

Parameter	Spec	Measurement Method	Actual	Pass/Fail	Comments
Illumination					
15.0X15.0	<=3.0%		2.05	P	
9.4X19.0	<=3.0%		2.29	P	
Intensity	>280mW/cm2		598	P	Approx 300 hours on lamp
Reticle Masking	<500um		Y0 = 450	P	X0=400um Y0=450um X1=400um Y1=350um
Lens Distortion					
X @15x15	120nm		230nm	126nm	F
Y @15X15	120nm		230nm	126nm	F
Mag	<50nm/cm		5nm/cm	P	Distortion at 12X12
Die Rotation	<5urad		-0.028urad	P	
Trapezoidal					
X	<50nm/cm2		27nm	P	
Y	<50nm/cm2		1nm	P	
Optical sensor					
Xm1w1	<7um		4.2	P	
Ym1w1	<7um		6	P	
Ym1w2	<7um		5.4	P	
Overlay					
Stage X	<100nm		77nm	P	
Stage Y	<100nm		61nm	P	
Single Stepper					
X	<150nm		60nm	P	
Y	<150nm		57nm	P	
Throughput	>74 Wafers/hour		77	P	
Reticle Echange time	<40s		19.2s	P	

The tests below require CD SEM or Other

Focus Leveling					
Out Of Focus		Zero per wafer			
Imaging (Target CD)					
UDOF		>1.2um			
Intra Filed CD		+/- 0.05um @ 0.5+/-0.025um mean CD			
Target CD reproducibili		0.5 +/-0.05um			
Overlay					
Box in Box		<150nm			
Overlay on Produt wafe		<150nm			
System Stability					
3 day run test		Zero errors			
Contamination					
Topside particles		,3 Particles (0.5um or larger)			

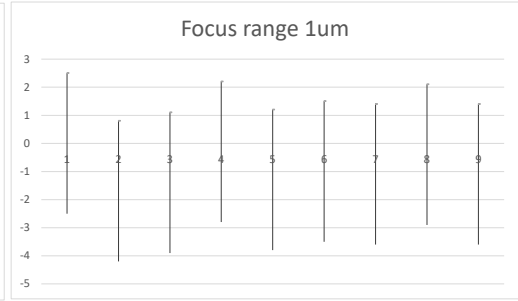
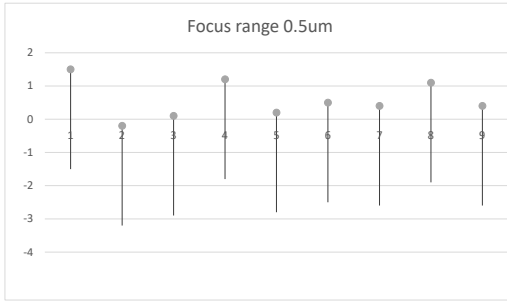
Normal reticle shot 21X21 with 14X14 Pitch

0.5um

CE	0	-1.5	1.5
UM	-1.7	-3.2	-0.2
UL	-1.4	-2.9	0.1
LM	-0.3	-1.8	1.2
LL	-1.3	-2.8	0.2
LM	-1	-2.5	0.5
LR	-1.1	-2.6	0.4
RM	-0.4	-1.9	1.1
UR	-1.1	-2.6	0.4

UL UM UR
LM CE RM 9 locations
LL LM LR

1.5-2um range @ 0.5um
2.5um range @ 1um



1um

CE	0	-2.5	2.5
UM	-1.7	-4.2	0.8
UL	-1.4	-3.9	1.1
LM	-0.3	-2.8	2.2
LL	-1.3	-3.8	1.2
LM	-1	-3.5	1.5
LR	-1.1	-3.6	1.4
RM	-0.4	-2.9	2.1
UR	-1.1	-3.6	1.4

