

Megawatt Charging Discovery System

EV & EVSE Test

Megawatt Charging Discovery System

Megawatt Charging Discovery System - Inlet Unit for EVSE Test

Megawatt Charging Discovery System -Charging Cable Unit for EV Test



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Solution Overview

The SL26X0A Megawatt Charging Discovery System (MCS-CDS) is Keysight's advanced test solution for validating megawatt charging interfaces in Electric Vehicles (EV) and Electric Vehicle Supply Equipment (EVSE). Designed for charging currents up to 1,500 A and voltages up to 1,500 V DC, it enables comprehensive testing of next-generation megawatt charging systems under realistic conditions.

Thanks to its modular architecture, the system can emulate both EV and EVSE roles, supporting two primary applications:

- EV Testing: Simulate a configurable charging station to verify vehicle charging behavior, safety, and communication.
- EVSE Testing: Emulate an electric vehicle to validate charging infrastructure performance and compliance.

In combination with corresponding **software packages**, the Megawatt CDS combines standard-compliant communication emulation or test execution according to ISO 15118-20, IEC 61851-23(-3)) with real-time control and precision measurement technology. It offers programmable error injection for robustness testing and integrates seamlessly with high-power DC emulators and cooling units to support full megawatt charging scenarios.

The SL2600A is additionally recognized as a **CharIN-certified Conformance Test System (CCTS)** for Basic and Extended application profiles, supporting established industry processes for CCS-based EV and EVSE conformance and interoperability testing.

By accelerating development and certification of heavy-duty charging systems, the Megawatt CDS ensures fast, scalable, and future-ready infrastructure for sustainable transport



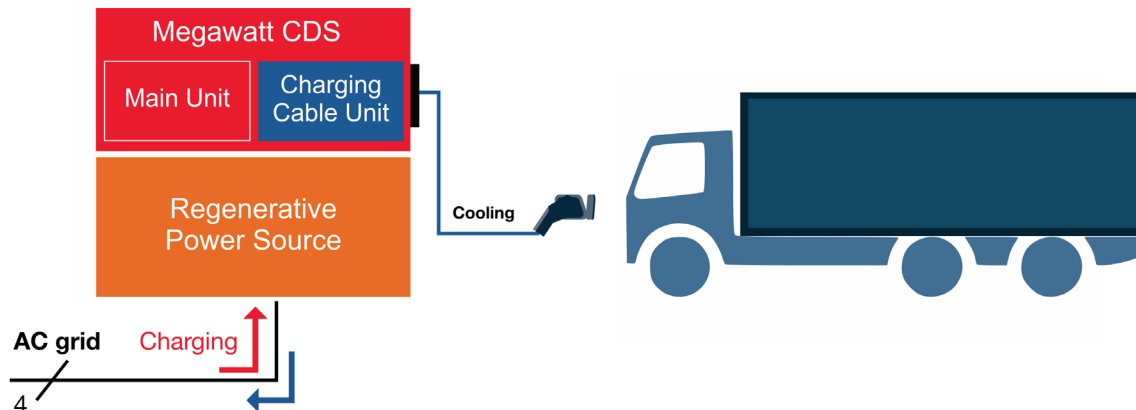
Figure 1. SL2600A Megawatt Charging Discovery System Series with SL2610A Megawatt Charging Discovery System – Inlet Unit for EVSE Test and SL2620A Megawatt Charging Discovery System – Charging Cable Unit for EV Test

Configuration Examples

The SL2600A Megawatt CDS can be configured for different use cases, ranging from communication-only to full megawatt testing scenarios. For EVSE tests the Main Unit is combined with the SL2610A Megawatt Inlet Unit and supports continuous currents up to 1500 A DC. For EV tests the Main Unit can be combined with the SL2620A Charging Cable Unit which includes a liquid-cooled MCS charging cable and supports continuous currents up to 1500 A DC.

Below are examples of typical configurations to help you select the right setup for your requirements.

Example 1: SL2600A Megawatt CDS with SL2620A Charging Cable Unit and High-Power DC Supply for EV Test



In this configuration, the SL2600A Megawatt CDS acts as a fully configurable charging station, paired with the SL2620A Charging Cable Unit featuring a liquid-cooled MCS cable, and a bidirectional DC emulator (e.g., Keysight's SL1800A series). Together, they enable high-power EV validation up to 1500 A DC and high DC voltage levels aligned to the MCS interface — covering functional, safety, interoperability, conformance, and durability testing under realistic load.

