LinkZill

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TruEbox 02CM User Guide

V1.3

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TruEbox 02CM User Guide

Product Overview

The TruEbox 02CM can provide multichannel (seven) bias voltages and measure multichannel (eight) currents. The device can measure real-time, accurate current, and send it to the mobile APP via Bluetooth to realize real-time data display, storage, and sharing. The TruEbox excels in fast response speed and high resolution. The device meets the needs of the typical I-V characteristic scanning and dynamic current monitoring functions for various biochemical sensors, photodiodes, and other components, allowing applications in biomedical testing, portable electronic product development, sports health monitoring, and other scenarios.

Parameter	Specification
L×W×H	106×92×24 mm
Weight	100 g
Charging interface	USB 2.0 Micro-B
Test interface	Single: 2 channels of adjustable voltage, 1 channel of bidirectional current detection; Multichannel: 7 channels of adjustable voltage, 8 channels of bidirectional current detection;
Communication	Bluetooth
Terminal	Phone/Tablet (Android 9.0 or higher)
Current range	±(1nA~1mA)
Current measurement accuracy	a. ±(1nA~10nA), Error range: 1%+1nA/current value; b. ±(10nA~1mA), Error range: 1.6%+1nA/current value;
Voltage output range and accuracy	-1.66V~+1.54V (Based on the current measuring terminal voltage), Voltage error: <10mV
Duration	>5 hours
Data output rate	Single: 50 point/second/channel; Multichannel: 5 point/second/channel;
Save	Original data: .CSV; Image: .PNG

Product List

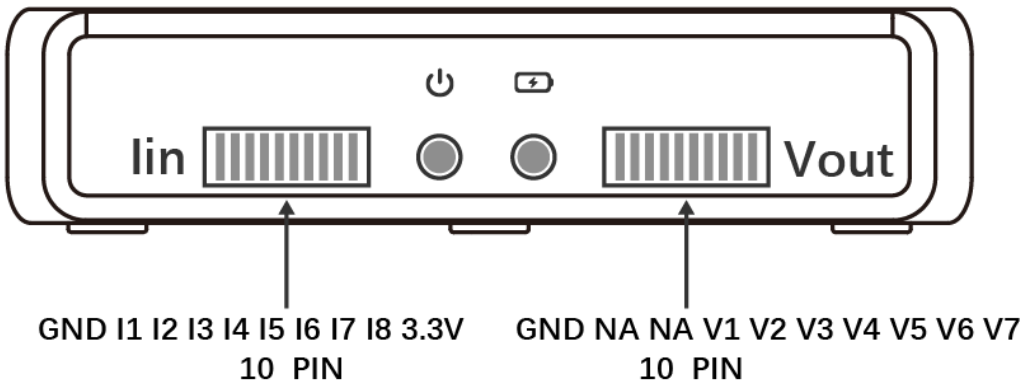
Host	X1
Charger	X1
USB-MicroB Charging Cable	X1
User Guide	X1
Single-Channel MCX Alligator Clip Cable	X3
Multi-Channel FPC Connecting Cable	X 2
Multi-Channel Adaptor Board (2.54mm spacing)	X 1

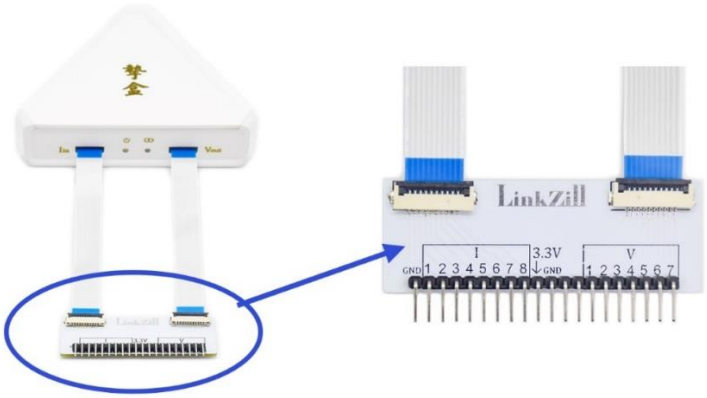
Pin Assignment

Single-Channel Interface Pin Assignment:

1. Vout1, Vout2 are single-channel voltage outputs, providing relative bias voltages of -1.66V~+1.54V;
2. Iin is the single-channel current measuring terminal for meauring current of ±(1nA~1mA).

