CA-320/330 Series

Dynamic Current Analyzer

User's Guide

V3.0

Beijing Chipment Technology Co., Ltd

Note

© All rights reserved Beijing Chipment Technology Co., Ltd

In accordance with Chinese and international copyright laws, without the prior consent and written authorization of Beijing Chipment Technology Co., Ltd., no group or individual may reproduce any part of this manual in any form, including electronic storage or translation into a foreign language.

Manual

DCA-01

Software version

This guide applies to the firmware of the device at the time of manufacture and installation.However, upgrading the firmware may add or change product features.For the latest firmware and documentation, please visit the download interface of the company's official ： ©2022 www.chipment.com

Guarantee

The content contained in this document is true and valid, but is subject to change in future releases without notice. In addition, to the maximum extent permitted by law, Beijing Chipment Technology Co., Ltd. does not respect this manual and it any information contained makes any warranties, express or implied, including, but not limited to, implication of merchantability and fitness for a particular purpose warranty.Beijing Chipment Technology Co., Ltd. does not undertake and provide, use or execute this Capital Liability for errors or incidental or consequential damages relating to documents or other documents.

Technology

The hardware or software described in this manual is provided under a product license and may only be used or copied in accordance with the terms of that license.

Safety tips

Please use the equipment in strict accordance with the operating procedures and specifications described in this document,incorrect operation may lead to product damage and data loss.

Daily cleaning

Use a soft, lint-free, slightly damp cloth to clean the outside of the device and the screen. No detergents or chemical solvents!

PRODUCT HIGHLIGHTS

Note:

Unless otherwise noted, this manual applies to any family of dynamic current analyzers.

Dynamic current analyzer

CA-320/330 Series

- **1uA~3A dynamic current real-time measurement**
- **6.4~64ksps variable sample rate, 16-bit accuracy**
- **64k pts storage depth**
- **5 inch HD LCD，single and dual channel waveform display**
- **Support remote control and acquisition**
- **Class oscilloscope operator interface**

©2022 www.chipment.com

COMPARISON OF MODELS

	CA-320	CA-320 PRO	CA-330	CA-330 PRO
Current range	10uA-3A	1uA-3A	0.5uA-3A	0.5uA-3A
Current resolution	1uA	1uA	0.1uA	0.1uA
Voltage range	0.6-15V	0.6-15V	0.6-18V	0.6-18V
Remote control	×	√	×	√
Single-channel trigger	×	√	×	√
Axis zoom	×	×	√	√
Dual-channeldisplay	×	×	×	√
Screensaver	×	×	√	√
Waveform	×	×	×	√

SPECIFICATION

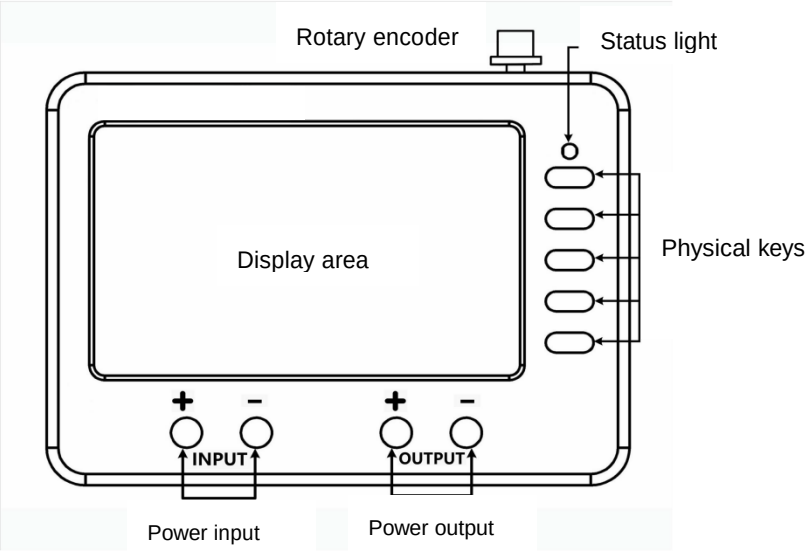
Measurement metrics		
Measured range	DC 0-15V (CA-320 series)	
	DC 0-18V (CA-330 series)	
Measured range	1uA-3A (CA-320 series)	
	0.5uA-3A (CA-330 series)	
Current accuracy	1uA-50uA	5%±0.2
	50uA-2mA	5%±0.2
	2mA-80mA	5%±0.2
	80mA-3A	5%±0.2
Voltage accuracy	3%±0.3	
Measure the path pressure drop		
Less than 100mV		
Level		
Sample rate range	6.4 kSa/s～64 kSa/s (CA-330 Series as low as 0.3 kSa/s)	
Waveform interpolation	Three spline interpolations	
Storage depth	64k pts（Current channel）	
Timescale	10ms/div～1s/div (1-2-5 times)	
Vertical		
Analog-to-digital converters（A/D）	16 bit sample rate, 5 channels simultaneous sampling	
Sensitivity range	current	400mA/div～1uA/div（Linear）
		20dBA/div～1dBA/div (logarithm)

©2022 www.chipment.com

	voltage	4V/div～20mV/div
	power	8W/div～1uW/div
The offset range	current	Upper 4A (Linear)
		Lower 0A (Linear)
		Upper 30dBA (logarithmic)
		Lower bound -150dBA (logarithmic)
	voltage	Upper limit 16V
		Lower limit 0V
	power	Maximum 32W
		Lower limit 0W
Response bandwidth	20kHz	
Trigger (current channel only)		
Trigger range	2uA～2.9A	
The trigger type	Internal trigger (rising edge, for periodic current signal)	
Remote		
AT serial port programming	Supported (CA-320PRO, CA-330PRO)	
Display		
Type	TFT LCD (5 inches)	
Resolution	800×480	
Display color	16 million (24bit)	
Color mode	RGB	
Size	5 inches	
Screensaver (CA-330 series only)		
Image format	JPG, GIF, BMP (24-bit)	
SD card		
Snipping feature	Supported (1000 Photos, CA-330 Series)	
Waveform recording and playback	Supported (CA-330PRO)	
Capacity	16GB (CA-330 Series)	
Dimensions		
Dimensions	150mm×110mm×30mm	
Environment		
Operating temperature	-20 ～ 45°C	
Storage temperature	-40 ～ 70°C	
Altitude	Working status (under 3,000 meters)	
	Non-working (under 15,000 meters)	
Other		
Power supply	9V/1A (adapter)	
Power consumption	Less than 3.2W	
Warranty period	1 year	

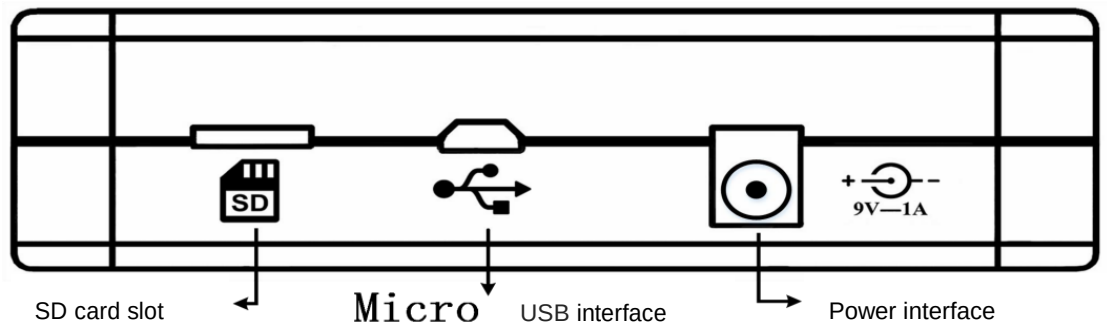
©2022 www.chipment.com

FRONT PANEL

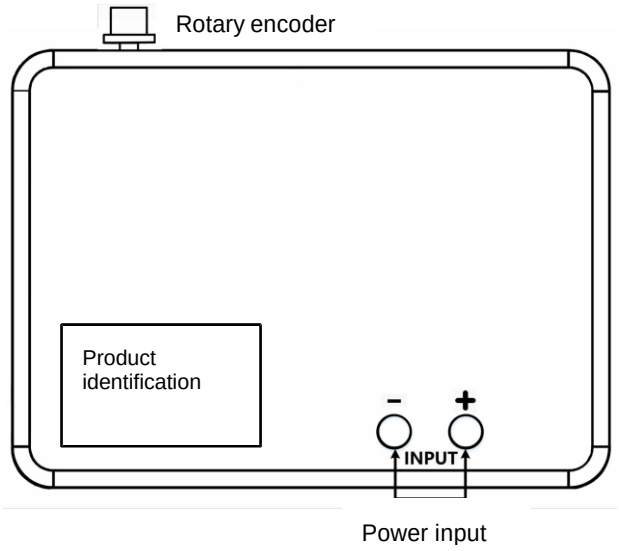


Press the key	Function
The knob and F1 key are pressed at the same time (at boot)	Firmware upgrade
The F1 and F2 keys are pressed at the same time	Full screen screenshots
Press and hold the F1 key long	Power on or shut down normally
Press and hold the F5 key long	Return to the main menu
Press and hold the knob	Unlock the lock screen

SIDE PANELS



BACK PANEL



NOTE:

- **Front and rear panel power input interface input voltage range of 0-15V (CA-320 Series) or 0-18V (CA-330 Series) The capacity of the SD card used should not be greater than 32GB (CA-330 series)**
- **Connect your device to your computer using a data cable from the Micro USB interface**
- **The power supply of the device should be 9V/1A (maximum 12V/1A, not recommend**

GENERAL DESCRIPTION

- **Quick to use**
  The first chapter prepares you for use with the device and provides a brief introduction to the basic functions.
- **Function and operation**
  The second chapter introduces the main functional units and interface operations.
- **Communication and storage**
  Chapter 3 describes device communication functions and storage (such as AT remote control, firmware updates, etc.) and SD memory card use.
- **Typical applications**
  Chapter 4 describes typical application areas of the device.
- **Appendix**
  Chapter 5 introduces the equipment accessories and options, maintenance and warranty.

