اطلاعات مورد نیاز برای حل مسائل

رجیسترها و جداول مربوط به واحد تایمر/شمارنده:

TCCR0A – Timer/Counter Control Register A

Bit	7	6	5	4	3	2	1	0
0x24 (0x44)	COM0A1	COM0A0	COM0B1	COM0B0	–	–	WGM01	WGM00
Read/Write	R/W	R/W	R/W	R/W	R	R	R/W	R/W

TCCR0B – Timer/Counter Control Register B

Bit	7	6	5	4	3	2	1	0
0x25 (0x45)	FOC0A	FOC0B	–	–	WGM02	CS02	CS01	CS00
Read/Write	W	W	R	R	R/W	R/W	R/W	R/W

TCNT0 – Timer/Counter Register

Bit	7	6	5	4	3	2	1	0
0x26 (0x46)	TCNT0[7:0]							
Read/Write	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W

OCR0A – Output Compare Register A

Bit	7	6	5	4	3	2	1	0
0x27 (0x47)	OCR0A[7:0]							
Read/Write	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W

OCR0B – Output Compare Register B

Bit	7	6	5	4	3	2	1	0
0x28 (0x48)	OCR0B[7:0]							
Read/Write	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W

TIFR0 – Timer/Counter 0 Interrupt Flag Register

Bit	7	6	5	4	3	2	1	0
0x15 (0x35)	–	–	–	–	–	OCF0B	OCF0A	TOV0
Read/Write	R	R	R	R	R	R/W	R/W	R/W

TIMSK0 – Timer/Counter Interrupt Mask Register

Bit	7	6	5	4	3	2	1	0
(0x6E)	–	–	–	–	–	OCIE0B	OCIE0A	TOIE0
Read/Write	R	R	R	R	R	R/W	R/W	R/W

Table 15-8. Waveform Generation Mode Bit Description

Mode	WGM02	WGM01	WGM00	Timer/Counter Mode of Operation	TOP	Update of OCRx at	TOV Flag Set on[1][2]
0	0	0	0	Normal	0xFF	Immediate	MAX
1	0	0	1	PWM, Phase Correct	0xFF	TOP	BOTTOM
2	0	1	0	CTC	OCRA	Immediate	MAX
3	0	1	1	Fast PWM	0xFF	BOTTOM	MAX
4	1	0	0	Reserved	–	–	–
5	1	0	1	PWM, Phase Correct	OCRA	TOP	BOTTOM
6	1	1	0	Reserved	–	–	–
7	1	1	1	Fast PWM	OCRA	BOTTOM	TOP

Table 15-9. Clock Select Bit Description

CS02	CS01	CS00	Description
0	0	0	No clock source (Timer/Counter stopped)
0	0	1	$clk_{I/O}$/(No prescaling)
0	1	0	$clk_{I/O}$/8 (From prescaler)
0	1	1	$clk_{I/O}$/64 (From prescaler)
1	0	0	$clk_{I/O}$/256 (From prescaler)
1	0	1	$clk_{I/O}$/1024 (From prescaler)
1	1	0	External clock source on T0 pin. Clock on falling edge.
1	1	1	External clock source on T0 pin. Clock on rising edge.

Table 15-6. Compare Output Mode, Fast PWM Mode[1]

COM0B1	COM0B0	Description
0	0	Normal port operation, OC0B disconnected.
0	1	Reserved
1	0	Clear OC0B on Compare Match, set OC0B at BOTTOM, (non-inverting mode)
1	1	Set OC0B on Compare Match, clear OC0B at BOTTOM, (inverting mode).

