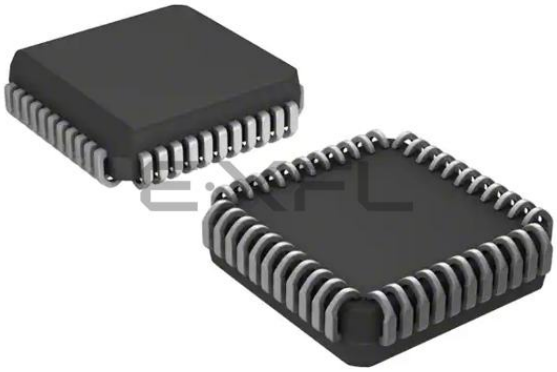

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Applications of "Embedded - Microcontrollers"

Details	
Product Status	Obsolete
Core Processor	eZ8
Core Size	8-Bit
Speed	20MHz
Connectivity	I²C, IrDA, SPI, UART/USART
Peripherals	Brown-out Detect/Reset, DMA, POR, PWM, WDT
Number of I/O	31
Program Memory Size	64KB (64K x 8)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	4K x 8
Voltage - Supply (Vcc/Vdd)	3V ~ 3.6V
Data Converters	A/D 8x10b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 105°C (TA)
Mounting Type	Surface Mount
Package / Case	44-LCC (J-Lead)
Supplier Device Package	-
Purchase URL	https://www.e-xfl.com/product-detail/zilog/z8f6421vn020ec00tr

Use of All Uppercase Letters

The use of all uppercase letters designates the names of states, modes, and commands.

- Example 1: The bus is considered BUSY after the Start condition.
- Example 2: A START command triggers the processing of the initialization sequence.
- Example 3: STOP mode.

Bit Numbering

Bits are numbered from *0* to *n–1* where *n* indicates the total number of bits. For example, the 8 bits of a register are numbered from 0 to 7.

Safeguards

It is important that you understand the following safety terms, which are defined here.

Caution: *Indicates a procedure or file may become corrupted if you do not follow directions.*

