User Manual

Thermal Profiler

TOPCITY ELECTRONICS CO., LTD

Important Precautions and Safety Information

Thank you for selecting the TCK thermal profiler. To avoid safety accidents and damage to the profiler, the following safety precautions must be followed when you are using it.

1. Please read through and understand this manual before using or operating the profiler;
2. No person other than the maintenance persons and specifically trained qualified operators is allowed to use the profiler;
3. Before initial use of the profiler, please remove the protective film on the profiler and the tray protection box;
4. In order to avoid damage to the profiler and accident due to high temperature, be sure to put the profiler in the tray thermos box during use and make sure the thermos box is in good condition;
5. The profiler is a thermal conductor; please pay attention to personal and instrument safety during operation;
6. Please use the profiler in clean environment;
7. Do not use and store the profiler in open air, under high temperatures, or humid conditions;
8. Do not use the profiler near electromagnetic interference sources;
9. Please turn off the power supply before performing any service work to avoid damage to elements;
10. During use or storage, to avoid sliding of the profiler, please keep it stable and on a flat surface;
11. To ensure normal operation of the profiler, it must be recharged when insufficient voltage is indicated by green alarm indicator;
12. After use, please put the profiler back into its box to avoid accidental damage to it;
13. The profiler can be transported and stored in the temperature range of -25℃～55℃. During transportation, please avoid high humidity, vibration, pressure and mechanical shock whenever possible;
14. Please keep the manual in a proper place for later use in maintenance and repair.

Contents

Introduction

1. Instrument Models

- ☐ TCK1203 3-channel thermal profiler----------
- ☐ TCK1206 6-channel thermal profiler----------
- ☐ TCK1209 9-channel thermal profiler----------
- ☐ TCK1200 12-channel thermal profiler----------

2. Standard Composition

1. Thermal profiler	2. Insulation box	3. Temperature test line
4. Data download line	5. Wireless receiver	6. Antenna
7. Software CD	8. Charger	9. Tweezers
10. Insulated gloves	11. Hi-temp tine wire	12. Scissors
13. “+” screwdriver	14. Hi-temp adhesive tape	15. Instrument box
16. Operator’s Manual	17. Acceptance Certificate	

3. Main Technical Specifications

Types	**TCK1203**	**TCK1206**	**TCK1209**	**TCK1200**
Dimensions	196×82×16mm	196×82×21mm	196×82×21mm	196×103×21mm
Insulation boxes' dimensions	245×100×26mm	245×100×30mm	245×100×30mm	245×121×30mm
Test channel number	**3CH**	**6CH**	**9CH**	**12CH**
Thermocouple	K-type thermocouple			
Sampling interval	0.25sec---600sec Set with software			
Record data	80000 point/channel			
Resolution	0.1℃			
Temperature measuring range	0---1000℃			
Temperature measuring accuracy	±1.2℃			
Operating voltage	3.6VDC, rechargeable battery			
Total power	120mW			
Connection mode	USB/RS-232/RF			
Outspread width	98------218mm (Standard configuration)			
Software version	V1.50			

4. Duration at High Temperature of the Thermal profiler in Combination of the Protection Box

Temp (Convection hot air)	100℃	150℃	200℃	250℃	300℃
Duration	32min	20min	15min	12min	8min

Software Installation

1. System Requirements

Operating system: Windows 9x / me / 2000 / XP
Disc space: 50M or more
Memory: 64M or more
Display requirement: 800*600 / 256 colors or more
Communication requirement: one spare RS-232 serial port or USB port
Driver: 4x or higher CD-ROM drive

2. Installation of Profile Manager

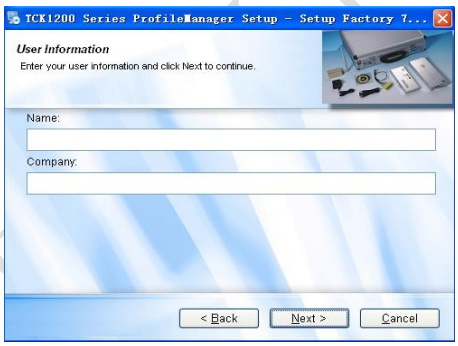
1) Power on the computer and start WINDOWS.
2) Insert the software CD provided in the CD-ROM drive. Wait a moment. It will enter the automatic installation wizard (screen 1).

Screen 1

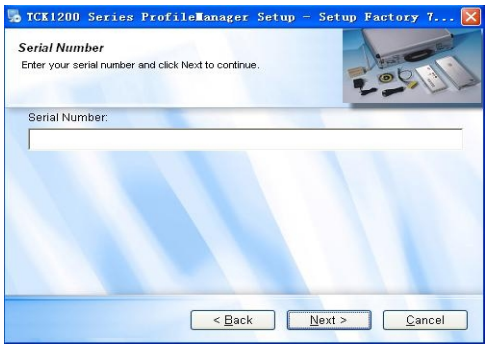
Screen 2

4) Click the **Install TCK Software** button on the installation screen or double click **My Computer** on WINDOWS desktop to start the **CD**. Double click **ProfileManager1.10.exe** to enter the program installation wizard (screen 2). Click **Next** to enter the **License** Agreement. Select 'I Agree to the License Agreement' and click **Next** to enter the **User Information** (screen 3). Enter a user name and company name or select the default ones. Click **Next** to enter (screen 4) and enter the software installation **Serial Number** provided by the service supplier

Software Serial Number: ＃＃＃＃－＃＃＃＃－＃＃＃＃－＃＃＃＃

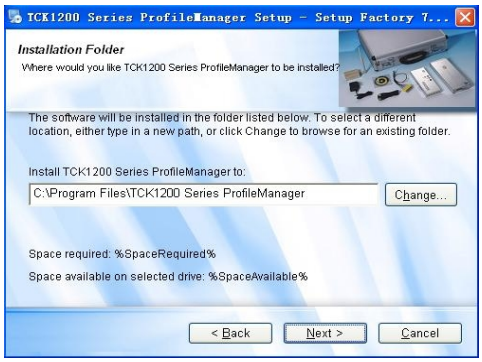


Screen 3



Screen 4

5) After you have entered the correct serial number, click **Next** to enter (Screen 5). Select the desired installation path and click **Next** on the screens that appear one by one until the installation is successful (Screen 6). Click **Finish**, the software installation is completed.

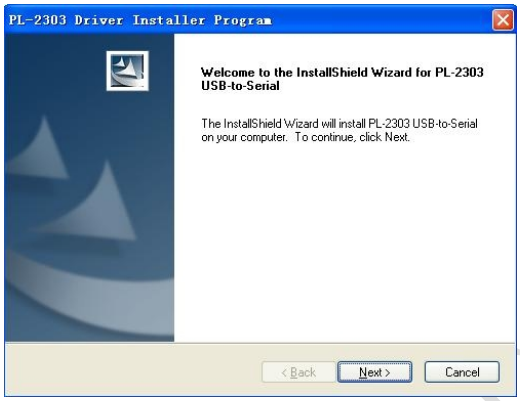


Screen 5

Screen 6

3. Installation of USB Driver

Click **Install USB Driver** on the installation screen (Screen 1) or open the CD and double click **USB Driver.exe** to enter USB Driver installation (Screen 7). Click **Next** until the installation is finished (Screen 8).



Screen 7

Screen 8

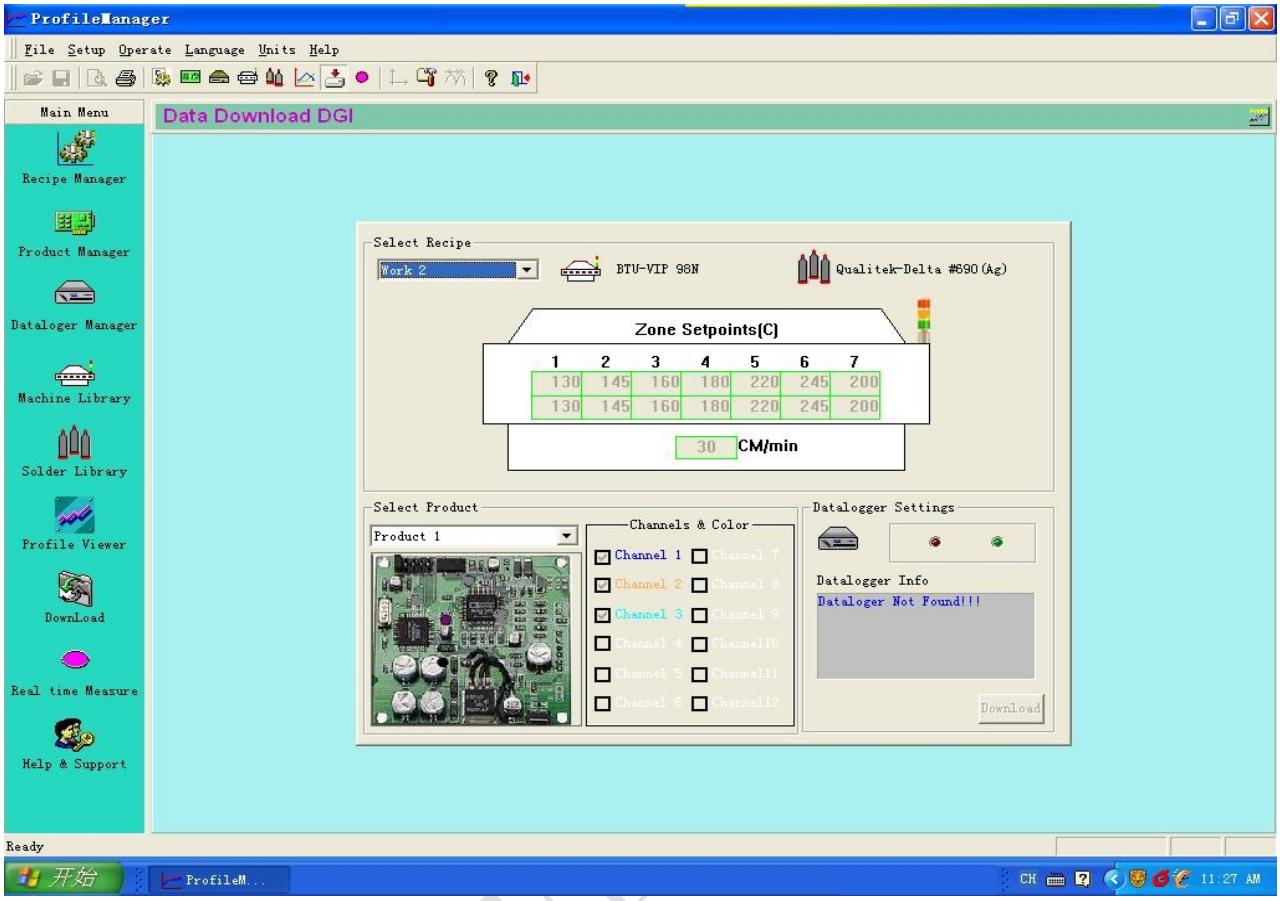
Instrument Setup and Operating

1. Thermal Profiler Picture

① Power switch
② Test switch (there is a test indicator lamp under it, which lights up in standby mode and flashes in test mode)
③ Clear key (there is clear indicator lamp under it. Press down on the Clear key until the lamp lights once, the memory data is cleared)
④ RF switch (there is RF indicator lamp under it which lights during operation)
⑤ Temperature measuring port
⑥ Wave solder test port
⑦ Data download port
⑧ Charging port
⑨ RF antenna port
⑩ RF transceiver

2. Descriptions of Software Screens

1) Run the temperature data download and analysis software **ProfileManager** on the computer. Enter the software initial password 888888 and click **OK** to enter the program's main screen (Screen 9). If **Opening Communication Port Error** prompt appears, click **OK** directly.



