

## EA-BIM 20005

### 20-Channel Battery Impedance Meter Datasheet



#### Features

- Electrochemical impedance spectroscopy (EIS) for measuring lithium-ion battery cells
- 20 multiplexed channels in a 19-inch, 3U form factor
- Frequency range from 1 mHz up to 10 kHz
- AC stimulus up to 10 A (peak-peak)
- Multi-sine measurements are hundreds of times faster than traditional swept measurements
- 20 channels of 4-wire PT100 temperature
- Integrated DC power supply delivers up to  $\pm 1$  A at 5 V enabling EIS measurements during charge/discharge
- No need to disconnect battery cycle tester before performing EIS measurements
- USB device port and 2 CAN bus interfaces
- Low power consumption does not require active cooling
- Combines easily with cycle testing systems such as EA-BCTS for deeper insight into battery quality

#### Included battery impedance measurement PC software

- Configure settings effortlessly
- Evaluate measurements with built-in visualizations and analysis tools
- Record results in your preferred file formats
- Perform standard sweep measurements or rapid multi-sine measurements to suit your requirements
- Make EIS measurements during charging and discharging

#### Key applications

- Incoming inspection
- Cell aging monitoring and prediction
- Research and development

#### Accurate impedance and fastest throughput

Electrochemical impedance spectroscopy measurements (EIS) provide deep insight into the quality of Li-ion battery cells. However, testing a high volume of battery cells can be a time-consuming bottleneck. The EA-BIM 20005 offers fast, accurate EIS measurements with 20 measurement channels and exceptionally high throughput. The included software, industry-standard interfaces, and low power consumption make it easy to integrate this battery impedance tester into your workflow.

#### Deeper insight

The EA-BIM 20005 offers a frequency range of 1 mHz to 10 kHz with better than 1% impedance measurement accuracy, optimized for providing the key insights needed for high-volume Li-ion battery testing.

The AC stimulus is up to 10 A (peak-to-peak), which is suitable for cylindrical, pouch, and prismatic cells. Every EIS channel is accompanied by a high-precision 4-wire PT100 temperature measurement channel, allowing for tracking both impedance and cell temperature with a single instrument.

This instrument makes it easy to combine EIS and cycle testing for deeper insights into cell quality. It includes a built-in DC power stage that can deliver up to  $\pm 1$  A and 5 V to facilitate measurements during charging and discharging. It can also be integrated into larger battery test systems such as the EA-BCTS. Battery test systems can remain connected during EIS testing without negatively impacting results, further streamlining the testing process.

#### Exceptionally fast EIS

Traditional EIS measurement systems typically apply a current at each test frequency and measure the resultant voltage. In contrast, the EA-BIM 20005 leverages an innovative multi-sine stimulus that allows for impedance measurements across multiple frequencies simultaneously, making it hundreds of times faster than conventional swept measurements. For those who need to compare results with other instruments, the EA-BIM 20005 can also perform standard swept measurements. Furthermore, the integrated measurement system connects to devices via a 20-channel, high-speed multiplexer, enabling quick measurements while keeping the cost-per-channel low.

#### Easily add high-throughput EIS to your battery test workflow

For EIS testing right out of the box, the included PC software is flexible and easy to use. The EA-BIM 20005 connects to your PC via the USB device port on the rear of the instrument. Configure the system effortlessly and start making EIS measurements right away. You can evaluate measurements with built-in visualizations and analysis tools and record results in your preferred file formats.

Two onboard CAN Bus interfaces are included for integration into battery cycle test systems and to support custom test programming. With 20 EIS channels in just 3U, the BIM 20005 helps conserve valuable bench and floor space, while low power consumption reduces the need for active cooling.



## Specifications

| Parameter                                       | Value                                                                                                                                                                                                                                                                                               |
|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AC Current Output (1 Hz - 10 kHz)               | Max. 10 A (peak-peak)                                                                                                                                                                                                                                                                               |
| AC Current Output (100 mHz - 1 Hz)              | Max. 10 A (peak-peak)                                                                                                                                                                                                                                                                               |
| AC Current Output (10 mHz - 100 mHz)            | Max. 5 A (peak-peak), depending on the cell voltage                                                                                                                                                                                                                                                 |
| AC Current Output (1 mHz - 10 mHz)              | Max. 2.5 A (peak-peak)                                                                                                                                                                                                                                                                              |
| AC Excitation                                   | Parallel multi-sine operation, up to 32 frequency points                                                                                                                                                                                                                                            |
| DC Current Output (charge and discharge option) | Max. $\pm 1$ A                                                                                                                                                                                                                                                                                      |
| BIM measurement charge/discharge                | Yes. An impedance measurement can be performed in parallel during charging and discharging or temperature change tests, but care must be taken to select the lowest frequency and the excitation periods so that the state of the battery does not change significantly during the BIM measurement. |
| BIM measurement during temperature change       |                                                                                                                                                                                                                                                                                                     |
| DC Voltage Range                                | 0 - 5 V                                                                                                                                                                                                                                                                                             |
| Frequency Range                                 | 1 mHz - 10 kHz, the AC excitation frequency limits the AC excitation current. In the range of 1 Hz - 10 kHz the maximum current is limited to 10 A (peak-peak) and in frequencies below <1 Hz, the maximum current is limited to 5 A (peak-peak).                                                   |
| Frequency Accuracy                              | 100 ppm                                                                                                                                                                                                                                                                                             |
| Impedance Range                                 | 0.1 m $\Omega$ to 100 m $\Omega$                                                                                                                                                                                                                                                                    |
| Interfaces                                      | USB, CAN (free configurable)                                                                                                                                                                                                                                                                        |
| Temperature Measurement Unit                    | 1 (PT100, 4-wire measurement)                                                                                                                                                                                                                                                                       |
| Temperature channels                            | 20 (multiplexed)                                                                                                                                                                                                                                                                                    |
| Voltage Input Resolution (DC)                   | < 0.5 mV                                                                                                                                                                                                                                                                                            |
| Voltage Input Resolution (AC)                   | < 2 $\mu$ V                                                                                                                                                                                                                                                                                         |
| Accuracy  Z  (typical, after calibration)       | < 1 %                                                                                                                                                                                                                                                                                               |
| Accuracy arg (Z) (typical, after calibration)   | < 0.5, depending on the cell voltage                                                                                                                                                                                                                                                                |
| Input Power                                     | < 60 W                                                                                                                                                                                                                                                                                              |
| Input Voltage                                   | 100 - 230 V AC                                                                                                                                                                                                                                                                                      |
| Dimensions (W x D x H)                          | 19" x 19.7" x 5.25" (19" x 50 cm x 3U)                                                                                                                                                                                                                                                              |
| Ambient Temperature                             | +10°C to +30°C                                                                                                                                                                                                                                                                                      |

## Ordering information

### Instrument models and recommended accessories

| Item               | Description                                                                                |
|--------------------|--------------------------------------------------------------------------------------------|
| EA-BIM 20005-10-20 | Battery impedance meter with 20 channels and 20 PT100 channels                             |
| EA-BIM CABLE SET   | Recommended set of cables for 20 cells and 20 temperature sensors with 5 m (1.5 ft) length |

Tektronix is registered to ISO 9001:2015 and ISO 14001:2015.



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