



CUSTOMER PROCUREMENT SPECIFICATION

Z86C90/C89
ROMLESS CMOS
Z8® 8-BIT MICROCONTROLLER

GENERAL DESCRIPTION

The Z86C90/C89 CCP™ (Consumer Controller Processor) introduces a new level of sophistication to single-chip architecture. The Z86C90/C89 are ROMless members of the Z8 single-chip microcontroller family with 236 bytes of general purpose RAM. The only difference that exists between the Z86C89 and the Z86C90 is that the on-chip oscillator of the Z86C89 can accept an external RC network or other external clock source, while the Z86C90's on-chip oscillator accepts a crystal, ceramic resonator, LC, or external clock source drive. The CCP controllers are housed in a 40-pin DIP, 44-pin Leaded Chip Carrier, and are CMOS compatible. The CCP offers the use of external memory which enables this Z8 microcomputer to be used where code flexibility is required. Zilog's CMOS microcomputer offers fast execution, efficient use of memory, sophisticated interrupts, input/output bit manipulation capabilities, and easy hardware/software system expansion along with low cost and low power consumption.

The Z86C90/C89 architecture is based on Zilog's 8-bit microcontroller core with an Expanded Register File to allow access to register mapped peripheral and I/O circuits. The CCP offers a flexible I/O scheme, an efficient register and address space structure, and a number of ancillary features that are useful in many industrial, automotive, computer peripherals, and advanced scientific applications.

The CCP applications demand powerful I/O capabilities. The Z86C90/C89 fulfills this with 32 pins dedicated to input and output. These lines are grouped into four ports. Each

port consists of eight lines, and is configurable under software control to provide timing, status signals, parallel I/O with or without handshake, and an address/data bus for interfacing external memory.

There are four basic address spaces available to support this wide range of configurations: Program Memory, Register File, Data Memory, and Expanded Register File. The Register File is composed of 236 bytes of general purpose registers, four I/O port registers, and fifteen control and status registers. The Expanded Register File consists of two control registers.

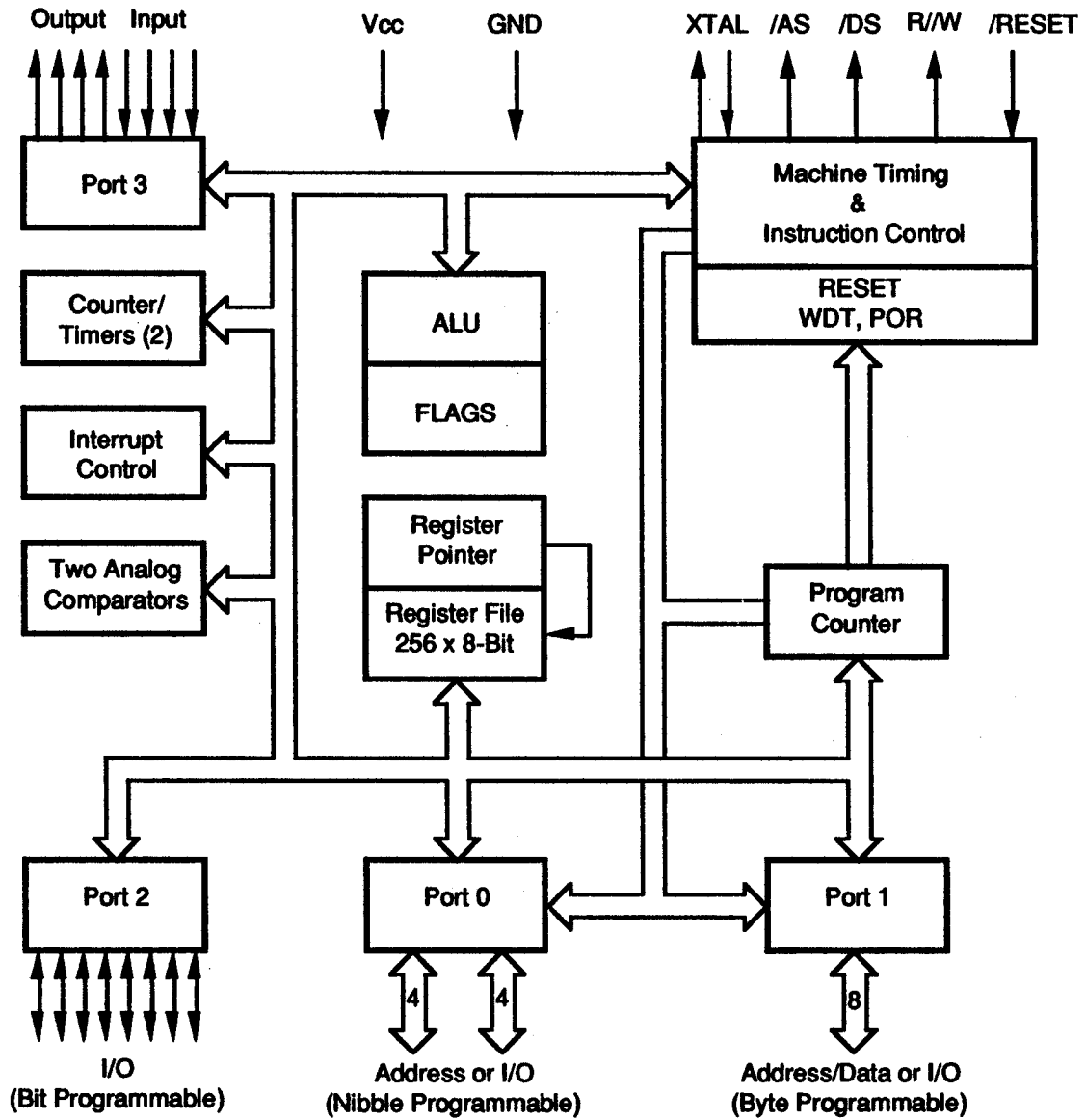
To unburden the program from coping with the real-time problems, such as counting/timing and data communication, the Z86C90/C89 offers two on-chip counter/timers. Included are a large number of user selectable modes, and two on-board comparators to process analog signals with a common reference voltage (see Functional Block Diagram).

