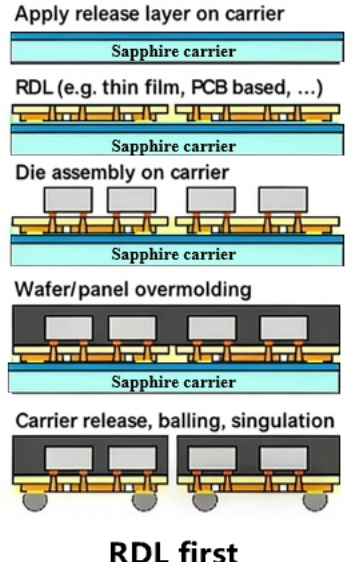
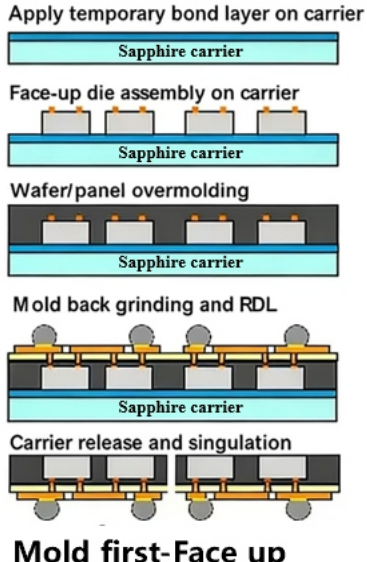
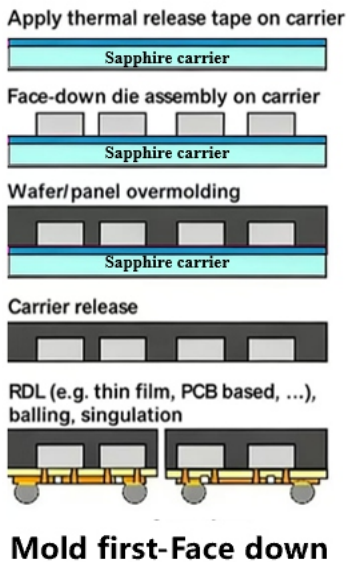
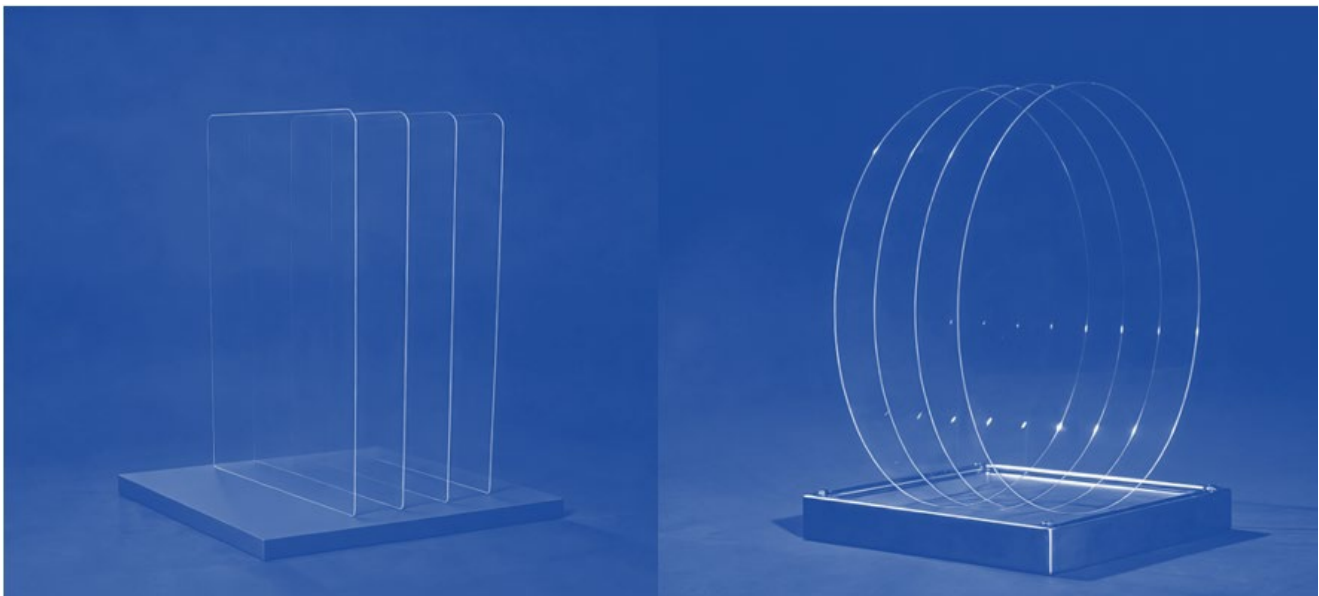


