, Device ID and Configuration Word Access"** for more information on accessing these memory locations.

Development tools, such as device programmers and debuggers, may be used to read the Device ID and Revision ID.

4.7 Register Definitions: Device and Revision

REGISTER 4-3: DEVID: DEVICE ID REGISTER

R	R	R	R	R	R
DEV<13:8>					
bit 13					bit 8

R	R	R	R	R	R	R	R
DEV<7:0>							
bit 7							bit 0

Legend:	
R = Readable bit	
'1' = Bit is set	'0' = Bit is cleared

bit 13-0 **DEV<13:0>:** Device ID bits

Device	DEVID<13:0> Values
PIC16F1704	11 0000 0100 0011 (3043h)
PIC16LF1704	11 0000 0100 0101 (3045h)
PIC16F1708	11 0000 0100 0010 (3042h)
PIC16LF1708	11 0000 0100 0100 (3044h)

REGISTER 4-4: REVID: REVISION ID REGISTER

R	R	R	R	R	R
REV<13:8>					
bit 13					bit 8

R	R	R	R	R	R	R	R
REV<7:0>							
bit 7							bit 0

Legend:	
R = Readable bit	
'1' = Bit is set	'0' = Bit is cleared

bit 13-0 **REV<13:0>:** Revision ID bits

5.0 RESETS

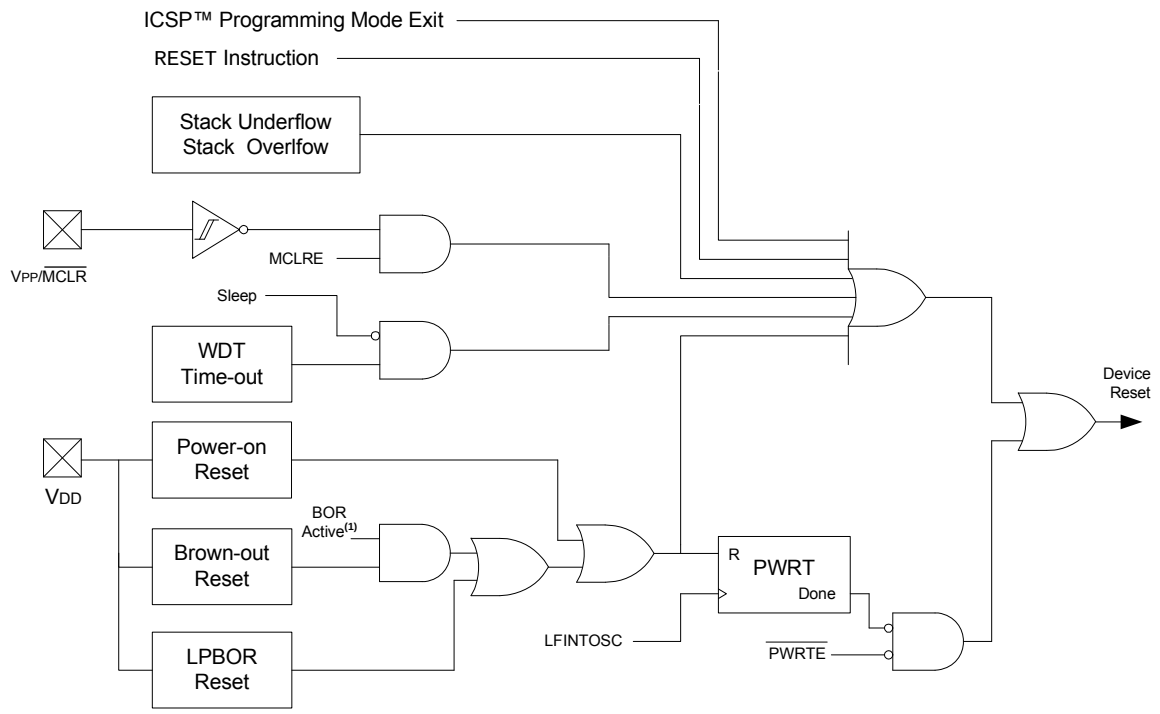
There are multiple ways to reset this device:

- Power-On Reset (POR)
- Brown-Out Reset (BOR)
- Low-Power Brown-Out Reset (LPBOR)
- $\overline{\text{MCLR}}$ Reset
- WDT Reset
- RESET instruction
- Stack Overflow
- Stack Underflow
- Programming mode exit

To allow VDD to stabilize, an optional power-up timer can be enabled to extend the Reset time after a BOR or POR event.

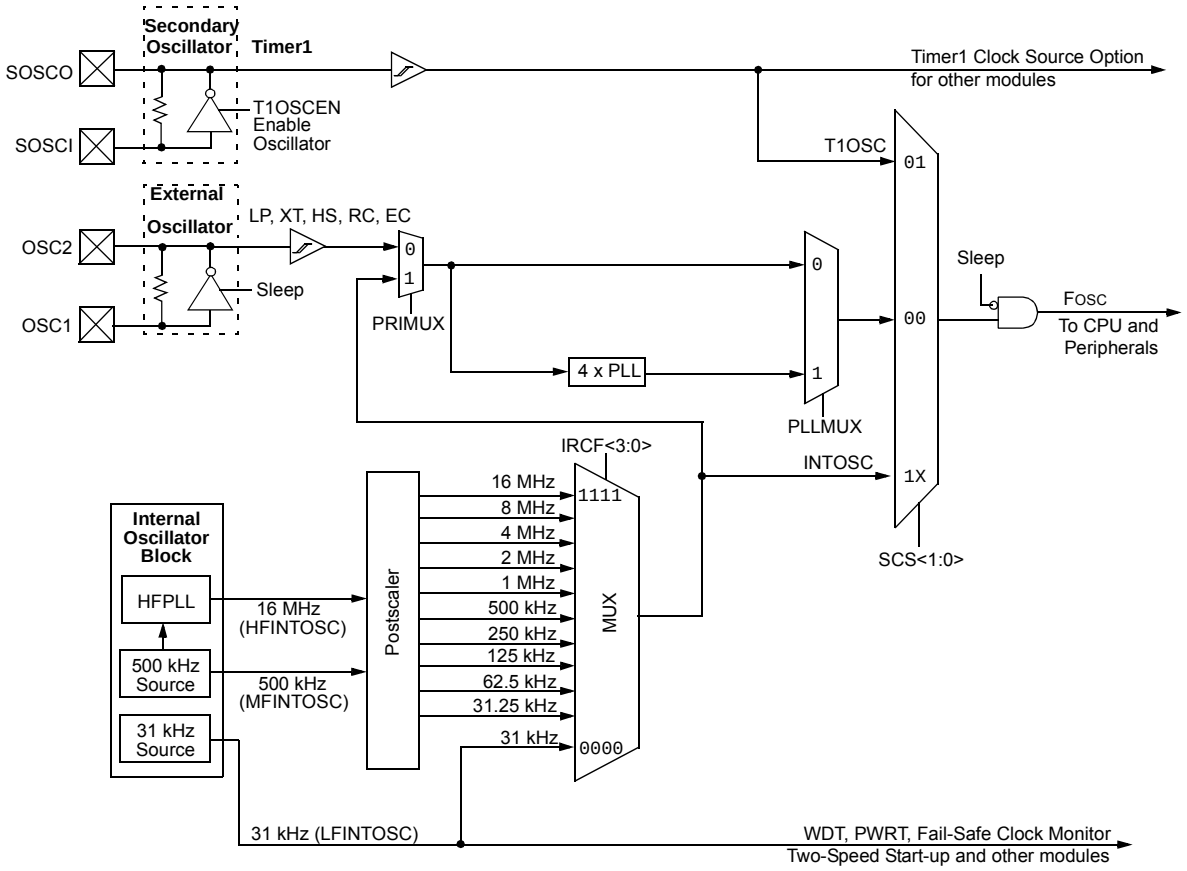
A simplified block diagram of the On-Chip Reset Circuit is shown in Figure 5-1.

