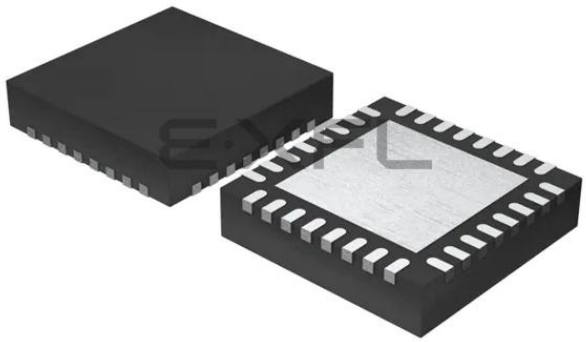

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Applications of "Embedded - Microcontrollers"

Details	
Product Status	Active
Core Processor	8051
Core Size	8-Bit
Speed	50MHz
Connectivity	SMBus (2-Wire/I²C), SPI, UART/USART
Peripherals	POR, PWM, Temp Sensor, WDT
Number of I/O	25
Program Memory Size	64KB (64K x 8)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	4.25K x 8
Voltage - Supply (Vcc/Vdd)	1.8V ~ 5.25V
Data Converters	A/D 25x12b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 125°C (TA)
Mounting Type	Surface Mount
Package / Case	32-VFQFN Exposed Pad
Supplier Device Package	32-QFN (5x5)
Purchase URL	https://www.e-xfl.com/product-detail/silicon-labs/c8051f503-imr

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8. Voltage Reference

The Voltage reference multiplexer on the C8051F50x/F51x devices is configurable to use an externally connected voltage reference, the on-chip reference voltage generator routed to the VREF pin, or the V_{DD} power supply voltage (see Figure 8.1). The REFSL bit in the Reference Control register (REF0CN, SFR Definition 8.1) selects the reference source for the ADC. For an external source or the on-chip reference, REFSL should be set to 0 to select the VREF pin. To use V_{DD} as the reference source, REFSL should be set to 1.

The BIASE bit enables the internal voltage bias generator, which is used by the ADC, Temperature Sensor, and internal oscillator. This bias is automatically enabled when any peripheral which requires it is enabled, and it does not need to be enabled manually. The bias generator may be enabled manually by writing a 1 to the BIASE bit in register REF0CN. The electrical specifications for the voltage reference circuit are given in Table 5.11.

The on-chip voltage reference circuit consists of a temperature stable bandgap voltage reference generator and a gain-of-two output buffer amplifier. The output voltage is selectable between 1.5 V and 2.25 V. The on-chip voltage reference can be driven on the VREF pin by setting the REFBE bit in register REF0CN to a 1. The maximum load seen by the VREF pin must be less than 200 µA to GND. Bypass capacitors of 0.1 µF and 4.7 µF are recommended from the VREF pin to GND. If the on-chip reference is not used, the REFBE bit should be cleared to 0. Electrical specifications for the on-chip voltage reference are given in Table 5.11.

Important Note about the VREF Pin: When using either an external voltage reference or the on-chip reference circuitry, the VREF pin should be configured as an analog pin and skipped by the Digital Crossbar. Refer to Section “20. Port Input/Output” on page 177 for the location of the VREF pin, as well as details of how to configure the pin in analog mode and to be skipped by the crossbar.

