

C2000 Ecosystem Overview

Real-Time Control Made Simple

Getting Started Resources for C2000 Real-Time Microcontrollers

Where is C2000™ real-time control?

Energy Delivery



Solar Power

Charging Infrastructure



Wind Power

Motor Control



Appliance

Drones



E-bike



Pumps



Digital Power



Telecom / Server
AC/DC Rectifiers



Uninterruptible
Power Supplies



DC/DC
Converters

C2000™
Real-time
Microcontrollers



Industrial Drives



Robotics



Automation



AC Drives



Servo Drive



Sensors

Power



Lighting



On-Board Charging



HV DCDC



Charging Stations

Motor



Traction Drive



Compressors



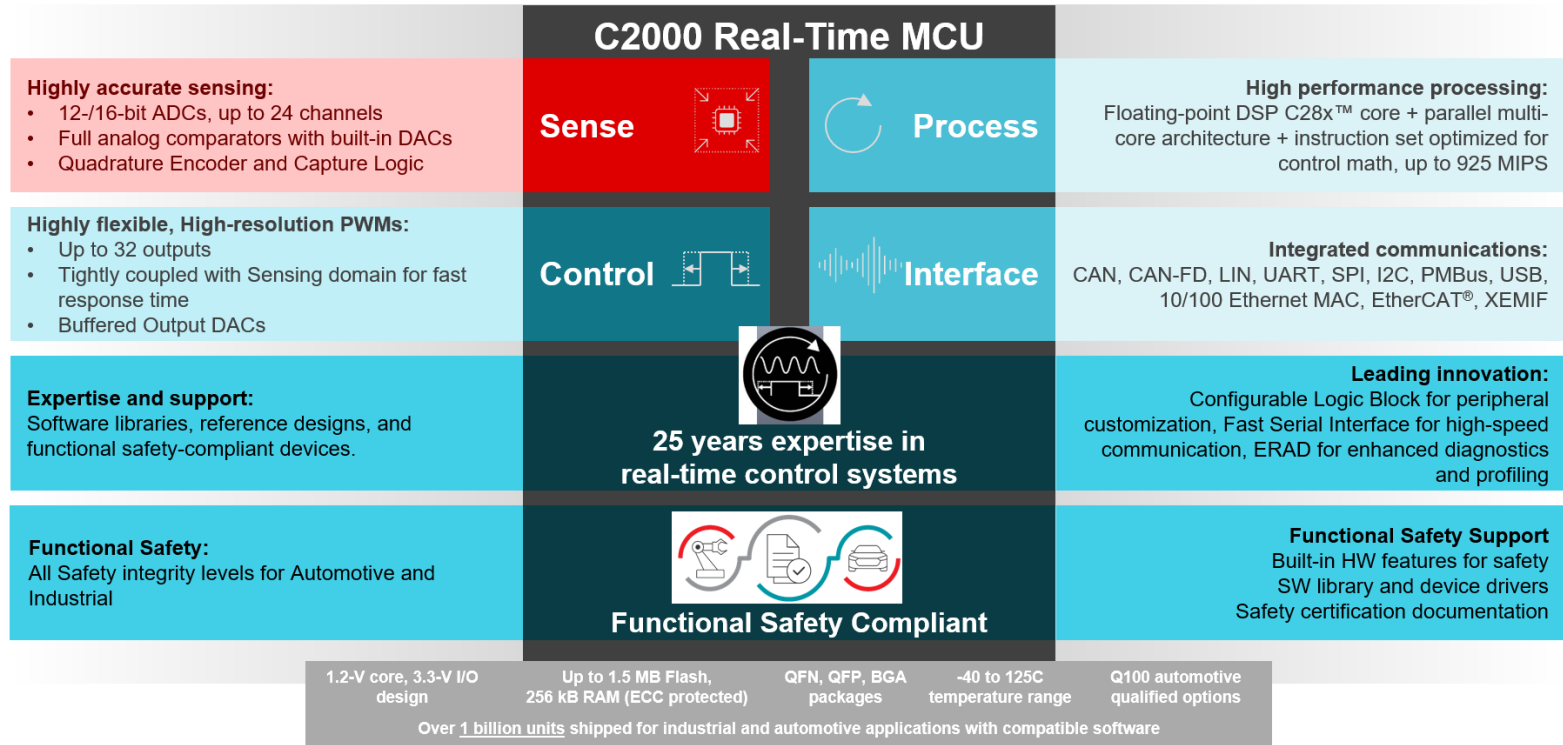
Pumps/ Power-Steering / Fans

Automotive

C2000™ Real-Time Microcontrollers



Scalable, ultra-low latency, real-time MCU platform designed for efficiency in power electronics, such as high power density and high switching frequencies with GaN and SiC technologies

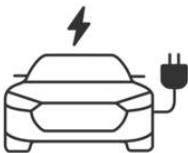


C2000 Ecosystem Snapshot

