

PCI-EXPRESS SYNCLOCK LP

- Single-slot low profile 32 bit PCI Express module
- IRIG A, B, NASA 36, 1 PPS sync inputs
- GPS sync option (maintains single-slot)
- HaveQuick sync input option
- Propagation delay correction
- Zero latency time reads
- Match Time output
- IRIG-B time code output (option)
- External Event time tags
- Three user programmable rates
- Designed for Low Profile PCI Express slots



The PCI-Express SyncClock LP from Brandywine Communications provides precision time with zero latency to the host computer over the PCI bus. An on-board microprocessor automatically synchronizes the clock to reference signal inputs. The reference signal inputs can be 1 PPS, IRIG or NASA time codes and optionally, GPS or HaveQuick. The clock can free run and be set by commands from the host over the PCI Express bus.

The on-board clock accepts an IRIG A, B, or NASA 36 input and accepts user input reference input signal delay information. An IRIG B code generator is available.

The advanced microprocessor on the PCI-Express SyncClock LP module constantly measures the time error between the on-board clock and the reference input code and adjusts the error measurement for propagation delay. In units with a disciplined TCXO or OCXO the residual error is used in an adaptive gain loop to adjust the frequency of the oscillator for minimum error. If the incoming time code is missing, or corrupted by noise, the on-board clock is updated using the disciplined oscillator. When the input code is again useable the correction loop is smoothly closed.

58 bits of BCD time data are available to the host computer using two zero latency time reads. The time message contains units of microseconds through units of years. A status word is available using an additional read.

The exact time-of-occurrence of random external events may be captured by using the Event Time input. When the event input is sensed the current time is saved in a buffer for later interrogation by the host. The resolution of the time tag is 100 nanoseconds.

Internal or external processes may be automatically initiated or terminated by using the Match Time feature. This feature asserts an output when the clock's time matches that of the user input start time. The output is terminated under user control or when the pre-programmed stop time is encountered. The resolution of the Match Time comparison is one microsecond.

Three user programmable pulse rates are provided. Two pulse rates, Clock Low and Clock High, are available on the multi-pin connector. The third rate generator provides heartbeat timing to the host. The divider for each of the three rate generators is programmable by the host over the range 2–65,535. The inputs to the rate generators are 3 MHz or 100 Hz for the heartbeat, 3 MHz for Clock High and 100 Hz for Clock Low.

The GPS synchronization option adds worldwide time transfer capability that can be traced to the U.S. Government standard UTC-USNO. Very precise synchronization, automatic leap year and leap second correction, and accurate position information are additional benefits provided by the GPS option.

Software packages for Windows, VxWorks and Linux are available. C language samples are supplied with the PCI-Express.

In addition to the comprehensive set of standard capabilities of the PCI-Express, Brandywine Communications offers a wide range of options that may be specified. These options allow the user to customize the PCI-Express to fit almost any application.

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PCI-Express Specifications

General Input Specifications

| | |
|--------------------|------------------------------------|
| Input Codes | IRIG A & B, NASA 36 (1kHz Carrier) |
| Input Amplitude | .25 to 10 Vpp |
| Input Impedance | >10k Ohms |
| Ratio | 2:1 to 6:1 |
| Frequency Error | 100 PPM maximum |
| Code Sync Accuracy | One microsecond |
| 1PPS Input | TTL, positive edge |
| 1PPS Sync Accuracy | One microsecond |
| External Event | TTL, positive or negative edge |
| Resolution | 100 nanoseconds—units of year |
| Min. event spacing | None |

General Output Specifications

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|-----------------|---|
| IRIG B DC Shift | TTL (Option) |
| Match Pulse | TTL level at Start–Stop time |
| Resolution | Microseconds—eight milliseconds |
| Clock Low | TTL, negative going |
| Clock Divisor | 2–65,535 |
| Clock Input | 100 PPS |
| Default output | 1 PPS |
| Clock High | TTL, negative going |
| Clock Divisor | 2–65,535 |
| Clock Input | 3 MPPS |
| Default output | 76.923k PPS |
| Heartbeat Rate | Interrupt, flag |
| | TTL, negative going |
| Clock Divisor | 2–65,535 |
| Clock Input | 100 PPS or 3 MPPS |
| Default output | 1k PPS |
| BCD Time | Microseconds—unit year on demand, zero latency 58 bits in two 32 bit words |
| Status word | 8 bits |
| Status LED | Flashes coded patterns |
| Interrupts | External Event, RAM FIFO, Heartbeat, Match Time |
| Flags | Dual Port RAM data ready, FIFO data ready, In sync, Heartbeat, Match Time, External Event |
| Connectors | BNC, high density DB-26 |
| MTBF | 155,000 Hours Per MIL 217 F, Notice 2, at 25°C |

Mechanical & Environmental

| | |
|-----------------------|--------------------------------|
| Size | 64mm X 257mm |
| Type | Single-slot 32 bit PCI-Express |
| Power | |
| +5 Vdc | ±5%, 400 mA maximum |
| +12 Vdc | ±5%, 100 mA maximum |
| -12 Vdc | ±5%, 50 mA maximum |
| Operating Temperature | 0°C to +70°C |
| Storage Temperature | -40°C to +85°C |
| Humidity | To 95% without condensation |

Options

| | |
|-----------------------------|--|
| ½ Card Length | Non-GPS only |
| GPS Sync Input | C/A code |
| Sync Accuracy | 100 nanoseconds |
| Position Accuracy | 25 meters SEP |
| Tracking | Eight parallel channels |
| Antenna | L1 magnetic mount, 25' cable |
| Antenna Options | |
| Hi-gain | L1, mast mount, 100' cable |
| Fiber Optic Kit | Fiber optic transmitter-receiver pair for long antenna cable runs |
| Differential GPS Inputs | Per RTCM 104 |
| IRIG B Modulated Output | 2.5 Vpp into 600 Ohms |
| Input Code Isolation | Transformer coupling |
| Input Codes | IRIG G, XR3, 2137, IRIG E, 109-60 |
| Output codes | IRIG A, NASA 36, IRIG G |
| Eight External Event Inputs | TTL positive or negative edge |
| Have Quick Input | Per ICD–GPS–060 |
| Have Quick Output | Per ICD–GPS–060 |
| Binary Time Words | Replaces BCD |
| Oscillator Upgrades | Disciplined TCXO, 1 PPM Disciplined OCXO, .01 PPM |
| 1 PPS 10 Vdc input | Sync input, +10 Vdc, 50 ohms |
| STANAG 4430 | Time code sync input |
| STANAG 4430 | Time code output |
| IRIG B D.C. shift time code | TTL |
| Software packages | Windows, Linux, VX Works |

Other **brandywine communications**

- Video Character Inserters
- Time-Message Displays
- VME, PMC, PC/104, CPCI, ISA Computer Clock Synchronization Boards
- Network Time Servers
- Frequency Generation and Distribution Instruments
- Dual & Triple Redundant Systems
- Time and Message Displays

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