Standard Operating Manual

RTP-600S Rapid Thermal Processing System
Contents

1. Picture and Location

2. Process Capabilities
   2.1 Cleanliness Standard
   2.2 Process Temperatures, Time and Process Gases Available
   2.3 Wafer Size

3. Contact List and How to Become a Qualified User
   3.1 Emergency Responses and Communications
   3.2 Training to Become a Qualified User

4. Operating Procedures
   4.1 System Description
   4.2 Important Cautions
   4.3 Power Up Procedure
   4.4 Wafer Loading
   4.5 Start Annealing
   4.6 Cooling and Unloading
   4.7 Power down Procedure
1. Picture and Location

Fig. 1: RTP-600S is located at NFF Phase II Room 2240

2. Process Capabilities

2.1 Cleanliness Standard

RTP-600S is “Clean” equipment for rapid thermal annealing.

2.2 Process Temperatures, Time and Process Gases Available

700°C to 1150°C

Process gases available: N2, O2, Ar

Maximum allowable steady time (Suppose temperature ramp up/down rates are not less than 45°C/s): 2min
2.3 Wafer Size

The maximum wafer size is 4 inch in diameter, 1mm thick.

3. Contact List and How to Become a User

3.1 Emergency Responses and Communications

- Safety Officer: Mr. Wing Leong CHUNG 2358-7211 & 64406238
- Deputy Safety Officer: Mr. Man Wai LEE 2358-7900 & 9621-7708
- NFF Phase 2 Technicians: Mr. Li Ho, Mr. Chan Tai Shing, Mr. Chen Yi gong 2358 7896
- Security Control Center: 2358-8999 (24hr) & 2358-6565 (24hr)

3.2 Training to Become a Qualified User

Please follow the procedure below to become a qualified user of the RTP-600S.

1. Read all materials on the NFF website concerning the RTP-600S.
2. To register RTP-600S operation training, logon to NFF Equipment Reservation System. Go to User Info page. Select Equipment Operation Training. Please follow the instructions on the web page.
4. Operating Procedures

4.1 System Description
The RTP-600S is rapid thermal processing (RTP) system, which uses high intensity visible radiation to heat single wafer for short process period of time at precisely controlled temperatures. The system consists of an oven unit with an integrated computer control system and software. The wafer to be processed is placed on a quartz tray that slides into a quartz isolation tube in the oven unit. Two banks of lamps, one above the quartz tube and one below it, provide the source of energy for heating the wafer.

**System Component Locations**

Fig. 2: System component locations
Hazards

The RTP-600S system presents certain hazards. These fall into the following categories:

- Electrical shock hazards
- Process gas hazards
- Process byproduct hazards
- Oxygen hazards
- Thermal hazards

Emergency Stop Procedure

If an emergency condition is suspected, depress fully the Red Emergency Off (EMO) Button located on the system as shown in Fig. 2.

4.2 Important Cautions

(1) If an equipment failure while being used, never try to fix the problem by yourself. Please contact NFF staff.

(2) This is clean equipment. Clean your wafers in Wetstation A before the process.

(3) Also make sure your wafer container and handling tweezers are clean.

(4) Use tweezers to handle your samples.

(5) Materials such as photoresist which cannot sustain high temperature are not allowed. Follow your process flow. Materials which are not mentioned in the process flow are NOT allowed to put into the RTP-600S.

(6) The machine consists of quartz wares which are fragile. Be careful to avoid breaking them.

(7) Please contact NFF staff for editing a new recipe.
(8) Remember to fill in the Log Sheet.

4.3 Power up Procedure

(1) To turn on the cooling water supply and return, use the suction cup lifter to securely attach to the cleanroom raised floor panel located near the back side of the machine. Lift the floor panel. Find there are two water ball valves labeled “RTP-600S”. Open BOTH of them by turning the handles a quarter of one turn anticlockwise (See Fig. 3 below for the correct opening positions of the handles).