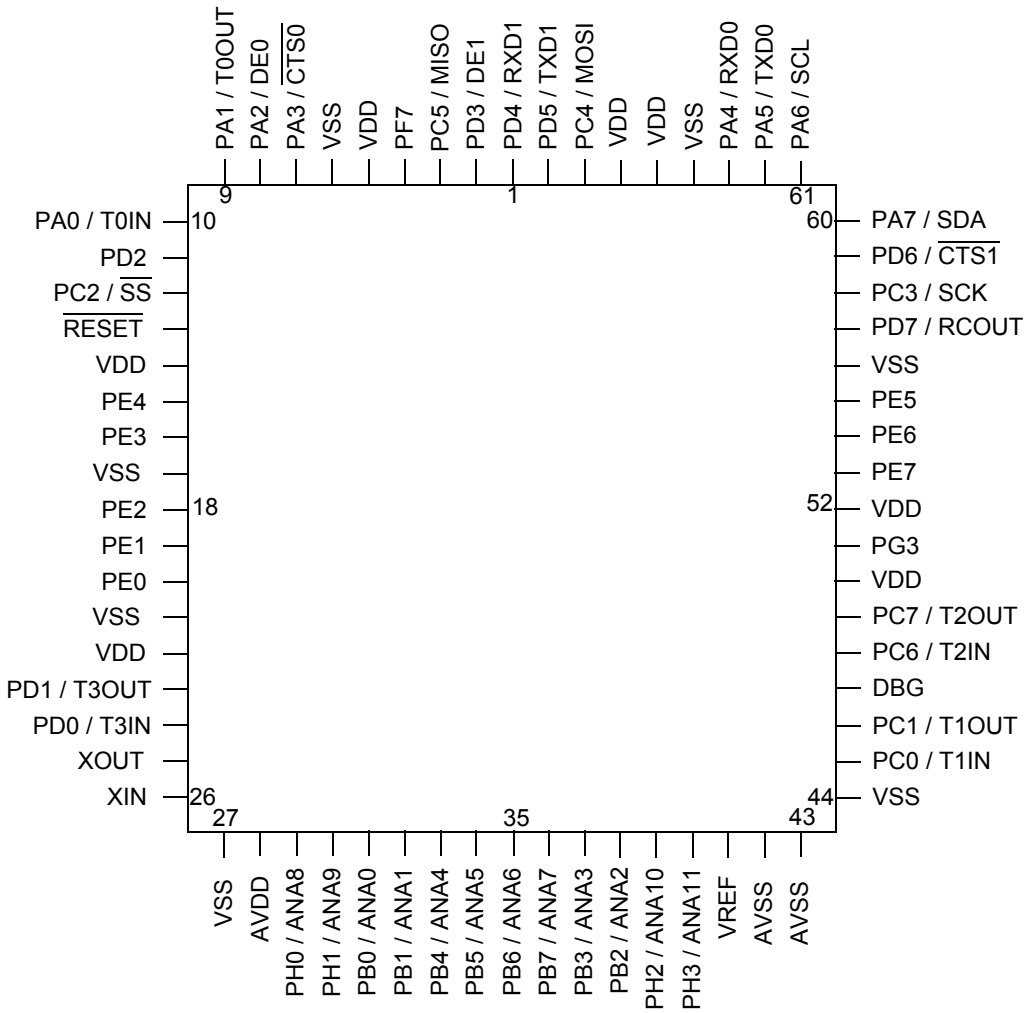

Figure 6. Z8 Encore! XP 64K Series Flash Microcontrollers in 68-Pin Plastic Leaded Chip Carrier (PLCC)

Address Space

Overview

The eZ8™ CPU can access three distinct address spaces:

- The Register File contains addresses for the general-purpose registers and the eZ8 CPU, peripheral, and general-purpose I/O port control registers.
- The Program Memory contains addresses for all memory locations having executable code and/or data.
- The Data Memory consists of the addresses for all memory locations that hold only data.

These three address spaces are covered briefly in the following subsections. For more information on eZ8 CPU and its address space, refer to *eZ8™ CPU Core User Manual (UM0128)* available for download at www.zilog.com.

Register File

The Register File address space in the 64K Series is 4 KB (4096 bytes). The Register File is composed of two sections—control registers and general-purpose registers. When instructions are executed, registers are read from when defined as sources and written to when defined as destinations. The architecture of the eZ8 CPU allows all general-purpose registers to function as accumulators, address pointers, index registers, stack areas, or scratch pad memory.

The upper 256 bytes of the 4 KB Register File address space are reserved for control of the eZ8 CPU, the on-chip peripherals, and the I/O ports. These registers are located at addresses from F00H to FFFH. Some of the addresses within the 256-byte control register section are reserved (unavailable). Reading from an reserved Register File addresses returns an undefined value. Writing to reserved Register File addresses is not recommended and can produce unpredictable results.

The on-chip RAM always begins at address 000H in the Register File address space. The 64K Series provide 2 KB to 4 KB of on-chip RAM depending upon the device. Reading from Register File addresses outside the available RAM addresses (and not within the control register address space) returns an undefined value. Writing to these Register File addresses produces no effect. To determine the amount of RAM available for the specific 64K Series device, see Part Selection Guide on page 2.

Port A–H Data Direction Sub-Registers

The Port A–H Data Direction sub-register is accessed through the Port A–H Control register by writing 01H to the Port A–H Address register (Table 16).

Table 16. Port A–H Data Direction Sub-Registers

BITS	7	6	5	4	3	2	1	0
FIELD	DD7	DD6	DD5	DD4	DD3	DD2	DD1	DD0
RESET	1							
R/W	R/W							
ADDR	If 01H in Port A–H Address Register, accessible through Port A–H Control Register							

DD[7:0]—Data Direction
These bits control the direction of the associated port pin. Port Alternate Function operation overrides the Data Direction register setting.
0 = Output. Data in the Port A–H Output Data register is driven onto the port pin.
1 = Input. The port pin is sampled and the value written into the Port A–H Input Data Register. The output driver is tri-stated.

Port A–H Alternate Function Sub-Registers

The Port A–H Alternate Function sub-register (Table 17) is accessed through the Port A–H Control register by writing 02H to the Port A–H Address register. The Port A–H Alternate Function sub-registers select the alternate functions for the selected pins. To determine the alternate function associated with each port pin, see GPIO Alternate Functions on page 59.

