Z86317
CMOS Z8® 8-BIT MCU

FEATURES

Part Number	ROM (KB)	RAM* (Bytes)	Speed (MHz)	I/O	Package (18-Pin)
Z86317	2	124	4	13	DIP, SOIC

*General Purpose

n 4.5- to 5.5-Volt Operating Range

n 0°C to + 40°C Operating Temperature Range

n Low-Power Consumption: 33 mW (Typical)

n P24-P27 Can be Configured as a Voltage Divider During Input Mode

n On-Chip Precision RC Oscillator (Tolerance = ± 10%)

n Fast Instruction Pointer: 1.5 µs @ 4 MHz

n ESD Protection Circuitry

n Hardwired Watch-Dog Timer (WDT)

GENERAL DESCRIPTION

The Z86317 is a member of the Z8® family of CMOS microcontrollers architected to be used in mouse applications. These devices offer on-board pull-up and pull-down resistors, a scalable trip-point buffer to accommodate opto-transistor outputs, and high drive ports capable of up to 10 mA current sinking per pin (six pins maximum).

A permanently enabled Watch-Dog Timer ensures operational reliability across a broad range of mouse application environments. The precision RC oscillator filters out high-frequency noise from the oscillator input pin. When configured as inputs, P24-P27 are configured as voltage divider (25K pull-up / 7.5K pull-down). The input levels are adjusted for connection to the emitters of the opto-transistors and switch at a voltage level of 0.4 V_{DD}.

For applications requiring powerful I/O capabilities, the Z86317 provides dedicated input and output lines that are grouped into three ports. There are two basic address spaces available to support this configuration: Program Memory, and 124 bytes of general-purpose registers.

The Z86317 device provides two on-chip 8-bit programmable counter/timers with a large number of user-selectable modes. Each counter/timer is driven by its own 6-bit programmable prescaler. The Z86317 counter/timers offload system real-time tasks such as counting/timing and input/output data communications for increased system efficiency.
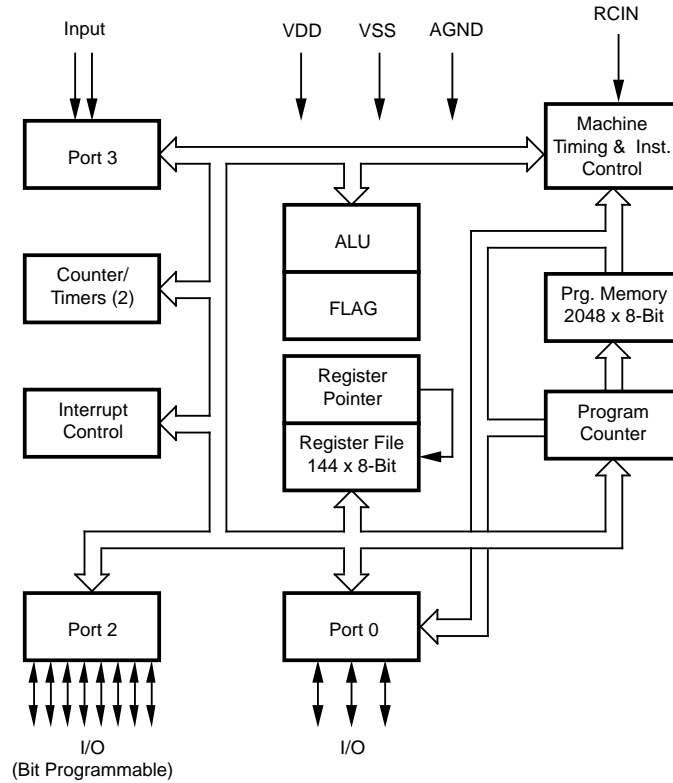
Notes:
All Signals with a preceding front slash, "/", are active Low, e.g.; B//W (WORD is active Low); /B/W (BYTE is active Low, only).

