



Your Trusted SiC Epi Foundry

The
4H-SiC
Epiwafer Brochure
4H-SiC外延片产品手册

瀚天天成

电子科技（厦门）有限公司

打造瀚天品牌，领先外延世界

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ABOUT US

- Largest pure play SiC epitaxial foundry in China, second largest globally.
- Serving over one hundred customers including one of world's top 5 power device manufacturers.
- Guaranteed top quality with most competitive price and shortest delivery time.
- Received certification of IATF16949.
- 全球第二，中国第一的纯碳化硅外延片制造商。
- 全球超过100家客户，其中包括世界前五的功率器件制造商。
- 提供极具竞争力的价格、交期和产品质量。
- 通过IATF16949（国际汽车质量管理体系）认证。

Epiworld's Product Development

公司进程

3" & 4" N-type SiC Epiwafer

Accepted commercial production order for 3" & 4" N-type SiC Epiwafer
成功量产3英寸和4英寸碳化硅外延片

6" N-type SiC Epiwafer

Accepted commercial production order for 6" N-type SiC Epiwafer
成功量产6英寸碳化硅外延片

IATF16949 Certification

Received certification of IATF16949
通过IATF16949认证

N-type thick & P-type Epiwafer

Successfully developed SiC N-type thick & P-type Epiwafer
成功研发N型厚膜和P型碳化硅外延片

2011

Epiworld Founded

公司成立

2012

2013

Quality Certification

Received certifications of ISO9001/ISO14001/OHSAS18001
获得ISO质量管理体系认证

2014

2015

BPD-free Technology

BPD-free 4H-SiC epitaxy technology developed; General manager Dr. Feng Gan invited to serve as a Session Chair for Epitaxy @ICSCRM2015
成功研发BPD-free外延技术，成为业内首家提供零BPD外延片的厂商

2018

2019

More Capacity

Second facility is ready for production, having room for rapid expansion to 400k wafer/year
新厂区投入生产，产能快速提升

2020

Applications for 4H-SiC Epiwafer

All types of power devices such as Schottky diodes, MOSFETs, JETs, BJTs, IGBTs, Thyristors, GTOs etc. over a wide voltage range for green energy systems such as solar inverters, wind farms, hybrid and electric vehicles and numerous other energy-efficient systems.

Standard specification for N-type 4H-SiC Epiwafer (Mass Production)

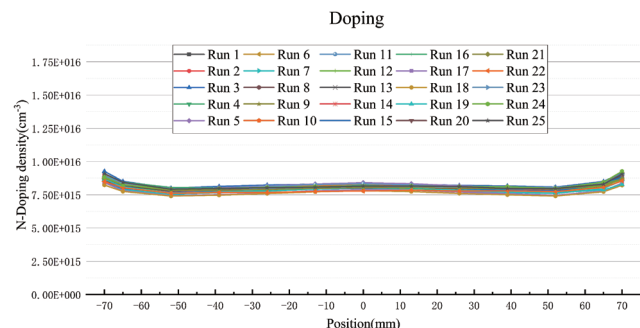
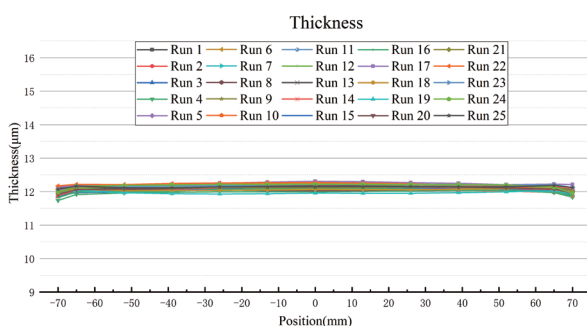
(100.0 mm and 150.0 mm)

Ver 6.0 (2020.5)

N-type SiC Epiwafer for Mass Production	
Thickness Range: 1 – 40 μm	
Tolerance	$\pm 10\%$
Uniformity (σ/mean)	$\leq 5\%$
Doping Range: $1\text{E}15 - 1\text{E}17 \text{ cm}^{-3}$	
Dopant	Nitrogen
Net Doping Density	$N_D - N_A$
Tolerance	$\pm 15\%$
Uniformity (σ/mean)	$\leq 10\%$
Surface Quality	
Die yield (2 mm \times 2 mm)	$\geq 95\%$
Edge chips	None with length ≥ 1.5 mm or depth ≥ 1.0 mm
Scratches	$\leq 1 \times$ wafer diameter cumulative length
Backside Cleanliness	100% clean
Surface Roughness (R_q 20 $\mu\text{m} \times 20 \mu\text{m}$)	≤ 0.5 nm

