Al_2O_3 sapphire

Al_2O_3 Sapphire single crystal is an excellent multifunctional material. It has high temperature resistance, good thermal conductivity, high hardness, infrared transmittance, and good chemical stability. Widely used in multiple fields such as industry, national defense, and scientific research (such as high-temperature infrared windows). At the same time, it is also a widely used single crystal substrate material, which is the preferred substrate for the current blue, purple, and white light emitting diodes (LEDs) and blue laser (LD) industries (requiring the epitaxial growth of gallium nitride thin films on sapphire substrates), and is also an important superconducting thin film substrate.

Material Properties:

Syngony	hexagonal crystal system		
Lattice constants	a=4.748Å c=12.97Å		
Density	3.98（g/cm3）		
Melting point	2040℃		
Growing directions	Tira method, bubble method		
Mohs hardness	9		
Refractive index	At 300K, C, 1.762 @630nm ⊥C，1.770 @630nm		
Thermal expansion coefficient	5.8x10-6/K		
Thermal conductivity (cal/℃ cm s)		⊥c	//c
	23℃	0.055	26℃ 0.060
	77℃	0.040	70℃ 0.041
Loss angle tangent @ 293K	1×10-4（1MHz）		
Dielectric constant *103-109Hz @ 25 ℃	//C，11.5 ⊥C，9.3		
Transmittance	Ø 80%@ 400~4000nm		
Crystallographic orientation	A-plane	<11-20>	2.379A
	R-plane	<1-102>	1.740A
	M-plane	<10-10>	1.375A
	C-plane	<0001>	2.165A
Crystallographic tolerance	±0.5°		

Conventional dimensions and tolerances	103,105,1010,1515,2015,2020 or custom-made
Conventional thickness and tolerance	0.5mm，1.0mm
Polishing	Single or double-sided
Surface roughness	Ra＜1nm （5×5μm）
Package	100 clean bag, 1000 ultra-clean room