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EIS Simulator

OVERVIEW

The EIS Simulator is a battery internal impedance simulator board used to simulate cell response with AC excitation current applied. This board contains 6 isolated channels that can be controlled or adjusted by software via CAN, Ethernet TCP and USB-C. A single board can be used or several in series according to the requirements (based on how many cells are needed).
The DC voltage, AC amplitude, frequency and phase for each EIS channel can be controlled by software.

KEY FEATURES

- 6 independent channels that can generate sine wave up to 1kHz.
- 0~7V DC output, 5mV Vp-p AC output.
- Controllable by CAN, Ethernet TCP and USB-C.

DIMENSION

L*W*H =
248mm*175mm*20mm

OPERATING TEMPERATURE

-20 ˚C ~ +60 ˚C

POWER REQUIREMENT

DC power supply:
24VDC, 1A

Working Voltage Range:
9 V – 36 V (Default 24 V)

DETAILED SPECIFICATIONS:

DC Output	Value	Unit
Output Range	0 to 7	V
Resolution	16	bits
Accuracy	<1	mV

AC output	Value	Unit
Output Range(Vp-p)	0.5 to 5	mV
Resolution	16	bits
Amplitude Accuracy	0.01+1%FSR	mV
Frequency Output Range	Up to 1000	Hz
Frequency Accuracy	< 3%	Hz
Phase Accuracy	< 0.5°	
Peak Current	20	mA

Power Supply = 24V, Ta = 25℃

Synchronization accuracy impact the AC phase, sync clock is 10M. AC phase shift < 0.5° @100Hz.

ENVIRONMENTAL

The EIS Simulator is intended for indoor use only but may be used outdoors if installed in a suitable enclosure. Refer to the manual for more information about meeting these specifications.

Operating temperature	**-20℃ --+60℃**
Storage temperature	**-40℃--+85℃**
Ingress protection (IP code)	**None**
Operating humidity	**10-90% RH non condensing**
Storage humidity	**5-95% RH non condensing**

USAGE EXAMPLES

Mainly used to simulate phase and amplitude response of battery cell impedance.

When an excitation AC current is applied on a series of cells:

$$I(t) = I_{peak}\, sin\,(\omega t)$$

I(t) - Exitation current; Ipeak - Peak current; t - time;

A ideal impedence of cells:

$$Z_c = (\frac{1}{R_c} + j\omega C_c)^{-1}$$

Zc - Cell equivalent impedance; Rc - Cell internal equivalent resistance Cc - Cell equivalent capacitance

The expected voltage on the cell should be:

$$U(t) = \frac{I_{peak}R_c}{\sqrt{1+(\omega R_c C_c)^2}} \cdot sin\left(\omega t - arctan(\omega R_c C_c)\right) + V_{DC}$$

Vdc - Cell output voltage. Typical value is 3~4.2V, depending on the SoC of cell.

User can calculate the desired phase delay and output amplitude with this function.

SUPPORT AND SERVICES

Calibration

ART logics measurement hardware is calibrated to ensure measurement accuracy and verify that the device meets its published specifications. To ensure the ongoing accuracy of the measurement hardware, ART logics offers basic or detailed recalibration service.

PHYSICAL

Dimension:

L*W*H = 248mm*175mm*20mm

L*W*H = 264.38mm*175mm*20mm (with connector)

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