

Fuse settings for the XNUT-100 and XNUT-105 CPUs

Application Note 107

Revision 2, April 2009

This document contains the default fuse settings for the XNUT-100 and XNUT-105 CPU modules.

Fuse byte	XNUT-100	XNUT-105
Low	0x3F	0xFF
High	0x80	0x90
Extended	0xFF	0xFD

Table 1: Fuse byte values

	XNUT-100	XNUT-105
LockBits	0xFC	0xFC

Table 2: Lock bit values

XNUT-100

- ATmega103 Compatibility Mode [M103C=0]
- Watchdog Timer always on; [WDTON=0]
- On-Chip Debug Enabled; [OCDEN=0]
- JTAG Interface Enabled; [JTAGEN=0]
- Serial program downloading (SPI) enabled; [SPIEN=0]
- Preserve EEPROM memory through the Chip Erase cycle; [EESAVE=0]
- Boot Flash section size=512 words Boot start address=\$FE00; [BOOTS.
- Boot Flash section size=1024 words Boot start address=\$FC00; [BOOT:
- Boot Flash section size=2048 words Boot start address=\$F800; [BOOT:
- Boot Flash section size=4096 words Boot start address=\$F000; [BOOT:
- Boot Reset vector Enabled (default address=\$0000); [BOOTRST=0]
- CKOPT fuse (operation dependent of CKSEL fuses); [CKOPT=0]
- Brown-out detection level at VCC=4.0 V; [BODLEVEL=0]
- Brown-out detection level at VCC=2.7 V; [BODLEVEL=1]
- Brown-out detection enabled; [BODEN=0]
- Ext. Clock; Start-up time: 6 CK + 0 ms; [CKSEL=0000 SUT=00]
- Ext. Clock; Start-up time: 6 CK + 4 ms; [CKSEL=0000 SUT=01]
- Ext. Clock; Start-up time: 6 CK + 64 ms; [CKSEL=0000 SUT=10]
- Int. RC Osc. 1 MHz; Start-up time: 6 CK + 0 ms; [CKSEL=0001 SUT=00]
- Int. RC Osc. 1 MHz; Start-up time: 6 CK + 4 ms; [CKSEL=0001 SUT=01]
- Int. RC Osc. 1 MHz; Start-up time: 6 CK + 64 ms; [CKSEL=0001 SUT=1
- Int. RC Osc. 2 MHz; Start-up time: 6 CK + 0 ms; [CKSEL=0010 SUT=00]
- Int. RC Osc. 2 MHz; Start-up time: 6 CK + 4 ms; [CKSEL=0010 SUT=01]
- Int. RC Osc. 2 MHz; Start-up time: 6 CK + 64 ms; [CKSEL=0010 SUT=1
- Int. RC Osc. 4 MHz; Start-up time: 6 CK + 0 ms; [CKSEL=0011 SUT=00]
- Int. RC Osc. 4 MHz; Start-up time: 6 CK + 4 ms; [CKSEL=0011 SUT=01]
- Int. RC Osc. 4 MHz; Start-up time: 6 CK + 64 ms; [CKSEL=0011 SUT=1
- Int. RC Osc. 8 MHz; Start-up time: 6 CK + 0 ms; [CKSEL=0100 SUT=00]
- Int. RC Osc. 8 MHz; Start-up time: 6 CK + 4 ms; [CKSEL=0100 SUT=01]
- Int. RC Osc. 8 MHz; Start-up time: 6 CK + 64 ms; [CKSEL=0100 SUT=1
- Ext. RC Osc. - 0.9 MHz; Start-up time: 18 CK + 0 ms; [CKSEL=010
- Ext. RC Osc. - 0.9 MHz; Start-up time: 18 CK + 4 ms; [CKSEL=010
- Ext. RC Osc. - 0.9 MHz; Start-up time: 18 CK + 64 ms; [CKSEL=01
- Ext. RC Osc. - 0.9 MHz; Start-up time: 6 CK + 4 ms; [CKSEL=010
- Ext. RC Osc. 0.9 MHz - 3.0 MHz; Start-up time: 18 CK + 0 ms; [CKSEL=
- Ext. RC Osc. 0.9 MHz - 3.0 MHz; Start-up time: 18 CK + 4 ms; [CKSEL=
