

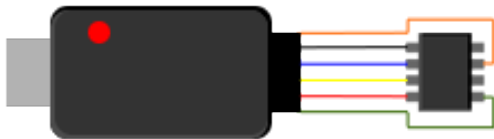
MSP430 BSL Programmer FCD-PRG01

Highlights

- MSP430 F1x, F2x, F4x, F5x compatible¹
- Standard 6 pin, 0.1" header interface
- USB bus powered
- 3.3V target supply output (up to 400mA)
- Cross platform driver support for Windows, Linux, and Mac OS
- Full MSPGCC GNU toolchain support
- Full TinyOS support
- Fully Open-Source hardware design²

Product Description

The FCD-PRG01 is a USB bootstrap loader³ (BSL) programmer for the Texas Instruments MSP430 microprocessor. For designs where low cost or small form factor prohibit the integration of custom programming logic or a large JTAG header, the FCD-PRG01 enables in-system programming by including a single 6 pin header in the target device design.



Designed to work with the cross platform MSPGCC toolchain, the FCD-PRG01 provides an open source, cross platform alternative to platform dependent development tools for the MSP430 microprocessor.



The FCD-PRG01 integrates a USB-to-serial converter and on board regulated power supply into a small USB dongle, allowing programming and test capability over a single interface. It exposes a standard 6 pin, 0.1" header which can be used to interface to the target board via a device specific cable harness. This modular approach provides designers with the flexibility to select the optimal physical programming interface for the unique design constraints of each target platform.

Ordering Information

- FCD-PRG01** MSP430 BSL Programmer
FCD-CBL01 Programming interface cable (6x1, 0.1" ↔ 3x2, 2mm)

¹MSPGCC BSL tools currently support F1x, F2x, and F4x only

²Design files available at <http://www.flyingcampdesign.com/msp430-bsl-programmer.html>

³"MSP430 Programming Via the Bootstrap Loader" Application Note (<http://www-s.ti.com/sc/techlit/slau265>)

Programming Interface

The FCD-PRG01 provides a standard 6x1, 0.1" programming header for powering and communicating with the target device.

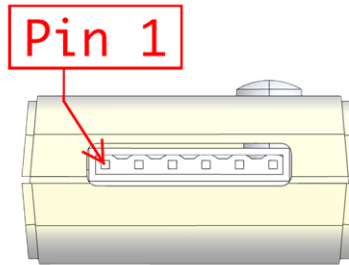


Figure 1: 6x1, 0.1" Header

Pinout

FCD-PRG01 Signal	FCD-PRG01 Pin	MSP430 devices with TEST pin	MSP430 devices without TEST pin
DTR	1	TEST	TCK
RXD	2	UART_TX	UART_TX
TXD	3	UART_RX	UART_RX
VCC	4	VDD	VDD
RTS	5	RST/NMI	RST/NMI
GND	6	GND	GND

Electrical Characteristics

VCC Target Supply Output (Pin 4)

Parameter	Minimum	Typical	Maximum	Units	Conditions
Output Voltage	-	3.3	-	V	
Output Current	-	-	0.4	A	
Short Circuit Current	-	450	-	mA	$V_{out} = 0\text{ V}$
Dropout Voltage	-	75	200	mV	$I_{out} = 400\text{ mA}$
Accuracy	-	1	-	%	

UART and I/O (Pins 1,2,3,5)

Parameter	Minimum	Typical	Maximum	Units	Conditions
DC Input Voltage	-0.5	-	3.8	V	
Output Drive Current	-	12	-	mA	
Output Voltage High	2.2	2.8	3.2	V	$I_{source} = 3\text{ mA}$
Output Voltage Low	0.3	0.4	0.6	V	$I_{sink} = 8\text{ mA}$
Input Switching Threshold	1.0	1.2	1.5	V	
Input Switching Hysteresis	20	25	30	mV	

Programming Cables

FCD-CBL01

A programming cable harness which mates with standard 3x2, 2mm PCB headers is available from Flying Camp Design for use with the FCD-PRG01.