Notes:
All Signals with a preceding front slash, '/', are active Low, e.g.: B/W (WORD is active Low); /B/W (BYTE is active Low, only).

Power connections follow conventional descriptions below:

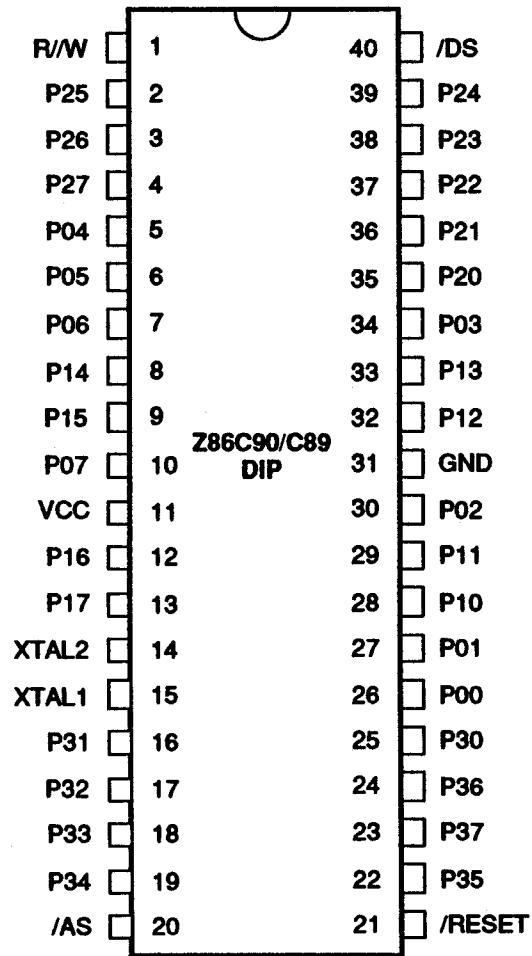
| Connection | Circuit | Device |
|--------------|------------------------|------------------------------------|
| Power Ground | V _{CC} GND | V _{DD} V _{SS} |

GENERAL DESCRIPTION (Continued)



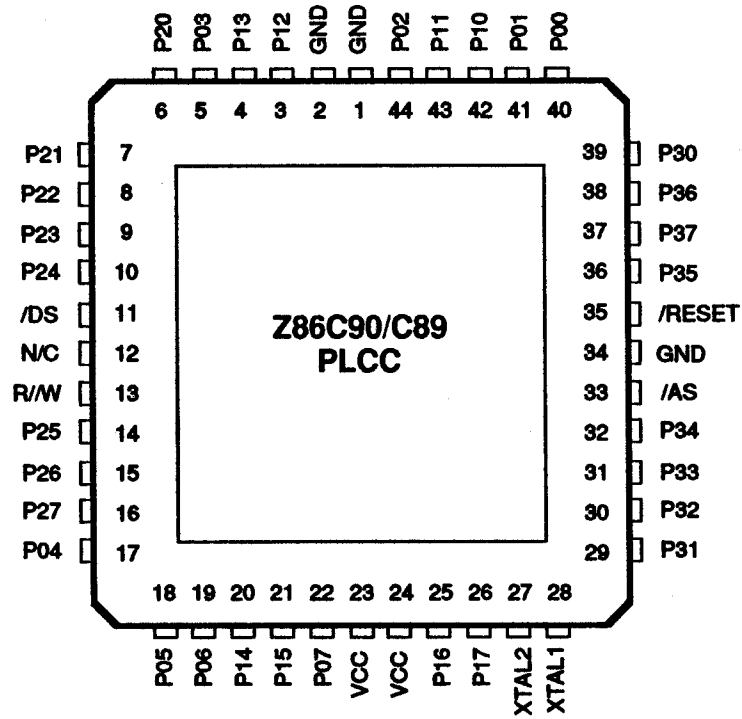
Functional Block Diagram

PIN DESCRIPTION



40-Pin DIP Pin Assignments

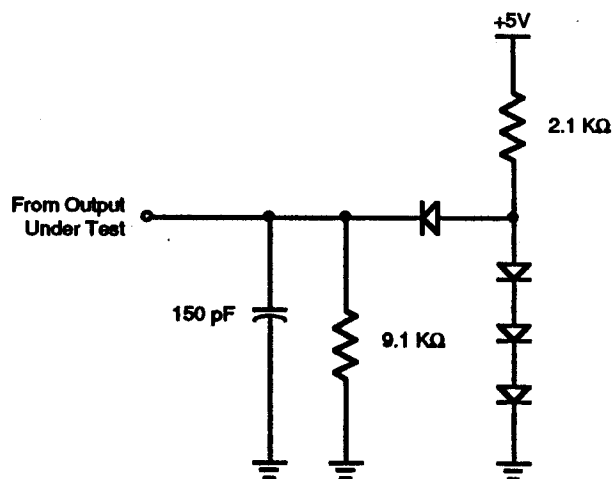
PIN DESCRIPTION (Continued)



44-Pin PLCC Pin Assignments

STANDARD TEST CONDITIONS

The characteristics listed below apply for standard test conditions as noted. All voltages are referenced to GND. Positive current flows into the referenced pin (Test Load Diagram).



Test Load Diagram

ABSOLUTE MAXIMUM RATINGS

| Symbol | Description | Min | Max | Units |
|-----------|--------------------|------|-------|-------|
| V_{CC} | Supply Voltage (*) | -0.3 | +7.0 | V |
| T_{STG} | Storage Temp | -65° | +150° | C |
| T_A | Oper Ambient Temp | | † | C |
| | Power Dissipation | | 2.2 | W |

Notes:

* Voltage on all pins with respect to GND.

† See Ordering Information.

Stress 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 an extended period may affect device reliability.

