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bHome Reader (BHR) Development Tool

Version History

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Version	Compatible Software Version	Date	Description of Changes	Edited By
1	BHR Tool V0.0.6	2025/4/25	Initial release	Nathan Chen
1.1	BHR Tool V0.0.9	2025/6/6	Add for the "Floating Number" and "Reference Range" features	Nathan Chen
1.2	BHR Tool V0.0.16	2025/8/23	Used RANSAC to determine if the T-line is linear	Walter
1.3	BHR Tool V0.0.29	2025/10/17	Increase Profile name to 26 digits, Curve Type: Logistic Input, Logistic InputLogGaussian Input,Guadractic,Guaussian,Statement condition	Walter
1.4	BHR Tool V0.0.30	2025/10/31	Modify the ProfileList buffer to prevent by excessive profiles Fix the issue where UART read data gets truncated. Resolve the UART connection issue during charging.	Walter
1.5	BHR Tool V0.0.31	2025/11/6	Modify the license storage method for scenarios multiple sets of licenses.	Walter
1.6	BHR Tool V0.0.34	2025/12/05	Adjust the analysis time to prevent issues caused	
			Modify the boot process to avoid the issue of booting during connection Add database function. And”User”and”Note” field in the setting Add input function for the statement button	
1.7	BHT ToolV0.0.36	12/07	Modify the database to migrate the setting feature to the FindArea page Impose restrictions on the input contest of ProfileName field	
	BHR ToolV0.0.37	12/09	Fixed the issue of setting serial numbers are not reflected in the database Fixed the issue where the Factor is not updated after calibration. Fixed the abnormal record issue in the database.	

Setting And Get License Key

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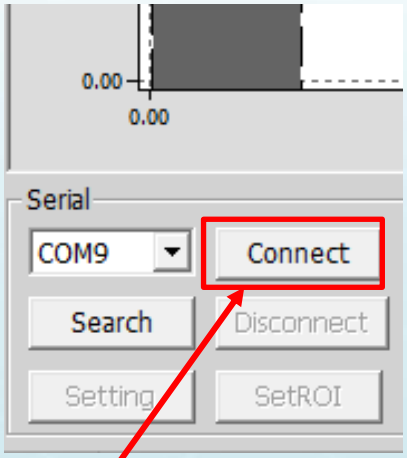
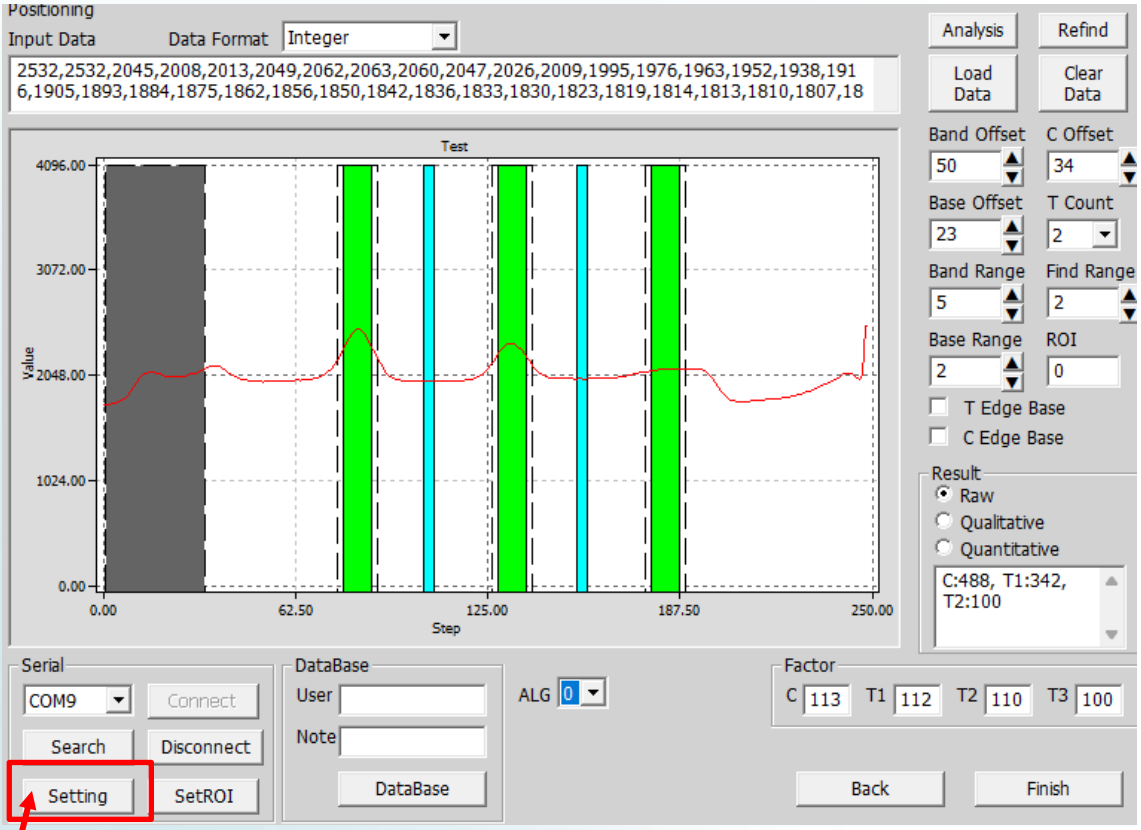


Setp1 : press connect



Setp2 : press setting

Setting And Get License Key

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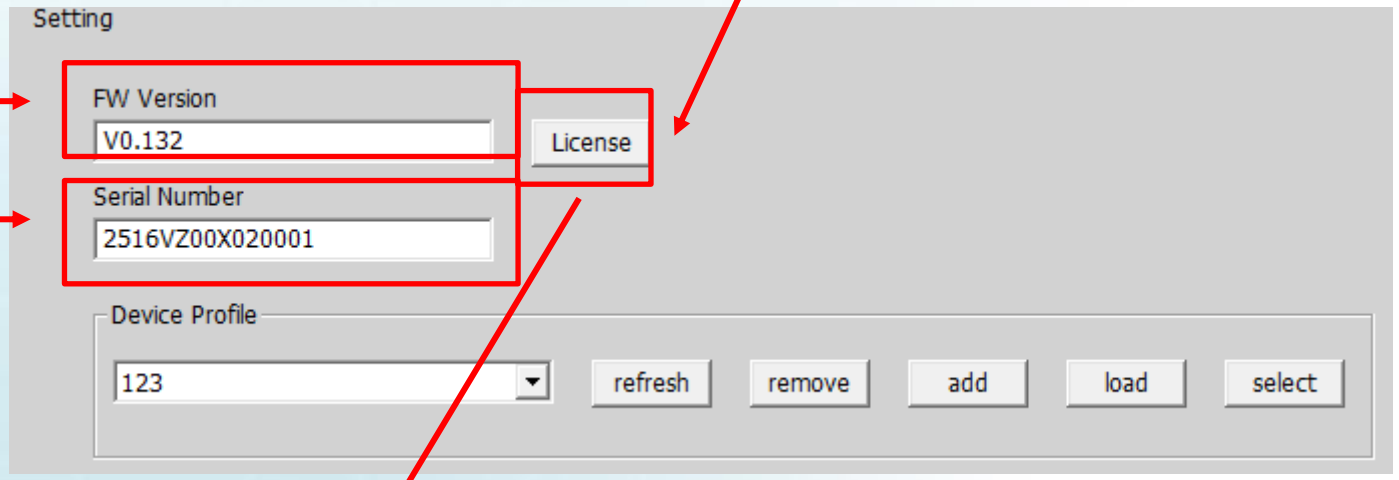
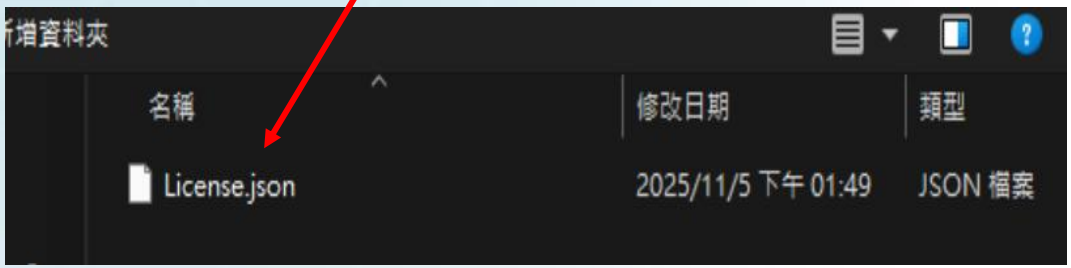
Select License.json to get BHR SW license

BHR SW version

PH Plus serial No.





Setting Page

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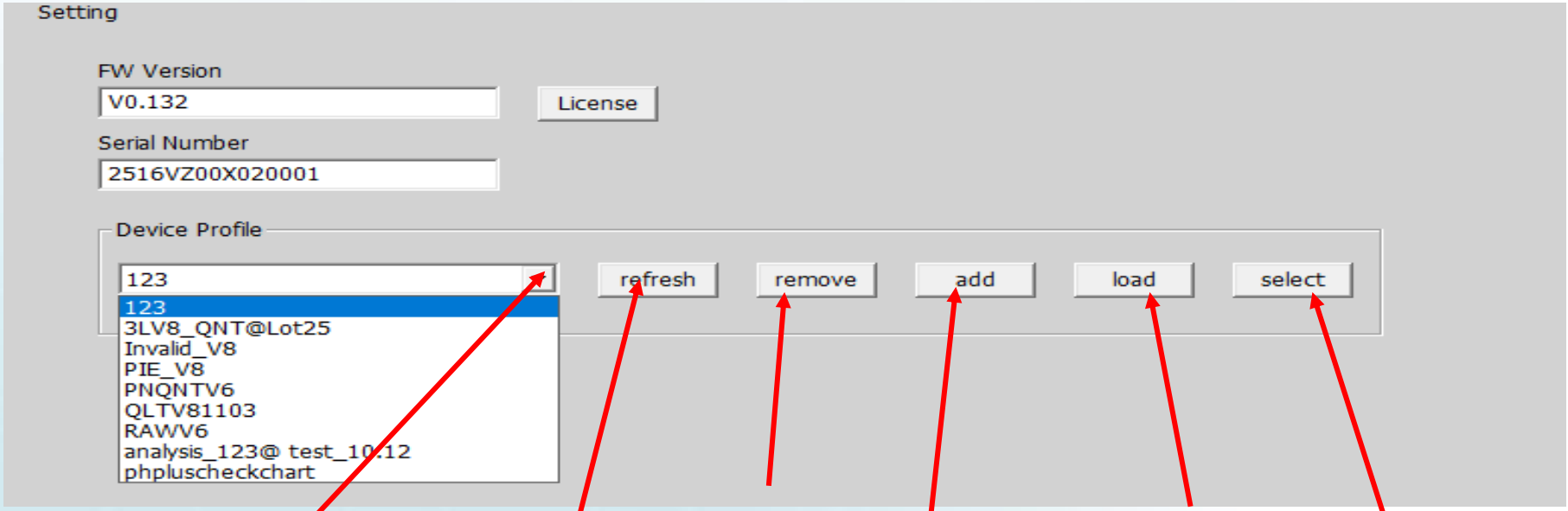

Profile list

Show PH Plus reader profile

Remove PH Plus reader profile

Add PH Plus reader profile

Load PH Plus reader new profile

Load PH Plus reader new profile

Main Steps

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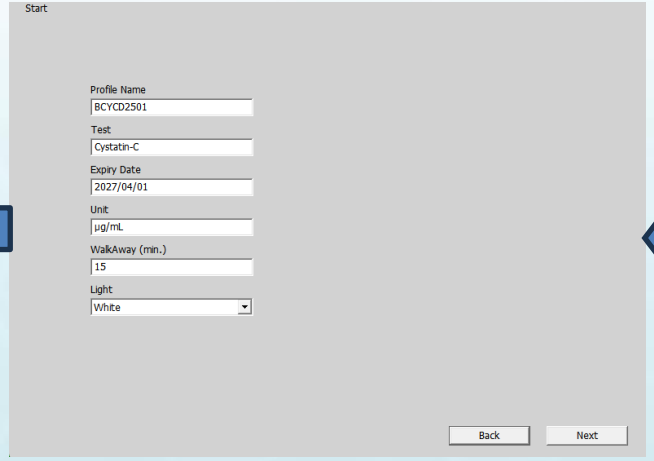
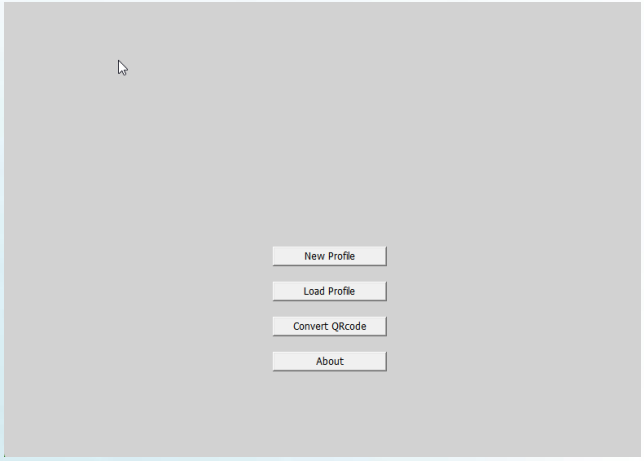
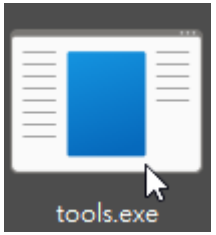
Menu2: Basic Information Settings



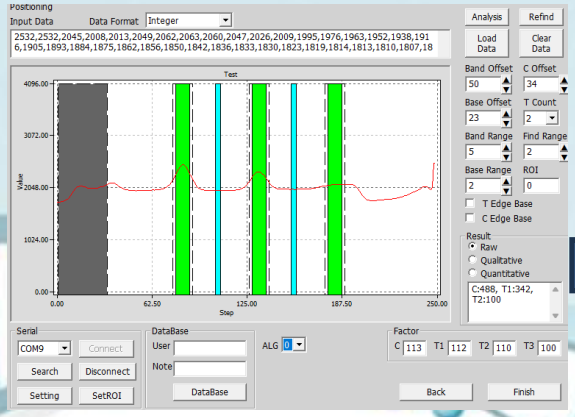
Menu1:Create a New Profile or Load a Sample Profile



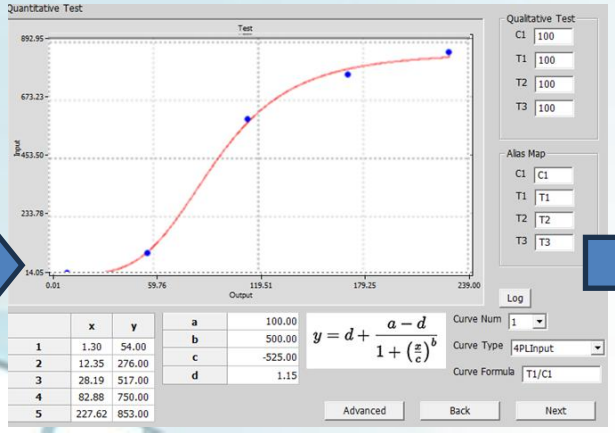
Launch Development Tool



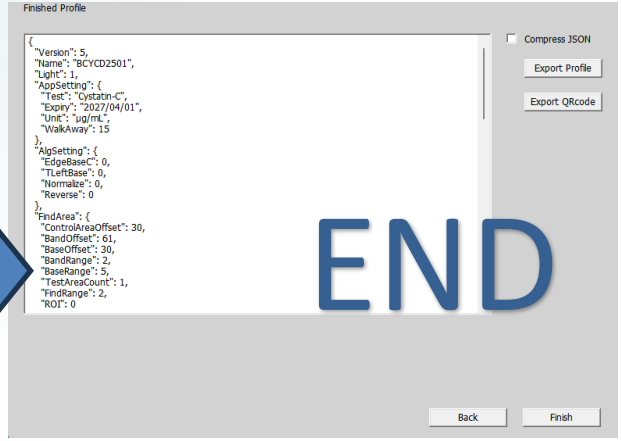
Menu3 :C and T Band Position Settings



Menu4:Concentration Curve Settings (**for Licsenc Key only**)



Menu5:Export Profile or Convert to QR Code



END

Menu 1

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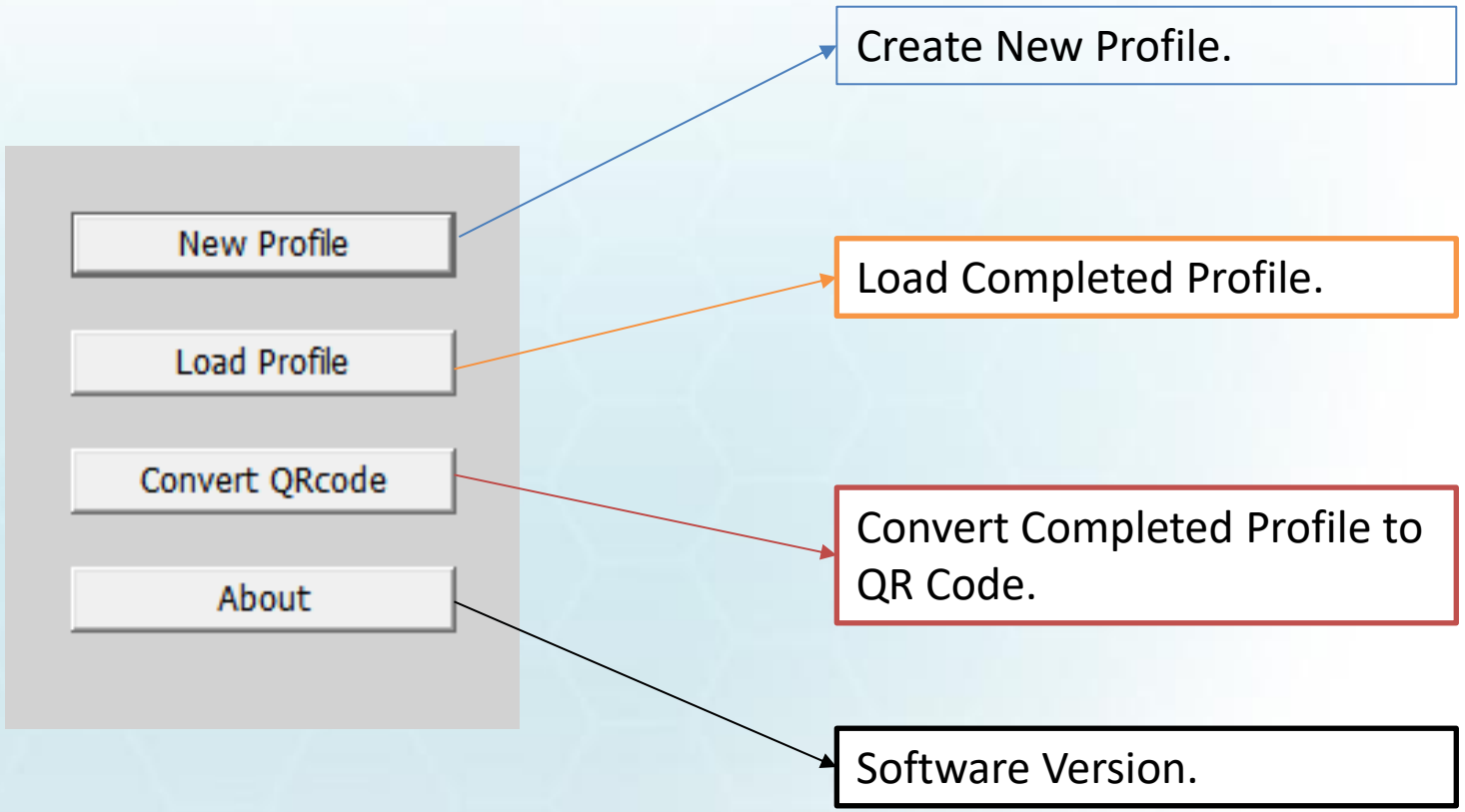

Menu 2

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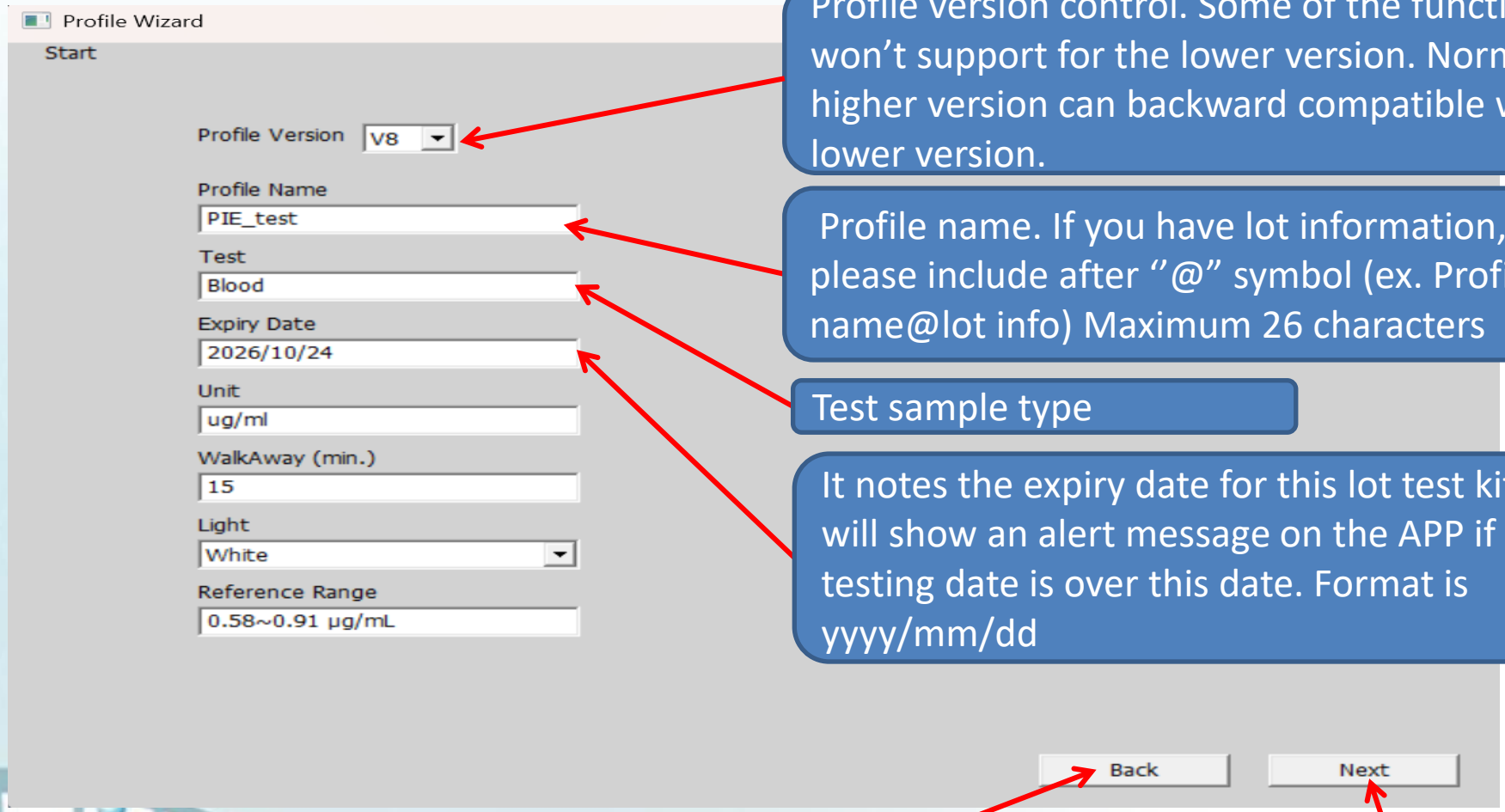

Profile version control. Some of the function won't support for the lower version. Normally higher version can backward compatible with lower version.

Profile name. If you have lot information, please include after ''@" symbol (ex. Profile name@lot info) Maximum 26 characters

Test sample type

It notes the expiry date for this lot test kits. It will show an alert message on the APP if the testing date is over this date. Format is yyyy/mm/dd

Get back to previous menu

Go to the next menu

Menu 2

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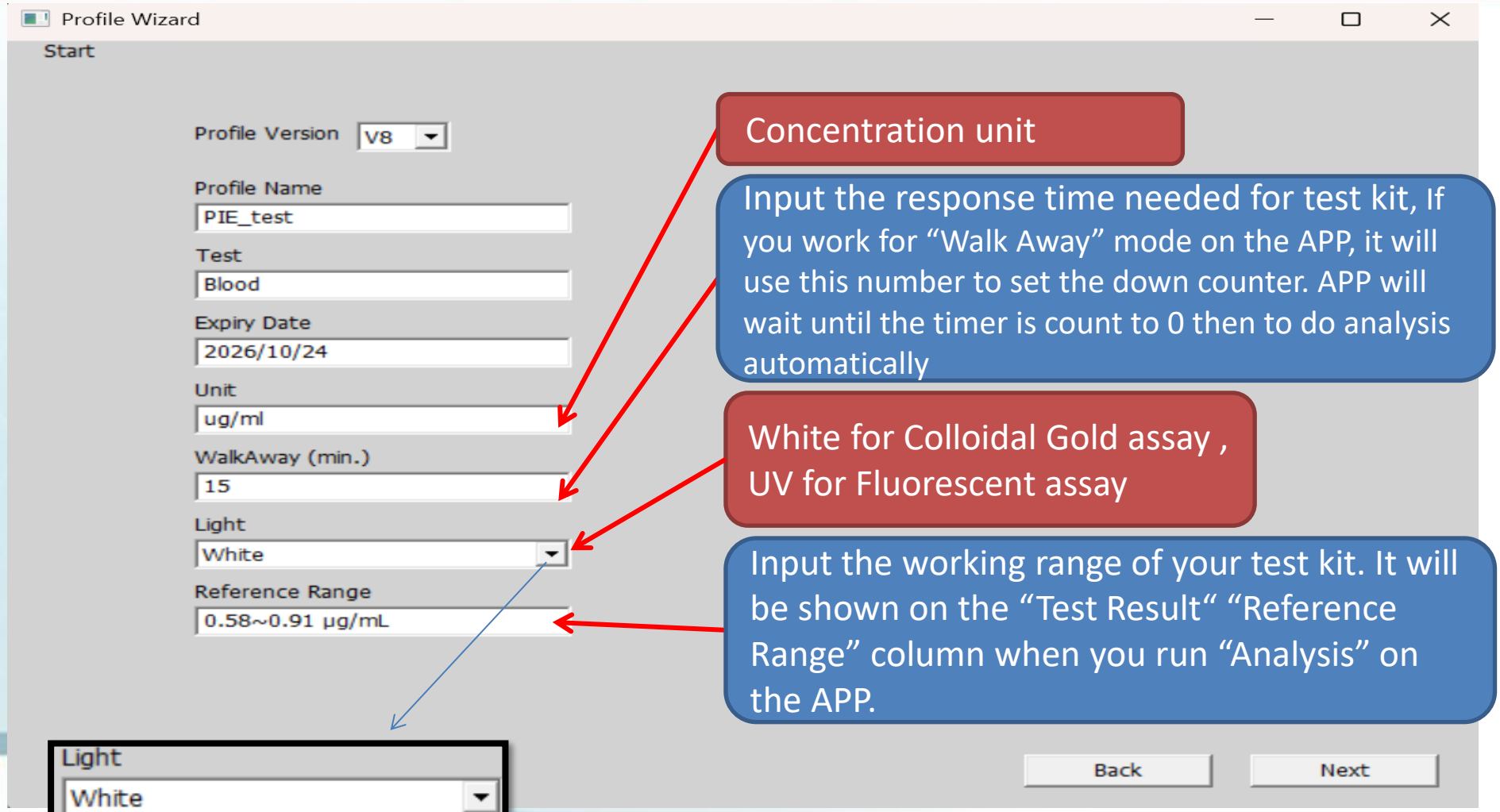

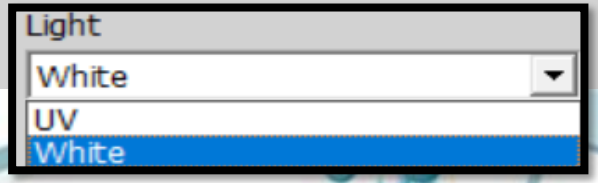

Menu 3(Positioning)

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Reader signal viewing window

"Input Data" row for signal data input

Directly read the signal data from reader

Use to auto-adjust "Band Offset" value

Clear the data in "signal data input row"

Load the signal data to "signal data input row" by .csv file

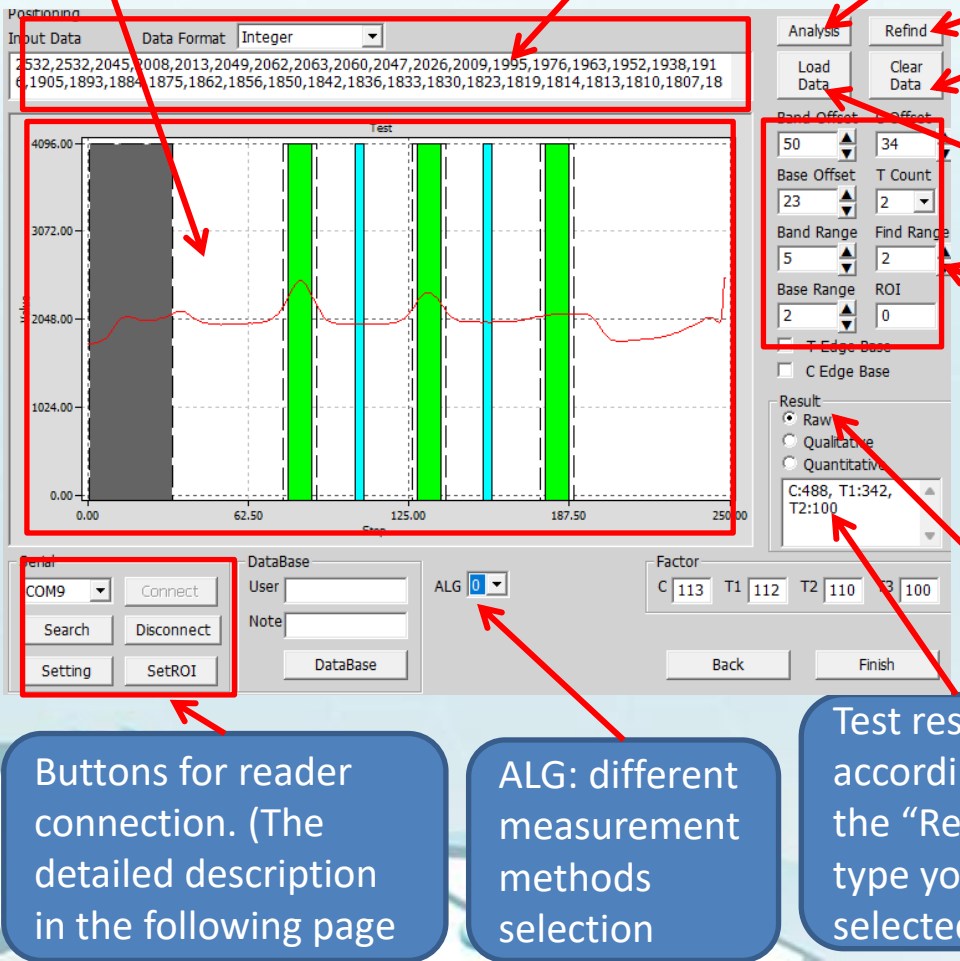
Some parameters used for measuring the value of C/Ts. It will have more detail explanation in the following pages

