

# Scienlab Test Case Library

TTCN-3

SL14XXA



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## Software Overview

The Scienlab Charging Discovery System (CDS) from Keysight enables users to define, compile and execute custom test routines easily.<sup>1</sup> In addition, Keysight provides complete test case libraries for all important charging conformance and interoperability standards. Each library is developed according to official specification and carefully verified with all CDS hardware configurations and every software release version. Hence, it is the quickest and most simple way to get valid test results out of the box.

This data sheet gives an overview of all currently available test case bundles driven by TTCN-3 (Testing and Test Control Notation) software and explains its content. Each library is based on a national or international standard that specifies a certain number of concrete test cases with detailed description of test actions and the expected behavior.

Furthermore, this data sheet also contains software maintenance contract options which are mandatory to be included at least for 12 months.

<sup>1</sup> See also item SL1040A-S01 Expert mode in data sheet SL1040A and SL1047A. Further see item SL1093A-FP Charging Discover (operating software) in data sheet SL1093A.

		SUT EV		SUT EVSE	
		AC	DC	AC	DC
Test suites	DIN 70122:2018 Conformance & CharIN TCs for DIN 70121 Impl. Guide (2020) Executable TS with Codecs & Adapters	--	SWTS-DIN70122_EV +	--	SWTS-DIN70122_SE +
	DIN 70121 Interop (IOP) Executable Test Suite		SWTS-IOP70121_EV		SWTS-IOP70121_SE
	ISO 15118-4/5:2018 Conformance Executable TS with Codecs & Adapters	SWTS-ISO1511845_EV +		SWTS-ISO-1511845_SE +	
		SWTS-ISO1511845_EV_AC +	SWTS-ISO1511845_EV_DC +	SWTS-ISO1511845_SE_AC +	SWTS-ISO1511845_SE_DC +
Option: ISO 15118-4:2018 TLS/PNC Executable TS with Security Plugins	SWTS-ISO1511845_EV_PNC Requires ISO 15118 Conformance TS		SWTS-ISO1511845_EVSE_PNC Requires ISO 15118 Conformance TS		
Keysight HW drivers	Keysight/Scienlab CDS Driver (Scienlab Charging Discovery System, Gen 1/2)	SWDR-KS_CDS			
	Keysight/Scienlab DHVE Driver (Dynamic High Voltage Emulator)	SWDR-KS_DHVE			

## Option Class EVSE Test Cases

### SL1449A EVSE DIN 70122:2018 Conformance and CharIN TCs for DIN 70121 Impl. Guide (2020)

SL1449A - Executable test suite with codecs and adapters
<p><b>Key features</b></p> <ul style="list-style-type: none"><li>• DIN 70121:2014 Codec Plugin for V2GTP Messaging</li><li>• DIN 70121:2014 Codec Plugin for SDP over UDP Messaging</li><li>• DIN 70121:2014 Codec Plugin for V2G over TCP Messaging</li><li>• DIN 70121:2014 System under test (SUT) Adapter for UDP Messaging (V2GTP/SDP)</li><li>• DIN 70121:2014 SUT Adapter for TCP Messaging (V2GTP/V2G)</li><li>• Includes all test cases for according to DIN 70122:2018</li><li>• Includes all test cases for according to CharIN test cases for DIN SPEC 70121:2014 Implementation Guide (Version 1.1.0 January 2020)</li></ul>
<p><b>Test scope</b></p> <p>DC charging only; conformance test of protocol</p> <ul style="list-style-type: none"><li>• Test of "Signal Level Attenuation Characterization, SLAC" and matching process according to DIN 70121:2014 (requires HWCTS-SECC-R21 and TTWB-SECC).</li><li>• Test of "SECC Discovery Protocol" and TCP/IPv6 binding process according to DIN 70121:2014.</li><li>• Test of "V2GTP" message encapsulation according to DIN 70121:2014.</li><li>• Test of "Supported Application Protocol Handshake" process and messaging according to DIN 70121:2014.</li><li>• Test of all V2G Messages according to DIN 70121:2014 for Charging Setup, Charging Loop and Termination of Charging Process.</li><li>• Good case AND Error case test run through all SLAC Messages according to DIN 70121:2014.</li><li>• Good case AND Error case test run through all V2G Messages according to DIN 70121:2014.</li><li>• Test of concurrent handling of PLC communication based on DIN 70121:2014.</li><li>• Test scope is focusing on communication/signaling. Power Flow Support is available depending on chosen hardware/driver option.</li></ul>
<p><b>Quantity</b></p> <ul style="list-style-type: none"><li>• DIN 70122:2018 EVSE DC conformance: ~200 test cases</li><li>• CharIN test cases for DIN SPEC 70121:2014 Implementation Guide (Version 1.1.0): ~248 test cases (129 from DIN 70122:2018 and 119 new test cases)</li></ul>

**Note 1:** SL1449A is delivered as set of Plugins for Spirent's TTWorkBench (TTWB).

TTWorkBench is a full-featured integrated test development and execution environment (IDE). This powerful, user-friendly tool allows you to test software products and services regardless of technology, operating system, or implementation domain. Based on the standardized testing language TTCN-3, it enables test automation as well as unlimited extensibility.

