SiC衬底材料产品手册

SiC Substrate Material Products Catalogue

先进半导体 助力中国梦

Advanced Semiconductor Boost Chinese Dream

企业简介
Enterprise Introduction

山东天岳成立于2010年，起步于碳化硅单晶衬底材料，致力于碳化硅功率半导体全产业链发展。在“德育亲情，经营卓越”的企业文化指引下，坚持创新驱动发展，走高品质路线，打造企业核心竞争力。截至目前，累计投资12亿元建成了国际一流的碳化硅单晶衬底材料产业化基地，产品性能达到国际先进、国内领先水平。山东天岳是国家工信部主管的“中国宽禁带功率半导体及应用产业联盟”理事长单位。公司建有“碳化硅半导体材料研发技术国家地方联合工程研究中心”、国家博士后科研工作站和2个省级研发平台，在海外设有4个研发中心，拥有60人研发团队，2016年入选山东省首批关键核心技术知识产权。公司获得济南市科技进步一等奖和山东省技术发明一等奖，并成为山东省首批制造业单项冠军企业和山东百年品牌培育企业。

SICC, founded in 2010, started its business with SiC single crystal substrate material and has been devoting itself to the development of the whole chain of SiC power semiconductor. Under the guidance of the corporate culture “Cultivating Affection and Operating Excellence”, SICC insists on using innovation to drive development, takes the route of high quality, and creates the core competitiveness. Up to now, SICC has invested 1.2 billion RMB and built up the international first-level industrial base of SiC single crystal substrate material. The products of SICC are advanced in the world and leading in China. SICC is the President Company of the Association of China Wide Bandgap Power Semiconductor Industry, which is led by the Ministry of Industry and Information Technology of China. It has built up the National Joint Engineering Research Center of SiC Semiconductor Material Technology, National Postdoctoral Research Station, and 2 Provincial R&D Platforms. SICC has 4 overseas R&D centers and a R&D team of 60 members. It has undertaken 23 national, provincial and ministry projects. In 2016, SICC’s patents were selected as the First Batch of Key& Core Technical Intellectual Property of Shandong Province. SICC won the First Prize for Progress in Science and Technology of Jinan City and the First Class of Provincial Technology Invention Award of Shandong . It also became one of the First Champion Enterprises of Single Product in Manufacturing Industry of Shandong Province and one of the Enterprises of Century Brand Cultivating Project.

4英寸 4H–SiC高纯半绝缘衬底参数

4-inch Specifications of 4H-SiC High-Purity Semi-Insulating Substrate

产品性能 Property	P级 (Production Grade)	R级 (Research Grade)	D级 (Dummy Grade)
直径 Diameter	100.0mm+0.0/-0.5mm		
表面取向 Surface Orientation	{0001}±0.2°		
主参考面取向 Primary Flat Orientation	<11-20>±5.0°		
副参考面取向 Secondary Flat Orientation	顺时针与主参考面成90° ±5.0° ，Si面朝上 90.0 ° CW from Primary Flat ± 5.0 ° , Si Face up		
主参考面长度 Primary Flat Length	32.5mm±2.0mm		
副参考面长度 Secondary Flat Length	18.0mm±2.0mm		
晶片边缘 Wafer Edge	倒角 Chamfer		
微管密度 Micropipe Density	≤5个/cm^2 ≤5 micropipes/ cm^2	≤10个/cm^2 ≤10 micropipes/ cm^2	≤50个/cm^2 ≤50 micropipes/ cm^2
多型 Polytype Area by Hign-intensity Light	不允许 None		累计面积≤10% ≤10% of Whole Area
电阻率 Resistivity	≥1E7Ω · cm		(面积75%) ≥1E7Ω · cm (Area 75%) ≥1E7Ω · cm
厚度 Thickness	500.μm±25.μm或350.0μm±25.μm 500.μm±25.μm or 350.0μm±25.μm		
总厚度变化 TTV	≤10μm		≤15μm
弯曲值（绝对值） Bow（Absolute Value)	≤25μm		≤30μm
翘曲度 Warp	≤45μm		
表面粗糙度 Surface Roughness	Si-面CMP Ra≤0.5nm Si Face CMP Ra≤0.5 nm		N/A
裂纹（强光灯观测） Cracks by High-intensity Light	不允许 None		
崩边/缺口（漫反射光观测） Edge Chips/Indents by Diffuse Lighting	不允许 None	≤2个，且每个长度宽度均＜1mm Qty.≤2, the length and width of each＜1.0 mm	