Applications



Industrial Drives



Automotive



Motor Control

Products



C2000

Hardware Development



LaunchPad



ControlCARD



Application Kits

Debuggers/ Programmers



Debug Probe



Programmer

Development Toolchain



CCS / CCS Cloud



SysConfig



Resource Explorer

Software Development



C2000Ware

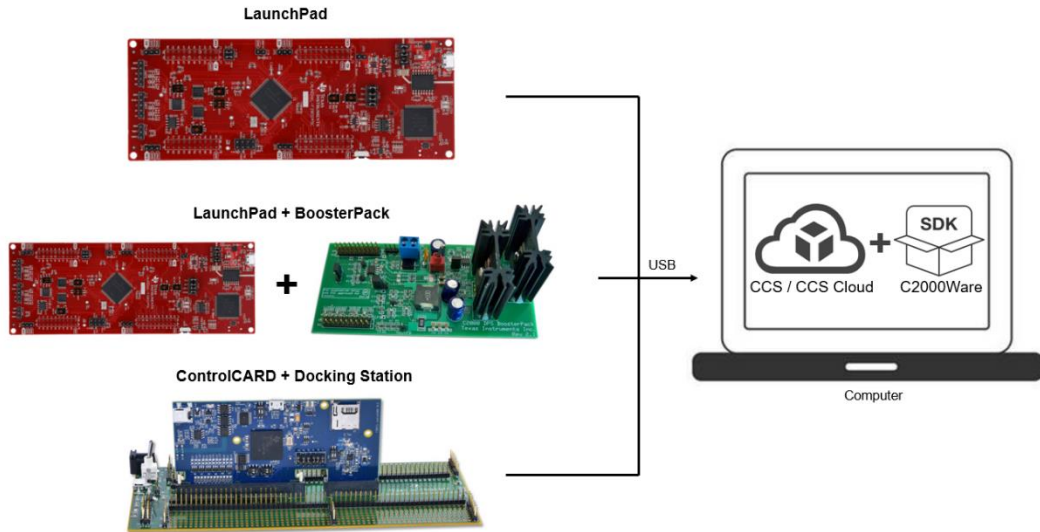


Digital Power



Motor Control

C2000 Ecosystem: Entry-Level



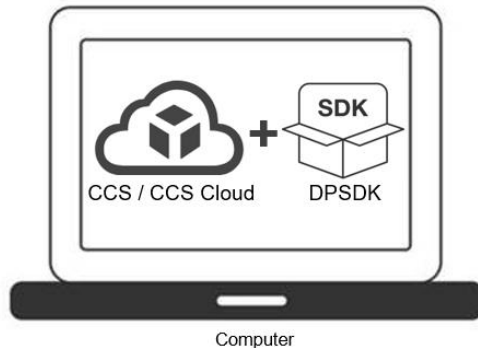
- New to C2000 MCU ecosystem
- Explore device capabilities and features
- Hardware
 - Low-cost development options:
 - [LaunchPad](#)
 - [LaunchPad + BoosterPack](#)
 - [ControlCARD + Docking Station](#)
 - Onboard debug probe, no extra HW required to interface with the C2000
- Software
 - Code Composer Studio (CCS)
 - [Local Install](#) or [Cloud Based](#)
 - No-cost IDE
 - C2000Ware SDK
 - [Local](#) or [Cloud Based](#)
 - Drivers
 - Device-specific examples
 - Diagnostic library for Functional Safety development

