CASCRYSTECH CO., LTD
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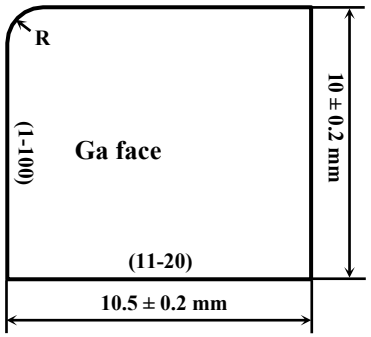
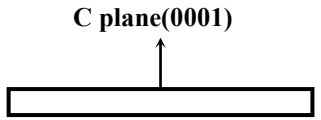
Free-standing GaN Substrates 1010

Item	GaN-FR-U-1010	GaN-FR-N-1010	GaN-FR-SI-1010
Dimension	10 x 10.5 mm^2 ， Customed Size		
Thickness	350 ± 25 μm		
Orientation	C plane (0001) off angle toward M-axis 0.35 ± 0.15°		
Conduction Type	N-type	N-type	Semi-Insulating
Resistivity (300K)	< 0.1 Ω·cm	< 0.05 Ω·cm	> 10^6 Ω·cm
TTV	≤ 10 μm		
BOW	-10 μm ≤ BOW ≤ 10 μm		
Ga Face Surface Roughness	< 0.2 nm (polished) or < 0.3 nm (polished and surface treatment for epitaxy)		
N Face Surface Roughness	0.5 ~1.5 μm option: 1~3 nm (fine ground); < 0.2 nm (polished)		
Dislocation Density	From 1 x 10^5 to 3 x 10^6 cm^{-2} (calculated by CL)*		
Useable Area	> 90% (edge exclusion)		
Package	Packaged in a class 100 clean room environment, and under a nitrogen atmosphere.		





Notes:
The circular arc angle (R < 2 mm) is used for distinguishing the Ga and N face.

*National standards of China (GB/T32282-2015)

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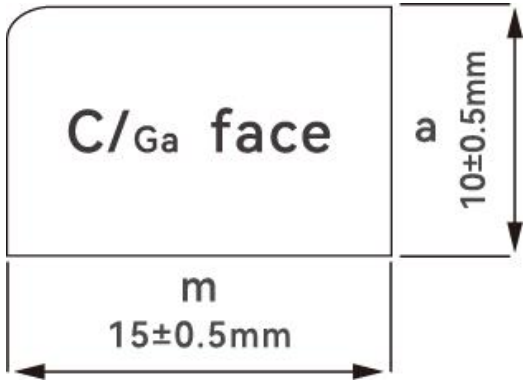
Free-standing GaN Substrates 1015

Item	GaN-FR-U-1015	GaN-FR-N-1015	GaN-FR-SI-1015
Dimension	10 x 15 mm^2, Customed Size		
Thickness	400 ± 25 μm		
Orientation	C plane (0001) off angle toward M-axis 0.35 ± 0.15°		
Conduction Type	N-type	N-type	Semi-Insulating
Resistivity (300K)	< 0.1 Ω·cm	< 0.05 Ω·cm	> 10^6 Ω·cm
TTV	≤ 10 μm		
BOW	-10 μm ≤ BOW ≤ 10 μm		
Ga Face Surface Roughness	< 0.2 nm (polished) or < 0.3 nm (polished and surface treatment for epitaxy)		
N Face Surface Roughness	0.5 ~1.5 μm option: 1~3 nm (fine ground); < 0.2 nm (polished)		
Dislocation Density	From 1 x 10^5 to 3 x 10^6 cm^{-2} (calculated by CL)*		
Useable Area	> 90% (edge exclusion)		
Package	Packaged in a class 100 clean room environment, and under a nitrogen atmosphere.		



Notes:
The circular arc angle (R < 2 mm) is used for distinguishing the Ga and N face.

*National standards of China (GB/T32282-2015)

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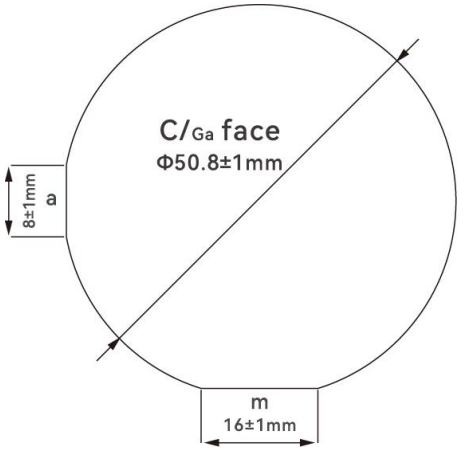
Free-standing GaN Substrates 2 inch

