APPENDIX A

SPECIFICATIONS

The following are the specifications for the HEATPULSE system:

- Wafer handling: Manual loading of a wafer in to the oven.
- Wafer sizes for the Heatpulse 610: 2", 3", 4", 5", and 6" wafers.
  Wafer sizes for the Heatpulse 410: 2", 3", and 4" wafers.
- Ramp up rate: programmable, 10°C to 250°C per second.
- Steady State duration: 0 to 9999 seconds per step. (Typically a duration of 1 to 600 seconds is used.)
- Ramp down rate: Programmable, 1°C to 200°C per second. Ramp down rate is temperature-and-radiation dependent, and the maximum is 80°C per second.
- Recommended steady-state temperature range: 400°C to 1200°C.
- ERP temperature accuracy: +3°C to –7°C, when calibrated against an instrumented thermocouple wafer (ITC).
- Thermocouple temperature accuracy: ±2.5°C.
- Temperature repeatability: ±3°C or better at 1150°C wafer-to-wafer. (Repetition specifications are based on a 100-wafer set.)
- Temperature uniformity: ±5°C across a 6" (150mm) wafer at 1150°C. (This is a one sigma deviation 100 angstrom oxide.) For a titanium silicidation process, no more than 4% increase in non-uniformity during the first anneal at 650°C to 700 °C.)

DIMENSIONS	Oven	10 1/4" H x 18" W x 16 1/2 " L		
	Chiller	12" H x 9" W x 13 " L		
	GHS-01 (option)	13" H x 15" W x 19" D		
WEIGHT:	Oven	100 lbs		
	GHS-01 (option)	30 lbs.		

ELECTRICAL:	U.S	Japan	Europe
Oven	208V (240V avail.) One Phase + grnd. 60 Hz, 90A	200V 50/60 Hz 90A	220/240V 50 Hz 90A
Chiller	100/120V 60 Hz, 11 A	100V 50/60 Hz, 11 A	220/240V 50 Hz, 5.5 A
GHS-01 (Option)	100/120V 60 Hz, 1 A	100V 50/60 Hz, 1 A	220/240V 50 Hz, 0.5 A

PROCESS GAS:

Any non-corrosive gas regulated to 20 psi, and pre-filtered to 1 micron . (Corrosive process gases may be used with systems equipped with the GHS-01 option.)
Inlet/out connections: 1/4 " female VCR fitting.

TUBE-COOLING

Oil- and water free compressed air or nitrogen, 10-15 scfm (283-425 slpm), filtered to 3 microns.
Inlet pressure: 20 psig pressure (1.4 kg/cm^2).
Inlet connection: 3/8" Parker Push-Lok. (Recommended tubing is 3/8" O.D. nylon.)

WATER

Pre-filtered with conventional paticulate filter to 100 microns **(No DI water.)**
Flow: 2 gpm (7.5 lpm) min..
Pressure differential: 35-50 psi (2.5-3.5 kg/cm^2)min.
Inlet pressure: 60 psi (4.2 kg/cm^2) max.
Inlet temperature: 35° C max.; 3° above dew point
Inlet and outlet connection: 3/4 " male hose threads.
(Two hoses supplied for connection to 3/4" hose connection.)

2.2 PERFORMANCE SPECIFICATIONS

The system specifications below may change as different models are introduced or as design enhancements are implemented.

- Recommended Steady-State Temperature Range: 400-1200° C.
- Steady-State Temperature Stability: ± 7° C.
- Temperature Monitoring Mechanisms: Standard pyrometer (used above 800° C), an optional Extended Range Pyrometer (the ERP is used above 400°C), and a thermocouple (used below 800° C).
- Heating Rate: 1-200° C per second, user-controllable.
- Cooling Rate: Temperature dependent; max 150° C per second.
- Maximum Non-uniformity:

  Radiant Flux: ±0.25%

  Sheet resistivity: *

  ≤2% (Dose Monitoring Units)

  ≤ 1.35% (R&D Units)

  * Post-anneal sheet resistivity measured on a 150mm wafer annealed at 1100° C for 10 seconds. R&D models optimized for slip control.

