

# SL1091A Scienlab Energy Storage Discover

Test and control software



## SL1091A Energy Storage Discover Software

Successfully developing and manufacturing batteries requires a software environment for performing comprehensive tests that provide actionable insights. Test software needs to be mature, stable, and intuitive, allowing users to conduct tests that deliver concrete and reproducible test results.

Scienlab Energy Storage Discover (ESD) is the software solution for satisfying these complex and comprehensive test procedures. We continually discuss advances in battery technology with our customers and update our software to address the latest industry trends and their associated test challenges.

## Get started quickly

Start making measurements today! Each “program” is a list of step-by-step instructions that mirror a manual process. More complex tasks can be split into simpler pieces using subroutines, variables, and battery models.

- Debug offline using a simulation environment.
- Connect quickly to battery test system via Ethernet.
- Install a simple single license per workstation.



**Figure 1.** PC running ESD at test bench.

## Adopt to current processes

ESD controls your test system and can monitor and control external devices like thermal chambers, valves and pumps. ESD can be controlled by an over-arching test manager using WCF, REST, and XML technologies.

- Learn once, ESD controls all Keysight Scienlab cell, battery, and pack test systems.
- Control and monitor temperature chambers, and safety equipment using Scienlab Measurement and Control Modules (MCMs).
- Manage laboratory components and ESD tests with the help of PathWave Lab Operations for Battery Test.

## Gain insights quickly

Monitor key voltages and currents before you start your test. Once you start your test, view each step along with critical voltages and currents. Tests can be paused, stopped, and restarted. Once a test is complete review the results in tables and graphs.

- Analyze results with tables and graphs.
- Correlate measurement and environmental data.
- Export results in common formats including Matlab.

