

Z86116

CMOS Z8 PN MODULATOR WIRELESS CONTROLLER

FEATURES

Part	ROM	RAM*	Speed
Z86116	1 KB	124 KB	12 MHz

Note: *General-Purpose

- 18-Pin DIP and SOIC Packages
- 3.0V to 5.5V Operating Range
- On-Chip PN Modulator for Spread Spectrum Communications
- Low-Power Consumption
- Expanded Register File (ERF)
- 12 Input/Output Lines (One with Comparator Input)
- Two Programmable 8-Bit Counter/Timers with each 6-Bit Programmable Prescaler
- Watch-Dog (WDT)/Power-On Reset Timer (POR)
- Analog Comparator with Programmable Interrupt Polarity
- On-Chip Oscillator that Accepts a RC, or External Clock Drive
- Low -Voltage Protection/Low-EMI Option
- 0° to +70°C Temperature Range

GENERAL DESCRIPTION

The Z86116 Wireless Controller is a member of the Z8[®] MCU family based on Zilog's 8-bit microcontroller core. The Z86116 is designed with specific features for wireless spread spectrum applications using direct sequence pseudo-noise (PN) modulation.

Three address spaces are available to support this wide range of configurations; Program Memory, Register File, and Expanded Register File (ERF). Through ERF, the designer has access to three additional control registers that provide extra peripheral devices, I/O ports, and register addresses.

For applications demanding powerful I/O capabilities, the Z86116's dedicated input and output lines are grouped into two ports, and are configurable under software control to provide timing, status signals, or parallel I/O.

Notes: All signals with a preceding front slash "/", are active Low. For example, 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)

