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QUICK GUIDE

voipac

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About Voipac iMX6 Rex Development Kit

iMX6 Rex Development kit is a complete development environment designed to present the functionality, connectivity and performance of the iMX6 Rex Modules, ideal for evaluation and application development purposes. It is targeting skilled development teams building multimedia or other demanding and compact solutions.

This Quick Guide shows, how to flash the module using MfgTool program, load Yocto Project Linux image on microSD card using USB writer. Programs run under Windows XP/7/8/10. More information available at: <u>imx6 rex at wiki.voipac.com</u>.

COMPONENTS	QUANTITY			
iMX6 Rex Base Board	1			
iMX6 Rex Module	1			
8GB microSDHC Class 4 memory card	1			
Aluminum heatsink	1			
iMX6 Rex Documentation on DVD	1			
SFTP CAT.6 Patch Ethernet cable	1			
60pin Header	1/2			
Spacer with bolt and nut	4			
Quick Guide brochure	1			
Yocto Project Linux OS preinstalled. (Android 7.1 preinstalled upon request)				





Connectors Locations



Connecting the Components and Cables

Prepare iMX6 Base Board and plug in (bootable) microSD card, serial cable, Ethernet cable, HDMI cable and other devices or interfaces you need. Plug the power supply connector in.





IMPORTANT!

Check if JP2 jumper pins are open to boot from SPI Flash and if microSD card is plugged in microSD card slot J29.

To boot from SPI Flash, make sure that BOOT_MODE jumper is not present.



microSD card plugged in slot J29.



The First Steps

The development kit is supplied with bootloader and Yocto Project Linux distribution preinstalled on microSD card by default. The development kit can be controlled over:

Controlling the Development Kit over Serial Line

Recommended HW:

- a) PC with USB port
- b) Voipac iMX6 Rex Development Kit
- c) Serial Port Cable

Recommended SW:

Serial line terminal (PUTTY, Minicom, Ckermit, Hyperterminal, TeraTerm, ...)

Default serial port settings:

Speed (baud):	115200
Data bits:	8
Stop bits:	1
Parity:	None
Flow control:	None

Controlling the development kit using TeraTerm

COM1:115200baud - Tera Term VT × File Edit Setup Control Window Help done. Starting Xserver Starting system message bus: dbus. Starting Connection Manager Starting Dropbear SSH server: dropbear. Starting rpcbind daemon...done. starting statd: done Starting advanced power management daemon: No APM support in kernel (failed.) Starting atd: OK exportfs: can't open /etc/exports for reading NFS daemon support not enabled in kernel Starting system log daemon...0 Starting kernel log daemon...0 * Starting Avahi mDNS/DNS-SD Daemon: avahi-daemon [ok] Starting Telephony daemon Starting Linux NFC daemon Starting crond: OK Starting autohdmi: Running local boot scripts (/etc/rc.local). Freescale i.MX Release Distro 4.1.15-2.0.1 imx6-rexpro /dev/ttymxc0 imx6-rexpro login: fec 2188000.ethernet eth0: Link is Up - 100Mbps/Full - flow control rx/tx IPv6: ADDRCONF(NETDEV_CHANGE): eth0: link becomes ready

~

Using External Monitor and USB Keyboard

Recommended HW:

- a) External monitor with HDMI connector (HDMI to VGA adapter is required for VGA monitor)
- b) Voipac iMX6 Rex Development Kit
- c) HDMI High Speed Cable
- d) USB keyboard and USB mouse

Controlling the development kit using external monitor and USB keyboard



Controlling the Development Kit over Ethernet (telnet, ssh, ftp, sftp)

Recommended HW:

- a) PC with Ethernet
- b) Voipac iMX6 Rex Development Kit
- c) Ethernet cable

Recommended SW:

- Telnet client (Telnet, PUTTY, ...)
- SSH client (SSH,PUTTY, ...)
- FTP client (FTP, Filezilla, BareFTP, ...)
- SFTP client (Filezilla, PUTTY, WinSCP, ...)

IMPORTANT!

iMX6 Rex Development Kit is shipped with empty password. Login is: root The default IP address is dynamic and setup by your dhcp server upon boot.

SSH, SFTP require root password to be set up. ("passwd" command) FTP, SFTP are recommended only for data transfers (binary mode is recommended). Controlling the development kit using PUTTY connected to Serial Line.

