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Details	
Product Status	Obsolete
Core Processor	dsPIC
Core Size	16-Bit
Speed	40 MIPs
Connectivity	I²C, IrDA, LINbus, SPI, UART/USART
Peripherals	Brown-out Detect/Reset, POR, PWM, WDT
Number of I/O	21
Program Memory Size	6KB (2K x 24)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	256 x 8
Voltage - Supply (Vcc/Vdd)	3V ~ 3.6V
Data Converters	A/D 6x10b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 125°C (TA)
Mounting Type	Surface Mount
Package / Case	36-VFTLA Exposed Pad
Supplier Device Package	36-VTLA (5x5)
Purchase URL	https://www.e-xfl.com/product-detail/microchip-technology/dspic33fj06gs102at-e-tl

REGISTER 7-12: IEC0: INTERRUPT ENABLE CONTROL REGISTER 0

U-0	U-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	U-0
—	—	ADIE	U1TXIE(1)	U1RXIE(1)	SPI1IE(1)	SPI1EIE(1)	—
bit 15							bit 8

R/W-0	U-0	U-0	U-0	R/W-0	R/W-0	R/W-0	R/W-0
T2IE	—	—	—	T1IE	OC1IE(1)	IC1IE(2)	INT0IE
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 15-14 **Unimplemented:** Read as '0'

bit 13 **ADIE:** ADC1 Conversion Complete Interrupt Enable bit
1 = Interrupt request is enabled
0 = Interrupt request is not enabled

bit 12 **U1TXIE:** UART1 Transmitter Interrupt Enable bit(1)
1 = Interrupt request is enabled
0 = Interrupt request is not enabled

bit 11 **U1RXIE:** UART1 Receiver Interrupt Enable bit(1)
1 = Interrupt request is enabled
0 = Interrupt request is not enabled

bit 10 **SPI1IE:** SPI1 Event Interrupt Enable bit(1)
1 = Interrupt request is enabled
0 = Interrupt request is not enabled

bit 9 **SPI1EIE:** SPI1 Event Interrupt Enable bit(1)
1 = Interrupt request is enabled
0 = Interrupt request is not enabled

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

bit 7 **T2IE:** Timer2 Interrupt Enable bit
1 = Interrupt request is enabled
0 = Interrupt request is not enabled

bit 6-4 **Unimplemented:** Read as '0'

bit 3 **T1IE:** Timer1 Interrupt Enable bit
1 = Interrupt request is enabled
0 = Interrupt request is not enabled

bit 2 **OC1IE:** Output Compare Channel 1 Interrupt Enable bit(1)
1 = Interrupt request is enabled
0 = Interrupt request is not enabled

bit 1 **IC1IE:** Input Capture Channel 1 Interrupt Enable bit(2)
1 = Interrupt request is enabled
0 = Interrupt request not enabled

bit 0 **INT0IE:** External Interrupt 0 Enable bit
1 = Interrupt request is enabled
0 = Interrupt request is not enabled

Note 1: This bit is not implemented in dsPIC33FJ06GS001/101A/102A devices.
2: This bit is not implemented in the dsPIC33FJ06GS001 device.

REGISTER 7-16: IEC5: INTERRUPT ENABLE CONTROL REGISTER 5

R/W-0	R/W-0	U-0	U-0	U-0	U-0	U-0	U-0
PWM2IE(1)	PWM1IE	—	—	—	—	—	—
bit 15							bit 8

U-0	U-0	U-0	U-0	U-0	U-0	U-0	R/W-0
—	—	—	—	—	—	—	JTAGIE
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 **PWM2IE:** PWM2 Interrupt Enable bit(1)
1 = Interrupt request is enabled
0 = Interrupt request is not enabled

bit 14 **PWM1IE:** PWM1 Interrupt Enable bit
1 = Interrupt request is enabled
0 = Interrupt request is not enabled

bit 13-1 **Unimplemented:** Read as '0'

bit 0 **JTAGIE:** JTAG Interrupt Enable bit
1 = Interrupt request is enabled
0 = Interrupt request is not enabled

Note 1: This bit is not implemented in dsPIC33FJ06GS001/101A devices.

REGISTER 7-21: IPC2: INTERRUPT PRIORITY CONTROL REGISTER 2

U-0	R/W-1	R/W-0	R/W-0	U-0	R/W-1	R/W-0	R/W-0
—	U1RXIP<2:0>(1)			—	SPI1IP<2:0>(1)		
bit 15							bit 8

U-0	R/W-1	R/W-0	R/W-0	U-0	U-0	U-0	U-0
—	SPI1EIP<2:0>(1)			—	—	—	—
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 **Unimplemented:** Read as '0'

bit 14-12 **U1RXIP<2:0>:** UART1 Receiver Interrupt Priority bits(1)
111 = Interrupt is Priority 7 (highest priority interrupt)
•
•
•
001 = Interrupt is Priority 1
000 = Interrupt source is disabled

bit 11 **Unimplemented:** Read as '0'

bit 10-8 **SPI1IP<2:0>:** SPI1 Event Interrupt Priority bits(1)
111 = Interrupt is Priority 7 (highest priority interrupt)
•
•
•
001 = Interrupt is Priority 1
000 = Interrupt source is disabled

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

bit 6-4 **SPI1EIP<2:0>:** SPI1 Error Interrupt Priority bits(1)
111 = Interrupt is Priority 7 (highest priority interrupt)
•
•
•
001 = Interrupt is Priority 1
000 = Interrupt source is disabled

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

Note 1: These bits are not implemented in the dsPIC33FJ06GS001 device.

