

# SL1047A-HP4 Scienlab Charging Discovery System – High-Power Series

EV & EVSE Test



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# Solution Overview

The Keysight SL1047A-HP4 Scienlab Charging Discovery System – High-Power Series (CDS HP Series) represents the second generation of Keysight's proven high-power charging test platform, delivering exceptional performance, flexibility, and scalability for validating fast charging technologies up to 800 A and 1,500 V DC.

Engineered for conformance, interoperability, and functional testing of Electric Vehicle (EV) and EV Supply Equipment (EVSE) interfaces, the CDS HP Series supports all major global charging standards and communication protocols:

- CCS (Type 1, Type 2, NACS)
- GB/T
- CHAdeMO

A detailed list of supported charging versions, is provided in the respective data sheets for [SL2000A](#), [SL1470A](#), [SL1471A](#), and [SL1300A](#).

Furthermore, the SL1047A HP4 is recognized as certified [CharIN Conformance Test System \(CCTS\)](#) for Basic and Extended application profiles, supporting industry recognized conformance and interoperability processes required for CCS based EV and EVSE validation.

The system's modular architecture allows you to start with a baseline of 400 A and 1,000 V DC and expand seamlessly as testing needs evolve. Voltage configurations of 1,000 V or 1,500 V DC and current options of 400 A, 600 A, and 800 A DC can be upgraded in the field without returning hardware, ensuring maximum uptime and minimal operational disruption.

Combining future proof upgradeability with the precision and reliability expected from Keysight, the CDS HP Series is the ideal solution for OEMs, Tier 1 suppliers, test laboratories, and charging infrastructure manufacturers looking to accelerate development cycles and ensure robust, standards-compliant high-power charging performance.

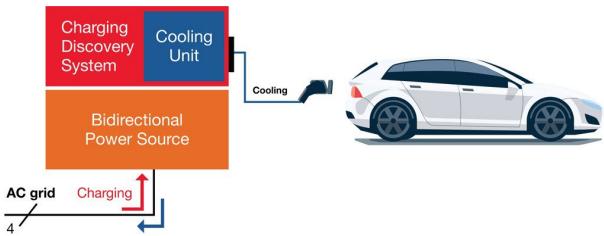
Additional CDS variants, such as EMC shielded, portable, or megawatt-level solutions, described in the corresponding data sheets available on our website for [charging test equipment and solutions](#).

# Main Use Cases

## EV Test

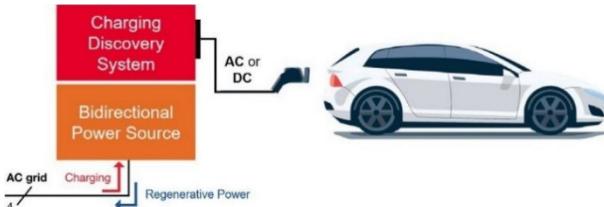
### Use Case 1a: EV Test with Cooling Unit incl. Liquid-Cooled Charging Adapter

The CDS HP Series, in combination with the separate cooling unit and interchangeable liquid-cooled charging adapters, can emulate a high-power charging infrastructure of up to 800 A DC. It can be used for functional testing of the charging interface of any EV, as well as for safety, interoperability, conformance, and durability tests.



### Use Case 1b: EV Test without Cooling Unit

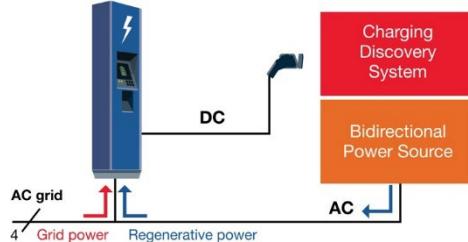
The CDS HP Series can be used as a configurable charging infrastructure (e.g., DC charging station or AC wallbox). The EV test, conducted without a cooling unit and using a non-cooled charging adapter, is designed for testing up to 400 A DC and 100 A AC (as per supplier specifications). It can be used for functional testing of charging interfaces of any EV, as well as for safety, interoperability, conformance, and durability tests.



## EVSE Test

### Use Case 2: EVSE Test

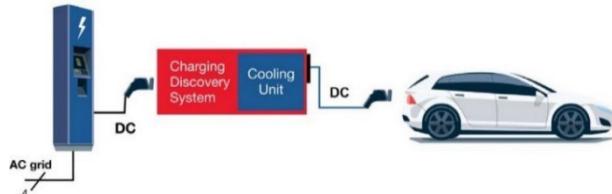
In this use case, the CDS HP Series serves as a universal, configurable charging interface emulation of an EV. Designed to accommodate plug-ins for up to 500 A DC and 100 A AC. Again, this allows functional, safety, interoperability, conformance, and durability testing of any EVSE product.



## Man-in-the-Middle Test

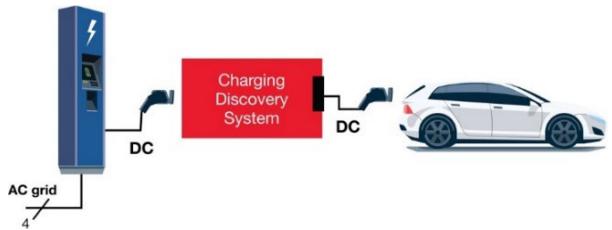
### Use Case 3a: Man-in-the-Middle Test with Cooling Unit incl. Liquid-Cooled Charging Adapter

In this third use case, the CDS HP Series is connected between two real devices to capture all electrical signals and digital communication between an EVSE and EV. The user can identify and trace potential interoperability issues.



### Use Case 3b: Man-in-the-Middle Test without Cooling Unit

This use case is identical to the one above, except that it does not require a separate cooling unit for the simultaneous use of high-power EVSE and EV.



Note: Some illustrated use case setups show the CDS HP Series operated together with a liquid cooling unit. A customized cooling unit can be ordered to match your specific test requirements. For details and availability, please contact your local Keysight account manager.

# Configuration Examples

When ordering CDS hardware, it is essential to consider the specific use case and test scope. For certain applications, such as testing an EV or EVSE with a maximum charging power of 300 kW, the CDS HP Series alone may be sufficient. If tests with EV are to be performed using high-power charging, the CDS HP Series is combined with an additional cooling unit and a liquid-cooled charging adapter to support charging power of up to 800A DC. The following table shows three examples of CDS HP Series configurations.

