F281x SDFlash RS232 Serial Flash Programming

Getting Started Checklist

Limitations:

The SDFlash RS232 Serial patch is provided by Spectrum Digital as an "as is" proof of concept example of serial programming for the F281x flash DSPs. SDFlash v1.60 has been modified to expose a generic interface to support a generic communications connection. All of the source code, project files and documentation to build F28xxRS232Flash.dll and F2812SerialFlash.out are installed in the following directory:

<ccs_install_dir>\specdig\sdflash\mydrivers\DSP281x_v2_2.

The source\build documentation is in the subdirectory "DSP281x_serial\docs".

The SDFlash serial patch and source code is provided as is without technical support.

Assumptions:

This document assumes the reader has some familiarity with the following:

SDFlash for JTAG programming of the F281x family.

TMS320F2810, TMS320F2811 and TMS320F2812 Flash API v1.00 (SPRC125). Available on TI's website.

Getting Started:

1. **Install SDFlash V1.6 or higher.**

   In version 1.6 and above Spectrum Digital exposed a generic interface that can support programming via non-JTAG interfaces.

   The latest SDFlash can be downloaded from the Spectrum Digital website.

   – Go to www.spectrumdigital.com and register or login if you have previously registered. The login button is at the top right of the webpage.

   – Click *"Drivers and Config Utilities"*

   – Click "*LatestC2000Tools.htm*" at the bottom of the page. This will open the following webpage:

     www.spectrumdigital.com/drivers/download.cgi?file=docstore/LatestC2000Tools.htm

   – At the top of the table, find the **C2000 Emulation Drivers** heading. Download and install the latest emulation drivers for Code Composer Studio located at the top of the table. As the description on the webpage shows, this includes the latest SDFlash utility.

2. **Install the SDFlash V1.6 Patch to receive the as-is example RS232 interface for the F281x DSP.**

   – Go to www.spectrumdigital.com and login if you have not previously done so. The login button is at the top right of the webpage.

   – Click *"Drivers and Config Utilities"*

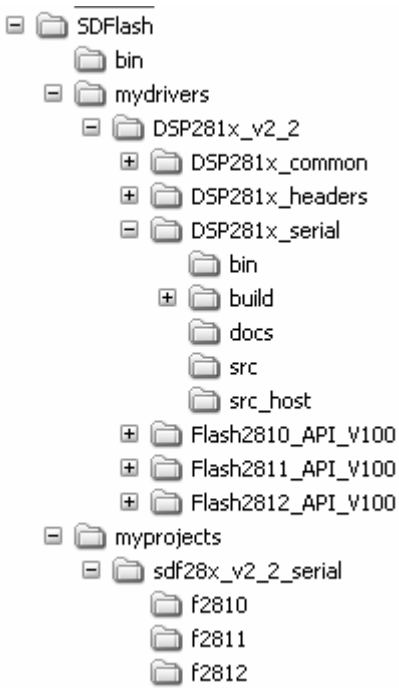
   – Click "*LatestC2000Tools.htm*" at the bottom of the page. This will open the following webpage:

     www.spectrumdigital.com/drivers/download.cgi?file=docstore/LatestC2000Tools.htm

   – Under the **F28xx SDFlash Algo's** heading, download the latest SDFlash 1.60 Beta Patch.

   – Unzip the patch into the specdig directory over your SDFlash install. The default install directory is C:\ti\specdig\sdflash. Thus, in this case, unzip the patch in the C:\ti\specdig directory.

– This action will create two new sub-directories:



<sdflash>mydrivers/DSP281x_v2_2

Contains the RS232 interface example code. This code is supplied as an as-is example of how to perform programming over the RS232 communications channel. This sample code is provided without technical support.

<sdflash> myproject/sdf28x_v2_2_serial

All of the files specific to executing serial programming are located in this directory. Each device within the 281x family has it's own specific sub directory.

The required files are:

SDFlash serial project files:

- F2812SerialFlash.sdp, F2811SerialFlash.sdp and F2810SerialFlash.sdp

SDFlash driver file:

- F28xxRS232Flash.dll

SDFlash algo files:

- F2812SerialFlash.out, F2811SerialFlash.out and F2810SerialFlash.ou

CCS board.dat file.

