

LEAD FREE REFLOW OVEN TU-380

OPERATION MANUAL



BGA CUSTOMISED FULLY-AUTO LEAD FREE REFLOW OVEN

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LEAD FEAD REFLOW OVEN TU-380

FUNCTION & SPECIFICATION

1. Machine Dimension : 850(L) x 280(W) x 280(H) mm
2. Voltage : 220V /AC /50/60Hz
3. Power : **3300Watts**
4. Weight : 40 Kg
5. Reflow Area : **155mm x 155 mm**
6. N2 Retrofit : N2 flow rate can control by a N2 Flow Meter, Range from 0-25 M3/Min.(1 LPM = 28 lit/Min), N2 will help to reduce oxidation during reflow process.
7. Amp Meter : During power on Oven max. surge is 15Amp, and when under normal running condition consume only 6.2 –8 Amp.
8. The upper and bottom heating panel are control by separate controller and the temp. setting can be set individually.
9. During Power on until ready to use, The oven takes about 25 min.
10. Temperature Control Function:
 - (a) It control by two separate controller with Fuzzy Control.
 - (b) By using PID Micro Computer Controller, The Computer can control for temperature setting and using for measuring temperature profile.
 - (c) The 'Smart' type temperature Controller can be easily use to monitor the working area temperature, auto run, auto set PID Value and temperature setting. Temperature Adjustment 0.5% FS + 1 digit.
 - (d) Temperature Setting Range : 28 –420 Degree Celcius.
 - (E) Temperature Accuracy : 0.1 Degree Celcius
11. Timer Setting : Set according to required time for application.
(Moving into Reflow Area)
12. AUTO Setting : When press Fully Auto Button, The BGA tray will auto send the tray into the reflow area, after finish reflow the tray will auto move to the original area with fan cooling function.
13. Before turn off the Oven, we must off the heater first until it reach below 100 degree celcius Then can only power off the main switch for the main power source.
14. During application, do not press the tray and sometimes it will bend the slider guide and it will cause problem for sliding movement.

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Control Panel Introduction :

- Heater ON/OFF Switch
- Amp. Meter
- Fuse 3 Amp
- Thermo Couple Plug
- Temp. Controller Detected Value
- Temp. Controller Max.Temp. Setting
- USB Connector
- N2 Meter
- Emergency Stop Swith