## Example 1: CDS HP Series with Cooling Unit and High-Power DC Supply for EV Test

For high-power DC charging scenarios, the CDS HP Series can be combined with a cooling unit and high-power DC Emulators (DCE) up to 800 A DC. This setup enables EV testing across the full available power range.



## Example 2: CDS HP Series and High-Power DC Supply for EVSE Test

By integrating the CDS HP Series with high-power DC Emulators (DCE) up to 800 A DC, EVSEs can be tested confidently across their entire high-power operating range.



## Example 3: Stand-Alone CDS HP Series

In few use cases, a stand-alone CDS HP Series configuration is fully sufficient. It enables AC and DC man-in-the-middle analysis as well as comprehensive testing of V2G and CAN communication protocol.

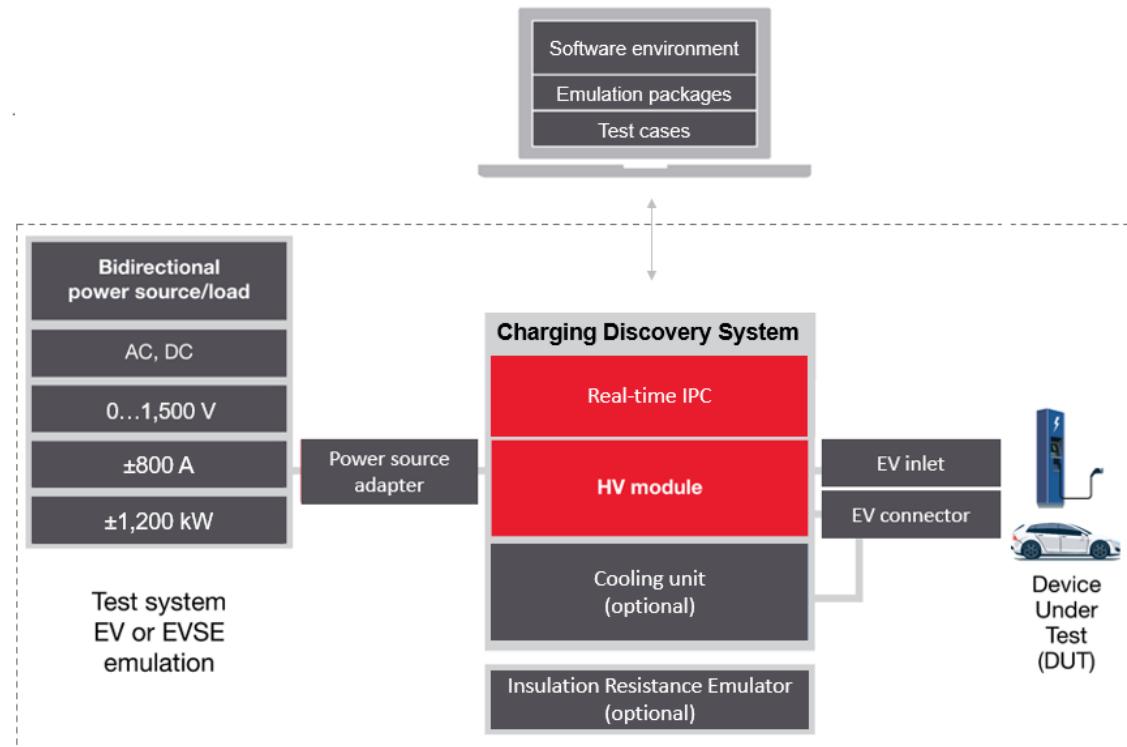


Note: For illustration purposes, the application photos feature the predecessor model SL1047A-HP3.

# Modularity of the Solution

This chapter provides a detailed examination of the modularity of the CDS HP Series, focusing on components from the real-time computer to the high-voltage module. Figure 1 provides a generic overview of this modularity. This data sheet details the components highlighted in the red sections of the diagram. The components shown in dark gray, representing extended functionality and optional system expansions, are described in their respective data sheets.

For information on accessories such as power source adapters, EV inlets, and EV connectors, please refer to the dedicated [EV Charging and EVSE Plug-In Adapter](#) data sheet. Information about the operating software environments, including all associated emulation packages and conformance and interoperability test cases, is provided in the respective data sheets for [SL2000A](#), [SL1470A](#), [SL1471A](#), and [SL1300A](#).



**Figure 1.** Modularity of the SL1047A-HP4 Scienlab Charging Discovery System – High-Power Series

## Optional Licenses for Voltage and Current Performance

Start with the SL1047A-HP4 Scienlab Charging Discovery System – High-Power Series in its baseline configuration of 400 A / 1,000 V DC. The system performance can be expanded step-by-step through incremental upgrade licenses as testing requirements evolve.

To increase the voltage range to 1,500 V DC, the SL1047A-UP1 option can be added at any time.

For higher current performance, the SL1047A-IP1 license increases the capability to 600 A DC. The SL1047A-IP2 license builds on IP1 and extends the current range to 800 A DC. Both licenses (IP1 and IP2) are required to achieve 800 A.

All upgrade options are applied in the field, no hardware return is required, ensuring uninterrupted operation and maximum system availability.

To configure an 800 A / 1,500 V DC CDS HP Series, the following incremental options must be combined: SL1047A-HP4 + SL1047A-UP1 + SL1047A-IP1 + SL1047A-IP2.

Item Number	Description	Current (A DC)	Voltage (V DC)
SL1047A-HP4	Scienlab Charging Discovery System - High Power Series	400	1,000
SL1047A-UP1	Upgrade from 1,000 V to 1,500 V DC	-	1,500
SL1047A-IP1	Upgrade from 400 A to 600 A DC	600	-
SL1047A-IP2	Upgrade from 600 A to 800 A DC	800	-

## SL1047A-HP4 Scienlab Charging Discovery System – High-Power Series

Figure 2 shows the front panel of the SL1047A-HP4 CDS HP Series. This panel features several key components, including the real-time computer, the high-voltage module, and a cassette slot designed for EV adapters or EVSE inlets.



**Figure 2.** SL1047A-HP4  
Scienlab Charging Discovery  
System – High-Power Series

## Real-Time Computer in a 19" Plug-In Unit

The following figure illustrates the same front panel, with a spotlight highlighting the real-time computer in a 19" plug-in unit.