- Ext. RC Osc. 0.9 MHz - 3.0 MHz; Start-up time: 18 CK + 64 ms; [CKSEL
- Ext. RC Osc. 0.9 MHz - 3.0 MHz; Start-up time: 6 CK + 4 ms; [CKSEL=l
- Ext. RC Osc. 3.0 MHz - 8.0 MHz; Start-up time: 18 CK + 0 ms; [CKSEL=
- Ext. RC Osc. 3.0 MHz - 8.0 MHz; Start-up time: 18 CK + 4 ms; [CKSEL=
- Ext. RC Osc. 3.0 MHz - 8.0 MHz; Start-up time: 18 CK + 64 ms; [CKSEL
- Ext. RC Osc. 3.0 MHz - 8.0 MHz; Start-up time: 6 CK + 4 ms; [CKSEL=l
- Ext. RC Osc. 8.0 MHz - 12.0 MHz; Start-up time: 18 CK + 0 ms; [CKSEL
- Ext. RC Osc. 8.0 MHz - 12.0 MHz; Start-up time: 18 CK + 4 ms; [CKSEL
- Ext. RC Osc. 8.0 MHz - 12.0 MHz; Start-up time: 18 CK + 64 ms; [CKSE
- Ext. RC Osc. 8.0 MHz - 12.0 MHz; Start-up time: 6 CK + 4 ms; [CKSEL=
- Ext. Low-Freq. Crystal; Start-up time: 1K CK + 4 ms; [CKSEL=1001 SUT
- Ext. Low-Freq. Crystal; Start-up time: 1K CK + 64 ms; [CKSEL=1001 SU
- Ext. Low-Freq. Crystal; Start-up time: 32K CK + 64 ms; [CKSEL=1001 SI
- Ext. Crystal/Resonator Low Freq.; Start-up time: 258 CK + 4 ms; [CKSEI
- Ext. Crystal/Resonator Low Freq.; Start-up time: 258 CK + 64 ms; [CKSI
- Ext. Crystal/Resonator Low Freq.; Start-up time: 1K CK + 0 ms; [CKSEL=
- Ext. Crystal/Resonator Low Freq.; Start-up time: 1K CK + 4 ms; [CKSEL=
- Ext. Crystal/Resonator Low Freq.; Start-up time: 1K CK + 64 ms; [CKSE
- Ext. Crystal/Resonator Low Freq.; Start-up time: 16K CK + 0 ms; [CKSE
- Ext. Crystal/Resonator Low Freq.; Start-up time: 16K CK + 4 ms; [CKSE
- Ext. Crystal/Resonator Low Freq.; Start-up time: 16K CK + 64 ms; [CKSI
- Ext. Crystal/Resonator Medium Freq.; Start-up time: 258 CK + 4 ms; [CK
- Ext. Crystal/Resonator Medium Freq.; Start-up time: 258 CK + 64 ms; [C
- Ext. Crystal/Resonator Medium Freq.; Start-up time: 1K CK + 0 ms; [CK
- Ext. Crystal/Resonator Medium Freq.; Start-up time: 1K CK + 4 ms; [CK
- Ext. Crystal/Resonator Medium Freq.; Start-up time: 1K CK + 64 ms; [CK
- Ext. Crystal/Resonator Medium Freq.; Start-up time: 16K CK + 0 ms; [C
- Ext. Crystal/Resonator Medium Freq.; Start-up time: 16K CK + 4 ms; [C
- Ext. Crystal/Resonator Medium Freq.; Start-up time: 16K CK + 64 ms; [C
- Ext. Crystal/Resonator High Freq.; Start-up time: 258 CK + 4 ms; [CKSE
- Ext. Crystal/Resonator High Freq.; Start-up time: 258 CK + 64 ms; [CKS
- Ext. Crystal/Resonator High Freq.; Start-up time: 1K CK + 0 ms; [CKSEL
- Ext. Crystal/Resonator High Freq.; Start-up time: 1K CK + 4 ms; [CKSEL
- Ext. Crystal/Resonator High Freq.; Start-up time: 1K CK + 64 ms; [CKSE
- Ext. Crystal/Resonator High Freq.; Start-up time: 16K CK + 0 ms; [CKSE
- Ext. Crystal/Resonator High Freq.; Start-up time: 16K CK + 4 ms; [CKSE
- Ext. Crystal/Resonator High Freq.; Start-up time: 16K CK + 64 ms; [CKS

