

# Saint-Gobain Crystals Sapphire

## The Clear Advantage for EO-IR Window Solutions

- Largest area optical sapphire in the world
- Extremely hard, durable and scratch resistant
- Broadband transmission from UV to visible to IR wavelengths up to 5 microns
- AR Coatings, Heater & EMI Grids readily available



Sapphire aerospace window applications:

- Forward Looking Infra-Red (FLIR) systems
- Targeting systems
- Reconnaissance and surveillance systems
- Sight window



# Sapphire The Clear Advantage for EO-IR Window Solutions

## Sapphire windows protect onboard imaging, sensing and targeting systems while allowing broadband transmission

### Saint-Gobain Sapphire Windows:

- Currently used in both commercial and protection applications
- Configured in an external pod / helicopter turret / optics shroud on fuselage
- Sapphire desired for impact resistance and high strength to thickness ratio, for a durable, lighter weight window structure when compared to alternative materials

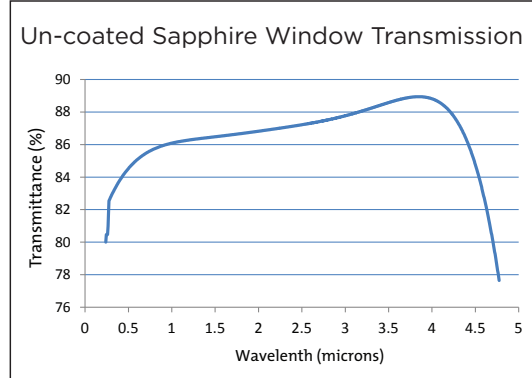
### Finishing Capabilities:

- Surface Quality: Down to 10-5 Scratch-Dig
- Surface Flatness: High Precision up to  $1/20\lambda$
- Parallelism: Down to 1 arc second

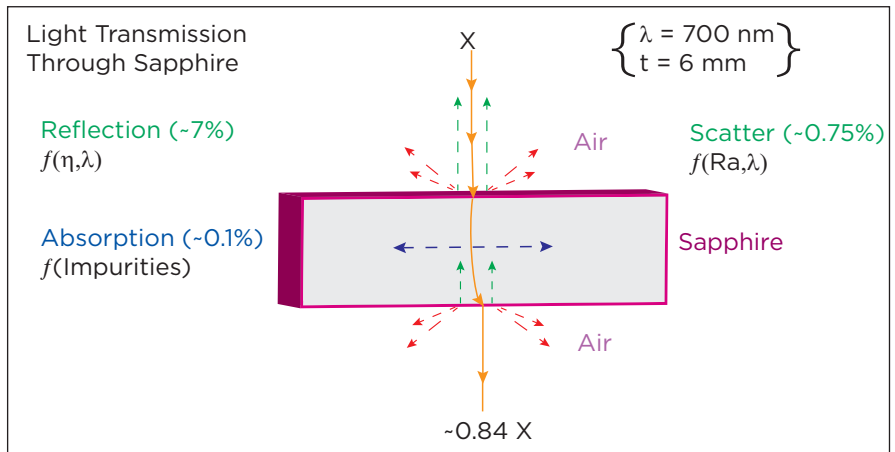
### Window Solution Options:

- Metal grid for de-icing
- Electromagnetic Interference (EMI) shielding
- Anti reflective (AR) coating for improved transmission
  - Transmission >90% easily achieved

| Mechanical Properties                        | Sapphire | ZnS  |
|--|----------|------|
| Density (g/mL)                               | 3.98     | 4.08 |
| Hardness (Knoop, GPa)                        | 22       | 2.5  |
| Fracture Toughness (MPa*m <sup>.5</sup> )    | 2        | 1    |
| Flexural Strength (MPa, 20°C)                | 300-1000 | 100  |
| Young's Modulus (Gpa, 20°C, parallel C-axis) | 435      | 74   |



Example of window with metal grid



ISO 9001:2008 and ISO14001:2004 Certified

Manufacturer reserves the right to alter specifications.

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