

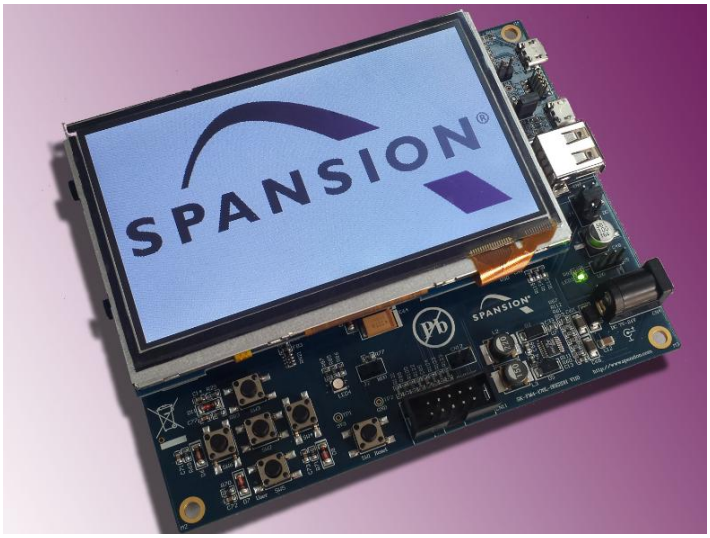
Spansion®
FM4 Starter Kit

SK-FM4-176L-S6E2DH

QUICK START PROGRAMMING GUIDE

This document is a guide for programming one of the 4 pre-compiled demonstration programs (.srec files) on the SK-FM4-176L-S6E2DH starter kit board.

SK-FM4-176L-S6E2DH Starter Kit provides an easy to use, cost-effective solution to evaluate an ARM® Cortex®-M4 based microcontroller that incorporates a dedicated hardware graphics engine, allowing rich display images. The board comes complete with a WQVGA TFT display with a touch sensor and on-board CMSIS-DAP enabling users to connect directly to a PC and begin development. In addition to the evaluation board, the Spansion solution includes a free-of-charge graphics authoring tool and low-level libraries for the graphics engine.



- Spansion FM4 Family S6E2DH MCU
- CMSIS-DAP JTAG adapter
- USB-Device (Micro type-B)
- USB-Host (Type-A)
- WQVGA TFT with touch
- 512MB Spansion HyperFlash
- 128MB SDRAM
- I^2S connection to codec
- SD card interface
- Acceleration Sensor
- Phototransistor
- 3D Magnetometer
- 6X push buttons

Equipment and Software Requirements

- PC with USB interface, Windows OS 7 or later
- SK-FM4-176L-S6E2DH starter kit with USB cable (A/micro-B)
- SK-FM4-176L-S6E2DH-Demopak.zip. This file contains:
  - Windows USB driver installation files
  - Documentation – “Quick Start Programming Guide”
  - “Flash USB Direct” Programmer tool installation files
  - Four .srec files with graphics demonstration programs

Demonstration program description

There are four pre-compiled demonstration programs included in this SK-FM4-176L-S6E2DH-Demopak.zip file. They are described in detail in section 4 of this document. All of these programs have information stored in both the on-chip flash and the external HyperFlash. The HyperFlash is used to store the images shown in the various scenes. A short note on each is offered here:

- All_in_one-demo.srec: Seven different scenes showcasing the various graphic engine features. Nearly all of the graphics engine features are exercised.

- Coverflow-demo.srec: Four album covers that can be rotated by a touch swipe. Blending, sizing and movement features of the graphics engine are demonstrated
- TouchGFX2014.srec: This was created by the TouchGFX development team. It showcases many of the graphics engine features and incorporates touch sensing.
- emWin-demo.srec: This was created by the Segger emWin development team. Several of the graphics engine features are incorporated.

