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Z86E02 SL 1925

General-Purpose OTP MCU with 14 I/O Lines

Product Specification

PS014802-0903

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Architectural Overview

ZiLOG's Z86E02 SL1925 Microcontroller (MCU) is a One-Time Programmable (OTP) member of ZiLOG's single-chip Z8® MCU family that allows easy software development, debug, prototyping, and small production runs not economically desirable with masked ROM versions.

For applications demanding powerful I/O capabilities, the Z86E02 SL1925'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. One on-chip counter/timer, 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.

Z86E02 SL1925 Features

Table 1. Z86E02 SL1925 Features

Device	OTP (KB)	RAM* (Bytes)	Speed (MHz)
Z86E02 SL1925	0.5	61	8

Note: *General-Purpose.

- 3.5V to 5.5V Operating Range @ 0°C to +70°C
- 4.5V to 5.5V Operating Range @ -40°C to +105°C
- 14 Input/Output Lines
- Six Vectored, Prioritized Interrupts (3 falling edge, 1 rising edge, 1 timer, 1 software)
- Program Options:
  - Low Noise
  - ROM Protect
  - Auto Latch
  - Watch-Dog Timer (WDT)
  - RC Oscillator
- One Programmable 8-Bit Counter/Timer, with 6-bit Programmable Prescaler
- WDT/Power-On Reset (POR)
- On-Chip Oscillator that accepts XTAL, Ceramic Resonance, LC, RC, or External Clock
- Clock-Free WDT Reset

- Low-Power Consumption (50 mΩ typical)
- Fast Instruction Pointer (1.5µs @ 8 MHz)
- RAM Bytes (61)

