Getting Started with the Freescale SDK

Supports
3700 SDK

3700-1000-110
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Contents

Preface

About This Document

This document provides an introduction to the Freescale Software Development Kit (SDK) and is intended for engineers that use the Freescale STMP37xx SDK to develop custom application for portable audio devices. In addition, this document describes the procedures required to install the SDK software and hardware. Freescale recommends that you complete these procedures in the order they are presented in this document.

> **NOTE** This document is intended to be printed using double-sided printing. If you print this document using single-sided printing, some pages will appear blank.

Organization

The following table describes the chapters and appendixes in this document.

Chapter/Appendix	Description
Chapter 1, “Introduction to the Freescale SDK”	Provides an introduction to the Freescale STMP37xx SDK
Chapter 2, “Installing the SDK Software and Hardware”	Describes procedures for installing the Freescale SDK software and hardware
Chapter 3, “Installing the Green Hills Development Tools”	Describes the procedures for installing the Green Hills development tools
Appendix A, “Common Procedures”	Describes procedures that are common to the Freescale SDK
Appendix B, “Development System Default Configurations”	Describes the default configurations for the Armadillo Engineering Mainboard and the STMP3700 169-BGA CPU Daughtercard

Document Conventions

Typographic The following table describes the typographic conventions used in this document.

Convention	Description	Example
ABCdef	Identifies book titles, emphasized words or words that appear in the glossary, and command variables	You *must* log in as root. `C:\>`**`cd`** *directory_name* *path_name*
ABCdef	Identifies graphical user interface items with which you interact	Click the **OK** button.
ADCdef	Identifies a hyperlink or URL	http://www.freescale.com
`ABCdef`	Identifies commands, computer-generated output, API elements, and code samples	`Build successful`
`[]`	Indicates optional parameters within a syntax description	`[ALL]`
`{}`	Indicates a choice between parameters in a syntax description	`{ALL|NONE}`
`|`	Separates items in a list of choices; used with braces (`{}`) in a syntax description	`{ALL|NONE}`
`...`	Indicates that you can repeat a series of items one or more times	*path_name* `...`

Notational The following table describes the notational conventions used in this document.

Type	Symbol	Description
Tip		Provides information that may help you better utilize the product
NOTE		Provides information that emphasizes the main text
IMPORTANT		Provides important information required for the successful operation of the product

Additional Information

The following table identifies additional documentation associated with the Freescale STMP37xx SDK. To download the most recent versions of these documents, visit the Freescale Extranet.

Document	Description
Freescale SDK Release Notes	Provides information about the latest Freescale STMP37xx SDK release, including structural and operational changes
Freescale SDK Defect Report	Provides a description of all resolved and known defects for the latest Freescale STMP37xx SDK release
Freescale SDK Developer's Guide	Provides step-by-step instructions for developing custom applications using the Freescale STMP37xx SDK, as well as an overview of the system architecture and operating system concepts
Freescale SDK API Reference	Provides detailed information about the API that is distributed with the Freescale STMP37xx SDK
Freescale STMP37xx Reference Design Schematics	Provides detailed information about the STMP37xx
Freescale STMP37xx Reference Design Schematics	Provides schematics for STMP37xx-based player designs

Accessing the Freescale Extranet

Introduction The Freescale Extranet provides access to the following product resources:

- Release notes and defect reports
- Datasheets and product change notices (PCNs)
- Product documentation and schematics
- Source code and upgrades
- Example applications and application notes
- Return materials authorization (RMA) and host customization forms

NOTE To gain access to the Freescale Extranet, you must purchase the Freescale SDK and sign a license agreement. After you sign the license agreement, a user name and password will be emailed to you.

Procedure To access the Freescale Extranet, open a browser, and enter the following URL:

http://www.freescale.com.

Customer Support

Introduction

You can request new features, report product defects, or ask general questions by visiting the Freescale web site at the following URL:

http://www.freescale.com

Request New Features

To request new features, include the following information in your email:

- A detailed description of the requested feature, including a description of the user interface
- Feature specifications
- Project schedule
- Datasheet for peripherals

NOTE Freescale uses this information to prioritize new features.

Report a Defect

To report a defect, include the following information in your email:

- Freescale STMP37xx SDK *version number and part numbers*

  Include the version number of your Freescale STMP37xx SDK, and indicate whether any patches have been applied.

- *CPU product number*

  Include the product number listed on the Freescale CPU chip.

- *Full description of issue*

  Include a detailed description of the issue, as well as answers to the following questions:

  – Is the defect included in the *Freescale SDK Defect Report*?
  – Can you reproduce the defect with the latest SDK?
  – What steps are required to reproduce the defect?

- *Debugging information* (if applicable)

  Before contacting Freescale Customer Support, you should attempt to debug the issue. If you are unable to resolve the issue, please include all relevant debugging information in your email submission.

- *Screenshots* (if applicable)

NOTE When reporting multiple issues, submit only one issue per email.

CHAPTER 1

Introduction to the Freescale SDK

Introduction This chapter describes the software and hardware that is distributed with the Freescale SDK. In addition, this chapter provides an overview of the SDK development options.

In this Chapter The following table lists the sections in this chapter.

See Also *Freescale SDK Developer's Guide*

Section A Overview

Introduction

The Freescale STMP37xx Software Development Kit (SDK) provides a total system solution including stable source code and a hardware development platform that allows you to develop custom applications for portable audio devices.

The Freescale SDK provides support for the Microsoft® PlaysForSure technology, as well as Windows® Media digital rights management (DRM) 10 and provides all essential features for MP3 flash players, including a Digital Radio Interface (DRI) to support the Freescale FM tuner solution.

The Freescale SDK enables industry-leading audio quality with support for all major audio codecs including MP3, Windows Media Audio, Advanced Audio Compression (AAC), and OGG Vorbis, as well as support for MPEG4, H.264, and WMV9 video codecs at varying resolutions and bit rates.

Version Numbers

The Freescale SDK releases use the following naming convention for version numbers:

m.xyz.nnn

Where

- *m* is the major version number and denotes wholesale changes to an SDK, or identifies an SDK for a new chip.
- *x* is the minor version number and denotes additional features and optimization changes to an SDK.
- *y* is the maintenance version number and denotes maintenance changes to an SDK.
- *z* is the maintenance version and is for internal use only.
- *nnn* is the version release field and is for internal use only.

Features

The Freescale SDK includes the following features:

- Freescale development tools
- System recovery utility
- Customizable user interface (UI)
- Localized Fonts
- Color LCD/OLED displays
- 2-D graphics library
- Button input, rotary encoders and analog–digital remotes
- NAND + SDRAM (2MB SDRAM minimum)
- SDRAM/media-assisted content management
- Browsing while playing and displaying images
- Persistent user settings
- ThreadX operating system
- FAT32 file system
- Check disk
- Code encryption and authentication
- Real-time clock
- Streaming architecture
- Support for STFM1000 FM Tuner companion chip
- Battery charging and monitoring (Lithium Ion only)
- Power management
- JPEG decoder with simultaneous audio decode
- AAC, MP3, WMA, PCM, and Ogg Vorbis decoders
- MP3, WMA, and PCM encoders
- Support for DRM: Portable Devices DRM 9 (PDDRM) and Windows Media DRM 10 (WMDRM 10)
- Flash: NAND (Large-block SLC and MLC)
- Removable Media: MMC/SD allowing playback of WMDRM10 content from removable media

IMPORTANT For external media support on Windows 2000, service pack 3 is required.

For more information about the implementation of these features, refer to the *Freescale SDK Developer's Guide*.

Deliverables The SDK5xxx release includes the following features:

- Host Installer with Example Application Binaries
- Example Application Firmware
  - Audio playback
  - Video playback
  - FM Tuner (SDRAMless only)
  - Recording
  - Media Content Browsing
  - Image playback – JPG
- Various Unit Tests (see Table 1-1)

Unit Tests Table 1-1 lists the various unit tests that are included with the Freescale STMP37xx SDK.

Table 1-1: Freescale SDK Unit Tests

Unit Test	Location and File Name
Button driver (basic_os_btn)	SOCFirmware\components\btn_translator\unit_test\ basic_os_btn_top_37xx.gpj
Rotary encoder (basic_os_rotary)	SOCFirmware\drivers\rotary\unit_test\ basic_os_rotary_top_37xx.gpj
Timer (basic_os_timer)	SOCFirmware\hw\timrot\unit_test\timer\ basic_os_timer_top_37xx.gpj
Presentation (cmp_presentation_test)	SOCFirmware\components\presentation\unit_test\cmp_ presentation_test_top_37xx.gpj
Display (ddi_display_test)	SOCFirmware\drivers\display\unit_test\ ddi_display_test_top_37xx_tx.gpj
I2C (ddi_i2c_test)	SOCFirmware\drivers\i2c\unit_test\ ddi_i2c_test_top_37xx.gpj
Application UART (ddi_uartapp_unit_test)	SOCFirmware\drivers\uartapp\unit_test\ unit_test_top_37xx.gpj
Debug UART (ddi_uartdbg_os_example)	SOCFirmware\drivers\uartdbg\unit_test\os_example\dd i_uartdbg_os_example_top_37xx.gpj

Section B Software and Development Tools

The Freescale SDK includes the following software and development tools:

- *SDK system source code*

  The Freescale SDK system source code provides access to core SDK functionality; however, some functionality is distributed separately as libraries. The system source code, along with the STMP37xx Development System, is used to create custom applications.

  NOTE The Freescale system source code includes the ThreadX real-time operating system (RTOS). For more information, refer to the ThreadX documentation that is distributed with the Freescale SDK.

- *Codec libraries*

  Libraries are provided for proprietary source code, such as codecs, and are used, along with the SDK system source code, to create custom applications. Because they require separate license agreements, codecs are distributed as individual archived (.zip) files.

- *Green Hills Software Development Tools*

  The Green Hills MULTI IDE is used, along with the Freescale SDK system source code, to create custom applications. The Green Hills MULTI Software CD is included with the SDK and includes a PDF file of the *MULTI: Getting Started* document. For more information about the Green Hills MULTI IDE, see Chapter 3, “Installing the Green Hills Development Tools.”

- *User Interface Development Tool*

  The User Interface Development Tool simulates the SDK system source code on a Win32 operating system environment and allows you to customize the user interface without requiring the STMP37xx Development System. For information about how to configure and use the User Interface Development Tool, refer to Chapter 2, “Project Management,” in the *Freescale SDK Developer’s Guide*.

- *Example applications*

  Example applications, such as the Cinema Example Application, are used with the Freescale source code or the User Interface Development Tool to provide an example of a custom application. For more information, refer to the *Cinema Example Application User’s Guide*.

- *Example host application*

  The example host application provides an example of a custom host application and is used to download the example application binaries to the STMP37xx Development System. This application, along with the example application binaries, is distributed in a single archived (.zip) file.

- *Example host application source code*

  Source code for the example host application is provided as a template for creating custom host applications. This source code is distributed as a separate archived (.zip) file.

The Freescale SDK software and development tools are distributed as .zip files and are available for download from the Freescale Extranet. For information about downloading the Freescale SDK software and development tools, “Downloading the Freescale SDK files” on page 20.

Section C STMP37xx Development System

The STMP37xx Development System includes the following components:

- Armadillo Engineering Mainboard
- STMP3700 169-BGA CPU Daughtercard
- Memory Daughtercard; choose one of the following:
  - NAND Flash Daughtercard (Default)
  - CF / 1.0" Hard Drive Daughtercard (This card is required for Linux BSP and requires the STMP3700 169-BGA CPU Daughtercard.)
- LCD Daughtercard; choose one of the following:
  - Color CSTN LCD Display (Default)
  - QVGA TFT LCD Display (This card is required for video.)
- Additional Daughtercard options:
  - STFM1000 FM Tuner Daughtercard
  - Power Supply (US)
- Green Hills Slingshot Debugger Hardware

NOTE In addition to the components listed above, you will need a USB cable and either an AC adapter or a DC power supply. These components are not included with the STMP37xx Development System.

For more information about the STMP37xx Development System, contact your Freescale representative.

Section D Development Options

The Freescale SDK provides the following development options:

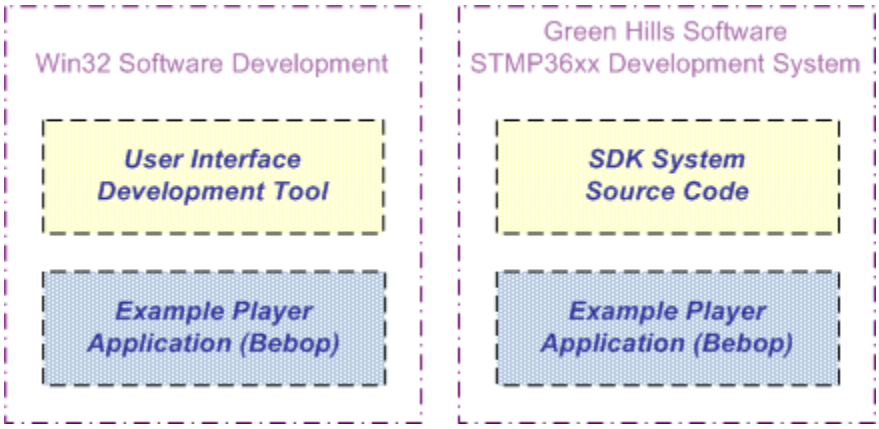
- *User Interface Development Tool*

  The User Interface (UI) Development Tool is used, along with an example application, such as Cinema Example Application, to simulate a development environment. Because the User Interface Development Tool does not require the STMP37xx Development System, it provides a quick and affordable way to develop custom applications. For information about how to configure and use the User Interface Development Tool, refer to Chapter 2, “Project Management,” in the *Freescale SDK Developer’s Guide*.

- *SDK system source code*

  The Freescale SDK system source code is required for more advanced custom applications. This solution provides more flexibility and control over your custom applications. The SDK system source code solution requires the Green Hills Software development tools, as well as the STMP37xx Development System. For more information about the system source code, refer to the *Freescale SDK Developer’s Guide* and the *Freescale SDK API Reference*.

The following diagram provides a visual representation of these options.



CHAPTER 2

Installing the SDK Software and Hardware

Introduction

This chapter describes how to install software and hardware that is distributed with the Freescale STMP37xx SDK.

Python Installation

The Freescale STMP37xx SDK uses ActivePython to execute scripts during the build process. You must install ActivePython and add it to your system's environment variables path. For more information about downloading and installing ActivePython, visit the following Web site:

http://www.activestate.com/Products/ActivePython

wxPython is required to run the RPCNet instrumentation application during debug procedures. For more information about downloading and installing wxPython, visit the following Web site:

http://www.wxpython.org/download.php

NOTE Be sure to download the 'unicode' version that matches your python version (that is, Python 2.4 unicode).

In this Chapter

The following table lists the sections in this chapter.