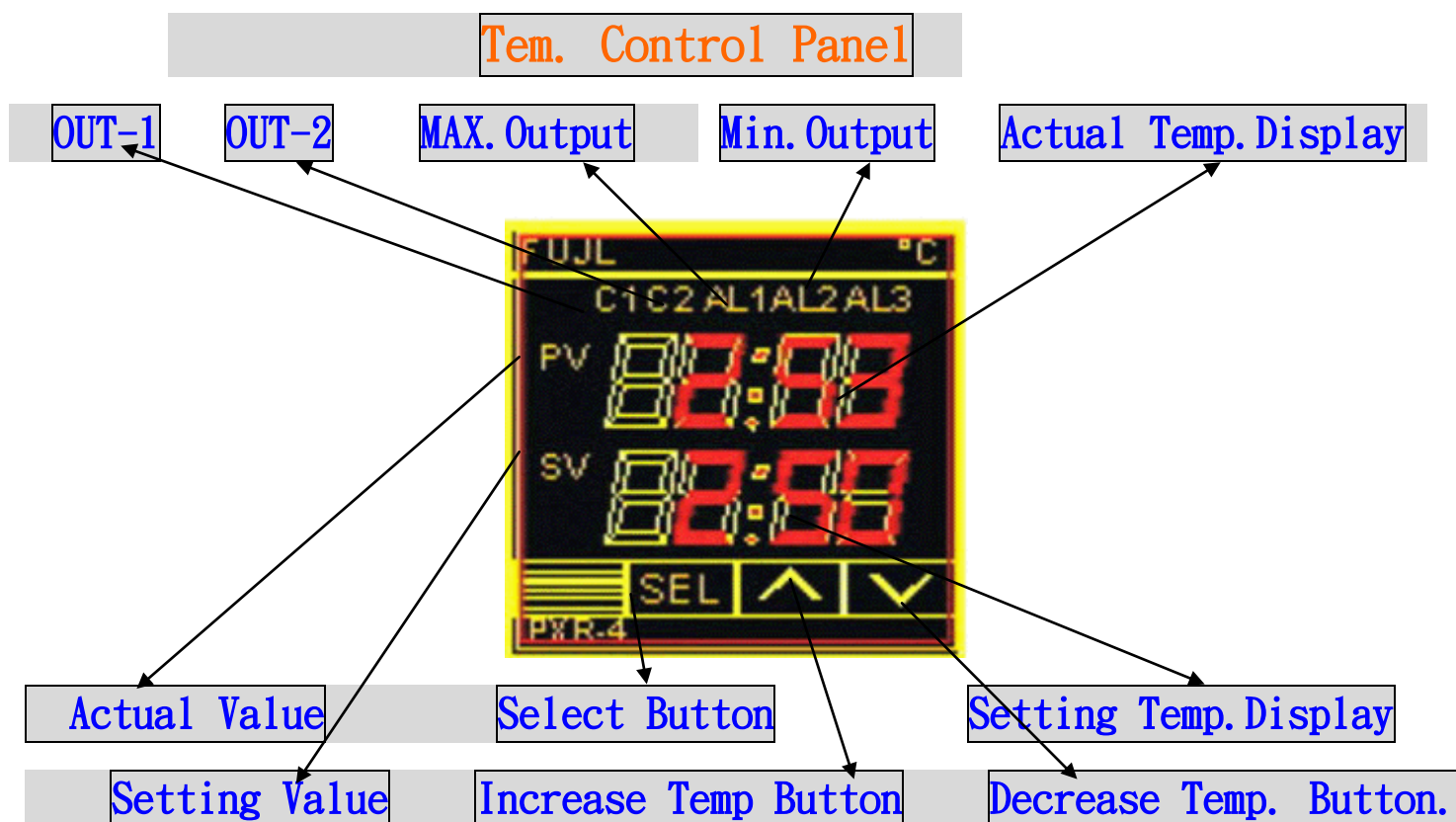


- Power Switchch
- Thermo Couple
- Temp.Timer
- Start Button
- Flow Meter
- Upper Heater Detected Temp.
- Bottom Heater Detected
- Upper Heater Temp. Setting
- Below Heater Temp. Setting

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Operation Procedure

1. Press POWER -> On Machine
2. Press AUTO->Complete Run
3. Press Red Button -> Will Stop at any step until dissolve defect issue, Press Stop and return to Origin, If you need to continue Please press AUTO.
4. Press STOP-> Will immediately stop operation until defect issue dissolve And will continue to run.
5. Press HEATER-> ON Start Heating TOP & Bottom Heater, Press OFF Will cut off Both Heaters.
6. Flow Meter ->Flow Meter Knob. Adjust N2 flow rate (1 LPM=28 Lit/Min.)
7. N2 Knob ->Adjust N2 intake pressure.
8. N2 Meter -> N2 Meter set at 1.5Kg.
9. Ampere Meter-> Show Existing ampere consumption.



***** **WEIDACHENG** ***** (3)

Temperature Controller Setting



Select Button

Confirm button

Select upper setting

Select lower setting

Press for 3sec go into first level setting

Press 5sec go into secong level setting.

Warning: When setting in the first and Second level, pls do not re set factory setting to avoid machine error.

First Level Setting

Press for 3sec go into first level setting

1. STby-Disply OFF Press **SEL** OFF Blink Press **^** ON Blink Press **SEL**
Enter ON Stop Blinking.
(A) Disply OFF-Temp. Control Display and Function.
(B) Disply ON-Only temp. Control Display. Stop Temp. Control.
2. LRCH Disply 0 (Display 0)
3. AT Disply 0 Press **SEL** → 0 Blink ~Display1 → Press **SEL** Enter →
1 Stop Blinking, 1 Right Bottom corner start blinking.
(A)-Numbers Right Bottom corner start blinking, CPU start initialize PID Value.

PID Defination:

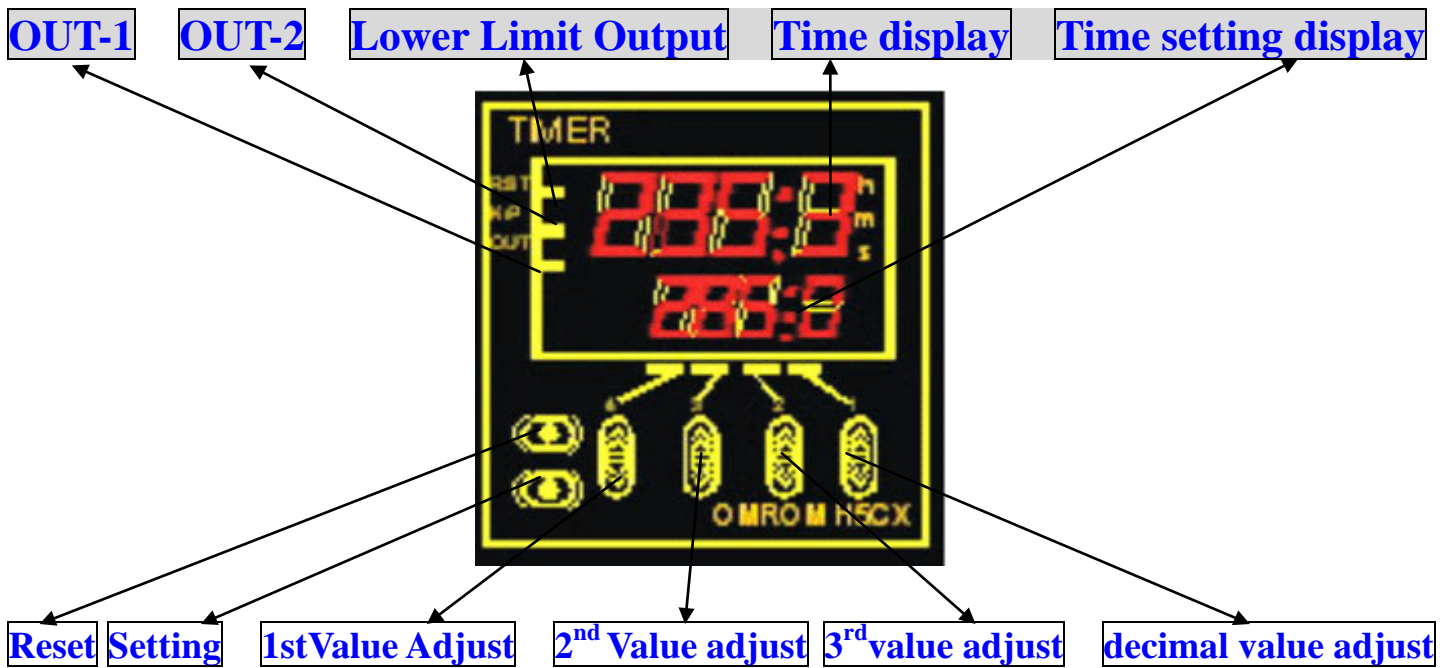
P=5.0 P- Output ratio 0.01to999.9

i=240 i=Intergrayion 0to3200 seconds.

d=60 d=Differentate 0.01to999.9 seconds.

***** **WEIDACHENG** ***** (4)

Timer Setting Accuracy 0.1 Sec



1. Thermo Couple is measuring the BGA IC actual surface tempreture. temp.



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2. Communication connection between Thermo Couple & USB



