

GPS Timing Board

Model TSAT-VME



- 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
- 1 MHz TTL output
- Freewheel capability
- Continuous parallel time output

The TSAT-VME package includes a GPS receiver/antenna (housed in a common enclosure), a 100-foot antenna cable, and a VME circuit card assembly. The board performs timing and synchronization functions referenced to an input timecode signal, synchronizing its on-board clock to the incoming timecode and providing it as an IRIG-B output. Other features include a time-tag TTL input, a 1 MHz TTL output, and two user-configurable TTL pulse rate outputs.

If automatic GPS position and satellite tracking is lost, the board continues to increment time ("freewheel"), until the reference is reestablished. A propagation delay offset can be specified to compensate for cable delays. The GPS satellites provide worldwide coverage in all weather. The received time is accurate to within 1 μ S of UTC.

The front panel includes status indicators.

VME Interface

The board supports A32, A24, and A16 addressing modes using the standard address modifiers. Custom modifications for additional modifiers are also available.

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. Interrupts may be disabled and the status registered polled. Customized periodic interrupts are also available.

Per VME specifications, users may define rows A and C of the P2 backplane connector. The on-board clock time is output as 54 TTL signals, providing continuous time with zero latency. To prevent conflict with other user-specific boards, order Option "–32P2" to eliminate these outputs.

Specifications

Timecode Input

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

Amplitude

2.6 V_{p-p} (0 V_{p-p}–6 V_{p-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, ±200 V max

Timecode Output

Code Format

IRIG-B (B122)

Amplitude (Adjustable)

2.6 V_{p-p} typical (0-6 V_{p-p} mark
adjustable)

Modulation Ratio (Adjustable)

3:1

Output Impedance

600 Ohms

On-Board Clock

Resolution

1 μS

Range

366:23:59:59:999999

Date Format

Integer (001–366)

Propagation Delay Correction

–1000 μS through +8999 μS
(1 μS resolution)

Propagation Delay Setting

Programmed over bus

Synchronization Time

<20 seconds

Stability

Disciplined to timecode: 2 x 10⁻⁷
Undisciplined: 1 x 10⁻⁶

Time-Tag Input

Input Voltage

–0.5 V min, +0.8 V max for logic 0
+2.0 V min, +5.5 V 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 maximum

Timing Resolution

1 μS

Parallel Time Outputs

(not present if ordered with
Option –32P2)

Output Voltage

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

Strobe

1 MHz squarewave

Format

BCD, 54-bit, days through micro-
seconds

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

Pulse Width

1.5 mS positive, typical

Timing

Rising edge on-time

1 MHz Output

Output Voltage

High: 3.8 V min at 4.0 mA
Low: 0.3 V max at 5.0 V mA

Duty Cycle

45% min, 50% typ, 55% max

Timing

Rising edge on-time

Bus Interface

Addressing Modes

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

Data Modes

All functions accessible with D08 (0)
(D07–D00)
D16 supported with D15 D08 unused.
Time can also be read as two D32
long words.

Time between Accesses

100 μS 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

General

Size

H 261.8 mm, L 172.2 mm, D
22.6 mm

Power (from bus)

+5 Vdc @ 1.5 A max
+12 Vdc @ 150 mA max
–12 Vdc @ 200 mA max

Operating Temperature

0° to +50° C (32° to +122° F)

Storage Temperature

–40° to +60° C (–40° to +140° F)

GPS Receiver/Antenna

Number of Satellites

12

Acquisition Time

<50 seconds

Reacquisition Time

<2 seconds

Frequency

1575 MHz (receive only)
(L1 band, C/A code [SPS])

Sync to UTC

Within ± 1.0 μS max

Position

Horizontal: <9 m
Altitude: <18 m

Size

95 mm Dia., 72.5 mm H
(3.74" Dia., 2.85" H)

Pole Mount

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

Operating Temperature

–40° to +85° C (–40° to +185° F)

Storage Temperature

–55° to +105° C (–67° to +221° F)

Antenna Cable

Length

30.5 m ±0.2 m (100' ±8")

Maximum Length

92 m (300')

Cable Size

9 mm (0.35") O.D.

Connector Size

20 mm (0.75") (antenna end)
Industry standard DB-15 (board
end and extension cable)

Drivers

Major operating systems are sup-
ported.

Ordering Information

Model TSAT-VME (+option #)

Options

–32P2:

Connector option eliminates 54-bit
output on VME P2 connector

TRIM-CAB-D-D-100

100' extension cable for GPS
antenna

GPS Optic Isolator

–**APL1**: Timecode input and time
tag input to back plane

–**MX5**: 2 PPS reference input

–**MJ5**: 2 PPS input on J5 connector

–**50L**: 50Hz output