

Programming C2000 Flash DSPs using the SoftBaugh™ SUP2000™ and GUP2000™ in SCI Mode

Sangmin Chon

C2000 Digital Signal Controllers

ABSTRACT

The C2000 Flash DSP(s) can be programmed via the on-chip bootloader resources. The SoftBaugh SUP2000™ Single USB Flash Programmer and the GUP2000™ Gang USB Flash Programmer provide access to these bootloader resources to support in-system programming of C2000 ICs.

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1 Theory of Operation

The C2000 Flash DSPs can be programmed via the on-chip bootloader in a variety of ways. Refer to Reference 1 and Appendix C of Reference 2 for descriptions of bootloader operation on the C28x and C24x families, respectively. The SUP2000 Single USB Flash Programmer for C28x/C24x and the GUP2000 Gang USB Programmer for C28x/C24x both support the SCI_Boot feature for the C28x and the SCI Asynchronous Transfer Protocol feature for the C24x family. These features allow a target DSP to be programmed in-system by incorporating access to a few key signals.

2 Target Header

To use the SCI mode for either of these programming options with the SUP2000/GUP2000, the target board must provide access to the following signals at the 10-pin header on the bootloaders. This header is defined below:

Table 1. Target Header Connections for C28x/C24x

PIN	C28x SIGNAL	C24x SIGNAL	I/O	PURPOSE
1	GPIOF4 (SCITXDA) [PU]	IOPA0 (SCITXD) [PU]	I/O	Target transmit
2	GPIOF2[-]	IOPC2 [PU]	I	Mode select
3	GPIOF5 (SCIRXDA) [PU]	IOPA1 (SCIRXD) [PU]	I	Target receive
4	#XRS [PU]	#RS [PU]	I	Target reset
5	GND	GND	-	Signal ground
6	n/c	n/c	-	No connection
7	GPIOF12[-]	MP/#MC or n/c if low on target board [PD]	I	Mode select
8	n/c	n/c	-	No connection
9	GPIOF3[-]	#BOOT_EN/XF [PU]	I, I/O	Mode select
10	n/c	n/c	-	No connection

Note:

[PU] indicates target on-chip pull-up, [PD] indicates target on-chip pull-down, [-] indicates lack of target on-chip pull-up or pull-down.

The SUP2000 and GUP2000 are supplied with 10-pin SCI cables. These cables mate to a keyed 10-pin header (Oupiin, part number 3012-10GSB) that can be used on the target board, or on a customer-supplied pogo adapter.

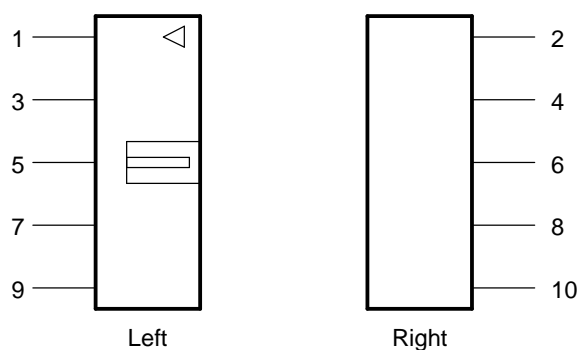
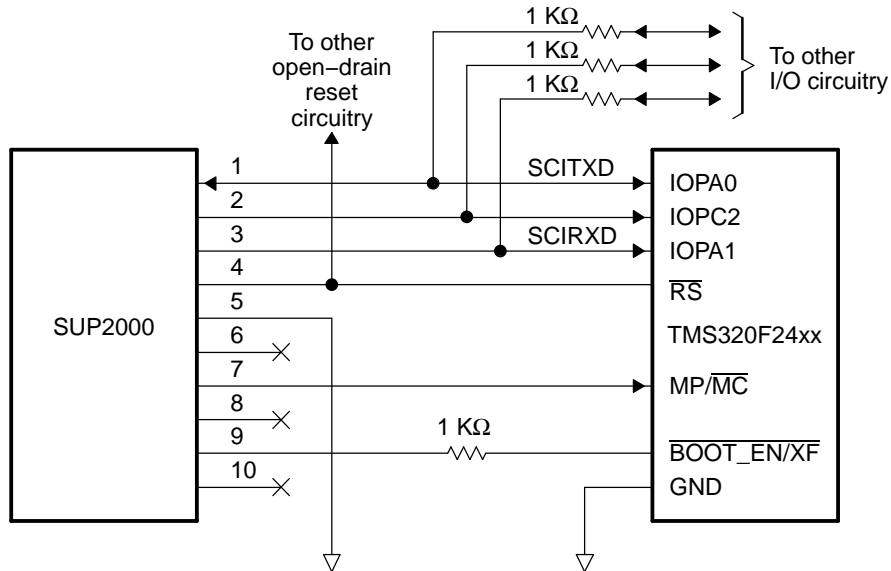