CAPACITANCE

$T_A = 25^\circ\text{C}$, $V_{CC} = \text{GND} = 0\text{V}$, $f = 1.0\text{ MHz}$, unmeasured pins to GND

| Parameter | Max |
|--------------------|-------|
| Input capacitance | 12 pF |
| Output capacitance | 12 pF |
| I/O capacitance | 12 pF |

PLEASE NOTE

These devices will not operate in extended timing mode. Set Register 248, D5 = 0.

DC CHARACTERISTICS

| Sym | Parameter | V _{CC} Note [3] | T _A = 0°C to 70°C | | T _A = -40°C to 105°C | | Typ @ 25°C | Units | Conditions | Notes |
|---------------------|---------------------------------|-----------------------------|---------------------------------|----------------------|------------------------------------|----------------------|---------------|-------|---|-------|
| | | | Min | Max | Min | Max | | | | |
| V _{CH} | Max Input Voltage | 3.3V | | 7 | | 7 | | V | I _{IN} 250µA | |
| | | 5.0V | | 7 | | 7 | | V | I _{IN} 250µA | |
| | Clock Input High Voltage | 3.3V | 0.7 V _{CC} | V _{CC} +0.3 | 0.7 V _{CC} | V _{CC} +0.3 | 1.3 | V | Driven by External Clock Generator | |
| | | 5.0V | 0.7 V _{CC} | V _{CC} +0.3 | 0.7 V _{CC} | V _{CC} +0.3 | 2.5 | V | Driven by External Clock Generator | |
| V _{CL} | Clock Input Low Voltage | 3.3V | GND-0.3 | 0.2 V _{CC} | GND-0.3 | 0.2 V _{CC} | 0.7 | V | Driven by External Clock Generator | |
| | | 5.0V | GND-0.3 | 0.2 V _{CC} | GND-0.3 | 0.2 V _{CC} | 1.5 | V | Driven by External Clock Generator | |
| V _{HI} | Input High Voltage | 3.3V | 0.7 V _{CC} | V _{CC} +0.3 | 0.7 V _{CC} | V _{CC} +0.3 | 1.3 | V | | |
| | | 5.0V | 0.7 V _{CC} | V _{CC} +0.3 | 0.7 V _{CC} | V _{CC} +0.3 | 2.5 | V | | |
| V _{LI} | Input Low Voltage | 3.3V | GND-0.3 | 0.2 V _{CC} | GND-0.3 | 0.2 V _{CC} | 0.7 | V | | |
| | | 5.0V | GND-0.3 | 0.2 V _{CC} | GND-0.3 | 0.2 V _{CC} | 1.5 | V | | |
| V _{OHI} | Output High Voltage | 3.3V | V _{CC} -0.4 | | V _{CC} -0.4 | | 3.1 | V | I _{OHI} = -2.0 mA | |
| | | 5.0V | V _{CC} -0.4 | | V _{CC} -0.4 | | 4.8 | V | I _{OHI} = -2.0 mA | |
| V _{OL1} | Output Low Voltage | 3.3V | | 0.6 | | 0.6 | 0.2 | V | I _{OLI} = +4.0 mA | |
| | | 5.0V | | 0.4 | | 0.4 | 0.1 | V | I _{OLI} = +4.0 mA | |
| V _{OL2} | Output Low Voltage | 3.3V | | 1.2 | | 1.2 | 0.3 | V | I _{OLI} = +6 mA, 3 Pin Max | |
| | | 5.0V | | 1.2 | | 1.2 | 0.3 | V | I _{OLI} = +12 mA, 3 Pin Max | |
| V _{RHI} | Reset Input High Voltage | 3.3V | .8 V _{CC} | V _{CC} | .8 V _{CC} | V _{CC} | 1.5 | V | | |
| | | 5.0V | .8 V _{CC} | V _{CC} | .8 V _{CC} | V _{CC} | 2.1 | V | | |
| V _{RL} | Reset Input Low Voltage | 3.3V | GND-0.3 | 0.2 V _{CC} | GND-0.3 | 0.2 V _{CC} | 1.1 | | | |
| | | 5.0V | GND-0.3 | 0.2 V _{CC} | GND-0.3 | 0.2 V _{CC} | 1.7 | | | |
| V _{OFFSET} | Comparator Input Offset Voltage | 3.3V | | 25 | | 25 | 10 | mV | | |
| | | 5.0V | | 25 | | 25 | 10 | mV | | |
| I _{IL} | Input Leakage | 3.3V | -1 | 1 | -1 | 2 | <1 | µA | V _{IN} = 0V, V _{CC} | |
| | | 5.0V | -1 | 1 | -1 | 2 | <1 | µA | V _{IN} = 0V, V _{CC} | |
| I _{OL} | Output Leakage | 3.3V | -1 | 1 | -1 | 2 | <1 | µA | V _{IN} = 0V, V _{CC} | |
| | | 5.0V | -1 | 1 | -1 | 2 | <1 | µA | V _{IN} = 0V, V _{CC} | |
| I _{IR} | Reset Input Current | 3.3V | | -45 | | -60 | -20 | µA | | |
| | | 5.0V | | -55 | | -70 | -30 | µA | | |
| I _{CC} | Supply Current | 3.3V | | 10 | | 10 | 4 | mA | @ 8 MHz | [4.5] |
| | | 5.0V | | 15 | | 15 | 10 | mA | @ 8 MHz | [4.5] |
| | | 3.3V | | 15 | | 15 | 5 | mA | @ 12 MHz | [4.5] |
| | | 5.0V | | 20 | | 20 | 15 | mA | @ 12 MHz | [4.5] |