**Note 2:** Number of test cases strongly depends on capabilities and configurability of the SUT.

**Note 3:** Software maintenance options are available on request.

## SL1450A EVSE DIN 70121 TTCN-3 Interop (IOP)

### SL1450A - Executable test suite complementary to conformance tests suite

#### Key features

- Complementary test cases to enhance the scope of conformance tests with respect to standards interdependencies
- Practical valid/invalid scenario tests
- Robustness tests, etc.

#### Test scope

IOP Test Suite covers 9 groups of test cases:

- All Pairs Testing (APT): Testing of possible discrete combinations of values/enumerations.
- Boundary Value Testing (BVT): Testing of valid and invalid boundary values.
- Compatibility Testing (CT): Testing of application compatibility for different use case scenarios/ environments (e.g. protocol versions).
- Interface Testing (IT): Testing of customer interaction (HMI testing).
- Negative Testing (NT): Testing of brought range of unexpected input values or conditions (e.g. wrong data, timeouts).
- Performance Testing (PT): Testing of responsiveness, stability and application performance.
- Reliability Testing (RT): Testing of software reliability in given environmental conditions and for a specified period of time (e.g. long charging sessions).
- Stress Testing (ST): Testing of reliability and stability under heavy workload.
- System Testing (SYST): Integration testing of various system components (e.g. EV/EVSE with power flow).

#### Quantity

- DIN 70121:2014 DC EVSE IOP: ~ 106 test cases

**Note 1:** This option is only available in combination with SL1449A.

**Note 2:** SL1450A is delivered as set of Plugins for Spirent's TTWorkBench.

**Note 3:** Software maintenance options are available on request.

## SL1451A EVSE ISO 15118-4/-5:2018 Conformance (COMMON test cases)

### SL1451A - Executable test suite with codecs and adapters

#### Key features

- ISO 15118-2:2014 Codec Plugin for V2GTP Messaging
- ISO 15118-2:2014 Codec Plugin for SDP over UDP Messaging
- ISO 15118-2:2014 Codec Plugin for V2G over TCP Messaging
- ISO 15118-2:2014 SUT Adapter for UDP Messaging (V2GTP/SDP)
- ISO 15118-2:2014 SUT Adapter for TCP Messaging (V2GTP/V2G)

**Note 1:** SL1451A is delivered as set of Plugins for Spirent's TTWorkBench.

**Note 2:** SL1451A must be combined with either AC- or DC-specific Test Suites package (SL1452A or SL1453A).

**Note 3:** Software maintenance options are available on request.

## SL1452A EVSE ISO 15118-4/-5:2018 Conformance (AC-Specific Test Cases)

### SL1452A - Executable test suite with codecs and adapters

#### Key features

- Includes all test cases for AC EVSE according to ISO/IS 15118-4:2018 and ISO/IS 15118-5:2018.

#### Test scope

AC charging only; conformance test of protocol

- Test of "Signal Level Attenuation Characterization, SLAC" and TCP/IPv6 binding process according to ISO 15118-3:2015.
- Test of "SECC Discovery Protocol, SDP" and TCP/IPv6 binding process according to ISO 15118-2:2014.
- Test of "V2GTP" message encapsulation according to ISO 15118-2:2014.
- Test of "Supported Application Protocol Handshake" process and messaging according to ISO 15118-2:2014.
- Test of all V2G Messages according to ISO 15118-2:2014 for Charging Setup, Charging Loop and Termination of Charging Process.
- Good case AND Error case test run through all SLAC Messages according to ISO 15118-3:2015.
- Good case AND Error case test run through all V2G Messages according to ISO 15118-2:2014.
- Test of concurrent handling of ISO 15118-2:2014 and ISO 15118-3:2015.
- Test of concurrent handling of power flow scope is focusing on communication/signaling only. Power Flow Support is available depending on chosen hardware/driver option. Power Flow Support is available depending on chosen hardware/driver option.

#### Quantity

- ISO/IS 15118-4:2018 and ISO/IS 15118-5:2018 EVSE AC EIM conformance: ~210 test cases

