5200TN

High Performance Solderability tester

2014-3-20-1000-CA

CONFIGURATION

5200TN	PC with monitor, Data Manipulation software, USB Cable, Kit (ClipA, B, C, 45 degree, 2 solder pod), Certification of calibration Clip A Clip B Clip C Clip 45 degree

SPECIFICATIONS

Range of analysis	10mN full scale and 50mN full scale
Solder temperature	R.T. to 400 degree
Accuracy of Temp.	±2 at 245 degree
Size of solder pod	I.D. 60mm Depth 30mm or 60mm
Dwell time	1 to 999 sec, 1 to 999 min
Immersion depth	0.01 to 1 mm 0.01mm steps
	1 to 20mm 0.1mm steps
Immersion speed	0.1 to 1mm/sec 0.1mm/sec steps
	1 to 5mm/sec 0.5mm/sec steps
	5 to 30mm/sec 5mm/sec steps
Accuracy	0.1% full scale (0.01mN at the 10mN full scale, 0.05mN at the 50mN full scale)
Travel of stage	X axis ±5mm, Y axis ±5mm
Spacemen weight	Less than 10g
Power supply	200 to 240V ±10% 50,60 Hz
Power consumption	600W only main unit
NET weight	42Kg
Size	467(W) x 475(D) x 556(H) mm

OPTION

2nd Licence for data manipulate soft ware
Solder globule Kit : 1,2, 4 (3.2) mm and thermocouple, small samples sampling Kit
Quick heat unit
Temperature profile unit
240 fps High speed camera system: included work station and monitor
Alignment camera
Active isolation table
N2 gass flow case
High temperature option to 450 degree
Pre heat furnace with N_2 gass flow case

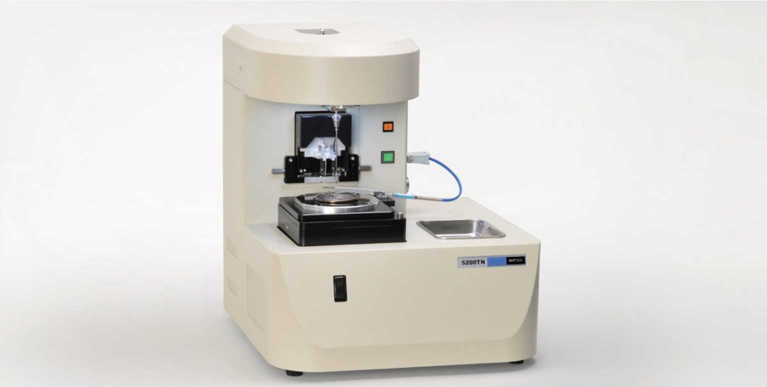
Registered to ISO 9001

Accuracy and Reliability
RHESCA

RHESCA CO., LTD.
15-17, Hinohonmachi 1-chome Hino Tokyo
191-0011 Japan
Tel: +81-(0)42-582-4711
Fax: +81-(0)42-589-4686

5200TN

High Performance Solderability tester



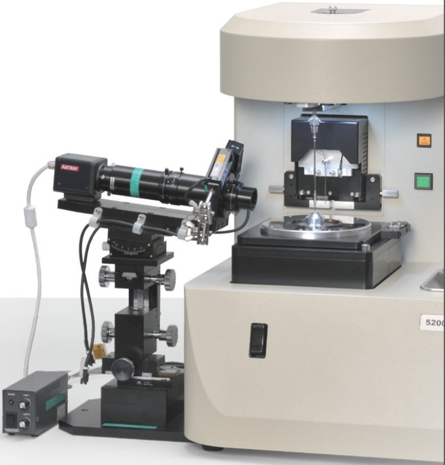
RHESCA launched 5200TN in the overseas solderability-testing world.
The year 2014 may mark the start of a new era for the solderability-testing.
5200TN is defining latest High Performance Solderability Tester.

RHESCA CO.,LTD. was established in 1955.
We have traceability experience of manufacturing testing instruments for electronic components for over 50 years in the world. With previous good history of SAT5100 and 5200T models, RHESCA has now grown to become one of the leading companies in the world for solderability testers.

RHESCA CO., LTD.