See Also

Freescale SDK Developer's Guide

Section A Downloading the Freescale SDK files

Introduction This section describes how to download the Freescale SDK software and development tools .zip files. The SDK files that you must download depend on the type of application you want to create, as well as your license agreement with Freescale and other companies; therefore, if you are unsure about which files to download, contact your Freescale representative. For more information about the Freescale SDK software and development tools, see “Software and Development Tools” on page 15.

> **NOTE** To complete several procedures in this chapter, an archive utility, such as WinZip, must be installed on your computer. WinZip is used to complete the procedures in this document.

Procedure To download the Freescale SDK files:

Step 1 Access the Freescale Extranet as described in “Accessing the Freescale Extranet” on page 8.

Step 2 From the STMP37xx Development page, click the **SDK** link.

Step 3 Download each SDK file by right-clicking the link, and selecting **Save Target As**.

> **IMPORTANT** To download PDDRM or WMDRM libraries, you must have permission to the DRM section of the Freescale Extranet. If you require access to the DRM section of the Freescale Extranet, contact your Freescale representative.

Step 4 Change to the desired directory on your computer, and click **Save**.

Step 5 Repeat the previous steps for each SDK file.

Section B Extracting the Freescale SDK files

Introduction This section describes how to extract the Freescale SDK files to the root directory of your local computer.

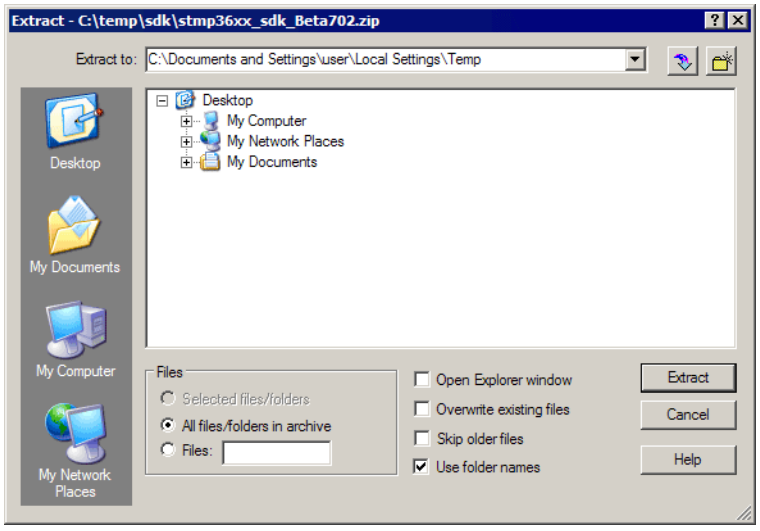
> **IMPORTANT** Patch files may be available for your Freescale SDK and are intended to replace original SDK files. If you are unsure of whether your SDK requires a patch, contact your Freescale representative.

Procedure To extract the Freescale SDK files:

Step 1 Change to the directory in which you saved the files.

Step 2 Right-click a file, select **WinZip**, and then select **Extract to**.

A dialog box similar to the following appears.



Step 3 In the directory list, select **Local Disk (C)**.

> **NOTE** The example host .zip file contains the example host application installation application and example application binaries. Freescale recommends that you extract the contents of this file to a temporary directory, such as C:\temp.

Step 4 Select the **Use folder names** option, and click **Extract**.

Step 5 Repeat the previous steps to extract each SDK file.

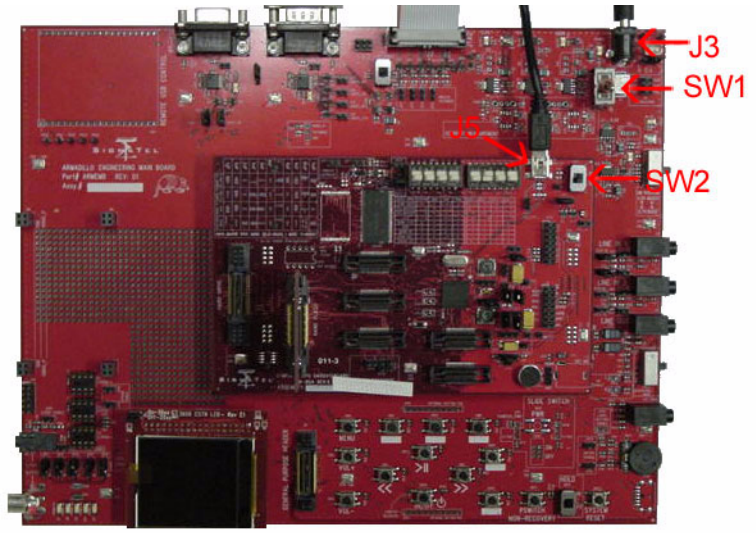
Result The Freescale SDK files are extracted to the following location:

C:\STMP37XX_SDK\SOCFirmware

> **IMPORTANT** Unless specified otherwise, Freescale recommends that you extract all SDK files to the location listed above. If the Freescale SDK directory path exceeds 260 characters or includes spaces, your projects will not compile successfully.

Section C Connecting the Development System

Introduction After you have successfully installed the example host application, you must connect the STMP37xx Development System to your computer. The following image provides a visual representation of the STMP37xx Development System after it has been connected.



Procedure To connect the STMP37xx Development System:

Step 1 Verify the STMP37xx Development System is configured according to the default settings. For more information, see Appendix B, “Development System Default Configurations.”

Step 2 Insert barrel plug for the AC adapter into the J3 jack located on the Armadillo Engineering Mainboard, and then plug the AC adapter into a standard AC outlet.

Step 3 On the Armadillo Engineering Mainboard, move the SW1 switch to the ON position.

Step 4 Insert the type B (small) connector of the mini USB cable into the J5 jack located on the STMP3700 CPU Daughtercard, and insert the type A (large) connector of a USB cable into a USB port on your computer.

Step 5 On the STMP3700 CPU Daughtercard, move the SW2 switch to the ON position.

Windows automatically recognizes the STMP37xx Development System as a Player Recovery Device Class.

> **NOTE** If the Found New Hardware Wizard dialog box appears, select the **Install the software automatically**, and follow the onscreen instructions to complete installation.

CHAPTER 3

Installing the Green Hills Development Tools

Introduction

The Freescale STMP37xx SDK uses the following Green Hills development tools:

- *Green Hills® MULTI® IDE*—The Green Hills Software MULTI integrated development environment (IDE) is used to create embedded applications and is required to build the Freescale STMP37xx SDK code base, including various components and example projects.
- *Green Hills Slingshot™ Debug Device*—The MULTI IDE uses the Slingshot debug device to debug and test embedded applications using a USB interface.

This section describes how to install the Green Hills development tools.

IMPORTANT The Freescale SDK is not backwards compatible to development tools. Refer to the *Freescale SDK Release Notes* to ensure that you install the correct version of the development tools for your SDK.

Before You Begin

Locate the following items:

- Green Hills Software Installation CD (or installation file)
- Slingshot Debug Device and installation CD

If you have not received these items, contact your Freescale representative to request your Freescale STMP37xx SDK.

NOTE To complete several procedures in this section, an archive utility, such as WinZip, must be installed on your computer.

In this Chapter

The following table lists the sections in this chapter.

Section A Installing the MULTI IDE

Introduction This section describes how to install the MULTI IDE. If a previous version of the MULTI IDE is installed on your computer, you must remove it before proceeding with this procedure.

> **IMPORTANT** MULTI IDE patches may be available on the Freescale Extranet. After you complete the installation process, you must apply available patches and reinstall your MULTI license as described in Step 6 of this procedure. If you do not apply the patches, your builds may not complete successfully. For more information, refer to the *Freescale SDK Release Notes* and the readme.txt file located within the patch .zip file.

Before You Begin Refer to the *Freescale SDK Release Notes* to verify that the MULTI IDE is compatible with your version of the Freescale SDK.

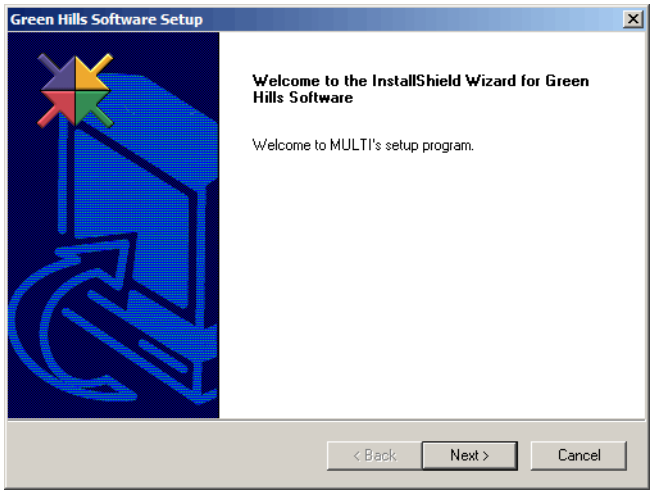
Procedure To install the MULTI IDE:

Step 1 Download and extract the MULTI IDE installation application and available patches from the Freescale Extranet:

A. Access the Freescale Extranet as described in “Accessing the Freescale Extranet” on page 8.
B. Beneath the STMP37xx Development link, click **Green Hills (GHS)**.
C. Beneath the MULTI Tools heading, right-click a link, and select **Save Target As**.
D. Change to the desired location on your local computer, and click **Save**.
E. Repeat the previous step for each file listed under the MULTI Tools heading.
F. Change to the directory in which you saved the `.zip` files, and extract the MULTI Tools file to a location on your local computer.
G. Change to the directory in which you extracted the files, locate the installation application (`setup.exe`), and proceed to the next step.

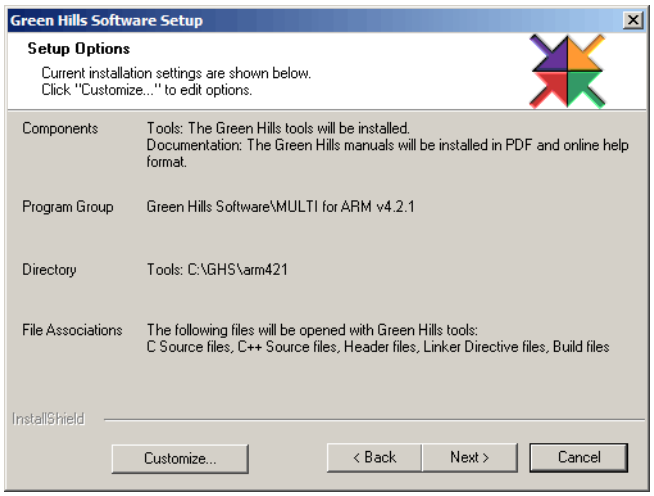
Step 2 Double-click setup.exe.

The Green Hills Software Setup dialog box appears.



Step 3 Click **Next**.

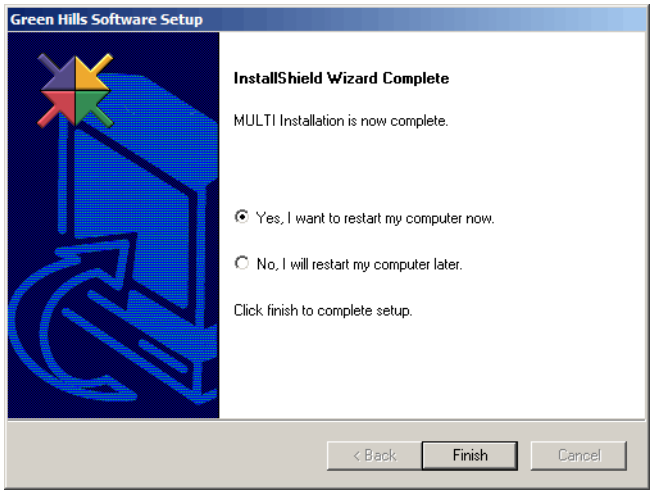
The Setup Options dialog box appears.



Step 4 Click **Next** to install the MULTI IDE software using the default settings. By default, the Green Hills MULTI IDE is installed in the following directory:

C:\GHS

Once installation is complete, you are prompted to restart your computer.



Step 5 Click **Finish** to restart your computer.

Step 6 Install available MULTI IDE software patches.

A. Locate the .zip file you downloaded earlier in this procedure, and extract the contents of each zip file into the C:\GHS\arm421 directory.
B. Open a command prompt and change to the C:\GHS\arm421 directory.
C. Execute the following command for each .iff file:
   gpatch -install patch_*xxxx*.iff
D. Confirm that the patch was installed by opening the patch_information.txt file or by looking in the Add and Remove Programs application, which lists the patch number and the installed directory.
E. If you already have your MULTI license, reinstall it.

Once you install the MULTI application and patches, you must obtain and install the MULTI license as described in the next sections.

NOTE Green Hills Software version 4.2.3 includes version 4.2.1, plus all applicable patches. If you install version 4.2.3, you do not need to install additional patches.

Section B Obtaining a MULTI license

Introduction This section describes how to obtain a MULTI license. After you submit the required information, Freescale processes your request and sends you a license file, along with the *Green Hills Software Getting Started Manual*.

> **NOTE** The Green Hills Software MULTI IDE license obtained through Freescale does not include a simulator or C++ compiler.

Procedure To obtain a MULTI license:

Step 1 Install the MULTI IDE as described in “Installing the MULTI IDE” on page 26.

Step 2 After restarting your computer, open a command-line window. To open a command-line window:

A. From the Windows Start menu, select Run.
B. In the Run dialog box, type **cmd** in the Open field, and click **OK**.

Step 3 From the command-line, change to the MULTI installation directory. For example, if you used the default settings during installation, change to the following directory:

c:\GHS\arm421

Step 4 From the GHS\arm421 directory, execute the following command:

```
servecode –g –v
```

Output similar to the following appears.

```
Host name(s) for this machine:
NetBIOS: JUSER
    IP: juser
Server code(s) for this machine:
5#0x0000000
9#0x0000000
4#0x0000000
8#0x0000000
1#0x0000000
```

Step 5 Copy and paste the output into an email message or text file.

A. Highlight the text with your cursor, and press **Enter**.
B. Press Ctrl+V to paste the text into an email message or text file.

Step 6 Send the following information to psgquality@sigmatel.com.

- Servecode output
- Company name
- Company address
- Contact's name
- Contact's phone number

In response to your email message, Freescale sends you a license file.

Step 7 Once you receive the license file, install the license as described in "Installing the MULTI license file" on page 32.

Section C Starting the MULTI Launcher

Introduction The MULTI Launcher is a graphical user interface that allows you to install the MULTI license, launch MULTI development tools, access open windows, and manage MULTI workspaces.

Procedure To start the MULTI Launcher application:

Step 1 From the Windows Start menu, select **Program Files**.

Step 2 Select **Green Hills Software**.

Step 3 Select the **Multi for ARM**, and then select **MULTI**.

The MULTI IDE Launcher appears.

For more information about the MULTI Launcher, refer to the *MULTI: Getting Started* document.

Section D Installing the MULTI license file

Introduction After you receive the license file from Freescale, you must install the file using the MULTI License Administrator.

