

# Release Notes for the QNX Neutrino 6.4.0 BSP for Atmel AT91SAM9M10-EK Board#

## System requirements#

### Target system#

- QNX Neutrino RTOS 6.4.0
- Board: Atmel at91sam9m10-EK Evaluation Board
- Data-Flash: AT45DCB008D (4 MB) CARD
- DDR2 SDRAM: 16-bit Micron MT47H64M8CF (64 MB) SDRAM
- NAND Flash: Micron 29F2G08ABD (256 MB) NAND Flash

### Host development system#

- QNX Momentics 6.4.0, one of the following host systems:
  - QNX Neutrino 6.4.0
  - Microsoft Windows Vista, XP SP2 or SP3, 2000 SP4
  - Linux Red Hat 8 or 9, Linux Red Hat Enterprise Workstation 3 or 4, Red Hat Fedora Core 3 or 4, or SUSE 10
- Terminal emulation program (Qtalk, Momentics IDE Terminal, tip, HyperTerminal, etc.)
- Windows Machine required SAM-BA application to download the image on Data-Flash.
- RS-232 serial port
- NULL-modem serial cable
- USB cable to connect board with windows Machine

## Getting Started#

### Step 1: Connect your hardware#

Connect the DEBUG port of the AT91SAM9M10 board to the first serial port of your windows machine. Install the SAM-BA application provided by Atmel. Connect the board with Windows Machine using USB Cable.

### Step 2: Build the BSP#

You can build an OS image from the source code or the binary components contained in a BSP package. For instructions about building an OS image, please refer to the chapter Working with a BSP in the Building Embedded Systems manual. After Building the BSP three bin files will be created in images directory.

```
*ifs-at91sam9m10.bin
*ipl-at91sam9m10.bin
*ipl-ifs-at91sam9m10.bin
```

mkflashimage script creates a combined IPL/IFS image as ipl-ifs-at91sam9m10.bin

The mkflashimage script:

```
#!/bin/sh
```

```
# script to build a binary IPL and boot image for ATMEL AT91SAM9M10 Evaluation Kit board.
```

```
# NOTE the image (ipl-ifs-at91sam9m10.bin) must be built as binary, i.e. [virtual=armle,binary] in the buildfile
```

```
set -v
```

```
# Convert IPL into BINARY format
```

```
${QNX_HOST}/usr/bin/ntoarm-objcopy --input-format=elf32-littlearm --output-format=binary -R.data ../install/armle/boot/sys/
```

```
# Pad BINARY IPL
mkrec -s16k -ffull -r ipl-tmp-at91sam9m10.bin > ipl-at91sam9m10.bin

# Combine the BINARY IPL with the BINARY OS Image
cat ./ipl-at91sam9m10.bin ./ifs-at91sam9m10.bin > ipl-ifs-at91sam9m10.bin

# Cleaning up temporary files
rm -f *tmp*
```

### Step 3A: Download the Bootable IFS image.#

The Boot Program integrates different programs that manage download and/or upload into the different memories of the product. First, it initializes the Debug Unit serial port (DBGU) and the USB High Speed Device Port.

- Then the SD Card Boot program is executed, It looks for a boot.bin file in the root directory of a FAT12/16/32 formatted SD Card. If such a file is found, code is downloaded into the internal SRAM. This is followed by a remap and a jump to the first address of the SRAM.
- If the SD Card is not formatted or if boot.bin file is not found, NAND Flash Boot program is then executed. The NAND Flash Boot program searches for a valid application in the NAND Flash memory. If a valid application is found, this application is loaded into internal SRAM and executed by branching at address 0x0000\_0000 after remap.
- If no valid ARM vector sequence is found, the Data-Flash Boot program is then executed. It looks for a sequence of seven valid ARM exception vectors in a Data-Flash connected to the SPI. All these vectors must be B-branch or LDR load register instructions except for the sixth vector. This vector is used to store the size of the image to download. If a valid sequence is found, code is downloaded into the internal SRAM. This is followed by a remap and a jump to the first address of the SRAM. If no valid ARM vector sequence is found, SAM-BA Boot is then executed. It waits for transactions either on the USB device, or on the DBGU serial port.