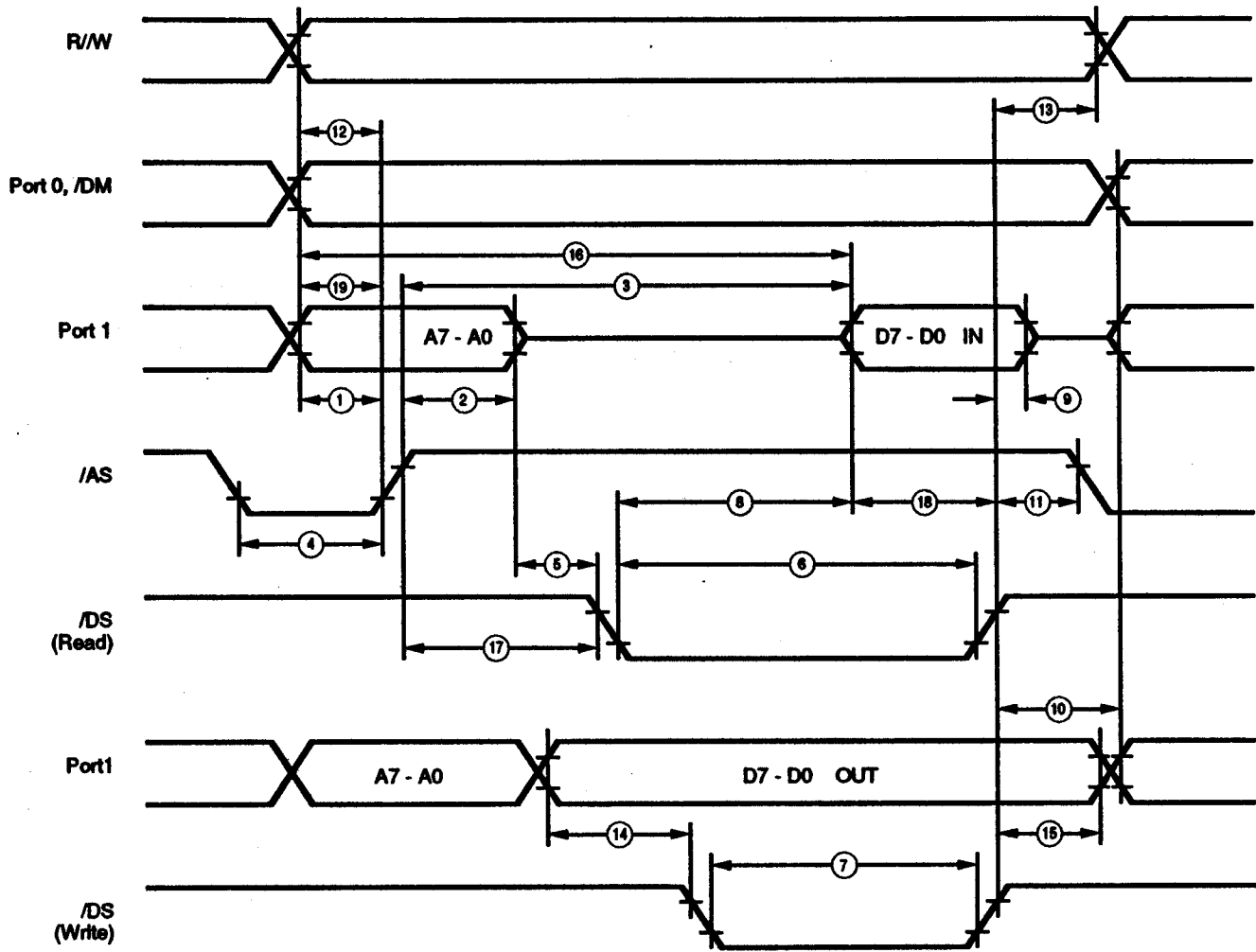
| Sym | Parameter | V _{CC} Note [3] | T _A = 0°C to 70°C | | T _A = -40°C to 105°C | | Typ @ 25°C | Units | Conditions | Notes | |
|------------------|-----------------------------------|-----------------------------|---------------------------------|------|------------------------------------|------|---------------|-------|--|--------------------------------|-------|
| | | | Min | Max | Min | Max | | | | | |
| I _{CC1} | Standby Current | 3.3V | | 3 | | 3 | 1 | mA | HALT Mode V _{IN} = 0V, V _{CC} @ 8 MHz | [4,5] | |
| | | 5.0V | | 5 | | 5 | 2.4 | mA | HALT Mode V _{IN} = 0V, V _{CC} @ 8 MHz | [4,5] | |
| | | 3.3V | | 4 | | 4 | 1.5 | mA | HALT Mode V _{IN} = 0V, V _{CC} @ 12 MHz | [4,5] | |
| | | 5.0V | | 6 | | 6 | 3.2 | mA | HALT Mode V _{IN} = 0V, V _{CC} @ 12 MHz | [4,5] | |
| | | | 3.3V | | 2 | | 2 | 0.8 | mA | Clock Divide by 16 @ 8 MHz | [4,5] |
| | | | 5.0V | | 4 | | 4 | 1.8 | mA | Clock Divide by 16 @ 8 MHz | [4,5] |
| | | | 3.3V | | 3 | | 3 | 1.2 | mA | Clock Divide by 16 @ 12 MHz | [4,5] |
| | | | 5.0V | | 5 | | 5 | 2.5 | mA | Clock Divide by 16 @ 12 MHz | [4,5] |
| I _{CC2} | Standby Current | 3.3V | | 8 | | 15 | 1 | μA | STOP Mode V _{IN} = 0V, V _{CC} WDT is not Running | [6] | |
| | | 5.0V | | 10 | | 20 | 2 | μA | STOP Mode V _{IN} = 0V, V _{CC} WDT is not Running | [6] | |
| | | 3.3V | | 500 | | 600 | 310 | μA | STOP Mode V _{IN} = 0V, V _{CC} WDT is Running | [6] | |
| | | 5.0V | | 800 | | 1000 | 600 | μA | STOP Mode V _{IN} = 0V, V _{CC} WDT is Running | [6] | |
| I _{ALL} | Auto Latch | 3.3V | | 8 | | 10 | 5 | μA | 0V < V _{IN} < V _{CC} | | |
| | Low Current | 5.0V | | 15 | | 20 | 11 | μA | 0V < V _{IN} < V _{CC} | | |
| I _{ALH} | Auto Latch | 3.3V | | -5 | | -7 | -3 | μA | 0V < V _{IN} < V _{CC} | | |
| | High Current | 5.0V | | -8 | | -10 | -6 | μA | 0V < V _{IN} < V _{CC} | | |
| I _{POR} | Power On Reset | 3.3V | 7 | 24 | 7 | 25 | 13 | ms | | | |
| | | 5.0V | 3 | 13 | 3 | 14 | 7 | ms | | | |
| V _{BO} | V _{CC} Brown-Out Voltage | | 1.5 | 2.65 | 1.2 | 2.95 | 2.1 | V | 2 MHz max Ext. CLK Freq. | [7] | |