REGISTER 7-29: IPC23: INTERRUPT PRIORITY CONTROL REGISTER 23

U-0	R/W-1	R/W-0	R/W-0	U-0	R/W-1	R/W-0	R/W-0
—	PWM2IP(1)			—	PWM1IP<2:0>		
bit 15							bit 8

U-0	U-0	U-0	U-0	U-0	U-0	U-0	U-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 **Unimplemented:** Read as '0'

bit 14-12 **PWM2IP<2:0>:** PWM2 Interrupt Priority bits(1)
111 = Interrupt is Priority 7 (highest priority)
•
•
•
001 = Interrupt is Priority 1
000 = Interrupt source is disabled

bit 11 **Unimplemented:** Read as '0'

bit 10-8 **PWM1IP<2:0>:** PWM1 Interrupt Priority bits
111 = Interrupt is Priority 7 (highest priority)
•
•
•
001 = Interrupt is Priority 1
000 = Interrupt source is disabled

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

Note 1: These bits are not implemented in dsPIC33FJ06GS001/101A devices.

8.6 Fail-Safe Clock Monitor (FSCM)

The Fail-Safe Clock Monitor (FSCM) allows the device to continue to operate, even in the event of an oscillator failure. The FSCM function is enabled by programming. If the FSCM function is enabled, the LPRC internal oscillator runs at all times (except during Sleep mode) and is not subject to control by the Watchdog Timer.

In the event of an oscillator failure, the FSCM generates a clock failure trap event and switches the system clock over to the FRC oscillator. Then, the application program can either attempt to restart the oscillator or execute a controlled shutdown. The trap can be treated as a warm Reset by simply loading the Reset address into the oscillator fail trap vector.

If the PLL multiplier is used to scale the system clock, the internal FRC is also multiplied by the same factor on clock failure. Essentially, the device switches to FRC with PLL on a clock failure.

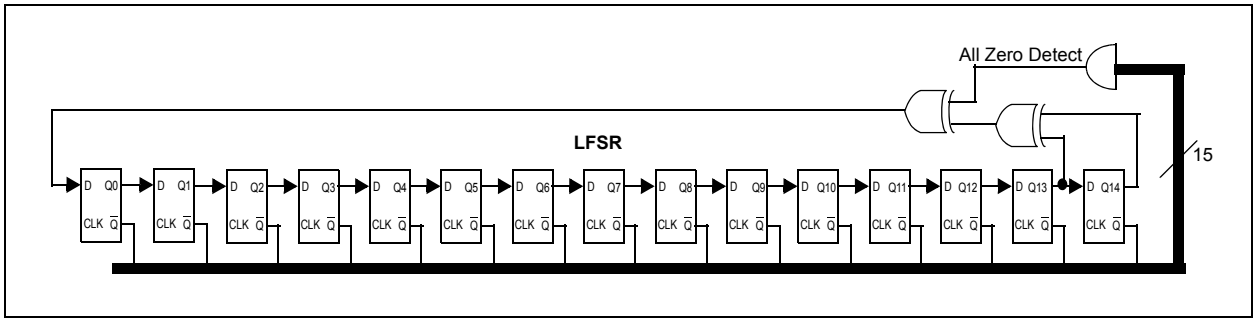
8.7 Pseudo-Random Generator

The pseudo-random generator is implemented with a 15-bit Linear Feedback Shift Register (LFSR), which is a shift register with a few exclusive OR gates. The shift register is clocked by the PWM clock and is a read-only register. The purpose of this feature is to provide the ability to randomly change the period or the active portion of the PWM.

A firmware routine can be used to read “n” random bits from the LFSR register and combine them, by either summing or performing another logical operation with the PWM period of the Duty Cycle registers. The result will be a PWM signal whose nominal period (or duty cycle) is the desired one, but whose effective value changes randomly. This capability will help in reducing the EMI/EMC emissions by spreading the power over a wider frequency range.

Figure 8-3 provides a block diagram of the LFSR.

FIGURE 8-3: LFSR BLOCK DIAGRAM



REGISTER 9-2: PMD2: PERIPHERAL MODULE DISABLE CONTROL REGISTER 2

U-0	U-0	U-0	U-0	U-0	U-0	U-0	R/W-0
—	—	—	—	—	—	—	IC1MD(1)
bit 15							bit 8

U-0	U-0	U-0	U-0	U-0	U-0	U-0	R/W-0
—	—	—	—	—	—	—	OC1MD(2)
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 15-9 **Unimplemented:** Read as '0'

bit 8 **IC1MD:** Input Capture 1 Module Disable bit(1)
1 = Input Capture 1 module is disabled
0 = Input Capture 1 module is enabled

bit 7-1 **Unimplemented:** Read as '0'

bit 0 **OC1MD:** Output Compare 1 Module Disable bit(2)
1 = Output Compare 1 module is disabled
0 = Output Compare 1 module is enabled

Note 1: This bit is not implemented in dsPIC33FJ06GS001/101A/102A devices.
2: This bit is not implemented in the dsPIC33FJ06GS001 device.

