

# Standard specifications of 2 inch / 100 mm Sn-doped $\beta$ -Ga<sub>2</sub>O<sub>3</sub> (001) substrates

Items		Specifications	
Orientation		(001)	
Dopant		Sn	
Conductivity		n-type	
Resistivity ( $\Omega \cdot \text{cm}$ )		0.007–0.042	
Dimensions	Size	2 inch	100 mm
	Diameter (mm)	$50.8 \pm 0.3$	$100 \pm 0.5$
	Orientation flat width (mm)	$15.9 \pm 2.5$	$32.5 \pm 2.5$
	Index flat width (mm)	$8.0 \pm 2.5$	$18.0 \pm 2.5$
	Thickness (mm)	$0.65 \pm 0.02$	
	Reference	Fig. 1	
Offset angle (degree)	[010]	$0 \pm 1$	
	[100]	$0 \pm 1$	
XRD FWHM (arcsec)	[010]	$\leq 50$	
	[100]	$\leq 50$	
Surface	Front	CMP	
	Back	CMP	

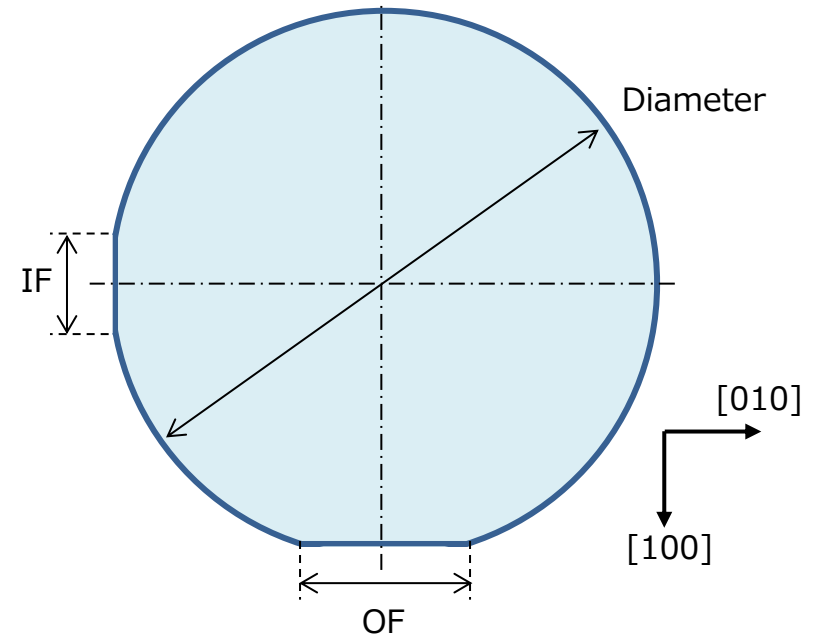


Fig. 1

## Remarks

- Chipping may occur within the following limits:  
2-inch: <8 mm (opposite OF), < $15.9 \pm 2.5$  mm (OF side); 100 mm: <18 mm (opposite OF), < $32.5 \pm 2.5$  mm (OF side).
- These products must be used for research and development purposes only.
- The substrates must not be used as a seed crystal.
- The specifications are subject to change without notice.



# Specifications of 150 mm Sn-doped $\beta$ -Ga<sub>2</sub>O<sub>3</sub> (001) substrate

Items		Specifications
Orientation		(001)
Dopant		Sn
Conductivity		n-type
Resistivity ( $\Omega \cdot \text{cm}$ )		0.007–0.042
Dimensions	Diameter (mm)	$150 \pm 0.5$
	Orientation flat width (mm)	$57.5 \pm 2.5$
	Index flat width (mm)	$32.5 \pm 2.5$
	Thickness (mm)	$0.67 \pm 0.02$
	Reference	Fig. 2
Offset angle (degree)		[010] : $0 \pm 1$
		[100] : $0 \pm 1$
XRD FWHM (arcsec)		[010] : $\leq 50$
		[100] : $\leq 50$
Surface	Front	CMP
	Back	CMP

**Remarks**

- 1 Chipping may be up to <32.5 mm on the opposite side of the OF, and < $57.5 \pm 2.5$  mm on the OF side.
- 2 These products must be used for research and development purposes only.
- 3 The substrates must not be used as a seed crystal.
- 4 The specifications are subject to change without notice.