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

BLOCK DIAGRAMS

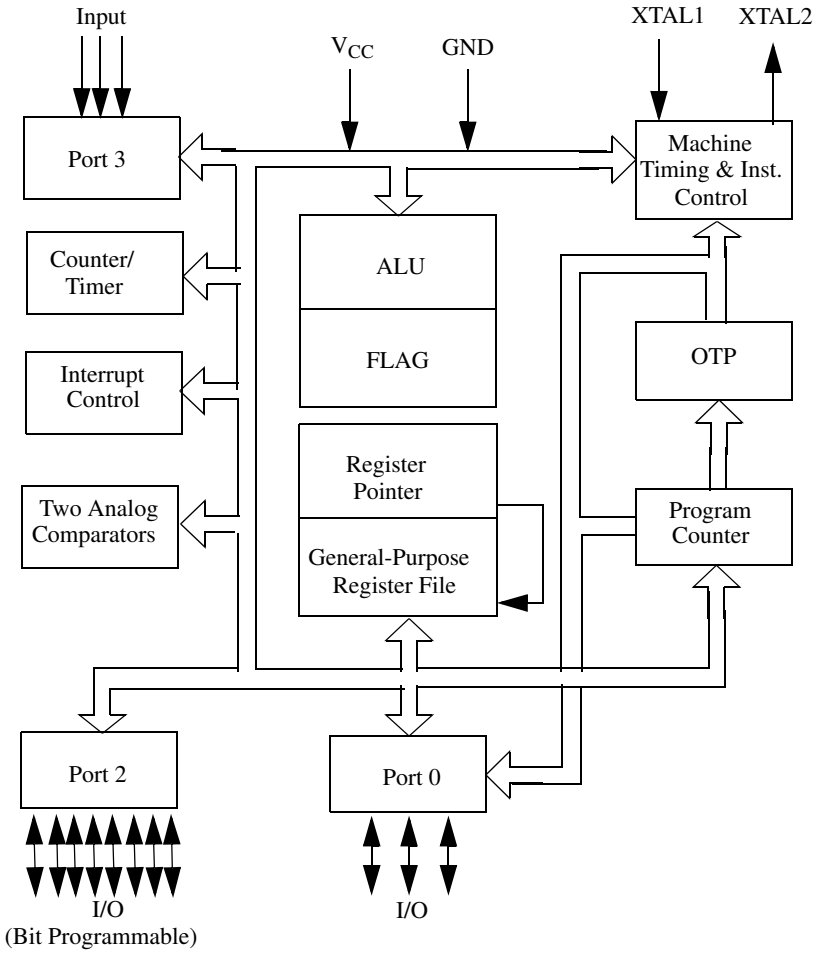

Figure 1. Functional Block Diagram

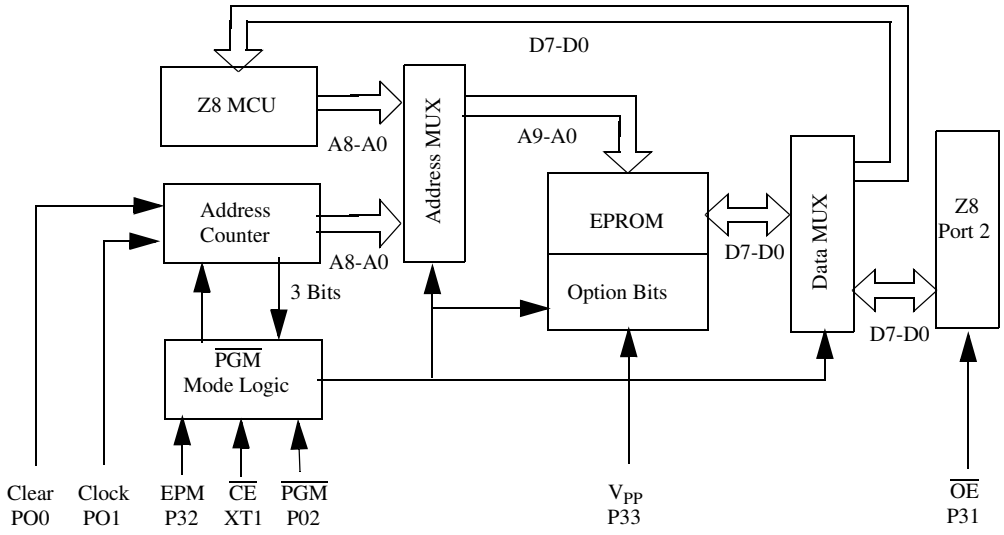

Figure 2. EPROM Programming Mode Block Diagram

PIN DESCRIPTION

Pin diagrams and identification for the device are displayed in Figure 3 through Figure 6, and in Table 2 through Table 5.

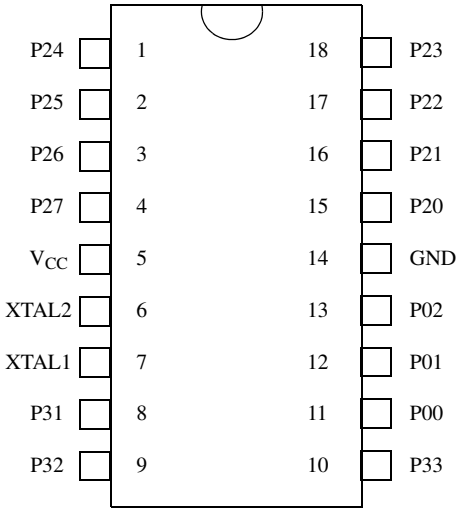

Figure 3. 18-Pin DIP/SOIC Configuration, STANDARD Mode

Table 2. 18-Pin DIP/SOIC Pin Identification, STANDARD Mode

Pin #	Symbol	Function	Direction
1-4	P24-P27	Port 2, Pins 4-7	Input/Output
5	V_{CC}	Power Supply	
6	XTAL2	Crystal Oscillator Clock	Output
7	XTAL1	Crystal Oscillator Clock	Input
8	P31	Port 3, Pin 1 AN1	Input
9	P32	Port 3, Pin 1 AN2	Input
10	P33	Port 3, Pin 3, REF	Input
11-13	P00-P02	Port 0, Pins 0-2	Input/Output
14	GND	Ground	
15-18	P20-P23	Port 2, Pins 0-3	Input/Output

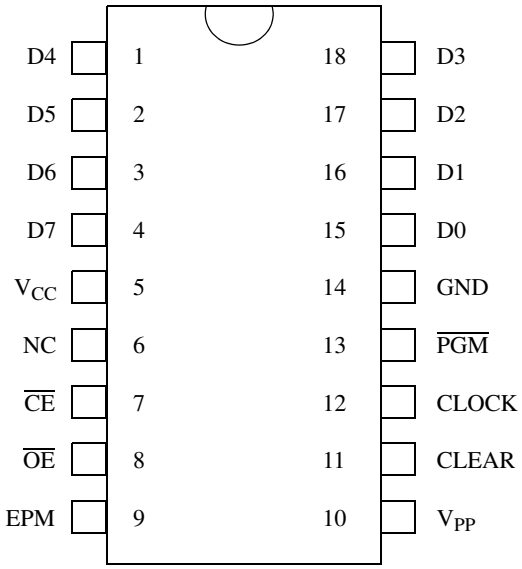

Figure 4. 18-Pin DIP/SOIC Configuration, EPROM Mode

Table 3. 18-Pin DIP/SOIC Pin Identification, EPROM Mode

Pin #	Symbol	Function	Direction
1-4	D4-D7	Data 4-7	Input/Output
5	V_{CC}	Power Supply	
6	NC	No Connection	
7	$\overline{CE}$	Chip Enable	Input
8	$\overline{OE}$	Output Enable	Input
9	EPM	EPROM Program Mode	Input
10	V_{PP}	Program Voltage	Input
11	CLEAR	Clear Clock	Input
12	CLOCK	Address	Input
13	$\overline{PGM}$	Program Mode	Input
14	GND	Ground	
15-18	D0-D3	Data 0-3	Input/Output