**Note 1:** This test suite package is only available in combination with SL1451A.

**Note 2:** SL1452A is delivered as set of Plugins for Spirent's TTWorkBench.



**Note 3:** Number of test cases strongly depends on capabilities and configurability of the SUT.

**Note 4:** Software maintenance options are available on request.

## SL1453A EVSE ISO 15118-4/-5:2018 Conformance (DC-Specific Test Cases)

SL1453A - Executable test suite with codecs and adapters
<b>Key features</b> <ul style="list-style-type: none"><li>• Includes all test cases for DC EVSE according to ISO/IS 15118-4:2018 and ISO/IS 15118-5:2018.</li></ul>
<b>Test scope</b> <p>DC charging only; conformance test of protocol</p> <ul style="list-style-type: none"><li>• Test of "Signal Level Attenuation Characterization, SLAC" and matching process according to ISO 15118-3:2015 (requires suitable hardware adapter).</li><li>• Test of "SECC Discovery Protocol, SDP" and TCP/IPv6 binding process according to ISO 15118-2:2014.</li><li>• Test of "V2GTP" message encapsulation according to ISO 15118-2:2014.</li><li>• Test of "Supported Application Protocol Handshake" process and messaging according to ISO 15118-2:2014.</li><li>• Test of all V2G Messages according to ISO 15118-2:2014 for Charging Setup, Charging Loop and Termination of Charging Process.</li><li>• Good case AND Error case test run through all SLAC Messages according to ISO 15118-3:2015 (requires suitable hardware adapter).</li><li>• Good case AND Error case test run through all V2G Messages according to ISO 15118-2:2014.</li><li>• Test of concurrent handling of PLC communication based on ISO 15118-2:2014 and ISO 15118-3:2015.</li><li>• Test scope is focusing on communication/signaling only. Power Flow Support is available depending on chosen hardware/driver option. Power Flow Support is available depending on chosen hardware/driver option.</li></ul>
<b>Quantity</b> <ul style="list-style-type: none"><li>• ISO/IS 15118-4:2018 and ISO/IS 15118-5:2018 EVSE DC EIM conformance: ~230 test cases</li></ul>

**Note 1:** This test suite package is only available in combination with SL1451A.

**Note 2:** SL1453A is delivered as set of Plugins for Spirent's TTWorkBench.

**Note 3:** Number of test cases strongly depends on capabilities and configurability of the SUT.

**Note 4:** Software maintenance options are available on request.

## SL1454A EVSE ISO 15118-4/-5:2018 Conformance (Plug and Charge (PnC)-Specific Test Cases)

SL1454A - Executable test suite with codecs and adapters
<b>Required</b> <ul style="list-style-type: none"><li>• SL1451A and SL1453A or SL1451A and SL1452A</li></ul>
<b>Test scope</b> <p>AC and DC charging; conformance test of protocol</p> <ul style="list-style-type: none"><li>• 7 Test PKIs with different setups according to ISO 15118-2:2014 and with valid and invalid certificates.</li><li>• Good case test run through PnC charging process with all V2G Messages according to ISO 15118-2:2014.</li><li>• Error case test run through PnC charging process with all V2G Messages according to ISO 15118-2:2014.</li><li>• Good case test run through certificate update and installation process according to ISO 15118-2:2014.</li><li>• Error case test run through certificate update and Installation according to ISO 15118-2:2014.</li><li>• Signature validation as part of all test runs and in-depth analysis tools for fault identification.</li></ul>
<b>Quantity</b> <p>ISO/IS 15118-4:2018 EVSE PnC conformance:</p> <ul style="list-style-type: none"><li>• DC: ~280 test cases (in combination with SL1453A)</li><li>• AC: ~255 test cases (in combination with SL1452A)</li></ul>

**Note 1:** This option is only available in combination with SL1451A and SL1452A or SL1451A and SL1453A.

**Note 2:** SL1454A is delivered as set of Plugins for Spirent's TTWorkBench.

**Note 3:** Number of test cases strongly depends on capabilities and configurability of the SUT.

**Note 4:** Software maintenance options are available on request.

## Option Class EVSE Test Case Bundles

**Please note:** Software maintenance options are available on request for each bundle.

### SL1456A EVSE ISO 15118-4/-5:2018 DC & PNC Conformance Bundle

This software bundle includes:

- SL1451A EVSE ISO 15118-4/-5:2018 Conformance (COMMON test cases) - Executable test suite with codecs and adapters
- SL1453A EVSE ISO 15118-4/-5:2018 Conformance (DC-specific test cases) - Executable test suite with codecs and adapters
- SL1454A EVSE ISO 15118-4/-5:2018 Conformance (Plug and Charge (PnC)-specific test cases) - Executable test suite with codecs and adapters



## SL1457A EVSE ISO 15118-4/-5:2018 AC/DC & PNC Conformance Bundle

This software bundle includes:

- SL1451A EVSE ISO 15118-4/-5:2018 Conformance (COMMON test cases) - Executable test suite with codecs and adapters
- SL1452A EVSE ISO 15118-4/-5:2018 Conformance (AC-specific test cases) - Executable test suite with codecs and adapters
- SL1453A EVSE ISO 15118-4/-5:2018 Conformance (DC-specific test cases) - Executable test suite with codecs and adapters
- SL1454A EVSE ISO 15118-4/-5:2018 Conformance (Plug and Charge (PnC)-specific Test Cases) - Executable test suite with codecs and adapters

## SL1458A EVSE DIN 70122 & ISO 15118-4/-5:2018 DC & PNC Conformance Bundle

This software bundle includes:

- SL1449A EVSE DIN 70122:2018 Conformance and CharIN test cases (TCs) for DIN 70121 Impl. Guide (2020) - Executable test suite with codecs and adapters
- SL1451A EVSE ISO 15118-4/-5:2018 Conformance (COMMON TCs) - Executable test suite with codecs and adapters
- SL1453A EVSE ISO 15118-4/-5:2018 Conformance (DC-specific TCs) - Executable test suite with codecs and adapters
- SL1454A EVSE ISO 15118-4/-5:2018 Conformance (Plug and Charge (PnC)-specific TCs) - Executable test suite with codecs and adapters