3 different kinds of data will be get after do analysis:
*Raw: original data got from reader
*Qualitative: Positive+ or Negative- after compare with the cut-off values
* Quantitative: will get the concentration value like according to the standard curve

Buttons for reader connection. (The detailed description in the following page

ALG: different measurement methods selection

Test result according to the "Result" type you selected



Menu 3(Positioning)

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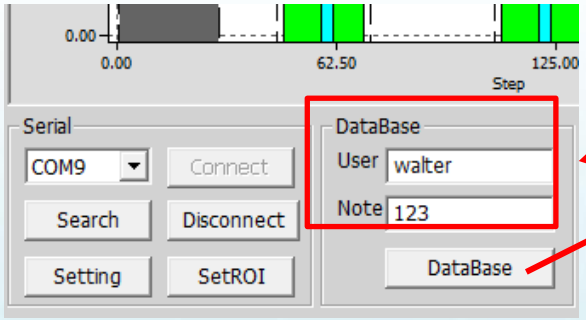
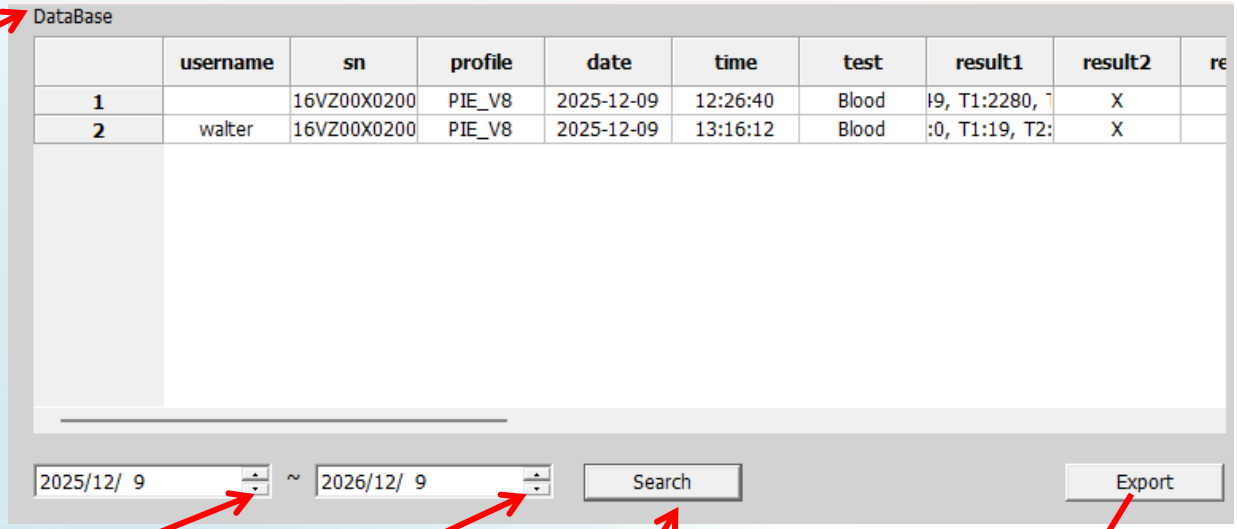


Input User and Not

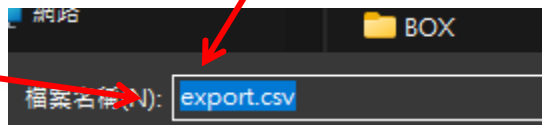


Select start date

Select finish date

Search for Analysis report

Data Export for .csv file



Menu 4(Qualitative)

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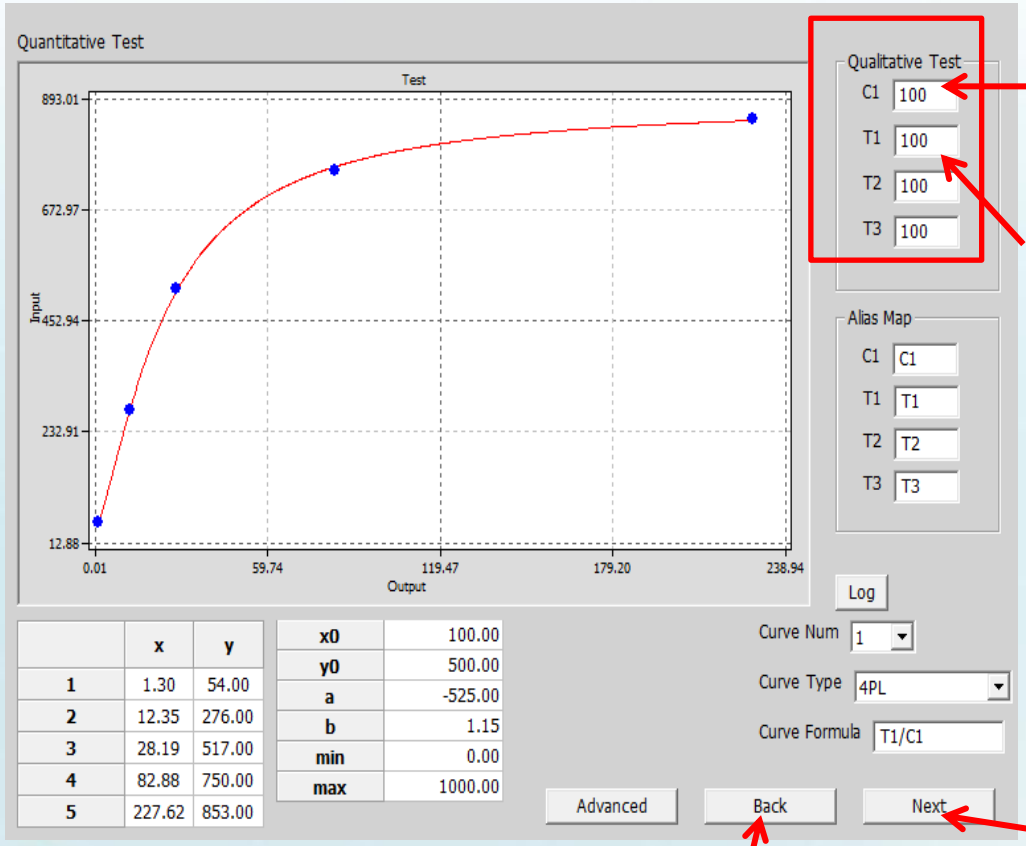

	x	y
1	1.30	54.00
2	12.35	276.00
3	28.19	517.00
4	82.88	750.00
5	227.62	853.00

x0	100.00
y0	500.00
a	-525.00
b	1.15
min	0.00
max	1000.00

Input the cut-off value for C. If the test result of C is less than this value, it will be noted a “Invalid” test no matter how it is qualitative or quantitation test

Set the cut-off value for (T1/T2/T3). It will get result “Positive+” if the tested value is bigger than this value. It will be “Negative –” if the tested value is less or equal to this value.

Go to the next menu

Get back to previous menu

Menu 4 (Quantitative)

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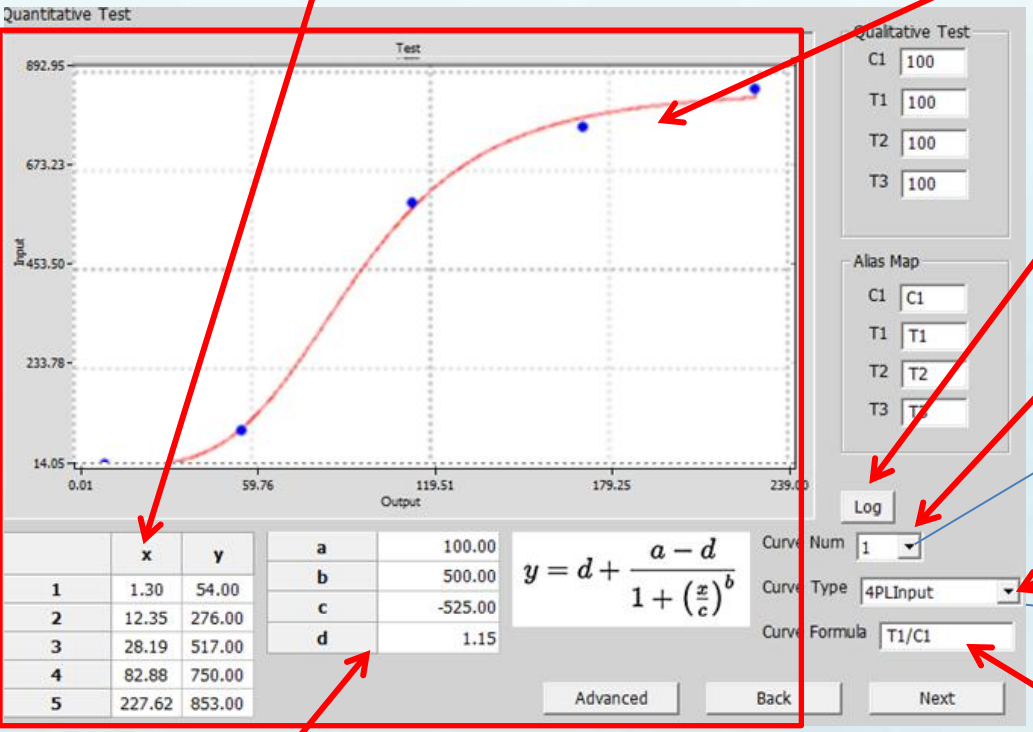
Standard curve XY table input

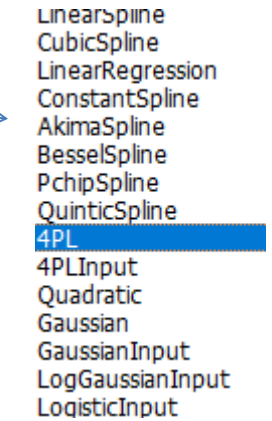
Standard curve: It will according to the sample points (X,Y) and the curve type you selected to plot the best fit curve.

Select Log function

Switch the curve for which test line (1/2/3)

Select what kind of curve to fit your bio reaction curce





This is the special input table if you select the curve type Input for“4PL ,Gaussian,LogGaussian,Logistic”

It define the formula which will apply for the curve Y input

Statement Function

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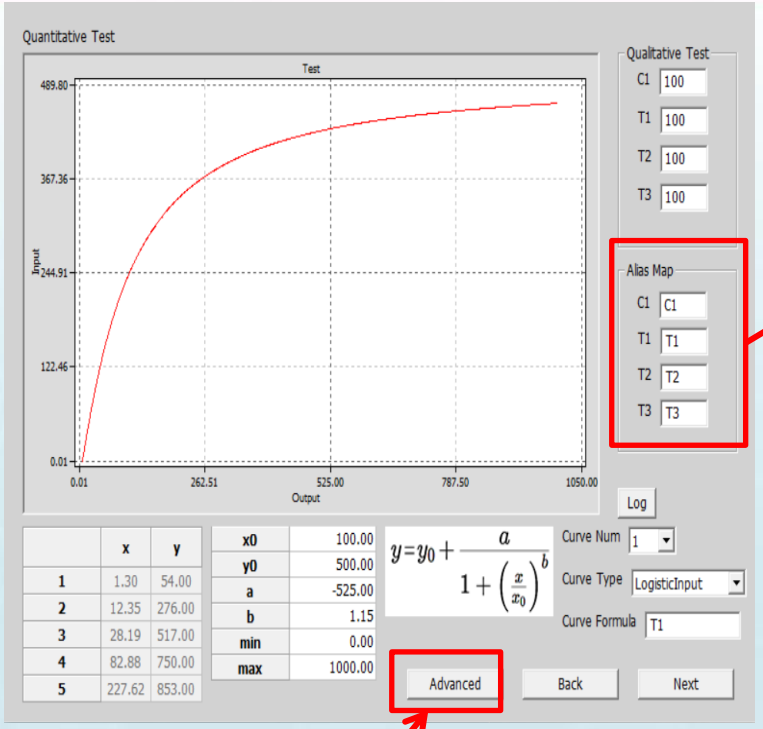
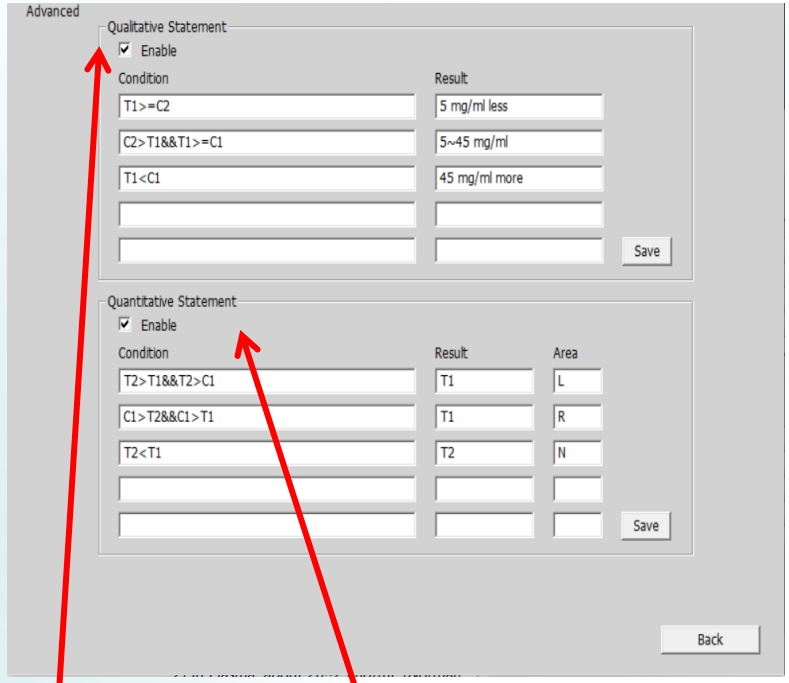


mapping with condition formula symbols



Press Advance key

Divide into two types of statements: Qualitative and Quantitative

Statement Function

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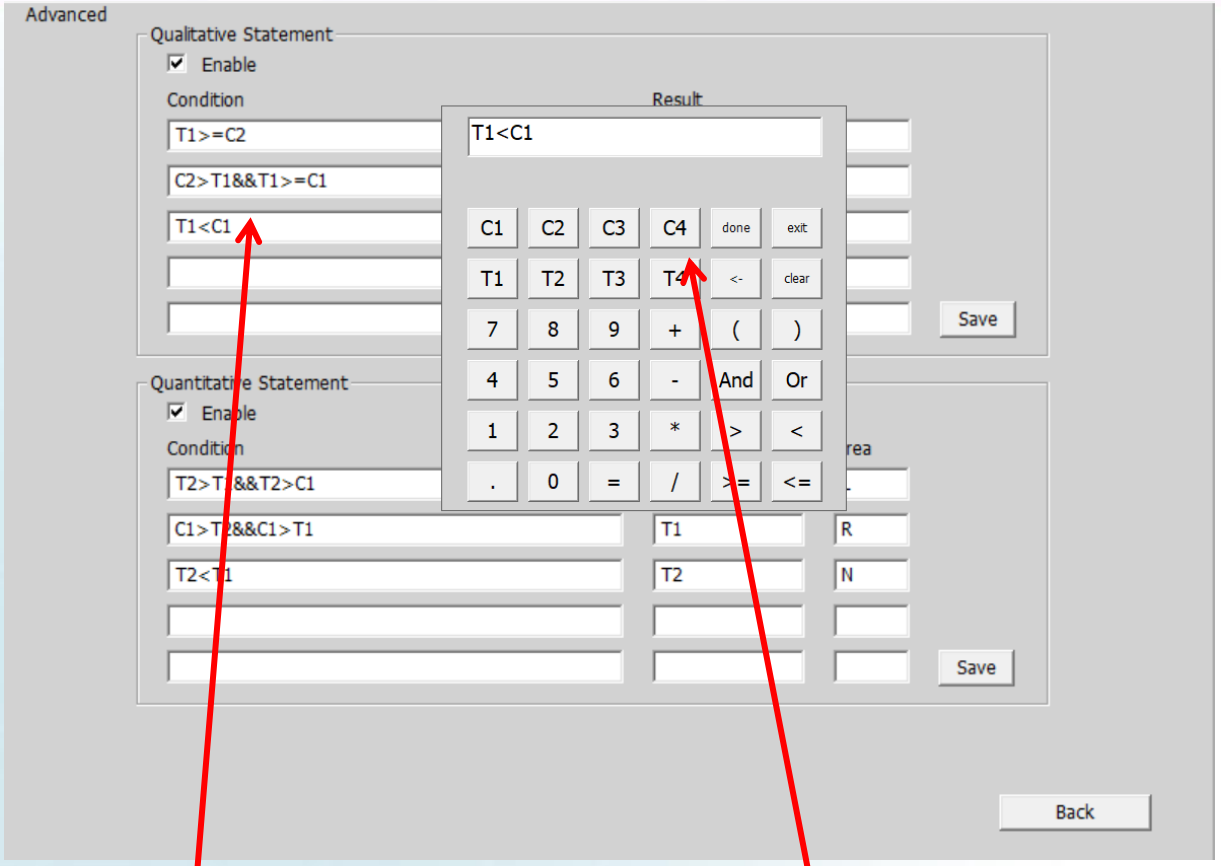

Press Mouse left key will show the keyboard for input

Qualitative Statement

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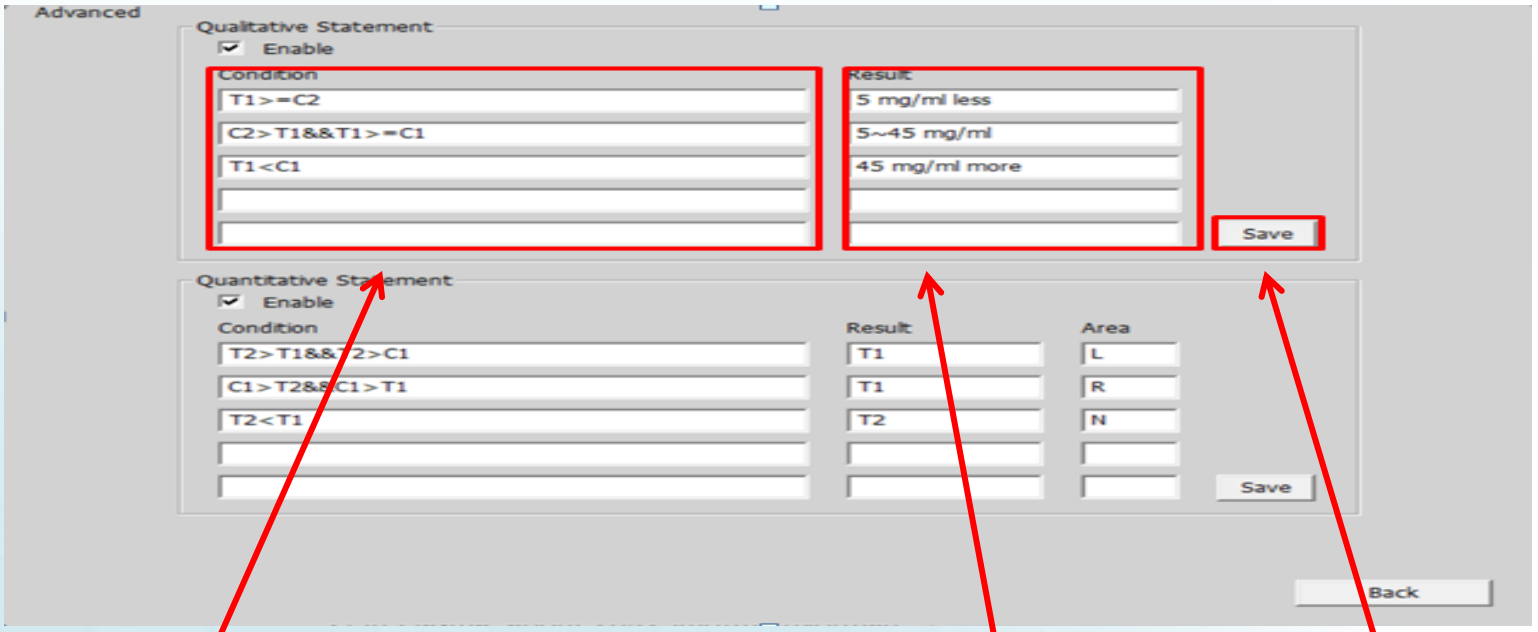


Condition : Set operation conditions

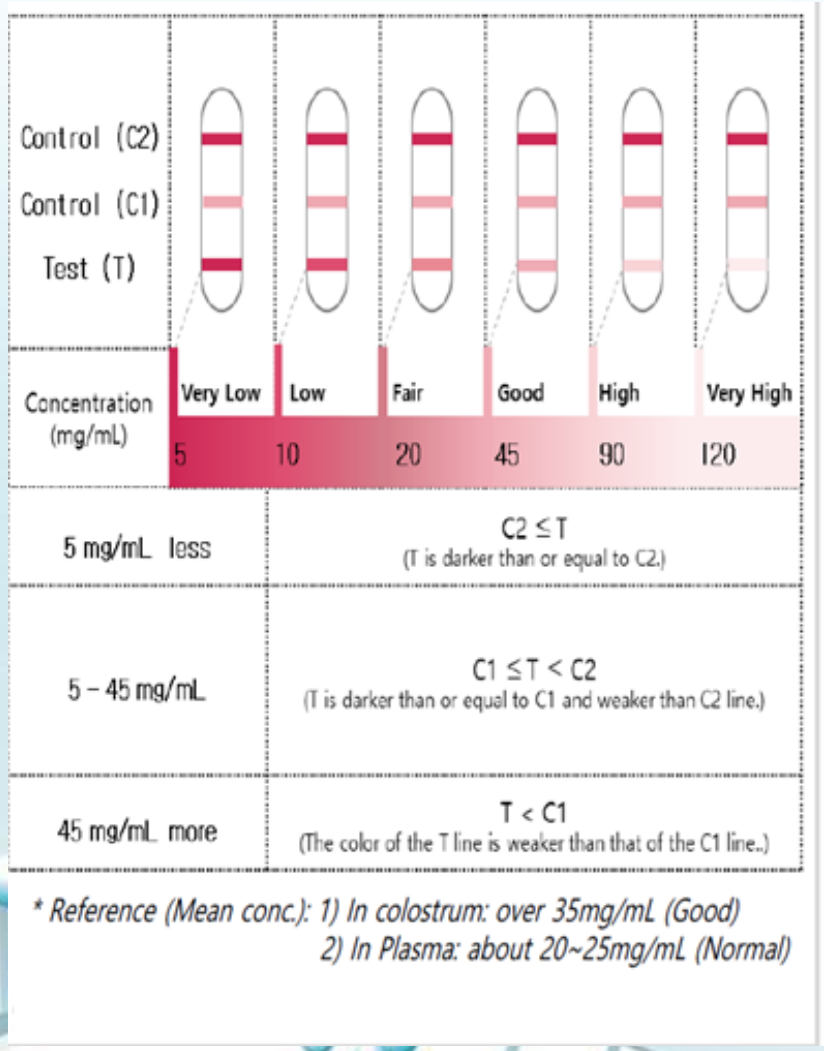
Note:

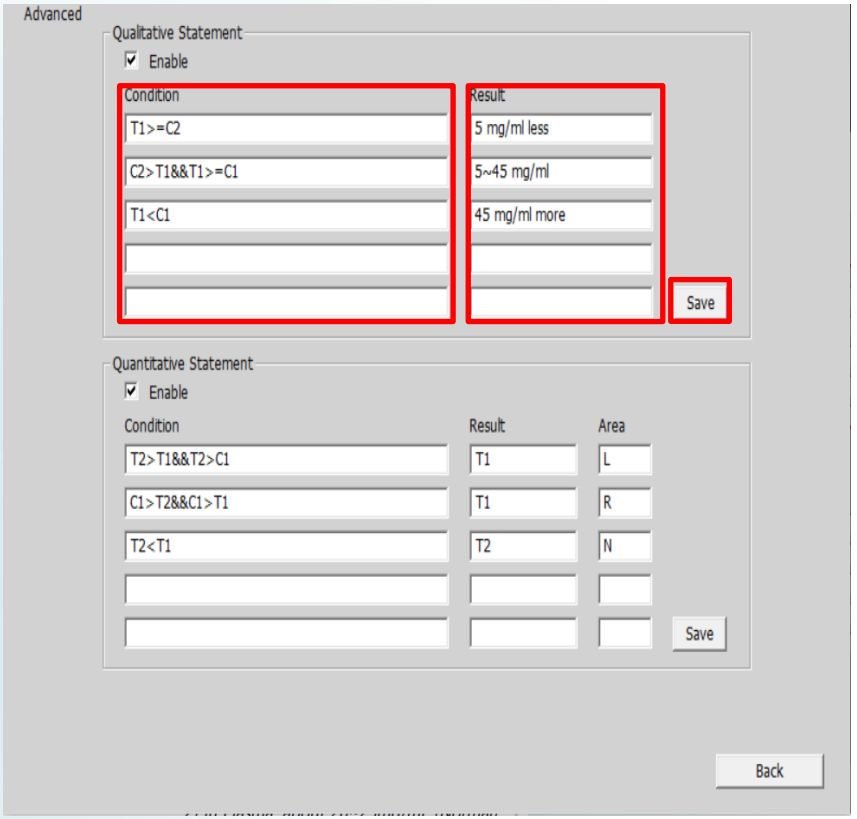
- The && symbol represents the AND operation in logical expressions."
- The II symbol represents the OR operation in logical expressions."

Result Settings:
Display Results Priority: From Top to Bottom

Save : update the current Profile

Example Qualitative Statement





Quantitative Statement

PACIFICIMAGE ELECTRONICS
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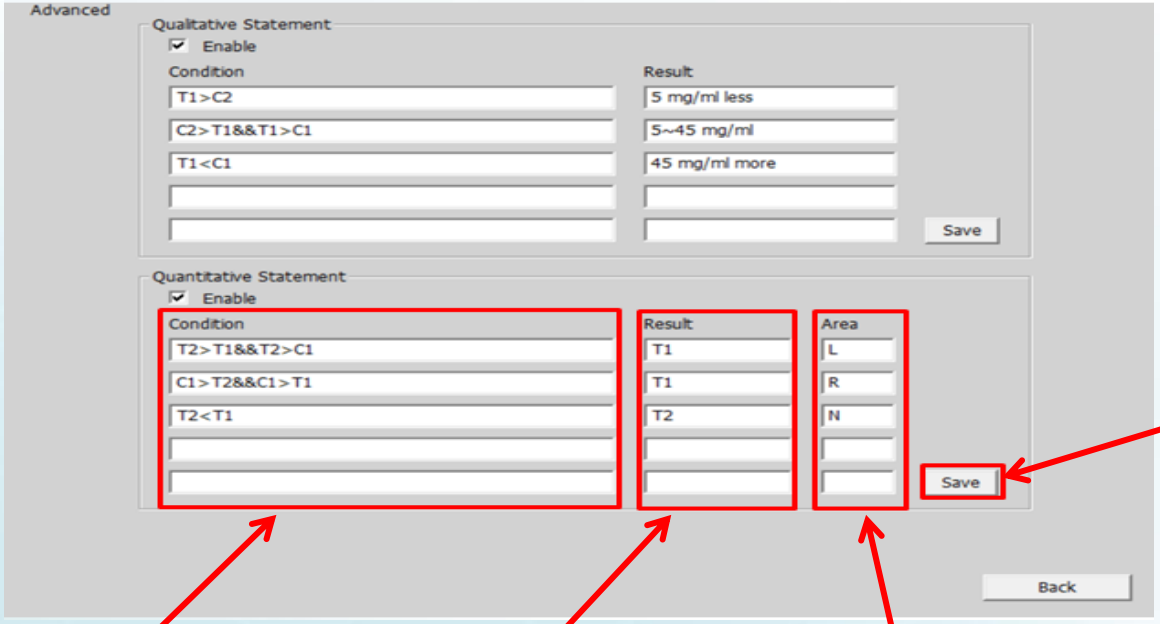

Save : update the current Profile

Condition : Set operation conditions

Result Settings: Display Results Priority: From Top to Bottom

Area Setting : Left and right sides of the Line (only used for Gaussian curve). Left: L; Right: R; None: N.

