conga-QMX8-Plus

Sample Distribution Set for congatec Qseven® 2.1 Development

Quick Start Guide

Revision 1.0

Preface

This quick start guide provides information about the contents of the conga-QMX8-Plus sample distribution set and how to set it up.

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Revision History

Revision	Date (yyyy-mm-dd)	Author	Changes
1.0	2021-09-03	BEU	First release for Rev. X.1

1 Hardware

1.1 Sample Distribution Set

The following items are included in the sample distribution set:

Part #	Rev.	Name	Description	Qty
016620/ 016621	X.1	conga-QMX8-Plus	Qseven® 2.1 engineering sample module with NXP i.MX 8M Plus Quad applications processor, 32 GB onboard HS400 eMMC, and 4 GB (016620) or 2 GB (016621) LPDDR4 onboard memory. Note: MP module variants feature 16 GB onboard HS400 eMMC.	1
016650/ 016651	X.0	QMX8-Plus/HSP-T/ QMX8-Plus/HSP-B	Heatspreader for conga-QMX8-Plus. M2.5 threaded or 2.7 mm bore hole standoffs depending on customer request.	1
007005B	B.5	conga-QEVAL/ Qseven 2.0 ARM	Evaluation carrier board for Qseven® modules.	1
48000023	A	RS-232 adapter cable	MOLEX 6-Pin PicoBlade to two D-SUB 9	1
10000116	A	RS-232 to USB adapter	USB 2.0 to standard serial port. Based on FTDI-Chipset.	1
10000413	A	SD card	SANDISK Ultra 16 GB Class 10 UHS-1	1
011115	B.0	conga-LDVI/EPI	LVDS to DVI converter board for digital flat panels with onboard EEPROM.	1
033331	A	cab-LVDV-DAT-34-15	15 cm data cable LVDS to DVI adapter	1
052147	A	cab-LVDV-PWR-10-15	15 cm power cable LVDS to DVI adapter	1
500025B	B.0	conga-HDMI® add-on card	HDMI® add-on card for the PCIe x16 slot on the conga-QEVAL/Qseven 2.0 ARM.	1
N/A	1.0	Quick Start Guide	conga-QMX8-Plus Sample Distribution Set Quick Start Guide	1

1.2 conga-QMX8-Plus

The included conga-QMX8-Plus is a Qseven® 2.1 engineering sample module featuring the NXP i.MX 8M Plus Quad applications processor, 32 GB HS400 onboard eMMC[1], and 4 GB or 2 GB LPDDR4 onboard memory depending on sample availability and customer request.

Note

1. *The conga-QMX8-Plus Mass Production (MP) module variants feature 16 GB HS400 onboard eMMC. For more information about MP module variants, refer to the datasheet available at www.congatec.com*

1.2.1 Pinout Description

The pinout description lists which signals of the NXP i.MX 8M Plus Quad processor are routed to the Qseven® connector.

Use the link below to directly download the conga-QMX8-Plus pinout as an Excel file:

https://git.congatec.com/arm-nxp/imx8-family/doc/cgtimx8_pinlist/-/raw/cgtqx8p_pinlist/cgtqx8p_pin_connection.xlsx

Alternatively, use the link below and follow the instructions to download it:

https://git.congatec.com/arm-nxp/imx8-family/doc/cgtimx8_pinlist

1.3 conga-QEVAL/Qseven 2.0 ARM

The conga-QEVAL/Qseven 2.0 ARM included in this sample distribution set is an evaluation carrier board based on the Qseven® Specification 2.0.

For information about the conga-QEVAL/Qseven 2.0 ARM, refer to the User's Guide available at www.congatec.com

