Zilog - Z8L18220FSG Datasheet

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Applications of Embedded - Microprocessors

Embedded microprocessors are utilized across a broad spectrum of applications, making them indispensable in

Details	
Product Status	Active
Core Processor	Z8S180
Number of Cores/Bus Width	1 Core, 8-Bit
Speed	20MHz
Co-Processors/DSP	-
RAM Controllers	DRAM
Graphics Acceleration	No
Display & Interface Controllers	-
Ethernet	-
SATA	-
USB	-
Voltage - I/O	3.3V
Operating Temperature	0°C ~ 70°C (TA)
Security Features	-
Package / Case	100-QFP
Supplier Device Package	100-QFP
Purchase URL	https://www.e-xfl.com/product-detail/zilog/z8l18220fsg

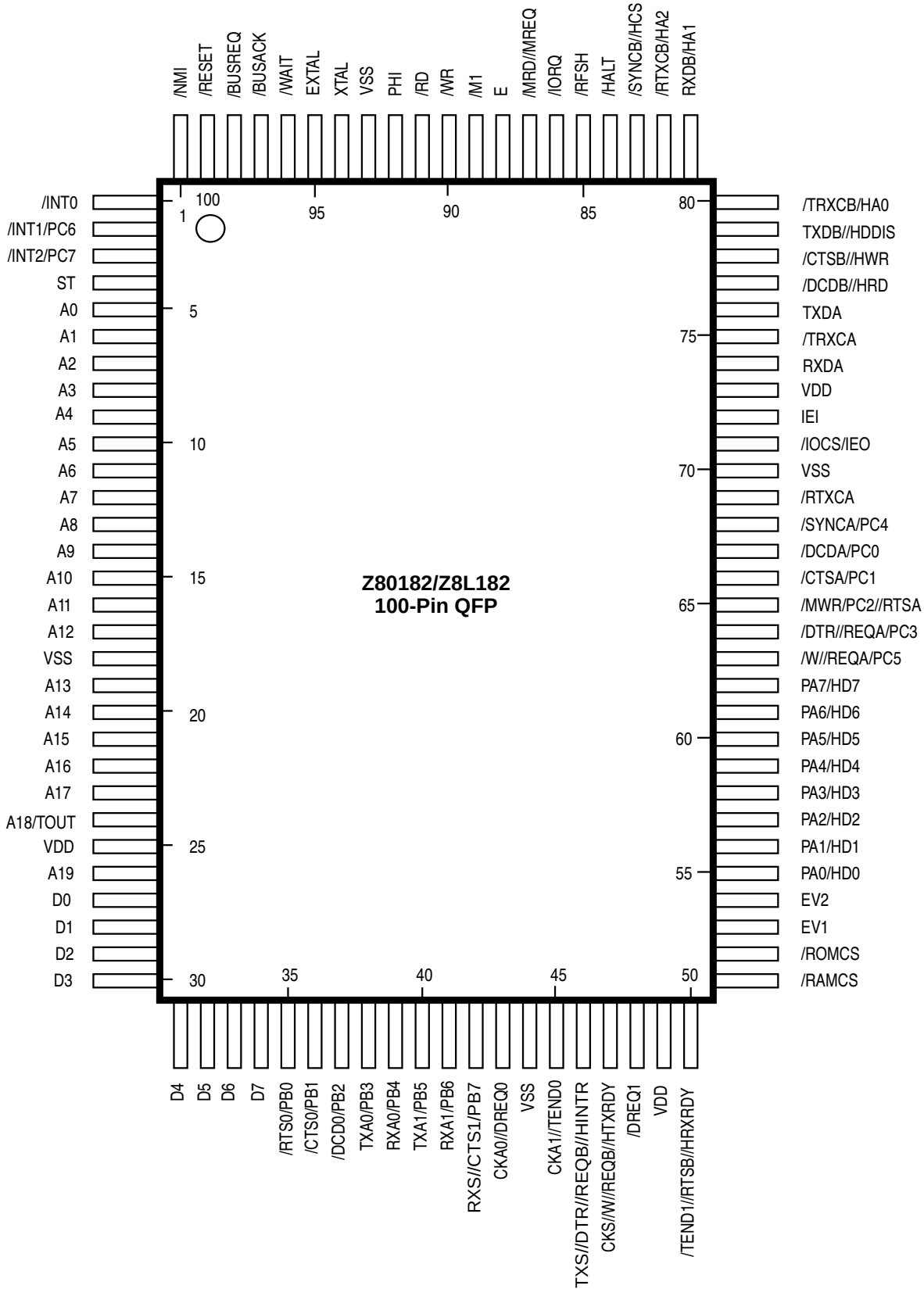


Figure 2. Z80182/Z8L182 100-Pin QFP Pin Configuration

Table 5. Primary, Secondary and Tertiary Pin Functions

Pin Number VQFP	Pin Number QFP	1st Function	2nd Function	3rd Function	MUX Control
1	4	ST			
2	5	A0			
3	6	A1			
4	7	A2			
5	8	A3			
6	9	A4			
7	10	A5			
8	11	A6			
9	12	A7			
10	13	A8			
11	14	A9			
12	15	A10			
13	16	A11			
14	17	A12			
15	18	V_{SS}			
16	19	A13			
17	20	A14			
18	21	A15			
19	22	A16			
20	23	A17			
21	24	A18/T_{OUT}			
22	25	V_{DD}			
23	26	A19			
24	27	D0			
25	28	D1			
26	29	D2			
27	30	D3			
28	31	D4			
29	32	D5			
30	33	D6			
31	34	D7			
32	35	/RTS0	PB0		SYS CONF REG Bit 5
33	36	/CTS0	PB1		SYS CONF REG Bit 5
34	37	/DCD0	PB2		SYS CONF REG Bit 5
35	38	TxA0	PB3		SYS CONF REG Bit 5
36	39	RxA0	PB4		SYS CONF REG Bit 5
37	40	TxA1	PB5		SYS CONF REG Bit 6
38	41	RxA1	PB6		SYS CONF REG Bit 6
39	42	RxS//CTS1	PB7		SYS CONF REG Bit 6
40	43	CKA0//DREQ0			

Z85230 ESCC™ FUNCTIONAL DESCRIPTION

The Zilog Enhanced Serial Communication Controller ESCC™ is a dual channel, multiprotocol data communication peripheral. The ESCC functions as a serial-to-parallel, parallel-to-serial converter/controller. The ESCC can be software-configured to satisfy a wide variety of serial communications applications. The device contains a variety of new, sophisticated internal functions including on-chip baud rate generators, digital phase-lock loops, and crystal oscillators, which dramatically reduce the need for external logic.

The ESCC handles asynchronous formats, synchronous byte-oriented protocols such as IBM® Bisync, and synchronous bit-oriented protocols such as HDLC and IBM SDLC. This versatile device supports virtually any serial data transfer application (telecommunication, LAN, etc.)

The device can generate and check CRC codes in any synchronous mode and can be programmed to check data integrity in various modes. The ESCC also has facilities for modem control in both channels in applications where these controls are not needed, the modem controls can be used for general-purpose I/O.

With access to 14 Write registers and 7 Read registers per channel (number of the registers varies depending on the version), the user can configure the ESCC to handle all synchronous formats regardless of data size, number of stop bits, or parity requirements. The ESCC also accommodates all synchronous formats including character, byte, and bit-oriented protocols.

Within each operating mode, the ESCC also allows for protocol variations by checking odd or even parity bits, character insertion or deletion, CRC generation, checking break and abort generation and detection, and many other protocol-dependent features.

