



Coplanarity Measuring Module
core9031a

By measuring **“buried leads”** in the resin,
core9031 now makes the impossible possible

Do you get right under your control various problems due to “Lead-free solders” and “High temperatures in surface mounting process” ?

Let's try to get to know more about the shape change characteristics of surface mounted parts and devices at high temperatures

With the rapid and wide spread of the use of lead-free solders, electric and electronic parts and devices have come to be exposed to much severer heat stress during the surface mounting process than when lead contained solders were commonly used.

This thermal stress causes coplanarity, warpage and various other shape changes on the parts and devices to such an extent as would make entire production lines shut down, or invite customer's endless claims and complains leading to a bad corporate reputation.

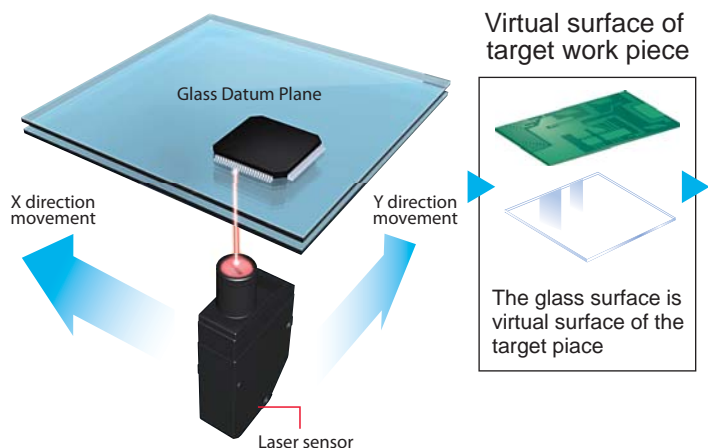
You could not really avoid these possible huge losses and damages without any proper knowledge and counter measures concerning the shape change characteristics of the small parts and devices under heated conditions. core9031a only helps you know and solve the problems on the production line and thus save your corporation from these material and serious mishaps in its daily operations.

Basic structure of SMT device

- SMT device consists of conductor(metal) and insulator (synthetic resin).
- Synthetic resin deforms under thermal stress.

See how deformity really develops

- The real SMT and PCB device manufacturing process is under strict time-temperature control with the temperature profile in the reflow ovens.
- Using its similar temperature control to the real reflow ovens, core9035a can determine the shape change of the target piece real-time.
- In addition, CORES' “Glass Datum Plane Method”, which sets its glass surface as the datum plane, now makes it possible to do such determinations of thermal characteristics of the target at high temperatures.

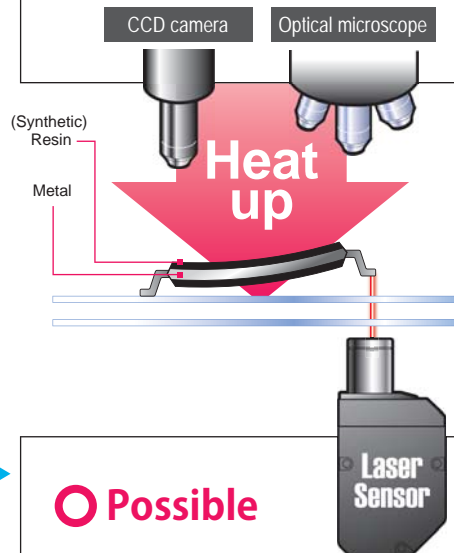


Measurement at high temperatures

Difficulties with Conventional Method

Conventional measurement methods only see the target from “above” or from “sideways”, so they can not detect the accurate amounts of shape change or floating from its surface of the target piece .

✗ Impossible



○ Possible

“core9031a” equipped with Glass Datum Plane Method, now makes it possible with high accuracy at high temperatures to determine its shape change or floating from its original surface by the measurement with laser sensors from under the glass plane.

core9031a Now Makes It Possible and Precise

core9031a, its Idea and Performance

Its “Glass datum plane” method and “Temperature profile” function in combined synergy brings forth the precision in the measurement of any shape change in the surface mounting process

The temperature profile function equipped to core9031a is required to be capable of rapid heating just like those real reflow ovens used for real surface mounting. core9031a, to be able to simulate the similar environment to that of reflow ovens, is provided with a convectional heating system and with a newly developed control unit, which minimizes the time in which the temperature can reach designated point and restrains overshooting, hunting, stationary variation and so on.