Thermo Couple Connection

Detected temperature

USB- Connection

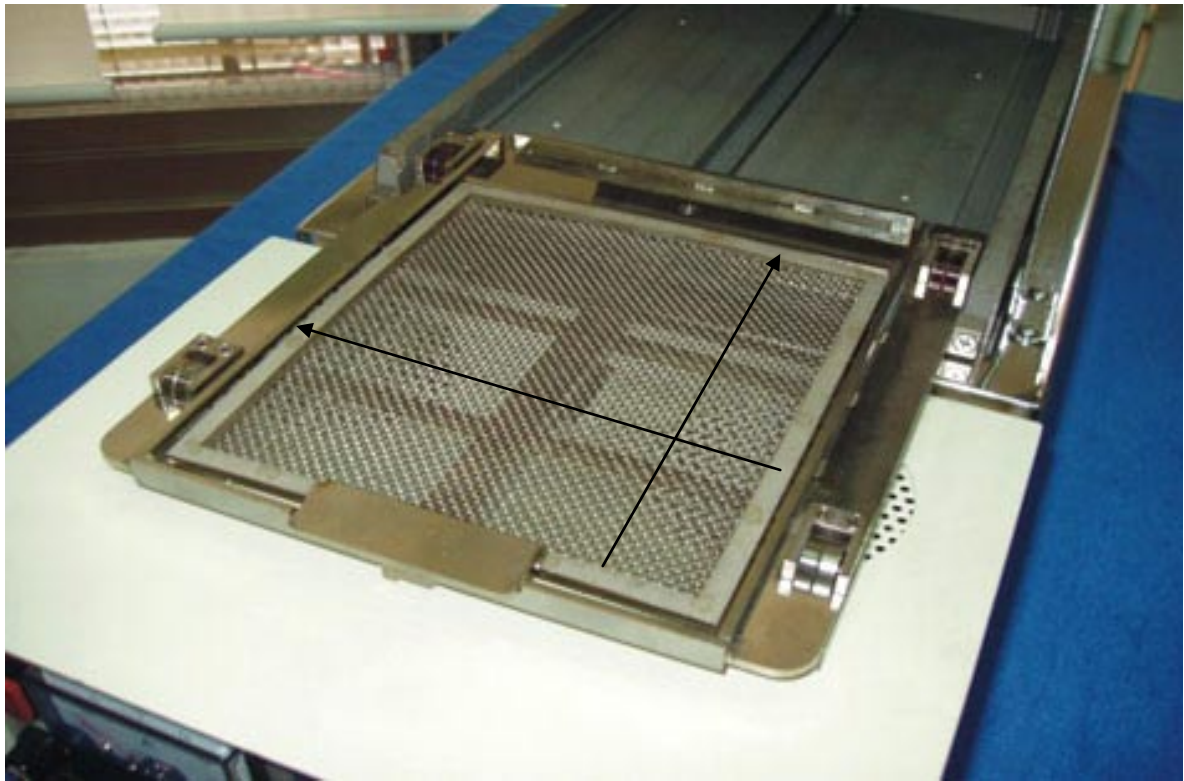
3. Timer Setting Accuracy 0.1 Sec



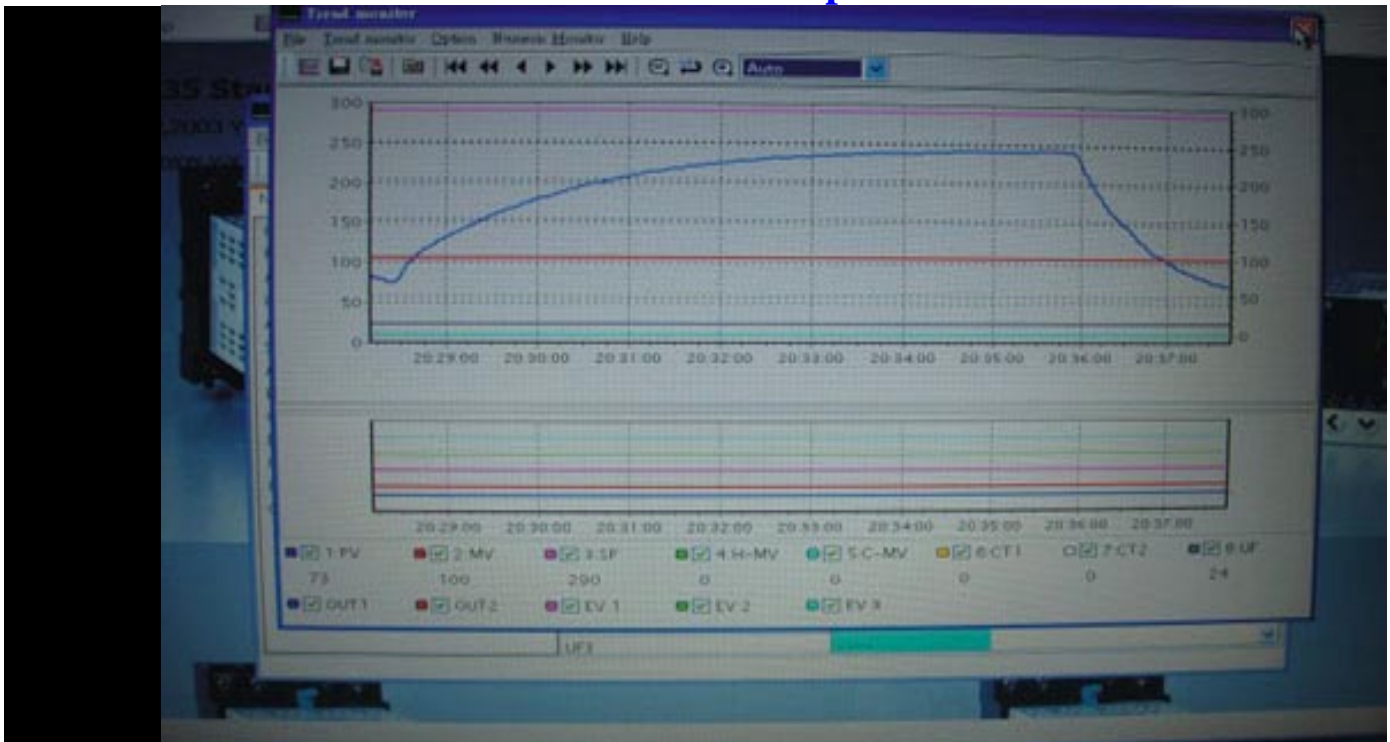
0~ 9 9 9. 9 sec

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4. Max. Reflow Area. 155mmX155mm