5200TN

High Performance Solderability tester



OVERVIEW

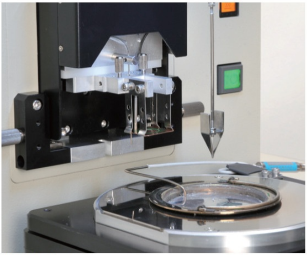
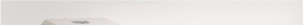


Photo 1 Close up



5200TN robust solderability platform is renowned its superior build quality and exceptional performance for small samples analysis. 5200TN has been designed to integrate with the widest range of method for solderability testing. Our development is in a bid to lessen the burden of the users, and they take a good repeatability. The unique design of the 5200TN allows state-of-art performance without requiring study for solderability testing technique.
We board on a new improved electro microbalance and controller in a bid to lessen the burden of the user with improved auto zero balancing. This new electro microbalance has better response for wetting force and able to perform good repeatability for the result. We achieved success high resolution against dynamic wetting force is established less than 0.01mN.

Photo 2 With isolation table (option) and PC
Note PC is image not standard using.

INTERNATIONAL STANDARD

In conformity with international standards as follows,

- IEC 60068-2-54 and 69
- IEC 60068-2-83
- IPC J-STD-002D
- IPC J-STD-003C
- JIS C 60068-2-54 and 69
- JIS Z 3198-4
- JIS C 0099
- JEITA ET-7404
- JEITA ET-7411
- MIL STD 883J (METHOD2022.3)
- User customs criterion

FEATURES

1 Small samples analysis

Our RHESCA has to focus on small samples analysis with good repeatability. In general this kind of method has a less repeatability but many kinds of factors included in this analysis. We archived some factors can control by this new 5200TN Solderability Tester.

2 Accuracy and Repeatability

5200TN has a 0.003mN resolution of wetting force and better response at the samples analysis. We can take rapid phenomenon of the solder wetting. The other thing is that for the repeatability we can make a home position of stage high. This is an important for the equal pre-immersion time of each run. In general, flux activity is changing very short times. We use a magnet clip hold, which you have an easy to use not only but also make a same gap against solder surface or solder globule.

3 Versatile

5200TN has a wide range of applications.
Traditional Wetting Balance method, Solder Globule Method, Quick Heat Method, Temperature Profile Method, Reflow Simulate, High Speed Camera System

4 Full PC controlled data manipulation

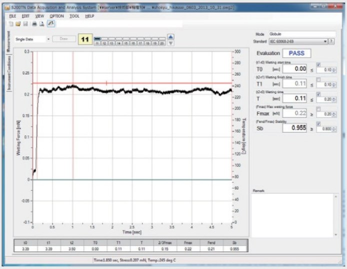
5200TN included PC with monitor and software but standard PC is appropriate desktop models.
Notice: Photo 2 shows Note PC but this is only image not standard system.

Full PC controlled data manipulation

The 5200TN Data Acquisition and Analysis System is the instruments control and data manipulate software for RHESCAs' solderability-test systems, in order to address the specific requirements of the solderability-test market. RHESCA has purpose designed this software package to be dedicated to the requirement of the solderability-test community.
The 5200TN Data Acquisition and Analysis System allow simple and easy operation via PC. It has the latest internal standard pages for IEC, IPC, MIL, JIS and JEITA. The other thing is that you can make a custom criterion page.

Included function as follows,

- The test mood selection
- Make the test file and data saving included analysis condition
- Take the data and shows wetting force to time trace, which can overlay, zoom and average
- Automatic passes or fails judgment
- Data transfer to CSV file format
- Sample position alignment controller and make stage high at the home position
- Vibration monitor
- Report print out at PDF file format



Mode Globule
Standard IEC 60068-2-69
Evaluation PASS
(t1-t0) Wetting start time T0 [sec] 0.00 ≤ ☑ 0.10
(t2-t1) Wetting finish time T1 [sec] 0.11 ≤ ☐ 0.10
(t2-t0) Wetting time T [sec] 0.11 ≤ ☑ 0.20
(Fmax) Max wetting force Fmax [mN] 0.22 ≥ ☐ 0.20
(Fend/Fmax) Stability Sb 0.955 ≥ ☑ 0.800

t0	t1	t2	T0	T1	T	2/3Fmax	Fmax	Fend	Sb
3.39	3.39	3.50	0.00	0.11	0.11	0.15	0.22	0.21	0.955

Time:1.850 sec, Stress:0.207 mN, Temp.:245 deg C

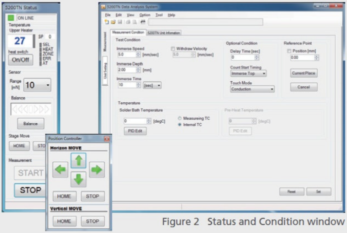
5 Motorized XY stage traveling

We can move 10mm X and Y axis via Controller. This function needs for the solder globule method which small sample position alignment.

