Z86E23
CMOS Z8® OTP
MICROCONTROLLER

GENERAL DESCRIPTION

The Z86E23 microcontroller introduces the next level of sophistication to single-chip architecture. The Z86E23 is a member of the Z8 single-chip microcontroller family with 8 Kbytes of EPROM and 236 bytes of general-purpose RAM.

The Z86E23 is a pin compatible, One-Time-Programmable (OTP) version of the Z8614 and Z8602 Keyboard Controller (KBC).

Zilog's CMOS microcontroller 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 Z86E23 architecture is based on Zilog's 8-bit microcontroller core. The device 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 and advanced scientific applications.

There are two basic address spaces available to support this wide range of configurations: program memory and 236 general-purpose registers.

To unburden the program from coping with real-time problems such as counting/timing, the Z86E23 offers two on-chip counter/timers with a large number of user selectable modes (Block Diagram).
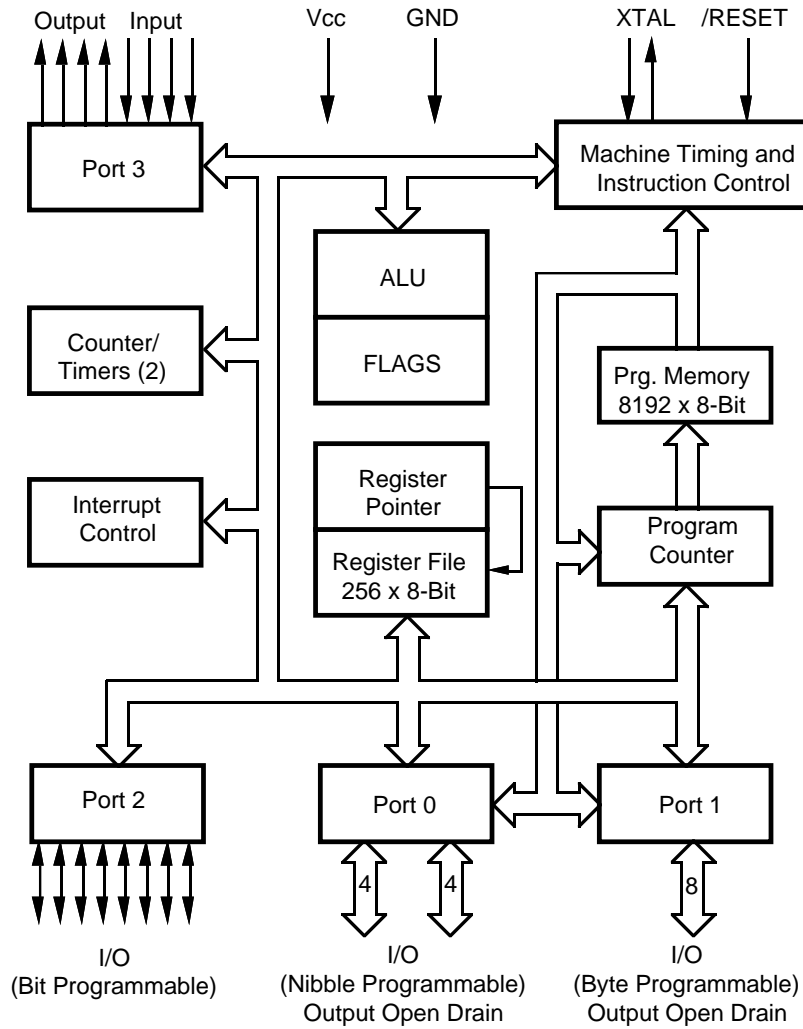
Notes:
All Signals with a preceding front slash, "/", are active Low, e.g., B//W (WORD is active Low); /B/W (BYTE is active Low, only).
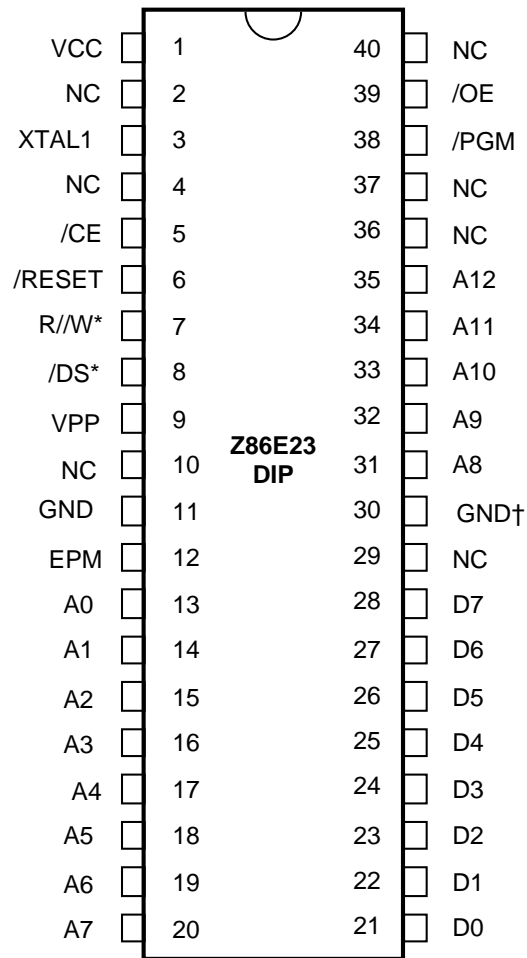
Power connections follow conventional descriptions below:

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

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GENERAL DESCRIPTION (Continued)

Output Input   Vcc   GND   XTAL   /RESET

| Port 3 | | Machine Timing and Instruction Control |

ALU

FLAGS

Counter/
Timers (2)

Prg. Memory
8192 x 8-Bit

Interrupt
Control

Register
Pointer

Register File
256 x 8-Bit

Program
Counter

| Port 2 | Port 0 | Port 1 |

4   4   8

I/O
(Bit Programmable)

I/O
(Nibble Programmable)
Output Open Drain

I/O
(Byte Programmable)
Output Open Drain

Functional Block Diagram

ZiLOG

```
                    ┌────────┐
          VCC  ──┤ 1    40 ├──  NC
          NC   ──┤ 2    39 ├──  /OE
          XTAL1──┤ 3    38 ├──  /PGM
          NC   ──┤ 4    37 ├──  NC
          /CE  ──┤ 5    36 ├──  NC
          /RESET──┤ 6    35 ├──  A12
          R//W*──┤ 7    34 ├──  A11
          /DS* ──┤ 8    33 ├──  A10
          VPP  ──┤ 9    32 ├──  A9
          NC   ──┤ 10   31 ├──  A8
          GND  ──┤ 11   30 ├──  GND†
          EPM  ──┤ 12   29 ├──  NC
          A0   ──┤ 13   28 ├──  D7
          A1   ──┤ 14   27 ├──  D6
          A2   ──┤ 15   26 ├──  D5
          A3   ──┤ 16   25 ├──  D4
          A4   ──┤ 17   24 ├──  D3
          A5   ──┤ 18   23 ├──  D2
          A6   ──┤ 19   22 ├──  D1
          A7   ──┤ 20   21 ├──  D0
                    └────────┘
                  Z86E23
                    DIP
```