■ Temperature profile is adjustable by heat and time.



■ The temperature profile equipped with a new control unit makes possible a freer time-temperature settings for measurement

■ The temperature profile may have a maximum of 32 setting points in temperature and time for measurement

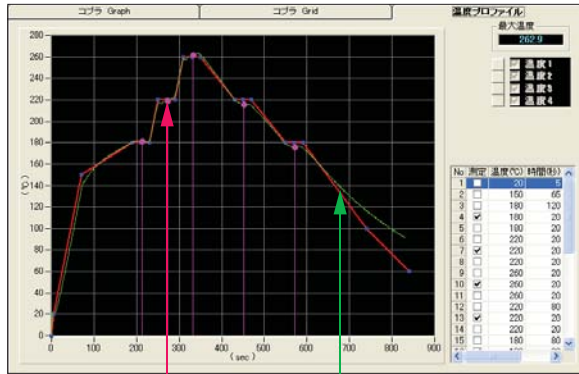
■ The temperature profile can be easily set for measurement by simply inputting necessary numbers

Special features of core9031a

- The measurement of “buried” leads in the resin is possible
- The temperature profile has a maximum of 32 setting points
- Coplanarity waveform data and corresponding heating temperatures are displayed in different colors and in real-time
- Just select speed and pitch for measurement and the data can be easily obtained
- The tendency of shape change due to heat of the target work piece can be visually grasped in 3D color distribution function
- The temperature at up to 4 points on the target work piece can be measured with the equipped logger unit

Various things to see in various ways to search

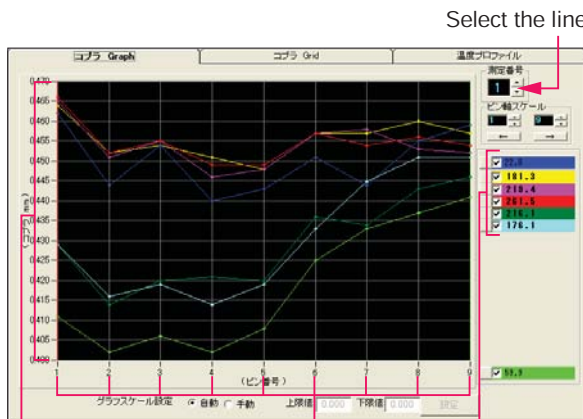
Introduction of data analysis on the screen



Temperature profile Actual temperature

Automatic measurement in accordance with the temperature profile

- Similar time- temperature settings to those of real reflow ovens
- High temperature atmospheres applicable for lead-free soldering
- Up to 32 setting patterns in temperature profile
- Indication of the real temperatures inside the reflow in real time
- Measurement starts when the temperature inside the reflow reach to the setting temperature (Measurement on max 50 lines x 200 pins at a time)

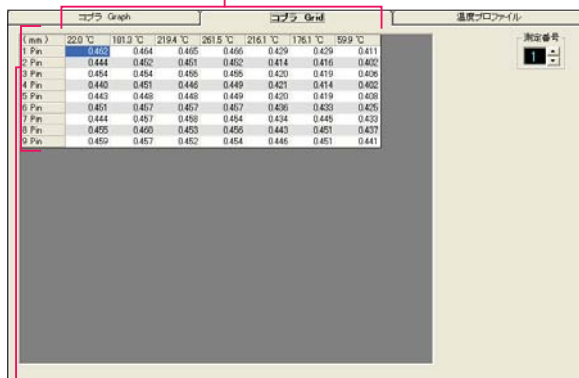


Coplanarity Pin no. Select the graph (by temperature)

Displays of measurement data in different colors to respective temperatures

- Each graphic display shows the relationship between coplanarity of each pin and temperature
- Each graphic display shows the magnitude of warpage or twisting of the work piece
- Each graphic displays provides
- Study of such actual measurement data on shape changes at deferent temperatures makes it possible to re-examined the design criteria and to optimize the safety factors
- The shape change characteristics of the work piece material can be obtained
- The heat resistance of the work piece at high temperatures can be obtained