©2022 www.chipment.com

CONTENTS

Comparison of models **4**
Specification **4**
Front panel **6**
Side panels **6**
Back panel **7**
一. Quick start **12**
二. Functions and Operations **14**
2.1. Digital display mode 14
2.2. Current mode 16
2.2.1. Waveform recording (only supported by CA330PRO) 32
2.2.2. Waveform playback (only supported by CA330PRO) 33
2.3. U/I mode and I/P mode (CA-330PRO only) 34
2.4. System Settings 45
三. Communication and storage **53**
3.1. Communication capabilities 53
3.1.1. AT command 53
3.1.2. Firmware upgrade 53
3.2. Storage Functions and Precautions (CA-330 Series Only) 55
3.2.1. Storage Functions (CA-330 Series Only) 55
3.2.2. Precautions (CA-330 Series Only) 56
四. AT command **57**
4.1. AT Command Summary 57
4.2. Introduction to some AT commands 58
4.2.1. AT+CURR VZ= 58
4.2.2. AT+CURR HZ= 59
4.2.3. AT+CURR PAGE= 59
4.2.4. AT+CURR dB= 59
4.2.5. AT+CURR MKR= 59
4.2.6. AT+CURR MKR1= 60
4.2.7. AT+CURR MKR2= 60
4.2.8. AT+CURR SOFTTEST? 60
4.2.9. AT+SET LIGHT= 60
4.2.10. AT+SET TIME= 60
4.2.11. AT+SET DATE= 60
4.2.12. AT+SET SLEEP= 60
4.2.13. AT+SET CLOSE= 60
五. Typical applications **61**
六. Appendix **62**
6.1. Appendix II Warranty Summary 62

List of Tables

Table 2-1 Horizontal axis static adjustment range 20
Table 2-2 Key Functions of Waveform Playback Interface 34
Table 2-3 Horizontal axis static adjustment range 38
Table 3-1 Key Operation of File Management Interface 56
Table 4-1 AT Command Summary 57
Table 4-2 Vertical Axis Setting Parameters 58
Table 4-3 Horizontal axis setting parameter table 59

©2022 www.chipment.com

Table 4-4 Current interface page setting parameter table 59
Table 4-5 Parameter table of current interface for data axis setting 59
Table 4-6 Current Interface MKR Status Setting Parameters 60
Table 6-1 Appendix I Accessories and Options 62

List of Figures

Figure 1-1 The self-test interface passes the diagram 12
Figure 1-2 Numerical display interface 12
Figure 1-3 Main Menu Interface 13
Figure 2-1 Digital Display Mode Interface 14
Figure 2-2 Schematic diagram of the operation stop state switchover 14
Figure 2-3 Refresh Rate is in a tunable state diagram 15
Figure 2-4 Refresh rate changed from "Low" to "High" 15
Figure 2-5 Schematic of the lock refresh rate 16
Figure 2-6 Digital Display Interface Status Bar Functional Partition 16
Figure 2-7 Current Waveform Interface 17
Figure 2-8 Schematic diagram of the menu switch 17
Figure 2-9 Schematic diagram of a menu switch 18
Figure 2-10 Schematic diagram of automatic mode on/off 18
Figure 2-11 Sets the vertical axis zoom to adjustable mode 19
Figure 2-12 Knob adjustment portrait zoom schematic 19
Figure 2-13 Locking the Adjusted Vertical Axis Scale Scale 20
Figure 2-14 Schematic diagram of dynamic and static zoom ranges 21
Figure 2-15 Press F4 to bring the horizontal zoom function key into an adjustable state 21
Figure 2-16 The rotary knob adjusts the horizontal axis scale scale 22
Figure 2-17 Schematic diagram of the locking horizontal zoom function keys 22
Figure 2-18 Diagram of switching the operating state to a stopped state 23
Figure 2-19 Toggles the Horizontal Axis function key to an adjustable state 23
Figure 2-20 Diagram of switching "1s/div" to "10ms/div" 24
Figure 2-21 Diagram of locking the current horizontal zoom settings 24
Figure 2-22 The longitudinal axis reference function key enters the adjustable state 25
Figure 2-23 Adjust the longitudinal axis reference to 700mA 25
Figure 2-24 Locking the Vertical Axis Reference Value 26
Figure 2-25 Schematic diagram of axis switching 26
Figure 2-26 Diagram of the Mkr1 setup flow 27
Figure 2-27 Turning on the cursor switch 27
Figure 2-28 Confirm that Mkr1 is selected 28
Figure 2-29 Toggles the current Mkr1 position setting to an adjustable state 28
Figure 2-30 Setting the Location of "Mkr1" to "022" 29
Figure 2-31 Locking the Cursor function key 29
Figure 2-32 Puts "ON/OFF" into an adjustable state 30

©2022 www.chipment.com

Figure 2-33 Turn on the trigger settings switch 30
Figure 2-34 Schematic of setting trigger values 31
Figure 2-35 Schematic of setting the trigger unit 31
Figure 2-36 Locks the current trigger setting 32
Figure 2-37 Schematic of the current mode status bar 32
Figure 2-38 Schematic Diagram of Waveform Recording Start 32
Figure 2-39 Waveform Recording End 33
Figure 2-40 Schematic diagram of waveform recording file path 33
Figure 2-41 Waveform playback diagram-1 33
Figure 2-42 Waveform playback diagram-2 34
Figure 2-43 U/I waveform display interface 34
Figure 2-44 Schematic diagram of the toggle menu 35
Figure 2-45 Schematic diagram of operational state switching 35
Figure 2-46 Manual/automatic adjustment diagram 36
Figure 2-47 The "I/U" item is in a tunable state 36
Figure 2-48 Adjust the longitudinal axis zoom size to 100mA/div 37
Figure 2-49 Locking the Portrait Axis function key 37
Figure 2-50 Schematic diagram of the dynamic and static horizontal axis scaling relationship 38
Figure 2-51 Adjusting the Horizontal Axis Scale to X10 (100ms/div) 39
Figure 2-52 Locking the Horizontal Axis function key 39
Figure 2-53 The Vertical Axis Reference function key is adjustable 40
Figure 2-54 Adjusting the longitudinal axis reference is 600mA 40
Figure 2-55 Locking the Vertical Axis Reference function key 41
Figure 2-56 Schematic diagram of the open cursor switch 42
Figure 2-57 Confirms that "Mkr1" is selected 42
Figure 2-58 Adjusting the cursor position is 22 43
Figure 2-59 Locking cursor function keys 43
Figure 2-60 Turning on the trigger switch 44
Figure 2-61 Sets the trigger value to 300 44
Figure 2-62 determines that the trigger unit is mA 45
Figure 2-63 Locking the trigger function key 45
Figure 2-64 Schematic of the current mode status bar 45
Figure 2-65 Device Settings Interface 46
Figure 2-66 Schematic of the backlight setup 46
Figure 2-67 Backlight setup schematic Figure 2 47
Figure 2-68 Backlight setup schematic Figure 3 47
Figure 2-69 Time/Date Setup Diagram 48
Figure 2-70 Schematic of the time/date setup 48
Figure 2-71 Schematic of the time/date setup 49
Figure 2-72 Schematic of the time/date setu 49
Figure 2-73 Shutdown/Hibernation Settings Schematic Figure 1 50
Figure 2-74 Shutdown/Hibernation Settings Schematic Figure 50

©2022 www.chipment.com

Figure 2-75 Shutdown/Hibernation Settings Schematic Figure 3 51
Figure 2-76 Device Status Display Interfac 51
Figure 2-77 Schematic of the native interface 52
Figure 3-1 Firmware Upgrade Required Files 53
Figure 3-2 The device enters the firmware upgrade interface 53
Figure 3-3 Firmware Upgrade Software Interface 54
Figure 3-4 The host computer firmware normal upgrade interface 54
Figure 3-5 The firmware of the lower computer is upgraded normally 55
Figure 3-6 Menu interface 55
Figure 3-7 Document Management Interface 55
Figure 3-8 Files in the SD card 56

©2022 www.chipment.com

QUICK START

The first thing you have to do is to familiarize yourself with some basic operations of your device. The device has five function buttons on the right and a rotary encoder above for operation. On the left, from top to bottom, is the SD card slot, Mirco-USB communication interface and power supply interface.

Long press the F1 key for 3 seconds to turn on the machine, after the device self-test passes, the default into the value display interface, display the current measurement of voltage, current and power (pass measurement).

PREPARE FOR USE WITH THE DYNAMIC CURRENT TESTER

Confirm that the device is working properly by following these steps

1) before using the equipment, please confirm that there are the following items, if there is missing, please contact our company or dealer.

- One power adapter
- Two sets of power supply test cables
- SD card (if you purchase CA-330 series) and USB cable
- One copy of the user guide (electronic or paper version)
- One warranty card

2) Second, connect the power adapter and turn on the device

The device can automatically conduct a self-test when it is powered on, displaying the current equipment supply voltage, LCD supply voltage, LCD current and SD card status. After passing the self-test, it enters the value display interface, and the default low-speed display data is shown in Figure 1- 1 and Figure 1- 2 below.

Figure 1-1 The self-test interface passes the diagram

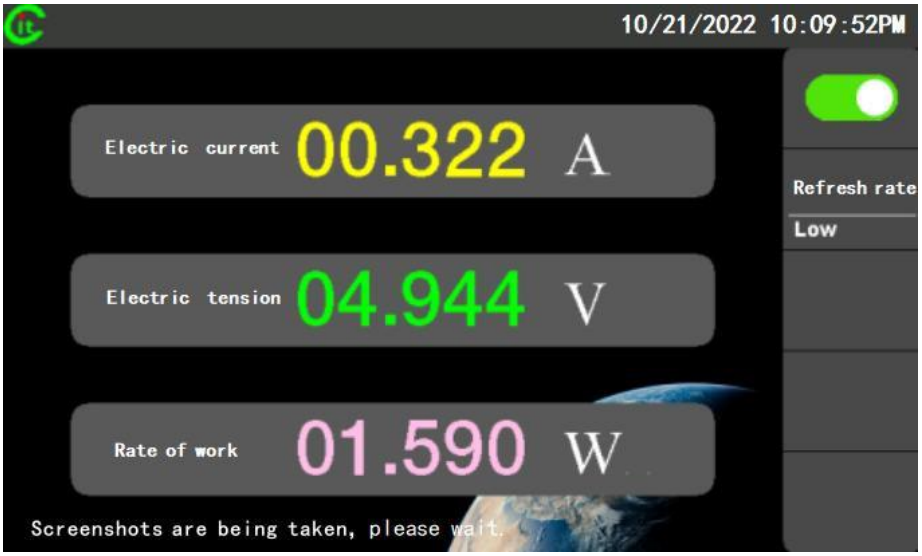


Figure 1-2 Numerical display interface

©2022 www.chipment.com

If the device does not boot properly

If the device does not start normally, please use the following steps to troubleshoot the cause, if you need more support, please contact our technical support.

■ **if the device has a black screen, it cannot light up**

Verify that the power adapter voltage output is normal and that the power adapter is firmly connected to the device.

■ **if the device does not pass the self-test, can not enter the system**

Check the output voltage of the power adapter and check the output voltage and current of the power adapter. If the LCD current is abnormal, please contact our technical support.

■ **Confirm the insertion of SD card (CA-330 series)**

Please confirm that the SD card is in normal use through the computer, and the capacity should be 32G and below, insert the SD card in the correct direction again, and restart the device.

Quickly switch the functional interface

Long pressing F5 on any interface will enter the main menu interface, as shown in Figure 1- 3 below, with six options: digital display mode, current mode, U/I mode, I/P mode, data storage and system settings.

Press the F3 key (i.e. the confirmation key for that interface) to enter the selected function interface.

Figure 1-3 Main Menu Interface

©2022 www.chipment.com

1. Functions and Operations

This section describes each functional interface in detail.

1.1. DIGITAL DISPLAY MODE

The digital display mode is the default interface of the device that automatically enters the interface when it is powered on, which displays the current, voltage and power measured in real time, as shown in Figure 2-1 below.