🚰 COM1 - PuTTY × Starting system log daemon...0 ~ Starting kernel log daemon...0 * Starting Avahi mDNS/DNS-SD Daemon: avahi-daemon [ok] Starting Telephony daemon Starting Linux NFC daemon Starting crond: OK Starting autohdmi: Running local boot scripts (/etc/rc.local). Freescale i.MX Release Distro 4.1.15-2.0.1 imx6-rexpro /dev/ttymxc0 imx6-rexpro login: fec 2188000.ethernet eth0: Link is Up - 100Mbps/Full - flow c ontrol rx/tx IPv6: ADDRCONF(NETDEV CHANGE): eth0: link becomes ready Freescale i.MX Release Distro 4.1.15-2.0.1 imx6-rexpro /dev/ttymxc0 imx6-rexpro login: root root@imx6-rexpro:~#

Controlling the development kit using PUTTY SSH client.



Controlling the development kit using WinSCP.

🌆 / - 192.168.1.150 - Wins	СР				- 🗆	×
Local <u>M</u> ark <u>F</u> iles <u>C</u> omm	Local Mark Files Commands Session Options Remote Help					
🖶 🔁 😂 Synchronize	s 🦑 🔝	🛯 🖗 👔 Queue	Transfer Settings Def	ault	- 16	-
📮 192.168.1.150 🚅 Net	w Session					
🟪 C: Wi 🝷 🚰 🔽 🛛 🖛	•	🖻 🗈 🏫 🎜 😘		-> - 💼	🖻 🏠 💋	»
🛙 📑 Upload 👻 📝 Edit 👻	×	» 🕂 »	Edi	t - 🗙 🛃	»	+ »
C:\Users\Public			1			
Name	Size	Туре	Name	Size	Changed	^
t		Parent directory	±		1.1.1970 0:00:0)4
Documents		Priečinok súborov	bin		27.1.2017 15:3	4:0
- Downloads		Priečinok súborov	boot		27.1.2017 15:3	3:4
Music		Priečinok súborov	dev		27.1.2017 15:3	5:1
Pictures		Priečinok súborov	etc		1.1.1970 0:00:0)5
Videos		Priečinok súborov	home		27.1.2017 15:3	2:4 🗸
<		>	<			>
0 B of 0 B in 0 of 5		4 hidden	0 B of 8 B in 0 of 18			
				SCP	i 0:00:	54

MfgTool for Booting by USB OTG

MfgTool

U-boot is a bootloader responsible for hardware initialization, loading and booting Linux kernel. It is also used for module flashing. Following example is for iMX6 Rex Module in Pro configuration.

Recommended HW:

Recommended SW:

- a) PC with USB port
- b) Voipac iMX6 Rex Development Kit
- c) USB to Micro-USB cable
- d) Soldering station

- <u>MfgTool</u>
- Serial line terminal

Short BOOT_MODE jumper JP2 on iMX6 Rex Base Board. Resolder resistors R0 on position R63 to R62 and R67 to R65 on the base board (Near battery holder J32).





 Short BOOT_MODE jumper JP2 on iMX6 Rex Base Board.
 Connect USB cable to USB port on your computer and Development Kit USB OTG port and power on the base board.

3 Execute Manufacturing toolkit at host PC. Open an appropriate BAT file.

📓 malenky^ - Total Commander	r (x64) 9.0a - NOT	REGISTERED			- 🗆	×
<u>F</u> iles <u>M</u> ark <u>C</u> ommands <u>N</u> et	Sho <u>w</u> C <u>o</u> nfigu	uration <u>S</u> tart				<u>H</u> elp
2 111 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	* 🔹 🔶	• 🗅 🕯	🗎 🚟 🛤 🐹	🗱 🍰 🗍 🕮	* *	* *
d 🗸 [data] 259 527 744 k o	of 380 277 756 k	cfn 🔪 🖕	🖬 d 🖂 [data] 259 52	7 744 k of 380	277 756 k	fr \
-d:_PRACA\mfgtools-Imx6Rex\	`. *	* 🔻 🗸	 ✓\Development Kit iN 	X60*.*		* 🔻
Name	Ext Size	+Date ↑	Name	Ext	Size	Date
Production-OpenRex-basic	bat 72	11.03.2 ^	[LVDS ADAPTER]		<dir> 2</dir>	27.08.2 ^
Production-Rex-basic I	bat 680	21.11.2	[MODULE]		<dir> 2</dir>	27.08.2
Production-Rex-pro	bat 660	21.11.2	[Software]		<dir> 2</dir>	8.04.2
Production-Rex-ultra	bat 680	21.11.2	5V_power_supply	pdf 2	180 117 1	8.04.2
Production-TinyRex-ultra	bat 72	19.05.2 🗸 🎁	getting_started	pdf 2	987 093 0)3.12.2 ∨
0 k / 2 280 k in 0 / 19 file(s), 0 /	/ 4 dir(s)	0) k / 23 035 k in 0 / 5	file(s), 0 / 4 dir	r(s)	
ENT KIT i.MX\Development Kit iMX60> V						
F3 View F4 Edit	F5 Copy	F6 Mov	ve F7 NewFolder	F8 Delete	Alt+	F4 Exit

