GPS Timing Board
Model TSAT-PMC

- Complete GPS-synchronized timecode reader/generator system
- GPS, IRIG-A, IRIG-B, NASA36 timecode reader
- IRIG-B time code generator
- Time-Tag input
- Programmable start/stop time output and interrupt capability
- Freewheel capability
- High-performance, 2.5 ppm oscillator

The TSAT-PMC provides high-accuracy timing functions on a plug-in board for the PMC bus. Its on-board clock is kept in sync to an external timecode input; the clock’s time is also supplied as an IRIG-B output. The clock provides several timing functions, including a programmable periodic pulse rate output (“heartbeat”), a programmable start/stop output (“match”), a selectable frequency output (“oscillator out” at 1 kHz, 1, 5, or 10 MHz), and a timestamping input (“time-tag”).

A complete system package, the TSAT-PMC includes an externally-mounted GPS antenna, a 100-foot cable to connect the antenna to the board, and a circuit card assembly for the bus. It automatically syncs its on-board clock to the time transmitted by GPS satellites, which provide continuous time and position information accurate to within one microsecond, and available anywhere in the world. The board outputs a timecode signal, in IRIG-B format, that conveys the day, hours, minutes, and seconds. It also has a 1 kHz carrier referenced to the on-board oscillator.

The TSAT-PMC can be used as a stand-alone timecode generator. The computer programs the day, hour, minute, and second. The board continues to count from that time, using the on-board oscillator as the timebase reference. This is called “freewheeling.”
Specifications

Timecode Input

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

Amplitude
1.2 Vp-p min, 8.0 Vp-p max (IRIG B)

Polarity
Detected automatically

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

Input Impedance
>10K Ohms

Input Time Accuracy
Better than 25 ppm
(not suitable for tape playback)

Common Mode Voltage
Differential input, ±100 V max

Timecode Output

Code Format
IRIG-B (B122)

Amplitude (Adjustable)
4.0 Vp-p typical (0 V–20 Vp-p)
into >= 600 Ohm load

Modulation Ratio (Adjustable)
3:1

Output Impedance
50 Ohms

Settability
1 μS

On-Board Clock

Resolution
1 μS

Range
366:23:59:59:999999

Propagation Delay Correction
–999 μS through +999 μS
(1 μS resolution)

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

Accuracy
1 μS max

Oscillator Output

Frequency
1 kHz, 1 MHz, 5 MHz, 10 MHz
or Off [software selectable]

Type
RS-422

Differential Output Voltage
2.5 Vp-p (1 MHz)
1.8 Vp-p (10MHz) into 120 Ohms

Timebase Accuracy
Same as on-board clock

Time-Tag Input

Input Voltage
–0.1 V min, +0.4 V max for logic 0
+2.2 V min, +5.1 V max for logic 1
Tags rising edge

Input Current
–600 μA for logic 0
100 μA for logic 1

Rise/Fall Time
150 nS max

Repetition Rate
2000 events per second maximum

Timing Resolution
1 μS

Heartbeat Output

Output Voltage
High: 2.4 V min at 2.5 mA
Low: 0.4 V max at ~2.5 mA

Wave Shape
Pulse

Pulse Width
100 nS, 330 nS, 1 μS, 1 ms

Pulse Polarity
Software selectable

Range
200 nS to 65.5 seconds

Power-on Default Rate
Off

Match Input

Output Voltage
High: 3.8 V min at 6 mA
Low: 0.3 V max at ~6 mA

Settability
1 μS

In-Sync Flag Output

Type
Open Collector
External Pullup

Voltage
+27 VDC max

Current
~20 mA max

Polarity
Conducts to ground when board is synced to GPS or timecode.

Bus Interface

Interface
PICMG 2.0 compliant

I/O Address
64 bytes

General

Size
(H) 74 mm x (L) 149 mm
(2.91” x 5.87”)

Power (from cPCI bus)
+5 VDC @ 425 mA max
+12 VDC @ 225 mA max
–12 VDC @ 50 mA max

Operating Temperature
5° to +50° C (+41° to +122° F)

Storage Temperature
–40° to +85° C (+–40° to +185° F)

Connectors

Timing: Micro-D25
GPS Antenna: Micro-D15

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.

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