The ESCC (Enhanced SCC) is pin and software compatible to the CMOS SCC version. The following enhancements were made to the CMOS SCC:

- Deeper Transmit FIFO (4 bytes)
- Deeper Receive FIFO (8 bytes)
- Programmable FIFO interrupt and DMA request level
- Seven enhancements to improve SDLC link layer supports:
  - Automatic transmission of the opening flag
  - Automatic reset of Tx Underrun/EOM latch
  - Deactivation of /RTS pin after closing flag
  - Automatic CRC generator preset
  - Complete CRC reception
  - TxD pin automatically forced High with NRZI encoding when using mark idle
  - Status FIFO handles better frames with an ABORT
  - Receive FIFO automatically unlocked for special receive interrupts when using the SDLC status FIFO
- Delayed bus latching for easier microprocessor interface
- New programmable features added with Write Register 7' (WR seven prime)
- Write registers, 3, 4, 5 and 10 are now readable
- Read register 0 latched during access
- DPLL counter output available as jitter-free transmitter clock source
- Enhanced /DTR, /RTS deactivation timing

The following features are common to both the ESCC and the CMOS SCC:

- Two independent full-duplex channels
- Synchronous/Isochronous data rates:
  - Up to 1/4 of the PCLK using external clock source
  - Up to 5 Mbits/sec at 20 MHz PCLK (ESCC).
- Asynchronous capabilities
  - 5, 6, 7 or 8 bits/character (capable of handling 4 bits/character or less)
  - 1, 1.5, or 2 stop bits
  - Odd or even parity
  - Times 1, 16, 32 or 64 clock modes
  - Break generation and detection
  - Parity, overrun and framing error detection
- Byte oriented synchronous capabilities:
  - Internal or external character synchronization
  - One or two sync characters (6 or 8 bits/sync character) in separate registers
  - Automatic Cyclic Redundancy Check (CRC) generation/detection
- SDLC/HDLC capabilities:
  - Abort sequence generation and checking
  - Automatic zero insertion and detection
  - Automatic flag insertion between messages
  - Address field recognition
  - I-field residue handling
  - CRC generation/detection
  - SDLC loop mode with EOP recognition/loop entry and exit
- NRZ, NRZI or FM encoding/decoding. Manchester Code Decoding (Encoding with External Logic).
- Baud Rate Generator in each Channel
- Digital Phase-Locked Loop (DPLL) for Clock Recovery
- Crystal Oscillator

The following features are implemented in the ESCC™ for the Z80182/Z8L182 only:

- New 32-bit CRC-32 (Ethernet Polynomial)
- ESCC Programmable Clock
  - programmed to be equal to system clock divided by one or two
  - programmed by Z80182 Enhancement Register

Note: The ESCC™ programmable clock must be programmed to divide-by-two mode when operating above the following conditions:

– PHI > 20 MHz at 5.0V

– PHI > 10 MHz at 3.0V

16550 MIMIC FIFO DESCRIPTION

The receiver FIFO consists of a 16-word FIFO capable of storing eight data bits and three error bits for each character stored (Figure 7). Parity error, Framing error and Break detect bits are stored along with the data bits by copying their value from three shadow bits that are Write Only bits for the Z80180 MPU LSR address. The three shadow bits are cleared after they are copied to the FIFO memory. In FIFO mode, to write error bits into the receiver FIFO, the MPU must first write the Parity, Framing and Break detect status to the Line Status Register (shadow bits) and then write the character associated into the receiver buffer. The data and error bits will then move into the same address in the FIFO. The error bits become available to the PC side of the interface when that particular location becomes the next address to read (top of FIFO). At that time, they may either be read by the PC by accessing them in the LSR, or they may cause an interrupt to the PC interface if so enabled. The error bits are set by the error status of the byte at the top of the FIFO, but may only be cleared by reading the LSR. If successive reads of the receiver FIFO are performed without reading the LSR, the status bits will be set if any of the bytes read have the respective error bit set. See Table 6 for the setting and clearing of the Line Status Register bits.

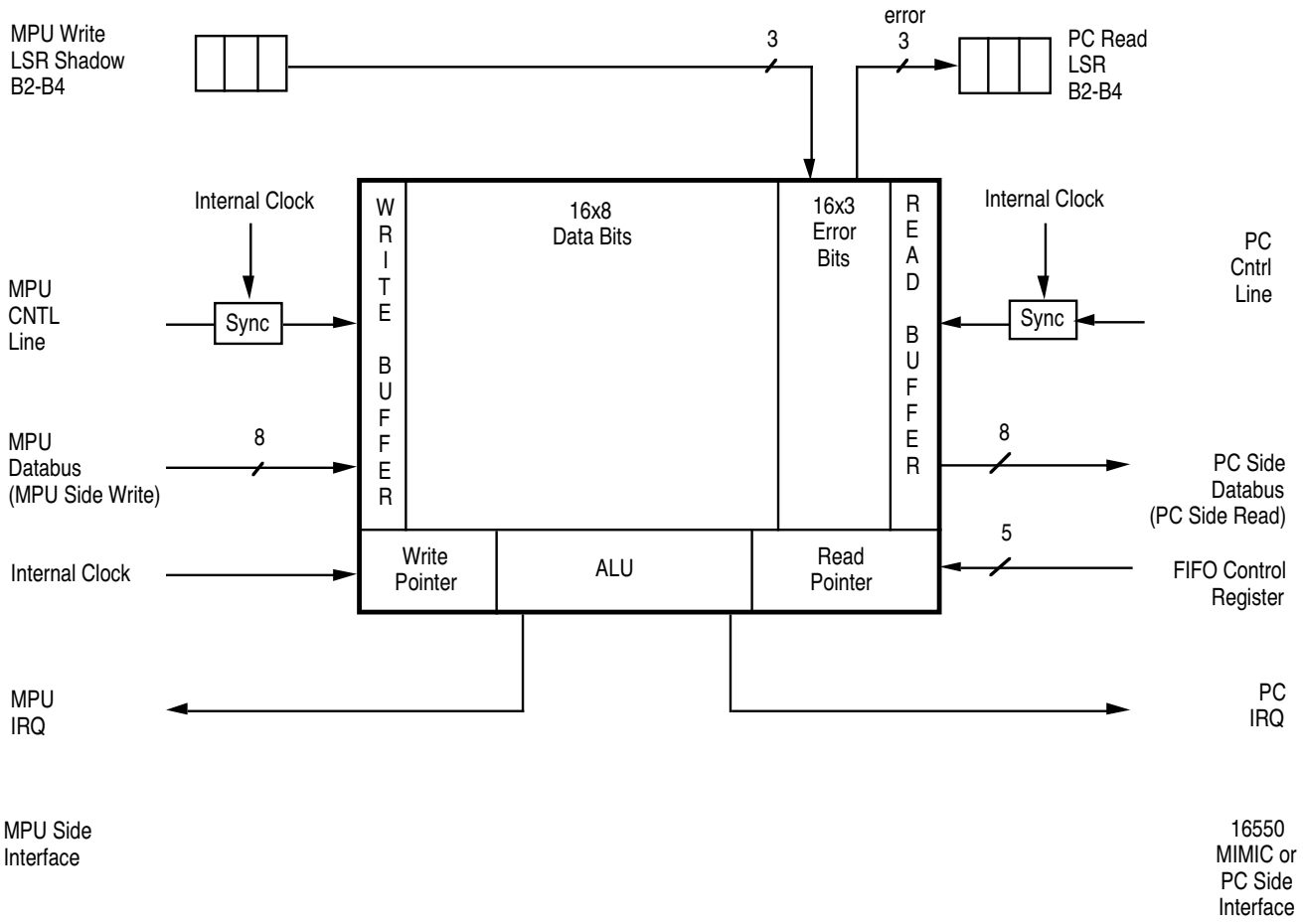


Figure 7. 16550 MIMIC Receiver FIFO Block Diagram

16550 MIMIC FIFO DESCRIPTION (Continued)

The PC interface may be interrupted when 1, 4, 8 or 14 bytes are available in the receiver FIFO by setting bits 6 and 7 in the FCR (FIFO Control Register, PC address 02H) to the appropriate value. If the FIFO is not empty, but below the above trigger value, a timeout interrupt is available if the receiver FIFO is not written by the MPU or read by the PC from an interval determined by the Character Timeout Timer. This is an additional Timer with MPU access only that is used to emulate the 16550 4 character timeout delay.

The Receive FIFO timeout timers are designed to reload and begin countdown after every read or write of the Rx FIFO, regardless of the Rx trigger level or number of bytes in the FIFO. Therefore, it is possible to get Timeout interrupts more often than Receive data interrupts. In order to closely emulate a 16550, a receive timeout timer enhancement is provided. When enabling this feature, the timeout timer will not begin counting down until the character emulation timer for each byte of data in the Rx FIFO has expired. ***Note: Enabling this feature will facilitate increased 16550 compatibility but may impede throughput.*** If the Receive Timeout interrupt occurs, the PC HOST will only be allowed to read up to 4-5 consecutive characters before the Data Ready bit is forced to zero (even if there is still more data in FIFO). This is required to maintain character pacing.

The timer receives the ESCC /TRxCB as its input clock. Software must determine the correct values to program into the Receiver Timeout register and the ESCC TRxCB to achieve the correct delay interval for timeout. These interrupts are cleared by the FIFO reaching the trigger point or by resetting the Timeout Interval Timer by FIFO MPU write or PC read access.

With FIFO mode enabled, the MPU is interrupted when the receiver FIFO is empty, corresponding to bit 5 being set in the IUS/IP register (MPU access only). This bit corresponds to a PC read of the receive buffer in non-FIFO (16450) mode. The interrupt source is cleared when the FIFO becomes non-empty or the MPU reads the IUS/IP register.

The transmitter FIFO is 16-byte FIFO with PC write and MPU read access (Figure 8). In FIFO mode, the PC receives an interrupt when the transmitter becomes empty corresponding to bit 5 being set in the LSR. This bit and the interrupt source are cleared when the transmit FIFO becomes non-empty or the Interrupt Identification Register (IIR) register is read by the PC.

