

EV2020BE Electric Vehicle Manufacturing Functional Test Platform for Electric Vehicle Supply Equipment



Introduction

As the adoption of electric vehicles accelerates, manufacturers of Electric Vehicle Supply Equipment (EVSE) face increasing pressure to deliver charging solutions that are safe, reliable, and compliant with global standards. However, the path from assembly line to deployment is often challenged by a range of testing-related issues. These include incomplete test coverage, inconsistent power simulations, communication protocol mismatches, and electrical safety.

Many EVSE manufacturers still rely heavily on manual testing processes or outdated equipment, leading to inefficiencies, human error, and unreliable data. Firmware bugs and interoperability failures with different EV models or charging networks further complicate quality assurance. Without a robust testing framework, these issues can slip through to the field—resulting in costly recalls, damaged brand reputation, and safety hazards.

Achieve full functional EVSE testing

The EV2020BE is purpose-built to address these challenges. Designed for EVSE manufacturing environments, offering a comprehensive, and scalable testing platform that ensure quality and functionality.

Key features

- Modular charging channels for quick turnaround time
- Safe to use: Safety interlock, Emergency Power Off (EPO), Output Inhibit, Protective Contactor, touch-safe high-power connectors.
- Keysight PathWave platform with EVSE test case library feature
- Seamless integration to the EV20 product family

Application Use Case

Multi standard testing

When developing charging station, the problem of standard varying from country to country. This makes it complicated for EVSE manufacturers as there will be the need for multiple testers for different standards. The EV2020BE provides a modular approach allowing the same tester to be used for different standards testing. Pair this together with the SL1040A, an international charging standards available at your fingertips. These charging modules can be swapped out to cover different charging standards or voltage offering such as AC, DC or a combination of DC+AC testing.

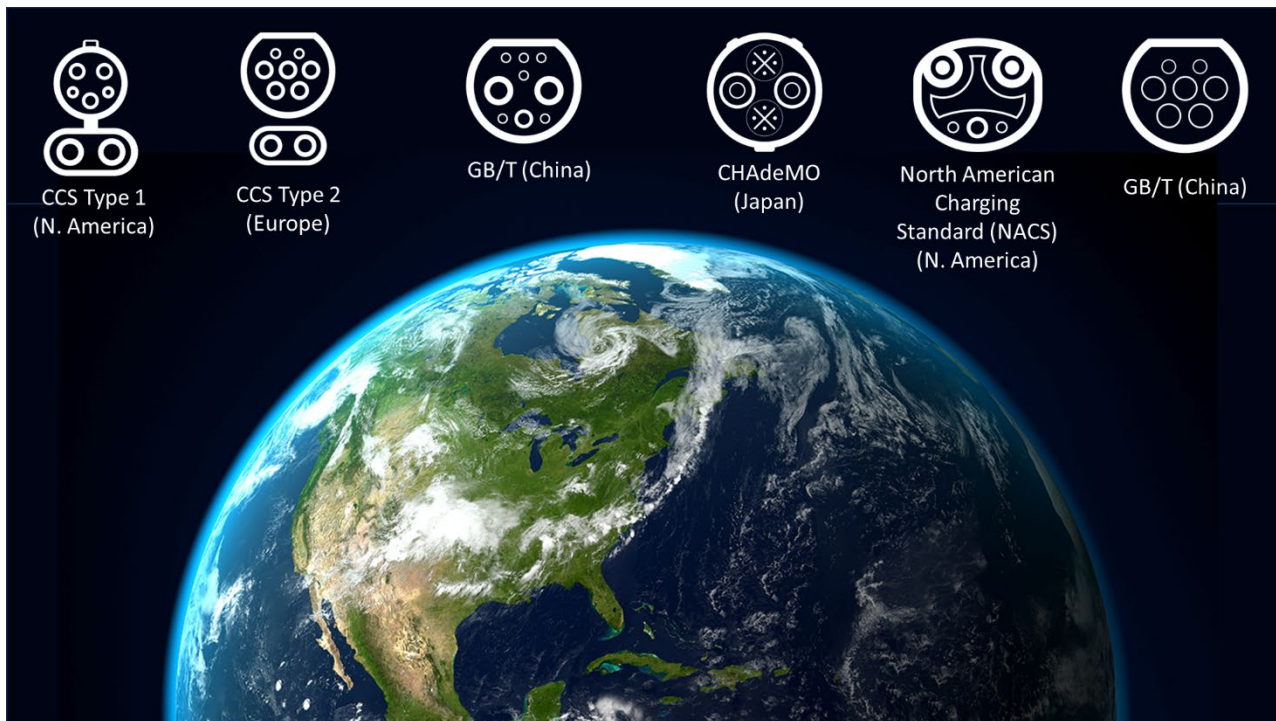


Figure 1. Different charging standards available in the world

Dual gun power simulation

Modern EVSE are increasingly featured with multiple charging guns in a single unit. These guns often operate simultaneously while maintaining the power output between the Electric Vehicles (EV). The EV2020BE comes equipped with independent multi charging channels, each capable of running simultaneously. Additionally, the EV2020BE is capable of simulating varying loads (representing the different EV battery levels). This allows manufacturers to simulate varying scenarios for the EVSE to output the appropriate power levels, making smarter and more efficient EVSE systems. Simulating the test scenario shown in Figure 2.

