



# Z86317

## CMOS Z8® 8-BIT MICROCONTROLLER

### FEATURES

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

\*General Purpose

- 4.5- to 5.5-Volt Operating Range
- 0°C to + 40°C Operating Temperature Range
- Low-Power Consumption: 33 mW (Typical)

- P24-P27 Can be Configured as a Voltage Divider During Input Mode
- On-Chip Precision RC Oscillator (Tolerance = ± 10%)
- Fast Instruction Pointer: 1.5 μs @ 4 MHz
- ESD Protection Circuitry
- 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<sub>DD</sub>.

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 <sub>CC</sub>	V <sub>DD</sub>
Ground	GND	V <sub>SS</sub>

GENERAL DESCRIPTION (Continued)

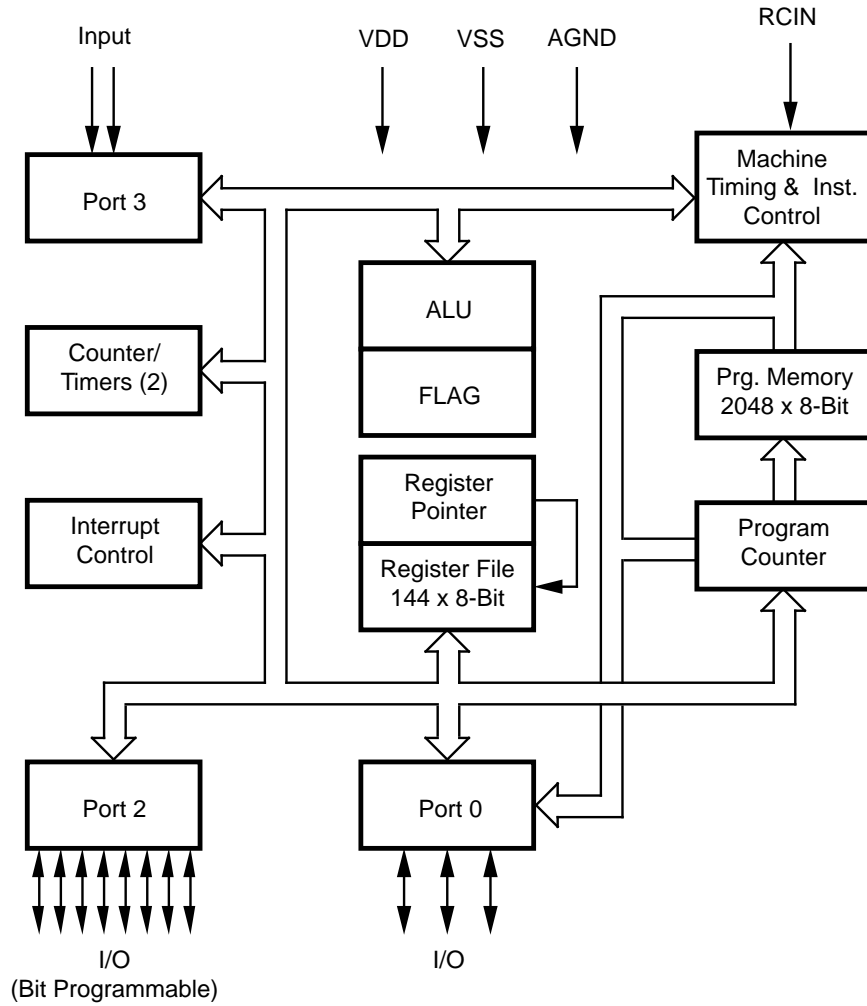
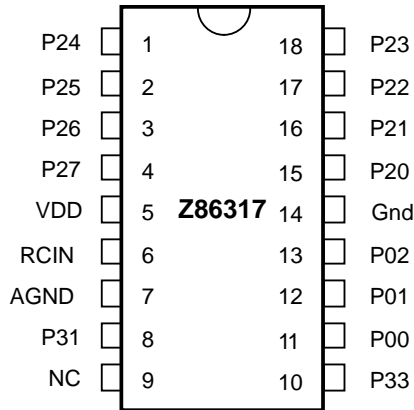


Figure 1. Z86317 Functional Block Diagram

**PIN DESCRIPTIONS**



**Figure 2. 18-Pin DIP/SOIC Pin Configuration**

**Table 1. 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 <sub>DD</sub>	Power Supply	Input
6	RCIN	RC Oscillator	Input
7	AGND	Analog Ground	Input
8	P31	Port 3, Pin 1	Input
9	NC	Not Connected	
10	P33	Port 3, Pin 3,	Input
11-13	P00-P02	Port 0, Pins 0,1,2	In/Output
14	V <sub>SS</sub>	Ground	Input
15-18	P20-P23	Port 2, Pins 0,1,2,3	In/Output

