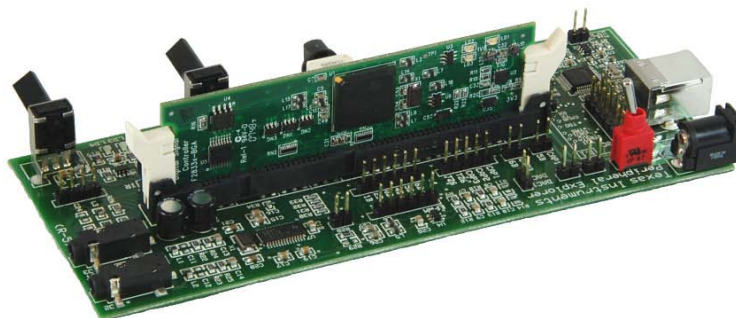


Peripheral Explorer Kit Overview

April 2010



The Peripheral Explorer Kit is an evaluation board designed to allow for experimentation with many of the peripherals available in the C2000 F28x family of microprocessors. The board is designed to accept any of the DIMM100 plug-in controlCARDs™ and contains all hardware (controlCARD, power supply, etc) required for normal usage. The kit is self-contained and contains multiple experiments in which external equipment, such as oscilloscopes, are not required. Commonly in these examples one peripheral read the output of a different peripheral, confirming the operation of both.

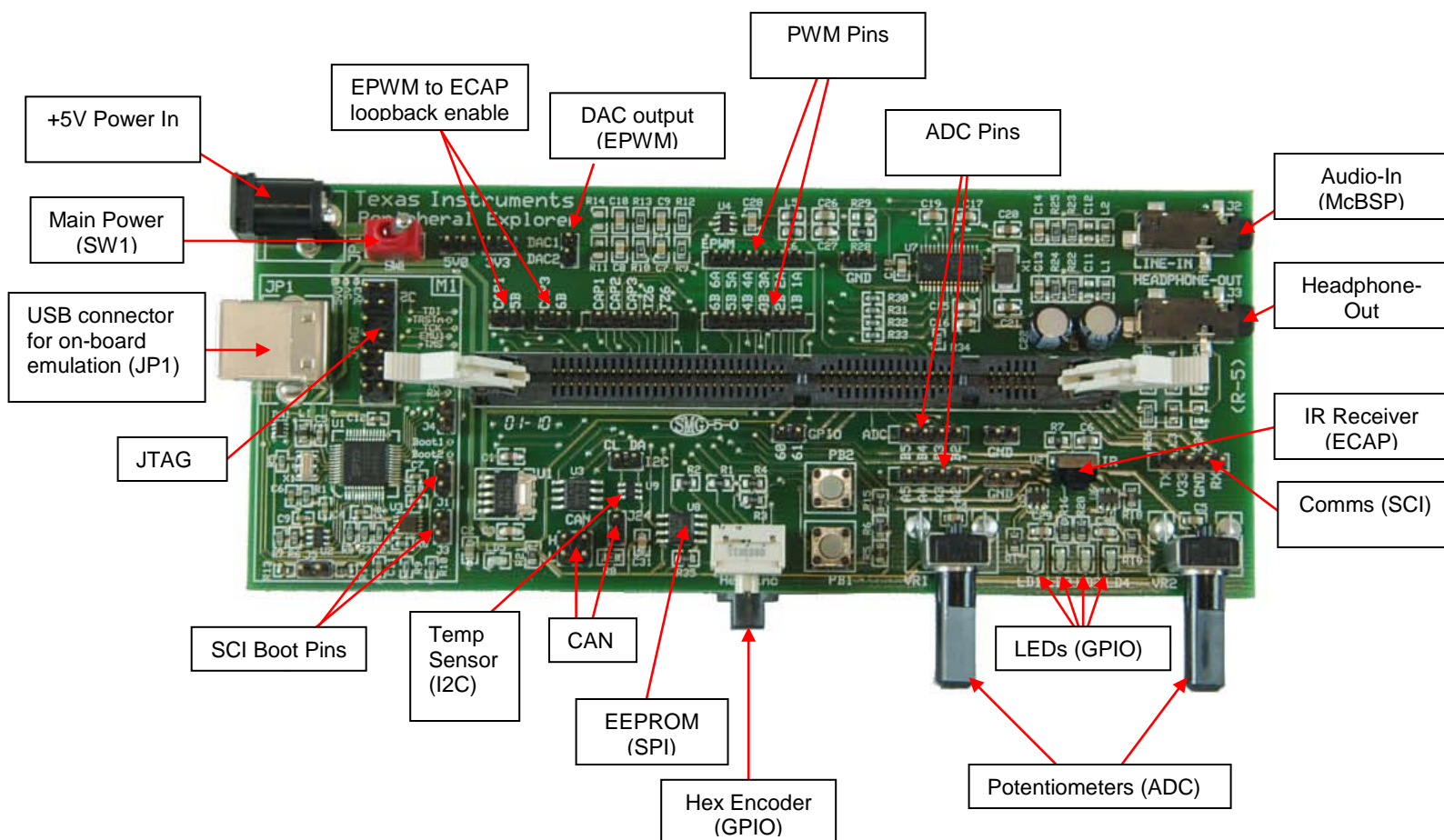
Features of the Peripheral Explorer Kit include:

- Multiple peripheral-based examples
 - EPWM based sinusoidal output based on a sine table
 - DAC via filtered ePWM module and then read by an ADC
 - CAP based IR receiver reading
 - SPI based EEPROM
 - UART communications header available for host control
 - ADC based potentiometers
 - GPIO based components such as pushbuttons, hex encoder, LEDs
 - McBSP/DMA based AIC23 codec software (F28335 only)
 - I2C header for external use and communication with TMP100 temperature sensor
 - CAN header for external use
- Hardware Developer's Package is available and includes schematics, bill of materials, Gerber files, etc.

Getting Started

Hardware Overview

The **Peripheral Explorer Kit** consists of multiple peripheral based components. Below is a diagram of the **Peripheral Explorer board** and some of its key features.



Note: For full details (schematics, pin-out table, etc) of the hardware please refer to the Hardware Developer's Package, PeripheralExplorer-HWdevPkg.

+5V Power In	DC power supply from plug pack (5V supply may be used as well)
Main Pwr	SW1 - Master power switch for entire EVM
USB connector	USB connection for on-board emulation and power.
JTAG	Connector to external JTAG emulator
SCI Boot Pins	Controls how the controlCARD will boot <ul style="list-style-type: none"> If no jumpers are placed the target will boot from flash If a jumper is placed at "J1", a F2808 controlCARD will boot from SCI If a jumper is placed at "J3", a F28335 controlCARD will boot from SCI
Temp Sensor	TMP100 temperature sensor connected to I2C
CAN	External pins available for connection to two parallel CAN devices
EEPROM	Uses the SPI peripheral to read/write to a 256K EEPROM
Hex Encoder	The position of the 4-bit hex encoder sets the values of GPIOs 12-15
Potentiometers	Divide a 3.3V input into a voltage value to be read by ADC-A0 and ADC-A1
LEDs	LED1 and LED2 are controlled by GPIO-09 and GPIO-11
Comms	Serial communications UART (connects to the optional GUI)
IR Receiver	Uses the eCAP module to read signals sent by a IR transmitter. The software included with this kit is configured to work with the Sharp TV protocol
Headphone-Out	Output from the TI AIC23B codec which is controlled by the F28x MCU (headphones not included in this package)
Audio-In	Input to the TI AIC23B codec (line-in audio cable not included in this package)
ADC pins	ADC pins available to be connected as desired
PWM pins	PWM pins available to be connected as desired
DAC output	Output of a filtered ePWM. The ePWM output is connected to a second-order passive filter then connected to these pins
ePWM to ECAP loopback enable	Connecting a jumper across these headers allows for an experiment to be done where the eCAP module reads the duty cycle and period of the ePWM output

Hardware Setup

All the hardware needed to get started is included in this package. Since on-board emulation is available using the USB, an external emulator is not needed but suggested emulators are listed near the end of this document.

Please follow these steps to set up the hardware

- 1) Unpack the DIMM style controlCARD
- 2) Spread open the winged retaining clips on connector J1
- 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 picture below)
- 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)



- 5) Ensure switch 1 (SW1) is in the off position and connect the USB cable

- 6) Turn on power and proceed to Software Setup

Software Setup

The **Peripheral Explorer Kit** application software, step-by-step lab style documentation, and other useful soft collateral can all be found on the TI website. If you already have your own software project and don't require this collateral skip this section.

To download the **Peripheral Explorer Kit** software, go to <http://www.ti.com/controlsuite> and run the controlSUITE installer. Select to install the "Peripheral Explorer Kit" software and allow the installer to also download all automatically checked software. This software is also available on the "C2000 Teaching Materials" CD-ROM.

Emulators

The following companies provide low cost, full featured emulators designed specifically for C2000 controllers:

Blackhawk™

- USB2000 Controller (part number BH-USB-2000)
- <http://www.blackhawk-dsp.com>
- \$299

Spectrum Digital

- XDS510LC JTAG Emulator (part number 701902)
- <http://www.spectrumdigital.com>
- \$249

References

For more information please see the following guides:

- **C2000 Teaching CD-ROM** – provides detailed information on the Peripheral Explorer projects
- **PeripheralExplorer-HWdevPkg** – a folder containing various files related to the hardware on the Peripheral Explorer board (schematics, bill of materials, Gerber files, PCB layout, etc). All schematics and PCB files were created with the freeware ExpressPCB package.
- **F28xxx User's Guides**
<http://www.ti.com/f28xuserguides>

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