



i.MX6 Development Procedure

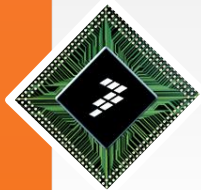
----- Quick Start

i.MX FAE Team



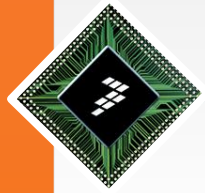
May 15, 2013



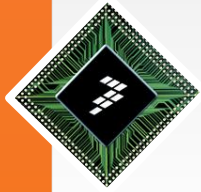


Topics

- **Get i.MX materials from Freescale website**
 - i.MX6 Series Processor / Reference Solutions Material
- **Setup building environment and compiling**
 - Android / Linux solution
- **Download compiled images into target board**
- **Design Consideration**
 - Hardware Design
 - Software Design
- **New board debug step**



Get i.MX materials from Freescale website



Get i.MX materials from Freescale website

From the following web address:

<http://www.freescale.com/webapp/sps/site/homepage.jsp?nodeId=018rH3ZrDR>

You can get all i.MX application processors' family list:

i.MX Applications Processors

[i.MX Product Selector](#)

[i.MX Family Comparison Table](#)

- [+ i.MX 6 Series Processors](#)
- [+ i.MX53 Processors](#)
- [+ i.MX51 Processors](#)
- [+ i.MX50 Processors](#)
- [+ i.MX37 Processors](#)
- [+ i.MX35 Processors](#)
- [+ i.MX31 Processors](#)
- [+ i.MX28 Processors](#)
- [+ i.MX27 Processors](#)
- [+ i.MX25 Processors](#)
- [+ i.MX23 Processors](#)
- [+ i.MX21 Processors](#)
- [+ i.MXS Processors](#)

You can get detailed information about each i.MX application processors after clicking into it.

This section use i.MX 6 Series Processors for example.

i.MX6 Series and Reference Solutions

Check available reference solutions for i.MX6:

Freescale > i.MX Applications Processors > **i.MX 6 Series Processors** (1)

i.MX 6 Series Processors

[View Product Parametrics](#)

The i.MX 6 series unleashes the industry's first truly scalable multicore platform that includes single-, dual- and quad-core families based on the ARM® Cortex™-A9 architecture. Together with a robust ecosystem, i.MX 6 series provides the ideal platform to develop a portfolio of end devices based on a single hardware design.

With high-performance multimedia processing, pin*- and software- compatible product families and integrated power management, i.MX 6 series is purpose built for the new era of smart devices.

*4 of 5 families are pin-compatible

The i.MX 6 applications processor is a Freescale Energy-Efficient Solutions product.

- ▶ Automotive
- ▶ Smart Devices

i.MX 6 Series Portfolio

View the complete i.MX 6 Series; compare features and performance

[Check out the i.MX 6 series today ▶](#)

Design Resources

- [i.MX 6 Series Fact Sheet \(pdf\)](#)
- [i.MX 6 Series Software and Development Tools](#)
- [i.MX 6 Series Ecosystem Partners](#)
- [QNX and i.MX 6 Series: Driving Automotive Infotainment \(pdf\)](#)
- [SABRE Board for Smart Devices](#)
- [SABRE Platform for Smart Devices](#) (2)
- [SABRE for Automotive Infotainment](#)
- [i.MX 6SoloLite Evaluation Kit](#)
- [i.MX Community](#)

Choose suitable processor for your production in i.MX 6 Series :

Product (# of Parts)	Datasheet Part Data	Order	Description	Product Page Status	Core Type	Core: Operating Frequency (Max) (MHz)	Core: Number of cores (Spec)	Ambient Operating Temperature (Min-Max) (°C)	Cache (KB)	L2 Cache (Max) (KB)	Internal RAM (KB)	External Memory Supported	Serial Interface Type	Video/Display features
i.MX6D (10)	Distributor Buy Direct Sample	Distributor Buy Direct Sample	i.MX 6Dual Family of Applications Processors	Active	ARM Cortex A9	1000 850	2	-40 to 125 -40 to 105 -20 to 105	32	1000	256	DDR3 DDR3L FLASH LPDDR2	SDIO eCSPI I2C UART USB I2S ESAI	HD1080p Video Decode HD1080p Video Encode HD1080p Video Transcode HDMI 1.4 Image Pre and Post Processor LCD Controller OpenCL OpenGL ES 2.0 OpenVG 1.1 OpenGL ES 1.1
i.MX6DL (7)	Distributor Buy Direct Sample	Distributor Buy Direct Sample	i.MX 6DualLite Family of Applications Processors	Active	ARM Cortex A9	800 1000	2	-40 to 105 -40 to 125 0 to 95 -20 to 105	32	512	128	DDR3 DDR3L FLASH LPDDR2	SDIO eCSPI I2C UART I2S ESAI	HD1080p Video Decode HD1080p Video Encode HD1080p Video Transcode HDMI 1.4 Image Pre and Post Processor LCD Controller OpenGL ES 1.1

i.MX6Q Processor Related Material

Freescale ▶ i.MX Applications Processors ▶ i.MX 6 Series Processors ▶ **i.MX6Q** (1)

i.MX6Q: i.MX 6Quad Family of Applications Processors ☆

The screenshot shows the Freescale website interface for the i.MX6Q processor. At the top, a breadcrumb trail leads to 'i.MX6Q' (1). Below this is a navigation bar with tabs for 'Overview', 'Documentation' (2), 'Software & Tools', 'Buy / Parametrics', and 'Training & Support'. Under the 'Documentation' tab, there are sub-tabs for 'Data Sheet', 'Application Notes', 'Buy', and 'Sample'. A 'Refine Your Results' sidebar on the left shows a list of document types: 'Documentation - (22)', 'Data Sheets - (3)', 'Errata - (1)', 'Application Notes - (8)', 'Reference Manuals - (2)', 'Users Guides - (1)', 'Fact Sheets - (1)', and 'Supporting Information - (6)'. The main content area is divided into 'Featured Documentation' and 'Popular with Other Engineers'. The 'Featured Documentation' section contains a table with the following data:

ID and Description	Type	Format	Size K	Rev #	Date Last Modified	Download Files / Code Files	Favorite
IMX6DQAEC i.MX 6Dual/6Quad Automotive and Infotainment Applications Processors	Data Sheets	pdf	2765	1	11/5/2012	Download	☆
IMX6DQCEC i.MX 6Dual/6Quad Applications Processors for Consumer Products	Data Sheets	pdf	2443	1	11/5/2012	Download	☆

1. Select i.MX6Q in family tree and click into it;
2. Choose and press “Documentation” in option bar;
3. Get i.MX6Q Application Processor related material;

i.MX6DL Processor Documentation

显示:

全部关闭

■ i.MX Infocenter—Online Documentation

■ Using Open Source Debugging Tools for Linux o...

