

PCI-EXPRESS SYNCLOCK LP

Single-slot low profile 32 bit PCI Express module

- IRIG B, 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-B AM 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 B AM 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.

A user programmable heartbeat rate is provided on the multi-pin connector. The divider for the heartbeat generator is programmable by the host over the range 2–65,535. The input heartbeat generators are 3 MHz or 100 Hz.

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 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.

Specifications

General Input Specifications

Input Codes	IRIG B AM (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

IRIG B DC Shift	TTL (Option)
Match Pulse	TTL level at Start–Stop time
Resolution	Microseconds—eight milliseconds
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, Heartbeat, Match Time
Flags	Dual Port RAM data ready, In sync, Heartbeat, Match Time, External Event
Connectors	BNC, high density DB-15
MTBF	155,000 Hours Per MIL 217 F, Notice 2, at 25°C

Mechanical & Environmental

Size	68.8mm X 167.73mm
Type	Single-slot 32 bit PCI-Express
Power	
+3.3 Vdc	±5%, 100 mA maximum
+12 Vdc	±5%, 100 mA maximum
Operating Temperature	0°C to +70°C (-40/+85 option available)
Storage Temperature	-40°C to +85°C
Humidity	To 95% without condensation

Options

GPS Sync Input	C/A code
Sync Accuracy	100 nanoseconds
Position Accuracy	25 meters SEP
Tracking	12 parallel channels
Antenna	L1 magnetic mount, 3 M cable
Antenna Options	
Hi-gain	L1, mast mount, 100' cable
IRIG B Modulated Output	2.5 Vpp into 600 Ohms
Input Code Isolation	Transformer coupling
Input Codes	IRIG G AM, IRIG G DC IRIG B DC
Output codes	IRIG G AM IRIG B AM IRIG G DC IRIG B DC
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, .28 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
Software packages	Windows, Linux

Other Brandywine Communication products

- 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

Revised 2023/03/15