Figure 1. Target Header Diagram

3 Target Circuit Connections

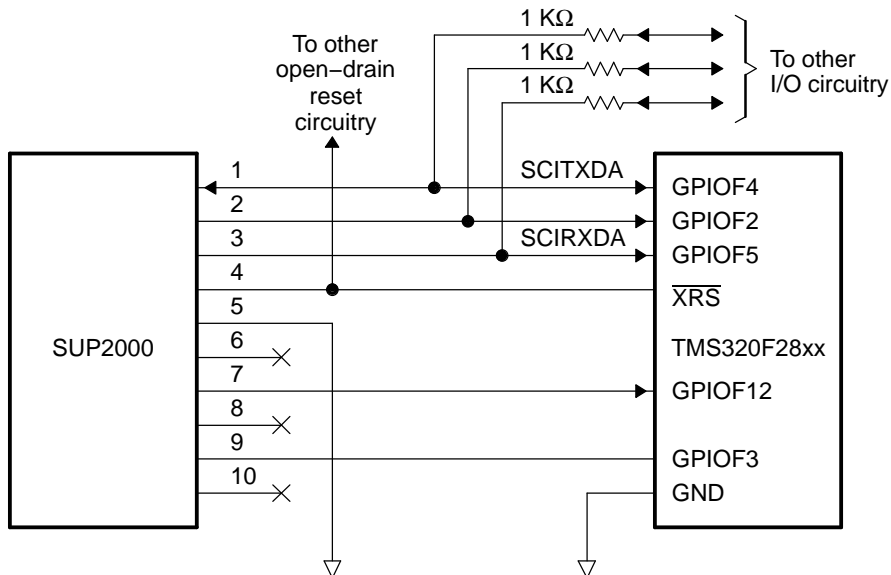
The signals shown in Table 1 should be connected directly to the appropriate signals on the target DSP, as shown in the following figures. No other conditioning or other buffering circuitry is required or expected on the target board.



A.

#IMPLIED If the target application prohibits use of isolation resistors, jumpers may be substituted instead.

Figure 2. C24xx Target IC Connections



A.

#IMPLIED If the target application prohibits use of isolation resistors, jumpers may be substituted instead.

Figure 3. C28xx Target IC Connections

Where possible, with the exception of the Rx pin, the bootloader signals should be designed as outputs on the target board, allowing the SUP2000/GUP2000 to take control of the nets during programming. The Rx pin should be used as an input in any case. A minimum of a 1k ohm resistor should be used between the Rx pin on the DSP and the output pin of any RS232 transceiver, to allow the SUP2000/GUP2000 to take control of this pin at the programming header node.

Alternatively, jumpers may be used on the target board to disconnect signals in conflict for programming if the mode select pins are required to be inputs in the target application. Or, 1k ohm resistors may be used to isolate the SUP2000/GUP2000 nodes from conflicting outputs on the target board.

Except during actual programming cycles, the SUP2000/GUP2000 pins are in a high-impedance state, and do not interact with the target board.

4 Software Operation

SoftBaugh provides the PrgSUP2000™ and PrgGUP2000™ software at <http://www.softbaugh.com> to support the SUP2000 and GUP2000 USB Flash Programmers, respectively. These software packages include a Software Development Kit (SDK) to allow access to the programmer DLLs in a customer's application, or the programmer utilities may be used without any additional software development effort. Refer to SoftBaugh's website for the most recent releases, documentation, and code samples.

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5 References

The following references contain additional information about the bootloader as implemented on the C2000 family.

1. *TMS320x281x Boot ROM Reference Guide* (SPRU095)
2. *TMS320LF/LC240xA DSP Controllers Reference Guide* (SPRU357)

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Mailing Address: Texas Instruments
Post Office Box 655303 Dallas, Texas 75265