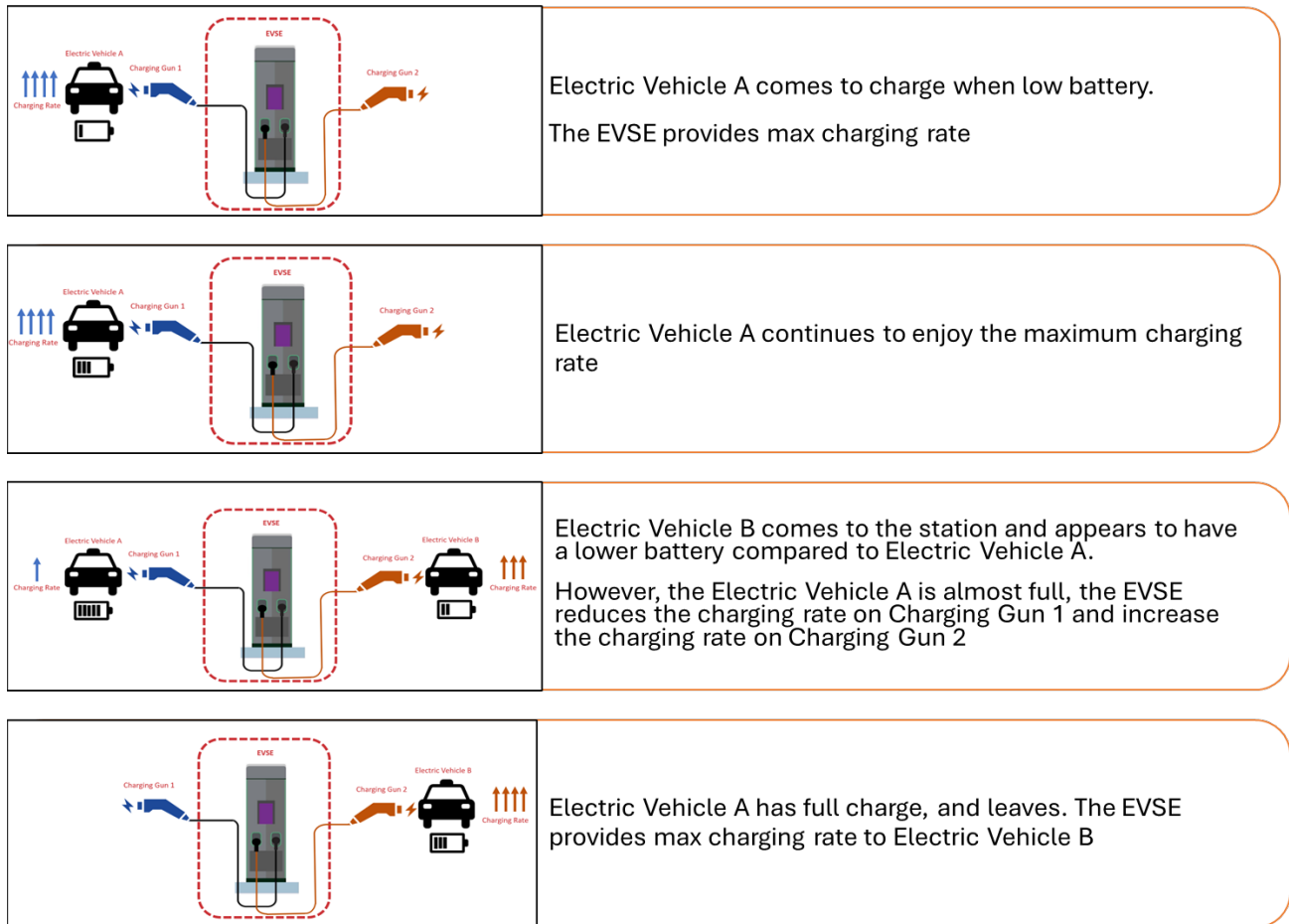


Figure 2. Smart EVSE scenario

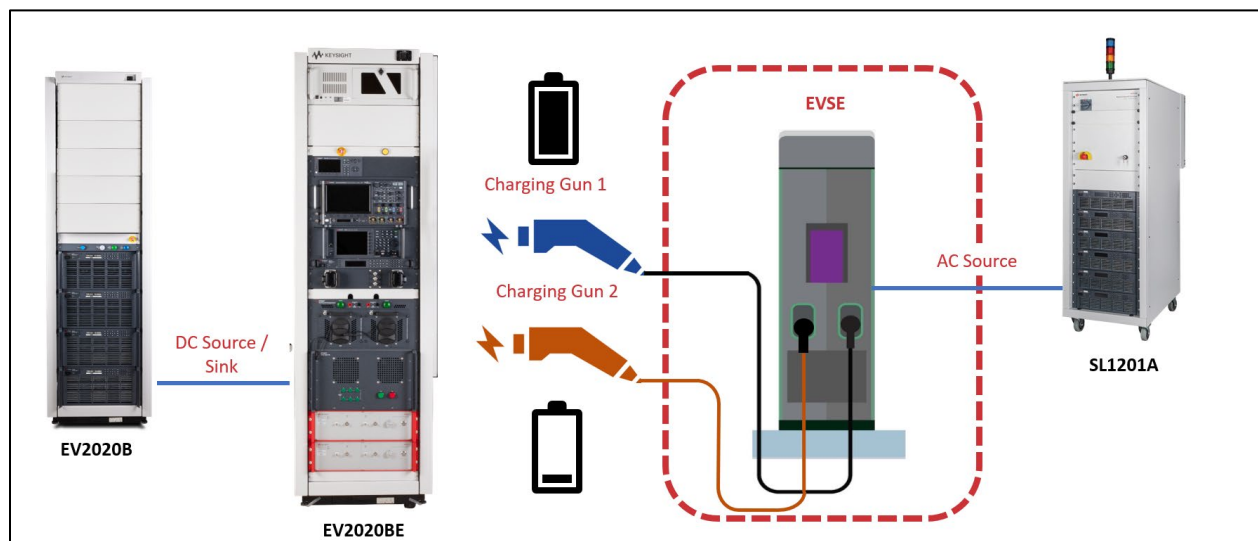


Figure 3. Simulating different power levels using the EV2020BE and testing 2 charging guns simultaneously. Sourcing AC via **SL1200 Series** and Bidirectional DC power via **EV2020B**.

Solution Highlights

Conformance and interoperability testing of EVSE

The Keysight Scienlab Charging Discovery System Series (CDS) provides the capability to test all AC and DC charging standards for EVSE. The CDS provides an independent, reproducible test for any EVSE through real-time emulation of all electrical interfaces (including communication signals and energy transfer). Additionally, it provides full coverage of charging standards such as CCS, CHAdeMO and GB/T. This provides the core component for the EV2020BE capabilities to support varying charging standards ensuring quality, interoperability and conformance. More details [here](#)



Figure 4. Keysight Scienlab CDS unit rack mount unit edition

Global charging standard support

The EV2020B comes equipped with multichannel charging interfaces and this is scalable up to 4 channels per system. Each channel is designed to act independently enabling simultaneous testing capable of performing voltage, current and frequency* measurements. Furthermore, it is designed to be modular allowing for quick replacement to minimize downtime, different voltage testing (either AC or DC) and different standard testing.



Figure 5. 2 channel independent modular charging interface for simultaneous testing

*Applicable for AC modules only

Supported AC standards (32A per channel)

SAE J1772	IEC 62196-2	GB/T 20234.2	SAE J3400
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AC measurement specification	% of Reading	Maximum offset
Voltage measurement accuracy (V)	1%	0
Current measurement accuracy (A)	0.5%	0
Frequency measurement accuracy	0	±0.1 Hz

Supported DC standards (325A per channel)

ISO 15118-1 & DIN 70121	SAE J3400	GBT 20234.3	CHAdemo
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DC measurement specification	% of Reading	Maximum offset
Voltage measurement accuracy	0.05%	150mV
Current measurement accuracy (A)	0.1%	100mA

Extensive EVSE test coverage

The EV2020BE can be integrated with the **N9321C Spectrum Analyzer** enabling the power spectral density (PSD) test with an accuracy of up to ±0.3dB.