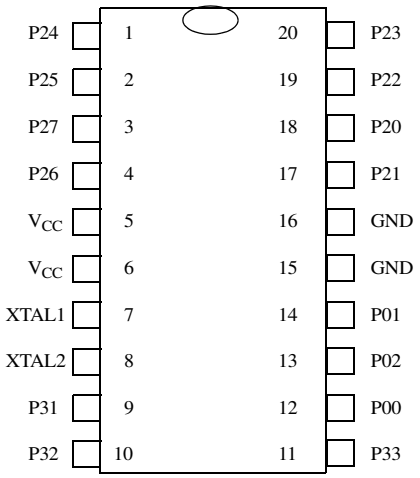

Figure 5. 20-Pin SSOP Pin Configuration, STANDARD Mode

Table 4. 20-Pin SSOP Pin Identification, STANDARD Mode

Pin #	Symbol	Function	Direction
1,2	P24-P25	Port 2, Pins 4-5	Input/Output
3	P27	Port 2, Pin 7	Input/Output
4	P26	Port 2, Pin 6	Input/Output
5	V_{CC}	Power Supply	
6	V_{CC}	Power Supply	
7	XTAL1	Crystal Oscillator Clock	Input
8	XTAL2	Crystal Oscillator Clock	Output
9	P31	Port 3, Pin 1, AN1	Input
10	P32	Port 3, Pin 2, AN2	Input
11	P33	Port 3, Pin 3, REF	Input
12	P00	Port 0, Pin 0	Input/Output
13	P02	Port 0, Pin 1	Input/Output
14	P01	Port 0, Pin 1	Input/Output
15	GND	Ground	
16	GND	Ground	
17	P21	Port 2, Pin 1	Input/Output
18	P20	Port 2, Pin 0	Input/Output
19-20	P22-P23	Port 2, Pins 2-3	Input/Output

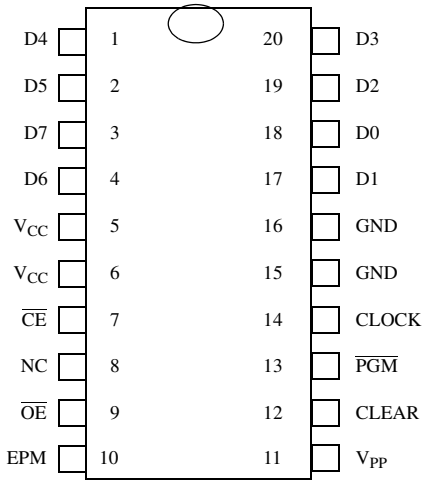

Figure 6. 20-Pin SSOP Pin Configuration, EPROM Mode

Table 5. 20-Pin SSOP Pin Identification, EPROM Mode

Pin #	Symbol	Function	Direction
1-2	D4-D5	Data 4-5	Input/Output
3	D7	Data 7	Input/Output
4	D6	Data 6	Input/Output
5	V_{CC}	Power Supply	
6	V_{CC}	Power Supply	
7	$\overline{CE}$	Chip Enable	Input
8	NC	No Connection	
9	$\overline{OE}$	Output Enable	Input
10	EPM	EPROM Program Mode	Input
11	V_{PP}	Program Voltage	Input
12	CLEAR	Clear Clock	Input
13	$\overline{PGM}$	Program Mode	Input
14	CLOCK	Address	Input
15	GND	Ground	
16	GND	Ground	
17	D1	Data 1	Input/Output
18	D0	Data 0	Input/Output
19-20	D2-D3	Data 2-3	Input/Output

Electrical Characteristics

Absolute Maximum Ratings

Stresses greater than those listed on Table 6 may cause permanent damage to the device. This rating is a stress rating only; functional 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. Total power dissipation should not exceed 462 mΩ for the package. See Table 6. Power dissipation is calculated as follows:

Total Power Dissipation = V_{CC} X [I_{CC}–(sum of I_{OH})]
+sum of [(V_{CC}–V_{OH}) X I_{OH}]
+ sum of (V_{OL} X I_{OL})

Table 6. Absolute Maximum Ratings

Parameter	Min	Max	Units	Note
Ambient Temperature under Bias	-40	+105	C	
Storage Temperature	-65	+150	C	
Voltage on any Pin with Respect to V_{SS}	-0.7	+12	V	1
Voltage on V_{DD} Pin with Respect to V_{SS}	-0.3	+7	V	
Voltage on XTAL1, P31, P32, P33 with respect to V_{SS}	-0.6	V_{DD}+1	V	3
Total Power Dissipation		462	mΩ	
Maximum Allowable Current out of V_{SS}		300	mA	
Maximum Allowable Current into V_{DD}		270	mA	
Maximum Allowable Current into an Input Pin	-600	+600	µA	4
Maximum Allowable Current into an Open-Drain Pin	-600	+600	µA	2
Maximum Allowable Output Current Linked by any I/O Pin		20	mA	
Maximum Allowable Output Current Sourced by any I/O Pin		20 mA		

1. Applies to all pins except where otherwise noted. Maximum current into or out of pin must be ±600 µA.
2. Device pin is not at an output Low state.
3. There is no input protection diode from pin to V_{DD}.
4. This excludes XTAL1 and XTAL2.