Caution: *Do not enable alternate function for GPIO port pins which do not have an associated alternate function. Failure to follow this guideline may result in unpredictable operation.*

Table 17. Port A–H Alternate Function Sub-Registers

BITS	7	6	5	4	3	2	1	0
FIELD	AF7	AF6	AF5	AF4	AF3	AF2	AF1	AF0
RESET	0							
R/W	R/W							
ADDR	If 02H in Port A–H Address Register, accessible through Port A–H Control Register							

Port A–H Input Data Registers

Reading from the Port A–H Input Data registers (Table 21) returns the sampled values from the corresponding port pins. The Port A–H Input Data registers are Read-only.

Table 21. Port A–H Input Data Registers (PxIN)

BITS	7	6	5	4	3	2	1	0
FIELD	PIN7	PIN6	PIN5	PIN4	PIN3	PIN2	PIN1	PIN0
RESET	X							
R/W	R							
ADDR	FD2H, FD6H, FDAH, FDEH, FE2H, FE6H, FEAH, FEEH							

PIN[7:0]—Port Input Data
Sampled data from the corresponding port pin input.
0 = Input data is logical 0 (Low).
1 = Input data is logical 1 (High).

Port A–H Output Data Register

The Port A–H Output Data register (Table 22) writes output data to the pins.

Table 22. Port A–H Output Data Register (P*x*OUT)

BITS	7	6	5	4	3	2	1	0
FIELD	POUT7	POUT6	POUT5	POUT4	POUT3	POUT2	POUT1	POUT0
RESET	0							
R/W	R/W							
ADDR	FD3H, FD7H, FDBH, FDFH, FE3H, FE7H, FEBH, FEFH							

POUT[7:0]—Port Output Data
These bits contain the data to be driven out from the port pins. The values are only driven if the corresponding pin is configured as an output and the pin is not configured for alternate function operation.
0 = Drive a logical 0 (Low).
1= Drive a logical 1 (High). High value is not driven if the drain has been disabled by setting the corresponding Port Output Control register bit to 1.

- Executing a Trap instruction.
- Illegal Instruction trap.

Interrupt Vectors and Priority

The interrupt controller supports three levels of interrupt priority. Level 3 is the highest priority, Level 2 is the second highest priority, and Level 1 is the lowest priority. If all of the interrupts were enabled with identical interrupt priority (all as Level 2 interrupts, for example), then interrupt priority would be assigned from highest to lowest as specified in Table 23 on page 68. Level 3 interrupts always have higher priority than Level 2 interrupts which, in turn, always have higher priority than Level 1 interrupts. Within each interrupt priority level (Level 1, Level 2, or Level 3), priority is assigned as specified in Table 23 on page 68. Reset, Watchdog Timer interrupt (if enabled), and Illegal Instruction Trap always have highest priority.

Interrupt Assertion

Interrupt sources assert their interrupt requests for only a single system clock period (single pulse). When the interrupt request is acknowledged by the eZ8 CPU, the corresponding bit in the Interrupt Request register is cleared until the next interrupt occurs. Writing a 0 to the corresponding bit in the Interrupt Request register likewise clears the interrupt request.

Caution: *The following style of coding to clear bits in the Interrupt Request registers is NOT recommended. All incoming interrupts that are received between execution of the first LDX command and the last LDX command are lost.*

Poor coding style that can result in lost interrupt requests:

```
LDX r0, IRQ0
AND r0, MASK
LDX IRQ0, r0
```

To avoid missing interrupts, the following style of coding to clear bits in the Interrupt Request 0 register is recommended:

Good coding style that avoids lost interrupt requests:

```
ANDX IRQ0, MASK
```

Software Interrupt Assertion

Program code can generate interrupts directly. Writing a 1 to the desired bit in the Interrupt Request register triggers an interrupt (assuming that interrupt is enabled). When the interrupt request is acknowledged by the eZ8 CPU, the bit in the Interrupt Request register is automatically cleared to 0.

Follow the steps below for configuring a timer for COMPARE mode and initiating the count:

1. Write to the Timer Control 1 register to:
   – Disable the timer
   – Configure the timer for COMPARE mode
   – Set the prescale value
   – Set the initial logic level (High or Low) for the Timer Output alternate function, if desired
2. Write to the Timer High and Low Byte registers to set the starting count value.
3. Write to the Timer Reload High and Low Byte registers to set the Compare value.
4. If desired, enable the timer interrupt and set the timer interrupt priority by writing to the relevant interrupt registers.
5. If using the Timer Output function, configure the associated GPIO port pin for the Timer Output alternate function.
6. Write to the Timer Control 1 register to enable the timer and initiate counting.