Tentative

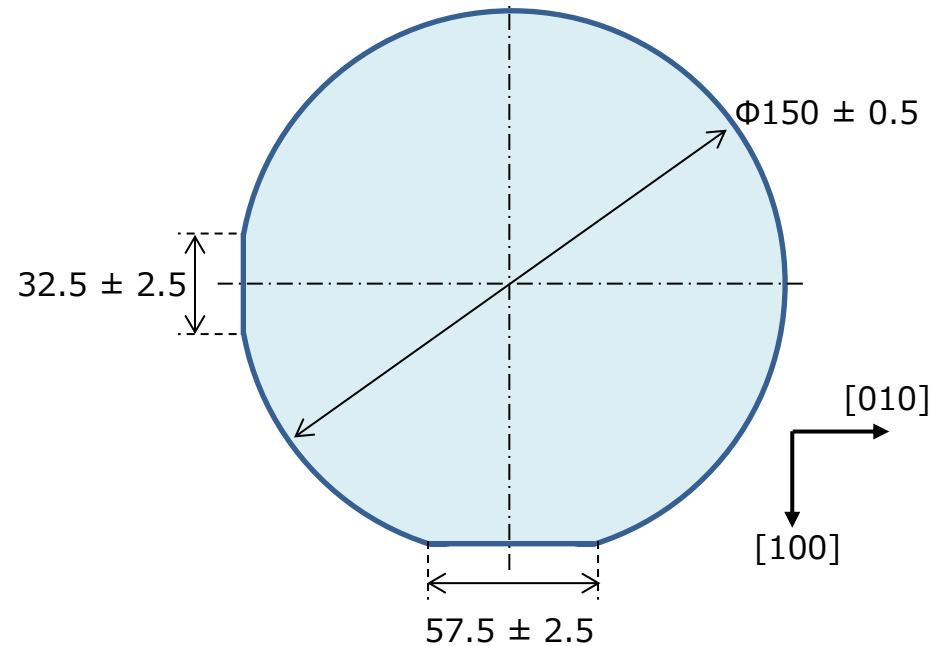
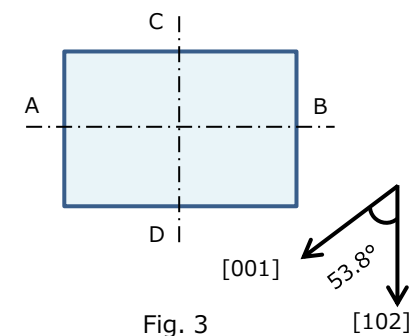


Fig. 2



# Standard specifications of 10×15 mm<sup>2</sup> β-Ga<sub>2</sub>O<sub>3</sub> (010) substrates

Items		Specifications		
Orientation		(010)		
Dopant		Sn	Undoped	Fe
Conductivity		n-type	n-type	Insulating ( $>10^{10}\Omega \cdot \text{cm}$ )
$N_d-N_a$ (cm <sup>-3</sup> )		$1 \times 10^{18} - 9 \times 10^{18}$	$\leq 9 \times 10^{17}$	-
Dimensions	A-B (mm)	$15 \pm 0.3$	$15 \pm 0.3$	$15 \pm 0.3$
	C-D (mm)	$10 \pm 0.3$	$10 \pm 0.3$	$10 \pm 0.3$
	Thickness (mm)	$0.5 \pm 0.02$	$0.5 \pm 0.02$	$0.5 \pm 0.02$
	Reference	Fig. 3	Fig. 3	Fig. 3
Offset angle (degree)	$\perp[102] : 0 \pm 1$	$\perp[102] : 0 \pm 1$	$\perp[102] : 0 \pm 1$	$\perp[102] : 0 \pm 1$
	$[102] : 0 \pm 1$	$[102] : 0 \pm 1$	$[102] : 0 \pm 1$	$[102] : 0 \pm 1$
XRD FWHM (arcsec)	$\perp[102] : \leq 150$	$\perp[102] : \leq 150$	$\perp[102] : \leq 150$	$\perp[102] : \leq 150$
	$[102] : \leq 150$	$[102] : \leq 150$	$[102] : \leq 150$	$[102] : \leq 150$
Surface	Front	CMP	CMP	CMP
	Back	Grinding	Grinding	Grinding



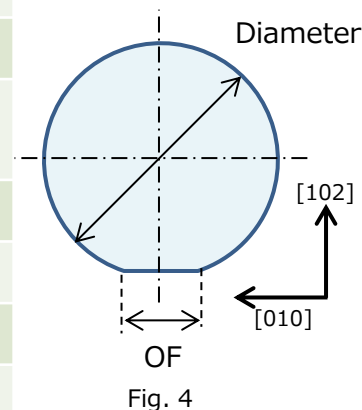
## Remarks

- 1 These products must be used for research and development purposes only.
- 2 The substrates must not be used as a seed crystal.
- 3 The specifications are subject to change without notice.