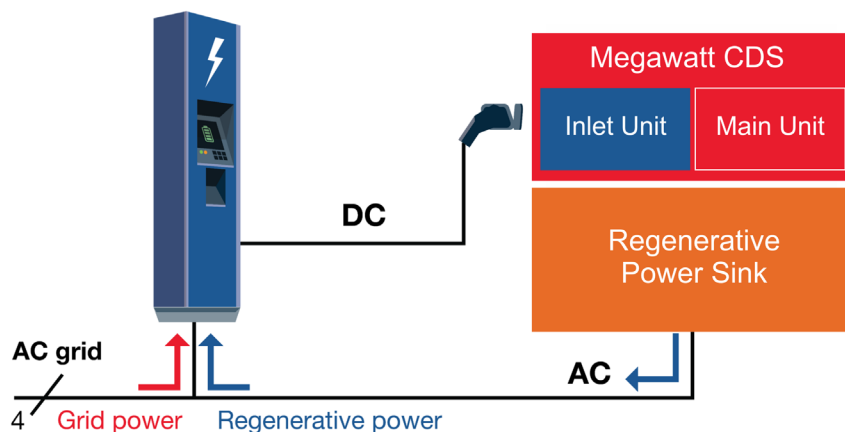
Why It Is the Right Setup for EV Validation

- Real megawatt conditions: High current (up to 1500 A DC continuous) and high DC voltage (up to 1500 V DC) for heavy-duty and fleet applications.
- Fast development cycles: Start with No HV (communication and protocol tests without power flow), then scale to full power testing.
- Deep insight & robustness: Precision signal measurement for Charge Enable (CE) and Insert Detection (ID) pilot lines, real-time control, and fault injection help validate edge cases and resilience.

What You Can Validate

- Full EV charging behavior under high-power load.
- Standard-compliant communication, safety, and interoperability (MCS stack).
- Robustness via targeted fault injection as part of repeatable and reproducible test cases.

Example 2: SL2600A Megawatt CDS with SL2610A Megawatt CDS Inlet Unit and High-Power DC Supply for EVSE Test



In this setup, the SL2600A Megawatt CDS emulates a next generation EV, while the SL2610A Inlet Unit provides the MCS vehicle side interface. Combined with a bidirectional DC emulator in sink mode, you can test charging infrastructure up to 1500 A DC - from communication and safety to performance and standard compliance - quickly and repeatably.

Why It's Ideal for EVSE Validation

- Real EV emulation: Verify your charging station from handshake to full power behavior under controlled, repeatable conditions.
- Compliance made practical: Automated test cases, precision measurements, and reproducible fault injection accelerate conformance and interoperability checks.
- Safe ramp ups: Start with No HV for protocol validation, then enable energy flow to prove power stage performance.

What You Can Validate

- EVSE communication, safety, performance, and control under high current conditions.
- Conformance and interoperability against MCS, with automated and repeatable test sequences.
- Response to fault scenarios and edge cases via controlled fault injection.

Megawatt Charging Discovery System

The SL2600A Megawatt CDS is the core of Keysight's high-power charging test solution. In combination with the comprehensive software portfolio from Keysight, it enables megawatt charging with real-time control, precision measurement and standard-compliant communication emulation in a single, modular platform.

- Voltage & current capability: Supports up to 1500 V DC and 1500 A DC for full megawatt charging scenarios.
- MCS standards coverage: ISO 15118-10, ISO 15118-20, IEC 61851-23(-3) including CE/ID signaling and Automotive Ethernet (10BASE-T1S) communication.
- CCS standards coverage: DIN/TS 70121, ISO 15118-3, ISO 15118-2, ISO 15118-20, IEC 61851-1, IEC 61851-23, including PWM and Homeplug GreenPHY powerline communication.
- Real-time control: High-performance computing unit ensures low latency and accurate protocol handling.
- Integrated high-precision measurement technology: High-accuracy voltage, current, and signal measurement enables detailed analysis and repeatable validation of high-power charging behavior.
- Integrated safety: Built-in insulation monitoring, emergency stop circuits, and temperature monitoring for safe operation.
- Modular design: Expandable with SL2620A Charging Cable Unit (EV test) or SL2610A Inlet Unit (EVSE test) for high-power configurations.