## SL1459A EVSE DIN 70122 & ISO 15118-4/-5:2018 AC/DC & PNC Conformance Bundle

This software bundle includes:

- SL1449A EVSE DIN 70122:2018 Conformance and CharIN TCs for DIN 70121 impl. Guide (2020) - Executable test suite with codecs and adapters
- SL1451A EVSE ISO 15118-4/-5:2018 Conformance (COMMON test cases) - Executable test suite with codecs and adapters
- SL1452A EVSE ISO 15118-4/-5:2018 Conformance (AC-specific test cases) - Executable test suite with codecs and adapters
- SL1453A EVSE ISO 15118-4/-5:2018 Conformance (DC-specific test cases) - Executable test suite with codecs and adapters
- SL1454A EVSE ISO 15118-4/-5:2018 Conformance (Plug and Charge (PnC)-specific test cases) - Executable test suite with codecs and adapters

## Option Class EV Test Cases

### SL1438A EV DIN 70122:2018 Conformance and CharIN TCs for DIN 70121 Impl. Guide (2020)

#### SL1438A - Executable test suite with codecs and adapters

##### Key features

- DIN 70121:2014 Codec Plugin for V2GTP Messaging
- DIN 70121:2014 Codec Plugin for SDP over UDP Messaging
- DIN 70121:2014 Codec Plugin for V2G over TCP Messaging
- DIN 70121:2014 SUT Adapter for UDP Messaging (V2GTP/SDP)
- DIN 70121:2014 SUT Adapter for TCP Messaging (V2GTP/V2G)
- Includes all test cases for according to DIN 70122:2018
- Includes all test cases for according to CharIN test cases for DIN SPEC 70121:2014 Implementation Guide (Version 1.1.0 January 2020)

##### Test scope

DC charging only; conformance test of protocol

- Test of "SECC Discovery Protocol" and TCP/IPv6 binding process according to DIN 70121:2014.
- Test of "V2GTP" message encapsulation according to DIN 70121:2014.
- Test of "Supported Application Protocol Handshake" process and messaging according to DIN 70121:2014.
- Test of all V2G Messages according to DIN 70121:2014 for charging setup, charging loop and termination of charging process.
- Good case test run through all V2G Messages according to DIN 70121:2014.
- Error case test runs through all V2G Messages according to DIN 70121:2014.
- Test of concurrent handling of DIN 70121:2014.
- Test scope is focusing on charging communication and signaling. Power flow support is available depending on chosen hardware adapter.

##### Quantity

- DIN 70122:2018 EV DC conformance: ~250 test cases
- CharIN test cases for DIN SPEC 70121:2014 Implementation Guide (Version 1.1.0): ~287 test cases (170 from DIN 70122:2018 and 117 new test cases)

**Note 1:** SL1438A is delivered as set of Plugins for Spirent's TTWorkBench.

**Note 2:** Number of executable test cases strongly depends on capabilities and configurability of the SUT.

**Note 3:** Software maintenance options are available on request.

## SL1439A EV DIN 70121 TTCN-3 Interop (IOP)

### SL1439A - Executable test suite complementary to conformance tests suite

#### Key features

- Complementary test cases to enhance the scope of conformance tests with respect to standards interdependencies
- Practical valid/invalid scenario tests
- Robustness tests, etc.

#### Test scope

IOP Test Suite covers 9 groups of test cases:

- All Pairs Testing (APT): Testing of possible discrete combinations of values/enumerations.
- Boundary Value Testing (BVT): Testing of valid and invalid boundary values.
- Compatibility Testing (CT): Testing of application compatibility for different use case scenarios/ environments (e.g. protocol versions).
- Interface Testing (IT): Testing of customer interaction (HMI testing).
- Negative Testing (NT): Testing of brought range of unexpected input values or conditions (e.g. wrong data, timeouts).
- Performance Testing (PT): Testing of responsiveness, stability and application performance.
- Reliability Testing (RT): Testing of software reliability in given environmental conditions and for a specified period of time (e.g. long charging sessions).
- Stress Testing (ST): Testing of reliability and stability under heavy workload.
- System Testing (SYST): Integration testing of various system components (e.g. EV/EVSE with power flow).

#### Quantity

- DIN 70121:2014 DC EV IOP: ~ 480 test cases

**Note 1:** This option is only available in combination with SL1438A.

**Note 2:** SL1439A is delivered as set of Plugins for Spirent's TTWorkBench.

**Note 3:** This test suite is continuously enhanced with new test cases based on customer feedback and field experience (see support and maintenance contract).

