

C2000™ Solar Inverter Development Kits



Jump start your solar design with high-voltage, string-ready, isolated inverter kit or low-voltage emulation kit

Two new Piccolo-based solar developer kits from Texas Instruments bring advanced peripherals, application targeted development hardware, a comprehensive library of algorithms, and an industry leading development environment to the renewable energy market. These two kits enable designers to jump-start designs while evaluating different algorithms and topologies.

Both development kits are built on the Texas Instruments C2000™ F28035 Piccolo MCU device. Running at speeds up to 60Mhz, the F28035 features up to 128KB of flash memory, a 12-bit 4.6MSPS multi-channel ADC, ePWM outputs, and the control law accelerator (CLA). The CLA is an integrated floating-point coprocessor designed to run control algorithms without any processor interaction. The high voltage solar developers kit features the Concerto™ MCU to the inverter portion of the design offering the flexibility of having control code and communications code handled by a single processor.

As part of the C2000 family of MCU devices, these boards are fully supported in the controlSUITE™ IDE. Within controlSUITE, designers can quickly find all of the necessary tools for the Solar Developer boards including both general purpose algorithm libraries as well as renewable energy specific functions.

The high voltage isolated kit features a 300VDC compatible input stage supporting up to 500W. This dual controller design features a two switch interleaved boost stage for MPPT and an isolated LLC resonant DC/DC converter. A full bridge inverter stage with PLL AC line synchronization completes the secondary side of the board and features enhanced communications by utilizing the Concerto MCU to drive the control stage while also providing ethernet support to the board.

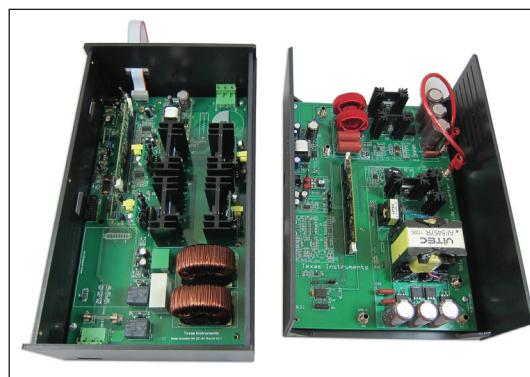
The low voltage kit is designed for safe benchtop level experimentation. Supporting a 12VDC/50W input stage, this board also features built in PV emulation, a photo-diode for light sensing, a single switch DC/DC boost for MPPT, a DC/DC SEPIC stage for battery charging, and a full bridge AC/DC inverter stage capable of driving 24VAC.

High Voltage Kit (TMDSHV1PHINVKIT and TMDSHVMPPTKIT) Key Features

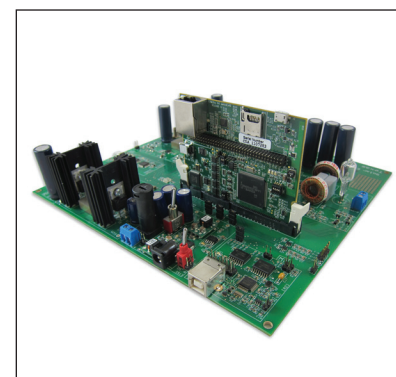
- Dual C2000 processor transformer isolated design
- 200-300VDC Input
- 2-Switch Interleaved Boost DCDC for MPPT
- Resonant LLC stage and Isolation stage
- Full Bridge single phase AC Inverter supports 120-220VAC output
- Phase Locked Loop controlled grid-tie and anti-islanding functions
- Ethernet communication enabled

Low Voltage Kit (TMDSSOLARPEXPKIT and TMDSSOLARCEXPKIT) Key Features

- Single C2000 non-isolated design
- 12VDC Input / 24VAC output voltages for benchtop safe experiments
- Includes built-in software based PV emulator and ambient light sensor
- Single Switch Boost DC/DC for MPPT
- Full Bridge single phase AC Inverter
- Ethernet connectivity enabled



▲ High voltage solar developers kit TMDSHV1PHINVKIT (\$450) and TMDSHVMPPTKIT (\$550)



▲ Low voltage solar explorer kit TMDSSOLARCEXPKIT (\$575) and TMDSSOLARPEXPKIT (\$425)



www.ti.com/C2000

Part Number	Solar Application Functions	Communications	Microcontroller
TMDSSOLARCEXPKIT TMDSSOLARPEXPKIT	Solar Panel Emulator (Buck/Boost) Buck/Boost MPPT SEPIC MPPT / Battery Charging Low Voltage DC/AC 4 Switch Inverter with Grid Tie capabilities	Ethernet on TMDSSLRCECPKIT	TMS320F2803x Concerto F28M35 on SLRCEXPKIT
TMDSHVMPPTKIT	300V DC/DC MPPT Boost Stage 1:1 Resonant LLC Isolation Stage	None	TMS320F2803x
TMDSHV1PHINVKIT	400V Input DC/AC Inverter stage Grid Tie capabilities	Ethernet	TMS320F2803x or Concerto F28M35