Example Quantitative Statement

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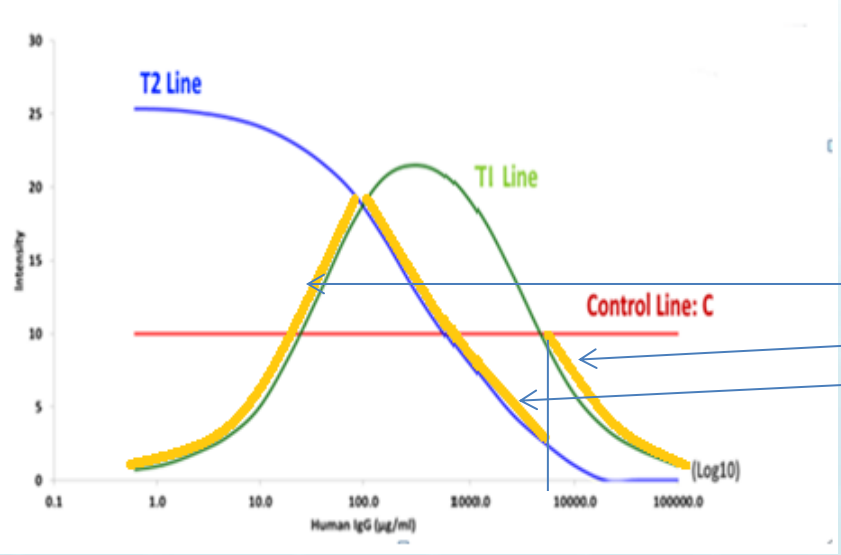

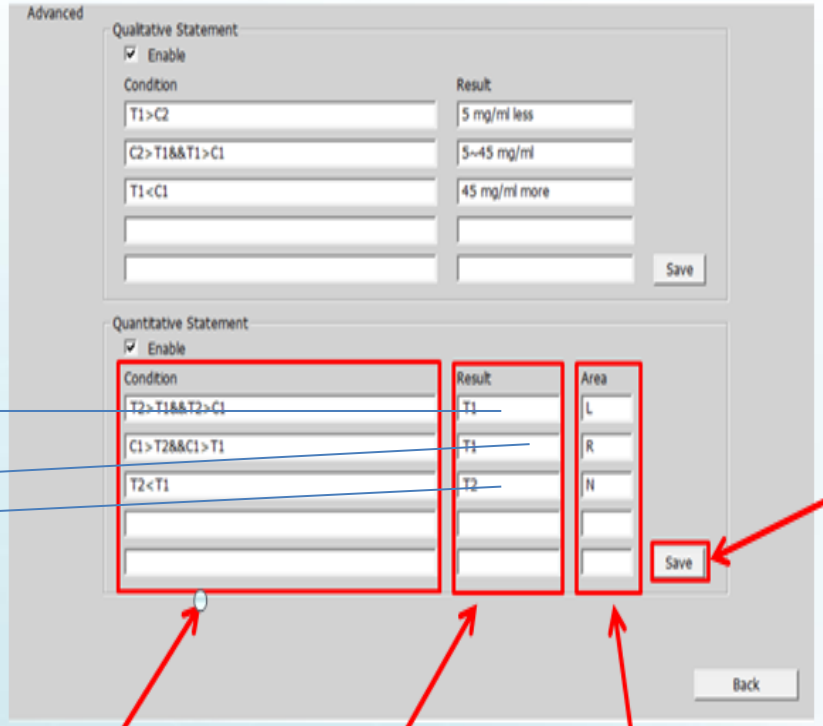

Save : update the current Profile

Condition : Set operation conditions

Result Settings: Display Results Priority: From Top to Bottom

Area Setting : Left and right sides of the Line (only used for Gaussian curve). Left: L; Right: R; None: N.

Menu 5 Export Profile

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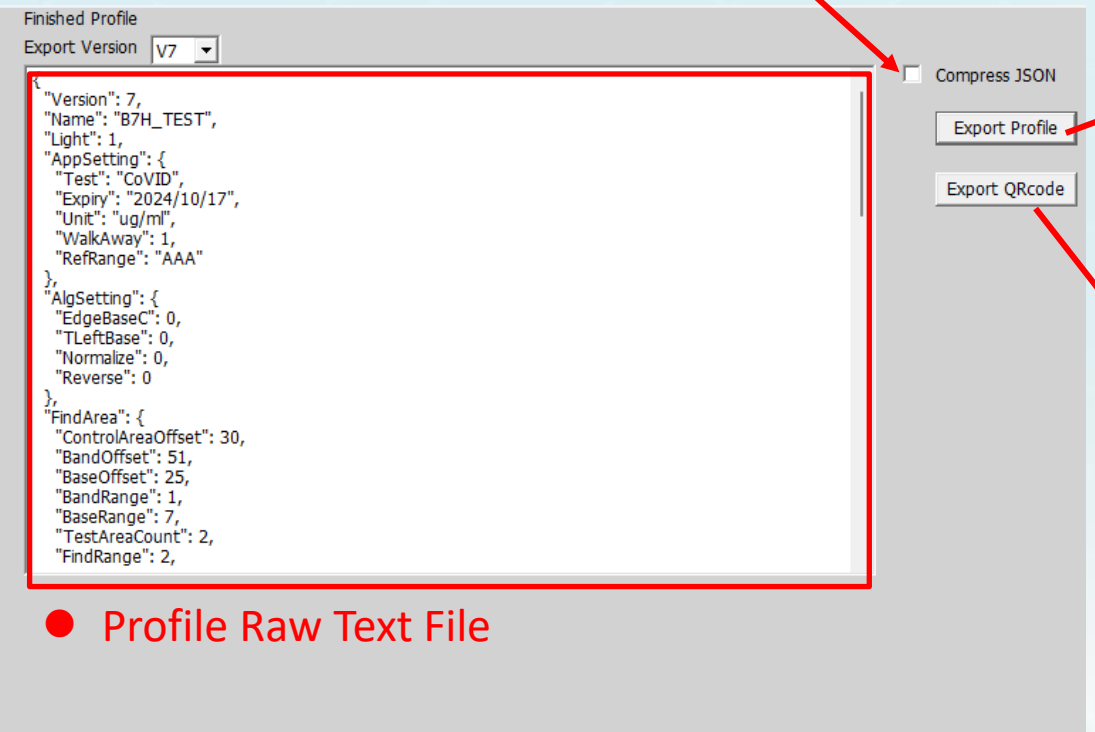
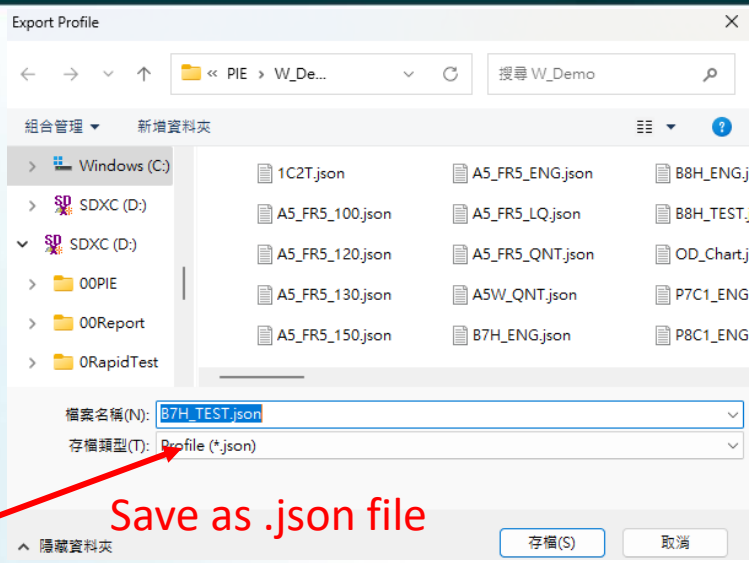
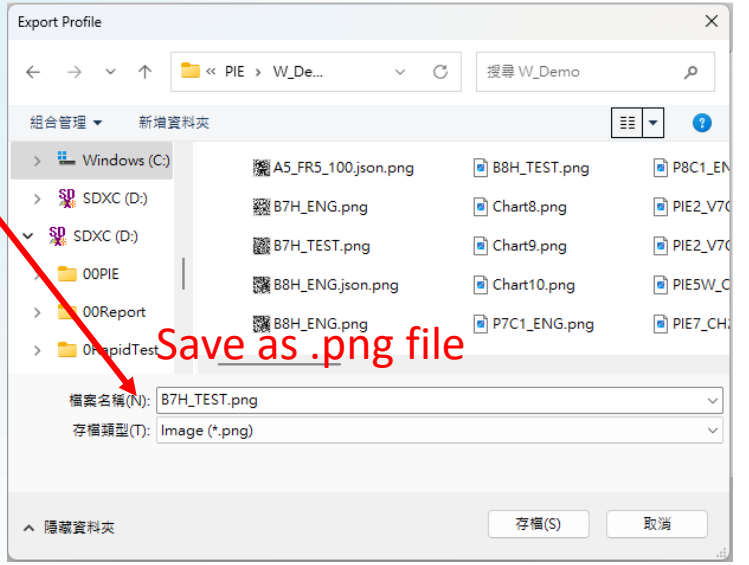
Jason file can be compressed



- Profile Raw Text File



Save as .json file



Save as .png file

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Connect to RS PH/PH+ to Get Live Signal

How to Connect to PC

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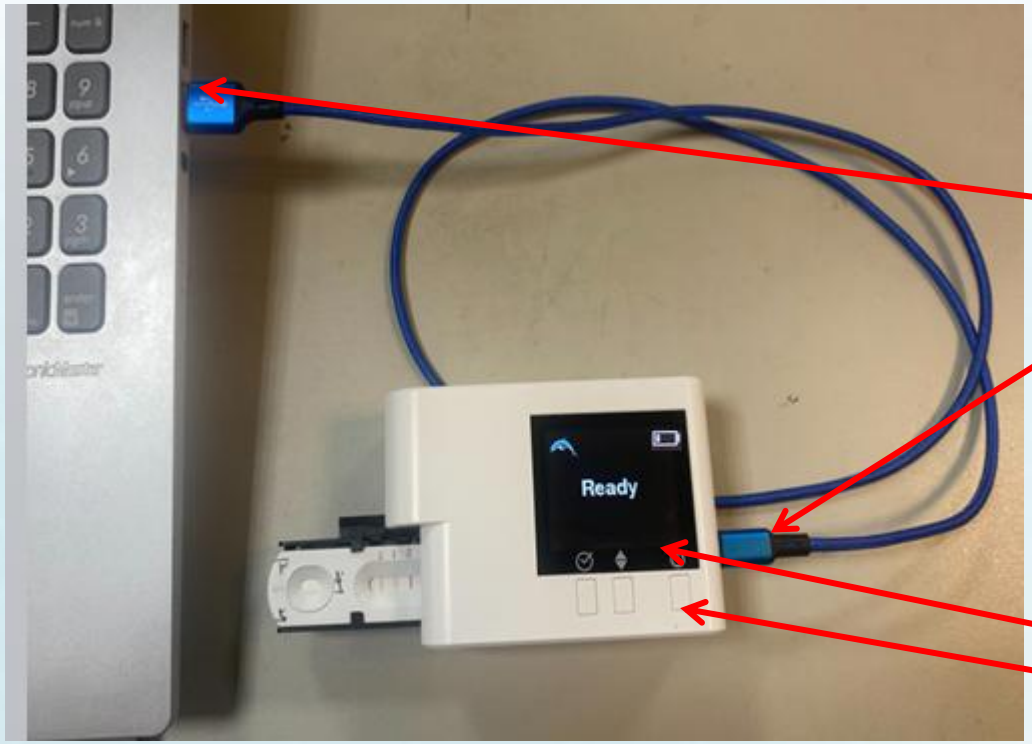

Using a type C cable connect to PC

Power on the reader

How to Connect to PC

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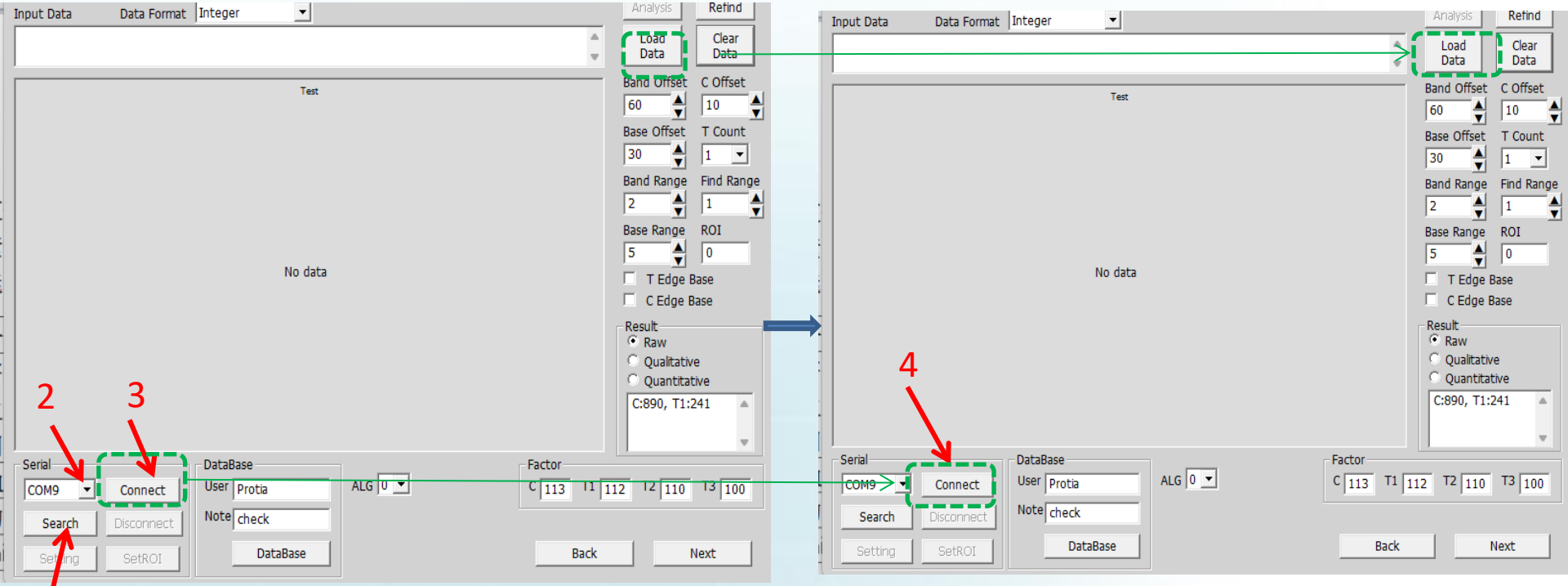

Follow the instruction sequence to enable the connection.

Analysis

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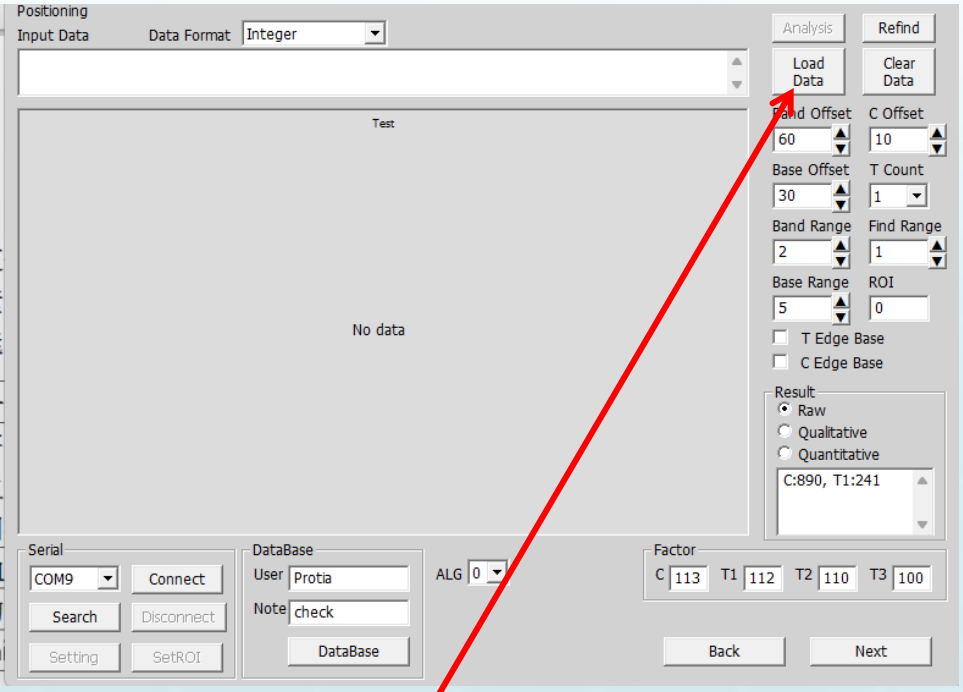

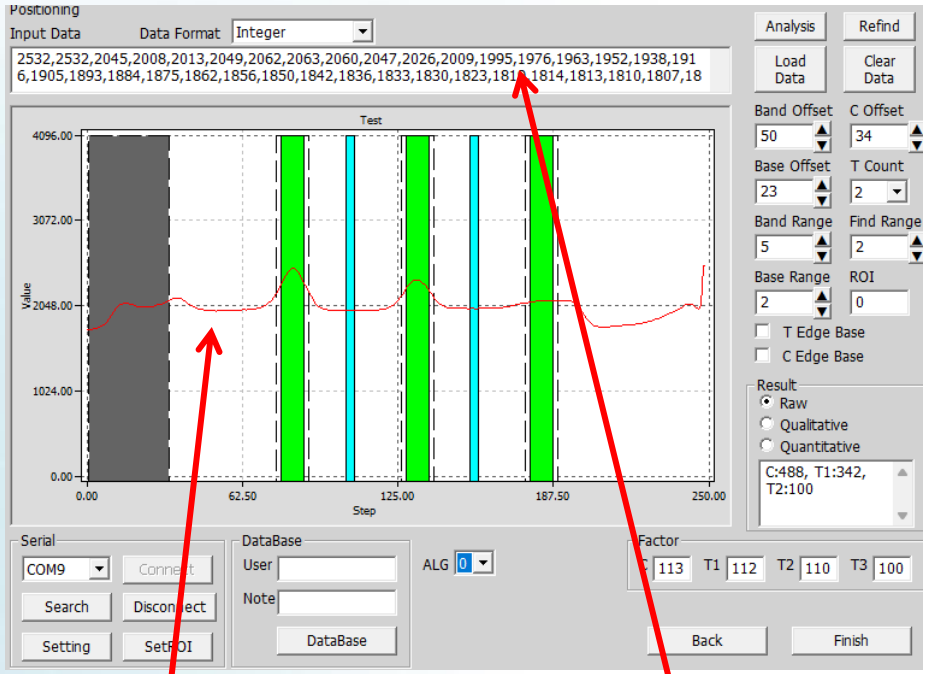

After press Analysis button, you will find the reader work lively.

Then it will have the test kit's signal in this viewing window.

And it will have the signal data on the top data window bar.

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Get the Signal Data from Existed Data

2 Ways to Get the Signal Data

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- Why: Need to backtrack the existed data to find the problem if it has
- Method 1:
  - Press the button “Load Data” @ Menu 3 and find the .csv file which you exported from your APP
  - The signal you see in the viewing window is the first test signal of the .csv file
- Method 2:
  - Press the button “Clear Data” to clean the data in the signal data row first
  - Open the .csv file and go to the “raw” column to select the one which you want to check.
  - Copy and go the “Input Data” row area to plate the data

Method 1 (Load from File)

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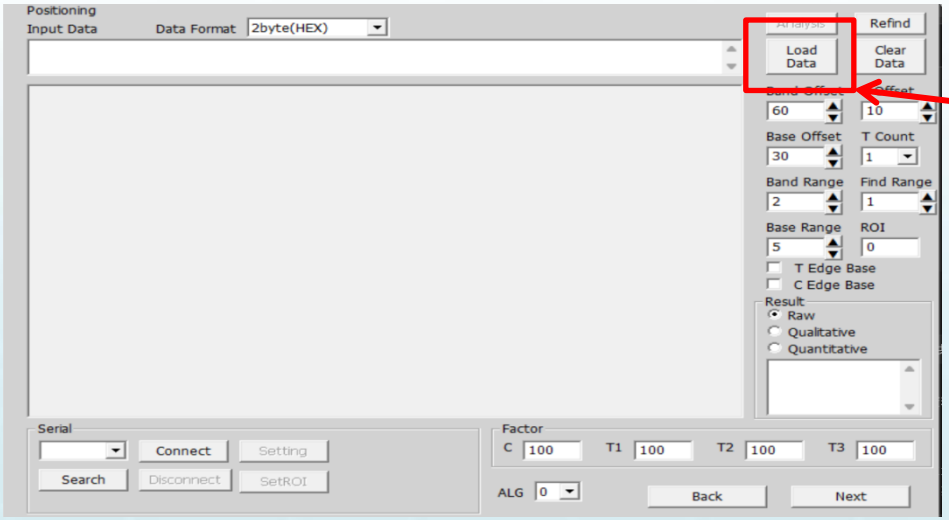
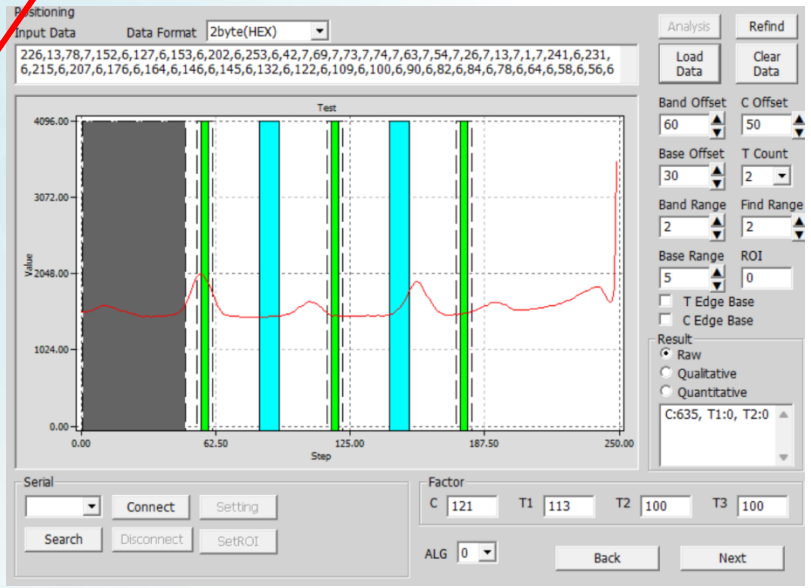


1

Step 1:select LoadData
Step 2: select export file

2

3



Method 2 (Load from Raw Data)

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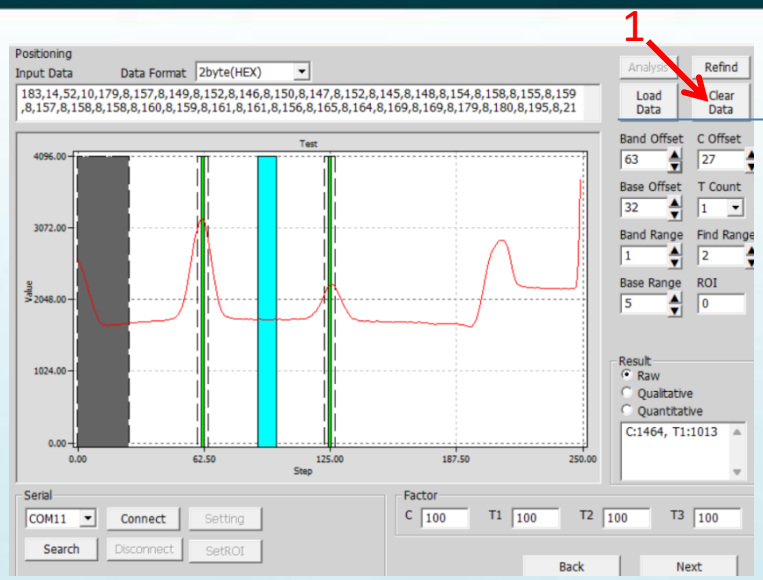
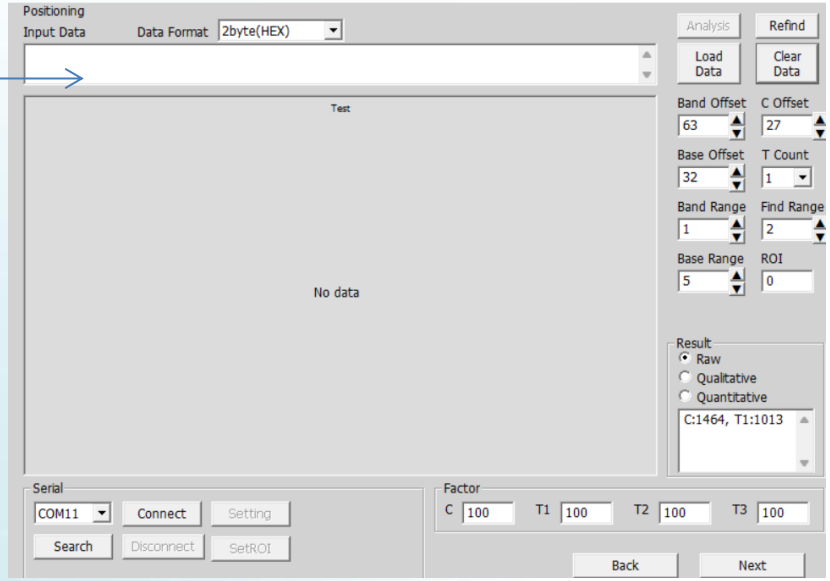
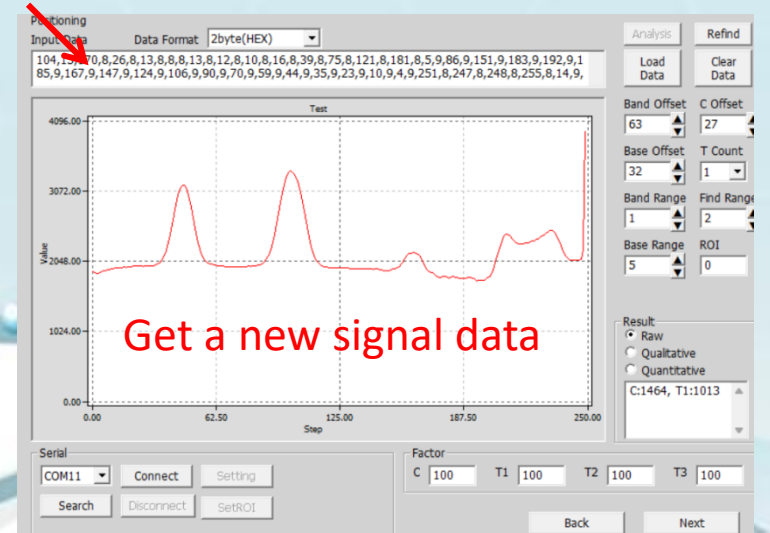




3 Past it



Open a RS PH tested .csv file

N	X	Y	Z	AA	AB
	ct_t2	ct_t3	raw		
115	100	100	162,15,123,10,95,8,6,8,238,7,11,8,		
115	100	100	123,15,127,8,237,7,226,7,227,7,22		
115	100	100	104,15,170,8,26,8,13,8,8,8,13,8,12		
100	100	100	190,15,220,9,56,8,33,8,23,8,28,8,2		
100	100	100	180,15,189,10,38,10,244,9,215,9,1		

2. Select & copy it

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C & Ts Bands Positioning & Measuring

Relationship of Signal & Test Kit

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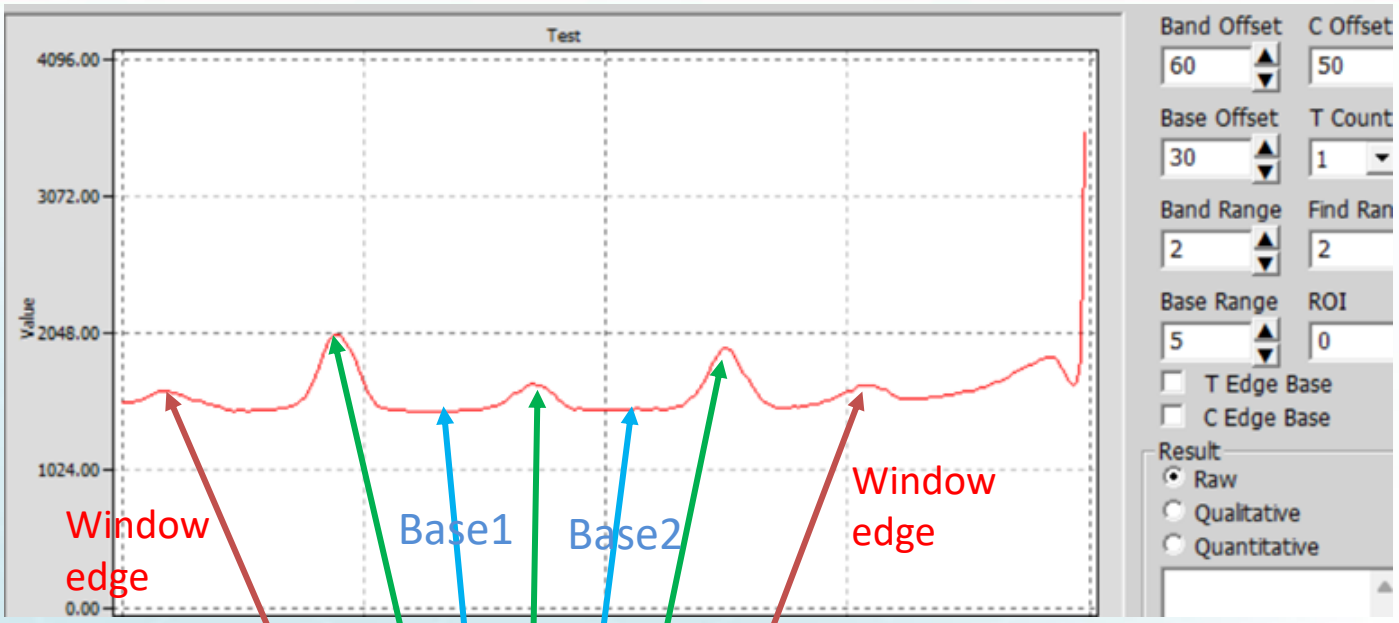