Figure 2: Flying Camp Design FCD-CBL01

Flying Camp Design recommends using the following through hole and surface mount headers for use with the FCD-CBL01:

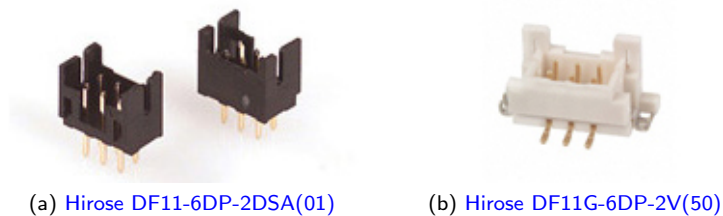


Figure 3: Recommended headers for use with the FCD-CBL01 cable

A Cadsoft Eagle CAD library which contains land pattern footprints for these headers is available for download on the FCD-PRG01 product page: <http://www.flyingcampdesign.com/msp430-bsl-programmer.html>

Custom Programming Cables

For those customers wishing to design their own custom programming cables, Flying Camp Design recommends the following mating connector for use with the 6 pin programming interface:



Figure 4: Molex 50-57-9006

Installation

The FCD-PRG01 uses a USB ↔ Serial interface chip ([FTDI Chip FT232R](#)) and corresponding operating system driver to provide a Virtual COM Port (VCP) interface layer to the BSL programming software. The BSL programming software depends upon this VCP interface layer to control the communication pins on the programmer.

1. **Before plugging in the FCD-PRG01 to your computer**, install the appropriate driver for your operating system by following the corresponding installation guide available online at:
<http://ftdichip.com/Documents/InstallGuides.htm>

A full listing of the latest VCP drivers for all supported operating systems is available online at:
<http://ftdichip.com/Drivers/VCP.htm>

Note: A Linux driver for the FT232R is included in most newer kernels (> 2.4.20 or greater). However, on some kernels an older F232BM driver may be used which is compatible with the FT232R.

2. After installing the appropriate driver for your operating system, insert the FCD-PRG01 into a free USB port on your computer.
3. If installation was successful, the FCD-PRG01 should appear as a VCP on your computer:

Windows	COM[X]
Linux	/dev/ttyUSB[X]
Mac OS X	/dev/tty.usbserial-[...]

Software Support

The Virtual COM Port (VCP) drivers provide a serial port interface to the BSL control software. This generic software interface enables the use of third party BSL tools, as well as providing a simple abstraction to those users wishing to write their own BSL tools. The mapping between the VCP signal and the programmer pins is shown in the table on page 2. The following examples show how to use the FCD-PRG01 with the BSL tools available from a couple popular MSP430 toolchains.

MSPGCC Toolchain Programming Example

The MSPGCC GNU toolchain includes a set of python scripts (“tools”⁴) which can be used to control the MSP430 BSL (download to Flash and/or RAM, erase, verify, etc) on supported flash devices. The following example clears all flash memory, programs the target with the Intel hex firmware file “firmware.ihex”, and then resets the target:

```
python msp430-bsl.py --speed=9600 --swap-reset-test --invert-reset --invert-test \  
-c /dev/path-to-msp430-bsl-programmer -r -e -I -p path/to/firmware.ihex
```

More information about msp430-bsl.py is available online at: <http://mspgcc.sourceforge.net/tools.html#pybsl>

TinyOS Programming Example

The TinyOS toolchain includes built in support for the FCD-PRG01. The following example can be used to compile a TinyOS application and install it onto an MSP430 based TinyOS “platform”:

```
make [platform] install miniprogram
```

More information about the TinyOS toolchain is available online at: <http://tinyos.net>

MSP430 BSL Utility

The Flying Camp Design MSP430 BSL Utility is an open source, cross-platform GUI utility which was designed to be fully compatible with the FCD-PRG01. More information about using the FCD-PRG01 with this software is available on the MSP430 BSL Utility product page:

<http://www.flyingcampdesign.com/msp430-bsl-utility.html>

⁴<http://mspgcc.sourceforge.net/tools.html>

Questions?

Contact support@flyingcampdesign.com or visit <http://www.flyingcampdesign.com/support.html>

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