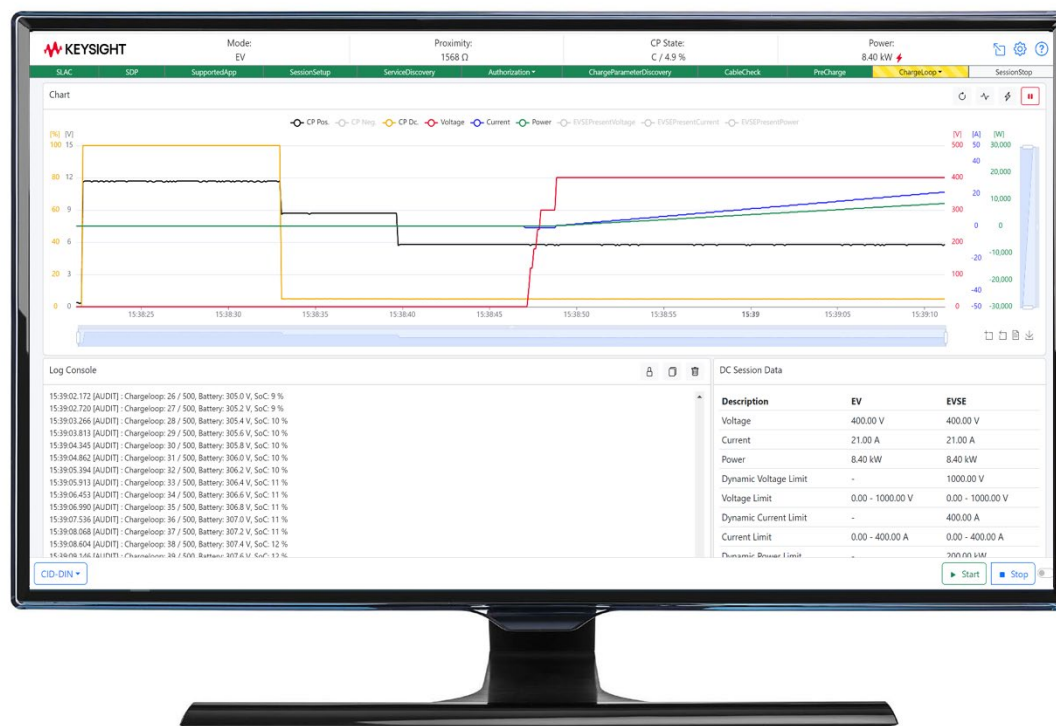


SL1470A EV - EVSE Smart Charging Emulation Software

Perform EV/EVSE emulation for functional CCS testing



Perform EV/EVSE Emulation for Functional CCS Testing

The Keysight EV - EVSE Smart Charging Emulation Software (SCE) provides emulation of electric vehicles (EV) / electric vehicle communication controllers (EVCC) or electric vehicle supply equipment (EVSE) / supply equipment communication controllers (SECC) according to the standards addressed by the Combined Charging System (CCS) specification. Emulation of both AC, as well as DC charging, is supported.

Learn more about the SCE, the corresponding option classes, and the key features of each software package.

		EVSE Emulation for EV Test		EV Emulation for EVSE Test	
		AC	DC	AC	DC
SCE Emulation Packages	DIN 70121:2014	--	SL1472A	--	SL1478A
	ISO 15118-3:2015 & ISO 15118-2:2014 with EIM over TCP/TLS support	SL1473A	SL1474A	SL1479A	SL1480A
	ISO 15118-2:2014 Plug & Charge Extension with PNC over TLS	SL1475A		SL1481A	
	ISO 15118-20:2022 with EIM over TLS support	SL1483A	SL1484A	SL1490A	SL1491A
	ISO 15118-20:2022 Bidirectional (BPT) Extension	SL1486A		SL1493A	
	OCPP 1.6 with ISO 15118-2 Plug & Charge support	SL1477A		--	
EV/ EVSE Smart Charging Emulation Software (SCE) Core & Drivers		SL1470A			

