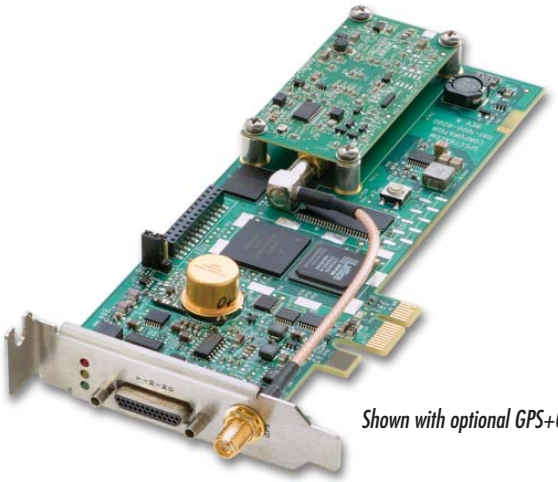
spectracom

PCI Express Time Code Processor

Model TSync-PCIe



Shown with optional GPS+GLONASS receiver and OCXO

- **Low-Profile PCIe Form Factor**
- **PCIe x1 Local Bus Operation**
- **Zero Latency Time Reads**
- **±100ns Accuracy to Input**
- **Auto-Detects and Prioritizes GPS and Time Code Inputs**
- **IRIG AM/DCLS Time Code Outputs**
- **1PPS Input**
- **Multiple External Event Time Capture/Interrupt**
- **Programmable Periodic Output/ Interrupt (1Hz–10MHz)**
- **Programmable Time Match Output/ Interrupt**
- **GNSS Sync Options (GPS, GLONASS)**
- **Optional OCXO Upgrade**
- **CE and RoHS Compliant**

The TSync-PCIe, with optional GPS+GLONASS, is a complete synchronized time code reader/ generator package offering flexibility and easy integration of precise timing into an embedded computing application. It supports multiple prioritized timing inputs. When an input is lost, the unit automatically switches to the next input.

The onboard oscillator is phase-locked to a wide variety of external timing signals and provides 5ns resolution to the time keeping hardware. The oscillator also "freewheels" to maintain time accuracy in the absence of a reference. For applications where "holdover" is essential, an ovencontrolled crystal oscillator (OCXO) is available for higher accuracy.

Four user-programmable time tag inputs may be used for multiple event capture at a rate higher than 10,000 events per second. Additionally, four programmable time match/frequency outputs are provided. Other features include two unique time code outputs, multiple programmable squarewaves or "heartbeats," multiple programmable "alarm" time match start/stop time outputs, a 10 MHz sine wave output, and a 1PPS output.

Key to the TSync functionality is the ability to generate interrupts. Using a Spectracom driver package available for the latest versions of popular operating systems, you may configure your card using interrupt-driven algorithms to support your unique applications.

The TSync-PCIe is the first timing board to offer field upgradeability. If you require a timing function after the initial deployment, let us know.

PCI EXPRESS®

solaris™

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Internal Time-Keeping

Disciplined On-board Clock

- Frequency: 200 MHz
- Resolution: 5ns
- Sync Sources: GPS, GLONASS, IRIG, 1PPS inputs

Reference Inputs

GNSS Reference

- Frequency: GPS L1 (1575.42 MHz), GLONASS L1 (1602 MHz)
- Satellite Tracking: 1 to 32, GPS T-RAIM satellite error management
- Synchronization Time: cold start < 4 minutes (includes almanac download), warm start < 2 seconds (90%, assumes almanac download)
- Sensitivity: -136 dBm (acquisition), -141 dBm (tracking)
- 1PPS Accuracy (1-sigma): <15 ns (stationary mode), <45 ns (mobile mode)

Internal GNSS Receiver Option

- Connector: SMA jack (+5V at 30 mA max supplied to power antenna pre-amp)
- Antenna sold separately
- SMA to Type N adapter cable included

External GNSS Receiver/Antenna Option

- Size: 45 mm dia., 72.55 mm H (3.74" dia., 2.85" H)
- Pole mount included
- Operating Temperature: -40° C to 85° C (-40°F to +185°F)
- Cable: 30.5 M (100') included, 92 M (300') max., 9mm (0.35" dia.)
- Connectors: 20 mm (0.79") at antenna end, high density DB15 at board end

IRIG

Code Format (AM or DCLS)

- IRIG A, IRIG B, IRIG G, NASA36 (auto-detect), IEEE 1344/C37.118 (selectable)

AM

- Amplitude: 500mV p-p min, 10V p-p max
- Modulation Ratio: 2:1 min, 6:1 max
- Input Impedance: >10K Ohms
- Common Mode Voltage: ±150V DC max
- Input Stability: Better than 100 ppm

