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New Multiphase LLC Resonant Voltage Regulators for Next Generation Microprocessors

Tech ID: 18830 / UC Case 2005-089-0

BACKGROUND

Recent developments in semiconductor manufacturing technology have resulted in unprecedented density of transistor elements per silicon area. This new technology facilitates a dramatic increase in circuit complexity of the modern computer and communication hardware. With transistors dimensions as low as 90nm, operation frequencies in the 5GHz range are possible and will surely be surpassed by the next generation of 60 nm devices. Increased switching frequency inevitably causes higher power dissipation and results in higher overall current consumption. Lower, junction breakdown voltages of only 1.2-1.5V are expected to become even lower in the future, thus posing a limitation on operating voltage level. According to Intel's Roadmap 2005, the next generation of processors will operate at 0.9V DC voltage, with current consumption of up to 120A. Systems current slew rate of 140A/uSec is expected when the processors come out of the power saving mode and vice versa when entering the sleep mode.

TECHNOLOGY DESCRIPTION

University researchers have developed a new multiphase LLC resonant converter to address these next generation needs. Compared to today's buck type Voltage Regulators (VR), the proposed VR features zero voltage switching for both inverter and rectifier switches, a wide load range, a limited frequency range, a faster dynamic response, high efficiency, automatic current sharing ability, no additional current sensor and control circuitry.

APPLICATIONS

Next generation microprocessors.

PATENT STATUS

Country	Туре	Number	Dated	Case
United States Of America	Issued Patent	8,259,477	09/04/2012	2005-089

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OTHER INFORMATION

KEYWORDS

microprocessor

CATEGORIZED AS

- » Computer
- » Hardware
- » Engineering
 - » Engineering
 - >>> Other
- >> Semiconductors
- Design and Fabrication

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