Notes:

- | | | | | | |
|-----|-------------------------------|--------|-----|------|-------|
| [1] | I _{CC1} Frequency | Typ | Max | Unit | |
| | Crystal/Resonator | 3.0 mA | 5 | mA | 8 MHz |
| | External Clock Drive | 0.3 mA | 5 | mA | 8 MHz |
- [2] GND=0V
[3] 5.0V ±0.5V, 3.3V ±0.3V.
[4] All outputs unloaded, I/O pins floating, inputs at rail.
[5] CL1=CL2=100 pF
[6] Same as note [4] except inputs at V_{CC}.
[7] The V_{BO} increases as the temperature decreases.

AC CHARACTERISTICS

External I/O or Memory Read and Write Timing Diagram



External I/O or Memory Read/Write Timing

AC CHARACTERISTICS

External I/O or Memory Read and Write Timing Table

| No | Symbol | Parameter | V _{cc} Note[3] | T _A = 0°C to +70°C | | | | T _A = -40°C to +105°C | | | | Units | Notes |
|----|-----------|-------------------------|----------------------------|-------------------------------|-----|--------|-----|----------------------------------|-------|--------|-----|-------|-------|
| | | | | 8 MHz | | 12 MHz | | 8 MHz | | 12 MHz | | | |
| | | | | Min | Max | Min | Max | Min | Max | Min | Max | | |
| 1 | Td(AS) | Address Valid to | 3.3 | 55 | 35 | 55 | 35 | ns | [2] | | | | |
| | | /AS Rising Delay | 5.0 | 55 | 35 | 55 | 35 | ns | | | | | |
| 2 | TdAS(A) | /AS Rising to Address | 3.3 | 70 | 45 | 70 | 45 | ns | [2] | | | | |
| | | Float Delay | 5.0 | 70 | 45 | 70 | 45 | ns | | | | | |
| 3 | TdAS(DR) | /AS Rising to Read | 3.3 | 400 | 250 | 400 | 250 | ns | [1,2] | | | | |
| | | Data Required Valid | 5.0 | 400 | 250 | 400 | 250 | ns | | | | | |
| 4 | TwAS | /AS Low Width | 3.3 | 80 | 55 | 80 | 55 | ns | [2] | | | | |
| | | | 5.0 | 80 | 55 | 80 | 55 | ns | | | | | |
| 5 | Td | Address Float to | 3.3 | 0 | 0 | 0 | 0 | ns | | | | | |
| | | /DS Falling | 5.0 | 0 | 0 | 0 | 0 | ns | | | | | |
| 6 | TwDSR | /DS (Read) Low Width | 3.3 | 300 | 200 | 300 | 200 | ns | [1,2] | | | | |
| | | | 5.0 | 300 | 200 | 300 | 200 | ns | | | | | |
| 7 | TwDSW | /DS (Write) Low Width | 3.3 | 165 | 110 | 165 | 110 | ns | [1,2] | | | | |
| | | | 5.0 | 165 | 110 | 165 | 110 | ns | | | | | |
| 8 | TdDSR(DR) | /DS Falling to Read | 3.3 | 260 | 150 | 260 | 150 | ns | [1,2] | | | | |
| | | Data Required Valid | 5.0 | 260 | 160 | 260 | 160 | ns | | | | | |
| 9 | ThDR(DS) | Read Data to | 3.3 | 0 | 0 | 0 | 0 | ns | [2] | | | | |
| | | /DS Rising Hold Time | 5.0 | 0 | 0 | 0 | 0 | ns | | | | | |
| 10 | TdDS(A) | /DS Rising to Address | 3.3 | 85 | 45 | 85 | 45 | ns | [2] | | | | |
| | | Active Delay | 5.0 | 95 | 55 | 95 | 55 | ns | | | | | |
| 11 | TdDS(AS) | /DS Rising to /AS | 3.3 | 60 | 30 | 60 | 30 | ns | [2] | | | | |
| | | Falling Delay | 5.0 | 70 | 45 | 70 | 45 | ns | | | | | |
| 12 | TdR/W(AS) | R/W Valid to /AS | 3.3 | 70 | 45 | 70 | 45 | ns | [2] | | | | |
| | | Rising Delay | 5.0 | 70 | 45 | 70 | 45 | ns | | | | | |
| 13 | TdDS(R/W) | /DS Rising to | 3.3 | 70 | 45 | 70 | 45 | ns | [2] | | | | |
| | | R/W Not Valid | 5.0 | 70 | 45 | 70 | 45 | ns | | | | | |
| 14 | TdDW(DSW) | Write Data Valid to /DS | 3.3 | 80 | 55 | 80 | 55 | ns | [2] | | | | |
| | | Falling (Write) Delay | 5.0 | 80 | 55 | 80 | 55 | ns | | | | | |
| 15 | TdDS(DW) | /DS Rising to Write | 3.3 | 70 | 45 | 70 | 45 | ns | [2] | | | | |
| | | Data Not Valid Delay | 5.0 | 80 | 55 | 80 | 55 | ns | | | | | |
| 16 | TdA(DR) | Address Valid to Read | 3.3 | 475 | 310 | 475 | 310 | ns | [1,2] | | | | |
| | | Data Required Valid | 5.0 | 475 | 310 | 475 | 310 | ns | | | | | |
| 17 | TdAS(DS) | /AS Rising to | 3.3 | 100 | 65 | 100 | 65 | ns | [2] | | | | |
| | | /DS Falling Delay | 5.0 | 100 | 65 | 100 | 65 | ns | | | | | |
| 18 | TdDI(DS) | Data Input Setup to | 0.0 | 115 | 115 | 115 | 115 | ns | [1,2] | | | | |
| | | /DS Rising | 5.0 | 75 | 75 | 75 | 75 | ns | | | | | |
| 19 | TdDM(AS) | /DM Valid to /AS | 3.3 | 55 | 35 | 55 | 35 | ns | [2] | | | | |
| | | Falling Delay | 5.0 | 55 | 35 | 55 | 35 | ns | | | | | |

