C2000 Family Lauchpads

Texas Instruments

C2000™ Real-Time Microcontrollers

- **Motor control**
- **Digital power**
- **Solar energy**
- **LED lighting**
- **Power line communications**

Get to know The C2000 Family

Piccolo™ Microcontrollers

Real control. Real time. For real systems.

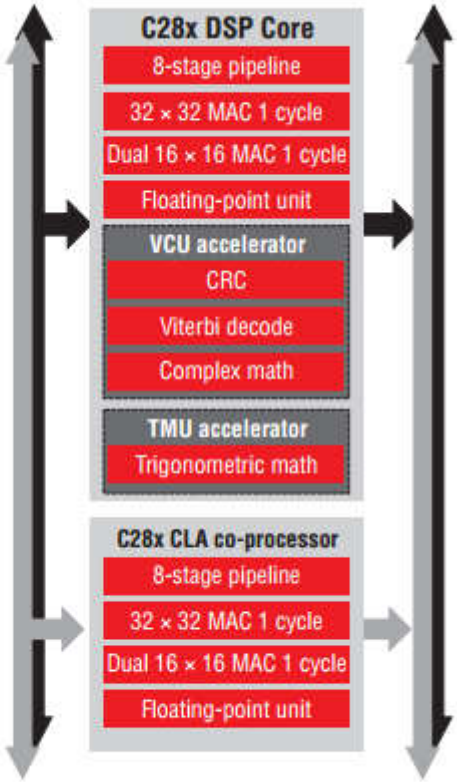
Delfino™ Microcontrollers

High performance. For high-end control.

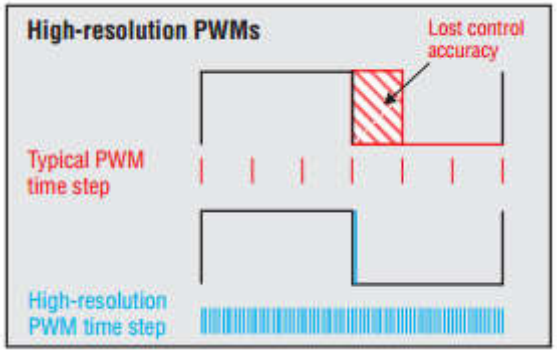
F28M3x Microcontrollers

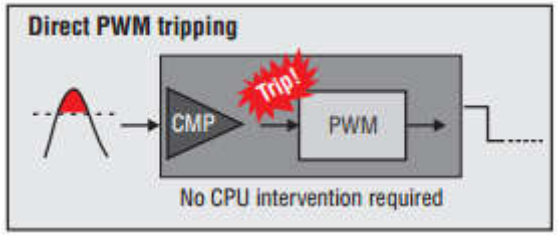
Connectivity. Control. No compromise.

