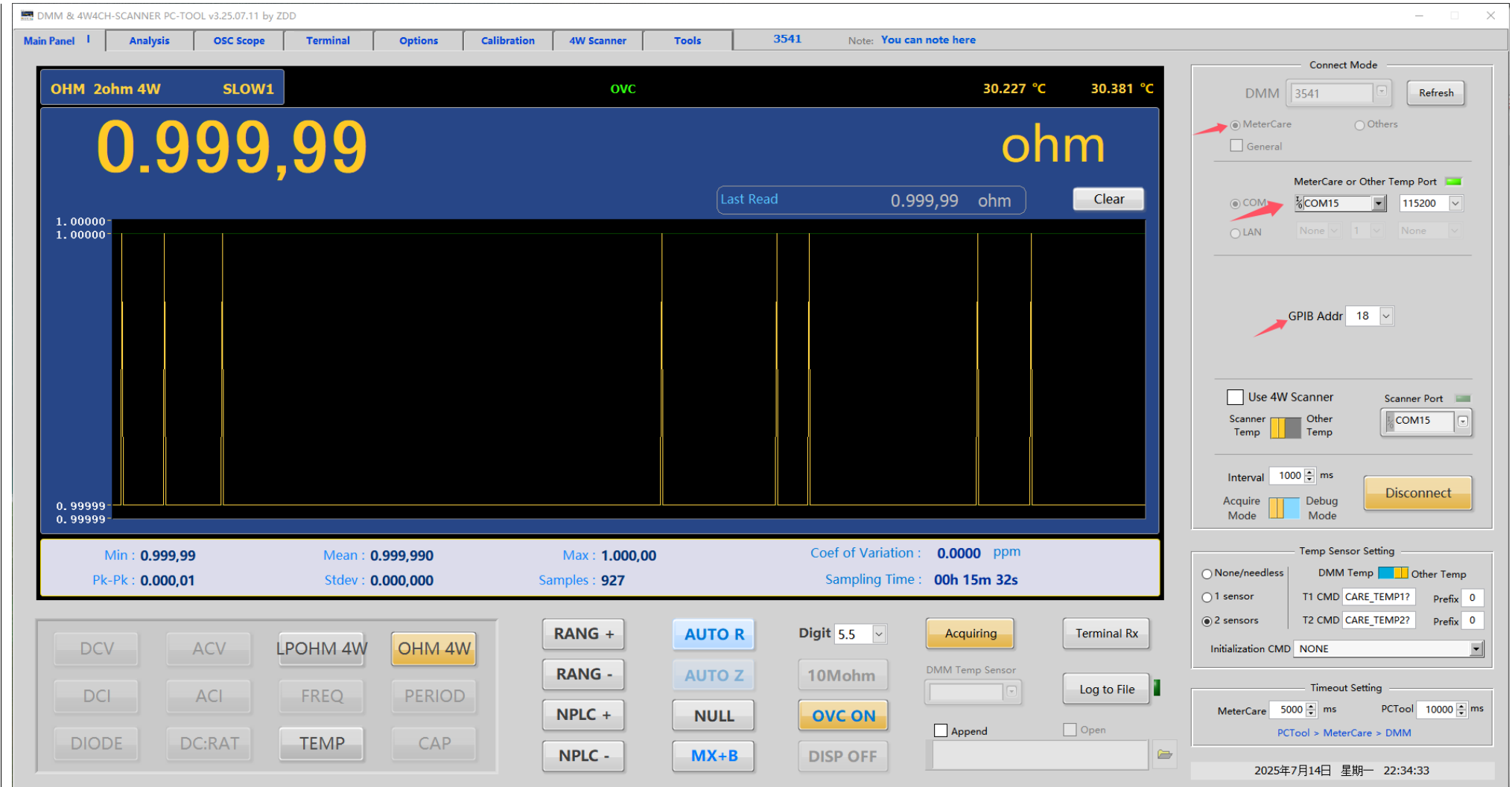


# DMM PC-TOOL User's Manual

Ver 3.0 / 2025-07-12 by ZDD

## 1. Main Panel

### 1.1 Connect DMM via MeterCare USB-GPIB card with 2 temperature sensors.



It is recommended to set a larger timeout value. When the timeout value is close to the response time of the DMM, timeout may occur more easily due to certain uncertain factors.

## 1.2 Connect DMM via a Prologix compatible GPIB-USB card with 2 temperature sensors.

The DMM port here should be that of a Prologix compatible GPIB-USB card, as it is a COM port, the parameters should be set correctly.

The screenshot displays the 'DMM & 4W4CH-SCANNER PC TOOL v3.25.07.11 by ZDD' software interface. The main display area shows a large digital readout of **0.999,99 ohm**. The interface includes various tabs (Main Panel, Analysis, OSC Scope, Terminal, Options, Calibration, 4W Scanner, Tools) and a top status bar showing '3541' and 'Note: You can note here'. The right sidebar contains settings for 'Connect Mode' (DMM 3541, GPIB Addr 18), 'MeterCare or Other Temp Port' (COM15, 115200), 'DMM port' (COM15), 'Interface Type' (Serial), 'Baud' (115200), 'Data' (8), 'Stop' (1), 'Parity' (None), 'FlowCtl' (None), 'Use 4W Scanner' (checked), 'Scanner Port' (COM15), 'Interval' (1000 ms), 'Acquire Mode' (Temp), and 'Debug Mode'. The bottom section includes a keypad with buttons like DCV, ACV, LPOHM 4W, OHM 4W, DCI, ACI, FREQ, PERIOD, DIODE, DC:RAT, TEMP, CAP, RANG +, RANG -, NPLC +, NPLC -, AUTO R, AUTO Z, NULL, MX+B, 10Mohm, OVC ON, DISP OFF, and a 'Terminal Rx' button. The status bar at the bottom shows '2025年7月14日 星期一 22:22:23'.

1.3 Connect DMM via a Prologix compatible GPIB card without temperature sensor.

DMM & 4W4CH-SCANNER PC-TOOL v3.25.07.11 by ZDD

Main Panel Analysis OSC Scope Terminal Options Calibration 4W Scanner Tools 3541 Note: You can note here

OHM 2ohm 4W SLOW1

0.999,99 ohm

Last Read 0.999,99 ohm Clear

1.00000 1.00000

0.99999 0.99999

Min : 0.999,99 Mean : 0.999,990 Max : 1.000,00 Coef of Variation : 0.0000 ppm  
Pk-Pk : 0.000,01 Stdev : 0.000,000 Samples : 1,485 Sampling Time : 00h 26m 49s

DCV ACV LPOHM 4W OHM 4W

DCI ACI FREQ PERIOD

DIODE DC:RAT TEMP CAP

RANG + AUTO R Digit 5.5 Acquiring Terminal Rx

RANG - AUTO Z 10Mohm

NPLC + NULL OVC ON

NPLC - MX+B DISP OFF

DMM Temp Sensor

Append Open

Log to File

Connect Mode

DMM 3541 Refresh

☐ MeterCare ☒ Others

☒ Prologix GPIB Addr 18

MeterCare or Other Temp Port

☒ COM %COM4 115200

☐ LAN None 1 None

DMM port COM67 Interface Type Serial

Baud 115200 Data 8 Stop 1

Parity None FlowCtl None

☐ Use 4W Scanner Scanner Port COM15

Interval 1000 ms

Acquire Mode Debug Mode

Disconnect

Temp Sensor Setting

☒ None/needless

☐ 1 sensor

☐ 2 sensors

DMM Temp Other Temp

T1 CMD TEMP1? Prefix 0

T2 CMD TEMP2? Prefix 0

Initialization CMD NONE

Timeout Setting

MeterCare 800 ms PCTool 10000 ms

PCTool > MeterCare > DMM

2025年7月14日 星期一 22:48:37

1.4 Connect DMM via Prologix compatible GPIB card, and connect other temperature sensor to PC.

DMM & 4W4CH-SCANNER PC-TOOL v3.25.07.11 by ZDD

Main Panel

Analysis

OSC Scope

Terminal

Options

Calibration

4W Scanner

Tools

3541

Note: You can note here

OHM 2ohm 4W

SLOW1

OVC

31.039 °C

29.984 °C

0.999,990

ohm

Last Read 0.999,990 ohm

Clear

1.000001

1.000000

0.999999

0.999998

0.999997

0.999996

0.999995

0.999994

0.999993

0.999992

0.999991

0.999990

0.999990

Min : 0.999,990

Mean : 0.999,990,1

Max : 1.000,000

Coef of Variation : 1.0000 ppm

PK-Pk : 0.000,010

Stdev : 0.000,001,0

Samples : 126

Sampling Time : 00h 02m 47s

DCV

ACV

LPOHM 4W

OHM 4W

DCI

ACI

FREQ

PERIOD

DIODE

DC:RAT

TEMP

CAP

RANG +

RANG -

NPLC +

NPLC -

AUTO R

AUTO Z

NULL

MX+B

Digit 6.5

10Mohm

OVC ON

DISP OFF

Acquiring

Terminal Rx

Log to File

DMM Temp Sensor

Append

Open

Connect Mode

DMM 3541

Refresh

MeterCare

Others

☒ Prologix

GPIB Addr 18

MeterCare or Other Temp Port

COM

%COM4

115200

LAN

None

1

None

DMM port

Interface Type Serial

COM67

Baud 115200

Data 8

Stop 1

Parity None

FlowCtl None

Use 4W Scanner

Scanner Port COM15

Interval 1000 ms

Acquire Mode

Debug Mode

Disconnect

Temp Sensor Setting

None/needless

1 sensor

2 sensors

DMM Temp

Other Temp

T1 CMD TEMP1?

Prefix 0

T2 CMD TEMP2?

Prefix 0

Initialization CMD NONE

Timeout Setting

MeterCare 800 ms

PCTool 10000 ms

PCTool > MeterCare > DMM

2025年7月14日 星期一 22:56:08

4

1.5 Connect DMM via other VISA-compatible GPIB card (similarly for USB or TCP/IP), and connect other temperature sensor to PC.

DMM & 4W4CH-SCANNER PC-TOOL v3.25.07.11 by ZDD

Main Panel Analysis OSC Scope Terminal Options Calibration 4W Scanner Tools 3541 Note: You can note here

OHM 2ohm 4W SLOW1 OVC 31.344 °C 30.258 °C

1.000,000 ohm

Last Read 1.000,000 ohm Clear

1.000001  
1.000000  
0.999999  
0.999998  
0.999997  
0.999996  
0.999995  
0.999994  
0.999993  
0.999992  
0.999991  
0.999990  
0.999990

Min : 0.999,990 Mean : 0.999,990,6 Max : 1.000,000 Coef of Variation : 4.2296 ppm  
PK-Pk : 0.000,010 Stdev : 0.000,004,2 Samples : 397 Sampling Time : 00h 08m 36s

DCV ACV LPOHM 4W OHM 4W  
DCI ACI FREQ PERIOD  
DIODE DC:RAT TEMP CAP

RANG + AUTO R Digit 6.5 Acquiring Terminal Rx  
RANG - AUTO Z 10Mohm  
NPLC + NULL OVC ON  
NPLC - MX+B DISP OFF

DMM Temp Sensor  
Append Open

Log to File

Connect Mode  
DMM 3541 Refresh  
☐ MeterCare ☒ Others  
☐ General  
MeterCare or Other Temp Port  
☒ COM COM4 115200  
☐ LAN None 1 None  
DMM port GPIB Interface Type GPIB  
GPIB0::18::INSTR  
Baud 115200 Data 8 Stop 1  
Parity None  
Use 4W Scanner Scanner Port COM15  
Interval 1000 ms  
Acquire Mode Debug Mode Disconnect

Temp Sensor Setting  
☐ None/needless ☒ DMM Temp ☐ Other Temp  
☐ 1 sensor T1 CMD TEMP1? Prefix 0  
☒ 2 sensors T2 CMD TEMP2? Prefix 0  
Initialization CMD NONE

Timeout Setting  
MeterCare 5000 ms PCTool 10000 ms  
PCTool > MeterCare > DMM

2025年7月14日 星期一 23:07:03

## 1.6 Connect DMM via RS232 port, and connect other temperature sensor to PC.

The serial port parameters under the DMM port must be configured to match the RS232 parameters of the DMM.

The screenshot displays the 'DMM & 4W4CH-SCANNER PC TOOL v3.25.07.15 by ZDD' software interface. The main panel shows a large digital readout of **0.999,990** ohm. Below the readout is a graph showing a triangular waveform. The right sidebar contains configuration settings for the DMM port, including COM50, Baud 9600, Data 8, Stop 1, Parity None, and FlowCtl None. The bottom section shows various measurement buttons like DCV, ACV, LPOHM 4W, OHM 4W, etc.