# Features

## Test programming

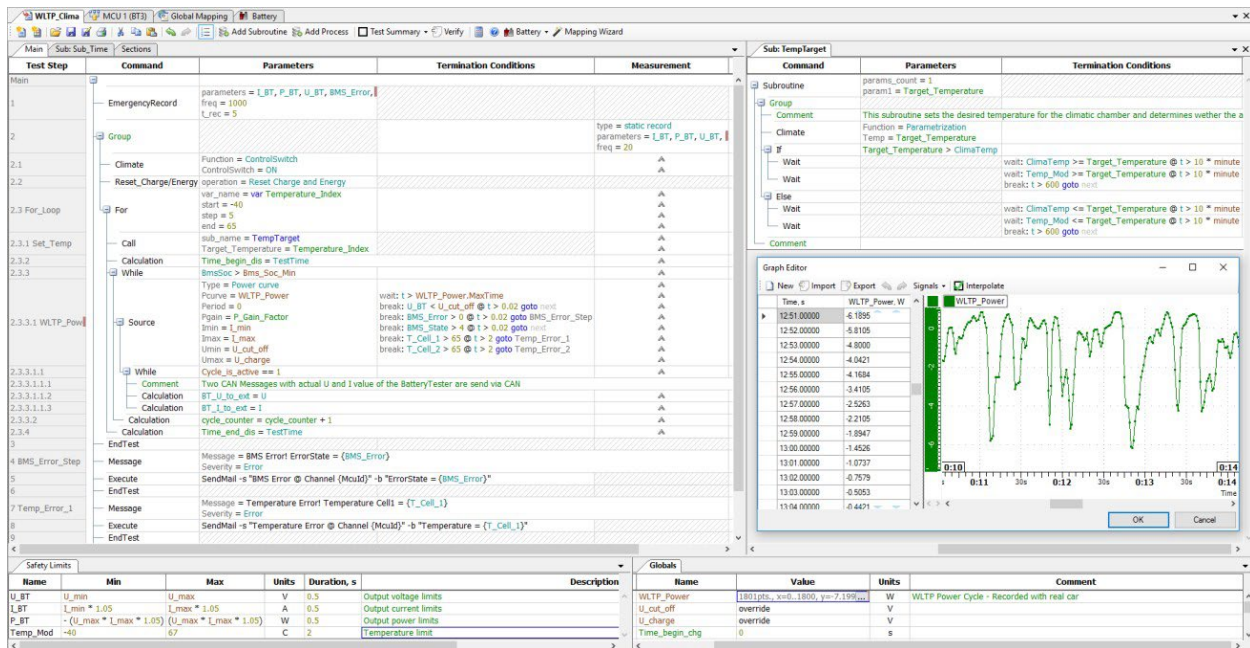


Figure 2. Intuitive programming in ESD.

User-friendly software facilitates a shorter learning curve, whether you are creating a simple or complex program. Highly structured code includes battery models and subroutines that allow sharing and re-using code.

- Self-explanatory test program solutions allow the generation of simple and complex tests.
- Syntax-check and verification options during programming help to develop test programs faster.
- Maintain structured test processes with the help of sub-routines and management of test libraries.
- Create and bind the battery database with “battery types” and “battery individuals.”
- Use chronological value tables or simulate a drive profile, import .csv or .txt files.
- Send emails from ESD while a test is running to notify the operator of the progress.
- Further characterization of batteries with optional impedance spectroscopy and cyclic voltammetry.
- Define parallel processes with independent execution of different actions during a test run.
- RestBus simulation with Battery Management System (BMS) simulation tables.

# Test execution

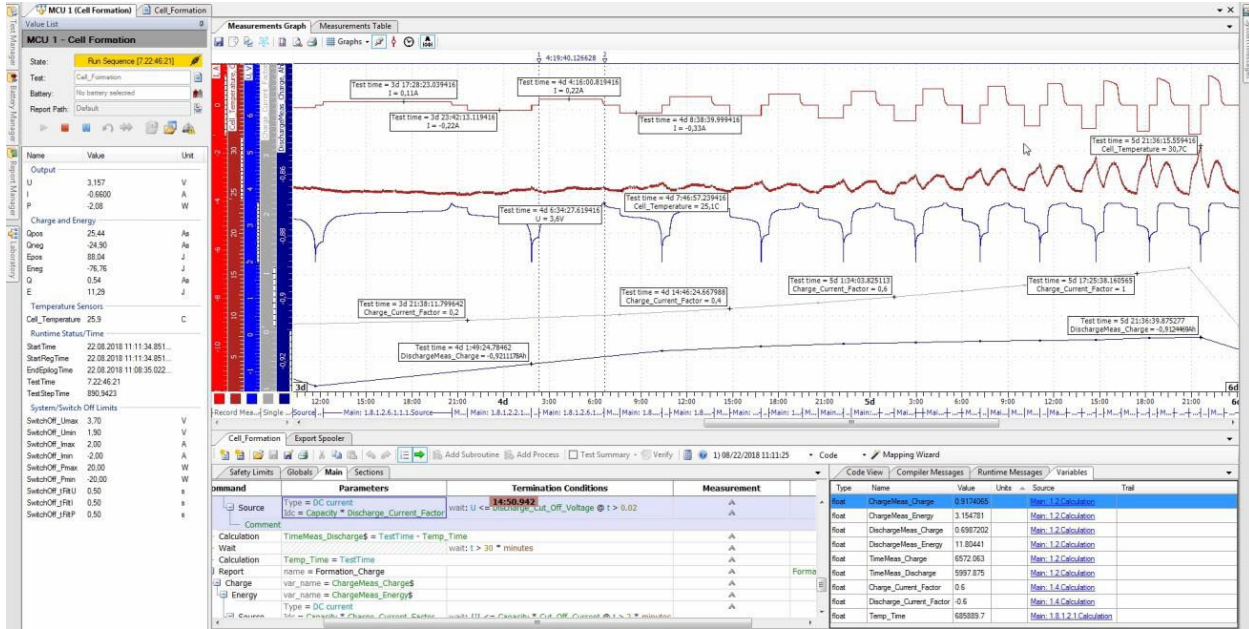


Figure 3. The execution of a test in ESD.

