Digital Totem Pole PFC Controller with I2C & UART Interfaces

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HP1010A

FEATURES

- Highly flexible digital Totem Pole PFC controller
- High flexibility digital PWM
  - PWM frequency ranges from 20 kHz to 200 kHz
  - PWM soft start during AC line zero-crossing
  - Switching frequency spread spectrum for improved EMI
- High performance control loop
  - 25 MHz sigma-delta ADC for line voltage and current sense, 12.5 MHz sigma-delta ADC for output voltage
  - Enhanced dynamic loop response
  - Input voltage feedforward to avoid reverse current during AC drop
  - Control loop parameters can be configured separately for operating modes and input voltage
  - Support HVDC input
- Multi−mode operations
  - Continuous Conduction Mode (CCM) in heavy load Conditions
  - Discontinuous Conduction Mode (DCM) in light load conditions
  - Burst mode in the zero load conditions
  - The mode parameters can be configured separately for high line and low line
- Advanced control functions
  - True RMS power metering
  - Inrush current control with programming relay delay
  - Output voltage follows power variation
  - Relay power-saving mode
  - PFC quick start function
- Extensive fault protections
  - Fast over-voltage protection
  - Bulk under-voltage protection and over-voltage protection
  - External NTC thermal protection
  - Cycle−by−cycle current limit
  - Average switching current protection
- I²C and UART interfaces
- Programming via easy-to-use Graphical User Interface (GUI)
- Available in QFN4×4-24L packages
- -40°C to 125°C operating temperature

APPLICATIONS

Ultra−High Efficiency Power Supplies
LED Lighting
Industrial Power Supplies
Server/Telecom
EV/E-Bike Charger
Supercomputing
Variable-Frequency Drivers (VFD)

GENERAL DESCRIPTION

The HP1010A is a highly flexible digital Power Factor Correction (PFC) controller designed to drive a totem pole PFC power stage.

Totem-pole PFC is composed of a fast-leg using the third-generation semiconductor (GaN or SiC MOSFET) switching at PWM frequency and a slow-leg operating at the AC frequency. This design allows for a considerable increase in efficiency and power density by removing the diode bridge that is present at the input of a traditional PFC circuit.

The HP1010A offers RMS values of input voltage, current, and power. Through the I²C and UART interfaces, this information can be communicated to a microcontroller.

The HP1010A operates from a single 3.3 V supply. The device is available in a 4 mm x 4 mm QFN-24L package specified over an ambient temperature range of −40°C to +125°C.