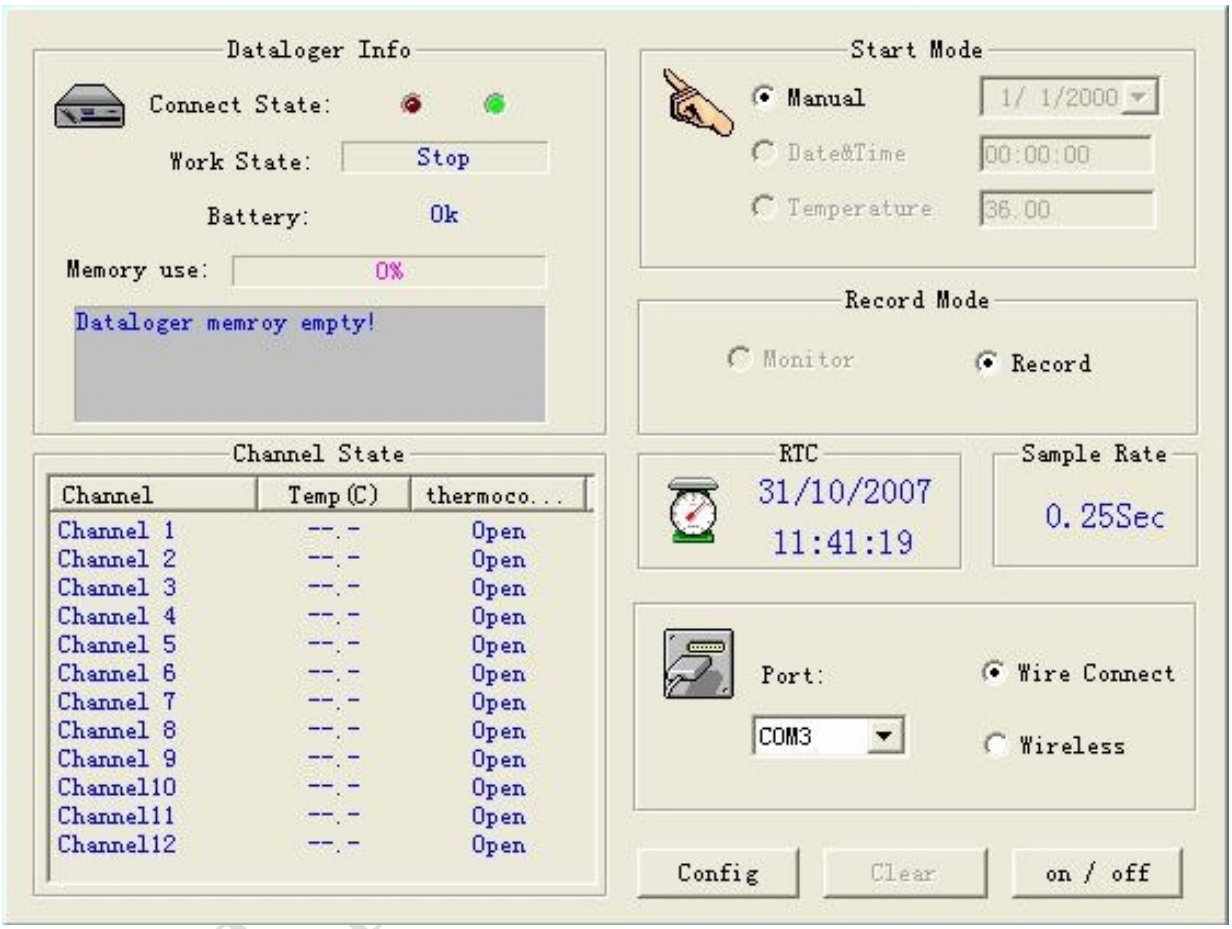
Screen 9

2) After entering the program's main screen, execute **Language** menu and select the desired program language.
Language------Chinese simplified, Chinese traditional and English
【Under Chinese simplified operating system**,** ProfileManager V1.10 provides interchange function among Chinese simplified, Chinese traditional, and English. Under Chinese traditional operating system**,** ProfileManager V1.10 provides interchange function between Chinese traditional and English.】
3) Execute **Unit** menu and select the corresponding temperature unit.
Unit --------- Celsius and Fahrenheit
4) Execute **Safety Setup** under **Setup** menu and set the running password of the software (Screen 10)

Screen 10

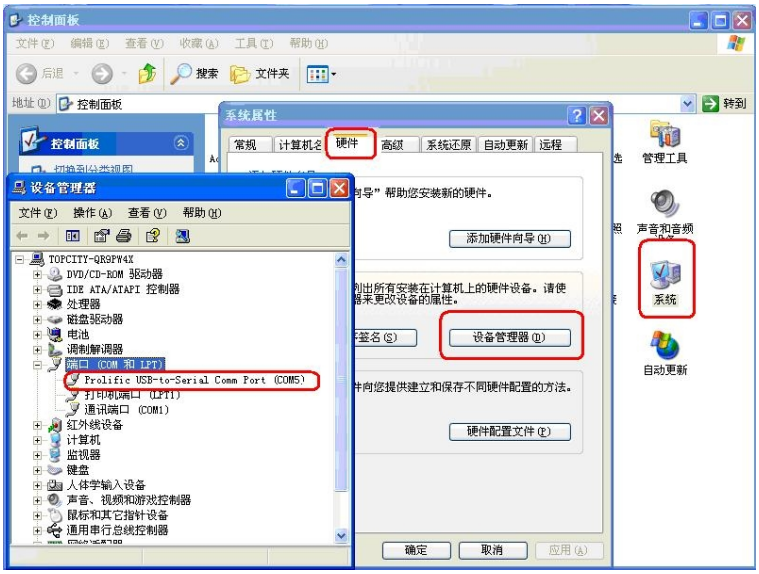
3. Instrument Setup

1) Open the instrument box to take out the temperature test line and the data line. Connect the profiler to the computer with the data line.
2) Press the **POWER button** on the profiler. The power indicator will light up. If the RF indicator also lights, you need to press the **RF switch** to turn off the RF transmission function.
3) Run temperature data download and analysis software **ProfileManager** on the computer and enter the running password of the software. Click **OK** to enter the program's main screen. Click Dataloger manage button to enter the Dataloger manage screen (Screen 11)



Screen 11

4) Select wire connection and thermal profiler to connect the corresponding ports of the computer. You can select COM1……COM8 in turn or directly enter System Attribute/Hardware/Equipment Manager/Port in WINDOWS Control Panel to view correct connection ports (Screen 12). If you find that the connection ports have exceeded the selectable scope, enter Port Attribute (right click Port to enter)/Port Setup to perform advanced setup and set the ports in the selectable scope (Screen 13). After the correct ports are selected, profiler manage screen will display the profiler's internal setup state.



Screen 12

Screen 13

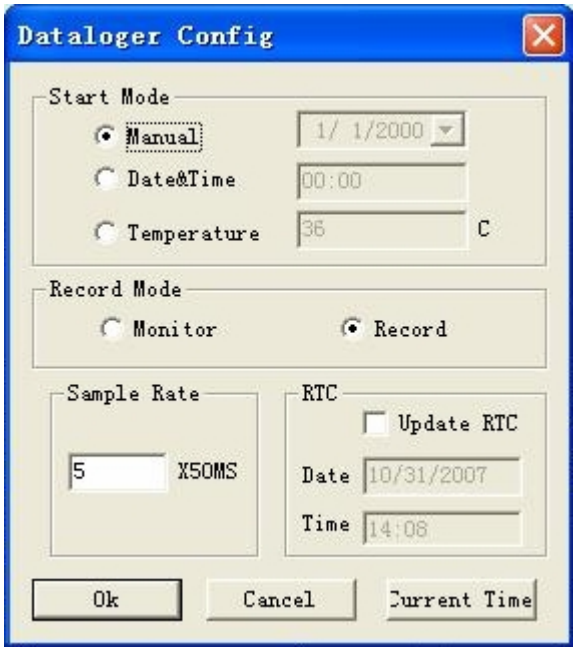
Port No. ------ RS-232 Serial port COM1……COM8

Connection mode ----- Wire connect /wireless

Clear ------ Clear the data in the profiler memory. The next test cannot be carried out if the memory is not cleared. You can also clear it by pressing the key on the profiler (press the **Clear key** and hold it down for 3 seconds until the clear indicator lights up once)

On/off ------ Start or stop the profiler's test by computer software.

5) Click **Config** to enter Cataloger Config screen and set the instrument (Screen 14). After the setting is finished, click **OK .** The configuration mode set can be saved until next setup**.**



Screen 14

Cataloger Config ------ **Start Mode** (Manual, specified time or specified temperature)
Record mode (Monitor, record
Sample rate (5*50MS……12000*50MS)
RTC (Update or modify internal clock of the instrument)

6) Click product register button  to enter the product register (Screen 15). Enter the product serial number on the instrument and click **OK** . The software is unable to download data without the product register.