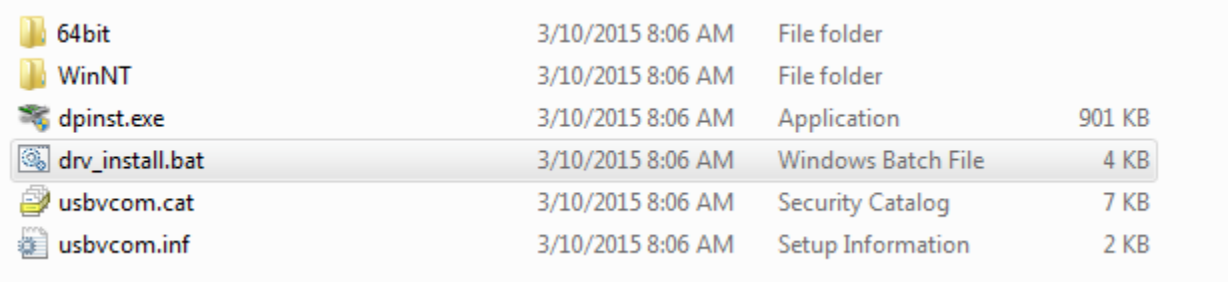
1.0 WINDOWS USB DRIVER INSTALLATION INSTRUCTIONS

The S6E2DH MCU communicates directly with a PC via the USB port. Prior to the PC USB Host enumerating, a device driver must be installed. The S6E2DH is put into a bootloader mode when the MD0 pin is pulled low as reset is released. These steps will guide you through the Windows USB driver installation process.

Driver installation

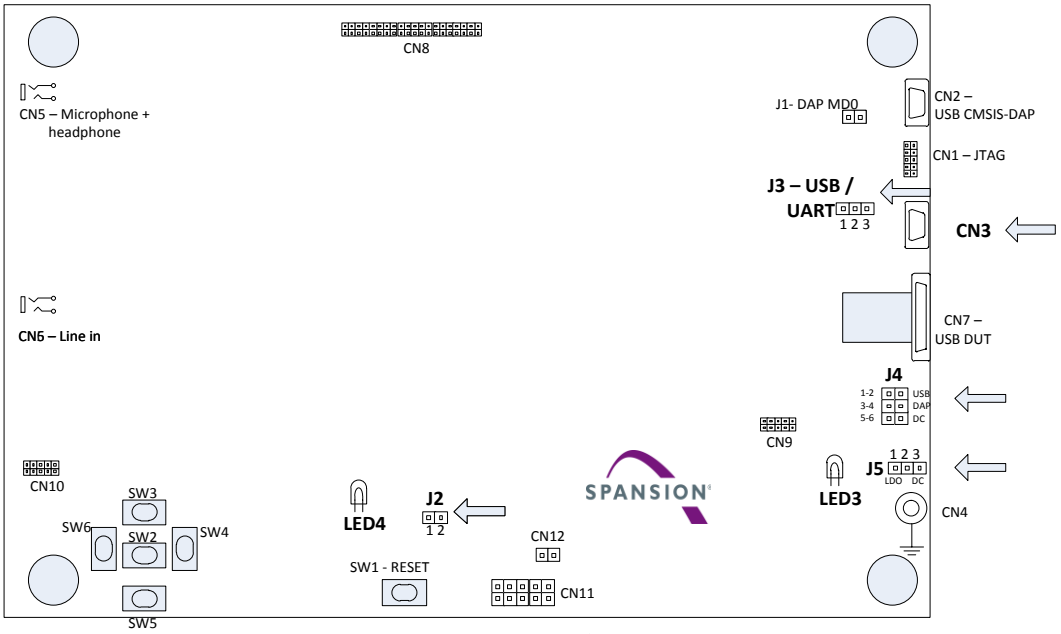
As administrator, run the driver installation batch file in the SK-FM4-176L-S6E2DH-Demopak.zip file. To do this, right-click "drv_install.bat" as shown below and select "Run as Administrator" to run the batch file. The path to this directory is shown here:

…\SK-FM4-176L-S6E2DH-Demopak\USBDIRECT_V01L16c03_for_STK\driver\win7



2.0 CONFIGURING THE STARTER KIT FOR PROGRAMMING

This section provides information to configure the board and connect it to a PC for the programming operation. See the figure below for location of the jumpers and connectors.



Drawing not to Scale.

1) Set jumper positions as shown here to select the power source and put the device into bootloader mode, which is necessary for using the Flash USB Direct Programmer.

Jumper ID	Options			Notes
J1	P1 – P2	NA	NA	Puts CMSIS-DAP into bootloader mode. Not used in this procedure
	Open	NA	NA	
J2	P1 – P2	P2 – P3	NA	(MD0) to enable bootloader mode
	Closed	Open	NA	
J3	P1 – P2	P2 – P3	NA	Enable USB communication in bootloader mode (silk screen shows "USB")
	Open	Closed	NA	
J4	P1 – P2	P3 – P4	P5 – P6	Power from USB Device connector (CN3) (silk screen shows "USB")
	Closed	Open	Open	
J5	P1 – P2	P2 – P3	NA	Select 3.3 V power to come from LDO (silk screen shows "LDO")
	Closed	Open	NA	

2) Plug in the USB cable to CN3 to power the board and wait for the Windows OS drivers to run. The green power LED3 will illuminate. When the board is powered-up, the PC should enumerate one of the USB ports and a pop up message will momentarily appear with "USBVCOM (COMxx) [USB]". The starter kit display should remain blank since the MCU is in bootloader mode. The "xx" placeholder is determined by the PC and will be a unique number between 0 and 255.