REGISTER 10-4: RPINR3: PERIPHERAL PIN SELECT INPUT REGISTER 3

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

U-0	U-0	R/W-1	R/W-1	R/W-1	R/W-1	R/W-1	R/W-1
—	—	T2CKR<5:0>					
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 15-6 **Unimplemented:** Read as ‘0’

bit 5-0 **T2CKR<5:0>:** Assign Timer2 External Clock (T2CK) to the Corresponding RPn Pin bits

111111 = Input tied to Vss
100011 = Input tied to RP35
100010 = Input tied to RP34
100001 = Input tied to RP33
100000 = Input tied to RP32
•
•
•
00000 = Input tied to RP0

REGISTER 10-10: RPINR29: PERIPHERAL PIN SELECT INPUT REGISTER 29

U-0	U-0	R/W-1	R/W-1	R/W-1	R/W-1	R/W-1	R/W-1
—	—	FLT1R<5:0>					
bit 15							bit 8

U-0	U-0	U-0	U-0	U-0	U-0	U-0	U-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 15-14 **Unimplemented:** Read as '0'

bit 13-8 **FLT1R<5:0>:** Assign PWM Fault Input 1 (FLT1) to the Corresponding RPn Pin bits

111111 = Input tied to Vss
100011 = Input tied to RP35
100010 = Input tied to RP34
100001 = Input tied to RP33
100000 = Input tied to RP32
•
•
•
00000 = Input tied to RP0

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

REGISTER 10-14: RPINR33: PERIPHERAL PIN SELECT INPUT REGISTER 33

U-0	U-0	R/W-1	R/W-1	R/W-1	R/W-1	R/W-1	R/W-1
—	—	SYNCI1R<5:0>					
bit 15							bit 8

U-0	U-0	R/W-1	R/W-1	R/W-1	R/W-1	R/W-1	R/W-1
—	—	FLT8R<5:0>					
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 15-14 **Unimplemented:** Read as '0'

bit 13-8 **SYNCI1R<5:0>:** Assign PWM Master Time Base External Synchronization Signal to the Corresponding RPn Pin bits

111111 = Input tied to Vss
100011 = Input tied to RP35
100010 = Input tied to RP34
100001 = Input tied to RP33
100000 = Input tied to RP32
•
•
•
00000 = Input tied to RP0

bit 7-6 **Unimplemented:** Read as '0'

bit 5-0 **FLT8R<5:0>:** Assign PWM Fault Input 8 (FLT8) to the Corresponding RPn Pin bits

111111 = Input tied to Vss
100011 = Input tied to RP35
100010 = Input tied to RP34
100001 = Input tied to RP33
100000 = Input tied to RP32
•
•
•
00000 = Input tied to RP0

11.1 Timer1 Control Register

REGISTER 11-1: T1CON: TIMER1 CONTROL REGISTER

R/W-0	U-0	R/W-0	U-0	U-0	U-0	U-0	U-0
TON	—	TSIDL	—	—	—	—	—
bit 15							bit 8

U-0	R/W-0	R/W-0	R/W-0	U-0	R/W-0	R/W-0	U-0
—	TGATE	TCKPS<1:0>		—	TSYNC	TCS	—
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 **TON:** Timer1 On bit
1 = Starts 16-bit Timer1
0 = Stops 16-bit Timer1

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

bit 13 **TSIDL:** Stop in Idle Mode bit
1 = Discontinues module operation when device enters Idle mode
0 = Continues module operation in Idle mode

bit 12-7 **Unimplemented:** Read as '0'

bit 6 **TGATE:** Timer1 Gated Time Accumulation Enable bit
When TCS = 1:
This bit is ignored.
When TCS = 0:
1 = Gated time accumulation is enabled
0 = Gated time accumulation is disabled

bit 5-4 **TCKPS<1:0>:** Timer1 Input Clock Prescale Select bits
11 = 1:256
10 = 1:64
01 = 1:8
00 = 1:1

