

Fuses

ATmega128



Fuses



- „global settings“
- 3 bytes, changed only during mem.programming
- not erased during Chip Erase
- cannot be changed if LB1 is set
 - ⇒ program Fuses *before* programming LB
- 1... unprogrammed, 0 ... programmed

Fuse Low 3-0



7	6	5	4	3	2	1	0
BODLEVEL	BODEN	SUT1	SUT0	CKSEL3	CKSEL2	CKSEL1	CKSEL0

CKSEL3-0 Clock source selection

- 1111 – 1010 External Crystal/Ceramic Resonator
- 1001 External Low-frequency Crystal
- 1000 – 0101 External RC Oscillator
- 0100 – **0001** Calibrated Internal RC Oscillator
- 0000 External Clock

Fuse Low 4-7



7	6	5	4	3	2	1	0
BODLEVEL	BODEN	SUT1	SUT0	CKSEL3	CKSEL2	CKSEL1	CKSEL0

BODLEVEL Brown-out detection level (hysteresis 130mV, min 2µs)

- 0 ... 4.0V
- 1** ... 2.7V

BODEN Brown-out detection

- 0 ... enabled
- 1** ... disabled

SUT1-0 Startup time

- 10** (maximum)
- (based on clock source)

Fuse High 3-0



7	6	5	4	3	2	1	0
OCDEN	JTAGEN	SPIEN	CKOPT	EESAVE	BOOTSZ1	BOOTSZ0	BOOTRST

EESAVE EEPROM behaviour during Chip Erase

- 0 ... erased
- 1** ... preserved

BOOTSZ1-0 Boot Code size

- 1 1 512 0xFE00
- 1 0 1024 0xFC00
- 0 1 2048 0xF800
- 0 0** 4096 0xF000

BOOTRST Select Reset Vector

- 0 ... jump to Boot Loader
- 1** ... jump to 0x000

Fuse High 7-4



7	6	5	4	3	2	1	0
OCDEN	JTAGEN	SPIEN	CKOPT	EESAVE	BOOTSZ1	BOOTSZ0	BOOTRST

OCDEN Enable OCD

- 0 ... OCD enabled
- 1** ... OCD disabled

JTAGEN Enable JTAG

- 0** ... JTAG enabled
- 1 ... JTAG disabled

SPIEN Enable serial Program and Data Downloading

- 0** ... SPI prog. enabled
- 1 ... disabled

CKOPT Clock options

- 0
- 1**
- (based on clock source)

Extended Fuse

7	6	5	4	3	2	1	0
-	-	-	-	-	-	M103C	WDTON

M103C ATmega103 compatibility mode

0 ... ON 1 ... OFF

WDTON Watchdog control

0 ... WDT always on 1 ... WDTCR controls WDT



Internal RC Oscillator

CKSEL3..0 Frequency

0001 1 MHz

0010 2 MHz

0011 4 MHz

0100 8 MHz



Internal RC Oscillator

OSCCAL Oscillator Calibration

Default: 1MHz calibration value from the signature

value	min %	max %
\$00	50	100
\$7F	75	150
\$FF	100	200

in respect to nominal frequency

if writing EEPROM or Flash, do not set above +10%



Signature

\$000: \$1E (Atmel)

\$001: \$97 (128kB Flash device)

\$002: \$02 (ATmega128)



Calibration

\$000: 1 MHz

\$001: 2 MHz

\$002: 4 MHz

\$003: 8 MHz

During reset, OSCCAL is filled with 1MHz calibration byte. Other values must be stored manually (Flash, EEPROM).