6 Sample light, tray and vibration monitor

5200TN has the LED sample light for the position alignment and tray for sample handling tool. Further to our useful for the data sampling which we have a vibration monitor of the desk.

Figure 1 Result window



Temperature Upper Heater: 27
SP: 0
Range [mN]: 10
Immerse Speed: 5.0 [mm/sec]
☐ Withdraw Velocity: 5.0 [mm/sec]
Immerse Depth: 2.00 [mm]
Immerse Time: 10 [sec]
Delay Time [sec]: 0
Count Start Timing: Immerse Top
Touch Mode: Conduction
☐ Position [mm]: 0.00
Solder Bath Temperature: 0 [degC]
○ Measureing TC
● Internal TC
Pre-Heat Temperature: 0 [degC]

Figure 2 Status and Condition window

APPLICATION

1 Wetting balance method (standard)

This is a conventional test method for electronics termination, lead frame and surface mount device and others.

In the wetting balance method, a test specimen is immersed at a preset speed and depth into the solder bath, which is maintained at a specified temperature. This method uses a high-sensitivity electro micro balance to continuously detect the force that acts in the vertical direction as a result of the buoyancy force applied on the test specimen before it is wet, and the surface tension after wetting is started. The wetting balance method performs recording as a function of time when the specimen is immersed into molten solder. It evaluates solderability by analyzing the obtain action force to time trace.

For examples, we can take the result wetting force to time trace and you can use zero cross time, 2/3 time of maximum wetting force. May you know, wetting force depend on sample size. You should be using same size of samples for Repeatability.

Repeatability is important for this test method. Solder wettability involves number of factors such as electrode

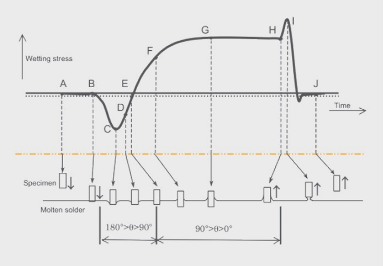


Figure 3 Normalization of force to time trace

The zero cross time is B to E which means short time is good wetting and F or G means wetting force which big is good.

The cause of less repeatability are sample size, contact angles, Flux Volume and contact timing of after put on the flux to samples. Would you please take care of samples preparation and handling?

materials, surface condition, some kinds of flux, flux volume, solder composition, soldering atmosphere and soldering temperature. You should be removal unknown factors and controlled other conditions at the test, for good repeatability.

Conditions (for examples)

Solder bath temperature : 245 degree at the lead free solder
Immersion speed : 5mm/sec
Immersion depth : 2.0mm (depend on samples size)
Immersion time : 6 to 10sec
(Analysis time)

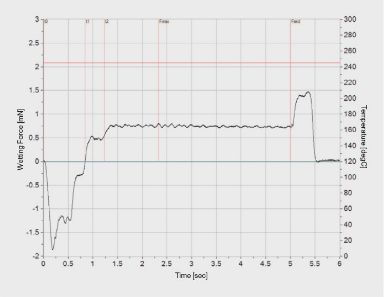


Figure 4 Wetting force to time trace
Sample : Copper coupon 5.0 mm x 0.3 mm
Temperature : 245 degree
Immersion speed : 10.0 mm/sec
Immersion depth : 2.0 mm

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2 Solder Globule wetting balance method (option)

These methods applicable for surface mount devise (SMD). These methods determine quantitatively the solderability of terminations on printed circuit board (PCB). Recently SMD samples of us going smaller than previous one, we need for enough of resolution and response of wetting force. This method is going to latest method for small specimen in stead of conventional Wetting balance method.

Of course the customer needs good repeatability. RHESCA has some solutions of such as the customers requires.

