

PRELIMINARY CUSTOMERPROCUREMENTS PECIFICATION

Z86E04/E08 SL1866 CMOSZ8® OTPMICROCONTROLLER

FEATURES

	ROM	RAM*	Speed
	(Kbytes)	(Bytes)	(MHz)
Z86E08	2	125	12
Z86E04		125	8

- * General-Purpose
- 18-Pin DIP and SOIC Packages
- 3.0- to 5.5-Volt @ 0°C to 70°C
- 14 Input / Output Lines
- Six Vectored, Prioritized Interupts with Programmable Polarity
- Two Analog Comparators

- Program Options:
 - Low Noise
 - ROM Protect
 - Auto Latch
 - Watch-Dog Timer (WDT)
- Two Programmable 8-Bit Counter/Timers, Each wth 6-Bit Programmable Prescaler
- WDT/ Power-On Reset (POR)
- On-Chip Oscillator that Accepts XTAL, Ceramic Resonance, LC, or External Clock
- Clock-Free WDT Reset
- Low-Power Consumption (50mw)
- Fast Instruction Pointer (1µs @ 12 MHz)

GENERAL DESCRIPTION

Zilog's Z86E04/E08 Microcontrollers (MCU) are One-Time Programmable (OTP) members of the Z8® single-chip microcontroller family which allow easy software development, debug, prototyping, and small production runs not economically desirable with masked ROM versions.

For applications demanding powerful I/O capabilities, the Z86E04/E08's dedicated input and output lines are grouped into three ports, and are configurable under software control to provide timing, status signals, or parallel I/O.

Two on-chip counter/timers, with a large number of user selectable modes, offload the system of administering real-time tasks such as counting/timing and I/O data communications.

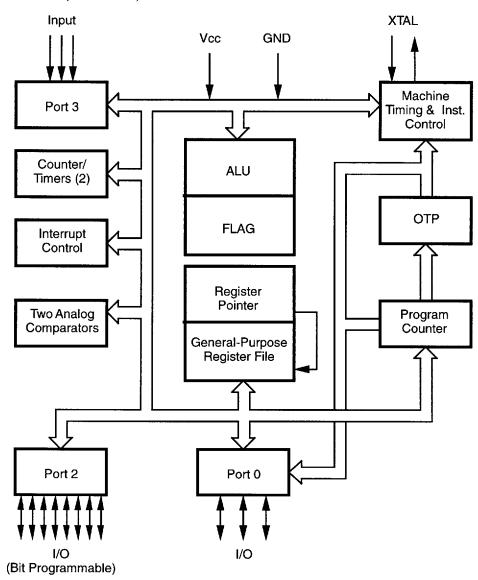
Note: All Signals with a preceding front slash, "/", are active Low, e.g.: B//W (WORD is active Low); /B/W (BYTE is active Low, only).

Power connections follow conventional descriptions below:

Connection	Circuit	Device
Power	V _{cc}	V _{DD}
Ground	GND	V _{ss}



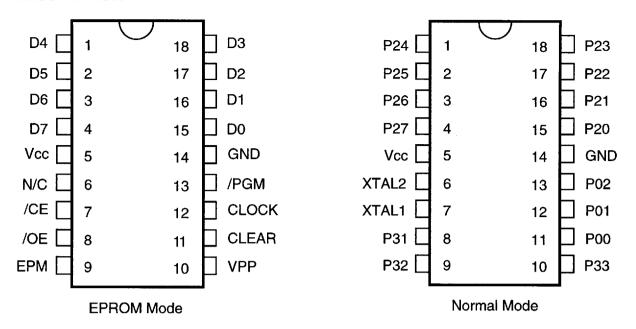
GENERAL DESCRIPTION (Continued)