Special lens qual reticle shot 21X21 with 14X14 Pitch

CE=0.25

UL=-0.25

LL=-0.25

LR=-0.25

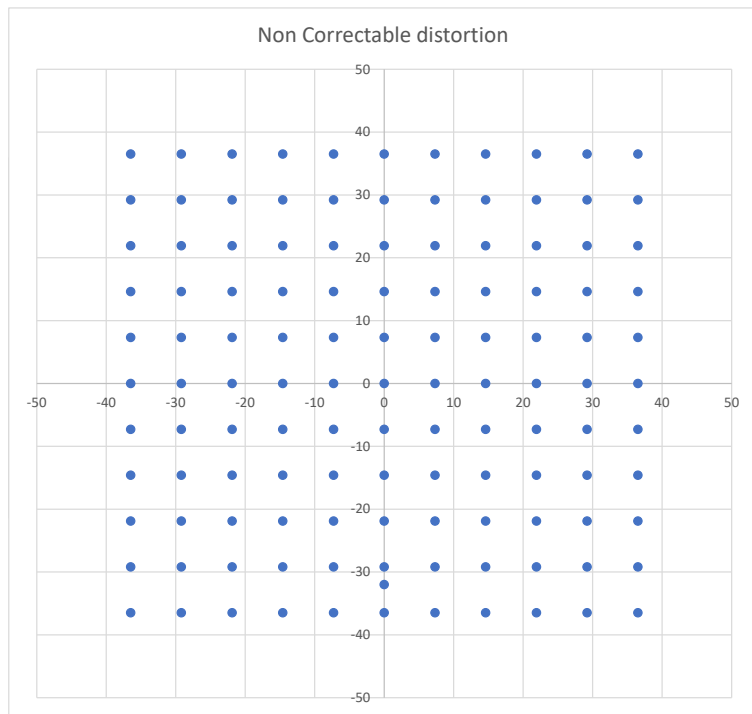
UR=-0.5

UL UR
CE 5 locations only on this mask
LL LR

3um Range at 1um features (smallest on this reticle)

Full Field at 15X15 230nm 230nm
 Reduced field at 12X12 126nm 126nm

Reticle mm		Wafer mm	
0	0	0	0
36.5	36.5	7.3	7.3
0	36.5	0	7.3
-36.5	36.5	-7.3	7.3
36.5	0	7.3	0
-36.5	0	-7.3	0
36.5	-36.5	7.3	-7.3
0	-36.5	0	-7.3
-36.5	-36.5	-7.3	-7.3
21.9	21.9	4.38	4.38
0	21.9	0	4.38
-21.9	21.9	-4.38	4.38
21.9	0	4.38	0
-21.9	0	-4.38	0
21.9	-21.9	4.38	-4.38
0	-21.9	0	-4.38
-21.9	-21.9	-4.38	-4.38
7.3	7.3	1.46	1.46
0	7.3	0	1.46
-7.3	7.3	-1.46	1.46
7.3	0	1.46	0
-7.3	0	-1.46	0
7.3	-7.3	1.46	-1.46
0	-7.3	0	-1.46
-7.3	-7.3	-1.46	-1.46
29.2	36.5	5.84	7.3
21.9	36.5	4.38	7.3
14.6	36.5	2.92	7.3
7.3	36.5	1.46	7.3
-7.3	36.5	-1.46	7.3
-14.6	36.5	-2.92	7.3
-21.9	36.5	-4.38	7.3
-29.2	36.5	-5.84	7.3
-36.5	29.2	-7.3	5.84
-29.2	29.2	-5.84	5.84
-21.9	29.2	-4.38	5.84
-14.6	29.2	-2.92	5.84
-7.3	29.2	-1.46	5.84
0	29.2	0	5.84
7.3	29.2	1.46	5.84
14.6	29.2	2.92	5.84
21.9	29.2	4.38	5.84
29.2	29.2	5.84	5.84
36.5	29.2	7.3	5.84
36.5	21.9	7.3	4.38
29.2	21.9	5.84	4.38
14.6	21.9	2.92	4.38
7.3	21.9	1.46	4.38
-7.3	21.9	-1.46	4.38
-14.6	21.9	-2.92	4.38
-21.9	21.9	-4.38	4.38
-29.2	21.9	-5.84	4.38
-36.5	21.9	-7.3	4.38
-36.5	14.6	-7.3	2.92
-29.2	14.6	-5.84	2.92
-21.9	14.6	-4.38	2.92
-7.3	14.6	-1.46	2.92
0	14.6	0	2.92
7.3	14.6	1.46	2.92
14.6	14.6	2.92	2.92
21.9	14.6	4.38	2.92
29.2	14.6	5.84	2.92
36.5	14.6	7.3	2.92
36.5	7.3	7.3	1.46
29.2	7.3	5.84	1.46
21.9	7.3	4.38	1.46
14.6	7.3	2.92	1.46
-14.6	7.3	-2.92	1.46
-21.9	7.3	-4.38	1.46
-29.2	7.3	-5.84	1.46
-36.5	7.3	-7.3	1.46
-29.2	0	-5.84	0