Measuring temperature



Pin no. of measured line

Pin No.	22.0 °C	181.0 °C	219.4 °C	261.5 °C	216.1 °C	176.1 °C	59.9 °C
1 Pin	0.413	0.454	0.455	0.456	0.429	0.429	0.411
2 Pin	0.454	0.452	0.451	0.452	0.414	0.416	0.402
3 Pin	0.454	0.454	0.455	0.455	0.420	0.419	0.406
4 Pin	0.440	0.451	0.446	0.449	0.421	0.414	0.402
5 Pin	0.463	0.449	0.445	0.449	0.420	0.419	0.409
6 Pin	0.451	0.457	0.457	0.457	0.436	0.433	0.425
7 Pin	0.444	0.457	0.456	0.454	0.424	0.445	0.423
8 Pin	0.455	0.460	0.453	0.455	0.442	0.451	0.437
9 Pin	0.459	0.457	0.452	0.454	0.446	0.451	0.441

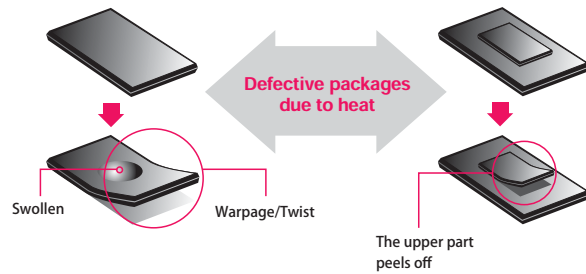
Inspection sheet

More precise measurement data by numerical indication function

- The coplanarity of each pin at each temperature is numerically indicated, which makes the qualification of any target work pieces very easy
- The precise coplanarity measured on the horizontal glass datum plane is summarized in the data inspection sheet and can be printed out
- Each data is saved in excel format according to each measured temperature

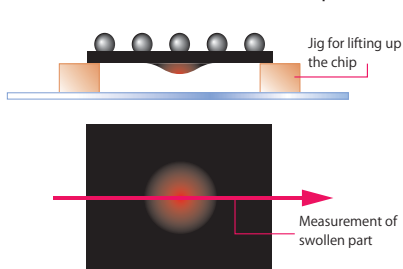
Problems in heating process of IC packages

- The use of lead-free solder in the production process of electronic parts and devices, has aggravated the leads coplanarity problem, which is caused by the warpage, twisting or swelling of substrates developed during high reflow temperatures.
- The surface layer of laminated IC packages is seen to peel off because of such deformation by heat in the final surface mounting process.

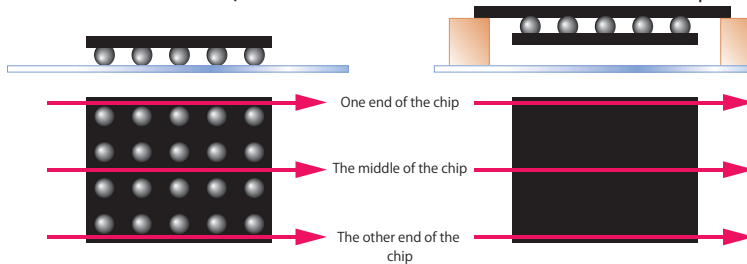


Example of measurement methods

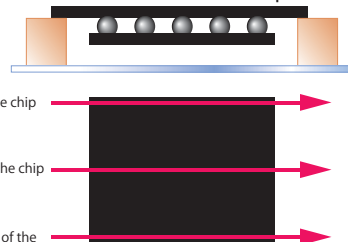
■ Measurement of swell of chip



■ Measurement of warpage or twist of chip

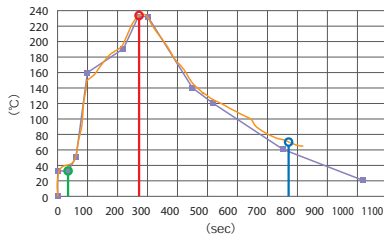


■ Measurement of the surface of a laminated IC chip



Example of obtained data displays

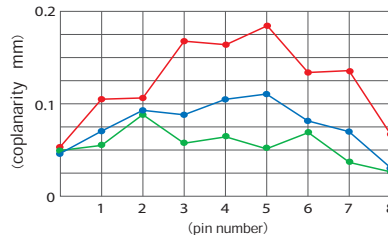
■ Example of temp pfile setting



□ 3 points are measured according to the preset temp profile

- 🟢 Room temp before heating...35.6°C
- 🔴 Peak temp...235.7°C
- 🟡 Temp while cooling...69.7°C

