# *FNIRSI FNB48 Voltmeter Ammeter Current Quick Recharging Tester Protocol Tool PD Trigger Ammeter USB Tester QC4 PD3.0 2.0 PPS Capacity Test*

This tool is an multifunction protocol capacity test tool, it integrated USB-A, Micro-USB, type-C interface, with 1.77 inch high definition display screen, using external 16-bit ADC, PD protocol physical chip, which can real-time monitoring of the voltage, current, power, capacity, recharging protocol, curve waveform and so on, come on and try it, it will not let you down.

Features:
Five-bit or six-bit display can be switched by one button , with the maximum resolution of 0.00001, which can real time monitoring of the subtle changes in voltage, current and power during recharging.
This product uses USB3.0 interface, 9 pin design, downward compatible with USB2.0,+ times the transmission rate of USB2.0.There is no need to use the primary data cable, it can also directly test the recharger agreement of some mobile phones.
It is in small size, so you can take it with you to anywhere you want to use it, or you can take it and share it with your friends.
This product can record 10 sets of measurement data, you can use the data you get to calculate the capacity of battery.
This product directly add the calculate formula on this product, the result multiply 1000 to get the capacity of battery.
This product support read the data of E-Marker and DASH cable, and the chips of e-marker and DASH cables can be easily read after connecting the data lines.
This product support screen flip function, through the gravity-induction, the screen can be free to flip, you can also turn off gravity-direction recognition and flip the screen by long pressing the middle key.
This product uses differential pressure method to measure cable resistance. It is used with constant current load to easily detect cable resistance.

Specifications:
Material: ABS
Monitor voltage: 4~24V
Monitor voltage resolution: 0.00001V
Monitor voltage accuracy: ±（0.2%+2）

Monitor current: 0~6.5A
Monitor current resolution: 0.00001A
Monitor current accuracy: ±（0.5%+2）
Monitor power: 0~156W
Monitor current resolution: 0.00001W
Monitor current accuracy: ±（0.5%+2）
Load equivalent international resistance: 0~9999.9Ω
Load equivalent international resistance resolution: 0.0001Ω

Load equivalent international resistance accuracy: ±（0.5%+2）
Capacity: 0~9999.99Ah
Energy used: 0~9999.99Wh
Cable resistance: 0~9999.99Ω
D+/D- voltage: 0~3.3V
D+/D- voltage resolution: 0.001V
D+/D- voltage accuracy: ±（1.0%+2）
Equipment temperature: ℃/℉

# FNB48 Multifunctional fast charging protocol detector

Integrated USB-A, Micro-USB, Type-C interface, with 1.77-inch high-definition display, using external 16-bit ADC, PD protocol physical chip, real-time monitoring of voltage, current, power, power, capacity, charging protocol during charging , Curve aveform, etc.
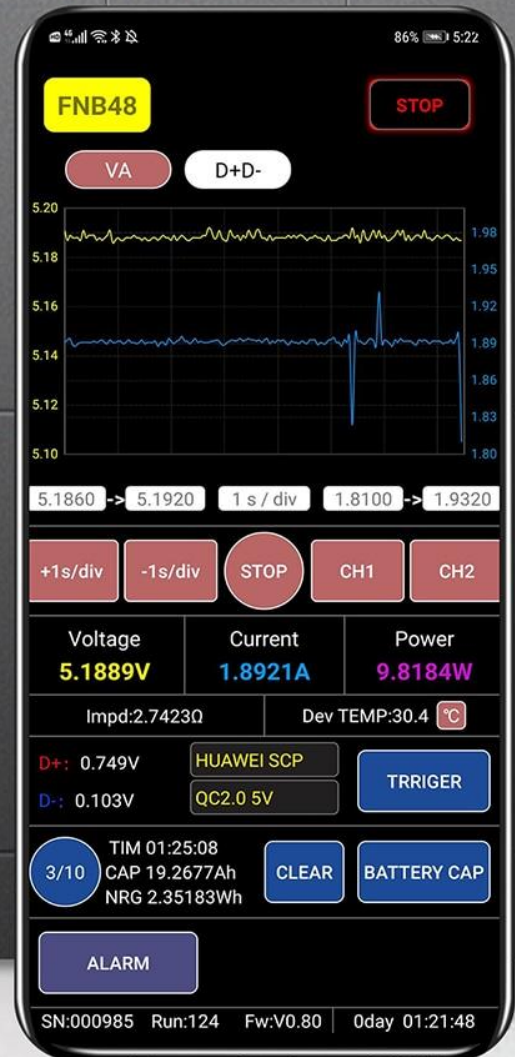
# Bluetooth APP For Android

By connecting to the Bluetooth APP,Real-time view of voltage, current, curve,Protocol control .View 10 groups of capacity statistics group and capacity calculation,At the same time, overvoltage and overcurrent alarms can be set in the APP.

APP interface supports multiple languages: русский，Chinese, English, 한국어, にほんご, Português, Deutsche, Español, français

The APP download link is at the top of this detail page

**FNB48**   **STOP**

VA   D+D-

5.20 / 1.98
5.18 / 1.95
5.16 / 1.92
5.14 / 1.89
5.12 / 1.86
5.10 / 1.83 / 1.80

5.1860 -> 5.1920 | 1 s / div | 1.8100 -> 1.9320

+1s/div | -1s/div | STOP | CH1 | CH2

| Voltage | Current | Power |
| --- | --- | --- |
| 5.1889V | 1.8921A | 9.8184W |

Impd:2.7423Ω | Dev TEMP:30.4 ℃

D+: 0.749V | HUAWEI SCP
D-: 0.103V | QC2.0 5V | TRRIGER

3/10 | TIM 01:25:08 CAP 19.2677Ah NRG 2.35183Wh | CLEAR | BATTERY CAP

ALARM

SN:000985 | Run:124 | Fw:V0.80 | 0day 01:21:48

F N I R S I

# Technical index

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Accuracy：±（a%（%）Reading + Number）