Procedure To install the MULTI license file:

Step 1 Open the email you received from Freescale in response to your license request.

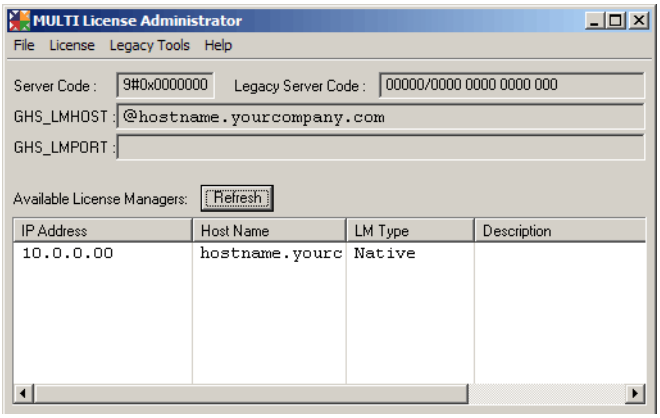
Step 2 Save the attached license file to a location on your local computer.

> **IMPORTANT** Freescale recommends that you create a backup of your license file by saving an additional copy to a secure location.

Step 3 Start the MULTI Launcher as described in “Starting the MULTI Launcher” on page 31.

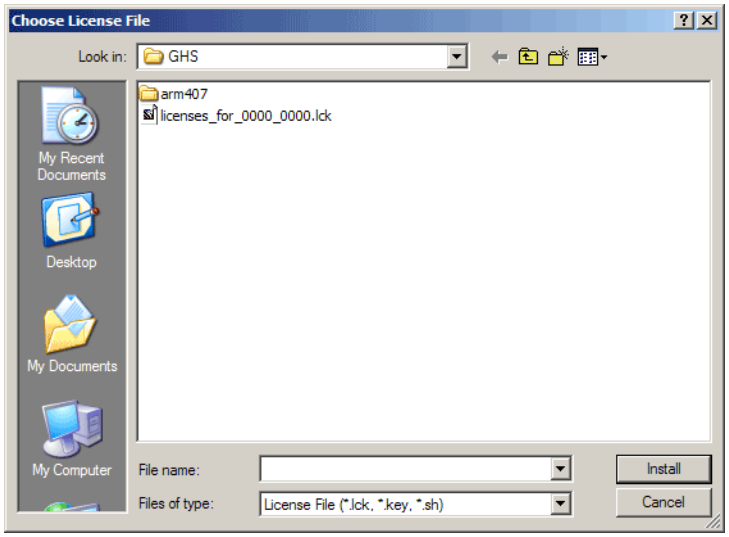
Step 4 From the MULTI Launcher, select **License Administration** from the Utilities menu.

The License Administration dialog box appears.



Step 5 From the MULTI License Administration dialog box, select **Install License File** from the License menu.

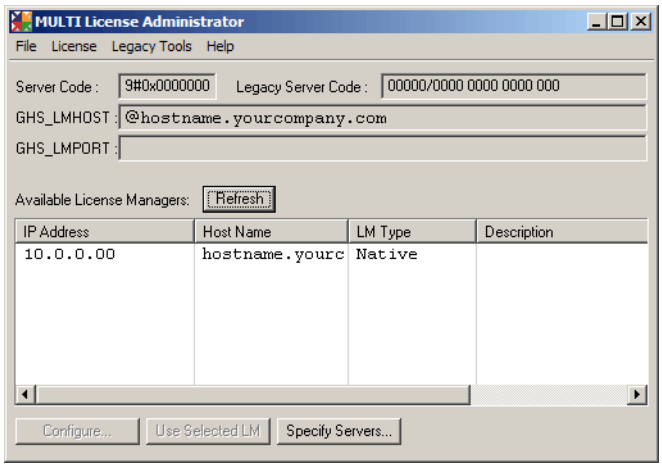
The Choose License File dialog box appears.



Step 6 Navigate to the directory in which you saved the license file.

Step 7 Select the license file, and click **Install**.

Once the license file is installed, license information appears in the MULTI License Administrator dialog box.

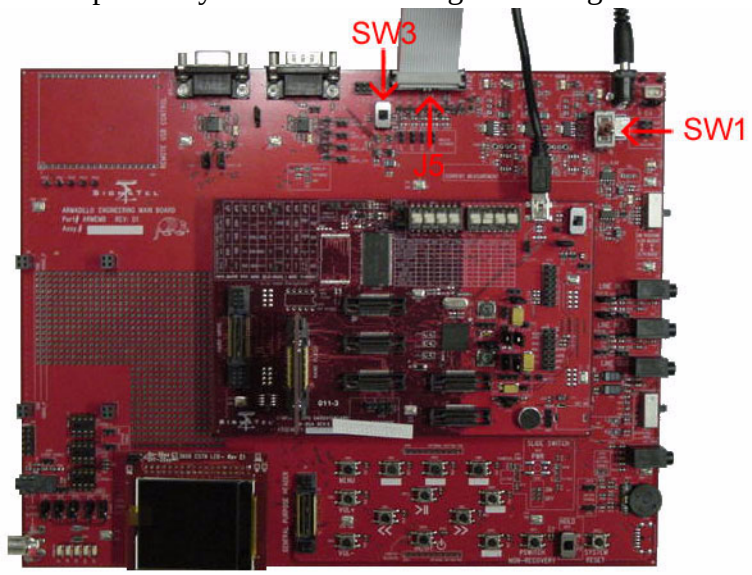


Section E Installing the Slingshot debug device

Introduction

The Green Hills Slingshot™ is an advanced hardware debug device that enables the MULTI debugger to load, control, debug and test a target system without the need for prior board initialization, an RTOS, or a ROM monitor. This section describes how to install the Slingshot debug device.

The following image provides a visual representation of the STMP37xx Development System after the Slingshot debug device has been connected.



For more information about the Slingshot debug device, visit the Green Hills Web site at the following URL: http://www.ghs.com/products/slingshot.html

Before You Begin

- Verify MULTI is installed as described in “Installing the MULTI IDE” on page 26.
- Verify the STMP37xx Development System is configured according to the default configurations described in Appendix B, “Development System Default Configurations.”

Procedure To install the Slingshot debug device:

Step 1 On the Armadillo Engineering Mainboard, verify the SW1 switch and the JTAG ENABLE (SW3) switch are in the ON position.

Step 2 Connect the USB type B connector to the Slingshot device.

Step 3 Connect the USB type A connector to an open USB port on your computer.

Step 4 Connect the Slingshot ribbon cable to the J5 (JTAG) connector located on the Armadillo Engineering Mainboard.

Windows automatically recognizes the new hardware as *Green Hills - Slingshot (tm)*, and the Found New Hardware Wizard dialog box appears.

Step 5 Complete the onscreen instructions to install the new hardware.

Step 6 Open the Device Manager and verify that the *Green Hills - Slingshot (tm)* entry appears under the Universal Serial Bus Controllers heading.

NOTE If Windows does not recognize the hardware, update the driver by opening the Device Manager, right-clicking the device, and selecting **Update Driver**. Slingshot drivers are included in the Green Hills Tools .zip file located on the Freescale Extranet.

Section F Creating a new probe

Introduction To allow the MULTI IDE to recognize the Slingshot debug device, you must create a new probe using the MULTI Probe Administrator.

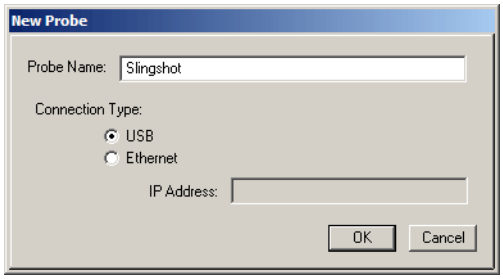
Procedure To create a new probe using the MULTI Probe Administrator:

Step 1 Start the MULTI Launcher as described in “Starting the MULTI Launcher” on page 31.

Step 2 From the Utilities menu, select **Probe Administrator**.

Step 3 In the Probe Administrator dialog box, select **New Probe** from the File menu.

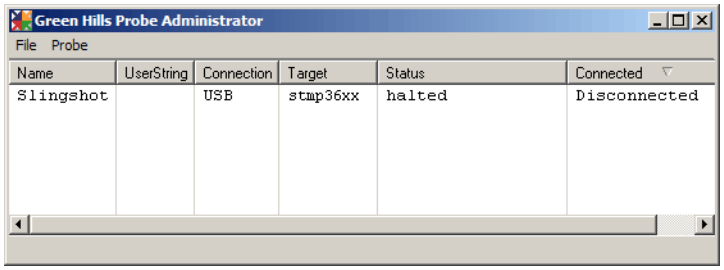
The New Probe dialog box appears.



Step 4 In the Probe Name field, enter a name for the device.

Step 5 Under Connection Type, select the **USB** radio button, and then click **OK**.

The new device appears in the Probe Administrator dialog box.



Step 6 Verify that the Target column displays *stmp37xx*.

> **NOTE** If the Target column does not display *stmp37xx*, you must update the probe firmware. For more information, contact your Freescale representative.

APPENDIX A

Common Procedures

Introduction This appendix describes procedures that are common to the Freescale SDK.

In this Appendix The following table lists the sections in this appendix.

Section A Updating firmware with PC host application

Introduction The Freescale SDK example host application is used to update firmware with a PC host application. This section describes how to download the binaries.

> **NOTE** This section is optional and applies only to customers that use the version of the Freescale SDK that includes the example host application.

Before You Begin Verify the STMP37xx Development System is configured according to the default configurations described in Appendix B, “Development System Default Configurations.”

Procedure To download the example player binaries:

Step 1 Save your binaries to the directory in which the stupdaterapp.exe is located:

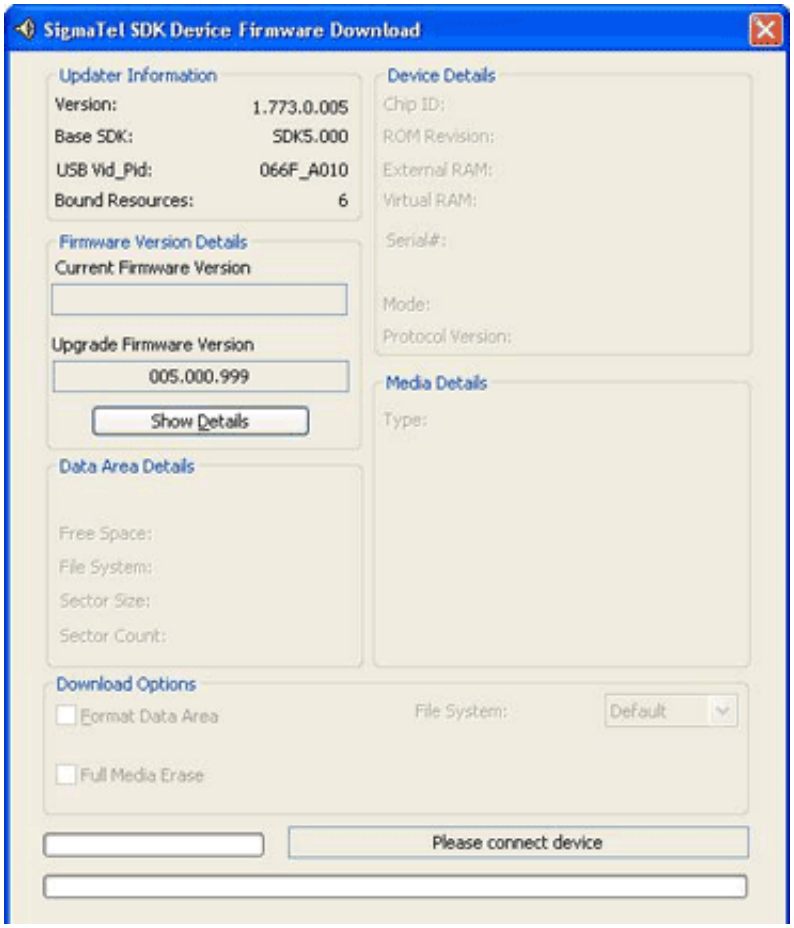
SOCFirmware\bin\updater

Step 2 On the STMP3700 CPU Daughtercard, move the SW2 USB switch to the ON position.

Step 3 Execute the stupdaterapp.exe application that is located in the directory in which you saved the binaries.

Step 4 Select **Download Firmware**.

The Freescale Firmware Download dialog box appears.



Step 5 Optionally, check one of the following download options:

- Format Data Area: Erases the data drive including all media.
- Full Media Erase: Erases the entire NAND including any hidden data not erased by the Format Data Area option.

Step 6 Click **Start**.

> **NOTE** A corrupt NAND will cause the firmware update to fail. If the firmware update fails, enter recovery mode as described in “Entering recovery mode” on page 46.

Step 7 Once the binaries are downloaded to the development system, you can enter player mode.

To enter player mode, move the `SW2 USB` switch on the STMP3700 CPU Daughtercard to the `OFF` position, and then move the `SW1` switch on the Armadillo Engineering Mainboard to the `ON` position.