In COMPARE mode, the system clock always provides the timer input. The Compare time is given by the following equation:

$$\text{COMPARE Mode Time (s)} = \frac{(\text{Compare Value} - \text{Start Value}) \times \text{Prescale}}{\text{System Clock Frequency (Hz)}}$$

GATED Mode

In GATED mode, the timer counts only when the Timer Input signal is in its active state (asserted), as determined by the TPOL bit in the Timer Control 1 register. When the Timer Input signal is asserted, counting begins. A timer interrupt is generated when the Timer Input signal is deasserted or a timer reload occurs. To determine if a Timer Input signal deassertion generated the interrupt, read the associated GPIO input value and compare to the value stored in the TPOL bit.

The timer counts up to the 16-bit Reload value stored in the Timer Reload High and Low Byte registers. The timer input is the system clock. When reaching the Reload value, the timer generates an interrupt, the count value in the Timer High and Low Byte registers is reset to 0001H and counting resumes (assuming the Timer Input signal is still asserted). Also, if the Timer Output alternate function is enabled, the Timer Output pin changes state (from Low to High or from High to Low) at timer reset.

Follow the steps below for configuring a timer for GATED mode and initiating the count:

1. Write to the Timer Control 1 register to:
   – Disable the timer
   – Configure the timer for GATED mode

SPI Status Register

The SPI Status register (Table 65) indicates the current state of the SPI. All bits revert to their reset state if the SPIEN bit in the SPICTL register = 0.

Table 65. SPI Status Register (SPISTAT)

BITS	7	6	5	4	3	2	1	0
FIELD	IRQ	OVR	COL	ABT	Reserved		TXST	SLAS
RESET	0							1
R/W	R/W*				R			
ADDR	F62H							
Note: R/W* = Read access. Write a 1 to clear the bit to 0.								

IRQ—Interrupt Request
If SPIEN = 1, this bit is set if the STR bit in the SPICTL register is set, or upon completion of an SPI master or slave transaction. This bit does not set if SPIEN = 0 and the SPI Baud Rate Generator is used as a timer to generate the SPI interrupt.
0 = No SPI interrupt request pending.
1 = SPI interrupt request is pending.

OVR—Overrun
0 = An overrun error has not occurred.
1 = An overrun error has been detected.

COL—Collision
0 = A multi-master collision (mode fault) has not occurred.
1 = A multi-master collision (mode fault) has been detected.

ABT—Slave mode transaction abort
This bit is set if the SPI is configured in slave mode, a transaction is occurring and $\overline{SS}$ deasserts before all bits of a character have been transferred as defined by the NUMBITS field of the SPIMODE register. The IRQ bit also sets, indicating the transaction has completed.
0 = A slave mode transaction abort has not occurred.
1 = A slave mode transaction abort has been detected.

Reserved—Must be 0.

TXST—Transmit Status
0 = No data transmission currently in progress.
1 = Data transmission currently in progress.

SLAS—Slave Select
If SPI enabled as a Slave,

15. The I2C Controller sends the repeated START condition.
16. The I2C Controller loads the I2C Shift register with the contents of the I2C Data register (third address transfer).
17. The I2C Controller sends 11110B followed by the two most significant bits of the slave read address and a 1 (read).
18. The I2C slave sends an acknowledge by pulling the SDA signal Low during the next high period of SCL

    If the slave were to Not Acknowledge at this point (this should not happen because the slave did acknowledge the first two address bytes), software would respond by setting the STOP and FLUSH bits and clearing the TXI bit. The I2C Controller sends the STOP condition on the bus and clears the STOP and NCKI bits. The transaction is complete (ignore the following steps).
19. The I2C Controller shifts in a byte of data from the I2C slave on the SDA signal. The I2C Controller sends a Not Acknowledge to the I2C slave if the NAK bit is set (last byte), else it sends an Acknowledge.
20. The I2C Controller asserts the Receive interrupt (RDRF bit set in the Status register).
21. Software responds by reading the I2C Data register which clears the RDRF bit. If there is only one more byte to receive, set the NAK bit of the I2C Control register.
22. If there are one or more bytes to transfer, return to step 19.
23. After the last byte is shifted in, a Not Acknowledge interrupt is generated by the I2C Controller.
24. Software responds by setting the STOP bit of the I2C Control register.
25. A STOP condition is sent to the I2C slave and the STOP and NCKI bits are cleared.

