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Using a Metrology System on Module (SoM) Design Guide

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TI Designs provide the foundation that you need including methodology, testing and design files to quickly evaluate and customize and system. TI Designs help you accelerate your time to market.

Design Resources

Dual-Phase SoM	Tool Folder Containing Design Files
Three-Phase SoM	Tool Folder Containing Design Files
SLAA409	Application Note

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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.

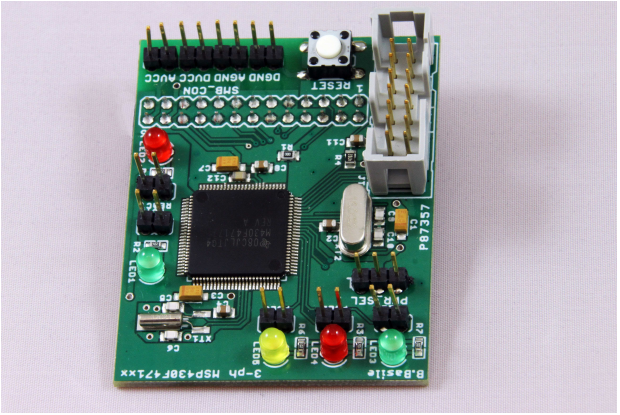

Figure 1. Three-Phase E-Meter SoM

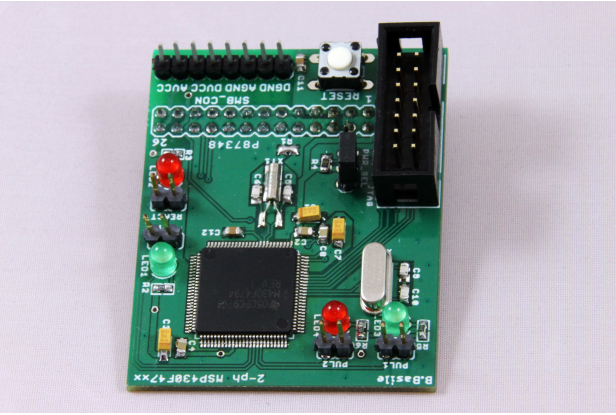

Figure 2. Two-Phase E-Meter SoM

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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..

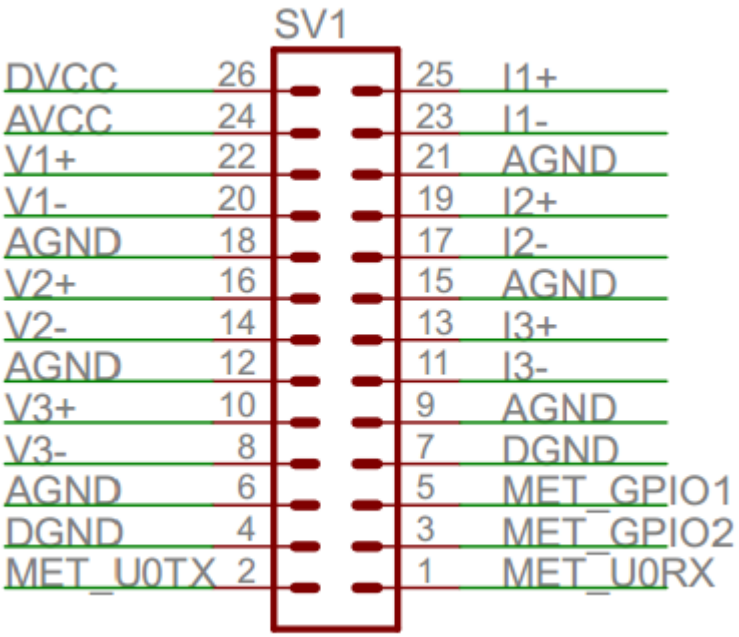

Figure 3. SV1 Header

2 Terminal Attributes

Table 1. Terminal Attributes

Pin	Description
MET_U0RX	UART RX as referenced from the host processor (DTE)
MET_U0TX	UART TX as referenced from the host processor (DTE)
MET_GPIO2	General Purpose IO2
DGND	Digital ground
MET_GPIO1	General Purpose IO1
AGND	Analog ground
DGND	Digital ground
V3-	Phase three voltage negative sense
AGND	Analog ground
V3+	Phase three voltage positive sense
I3-	Phase three current negative sense
AGND	Phase three current negative sense
I3+	Phase three current positive sense
V2-	Phase two voltage negative sense
AGND	Analog ground
V2+	Phase two voltage positive sense
I2-	Phase two current negative sense

