

Major Area	Sub-Area/Capability	Fraunhofer IPMS (200mm CR)	Wafer Size	Fraunhofer IPMS (300mm CR)	Wafer Size	CNF	Wafer Size	Additional Comments	
Lithography	248 nm Lithography ≥ 180 nm L/S resolution, OL ≤ 60nm	Installation planned for 2020	200/300mm			ASML PAS 5500/300C (NA <sub>imm</sub> 0.63) + Suss MicroTec Gamma 180 nm L/S resolution OL < 45 nm	100mm-200mm	Backside alignment	
	248 nm Lithography ≥ 220 nm hole resolution OL ≤ 60nm	Installation planned for 2020	200/300mm			ASML PAS 5500/300C (NA <sub>imm</sub> 0.63) + Suss MicroTec Gamma 220 nm hole resolution OL < 45 nm	100mm-200mm	Backside alignment	
	I-line Lithography ≥ 350 nm L/S resolution OL ≤ 100nm	NSR-220Si 14E2   Nikon & SK-80EX   Screen	200mm			GCA Autostep 200 (NA 0.45) + Suss MicroTec Gamma 450 nm L/S resolution OL < 120 nm	pieces-200mm	pieces-200mm	
	I-line Lithography ≥ 400 nm hole resolution OL ≤ 100nm	NSR-220Si 14E2   Nikon & SK-80EX   Screen	200mm			GCA Autostep 200 (NA 0.45) + Suss MicroTec Gamma 500 nm hole resolution OL < 120 nm	pieces-200mm	pieces-200mm	
	Electron beam lithography-positive resist > 18nm L/S resolution OL < 20 nm					JEOL JBX 9500FS or JBX 6300FS	piece-> 300mm	6300 is pieces-150mm, 9500 is pieces-300mm	
	Electron beam lithography-neg HSQ resist > 10nm L/S resolution OL < 20 nm					JEOL JBX 9500FS or JBX 6300FS	piece-> 300mm	6300 is pieces-150mm, 9500 is pieces-300mm	
	1X /4x Mask Making			Vistec SB3050 - exposure, ebeam					
	Proximity Print ≥ 1u	MA 200 GEN 3   SUSS		200mm			Heidelberg DWL 66; Heidelberg DWL 2000	3" - 9"	Maskmaking to <1um resolution, direct-write possible w/alignment
	Proximity Print ≥ 1u						Suss Microtech MA6 + Brewer Spin/Bake/Suss Gamma	pieces-150mm	Backside alignment
	Proximity Print ≥ 1u						Suss Microtech MJ84 + Brewer Spin/Bake/Suss Gamma	pieces-100mm	Infrared alignment
	Proximity Print ≥ 1u						ABM + Brewer Spin/Bake/Suss Gamma	pieces-200mm	DUV exposure, IR alignment
							TEL Track ACT12 - Resist - coat / bake	300	
							CEE Resist - lab bake	100/150/200/300	
							CEE Resist - lab coat	100/150/200/300	Hamatech HMx-900
							CEE Resist - lab developer	100/150/200/300	CEE 1300X Hotplate
Spin On Dielectric & Other Material Coating	EV101   EVG & Gamma 80 Spin / Gamma 80 Alta Spray + Developer   SUSS	200mm				Brewer Science General Purpose Spinner	100mm-300mm	Manual spinner	
Dry Plasma Etch & Strip	Front End Resist Ash, (1) CH - O2/CF4			AMAT CENTURA Advantedge G5	300mm, <300 with pocket wf	Anatech Asher(O2/N2)	100mm-200mm		
	Dielectric Etch: Oxide, Nitride, BARC	Omega fxp, MORI   SPTS	200mm	AMAT CENTURA Enabler	300mm, <300 with pocket wf	Oxford Plasmalab 100	100mm		
	Etch - FEOL - high-k, Resist strip AMAT			AMAT CENTURA Advantedge G5, Hot Chuck	300mm, <300 with pocket wf	Plasmatherm 770(Chlorine)	100mm		
	Etch - dielectrics - BEOL AMAT			AMAT CENTURA Enabler	300mm, <300 with pocket wf	Oxford 100	100mm		
