# RAA228228

Digital Double Output 20-Phase PWM Controller with Adaptive Voltage Scaling Bus (AVSBus)

The RAA228228 is a digital double output 20-phase (X+Y ≤ 20) PWM controller with an Adaptive Voltage Scaling Bus (AVSBus) interface.

The RAA228228 controller can be configured to support any required phase assignment up to a maximum of 20 phases across the two outputs (X+Y). For example, 19+1, 18+2, 17+3, 10+10, or even single output operation as a 20+0 configuration are supported. Increased power density, combined with support for the PMBus V1.3 and Adaptive Voltage Scaling Bus (AVSBus) interfaces, allows the RAA228228 to support any demanding power supply requirement.

The RAA228228 AVSBus interface complements PMBus by providing a common high-speed interface that accelerates point-to-point communication. The communication occurs between the controller and the load to statically and dynamically control the processor voltage, which delivers a balanced power-efficient design.

The RAA228228 uses the proprietary Renesas digital synthetic current modulation scheme to achieve the industry-best combination of transient response, ease of tuning, and efficiency across the full load range. The diode emulation and automatic phase add/drop features allow you to extract maximum efficiency from the converter regardless of load conditions. You can use the intuitive Renesas PowerNavigator™ software to configure and monitor the device.

With minimal external components, easy configuration, robust fault management, and highly accurate regulation capability, implementing a high-performance multiphase regulator has never been easier.

## Features

- Advanced linear digital modulation scheme
  - Auto phase add/drop with PFM mode for excellent load vs efficiency profile
  - Dual edge modulation with optional diode braking for faster transient response
  - Excellent $V_{OUT}$ transition performance
  - Zero latency synthetic current control for excellent high-frequency current balance
- Flexible phase assignment from 0 to 20 phases per output
- Up to 2MHz switching frequency operation for high density designs
- Differential remote voltage sensing supports ±0.5% closed-loop system accuracy over load, line, and temperature
- Highly accurate current sensing for excellent load line regulation and accurate OCP
- Supports the full range of Renesas Smart Power Stage (SPS) devices
- Comprehensive fault management enables high reliability systems
  - Pulse-by-pulse (per phase) and total output current limiting
  - Black Box status recording capability with first fault indicator
- Intuitive configuration using PowerNavigator
- SMBus/PMBus V1.3 and AVSBus compatible
- Up to 16 user configurations stored in device Non-Volatile Memory (NVM)

