Quick, Low-Cost Access to Industry-Leading PFC Performance

C2000™ 32-bit C28x Piccolo™ MCU devices are leading the way for end markets requiring power factor correction (PFC), offering best-in-class efficiency, PF and THD performance.

Power Factor Correction

From motor-control applications to high-efficiency telecom and server power supplies, PFC is used in just about every application based on an AC source. Independent of the application, designers are focused on efficiency, PF and THD performance.

The Piccolo C28x MCU Advantage

The Piccolo MCU series offers a full complement of digital controllers ranging from low-cost devices tailored for digital PFC to high-end, multi-processor devices with enhanced connectivity, and features code-compatibility across the entire device series. The C28x MCU core is a native 32-bit processor, with extensions such as a floating-point unit and Viterbi complex math co-processor. Communications peripherals range from SPI, I²C and UART to USB and emulated PMBus. Operating frequencies range from 40 MHz to 90 MHz.

Dedicated Control Applications Processor

On select Piccolo F2803x and F2806x devices, the standard C28x MCU core is augmented with an additional Control Law Accelerator (CLA). This secondary processor core has direct access to digital power and control-based peripherals such as the ADCs, comparators and PWM units, and operates independently of the main CPU. Natively supporting 32-bit floating-point math, it's like getting two processors in one package! The CLA is supported by a library of digital power and motor control libraries, and is fully programmable in a C level language. The CLA, running at the same clock frequency of the main CPU, offers devices with up to 180 MIPS of real-time control performance.

C2000 Dual-Interleaved PFC Development Board
- Code compatible support for Piccolo Entry Line, F2802x, F2803x and F2806x series MCUs
    - CPU utilization approximately 30 MIPS
- Industry-standard interleaved boost PFC topology
- 95 to 265VAC input at 47 to 63 Hz
- 400VDC / 700 watt output DC bus
- 200-KHz switching frequency
- THD 1.5%, PF 0.99, 94%+ efficiency
- Isolated JTAG on Piccolo F28035 controlCARD
- Integrated power metering functions for input RMS current, voltage, power and frequency measurement
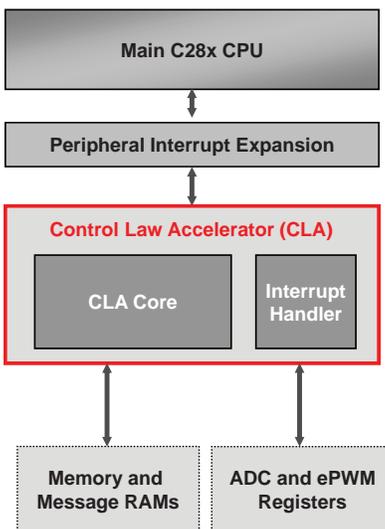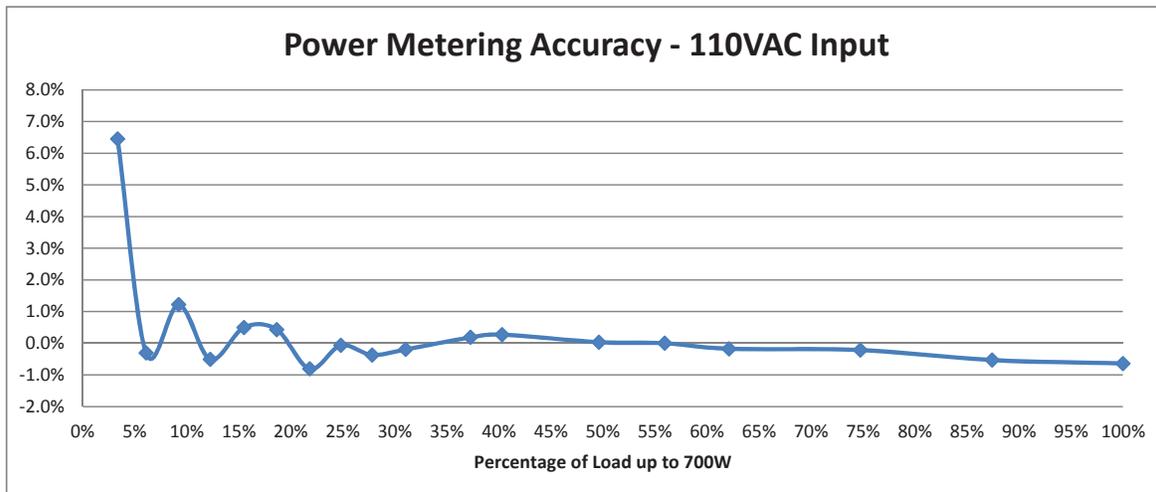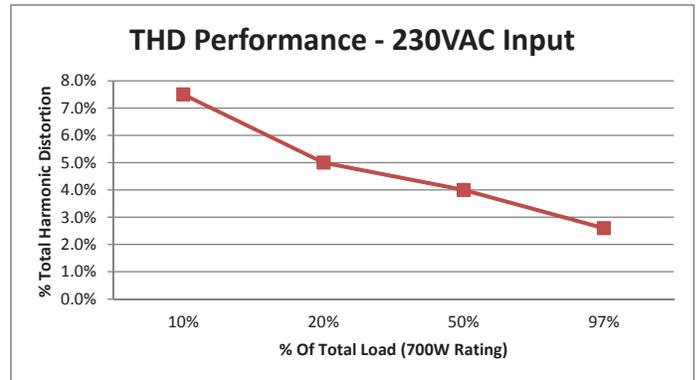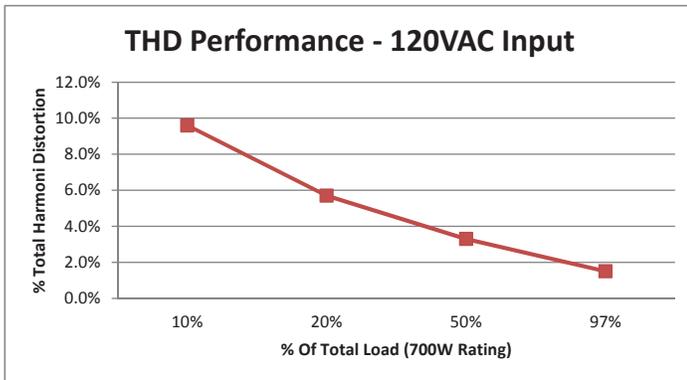- ILPFC library for CLA support