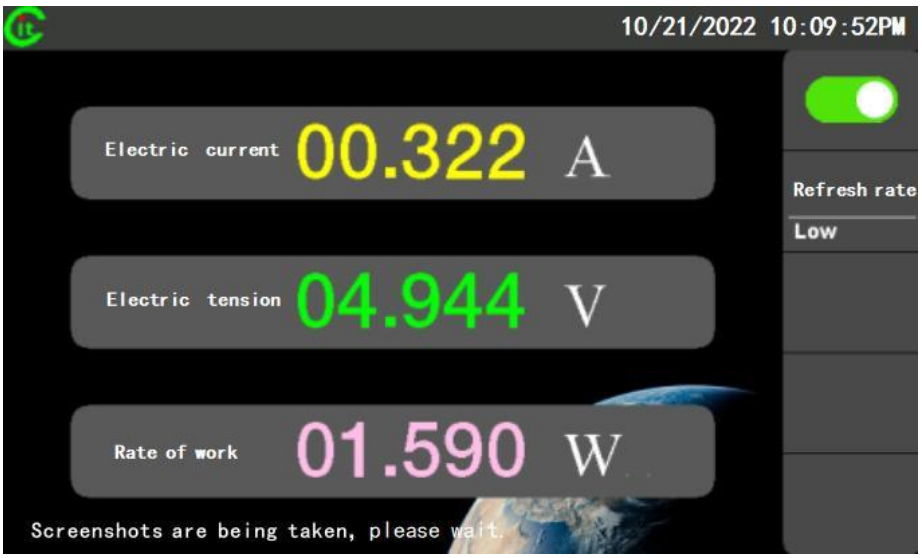


Figure 1-1 Digital Display Mode Interface

MENU BAR

- **Press the F1 key to toggle Run/Stop as shown in Figure 2-2 below.**

Figure 1-2 Schematic diagram of the operation stop state switchover

Eg: Represents a running delegate; Represents a stop.

- **Press F2 key, when the edit box appears, the rotary knob can adjust the value refresh speed, the operation process is as follows:**

1) Press the F2 key to make the "refresh rate" in an adjustable state, at which point the background color of "Low" becomes black, as shown in Figure 2-3 below.

Figure 1-3 Refresh Rate is in a tunable state diagram

Press F2 to switch between locked and adiustable states.

2) Rotate the knob so that the refresh rate changes from "Low" to "High", as shown in Figure 2-4 below.

Figure 1-4 Refresh rate changed from "Low" to "High"

In the adjustable state, you can toggle the fast and slow gears of the refresh rate ("High", "Low") by either left or right.

3) Press the F2 key again to lock the adjusted refresh rate, as shown in Figure 2-5 below.

©2022 www.chipment.com

Figure 1-5 Schematic of the lock refresh rate

STATUS BAR

The status bar of the digital display interface is divided into three functional areas, as shown in Figure 2-6 below.

Figure 1-6 Digital Display Interface Status Bar Functional Partition

- **Icon display area：Beijing chipment icon display.**
- **Message Alert Area：Warning and other message display areas, such as overvoltage alarms.**
- **Time and Date Display Area: Displays the current date and time.**

1.2. CURRENT MODE

The current mode is a current waveform display mode, as shown in Figure 2-7 below.

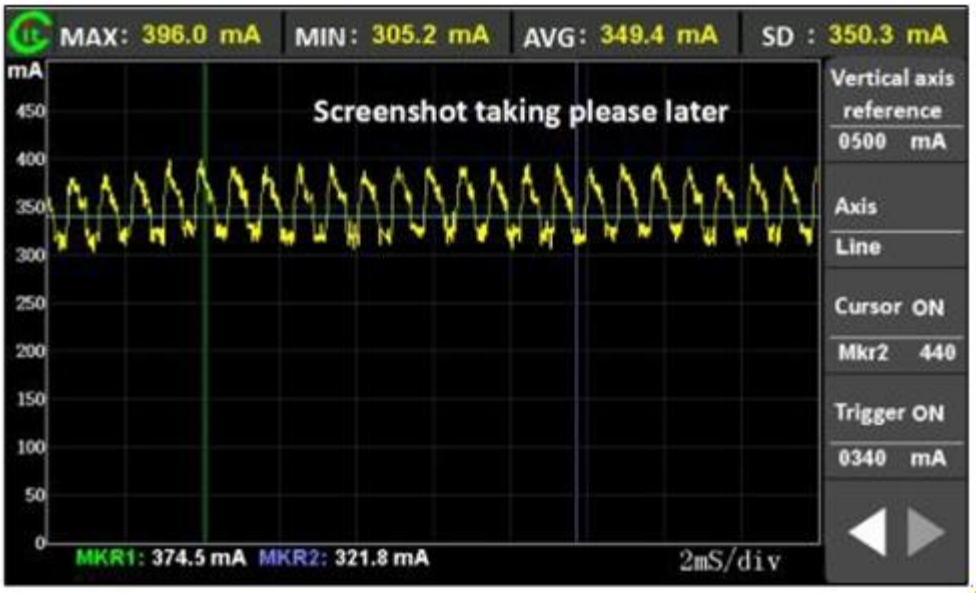


Figure 1-7 Current Waveform Interface

Current mode has the following eight functions：

1.Run/Stop	2.Longitudinal axis reference adjustment
3. Automatic longitudinal axis ON/OFF	4 Axis transformation (linear/logarithmic)
5 Vertical axis scaling adjustment	6. Cursor settings
7 Horizontal axis zoom adjustment	8. Trigger settings (internal triggers)

MENU BAR

■ **Menu toggle function key，**

press F5 to toggle menu, this is shown in Figure 2-8 below.

Figure 1-8 Schematic diagram of the menu switch

■ **Run/Stop toggle function keys**

Press F1 to toggle, as shown in Figure 2-9 below.

©2022 www.chipment.com

Figure 1-9 Schematic diagram of a menu switch

Eg： Represents a running delegate； Represents a stop

■

Auto function on/off function key

When the auto function is turned on, the device will automatically adjust the vertical axis zoom multiple according to the current measured value, the red bar indicates that the automatic vertical axis zoom is off, and the opposite means on, press F2 to toggle, as shown in Figure 2-10 below.

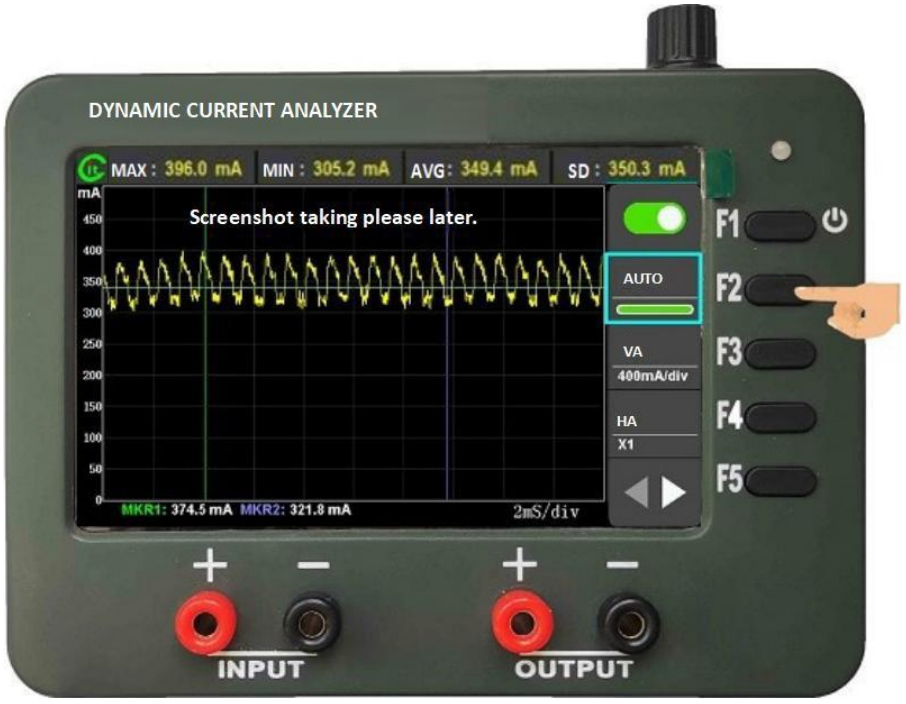


Figure 1-10 Schematic diagram of automatic mode on/off

Eg：

Represents a running delegate；

Represents a stop.

■

Vertical axis zoom adjustment function key

©2022 www.chipment.com

(Non-adjustable in auto-adjustment mode, the zoom value will be displayed automatically), the zoom range is 400mA/div to 1uA/div.

For example, under Auto Zoom off, adjust the vertical axis zoom scale from 400mA/div to 50mA/div, and the operation process is as follows:

1) Press F3 to adjust the vertical axis to an adjustable state, as shown in Figure 2-11 below.

Figure 1-11 Sets the vertical axis zoom to adjustable mode

2) Rotating the knob adjusts the vertical axis scaling to 50mA/div, as shown in Figure 2-12 below.

Figure 1-12 Knob adjustment portrait zoom schematic

Adiustment range: 400mA/div to 1uA/div

3) After the knob is adjusted, press F3 to lock the adjusted longitudinal zoom scale, as shown in Figure 2-13 below.

©2022 www.chipment.com

Figure 1-13 Locking the Adjusted Vertical Axis Scale Scale

■ **Horizontal zoom adjustment function key**

Press F4 to enter theadjustable state, and rotate the knob to adjust the scale. (The dynamic adjustment range refers to the horizontal axis zoom interval in the running state, and the static adjustment range refers to the horizontal axis zoom interval in the stopped state)

Dynamic adjustment range: 10ms/div to 1s/div

The static adjustment range is shown in Table 2-1 below:

Table 1-1 Horizontal axis static adjustment range

Health status	Stop state
100ms/divand below scale	Maximum scaling to 1ms/div
200ms/div	Maximum scaling to 2ms/div
500ms/div	Maximum scaling to 5ms/div
1s/div	Maximum scaling to 10ms/div

Eg： If the horizontal axis zoom scale is 200ms/div in the running state, the maximum scale is 2ms/div in thecorresponding stop state.

Note：Static scaling is centered on the Mkr1 identificationline, the default is the left boundary, and the static zoom position can be adjusted by adjusting the Mkr1 identification line.

The relationship between dynamic scaling and static scaling is shown in Figure 2-14 below.

©2022 www.chipment.com

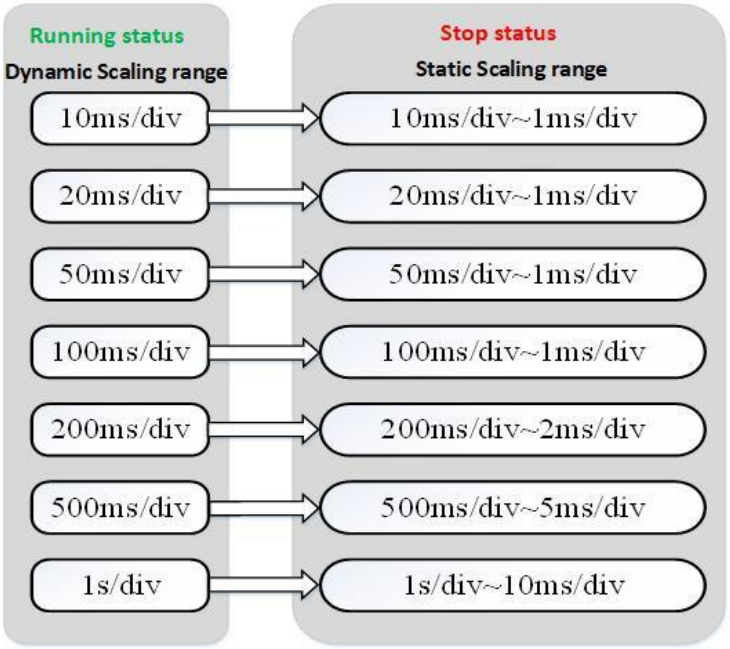


Figure 1-14 Schematic diagram of dynamic and static zoom ranges

Eg： in the running state, the horizontal zoom scale is adjusted from X1 (10ms/div) to X100 (1s/div), and the operation process is as follows

1) Press F4 to make the horizontal zoom function key into an adjustable state, as shown in Figure 2-15 below.