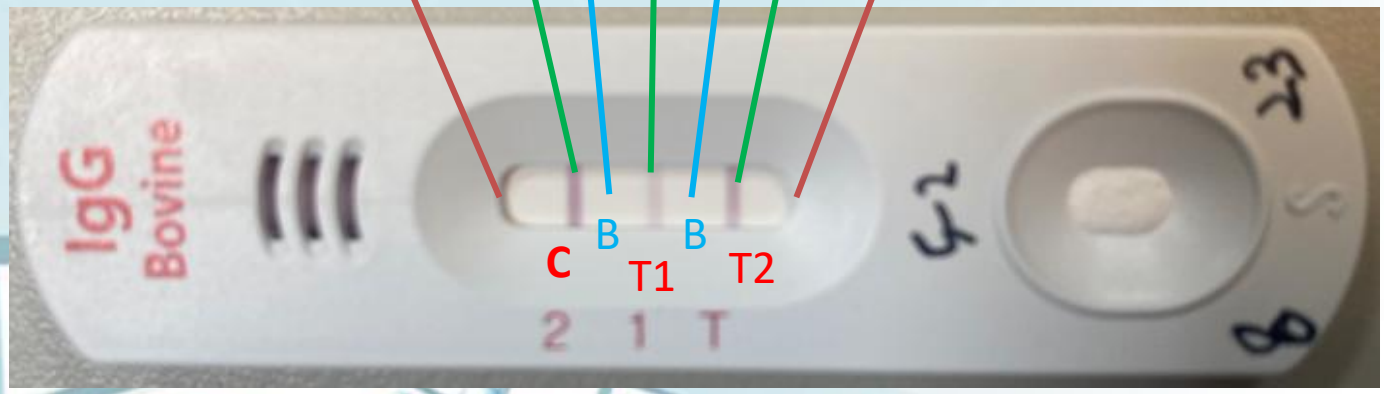

C&T Position and Definition

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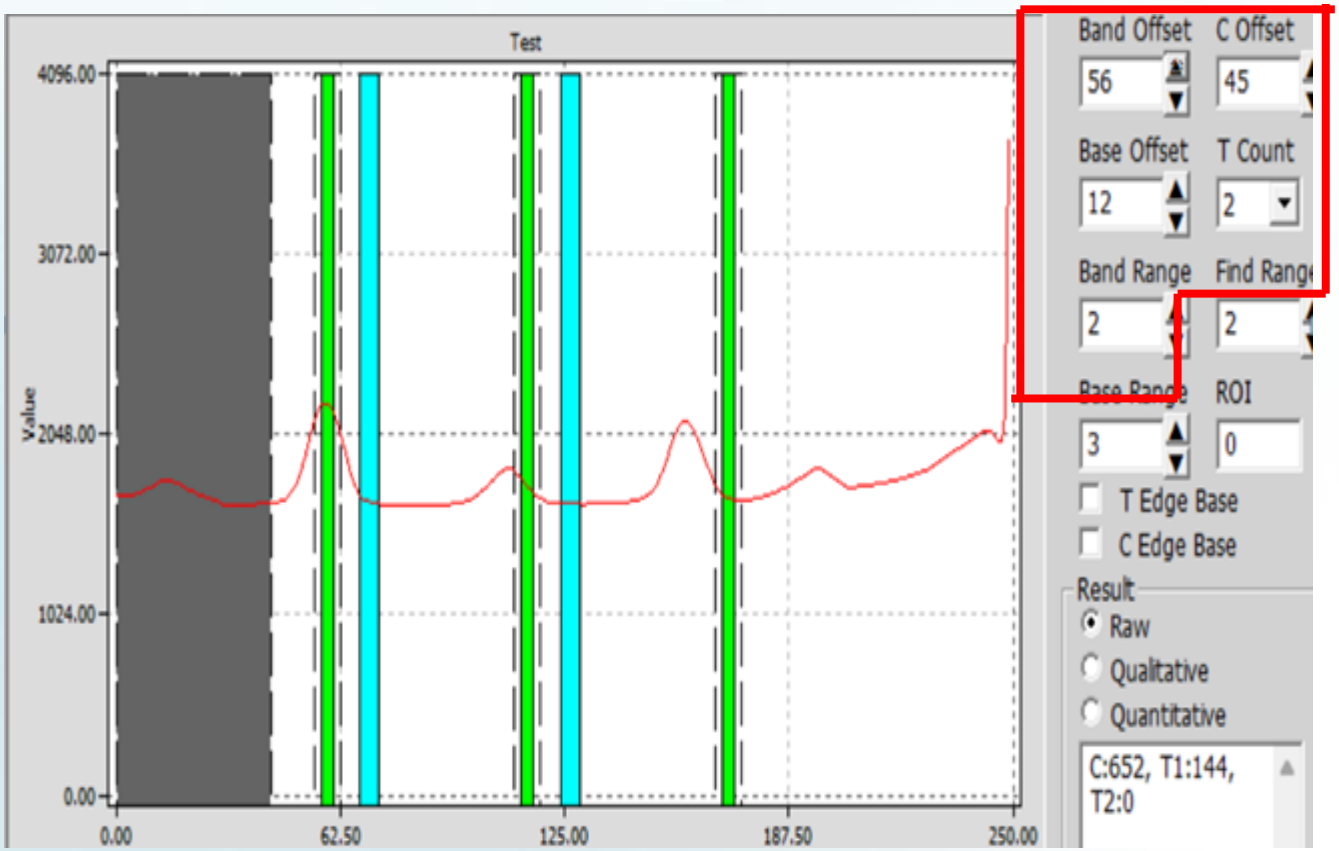

C & Ts position definition

C Offset

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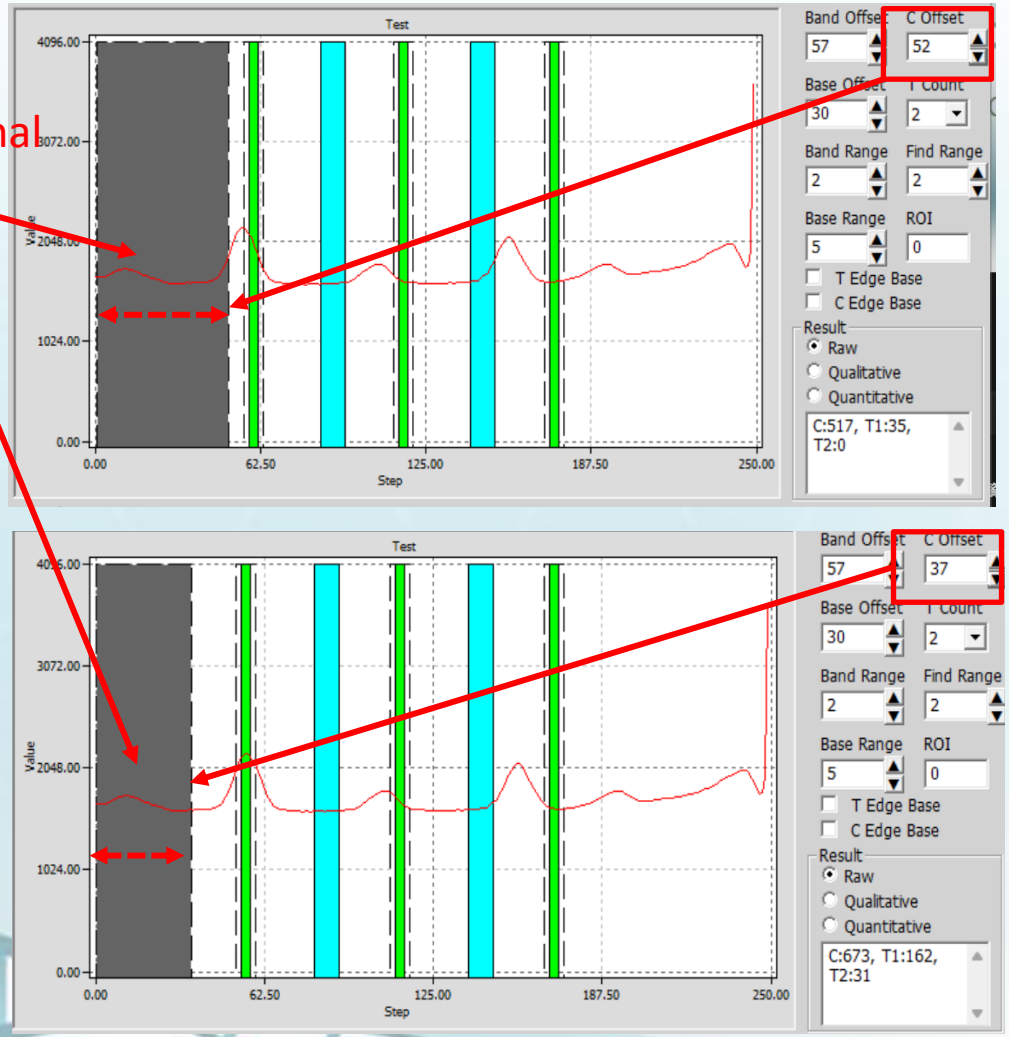

C Offset

- Define the start position to find the C band peak. We will find the peak value of C from this position to right side in a interval
- Adjust C Offset to avoid the window edge near C band

Band Offset

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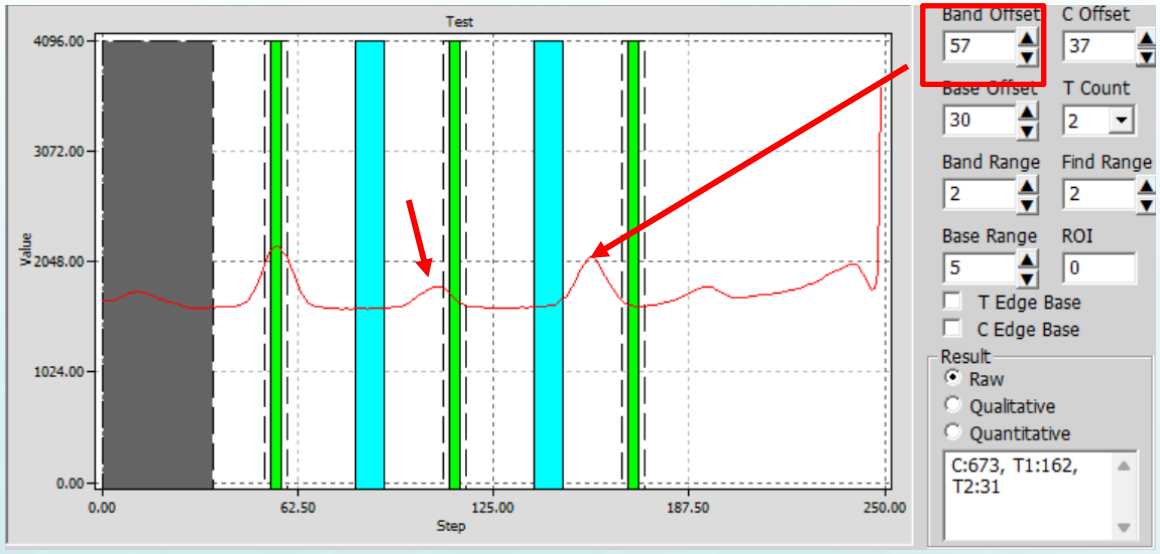

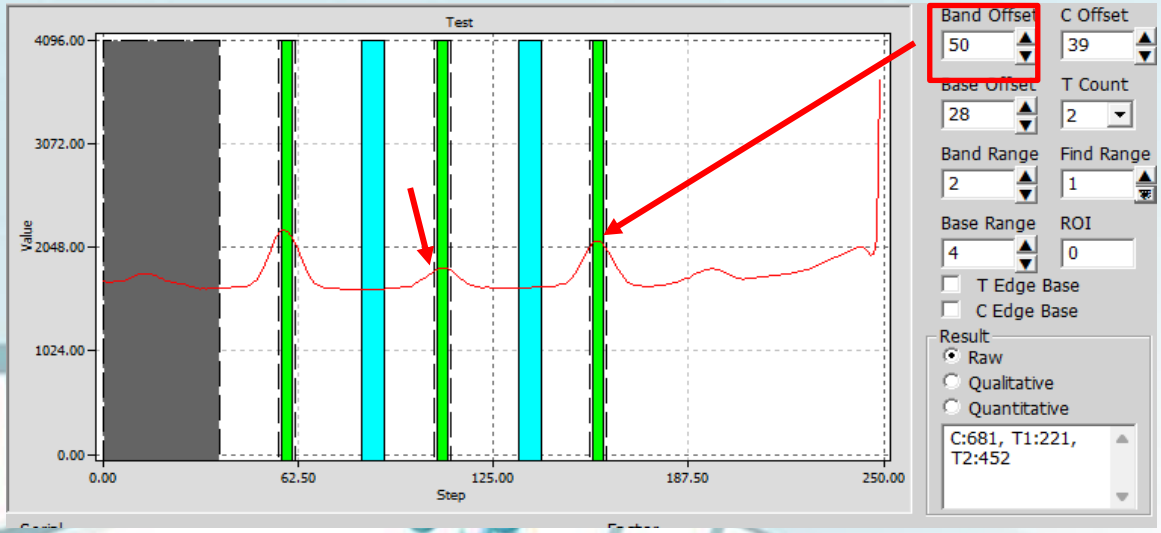

- Define the distance from C to T1. It will automatically use it to define the distance T1 to T2 or T2 to T3, if the T Count is more than 1
- In case the distance of C-T1, T1-T2 and T2-T3 are different, you may adjust Band Offset to let the rightest peak can be fit. And then set the “Find Range” wider to cover the variation of different distances.

Base Offset @ ALG=0 (1)

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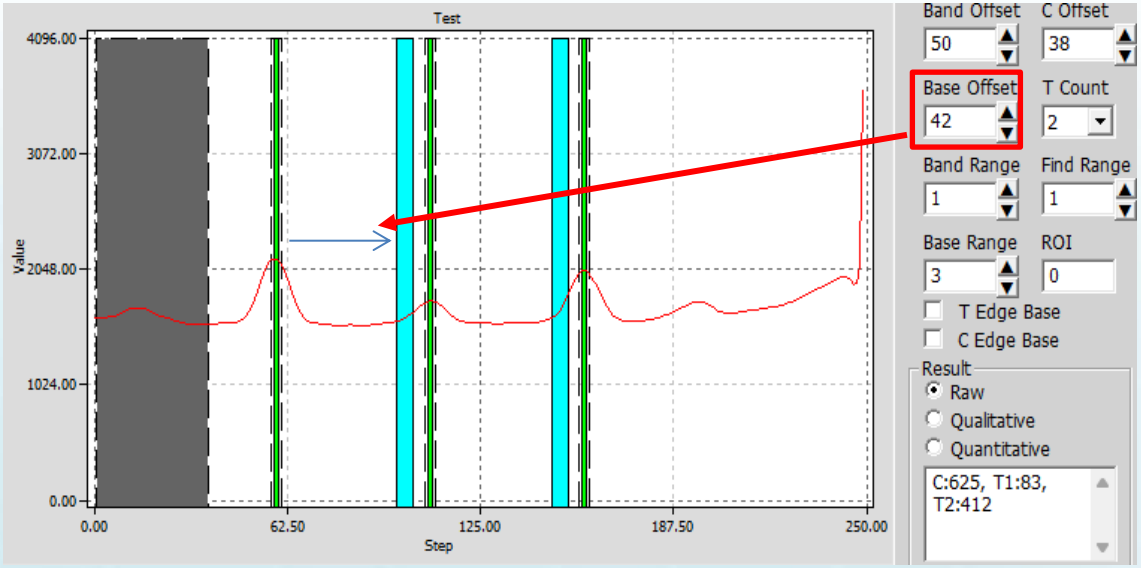

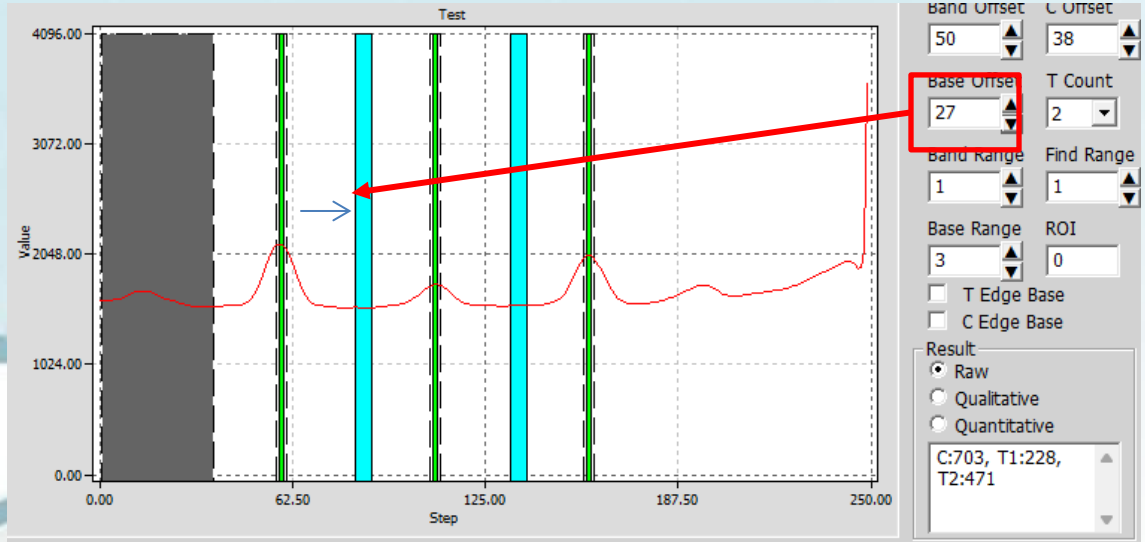

- If ALG=0, Peak average method
- Base Offset defines the distance from C to Base1 and it will also apply for T1 to Base2
- It is recommended to position it at the middle area of the two green bars which has more flat curve

Base Offset @ ALG=0 (2)

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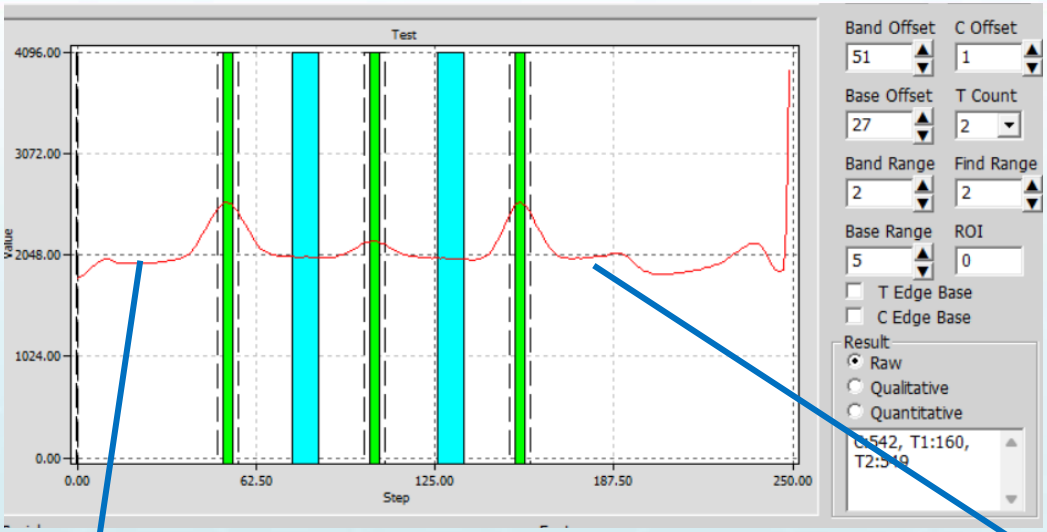

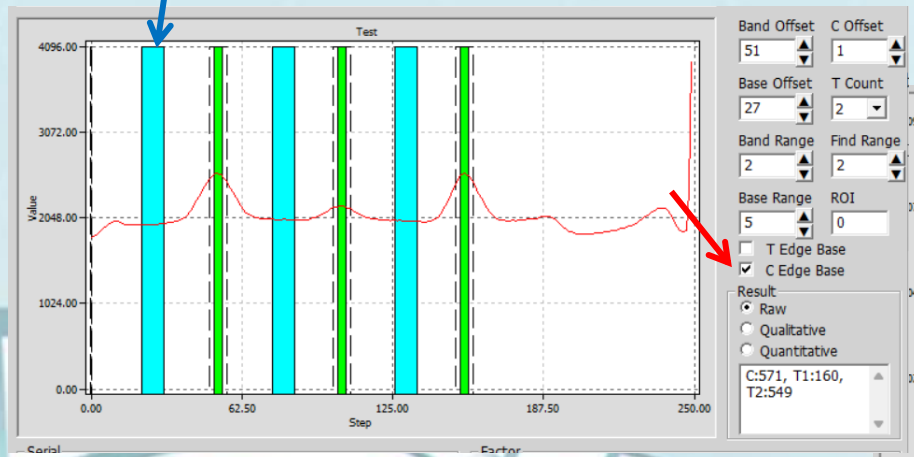

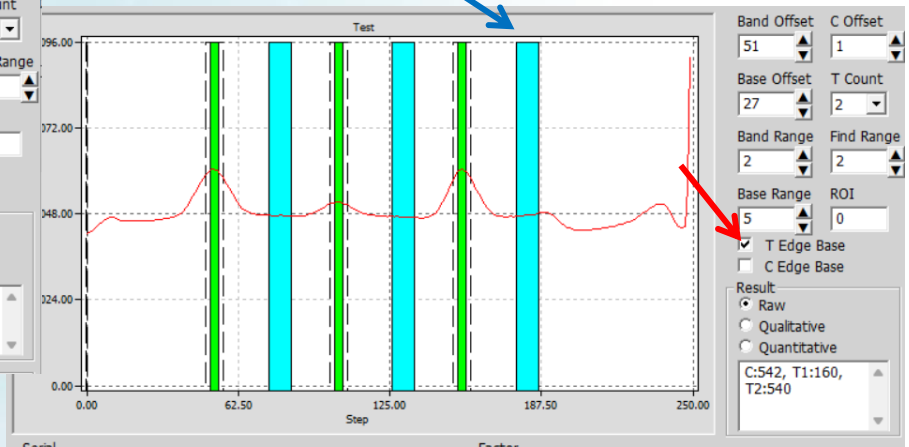

- T Edge Base enable: increase the right base used to calculate the value of rightest T
- C Edge Base enable: increase the left base used to calculate the value of C
- If these base are too close to the window edge, we suggest disable them

Base Offset @ ALG=1

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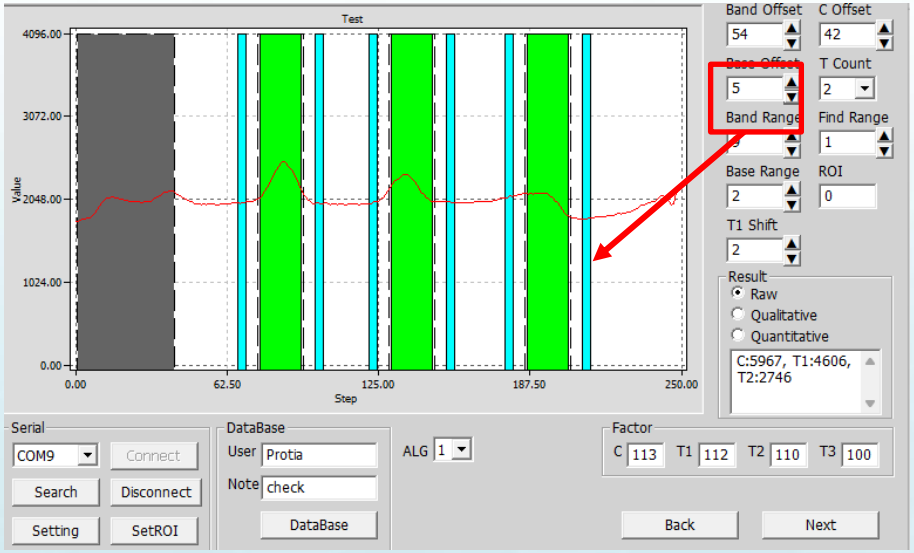

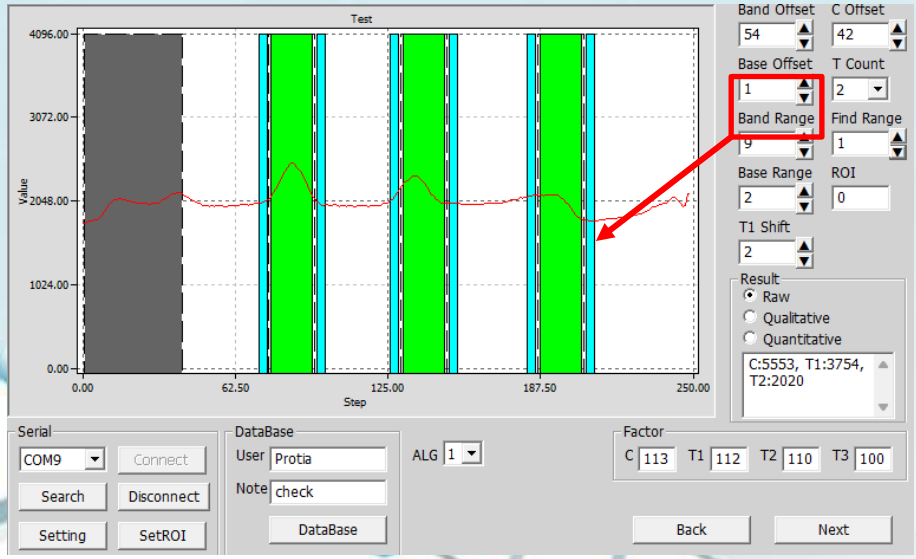

- If ALG=1, Integration mode
- It will force to use left and right “Base” to calculate the value of C or Ts
- It is recommended to position it near by the green bar area and make sure they are at flat curve area

T1 Shift @ ALG=1

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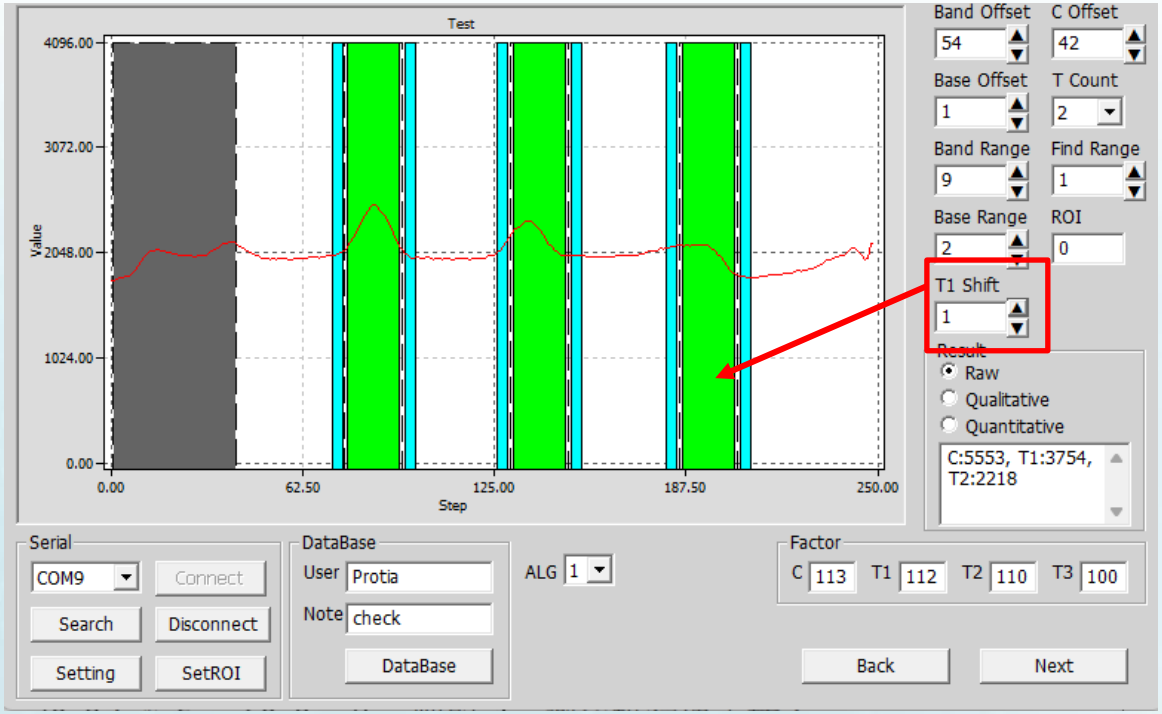

- Adjust T Band to the right curve position

Find Range

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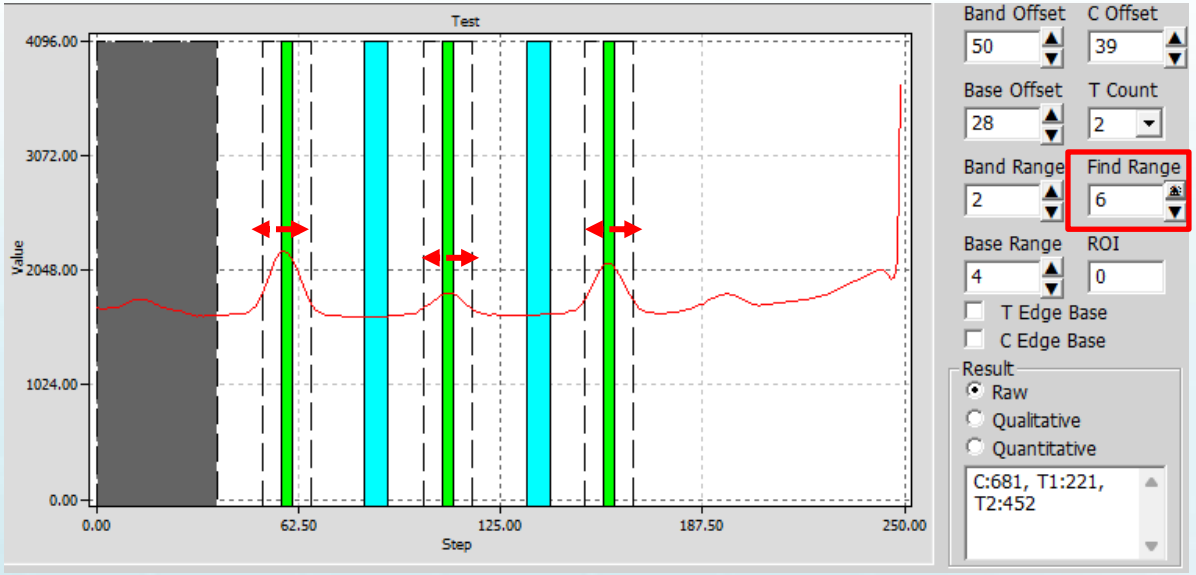

- The detection range for finding the peak values of the C and T bands.
- This is used to cover the variation for distance between C-T1, T1-T2 & T2-T3. If the test kit has higher variation of these distance, we suggest to increase the range. But we don't suggest increase this number too wide since it may cause the higher signal detection at negative signal

