



# BATTERY IMPEDANCE METER BT4560

Component measuring instruments



## Check Li-ion battery reliability in just 10 seconds

### Shorten battery cell inspection time

By measuring low frequencies of 1 Hz and below, the BT4560 Battery Impedance Meter drastically shortens the time required for battery cell internal resistance inspections on Li-ion battery production lines.

#### Inspection Time

Battery cell internal resistance inspection time comparison.

#### DC-IR measurement (traditional method)

Requires several tens of minutes to around one hour.

#### AC-IR measurement (using BT4560)

Requires around 10 seconds\*

**Fast!**

\*When measuring at frequency of 1 Hz

#### Why it's fast

##### No precharging required

Measurement of battery cell internal resistance has traditionally been carried out by precharging the battery, then passing large current and measuring its voltage drop (DC-IR). Precharging the battery usually takes several minutes to several tens of minutes. The BT4560 uses frequencies of 1 Hz and lower to measure (AC-IR) internal impedance, thereby eliminating the need for precharging.

##### Simultaneous measurement of impedance and voltage

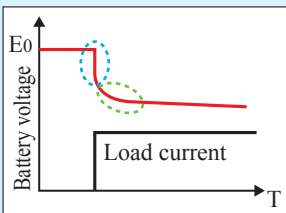
Internal impedance and voltage that have been measured separately can now be measured simultaneously with the BT4560, enabling drastic reduction of battery cell inspection time.

Measurement of voltage with a high-accuracy of  $\pm 0.0035\%$  rdg., and stable measurement of impedance can be achieved simultaneously with the BT4560.

## Correlation between DC-IR and AC-IR

### DC-IR measurement

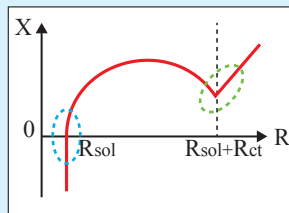
Method whereby a DC load is put through the battery, and the resistance is calculated from the voltage variation that occurs. Because a large current is passed, a large load is imposed on the battery.



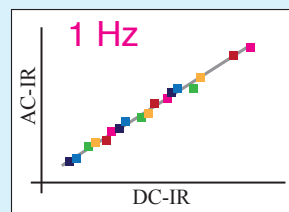
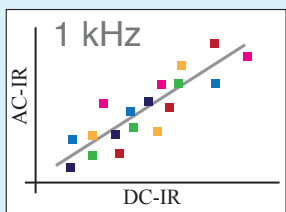
Response deriving from fast reaction Response deriving from slow reaction

### AC-IR measurement

Method whereby an AC signal is applied to the battery to measure its impedance. Because it uses a relatively small current, it does not damage the battery.



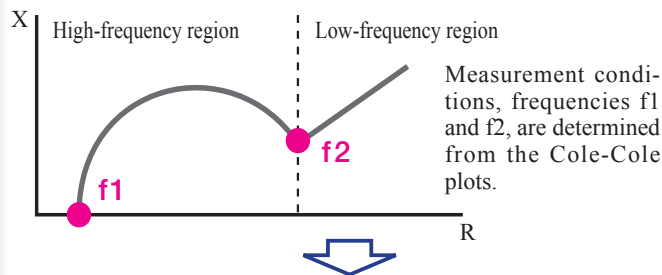
When the correlation between DC-IR and AC-IR measurement values is investigated using multiple Li-ion batteries ...



**A strong correlation between DC-IR and low-frequency AC-IR measurement values is found.**

## Measurement overview

### 1 Cole-Cole plots created using bundled software



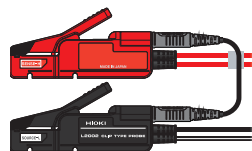
Measurement conditions, frequencies  $f_1$  and  $f_2$ , are determined from the Cole-Cole plots.

### 2 Using the frequencies determined in step 1, measurement is carried out in production line inspections

Use the **panel save/load function** to save up to 126 sets of measurement conditions (frequencies) in the meter.

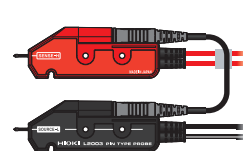
### Two types of probes matching different battery types available (optional, special order up to 4 m in length)

#### CLIP TYPE PROBE L2002



For laminated type batteries

#### PIN TYPE PROBE L2003



For line-embedded applications and other various types of batteries

## BT4560 Brief specifications

### Impedance measurement

Measurement parameters	Z, $\theta$ , R, X
Measurement frequency	0.1 Hz to 1050 Hz
Minimum resolution	0.1 $\mu\Omega$
Measurement ranges and accuracy	3.0000 m $\Omega$ / $\pm 0.5$ % rdg. $\pm 10$ dgt. 10.0000 m $\Omega$ / $\pm 0.5$ % rdg. $\pm 30$ dgt. 100.0000 m $\Omega$ / $\pm 0.5$ % rdg. $\pm 30$ dgt.

### Battery voltage measurement

Voltage measurement ranges	5.00000 V (Single range, resolution: 10 $\mu$ V)
Voltage measurement accuracy	$\pm 0.0035$ % rdg. $\pm 5$ dgt.

### Temperature measurement

Measurement range	-10.0 $^{\circ}$ C to 60.0 $^{\circ}$ C
Resolution	0.1 $^{\circ}$ C
Accuracy	$\pm 0.5$ $^{\circ}$ C (10.0 $^{\circ}$ C to 40.0 $^{\circ}$ C) $\pm 1.0$ $^{\circ}$ C (-10.0 $^{\circ}$ C to 9.9 $^{\circ}$ C, 40.1 $^{\circ}$ C to 60.0 $^{\circ}$ C)

### Basic specifications

Functions	Contact check, Comparator, Panel save/load (Up to 126 condition sets)
Inputtable voltage	Max. 5 V
Operating temperature range	0 $^{\circ}$ C to 40 $^{\circ}$ C
Power supply	AC100 V to 240 V, 50/60 Hz
Interfaces	EXT I/O (Switchable between PNP and NPN output) USB, RS-232C
Dimensions and mass	330 W $\times$ 80 H $\times$ 293 D mm, 3.7 kg
Accessories	Power cord, Instruction manual, USB cable, CD-ROM (Bundled software, USB driver), Zero adjustment board

## Battery Impedance Meter BT4560

.....Coming Soon

Options : CLIP TYPE PROBE L2002, PIN TYPE PROBE L2003, Temperature Sensor, RS-232C Cable

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