Figure 1-15 Press F4 to bring the horizontal zoom function key into an adjustable state

Press F4 to switch between adjustable and locked states

2) The rotary knob adjusts "X1(10ms/div)" to "X100(1s/div)", as shown in Figure 2-16 below.

©2022 www.chipment.com

Figure 1-16 The rotary knob adjusts the horizontal axis scale scale

Adjustment range: 10ms/div to 1s/div

3) Press F4 to lock the adjusted horizontal scale as shown in Figure 2-17 below.

Figure 1-17 Schematic diagram of the locking horizontal zoom function keys

Eg：**the running state is adjusted to the stopped state, and then the horizontal axis zoom scale is adjusted from 1s/div to 10ms/div, the operation process is as follows：**

1) Press the F1 key to switch the running state to the stopped state, and the horizontal zoom scale indicator changes from "X100" to "X1", as shown in Figure 2-18 below.

©2022 www.chipment.com

Figure 1-18 Diagram of switching the operating state to a stopped state

2) Press F4 again to toggle the "Horizontal Axis" function key to an adjustable state, as shown in Figure 2-19 below.

Figure 1-19 Toggles the Horizontal Axis function key to an adjustable state

Press F4 to switch between adjustable and locked states

The rotary knob toggles "1s/div" to "10ms/div", as shown in Figure 2-20 below.

©2022 www.chipment.com

Figure 1-20 Diagram of switching "1s/div" to "10ms/div"

3) Press the F4 key to lock the current setting value, as shown in Figure 2-21 below.

Figure 1-21 Diagram of locking the current horizontal zoom settings

- **Longitudinal axis reference adjustment function key,**

  (Not adjustable in auto-adjustment mode, the reference value is automatically displayed) to adjust up and down in the scale of the current vertical axis scale

  For example, the longitudinal axis reference is adjusted from 500mA to 700mA, and the operation process is as follows

1) Press F1 to put the "Vertical Axis Reference" function key into an adjustable state, as shown in Figure 2-22 below.

©2022 www.chipment.com

Figure 1-22 The longitudinal axis reference function key enters the adjustable state

2) Rotate the knob to adjust the longitudinal axis reference to "700mA", as shown in Figure 2-23 below.

Figure 1-23 Adjust the longitudinal axis reference to 700mA

3) Press F1 to lock the adjusted longitudinal axis reference value, as shown in Figure 2-24 below.

©2022 www.chipment.com

Figure 1-24 Locking the Vertical Axis Reference Value

■

Axis adjustment function keys

"Line" represents the linear axis and "Log" represents the logarithmic axis, toggle by pressing F2, as shown in Figure 2-25 below.

Figure 1-25 Schematic diagram of axis switching

When the vertical axis is displayed on the logarithmic axis, the "Vertical Axis" and "Vertical Axis Reference" function keys are not adjustable, and the current status is automatically displayed

■

The cursor sets the function key

There are three setting items, press F3 key to toggle the adjustable state of these three settings.

©2022 www.chipment.com

a) ON/OFF：**Turn on/off the cursor function；**

b) Mkr1/Mkr2：**Mkr1 or Mkr2 settings；**

c) 001<->640：**Cursor position setting from 1 to 640 (left to right border of the waveform display area), press the knob to adjust the increase or decrease step when editing this item.**

Eg： open the Mkr point display and set the display position of the Mkr1 identification line to 22, the operation process is as follows:

1) Press F3 to make the "ON/OFF" item of the "cursor" function key adjustable, as shown in Figure 2-26 below.

Figure 1-26 Diagram of the Mkr1 setup flow

2) Turn the knob to turn on the wiper switch ("OFF"->"ON"), as shown in Figure 2-27 below.

Figure 1-27 Turning on the cursor switch

3) Press the F3 key to toggle "Mkr1" to the adjustable state, and confirm that "Mkr1" is selected, as shown in Figure 2-28 below.

©2022 www.chipment.com

Figure 1-28 Confirm that Mkr1 is selected

4) Press the F3 key to toggle "001" to an adjustable state, which sets the position of the currently selected Mkr1, as shown in Figure 2-29 below.

Figure 1-29 Toggles the current Mkr1 position setting to an adjustable state

5) Rotate the knob to adjust the display position of "Mkr1" to "022", the interval from the left boundary to the right boundary is 640, and the left boundary is the starting point, as shown in Figure 2-30 below.

©2022 www.chipment.com

Figure 1-30 Setting the Location of "Mkr1" to "022"

6) Press the F3 key to lock the Cursor function key to complete the setup, as shown in Figure 2-31 below.

Figure 1-31 Locking the Cursor function key

■

Trigger the settings function key

There are three setting items, press F3 key to toggle the adjustable state of these three settings.

- **ON/OFF：** Turn on/off the trigger function;
- **000：** The trigger value is set, and when editing this item, press the knob to adjust the increase or decrease step;

©2022 www.chipment.com

➢ **uA：** Trigger unit settings.

Eg： Turn on the trigger switch and set the trigger threshold to 350mA, the setup process is as follows.

1) Press the F4 key to make the "ON/OFF" item of the trigger function key in an adjustable state, as shown in Figure 2-32 below.

Figure 1-32 Puts "ON/OFF" into an adjustable state

2) Turn the knob to turn on the trigger setting switch, as shown in Figure 2-33 below

Figure 1-33 Turn on the trigger settings switch

3) Press F4 again to set the value of the trigger function key in an adjustable state, and rotate the knob to adjust the value to 350, as shown in Figure 2-34 below

Figure 1-34 Schematic of setting trigger values

4) Press F4 again to make the unit setting of the trigger function key adjustable, and rotate the knob setting to mA, as shown in Figure 2-35 below.

Figure 1-35 Schematic of setting the trigger unit

©2022 www.chipment.com

5) Finally press the F4 key to lock the current trigger setting, as shown in Figure 2-36 below.

Figure 1-36 Locks the current trigger setting

STATUS BAR

The status bar for current mode mainly shows the maximum, minimum, average, and rms values of the current waveform, as shown in Figure 2-37 below.

Figure 1-37 Schematic of the current mode status bar

1.2.1. Waveform recording (only supported by CA330PRO)

Waveform recording can record the waveform displayed on the current waveform interface in real time. The operation is as follows:

1) In the current waveform interface, press F2 and F3 briefly at the same time. When the icon at the upper left corner changes to "camera icon", it represents the beginning of waveform recording, as shown in Figure 2-38 below.

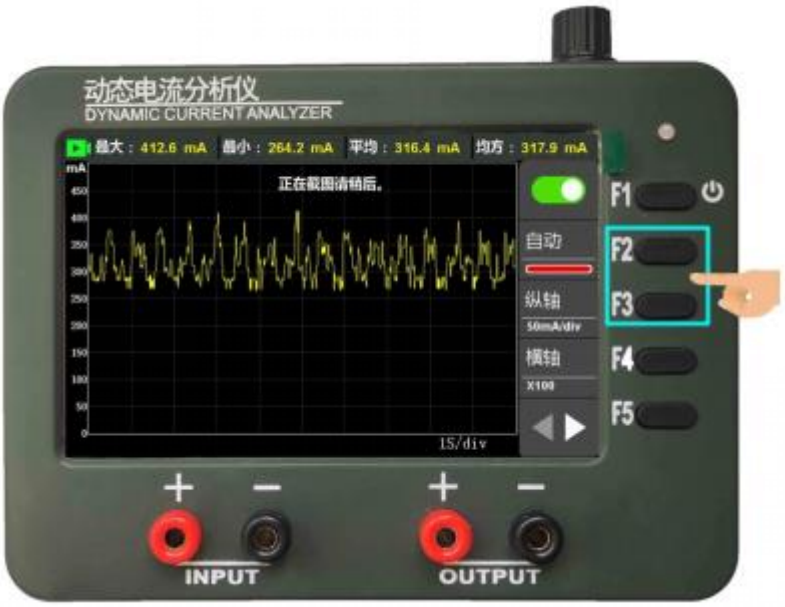


Figure 1-38 Schematic Diagram of Waveform Recording Start

2) The duration of waveform recording is recommended to be within 15 minutes. When the screen recording is over, press F2 and F3 briefly again. When the icon in the upper left corner changes to our icon, the waveform

©2022 www.chipment.com

recording ends. The file of waveform recording will be stored in the " datasave" folder of SD card. The file name is named after the time displayed on the device when recording starts. As shown in Figure 2-39 below.

Figure 1-39 Waveform Recording End

3) The storage path of waveform recording files is shown in Figure 2-40 below.

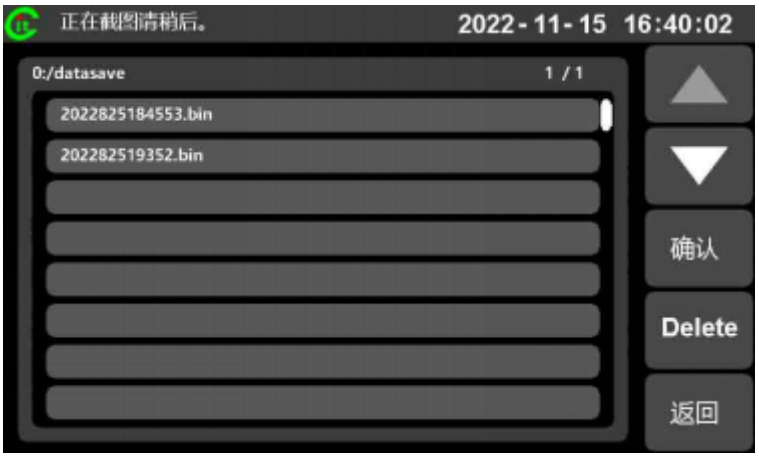


Figure 1-40 Schematic diagram of waveform recording file path

1.2.2. Waveform playback (only supported by CA330PRO)

1) Select the waveform file to be played back in the file management interface, as shown in Figure 2-41 below.

Figure 1-41 Waveform playback diagram-1

2) After entering the playback interface, it will automatically play once, as shown in Figure 2-42below. The key functions of this interface are shown below.

Figure 1-42 Waveform playback diagram-2

Table 1-2 Key Functions of Waveform Playback Interface

Key	Function
Start	Start waveform refresh
Refresh	Waveform refresh speed.Default：Defaultspeed;Slow：Slow down.
Stop	Stop waveform refreshing, and press the "Start" key after stopping to re read and refresh the file.
Pause	Pause waveform refresh, and press the "Start" key after the pause to continue refreshing from the file reading position at the time of pause.