I2C Control Register Definitions

I2C Data Register

The I2C Data register (see Table 70 on page 157) holds the data that is to be loaded into the I2C Shift register during a write to a slave. This register also holds data that is loaded from the I2C Shift register during a read from a slave. The I2C Shift Register is not accessible in the Register File address space, but is used only to buffer incoming and outgoing data.

I²C Baud Rate High and Low Byte Registers

The I²C Baud Rate High and Low Byte registers (Tables 73 and 73) combine to form a 16-bit reload value, BRG[15:0], for the I²C Baud Rate Generator.

When the I²C is disabled, the Baud Rate Generator can function as a basic 16-bit timer with interrupt on time-out. To configure the Baud Rate Generator as a timer with interrupt on time-out, complete the following procedure:

1. Disable the I²C by clearing the IEN bit in the I²C Control register to 0.
2. Load the desired 16-bit count value into the I²C Baud Rate High and Low Byte registers.
3. Enable the Baud Rate Generator timer function and associated interrupt by setting the BIRQ bit in the I²C Control register to 1.

When configured as a general purpose timer, the interrupt interval is calculated using the following equation:

Interrupt Interval (s) = System Clock Period (s) × BRG[15:0]

Table 73. I²C Baud Rate High Byte Register (I2CBRH)

BITS	7	6	5	4	3	2	1	0
FIELD	BRH							
RESET	FFH							
R/W	R/W							
ADDR	F53H							

BRH = I²C Baud Rate High Byte
Most significant byte, BRG[15:8], of the I²C Baud Rate Generator's reload value.

Note: *If the DIAG bit in the I²C Diagnostic Control Register is set to 1, a read of the I2CBRH register returns the current value of the I²C Baud Rate Counter[15:8].*

0100 = ANA4
0101 = ANA5
0110 = ANA6
0111 = ANA7
1000 = ANA8
1001 = ANA9
1010 = ANA10
1011 = ANA11
11XX = Reserved.

ADC Data High Byte Register

The ADC Data High Byte register (Table 87) contains the upper eight bits of the 10-bit ADC output. During a single-shot conversion, this value is invalid. Access to the ADC Data High Byte register is read-only. The full 10-bit ADC result is given by {ADCD_H[7:0], ADCD_L[7:6]}. Reading the ADC Data High Byte register latches data in the ADC Low Bits register.

Table 87. ADC Data High Byte Register (ADCD_H)

BITS	7	6	5	4	3	2	1	0
FIELD	ADCD_H							
RESET	X							
R/W	R							
ADDR	F72H							

ADCD_H—ADC Data High Byte
This byte contains the upper eight bits of the 10-bit ADC output. These bits are not valid during a single-shot conversion. During a continuous conversion, the last conversion output is held in this register. These bits are undefined after a Reset.

ADC Data Low Bits Register

The ADC Data Low Bits register (Table 88) contains the lower two bits of the conversion value. The data in the ADC Data Low Bits register is latched each time the ADC Data High Byte register is read. Reading this register always returns the lower two bits of the conversion last read into the ADC High Byte register. Access to the ADC Data Low Bits register is read-only. The full 10-bit ADC result is given by {ADCD_H[7:0], ADCD_L[7:6]}.

Option Bits

Overview

Option Bits allow user configuration of certain aspects of the 64K Series operation. The feature configuration data is stored in the Flash Memory and read during Reset. The features available for control via the Option Bits are:

- Watchdog Timer time-out response selection–interrupt or Reset.
- Watchdog Timer enabled at Reset.
- The ability to prevent unwanted read access to user code in Flash Memory.
- The ability to prevent accidental programming and erasure of the user code in Flash Memory.
- Voltage Brownout configuration-always enabled or disabled during STOP mode to reduce STOP mode power consumption.
- Oscillator mode selection-for high, medium, and low power crystal oscillators, or external RC oscillator.