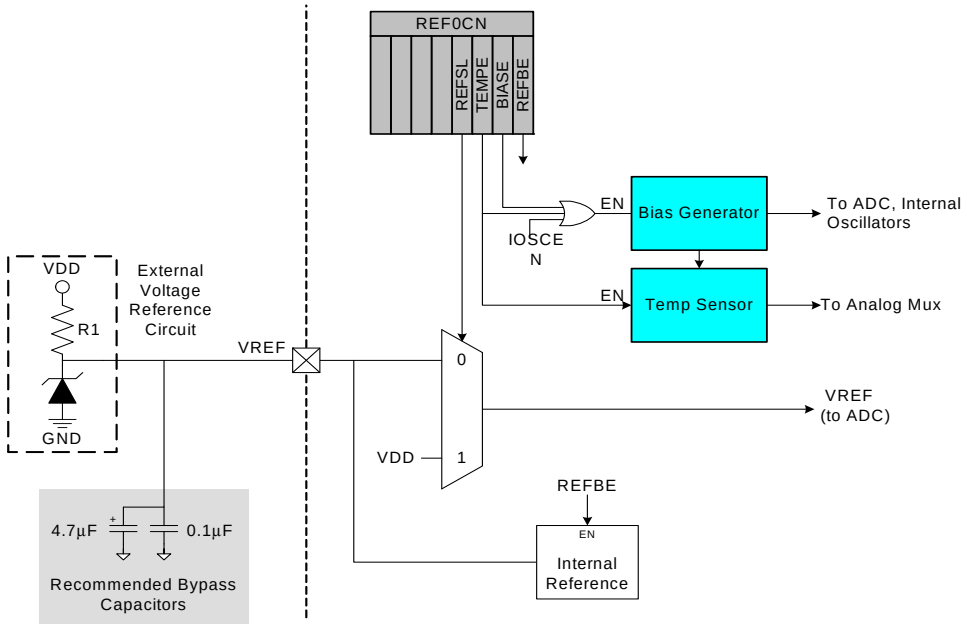

Figure 8.1. Voltage Reference Functional Block Diagram

SFR Definition 11.3. SP: Stack Pointer

Bit	7	6	5	4	3	2	1	0
Name	SP[7:0]							
Type	R/W							
Reset	0	0	0	0	0	1	1	1

SFR Address = 0x81; SFR Page = All Pages

Bit	Name	Function
7:0	SP[7:0]	**Stack Pointer.** The Stack Pointer holds the location of the top of the stack. The stack pointer is incremented before every PUSH operation. The SP register defaults to 0x07 after reset.

SFR Definition 11.4. ACC: Accumulator

Bit	7	6	5	4	3	2	1	0
Name	ACC[7:0]							
Type	R/W							
Reset	0	0	0	0	0	0	0	0

SFR Address = 0xE0; SFR Page = All Pages; Bit-Addressable

Bit	Name	Function
7:0	ACC[7:0]	**Accumulator.** This register is the accumulator for arithmetic operations.

SFR Definition 11.5. B: B Register

Bit	7	6	5	4	3	2	1	0
Name	B[7:0]							
Type	R/W							
Reset	0	0	0	0	0	0	0	0

SFR Address = 0xF0; SFR Page = All Pages; Bit-Addressable

Bit	Name	Function
7:0	B[7:0]	**B Register.** This register serves as a second accumulator for certain arithmetic operations.

12.1. Program Memory

The CIP-51 core has a 64 kB program memory space. The C8051F50x/F51x devices implement 64 kB or 32 kB of this program memory space as in-system, re-programmable Flash memory, organized in a contiguous block from addresses 0x0000 to 0xFFFF in 64 kB devices and addresses 0x0000 to 0x7FFF in 32 kB devices. The address 0xFBFF in 64 kB devices and 0x7FFF in 32 kB devices serves as the security lock byte for the device. Addresses above 0xFDFF are reserved in the 64 kB devices.

