Model TSAT-cPCI

GPS Timing Board with Compact PCI Interface

Version 1.3

The TSAT-cPCI provides high-accuracy timing functions on a plug-in board for the CompactPCI 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," 1kHz, 1, 5, or 10MHz), and a time-stamping input ("time-tag").

The TSAT-cPCI includes an externally-mounted GPS antenna and a 100-foot cable to connect the antenna to the board. The GPS satellites provide Coordinated Universal Time (UTC) accurate to within 1 microsecond, 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 timecode signal, in IRIG-B format, which conveys the day, hour, minute, and seconds, and also has a 1kHz 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 memory-mapped registers. When the computer boots up, the board identifies itself to the CompactPCI bus by specifying the unique Subsystem Vendor ID. The host computer can then read the instantaneous time, and 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.

Features

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

Ordering Information

Model TSAT-cPCI (+ option)

TRIM-CAB-D-D-100
Extension cable for antenna

GPS Optic Isolator

Drivers
All major operating systems are supported.

KSI
A Division of DSPCon, Inc.

www.ksi-corporation.com

KSI Corp. 380 Foothill Road, Suite 102 Bridgewater, NJ 08807 (866) KSI-KSI3 Fax (866) 593-2080 E-mail: info@ksi-corporation.com

Model TSAT-cPCI

Accurate, User-programmable

Specifications

GPS Receiver/Antenna
(externally mounted)

Number of Satellites
8

Acquisition Time (cold start)
5 minutes typ, 15 minutes max

Re-acquisition Time
<10 seconds

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

Sync to UTC
within ± 1.0 uS max
(antenna stationary)

Position
25 m SEP (w/o SA) (82')

Altitude
–400 m to +18,000 m
(–1,1312 to +59,055')

Size
147 mm Diam, 100 mm H
(5.8" Diam, 3.9" H)

Pole Mount
1.00' ID, 14 turns/inch
straight (not tapered)

Operating Temp
–30 to +70 C (–22 to +158 F)

Storage Temp
–55 to +100 C (–67 to +212 F)

Waterproof
Submersion to 1 m

Salt Fog
MIL-STD-202F
Method 101D
Condition B

Match Output

Output Voltage
3.8V min at 6 mA (high)
0.3V max at -6 mA (low)

Setability
1 uS

Timecode Input

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

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

Polarity
Detected automatically

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

Input Impedance
>10K ohms

Timing Accuracy
Better than 100ppm
(not suitable for tape playback)

Common Mode Voltage
Differential input, ± 100V max

Timecode Output

Code Format (Autodetect)
IRIG-B (B122)

Amplitude (Adjustable)
4.0Vp-p typical (0V-20Vp-p)

Modulation Ratio (Adjustable)
3:1

Output Impedance
600 Ohms

Time-tag Input

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

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

Rise/Fall Time
150 nS max

Repetition Rate
2000 events per second max

Timing Resolution
1 uS

On-board Clock

Resolution
1 uS

Range
366:23:59:59:999999

Programmable Delay
-999 uS through +999 uS
(1 uS resolution)

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

Heartbeat Output

Output Voltage
2.4V min at 2.5 mA (high)
0.4V max at -2.5 mA (low)

Wave Shape
Pulse

Pulse Width
100 nS, 330 nS, 1 uS, 1 mS

Pulse Polarity
Software Selectable

Range
200 nS to 65.5 seconds

Power-on default rate
Off

Oscillator Output

Frequency
1kHz, 1MHz, 5MHz, 10MHz or Off
(software selectable)

Type
RS-422

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

Timebase Accuracy
same as clock

In-Sync Flag Output

Type
Open Collector
External Pullup

Voltage
–27VDC Max

Current
–20 mA max

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

PCI Bus Interface

Interface
PICMG 2.0 compliant

I/O Address
64 Bytes

General

Size
H 106.7 mm, L 175.6 mm

Power (from cPCI bus)
+5Vdc @ 425 mA max
+1Vdc @ 225 mA max
–12Vdc @ 50 mA max

Operating Temperature
–30 to +75 C
(–22 to +167 F) Storage

Connectors
BNC & DB-15 depending
on input/output

Phase Noise

–100dBc/Hz @ 10Hz offset
–130dBc/Hz @ 10Hz offset
–145dBc/Hz @ 1kHz offset
–150dBc/Hz @ 10kHz offset

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