■ i.MX Family Comparison Table

文档 - (26)

- 数据手册 - (3)
- 勘误表 - (1)
- 应用说明 - (10)
- 参考手册 - (2)
- 用户指南 - (1)
- 工程设计要点 - (1)
- 简介 - (1)
- 支持信息 - (7)

显示 ▼

ID和描述	类型	格式	大小 (K)	修订号 #	最后修改日期	下载文件/代码文件	收藏
IMX6SDLAEC i.MX 6Solo/6DualLite Automotive and Infotainment Applications Processors	数据手册	pdf	2947	2.1	5/29/2013	Download English	☆
IMX6SDLCEC i.MX 6Solo/6DualLite Applications Processors for Consumer Products	数据手册	pdf	2949	2.1	5/29/2013	Download English	☆
IMX6SDLIEC i.MX 6Solo/6DualLite Applications Processors for Industrial Products	数据手册	pdf	2815	2.1	5/29/2013	Download English	☆
IMX6SDLCE Chip Errata for the i.MX 6Solo/6DualLite	勘误表	pdf	982	2	5/13/2013	Download English	☆
AN4725 AN4725, i.MX 6Solo/6DualLite Product Usage Lifetime Estimates - Application Note	应用说明	pdf	149	0	5/29/2013	Download English	☆
AN4629 Fast Image Processing with i.MX 6 Series	应用说明	pdf	650	0	1/24/2013	Download English	☆
AN4671 AN4671, i.MX 6 Series HDMI Test Method for Eye Pattern and Electrical Characteristics - Application Notes	应用说明	pdf	422	0	4/22/2013	Download English	☆
AN4576 i.MX 6DualLite Power Consumption Measurement	应用说明	pdf	269	1	3/8/2013	Download English	☆
AN4397 Common Hardware Design for i.MX 6Dual/6Quad and i.MX 6Solo/6DualLite	应用说明	pdf	230	1	6/4/2013	Download English	☆
AN4581 Secure Boot on i.MX50, i.MX53, and i.MX 6 Series using HABv4	应用说明	pdf	795	0	10/25/2012	Download English	☆
AN4589 Configuring USB on i.MX 6 Series Processors	应用说明	pdf	213	0	10/23/2012	Download English	☆
AN4553 Using Open Source Debugging Tools for Linux on i.MX Processors	应用说明	pdf	245	0	7/19/2012	Download English	☆
AN4467 i.MX 6 Series DDR Calibration	应用说明	pdf	877	0	10/17/2012	Download English	☆
AN4579 i.MX 6 Series Thermal Management Guidelines	应用说明	pdf	3625	0	12/10/2012	Download English	☆

i.MX6 Reference Solution Related Material

Freescale ▶ i.MX Applications Processors ▶ i.MX 6 Series Processors ▶ RDMIMX6SABREPLAT

SABRE Platform for Smart Devices Based on the i.MX 6 Series ☆

Overview Documentation **Software & Tools** Buy / Parametrics

Buy Export to Excel Expand All Sections (1)

Jump Start Your Design

- Get Started With SABRE-SDP and Google Android OS
Unleash the power of the i.MX 6 Series using the new SABRE-SDP development ...

Popular with Other Engineers

- i.MX 6SoloLite Evaluation Kit
- i.MX 6 Series Software and Development Tool Resources
- Design files, including hardware schematics, Gerbers, and OrCAD files.
- Design files, including hardware schematics, Gerbers, and OrCAD files.

Show ▾

Hardware Development Tools (4) Expand All	Sort by Modified Date
▶ Printed Circuit Boards and Schematics-Schematics (1) ← (2)	
▶ Programmers (Flash, etc.) (3) ← (3)	
Software Development Tools (7) Expand All	Sort by Modified Date
▶ Debuggers and Runtime Analysis (1)	
▶ IDE - Debug, Compile and Build Tools (2)	
▶ Initialization/Boot/Device Driver Code Generation (1)	
▶ Lab and Test Software (1)	
▶ Snippets, Boot Code, Headers, Monitors, etc. (2)	
Run-time Software (18) Expand All	Sort by Modified Date
▶ Operating System Software-Board Support Packages (12) ← (4)	
▶ Middleware-Codecs and other Algorithms (6)	

1. Select “SABRE Platform for Smart Devices”, and choose “Software & Tools”;
2. Hardware Material (Schematic, Gerber, OrCAD..etc);
3. Manufacturing tool;
4. Software Material (Android, Linux..etc)

Setup Building Environment and Compiling

-- Using Android Solution

Preparation

Download Ubuntu 10.04 (Lucid) 64 Bit Desktop from:

<http://releases.ubuntu.com/lucid/>

 ubuntu-10.04.4-alternate-i386.template	14-Feb-2012 10:36	2.6M	Alternate install CD for PC (Int
 ubuntu-10.04.4-desktop-amd64.iso	14-Feb-2012 11:51	696M	Desktop CD for 64-bit PC (AMD64)
 ubuntu-10.04.4-desktop-amd64.iso.torrent	16-Feb-2012 19:09	28K	Desktop CD for 64-bit PC (AMD64)

The Sun JDK is no longer in Ubuntu's main package repository. Download latest Oracle/Sun JDK 6 binary release from:

<http://www.oracle.com/technetwork/java/javase/downloads/index.html>

Java SE 6 Update 43







This release brings in security features and bug fixes. Oracle strongly recommends that all Java SE 6 users upgrade to this release. [Learn more](#) ▶



JDK 6 Docs



JRE 6 Docs

Product / File Description	File Size	Download
Linux x86	65.43 MB	 jdk-6u43-linux-i586-rpm.bin
Linux x86	68.45 MB	 jdk-6u43-linux-i586.bin
Linux x64	65.65 MB	 jdk-6u43-linux-x64-rpm.bin
Linux x64	68.7 MB	 jdk-6u43-linux-x64.bin
Solaris x86	68.35 MB	 jdk-6u43-solaris-i586.sh
Solaris x86 (SVR4 package)	119.92 MB	 jdk-6u43-solaris-i586.tar.Z

Setup Building Environment

Install the Ubuntu 10.04 64 Bit Desktop.

Install the following packages for essential Android build, ulmage And uboot format support, building mtd-util, file comparison, storage partition:

```
$ sudo apt-get install git-core gnupg flex bison gperf build-essential \  
zip curl zlib1g-dev libc6-dev lib32ncurses5-dev ia32-libs \  
x11proto-core-dev libx11-dev lib32readline5-dev lib32z-dev \  
libgl1-mesa-dev g++-multilib mingw32 tofrodos python-markdown \  
libxml2-utils xsltproc  
$ sudo apt-get install uboot-mkimage  
$ sudo apt-get install uuid-dev liblzo2-dev  
$ sudo apt-get install meld gparted
```

Install and setup jdk-6u43-linux-x64.bin, then verify Java version.

```
$ sudo chmod +x jdk-6u43-linux-x64.bin  
$ ./jdk-6u43-linux-x64.bin  
$ echo 'export PATH=Your Path/jdk1.6.0_43/bin:$PATH' >> ~/.bashrc  
$ java -version  
java version "1.6.0_43"  
Java(TM) SE Runtime Environment (build 1.6.0_43-b01)  
Java HotSpot(TM) 64-Bit Server VM (build 20.14-b01, mixed mode)
```

NOTE: You can get detailed install guide in [“buildenv.pdf”](#) from our Disty.

