

Model TSAT-VME

Version 1.3

Complete GPS Synchronized Timecode Generator System



The TSAT-VME is a complete system package, including the GPS Receiver/ Antenna (housed in a common enclosure), a 100-foot antenna cable, and a VME circuit card assembly.

The board synchronizes its on-board clock to the incoming timecode. The on-board clock's time is also provided as an IRIG-B output. Other features include a time-tag TTL input, a 1Mhz TTL output, and two user-configurable TTL pulse rate outputs.

The unit automatically tracks GPS satellites. In addition to time, the host computer can also read longitude, latitude and elevation. In the unlikely event that satellite reception is lost, the board will continue to increment time ("freewheel") until reception is re-established. A propagation delay offset may be specified to compensate for the antenna cable delay.

A front panel indicator lights when the unit is tracking satellites. An optional seven-segment LED display shows day and time in DDD:HH:MM:SS format (order Option -D).

The GPS satellites provide worldwide coverage in all weather. The received time is accurate to within 1ms of UTC. This is useful for synchronizing processed or data collection at distant sites.

VME Interface

The board supports A32, A24, and A16 addressing modes using the standard address modifiers. Other address modifiers can be supported by custom modifications.

All board functions can be generated when time is available or when a time-tag event has occurred. The interrupt level (IRQ1-IRQ7) is selected by jumpers, or the user can disable interrupts and poll the status register instead. Customized periodic interrupts are also available.

The VMEbus specification permits Rows A and C of the P2 backplane connector to be user-defined. The on-board clock time is output as 54 TTL signals on these pins; this provides continuous time with zero latency. To prevent any possible conflict with other user-specific boards in the system, order the board with Option -32P2 to eliminate these outputs.

Features

GPS-synchronized timecode generator

GPS, IRIG-A, IRIG-B, NASA36, XR3 and 2137 timecode reader

IRIG-B output

Time-Tag input

Two configurable pulse rate outputs

A32, A24, or A16 configurable base address

Base Address — D08 (O) or D32 data words

Continuous parallel time output

Ordering Information

Model TSAT-VME (+ option #)

Options

-D
LED display

-32P2
Eliminates 54-bit output on VME P2 connector

-TRIM-CAB-D-D-100
100' extension cable for GPS antenna

-GPS Optic Isolator

Device Drivers

All major operating systems are supported.



Model TSAT-VME

Complete Package, Customizable, User-programmable

Specifications

Timecode Input

Code Format (Autodetect)

IRIG-A (A132), IRIG-B (B122), NASA36, 2137, XR3

Amplitude

2.6Vp-p (0Vp-p - 6Vp-p)

Polarity

Detected Automatically

Modulation Ratio

2:1 min, 3:1 typ, 4:1 max

Input Impedance

> 10K ohms

Input Time Accuracy

Better than 100 ppm
(not suitable for tape playback)

Common Mode voltage

Differential input, $\pm 200V$ max

IRIG-B Output

Code Format

IRIG-B (B122)

Amplitude (adjustable)

2.6Vp-p typical
(0-6Vp-p) (mark adjustable)

Modulation Ratio (adjustable)

3:1

Output Impedance

600 ohms

Time-tag Input

Input Voltage

-0.5V min, +0.8V max for logic 0
+2.0V min, +5.5V max for logic 1
Tags rising edge

Input Current

<-1.2 mA for logic 0
< 0.5 mA for logic 1

Rise/Fall Time

500 nS max

Repetition Rate

1000 events per second max

Timing Resolution

1 uS

Parallel Time Outputs

Output Voltage

Logic 1: 2.4v min at 15 mA max
Logic 0: 0.5v max at 2.7 mA max

Strobe

1MHz squarewave

Format

BCD, 54-bits, days through microseconds

Rate Outputs 1 and 2

Pulse Rates

1 pps, 5 pps, 10 pps, 20 pps, 100 pps, 1 Kpps,
10 Kpps, 50 Kpps, 100 Kpps

Output Voltage

Logic 1: 2.4V min at 800 mA max
Logic 0: 0.4V min at 16 mA max

Pulse Width

1.5 mS positive, typical

Timing

Rising Edge on-time

On-Board Clock

Resolution

1 uS

Range

366:23:59:999999

Date Format

Integer (001-366)

Propagation Delay Correction

-1000 uS through +8999 uS
(1 uS resolution)

Propagation Delay Setting

Programmed over bus

Synchronization Time

<20 seconds

Stability

Disciplined to timecode: 2×10^{-7}
Undisciplined: 1×10^{-6}

1MHz Output

Output Voltage

3.8V min at 4.0 mA max (high)
0.3V max at 4.0 mA max (low)

Duty Cycle

45% min, 50% typ, 55% max

Timing

Rising Edge on-time

General

Size

H 261.8 mm, L172.2 mm, D 22.6 mm
(H 10.3", L 6.8", D 0.89")

Power (from bus)

+5Vdc @ 1.5 Amps max
+12Vdc @ 150 mA max
-12Vdc @ 100 mA max

Operating Temperature

0 to +50 C (+32 to + 122 F) Storage

Storage Temperature

-40 to +60 C (-40 to + 140 F)

VME Interface

Addressing Modes

A32 with address modifiers 09 or 0D
A24 with address modifiers 39 or 3D
A16 with address modifiers 29 or 2D

VME Interface (continued)

Data Modes

All functions accessible with D08 (O) (D07-D00)
D16 supported with D15 D08 unused. Time can also
be read as two D32 long words.

Time Between Accesses

100 uS min

Access Needed

2 (read time, 32-bit mode)
14 (read time, 8-bit mode)
12 (read time-tag, set time)

Interrupts

IRQ1-IRQ7 (jumper selected)
(all functions can be used without interrupts if desired)

Interrupt Controller

MC68153

GPS Receiver/Antenna (externally mounted)

Number of Satellites

8

Acquisition Time

5 min typ, 15 min max

Re-acquisition Time

< 10 seconds

Frequency

1575 MHz (receive only) (L1 band, C/A code {SPS})

Sync to UTC

Within ± 1.0 uS max

Position

25 m SEP (w/o SA) (82 feet)

Altitude

-400 m to + 18,000 m

Cable Delay Correction

-1000 uS through + 8999 uS

Cable Delay Setting

Programmed over VMEbus

Size

147 mm Diam, 100 mm H

Pole Mount

1.00" I.D., 14 turns/inch straight (not tapered)

Operation Temperature

-30 to + 70 C (-22 to + 158 F)

Waterproof

Submersion to 1 m

Antenna Cable

Length

30.5m $\pm 0.2m$ (100' $\pm 8"$)

Maximum Length

92m (300')

Cable Size

9mm (0.35") O.D.

Connector Size

20mm (0.79") O.D. (antenna end)
Industry-standard DB-15 (board & extension cable)