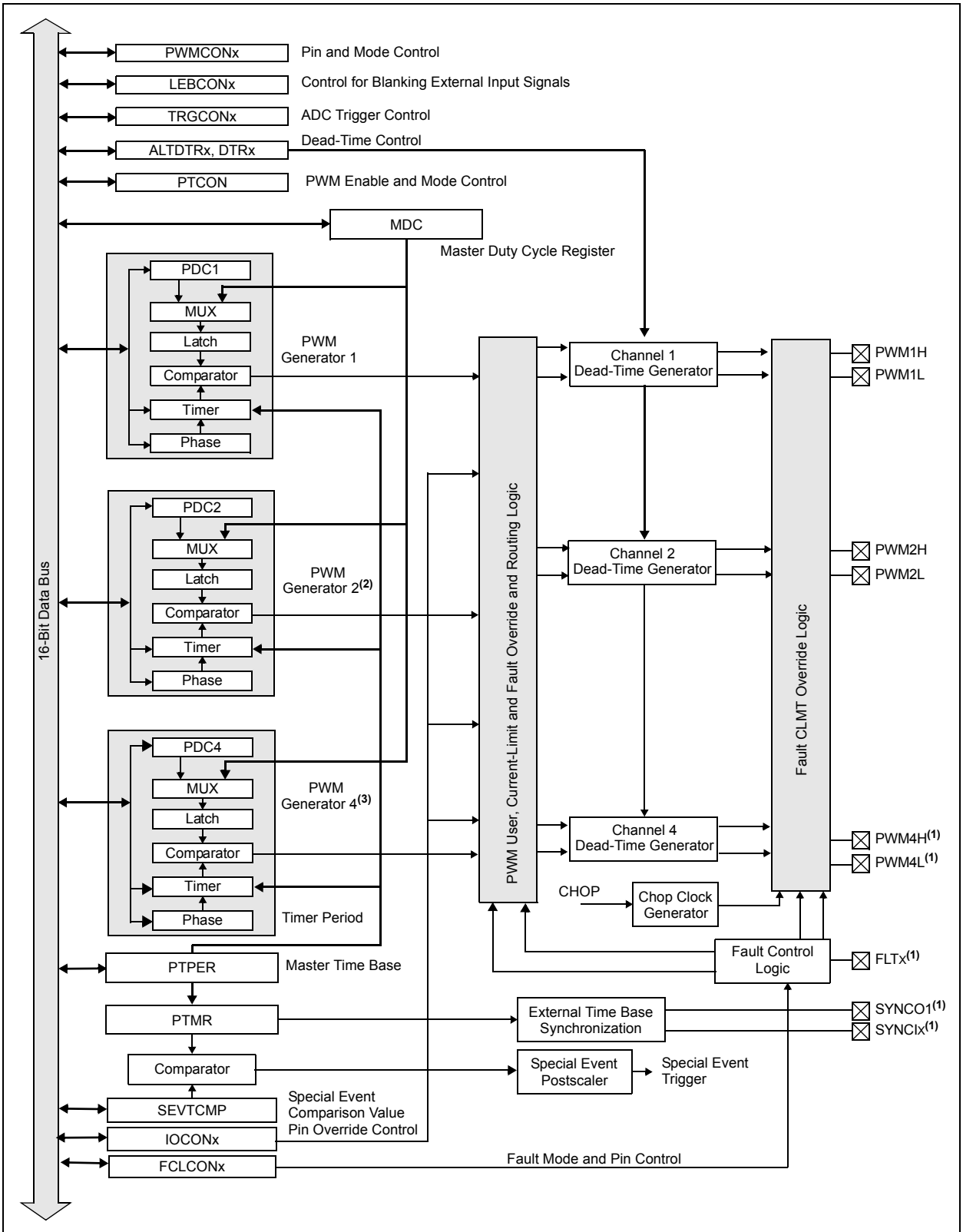
bit 3 **Unimplemented:** Read as '0'

bit 2 **TSYNC:** Timer1 External Clock Input Synchronization Select bit
When TCS = 1:
1 = Synchronizes external clock input
0 = Does not synchronize external clock input
When TCS = 0:
This bit is ignored.

bit 1 **TCS:** Timer1 Clock Source Select bit
1 = External clock from T1CK pin (on the rising edge)
0 = Internal clock (FCY)

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

FIGURE 15-1: SIMPLIFIED CONCEPTUAL BLOCK DIAGRAM OF HIGH-SPEED PWM



Note 1: These pins are remappable.

2: This PWM generator is not available in dsPIC33FJ06GS001/101A devices.

3: This PWM generator is only available in dsPIC33FJ06GS001/101A and dsPIC33FJ09GS302A devices.

REGISTER 15-14: IOCONx: PWMx I/O CONTROL 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
PENH	PENL	POLH	POLL	PMOD<1:0>(1)		OVRENH	OVRENL
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
OVRDAT<1:0>		FLTDAT<1:0>(2)		CLDAT<1:0>(2)		SWAP	OSYNC
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 **PENH:** PWMxH Output Pin Ownership bit
1 = PWM module controls PWMxH pin
0 = GPIO module controls PWMxH pin

bit 14 **PENL:** PWMxL Output Pin Ownership bit
1 = PWM module controls PWMxL pin
0 = GPIO module controls PWMxL pin

bit 13 **POLH:** PWMxH Output Pin Polarity bit
1 = PWMxH pin is active-low
0 = PWMxH pin is active-high

bit 12 **POLL:** PWMxL Output Pin Polarity bit
1 = PWMxL pin is active-low
0 = PWMxL pin is active-high

bit 11-10 **PMOD<1:0>:** PWMx I/O Pin Mode bits(1)
11 = PWM I/O pin pair is in the True Independent Output mode
10 = PWM I/O pin pair is in the Push-Pull Output mode
01 = PWM I/O pin pair is in the Redundant Output mode
00 = PWM I/O pin pair is in the Complementary Output mode

bit 9 **OVRENH:** Override Enable for PWMxH Pin bit
1 = OVRDAT<1> provides data for output on PWMxH pin
0 = PWM generator provides data for PWMxH pin

bit 8 **OVRENL:** Override Enable for PWMxL Pin bit
1 = OVRDAT<0> provides data for output on PWMxL pin
0 = PWM generator provides data for PWMxL pin

bit 7-6 **OVRDAT<1:0>:** Data for PWMxH and PWMxL Pins if Override is Enabled bits
If OVERENH = 1 then OVRDAT<1> provides data for PWMxH.
If OVERENL = 1 then OVRDAT<0> provides data for PWMxL.

bit 5-4 **FLTDAT<1:0>:** State for PWMxH and PWMxL Pins if FLTMOD is Enabled bits(2)
IFLTMOD (FCLCONx<15>) = 0, Normal Fault mode:
If Fault is active, then FLTDAT<1> provides the state for PWMxH.
If Fault is active, then FLTDAT<0> provides the state for PWMxL.
IFLTMOD (FCLCONx<15>) = 1, Independent Fault mode:
If current-limit is active, then FLTDAT<1> provides the state for PWMxH.
If Fault is active, then FLTDAT<0> provides the state for PWMxL.