## Applications

- Artificial Intelligence/accelerator cards (FPGA, ASIC)
- Network equipment
- Server/storage equipment
- Telecom/datacom equipment
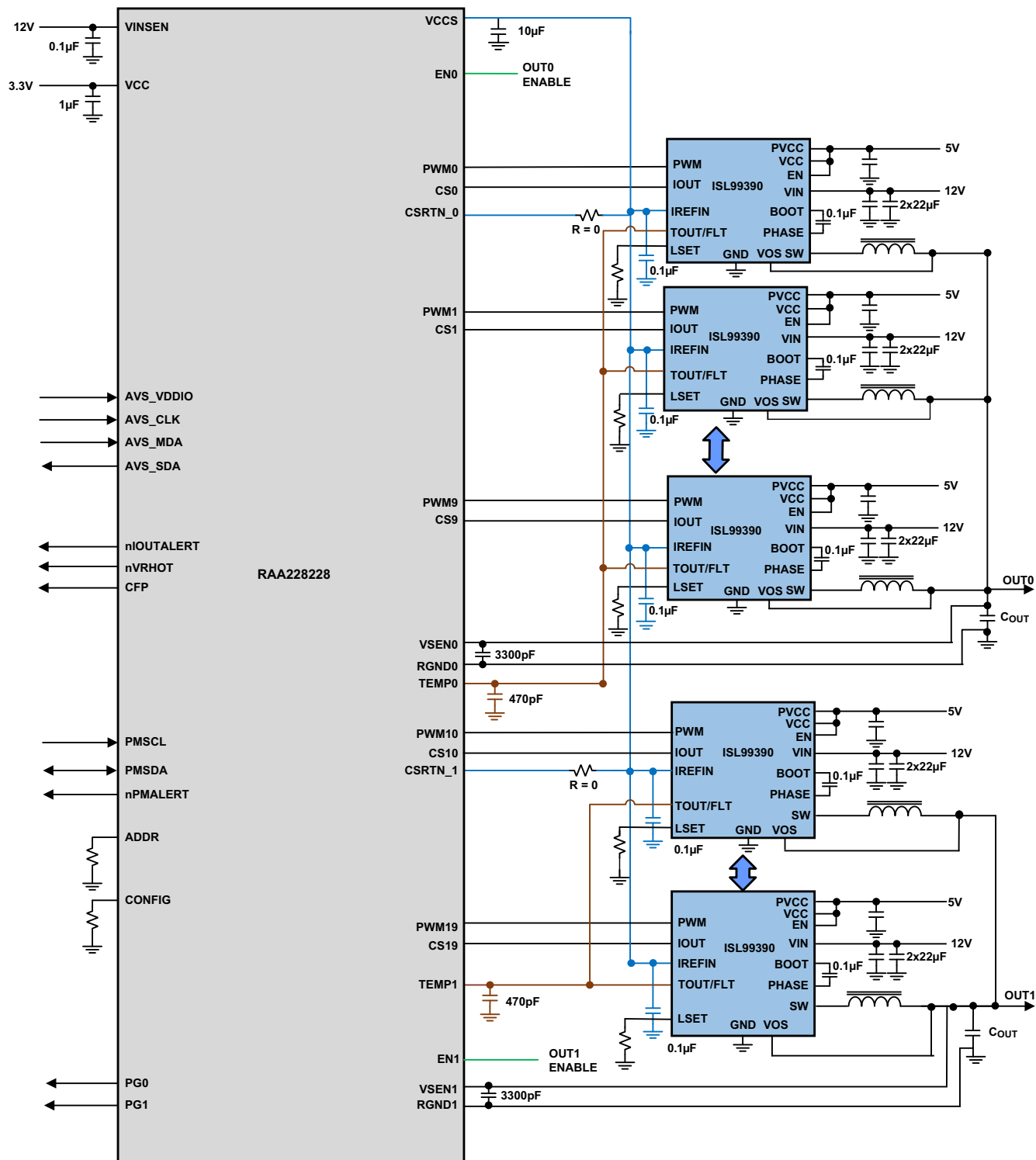- Point-of-load power supply (DSP, ASIC, FPGA)
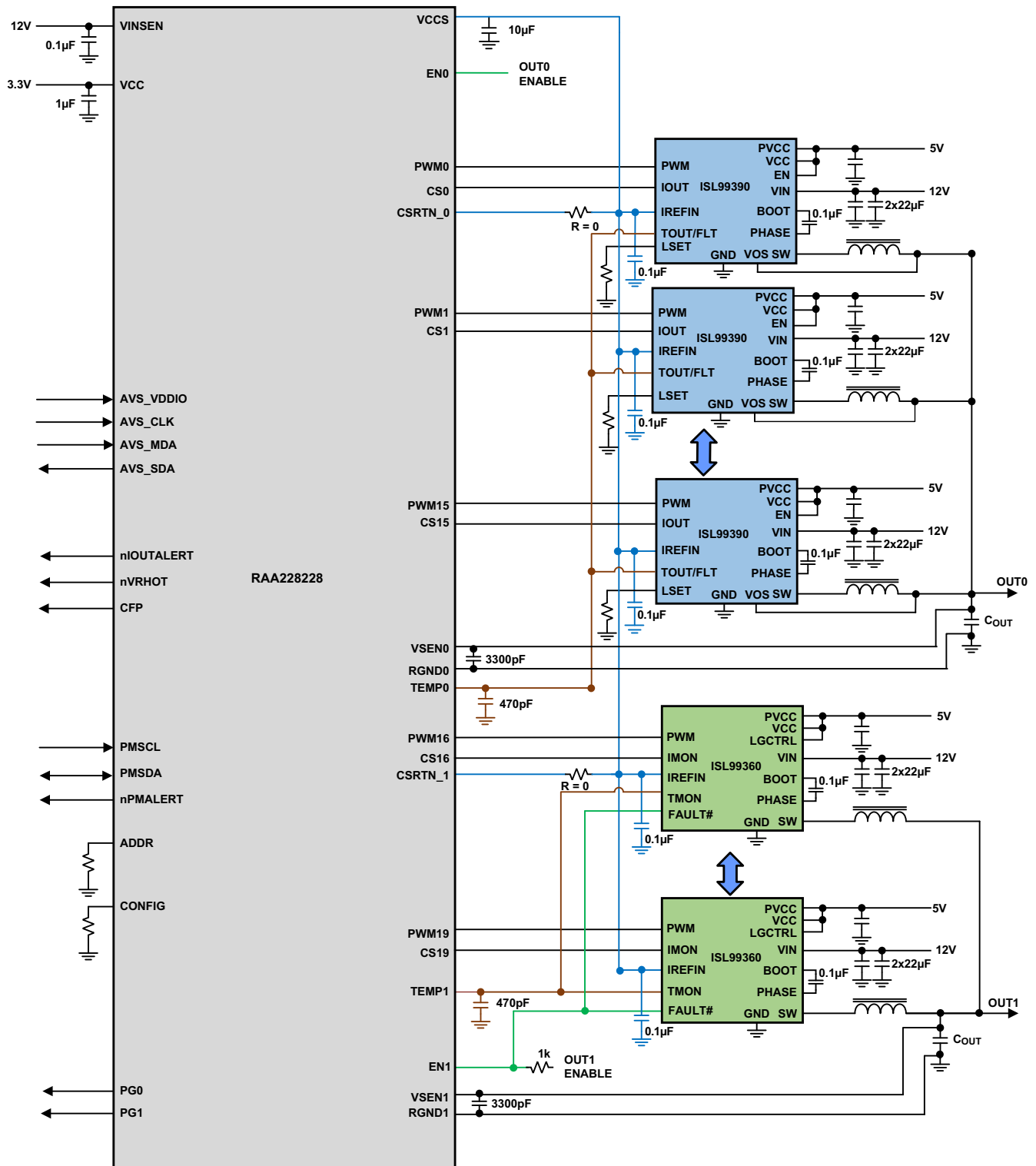
Figure 1. 10+10 Smart Power Stage

**Figure 2. 16+4 Smart Power Stage**

# 1. Revision History

| Rev. | Date | Description |
|------|------|-------------|
| 2.0 | May 17, 2021 | Updated File Number, applied new template, and added Revision History. |
| 1.0 | Oct 7, 2020 | Initial release |

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