Control and adjust your test at any time. Make decisions based on measurements displayed during run time or make programmatic changes based on calculated values.

- New parametrization of the test program during run time along with the ability to incorporate the calculated values and results into the subsequent test procedures.
- Monitoring the test environment with a detailed view for each channel.
- Control of the test run process through start, stop, pause, and reset functions and to jump into any required test step.
- Change the global and battery constant source parameters to run time calculated values, measurements or BMS values advanced through CAN, while the source is active with a 1 ms reaction time.<sup>1</sup>
- Communicate with the BMS directly during the test run procedure using a XCP utility.
- Comprehensive statistical and arithmetic calculations during test run procedure.

1. Not available for the SL1700A Series Scienlab Battery Test System – Pack Level.

# Test analysis

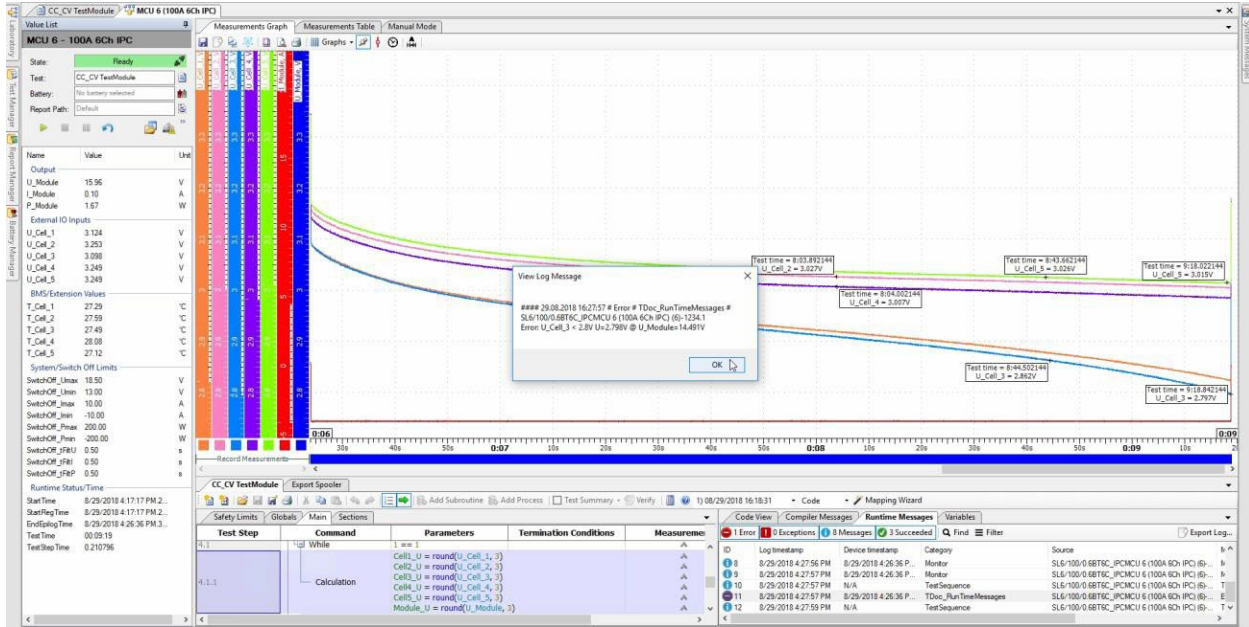


Figure 4. Easy analysis and visualization of measurement data.

Analyze your measurement data and present it in straightforward, easy-to-understand tables and graphs. Easily export your data using standard data formats to your favorite analytic software.