-14.6	0	-2.92	0
14.6	0	2.92	0
29.2	0	5.84	0
36.5	-7.3	7.3	-1.46
29.2	-7.3	5.84	-1.46
21.9	-7.3	4.38	-1.46
14.6	-7.3	2.92	-1.46
-14.6	-7.3	-2.92	-1.46
-21.9	-7.3	-4.38	-1.46
-29.2	-7.3	-5.84	-1.46
-36.5	-7.3	-7.3	-1.46
-36.5	-14.6	-7.3	-2.92
-29.2	-14.6	-5.84	-2.92
-21.9	-14.6	-4.38	-2.92
-14.6	-14.6	-2.92	-2.92
-7.3	-14.6	-1.46	-2.92
0	-14.6	0	-2.92
7.3	-14.6	1.46	-2.92
14.6	-14.6	2.92	-2.92
21.9	-14.6	4.38	-2.92
29.2	-14.6	5.84	-2.92
36.5	-14.6	7.3	-2.92
36.5	-21.9	7.3	-4.38
29.2	-21.9	5.84	-4.38
14.6	-21.9	2.92	-4.38
7.3	-21.9	1.46	-4.38
-7.3	-21.9	-1.46	-4.38
-14.6	-21.9	-2.92	-4.38
-29.2	-21.9	-5.84	-4.38
-36.5	-21.9	-7.3	-4.38
-36.5	-29.2	-7.3	-5.84
-29.2	-29.2	-5.84	-5.84
-21.9	-29.2	-4.38	-5.84
-14.6	-29.2	-2.92	-5.84
-7.3	-29.2	-1.46	-5.84
0	-29.2	0	-5.84
7.3	-29.2	1.46	-5.84
14.6	-29.2	2.92	-5.84
21.9	-29.2	4.38	-5.84
29.2	-29.2	5.84	-5.84
36.5	-29.2	7.3	-5.84
29.2	-36.5	5.84	-7.3
21.9	-36.5	4.38	-7.3
14.6	-36.5	2.92	-7.3
7.3	-36.5	1.46	-7.3
-7.3	-36.5	-1.46	-7.3
-14.6	-36.5	-2.92	-7.3
-21.9	-36.5	-4.38	-7.3
-29.2	-36.5	-5.84	-7.3
-14.6	14.6	-2.92	2.92
0	-32	0	-6.4