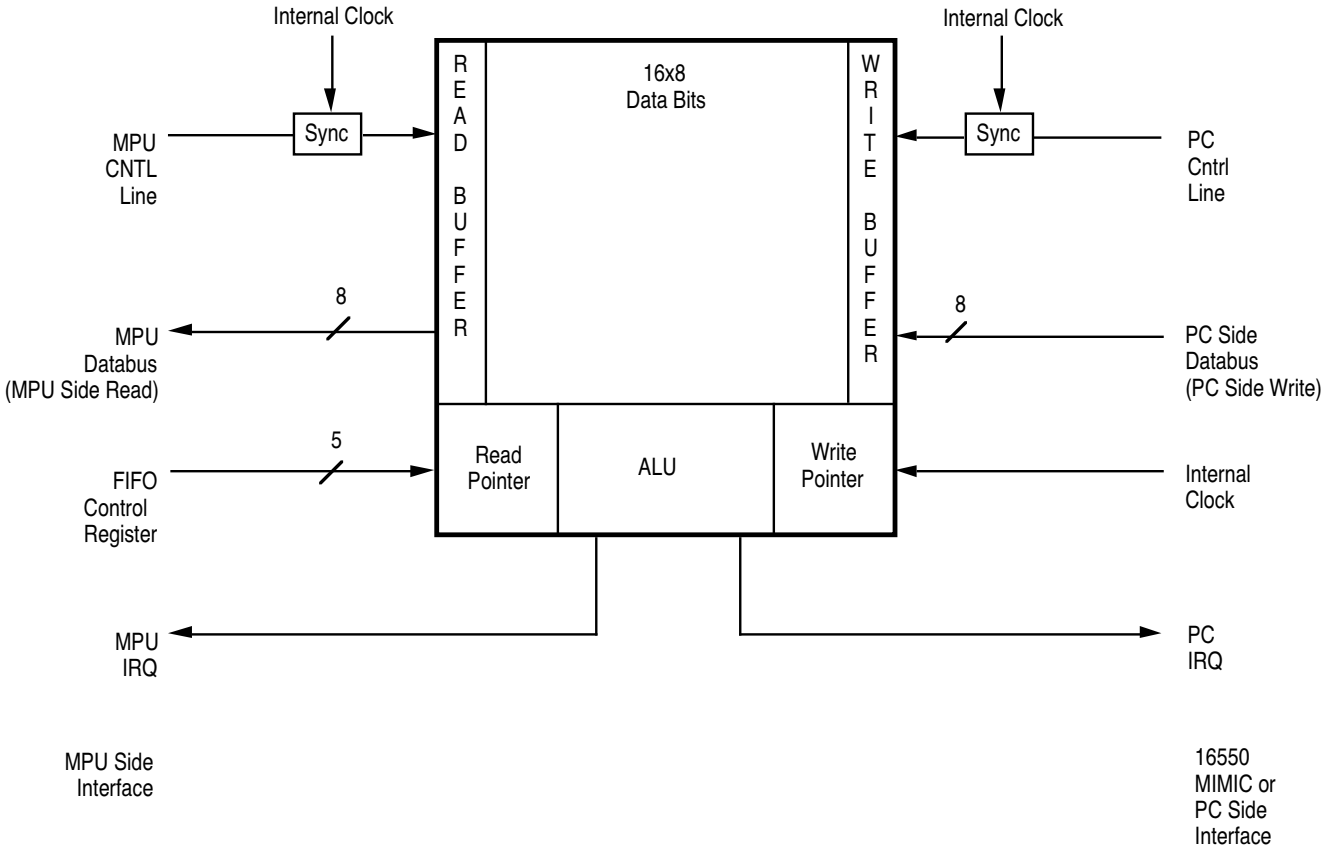


Figure 8. 16550 MIMIC Transmitter FIFO Block Diagram

On the MPU interface, the transmitted data available can be programmed to interrupt the MPU on 1, 4, 8 or 14 bytes of available data by seeing the appropriate value in the MPU FSCR control register (MPU write only xxECH) bits 6 and 7. A timeout feature exists, Transmit Timeout Timer, which is an additional 8-bit timer with SCC TxRCB as the input source. If the transmitter FIFO is non-empty and no PC write or MPU read of the FIFO has taken place within the timer interval, a timeout occurs causing a corresponding interrupt to the MPU.

Z80182/Z8L182 MIMIC SYNCHRONIZATION CONSIDERATIONS

Because of the asynchronous nature of the FIFO's on the MIMIC, some synchronization plan must be provided to prevent conflict from the dual port accesses of the MPU and the PC.

To solve this problem, I/O to the FIFO is buffered and the buffers allow both PC and MPU to access the FIFO asynchronously. Read and Write requests are then synchronized by means of the MPU clock. Incoming signals are buffered in such a way that metastable input levels are stabilized to valid 1 or 0 levels. Actual transfers to and from the buffers, from and to the FIFO memory, are timed by the MPU clock. ALU evaluation is performed on a different phase than the transfer to ensure stable pointer values.

Another potential problem is that of simultaneous access of the MPU and PC to any of the various 'mailbox' type registers. This is solved by dual buffering of the various read/write registers. During a read access by either the MPU or PC to a mailbox register, the data in the output or slave portion of the buffered register is not permitted to change. Any write that might take place during this time will be stored in the input of master part of the register. The corresponding status/interrupt is reset appropriately based on the write having followed the read to the register. For example, the IUS/IP bit for the LCR write will not be cleared by the MPU read of the LCR if a simultaneous write to the LCR by the PC takes place. Instead the LSR data will change after the read access and IUS/IP bit 3 remains at logic 1.

FREE RUNNING COUNTER

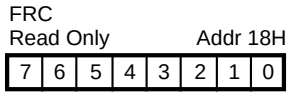


Figure 32. Free Running Counter

CPU CONTROL REGISTER

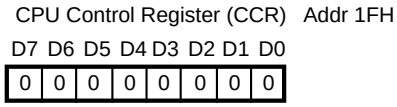
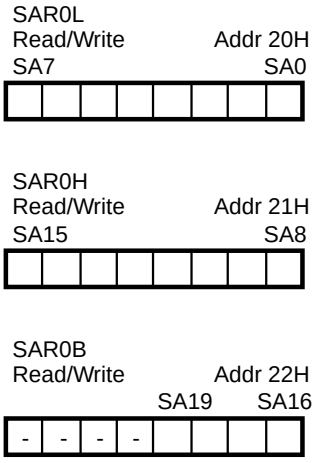


Figure 33. CPU

Note: See Figure 49 for full description.

DMA REGISTERS



Bits 0-2 (3) are used for SAR0B

A19,	A18,	A17,	A16	DMA Transfer Request
x	x	0	0	/DREQ0 (external)
x	x	0	1	RDR0 (ASCI0)
x	x	1	0	RDR1 (ASCI1)
x	x	1	1	Not Used

Figure 34. DMA 0 Source Address Registers

CPU Control Register

Bit 7. *Clock Divide Select.* Bit 7 of the CCR allows the programmer to set the internal clock to divide the external clock by 2 if the bit is 0 and divide-by-one if the bit is 1. Upon reset, this bit is set to 0 and the part is in divide-by-two mode. Since the on-board oscillator is not guaranteed to operate above 20 MHz, an external source must be used to achieve the maximum 33 MHz operation of the part, i.e., an external clock at 66 MHz with 50% duty cycle.

If an external oscillator is used in divide-by-one mode, the minimum pulse width requirement must be satisfied.

Bits 6 and 3. *STANDBY/IDLE Enable.* These two bits are used for enabling/disabling the IDLE and STANDBY mode.

Setting D6, D3 to 0 and 1, respectively, enables the IDLE mode. In the IDLE mode, the clock oscillator is kept oscillating but the clock to the rest of the internal circuit, including the CLKOUT, is stopped. The Z8S180 enters IDLE mode after fetching the second opcode of a SLEEP instruction, if the I/O STOP bit is set.

Setting D6, D3 to 1 and 0, respectively, enables the STANDBY mode. In the STANDBY mode, the clock oscillator is stopped completely. The Z8S180 enters STANDBY after fetching the second opcode of a SLEEP instruction, if the I/O STOP bit is set.

Setting D6, D3 to 1 and 1, respectively, enables the STANDBY-QUICK RECOVERY mode. In this mode, its operations are identical to STANDBY except that the clock recovery is reduced to 64 clock cycles after the exit conditions are gathered. Similarly, in STANDBY mode, the Z8S180 enters STANDBY after fetching the second opcode of a SLEEP instruction, if the I/O STOP bit is set.

Bit 5. *BREXT.* This bit controls the ability of the Z8S180 to honor a bus request during STANDBY mode. If this bit is set to 1 and the part is in STANDBY mode, a BUSREQ is honored after the clock stabilization timer is timed out.

Bit 4. *LNPHI.* This bit controls the drive capability on the PHI Clock output. If this bit is set to 1, the PHI Clock output is reduced to 25% of its drive capability.

