**Overview**

The TI e-meter SoM boards are designed to be paired with a master system that contains the analog filtering, signal inputs, and a host processor. When combined with the SMB3.0, the e-meter SoMs can evaluate solutions from singlephase to polyphase, across a wide range of sensor inputs.

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**Design Resources**

- **Dual-Phase SoM**
- **Three-Phase SoM**
- **SLAA409**

**Tool Folder Containing Design Files**

- Dual-Phase SoM
- Three-Phase SoM
- SLAA409

**Application Note**

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**Figure 1. Three-Phase E-Meter SoM**

**Figure 2. Two-Phase E-Meter SoM**

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1 Base Board Interface

The SoM interfaces with the base board through the female dual-row, 26-pin, 100-mil-pitch, SV1 pin header (see Figure 3). A mating male header is required to properly use this interface.

![SV1 Header Diagram](image-url)

Figure 3. SV1 Header

2 Terminal Attributes

Table 1. Terminal Attributes

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MET_U0RX</td>
<td>UART RX as referenced from the host processor (DTE)</td>
</tr>
<tr>
<td>MET_U0TX</td>
<td>UART TX as referenced from the host processor (DTE)</td>
</tr>
<tr>
<td>MET_GPIO2</td>
<td>General Purpose IO2</td>
</tr>
<tr>
<td>DGND</td>
<td>Digital ground</td>
</tr>
<tr>
<td>MET_GPIO1</td>
<td>General Purpose IO1</td>
</tr>
<tr>
<td>AGND</td>
<td>Analog ground</td>
</tr>
<tr>
<td>DGND</td>
<td>Digital ground</td>
</tr>
<tr>
<td>V3-</td>
<td>Phase three voltage negative sense</td>
</tr>
<tr>
<td>AGND</td>
<td>Analog ground</td>
</tr>
<tr>
<td>V3+</td>
<td>Phase three voltage positive sense</td>
</tr>
<tr>
<td>I3-</td>
<td>Phase three current negative sense</td>
</tr>
<tr>
<td>AGND</td>
<td>Phase three current negative sense</td>
</tr>
<tr>
<td>I3+</td>
<td>Phase three current positive sense</td>
</tr>
<tr>
<td>V2-</td>
<td>Phase two voltage negative sense</td>
</tr>
<tr>
<td>AGND</td>
<td>Analog ground</td>
</tr>
<tr>
<td>V2+</td>
<td>Phase two voltage positive sense</td>
</tr>
<tr>
<td>I2</td>
<td>Phase two current negative sense</td>
</tr>
</tbody>
</table>
### Pin Function Overview

In order to power the SoM from the base board, 3.3 volts must be applied to both the DVCC and AVCC pins. A good power supply with stable rails is highly recommended to ensure accuracy. The SoM draws approximately 10 mA from these voltage rails.

The key function of the SoM is to measure data on the analog inputs. For the single-phase SoM, only the phase one ports are connected to the SoC. These ports are fully differential inputs that lead straight to the positive and negative inputs of the SD24 converters. The full-scale range is ±500 mV.

Any digital communication can be facilitated through the MET_U0TX and MET_U0RX pins. These are standard TTL UART, and can be connected directly to a host processor on the same voltage rail. If a different voltage domain is used, isolators on the communication interface may be required on the base board. Also, there are two general purpose I/Os that can be used for signaling (pin names are MET_GPIO1 and MET_GPIO2).

### Example Filter Interface for E-Metering

To perform e-metering on the SoM, the front-end filters for interfacing with the high voltage lines must be on the base board. For the voltage input, a simple attenuation network and voltage divider can be implemented. See Figure 4.

![Figure 4. Analog Front End for Voltage Input](image)

For current sensing with a CT, a similar reference circuit is provided. This circuit uses a burden resistor of 6.8 Ω that may need to be changed to match the CT in the specific design. See Figure 5.
Both of these reference circuits are described in detail in section 3.2 of the TI application note *Implementation of a Three-Phase Electronic Watt-Hour Meter Using the MSP430F471xx* (SLAA409).

## 5 Loading Example Code

The process for loading the example code for this SoM is identical to the one described in section 5.2 of the TI application note, *Implementation of a Three-Phase Electronic Watt-Hour Meter Using the MSP430F471xx* (literature number: SLAA409).
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