C2000 Ecosystem: Intermediate-Level

Power Conversion Application Kit



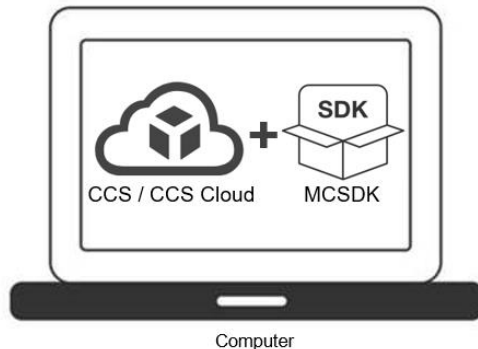
USB →



Motor Drives Application Kit

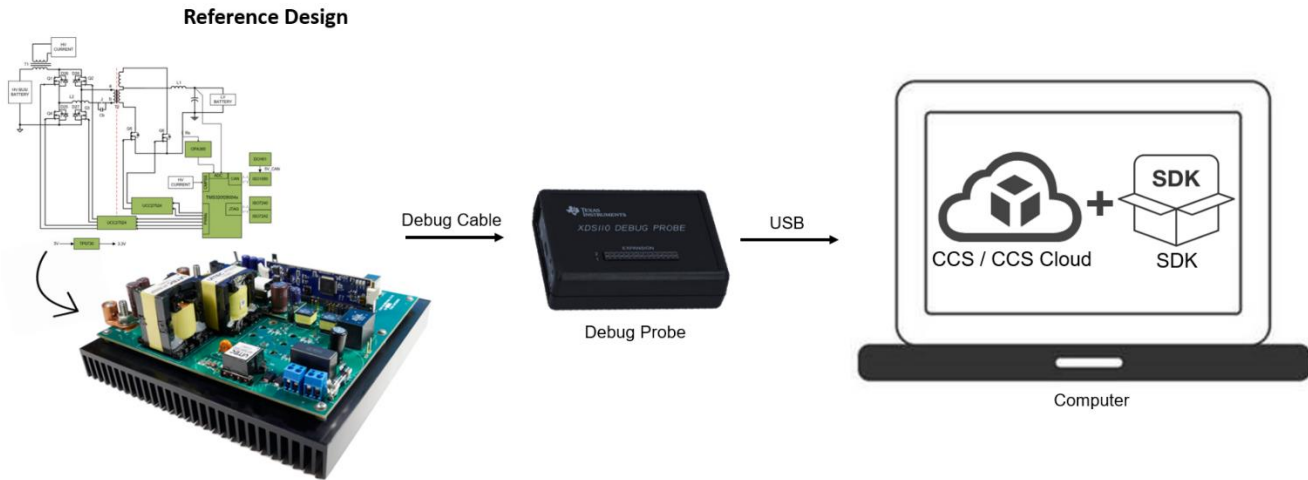


USB →



- New to C2000 MCU ecosystem
- Explore application-specific capabilities
 - Use LaunchPad and ControlCARD
 - [Application Kits](#)
- Self-contained SW Development based on use cases
 - [Digital Power SDK](#)
 - [Motor Control SDK](#)

C2000 Ecosystem: Advanced-Level



- Experienced with C2000 MCU
- Reference Designs
 - Design Files
 - SW projects
- Custom Designs
 - HW design guidelines
 - Models

Reference Design Page on TI.com

Microcontrollers (MCUs) & processors

Overview Products Applications **Reference designs** Design & development Support & training

C2000 real-time microcontrollers – Reference designs

Hide filters Reset 8 matching designs out of 82 total designs [Email](#) [Search all reference designs](#)

Market ^

Automotive x

Hybrid, electric & powertrain systems x

- Automatic transmission
- Battery management system (BMS)
- DC/DC converter
- Diesel engine
- Drive line components
- Electric drive
- Electric power steering (EPS)
- Engine fan
- Fuel cell control unit (FCCU)
- Gasoline & diesel engine platform
- Gasoline engine
- Ignition
- Inverter & motor control
- On-board (OBC) & wireless charger
- Powertrain current sensor
- Powertrain exhaust sensor