	Silicon Etch: silicon, aSi, polySi			AMAT CENTURA Advantedge G5 / G3	300mm, <300 with pocket wf	Oxford Cobra(HBr, Cl2)	100mm		
	Silicon Etch: silicon, aSi, polySi			AMAT CENTURA Advantedge G5 / G3	300mm, <300 with pocket wf	Unaxis (PT)770(SF6+C4F8)	150mm		
	Silicon Etch: silicon, aSi, polySi			AMAT CENTURA Advantedge G5 / G3	300mm, <300 with pocket wf	VOID	VOID		
	Dielectric Etch: SiO2, SiN, BARC			AMAT CENTURA Enabler	300mm, <300 with pocket wf	Oxford Plasmalab 80	200mm		
	Poly Etch: PolySi, aSi, Si	Omega fxp, MORI   SPTS	200mm	AMAT CENTURA Advantedge G5 / G3	300mm, <300 with pocket wf	Oxford Cobra(HBr, Cl2)	100mm		
	Poly Etch: PolySi, aSi, Si			AMAT CENTURA Advantedge G5 / G3	300mm, <300 with pocket wf	VOID	VOID		
	Dielectric Etch: Oxide, Nitride, BARC			AMAT CENTURA Enabler	300mm, <300 with pocket wf	Plasmatherm 72	200mm		
	Deep Silicon Etch	Omega fxp, Rapier + DSI   SPTS	200mm	AMAT CENTURA Mariana	300mm, <300 with pocket wf	Plasmatherm Versaline; Unaxis/PlasmaTherm PT770 (Bosch)	100mm		
	Metal Gate Etch: DPs II			AMAT CENTURA Axiom	300mm, <300 with pocket wf	Plasmatherm 770(Chlorine)	100mm		
	Tungsten (W) Etch: Clamped			AMAT CENTURA Advantedge G5 / G3	300mm, <300 with pocket wf	Oxford Cobra(SF6)	100mm		
	Metal Plasma Etch: AlCu/Ti/TiN/TiW etc.	Alliance 9600 PTX   LAM	200mm	AMAT CENTURA Advantedge G5 / G3	300mm, <300 with pocket wf	Plasmatherm 770(Chlorine), Oxford Cobra (SF6)	100mm		
	Deep Silicon Etch			AMAT CENTURA Mariana	300mm, <300 with pocket wf	Plasmatherm Versaline	100mm		
	Barrel Asher	Plasma System 300   PVA Tepla	150/200mm	N/A	300mm, <300 with pocket wf	Anatech Asher	200mm		
	Backend Resist Ash (2 chambers)			AMAT CENTURA Axiom	300mm, <300 with pocket wf	YES asher (O2, N2, Ar)	200mm		
	DRM Oxide Etch: Oxide Etch			AMAT CENTURA Enabler	300mm, <300 with pocket wf	Oxford Plasmalab 100	100mm		
	DRM Oxide Etch: Low-K Etch			AMAT CENTURA Enabler	300mm, <300 with pocket wf	Oxford Plasmalab 100	100mm		
	Poly, Si Trench and Metals			AMAT CENTURA Advantedge G5 / G3	300mm, <300 with pocket wf	Oxford Cobra(HBr, Cl2)	100mm		
	Etch Oxide, and nitride etch for trench and contacts (Front end)			AMAT CENTURA Enabler	300mm, <300 with pocket wf	Oxford Plasmalab 100	100mm		
	Front and back end asher w O2/CF4/NH3	Neo 2000   Trymax	150/200mm	AMAT CENTURA Axiom	300mm, <300 with pocket wf	YES asher (O2, N2, Ar)	200mm		
	Oxide Trench and Via etch and ASH, >100nm DR			AMAT CENTURA Enabler	300mm, <300 with pocket wf	Oxford 100	100mm		
	Low K Trench and Via etch and ASH, >100nm DR			AMAT CENTURA Enabler	300mm, <300 with pocket wf	Oxford 100	100mm		
			AMAT CENTURA Enabler	300mm, <300 with pocket wf	Oxford 100	100mm			
Diffusion, Chemical Vapor Deposition & Rapid Thermal Processing	Atmospheric Undoped SiO2 Steam/Dry/Anneal					MRL Furnaces	150mm		