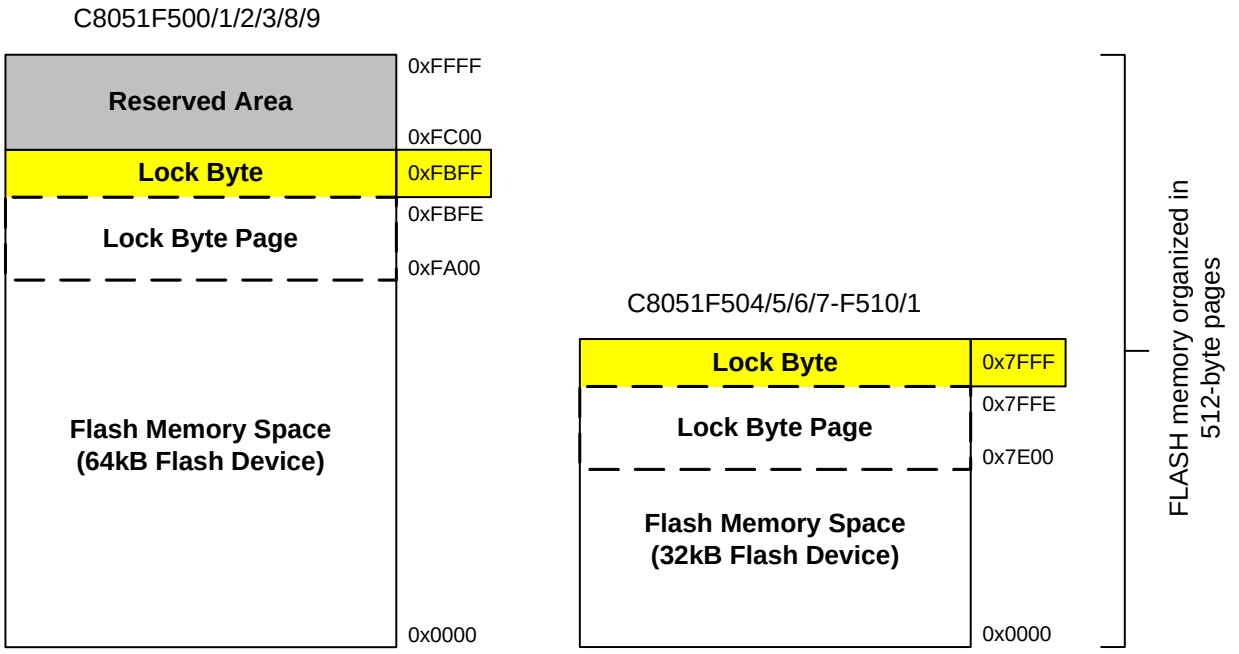

Figure 12.2. Flash Program Memory Map

12.1.1. MOVX Instruction and Program Memory

The MOVX instruction in an 8051 device is typically used to access external data memory. On the C8051F50x/F51x devices, the MOVX instruction is normally used to read and write on-chip XRAM, but can be re-configured to write and erase on-chip Flash memory space. MOVC instructions are always used to read Flash memory, while MOVX write instructions are used to erase and write Flash. This Flash access feature provides a mechanism for the C8051F50x/F51x to update program code and use the program memory space for non-volatile data storage. Refer to Section “15. Flash Memory” on page 129 for further details.

12.2. Data Memory

The C8051F50x/F51x devices include 4352 bytes of RAM data memory. 256 bytes of this memory is mapped into the internal RAM space of the 8051. The other 4096 bytes of this memory is on-chip “external” memory. The data memory map is shown in Figure 12.1 for reference.

12.2.1. Internal RAM

There are 256 bytes of internal RAM mapped into the data memory space from 0x00 through 0xFF. The lower 128 bytes of data memory are used for general purpose registers and scratch pad memory. Either direct or indirect addressing may be used to access the lower 128 bytes of data memory. Locations 0x00 through 0x1F are addressable as four banks of general purpose registers, each bank consisting of eight

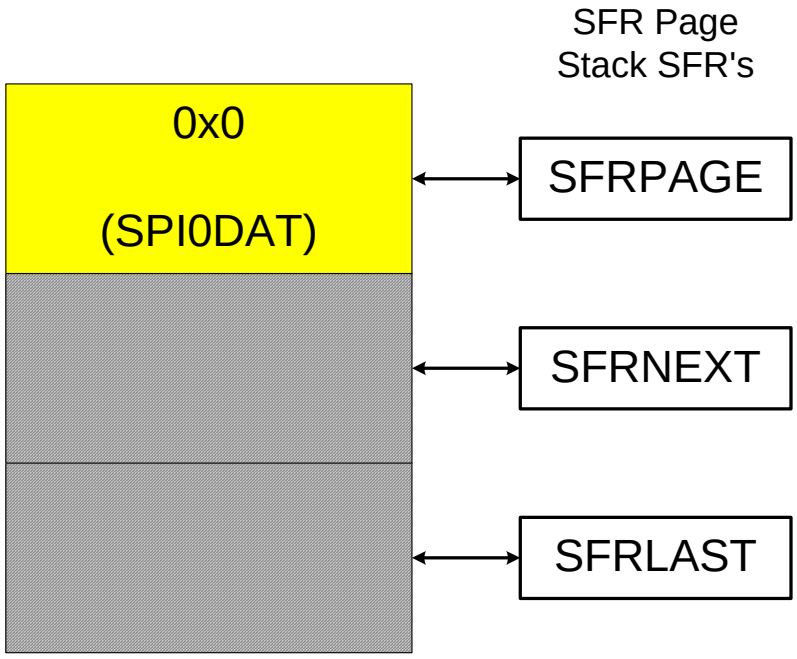

Figure 13.2. SFR Page Stack While Using SFR Page 0x0 To Access SPI0DAT

While CIP-51 executes in-line code (writing values to SPI0DAT in this example), the CAN0 Interrupt occurs. The CIP-51 vectors to the CAN0 ISR and pushes the current SFR Page value (SFR Page 0x00) into SFRNEXT in the SFR Page Stack. The SFR page needed to access CAN's SFRs is then automatically placed in the SFRPAGE register (SFR Page 0x0C). SFRPAGE is considered the "top" of the SFR Page Stack. Software can now access the CAN0 SFRs. Software may switch to any SFR Page by writing a new value to the SFRPAGE register at any time during the CAN0 ISR to access SFRs that are not on SFR Page 0x0C. See Figure 13.3.

SFR Definition 13.1. SFR0CN: SFR Page Control

Bit	7	6	5	4	3	2	1	0
Name								SFRPGEN
Type	R	R	R	R	R	R	R	R/W
Reset	0	0	0	0	0	0	0	1

SFR Address = 0x84; SFR Page = 0x0F

Bit	Name	Function
7:1	Unused	Read = 0000000b; Write = Don't Care
0	SFRPGEN	**SFR Automatic Page Control Enable.** Upon interrupt, the C8051 Core will vector to the specified interrupt service routine and automatically switch the SFR page to the corresponding peripheral or function's SFR page. This bit is used to control this autopaging function. 0: SFR Automatic Paging disabled. The C8051 core will not automatically change to the appropriate SFR page (i.e., the SFR page that contains the SFRs for the peripheral/function that was the source of the interrupt). 1: SFR Automatic Paging enabled. Upon interrupt, the C8051 will switch the SFR page to the page that contains the SFRs for the peripheral or function that is the source of the interrupt.

