

# SAPPHIRE ASPHERES FOR HIGH-POWER 1 $\mu$ m LASER

Coherent, a global leader in laser optics solutions, introduces aspheric sapphire optics for the high-power 1 micron market. Sapphire is an alternative to fused silica with exceptional material properties for high-power performance, including increased thermal conductivity, refractive index, and hardness. Used in demanding 1 micron cutting and welding applications, Coherent's sapphire aspheres enable smaller, lighter designs with fewer lenses and longer lifetime, thus reducing system operating costs.



## FEATURES

- Sapphire aspheres decrease contamination effects on laser performance, meaning less downtime for cleaning and servicing.
- Improved thermal conductivity offers significant advantage over fused silica.
- High quality water-cooled mounts are recommended for high power.
- Higher power handling allows for reduced clear aperture size compared to fused silica.
- Higher index of refraction allows for shallower lenses compared to fused silica.
- Laser induced focal shift is 50% of fused silica for the same absorbed power.
- Laser induced focal shift rise time is three times faster than that of fused silica.

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## Manufacturing Capabilities

Power	1 fringe @ 0.6328 $\mu$ m
Irregularity	1 fringe @ 0.6328 $\mu$ m
Coating	Antireflection coatings from UV - 5 $\mu$ m
Local CC Radius	> 100 mm
Max Radial Slope	20°
Roughness	< 30 Å RMS
Diameter	10 - 100 mm
Overall Thickness	< 8 mm (Recommended)
Edge Thickness	> 2 mm
ETV	< 12.7 $\mu$ m
Scratch/Dig	40/20

Tested at 20 kW with 31 mm beam diameter

## Material Properties

Refractive Index @ 1.06 $\mu$ m	1.75
dn/dT @ 1.06 $\mu$ m	13x10 <sup>-6</sup> /°C
Linear Expansion Coefficient	~5x10 <sup>-6</sup> /°C
Absorption @ 1.06 $\mu$ m	< 300 ppm/cm
Scatter	~0%/cm
Knoop Hardness	1500 kg/mm <sup>2</sup>
Thermal Conductivity	27 W/(m*K)