Figure 2. SL2600A Megawatt Charging Discovery System – Main Unit

Technical Data

System Characteristics SL2600A

Model number	SL2600A
Dimension (H x W x D)	1290 x 630 x 560 mm
Weight	approx. 135 kg
System heat radiation	max. 500 W
Degree of protection	IP20, type 1 Enclosure (UL50E)

Operating Conditions

Ambient temperature (operation)	5 to 40 °C
Relative humidity	max. 80% (non-condensing) for temperatures up to 31 °C, decreasing linearly to 50% (non-condensing) at 40 °C
Maximum operating altitude	2000 m AMSL

Central Mains Supply

Voltage supply	100-240 V AC ($\pm 10\%$), 8 A (@100 V)
Interface to workstation	1000 Mbps Ethernet, RJ45
Electrical isolation	Consistently between power supply, electronics, measuring technology and DUT PE

Measuring Taps

Control pilot EV	BNC socket
Control pilot EVSE	BNC socket

Status LEDs

System status	3 LEDs (monochrome)
EV	Status of EVCC (RGB) and Power Line Communication (PLC) modem
EVSE	Status of SECC (RGB) and PLC modem

Megawatt CDS- Inlet Unit for EVSE Test

The SL2610A Megawatt CDS Inlet Unit is a dedicated accessory designed to extend the SL2600A Megawatt Charging Discovery System for EVSE testing. Equipped with an MCS vehicle inlet, it enables realistic and repeatable emulation of an electric vehicle interface for megawatt-class charging infrastructure validation.



Figure 3. SL2610A Megawatt Charging Discovery System - Inlet Unit for EVSE Test (MCS inlet included)

Technical Data

System Characteristic SL2610A

Dimensions (H x W x D)	1075 x 630 x 560 mm
Weight	approx. 120 kg
System heat radiation	max. 500 W
Degree of protection	IP20
Operating Conditions	
Ambient temperature	5 to 40 °C
Relative humidity	max. 80% (non-condensing) for temperatures up to 31 °C, decreasing linearly to 50% (non-condensing) at 40 °C
Maximum operating altitude	2,000 m MSL
Interface	
Voltage supply	24 V voltage supply via communication adapter
HV interface to Megawatt CDS	1500 V DC, 1500 A DC

Megawatt CDS-Charging Cable Unit for EV Test

The SL2620A Megawatt CDS Charging Cable Unit extends the SL2600A Megawatt Charging Discovery System for high-power EV testing. Equipped with a liquid-cooled Megawatt Charging System (MCS) cable, it enables realistic emulation of a megawatt-class charging station, supporting charging currents of up to 1500 A DC.



Figure 4. SL2620A Megawatt Charging Discovery System – Charging Cable Unit for EV Test (liquid-cooled MCS charging cable included)

Technical Data

System Characteristic SL2620A

Dimensions (H x W x D)	1290 x 630 x 560 mm
Weight	approx. 165 kg
System heat radiation	max. 7000 W
Degree of protection	IP20
Operating Conditions	
Ambient temperature	5 to 40 °C
Relative humidity	max. 80% (non-condensing) for temperatures up to 31 °C, decreasing linearly to 50% (non-condensing) at 40 °C
Maximum operating altitude	2,000 m MSL
Interface	
Voltage supply	24 V voltage supply via communication adapter (included in scope of delivery)
HV interface to Megawatt CDS	HV 1,500 V DC, 3x 600 A via HV adapter (3x2 separate 240 mm ² DC lines = 6 in total)
Megawatt charging cable	Specification see table below

Technical Data

Megawatt Charging Cable

Rated Voltage	Rated Current	Cable Cross Section	Cable Length	Standard
1500 V	1500 A	2 x 2 x 36 mm ² DC± 1 x 25 mm ² PE Signal cables 14 x 0.5 mm ² Communication cables 2 x 0.34 mm ² Power Metering 2 x 0.5 mm ²	4 m	DC: IEC 62196-3 (CCS) DC: IEC 62196-23-3 (MCS)

Specifications

Electrical Specification		Standard Application
DC ratings	Voltage	±1500 V
	Current	±1500 A

Output Ratings	Measurement Range	Range	Accuracy
DC ratings	Voltage	0 to 1500 V	±1 V offset ±0.2% of measured value
	Current	±1500 A	±0.1 A offset ±0.1% of measured value