Bit 2. Reserved

Bit 1. *LNCPUCTL.* This bit controls the drive capability of the CPU Control pins. When this bit is set to 1, the output drive capability of the following pins is reduced to 25% of the original drive capability:

- /BUSACK
- /RD
- /WR
- /M1
- E
- /MREQ
- /IORQ
- /RFSH
- /HALT
- /TEND1

Bit 0. *LNAD/DATA.* This bit controls the drive capability of the Address/Data bus output drivers. If this bit is set to 1, the output drive capability of the Address and Data bus output is reduced to 25% of its original drive capability.

CONTROL REGISTERS

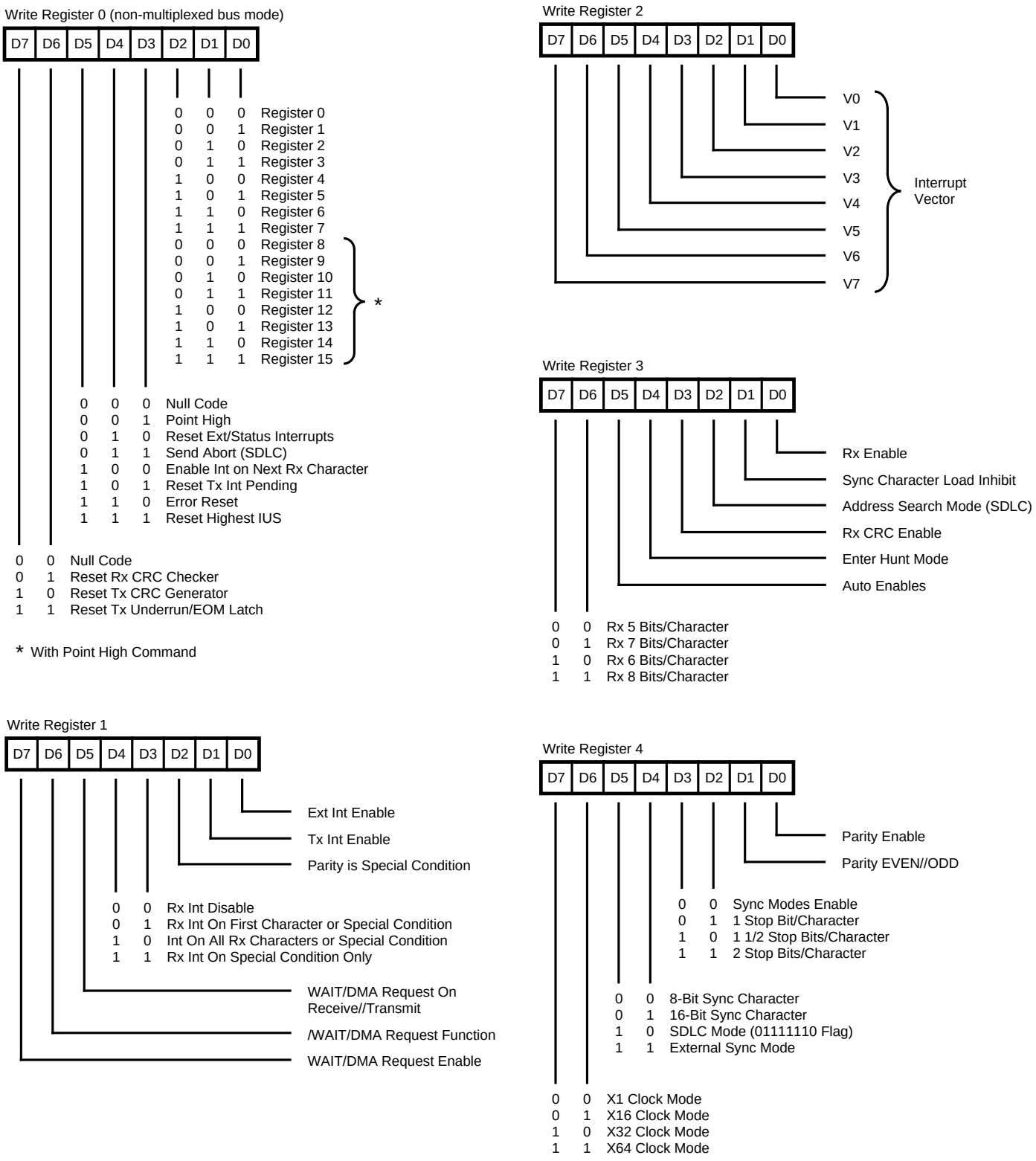
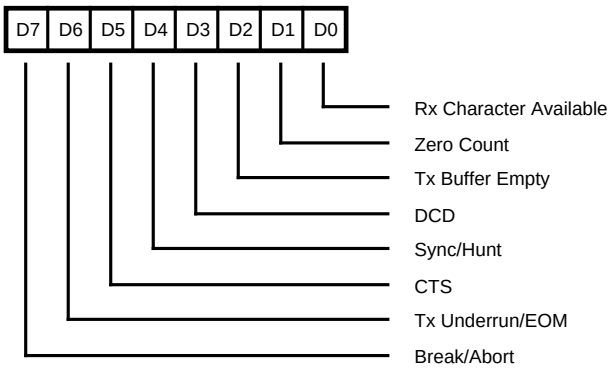
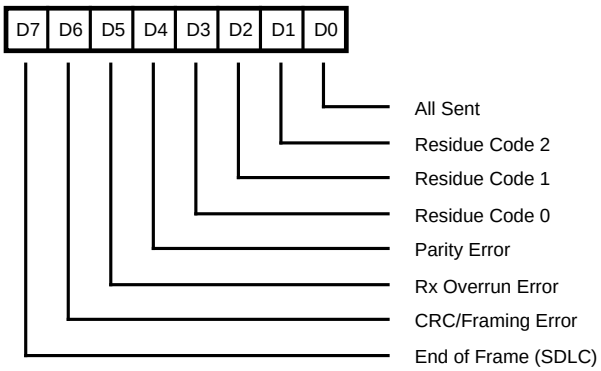


Figure 52. Write Register Bit Functions

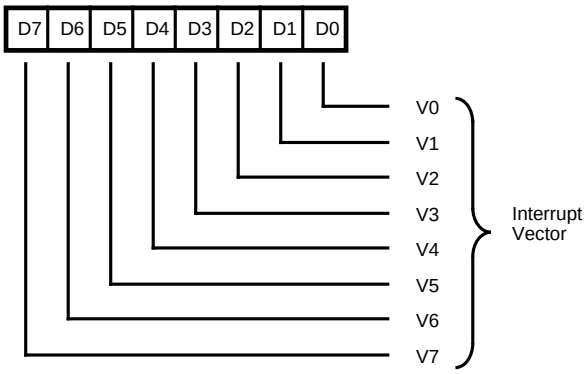
Read Register 0



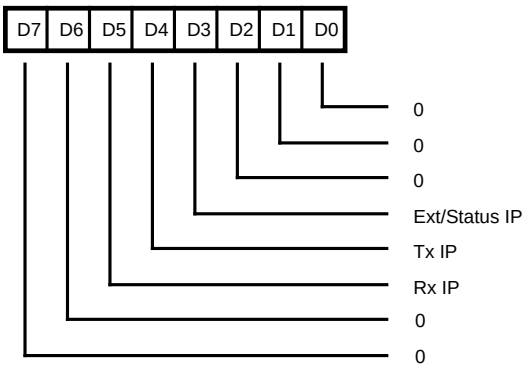
Read Register 1



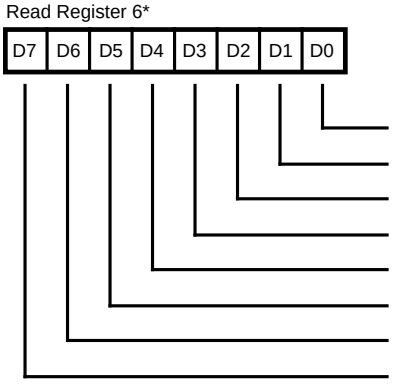
Read Register 2



Read Register 3



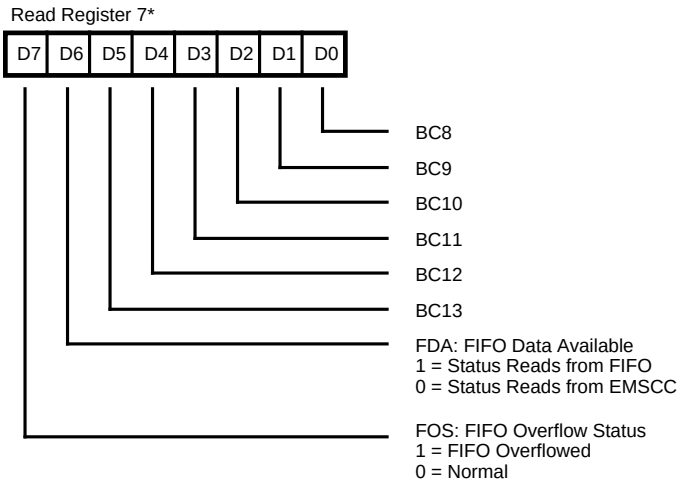
Read Register 6*



*Can only be accessed if the SDLC FIFO enhancement is enabled (WR15 bit D2 set to 1)

SDLC FIFO Status and Byte Count (LSB)

Read Register 7*



*Can only be accessed if the SDLC FIFO enhancement is enabled (WR15 bit D2 set to 1)

SDLC FIFO Status and Byte Count (LSB)

Figure 52. Write Register Bit Functions (Continued)

Z182 MISCELLANEOUS CONTROL AND INTERFACE REGISTERS

Figures 54 through 65 describe miscellaneous registers that control the Z182 configuration, RAM/ROM chip select, interrupt and various status and timers.