### Install and setup SAM-BA#

1. Install "Install AT91-ISP v1.13RC2.exe" .
2. Install "ActiveTcl8.5.5.0.287690-win32-ix86-threaded.exe" i.e.TCL environment which is used by SAM-BA (any other TCL environment can also be used) .
3. Connect serial cable with windows machine, and use any serial port application such as teraterm or hyperterminal, and attach it with COM device, with baud rate set as 115200.
4. Restart the board and connect usb cable with windows machine. It will prompt with a new usb hardware found message, and will try to install the corresponding driver.
5. In case, a new usb hardware is not found. The followings sequence of operations should be done to fix ROMBoot on AT91SAM9M10-EK (Revision C) board:
  - 5.1. Unplug power supply and unplug usb device cable from the board.
  - 5.2. Remove jumper JP10 ([NandFlash](#) Chip Select) & JP12 ([DataFlash](#) Chip Select).
  - 5.3. Plug serial cable, launch hyper terminal (115200 bauds, 8 bits, parity none, 1 stop bit, no flow control and then, plug power supply.
  - 5.4. Type on hyper terminal : "Alt-0128 Alt-0128 #" and AT91SAM9M10-EK returns ">" .

- 5.5. Close hyper terminal and close jumper JP12 ([DataFlash](#) Chip Select).
- 5.6. Launch SAM-BA (Choose right COM port and AT91SAM9M10-EK).
- 5.7. Choose [DataFlash](#) media tab in the SAM-BA GUI interface.
- 5.8. Initialize [DataFlash](#) choosing the Enable action in the Scripts rolling menu and press Execute.
- 5.9. Choose Send boot file, press Execute.
- 5.10. Select AT91SAM9M11.bin binary file and press Open ; the media is written down
- 5.11. Close SAM-BA
6. Check device has enumerated properly by looking into device manager .
7. Start SAM-BA 2.9 with \usb\ARM0 as connection.

### **Loading the IFS image using SAM-BA#**

- Select the Nand Flash tab in SAM-BA Application. Execute the Enable Nandflash script.
- Select the ifs-at91sam9m10.bin file to be sent to the target, and then press Send File. Depending on the size of your file, it will take a few seconds up to a minute.

File Script File Link Help

AT91SAM9M10 Memory Display

Start Address:  Refresh

Display format:  ascii  8-bit  16-bit  32-bit

Size in byte(s):

0x00300000	0xEA000006	0xEAFFFFFEE	0xEA000026	0xEAFFFFFEE
0x00300010	0xEAFFFFFEE	0x00005C40	0xEAFFFFFEE	0xEAFFFFFEE
0x00300020	0xE3A0D9C4	0xE28F202C	0xE892001B	0xE1500001
0x00300030	0x0A000003	0xE1510003	0x34902004	0x34812004
0x00300040	0x3AFFFFFEB	0xE3A02000	0xE1530004	0x34832004
0x00300050	0x3AFFFFFC	0xEA000003	0x00305940	0x0030F000
0x00300060	0x0030F300	0x0030F864	0xE59F0074	0xE1A0E00F
0x00300070	0xE12FFF10	0xE59F006C	0xE1A0E00F	0xE12FFF10

DDRAM | SRAM | DataFlash AT45DB/DCB | NorFlash | EEPROM AT24 | SerialFlash AT25/AT26 | NandFlash

Download / Upload File

Send File Name:  Send File

Receive File Name:  Receive File

Address:  Size (For Receive File):  byte(s) Compare sent file with

Scripts

```

-I- 0x20000 bytes written by applet
-I- Writing: 0x20000 bytes at 0x9E0000 (buffer addr : 0x700047E4)
-I- 0x20000 bytes written by applet
-I- Writing: 0x20000 bytes at 0xA00000 (buffer addr : 0x700047E4)
-I- 0x20000 bytes written by applet
-I- Writing: 0x20000 bytes at 0xA20000 (buffer addr : 0x700047E4)
-I- 0x20000 bytes written by applet
-I- Writing: 0x3EEC bytes at 0xA40000 (buffer addr : 0x700047E4)
-I- 0x3EEC bytes written by applet
(AT91-ISP v1.13RC2) 26 %
    
```

Now on your terminal you will see output as follows:

RomBOOT

>

QNX Neutrino Initial Program Loader for ATMEL AT91SAM9M10-EK

Commands:

Press 'D' for serial download, using the 'sendnto' utility

Press 'N' to Boot an OS image from NAND flash

Atmel K9F2G08U0M detected.