**Figure 3.** Real-time computer  
of the CDS HP Series

## General Functions

- Real-time computing control unit with high system performance and low dead times.
- Standard-compliant emulation of the EV or EVSE charging communication controller; programmable using documented interfaces.
- Fault injection at the control and proximity pilot (idle and short circuit).
- Man-in-the-middle mode for analyzing the charging communication interface between EV and EVSE.
- Keysight software drivers allow easy integration of Keysight power sources and sinks.

## PWM Functionality

- Measurement of the PWM level on the EVSE and EV sides.
- Emulation of the EVSE signal generator with adjustable positive or negative amplitude, frequency, and duty cycle.
- Testing of the PWM signal with respect to level, edge steepness, frequency, and duty cycle.
- Variation of the Control Pilot's (CP) line impedance with switchable parallel resistors and capacitors.
- Emulation of the vehicle side with freely programmable resistance at the CP within the specified resistance decade according to IEC 61851-1.
- Fault injection: control pilot line break and short circuit to Protective Earth (PE).

## GB/T and CHAdeMO Signals

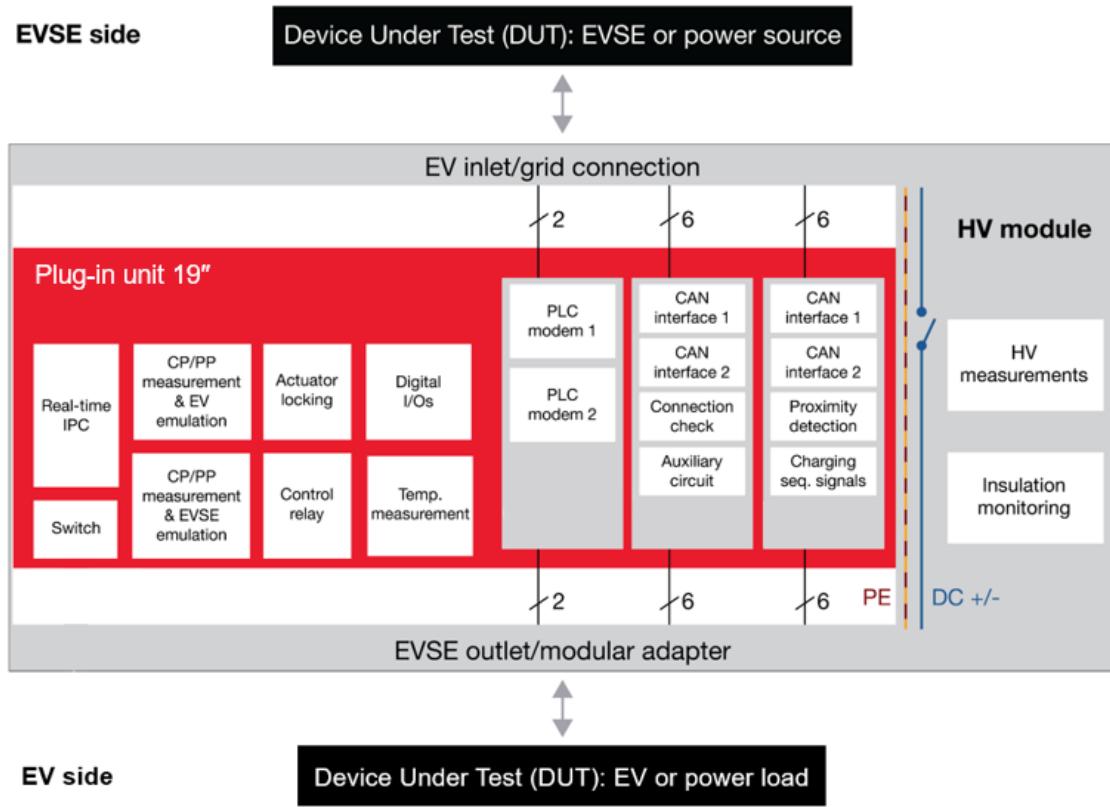
- CAN high and CAN low signals
- GB/T communication signals (CC1 and CC2, A+, A-)
- CHAdeMO communication signals
- All signals are provided by two DSUB 15 mating plugs that are divided into EV and EVSE sides.

## Proximity Pilot (PP)

- Measurement and interpretation of the resistance of the PP for coding the current rating of the charging cable.
- Emulation of the PP resistance (during EVSE emulation)
- Fault injection: Line break and short circuit to PE

## System Architecture

The CDS comprises several internal electronic functional groups designed to meet EV and EVSE requirements. The following block diagram shows the system architecture:



**Figure 4.** Block diagram of the CDS architecture

## High-Voltage Module

The High-Voltage (HV) module connects the control unit to the DUT, i.e., vehicle and/or charging infrastructure. Several variants are available to fulfill different worldwide standards. In addition to country and standard-dependent DUT contacting, the HV module is incorporated in a 19-inch housing, current transducers, safety components, and power contactors for AC and DC.

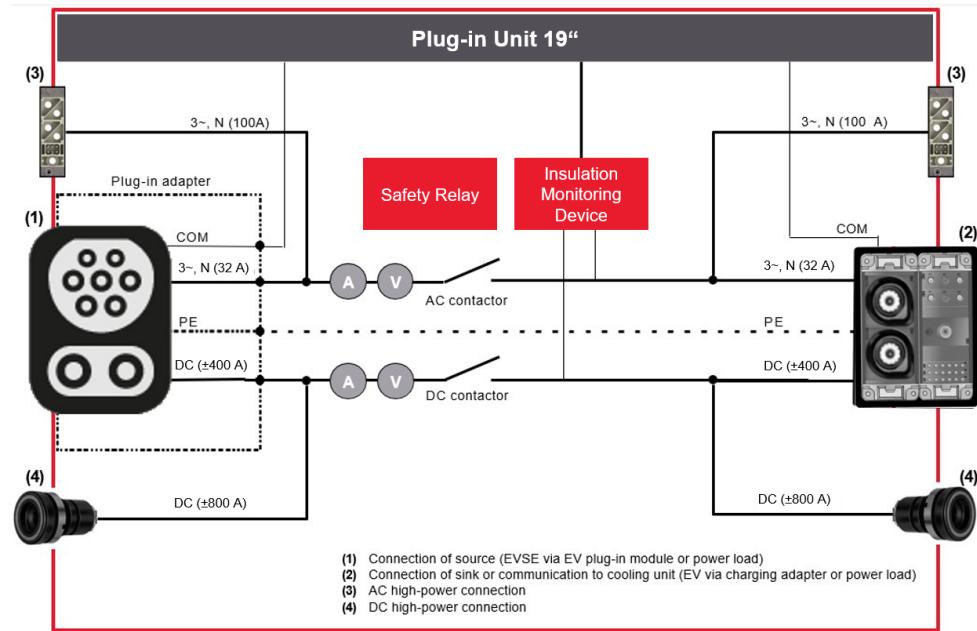
For high-power charging applications, the HV module features special high-power DC connectors that facilitate easy connection to the cooling unit. Additional high-power AC contactors allow testing up to 100 A AC per phase.