Step	Procedure	Actions	Completed?	Duration
4	500.000_Phase I	Phase I	X	26.33 hrs
5	500.010_Move_In and Positioning	Move_In and Positioning		7.83 hrs
6	MI_UnpExpUni.PAC	Unpack the Exposure unit from the container	X	3 hrs
7	MI_TraFraRem.LOC	Remove the transport frame	X	1 hr
8	MI_EleCab.LOC	Unpack the electronics cabinet	X	20 mins
9	MI_PrePosSys.INS	Prepare and position the system	X	30 mins
10	no procedure	Unpack and prepare submodules and parts.	X	1 hr
11	MI_RetCon.PAC	Pack and return the container	X	1 hr
12	MIshoTemHum.PER	Measure shock, temperature and humidity	X	1 hr
13	500.020_Cabling	Cabling		7.75 hrs
14	EIConElCab.INS	Connect the electronics cabinet	X	4 hrs
15	CsOcuSuntlf.INS	Connect the OCU MK2 and SUN system interface	X	15 mins
16	CTFLLWatChk.PER	Examine the quality of the filling water TCU	X	1 hr
17	CTTCUSk130.INS	Install the TCU SK 130	X	1 hr
18	CT_TCUtemCon.ADJ	Temperature control unit modules N8 adjustment	Neslab Chiller	1 hr
19	CtConAirPum.INS	Connect the air shower air pump	X	30 mins
20	500.030_Connecting supplies and remaining cabling	Connecting supplies and remaining cabling		5.5 hrs
21	MI_GraSto.LOC	Unlock the granite block	X	15 mins
22	MI_RemAirBuf.INS	Install the air buffer to the stone	X	15 mins
23	MI_PneSup.PER	Check the pneumatic supplies from the customer	X	30 mins
24	MI_PneCon.INS	Connect the pneumatic supplies	X	30 mins
25	MIPneumCheck.PER	Examine the pneumatic supplies in the system	X	30 mins
26	EIConMns.INS	Connect the electrical supplies	X	30 mins
27	MI_CooHos.INS	Connect the cooling hoses	X	1 hr
28	MI_Cyb.INS1	Mount and connect the cybeq units and GCU	X	1 hr
29	ExGcu.ADJ	Adjust Gas Control Unit	X	1 hr
30	500.040_Unlock	Unlock		5.25 hrs
31	IIUnlHouP50.LOC	Unlock the SA5200 and PAS5000 illumination house	X	30 mins
32	Note for next step	use the correct steps versus machine type to unlock xyz manipulator	X	0 hrs
33	IIUnlXyzManP50.LOC	Unlock the PAS5000 xyz manipulator	X	15 mins
34	IIUnlXyzManP50Spr.LOC	Unlock the 1000Watt PAS5000 xyz manipulator	X	15 mins
35	MI_RetManUnl.LOC	Unlock the reticle management system	X	10 mins
36	MI_MERUnl.LOC	Unlock machine electronics rack	X	10 mins
37	MI_EchXys.LOC	Unlock the E-chuck and xy stage	X	20 mins
38	MI_DipUnl.LOC	Unlock the dipod	X	10 mins
39	MI_StaUnl.LOC	Unlock the stamp unit	X	10 mins
40	MI_FraHei.ADJ	Adjust the height of the machine frame	X	45 mins
41	MI_LevGraSto1.ADJ	Level the granite block	X	1.5 hrs
42	no procedure available for this step	mount the skirts to the system; mount the black plastic skirt clamps and the skirts to the bottom of the system	X	30 mins
43	MI_XyCov.INS	Mount the xy stage covers	X	30 mins
44	510.000_Phase II	Phase II		29.33 hrs
45	510.010_Cleaning and Startup	Cleaning and Startup	X	6.83 hrs
46	MISystemON.PER	Startup system	X	30 mins
47	Startup/shutdown/full startup	Full startup	X	1 hr
48	MI_StaUpAs.PER	start up and check performance of the airshower	X	10 mins
49	no procedure	Clean doors, panels of the whole system	X	2 hrs
50	MI_RefTemPrs.INS	Barometric calibration	X	10 mins
51	WhCybDun.CLE	Clean cybeq	X	30 mins
52	WhPch.CLE	Clean pre-alignment chuck	X	30 mins
53	WhStamp.CLE	Clean stamp	X	30 mins
54	WhWafTab.CLE	Clean wafertable	X	1 hr
55	WhDipod.CLE	Clean dipod	X	30 mins
56	510.020_Testing submodules	Testing submodules		22.5 hrs