■ Example of copla displays



□ Coplanarity at each temp is displayed in different colors

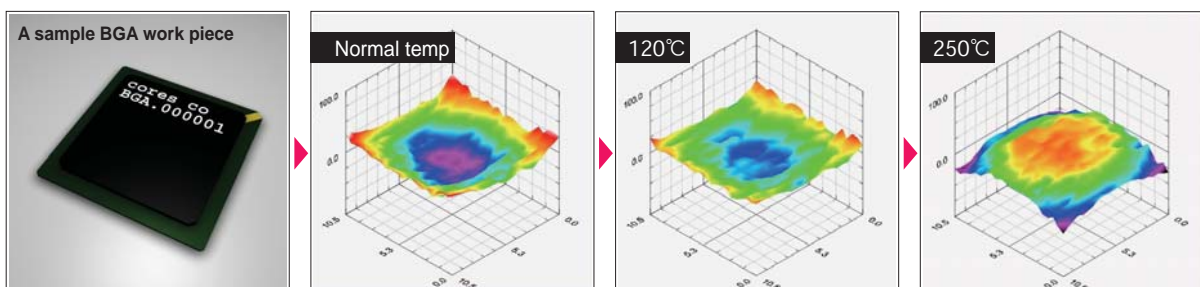
- 🟢 Room temp before heating...35.6°C
- 🔴 Peak temp...235.7°C
- 🟡 Temp while cooling...69.7°C

■ Example of numerically displayed results

(Pin No.)	35.6°C	235.7°C	69.7°C
1	0.055	0.107	0.073
2	0.083	0.108	0.090
3	0.057	0.171	0.088
4	0.068	0.169	0.106
5	0.050	0.185	0.116
6	0.070	0.134	0.079
7	0.038	0.135	0.072
8	0.025	0.067	0.026

(coplanarity mm)

■ Example of 3D display

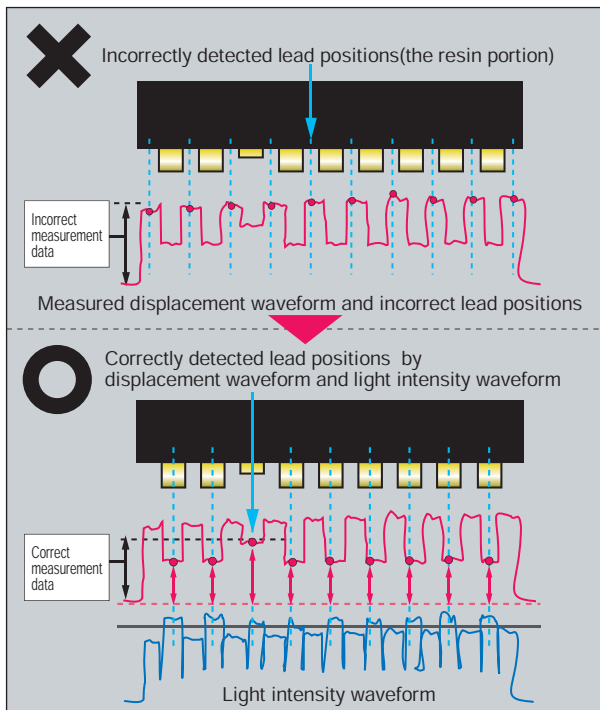
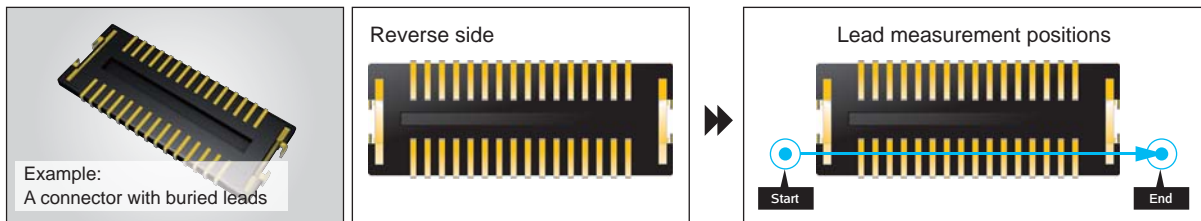


Coplanarity of “buried leads” connectors can be measured !