Notes:

[1] When using extended memory timing add 2 TpC.

[2] Timing numbers given are for minimum TpC.

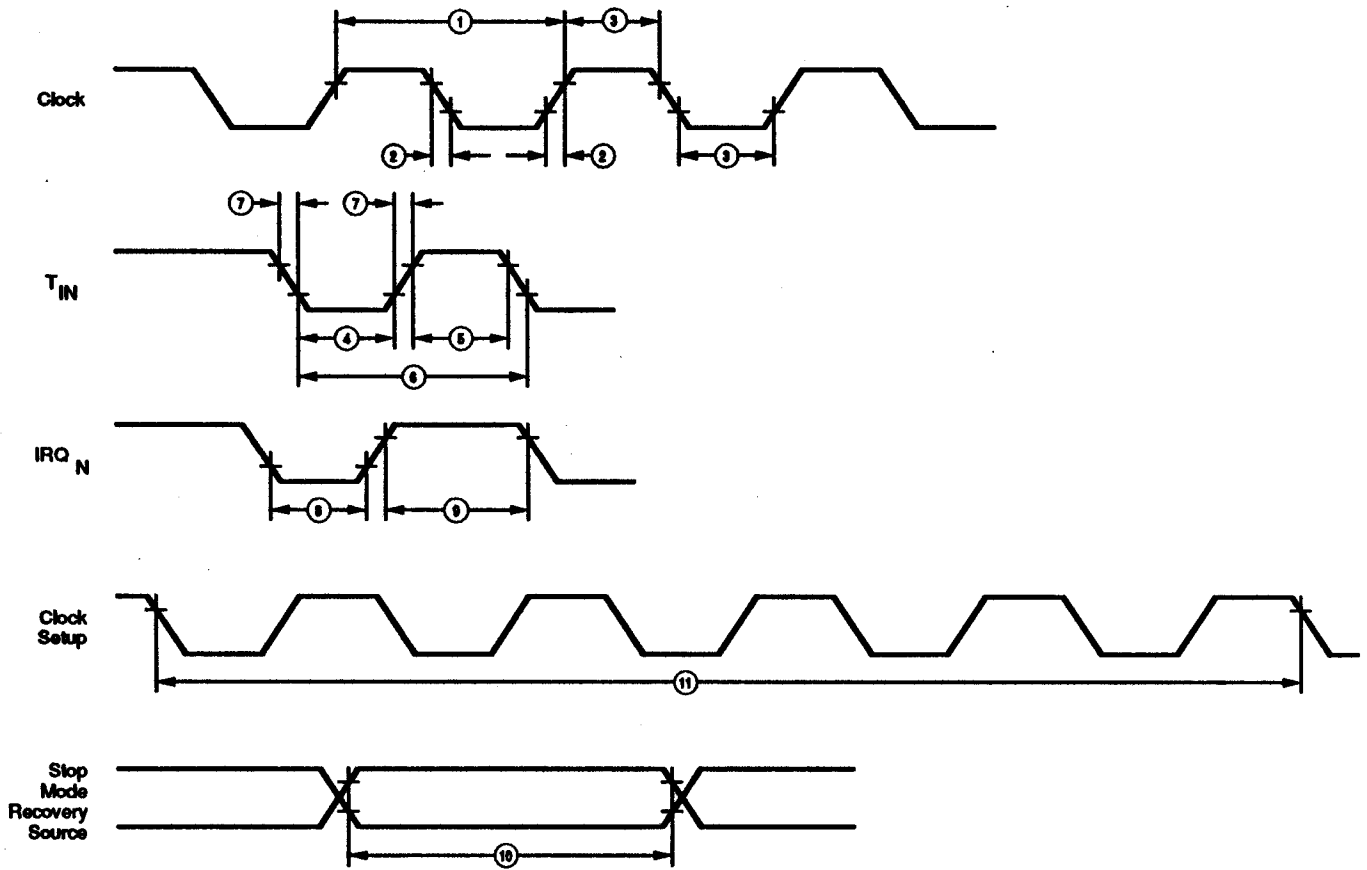
[3] 5.0V ±0.5V, 3.3V ±0.3V.

Standard Test Load

All timing references use 0.9 V_{cc} for a logic 1 and 0.1 V_{cc} for a logic 0.

