

PCI Express PTP Processor

Model TSync-PCIe-PTP



- ± 4 nS resolution PTP packet time-stamping
- PCIe x1 Local Bus Operation
- Master/Slave Operation PTPv2 (IEEE-1588-2008)
- Onboard Oscillator for Internal Time-Keeping (OCXO Optional)
- Many Other Timing Functions (IRIG, 1PPS, Frequency, Event Capture, Heartbeats, Alarms/Time Match)

The TSync-PCIe-PTP timing card adds support for precision time protocol (PTPv2 IEEE-1588) to the popular TSync PCI Express timing card. It is a complete timecode reader/generator package for servers and computers to realize sub-microsecond synchronization over the LAN. In slave mode, the PCIe card is a PTP client as known as an "ordinary clock". It synchronizes to a PTP master and provides precision time-stamping functions to local applications as well as providing precision timing signals to external devices. This provides an alternative to synchronizing with GPS antennas and receivers when a precise network timing protocol is in place.

The TSync-PCIe-PTP can also operate in master mode when connected to a precision timing signal such as IRIG timecode. In this case, the on-board precision oscillator is locked to the external reference and is used to accurately synchronize PTP clients on the network. This function is well-suited for facilities that are migrating from a dedicated timing infrastructure (such as IRIG over coaxial cable) to one that leverages network infrastructure.

The card features all the other timing functions available from Spectracom's TSync bus-level timing platform. For example it offers industry-leading time-stamp accuracy with ± 4 nanosecond resolution and near zero-latency time reads. Time-stamping up to 4 different external events occurs at 5 nanosecond resolution at a rate up to 50 kHz. Additionally 4 programmable time match/frequency outputs are provided. Other features include two unique timecode outputs, multiple programmable square waves or "heartbeats", multiple programmable "alarm" time match start/stop time outputs, a 10 MHz sine wave output, and 1PPS pulse output.



Key to the TSync functionality is the ability to generate interrupts. Using a Spectracom driver package for the latest version of Linux and Windows, you may configure your card using interrupt-driven algorithms.

PTP Interface**Master or Slave Operation**

IEEE 1588v2-2008 fully compliant
10/100 Mb Ethernet, RJ45
8 nS (± 4 nS) packet timestamping resolution
30nS accuracy (3σ) Master to Slave via crossover cable
1 step or 2 step operation

Master Mode

IRIG, 1ppS or other Time Code Input
Capacity: >512 Syncs/sec
dependent on number of slaves

Slave Mode

Outputs IRIG Time codes, frequency, and general purpose outputs and events tagging

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

± 150 V DC max

Input Stability

Better than 100 ppm

DCLS (Differential or Single Ended)**Differential Amplitude**

200mV p-p min, 5V p-p max
 ± 7 V 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
 ± 1.5 V 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

PTP, IRIG time code, 1PPS input

Sine Output**Frequency**

10 MHz

Amplitude (50 Ohm load)

+13dBm, +3/-1dB

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

Standard TCXO:

2.0E-7 short term "tracking"

1.0E-6 long term "loss of reference"

Optional OCXO:

2.0E-9 short term "tracking"

5.0E-8 long term "loss of reference"

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 board with connector on full-height mounting bracket

Power

+3.3V DC $\pm 5\%$ @ 0.7A typ

+12V DC $\pm 8\%$ @ 0.2A typ

Operating Temperature

-5° to +70° C (-23° to +158° F)

Storage Temperature

-40° to +85° C (-40° to +185° F)

Drivers

Linux* 64/32 bit, Windows 64/32 bit included

*Contact Sales for specific kernel versions.

Agency Approval**Ordering Information****Model TSync-PCIe-PTP**

Includes 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