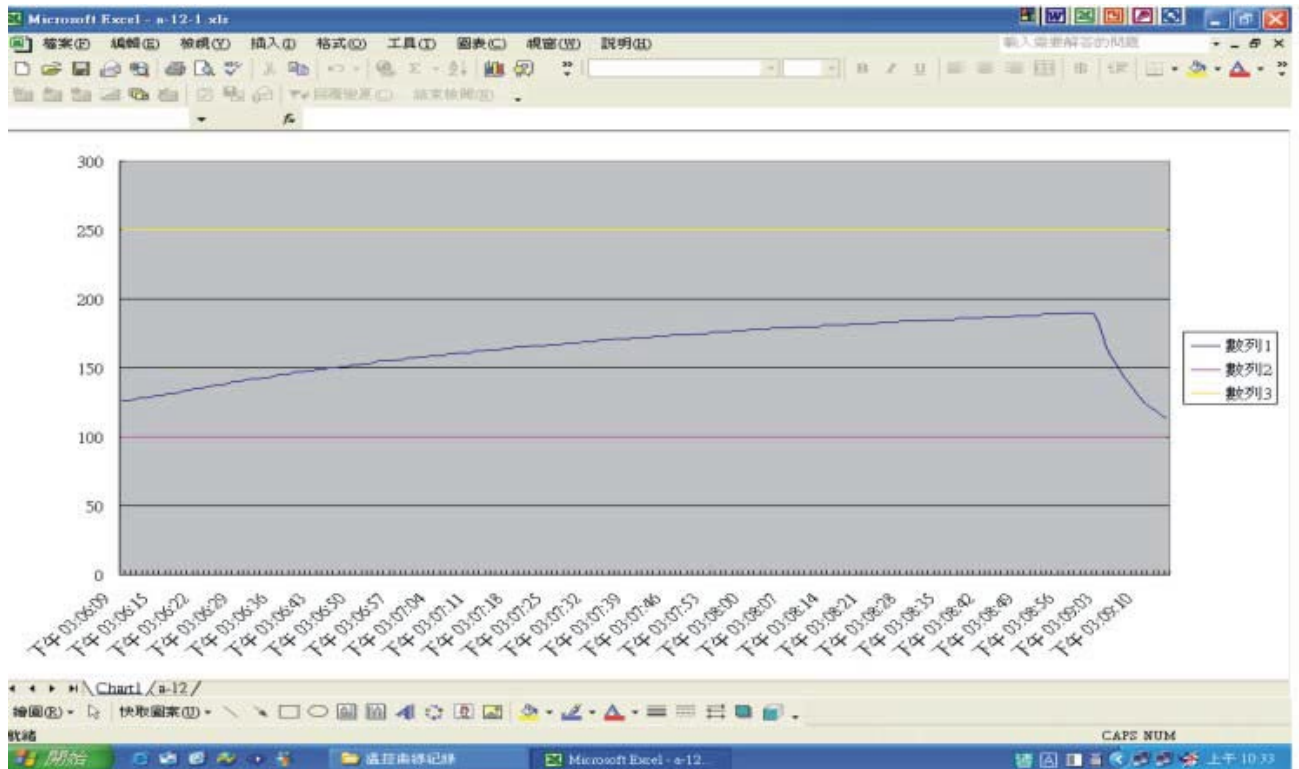
5. Using Computer to Plot out the Temp. Profile for the Communication connection between Thermo Couple & USB



6. Saving for the Temperature Profile and print out in the Graph Format.

***** WEIDACHENG ***** (7)

6. Data convert into Graph format



7. Data convert to Microsoft Excel format

No.	date	time	1:PV	2:MV	3:SP	4:H-MV	5:C-MV	6:CT1	7:CT2	8:user def	1:OUT1	2:OUT2	3:EV
1	2005/7/6	下午 12:46	129	100	275	0	0	0	0	24	1	0	
2	2005/7/6	下午 12:46	129	100	275	0	0	0	0	24	1	0	
3	2005/7/6	下午 12:46	131	100	275	0	0	0	0	24	1	0	
4	2005/7/6	下午 12:46	133	100	275	0	0	0	0	24	1	0	
5	2005/7/6	下午 12:46	135	100	275	0	0	0	0	24	1	0	
6	2005/7/6	下午 12:46	137	100	275	0	0	0	0	24	1	0	
7	2005/7/6	下午 12:46	139	100	275	0	0	0	0	24	1	0	
8	2005/7/6	下午 12:46	142	100	275	0	0	0	0	24	1	0	
9	2005/7/6	下午 12:46	144	100	275	0	0	0	0	24	1	0	
10	2005/7/6	下午 12:46	147	100	275	0	0	0	0	24	1	0	
11	2005/7/6	下午 12:46	149	100	275	0	0	0	0	24	1	0	
12	2005/7/6	下午 12:46	152	100	275	0	0	0	0	24	1	0	
13	2005/7/6	下午 12:46	154	100	275	0	0	0	0	24	1	0	
14	2005/7/6	下午 12:46	158	100	275	0	0	0	0	24	1	0	
15	2005/7/6	下午 12:46	161	100	275	0	0	0	0	24	1	0	
16	2005/7/6	下午 12:46	163	100	275	0	0	0	0	24	1	0	
17	2005/7/6	下午 12:47	166	100	275	0	0	0	0	24	1	0	
18	2005/7/6	下午 12:47	169	100	275	0	0	0	0	24	1	0	