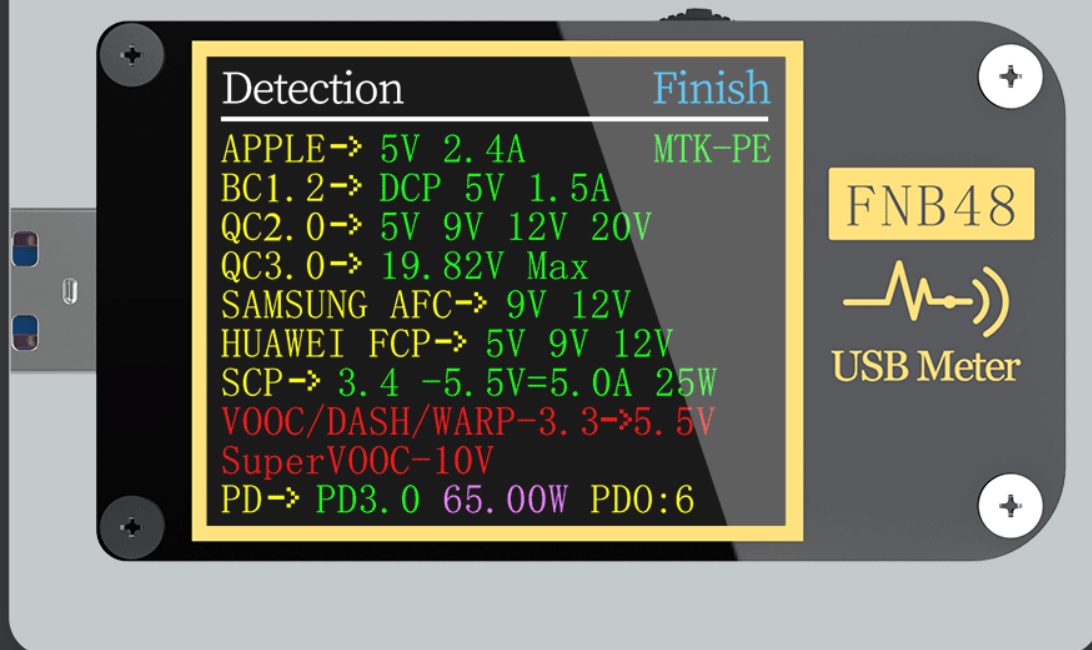| Index | Range | Resolution | Accuracy |
|---|---|---|---|
| Monitor voltage | 4~24V | 0.00001V | ±（0.2%+2） |
| Monitor current | 0~6.5A | 0.00001A | ±（0.5%+2） |
| Monitor power | 0~156W | 0.00001W | ±（0.5%+2） |
| Load equivalent internal resistance | 0~9999.9Ω | 0.0001Ω | ±（0.5%+2） |
| D+/D- voltage | 0~3.3V | 0.001V | ±（1.0%+2） |
| Equipment temperature | ℃ | 1℃ | ±（1.2%+3） |
| | ℉ | 1℉ | ±（1.2%+4） |
| Capacity | 0~9999.99Ah | 0.00001Ah | |
| Energy used | 0~9999.99Wh | 0.00001Wh | |
| Cable resistance | 0~9999.9Ω | 0.0001Ω | |
| Operation hours | 99 days 23 hours 59 minutes 59 seconds | 1秒 | |
| Record time | 999 hours, 59 minutes and 59 seconds | 1秒 | |

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# Protocol detection triggers the upgrade,Wider application areas

## Protocol detection:

APPLE 2.4A, QC2.0, QC3.0, PD, Samsung AFC, Huawei FCP,

Huawei SCP, VOOC/WARP, SuperVOOC, MTK-PE

Detection                    Finish

APPLE-> 5V 2.4A              MTK-PE
BC1.2-> DCP 5V 1.5A
QC2.0-> 5V 9V 12V 20V
QC3.0-> 19.82V Max
SAMSUNG AFC-> 9V 12V
HUAWEI FCP-> 5V 9V 12V
SCP-> 3.4 -5.5V=5.0A 25W
VOOC/DASH/WARP-3.3->5.5V
SuperVOOC-10V
PD-> PD3.0 65.00W PDO:6

FNB48

USB Meter

# Protocol trigger:

QC2.0, QC3.0, Huawei FCP, Huawei SCP, Samsung AFC, PD trigger, VOOC/WARP, SVOOC

## Trigger and Detection

[01] Protocol detection
[02] Qualcomm QC 2.0
[03] Qualcomm QC 3.0
[04] HUAWEI    FCP
[05] HUAWEI    SCP
[06] SAMSUNG   AFC
[07] PD Trigger

FNB48

USB Meter

## Trigger and Detection

[05] HUAWEI   SCP
[06] SAMSUNG AFC
[07] PD Trigger
[08] PD Convert
[09] VOOC/WARP 5V
[10] SVOOC 1.0 10V 5A
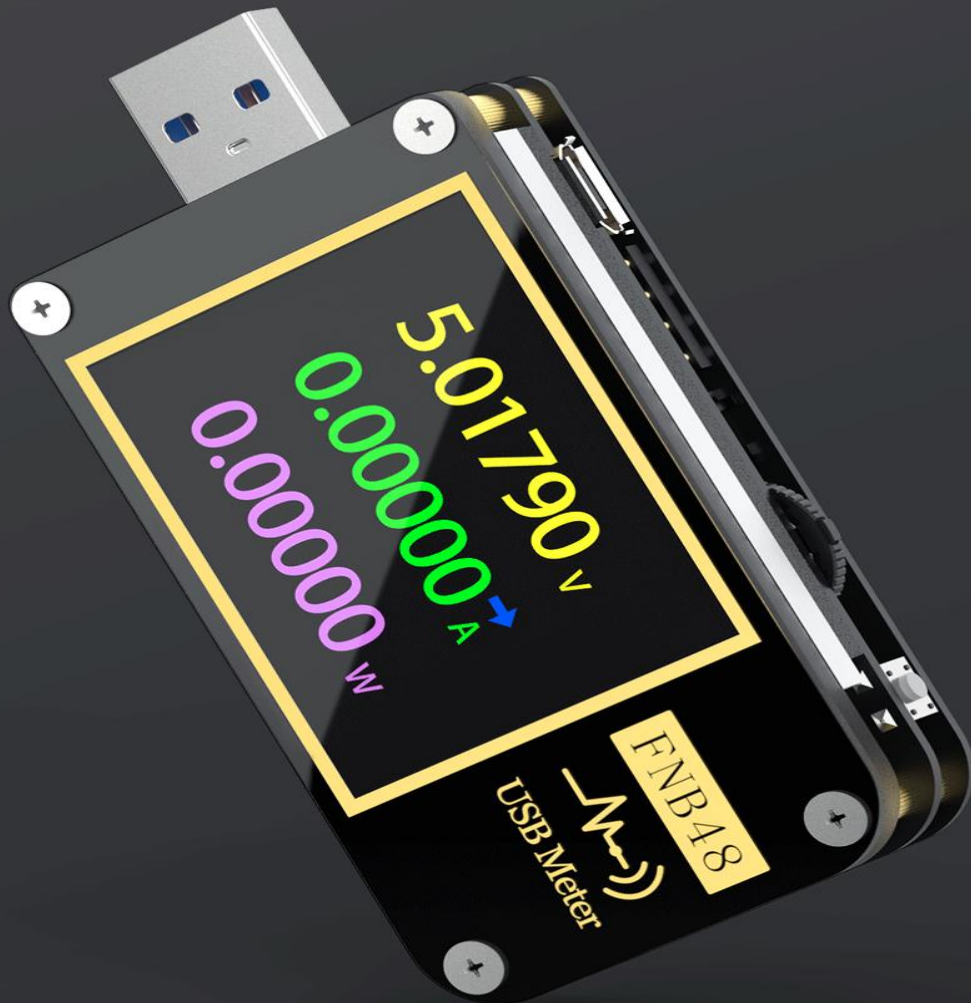[11] SVOOC 2.0 10V 6. 5A

FNB48

USB Meter

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# 6-digit display high precision

5-digit/6-digit display with one-key switching, maximum resolution 0.00001, real-time monitoring of subtle changes in voltage,current and power during charging.It can also detect the weak current when the original Apple data cable is no-load

5.01790 v
0.00000 A
0.00000 w

FNB48
USB Meter

F N I R S I

# The USB connector upgrade, faster transmission rate

FNB48 uses USB3.0 interface, 9-pin pin design, compatible with USB2.0, transmission rate is ten times that of USB2.0, and more energy-saving. No need to match the original data cable, you can also directly detect the charger protocol of OPPO, Huawei, OnePlus and other brands.