We can supply 1, 2, 4 or 3.2 mm center pin size of solder globule.

You can make a reservation of stage high at the home position with Motorized X-Y stage traveling. We have 2 types of camera systems, one is alignment camera other is 240fps high speed camera system.

5200TN can use active isoration stable table and we can supply it.

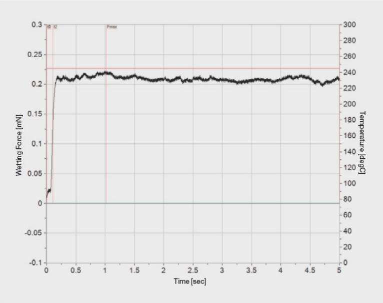


Figure 5 Wetting force to time trace
Sample : 0603 (mm) device
Temperature : 245 degree

Conditions (for examples)

Solder bath temperature : 245 degree at the lead free solder
Immersion speed : 0.2 mm/sec
Immersion depth : 0.04 to 0.10mm (depend on samples size)
Immersion time : 10 sec
(Analysis time)

Configuration

Sloder blobule : 1, 2, and 4mm (or 3.2mm)
Thermocouples : 1
Solder pellets : 5mg, 25mg, and 200mg 100 pices each
Sampling kit : included

Specifications

Trmperature range : R.T. to 400 degree
Accuracy of temperature : ±2 at the 245 degree

Immersion speed : 0.10 mm/sec
Immersion depth : 0.02 mm
Globule size : 2mm

Photo 3 With 240FPS High Speed Camara

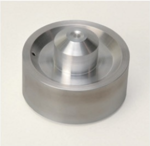


Photo 4 Solder Globule

Photo 5 Alignment Camara

3 Quick heat method (option)

These methods applicable for SMD. These methods have high throughput for samples analysis which is specimen and solder paste analysis by using molten solder pod. The quick heat method use a micro melting pot coated with solder paste in the designated shape.

At first, specimen is clipped by the appropriate clip and immerse into the not molten solder paste. Secondly, specimen and solder paste in the micro melting pot go to melting solder bathe surface.

After that solder past's temperature rising immediately and melt with wetting, we can take the wetting force. We have 2 mode of test method as follows,

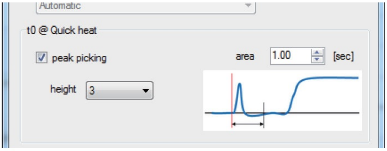
1, Dip-only mode

This measurement mode completes the immersion operation after the specimen is immersed into the micro melting pot to the preset depth. In this method, flux is

We have a peck pick which determination of start point (timing).

The t0 recognized with peak top at the start heating.

At the "t0 @ Normal" is contact to solder bath and "t0 @ Quick heat" is peak top of the start time. We have a function for "t0 @ Quick heat" on the other hand we can correct start timing to the peak top.



Automatic

t0 @ Quick heat

☑ peak picking

area 1.00 [sec]

height 3

Figure 6 t0@ Quick Heat

This function can select ON and OFF. You can choice or not at the peak applied on the specimen up to the portion immersed in the solder paste.

2, Dip GAP mode

These measurement modes first immerse the specimen into the micro melting pot to twice the preset depth and then return it to the preset depth before completing the immersion operation. In this mode, flux is applied on the specimen portion higher than the preset immersion depth. This mode can achieve an effect similar to when flux is applied on the wetting portion at the point of completing the immersion operation.

Condition (for examples)

Solder bath temperature : 245 degree at the lead free solder
Immersion speed : 0.20mm/sec
Immersion depth : 0.04 to 0.10mm (depend on samples size)
Immersion time : 10 sec
(Analysis time)

picking in area at t0 @ Quick heat. This function has 2 parameters, height and area.