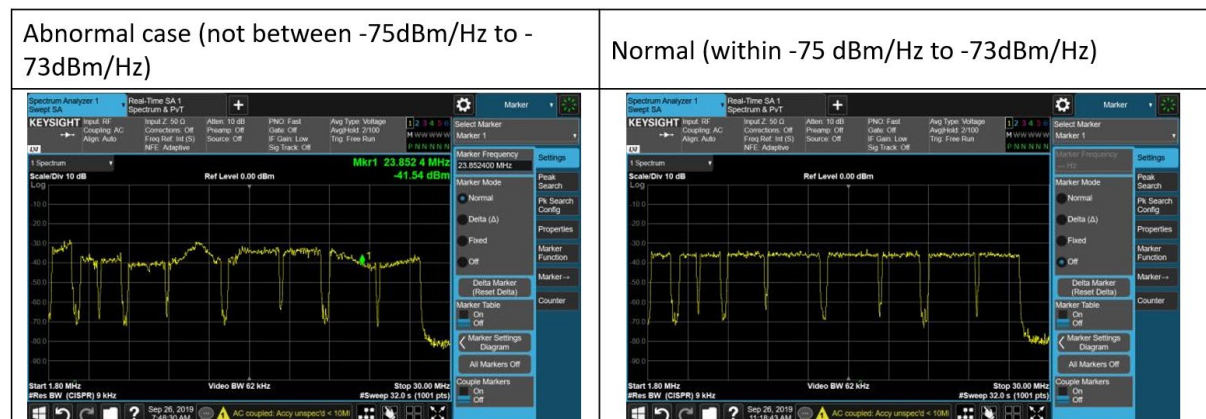


Figure 6. Snapshot of a PSD test results based on ISO15118-3

Additionally, the EV2020BE also covers the signal channel with the integration of the **InfiniiVision 3000 series**, allows to measure healthy Control Pilot (CP) signals ensuring quality and performance of the EVSE.



Figure 7. Snapshot of the state results

Robust software

KS8328B PathWave Test Executive for Manufacturing (PTEM) is a plug-in that enhances the user experience in developing automated test programs using KS8400B PathWave Test Automation Platform (TAP). With powerful PathWave Test Executive software, we eliminate the need to maintain or develop a test platform by users, especially in a manufacturing environment where a high mix of products exist, the maintenance, enhancement, and control of it could become challenging. Development of a test execution platform should not be a priority for valuable resources, instead optimizing and improving test coverage should be the key area of focus.

Additionally, PTEM can be paired with the EV2010 test case libraries further reduces development time with its application base libraries such as the EV2010AD: DC-DC Converters + On Board Charging (OBC), EV2010AB: EV Battery, and EV2010AE: Electric Vehicle Supply (EVSE). This will help teams leverage on Keysight experience and further reduce development times allowing for faster entry to market!

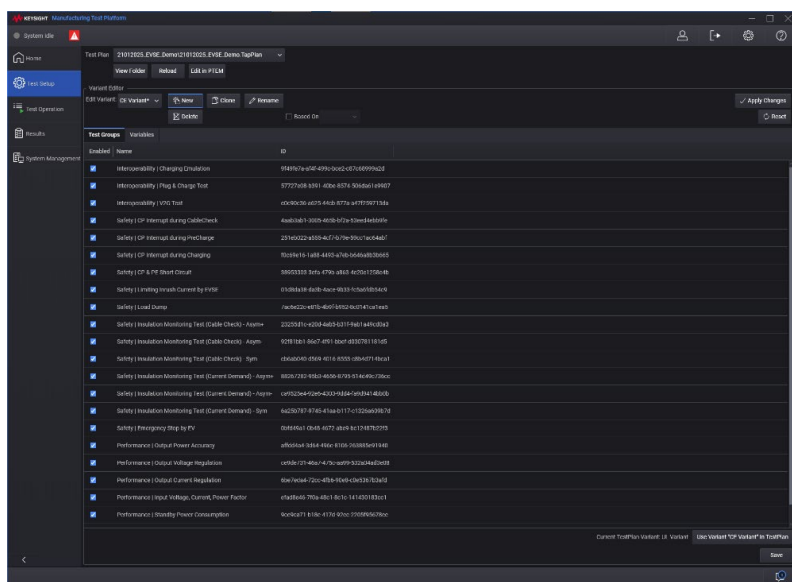




Figure 8. Sample test case of the EV2010AE, to help teams reduce development time and being first to market. Linking with PathWave Manufacturing Analytics for a complete overview of the manufacturing!

General Characteristics

Line power	
Input AC Supply	Single Phase: 100 to 240 V _{AC}
Power line frequency	50/60 Hz
Environment	
Maximum Altitude	2000 meters
Temperature (operation)	5°C to 40°C
Maximum relative humidity	The test system is designed to operate in the range from 50% to 80% relative humidity. (non-condensing)
Pollution degree	2
Installation category	2
Regulatory	
Safety and EMC Regulatory	Refer to Declaration of Conformity for the latest revisions of regulatory compliance at: http://www.keysight.com/go/conformity
Mechanical specification	
Dimensions (H x W x D)	2020 x 600 x 1005 mm (79.5 x 23.6 x 39.5 in.)
Weight	426kg (including crate) 360kg (without crate)

Global Deployment

Keysight's global footprint ensures we deliver solutions where you need them. We have established automotive customer centers globally. These centers underscore our commitment to work with and serve customers in local proximity to support innovative technology projects that drive the automotive and energy industries.



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.



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