| ① PC | ④ TYPE-C IN | ⑦ PD COM |
| ② Function keys | ⑤ microUSB IN | ⑧ USB3.0 IN |
| ③ Function keys | ⑥ TYPE-C OUT | ⑨ USB-A OUT |

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# Multiple data records, battery capacity calculation

FNB48 can record up to 10 sets of measurement data,The measured data can be used to calculate the battery capacity

Batt Capacity Calculation

Now REC:
●Group 01: Grp 01
000:39:36
Batt Vol: 0.65482 Ah
Conv Eff: 3.28984 Wh
3.7 V (3.0 — 5.0)
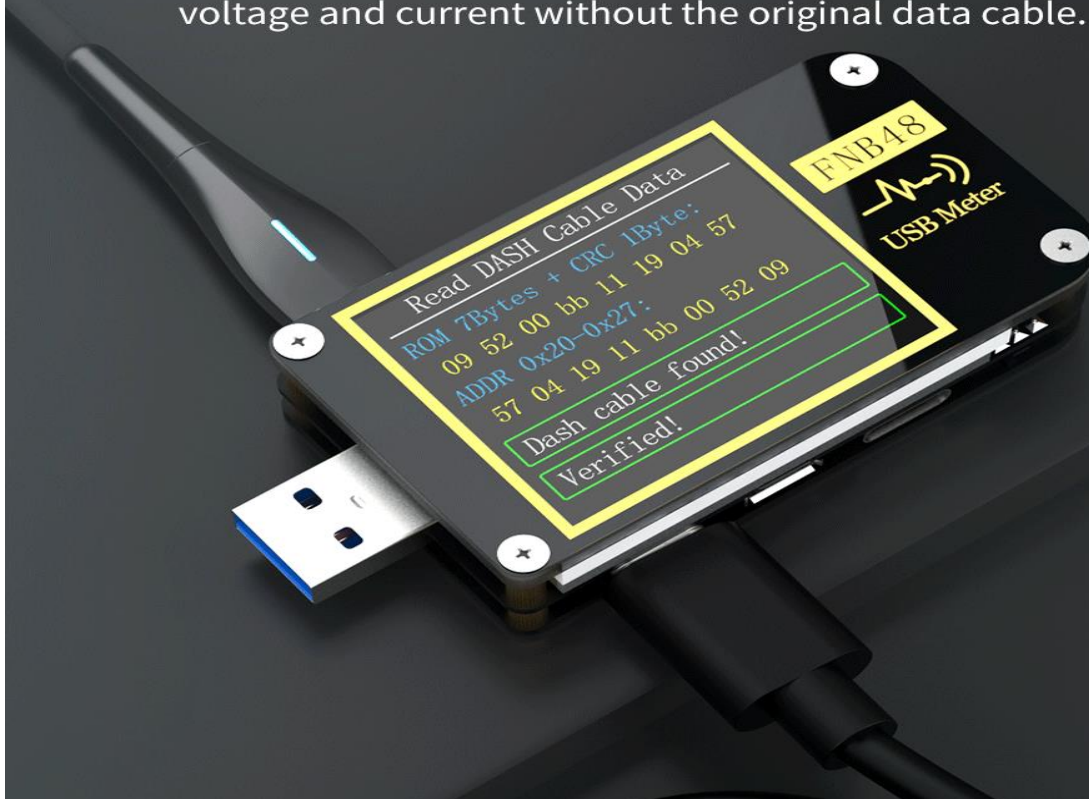Result: 90 % (80 — 100)
0.80023 Ah

FNB48
USB Meter

FNB48 directly puts the calculation formula of battery capacity on the tester,The calculation result is multiplied by 1000 to get the capacity of the battery, and the calculation is more convenient and faster.

F N I R S I

# PD E-Marker, DASH cable inspection

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FNB48 supports reading the data of E-Marker and DASH cables. After connecting the data cable, it is easy to read the chips of E-Marker and DASH cables.With analog DASH cable and Apple 2.4A acceleration function, it can directly charge and detect voltage and current without the original data cable.

FNB48

USB Meter

Read DASH Cable Data
ROM 7Bytes + CRC 1Byte:
09 52 00 bb 11 19 04 57
ADDR 0x20-0x27:
57 04 19 11 bb 00 52 09
Dash cable found!
Verified!

| PD E-Marker | |
|---|---|
| VenderID: | 0x0000 |
| Type: | Passive |
| Speed: | USB 3.2 Gen2 |
| Length: | 0-1 m |
| Max Vol: | 20V |
| Cur: | 5A |
| Hardware: | 0x0000 |
| Firmware: | 0x0000 |

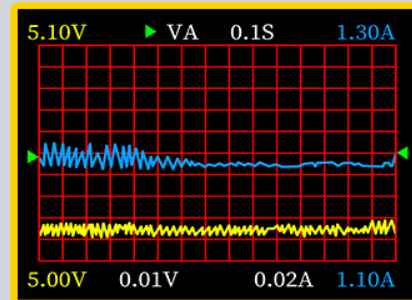| PD E-Marker | |
|---|---|
| Now CC Pin: | CC1 |
| VDM Header: | 0xFF008041 |
| ID Header: | 0x18000000 |
| Cert Stat: | 0x00000000 |
| product: | 0x00000000 |
| Cable1: | 0x00082052 |

F N I R S I

# Voltage and current curve, real-time detection of voltage and current
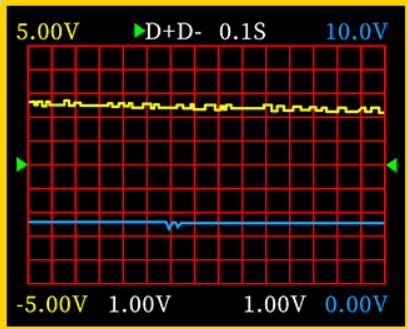
—

**1**                      Mode 1

Low-speed voltage and current curve
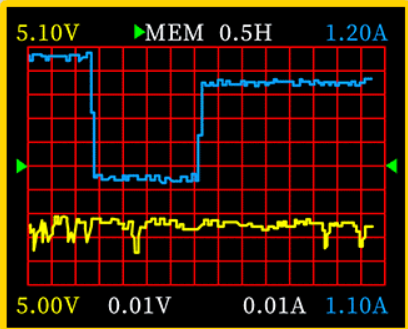
| 5.10V | ▶ VA | 0.1S | 1.30A |
|---|---|---|---|
| 5.00V | 0.01V | 0.02A | 1.10A |