Get Source Code (Android raw code/u-boot/Kernel)

Get Android source code from Google repo, then retrieve ALSA source code:

```
$ cd ~  
$ mkdir myandroid  
$ cd myandroid  
$ curl https://dl-ssl.google.com/dl/googlesource/git-repo/repo > ./repo  
$ chmod a+x ./repo  
$ ./repo init -u https://android.googlesource.com/platform/manifest -b android-4.2.2_r1  
$ ./repo sync # this command loads most needed repos. Therefore, it can take a while to load.
```

Get Kernel source code from Freescale's git:

Get jb4.2.2_1.0.0-ga kernel source code from Freescale open source git:

```
$ cd myandroid  
$ git clone git://git.freescale.com/imx/linux-2.6-imx.git kernel_imx # the kernel repo is  
heavy. Therefore, this process can take a while.  
$ cd kernel_imx  
$ git checkout jb4.2.2_1.0.0-ga
```

Get U-Boot source code from Freescale's git:

```
$ cd myandroid/bootable  
$ cd bootloader  
$ git clone git://git.freescale.com/imx/u-boot-imx.git u-boot-imx  
$ cd u-boot-imx  
$ git checkout jb4.2.2_1.0.0-ga
```

- If you have difficulties to download Google sourcecode & FSL uboot/kernel code, pls contact Freescale FAE.

Add patch code for i.MX:

Apply all i.MX Android patches by using the following steps:

Assume you had unzipped i.MX Android release package to /opt/android_jb4.2.2_1.0.0-ga_source.

```
$ cd ~/myandroid
```

```
$ source /opt/android_jb4.2.2_1.0.0-ga_source/code/jb4.2.2_1.0.0-ga/and_patch.sh
```

```
$ help
```

Now you should see that the "c_patch" function is available

```
$ c_patch /opt/android_jb4.2.2_1.0.0-ga_source/code/jb4.2.2_1.0.0-ga imx_jb4.2.2_1.0.0-ga
```

If everything is OK, "c_patch" will generate the following output to indicate successful patch:

```
*****  
Success: Now you can build the Android code for FSL i.MX platform  
*****
```

NOTE: You can get detailed steps from ["/imx-android-13.4.1/doc/Android_User_Guide.pdf"](/imx-android-13.4.1/doc/Android_User_Guide.pdf)

After applying all i.MX patches, build the U-Boot, kernel, and Android image using the steps below:

Build Android Images

Build U-Boot image (i.MX 6Quad SABRE SD for example):

```
$ cd ~/myandroid/bootable/bootloader/uboot-imx
$ export ARCH=arm
$ export CROSS_COMPILE=~/.myandroid/prebuilt/linux-x86/toolchain/arm-eabi-4.4.3/bin/arm-eabi-
$ make distclean
$ make mx6q_sabresd_android_config
$ make
```

Build boot.img (ulmage + uRamdisk):

```
$ cd ~/myandroid
$ source build/envsetup.sh
$ lunch sabresd_6dq-user
$ make bootimage
```

Build Android Image

```
$ cd ~/myandroid
$ source build/envsetup.sh
$ lunch sabresd_6dq-user
$ make
```

Image difference for different silicon

i.MX6Q/D/DL are same Android BSP code, all the images are same except uboot image:

Compile different uboot image as following:

- For i.MX 6Quad/Dual SABRE SD:

```
$ make mx6q_sabresd_android_config
```

- For i.MX 6DualLite SABRE SD:

```
$ make mx6dl_sabresd_android_config
```

- \$ make

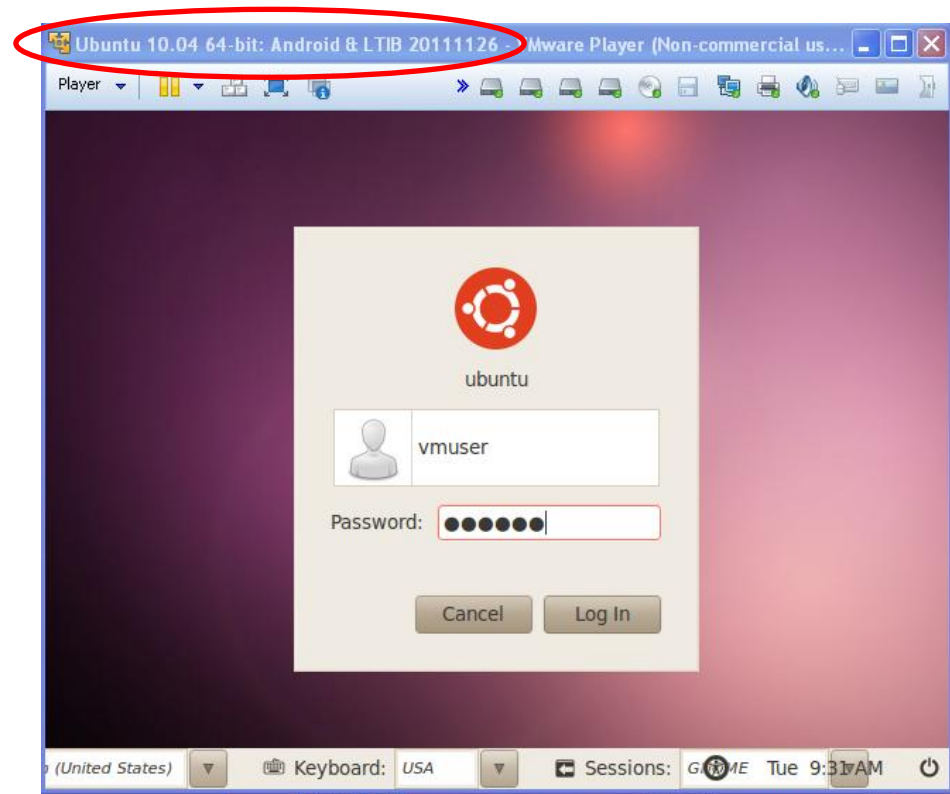
Useful Tips:

We provide reference virtual build host running on VMware-player-5.0.0, all the building environment are ready.

Uncompress ubunut_64-bit_1004_20121126_android.7z to PC, Install VMware-player-5.0.0 and open this image.

