



Technical Information Manual

Revision n. 8
26 Nov 2013

A3818

*PCI EXPRESS
OPTICAL LINK*

CAEN will repair or replace any product within the guarantee period if the Guarantor declares that the product is defective due to workmanship or materials and has not been caused by mishandling, negligence on behalf of the User, accident or any abnormal conditions or operations.

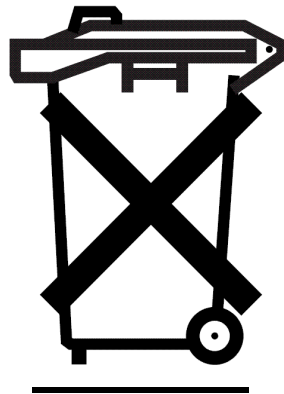
CAEN declines all responsibility for damages or injuries caused by an improper use of the Modules due to negligence on behalf of the User. It is strongly recommended to read thoroughly the CAEN User's Manual before any kind of operation.



CAEN reserves the right to change partially or entirely the contents of this Manual at any time and without giving any notice.

Disposal of the Product

The product must never be dumped in the Municipal Waste. Please check your local regulations for disposal of electronics products.



MADE IN ITALY : We stress the fact that all the boards are made in Italy because in this globalized world, where getting the lowest possible price for products sometimes translates into poor pay and working conditions for the people who make them, at least you know that who made your board was reasonably paid and worked in a safe environment. (this obviously applies only to the boards marked "MADE IN ITALY", we can not attest to the manufacturing process of "third party" boards).

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1 Overview



Fig. 1.1: A3818C PCI Express Optical Link Controller

The Mod. A3818 is a PCI Express x8 card that can plug into both x8 and x16 PCI Express slots (1.1 or higher) and allows to control up to 4 CONET2 independent networks.

CONET2 is an optical link based network (the communication path uses optical fiber cables as physical transmission line), with daisy chain capabilities (up to 8 nodes controlled by one link), and proprietary communication protocol.

Through the CONET2 it is possible to handle the VMEbus through the CAEN VMEbus Optical Link Bridges (such as the V2718) or to control directly CAEN modules with built-in optical link (such as the N67xx, DT57xx and V17xx digitizers).

IMPORTANT NOTE! CONET2 is not compatible with CONET1 network, an earlier optical link network (please read the Application Note “AN2472 - CONET1 to CONET2 migration” downloadable in the “Document Library” section of www.caen.it website).

The table below shows the A3818 orderable options.

Table 1.1: Available items

Code	Product	Description
WA3818AXAAAA	A3818A	PCIe 1 Optical Link
WA3818BXAAAA	A3818B	PCIe 2 Optical Link
WA3818CXAAAA	A3818C	PCIe 4 Optical Link