QNX IFS image detected on page: 00000009 Offset: 00000000 Size: 00A4EEE8

#####Done

found image, calling image setup...

image\_setup OK, calling image start...

PIO init : DBGU, USART1, SPI0, Audio(AC97), NAND, USB, LCD, TWI) (I2C), EMAC.

CPU0: Dcache: 1024x32 WB

CPU0: Icache: 1024x32

CPU0: 41069265: arm926 rev 5 133MHz

elf\_map: 1M va=fe000000 pa=71000000 sz=00100000

elf\_map: 1M va=fe000000 pa=71000000 sz=00100000

Header size=0x0000009c, Total Size=0x00000500, #Cpu=1, Type=4

Section:system\_private offset:0x000001f0 size:0x00000068

syspage ptr user:fc404000 kernel:fc404000

cpupage ptr user:fc404800 kernel:fc404800 spacing:84

kdebug info:00000000 callback:00000000

boot pgms: idx=0

0) base paddr:71011000 start addr:fe03e838

ramsize:00000000 pagesize:00001000

Section:qtime offset:0x00000148 size:0x00000060

boot:00000000 CPS:0000000002faf08 rate/scale:320000000/-15 intr:1

Section:callout offset:0x000000a0 size:0x00000048

reboot:fc404678 power:fc404698

timer\_load:fc4046ac reload:fc4046d4 value:fc404700

0) display:fc404720 poll:fc404744 break:fc404768

1) display:00000000 poll:00000000 break:00000000

Section:cpuinfo offset:0x000001a8 size:0x00000020

0) cpu:41069265 flags:40000000 speed:00000085 cache i/d:1/0 name:53

Section:cacheattr offset:0x000004c0 size:0x00000040

0) flags:32 size:0020 #lines:0400 control:fc404500 next:255

1) flags:11 size:0020 #lines:0400 control:fc404554 next:255

Section:meminfo offset:0x00000500 size:0x00000000

Section:asinfo offset:0x00000320 size:0x00000160

0000) 0000000000000000-00000000ffffff o:ffff a:0010 p:100 c:00000000 n:21

0020) 0000000070000000-0000000077ffffff o:0000 a:0017 p:100 c:00000000 n:28

0040) 0000000000000000-00000000ffffff o:ffff a:0010 p:100 c:00000000 n:21

0060) 0000000070000000-0000000077ffffff o:0040 a:0007 p:100 c:00000000 n:32

0080) 000000007100e108-0000000071a4eee7 o:0000 a:0005 p:100 c:00000000 n:60

00a0) 0000000071000000-000000007100e107 o:0000 a:0007 p:100 c:00000000 n:68

00c0) 000000007100e108-0000000071a4eee7 o:0000 a:0007 p:100 c:00000000 n:76

00e0) 0000000070000000-0000000070007fff o:0020 a:0007 p:100 c:00000000 n:84

0100) 0000000070010854-0000000070ffffff o:0020 a:0007 p:100 c:00000000 n:84

0120) 0000000071a4eee8-0000000073dcffff o:0020 a:0007 p:100 c:00000000 n:84

0140) 0000000073fd0000-0000000077ffffff o:0020 a:0007 p:100 c:00000000 n:84

Section:hwinfo offset:0x000002d8 size:0x00000048

0) size:3 tag:3 isize:3, iname:0, owner:65535, kids:1

12) size:3 tag:17 isize:3, iname:9, owner:0, kids:1

24) size:3 tag:3 isize:3, iname:37, owner:12, kids:1

36) size:4 tag:46 isize:4, iname:41, owner:24, kids:0

00 00 00 00

Section:typed\_strings offset:0x00000258 size:0x00000020

off:0 type:5 string:'UNKNOWN'

off:12 type:2 string:'localhost'

Section:strings offset:0x00000278 size:0x00000060

[0]'hw' [3]'Group' [9]'unknown' [17]'Bus' [21]'memory' [28]'ram' [32]'1to1'

[37]'rtc' [41]'NONE' [46]'Device' [53]'arm926' [60]'imagefs' [68]'startup'

[76]'bootram' [84]'sysram'