**Figure 5.** HV module of the  
CDS HP Series

Note: If the HV module is ordered without an EVSE inlet (see further details in the [EV Charging and EVSE Plug-In Adapter](#) data sheet, the EVSE/source port on the left side of the front panel will be covered by a blank front plate.

The figure below provides a detailed illustration of the components and interfaces of the HV module within the CDS HP Series.



**Figure 6.** HV module within the CDS HP Series

## Interfaces

Operating buttons	fast stop (safety shutdown)
(1) Connection EVSE/external source	via EVSE inlet or AC/DC high-power connection <sup>1</sup>
(2) Connection EV/external load	via EV charging adapter <sup>1</sup>
(3) AC high-power connection	0 to 520 V <sub>L-L</sub> rms/0 to 300 V <sub>L-N</sub> rms
(4) DC high-power connection	100 A rms (per phase)
HV measuring	1,500 V DC / 1,000 V DC

1. For more information, refer to the [EV Charging and EVSE Plug-In Adapter data sheet](#).

Note: The voltage and current carrying capacity rating may be limited by the attached EV adapter or EVSE inlet.

# Technical Data

## System Data SL1047A-HP4

### System Characteristics

Model number	SL1047A-HP4
Dimension (H x W x D)	1,290 x 650 x 555 mm
Weight	165 kg
Heat dissipation (environment)	max. 500 W (Standby, without 1,200 kW HV)
Protection class	IP20, type 1 Enclosure (UL50E)
Available storage space for log files/traces	max. 400 GB (up to 200 hours testing records)
Recommended recalibration period	12 months

### Operating Conditions

Ambient temperature (operation)	5 to 40 °C
Ambient temperature (transport/storage)	-25 to +55 °C
Relative humidity	max. 80% (non-condensing) for temperatures up to 31 °C, decreasing linearly to 50% (non-condensing) at 40 °C
Noise level	< 70 dB (A) at 1 m from the front
Maximum operating altitude	2,000 m AMSL

### Mains Supply

Voltage supply	100 to 240 V AC ( $\pm 10\%$ ), 50 or 60 Hz ( $\pm 2\%$ )
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### Interfaces

Electrical isolation	Consistently between power supply, electronics, measuring technology, and DUT PE
Measuring taps – Control pilot EV	BNC socket
Measuring taps – Control pilot EVSE	BNC socket
System status – Status LEDs	3 LEDs (monochrome)
EV – Status LEDs	Status of EVCC (RGB) and Power Line Communication (PLC) modem

## Specifications

Unless otherwise noted, specifications are warranted over the ambient temperature range of 5 °C to 40 °C after a 30-minute warm-up period. Specifications apply at the output terminals. Accuracy specifications are warranted for a period of one year.

Electrical Specification		Value
AC ratings	Voltage	0 to 300 V <sub>L-N</sub> rms
	Current	0 to 520 V <sub>L-L</sub> rms
	Power	100 A rms (per phase)
		±90 kW
DC ratings	Voltage	±1,500 V
	Current	±800 A (continuous)
	Power	±1,200 kW

Output Ratings	Measurement Range	Range	Accuracy
AC ratings	Measurement category CAT III 300 V		
	Voltage (L1-N, L2-N, L3-N)	0 to 300 V <sub>L-N</sub> rms	±0.5 V offset ±0.25% of reading
		0 to 520 V <sub>L-L</sub> rms	
	Current (L1, L2, L3, N)	0 to 100 A rms	± 0.1 A offset ±0.5% of reading
DC ratings	Voltage (DC, DC-PE)	±1,500 V	±1 V offset ±0.2% of measurement value
	Current	±1200 A	±0.1 A offset ±0.1% of measurement value