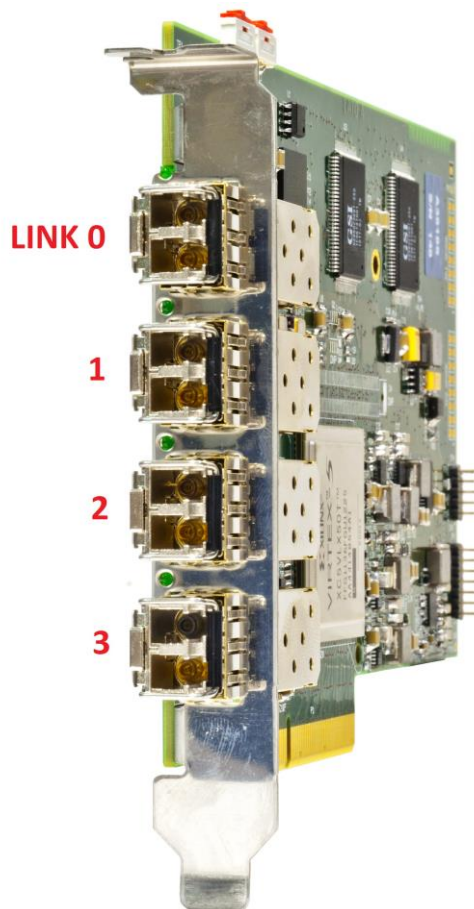
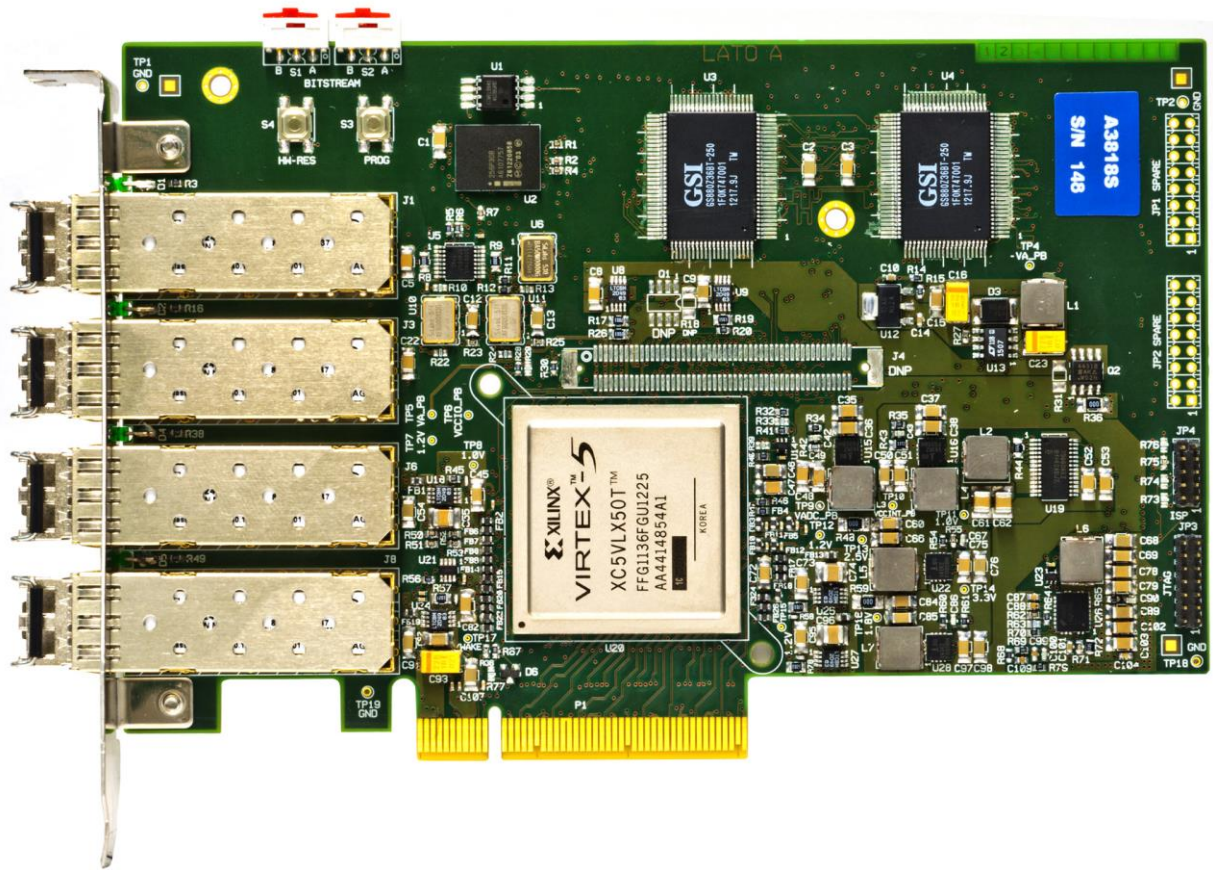


Fig. 1.2: Mod. A3818C – 4-link version of the PCIe Optical Link Controller

2 Technical Specifications

Table 2.1: A3818 Technical Specifications Table

ARCHITECTURE	PCI Express x8	
SLOT COMPATIBILITY	PCI Express x8, x16 (V1.1 or higher)	
PCI EXPRESS LANES	Lane Capability x8	Compatibility x1, x4 lanes slots
COMMUNICATION INTERFACE	Optical Link (CONET 2 CAEN proprietary protocol)	
NUM. OF OPTICAL LINKS	1 (mod. A3818A) 2 (mod. A3818B) 4 (mod. A3818C)	
NUM. OF BOARDS / LINK	Up to 8 boards can be controlled by a single CONET 2 link thanks to Daisy-chain capability	
TRANSFER RATE	Up to 80 MB/s	
MECHANICAL	Form Factor Half size	Dimension 106,65 x 167,65 mm (HxL) See Fig. 2.1
POWER RAILS	+12 V +3.3 V	
OPERATING SYSTEMS SUPPORTED	Windows® and Linux platforms	

