4-1-1. Reduced Projection Optical System

1) Reduction Magnification	1/4
2) YES	NA 0.55–0.85 Automatically variable
3) Exposure range 6" reticle specification	25.00 × 33.00 mm
4) Exposure wavelength	ArF excimer laser (193 nm)
5) Lens temperature control	Upper and lower flange (Novec)
6) Distortion adjustment mechanism	MAC1 Mechanism (5 segments)
7) Wavelength stability	Within ±0.10 pm
8) Spectral width (FWHM)	Within 0.5 pm

4-1-2. Department of Illumination Optics

1) Exposure settings	2.0 mJ/cm² to 1.0 J/cm² and 0 (adjustable in increments of 0.1 mJ)
2) Excimer laser output	40.0 W@4.0 kHz
3) Aperture mechanism	Iris diaphragm, Core
4) Auxiliary field lens turret for B.F correction	
5) Integrator	V/F conversion + soft correction
6) Fly Eye	1st FlyEye MODE
7) Reflectance monitor	SPD
8) Integrator Sensor	Reflective
9) Attenuator	double attenuator

4-1-3. Focus/Leveling System

4-1-3-1. Autofocus section

1) Detection method	Broadband light illumination with oblique incidence 2D multi-point method
2) Vertical stroke	0.2 and
3) Focus offset input range	±10 μm
4) Autofocus tracking range	±0.1 mm
5) Number of AF beams	49 mounting points; up to 12 points can be selected.
6) AF illumination	Halogen lamp (broadband)
7) VIB frequency	3.4 kHz
8) Detector	SPD
9) Signal processing	PSD
10) Optical configuration	AF/AL combined, 45
11) Determination of acceptable values	Soft (A/D)

4-1-3-2. Focus Harving

1) Control unit	LC (lens controller)
2) Drive/Position Detection	Drive: DC motor Position detection: Linear encoder

4-1-3-3. Leveling

1) Leveling light source	AF shared light source (halogen lamp)
2) Detector	49 points SPD
3) Optical configuration	AF/AL combined, 45~
4) Leveling offset input range	±20 offices
5) Determination of acceptable values	Soft (A/D)

4-1-4. Reticle Alignment Section

1) Attaching the reticle	Automatic loading from the reticle autoloader.
2) Alignment method	Auto-alignment using transmitted light from the reticle alignment mark.
3) Observation system	Use ITV monitor.
(4) Reticle microscope	2 eyes 4 axis
5) Baseline	4-axis image processing (FIA image processing)
6) Reticle rotation	Image processing (CCD)
7) ITV Monitor	X1Y/X20 electrosynthesis
8) Alignment Method	ASK
9) R-PEM	Detector CCD Tolerance level determination: Soft (A/D)
10) Processing Unit	alignment unit

4-1-5. Reticle Stage Section

1) Compatible sizes	6 inch reticle
2) Positioning stroke	Each axis is more than 1mm
3) Scan stroke	Y-direction: 132mm or more (up to 33mm on the wafer)
4) Rotation angle	±1
5) Drive/Position Detection	Drive: Linear motor Position detection: Linear encoder + laser interferometer
6) Position control method	Closed-loop servo control system using laser interferometer
7) VAC sensor	Semiconductor sensor, analog type
8) Scan speed	1200 mm/s or faster (1400 mm/s available as an option)
9) Table material	ceramics
10) Guide	air bearing

4-1-6. Auto Reticle Blind Section

1) Aperture mechanism	Imaging type
2) Setting range	Each side extends from the outermost part of the exposure area to the outermost edge. However, this includes a 1.5mm light-shielding strip. The minimum aperture is 2.0 mm × 2.0 mm (on the reticle).
3) Projection magnification	2.25
4) Blind placement	beside
5) Drive/Position Detection	Drive: DC motor Position detection and sanitary encoder
6) Positive and negative trailer correction	by software
7) Position Correction	Position error correction using laser interferometer

