SCI-COMPILER

Visual Programming Language for Open FPGA

Empowering Science with Visual FPGA Programming

Sci-Compiler is a graphical design tool for creating custom firmware on CAEN Open FPGA boards—no HDL required. Its intuitive block-based interface makes it easy to build signal processing, trigger logic, and data acquisition systems, streamlining development for all users.

www.sci-compiler.com

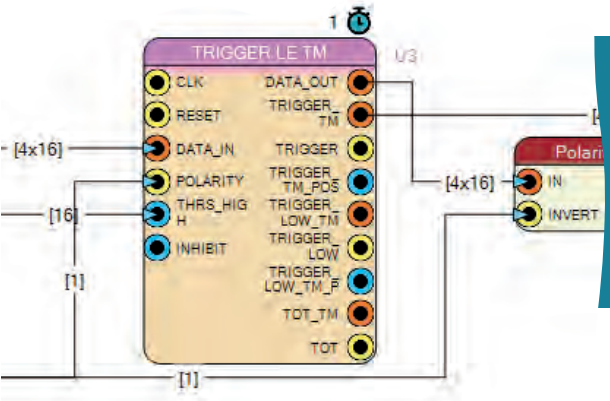
Block Building Interface

Code faster, Craft with block

Sci-Compiler uses a set of high-level functionalities (IP blocks) to mask the real firmware coding, which improves and speeds-up the R&D phase. Placing and interconnecting the available blocks on a diagram, it is able to automatically generate a VHDL code that implements the required function and deploy it to the FPGA.

100+ IPs blocks that works exactly as real laboratory instrumentations

Sci-Compiler includes over 100 high-level functional blocks designed to accelerate FPGA development for physics and instrumentation. Each block encapsulates a specific task from signal acquisition, digital logic and timing, to real-time analysis and data visualization. Users can implement TDCs, PSD algorithms, charge integrators, waveform viewers, scalers triggers, and logic units simply by connecting them in a graphical environment. These blocks emulate the behavior of real lab instruments, enabling rapid prototyping. With Sci-Compiler, firmware becomes modular, scalable, and ready for advanced applications in minutes.



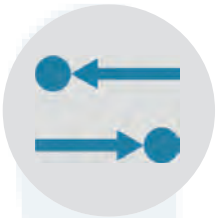
30+ Math IPs

20+ Signal Analysis IPs

15+ DAQ IPs

A complete set of tools!

Sci-Compiler comes with 100+ virtual blocks that works exactly as real laboratory instrumentation.



I/O Interface

Control Digital and Analog Input/Output of the hardware devices.

Math Library

Basic and advanced math operations.

Oscilloscope

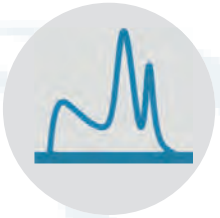
Probe signals of each acquiring channel, even in the middle of the processing chain.

Logic Gate

A rich library that contains coincidence logic, boolean functions, Gate and Delay, counters, timers, scaler, frequency meters, array of bit manipulation.

Trapezoidal Filter

Trapezoidal filter allows to achieve the optimum resolution on HpGE and PMT detectors.



Online Spectrum

Energy/Time Spectrum can be calculated onboard. Online spectrum allows readout thousands of channels per second.

Analog Shaper and Peak Stretcher

Library for signal conditioning useful in advance digital signal processing.

State Machine

Define sequential states, transitions triggered by events/conditions and actions per state.

Automatic Firmware Code Simulation

simulate with Ease

Sci-Compiler allows users to simulate firmware code, providing rapid feedback on how the implemented Signal Processing Algorithm performs. Users can inject custom inputs into the simulation and set probing points within the block diagram. This enables real-time monitoring of the electrical signals at specific locations within the system.

Resource explorer

debugging mode effortless

Sci-Compiler offers a built-in tool, called Resource Explorer, to connect one of the supported boards and test the features of the FPGA firmware. This tool allows to manage all Local Bus readout blocks placed in the firmware diagram, therefore it gives the possibility to read and write the configuration registers.

Sci-SDK for Developers

make your next great Software!

Sci-SDK Library is a software development kit (SDK) to help developers program their own applications for CAEN hardware running Sci-Compiler firmware. It includes a collection of software tools, libraries, and examples for different programming languages (such as C++, C#, Visual Basic, Python, LabVIEW, Matlab), as well as documentation and technical support.

Remote Customization Service

No need of local components!

Allows to generate the firmware code exploiting the computing power on CAEN server, with no **need of any local FPGA compiler.**

Using a single Sci-Compiler license, it is possible to deploy firmware for **MULTIPLE COMPATIBLE BOARDS** that have been activated through a **RUNTIME LICENSE**.

Stay **UP-TO- DATE** with the newest Sci-Compiler features by subscribing the **multi year upgrade service.**

Firmware Everywhere

Locally or remotely? It's on you.

