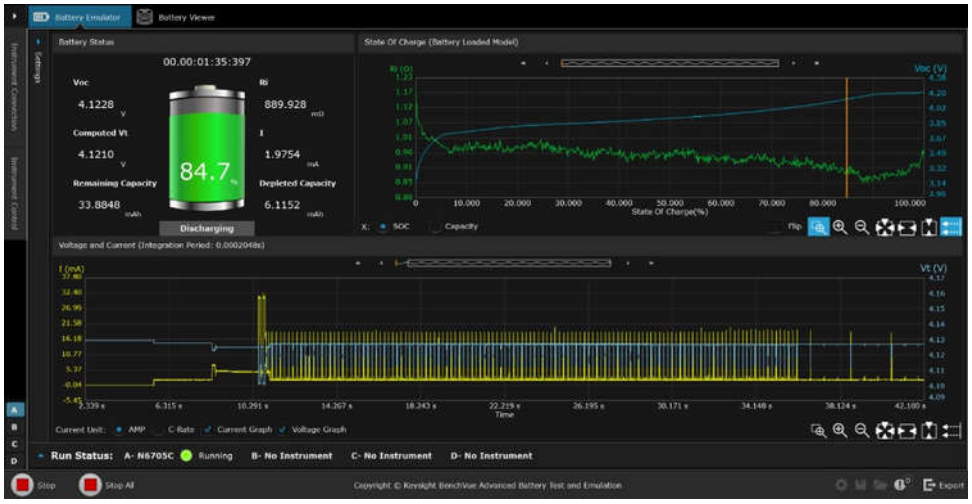
DATA SHEET

BV9210B PathWave BenchVue

Advanced Battery Test and Emulation Software



N6705C DC power analyzer mainframe

- All N6780 Series Source/Measure Units (SMU)

N6700C, N6701C, N6702C low profile, modular power system mainframe

- All N6780 Series Source/Measure Units (SMU)

N7900 Series advanced system power supplies

- All N7900A Series models with or without N7909A power dissipater unit

RP7900 Series regenerative power system

- All RP7900 Series models

KEYSIGHT TECHNOLOGIES

Quickly visualize, emulate, profile and cycle batteries

The Keysight BV9210B Pathwave BenchVue Advanced Battery Test and Emulation application software provides a test environment for you to easily run battery tests, generate battery models and perform battery emulation using one or more Keysight two-quadrant power supplies. The emulation function allows you to quickly output the desired battery operation conditions. It allows you to cover various test scenarios without having to wait for a real battery to go through discharging or charging conditions. Integrating the BV9210B software with Keysight's advanced two-quadrant product families, covers a broad range of low to high power level applications, across various industries from consumer electronics, medical devices, e-mobility, residential energy storage and automotive.

Features

- Tests and emulates batteries up to 200kW and up to 2000V
- Supports four modes of operation: emulation, profiler, discharge/charge, and cycler
- Creates custom battery models
- Controls up to four instruments at a time
- Includes API functions to facilitate integration into your programming environment
- Provides advanced control capabilities - capacity rating, state of charge, constant or dynamic level selection, pulse width control
- Simultaneously measures voltage and current with its built-in digitizer
- Accurately captures voltage, current, capacity from seconds up to days
- Creates custom dynamic loading characteristics for discharging
- Imports battery models
- Exports measurement data
- Provides a graphical view of the battery model
- Provides customizable battery protection parameters

Profiler - Creating battery model tailored around device behavior

A battery profiler is a must tool to have if you are working with different batteries and need to create your own custom battery model library. This ensures you are getting the most accurate models for battery life predictions tailored to your devices and working scenarios. The BV9210B software has the capability of creating custom battery models. It creates a battery model when discharging or charging a physical battery with either a static current condition or dynamic loading profile. A battery model created by the BV9210B will consist of a file with of up to 200 points, each point includes the open circuit voltage (Voc), series resistance (Ri), and state of charge (SoC). The software will continue to build up battery model automatically until the stopping condition is reached. While discharging or charging a battery, in real-time the software continuously captures parameters like Voc, Vt, Ri, Current, Time, Capacity and SoC. The profiler also can export all graphed data while the test is running for further analysis.