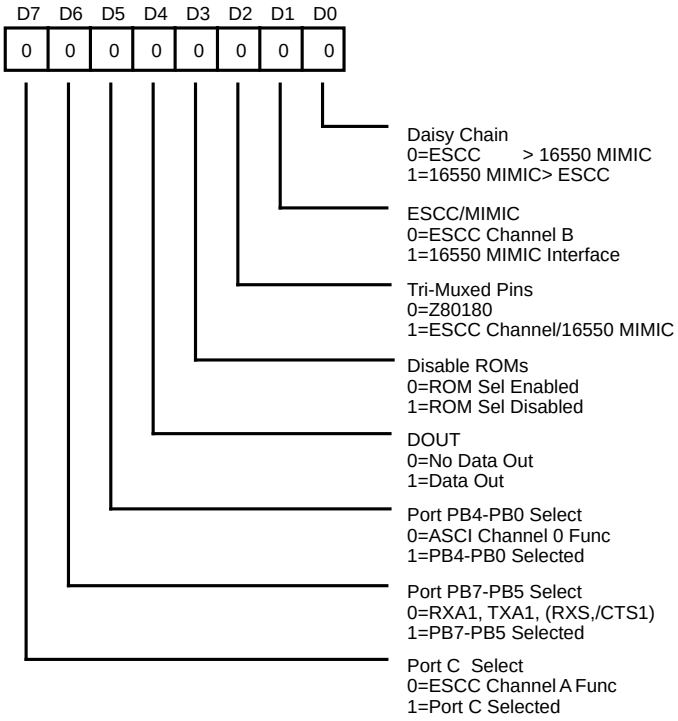


Figure 54. System Configuration Register
(Z180 MPU Read/Write, Address xxEFH)

System Configuration Register

Bit 7 Port C Select
When this bit is set to 1, bit 8 parallel Port C is selected on the multiplexed pins. When this bit is reset to 0 then these multiplexed pins take ESCC™ Channel A functions.

Bit 6 PB7-PB5 Select
When this bit is set to 1, parallel Port B bits 7 through 5 are selected on the multiplexed pins. When this bit is reset to 0, these multiplexed pins become RxA1, TxA1 and RxS/CTS1.

Bit 5 PB4-PB0 Select
When this bit is set to 1, parallel Port B bits 4 through 0 are selected on the multiplexed pins. When this bit is reset to 0, these multiplexed pins take ASCI channel 0 functions.

Bit 4 DD_{OUT} ROM Emulator Mode Enable
When this bit is set to 1, the Z182 is in "ROM emulator mode". In this mode, bus direction for certain transaction periods are set to the opposite direction to export internal bus transactions outside the Z80182/Z8L182. This allows the use of ROM emulators/logic analyzers for application development (see Tables 12a and 12b).

Note: The word "Out" means that the Z182 data bus direction is in output mode, "In" means input mode, and "Z" means high impedance. DD_{OUT} stands for Data Direction Out and is the status of the D4 bit in the System Configuration Register (SCR).

Table 12a. Data Bus Direction (Z182 Bus Master)

I/O And Memory Transactions

	I/O Write to On-Chip Peripherals	I/O Read From On-Chip Peripherals	I/O Write to Off-Chip Peripherals	I/O Read From Off-Chip Peripherals	Write To Memory	Read From Mode	Refresh	Z80182 /Z8L182 Idle Mode
Z80182 /Z8L182 Data Bus (DD_{OUT} =0)	Out	Z	Out	In	Out	In	Z	Z
Z80182 /Z8L182 Data Bus (DD_{OUT} =1)	Out	Out	Out	In	Out	In	Z	Z

INTERRUPT EDGE/PIN MUX REGISTER

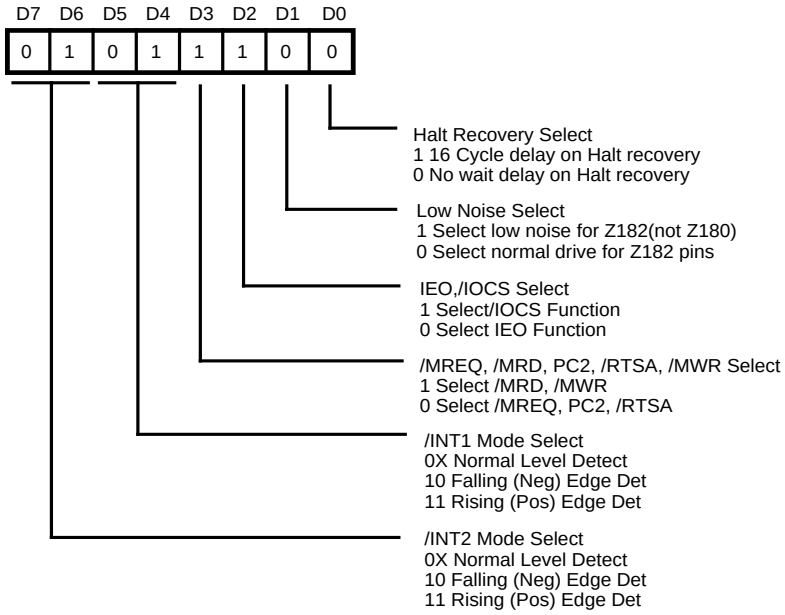


Figure 59. Interrupt Edge/Pin MUX Register
(Z180 MPU Read/Write, Address xxDFH)

Bits 7-6. These bits control the interrupt capture logic for the external /INT2 PIN. When programmed as '0X', the /INT2 pin performs as the normal level detecting interrupt pin. When programmed as 10 the negative edge detection is enabled. Any falling edge latches an active Low on the internal /INT2 of the Z180. This interrupt must be cleared by writing a 1 to bit 7 of the Port C Data Register. Programming these control bits to 11 enables rising edge interrupts to be latched. The latch is cleared in the same fashion as the falling edge.

Bits 5-4. These bits control the interrupt capture logic for the external /INT1 PIN. When programmed as '0X', the /INT1 pin performs as the normal level detecting interrupt pin. When programmed as 10, the negative edge detection is enabled. Any falling edge latches an active Low on the internal /INT1 of the Z180. This interrupt must be cleared by writing a 1 to bit 6 of the Port C Data Register. Programming these control bits to 11 enables rising edge interrupts to be latched. The latch is cleared in the same fashion as the falling edge. Edge detect logic cannot be used in Emulation Adaptor EV mode 1.

Bit 3. Programming this bit to 1 selects the /MRD and the /MWR functions. The default for power up and /RESET conditions is 1, i.e., the /MRD and /MWR. By programming this bit to 0 the /MREQ Z180 function is enabled, as well as the PC2//RTSA function on the PC2//RTSA//MWR pin. If the /MREQ Z180 function is enabled, any external bus master must be prevented from asserting Z182's IRD signal unless accessing Z182's IO.

Bit 2. This bit selects the /IOCS function which is the default for power up and /RESET conditions. By programming this bit to 0 the IEO function is enabled for this multiplexed pin.

Bit 1. This bit selects the low noise or normal drive feature for the Z182 pins . The default at power up is normal drive for Z182 pins. By programming this bit to 1, low noise for the Z182 pins is chosen and the output drive capability of the following pins is reduced to 25% of the original drive capability:

- CKS
- CKA1/TEND0
- CKA0/DREQ0
- RxS/CTS1
- TxA1
- TxA0
- TxS

Programming this bit to 0 selects normal drive for the Z182 pins. Refer to the Z8S180 Product Specification for Low noise control of Z180 pins.

16550 MIMIC REGISTERS

The Z80182/Z8L182 contains the following set of registers for interfacing with the PC/XT/AT.