Multi-Channel Interface Pin Assignment:





(Connection of Multi-Channel Adaptor Board) (Multi-Channel Interface Pin Assignment)

1. I1~I8 pins refer to the 8-channel current measurement terminals for meauring current of ±(1nA~1mA);
2. GND and 3.3V are pins for calibration;
3. V1~V7 pins refer to the adjustable outputs of voltage between -1.66V~+1.54V;
4. The unnamed pins are unusable.

Operating Manual

1. APP Installation:

Scan the QR code and press the button to download the application. Install the app.

⚠ The APP works on phone or pad with Android system of 9.0 or higher. The APP needs permission to access the Bluetooth/location/storage of the terminal device to function properly. The accession will not do any harm to the terminal devices, please don't worry about the security of the APP.

2. Device Connection:

a. Switch on the TruEbox 02CM. When powered on, the white indicator light should be on. If not, please charge the system for the low battery.

b. Open the "TruEbox 02CM" app, press the Bluetooth button on the top right, and the window of "Available Devices" would pop out. Find and connect the device with Bluetooth address "20:XX:XX:XX:XX:XX" (⚠ If the correct option is not available, please press the "Cancel" button and redo the previous procedures) with Bluetooth name "CM+serial number". Insert the Bluetooth password on the warranty certificate to activate the TruEbox.

c. Choose "Two-terminal device" or "Three-terminal device" in the app according to the tested device.

⚠ The TruEbox 02CM will show as "CM+serial number" in the "Paired Devices" window of the app after the first-time pairing.

3. Measurement:

a. Press the setting button and select “Channel” or “Channels” for single or multi-channel; adjust “View duration”, change “Test Speed”, and set “I-t test” and “I-V test” voltage manually.

b. Press the start button to start the test; press the pause button to stop the test.

c. Press the clear button to delete data points and curves from the graph.

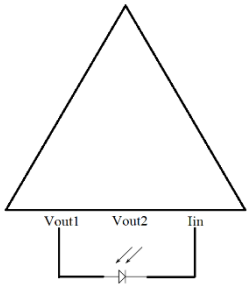
d. Press the save button to save the measured data as .csv and .png in the file “LinkZill” of the root directory; select the data and click “Share” to share the data through email, Bluetooth et. al.

e. Press the return button to go back to the previous page for resetting the test.

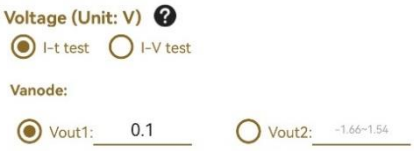
Demonstration:

1. Photocurrent testing of a single photodiode (or light sensor):

Physical photo of the photodiode



Demonstration of the photodiode



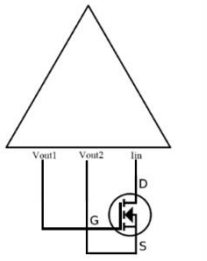
Screenshot of the parameter setting

a. Connect the anode of the photodiode (or light sensor) to the Vout1 terminal of the TruEbox 02CM, and the cathode to the Iin terminal.

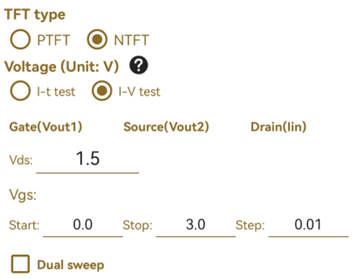
b. Open the app and choose “Two-terminal device”. Press “setting” and set the Voltage as mode “I-t test”. If the photodiode (or light sensor) needs to be reverse biased (mode photoconductive), set Vout1 to 0.1V manually. Otherwise, the voltage can remain as default (PV mode). Click "OK" to complete the setting. (At this time, the voltage difference between the default voltage of Vout1 and the Iin terminal is approximately 0V.)