Operation

Option Bit Configuration By Reset

Each time the Option Bits are programmed or erased, the device must be Reset for the change to take place. During any reset operation (System Reset, Reset, or Stop Mode Recovery), the Option Bits are automatically read from the Flash Memory and written to Option Configuration registers. The Option Configuration registers control operation of the devices within the 64K Series. Option Bit control is established before the device exits Reset and the eZ8 CPU begins code execution. The Option Configuration registers are not part of the Register File and are not accessible for read or write access.

Option Bit Address Space

The first two bytes of Flash Memory at addresses 0000H (see Table 98 on page 196) and 0001H (see Table 99 on page 197) are reserved for the user Option Bits. The byte at Flash Memory address 0000H configures user options. The byte at Flash Memory address 0001H is reserved for future use and must remain unprogrammed.

- Asserting the $\overline{\text{RESET}}$ pin Low to initiate a Reset.
- Driving the DBG pin Low while the device is in STOP mode initiates a system reset.

OCD Data Format

The OCD interface uses the asynchronous data format defined for RS-232. Each character is transmitted as 1 Start bit, 8 data bits (least-significant bit first), and 1 Stop bit (see Figure 39).

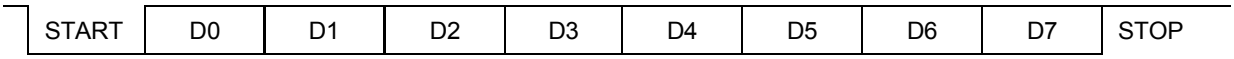

Figure 39. OCD Data Format

OCD Auto-Baud Detector/Generator

To run over a range of baud rates (bits per second) with various system clock frequencies, the On-Chip Debugger has an Auto-Baud Detector/Generator. After a reset, the OCD is idle until it receives data. The OCD requires that the first character sent from the host is the character 80H. The character 80H has eight continuous bits Low (one Start bit plus 7 data bits). The Auto-Baud Detector measures this period and sets the OCD Baud Rate Generator accordingly.

The Auto-Baud Detector/Generator is clocked by the system clock. The minimum baud rate is the system clock frequency divided by 512. For optimal operation, the maximum recommended baud rate is the system clock frequency divided by 8. The theoretical maximum baud rate is the system clock frequency divided by 4. This theoretical maximum is possible for low noise designs with clean signals. Table 100 lists minimum and recommended maximum baud rates for sample crystal frequencies.

Table 100. OCD Baud-Rate Limits

System Clock Frequency (MHz)	Recommended Maximum Baud Rate (kbits/s)	Minimum Baud Rate (kbits/s)
20.0	2500	39.1
1.0	125.0	1.96
0.032768 (32 kHz)	4.096	0.064

If the OCD receives a Serial Break (nine or more continuous bits Low) the Auto-Baud Detector/Generator resets. The Auto-Baud Detector/Generator can then be reconfigured by sending 80H.

DC Characteristics

Table 106 lists the DC characteristics of the 64K Series products. All voltages are referenced to V_{SS}, the primary system ground.

