brandywine communications

PCIe-5905 UNIVERSAL TIMING CARD

- **Half Height Single-slot 32 bit PCI Express module**
- **Total Timing Flexibility for PCI-e systems**
- **IRIG, Have Quick, and GPS sync inputs**
- **10/100/1000 BaseT NTPv4 Grand Master**
- **Built-in OCXO is standard time base**
- **IRIG, Have Quick time code outputs are standard**
- **Propagation delay correction**
- **Low latency time reads**
- **Match Time output**
- **External Event time tags**
- **Windows and Linux drivers**
- **Easy to Use GUI via browser for setup and configuration**

The PCIe-5905 Universal Timing Card from Brandywine Communications provides an ultra-flexible means of providing precise time synchronization to a host computer, or a variety of external equipment. The PCIe-5905 is unmatched in the industry for its flexibility and features, while maintaining a compact ½ height PCIe form factor.

The key function of the PCIe-5905 is to provide precision time with zero latency to the host computer through a PCI Express X1,X2,X4,X8,X16 or X32 slot. An on-board microprocessor automatically synchronizes the clock to reference signal inputs. The reference signal inputs can be from the on-board GPS receiver, from serial time code. Both IRIG B and HaveQuick formats are supported. The clock can free run and be set by commands from the host over the PCI Express bus.

When the GPS receiver is used, the PCIe-5905 can be configured to operate as an NTP server, supporting up to 32 clients. In this mode, the NTP function allows a host PC to have a dedicated Stratum 1 NTP source directly on the PCIe bus and up to 100 client PCs on the network.

The PCIe-5905 will also synchronize to 1PPS, IRIG B, or Have Quick time code inputs and accepts user input reference input signal delay information.

The advanced microprocessor on the PCIe-5905 module constantly measures the time error between the on-board clock and the selected reference input code and use this to discipline the high stability OCXO that provides the precision timebase for the system. The PCIe-5905 monitors all input sources simultaneously to determine the best source. If all incoming time sources are missing, or corrupted by noise, the reference clock will continue operating in holdover mode using the disciplined oscillator. When the time input is again useable the correction loop is smoothly closed.

64 bits of binary time data are available to the host computer using two zero latency time reads in native Unix format with 5ns resolution. Status words are available using additional read functions.

The exact time-of-occurrence of random external events may be captured by using the time tag inputs. 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 5 nanoseconds. One input is standard, with an additional two available on an optional full height panel.

Internal or external processes may be automatically initiated or terminated by using the Event Trigger feature. This feature asserts an output when the clock's time matches a user-programmed time. One output is standard with an additional two available on an optional full height panel. Event Triggers can be configured as interrupts to the host system, allowing software running on them to capture those interrupts and execute a function whenever an interrupt occurs.

The PCIe-5905 on board OCXO provides the user with holdover capability that is normally not found in this class of product. The inherent stability of the Brandywine designed ovenized quartz oscillator is complemented by advanced firmware algorithms to provide exceptional stability and holdover accuracy. Using a full height panel allows access to a 10 MHz sinewave output.

Setup can be via the Ethernet port using a web browser, or through the PCIe interface using the included drivers. Drivers are available for both 32/64-bit Windows 7, 8, and 8.1. Once installed, the PCIe-5905 acts as a virtual network interface with the integrated NTP server, so that the built-in NTP time synchronization will accurately sync to the card via NTP.

PCIe-5905 Universal Timing Card Specifications

Input Specifications

GPS
Type	14 Channel C/A code
Connector	SMA

AC Time Code
Type	IRIG B121-IRIG B127
Amplitude	0.25 to 5Vpp/2:1-6:1 ratio
Impedance	600Ω
Accuracy	1 µs

DC Time Code
Type	HaveQuick/Stanag 4430
Amplitude	0 – 5 VDC
Impedance	<2kΩ

1PPS Input
Amplitude	3-5V max, rising on- time
Accuracy	<30ns
Impedance	50Ω

Time Tag Input / Interrupt
No of Inputs	1 Standard. 2 on extended panel
Amplitude	0-5V DC
Impedance	TBD
Resolution	5ns
Min Event Spacing	50ns
FIFO size	256 time stamps

Output Signals

Ethernet
Protocol	NTP v4 (RFC5905, client/ server mode only, no authentication)

AC Time Code
IRIG B125	CF per IEEE-1344

DC Time Code
    Have Quick per ICD-GPS-060

1PPS
Level	0-3.3V DC

Matched Time Output/Input
Number of Outputs
	1 Standard 2 w/ expansion panel
Level	0-3.3 VDC, rising edge
Resolution	100ns

10 MHz (requires expansion panel)
Waveform	Sine wave
Amplitude	7 dBn

PCI Express Bus
    PCIe x1 Local Bus Operation

Oscillator
    High Stability OCXO
Holdover (24 Hrs)	50 µs

Mechanical Environment

Size	Low-profile PCIe x 1 Rev 1.1
Power	+3.3V TBD
	+12V TBD
Temperature	-10°C to +70°C

Drivers
Windows 7, 8, and 8.1 64/32-bit

Ordering Information
P/N TBD	PCIe-5905 Multi-function clock
P/N TBD	Breakout Cable
P/N	Antenna Kit w/ 100' cable