Username: `vmuser`

Password: `vmuser`



Download Android Images into Target Board

-- using SABRE Platform for Smart Devices

Compiled Images

After building, you can get the following images located in “myandroid/out/target/product/sabresd_6dq”:

u-boot.bin	3/12/2013 2:19 PM	BIN 文件	446 KB
u-boot-6dl.bin	3/12/2013 2:19 PM	BIN 文件	446 KB
u-boot-6q.bin	3/12/2013 2:18 PM	BIN 文件	446 KB
clean_steps.mk	3/12/2013 2:03 PM	Makefile	16 KB
previous_build_config.mk	3/12/2013 2:03 PM	Makefile	1 KB
boot.img	3/12/2013 5:33 PM	WinZip File	4,164 KB
ramdisk.img	3/12/2013 1:53 PM	WinZip File	164 KB
ramdisk-recovery.img	3/12/2013 5:33 PM	WinZip File	917 KB
recovery.img	3/12/2013 5:33 PM	WinZip File	4,918 KB
system.img	3/12/2013 5:33 PM	WinZip File	286,720 KB
userdata.img	3/12/2013 5:33 PM	WinZip File	131,072 KB

u-boot-6dl.bin/u-boot-6q.bin: bootloader, start offset is 0, max size is 1MB;

boot.img: android image which stores kernel and ramdisk together, partition name is “Boot”, start offset is 8MB, max size is 8MB;

recovery.img: boot.img format, which stores kernel and ramdisk, partition name is “Recovery”, start offset is following “Boot”, max size is 8MB;

system.img: android EXT4 system files, partition name is “System”, start offset is following “Recovery”, max size is 512MB;

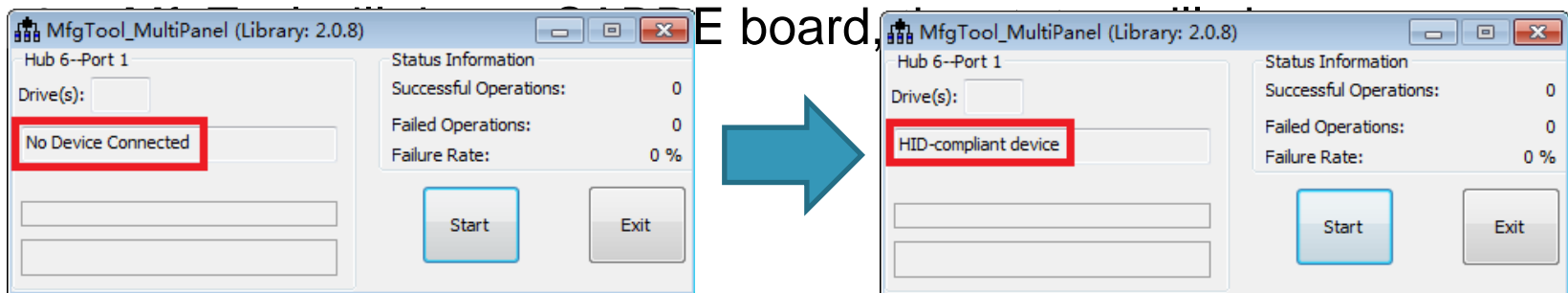
Download Preparation

Setup download environment as following:



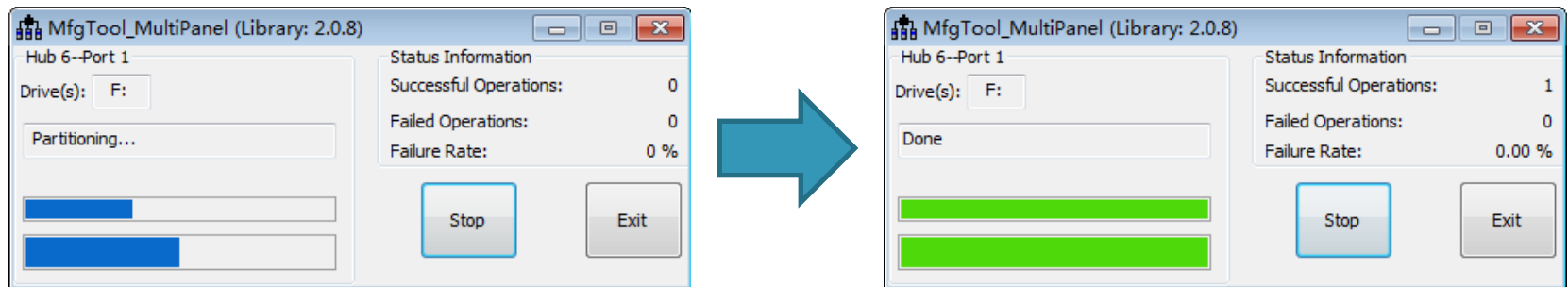
Download Images by Mfgtools

1. Copy such four images into “\Mfgtools-Dir\Profiles\MX6Q Linux Update\OS Firmware\files\android”;
(Pls don't copy to MX6Q Linux Update\OS Firmware directory, this is firmware directory)
1. Change the SABRE SD SW6 (boot) to 00001100 (from 1-8 bit) to enter USB OTG download mode;
2. Power on the board. Using USB cable on the SABRE SD OTG port, connect your Windows PC to SABRE SD;



Download Images by Mfgtools

5. Click “Start” to start image downloading;
6. During the downloading process, the status bar of MfgTool will show the downloading status;
7. The downloading is complete when MfgTool show “green progress bar” as following:



8. Change Boot Switch (SW6) to 11100110 (from 1-8 bit), make SABRE boot from eMMC;

NOTE: You can get detailed steps from ["/imx-android-13.4.1/doc/Android_Quick_Start_Guide.pdf"](/imx-android-13.4.1/doc/Android_Quick_Start_Guide.pdf)

Different display output

There are three hardware displays supported in SDP: two LVDS display panels and HDMI output, you can set different U-Boot environment parameters for display output as following:

LVDS Display Single Display on LVDS1 display:

```
U-Boot > setenv bootargs console=ttymxc0,115200 init=/init video=mxcfb0:dev=ldb,bpp=32
video=mxcfb1:off video=mxcfb2:off fbmem=10M fb0base=0x27b00000 vmalloc=400M
androidboot.console=ttymxc0 androidboot.hardware=freescale
U-Boot > saveenv
```

HDMI Display Single Display:

```
U-Boot > setenv bootargs console=ttymxc0,115200 androidboot.console=ttymxc0 vmalloc=400M
init=/init video=mxcfb0:dev=hdmi,1920x1080M@60,bpp=32 video=mxcfb1:off video=mxcfb2:off
fbmem=28M androidboot.hardware=freescale
```

LVDS&HDMI Display Dual Display enable LVDS1 and HDMI output dual display feature:

```
U-Boot > setenv bootargs console=ttymxc0,115200 androidboot.console=ttymxc0 vmalloc=400M
init=/init video=mxcfb0:dev=ldb,bpp=32 video=mxcfb1:dev=hdmi,1920x1080M@60,bpp=32
video=mxcfb2:off fbmem=10M androidboot.hardware=freescale
```

Pls refer to [Android_Quick_Start_Guide.pdf](#) on detail command

Setup Building Environment and Compiling

-- Using Linux Solution

LTIB Introduction

- Linux Target Image Builder (LTIB) is a tool created by Freescale that is used to build Linux target images, composed of a set of packages:
 - A mechanism to deliver Linux board support packages (BSPs)
 - A wrapper around tool chains and standard Linux commands (cp, make, objcopy, tar, gcc, ...)
- LTIB Packages for i.MX6Q SABRE Board:
 - Toolchain for the ARM[®] Cortex[™] - A9 CPU
 - Linux Kernel 3.0.35
 - Uboot 2009.08
 - Base tools: BusyBox, Dropbear, ...
 - and many more ...

Setup LTIB Environment

Install the Ubuntu 10.04 64 Bit Desktop.