Table 106. DC Characteristics

Symbol	Parameter	T_A = –40 °C to 125 °C			Units	Conditions
		Minimum	Typical	Maximum		
V_{DD}	Supply Voltage	3.0	–	3.6	V	
V_{IL1}	Low Level Input Voltage	-0.3	–	0.3*V_{DD}	V	For all input pins except $\overline{\text{RESET}}$, DBG, XIN
V_{IL2}	Low Level Input Voltage	-0.3	–	0.2*V_{DD}	V	For $\overline{\text{RESET}}$, DBG, and XIN.
V_{IH1}	High Level Input Voltage	0.7*V_{DD}	–	5.5	V	Port A, C, D, E, F, and G pins.
V_{IH2}	High Level Input Voltage	0.7*V_{DD}	–	V_{DD}+0.3	V	Port B and H pins.
V_{IH3}	High Level Input Voltage	0.8*V_{DD}	–	V_{DD}+0.3	V	$\overline{\text{RESET}}$, DBG, and XIN pins
V_{OL1}	Low Level Output Voltage Standard Drive	–	–	0.4	V	I_{OL} = 2 mA; VDD = 3.0 V High Output Drive disabled.
V_{OH1}	High Level Output Voltage Standard Drive	2.4	–	–	V	I_{OH} = -2 mA; VDD = 3.0 V High Output Drive disabled.
V_{OL2}	Low Level Output Voltage High Drive	–	–	0.6	V	I_{OL} = 20 mA; VDD = 3.3 V High Output Drive enabled T_A = -40 °C to +70 °C
V_{OH2}	High Level Output Voltage High Drive	2.4	–	–	V	I_{OH} = -20 mA; VDD = 3.3 V High Output Drive enabled; T_A = -40 °C to +70 °C
V_{OL3}	Low Level Output Voltage High Drive	–	–	0.6	V	I_{OL} = 15 mA; VDD = 3.3 V High Output Drive enabled; T_A = +70 °C to +105 °C
V_{OH3}	High Level Output Voltage High Drive	2.4	–	–	V	I_{OH} = 15 mA; VDD = 3.3 V High Output Drive enabled; T_A = +70 °C to +105 °C
V_{RAM}	RAM Data Retention	0.7	–	–	V	
I_{IL}	Input Leakage Current	-5	–	+5	µA	V_{DD} = 3.6 V; V_{IN} = VDD or VSS[1]
I_{TL}	Tri-State Leakage Current	-5	–	+5	µA	V_{DD} = 3.6 V

SPI Slave Mode Timing

Figure 54 and Table 118 provide timing information for the SPI slave mode pins. Timing is shown with SCK rising edge used to source MISO output data, SCK falling edge used to sample MOSI input data.

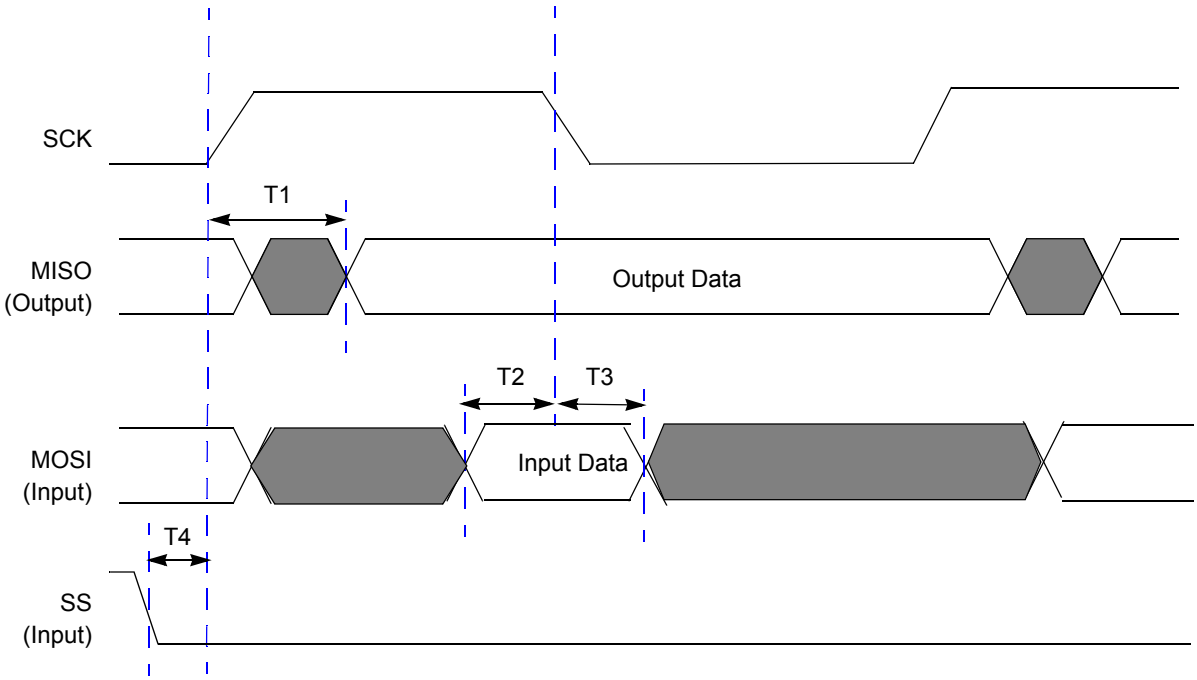

Figure 54. SPI Slave Mode Timing

Table 118. SPI Slave Mode Timing

		Delay (ns)	
Parameter	**Abbreviation**	**Minimum**	**Maximum**
SPI Slave			
T_1	SCK (transmit edge) to MISO output Valid Delay	2 * Xin period	3 * Xin period + 20 nsec
T_2	MOSI input to SCK (receive edge) Setup Time	0	
T_3	MOSI input to SCK (receive edge) Hold Time	3 * Xin period	
T_4	SS input assertion to SCK setup	1 * Xin period	

