# BoosterPack Ecosystem

DRV8301 Motor Driver BoosterPack
- Spin Any Three Phase Motor!
- 6-24V Supply Input
- 10A Continuous/14A Peak

Only $49

Digital Power BoosterPack
- Experiment with switching power supplies
- Supported by PowerSUITE
- On board Buck Converter and Active Load
- 9V Input

Only $59

>> See them all @ ti.com/boosterpacks

# Software Tools

powerSUITE
powerSUITE is a set of tools designed to make designing a digital power supply easy!

www.ti.com/powersuite

Professional Software tools
LaunchPad is also supported by professional IDEs that provide industrial-grade features and full debug-capability. Set breakpoints, watch variables & more with LaunchPad.

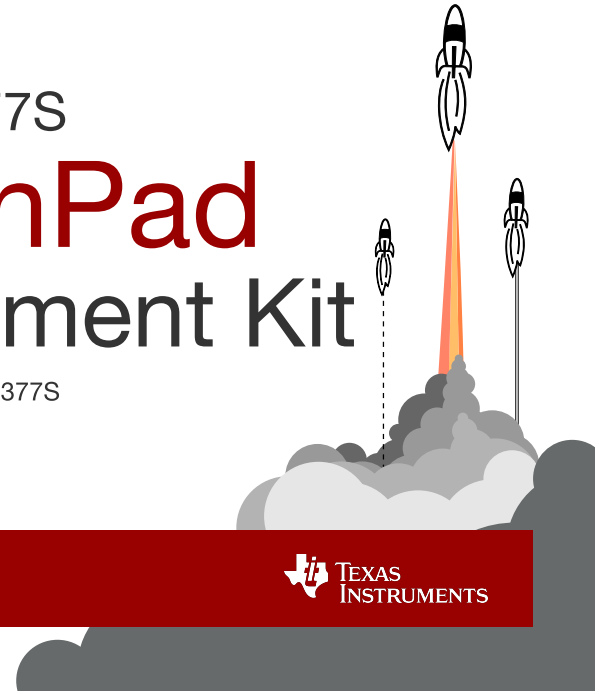
www.ti.com/ccs

Code Composer Studio ™ IDE



# Meet the TMS320F28377S LaunchPad Development Kit

Part Number: LAUNCHXL-F28377S

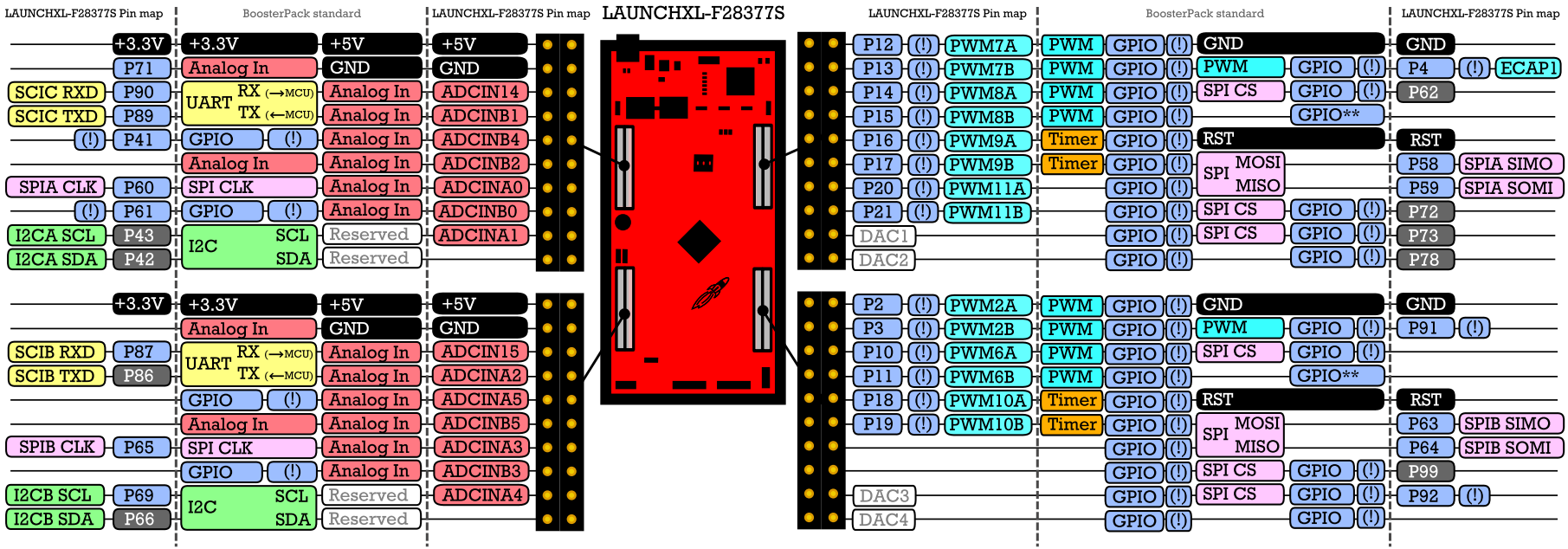



## Resources
## ti.com/launchpad

- Code examples
- Open Source Design Files
- Documentation
- Example projects
- Videos
- Tutorials
- Other TI products

## Below are the pins exposed @ the BoosterPack connector.

Also shown are functions that map with the BoosterPack standard.
* Note that to comply with the I2C channels of the BoosterPack standard, a software-emulated I2C must be used.
** Some LaunchPads do not 100% comply with the standard, please check your LaunchPad to ensure compatability
(!) Denotes I/O pins that are interrupt-capable.



# A closer look at your new LaunchPad Development Kit

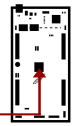
### Featured microcontroller: TMS320F28377S

### This LaunchPad is great for...

- Evaluation of motor control algorithms, including encoder and sensorless based torque, velocity, and servo position control
