

AN_6613_048

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Introduction

When using a shunt as a current sensor with the 78M6613, V3P3 must be directly connected to the NEUTRAL wiring for precise energy measurement accuracy. This topology presents two potential safety issues:

- The 78M6613 ground pin is normally -3.3 V below earth ground.
- In the event of a LINE wiring reversal, the 78M6613 ground pin becomes 120/240 VAC.

Therefore, any external test equipment attached to the 78M6613 is subject to this -3.3 V ground reference disparity.



The LINE and NEUTRAL wire connections to the 78M6613 can become reversed between the 78M6613 and external equipment when they are powered from different wall outputs or power strips, one of which is mis-wired. With proper earth grounding, external equipment is always referenced to earth ground via their enclosures.

Isolating Test Equipment

External test equipment **must** be floated from earth ground to avoid equipment damage due to this ground reference disparity. This can easily be achieved by using a 3-prong to 2-prong AC adaptor.



Laptop power supplies are not always isolated. If the AC power adaptor's power cord contains three wires, the laptop is most likely earth grounded. A two-wire power cord may imply an isolated power adaptor. Always verify galvanic isolation through the laptop's AC power adaptor.

When isolating the primary external equipment, look for attached peripherals. You may be using an isolated power adaptor or operating a laptop from batteries but if a monitor is attached to the laptop, the earth ground connection is established through the monitor's power cord.

78M6613 Evaluation Boards



The 78M6613 Evaluation Boards employ a shunt resistor as its current sensor. Therefore, the internal circuitry is directly connected to NEUTRAL. All safety precautions stated above apply to the 78M6613 Evaluation Kits.

In-Circuit Emulator

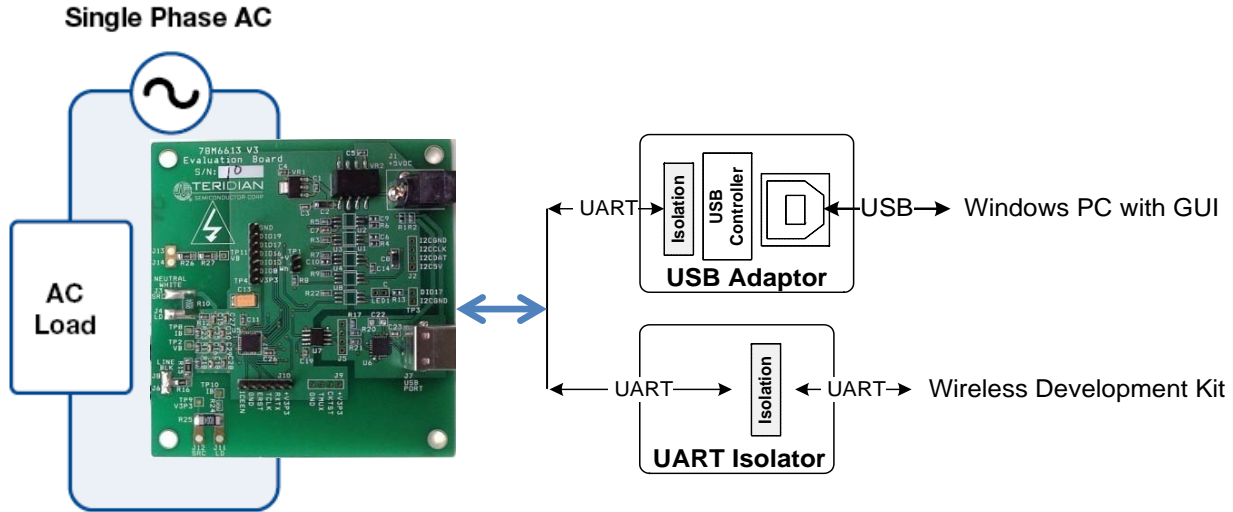
The In-Circuit Emulator (ICE) connector provides V3P3 and GND connections to the Signum ICE module. Therefore, a ground reference disparity occurs with the PC attached to the Signum ICE. Insert an isolated USB hub between the Signum ICE module and the PC.



Do not attach any other peripheral to the isolated USB hub. An attached peripheral will provide an earth ground connection defeating the purpose of the isolated USB hub.

Communications Interface

Any systems communication interface (UART, SPI, I2C) between the 78M6613 and external circuitry must be isolated to accommodate the -3.3 V disparity in their GND pins (or in the event of a line reversal). Teridian provides an isolated UART-to-USB adaptor to protect external equipment. The UART adaptor is inserted in the cable assembly between the 78M6613 and the external equipment.



Revision History

| Revision | Date | Description |
|----------|------------|--------------------|
| 1.0 | 10/29/2010 | First publication. |

Maxim cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in a Maxim product. No circuit patent licenses are implied. Maxim reserves the right to change the circuitry and specifications without notice at any time.

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