Functional Block Diagram

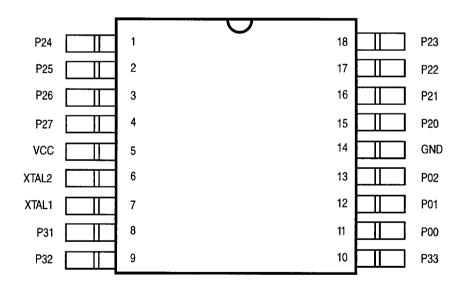


PIN DESCRIPTION



18-Pin EPROM Mode Configuration

18-Pin Standard Mode Configuration

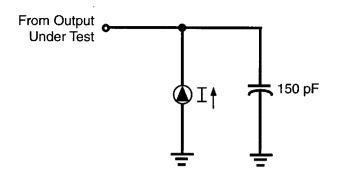


18-Pin SOIC Configuration



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	Parameter	Min	Max	Units
V_{cc}	Supply Voltage*	-0.3	+7	V
T _{STG}	Storage Temp	-65	+150	°C
T _A	Oper Ambient Temp	†	†	°C

Notes:

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.

CAPACITANCE

 $T_A = 25$ °C, $V_{CC} = GND = 0V$, 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

3.0-V to 5.5-V @ 0°C to 70°C

PRODUCT RECOMMENDATIONS

Zilog recommends the following programming equipment for use with this One-Time Programmable product:

Device	Zilog	Revision Level
Type	Support Tool	Software
Z86E08	Z86CCP00ZEM	3.0

Some non-Zilog programmers may have different programming waveforms, voltages and timings and not all programmers may meet the programming requirements of Zilog's One-Time Programmable products.

If difficulty is encountered in programming a Zilog OTP product, please contact your local Zilog sales office.

^{*} Voltages on all pins with respect to GND.

[†] See Ordering Information



DC ELECTRICAL CHARACTERISTICS

Sym .	Parameter	U _{CC} [4]	T _n =0°C1	to+70°C Max	Typical @25°C	Units	Conditions	Notes
	Max Input Voltage	45V		12		V	I _m <250µA	
	1 0	5 <i>5</i> V		12		V	I <250µA	
V_{CH}	Clock Input High Voltage	45V	$0.8V_{cc}$	V_{cc} +0.3	2.8	V	Driven by External Clock Generator	
		5 <i>5</i> V	$0.8V_{CC}$	V _{CC} +0.3	2.8	V	Driven by External Clock Generator	
$\overline{v_{\alpha}}$	ClockInputLow Voltage	4.5V	V _{SS} -0.3	0.2V _{CC}	1.7	V	Driven by External Clock Generator	
	, 0	5 <i>5</i> V	V _{SS} -0.3	$0.2V_{CC}$	1.7	V	Driven by External Clock Generator	
$\overline{V_{H}}$	InputHighVoltage	45V	0.7V _{CC}	V _{CC} +0.3	2.8	V		***
		5 <i>5</i> V	$0.7V_{\infty}$	V _{cc} +0.3	2.8	V		
$\overline{V_L}$	InputLowVoltage	45V	V _{SS} -0.3	0.2V _{CC}	1.5	V		
		5 <i>5</i> V	$V_{SS}^{-0.3}$	$0.2V_{\rm CC}$	1.5	V		
$\overline{V_{CH}}$	Output High Voltage	45V	V _{CC} -0.4		4.8	V	I _{OH} =-2.0mA	[5]
		55V	V _{CC} -0.4		4.8	V	$I_{OH} = -2.0 \text{mA}$	[5]
		45V	$V_{\rm CC}$ -0.4		4.8	V	LowNoise@I _{OH} =-0.	5mA
		55V	V _{CC} -0.4		4.8	V	Low Noise @ I _{OH} =-0.5	5mA
$\overline{v_{\alpha}}$	OutputLowVoltage	45V		0.4	0.1	V	I _{OL} =+4.0mA	[5]
		55V		0.4	0.1	V	I_{OL} =+4.0mA	[5]
		45V		0.4	0.1	V	LowNoise@I _{OL} =1.0n	
		55V		0.4	0.1	V	Low Noise @ I _{OL} =1.0 m	n A
$\overline{V_{012}}$	OutputLow Voltage	45V		1.0	0.8	V	I _{OL} =+12mA,	[5]
	-	55V		0.8	0.8	V	I_{OL} =+12mA,	[5]
VOHSET	Comparator Input	45V		25	10	m V		
GIG.	OffsetVoltage	5 <i>5</i> V		25	10	m V		
V _{RST}	V _{CC} LowVoltage AutoReset		2.6	2.8	3.0	V	@6MHzMax, Int.CLKFreq	
<u>L</u>	InputLeakage	45V	-1.0	1.0		μA	V _{IN} =OV,V _{CC}	
	(Input Bias Current of Comparator)	55V	-1.0	1.0		μA	$V_{IN}=OV,V_{CC}$	
$\overline{\mathbf{f}^{\mathbf{r}}}$	OutputLeakage	45V	-1.0	1.0		μA	V _{IN} =OV,V _{CC}	
_	- 5	55V	-1.0	1.0		μA	$V_{IN} = OV, V_{CC}$	
V _{VICR}	Comparator Input Common Mode Voltage Range		0	V _{CC} -1.0		V		