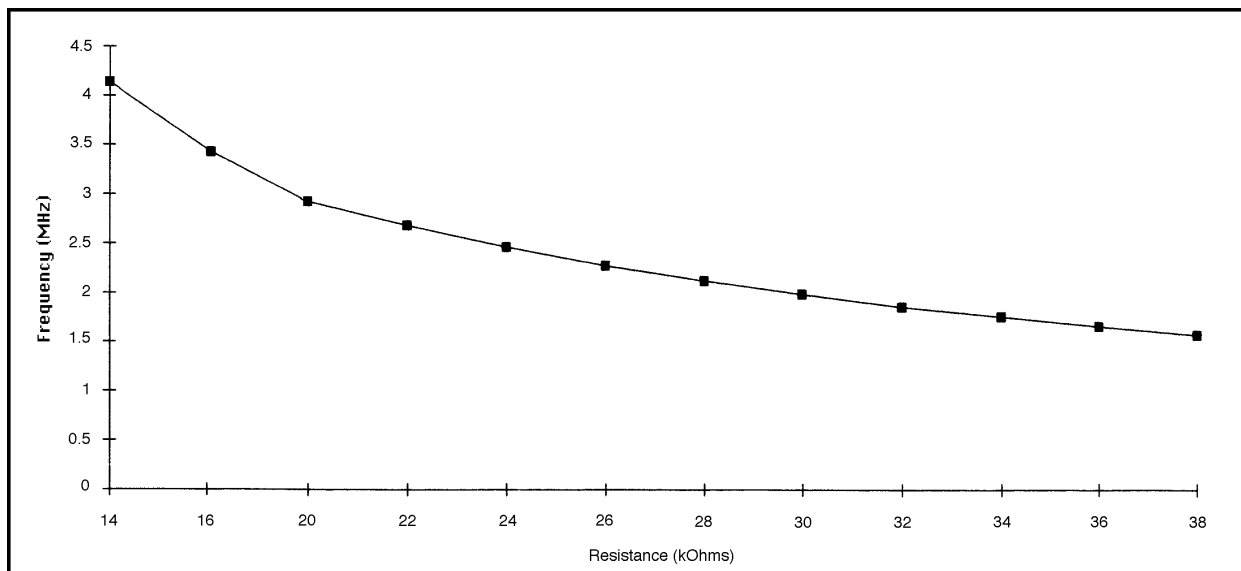
**PIN FUNCTIONS**

**RCIN.** A precision 1% resistor is connected to RCIN, generating oscillation with an internal capacitor.

Resistor values and corresponding frequencies are shown in the following table and graph chart.

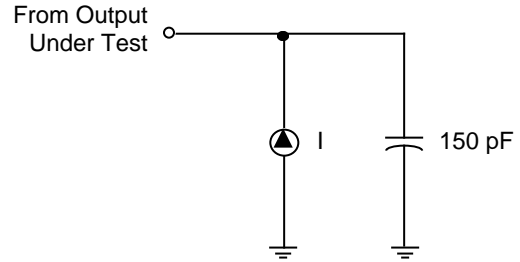
**Table 2. Z86317 RC Frequency vs. External Precision Resistor**

External Resistor	Average Frequency	External Resistor	Average Frequency
14K	4.140 MHz	28K	2.121 MHz
16K	3.627 MHz	30K	1.982 MHz
20K	2.925 MHz	32K	1.856 MHz
22K	2.681 MHz	34K	1.755 MHz
24K	2.462 MHz	36K	1.657 MHz
26K	2.273 MHz	38K	1.568 MHz



**STANDARD TEST CONDITIONS**

The characteristics listed below apply for standard test conditions as noted. All voltages are referenced to Ground. Positive current flows into the referenced pin (Figure 3).



**Figure 3. Test Load Diagram**

**ABSOLUTE MAXIMUM RATINGS**

Sym	Parameter	Min	Max	Units
V <sub>DD</sub>	Supply Voltage*	-0.3	+7	V
T <sub>STG</sub>	Storage Temp	-65°	+150°	C
T <sub>A</sub>	Oper Ambient Temp	†	†	C

**Notes:**

- \* Voltages on all pins with respect to Ground.
- † See Ordering Information.

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.

**CAPACITANCE**

T<sub>A</sub> = GND = 0V, f = 1.0 MHz, unmeasured pins returned to Ground.