Band Range And Base Range

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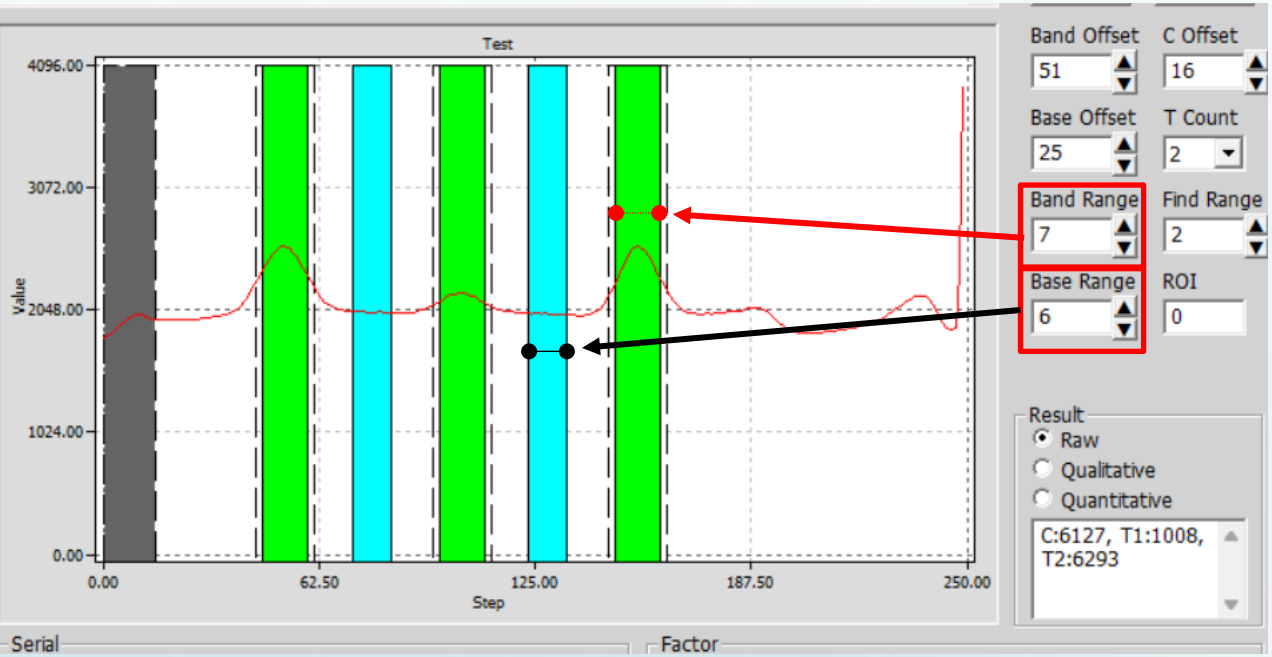

- Band Range: The width range for calculating C and T Bands
- Base Range: The width range for calculating Base values

ALG 0 Setting Band Range

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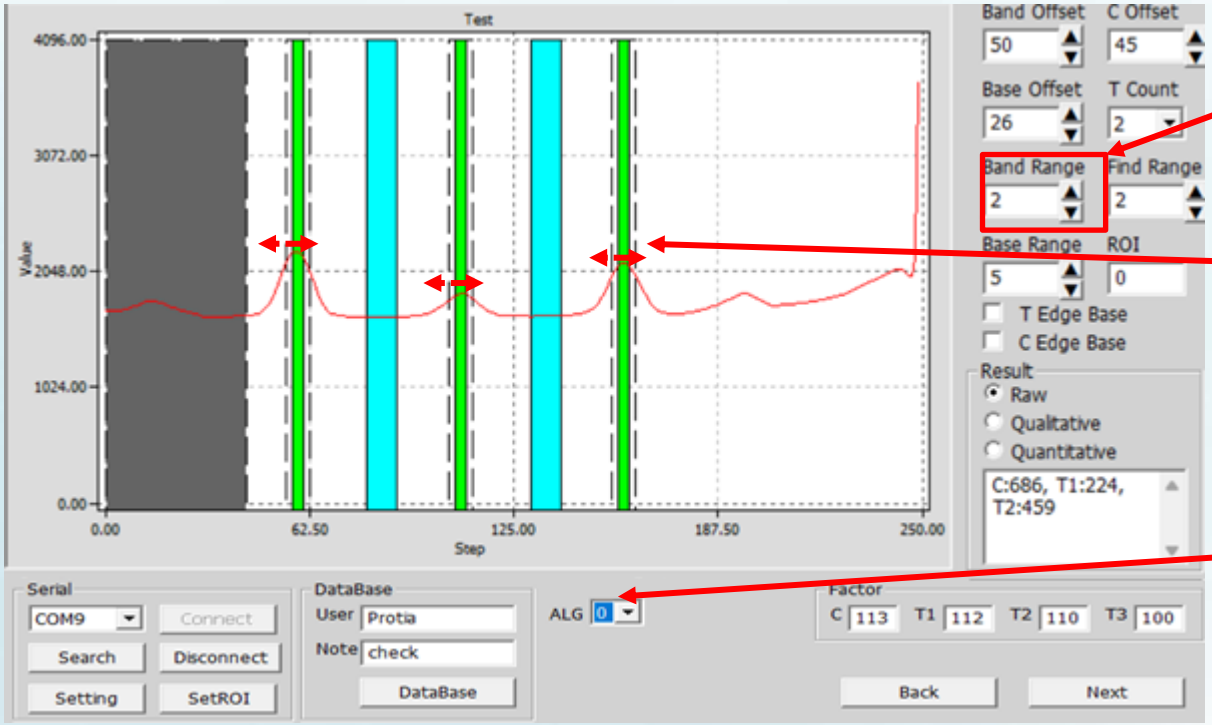


Band Range :

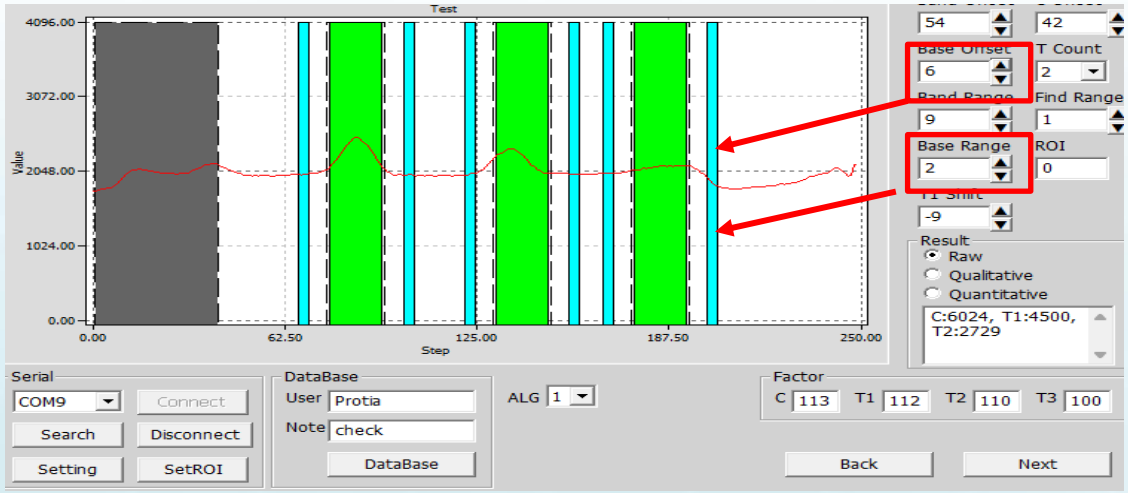
The width range for calculating C and T Bands values .

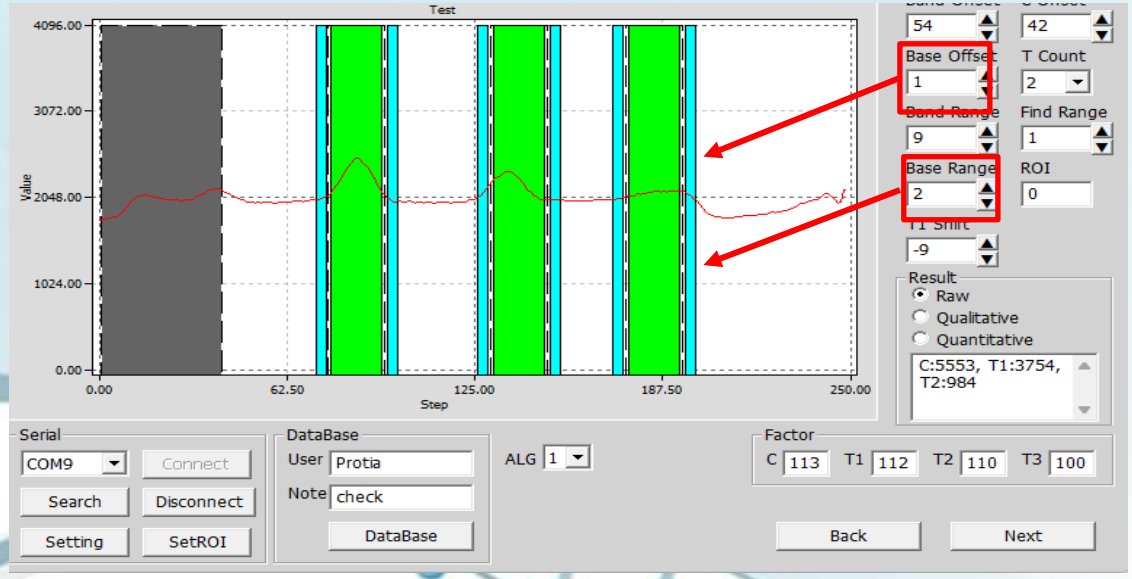
The Band Rang should be cover peak for better calculating

(ALG : 0) :

Average calculation

ALG 1 Setting Base Range/Offset





(ALG: 1)
Integral function calculate

Base Range /***Base offset***
The range should be narrowed and close to Band for better integral function calculation.

For example:
Adjust Base Offset form 6 to 2

ALG 1 Setting Band Range

PACIFICIMAGE ELECTRONICS
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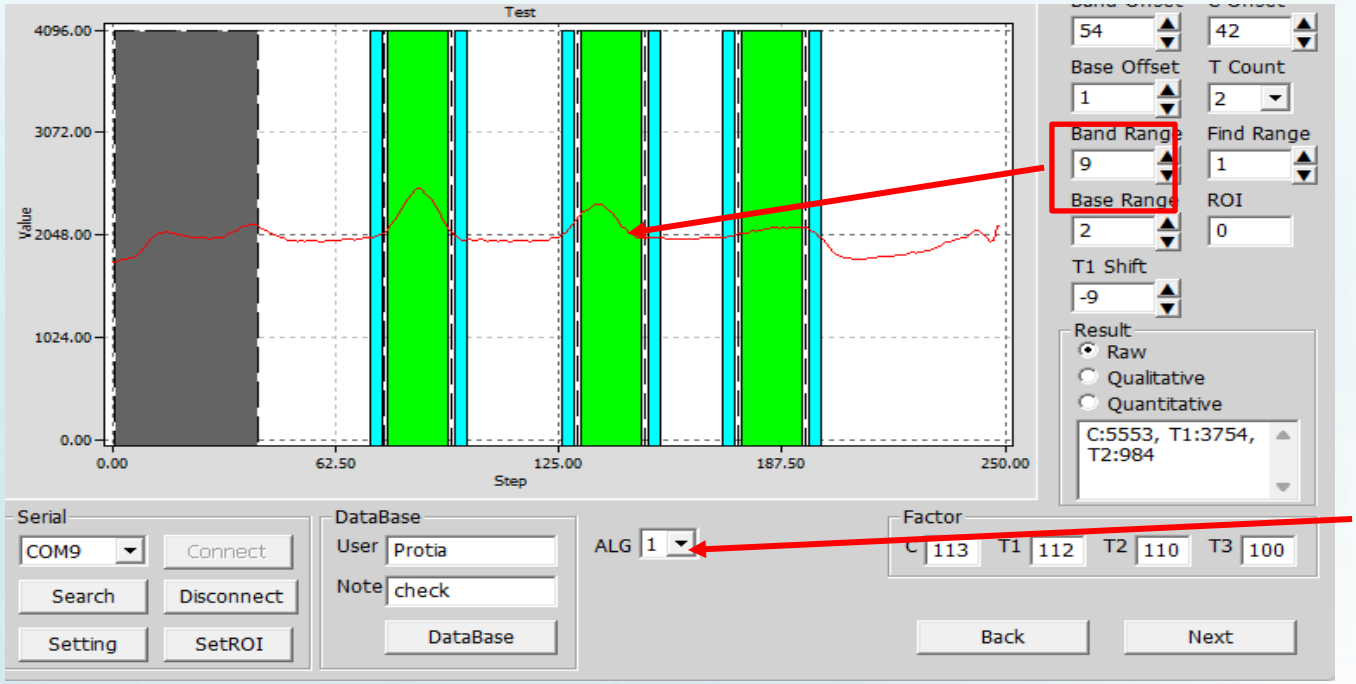

Band Range :
The range should be widened up to the flat band for better integral function calculation.

(ALG: 1)
Integral function calculate

T Count

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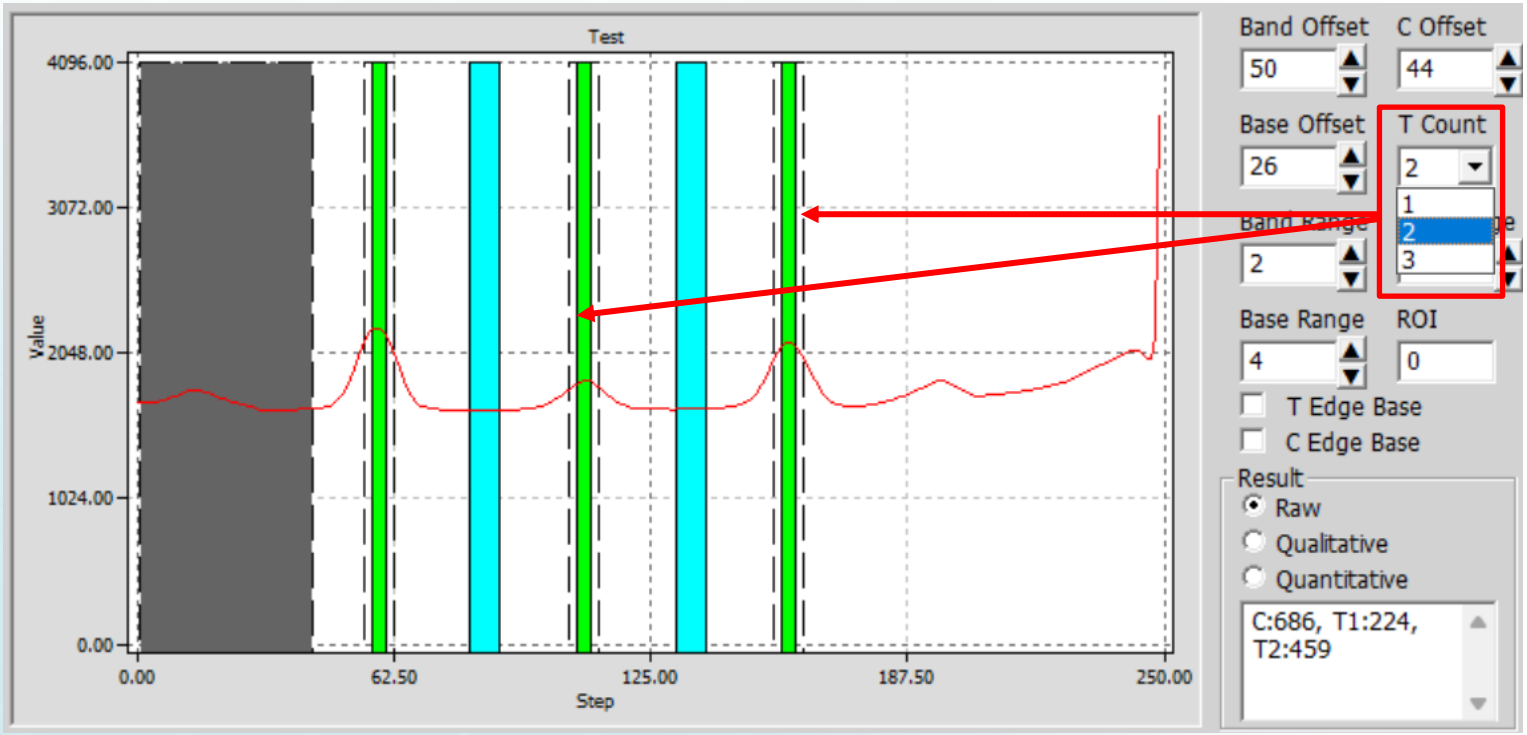

- ***T Count***: Number of T Bands

Refind

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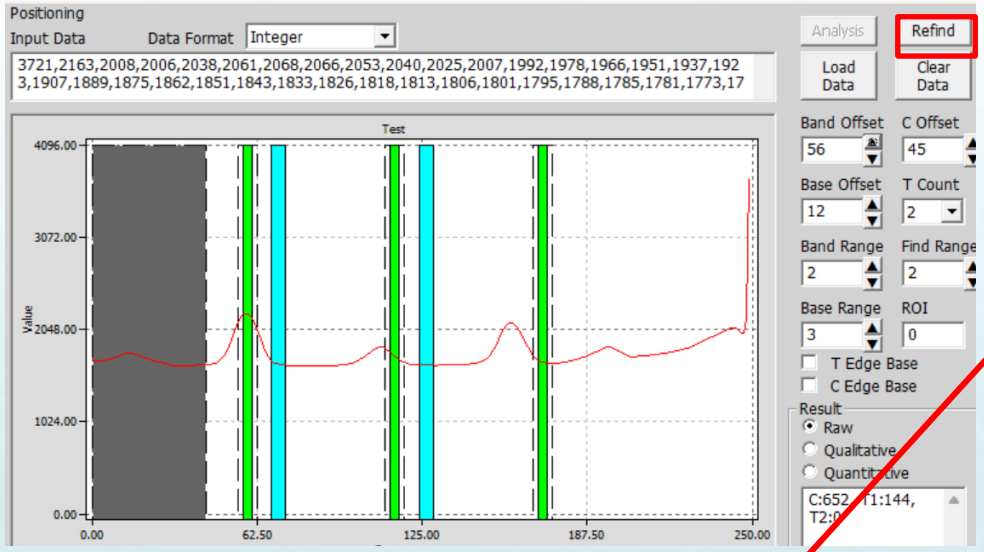
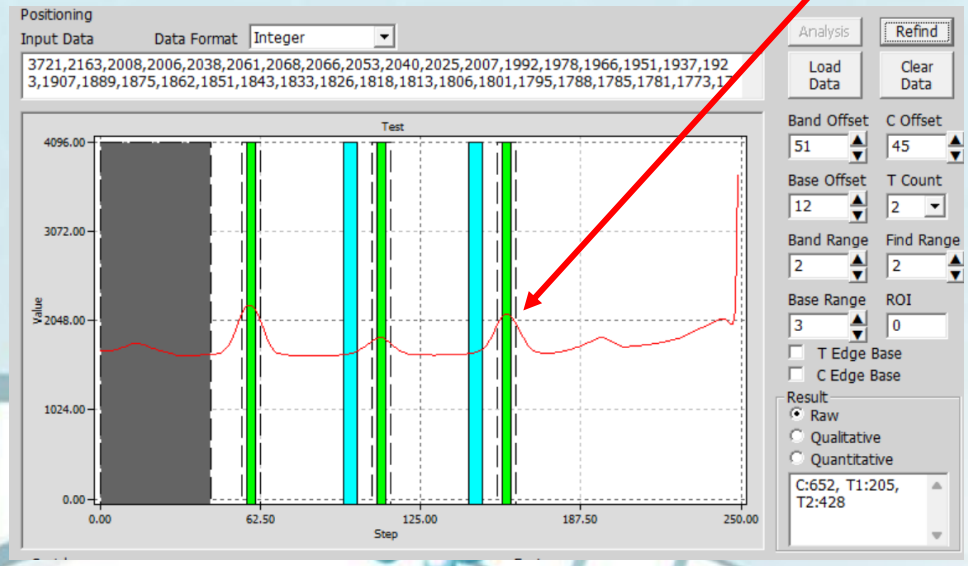
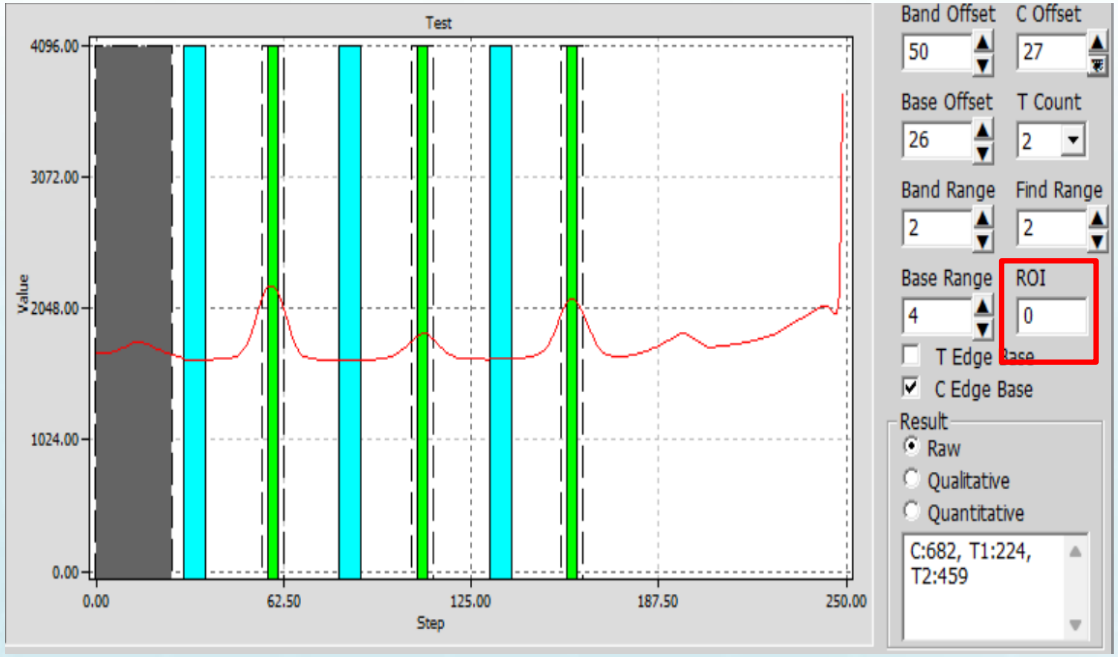




- It can help you to find the best “Base Offset”.
- You need to select the test kit with all positive Ts

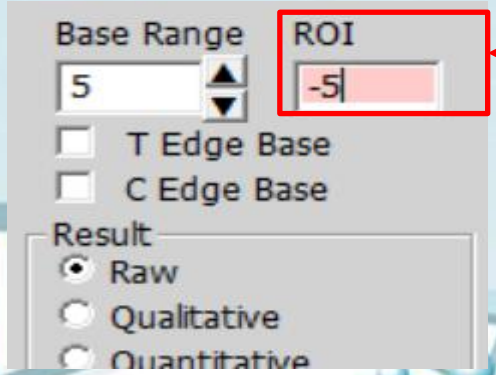
ROI



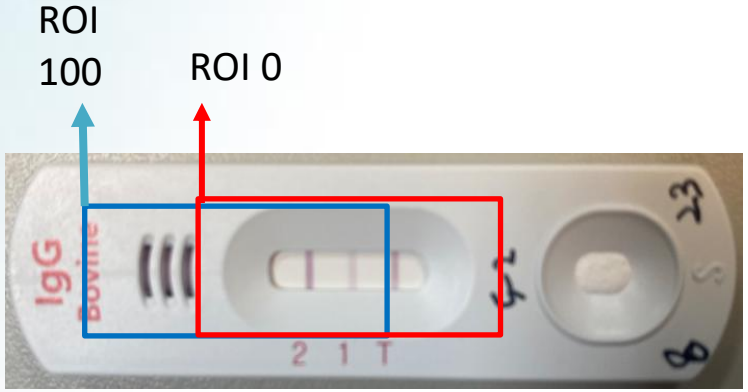
- ***ROI :***

Suggest ROI setting 0

If the casseete view area is in fornt position then can adjust ROI setting from 0 to100



Red color : wrong ROI setting



ROI Setting

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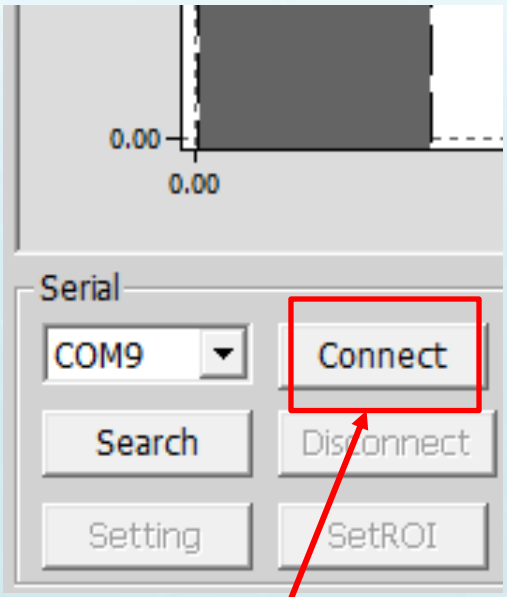
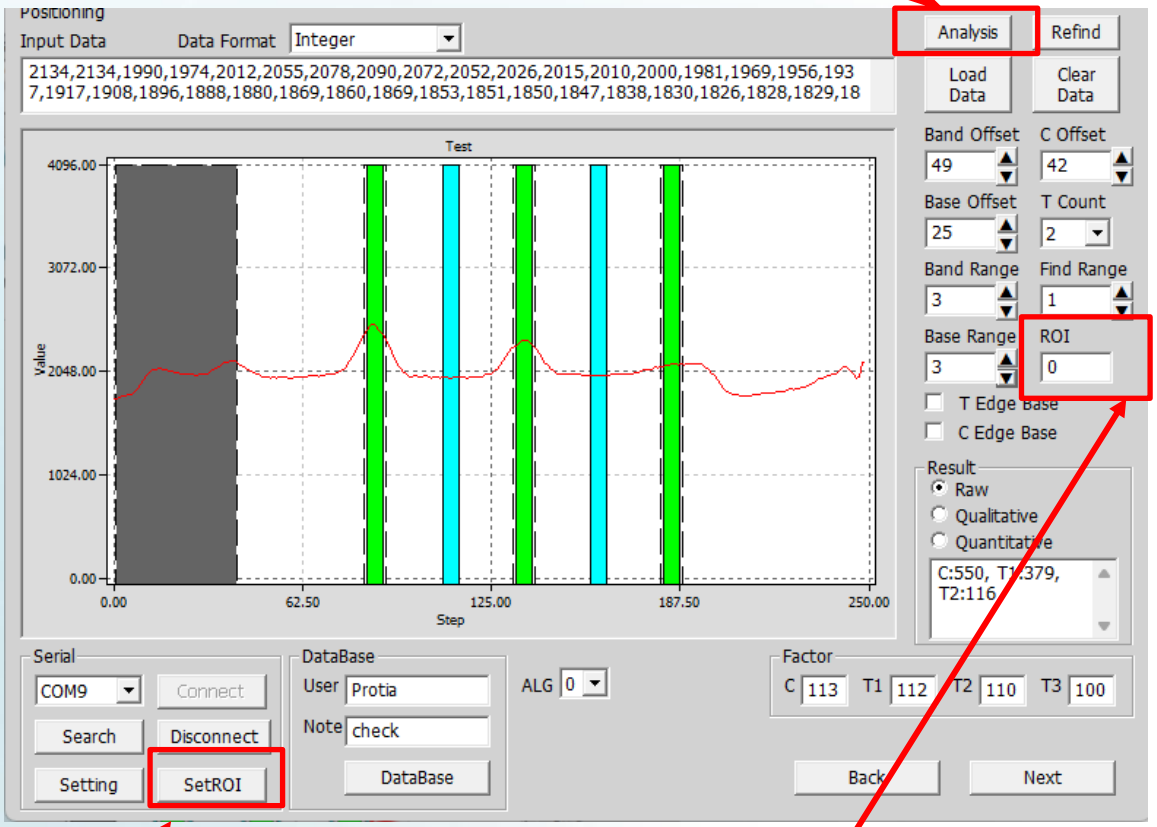
Step 4: Analysis





Setp1 : press connect

Step 3 : press SetROI

Step 2 :Set ROI : 50

Comparison of ROI=0 and ROI=50

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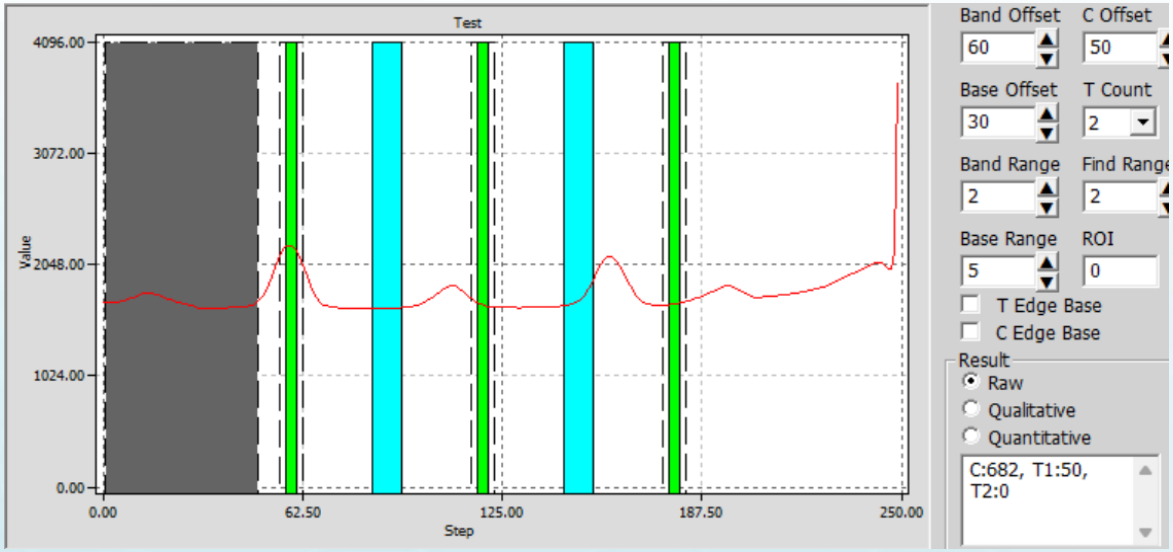
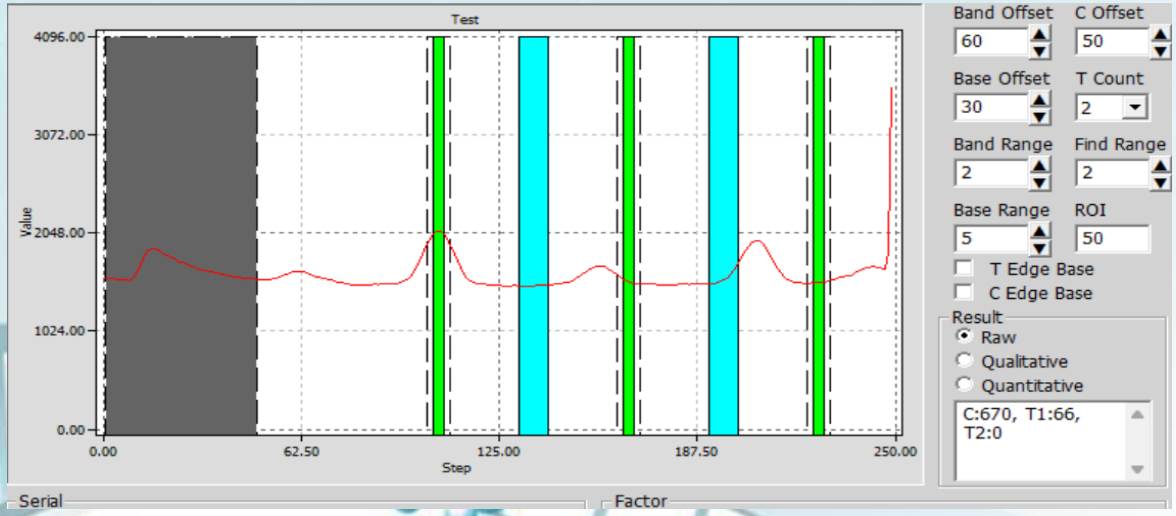