Install the following packages:

```
$ sudo apt-get install gettext libgtk2.0-dev rpm bison m4 libfreetype6-dev  
$ sudo apt-get install libdbus-glib-1-dev liborbit2-dev intltool  
$ sudo apt-get install ccache ncurses-dev zlib1g zlib1g-dev gcc g++ libtool  
$ sudo apt-get install uuid-dev liblz2-dev  
$ sudo apt-get install tcl dpkg  
$ sudo apt-get install ia32-libs libc6-dev-i386 lib32z1
```

This package is used for ulmage and uboot format support:

```
$ sudo apt-get install uboot-mkimage
```

These two packages are recommended to help the daily work, “meld” for file comparison and “gparted” for storage partition:

```
$ sudo apt-get install meld gparted
```

NOTE: You can get detailed steps from “[Setting_up_LTIB_Host_L3.0.35_1.1.0.pdf](#)”

Install and Configure LTIB

Install LTIB package, not as root, in a location such as /home/user/:

```
$ tar zxvf L3.0.35_1.1.0_121218_source.tar.gz
$ ./L3.0.35_1.1.0_121218_source/install
```

Configure and build LTIB:

```
$ cd <LTIB directory>
$ ./ltib -m config
```

- 1). The LTIB menu will appear as following;
- 2). If it has not been selected already, select:

```
--- Choose the platform type
    Selection (imx6q) --->
```

- 3). Exit
- 4). Save

- 5). Select

```
--- Choose your board for u-boot
    board (mx6q_sabresd) --->
```

- 6). Using the spacebar, select:

```
[*] Configure the Kernel
```

- 7). Don't exit yet...

```
FreeScale Linux development platform
Arrow keys navigate the menu. <Enter> selects submenus --->.
Highlighted letters are hotkeys. Pressing <Y> selects a feature,
while <N> will exclude a feature. Press <Esc><Esc> to exit, <?> for
Help. Legend: [*] feature is selected [ ] feature is excluded

--- Choose the platform type
  Selection (imx6q) --->
--- Choose the packages profile
  Selection (use packages in preconfig (Min profile)) --->
---
  Load an Alternate Configuration File
  Save Configuration to an Alternate File

<Select> < Exit > < Help >
```

```
FreeScale Linux based board
Arrow keys navigate the menu. <Enter> selects submenus --->.
Highlighted letters are hotkeys. Pressing <Y> selects a feature,
while <N> will exclude a feature. Press <Esc><Esc> to exit, <?> for
Help. Legend: [*] feature is selected [ ] feature is excluded
*(-)

  Bootloader (u-boot) --->
--- Choose your board for u-boot
  board (mx6q_sabresd) --->
--- Choose your Kernel
  Kernel (Linux 3.0.35-imx) --->
[ ] Always rebuild the kernel
[ ] Reduce cscope index
--- Include kernel headers
[*] Configure the Kernel
--- Leave the sources after building
v(+)
```

Install and Configure LTIB

8). Select Package List;

A Linux system is comprised of two main entities:

- Kernel
- File System

9). The Package List is what produces the File System.

10). Kernel Configuration;

11). Text messages will scroll by until the Kernel Configuration menu appears;

12). Exit from the kernel config;

13). The kernel now builds.

```
Package List
Arrow keys navigate the menu. <Enter> selects submenus --->.
Highlighted letters are hotkeys. Pressing <Y> selects a feature,
while <N> will exclude a feature. Press <Esc><Esc> to exit, <?> for
Help. Legend: [*] feature is selected [ ] feature is excluded

-- Platform specific package selection
--- firmware-ixm
[*] mx-test
[*] mx-lib
[*] obs-ng
[ ] tp_ixm (NEW)
[ ] pa_supplicant
[ ] pu-viv-bin-mx6q (NEW)
[ ] uc (NEW)
[ ] theros-wifi (NEW)
v(+)
```

```
Linux/arm 3.0.35 Kernel Configuration
Arrow keys navigate the menu. <Enter> selects submenus --->.
Highlighted letters are hotkeys. Pressing <Y> includes, <N> excludes,
<M> modularizes features. Press <Esc><Esc> to exit, <?> for Help, </>
for Search. Legend: [*] built-in [ ] excluded <M> module <>

[ ] Patch physical to virtual translations at runtime (EXPERIMENT)
General setup --->
[*] Enable loadable module support --->
[*] Enable the block layer --->
System Type --->
Bus support --->
Kernel Features --->
Boot options --->
CPU Power Management --->
Floating point emulation --->
v(+)
```

After LTIB building, you can get the U-boot and Kernel images:

(Z:) > imx6 > linux > L3.0.35_1.1.0_121218_source > ltib > ltib > rootfs > boot

名称	修改日期	类型	大小
bootable_kernel	3/19/2013 11:19 AM	文件	3,762 KB
linux.config	3/19/2013 11:19 AM	XML Configurati...	68 KB
System.map	3/19/2013 11:19 AM	Linker Address ...	1,599 KB
u-boot	3/19/2013 10:45 AM	文件	1,000 KB
u-boot.bin	3/19/2013 10:45 AM	BIN 文件	422 KB
uimage	3/19/2013 11:19 AM	文件	3,762 KB
vmlinux	3/19/2013 11:19 AM	文件	13,896 KB
zimage	3/19/2013 11:19 AM	文件	3,761 KB

Download Linux Images into Target Board

-- using SABRE Platform for Smart Devices

Download Images by Mfgtools

You should prepare Rootfs for Mfgtools download as following:

```
$ cd <your rootfs directory>
$ sudo -s
$ tar -cjf ../rootfs.tar.bz2 ./*
```

Copy “u-boot.bin”, “ulmage”, “rootfs.tar.bz2” into i.MX6Q Linux MFGtool profile folder.

(~\Mfgtools-Rel-1.1.0_121218_MX6Q_UPDATER\Profiles\i.MX6Q Linux Update\OS Firmware\files)

Change the SABRE SD SW6 (boot) to 00001100 (from 1-8 bit) to enter USB OTG download mode, then download Linux images by Mfgtools at the same way as Android;

Change Boot Switch (SW6) to 01000010 (from 1-8 bit), make SABRE boot from SD card slot3;

Download Images in Linux Host – (1)

Insert one SD card into your Linux host PC, and it will recognize your SD, In this example, the device node assigned is “/dev/sdb”:

```
$ cat /proc/partitions
major minor #blocks name
 8      0  78125000 sda
 8      1  75095811 sda1
 8      2      1 sda2
 8      5  3028221 sda5
 8     32 488386584 sdc
 8     33 488386552 sdc1
 8     16  3921920 sdb
 8     18  3905535 sdb1
```

Copying Boot Loader Image into SD card:

```
$ sudo dd if=u-boot-mx6q-sabresd.bin of=/dev/sdb bs=512 seek=2 skip=2 conv=fsync
```

Copying Kernel Image into SD card:

```
$ sudo dd if=uImage of=/dev/sdb bs=512 seek=2048 conv=fsync
```

Download Images in Linux Host – (2)

Create a partition for Root File System:

```
$ sudo umount /dev/sdb
$ sudo fdisk /dev/sdb
u [switch the unit to sectors instead of cylinders]
d [repeat this until no partition is reported by the 'p' command ]
n [create a new partition]
p [create a primary partition]
1 [the first partition]
16384 [starting at offset sector #16384, i.e. 8MB, which leaves enough space for the
kernel, the boot loader and its configuration data]
<enter> [using the default value will create a partition that spans to the last sector
of the medium]
w [this writes the partition table to the medium and fdisk exits]
$ sudo mkfs.ext4 /dev/sdb1
```

Copy target file system into the partition in SD card:

```
$ mkdir /home/user/mountpoint
$ sudo mount /dev/sdb1 /home/user/mountpoint
$ gunzip rootfs.ext2.gz
$ mount -o loop -t ext2 rootfs.ext2 /home/user/rootfs
$ cd /home/user/rootfs
$ sudo cp -rpa [A-z]* /home/user/mountpoint
$ sudo umount /home/user/mountpoint
```

Insert this SD card into SABRE board slot3 and boot from it.