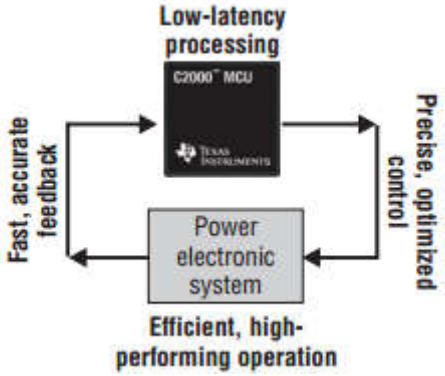
C2000 MCU Processing Engine

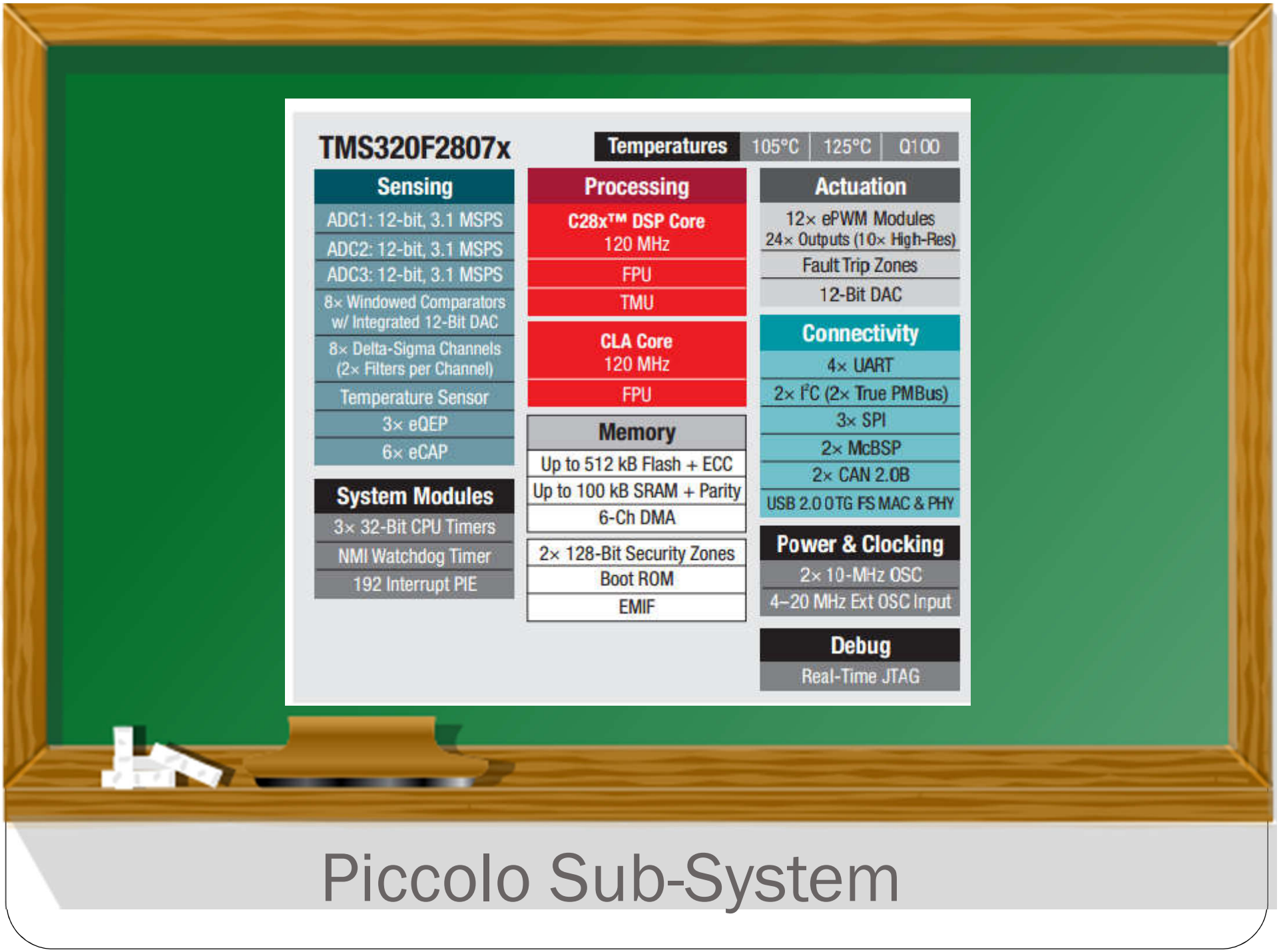


C2000 MCU Processing Engine
Dual C28x, dual CLA co-processor, TMU accelerator and VCU accelerator

