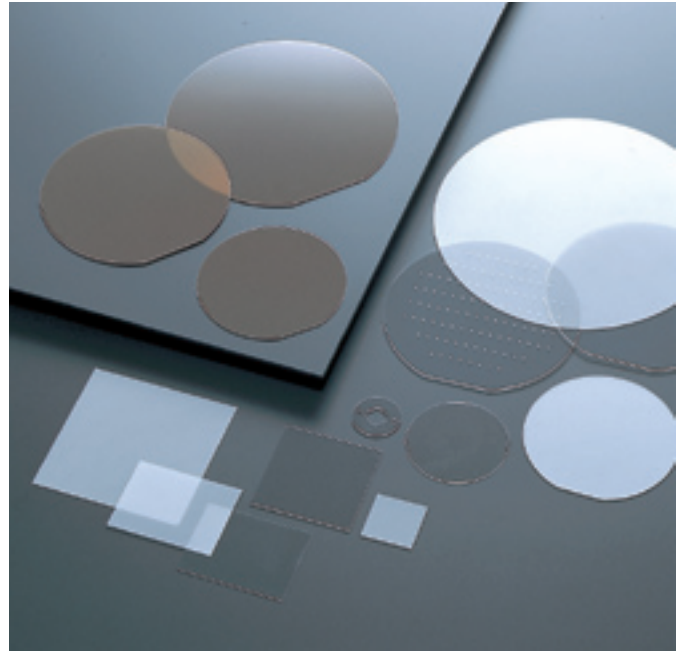


Single Crystal Sapphire Substrates

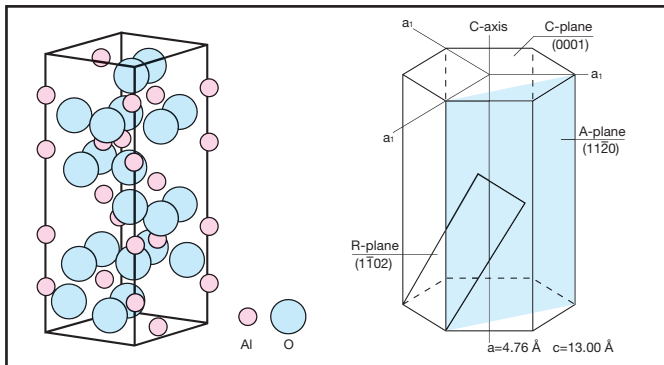
■ Sapphire

■ Features

- Perfect control of crystal orientation. (Fig. 1)
- Mirror polished surface.
- Low dielectric loss: $\tan \delta < 10^{-4}$.
- High thermal conductivity.
- Excellent chemical durability.



Crystal Orientation (Fig.1)



■ Characteristics of Material

Material code	SA-100	
Appearance	Dense	
Color	Transparent	
Principle Materials	Al ₂ O ₃	
Bulk Density (kg/m ³)	3.97 × 10 ³	
Water Absorption (%)	0	
Vickers Hardness (Gpa, Hv 1.0)	22.5	
Flexural Strength (Mpa)	690	
Young's Modulus (GPa)	470	
Coefficient of Linear Thermal Expansion at 25°C (1/°C)	C軸に平行 Parallel to C-axis	7.7 × 10 ⁻⁶
	C軸に垂直 Vertical to C-axis	7.0 × 10 ⁻⁶
Thermal Conductivity (W/mk)	41	
Dielectric Strength (V/m)	48 × 10 ⁶	
Volume Resistivity (Ω · cm)	20°C	>10 ¹⁴
	300°C	—
	500°C	10 ¹¹
Dielectric Constant (1MHz)	Parallel to C-axis	11.5
	Vertical to C-axis	9.3
Dielectric Loss Angle (1MHz)	<1	

※The values are typical material properties and may vary according to products configuration and manufacturing process. For more details, please feel to contact us.