Communication Signals		Range	Accuracy
Control pilot parameter	<b>EVSE</b>		
	Voltage programming	±1 to 14,5 V, res. 0.01 V	±0.02 V
	Frequency programming	0 Hz; 100 to 1,200 Hz	±1 Hz (High range mode)
		0 Hz; 800 to 1,200 Hz	±0,1 Hz (High resolution mode)
	Frequency measurement	0 Hz; 100 to 1,200 Hz	±1 Hz (High range mode)
		0 Hz; 800 to 1,200 Hz	±0,1 Hz (High resolution mode)
	Duty cycle programming	0;1-99;100%	0.2%
	Duty cycle measurement	0;2-98;100%	±0.5% (High range mode) ±0.2% (High resolution mode)
	Rise time measurement	1 to 30 µs	±1 µs
	Fall time measurement	1 to 30 µs	±1 µs
	Resistance programming (R1)	1 to 8,000 Ω, resolution 1 Ω	±1% for 1-599 Ω ±0.1% for 600 to 8,000 Ω
	<b>EV</b>		
	Frequency measurement	0 Hz; 100 to 1,200 Hz	±1 Hz (High range mode)
		0 Hz; 800 to 1,200 Hz	±0,1 Hz (High resolution mode)
	Resistance programming (R2 II R3)	1 to 25,000 Ω, resolution 0.5 Ω	±1% for 1-749 Ω ±0,1% for 750-25,000 Ω
	Duty cycle measurement	0;2-98;100%	±0.5% (High range mode) ±0.2% (High resolution mode)
	Rise time measurement	1 to 30 µs	±1 µs
	Fall Time measurement	1 to 30 µs	±1 µs
	<b>EV/EVSE</b>		
	Voltage measurement	± 15 V	±0.01 V
Proximity pilot parameter	<b>EVSE</b>		
	Resistance programming	0 to 16,000 Ω, res. 1 Ω	±1.0%
	<b>EV</b>		
	Resistance programming (R5)	0 to 8,000 Ω, res. 1 Ω	±1.0%
	<b>EV/EVSE</b>		
	Resistance measurement	0 to 4,600 Ω	±2.0% of range
GB/T CC1	<b>EVSE</b>		
	GB/T EVSE_set_CC1_pullup-resistance (R1 or R1+R2)	1 to 8,000 Ω, resolution 1 Ω	±1% for 1-599 Ω ±0,1% for 600-8,000 Ω
	EVSE_set_CC1_pullupvoltage (U1)	±1 to 14,5 V, res. 0.01 V	±0.02 V
	EVSE_get_CC1_voltage (DP1)	±15 V	±0.01 V
	<b>EV</b>		
	EV_set_CC1_resistance (R4 or R4+R6)	1 to 25,000 Ω, resolution 0.5 Ω	±1% for 1-749 Ω ±0,1% for 750-25,000 Ω
	EV_get_CC1_voltage (DP3)	0 to 15 V	±0.1 V
GB/T CC2	<b>EVSE</b>		
	Adapter_set_CC2_resistance (R3)	0 to 8,000 Ω, resolution 1 Ω	±1.0%
	<b>EV</b>		
	EV_set_CC2_pullup-resistance (R5)	750 to 1,250 Ω, res. 1 Ω	±1.0%
	EV_set_CC2_pullupvoltage (U2)	0 to 14 V, resolution 0.01 V	1.0%
	<b>EV/EVSE</b>		
	EV_get_CC2 Voltage (DP2)	± 15 V	± 0.01 V

## Supplemental Characteristics

Supplemental characteristics are not warranted but are descriptions of performance determined either by design or by type testing. All supplemental characteristics are typical unless otherwise noted.

Output Ratings Measurement Range	Range	Accuracy
DC ripple (0 to 150 kHz)	Voltage	0 to 20 Vpp ±0.1 V offset ±0.2% of value
	Current	0 to 20 App ±0.1 A offset ±0.25% of value

Communication Signals	Range	Accuracy
Control pilot parameter	<b>EVSE</b>	
	Maximum rise/fall time	max. 2 µs at Cc = 0 pF
	Minimum settling time to 95% of the steady state	3 µs at Cc = 0 pF
	Capacitance programming	low / 1,600 / 1,800 / 3,100 pF
	<b>EV</b>	±5% of value
	Capacitance programming	low / 1,500 / 2,400 / 3,900 pF
	Voltage Diode programming	0.55, 0.7, 0.85 V
	<b>EV</b>	±5% of value
	Pullup voltage programming (Proximity voltage)	0.5 to 6 V
Proximity pilot parameter	<b>EVSE</b>	±0.5%
	Set_A+/A-_voltage	0 to 30 V
	I_max_A+/A-_voltage	0 to 6 A
	<b>EV/EVSE</b>	-
	Get A+/A-_voltage	0 to 30 V
		±1%

In addition to the technical data, the CDS HP Series provides the following functions:

### Control Pilot:

- Oscillator status programming (EVSE)
- State measurement (EV/EVSE)
- Open circuit programming (EV/EVSE)
- Short circuit programming (with < 1 Ω) (EV)

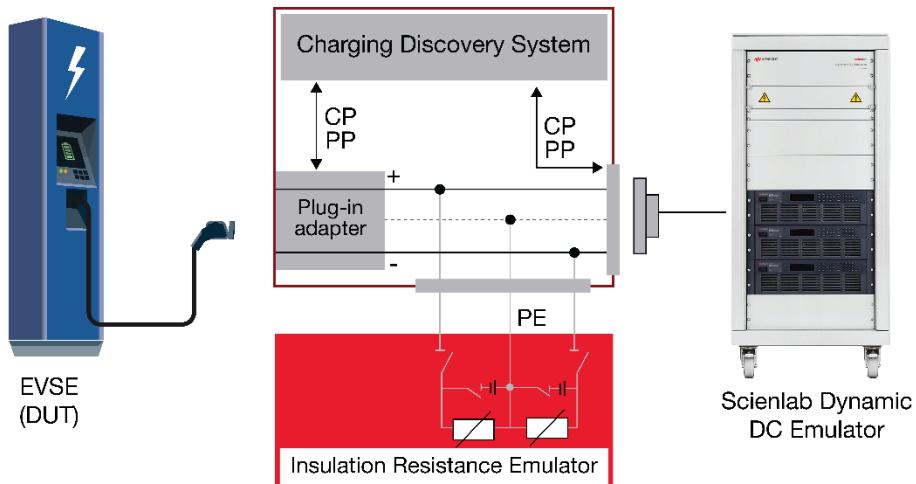
### Proximity Pilot:

- Short circuit programming (EV/EVSE)
- Open circuit programming (EV/EVSE)

# Keysight Hardware Option

## SL1040A-IRE Scienlab Insulation Resistance Emulator

For testing the insulation monitoring function of a vehicle or charging station, a variable resistance is connected between DC+ and PE, and between DC- and PE, via the Charging Discovery System (CDS). The Scienlab Insulation Resistance Emulator (IRE) can be used to systematically emulate an insulation fault. The IRE may only be used in combination with the CDS and is shipped with an example test case for EVSE testing.



**Figure 7.** System topology including the SL1040A-IRE and SL1041B Scienlab Dynamic DC Emulator

### System Characteristics

Dimension (H x W x D)	220 x 520 x 600 mm
Weight	approx. 25 kg
Protection class	IP40
Recommended recalibration period	12 months
Adjusting range per R-cascade	500 $\Omega$ to 2 M $\Omega$
Step width per R-cascade	500 $\Omega$
Max. adjustment deviation at 1 k $\Omega$ to 1 M $\Omega$	1% of adjusted value + 60 $\Omega$
Adjusting range per C-cascade	0 to 3.5 $\mu$ F
Step width per C-cascade	0.5 $\mu$ F
Max. adjustment deviation at 0.5 $\mu$ F to 3.5 $\mu$ F	5% of adjusted value
Rges_min (software limit for current limitation)	$U_{bat} / I_{max}$
Max. operating voltage	1,000 V DC
Self-protection	Minimum total resistance DC+ to DC- limited by software 32 mA fuse

# Project Management and Commissioning Services

The following services are offered by Keysight to ensure a smooth laboratory delivery, installation, commissioning, and reduce ramp-up time for our customers. The exact definition of services depends on the facilities, customer expertise, and overall scope of the project. Please work with your Keysight sales representative to discuss your specific needs.