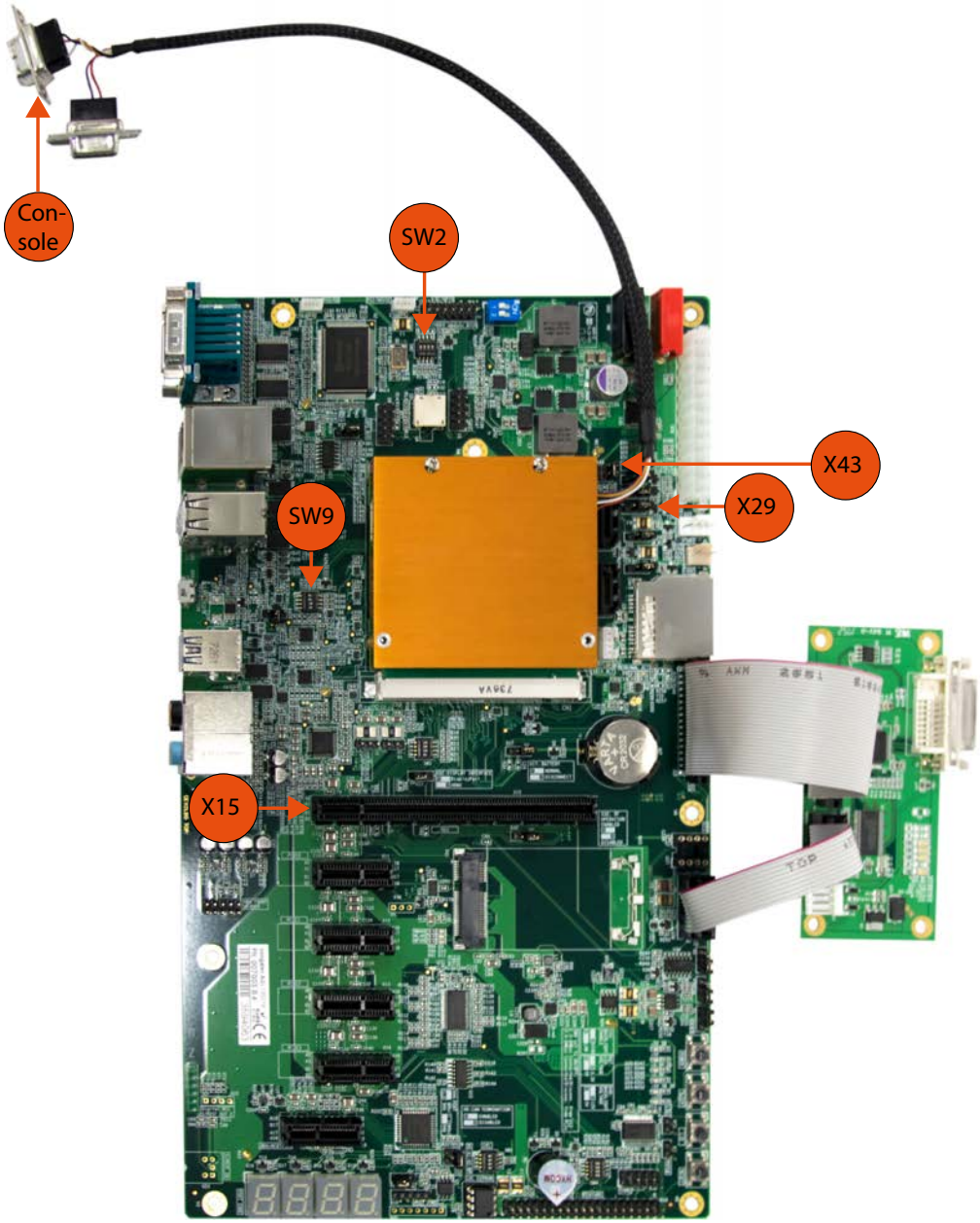
1.4 Hardware Setup

Follow the steps below to assemble the hardware:

1. Ensure the hardware is protected from the effects of electrostatic discharge (ESD).
2. On the module, select **QSPI** as the boot source via DIP switch SW1: [1]

SW1				Selected Boot Source[1]
#4	#3	#2	#1	
OFF	OFF	OFF	OFF	Boot from fuse
OFF	OFF	OFF	ON	Serial download
OFF	OFF	ON	OFF	SDHC3 (eMMC)
OFF	OFF	ON	ON	SDHC2 (uSD onmodule)
OFF	**ON**	**ON**	**OFF**	**QSPI (onmodule)**

3. Connect the RS-232 adapter cable to the connector on the module.
4. Connect the USB 2.0 to Serial Adapter to the RS-232 adapter cable port labeled "CONSOLE".
5. Insert the microSD card into the slot of the module. [2]
6. Mount the module and heatspreader onto the carrier board. (Final torque: 0.4 Nm)
7. On the carrier board, set DIP switch SW9 as desired (USB ports configuration) [3]
8. Optionally, connect the conga-HDMI® add-on card to PCIe slot X15. [4]
9. Optionally, connect the conga-LDVI/EPI as shown in the picture. [4]
10. Connect an ATX Power Supply Unit (PSU) to the carrier board.
11. To start the system, switch the ATX PSU on.



Note

1. *Boot source selection via DIP switch will not be implemented on Mass Production (MP) variants.*
2. *Refer to section 2.1 "Building the Image" to build the image first.*
3. *USB 3.0 is only supported on port 0. USB ports 5, 6 and 7 are not supported. For more information, refer to section 5.2.7 "Universal Serial Bus (USB)" of the conga-QEVAL/Qseven 2.0 ARM User's Guide.*
4. *Default device tree supports HDMI® (autodetect) and LVDS (1024x768@75Hz) video output.*

2 Software

2.1 Building the Image

To build the Linux operating system image for the conga-QMX8-Plus, follow the instructions described in the website below:

https://wiki.congatec.com

Note

Contact congatec technical support to get access to the repositories.