**2**                      Mode 2

## Low speed D+D-curve

| 5.00V | ▶D+D- 0.1S | 10.0V |
| --- | --- | --- |
| -5.00V | 1.00V | 1.00V | 0.00V |

**3**        Mode 3

## Record offline curve

| 5.10V | ▶MEM 0.5H | 1.20A |
| --- | --- | --- |
| 5.00V | 0.01V | 0.01A | 1.10A |

**4**        Mode 4

## High-speed voltage ripple (AC coupling)

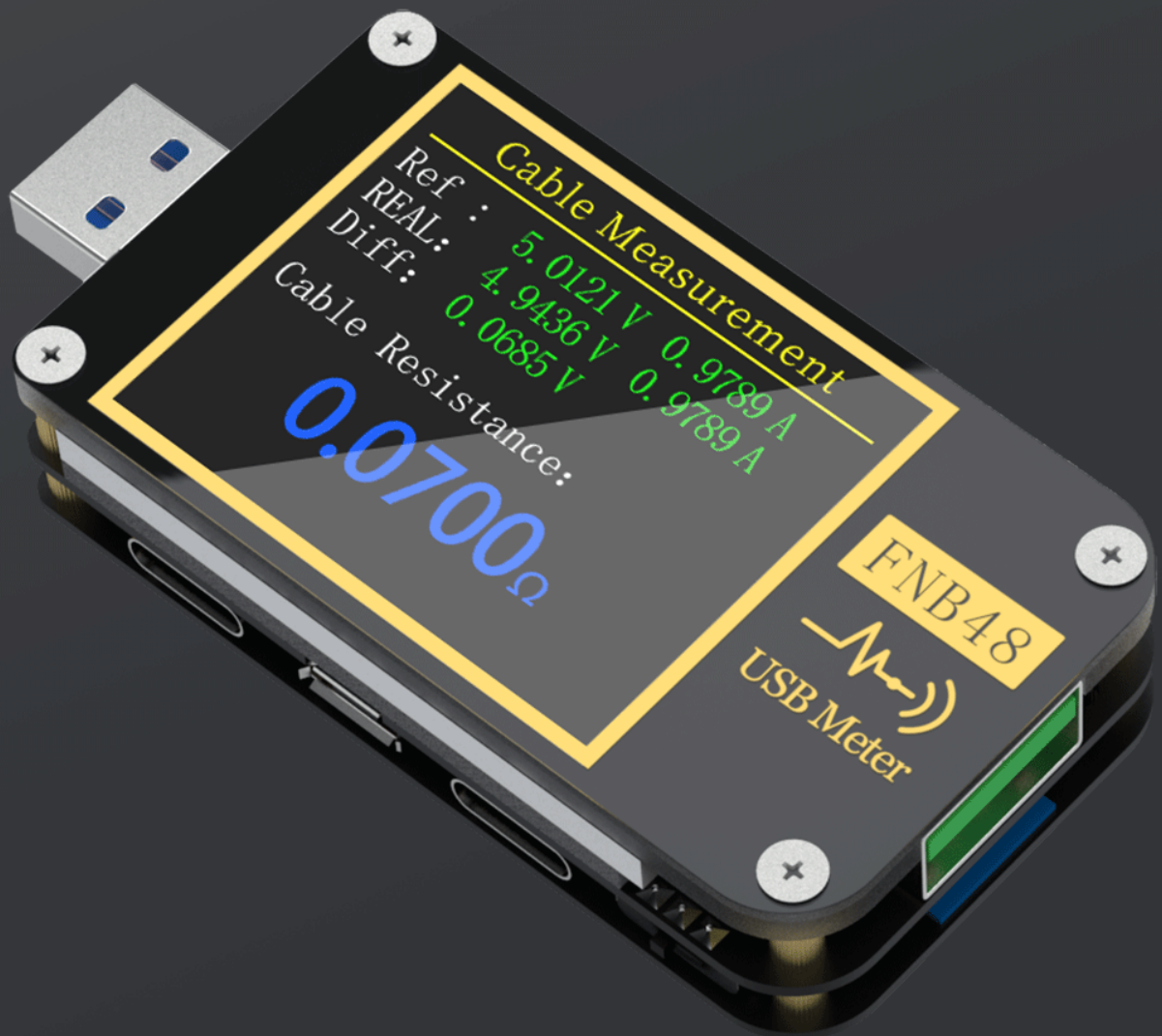| +0.05V | ▶15.62KHz | 5.0234V |
| --- | --- | --- |
| -0.05V | ↕3.1uS/div | 36.0mV |
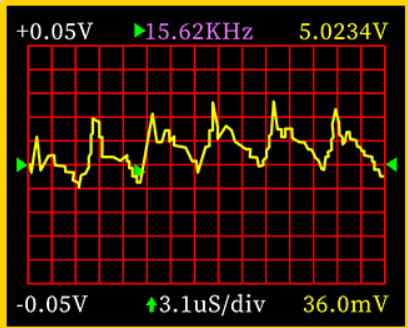
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# Cable resistance detection

FNB48 uses the differential pressure method to measure the internal resistance of the cable,Use with constant current load, Easily detect the internal resistance of the cable.

Cable Measurement

Ref :  5. 0121 V  0. 9789 A
REAL: 4. 9436 V  0. 9789 A
Diff: 0. 0685 V

Cable Resistance:

0.0700Ω

FNB48
USB Meter

F N I R S I

# Gravity sensing screen automatically flips

FNB48 upgraded the screen flip function,Through gravity sensing,The screen can be flipped freely;You can also turn off the gravity direction recognition,Long press the middle button to realize the screen flip.

In any interface, by long pressing the return button, the screen can be hibernated, wake up by any operation, and charging at night will not affect sleep.
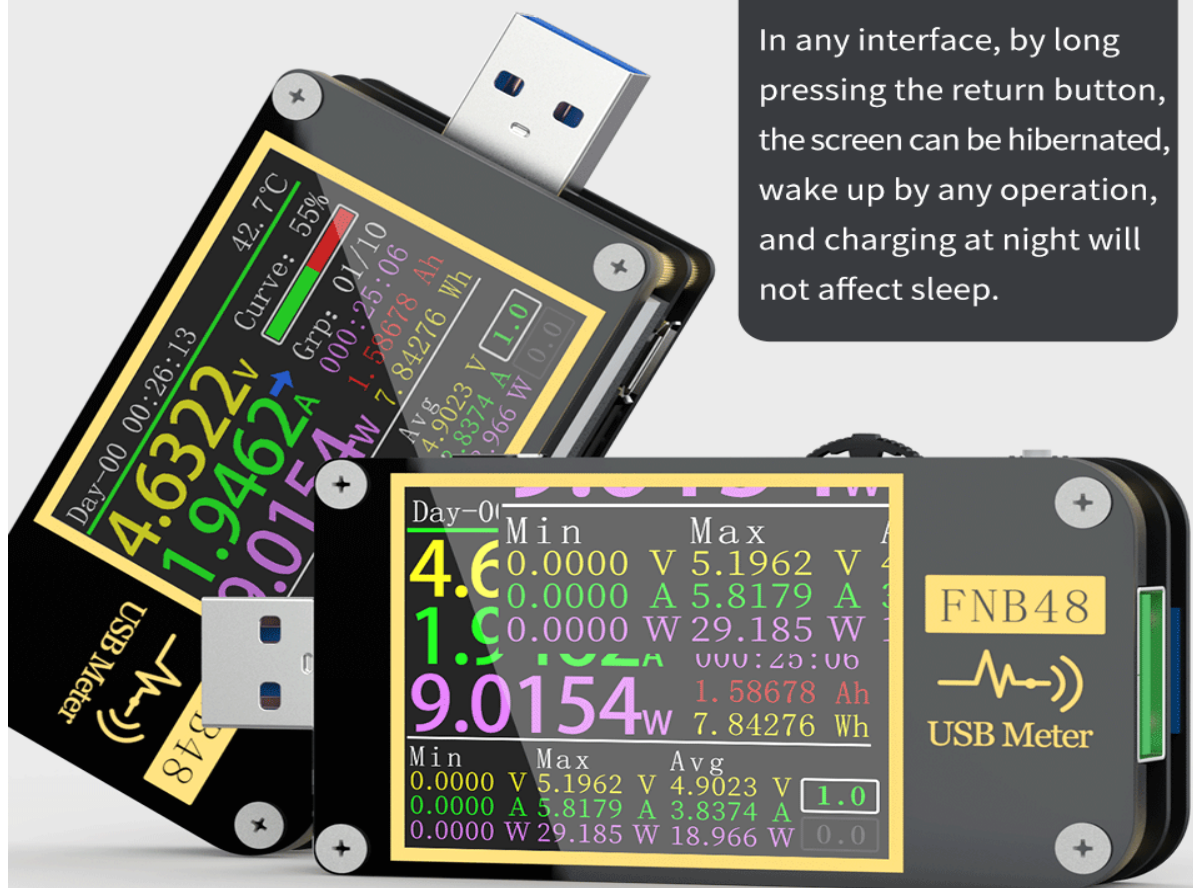
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# Protocol trigger introduction