FIGURE 5-1: SIMPLIFIED BLOCK DIAGRAM OF ON-CHIP RESET CIRCUIT



Note 1: See Table 5-1 for BOR active conditions.

FIGURE 6-1: SIMPLIFIED PIC® MCU CLOCK SOURCE BLOCK DIAGRAM



Inputs				Outputs	
SCS	FOSC<2:0>	PLLEN or SPLLEN	IRCF	PRIMUX	PLLMUX
=00	=100	0	x	1	0
		1	=1110	1	1
			≠1110	1	0
	≠100	0	x	0	0
		1	x	0	1
≠00	X	X	X	X	X

7.6 Register Definitions: Interrupt Control

REGISTER 7-1: INTCON: INTERRUPT CONTROL REGISTER

R/W-0/0	R/W-0/0	R/W-0/0	R/W-0/0	R/W-0/0	R/W-0/0	R/W-0/0	R-0/0
GIE	PEIE	TMR0IE	INTE	IOCIE	TMR0IF	INTF	IOCIF(1)
bit 7							bit 0

Legend:		
R = Readable bit	W = Writable bit	U = Unimplemented bit, read as '0'
u = Bit is unchanged	x = Bit is unknown	-n/n = Value at POR and BOR/Value at all other Resets
'1' = Bit is set	'0' = Bit is cleared	

bit 7 **GIE:** Global Interrupt Enable bit
1 = Enables all active interrupts
0 = Disables all interrupts

bit 6 **PEIE:** Peripheral Interrupt Enable bit
1 = Enables all active peripheral interrupts
0 = Disables all peripheral interrupts

bit 5 **TMR0IE:** Timer0 Overflow Interrupt Enable bit
1 = Enables the Timer0 interrupt
0 = Disables the Timer0 interrupt

bit 4 **INTE:** INT External Interrupt Enable bit
1 = Enables the INT external interrupt
0 = Disables the INT external interrupt

bit 3 **IOCIE:** Interrupt-on-Change Enable bit
1 = Enables the interrupt-on-change
0 = Disables the interrupt-on-change

bit 2 **TMR0IF:** Timer0 Overflow Interrupt Flag bit
1 = TMR0 register has overflowed
0 = TMR0 register did not overflow

bit 1 **INTF:** INT External Interrupt Flag bit
1 = The INT external interrupt occurred
0 = The INT external interrupt did not occur

bit 0 **IOCIF:** Interrupt-on-Change Interrupt Flag bit(1)
1 = When at least one of the interrupt-on-change pins changed state
0 = None of the interrupt-on-change pins have changed state

Note 1: The IOCIF Flag bit is read-only and cleared when all the interrupt-on-change flags in the IOCxF registers have been cleared by software.

Note: Interrupt flag bits are set when an interrupt condition occurs, regardless of the state of its corresponding enable bit or the Global Enable bit, GIE, of the INTCON register. User software should ensure the appropriate interrupt flag bits are clear prior to enabling an interrupt.

REGISTER 7-5: PIR1: PERIPHERAL INTERRUPT REQUEST REGISTER 1

R/W-0/0	R/W-0/0	R-0/0	R-0/0	R/W-0/0	R/W-0/0	R/W-0/0	R/W-0/0
TMR1GIF	ADIF	RCIF	TXIF	SSP1IF	CCP1IF	TMR2IF	TMR1IF
bit 7							bit 0

Legend:		
R = Readable bit	W = Writable bit	U = Unimplemented bit, read as '0'
u = Bit is unchanged	x = Bit is unknown	-n/n = Value at POR and BOR/Value at all other Resets
'1' = Bit is set	'0' = Bit is cleared	

bit 7 **TMR1GIF:** Timer1 Gate Interrupt Flag bit
1 = Interrupt is pending
0 = Interrupt is not pending

bit 6 **ADIF:** Analog-to-Digital Converter (ADC) Interrupt Flag bit
1 = Interrupt is pending
0 = Interrupt is not pending

bit 5 **RCIF:** USART Receive Interrupt Flag bit
1 = Interrupt is pending
0 = Interrupt is not pending

bit 4 **TXIF:** USART Transmit Interrupt Flag bit
1 = Interrupt is pending
0 = Interrupt is not pending

bit 3 **SSP1IF:** Synchronous Serial Port (MSSP) Interrupt Flag bit
1 = Interrupt is pending
0 = Interrupt is not pending