Note 1: These bits should be changed only when PTEN = 0. Changing the clock selection during operation will yield unpredictable results.

2: State represents the active/inactive state of the PWM module depending on the POLH and POLL bit settings.

REGISTER 15-18: LEBCONx: PWMx LEADING-EDGE BLANKING CONTROL 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
PHR	PHF	PLR	PLF	FLTLEBEN	CLLEBEN	LEB<6:5>	
bit 15							bit 8

R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	U-0	U-0	U-0
LEB<4:0>					—	—	—
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 **PHR:** PWMxH Rising Edge Trigger Enable bit
1 = Rising edge of PWMxH will trigger LEB counter
0 = LEB ignores rising edge of PWMxH

bit 14 **PHF:** PWMxH Falling Edge Trigger Enable bit
1 = Falling edge of PWMxH will trigger LEB counter
0 = LEB ignores falling edge of PWMxH

bit 13 **PLR:** PWMxL Rising Edge Trigger Enable bit
1 = Rising edge of PWMxL will trigger LEB counter
0 = LEB ignores rising edge of PWMxL

bit 12 **PLF:** PWMxL Falling Edge Trigger Enable bit
1 = Falling edge of PWMxL will trigger LEB counter
0 = LEB ignores falling edge of PWMxL

bit 11 **FLTLEBEN:** Fault Input LEB Enable bit
1 = Leading-edge blanking is applied to selected Fault input
0 = Leading-edge blanking is not applied to selected Fault input

bit 10 **CLLEBEN:** Current-Limit LEB Enable bit
1 = Leading-edge blanking is applied to selected current-limit input
0 = Leading-edge blanking is not applied to selected current-limit input

bit 9-3 **LEB<6:0>:** Leading-Edge Blanking for Current-Limit and Fault Inputs bits
The value is 8.32 nsec increments.

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

16.0 SERIAL PERIPHERAL INTERFACE (SPI)

Note 1: This data sheet summarizes the features of the dsPIC33FJ06GS001/101A/102A/202A and dsPIC33FJ09GS302 family of devices. It is not intended to be a comprehensive reference source. To complement the information in this data sheet, refer to **Section 18. "Serial Peripheral Interface (SPI)"** (DS70206) of the "*dsPIC33F/PIC24H Family Reference Manual*", which is available from the Microchip web site (www.microchip.com).

2: Some registers and associated bits described in this section may not be available on all devices. Refer to **Section 4.0 "Memory Organization"** in this data sheet for device-specific register and bit information.

The Serial Peripheral Interface (SPI) module is a synchronous serial interface useful for communicating with other peripheral or microcontroller devices. These peripheral devices can be serial EEPROMs, shift registers, display drivers, Analog-to-Digital Converters, etc. The SPI module is compatible with Motorola® SPI and SIOP.

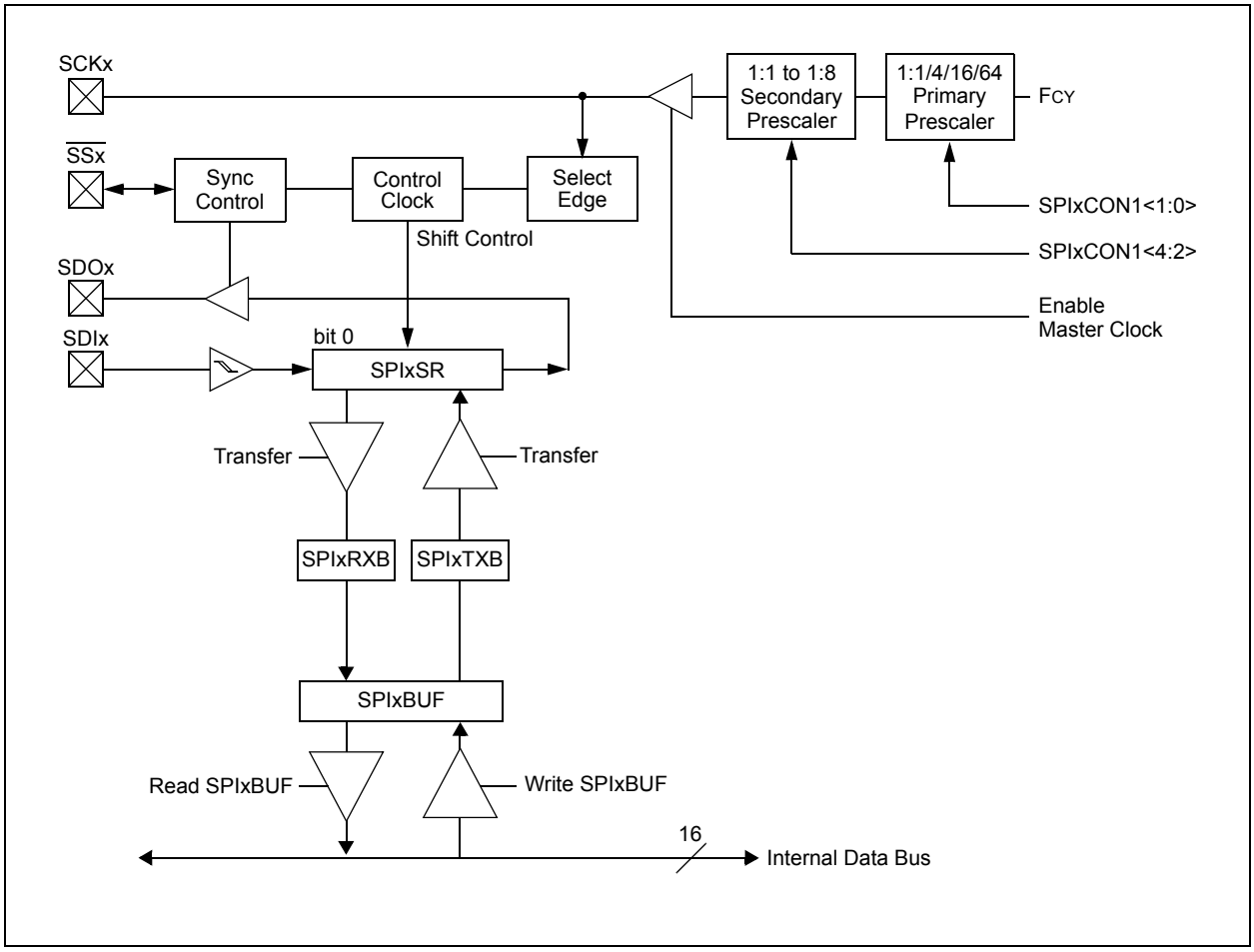
Each SPI module consists of a 16-bit shift register, SPIxSR (where x = 1 or 2), used for shifting data in and out, and a buffer register, SPIxBUF. A control register, SPIxCON, configures the module. Additionally, a status register, SPIxSTAT, indicates status conditions.