- Experimentation with power conversion control including DC-AC, AC-DC, DC-DC, and MPPT algorithms
- Power Line Communications and Metering
- Industrial sensing and interface
- Digital Signal Processing, sensing, and capture applications including radar, Doppler, infrared, and time-of-flight

### What comes in the box?

**LAUNCHXL-F28377S LaunchPad**

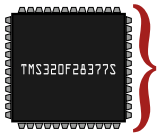


**XDS100v2 On-Board Emulator**
Enables programming, debugging & application UART via USB while protecting your PC with electrical isolation.


This Quick Start Guide

Mini-USB Cable

Software @ ti.com/launchxl-f28377s




**TMS320F28377S Microcontroller**
- 200 MHz CPU
- 200MHz Real-time control co-processor (CLA)
- 1024 kB Flash and 164 kB RAM
- Viterbi, Complex Math, CRC Accelerator (VCU)
- Trigonometric Math Accelerator (TMU)
- 15-Channel Enhanced Pulse Width Modulator (ePWM)
- 14-Channel 12-bit Analog-to-Digital Converter (ADC)
  - 3.5 MSPS + Internal Reference
- Serial Communications Peripherals
  - SCI, SPI, I2C
  - CAN, McBSP

# Out-of-box Demo

For more detailed instructions refer to the user's guide @ ti.com/launchxl-f28377s

**1. Connecting to the Computer**
Connect the LaunchPad using the included mini-USB cable to a computer. Two green power LEDs should illuminate. For proper operation, drivers are needed. It is recommended to get drivers by installing an IDE such as TI's CCS. Drivers are also available at ti.com/xds100drivers.

**2. Running the Out-of-box Demo**
When connected to your computer, the LaunchPad will power up and flash the red and blue LEDs for approximately 3 seconds. After the LEDs complete flashing the LaunchPad goes into an ADC sample mode.