# 蓝宝石载盘

## Sapphire Carrier

高杨氏模量 | 高机械强度 | 高透过率 | 与晶圆制程完美兼容  
 —— 适配先进封装、超薄晶圆处理场景

High Young's Modulus | High mechanical strength | High Transmittance | Perfect Compatibility with Wafer Processing  
 —— Suitable for advanced packaging and ultra-thin wafer processing scenarios



# 半导体载盘行业痛点

## Pain Points in the Semiconductor Carrier Industry

当前先进封装在薄型化过程中面临的主要挑战是形变与翘曲问题。由于晶片、封装基板、底部填充胶、中介层及覆盖层等材料之间存在热膨胀系数不匹配、固化收缩以及厚度分布不对称等因素，在反复热循环过程中容易引发应力累积，进而导致结构变形。这一问题已成为封装行业在优化设计中亟需解决的关键痛点。

Current advanced packaging faces primary challenges of deformation and warpage during the thinning process. Due to factors such as mismatches in the coefficient of thermal expansion (CTE) among materials like the die, packaging substrate, underfill, interposer, and mold compound, as well as curing shrinkage and asymmetric thickness distribution, stress accumulation is prone to occur during repeated thermal cycling, which in turn leads to structural deformation. This issue has become a critical pain point that the packaging industry urgently needs to address in optimization design.

## 蓝宝石性能优势

### Performance Advantages of Sapphire



#### 高杨氏模量 High Young's Modulus

高杨氏模量(345-420Gpa)有效抑制形变和翘曲，解决封装结构翘曲，提升制程稳定性

High Young's modulus(345-420 GPa) effectively suppresses deformation and warpage, solves the warpage issue of packaging Structure, and improves process stability.



#### 高透过率 High Transmittance

蓝宝石在近紫外至中红外区的高透过率(>83%)，可灵活搭配各类解键合方案，其中完美适配激光解键合制程

With a high transmittance (>83%) across the near-UV to mid-IR range, sapphire is highly adaptable to various debonding methods and ideally suited for laser debonding



#### 高机械强度 High Mechanical Strength

蓝宝石的高机械强度，可为核心晶圆及芯片稳定提供机械支撑

Sapphire's high mechanical strength can provide stable mechanical support for core wafers and chips.

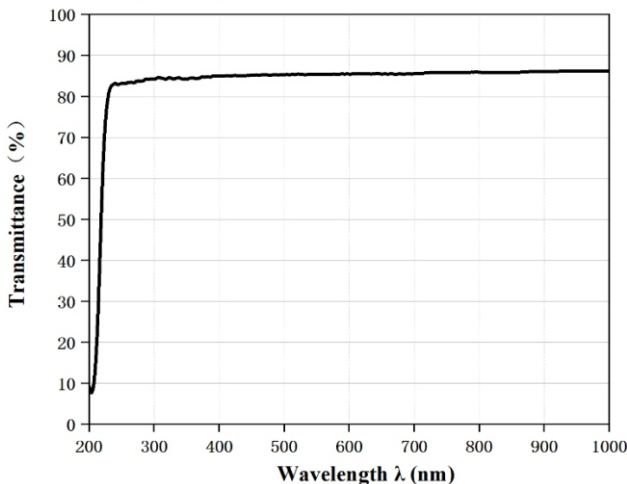


#### 材料均匀性 Material Uniformity

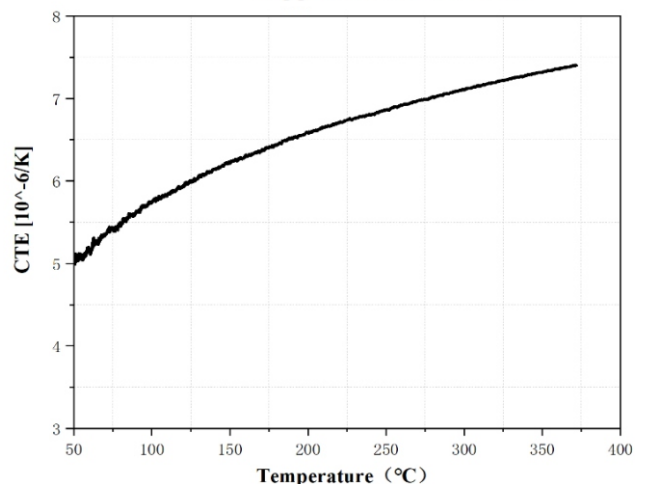
蓝宝石的材料均匀性，可有效避免封装制程中因载盘应力分布不均造成的局部变形

Sapphire's material uniformity can effectively avoid local deformation caused by uneven stress distribution of the carrier during the packaging process.

