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Multi-Purpose Compact Zynq-Based System-on-Module for Data Acquisition Systems

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Modern FPGA and system-on-chip (SoC) require extensive amounts of electronics and complex multi-layer printed circuit boards (PCB) to support their operating conditions. By combining all required electronics on a densely packed PCB, the use of SoC-based system-on-module (SoM) helps to reduce system costs by reusing multiple SoMs in the same DAQ system or in different applications. Off-the-shelf SoM are widely available, but they generally are limited to entry level processors and commonly sacrifice electromagnetic compatibility and interference (EMC/EMI) and signal integrity to lower costs by reducing the number of layers and component quality. We present a new SoM based on Xilinx Zynq SoC specifically designed for low noise applications requiring high bandwidth and large numbers of I/O, such as positron emission tomography (PET) and time-correlated single photon counting (TCSPEC) applications. The SoM integrates a Zynq 7030 SoC, 1 GB DDR3L RAM, Gigabit Ethernet PHY and all required voltage regulators on an 18-layer 60 x 70 mm² PCB and comprises up to 197 user I/O available to the carrier board. The board design was optimized for high signal integrity, low EMI emissions and good power integrity using custom stackup and shielding techniques. All power sequencing is managed onboard, and I/O signal length was precisely matched and compensated for internal package variations leading to simple application-driven carrier board designs and lower system costs. A custom test board was also designed to validate the SoM after the assembly process and ensure good electrical paths, reducing the risk prior to system integration.

Minioral

Yes

IEEE Member

Yes

Are you a student?

Yes

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