Section:intrinfo offset:0x00000480 size:0x00000040

0) vector\_base:00000000, #vectors:32, cascade\_vector:7ffffff

cpu\_intr\_base:00000000, cpu\_intr\_stride:0, flags:0000

id => flags:8000, size:002c, rtn:fc4045c0

```
eoi => flags:9000, size:0028, rtn:fc4045ec
mask:fc404614, unmask:fc404638, config:00000000
Section:smp offset:0x00000500 size:0x00000000
Section:pminfo offset:0x00000500 size:0x00000000
Section:mdriver offset:0x00000500 size:0x00000000
Section:boxinfo offset:0x000001c8 size:0x00000028
hw_flags:00000000
Section:cpu offset:0x00000128 size:0x00000020
page_flush:fc404584 page_flush_deferred:fc4045bc
upte_ro:00000aae upte_rw:00000ffe
kpte_ro:0000000e kpte_rw:0000055e
mask_nc:0000000c
mmu_cr1:00051078 set:0000317f clr:00000000 -> 0005317f
```

```
System page at phys:70010000 user:fc404000 kern:fc404000
Starting next program at vfe03e838
cpu_startnext: cpu0 -> fe03e838
Welcome to QNX Neutrino 6.4 on the Atmel AT91SAM9M10 Board
Starting DBGU driver...
Starting Serial USART 1 driver ...
Starting Ethernet driver ...
Starting SPI0 driver...
Starting Audio driver...
Starting Graphics driver...
Starting USB driver...
starting Input Drivers...
Starting i2c1 driver...
Starting i2c2 driver...
#
```

You can test the OS simply by executing any shell builtin command or any command residing within the OS image (e.g. ls).

### **Step 3B: Reprogram the IPL.#**

In case if Board is new or IPL gets corrupted, We can reprogram IPL using SAM-BA application.

- Select the Nandflash tab in SAM-BA application window, . Execute the Enable Nandflash script.
- Select the ipl-at91sam9m10.bin file to be sent to the target, and then press Send File. It will take a few seconds up to a minute.
- Sanpshot is as follows:

File Script File Link Help

AT91SAM9M10 Memory Display

Start Address:  Refresh

Size in byte(s):

Display format:  ascii  8-bit  16-bit  32-bit

0x00300000	0xEA000006	0xEAFFFFFEE	0xEA000026	0xEAFFFFFEE
0x00300010	0xEAFFFFFEE	0x00005C40	0xEAFFFFFEE	0xEAFFFFFEE
0x00300020	0xE3A0D9C4	0xE28F202C	0xE892001B	0xE1500001
0x00300030	0x0A000003	0xE1510003	0x34902004	0x34812004
0x00300040	0x3AFFFFFEB	0xE3A02000	0xE1530004	0x34832004
0x00300050	0x3AFFFFFC	0xEA000003	0x00305940	0x0030F000
0x00300060	0x0030F300	0x0030F864	0xE59F0074	0xE1A0E00F
0x00300070	0xE12FFF10	0xE59F006C	0xE1A0E00F	0xE12FFF10

DDRAM | SRAM | DataFlash AT45DB/DCB | NorFlash | EEPROM AT24 | SerialFlash AT25/AT26 | NandFlash

Download / Upload File

Send File Name:  Send File

Receive File Name:  Receive File

Address:  Size (For Receive File):  byte(s) Compare sent file with

Scripts

```

-I- Buffer address : 0x700047E4
-I- Buffer size: 0x20000 bytes
-I- Applet initialization done
(AT91-ISP v1.13RC2) 26 % send_file {NandFlash} "Y:/package/download_pckg/m10/images/ipl-at91sam9m10.bin" 0x0 0
-I- Send File Y:/package/download_pckg/m10/images/ipl-at91sam9m10.bin at address 0x0
GENERIC::SendFile Y:/package/download_pckg/m10/images/ipl-at91sam9m10.bin at address 0x0
-I- File size : 0x4000 byte(s)
-I- Writing: 0x4000 bytes at 0x0 (buffer addr : 0x700047E4)
-I- 0x4000 bytes written by applet
(AT91-ISP v1.13RC2) 26 % |
    
```

### Step 3C: Download the combined IPL and IFS onto Data-Flash#

- Select the Nandflash tab in SAM-BA application window, . Execute the Enable Nandflash script.
- Select the ipl-ifs-at91sam9m10.bin file to be sent to the target, and then press Send File. It will take a few seconds up to a minute.
- Sanpshot is as follows:

File Script File Link Help

AT91SAM9M10 Memory Display

Start Address :  Refresh

Size in byte(s) :