	Atmospheric Undoped oxide: Steam or Dry Ox & Anneal					MRL Furnaces	150mm		
	Low Pressure Chem. Vapor Deposition - Amorphous Si & POLY Si	E1550 HAT 320-4   Centrotherm (Poly only)	150/200mm			MRL Furnaces	150mm		
	Low Pressure Chem. Vapor Deposition - TEOS	E1550 HAT 320-4   Centrotherm	150/200mm			MRL Furnaces	150mm		
	Low Pressure Chem. Vapor Deposition - Silicon Nitride	E1550 HAT 320-4   Centrotherm	150/200mm			MRL Furnaces	150mm		
	Atmospheric Rapid Thermal Anneal (N2/O2)	Heatpuls 8800   OEM group	200mm			AG8108	150mm		
	Atmospheric Rapid Thermal Processing (Spike Anneal)	see above				AG610	150mm		
	POCL3 Dopant Furnace	LDS 200-2   Inotherm	150/200mm			MRL Furnaces	150mm		
	Metal Anneal and Low K Cure. 4% max H2 in N2. Atmospheric or Vacuum	LDS 200-2   Inotherm	150/200mm			MRL Furnaces	150mm		
	Atm Strm/Dry/Anneal Undoped - Atmo/Low Pressure					MRL Furnaces	150mm		
	LPCVD Amor. Si and Poly Si (530c and 600C)					MRL Furnaces	150mm		
	Soak RTP			RTP bis 75mm - SSI Solaris75	pieces up to sq75mm				
	Cu Anneal - 250c - 450c			TEL Formula, BEOL	300	MRL Furnaces(anneal 1)	150mm		
	Spike Anneal	see above		Mattson Helios XP	300				
	Soak RTA/RTD			Mattson Helios XP	300				
Low K anneal - 535c - 620c					MRL Furnaces(anneal 1)	150mm			
Wet Etch/Clean	SPM, SC1, SC2, Dilute HF for oxide etch, KOH					Reynolds Tech bench	150mm		
	batch clean	Wafer Cleaning (SC1, SC2, DHF, RCA): GigaStep   AP&S	150/200mm	DNS FC3000 (SC1, SC2, PIR, HF, Dry Magangoni, (H3PO4 offline), Supersonic clean	300				
	Single wafer clean	SS-80BW-AVR   Screen (Nanospray, Brush, Bevel Brush)	200mm	Amat/Semitoil Raider, BEOL	300				
	Vapor HF Oxide Etch	MEMS-CET system   SPTS (HF gas phase etch) & X-SYS-3B-6   SPTS (Xef2)	150/200mm			Primaxx wetch	200mm		
	Hot H3PO4 for SiN etch, Hot KOH	Silicon oxide, Silicon nitride, Al (no KOH)   AP&S	150/200mm			Reynolds Tech bench	150mm		

Major Area	Sub-Area/Capability	Fraunhofer IPMS (200mm CR)	Wafer Size	Fraunhofer IPMS (300mm CR)	Wafer Size	CNF	Wafer Size	Additional Comments	
Thin Films	ALD HfO2, HfSiO2, HfZrOx, ZrO2, ZrSiO2			ASM Pulsar (HfO2, SiO2, Al2O3, ZrO2)	pieces(pocket),200(pocket)/300	Oxford FlexAl (HfO2, HfSiO2, HfAlOx)	200mm		
	ALD HfN, HfON, HfSiN, HfSiON, ZrN, ZrSiN, ZrON, ZrSiON					Oxford FlexAl (HfN, HfSiON)	200mm		
	ALD Al2O3, SiO2, Ta2O5, H2O-(Al2O3, HfO2, HfSiO2, or Ta2O5)	P-300   Picosun (Al2O3, SiO2, HfO, H2O, O3)	150/200mm	Jusung Eureka 3000 (HfO2, SiO2, Al2O3, ZrO2, TiO2)	pieces(pocket),200(pocket)/300	Oxford FlexAl (Al2O3, SiO2, Ta2O5, HfSiO2)	200mm		
	ALD Thermal/Plasma anneal (H2, NH3, O2, N2O)					Oxford FlexAl (O2, N2, Ar, NH3)	200mm		
	ALD TiN, TaCN, SiN			ASM A412 (TiN/TaCN)		Oxford FlexAl (SiN, TaN)	200mm		
	PVD Metal Gate & Bias Sput'd Diel.: (Ti, Ta, W, etc.)	CS400   Ardenne (SiO2, HfO2, Ta, Ta2O5)	200mm			AJA Sputter;CVC Sputter	150mm		