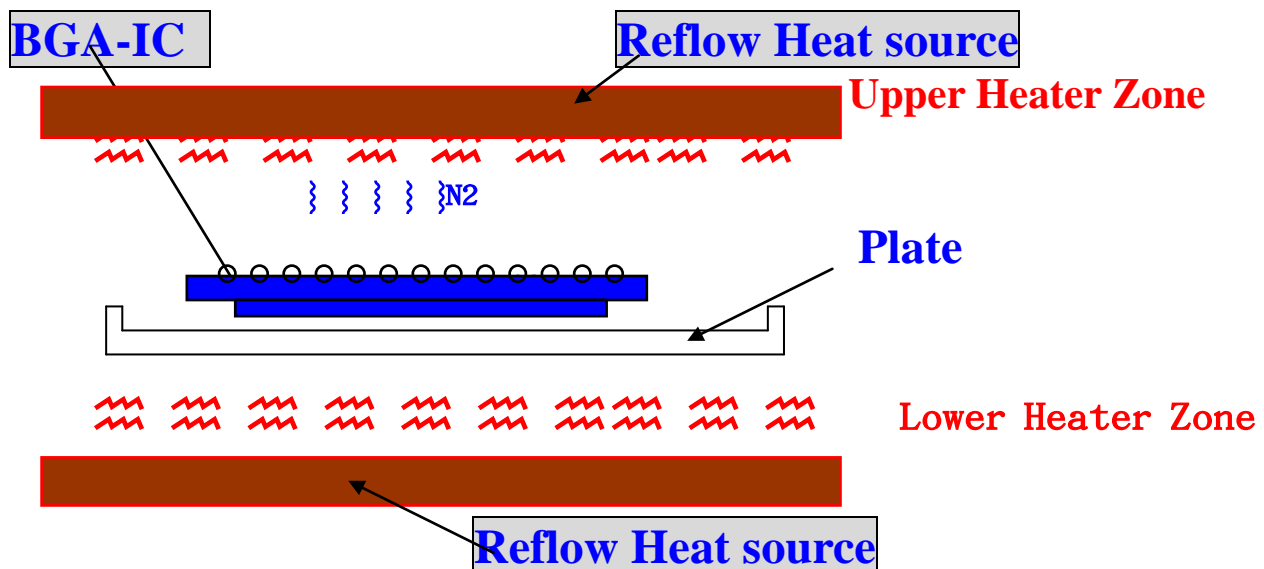
***** WEIDACHENG ***** (8)

Comparison for Different Solders Melting Point

- (A) Sn/In/Ag-Tin, Silver & Copper alloy the melting point is about 217 Deg C.
- (B) Pb-Sn-Tin, Lead Melting point is about 183 Deg C



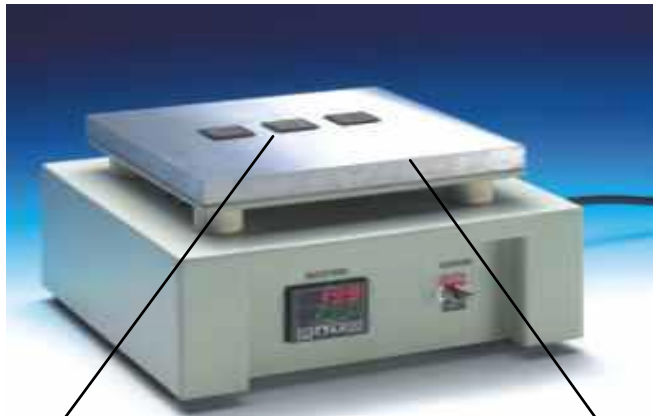
TU-380 Fully Auto Lead Free Reflow- Advantages



(8) TU-380 is more suitable to use to reflow and rework for BGA cause the heat transfer is transfer using not contact and also the heat transfer is more even. Compare to the Hot plate which are using direct heat transfer will cause die damages due to delta T is More than 5 Deg C. The delta T for the hot air is only 1 Deg /sec. Therefore by using Hot Air method will not cause damage to the components and more suitable for Rework.

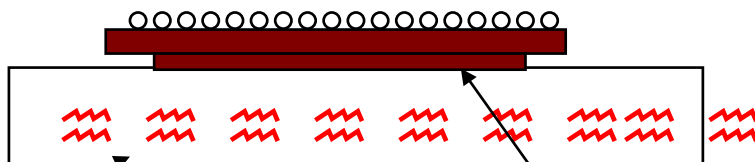
***** WEIDACHENG ***** (8)

Single Side Hot Plate



BGA-IC

Heating Panel



Hot Plate Heat source

Transfer from IC body to others

Direct Heat transfer will easily cause die expansion more rapidly and will cause die Crack and the solder ball will flow away from pad (205-208Deg C). Even during reflow for Lead Free at (217Deg C) it will more easily cause damage on the die.

