
BitCtrl Systems GmbH

QNX6.5.0SP1 BSP for AM3359 IDK

User's Guide

Version 1.0

QNX6.5.0SP1 BSP for AM3359 IDK	Version: 1.0
User's Guide	Date: October 05, 2012
State: Approved	

Document History

Date	Ver.	Description	Author
October 02, 2012	0.1	Initialisation from various plaintext files	A. Uhlmann
October 05, 2012	1.0	Final reading and approval	A. Uhlmann

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1 Introduction

1.1 Purpose

The purpose of this document is to describe the installation, building, integration and usage of the "QNX6.5.0SP1 BSP for AM3359 IDK".

This document refers to version 1.0, build date September 21, 2012, of the BSP.

This BSP is an amendment to the BSP for the AM335x General-Purpose EVM supplied by QSS. Its only component is the startup program, which is a copy of the one supplied in the original BSP. It contains those modifications necessary to boot QNX Neutrino RTOS on the IDK, hopefully without breaking the boot process on the GP EVM. Ideally, the sources should be merged to provide a single startup program for both GP EVM and IDK.

The BSP contains no prebuilt binaries. These are pulled in by reference from the original BSP. Because of this, the original BSP has to be imported and built first, and the directory must be named bsp-ti-am335x-evm-src.

1.2 Scope

All content within this document is only valid in conjunction with the realisation of the project "QNX6.5.0SP1 BSP for AM3359 IDK".

1.3 References

[IDK] Information about the IDK can be found here: <http://www.ti.com/am3359idk>.

[GPEVMBSP] Information about the GP EVM BSP can be found here:

<http://community.qnx.com/sf/wiki/do/viewPage/projects.bsp/wiki/TiAm335Evm>.

1.4 Contact and Support

BitCtrl Systems GmbH
 Weißenfelser Str. 67
 04229 Leipzig
 Germany

Use our online form to request the BSP:

http://www.bitctrl.de/kontakt/kontakt_en.shtml

For support, use our helpdesk:

<http://www.bitctrl.de/helpdesk/>

2 Importing and Building the Source Code in QNX Momentics IDE

Use the Import Wizard and choose QNX → BSP and Source Package.

1. Import and build the GP EVM BSP (<http://community.qnx.com/sf/wiki/do/viewPage/projects.bsp/wiki/TiAm335Evm>). Do not change the project name; it must be "bsp-ti-am335x-evm" since it is referenced with relative paths.
2. Import the IDK BSP and build it.
3. Import the System Builder Project `bsp-ti-am3359IDK` and build it. It contains a prebuilt version of the `devnp-am335x.so` built using the Beagle

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Bone BSP. The BSP for the GP EVM only contained a prebuilt binary which uses RGMII which doesn't work on the IDK. The latest release of the GP EVM BSP now contains the source for the driver so one could modify its source.

4. Prepare an SD card according to the release notes of the GP EVM BSP. Use the MLO provided with the starter kit. It will load files it doesn't understand (e.g. which don't have a `ti_header` prepended to it) to the fixed location `DDR_RAM_START`. Therefore the parameter "Image Address" must be set to `0x80000000`.
5. Copy the generated image "bsp-ti-am3359IDK.ifs" to the SD card and rename it "app", otherwise MLO will not find it.
6. Connect terminal program to J10 on the daughter board (this is UART3) using null-modem cable, 115200 baud 8-N-1.
7. Power the board
8. Import and build the System Builder Project "bsp-ti-am3359idk_std". It will be used by the installation procedure in chapter 4.

