CONTENTS

[02-03] Sapphire substrate

[04] Glass substrate

[05] Silicon substrate

[06] Silicon Carbide (SiC)

[07] Gallium Arsenide (GaAs)

[08] Gallium Nitride (GaN)

SPECIFICATION

HELIOS NEW MATERIALS LIMITED
www.helios-waferprocess.com
Email: edytian@helioswafer.com

SPECIFICATION | Sapphire Substrate

Item	Standard Sapphire Substrate				
Material	>99.99%，High Purity，Mono-crystalline Al2O3 (KY)				
Orientation	C-Plane (0001) / A-Plane (11-20) / R-Plane (1-102) / M-Plane (10-10)				
Diameter	2 inch (50.8mm)	3 inch (76.2mm)	4 inch (100mm)	6 inch (150mm)	8 inch (200mm)
Thickness (standard)	430 ± 25um	500 ± 25um	650 ± 25um	1000 ± 25um	1000 ± 25um
Thickness (optional) *	200um, 400um, 1000um	430um, 520um, 800um	225um, 430um, 1000um	500um,1300um	700um,1600um
* Thickness could be customized as per requirement					
Primary flat	A-plane 16 mm	A-plane 22 mm	A-plane 30 mm	A-plane 47.5 mm	Notch
Polishing	Single sided polished (SSP) / Double sided polished (DSP)				
Roughness Front side	Epi-ready, Ra <0.3nm				
Roughness Back side	Fine ground, Ra<1.2um (SSP) / Epi-ready, Ra <0.3nm (DSP)				
TTV	<10 um	<10 um	<10 um	<10 um	<20 um
BOW	<10 um	<10 um	<10 um	<15 um	<35 um
WARP	<10 um	<15 um	<15 um	<20 um	<60 um
Package	25pcs in a cassette, class 100 Clean room cleaning and vacuum nitrogen packaging				

HELIOS NEW MATERIALS LIMITED
www.helios-waferprocess.com
Email: edytian@helioswafer.com

SPECIFICATION | Sapphire Substrate

Item	Misoriented (off-cut) Sapphire Substrate				
Material	>99.99%，High Purity，Mono-crystalline Al_2O_3 (KY)				
Orientation	C/A off-cut	C/M off-cut	A/C off-cut	A/M off-cut	R/M off-cut
Off-cut angle *	0.5,1,2,4,6,8,10 degree	0.5,1,2,4,6 degree	1,4,5 degree	7 degree	1,2,5,8 degree
* Off-cut angle could be customized as per requirement					
Diameter	2 inch (50.8mm)	4 inch (100mm)	6 inch (150mm)		
Thickness	430 ± 25um	650 ± 25um	1000 ± 25um		
Primary flat	16 mm	30 mm	47.5 mm		
Polishing	Single sided polished (SSP) / Double sided polished (DSP)				
Roughness Front Side	Epi-ready, Ra <0.3nm				
Roughness Back Side	Fine ground, Ra<1.2um (SSP) / Epi-ready, Ra <0.3nm (DSP)				
TTV	<10 um	<10 um	<10 um		
BOW	<15 um	<20 um	<25 um		
WARP	<15 um	<25 um	<35 um		
Package	25pcs in a cassette, class 100 Clean room cleaning and vacuum nitrogen packaging				

HELIOS NEW MATERIALS LIMITED
www.helios-waferprocess.com
Email: edytian@helioswafer.com

SPECIFICATION | Glass Substrate

Material	JGS1 Quartz glass	JGS2 Quartz glass	BOROFLOAT 33	

Diameter	2 inch (50.8mm)	4 inch (100mm)	6 inch (150mm)	8 inch (200mm)
Typical Thickness	500 ± 25um	500 ± 25um	1000 ± 25um	1000 ± 25um
Flat Length	16 mm	30 mm	47.5 mm	Notch
Roughness	Ra <0.5 nm			
Flatness	< 5 um			
Surface quality	Scratch/Dig 40/20			
* Size and thickness could be customized as per requirement				

HELIOS NEW MATERIALS LIMITED
www.helios-waferprocess.com
Email: edytian@helioswafer.com

SPECIFICATION | Silicn Wafer

Material	6N Monocrystalline silicon CZ / FZ				
Type (doping)	N type (Phosphorous, Antimony, Arsenic) / P type (Boron) / High Resistivity (undoped)				
Resistivity	0.001-0.005 ohm.cm	1-10 ohm.cm	>10 ohm.cm	>5K ohm.cm	>10K ohm.cm
Wafer Orientation	<100> <110> <111>				
Diameter	2 inch (50.8mm)	3 inch (76.2mm)	4 inch (100mm)	6 inch (150mm)	8 inch (200mm)
Typical Thickness	400 ± 25um	400 ± 25um	500 ± 25um	625 ± 25um	725 ± 25um
Polish	Single sided polished (SSP) / Double sided polished (DSP)				
Roughness Front side	Ra <0.5 nm				
Back side	Etched (SSP) / Ra <0.5nm (DSP)				
TTV	<5 um	<10 um	<10 um	<10 um	<10 um
BOW	<10 um	<10 um	<10 um	<15 um	<20 um
WARP	<10 um	<15 um	<15 um	<20 um	<25 um
Package	25pcs in a cassette				