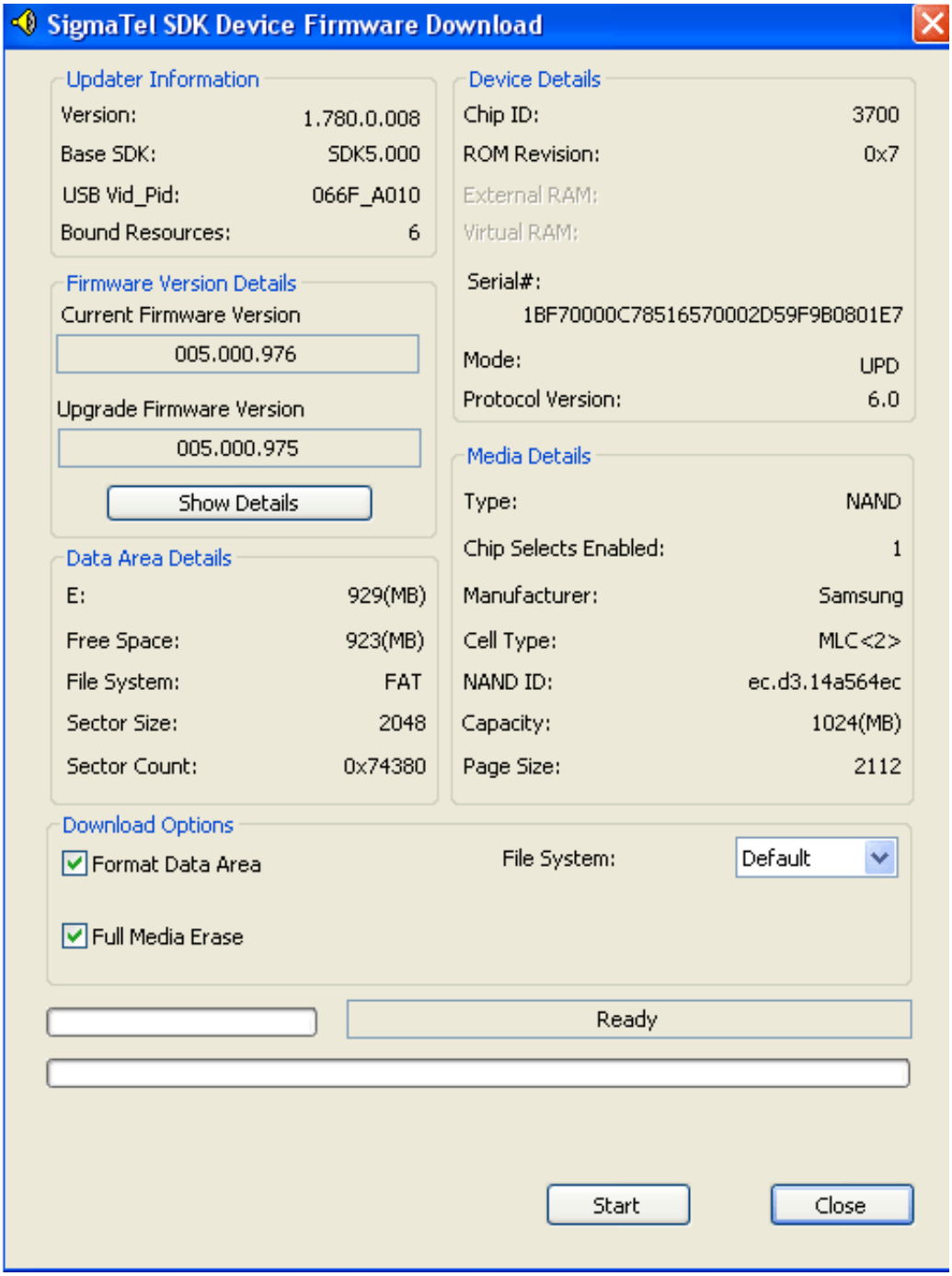
Section B Updating firmware with Live Updater

Introduction

The Freescale SDK Live Updater is a firmware update process for “live” devices that uses a simplified host client or none at all. This new process is targeted toward end-users who are upgrading firmware, and *will not be used for manufacturing or recovering dead devices*.

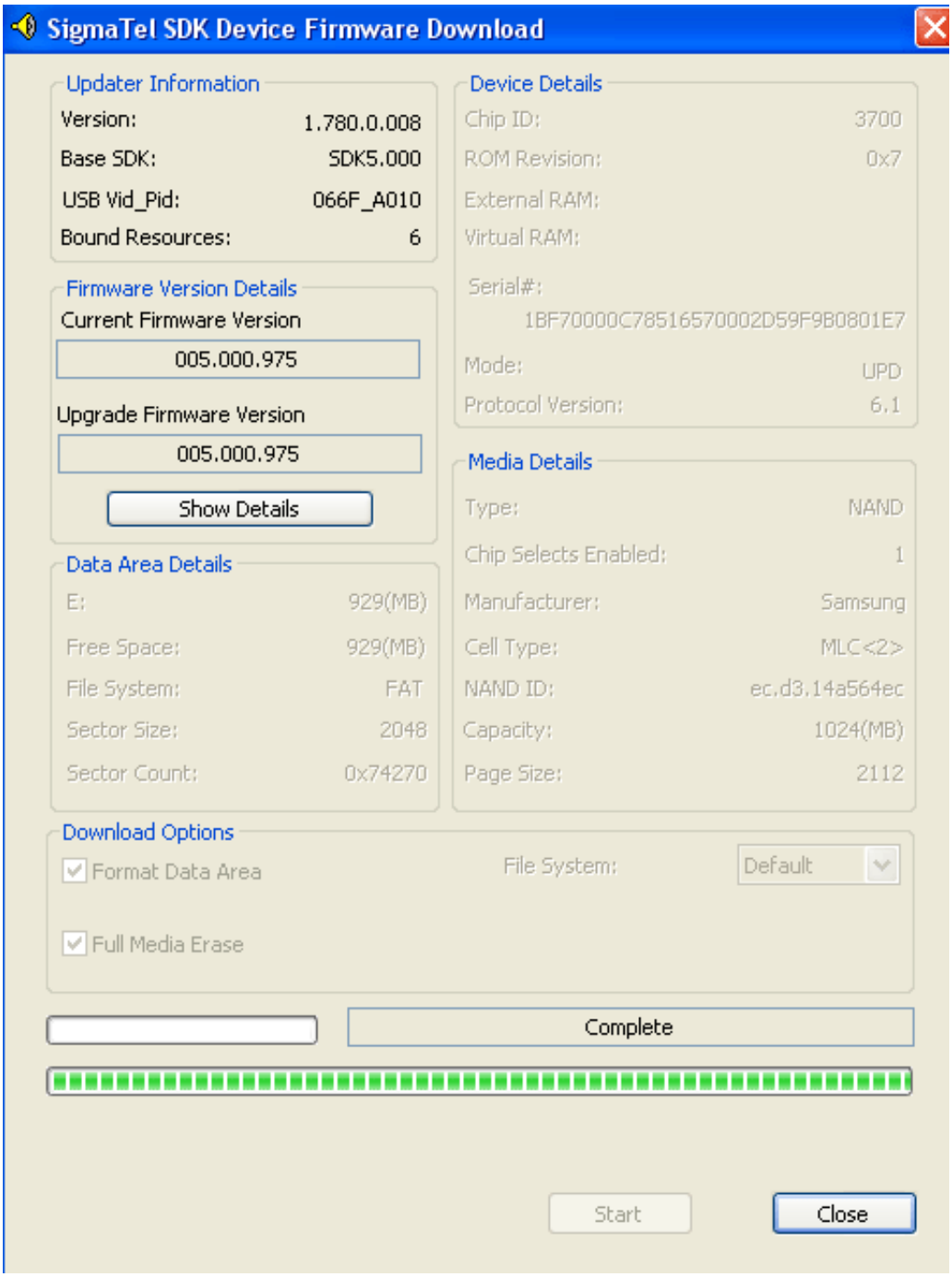
Before You Begin

Before using the Live Updater for the first time, follow the procedures indicated in Appendix A, “Updating firmware with PC host application.” Please ensure that both the **Format Data Area** and **Full Media Erase** options are checked before updating the firmware, and then click **Start** to complete the firmware update process. *You must follow these procedures in order for Live Updater to function properly.* The snapshot that follows shows the necessary configuration for this application.


SigmaTel SDK Device Firmware Download
Updater Information
Version: 1.780.0.008
Base SDK: SDK5.000
USB Vid_Pid: 066F_A010
Bound Resources: 6
Firmware Version Details
Current Firmware Version
005.000.976
Upgrade Firmware Version
005.000.975
Show Details
Data Area Details
E: 929(MB)
Free Space: 923(MB)
File System: FAT
Sector Size: 2048
Sector Count: 0x74380
Device Details
Chip ID: 3700
ROM Revision: 0x7
External RAM:
Virtual RAM:
Serial#:
1BF70000C78516570002D59F9B0801E7
Mode: UPD
Protocol Version: 6.0
Media Details
Type: NAND
Chip Selects Enabled: 1
Manufacturer: Samsung
Cell Type: MLC<2>
NAND ID: ec.d3.14a564ec
Capacity: 1024(MB)
Page Size: 2112
Download Options
Format Data Area
File System: Default
Full Media Erase
Ready
Start
Close

After successful completion, you will see that the update is complete as shown below.

NOTE If you are in Mass Storage (MSC) Mode, you will not see the smaller **Portable Device** box shown below. You will also not see this box if you have checked the **Always Perform the Selected Action** box.



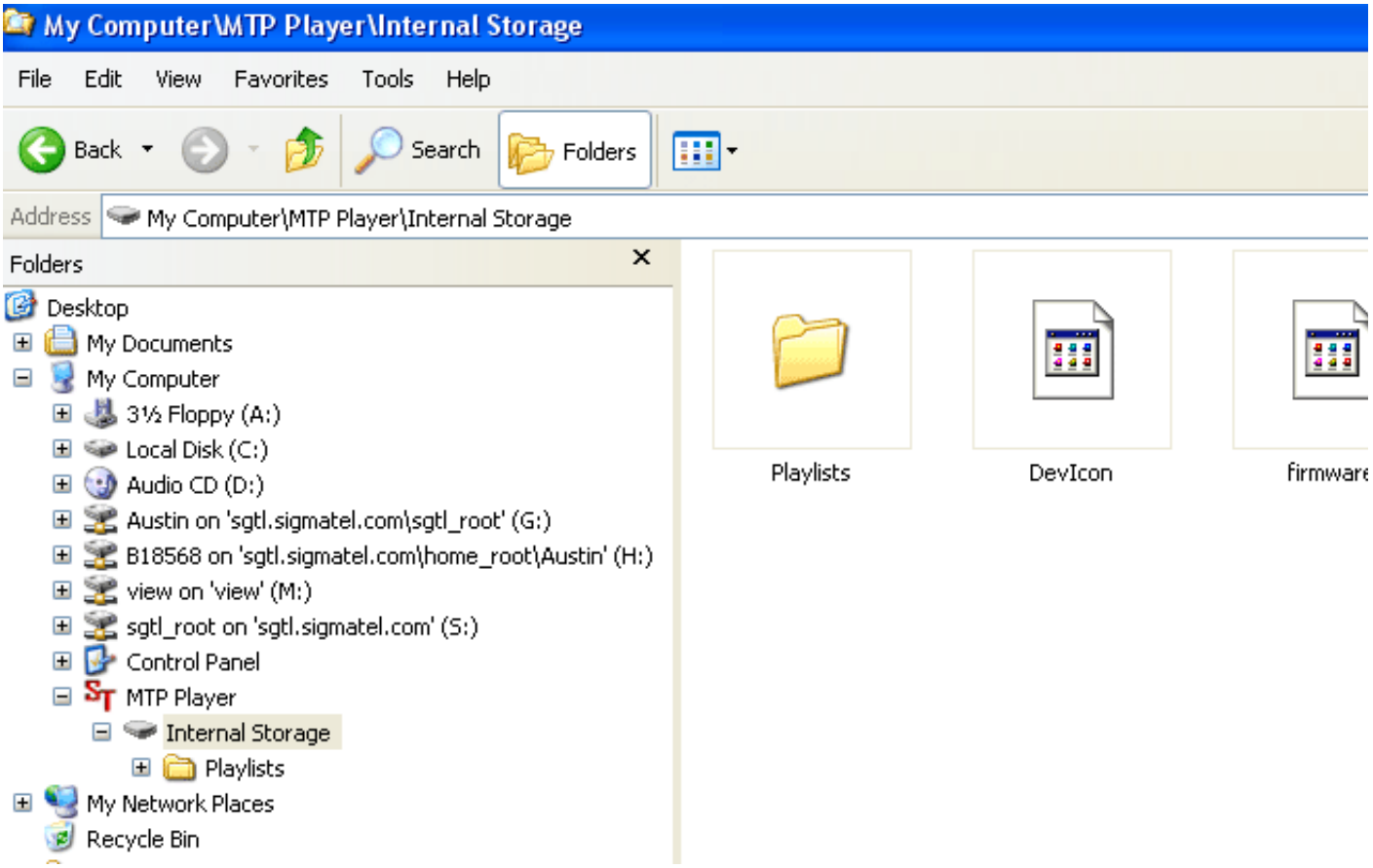
Now close the updater application(s). *You are now ready to use the Live Updater application for future binaries and releases.*

Procedure To use the Live Updater application in MTP Mode:

Step 1 After receiving the new binary, bring up the device in MTP mode by plugging in your USB cable, then wait for the Ready sign on the player screen.

Step 2 Open Windows Explorer and find the MTP device. Click on it and go to the root of the Internal Media storage.

Step 3 Copy the firmware.sb file onto the root folder in the Internal Storage area of the MTP folder as shown below.

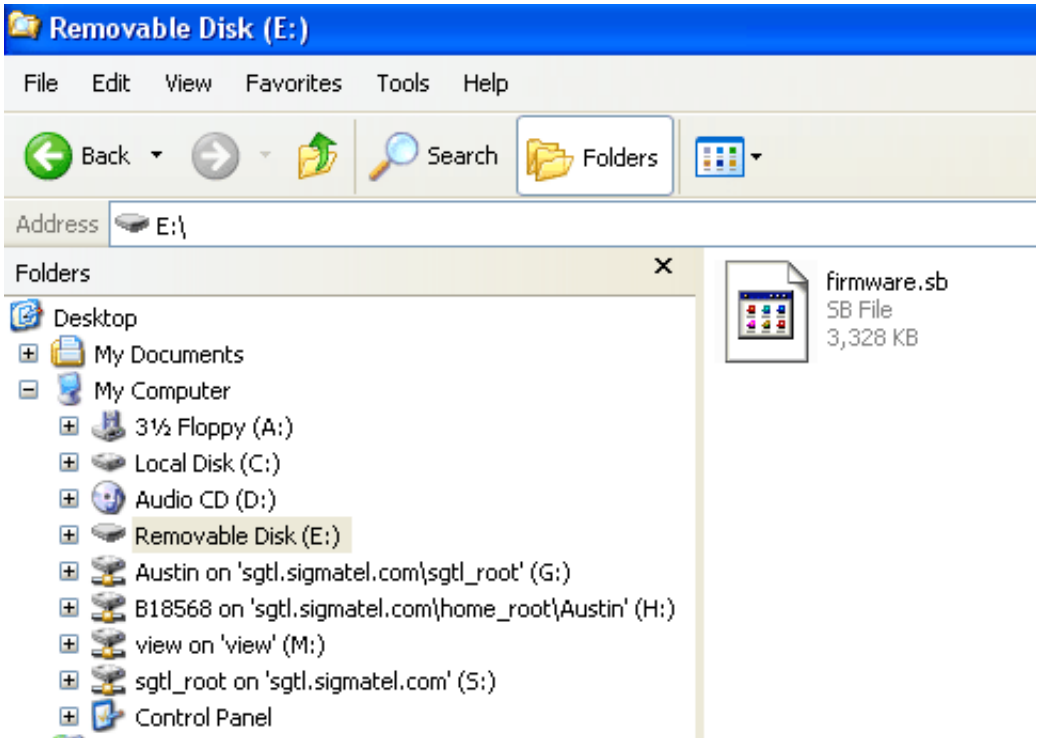


Step 4 Unplug your USB cable and boot the device as you usually do. You will observe this time that a progress bar appears on your player which is the indicator that the Live Updater is updating the firmware. Once complete, the device will reboot and you will see the player application.

Step 5 To confirm that you have the latest firmware, go to the About menu and verify that the firmware release number is appropriate.

Procedure To update the new binaries in MSC (mass storage) Mode:

Step 1 Upload the firmware onto the root folder as shown below.



Step 2 After copying the firmware.sb file, unplug your USB cable and boot the device as you normally do. A progress bar will appear on your player indicating that the Live Updater is updating the firmware. Once complete, the device will reboot and you will see the player application.