2. IV Characteristic Scan of Single N-Shape MOS (Vds 1.5V, Vgs from 0V to 3V with steps of 0.01V):

Physical photo of the NMOS testing



Demonstration of the NMOS testing

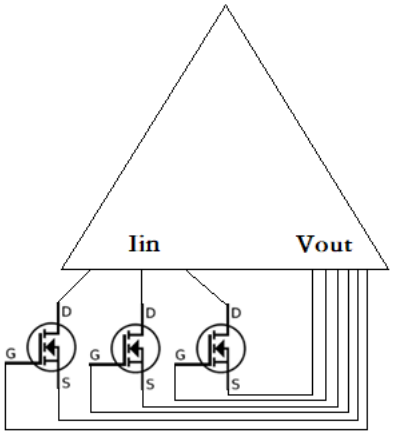


Screenshot of the parameter setting

a. Open the app and choose “Three-terminal device”. Press “setting” and choose “NTFT” for the TFT type. Follow the instruction in the app and connect the Drain end of the N-type MOS to the Iin end, the Source end to the Vout1 end, and the Gate end to the Vout2 end of the TruEbox 02CM.

b. Choose mode "I-V test" for voltage, enter 1.5 for "Vds", and the usable range for "Vgs" would be updated.
c. Enter the starting value of the voltage sweep in the "Start" box (e.g. 0V), the end value of the voltage sweep in the "Stop" box (e.g. 3V), the step value of the voltage sweep in the "Step" box (e.g. 0.01V); use "Dual Sweep" for a single sweep in both direction when needed; press the "x" on the top right of "Settings" to finish setting.
d. The voltage between the Drain and the Source (Vds) is fixed at 1.5V; the voltage between the Gate and Source (Vgs) starts from 0V with steps of 0.01V and stop automatically at 3V. For the "Dual Sweep", another sweep would start from 3V with steps of 0.01V and stops automatically at 0V. During this process, TruEbox 02CM Provides a voltage sweep of Vgs and continuously monitors the current at the Drain terminal.

3. IV Characteristic Scan of Multiple N-Shape MOS (Vds 1.5V, Vgs from -3V to 0V with steps of 0.01V):



Physical photo of the PMOS testing Demonstration of the PMOS testing Screenshot of the parameter setting

a. Open the app and choose "Three-terminal device". Press "setting" to choose "PTFT" for TFT type, and "I-V test" for Voltage. Connect the Drain ends of the MOS to I1, I2, and I3 of the TruEbox; the Source ends to V1, V2, and V3 of the TruEbox while checking V1, V2, and V3 in the Vds column; enter Vds as -1.5V. The usable range for voltage in other columns may change accordingly. Additional bias voltages may be provided by setting Vbias (not needed in this example). Connect the Gate ends to V5, V6, and V7 of the TruEbox while checking V1, V2, and V3 in the Vgs column.
(The V1~V7 channels can only be used as Vds, Vbias, Vgs, or none of the above for output.)
b. Enter the starting value of the voltage sweep in the "Start" box (e.g. -3V), the end value of the voltage sweep in the "Stop" box (e.g. 0V), the step value of the voltage sweep in the "Step" box (e.g. 0.01V); use "Dual Sweep" for a single sweep in both direction when needed; press the "x" on the top right of "Settings" to finish setting.
c. The voltage between the Drain and the Source (Vds) is fixed at -1.5V for all tested MOS; the voltage between the Gate and Source (Vgs) starts from -3V with steps of 0.01V and stops automatically at 0V. For "Dual Sweep", another sweep would start from 0V with steps of 0.01V and stop automatically at -3V. During this process, TruEbox 02CM Provides a voltage sweep of Vgs and continuously monitors the current at the Drain terminal.

Warnings:

⚠ All indicators (e.g. accuracy and error) in specifications are based on the test results with standard fixtures.

⚠ Please keep the test environment, objects, and fixtures dry and clean.

⚠ Please avoid moving the equipment during operation to prevent the introduction of human error.

⚠ Please use the original charging adapter for charging to avoid damaging the TruEbox.

⚠ The charging light on the device is red when charging and green when fully charged. Please disconnect the device when fully charged to avoid damage.

⚠ Please handle the device with care to prevent damage from falling.

⚠ Please do not use the device while charging to avoid electromagnetic interference from charging.

⚠ Please avoid complex electromagnetic environments (e.g. within 2m of power strips, sockets, and charging devices).

⚠ Please do not shake the device violently.

⚠ Please do not use it in high temperature and high humidity environments.

⚠ Please do not throw the device into water or fire to avoid damage or explosion of the device.