AC CHARACTERISTICS

Additional Timing Diagram



Additional Timing

AC CHARACTERISTICS

Additional Timing Table

| No | Symbol | Parameter | V _{cc} Note[6] | T _A = 0°C to 70°C | | | | T _A = -40°C to 105°C | | | | Units | Notes | |
|----|-------------|--------------------------------------|----------------------------|------------------------------|--------|--------|--------|---------------------------------|--------|--------|--------|-------|-------|-----|
| | | | | 8 MHz | | 12 MHz | | 8 MHz | | 12 MHz | | | | |
| | | | | Min | Max | Min | Max | Min | Max | Min | Max | | | |
| 1 | TpC | Input Clock Period | 3.3V | 125 | 100000 | 83 | 100000 | 125 | 100000 | 83 | 100000 | ns | [1] | |
| | | | 5.0V | 125 | 100000 | 83 | 100000 | 125 | 100000 | 83 | 100000 | ns | [1] | |
| 2 | TrC,TfC | Clock Input Rise and Fall Times | 3.3V | | 25 | | 15 | | 25 | | 15 | ns | [1] | |
| | | | 5.0V | | 25 | | 15 | | 25 | | 15 | ns | [1] | |
| 3 | TwC | Input Clock Width | 3.3V | 37 | | 26 | | 37 | | 26 | | ns | [1] | |
| | | | 5.0V | 37 | | 26 | | 37 | | 26 | | ns | [1] | |
| 4 | TwTinL | Timer Input Low Width | 3.3V | 100 | | 100 | | 100 | | 100 | | ns | [1] | |
| | | | 5.0V | 70 | | 70 | | 70 | | 70 | | ns | [1] | |
| 5 | TwTinH | Timer Input High Width | 3.3V | 3TpC | | 3TpC | | 3TpC | | 3TpC | | | [1] | |
| | | | 5.0V | 3TpC | | 3TpC | | 3TpC | | 3TpC | | | [1] | |
| 6 | TpTin | Timer Input Period | 3.3V | 8TpC | | 8TpC | | 8TpC | | 8TpC | | | [1] | |
| | | | 5.0V | 8TpC | | 8TpC | | 8TpC | | 8TpC | | | [1] | |
| 7 | TrTin,TfTin | Timer Input Rise and Fall Timers | 3.3V | | 100 | | 100 | | 100 | | 100 | ns | [1] | |
| | | | 5.0V | | 100 | | 100 | | 100 | | 100 | ns | [1] | |
| 8A | TwIL | Interrupt Request Low Time | 3.3V | 100 | | 100 | | 100 | | 100 | | ns | [1,2] | |
| | | | 5.0V | 70 | | 70 | | 70 | | 70 | | ns | [1,2] | |
| 8B | TwIL | Int. Request Low Time | 3.3V | 3TpC | | 3TpC | | 3TpC | | 3TpC | | | [1,3] | |
| | | | 5.0V | 3TpC | | 3TpC | | 3TpC | | 3TpC | | | [1,3] | |
| 9 | TwIH | Interrupt Request Input High Time | 3.3V | 3TpC | | 3TpC | | 3TpC | | 3TpC | | | [1,2] | |
| | | | 5.0V | 3TpC | | 3TpC | | 3TpC | | 3TpC | | | [1,2] | |
| 10 | Twsm | STOP Mode Recovery Width Spec | 3.3V | 12 | | 12 | | 12 | | 12 | | ns | | |
| | | | 5.0V | 12 | | 12 | | 12 | | 12 | | ns | | |
| | | | 3.3V | 5TpC | | | | | | | | | | [7] |
| | | | 5.0V | 5TpC | | | | | | | | | | [8] |

AC CHARACTERISTICS

Additional Timing Table (Continued)

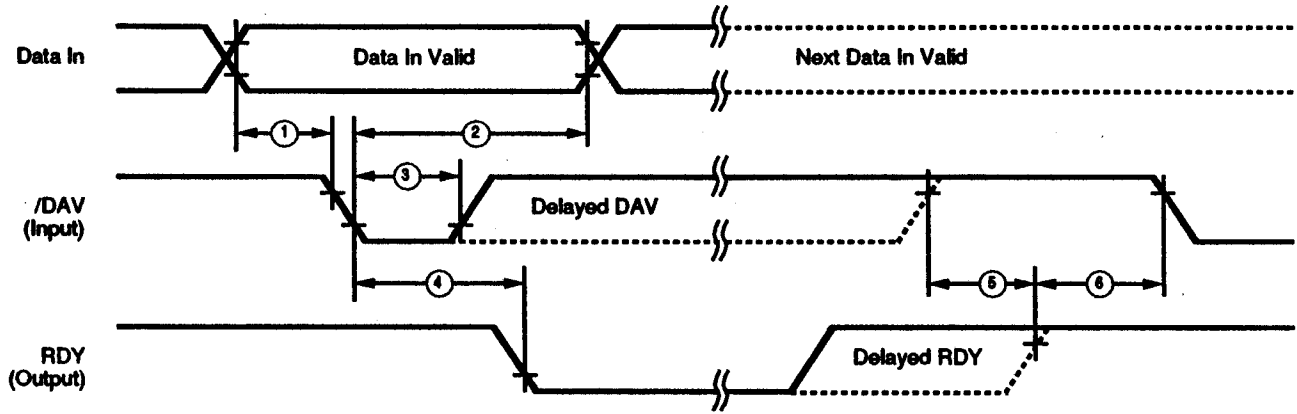
| No | Symbol | Parameter | V _{cc} Note[6] | T _A = 0°C to 70°C | | | | T _A = -40°C to 105°C | | | | Units | Notes |
|----|--------|------------------------------|------------------------------|------------------------------|--------------|------------------------|--------------|---------------------------------|--------------|------------------------|----------------------|--|-------|
| | | | | 8 MHz | | 12 MHz | | 8 MHz | | 12 MHz | | | |
| | | | | Min | Max | Min | Max | Min | Max | Min | Max | | |
| 11 | Tost | Oscillator Startup Time | 3.3V 5.0V | | 5TpC 5TpC | | 5TpC 5TpC | | 5TpC 5TpC | | | [4] [4] | |
| 12 | Twdt | Watchdog Timer Delay Time | 3.3V 5.0V 3.3V 5.0V | 10 5 30 15 | | 10 5 30 15 | | 10 5 30 15 | | 10 5 30 15 | ms ms ms ms | D0 = 0 [5] D1 = 0 [5] D0 = 1 [5] D1 = 0 [5] | |
| | | | 3.3V 5.0V 3.3V 5.0V | 50 25 200 100 | | 50 25 200 100 | | 50 25 200 100 | | 50 25 200 100 | ms ms ms ms | D0 = 0 [5] D1 = 1 [5] D0 = 1 [5] D1 = 1 [5] | |