**Main Panel:**

- Top: OHM 2ohm 4W, SLOW1, OVC, 30.566 °C, 29.484 °C
- Large Display: 0.999,990 ohm
- Last Read: 0.999,990 ohm
- Graph: A triangular waveform on a grid.
- Statistics: Min: 0.999,990, Mean: 0.999,990,6, Max: 1.000,000, Coef of Variation: 2.4254 ppm, Pk-Pk: 0.000,010, Stdev: 0.000,002,4, Samples: 17, Sampling Time: 00h 00m 16s

**Right Sidebar (Connect Mode):**

- DMM: 3541
- Connect Mode: DMM (selected), MeterCare, General
- MeterCare or Other Temp Port: COM4, 115200
- DMM port: COM50
- Interface Type: Serial
- Baud: 9600, Data: 8, Stop: 1, Parity: None, FlowCtl: None
- Use 4W Scanner: Scanner Temp, Other Temp
- Scanner Port: COM15
- Interval: 1000 ms
- Acquire Mode: Debug Mode
- Disconnect button

**Bottom Panel:**

- Buttons: DCV, ACV, LPOHM 4W, OHM 4W, DCI, ACI, FREQ, PERIOD, DIODE, DC:RAT, TEMP, CAP
- Buttons: RANG +, RANG -, NPLC +, NPLC -, AUTO R, AUTO Z, NULL, MX+B, Digit 6.5, 10Mohm, OVC ON, DISP OFF
- Buttons: Acquiring, Terminal Rx, Log to File
- Buttons: DMMTempSen, Append, Open

**Temp Sensor Setting:**

- None/needless
- 1 sensor
- 2 sensors (selected)
- T1 CMD: TEMP1?, Prefix: 0
- T2 CMD: TEMP2?, Prefix: 0
- Initialization CMD: NONE

**Timeout Setting:**

- MeterCare: 5000 ms
- PCTool: 10000 ms
- PCTool > MeterCare > DMM

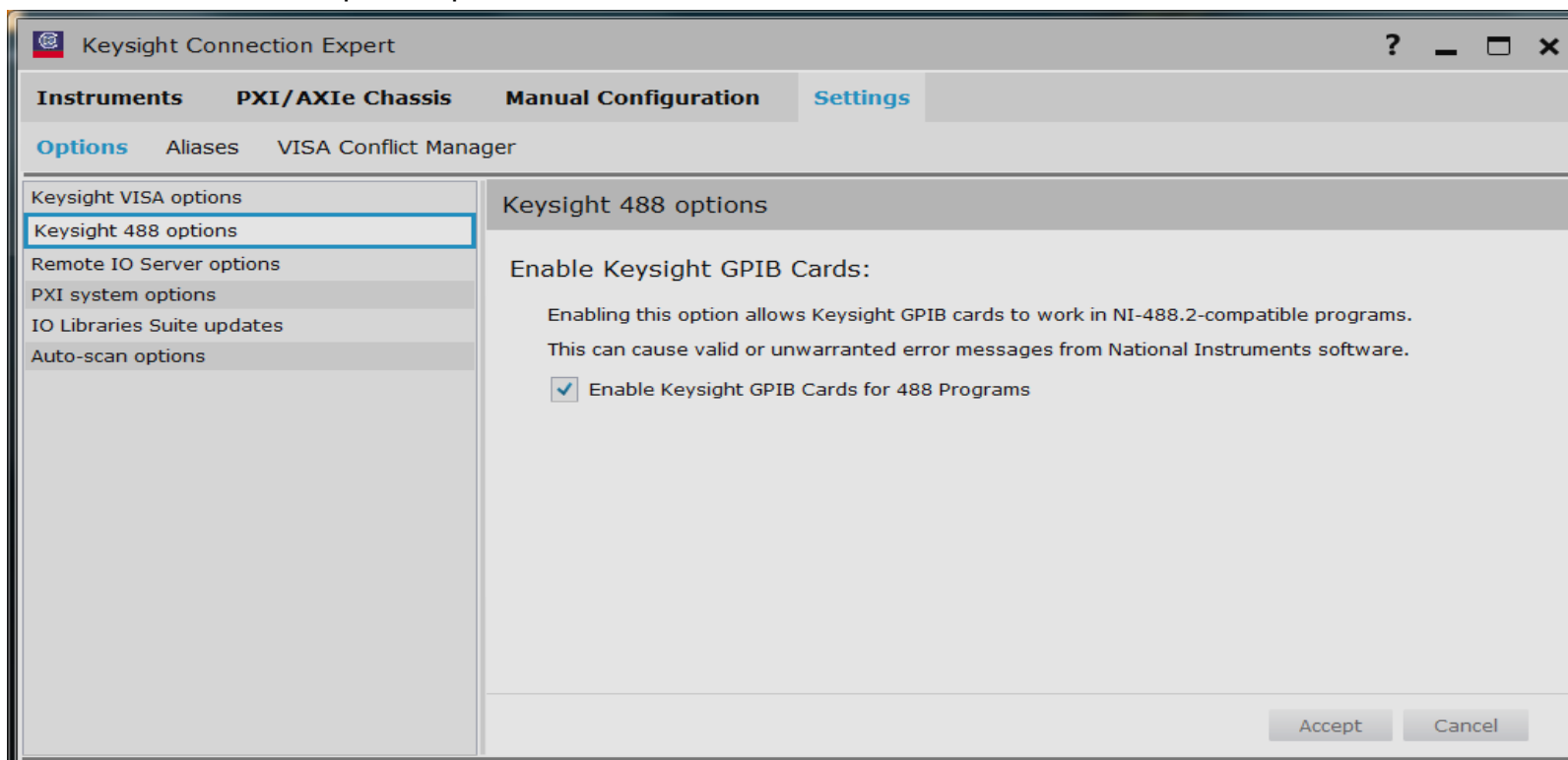
**Footer:** 2025年7月15日 星期二 23:38:17

If it is not a serial port, such as USB, LAN, and other GPIB adapter cards, you may need to install the IVI driver to see the corresponding VISA standard port in the DMM port drop-down box.

So far, the confirmed compatible GPIB cards include:

- Agilent/Keysight 82357 USB/GPIB cards (needs to install Keysight IO Libraries Suite)
- Keysight E5810 LAN/GPIB gateway (needs to install Keysight IO Libraries Suite)
- NI (National Instruments) GPIB-USB cards (needs to install NI-488.2 driver)
- CONTEC GPIB cards (needs to install GPLV (GPIB Labview Version) runtime library and driver)
- ADLINK GPIB cards

If use Agilent/Keysight 82357 USB/GPIB cards, or Keysight E5810 LAN/GPIB gateway, please check the options shown in the picture below in the settings, click “Accept” and restart your PC. Connect the DMM through the GPIB card and turn it on. Then select the GPIB port number corresponding to the DMM in the DMM port drop-down box.



If use E5810, and you can find the device on the web page, you need to set it up as shown below to find the port address in the DMM port drop-down box.

Edit settings for a remote GPIB interface

Specify Connection Addresses:

VISA Interface ID (Board Number): GPIB1

TCPIP Interface ID: TCPIP0

SICL Interface ID: gpib1

Logical Unit: 10

Specify Connection Information:

Find Interfaces...

Hostname or IP Address: 18.8.1.39

SICL Interface Name on Remote Host: hpib

Verify Connection:

Test Connection

Configure GPIB Properties:

☒ Auto-Discover Instruments Connected to This Interface

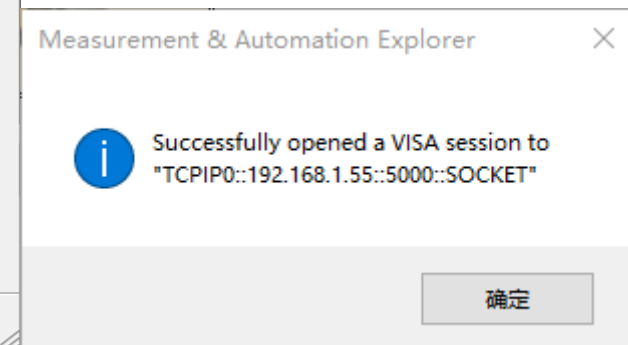
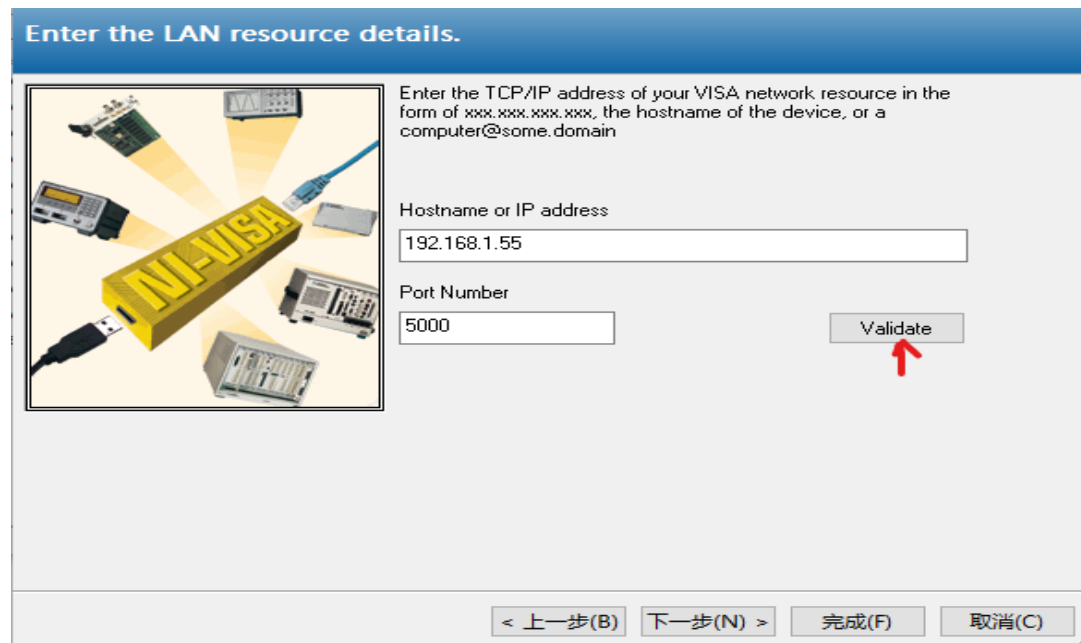
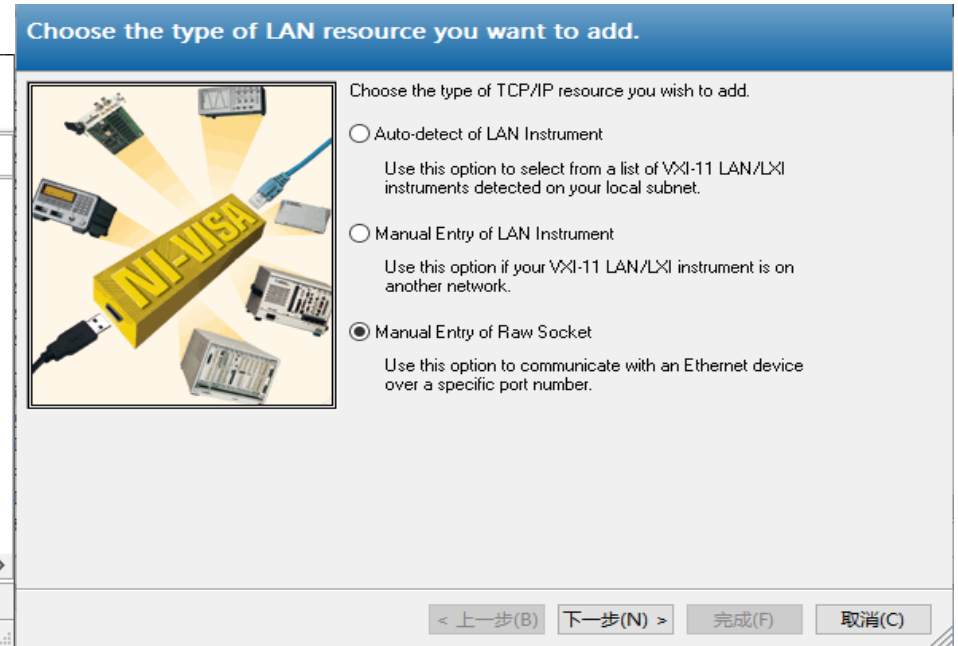
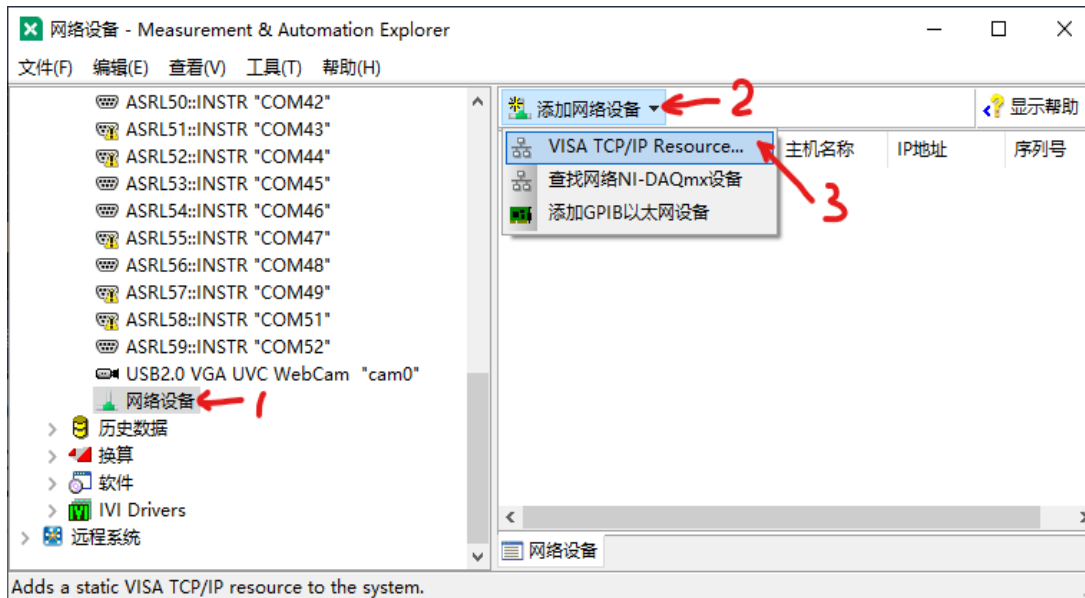
Keysight 488 Properties