C:\WINDOWS\system32\cmd.exe		—		×
:_PRACA\mfgtools-Imx6Rex>mfgtool2.exe -l rex" -s "mmc=0"	"Production-Efuses-Ma	ax" -s "b	ooard=ti	n ^
MfgTool_MultiPanel (Library: 2.3.3)		×		
Hub 4Port 3	Status Information			
Drive(s):	Successful Operations:	0		
	Failed Operations:	0		
HID-compliant vendor-defined device	Failure Rate:	0 %		
	Start	Exit		

4 Press Start button (The iMX6 Rex Developmet Kit will boot firmware loaded over USB).

MfgTool_MultiPanel (Library: 2.2.3)		×
Hub 4Port 3	Status Information	
Drive(s):	Successful Operations:	0
	Failed Operations:	0
Loading U-boot	Failure Rate:	0 %
	Stop	Exit



MfgTool_MultiPanel (Library: 2.3.3)		×
Hub 4Port 3	Status Information	
Drive(s):	Successful Operations:	1
	Failed Operations:	0
Jumping to OS image.	Failure Rate:	0.00 %
	Stop	Exit

🔟 COM1:115200baud - Tera Term VT	—	×
<u>File Edit S</u> etup C <u>o</u> ntrol <u>W</u> indow <u>H</u> elp		
U-Boot 2015.04 (Jan 27 2017 - 10:12:16) CPU: Freescale i.MX6Q rev1.2 at 792 MHz CPU: Temperature 61 C Reset cause: POR Board: MX6 Rex - pro I2C: ready DRAM: 2 GiB MMC: FSL_SDHC: 0, FSL_SDHC: 1 SF: Detected SST25VF032B with page size 256 Bytes, erase size 4 KiB, total 4 MiB In: serial Out: serial Out: serial Err: serial Net: FEC		^
Normal Boot Hit any key to stop autoboot: 0 Rex U-Boot >		~



б sтер	6 Burn efuses over serial terminal. Only for "VIRGIN" Modules !							
	Efuses Boot From SD3:	fuse fuse	prog prog	0 0	5 6	0x2A000030 0x00000010		
	MAC Address (For example 00:0D:15:00:D1:75):	fuse	prog	4	3	0x000d		
		fuse	prog	4	2	0x1500d175		

💆 COM1:115200baud - Tera Term VT	—	×
<u>File Edit S</u> etup C <u>o</u> ntrol <u>W</u> indow <u>H</u> elp		
Rex U-Boot > fuse prog 0 5 0x2A000030 Programming bank 0 word 0x00000005 to 0x2a000030 Warning: Programming fuses is an irreversible operation! This may brick your system. Use this command only if you are sure of what you are doing! Really perform this fuse programming? <y n=""></y>		^
y Rex U-Boot > fuse prog 0 6 0x00000000 Programming bank 0 word 0x00000006 to 0x00000010 Warning: Programming fuses is an irreversible operation! This may brick your system. Use this command only if you are sure of what you are doing!		
Really perform this fuse programming? <y n=""></y>		
у Rex U-Boot >		~



This operation is not reversible and should be executed carefully. The iMX6 Rex COM must be replaced in the case of error.



BE AWARE THAT E-FUSES PROGRAMING IS A NON REVERSAL PROCESS . WARRANTY CLAIM CAUSED BY IMPROPER E-FUSES PROGRAMMING WILL NOT BE ACCEPTED .



Power off iMX6 Rex Base Board.



Remove BOOT_MODE jumper.

SPI Bootloader

How to Flash SPI Bootloader (u-boot-imx6-rex*.imx)

This part of QuickGuide shows how to flash u-boot and configure the module to run, in addition to the base board SD card, from iMX6 Rex Module SPI flash. Updating of existing modules with burned efuses possible.