- ccBrd028x.dat

Example test file.

- mem_test.out

sdopts.cfg setup parameters.

- AddToSdOpts.cfg

3. **The algo and host side software is configured for the following:**

   – F281x API V1.00 for Rev C and later silicon.

   – PLL = x10/2 - Algo's configured for 150MHz operation

   – Passwords assumed to be erased (0xFFFF)

   Any changes to the above configuration for your system need to be made to the SDFlash serial algo file (F281xSerialFlash.out where x = 0,1 or 2). The projects and source for the algo files can be found in:

   `\mydrivers\DSP281x_v2_2\DSP281x_serial\build\F28xxSerialFlash`

   `\mydrivers\DSP281x_v2_2\DSP281x_serial\src`

4. **Read the included file readme_f2812_serial.txt for information on how to use SDFlash as an RS232 programming interface. The default location of this file is:**

   ti\specdig\sdflash\myprojects\sdf28x_v2_2_serial\ readme_f2812_serial.txt

   The information in the following steps is also included in the **readme_f2812_serial.txt** file**.**

5. **Setup sdopts.cfg. Search for and modify the sdopts.cfg file to support RS232 SDFlash.**

   Spectrum Digital tools store emulator setup and configuration information in a file named sdopts.cfg which is generally configured by SdConfig.

   SdConfig will NOT configure a non-JTAG tool so this has to be done manually. Add the following text to sdopts.cfg. This has to be added before the line "# End of sdopts.cfg" comment.

   This text can be copied from the file: `AddToSdOpts.cfg`

```
#
================================================================================
# Serial Port
#
[EmulatorId=C1]
EmuPortAddr=0xC1
EmuPortMode=RS232
EmuProductName=SERIAL_FLASH

[EmulatorId=C2]
EmuPortAddr=0xC2
EmuPortMode=RS232
EmuProductName=SERIAL_FLASH

[EmulatorId=C3]
EmuPortAddr=0xC3
EmuPortMode=RS232
EmuProductName=SERIAL_FLASH

[EmulatorId=C4]
EmuPortAddr=0xC4
EmuPortMode=RS232
EmuProductName=SERIAL_FLASH
```

6. **Connect serial cable between target (SCI-A) and host.** The connection must be made through a transceiver to level shift the signals. Note that as supplied, the F2812 eZdsp does not include this hardware.

7. **Set F28xx for boot to SCI-A serial bootload as shown in the following boot mode table:**

GPIOF4	GPIOF12	GPIOF3	GPIOF2	
(SCITXDA)	(MDXA)	(SPISTEA)	(SPICLK)	
PU	No PU	No PU	No PU	Mode Selected
1	x	x	x	Jump to Flash address 0x3F 7FF6 User must have programmed a branch instruction here prior to reset to re-direct code execution as they desire
0	1	x	x	Call SPI_Boot to load from an external serial SPI EEPROM
0	0	1	1	Call SCI_Boot to load from SCI-A
0	0	1	0	Jump to H0 SARAM address 0x3F 8000
0	0	0	1	Jump to OTP address 0x3D 7800
0	0	0	0	Call Parallel_Boot to load from GPIO Port B

Notes: 1) PU = pin has an internal pullup No PU = pin does not have an internal pullup
2) Users must take extra care due to any affect toggling SPICLK in order to select a boot mode may have on external logic.
3) If the boot mode selected is Flash, H0 or OTP, then no external code is loaded by the bootloader.

NOTE: The SCITXDA must be pulled down through a resistor so that the F281x can sill drive the pin once the boot load process begins.

8. **If programming the F2812, make sure the XMP/MC is pulled low to access the boot ROM.**

9. **Disconnect any JTAG controller such as XDS510PP from the target.**

   A JTAG controller connected to the JTAG port may hold the device in reset and thus the bootloader will not start when the device is reset.