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 See Figure 7.

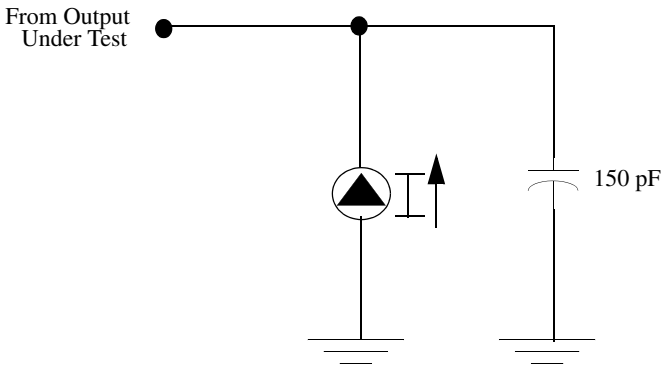

Figure 7. Test Load Diagram

Capacitance

T_A = 25°C, V_{CC} = GND = OV, f = 1.0 MHz, unmeasured pins returned to GND. See Table 7.

Table 7. Capacitance

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

DC Electrical Characteristics

Standard Temperature Range

Table 8 provides Direct Current characteristics for the Z86E02 SL1925 microcontroller, at a standard ambient temperature range of 0°C to 70°C.

Table 8. DC Characteristics, Standard Temperature Range

TA = 0°C to +70°C							
Sym	Parameter	V_{CC}	Min	Max	Typical @ 25°C[1] Units	Conditions	Notes
V_{INMAX}	Max Input Voltage	3.5V	-12	12	V	I_{IN} < 250 µA	2
		5.5V	-12	12	V	I_{IN} < 250 µA	2

Table 8. DC Characteristics, Standard Temperature Range (Continued)

TA = 0°C to +70°C								
Sym	**Parameter**	**V_{CC}**	**Min**	**Max**	**Typical @ 25°C[1]**	**Units**	**Conditions**	**Notes**
V_{CH}	Clock Input High Voltage	3.5V	0.8 V_{CC}	V_{CC}+0.3	1.7	V	Driven by External Clock Generator	
		5.5V	0.8 V_{CC}	V_{CC}+0.3	2.8	V	Driven by External Clock Generator	
V_{CL}	Clock Input Low Voltage	3.5V	V_{SS}-0.3	0.2 V_{CC}	0.8	V	Driven by External Clock Generator	
		5.5V	V_{SS}-0.3	0.2 V_{CC}	1.7	V	Driven by External Clock Generator	
V_{IH}	Input High Voltage	3.5V	0.7 V_{CC}	V_{CC}+0.3	1.8	V		
		5.5V	0.7 V_{CC}	V_{CC}+0.3	2.8	V		
V_{IL}	Input Low Voltage	3.5V	V_{SS}-0.3	0.2 V_{CC}	0.8	V		
		5.5V	V_{SS}-0.3	0.2 V_{CC}	1.5	V		
V_{OH}	Output High Voltage	3.5V	V_{CC}-0.4		3.3	V	I_{OH} = -2.0 mA	3
		5.5V	V_{CC}-0.4		4.8	V	I_{OH} = -2.0 mA	3
		3.5V	V_{CC}-0.4		3.3	V	I_{OH} = -0.5 mA	10
		5.5V	V_{CC}-0.4		4.8	V	I_{OH} = -0.5 mA	10
V_{OL1}	Output Low Voltage	3.5V		0.8	0.2	V	I_{OL} = +4.0 mA	3
		5.5V		0.4	0.1	V	I_{OL} = +4.0 mA	3
		3.5V		0.4	0.2	V	I_{OL}=1.0mA	10
		5.5V		0.4	0.1	V	I_{OL}=1.0mA	10
V_{OL2}	Output Low Voltage	3.5V		1.2	1.0	V	I_{OL} = +12 mA	3
		5.5V		1.2	0.8	V	I_{OL} = +12 mA	3
V_{LV}	V_{CC} Low Voltage Auto Reset		2.6	3.2	2.9	V	@ 4MHz Maximum Internal Clock Frequency	4
I_{IL}	Input Leakage (Input Bias Current of Comparator)	3.5V	-1.0	1.0		µA	V_{IN} = 0V, V_{CC}	
		5.5V	-1.0	1.0		µA	V_{IN} = 0V, V_{CC}	
I_{OL}	Output Leakage	3.5V	-1.0	1.0		µA	V_{IN} = 0V, V_{CC}	
		5.5V	-1.0	1.0		µA	V_{IN} = 0V, V_{CC}	