CCS Pilot Signals		Range	Accuracy	Resolution
EVSE				
Control pilot parameters	Voltage programming	±1 to 14,5 V	±0.02 V	0.01 V
	Frequency programming	0Hz; 800 to 1200Hz	±0,1 Hz (High Resolution Mode)	
	Frequency measurement	0Hz; 800 to 1200Hz	±0,1 Hz (High Resolution Mode)	
	Duty cycle programming	0;1-99;100%	±0.2% (High Resolution Mode)	
	Duty cycle measurement	0;2-98;100%	±0.1% (absolute value) (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 8000 Ω	±1 % for 100 to 599 Ω ±0,1 % for 600 to 8000 Ω	1 Ω
Proximity pilot parameters	Resistance programming	1 to 16000 Ω	±1 % of value for 150 to 16000 Ω	1 Ω
EV				
Control pilot parameters	Frequency measurement	0Hz; 800 to 1200Hz	±0.1Hz (High Resolution Mode)	
	Duty cycle measurement	0;2-98;100%	±0.1% (absolute value) (High Resolution Mode)	
	Rise time measurement	1 to 30 µs	±1 µs (High Resolution Mode)	
	Fall Time measurement	1 to 30 µs	±1 µs (High Resolution Mode)	
	Resistance programming (R2 II R3)	1 to 25000 Ω	±1 % for 100 to 749 Ω ±0,1 % for 750 to 25000 Ω	0,5 Ω
Proximity pilot parameters	Resistance programming (R5)	1 to 8000 Ω	±1 % of value for 150 to 8000 Ω	1 Ω
EV/ EVSE				
Proximity pilot parameters	Resistance measurement	0 to 4600 Ω	±2 % of range	
Control pilot parameters	Voltage measurement	±14.5 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	Frequency Range
DC ripple (0 to 150 kHz)	Voltage	0 to 20 Vpp	±0.1 V offset ±0.2 % of value	0...150 kHz
	Current	0 to 20 App	±0.1 A offset ±0.25 % of value	0...150 kHz

CCS Pilot Signals		Range	Accuracy
EVSE			
Control pilot parameters	Maximum rise/fall time	2 µs at Cc = 0 pF	-
	Minimum settling time to 95% of the steady state	3 µs at Cc = 0 pF	±1 µs
	Frequency programming	0 Hz; 100 to 1200 Hz	±1 Hz (High Range Mode)
	Frequency measurement	0 Hz; 100 to 1200Hz	±1 Hz (High Range Mode)
	Duty cycle measurement	0;2-98; 100 %	±0.5 % (High Range Mode)
	Duty cycle programming	0;1-99; 100 %	±0.2 % (High Range Mode)
	Capacitance programming	Low, 1600; 1800; 3100 pF	±5 %
EV			
Control pilot parameters	Capacitance programming	Low, 1500; 2400; 3900 pF	±5 % of value
	Voltage Diode programming	0.55; 0.7; 0.85 V	±5 % of value
	Frequency measurement	0 Hz; 100 to 1200 Hz	±1Hz (High Range Mode)
	Duty cycle measurement	0;2-98; 100 %	±0.5 % (High Range Mode)
Proximity pilot parameter	Pullup voltage programming (Proximity voltage)	0,5 to 6 V	±0,5 %

MCS Pilot Signals		Range	Accuracy
EVSE			
Charge enable parameters	Voltage programming	1 to 10 V	0,01 V
	Set Resistance Rs4 + Rs5	1 Ω to 4000 Ω	1 %
Insertion detection parameters	Set Resistance Rs2 Rs3	1 Ω to 16000 Ω	1 %
EV			
Charge enable parameters	CE Set Resistance Rv4 + (Rv5 Rv6 Rv7)	1 Ω to 4000 Ω	1 %
Insertion detection parameters	Voltage programming	1 to 10 V	0,01 V
	Set Resistance Rv1	1 to 16000 Ω	1 %
	ID Set Resistance Rv3	1 to 16000 Ω	1 %
EV/EVSE			
Charge enable parameters	Voltage measurement	0 to 10 V	0,1 V
Insertion detection parameters	Voltage measurement	0 to 32 V	0,1 V

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

- 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 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.