The serial interface consists of 4 pins:

- SDIx (serial data input)
- SDOx (serial data output)
- SCKx (shift clock input or output)
- $\overline{SSx}$ (active-low slave select)

In Master mode operation, SCKx is a clock output; in Slave mode, it is a clock input.

FIGURE 16-1: SPI MODULE BLOCK DIAGRAM



REGISTER 19-6: ADCPC1: ADC CONVERT PAIR CONTROL REGISTER 1 (CONTINUED)

bit 7 **IRQEN2:** Interrupt Request Enable 2 bit(2)
1 = Enables IRQ generation when requested conversion of channels AN5 and AN4 is completed
0 = IRQ is not generated

bit 6 **PEND2:** Pending Conversion Status 2 bit(2)
1 = Conversion of channels AN5 and AN4 is pending; set when selected trigger is asserted.
0 = Conversion is complete

bit 5 **SWTRG2:** Software Trigger 2 bit(2)
1 = Starts conversion of AN5 and AN4 (if selected by the TRGSRCx bits)(3)
This bit is automatically cleared by hardware when the PEND2 bit is set.
0 = Conversion has not started

bit 4-0 **TRGSRC2<4:0>:** Trigger 2 Source Selection bits(2)
Selects trigger source for conversion of analog channels AN5 and AN4.
11111 = Timer2 period match
•
•
•
11011 = Reserved
11010 = PWM Generator 4 current-limit ADC trigger
11001 = Reserved
11000 = PWM Generator 2 current-limit ADC trigger
10111 = PWM Generator 1 current-limit ADC trigger
10110 = Reserved
•
•
•
10010 = Reserved
10001 = PWM Generator 4 secondary trigger is selected
10000 = Reserved
01111 = PWM Generator 2 secondary trigger is selected
01110 = PWM Generator 1 secondary trigger is selected
01101 = Reserved
01100 = Timer1 period match
•
•
•
01000 = Reserved
00111 = PWM Generator 4 primary trigger is selected
00110 = Reserved
00101 = PWM Generator 2 primary trigger is selected
00100 = PWM Generator 1 primary trigger is selected
00011 = PWM Special Event Trigger is selected
00010 = Global software trigger is selected
00001 = Individual software trigger is selected
00000 = No conversion is enabled

Note 1: This bit is available in dsPIC33FJ06GS001/101A and dsPIC33FJ09GS302 devices only.
2: This bit is available in dsPIC33FJ06GS102A/201A and dsPIC33FJ09GS302 devices only.
3: The trigger source must be set as a global software trigger prior to setting this bit to '1'. If other conversions are in progress, conversion will be performed when the conversion resources are available.

REGISTER 20-1: CMPCONx: COMPARATOR CONTROL x REGISTER

R/W-0	U-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0
CMPON(1)	—	CMPSIDL(1)	HYSSEL<1:0>(1)		FLTREN(1)	FCLKSEL(1)	DACOE(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
INSEL<1:0>(1)		EXTREF(1)	HYSPOL(1)	CMPSTAT(1)	HGAIN(1)	CMPPOL(1)	RANGE(1)
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 **CMPON:** Comparator Operating Mode bit(1)
1 = Comparator module is enabled
0 = Comparator module is disabled (reduces power consumption)

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

bit 13 **CMPSIDL:** Stop in Idle Mode bit(1)
1 = Discontinues module operation when device enters Idle mode.
0 = Continues module operation in Idle mode
If a device has multiple comparators, any CMPSIDL bit that is set to '1' disables *all* comparators while in Idle mode.