Notes:

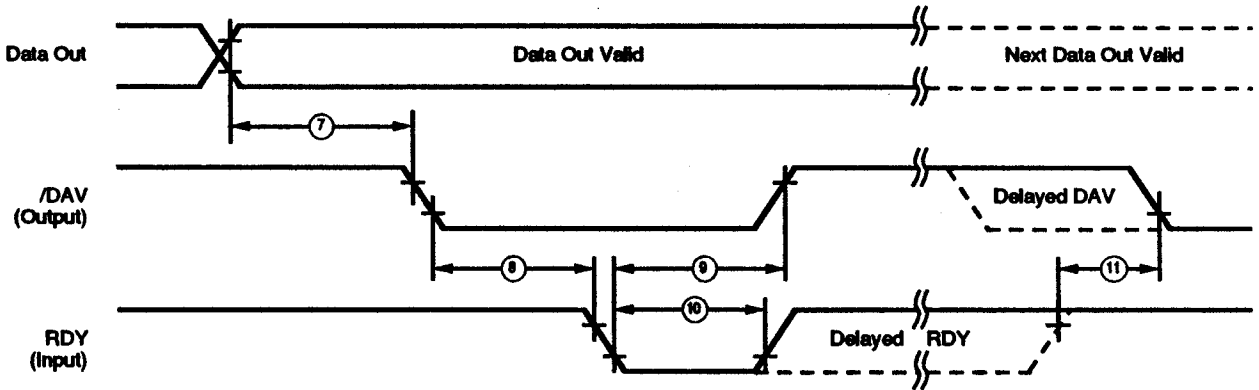
- [1] Timing Reference uses 0.9 V_{cc} for a logic 1 and 0.1 V_{cc} for a logic 0.
- [2] Interrupt request via Port 3 (P31-P33).
- [3] Interrupt request via Port 3 (P30).
- [4] SMR-D5 = 0
- [5] Reg. WDTMR
- [6] 5.0V ±0.5V, 3.3V ±0.3V
- [7] Reg. SMR - D5=0
- [8] Reg. SMR - D5=1

AC CHARACTERISTICS

Handshake Timing Diagrams



Input Handshake Timing



Output Handshake Timing

AC CHARACTERISTICS

Handshake Timing Table

| No | Symbol | Parameter | V _{cc} Note[1] | T _A = 0°C To 70° C | | | | T _A = -40° C To 105° C | | | | Data Direction |
|----|--------------|-------------------------------------|----------------------------|-------------------------------|-----|--------|-----|-----------------------------------|-----|--------|-----|-------------------|
| | | | | 8 MHz | | 12 MHz | | 8 MHz | | 12 MHz | | |
| | | | | Min | Max | Min | Max | Min | Max | Min | Max | |
| 1 | TsDI(DAV) | Data In Setup Time | 3.3V | 0 | 0 | 0 | 0 | 0 | 0 | 0 | IN | |
| | | | 5.0V | 0 | 0 | 0 | 0 | 0 | 0 | 0 | IN | |
| 2 | ThDI(DAV) | Data In Hold Time | 3.3V | 160 | 160 | 160 | 160 | 160 | 160 | 160 | IN | |
| | | | 5.0V | 115 | 115 | 115 | 115 | 115 | 115 | 115 | IN | |
| 3 | TwDAV | Data Available Width | 3.3V | 155 | 155 | 155 | 155 | 155 | 155 | 155 | IN | |
| | | | 5.0V | 110 | 110 | 110 | 110 | 110 | 110 | 110 | IN | |
| 4 | TdDAVI(RDY) | DAV Falling to RDY Falling Delay | 3.3V | | 160 | 160 | 160 | 160 | 160 | 160 | IN | |
| | | | 5.0V | | 115 | 115 | 115 | 115 | 115 | 115 | IN | |
| 5 | TdDAVI(dRDY) | DAV Rising to RDY Falling Delay | 3.3V | | 120 | 120 | 120 | 120 | 120 | 120 | IN | |
| | | | 5.0V | | 80 | 80 | 80 | 80 | 80 | 80 | IN | |
| 6 | TdDO(DAV) | RDY Rising to DAV Falling Delay | 3.3V | 0 | 0 | 0 | 0 | 0 | 0 | 0 | IN | |
| | | | 5.0V | 0 | 0 | 0 | 0 | 0 | 0 | 0 | IN | |
| 7 | TcLDAVO(RDY) | Data Out to DAV Falling Delay | 3.3V | 63 | 42 | 63 | 63 | 42 | 42 | 42 | OUT | |
| | | | 5.0V | 63 | 42 | 63 | 63 | 42 | 42 | 42 | OUT | |
| 8 | TcLDAVO(RDY) | DAV Falling to RDY Falling Delay | 3.3V | 0 | 0 | 0 | 0 | 0 | 0 | 0 | OUT | |
| | | | 5.0V | 0 | 0 | 0 | 0 | 0 | 0 | 0 | OUT | |
| 9 | TdRDYQ(DAV) | RDY Falling to DAV Rising Delay | 3.3V | | 160 | 160 | 160 | 160 | 160 | 160 | OUT | |
| | | | 5.0V | | 115 | 115 | 115 | 115 | 115 | 115 | OUT | |
| 10 | TwRDY | RDY Width | 3.3V | 110 | 110 | 110 | 110 | 110 | 110 | 110 | OUT | |
| | | | 5.0V | 80 | 80 | 80 | 80 | 80 | 80 | 80 | OUT | |
| 11 | TdRDYOd(DAV) | RDY Rising to DAV Falling Delay | 3.3V | | 110 | 110 | 110 | 110 | 110 | 110 | OUT | |
| | | | 5.0V | | 80 | 80 | 80 | 80 | 80 | 80 | OUT | |

Note:

[1] 5.0 V ± 0.5V, 3.3V ± 0.3V