Digital Power Math Algorithms

- Control 2P/2Z
- Control 3P/3Z
- Inverse square
- Exponential moving avg.
- Current command
- Soft /sequential start
- Ramp generators

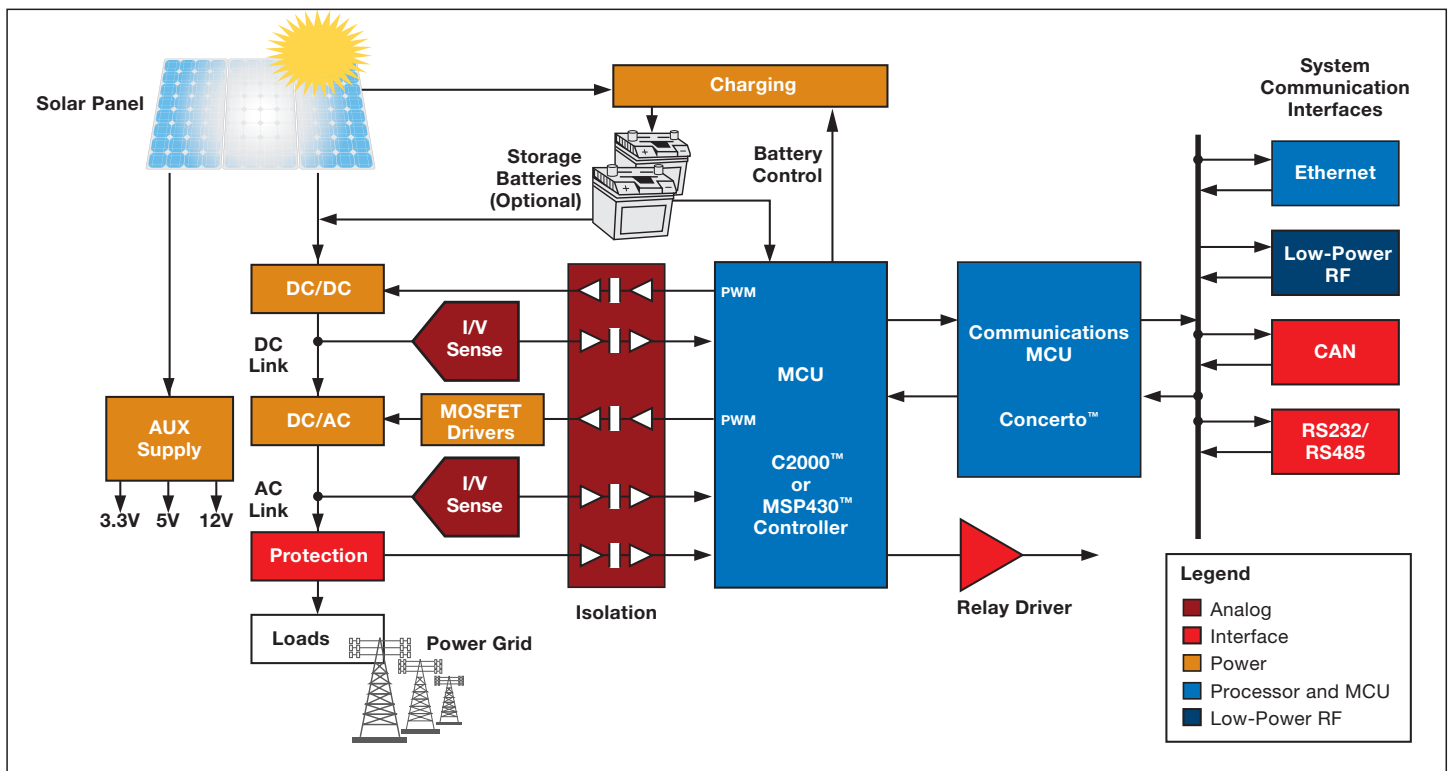
Solar Library Functions

- MPPT
- Anti-islanding
- Single phase inverter
- Sine analyzer for RMS, frequency and ZCD
- ADC driver for sense signals
- PI controller for inverter control
- Software PLL for mains phase lock

Digital Power Hardware Drivers

- Single channel buck
- High resolution buck
- Multi-phase interleaved
- MP balanced interleaved
- Half-H Bridge
- 2 Phase interleaved PFC
- ZVS full bridge

For more information on solar and digital power libraries for C2000 MCUs, please visit www.ti.com/controlsuite.



▲ Typical solar application system diagram

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