Modify U-Boot Environment

Create U-Boot environment commands to send display out through LVDS connected to DISP0 (default) from SD card:

```
U-Boot > setenv loadaddr 0x10800000
U-Boot > setenv bootargs_base 'console=ttyMxc0,115200`
U-Boot > setenv bootargs_base_lvds 'video=mxcfb0:dev=ldb,LDB-XGA,if=RGB666`
U-Boot > setenv bootargs_mmc 'root=/dev/mmcblk1p1 rootwait rw ip=none rootfstype=ext4`
U-Boot > setenv bootargs ${bootargs_base} ${bootargs_base_lvds} ${bootargs_mmc}
U-Boot > setenv bootcmd_mmc 'mmc dev 2;mmc read ${loadaddr} 0x800 0x2000;bootm`
U-Boot > setenv bootcmd 'run bootcmd_mmc`
U-Boot > saveenv
```

For SDP, the LVDS is connected to DISP1, thus, modify the command as follows:

```
U-Boot > setenv bootargs_base_lvds 'video=mxcfb0:dev=ldb,LDB-XGA,if=RGB666 ldb=sin1`
```

Need to add “rootfstype=xxx” to eliminate the time to determine the file system type of the root file system.

NOTE: refer to “[SABRE_SD_Release_Notes_L3.0.35_1.1.0.pdf](#)” for the details about the “Kernel Boot Parameters”.

Ubuntu Booting on SDP

After download, the Ubuntu boot from SD card slot3 on SABRE Platform for Smart Devices as following:



Hardware Design Consideration

PMIC connection

- In i.MX6SDB board, we use FSL PFUSE100 PMIC to connect with i.MX6, which we recommend to most customers;
- Some customer also use DC/DC solution;
- Above two solution cost is similar.

Power Management

You should consider the following parts in power design:

1. Voltage range of each power domain;
2. Maximal current consuming of each power domain;
3. System power up sequence(SNVS power up firstly);

The following are typical Max Power Measurement Results on SD Board:

Supply Domain	Voltage (V)	Linux - ER1205 - on SD Board ¹	
		P (mW)	I (mA)
VDDARM_IN	1.37	2068.7	1510 (1625 max ²)
VDDSOC_IN	1.37	1555	1135 (1250 max ²)
VDDHIGH_IN	2.78	236.3	85
Total Power (without DDR3 I/O + Memories)		3860	
DDR3 I/O + ³ Memories	1.5	1995	1330 (1390 max ²)
Total Power		5855	

i.MX6Q Power Domain

Symbol	Usage	Voltage	Max Current	Generated	Sequence
VDDARM_IN	ARM Core Power	1.05~1.5V, 1.375V	2500 mA	PF0100 SW1A/B	1
VDDARM23_IN					
VDDSOC_IN	IP Power(VPU, GPU...etc)	1.275~1.5V, 1.375V	1750 mA	PF0100 SW1C	1
VDDHIGH_IN	Internal Regulator	2.8~3.3V, 2.8V	100 mA	PF0100 VGEN5	---
VDD_SNVS_IN	Backup Battery	2.8~3.3V, 3.0V	400 μ A	PF0100 VSNVS	0
USB_OTG_VBUS	USB Supply Voltages	4.4~5.25V, 5.0V	600 mA	PF0100 SWBST	---
USB_H1_VBUS					
NVCC_DRAM	DDR I/O supply	LPDDR2: 1.14~1.3V, 1.2V DDR3: 1.425~1.575V, 1.5V DDR3_L:1.283~1.45V,1.35V	2500 mA	PF0100 SW3A/B	---
NVCC_RGMII					
NVCC_EIM0,1,2 NVCC_ENET NVCC_GPIO NVCC_LCD NVCC_NANDF NVCC_SD2/3 NVCC_JTAG	GPIO Power Supply	1.65~3.6V, 1.8/ 2.8/ 3.3 V	2000 mA	PF0100 SW2	---