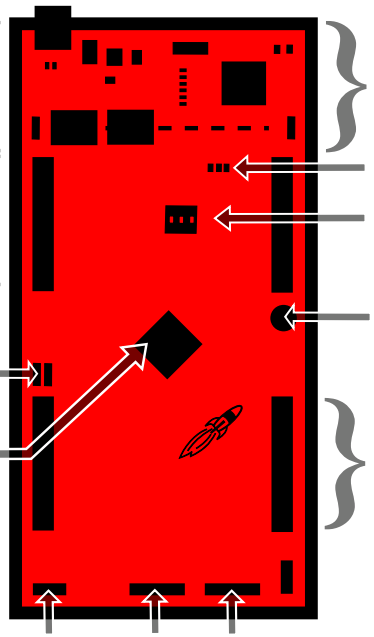
**ADC Sample Mode**
This mode provides a simple example of how to sample the ADC and display the sampled data. ADCIN14 (Pin 23) is sampled once per second.

If the sample is above mid-scale (2048) the red LED (D9) will light.

Conversely, if the sample is below mid-scale the blue LED (D10) will light.

Sample data is also sent serially to the PC through the USB cable using a virtual COM port. The data can be viewed in a terminal using these settings: 115200 baud, 8 data, no parity, and 1 stop bit.

# LAUNCHXL-F28377S Overview



**XDS100v2 On-Board Emulator**
Enables JTAG debugging/programming as well as provides serial communication back to the PC. The XDS100 can also provide power to the target MCU.

**40-pin BoosterPack plug-in module connector**
(J1, J2, J3, and J4)

**Power Jumpers**
(JP4 and JP5)

**TMS320F28377S Microcontroller**
(U1)

**CAN Interface w/Transceiver**
(J12)

**Dual 5V Quadrature Interfaces**
(QEP_A and QEP_B)

**Electrically Isolated PC Interface**
When power to the F28377S device is supplied externally through the BoosterPack headers, JP1 and JP2 may be removed to enable electrical isolation of the board from the PC.

**Power & User LEDs**
(D1, D9, and D10)

**Boot Configuration Switches**
(S1)

**Reset**

**40-pin BoosterPack plug-in module connector**
(J5, J6, J7, and J8)

# Software Tools

Find more information @ ti.com/controlsuite

TI's software tools make it easy to get started building your control application.


**controlSUITE™**
controlSUITE for C2000™ microcontrollers is a cohesive set of software infrastructure and software tools designed to minimize software development time. From device-specific drivers and support software to complete system examples in sophisticated system applications, controlSUITE provides libraries and examples at every stage of development and evaluation. Go beyond simple code snippits - jump start your real-time system with real-world software.

**powerSUITE**
Within controlSUITE, you'll find powerSUITE, a suite of tools designed to make your life as a digital power supply designer easier. The Adaptation GUI allows you to modify existing code examples provided by TI for your custom hardware using a GUI instead of writing the control code from scratch. The Compensation Designer GUI paired with the Software Frequency Analyzer GUI allows you to modify the necessary control loop parameters required to design and tun your control loop.

**Getting Started**
To get started download controlSUITE from www.ti.com/controlsuite. After controlSUITE is installed, run ControlSUITE.exe and follow the User's Guide for the F28377S LaunchPad.

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   1.2 EVMs are not intended for consumer or household use. EVMs may not be sold, sublicensed, leased, rented, loaned, assigned, or otherwise distributed for commercial purposes by Users, in whole or in part, or used in any finished product or production system.

2 *Limited Warranty and Related Remedies/Disclaimers*:

   2.1 These terms and conditions do not apply to Software. The warranty, if any, for Software is covered in the applicable Software License Agreement.