Item	GaN-FR-U-50	GaN-FR-N-50	GaN-FR-SI-50
Dimension	Φ50.8±1 mm		
Thickness	400 ± 25 μm		
Orientation	C plane (0001) off angle toward M-axis 0.35 ± 0.25°		
Conduction Type	N-type	N-type	Semi-Insulating
Resistivity (300K)	< 0.5 Ω·cm	< 0.05 Ω·cm	> 10^6 Ω·cm
TTV	≤ 15 μm		
BOW	-10 μm ≤ BOW ≤ 10 μm		
Ga Face Surface Roughness	< 0.2 nm (polished) or < 0.3 nm (polished and surface treatment for epitaxy)		
N Face Surface Roughness	0.5 ~1.5 μm option: 1~3 nm (fine ground); < 0.2 nm (polished)		
Dislocation Density	From 1 x 10^5 to 3 x 10^6 cm^{-2} (calculated by CL)*		
Useable Area	> 90% (edge exclusion)		
Package	Packaged in a class 100 clean room environment, and under a nitrogen atmosphere.		



Notes:
Useable area: edge and macro defects exclusion

*National standards of China (GB/T32282-2015)

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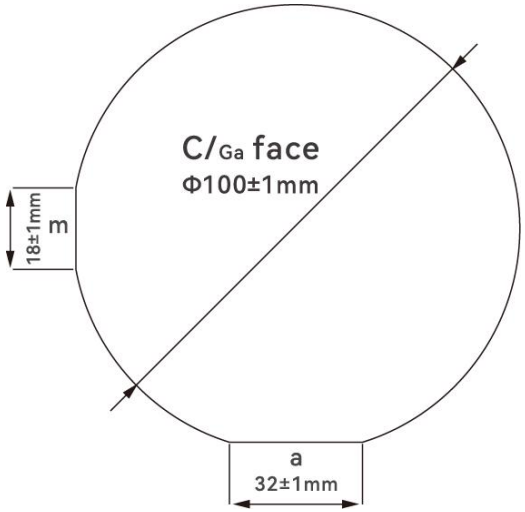
Free-standing GaN Substrates 4 inch

Item	GaN-FR-U-100	GaN-FR-N-100
Dimension	Φ100 ± 1 mm	
Thickness	420 ± 50 μm	
Orientation	C plane (0001) off angle toward M-axis 0.3 ± 0.25°	
Conduction Type	N-type	N-type
Resistivity (300K)	< 0.5 Ω·cm	< 0.05 Ω·cm
TTV	≤ 30 μm	
BOW	-25 μm ≤ BOW ≤ 25 μm	
Ga Face Surface Roughness	< 0.2 nm (polished) or < 0.3 nm (polished and surface treatment for epitaxy)	
N Face Surface Roughness	0.5 ~1.5 μm option: 1~3 nm (fine ground); < 0.2 nm (polished)	
Dislocation Density	< 5 x 10^6	
Useable Area	> 90% (edge exclusion)	
Package	Packaged in a class 100 clean room environment, and under a nitrogen atmosphere.	



Notes:
Useable area: edge and macro defects exclusion

*National standards of China (GB/T32282-2015)

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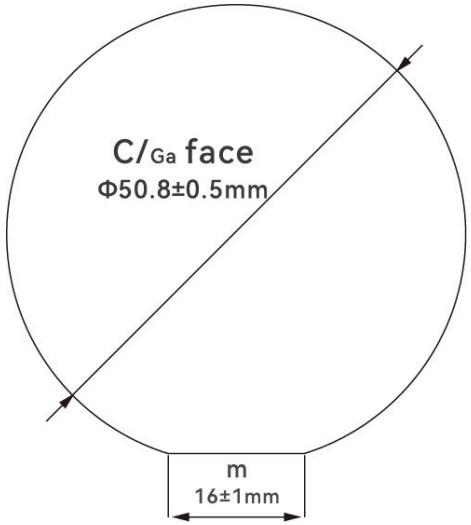
Free-standing GaN Composite Substrates 2-4 inch

Item	GaN-FR-U-50S, GaN-FR-U-100S	GaN-FR-N-50S, GaN-FR-N-100S
Dimension	Φ50±0.5 mm, Φ100±0.5 mm	
Thickness	4.5 ± 0.5 μm, Customized	
Substrate Structure	GaN on Sapphire (0001)	
Orientation	C plane (0001) off angle toward M-axis 0.3 ± 0.25°	
Conduction Type	N-type	N-type
Resistivity (300K)	< 0.5 Ω·cm	< 0.05 Ω·cm
TTV	≤ 30 μm	
BOW	-25 μm ≤ BOW ≤ 25 μm	
Ga Face Surface Roughness	< 0.2 nm (polished) or < 0.3 nm (polished and surface treatment for epitaxy)	
N Face Surface Roughness	0.5 ~1.5 μm option: 1~3 nm (fine ground); < 0.2 nm (polished)	
Dislocation Density	< 5 x 10^8	
Useable Area	> 90% (edge exclusion)	
Package	Packaged in a class 100 clean room environment, and under a nitrogen atmosphere.	



Notes:
Useable area: edge and macro defects exclusion

*National standards of China (GB/T32282-2015)