Screen 15

4. Instrument Installation and Operation

1) After the setup is completed successfully, take out the temperature test line from the instrument box. Plug the end with the connector into the temperature test port on the instrument and solder the other end onto the temperature measuring point on the PCB with high temperature tin wire and bind it with high temperature adhesive tape. Put the profiler in the tray protection box (Fig. 3)

Fig. 3

If a rail conveyer is adopted on the soldering machine, the width of the tray protection box's stretching pieces should be adjusted with a "+" screwdriver to fit the rail width of the soldering machine. When testing the reflow soldering, the installation manner of the stretching pieces of the tray protection box is as shown in Fig. 4. When testing the wave soldering, the installation manner of the stretching pieces of the tray protection box is as shown in Fig. 5.

Fig. 4

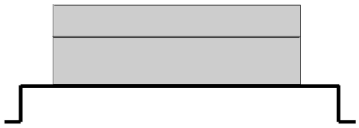


Fig. 5

2) If the profiler is set to start at a specified time or temperature, with the profiler powered on and the memory cleared, directly put the profiler into the tray protection box and close the box. Send the PCB into the soldering machine's rail or mesh belt (PCB in the front and the instrument follows it). The instrument enters the soldering machine following the PCB. It will start to measure the temperature when the specified condition is met. If manual measuring is desired, you only need to press the **Test Switch** in the state when the power is on and the memory is cleared. It starts to measure the temperature when the power indicator flashes.

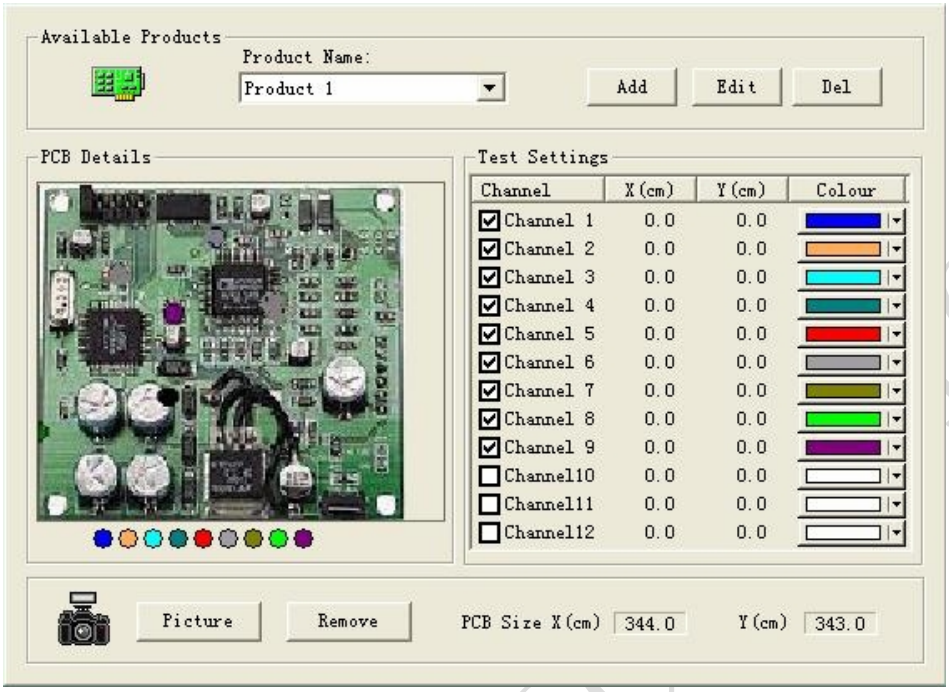
(Tip: During measuring, the operator shall stay near the soldering machine and observe the operation state in the measuring environment. If any fault occurs, he/she should remove them promptly to avoid damage to the instrument due to high temperature as well as interruption to production.)

3) When the PCB and the instrument comes out from the soldering machine, the operator, wearing insulate gloves, should take them off the machine, open the insulation protection box, take out the profiler and press the **Test Switch** to stop the temperature measuring. After that, connect the profiler to the computer with the data line and upload the temperature data stored in the profiler to the computer.
(Warning: The instrument is very hot when it comes out of the soldering machine. The operator must wear insulated gloves to avoid injury)
4) To turn off the profiler, its **Power switch** must be pressed once. At this time the power indicator will extinguish.
5) The instrument cannot be used at high temperature continuously. Each time after it is used at high temperature, it can only be put into next measurement after it has cooled down to normal temperature. Otherwise, inaccurate measurement or even damage to the instrument may be resulted in.
6) Before each measurement, please check for low power of the instrument (view in the software profiler manage). If the voltage is low, please charge it in time to ensure its normal operation. The instrument is provided with built-in high capacity battery and special charger. The charging time is 3 hours. During charging, the charge indicator is red. It will change to green when the battery is charged full. It can be used continuously for approximately 15 hours with a full charge. From low power alarm, it can further be used normally for 30 minutes. If low power alarm happens during measuring, a measurement within 20 minutes can be completed for sure.

Temperature Data Download and Analysis

1. Software Setup

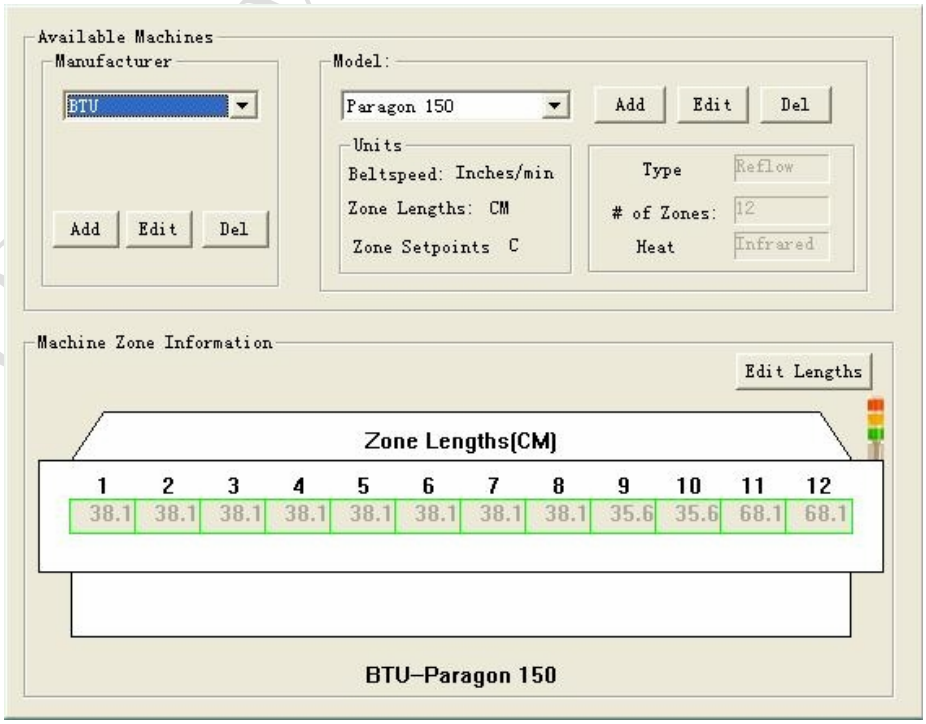
1) Product Manager : Click the Product Manager button  to enter Product Manager Screen (Screen 16) to add, modify or delete the product information of the product being tested.



Screen 16

Product Manager ----- Product name , PCB size
Picture , Test Setting

2) Machine Library Manager : Click the Machine Library button  to enter the Machine Library Manager Screen (Screen 17) and add, modify (Screen 18) or delete the machine information.



Screen 17

Machine Library Manager ----

Manufacturer

Model

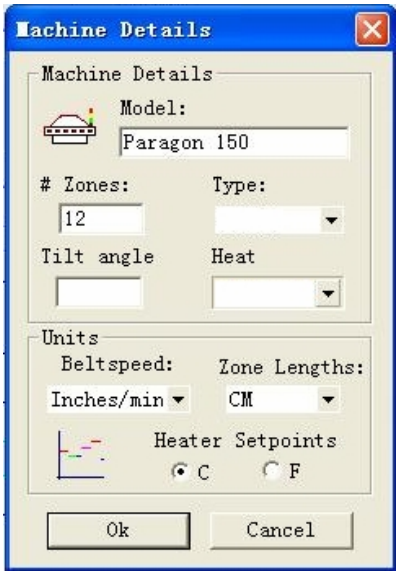
Type

Heat

# of zones

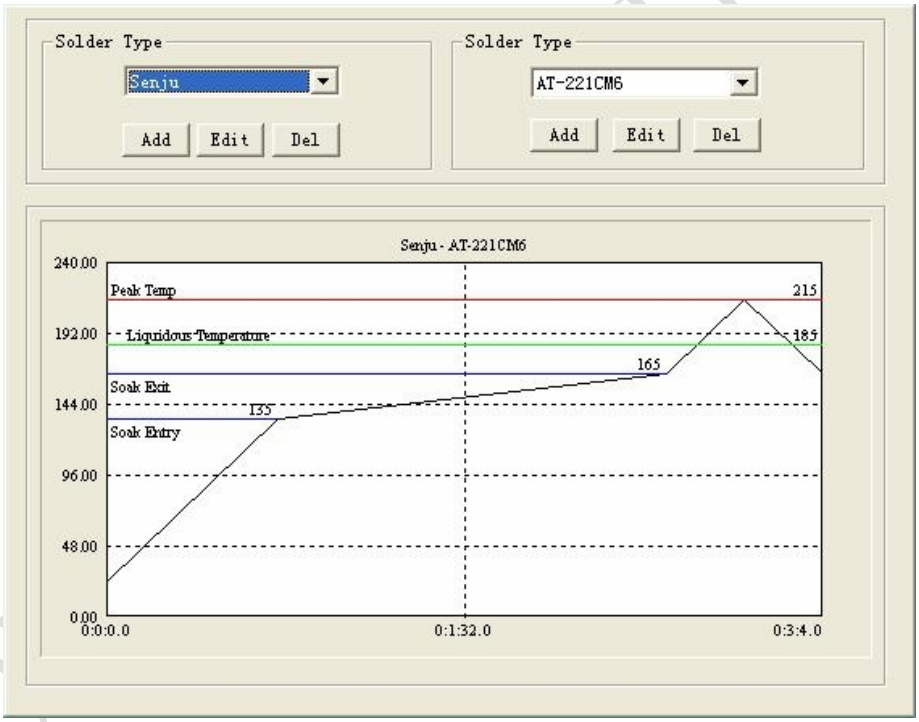
Zone lengths

Units



Screen 18

3) Solder Library Manager : Click the Solder Library button to enter the Solder Library Manager Screen (Screen 19) to add, modify or delete solder information.