  Implant: As 1E16 50 KeV with implant uniformity ≤0.3%
- Lamp Life: Unconditionally guaranteed for three years.
- Steady State Time: 1-9999 sec. (1-600 sec. recommended)
- Wafer Sizes for the HEATPULSE 610: 2", 3", 4", 5" and 6".
  Wafer Sizes for the HEATPULSE 410: 2", 3", and 4".
- Process Gases: The HEATPULSE system delivers one non-corrosive process gas with manually controlled flow. When used with the GHS-01 Multigas-Handling Subsystem option, the HEATPULSE can deliver multiple corrosive and/or non-corrosive process gases.

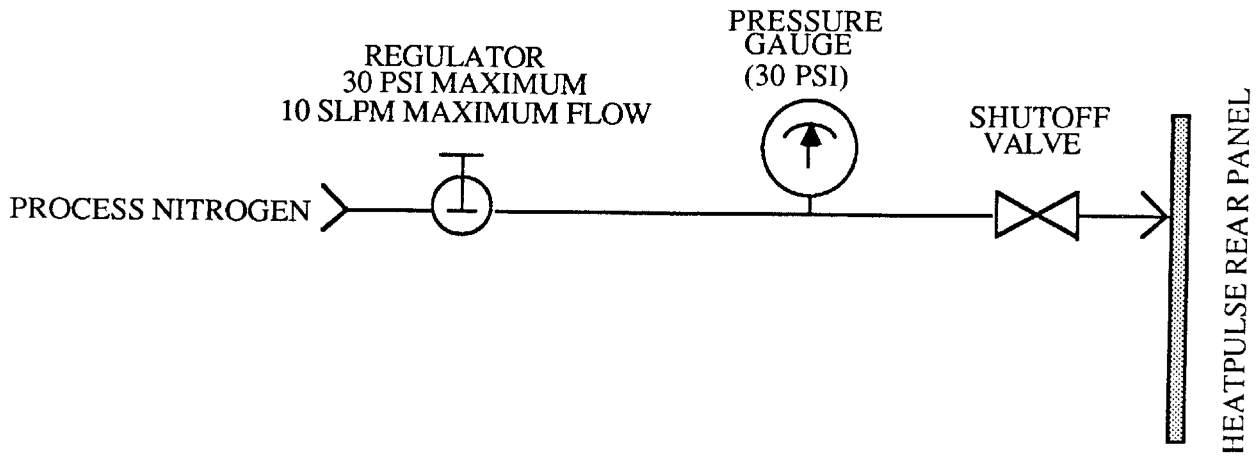

Figure 4-4. Optimal Process Gas Supply Configuration

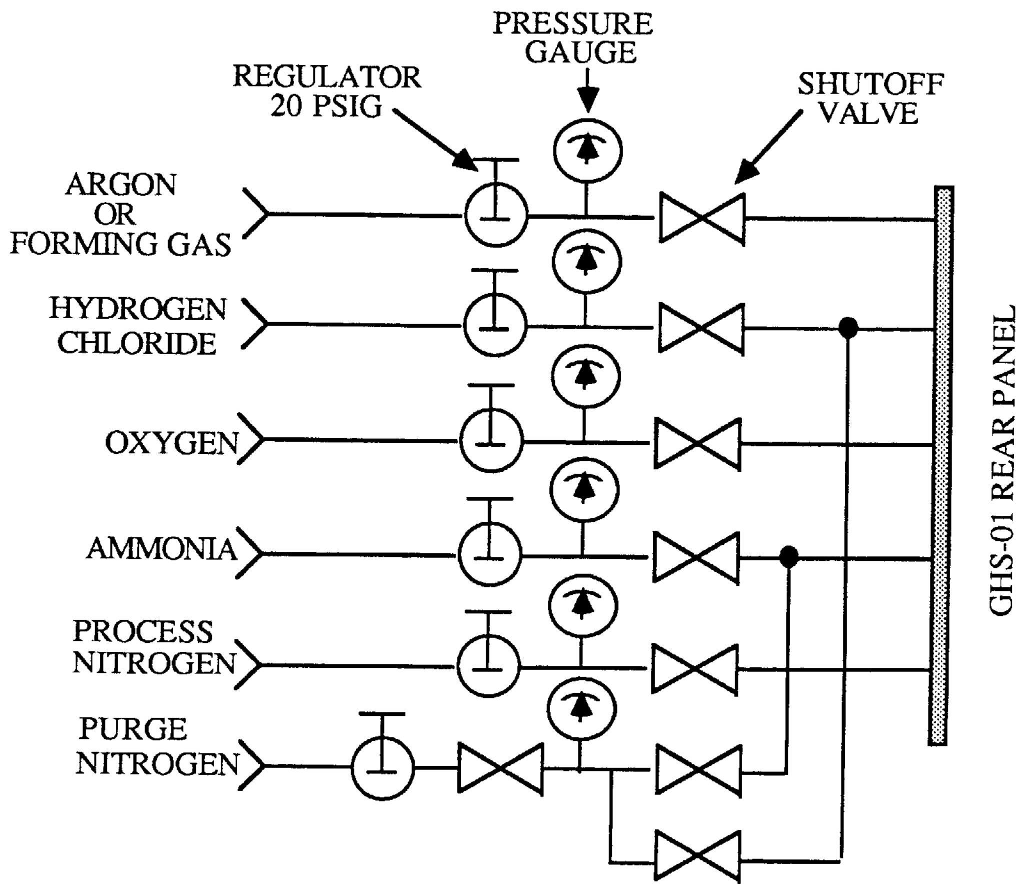

Figure 4-5. Optimal Process Gas Supply Configuration for Connection to GHS-01

4.7 Pyrometer Cooling System Connections (610 Only)

The HEATPULSE 610 system has a separate, closed-loop water system to cool the pyrometer. A Neslab RTE-100B water chiller unit, which must be located near the HEATPULSE system, circulates 1.3 gallons of water through the pyrometer to maintain a constant pyrometer temperature.

The chiller unit water connections are made to the two tubes on the rear of the HEATPULSE 610 below the oven water cooling connections. Refer to Figures 4-1 and 4-10. Connect the hose on the back of the chiller labelled **PUMP OUTLET** to the tube on the back of the HEATPULSE 610 labelled **PYROMETER INLET**. Connect the hose on the back of the chiller labelled **PUMP INLET** to the tube on the back of the HEATPULSE labelled **PYROMETER OUTLET**. Two quick-connect tube connectors are supplied with the HEATPULSE 610 to make these connections.

The chiller unit plugs into any 110 VAC/60 Hz outlet (220 VAC/50 Hz outlet for international systems). The chiller draws approximately 11 Amps (5.5 Amps at 220 VAC).

Fill the chiller with approximately 1.3 gallons of clean tap water. The chiller should be filled so that the water level is between the high and low fluid level markers. The markers are 1" horizontal slits located in the center of the stainless steel baffle that separates the refrigeration and pump assemblies from the bath area. See Figure 4-11. A chiller thermometer shipped with the chiller should be installed through the grommetted hole in the top of the chiller water reservoir.

Do not operate the chiller with low water level. The chiller may overheat and cause damage to the refrigeration unit.

After the water and power connections have been made and the chiller filled with water, the chiller unit may be turned on to check for leaks and adjusted for proper operation. See Figure 4-10.

1. Turn ON the switch labelled **MAIN**. The white LED above the switch should light.

2. Turn ON the switch labelled **REFRIG**. The white LED above the switch should light.