40-Pin DIP Pin Assignments

⚡ ZiLOG
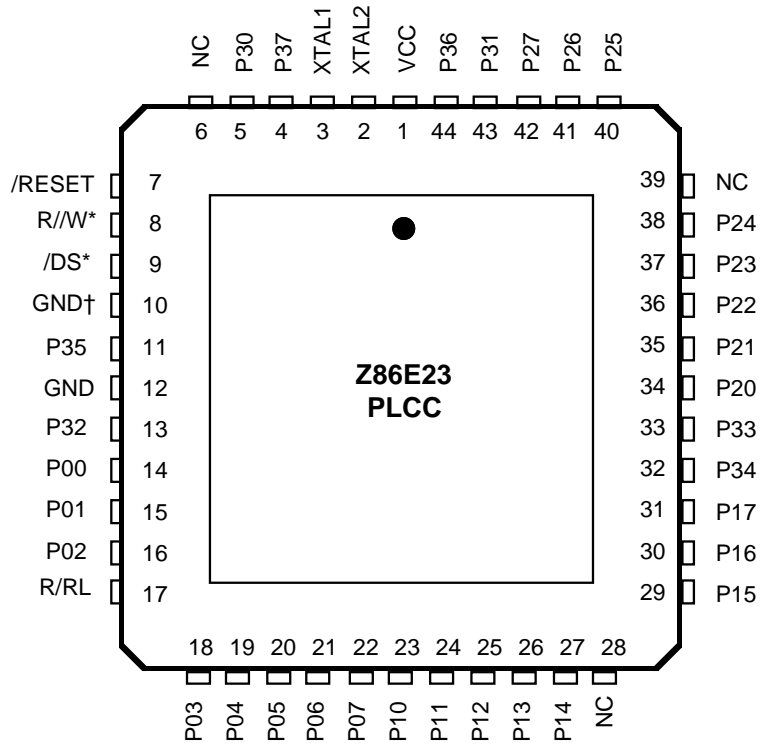
PIN DESCRIPTIONS

44-Pin PLCC Pin Assignments

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

Notes:

* Voltages on all pins with respect to GND.
   13.0 V Maximum on P33-P30.
† 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 an extended period may affect device reliability.

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 (Standard Test Load).
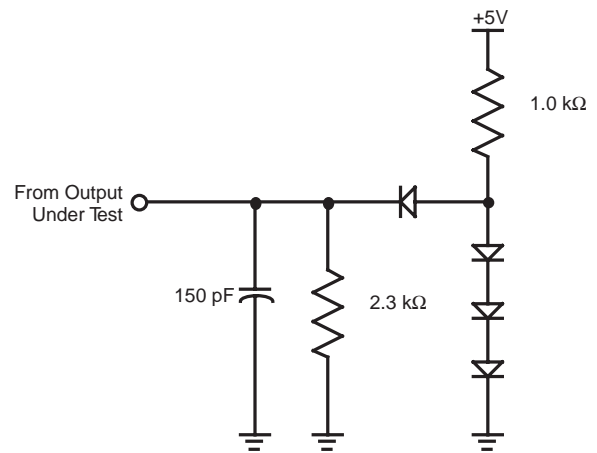
Test Load Diagram

DC CHARACTERISTICS
V_{CC} = 4.5 V to 5.5V @ 0°C to +70°C

Sym	Parameter	Min	Max	Typ*	Unit	Condition
V_{CH}	Clock Input High Voltage	3.8	V_{CC}		V	Driven by External Clock Generator
V_{CL}	Clock Input Low Voltage	−0.3	0.8		V	Driven by External Clock Generator
V_{IH}	Input High Voltage	2.0	V_{CC}		V	
V_{IL}	Input Low Voltage	−0.3	0.8		V	
V_{RH}	Reset Input High Voltage	3.8	V_{CC}		V	
V_{RL}	Reset Input Low Voltage	−0.3	0.8		V	
V_{OH}	Output High Voltage	2.0			V	I_{OH} = −250 µA (Port 2 only)
	Output High Voltage	2.4			V	I_{OH} = −250 µA (Port 3 only)
V_{OL}	Output Low Voltage		0.8		V	I_{OL} = +4.0 mA (See Note (1) below.)
I_{IL}	Input Leakage	−10	10		µA	V_{IN} = 0V, 5.5V
I_{OL}	Output Leakage	−10	10		µA	V_{IN} = 0V, 5.5V
I_{IR}	Reset Input Current		−50		µA	V_{IN} = 0V, 5.5V
I_{CC}	V_{CC} Supply Current		50	25	mA	

Notes:

* Typical @ 25°C

1. A combined total of six I/O pins from Ports 2 and 3 may be used to sink 10 mA each at 0.8V V_{OL} (max. three pins per port). These may be used for LEDs or as general-purpose outputs requiring high sink current.

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.