fADC125 register map

Firmware version 0x00020001

**Main FPGA**(0x0000-0x0ffc)

Board ID – Status (0x0000)

0xADC12500

Swap Control – Control/Status (0x0004)

Any write other than “0” swaps.

Firmware version – Status (0x0008)

Main CSR - Control/Status (0x000C)

1-0 (R/W) – select clock

 00 – P2 clock

 01 – P0 clock

 10 – On

 11 – local 125Mhz – (default in firmware)

Power Control - Control/Status (0x0010)

Writing 0x3000ABCD turns “ON”,

Anything else turns “OFF”

DAC Control – Control (0x0014) – note: write only

0 – (W) –

1 – (W) – Serial Interface Chip Load (main and mezz chains)

2 – (W) – Serial Interface Clock Input (main and mezz chains)

3 – (W) –

 4 – (W) – Serial Interface Data Input (main chain)

5 – (W) –

 6 – (W) –

7– (W) –

 8 – (W) – Serial Interface Data Input (mezz chain)

Control/Status (0x0018 -0x001C) – used for testing

Serial – Status (0x0020-0x002C)

 0x0020 – main\_serial(47 downto 32)

 0x0024 – main\_serial(31 downto 0)

 0x0028 – mezz\_serial(47 downto 32)

 0x002C – mezz\_serial(31 downto 0)

Temperature – Status (0x0030-0x0034)

 0x0030 – main temperature

 0x0034 – mezz temperature

Geographical slot address – Status (0x0038)

0 – (R) – bit 0 of GAD

1 – (R) – bit 1 of GAD

2 – (R) – bit 2 of GAD

3 – (R) – bit 3 of GAD

4 – (R) – bit 4 of GAD

A32 base address – Status (0x003C)

Block CSR – Control/Status (0x0040)

0 – (R) –

 1 – (R) –

 2 – (R) – Block of Events ready for readout

 3 – (R) – BERR Status (1 = BERR asserted)

 4 – (R) – Token Status (1 = module has token)

 5 – (W) – Take Token

 6 – (W) – Pulse Soft Sync Reset

 7 – (W) – ~~Pulse Soft Trigger~~ (ACTUALLY bit 0 of 0xd010, on proc)

 8 – (W) – Pulse Soft Reset

 9 – (W) – Pulse Hard Reset

CTRL1 – Control/Status (0x0044)

1-0 (R/W) – Sync reset source select N/A, MOVED TO PROC (0xd00C)

00– (R/W) – N/A, moved to proc

 01 – (R/W) – N/A, moved to proc

 10 – (R/W) – N/A, moved to proc

 11 – (R/W) – N/A, moved to proc

2 – (R/W) – Enable BERR response

3 – (R/W) – Enable Multiboard protocol

4 – (R/W) – FIRST board in Multiblock system

5 – (R/W) – LAST board in Multiblock system

ADR32 – Control/Status (0x0048)

 0 – (R/W) – Enable 32-bit address decoding

 [1… 6] – (not used – read as 0)

 [15…7] – (R/W) – Base Address for 32-bit addressing mode (8 Mbyte total)

ADR\_MB – Multiblock Address for data access (0x004C)

 0 – (R/W) – Enable Multiblock address decoding

 1 – 6 – (not used – read as 0)

 [15…7] – (R/W) – Lower Limit address (ADR\_MIN) for Multiblock access

 16 – 22 – (not used – read as 0)

 [31…23] – (R/W) – Upper Limit address (ADR\_MAX) for Multiblock access

The board that has the TOKEN will respond with data when the VME address satisfies the following condition:

 ADR\_MIN ≤ Address < ADR\_MAX.