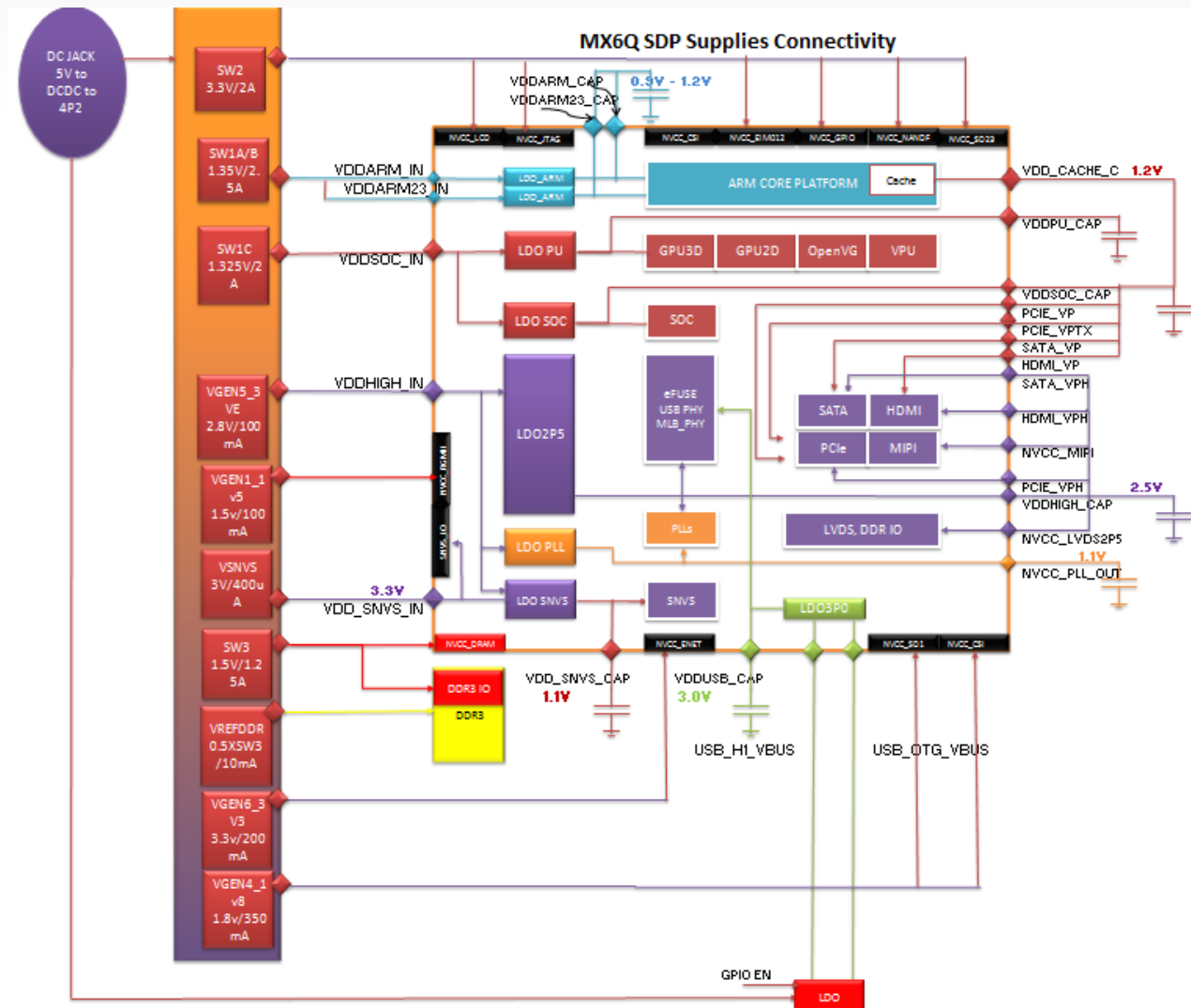
i.MX6Q Internal Regulators

i.MX6 series contain 7 internal regulators, it simplify the power supply scheme of the system;

The following domains are supplied by internal regulators:

Symbol	Usage	Voltage	Generated
NVCC_LVDS2P5	LVDS	2.25~2.75V, 2.5V	i.MX VDDHIGH_CAP
NVCC_MIPI	MIPI	2.25~2.75V, 2.5V	i.MX VDDHIGH_CAP
HDMI_VP	HDMI Supply Voltages	0.99~1.3V, 1.1V	i.MX VDDSOC_CAP
HDMI_VPH		2.25~2.75V, 2.5V	i.MX VDDHIGH_CAP
PCIE_VP	PCIe Supply Voltages	1.023~1.3V, 1.1V	i.MX VDDSOC_CAP
PCIE_VPH		2.325~2.75V, 2.5V	i.MX VDDHIGH_CAP
PCIE_VPTX		1.023V~1.3V, 1.1V	i.MX VDDSOC_CAP
SATA_VP	SATA Supply Voltages	0.99~1.3V, 1.1V	i.MX VDDSOC_CAP
SATA_VPH		2.25~2.75V, 2.5V	i.MX VDDHIGH_CAP

i.MX6 SDP Power Connectivity



i.MX6 SDP Power Design

	Voltage	Power Up Sequence	Current Drawn (mA)	SYS 4V2 Current (mA)	NOTES
SW1A	1.375	1	2155	1001	
SW1B					
SW1C	1.375	2	1590	739	
SW2	3.3	5	653	728	
SW3A	1.5	3	1500	760	
SW3B					
SW4	3.15	6	200	213	
SWBST	5.0	13	300	507	
VGEN1	1.5	9	100	0	Supplied from SW4
VGEN2	1.5	10	250	0	Supplied from SW4
VGEN3	2.8	11	70	66	
VGEN4	1.8	12	310	189	
VGEN5	2.8	10	75	71	See Note on Page 20
VGEN6	3.3	8	160	178	
VSNSV	3.0	0	0.2	0	
VREFDDR	0.75	3	10	3	
Total System Current Requirements:				4454	

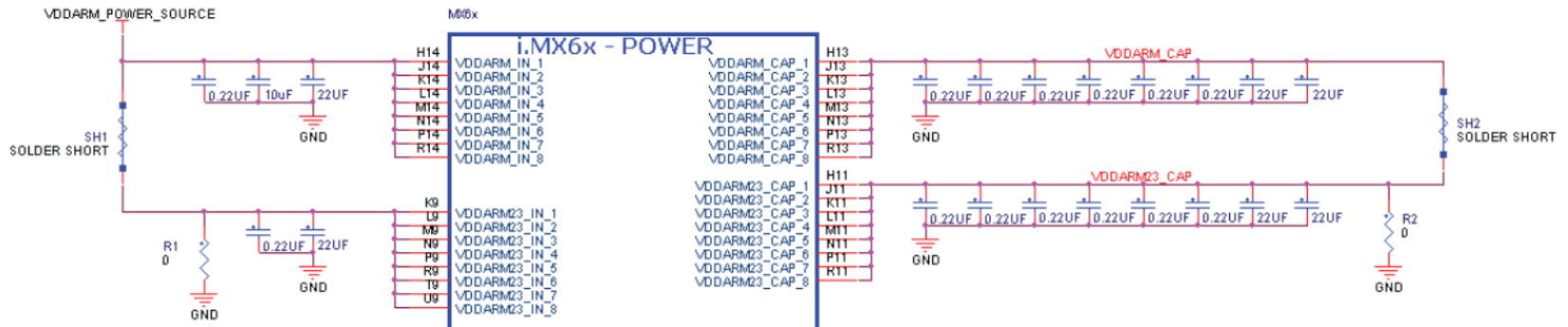
Typical Power Requirements

Voltage	Rail Name	Block	Generated By	Current Capability (mA)	NOTES
5.0	PMIC_5V	USB	PF0100 SWBST	600	
		LVDS1			
		HDMI			
	AUX_5V	SATA	MAX8815	1000	
		LVDS0			
CAN					
3.3	GEN_3V3	EMMC	PF0100 SW2	2000	NVCC_LCD NVCC_EIM0/1/2 NVCC_GPIO NVCC_SD2/3 NVCC_NANDF NAND_JTAG
		SD3			
		NOR			
		SATA			
		LVDS			
		HDMI			
		MIPI			
		mPCIe			
		SENSORS			
		VGEN6_3V3			
	3.15	AUX_3V15	EXP HDR	PF0100 SW4	1000
TOUCH					
GPS					
2.8	VDDHIGH_IN	IMX6	PF0100 VGEN5	100	
	VGEN3_2V5	CAMERA	PF0100 VGEN3	100	
2.5	GEN_2V5	SATA	IMX6 VDDHIGH_CAP	TBD	NVCC_MIPI
		HDMI			
		MIPI			
		mPCIe			
1.8	GEN_1V8	AUDIO	PF0100 VGEN4	350	NVCC_SD1 NVCC_CSI
		CAMERA			
		ACC			
1.5	VGEN2_1V5	CAMERA	PF0100VGEN2	250	
	VGEN1_1V5	GPS	PF0100 VGEN1	100	
		mPCIe			
	DDR_1V5	DDR	PF0100 SW3A/B	2500	
1.375	VDDCORE	ARMCORE	PF0100 SW1A/B	2500	
	VDDSOC	VDDSOC	PF0100 SW1C	1750	
0.75	VREFDDR	DDR	PF0100 VREFDDR	10	

System Power Rails

Pin-to-Pin Compatible Design

All-In-One Circuit:



Power Connections for i.MX6 Series:

	i.MX 6Quad	i.MX 6Dual	i.MX 6DualLite	i.MX 6Solo
SH1	Shorted	Open	Shorted	Shorted
SH2	Shorted	Open	Shorted	Shorted
R1	Open	Shorted	Open	Open
R2	Open	Shorted	Open	Open

Capacitor Placement

One 22 μ F bulk capacitor should be connected to each of these on-chip LDO regulator outputs:

- VDDARM_CAP
- VDDARM23_CAP
- VDDSOC_CAP
- VDDPU_CAP

A 22 μ F bulk capacitor must be placed as near as possible with pins/vias. ***The distance should be less than 50mil between bulk cap and VDDxx_CAP pins.*** Decoupling capacitors such as 0.1 μ F or 0.22 μ F should also be used.