- Receive Buffer Register
- Transmit Holding Register
- Interrupt Enable Register
- Interrupt Identification Register
- FIFO Control Register
- Line Control Register
- Modem Control Register
- Line Status Register
- Modem Status Register
- Scratch Register
- Divisor Latch Least/Most Significant Bytes
- FIFO Control Register

These registers emulate the 16550 UART and enable the PC/XT/AT to interface with them as with an actual 16550 UART. This allows the Z80182/Z8L182 to be software compatible with existing modem software.

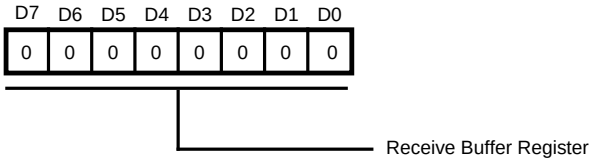


Figure 69. Receive Buffer Register
(PC Read Only, Address 00H, DLAB=0, R/W=Read)
(Z180™ MPU Write Only, Address XXF0H)

Receive Buffer Register

When the Z180 has assembled a byte of data to pass to the PC/XT/AT, it places it in the Receive Buffer Register. If the Received Data Available interrupt is enabled then an interrupt is generated for the PC/XT/AT and the Data Ready bit is set (if the Receive Timer is enabled, the interrupt and setting of the Data Ready bit is delayed until after the timer times out). Also the shadowed bits of the Line Status Register are transferred to their respective bits when the Z180 MPU writes to the Receive Buffer Register (See Line Status Register Bits 1, 2, 3 and 4). This allows a simultaneous setting of error bits when the data is written to the Receive Buffer Register. In FIFO, mode this address is used to read (PC) and write (Z180) the Receive FIFO.

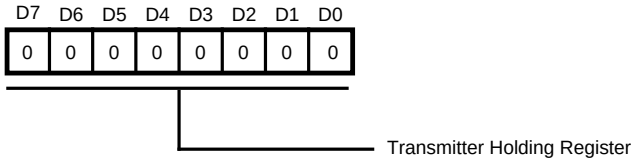


Figure 70. Transmit Holding Register
(PC Write Only, Address 00H, DLAB=0, R/W=Write)
(Z180 MPU Read Only, Address xxF0H)

Transmit Holding Register

When the PC/XT/AT writes to the Transmit Holding Register, the Z80182/Z8L182 responds by setting the appropriate bit in the IP register and by generating an interrupt to the Z180 MPU if it is enabled. When the Z180 MPU reads this register the Transmit Holding Register empty flag is set (if the transmitter timer is enabled , this bit is set after the timer times out). In FIFO mode of operation, this address is used to read (Z180) and write (PC) the Transmitter FIFO.

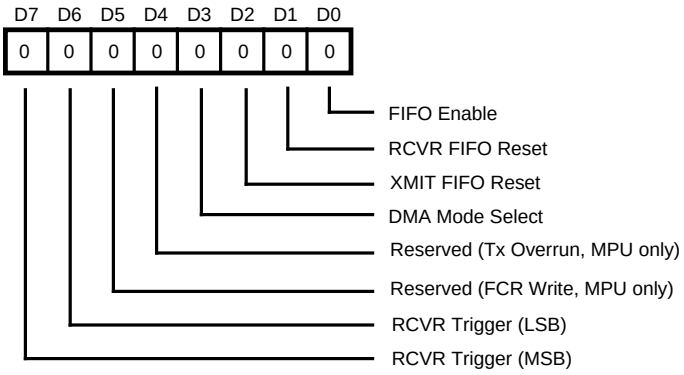


Figure 71. FIFO Control Register
(PC Write Only, Address 02H)
(Z180 MPU Read Only, Address xxE9H)

ABSOLUTE MAXIMUM RATINGS

Voltage on V_{CC} with respect to V_{SS} ..... –0.3V to +7.0V
Voltages on all inputs
with respect to V_{SS} ..... –0.3V to V_{CC} +0.3V
Operating Ambient Temperature ..... 0 to +70°C
Storage Temperature .....–55°C to +150°C

Stresses greater than those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only; operation of the device at any condition above those indicated in the operational sections of these specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

STANDARD TEST CONDITIONS

The DC Characteristics and capacitance sections below apply for the following standard test conditions, unless otherwise noted. All voltages are referenced to GND (0V). Positive current flows into the referenced pin (Figure 89).

Available operating temperature range is:
S = 0°C to +70°C

Voltage Supply Range:
+4.50V ≤ V_{CC} ≤ + 5.50V Z80182
+3.0V ≤ V_{CC} ≤ + 3.60V Z8L182

All AC parameters assume a load capacitance of 100 pF. Add 10 ns delay for each 50 pF increase in load up to a maximum of 150 pF for the data bus and 100 pF for address and control lines. AC timing measurements are referenced to 1.5 volts (except for clock, which is referenced to the 10% and 90% points). Maximum capacitive load for CLK is 125 pF.

Note: The ESCC™ Core is only guaranteed to operate at 20 MHz 5.0 volts or 10 MHz 3.3 volts. Upon reset, the Z182 system clock is "divided by one" before clocking the ESCC. When Z182 is operated above 20 MHz 5.0 volts or 10 MHz 3.3 volts, the ESCC should be programmed to "divide-by-two" mode.

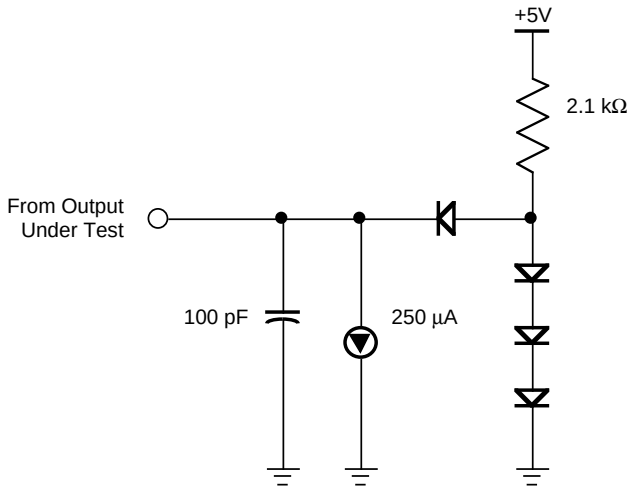


Figure 89. Test Load Diagram

TIMING DIAGRAMS (Continued)

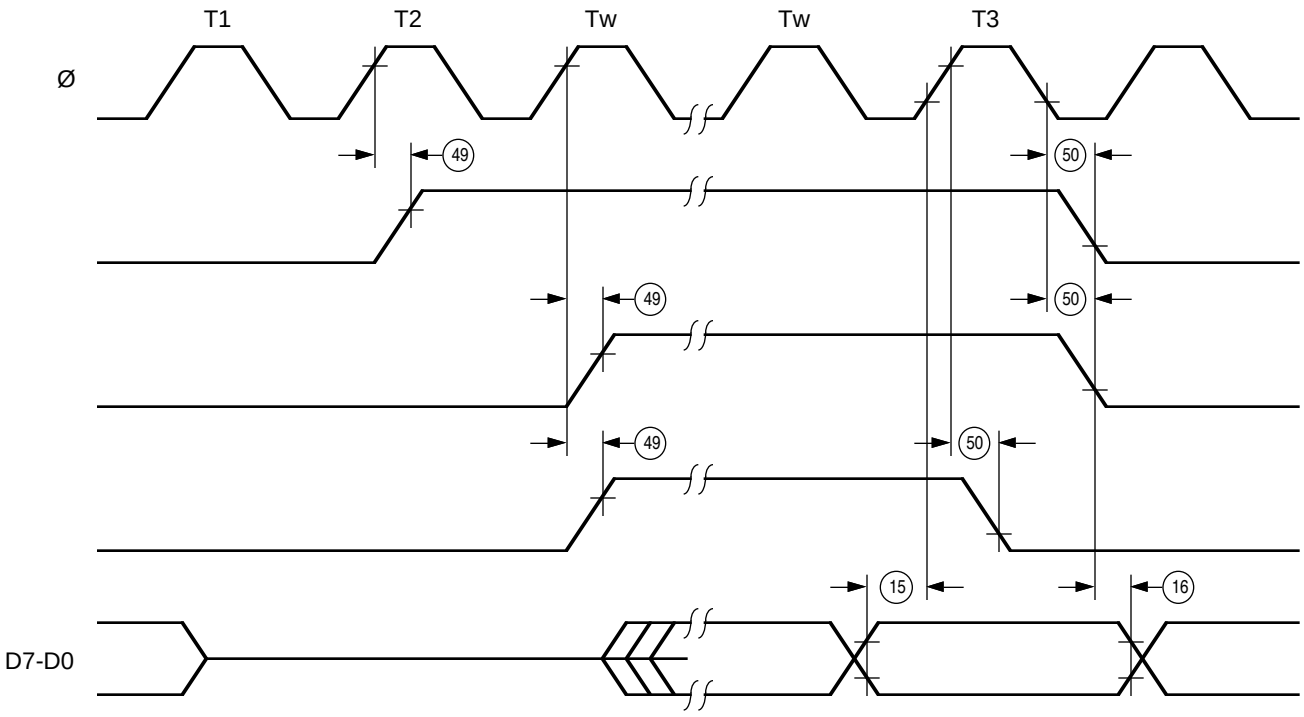


Figure 94. E Clock Timing
(Memory Read/Write Cycle
I/O Read/Write Cycle)