DC ELECTRICAL CHARACTERISTICS (Continued)

		T _A =0°C to+70°C			Typical			
Sy m	Parameter	U _{CC} [4]	"Min	Mex	@25°C	Units	Conditions	Notes
I_{cc}	SupplyCurrent	45V		11.0	6.8	m2A	AllOutput and I/O Pins	
							Floating@2MHz	[5]
		5 <i>5</i> V		11.0	6.8	m A	AllOutput and I/OPins	
							Floating@2MHz	[5]
		45V		15.0	8.2	mA.	AllOutput and I/OPins	
							Floating@8MHz	[5]
		55V		15.0	8.2	mA	All Output and I/O Pins	
							Floating@8MHz	[5]
		3.0V		20.0	12.0	mA.	AllOutput and I/OPins	
							Floating@12MHz	[5,6]
		55V		20.0	12.0	mA	AllOutput and I/O Pins	
							Floating@12MHz	[5,6]
$\overline{I_{CC1}}$	StandbyCurrent	3.0V		4.0	2.5	mA	HALTmodeV _{IN} =0V,	
							V _{CC} @2MHz	[5]
		55V		4.0	2.5	mA.	HALTmodeV _{IN} =0V,	
							V_{CC} @2MHz	[5]
		3.0V		5.0	3.0	mA	HALTmodeV _{IN} =OV,	
							$V_{CC}@8MHz$	[5]
		55V		5.0	3.0	mA	HALTmodeV _{IN} =OV,	
							V _{CC} @8MHz	[5]
		3.0V		7.0	4.0	m A	$HALTmodeV_{IN}=OV$,	
							V_{CC} @12MHz	[5,6]
		5 <i>5</i> V		7.0	4.0	m A	HALTmodeV _{IN} =OV,	
							V _{CC} @12MHz	[5,6]
\overline{I}_{cc}	Supply Current	3.0V		11.0	6.8	mA	All Output and I/OPins	
	(LowNoiseMode)						Floating@1MHz	
		55V		11.0	6.8	m A	All Output and I/O Pins	
							Floating@1MHz	
		3.0V		13.0	7.5	mA.	All Output and I/O Pins	
							Floating@2MHz	
		55V		13.0	7.5	mA.	All Output and I/O Pins	
							Floating@2MHz	
		3.0V		15.0	8.2	m A	All Output and I/OPins	
							Floating@4MHz	
		5 <i>5</i> V		15.0	8.2	m A	All Output and I/O Pins	
							Floating@4MHz	



DC ELECTRICAL CHARACTERISTICS (Continued)