Figure 1. Overview of Smart Charging Emulation Software (SCE) options

Option Class Smart Charging Emulation Software - CORE

SL1470A EV - EVSE Smart Charging Emulation Software (SCE) - Core and Drivers

SL1470A - Core and drivers

Key features

- Provides a graphical user interface for parameter configuration, monitoring, and smart charging control
- User Interface (UI) is accessible via a web browser
- AC charging (Mode 3) based on IEC 61851-1:2017 Ed. 3
 - EV Human Machine Interface (HMI) with Control Pilot (CP) State selection (see Figure 3)
 - EVSE HMI with CP Voltage, Oscillator & Duty Cycle selection (see Figure 4)
- Logging
- System and service configuration
 - Use case selection via predefined configuration profiles (CIDs)
 - HMI supports customization of the EV/EVSE emulation behavior
- Supported power units:
 - Keysight Technologies DC emulators (power units)
 - Keysight's DC emulators (DCE) via Keysight's Scienlab Charging Discovery System (SLEP)
- Public key infrastructure (PKI) management (only supported if Plug and Charge (PnC) or Transport Layer Security (TLS) license is available)

Note 1: PKI management is only available in combination with SL1475A or SL1481A.

Note 2: Module upgrade at a later stage is possible at any time. A mandatory pre-condition to perform an upgrade is a valid support and maintenance contract of all existing SW assets of SCE.