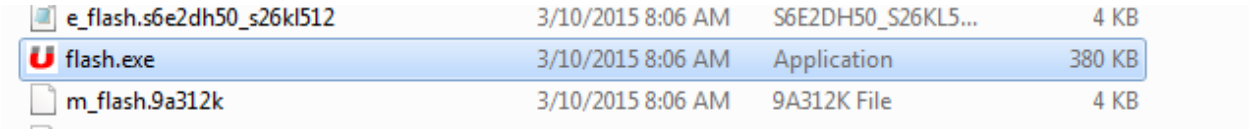
Note: If the COM port does not appear to be active, please check that the Jumper J2 is in place and that CN3 is used for the USB connection.

3.0 FLASH PROGRAMMING

This section provides the instructions to guide you through the process of programming the S6E2DH and HyperFlash. The process uses one source that is a pre-compiled and linked .srec file. Separate steps are required to program the on-chip flash (S6E2DH(MAIN)) and off-chip flash (S26KL512).

1) Start the programming utility by running the "flash.exe" file (double click on file name) that is included in the SK-FM4-176L-S6E2DH-Demopak.zip file. The path to this directory is shown here:

…\SK-FM4-176L-S6E2DH-Demopak\USBDIRECT_V01L16c03_for_STK



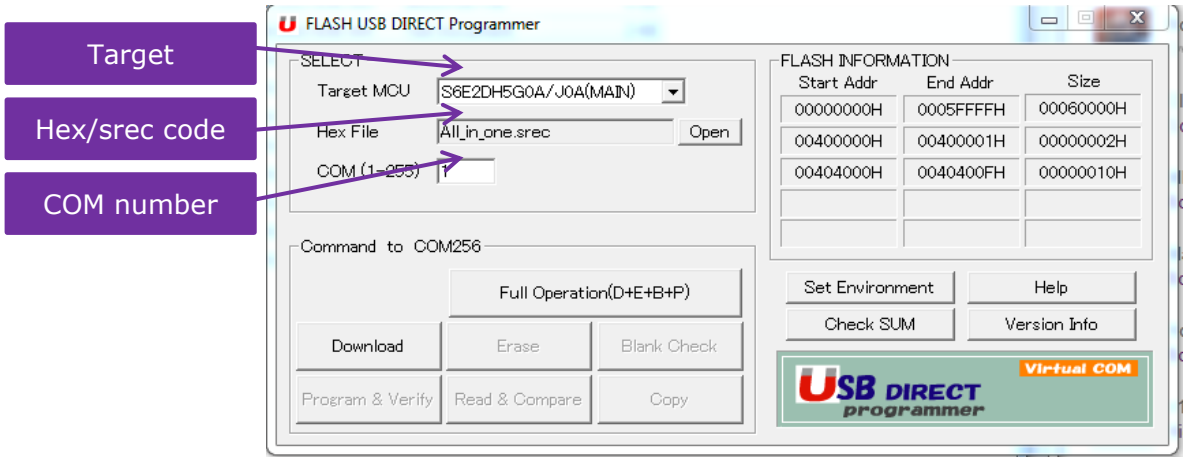
2) Set the parameters as shown here:

   a. Target MCU: Using pull down menu, select "S6E2DH5G0A/J0A (MAIN)". The on-chip flash is programmed in this step. To program the external flash a separate step is required. See step 4.

   b. Hex File: Click the Open button and navigate to one of the four .srec files. The path to this directory is shown here: …\SK-FM4-176L-S6E2DH-Demopak\SREC folder

   c. COM (1-256): Type in the COM port number that the PC enumerated with when connected to the board. There are two ways to get this information:
      i. Through Windows, navigate through "Control Panel" -> "Device Manager" -> "Ports (COM & LPT)". You should see "USBVCOM(COMxx)" under the ports list.
      ii. Pressing the RESET button on the board will force the PC to re-enumerate and message window will temporarily pop up with the COM port number. You should see a message like this "USBVCOM (COMxx) [USB]".

Note: If the COM port does not appear to be active, please check that the Jumper J2 is in place and that CN3 is used for the USB connection.