Screen 19

Solder Library Manager -----

Supplier

Solder type

Characteristic curve -----Warm-up slope

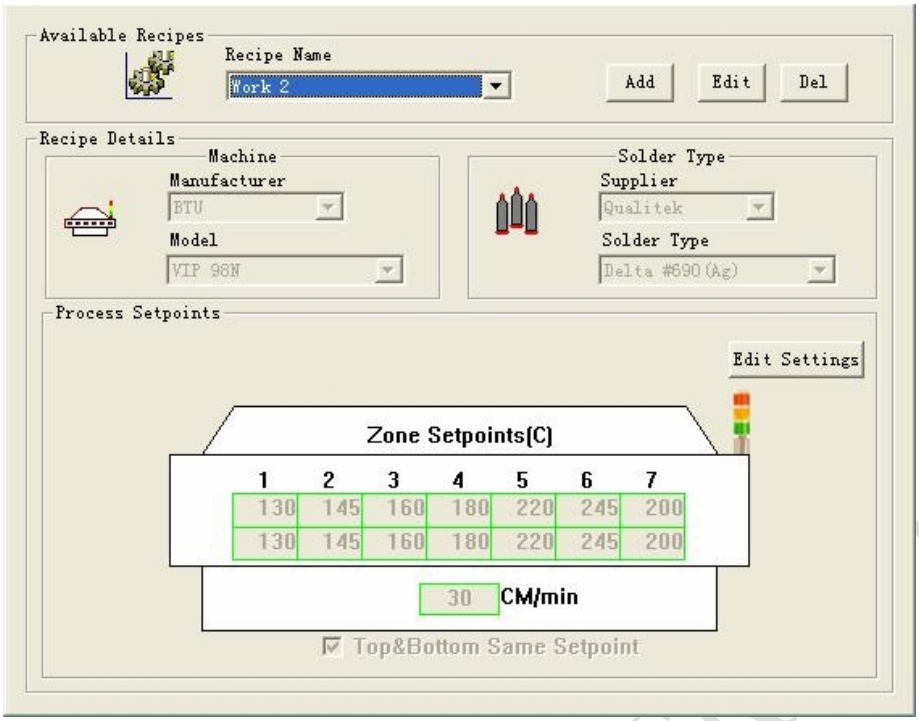
Soak temperature & time

Melt point & tin melting time

Peak temperature

Cooling slope

4) Recipe Manager : Click the Recipe Manager button to enter the Recipe Manager Screen to add, modify or delete the zone temperature settings of the production machine and the use of solders.



Screen 20

Recipe Manager ----- Recipe name

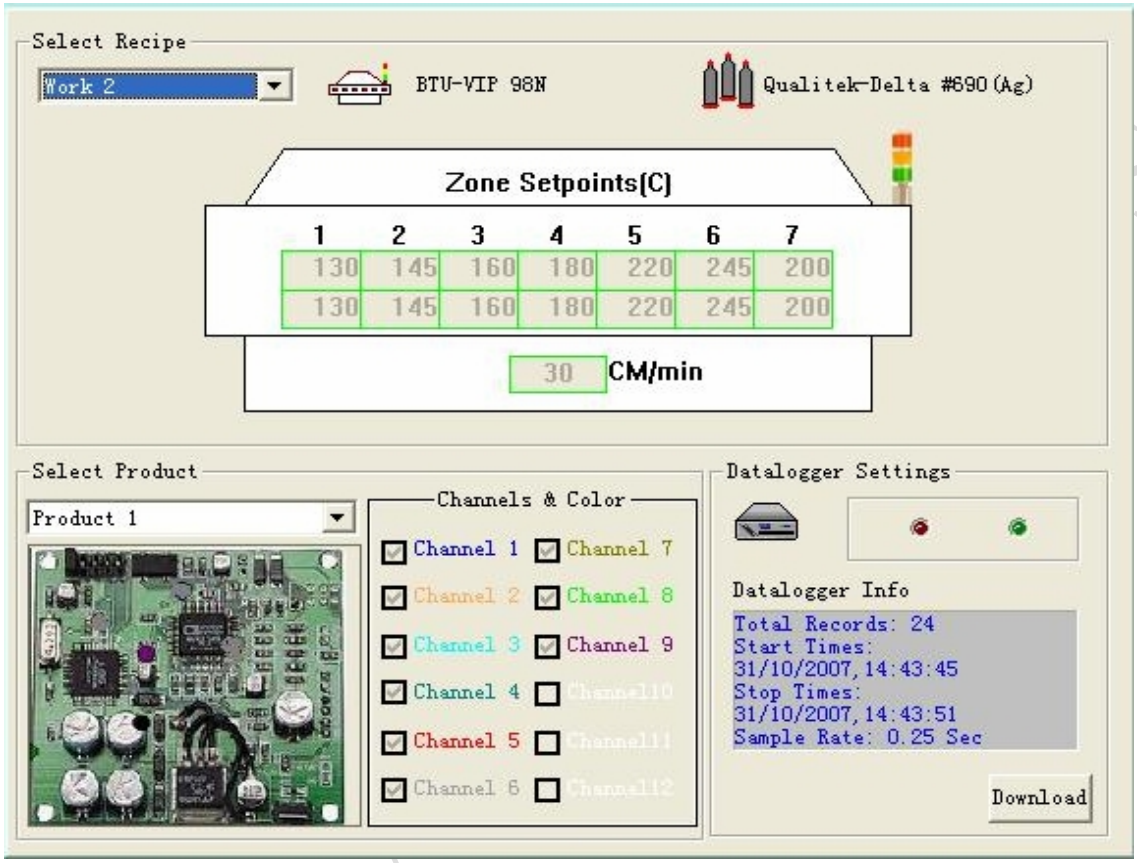
Machine information : Select the corresponding machine manufacturer and model from the machine manage database

Solder information : Select the corresponding solder manufacturer and model from the solder manage database

Oven temperature settings : Edit the machine zone temperature and conveying speed.

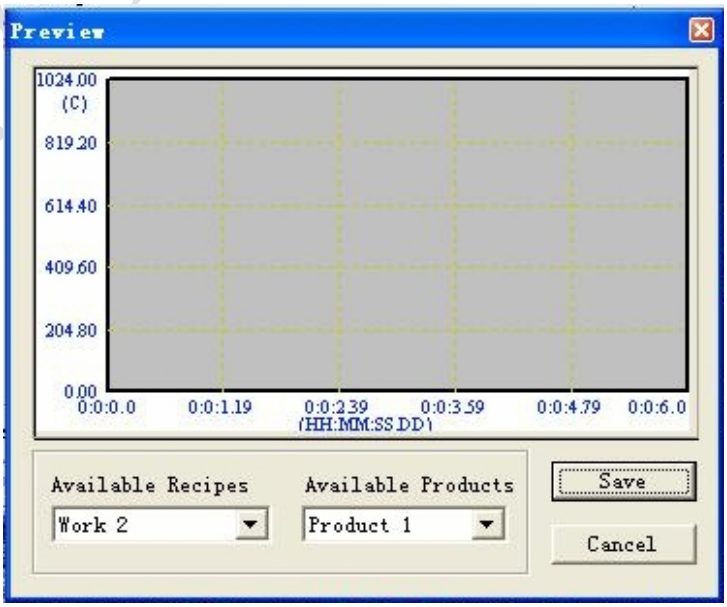
2. Temperature Data Download

1) After the PCB and the profiler come out from the soldering machine and the temperature measuring is stopped, connect the profiler to the computer with the data line.
2) Run the temperature data download and analysis software **ProfileManager** on the computer. Enter the software running password to enter the software download screen (Screen 21). If the software has not detected the profiler, enter the Profiler Manager again to select the correct corresponding port (refer to profiler setup P7). After proper connection click the Download button to enter the Download Screen.



Screen 21

3) Select the corresponding recipe items and product items respectively in the Recipe Setting and Product Setting. After the selection, click **Download** button to begin the data download. After the download is completed, the Profile Viewer Screen (Screen 22) will pop up. Click **Save** to save the profile under the selected product directory.



Screen 22

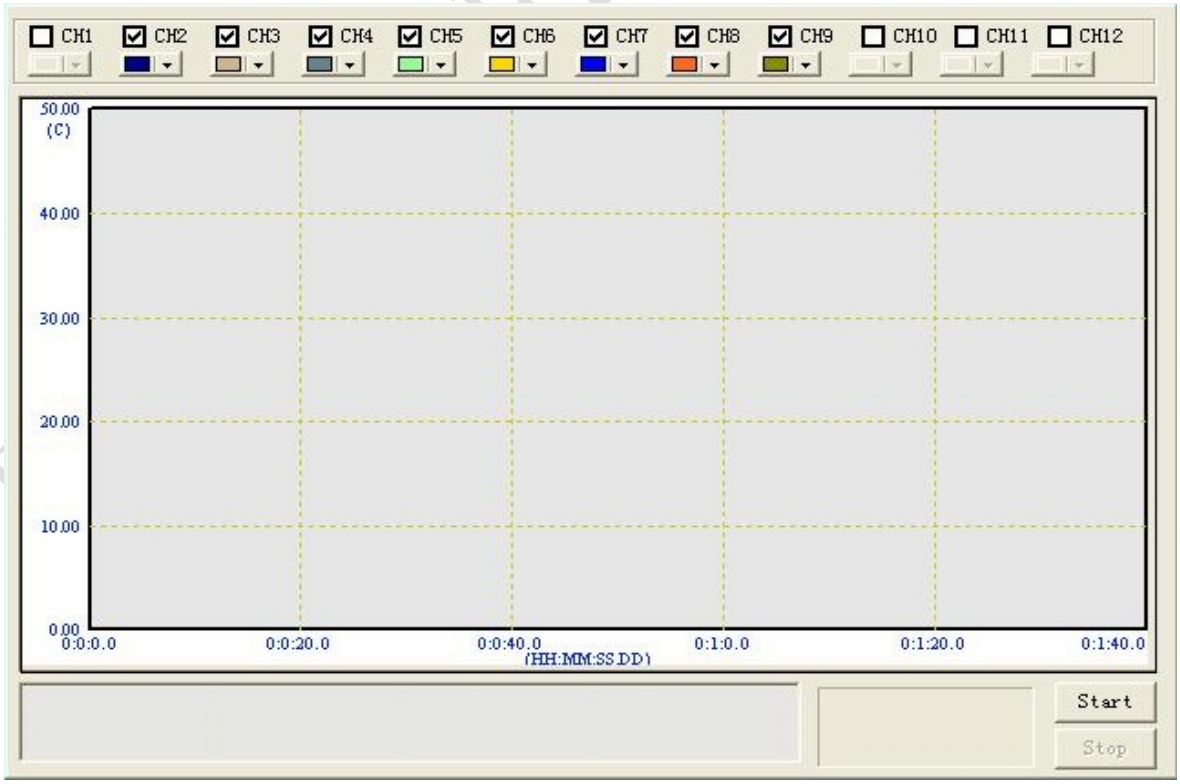
3. Wireless Transmission

1) Connect the RF transceiver and the computer with the data line. Fit the Rx/Tx antenna in the profiler's RF antenna port and press the **RF Switch** . It will light up the RF indicator and start the profiler's wireless transmission function (Fig. 6).
2) Tick Wireless on the software Dataloger Manager Screen. Then, select the correct corresponding ports. After they are connected properly, you can carry out profiler setup or data download.