Figure 1: AVRStudio screenshot of fuses dialog for XNUT-100

- Mode 1: No memory lock features enabled
- Mode 2: Further programming disabled
- Mode 3: Further programming and verification disabled
- Application Protection Mode 1: No lock on SPM and LPM in Application Section
- Application Protection Mode 2: SPM prohibited in Application Section
- Application Protection Mode 3: LPM and SPM prohibited in Application Section
- Application Protection Mode 4: LPM prohibited in Application Section
- Boot Loader Protection Mode 1: No lock on SPM and LPM in Boot Loader Section
- Boot Loader Protection Mode 2: SPM prohibited in Boot Loader Section
- Boot Loader Protection Mode 3: LPM and SPM prohibited in Boot Loader Section
- Boot Loader Protection Mode 4: LPM prohibited in Boot Loader Section

Figure 2: AVRStudio screenshot of lock bit dialog for XNUT-100

XNUT-105

- Brown-out detection disabled; [BODLEVEL=111]
- Brown-out detection level at VCC=4.1 V; [BODLEVEL=110]
- Brown-out detection level at VCC=4.0 V; [BODLEVEL=101]
- Brown-out detection level at VCC=3.9 V; [BODLEVEL=100]
- Brown-out detection level at VCC=3.8 V; [BODLEVEL=011]
- Brown-out detection level at VCC=2.7 V; [BODLEVEL=010]
- Brown-out detection level at VCC=2.6 V; [BODLEVEL=001]
- Brown-out detection level at VCC=2.5 V; [BODLEVEL=000]
- Reserved for factory tests; [TA0SEL=0]
- On-Chip Debug Enabled; [OCDEN=0]
- JTAG Interface Enabled; [JTAGEN=0]
- Serial program downloading (SPI) enabled; [SPIEN=0]
- Watchdog timer always on; [WDTON=0]
- Preserve EEPROM memory through the Chip Erase cycle; [EESAVE=0]
- Boot Flash section size=512 words Boot start address=\$FE00; [BOOTS=0]
- Boot Flash section size=1024 words Boot start address=\$FC00; [BOOTS=1]
- Boot Flash section size=2048 words Boot start address=\$F800; [BOOTS=2]
- Boot Flash section size=4096 words Boot start address=\$F000; [BOOTS=3]
- Boot Reset vector Enabled (default address=\$0000); [BOOTRST=0]
- Divide clock by 8 internally; [CKDIV8=0]
- Clock output on PORTE7; [CKOUT=0]
- Ext. Clock; Start-up time: 6 CK + 0 ms; [CKSEL=0000 SUT=00]
- Ext. Clock; Start-up time: 6 CK + 4.1 ms; [CKSEL=0000 SUT=01]
- Ext. Clock; Start-up time: 6 CK + 65 ms; [CKSEL=0000 SUT=10]
- Int. RC Osc.; Start-up time: 6 CK + 0 ms; [CKSEL=0010 SUT=00]
- Int. RC Osc.; Start-up time: 6 CK + 4.1 ms; [CKSEL=0010 SUT=01]
- Int. RC Osc.; Start-up time: 6 CK + 65 ms; [CKSEL=0010 SUT=10]
- Ext. Low-Freq. Crystal; Start-up time: 32K CK + 0 ms; Int. Cap.; [CKSEL=0100 SUT=00]
- Ext. Low-Freq. Crystal; Start-up time: 32K CK + 4.1 ms; Int. Cap.; [CKSEL=0100 SUT=01]
- Ext. Low-Freq. Crystal; Start-up time: 32K CK + 65 ms; Int. Cap.; [CKSEL=0100 SUT=10]
- Ext. Low-Freq. Crystal; Start-up time: 1K CK + 0 ms; Int. Cap.; [CKSEL=0101 SUT=00]
- Ext. Low-Freq. Crystal; Start-up time: 1K CK + 4.1 ms; Int. Cap.; [CKSEL=0101 SUT=01]
- Ext. Low-Freq. Crystal; Start-up time: 1K CK + 65 ms; Int. Cap.; [CKSEL=0101 SUT=10]
- Ext. Low-Freq. Crystal; Start-up time: 32K CK + 0 ms; [CKSEL=0101 SUT=00]
- Ext. Low-Freq. Crystal; Start-up time: 32K CK + 4.1 ms; [CKSEL=0101 SUT=01]
- Ext. Low-Freq. Crystal; Start-up time: 32K CK + 65 ms; [CKSEL=0101 SUT=10]
- Ext. Low-Freq. Crystal; Start-up time: 1K CK + 0 ms; [CKSEL=0100 SUT=00]
- Ext. Low-Freq. Crystal; Start-up time: 1K CK + 4.1 ms; [CKSEL=0100 SUT=01]
- Ext. Low-Freq. Crystal; Start-up time: 1K CK + 65 ms; [CKSEL=0100 SUT=10]
- Ext. Low-Freq. Crystal; Start-up time: 1K CK + 0 ms; [CKSEL=0100 SUT=00]
- Ext. Low-Freq. Crystal; Start-up time: 1K CK + 4.1 ms; [CKSEL=0100 SUT=01]
