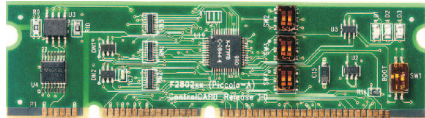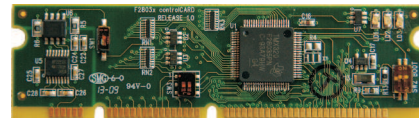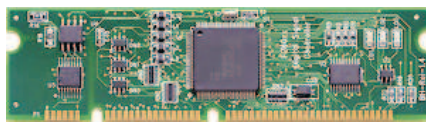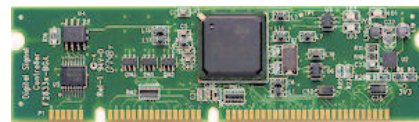# TMS320C2000™ Experimenter Kit Overview
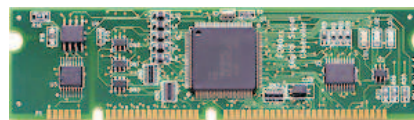

F28027 Piccolo™ Family
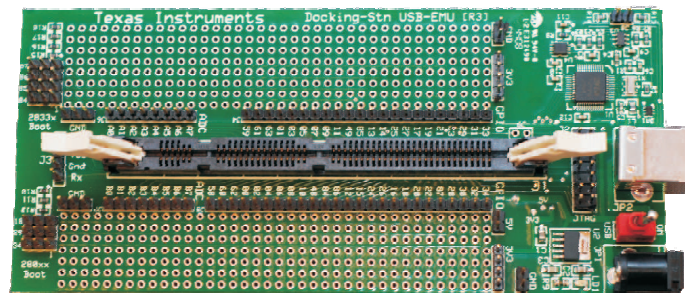

F28035 Piccolo™ Family

F28044

F28335 Delfino™ Family

F2808

Experimenter's Kit USB Docking Station

The C2000™ Experimenter's Kit is a quick, easy, low cost way to evaluate the TMS320F28x family of devices. It consists of a docking station and a F28x controlCARD™. The docking station is a small mother board that accepts any of the plug-in controlCARDs and gives the user access to all the F28x device's GPIO and ADC signals. Additionally, it also provides two prototyping areas (one on each side of the DIMM100 connector) with an array of 0.1" spaced plated through holes for wire-wrapping and soldering.

Other features of the Docking Station include:

* On-board USB emulation or the ability to use an external JTAG emulator
* Ability to use either the USB's 5-V supply or an external power supply to power the board.
* UART communications header connector
* Boot jumpers for all boot modes covered by F280xx and F2833x devices
* 5.0-V supply for prototyping area
* 3.3-V supply for prototyping area
* All key signals accessible via clearly labeled header pins

ControlCARDs are small 100-pin Dual In Line Memory Module (DIMM) style vertical plug-in boards based on the TMS320F28027 (Piccolo™), TMS320F2808, TMS320F28044 (fixed point CPUs) and TMS320F28335 (floating point CPU) microcontrollers. These controlCARDs have all the necessary support circuitry (clock, supply LDO, decoupling, pull-ups, etc.) to provide reliable operation on MCU devices. The board design is robust and meant for operation in noisy electrical environments.

It includes the following features:

- Small size - 90 mm x 25 mm (3.5" x 1")
- All GPIO, ADC, and other key signal routed to gold edge connector fingers
- Extensive supply pin decoupling with L+C close to pins
- Clamping diode protection at ADC input pins
- Anti-aliasing filter (noise filter) at ADC input pins
- Ground plane
- Isolated UART communications using RS232 translator + ISO7221 isolators

Both the controlCARD and Docking Station include a "Hardware Developer's Package", a set of "soft collateral" files that make copying or deploying this technology very easy.

These files include:

- Schematics (source or .PDF files)
- Bill of materials (BOM)
- Gerber files to freely use or modify
- Pin-out table showing all key signals on the 100-pin connector
- DIMM100 pin / socket mechanical details
- PCB files done in popular Freeware tool for easy modification (Docking Station only)
- Template mother board PCB file created in a popular freeware tool – great way to begin a new prototype design

1 Hardware Set Up

This guide sets up the board to use on-board USB emulation and uses the USB's 5V supply to power the board.