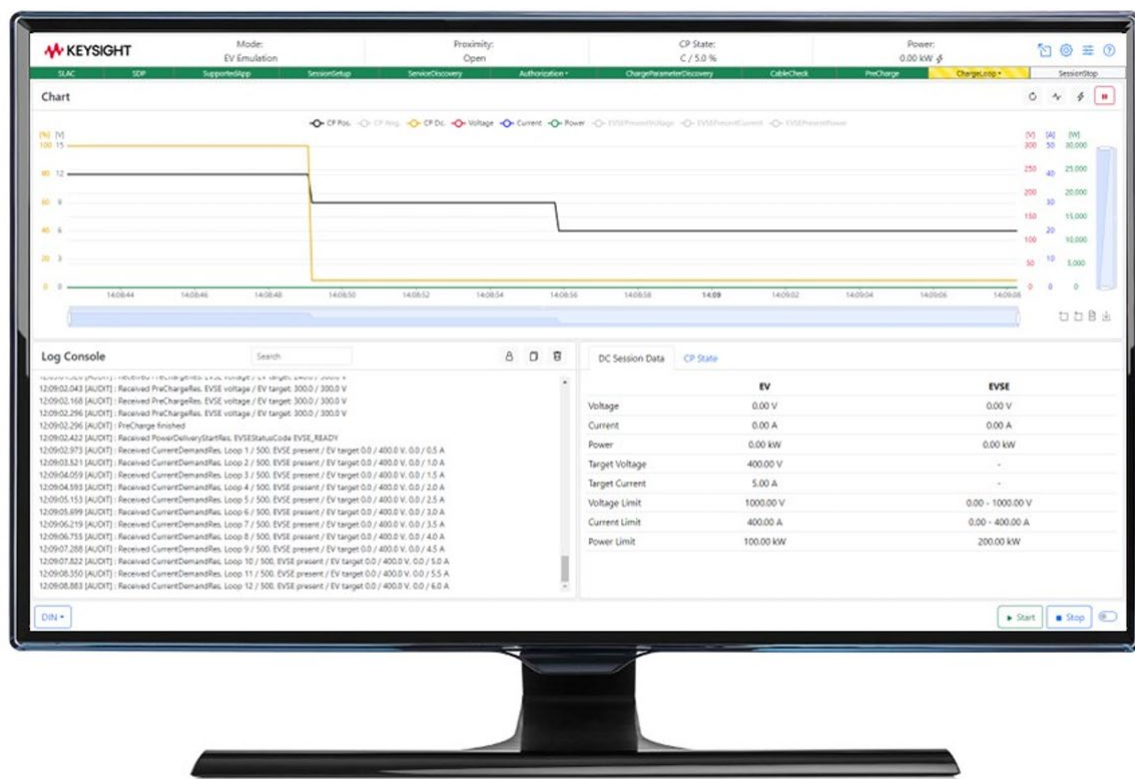


Figure 6. SL1470A EV-EVSE Smart Charging Emulation Software

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

Meet the 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.

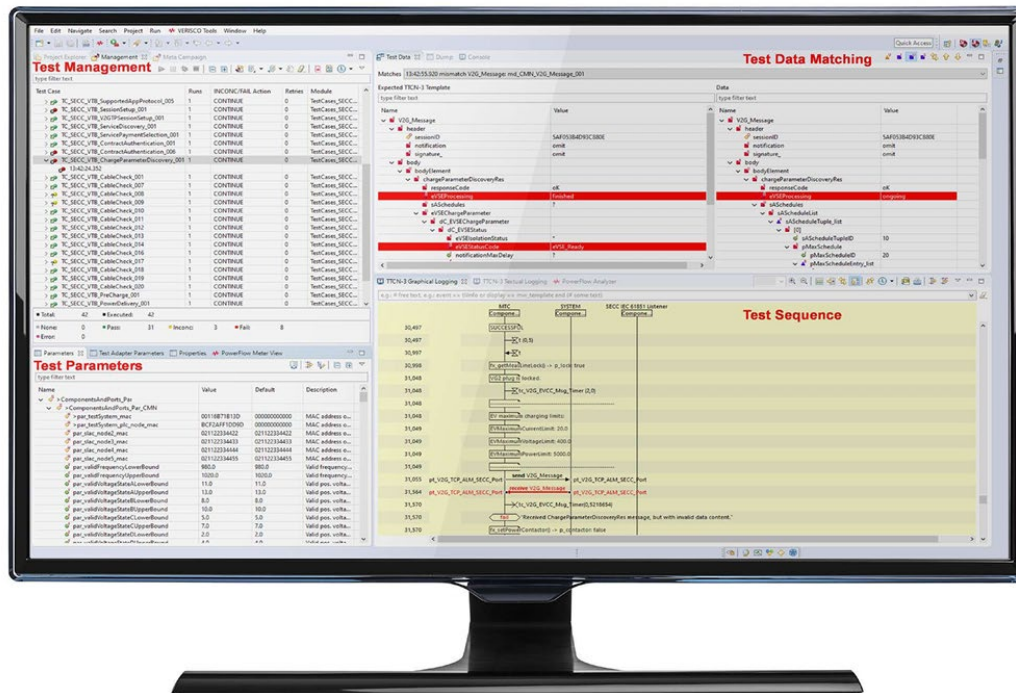


Figure 7. SL1471A TTCN 3 Charging Communication Test Automation Software

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

Meet the 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 8. SL1800A Scienlab Regenerative DC Emulator - High-Power Series

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

As a mission-critical design enablement partner, Keysight connects design, emulation, and test so customers can solve the world's most complex engineering challenges. Accelerate innovation at www.keysight.com.



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