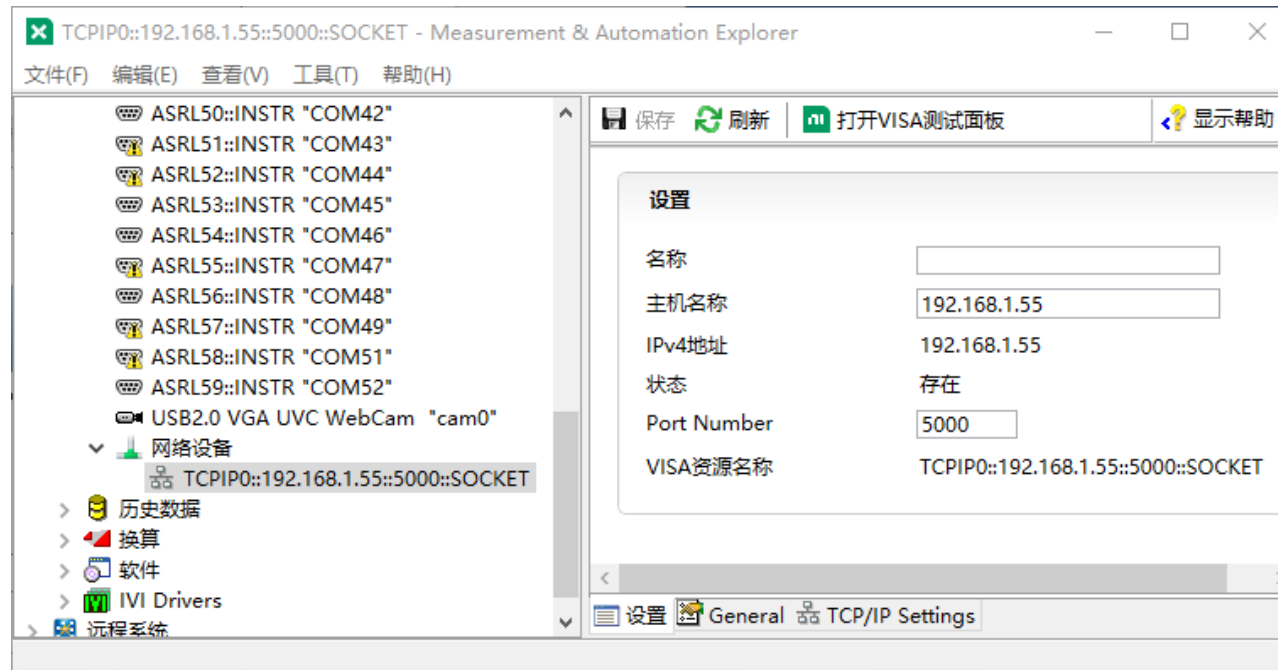
OK Cancel

显示比例: 86%, 双击查看原图

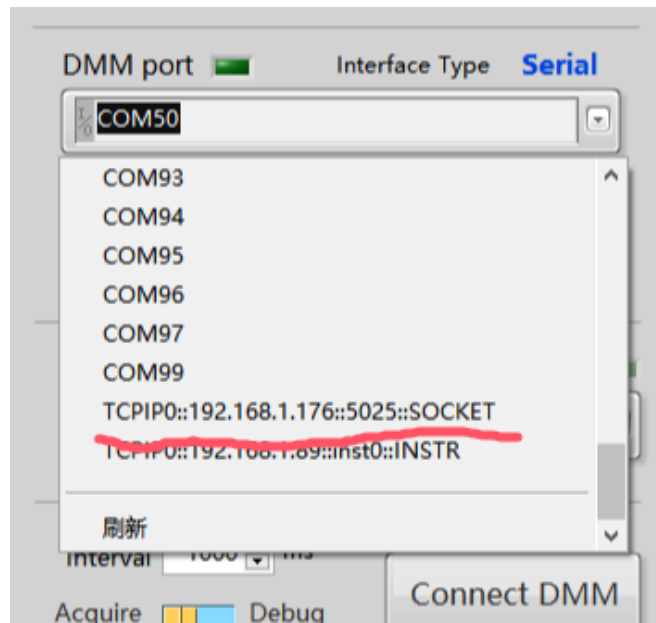


If it is TCP/IP protocol but there is no VISA driver support, you can use NI-MAX to add it to the network device and it can be used.





When the TCP/IP resource is created successfully, it will be shown in the DMM port drop-down box. As shown below.



## 1.7 Temperature Sensor Settings

### 1) Sensor Selection:

- Choose **None**, **1**, or **2** sensors based on your hardware.
- **Note:** Only **one** temperature sensor device (one communication port) is supported per software instance, with max **two temperature channels** support.

### 2) Command & Prefix Configuration:

- Enter the correct **temperature read command** and **prefix length**.
- **Example:** If the returned data format is "**TMP:+23.0**", the prefix is "**TMP:**", and the length should be **4**.

### 3) DMM Built-in Sensor:

- If your DMM has an integrated sensor (e.g., Keysight 34461A), you can select "**DMM Temp**", and T1 CMD: **SYST:TEMP?**