**Note 4:** Number of executable test cases strongly depends on capabilities and configurability of the SUT.

**Note 5:** Software maintenance options are available on request.

## SL1440A EV ISO 15118-4/-5:2018 Conformance (COMMON Test Cases)

SL1440A - Executable test suite with codecs and adapters

### Key features

- ISO 15118-2:2014 Codec Plugin for V2GTP Messaging
- ISO 15118-2:2014 Codec Plugin for SDP over UDP Messaging
- ISO 15118-2:2014 Codec Plugin for V2G over TCP Messaging
- ISO 15118-2:2014 SUT Adapter for UDP Messaging (V2GTP/SDP)
- ISO 15118-2:2014 SUT Adapter for TCP Messaging (V2GTP/V2G)

**Note 1:** SL1440A is delivered as set of Plugins for Spirent's TTWorkBench.

**Note 2:** SL1440A must be combined with either AC- or DC-specific Test Suites package (SL1441A or SL1442A).

**Note 3:** Software maintenance options are available on request.

## SL1441A EV ISO 15118-4/-5:2018 Conformance (AC-specific Test Cases)

SL1441A - Executable test suite with codecs and adapters

### Key features

- Includes all test cases for AC EV according to ISO/IS 15118-4:2018 and ISO/IS 15118-5:2018.

### Test scope

AC charging only; conformance test of protocol

- Test of "Signal Level Attenuation Characterization, SLAC" and TCP/IPv6 binding process according to ISO 15118-3:2015.
- Test of "SECC Discovery Protocol, SDP" and TCP/IPv6 binding process according to ISO 15118-2:2014.
- Test of "V2GTP" message encapsulation according to ISO 15118-2:2014.
- Test of "Supported Application Protocol Handshake" process and messaging according to ISO 15118-2:2014.
- Test of all V2G Messages according to ISO 15118-2:2014 for Charging Setup, Charging Loop and Termination of Charging Process.
- Good case AND Error case test run through all SLAC Messages according to ISO 15118-3:2015.
- Good case AND Error case test run through all V2G Messages according to ISO 15118-2:2014.
- Test of concurrent handling of ISO 15118-2:2014 and ISO 15118-3:2015.
- Test scope is focusing on communication/signaling. Power Flow Support is available depending on chosen hardware/driver option.

### Quantity

- ISO/IS 15118-4:2018 and ISO/IS 15118-5:2018 EV AC EIM conformance: ~290 test cases

**Note 1:** This Test Suite package is only available in combination with SL1440A.

**Note 2:** SL1441A is delivered as set of Plugins for Spirent's TTWorkBench.

**Note 3:** Number of executable test cases strongly depends on capabilities and configurability of the SUT.  
**Note 4:** Software maintenance options are available on request.

## SL1442A EV ISO 15118-4/-5:2018 Conformance (DC-specific Test Cases)

SL1442A - Executable test suite with codecs and adapters
<b>Key features</b> <ul style="list-style-type: none"><li>• Includes all test cases for DC EV according to ISO/IS 15118-4:2018 and ISO/IS 15118-5:2018</li></ul>
<b>Test scope</b> <p>DC charging only; conformance test of protocol</p> <ul style="list-style-type: none"><li>• Test of "Signal Level Attenuation Characterization, SLAC" and TCP/IPv6 binding process according to ISO 15118-3:2015.</li><li>• Test of "SECC Discovery Protocol, SDP" and TCP/IPv6 binding process according to ISO 15118-2:2014.</li><li>• Test of "V2GTP" message encapsulation according to ISO 15118-2:2014.</li><li>• Test of "Supported Application Protocol Handshake" process and messaging according to ISO 15118-2:2014.</li><li>• Test of all V2G Messages according to ISO 15118-2:2014 for Charging Setup, Charging Loop and Termination of Charging Process.</li><li>• Good case AND Error case test run through all SLAC Messages according to ISO 15118-3:2015.</li><li>• Good case AND Error case test run through all V2G Messages according to ISO 15118-2:2014.</li><li>• Test of concurrent handling of ISO 15118-2:2014 and ISO 15118-3:2015.</li><li>• Test scope is focusing on communication/signaling. Power Flow Support is available depending on chosen hardware/driver.</li></ul>
<b>Quantity</b> <ul style="list-style-type: none"><li>• ISO/IS 15118-4:2018 and ISO/IS 15118-5:2018 EV DC EIM conformance: ~325 test cases</li></ul>

**Note 1:** This Test Suite package is only available in combination with SL1440A.

**Note 2:** SL1442A is delivered as set of Plugins for Spirent's TTWorkBench.

**Note 3:** Number of executable test cases strongly depends on capabilities and configurability of the SUT.

**Note 4:** Software maintenance options are available on request.

## SL1443A EV ISO 15118-4/-5:2018 Conformance (Transport Layer Security/PnC-specific Test Cases)

SL1443A - Executable test suite with codecs and adapters
<b>Required</b> <ul style="list-style-type: none"><li>• SL1441A or SL1442A</li></ul>
<b>Test scope</b> <p>AC and DC charging; conformance test of protocol</p> <ul style="list-style-type: none"><li>• 7 Test PKIs with different setups according to ISO 15118-2:2014 and with valid and invalid certificates.</li><li>• Good case test run through PnC charging process with all V2G Messages according to ISO 15118-2:2014.</li><li>• Error case test run through PnC charging process with all V2G Messages according to ISO 15118-2:2014.</li><li>• Good case test run through Certificate Update and Installation process according to ISO 15118-2:2014.</li><li>• Error case test run through Certificate Update and Installation according to ISO 15118-2:2014.</li><li>• Signature Validation as part of all test runs and in-depth analysis tools for fault identification.</li></ul>
<b>Quantity</b> <p>ISO/IS 15118-4:2018 EV PnC conformance:</p> <ul style="list-style-type: none"><li>• DC: ~350 test cases (in combination with SL1441A)</li><li>• AC: ~330 test cases (in combination with SL1440A)</li></ul>