Table 15-5. Compare Output Mode, non-PWM Mode

COM0B1	COM0B0	Description
0	0	Normal port operation, OC0B disconnected.
0	1	Toggle OC0B on Compare Match
1	0	Clear OC0B on Compare Match
1	1	Set OC0B on Compare Match

رجیسترها و جداول مربوط به واحد وقفه:

SREG – AVR Status Register

Bit	7	6	5	4	3	2	1	0
0x3F (0x5F)	I	T	H	S	V	N	Z	C
Read/Write	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W
Initial Value	0	0	0	0	0	0	0	0

EIMSK – External Interrupt Mask Register

Bit	7	6	5	4	3	2	1	0
0x1D (0x3D)	–	–	–	–	–	–	INT1	INT0
Read/Write	R	R	R	R	R	R	R/W	R/W
Initial Value	0	0	0	0	0	0	0	0

EICRA – External Interrupt Control Register A

Bit	7	6	5	4	3	2	1	0
(0x69)	–	–	–	–	ISC11	ISC10	ISC01	ISC00
Read/Write	R	R	R	R	R/W	R/W	R/W	R/W
Initial Value	0	0	0	0	0	0	0	0

EIFR – External Interrupt Flag Register

Bit	7	6	5	4	3	2	1	0
0x1C (0x3C)	–	–	–	–	–	–	INTF1	INTF0
Read/Write	R	R	R	R	R	R	R/W	R/W
Initial Value	0	0	0	0	0	0	0	0

Table 12-6. Reset and Interrupt Vectors in ATmega328 and ATmega328P

VectorNo.	Program Address[2]	Source	Interrupt Definition
1	0x0000[1]	RESET	External Pin, Power-on Reset, Brown-out R
2	0x0002	INT0	External Interrupt Request 0
3	0x0004	INT1	External Interrupt Request 1
4	0x0006	PCINT0	Pin Change Interrupt Request 0
5	0x0008	PCINT1	Pin Change Interrupt Request 1
6	0x000A	PCINT2	Pin Change Interrupt Request 2
7	0x000C	WDT	Watchdog Time-out Interrupt
8	0x000E	TIMER2 COMPA	Timer/Counter2 Compare Match A
9	0x0010	TIMER2 COMPB	Timer/Counter2 Compare Match B
10	0x0012	TIMER2 OVF	Timer/Counter2 Overflow

Table 13-2. Interrupt 0 Sense Control

ISC01	ISC00	Description
0	0	The low level of INT0 generates an interrupt request.
0	1	Any logical change on INT0 generates an interrupt request.
1	0	The falling edge of INT0 generates an interrupt request.
1	1	The rising edge of INT0 generates an interrupt request.

رجیسترها و جداول مربوط به واحد مبدل آنالوگ به دیجیتال:

7	6	5	4	3	2	1	0	
ADEN	ADSC	ADATE	ADIF	ADIE	ADPS2	ADPS1	ADPS0	ADCSRA
7	6	5	4	3	2	1	0	
REFS1	REFS0	ADLAR	–	MUX3	MUX2	MUX1	MUX0	ADMUX
15	14	13	12	11	10	9	8	
ADC9	ADC8	ADC7	ADC6	ADC5	ADC4	ADC3	ADC2	ADCH
ADC1	ADC0	–	–	–	–	–	–	ADCL
7	6	5	4	3	2	1	0	
7	6	5	4	3	2	1	0	
–	ACME	–	–	–	ADTS2	ADTS1	ADTS0	ADCSRB

Table 24-4. Input Channel Selections

MUX3...0	Single Ended Input
0000	ADC0
0001	ADC1
0010	ADC2
0011	ADC3
0100	ADC4
0101	ADC5
0110	ADC6
0111	ADC7
1000	ADC8[1]
1001	(reserved)
1010	(reserved)
1011	(reserved)
1100	(reserved)
1101	(reserved)
1110	1.1V (V_{BG})
1111	0V (GND)

Table 24-3. Voltage Reference Selections for ADC

REFS1	REFS0	Voltage Reference Selection
0	0	AREF, Internal V_{ref} turned off
0	1	AV_{CC} with external capacitor at AREF pin
1	0	Reserved
1	1	Internal 1.1V Voltage Reference with external capacitor at AREF pin

Table 24-5. ADC Prescaler Selections

ADPS2	ADPS1	ADPS0	Division Factor
0	0	0	2
0	0	1	2
0	1	0	4
0	1	1	8
1	0	0	16
1	0	1	32
1	1	0	64
1	1	1	128