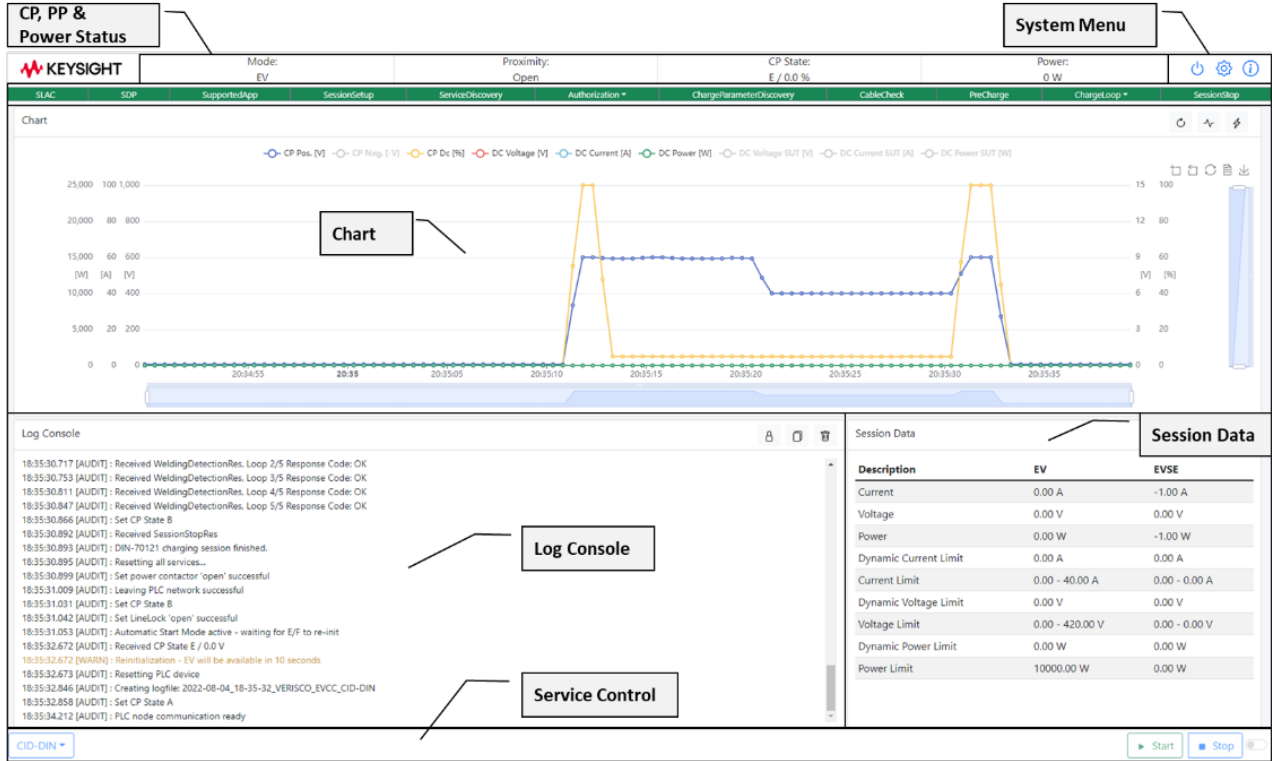


Figure 2. HMI overview

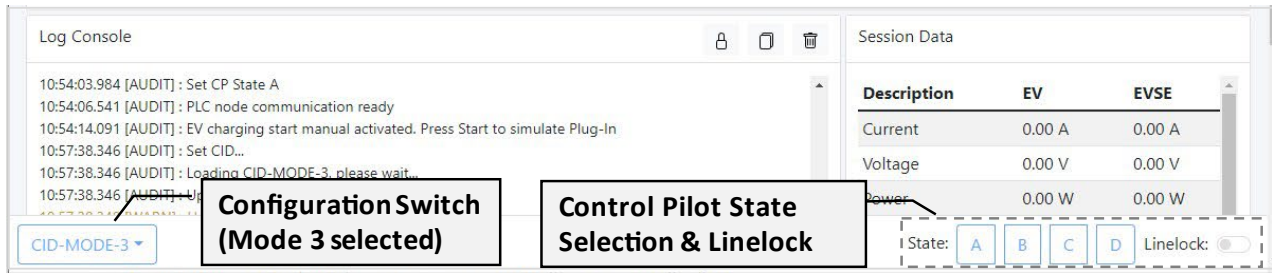


Figure 3. EVCC frontend web mode 3 basic charging mode

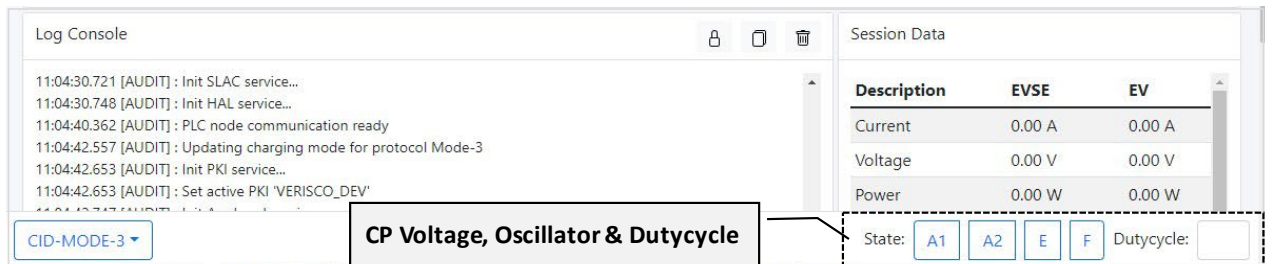


Figure 4. SECC frontend web control overview (MODE 3 w/o PLC)

View/component name	Description
CP, PP, and power status	Continuously display the status information of the CP, the Proximity Pilot (PP), and the measured power.
System menu	Includes three menu options: System shutdown and restart, system configuration, and system information dialog.
V2G progress bar	Indicates the state of the currently running vehicle-to-grid (V2G) session.
Chart	Continuously display the status information over time during a session like CP positive / CP negative voltage, own, and System Under Test (SUT) DC power flow values.
Log console	Provides live logging with access to stored log files.
Session data	Provides further information on EV/EVSE limits, target values, and measurement values.
Service control	Allows to choose between preconfigured profiles (CIDs), when clicking the configuration switch button. In addition, it also displays other controls that depend on the selected CID and mode, such as SECC or EVCC.