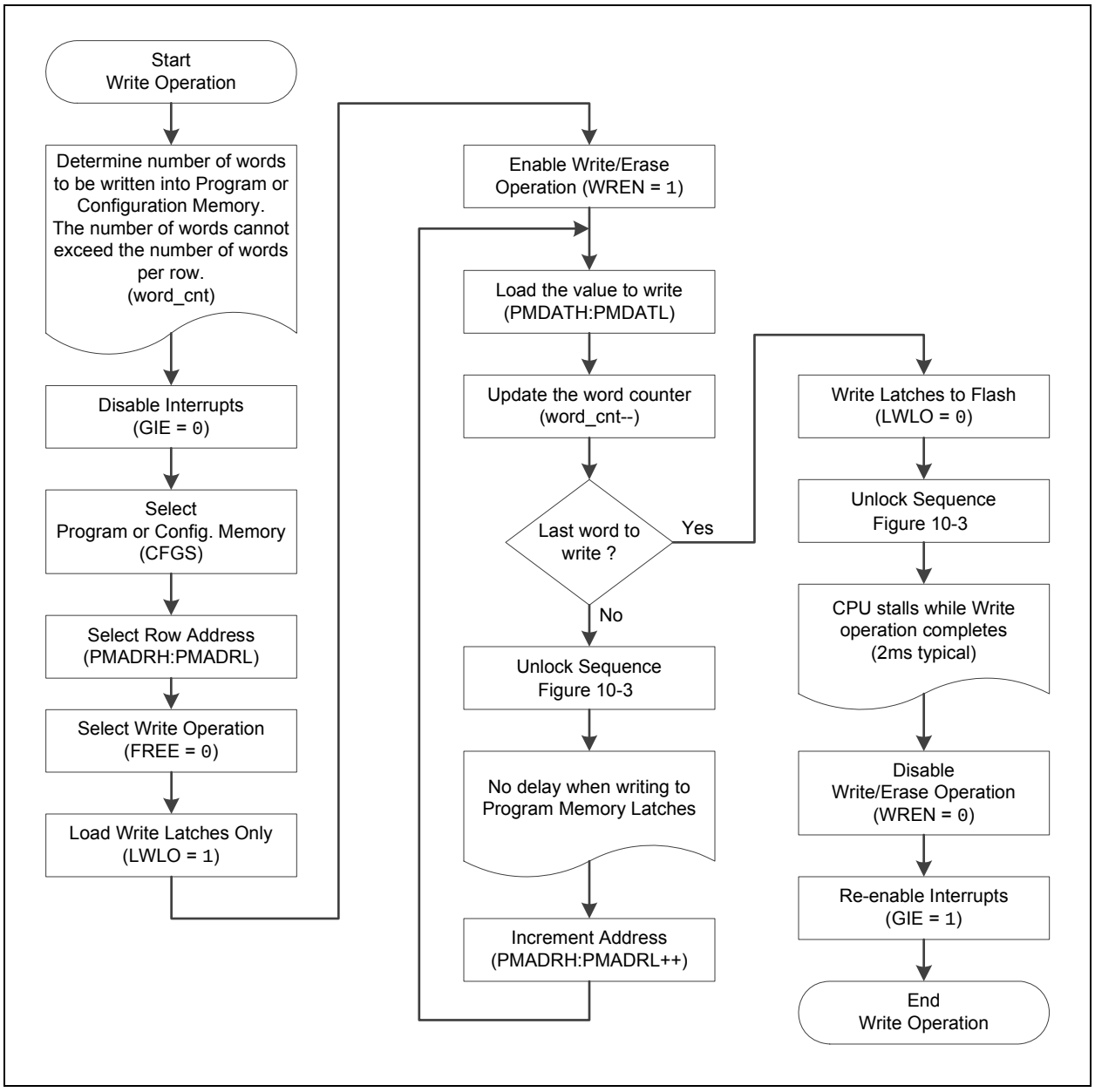
bit 2 **CCP1IF:** CCP1 Interrupt Flag bit
1 = Interrupt is pending
0 = Interrupt is not pending

bit 1 **TMR2IF:** Timer2 to PR2 Interrupt Flag bit
1 = Interrupt is pending
0 = Interrupt is not pending

bit 0 **TMR1IF:** Timer1 Overflow Interrupt Flag bit
1 = Interrupt is pending
0 = Interrupt is not pending

Note: Interrupt flag bits are set when an interrupt condition occurs, regardless of the state of its corresponding enable bit or the Global Enable bit, GIE, of the INTCON register. User software should ensure the appropriate interrupt flag bits are clear prior to enabling an interrupt.

FIGURE 10-6: FLASH PROGRAM MEMORY WRITE FLOWCHART



14.0 FIXED VOLTAGE REFERENCE (FVR)

The Fixed Voltage Reference, or FVR, is a stable voltage reference, independent of VDD, with 1.024V, 2.048V or 4.096V selectable output levels. The output of the FVR can be configured to supply a reference voltage to the following:

- ADC input channel
- ADC positive reference
- Comparator positive input
- Digital-to-Analog Converter (DAC)

The FVR can be enabled by setting the FVREN bit of the FVRCON register.

14.1 Independent Gain Amplifiers

The output of the FVR supplied to the ADC, Comparators, and DAC is routed through two independent programmable gain amplifiers. Each amplifier can be programmed for a gain of 1x, 2x or 4x, to produce the three possible voltage levels.

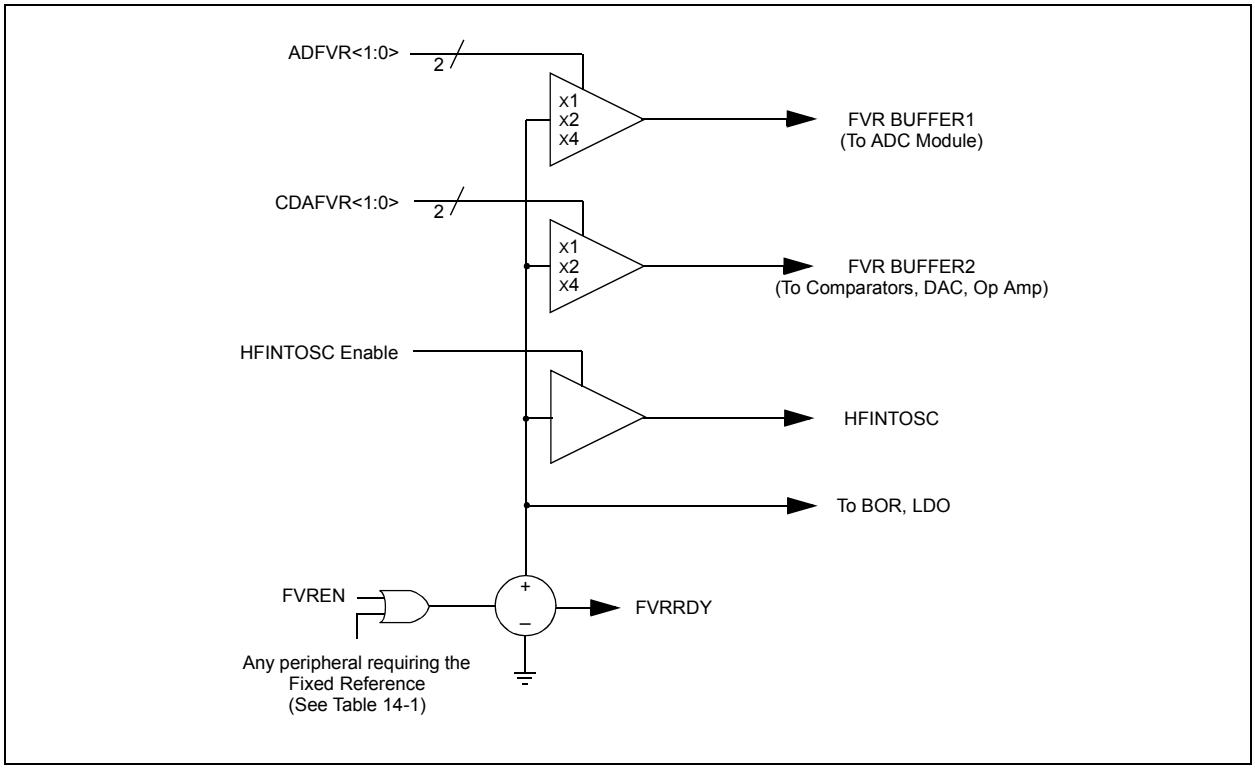
The ADFVR<1:0> bits of the FVRCON register are used to enable and configure the gain amplifier settings for the reference supplied to the ADC module. Reference **Section 20.0 "Analog-to-Digital Converter (ADC) Module"** for additional information.

