ModuLab® XM ECS

Xtreme Measurement

solartron analytical

energy storage



Energy Storage

Batteries | fuel cells | solid state batteries
Supercapacitors | Solar Cells | DSSC

the xm difference



- ***Market leading impedance analysis***
- ***Widest voltage and current range available***
- ***Anode/Cathode and multi-cell stack testing***

The latest generation ModuLab® XM ECS system is designed with modularity and flexibility very much in mind, to satisfy a wide range of applications. Purpose built for energy research the ModuLab XM provides:

- High-performance impedance analysis throughout the entire frequency range and across all three modes of operation
  - Swept sine (highest accuracy and repeatability)
  - Multi-sine/FFT (for increased test throughput especially at low frequency)
  - Harmonic analysis (to study cell non-linearity)
- Unique 100 V compliance and polarization enables potentiostatic and galvanostatic tests on high voltage stacks
- Reference electrodes for anode/cathode and individual cell testing in high voltage stacks
- Multi-component system calibration for ensured measurement accuracy
- Market leading frequency range and resolution (1 in 65,000,000)
- High power boosters integrated for measurement of new generation ultra-low impedance cells (<100 μΩ)
- Smooth 'analog' ramp waveforms for testing sensitive low-impedance cells
- Fast data acquisition up to 1 MSamples per second for CDMA/GSM cell phone simulation, pulse charge/discharge simulation, and for accurate measurement of ohmic-drop/equivalent series resistance ESR
- Wide current measurement range (over 16 decades from 0.15 fA to 2 A, and even more using external boosters) ensures all types of energy devices can be fully characterized
- Available voltage and current amplification modules (100 V amplifier, femto ammeter, 2A booster) for the greatest flexibility in application
- User friendly software with simple three step test setup/run, built-in live waveform displays, connection diagrams and equivalent circuit fit functions
- Compatibilty with materials test modules for testing component materials
- Plug and Play option modules and additional channels to minimize system down time

AMETEK

Accessories

High Power Boosters

ModuLab XM is compatible with power boosters that are designed to extend its range of operation for testing extreme low impedance (< 100 μΩ) batteries, fuel cells, and supercapacitors.



- Floating design - enables tests on grounded cells
- Time domain and impedance tests on short stack fuel cells and multi-cell batteries- including individual cells within the stack
- Choice of booster models with up to 50V / 25A range
- 100 kHz impedance measurement bandwidth for SOFC and other high frequency applications
- Automatically controlled by ModuLab XM

Systems

ModuLab XM DSSC (Dye-Sensitized Solar Cell)

ModuLab XM DSSC is a fully integrated photoelectrochemical measurement system designed for the characterization of Dye Sensitized Solar Cells.



- Range of Frequency and Time Domain Measurements techniques including IMPS, IMVS, Impedance, PhotoVoltage Decay, Charge Extraction Techniques, I-V
- 'Auto' analysis of data enabled for calculation of effective diffusion coeffients and electron lifetimes at one click of a button

Software

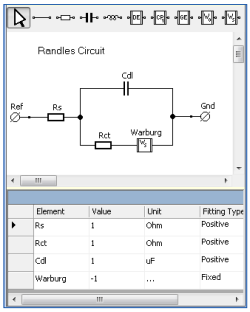
ModuLab XM ECS software is a very flexible and comprehensive electrochemical test software package. A large selection of test types are provided, from standard open circuit and cyclic voltammetry to complete multi-step sequences. This can include sample preparation, potentiostatic/galvanostatic, ramp and pulse techniques, and integrated impedance analysis.

As test parameters are entered into the software, a waveform diagram displays the timing and levels that will be applied to the cell when the test is run.

Equivalent circuit models may be constructed using a range of components including resistors, capacitors, inductors, distributed elements, constant phase elements, Gerischer elements, and Warburg open / short elements.

A built-in report generator takes test results and outputs them, together with graphs, diagrams and analysis information into your selected word processor software.





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