Table 8. DC Characteristics, Standard Temperature Range (Continued)

TA = 0°C to +70°C								
Sym	**Parameter**	**V_{CC}**	**Min**	**Max**	**Typical @ 25°C[1] Units**		**Conditions**	**Notes**
V_{ICR}	Comparator Input Common Mode Voltage Range		0	V_{CC} - 1.0		V		
I_{CC}	Supply Current	3.5V	3.5		1.5	mA	@ 2 MHz	3,6
		5.5V	7.0		6.8	mA	@ 2 MHz	3,6
		3.5V	8.0		3.0	mA	@ 8 MH	3,6
		5.5V	11.0		8.2	mA	@ 8 MHz	3,6
I_{CC1}	Standby Current (HALT Mode)	3.5V	2.5		0.7	mA	@ 2 MHz	3,6
		5.5V	4.0		2.5	mA	@ 2 MHz	3,6
		3.5V	4.0		1.0	mA	@ 8 MHz	3,6
		5.5V	5.0		3.0	mA	@ 8 MHz	3,6
I_{CC}	Supply Current (HALT and Low EMI Mode)	3.5V	3.5		1.5	mA	@ 1 MHz	6,10
		5.5V	7.0		6.8	mA	@ 1 MHz	6,10
		3.5V	5.8		2.5	mA	@ 2 MHz	6,10
		5.5V	9.0		7.5	mA	@ 2 MHz	6,10
		3.5V	8.0		3.0	mA	@ 4 MHz	6,10
		5.5V	11.0		8.2	mA	@ 4 MHz	6,10
I_{CC1}	Standby Current (Low EMI Mode)	3.5V	1.2		0.4	mA	@ 1 MHz	6,10
		5.5V	1.6		0.9	mA	@ 1 MHz	6,10
		3.5V	1.5		0.5	mA	@ 2 MHz	6,10
		5.5V	1.9		1.0	mA	@ 2 MHz	6,10
		3.5V	2.0		0.8	mA	@ 4 MHz	6,10
		5.5V	2.4		3.0	mA	@ 4 MHz	6,10
I_{CC2}	Standby Current (STOP Mode)	3.5V	10.0		1.0	µA	WDT is not Running	6,7,8
		5.5V	10.0		1.0	µA	WDT is not Running	6,7,8
I_{ALL}	Auto Latch Low Current	3.5V	12.0		3	µA	$0V < V_{IN} < V_{CC}$	9
		5.5V	32.0		16	µA	$0V < V_{IN} < V_{CC}$	9

Table 8. DC Characteristics, Standard Temperature Range (Continued)

TA = 0°C to +70°C								
Sym	**Parameter**	**V_{CC}**	**Min**	**Max**	**Typical @ 25°C[1]**	**Units**	**Conditions**	**Notes**
I_{ALH}	Auto Latch High Current	3.5V	-8.0		-1.5	µA	$0V < V_{IN} < V_{CC}$	9
		5.5V	-16.0		-8.0	µA	$0V < V_{IN} < V_{CC}$	9

1. Typical values are read at a V_{CC} of 5.0V and V_{CC} of 3.5V.
2. Port 2, Port 3, and Port 0 only.
3. STANDARD mode (not low EMI mode).
4. These values apply while operating in RUN mode or HALT mode.
5. These values apply while operating in STOP mode.
6. All outputs are unloaded and all inputs are at the V_{CC} or V_{SS} level.
7. If the analog comparator is selected, then the comparator inputs must be at the V_{CC} level.
8. A 10-M pull-up resistor is required in the circuit between the X_{IN} pin to the V_{CC} pin.
9. Auto latches are enabled.
10. Low EMI Mode (not Standard Mode)

Extended Temperature Range

Table 9 provides Direct Current characteristics for the Z86E02 SL1925 microcontroller, at an extended ambient temperature range of -40°C to 105°C.