Display format  
 ascii  8-bit  16-bit  32-bit

0x00300000	0xEA000006	0xEAFFFFFEE	0xEA000026	0xEAFFFFFEE
0x00300010	0xEAFFFFFEE	0x00005C40	0xEAFFFFFEE	0xEAFFFFFEE
0x00300020	0xE3A0D9C4	0xE28F202C	0xE892001B	0xE1500001
0x00300030	0x0A000003	0xE1510003	0x34902004	0x34812004
0x00300040	0x3AFFFFFEB	0xE3A02000	0xE1530004	0x34832004
0x00300050	0x3AFFFFFC	0xEA000003	0x00305940	0x0030F000
0x00300060	0x0030F300	0x0030F864	0xE59F0074	0xE1A0E00F
0x00300070	0xE12FFF10	0xE59F006C	0xE1A0E00F	0xE12FFF10

DDRAM | SRAM | DataFlash AT45DB/DCB | NorFlash | EEPROM AT24 | SerialFlash AT25/AT26 | NandFlash

Download / Upload File

Send File Name :  Send File

Receive File Name :  Receive File

Address :  Size (For Receive File) :  byte(s) Compare sent file with

Scripts

```
-I- 0x20000 bytes written by applet
-I- Writing: 0x20000 bytes at 0x9E0000 (buffer addr : 0x700047E4)
-I- 0x20000 bytes written by applet
-I- Writing: 0x20000 bytes at 0xA00000 (buffer addr : 0x700047E4)
-I- 0x20000 bytes written by applet
-I- Writing: 0x20000 bytes at 0xA20000 (buffer addr : 0x700047E4)
-I- 0x20000 bytes written by applet
-I- Writing: 0x7EEC bytes at 0xA40000 (buffer addr : 0x700047E4)
-I- 0x7EEC bytes written by applet
(AT91-ISP v1.13RC2) 26 %
```

- Now on your terminal you will see output as follows:

RomBOOT

>

QNX Neutrino Initial Program Loader for ATMEL AT91SAM9M10-EK

Commands:

Press 'D' for serial download, using the 'sendnto' utility

Press 'N' to Boot an OS image from NAND flash

Atmel K9F2G08U0M detected.

QNX IFS image detected on page: 00000009 Offset: 00000000 Size: 00A4EEE8

#####Done



found image, calling image setup...  
image\_setup OK, calling image start...

PIO init : DBGU, USART1, SPI0, Audio(AC97), NAND, USB, LCD, TWI) (I2C), EMAC.