Option Class EVSE Emulation

SL1472A EVSE Emulation Package for EV Test - CCS - DIN 70121

SL1472A - EVSE emulation for functional EV testing

Key features

- Support of Signal Level Attenuation Characterization (SLAC) and matching process according to DIN 70121:2014
- Support of "SECC Discovery Protocol" and TCP/IPv6 binding process according to DIN 70121:2014
- Support of "V2GTP" message encapsulation according to DIN 70121:2014
- Support of "Supported Application Protocol Handshake" process and messaging according to DIN 70121:2014
- Support of all V2G messages according to DIN 70121:2014 for charging setup, charging loop, and termination of the charging process
- Power value configuration
- Protocol-specific message data configuration
- Protocol-specific timeout configuration
- Protocol-specific error injection (SessionID, sequence, CP state)

Note 1: Software maintenance options are available on request.

Note 2: Module upgrade at a later stage is possible at any time. A mandatory pre-condition to perform the upgrade is a valid support and maintenance contract of all existing SW assets of SCE

SL1473A EVSE Emulation Package for EV Test - CCS - ISO 15118-2/3 EIM AC

SL1473A - EVSE emulation for functional EV testing

Key features

- Support of SLAC and matching process according to ISO 15118-3:2015
- Support of "SECC Discovery Protocol" and TCP/IPv6 binding process according to ISO 15118-2:2014
- Support of "V2GTP" message encapsulation according to ISO 15118-2:2014
- Support of "Supported Application Protocol Handshake" process and messaging according to ISO 15118-2:2014
- Support of all common and AC V2G messages according to ISO 15118-2:2014 for charging setup, charging loop, and termination of the charging process (External Identification Means (EIM) via Transmission Control Protocol (TCP)/TLS)
- Support of TLS 1.2 (EIM via TLS)
- Power value configuration
- Protocol-specific message data configuration
- Protocol-specific timeout configuration
- Protocol-specific error injection (SessionID, sequence, CP state)

Note 1: Software maintenance options are available on request.

Note 2: Module upgrade at a later stage is possible at any time. Mandatory pre-condition to perform upgrade is a valid support and maintenance contract of all existing SW assets of SCE.

SL1474A EVSE Emulation Package for EV Test - CCS - ISO 15118-2/3 EIM DC

SL1474A - EVSE emulation for functional EV testing

Key features

- Support of SLAC and matching process according to ISO 15118-3:2015
- Support of "SECC Discovery Protocol" and TCP/IPv6 binding process according to ISO 15118-2:2014
- Support of "V2GTP" message encapsulation according to ISO 15118-2:2014
- Support of "Supported Application Protocol Handshake" process and messaging according to ISO 15118-2:2014
- Support of all common and DC V2G messages according to ISO 15118-2:2014 for charging setup, charging loop, and termination of the charging process (EIM via TCP/TLS)
- Support of TLS 1.2 (EIM via TLS)
- Power value configuration
- Protocol-specific message data configuration
- Protocol-specific timeout configuration
- Protocol-specific error injection (SessionID, sequence, CP state)

Note 1: Software maintenance options are available on request.

Note 2: Module upgrade at a later stage is possible at any time. A mandatory pre-condition to perform the upgrade is a valid support and maintenance contract of all existing SW assets of SCE.

SL1475A EVSE Emulation Package for EV Test - CCS - ISO 15118-2 TLS/PnC

SL1475A - EVSE emulation for functional EV testing

Key features

- Support of TLS 1.2 (EIM via TLS and PnC via TLS)
- Support of all PnC-specific V2G messages according to ISO 15118-2:2014 for charging setup and charging loop (PnC via TLS)
- Support of signature calculation/validation
- Certificate handling

Note 1: Software maintenance options are available on request.

Note 2: Module upgrade at a later stage is possible at any time. A mandatory pre-condition to perform the upgrade is a valid support and maintenance contract of all existing SW assets of SCE.

Note 3: This option is only available in combination with SL1473A and SL1474A.