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Qualcomm QC 2.0

**8.9704v**
D+ 3.290V
D- 0.545V

**0.0000A**
0.0000 W

[1] 5V    [2] 9V

[3] 12V   [4] 20V

### QC2.0 trigger

---

Qualcomm QC 3.0

**6.7906v**
D+ 0.594V
D- 3.021V

**0.0000A**
0.0000 W

−200mV    +200mV

Now 06800mV

### QC3.0 trigger

---

HUAWEI FCP

**8.9549v**
D+ 0.596V
D- 0.004V

**0.0001A**
0.0012 W

[1] 5V

[2] 9V

### Huawei FCP trigger

---

HUAWEI SCP

**5.0811v**
D+ 0.594V
D- 0.004V

**0.0001A**
0.0000 W

−25mV    +25mV

Now 05000mV

3.4−5.5V ⎓ 5.0A    18W

### Huawei SCP trigger

## SAMSUNG AFC

| | D+ 0.594V |
|---|---|
| 8.9550v | D− 0.004V |
| 0.0000A | 0.0000 W |

[1] 9V    [2] 12V

**Samsung AFC trigger**

---

## PD3.0 65.00W

| | D+ 2.677V |
|---|---|
| 9.8539v | D− 2.677V |
| 0.0000A | 0.0000 W |

| Gear | 1 | 5.00V 3.00A |
|---|---|---|
| 20 | 2 | 9.00V 3.00A |
| 100 | 3 | 12.00V 3.00A |
| ● 1000 | 4 | 15.00V 3.00A |
| (mV) | 5 | 20.00V 3.25A |
| Target | 6 | 3.30−21.00V 3.25A |
| 10.00V | | |

**PD protocol trigger**

---

## PD Convert

| | D+ 0.594V |
|---|---|
| 5.0172v | D− 0.001V |
| 0.0000A | 0.0000 W |

| 1 | 5V | 2.00A |
|---|---|---|
| 2 | 9V | 1.11A |
| 3 | 12V | 0.83A |
| 4 | 20V | 0.50A |

PD2.0 10W                Find

**PD protocol conversion**

---

## SVOOC 2.0 10V 6.5A

| | D+ 3.287V |
|---|---|
| 10.048v | D− 1.917V |
| 0.0000A | 0.0000 W |

Click BACK to return

**SVOOC trigger**

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## VOOC/WARP 5V

| | D+ 2.694V |
|---|---|
| 4.9624v | D− 2.694V |
| 0.0000A | 0.0000 W |

−10mV    +10mV

Now 05000mV

**VOOC/WARP constant voltage trigger**

74mm

34mm

61mm

12.6mm

**2**

## QC/PD Detection & Trigger

**3**

## Offline data storage

**Fnirsi**
**Technology**

# Powerful PC software
# Driver-free installation

Data management * Protocol control * Firmware upgrade
Support monitoring and recording of voltage and current curves;
Protocol single trigger and smart trigger functions

# Bluetooth APP Control

By linking the Bluetooth APP,Can view voltage, current and curve in real time, and can be controlled by agreement,View 10 sets of capacity statistics and capacity calculations,At the same time, the overvoltage current alarm can be set in the APP.

NOTE: Currently only supports Android phones; Normal version without Bluetooth function.
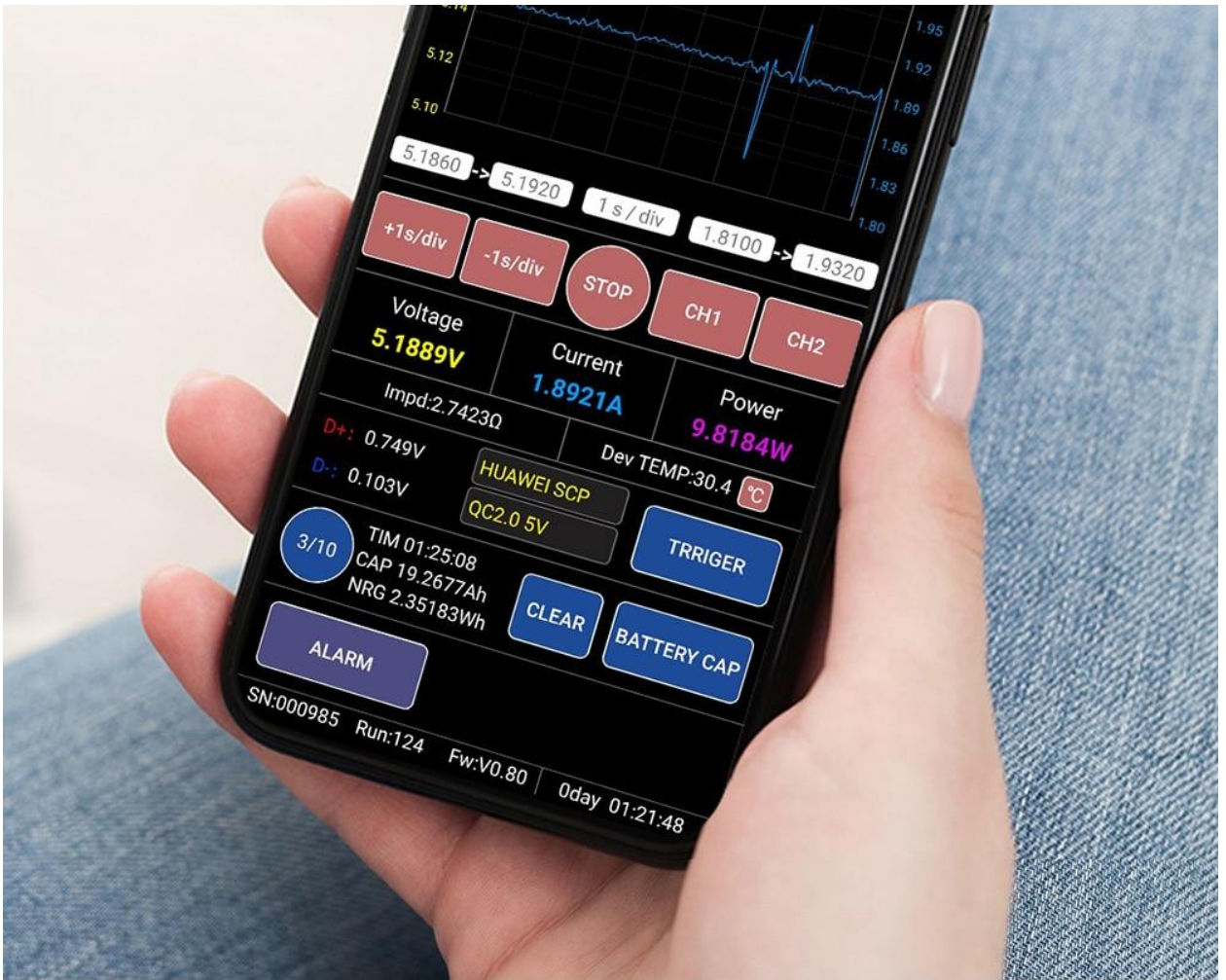
**Fnirsi Technology**