Transmittance  $\lambda=200\text{nm}$  to  $1000\text{nm}$

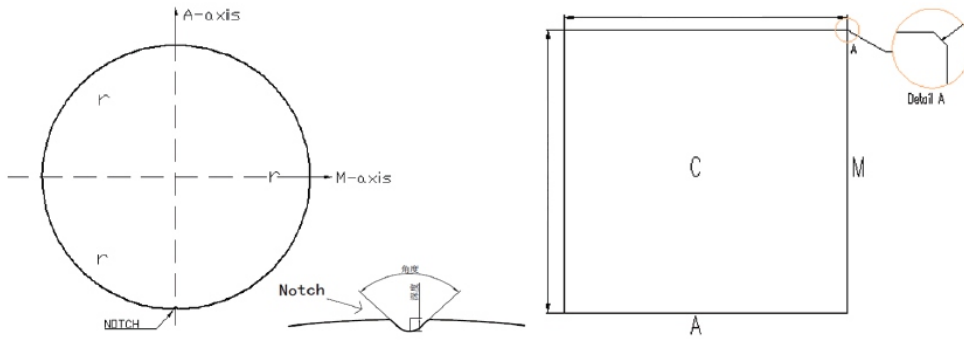


Sapphire CTE (C-axis)



# 蓝宝石载盘规格

## Specifications of Sapphire Carrier



类型 (Type)	规格 (Specification)
Wafer	8", 12"; THK 0.7~2mm
Panel	100*100~510*515mm; THK 0.7~2mm

特性 (Property)	数值 (Value)		
	—	Φ300mm	310*310mm
总厚度变化 (TTV)	Standard	≤ 3μm	≤ 5μm
	Advanced	≤ 2μm	≤ 3μm
厚度偏差 (Thickness Tolerances)	Standard	±0.010mm	±0.015mm
	Advanced	±0.005mm	±0.010mm
翘曲度 (Warp)	Standard	≤ 100μm	
	Advanced	≤ 50μm	
表面粗糙度 (Ra)	-	< 1.0nm	
外观质量 (Appearance Quality)	Standard	Scratch / Dig: 60/40	
	Advanced	Scratch / Dig: 40/20	

\*大尺寸蓝宝石载盘的具体规格可根据客户需求定制。  
Specific specs for large-size sapphire carrier can be customized according to customer requirement.

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- Obtain E-brochure manually by scanning the QR code on the right, or visit the download center of TDG official website (<https://www.tdgcore.com>).



# 先进封装载盘性能矩阵

## Advanced Packaging Carrier Performance Matrix

特性 (Property)	玻璃 (Glass)	透明陶瓷 (Transparent Ceramic)	蓝宝石 (Sapphire)
热膨胀系数 (CTE, $10^{-6}/K$ )	3.3-9	6-8	5.6 @20°C $\perp$ C; 6.6 @20°C //C 7.7 @300°C $\perp$ C; 7.0 @300°C //C
热导率 (Thermal Conductivity, W/m·K)	1-1.5	15-30	$\perp$ C 35; //C 40
透过率 (Transmittance, %)	> 90	>65	>83% @300~1200nm
杨氏模量 (Young's Modulus, GPa)	80-163	330-400	345-420
维氏硬度 (Vickers HV)	500~600	1500-2000	1800-2200
抗弯强度 (Bending Strength, Mpa)	50-200	200-400	$\perp$ C 1540; //C 1030
抗压强度 (Compressive Strength, Mpa)	500-1000	2000-3500	2000-2900
莫氏硬度 (Mohs hardness)	5.5~7	8	9
断裂模量 (MOR, Mpa)	~100	~300	350 ~ 690
密度 (Density, g/cm <sup>3</sup> )	2.2-2.8	3.6-3.9	3.98

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