Patent Applied

core9031a, unlike any other conventional instruments, now makes the impossible possible with its LIP or light intensity plus function aimed at highly precise measurement

core9031a accurately traces and relocates each lead position which moves due to expansion with heat by its new function of “light intensity” measurement of leads in addition to its original function of “displacement” measurement



Sensor can not measure buried leads correctly

Connectors with leads buried in the resin can not be measured correctly, and the output data will be unstable because the sensor detects the resin portion

Light intensity waveform can do that correctly

Lead positions can be measured correctly by using the higher light intensity of the leads than that of the resin and by recalculating the displacement waveform data

Two measurement modes

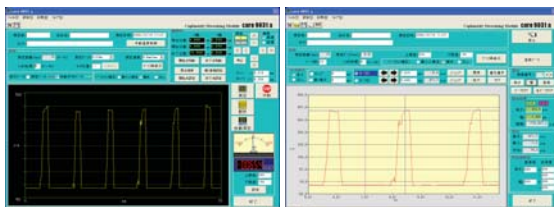
Manual measurement

For particular position of the target works

Obtain the data of the selected position in details

Function

- Overlay function for shape change comparison
- Inspection sheet creation
- Graph expansion for details
- Data saving and recalling
- Printing out both graph and inspection sheet



Automatic measurement

For multiple line inspection

Usable for multi lined target works with complicated design

Function

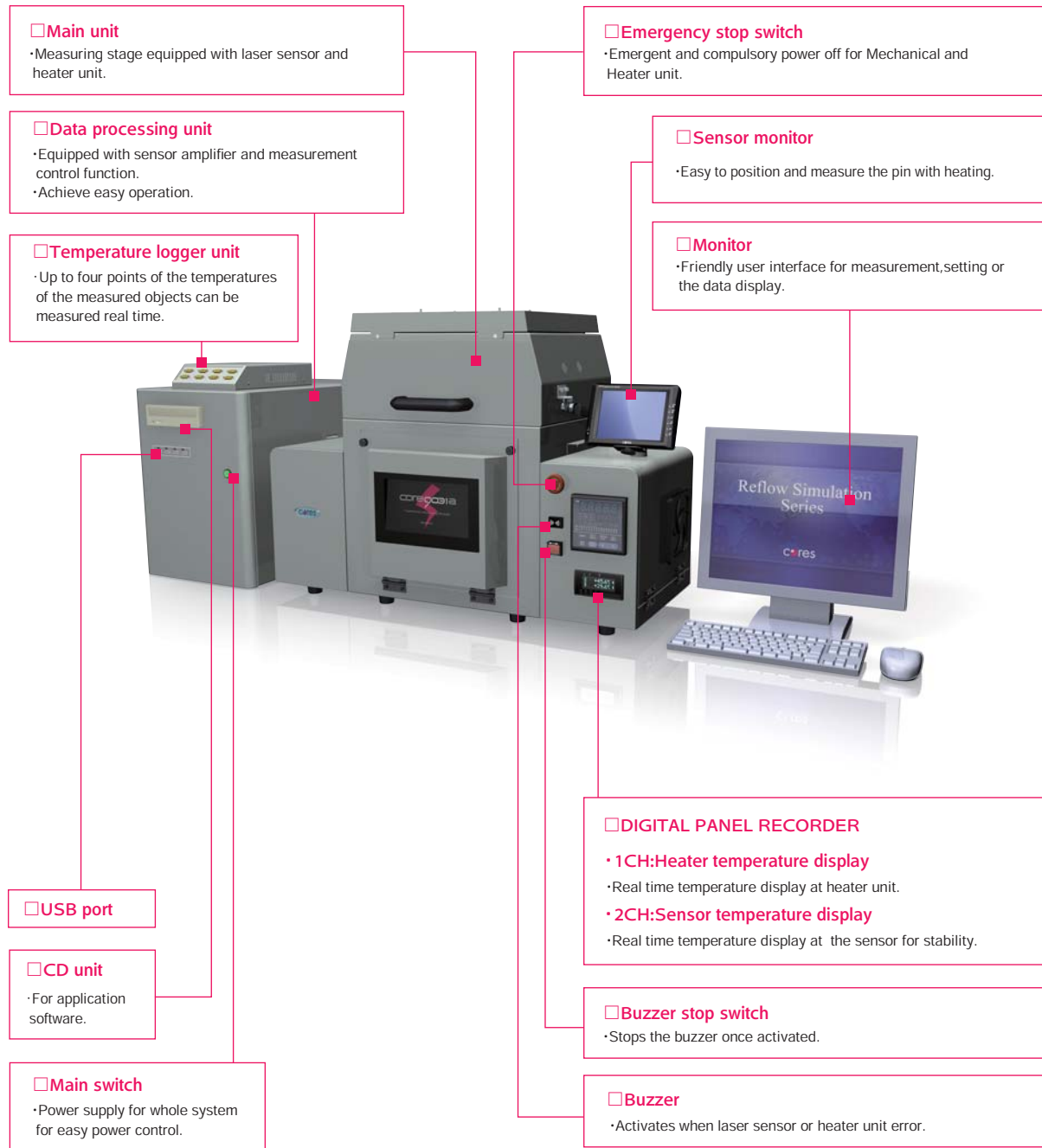
- Automatic judgement to criteria
- Creates inspection sheet automatically
- Data can be saved automatically(excel)
- Setting data can be saved and read out
- Max 50lines × 200pins can be measured