(Deform, Color change), therefore not suitable to use as repairing.

***** **WEIDACHENG** ***** (10)

(A)Hot Plate Disadvantages

(1) Heat Increase : Single Sided Heat Increase.

Disadvantages : For Lead Free it need to increase until 260 Deg C to Reflow.

(2) Heat Transfer : Component direct Heat Contact Heat Transfer

Disadvantages : Direct Heat contact with component will cause the die to crack or Lifted with the pad cause the heat expansion is too high.

(3) During reflow will not be able to apply N2, Will decrease the performance of N2 During reflow.

Disadvantages : Lead Free process the reflow Temp. is 217 Deg C, Without N2 and High Temp. it will cause the Pad easily oxidize and will not get a good solder joint, It will also cause the package change color and oxidized.

(B) Lead Free Solder ball Reflow Oven : Tu-380

(1) Heat Increase : Top And Bottom Heaters

Advantages : By using Top and Bottom heaters and can set separately can Easily Get the heating profile that we require.

(2) Heat Transfer : Using Non Contact Heat Transfer.

Advantages : During heat transfer the component is in the middle of the conveyer, Whereas the heat transfer will be more even for the whole component.

(3) Can apply N2 : Is a must for Lead Free Process

Advantages : Decrease Oxidation. Increase the joint contacts and reliability.

(4) Profile detection: Can direct link to the PC and be able to view directly from PC.

Advantages : Can immediate detect the temp. for the Solder Joints, It's also Easy To view or change the parameter for the temp. setting required.

(5) Reflow Oven Tray Transfer Vibration rate Requirement :

With a stable transfer Guide to enable a minimum vibration rate required.

Advantages : By using a linear guide enable the movement to cut down to the Minimal vibration of the tray and it will decrease the movement of the solder Ball during reflow.

Lead Free solder ball melting Point diagram.

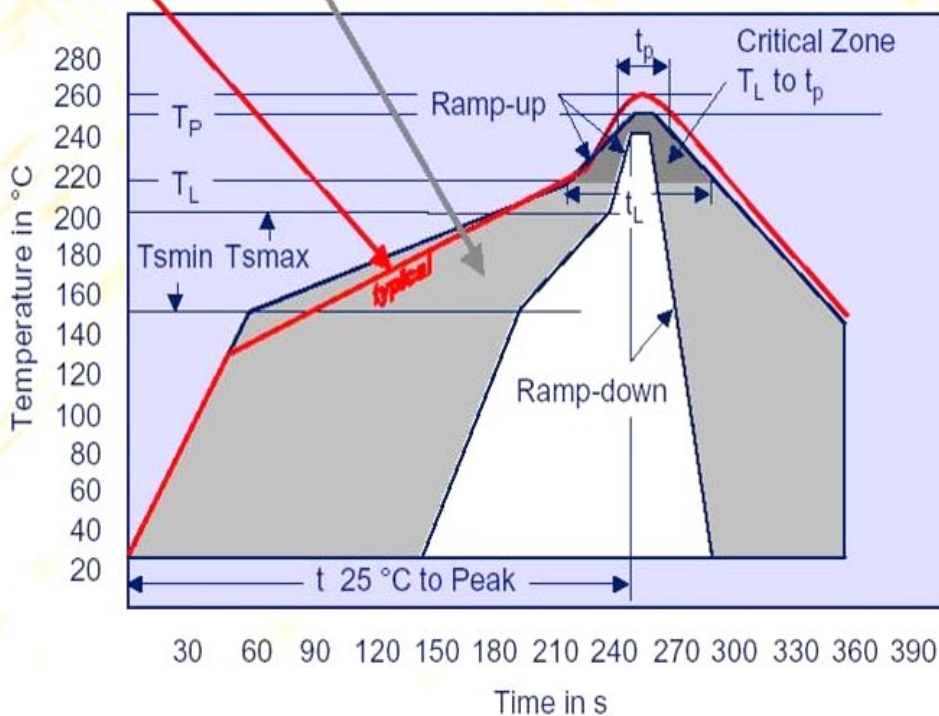
LEAD-FREE ALLOYS

	Tin (Sn)	Silver (Ag)	Copper (Cu)	Melting Point (°C)		
				Eutectic	Solidus	Liquidus
LAC405	95.5	4	0.5	--	217	218
LAC305	96.5	3	0.5		217	218
LAC350	96.5	3.5	--	221	--	--

Profile for the Lead Free solder Ball melting Point.