Design title	Market	Vin (V) (Min)	Vin (V) (Max)	Isolated/Non-Isolated	Input Type	Vout (V) (Nom)	Iout (A) (Max)	Output Power (W)	Topology
TIDM-2PHILPFC.1 - Two-Phase Interleaved Power Factor Correction Converter Reference Design with Power Metering	Automotive Industrial								
TIDM-1000 - Vienna Rectifier-Based Three Phase Power Factor Correction Reference Design Using C2000 MCU	Automotive Industrial								
TIDM-1001 - Two Phase Interleaved LLC Resonant Converter Reference Design Using C2000™ MCUs	Automotive Industrial								
TIDA-01604 - 98.6% Efficiency, 6.6-kW Totem-Pole PFC Reference Design for HEV/EV Onboard Charger	Industrial Automotive								
TIDM-1022 - Valley switching boost power factor correction (PFC) reference design	Automotive Industrial								
TIDM-02002 - Bidirectional CLLLC resonant dual active bridge (DAB) reference design for HEV/EV onboard charger	Industrial Automotive								
TIDM-02008 - Bidirectional high density GaN CCM totem pole PFC using C2000™ MCU	Industrial Automotive								
PMP22650.1 - NEW - GaN-based, 6.6-kW, bidirectional, onboard charger reference design	Automotive	90	264	Isolated	AC	350	19	6650	Boost-PFC Full Bridge-LLC

Software Interfacing Levels

Digital Power and Motor Control SDK

Application
Libraries / Utils

TI Reference
Designs

Reference
Application

Safety SW

Software
Test
Library

Safety
Diagnostic
Library

C2000Ware

Examples (Bitfield, DriverLib, Library)

DSP & Math Libs

DSP
FPU
VCU/VCRC
Fixed Point

Math
CLAMath
IQMath
FastRTS

Libs – C28x

Control
DCL

Comms
PMBUS

Libs – C28x/CM

Flash
API

Comms
USB
CAN
EtherCAT

Libs – CM

Comms
Ethernet

Bit-fields headers

C28x Driverlib

CM Driverlib

MCU - C28x Subsystem

MCU - CM Subsystem

Application-Specific SDKs

- Reference SW to get started for Digital Power and Motor Control
- Libraries and utilities to get started

Safety SW

- Reference SW to implement Safety manual mechanisms
- Production ready STL for C28x and CLA diagnostic coverage

C2000Ware Examples

- Examples for peripheral access using driver-lib or bit-field
- Examples for compute and communication libraries

C2000Ware Libraries

- Compute and Communication libraries for standard functions

C2000Ware Driver Lib / Bit-field

- Functional APIs for using a peripheral or accessing hardware registers

C2000™ Real-Time Controllers – Quick Reference



Hardware

- Select Part
 - [Device Selection Guide](#)
 - [Peripheral Ref Guide](#)
- [Pick a C2000 EVM](#)
 - **Launchpads :**
 - Low-cost evaluation board
 - **ControlCARDs :**
 - Full-featured development board
 - Purchase EVM to get started
- [Reference Designs](#)
- [Hardware Design Guide](#)



Software/Tools

- [SW Overview](#)
- [Tool-Chain](#)
 - [Code Composer Studio](#)
 - Debug Probe
 - Onboard debug probe on TI EVMs (Launchpad & ControlCARD).
 - External Emulators – XDSxx
 - [SysConfig & PinMux Support](#)
- [C2000ware SDK](#) – Low-level drivers and highly optimized libraries.
 - [Digital Power SDK](#)
 - [Motor Control SDK](#) w/ InstaSpin
- Model-Based Evaluation
 - [MathWorks Embedded Coder](#)



Training

[C2000 Academy](#)

The all-inclusive portal for developing with C2000™ real-time MCUs, featuring foundational training modules and guided lab exercises

Additional Training Collateral

- [Getting Started with C2000](#)
- [Essential Development Guide](#)
- [Motor Control Workshop-Series](#)
- [Digital Power Training Series.](#)
- [EV Training Modules](#)
- [Safety Overview](#)