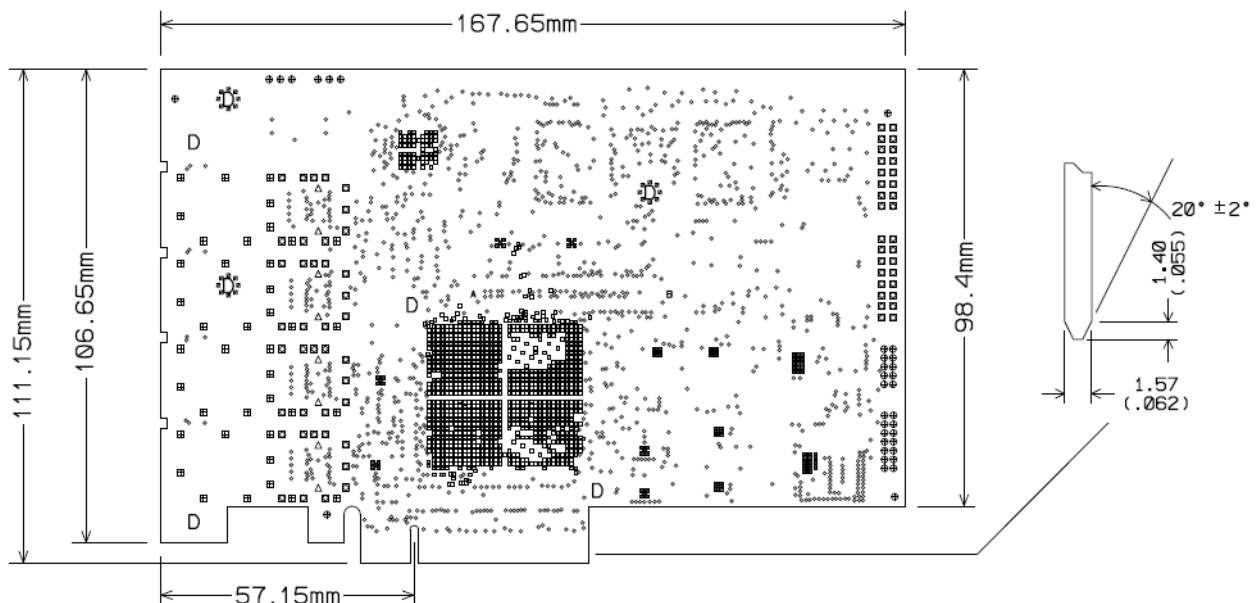


Fig. 2.1: A3818 Dimensional References

From Q3 2013, the PCB version in **Fig. 2.1** definitely substituted the old version (featuring 196,69 mm length). Both the PCB versions are declared to be full functionally interchangeable.

2.1 Transceiver Component



Fig. 2.2: The pluggable transceiver component of A3818

All A3818 types mount the Small Form Factor Pluggable (SFP) transceiver component shown in **Fig. 2.2**. The PCIe Controller is delivered with its transceiver components already plugged in and mechanically tested.

IT IS STRONGLY RECOMMENDED NOT TO UNPLUG THE TRANSCEIVER COMPONENTS!

2.1.1 Troubleshooting

In case the transceiver results partially or totally unplugged for whatever reason, the procedure to plug it back in, restoring the full functionality of the optical communication, is to push the component along its guide, fixed on the board, until a click occurs to guarantee the proper plug (see **Fig. 2.3**).