Sym .	Parameter	U _{CC} [4]	T _A =0°Cto+70°C Min Mex	Typical @25°C	Units	Conditions
I_{CC1}	StandbyCurrent (LowNoiseMode)	45V	1.6	0.9	mA	HALTmodeV _{IN} =0V, V _{CC} @1MHz
	,	5 <i>5</i> V	1.6	0.9	mA	HALTmodeV _{IN} =0V, V _{CC} @1MHz
		45V	1.9	1	mA	HALTmodeV _{IN} =0V, V _{CC} @2MHz
		5 <i>5</i> V	1.9	1	mA	HALTmodeV _{IN} =0V, V _{CC} @2MHz
		45V	2.4	1./5	mA	HALTmodeV _{IN} =0V, V _{CC} @4MHz
		5 <i>5</i> V	2.4	1.5	mA	HALTmodeV _{IN} =0V, V _{CC} @4MHz
\overline{I}_{02}	Standby Current	45V	10	1.0	μΑ	STOPmodeV _{IN} =OV, V _{CC} WDTisnotRunning
		5 <i>5</i> V	10	1.0	μA	STOPmodeV _{IN} =OV, V _{CC} WDTisnotRunning
I _{ALL}	AutoLatchLow Current	4.5V	32	16	μA	OV <v<sub>IN<v<sub>CC</v<sub></v<sub>
		55V	32	16	μA	$OV < V_{IN} < V_{CC}$
I _{ALH}	AutoLatchHigh Current	45V	-25	-8.0	μA	OV <v<sub>IN<v<sub>CC</v<sub></v<sub>
		5 <i>5</i> V	-25	-8.0	μA	$OV < V_{IN} < V_{CC}$

Notes:

^[1] Port 2 and Port 0 only.

^[2] $V_{SS} = 0V = GND$

^[3] The device operates down to V_{RST} of the specified frequency for V_{RST} The minimum operational V_{CC} is determined on the value of the voltage V_{RST} at the ambient temperature. The V_{RST} increases as the temperature decreases.

^[4] $V_{CC} = 3.0V$ to 5.5V, typical values measured at $V_{CC} = 3.3V$ and $V_{CC} = 5.0V$.

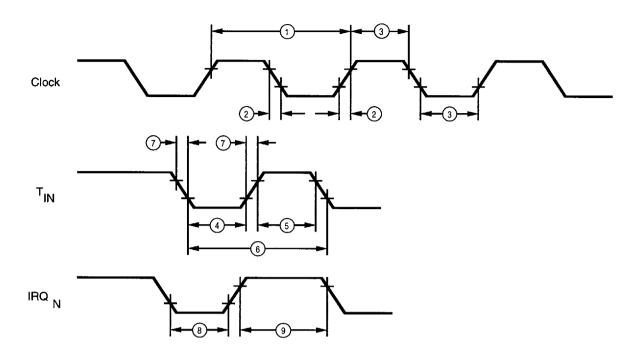
^[5] Standard Mode (not Low EMI mode)

^[6] Z86E08 only.

^[7] CL1 = 100 pF, CL2 = 220 pF, RF = 30 kOhm



AC ELECTRICAL CHARACTERISTICS



AC Electrical Timing Diagram



AC ELECTRICAL CHARACTERISTICS

Timing Table (Standard Mode for SCLK/TCLK = XTAL/2)