Standardisation

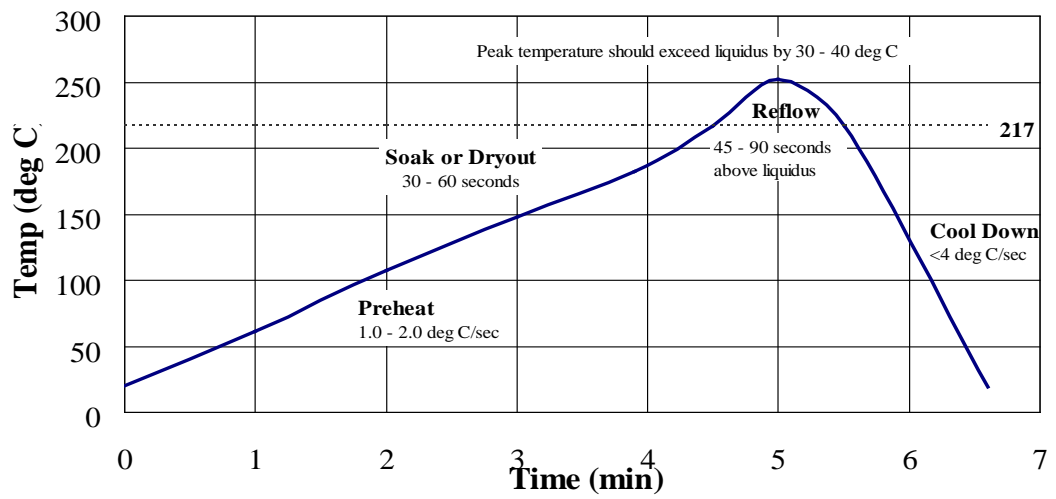
E3-profile vs. J-STD 020B - designed for lead-free MSL evaluation, 260°



Reflow Profile

Indalloy # 241 ; 95.5Sn 3.8Ag 0.7Cu

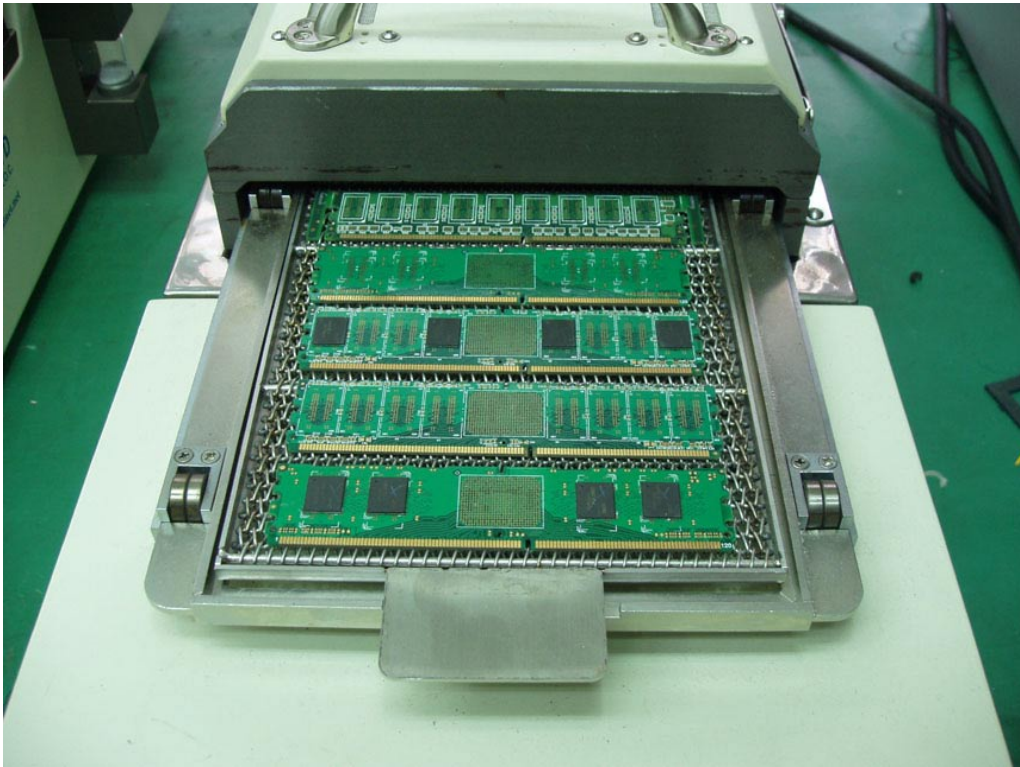
Solidus Temp 217 deg C , Liquidus Temp 217 deg C ,



This profile serve as a guide in establishing a reflow profile for your process.

Different reflow methods, board geometries and densities may require further adjustments.

DRAM-PCB Reflow



Reballed Reflow