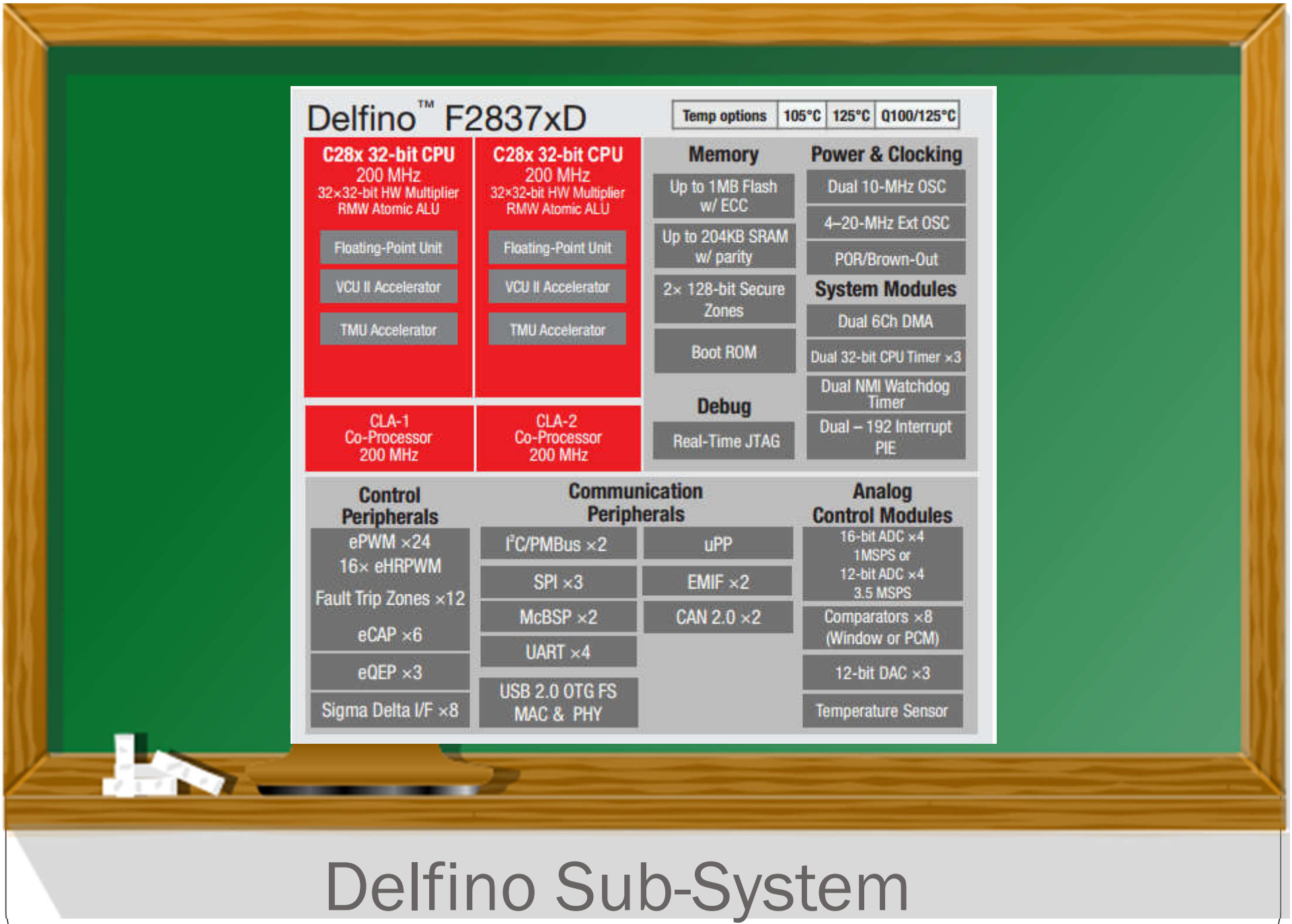




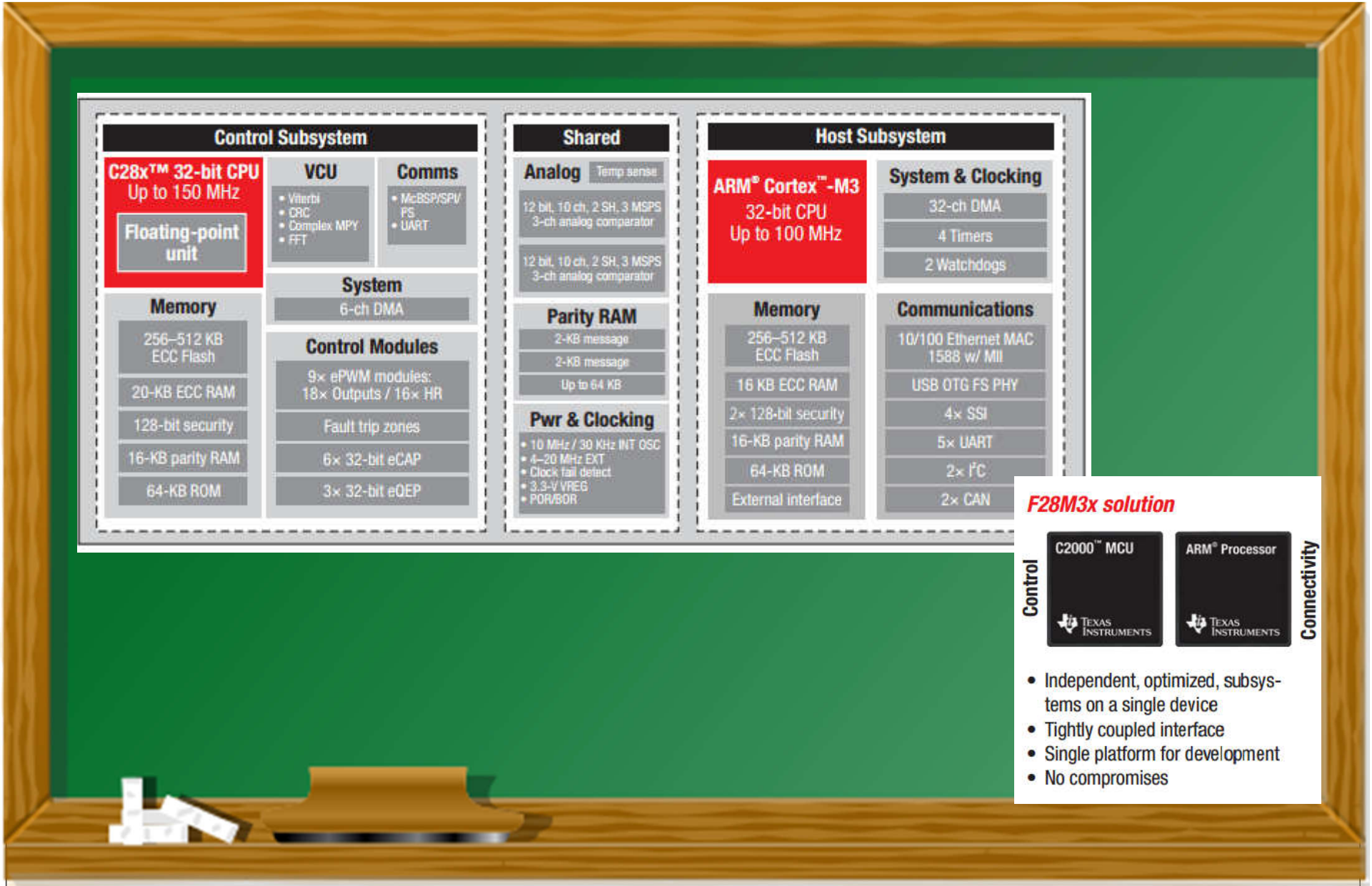




Piccolo Sub-System

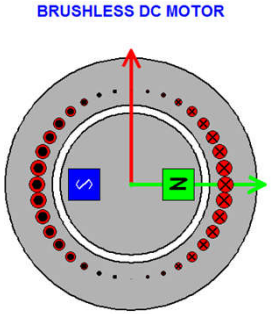


Delfino Sub-System



Concerto Sub-System

INSTASPIN-FOC



Field Control
- Weakening allows for the rotor to obtain higher speeds than designed
- Boosting allows for higher torque than designed