Module Busy Level – Control/Status (0x0050)

 [19…0] – Busy level (eight byte words)

 (External RAM word count > Busy level -> module busy = 1)

 [31] – Force module busy

Block Count – Control/Status (0x0054)

 [19…0] – (R) - number of event BLOCKS on board

**CONFIGURATION** **CSR** **(0x0058)** – (Firmware Update)

 [31] – (R/W) – vme program enable

 [30…28] – (R/W) – Reserved

 [27] – (R/W) – Reserved

 [26…24] – (R/W) – OPCODE (bit 31 = 1 also required)

 [23…9] – (R) – Reserved

 8 – (R) – Busy (operation in progress)

 [7…0] – (R) – Last Valid Data Read

**CONFIGURATION ADR/DATA (R/W)** **(0x005C)** – (Firmware Update)

 [31] – Execute

 [30…18] – Page address

 [17…8] – Byte address

 [7…0] – EPROM data to write

**Processor FPGA**(0xd000-0xdffc)

Processor Firmware Version – Status (0xd000)

Processor CSR – Control/Status (0xd004)

0 – (R) – busy status – not used

1 – (R/W) – processor csr clear – not used

2 – (R/W) – reset (testing) N/A

Trigger source – Control/Status (0xd008)

1 – 0 (R/W) – trig setup

 00 - trig on p0\_trg(0) rising

 01 - trig on SW TRIGGER (was internal timer)

 10 - trig on internal multiplicity sum

 11 - trig on p2\_trg(0) rising

CTRL2 – Control/Status (0xd00C)

 0– (R/W) – Enable Trigger to Module (source = Trigger source[1-0])

 1– (R/W) – ~~Enable Sync Reset to Module~~ N/A, MOVED TO FE (0x1004)

3-2 (R/W) – Sync reset source select - default “00”

00– (R/W) – P0 Connector (VXS)

 01 – (R/W) –

 10 – (R/W) – VME (software generated)

 11 – (R/W) – no source

Control/Status (0xd010) – used for testing

 0-R/W –

BLOCK SIZE – Control/Status (0xd014)

 [15…0] - (R/W) – number of events in a BLOCK.

 Stored Event Count ≥ BLOCK SIZE → BLOCK CSR[2] = 1.

 [31…16] – (not used)

Trigger Count – Control/Status (0xd018)

 [30…0] – (R) – total trigger count

31– (R/W) – reset count

Event Count – Control/Status (0xd01C)

 [23…0] – (R) – number of events on board

CLOCK\_125 COUNT REGISTER (0xd020)

 0 – (W) – Write ‘1’ resets the counter. Write ‘1’ initiates 20us counting interval.

 [31 - 0] – (R) – CLK\_250 counter value. (Should be 5000 after count interval.)

SYNC\_IN\_P0 COUNT REGISTER (0xd024)

 0 – (W) – Write ‘1’ resets the counter.

[31 - 0] – (R) – SYNC\_IN\_P0 counter value.

TRIG2\_IN\_P0 COUNT REGISTER (0xd028)

 0 – (W) – Write ‘1’ resets the counter.

[31 - 0] – (R) – TRIG1\_IN\_P0 counter value

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Pulser\_Control (0xd02C)

0 - (W) - write '1' to enable pulser mode
[1 - 31] - (reserved)

Pulser\_Trig\_delay (0xd030)

[11 – 0] – R/(W) – delay trigger, in # of samples at 125 Mhz
[31 - 12] - (reserved)

**FE PFGA**(0x1000-0xcffc)

FE Firmware Version – Status (0x1000)

FE Test Register (0x1004)

 0– (R) – reset (testing) read

1– (R/W) – Collect On default on

2– (R/W) – Enable Sync Reset to Module default on, all rst sync

FE Asynchronous ADC read – Status (0xN020-0xN034) – not used

FE FIFO ADC read – Status (0xN040-0xN054) – not used

PTW (0x1058)

 [9 - 0] – (R/W) – Window Width (NOW 10 bits!!!)