10. **Power up target and reset the F28xx so that the bootloader will start.**

11. **Start SDFlash and load the appropriate project file: F2812SerialFlash.sdp, F2811SerialFlash.sdp or F2810SerialFlash.sdp**

    This project is included in the device specific directory:

    \specdig\sdflash\myprojects\sdf28x_v2_2_serial\f2812

    \specdig\sdflash\myprojects\sdf28x_v2_2_serial\f2811

    \specdig\sdflash\myprojects\sdf28x_v2_2_serial\f2810

You should use these projects as templates to create your own SDFlash project for RS232 programming.

12. **Modify the SDFlash project (if required) to locate the various elements such as device driver, algorithm file and flash data file.**

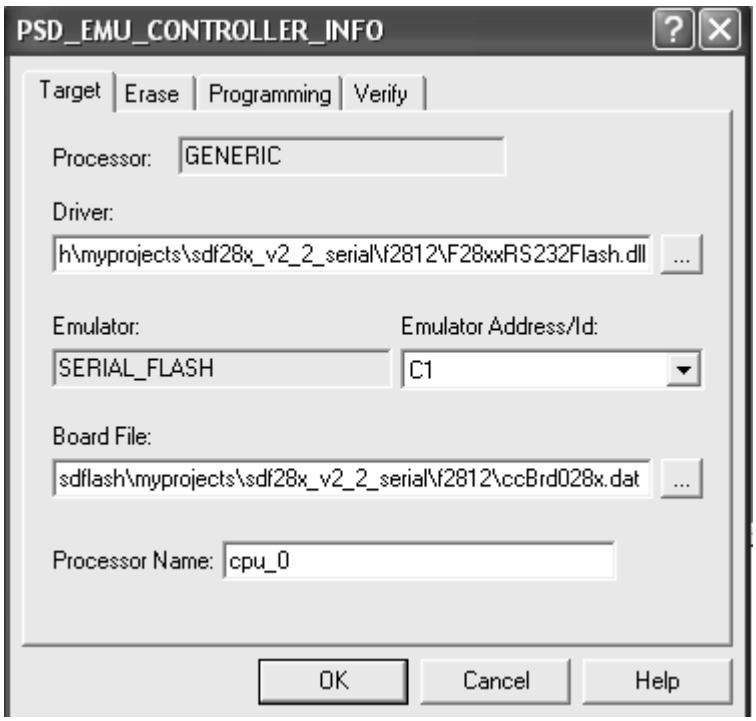
    If you installed CCS and SDFlash in the default install directories, then usually only the *Flash Data File* on the Program Tab**, the *Emulator Address/ID* on the** Target Tab**, and the *Erase User Options 3*** need to be changed.

    To change any of the directory paths or project settings from their default values, open the project settings dialog box: *Project->Settings*

    The settings detailed here are specific to the SDFlash Serial Patch.

    Target Tab:

    - *Driver:* This must point to the F28xxRS232Flash.dll
    - *Board file:* ccBrd028x.dat
    - *Processor name:* default is cpu_0
    - ***Emulator Address/ID:*** This is the COM port on your PC that you are using to connect to the DSP. If COM1, COM2, COM3 and COM4 do not appear as options, modify the sdopts.cfg file as described in step 5.



The following table shows an overview of which user options are used by the F281x SDflash Serial Patch algorithm V2_2. These settings can be specified on the Erase, Program and Verify tabs of the SDFlash project.

	Erase	**Program**	**Verify**
User Option 1	Sector Mask	Not used	Flash bank wait states
User Option 2	Run the configuration toggle test.	Not used	OTP wait states
User Option 3	Specify default autobaud rate	Not used	Not used
User Option 4	Not used	Not used	Not used

Erase Tab:

- *Algorithm File:*
  F2810: myprojects\sdf28x_v2_2_serial\f2812\F2810SerialFlash.out
  F2811: myprojects\sdf28x_v2_2_serial\f2812\F2811SerialFlash.out
  F2812: myprojects\sdf28x_v2_2_serial\f2812\F2812SerialFlash.out
- *Timeout:* leave as 200 or higher
- *User Options 1:* Sector Mask for erase.
  Set Bit 0 = erase Sector A, Set Bit1 = erase Sector B etc.
- *User Options 2:* Toggle Test pin select.