Step 3 To confirm that the firmware is the latest, go to the About menu and verify that the firmware release number is appropriate.

! **IMPORTANT** Requirements for Live Updater to function properly:

1. The device must have working firmware installed at the start of the update. This design does not handle recovering from a “brick” state.
2. The update process does not handle the case where the data store is already full.
3. The update process may refuse the update if the firmware storage region is smaller than the new firmware.
4. The design works with the 37xx and derivative SOCs and not earlier SOCs.

Section C Entering recovery mode

Introduction Recovery mode is used to download firmware (binary files) to the STMP37xx Development System when firmware or media becomes corrupt. This procedure describes how to enter recovery mode and download new firmware.

> **NOTE** The procedure described in this section applies to only the Freescale STMP37xx Development System. To enter recovery mode on an end-user device that is based on the STMP37xx design schematics, you must press and hold the high-level PSWITCH button (typically, the MENU button) and then plug in the device to a USB port. For more information about the STMP37xx design schematics, refer to the *Freescale STMP37xx Reference Design Schematics.*

Procedure To enter recovery mode and download new firmware:

Step 1 Verify SW1 on the Armadillo Engineering Mainboard is in the OFF position.

Step 2 Verify SW2 on the STMP3700 CPU Daughtercard is in the OFF position.

Step 3 Configure the STMP3700 CPU Daughtercard for STMP Boot mode.

> **NOTE** For STMP Boot mode, all SW1 switches on the daughtercard are in the down (0) position. For more information, refer to the silk screen image located on the STMP3700 CPU Daughtercard.

Step 4 Move the SW2 on the daughtercard to the ON position.

The device should now be enumerated as a Human Interface Device (HID).

Step 5 To verify that the driver was successfully installed, open Windows Device Manager, and expand **Human Interface Device**.

Once the device is enumerated, you can begin the firmware update process.

Issues You may be unable to enter recovery mode if the STMP37xx Development System is not configured correctly

Resolution Verify your development system is configured as described in Appendix B, “Development System Default Configurations” and then try again to enter recovery mode.

Section D Windows Media DRM 10 Procedures

Introduction This section provides the procedures necessary to obtain from Microsoft Windows Media DRM 10 for Portable Devices and to store the Windows Device Authorization Certificate (DAC) within your custom project.

In this Section The following table lists the topics in this section.

Obtaining Windows Media DRM 10 for Portable Devices

Introduction To distribute WMDRM 10 on devices that can store and play protected content, you must obtain a WMDRM 10 device certificate for Portable Devices.

Procedure To obtain WMDRM 10 for Portable Devices:

Step 1 Request from Microsoft a Windows Media DRM 10 for Devices Development and Interim Product Distribution Agreement by completing the License Request Form located at the following URL:

https://wmlicense.smdisp.net/licenserequest-04/licenserequest.aspx

> **NOTE** Select **WM DRM 10 for Devices Application (Interim and Final Agreements)** from the Select License to Request pull-down menu.

Once Microsoft approves the license agreement, you receive an email from *wmla@microsoft.com* that includes instructions on how to download additional materials from the Microsoft SpecServer, as well as instructions for requesting a device certificate.

> **IMPORTANT** This process may take several weeks to complete. We encourage you to submit your request as soon as possible. You will not be able to use online music services until you obtain a device certificate and complete the procedures described in this section.

Step 2 Access the Microsoft SpecServer using the instructions provide to you by Microsoft.

Step 3 Download the WMDRM 10 OEM installer package.

Step 4 Extract the files to your computer by double-clicking the installer package.

The WMDRM 10 OEM Kit is extracted to the specified location on your computer.

> **NOTE** If you used the default settings, the WMDRM 10 OEM Kit is extracted into the WMDRMPD_OEM_Kit directory. The WMDRMPD_OEM_Kit directory name is used within this document to refer to the WMDRM 10 OEM Kit directory.

Obtaining a DACResponse file

Introduction The DACResponse file is an XML file that is used to sign the Device Certificate Template (DCT) described in "Creating an unsigned Device Certificate Template" on page 50. You must obtain the DACResponse file from Microsoft.

> **NOTE** To receive and install a Windows Device Authorization Certificate (DAC), you must execute the Microsoft Windows Media DRM 10 for Devices Final Product Distribution Agreement, which is included with WMDRM 10 for Portable Devices, or be named as a *Third-Party Installer* or as an *Authorized Contractor* under another company's WMDRM 10 Final Distribution Agreement.

Procedure To obtain a DACResponse file:

Step 1 Complete the Certificate Request Form that is provided with the WMDRM 10 OEM kit.

Step 2 Generate the PrivateKeyFile and the DACRequestFile files.

A. Click the Windows **Start** button, and select **Run**.
B. Type **cmd**, and click **OK**.
C. Change to the WMDRMPD_OEM_Kit\Tools directory, and execute the following command:

```
generatedacrequest.exe –r:DACRequestFile –p:PrivateKeyFile
```

The DACRequestFile and PrivateKeyFile files are created in the WMDRMPD_OEM_Kit\Tools directory. For more information about the GenerateDACRequest tool, refer to the WMDRM_PD.chm file located in the WMDRMPD_OEM_Kit\Documents directory.

Step 3 Email the completed Certificate Request Form and the DACRequestFile to wmla@microsoft.com.

> **IMPORTANT** Do not submit PrivateKeyFile to Microsoft. This file should remain proprietary to your company.

Once the Certificate Request Form and DACRequestFile are processed, Microsoft emails to you a DACResponse file (DACResponse.xml).

Step 4 Place the DACResponse.xml file in the WMDRMPD_OEM_Kit\Tools directory, and proceed to "Creating a signed Device Certificate Template" on page 52.

For more information about this procedure, refer to AcquiringDACResponse.doc located in the WMDRMPD_OEM_Kit\Documents directory.

Creating an unsigned Device Certificate Template

Introduction The Device Certificate Template (DCT) is an XML document that outlines information about your device model and feature set. After the DCT is created, it must be signed by Microsoft using the DACResponse file as described in “Creating a signed Device Certificate Template” on page 52.

Procedure To create an unsigned DCT:

Step 1 Copy the following text from AcquiringDACResponse.doc (located in the WMDRMPD_OEM_Kit\Documents directory) and paste it into a text file.

```
<UNSIGNEDTEMPLATE>
    <NAME>MyDevice</NAME>
    <MANUFACTURER>Fabrikam</MANUFACTURER>
    <MAKE>UnknownMake</MAKE>
    <DISTRIBUTOR>WideWorldImporters</DISTRIBUTOR>
    <MODEL>XR-700</MODEL>
    <SECURITYLEVEL>2000</SECURITYLEVEL>
    <HARDWARE_VER_MAJOR>2</HARDWARE_VER_MAJOR>
    <HARDWARE_VER_MINOR>1</HARDWARE_VER_MINOR>
    <FIRMWARE_VER_MAJOR>1</FIRMWARE_VER_MAJOR>
    <FIRMWARE_VER_MINOR>3</FIRMWARE_VER_MINOR>
    <FEATURES>
        <CLOCK>2</CLOCK>
        <SECURECLOCK>
            <URL>http://go.microsoft.com/fwlink/?LinkId=25817</URL>
            <PUBLICKEY>
                !CNhvvz1WaNV1AFUmetxkvm9iD4UrE9cnGUi!qcqdxMiXmD1*ikYGA==
            </PUBLICKEY>
        </SECURECLOCK>
        <METERING>1</METERING>
        <LICENSE_ACQ>1</LICENSE_ACQ>
        <LICENSE_SYNC>1</LICENSE_SYNC>
        <ENCRYPTION>1</ENCRYPTION>
        <SYMMETRIC_OPT>1</SYMMETRIC_OPT>
    </FEATURES>
    <LIMITS>
        <MAXCHAINDEPTH>2</MAXCHAINDEPTH>
        <MAXLICENSESIZE>10240</MAXLICENSESIZE>
        <MAXHEADERSIZE>5120</MAXHEADERSIZE>
    </LIMITS>
</UNSIGNEDTEMPLATE>
```

Step 2 Modify the values of each tag as necessary. Microsoft recommends that you include all information listed; however, you may include only the following tags if desired:

- <SECURITYLEVEL>
- <FEATURES>
- <LIMITS>

> **IMPORTANT** You must change the <SECURITYLEVEL> tag to include the security level provided by Microsoft in the DACResponse file; for example: <SECURITYLEVEL>2000</SECURITYLEVEL>

Step 3 Save the file to the WMDRMPD_OEM_Kit\Tools directory using the following file name: UnsignedTemplate

> **NOTE** This file must be saved using Unicode encoding. To save the file using Unicode encoding, use an application such as Notepad, select **Save As** from the File menu, and then select **Unicode** from the Encoding pull-down menu. In addition, you must remove all tabs and spaces between tags.

For more information about the contents of an unsigned device certificate template and valid values for each tag, refer to the following files located in the WMDRMPD_OEM_Kit\Documents directory:

- WMDRM_PD.chm
- AcquiringDACResponse.doc

Creating a signed Device Certificate Template

Introduction Once you create the unsigned DCT, you must sign the DCT using the GenerateDevCertTemplate tool. The GenerateDevCertTemplate tool adds a group certificate to the unsigned template and then signs the template using the PrivateKeyFile. In addition to the signed DCT, DevCertTemplateFile, the GenerateDevCertTemplate tool creates a group private key, OemGroupKey.bin.

> **IMPORTANT** It is critical that you do not disclose private keys to individuals outside your organization.

For more information about the GenerateDevCertTemplate tool, refer to the WMDRM_PD.chm file located in the WMDRMPD_OEM_Kit\Documents directory.

Required Files The following files are used in this procedure:

- UnsignedTemplate
- DACResponse.xml
- PrivateKeyFile

> **NOTE** If you followed the procedures described in this document, these files are located in the WMDRMPD_OEM_Kit\Tools directory.

Procedure To create a signed DCT:

Step 1 Click the Windows **Start** button, and select **Run**.

Step 2 Type **cmd**, and click **OK**.

Step 3 Change to the WMDRMPD_OEM_Kit\Tools directory, and execute the following command:

```
GenerateDevCertTemplate.exe -d:DACResponseFile -u:UnsignedTemplate
   -f:PrivateKeyFile -t:DevCertTemplateFile -k:OemGroupKey.bin
```

The following files are created in the WMDRMPD_OEM_Kit\Tools directory:

- DevCertTemplateFile
- OemGroupKey.bin

For more information about these files, refer to AcquiringDACResponse.doc located in the WMDRMPD_OEM_Kit\Documents directory.

Creating and storing the build resource files

Introduction To ensure the security of the DCT, the DCT is encrypted during the player build process, and the device certificate template, devcerttemplate.c, and the OEM group key, OemGroupKey.bin, must be stored in the build path. Freescale provides a utility, createcfile.exe, to create the devcerttemplate.c file. This utility is located in the SOCFirmware\bin directory of the Freescale SDK distribution.

Required Files The following files are used in this procedure:

- DevCertTemplateFile
- OemGroupKey.bin

> **NOTE** If you followed the procedures described in this document, these files are located in the WMDRMPD_OEM_Kit\Tools directory.

Procedure To create and store the build resource files:

Step 1 Copy DevCertTemplateFile and OemGroupKey.bin files from WMDRMPD_OEM_Kit\Tools directory to SOCFirmware\bin directory of the Freescale SDK distribution.

Step 2 Click the Windows **Start** button, and select **Run**.

Step 3 Type **cmd**, and click **OK**.

Step 4 Change to the SOCFirmware\bin directory, and execute the following command:

```
CreateCfile DevCertTemplateFile devcerttemplate.c
```

Step 5 Copy and paste the devcerttemplate.c and OemGroupKey.bin files into your project directory that you created using the Build Configuration Tool. For example:

SOCFirmware\application\framework\sdk_os_media_player

Once they are stored in the specified folders, these files are used to encrypt and securely store the DCT on the player.

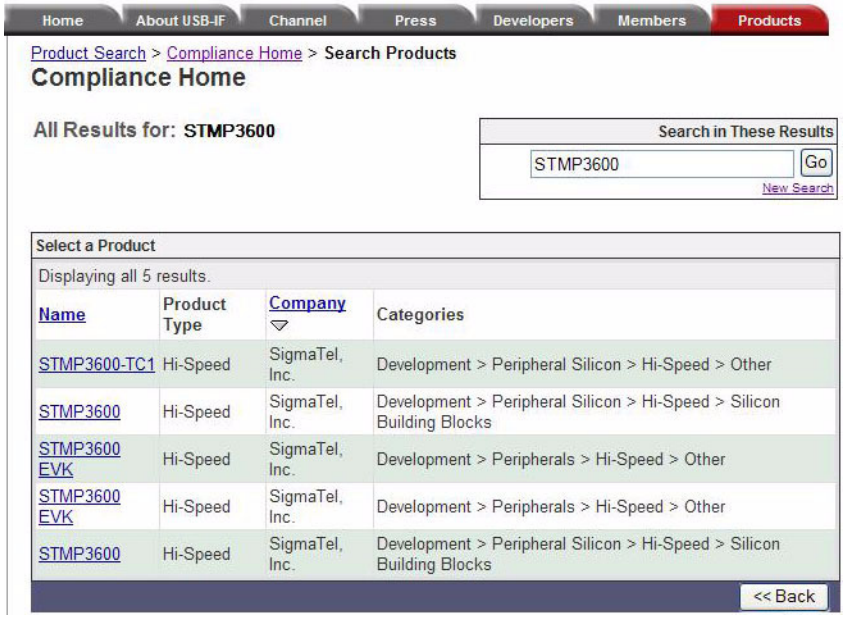
Section E Compliance Testing

Introduction

STM3600 has passed USB certification. To view the STMP3600 products that are USB 2.0 compliant, go to the following URL and search by product for STMP3600:

http://www.usb.org/kcompliance/view

The list of STMP3600 products that are USB 2.0 compliant appears.



USB Commands

USBCV is the test tool that National Software Testing Laboratories (NTSL) uses to test USB commands. You can find the tool on the usb.org website at the following URL:

http://www.usb.org/developers/tools

Customers are encouraged to test their products with this tool before sending devices to the test labs. It will save you time and money.

PlaysForSure Requirements

For the latest PlaysForSure performance requirements, visit the PlaysForSure Web site at the following URL:

http://www.playsforsure.com/product/specifications

These performance requirements are different for the each device classifications:

- **Small**—Devices with a storage size of 2GB and less.
- **Medium**—Devices greater than 2GB and less than or equal to 10GB.
- **Large**—Devices greater than 10GB. (This configuration is not supported with current Freescale SDK.)

