



# PCI Express Time Code Processor

Model TSync-PCle



*Shown with optional GPS 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**
- **Optional GPS Synchronization**
- **Optional OCXO Upgrade**
- **CE and RoHS Compliant**

The TSync-PCle, 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-PCle 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**

+1.3V  $V_{IL}$  min, +2V  $V_{IH}$  max  
(TTL compatible)

**Time Code Output****Code Format (AM or DCLS)**

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

**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)

**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/-1 dB

**Phase Noise (25C 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"  
1.0E-6 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**

+0.8V  $V_{IL}$  min, +2V  $V_{IH}$  max  
(TTL compatible)

**Polarity**

Positive

**Pulse Width**

100ns min

**1PPS Output****Amplitude**

+0.55V  $V_{OL}$  max, +2.2V  $V_{OH}$   
min (TTL compatible)

**Pulse Width**

200ms default

User settable: 100ns min,  
999ms max in 5ns steps

**Polarity (Selectable)**

Positive or negative

**General Input (x4)****Event Time-Tag Input****Amplitude**

+0.8V  $V_{IL}$  min, +2V  $V_{IH}$  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**

+0.55V  $V_{OL}$  max, +2.2V  $V_{OH}$   
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**

+0.55V  $V_{OL}$  max, +2.2V  $V_{OH}$   
min (TTL compatible)

**Range**

100 days 5ns steps

**General****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****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