

# ADDI-DATA APCLe-1711 Incremental Counter EPICS Driver

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# Overview

This is an EPICS asyn port driver for the ADDI-DATA APCLe-1711 PCI-Express incremental counter board.

The driver supports 4 counter channels by both polling and interrupt modes.

Interrupt mode support includes EVR timestamps.



# ADDI-DATA APCLe-1711 Versions

## 7.3 Versions and options

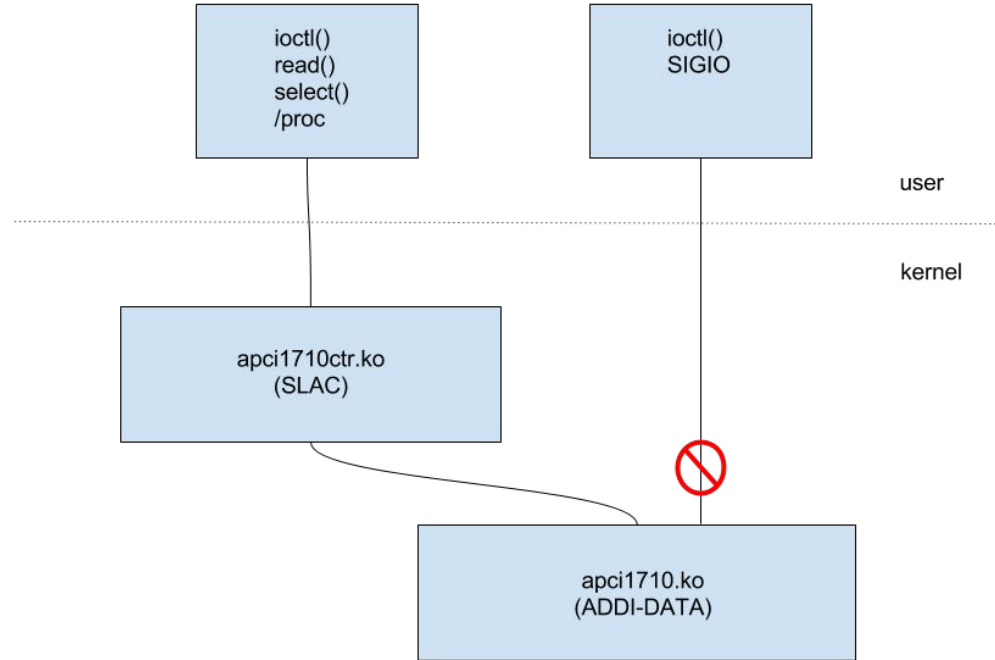
The boards **APCLe-1711** and **CPCIs-1711** are available in the following versions:

Table 7-1: Versions and options

Version	Features
<b>APCLe-1711</b>	Multifunction counter board, optically isolated
<b>APCLe-1711-24V</b>	24 V inputs instead of RS422/TTL inputs/outputs (A, B, C, D)
<b>APCLe-1711-5V-I</b>	5 V inputs instead of 24 V inputs (E, F, G)
<b>APCLe-1711-10MHz</b>	Input frequency 10 MHz, inputs (A, B, C, D)
<b>CPCIs-1711</b>	Multifunction counter board, optically isolated
<b>CPCIs-1711-24V</b>	24 V inputs instead of RS422/TTL inputs/outputs (A, B, C, D)
<b>CPCIs-1711-5V-I</b>	5 V inputs instead of 24 V inputs (E, F, G)

The specific version name can be found on the type label at the slot bracket or front panel of your board.

# SLAC Kernel Module Uses ADDI-DATA Kernel API



# SLAC Kernel Module Ring Buffers

Each channel has a ring buffer in kernel memory

Small amount of data per interrupt...

Written to ring buffer by interrupt callback routine (ADDI-DATA kernel API)

Copied to user memory by read() (character device interface)

# Template db/APCI1710Counter.db Records

Record Name	Description
\$(P)\$(R)Counts	Read the raw counter value; polled at 10 Hz.
\$(P)\$(R)RTCounts	Read the real-time raw counter value; interrupt mode with EVR timestamps support.
\$(P)\$(R)POSN	Read the engineering unit value; polled at 10 Hz.
\$(P)\$(R)RTPOSN	Read the real-time engineering unit value; interrupt mode with EVR timestamps support.
\$(P)\$(R)Reset	Zero the counter by writing 1 to this binary output.

# Template db/APCI1710Counter.db Macros

Macro Name	Description
\$(P) and \$(R)	These macros are concatenated to form the record name prefix.
\$(PORT)	Must match the port name passed to APCI1710Config().
\$(ADDR)	Channel index: 0, 1, 2, 3
\$(ESLO)	Linear conversion factor (ai record, LINR=SLOPE). Must be non-0.
\$(EGU)	Human readable engineering unit description, up to 16 chars.