57	XySettTime.ADJ	Average settling time in X and Y	X	15 mins
58	XyRotation.PER	Static stage rotation	X	15 mins
59	No procedure available	run SM/Waferhandling test/F2x25 (check mechanical wafertransport from feed cassette to discharge cassette)	X	30 mins
60	WhStampTilt.ADJ	Stamptilt	X	30 mins
61	RhExcPosMc.ADJ	only in case of reticle handling problems	na	0 mins
62	AlFidRepro.PER	Check fiducial repro N0.0	X	15 mins
63	RhRms.PER	Perform RMS measurements (loading 180 reticles)	X	2 hrs
64	Note for next step	use the correct steps versus machine type to install the HG lamp.	X	0 hrs
65	lIHg_Lam50.REP	Install and adjust HG lamp in PAS5000 system	X	30 mins
66	lIHg_Lam50.REP2	Install and adjust HG lamp in 1000W PAS5000 system	X	30 mins
67	lIGraFil.ADJ	Install Gradient filter (If applicable)	na	15 mins
68	lIHouTilP50.ADJ	Adjust the tilt of the PAS 5000 illumination house	na	30 mins
69	lIRemRot.ADJ	Adjust rotation of the REMA unit	na	10 mins
70	lIHom.ADJ	Homogeneity	X	30 mins
71	lIEneCal.ADJ	Energy calibration	X	30 mins
72	FoTesLas.ADJ	Adjust Best focus in TESA and LASER mode	1 um delta from center to edges	1 hr
73	No procedure available	Run SM/Focusing test/PactRespTime (spec. = 65ms / sd.= 20msec)	X	10 mins
74	FoOffTesStr.ADJ	Offset stroke	X	10 mins
75	FoLin.PER	Determine focus linearity	X	30 mins
76	ExImageTilt.ADJ2	Lens tilt X / Y < 0.15 um (LTX and LTY)	X	4 hrs
77	No procedure available	exposure 25 wafers with zero layers	na	30 mins
78	WhShifts.ADJ	Check optical reproducibility and update shifts	X	45 mins
79	lIAccRem.PER	REMA exposure < 500 um	X	45 mins
80	AlRedBlu.ADJ	Red blue adjustment	X	1 hr
81	AlOvlAcc.PER	Stage overlay (1 wafer)	X	1.5 hrs
82	AlOvlAcc.PER	Global overlay day 1 (1 wafer)	X	1.5 hrs
83	No procedure	Prepare 25 wafers with PM for SAT.	NA	4 hrs
84	580.000_Site Acceptance Test	Site Acceptance Test		25.5 hrs
85	580.020_SAT - DAY 1	SAT - DAY 1		8.5 hrs
86	lIHom.ADJ	Uniformity		30 mins
87	FoTesLas.ADJ	Adjust Best focus in LASER mode		1 hr
88	WhStampTilt.ADJ	Stamptilt (stamptilt stability)		30 mins
89	ExLensDisto.PER	Check lens distorsion, sym trap., magn. and die rot.		2 hrs
90	AlOvlAcc.PER	Stage overlay (3 wafers)		1.5 hrs
91	AlOvlAcc.PER	Global overlay day 1 (3 wafers)		1.5 hrs
92	run job: fat/THRUPUTx (ID = 1)	Measure wafer throughput		30 mins
93	run job: fat/THRUPUTx (ID = 2)	Measure reticle exchange time		30 mins
94	Run job: fat/RELIABx	Reliability overnight (25 wafers)		30 mins
95	580.020_SAT - DAY 2	SAT - DAY 2		4 hrs
96	lIHom.ADJ	Uniformity		30 mins
97	FoTesLas.ADJ	Adjust Best focus in LASER mode		1 hr
98	WhStampTilt.ADJ	Stamptilt (stamptilt stability)		30 mins
99	AlOvlAcc.PER	Global overlay day 2 (3 wafers)		1.5 hrs
100	Run job: fat/RELIABx	Reliability overnight (25 wafers)		30 mins
101	580.030_SAT - DAY 3	SAT - DAY 3		4 hrs
102	lIHom.ADJ	Uniformity		30 mins
103	FoTesLas.ADJ	Adjust Best focus in LASER mode		1 hr
104	WhStampTilt.ADJ	Stamptilt (stamptilt stability)		30 mins
105	AlOvlAcc.PER	Global overlay day 3 (3 wafers)		1.5 hrs
106	Run job: fat/RELIABx	Reliability overnight (25 wafers)		30 mins
107	580.040_SAT - DAY 4	SAT - DAY 4		9 hrs
108	in ATP document	Contamination test (25 wafers)		2 hrs
109	Lensqual manual (see intranet)	Lensqual		5 hrs
110	WhPchVarMic.ADJ2	Adjust the P-chuck for customer reference wafers		1 hr
111	No proceure available	Backup specific machine constants on floppy diskette		10 mins
112	No proceure available	Backup the file system		30 mins