Power connections follow conventional descriptions below:

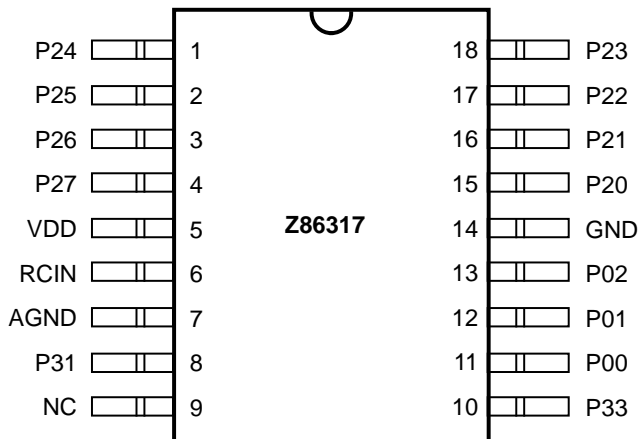| Connection	Circuit	Device
Power	V_{CC}	V_{DD}
Ground	GND	V_{SS}

BLOCK DIAGRAM

Functional Block Diagram

PIN DESCRIPTIONS

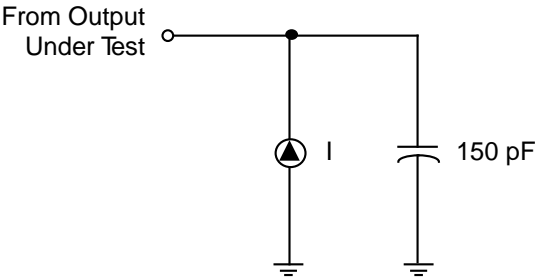This section describes the pin numbers and respective signals plus their functions.

18-Pin DIP/SOIC Pin Configuration

18-Pin DIP/SOIC Pin Identification

Pin #	Symbol	Function	Direction
1-4	P24-P27	Port 2, Pins 4,5,6,7	In/Output
5	V_{DD}	Power Supply	
6	RCIN	RC Oscillator	Input
7	AGND	Analog Ground	Input
8	P31	Port 3, Pin 1	Input
9	N/C	No Connection	
10	P33	Port 3, Pin 3	Input
11-13	P00-P02	Port 0, Pins 0,1,2	In/Output
14	V_{SS}	Ground	
15-18	P20-P23	Port 2, Pins 0,1,2,3	In/Output

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).

Test Load Diagram

ABSOLUTE MAXIMUM RATINGS

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 extended periods may affect device reliability.

Sym	Parameter	Min	Max	Units
V_{DD}	Supply Voltage (*)	–0.3	+7	V
T_{STG}	Storage Temp	–65°	+150°	C
T_A	Oper Ambient Temp	†	†	C

Notes:

* Voltages on all pins with respect to GND

† See Ordering Information

CAPACITANCE

T_A = GND = 0V, f = 1.0 MHz, unmeasured pins to GND

Parameter	Max
Input capacitance	10 pF
Output capacitance	20 pF
I/O capacitance	25 pF

V_{CC} SPECIFICATION

V_{CC} = 4.5V To 5.5V

When using the precision RC oscillator feature f = 4.0 MHz ± 10% under the following conditions:

n V_{CC} = 5.0V ± 10%

n   Temp 0 To +40°C

n   Application board capacitance: 2.0 pF max.
                                      0.5 pF min.

