**QNX 6.5.0 BSP for Freescale iMX53QSB**

**MPC Data Limited**

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# Introduction

This is the Quick Start Guide for the QNX 6.5.0 BSP for the Freescale i.MX53QSB platform. More information on this platform can be found in the system reference manual, reference [1]

# Scope

This revision of the Quick Start Guide describes the i.MX53QSB BSP for QNX 6.5.0 produced by MPC Data for the first milestone release. This document describes steps to build the BSP and use the included drivers. Further information on developing for QNX can be found on the QNX website, reference [2].

# References

1. iMX53-QSB Specification, MCIMX53RM.pdf, Freescale Semiconductor
2. Documentation for QNX
[www.qnx.com/developers/docs/](http://www.qnx.com/developers/docs/)
3. i.MX53QSB reference on Freescale website

[www.freescale.com/](http://www.freescale.com/)

# System Requirements

## Target Requirements

1. Board version: iMX53QSB Rev D.
2. IPL

## Host Requirements

1. QNX Momentics 6.5.0 SDP
2. Terminal emulation program (Qtalk, Momentics IDE Terminal, HyperTerminal, etc.)
3. RS-232 serial port and serial cable, or a USB-to-serial adapter
4. Ethernet link

# System Layout

|  |  |  |
| --- | --- | --- |
| **Start** | **End** | **Item** |
| 0x00000000 | 0x0000FFFF | On-chip ROM |
| 0x50000000 | 0x6FFFFFFF | Hardware peripherals |
| 0x70000000 | 0xEFFFFFFF | External Memory |

# Getting Started - Building the BSP

The BSP OS image can be built from the source code and binary components contained in this BSP package. For instructions about building a BSP OS image, please refer to the chapter *Working with a BSP* in the QNX *Building Embedded Systems* manual.

# Connect the Hardware

To control the target board it must be connected to the host PC using a crossover (null modem) serial cable. This should be connected between the Debug UART port of the iMX28EVK and the first serial port of the host PC.

The serial terminal should be configured with the following settings:

|  |  |
| --- | --- |
| baudrate  | 115200 |
| data  | 8 bit |
| parity  | None |
| stop  | 1 bit |
| flow control  | None |

# Getting IPL onto the target

Please note following the steps below will erase all data on the SD card. Ensure data is backed up before continuing!

## Using a Linux host

(Note: instructions from i.MX53 EVK release note)

You will need a properly formatted SD card to boot the MX53. First, U-boot must be installed onto the card. To do this, you will need to

download a Linux BSP image release from the Freescale website. As of this writing the most current file is L2.6.31\_10.05.02\_ER\_images\_

MX5X.tar.gz. Once you have the BSP images extracted, change into the root directory of the BSP and execute the following command to

get U-boot onto the SD card:

dd if=u-boot-mx53.bin of=/dev/X bs=512 && sync && sync

Replace the X with what your system assigns to the SD device. You can find this information with the dmesg command.

Note that the dd command will delete the partition table on the card. A filesystem is not required to boot, but if you would like one you

scroll down to the later section and follow the instructions there.

Now, to get the raw OS image onto the SD card, navigate to your QNX bsp images directory, and execute the command

sudo dd if=ifs-mx53evk.raw of=/dev/X bs=512 seek=2048 && sync && sync

Again, replacing the 'X' with the proper value. Insert the SD card in the top MMCSD port on the target board and apply power to the

board. After U-boot is started, you can change a few environment variables to enable automatic booting. At the U-boot prompt, execute

the following commands:

set bootcmd\_qnx 'mmc read 0 0x70800000 0x800 0x3800;go 0x70800000'

set bootcmd 'run bootcmd\_qnx'

After these commands have been executed, use the print command to verify that they have been set properly and then the save

command to save them to the memory card. Now, execute boot or reset the target board to attempt to boot into QNX.