Motor ID
- No datasheet required!
- One time parameter identification
- Optional on-line feature can track changes and provide compensation during operation

System Flexibility
- Supports all main 3-ph motor types
- Control torque, speed+torque, angle, and flux
- Full FOC in ROM for simplicity
- Full customization for expert users
- All source besides FAST provided in MotorWare™ software projects and new motor control library

FAST™ Software Encoder
- Universal 3-phase motor sensorless observer
- Encoder-like performance
- Relies on fewer parameters than other observers
- No tuning of the observer required

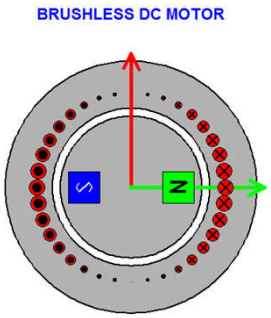
Control Loop Tuning
- Current PI gains set from motor parameters
  - user may adjust if using ROM
  - or use own controllers
  - MTPA for most motors
- Speed PI gains chosen for evaluation
  - user tuned to meet performance goals
  - or use own controller
- PowerWarp™ Technology
  - optional mode for induction motors
  - minimum current use at all times

PowerWarp™ Technology
14-Month Field Trial

- 80%+ savings vs. Triac
- 45%+ savings vs. standard FOC

www.ti.com/powerwarp

INSTASPIN-MOTION



IDENTIFY

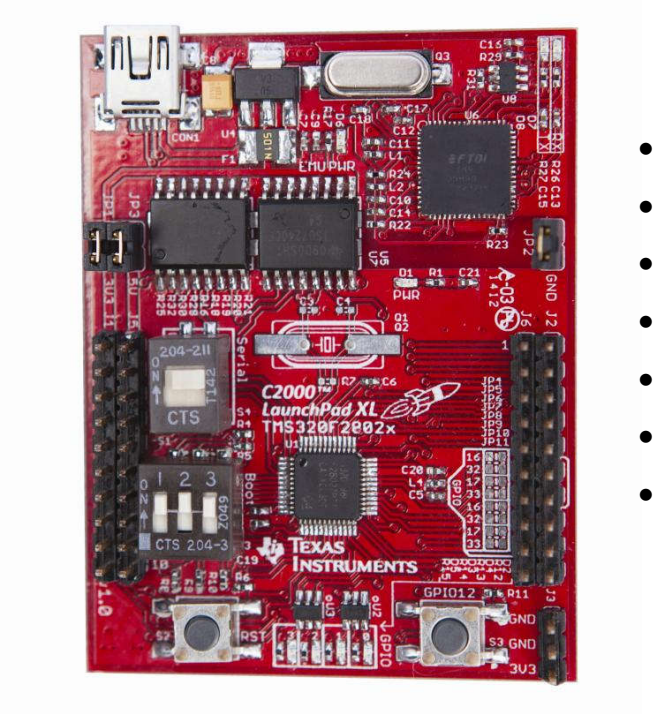
CONTROL

MOVE

PLAN

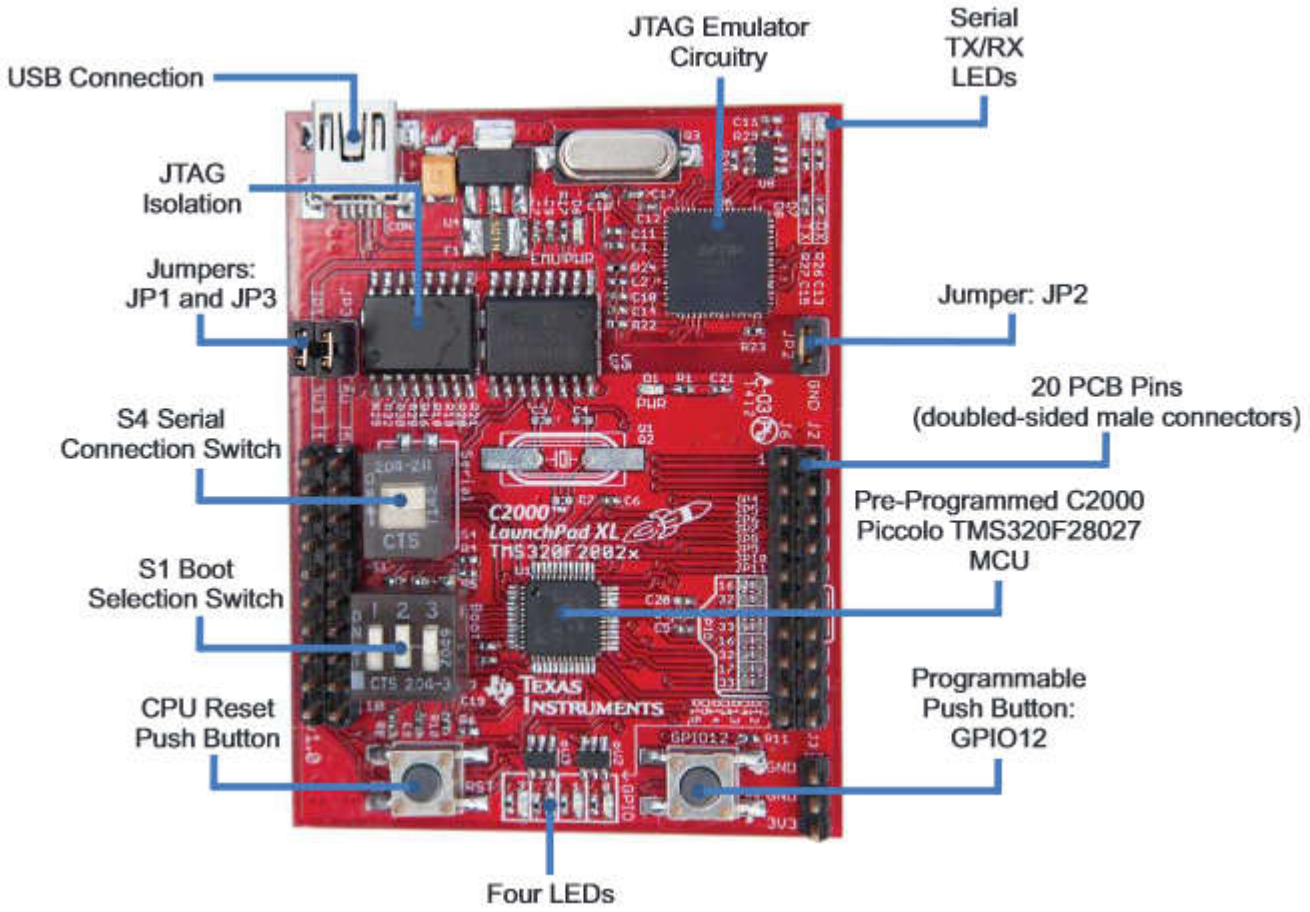
C2000 Launchpads

- LAUNCHXL- F28027



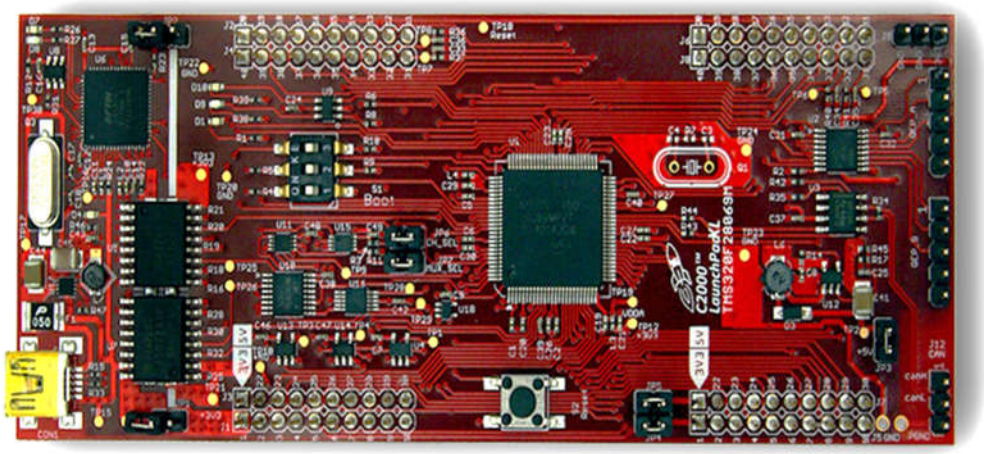
- **60 MHz (16.67ns Cycle Time)**
- **64 KB integrated flash**
- **8 PWM channels with high resolution capability**
- **12-bit 4.6 MSPS ADC**
- **Capture interface**
- **Serial connectivity (SCI, SPI and I2C)**
- **On-Board XDS100v2 (Free License)**