1.3. U/I MODE AND I/P MODE (CA-330PRO ONLY)

U/I mode and I/P mode are dual-screen displays, i.e. simultaneous display of voltage and current or simultaneous display of current power, as shown in Figure 2-43 below. The current curve display box is always above, and the two interfaces operate in the same way, which is introduced below in the U/I mode interface.

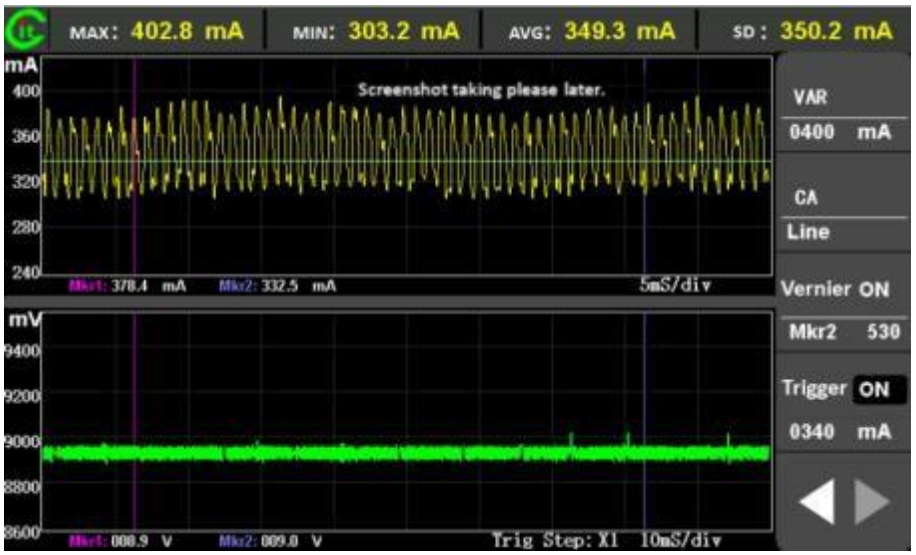


Figure 1-43 U/I waveform display interface

©2022 www.chipment.com

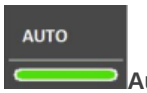
MENU BAR

- **Menu toggle function keys**：Press F5 to switch menus,This is shown in Figure 2-44 below.

Figure 1-44 Schematic diagram of the toggle menu

- **Run state toggle function key**：Press F1 to toggle, as shown in Figure 2-45 below.

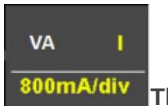
Figure 1-45 Schematic diagram of operational state switching

- 

Auto/manual adjustment toggle function key， The red bar represents auto-scaling off, and vice versa, it means on, press F2 to toggle, as shown in Figure 2-46 below (auto mode is only valid for current waveforms)。

©2022 www.chipment.com

Figure 1-46 Manual/automatic adjustment diagram



■ **The vertical axis zoom adjustment function key, there are two setting items。**

- **I/U：** Current or voltage waveform selection；
- **800mA/div ：** Current waveform vertical axis scaling size setting (if voltage waveform is selected, set the corresponding scaling size value).

Eg： set the vertical axis scaling size of the current waveform to 100mA/div, and the operation process is as follows.

1) Press F3 to make the "I/U" item adjustable and confirm that the current waveform is selected, as shown in Figure 2-47 below.

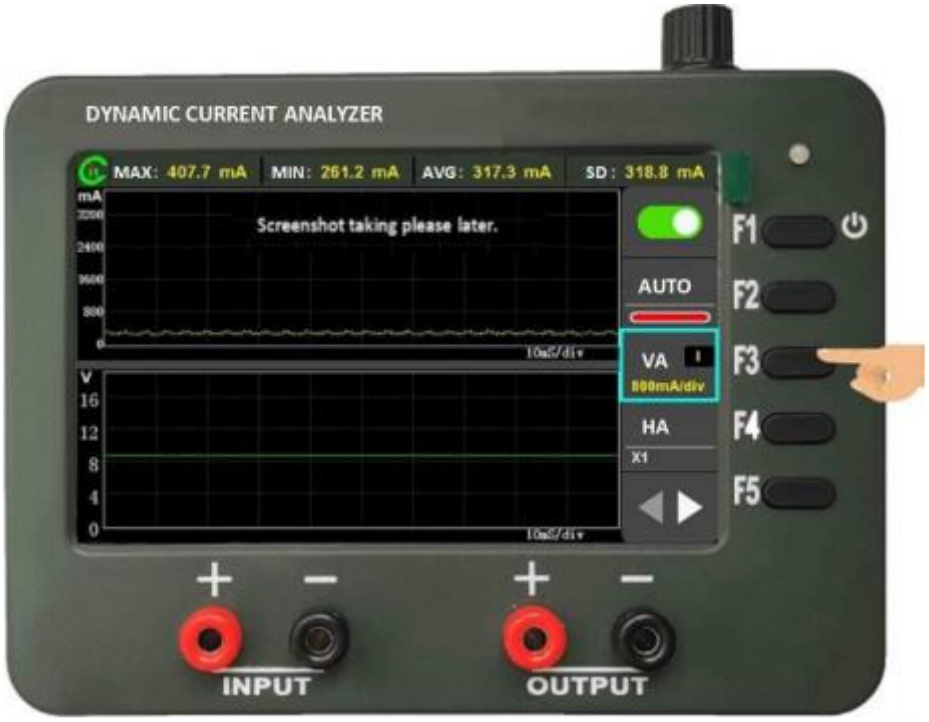


Figure 1-47 The "I/U" item is in a tunable state

2) Press F3 again to make the "xxx/div" item adjustable, and then rotate the knob to adjust the vertical axis retraction size to 100mA/div, as shown in Figure 2-48 below.

©2022 www.chipment.com

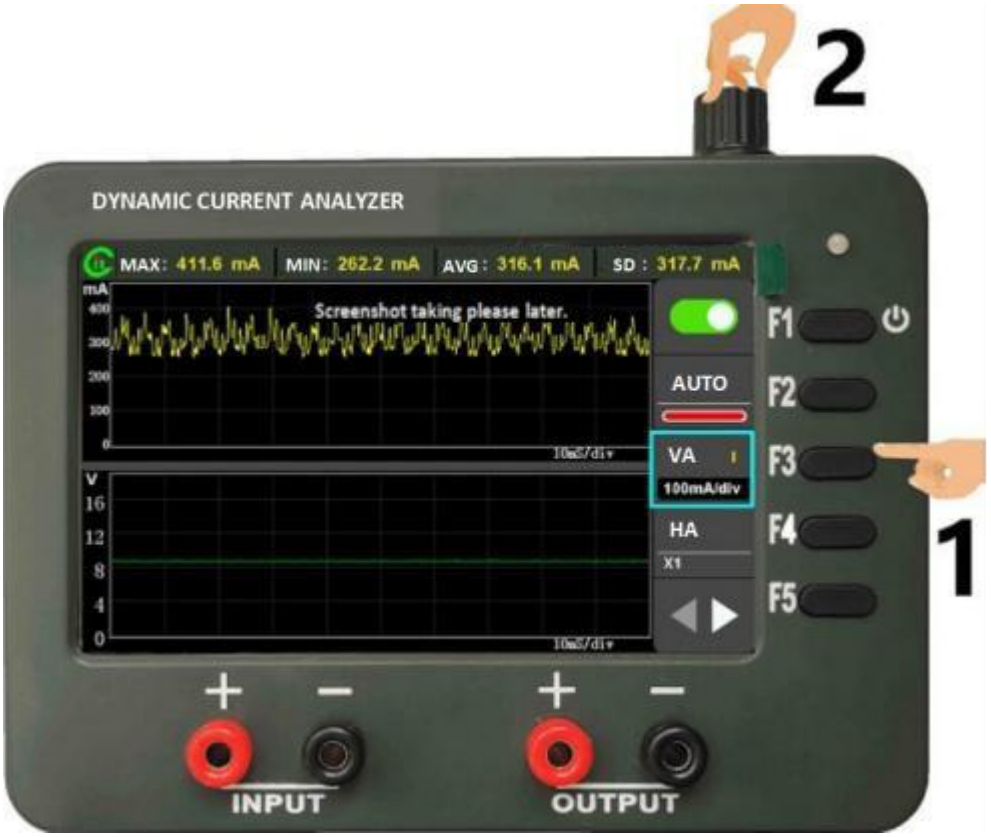


Figure 1-48 Adjust the longitudinal axis zoom size to 100mA/div

3) Finally press F3 to lock the "Vertical Axis" function key, as shown in Figure 2-49 below.

Figure 1-49 Locking the Portrait Axis function key

■

Horizontal zoom adjustment function key, Press F4 to edit **(dynamic adjustment range refers to the horizontal axis zoom interval in the running state, static adjustment range refers to the horizontal axis zoom interval in the stopped state)**

Dynamic adjustment range: 10ms/div to 1s/div

©2022 www.chipment.com

The static adjustment range is shown in Table 2-2 below：

Table 1-3 Horizontal axis static adjustment range

Health status	Stop state
100ms/divand below scale	Scale down to 1ms/div
200ms/div	Scale down to 2ms/div
500ms/div	Scale down to 5ms/div
1s/div	Scale down to 10ms/div

Eg：If the horizontal axis zoom scale is 200ms/div in the running state, the maximum scale is 2ms/div in the corresponding stop state.

Note：Static scaling is centered on the Mkr1 identification line, the default is the left boundary, and the static zoom position can be adjusted by adjusting the Mkr1 identification line

The relationship between dynamic horizontal scaling and static horizontal scaling is shown in Figure 2-50 below.

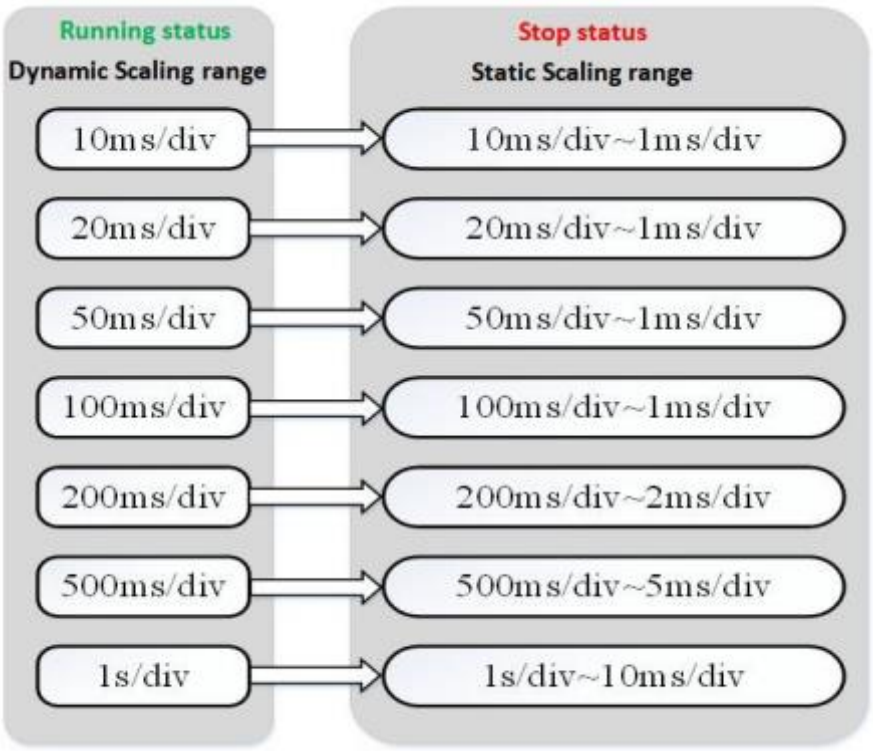


Figure 1-50 Schematic diagram of the dynamic and static horizontal axis scaling relationship

For example, to set the horizontal scale from "10ms/div" to "100ms/div", the operation process is as follows:

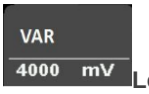
1) Ress F4 to make the "horizontal axis" function key adjustable, and the rotary knob adjusts the horizontal axis scale to X10 (100ms/div), as shown in Figure 2-50 below.