The CDAFVR<1:0> bits of the FVRCON register are used to enable and configure the gain amplifier settings for the reference supplied to the DAC and comparator module. Reference **Section 22.0 "8-Bit Digital-to-Analog Converter (DAC1) Module"** and **Section 16.0 "Comparator Module"** for additional information.

14.2 FVR Stabilization Period

When the Fixed Voltage Reference module is enabled, it requires time for the reference and amplifier circuits to stabilize. Once the circuits stabilize and are ready for use, the FVRRDY bit of the FVRCON register will be set. See Figure 33-74: Wake from Sleep, VREGPM = 0.

FIGURE 14-1: VOLTAGE REFERENCE BLOCK DIAGRAM



REGISTER 20-3: ADCON2: ADC CONTROL REGISTER 2

R/W-0/0	R/W-0/0	R/W-0/0	R/W-0/0	U-0	U-0	U-0	U-0
TRIGSEL<3:0>(1)				—	—	—	—
bit 7							bit 0

Legend:		
R = Readable bit	W = Writable bit	U = Unimplemented bit, read as '0'
u = Bit is unchanged	x = Bit is unknown	-n/n = Value at POR and BOR/Value at all other Resets
'1' = Bit is set	'0' = Bit is cleared	

bit 7-4 **TRIGSEL<3:0>:** Auto-Conversion Trigger Selection bits(1)

0000 = No auto-conversion trigger selected
0001 = CCP1
0010 = CCP2
0011 = Timer0 – T0_overflow(2)
0100 = Timer1 – T1_overflow(2)
0101 = Timer2 – T2_match
0110 = Comparator C1 – C1OUT_sync
0111 = Comparator C2 – C2OUT_sync
1000 = CLC1 – LC1_out
1001 = CLC2 – LC2_out
1010 = CLC3 – LC3_out
1011 = Reserved
1100 = Timer4 – T4_match
1101 = Timer6 – T6_match
1110 = Reserved
1111 = Reserved

bit 3-0 **Unimplemented:** Read as '0'

Note 1: This is a rising edge sensitive input for all sources.
2: Signal also sets its corresponding interrupt flag.

28.0 MASTER SYNCHRONOUS SERIAL PORT (MSSP) MODULE

28.1 MSSP Module Overview

The Master Synchronous Serial Port (MSSP) module is a serial interface useful for communicating with other peripheral or microcontroller devices. These peripheral devices may be serial EEPROMs, shift registers, display drivers, A/D converters, etc. The MSSP module can operate in one of two modes:

- Serial Peripheral Interface (SPI)
- Inter-Integrated Circuit (I^2C)

The SPI interface supports the following modes and features:

- Master mode
- Slave mode
- Clock Parity
- Slave Select Synchronization (Slave mode only)
- Daisy-chain connection of slave devices

Figure 28-1 is a block diagram of the SPI interface module.

FIGURE 28-1: MSSP BLOCK DIAGRAM (SPI MODE)

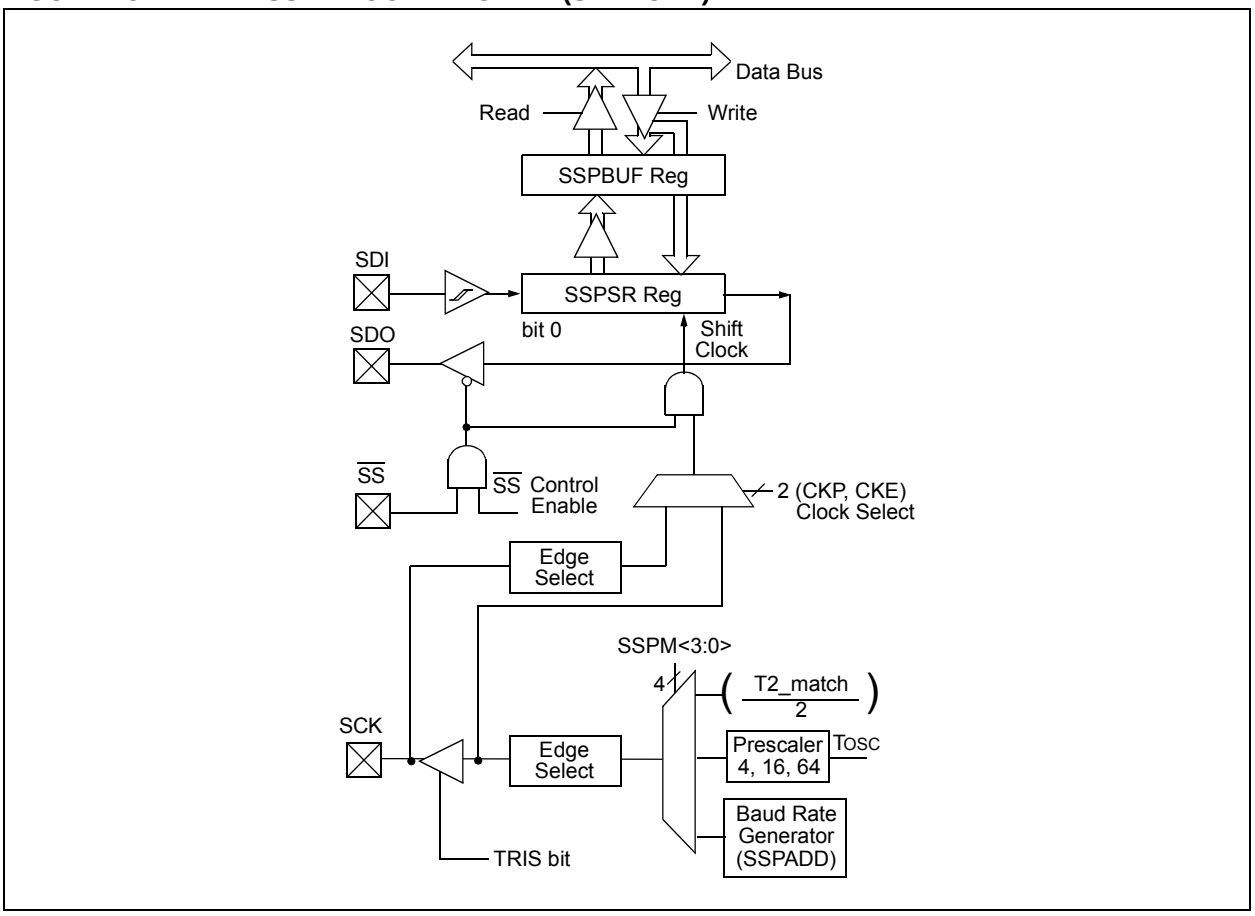


FIGURE 28-3: MSSP BLOCK DIAGRAM (I^2C SLAVE MODE)