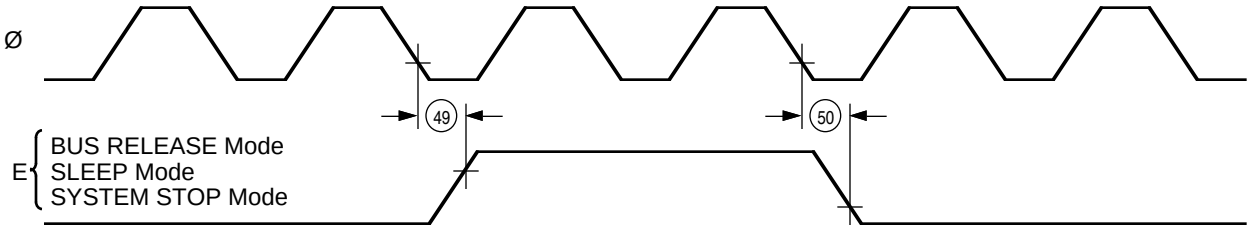


Figure 95. E Clock Timing

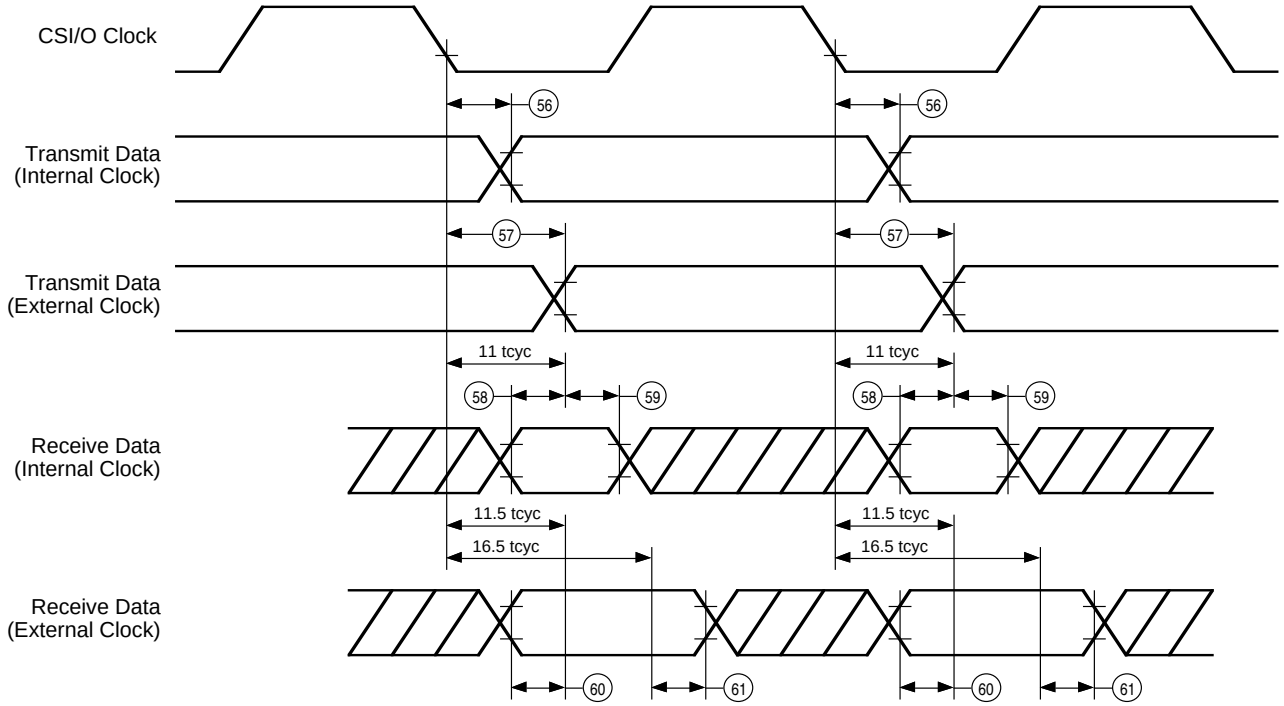


Figure 99. CSI/O Receive/Transmit Timing

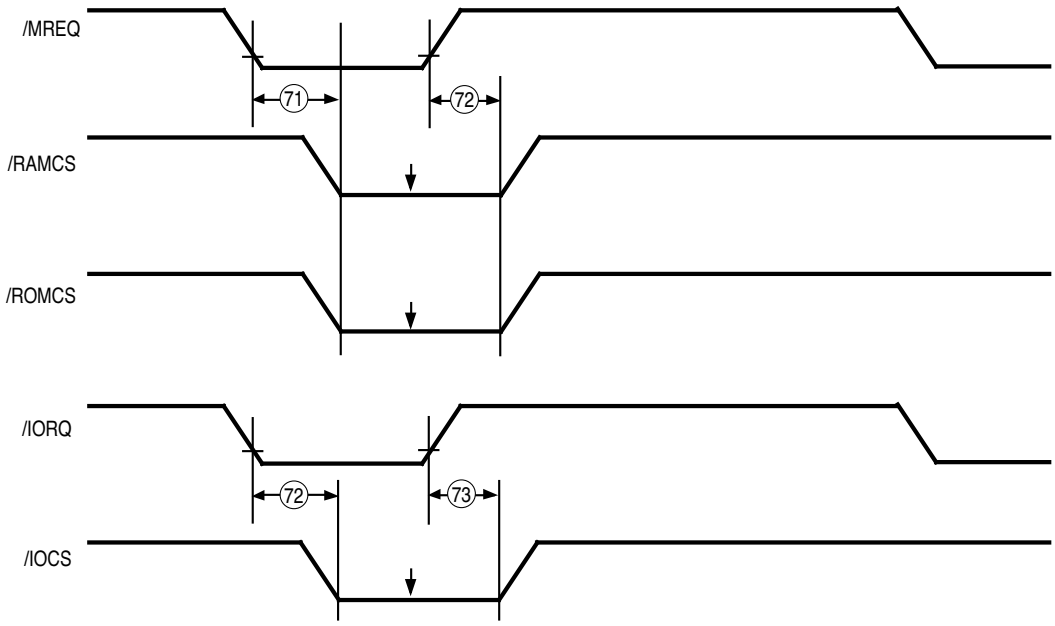


Figure 100 /ROMCS and /RAMCS Timing

TIMING DIAGRAMS (Continued)

