Application Note

[NOTE] Guidance to Set Up the Profile of Biochemical Tests
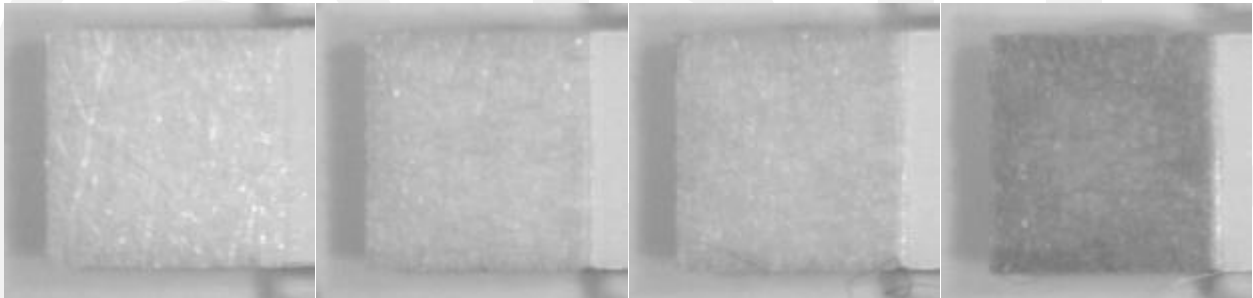
[AN] RTV-2023-0214-001

Application:

Biochemical test strips (pictured below) are often used to test water quality and urine ,and are one of the items for rapid screening.

One of the rapid diagnostic modes of biochemical detection is the density mode, as shown in the figure below (sample concentration increases from left to right):

This kind of detection cannot be quantitatively analyzed by human eyes, and needs to rely on Reader.

Compared with human eyes, PIE RapidScan Reader has the following advantages:
1. Reader can analyze the real concentration value.
2. For weak signals invisible to human eyes, Reader can still measure the value, even if the concentration is reduced by 4~8 times.

Product:

RapidScan Lateral Flow Readers Pro with Rapid Test View or Rapid Test View_Ethernet Software (RTV&ERTV for short)
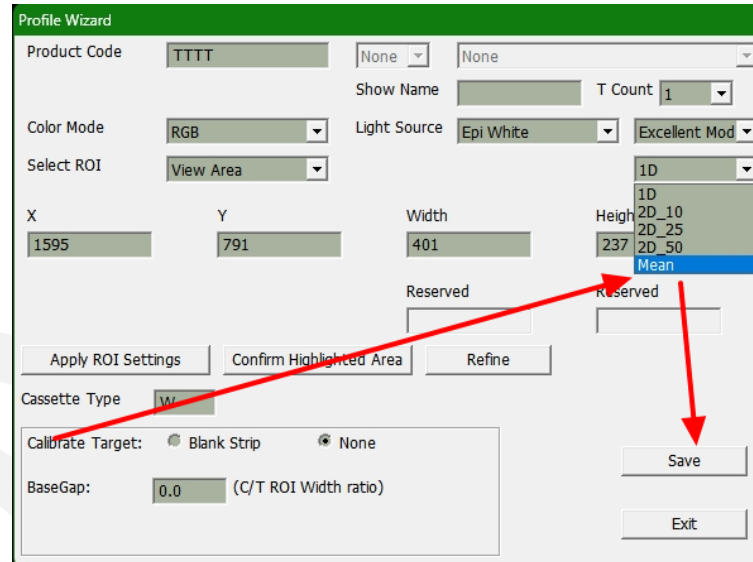
Introduction:

1. The **Mean** setting in the **Profile Wizard** is specially used for biochemical detection.

2. With the **Quantitative Mapping Curve** function of **Modify Lot**, the value measured by Mean can be converted into the actual concentration, which is helpful for data interpretation.

Steps:

1. *Mean Setting Process:*

   A. Enter the **Profile Wizard** and go to the **Mean** setting option, modify the Mean setting, and save the file Profile. As shown below:
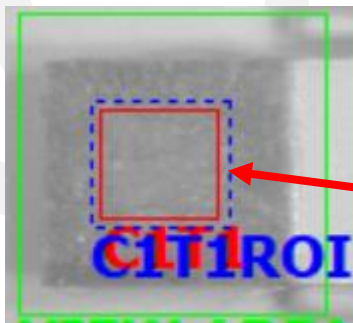

   B. After that, use "Select ROI" to set the calculation area of the T value (the setting of C can be ignored), and the setting can be completed, as shown in the figure below:

   Note that Mean's ROI setting method is different from 1D/2D. →The position of the ROI needs to be in the middle of the Colored Area, and its size needs to be smaller than the Colored Area.