The erase function – leave blank for normal operation.With Erase User Option 2 set to 0001 - 0005, the toggle test will be performed instead of the erase operation and SDFlash will eventually timeout. The timeout period is as specified in the *Timeout* box, in seconds (e.g., 200 seconds). The user can click *Stop* to halt the toggle test sooner.

blank	Test not run
0000	Test not run
0001	GPIOF14_XF
0002	GPIOA0_PWM1
0003	Test not run
0004	GPIOG4_SCITXDB
0005	GPIOF12_MDXA
0006-FFFF	Test not run

While the test runs, monitor the selected pin using an oscilloscope. If the algorithms are configured correctly for your CPU rate then the pin will toggle near 10kHz (100µS +/- 10µS cycle time). If the pin is toggling at a different rate, then the algorithms are not configured correctly.

Changes need to be made to the SDFlash serial algo file (F281xSerialFlash.out where x = 0,1 or 2). The projects and source for the algo files can be found in:

\mydrivers\DSP281x_v2_2\DSP281x_serial\build\F28xxSerialFlash

\mydrivers\DSP281x_v2_2\DSP281x_serial\src

- ***User Options 3:***

  Default Autobaud setting. While this is under erase operation, this option really holds for all operations (Erase, Program and Verify). It was only put here for lack of a better place. This option was not available on v2.1 of the serial algos.

  Enter a number 0001 - 0004 that sets the default baud rate that the programmer will attempt to autobaud lock with the boot loader.

0001	**57600**	
0002	**38400**	
0003	**19200**	**(Default setting in the example projects)**
0004	**9600**	
Other	**38400**	

  Due to hardware, connectors, transceiver, PC UART, etc you may need to lower the auto baud rate in order to successfully autobaud lock with the device.

- *For all other boxes the default is blank.*

Program Tab:

- *Algorithm File:*
  F2810: myprojects\sdf28x_v2_2_serial\f2812\F2810SerialFlash.out
  F2811: myprojects\sdf28x_v2_2_serial\f2812\F2811SerialFlash.out
  F2812: myprojects\sdf28x_v2_2_serial\f2812\F2812SerialFlash.out
- *Flash Data File:* This is the .out file that you want to program into the flash.

- *Timeout:* leave as 200 or higher
- *For all other boxes the default is blank.*

Verify Tab:

- *Algorithm File:*
  F2810: myprojects\sdf28x_v2_2_serial\f2812\F2810SerialFlash.out
  F2811: myprojects\sdf28x_v2_2_serial\f2812\F2811SerialFlash.out
  F2812: myprojects\sdf28x_v2_2_serial\f2812\F2812SerialFlash.out
- *Timeout:* leave as 200 or higher
- *User Options 1:* default is 0F0F (Flash waitstate register setting)
- *User Options 2:* default is 001F (OTP waitstate register setting)
- *For all other boxes the default is blank.*

13. Save the SDFlash project file: *File->Save Project As.*

Once you have made the required changes select ok and save the project using the name of your choice: *File->Save Project As.*

14. Reset the target to start the F281x bootloader.

The Bootloader will wait to Autobaud detect with the host.

15. **Reset SDFlash by pressing the large R button within the SDFlash application or by the Device->Reset pull down menu.**

    NOTE: The reset button of SDFlash CANNOT bring a target back to a good state. If the target is in a bad state or not in bootloader mode then user must use a hardware reset to get target back to bootloader mode. Once that is done the reset button used to inform SDFlash that target is in bootloader mode.

16. **Erase/Program/Verify as with the JTAG version of the interface.**

Other Documentation:

- **SDFlash RS232 Host Side Software**: For more information on the as-is host side software example code that is included, read the file readme_F28xxRS232Flash.txt The default location of this file is in:

  ti\specdig\sdflash\mydrivers\DSP281x_v2_2\DSP281x_serial\docs

- **F281x Flash API**: Download SPRC125 from the TI website:

  http://focus.ti.com/docs/toolsw/folders/print/sprc125.html

- **F281x Boot ROM and Bootloader info**: Download SPRU095

  http://focus.ti.com/docs/prod/folders/print/tms320f2812.html#technicaldocuments