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	V_{DD}	$T_A = 0°C$ to $+40°C$ Min	Max	Typical @ 25°C	Units	Conditions
	Max Input Voltage	5.5V		12		V	$I_{IN}=250\mu A$
V_{CH}	Clock Input High Voltage	5.5V	$0.7V_{DD}$	$V_{DD}+0.3$	3.0	V	Driven by External Clock Generator
V_{CL}	Clock Input Low Voltage	5.5V	$V_{SS}-0.3$	$0.2V_{DD}$	1.5	V	Driven by External Clock Generator
V_H	Input High Voltage Schmitt-Triggered	5.5V	$0.7V_{DD}$	$V_{DD}+0.3$	2.6	V	
V_H	Input High Voltage CMOS Input	5.5V	$0.7V_{DD}$	$V_{DD}+0.3$	2.6	V	
V_L	Input Low Voltage Schmitt-Triggered	5.5V	$V_{SS}-0.3$	$0.2V_{DD}$	1.5	V	
V_L	Input Low Voltage CMOS Input	5.5V	$V_{SS}-0.3$	$0.2V_{DD}$	2.4	V	
V_{OH}	Output High Voltge	5.5V	$V_{DD}-0.4$		5.5	V	$I_{OH}=-2.0mA$
V_{OL1}	Output Low Voltage	5.5V		0.4	0.1	V	$I_{OL}=+4.0mA$
V_{LV}	V_{CC} Low Voltage Protection		1.6	2.7	2.3	V	@ 2MHz Max.
V_{TP}	Trip Point	5.5V	1.9	2.5	2.2	V	P24-P27
	Voltage	4.5V	1.5	2.1	1.8	V	
I_{IL}	Input Leakage	5.5V	-1.0	1.0	0.4	μA	$V_{IN}=0V, V_{CC}$
I_{OL}	Output Leakage	5.5V	-1.0	1.0	0.4	μA	$V_{IN}=0V, V_{CC}$
I_{DD}	Supply Current	5.5V		3.0	1.44	mA	All Output & I/O Pins Floating @ 1MHz
		5.5V		4.0	2.60	mA	All Output & I/O Pins Floating @ 2MHz
		5.5V		6.0	4.28	mA	All Output and I/O Pins Floating @ 4MHz
I_{DD1}	Supply Current	5.5V		1.3	0.70	mA	HALT mode $V_{IN}=0V$, V_{CC} @ 1MHz
		5.5V		1.5	0.80	mA	HALT mode $V_{IN}=0V$, V_{CC} @ 2MHz
		5.5V		2.0	1.0	mA	HALT mode $V_{IN}=0V$, V_{CC} @ 1MHz @ 4
I_{PU}	Pull-up Current (100K)	4.5V	-20			μA	V_{IH} @ 3V
		5.5V		-80		μA	V_{IH} @ 3V
I_{PD}	Pull-down Current (100K)	4.5V	$+20$			μA	V_{IL} @ 1V
		5.5V		$+95$		μA	V_{IL} @ 1V

Notes:

The device is functional to V_{LV} voltage. The minimum operational V_{DD} is determined by the value of the V_{LV} voltage at ambient temperature. The V_{LV} voltage increases as the temperature decreases.

AC ELECTRICAL CHARACTERISTICS

No	Symbol	Parameter	V_{DD}	1MHz		4MHz		Units	Notes
				Min	Max	Min	Max		
1	TpC	Input Clock Period	5.5V	1,000	100,000	250	100,000	ns	[1]
2	TiC,TfC	Clock Input Rise and Fall Times	5.5V		25		25	ns	
3	TwC	Input Clock Width	5.5V		475		100	ns	[1]
4	TwTinL	Timer Input Low Width	5.5V		70		70	ns	[1]
5	TwTinH	Timer Input High Width	5.5V	2.5TpC		2.5TpC			[1]
6	TpTin	Timer Input Period	5.5V	4TpC		4TpC			[1]
7	TrTin, TfTin	Timer Input Rise and Fall Timer	5.5V		100		100	ns	[1]
8	TwIL	Int. Request Input Low Time	5.5V	70		70		ns	[1,2]
9	TwIH	Int. Request Input High Time	5.5V	2.5TpC		2.5TpC			[1,2]
10	Twdt	Watch-Dog Timer Time Out Timer	5.5V	10		10		ms	[1]
11	T_{POR}	Power-On Reset Time	5.5V	2		2		ms	[1]

$T_A = 0°C$ to $+40°C$

Notes:

[1] Timing Reference uses 0.9 V_{DD} for a logic 1 and 0.1 V_{DD} for a logic 0.

[2]   Interrupt request through Port 3 (P33-P31)

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