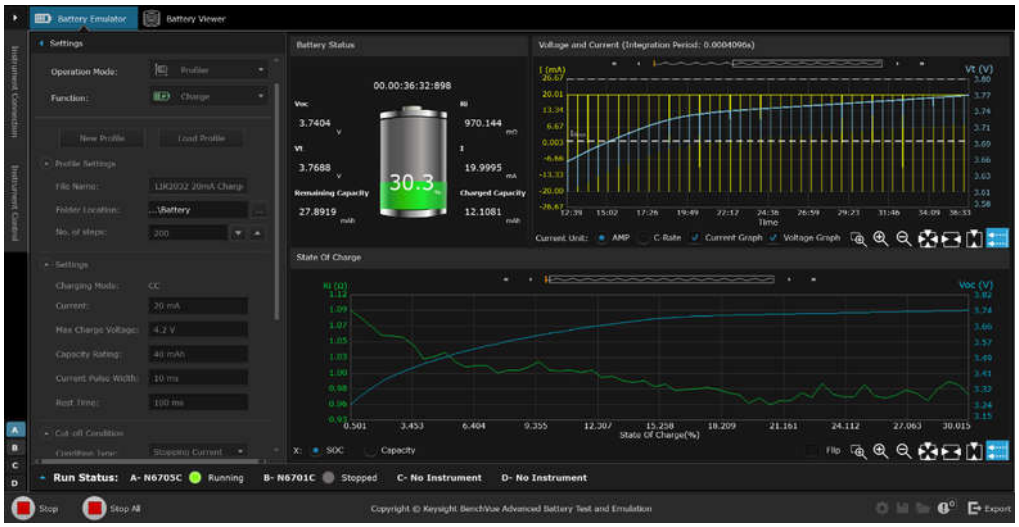


Figure 1. BV9210B creating a battery model with static profiler function.



Figure 2. BV9210B creating a battery model with dynamic profiler function.

Emulation – Battery emulation reduces test time

Battery emulation is a critical process as it allows one to understand how the battery or the device would behave in a real-life scenario when connected to each other. Using a battery emulator instead of a real battery has many advantages. A battery emulator helps to create a safer test environment and allowing to validate the various operation modes of the device. To emulate battery characteristics, start by loading a battery model into BV9210B Advanced Battery Test and Emulation software. The software algorithm will follow the battery model in real-time and emulate the battery behavior. The software allows two methods for battery models - open profiles generated by the software or importing external battery models with Voc, SoC, and Ri parameters in a CSV file. For simplicity, you will only need to enter four parameters to emulate a battery – capacity rating, current limit, initial SoC, and a cut-off condition. While emulating a battery, it can simultaneously measure voltage and current continuously and save the measurement results.

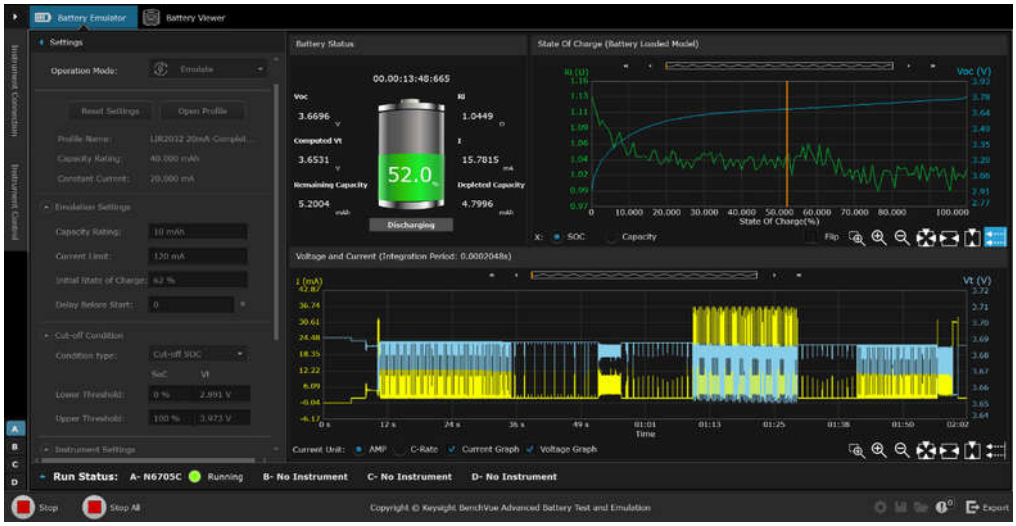


Figure 3. BV9210B Emulating Lithium battery powering a low power device.

Cycler – Life cycling battery characteristics

The cycling function as the flexibility allows you to create a custom sequence of charging, resting, and discharging a battery at various test conditions. The software enables you to make up to 1000 cycle operations on the battery to determine the battery's age effect and reliability under sequence test conditions. While continuously monitoring the battery's health and recording test data parameters of capacity, terminal voltage, current, and time.