PlaysForSure Logo

To distribute WMDRM 10, Microsoft encourages all device manufacturers and subscription service providers to obtain the PlaysForSure logo. For more information about the PlaysForSure logo program, visit the Microsoft Web site at the following URL:

http://www.microsoft.com/windows/windowsmedia/licensing/logo.aspx

PlaysForSure Testing

In addition, OEMs must submit their device to National Software Testing Labs (NSTL) for PlaysForSure testing. For more information, visit the NSTL Web site at the following URL:

http://www.nstl.com/playsforsure/

PlaysForSure Testing with the SGTL SDK

PlaysForSure test logs performed with the latest SDK are located on the Freescale Extranet for reference. Refer to the PlaysForSure 2.01 Results on the Supported Media page.

Verify the NAND you are using supports PlaysForSure download speeds.

For a list of NAND devices that have been tested with the latest SDK release and pass the PlaysForSure performance requirements, refer to the STMP36xx Flash Memory List document located on the Supported Media page of the Freescale Extranet. The devices marked with a *V* do not meet P4S performance criteria.

PlaysForSure Test Kit Hints

- Remove the DRM by updating the firmware with the `/RemoveDRM` option
- Package the log file when retest the device with newer firmware
- Include the logs and MTPmon or WPDmon when asking for help from Freescale
- Do not run P4S tests on the PC that you have DRM that you want to keep. P4S tests will remove all DRM from the PC.
- When testing a LiION product a battery must be used during testing. The regulators on the development boards and power supplies will not sink current like a battery, resulting in a significant voltage drop during battery charging.

Troubleshoot PlaysForSure

Tests fail DRM or secure transfers during P4S testing.

Solution: Download WMP security upgrade for P4S v2.0. Refer to *Installing the Portable Device Test Kit* in the PlaysForSure v2.0 test kit help file.

After installation, check for the latest security upgrades for Windows Media Player:

1. Open Windows Media Player, and select **Open** from the File menu.
2. In the Open dialog box, select the DRM_Content\TransferToDevice\V10\CTC18_128_44_16_2_CBR.wma file in the folder in which you installed the test kit, and click **Open**.
3. If Windows Media Player asks if you want to download a security upgrade, click **Yes**. This step is optional.

Status bar indicates failures even if the device passes all the tests.

Solution: This issue is covered by the P4S errata.

http://www.playsforsure.com/product/specifications/

The relevant text is located under the *Usability Issues* heading.

Status bar at the bottom of the test shell incorrectly calculates number of tests passed.

Even if the device passes all the tests, the status bar still displays:

"X/68 required test passed, current total points Y, required points 85, possible points 195, (Overall test status: FAILED)".

To determine if the device has in fact passed testing, you should verify the following:

- Check in the status bar:
  “Current total points” is equal or higher than the “Required points”
- Check no required manual tests failed (No solid red dots (failed required tests) or solid yellow dots (skipped required tests) in the test results pane).

PFS [11.01] Content Transfer Stress-Two Rounds fails with power loss.

Example Log:

```
Power level at the end of this test run = 116
Failed: Power loss detected during the stress run, start power level = 130
```

Solution: Use a battery instead of a regulated power source.

APPENDIX B

Development System Default Configurations

Introduction This appendix describes the default configurations for the Armadillo Engineering Mainboard and the different versions of the STMP3700 CPU Daughtercard and STMP378x CPU Daughtercard. These default configurations are applied before the STMP37xx Development System and STMP 378x Development System are shipped.

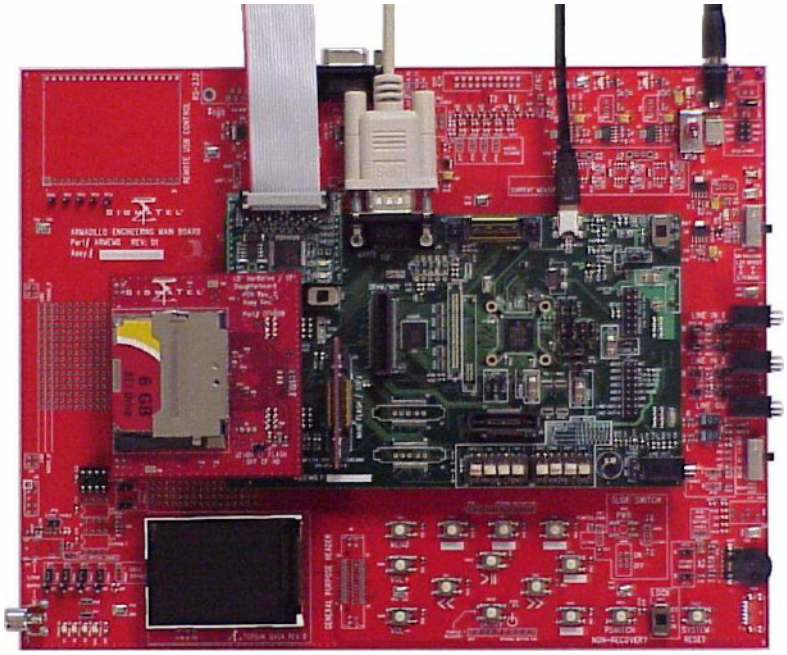


Figure B-1. STMP37xx Development System with the STMP3700 169-BGA CPU Daughtercard

In this Appendix The following table lists the sections in this appendix.

Section A Armadillo Engineering Mainboard

Introduction

Figure B-2 provides a visual representation of the Armadillo Engineering Mainboard.

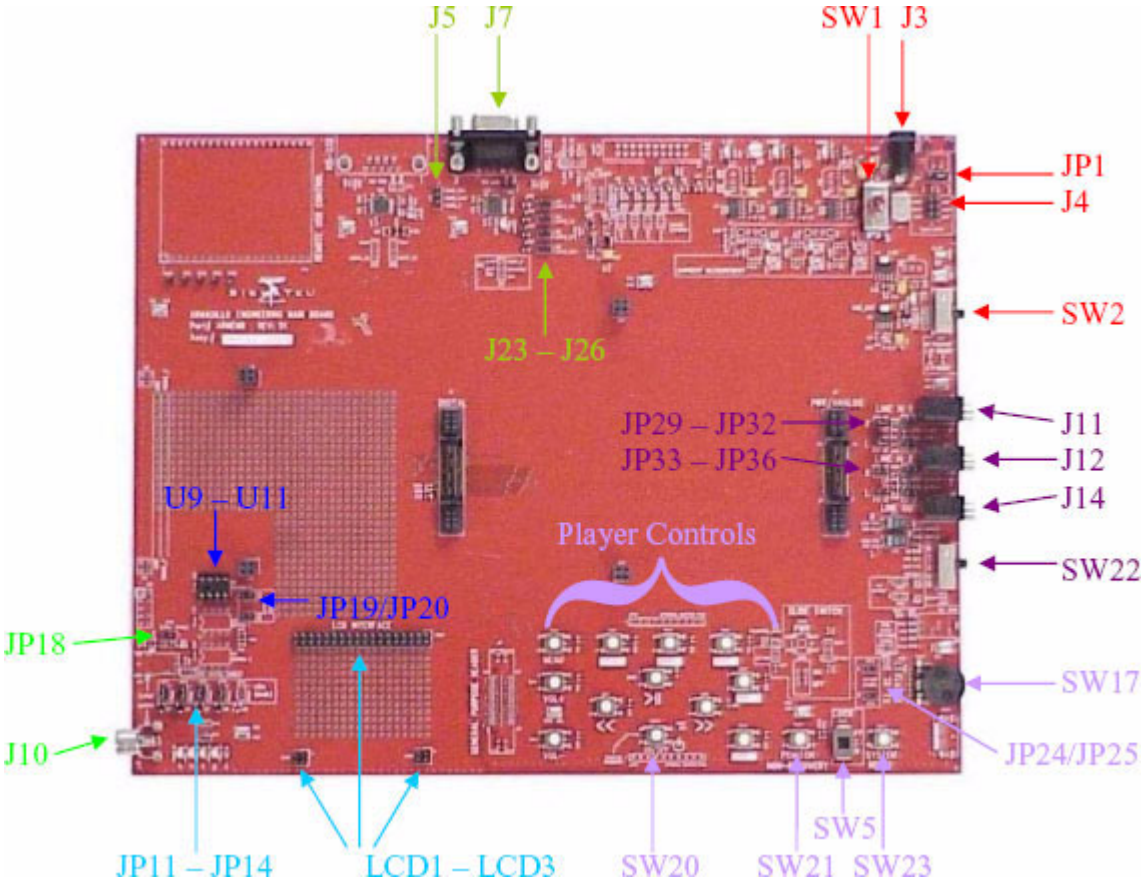


Figure B-2. Armadillo Engineering Mainboard

Default Configuration

Table B-1 describes the default configuration for the Armadillo Engineering Mainboard.

Table B-1: Armadillo Engineering Mainboard Default Configuration

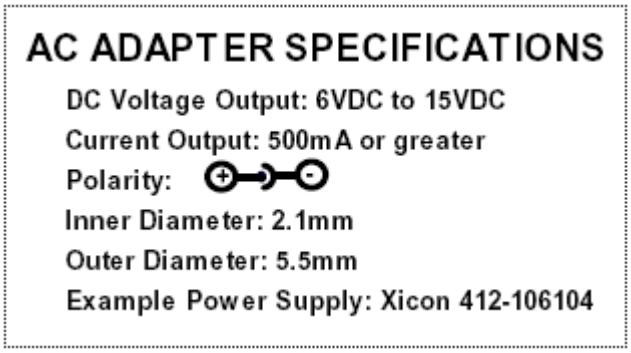
Component	Description	Default
Power		
J3	J3 is the wall power jack; J3 accepts a DC input from 6-15V. 	N/A
SW1	SW1 is the master power switch.	OFF
JP1	JP1 is a jumper that selects whether VDD_BATT comes from the onboard voltage regulators or from a physical battery. If you use a real battery or an external DC power supply, connect the source to the TP1 and TP2 posts.	BATT_REG (Right)
SW2	SW2 is a slide switch that selects the regulated voltage (VDD_BAT) that is supplied to the CPU. Set this switch according to the DC/DC converter mode used on the CPU, either 4.2V (for Li-Ion buck mode) or 1.3V (for AAA boost mode). IMPORTANT! You must ensure that the SW2 switch and the CPU are configured for the same mode. If the CPU is configured for 1.3V (AAA-boost mode) and the SW2 switch is inadvertently set to 3.7V (Li-Ion buck mode), the STMP37xx can become damaged.	4.2V (Buck)
J4	J4 provides a single location to measure the status of all main board generated voltage rails.	Jumpers not installed
UART		
J7	J7 is a UART2 (application) connector.	N/A
JP5	JP5 is a jumper that selects the power source for the UART level-shifters: J6 and J7. In the up position (VDDIO_REG), power comes from onboard VDDIO regulator. In the down position, power comes from VDDIO generated by the STMP 36xx DC/DC converter.	VDDIO_REG (Up)
J23–J26	J23–J26 enable UART2.	Jumpers not installed
EEPROM		
U9–U11	U9 – U11 are used for EEPROMs. If you are installing only one EEPROM, use U9.	Not installed

Table B-1: Armadillo Engineering Mainboard Default Configuration *(Continued)*

Component	Description	Default
JP19 JP20	JP19 and JP20 enable the I2C signals (and the 2.2K pull-up resistors). These jumpers must be installed to use EEPROM.	Jumpers not installed
S/PDIF		
JP18	To enable S/PDIF output, pin 2 of JP18 must be connected via a jumper wire to pin 1 of JP13 (PWM2). Note: This is a change from the STMP36XX Development System in which S/PDIF was driven by PWM3.	Jumper wire not installed
J10	J10 is the RCA jack.	Not enabled
Miscellaneous		
LCD1–LCD3	LCD1–LCD 3 make up the LCD interface; it is backwards compatible with STMP 36xx LCD hardware.	Installed
JP11–JP14	JP11 – JP14 enable the 4 LEDs (PWM0-PWM3). Note that PWM4 does NOT route to the main board. This connection was repurposed to connect LCD RD.	Jumpers installed on JP11 and JP12 only
Player Controls		
SW4	Player control.	Menu
SW9	Player control.	Volume Up
SW11	Player control.	Volume Down
SW6	Player control.	User-defined
SW12	Player control.	A-B Mode
SW8	Player control.	User-defined
SW13	Player control.	Play/Pause
SW14	Player control.	User-defined
SW7	Player control.	Rewind
SW5	Player control.	Fast Forward
SW20 PSWITCH RECOVERY	Player control; press and hold for recovery mode.	Power/Play
SW10	Player control.	Record
SW21	Player control; same as SW20, but without access to Recovery Mode. SW21 is the mid-level PSWITCH, whereas SW20 is the high-level PSWITCH.	Power On/Off
SW17	SW17 is the rotary encoder.	Not enabled

Table B-1: Armadillo Engineering Mainboard Default Configuration *(Continued)*

Component	Description	Default
JP24 JP25	JP24 and JP25 enable the rotary encoder (SW17).	Jumpers not installed
SW23 SYSTEM RESET	SW23 resets the chip and shuts down DC/DC converter. This switch provides a hardware shutdown of the STMP37XX chip and leaves it powered off.	N/A
SW15	SW15 is the LOCK slide switch.	OFF (Up)
Audio		
J11	J11 is a line-in audio jack, LINE IN 1.	Enabled
J12	J12 is a line-in audio jack, LINE IN 2 (BGA only, muxed with LRADC2/3).	Not enabled
J14	J14 is a line-out headphone jack, HEADPHONE OUT.	Enabled
JP29–JP32	JP29 – JP32 control the input voltage level of J11 (LINE IN 1). The jumpers are labeled NC (normally closed) and NO (normally open). The default configuration is used when line input voltage levels are less than 1.5 V_{p-p}. If line voltage levels are expected to be greater than 1.5 V_{p-p}, then jumpers should be fitted on JP29 and JP30, and removed from JP31 and JP32.	NC (normally closed); jumpers are installed on JP31 and JP32 only.
JP33–JP36	JP33 – JP36 control the input voltage level of J12 (LINE IN 2). The jumpers are labeled NC (normally closed) and NO (normally open). If line input voltage levels are expected to be less than 1.5 Vp-p, then jumpers should be fitted on JP35 and JP36, and not fitted on JP33 and JP34. If line voltage levels are expected to be greater than 1.5 V_{p-p}, then jumpers should be fitted on JP33 and JP34, and not fitted on JP35 and JP32.	Jumpers not installed
SW22	SW22 is a slide switch that selects between AC-coupled (AC-C) and direct-drive (DD) amplifier mode. The switch position should be set according to the mode selected in firmware.	DD (Up)

Section B STMP3700 169-BGA CPU Daughtercard

Introduction Table B-2 provides a visual representation of the STMP3700 169-BGA CPU Daughtercard.