## PS-XPM-100-SL Project Management Services

Keysight recommends project management services, which provide an experienced project manager dedicated to your project and serving as a direct communication interface between Keysight and your project management team.

The project manager takes over responsibility for:

- Defining and controlling the project schedule, critical path, and following project milestones
- Consulting with the customer to progress through relevant design, installation, safety, installation, commissioning, and acceptance planning phases.
- Communicating the project status regularly and ensuring any unscheduled project events or project deviations are communicated and promptly discussed with the customer project team
- Coordinating applicable delivery, installation, and commissioning on-site
- Providing complete and accurate project documentation to the customer

## PS-XCOM-100-SL Project Commissioning Services

Project commissioning services for the test solution include an experienced test bench engineer to validate and complete the test bench setup, ensuring it is ready for the customer's initial usage. It includes validating specific hardware and software configurations per the project requirements and any specific consulting agreed upon between Keysight and the customer.

This service includes:

- Inspection of hardware/laboratory after installation
- Validation of software/network communication at test benches
- Validation of electrical installation, system connections to applicable associated workcell hardware, and a complete commissioning checklist
- Validation of the applicable safety and system interlocks matrix
- Support in commissioning the test system and instructions on how to use it
- Presence of an experienced test bench engineer during the first usage of the test bench

## Startup Assistance

Startup assistance is flexible instruction designed to get your team up to speed quickly, by providing training with an introduction to your new solution from Keysight Technologies. The goal of this assistance is to familiarize you with the hardware and software tools within your solution so that you can adapt it to your own specific application and test cases. Training takes place at your site and focuses on instrument fundamentals and operations starter training. Detailed topics can include:

### **Basic Training - 1-Day Training on the Introduction to the Hardware**

- Switching a system on, the order of the instruments
- Getting a system in ready mode (software & hardware)
- Resetting the system & safety matrix after an emergency off
- Connect cables to DUT
- Setting up a system in software and starting a test
- System care

### **Advanced Training - 1 or 2 Days of Advanced Use of the Software**

- Programming examples and exercises
- Details on system warnings/errors and how to react to them

### **Premium - Custom # of Days**

Custom content based on customer needs

# Solution Service Description Summary

KeysightCare for solutions services goes beyond basic warranty, providing a priority-one connection between our resources and your teams. Every support tier includes access to the Keysight Support Portal and Knowledge Center, where you can find answers, manage service requests, and interact with Keysight experts familiar with the instruments and software you are using and the challenges you face. All the packages offer onsite options for large systems that cannot be moved.

- **Warranty Plus** – Reduce risk and avoid project delays with technical support coverage
- **Assured** – Increase supportability to match your application needs with a committed turnaround time.
- **Enhanced** – Keep your project schedules on track and receive priority support and even faster turnaround times for repairs and calibration to optimize your solution.

Support Agreement Description	KeysightCare Warranty Plus for Solutions *	KeysightCare Assured for Solutions	KeysightCare Enhanced for Solutions
	Onsite R-55T-005-X <sup>1</sup>	Onsite R-55U-005-X <sup>1</sup>	Onsite R-55V-006-X <sup>1</sup>
<b>Solution Technical Support (Hardware and Software <sup>2</sup>)</b>			
Keysight Support Portal	24x7 access to Knowledge Center, calibration certificates, service requests, and other asset details.		
Remote technical support response times <sup>3</sup>	≤ 2 business days	≤ 4 business hours	≤ 2 business hours
Onsite technical support <sup>4</sup>		•	•
<b>Solution Hardware Support</b>			
Repair service coverage	Onsite	Onsite	Onsite
Repair service turnaround or response time	No commitment	≤ 12 business days response time <sup>6</sup>	≤ 5 business days response time <sup>6</sup>
Solution calibration service <sup>5</sup>			Up to Keysight Calibration + Uncertainty + GuardBanding Onsite
Calibration service turnaround time			Scheduled
Proactive firmware release notification		•	•

\* Only offered for solutions where Assured and Enhanced support levels are not yet available.

1. When ordering, update with the relevant (Solution Product Number (SPN) based on the length of service required (e.g., -1, -2, -3, or -5 for 1 year, 2 years, 3 years, or 5 years.
2. KeysightCare Software Agreement required for software support.
3. Remote Technical Support response time is measured from the time you contact the KTAS team to have an initial meaningful response from the case owner.
4. Onsite technical support is provided at the discretion of Keysight
5. The recommended recalibration period is 12 months
6. Response time is measured from the date the service request is received to the date Keysight arrives at your site.

Please note: Not all services are available on all solutions. See the [Service Definition Tool](#) for services available for your Keysight solution.

# Extend the Capabilities of Your Test Solution

## Meet the Charging Discovery System Family of Solutions

### Accelerate Your Charging Interface Testing and Validate Charging Behavior Across EV and EVSE

Keysight's Charging Discovery System Series (CDS) supports the latest adapters and protocols used with Electric Vehicles (EVs) and Electric Vehicle Supply Equipment (EVSE). As use cases, standards, and protocols evolve, our modular, upgradeable portfolio will help you ensure conformance and interoperability today and tomorrow.



**Figure 8.** From left to right: SL1040A EMC CDS, SL1047A High-Power CDS, SL1040A Portable CDS, and SL2600A Megawatt CDS with EV and EVSE test

- Configure the CDS to meet your specific needs and replace multiple real EV/EVSEs with a single test solution.
- Address R&D and type-approval applications with automated functional, conformance, interoperability, safety, and quality testing.
- Automate and accelerate conformance testing with pre-programmed test cases.
- Gain a comprehensive view of current and voltage measurements, as well as charging communication.

Find out more about the SL1040A Scienlab CDS Series [here](#).