- Ext. Low-Freq. Crystal; Start-up time: 1K CK + 65 ms; [CKSEL=0100 SUT=10]
- Ext. Low-Freq. Crystal; Start-up time: 16K CK + 0 ms; [CKSEL=0100 SUT=00]
- Ext. Low-Freq. Crystal; Start-up time: 16K CK + 4.1 ms; [CKSEL=0100 SUT=01]
- Ext. Low-Freq. Crystal; Start-up time: 16K CK + 65 ms; [CKSEL=0100 SUT=10]
- Ext. Low-Freq. Crystal; Start-up time: 16K CK + 0 ms; [CKSEL=0100 SUT=00]
- Ext. Low-Freq. Crystal; Start-up time: 16K CK + 4.1 ms; [CKSEL=0100 SUT=01]
- Ext. Low-Freq. Crystal; Start-up time: 16K CK + 65 ms; [CKSEL=0100 SUT=10]
- Ext. Low-Freq. Crystal; Start-up time: 258 CK + 4.1 ms; [CKSEL=0100 SUT=00]
- Ext. Low-Freq. Crystal; Start-up time: 258 CK + 65 ms; [CKSEL=0100 SUT=01]
- Ext. Low-Freq. Crystal; Start-up time: 258 CK + 65 ms; [CKSEL=0100 SUT=10]
- Ext. Low-Freq. Crystal; Start-up time: 1K CK + 0 ms; [CKSEL=0100 SUT=00]
- Ext. Low-Freq. Crystal; Start-up time: 1K CK + 4.1 ms; [CKSEL=0100 SUT=01]
- Ext. Low-Freq. Crystal; Start-up time: 1K CK + 65 ms; [CKSEL=0100 SUT=10]
- Ext. Low-Freq. Crystal; Start-up time: 16K CK + 0 ms; [CKSEL=0100 SUT=00]
- Ext. Low-Freq. Crystal; Start-up time: 16K CK + 4.1 ms; [CKSEL=0100 SUT=01]
- Ext. Low-Freq. Crystal; Start-up time: 16K CK + 65 ms; [CKSEL=0100 SUT=10]
- Ext. Low-Freq. Crystal; Start-up time: 258 CK + 4.1 ms; [CKSEL=0100 SUT=00]
- Ext. Low-Freq. Crystal; Start-up time: 258 CK + 65 ms; [CKSEL=0100 SUT=01]
- Ext. Low-Freq. Crystal; Start-up time: 258 CK + 65 ms; [CKSEL=0100 SUT=10]
- Ext. Low-Freq. Crystal; Start-up time: 1K CK + 0 ms; [CKSEL=0100 SUT=00]
- Ext. Low-Freq. Crystal; Start-up time: 1K CK + 4.1 ms; [CKSEL=0100 SUT=01]
- Ext. Low-Freq. Crystal; Start-up time: 1K CK + 65 ms; [CKSEL=0100 SUT=10]
- Ext. Low-Freq. Crystal; Start-up time: 16K CK + 0 ms; [CKSEL=0100 SUT=00]
- Ext. Low-Freq. Crystal; Start-up time: 16K CK + 4.1 ms; [CKSEL=0100 SUT=01]
- Ext. Low-Freq. Crystal; Start-up time: 16K CK + 65 ms; [CKSEL=0100 SUT=10]
- Ext. Low-Freq. Crystal; Start-up time: 258 CK + 4.1 ms; [CKSEL=0100 SUT=00]
- Ext. Low-Freq. Crystal; Start-up time: 258 CK + 65 ms; [CKSEL=0100 SUT=01]
- Ext. Low-Freq. Crystal; Start-up time: 258 CK + 65 ms; [CKSEL=0100 SUT=10]
- Ext. Low-Freq. Crystal; Start-up time: 1K CK + 0 ms; [CKSEL=0100 SUT=00]
- Ext. Low-Freq. Crystal; Start-up time: 1K CK + 4.1 ms; [CKSEL=0100 SUT=01]
- Ext. Low-Freq. Crystal; Start-up time: 1K CK + 65 ms; [CKSEL=0100 SUT=10]
- Ext. Low-Freq. Crystal; Start-up time: 16K CK + 0 ms; [CKSEL=0100 SUT=00]
- Ext. Low-Freq. Crystal; Start-up time: 16K CK + 4.1 ms; [CKSEL=0100 SUT=01]
- Ext. Low-Freq. Crystal; Start-up time: 16K CK + 65 ms; [CKSEL=0100 SUT=10]
- Ext. Low-Freq. Crystal; Start-up time: 258 CK + 4.1 ms; [CKSEL=0100 SUT=00]
- Ext. Low-Freq. Crystal; Start-up time: 258 CK + 65 ms; [CKSEL=0100 SUT=01]
- Ext. Low-Freq. Crystal; Start-up time: 258 CK + 65 ms; [CKSEL=0100 SUT=10]
- Ext. Low-Freq. Crystal; Start-up time: 1K CK + 0 ms; [CKSEL=0100 SUT=00]
- Ext. Low-Freq. Crystal; Start-up time: 1K CK + 4.1 ms; [CKSEL=0100 SUT=01]
- Ext. Low-Freq. Crystal; Start-up time: 1K CK + 65 ms; [CKSEL=0100 SUT=10]
- Ext. Low-Freq. Crystal; Start-up time: 16K CK + 0 ms; [CKSEL=0100 SUT=00]
- Ext. Low-Freq. Crystal; Start-up time: 16K CK + 4.1 ms; [CKSEL=0100 SUT=01]
- Ext. Low-Freq. Crystal; Start-up time: 16K CK + 65 ms; [CKSEL=0100 SUT=10]
- Ext. Low-Freq. Crystal; Start-up time: 258 CK + 4.1 ms; [CKSEL=0100 SUT=00]
- Ext. Low-Freq. Crystal; Start-up time: 258 CK + 65 ms; [CKSEL=0100 SUT=01]
- Ext. Low-Freq. Crystal; Start-up time: 258 CK + 65 ms; [CKSEL=0100 SUT=10]
- Ext. Low-Freq. Crystal; Start-up time: 16K CK + 65 ms; [CKSEL=0100 SUT=10]