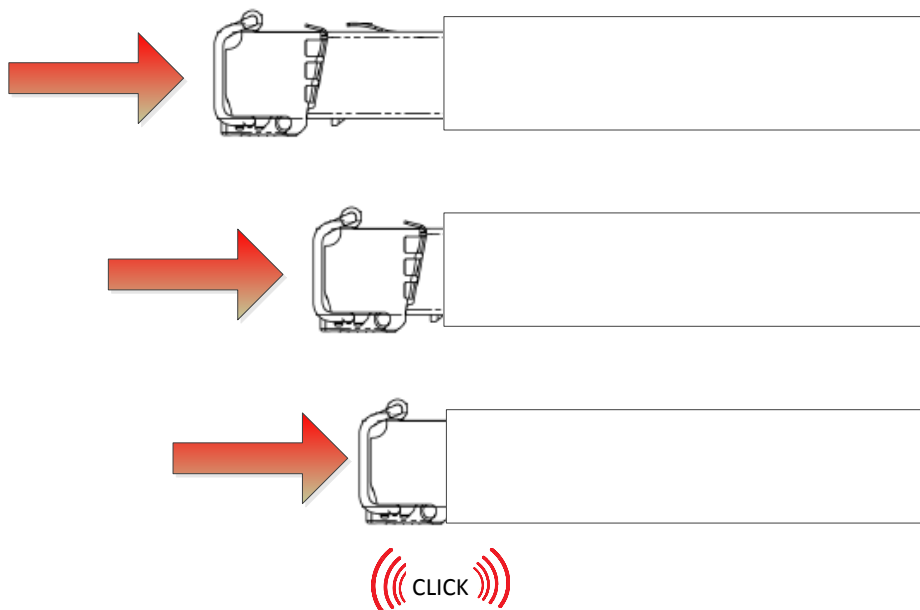


Fig. 2.3: Steps of the Optical Link transceiver plug-in procedure

The position of the adjustable front lever does not affect the plug-in procedure. In case of any need of support, please contact CAEN as indicated in § 3.8.

3 Configuration and installation

3.1 System requirements

Linux, Win32 and Win64 drivers are available.

3.2 Installation

The installation procedure is as follows:

- Plug the A3818 into a free x8/x16 PCI Express slot (1.1 or higher)
 - Connect the optical fibres as described in § 3.4.1
 - Turn ON the system
 - Go to www.caen.it and browse:
Home / Products / Modular Pulse Processing Electronics / PCI/PCIe / Optical Controllers / A3818
 - Click on the Firmware/Software tab
 - Download and install the driver that supports the used OS
 - Download and install the latest version of CAENVMElib (2.20 or higher)
- The new hardware will be detected; in order to start to use it:
- Reboot the system Now the network is ready to work.

In case of any need of support, please contact CAEN as indicated in § 3.8.

3.2.1 Note on driver upgrade in Windows OS

In case of upgrading an existing version of the A3818 driver, the recommended procedure is as follows:

- Stop the current *A3818CardManager* service through the path:
Task Manager->Services->Services Admin.
- Uninstall the *A3818 Virtual Device* through the Windows Device Manager, checking the option *Delete the driver software for this device.*
- Uninstall the *CAEN A3818 PCIe Card* through the Windows Device Manager, checking the option *Delete the driver software for this device.*
- Uninstall the A3818 driver setup through the *Control Panel.*
- Install the new release of A3818 drivers.

3.3 Components location

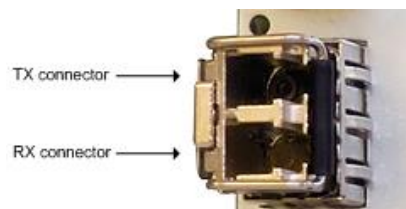


Fig. 3.1: Led and connector location

The A3818 has the following external components:

- TX/RX:** LC type connector (one per link); to be used with Multimode 62.5/125µm cable with LC connectors on both sides
- Leds:** green (one per link); data transfer, active ON

3.4 CONET2 Layout

Up to 8 Modules can be controlled by one CONET2 link; therefore a controller with four links can handle up to 32 modules. For this purpose, various types of cables are available:

Table 3.1: CONET2 cables specifications

Code	Product	Description
WAI2730XAAAA	AI2730	Optical Fibre 30 m. simplex
WAI2720XAAAA	AI2720	Optical Fibre 20 m. simplex
WAI2705XAAAA	AI2705	Optical Fibre 5 m. simplex
WAI2703XAAAA	AI2703	Optical Fibre 30cm. simplex
WAY2730XAAAA	AY2730	Optical Fibre 30 m. duplex
WAY2720XAAAA	AY2720	Optical Fibre 20 m. duplex
WAY2705XAAAA	AY2705	Optical Fibre 5 m. duplex

3.4.1 Network connection

- Connect the TX connector of the A3818 to the RX connector of the first Module of the CONET2 network, via the optical fiber cable, then connect the TX connector of the first Module of the network to the RX connector of the second Module (if existing) and so on, until the last module in the chain, whose TX connector must be connected to the A3818 RX connector; if only one Module is present, then its TX connector must be connected to the RX connector of the A3818. Link index starts from 0 (1st link in the 1st slot used, and so on, see picture below)
 - **Important note:** if also A2818s are installed, these ones have lower index number assigned
- Now the network is ready for operation.