Temp Sensor Setting

☐ None/needless      DMM Temp ☒ Other Temp

☐ 1 sensor      T1 CMD TEMP1?      Prefix 0

☒ 2 sensors      T2 CMD TEMP2?      Prefix 0

Initialization CMD NONE

Temp Sensor Setting

☐ None/needless      DMM Temp ☒ Other Temp

☐ 1 sensor      T1 CMD SYST:TEMP?      Prefix 0

☒ 2 sensors      T2 CMD TEMP2?      Prefix 0

Initialization CMD NONE

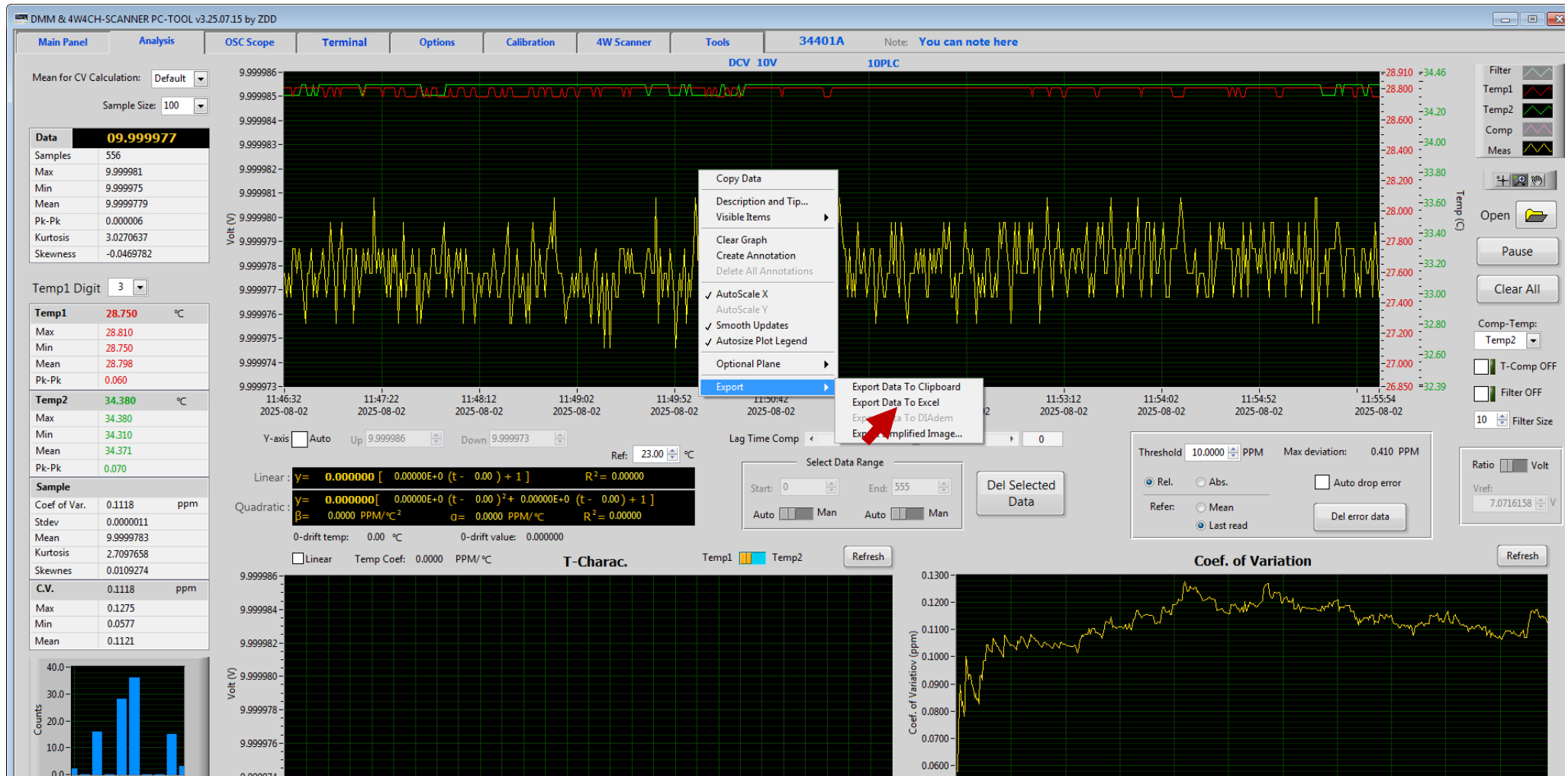
## 2. Analysis

### 2.1 Waveform Export & Import

#### 1) Exporting Waveform Data:

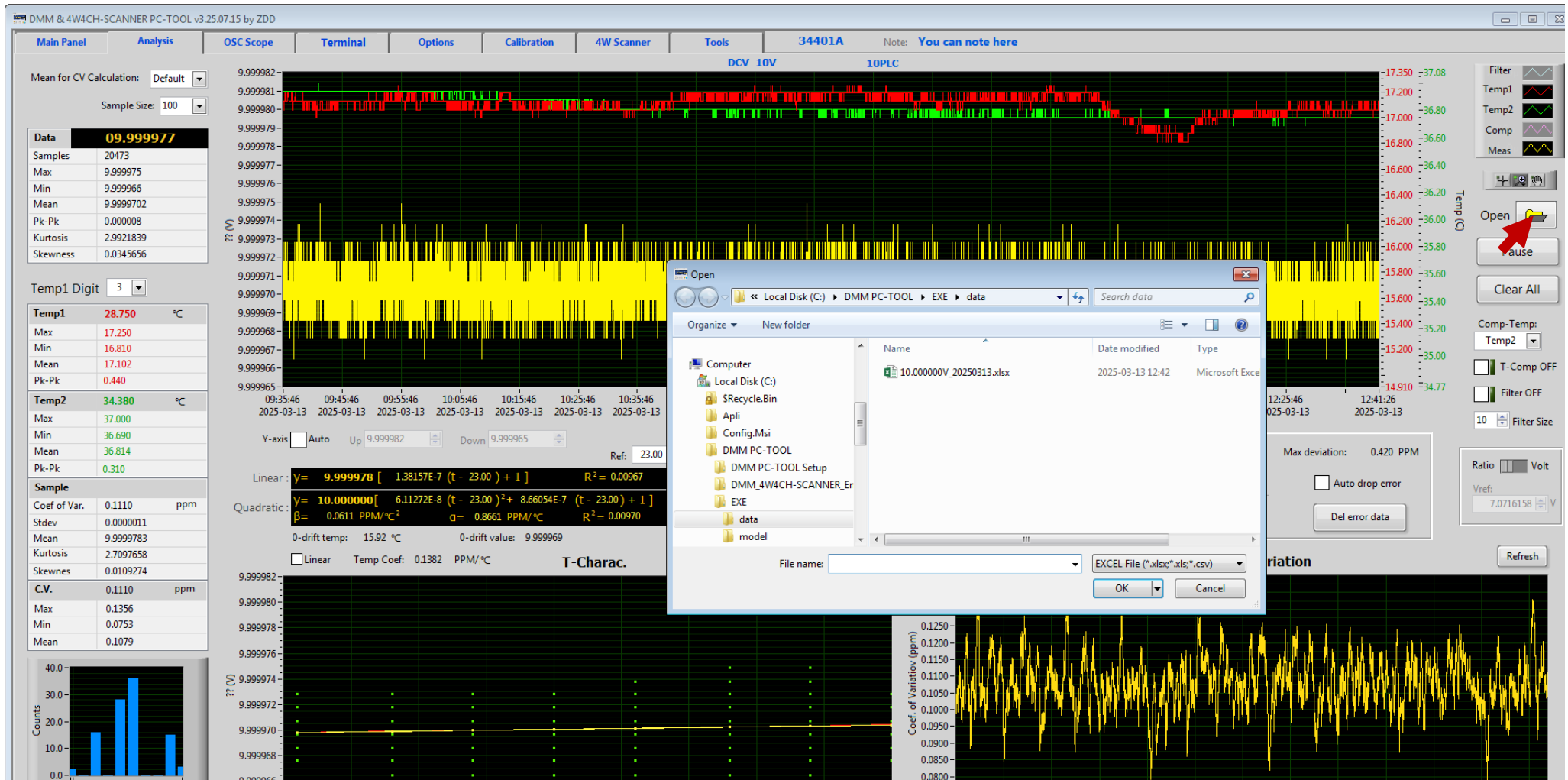
Right-click in the waveform window and select **"Export" -> "Export Data To Excel"** to save the waveform data.

- **For Better Resolution:** Before exporting, **increase the data digit** (adjust the "Digit" option of the main panel). This helps maintain closer fidelity when re-importing the waveform later.



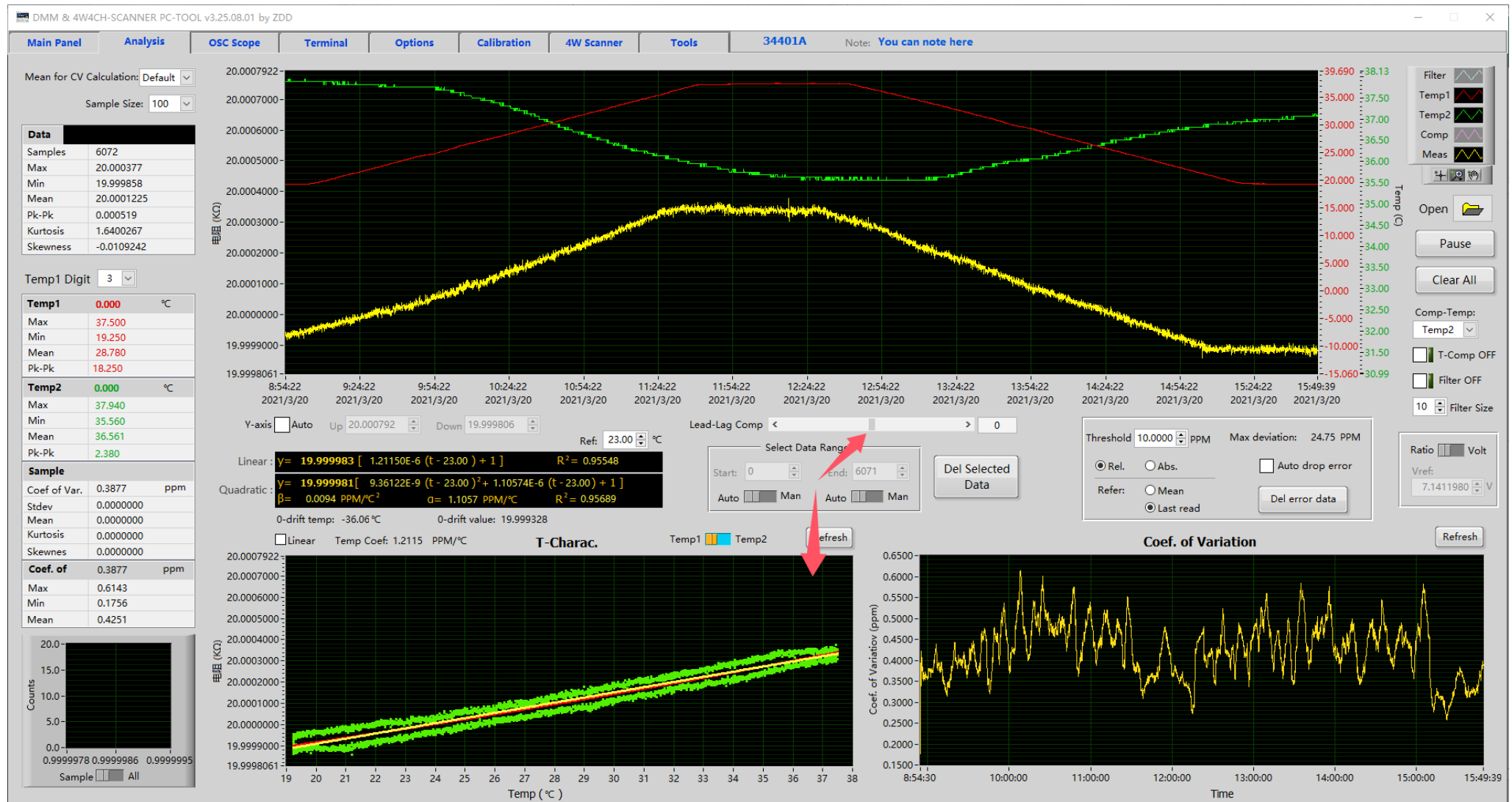
## 2) Importing Waveform Data:

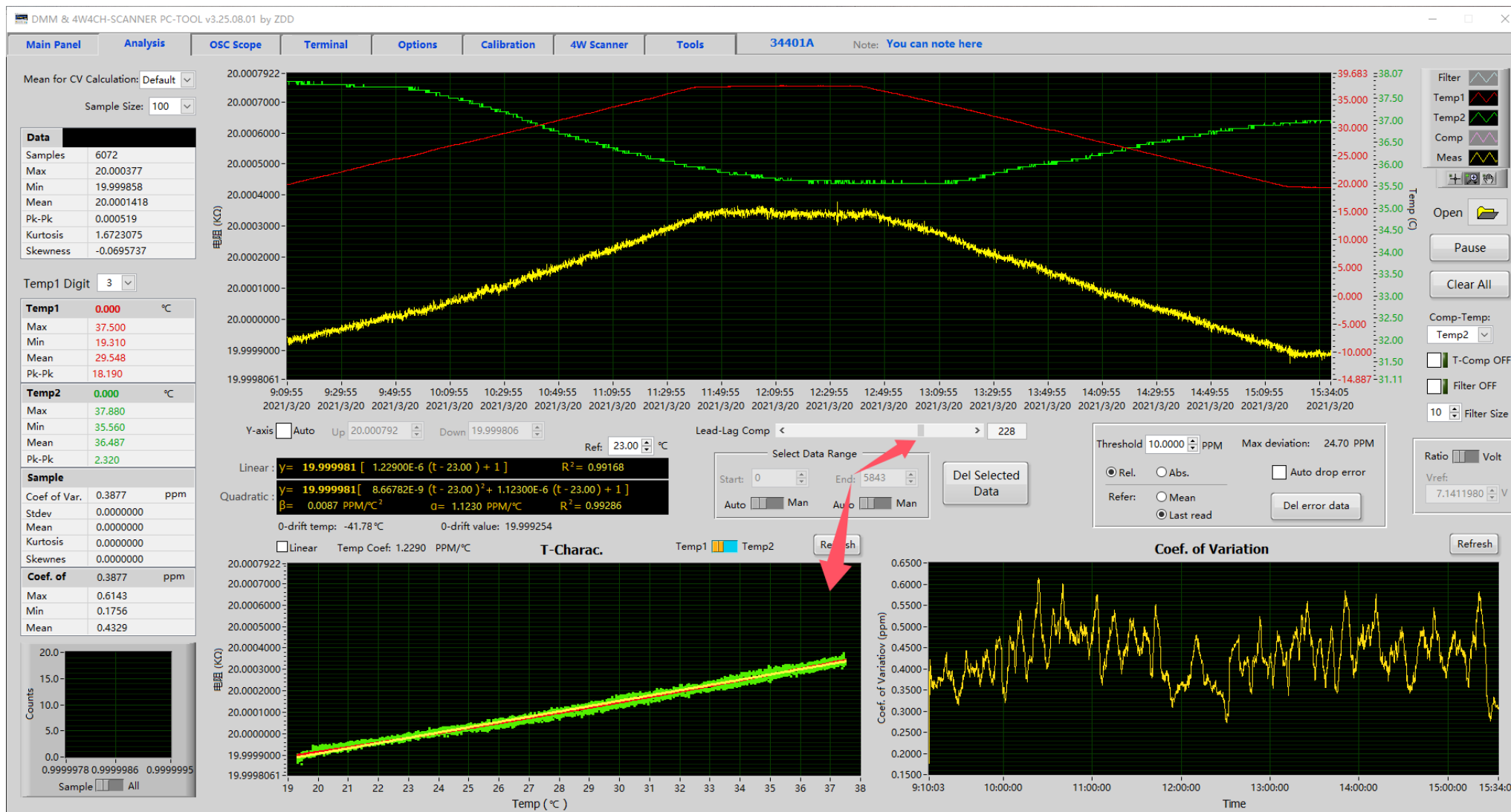
Click the “Open” button to import data file (.xlsx; .xls; .csv). Ensure the imported data matches the expected structure for accurate reconstruction.



## 2.2 Lead-Lag Compensation

By adjusting the “**Lead-Lag Comp**” slider position, the system's lead or lag compensation can be fine-tuned, particularly for temperature measurement applications. Comparing the two figures below, you can clearly see the effect of compensation.







## 2.3 Delete Error Data

### 1) Relative Value-Based Rejection

- **Reference Options:**
  - **Mean:** Compares the measurement against the average.
  - **Last read:** Compares the measurement against the last read.
- **Rejection Criteria:**

The measurements will be removed if their deviation from the selected reference exceed preset threshold.

Threshold 10.0000 ppm Max deviation: 0.533 PPM

☒ Rel. ☐ Abs. ☐ Auto drop error

Refer: ☒ Mean ☐ Last read

### 2) Absolute Value-Based Rejection

- **Condition Options:**
  - **>:** Rejects data exceeding the setting threshold.
  - **<:** Rejects data falling below the setting threshold.
- **Rejection Criteria:**

The measurements will be removed if they satisfy the selected inequality condition relative to the preset threshold.

Threshold 10.0000 ppm > Max deviation: 0.533 PPM

☐ Rel. ☒ Abs. ☐ Auto drop error

Condition ☒ > ☐ <

### 3) Auto drop error

When enabled, this feature automatically discards data points during acquisition that meet either of the following outlier criteria:

- **Relative Value-Based Rejection**
  - Compares measurements against either:
    - ✓ Mean
    - ✓ Last read
  - Discards data if deviation exceeds the preset threshold
- **Absolute Value-Based Rejection**
  - Discards data when:
    - ✓ Measurement > Preset threshold (if ">" selected)
    - ✓ Measurement < Preset threshold (if "<" selected)

Threshold 1.0000 ppm Max deviation: 0.462 PPM

☒ Rel. ☐ Abs. ☒ Auto drop error

Refer: ☒ Mean ☐ Last read

Threshold 1.0000 ppm > Max deviation: 0.462 PPM

☐ Rel. ☒ Abs. ☒ Auto drop error

Condition ☒ > ☐ <



## 2.4 Select Data Range

Users can define analysis or deletion ranges through two intuitive methods:

### 1) Mouse Drag Selection

Click and drag directly on the plot to visually select a continuous data range.

### 2) Data Panel Selection

Precisely specify ranges by entering Start/End values.