# Comprehensive functions, Meet all your needs

All mainstream protocol detection triggers,Wave curve,
Internal resistance measurement of charging cable,
Low internal resistance,Free drive PC software, etc.

**1.3-inch high-definition TFT color screen**

**Double Type-C (1 male & 1 female)**

**Two-way charging**

**Gravity sensor 360 degree screen rotation**

**On-board temperature monitoring**

**Four major mode curve detection**

**V/A/W 6-bit high-precision detection**

**6.5A high current**

**Apple 2.4A acceleration**

**Rich fast charge protocol triggers**

**PD E-Marker/DASH cable inspection**

**Cable internal resistance detection**

| | | |
|---|---|---|
| 10 sets of output capacity & energy detection statistics | Bluetooth APP | PC software |

**Fnirsi Technology**

# Technical Parameters

Accuracy: ± (a% (%) Reading + Number of words

| Index | Range | Resolution | Precisio |
|---|---|---|---|
| Monitor voltage | 4~24V | 0.00001V | ±(0.2‰+2) |
| Monitor current | 0~6.5A | 0.00001A | ±(0.5‰+2) |
| Monitor power | 0~130W | 0.00001W | ±(0.5‰+2) |
| Load equivalent internal resistance | 0~9999.9Ω | 0.0001W | ±(0.5‰+2) |
| D+/D- voltage | 0~3.3V | 0.001V | ±(1.0%+2) |

| | | | |
|---|---|---|---|
| Equipment temperature | °C | 1°C | ±(1.2%+3) |
| | °F | 1°F | ±(1.2%+4) |
| Capacity | 0～9999.99Ah | 0.00001Ah | |
| Energy used | 0～9999.99Wh | 0.00001Wh | |
| Internal resistance of the cable | 0～9999.9Ω | 0.0001Ω | |
| Equipment running time | 99days23hours 59minute59second | 1second | |
| Record time | 999hours 59minute59second | 1second | |

**Fnirsi Technology**

# Real-time monitoring of charging voltage, current and power. Multi-interface display, Multi-data measurement

FNIRSI-C1 uses an external 16-bit ADC&PD protocol physical chip,Commonly used forthe detection and monitoring of various digital devices such as various chargers, power banks, data cables, mobile phones and laptops
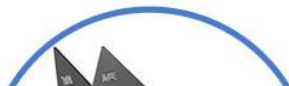
DOO 00:04:23  37.4℃
20.182 V  0.0h
1.0000 A  0.0%
80.728 W  STOP
D+/D  Protocol
+2.680V  PD MTK
-2.676V  Unknown

Fnirsi-C1

● ● ●

**Fnirsi-C1**

Charger          Data cable          Power Bank

**Fast charge
mobile phone**

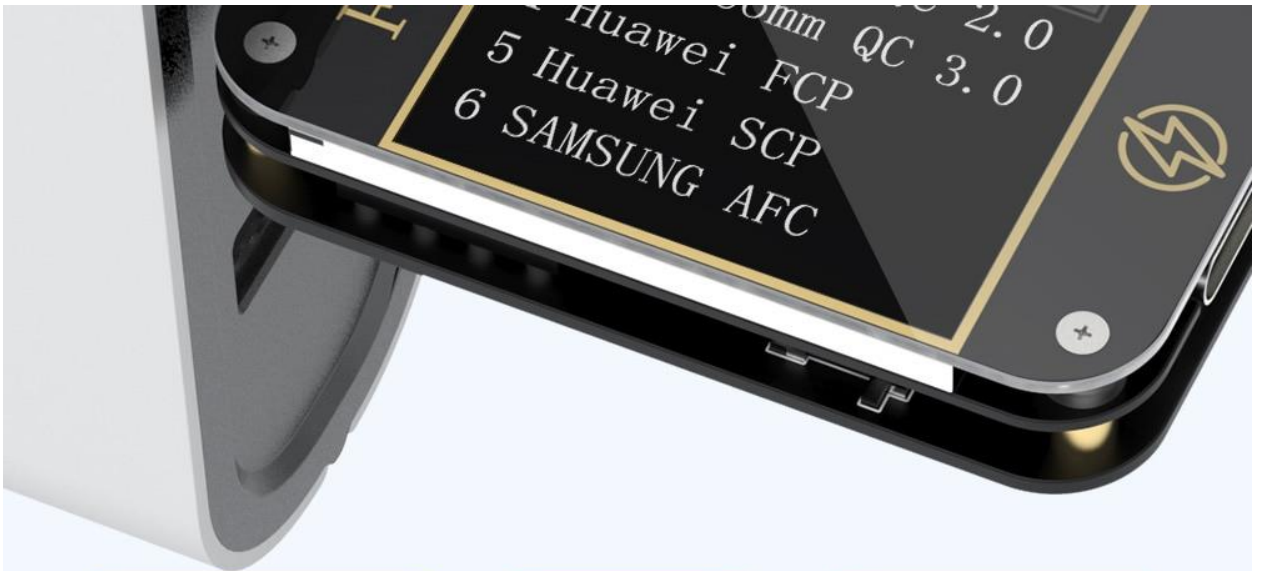**Various laptop
computers**

**Type-C digital
equipment**

# Automatic Detection/Triggering of multiplefast charging protocols

Protocol trigger: QC2.0, QC3.0, Huawei FCP, Huawei SCP, Samsung
AFC, PD protocol
Protocol detection: APPLE2.4A, PD2.0, PD3.0, QC2.0, QC3.0,Huawei
FCP, Huawei SCP, Samsung AFCMTK-PE
and other fast charging protocols

**Protocol detection in progress**

**Support the agreement**

**Does not support the protocol**

In the "Quick Charge Trigger Interface", long press the "<< key" to enter the trigger menu,Press "OK" to enter "Quick Charge Detection Trigger Menu"After entering, you can see the automatic detection of various fast charging protocols.Do not connect any load during automatic detection,To prevent damage,After the detection is completed, "Detection Complete" will be displayed in the upper right corner.