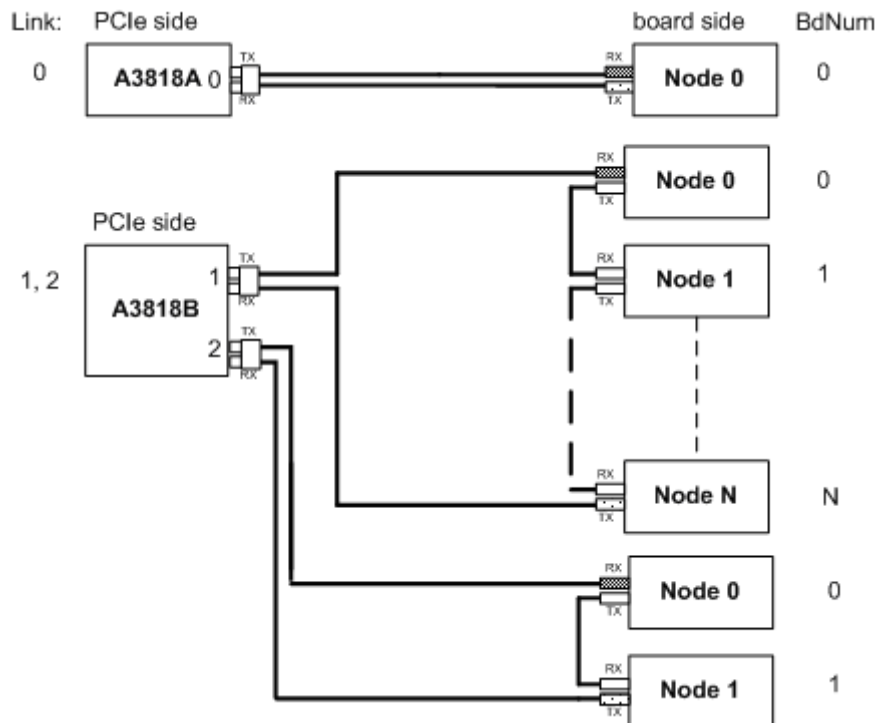


Fig. 3.2: Network scheme

3.5 Firmware upgrade

It is possible to upgrade the A3818 firmware by writing the Flash. The firmware file is a binary file (.bin) whose name follows this general scheme:

a3818_revX.Y.BIN

where X.Y is the major/minor revision number of the Flash.

Firmware upgrades are downloadable on CAEN website (www.caen.it) at:

Home / Products / Modular Pulse Processing Electronics / PCI/PCIe / Optical Controllers / A3818

CAEN provides the CAENUpgrader software tool to upgrade the firmware. Installation package and documentation are available for download on caen website (www.caen.it) at:

Home / Products / Firmware/Software / Digitizer Software / Configuration Tools / CAENUpgrader

Important Note: the A3818 can store four firmware image files on four pages (from 0 to 3) of a BPI Flash; the “Config Options” tab of the CAENUpgrader tool allows to select the BPI Flash page where the new image is going to be saved.

The picture below shows the CAENUpgrader settings for the A3818 firmware upgrade (Flash page “0” selected by default).

- Select the Bridge Upgrade tab in the CAENUpgrader GUI;
- select the Upgrade Firmware option in the “Available Actions” menu;
- select A3818 as option in the “Bridge Model” menu;
- browse for the .bin firmware file to load, that you stored on your disk drive (use “all files” option);
- select PCI MASTER as option in the “Connection Type” menu;
- select the “LINK number” of the A3818 (“0” for a single A3818 mounted in the PC).

Note: the LINK number parameter is described in the CAENDigitizer User & Reference Manual available on CAEN website (www.caen.it) at:

Home / Products / Firmware/Software / Digitizer Software / Software Libraries / CAENDigitizer Library

- select the number of the “Flash page” to store the firmware in;
- click the “Upgrade” button to perform the upgrade.

