T-G-C electronics design

Case Study 1:

480 Channels of Data Acquisition at 200MHz Sampling Frequency

The Challenge

A well-known test equipment manufacturer needed a method of capturing data in real time to generate functional test programs. The system needed to sample both digital and analogue signals at 200MHz and upload the captured data over USB3 or Ethernet.

TGC's Solution

The heart of the product is an array of transceiver equipped FPGAs, generic DDR memory, and an ARM processor running Linux.

The 480 input channels were digitised using carefully designed very high speed comparators and sent to the FPGA. Care was taken to ensure all 480 channels sampled simultaneously. We've designed many custom DDR memory controllers – in this case DDR2 was chosen. The high-speed transceivers in the FPGAs were used to exchange trigger information between the FPGAs and to deliver captured data to the ARM processor for upload.

Highlights of the Design

- Multiple interlinked transceiver equipped Lattice FPGAs each with attached 64 bit wide DDR2 memory.
- High speed controlled impedance PCB layout including 1156 pin BGA packages & DDR trace length matching.
- Spice modelling of input digitisation.
- High Speed A/D conversion.
- VHDL coding & simulation for FPGA.
- Custom VHDL DDR2 memory controller optimised for continuous write operation.
- Arm9 CPU running Linux.
- Software development for CPU.
- Variable sampling frequency sampling clock using DDS techniques.
- Close liaison with client's mechanical design, procurement and manufacturing processes.
- Excellent EMC performance

Click here to see Case Study 2: Fibre Interface for Digital Movie Camera.