4英寸 4H–SiC N型衬底参数

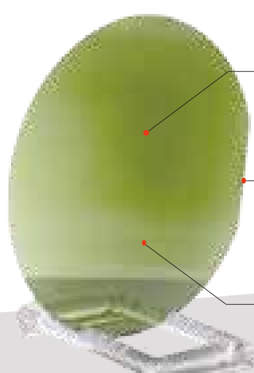
4-inch Specifications of 4H-SiC N-type Substrate

产品性能 Property	U级 (Ultra Grade)	P级 (Production Grade)	R级 (Research Grade)	D级 (Dummy Grade)
直径 Diameter	100.0mm+0.0/-0.5mm			
表面取向 Surface Orientation	偏晶向：4° 偏向<11-20>±0.5° Off-axis: 4° toward<11-20>±0.5°			
主参考面取向 Primary Flat Orientation	<11-20>±5.0°			
副参考面取向 Secondary Flat Orientation	顺时针与主参考面成90° ±5.0° ，Si面朝上 90.0 ° CW from Primary Flat ± 5.0 ° , Si face up			
主参考面长度 Primary Flat Length	32.5mm±2.0mm			
副参考面长度 Secondary Flat Length	18.0mm±2.0mm			
晶片边缘 Wafer Edge	倒角 Chamfer			
微管密度 Micropipe Density	≤1个/cm² ≤1 micropipe/cm²	≤5个/cm² ≤5 micropipes/cm²	≤10个/cm² ≤10 micropipes/cm²	≤50个/cm² ≤50 micropipes/cm²
多型 Polytype Area by Hign-intensity Light	不允许 None			累计面积≤10% ≤10% of Whole Area
电阻率 Resistivity	0.015 Ω · cm ~ 0.028 Ω · cm			（面积75%）0.015 Ω · cm ~ 0.028 Ω · cm (Area 75%)0.015Ω · cm~0.028Ω · cm
厚度 Thickness	350.0 μm±25.0 μm 或 500.0 μm±25. 0 μm 350.0 μm ± 25.0 μm or 500.0 μm ± 25.0 μm			
总厚度变化 TTV	≤10 μm			≤15 μm
弯曲值（绝对值） Bow（Absolute Value)	≤25 μm			≤30 μm
翘曲度 Warp	≤45 μm			
表面处理 Surface Finish	C-面：光学抛光， Si面：化学机械抛光（CMP) C Face Polished, Si Face CMP			
表面粗糙度 Surface Roughness	CMP Si-面 Ra ≤0.5nm Si Face CMP Ra≤0.5 nm			N/A
裂纹（强光灯观测） Cracks by High-intensity Light	不允许 None			
崩边/缺口（漫反射光观测） Edge Chips/Indents by Diffuse Lighting	不允许 None		≤2个，且每个长度、宽度均＜1mm Qty.≤2, the length and width of each＜1.0 mm	