Select Data Range

Start: 0 End: 24460

Auto Man Auto Man

Del Selected Data

Select Data Range

Start: 8259 End: 17204

Auto Man Auto Man

Del Selected Data

## 2.5 DCV Ratio to Volt

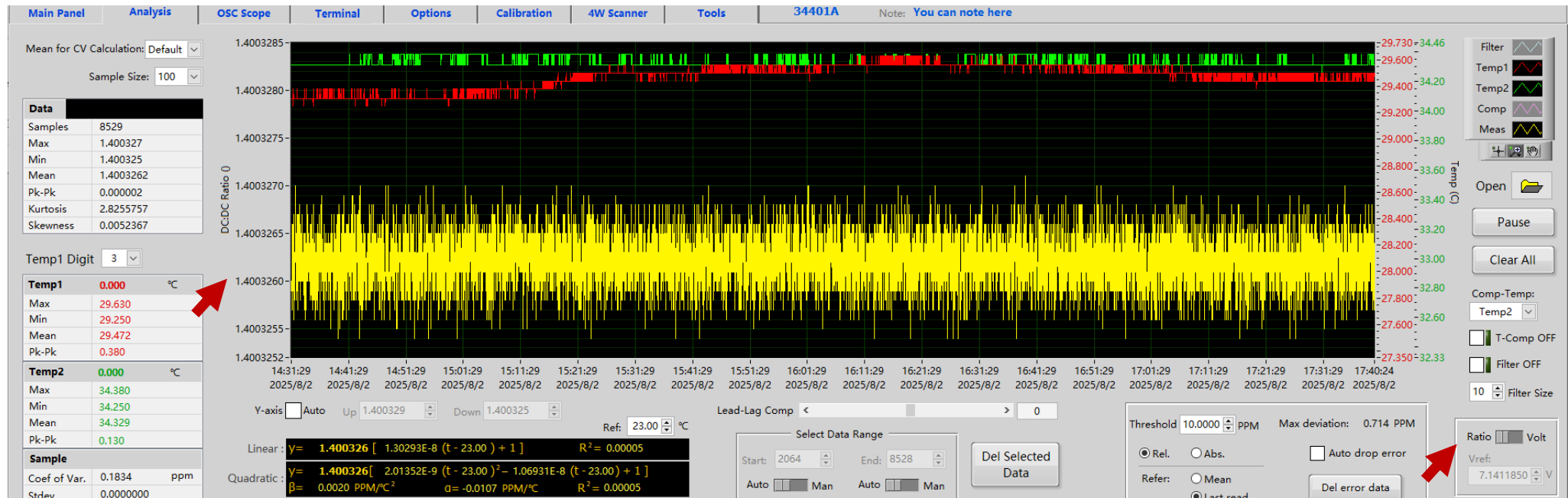
Enter the reference voltage value in the "Vref:" input field

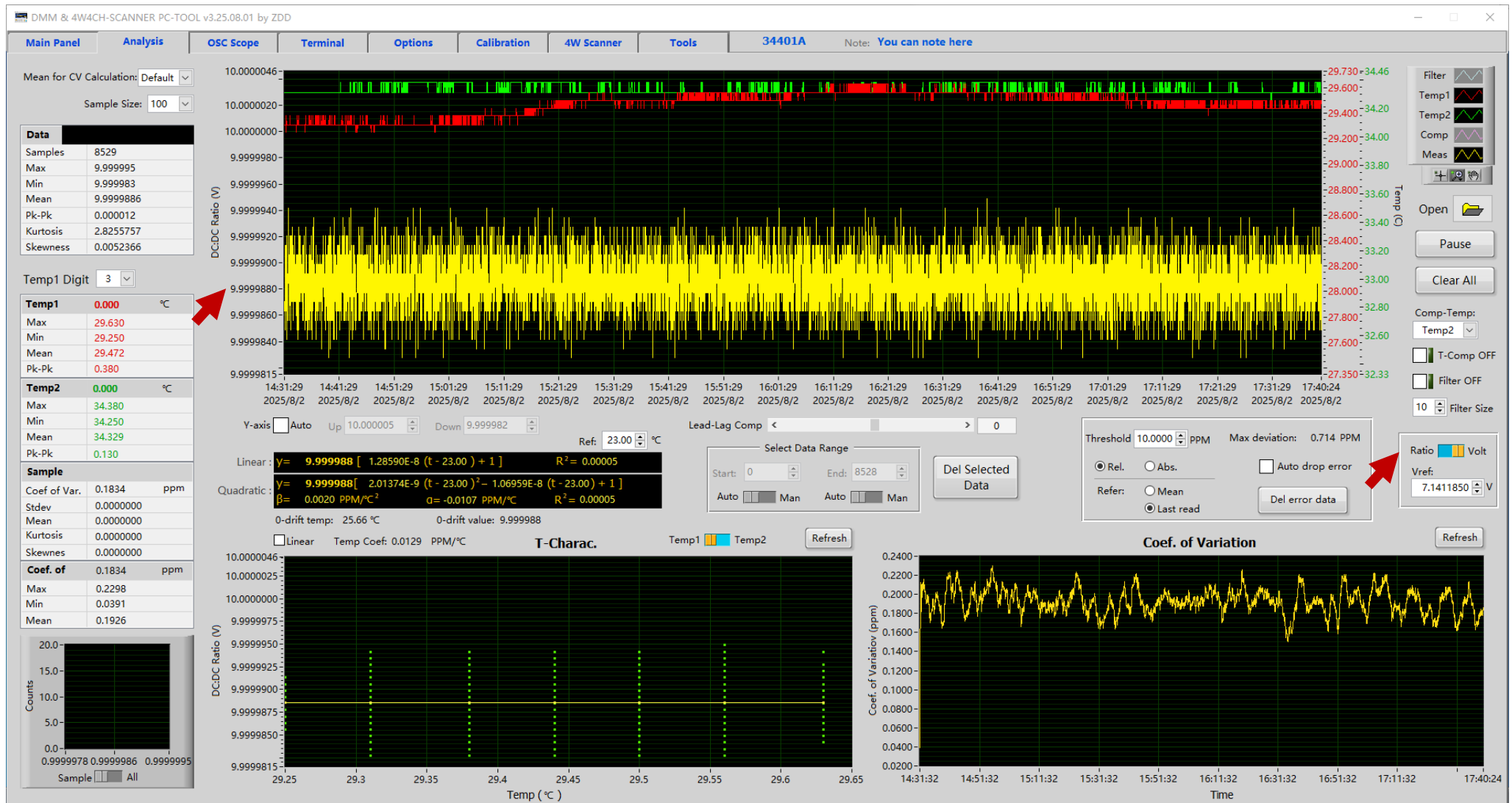
Set the "Ratio-Volt" toggle switch to:

- **Ratio** position: Displays raw ratio measurement.
- **Volt** position: Converts and displays actual voltage value.

Ratio Volt

Vref: 7.1411850 V





## 2.6 Filter & Temp Compensation

- 1) Check **ON** or **OFF** the “Filter” checkbox to switch filter function on or off.

By increasing/decreasing the filter size, one can enhance/reduce the filtering effect accordingly:



## 2) DMM Temp Compensation

### • Set DMM Temperature Drift Parameters:

- Enter the DMM's temperature drift parameters in the **Options** tab.
- Alternatively, pre-configure these parameters in the **tc.ini** file.

### • Enable Temperature Compensation:

- In the Analysis tab, select the compensation temperature (Temp1 or Temp2).
- Check T-Comp ON to activate the temperature compensation function.