Table 13.3. Special Function Registers (Continued)

SFRs are listed in alphabetical order. All undefined SFR locations are reserved

Register	Address	Description	Page
IT01CF	0xE4	INT0/INT1 Configuration	128
LIN0ADR	0xD3	LIN0 Address	208
LIN0CF	0xC9	LIN0 Configuration	208
LIN0DAT	0xD2	LIN0 Data	209
OSCICN	0xA1	Internal Oscillator Control	168
OSCICRS	0xA2	Internal Oscillator Coarse Control	169
OSCIFIN	0x9E	Internal Oscillator Fine Calibration	169
OSCXCN	0x9F	External Oscillator Control	173
P0	0x80	Port 0 Latch	191
P0MASK	0xF2	Port 0 Mask Configuration	187
P0MAT	0xF1	Port 0 Match Configuration	187
P0MDIN	0xF1	Port 0 Input Mode Configuration	192
P0MDOUT	0xA4	Port 0 Output Mode Configuration	192
P0SKIP	0xD4	Port 0 Skip	193
P1	0x90	Port 1 Latch	193
P1MASK	0xF4	Port 1 Mask Configuration	188
P1MAT	0xF3	Port 1 Match Configuration	188
P1MDIN	0xF2	Port 1 Input Mode Configuration	194
P1MDOUT	0xA5	Port 1 Output Mode Configuration	194
P1SKIP	0xD5	Port 1 Skip	195
P2	0xA0	Port 2 Latch	195
P2MASK	0xB2	Port 2 Mask Configuration	189
P2MAT	0xB1	Port 2 Match Configuration	189
P2MDIN	0xF3	Port 2 Input Mode Configuration	196
P2MDOUT	0xA6	Port 2 Output Mode Configuration	196
P2SKIP	0xD6	Port 2 Skip	197
P3	0xB0	Port 3 Latch	197
P3MASK	0xAF	Port 3 Mask Configuration	190
P3MAT	0xAE	Port 3 Match Configuration	190
P3MDIN	0xF4	Port 3 Input Mode Configuration	198
P3MDOUT	0xAE	Port 3 Output Mode Configuration	198
P3SKIP	0xD7	Port 3 Skip	199
P4	0xB5	Port 4 Latch	199
P4MDOUT	0xAF	Port 4 Output Mode Configuration	200
PCA0CN	0xD8	PCA Control	300
PCA0CPH0	0xFC	PCA Capture 0 High	305

15. Flash Memory

On-chip, re-programmable Flash memory is included for program code and non-volatile data storage. The Flash memory can be programmed in-system, a single byte at a time, through the C2 interface or by software using the MOVX instruction. Once cleared to logic 0, a Flash bit must be erased to set it back to logic 1. Flash bytes would typically be erased (set to 0xFF) before being reprogrammed. The write and erase operations are automatically timed by hardware for proper execution; data polling to determine the end of the write/erase operation is not required. Code execution is stalled during a Flash write/erase operation. Refer to Table 5.5 for complete Flash memory electrical characteristics.

15.1. Programming the Flash Memory

The simplest means of programming the Flash memory is through the C2 interface using programming tools provided by Silicon Labs or a third party vendor. This is the only means for programming a non-initialized device. For details on the C2 commands to program Flash memory, see Section “28. C2 Interface” on page 306.

To ensure the integrity of Flash contents, The on-chip V_{DD} Monitor must be enabled in any system that includes code that writes and/or erases Flash memory from software. See Section 15.4 for more details. Before performing any Flash write or erase procedure, set the FLEWT bit in Flash Scale register (FLSCL) to ‘1’. Also, note that 8-bit MOVX instructions cannot be used to erase or write to Flash memory at addresses higher than 0x00FF.

15.1.1. Flash Lock and Key Functions

Flash writes and erases by user software are protected with a lock and key function. The Flash Lock and Key Register (FLKEY) must be written with the correct key codes, in sequence, before Flash operations may be performed. The key codes are: 0xA5, 0xF1. The timing does not matter, but the codes must be written in order. If the key codes are written out of order, or the wrong codes are written, Flash writes and erases will be disabled until the next system reset. Flash writes and erases will also be disabled if a Flash write or erase is attempted before the key codes have been written properly. The Flash lock resets after each write or erase; the key codes must be written again before a following Flash operation can be performed. The FLKEY register is detailed in SFR Definition 15.2.

15.1.2. Flash Erase Procedure

The Flash memory can be programmed by software using the MOVX write instruction with the address and data byte to be programmed provided as normal operands. Before writing to Flash memory using MOVX, Flash write operations must be enabled by doing the following: (1) setting the PSWE Program Store Write Enable bit (PSCTL.0) to logic 1 (this directs the MOVX writes to target Flash memory); and (2) Writing the Flash key codes in sequence to the Flash Lock register (FLKEY). The PSWE bit remains set until cleared by software.