SL1477A EVSE Emulation Package for Backend Test - OCPP 1.6

SL1477A - EVSE emulation for functional backend testing

Key features

- Open Charge Point Protocol (OCPP) 1.6 edition 2 Core
- OCPP 1.6 edition 2 Local Auth List Management
- OCPP 1.6 edition 2 Remote Trigger
- Improved security for OCPP 1.6-J
- Using ISO 15118 PnC with OCPP 1.6

Note 1: Software maintenance options are available on request.

Note 2: Module upgrade at a later stage is possible at any time. A mandatory pre-condition to perform the upgrade is a valid support and maintenance contract of all existing SW assets of SCE.

SL1483A EVSE Emulation Package for EV Test - CCS - ISO 15118-20/-3 EIM AC

SL1483A - EVSE emulation for functional EV testing

Key features

- Support of SLAC and matching process according to ISO 15118-3:2015
- Support of "SECC Discovery Protocol" and TCP/IPv6 binding process according to ISO 15118-20:2022
- Support of "V2GTP" message encapsulation according to ISO 15118-20:2022
- Support of "Supported Application Protocol Handshake" process and messaging according to ISO 15118-2:2022
- Support of all common and AC V2G messages according to ISO 15118-20:2022 for charging setup, charging loop, and termination of the charging process (EIM via TCP and TLSv1_3)
- Support of TLS 1.3 (EIM via TLSv1_3)
- Power value configuration
- Protocol-specific message data configuration
- Protocol-specific timeout configuration

Note 1: Software maintenance options are available on request.

Note 2: Module upgrade at a later stage is possible at any time. A mandatory pre-condition to perform the upgrade is a valid support and maintenance contract of all existing SW assets of SCE.

SL1484A EVSE Emulation Package for EV Test - CCS - ISO 15118-20/-3 EIM DC

SL1484A - EVSE emulation for functional EV testing

Key features

- Support of SLAC and matching process according to ISO 15118-3:2015
- Support of "SECC Discovery Protocol" and TCP/IPv6 binding process according to ISO 15118-20:2022
- Support of "V2GTP" message encapsulation according to ISO 15118-20:2022
- Support of "Supported Application Protocol Handshake" process and messaging according to ISO 15118-2:2022
- Support of all common and DC V2G messages according to ISO 15118-20:2022 for charging setup, charging loop, and termination of the charging process (EIM via TCP and TLSv1_3)
- Support of TLS 1.3 (EIM via TLSv1_3)
- Power value configuration
- Protocol-specific message data configuration
- Protocol-specific timeout configuration

Note 1: Software maintenance options are available on request.

Note 2: Module upgrade at a later stage is possible at any time. A mandatory pre-condition to perform the upgrade is a valid support and maintenance contract of all existing SW assets of SCE.

SL1486A EVSE Emulation Package for EV Test - CCS - ISO 15118-20/-3 BPT (AC and DC)

SL1486A - EVSE emulation for functional EV testing

Key features

- Support of SLAC and matching process according to ISO 15118-3:2015
- Support of "SECC Discovery Protocol" and TCP/IPv6 binding process according to ISO 15118-20:2022
- Support of "V2GTP" message encapsulation according to ISO 15118-20:2022
- Support of "Supported Application Protocol Handshake" process and messaging according to ISO 15118-2:2022
- Support of all common and AC/DC V2G messages according to ISO 15118-20:2022 for charging setup, charging loop, and termination of the charging process (EIM via TCP and TLSv1_3)
- Support of TLS 1.3 (EIM via TLSv1_3)
- Support of bidirectional charging
- Power value configuration
- Protocol-specific message data configuration
- Protocol-specific timeout configuration

Note 1: Software maintenance options are available on request.

Note 2: Module upgrade at a later stage is possible at any time. A mandatory pre-condition to perform the upgrade is a valid support and maintenance contract of all existing SW assets of SCE.