If the image is successfully loaded U-Boot will display:

## Starting application at 0x70800000

You also should see QNX Neutrino boot, followed by the welcome message on your terminal screen:

## Using a Windows host

The command file ‘Create\_bin\_ipl.cmd’ can be used to produce the IPL & IFS images.

IPL: ipl-mx53qsb.bin

IFS: bsp-freescale-imx53-qsb.ifs (must be renamed QNX-IFS)

Type: ntoarm-objcopy –output-format=binary src/hardware/ipl/boards/mx53qsb/le.v7/ipl-mx53qsb ipl-mx53qsb.bin

* *cfimager.exe* is required to prepare the SD card, this is available from the Freescale website.
* Run command prompt as an administrator, change to the directory with *cfimager.exe* and type the following command:

**cfimager –raw –offset 0x400 –skip 0x400 –f ipl-mx53qsb.bin -d <SD card drive letter without a colon>**

* Wait for the script to finish, indicated by the message “*done!”*. Be patient, it could take more than 10 seconds.
* Copy the QNX-IFS file to the FAT32 partition on the SD card.

# Setup the environment

1. Connect an Ethernet cable to the bottom PHY port (nearest to the PCB) available on the back panel.
2. Start your serial terminal with the settings listed in chapter 7.

# Boot the IFS image

1. After completing the steps in section 9, insert the SD card into socket on the i.MX53 QSB
2. Press the power button. You should see output similar to the following:

===============================================

 QNX Neutrino IPL for the Freescale i.MX53 QSB

===============================================

CPU clock speed .........: 1000MHz

Please note when you wish to boot a new IFS image, youonly need to overwrite the old **QNX-IFS** on the SD card and not redo the steps in section 9.

# Driver Command Summary

## Startup

|  |  |
| --- | --- |
| Buildfile command | startup-mx53qsb –d1 –v -W |
| Required binaries | startup-mx53qsb |
| Required libraries | None |
| Source location | src/hardware/startup/boards/mx53qsb |
| Notes: | -W enables the watchdog |

## Serial

|  |  |
| --- | --- |
| Buildfile command | devc-sermx1 -e -F –S –c21657600 0x53fbc000,31reopen |
| Required binaries | devc-sermx1 |
| Required libraries | libc.so.3 |
| Source location | src/hardware/devc/sermx1 |

## Network

|  |  |
| --- | --- |
| Buildfile command | io-pkt-v4 –d mx53 verbose |
| Required binaries | io-pkt-v4 ifconfig |
| Required libraries | devnp-mx53.so |
| Source location | /src/hardware/devnp/mx53 |

## Watchdog Timer

|  |  |
| --- | --- |
| Buildfile command | wdtkick |
| Required binaries | wdtkick |
| Required libraries | none |
| Source location | /src/hardware/startup/support/wdtkick |

## USB

|  |  |
| --- | --- |
| Buildfile command | io-usb -d ehci-mx31 ioport=0x53F80300,irq=14 -d ehci-mx31 ioport=0x53F80100,irq=18waitfor /dev/io-usb/io-usb 4devb-umass cam pnp |
| Required binaries | devu-ehci-mx31.so |
| Required libraries | none |
| Source location | Only released as a prebuilt binary |

## I2C

|  |  |
| --- | --- |
| Buildfile command | i2c-mx35 --u0,0i2c-mx35 –u1,1 |
| Required binaries | i2c-mx35 |
| Required libraries | lib.so.3 |
| Source location | /src/hardware/i2c |

## SPI

|  |  |
| --- | --- |
| Buildfile command | spi-master -d mx35 base=0x63FC0000,irq=38,waitstate=2,loopback=1spi-master -u1 -d mx51ecspi base=0x50010000, irq=36, waitstate=0, clock=54000000, burst, gpiocsbase=0x53f8c000, gpiocs1=19spi-master -u2 -d mx51ecspi base=0x63FAC000,irq=37,waitstate=2,loopback=1 |
| Required binaries | spi-master |
| Required libraries | spi-mx35.so, spi-mx51ecspi.so |
| Source location | /src/hardware/spi |

