GPS Timing Board

Model TSAT-cPCI

- **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**

PICMG®

PXI™

CompactPCI®

The TSAT-cPCI provides high-accuracy timing functions on a plug-in board for the Compact PCI computer bus. The board has an on-board clock, which is kept in sync to an external timecode input. Several timing functions are derived from the on-board clock, including a programmable periodic pulse rate output ("heartbeat"), a programmable start/stop output ("match"), a selectable frequency output ("oscillator out," 1 kHz, 1, 5, or 10 MHz), and a time-stamping input ("time-tag").

The TSAT-cPCI includes an externally-mounted GPS antenna and100-foot of antenna cable. The GPS satellites provide Coordinated Universal Time (UTC) accurate to within 1 micro-second, and also give position in latitude, longitude, and elevation. The board automatically syncs its on-board clock to the
time transmitted by the GPS satellites. The board outputs a imecode signal, in IRIG-B format, which conveys the day, hour, minute, and seconds, and also has a 1 kHz carrier referenced to the on-board oscillator.

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

The host computer communicates to the board through a set of memorymapped registers. When the computer boots up, the board identifies itself to the Compact PCI bus by specifying the unique Subsystem Vendor ID. The host computer can then read the instantaneous time, command the board to set time, and/or to provide an interrupt at a periodic rate, at a specified time, and/or when a time-tag event occurs.

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Specifications

Timecode Input

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

Amplitude
1.2 Vp-p min, 8.0 Vp-p max

Polarity
Detected automatically

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

Input Impedance
>10K Ohms

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

Common Mode Voltage
Differential input, ±100 V max

Timecode Output

Code Format (Autodetect)
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

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: 2×10^{-7}
Undisciplined: 1×10^{-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) 100 mm x (L) 160 mm
(3.94″ x 6.30″)

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

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

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

Connectors
Timing – DB15
GPS Antenna – HDB15

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°C to +85° C (–40°F to +185° F)

Storage Temperature
–55°C to +105° C (–67°F 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 (0.79″) (antenna end)
46 mm (1.80″) (board end and extension cable)

Drivers

Major operating systems are supported.

Ordering Information

Model TSAT-cPCI (+ option #)

Options

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

GPS Optic Isolator

-6U: 6U bracket (no charge)

October 8, 2012 - TSAT-cPCI(H)
Specifications subject to change or improvement without notice.
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