

# Compact PCI Time Code Processor

Model TSync-cPCI



- Rugged cPCI timing board
- Conduction cooled ready (thermal frame option)
- Auto-detects and prioritizes references
- GNSS sync options (GPS, GLONASS)
- SAASM GPS option
- IRIG time code input and output
- 1PPS input and output
- Multiple external event time capture/interrupt
- Programmable periodic output/interrupt (1Hz–10 MHz)
- Programmable time match output/interrupt
- Optional OCXO internal clock
- CE and RoHS Compliant

The TSync-cPCI is a complete synchronized time code reader/generator package offering flexibility and easy integration of precise timing into a compact PCI chassis including an option for ruggedized applications. The board's onboard clock oscillator is phase-locked to a wide variety of external timing references and provides 5ns resolution to the time-keeping hardware. Typical reference signals include GPS+GLONASS, IRIG and 1PPS. The user can prioritize multiple external references so if one reference is lost the unit will automatically switch to the next.

The oscillator can be its own reference when it "freewheels" in the absence of a valid external synchronization source. For applications where accuracy in this "holdover" conditional is essential, an upgrade to an ovenized crystal oscillator (OCXO) is available. There is also a rugged OCXO option that has been tested for shock and vibration according to MIL-STD-810F.

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 board using interrupt-driven algorithms to support your unique applications.

The TSync-cPCI offers a high degree of customization and field upgradeability. If a new application or change in deployment requires a different feature set, we can usually accommodate it.

### 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

##### SAASM GPS Receiver Option

- Contact factory for information

#### 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 Impedance: <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, 4.3 V minimum, base-to-peak into 50  $\Omega$
- Pulse Width: Configurable Pulse width (200 milliseconds by default)
- Rise Time: <10 ns
- Accuracy: See table

#### General Outputs (x4)

##### Periodic Output

- Amplitude: TTL compatible, 4.3 V minimum, base-to-peak into 50  $\Omega$
- 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, 4.3 V minimum, base-to-peak into 50  $\Omega$
- 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	OCXO (Rugged Option)
<b>Accuracy to UTC</b> (1-sigma locked to GPS)	±50 ns	±50 ns	±25 ns
<b>Holdover</b> (constant temp after 2 weeks of GPS lock)			
After 4 hours	12 $\mu$ s	3 $\mu$ s	1 $\mu$ s
After 24 hours	450 $\mu$ s	100 $\mu$ s	25 $\mu$ s

#### 10 MHz Frequency Output:

	TCXO	OCXO	OCXO (Rugged Option)
<b>Accuracy</b> (average over 24 hours when GPS locked)	1x10 <sup>-11</sup>	5x10 <sup>-12</sup>	2x10 <sup>-12</sup>
<b>Medium Term Stability</b> (without GPS after 2 weeks of GPS lock)	1x10 <sup>-8</sup> /day	2x10 <sup>-9</sup> /day	5x10 <sup>-10</sup> /day
<b>Phase Noise</b> (dBc/Hz)			
@1 Hz	-	-90	-
@10 Hz	-	-113	-120
@100 Hz	-110	-120	-135
@1 KHz	-135	-140	-135
@10 KHz	-140	-150	-145
<b>Signal Waveform &amp; Levels:</b> +13 dBm ±3dB into 50 ohm, BNC			

#### General

##### cPCI Specifications

- 3U Compact PCI (cPCI) Compliant to PICMG 2.0 r3.0 100 mm x 160 mm (3U card size)
- Bus Interface: Universal Signaling Voltage 3.3V/5V
- Bus Speed: 32bit address @ 33/66MHz

##### Conduction Cooling

- Per ANSI/VITA 30.1-2002
- Thermal frame available by request
- Component elevations available for custom thermal frame design

##### Power from cPCI bus via J1 Connector

- +5 VDC +/-5% @ 1.4A typical
- +3.3 VDC +/-5% @ 0.7A typical
- +12VDC +/-8% @ 0.2A typical
- -12VDC +/-5% @ 0.2A typical

##### Environmental Temperature

- Operating: -40° C to 80° C (-40°F to +176°F) at card edge with conduction cooled frame
- 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

##### Ruggedized OCXO Option

Contact factory for details

#### 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-cPCI-0YZ

Select internal oscillator and reference options:

Y=Oscillator	Z=Reference
0=TCXO	0=IRIG or Other
1=OCXO	1=Internal GNSS
2=Rugged OCXO	2=External GNSS
	3=SAASM GPS

**NOTE:** GNSS (GPS+GLONASS) to be included on all TSync-cPCI 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