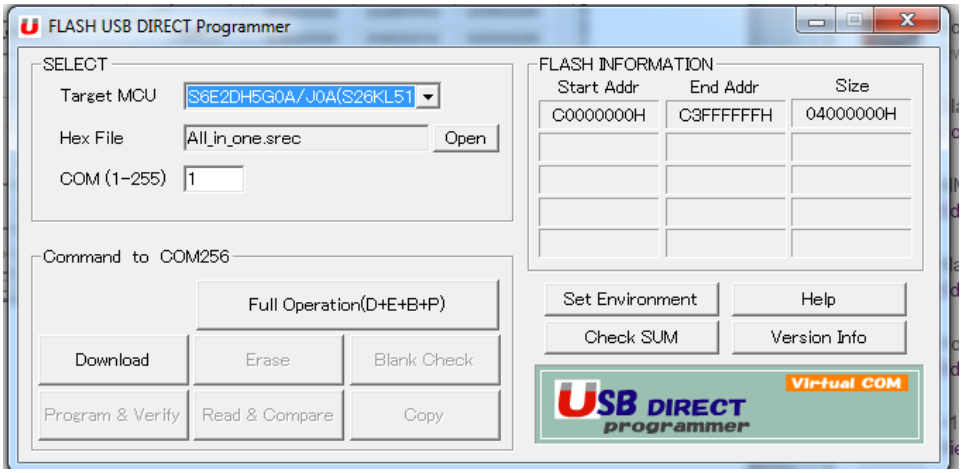


3) Click “Full Operation(D+E+B+P)” to start the programming process of the S6E2DH5G0A/J0A (MAIN). {D+E+B+P stands for Download programming algorithm to the MCU, Erase the flash, Blank Check the flash and Program}

   Note: The srec is a single file that may contain information to be programmed on both the MCU flash and the external HyperFlash. For the .srecs that make use of the external HyperFlash, a second step is required and is explained in step 4. Normally, the on-chip flash programming takes less than 15 seconds.

   For demonstrations with srecs that use the HyperFlash, continue on to step 4. If not, skip to step 6.

4) Change Target MCU to S6E2DH5G0A/J0A (S26KL512). This is a separate step to program the external HyperFlash memory.



5) Click “Full Operation(D+E+B+P)” to start the programming process of the S6E2DH5G0A/J0A (S26KL512).

Note: Programming the HyperFlash (S26KL512) can take 3-5 minutes for this operation to complete. Approximate times are shown in this table.

Name of Program	Approximate Time to Program (Seconds)	
	Main flash	HyperFlash
All-in-one	15	84
Album cover flow	15	35
TouchGFX2014	15	300
emWin	15	36

6) Remove the jumper J2 and press SW1 (RESET) to reset the board. The demonstration you just programmed will begin.

4.0 DEMONSTRATION PROGRAM EXPLANATION

The four demonstration programs are described in this section.

1) All-in-one: This project consists of seven display scenarios as described below. Each scenario will play for approximately 10 seconds or until the screen is tapped.

   a. Roadmap with overlay of direction and compass. The following techniques and features are used:

   • Blend four layers with pixel based alphas and different color formats.
   • Fade a layer.
   • Move a layer.
   • Switch buffers.
   • Use multi-layer feature.

   b. Chart with Spansion logo in background. The following techniques and features are used:

   • Work with clip rectangle for the STORE surface.
   • Synchronize display read and blit operations.
   • Analyze render time.
   • Analyze command sequencer buffer size.
   • Color matrix operations for blit operations.
   • Use alpha multiply with MASK surface.

   c. Digital picture frame

   • Movements.
   • Rotation.
   • Alpha blend.
   • Alpha masking.
   • Color matrix modification.

   d. Simple drawing shapes: The example shows how complex features can be achieved in software by combining simple features supported by the hardware:

   • Draw lines with different widths and line ends.

• Draw circles and points.
• Draw rectangles.

e. Speedometer: This example realizes a simple speedometer. The aim is to use two layers:

• One as a static background for the scale.
• One dynamic layer with a rotating needle and a fixed hub around the rotation center. The hub image has a light shadow and must not be rotated with the needle.

f. Cover Flow: This example demonstrates several Pixel Engine features in the form of a cover flow.

g. TFT Wizard: Simple images created with Free TFT Wizard graphics authoring tool.

2) Album cover flow with touch sensing

a. This demonstrates how four images (album covers) can be moved and sized simultaneosly. The touch screen sensor is sampled at 60 Hz intervals. The cover flow can be rotated left or right depending upon the touch screen input.

3) TouchGFX 2014

a. See touchgfx.com for an explanation of this demonstration.

4) Segger emWin demo

a. See segger.com for an explanation of this demonstration.

5.0 ADDITIONAL RESOURCES

Please visit the website for latest updates:

SK-FM4-176L-S6E2DH starterkit

Or contact us for technical support:
http://www.spansion.com/Support/SES/Pages/Ask-Spansion.aspx