3 Tested Devices

No.	Device	Command line
1	UART3	<code>devc-seromap -e -F -b115200 -c48000000/16 0x481A6000^2,44</code>
2	UART5	<code>devc-seromap -e -F -b115200 -c48000000/16 0x481AA000^2,46</code>
3	On-board Ethernet interface 1	<code>io-pkt-v4 -d am335x -p tcpip stacksize=40960 waitfor /dev/socket ifconfig dm0 192.168.1.151</code>
4	USB Host with DLink DUB-E100 Ethernet dongle	<code>io-usb -vvv -d dm816x-mg ioport=0x47401400,irq=18 -d dm816x-mg ioport=0x47401c00,irq=19 waitfor /dev/io-usb/io-usb 4 display_msg Wait for device enumeration ... sleep 4 io-pkt-v4 -i1 -dasix -p tcpip prefix=/alt SOCK=/alt ifconfig en0 192.168.2.151</code>
5	RTC on I2C bus number 0	<code>i2c-omap35xx-j5 -i 70 -p0x44E0B000 --u0 rtc tps65910</code>
6	Board Id driver	<code>bdid-am335x & waitfor /dev/bdid cat /dev/bdid</code>
7	On-board NAND flash	<code>fs-etfs-omap3530_micron -D gpmc=0x50000000 -r2433 -m /opt Quick test: Read: 1.8 MB/s, Write: 1.5 MB/s</code>
8	USB Mass Storage	<code>devb-umass mount -tdos /dev/hd1t12 /fs/usb0 Quick test with USB stick Read: 3.5 MB/s, Write 1.5 MB/s</code>
9	MMC/SD card (the boot device)	<code>devb-mmc-sd-jacinto5 blk automount=hd0t12:/fs/sd0 mmc-sd verbose=5,ioport=0x48060100,irq=64,ioport=0x49000000,dma=24,dma=25 Quick test with card delivered with IDK board Read: 3 MB/s, Write: 1.1 MB/s</code>
10	Activity LEDs	<code>am3359idk_leddemo &</code>

Table 1: Tested Devices

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4 Installation of the BSP and runtime environment on the target platform

There are two steps: Use a full-blown image to initialize the NAND flash and copy core runtime files to it. Then, use a much smaller boot image containing only NAND flash driver. It will be started and mounted to the root, and all other files will be taken from NAND.

The following procedure assumes you have received a CD (or an ISO image) with various prebuilt files, or you have built them yourself.

1. Plug the SD card delivered with the IDK into Windows Development Host:

```
F:\>dir

Datenträger in Laufwerk F: ist INDSDK

Volumeseriennummer: EAFF-2CD7

Verzeichnis von F:\

17.02.2012  04:22          41.828 MLO
17.02.2012  04:22        199.072 app
17.02.2012  05:16    <DIR>          TI_AM335x_SYSBIOS_Ind_SDK_01_00_00_02
                2 Datei(en)          240.900 Bytes
                1 Verzeichnis(se),  2.387.296.256 Bytes frei

F:\>.
```

2. Rename the EC demo from “app” to “app_EC_demo”, or delete the file.
3. Copy folder “QNX” to SD card.
4. Extract bsp-ti-am3359IDK.ifs.install.zip to SD card root, rename the resulting file bsp-ti-am3359IDK.ifs to “app”.
5. Safely remove SD card, plug it into IDK SD slot and power the board. You should now see a QNX startup, like this:

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```

I2C write failed, error 17
AM335x Industrial Development Kit 15x15
Display board not detected
Unable to detect profile. Defaulting to profile 8.
Jumping to QNX
VFPv3: fpsid=410330c3
coproc_attach(10): replacing fe07a700 with fe079f8c
coproc_attach(11): replacing fe07a700 with fe079f8c
QNX Neutrino v6.5.0SP1 Texas Instruments AM3359 IDK ($LastChangedRevision: 37208 $)
Starting MMC/SD driver...
starting I2C driver...
starting Board ID driver...
Board ID
header: ee3355aa
name: A33515BB
version: 1.2A
serial: 16124P180016
config: SKU#02 base board for industrial motor control evm
mac1: ff.ff.ff.ff.ff.ff
mac2: ff.ff.ff.ff.ff.ff
mac3: ff.ff.ff.ff.ff.ff
header: ee3355aa
name: A335IAMC
version: 1.2A
serial: 16124P140005
config: SKU#00
I2C write failed (DCMD_I2C_SEND), error 5
Unable to read /dev/i2c0 (errno=0)
Setting OS Clock from on-board RTC
Starting serial driver for UART5
Starting USB OTG Host driver...
Wait for device enumeration ...
Path=0 - TI OMAP3 MMCHS
target=0 lun=0 Direct-Access(0) - SD:2 SA04G Rev: 1.0
Starting onboard network driver...
Getting network address with DHCP...
dm0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
address: d4:94:a1:98:e5:90
media: Ethernet none (100baseTX full-duplex)
status: active
inet 192.168.1.212 netmask 0xffffffff broadcast 192.168.1.255
Starting inetd daemon
#

```

6. Set the local time using date and save it to HW clock:
date 2012...
rtc -s -l tps65910
7. The SD card should be mounted under /fs/sd0:
mount
/dev/hd0t12 on /fs/sd0 type dos (fat32)
8. Start NAND flash driver and erase NAND: (takes some 10 secs)
fs-etfs-omap3530_micron -D gpmc=0x50000000 -r1200 -e -m /opt
WARNING: ALL DATA ON NAND WILL BE LOST!!!!
9. Use any procedure to copy a full runtime environment to /opt (e.g. bin, sbin,
lib, lib/dll, usr/lib, ...)

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10. Shut down the board, remove SD card and plug it back into Windows Host. Extract the standard boot image, bsp-ti-am3359IDK.ifs.prod.zip, to the SD card root, same as in step 4.
11. delete "app", rename the standard image just copied to "app".
12. Safely remove SD card, plug it into IDK SD slot and power the board. You should now see a QNX startup, like this:

```

I2C write failed, error 17
AM335x Industrial Development Kit 15x15
Display board not detected
Unable to detect profile. Defaulting to profile 8.
Jumping to QNX
Welcome to QNX Neutrino v6.5.0SP1 on the Texas Instruments AM3359 IDK ($LastChangedRevision:
37208 $)
Starting ETFS driver with main filesystem...
starting I2C driver for bus 0 (for RTC) ...
Starting serial driver on UART5
Booting into /etc/system/sysinit
Starting Board ID driver...
Board ID
header: ee3355aa
name: A33515BB
version: 1.2A
serial: 16124P180016
config: SKU#02 base board for industrial motor control evm
mac1: ff.ff.ff.ff.ff.ff
mac2: ff.ff.ff.ff.ff.ff
mac3: ff.ff.ff.ff.ff.ff
header: ee3355aa
name: A335IAMC
version: 1.2A
serial: 16124P140005
config: SKU#00
I2C write failed (DCMD_I2C_SEND), error 5
Unable to read /dev/i2c0 (errno=0)
Starting MMC/SD driver...
Starting USB OTG Host driver...
Wait for device enumeration ...
Path=0 - TI OMAP3 MMCHS
target=0 lun=0 Direct-Access(0) - SD:2 SA04G Rev: 1.0
Starting onboard network driver...
Getting network address with DHCP...
dm0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
address: d4:94:a1:98:e5:90
media: Ethernet none (100baseTX full-duplex)
status: active
inet 192.168.1.212 netmask 0xffffffff broadcast 192.168.1.255
Starting extra run commands
Starting NTP Daemon...
Creating partitions APP (60%), debug (10%) and untrusted (10%)...
Starting inetd in Partition 'debug'...
Starting QConn in Partition 'debug'...
rc.local finished.
login:

```


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5 Troubleshooting

If the board does not boot, rebuild the image with `startup-am335xevm -vvvv`. Look at the output to see what the last message is.

Let the original EtherCAT demo run to verify that serial connection is working.

6 List of enhancements and fixes for this release

- This is the first release.

7 BSP History (older releases)

No.	Date	Description
1.0	September 21, 2012	Initial release

Table 2: BSP History

8 Known Issues for this release

No.	Description	Reference
1	The MPU clock is statically configured to 500MHz as in the GP EVM, although the board can run at 720 MHz. Clock and Core PLL settings need to be reviewed.	
2	The pinmux is not yet set up to use the PRUs.	
3	The on-board RTC doesn't keep the date when board is powered down.	
4	startup and Board-ID utility complain about not being able to write to I2C: I2C write failed (DCMD_I2C_SEND), error 5 Unable to read /dev/i2c0 (errno=0) This is because they try to read the EEPROM from the display board which is not available on the IDK. The message can be ignored.	
5	Because the BSP needs the original BSP, the auto-generated System Builder Project doesn't build. We provide a dedicated System Builder Project that has all references set up correctly.	

Table 3: Known Issues

9 Usage Restrictions

Not currently known.

10 Glossary

Term	Description
BitCtrl	BitCtrl Systems GmbH
BSP	Board Support Package
DMA	Direct Memory Access
EVM	Evaluation Module
GP EVM	General-Purpose Evaluation Module
IDK	Industrial Development Kit
IRQ	Interrupt request
MB	Megabytes (=1024*1024=2 ²⁰ bytes)
PIO	Programmed I/O
QSS	QNX Software Systems. Manufacturer of the QNX Neutrino RTOS which the BSP is developed for.

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RAM	Random Access Memory
TB	Terabytes (=1024*1024*1024*1024=2 ⁴⁰ bytes)
TI	Texas Instruments Incorporated

Table 4: Glossary

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