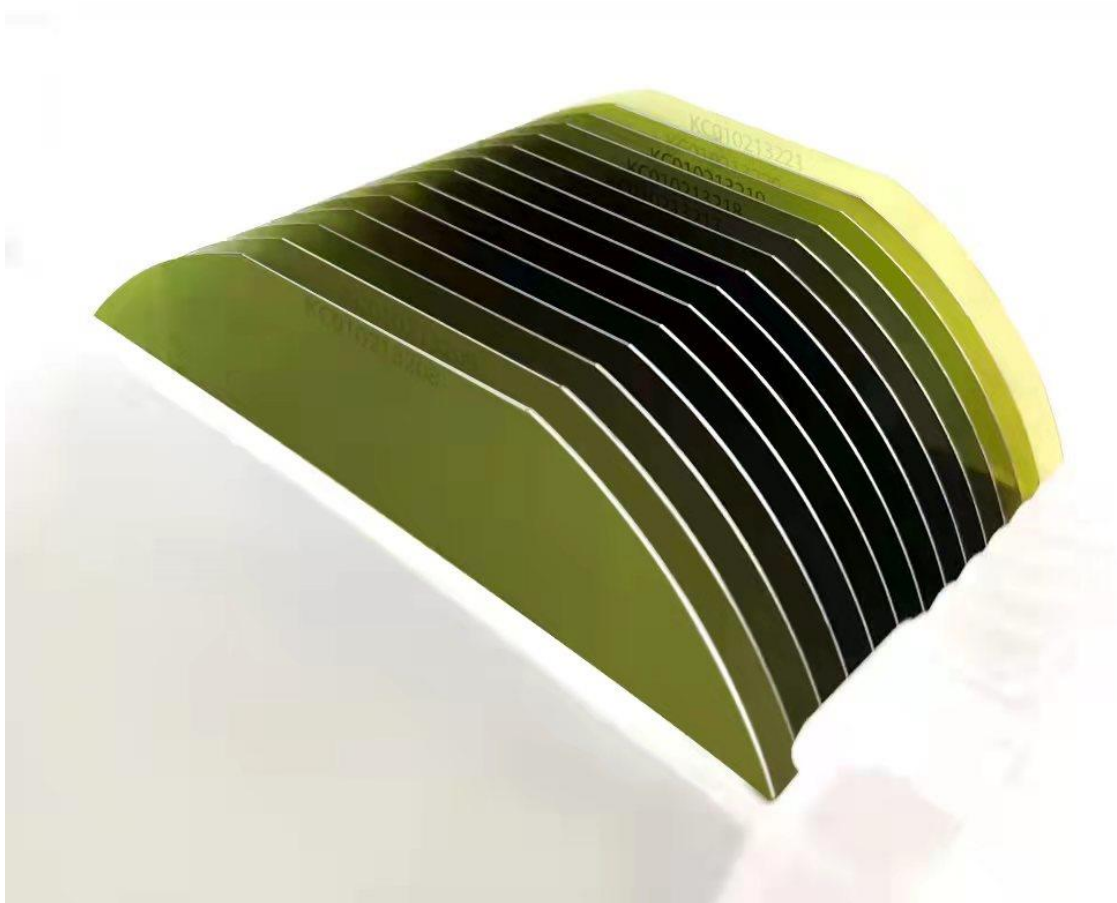


# 乾晶半导体 产品手册

## IV-SEMITEC Product Specifications

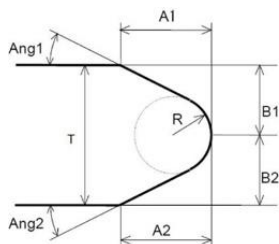
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### 6 英寸导电型 4H-SiC 衬底片 / 6-inch conductive 4H-SiC wafer