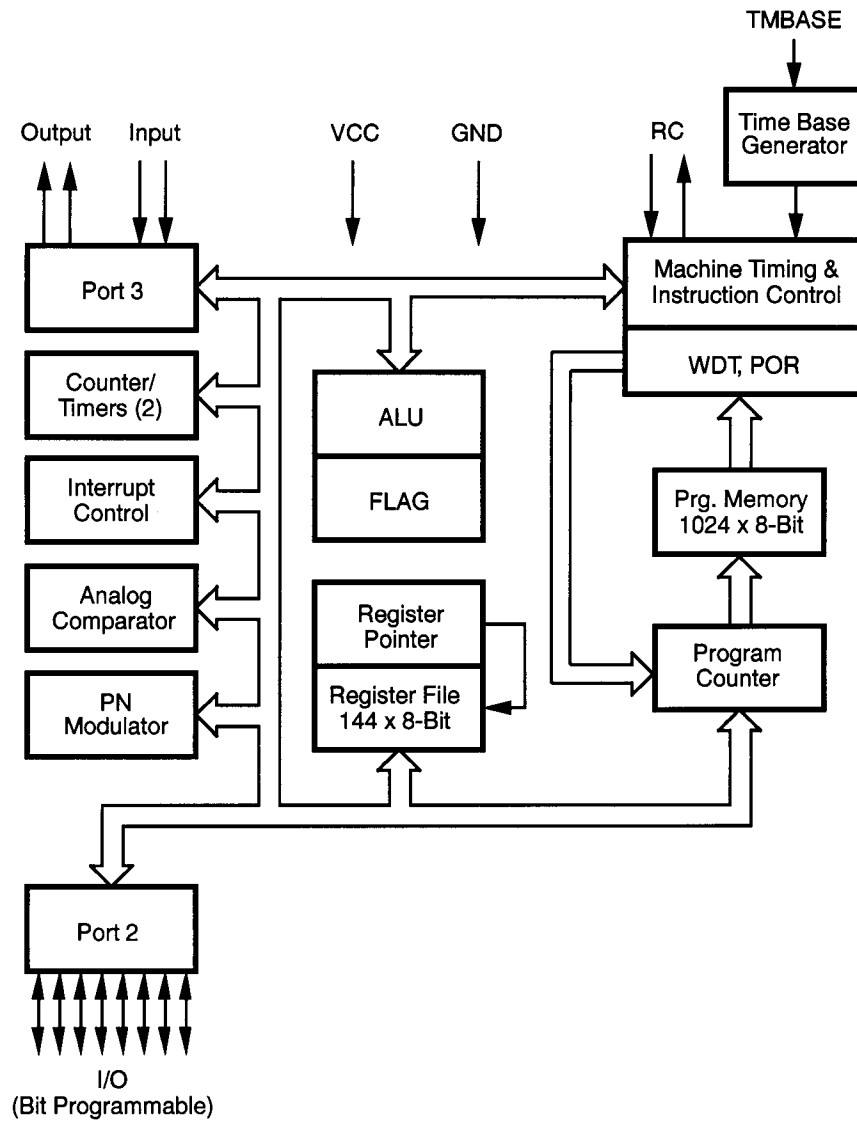


Figure 1. Functional Block Diagram

PIN DESCRIPTION

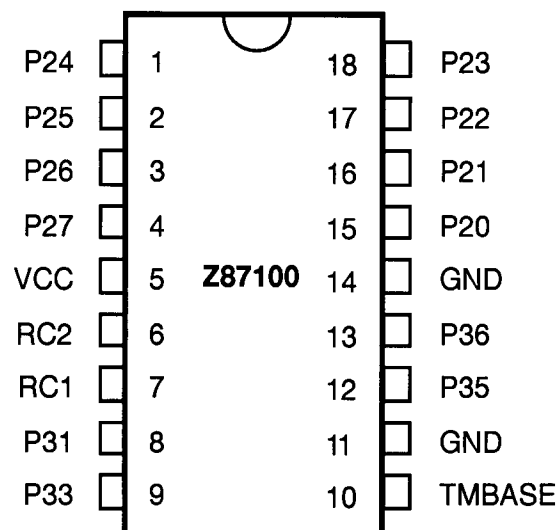


Figure 2. 18-Pin DIP/SOIC Pin Configuration

Table 1. 18-Pin DIP/SOIC Pin Identification

No	Symbol	Function	Direction
1-4	P24-27	Port 2, Pins 4, 5, 6, 7	In/Output
5	V _{CC}	Power Supply	Input
6	RC2	RC Oscillator Clock	Output
7	RC1	RC Oscillator Clock	Input
8-9	P31, P33	Port 3, Pins 1, 3	Fixed Input
10	TM BASE	Time Base Clock	Input
11	GND	Ground	
12-13	P35-36	Port 3, Pins 5, 6	Fixed Output
14	GND	Ground	
15-18	P20-23	Port 2, Pins 0, 1, 2, 3	In/Output

ABSOLUTE MAXIMUM RATING

Sym	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:

1. *Voltage on all pins with respect to GND.
2. † 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 period may affect device reliability.

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).

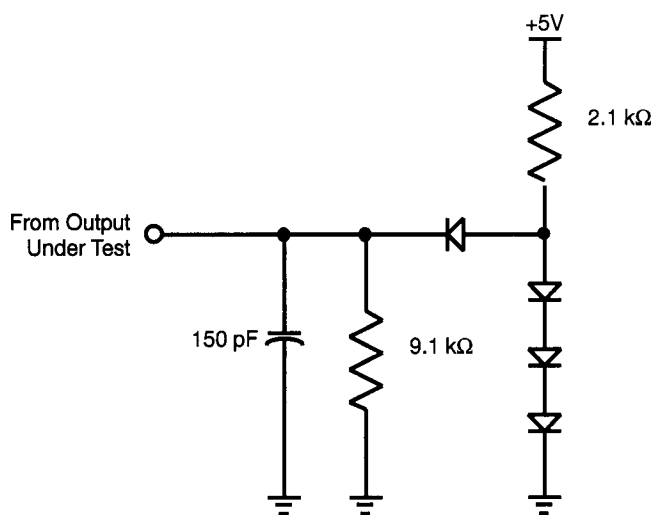


Figure 3. Test Load Configuration

DC ELECTRICAL CHARACTERISTICS

Sym	Parameter	V _{CC}	T _A = 0°C to +70°C		Typical @ 25°C	Units	Conditions	Notes
			Min	Max				
	Max Input Voltage	3.0V		12		V	I _{IN} ≤ 250 μA	
		5.5V		12		V	I _{IN} ≤ 250 μA	
V _{CH}	Clock Input High Voltage	3.0V	0.9 V _{CC}	V _{CC} + 0.3	2.4	V	Driven by External Clock Generator	
		5.5V	0.9 V _{CC}	V _{CC} + 0.3	3.9	V	Driven by External Clock Generator	
V _{CL}	Clock Input Low Voltage	3.0V	V _{SS} - 0.3	0.2 V _{CC}	1.6	V	Driven by External Clock Generator	
		5.5V	V _{SS} - 0.3	0.2 V _{CC}	2.7	V	Driven by External Clock Generator	
V _{IH}	Input High Voltage	3.0V	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	3.0V	V _{SS} - 0.3	0.2 V _{CC}	1.0	V		
		5.5V	V _{SS} - 0.3	0.2 V _{CC}	1.5	V		
V _{OH}	Output High Voltage	3.0V	V _{CC} - 0.4		3.1	V	I _{OH} = -2.0 mA	
		5.5V	V _{CC} - 0.4		4.8	V	I _{OH} = -2.0 mA	
V _{OL1}	Output Low Voltage	3.0V		0.8	0.2	V	I _{OL} = +4.0 mA	
		5.5V		0.4	0.1	V	I _{OL} = +4.0 mA	
V _{OL2}	Output Low Voltage	3.0V		1.0	0.4	V	I _{OL} = 6 mA, 3 Pin Max	
		5.5V		1.0	0.5	V	I _O = +12 mA, 3 Pin Max	
V _{OFFSET}	Comparator Input Offset Voltage	3.0V		25	10	mV		
		5.5V		25	10	mV		
I _{IL}	Input Leakage (Input bias current of comparator)	3.0V	-1.0	1.0		μA	V _{IN} = O _V , V _{CC}	
		5.5V	-1.0	1.0		μA	V _{IN} = O _V , V _{CC}	
I _{OL}	Output Leakage	3.0V	-1.0	1.0		μA	V _{IN} = O _V , V _{CC}	
		5.5V	-1.0	1.0		μA	V _{IN} = O _V , V _{CC}	
I _{CC}	Supply Current	3.0V		8.0	4.5	mA	@ 12 MHz	2,3
		5.5V		15	9.0	mA	@ 12 MHz	2,3
		4.5V		15	10	μA	10 kHz; external RC	2,3