2.2 Starting Up

The conga-QMX8-Plus uses U-Boot as standard bootloader. The bootloader is GNU GPL open source software. A serial terminal connection is required in order to display the boot process and to modify the boot behavior. The boot behavior is controlled via environment variables.

The included RS-232 adapter cable has two connectors. The RX/TX signals are already crossed. Therefore, do NOT use a crossover-cable. Use the connector labeled "CONSOLE" for the U-Boot console output.

To establish a terminal connection, a terminal program such as TeraTerm or Putty can be used.

Use the following communication parameters:

Baud rate:	115200
Data:	8 bit
Parity:	none
Stop:	1 bit
Flow control:	none

2.3 Boot Process

The conga-QMX8-Plus boot process starts at Power On Reset (POR), where the hardware reset logic forces the ARM core to begin execution. The on-chip boot ROM loads the bootloader.

After loading, the bootloader is executed and performs basic system initialization (serial console, etc.). Afterwards, the environment settings are parsed and the system boot continues as specified.

Press any key during startup to stop autoboot and to get to U-Boot console. At the U-Boot console, the environment settings can be displayed using the "print" command. In addition, useful functionality is available (such as memory dump, access to the SPI and the I2C system, etc.). The "help" command will display any command supported by the U-Boot.

If autoboot is not interrupted by pressing a key, the boot process goes ahead and the module boots the Linux operating system installed on the microSD card.

2.4 U-Boot Environment Variables

The U-Boot environment is located in SPI flash. One of the benefits of the U-Boot bootloader is the possibility to specify its run time configuration using environment variables.

The environment variables of U-Boot can be displayed using the printenv (or the print) command.

During the boot process, the bootloader evaluates the "bootcmd" variable and executes it. The boot command tries to load a bootscript or a kernel from the boot device. If this is successful, the script or kernel will be started, otherwise a fallback to network boot is performed. The variable "mmcdev" specifies the mmc boot device. Furthermore, the variable "mmcroot" is passed to the kernel in order to specify the location of the root filesystem.

The following environment variables are predefined for conga-QMX8-Plus:

Name	Default value	Description
bootcmd		Defines the startup command of the bootloader, i.e. how the system performs the boot process.
fdt_file	"imx8mp-cgtqx8p.dtb"	The device tree blob, might be exchanged in order to enhance functionality.
image	Image	The name of the kernel image file that is loaded during boot process.
ipaddr	not specified	Address of the system (used for network boot).
serverip	not specified	Address of the remote host (used for network boot).
netmask	not specified	Netmask of the network (used for network boot).
nfsroot	not specified	The location where the NFS root filesystem is stored (used for network boot).
mmcdev [1]	not specified (autodetect)	The boot device number (used for mmcboot). Default: Automatially set to match the device that u-boot was loaded from (see mmcautodetect).
mmcpart	"1" (first partition)	The number of the bootpartiton on the bootdevice (used for mmcboot).
mmcroot [1]	not specified (autodetect)	The root filesystem extends the kernel command line. Default: Automatially set to match the device that u-boot was loaded from (see mmcautodetect).
mmcautodetect	"yes"	Set to "no" in order to manually change the values for mmcdev and mmcroot.

Note

1. *If SPI is the boot device, compiled default values are set for mmcdev ("1") and mmcroot ("/dev/mmcblk1p2"). The values can only be changed if mmcautodetect is set to "no".*

Following, some frequently used scripts:

Name	Description
mmcboot	Boots the system from mmc (with the specified parameters for mmcboot), i.e. eMMC, microSD card
mmcargs	Configures the bootargs for mmcboot
netboot	Boots the system from network (with the specified parameters for network boot)
netargs	Configures the bootargs for network boot
loadbootscript	Used during boot, loads an eventually existing boot script
loadimage	Used during boot, loads the kernel
loadfdt	Used during boot, loads the device tree blob file

There are several commands to change the behavior of the bootloader and to customize the boot process. The help command can be used to display a list of all available commands.

2.5 Linux

By default, the system boots the Linux operating system that is stored on the microSD card. Booting to the Linux desktop may take some time. To speed up the boot process significantly, install the root filesystem onto the onboard eMMC device. In case of questions, contact congatec technical support.

Note

In order to maintain the integrity of the file system, it is recommended to always shut down the system by issuing the command "poweroff" in the console terminal.

2.6 Additional Information

The NXP i.MX 8M Plus Quad processor documentation is available at:
www.nxp.com