

Multiphase power supply

Multiphase power supply is a power management chip that converts electrical energy into higher or lower voltage, current, or power. The meaning of "phase" refers to the number of parallel combinations of "inductance+MOS power devices", and the number of parallel groups of components corresponds to the number of phases. Multiphase power supply is born to meet the power supply needs of large load main chips such as CPU/GPU.

Composition of Multiphase Power Supply

The multiphase power supply consists of a multiphase controller and DrMOS.

Multiphase controller: The latest products are generally digital power chips (some of which are analog chips, such as Richtek's products), which usually use PWM technology to control the output voltage by changing the pulse width, and to control its output frequency by changing the pulse modulation period. In addition, through information exchange with the CPU and other main cores, the multiphase controller also has protection functions such as overvoltage, undervoltage, overtemperature, and overcurrent protection.

Driver MOS: DrMOS, abbreviated as DrMOS, is a power management chip (belonging to DC-DC) that completes the specific actions of circuit voltage control. It is integrated with a driver IC and MOSFET (main switch tube+freewheeling tube), known as the "Driver+MOS" integrated solution.

The advantages of DrMOS over traditional device separation schemes (i.e. packaging the driver IC, main switch MOS, and freewheeling MOS separately) are: 1) reducing the communication transmission path between the driver IC and MOS, thus increasing the switching frequency from 200KHz-400KHz in traditional discrete schemes to MHz level, and providing the dynamic current required by CPU/GPU; 2) The device's volume is reduced, occupying a smaller PCB area, which is beneficial for wiring; 3) It performs better in terms of conversion efficiency and heat generation.

The main barrier to multiphase power supply

1) Difficulty in obtaining certification from the main chip manufacturer: Multiphase power supplies are responsible for supplying power to CPU/GPU, which directly affects the performance and stability of the main chip. As CPU/GPU and other main chip manufacturers specialize in product certification for multiphase power supply manufacturers, the difficulty of obtaining certification is very high, and downstream manufacturers usually only use products listed as reference designs by the main chip manufacturer. 2) The technical difficulty of the product itself is high: the difficulty of multiphase controllers lies in precise signal regulation, with more prominent requirements for topology and other design aspects; DrMOS belongs to high current DC-DC and requires high integration to achieve stable control of high current. It has high requirements for chip manufacturers in product design, high-voltage BCD process, chip packaging, and other aspects.

Multiphase power protocol specifications of different chip manufacturers

Intel: VRD/SVID (IMVP), VR protocol is usually used in server product lines. AMD: SVI2/3/NVIDIA: OVR/Megacore: SVID, Same as Intel protocol. Hai Guang: SVI2/3, Same as AMD protocol. Feiteng: PMBUS, Belonging to the Open Standards Alliance. Arm base IC: AVS Open Standard Alliance: PMBUS

Multiphase power supply main players

Foreign players: Infineon, Renesas MPS、 Overseas giants such as Ansenmei have always been dominant players in the multiphase power supply market. 1. Infineon: focuses on the server and high-end GPU markets. 2. Renesas: focuses on the server, high-end PC, and GPU markets. 3, MPS: This year, both the low-end PC market and high-end servers have been well promoted. 4, Richtek: Multiphase controllers have always been doing well, with a high market share in the PC market, but DrMOS has always been its weakness, and it was not until this year that it (barely) launched its DrMOS. 5, AOS: Previously, the focus was always on MOS and Dr In recent years, efforts have been made to focus on multiphase controllers in MOS. 6, uPI: It is said that it has been promoting well in the consumer GPU market.

Domestic players: mainly including Jewate, Silicon Jet, Jingfeng Mingyuan, Changgong Microelectronics, etc., all of which have their own Dr MOS and multi-phase controllers. Most domestic MOS manufacturers are also expanding into the Dr MOS market.

Jewat: Supports SVID protocol and is currently the only manufacturer in China to obtain Intel protocol certification. Jingfeng Mingyuan: Supports SVI, PMBUS, and AVSBus protocols. Changgong Micro: Supports PMBUS protocol. Silijie: Supports PMBUS and AVSBUS protocols.