4-1-7. Wafer Alignment System

4-1-7-1. Laser Step Alignment (LSA) Section

1) Alignment Method	A laser spot is projected onto the wafer surface, and scattered light from the wafer's alignment marks is detected. Manual alignment is also possible using a CRT.
2) Laser spot position	Out of exposure range
3) Function	Fine alignment and search alignment
4) Configuration	Off-axis, LSAX, LSAY 2-axis
5) Detector	LSA Detector Integrated (diffracted light A/B scattered light)
6) Laser power	5 mW
7) Light transmission/reception splitting	Polarizing prism + waveplate
8) Autofocus	

4-1-7-2. Field Image Alignment (FIA) Section

1) Alignment Method	By irradiating the eight surfaces of the wafer with broadband light using optical fibers, Reflected light from the wafer's alignment marks is detected using a CCD sensor, and then TV image processing is performed. Manual alignment is also possible using a CRT monitor.
2) Function	Fine alignment, search alignment, and manual assist.
3) Configuration	Includes 1 eye with 2-axis independent indicator lighting (LED lighting)
4) Detector	CCD
5) Alignment light source	Halogen lamp (broadband) +
6) Autofocus	White light detected by bell-splitting method + linear image sensor Focus position detection method
7) Indicators	5 μm L/S cross (200 μm aperture range)
8) Phase difference plate (phase difference FIA compliant)	Phase difference generation method using a disc-shaped optical phase object

4-1-8. Wafer Observation Section

1) Function	Visual observation during manual assistance

4-1-9. Interferometer Section

4-1-9-1. Reticle Interferometer Section

1) Configuration	4 axes
2) Minimum unit of interferometer reading	X, Y, and mother are all within 1.2 nm on the reticle.
3) Laser wavelength correction	automatic
4) Interferometer head	HP5517D
5) Interferometer receiver	10780F (Fiber)
6) ALCP temperature sensor	CR1210 (Hayashi Electric) 2 pieces
7) ALCP Barometric Pressure Sensor	470A (Setra)
8) Interferometer air conditioning	Localized air conditioning (Y-axis)
9) Differential interferometer	3 axis interferometer
10) Moving mirror	Rectangular prism (X), corner cube (Y), direct fastening type

4-1-9-2. Wafer Interferometer Section

1) Configuration	XB, XM,XMP,XF, XFP, YL, YR, YRP 8 axis~
2) Minimum unit of interferometer reading	All axes within 0.6mm
3) Laser wavelength correction	automatic
4) Interferometer head	HP5517D
5) Interferometer receiver	E1709A (Fiber)
6) ALCP temperature sensor	CR1210 (Hayashi Electric) 2 pieces
7) ALCP Barometric Pressure Sensor	470A (Setra)
8) Interferometer air conditioning	Localized air conditioning (Y- axis)
9) Differential interferometer	5-axis interferometer (4-axis stage, 1-axis off-axis microscope)
10) Moving mirror	Rectangular prism (chamfered), direct fastening type

4-1-10. Wafer XY Stage Section

1) Configuration	× Linear motor, air stager Y Linear Motor, Air Stager
2) Stroke	500 mm/s or higher (3XX mm/s during scanning)
3) Position control method	Closed-loop servo control system using laser interferometer
4) Driving, position detection	Drive: AC linear motor (Yaskawa) Position detection: Laser interferometer
5) Stage temperature control	Inert coolant (product name Novec) Temperature control system using circulation in the motor coil section
6) Power amplifier	linear amplifier
7) High point on the wafer electrosurface	600 mm

4-1-11. Peripheral area of the wafer table

4-1-11-1. Wafer Table Section

1) Wafer table rotation angle	±1 °
2) Wafer holder	300 mm type
3) Parallelism of the wafer adsorption surface	Image plane reference
4) Adsorption full pattern	pin chuck folder Holder contact rate: 2.2%
5) VAC sensor	Semiconductor sensor (analog type)
6) Wafer table size	510×509 mm
7) Wafer table material	ceramics
8) Holder material	ceramics
9) Z feed mechanism	Direct drive using VCM (Voice Coil Motor)
10) Z drive, position detection	Drive: VCM (Voice Coil Motor) Position detection: Linear encoder
11) Leveling drive, position detection	Drive: Driven by VCM (Voice Coil Motor) Position detection: Linear encoder
12) Center table drive, position detection	Drive : DC motor Position detection: Photosensor + potentiometer
13) Wafer transfer configuration	1 pin
14) Notch reference positioning	Positioning by optical sensor
15) Notch positioning pin arrangement	Detailed configuration
16) Leveling plate material	ceramics