LAUNCHXL-F28027



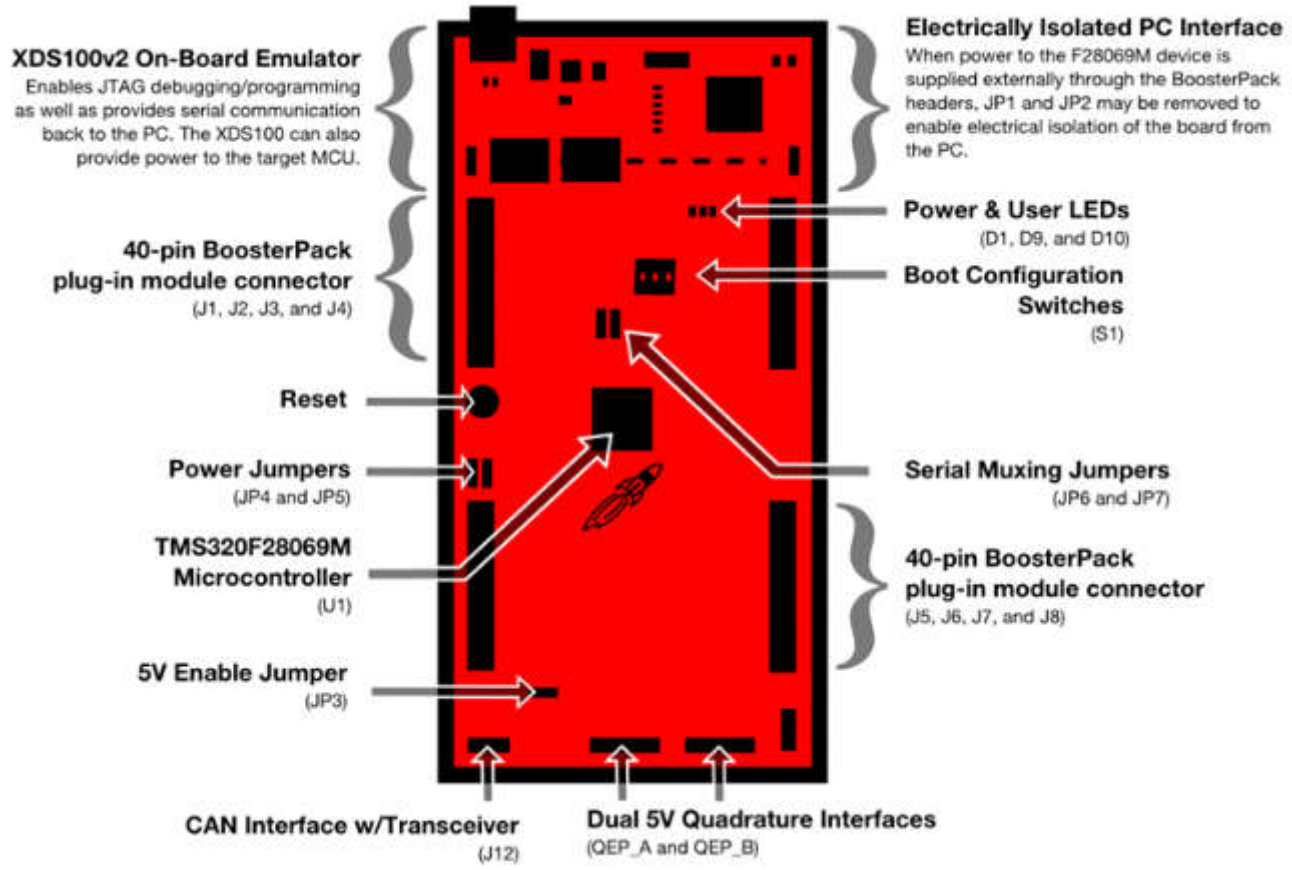
C2000 Launchpads

- LAUNCHXL- F28069M



- **90 MHz (11.11 ns Cycle Time)**
- **256 KB integrated flash, 100KB RAM**
- **PWM channels with high resolution capability**
- **12-bit 4.6 MSPS ADC**
- **Capture interface**
- **Serial connectivity (SCI, SPI , I2C and CAN)**
- **Encoder Module**
- **On-chip Instaspin libraries**
- **USB Peripheral**