**Note 1:** This option is only available in combination with SL1441A or SL1442A.

**Note 2:** SL1443A is delivered as set of Plugins for Spirent's TTWorkBench.

**Note 3:** Number of executable test cases strongly depends on capabilities and configurability of the SUT.

**Note 4:** Software maintenance options are available on request.

## Option Class EV Test Case Bundles

**Please note:** Software maintenance options are available on request for each bundle.

### SL1445A EV ISO 15118-4/-5:2018 DC & PNC Conformance Bundle

This software bundle includes:

- SL1440A EV ISO 15118-4/-5:2018 Conformance (COMMON Test Cases) - Executable test suite with codecs and adapters
- SL1442A EV ISO 15118-4/-5:2018 Conformance (DC-specific Test Cases) - Executable test suite with codecs and adapters
- SL1443A EV ISO 15118-4/-5:2018 Conformance (Transport Layer Security (TLS)/PnC-specific Test Cases) - Executable test suite with codecs and adapters

## SL1446A EV ISO 15118-4/-5:2018 AC/DC & PNC Conformance Bundle

This software bundle includes:

- SL1440A EV ISO 15118-4/-5:2018 Conformance (COMMON Test Cases) - Executable test suite with codecs and adapters
- SL1441A EV ISO 15118-4/-5:2018 Conformance (AC-specific Test Cases) - Executable test suite with codecs and adapters
- SL1442A EV ISO 15118-4/-5:2018 Conformance (DC-specific Test Cases) - Executable test suite with codecs and adapters
- SL1443A EV ISO 15118-4/-5:2018 Conformance (Transport Layer Security (TLS)/PnC-specific Test Cases) - Executable test suite with codecs and adapters

## SL1447A EV DIN 70122 & ISO 15118-4/-5:2018 DC & PNC Conformance Bundle

This software bundle includes:

- SL1438A EV DIN 70122:2018 Conformance and CharIN TCs for DIN 70121 Impl. Guide (2020) - Executable test suite with codecs and adapters
- SL1440A EV ISO 15118-4/-5:2018 Conformance (COMMON Test Cases) - Executable test suite with codecs and adapters
- SL1442A EV ISO 15118-4/-5:2018 Conformance (DC-specific Test Cases) - Executable test suite with codecs and adapters
- SL1443A EV ISO 15118-4/-5:2018 Conformance (Transport Layer Security (TLS)/PnC-specific Test Cases) - Executable test suite with codecs and adapters

## SL1448A EV DIN 70122 & ISO 15118-4/-5:2018 AC/DC & PNC Conformance Bundle

This software bundle includes:

- SL1438A EV DIN 70122:2018 Conformance and CharIN TCs for DIN 70121 Impl. Guide (2020) - Executable test suite with codecs and adapters
- SL1440A EV ISO 15118-4/-5:2018 Conformance (COMMON Test Cases) - Executable test suite with codecs and adapters
- SL1441A EV ISO 15118-4/-5:2018 Conformance (AC-specific Test Cases) - Executable test suite with codecs and adapters
- SL1442A EV ISO 15118-4/-5:2018 Conformance (DC-specific Test Cases) - Executable test suite with codecs and adapters
- SL1443A EV ISO 15118-4/-5:2018 Conformance (Transport Layer Security (TLS)/PnC-specific Test Cases) - Executable test suite with codecs and adapters



## Option Class Test Case Bundles for EV and EVSE Test

**Please note:** Software maintenance options are available on request for each bundle.

### SL1460A EV & EVSE ISO 15118-4/-5:2018 DC & PNC Conformance Bundle

This software bundle includes:

- SL1440A EV ISO 15118-4/-5:2018 Conformance (COMMON Test Cases) - Executable test suite with codecs and adapters
- SL1442A EV ISO 15118-4/-5:2018 Conformance (DC-specific Test Cases) - Executable test suite with codecs and adapters
- SL1443A EV ISO 15118-4/-5:2018 Conformance (Transport Layer Security (TLS)/PnC-specific Test Cases) - Executable test suite with codecs and adapters
- SL1451A EVSE ISO 15118-4/-5:2018 Conformance (COMMON Test Cases) - Executable test suite with codecs and adapters
- SL1453A EVSE ISO 15118-4/-5:2018 Conformance (DC-specific Test Cases) - Executable test suite with codecs and adapters
- SL1454A EVSE ISO 15118-4/-5:2018 Conformance (Plug and Charge (PnC)-specific Test Cases) - Executable test suite with codecs and adapters

### SL1461A EV & EVSE ISO 15118-4/-5:2018 AC/DC & PNC Conformance Bundle

This software bundle includes:

- SL1440A EV ISO 15118-4/-5:2018 Conformance (COMMON Test Cases) - Executable test suite with codecs and adapters
- SL1441A EV ISO 15118-4/-5:2018 Conformance (AC-specific Test Cases) - Executable test suite with codecs and adapters
- SL1442A EV ISO 15118-4/-5:2018 Conformance (DC-specific Test Cases) - Executable test suite with codecs and adapters
- SL1443A EV ISO 15118-4/-5:2018 Conformance (Transport Layer Security (TLS)/PnC-specific Test Cases) - Executable test suite with codecs and adapters
- SL1451A EVSE ISO 15118-4/-5:2018 Conformance (COMMON Test Cases) - Executable test suite with codecs and adapters
- SL1452A EVSE ISO 15118-4/-5:2018 Conformance (AC-specific Test Cases) - Executable test suite with codecs and adapters
- SL1453A EVSE ISO 15118-4/-5:2018 Conformance (DC-specific Test Cases) - Executable test suite with codecs and adapters
- SL1454A EVSE ISO 15118-4/-5:2018 Conformance (Plug and Charge (PnC)-specific Test Cases) - Executable test suite with codecs and adapters

## SL1462A EV & EVSE DIN 70122 & ISO 15118-4/-5:2018 DC & PnC Conformance Bundle

This software bundle includes:

- SL1438A EV DIN 70122:2018 Conformance and CharIN TCs for DIN 70121 Impl. Guide (2020) - Executable test suite with codecs and adapters
- SL1440A EV ISO 15118-4/-5:2018 Conformance (COMMON Test Cases) - Executable test suite with codecs and adapters
- SL1442A EV ISO 15118-4/-5:2018 Conformance (DC-specific Test Cases) - Executable test suite with codecs and adapters
- SL1443A EV ISO 15118-4/-5:2018 Conformance (Transport Layer Security (TLS)/PnC-specific Test Cases) - Executable test suite with codecs and adapters
- SL1449A EVSE DIN 70122:2018 Conformance and CharIN TCs for DIN 70121 Impl. Guide (2020) - Executable test suite with codecs and adapters
- SL1451A EVSE ISO 15118-4/-5:2018 Conformance (COMMON Test Cases) - Executable test suite with codecs and adapters
- SL1453A EVSE ISO 15118-4/-5:2018 Conformance (DC-specific Test Cases) - Executable test suite with codecs and adapters
- SL1454A EVSE ISO 15118-4/-5:2018 Conformance (Plug and Charge (PnC)-specific Test Cases) - Executable test suite with codecs and adapters

## SL1463A EV & EVSE DIN 70122 & ISO 15118-4/-5:2018 AC/DC & PnC Conformance Bundle

This software bundle includes:

- SL1438A EV DIN 70122:2018 Conformance and CharIN TCs for DIN 70121 Impl. Guide (2020) - Executable test suite with codecs and adapters
- SL1440A EV ISO 15118-4/-5:2018 Conformance (COMMON Test Cases) - Executable test suite with codecs and adapters
- SL1441A EV ISO 15118-4/-5:2018 Conformance (AC-specific Test Cases) - Executable test suite with codecs and adapters
- SL1442A EV ISO 15118-4/-5:2018 Conformance (DC-specific Test Cases) - Executable test suite with codecs and adapters
- SL1443A EV ISO 15118-4/-5:2018 Conformance (Transport Layer Security (TLS)/PnC-specific Test Cases) - Executable test suite with codecs and adapters
- SL1449A EVSE DIN 70122:2018 Conformance and CharIN TCs for DIN 70121 Impl. Guide (2020) - Executable test suite with codecs and adapters
- SL1451A EVSE ISO 15118-4/-5:2018 Conformance (COMMON Test Cases) - Executable test suite with codecs and adapters
- SL1452A EVSE ISO 15118-4/-5:2018 Conformance (AC-specific Test Cases) - Executable test suite with codecs and adapters
- SL1453A EVSE ISO 15118-4/-5:2018 Conformance (DC-specific Test Cases) - Executable test suite with codecs and adapters
- SL1454A EVSE ISO 15118-4/-5:2018 Conformance (Plug and Charge (PnC)-specific Test Cases) - Executable test suite with codecs and adapters

## Option Class TTCN-3 Driver

### SL1436A Keysight's Scienlab CDS Driver EV and EVSE Test

Keysight's Scienlab plug-in for CDS support:

Mandatory software driver to integrate Keysight's Scienlab Charging Discovery System (CDS) in TTCN-3 CCS Conformance Test Automation Framework. This driver enables execution of conformance/interop test suites (e.g. for DIN 70121/ISO 15118) and provides PLC communication support as well as control and measurement capabilities for CP signaling required for SUT EV/EVSE.

- Homeplug GreenPHY 1.1.1 RAW Ethernet MME Codec and MAC SUT Adapter for SLAC Messaging based on ISO 15118-3:2015/DIN 70121:2014

**Note:** Software maintenance options are available on request.

### SL1437A Keysight's Scienlab DHVE Driver AC and DC

Keysight's Scienlab plugin for AC/DC emulator support:

Mandatory software driver to integrate Keysight Dynamic High Voltage Emulators (DHVE) in TTCN-3 CCS Conformance Test Automation Framework. This driver enables power flow support according to IEC 61851-23 as well as HV measurement capabilities for TTCN-3 conformance/interop test suites (e.g. for DIN 70121/ISO 15118) required for SUT EV/EVSE.