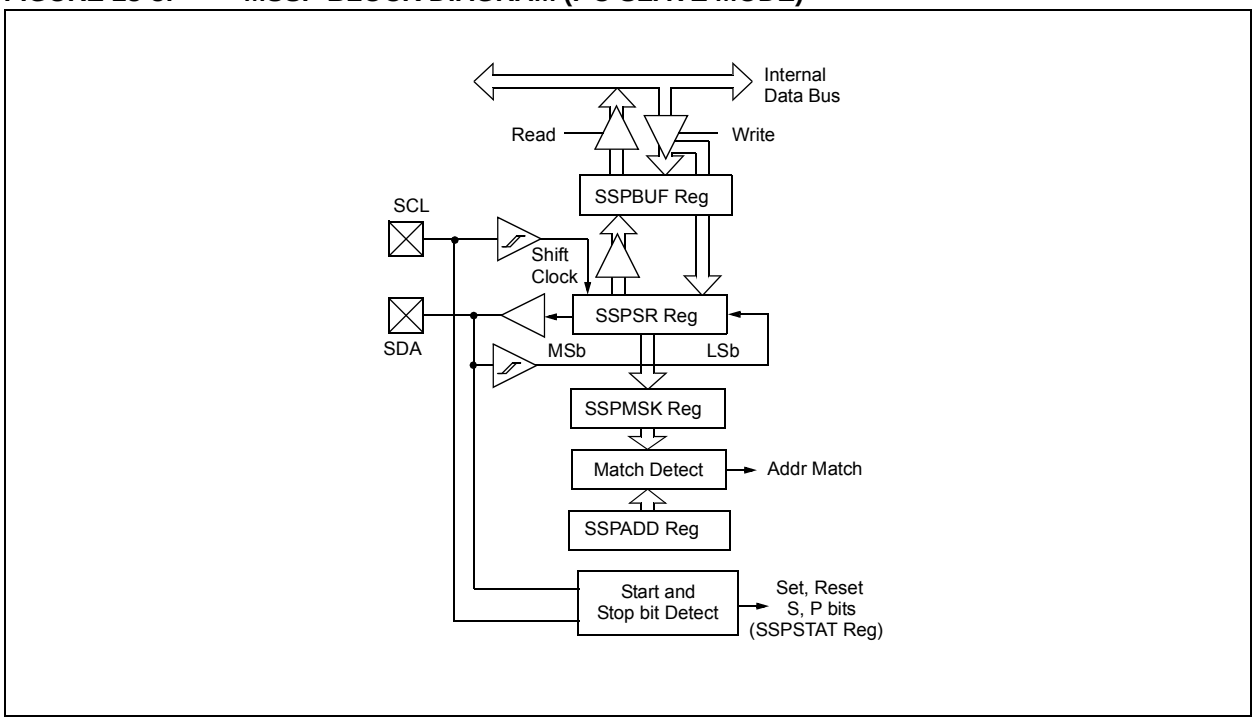
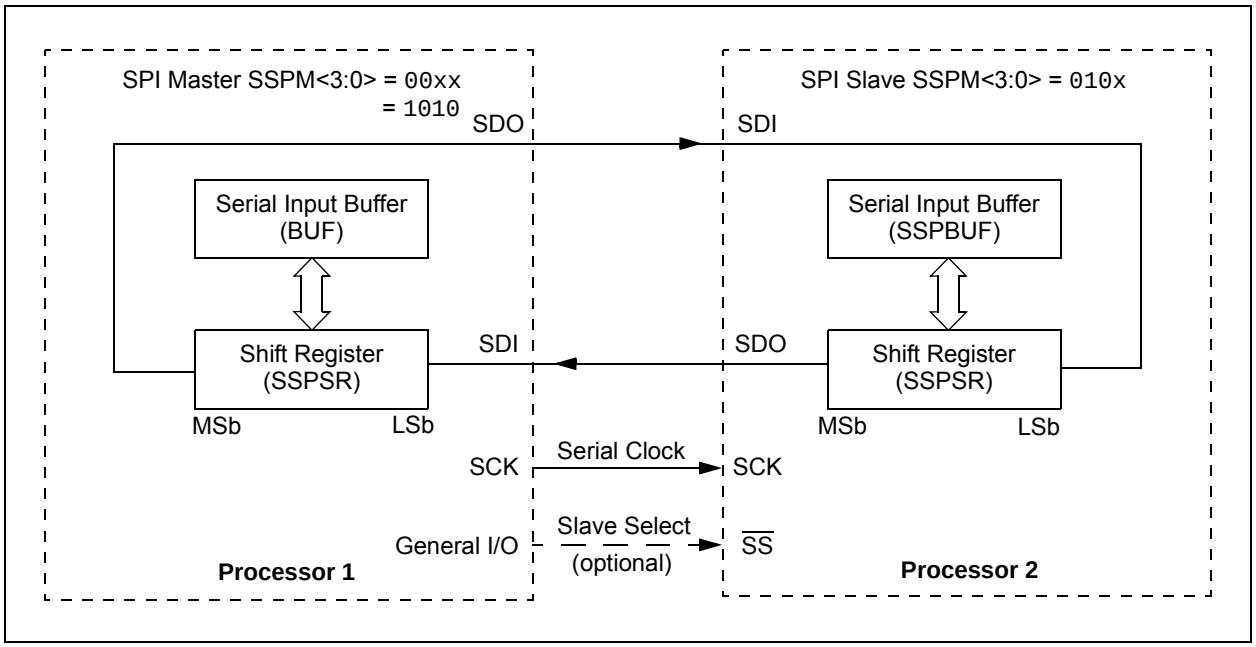


FIGURE 28-5: SPI MASTER/SLAVE CONNECTION



28.6.8 ACKNOWLEDGE SEQUENCE TIMING

An Acknowledge sequence is enabled by setting the Acknowledge Sequence Enable bit, ACKEN bit of the SSPCON2 register. When this bit is set, the SCL pin is pulled low and the contents of the Acknowledge data bit are presented on the SDA pin. If the user wishes to generate an Acknowledge, then the ACKDT bit should be cleared. If not, the user should set the ACKDT bit before starting an Acknowledge sequence. The Baud Rate Generator then counts for one rollover period (TBRG) and the SCL pin is deasserted (pulled high). When the SCL pin is sampled high (clock arbitration), the Baud Rate Generator counts for TBRG. The SCL pin is then pulled low. Following this, the ACKEN bit is automatically cleared, the Baud Rate Generator is turned off and the MSSP module then goes into Idle mode (Figure 28-30).

28.6.8.1 WCOL Status Flag

If the user writes the SSPBUF when an Acknowledge sequence is in progress, then WCOL bit is set and the contents of the buffer are unchanged (the write does not occur).