A write to Flash memory can clear bits to logic 0 but cannot set them; only an erase operation can set bits to logic 1 in Flash. **A byte location to be programmed should be erased before a new value is written.** The Flash memory is organized in 512-byte pages. The erase operation applies to an entire page (setting all bytes in the page to 0xFF). To erase an entire 512-byte page, perform the following steps:

1. Disable interrupts (recommended).
2. Set the PSEE bit (register PSCTL).
3. Set the PSWE bit (register PSCTL).
4. Write the first key code to FLKEY: 0xA5.
5. Write the second key code to FLKEY: 0xF1.
6. Using the MOVX instruction, write a data byte to any location within the 512-byte page to be erased.
7. Clear the PSWE and PSEE bits.

SFR Definition 15.2. FLKEY: Flash Lock and Key

Bit	7	6	5	4	3	2	1	0
Name	FLKEY[7:0]							
Type	R/W							
Reset	0	0	0	0	0	0	0	0

SFR Address = 0xB7; SFR Page = All Pages

Bit	Name	Function
7:0	FLKEY[7:0]	**Flash Lock and Key Register.** Write: This register provides a lock and key function for Flash erasures and writes. Flash writes and erases are enabled by writing 0xA5 followed by 0xF1 to the FLKEY register. Flash writes and erases are automatically disabled after the next write or erase is complete. If any writes to FLKEY are performed incorrectly, or if a Flash write or erase operation is attempted while these operations are disabled, the Flash will be permanently locked from writes or erasures until the next device reset. If an application never writes to Flash, it can intentionally lock the Flash by writing a non-0xA5 value to FLKEY from software. Read: When read, bits 1–0 indicate the current Flash lock state. 00: Flash is write/erase locked. 01: The first key code has been written (0xA5). 10: Flash is unlocked (writes/erases allowed). 11: Flash writes/erases disabled until the next reset.

20.2.3. Assigning Port I/O Pins to External Digital Event Capture Functions

External digital event capture functions can be used to trigger an interrupt or wake the device from a low power mode when a transition occurs on a digital I/O pin. The digital event capture functions do not require dedicated pins and will function on both GPIO pins (PnSKIP = 1) and pins in use by the Crossbar (PnSKIP = 0). External digital event capture functions cannot be used on pins configured for analog I/O. Table 20.3 shows all available external digital event capture functions.

Table 20.3. Port I/O Assignment for External Digital Event Capture Functions

Digital Function	Potentially Assignable Port Pins	SFR(s) used for Assignment
External Interrupt 0	P1.0–P1.7	IT01CF
External Interrupt 1	P1.0–P1.7	IT01CF
Port Match	P0.0–P3.7*	P0MASK, P0MAT P1MASK, P1MAT P2MASK, P2MAT P3MASK, P3MAT
***Note:** P3.1–P3.7 are only available on the 48-pin packages.		

20.3. Priority Crossbar Decoder

The Priority Crossbar Decoder (Figure 20.3) assigns a priority to each I/O function, starting at the top with UART0. When a digital resource is selected, the least-significant unassigned Port pin is assigned to that resource excluding UART0, which is always assigned to pins P0.4 and P0.5, and excluding CAN0 which is always assigned to pins P0.6 and P0.7. If a Port pin is assigned, the Crossbar skips that pin when assigning the next selected resource. Additionally, the Crossbar will skip Port pins whose associated bits in the PnSKIP registers are set. The PnSKIP registers allow software to skip Port pins that are to be used for analog input, dedicated functions, or GPIO.

Because of the nature of Priority Crossbar Decoder, not all peripherals can be located on all port pins. Figure 20.3 maps peripherals to the potential port pins on which the peripheral I/O can appear.

Important Note on Crossbar Configuration: If a Port pin is claimed by a peripheral without use of the Crossbar, its corresponding PnSKIP bit should be set. This applies to P0.0 if VREF is used, P0.1 if the ADC is configured to use the external conversion start signal (CNVSTR), P0.3 and/or P0.2 if the external oscillator circuit is enabled, and any selected ADC or Comparator inputs. The Crossbar skips selected pins as if they were already assigned, and moves to the next unassigned pin.

