

# Digital Scan

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## 1 Digital scan

The digital scan inject single hits directly into the in-pixel memories of the ALPIDE. A section of pixels is selected, and is injected. If a pixel that has been selected is not firing, it indicates that this pixel is stuck. If a pixel that has not been selected is firing, it indicates that it is noisy.

### 1.1 Alpile Registers

- `reg_fromu_config1` (0x4)

Must be set to 0x40 to get digital pulsing.

- `reg_fromu_config2` (0x5)

Strobe duration. The length of the window that a hit can be latched onto. Default: 0x14

- `reg_fromu_config3` (0x6)

Strobe gap. The gap between two strobes with the internal strobe sequencer.

- `reg_fromu_pulsing1` (0x7)

Pulse to strobe delay. The gap between the generation of a pulse and the generation of a strobe signal. Must be less then the duration of a strobe in order to collect the signal.

- `reg_fromu_pulsing2` (0x8)

The duration of a pulse signal. If it is set to 0, no pulse will be generated.

- `reg_cmudmu_config (0x10)` Can be used to enable manchester encoding. For digital scan performed on the VCU118 this must be turned on, which is the default value. For PTB it must be turned off.

## 1.2 Registers to be set on board

- `reset_counters`

Found in ALPIDE CONTROL. Resets control counters.

- `enable_frame_based_offload`

Found in OFFLOAD. Forces the offload to be sorted so that data from two different frames are not entangled.

- `enable_offload`

Found in OFFLOAD. Enables the offload state machine. Register must be set to 1 in order to receive data.

- `enable_alpide_clock`

Found in GLOBAL REGS. Turns on the Alpide clock. Register must be set to 1 in order to turn on Alpide. Reset to default value of 0 at the end of the test.

- `reset_offload_fifo`

Found in OFFLOAD. Resets the offload FIFO. Is a PULSE, so the register should be set to 1 in order to empty the FIFOs.

- `run_settings`

Found in ALPIDE DATA. Register must be set to 1 in order to put the data-module into run mode.

- `trigger_source`

Found in TRIGGER MANAGER. The source of the ALPIDE trigger signal.

- `alpide_mode`

Found in TRIGGER MANAGER. For triggered mode set register to 0. For continues mode set register to 1.

- mode

Found in TRIGGER MANAGER. Controls whether transmitting trigger or pulse. Register must be set to 2 for digital scan.

- num\_triggers

Found in TRIGGER MANAGER. Sets the number of triggers.

- pulse\_delay

Found in TRIGGER MANAGER. Sets the period between the pulses. Is an increment of 25 ns. So for 10  $\mu$ s between pulses, set the register to 400. Must at minimum be pulse\_trigger\_delay + 14

- pulse\_trigger\_delay

Found in TRIGGER MANAGER. Sets the delay between the pulse signal and the trigger signal. Must at minimum be 14-num\_triggers.

- trigger\_init

Found in TRIGGER MANAGER. Initiates the command transmission process for all modes.

In addition to this, the pixels that are to be pulsed must be selected and unmasked.

Detailed information on registers can be found in [wp3/firmware/source/modules](#)