
BitCtrl Systems GmbH

**QNX6.5.0SP1/6.6.0/7.0 BSP for PHYTEC i.MX6
boards (RDK/MIRA/SEGIN)**

Release Notes

BSP Version 2.0.0

QNX6.5.0SP1/6.6.0/7.0 BSP for PHYTEC i.MX6 boards (RDK/MIRA/SEGIN)	BSP Version: 2.0.0
Release Notes	Date: May 15, 2020
State: Released	

Document History

Date	Ver.	Description	Author
July 24, 2013	0.1	Initialization from internal documentation	A. Uhlmann
July 25, 2013	1.0	Final reading and approval	J. Winter
January 10, 2014	1.1	Documentation of Release v1.1	A. Uhlmann
April 11, 2014	1.2	Documentation of Release v1.2	A. Uhlmann
January 29, 2015	1.3	Documentation of Release v1.3.1	A. Uhlmann
July 16, 2015	1.3.2	Documentation of Release v1.3.2	A. Uhlmann
September 13, 2016	1.4.0	Documentation of Release v1.4.0	A. Uhlmann
November 30, 2016	1.4.1	Documentation of Release v1.4.1	A. Uhlmann
June 23, 2017	1.4.2	Documentation of Release v1.4.2	A. Uhlmann
April 27, 2018	1.4.3	Documentation of Release v1.4.3	A. Uhlmann
December 7	1.4.4	Documentation of Release v1.4.4	A. Uhlmann
May 15, 2020	2.0.0	Documentation of Release v2.0.0	A. Uhlmann

Table of Contents

1	PHYTEC i.MX6 QNX Board Support Package (phyFLEX, phyCORE)	1
1.1	Date and Version of this edition	1
1.2	Target Hardware.....	1
1.3	Host OS.....	1
1.4	References	1
1.5	Contact and Support.....	2
2	Tested Devices.....	2
3	List of new features, enhancements and fixes for this release	4
4	BSP History (older releases)	4
5	Known Issues for this release	5
6	Usage Restrictions	6
7	Discontinued Items	6
8	Glossary	6

QNX6.5.0SP1/6.6.0/7.0 BSP for PHYTEC i.MX6 boards (RDK/MIRA/SEGIN)	BSP Version: 2.0.0
Release Notes	Date: May 15, 2020
State: Released	

1 PHYTEC i.MX6 QNX Board Support Package (phyFLEX, phyCORE)

1.1 Date and Version of this edition

This document refers to baseline version 2.0, release v2.0.0, date May 15, 2020, of the BSP. This is new major release that forms in itself a new baseline. It adds new features, most notably support for the i.MX6UL/ULL variant of the i.MX6 family of SoCs.

1.2 Target Hardware

The product is targeted at the following hardware

- phyFLEX i.MX6, hardware revision C (1362.2) on the Rapid Development Carrier (1364.4)
- phyCORE i.MX6dq (1429.3-5) on the MIRA board (1434.2, 1434.3 and 1434.5)
- phyCORE i.MX6UL/ULL (1468.4, 1515.0-1) on the SEGIN board (1472.2).

1.3 Host OS

You can install and use this package on Hosts running MS Windows 7 or MS Windows 10, with the QNX Momentics IDE v5.0 (for QNX6.5SP1 and 6.6.0) or QNX Momentics IDE v7 (for QNX 7) installed. There has to be a valid development license installed and activated in order to build the BSP binaries from source.

We have also validated the build for the QNX 6.6 and QNX 6.5 versions under Ubuntu 14.04 LTS and for QNX 7 under Ubuntu 18.04 LTS.

Using the package on other Linux hosts or self-hosted under QNX Neutrino (QNX6.5 only) should work also, but currently we do not officially support it.

1.4 References

[phyFLEX] Information about the phyFLEX hardware can be found here:

<http://www.phytec.eu/product/system-on-modules/phyflex-imx-6/>.

[phyCORE] Information about the newer phyCORE hardware can be found here:

<http://www.phytec.eu/product/single-board-computer/phyboard-mira/>.