Table 1. Terminal Attributes (continued)

Pin	Description
AGND	Analog ground
I2+	Phase two current positive sense
V1-	Phase one voltage negative sense
AGND	Analog ground
V1+	Phase one voltage positive sense
I1-	Phase one current negative sense
AVCC	Analog VCC (3.3 V)
I1+	Phase one current positive sense
DVCC	Digital VCC

3 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).

4 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.

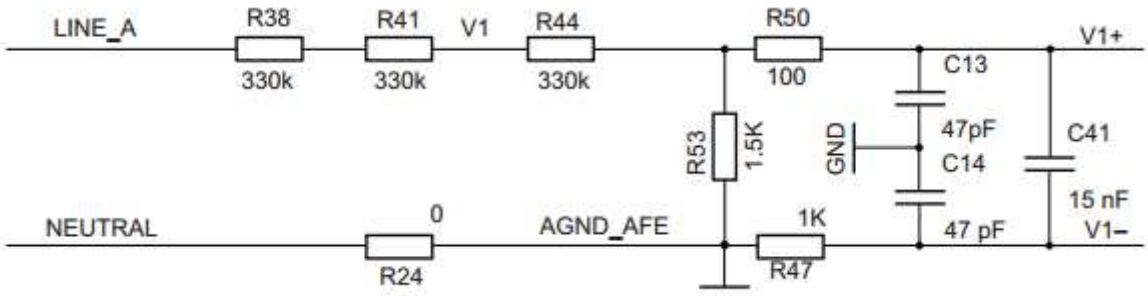

Figure 4. Analog Front End for Voltage Input

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.

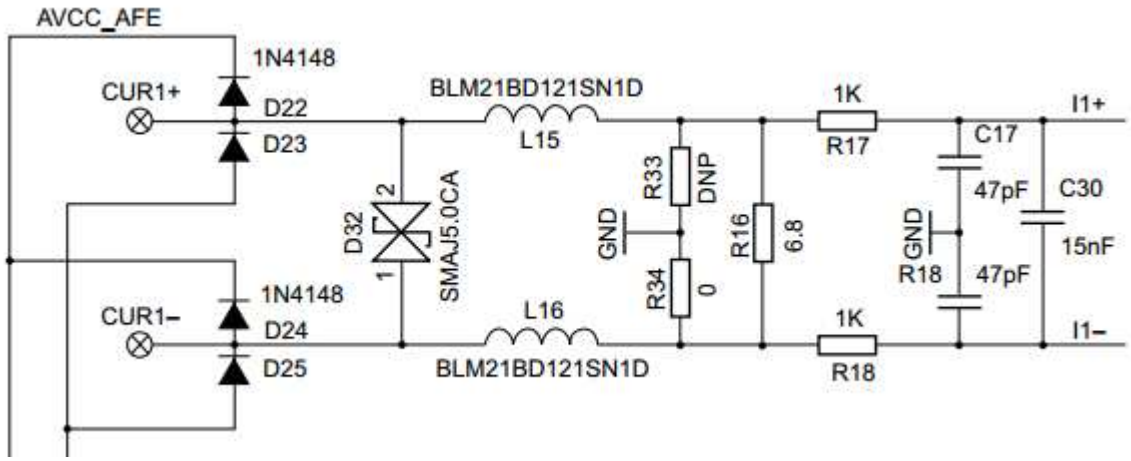

Figure 5. Analog Front End for Current Inputs

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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