2. *Mean Setting Supplement:*

   A. When set to "Mean", the calculation area of the T value will be fixed and will not be automatically adjusted with the Band.

   B. The T value calculation method of this setting is the **average grayscale value** in the ROI area. (For the meaning of the grayscale, please refer to the figure below):

   0   255

C. As for the calculation method of the T value of **1D/2D**, please refer to the figure below:

Integration Method

- **1D**: average each H and sum all W
- **2D**: sum all H x W pixels value = V_{2D}
  - 2D_10 = $V_{2D}/10$
  - 2d_25 = $V_{2D}/25$
  - 2d_50 = $V_{2D}/50$
- Value big→slop higher → noise high
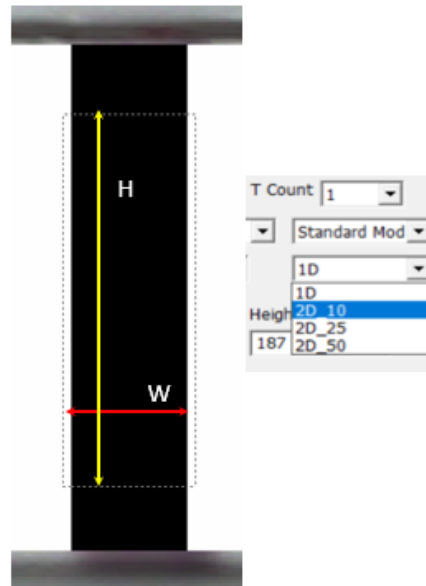
3. *Quantitative Mapping Curve Settings*

1st & The Most Recommended Way To Establish A Standard Curve

1. Go into the Database, and export all the test data you need into a CSV profile.

2. Use Excel to open the profile, and then you can calculate for example the T/C value for each concentration.

3. Go to Modify Lot and ① fill in the value you calculated & ② the unit (ppb, ng/ml…etc.) for your result.

4. ③ Click on "Add", and then finish all your concentration step by step like the description above.

5. Hereafter, you can choose any standard curve you'd like to establish.

※ The value of standard curve can be set for T1, T1/C1, T1-C1…etc.

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Example:

1. *Experimental Content:*

control variable	
Test sample	Sample A
manipulative variable	
concentration	$1000/2^n$ ng/ml(n=0,4,6,8) 0 ng/ml
Strain variable	
Mean value changes between different concentrations.	

For the video of the whole experiment operation process, please refer to *6.Conclusion*

2. *Profile Settings:*
   Refer to the **Step** instructions to create a Profile whose Integration Method is Mean.
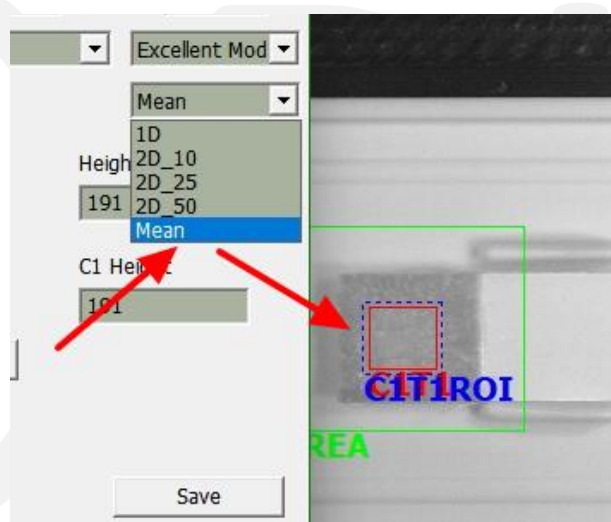
3. *Organize The Relationship Between Concentration And T Value:*
   Use Reader to analyze the Sample A of different concentrations, and record the T value result, the result is as follows:

	concentration (Sample A) ng/ml	T Value
$1000/2^0$	1000	100.91
$1000/2^4$	62.5	151.31
$1000/2^6$	15.625	189.39
$1000/2^8$	3.906	211.12