Fig. 6

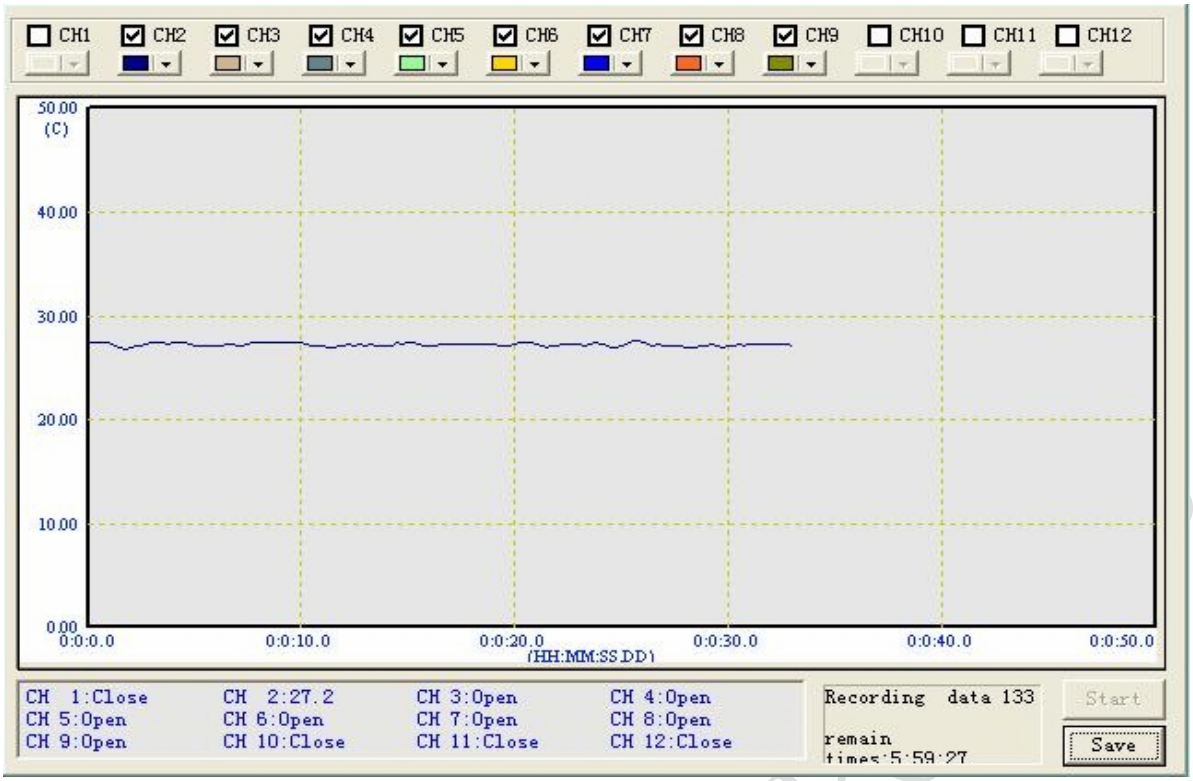
4. Real time Measure（Monitor）

1) With proper wire or wireless connection, set the profiler to real time measure mode.
2) Click the Real time Measure button on the software to enter the Real time Measure Screen (Screen 23).



Screen 23

3) Click **Start** Then, press the **Test Switch** of the profiler once. The test indicator will flash. Or set the profiler to start at specified temperature. It will start automatically and start the real time measuring (Screen 24) when the specified temperature is reached.



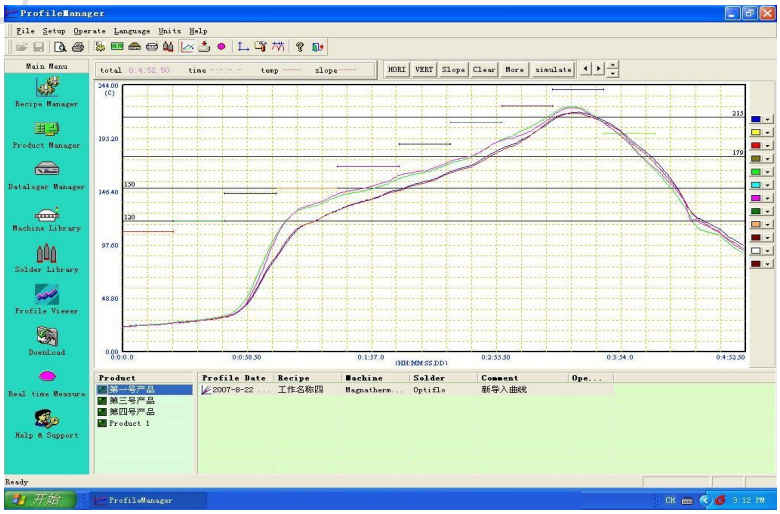
Screen 24

4) Click Stop after the measuring is finished. Then, click Save to pop up Profile Save Screen (Screen 25). Select the corresponding recipe items and product items and click **OK** to save the profile under the selected product directory.

Screen 25

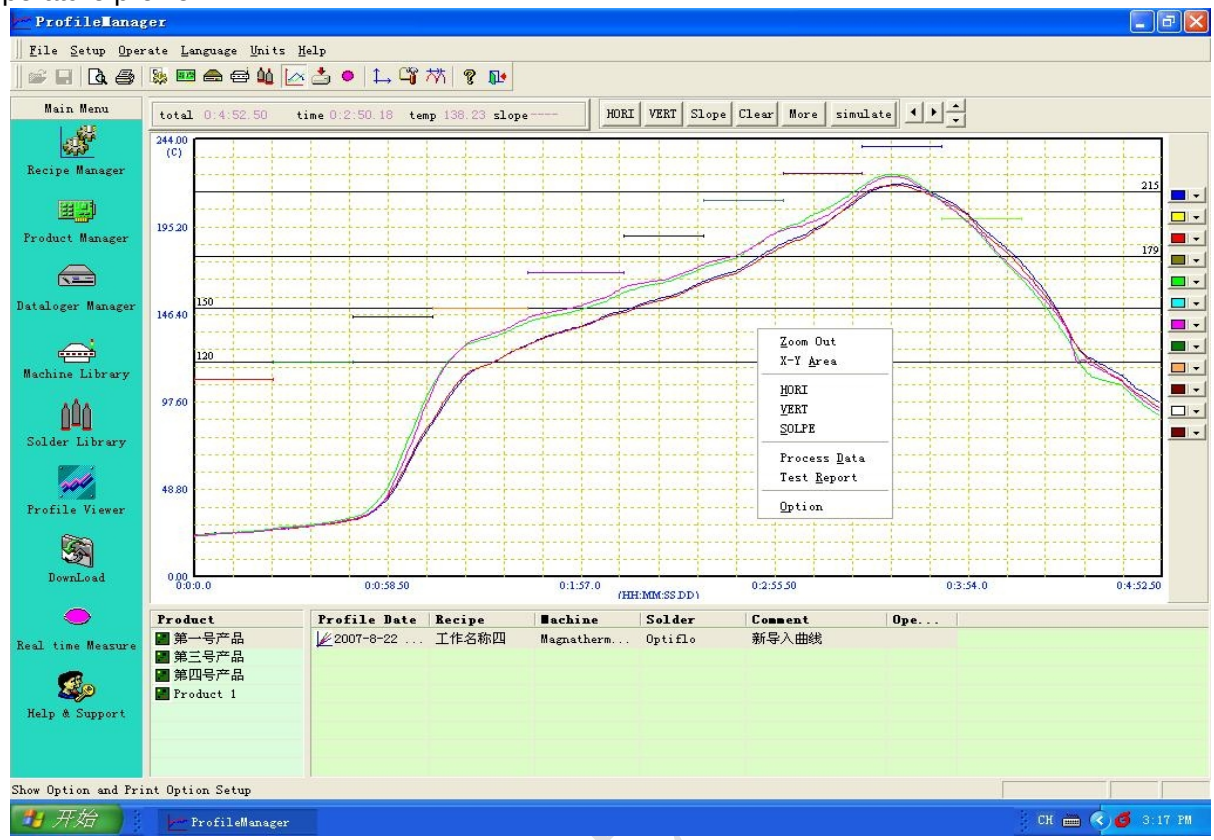
5. Profile Viewing and Data Analysis

1) Click the Profile Viewer button on the software screen to enter the Profile Viewer Screen to select the name of the product to be viewed and corresponding temperature profile (Screen 26).