# Configuration Command

This C function can be called directly or from iocsh:

```
int APCI1710Config(const char *portName, int boardNum)
```

Only board number 0 is currently supported. Example call:

```
APCI1710Config("apci1710", 0)
```

# EVR Timestamp Support

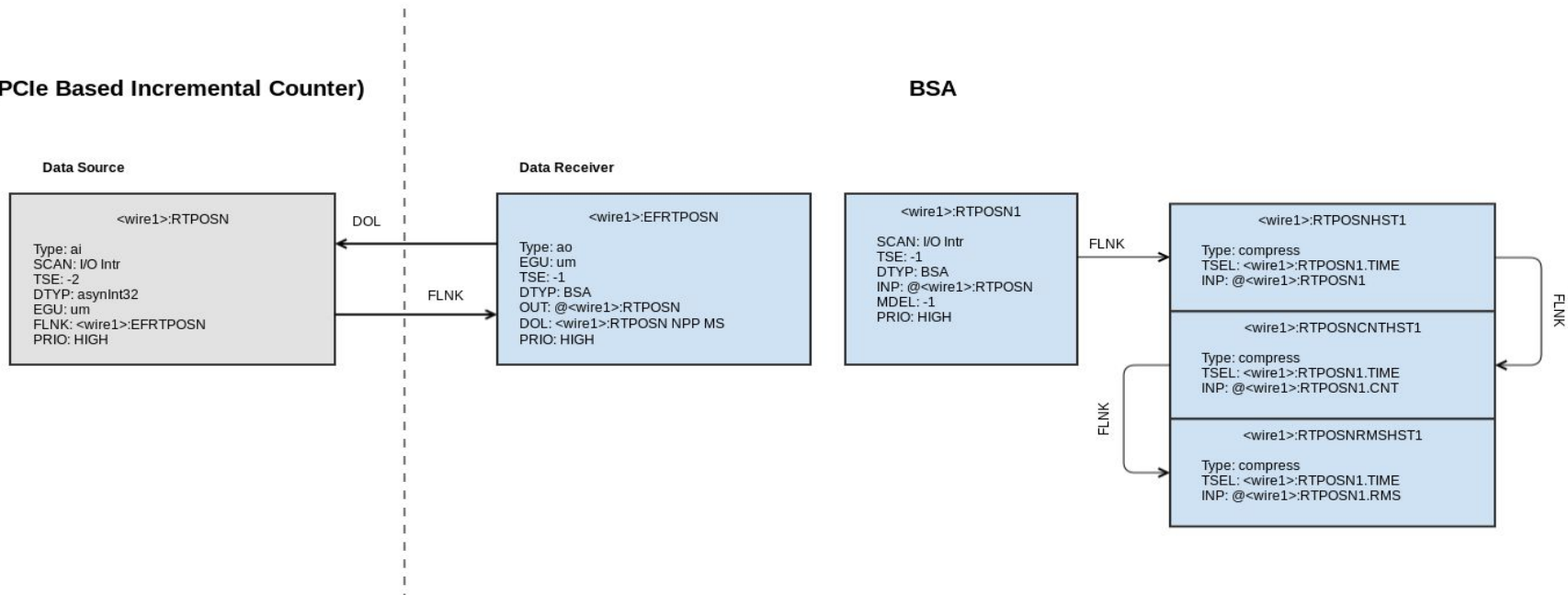
The  $(P)(R)RTCounts$  and  $(P)(R)RTPOSN$  records have  $TSE=-2$ , indicating that device support will handle the time stamp.

Each counter channel has a dedicated high priority thread that reads data from the kernel driver. Immediately after reading data, this thread calls `evrTimeGet()` to get the 120Hz resolution timestamp, followed by `setTimeStamp()` to set the timestamp in `pasynManager`.

# BSA Integration

APCI1710 (PCIe Based Incremental Counter)

BSA



# EPICS Version Information

This driver was developed with the following EPICS version environment:

ASYN\_MODULE\_VERSION=asyn-R4-26\_0

EPICS\_BASE\_VER=base-R3-14-12-4\_1-1

EVENT\_MODULE\_VERSION=evrClient-R1-0-p6

MISCUTILS\_MODULE\_VERSION=miscUtils-R2-2-2

# Linux Kernel Requirements

This driver was developed on the "Buildroot 2015.02" OS release, using Linux kernel 3.18.11 with real-time patches (LinuxRT). Two kernel modules are required.

Name	Origin
apci1710.ko	ADDI-DATA
apci1710ctr.ko	SLAC

Module apci1710 is used by module apci1710ctr. Thus one must insert module apci1710.ko into the Linux kernel before apci1710ctr.ko.

# Where to find the code

## Modules:

```
/afs/slac/g/lcls/epics/R3-14-12-4_1-1/modules/apci1710-asyn
```

```
/afs/slac/g/lcls/package/linuxKernel_Modules/apci1710ctrDriver
```

```
/afs/slac/g/lcls/package/linuxKernel_Modules/apci1710Driver
```

## Git Repositories:

```
/afs/slac/g/cd/swe/git/repos/package/epics/modules/apci1710.git
```

```
/afs/slac/g/cd/swe/git/repos/package/linux/drivers/kernel/apci1710ctrDriver.git
```

```
/afs/slac/g/cd/swe/git/repos/package/linux/drivers/kernel/apci1710Driver.git
```

# For Additional Information

ADDI-DATA Driver Development on Confluence:

<<https://confluence.slac.stanford.edu/display/~caf/ADDI-DATA+Driver+Development>>

ADDI-DATA Contact:

<[info@addi-data.com](mailto:info@addi-data.com)>