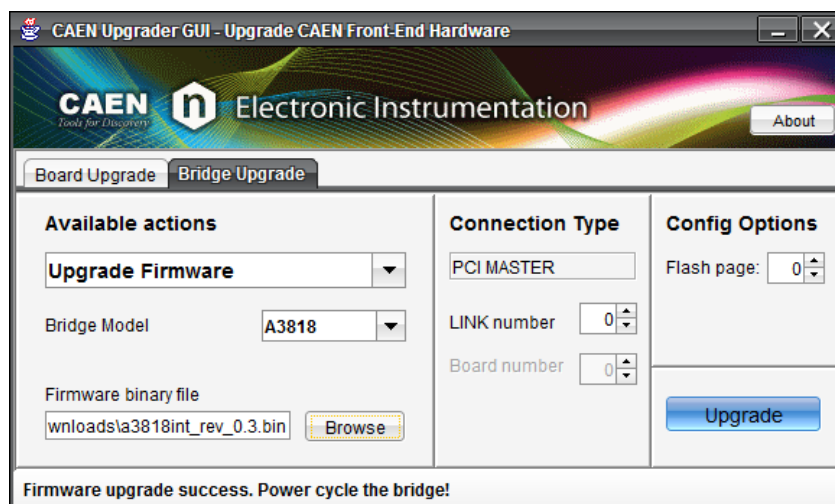


Fig. 3.3: CAENUpgrader tool

- Power cycle the Controller after the message given by the GUI.

Switches S1 and S2 on the A3818 printed board allow to select the image to run:

S2 = A, S1 = A -> firmware on page 0

S2 = A, S1 = B -> firmware on page 1

S2 = B, S1 = A -> firmware on page 2

S2 = B, S1 = B -> firmware on page 3

S1 and S2 setting is meaningless during the firmware upgrade procedure described above.

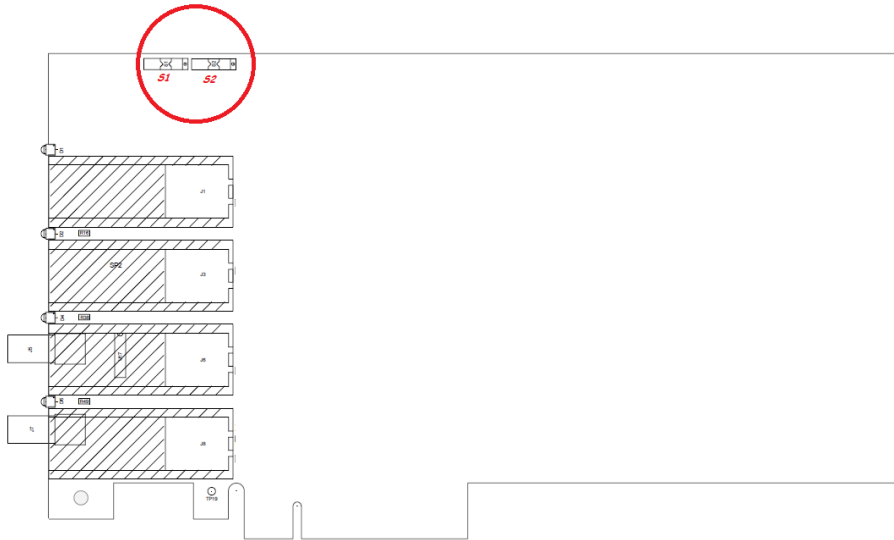


Fig. 3.4: S1, S2 switches location

By using the GET Firmware Release function in CAENUpgrader, it is also possible to read the version of the current firmware loaded on the Flash page selected by the switches above.

3.6 CAEN modules control

- VMEbus control through V2718 Bridge: refer to CAEN V2718 Bridge User's manual
- CAEN Digitizers control (all formats: VME, NIM and Desktop): refer to the CAENComm and CAENDigitizer libraries User's manual

3.7 CONET1 to CONET2 upgrade

CONET2 is not compatible with CONET1 network, therefore, in order to upgrade CONET1 compatible modules to CONET2 it is necessary to update the modules firmware by using the CAENUpgrader tool (see § 3.5).

3.8 CAEN Technical Support

CAEN makes available the technical support of its specialists at the e-mail addresses below:

support.nuclear@caen.it

(for questions about the hardware)

support.computing@caen.it

(for questions about software and libraries)