- Target relevant, and user-friendly analysis software without post processing.
- Record measurements at a constant rate, up to 20 kHz or as a dynamic record (switch low/high – data rate or delta measurement capture).
- Save measurement data as \*.MAT file for additional processing in MATLAB.
- Generate a test summary with all relevant information and results.
- Export selected measurement as .csv, .txt and as pictures (.jpg, .png etc).
- Optional standalone ESD report viewer for measurement analysis.

Clear visualization of measurement data simplifies spotting trends over time or comparing multiple test runs.

- Vivid and clear visualization of the measurements using tables and graphs, during the complete tests, to provide fast and easy analysis of large data volumes.
- Direct estimation and immediate comparison of several test run procedures in a single graph.
- Display and representation of measurements over time or measurements over measurements.
- Shared time stamps for carrying out time synchronous measurement analysis.

# System and Installation Requirements

## Computer operating system<sup>1</sup>

Microsoft Windows	<ul style="list-style-type: none"><li>• Windows 10, 64-bit (Professional, Enterprise, Education, Home versions)</li><li>• Microsoft .NET Framework Version 4.6 + Language Pack</li><li>• Windows administrator rights are required to install ESD.</li></ul>
Computer hardware <sup>2</sup>	<ul style="list-style-type: none"><li>• RAM: 8 GB minimum, 16 GB recommended</li><li>• Processor: Core (i3/i5/i7/i9) or equivalent</li></ul>
Interfaces	USB, GPIB, LAN, RS-232

1. Permanent NTP server access for ESD and the Measurement and Control Units (MCUs) of the channels is assumed. If there is no connection, e. g. due to a time server configuration error, the test report will be stored with a wrong time stamp and possibly with a wrong date.
2. The computer must not change over to stand-by or hibernation during active operation. This requirement may be defined under Windows/Energy options.

## Software Maintenance Contracts

### R-09S-012-A SW Maintenance Contract ESD - 12 Months

For the first six month after initial operational handover, all updates are free of charge.

This SW maintenance contract is valid for 12 months. It includes free access to updates for:

- ESD: new releases and patches
- Price per license/system
- Validity: 12 months, follow-up agreement can be renewed during this period

### R-09S-024-A SW Maintenance Contract ESD - 24 Months

Content like item number R-09S-012-A

For the first six month after initial operational handover, all updates are free of charge.

This SW maintenance contract is valid for 24 months. It includes free access to updates for:

- ESD: new releases and patches
- Price per license/system
- Validity: 24 months, follow-up agreement can be renewed during this period

## R-09S-036-A SW Maintenance Contract ESD - 36 Months

For the first six month after initial operational handover, all updates are free of charge.

This SW maintenance contract is valid for 36 months. It includes free access to updates for:

- ESD: new releases and patches
- Price per license/system
- Validity: 36 months, follow-up agreement can be renewed during this period

## ESD Customer Training

### PS-S40-02 ESD software remote training (2 days)

For cell-/module-/pack-test benches.

#### Participants would be able to

- Program test cases in ESD
- Get knowledge of basic functionalities of ESD control software
- Select test cases and start tests
- View and analyze measured data online
- Analyze measured data after test run
- Interpret test cases
- Create test reports (diagrammed and textual) and export tests

#### Module ESD-control software

- Introduction in ESD interface (GUI)
- Setting up personal workspace
- Introduction of main components and workflow
- Introduction to command- and control-library and necessary parameters
- Setup of sub-routines and function libraries
- Usage of system- and interface extensions
- Integration of Scienlab Measurement and Control Modules
- Dynamic parametrization of sources and termination criteria
- Program test cases to test specifications (test cases will be used in module test bench control)
- Analysis of measured values
- Export of measured data
- Illustration of measured data in report viewer
- Duration: 2 working days

Requirement: Internet connection and possibility to set up the WebEx client

Requirement for the participants: Basic knowledge of programming

## General training information – remote

Virtual training tailored for each participant.	
Duration of training	2 working days
Participants	Max. 5
Individual adaption after consulting	

## PS-S40-02 ESD software and user training (2.5 days)

For cell-/module-/pack-test benches.