ROI=0



ROI=50

Result : Raw

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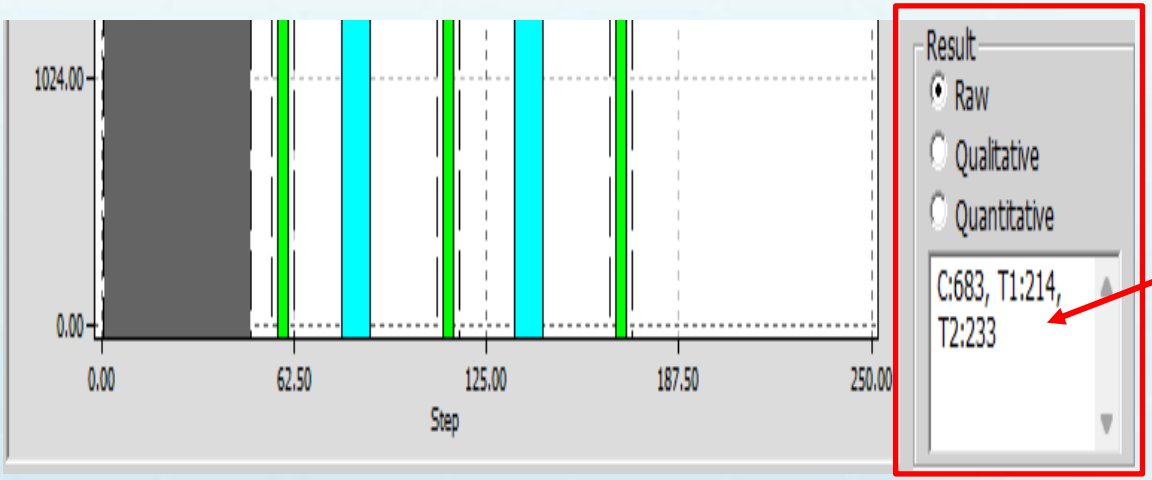

- ***Result***: Simulation analysis function, outputs results to the Result dialog box
  - ***Raw***: Outputs the raw values of the C and T bands

For example :

C: 683

T1:214

T2:233

Result :Qualtative

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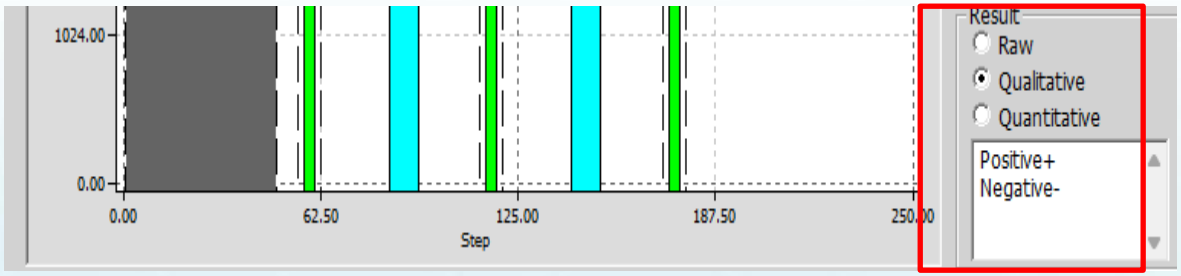

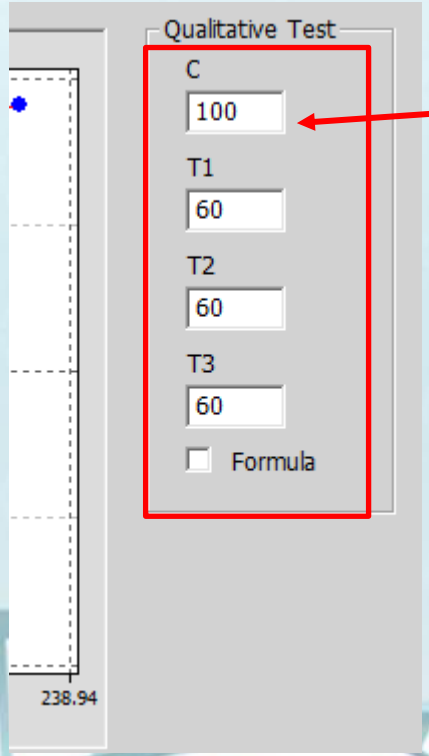

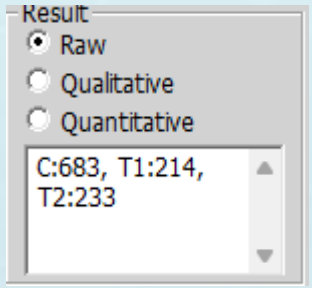

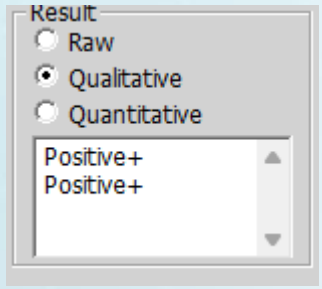

Qualitative: Outputs qualitative results

1) When control line value is less than 100, result should displayed as Invalid.
2) When the values of T1, T2, and T3 are greater than 60, the result should be displayed as "Positive+".

When the values of T1, T2, and T3 are less than 60, the result should be displayed as "Negative-".

Result :Quantitative

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concentration

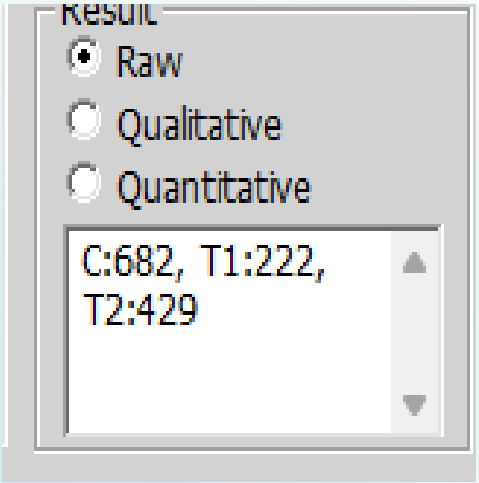
Intensive

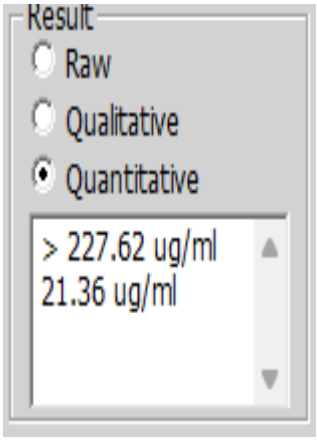
TI table

	x	y
1	1.30	5.00
2	12.35	25.00
3	28.19	50.00
4	82.88	100.00
5	227.62	150.00

T2 table

	x	y
1	1.30	54.00
2	12.35	276.00
3	28.19	517.00
4	82.88	750.00
5	227.62	853.00





Boundary Conditions:

1) When Peak area is less than 5, result should be displayed as < 1.3 ug/ml
2) When Peak area is greater than 150, result should be displayed as > 227.62 ug/ml

Formula

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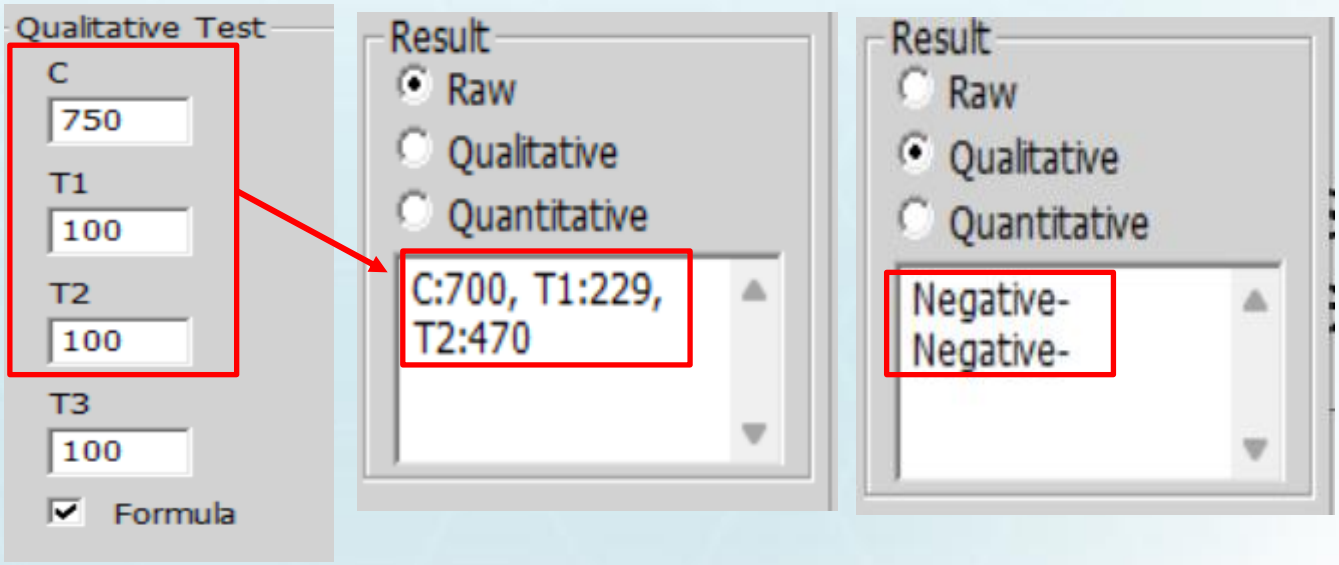
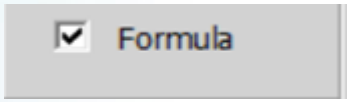


Normal setting

(recommended)



- Reverse function

When tick Formula

The actually test condition will change from C<cut off to C>Cut off

Result change will from Positive to Negative

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Standard Curve Setting

X Y Table

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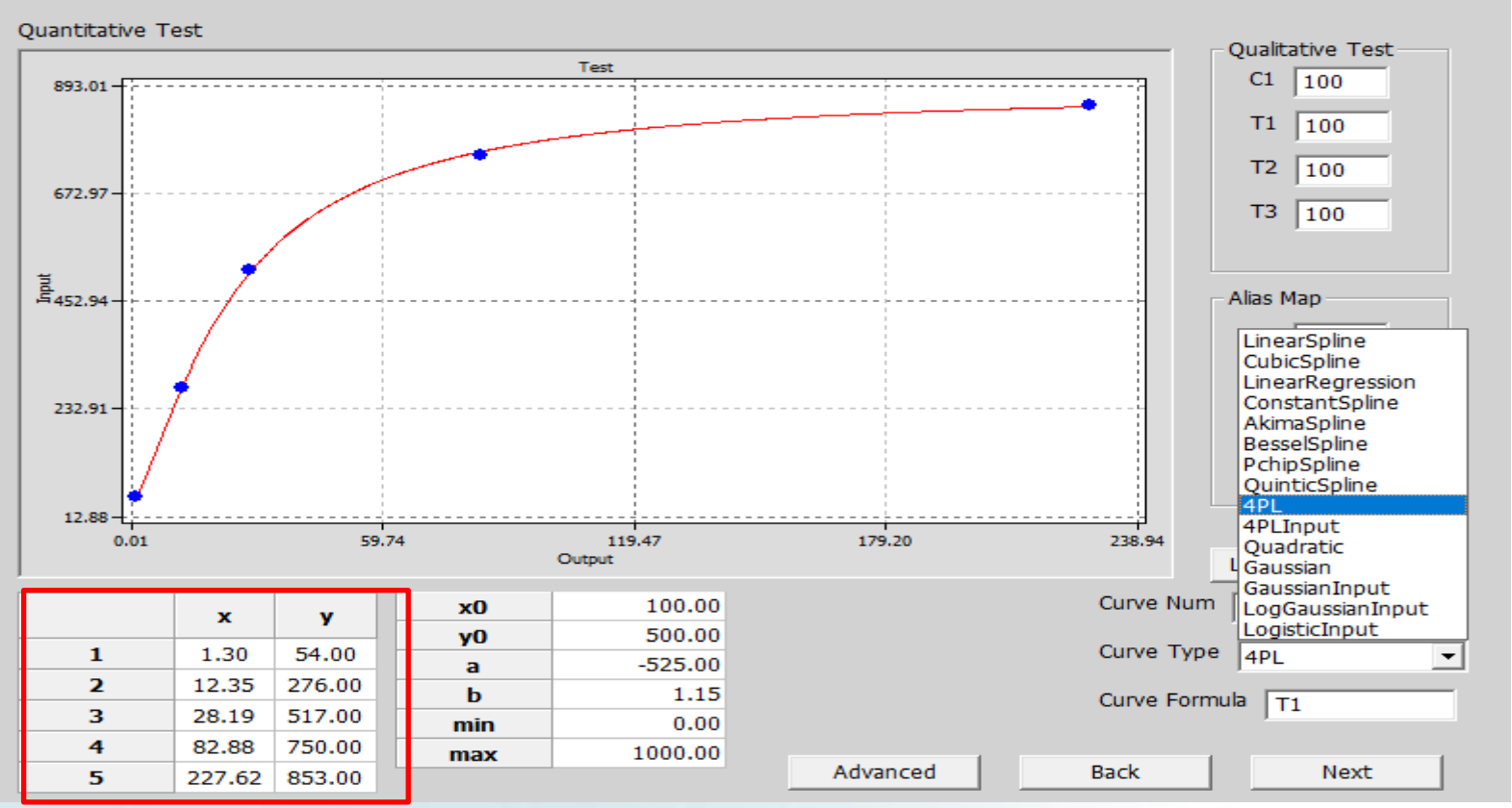

	x	y
1	1.30	54.00
2	12.35	276.00
3	28.19	517.00
4	82.88	750.00
5	227.62	853.00

x0	100.00
y0	500.00
a	-525.00
b	1.15
min	0.00
max	1000.00

According to the X Y table (X : concentration , Y: Intensity) input value to generate the stander cure for intensity and concentration value measurement

Relationship Between Intensity and Concentration

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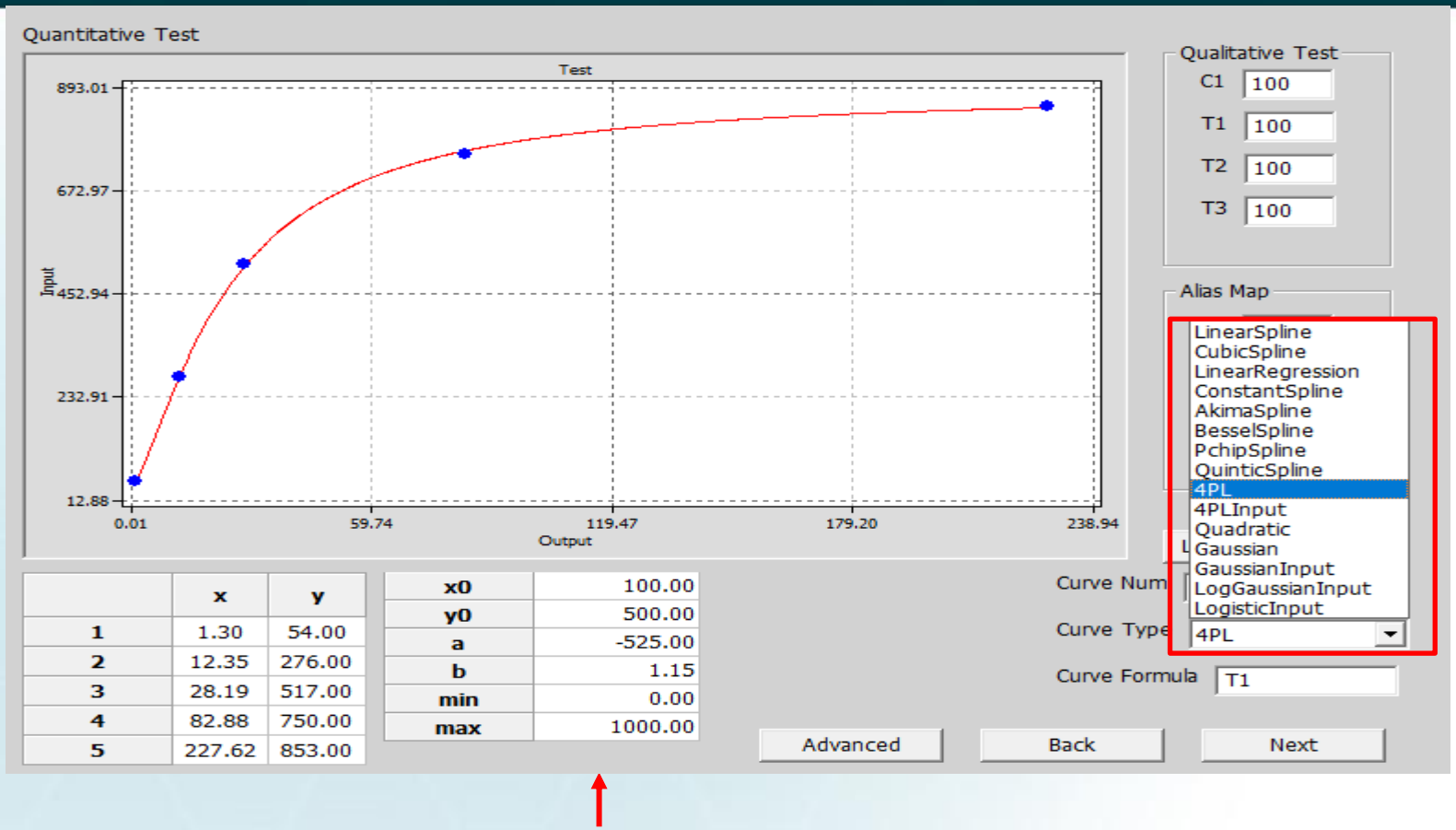

	x	y
1	1.30	54.00
2	12.35	276.00
3	28.19	517.00
4	82.88	750.00
5	227.62	853.00

x0	100.00
y0	500.00
a	-525.00
b	1.15
min	0.00
max	1000.00

Relationship Between Intensity and Concentration

Different intensities correspond to relative concentrations; the correspondence between intensity and traction shall be expressed according to the style curve.

Curve Num.

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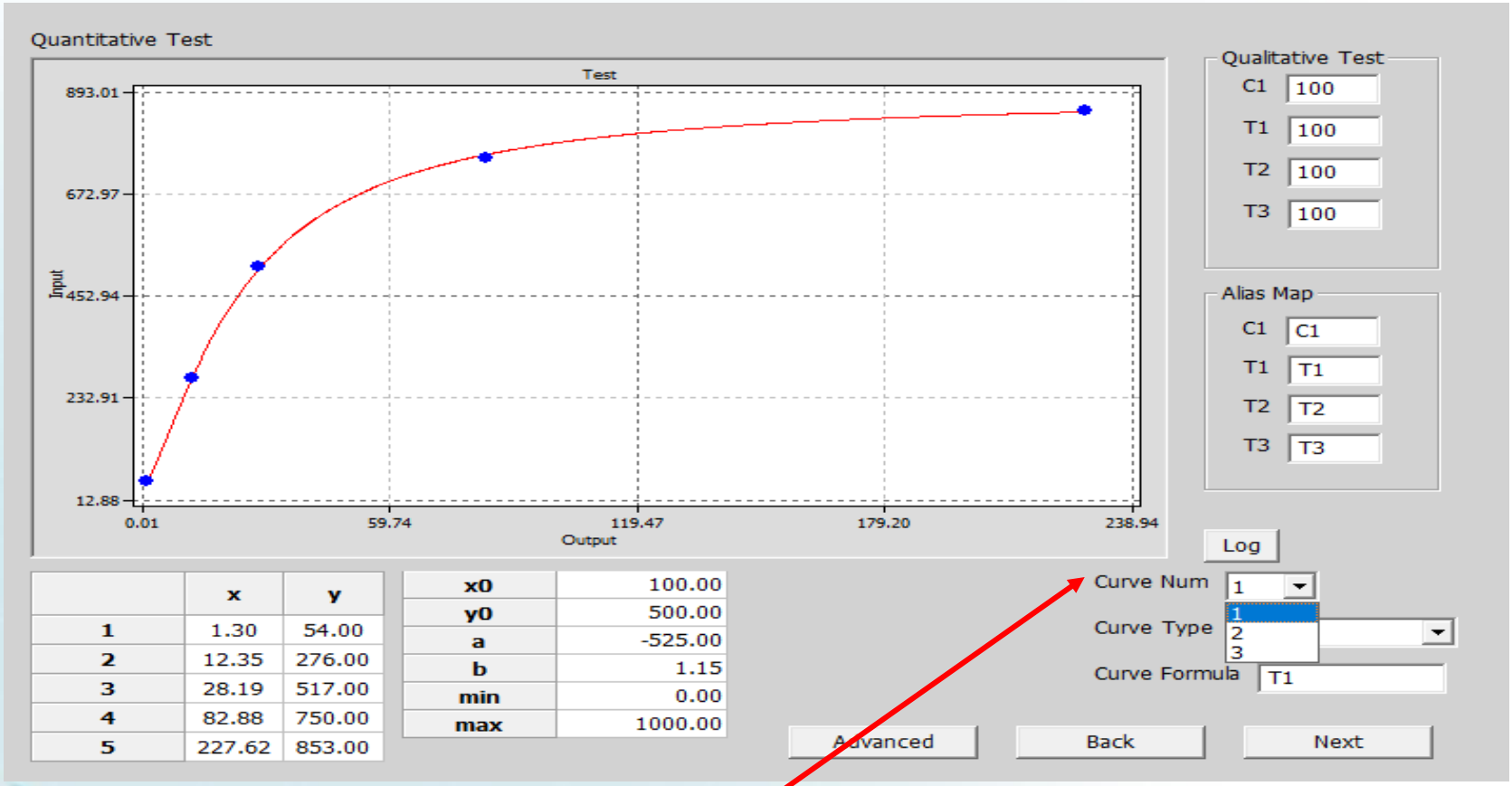

	x	y
1	1.30	54.00
2	12.35	276.00
3	28.19	517.00
4	82.88	750.00
5	227.62	853.00

x0	100.00
y0	500.00
a	-525.00
b	1.15
min	0.00
max	1000.00

Select curve for T1 or T2 or T3

Curve Type: Linear spline

PACIFICIMAGE ELECTRONICS
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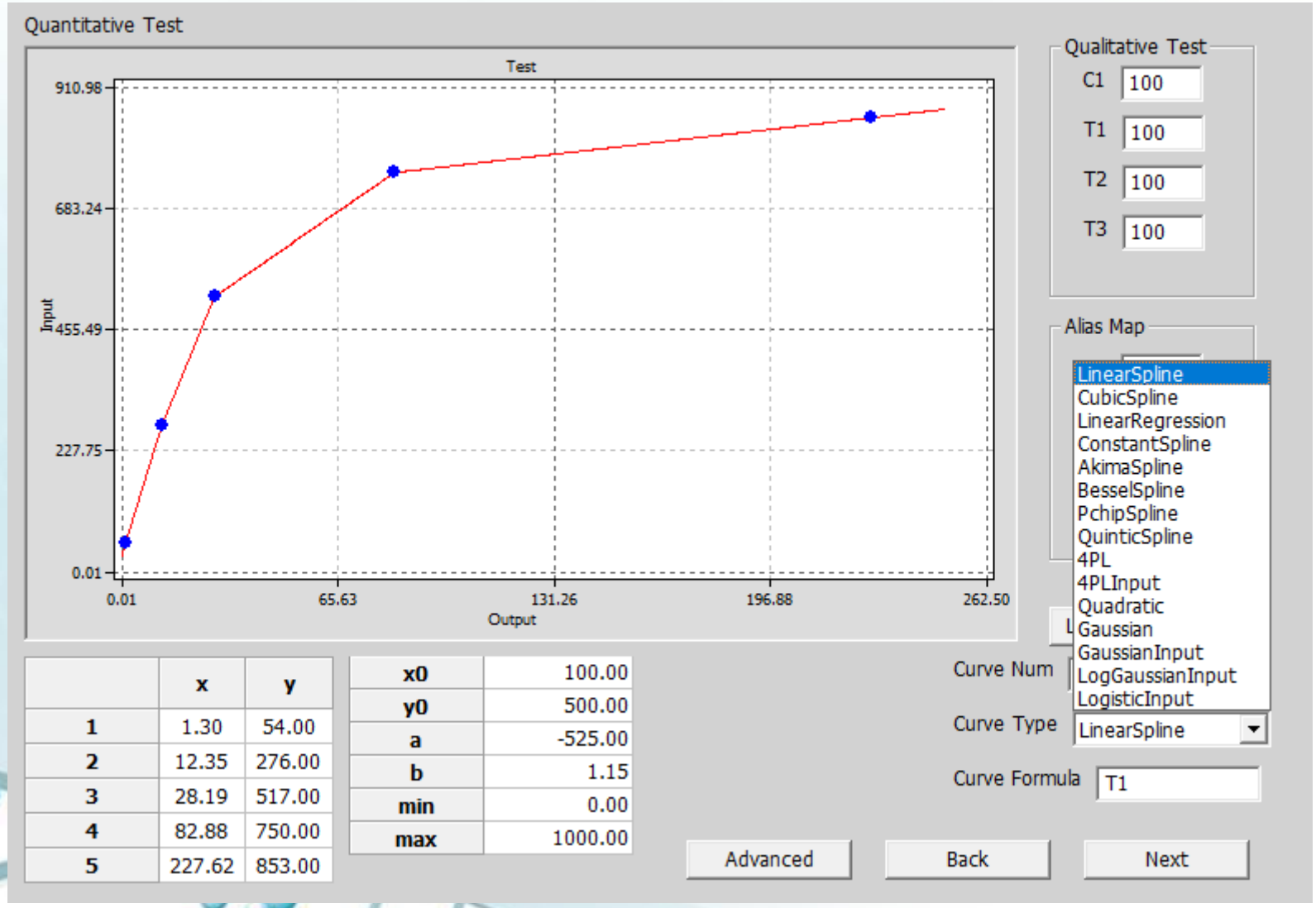

	x	y
1	1.30	54.00
2	12.35	276.00
3	28.19	517.00
4	82.88	750.00
5	227.62	853.00

x0	100.00
y0	500.00
a	-525.00
b	1.15
min	0.00
max	1000.00

Curve Type: Cubic spline

PACIFICIMAGE ELECTRONICS
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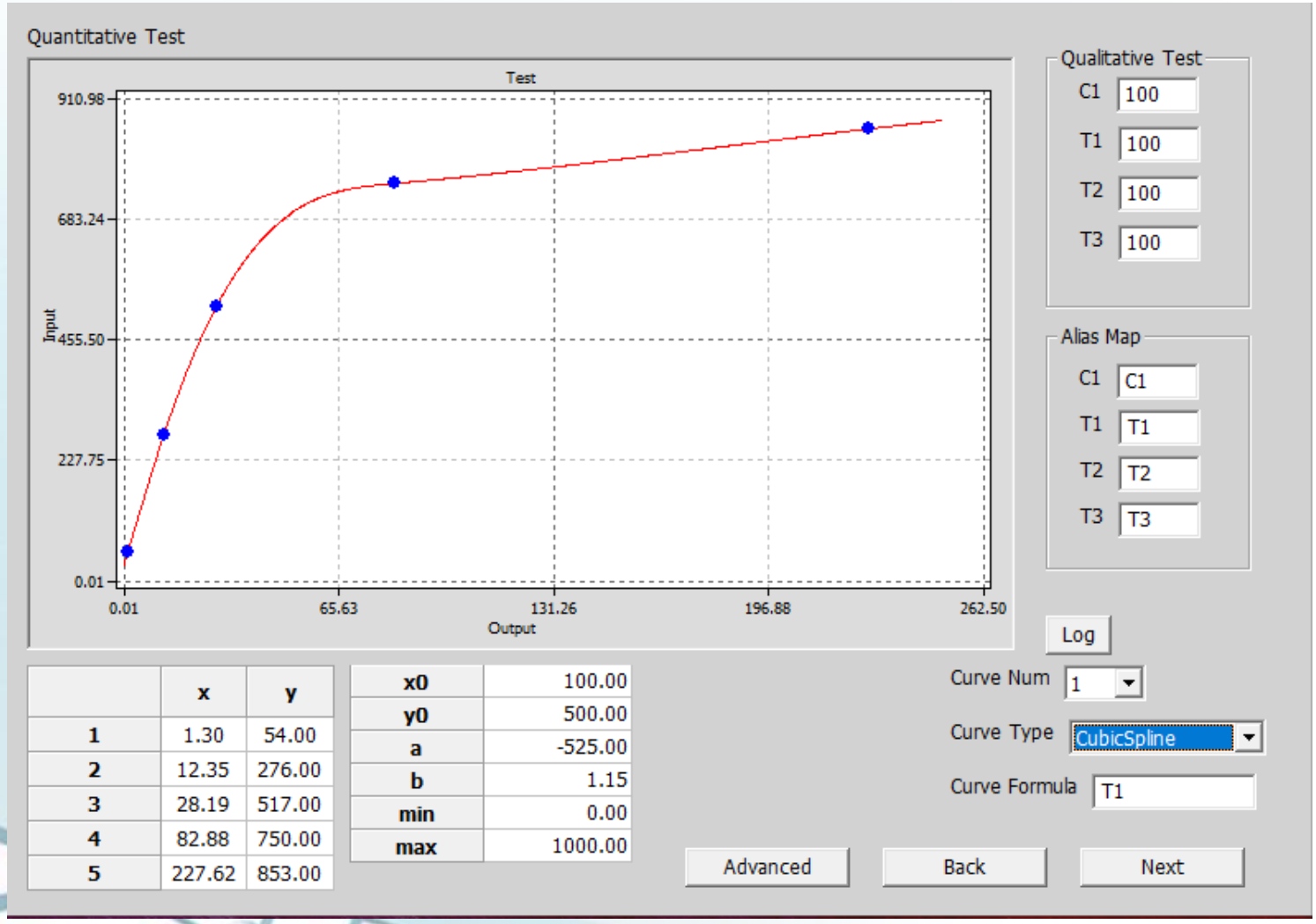

