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 Devices for Digital PFC

<table>
<thead>
<tr>
<th>Device</th>
<th>Processor (MHz)</th>
<th>CLA (MHz)</th>
<th>Flash Memory (KB)</th>
<th>Communications</th>
<th>1K Web Price ($ U.S.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>F2802x0 Piccolo Entry Line</td>
<td>40 – 50</td>
<td>–</td>
<td>16 – 64</td>
<td>I2C, SPI, UART</td>
<td>Starting at $1.60</td>
</tr>
<tr>
<td>F2802x Piccolo Series</td>
<td>40 – 60</td>
<td>–</td>
<td>16 – 64</td>
<td>I2C, SPI, UART</td>
<td>Starting at $2.20</td>
</tr>
<tr>
<td>F2803x Piccolo Series</td>
<td>60</td>
<td>60</td>
<td>32 – 128</td>
<td>I2C, SPI, UART, LIN, CAN</td>
<td>Starting at $3.05</td>
</tr>
<tr>
<td>F2806x Piccolo Series</td>
<td>90</td>
<td>90</td>
<td>128 – 256</td>
<td>I2C, SPI, UART, CAN, USB</td>
<td>Starting at $4.95</td>
</tr>
</tbody>
</table>
2-phase Interleaved PFC Evaluation Board Test Results – TMDSILPFCKIT

**THD Performance - 120VAC Input**

<table>
<thead>
<tr>
<th>% Of Total Load (700W Rating)</th>
<th>THD %</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>2.0%</td>
</tr>
<tr>
<td>20%</td>
<td>1.0%</td>
</tr>
<tr>
<td>50%</td>
<td>0.0%</td>
</tr>
<tr>
<td>97%</td>
<td>6.0%</td>
</tr>
</tbody>
</table>

**THD Performance - 230VAC Input**

<table>
<thead>
<tr>
<th>% Of Total Load (700W Rating)</th>
<th>THD %</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>2.0%</td>
</tr>
<tr>
<td>20%</td>
<td>1.0%</td>
</tr>
<tr>
<td>50%</td>
<td>0.0%</td>
</tr>
<tr>
<td>97%</td>
<td>6.0%</td>
</tr>
</tbody>
</table>

**Power Metering Accuracy - 110VAC Input**

Percentage of Load up to 700W

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

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