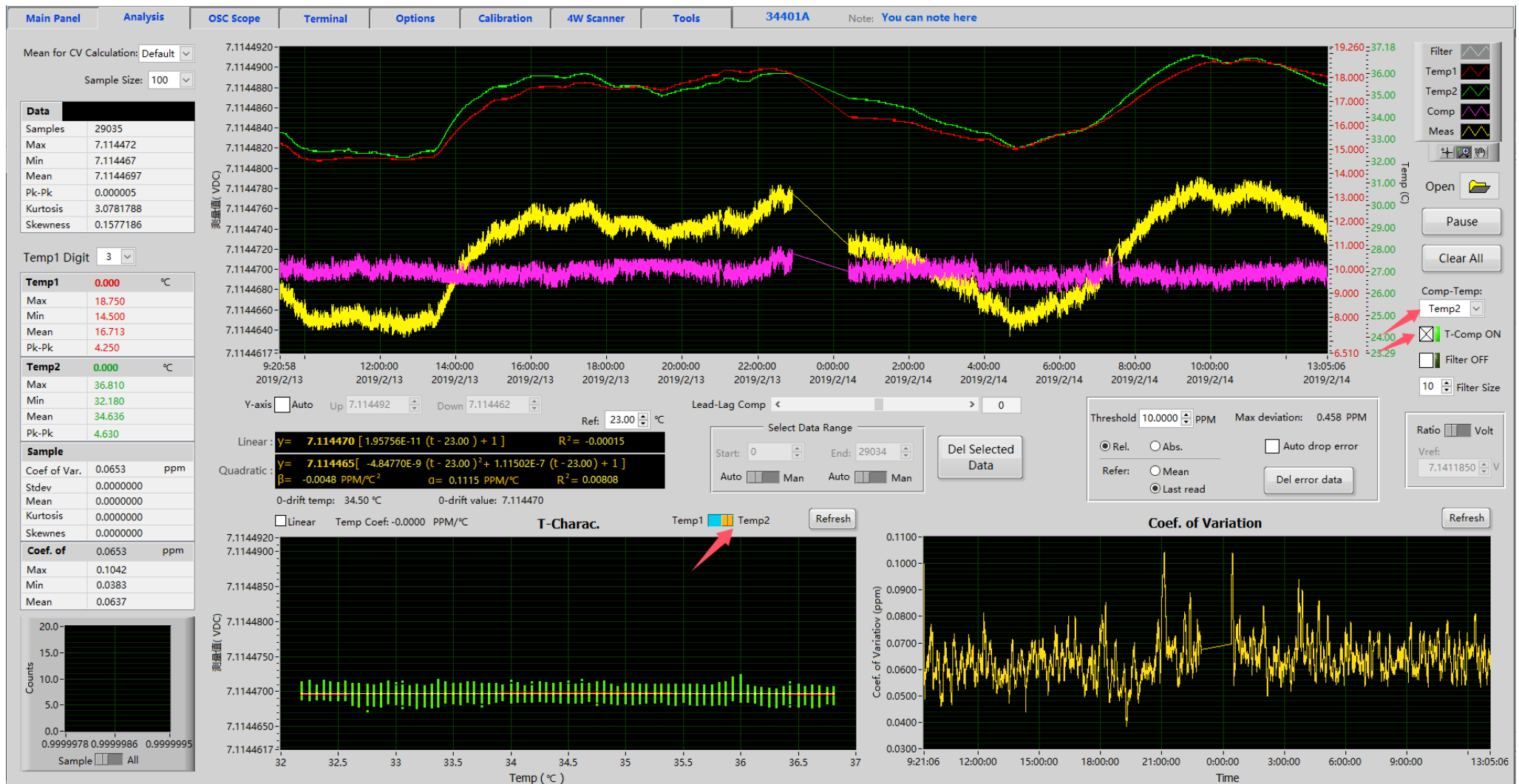
**DMM T-Comp**

$\alpha$  0.4290 PPM/°C

$\beta$  0.0000 PPM/°C<sup>2</sup>

Ref.Temp 23.00 °C

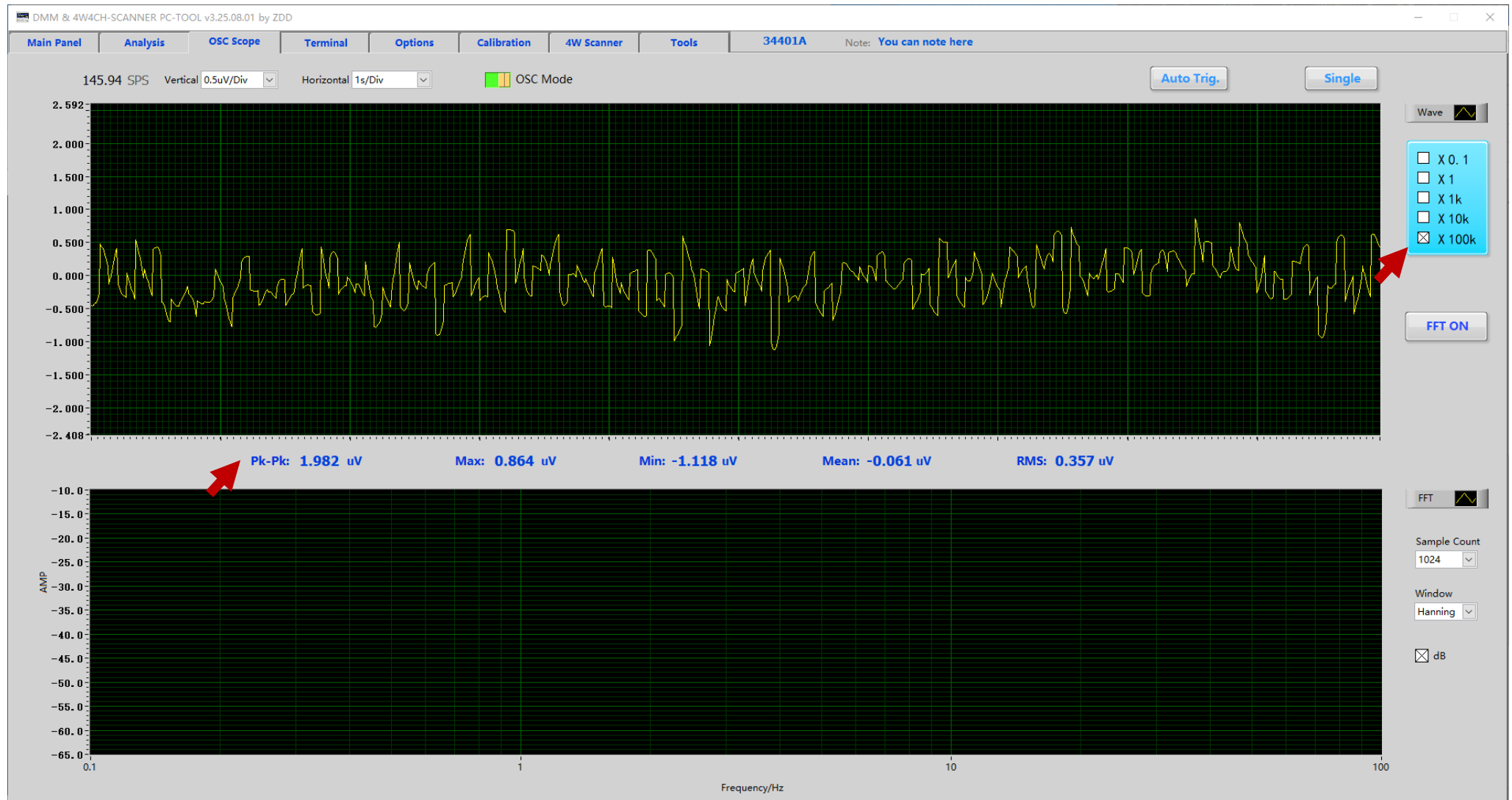
Cal.Temp 34.00 °C



### 3. OSC Scope

This oscilloscope function is primarily used as a temporary substitute for a physical oscilloscope when measuring **low-frequency noise** with a **noise amplifier**.

Select actual **Amplifier Gain**, directly displays the **peak-to-peak (P-P) noise voltage** for quick analysis.



## 4. Terminal

The terminal primarily serves debugging purposes. When the "Normal-Debug" switch is set to "Debug" mode. Multiple shortcut commands are available for efficient debugging operations.

DMM & 4W4CH-SCANNER PC TOOL v3.25.08.01 by ZDD

Main Panel Analysis OSC Scope **Terminal** Options Calibration 4W Scanner Tools 34401A Note: You can note here

Receive: Rx bytes: 2652 Rx buffer 100kB ☐ Time stamp ☐ HEX Clear Rx Pause

+4.41050000E-02  
+6.35470000E-02  
+9.25200000E-03  
+5.54570000E-02  
+3.61260000E-02  
-4.00300000E-03  
-2.47940000E-02  
+4.54500000E-02  
-2.71500000E-02  
-5.89340000E-02  
-3.71420000E-02  
-2.28800000E-03  
+1.63700000E-03  
-3.96180000E-02  
-1.04710000E-01  
-7.81770000E-02  
-1.01710000E-01  
-6.01900000E-02  
+8.58290000E-02  
-6.14500000E-03  
+1.84980000E-02  
+2.99800000E-02  
-1.03811000E-01  
+2.45440000E-02  
+3.30030000E-02  
+5.61820000E-02  
+1.01236000E-01  
+3.25800000E-03  
-4.30000000E-03  
-2.18810000E-02

Shortcut CMDs Return

0	READ?	<input type="checkbox"/>	Send
1	DISP?	<input type="checkbox"/>	Send
2	FUNC?	<input type="checkbox"/>	Send
3	NPLC?	<input type="checkbox"/>	Send
4	AZERO?	<input type="checkbox"/>	Send
5	ARANGE?	<input type="checkbox"/>	Send
6	RANGE?	<input type="checkbox"/>	Send
7	NDIG?	<input type="checkbox"/>	Send
8	FIXEDZ?	<input type="checkbox"/>	Send
9	CARE_TEMP1?	<input type="checkbox"/>	Send
10	CARE_TEMP2?	<input type="checkbox"/>	Send
11	TEMP1?	<input type="checkbox"/>	Send
12	TEMP2?	<input type="checkbox"/>	Send
13	ITEM?	<input type="checkbox"/>	Send
14	TARM SGL,1	<input type="checkbox"/>	Send

Normal ☒ Debug

Get DMM info \*IDN?  
HEWLETT-PACKARD,34401A,0,10-5-2

Get DMM error msg. SYST:ERR?  
+0,"No error"

Send: Tx bytes: 0 Clear Tx Send

☐ HEX  
☒ CRLF  
☒ Query  
☐ Timer  
1000 ms

## 5. Options

### 5.1 MEAS Mode

- **Normal, no Comp.:** It is a direct measurement, and all data does not undergo any temperature compensation processing.
- **Normal, Comp.:** It means to perform temperature compensation on the measured data according to the temperature drift coefficient and the actual temperature of the DMM. Note that if the temperature coefficient of the table is quadratic, then the  $\alpha$  must correspond to the **Ref.Temp.**
- **T-Drift Test:** It is to measure the temperature drift of DMM.

It is best to fix the temperature sensor somewhere inside the DMM. Otherwise, if the position changes, the temperature coefficient will be different and compensation will not be possible.

The temperature compensation of the source is turned on, and the temperature sensor corresponding to **Temp1**. If the temperature drift of the source can be ignored during the measurement process (for example, the temperature change is very small or the temperature drift itself is very small), you can fill in the  $\alpha$  and  $\beta$  of the source with 0. It's the same as **Normal, no Comp.** mode.

Under normal circumstances, the temperature drift of the DMM can be measured by cold starting the machine, some previous data can be removed during fitting.

- **T-Comp. Test:** Verifying the Effectiveness of Temperature Drift Compensation.

Be sure to use 2 temperature sensors. **Temp1** measures the source temperature, and **Temp2** measures the DMM temperature. If the temperature drift coefficients of both the DMM and the source are correct, the compensated curve should be a straight horizontal line with a temperature drift coefficient close to 0.00. If the source temperature drift is unknown,  $\alpha$  and  $\beta$  can be entered as 0. In this case, the compensated curve's drift for **Temp1** will be the source's drift.

If only 1 temperature sensor is used, use the same read command for both **Temp1** and **Temp2**, measuring only the DMM temperature. Enter 0 for the  $\alpha$  and  $\beta$  of source, or use **Normal, Comp.** mode for measurement. If the DMM's temperature drift coefficient is correct, the compensated curve can be used to determine whether the source has drifted.

The screenshot displays the MEAS Mode configuration interface with three main sections:

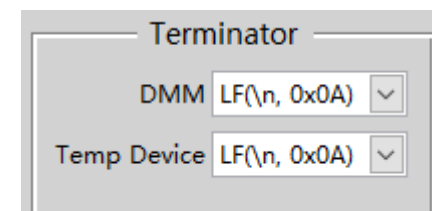
- MEAS Mode:** Contains four radio button options:   
• ☒ Normal, no Comp.   
• ☐ Normal, Comp.   
• ☐ T-Drift Test   
• ☐ T-Comp. Test
- DMM T-Comp:** Features a toggle switch (currently on) and input fields for:   
•  $\alpha$ : 0.0000 PPM/°C   
•  $\beta$ : 0.0000 PPM/°C<sup>2</sup>   
• Ref.Temp: 23.00 °C   
• Cal.Temp: 38.00 °C   
A large black box at the bottom displays the value **-0.08231**.
- Source T-Comp:** Features a toggle switch (currently on) and input fields for:   
•  $\alpha$ : 0.0000 PPM/°C   
•  $\beta$ : 0.0000 PPM/°C<sup>2</sup>   
• Cal.Temp: 23.00 °C   
A blue text note states: "During linear compensation, just set  $\beta=0$ ."   
A large black box at the bottom displays the value **-0.08231**.



## 5.2 Terminator character

Refer to the DMM and temperature device manuals to ensure the output terminator matches that of the this **DMM PC-TOOL**.

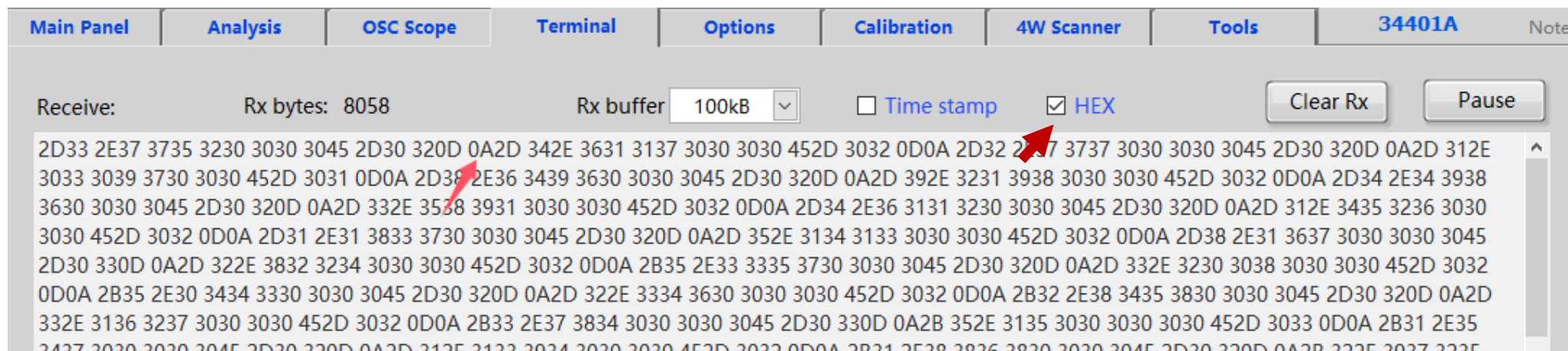
You can use a serial port assistant or this DMM PC-TOOL in **Debug** mode to view the output terminator (hexadecimal display).



Terminator

DMM LF(\n, 0x0A) ▼

Temp Device LF(\n, 0x0A) ▼



Main Panel Analysis OSC Scope Terminal Options Calibration 4W Scanner Tools 34401A Note:

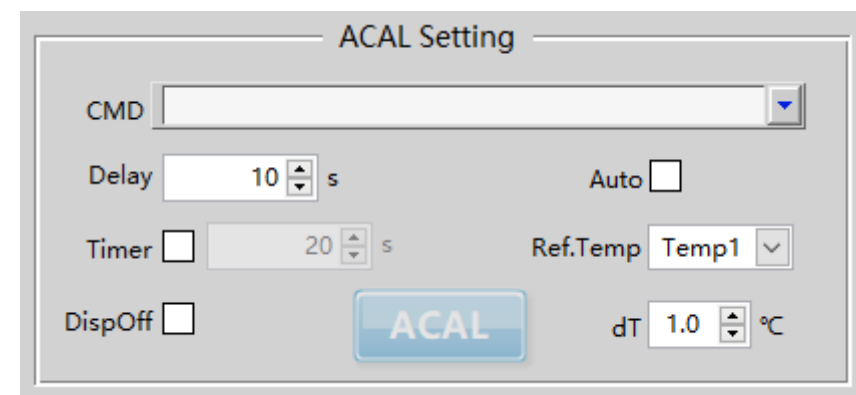
Receive: Rx bytes: 8058 Rx buffer 100kB ☐ Time stamp ☒ HEX Clear Rx Pause

2D33 2E37 3735 3230 3030 3045 2D30 320D 0A2D 342E 3631 3137 3030 3030 452D 3032 0D0A 2D32 2E37 3737 3030 3030 3045 2D30 320D 0A2D 312E 3033 3039 3730 3030 452D 3031 0D0A 2D38 2E36 3439 3630 3030 3045 2D30 320D 0A2D 392E 3231 3938 3030 3030 452D 3032 0D0A 2D34 2E34 3938 3630 3030 3045 2D30 320D 0A2D 332E 3538 3931 3030 3030 452D 3032 0D0A 2D34 2E36 3131 3230 3030 3045 2D30 320D 0A2D 312E 3435 3236 3030 3030 452D 3032 0D0A 2D31 2E31 3833 3730 3030 3045 2D30 320D 0A2D 352E 3134 3133 3030 3030 452D 3032 0D0A 2D38 2E31 3637 3030 3030 3045 2D30 330D 0A2D 322E 3832 3234 3030 3030 452D 3032 0D0A 2B35 2E33 3335 3730 3030 3045 2D30 320D 0A2D 332E 3230 3038 3030 3030 452D 3032 0D0A 2B35 2E30 3434 3330 3030 3045 2D30 320D 0A2D 322E 3334 3630 3030 3030 452D 3032 0D0A 2B32 2E38 3435 3830 3030 3045 2D30 320D 0A2D 332E 3136 3237 3030 3030 452D 3032 0D0A 2B33 2E37 3834 3030 3030 3045 2D30 330D 0A2B 352E 3135 3030 3030 3030 452D 3033 0D0A 2B31 2E35 3437 3030 3030 3045 2D30 320D 0A2D 312E 3133 3934 3030 3030 452D 3032 0D0A 2B31 2E38 3836 3830 3030 3045 2D30 320D 0A2B 322E 3937 3235

## 5.3 ACAL Setting

- **CMD:** Select ACAL command.
- **Delay:** Time required to execute ACAL command.
- **Timer:** Scheduled execution of ACAL command.
- **DispOff:** If checked, turn off the display after execution of ACAL command.
- **Auto:** Automatically execute ACAL command based on the change (**dT**) of the **Ref. Temp**.