	x	y
1	1.30	54.00
2	12.35	276.00
3	28.19	517.00
4	82.88	750.00
5	227.62	853.00

x0	100.00
y0	500.00
a	-525.00
b	1.15
min	0.00
max	1000.00

Curve Type: Linear Regression

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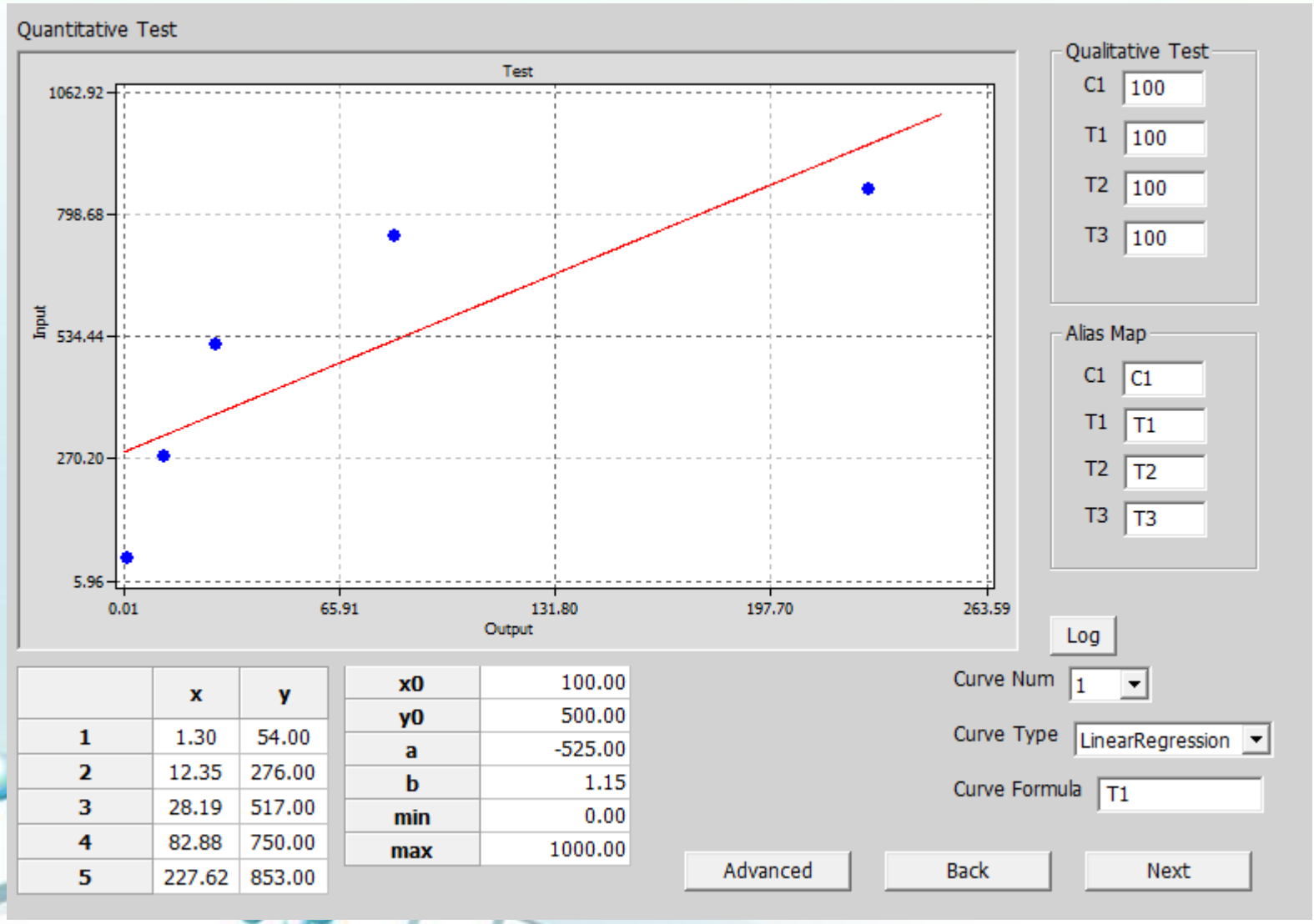

	x	y
1	1.30	54.00
2	12.35	276.00
3	28.19	517.00
4	82.88	750.00
5	227.62	853.00

x0	100.00
y0	500.00
a	-525.00
b	1.15
min	0.00
max	1000.00

Curve Type: Constant spline

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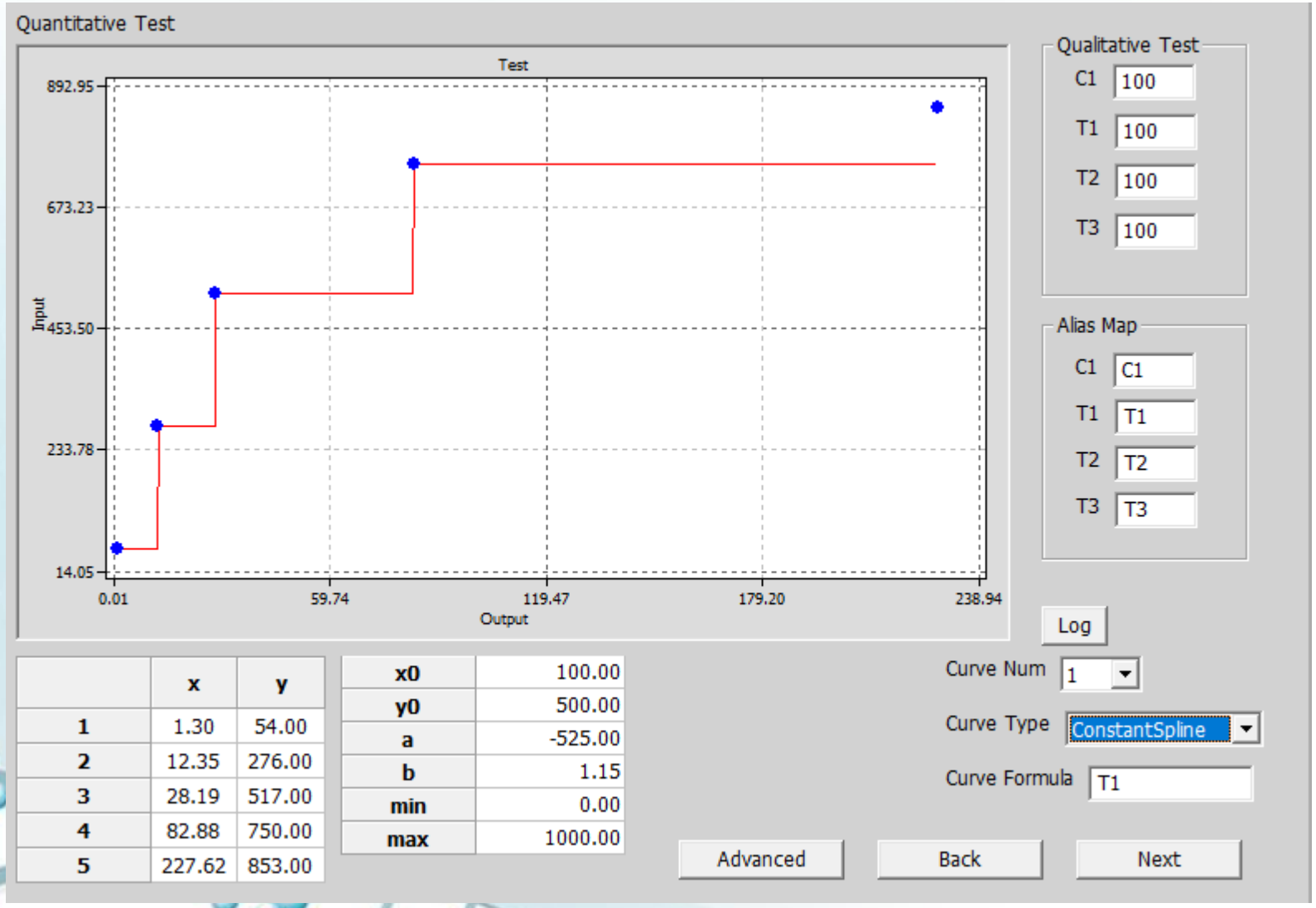

	x	y
1	1.30	54.00
2	12.35	276.00
3	28.19	517.00
4	82.88	750.00
5	227.62	853.00

x0	100.00
y0	500.00
a	-525.00
b	1.15
min	0.00
max	1000.00

Curve Type: Akima spline

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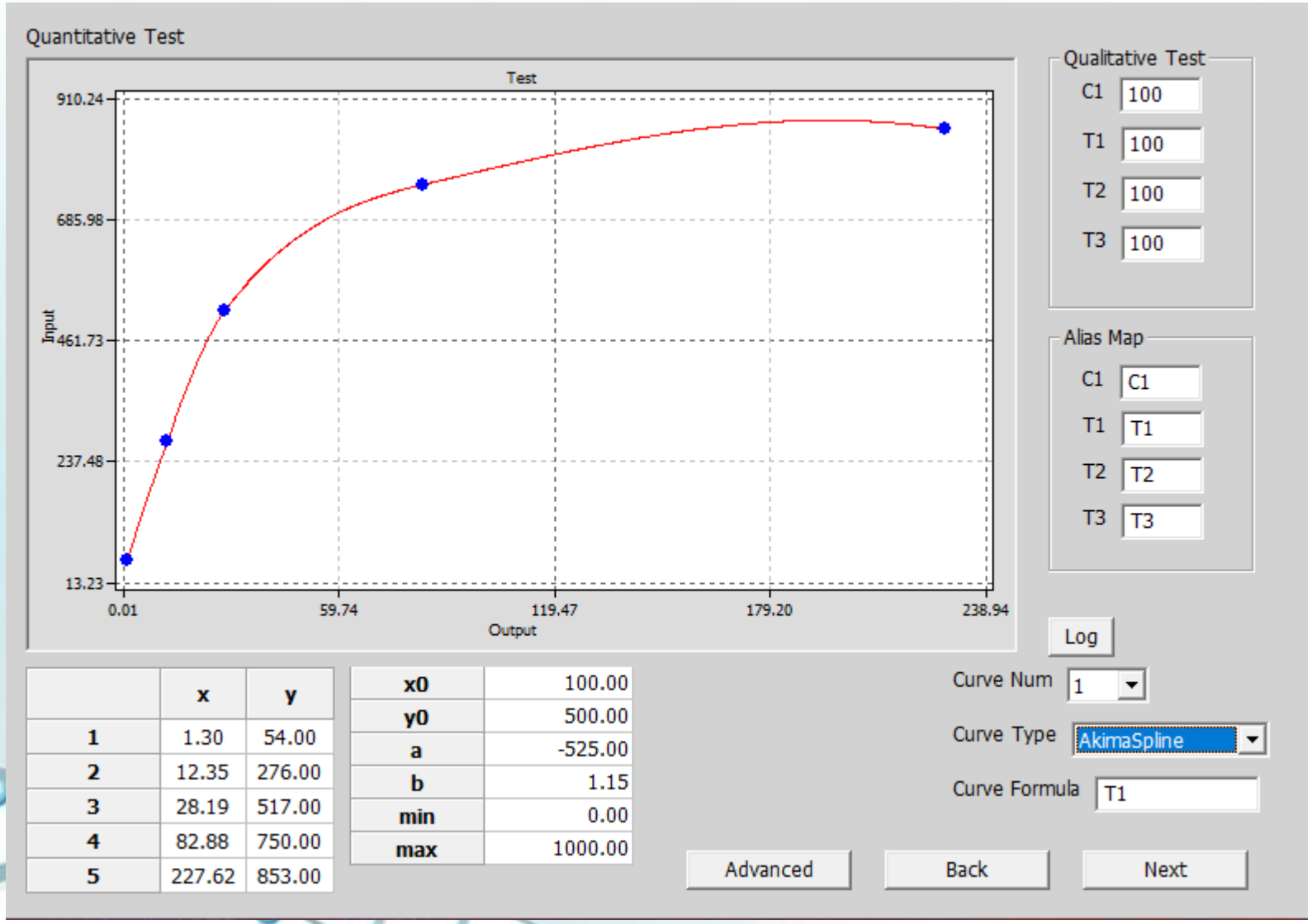

	x	y
1	1.30	54.00
2	12.35	276.00
3	28.19	517.00
4	82.88	750.00
5	227.62	853.00

x0	100.00
y0	500.00
a	-525.00
b	1.15
min	0.00
max	1000.00

Curve Type: Bessel spline

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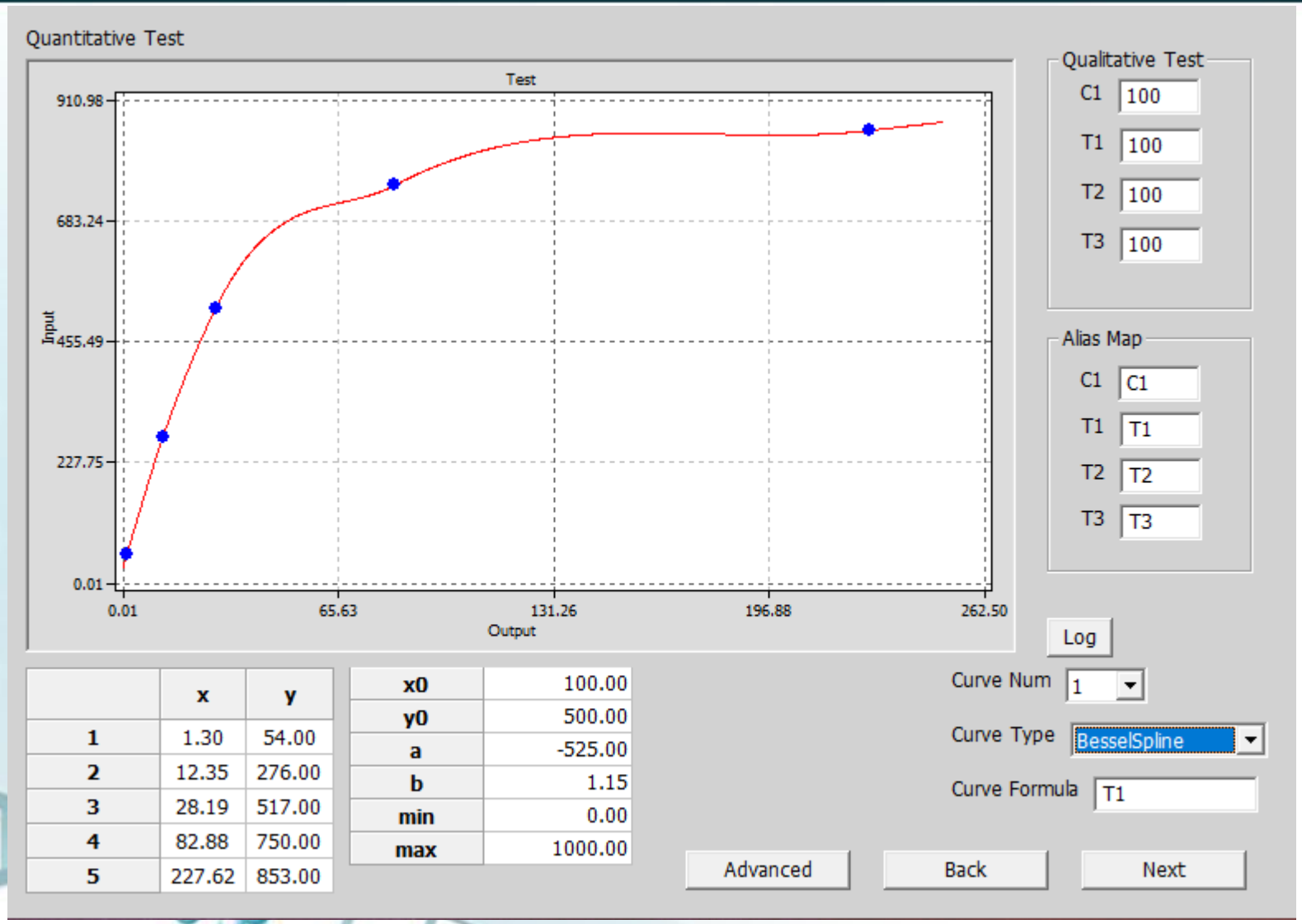

	x	y
1	1.30	54.00
2	12.35	276.00
3	28.19	517.00
4	82.88	750.00
5	227.62	853.00

x0	100.00
y0	500.00
a	-525.00
b	1.15
min	0.00
max	1000.00

Curve Type: Pchip spline

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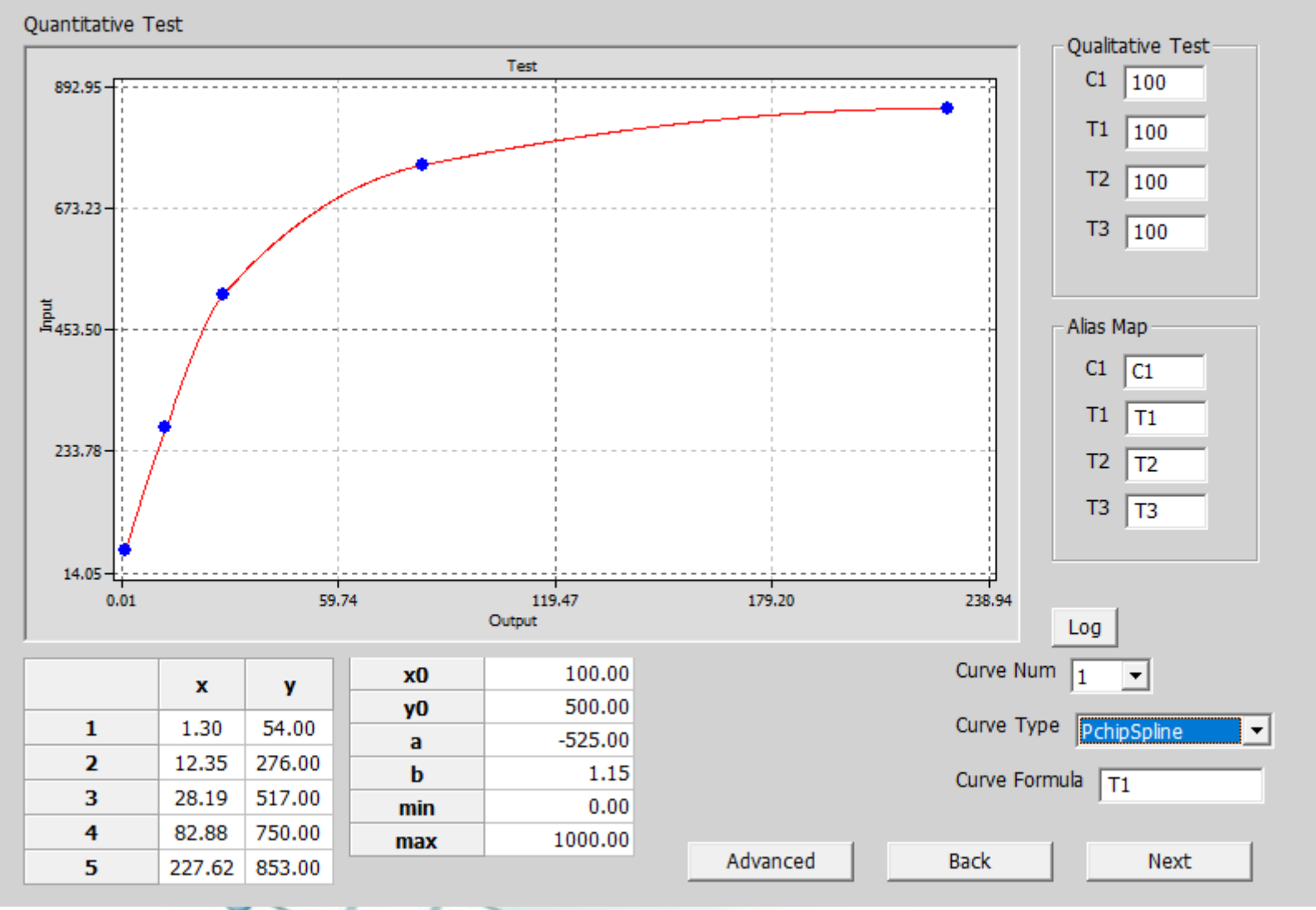

	x	y
1	1.30	54.00
2	12.35	276.00
3	28.19	517.00
4	82.88	750.00
5	227.62	853.00

x0	100.00
y0	500.00
a	-525.00
b	1.15
min	0.00
max	1000.00

Curve Type: Quintic spline

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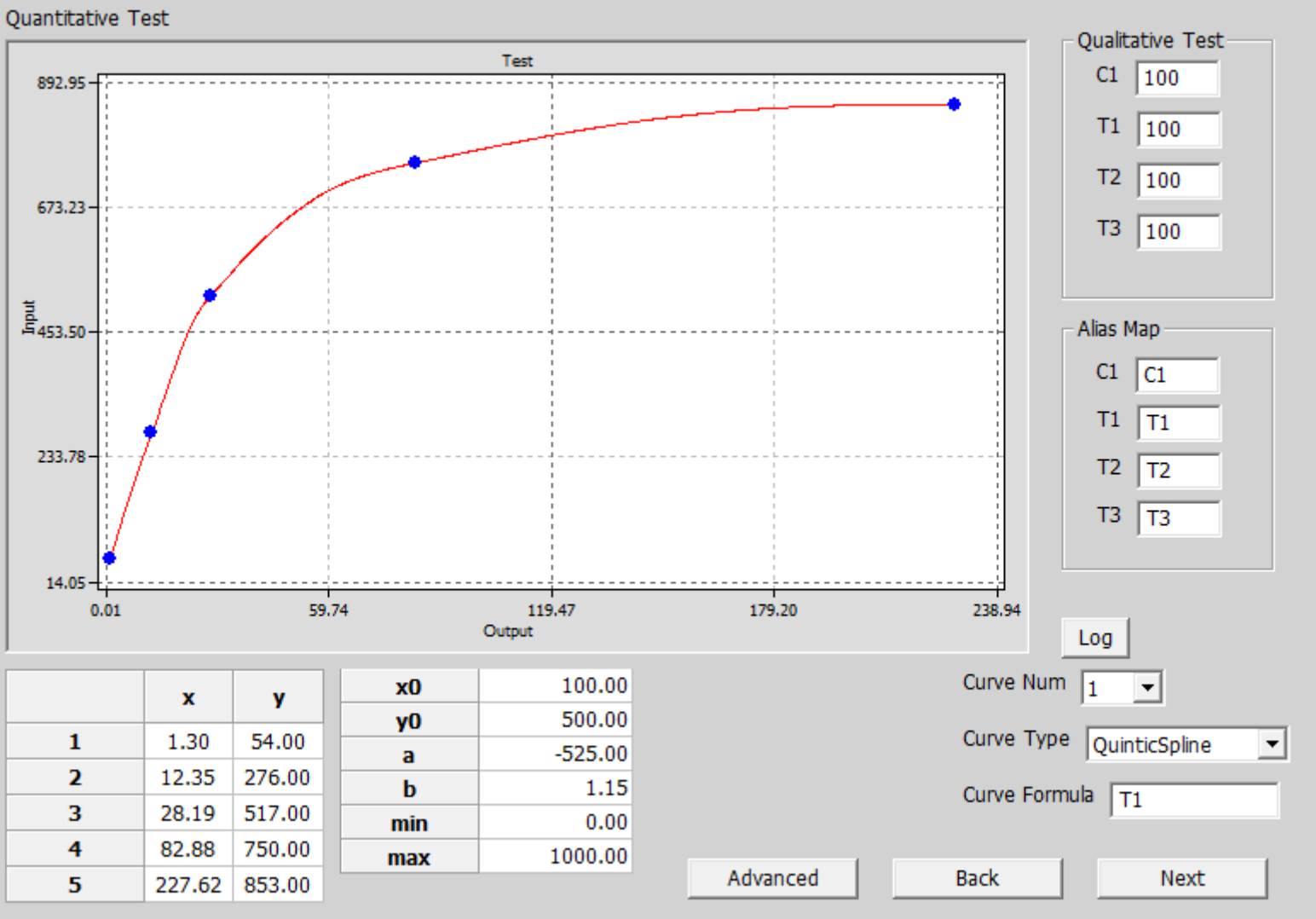

	x	y
1	1.30	54.00
2	12.35	276.00
3	28.19	517.00
4	82.88	750.00
5	227.62	853.00

x0	100.00
y0	500.00
a	-525.00
b	1.15
min	0.00
max	1000.00

Curve Type: 4PL

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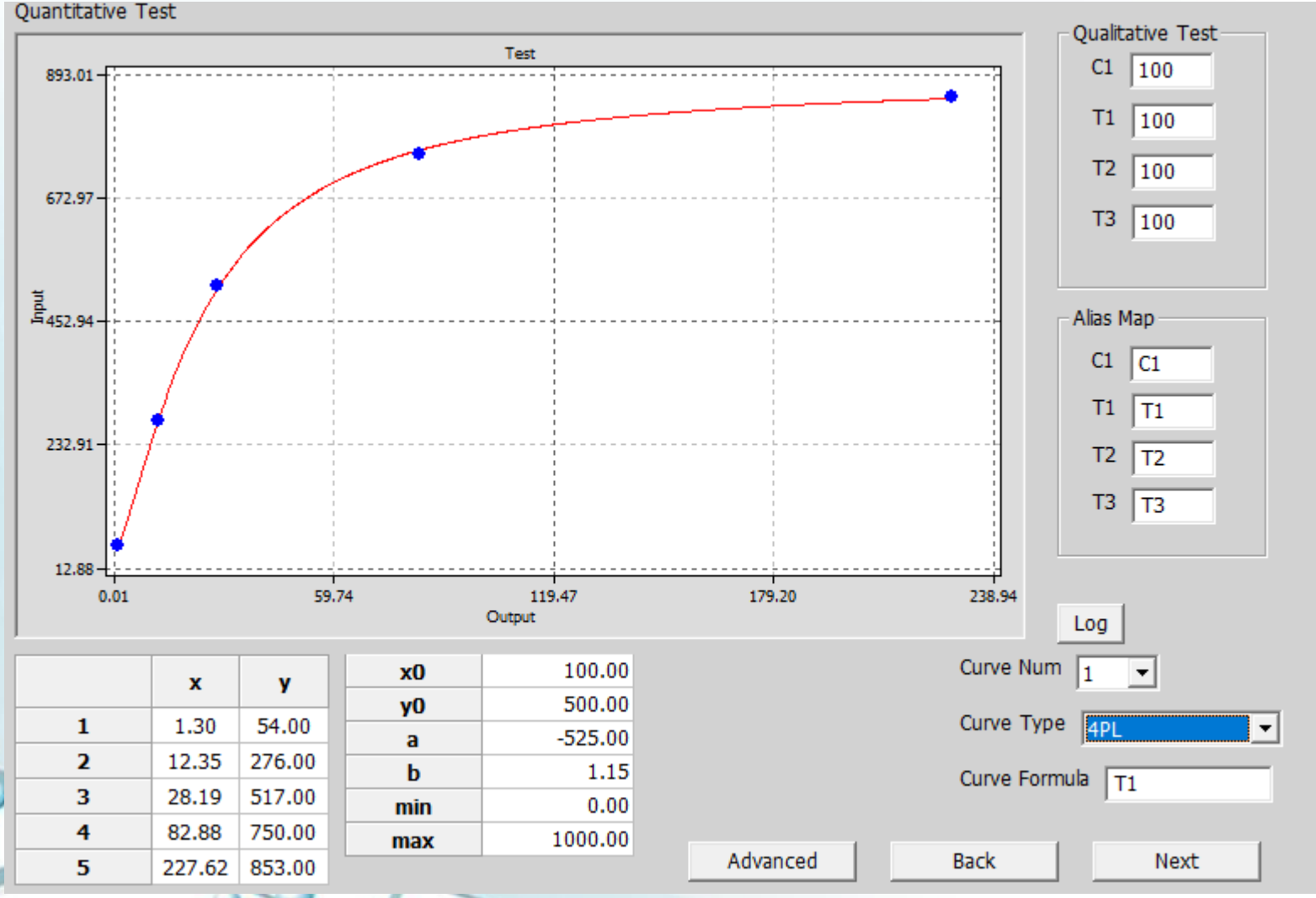

	x	y
1	1.30	54.00
2	12.35	276.00
3	28.19	517.00
4	82.88	750.00
5	227.62	853.00

x0	100.00
y0	500.00
a	-525.00
b	1.15
min	0.00
max	1000.00

Curve Type: 4PL Input (parameter input)

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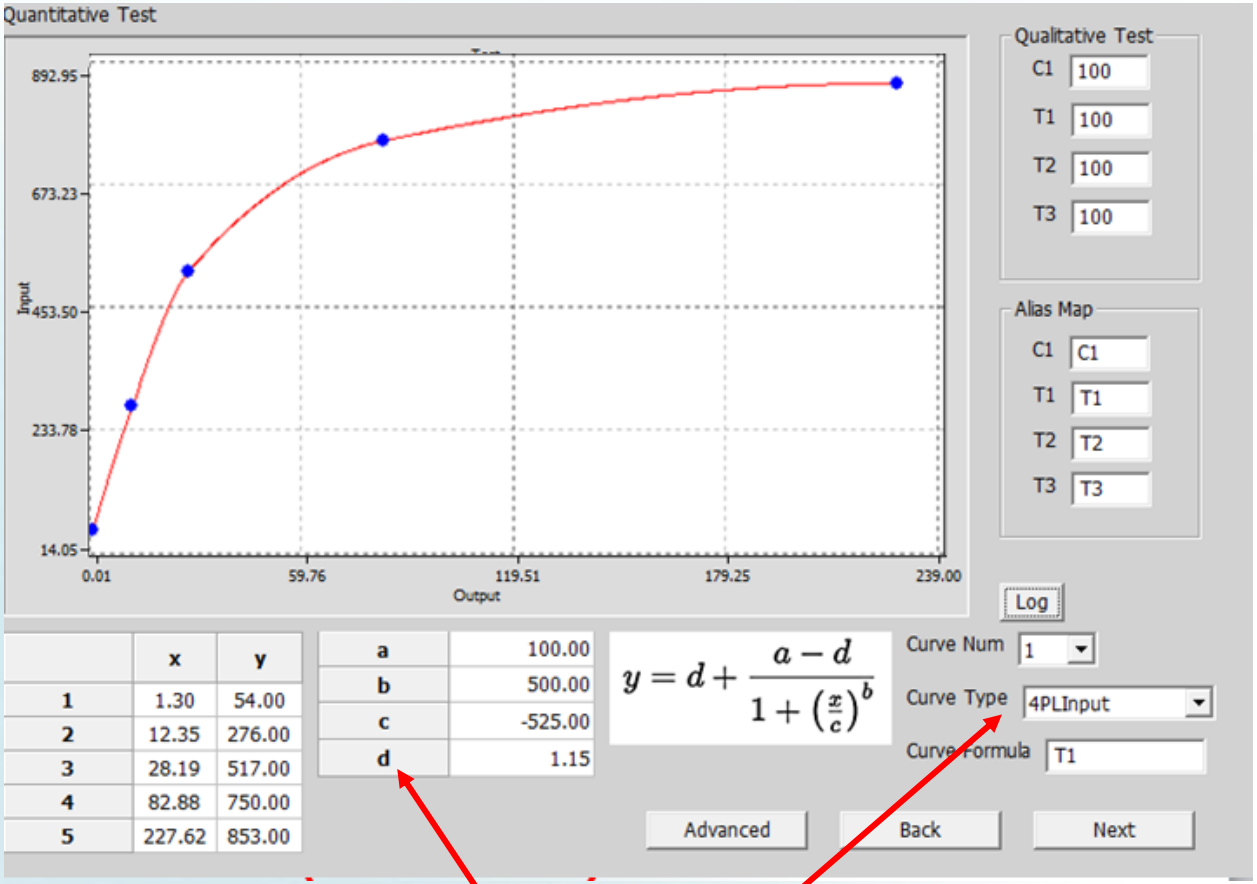