	CVD/pCVD aSi, polySi, SiGe (doped and undoped)			ASM A412 - ALD/pCVD	200/300				
	PVD React. Sput'd Metal & Diel.: (TiN, TaN, TiOx, etc)	CS400S   Ardenne (non reactive: Al2O3, AlSiCu, AlSiTi, Col Ti & TiN, TiAl)	200mm			AJA Sputter;CVC Sputter	150mm		
	PVD Metal Dep: Al, Col Ti & TiN, Uncolimated Ti, Co, Ni	Sigma 204   SPTS (Al, AlSiCu, Col Ti & TiN)	200mm			CVC Sputter (Uncolimated Ti, Co)	150mm		
	PVD: Barrier/seed (Ta, Cu, CVD TiN, TiSiN)					AJA Sputter(Ta, Cu, Reactive TiN); CVC Sputter(Ta,Cu, Reactive TiN)	150mm		
	PECVD: SiLOX, SiN, SiON, SiCN, SiCO, CORAL					Oxford PECVD (SiO2, Si3N4, SiC, TEOS, SiON)	200mm		
	PECVD: SiLOX, SiN, SiON, TEOS					GSI PECVD (SiO2, Si3N4, TEOS, SiON)	150mm		
	PECVD: PSG, BSG, BPSG	Centura   Applied Materials (USG, PSG, BPSG, Silicon nitride, a-Si:B, HDP oxide, SiGe)	200mm			Oxford PECVD (PSG, BSG, BPSG)	200mm		
	PECVD: PSG, BSG, BPSG	Centura   Applied Materials (USG, PSG, BPSG, Silicon nitride, a-Si:B)	200mm			GSI PECVD (PSG, BSG, BPSG)	150mm		
	ECD: Cu electrodeposition					Reynolds Tech Electroplate Station	150mm		
	PECVD - Undoped TEOS CVD & Silane CVD SIN	see above				Oxford PECVD (SiO2, Si3N4, SiC, TEOS, SiON)	200mm		
	PECVD - Undoped TEOS CVD & Silane CVD SIN	see above				GSI PECVD (SiO2, Si3N4, TEOS, SiON)	150mm		
	PECVD ILD SiLOX, SiN, SiON, SiCN, SiCO, AND CORAL					Oxford PECVD (SiO2, Si3N4, TEOS, SiON)	200mm		
	ALD Al2O3, TiN, Li-based thin films			ALD Oxford FlexAL	pieces. 150. 200	Arradiance (TiN-pending)	150mm		
	PECVD ILD SiLOX, SiN, SiON, SiCN, SiCO, AND CORAL					GSI PECVD (SiO2, Si3N4, TEOS, SiON) CMOS metals only	150mm		
	Copper Plate			MBE Omicron - metal dep	pieces				
	Copper Plate			Lam/Novellus Sabre - Cu (Plating)	300				
	CVD			AMAT/Semitool Raider - Cu (Plating) CF03LM	300	Reynolds Tech Electroplate Station	150mm		
	ALD TaN			AMAT Co-CVD VOLTA-chamber	200(pocket)/300				
	CVD Co			AMAT Endura2	200(pocket)/300	Oxford FlexAl	200mm		
	BeOL/Cus Anneal			AMAT Endura2	200(pocket)/300				
	PVD Cu/Ta/TaN			TEL Formula					
	PVD Cu/Ta/TaN			AMAT Endura2: RfX-PVD; EnCoReil -PVD	200(pocket)/300	CVC Sputter;AJA Sputter; CVC Evaporator	150mm		
	Chemical Mechanical Polish (CMP)	CMP: STI oxide, ILD oxide, SiN, W, Cu, Ta/TaN, Si, polyimide					Logitech Orbis	200mm	
		CMP: STI oxide, ILD oxide, SiN, W, Cu, Ta/TaN					Logitech Orbis	200mm	
CMP: SiO2, SiN				AMAT Reflexion LK polisher with Desica cleaner, FEOL/BEOL, STI polish	300				
CMP: SiO2, low-k, SiN		CMP (Silicon oxide, a-Si): DESICA   Applied Materials (Silicon oxide, a-Si)	200mm	AMAT Reflexion LK polisher with Desica cleaner, FEOL/BEOL, Oxid polish	300				
CMP: Ta, TaN, Co				AMAT Reflexion LK polisher with Desica cleaner, BEOL, Barrier polish	300				
CMP: Cu				AMAT Reflexion LK polisher with Desica cleaner, BEOL, Cu polish	300				
Metrology	CMP: Cu/Ta/TaN, SiO2					Logitech Orbis	200mm		