Parameter	Min	Max
Input Capacitance	0	10 pF
Output Capacitance	0	20 pF
I/O Capacitance	0	25 pF

**V<sub>CC</sub> SPECIFICATION**

V<sub>CC</sub> = 4.5V to 5.5V

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

- V<sub>CC</sub> = 5.0V ± 10%
- Temp 0 to 40°C
- Application board capacitance: 2.0 pF max.  
0.5 pF min.

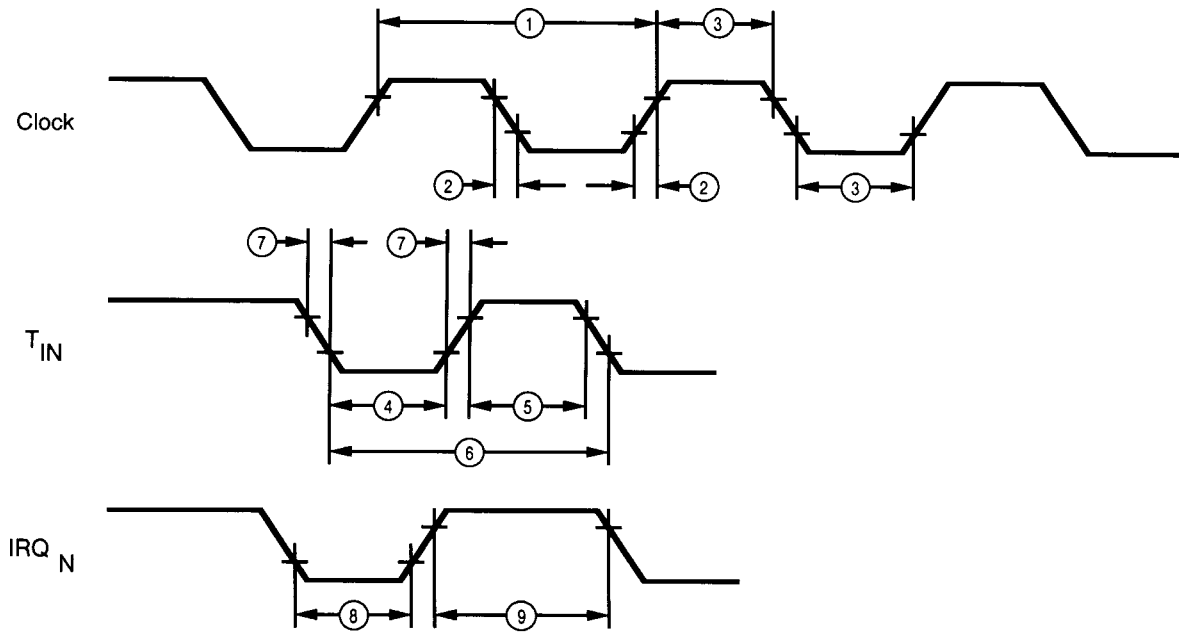
**DC ELECTRICAL CHARACTERISTICS**

Symbol	Parameter	V <sub>DD</sub>	T <sub>A</sub> = 0°C Min	to +40°C Max	Typical @ 25°C	Units	Conditions
V <sub>CH</sub>	Clock Input High Voltage	5.5V	0.7 V <sub>DD</sub>	V <sub>DD</sub> + 0.3	3.0	V	Driven by External Clock Generator
V <sub>CL</sub>	Clock Input Low Voltage	5.5V	V <sub>SS</sub> - 0.3	0.2 V <sub>DD</sub>	1.5	V	Driven by External Clock Generator
V <sub>IH</sub>	Input High Voltage Schmitt-Triggered	5.5V	0.7 V <sub>DD</sub>	V <sub>DD</sub> + 0.3	2.6	V	
V <sub>IH</sub>	Input High Voltage CMOS Input	5.5V	0.7 V <sub>DD</sub>	V <sub>DD</sub> + 0.3	2.6	V	
V <sub>IL</sub>	Input Low Voltage Schmitt-Triggered	5.5V	V <sub>SS</sub> - 0.3	0.2 V <sub>DD</sub>	1.5	V	
V <sub>IL</sub>	Input Low Voltage CMOS Input	5.5V	V <sub>SS</sub> - 0.3	0.2 V <sub>DD</sub>	2.4	V	
V <sub>OH</sub>	Output High Voltage	5.5V	V <sub>DD</sub> - 0.4		5.5	V	I <sub>OH</sub> = -2.0 mA
V <sub>OL1</sub>	Output Low Voltage	5.5V		0.4	0.1	V	I <sub>OL</sub> = +4.0 mA
V <sub>OL2</sub>	Output Low Voltage	5.5V		0.8	0.3	V	I <sub>OL</sub> = 10.0 mA, 6 Pin Max
V <sub>LV</sub>	V <sub>CC</sub> Low Voltage Protection		2.5	3	2.7	V	@ 2 MHz Max
V <sub>TP</sub>	Trip Point Voltage	5.5V	1.9	2.5	2.2	V	P24-P27
		4.5V	1.5	2.1	1.8	V	
I <sub>IL</sub>	Input Leakage	5.5V	-1.0	1.0	0.4	μA	V <sub>IN</sub> = 0V, V <sub>CC</sub>
I <sub>OL</sub>	Output Leakage	5.5V	-1.0	1.0	0.4	μA	V <sub>IN</sub> = 0V, V <sub>CC</sub>
I <sub>DD</sub>	Supply Current	5.5V		3.0	1.44	mA	All Output and I/O Pins Floating @ 1 MHz
		5.5V		4.0	2.60	mA	All Output and I/O Pins Floating @ 2 MHz
		5.5V		6.0	4.28	mA	All Output and I/O Pins Floating @ 4 MHz
I <sub>DD1</sub>	Standby Current	5.5V		1.3	0.70	mA	HALT mode V <sub>IN</sub> = 0V, V <sub>CC</sub> @ 1 MHz
		5.5V		1.5	0.80	mA	HALT mode V <sub>IN</sub> = 0V, V <sub>CC</sub> @ 2 MHz
		5.5V		2.0	1.0	mA	HALT mode V <sub>IN</sub> = 0V, V <sub>CC</sub> @ 4 MHz
I <sub>PU</sub>	Pull-Up Current P00-02 P31, P33	4.5V	-20			μA	V <sub>IH</sub> @ 3V
		5.5		-85		μA	V <sub>IH</sub> @ 4V
I <sub>PD</sub>	Pull-Down Current P00-02 P31, P33	4.5V	+20			μA	V <sub>IL</sub> @ 1V
		5.5		+95		μA	V <sub>IL</sub> @ 1V
I <sub>PU</sub>	Pull-Up Current P20, P22	4.5V	-450			μA	V <sub>IL</sub> = 0V
