Power Monitoring IC Measures AC And DC Power With High Accuracy

Microchip Technology's MCP39F511A is a flexible dual-mode power monitoring IC that measures both ac and dc modes with an accuracy of 0.1% error across a wide 4000:1 range. This is industry-leading accuracy according to the vendor, which adds that power calculations and event monitoring are included within a single IC, reducing bill-of-materials cost and firmware development time.

In systems that use both ac and dc power, the implementation of dual-mode power monitoring traditionally requires multiple ICs to ensure superior performance and accuracy. Growing applications such as solar inverters, smart lighting and cloud servers often use both modes to maintain safe operation, with ac as the main power source and dc as backup or vice versa. The MCP39F511A was developed to optimize performance and ease development of these systems (see the figure).

The MCP39F511A power monitoring IC is a highly integrated device that addresses the growing need for more accurate power measurements in high-performance designs. To simplify calibration procedures and support most accuracy requirements, two 24-bit delta-sigma ADCs with 94.5 dB of signal-to-noise ratio plus distortion (SINAD) performance and a 16-bit calculation engine are included.

Suitable for a range of consumer, internet of things (IoT) and industrial applications, the MCP39F511A automatically senses power supply types and switches between ac and dc modes, optimizing measurement results. The device also helps developers troubleshoot issues with an on-chip EEPROM that logs critical events, as well as an integrated low-drift voltage reference and internal oscillator to reduce implementation costs.

Other benefits of using the MCP39F511A include its flexibility and ease of implementation. The device provides standard power calculations such as active, reactive and apparent power, active and reactive energy, root-mean-square (RMS) current and voltage, line frequency and power factor. These capabilites enable designers to easily add highly accurate power monitoring functions to end applications with minimal firmware development.

To further simplify development efforts, the MCP39F511A includes advanced features such as auto-save and auto-load of power quantities to and from the EEPROM at power loss or start, ensuring that measurement results are never lost if power is disrupted unexpectedly. Event monitoring of various power conditions also enhances preventative system maintenance and enables developers to better manage power consumption.

"Power monitoring has become more prevalent in growing markets such as smart cities and smart homes as developers look to monitor product performance and improve energy usage," said Bryan Liddiard, vice president of Microchip's Mixed-signal and Linear Products Division. "The MCP39F511A provides customers with a simplified development path and the ability to monitor both ac and dc power supplies with industry-leading accuracy."

The device is supported by the MCP39F511A Power Monitor Demonstration Board (ADM00667), a fully functional single-phase power and energy monitoring system. The system calculates and displays active power, reactive power, RMS current, RMS voltage, active energy (both import and export) and four-quadrant reactive energy. It connects easily through USB to the "Power Monitor Utility Software" that offers automated control to allow users to easily evaluate all system configuration settings.

For volume purchases, Microchip's Application Center of Excellence offers custom firmware devices based on the calibration of customers' hardware, helping save calibration cost and time.

The MCP39F511A is available for $1.80 each in 10,000-unit quantities. The MCP39F511A Power Monitor Demonstration Board (ADM00667) is available for $150 each. For additional information, visit www.microchip.com/MCP39F511A .

Figure. The MCP39F511A is a flexible dual-mode power monitoring IC that measures both ac and dc modes with what the company describes as industry-leading accuracy of 0.1% error across a wide 4000:1 range. The chip addresses the growing need for more accurate power measurements in high-performance designs and is ideal for applications that use both modes to maintain safe operation, such as solar inverters, smart lighting and cloud servers. Power calculations and event monitoring are included within a single IC, reducing BOM cost and firmware development time.