					T _A =0°C	to+70°(C		
				8MHz	(ČØ4)	12MH	z(C 0 8)		
70	Symbol	Parameter	N _{CC}	Min	Мек	Min	Мак	Units	Notes
1	ΤįC	InputClockPeriod	45V	125	DC.	83	DC	ns	[1]
			5 <i>5</i> V	125	\mathbf{DC}	83	DC	ns	[1]
2	TiC,TIC	ClockInputRise	45V		25		15	ns	[1]
		and Fall Times	55V		25		15	ns	
3	TvC	InputClockWidth	45V	62		41			[1]
			55V	62		41		ns	[1]
4	TwTnL	TimerInputLowWidth	3.0V	70		70		ns	[1]
			5 <i>5</i> V	70		70		ns	[1]
5	TwTinH	TimerInputHighWidth	3.0V	5TpC		5TpC		[1]	
			5 <i>5</i> V	5TpC		5TpC		[1]	
6	TpTin	TimerInputPeriod	3.0V	8TpC		8TpC			[1]
			55V	8TpC		8TpC			[1]
7	TrTin,	TimerInputRise	3.0V		100		100	ns	[1]
	TtTin	and Fall Timer	55V		100		100	ns	[1]
8	TwL	Int. Request Input	3.0V	70		70		ns	[1,2]
		LowTime	55V	70		70		ns	[1,2]
9	TwIH	Int. Request Input	3.0V	5TpC		5TpC			[1]
		HighTime	55V	5TpC		5TpC			[1,2]
10	Twdt	Watch-DogTimer	3.0V	12		12		ms	[1]
		DelayTimeforTimeout	55V	12		12		ms	[1]
11	Tpor	Power-On Reset Time	3.0V	12		12		ms	[1]
			55V	12		12		ms	[1]

 ^[1] Timing Reference uses 0.7 V_{CC} for a logic 1 and 0.2 V_{CC} for a logic 0.
 [2] Interrupt request through Port 3 (P33-P31).



AC ELECTRICAL CHARACTERISTICS

Low Noise Mode

					T _A =ذC					
				1MHz			Hz			
No	Symbol	Parameter	$ u_{cc} $	Min	Mex	Min	Мак	Units	Notes	
1	TPC	InputClockPeriod	4.5V	1000	DC	250	DC	ns	[1]	
			5 <i>5</i> V	1000	DC	250	DC	ns	[1]	
2	TiC	ClockInputRise	45V		25		25	ns	[1]	
	TIC	and Fall Times	5 <i>5</i> V		25		25	ns	[1]	
3	TwC	InputClockWidth	45V	500		125		ns	[1]	
			5.5V	500		125		ns	[1]	
4.	TwTnL	TimerInputLowWidth	4 <i>5</i> V	70		70		ns	[1]	
			5 <i>5</i> V	7 0		70		ns	[1]	
5	TwTinH	TimerInputHighWidth	45V	2.5TpC	•	2.5Tp	C		[1]	
			55V	2.5TpC		2.5Tp	C		[1]	
6	TpTin	TimerInputPeriod	45V	4TpC		4TpC			[1]	
			5 <i>5</i> V	4TpC		4TpC			[1]	
7	TrTin,	TimerInputRise	45V	,	100		100	ns	[1]	
	TtTin	andFallTimer	55V		100		100	ns	[1]	
8	TwL	Int.RequestInput	45V	70		70		ns	[1,2]	
		LowTime	5 <i>5</i> V	70		70		ns	[1,2]	
9	TwH	Int. Request Input	45V	15V 25TpC		2.5Tp	C		[1]	
		HighTime	55V	25TpC	}	2.5Tp	C		[1,2]	
10	Twdt	Watch-DogTimer	45V	12		12		ms	[1]	
		DelayTimeforTimeout	5 <i>5</i> V	12		12		ms	[1]	

Notes:

^[1] Timing Reference uses 0.7 V_{CC} for a logic 1 and 0.2 V_{CC} for a logic 0. [2] Interrupt request through Port 3 (P33-P31).



PRECAUTIONS

 ROM Protect does not automatically enable the Low EMI Mode.

Low Margin:

Customer is advised that this product does not meet Zilog's internal guardbanded test policies for the specification requested and is supplied on an exception basis. Customer is cautioned that delivery may be uncertain and that, in addition to all other limitations on Zilog liability

stated on the front and back of the acknowledgement, Zilog makes no claim as to quality and reliability under the CPS. The product remains subject to standard warranty for replacement due to defects in materials and workmanship.

Pre-Characterization Product:

The product represented by this CPS is newly introduced and Zilog has not completed the full characterization of the product. The CPS states what Zilog knows about this product at this time, but additional features or non-conformance with some aspects of the CPS may be found,

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