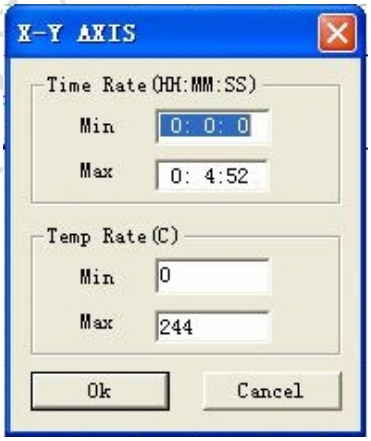
Screen 26

2) Description of temperature profile analysis setting function: as shown in the figure below (Screen 27), click the right key of the mouse in the profile display range to pop up the setting function table. Then, select the setting items to perform setting analysis of the temperature profile. Or you can click the setting buttons (HORI, VERT, Slope, Clear, More, simulate) above the profile to perform setting analysis of the temperature profile.



Screen 27

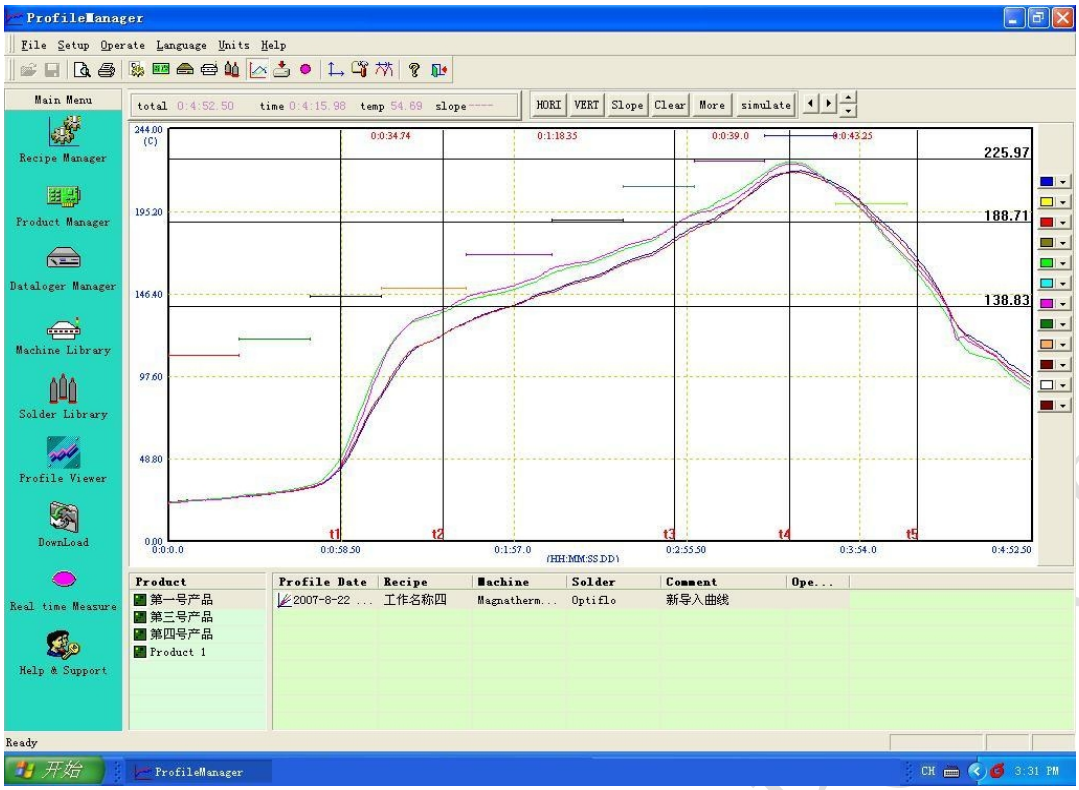
3) Display range setting and profile zoom in: The profile's total time length and the temperature of the place on which the cursor points as well as the time point are displayed on the top left corner of the profile box. Hold down the mouse left key and drag it in the profile box to zoom in the selected range. Or you can select **Coordinate Axis Setting** function to set the display range (Screen 28). Selecting adaptive display can return the profile to the original display range.



Screen 28

4) Horizontal line setting: You can click **HORI** to set the horizontal lines at any temperature point. 6 temperature points can be set simultaneously. After setting, the temperature value is displayed on the right end of the horizontal line (Screen 29). You can click a set horizontal line and drag it to a different location to generate a new horizontal line. You can click **Clear** to remove a set horizontal line.

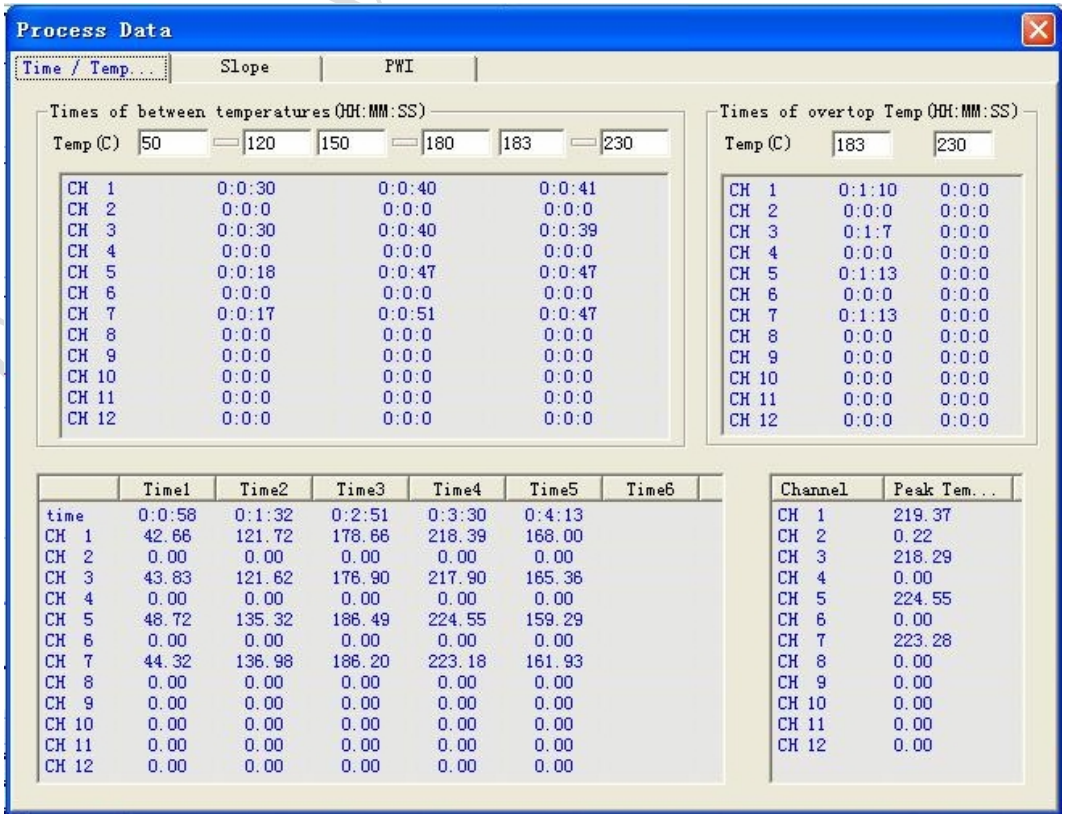
5) Vertical line setting: You can click **VERT** to set the vertical lines at any time point. 6 time points can be set simultaneously. After setting, the time value is displayed on the top between the two vertical lines (Screen 29). The temperature values corresponding to the time points are displayed on the Data Analysis Screen (Screen 30). You can click a set vertical line and drag it to a different location to generate a new vertical line. You can click **Clear** to remove a set vertical line.



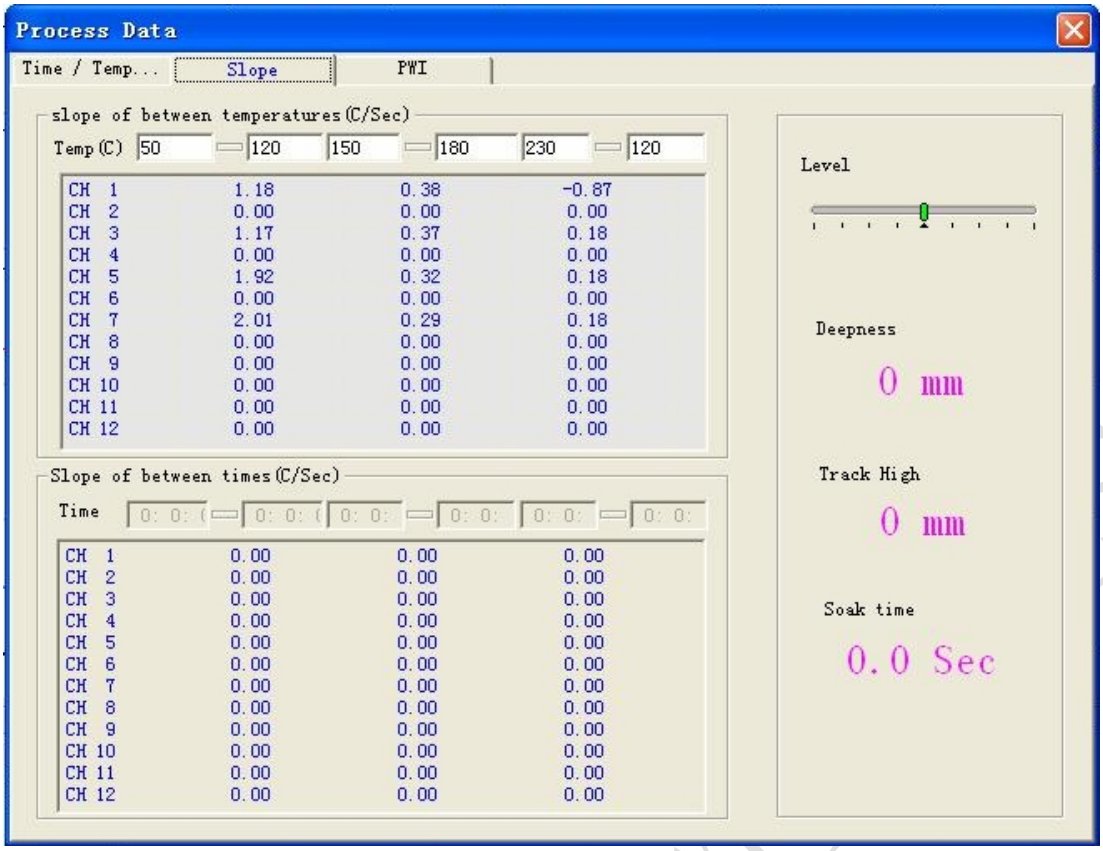
Screen 29

6) Slope viewing: Click Slope to view the slope between any two points. Click the start point and move to the end point and click again to generate the slope. The slope value is displayed on the top left corner of the profile box. Click **Clear** to remove the generated slope.
7) Data analysis: Click **More** to enter Process Data Screen (Screen 30) of data analysis to view and set the temperature and time data analysis.
   Time/Temp analysis -------Peak temp
   Time of between temperatures (reflow soldering)
   Time over the specified temperature
   Temperature at timed points on vertical lines