SFR Definition 20.2. XBR1: Port I/O Crossbar Register 1

Bit	7	6	5	4	3	2	1	0
Name	T1E	T0E	ECIE	PCA0ME[2:0]			SYSCKE	Reserved
Type	R/W	R/W	R/W	R/W	R/W	R	R/W	R/W
Reset	0	0	0	0	0	0	0	0

SFR Address = 0xE2; SFR Page = 0x0F

Bit	Name	Function
7	T1E	**T1 Enable.** 0: T1 unavailable at Port pin. 1: T1 routed to Port pin.
6	T0E	**T0 Enable.** 0: T0 unavailable at Port pin. 1: T0 routed to Port pin.
5	ECIE	**PCA0 External Counter Input Enable.** 0: ECI unavailable at Port pin. 1: ECI routed to Port pin.
4:2	PCA0ME[2:0]	**PCA Module I/O Enable Bits.** 000: All PCA I/O unavailable at Port pins. 001: CEX0 routed to Port pin. 010: CEX0, CEX1 routed to Port pins. 011: CEX0, CEX1, CEX2 routed to Port pins. 100: CEX0, CEX1, CEX2, CEX3 routed to Port pins. 101: CEX0, CEX1, CEX2, CEX3, CEX4 routed to Port pins. 110: CEX0, CEX1, CEX2, CEX3, CEX4, CEX5 routed to Port pins. 111: Reserved
1	SYSCKE	**$\overline{\text{SYSCLK}}$ Output Enable.** 0: $\overline{\text{SYSCLK}}$ unavailable at Port pin. 1: $\overline{\text{SYSCLK}}$ output routed to Port pin.
0	Reserved	Always Write to 0.

LIN Register Definition 21.8. LIN0SIZE: LIN0 Message Size Register

Bit	7	6	5	4	3	2	1	0
Name	ENHCHK				LINSIZE[3:0]			
Type	R/W	R	R	R	R/W			
Reset	0	0	0	0	0	0	0	0

Indirect Address = 0x0B

Bit	Name	Function
7	ENHCHK	**Checksum Selection Bit.** 0: Use the classic, specification 1.3 compliant checksum. Checksum covers the data bytes. 1: Use the enhanced, specification 2.0 compliant checksum. Checksum covers data bytes and protected identifier.
6:4	Unused	Read = 000b; Write = Don't Care
3:0	LINSIZE[3:0]	**Data Field Size.** 0000: 0 data bytes 0001: 1 data byte 0010: 2 data bytes 0011: 3 data bytes 0100: 4 data bytes 0101: 5 data bytes 0110: 6 data bytes 0111: 7 data bytes 1000: 8 data bytes 1001-1110: RESERVED 1111: Use the ID[1:0] bits (LIN0ID[5:4]) to determine the data length.

Table 23.4. SMBus Status Decoding

Mode	Values Read				Current SMbus State	Typical Response Options	Values to Write			Next Status Vector Expected
	Status Vector	ACKRQ	ARBLOST	ACK			STA	STO	ACK	
Master Transmitter	1110	0	0	X	A master START was generated.	Load slave address + R/W into SMB0DAT.	0	0	X	1100
	1100	0	0	0	A master data or address byte was transmitted; NACK received.	Set STA to restart transfer.	1	0	X	1110
						Abort transfer.	0	1	X	—
		0	0	1	A master data or address byte was transmitted; ACK received.	Load next data byte into SMB0DAT.	0	0	X	1100
						End transfer with STOP.	0	1	X	—
						End transfer with STOP and start another transfer.	1	1	X	—
						Send repeated START.	1	0	X	1110
						Switch to Master Receiver Mode (clear SI without writing new data to SMB0DAT).	0	0	X	1000
Master Receiver	1000	1	0	X	A master data byte was received; ACK requested.	Acknowledge received byte; Read SMB0DAT.	0	0	1	1000
						Send NACK to indicate last byte, and send STOP.	0	1	0	—
						Send NACK to indicate last byte, and send STOP followed by START.	1	1	0	1110
						Send ACK followed by repeated START.	1	0	1	1110
						Send NACK to indicate last byte, and send repeated START.	1	0	0	1110
						Send ACK and switch to Master Transmitter Mode (write to SMB0DAT before clearing SI).	0	0	1	1100
						Send NACK and switch to Master Transmitter Mode (write to SMB0DAT before clearing SI).	0	0	0	1100

24.2. Data Format

UART0 has a number of available options for data formatting. Data transfers begin with a start bit (logic low), followed by the data bits (sent LSB-first), a parity or extra bit (if selected), and end with one or two stop bits (logic high). The data length is variable between 5 and 8 bits. A parity bit can be appended to the data, and automatically generated and detected by hardware for even, odd, mark, or space parity. The stop bit length is selectable between 1 and 2 bit times, and a multi-processor communication mode is available for implementing networked UART buses. All of the data formatting options can be configured using the SMOD0 register, shown in SFR Definition 24.2. Figure 24.2 shows the timing for a UART0 transaction without parity or an extra bit enabled. Figure 24.3 shows the timing for a UART0 transaction with parity enabled (PE0 = 1). Figure 24.4 is an example of a UART0 transaction when the extra bit is enabled (XBE0 = 1). Note that the extra bit feature is not available when parity is enabled, and the second stop bit is only an option for data lengths of 6, 7, or 8 bits.