## RTC

|  |  |
| --- | --- |
| Buildfile command | rtcrtc –s hw (saves the current time/date in the hardware)Note: the QSB contains no battery so the clock is only preserved over reset, not power-cycle. |
| Required binaries | date |
| Required libraries | None |
| Source location | /src/utils/r/rtc |

## Graphics

|  |  |
| --- | --- |
| Buildfile command | io-display -dvid=0,did=0waitfor /dev/io-display 10 |
| Required binaries |  |
| Required libraries | none |
| Source location | /src/hardware/devg/imx51 |

## Audio

|  |  |
| --- | --- |
| Buildfile command | io-audio -d mx-mx53qsb ssibase=0x50014000, tevt=25, tchn=3, revt=24, rchn=4, rate=48000, mixer=i2cdev=1:adr0cs=0:mclk=27000000waitfor /dev/snd 4 |
| Required binaries | deva-ctrl-mx-mk53qsb.so |
| Required libraries | none |
| Source location | /src/hardware/deva/ctrl/mx |

# Touchpanel

|  |  |
| --- | --- |
| Buildfile command | devi-touch-mx53qsb pro1 dev1 |
| Required binaries | devi-touch-mx53qsb.so |
| Required libraries | none |
| Source location | /src/hardware/devi/mx53qsb |

# Driver Command Details

For additional information on each command, run the use command followed by the driver name. e.g.

use i2c-mx35

## Serial

Start the driver for the debug UART with this command:

devc-sermx1 -e -F –c21657600 0x53fbc000,31

## Network

To start network driver, run:

io-pkt-v4 –d mx53 verbose

You should see following output when you run **ifconfig**

# ifconfig

lo0: flags=8049<UP,LOOPBACK,RUNNING,MULTICAST> mtu 33192

 inet 127.0.0.1 netmask 0xff000000

fec0: flags=843<UP,BROADCAST,RUNNING,SIMPLEX> mtu 1500

 address: 00:04:9f:cc:9a:b5

 media: Ethernet autoselect (100baseTX full-duplex)

 status: active

 inet 0.0.0.0 netmask 0xff000000 broadcast 255.255.255.255

To manually bring a network interface up, type following command

ifconfig fec0 10.150.128.250/24 up

To bring up the interface up and automatically acquire an IP address from a DHCP server, enter the following command:

dhcp.client

Here 10.150.128.250 is the IP address assign to your target and 24 is the netmask bits (i.e. 255.255.255.0). The LEDs of the RJ45 ports corresponding to an enabled interface shall glow periodically. This can be used to identify the correct port corresponding to each interface.

## USB

The USB host driver can be started using the following commands for both ports.

io-usb –d ehci-mx31 ioport=0x53F80300,ir1=14 –d ehci-mx31 ioport=0x53F80100,irq=18

To enable the USB mass storage driver use the following command

devb-umass cam pnp &

Note that this command will exit if it doesn’t find any mass storage device.

## RTC

The RTC on the QSB is located within the i.MX53 core. By default there is no battery backup.

To store the current time & date in the rtc use the following command:

rtc –s hw

The kernel clock time and date can be set using the QNX **date** command.

## Touchpanel

The touchpanel requires the PMIC driver to be loaded. This in turn relies on the i2c0 driver to be loaded.

Start the i2c 0 interface with the following command:

i2c-mx35 –u0,0

Start the PMIC driver with the following command:

pmic-mx53qsb &

The touchscreen driver operates with Photon and assumes that this is running. The touchscreen driver is started with the following command:

devi-touch-mx53qsb pro1 dev1

# Hints and Tips

1. The build file starts a DHCP client when the system boots. It is configured to acquire an address in the background without holding up the boot process.

# Known Issues

None

Review Checklist for

QNX 6.5.0 BSP for Freescale iMX53QSB

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