ITEM	Thermal Oxidation Silicon wafer
Thickness of Oxidation	285nm, 20~2000 nm customized
Type	Single sided Oxidation / Double sided Oxidation
Polish	Single sided polished (SSP) / Double sided polished (DSP)

HELIOS NEW MATERIALS LIMITED
www.helios-waferprocess.com
Email: edytian@helioswafer.com

SPECIFICATION | Silicon Carbide (SiC) substrate

Material	4H Crystalline Silicon Carbide (SiC)		
Type	N type	Semi-insulating type	
Wafer Orientation	off axis 4.0˚ toward <1120>	on axis {0001}	
Resistivity	≤0.1 ohm.cm	≥1E7 ohm.cm	
Thickness	350 ± 25um	500 ± 25um	

Diameter	2 inch (50.8mm)	4 inch (100mm)	6 inch (150mm)
TTV	<15 um	<15 um	<15 um
Bow	<20 um	<30 um	<30 um
Warp	<25 um	<45 um	<45 um
Primary Flat Orientation	Parallel to <11-20> ±1°		
Secondary Flat	90.0˚ CW from Primary Flat ± 5.0˚, Si Face up		
Primary Flat Length	16 ± 2.0	32.5 ± 2.0	47.5 ± 2.0
Secondary Flat Length	8 ± 2.0	18 ± 2.0	None
Surface Roughness	Si face CMP Ra <0.5nm, C Face Ra <1 nm		
Grade	Dummy	Dummy / Prime	Dummy / Prime

HELIOS NEW MATERIALS LIMITED
www.helios-waferprocess.com
Email: edytian@helioswafer.com

SPECIFICATION | Gallium Arsenide (GaAs) substrate

Type	LED	LD	SI	
Dopant	N type Si doped	N type Si doped	undoped	
Orientation	<100> to <111>15°±1.0°	<100> to <111> or <110> off 2°±1.0°	<0001>±1.0°	
EPD (cm2)	<5000	<500	<5000	
Resistivity(Ω.cm)	0.8-9 E3	0.8-9 E3	>1 E7	
Carrier Concentration (cm-3)	0.4-4 E18	1.0-2.5 E18	N/A	
Mobility(cm2/v.s)	>1000	>1500	>4000	

Diameter	2 inch (50.8mm)	3 inch (76.2mm)	4 inch (100mm)	6 inch (150mm)
Thickness	350±25μm	350±25μm	350±25μm	675 ± 25um
Primary Flat	EJ<0-1-1>±1.0°			
Length	12mm	22mm	32mm	Notch
Secondary Flat	EJ<0-1 1>±1.0°			
Length	7mm	12mm	18mm	Nnoe
Surface polish	Front face:Epi-Polished; Back face:Etched			
TTV	≤10um	≤20um	≤20um	≤30um
BOW	≤15um	≤20um	≤25um	≤30um
Warp	≤15um	≤20um	≤25um	≤30um

HELIOS NEW MATERIALS LIMITED
www.helios-waferprocess.com
Email: edytian@helioswafer.com

SPECIFICATION | Gallium Nitride (GaN) substrate

Material	Monocrystalline Gallium Nitride (GaN)		
Conductivity types	N-type (Silicon doping)	UID	Semi-Insulating (Carbon doping)
Room temperature resistivity (300K)	≤0.05 ohm-cm	≤0.2 ohm-cm	> 1E8 ohm-cm
FWHM	(002) FWHM ＜80 arcsec, (102) FWHM ＜80 arcsec		
Orientation	Ga face (0001) C-M 0.5°±0.15°		

Diameter	2 inch (50.8mm)	4 inch (100mm)	
Thickness	400 ± 30um	450 ± 30um	
Major flat orientation	M-plane (10-10)		
Major flat length	16±1 mm	32±1 mm	
Minor flat	Ga face, 90°clockwise from the major orientation flat plane		
Minor flat length	8±1 mm	18±1 mm	
Polishing	Single sided polished (SSP) / Double sided polished (DSP)		
Roughness Ga face	≤ 0.3 nm		
Back-side surfac	Polished / Etched		
TTV	≤ 15 um	≤ 30 um	
BOW	≤ 15 um	≤ 30 um	
Grade	Dummy / Prime	Dummy / Prime	

HELIOS NEW MATERIALS LIMITED
www.helios-waferprocess.com
Email: edytian@helioswafer.com