[REFBSP] Information about the reference BSP that is used as a foundation for the product can be found here:

<http://community.qnx.com/sf/wiki/do/viewPage/projects.bsp/wiki/FreescaleImx6QSabreLite>

[QNXDOC] The documentation of the QNX Neutrino RTOS v6.5.0SP1 is available here:

http://www.qnx.com/developers/docs/6.5.0SP1.update/index.html#./650_webhelp/momentics/bookset.html. For QNX6.6.0 use this link:

http://www.qnx.com/developers/docs/6.6.0_anm11_wf10/#com.qnx.doc.qnxsdp.nav/topic/bookset.html. For QNX 7 use this link:

<http://www.qnx.com/developers/docs/7.0.0/#com.qnx.doc.qnxsdp.nav/topic/bookset.html>.

[I2CMAP] This document is a list of I²C devices with their corresponding addresses. (I2C-Map_11May2020.pdf)

QNX6.5.0SP1/6.6.0/7.0 BSP for PHYTEC i.MX6 boards (RDK/MIRA/SEGIN)	BSP Version: 2.0.0
Release Notes	Date: May 15, 2020
State: Released	

1.5 Contact and Support

BitCtrl Systems GmbH
 Weißenfelser Str. 67
 04229 Leipzig
 Germany

Use our online form to request the BSP:

<https://www.bitctrl.de/en/contact.html>

For support, use our helpdesk:

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

2 Tested Devices

No.	Device	Command line, Comments
1	Barebox Boot Loader	Part of the PHYTEC development kit. We tested Barebox version PD18.1.0, PD15.3.0 and PD16.1.0. For SEGIN, we use PD19.1.0. Only one barebox script is needed to boot QNX instead of Linux. The installation process is fully automated for SD card, eMMC and NAND flash-based root file system.
2	startup	Same as in [REFBSP]
3	Serial Driver	X51 (UART0, used for console, no RTS/CTS support): <code>devc-sermx1 -e -F -S -c80000000 0x021F0000,61</code> X50 (UART1, has RTS/CTS support, free for industrial protocols) <code>devc-sermx1 -E -F -S -c80000000 0x021EC000,60</code>
4	Flash driver (FFS3)	phyFLEX: <code>devf-norspi-N25Q128A</code> , Read: 1350 KB/s, Write: 14 KB/s. Derivative work from the NORSPI driver found in the Sabrelite reference BSP [REFBSP] <code>devf-norspi-N25Q128A -r</code> phyCORE: Not yet supported.
5	Boot images	There are three images in the System Builder [QNXDOC] project: A large one containing almost all drivers to get started easily, and a much smaller one, containing only the driver for the MMC/SD port. It expects a QNX6 file system and mounts it to /, expecting all further software in the usual /sbin, /bin/, /lib, /usr directories. A similar boot image exists but works for hosting the root file system in eMMC flash. The large boot image is also used for automatic installation of an SD card.
6	SPI Driver	We provide an experimental version of an SPI driver which is based on the SPI archive release on Foundry27, patch number 3305:
7	I ² C driver	Taken from original BSP <ul style="list-style-type: none"> • RTC is usable, QNX-conform via rtc utility on i.MX6 I²C instance 2 <code>i2c-mx35 -p 0x021A4000 -i69 -c66000000 --u 0</code> • EEPROM 24C32 (as static library), on i.MX6 I²C instance 1: <code>i2c-mx35 -p 0x021A0000 -i68 -c66000000 --u 2</code> • Camera VM-010-BW, on i.MX6 I²C instance 3: <code>i2c-mx35 -p 0x021A8000 -i70 -c66000000 --u 1</code> (See [I2CMAP])
8	MMC/SD-Driver	Taken from original BSP, no modifications. Command line: <code>devb-sdmmc-mx6 disk name=sd cam pnp,verbose blk rw,cache=8M,automount=sd0t179:/ dos exe=all sdio addr=0x02194000,irq=55</code> For phyBOARD MIRA: Not all cards are supported. We tested Transcend 4GB class 10, Intenso 4 GB Class 10, Sony 8 GB Class 10. See issue#16 Installation routine creates symlink from <code>devb-sdmmc-mx6</code> to <code>devb-sdmmc-mx6 generic</code> .
9	USB-Host-	Taken from original BSP, available in binary format only:

QNX6.5.0SP1/6.6.0/7.0 BSP for PHYTEC i.MX6 boards (RDK/MIRA/SEGIN)	BSP Version: 2.0.0
Release Notes	Date: May 15, 2020
State: Released	

	Driver	<ul style="list-style-type: none"> USB-Stick, command line: <code>devb-umass disk name=umass cam quiet blk automount=umass0t179:/fs/umass0qnx0).</code> USB-Ethernet-Dongle D-Link D-100.
10	rtc utility	phyFLEX: RTC8564, DA9063 phyBOARD MIRA/SEGIN: RV-4162-C2 via m41t6x backward compatibility, or DA9062
11	GPIO	gpt-phyFLEX-iMX6 (QNX 6.5SP1 only) Trigger Instance: <code>gpt-phyFLEX-iMX6 -p 5 -v</code> Consumer Instance: <code>on -p 50 gpt-phyFLEX-iMX6 -r 1 -N 4</code>
12	FPU	Enabled by default. The libm has FPU support compiled in, no extra-versions as with ARMv6 devices like the i.MX35. Under QNX 7 Hard-FPU operations are used, resulting in significant performance boost, depending on application.
13	TEMPMON	i.MX6 has on-chip temperature sensor. Driver is part of the new Slowsensor framework and periodically samples this sensor and publishes results under <code>/pps/system/sensors/temperatures/cpu/values</code> . The attributes are like this: <pre>@values description::CPU Core Temperature inode::1 publishTimeStamp::08.03.2018 13:31:49.841 sensorTimeStamp::08.03.2018 13:31:49.841 unit::deg C value::75.6098</pre> Driver start: <code>devs-imx6x</code> .
14	S-ATA	Seagate ST35 500 GB with QNX6 file system. (phyFLEX RDK only).
15	Graphics	<u>phyFLEX Hardware:</u> QNX Screen running on DVI and on LVDS Touch Panel (PHYTEC LCD-018, PL 1365.1 using LVDS channel) To switch between DUAL Display operation, LCD only, LVDS only and DVI monitor only, use this command: <code>switch_display.sh</code> Note: You need to reboot the board to make it take effect. <u>phyBOARD MIRA:</u> QNX Screen running on HDMI output, tested resolution 1920x1080. ETM0700G08 display via LCD pins with touch support. Mitsubishi AA084SC01ADA11 LVDS display with USB touch support <u>phyBOARD SEGIN:</u> No support yet (missing WFD driver).
16	ETFS	NAND flash driver using ETFS file system. Tested devices: - AMD/Spansion S34ML08G2 - Micron 29F4G08
17	PCIe	(QNX 6.6 only) Using QSS-supplied experimental PCIe driver JBN 35. This is not the latest release because this currently does not work. For QNX 7.0: Use "PCI Older Version of Libs" package.
18	CAN	Derivative work of QSS-supplied CAN driver found in the Sabrelite reference BSP [REFBSP] <code>dev-can-mx6x-phyFLEX -x -M -b 100K can0</code> <code>dev-can-mx6x-phyFLEX -x -M -b 100K can1</code> (not on RDK, but tested on customer boards) OR: <code>can-restart</code> (located in <code>/usr/sbin</code>) We have created a demo program that allows stress testing the interface.
19	Push Buttons	Newly developed driver for supporting pushbuttons on i.MX6 GPIO lines. On the MIRA Evaluation carrier two buttons are present. For example: pushbutton service for S2 (as unit 2), routed to GPIO bank 6, pin 18: <code>pushbtn-mx6x -u2 -b6 -p18</code>

QNX6.5.0SP1/6.6.0/7.0 BSP for PHYTEC i.MX6 boards (RDK/MIRA/SEGIN)	BSP Version: 2.0.0
Release Notes	Date: May 15, 2020
State: Released	

		On RDK buttons can be connected to the GPIO pinout header. See rc.devices for defaults.
20	STMPE811	Supported in temperature-only mode. Driver is integrated into slowsensor framework. Driver start: <code>devs-imx6x-<carrier></code> The values appear under <code>/pps/system/sensors/temperatures/mainboard.0/values</code>