Find out more about the SL1047A Scienlab CDS – High-Power Series [here](#).

Find out more about the SL2600A Megawatt CDS [here](#).

# Meet the SL2000A Charging Discover Software

## Accelerate Your Charging Interface Testing Operations

The SL2000A software is essential for operating the CDS hardware with Keysight AC/DC emulators, offering functionalities such as visualizing measured values, recording test sequences, and generating comprehensive reports. Additionally, it is important to note that the Charging Discover Software is not licensed; instead, licenses are activated directly on the CDS hardware, ensuring seamless integration and operation.



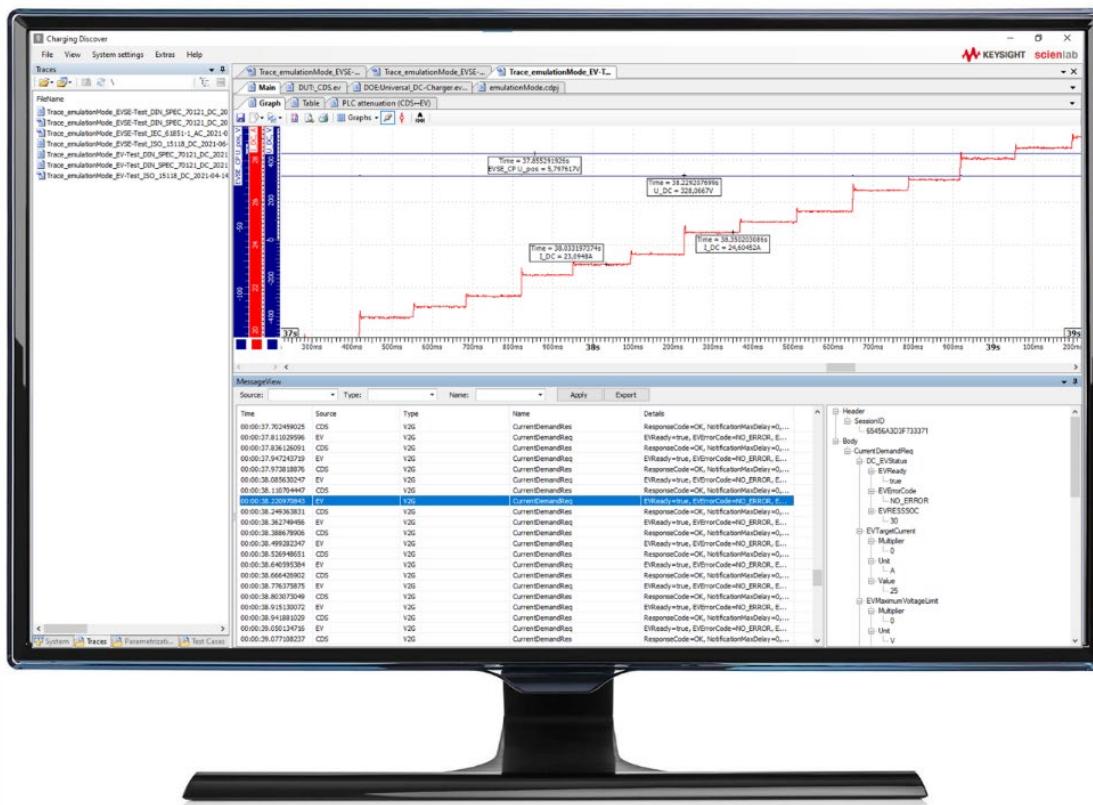
**Figure 9.** SL2000A Charging Discover Software

Find out more about the SL2000A Charging Discover Software [here](#).

# Meet the SL1300A Charging Discover Test Packages

## Perform Conformance and Interoperability Testing with Test Suites

The SL1300A Charging Discover Test Packages include comprehensive test cases for all key charging conformance and interoperability standards. Each test package is developed according to the official specification and carefully verified with all CDS hardware configurations and every software release version. Hence, it is the quickest and simplest way to get valid test results out of the box.



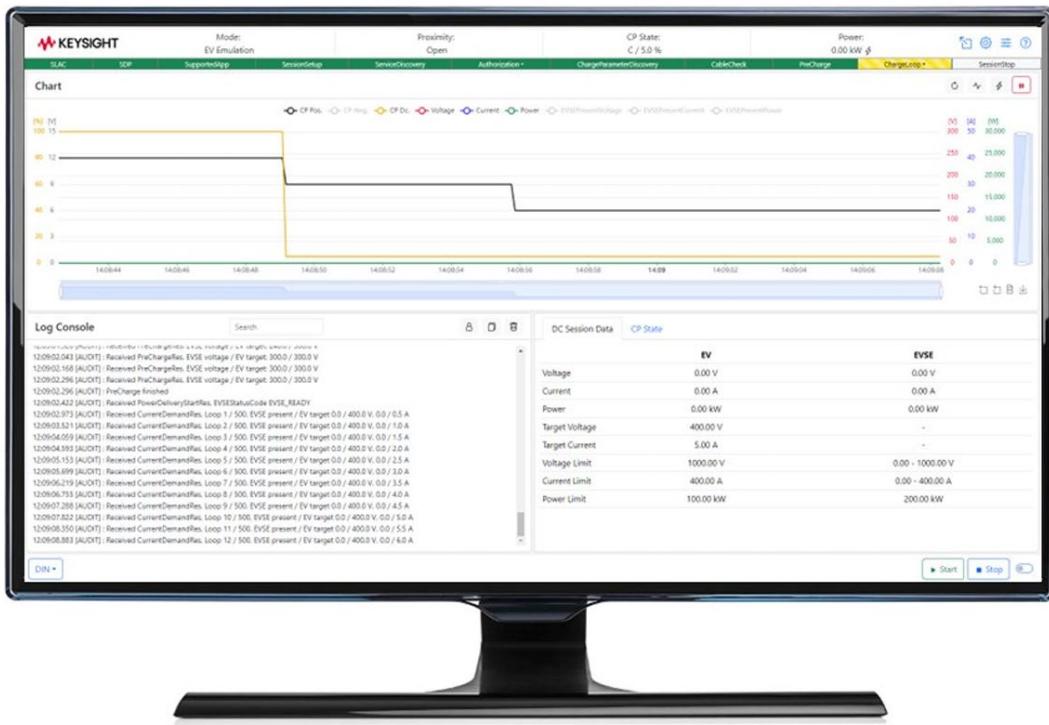
**Figure 10.** SL1300A Charging Discover Test Packages

Find out more about the SL1300A Charging Discover Test Packages [here](#).