©2022 www.chipment.com

Figure 1-51 Adjusting the Horizontal Axis Scale to X10 (100ms/div)

2) Press the F4 key to lock the Horizontal Axis function key, as shown in Figure 2-51 below.

Figure 1-52 Locking the Horizontal Axis function key

■ 

Longitudinal axis reference adjustment function key, （The auto-adjustment mode is not adjustable and the reference value is automatically displayed）, Adjusts up and down in the scale of the current vertical axis scale.For example, the longitudinal axis reference is adjusted to 600mV, and the operation process is as follows.

1) Press the F1 key to make the "Vertical Axis Reference" function key adjustable, as shown in Figure 2-52 below.

©2022 www.chipment.com

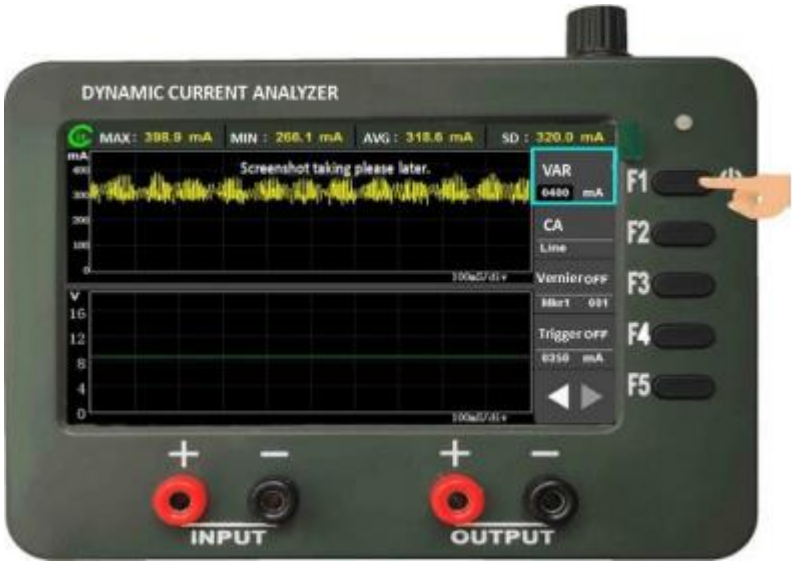


Figure 1-53 The Vertical Axis Reference function key is adjustable

2) Rotate the knob to adjust the longitudinal axis reference to 600mA, as shown in Figure2-53 below

Figure 1-54 Adjusting the longitudinal axis reference is 600mA

3) Press the F1 key to lock the Vertical Axis Reference function key, as shown in Figure 2-54 below.

©2022 www.chipment.com

Figure 1-55 Locking the Vertical Axis Reference function key

-

In UI/IP mode, the function key is invalid.

-

The cursor sets the function key，There are three setting items, press F3 key to switch between these three settings。

- **ON/OFF**：Turns cursor functionality on/off；
- **Mkr1/Mkr2**：Mkr1 or Mkr2 settings；
- **001<->640**： The cursor position is set from 1 to 640 (left to right of the waveform display area), and press the knob to adjust the step increase or decrease when editing this item.

Eg： open the Mkr point display and set the display position of the Mkr1 identification line to 22, the operation process is as follows:

1) Press the F3 key to make "ON/OFF" in an adjustable state, and rotate the knob to open the cursor function, as shown in Figure 2-55 below.

©2022 www.chipment.com

Figure 1-56 Schematic diagram of the open cursor switch

2) Press the F3 key to make "Mkr1" adjustable and confirm that "Mkr1" is currently selected, as shown in Figure 2-56 below.

Figure 1-57 Confirms that "Mkr1" is selected

3) Press the F3 key again to make the wiper position setting into an adjustable state, and the rotary knob adjustment value is 22, as shown in Figure 2-57 below.

©2022 www.chipment.com

Figure 1-58 Adjusting the cursor position is 22

4) Press the F3 key to lock the Cursor function key, as shown in Figure 2-58 below.

Figure 1-59 Locking cursor function keys

■ **Trigger the settings function key，There are three settings in total, press F4 to switch between these three settings.**

- **ON/OFF**：Turn on/off the trigger function；
- **000**：The trigger value is set, and pressing the knob to adjust the increase or decrease step when editing this item；
- **uA**：Trigger unit settings.

eg: if you set the trigger threshold to 300mA, the setup process is as follows:

1) Press the F4 key to make the "ON/OFF" item in an adjustable state, and rotate the knob to turn on the trigger switch, as shown in Figure 2-59 below.

©2022 www.chipment.com

Figure 1-60 Turning on the trigger switch

2) Press F4 to select the trigger value setting and the rotary knob is set to 300, as shown in Figure 2-60 below.

Figure 1-61 Sets the trigger value to 300

3) Press F4 to select the trigger unit and confirm that the current unit is "mA", if not the rotation knob adjustment unit, as shown in Figure 2-61 below.

©2022 www.chipment.com

Figure 1-62 determines that the trigger unit is mA

4) Finally lock the "trigger function key", as shown in Figure 2-62 below.

Figure 1-63 Locking the trigger function key

STATUS BAR

The status bar in UI/IP mode displays only the maximum, minimum, average, and rms values of the current current waveform, as shown in Figure 2-63 below.

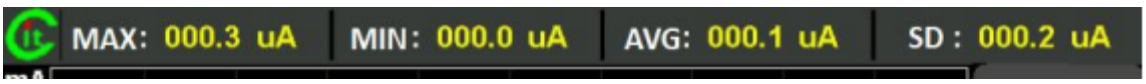


Figure 1-64 Schematic of the current mode status bar

1.4. SYSTEM SETTINGS

Through the system setup interface, you can set the backlighting of the device and view the running status of the device. Select the Settings subkey through the up and down arrows on the right, confirm that the key enters the subkey setting, and the return key exits the subitem setting, as shown in Figure 2-64 below.

©2022 www.chipment.com

Figure 1-65 Device Settings Interface

BACKLIGHT CONFIGURATION

Use this to set the display brightness of your device. Move the white arrow on the left side up and down to point to "Backlight Configuration", press the confirmation key to enter the backlight configuration subkey, rotate the knob to adjust the screen brightness in real time, and press the back key to exit.

Eg: to adjust the brightness from 30% to 60%, the operation flow chart is as follows:

1) Press F1F2, move the white arrow in the left menu bar, select "Backlight Configuration", and then press the confirmation key to activate the right backlight settings bar, as shown in Figure 2-65 below.

Figure 1-66 Schematic of the backlight setup

2) The rotary knob adjusts the screen brightness by 60%, as shown in Figure 2-62 below.

Figure 1-67 Backlight setup schematic Figure 2

3) Press the F4 key to exit the Backlight Settings item, as shown in Figure 2-63 below.

Figure 1-68 Backlight setup schematic Figure 3

TIME/DATE

Use this item to set the time date of the device. Move the white arrow on the left side up and down to point to "Time/Date", press the confirmation key to enter the time/date subkey, select the responsive setting item through the right up and down arrow, such as "W", rotate the knob to adjust, select "Save", press the confirmation key to save the changes, press the exit key to exit the setting.

Eg: Set the date to Tuesday, December 28, 2021, and the setup process looks like this:

1) Press F1F2 key, move the white arrow in the left menu bar, select "Time/Date", and then press the confirmation key to activate the time/date setting bar on the right, as shown in Figure 2-64 below.

©2022 www.chipment.com

Figure 1-69 Time/Date Setup Diagram

2) By pressing the F1/F2 key to select the time, minute, second, year, month, day, day and day, as well as the time save button, the date save button, the date save button, the knob can be adjusted to modify the date to Tuesday, December 28, 2021, as shown in Figure 2-65 below.

Figure 1-70 Schematic of the time/date setup

3) Move the F1/F2 key up and down, select the Date Save button, and press F3 to save the modified date, as shown in Figure 2-66 below.

Figure 1-71 Schematic of the time/date setup

4) Press the F4 key to exit the Time/Date setting item, as shown in Figure 2-67 below.

Figure 1-72 Schematic of the time/date setu

SHUT DOWN AND HIBERNATE

Use this item to set the device's scheduled shutdown and timed hibernation functions. The picture can be displayed as a screensaver when the SD card version is hibernating, and only the current time and date are displayed when the SD card version is hibernating.

Move the white arrow on the left side up and down to point to "Shutdown/Hibernation", press the confirmation key to enter the shutdown hibernate subkey, select the project you want to set, rotate the knob for editing, then select the "Save" item, press the confirmation key to save the settings.

Eg: if the device is set to shut down automatically after 6 minutes, the setup process is as follows.

1) Press F1F2 key, move the white arrow of the left menu bar, select the "Shutdown/Hibernation" confirmation key to activate the shutdown/hibernation settings bar on the right, as shown in Figure 2-68 below.

©2022 www.chipment.com

Figure 1-73 Shutdown/Hibernation Settings Schematic Figure 1

2) Press the F1/F2 key again, select the shutdown time setting item, and rotate the knob setting time for 6 minutes, as shown in Figure 2-69 below.

Figure 1-74 Shutdown/Hibernation Settings Schematic Figure

3) Press the F1/F2 key again, select the Save button for automatic shutdown, press F3 to confirm the saving of the changes, and finally press F4 to exit the set-up/hibernation item, as shown in Figure 2-70 below.

©2022 www.chipment.com

Figure 1-75 Shutdown/Hibernation Settings Schematic Figure 3

DEVICE STATUS

The interface displays the supply voltage, supply current and number of boots of the device, which can be displayed by moving the white arrow on the left side to select the interface, as shown in Figure 2-71 below.