# Standard specifications of 2 inch $\beta$ -Ga<sub>2</sub>O<sub>3</sub> (-201) substrates

Items		Specifications		
Orientation		(-201)		
Dopant		Sn	Undoped	Fe
Conductivity		n-type	n-type	Insulating ( $> 10^{10}\Omega \cdot \text{cm}$ )
$N_d - N_a$ (cm <sup>-3</sup> )		$1 \times 10^{18} - 2 \times 10^{19}$	$\leq 9 \times 10^{17}$	-
Dimensions	Diameter (mm)	$50.8 \pm 0.3$	$50.8 \pm 0.3$	$50.8 \pm 0.3$
	Orientation flat width (mm)	$15.9 \pm 2.5$	$15.9 \pm 2.5$	$15.9 \pm 2.5$
	Thickness (mm)	$0.68 \pm 0.02$	$0.68 \pm 0.02$	$0.68 \pm 0.02$
	Reference	Fig. 4	Fig. 4	Fig. 4
Offset angle (degree)	[010]:	$0 \pm 0.4$	$0 \pm 0.4$	$0 \pm 1$
	[102]:	$-0.7 \pm 0.4$	$-0.7 \pm 0.4$	$-0.7 \pm 1$
XRD FWHM (arcsec)	[010]:	$\leq 150$	$\leq 150$	$\leq 150$
	[102]:	$\leq 150$	$\leq 150$	$\leq 150$
Surface	Front	CMP	CMP	CMP
	Back	Grinding	Grinding	Grinding



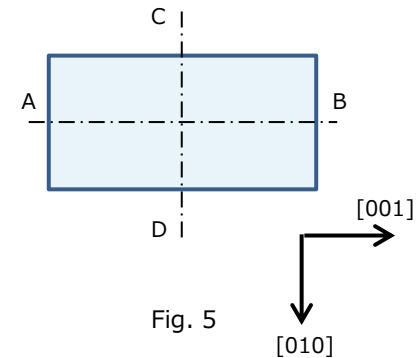
## Remarks

- 1 There are cases in which the opposite side of OF is chipped less than 8 mm.
- 2 There are cases in which the OF side is chipped less than  $15.9 \text{ mm} \pm 2.5 \text{ mm}$ .
- 3 These products must be used for research and development purposes only.
- 4 The substrates must not be used as a seed crystal.
- 5 The specifications are subject to change without notice.



# Standard specifications of $\beta\text{-Ga}_2\text{O}_3$ (100) substrates

Items		Specifications
Orientation		(100)
Dopant		Sn, Undoped, Fe
Dimensions	A-B (mm)	- (Typical : 20-23)
	C-D (mm)	- (Typical : 10)
	Thickness (mm)	- (Typical : 0.2-1.0)
	Reference	Fig. 5
Surface	Front	Cleavage
	Back	Cleavage



## Remarks

- 1 These products must be used for research and development purposes only.
- 2 The substrates must not be used as a seed crystal.
- 3 The specifications are subject to change without notice.



# Standard specifications of 10×15 mm<sup>2</sup> β-Ga<sub>2</sub>O<sub>3</sub> (011) substrates

Items		Specifications	
Orientation		(011)	
Dopant		Sn	Fe
Conductivity		n-type	Insulating ( $>10^{10}\Omega \cdot \text{cm}$ )
$N_d-N_a$ (cm <sup>-3</sup> )		$2 \times 10^{18} - 2 \times 10^{19}$	-
Dimensions	A-B (mm)	$15 \pm 0.3$	$15 \pm 0.3$
	C-D (mm)	$10 \pm 0.3$	$10 \pm 0.3$
	Thickness (mm)	$0.5 \pm 0.02$	$0.5 \pm 0.02$
	Reference	Fig. 6	Fig. 6
Offset angle (degree)	[100]:	$0 \pm 1$	$0 \pm 1$
	$\perp$ [100]:	$0 \pm 1$	$0 \pm 1$
XRD FWHM (arcsec)	[100]:	$\leq 150$	$\leq 150$
	$\perp$ [100]:	$\leq 150$	$\leq 150$
Surface	Front	CMP	CMP
	Back	Grinding	Grinding

## Remarks

- 1 These products must be used for research and development purposes only.
- 2 The substrates must not be used as a seed crystal.
- 3 The specifications are subject to change without notice.