DCLS (Differential or Single Ended)

- Differential Amplitude: 200 mV p-p min, 5V p-p max - 7V to +12V DC max common mode voltage (RS-485 compatible)
- Single Ended Amplitude: +1.3V V_{IL} min, +2V V_{IH} max (TTL compatible)

1PPS

- Amplitude: 0V to +5.5V, +0.8V V_{IL}, +2.0V V_{IH}
- 1Hz Pulse, Rising Edge or Falling Edge Active (selectable)
- 100 ns minimum pulse width
- Input Impedence: <150 pF capacitive

General Inputs (x4)

Event Time-Tag Input

- Amplitude: 0V to +5.5V, +0.8V V_{IL}, +2.0V V_{IH}
- Polarity (selectable): Positive or negative
- Pulse Width: 50 ns min
- Repetition Rate: More than 10,000 events per second
- Resolution: 5ns

Outputs

IRIG

Code Format (AM or DCLS)

- IRIG A, IRIG B, IRIG E, IRIG G, NASA36, IEEE 1344

AM

- Amplitude (adjustable): 500mV p-p min, 6V p-p max into 50 ohms
- Modulation Ratio: 3:1
- Output Impedance: 50 Ohms

DCLS

- Differential Amplitude: 1.5V p-p min, 3.3V p-p max, +/- 1.5V min, 1.8V max common mode voltage (RS-485 compatible)
- Single Ended Amplitude: (100 Ohm Load) +0.5V V_{OL} max, +2.5V V_{OH} min (TTL compatible)

1PPS

- Signal Level: TTL compatible, 2.2 V minimum, base-to-peak
- Pulse Width: Configurable Pulse width (200 milliseconds by default)
- Rise Time:<10 ns
- Accuracy: See table

General Outputs (x4)

Periodic Output

- Amplitude: TTL compatible, 2.2 V minimum, base-to-peak
- Period: 100 ns min, 20 s max in 5ns steps (10 MHz – 0.05Hz)
- Pulse Width: 50 ns min, 999 ms max in 5ns steps
- Polarity (selectable): Positive or negative

Time-Match/Alarm Output

- Amplitude: TTL compatible, 2.2 V minimum, base-to-peak
- Range: 100 days in 5ns steps

10 MHz Output (Sine Wave)

- Harmonics: < -40 dBc
- Spurious: < -70 dBc
- Other specifications: See table

1 PPS Output:

	TCXO	OCXO
Accuracy to UTC (1-sigma locked to GPS)	±50 ns	±50 ns
Holdover (constant temp after 2 weeks of GPS lock)		
After 4 hours	12 µs	3 µs
After 24 hours	450 µs	100 µs

10 MHz Frequency Output:

	TCXO	OCXO
Accuracy (average over 24 hours when GPS locked)	$1x10^{-11}$	$5x10^{-12}$
Medium Term Stability (without GPS after 2 weeks of GPS lock)	$1x10^{-8}$/day	$2x10^{-9}$/day
Phase Noise (dBc/Hz)		
@1 Hz	—	-85
@10 Hz	—	-113
@100 Hz	-110	-120
@1 KHz	-135	-140
@10 KHz	-140	-150
Signal Waveform & Levels: +13 dBm ±3dB into 50 ohm, BNC		

General

Form Factor

Low-profile PCIe x1, Rev 1.1
Full-height mounting bracket provided

Power

+3.3V DC ±5% @ 0.7A typ
+12V DC ±8% @ 0.2A typ

Environmental

Temperature

- Operating: -40° C to 80° C (-40°F to +176°F)
- Storage: -40° C to 85° C (-40°F to +185°F)

Humidity

- Operating & Storage: 95% RH at 60°C for 5 cycles of 48 hours/ cycle

Safety & EMI

- Certifications: RoHS, CE, FCC Class A

Drivers

Linux* 64/32 bit, Windows 64/32 bit, Windows Embedded, Solaris 10
**Contact sales for specific kernel versions*

Ordering Information

Models

TSync-PCIe-0YZ
Select internal oscillator and reference options:

Y=Oscillator	Z=Reference
0=TCXO 1=OCXO	0=IRIG or Other 1=Internal GNSS 2=External GNSS
NOTE: GNSS (GPS+GLONASS) to be included on all TSync-PCIe boards with internal or external GNSS receiver at no extra charge.	

Note: all models include basic breakout cable for 1 each inputs: IRIG AM/DCLS, 1PPS, and general purpose; and 1 each outputs: IRIG AM, 1PPS and general purpose

Options

Premium Breakout Cable Upgrade:
Replaces basic breakout cable for all available inputs and outputs

April 30, 2014 - TSync-PCIe(J)