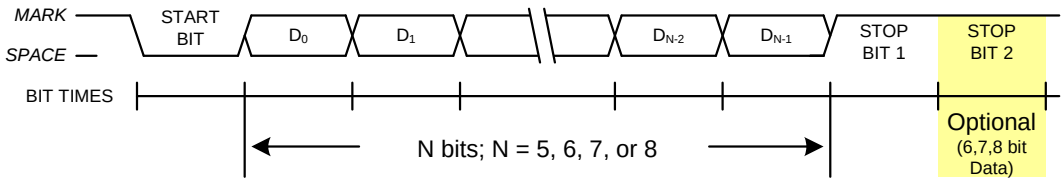

Figure 24.2. UART0 Timing Without Parity or Extra Bit

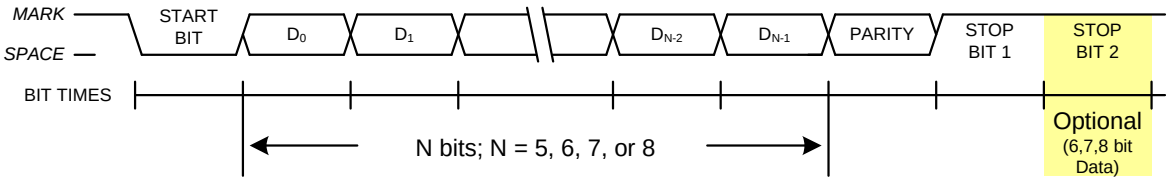

Figure 24.3. UART0 Timing With Parity

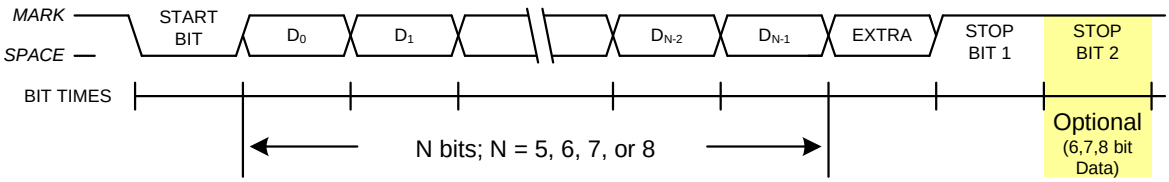

Figure 24.4. UART0 Timing With Extra Bit

SFR Definition 26.3. TMOD: Timer Mode

Bit	7	6	5	4	3	2	1	0
Name	GATE1	C/T1	T1M[1:0]		GATE0	C/T0	T0M[1:0]	
Type	R/W	R/W	R/W		R/W	R/W	R/W	
Reset	0	0	0	0	0	0	0	0

SFR Address = 0x89; SFR Page = All Pages

Bit	Name	Function
7	GATE1	**Timer 1 Gate Control.** 0: Timer 1 enabled when TR1 = 1 irrespective of $\overline{\text{INT1}}$ logic level. 1: Timer 1 enabled only when TR1 = 1 AND $\overline{\text{INT1}}$ is active as defined by bit IN1PL in register IT01CF (see SFR Definition 14.7).
6	C/T1	**Counter/Timer 1 Select.** 0: Timer: Timer 1 incremented by clock defined by T1M bit in register CKCON. 1: Counter: Timer 1 incremented by high-to-low transitions on external pin (T1).
5:4	T1M[1:0]	**Timer 1 Mode Select.** These bits select the Timer 1 operation mode. 00: Mode 0, 13-bit Counter/Timer 01: Mode 1, 16-bit Counter/Timer 10: Mode 2, 8-bit Counter/Timer with Auto-Reload 11: Mode 3, Timer 1 Inactive
3	GATE0	**Timer 0 Gate Control.** 0: Timer 0 enabled when TR0 = 1 irrespective of $\overline{\text{INT0}}$ logic level. 1: Timer 0 enabled only when TR0 = 1 AND $\overline{\text{INT0}}$ is active as defined by bit IN0PL in register IT01CF (see SFR Definition 14.7).
2	C/T0	**Counter/Timer 0 Select.** 0: Timer: Timer 0 incremented by clock defined by T0M bit in register CKCON. 1: Counter: Timer 0 incremented by high-to-low transitions on external pin (T0).
1:0	T0M[1:0]	**Timer 0 Mode Select.** These bits select the Timer 0 operation mode. 00: Mode 0, 13-bit Counter/Timer 01: Mode 1, 16-bit Counter/Timer 10: Mode 2, 8-bit Counter/Timer with Auto-Reload 11: Mode 3, Two 8-bit Counter/Timers

26.2. Timer 2

Timer 2 is a 16-bit timer formed by two 8-bit SFRs: TMR2L (low byte) and TMR2H (high byte). Timer 2 may operate in 16-bit auto-reload mode or (split) 8-bit auto-reload mode. The T2SPLIT bit (TMR2CN.3) defines the Timer 2 operation mode.