Table 126. Bit Manipulation Instructions (Continued)

Mnemonic	Operands	Instruction
BSWAP	dst	Bit Swap
CCF	—	Complement Carry Flag
RCF	—	Reset Carry Flag
SCF	—	Set Carry Flag
TCM	dst, src	Test Complement Under Mask
TCMX	dst, src	Test Complement Under Mask using Extended Addressing
TM	dst, src	Test Under Mask
TMX	dst, src	Test Under Mask using Extended Addressing

Table 127. Block Transfer Instructions

Mnemonic	Operands	Instruction
LDCI	dst, src	Load Constant to/from Program Memory and Auto-Increment Addresses
LDEI	dst, src	Load External Data to/from Data Memory and Auto-Increment Addresses

Table 128. CPU Control Instructions

Mnemonic	Operands	Instruction
ATM	—	Atomic Execution
CCF	—	Complement Carry Flag
DI	—	Disable Interrupts
EI	—	Enable Interrupts
HALT	—	HALT Mode
NOP	—	No Operation
RCF	—	Reset Carry Flag
SCF	—	Set Carry Flag
SRP	src	Set Register Pointer

Part Number	Flash	RAM	I/O Lines	Interrupts	16-Bit Timers w/PWM	10-Bit A/D Channels	I^2C	SPI	UARTs with IrDA	Description
Z8F482x with 48 KB Flash, 10-Bit Analog-to-Digital Converter										
Standard Temperature: 0 °C to 70 °C										
Z8F4821PM020SC	48 KB	4 KB	29	23	3	8	1	1	2	PDIP 40-pin package
Z8F4821AN020SC	48 KB	4 KB	31	23	3	8	1	1	2	LQFP 44-pin package
Z8F4821VN020SC	48 KB	4 KB	31	23	3	8	1	1	2	PLCC 44-pin package
Z8F4822AR020SC	48 KB	4 KB	46	24	4	12	1	1	2	LQFP 64-pin package
Z8F4822VS020SC	48 KB	4 KB	46	24	4	12	1	1	2	PLCC 68-pin package
Z8F4823FT020SC	48 KB	4 KB	60	24	4	12	1	1	2	QFP 80-pin package
Extended Temperature: –40 °C to +105 °C										
Z8F4821PM020EC	48 KB	4 KB	29	23	3	8	1	1	2	PDIP 40-pin package
Z8F4821AN020EC	48 KB	4 KB	31	23	3	8	1	1	2	LQFP 44-pin package
Z8F4821VN020EC	48 KB	4 KB	31	23	3	8	1	1	2	PLCC 44-pin package
Z8F4822AR020EC	48 KB	4 KB	46	24	4	12	1	1	2	LQFP 64-pin package
Z8F4822VS020EC	48 KB	4 KB	46	24	4	12	1	1	2	PLCC 68-pin package
Z8F4823FT020EC	48 KB	4 KB	60	24	4	12	1	1	2	QFP 80-pin package
Automotive/Industrial Temperature: –40 °C to +125 °C										
Z8F4821PM020AC	48 KB	4 KB	29	23	3	8	1	1	2	PDIP 40-pin package
Z8F4821AN020AC	48 KB	4 KB	31	23	3	8	1	1	2	LQFP 44-pin package
Z8F4821VN020AC	48 KB	4 KB	31	23	3	8	1	1	2	PLCC 44-pin package
Z8F4822AR020AC	48 KB	4 KB	46	24	4	12	1	1	2	LQFP 64-pin package
Z8F4822VS020AC	48 KB	4 KB	46	24	4	12	1	1	2	PLCC 68-pin package
Z8F4823FT020AC	48 KB	4 KB	60	24	4	12	1	1	2	QFP 80-pin package

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