	Ellipsometer Dielectric Thickness, N & K Values	V-VASE (190 - 1700 nm)   Woollam	150/200mm	KLA fx100 - Ellipsometer SE/BOW -	200/300	JA Woollam WVASE	200mm		
	Prism Coupler Index Measurement					Metricon 2010M	200mm		
	Prism Coupler Waveguide Loss Measurement					Metricon 2010M	200mm		
	Dark Field Wafer Defect Inspection	Surfscan 6220   KLA Tencor	150/200mm	KLASP2 - particle inspection	300	Olympus MX50-BF, DF, Polarized, Nomarski	200mm		
	Patterned Wafer Defect Inspection	Compass Pro   Applied Materials	150/200mm	Nextin AEGIS-4, FEOL/BEOL	200/300	Olympus MX50-BF, DF, Polarized, Nomarski	200mm		
	Four Point Probe contact Resistivity	CDE ResMap 168   Creative Design Engineering	150/200mm	Napson Euris - Resistivity; FEOL	200/300	CDE 4-pt. probe	200mm		
	Four Point Probe contact Resistivity			KLAR5100 - Resistivity -, BEOL	200/300	CDE 4-pt. probe	200mm		
	DC IV/CV Parametric Test Probe Station					Karl Suss PSM6, Keithley Instruments SMUs	150mm		
	Defview Review & UV Inspet. scope. (x250)	INS3000   Leica	150/200mm			Olympus MX50-BF, DF, Polarized, Nomarski	200mm		
	Defect Review	INS3000   Leica	150/200mm	AMAT SEMVision G3E / FIB, FEOL/BEOL	200/300				
	Film Stress & Wafer Bow	FSM 500TC-R   FSMG	150/200mm			Flexus	200mm		
	Film Thickness Measurement- Reflectometry	Nanospec 8000 / 9100   Nanometrics & Lambda Ace RE-3300   Screen	200mm			Leitz film measurement system;Filmetrics F40/F50 EXR	200mm		
	Texture Measurement - Laser based					Zygo New View Interferometer	200mm		
	AFM	Nanoscope D3100   Veeco	150/200mm	Veeco Dimension 3D - AFM	300				
	Profiler/Atomic Force Micro. - Tapping Mode with Silicon Tip	P16+   KLA Tencor	150/200mm	KLAHRP340 - Profiler	200/300	Veeco Icon	200mm		
	SEM Top-Down CD, Etch Depth & Profile Angle w Tilt	Verity light   Applied Materials	150/200mm	AMAT SemVision - CD/OVL -	200/300	Zeiss Supra FE-SEM	150mm		
	Optical Microscope	Optiphot 200   Nikon	150/200mm	Leica INS3000 - optical inspection	200/300				
	XRR/HRXRD			Bede XRD/XRR	200/300				
	XPS			Thermo Fisher Theta300 - (AR)XPS - BEOL	300				
	XPS			Revera VeraFlex - XPS	200/300				
	XRR/XRD	D5000   Siemens	pieces	Bruker D8 - X-ray; XRD/XRR	pieces/200				
	TXRF			Picofox S2 - TXRF	pieces				
	Raman			Varian 640-IR FTIR	pieces				
	FIB			Renishaw - Raman	pieces				
	Dual-beam FIB	Helios NanoLab 660   FEI	150/200mm	FEI Strata 400 - FIB	pieces				
	TEM			FEI Tecnai F20 - TEM	pieces				
	ToFSIMS			Hitachi S5000 - SEM	pieces				
				IonToF-ToFSIMS5	pieces				
	SEM Top-Down CD, Etch Depth & Profile Angle w Tilt	see above				Zeiss Ultra FE-SEM	150mm		
In-line DC/Small Signal AC test					Keithley IV-CV measurement system	150mm			
Test				vollauto-Prober TEL Precio	200/300				
				Device - NVM - halbautom. Prober Süss	pieces				
				vollauto-Prober TEL Precio inline (CR)	200/300				
				Device - NVM - fullyauto dual Prober Cascade / FormFaktor	200/300				