V1.0 检测完成

APPLE->5V2.4A
BC1.2->DCP 5V 1.5A
QC2.0->5V 9V 12V 20V
QC3.0->20.86V Max
SAMSUNG AFC->9V 12V
HUAWEI DCP->
NONE
HUAWEI SCP->
NONE

**Fast charge detection display diagram**

PD3.0 105.00W
20.104 V   D+2.719V
            D-2.705V
0.0163 A   0.3295W

● Gear   5.00V  3.00A
   20     9.00V  3.00A
   100   12.00V  3.00A
   1000  15.00V  3.00A
Target   20.00V  5.00A
20.00V   3.3-21.0V  5.0A

**Fast charge protocol Detection/ Trigger display diagram**

# Mainstream protocol trigger function Interface

## Meet your different needs

### Qualcomm QC 2.0

19.981 v  D+ 3.291V
           D− 3.012V
0.0162 A  0.3245W

[1]  5V       [2]  9V

[3]  12V      [4]  20V

**Qualcomm QC2.0
trigger interface**

### Qualcomm QC 3.0

19.982 v  D+ 0.597V
           D− 3.010V
0.0163 A  0.3261W

-200mV       +200mV

Now  20000mV

**Qualcomm QC3.0
trigger interface**

### HUAWEI FCP

12.100 v  D+ 0.593V
           D− 0.008V
0.0209 A  0.2536W

[1]  5V

[2]  9V

[3]  12V

### HUAWEU SCP

5.4649 v  D+ 0.593V
           D− 0.008V
0.0312 A  0.1706W

-20mV        +20mV

Now  05500mV
3.4−5.5V 5.0A  25W

SAMSUNG AFC

12.102 V   D+0.594V
            D−0.008V
0.0208 A   0.2529W

[1] 9V     [2] 12V

**Samsung AFC**
**trigger interface**

PD2.0 45.00W

15.056 V   D+2.719V
            D−2.705V
0.0154 A   0.2319W

● Gear    5.00V  3.00A
    20     9.00V  3.00A
   100    12.00V  3.00A
  1000    15.00V  3.00A
Target
15.00V

**PD2.0 trigger**
**interface**

PD3.0 105.00W

20.104 V   D+2.719V
            D−2.705V
0.0163 A   0.3295W

● Gear    5.00V  3.00A
    20     9.00V  3.00A
   100    12.00V  3.00A
  1000    15.00V  3.00A
Target    20.00V  5.00A
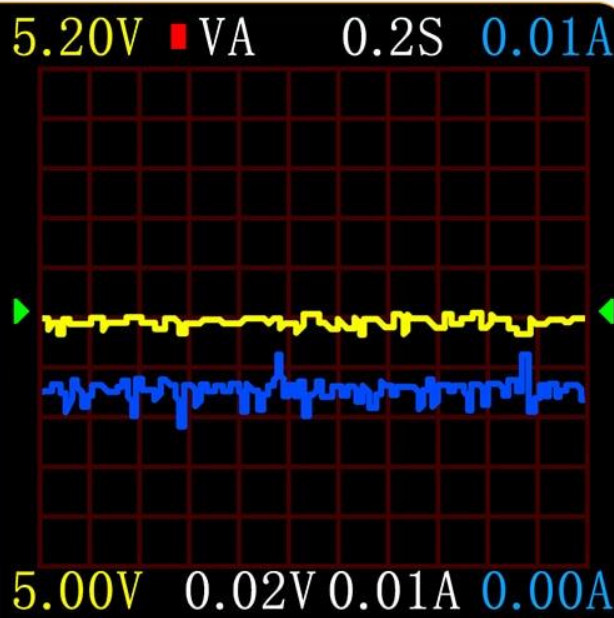20.00V    3.3−21.0V  5.0A

**PD3.0 trigger**
**interface**

# 3 large curve interface + Record offline curve

High-speed voltage ripple 5Ksps->4Msps sampling rate,Easily detect the ripple of the charging head and identify whether the charging head is good or bad.
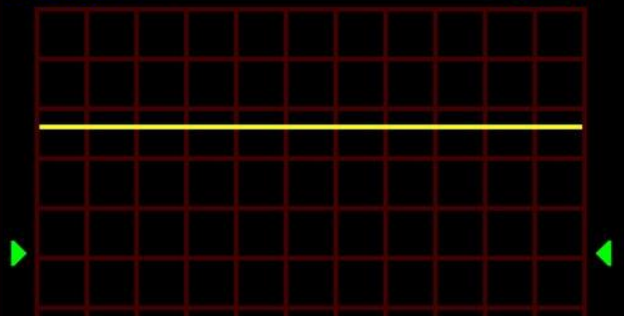
NOTE: The lower the ripple, the better the quality of the charging head and the lower the damage to the battery

**1**

## Low speed voltage and current curve

5.20V ▪VA     0.2S  0.01A

5.00V   0.02V 0.01A 0.00A

5.00V ▸D+D− 0.1S 10.0V

**2**

## Low speed D+D- curve

−5.00V 1.00V 1.00V 0.00V

**1**

## Record offline curve

9.10V ■MEM 1.0H 2.20A

9.00V 0.01V 0.01A 2.10A

+0.05V ■VOL 5.0962V

2.5uS/div
666.66KHz
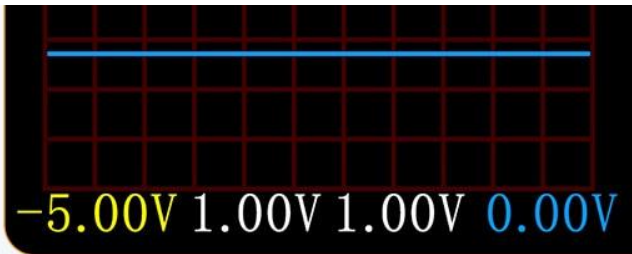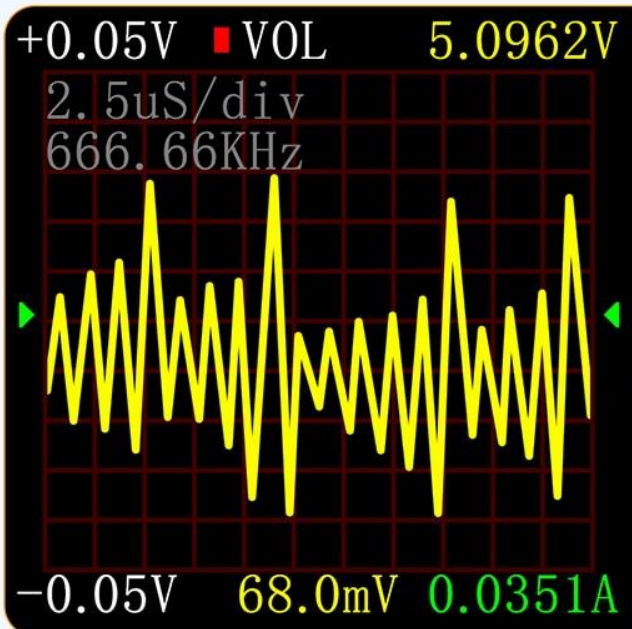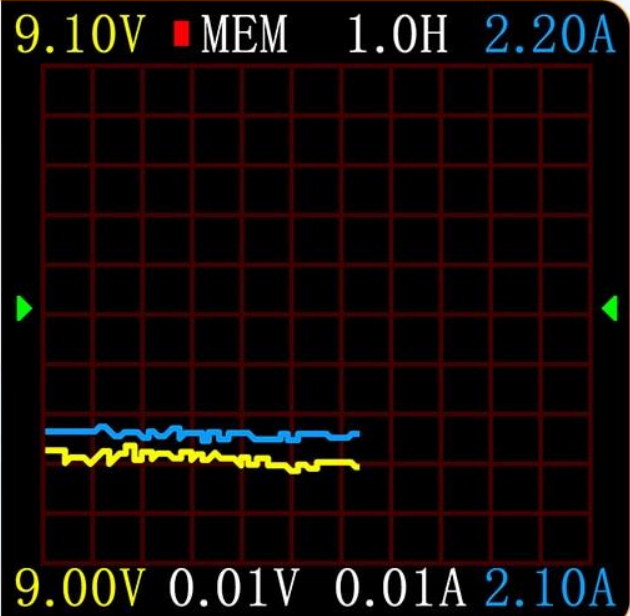
**2**

## High-speed voltage waveform (AC coupling) curve

−0.05V 68.0mV 0.0351A

# Cable internal resistance detection

Differential pressure method to measure the internal resistance of the cable,Use with constant current load,Easily test the internal resistance of the cable in two steps.