8) Click **Slope** data analysis screen to view and set slope data analysis (Screen 31).
   Slope Analysis -------Slope between temperatures (reflow soldering)
   Slope of between times (wave soldering)
   Wave Information (Level, Soak time, Track High)



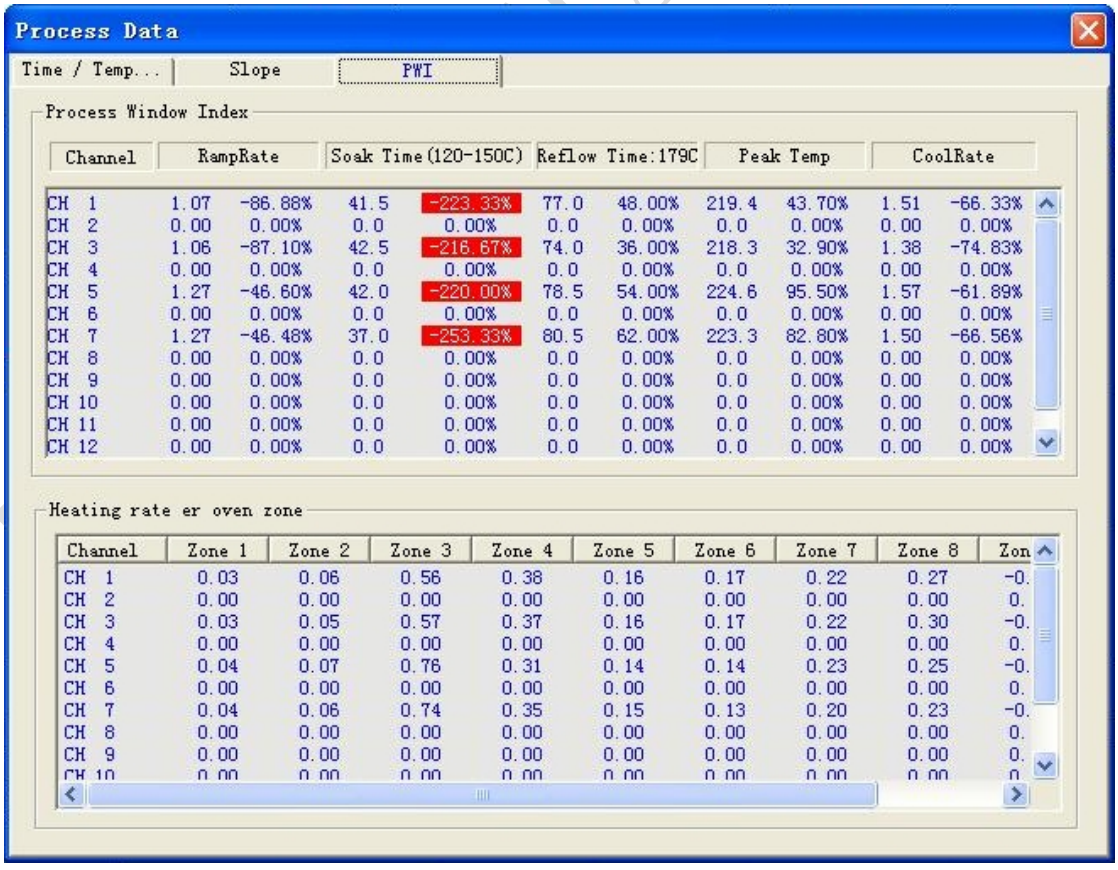
Screen 30



Screen 31

9) Click PWI Screen to view the process window index of each channel and average slope and each temperature zone (Screen 32)

PWI --------- Deviation values of solder properties from the PWIs of ramp section, soak section, reflow section and cool section of corresponding profile.



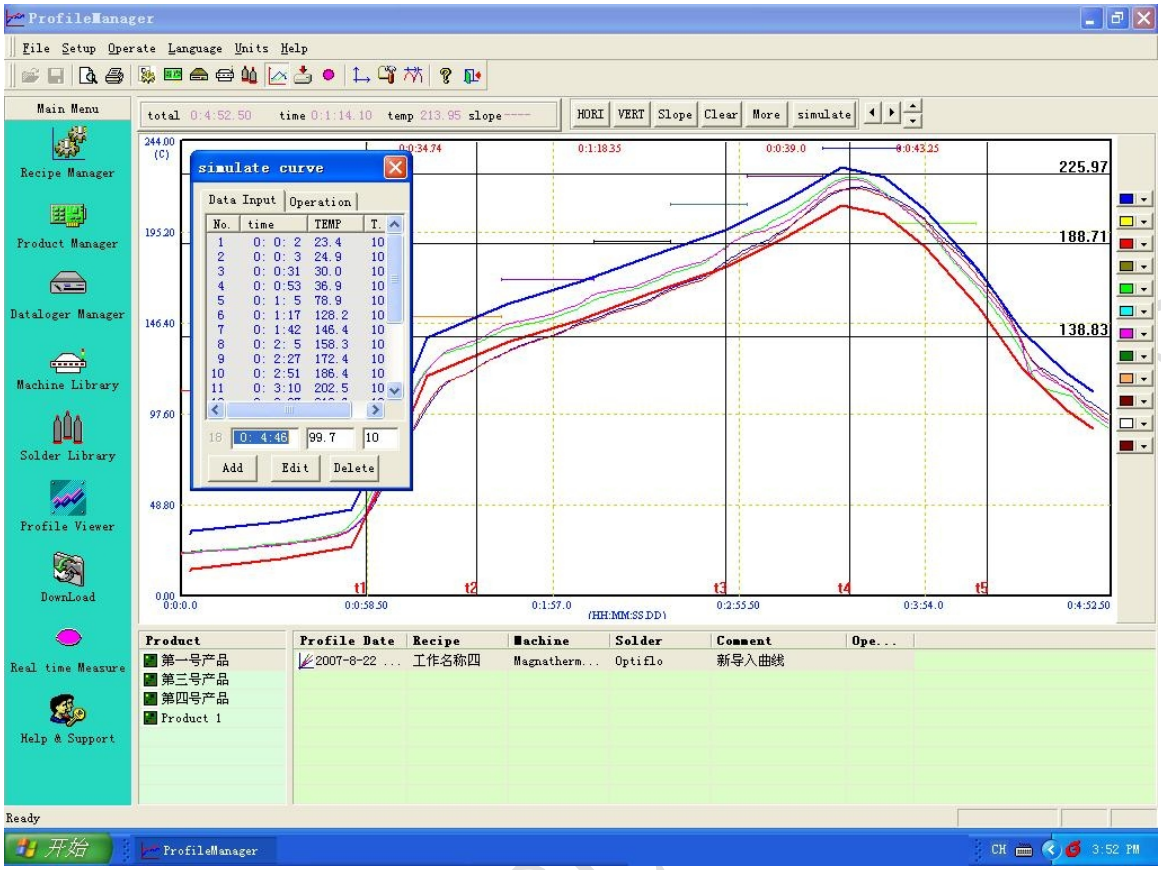
Screen 32

10) Click **Simulate** button. The Simulate Screen (Screen 33) will pop up. Enter the corresponding time and temperature in the **Data Input** menu and click **display**. Or you can move the cursor to the profile display screen to directly click the desired simulation profile. The software will generate two simulation profiles arranged one over another. Under the **Operation** menu, you can select the display color for **Simulation**

Profile 1 and **Simulation Profile 2** freely, move the simulation profiles right or left, save them or call in previously saved simulation profiles, and perform production optimization function (need to unify the simulation profile time and the actually measured profile time).

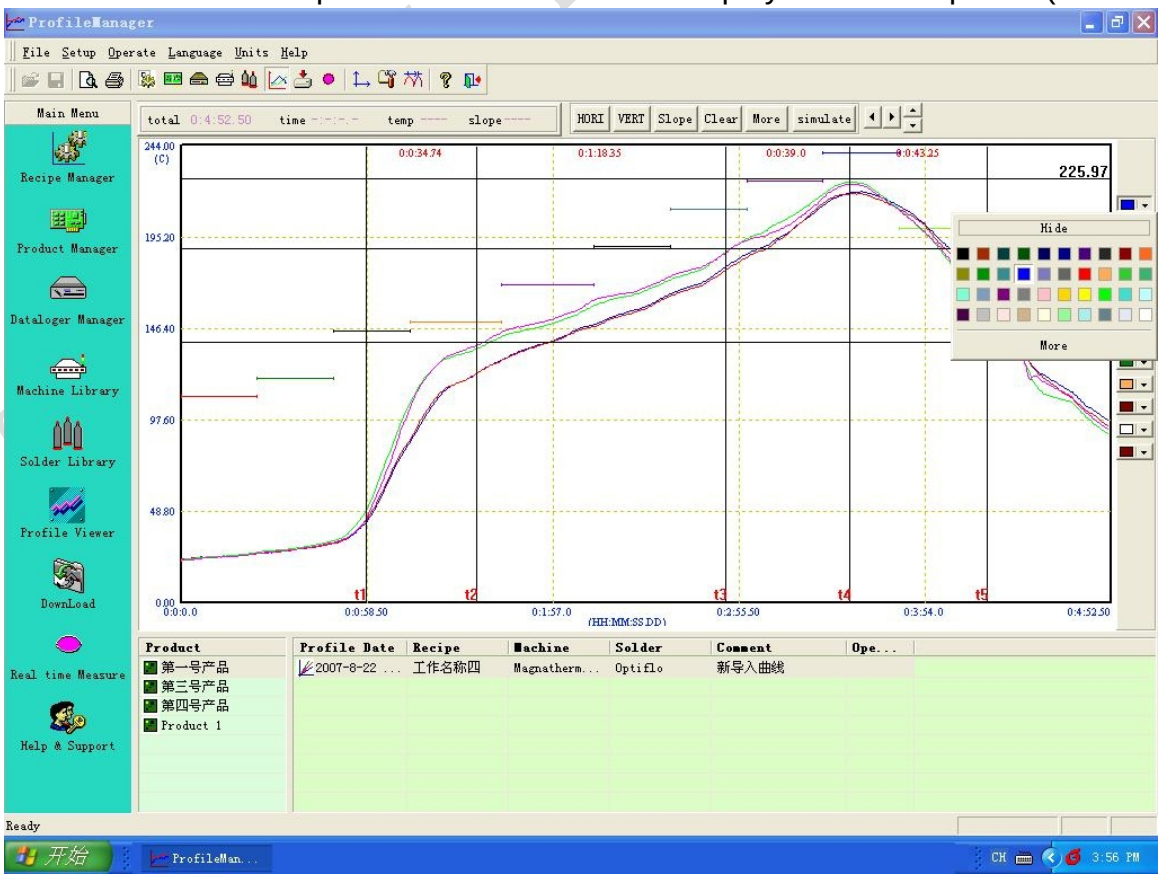
Simulation Profile ------ **Simulation Profile 1** and **Simulation Profile 2**