Table 9. DC Characteristics, Extended Temperature Range

			TA = -40°C to +105°C					
Sym	**Parameter**	**V_{CC}**	**Min**	**Max**	**Typical @ 25°C[1]**	**Units**	**Conditions**	**Notes**
V_{INMAX}	Max Input Voltage	4.5V		12.0		V	$I_{IN} < 250$ µA	2
		5.5V		12.0		V	$I_{IN} < 250$ µA	2
V_{CH}	Clock Input High Voltage	4.5V	0.8 V_{CC}	V_{CC}+0.3	2.8	V	Driven by External Clock Generator	
		5.5V	0.8 V_{CC}	V_{CC}+0.3	2.8	V	Driven by External Clock Generator	
V_{CL}	Clock Input Low Voltage	4.5V	V_{SS}-0.3	0.2 V_{CC}	1.7	V	Driven by External Clock Generator	
		5.5V	V_{SS}-0.3	0.2 V_{CC}	1.7	V	Driven by External Clock Generator	

Table 9. DC Characteristics, Extended Temperature Range (Continued)

			TA = -40°C to +105°C					
Sym	**Parameter**	**V_{CC}**	**Min**	**Max**	**Typical @ 25°C[1]**	**Units**	**Conditions**	**Notes**
V_{IH}	Input High Voltage	4.5V	0.7 V_{CC}	V_{CC}+0.3	2.8	V		
		5.5V	0.7 V_{CC}	V_{CC}+0.3	2.8	V		
V_{IL}	Input Low Voltage	4.5V	V_{SS}-0.3	0.2 V_{CC}	1.5	V		
		5.5V	V_{SS}-0.3	0.2 V_{CC}	1.5	V		
V_{OH}	Output High Voltage	4.5V	V_{CC}-0.4		4.8	V	I_{OH} = -2.0 mA	3
		5.5V	V_{CC}-0.4		4.8	V	I_{OH}= -2.0 mA	3
		4.5V	V_{CC}-0.4		4.8	V	I_{OH} = -0.5 mA	10
		5.5V	V_{CC}-0.4		4.8	V	I_{OH} = -0.5 mA	10
V_{OL1}	Output Low Voltage	4.5V		0.4	0.1	V	I_{OL} = +4.0 mA	3
		5.5V		0.4	0.1	V	I_{OL} = +4.0 mA	3
		4.5V		0.4	0.1	V	I_{OL}=1.0 mA	10
		5.5V		0.4	0.1	V	I_{OL}=1.0 mA	10
V_{OL2}	Output Low Voltage	4.5V		1.0	0.3	V	I_{OL} = +12 mA	3
		5.5V		1.0	0.3	V	I_{OL} = +12 mA	3
V_{LV}	V_{CC} Low Voltage Auto Reset		2.3	3.5	2.9	V	@ 4 MHz Maximum Internal Clock Frequency	
I_{IL}	Input Leakage (Input Bias Current of Comparator)	4.5V		-1.0	1.0	µA	V_{IN}= 0V, V_{CC}	
		5.5V		-1.0	1.0	µA	V_{IN}= 0V, V_{CC}	
I_{OL}	Output Leakage	4.5V		-1.0	1.0	µA	V_{IN}= 0V, V_{CC}	
		5.5V		-1.0	1.0	µA	V_{IN}= 0V, V_{CC}	
V_{ICR}	Comparator Input Common Mode Voltage Range		0	V_{CC}- 1.5		V		

Table 9. DC Characteristics, Extended Temperature Range (Continued)

			TA = -40°C to +105°C					
Sym	**Parameter**	**V_{CC}**	**Min**	**Max**	**Typical @ 25°C[1]**	**Units**	**Conditions**	**Notes**
I_{CC}	Supply Current	4.5V		7.0	6.8	mA	@ 2 MHz	3,6
		5.5V		7.0	6.8	mA	@ 2 MHz	3,6
		4.5V		11.0	8.2	mA	@ 8 MHz	3,6
		5.5V		11.0	8.2	mA	@ 8 MHz	3,6
I_{CC1}	Standby Current (HALT Mode)	4.5V		3.0	2.5	mA	@ 2 MHz	3,6
		5.5V		3.0	2.5	mA	@ 2 MHz	3,6
		4.5V		5.0	3.0	mA	@ 8 MHz	3,6
		5.5V		5.0	3.0	mA	@ 8 MHz	3,6
I_{CC}	Supply Current (Low EMI Mode)	4.5V		7.0	6.8	mA	@ 1 MHz	6,10
		5.5V		7.0	6.8	mA	@ 1 MHz	6,10
		4.5V		9.0	7.5	mA	@ 2 MHz	6,10
		5.5V		9.0	7.5	mA	@ 2 MHz	6,10
		4.5V		11.0	8.2	mA	@ 4 MHz	6,10
		5.5V		11.0	8.2	mA	@ 4 MHz	6,10
I_{CC1}	Standby Current (HALT and Low EMI Mode)	4.5V		1.6	0.9	mA	@ 1 MHz	6,10
		5.5V		1.6	0.9	mA	@ 1 MHz	6,10
		4.5V		1.9	1.0	mA	@ 2 MHz	6,10
		5,5V		1.9	1.0	mA	@ 2 MHz	6,10
		4.5V		2.4	3.0	mA	@ 4 MHz	6,10
		5.5V		2.4	3.0	mA	@ 4 MHz	6,10
I_{CC2}	Standby Current (Stop mode)	4.5V		20	1.0	µA	WDT is not Running	6,7,8
		5.5V		20	1.0	µA	WDT is not Running	6,7,8
I_{ALL}	Auto Latch Low Current	4.5V		40	16	µA	$0V < V_{IN} < V_{CC}$	9
		5.5V		40	16	µA	$0V < V_{IN} < V_{CC}$	9