controlSUITE™ Software Package

For more information on this and other digital power evaluation boards, including support software, documentation and design information, please visit **www.ti.com/controlsuite**

C2000 Devices for Digital PFC

Device	Processor (MHz)	CLA (MHz)	Flash Memory (KB)	Communications	1K Web Price ($ U.S.)
F2802x0 Piccolo Entry Line	40 – 50	–	16 – 64	I²C, SPI, UART	Starting at $1.60
F2802x Piccolo Series	40 – 60	–	16 – 64	I²C, SPI, UART	Starting at $2.20
F2803x Piccolo Series	60	60	32 – 128	I²C, SPI, UART, LIN, CAN	Starting at $3.05
F2806x Piccolo Series	90	90	128 – 256	I²C, SPI, UART, CAN, USB	Starting at $4.95

2-phase Interleaved PFC Evaluation Board Test Results – TMDSILPFCKIT

THD Performance - 120VAC Input

% Total Harmoni Distortion (y-axis: 0.0% to 12.0%)
% Of Total Load (700W Rating) (x-axis: 10%, 20%, 50%, 97%)

THD Performance - 230VAC Input

% Total Harmonic Distortion (y-axis: 0.0% to 8.0%)
% Of Total Load (700W Rating) (x-axis: 10%, 20%, 50%, 97%)

Power Metering Accuracy - 110VAC Input

(y-axis: -2.0% to 8.0%)
Percentage of Load up to 700W (x-axis: 0% to 100%)

Main C28x CPU

Peripheral Interrupt Expansion

Control Law Accelerator (CLA)

| CLA Core | Interrupt Handler |

Memory and Message RAMs

ADC and ePWM Registers

Control Law Accelerator (CLA)
- Independent, 32-bit floating-point math accelerator
  - Complete bus architecture and 8-state pipeline
  - Floating point-optimized execution units and registers
- Allows faster system response and higher frequency control loops
  - Simple interrupt handler reduces context switch time
  - No nested interrupts
  - Direct access to ADC and PWMs
- Reduces CPU load, allowing for more system functionality

ADC and ePWM registers
- CLA is directly connected to the ADC and ePWM, allowing control loop execution without any main CPU intervention
- Capable of using the ADCs "just-in-time" interrupts

TEXAS INSTRUMENTS

IMPORTANT NOTICE