

Interrupts, Startup

ATmega8



Interrupt Vector

No.	Addr.	Source	Interrupt Definition
1	0x000	RESET	External Pin, Power-on Reset, Brown-out Reset, and Watchdog Reset
2	0x001	INT0	External Interrupt Request 0
3	0x002	INT1	External Interrupt Request 1
4	0x003	TIMER2 COMP	Timer/Counter2 Compare Match
5	0x004	TIMER2 OVF	Timer/Counter2 Overflow
6	0x005	TIMER1 CAPT	Timer/Counter1 Capture Event
7	0x006	TIMER1 COMPA	Timer/Counter1 Compare Match A
8	0x007	TIMER1 COMPB	Timer/Counter1 Compare Match B
9	0x008	TIMER1 OVF	Timer/Counter1 Overflow
10	0x009	TIMER0 OVF	Timer/Counter0 Overflow
11	0x00A	SPI, STC	Serial Transfer Complete
12	0x00B	USART, RXC	USART, Rx Complete
13	0x00C	USART, UDRE	USART Data Register Empty
14	0x00D	USART, TXC	USART, Tx Complete
15	0x00E	ADC	ADC Conversion Complete
16	0x00F	EE_RDY	EEPROM Ready
17	0x010	ANA_COMP	Analog Comparator
18	0x011	TWI	Two-wire Serial Interface
19	0x012	SPM_RDY	Store Program Memory Ready

```

$000    rjmp RESET      ; Reset Handler
$001    rjmp EXT_INT0   ; IRQ0 Handler
$002    rjmp EXT_INT1   ; IRQ1 Handler
$003    rjmp TIM2_COMP  ; Timer2 Compare Handler
$004    rjmp TIM2_OVF   ; Timer2 Overflow Handler
$005    rjmp TIM1_CAPT  ; Timer1 Capture Handler
$006    rjmp TIM1_COMP A ; Timer1 CompareA Handler
$007    rjmp TIM1_COMP B ; Timer1 CompareB Handler
$008    rjmp TIM1_OVF   ; Timer1 Overflow Handler
$009    rjmp TIM0_OVF   ; Timer0 Overflow Handler
$00a    rjmp SPI_STC    ; SPI Transfer Complete Handler
$00b    rjmp USART_RXC  ; USART RX Complete Handler
$00c    rjmp USART_UDRE ; UDR Empty Handler
$00d    rjmp USART_TXC  ; USART TX Complete Handler
$00e    rjmp ADC        ; ADC Conversion Complete Handler
$00f    rjmp EE_RDY    ; EEPROM Ready Handler
$010    rjmp ANA_COMP   ; Analog Comparator Handler
$011    rjmp TWI       ; Two-wire Serial Interface Handler
$012    rjmp SPM_RDY   ; Store Program Memory Ready Handler
;
$013 RESET: ldi r16,high(RAMEND) ; Main program start
$014         out SPH,r16         ; Set Stack Pointer to top of RAM
$015         ldi r16,low(RAMEND)
$016         out SPL,r16
$017         sei                ; Enable interrupts
$018         ...
    
```

BOOTRST=1, BOOTSZ=00, IVSEL=1

```

$000    rjmp RESET      ; Reset handler
;
$001 RESET: ldi r16,high(RAMEND) ; Main program start
$002         out SPH,r16         ; Set Stack Pointer
$003         ldi r16,low(RAMEND)
$004         out SPL,r16
$005         sei                ; Enable interrupts
$006         ...
;
.org $c01
$c01    rjmp EXT_INT0   ; IRQ0 Handler
$c02    rjmp EXT_INT1   ; IRQ1 Handler
...
$c12    rjmp SPM_RDY   ; Store Program Memory Ready Handler
    
```

General Interrupt Control Register

GICR

7	6	5	4	3	2	1	0
INT1	INT0	-	-	-	-	IVSEL	IVCE
R/W	R/W	R	R	R	R	R/W	R/W
0	0	0	0	0	0	0	0

IVSEL Interrupt Vector Select

- 0 ... interrupt vector at start of program Flash
- 1 ... interrupt vector at start of Boot Loader section

IVCE Interrupt Vector Change Enable

po nastavení je možno do 4 cyklů změnit IVSEL
po tuto dobu nejsou vyvolávány interrupty

General Interrupt Control Register

GICR

7	6	5	4	3	2	1	0
INT1	INT0	-	-	-	-	IVSEL	IVCE
R/W	R/W	R	R	R	R	R/W	R/W
0	0	0	0	0	0	0	0

INT1/INT0 External Interrupt Request 1/0 Enable

0 ... disabled 1 ... enabled

Jsou-li splněny podmínky, je interrupt vyvolán,
i když je pin nastaven jako výstupní

⇒ lze použít jako softwarový interrupt

INT0, INT1 - External Interrupts



MCUCR	7	6	5	4	3	2	1	0
	SE	SM2	SM1	SM0	ISC11	ISC10	ISC01	ISC00
	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W
	0	0	0	0	0	0	0	0

ISC11-ISC10 Interrupt Sense Control 1

00 ... low level 10 ... falling edge
 01 ... any change 11 ... rising edge

Level event

asynchronně bez ohledu na hodiny
 ⇒ lze i v jiných, než Idle sleep modech
 detekováno na konci zpracovávané instrukce

Edge/toggle event

závisí na hodinách, pulsy delší než 1 clock

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General Interrupt Flag Register



GIFR	7	6	5	4	3	2	1	0
	INTF1	INTF0	-	-	-	-	-	-
	R/W	R/W	R	R	R	R	R	R
	0	0	0	0	0	0	0	0

nastaveny při vyvolání INT1/INT0
 jump na příslušné místo ve vektoru
 vynulovány při vykonání obslužné rutiny

2/2

atd.