bit 12-11 **HYSSEL<1:0>:** Comparator Hysteresis Select bits(1)
11 = 45 mV hysteresis
10 = 30 mV hysteresis
01 = 15 mV hysteresis
00 = No hysteresis is selected

bit 10 **FLTREN:** Digital Filter Enable bit(1)
1 = Digital filter is enabled
0 = Digital filter is disabled

bit 9 **FCLKSEL:** Digital Filter and Pulse Stretcher Clock Select bit(1)
1 = Digital filter and pulse stretcher operate with the PWM clock
0 = Digital filter and pulse stretcher operate with the system clock

bit 8 **DACOE:** DAC Output Enable(1)
1 = DAC analog voltage is output to DACOUT pin(2)
0 = DAC analog voltage is not connected to DACOUT pin

bit 7-6 **INSEL<1:0>:** Input Source Select for Comparator bits(1)
11 = Select CMPxD input pin
10 = Select CMPxC input pin
01 = Select CMPxB input pin
00 = Select CMPxA input pin

Note 1: This bit is not implemented in dsPIC33FJ06GS101A/102A devices.

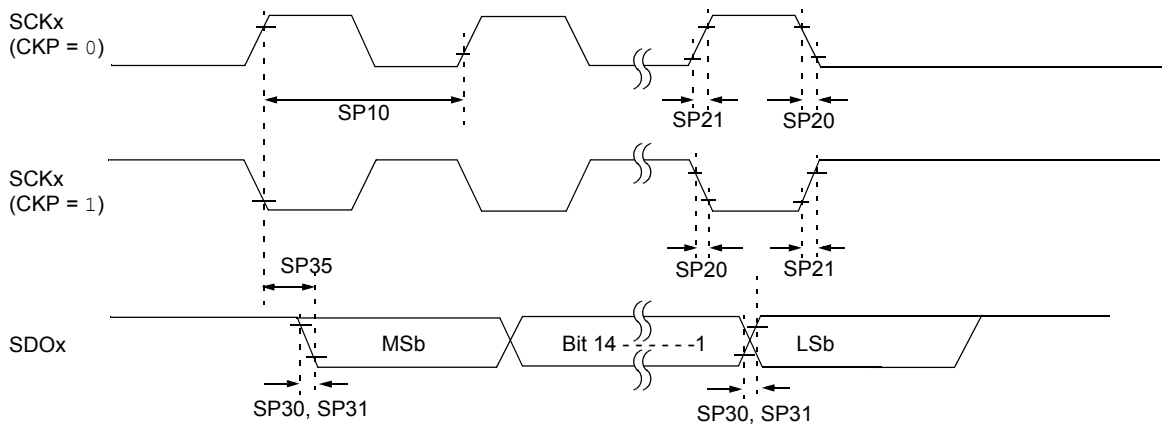
2: DACOUT can be associated only with a single comparator at any given time. The software must ensure that multiple comparators do not enable the DAC output by setting their respective DACOE bit.

3: For the INTREF value, refer to the DAC Module Specifications (Table 25-42) in **Section 25.0 "Electrical Characteristics"**.

TABLE 25-29: SPIx MAXIMUM DATA/CLOCK RATE SUMMARY

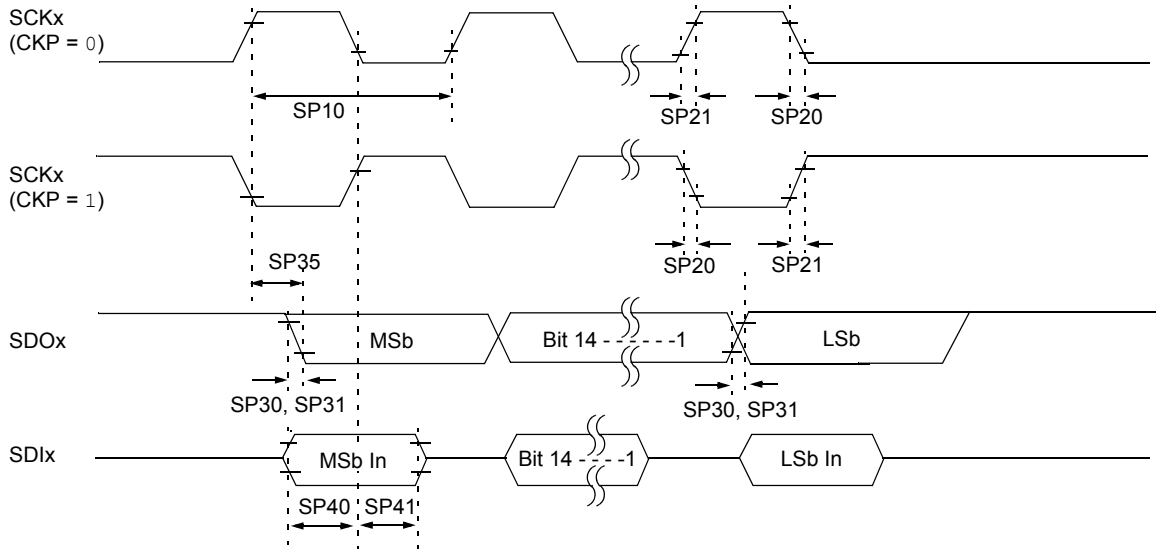
AC CHARACTERISTICS			Standard Operating Conditions: 3.0V to 3.6V (unless otherwise stated) Operating temperature -40°C ≤ TA ≤ +85°C for Industrial -40°C ≤ TA ≤ +125°C for Extended			
Maximum Data Rate	**Master Transmit Only (Half-Duplex)**	**Master Transmit/Receive (Full-Duplex)**	**Slave Transmit/Receive (Full-Duplex)**	**CKE**	**CKP**	**SMP**
15 MHz	Table 25-30	—	—	0,1	0,1	0,1
9 MHz	—	Table 25-31	—	1	0,1	1
9 MHz	—	Table 25-32	—	0	0,1	1
15 MHz	—	—	Table 25-33	1	0	0
11 MHz	—	—	Table 25-34	1	1	0
15 MHz	—	—	Table 25-35	0	1	0
11 MHz	—	—	Table 25-36	0	0	0