Table 1: Tested Devices

3 List of new features, enhancements and fixes for this release

No.	Description	Reference
	New Features	
1	Support for i.MX6UL and ULL devices present on the phyBOARD SEGIN SBCs.	BCM5748
2	Switch reference BSP to SabreSMART on all platforms	BCM5499
3	RAM size is detected automatically from DCD entries	BCM5728
4	Installation from SD cards formatted with type 12 or type 14 partitions is now supported	BCM4330
	Enhancements	
1	Common code base across all QNX versions and all supported hardware.	BCM5752
2	Slowsensor daemon has been refactored to support multi-platform approach, so integrating new sensors and creating a project-specific variant is straight forward and no longer conflicts with source we provide.	BCM5792
3	Logical indices of I2C have been harmonized across all boards. Attention: For the phyFLEX-i.MX6 RDK, the logical I2C indices have changed due to this!	BCM5696
4	Switch to new SD/MMC driver as supplied by reference BSP on all platforms	BCM5705
5	Introduces proper naming scheme for block devices to avoid confusion with multiple <code>/dev/hd</code> entries.	BCM5767
	Fixes	
1	We have documented the display control file	BCM5725
2	localhost und 127.0.0.1 are now resolved properly	BCM5423
3	Various corrections regarding the pinmux and pad settings	
4	Automount of DOS partitions on SD cards when booting from emmc now works correctly	BCM5768
5	We have documented the special environment of the rc.* scripts running at boot time	BCM5690
6	USB OTG host now works correctly even if I2C communication to external bus is being used	BCM5755, BCM5736

Table 2: New features, enhancement and fixes

4 BSP History (older releases)

No.	Date	Description
1.4.5	May 3, 2019	Internal, project-specific release
1.4.4	December 7, 2018	New release for V1.4 baseline with additional new drivers.
1.4.3	April 27, 2018	Maintenance release for V1.4 baseline with support for QNX 7
1.4.2	June 23, 2017	Maintenance release for V1.4 baseline with several new features
1.4.1	November 30, 2017	First maintenance release of v1.4 baseline
1.4.0	October 10, 2016	First Release of v1.4 baseline
1.3.2	July 16, 2015	Last release of v1.3 baseline
1.3.1	January 29, 2015	GA release of the v1.3 baseline
1.3	November 11, 2014	Internal Release for some customer-specific projects
1.2	April 11, 2014	Release to support latest hardware version 1362.2, introduced

QNX6.5.0SP1/6.6.0/7.0 BSP for PHYTEC i.MX6 boards (RDK/MIRA/SEGIN)	BSP Version: 2.0.0
Release Notes	Date: May 15, 2020
State: Released	

		TEMPMON driver and I ² C map.
1.1	January 10, 2014	First release with camera and QNX Screen support
1.0	May 24, 2013	Initial GA release

Table 3: BSP History

5 Known Issues for this release

No.	Description	Reference
1	Text files in /etc, specifically /etc/hosts, /etc/TIMZONE and /etc/net.cfg, have to be in UNIX file format, otherwise qconn may crash under certain conditions.	QSS86687
4	USB automount is not configured, the tools (enum-*) are partly contained on the SD-card, though. (QNX6.5 only; QNX6.6/7 have a completely different handling of USB devices)	
5	The prioritisation of the interrupts is not implemented.	QSS112556
7	Writing to the SPI NOR Flash is very slow (14 KB/s). One reason might be that every write cycle requires a 4KB Block ERASE. Whether this can be substantially improved, e.g. by enlarging the Erase-Unit to 64KB, is subject to further analysis.	BCM3711
9	CPU-frequency cannot be adjusted using standard option -f to startup	BCM3356
10	'Write Protect' and 'Card Detect' doesn't work in old-style SD card driver (used for 6.5 only). Under QNX 6.6/7, we use the new QNX-supplied driver which supports CD and WP signals correctly.	BCM3450, 51625
11	Auto-Negotiation at 1 GBit/s takes very long (10s or more) on QNX6.5	BCM4002
13	Running two independent Qt5 applications on two displays is currently not possible.	
16	Older variants of the MIRA carrier don't support all MicroSD HC cards. Contact PHYTEC directly for details.	
17	Using the -I option to ETFS driver currently leads to a lockup inside ETFS. There is currently no other workaround than abandoning using -I option	BCM5095
18	Latest core network patches for QNX 6.5 SP1 and ASIX USB-2-Ethernet driver do not seem to work properly.	
19	CAN driver's TX messageboxes can get stuck under heavy load with messages never transmitted	BCM5378
20	It is currently not easy to develop against the BSP. Certain parts of the source tree must be present in the workspace.	BCM5424
21	First touch on a touch screen can get lost if connected via I ² C	BCM5550
22	A dedicated resource sync variant for the ULx chips is missing. Workaround: Use resource sync variant for dq chips instead.	BCM5788

