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 accesses 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 LocalReset 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

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 anabled 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 (hex value) | Second's Count (high order 8 bit)

where: TQC - TrueTime 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:
Bit 1 (LSB) 1PPS Bit: is high if 1PPS signal has been present
Bit 2 10MHz: 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 SIO input has matched internal time

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

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

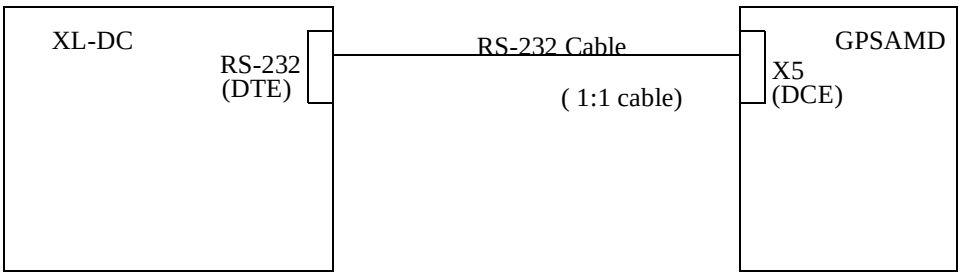
Event Counter

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

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 un this version

ECL Control (X6):

Pin	Signal	Pin	Signal
1	Pulse Out+	2	Pulse Out-
3	1PPS Out+	4	1PPS Out-
5	ECL_TRIG_In+	6	ECL_TRIG_In-
7	nc	8	nc
9	GND	10	GND

CAN-Connector (X4):

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

LEMO-Connector (X1):

Pin	Signal	Comment
1	NIM_TRIG_In	NIM-Input; >= 10 ns

LEMO-Connector (X2):

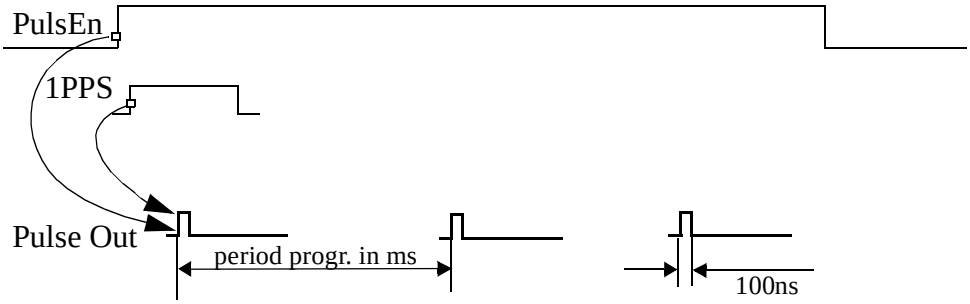
Pin	Signal	Comment
1	1PPS In (from GPS)	TTL-Input; >= 110ns

LEMO-Connector (X3):

Pin	Signal	Comment
1	Mhz10 In	Sine-Input (from GPS)

Pulser Output:

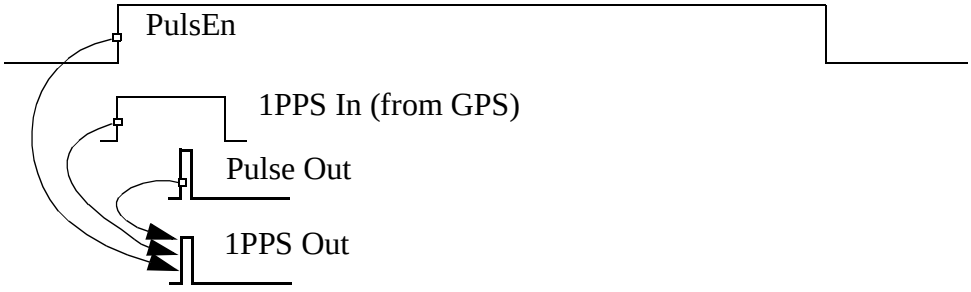
Differential ECL signal; pulse width 100ns, period programmable from 1 to 4096 ms by writing to the Frequency Divider Register



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

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

Differential ECL signal; pulse width is 100ns, 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.