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4. *Create Standard Curve:*
Through the **Quantitative Mapping Curve** function of **Modify Lot**, use the above table to create a "concentration/T value" standard curve, as shown in the figure below:
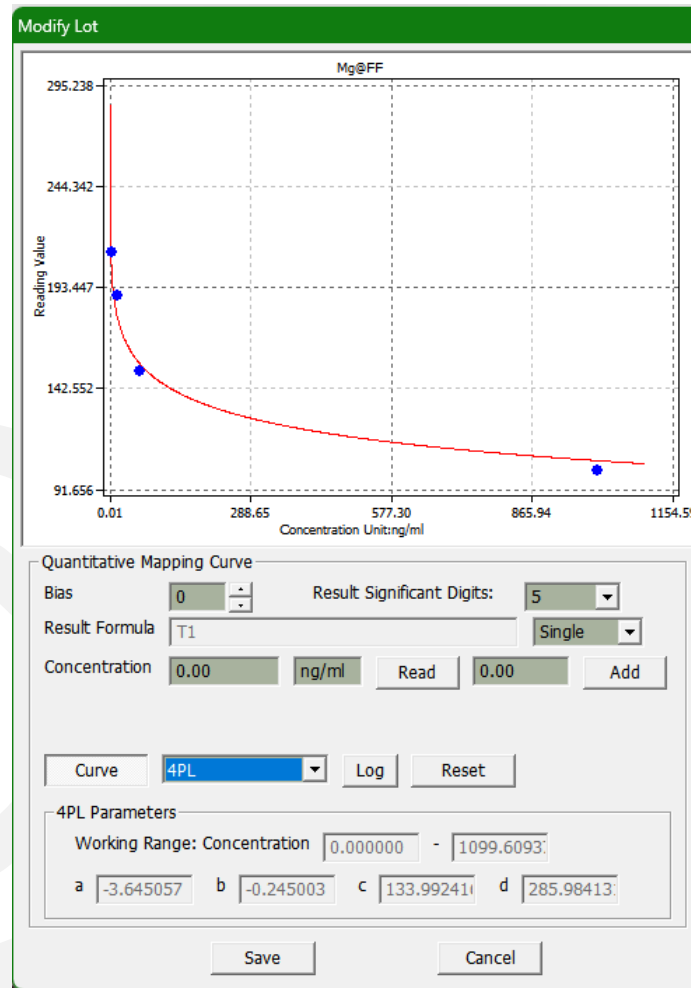
5. *Other Sample Analysis:*
After the standard curve is established, analyze other samples, and the concentration conversion results can be obtained, as shown in the figure below:
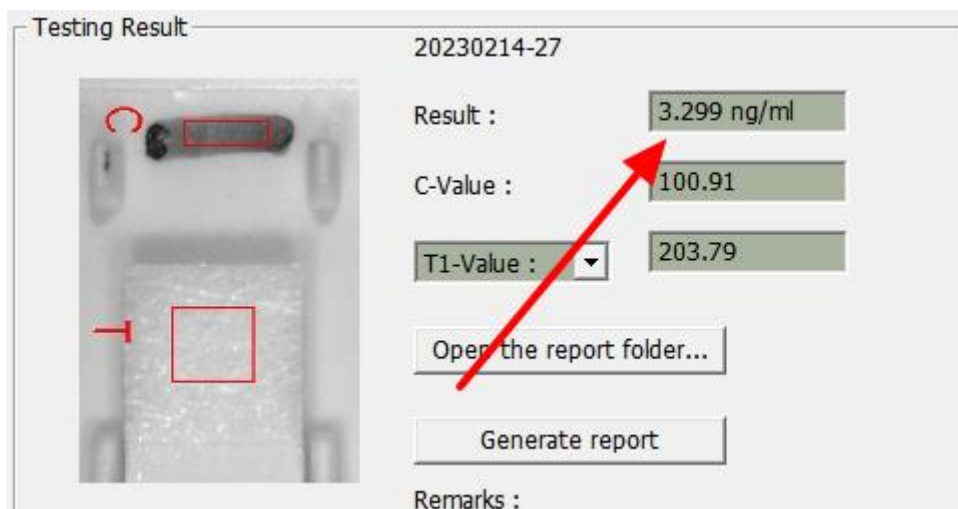
6. *__Conclusion:__*

For the operation from standard curve setting to sample analysis, please refer to the following video:
https://drive.google.com/file/d/1MeBI6hAN_4RXLSk0JQCaQRWpotbKSS6E/view?usp=share_link

Extended Application:

1. It is recommended to use the **Color Mode** function (please refer to [Application Note RTV-2023-0130-001]Increasing LFT's Sensitivity Using "Color Mode") to confirm which color has better Sensitivity.
2. Continuing from the above, if the **Group Profile** function is added, the results of different Color Mode settings can be displayed at the same time. (For Group Profile settings, please refer to (E)RTV User Manual), In this way, the differences of different colors can be compared.