【The program can provide at most 60 time and temperature data input values for each simulation profile. You can evaluate and profile being tested by setting simulation profile】



Screen 33

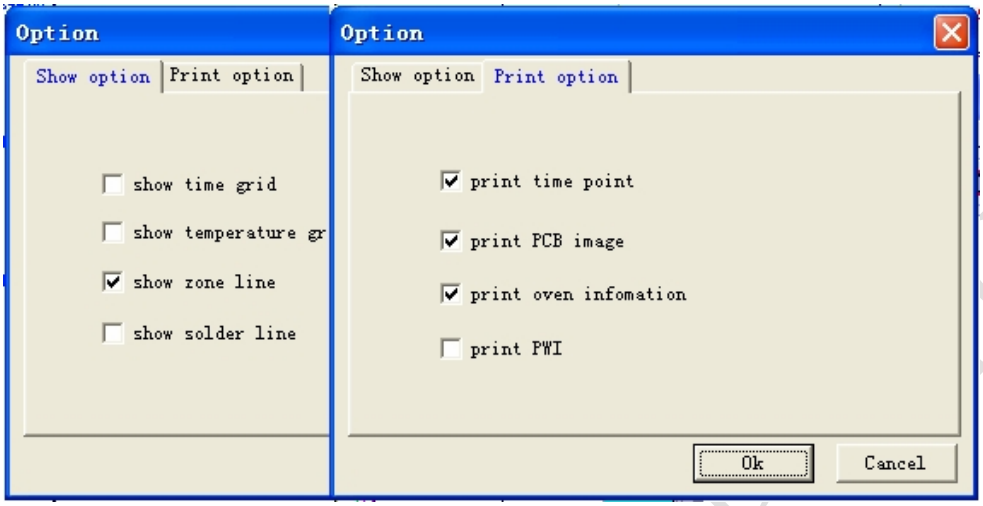
11) Change profile color and hide profiles: Click the color box on the right side of the profile box to select the desired profile color and select to display or hide the profile (Screen 34).



Screen 34

12) Select Display Options and Print Options: Select Function Options in the Setting Function Table or execute **Function Options** in **Setup** menu to select the contents to be displayed and printed (Screen 35).

Show Options ------	**Print Options ----**
Show time grid	**Print time point data**
Show temp grid	**Print PCB image**
Show zone lines	**Print oven information**
Show solder line	**Print PWI**



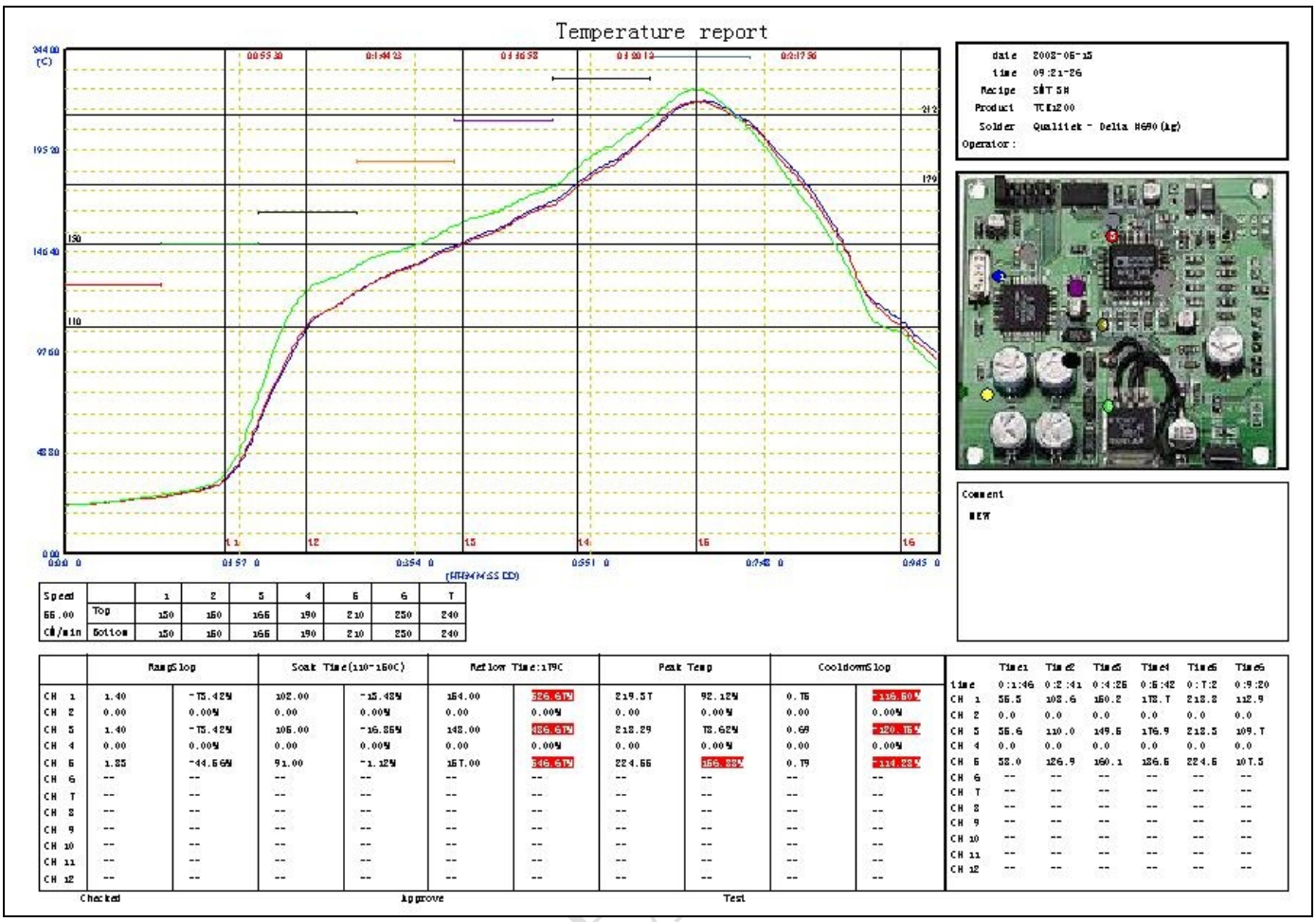
Screen 35

13) Double click the profile's Recipe Name. The Profile Details Screen will pop up. You can modify the profile details and remark information (Screen 36)

Screen 36

14) Print setup of temperature profile analysis report: after setting the data analysis and selecting the display options and print options, execute **Print Setup** in **File** menu to select paper format and print direction

15) Click Print button  to print temperature profile analysis report (Screen 36).



Screen 36

Congratulations! You have completed the whole test and analysis procedures

Are you sure there is problem? Please check:

Phenomena	Solutions
Alarm indicator is flashing in red	1. Check if any temperature test line is not plugged into the temperature test socket; 2. Check if any temperature test line is broken.
Alarm indicator lights in green	1. Low battery power, please charge it timely.
Alarm indicator lights in yellow	1. Low battery power and broken or unplugged temperature test line.
Power lamp lights but temperature measuring cannot be performed	1. Clear memory data in the profile and repeat the test operation.
No indicator lights	1. Battery power extremely low, please charge it immediately; 2. Damaged battery module, please replace it.
Mirror image in temperature measuring	1. The temperature test line is connected reversely. The correct connection: yellow wire to "**+**"(**positive pole**) and red wire to "**-**"(**negative pole**)
Inaccurate or unstable temperature measuring results in toothed profile	1. Short-circuit of cores in the middle of the temperature test line. In normal cases, the front end of the line is the temperature sensing point. There shall be no short-circuit in other parts; 2. The temperature sensing point at the front end of the temperature test line is loose. It needs to be re-soldered.
Unable to download temperature data	1. The data line is not connected to the profiler properly; 2. Communication port is not selected correctly; 3. There is no temperature data in the profiler; 4. The data line is damaged and needs to be replaced.
Record time is not equal to the actual one	1. Select the correct temperature test rate following the guide in the Operator's manual; 2. Set temperature test rate corresponding to the profiler in the analysis software.
Unstable operation in RF wireless mode	1. RF mode needs spacious, unshielded, visual environment. Otherwise the expected effect cannot be obtained; 2. Too long communication distance or damaged RF module.

Warranty Card

Customer Name: Purchase Date:

Product Model: TCK12 No.:

Supplier's Seal: Service Tel:

Service Record

Service date	Trouble description	Repair Result	Signature of repairman

Warranty Descriptions

1. The Warranty Card, together with the purchase invoice, can be used as the warranty document. The warranty period is one year from the date of purchase. In this period the supplier is responsible for repairs of the instrument free of charge.
2. Do not alter the warranty documents. Otherwise, they will be considered as invalid documents.
3. No person other than the repairmen of our company or the distributors is allowed to disassemble the profiler.
4. Repair to damages due to operation, maintenance and storage not following the requirements in this Operator's Manual will be charged.
5. To enjoy the warranty, please fill in the card carefully and fax it to our company for reference.

Serve the Users with Innovative Spirit

Dear users,

Thank you for using our products. If you encounter any trouble during use, please contact us without hesitation. We will provide you with solutions or recommendations.

The technical data and pictures in this User Manual are subjected to change without prior notice.