4-1-11-2. Others

1) Illuminance uniformity sensor	SPD
2) Irradiation dose sensor	SPD (large area)
3) FM configuration	Large light emitting type

4-1-12. Wafer Loader Section

1) Wafer loader type	12-inch compatible, Type 4, Inline compatible
2) Career	The designated carrier will be used. (The work will be done via inline transport.) Random access: 3 carriers reject :1 carrier
3) Transportation means	X direction: R-type scalar robot arm + X axis × 2 + Y-direction slider (AC linear motor)
4) Cassette drive, position detection	Drive: DC motor Position detection: Rotary encoder
5) Wafer sensor	Laser diode + photosensor (wafer spacing)
6) Wafer contact area	black ceramics
7) OF Table Drive	T.T Table Up/Down (DC Motor + Lead Screw)
8) OF Table Piping	VAC only, no flow
9) Light source for notch detection	laser diode
10) Notch detection detector	SPD
11) Notch rotation amount detection	Rotary encoder + spot sensor
12) Drive system for notch alignment	T.T Table: DC Motor △Day stage DC motor + lead screw
13) VAC sensor	Semiconductor sensor (analog type)
14) Inline-compatible rotary arm drive	The above R-type scalar robot arm can be used in conjunction with the X-axis.

4-1-13. Reticle Loader Section

1) Reticle loader type	6-inch reticle specification (Also compatible with reticles with perforations)
2) Number of reticle library discs	12 sheets x 2 (24 reticle cases included)
3) Reticle Handling Arm	Reticle compatible
4) Recruits exchange method	Double arm (rotating)
5) Drive and position detection	Drive: DC motor (Yaskawa and Harmonic Drive Corporation) Position detection: Rotary encoder + photosensor
6) VAC sensor	Semiconductor sensor (analog type)
7) Transport sequence	The reticle must not interfere during transport.
8) Countermeasures against magnification fluctuations	Lens magnification fluctuation countermeasure (reticle loader retraction software)

4-1-14. Comi Inspection Section (PPD Pellicle Foreign Object Inspection Machine)

1) Comics Test Type	PPD
2) Detection pixel position accuracy	Within ±1mm
3) Maximum detection area	−57(XM)～+57(XP) mm −67(YM)～+67(YP) mm
4) Detection rank	Grade B (adjusted with 415 μm spherical beads)
5) Light source	Laser Diode
6) Detector	linear image sensor
7) Optical path switching	No switching required (upper and lower independent)
8) Parallel actions	possible

4-1-15 Control System

1) Main computer	DMCC(COMPAC)
2) Interface	GP−IB/SCSI
3) Input voltage	100 V
4) Monitor	LCD and ITV monitors are separate.
5) Controller software	FLASH PROM
6) Operating system	WindowsNT4.0 SP5

4-1-16. Chamber Section

1) ULPA filter	0.05 μm, 99.99999%, Outlet wind speed 0.3 m/s Thickness: 50mm The particles are 0.1 μm in size per 1 CF.
	10 or less (amount of dust generated inside and outside the device) ←
	The number of inline handover positions is one or less.
2) Impurity concentration inside the chamber.	
① Wafer stage section	Ammonia < 0.5 μg/m³ Total organic matter < 20.0 μg/m³ 3
②Wafer loader section	Ammonia < 0.5 μg/m³
3) Chemical filter (4-piece set)	OA Cleanroom Air Intake Low Air supply to the entire SA chamber Air supply to the vicinity of the CATC wafer stage − RA Internal circulation return section
4) Method of OA delivery	Flange capable of supplying 6 m³/min (JIS standard, 1. Flange material is PVC, etc.)
5) Coolant filter	50 μm (made by Cuno)
6) LLTC	Liquid temperature control cooling/heating unit (with built-in temperature control unit)
7) CATC	Fluid volume temperature control refrigeration unit (with built-in temperature control unit)