Figure 3: AVRStudio screenshot of fuses dialog for XNUT-105

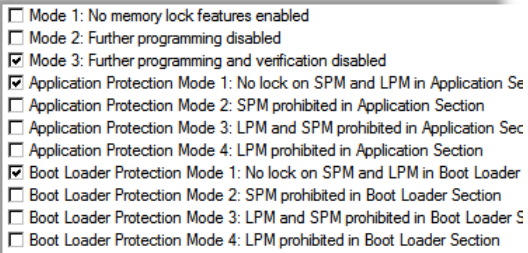
- 
- The screenshot shows a dialog box with a list of lock bit settings. The settings are as follows:
- Mode 1: No memory lock features enabled
 - Mode 2: Further programming disabled
 - Mode 3: Further programming and verification disabled
 - Application Protection Mode 1: No lock on SPM and LPM in Application Section
 - Application Protection Mode 2: SPM prohibited in Application Section
 - Application Protection Mode 3: LPM and SPM prohibited in Application Section
 - Application Protection Mode 4: LPM prohibited in Application Section
 - Boot Loader Protection Mode 1: No lock on SPM and LPM in Boot Loader Section
 - Boot Loader Protection Mode 2: SPM prohibited in Boot Loader Section
 - Boot Loader Protection Mode 3: LPM and SPM prohibited in Boot Loader Section
 - Boot Loader Protection Mode 4: LPM prohibited in Boot Loader Section

Figure 4: AVRStudio screenshot of lock bit dialog for XNUT-105

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