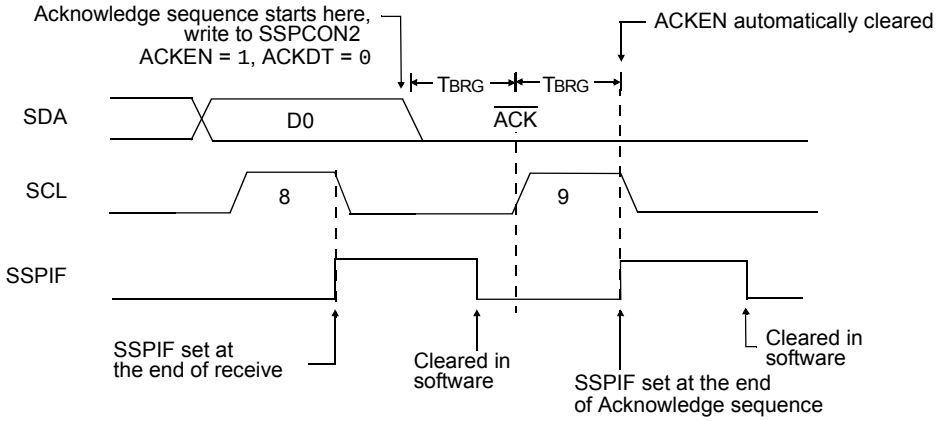
28.6.9 STOP CONDITION TIMING

A Stop bit is asserted on the SDA pin at the end of a receive/transmit by setting the Stop Sequence Enable bit, PEN bit of the SSPCON2 register. At the end of a receive/transmit, the SCL line is held low after the falling edge of the ninth clock. When the PEN bit is set, the master will assert the SDA line low. When the SDA line is sampled low, the Baud Rate Generator is reloaded and counts down to '0'. When the Baud Rate Generator times out, the SCL pin will be brought high and one TBRG (Baud Rate Generator rollover count) later, the SDA pin will be deasserted. When the SDA pin is sampled high while SCL is high, the P bit of the SSPSTAT register is set. A TBRG later, the PEN bit is cleared and the SSPIF bit is set (Figure 28-31).

28.6.9.1 WCOL Status Flag

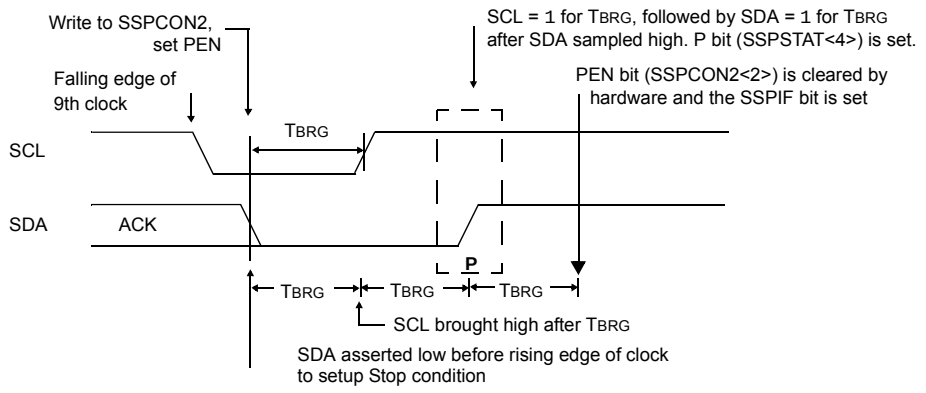
If the user writes the SSPBUF when a Stop sequence is in progress, then the WCOL bit is set and the contents of the buffer are unchanged (the write does not occur).

FIGURE 28-30: ACKNOWLEDGE SEQUENCE WAVEFORM



Note: TBRG = one Baud Rate Generator period.

FIGURE 28-31: STOP CONDITION RECEIVE OR TRANSMIT MODE



Note: TBRG = one Baud Rate Generator period.

FIGURE 28-34: BUS COLLISION DURING START CONDITION (SCL = 0)