		5.5		-85		μA	V <sub>IL</sub> = 0V

**Notes:**

The device is functional to V<sub>LV</sub> voltage. The minimum operational V<sub>DD</sub> is determined by the value of the V<sub>LV</sub> voltage at ambient temperature. The V<sub>LV</sub> voltage increases as the temperature decreases.

**AC ELECTRICAL CHARACTERISTICS**  
**Timing Diagrams**



**Figure 4. Electrical Timing Diagram**

## AC ELECTRICAL CHARACTERISTICS

No	Symbol	Parameter	V <sub>DD</sub>	T <sub>A</sub> = 0°C to +40°C				Units	Notes
				1	Max	4	Max		
				Min	Max	Min	Max		
1	TpC	Input Clock Period	5.5V	1,000	100,000	250	100,000	ns	[1]
2	TrC,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, TtTin	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 <sub>POR</sub>	Power-On Reset Time	5.5V	2		2		ms	[1]

**Notes:**

[1] Timing Reference uses 0.9 V<sub>DD</sub> for a logic 1 and 0.1 V<sub>DD</sub> for a logic 0.

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

---

© 1996 by Zilog, Inc. All rights reserved. No part of this document may be copied or reproduced in any form or by any means without the prior written consent of Zilog, Inc. The information in this document is subject to change without notice. Devices sold by Zilog, Inc. are covered by warranty and patent indemnification provisions appearing in Zilog, Inc. Terms and Conditions of Sale only. Zilog, Inc. makes no warranty, express, statutory, implied or by description, regarding the information set forth herein or regarding the freedom of the described devices from intellectual property infringement. Zilog, Inc. makes no warranty of merchantability or fitness for any purpose. Zilog, Inc. shall not be responsible for any errors that may appear in this document. Zilog, Inc. makes no commitment to update or keep current the information contained in this document.

Zilog's products are not authorized for use as critical components in life support devices or systems unless a specific written agreement pertaining to such intended use is executed between the customer and Zilog prior to use. Life support devices or systems are those which are intended for surgical implantation into the body, or which sustains life whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.

Zilog, Inc. 210 East Hacienda Ave.  
Campbell, CA 95008-6600  
Telephone (408) 370-8000  
FAX 408 370-8056  
Internet: <http://www.zilog.com>



This datasheet has been download from:

[www.datasheetcatalog.com](http://www.datasheetcatalog.com)

Datasheets for electronics components.