

GPSAMD: User's Guide

VME – Interface:

- All accesses must be performed using 32 bit addresses with address modifier AM=09h (standard access)
- VME /D16 and VME /D32 are allowed (FIFO access only with VME /D32)

Board base address:

VME A31 ? A24, selectable by means of 2 hex rotary switches:

Switch 1 corresponds to A31 ? A28;

Switch 2 corresponds to A27 ? A24

Base + 0x0: Control/ Status Register, read/ write

Bit	Write Function	Read Function	Value after Reset	Note
0	Local Reset	'Local Reset' Bit	0	1)
1	–	–	0	2)
2	Switch to GPS Clock Reference	Actual Clock Reference	0	3)
3	Enable Pulser	'Enable Pulser' Bit	0	1)
4	–	FIFO not empty flag	0	4)
5	–	FIFO full flag	0	4)
6	–	–	0	2)
7	–	–	0	2)

1) For Local Reset and Pulser:

Bit = 0 ⇐ off

Bit = 1 ⇐ on

2) Bit not in use

3) *Write function:*

Bit 2 = 0 ⇐ GPSAMD switches to internal 10 MHz clock as reference

Bit 2 = 1 ⇐ GPSAMD tries to switch to GPS clock as reference

Read function:

Bit 2 = 0 ⇐ clock reference from onboard clock

Bit 2 = 1 ⇐ clock reference from GPS clock

4) Bit 4 = 0 ⇐ FIFO empty

Bit 4 = 1 ⇐ FIFO **n o t** empty

Bit 5 = 0 ⇐ FIFO **n o t** full

Bit 5 = 1 ⇐ FIFO full

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Base + 0x4: Frequency Divider Register for the Calibration Pulse Output,
write only

Bit	Write Function	Read Function
11 ? 0	Frequency Divider Register	–

The Frequency Divider Register controls the period of the pulser output. Writing a '0' sets a 1 ms period, a value of '4095' corresponds to 4096 ms. The pulser output must be enabled by writing a '1' to the 'Pulser Enable' bit in the Control Register.

Base + 0x10: FIFO Data out.

Port is read only! A write to that address will cause a bus error!

Event Data Block Structure in FIFO:

Word #	Bit	Content
1	23 ? 00	10 MHz Frequency Count
2	23 ? 00	GPS time Telegram #1
3	23 ? 00	GPS time telegram #2
4	23 ? 16, 15 ? 00	Not in use Event Counter (16 bit)

Format of GPS time word #1:

Bit: 23 ? 00
Second's Count starting at 00:00:00 of the actual year
(low order 24 bit)

Format of GPS time word #2:

Bit: 23 ? 20 19 ? 16 15 ? 08 07 ? 00
Status TQC Year Second's Count
(hex value) (high order 8 bit)

where: TQC – True Time Quality Character as received via the RS–232 input from the GPS.
The Order of quality is:
0 (best), E, A, 3 and F (worst).

To set the actual year value a special time telegram must be sent out by the GPS!

Status – GPS Clock status:

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Bit 1 (LSB)	1 PPS Bit: is high if 1 PPS signal has been present
Bit 2	10 MHz: is high if 10 MHz has been stable
Bit 3	COM Bit: is high if SIO input has been valid and incrementing
Bit 4 (MSB)	TIME Bit : is high if SIO input has matched internal time

Note: GPSOK-led is on if status = '1111'

For more details see: **GRS2: GPS Repeater/ Scaler**

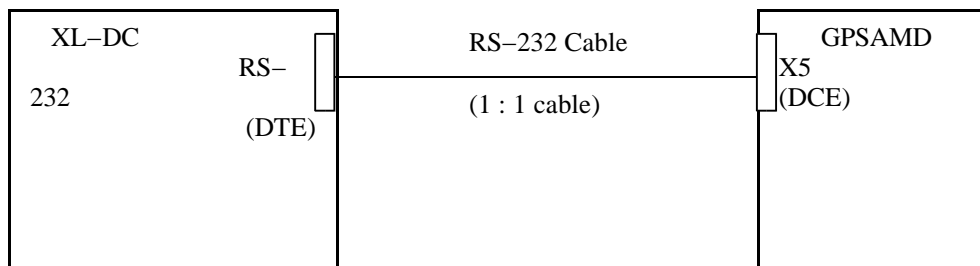
Event Counter

The number of events (i.e. the number of pulses at the NIM-TRIG input + the number of pulses at the ECL-TRIG input) after the last Local Reset.