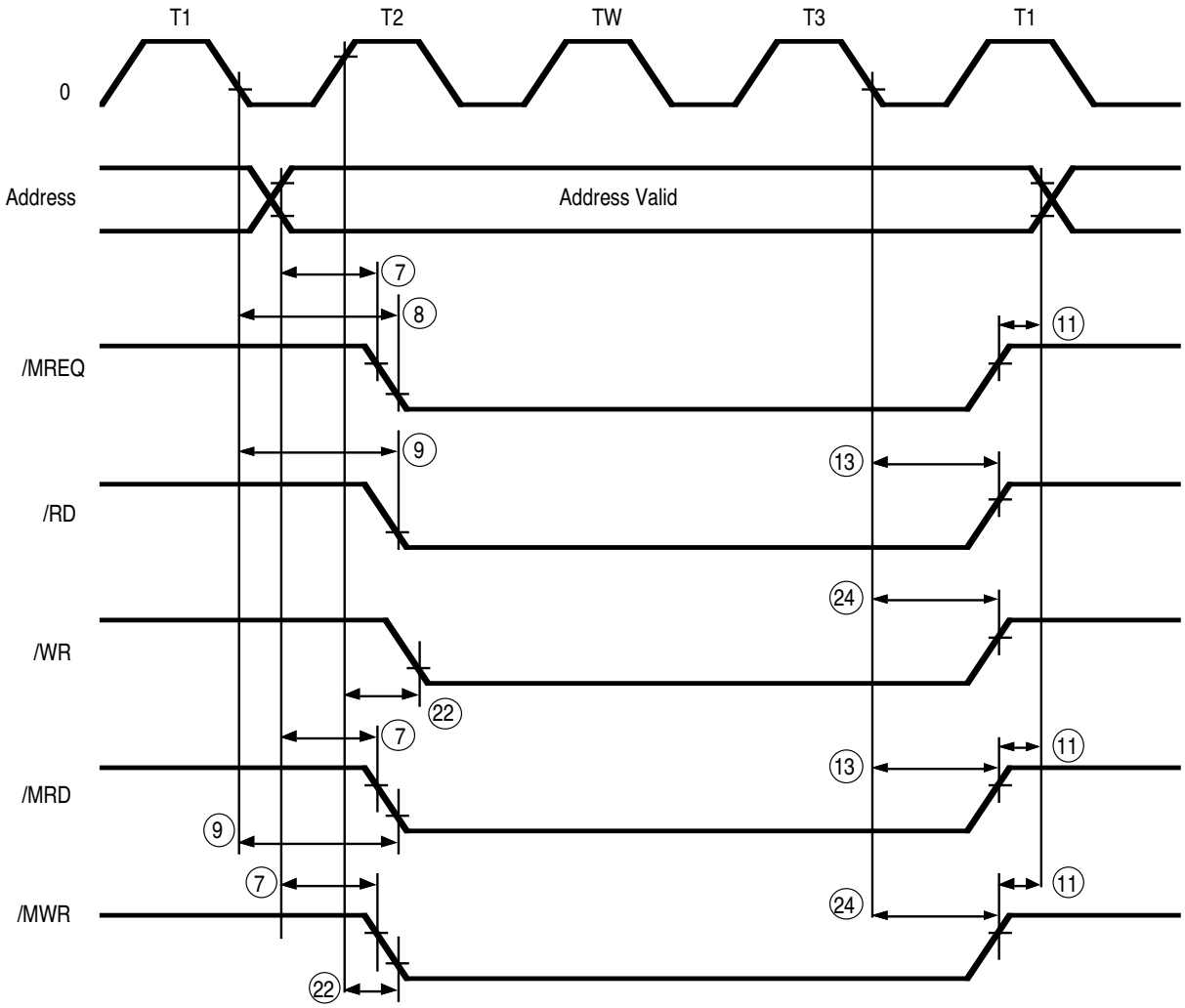


Figure 101. /MWR and /MRD Timing

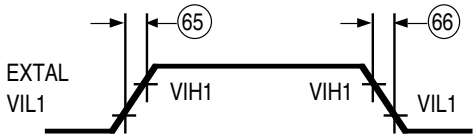


Figure 102. External Clock Rise Time and Fall Time

Figure 103. Input Rise and Fall Time
(Except EXTAL, /RESET)

Table C. Z85230 General Timing Table

No.	Symbol	Parameter	20 MHz Min	20 MHz Max	Notes
1	TdPC(REQ)	/PCLK to W/REQ Valid		70	
2	TdPC(W)	/PCLK to Wait Inactive		170	
3	TsRxC(PC)	/RxC to /PCLK Setup Time	N/A		[1,4]
4	TsRxD(RxCr)	RxD to /RxC Setup Time		0	[1]
5	ThRxD(RxCr)	RxD to /RxC Hold Time	45		[1]
6	TsRxD(RxCf)	RxD to /RxC Setup Time	0		[1,5]
7	ThRxD(RxCf)	RxD to /RxC Hold Time	45		[1,5]
8	TsSY(RxC)	/SYNC to /RxC Setup Time	–90		[1]
9	ThSY(RXC)	/SYNC to/RxC Hold Time	5TcPc		[1]
10	TsTxC(PC)	/TxC to /PCLK Setup Time	N/A		[2,4]
11	TdTxCf(TXD)	/TxC to TxD Delay		70	[2]
12	TdTxCr(TXD)	/TxC to TxD Delay		70	[2,5]
13	TdTxD(TRX)	TxD to TRxC Delay		70	
14	TwRTxh	RTxC High Width	70		[6]
15	TwRTxl	TRxC Low Width	70		[6]
16a	TcRTx	RTxC Cycle Time	200		[6,7]
16b	TxRx(DPLL)	DPLL Cycle Time Min	50		[7,8]
17	TcRTxx	Crystal Osc. Period	61	1000	[3]
18	TwTRxh	TRxC High Width	70		[6]
19	TwTRxl	TRxC Low Width	70		[6]
20	TcTRx	TRxC Cycle Time	200		[6,7]
21	TwExT	DCD or CTS Pulse Width	60		
22	TwSY	SYNC Pulse Width	60		

Notes:
These AC parameter values are preliminary and subject to change without notice.
[1] RxC is /RTxC or /TRxC, whichever is supplying the receive clock.
[2] TxC is /TRxC or /RTxC, whichever is supplying the transmit clock.
[3] Both /RTxC and /SYNC have 30 pF capacitors to ground connected to them.
[4] Synchronization of RxC to PCLK is eliminated in divide by four operation.
[5] Parameter applies only to FM encoding/decoding.
[6] Parameter applies only for transmitter and receiver; DPLL and baud rate generator timing requirements are identical to case PCLK requirements.
[7] The maximum receive or transmit data rate is 1/4 PCLK.
[8] Applies to DPLL clock source only. Maximum data rate of 1/4 PCLK still applies. DPLL clock should have a 50% duty cycle.

General-Purpose I/O Port Timing

This figure shows the timing for the Ports A, B and C. Parameters referred to in this figure appear in Tables D and E.

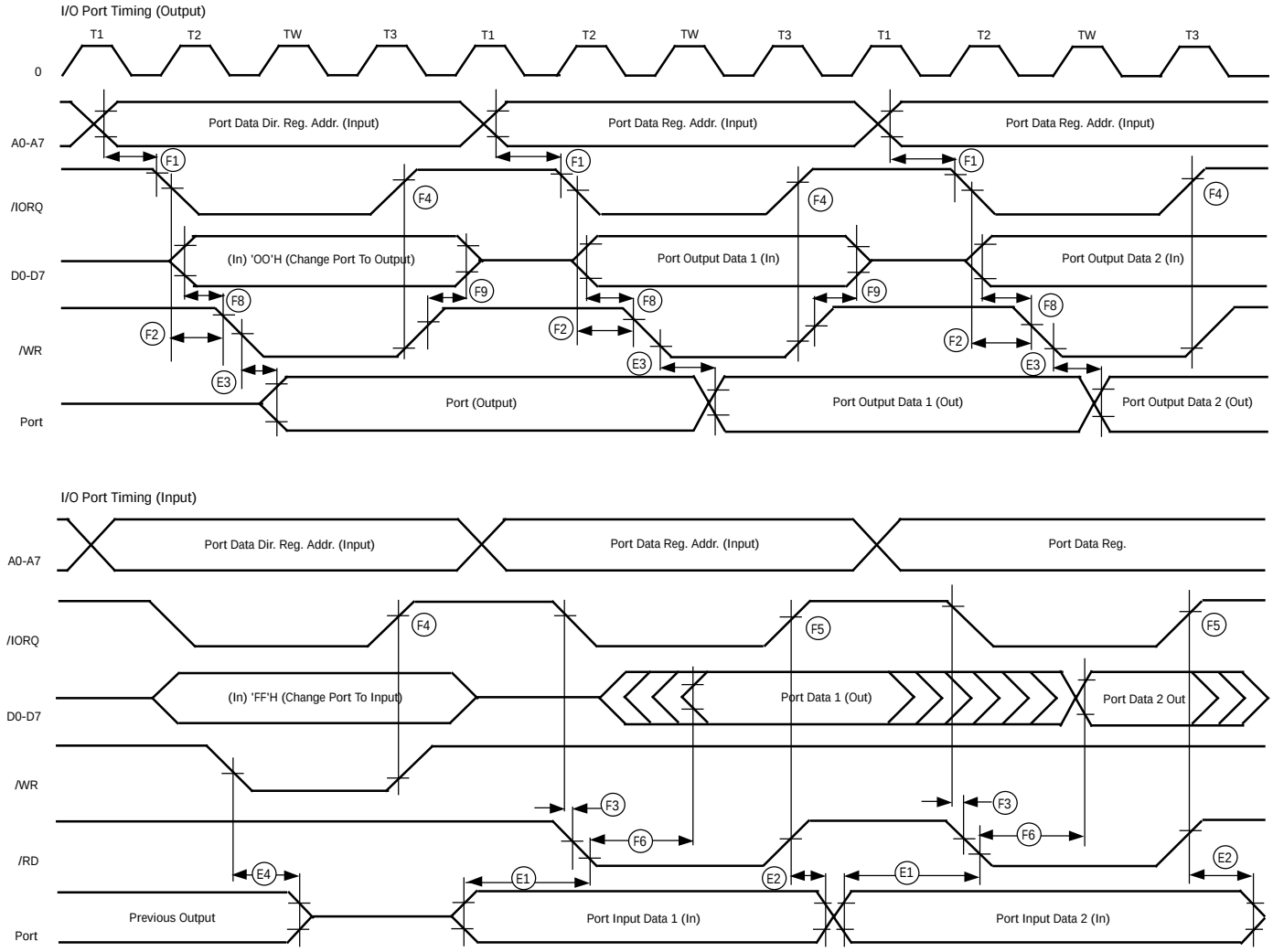


Figure 107. PORT Timing