

R7773

Shifter Register and Time Recorder



Features



- Intended for neutron counting applications with multiple detectors
- Dedicated to Nuclear Safeguards and nuclear material process monitoring in its life cycle
- 10 ns time stamp resolution
- 10 ns of pulse pair resolution and minimum pulse width detection
- 4 single-ended inputs on BNC connectors (TTL, 1000 Ω)
- 18 differential inputs on DB37 connector (LVDS, 100 Ω)
- High power high voltage supply output (+2000 V @1 mA)
- High power low voltage supply output (+5 V @ 1.5 A)
- microSD card slot for data logging in unattended operating
- 10/100T Ethernet and USB 2.0 interfaces
- Provided with readout software, SDK tool and web interface
- 19" rack form factor and suited for stand-alone use as well

Description

The **R7773** device is a Shift Register and Time Recorder able to acquire neutron detector pulse trains through a total of 22 inputs composed of 4 single-ended TTL (BNC) and 18 differential LVDS channels (DB37). It may provide the time-stamped list of pulses from neutron detector front-end electronics with 10ns pulse pairs resolution independently per each channel, shift register and multiplicity counter functionalities. The unit sampling clock is 100 MHz and each input has its independent buffer for signals acquisition.

The device can operate in attended and unattended mode. When in unattended operating, the results of coincidence and multiplicity analysis are automatically stored on a removable microSD card to ASCII files that follow the same format as the INCC data files (Neutron Coincidence Counting Program from Los Alamos*)

It is provided in mechanics compliant to 19" racks and can operated also stand-alone. The R7773 can connect to external host computers by point-to-point direct connection through the USB 2.0 link and by a remote network connection through the Ethernet 10/100T port. The internal CPU manages the board settings, the acquisition and the data transfer of the pulse train from each channel of the board to the host PC. The computational resources and data throughput allow the acquisition of a high total continuous input rate (up to $4 \cdot 10^6$ cps in attendend mode by Ethernet).

The device is equipped with high power outputs for multiple detector operation at once: HV output channel for the detector bias and LV output channel for powering the front-end electronics such as preamplifiers and discriminators.

The R7773 is fully supported by CAEN ShiftRegister control software which configures the device and handles the data acquisition. In attended mode, the recorded pulse trains can be saved to binary files on the host computer for offline analysis (supported PTR-32 format compatible with the INCC software*). It is also possible to import stored pulse trains and to execute coincidence and multiplicity analysis in post-processing. Users can take advantage of the provided CAENSR library for custom development. Firmware upgrade, file management and other useful functions are available through the integrated Web Interface.

*INCC Software Users Manual: <http://lib-www.lanl.gov/la-pubs/00326587.pdf>

Technical Specifications

PHYSICAL

From Factor

1.25U wide
compatible with 19" rack

Weight

2300 g

CONNECTORS

SGN[1:4]

4 signal inputs
Single-ended TTL ($Z_{in} = 1000 \Omega$)
BNC socket
Pulse width detected bigger than 10 ns

LVDS

18 signal inputs
Differential LVDS ($Z_{diff} = 100 \Omega$)
DB37 socket

HV

High Voltage output
SHV plug

LV

Low voltage output
BNC jack receptacle

SD

Memory slot for microSD card

USB

USB2.0 communication port
Type-B socket

ETHERNET

10/100T Ethernet port
RJ45 shielded jack

Power In

100 - 240 V

HVPS OUTPUT

Single channel for the detector power supply:
SHV plug
Output Bias Voltage (V_{set}) = $0 \div +2000$ V DC
Output Bias Current (I_{set}) = 1 mA (max.)
 V_{set} Resolution = 1 V
 V_{mon} Resolution = 1 V
 I_{mon} Resolution = 1 μ A
Ramp-Up/Ramp-Down = $1 \div 500$ V/s in steps of 1V

HVPS OUTPUT

Single channel for the detector power supply:
Output Bias Voltage (V_{set}) = $0 \div +2000$ V DC
Output Bias Current (I_{set}) = 1 mA (max.)
 V_{set} Resolution = 1 V
 V_{mon} Resolution = 1 V
 I_{mon} Resolution = 1 μ A
Ramp-Up/Ramp-Down = $1 \div 500$ V/s in steps of 1V

LOW VOLTAGE OUTPUT

Single channel for the preamplifier power supply:
+5 V @ 1.5 A (max.)

ON-BOARD CPU

ARM Cortex-A8 1 GHz (SDRAM Memory 512 MB DDR3L 800 MHz) running Linux Debian system

OPERATING MODES

Attended and unattended

DATA LOGGING

Removable 32GB microSD memory card for unattended operation
Raw data saved to ASCII files compatible with INCC data file format

SHIFT REGISTER

- Internal clock: 100 MHz
- Pulse pair resolution: bigger than 10 ns

BUTTONS AND INDICATORS

- Power (LED, green)
- HV ON (LED, red)
- EXT MODE (LED, yellow)
- Reset (button)

COMMUNICATION INTERFACES

Ethernet

10/100 Mbps

Compatible with IEEE
802.3u 100BASE-T standard

Configuration, operation,
and data taking in attended
mode

USB

Version 2.0

Configuration, operation and data taking in attended mode

SOFTWARE

- Windows® and Linux® support:
- Drivers for the communication links
- SDK tool including CAENSR library and demo code for custom development
- CAEN ShiftRegister control software
- Compatibility with INCC software
- Web Interface (Board information retrieval, files management, firmware upgrade)

POWER REQUIREMENTS

Integrated primary power supply unit 9-36V DC:

Voltage = 100 - 240 V ~

Frequency = 50/60 Hz

Current = 0.5 A RMS (max.)

FUSE = 2x T1A 6.3x32 250VAC

Related Products

R7780



CAEN Shift Register Multiplicity and Time Recorder



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