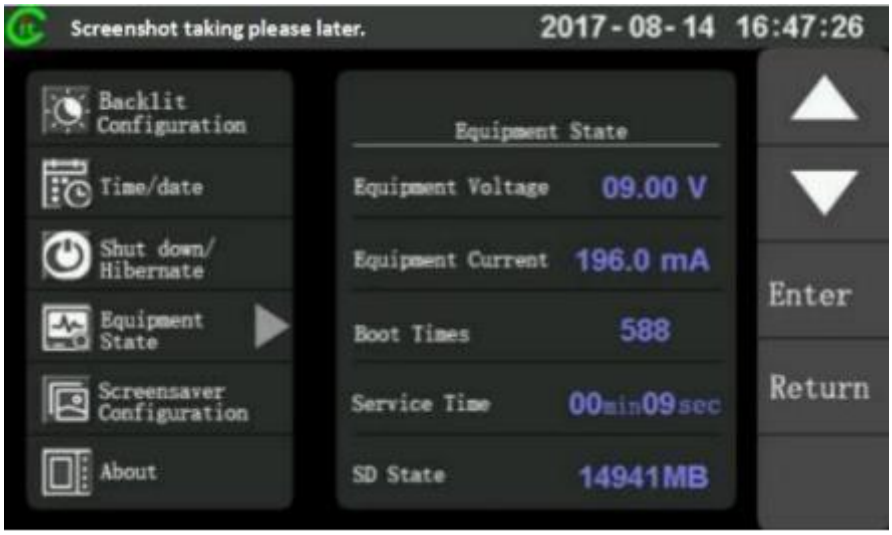


Figure 1-76 Device Status Display Interfac

©2022 www.chipment.com

ABOUT THIS UNIT

The interface displays information about the device's hardware, software version, and more.

Select the white arrow on the left to display the interface as shown in Figure 2-75 below.

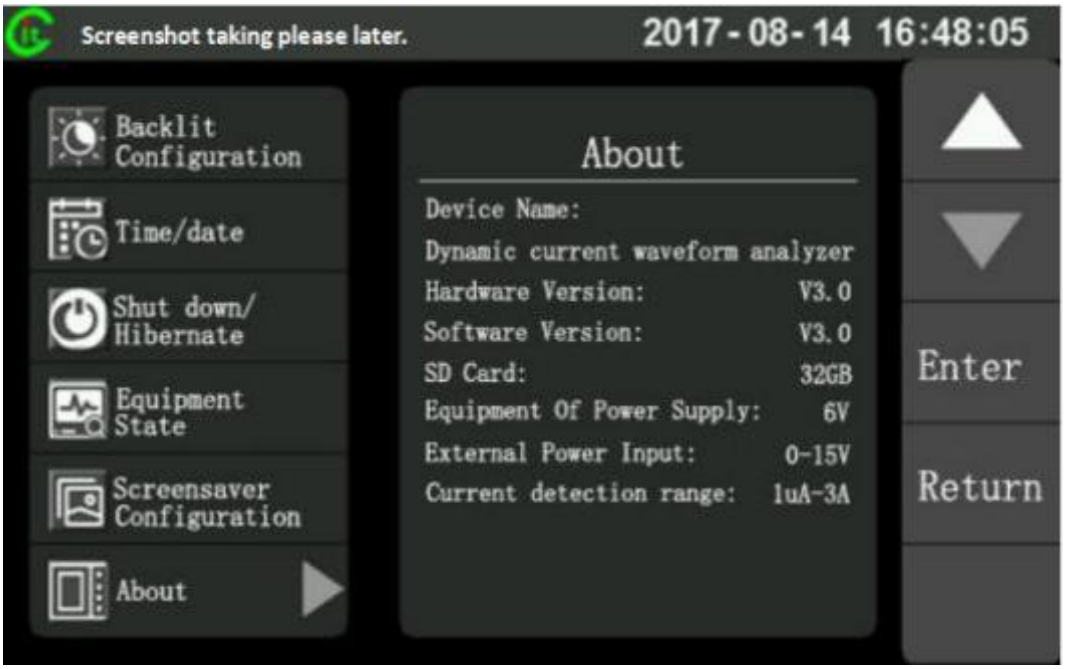


Figure 1-77 Schematic of the native interface

©2022 www.chipment.com

2. Communication and storage

2.1. COMMUNICATION CAPABILITIES

The device has a built-in USB to serial port chip, so only a data cable of the Micro USB interface can realize the communication between the device and the host computer. Through this communication interface, remote control of AT command, online firmware upgrade and host computer software data transmission can be realized.

2.1.1. AT command

2.1.2. Firmware upgrade

The firmware of the device will be upgraded and optimized from time to time, the firmware upgrade software and the corresponding firmware upgrade package, please download from the official website of Beijing Core Tonghui, the following brief introduction to the upgrade process.

1) Download the firmware upgrade software and firmware package, after the completion of the use of the verification software MD5 verification to confirm that the firmware package is normal, the inspection code is subject to the company's official website published in the subject, the required documents are shown in Figure 3-1 below.

Figure 2-1 Firmware Upgrade Required Files

2) Use a data cable to connect the device to the host computer.

3) While the device is powered on, press the knob to wait for the device to enter the Waiting for Upgrade interface, as shown in Figure 3-2 below.

Figure 2-2 The device enters the firmware upgrade interface

4) Open the firmware upgrade software, select the serial port of the device connection, the baud rate defaults to 115200, click to open the serial port. This is shown in Figure 3-3 below.

©2022 www.chipment.com

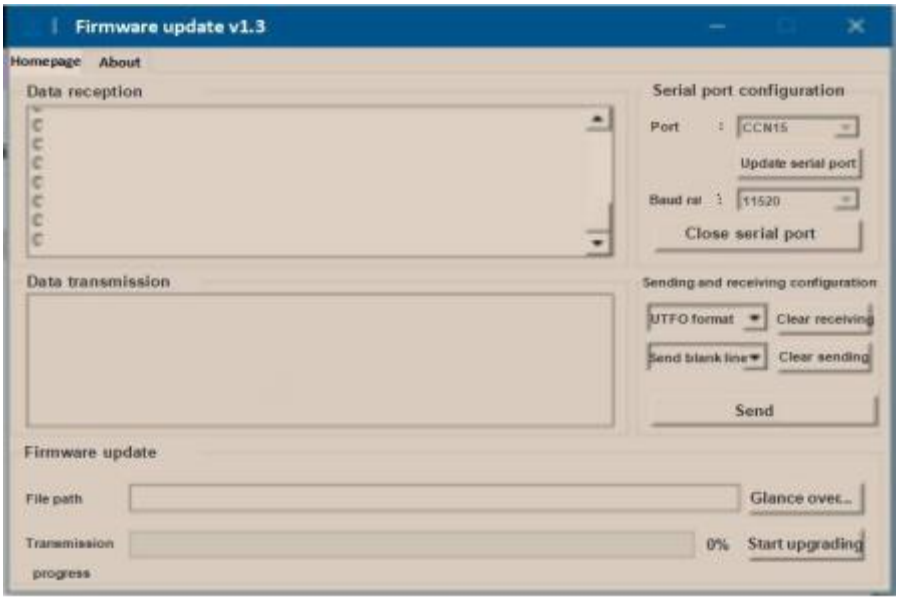


Figure 2-3 Firmware Upgrade Software Interface

5) Select the firmware upgrade package, click the "Start Upgrade" button, and the upgrade progress bar will be displayed on the host computer and the device at the same time after the device enters the normal upgrade interface, as shown in Figure 3-4 below. After the upgrade is completed, the device will automatically restart, if the host computer upgrade software prompts "File sent failed!" ", reboot the device into the firmware

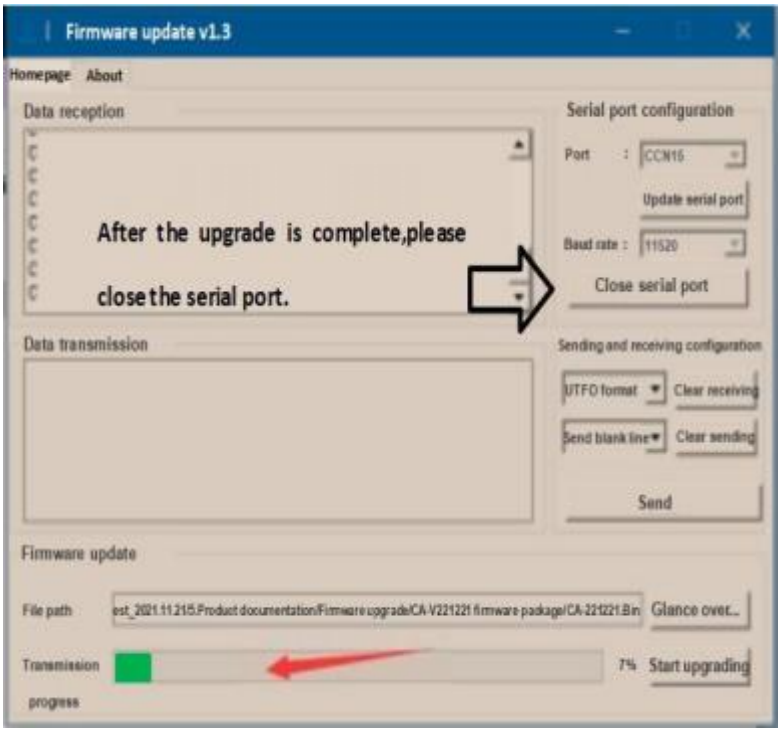


Figure 2-4 The host computer firmware normal upgrade interface

upgrade interface, as shown in Figure 3-5.

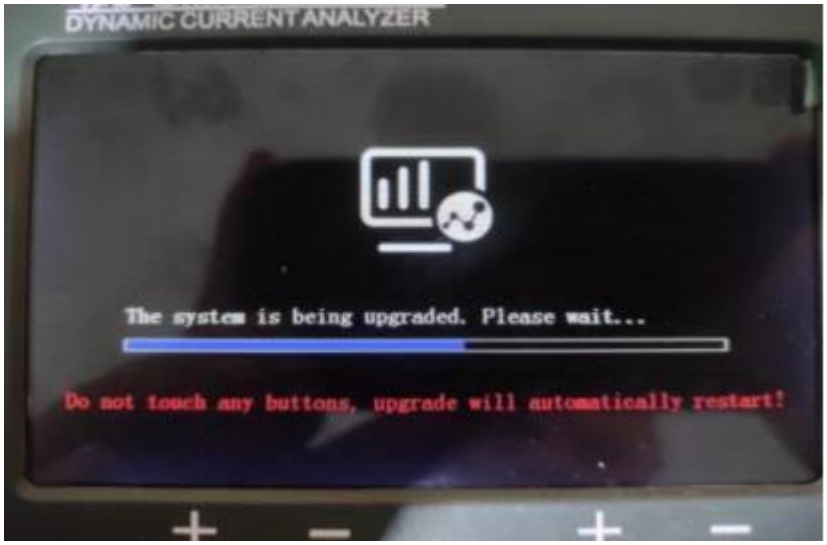


Figure 2-5 The firmware of the lower computer is upgraded normally

2.2. STORAGE FUNCTIONS AND PRECAUTIONS (CA-330 SERIES ONLY)

2.2.1. Storage Functions (CA-330 Series Only)

Select the "Data Storage" icon in the menu interface as shown in Figure 3-6 below, and press F3 (OK) to enter the SD card file management interface as shown in Figure 3-7 below.