### Participants would be able to

- Program test cases in ESD
- Get knowledge of basic functionalities of ESD control software
- Select test cases and start tests
- View and analyze measured data online
- Analyze measured data after test run
- Interpret test cases
- Create test reports (diagrammed and textual) and export tests

### Module ESD-control software

- Introduction in ESD interface (GUI)
- Setting up personal workspace
- Introduction of main components and workflow
- Introduction to command- and control-library and necessary parameters
- Setup of sub-routines and function libraries
- Usage of system- and interface extensions
- Integration of MCMs
- Dynamic parametrization of sources and termination criteria
- Program test cases to test specifications (test cases will be used in module test bench control)
- Analysis of measured values
- Export of measured data
- Illustration of measured data in report viewer
- Duration: 2 working days

Requirement: Seminar room with projector

Requirement for the participants: Basic knowledge of programming



### Module test bench control

- Introduction into test system
- Explanation of hardware and system construction
- Running test cases on real device under test (DUT)
- Duration: 0.5 working days

Requirement: Operative test system

### General training information – on-site

At customers site in a seminar room (incl. projector) and at test system.	
Duration of training	2.5 working days
Participants	Max. 5
Incl. seminar documents	
Individual adaption after consulting	

## Extend the Capabilities of Your Software Solution

### Scienlab Battery Test Systems

#### SL1700A Series Scienlab Battery Pack Test Systems

Keysight's SL1700A Scienlab Battery Pack Test System tests high-power battery packs comprehensively to improve functionality and safety. The growing demand for e-mobility increases the need for comprehensive battery test labs dedicated to EV battery development. Keysights SL1700A Series accelerates the development and validation of batteries. It offers a voltage range of up to 1500 V and power options between 90 and 270 kW. The new high-voltage silicon carbide (SiC) technology provides high energy efficiency in a small footprint and helps to minimize your operating costs.

Find out more about the Pack Level Series [here](#).

## SL1001A Scienlab Battery Module Test System

The SL1001A Scienlab Battery Module Test Systems can test both modules and cells. It has the capacity to test up to 12 battery modules for automotive and industrial applications.

- Test up to 12 batteries up to 300 V, 750 A
- Purchase a single system for both cell and battery test
- Four quadrant option for symmetrical cell and zero-volt cell testing
- Lower operating costs due to energy savings

Find out more about the Module Level Series [here](#).

## SL1007A Scienlab Battery Cell Test System

Accelerate lab throughput with fast, accurate testing of up to 64 cells using the SL1007A battery cell test system (25 to 1600 A). Our purpose-built Energy Storage Discover software helps you automate common compliance, load, and endurance tests. The system hardware provides excellent accuracy, ensuring precise capacity, efficiency, internal resistance, and cell lifespan measurements. The high-resolution dynamic output produces a realistic power profile, for example, emulating EV driving to characterize cell behavior and performance.

Find out more about the Cell Level Series [here](#).

## SL106XX Series Scienlab Measurement and Control Module

The Scienlab SL106XX Series covers a wide range of test, measurement, and control tasks. If required, you can combine your measurement task and scope. They are ideal for carrying out challenging measurement tasks, even under difficult environmental conditions, for example, a climate chamber. The modules offer top quality, robustness, and easy and intuitive operation.

- Precise, reproducible, and time-synchronous measurement data recording
- Fully electrically isolated measurement channels up to 1000 V insulated between each channel
- Connection via open Ethernet interface; automatic detection of Scienlab Energy Storage Discover (ESD) software
- Easy to use in challenging test environment (-40 to +80 °C, IP20)
- Individual combination of different measurement module types

Find out more about the Scienlab Measurement and Control Modules [here](#).