Recommended HW:

a) PC with USB port

- b) Voipac iMX6 Rex Development Kit
- c) USB to Micro-USB cable

- **Recommended SW:**
- <u>MfgTool</u> (only for "VIRGIN" modules)
- Serial line terminal
- Appropriate files

* Select appropriate file for specified configuration:

- iMX6 Rex Module Ultra: ι
- iMX6 Rex Module Pro:
- iMX6 Rex Module Basic:

u-boot-imx6-rexultra.imx u-boot-imx6-rexpro.imx u-boot-imx6-rexbasic.imx

1 Open MfgTool appropriate BAT file to load bootloader over USB OTG port. Use this step only for "VIRGIN" module as described in the above <u>MfgTool Chapter</u> of this document.

2 Stop autoboot in your serial line terminal. Type or paste commands separately to download appropriate bootloader file from TFTP server where the bootloader file is located. Following example is for iMX6 Rex Module Pro configuration.

setenv ipaddr 192.168.1.150
setenv serverip 192.168.1.75
mw.b 0x10800000 0xFF 0x80000
mw.b 0x10800000 0xFF 0x80000;tftp 0x10800000 u-boot-imx6-rexpro-2.2.imx; sf probe
2:2;sf erase 0x0 0x80000;sf write 0x10800000 0x400 0x7fc00

×

💆 COM1:115200baud - Tera Term VT



The bootloader is written to iMX6 Rex Module SPI Flash after automatic download from the TFTP Server.

🔟 COM1:115200baud - Tera Term VT 🦳 —		×
<u>F</u> ile <u>E</u> dit <u>S</u> etup C <u>o</u> ntrol <u>W</u> indow <u>H</u> elp		
<pre>Rex U-Boot > setenv netdev eth0 Rex U-Boot > setenv ethprime FEC0 Rex U-Boot > setenv ethadt PEC0 Rex U-Boot > setenv ethaddr 00:0d:15:00:eb:16 Rex U-Boot > setenv fec_addr 00:0d:15:00:eb:16 Rex U-Boot > setenv ipaddr 192.168.1.150 Rex U-Boot > setenv serverip 192.168.1.75 Rex U-Boot > setenv gatewayip 192.168.1.1 Rex U-Boot > mw.b 0x10800000 0xFF 0x80000;tftp 0x10800000 u-boot-imx6-rexpro-2.2.imx; s :2;sf erase 0x0 0x80000;sf write 0x10800000 0x400 0x7fc00 Using FEC device TFTP from server 192.168.1.75; our IP address is 192.168.1.150 Filename 'u-boot-imx6-rexpro-2.2.imx'. Load address: 0x10800000 Loading: ####################################</pre>	f probe	2
done Bytes transferred = 330752 (50c00 hex) SF: Detected SST25VF032B with page size 256 Bytes, erase size 4 KiB, total 4 MiB SF: 524288 bytes @ 0x0 Erased: OK SF: 523264 bytes @ 0x400 Written: OK		
Rex U-Boot >		¥

3 Reset the base board. iMX6 Rex Module will start booting from SPI Flash. The bootloader will defaultly start to download Image from the TFTP Server. To change bootloader environment, stop autoboot.

	🔟 COM1:115200baud - Tera Term VT		×
ľ	<u>F</u> ile <u>E</u> dit <u>S</u> etup C <u>o</u> ntrol <u>W</u> indow <u>H</u> elp		
i	U-Boot 2015.04 (Jan 27 2017 - 10:12:16)		^
	CPU: Freescale i.MX60 rev1.2 at 792 MHz CPU: Temperature 46 C Reset cause: POR Board: MX6 Rex - pro I2C: ready DRAM: 2 GiB MMC: FSL_SDHC: 0, FSL_SDHC: 1 SF: Detected SST25VF032B with page size 256 Bytes, erase size 4 KiB, total 4 MiB *** Warning - bad CRC, using default environment In: serial Out: serial		
	Net: FEC [PRIME]		
1	Error: FEC address not set.		
	Normal Boot Hit any key to stop autoboot: 0 MMC: no card present MMC: no card present Booting from net FEC Waiting for PHY auto negotiation to complete done Using FEC device TFTP from server 192.168.0.1; our IP address is 192.168.0.150 Filename 'imy6/zImage'		
	Load address: 0x10800000		
	Loading: T T		~

🚨 COM1:115200baud - Tera Term VT		×
<u>F</u> ile <u>E</u> dit <u>S</u> etup C <u>o</u> ntrol <u>W</u> indow <u>H</u> elp		
U-Boot 2015.04 (Jan 27 2017 - 10:12:16)		^
CPU: Freescale i.MX6Q rev1.2 at 792 MHz		
Reset cause: POR		
Board: MX6 Rex - pro		
I2C: ready		
DRAM: 2 G1B MMC, ESI SDUC, O ESI SDUC, 1		
SE: Detected SST25VE032B with page size 256 Bytes, erase size 4 KiB, total 4 Mil	в	
*** Warning - bad CRC, using default environment	-	
In: serial		
Out: serial		
Err: serial		
NEL: FEC (PRIME) Fron: FEC address not set		
Normal Boot		
Hit any key to stop autoboot: 0		×

Creating Bootable microSD Card

USB Writer

Following example is for iMX6 Rex Module in Pro configuration.