You can click the **ACAL** button to directly execute the ACAL command.



ACAL Setting

CMD

Delay 10 s Auto ☐

Timer ☐ 20 s Ref.Temp Temp1 ▼

DispOff ☐ ACAL dT 1.0 °C



## 5.4 DMM Configurable Selection

If the DMM supports configurable remote commands, you can select “**Configurable**”, or select “**Read ONLY**”.

When selecting “**Read ONLY**” mode, the **Function**, **Range** and **NPLC** must match the DMM's current settings, otherwise, the DMM PC-TOOL may display incorrect data.

In addition to the initialization commands in the configuration file, you can enter any temporary configuration commands in the “**Initial Command**” input box. One command per line, or separate commands with “;” (if supported by the DMM).

Configurable ☒ Read ONLY

Function: DCV Range: 10 NPLC: 10

If DMM isn't configurable, please set the read command in the config file, and switch to 'Read ONLY' mode.

Initial Command (make sure the first line is not empty)

## 5.5 DMM Disp Text

If the DMM supports display text commands, enable the checkbox to show the last measured value on the DMM's screen.

For example, with an HP34401A (6.5-digit DMM), you can:

- Set the digit to 7.5 in the “**Main Panel**”
- Enable this checkbox, the DMM will then display values with 7.5-digit resolution on its screen.

Digit 7.5

DMM Disp Text

☒ ON

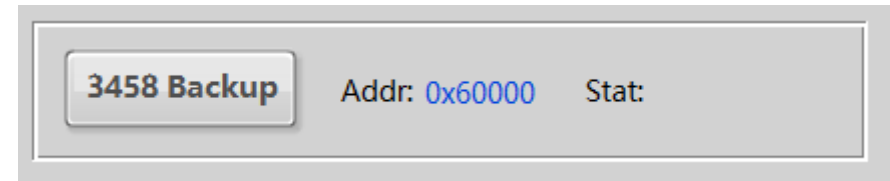
Refer to DMM manual.

Once ON, the last value will be shown on DMM's screen.

## 5.6 3458 Backup

This function uses the undocumented MREAD command to read the HP3458A DMM non-volatile, battery backed calibration or data NVRAM chips. When backup finished, it saves a bin file and a text summary file in “data” directory, named as follows:

CALM3458\_YYYY-MM-DD\_hhmmss.bin  
CALM3458\_YYYY-MM-DD\_hhmmss.txt



3458 Backup Addr: 0x60000 Stat:

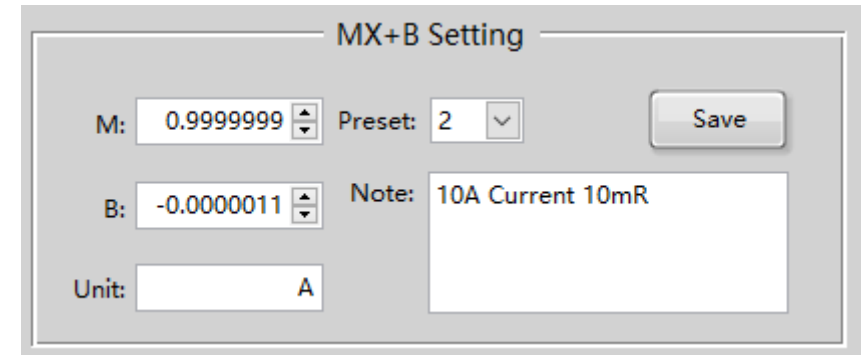
## 5.7 MX+B Setting

The DMM PC-TOOL provides **MX+B** measurement capability for DMMs that lack this native function. To use this feature:

- Configure your parameters and units here
- Enable **MX+B** in the Main Panel

Key advantages:

- Supports up to 10 preset **MX+B** parameter sets
- Allows for quick and convenient configuration



MX+B Setting

M: 0.9999999 Preset: 2 Save

B: -0.0000011 Note: 10A Current 10mR

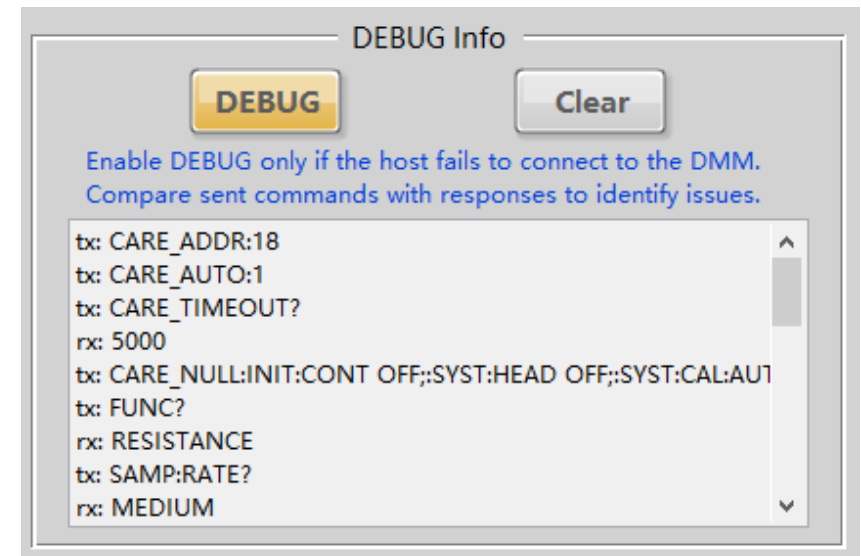
Unit: A

## 5.8 DEBUG Info

### Troubleshooting DMM Connection Issues:

- Enable **DEBUG** mode in Options before connecting to the DMM.
- All sent commands and received data will be displayed in the DEBUG Info text box.
- Compare the commands with their corresponding responses to identify where the problem occurs.

**Note:** Do not enable DEBUG mode when the DMM is connected and acquiring data normally, as this will significantly reduce operational efficiency.



DEBUG Info

DEBUG Clear

Enable DEBUG only if the host fails to connect to the DMM.  
Compare sent commands with responses to identify issues.

tx: CARE\_ADDR:18  
tx: CARE\_AUTO:1  
tx: CARE\_TIMEOUT?  
rx: 5000  
tx: CARE\_NULL:INIT:CONT OFF;;SYST:HEAD OFF;;SYST:CAL:AUT  
tx: FUNC?  
rx: RESISTANCE  
tx: SAMP:RATE?  
rx: MEDIUM

## 5.9 Registration

### Software Features & Limitations:

- **Free to Use:** All offline functionalities, **Terminal** when connected via **Debug** mode.
- **Trial Period:** Data **acquisition** and **calibration** functions can be used free for **30 minutes per session**.

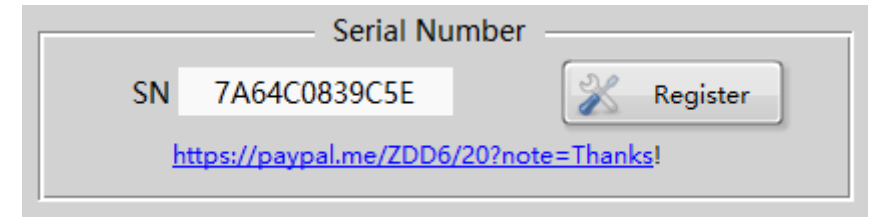
To unlock unlimited usage of all features, including data acquisition and calibration capabilities, please purchase a registration code.

### Pricing Options:

- \$20 USD (Payable via clicking the PayPal payment link)
- ¥100 CNY (Payable via WeChat Pay or Alipay QR code)

### Registration Process:

- After payment, please email your purchase details and device SN to: 1739687470@qq.com
- We will verify your payment and email the registration code to you
- Click the "**Register**" button in the software
- Enter the registration code in the pop-up window to complete activation



## 6. Calibration

Supported Models: **34401A, 34420A, DMM4040, DMM4050.**

If other DMM uses **identical calibration commands** to the 34401A, select “**34401A**” as the DMM model, and proceed with calibration.

Unsupported selections will **silently ignore** calibration operations.

### 1) Unsecure

Enter the correct password to disable protection.

### 2) Zero Calibration

Perform first by plugging in 4-wire shorter.

### 3) Full-Scale Calibration

Execute separately for each range/function.

### 4) Secure

Re-enable protection after calibration.

The screenshot displays the 'Calibration' tab of the 'DMM & 4W4CH-SCANNER PC TOOL v3.25.08.01 by ZDD' software. The interface is divided into several sections:

- Cal Security:** Shows the current password 'HP034401' and a message: 'LED ON: Unsecured for Cal. The DMM is currently in unsecure state. Note: This does not guarantee that the password is correct.' Below this are 'Unsecure' and 'Secure' buttons.
- Function/Range Calibration:** Features a large digital display showing '09.999967 V' and 'RANG: DCV 10V 10PLC'. To the right are buttons for 'RANG-', 'RANG+', 'PLC-', 'PLC+', 'AUTO', and 'NULL'. A dropdown menu for 'Select Function' is set to 'DC Voltage'. A red note states: 'Make sure correct FUNC/RANG are selected.'
- Zero Adjustment:** Includes a 'Zero Adjust' button and instructions: 'Plug in 4-wire shorter. Under any function, press 'Zero Adjust' to make zero adjust for DCV, DCI, OHM-4W and OHM-2W function.'
- Full-Scale Cal:** Includes a 'Full-Scale Cal' button and a 'Full-scale' input field set to '10.00000000 V'. Instructions state: 'Enter exact known value for selected scale, eg., 10.00001 (Note the units).'
- Cal Message:** Contains a 'Message' field (Max 40 characters) with the text '06 OCT 2023@34.0C', a 'Cal Count: +208', and a 'Modify Cal Msg' button.
- Messages from DMM:** A large text area for receiving messages from the DMM, with a 'Cal Finished' button below it. Instructions state: 'After a calibration, it will automatically return to the acquisition state, otherwise click the <Cal Finished> button to continue data acquisition.'

## 7. 4-Channel 4-Wire Scanner

### 7.1 Communication Protocol

This software supports compatible 4-channel scanners that adhere to the following communication protocol:

COM port parameter: 115200bps, 8N1

Command:	Action:
SCAN_RLY:01	Select Channel 1 ( Scanner must reply )
SCAN_RLY:02	Select Channel 2 ( Scanner must reply )
SCAN_RLY:03	Select Channel 3 ( Scanner must reply )
SCAN_RLY:04	Select Channel 4 ( Scanner must reply )

SCAN_TEMP:01	Read Scanner's Temp1
SCAN_TEMP:02	Read Scanner's Temp2

### 7.2 Connection Steps:

- 1) **Configure DMM Settings**
  - Set the correct **connection method** (e.g., GPIB, USB, TCPIP, RS232)
  - Specify **port parameters** (baud rate, address, etc.)
- 2) **Enable Scanner Functionality**
  - Check the **"Use 4W Scanner"** option
- 3) **Assign Scanner Port**
  - Select the **scanner's port number** (e.g., COM15)
- 4) **Establish Connection**
  - Click **"Connect DMM"** to initialize communication

The screenshot shows the software interface for configuring a 4-channel 4-wire scanner. The interface is divided into several sections:

- DMM Settings:** A red circle highlights this section. It includes a DMM dropdown menu set to "34401A", a "Refresh" button, and radio buttons for "MeterCare" and "Others". Below these are options for "COM" and "LAN" ports, with "COM" selected and set to "COM4" and "115200".
- Scanner Functionality:** This section includes a checkbox labeled "Use 4W Scanner" which is checked. Below it are "Scanner Temp" and "Other Temp" indicators.
- Scanner Port:** This section includes a "Scanner Port" dropdown menu set to "COM15".
- Connection:** This section includes an "Interval" dropdown set to "1000 ms" and a "Connect DMM" button.
- Temp Sensor Setting:** This section includes radio buttons for "None/needless", "1 sensor", and "2 sensors". It also has fields for "T1 CMD", "T2 CMD", and "Prefix".
- Timeout Setting:** This section includes dropdowns for "MeterCare" (5000 ms) and "PCTool" (10000 ms).