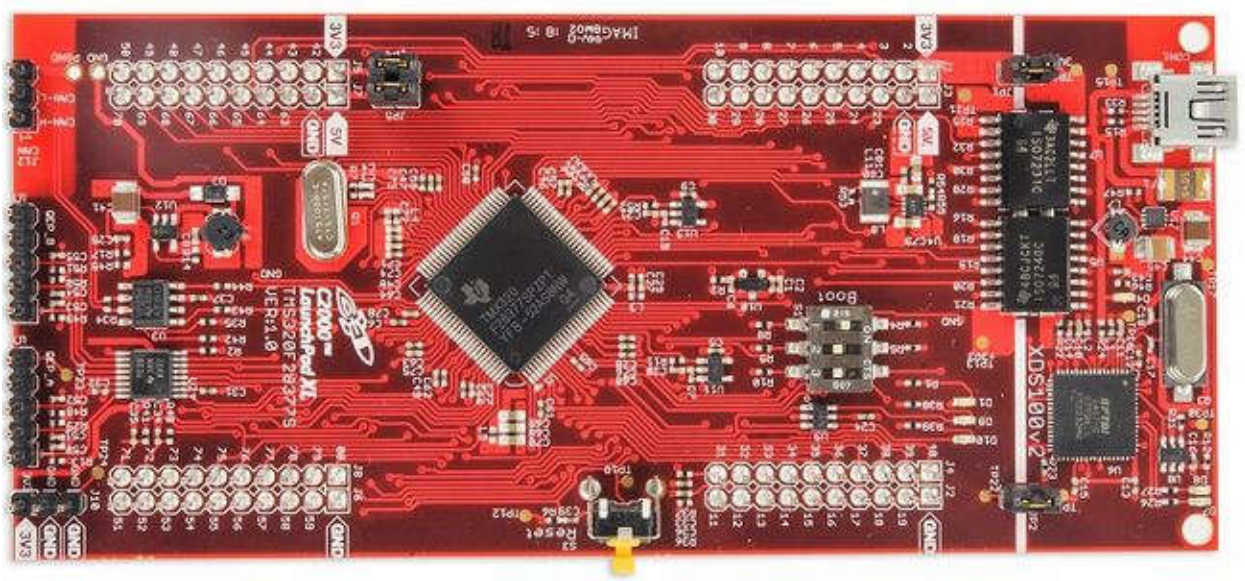
LAUNCHXL-F28069M



- LAUNCHXL-F28069M Out-of-the-box

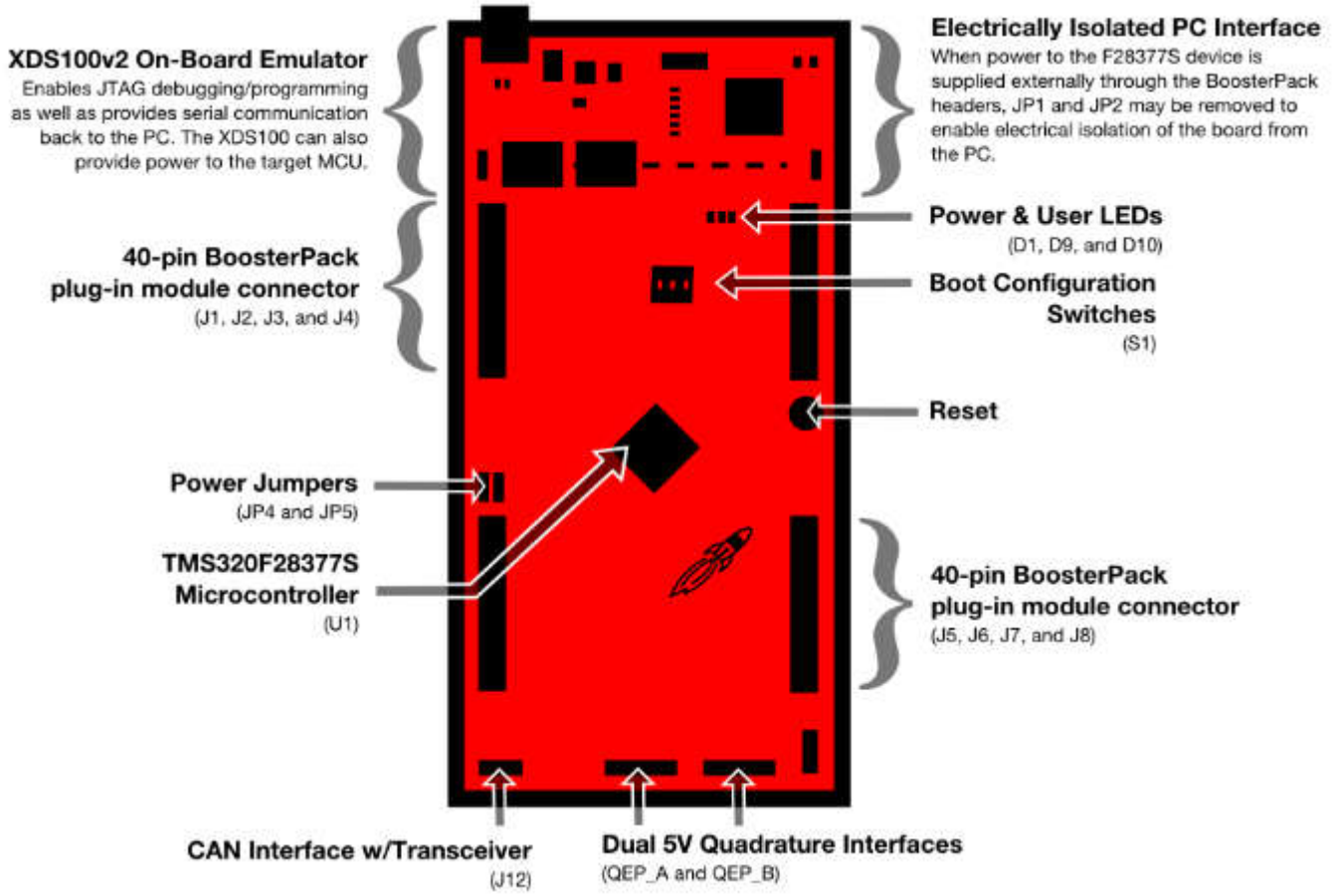
C2000 Launchpads

- LAUNCHXL- F28377S



- **200 MHz (5-ns Cycle Time)**
- **1MB of Flash, 164KB of RAM**
- **External Memory Interfaces (EMIFs)**
- **Direct Memory Access (DMA)**
- **12-bit DAC**

LAUNCHXL-F28377S

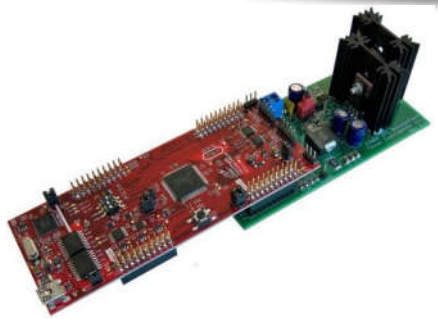


- LAUNCHXL-F28377S Out-of-the-box

Booster Packs

Digital Power Buck BoosterPack – *9V, 2A single-phase buck converter*

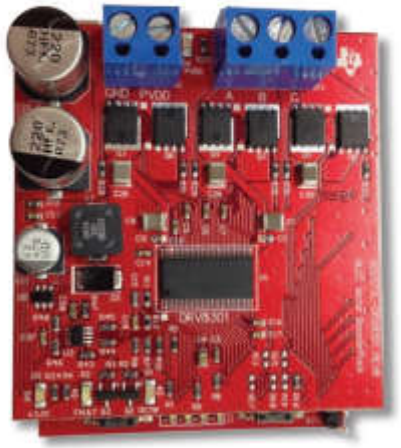
- Plugs into the LAUNCHXL-F28069M BoosterPack to simulate a single-phase buck converter
- Training platform to learn basics of digital power design
- Support in powerSUITE with the Solution Adapter, Software Frequency Response Analyzer, and Compensation Designer tools that allow for iterative tuning of the control loop



