Development of the Quality Control System of the Readout Electronics for the Large Size Telescope of the Cherenkov Telescope Array observatory

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The Dragon Board is the readout board of the Large Size Telescope of the Cherenkov Telescope Array [1,2].

Having to record very fast signals in a noisy environment where the background frequency can reach up to 400 MHz (photoelectrons per pixel per second), a fast digitization speed of the readout system coupled to a fast photosensor like a photomultiplier tube (PMT) is crucial to increase the pixel signal-to-noise ratio [3].

We have developed an automated quality control system in order to certify that the board production fulfills specific qualification standards.

The system will be used in the company production line in order to identify faulty components and react in short time for fixes to deliver a full set of working boards.

References:


The DRAGON Board

The Dragon Board (currently version 5) is provided with an integrated test pulse generator. In order to run the test, no external waveform generator is needed.

Required interfaces:
- power supply (24 V, CC)
- a workstation with a Gigabit Ethernet interface.

The duration of a basic quality control test is about 10 minutes, short enough to be performed in the production line.

Switched capacitor array samplers (Domino Ring Sampler, DRS4)

Analog Input from PMTs (7-channels)

FPGA (Xilinx Spartan 6)

ADC (Analog Devices AD9637)

Digitized output 7 channels (Ethernet interface)

Normalized Pulse Shape

Linearity Test

Crosstalk measurement

Pulse shape analysis

Test Pulse Linearity

Pulse FWHM (from Gaussian fit)