Please follow the steps below to setup the hardware:

Step 1. Unpack the DIMM style controlCARD

Step 2. Spread open the winged retaining clips on connector J1

Step 3. Sit the DIMM card loosely in the connector slot. Make sure to align the 2 keyed notches and position the card bottom corners inside the retaining clips (see Figure 1)

Step 4. Push vertically down using even pressure from both ends of the card until the clips snap and lock. (note: to remove or eject the card simply spread open the retaining clips with thumbs)

Step 5. Connect the USB cable to the USB connector JP2, then place switch 1 (SW1) to the "ON" position

Step 6. Once you have downloaded the TI Software or are ready to run your own project, turn on the board power by putting SW1 in the "USB" position. This will allow the board to use the USB's 5 V as the supply voltage.

Step 7. For full details (schematics, pin-out table, etc.) of the Hardware please refer to the Hardware Developer's package, DockingStnHWdevPkg

Figure 1. Retaining Clips
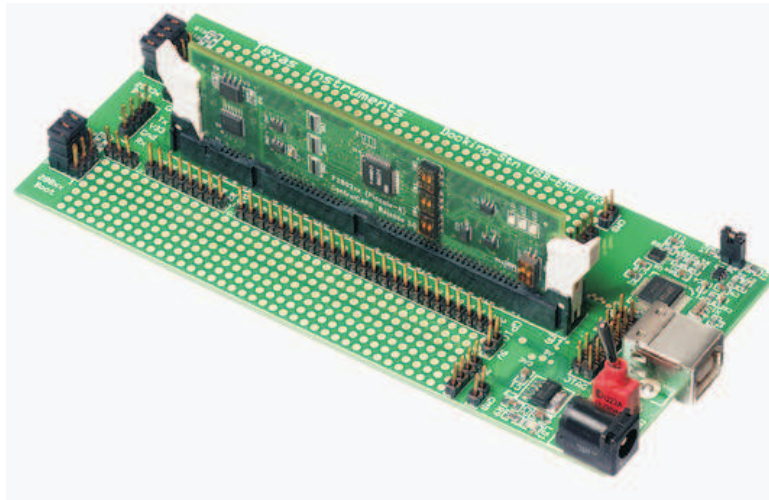
2   Software Set Up

Getting started software, latest header files, simple C framework code example, and other useful soft collateral can all be found on the TI website. If you already have your own software project and do not require this collateral, skip this section and startup your emulator/CCS environment.

To download the free TI software collateral follow these steps:

Step 1.   On an Internet browser type: http://www.ti.com/c2000tools

Step 2.   Under the Experimenter's Kit section of the website download the "Baseline Software" (SPRC675)

Step 3.   Save the .zip file to the directory of your choice

Step 4.   Unzip the file and run the install program Baseline Software Setup

Step 5.   The installer will create the following default directories:

>   C:\TI_F28xxx_SysSW
>   ~Docs
>   ~GeneralPurposeGUI
>   ~SupportFiles
>   FlashingLeds
>
>   C:\TI_F28xxx_SysHW
>   CC280xxHWdevPkg
>   CC2833xHWdevPkg
>   DockingStnHWdevPkg

Step 6.   For Code Composer Studio installation instructions please see the Code Composer C2000 Quick Start Guide found in C:\TI_F28xxx_SysSW\~Docs\CodeComposerC2000.pdf

If Code Composer Studio™ (CCS) is installed, the XDS100 emulator is installed, and CCS is set to use the XDS100 emulator, load the project file *"FlashingLeds.pjt"* found in:

C:\TI_F28xxx_SysSW\FlashingLeds\

Right-click the project name in the project window and select the proper configuration for your controlCARD. Next, compile, load, and run the code on the target. If the target, emulator and downloaded software are working properly this project should flash an LED on the controlCARD.

3   Using the Onboard USB JTAG Emulation

The onboard USB JTAG emulation is based on TI's XDS100 emulation technology and provides an easy way to connect to the board and begin Code Composer Studio development.

To setup the onboard USB JTAG emulation follow these steps:

- Install the include 32KB limited version of Code Composer Studio V3.3. If Code Composer Studio is already installed, run update advisor and update to the latest version. This will install the XDS100 drivers and Code Composer Studio support files.
- Connect the USB docking station to an available USB port.
- When prompted do not allow Windows to go online to search for drivers, but allow Windows to search your computer for drivers.
- Open Setup Code Composer Studio V3.3 and add the correct configuration set to the project. For example, the F2808 XDS100 USB Emulator board configuration would be used for a F2808 controlCARD.
- Save the configuration and launch Code Composer Studio on exit.

4   Emulators

While the Experimenter's Kit has on-board emulation, it is not a high performance emulator and not all C2000 evaluation boards have this feature. The following companies provide low cost, fully-featured external emulators designed to work with C2000 controllers.

Blackhawk™

USB2000 Controller (part number TMDSEMU2000U)

http://www.blackhawk-dsp.com

Spectrum Digital

http://www.spectrumdigital.com