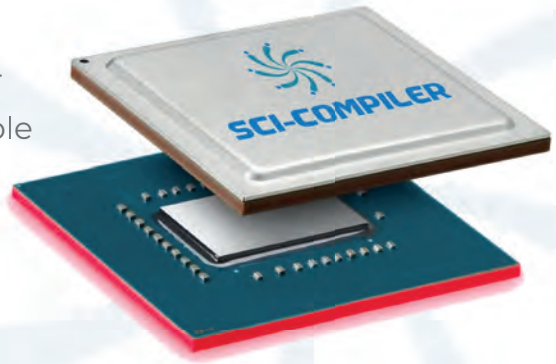
The Remote Customization Service (RCS) offered by CAEN is a convenient service that enables users to effortlessly obtain a firmware for their target board using the Sci-Compiler software. This eliminates the need for users to acquire, configure, or manage any additional resources on their own. By utilizing this service, it greatly improves the development process of FPGA firmware by offering a versatile solution that delivers quick results, enabling easy scalability when required.

One tool, multiple boards.

With Sci-Compiler you can design powerful FPGA firmware using a graphical interface and run it on a wide range of CAEN boards. From compact development kits like the DT1260 to advanced digitizers such as the x27XX digitizer family, R5560, DT5560, Sci-Compiler supports multiple hardware platforms out of the box. The DT1260, with its dual-channel 12-bit 65 MS/s ADC, is an ideal starting point to explore, develop and debug your designs.

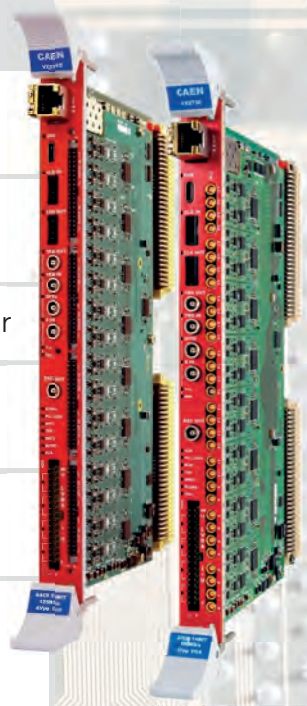
Open FPGA CAEN Board

Sci-Compiler has been designed to generate code for the new CAEN Digitizer generation and Programmable Logic Board. Presently, Sci-Compiler supports the following CAEN products.



Supported CAEN Models:

Model	Input Channels	Description
x5560	32 or 128 analog input ch.	14-bits 125 MS/s Open FPGA Digitizer
x2730	32 / 16 / 8 analog input ch.	14-bits 500 MS/s Waveform Digitizer
x2751	16 / 4 analog input ch.	14-bits 1 GS/s Waveform Digitizer
x2740/x2745	64 / 8 analog input ch.	16-bits 125 MS/s Waveform Digitizer
DT5571	1 analog input ch.	14-bit 200 MS/s Open FPGA Digitizer
V2495 and DT5495	Up to 162 inputs or 130 outputs (depending on configuration)	Programmable Logic Unit
DT5550W	Up to 32 / 64 / 128 analog input (depending on configuration)	Open FPGA Readout System based on Weeroc ASIC
N1082	24 inputs and 16 outputs	Programmable Logic Unit



Licensing Plans

All Sci-Compiler version allows not only to learn FPGA coding with block-diagram method, but also to test the functionalities on a real device. Sci-Compiler trial is a full version software, free to try on any supported board with firmware time-bomb of 30 min.

Smart Plan

EVALUATION, EDUCATION

Sci-Compiler software with dedicated support, latest update, remote or local compilation for DT1260 hardware only.

- Basic Hardware
- Up to 2 Channels
- RCS*

Pro Plan

LABS, EXPERIMENTS

Sci-Compiler full version with a dedicated Open FPGA hardware for evaluating and testing.

- High-spec Hardware
- Unlimited channels
- RCS priority*
- Support for upcoming Hardware
- Flexible upgrade plans

** Remote Customization Service (RCS)*

Evaluation and Learning kit for Sci-Compiler (SMART)

Sci-Compiler SMART is composed of **a Sci-Compiler license** and a **basic hardware** (DT1260 unit), designed for the exact purpose of evaluating the software and learning how to design custom firmware using the block diagram method. It includes:

- 1x **DT1260**, 2 Channel, 65 MS/s, 12 bit ADC unit with Open FPGA.
- 1x Sci-Compiler Lite license working with the DT1260 unit only.

The kit allows to develop both FPGA firmware for custom digital pulse processing and software application for data readout, using the generated libraries.

SCI-COMPILER

The firmware generator tool
that anyone can use.

SCAN
ME

Scan the qrcode and try a free license!

Nuclear Instruments

CAEN
Tools for Discovery

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