Recommended HW:

Recommended SW:

- a) PC with microSD port
- b) microSD card

- <u>USBWriter</u>
- Appropriate Image files

1 Open USBWriter. Browse source file (appropriate fsl-image). Select target device.

🚦 USBWriter	X
Source file D:_PRACA\MfgTools REX\fsl-image-gui-imx6-rexpro-2.2.sdcarc	Browse
Target device	<u>R</u> efresh
<u>W</u> rite	Close

2 Click on Write button and confirm the procedure.



USBWriter	×
Source file	
D:_PRACA\MfgTools REX\fsl-image-gui-imx6-rexpro-2.2.sdcarc	
Target device	
I: [7.3 GB] ~ <u>R</u> efresh	
Progress	
<u>W</u> rite <u>C</u> lose	

🚦 USBWriter 🛛 🗙
Success Browsery
I: [7] I: [7] Source file successfully written to target device.
Progre
<u>W</u> rite <u>C</u> lose

Bootable microSD Card is now created and prepared for use.

Notes

Product Life Cycle Phases

Voipac products life cycles are divided into 4 phases:

- INTRODUCTION PHASE, approximately the first 6-12 months.

The last software issues are still being resolved. Product in this stage is the most suitable for new designs.

- ACTIVE PHASE, the first 1-3 years following the product introduction.

Product software packages are stable, additional functions, OS and GUI are being released. Product in this stage is suitable for new designs.

- MATURITY PHASE, approximately the first 4-6 years after the introduction.

Products are shipped in volumes, additional functions additions declines. Product in this stage is no longer recommended for new designs.

- EOL PHASE, approximately 7-10 years after the introduction.

Used components availability decreases, although product may still be purchased under specific circumstances. The Last Time Buy notification is send to all product users app. 6 months prior to product discontinuation. Components stocking service for discontinued products and manufacturing of further production batches is available.

To find out the specific product life cycle phase, visit its product page and check the title color.

CE Compliance of Voipac Products

The CE label is a mandatory conformity mark for complex electronic devices placed on the market in the European Economic Area and each product sold within the EU needs a CE Certificate of Conformance that ensures that the product conforms to the essential requirements of the applicable EC directives.

However, if such complex electronic devices are produced for further processing by the industry, skilled development teams or system integrators, they do not need to observe the above mentioned CE requirements and consequently do not need any identification either. This applies to the Voipac Computers On Module, because these are not used as stand-alone devices by the general public.

To make sure that Voipac COMs can be used in CE marked devices, they are designed to obey the EC directives and the standard configuration COMs manufactured by Voipac are tested for Electromagnetic Interference and operating temperature ranges plugged in corresponding base board.

Technical Support

HW & SW support: <u>support@voipac.com</u> Warranty claims: <u>warranty.claim@voipac.com</u>

All of the relevant communication between the customer and Voipac should be executed via e-mails preferably. Response time is up to 48 hours, except state holidays and weekends. Voipac working hours are: 8:00 - 17:00, Monday - Friday.

Before contacting support, please read the following for the basic information about how to work with a development kit: www.voipac.com/#Downloads http://www.voipac.com/#Downloads/imx/iMX6_Rex/ http://www.voipac.com/downloads/imx/iMX6_Rex/ http://www.voipac.com/downloads/imx/iMX6_Rex/ http://wiki.voipac.com/xwiki/bin/view/imx6+rex/

We provide paid support for your new designs when it comes to the special drivers for the peripherals not included in the Voipac standard development kits, design of your own base boards, prototyping, or even new products development. Please contact: support@voipac.com for more info.

Warranty:

VOIPAC TECHNOLOGIES s.r.o. Does Not Bear Responsibility for the Following:

- Failure of a product resulting from misuse, accident, modification, unsuitable operating environment, or improper maintenance by user
- Unless otherwise agreed in written, a product does not include technical support and the customer may be able to purchase technical support under separate agreement
- Any technical or other support provided under warranty by VOIPAC TECHNOLOGIES s.r.o. such as assistance, set-up and installation is provided WITHOUT WARRANTY OF ANY KIND.

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