PCI Express Time Code Processor
Model TSync-PCIe

- 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
- Optional GPS Synchronization
- Optional OCXO Upgrade
- CE and RoHS Compliant

The TSync-PCIe, with optional GPS, 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.
## Time Code Input

**Code Format (AM or DCLS)**
- IRIG A, IRIG B, IRIG G, NASA36 (autodetect)
- 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: 200mV p-p min, 5V p-p max, ±7V DC max common mode voltage (RS-485 compatible)
- Single Ended Amplitude: +1.3Vₖₜₗ min, +2Vₖₜₜₘₚₚ max (TTL compatible)

## Disciplined On-Board Clock

**Frequency**
- 200 MHz

**Resolution**
- 5ns

**Sync Sources**
- GPS, time code, 1PPS input

## Sine Output

**Frequency**
- 10 MHz

**Amplitude (50 Ohm load)**
- +13dBm, +3/-1dB

**Phase Noise (25°C ambient)**
- TCXO:
  - -110 dBc/Hz > 100 Hz
  - -135 dBc/Hz > 1 kHz
  - -140 dBc/Hz > 10 kHz
- OCXO:
  - -85 dBc/Hz > 1 Hz
  - -110 dBc/Hz > 10 Hz
  - -120 dBc/Hz > 100 Hz
  - -140 dBc/Hz > 1 kHz
  - -150 dBc/Hz > 10 kHz
  - -150 dBc/Hz > 100 kHz

## Rate Stability (GPS Sync)

**Standard TCXO:**
- 2.0E-7 short term “tracking”
- 1.0E6 long term “loss of satellites”

**Optional OCXO:**
- 2.0E-9 short term “tracking”
- 5.0E-8 long term “loss of satellites”

## 1PPS Sync Input

**Amplitude**
- +0.8Vₖₜₗ min, +2Vₖₜₜₘₚₚ max (TTL compatible)

**Polarity**
- Positive

## General Input (x4)

**Event Time-Tag Input**
- Amplitude: +0.8Vₖₜₗ min, +2Vₖₜₜₘₚₚ max (TTL compatible)
- Polarity (selectable)
- Positive or Negative

## Pulse Width

- 50ns min
- Repetition Rate: More than 10,000 events per second
- Resolution: 5ns

## General Output (x4)

**Periodic Output**
- Amplitude: +0.55Vₖₜₗ max, +2.2Vₖₜₜₘₚₚ min (TTL compatible)
- Period: 100ns min, 1s max in 5ns steps (10 MHz–1 Hz)
- Pulse Width (periodic dependent): 50ns min, 999ms max in 5ns steps
- Polarity (selectable)
- Positive or Negative

## Time-Match/Alarm Output

**Amplitude**
- +0.55Vₖₜₗ max, +2.2Vₖₜₜₘₚₚ min (TTL compatible)

**Range:**
- 100 days 5ns steps

## Form Factor

- Low-profile PCIe x1
- Full-height mounting bracket provided

## Power

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

## Operating Temperature

- -40° to +75°C (-40° to +167°F)

## Storage Temperature

- -40° to +85°C (40° to +185°F)

## Drivers

- Linux® 64/32 bit, Windows 64/32 bit, Solaris 10

*Contact Sales for specific kernel versions.*

## Agency Approvals

- RoHS

## Ordering Information

### Models

- **TSync-PCIe:** Synchronization to IRIG external reference
- **TSyncE-PCIe:** Includes external GPS receiver / antenna / cable included
- **TSyncI-PCIe:** Includes on-board GPS receiver accepting GPS L1 frequency (antenna and cable sold separately)

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

### Options

- **Premium Cable Upgrade:** replaces basic breakout cable for all available inputs and outputs
- **PCIe Opt-OCXO:** OCXO on-board oscillator for extended holdover

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Specifications subject to change or improvement without notice.

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