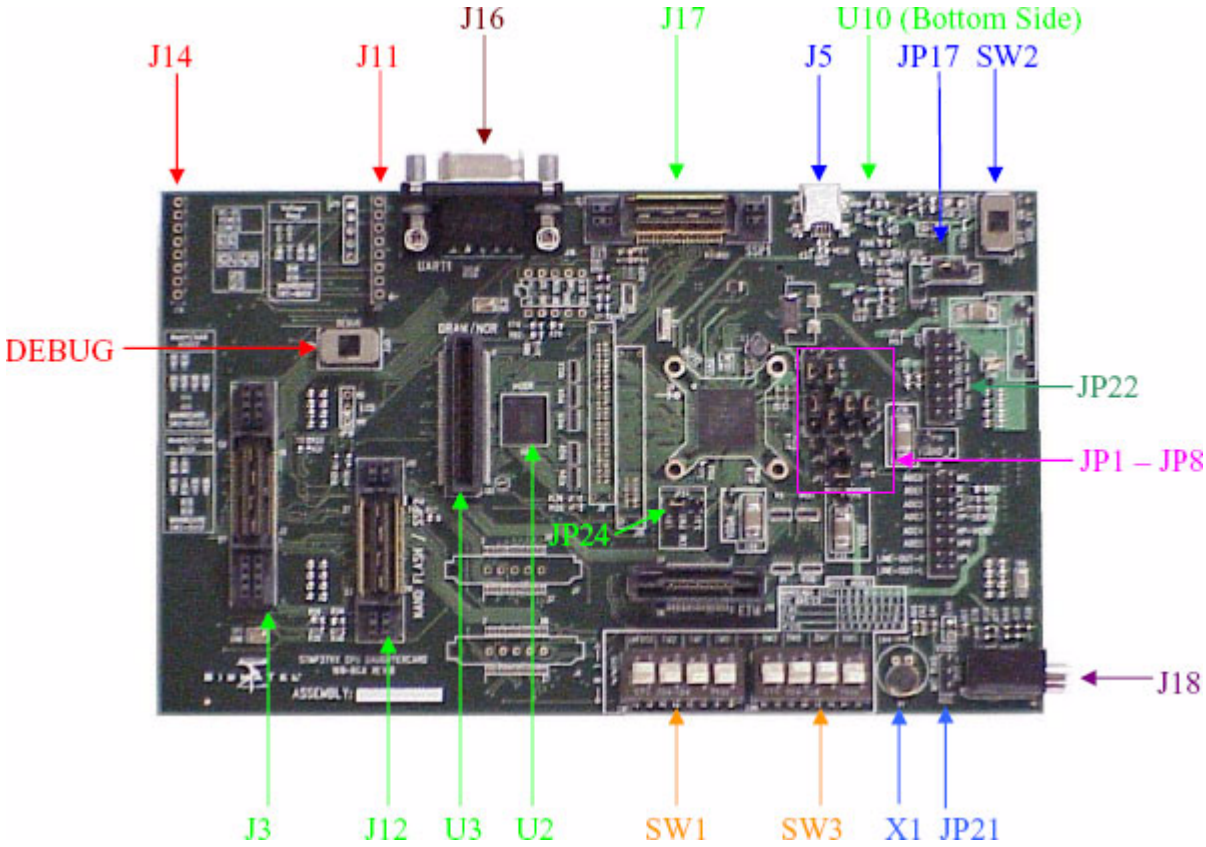


Figure B-3. STMP3700 169-BGA CPU Daughtercard

Default Configuration Table B-2 describes the default configuration for the STMP3700 169-BGA CPU Daughtercard.

Table B-2: STMP3700 169-BGA CPU Daughtercard Default Configuration

Component	Description	Default
USB		
J5	J5 is the USB jack and accepts a USB mini-B cable for normal USB connectivity.	Normal connectivity
SW2	SW2 is a slide switch to enable the +5V bus power to the USB_5V pin.	OFF (Down)
JP17	JP17 selects the +5V source from either the USB cable or the 5V regulator on the main board. REG mode is useful when emulating a wall supply re-charger.	USB (Left)

Table B-2: STMP3700 169-BGA CPU Daughtercard Default Configuration *(Continued)*

Component	Description	Default
Boot Modes		
SW1 and SW3	SW1 and SW3 are used to select the boot mode. Set the switch up for logic 1 and down for logic 0. For more information about setting boot modes, refer to the silkscreen chart located on the STMP3700 CPU Daughter Card. Notes: ◆ A full description of Boot Modes can be found in the STMP37XX datasheet. ◆ On some CPU Daughter Cards, SW1 may be removed. In these cases, resistor R25 is fitted, causing SW1 to be locked into '1000' state.	1000 0100 Boot Mode control enabled, NAND 3.3V
External Memory		
J12	J12 is the jack in which the NAND Flash Daughter Card is installed. J12 can also be configured to act as a secondary Synchronous Serial Port (SSP2) through pin muxing.	Optional
J17	J17 acts as the primary Synchronous Serial Port (SSP1) header. Normally, the SD/MMC card slot (U10) is connected to SSP1. To fully use J17, it may be necessary to deactivate the SD/MMC card slot [Depopulate R60, R61].	Optional
J3	J3 is the jack for the CF / 1.0" Hard Drive Daughtercard . The daughtercard signals plug into J3 while the card rests on standoffs on the main board.	Optional
U3	Slot U3 is used to give flexibility for adding different versions of SDRAM, other than the mDDR SDRAM soldered onto the board. In addition, NOR flash can be added with the SDRAM daughter card. When slot U3 is used, onboard mDDR SDRAM (U2) is disabled by reconfiguring several resistor banks. Refer to the CPU Daughter Card schematics for specific instructions on which resistors must be populated and de-populated.	Optional
U2	32 MB mDDR SDRAM is soldered directly on the STMP3700 169-BGA CPU Daughter Card.	Installed
JP24	JP24 selects the voltage level supplied to memory on the External Memory Interface. 1.8V can be selected for mobile memory chips, or 3.3V can be selected for regular SDRAM chips. Note that this jumper configuration needs to match both the DRAM device voltage requirements (HW) and the EMI firmware settings.	1.8V (for onboard mDDR SDRAM)
U10	SD/MMC card slot (reverse side). Electrically tied to SSP1.	Enabled
DC/DC Converter		

Table B-2: STMP3700 169-BGA CPU Daughtercard Default Configuration *(Continued)*

Component	Description	Default
JP1-JP8	JP1–JP8 are located directly to the right of the STMP37xx processor. These jumpers configure the DC/DC converter. The silkscreen charts at the left of the board shows all jumper positions for each DC/DC mode. The jumper orientations of the chart entries visually match those of the actual jumpers. NOTE: The DC/DC mode must match the VDD_BATT level that is selected by the main board's SW2; for more information, refer to the silkscreen chart located on the STMP3700 CPU Daughtercard.	MODE 0 Li-ION L
Microphone		
X1	X1 is the onboard microphone. JP21 selects how the mic is biased.	N/A
JP21	JP21 selects whether the mic (X1) is biased by VDDIO or by the LRADC1/MIC_BIAS pin.	Jumper not installed
Tuner		
JP22	JP22 is the jack on which the STFM1000 FM Tuner Daughtercard is installed. To ensure that this daughtercard is installed properly, verify that the number 1 slot is placed over the top-left pin of the JP22 jack.	Optional
UART		
J16	J16 is the UART1 (debug) connector.	Installed
Audio		
J18	J18 provides an Audio line out signal, independent of the headphone-out jack (J14) on the STFM1000 FM Tuner Daughtercard . This jack does not have an amplifier/driver associated with it.	Enabled
JTAG		
J11, J14	These headers support the Serial-to-Parallel JTAG daughter card. For development work that requires programming via JTAG, the daughter card should be installed.	Optional
DEBUG (SW4)	The DEBUG switch allows Serial JTAG signals to be disconnected from the rest of the CPU daughter card when the Serial-to-Parallel JTAG daughter card is installed. To pass through JTAG operations, this switch must be in the ON position.	OFF (default)

Section C STMP 3700 100-QFP CPU Daughtercard

Introduction Table B-2 provides a visual representation of the STMP 3700 100-QFP CPU Daughtercard.

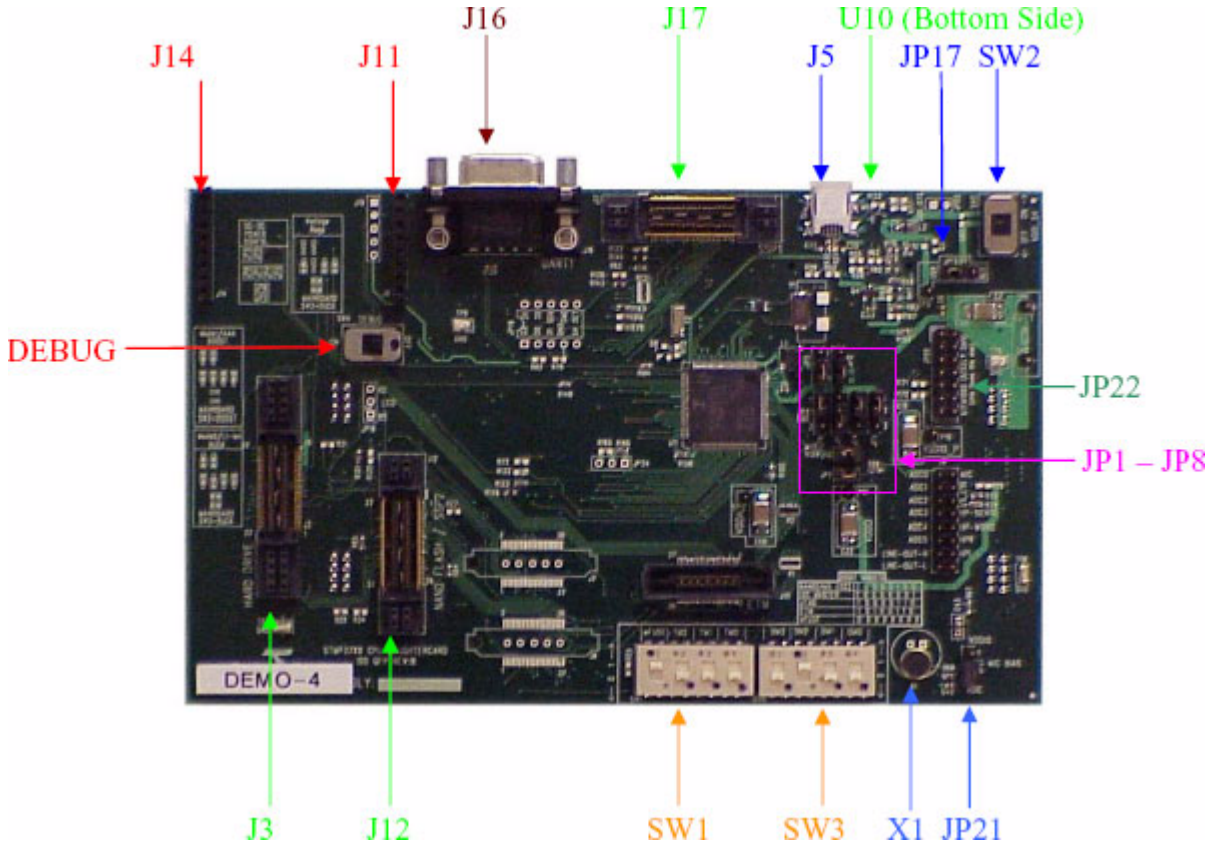


Figure B-4. STMP 3700 100-QFP CPU Daughtercard

Default Configuration Table B-3 describes the default configuration for the STMP 3700 100-QFP CPU Daughtercard.

Table B-3: STMP 3700 100-QFP CPU Daughtercard Default Configuration

Component	Description	Default
USB		
J5	J5 is the USB jack and accepts a USB mini-B cable for normal USB connectivity.	Normal connectivity
SW2	SW2 is a slide switch to enable the +5V bus power to the USB_5V pin.	OFF (Down)
JP17	JP17 selects the +5V source from either the USB cable or the 5V regulator on the main board. REG mode is useful when emulating a wall supply re-charger.	USB (Left)

Table B-3: STMP 3700 100-QFP CPU Daughtercard Default Configuration *(Continued)*

Component	Description	Default
Boot Modes		
SW1 and SW3	SW1 and SW3 are used to select the boot mode. Set the switch up for logic 1 and down for logic 0. For more information about setting boot modes, refer to the silkscreen chart located on the STMP3700 CPU Daughter Card. **Notes**: ◆ A full description of Boot Modes can be found in the STMP37XX datasheet. ◆ On some CPU Daughter Cards, SW1 may be removed. In these cases, resistor R25 is fitted, causing SW1 to be locked into '1000' state.	1000 0100 Boot Mode control enabled, NAND 3.3V
External Memory		
J12	J12 is the jack in which the NAND Flash Daughter Card is installed. J12 can also be configured to act as a secondary Synchronous Serial Port (SSP2) through pin muxing.	Optional
J17	J17 acts as the primary Synchronous Serial Port (SSP1) header. Normally, the SD/MMC card slot (U10) is connected to SSP1. To fully use J17, it may be necessary to deactivate the SD/MMC card slot [Depopulate R60, R61].	Optional
J3	J3 is the jack for the CF / 1.0" Hard Drive Daughtercard . The daughtercard signals plug into J3 while the card rests on standoffs on the main board.	Optional
U10	SD/MMC card slot (reverse side). Electrically tied to SSP1.	Enabled
DC/DC Converter		
JP1-JP8	JP1–JP8 are located directly to the right of the STMP37xx processor. These jumpers configure the DC/DC converter. The silkscreen charts at the left of the board shows all jumper positions for each DC/DC mode. The jumper orientations of the chart entries visually match those of the actual jumpers. NOTE: The DC/DC mode must match the VDD_BATT level that is selected by the main board's SW2; for more information, refer to the silkscreen chart located on the STMP3700 CPU Daughtercard.	MODE 0 Li-ION L
Microphone		
X1	X1 is the onboard microphone. JP21 selects how the mic is biased.	N/A
JP21	JP21 selects whether the mic (X1) is biased by VDDIO or by the LRADC1/MIC_BIAS pin.	Jumper not installed

Table B-3: STMP 3700 100-QFP CPU Daughtercard Default Configuration *(Continued)*

Component	Description	Default
Tuner		
JP22	JP22 is the jack on which the STFM1000 FM Tuner Daughtercard is installed. To ensure that this daughtercard is installed properly, verify that the number 1 slot is placed over the top-left pin of the JP22 jack.	Optional
UART		
J16	J16 is the UART1 (debug) connector.	Installed
Audio		
J18	J18 provides an Audio line out signal, independent of the headphone-out jack (J14) on the STFM1000 FM Tuner Daughtercard . This jack does not have an amplifier/driver associated with it.	Enabled
JTAG		
J11, J14	These headers support the Serial-to-Parallel JTAG daughter card. For development work that requires programming via JTAG, the daughter card should be installed.	Optional
DEBUG (SW4)	The DEBUG switch allows Serial JTAG signals to be disconnected from the rest of the CPU daughter card when the Serial-to-Parallel JTAG daughter card is installed. To pass through JTAG operations, this switch must be in the ON position.	OFF (default)

Section D STMP378x 169-BGA CPU Daughter Card

Introduction

Figure B-5 provides a visual representation of the STMP3780 169-BGA CPU Daughter Card.