产品分级 / Product grade	工业级 (Product grade)			测试级 (Dummy grade)		
	A 级 (MOS grade)		B 级 (SBD grade)			
直径 / Diameter	(150.0 ± 0.2) mm					
厚度 / Thickness	(350 ± 25) μm					
导电类型 / 掺杂元素 Conductivity type / Dopant	n-type / Nitrogen					
电阻率范围 / Resistivity range	0.015 – 0.028 Ω·cm					
表面粗糙度 / Surface roughness	Double-side CMP; Si face Epi-ready, Ra ≤ 0.2 nm ; C face Ra ≤ 0.5 nm					
总厚度变化 / TTV	≤ 5 μm		≤ 6 μm		≤ 15 μm	
局部厚度变化 / LTV (10 X 10 mm <sup>2</sup> )	≤ 2 μm		≤ 3 μm		≤ 5 μm	
弯曲度 / Bow	-15 ~ 15 μm		-20 ~ 15 μm		≤ 40 μm	
翘曲度 / Warp	≤ 25 μm		≤ 40 μm		≤ 60 μm	
表面取向 / Wafer orientation	{0001}± 0.2°, 4° toward [11-20] ± 0.5°					
主参考边取向 / Primary flat orientation	// [11-20] ± 5.0°					
主参考边长度 / Primary flat length	47.5 mm±2.0 mm					
包装 / Packaging	单片或者 25 片包装 / single wafer or 25 wafers					
X 射线半峰宽 / XRD FWHM	≤ 30 arcsec		≤ 40 arcsec		≤ 60 arcsec	
微管密度 / Micropipe density	≤ 0.1 cm <sup>-2</sup>		≤ 0.5 cm <sup>-2</sup>		≤ 5 cm <sup>-2</sup>	
位错 / Dislocation density (cm <sup>-2</sup> )	EPD	TSD	BPD	EPD	TSD	BPD
	≤5000	≤150	≤800	≤8000	≤300	≤1200
裂纹 (强光灯观察) / Cracks	0		0		0	
六方空洞 (强光灯观察) / Hex plates	0		0		≤ 100 μm, Qty ≤ 10 ea.	
多型区 (强光灯观察) / Polytype areas	0		0		Cumulative area ≤ 5%	
碳包裹物 (强光灯观察) / Carbon inclusions	0		Cumulative area ≤ 0.05%		Cumulative area ≤ 5%	
划痕 (量测设备测量) / Surface scratches	0		Cumulative length ≤ 75 mm, Qty ≤ 3 ea.		Cumulative length ≤ 225 mm	
崩边/缺口 (日光灯观察) / Edge chips	0		0		2 allowed, ≤ 1 mm ea.	
表面颗粒 (缺陷检测仪) / Particle	0.3 μm, ≤ 30 ea.				0.3 μm, ≤ 300 ea.	
表面金属沾污 / Surface metal contamination (Al\Cr\Fe\Ni\Cu\Zn\pb\V\Mn\NA\Ca\K\Mg)	≤ 5 × 10 <sup>10</sup> atoms/cm <sup>2</sup>				≤ 5 × 10 <sup>11</sup> atoms/cm <sup>2</sup>	
背面划伤 (强光灯观察) / Backside scratches	Cumulative length ≤ 75 mm				/	
表面沾污 (强光灯观察) / Surface contamination	None					
边缘去除 / Edge exclusion	3 mm					

#### 6 英寸导电型 4H-SiC 衬底片四周 R 型倒角的尺寸 / R-type edge profile of 6-inch conductive 4H-SiC wafer:

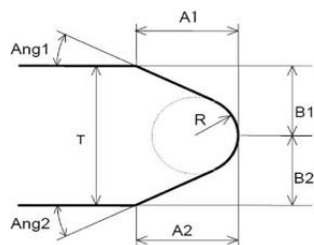


T	B1 / B2	R	A1 / A2	Ang1 / Ang2
350 ± 25 μm	175 ± 25 μm	200 ± 50 μm	150 ± 30 μm	20° ~ 30°

### 8 英寸导电型 4H-SiC 衬底片 / 8-inch conductive 4H-SiC wafer

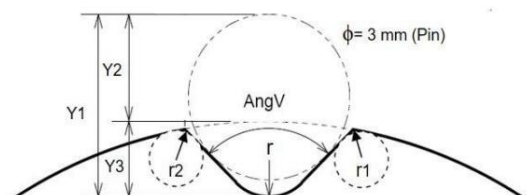
产品分级 / Product grade	工业级 (Product grade)	测试级 (Dummy grade)
直径 / Diameter	(200.0 ± 0.2) mm	
厚度 / Thickness	(500.0 ± 25.0) μm	
导电类型/掺杂元素 Conductivity type/Dopant	n-type / Nitrogen	
电阻率范围 / Resistivity range	0.015 – 0.028 Ω·cm	
表面粗糙度 / Surface roughness	Double-side CMP; Si face Epi-ready, Ra ≤ 0.2 nm; C face Ra ≤ 0.5 nm	
总厚度变化 / TTV	≤ 10 μm	≤ 10 μm
局部厚度变化 / LTV (10 X 10 mm²)	≤ 3 μm	≤ 5 μm
弯曲度 /  Bow	≤ 40 μm	≤ 50 μm
翘曲度 / Warp	≤ 60 μm	≤ 75 μm
表面取向 / Wafer orientation	{0001}± 0.2°, 4°toward [11-20] ± 0.5°	
Notch 位置取向 / Notch orientation	// [11-20] ± 5.0°	
包装 / Packaging	单片或者 25 片包装 / single wafer or 25 wafers	
X 射线半峰宽 / XRD FWHM	≤ 40 arcsec	≤ 60 arcsec
微管密度 / Micropipe density	≤ 0.5 cm <sup>-2</sup>	≤ 5 cm <sup>-2</sup>
裂纹 (强光灯观察) / Cracks	0	0
六方空洞 (强光灯观察) / Hex plates	0	≤ 100μm, Qty ≤ 10 ea.
多型区 (强光灯观察) / Polytype areas	0	Cumulative area ≤ 5%
碳包裹物 (强光灯观察) / Carbon inclusions	Cumulative area ≤ 0.05%	Cumulative area ≤ 3%
划痕 (量测设备测量) / Surface scratches	Cumulative length ≤ 100 mm, Qty ≤ 5 ea.	Cumulative length ≤ 300 mm
崩边/缺口 (日光灯观察) / Edge chips	0	2 allowed, ≤ 1 mm ea.
表面沾污 (强光灯观察) / Surface contamination	None	
边缘去除 / Edge exclusion	3 mm	