Table 4: Known Issues

QNX6.5.0SP1/6.6.0/7.0 BSP for PHYTEC i.MX6 boards (RDK/MIRA/SEGIN)	BSP Version: 2.0.0
Release Notes	Date: May 15, 2020
State: Released	

6 Usage Restrictions

No.	Description	Reference
1	Be aware that running the processor at speeds above ~600 MHz can cause so much heat that the processor automatically shuts down. Use proper cooling equipment if you plan to continuously run on higher clock rates	
2	For QNX 6.6, we recommend to use the network driver of the BSP released February 25, 2014 (JBN 5) since newer versions of the driver tend to cause kernel crashes under heavy load conditions.	
3	It is not recommended to store a continuous stream of data at high rates (e.g. several 100 KB/s or above) on the NAND flash since this conflicts with the NAND management being on the host side. Consider using managed flash in this type of usage scenario.	
4	We have validated Winbond W29N08GV and Macronix MX60LF8G18AC NAND flash chips. The driver supports them, but the required ECC level of 4 Bits per 528 Byte page is not met by the software implementation of the QSS-supplied ETFS library. If you plan to use ETFS for root file system or for critical storage please contact us to advise the best approach.	BCM5522

Table 5: Usage Restrictions

7 Discontinued Items

No.	Description	Reference
3	We have dropped support for the old IDE v4.7. To avoid misunderstandings, QNX 6.5SP1 is still supported, but IDE 5.0 is the minimum requirement.	
4	The old API to the CPU temperature sensor declared in devs.h is deprecated. Use the new API in slowsensapi.h. Currently, we keep the header devs.h for compatibility but plan to remove it in the next release. The new API is very similar to the old one so porting should be straight forward.	
7	We plan to remove NAND flash support from the generally available product. NAND flash will be supported only on a custom engineering basis in the future.	

Table 6: Discontinued Items

8 Glossary

Term	Description
BitCtrl	BitCtrl Systems GmbH
BSP	Board Support Package
DMA	Direct Memory Access
FPU	Floating Point Unit, part of processor that supports calculation of floating-point values in hardware
GA	Generally-available
GPIO	General-Purpose Input/Output
IPU	Image Processing Unit. Subsystem on the i.MX6 processor that connects displays and cameras to the core.
IRQ	Interrupt request
MB	Megabytes (=1024*1024=2 ²⁰ bytes)
PHYTEC	PHYTEC Messtechnik GmbH. Manufacturer of the phyFLEX-i.MX6 module and development kit.
PIO	Programmed I/O

QNX6.5.0SP1/6.6.0/7.0 BSP for PHYTEC i.MX6 boards (RDK/MIRA/SEGIN)	BSP Version: 2.0.0
Release Notes	Date: May 15, 2020
State: Released	

QSS	QNX Software Systems. Manufacturer of the QNX Neutrino RTOS which the BSP is developed for.
RAM	Random Access Memory
SPI	Serial Peripheral Interface. i.MX6 has five controllers on-board. On phyFLEX-i.MX6 module, instance 3 is used for on-board NOR flash AND is wired to external X_SPI0. Instance 5 is entirely free for external devices on X_SPI1 On phyCORE-i.MX6, instance 1 is used for on-board NOR flash

Table 7: Glossary

List of Tables

Table 1: Tested Devices..... 4
Table 2: New features, enhancement and fixes 4
Table 3: BSP History 5
Table 4: Known Issues 5
Table 5: Usage Restrictions 6
Table 6: Discontinued Items 6
Table 7: Glossary 7