The bottom status bar shows the date and time: 2025年8月5日 星期二 10:30:01.

### 7.3 4-Wire Scanner Configuration Guide:

#### 1) Channel Selection

- Select the **active channel number** (1–4) in the **4W Scanner** tab.
- **For reference measurements** (Enable **Use Ref**):
  - Reference source must connect to **CH1** (fixed requirement).
  - Enter the reference source's calibrated value in the **Ref** input box.

#### 2) Timing Settings

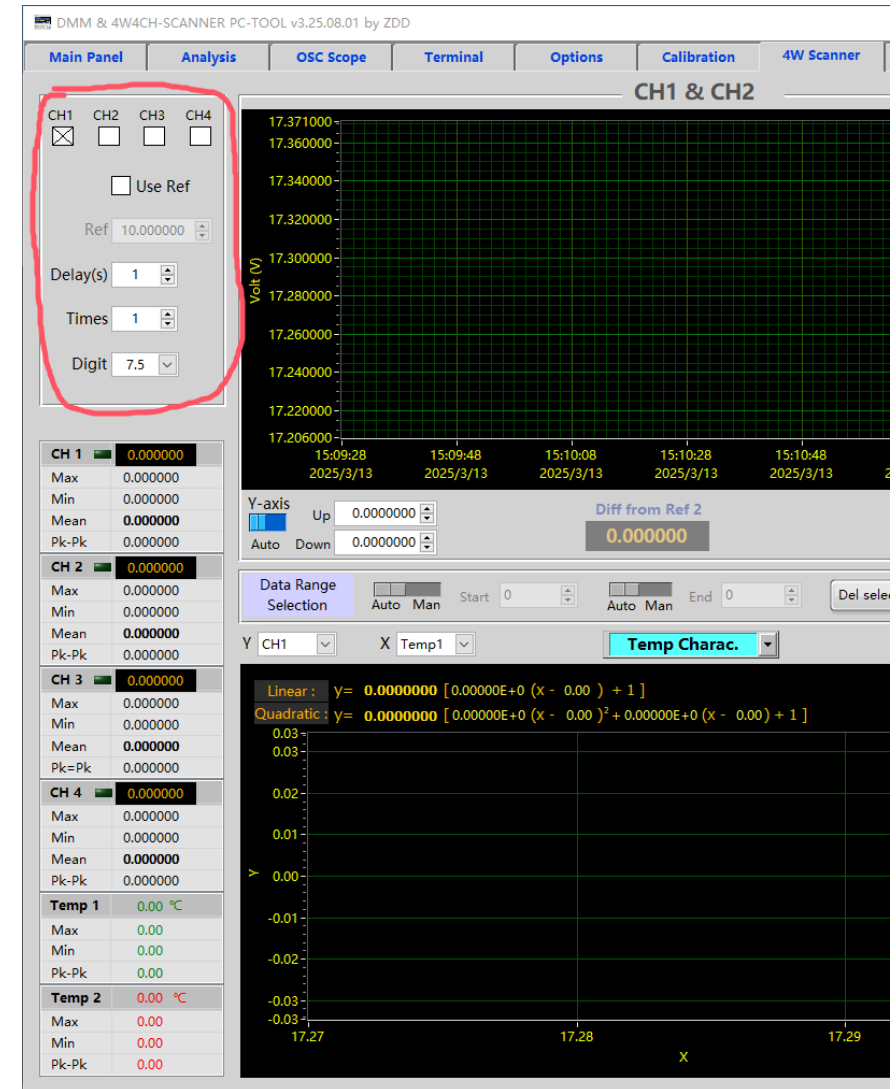
- **Delay Time (0–10s)**:
  - Defines the wait time after channel switching.
  - *Example*: Set to **2s** for stable relay settling.

#### 3) Sampling Configuration

- **Times** (Sampling Count):
  - Number of readings per acquisition (e.g., **10**).
  - The **average value** is used as the final result.

#### 4) Digit

- Select the digits for measurement results.



## 8. Tools

This tool can perform the following calculations related to temperature drift parameters:

### 1) Predict Value at Specific Temperature:

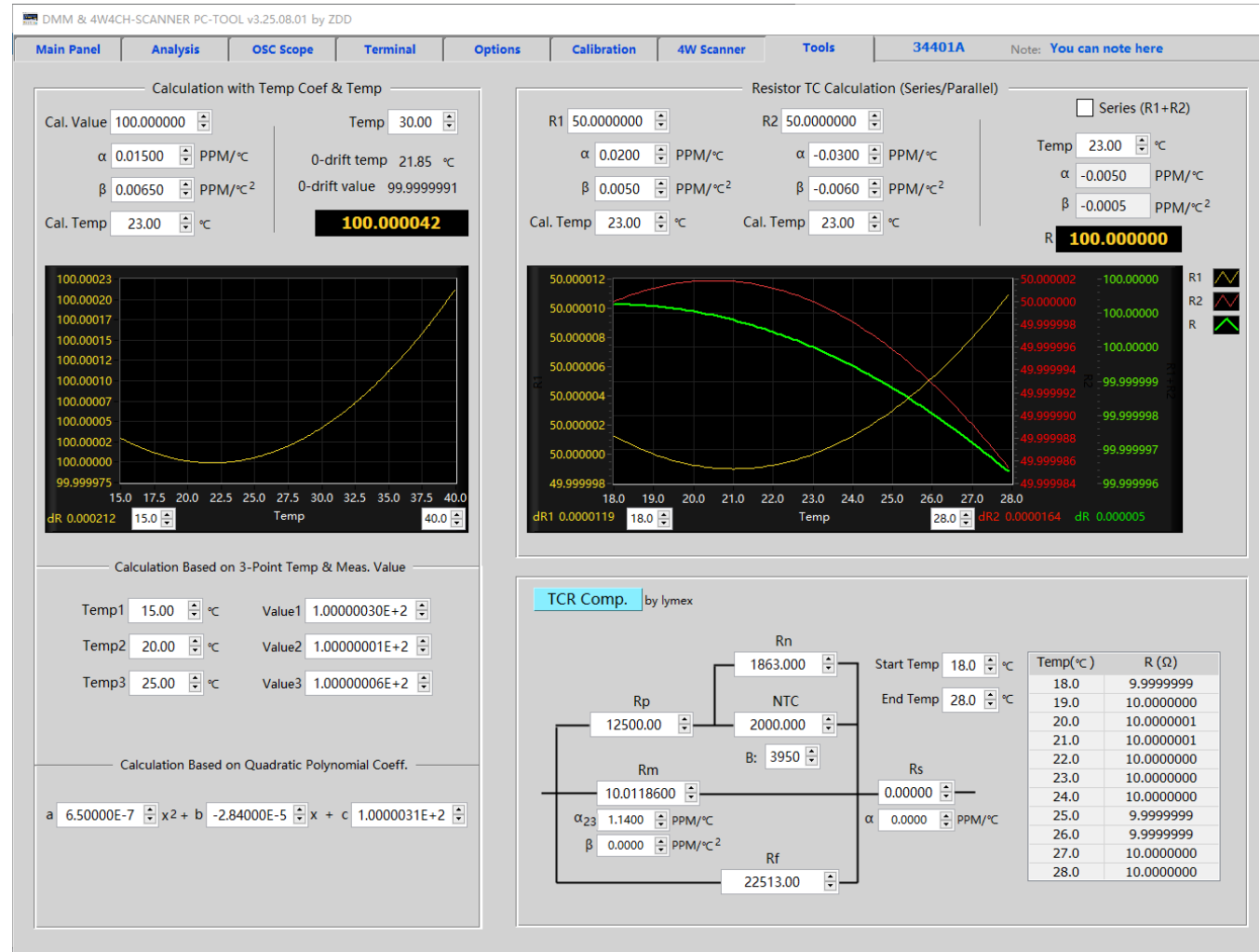
Calculate the predicted value of a component (e.g., resistor) at a given temperature based on its temperature coefficient parameters.

### 2) Temperature Drift Calculation for Series/Parallel Resistors:

Compute the effective temperature coefficient for resistors connected in series or parallel, considering their individual temperature coefficient parameters and values.

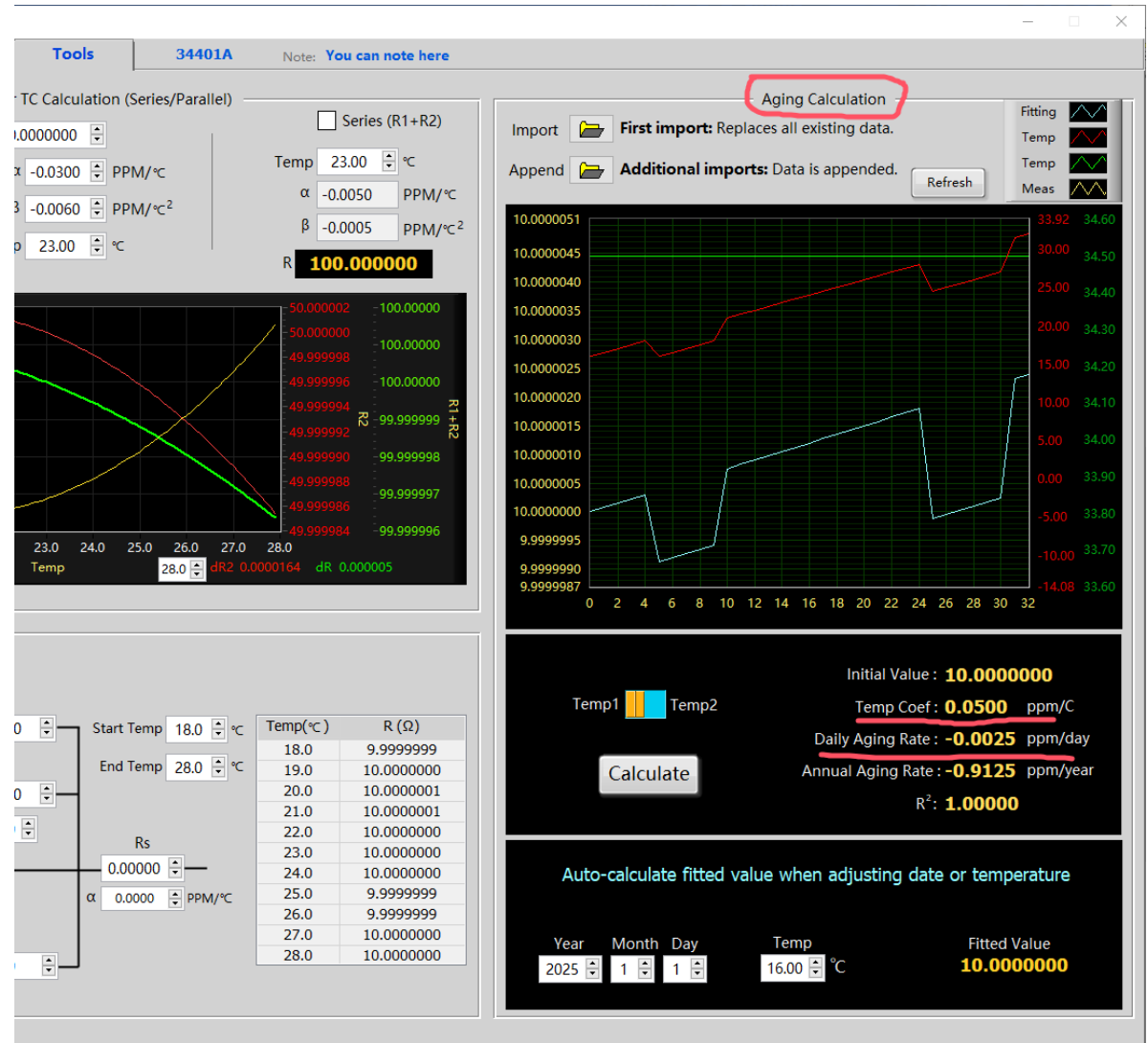
### 3) Temperature Compensation for Known Resistors:

Determine the optimal resistors (values and temperature coefficient parameters) required to compensate for the temperature drift of main resistor, achieving a near-zero overall drift.



#### 4) Aging Calculation:

- Import one data file, or append more data files for aging calculation.
- The data files should be (CSV, Excel) format that logged or exported by this DMM PC-TOOL.
- You can select Temp1 or Temp2 for temperature drift coefficient calculation.
- **The results:** Initial Value, Temp Coef., Daily Aging Rate, Annual Aging Rate, and  $R^2$ .
- Also, you can adjust the date or temperature to calculate the fitting value according to the Initial Value, Temp Coef., and Daily Aging Rate got above.





## 9. Trouble Shooting

### 1) Issue Description:

If the exported waveform data does not display correctly when reimported, it may be caused by incorrect system **date and time format settings**, resulting in incompatible data formatting.

### Solution:

Please adjust the system's **date/time format** as shown in the illustration right to ensure proper export and import functionality.