Table 9. DC Characteristics, Extended Temperature Range (Continued)

			TA = -40°C to +105°C					
Sym	**Parameter**	**V_{CC}**	**Min**	**Max**	**Typical @ 25°C[1]**	**Units**	**Conditions**	**Notes**
I_{ALH}	Auto Latch High Current	4.5V		-20.0	-8.0	µA	$0V < V_{IN} < V_{CC}$	9
		5.5V		-20.0	-8.0	µA	$0V < V_{IN} < V_{CC}$	9

1. Typical values are read at a V_{CC} of 5.0V
2. Port 2, Port 3, and Port 0 only.
3. STANDARD mode (not Low EMI mode).
4. These values apply while operating in RUN mode or HALT mode
5. These values apply while operating in STOP mode
6. All outputs are unloaded and all inputs are at the V_{CC}or V_{SS} level.
7. If the analog comparator is selected, then the comparator inputs must be at the V_{CC} level.
8. A 10-MΩ pull-up resistor is required in the circuit between the XTAL1 pin to the V_{CC} pin.
9. Auto latches are enabled.
10. Low EMI Mode (not Standard Mode)

AC Electrical Timing Characteristics

Figure 8 illustrates Alternating Current timing for the Z86E02 SL1925 microcontroller.

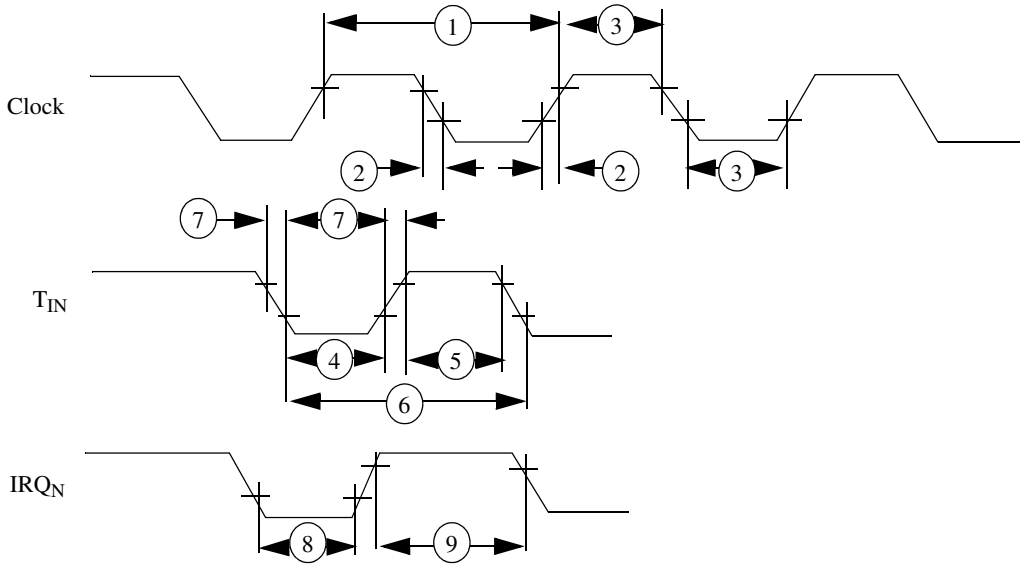

Figure 8. AC Electrical Timing

STANDARD Mode at Standard Temperature

Table 10 describes timing characteristics in STANDARD mode at standard temperature for the timing diagram noted in Figure 8.