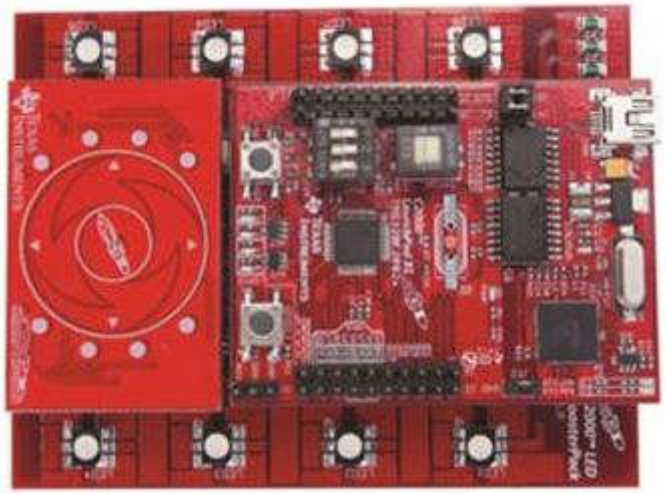
Motor Drive BoosterPack – *6–24V, 14A peak 3-ph inverter for sensorless InstaSPIN™-FOC*

DRV8301 Pre-Driver

- 3 half bridges with 3 or 6 PWM control
- Bootstrap gate drivers with slew rate control
- Shoot through protection
- On-chip 3.3V/1.5A buck supplies power to the LaunchPad
- 2.3A sink / 1.7A source
- On-chip current-sense amps



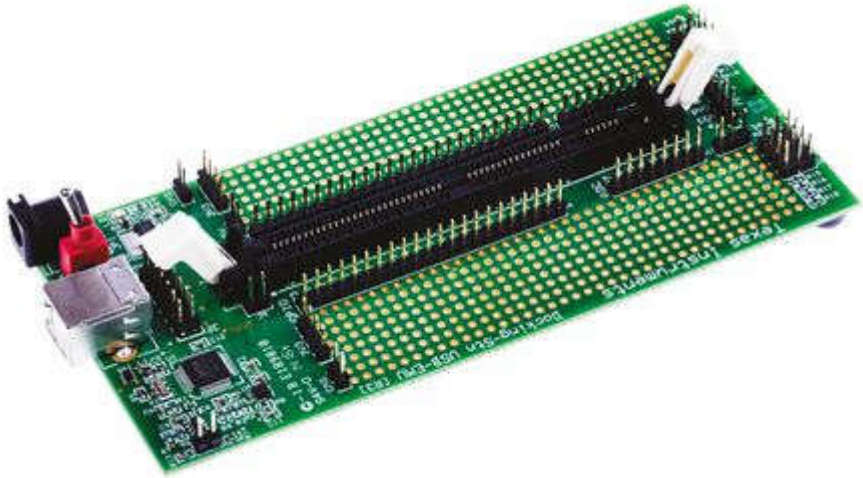
C2000 LED BoosterPack



Some More Development Kits

- ControlStick

- Experimenter Kit



Software

Intuitive IDE based on Processing/Wiring

Energīa

Get started now with our cloud-based IDE *now with debug!

CCS Cloud

Full-featured Eclipse-based IDE for TI Embedded Processors

Code Composer Studio ™

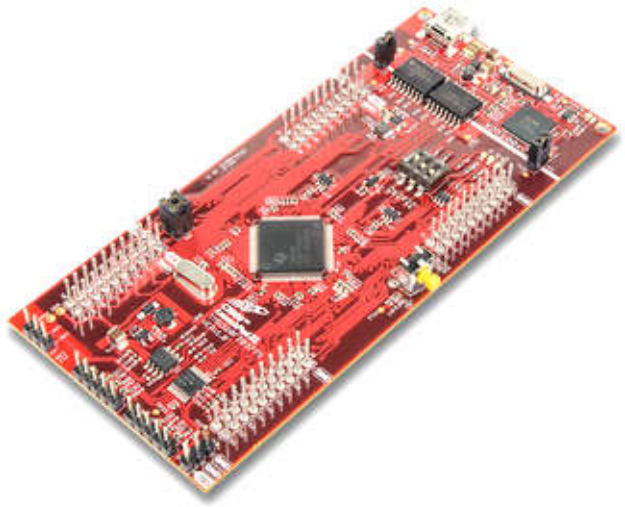
controlSUITE™ Software

MotorWare

Visual Solutions
INCORPORATED

VisSim

TIME TO SHOW OFF



How FAST is your 32-bit MCU?

Increase control performance with
C2000™ MCU accelerators

thank you
danke
рахмат
謝謝
ngiyabonga
teşekkür ederim
Баярлалаа
спасибо
faafetai lava
mersi
kia ora
barka
welalin
tack
spas
dank je
misaotra
matondo
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감사합니다
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merci