Option Class EV Emulation

SL1478A EV Emulation Package for EVSE Test - CCS - DIN 70121

SL1478A - EV Emulation for functional EVSE Testing

Key features

- Support of SLAC and matching process according to DIN 70121:2014
- Support of "SECC Discovery Protocol" and TCP/IPv6 binding process according to DIN 70121:2014
- Support of "V2GTP" message encapsulation according to DIN 70121:2014
- Support of "Supported Application Protocol Handshake" process and messaging according to DIN 70121:2014
- Support of all V2G messages according to DIN 70121:2014 for charging setup, charging loop, and termination of the charging process
- Power value configuration
- Protocol-specific message data configuration
- Protocol-specific timeout configuration
- Protocol-specific error injection (SessionID, sequence, CP state)

Note 1: Software maintenance options are available on request.

Note 2: Module upgrade at a later stage is possible at any time. A mandatory pre-condition to perform the upgrade is a valid support and maintenance contract of all existing SW assets of SCE.

SL1479A EV Emulation Package for EVSE Test - CCS - ISO 15118-2/3 EIM AC

SL1479A - EV emulation for functional EVSE testing

Key features

- Support of SLAC and matching process according to ISO 15118-3:2015
- Support of "SECC Discovery Protocol" and TCP/IPv6 binding process according to ISO 15118-2:2014
- Support of "V2GTP" message encapsulation according to ISO 15118-2:2014
- Support of "Supported Application Protocol Handshake" process and messaging according to ISO 15118-2:2014
- Support of all common and AC V2G messages according to ISO 15118-2:2014 for charging setup, charging loop, and termination of the charging process (EIM via TCP/TLS)
- Support of TLS 1.2 (EIM via TLS)
- Power value configuration
- Protocol-specific message data configuration
- Protocol-specific timeout configuration
- Protocol-specific error injection (SessionID, sequence, CP state)

Note 1: Software maintenance options are available on request.

Note 2: Module upgrade at a later stage is possible at any time. A mandatory pre-condition to perform upgrade is a valid support and maintenance contract of all existing SW assets of SCE.

SL1480A EV Emulation Package for EVSE Test - CCS - ISO 15118-2/3 EIM DC

SL1480A - EV emulation for functional EVSE testing

Key features

- Support of SLAC and matching process according to ISO 15118-3:2015
- Support of "SECC Discovery Protocol" and TCP/IPv6 binding process according to ISO 15118-2:2014
- Support of "V2GTP" message encapsulation according to ISO 15118-2:2014
- Support of "Supported Application Protocol Handshake" process and messaging according to ISO 15118-2:2014
- Support of all common and DC V2G Messages according to ISO 15118-2:2014 for charging setup, charging loop, and termination of the charging process (EIM via TCP/TLS)
- Support of TLS 1.2 (EIM via TLS)
- Power value configuration
- Protocol-specific message data configuration
- Protocol-specific timeout configuration
- Protocol-specific error injection (SessionID, sequence, CP state)

Note 1: Software maintenance options are available on request.

Note 2: Module upgrade at a later stage is possible at any time. A mandatory pre-condition to perform the upgrade is a valid support and maintenance contract of all existing SW assets of EV - EVSE Smart Charging Emulation Software (SCE).

SL1481A EV Emulation Package for EVSE Test - CCS - ISO 15118-2 TLS/PnC

SL1481A - EV emulation for functional EVSE testing

Key features

- Support of TLS 1.2 (EIM via TLS and PnC via TLS)
- Support of all PnC-specific V2G messages according to ISO 15118-2:2014 for charging setup and charging loop (PnC via TLS)
- Support of signature calculation/validation
- Certificate handling

Note 1: Software maintenance options are available on request.

Note 2: Module upgrade at a later stage is possible at any time. A mandatory pre-condition to perform the upgrade is a valid support and maintenance contract of all existing SW assets of SCE.

Note 3: This option is only available in combination with SL1479A and SL1480A.