DC ELECTRICAL CHARACTERISTICS (Continued)

Sym	Parameter	V _{CC}	T _A = 0°C to +70°C		Typical @ 25°C	Units	Conditions	Notes
			Min	Max				
I _{CC1}	Standby Current (HALT Mode)	3.0V		4.5	2.0	mA	HALT Mode V _{IN} =0V, V _{CC} @12 MHz	2,3
		5.5V		7.0	4.0	mA	HALT Mode V _{IN} =0V, V _{CC} @ 12 MHz	2,3
		3.0V		2.0	1.0	mA	Clock Divide-by-16 @12 MHz	2,3
		5.5V		4.5	2.5	mA	Clock Divide-by-16 @ 12 MHz	2,3
I _{CC2}	Standby Current (STOP Mode)	3.0V		10	1.0	µA	STOP Mode V _{IN} = 0V, V _{CC} WDT is not Running	4
		5.5V		10	3.0	µA	STOP Mode V _{IN} = 0V, V _{CC} WDT is not Running	4
		3.0V		TBD	160	µA	STOP Mode V _{IN} = 0V, V _{CC} WDT is Running	4
		5.5V		TBD	200	µA	STOP Mode V _{IN} = 0V, V _{CC} WDT is Running	4
		5.5V		12	5	µA	STOP Mode; TMBASE=32.768 kHz; WDT is not Running	6
T _{POR}	Power-On Reset	3.0V	7	24	13	ms		
		5.5V	3	13	7	ms		
V _{LV}	V _{CC} Low Voltage Protection Voltage			3.0		V	2 MHz max Ext. CLK Freq.	1

Notes:

1. V_{LV} increases as the temperature decreases.
2. All outputs unloaded, I/O pins floating, inputs at either rail, TMBASE clock input grounded.
3. C_{L1} = C_{L2} = 100 pF
4. Same as note 2 except inputs at V_{CC}.
5. Low EMI oscillator selected; SCLK = RC1/2;
10 kHz external oscillator with the comparator not enabled 10 µA.
10 kHz external oscillator with the comparator enabled 310 µA
RC selected for WDT; 10 kHz RC oscillator
(corresponding to R = 1.2MΩ C~ 68 pF), comparator is off.
6. Z8 in STOP Mode off; WDT off.
TMBASE selected; as Z8 system clock source
Time base counter enabled; V_{CC} = 5.5V.