Timer 2 may be clocked by the system clock, the system clock divided by 12, or the external oscillator source divided by 8. The external clock mode is ideal for real-time clock (RTC) functionality, where the internal oscillator drives the system clock while Timer 2 (and/or the PCA) is clocked by an external precision oscillator. Note that the external oscillator source divided by 8 is synchronized with the system clock.

26.2.1. 16-bit Timer with Auto-Reload

When T2SPLIT (TMR2CN.3) is zero, Timer 2 operates as a 16-bit timer with auto-reload. Timer 2 can be clocked by SYSCLK, SYSCLK divided by 12, or the external oscillator clock source divided by 8. As the 16-bit timer register increments and overflows from 0xFFFF to 0x0000, the 16-bit value in the Timer 2 reload registers (TMR2RLH and TMR2RLL) is loaded into the Timer 2 register as shown in Figure 26.4, and the Timer 2 High Byte Overflow Flag (TMR2CN.7) is set. If Timer 2 interrupts are enabled (if IE.5 is set), an interrupt will be generated on each Timer 2 overflow. Additionally, if Timer 2 interrupts are enabled and the TF2LEN bit is set (TMR2CN.5), an interrupt will be generated each time the lower 8 bits (TMR2L) overflow from 0xFF to 0x00.

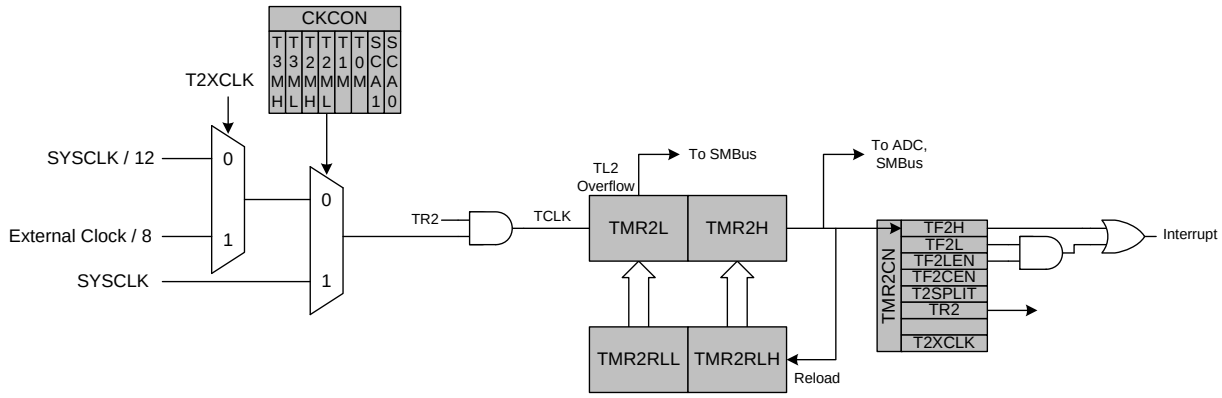

Figure 26.4. Timer 2 16-Bit Mode Block Diagram

26.2.2. 8-bit Timers with Auto-Reload

When T2SPLIT is set, Timer 2 operates as two 8-bit timers (TMR2H and TMR2L). Both 8-bit timers operate in auto-reload mode as shown in Figure 26.5. TMR2RLL holds the reload value for TMR2L; TMR2RLH holds the reload value for TMR2H. The TR2 bit in TMR2CN handles the run control for TMR2H. TMR2L is always running when configured for 8-bit Mode.

Each 8-bit timer may be configured to use SYSCLK, SYSCLK divided by 12, or the external oscillator clock source divided by 8. The Timer 2 Clock Select bits (T2MH and T2ML in CKCON) select either SYSCLK or the clock defined by the Timer 2 External Clock Select bit (T2XCLK in TMR2CN), as follows:

Revision 1.1 to Revision 1.2

- Updated “1. System Overview” with a voltage range specification for the internal oscillator.
- Updated Table 5.6 on page 47 with new conditions for the internal oscillator accuracy. The internal oscillator accuracy is dependent on the operating voltage range.
- Updated “5. Electrical Characteristics” to remove the internal oscillator curve across temperature diagram.
- Updated SFR Definition 10.1 (REG0CN) with a new definition for Bit 6. The bit 6 reset value is 1b and must be written to 1b.
- Updated “21. Local Interconnect Network (LIN)” with a voltage range specification for the internal oscillator.
- Updated “22. Controller Area Network (CAN0)” with a voltage range specification for the internal oscillator.
- Updated SFR Definition 8.1 (REF0CN) with oscillator suspend requirement for ZTCEN.
- Updated "16.3 Suspend Mode" with note regarding ZTCEN.
- Updated Figure 6.4 with new timing diagram when using CNVSTR pin.
- Added Port 2 Event and Port 3 Events to wake-up sources in Section 19.2.1.
- Updated LIN Register Definitions 21.9 and 21.10 with correct reset values.
- Updated C2 Register Definitions 28.2 and 28.3 with correct C2 and SFR addresses.