#### 8 英寸导电型 4H-SiC 衬底片四周 R 型倒角的尺寸 / R-type edge profile of 8-inch conductive 4H-SiC wafer:



T	B1 / B2	R	A1 / A2	Ang1/ Ang2
500 ± 25 μm	250 ± 25 μm	200 ± 50 μm	150 ± 30 μm	20° ~ 30°

#### 8 英寸导电型 4H-SiC 衬底片凹槽标记的尺寸 / Notch profile of 8-inch conductive 4H-SiC wafer:

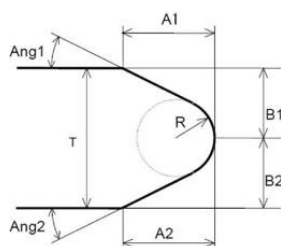


φ (Pin)	AngV	r	Y3
3 mm	90° (-5° / +1°)	1.0 mm	1.00 mm (-0.00 / +0.25)

### 4 英寸导电型 4H-SiC 衬底片 / 4-inch conductive 4H-SiC wafer

产品分级 / Product grade	工业级 (Product grade)	测试级 (Dummy grade)
直径 / Diameter	(100.0 + 0.0/-0.5) mm	
厚度 / Thickness	(350 ± 25) μm	
导电类型 / 掺杂元素 Conductivity type / Dopant	n-type/ Nitrogen	
电阻率范围 / Resistivity range	0.015 – 0.028 Ω-cm	
表面粗糙度 / Surface roughness	Double-side CMP; Si face Epi-ready, Ra ≤ 0.2 nm; C face Ra ≤ 0.5 nm	
X 射线半峰宽 / XRD FWHM	≤ 40 arcsec	≤ 60 arcsec
微管密度 / Micropipe density	≤ 0.2 cm <sup>-2</sup>	≤ 2 cm <sup>-2</sup>
总厚度变化 / TTV	≤ 5 μm	≤ 10 μm
局部厚度变化 / LTV (10 X 10 mm <sup>2</sup> )	≤ 3 μm	≤ 5 μm
弯曲度 /  Bow	≤ 15 μm	≤ 25 μm
翘曲度 / Warp	≤ 30 μm	≤ 40 μm
表面取向 / Wafer orientation	{0001}± 0.2°, 4° toward [11-20] ± 0.5° // [11-20] ± 5.0°	
主参考边长度 / Primary flat length	32.5 mm ± 2.0 mm	
次参考边取向 / Secondary flat orientation	硅面朝上, 顺时针方向与主参考面呈 90° ± 5.0° Silicon face up: 90° CW. from Prime flat ± 5.0°	
次参考边长度 / Secondary flat length	18.0 mm ± 2.0 mm	
包装 / Packaging	单片或者 25 片包装 single wafer or 25 wafers	
裂纹 (强光灯观察) / Cracks	0	0
六方空洞 (强光灯观察) / Hex plates	0	≤ 100 μm, Qty ≤ 6 ea.
多型区 (强光灯观察) / Polytype areas	0	Cumulative area ≤ 5%
碳包裹物 (强光灯观察) / Carbon inclusions	0	Cumulative area ≤ 5%
划痕 (量测设备测量) / Surface scratches	0	Cumulative length ≤ 150 mm
崩边/缺口 (日光灯观察) / Edge chips	0	2 allowed, ≤ 1 mm ea.
表面颗粒 (缺陷检测仪) / Particle	0.3 μm, ≤ 30 ea.	0.3 μm, ≤ 300 ea.
表面金属沾污 / Surface metal contamination (Al\Cr\Fe\Ni\Cu\Zn\pb\V\Mn\NA\Ca\K\Mg)	≤ 5 × 10 <sup>10</sup> atoms/cm <sup>2</sup>	≤ 5 × 10 <sup>11</sup> atoms/cm <sup>2</sup>
背面划伤 (强光灯观察) / Backside scratches	Cumulative length ≤ 75 mm	/
表面沾污 (强光灯观察) / Surface contamination	None	
边缘去除 / Edge exclusion	3 mm	

#### 4 英寸导电型 4H-SiC 衬底片四周 R 型倒角的尺寸 / R-type edge profile of 4-inch conductive 4H-SiC wafer:



T	B1 / B2	R	A1 / A2	Ang1/ Ang2
350 ± 25 μm	175 ± 25 μm	200 ± 50 μm	150 ± 30 μm	20° ~ 30°