

Tankeblue

Silicon Carbide Substrates

(Version:2022)

Product Specifications

4H N-Type
4H Semi-insulating

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天科合达 6 英寸 SiC 晶片产品标准
6 inch diameter Silicon Carbide (SiC) Substrate Specification

等级Grade		精选级（Z 级） ZeroMPD Production Grade(Z Grade)	工业级（P 级） Standard Production Grade(P Grade)	测试级（D 级） Dummy Grade (D Grade)
直径	Diameter	149.5 mm~150.0 mm		
厚度	Thickness	4H-N	350 μm±15 μm	350 μm±25 μm
		4H-SI	500 μm±15 μm	500 μm±25 μm
晶片方向	Wafer Orientation	Off axis : 4.0° toward <1120> ±0.5° for 4H-N, On axis : <0001>±0.5° for 4H-SI		
微管密度 ¹	Micropipe Density	4H-N	≤0.2 cm ⁻²	≤2 cm ⁻²
		4H-SI	≤1 cm ⁻²	≤5 cm ⁻²
电阻率 ¹	Resistivity	4H-N	0.015~0.024 Ω·cm	
		4H-SI	≥1E10 Ω·cm	
主定位边方向	Primary Flat Orientation	{10-10} ±5.0°		
主定位边长度	Primary Flat Length	4H-N	47.5 mm±2.0 mm	
		4H-SI	Notch	
边缘去除	Edge Exclusion	3 mm		
局部厚度变化/总厚度变化/弯曲度/翘曲度 LTV/TTV/Bow /Warp		≤2.5 μm/≤6 μm/≤25 μm/≤35 μm		≤5 μm/≤15 μm/≤40 μm/≤60 μm
表面粗糙度 ¹	Roughness	Polish	Ra≤1 nm	
		CMP	Ra≤0.2 nm	Ra≤0.5 nm
边缘裂纹 (强光灯观测) Edge Cracks By High Intensity Light		None		Cumulative length ≤ 20 mm, single length≤2 mm
六方空洞 (强光灯观测) ¹ Hex Plates By High Intensity Light		Cumulative area ≤0.05%		Cumulative area ≤0.1%
多型 (强光灯观测) ¹ Polytype Areas By High Intensity Light		None		Cumulative area≤3%
目测包裹物 (日光灯下观测) Visual Carbon Inclusions		Cumulative area ≤0.05%		Cumulative area ≤3%
划痕 (强光灯观测) ² Silicon Surface Scratches By High Intensity Light		None		Cumulative length≤1×wafer diameter
崩边 (强光灯观测) Edge Chips By High Intensity Light		None permitted ≥0.2mm width and depth		7 allowed, ≤1 mm each
穿透螺位错 ³ （TSD） Threading screw dislocation		≤500 cm ⁻²	N/A	
硅面污染物 (强光灯观测) Silicon Surface Contamination By High Intensity Light		None		
包装	Packaging	Multi-wafer Cassette Or Single Wafer Container		

Notes:

1 Defects limits apply to entire wafer surface except for the edge exclusion area.

2 The scratches should be checked on Si face only.

3 The dislocation data is only from KOH etched wafers.

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天科合达 4 英寸 SiC 晶片产品标准

4 inch diameter Silicon Carbide (SiC) Substrate Specification

等级Grade			精选级（Z 级） Zero MPD Production	工业级（P 级） Standard Production Grade(P Grade)	测试级（D 级） Dummy Grade (D Grade)
直径	Diameter		99.5 mm~100.0 mm		
厚度	Thickness	4H-N	350 μm±15 μm	350 μm±25 μm	
		4H-SI	500 μm±15 μm	500 μm±25 μm	
晶片方向	Wafer Orientation		Off axis : 4.0° toward <1 120> ±0.5° for 4H-N, On axis : <0001>±0.5° for 4H-SI		
微管密度 ¹ Density	Micropipe	4H-N	≤0.2 cm ⁻²	≤2 cm ⁻²	≤15 cm ⁻²
		4H-SI	≤ 1cm ⁻²	≤ 5 cm ⁻²	≤15 cm ⁻²
电阻率 ¹	Resistivity	4H-N	0.015~0.024 Ω·cm		0.015~0.028 Ω·cm
		4H-SI	≥1E10 Ω·cm		≥1E5 Ω·cm
主定位边方向	Primary Flat Orientation		{10-10} ±5.0°		
主定位边长度	Primary Flat Length		32.5 mm ± 2.0 mm		
次定位边长度	Secondary Flat Length		18.0 mm ± 2.0 mm		
次定位边方向	Secondary Flat Orientation		Silicon face up: 90° CW. from Prime flat ±5.0°		
边缘去除	Edge Exclusion		3 mm		
局部厚度变化/总厚度变化/弯曲度/翘曲度 LTV/TTV/Bow /Warp			≤2.5 μm/≤5 μm/≤15 μm/≤30 μm		≤10 μm/≤15 μm/≤25 μm/≤40 μm
表面粗糙度 ¹	Roughness	Polish	Ra≤1 nm		Ra≤0.5 nm
		CMP	Ra≤0.2 nm		
边缘裂纹 (强光灯观测)	Edge Cracks By High Intensity Light		None		Cumulative length ≤ 10 mm, single length≤2 mm
六方空洞 (强光灯测) ¹	Hex Plates By High Intensity Light		Cumulative area ≤0.05%		Cumulative area ≤0.1%
多型 (强光灯观测) ¹	Polytype Areas By High Intensity Light		None		Cumulative area≤3%
目测包裹物 (日光灯观测)	Visual Carbon Inclusions		Cumulative area ≤0.05%		Cumulative area ≤3%
硅面划痕 (强光灯观测) ²	Silicon Surface Scratches By High Intensity Light		None		Cumulative length≤1×wafer diameter
崩边 (强光灯观测)	Edge Chips High By Intensity Light		None permitted ≥0.2 mm width and depth		5 allowed, ≤1 mm each
硅面污染物 (强光灯观测)	Silicon Surface Contamination By High Intensity		None		
穿透螺位错 ³ （TSD） Threading screw dislocation			≤500 cm ⁻²	N/A	
包装	Packaging		Multi-wafer Cassette Or Single Wafer Container		

Notes:

1 Defects limits apply to entire wafer surface except for the edge exclusion area.

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天科合达 2 英寸 SiC 晶片产品标准
2 inch diameter Silicon Carbide (SiC) Substrate Specification

等级 Grade		工业级 Production Grade (P Grade)	研究级 Research Grade (R Grade)	试片级 Dummy Grade (D Grade)
直径	Diameter	50.8 mm±0.38 mm		
厚度	Thickness	330 μm±25 μm		
晶片方向	Wafer Orientation	On axis : <0001>±0.5° for 4H-N/4H-SI, Off axis : 4.0° toward □ <1120> ±0.5° for 4H-N/4H-SI		
微管密度	Micropipe Density	≤5 cm ⁻²	≤15 cm ⁻²	≤50 cm ⁻²
电阻率 *Resistivity	4H-N	0.015~0.028 Ω·cm		
	4H-SI	>1E5 Ω·cm		
主定位边方向	Primary Flat Orientation	{10-10} ±5.0°		
主定位边长度	Primary Flat Length	15.9 mm ±1.7 mm		
次定位边长度	Secondary Flat Length	8.0 mm ±1.7 mm		
次定位边方向	Secondary Flat Orientation	Silicon face up: 90° CW. from Prime flat ±5.0°		
边缘去除	Edge Exclusion	1 mm		
总厚度变化/弯曲度/翘曲度 TTV/Bow /Warp		≤15 μm /≤25 μm /≤25 μm		
表面粗糙度* Roughness		Polish Ra≤1 nm		
		CMP Ra≤0.5 nm		
边缘裂纹 (强光灯观测) Edge Cracks By High Intensity Light		None		1 allowed, ≤1 mm
六方空洞 (强光灯观测) * Hex Plates By High Intensity Light		Cumulative area≤1 %		Cumulative area≤3 %
多型 (强光灯观测) * Polytype Areas By High Intensity Light		None	Cumulative area≤2 %	Cumulative area≤5%
Si 面划痕 (强光灯观测) # Silicon Surface Scratches By High Intensity Light		3 scratches to 1×wafer diameter cumulative length	5 scratches to 1×wafer diameter cumulative length	8 scratches to 1×wafer diameter cumulative length
崩边 (强光灯观测) Edge Chips High By Intensity Light		None	3 allowed, ≤0.5 mm each	5 allowed, ≤1 mm each
硅面污染物 (强光灯观测) Silicon Surface Contamination By High Intensity		None		
包装 Packaging		Multi-wafer Cassette Or Single Wafer Container		

Notes:

※Defects limits apply to entire wafer surface except for the edge exclusion area.

The scratches should be checked on Si face only.

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