Please note: An active signal at either the NIM-TRIG input or the ECL-TRIG input will start the event processing!

GPS – Interface

GPS Connection to GPSAMD:



Pin-Assignments

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RS-232 Connector (X5):

Pin	Signal	Comment
1	nc	
2	Tx Data	
3	Rx Data	
4	nc	
5	GND	
6	nc	
7	nc	
8	nc	
9	nc	

PROGM-Connector (J7):

Pin	Function	Comment
1	VCC	
2	SDO	
3	SDI	
4	ISPEN/	
5	nc	
6	MODE	
7	GND	
8	SCLK	

ECL-Input/ Output (X7):

⌀ not in use on this version

ECL Control (X6):

Pin	Signal	Pin	Signal	Front Panel Label
1	Pulse Out +	2	Pulse Out -	'PO'
3	1 PPS Out +	4	1 PPS Out -	'CO'
5	ECL-TRIG-In +	6	ECL-TRIG-In -	'G'
7	nc	8	nc	
9	GND	10	GND	

CAN-Connector (X4):

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Pin	Function	Comment
1	nc	
2	CAN_L	
3	GND	
4	nc	
5	nc	
6	GND	
7	CAN_H	
8	nc	
9	+12 V	option

LEMO-Connector (X1):

Pin	Signal	Comment
1	NIM-TRIG-In	NIM-Input; ≥ 10 ns

Lemo-Connector (X2):

Pin	Signal	Comment
1	1 PPS In (from GPS)	TTL-Input; ≥ 110 ns

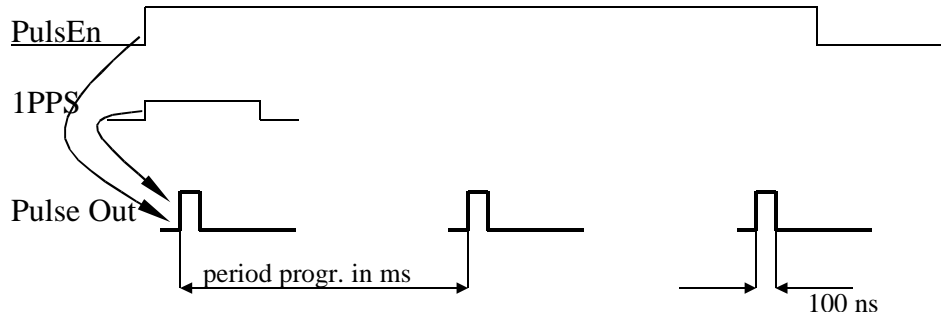
Lemo-Connector (X3):

Pin	Signal	Comment
1	MHz 10 In	Sine-Input (from GPS)

Pulser Output (labeled 'PO' on the front panel):

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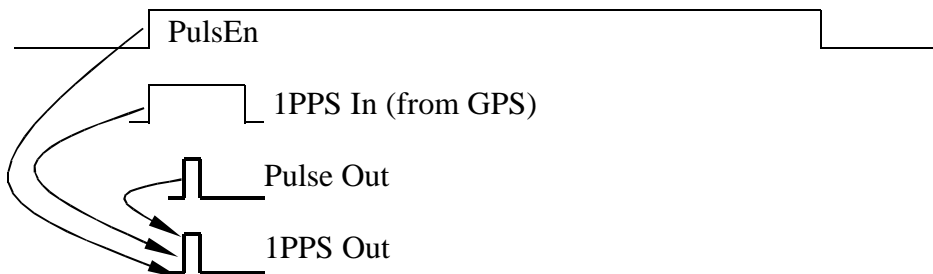
Differential ECL signal; pulse width 100 ns, period programmable from 1 to 4096 ms by writing to the Frequency Divider Register



Please note: the pulse sequence at CO is synchronized with the 1 PPS and the 10 MHz inputs from the GPS

1PPS Output (labeled 'CO' on the front panel):

Differential ECL signal; pulse width is 100 ns, period is 1s; signal is synchronized with the 1PPS input from the GPS and with the Pulser Output



LED Signals:

TRIG-LED: on when a trigger input is processed
PULSE-LED: blinking when 'Enable Pulser' is set
GPSERR-LED: on when one of the bits of the GPS status is reset
GPSOK-LED: on when the GPS status is '1111'

All other LED's are not in use.