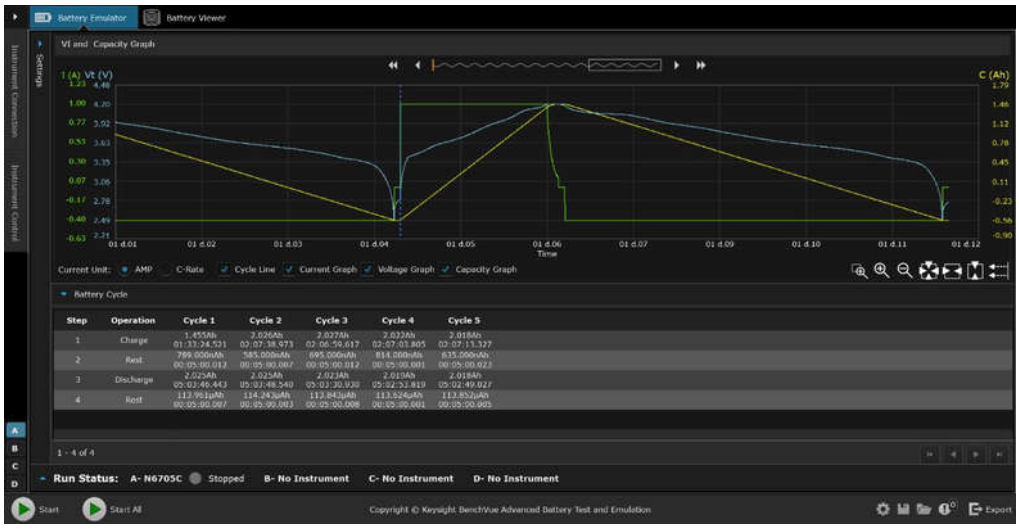


Figure 4. BV9210B Cycle testing a 18650 battery.

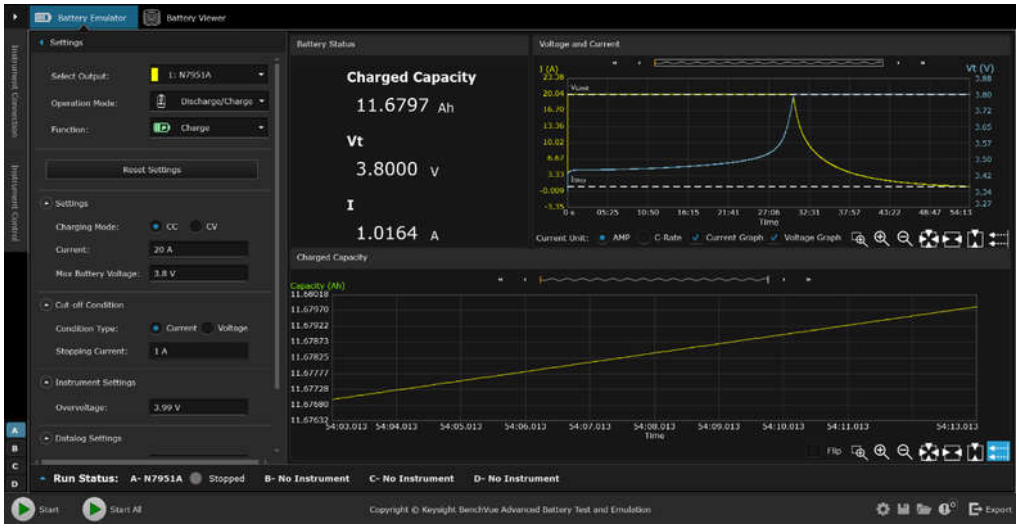


Figure 5. BV9210B Performing a battery charges on iron phosphate battery



Figure 6. BV9210B Controlling four instruments at once

Importing battery model characteristics

The BV9210B software provides an easy way for you to import battery models created outside of the BV9210B test environment. You can import a CSV file consisting of the following battery parameters: state of charge, open circuit voltage, and series resistance parameters.

State of Charge(%)	Open Circuit Voltage(V)	Internal Resistance(ohm)	Status
100.00	9.609423	7.544065	
99.50	8.828673	3.889564	
99.00	8.645126	3.791465	
98.50	8.516480	3.767940	
98.00	8.411436	3.780916	
97.50	8.320710	3.804418	
97.00	8.240466	3.840828	
96.50	8.167970	3.886445	
96.00	8.102751	3.927822	
95.50	8.043658	3.971063	
95.00	7.990255	4.014665	
94.50	7.942882	4.057762	
94.00	7.899871	4.098643	

Figure 8. BV9210B Importing a CSV file battery model

Free Trial and Licensing

The BV9210B software is available for download with a 7-day free trial period. Connect to your instrument for free with the built-in 7-day trial license. After the seven-day trial period, an extension trial is available for an additional 30 days once you enter your credentials. To purchase a license, choose the BV9211B single power supply option or the BV9210B multiple power supply option. The purchased license resides on the PC or network, depending on the type of license.

How to Order a License

Step 1 Determine the software model	Step 2 Choose license term	Step 3 Select license type
Choose the right software model to automate all the connected power supplies. • BV9211B: Allows only one instrument connection at a time. • BV9210B: Allows up to four instrument connections at a time.	• Subscription	• Node-locked • Transportable • USB portable • Floating – single site
Step 4 **Select Duration**	**Step 5** **Select USB**	**Step 6** **Select Delivery method**
• 6 months • 12 months • 24 months • 36 months	• Only for “USB portable”	• Paper certificate • eMail and paper certificate • eMail certificate

Supported Models

- N6705B, N6705C DC power analyzer mainframe with N6780 Series Source/Measure Units
- N6700C, N6701C and N6702C Low profile mainframe with N6780 Series Source/Measure Units
- N7900 Series advanced power system, all models with or without N7909A power dissipater unit
- RP7900 Series Regenerative Power System, all models

Download software at: www.keysight.com/find/BV9210

Learn more at: 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

KEYSIGHT TECHNOLOGIES

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