Fnirsi-C1

## Cable Measurement

Ref :5.0926V 1.0384A
Real:5.0710V 0.0000A
Didd:0.0216V

Cable Resistance:

# 9999.9Ω

**Fnirsi-C1**

①**Charger + FNIRSI-C1 + Constant current load, Record reference value**

②**Charger + Cable + FNIRSI-C1 + Constant current load,The system automatically calculates the internal resistance of the cable**

# PD E-marKer
# cable measurement

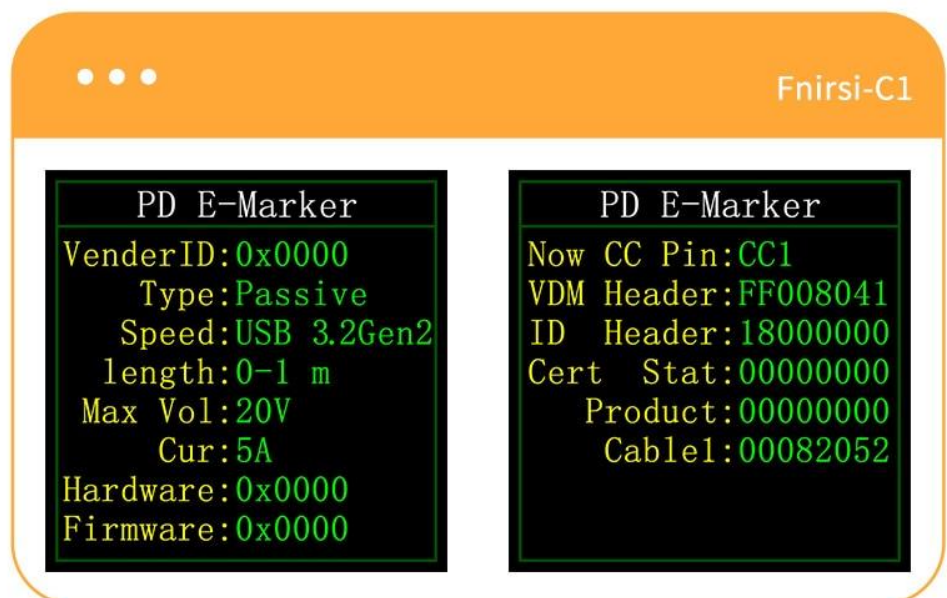Support reading E-Marker data.Connect the data cable to easily read the E-Marker chip,With Apple 2.4A acceleration function, fast charging function can be realized without original data cable,And detect voltage, current, power, etc.

Fnirsi-C1

```
PD E-Marker
VenderID:0x0000
    Type:Passive
   Speed:USB 3.2Gen2
  length:0-1 m
 Max Vol:20V
     Cur:5A
Hardware:0x0000
Firmware:0x0000
```

Fnirsi-C1

```
PD E-Marker
VenderID:0x0000
    Type:Passive
   Speed:USB 3.2Gen2
  length:0-1 m
 Max Vol:20V
     Cur:5A
Hardware:0x0000
Firmware:0x0000
```

```
PD E-Marker
Now CC Pin:CC1
VDM Header:FF008041
ID  Header:18000000
Cert  Stat:00000000
   Product:00000000
    Cable1:00082052
```

# Multiple data records
# Battery capacity detection

Power bank/battery capacity detection can record up to 10 sets of measurement data.

## Mobile power capacity calculation method

**The mobile power is fully charged and connected to the tester**

(The data is cleared to 0 first),Discharge to stop output

**Method 1:**

Mobile power capacity= FNIRSI-C1's mAH data $\times$ Output voltage $\div$ Battery voltage $\div$ Efficiency

**Method 2:**

Mobile power capacity =mWH of FNIRSI-C1 $\div$ Battery voltage $\div$ efficiency.

(Note: The general mobile power output voltage is about 5V, the battery voltage is 3.7V, and the efficiency is about 85-90%)

# Gravity sensor,The display screen can be rotated 360 degrees

Any angle can automatically sense and maintain the front reading display,
Meet various digital devices inserted at any angle can also be positive reading.

## 360 Degree automatic rotation

Fnirsi-C1
5.11849 v
1.84760 A
9.45692 w
2.77034 Ω

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Fnirsi-C1

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Fnirsi-C1
5.11849 v
1.84760 A
9.45692 w
2.77034 Ω

# Backstage menu setting interface

| GEN | REC | TRIG | SYS |
|-----|-----|------|-----|

01 Display Bright
02 Standby Bright
03 Standby Time
04 PC COM

| GEN | REC | TRIG | SYS |
|-----|-----|------|-----|

07 Auto Wake Up
08 Bluetooth
09 G-Sensor
10 Start Page

04 PC COM
05 TEMP Symbol
06 Language

**General setting
interface 1**

10 Start Page
11 Factry Reset
Whether to reset?

**General setting
interface 2**

| GEN | REC | TRIG | SYS |

01 Curve Rec time
02 Lowest REC Cur
03 Energy REC time
04 Clear Record

**Record setting
interface**

| GEN | REC | TRIG | SYS |

01 Trig Time
02 Mask PD CRC
03 Boot APPLE 2.4A

**Trigger setting
interface**

| GEN | REC | TRIG | SYS |

FNIRSi
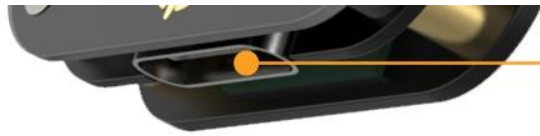
Run: 73
S N: 000016
Software: V0.1

**System message**

# 3 Function buttons
# 3 Interfaces

FNIRSI-C1 has dual TUPE-C interfaces,Saved money on a test line,Support 6.5A high current test,Long-term work is stable, performance improvement is significant.

**Tpye-C Male**

**Bluetooth switch**

*Fnirsi-C1*

**PC software interface**

**Confirm/ Return button**

**Move left/ up button**

**Right/Down Move Button**

Tpye-C Female

# Product Size

≈5cm

≈2.5cm

≈0.8cm

Fnirsi-C1

USB Voltage and Current Meter

DC 4~24V 0~6.5A

PC OK

<< >>

OFF ON
BLE

Fnirsi-C1