Configuration

Quick heat unit : on board
Micro melting pod : 100 pieces
Clip : F type included

Specifications

Temperature range : R.T. to 350 degree
Depth of immersion : 0.01 to 0.25mm
Immersion speed : 0.1 to 1.0mm/sec
Accuracy of temperature : ±2 at the 245 degree

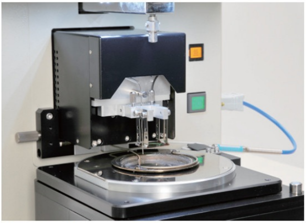


Photo 6 Quick heat unit

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4 Temperature profile method (option) included Reflow simulate Mode

These methods applicable for surface mount devise (SMD). The profile method perform the wetting evaluation using a specimen and solder paste by heat and melt the solder paste with a temperature rise profile similar to that of a reflow furnace. These methods applicable for SMD and you can do study of a phenomenon of temperature rise profile and wetting force still more solder paste and flux activities. We have Mode A and B still more Reflow simulate Mode. Different of Mode A and B is depending on Can or Can't Re-immersion for reject of Cohesion.

Condition (for examples)

Configuration

Temperature profile unit : one
Copper coupon : 100 pieces
Clip : F type included

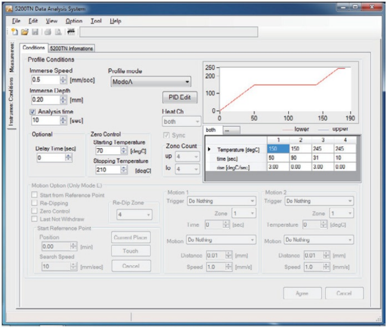
Specifications

Temperature range : R.T. to 350 degree
Temperature zone : 4 zone at the Mode A, B
16 zone maximum at the Reflow simulate Mode
Depth of immersion : 0.01 to 0.25mm
Immersion speed : 0.1 to 1.0mm/sec
Accuracy of temperature : ±2 at the 245 degree
Thermocouples : upper and lower
Power consumption : 1500W

Solder bath temperature : 245 degree at the lead free solder
Immersion speed : 0.10mm/sec
Immersion depth : 0.02 to 0.10mm (depend on samples size)
Immersion time : 10 sec
(Analysis time)

The Temperature profile method using copper coupon coated with the solder paste in a designed shape and size by using stencil at the room temperature. The specimen is attached to the clip. The copper coupon is placed on the heating floor and terminal of a specimen is immersed up to the preset depth into the printed solder paste. The heating flower and upper heater are turned on by scheduled temperature rising and melt the solder paste on the copper coupon with a temperature rise profile curve sillier to that of reflow furnace. At this point, you can take the combined force of the buoyancy, cohesion and surface tension that the specimen receives from under melting solder paste. Of course, you can take the wetting force to time trace after that with temperature rising profile at the result.

We have 3 Modes that are Mode A, Mode B and Reflow simulate Mode. Mode A and Mode B are using zero control before wetting and re-immersion at the scheduled. Reflow simulate Mode is using study of temperature rising schedule, flux activity, select the solder paste and Head and pillow defect. This mode can make a free timing that the specimen are going to immerse solder paste but limited temperature rising zone. This zone means temprature rising to time. You can make maximum 16 zones.



Profile Conditions

Immerse Speed 0.5 [mm/sec]
Immerse Depth 0.20 [mm]
☑ Analysis time 10 [sec]
Profile mode ModeA
Heat Ch both

Optional
Delay Time [sec] 0

Zero Control
Starting Temperature 70 [degC]
Stopping Temperature 210 [degC]

☑ Sync
Zone Count
up 4
lo 4

both

	1	2	3	4
Temperature [degC]	150	150	245	245
time [sec]	50	90	31	10
rise [degC/sec]	3.00	0.00	3.00	0.00

Motion Option (Only Mode E)
☐ Start from Reference Point
☐ Re-Dipping
☐ Zero Control
☐ Last Not Withdraw
Re-Dip Zone 4

Start Referrence Point
Position 0.00 [min]
Search Speed 10 [mm/sec]
Current Place
Touch
Cancel

Motion 1
Trigger Do Nothing
Zone 1
Time 0 [sec]
Motion Do Nothing
Distance 0.01 [mm]
Speed 1.0 [mm/s]

Motion 2
Trigger Do Nothing
Zone 1
Temperature 0 [degC]
Motion Do Nothing
Distance 0.01 [mm]
Speed 1.0 [mm/s]

Figure 7 condition of Temp. profile method

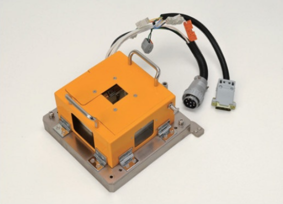


Photo 7 Temperature profile unit