Introduction of each unit

Coplanarity Measuring Module 【LIP type with reflow oven】

Measures the coplanarity or the shape change of the surface mount electric devices while heated along with the temperature profile(adjustable).



Specifications

General

Power	200VAC \pm 10% (50 / 60Hz) single phase	
Power consumption(Approx)	2,200 VA(Main unit :100VAC/ 1,900VA,Control unit:100VAC/300VAC)	
Moving shaft	2 shafts(X,-Y), 5-phase micro step motor	
Displacement sensor	Light source/Wavelength	Red semi-conductor laser/670 nm
	Resolution	0.3 μ m
	Spot diameter	7 μ m
Air pressure	0.6MPa ~ 0.9MPa	
Air consumption	230L/min	
Weight(Approx.)	Main unit: 65kg, Control unit:25kg, Transformer: 50kg	
Dimensions(excluding protrusions)	Main unit W 760 mm \times D 380 mm \times H 540 mm Control unit W 295 mm \times D 400 mm \times H 400 mm (Necessary desk area for the installation of the units:W 1,800 mm \times D 750 mm) Transformer W 435 mm \times D 340 mm \times H 285 mm	
Ambient temperature	25 $^{\circ}$ C \pm 3 $^{\circ}$ C	

Measurement Unit

Measurement length	X axis 100mm, Y axis 75 mm
Measurement area	\pm 1000 μ m
Accuracy	\pm 1% of reading \pm 2 μ m
Repeatability	5 μ m (when using CORES standard work pieces)
Measurement speed	0.1、0.2、0.5、1.0、2.0、4.0、8.0、16.0、30.0mm/s
Measurement pitch For coplanarity	0.001、0.002、0.005、0.01、0.02、0.05、0.1、0.2、0.5、1mm (8mm/s \rightarrow more than 0.01 mm, 16mm/s \rightarrow more than 0.02mm, 30mm/s \rightarrow more than 0.05mm) \times 1
Measurement pitch For 3D	Plus each 0.01mm over the first 0.01mm(In X axis ,8mm/s \rightarrow more than 0.01mm,16 mm/s \rightarrow more than 0.02mm, 30mm/s \rightarrow more than 0.05mm) \times 2

\times 1. \times 2:The pitch differs according to the measurement speed.

Heating Unit

Heating area	W 120mm \times D 120 mm \times H 25mm
Heating method	Convectional hot air blower heater

Transformer

Input	200VAC、220VAC、240VAC(to be fixed before installation) \pm 10% 50/60Hz
Output	100VAC
Output monitor	Indicated voltage \pm 2V

\times This catalog information is as of 1 April 2010.

\times This catalog information is subject to change without prior notice.



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