It is highly recommended that ***the user places the decoupling and bulk capacitors of the power domains on the bottom layer of the hardware design***, directly underneath the associated package contacts.

Related Materials:

i.MX6 datasheet,
i.MX6 reference manual

HW Design Checking List for i.Mx6 (only released in community)
(customer need to fillout all items in this check list, including DDR
signal length, etc)

AN4397.pdf:

Common Hardware Design for i.MX 6Dual/6Quad and i.MX 6Solo/6DualLite

AN4509.pdf:

i.MX 6Dual/6Quad Power Consumption Measurement

IMX6DQ6SDLHDG.pdf:

Hardware Development Guide for i.MX 6Quad, 6Dual, 6DualLite, 6Solo
Families of Applications Processors

AN4569.pdf

 i.MX6 thermal design.

How to bring up your own board

- Make sure below signals valid:
 - All power rails from PMIC/DCDC
 - Signals from XTAL
- Make sure bootstrap mode is correct
- Test DDR RAM using DDR stress test tool, make sure at least 10% margin for targeted clock frequency
- Suggest to boot from SD card
 - SD card can be burned via various way like Mfgtool, Linux PC, etc.
- Change booting parameter according to related documents.
- Try to burn other media like NAND flash, eMMC using Mfgtool and try them.

How to get support for i.MX development

Create a SR in Freescale website

The screenshot shows the Freescale website homepage. At the top left is the Freescale logo. To the right are links for "Locations", "中文", "日本語", "한국", a shopping cart icon, "My Freescale", and "Login". Below this is a navigation bar with tabs for "Products", "Applications", "Design Resources", "Support", "Sample and Buy", and "About". The "Support" tab is active, and a dropdown menu is open, showing "Sales and Support", "Technical Service Request" (highlighted with an orange background and a red arrow), and "Communities and Forums". To the right of the navigation bar is a search bar with the text "Search by keyword" and a search button. Above the search bar are three tabs: "Keyword", "Product/Parametric", and "Orderable Part". Below the navigation bar is a large banner for "S12 MagniV Mixed-Signal MCUs" with the text "Explore the latest single-chip solutions for LIN and CAN applications >". To the right of the banner is a stylized car icon with gears and a signal tower. Below the banner are four columns of content: "My Freescale" (with links like "Welcome Guest", "Register or Login", "Browse History", "My Recommendations", "Why Register?"), "Connect With Us" (with social media icons for YouTube, Twitter, Facebook, LinkedIn, and Google+), "Designing with Freescale" (with a chip icon and text "Better insight. Better tools. Better training."), "Real-Time Updates" (with a news item about Freescale re-entering the #RF IC market), "Partners" (with the Freescale Connect logo and text "Freescale Connect—your essential source for embedded designs"), "Headlines" (with news items about Freescale Semiconductor's Q1 2013 results, a student challenge win, and smart device awards), "Events" (with news items about the International Wireless Symposium 2013 and the Open Networking Summit), and "Now Playing" (with a video player showing a man speaking, titled "Next-gen Networks = QorIQ Built on Layerscape").

Input your questions in the SR

Locations | 中文 | 日本語 | 한국 | | My Freescale | Login

Keyword Product Parametric Orderable Part

Search by keyword

New Service Request

Category/Topic Contact Info

SR Details Submit

Please enter the following required fields to open a New Service Request.

*Required Fields

Step 1: Category*:

Step 2: Topic*:

Topic	When to use this Topic
CodeWarrior	Submit questions or issues about the CodeWarrior development environment and its components.
I.MX Products	Submit questions or issues about an i.MX multimedia application processor or use/availability of supporting products or tools.
License Issue	Select this topic to request a license when web-based license fulfillment does not work, or if an existing license is not working properly.
Linux BSP	Submit questions or issues about Freescale's Platform Creation Suite, LTIB, or Linux board support packages for any Freescale platform other than i.MX products. For i.MX issues, use the i.MX Products topic.
Network Security Software	Submit questions or issues about Freescale's Network Security Software.
Other SW Development Tool	Submit questions or issues about software development/programming tools created by Freescale or bundled with Freescale products, and not included in other topics.

Seek help in i.MX community

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i.MX Community

Log in to follow, share, and participate in this community. Not a member? [Join Now!](#)

Overview | Content | People | Subspaces and Projects | Calendar

Welcome to the i.MX Community



This is an open community of i.MX developers and users with the common interest of transforming i.MX applications processors into practically anything imaginable — be it a tablet, eReader, smart appliance, smart medical device, or even infotainment in your car. The i.MX Community is a place to share knowledge, development tips and code. Here you can find technical information and learn from your peers and from the Freescale product experts to take your designs to a new level.

We would like to encourage you to first search the community before asking a question, you might find someone has already solved your particular problem. If it hasn't been solved please ask the community...

Search for an answer...

Submit

GIT Branch for Patch Submissions

Dear i.MX Developers,

We have created a maintenance GIT branch for both MX28 EVK and MX53 QSB platforms. The branch is called "imx_2.6.35_maintain" and can be found at this location: <http://git.freescale.com/git/cgiit.cgi/imx/linux-2.6-imx.git/>.

In the future we will be making bug fix/maintain releases for MX53QSB and MX28EVK platform from this branch. For instructions on submitting patches to the branch, please refer to this discussion: [Submit i.MX53 & i.MX28 Linux kernel patches.](#)

i.MX Solution of the Month

Partner Contributions

Content tagged with partner

- iMX6 EOMA-68 CPU Card development
- i.MX training with Embedded covers WEC7
- Power management Power consumption : ARM Core off
- Yocto with Eclipse integration
- i.MX6 ROM API Documentation

Partner Videos

Content tagged with partner

- AdeneoEmbedded's Congatec WEC7 OpenGL Cube Demo
- AdeneoEmbedded's Congatec WEC7 OpenGL Cube Demo
- iWave launches Industry latest i.MX6 Pico ITX SBC
- iWave's WEC7 BSP Availability for Freescale's i.MX6 SABRE SDP/SDB
- iWave's Quad Display Solution based on Freescale's i.MX6 CPU

Why i.MX community matters?

- There is massive design resources in i.MX community
 - Design application note
 - Reference design
 - Latest patches
- Experts to answer your questions
 - Freescale experts join in community
- Share your finding.
 - Enrich the ecosystem.
- Link:
 - <https://community.freescale.com/community/imx>

