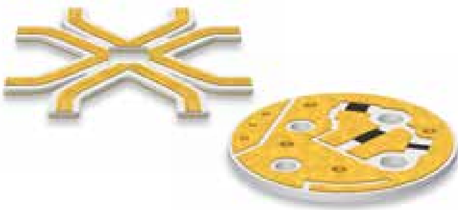
Laser Machining/Drilling

Our computer-controlled lasers can create features of virtually any planar shape and can deliver positional accuracies of 0.001" (0.0254mm) or better over areas as large as 8"x8" (203.2mm x 203.2mm). The laser is extremely flexible and permits close location of features with considerable layout flexibility.

Types of Ceramic Materials

Materials covered include Alumina, Beryllium Oxide, Aluminum Nitride, Ferrite and Fused Silica/Quartz.

Machined Features/Special Shapes



Virtually any planar shape can be cut in ceramic substrates. These shapes include circles, curves, rectangles, polygons, rounded thin slots, etc. Since ceramics are strong but brittle, the designer should consider a radius as large as practical on the inside corners. All inside corners will need to have a minimum of 0.003" (0.0762mm) radius due to the laser beam diameter. Rounding inside corners can reduce chipping and cracking. Laser machining next to conductor lines should be pulled back from edge by 0.001" or 0.0254mm minimum.

Minimum cut slot width: 0.004"
Corner radius: 0.004" typ.
HAZ is presented when laser drilling is involved.

Dual Beam Lasers

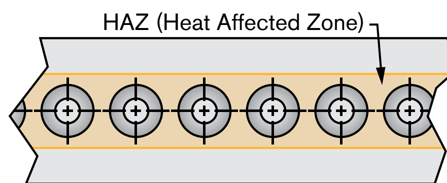
Backside Burnishing Treatment

ATP continues to offer a backside burnishing treatment that will minimize burrs, tails and post laser slags on the backside of substrates. This treatment can be used when laser cutting through gold on backsides of substrates. This cost effective process could also improve adhesion and eliminate the need for customers to "roughen up" the surface of the components themselves before epoxy bonding.

Backside burnishing treatment should not be confused with ATP's Fractal Fasten technology, see Fractal Fasten technology page. Please contact ATP Sales for further information on the Backside Burnishing Treatment.

Annealing

High temperature annealing for Alumina-based substrates is also offered. This can increase ceramic flexural strength, improve adhesion and reduce internal stresses.



Top View

Handling and Cleaning

Laser protective coating is applied to protect material surface finishes and parts during the laser process. Laser protective coating also guards against adhesion of "slag" to material surfaces. Slag buildup is primarily found on the beam exit side of the substrate and is removed after laser processing.

Tolerances for Machining/Drilling

The tolerances provided below will generally produce the most cost effective laser processing. Tighter tolerances can be achieved at an increase in cost and lead time. Spacing between via holes should be a minimum of one via diameter. Typical laser diameter is 0.00375" (0.095mm).

Substrate Thickness	Typical Taper	Typical Diameter Tolerance	Typical Diameter
0.003" (0.0762mm)	0.00075" (0.0190mm)	±0.00075" (0.0190mm)	0.004" (0.101mm)
0.004" (0.101mm)	0.00075" (0.0190mm)	±0.00075" (0.0190mm)	0.004" (0.101mm)
0.005" (0.127mm)	0.001" (0.0254mm)	±0.001" (0.0254mm)	0.005" (0.127mm)
0.010" (0.254mm)	0.001" (0.0254mm)	±0.001" (0.0254mm)	0.010" (0.254mm)
0.015" (0.381mm)	0.0015" (0.0381mm)	±0.0015" (0.0381mm)	0.015" (0.381mm)
0.020" (0.508mm)	0.002" (0.0508mm)	±0.002" (0.0508mm)	0.020" (0.508mm)
0.025" (0.635mm)	0.0025" (0.0635mm)	±0.0025" (0.0635mm)	0.025" (0.635mm)

Other taper and diameter tolerances available upon request. Please contact our sales department for more information.