SL1490A EV Emulation Package for EVSE Test - CCS - ISO 15118-20/-3 EIM AC

SL1490A - EV emulation for functional EVSE testing

Key features

- Support of SLAC and matching process according to ISO 15118-3:2015
- Support of "SECC Discovery Protocol" and TCP/IPv6 binding process according to ISO 15118-20:2022
- Support of "V2GTP" message encapsulation according to ISO 15118-20:2022
- Support of "Supported Application Protocol Handshake" process and messaging according to ISO 15118-2:2022
- Support of all common and AC V2G Messages according to ISO 15118-20:2022 for charging setup, charging loop, and termination of the charging process (EIM via TCP and TLSv1_3)
- Support of TLS 1.3 (EIM via TLSv1_3)
- Power value configuration
- Protocol-specific message data configuration
- Protocol-specific timeout configuration

Note 1: Software maintenance options are available on request.

Note 2: Module upgrade at a later stage is possible at any time. A mandatory pre-condition to perform the upgrade is a valid support and maintenance contract of all existing SW assets of SCE.

SL1491A EV Emulation Package for EVSE Test - CCS - ISO 15118-20/-3 EIM DC

SL1491A - EV emulation for functional EVSE testing

Key features

- Support of SLAC and matching process according to ISO 15118-3:2015
- Support of "SECC Discovery Protocol" and TCP/IPv6 binding process according to ISO 15118-20:2022
- Support of "V2GTP" message encapsulation according to ISO 15118-20:2022
- Support of "Supported Application Protocol Handshake" process and messaging according to ISO 15118-2:2022
- Support of all common and DC V2G messages according to ISO 15118-20:2022 for charging setup, charging loop, and termination of the charging process (EIM via TCP and TLSv1_3)
- Support of TLS 1.3 (EIM via TLSv1_3)
- Power value configuration
- Protocol-specific message data configuration
- Protocol-specific timeout configuration

Note 1: Software maintenance options are available on request.

Note 2: Module upgrade at a later stage is possible at any time. A mandatory pre-condition to perform the upgrade is a valid support and maintenance contract of all existing SW assets of SCE.

SL1493A EV Emulation Package for EVSE Test - CCS - ISO 15118-20/-3 BPT (AC and DC)

SL1493A - EV emulation for functional EVSE testing

Key features

- Support of SLAC and matching process according to ISO 15118-3:2015
- Support of "SECC Discovery Protocol" and TCP/IPv6 binding process according to ISO 15118-20:2022
- Support of "V2GTP" message encapsulation according to ISO 15118-20:2022
- Support of "Supported Application Protocol Handshake" process and messaging according to ISO 15118-2:2022
- Support of all common and AC/DC V2G messages according to ISO 15118-20:2022 for charging setup, charging loop, and termination of the charging process (EIM via TCP and TLSv1_3)
- Support of TLS 1.3 (EIM via TLSv1_3)
- Support of bidirectional charging
- Power value configuration
- Protocol-specific message data configuration
- Protocol-specific timeout configuration

Note 1: Software maintenance options are available on request.

Note 2: Module upgrade at a later stage is possible at any time. A mandatory pre-condition to perform the upgrade is a valid support and maintenance contract of all existing SW assets of SCE.

Extend the Capabilities of your Test Solution

Meet the Scienlab Charging Discovery System Family of Solutions

Accelerate your charging interface testing and validate charging behavior across EV and EVSE

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



Figure 5. From left to right: SL1040A CDS – EMC Series, SL1040A CDS – Portable Series and SL1047A CDS – High-Power Series

- Configure the CDS to your specific needs and replace multiple real EV/EVSE with one 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.
- Get a holistic view of current and voltage measurements as well as charging communication.

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

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

Meet the SL1550A EV - EVSE Charging Communication Interface Tester

Perform component-level testing for EV/EVSE communication controllers

The Keysight EV - EVSE Charging Communication Interface Tester (Com Tester) is a fully integrated test adapter for EVCC or SECC allowing equipment emulation or test case execution to test charging communication and protocols.



Figure 6. SL1550A EV - EVSE Charging Communication Interface Tester

With the Com Tester, you can perform component-level testing for development tests, type approval tests, manufacturing tests (end-of-line), and hardware-in-the-loop tests.

Find out more about SL1550A Com Tester [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.