6英寸 4H–SiC N型衬底参数

6-inch Specifications of 4H-SiC N-type Substrate

产品性能 Property	标准 Standard
直径 Diameter	150.0 mm ± 0.25 mm
表面取向 Surface Orientation	4.0° toward <11-20> ± 0.5°
主参考面取向 Primary Flat Orientation	<11-20> ± 5.0°
副参考面取向 Secondary Flat Orientation	N/A
主参考面长度 Primary Flat Length	47.5 mm ± 2.0 mm
副参考面长度 Secondary Flat Length	无 None
晶片边缘 Wafer Edge	倒角 Chamfer
微管密度 Micropipe Density	≤5/cm^2
多型 Polytype Area by Hign-intensity Light	不允许 None
电阻率 Resistivity	0.015 Ω · cm ~ 0.028 Ω · cm
厚度 Thickness	350.0 μm ± 25.0 μm
总厚度变化 TTV	≤10 μm
弯曲值（绝对值） Bow（Absolute Value）	≤40 μm
翘曲度 Warp	≤60 μm
表面处理 Surface Finish	双面抛光 Si面CMP Double Face Polished, Si Face CMP
裂纹（强光灯观测） Crack by High-intensity Light	不允许 None
崩边/缺口（漫反射光观测） Edge Chips/Indents by Diffuse Lighting	不允许 None



表面粗糙度≤0.5nm
Surface roughness≤0.5nm

按照国际惯例采用单一定位边
Use single orientation flat as international practice

最优等级微管密度≤1/cm^2
Micropipe density of the best grade≤1/cm^2

(*样品提供和量产时间，欢迎咨询营销团队)
（*Welcome to consult with Sales Dept. about sample and mass production time）

综合产品目录

Comprehensive Product Catalogue

尺寸 Size	类型 Type	表面取向 Surface Orientation	厚度 Thickness	级别 Grade
4英寸 4 inch	高纯半绝缘 High Purity Semi-insulating	0°	350/500μm	P/R/D
4英寸 4 inch	N型 N-Type	4°	350/500μm	U/P/R/D
6英寸 6 inch	N型 N-Type	4°	350/500μm	U/P/R/D

(*2、3寸小尺寸产品、以及异型产品请另行咨询营销团队)

(*For the smaller substrate of 2/3 inch and special type substrate, please consult with our Sales Dept.)

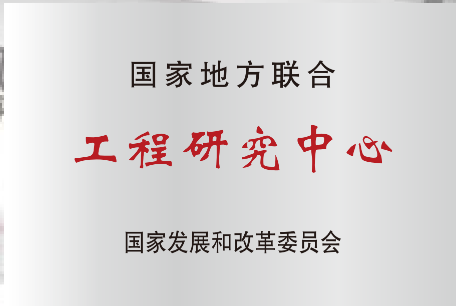
2015年起新工厂全面投产
占地面积12万平方米
The new factory started production in 2015,
which covers an area of 120,000 ㎡

6英寸碳化硅衬底研发已取得突破性进展
The 6-inch SiC substrate R&D has achieved
a significant breakthrough

产品清洁、封装、检测 严格控制在百级洁净环境下完成
The cleaning,packaging and testing of
products are strictly controlled and completed
in the clean room of Class 100

山东天岳资质

SICC Qualifications



2012年05月—济南市半导体衬底材料工程研究中心
2012年12月—山东省示范工程技术研究中心
2013年06月—山东省工程研究中心
2013年12月—中国宽禁带功率半导体产业联盟理事长单位
2014年02月—山东省技术发明一等奖
2015年10月—建立博士后科研工作站
2016年12月—纳入山东省首批关键核心技术知识产权
2017年08月—获得济南市科技进步一等奖
2018年01月—获批国家地方联合工程研究中心

May 2012—The Engineering Research Center of Semiconductor Substrate Material of Jinan City
Dec 2012—The Model Research Center on Engineering Technology of Shandong Province
Jun 2013—The Engineering Research Center of Shandong Province
Dec 2013—President Company of the Association of China Wide Bandgap Power Semiconductor Industry
Feb 2014—The First Class of Provincial Technology Invention Award of Shandong
Oct 2015—Set up the Postdoctoral Research Station
Dec 2016—Was selected as the First Batch of Key& Core Technical Intellectual Property of Shandong Province
Aug 2017—Won the First Prize for Progress in Science and Technology of Jinan City
Jan 2018—The National Joint Engineering Research Center was approved

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