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HiGBt, a 5Gbps SerDes for heavy-ion physics experiments

The Heavy Ion Research Facility at Lanzhou (HIRFL) and the High-Intensity heavy-ion Accelerator Facility (HIAF) are the leading heavy-ion physics centers. Heavy-ion physics experiments at HIRFL and HIAF with significantly increased scale have put forward urgent requirements on high-speed and high-density data transmission links. In addition, the strong radiation environment is a significant challenge for commercial ASIC. Hence, the HiGBt, a general-purpose 5Gbps SerDes ASIC is specifically designed in 0.13 μ m CMOS process for the on-detector and off-detector data transmission in these heavy-ion physics.

The HiGBt mainly consists of the Serializer, the DeSerializer, the 16b/20b Encoder/Decoder and the PLL. The Serializer includes three stages to realize high-speed serialization. The Deserializer is implemented in a high-linearity phase interpolator-based structure to avoid coupling multi VCOs. The 16b/20b encoder employs an upper 8b/10b encoder and two lower 8b/10b encoders to improve the speed. The PLL adopts a ring VCO-based structure to reduce the power consumption. The power consumption is 123.4mW under 3.3V analog and 1.2V digital voltage, and the layout area is 310 \times 310 μ m². The jitter is \sim 2.2 ps, which corresponds to a bit error rate better than 1E-14.

Minioral

Yes

IEEE Member

Yes

Are you a student?

No

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