CPU0: Dcache: 1024x32 WB

CPU0: Icache: 1024x32

CPU0: 41069265: arm926 rev 5 133MHz

elf\_map: 1M va=fe000000 pa=71000000 sz=00100000

elf\_map: 1M va=fe000000 pa=71000000 sz=00100000

Header size=0x0000009c, Total Size=0x00000500, #Cpu=1, Type=4

Section:system\_private offset:0x000001f0 size:0x00000068

syspage ptr user:fc404000 kernel:fc404000

cpupage ptr user:fc404800 kernel:fc404800 spacing:84

kdebug info:00000000 callback:00000000

boot pgms: idx=0

0) base paddr:71011000 start addr:fe03e838

ramsize:00000000 pagesize:00001000

Section:qtime offset:0x00000148 size:0x00000060

boot:00000000 CPS:0000000002faf08 rate/scale:320000000/-15 intr:1

Section:callout offset:0x000000a0 size:0x00000048

reboot:fc404678 power:fc404698

timer\_load:fc4046ac reload:fc4046d4 value:fc404700

0) display:fc404720 poll:fc404744 break:fc404768

1) display:00000000 poll:00000000 break:00000000

Section:cpuinfo offset:0x000001a8 size:0x00000020

0) cpu:41069265 flags:40000000 speed:00000085 cache i/d:1/0 name:53

Section:cacheattr offset:0x000004c0 size:0x00000040

0) flags:32 size:0020 #lines:0400 control:fc404500 next:255

1) flags:11 size:0020 #lines:0400 control:fc404554 next:255

Section:meminfo offset:0x00000500 size:0x00000000

Section:asinfo offset:0x00000320 size:0x00000160

0000) 0000000000000000-00000000ffffff o:ffff a:0010 p:100 c:00000000 n:21

0020) 0000000070000000-0000000077ffffff o:0000 a:0017 p:100 c:00000000 n:28

0040) 0000000000000000-00000000ffffff o:ffff a:0010 p:100 c:00000000 n:21

0060) 0000000070000000-0000000077ffffff o:0040 a:0007 p:100 c:00000000 n:32

0080) 000000007100e108-0000000071a4eee7 o:0000 a:0005 p:100 c:00000000 n:60

00a0) 0000000071000000-000000007100e107 o:0000 a:0007 p:100 c:00000000 n:68

00c0) 000000007100e108-0000000071a4eee7 o:0000 a:0007 p:100 c:00000000 n:76

00e0) 0000000070000000-0000000070007fff o:0020 a:0007 p:100 c:00000000 n:84

0100) 0000000070010854-0000000070ffffff o:0020 a:0007 p:100 c:00000000 n:84

0120) 0000000071a4eee8-0000000073dcffff o:0020 a:0007 p:100 c:00000000 n:84

0140) 0000000073fd0000-0000000077ffffff o:0020 a:0007 p:100 c:00000000 n:84

Section:hwinfo offset:0x000002d8 size:0x00000048

0) size:3 tag:3 isize:3, iname:0, owner:65535, kids:1

12) size:3 tag:17 isize:3, iname:9, owner:0, kids:1

24) size:3 tag:3 isize:3, iname:37, owner:12, kids:1

36) size:4 tag:46 isize:4, iname:41, owner:24, kids:0

00 00 00 00

Section:typed\_strings offset:0x00000258 size:0x00000020

off:0 type:5 string:'UNKNOWN'

off:12 type:2 string:'localhost'

Section:strings offset:0x00000278 size:0x00000060

[0]'hw' [3]'Group' [9]'unknown' [17]'Bus' [21]'memory' [28]'ram' [32]'ItoI'

[37]'rtc' [41]'NONE' [46]'Device' [53]'arm926' [60]'imagefs' [68]'startup'

[76]'bootram' [84]'sysram'

Section:intrinfo offset:0x00000480 size:0x00000040

0) vector\_base:00000000, #vectors:32, cascade\_vector:7ffffff

cpu\_intr\_base:00000000, cpu\_intr\_stride:0, flags:0000

```
id => flags:8000, size:002c, rtn:fc4045c0
eoi => flags:9000, size:0028, rtn:fc4045ec
mask:fc404614, unmask:fc404638, config:00000000
Section:smp offset:0x00000500 size:0x00000000
Section:pminfo offset:0x00000500 size:0x00000000
Section:mdriver offset:0x00000500 size:0x00000000
Section:boxinfo offset:0x000001c8 size:0x00000028
hw_flags:00000000
Section:cpu offset:0x00000128 size:0x00000020
page_flush:fc404584 page_flush_deferred:fc4045bc
upte_ro:00000aae upte_rw:00000ffe
kpte_ro:0000000e kpte_rw:0000055e
mask_nc:0000000c
mmu_cr1:00051078 set:0000317f clr:00000000 -> 0005317f
```

```
System page at phys:70010000 user:fc404000 kern:fc404000
Starting next program at vfe03e838
cpu_startnext: cpu0 -> fe03e838
Welcome to QNX Neutrino 6.4 on the Atmel AT91SAM9M10 Board
Starting DBGU driver...
Starting Serial USART 1 driver ...
Starting Ethernet driver ...
Starting SPI0 driver...
Starting Audio driver...
Starting Graphics driver...
Starting USB driver...
starting Input Drivers...
Starting i2c1 driver...
Starting i2c2 driver...
#
```

You can test the OS simply by executing any shell builtin command or any command residing within the OS image (e.g. ls).

## Summary of driver commands#

The driver command lines below are specific to the Atmel AT91SAM9M10-EK board. See the online docs for each driver for additional command-line options and other details.

Note: Some of the following drivers are commented out in the default buildfile. To use the drivers in the target hardware, you'll need to uncomment them in your buildfile, rebuild the image, and load the image into the board.