# Software to Control Your Battery Test Lab

Keysight provides battery test system software that starts with Scienlab Energy Storage Discover to control your individual battery test systems such as the SL1700A Series and extends to PathWave Lab Operations for Battery Test to manage and coordinate your entire battery testing laboratory with multiple systems used to test cells, modules, and battery packs.

## EP1150A PathWave Lab Operations for Battery Test

PathWave Lab Operations for Battery Test enables efficient planning and coordination of your entire battery test laboratory. It manages all resources, including test facilities, test systems, and your test objects or devices under test (DUTs). PathWave Lab Operations for Battery Test provides an integrated, web-based lab management platform that helps you modernize your test workflows, eliminating legacy paper-based processes, and increasing data integrity and traceability.

This powerful set of tools helps you to improve test throughput for all the cells and batteries you need to test, to fulfill the testing requirements for your projects on-schedule, and to optimize test asset utilization:

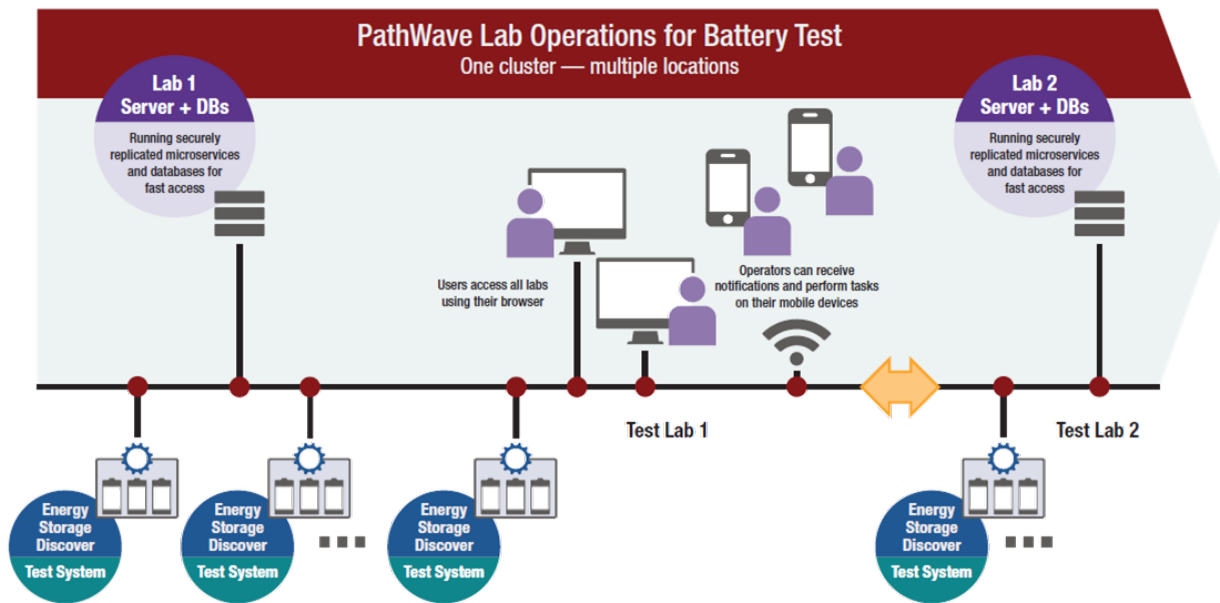


Figure 5. PathWave Lab Operations for Battery Test manages multiple test systems in a laboratory.

- Easily register and track test objects in your lab.
- Quickly analyze your data and statistics.
- Organize your test lab workflow, documents, lab orders, and tasks.
- Plan and optimize your test capacities and sequences.
- Share and control test plans, results, data, and other documents. Collaboration and discussion among lab staff become easy and productive.
- Remotely control your lab and its devices anywhere, anytime.
- Manage and route notifications to your preferred device or email service.
- Automated, networked, and scalable for any size of testing lab – up to thousands of channels.

Find out more about PathWave Lab Operations for Battery Test [here](#).