113	CsSunTim.ADJ	Adjust the SUN Time Zone		10 mins
114	CsSunDat.ADJ	Adjust the SUN Date and Time		10 mins
115	590.000 Transfer	Transfer		8 hrs
116	Note	System is ready and can be transferred to customer		8 hrs
117	599.999_END OF INSTALLATION			0 hrs
118	599.999_END OF INSTALLATION			

System 7472

5000/50

		P/M	P/M	P/M				
	Spec		20-Jul-18	#####				
Sensor Stability (%)	0.80%	0.13%		0.15%				
Homogeneity (%)	2.50%	1.84%	2.10%	2.05%				
Mean Intensity		620.4	584.4	598.3				
Lamp Lit Hours		75.2	150.4	158.4				
Stage								
Average Settling Time X (ms)	70	55	43.0	45				
Average Step Time X (ms)	247	229.9	218.0	220				
Average Settling Time Y (ms)	120	83.9	90.2	88.8				
Average Step Time Y (ms)	357	316	322.0	321.2				
Focus								
Actuator Response Time (ms)	65	59.9	61.5	60				
Sigma (ms)	20	5.3	5.9	9.3				
Actuator Stroke (μm) <0.4	-26	-26.6	-26.5	-26.7				
	26	27.1	27	26.8				
Offset Stroke (μm) <2.5	-35	-39.9	-39.9	-39.9				
	35	39.2	39.2	39.2				
F1 Height	-	11.3	23.5	16.2				
F2 Height	-	7.5	19.8	12.5				
F3 Height	-	19.3	??	23.6				
MC Focus Actuator	10	-11.5	5.5	5.5				
MC Focus Generator	5	-9.5	4.4	-0.6				
Wafer Handling								
P-Pin Speed - up (ms)	~200	236						
P-Pin Speed - down (ms)	500-600	533						
E-Pin Speed - up (ms)	300	302						
E-Pin Speed - down (ms)	200	225						
Dipod Load	1030	1028						
Dipod Discharge	1580	1302						
Dipod Park	350	419						
Wafer Tilt X	0.15	-0.04	0.14					
Wafer Tilt Y	0.15	0.11	0					
Global Height	-	0.1	0.3					
F3 Height	-	??	27					
Stamp Air Cushion	12-16	12.6	12					
Alignment								
Fid Repro M1X	<27nm	3	11					
Fid Repro M1Y	<27nm	7	7					
Fid Repro M2X	<27nm	10	12					
Fid Repro M2Y	<27nm	15	9					
Reference Voltage	9.00	9.00	9.00					
Reticle Handling								
Gripper Up	1700-1800	780	1720					
Gripper Down	1250-1350	480	1300					
Gripper Open	350-450	320	398					
Gripper Close	250-350	240	243					
Pre-Align Quadcells	115-215	Adjusted	150/165					
M1F1x stdv	<1.3		1.2					
M1F1y stdv	<1.3		0.8					
M2F1x stdv	<1.3		1.2					
M2F1y stdv	<1.3		1					
Theta Angle stdv			23.1					
Red/Blues								
Translation X	0.05 μm	-0.002	0.01	-0.007				

Translatioin Y	0.05 μm	0.008	3.98	0.006				
Mag	0.05 $\mu\text{m}/\text{cm}^2$	-0.014	0.01	-0.016				
Rotation	5 μrad	0.719	-361.14	0.784				
Trapezoid X	0.05 $\mu\text{m}/\text{cm}^2$	0.002	0.016	0.027				
Trapezoid Y	0.05 $\mu\text{m}/\text{cm}^2$	0.017	0.029	0.001				
Optrep								
Xm1w1	<7 μm		2.4	4.2				
Ym1w1	<7 μm		8.7	6				
Ym1w2	<7 μm		5.8	5.4				
Rotation	<0.2		0.122	0.1731				
Backup Floppy	Y	Y	Y	Y				