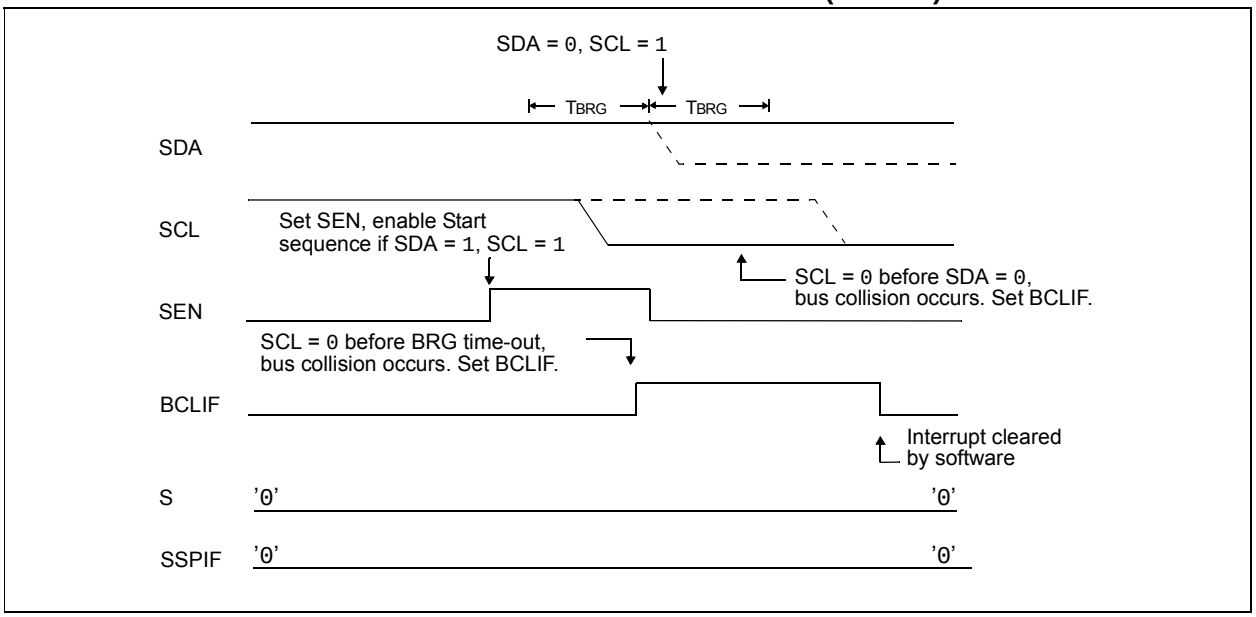


FIGURE 28-35: BRG RESET DUE TO SDA ARBITRATION DURING START CONDITION

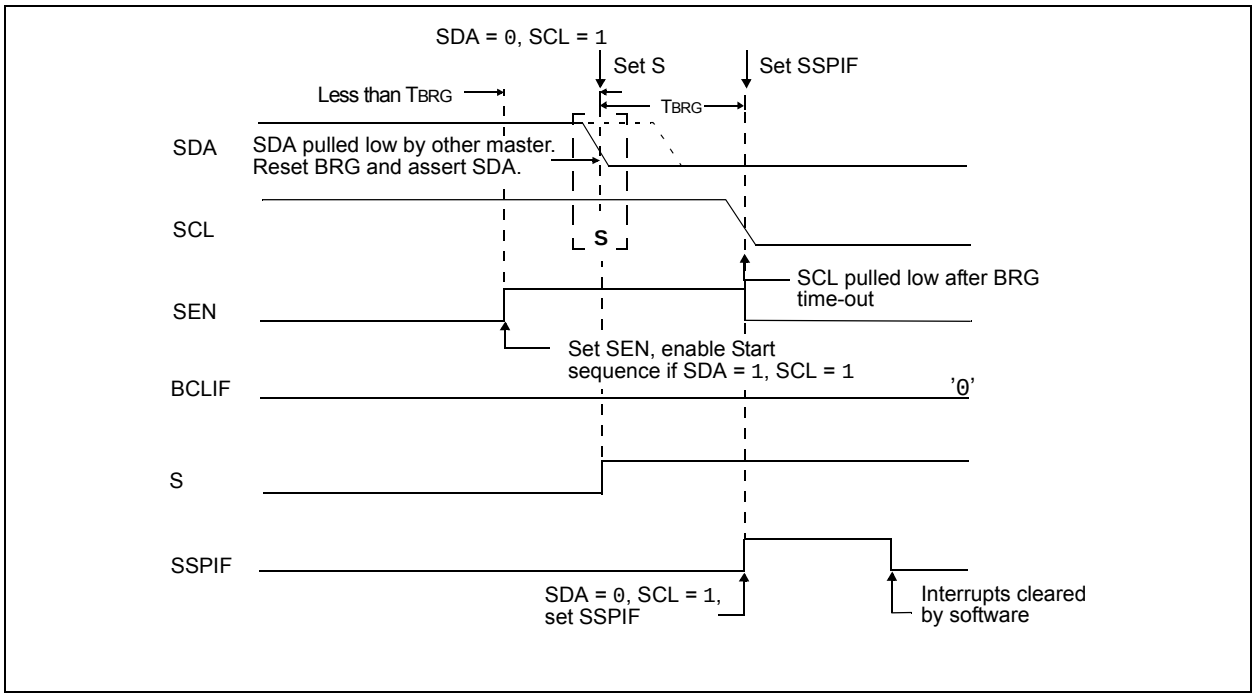


TABLE 29-5: BAUD RATES FOR ASYNCHRONOUS MODES (CONTINUED)

BAUD RATE	SYNC = 0, BRGH = 1, BRG16 = 0											
	Fosc = 8.000 MHz			Fosc = 4.000 MHz			Fosc = 3.6864 MHz			Fosc = 1.000 MHz		
	Actual Rate	% Error	SPBRG value (decimal)	Actual Rate	% Error	SPBRG value (decimal)	Actual Rate	% Error	SPBRG value (decimal)	Actual Rate	% Error	SPBRG value (decimal)
300	—	—	—	—	—	—	—	—	—	300	0.16	207
1200	—	—	—	1202	0.16	207	1200	0.00	191	1202	0.16	51
2400	2404	0.16	207	2404	0.16	103	2400	0.00	95	2404	0.16	25
9600	9615	0.16	51	9615	0.16	25	9600	0.00	23	—	—	—
10417	10417	0.00	47	10417	0.00	23	10473	0.53	21	10417	0.00	5
19.2k	19231	0.16	25	19.23k	0.16	12	19.2k	0.00	11	—	—	—
57.6k	55556	-3.55	8	—	—	—	57.60k	0.00	3	—	—	—
115.2k	—	—	—	—	—	—	115.2k	0.00	1	—	—	—

BAUD RATE	SYNC = 0, BRGH = 0, BRG16 = 1											
	Fosc = 32.000 MHz			Fosc = 20.000 MHz			Fosc = 18.432 MHz			Fosc = 11.0592 MHz		
	Actual Rate	% Error	SPBRG value (decimal)	Actual Rate	% Error	SPBRG value (decimal)	Actual Rate	% Error	SPBRG value (decimal)	Actual Rate	% Error	SPBRG value (decimal)
300	300.0	0.00	6666	300.0	-0.01	4166	300.0	0.00	3839	300.0	0.00	2303
1200	1200	-0.02	3332	1200	-0.03	1041	1200	0.00	959	1200	0.00	575
2400	2401	-0.04	832	2399	-0.03	520	2400	0.00	479	2400	0.00	287
9600	9615	0.16	207	9615	0.16	129	9600	0.00	119	9600	0.00	71
10417	10417	0.00	191	10417	0.00	119	10378	-0.37	110	10473	0.53	65
19.2k	19.23k	0.16	103	19.23k	0.16	64	19.20k	0.00	59	19.20k	0.00	35
57.6k	57.14k	-0.79	34	56.818	-1.36	21	57.60k	0.00	19	57.60k	0.00	11
115.2k	117.6k	2.12	16	113.636	-1.36	10	115.2k	0.00	9	115.2k	0.00	5

BAUD RATE	SYNC = 0, BRGH = 0, BRG16 = 1											
	Fosc = 8.000 MHz			Fosc = 4.000 MHz			Fosc = 3.6864 MHz			Fosc = 1.000 MHz		
	Actual Rate	% Error	SPBRG value (decimal)	Actual Rate	% Error	SPBRG value (decimal)	Actual Rate	% Error	SPBRG value (decimal)	Actual Rate	% Error	SPBRG value (decimal)
300	299.9	-0.02	1666	300.1	0.04	832	300.0	0.00	767	300.5	0.16	207
1200	1199	-0.08	416	1202	0.16	207	1200	0.00	191	1202	0.16	51
2400	2404	0.16	207	2404	0.16	103	2400	0.00	95	2404	0.16	25
9600	9615	0.16	51	9615	0.16	25	9600	0.00	23	—	—	—
10417	10417	0.00	47	10417	0.00	23	10473	0.53	21	10417	0.00	5
19.2k	19.23k	0.16	25	19.23k	0.16	12	19.20k	0.00	11	—	—	—
57.6k	55556	-3.55	8	—	—	—	57.60k	0.00	3	—	—	—
115.2k	—	—	—	—	—	—	115.2k	0.00	1	—	—	—

TABLE 29-7: SUMMARY OF REGISTERS ASSOCIATED WITH SYNCHRONOUS MASTER TRANSMISSION

Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Register on Page
ANSELA	—	—	—	ANSA4	—	ANSA2	ANSA1	ANSA0	122
ANSELB(1)	—	—	ANSB5	ANSB4	—	—	—	—	128
ANSELC	ANSC7(1)	ANSC6(1)	ANSC5(2)	ANSC4(2)	ANSC3	ANSC2	ANSC1	ANSC0	133
BAUD1CON	ABDOVF	RCIDL	—	SCKP	BRG16	—	WUE	ABDEN	336
INTCON	GIE	PEIE	TMR0IE	INTE	IOCIE	TMR0IF	INTF	IOCIF	85
PIE1	TMR1GIE	ADIE	RCIE	TXIE	SSP1IE	CCP1IE	TMR2IE	TMR1IE	86
PIR1	TMR1GIF	ADIF	RCIF	TXIF	SSP1IF	CCP1IF	TMR2IF	TMR1IF	89
RC1STA	SPEN	RX9	SREN	CREN	ADDEN	FERR	OERR	RX9D	335
RxyPPS	—	—	—	RxyPPS<4:0>					140
SP1BRGL	BRG<7:0>								337
SP1BRGH	BRG<15:8>								337
TRISA	—	—	TRISA5	TRISA4	—(3)	TRISA2	TRISA1	TRISA0	121
TRISB(1)	TRISB7	TRISB6	TRISB5	TRISB4	—	—	—	—	127
TRISC	TRISC7(1)	TRISC6(1)	TRISC5	TRISC4	TRISC3	TRISC2	TRISC1	TRISA0	132
TX1REG	EUSART Transmit Data Register								326*
TX1STA	CSRC	TX9	TXEN	SYNC	SENDB	BRGH	TRMT	TX9D	334

Legend: — = unimplemented location, read as '0'. Shaded cells are not used for synchronous master transmission.
* Page provides register information.