FIGURE 25-11: SPIx MASTER MODE (HALF-DUPLEX, TRANSMIT ONLY, CKE = 0) TIMING CHARACTERISTICS



Note: Refer to Figure 25-1 for load conditions.

FIGURE 25-14: SPIx MASTER MODE (FULL-DUPLEX, CKE = 0, CKP = x, SMP = 1) TIMING CHARACTERISTICS



Note: Refer to Figure 25-1 for load conditions.

TABLE 25-32: SPIx MASTER MODE (FULL-DUPLEX, CKE = 0, CKP = x, SMP = 1) TIMING REQUIREMENTS

AC CHARACTERISTICS			Standard 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(1)**	**Min**	**Typ(2)**	**Max**	**Units**	**Conditions**
SP10	TscP	Maximum SCKx Frequency	—	—	9	MHz	-40ºC to +125ºC and see **Note 3**
SP20	TscF	SCKx Output Fall Time	—	—	—	ns	See Parameter DO32 and **Note 4**
SP21	TscR	SCKx Output Rise Time	—	—	—	ns	See Parameter DO31 and **Note 4**
SP30	TdoF	SDOx Data Output Fall Time	—	—	—	ns	See Parameter DO32 and **Note 4**
SP31	TdoR	SDOx Data Output Rise Time	—	—	—	ns	See Parameter DO31 and **Note 4**
SP35	TscH2doV, TscL2doV	SDOx Data Output Valid after SCKx Edge	—	6	20	ns	
SP36	TdoV2scH, TdoV2scL	SDOx Data Output Setup to First SCKx Edge	30	—	—	ns	
SP40	TdiV2scH, TdiV2scL	Setup Time of SDIx Data Input to SCKx Edge	30	—	—	ns	
SP41	TscH2diL, TscL2diL	Hold Time of SDIx Data Input to SCKx Edge	30	—	—	ns	

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

2: Data in "Typ" column is at 3.3V, 25°C unless otherwise stated.

3: The minimum clock period for SCKx is 111 ns. The clock generated in master mode must not violate this specification.

4: Assumes 50 pF load on all SPIx pins.

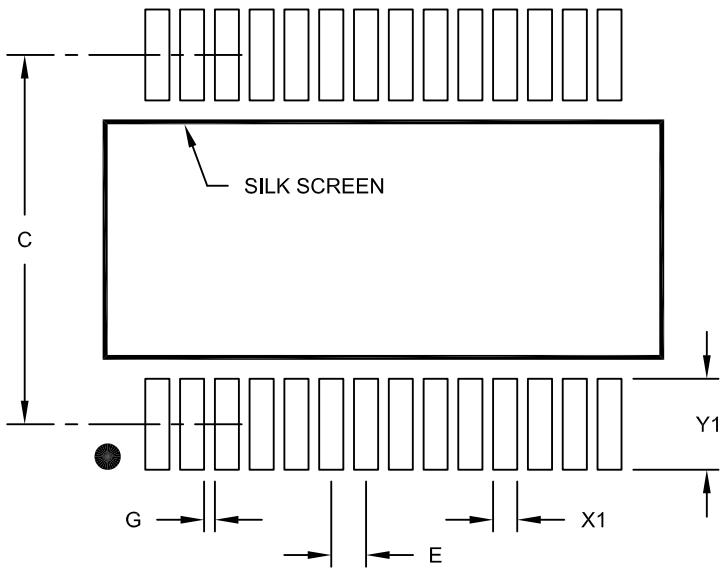
TABLE 25-45: CONSTANT CURRENT SOURCE SPECIFICATIONS

DC CHARACTERISTICS(1)				Standard Operating Conditions (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**
CC01	IDD	Current Consumption	—	30	—	µA	
CC02	IREG	Regulation of Current with Voltage On	—	±3	—	%	
CC03	IOUT	Current Output at Terminal	—	10	—	µA	

Note 1: Overall functional device operation at VBORMIN < VDD < VDDMIN is tested but not characterized. All device analog modules such as the ADC, etc., will function but with degraded performance below VDDMIN. Refer to Parameter BO10 in Table 25-11 for BOR values.

28-Lead Plastic Shrink Small Outline (SS) - 5.30 mm Body [SSOP]

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	0.65 BSC		
Contact Pad Spacing	C		7.20	
Contact Pad Width (X28)	X1			0.45
Contact Pad Length (X28)	Y1			1.75
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 No. C04-2073A