4PL input : a b c d input for 4-parameter logistic curve

Curve Type: Quadratic

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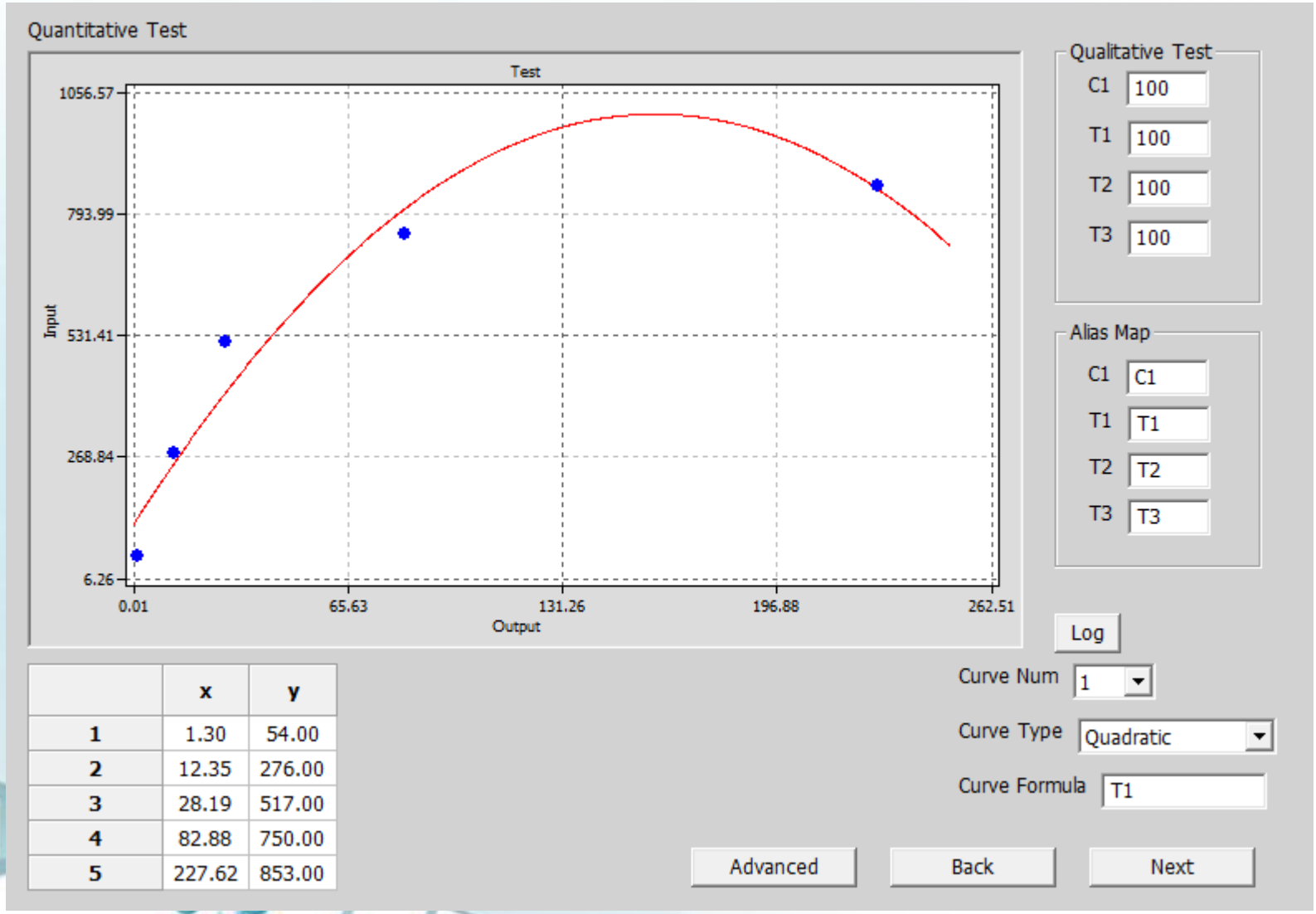

	x	y
1	1.30	54.00
2	12.35	276.00
3	28.19	517.00
4	82.88	750.00
5	227.62	853.00

Curve Type: Gaussian

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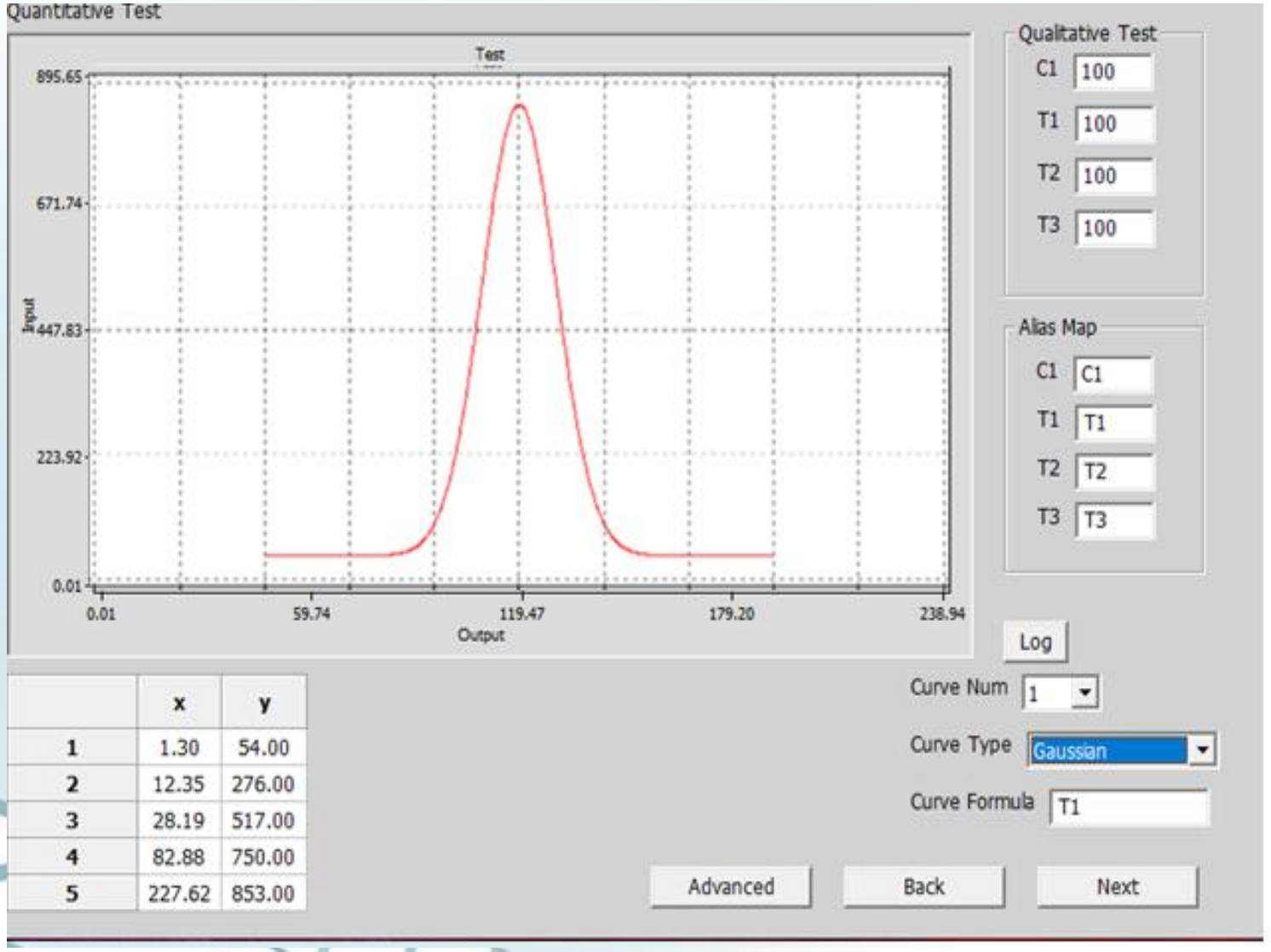

	x	y
1	1.30	54.00
2	12.35	276.00
3	28.19	517.00
4	82.88	750.00
5	227.62	853.00

Curve Type: Gaussian Input

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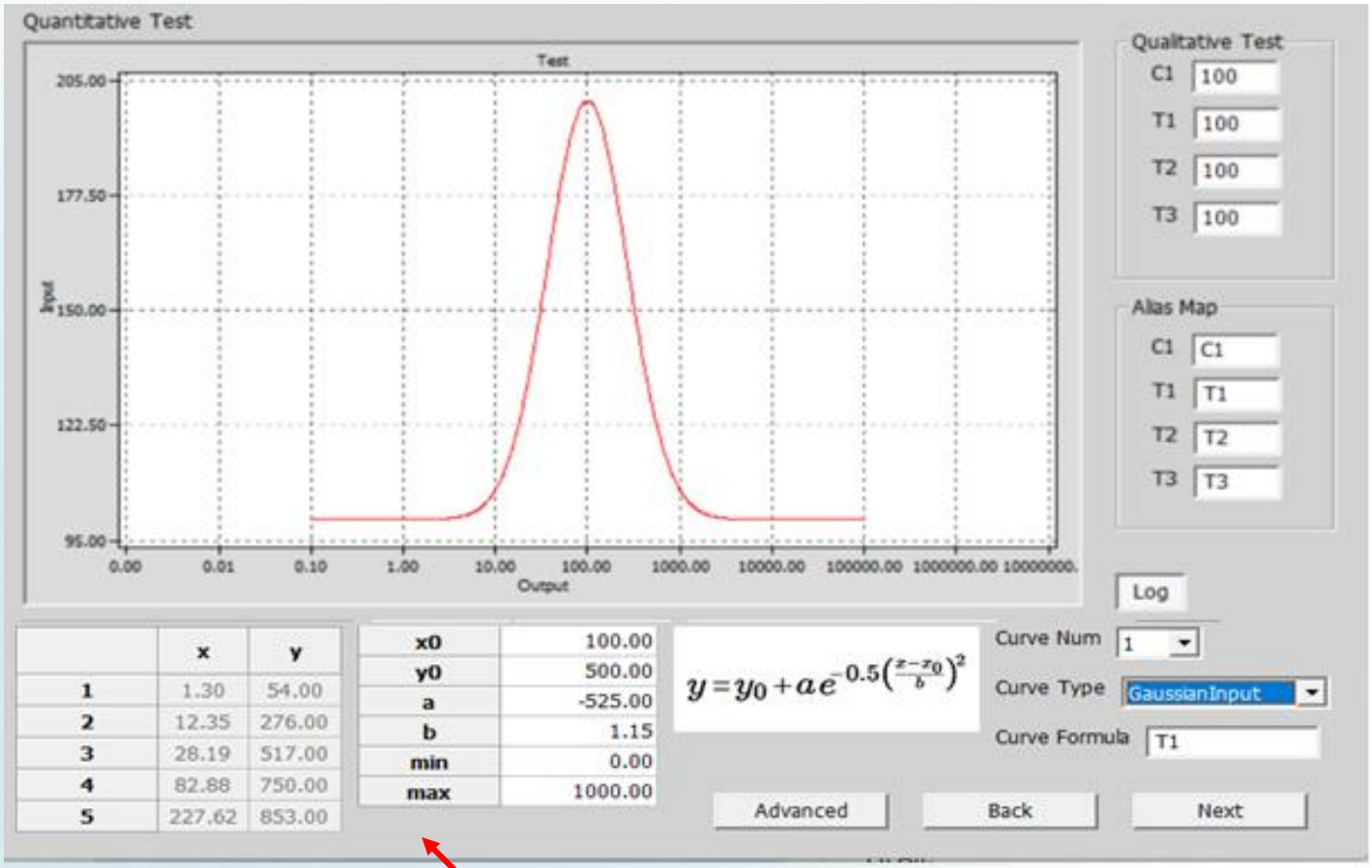
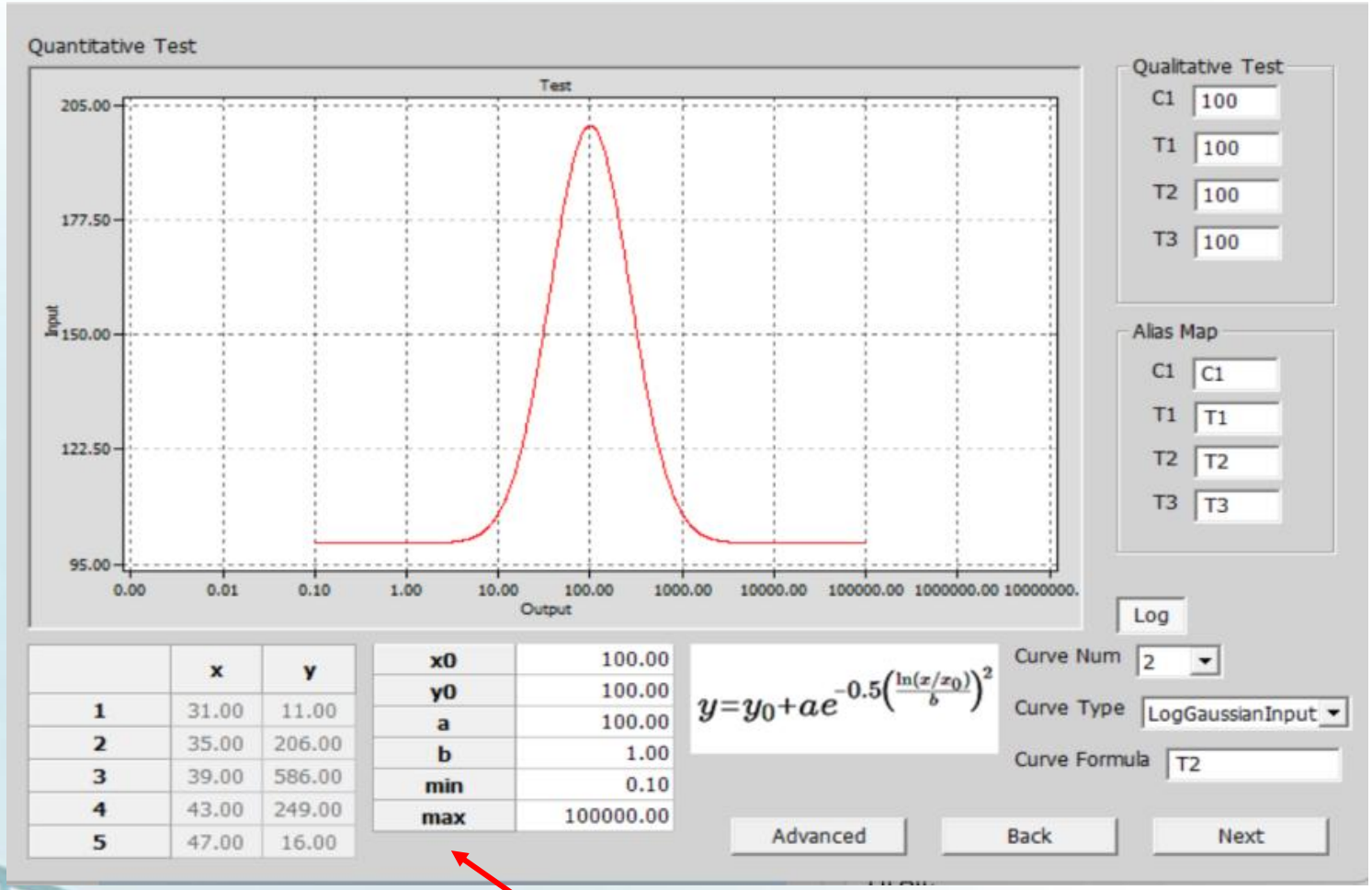


	x	y
1	1.30	54.00
2	12.35	276.00
3	28.19	517.00
4	82.88	750.00
5	227.62	853.00

Gaussian input : parameter for Gaussian logistic curve

Curve Type: LogGaussian Input



Gaussian input : parameter for LogGaussian logistic curve

Curve Type: Logistic Input

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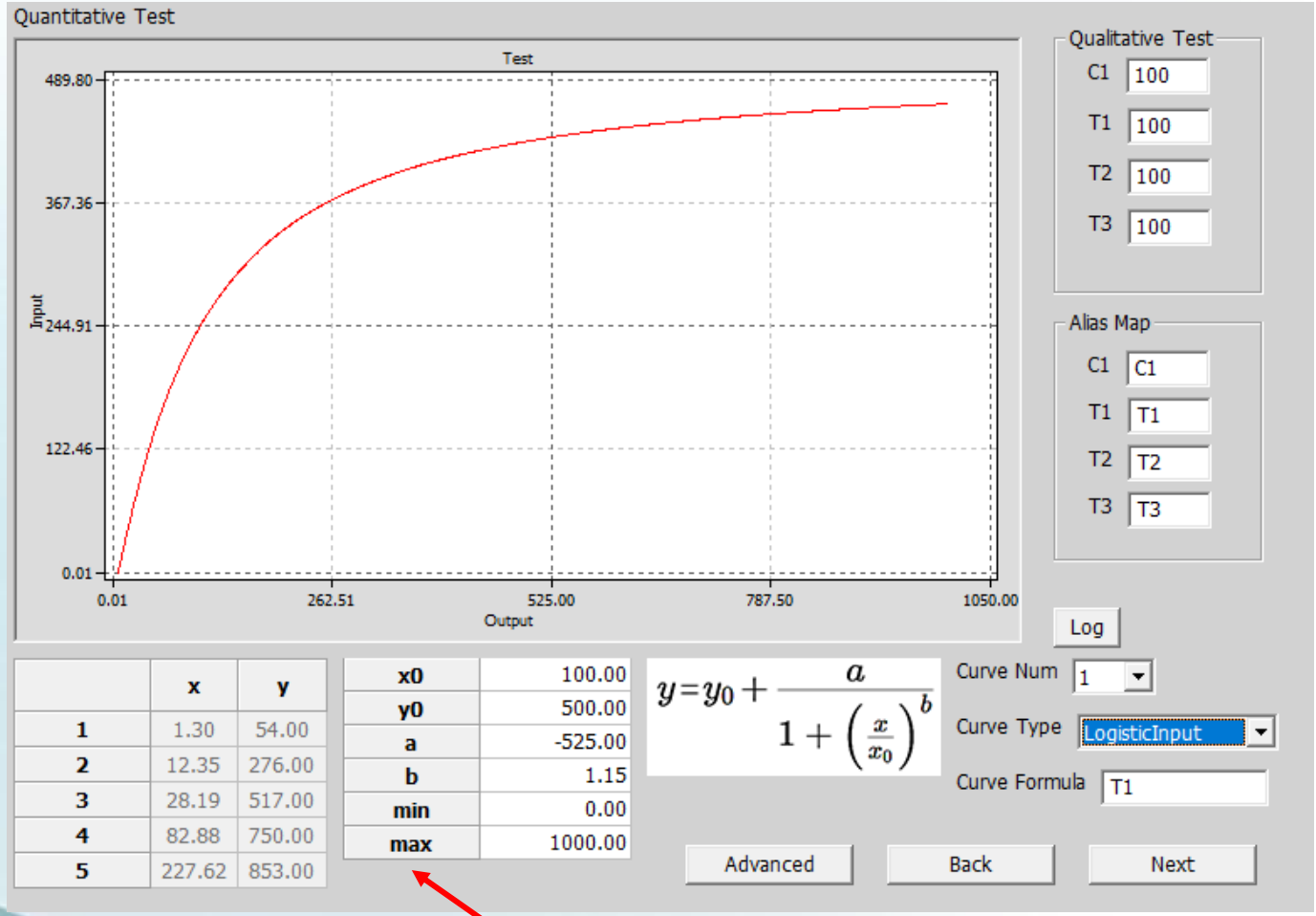

Logistic input : parameter for Logistic logistic curve

Curve Formula

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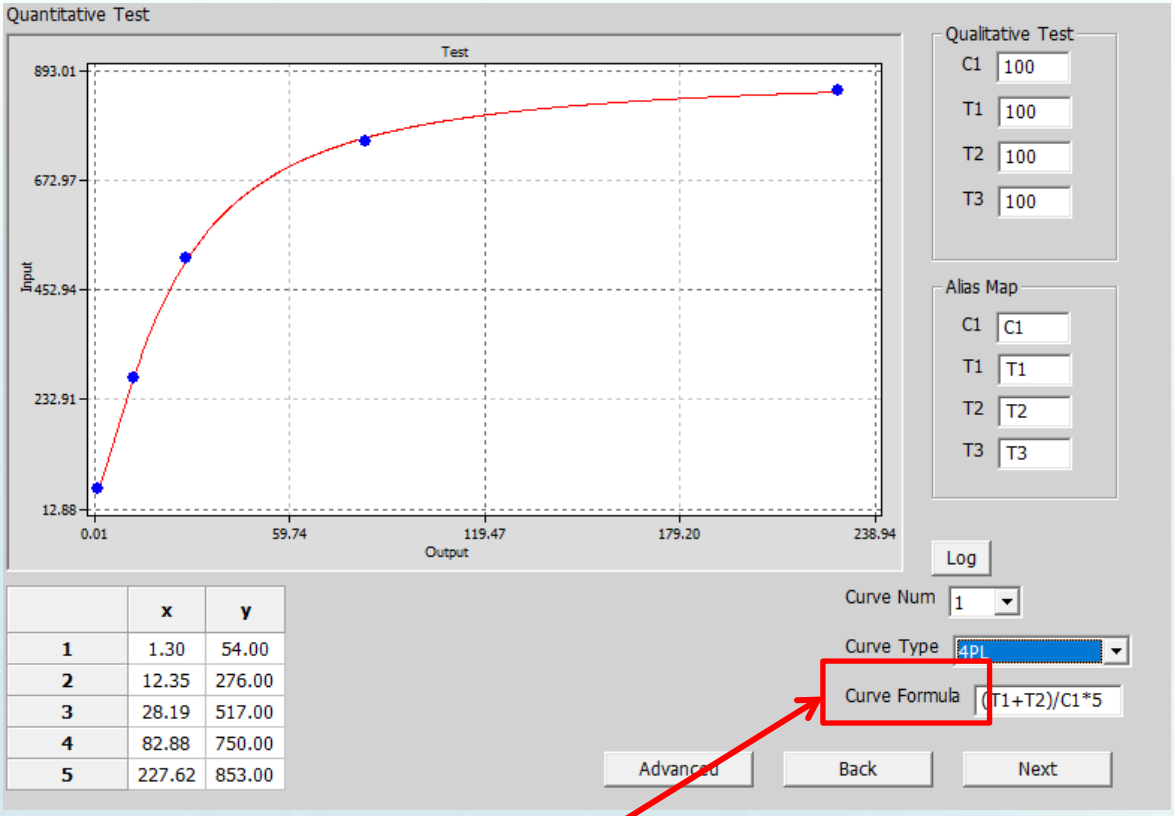
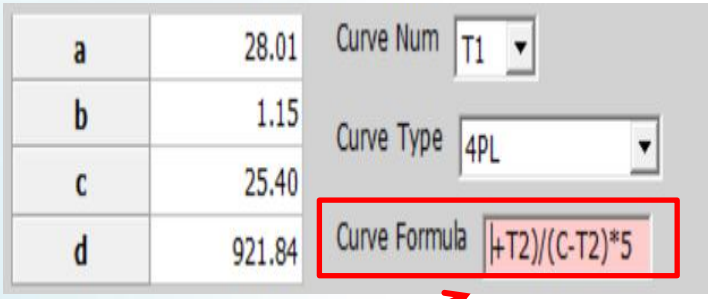


	x	y
1	1.30	54.00
2	12.35	276.00
3	28.19	517.00
4	82.88	750.00
5	227.62	853.00



Red color : wrong Calculation formula

Calculate the corresponding concentrations by using + - * / ( ) and combinations of capital C T1 T2 T3 of Calculation formula. For example :(T1+T2)/(C-T2)*5 , (T1+T2+T3)/C*5 , T1/C, ……

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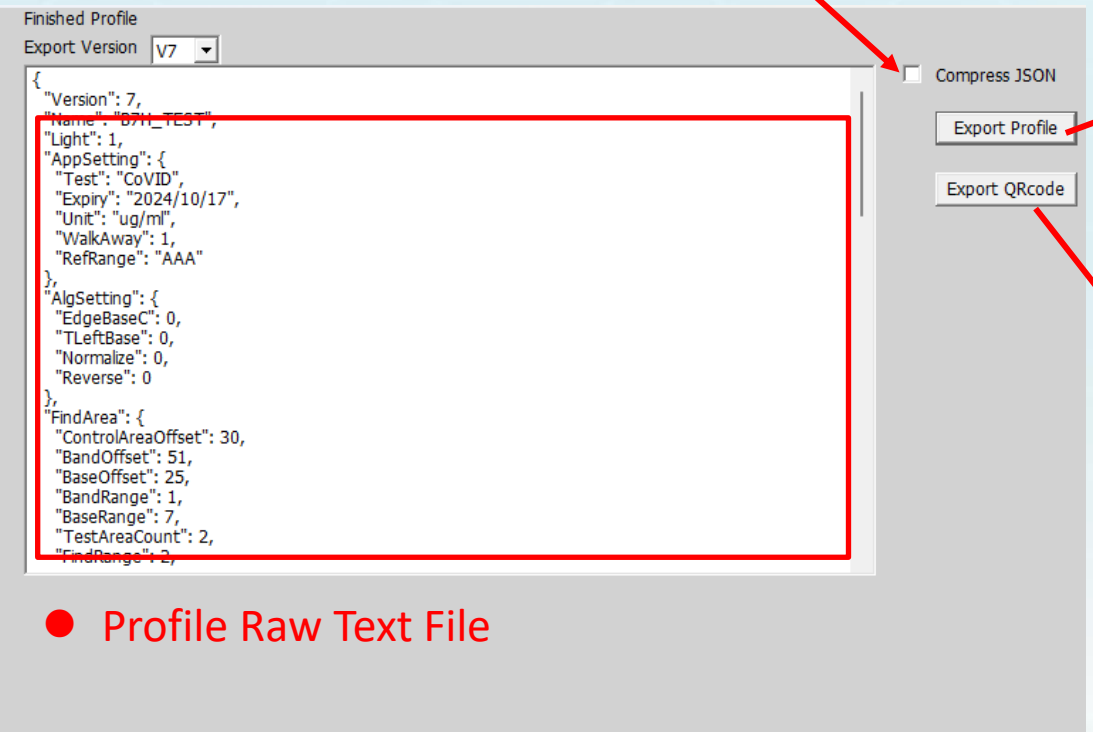
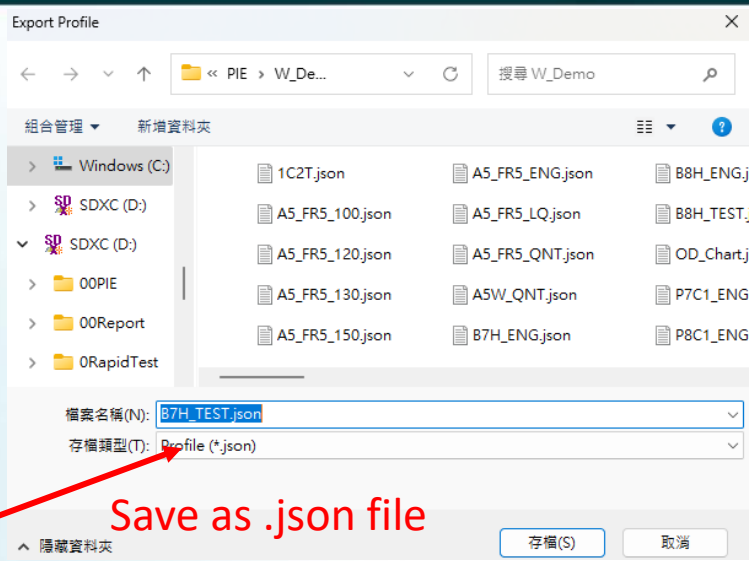
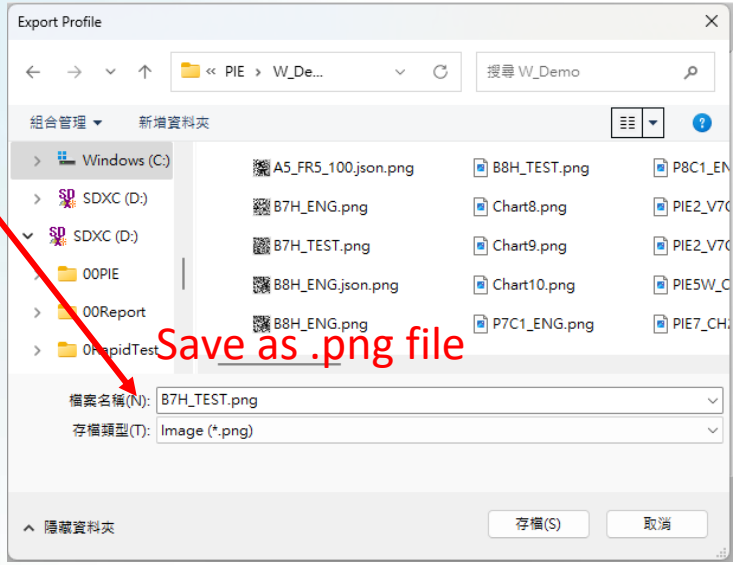
Jason file can be compressed



- Profile Raw Text File



Save as .json file



Save as .png file

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