Note 1: PIC16(L)F1708 only.
2: PIC16(L)F1704 only.
3: Unimplemented, read as '1'.

DECFSZ **Decrement f, Skip if 0**

Syntax: [*label*] DECFSZ f,d

Operands: $0 \le f \le 127$
$d \in [0,1]$

Operation: (f) - 1 → (destination);
skip if result = 0

Status Affected: None

Description: The contents of register 'f' are decremented. If 'd' is '0', the result is placed in the W register. If 'd' is '1', the result is placed back in register 'f'.
If the result is '1', the next instruction is executed. If the result is '0', then a NOP is executed instead, making it a 2-cycle instruction.

GOTO **Unconditional Branch**

Syntax: [*label*] GOTO k

Operands: $0 \le k \le 2047$

Operation: k → PC<10:0>
PCLATH<6:3> → PC<14:11>

Status Affected: None

Description: GOTO is an unconditional branch. The 11-bit immediate value is loaded into PC bits <10:0>. The upper bits of PC are loaded from PCLATH<4:3>. GOTO is a 2-cycle instruction.

INCF **Increment f**

Syntax: [*label*] INCF f,d

Operands: $0 \le f \le 127$
$d \in [0,1]$

Operation: (f) + 1 → (destination)

Status Affected: Z

Description: The contents of register 'f' are incremented. If 'd' is '0', the result is placed in the W register. If 'd' is '1', the result is placed back in register 'f'.

INCFSZ **Increment f, Skip if 0**

Syntax: [*label*] INCFSZ f,d

Operands: $0 \le f \le 127$
$d \in [0,1]$

Operation: (f) + 1 → (destination),
skip if result = 0

Status Affected: None

Description: The contents of register 'f' are incremented. If 'd' is '0', the result is placed in the W register. If 'd' is '1', the result is placed back in register 'f'.
If the result is '1', the next instruction is executed. If the result is '0', a NOP is executed instead, making it a 2-cycle instruction.

IORLW **Inclusive OR literal with W**

Syntax: [*label*] IORLW k

Operands: $0 \le k \le 255$

Operation: (W) .OR. k → (W)

Status Affected: Z

Description: The contents of the W register are OR'ed with the 8-bit literal 'k'. The result is placed in the W register.

IORWF **Inclusive OR W with f**

Syntax: [*label*] IORWF f,d

Operands: $0 \le f \le 127$
$d \in [0,1]$

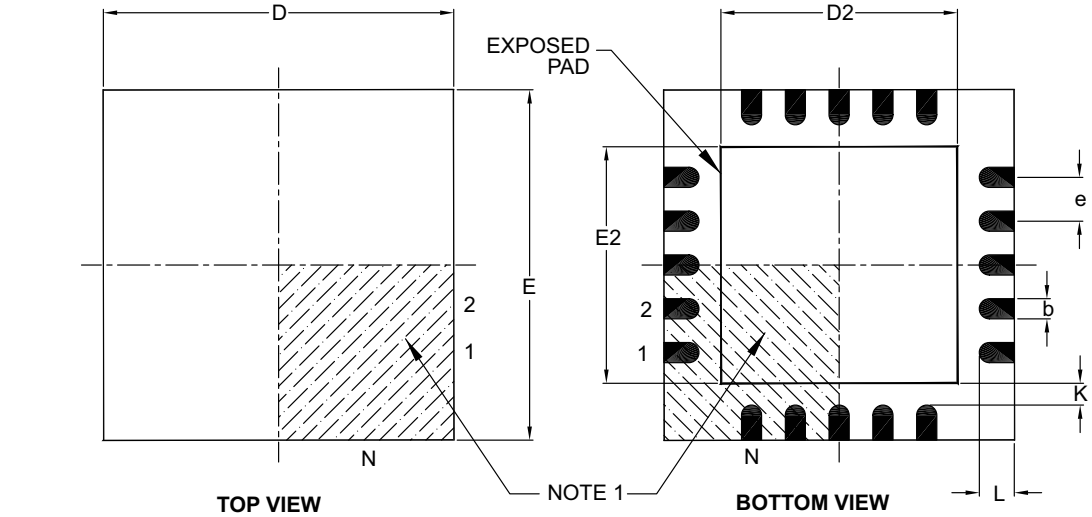
Operation: (W) .OR. (f) → (destination)

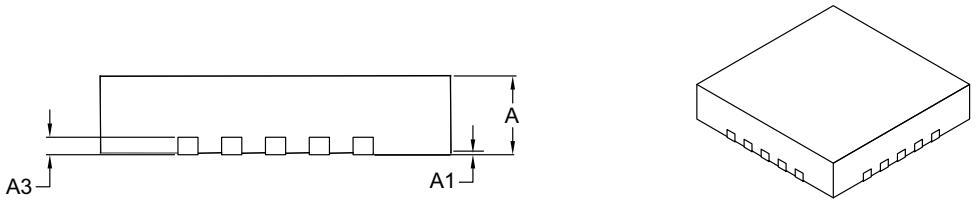
Status Affected: Z

Description: Inclusive OR the W register with register 'f'. If 'd' is '0', the result is placed in the W register. If 'd' is '1', the result is placed back in register 'f'.

20-Lead Plastic Quad Flat, No Lead Package (ML) – 4x4x0.9 mm Body [QFN]

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





Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		20	
Pitch	e		0.50 BSC	
Overall Height	A	0.80	0.90	1.00
Standoff	A1	0.00	0.02	0.05
Contact Thickness	A3		0.20 REF	
Overall Width	E		4.00 BSC	
Exposed Pad Width	E2	2.60	2.70	2.80
Overall Length	D		4.00 BSC	
Exposed Pad Length	D2	2.60	2.70	2.80
Contact Width	b	0.18	0.25	0.30
Contact Length	L	0.30	0.40	0.50
Contact-to-Exposed Pad	K	0.20	–	–

Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated.
3. Dimensioning and tolerancing per ASME Y14.5M.

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

REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-126B