**Note:** Software maintenance options are available on request.

### SL1468A Functional Mockup-Unit Interface Driver for CCS

Software driver to integrate TTCN-3 CCS Conformance Test Automation Framework in Model-in-the-Loop (MiL) or Software-in-the-Loop (SiL) test environments based on Functional Mockup Interface (FMI) standard for CCS EV SUTs.

This driver includes the following baseline mockup units according to FMI standard including their corresponding hooks into the TTCN-3 CCS Conformance Test Automation Framework.

- FMU 1 (skeleton): Hardware Abstraction Layer for SUT EVCC (ECU)  
Provides discrete values for Control Pilot and Proximity Pilot signal lines according to IEC 61851-1:2017.
  - Output: CP frequency, CP duty cycle, CP pos./neg. Voltage, PP Resistance
  - Input: CP pos. Voltage (Feedback Channel)

### **SL1040A-S06 Remote interface for TTCN-3**

This interface specification describes the main class with all data types and functions of the SL14XXA Scienlab Test Case Library – TTCN-3. In combination with the Charging Discovery System (CDS) and the application software TTCN-3 this driver can be used to:

- Access to remote interface of CDS.
- Direct access for TTCN-3 software via SLEP interface.
- External access for TTCN-3 software to configure CDS PLC (power line communication) modems.

**Note:** The item is required to be added manually to the order in CPQ. The license key can be generated later by the customer in KSM and activated on the CDS.

### **Option Class Service**

The training will be conducted after delivery of the test system (software and hardware) and will be negotiated between the customer and Keysight Technologies.

- **PST20-SL-1D Setup and Tool Training via Web Session (1 day):**  
Includes 1-day theoretical course and tool training covering the entire testing toolchain.
- **PST20-SL-2D Setup and Tool Training via Web Session (2 days):**  
Includes 2-day theoretical course and tool training covering the entire testing toolchain.
- **PST10-SL-1D Setup and Tool Training on site (1 day):**  
Includes 1-day theoretical course and tool training covering the entire testing toolchain.
- **PST10-SL-2D Setup and Tool Training on site (2 days):**  
Includes 2-day theoretical course and tool training covering the entire testing toolchain.

## Option Class Software Maintenance

Support and maintenance is mandatory for the 1st year. Keysight provides regular updates as part of the ongoing standardization activities and system and feature improvements.

### **Maintenance includes the following services for all SW options ordered:**

- Software updates (features and patches) during timeframe of the maintenance contract (2 release updates per year).
- Individual ticketing support for software issues/bugs.
- Individual patches for issues/bugs.

**Please note:** Support and maintenance does not include customer-specific tool-chain integration, development support, or in-depth test result interpretation.

### **Choose the duration according to your needs:**

- 12 months software maintenance
- 24 months software maintenance
- 36 months software maintenance

## Extend the Capabilities of your Test Solution

Keysight's Scienlab Charging Discovery System Series (CDS) is a breakthrough solution for holistic test of all AC and DC charging interfaces of electric vehicles (EV) and electric vehicle supply equipment (EVSE).



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

### Meet the SL1040A Series – Scienlab Charging Discovery System

The Scienlab Charging Discovery System Series from Keysight enables you to test charging interfaces of electric vehicles (EVs) and EV supply equipment (EVSE). Thanks to its modular and innovative design, you can configure the CDS to customers' specific needs and replace multiple real EV/EVSE with one test solution to ensure an optimal price-performance ratio.

- Automated functional, conformance, interoperability and quality testing for R&D, end-of-line (EOL) and Electromagnetic Compatibility (EMC) applications.
- Time synchronous measurement and decoding of communication and power signals.
- Scalable and futureproof hardware design according to CharIN e.V. CCS Test System.
- CE, UL and KC-Mark conformance certified by CSA Group.
- Extensive Test Case Library for automated conformance testing of CCS, CHAdeMO and GB/T standard.

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

## Meet the SL1047A Series – Scienlab Charging Discovery System – High-Power Series

The Scienlab Charging Discovery System – High-Power Series (CDS HP Series) from Keysight enables you to test charging interfaces of electric vehicles (EVs) and EV supply equipment (EVSE) during high-power charging up to 1,500 V DC and  $\pm 600$  A DC. With the CDS can perform all necessary conformance and interoperability tests according to worldwide charging standards. Our new solution, which features the separate Scienlab Cooling Unit with interchangeable liquid-cooled charging adapters, also enables a high-power upgrade of the SL1040A Scienlab Charging Discovery System – Portable Series.

- Automated functional, conformance, interoperability and quality testing for R&D and EOL applications.
- Time synchronous measurement and decoding of communication and power signals.
- Scalable and future-proof hardware design according to CharIN e. V. CCS Test System.
- CE, UL, and KC-mark conformance.
- Extensive Test Case Library for automated conformance testing of CCS, CHAdeMO, and GB/T standard.

Find out more about the [SL1047A Scienlab CDS HP Series](#).

Learn more at: [www.keysight.com](http://www.keysight.com)

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: [www.keysight.com/find/contactus](http://www.keysight.com/find/contactus)