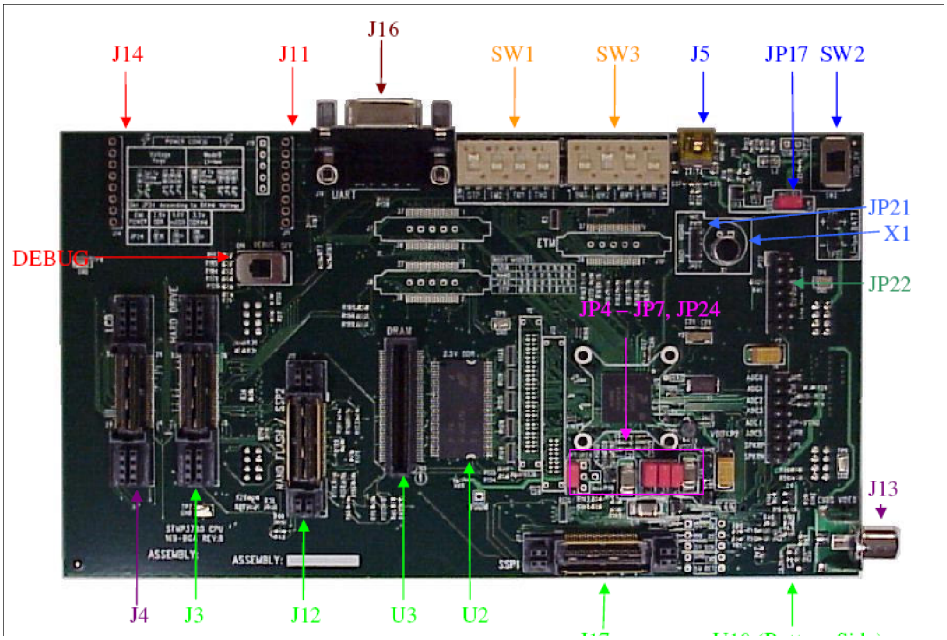


Figure B-5. STMP3800 169-BGA CPU Daughter Card

Default Configuration

Table B-4 describes the default configuration for the STMP3700 169-BGA CPU Daughtercard.

Table B-4: STMP3700 169-BGA CPU Daughtercard Default Configuration

Component	Description	Default
USB		
J5	J5 is the USB jack and accepts a USB mini-B plug for normal USB connectivity.	Normal connectivity
SW2	SW2 is a slide switch to enable the +5V bus power to the USB_5V pin.	OFF (Down)
JP17	JP17 selects the +5V source from either the USB cable or the 5V regulator on the main board. REG mode is useful when emulating a wall supply re-charger.	USB (Left)
Boot Modes		

Table B-4: STMP3700 169-BGA CPU Daughtercard Default Configuration *(Continued)*

Component	Description	Default
SW1 and SW3	SW1 and SW3 are used to select the boot mode. Set the switch up for logic 1 and down for logic 0. For more information about setting boot modes, refer to the silkscreen chart located on the STMP3780 CPU Daughter Card. Notes: ◆ A full description of Boot Modes can be found in the STMP378X datasheet. ◆ On some CPU Daughter Cards, SW1 may be removed. In these cases, resistor R25 is fitted, causing SW1 to be locked into '1000' state.	1000 0100 Boot Mode control enabled, NAND 3.3V
External Memory		
J12	J12 is the jack in which the NAND Flash Daughter Card is installed. J12 can also be configured to act as a secondary Synchronous Serial Port (SSP2) through pin muxing.	Optional
J17	J17 acts as the primary Synchronous Serial Port (SSP1) header. Normally, the SD/MMC card slot (U10) is connected to SSP1. To fully use J17, it may be necessary to deactivate the SD/MMC card slot [Depopulate R60, R61].	Optional
J3	J3 is the jack for the CF / 1.0" Hard Drive Daughtercard . The daughter card signals plug into J3 while the card rests on standoffs on the main board.	Optional
U3	Slot U3 is used to give flexibility for adding different versions of SDRAM, other than the DDR SDRAM soldered onto the board. In addition, NOR flash can be added with the SDRAM daughter card. When slot U3 is used, onboard DDR1 SDRAM (U2) is disabled by reconfiguring several resistor banks. Refer to the CPU Daughter Card schematics for specific instructions on which resistors must be populated and de-populated.	Optional
U2	64 MB DDR1 SDRAM is soldered directly on the STMP3780 169-BGA CPU Daughter Card.	Installed
JP24	JP24, if installed, selects the voltage level supplied to memory on the External Memory Interface. 1.8V can be selected for mobile memory chips, 2.5V used for DDR1 SDRAM, or 3.3V can be selected for regular SDRAM chips. Note that this jumper is not normally installed unless the daughter card is pre-configured for using slot U3.	Default 2.5V supply through bypass jumper R96.
U10	SD/MMC card slot (reverse side). Electrically tied to SSP1.	Enabled
DC/DC Converter		

Table B-4: STMP3700 169-BGA CPU Daughtercard Default Configuration *(Continued)*

Component	Description	Default
JP4-JP7	JP4-JP7 are located directly below the STMP378x processor. These jumpers select whether the chip converts power for its own use, or the CPU daughter card power rails are supplied by the Armadillo Main Board. The silkscreen charts at the left of the board show all jumper positions for each mode. The jumper orientations of the chart entries visually match those of the actual jumpers. NOTE: Supplying power from the main board is useful for troubleshooting brown-out situations.	Chip-supplied power
Microphone		
X1	X1 is the onboard microphone. JP21 selects how the microphone is biased.	N/A
JP21	JP21 selects whether the microphone (X1) is biased by VDDIO or by the LRADC1/MIC_BIAS pin.	Jumper not installed
Tuner		
JP22	JP22 is the jack on which the STFM1000 FM Tuner Daughtercard is installed. To ensure that this daughter card is installed properly, verify that the number 1 slot is placed over the top-left pin of the JP22 jack.	Optional
UART		
J16	J16 is the UART1 (debug) connector.	Installed
Video		
J13	J13 provides a Composite Video line out signal.	Enabled
J4	J4 provides an alternate LCD header to allow the use of 24-bit RGB mode displays. The Transposer Daughter Card plugs into this header. Future LCD Daughter Cards may plug directly into this header.	Installed
JTAG		
J11, J14	These headers support the Serial-to-Parallel JTAG daughter card. For development work that requires programming via JTAG, the daughter card should be installed.	Optional
DEBUG (SW4)	The DEBUG switch allows Serial JTAG signals to be disconnected from the rest of the CPU daughter card when the Serial-to-Parallel JTAG daughter card is installed. To pass through JTAG operations, this switch must be in the ON position.	OFF (default)

Section E Additional Add-On Daughter Cards

Introduction

This section describes additional add-on daughtercards that fit the expansion slots of the STMP3700 CPU Daughtercard.

Parallel-to-Serial JTAG Board

This daughtercard is inserted into slots J11 and J14 of the CPU daughtercard. It is designed to convert JTAG instructions on six wires into a single trace serial stream with a second trace signaling a master reset. It is possible to configure the Parallel-to-Serial JTAG Board to pass through a full six trace signal to the CPU daughter card. This requires resistor modifications to the Parallel-to-Serial JTAG Boards as well as to the CPU daughter card and also requires the correct eFUSE configuration on the STMP37xx chip.

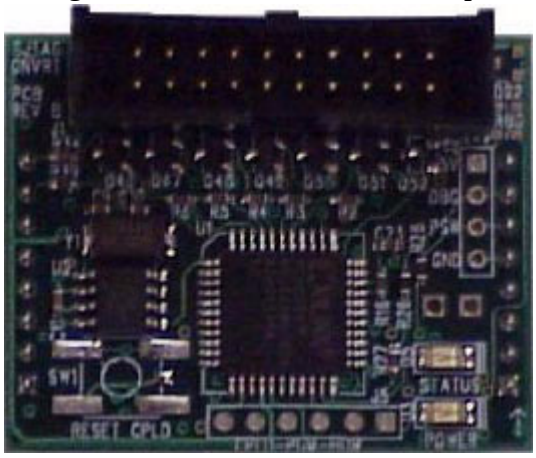


Figure B-6. Parallel-to-Serial JTAG Board

SDRAM Daughtercard

This board is inserted into slot U3 on the CPU daughtercard. The SDRAM chip should face towards the STMP37xx chip. To enable use of alternate SDRAM, several banks of resistors must be depopulated from the top side of the CPU daughtercard and populated on the bottom side of the CPU daughtercard. The bottom side of the SDRAM daughtercard has a foot print for NOR FLASH. Both chips can be populated without interfering with each other. In addition to the SDRAM daughtercard, there are cards available for: mDDR SDRAM (to provide greater development flexibility), dual mDDR SDRAM, and mSDRAM.

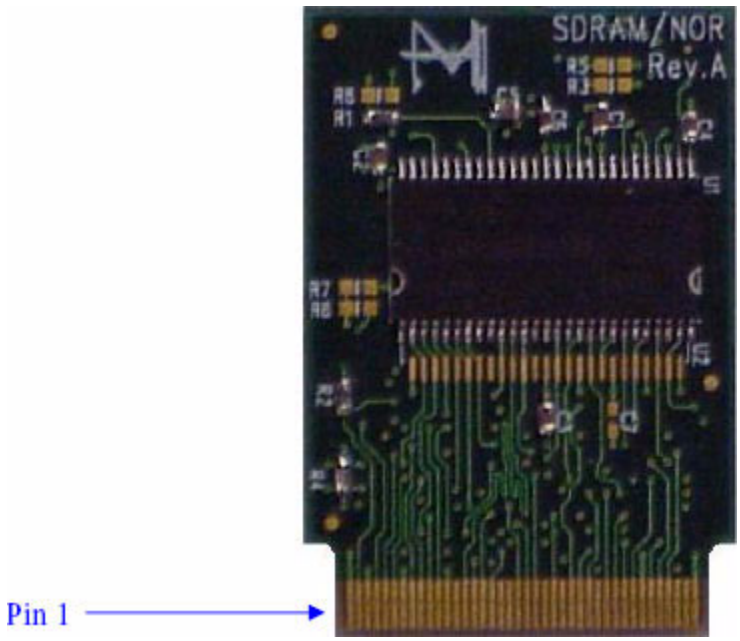


Figure B-7. SDRAM Daughtercard

NAND Flash Daughtercard

This board fits into connector J12 (NAND/SSP2). NAND Flash will specifically not work when plugged into J17, as this is an SSP-only port.

Figure B-8. NAND Flash Daughtercard

STFM1000 Daughtercard

This board plugs into JP22. The chip side of the board points is inserted facing the outside of the CPU daughtercard.

Figure B-9. STFM1000 Daughtercard

Figure B-10. Armadillo Engineering Main Board

Touch Screen LCD Display Daughter Card

Figure B-11. LCD Display Daughter Card

This board fits onto connectors J2-J4 of the LCD Transposer Daughter Card. This display typically operates in dotclock mode. The default display is the Samsung LMS430 4.3” LCD module with a 480 x 272 (xRGB) pixel screen. This screen can operate as a QVGA (320 x 240), WQVGA (384/400 x 240), or Sixteenth HD1080 (480 x 272) display, with proper masking of unused pixels.

LCD Transposer Daughter Card

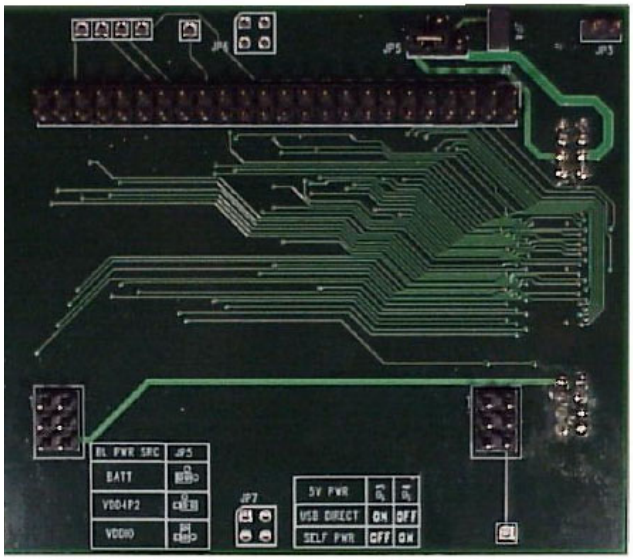


Figure B-12. LCD Transposer Daughter Card

This board fits onto connectors J3 of the STMP378x CPU Daughter Card, and J18 and J19 of the Armadillo Main Engineering Board. This Daughter Card is highly configurable through resistors on the bottom side of the board and can be used to break out pin muxed signals carried on the LCD traces. The default setting for the Transposer card is to be used with the default RGB Dotclock mode LCD panel. Jumper JP5 is configured to supply battery power directly to the LED Backlight driver on the LCD Daughter Card, but it can also be used to select alternate sources for powering the backlight. JP3 can be used to supply power to the backlight LEDs from a 5V USB source when connected, but it is not recommended. JP4 should be used by default. Refer to the Transposer Daughter Card Schematics for other options.

APPENDIX C

External Media Hardware/Software Compatibility

Introduction

This appendix lists external media hardware and software compatibility considerations for the SD/MMC detection implementation.

In this Appendix

The following table lists the sections in this appendix.

Section A Implementation Considerations

Table C-1 describes compatibility considerations for the SD/MMC card detection implementation.

Table C-1: SD/MMC Hardware and Software Compatibility

Card Detect Method		Mainboard and Daughtercard Support	Rev A/B EVK Support	Rev C EVK Support
SSP_DETECT connected to external media socket's WRITE_PROTECT / Interrupt driven software implementation	Default in previous SDK releases	Default	Default	*Unsupported*. Firmware update and boot up problems will be encountered.
SSP_DATA3	DEFAULT build option in SDK4.400 and 4.310.951 patch	Supported – May have power impact due to polling	Supported – May have power impact due to polling	Can be used without modification.
PWM4 connected to external media socket's CARD_DETECT	Must change the build option in the .cfg file adding: mmc_card_detect configuration option	*Unsupported*	*Unsupported*	Can be used without modification.

Section B Hardware Considerations

Introduction

The SSP detection software uses a polled algorithm to detect new or removed devices. One of two pins is used:

- `SSP_DATA3` default build option in example applications and .cfg files.
- PWM4 connected to the external socket CARD_DETECT line enabled by adding the `mmc_card_detect` configuration option to the project *.cfg file.

SSP_DATA3

If the default pin is used for card detection, the following boards can be used:

- RevA/ RevB EVK (may have power impact due to polling)
- RevC EVK
- Armadillo Engineering Mainboard and STMP3700 CPU Daughtercard (may have power impact due to polling)

PWM4

If the `mmc_card_detect` configuration option is used, enabling the use of PWM4 to CARD_DETECT for detection, this board can be used: RevC EVK with R25 on the Rev C EVK populated with a 0ohm resistor (this resistor is populated by default).