Stability of production process for 6" N-type Epiwafer

(Statistics based on multiple growth runs with the same process for 1200V Applications)



6" N-type Epiwafer	Typical value
Thickness Uniformity	1%
Doping Uniformity	5%
Die yield (2 mm \times 2 mm)	98%

Standard specification for P-type and N-type thick 4H-SiC Epiwafer (R&D)

(100.0 mm and 150.0 mm)

Ver 6.0 (2020.5)

	P-type SiC Epiwafer for R&D	N-type thick SiC Epiwafer for R&D
Thickness Range	0.1 – 40 μm	40 – 200 μm
Tolerance	$\pm 10\%$	$\pm 10\%$
Uniformity (σ/mean)	$\leq 5\%$	$\leq 5\%$
Doping Range	1E15 – 3E17 cm^{-3}	5E14 – 2E18 cm^{-3}
Dopant	Aluminum	Nitrogen
Net Doping Density	$N_A - N_D$	$N_D - N_A$
Tolerance	$\pm 25\%$	$\pm 15\%$
Uniformity (σ/mean)	$\leq 15\%$	$\leq 10\%$
Epi Defect		
Die yield (2 mm \times 2 mm)	$\geq 95\%$	-

Notes: For more specifications about **P-type** epiwafer and N-type **thick** epiwafer, please contact Epiworld's Sales.

Samples of 4" and 6" 4H-SiC Epiwafer



Definitions and Test Methods

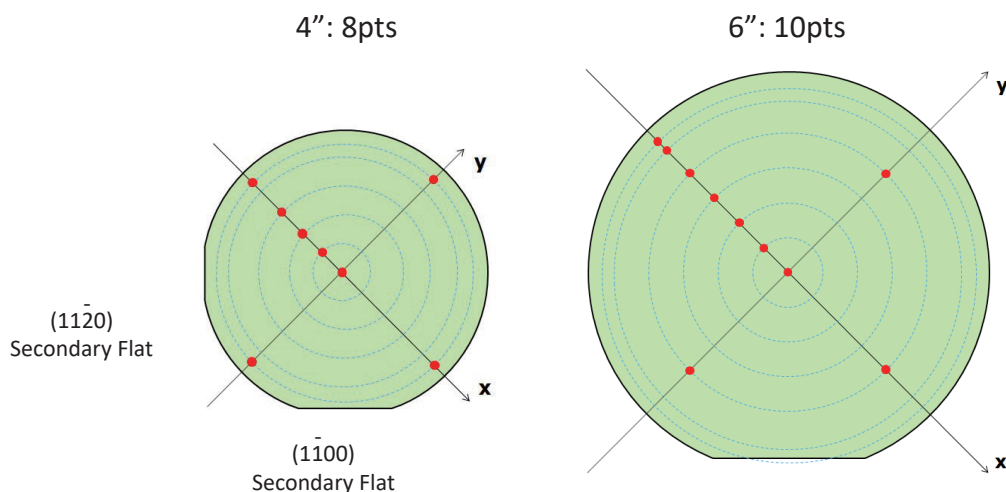
(100.0 mm and 150.0 mm)

Ver 6.0 (2020.5)

Characteristics	Definitions	Test Method
Net doping	Net doping is determined as an average value across the wafer by MCV.	MCV
Thickness	Thickness is determined as an average value across the wafer by FTIR.	FTIR
Epi Defects	Defects include Triangular defects, downfalls and carrots.	Candela or SICA
Edge Chips	Areas where material has been unintentionally removed from the wafer. Chips measuring < 0.5 mm in either length or depth are excluded from this definition.	High intensity illumination
Scratches	Grooves or cuts below the surface plane of the wafer having a length-to-width ratio of greater than 5 to 1.	
Backside Cleanliness	None Contamination	AFM
Surface Roughness	AFM on a 20 μm \times 20 μm	

Notes:

- The N-type Epiwafer is usually preceded by an n-type, $1\text{E}18\text{ cm}^{-3}$ and 0.5 μm buffer.
- The doping and thickness are measured with 5 mm edge exclusion for 100 mm and 150 mm wafers. The measured points for doping and thickness are shown as the figure below.



- Defect limits apply to entire surface except for edge exclusion area (3 mm for 100 mm and 150 mm wafers).
- Contact Epiworld's Sales for specifications on unique epitaxy.



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