### Startup:#

Command:

```
startup-at91sam9m10 -r 0x73dd0000,0x200000,1 -vvvvvvv
```

### Serial:#

Command:

```
devc-serusart -F -S -u2 -b115200 -c133000000 0xffff90000^2,8
```

Required binaries:

- devc-serusart

Command:

```
devc-serdebug -e -F -S -b115200 -c133000000 0xffffee00,1
```

Required binaries:

- devc-serdebug

### **SPI:#**

Command:

```
spi-master -d at91sam9xx base=0xFFFA4000,irq=14,clock=133000000
```

Required binaries:

- spi-master
- spi-at91sam9xx.so

### **Network:#**

Command:

```
io-pkt-v4 -dat91sam9xx mac=662200041615 -ptcpip
```

Required binaries:

- devnp-at91sam9xx.so
- io-pkt-v4

### **Audio:#**

Command:

```
io-audio -d at91sam9xx_ac97 ioport=0xfffac000,irq=24
```

Required binaries:

- io-audio
- libasound.so
- deva-mixer-ac97.so
- deva-ctrl-at91sam9xx\_ac97.so

### **USB:#**

Command:

```
io-usb -dehci ioport=0x00800000,irq=22 -dohci ioport=0x00700000,irq=22
```

Required binaries and libraries:

- io-usb
- usb
- devu-ohci.so
- devu-ehci.so
- libusbdi.so
- class drivers

## **I2C#**

### Command:

```
i2c-at91sam9xx -I1 -c133000000 --u0
```

```
i2c-at91sam9xx -I2 -c133000000 --u1
```

### Required binaries:

- i2c-at91sam9xx

### Libraries:

- libi2c-master.a

**Note:** 7bit device address and 2 byte internal address supported. When writing to a device two bytes for internal address needs to be specified first

## **ETFS NAND flash#**

### Command:

```
fs-etfs-at91sam9xx -D addr=0x40000000,board_id=at91sam9m10-ek -m /fs/etfs
```

### Required binaries:

- fs-etfs-at91sam9xx
- etfsctl

**Note:** For more information about these commands, see the Neutrino Utilities Reference.

## **Graphics#**

### Command:

```
Photon &  
waitfor /dev/photon  
io-display -dvid=0x0,did=0x0  
io-graphics  
pwm &  
pterm -x10 -y10 -h250 -w200 -t"QNX 6.4.0" -K 03 &  
devc-pty &
```

### Required binaries:

- devg-at91sam9xx.so
- libph.so
- libAp.so
- libphexlib.so
- libphrender.so
- libffb.so
- libdisputil.so
- libimg.so.1
- ttFFcore.so
- PHFcore.so

- FCcore.so
- libFF-T2K.so
- libblkcache.so
- libFF-T2K-fm.so
- libFF-T2K-cache.so
- phfont.so
- libfontutils.so
- libfont.so

Required configuration files:

- /usr/photon/config/at91sam9xx.conf=\${PWD}/../src/hardware/devg/at91sam9xx/at91sam9xx.conf
- /etc/system/config/display.conf=\${PWD}/../src/hardware/devg/at91sam9xx/display.conf

## About graphics#

This driver currently supports the AT91SAM9M10 integrated LCD controller . It was developed on the Atmel AT91SAM9M10 Evaluation Board. This is the GF graphics driver is loaded by io-display.

## LCD Displays#

- By default the driver sets up the Hitachi TX09D71VM1CCA TFT with the AT91SAM9M10 reference board.

You can use the driver configuration file at91sam9xx.conf to change display formats.

HW Format	QNX Format	Notes
16-bit	16-bit	QNX framework format is RGB565
24-bit	24-bit	QNX framework format is RGB888

## Reserving Memory / Memory Restrictions#

The Atmel AT91SMA9M10 is a UMA system (Unified Memory Architecture). This means there is no dedicated video memory in the system. Surfaces displayed by the LCD controller, and rendered by the CPU, reside in system memory

- To ensure there is enough memory available for graphics, we recommend that memory be reserved at startup by using the -r option to startup.

For example to reserve 2 MB of memory:

```
startup-at91sam9m10 -r 0x73dd0000,0x200000,1 -vvvvvvv
```

where 0x73dd0000 is the physical base address of memory, and 0x200000 is the size of memory reserved in bytes.

For a list of options available to the driver please see the at91sam9xx.conf file.

## Known Issues for This BSP#

- The conf file (at91samxx.conf) of graphics driver devg-at91sam9xx.so does not link against the prebuilt directory and give warning "Unable to find at91sam9xx.conf in search paths." . **Workaround:** Modify the Absolute Location on Host property in System Builder Projects tab in IDE.
- The devnp-at91sam9xx.so network driver binary does not link against the prebuilt directory and give warning "Unable to find devnp-at91sam9xx.so in search paths." . **Workaround:** Modify the Absolute Location on Host property in System Builder Projects tab in IDE.