![Cooling water supply and return](image)

Fig 3.: Cooling water supply and return

(2) Turn on the wall circuit breaker (labeled “RTP 600S” as shown in Fig. 4)

![Wall circuit breaker for RTP-600S](image)

Fig 4.: Wall circuit breaker for RTP-600S
(3) Turn on the front panel key switch.

(4) Press the “EMO Reset” button – this turns the entire system on. Once the computer boots up, the system Main Menu should appear on the monitor screen. If it does not, check that the monitor is on.

(5) Press the “Power On” button – this enables the heating unit.

(6) At the rear panel of the machine, visually inspect that the process gas exhaust connection is in position. Check that there is no restriction to the cabinet exhaust and there is proper air flow from the exhaust fan. Check also for possible water leaks at the cooling water inlet and outlet connections.

4.4 Wafer Loading

Warning: The wafer will be VERY HOT after unloading from the heated chamber.

Warning: The quartz tray, quartz chamber etc. must be allowed to cool down before they are serviced.

Warning: Change a new pair of Latex gloves if touching of parts (eq. quartz tray) of the chamber is necessary.

(1) Gently push up the handle of the chamber door to unlock the chamber door. Then gently pull out the chamber door. Beware that a delicate quartz tray is attached to the chamber door.

(2) Check the quartz tray is clean and level.

(3) Place the wafer directly on the middle of the tray.

(4) Slowly push the chamber door back into the chamber (Look at the quartz tray and wafer during door closing to make sure they do not collide with the chamber or other parts of the machine. If so, stop and contact NFF staff. Gently push down
the handle to lock the chamber door.

4.5 Start Annealing


(2) Note that users are NOT allowed to create a new recipe. Follow your approved process flow. Contact NFF staff if a new recipe is needed.

Warning: If an unwanted recipe is accidentally pressed [Enter] to start, you can abort the process by pressing [Esc].

(3) Use the [Up Arrow]/[Down Arrow] keys to highlight a recipe file. Press [F9] to enter the recipe edit screen. Check the steady time. Don’t change any contents of the recipe other than the steady time. And don’t set the steady time exceeding the maximum allowable steady time as stated in Section “2.2”. Steady time of recipes with more than one ramp up/ramp down cycle is not allowed to be changed.

(4) If change of steady time is not needed, go to step (6).


(6) Press [Esc] back to the recipe screen.

(7) Check the temperature of the machine casing is below 28°C. If not, wait until it drops to 28°C or below.
(8) Check the required recipe is highlighted. To start the annealing process, press [Enter]. After initializing, the Process Run screen will appear. The Process Run screen shows the process data in real-time. All process parameters are displayed on the screen, both the recipe values and the actual measured values.

(9) After the process has completed, the words “Process Over” will appear. Press [Esc] back to the “Recipe Data File Directory – Pyrometer Control Recipes Screen”. If another annealing process is needed on the same wafer, go to Step (2) of ‘Start Annealing’.

4.6 Cooling and Unloading

(1) Wait until the wafer is cooled to 400°C or below.

(2) Gently unlock the chamber door and pull it out.

Warning: The wafer and the quartz tray will be VERY HOT after unloading from the heated chamber.

(3) Remove the wafer.

(4) Go to Step (2) of ‘Wafer Loading’ for another run.

(5) Slowly push the chamber door back into the chamber and lock it.

4.7 Power down Procedure

(1) Check the temperature of the machine casing is below 28. If not, wait unit it drops to 28 or below.

(2) Press the “Power Off” button.

(3) Press [Esc] back to the Main Menu screen. Press [q] to exit the RTP-600S program.
(4) Turn off the front panel key switch.

(5) Switch off the wall circuit breaker (labeled “RTP 600S”).

(6) Turn off the cooling water supply and return.

Reference: (1) Operation Manual by Modular Process Technology Corp.
(2) Operation Manual by Allwin21 Corporation