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APPLICATION NOTE 4453

Using the MAXQ3180 Analog Front-End in a Single-Phase Configuration

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Abstract: This application note describes how to adapt the MAXQ3180 multifunction, polyphase analog front-end (AFE) to measure single-phase power. The unique electrical configuration required to configure a MAXQ3180-based system for this application is provided.

Overview

Three-phase power is commonly delivered to large industrial users and to multifamily dwellings. With billing based on energy usage, the supplying utility must accurately measure all three phases to charge the user the proper fee. There are many applications, most often single-family homes and smaller businesses, that use only a single phase. Single-phase measurement is also required to measure the power consumed at the point of use by most appliances such as refrigerators and computers.

The MAXQ3180 is a dedicated electricity measurement front-end device. It collects and calculates polyphase voltage, current, power, energy, and many other metering and power-quality parameters of a polyphase load. The computed results can be retrieved by an external master through the on-chip SPI™ bus.

Although the MAXQ3180 was designed to perform measurements across three supply phases, it can also measure single-phase energy by using only phase A inputs and leaving the B and C channels disconnected. The remainder of this application note describes the simple procedure to implement this single-phase operation.

Hardware Configuration

To configure the device inputs for single-phase operation, the following changes must be made:
1. Short the V1P, V2P, VN, and VCOMM pins together.
2. Short the I1P and I1N pins together.
3. Short the I2P and I2N pins together.

Software Configuration

Using the MAXQ3180 in single-phase measurement mode requires no special software configuration. Simply ignore registers and settings relating to the B and C voltages.

Specifically, these registers include:

> All Phase B Calibration and Status registers
> All Phase C Calibration and Status registers
> All Phase B Measurement registers
> All Phase C Measurement registers
> All virtual registers ending in ".B" or ".C"

If Phase B and Phase C are not required, device performance can be improved by disabling the scan functions associated with those phases. Setting bit 3 of the following registers will disable the corresponding scan function:

> SCAN_IB
> SCAN_VB
> SCAN_IC
> SCAN_VC

Typical Application Drawing

Below is a typical application drawing for implementing the MAXQ3180 in a single-phase system.
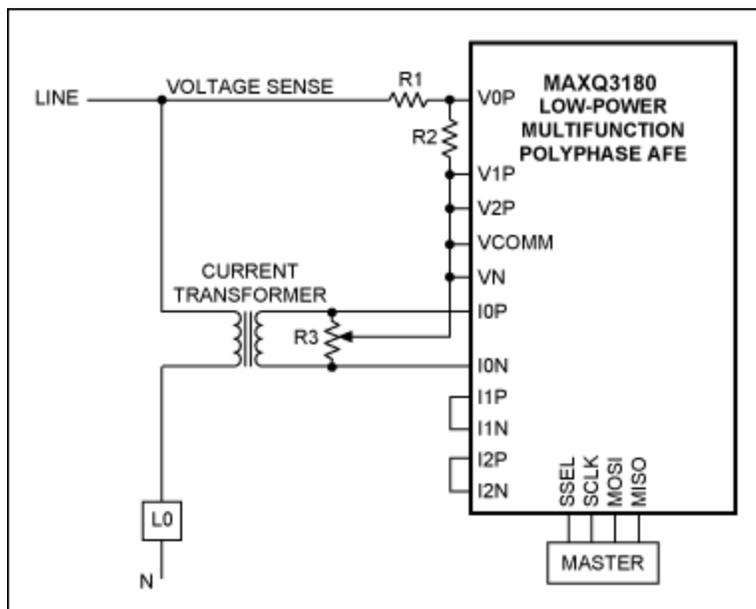
Conclusion

The MAXQ3180 multifunction, polyphase AFE can make single-phase measurements. The device requires only a simple connection to the line and load to allow this operation. This configuration can also improve device performance, as the unused channels can have their scan functions disabled which reduces the amount of calculations that must be performed in a cycle.

Related Parts		
MAXQ3180	Low-Power, Multifunction, Polyphase AFE	Free Samples

More Information

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