# Meet the SL1470A EV–EVSE Smart Charging Emulation Software

## Enable Functional CCS Testing with Realistic EV and EVSE Communication Emulation

The SL1470A EV–EVSE Smart Charging Emulation Software provides a flexible software framework for emulating Electric Vehicle (EV) or charging station (EVSE) communication controllers. It enables functional and scenario-based testing of charging communication, supporting use case validation during development, installation, and field testing. A graphical user interface allows intuitive parameter configuration, monitoring, logging, and smart charging control, helping engineers identify communication issues early and reduce testing time and effort.



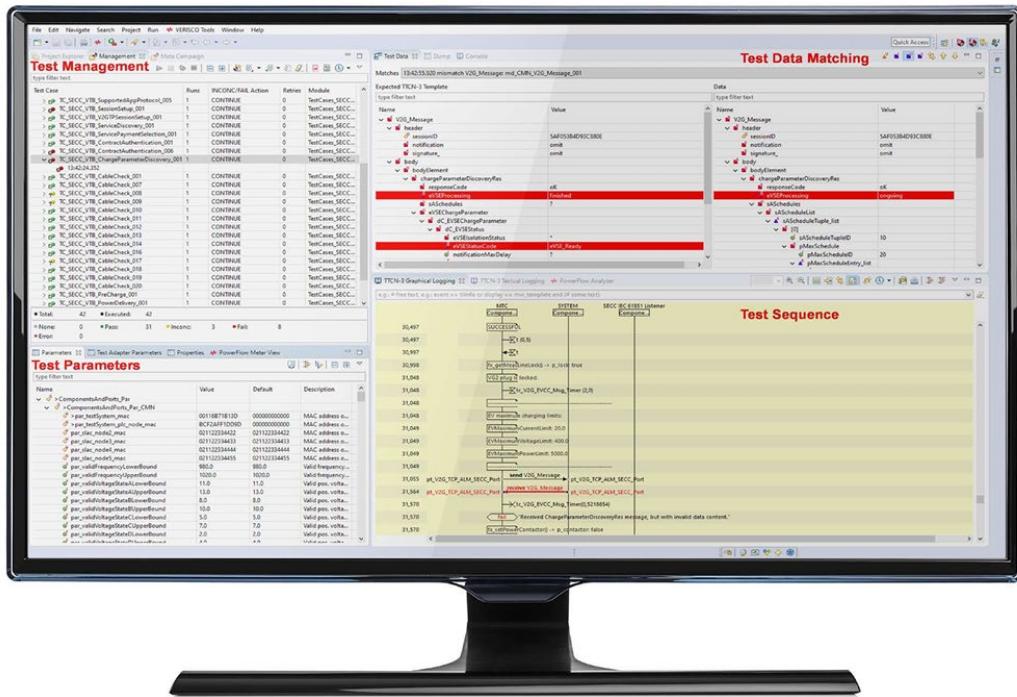
**Figure 11.** SL1470A EV–EVSE Smart Charging Emulation Software

Find out more about the SL1470A EV–EVSE Smart Charging Emulation Software [here](#).

# Meet the SL1471A TTCN-3 Charging Communication Test Automation Software

## Perform Test Cases for Conformance and Interoperability Testing

The Keysight TTCN-3 Charging Communication Test Automation Software provides automated conformance and interoperability test case packages for EV and EVSE charging communication based on TTCN-3. Conformance packages follow national and international standards, while interoperability packages complement standardized suites with additional, non-standardized test cases derived from field experience and expert input.



**Figure 12.** SL1471A TTCN-3 Charging Communication Test Automation Software

Find out more about the SL1471A TTCN-3 Charging Communication Test Automation Software [here](#).

## Meet the SL1200A Series Scienlab Regenerative AC Emulator, 3-Phase

The SL1200A Series was designed to handle all your 3-phase AC test needs up to 1200 VAC, from 30 to 810 kW without the need for a transformer. Two voltage ranges are available: 600 VAC and 1200 VAC. The 600 VAC models are ideal for low-voltage inverter tests, as well as EV and EVSE charging test applications enabling (HVRT) testing at the IEC LV-AC limit without the need for a large, complex test setup.

- Covers AC test needs; up to 1200 VL-L; up to 130 A; up to 810 kW.
- Achieve 1200 VL-L at full specifications without extra equipment, such as a transformer.
- Save energy with a 100% regenerative (bidirectional) power solution with >85% efficiency.
- Get up and run immediately with easy SL2000A Charging Discover Software integration.
- Feel confident with a complete, one-vendor solution of hardware, software, consulting, and support services worldwide for various applications, including EVSE/EV charging tests.



**Figure 13.** SL1200A Series Scienlab Regenerative AC Emulator

Find out more about the SL1200A Series [here](#).

# Meet the SL1800A Scienlab Regenerative DC Emulator – High-Power Series

Keysight's SL1800A Scienlab Regenerative DC Emulator – High-Power Series enables you to emulate the large batteries in electric vehicles. The bidirectional power flow allows emulation of both power-sourcing applications, such as traction inverter test, as well as power-absorbing (sinking) applications, such as EV charging. Being regenerative, the power absorbed is delivered back to the grid, saving on energy and cooling costs. With bi-directionality, integrated DC voltage and current controllers, high dynamics, and its regenerative energy feedback capacity, the Scienlab Dynamic DC Emulator provides an all-in-one system for efficient and effective testing of the power electronic components in EV and EVSE.

- Fully integrated with SL1040A, SL1047A Scienlab Charging Discovery System and SL2600A Megawatt Charging Discovery System.
- Available for high voltage, high-power applications. Extendable to meet future, increased power needs.
- Energy-efficient source and sink mode (96%)



**Figure 14.** SL1800A Scienlab Regenerative DC Emulator - High-Power Series

Find out more about the SL1800A Series [here](#).

Keysight enables innovators to push the boundaries of engineering by quickly solving design, emulation, and test challenges to create the best product experiences. Start your innovation journey at [www.keysight.com](http://www.keysight.com).