AC ELECTRICAL CHARACTERISTICS

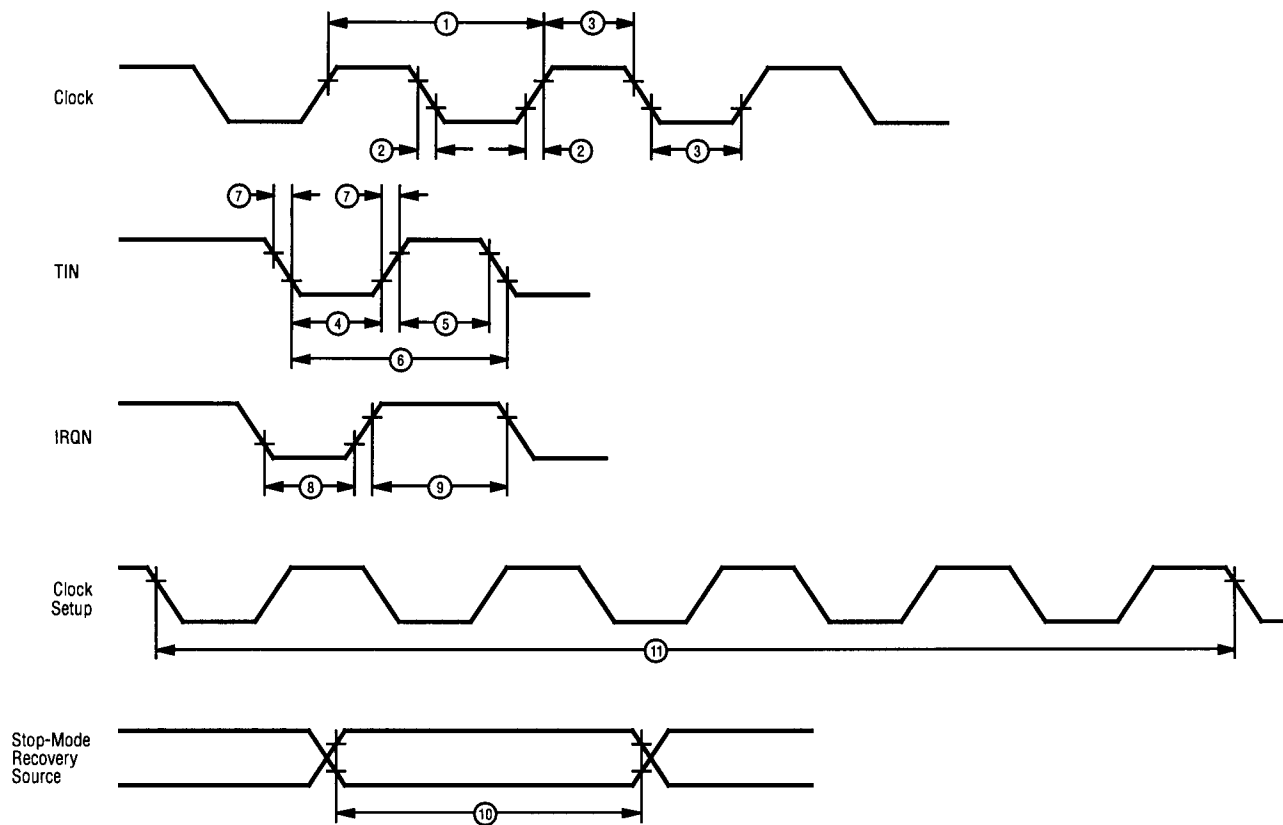


Figure 4. Additional Timing

AC ELECTRICAL CHARACTERISTICS

T _A =0°C to +70°C 12 MHz							
No	Sym	Parameter	V _{CC}	Min	Max	Units	Notes
1	TpC	Input Clock Period	3.3V	83	100,000	ns	1
			5.0V	83	100,000	ns	1
2	TrC,TfC	Clock Input Rise and Fall Times	3.3V		15	ns	1
			5.0V		15	ns	1
3	TwC	Input Clock Width	3.3V	26		ns	1
			5.0V	26		ns	1
4	TwTinL	Timer Input Low Width	3.3V	100		ns	1
			5.0V	70		ns	1
5	TwTinH	Timer Input High Width	3.3V	3TpC			1
			5.0V	3TpC			1
6	TpTi	Timer Input Period	3.3V	8TpC			1
			5.0V	8TpC			1
7	TrTin, TtTin	Timer Input Rise and Fall Timer	3.3V		100	ns	1
			5.0V		100	ns	1
8	TwIL	Int. Request Low Time	3.3V	100		ns	1,2
			5.0V	70		ns	1,2
9	TwIH	Int. Request High Time	3.3V	3TpC			1,2
			5.0V	3TpC			1,2
10	Twsm	Stop-Mode Recovery Width Spec	3.3V	12		ns	
			5.0V	12		ns	
11	Tost	RC Oscillator Start-up Time	3.3V		5TpC	ms	Reg.4
			5.0V		5TpC	ms	
	Twdt	Watch-Dog Timer Refresh Time	3.3V	15		ms	5
			5.0V	5		ms	D0=0 (6, D1=0) 6
			3.3V	30		ms	D0=1 6
			5.0V	16		ms	D1=0 6
			3.3V	60		ms	D0=0 6
			5.0V	25		ms	D1=1 6
			3.3V	250		ms	D0=1 6
			5.0V	120		ms	D1=1 6

Notes:

1. Timing Reference uses 0.9 V_{CC} for a logic 1 and 0.1 V_{CC} for a logic 0.
2. Interrupt request through Port 3 (P33-P31)
3. 5.0V ±0.5V, 3.3V ±0.3V
4. SMR-D5 = 0
5. Reg. WDTMR
6. WDT Oscillator only.

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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