   2.2 TI warrants that the TI EVM will conform to TI's published specifications for ninety (90) days after the date TI delivers such EVM to User. Notwithstanding the foregoing, TI shall not be liable for any defects that are caused by neglect, misuse or mistreatment by an entity other than TI, including improper installation or testing, or for any EVMs that have been altered or modified in any way by an entity other than TI. Moreover, TI shall not be liable for any defects that result from User's design, specifications or instructions for such EVMs. Testing and other quality control techniques are used to the extent TI deems necessary or as mandated by government requirements. TI does not test all parameters of each EVM.

   2.3 If any EVM fails to conform to the warranty set forth above, TI's sole liability shall be at its option to repair or replace such EVM, or credit User's account for such EVM. TI's liability under this warranty shall be limited to EVMs that are returned during the warranty period to the address designated by TI and that are determined by TI not to conform to such warranty. If TI elects to repair or replace such EVM, TI shall have a reasonable time to repair such EVM or provide replacements. Repaired EVMs shall be warranted for the remainder of the original warranty period. Replaced EVMs shall be warranted for a new full ninety (90) day warranty period.

3 *Regulatory Notices:*

   3.1 *United States*

      3.1.1 *Notice applicable to EVMs not FCC-Approved:*

      This kit is designed to allow product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.

      3.1.2 *For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant:*

      **CAUTION**

      This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

      Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

      **FCC Interference Statement for Class A EVM devices**

      *NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.*

**FCC Interference Statement for Class B EVM devices**

*NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:*

- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help.*

3.2 *Canada*

3.2.1 *For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210*

**Concerning EVMs Including Radio Transmitters:**

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

**Concernant les EVMs avec appareils radio:**

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

**Concerning EVMs Including Detachable Antennas:**

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

**Concernant les EVMs avec antennes détachables**

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur

3.3 *Japan*

3.3.1 *Notice for EVMs delivered in Japan:* Please see http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page 日本国内に輸入される評価用キット、ボードについては、次のところをご覧ください。
http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page

3.3.2 *Notice for Users of EVMs Considered "Radio Frequency Products" in Japan:* EVMs entering Japan may not be certified by TI as conforming to Technical Regulations of Radio Law of Japan.

If User uses EVMs in Japan, not certified to Technical Regulations of Radio Law of Japan, User is required by Radio Law of Japan to follow the instructions below with respect to EVMs:

1. Use EVMs in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,
2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

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4 *EVM Use Restrictions and Warnings:*

4.1 EVMS ARE NOT FOR USE IN FUNCTIONAL SAFETY AND/OR SAFETY CRITICAL EVALUATIONS, INCLUDING BUT NOT LIMITED TO EVALUATIONS OF LIFE SUPPORT APPLICATIONS.

4.2 User must read and apply the user guide and other available documentation provided by TI regarding the EVM prior to handling or using the EVM, including without limitation any warning or restriction notices. The notices contain important safety information related to, for example, temperatures and voltages.

4.3 *Safety-Related Warnings and Restrictions:*

4.3.1 User shall operate the EVM within TI's recommended specifications and environmental considerations stated in the user guide, other available documentation provided by TI, and any other applicable requirements and employ reasonable and customary safeguards. Exceeding the specified performance ratings and specifications (including but not limited to input and output voltage, current, power, and environmental ranges) for the EVM may cause personal injury or death, or property damage. If there are questions concerning performance ratings and specifications, User should contact a TI field representative prior to connecting interface electronics including input power and intended loads. Any loads applied outside of the specified output range may also result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. Please consult the EVM user guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative. During normal operation, even with the inputs and outputs kept within the specified allowable ranges, some circuit components may have elevated case temperatures. These components include but are not limited to linear regulators, switching transistors, pass transistors, current sense resistors, and heat sinks, which can be identified using the information in the associated documentation. When working with the EVM, please be aware that the EVM may become very warm.

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

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| DSP | dsp.ti.com | Energy and Lighting | www.ti.com/energy |
| Clocks and Timers | www.ti.com/clocks | Industrial | www.ti.com/industrial |
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