Table 10. AC Electrical Characteristics, Standard Mode and Temperature

			TA = 0°C to +70°C				
			8MHz				
No	Symbol	Parameter	V_{CC}	Min	Max	Units	Notes
1	T_PC	Input Clock Period	3.5V	125	DC	ns	1
			5.5V	125	DC	ns	1
2	T_RC,T_FC	Clock Input Rise and Fall Times	3.5V		25	ns	1
			5.5V		25	ns	1
3	T_WC	Input Clock Width	3.5V	62		ns	1
			5.5V	62		ns	1

Table 10. AC Electrical Characteristics, Standard Mode and Temperature (Continued)

			TA = 0°C to +70°C				
			8MHz				
No	**Symbol**	**Parameter**	**V_{CC}**	**Min**	**Max**	**Units**	**Notes**
4	$T_WT_{IN}L$	Timer Input Low Width	3.5V	100		ns	1
			5.5V	70		ns	1
5	$T_WT_{IN}H$	Timer Input High Width	3.5V	5TpC			1
			5.5V	5TpC			1
6	T_PT_{IN}	Timer Input Period	3.5V	8TpC			1
			5.5V	8TpC			1
7	T_RT_{IN}, T_TT_{IN}	Timer Input Rise and Fall Time	3.5V		100	ns	1
			5.5V		100	ns	1
8	T_WIL	Interrupt Request Input Low Time	3.5V	100		ns	1,2
			5.5V	70		ns	1,2
9	T_WIH	Interrupt Request Input High Time	3.5V	5TpC			1,2
			5.5V	5TpC			1,2
10	T_{WDT}	Watch-Dog Timer Delay Time before Time-out	3.5V	10		ms	
			5.5V	5		ms	
11	T_{POR}	Power-On Reset Time	3.5V	4	36	ms	
			5.5V	2	18	ms	

1. Timing reference is 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)

STANDARD Mode at Extended Temperature

Table 11 describes timing characteristics in STANDARD mode at extended temperature for the timing diagram noted in Figure 8.

Table 11. AC Electrical Timing, Standard Mode at Extended Temperature

			TA = -40°C to +105°C				
				8MHz			
No	Symbol	Parameter	V_{CC}	Min	Max	Units	Notes
1	T_PC	Input Clock Period	4.5V	125	DC	ns	1
			5.5V	125	DC	ns	1
2	T_RC,T_FC	Clock Input Rise and Fall Times	4.5V		25	ns	1
			5.5V		25	ns	1
3	T_WC	Input Clock Width	4.5V		62	ns	1
			5.5V		62	ns	1
4	$T_WT_{IN}L$	Timer Input Low Width	4.5V	70		ns	1
			5.5V	70		ns	1
5	$T_WT_{IN}H$	Timer Input High Width	4.5V	5TpC			1
			5.5V	5TpC			1
6	T_PT_{IN}	Timer Input Period	4.5V	8TpC			1
			5.5V	8TpC			1
7	T_RT_{IN}, T_TT_{IN}	Timer Input Rise and Fall Time	4.5V		100	ns	1
			5.5V		100	ns	1
8	T_WIL	Interrupt Request Input Low Time	4.5V	70		ns	1,2
			5.5V	70		ns	1,2
9	T_WIH	Interrupt Request Input High Time	4.5V	5TpC			1,2
			5.5V	5TpC			1,2
10	T_{WDT}	Watch-Dog Timer Delay Time before Time-out	4.5V	5		ms	
			5.5V	5		ms	
11	T_{POR}	Power-On Reset Time	4.5V	1	20	ms	
			5.5V	1	20	ms	

1. Timing reference is 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)

LOW EMI Mode at Standard Temperature

Table 12 describes timing characteristics in LOW EMI mode at standard temperature for the timing diagram noted in Figure 8.

Table 12. AC Electrical Timing, Standard Mode at Extended Temperature

			TA = 0°C to +70°C						
				1MHz		4MHz			
No	Symbol	Parameter	V_{CC}	Min	Max	Min	Max	Units	Notes
1	T_PC	Input Clock Period	3.5V	1000	DC	250	DC	ns	1
			5.5V	1000	DC	250	DC	ns	1
2	T_RC,T_FC	Clock Input Rise and Fall Times	3.5V		25		25	ns	1
			5.5V		25		25	ns	1
3	T_WC	Input Clock Width	3.5V	500		125		ns	1
			5.5V	500		125		ns	1
4	$T_WT_{IN}L$	Timer Input Low Width	3.5V	70		70		ns	1
			5.5V	70		70		ns	1
5	$T_WT_{IN}H$	Timer Input High Width	3.5V	3TpC		3TpC			1
			5.5V	3TpC		3TpC			1
6	T_PT_{IN}	Timer Input Period	3.5V	4TpC		4TpC			1
			5.5V	4TpC		4TpC			1
7	T_RT_{IN}, T_TT_{IN}	Timer Input Rise and Fall Time	3.5V		100		100	ns	1
			5.5V		100		100	ns	1
8	T_WIL	Interrupt Request Input Low Time	3.5V	70		70		ns	1,2
			5.5V	70		70		ns	1,2
9	T_WIH	Interrupt Request Input High Time	3.5V	3TpC		3TpC			1,2
			5.5V	3TpC		3TpC			1,2
10	T_{WDT}	Watch-Dog Timer Delay Time before Time-out	3.5V	10		10		ms	
			5.5V	5		5		ms	