Figure 2-6 Menu interface

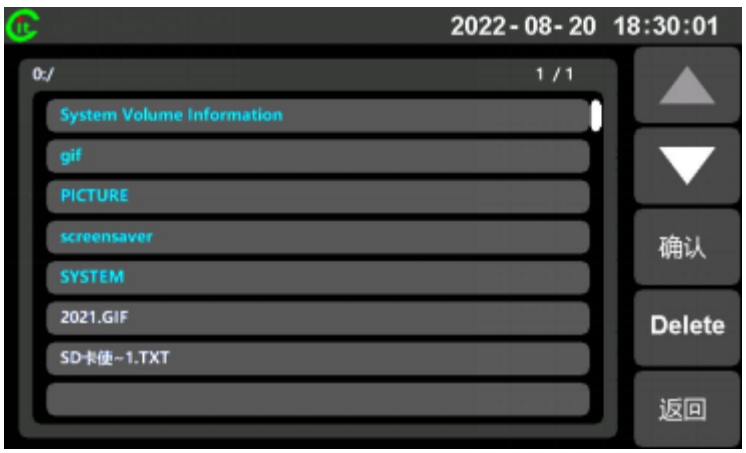


Figure 2-7 Document Management Interface

In this interface, you can browse the files in the SD card (three-level directory depth), view pictures (BMP, JPG and GIF), and view TXT files; File deletion and other operations; The key functions in this interface are shown in Table 3-1 below.

Table 2-1 Key Operation of File Management Interface

	Function
F1	Select and turn pages up
F2	Bottom selection and page turning
F3	Confirm the operation, for example, select a folder to enter the lower level directory, select a file to view the picture, etc. In the ready to delete status, short press to delete the file.
F4	Long press to return to the menu interface, short press to enter the ready to delete state.
F5	Return operation, return to the parent directory.
knob	In the picture viewing or TXT file viewing status, press the knob briefly to return to the file management interface

2.2.2. Precautions (CA-330 Series Only)

Devices equipped with SD cards can perform functions such as data storage and playback, firmware upgrades via SD cards, and more. The files on the SD card are shown in Figure 3-6 below:

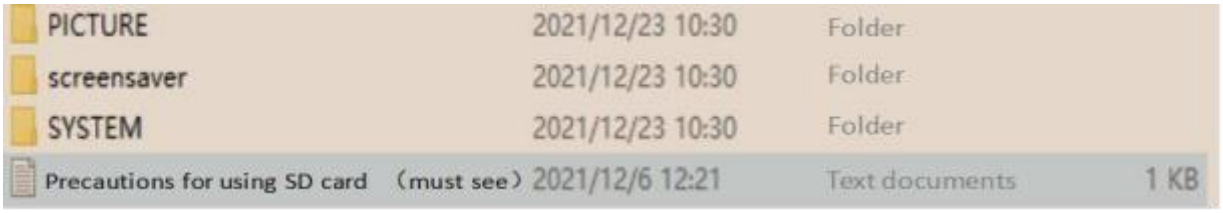


Figure 2-8 Files in the SD card

After opening the SD card, please read "Precautions for Using SD Card (Must See)" first, and the remaining folders are introduced as follows:

- PICTURE(Readable and writable)： A picture of the screenshot placed in this folder, and the file name is named after the year, month, day, minute, and second.
- screensaver(Not writable)：In this folder, the static screensaver picture, picture format JPG, BMP (24-bit), picture pixel size: 800 * 480; it is forbidden to change any content in this folder, otherwise the system cannot verify the pass.
- SYSTEM（Not writable）：SD card version of the device's system files, disable changes to the contents of this folder, otherwise the system can not verify passed!

©2022 www.chipment.com

3. AT command

3.1. AT COMMAND SUMMARY

Table 3-1 AT Command Summary

Command	Format
AT	AT Function test instruction
AT+NAME?	Equipment name and version number acquisition instruction
AT+CURR?	Real time current value acquisition
AT+TEST ON?	Start measuring
AT+TEST OFF?	Stop measuring
AT+TEST LOW?	Adjust to low refresh rate
AT+TEST HIGH?	Adjust to high refresh rate
AT+TEST ENERGY ON?	Enable energy consumption statistics
AT+TEST ENERGY OFF?	Close energy consumption statistics
AT+TEST ENERGY VALUE?	Read energy consumption statistics
AT+TEST ELECTRIC ON?	Turn on electricity statistics
AT+TEST ELECTRIC OFF?	Turn off electricity statistics
AT+TEST ELECTRIC VALUE?	Read power statistics
AT+CURR ON?	Current test ON
AT+CURR OFF?	Current test off
AT+CURR AUTO ON?	Automatic opening of current waveform
AT+CURR AUTO OFF?	Automatic closing of current waveform
AT+CURR VZ=	Vertical axis setting
AT+CURR HZ=	Horizontal axis setting
AT+CURR PAGE=	Page turning of current waveform interface
AT+CURR dB=	Linear logarithmic axis switching
AT+CURR MKR=	Set MKR point on or off

©2022 www.chipment.com

AT+CURR MKR1=	Set the position of MKR1
AT+CURR MKR2=	Set the position of MKR2
AT+CURR SOFTTEST?	Read current waveform data
AT+SET LIGHT=	Set screen brightness
AT+SET TIME=	Time setting
AT+SET DATE=	Date Setting
AT+SET SLEEP=	Sleep Settings
AT+SET CLOSE=	Automatic shutdown setting
AT+CAIL_DATA?	Calibration parameter query

3.2. INTRODUCTION TO SOME AT COMMANDS

3.2.1. AT+CURR VZ=

Function: longitudinal axis setting of current waveform interface

Format: AT+CURR VZ=<parameter>

Example: AT+CURR VZ=1, input parameters are shown in Table 4-1 below.

Table 3-2 Vertical Axis Setting Parameters

Parameter	Vertical axis scale
0	400mA/div
1	200mA/div
2	100mA/div
3	50mA/div
4	20mA/div
5	10mA/div
6	5mA/div
7	2mA/div
8	1mA/div
9	500uA/div
A	200uA/div
B	100uA/div
C	50uA/div
D	20uA/div
E	10uA/div

©2022 www.chipment.com

F	5uA/div
G	2uA/div
H	1uA/div

3.2.2. AT+CURR HZ=

Function: horizontal axis setting of current waveform interface

Format: AT+CURR HZ=<parameter>

Example: AT+CURR HZ=1, input parameters are shown in Table 4-2 below.

Table 3-3 Horizontal axis setting parameter table

Parameter	Horizontal axis scale
0	10ms/div
1	20ms/div
2	50ms/div
3	100ms/div
4	200ms/div
5	500ms/div
6	1s/div

3.2.3. AT+CURR PAGE=

Function: page turning setting of current waveform interface

Format: AT+CURR PAGE=<Parameter>

Example: AT+CURR PAGE=1, input parameters are shown in Table 4-3 below.

Table 3-4 Current interface page setting parameter table

Parameter	Page
0	First Page Menu
1	Page 2 Menu

3.2.4. AT+CURR dB=

Function: setting the number axis on the current waveform interface

Format: AT+CURR dB=<parameter>

Example: AT+CURR dB=1, input parameters are shown in Table 4-4 below.

Table 3-5 Parameter table of current interface for data axis setting

Parameter	vertical axis form
0	linear axis
1	pair of number axes

3.2.5. AT+CURR MKR=

Function: MKR state setting of current waveform interface

Format: AT+CURR MKR=<parameter>

Example: AT+CURR MKR=1, the input parameters are as follows.

©2022 www.chipment.com

Table 3-6 Current Interface MKR Status Setting Parameters

Parameter	MKR Status
0	OFF
1	NO

3.2.6. AT+CURR MKR1=

Function: MKR1 position setting of current waveform interface

Format: AT+CURR MKR1=<parameter>

Example: AT+CURR MKR1=1, input parameter range: 0-639.

3.2.7. AT+CURR MKR2=

Function: MKR2 position setting of current waveform interface

Format: AT+CURR MKR2=<parameter>

Example: AT+CURR MKR2=1, input parameter range: 0-639.

3.2.8. AT+CURR SOFTTEST?

Function: Read the current waveform data on the current waveform interface (2568 bytes and 642 32-bit data are uploaded at a time.)

Format:<Horizontal axis parameter><Vertical axis parameter><Waveform data>.....<Waveform data>

Example: AT+CURR SOFTWARE?.

3.2.9. AT+SET LIGHT=

Function: screen brightness setting

Format: AT+SET LIGHT=<Parameter>

Example: AT+SET LIGHT=30, input parameter range: 15-99.

3.2.10. AT+SET TIME=

Function: time setting

Format: AT+SET TIME=<hour>.<minute>.<second>

Example: AT+SET TIME=19.18.35

3.2.11. AT+SET DATE=

Function: date setting

Format: AT+SET DATE=<Year>.<Month>.<Day>.<Week>

Example: AT+SET DATE=2022.07.06.3

3.2.12. AT+SET SLEEP=

Function: Sleep setting

Format: AT+SET SLEEP=<minute>

Example: AT+SET SLEEP=20, range 1-99.

3.2.13. AT+SET CLOSE=

Function: Automatic shutdown setting

Format: AT+SET CLOSE=<minute>

Example: AT+SET CLOSE=20, the range is 1-99.

©2022 www.chipment.com

4. Typical applications

- **Design and validation of IoT and mobile devices**
  - ØLow power IoT devices(Bluetooth、NB-IOT，LoRa，ZigBee ）
  - ØSmartphones, tablets and other mobile devices (WiFi、LTE、5G)
  - ØWearable devices (Watches, glasses, wristbands)
  - ØEnergy harvesting (ICs, sensors, actuators)
- **Product verification of medical and healthcare equipment and automobiles**
  - ØMedical/healthcare equipment (sensors, pacemakers, vital signs monitoring equipment, etc.)
  - ØAutomotive (ECUs, sensors, drivers)
- **Measure semiconductor device characteristics**
  - ØNon-volatile memory (NVM) devices such as RAM (resistive RAM), PCM (phase change memory), MRAM (magnetoresistive RAM) and various new NVM devices
- **Chip and component operating characteristics**
  - ØMCU、SoC、FPGA、CPLD、PLC etc
  - ØLow voltage IC and universal sensor
  - ØCircuit module, FET, PMU

©2022 www.chipment.com

5. Appendix

Appendix I Accessories and Options

Table 5-1 Appendix I Accessories and Options

	Description	Order number
Model	CA-320 (15V-1uA)	CA-320
	CA-320PRO (15V-0.1uA)	CA-320PRO
	CA-330 (18V-1uA)	CA-330
	CA-330PRO (18V-0.1uA)	CA-330PRO
Standard accessory	One set of power adapters	——
	Two pairs of test power cables	——
Optional accessory	Multifunction power supply test line	CA-MULTLINE
	Banana plug to USB power cord	CA-USBLINE
	16G high-speed SD card (only available for CA-330 series)	CA-SDCARD

5.1. APPENDIX II WARRANTY SUMMARY

Beijing Core Tonghui Technology Co., Ltd. promises that its products do not have any material and process defects during the warranty period, if during the warranty period, the product is proved to be defective, Beijing Core Tonghui will provide users with free repair and replacement.

In addition to the warranties provided in this summary or other applicable warranty cards, Beijing Core Tonghui does not provide any other express or implied warranties, including but not limited to any implied warranties regarding the marketability and special use of the products. In any case, Beijing Core Tonghui does not assume any liability for indirect, special or consequential losses.

©2022 www.chipment.com

For more product information about Beijing Core Tonghui, please scan the QR code below with your mobile phone Taobao.

This information is subject to change without notice

©2022 www.chipment.com