PL (0x105C)

 [15 - 0] – (R/W) – # of samples back from trigger point

PTW DAT BUF LAST ADDR (0x1060) – N/A

 [11 - 0] – (R/W) – Last Address of secondary buffer (see calculation 1.0 below)

PTW MAX BUF (0x1064) – N/A

[7 - 0] – (R/W) – Max # of unprocessed PTW blocks to store in secondary buffer (see calculation 2.0 below)

NSB (0x1068) - N/A

[12 - 0] – (R/W) – # of samples before (including) trigger point to include in data processing

NSA (0x106C) - N/A

[13 - 0] – (R/W) – # of samples after trigger point to include in data processing

TET 1 (0xN070)

[11 - 0] – (R/W) – Threshold Offset added to Initial pedestal calculation

TET 2 (0xN074)

[11 - 0] – (R/W) – Threshold Offset added to Initial pedestal calculation

TET 3 (0xN078)

[11 - 0] – (R/W) – Threshold Offset added to Initial pedestal calculation

TET 4 (0xN07C)

[11 - 0] – (R/W) – Threshold Offset added to Initial pedestal calculation

TET 5 (0xN080)

[11 - 0] – (R/W) – Threshold Offset added to Initial pedestal calculation

TET 6 (0xN084)

[11 - 0] – (R/W) – Threshold Offset added to Initial pedestal calculation

CONFIG1 (0x1088)

[2 - 0] – (R/W) – Process mode select

 “000” = Window Raw Data

 “001” = Pulse Raw Data

 “010” = Pulse Data (Integral and time, CDC format)

 “011” = Pulse Data (Integral and time, FDC format)

“100” = Pulse Data (Peak Amplitude and time, FDC format)

“101” = Pulse Data and Pulse Samples (CDC Format)

“110” = Pulse Data and Pulse Samples (FDC Format)

 [3] – (R/W) – Run (Collect On) default ‘1’

 [6-5] – (R/W) – Number of pulses in Mode 1 and 2

 [7] – (R/W) – Test Mode (playback)

Trigger Number (0xN08C)

[15- 0] – (R) – Trigger number

CONFIG2 (0xN090)

CH mask When ‘1’ ADC values = 0

[ 0] – (R/W) – ADC 1

[ 1] – (R/W) – ADC 2

[ 2] – (R/W) – ADC 3

[ 3] – (R/W) – ADC 4

[ 4] – (R/W) – ADC 5

[ 5] – (R/W) – ADC 6

Test Waveform (0x1094)

 [ 15] – (R/W) – ‘1’ to write PPG Data (‘0’ for last two samples)

[ 14-13] – (R/W) – Don’t care

[ 12] – (R/W) – Overflow

[ 11-0] – (R/W) – PPG Data

TEST (0x1098) N/A
[31 - 0] - (reserved)

PPG\_Trig\_delay (0x109C) – Uses HW trigger to start playback and delays HW trigger sampling **when testmode (config1(7)) enabled**

[11 – 0] – R/(W) – delay from output pulse to internally generated trigger, in # of samples at 125 Mhz
[31 - 12] - (reserved)

Pedestal calc and scale factors (0x10A0)

 [ 7-0] – (R/W) – NP (2^n # of samples for initial pedestal calc)

[ 15-8] – (R/W) – NP 2 (2^np2 # of samples for local pedestal calc)

[ 18-16] – (R/W) – IBIT (integration scale factor)

[21-19] – (R/W) – ABIT (amplitude scale factor)

[ 24-22] – (R/W) – PBIT (Pedestal scale factor)

Timing Thresholds 1(0xN0A4)

 [ 7-0] – (R/W) – THRES\_HI\_0

[ 15-8] – (R/W) – THRES\_LO\_0

[ 23-16] – (R/W) – THRES\_HI\_1

[31-24] – (R/W) – THRES\_LO\_1

Timing Thresholds 2(0xN0A8)

 [ 7-0] – (R/W) – THRES\_HI\_2

[ 15-8] – (R/W) – THRES\_LO\_2

[ 23-16] – (R/W) – THRES\_HI\_3

[31-24] – (R/W) – THRES\_LO\_3

Timing Thresholds 3(0xN0AC)

 [ 7-0] – (R/W) – THRES\_HI\_4

[ 15-8] – (R/W) – THRES\_LO\_4

[ 23-16] – (R/W) – THRES\_HI\_5

[31-24] – (R/W) – THRES\_LO\_5

Integration End (0x10B0)

 [ 11-0] – (R/W) – IE

XTHR\_SAMPLE/(PG) (0x10B4) – not yet implemented

 [ 7-0] – (R/W) – PG (Pedestal gap- from timing pedestal x-ing(5) to xthr sample)