



APPLIED LASER TECHNOLOGY, INC.



CO<sub>2</sub> Laser Processing | YAG Laser Trimming | Excimer Laser Processing | Diamond Sawing | R&D



**Applied Laser Technology® (ALT)** has been a leader in the laser processing industry since 1987. Our team's average 30 years of experience affords our customers decades of knowledge in the laser processing of microelectronic materials.

At ALT, our objective is to provide an innovative response to the constantly changing needs of a complex industry whose exponential growth presents never-ending challenges.

Our team's dedication, our adherence to quality, and our belief in providing exceptional customer service, are the reasons ALT remains at the forefront of the microelectronics industry. We look forward to working with you and becoming an integral part of your manufacturing process.

## APPLIED LASER TECHNOLOGY, INC



- 1 Exceptional Quality
- 2 Exceptional Customer Service
- 3 Exceptional Partnerships

### Quality

Quality is our primary objective. Today's growing industry demands lower production costs and faster turn-around. ALT's staff of engineers and material specialists have designed proprietary means of increasing capacity and speed, while continuing to maintain our rigid and strict quality guidelines.

All incoming material is inspected for camber, cracking, thickness, and over-all quality. Substrates are then specially treated to prevent surface damage or material deposits during laser processing. Once completed, each order is thoroughly inspected by our Quality Assurance staff, in accordance with the latest MIL standard. After all necessary inspections are complete, orders are released for shipping.



[www.altinc.com](http://www.altinc.com)

## Customer Service

One of the core fundamentals of this company will always be customer service. Our customer service is the best in the industry. We pride ourselves on same day quotes, samples, and the fastest turn-around in the industry.

We offer consultation by any one of our knowledgeable sales representatives. Each boasting decades of technical experience with various material compositions. If you are looking to increase yields by multi-up arrays, ALT is capable of providing several possible solutions to minimize costs and maximize profits.

## Research & Development

Our R&D team specializes in developing custom processes to tackle your most challenging projects. Processes are continually evaluated and developed to improve quality, reduce costs, and optimize yields. The key elements in our R&D services are flexibility and expertise, delivered through a 5 step process:

## OUR 5 STEP R&D PROCESS

1

### INITIAL OVERVIEW

Initial consultation and appraisal of your needs is complimentary. We gladly offer our independent advice and guidance on the most suitable options for your project.

2

### PROOF OF CONCEPT

We provide simple and quick trials to determine the best quality, most efficient method of processing, and the least cost for your specific project. Customers can, without expensive and time-consuming tooling, obtain a quick answer as to whether a concept might be taken further.

3

### PROTOTYPING

Following development trials, we produce prototype substrates conforming to the agreed upon specifications. These substrates are sent to your facility for evaluation and testing.

4

### PRODUCTION

Final adjustments are made based on feedback from testing. Production runs of the project begin.

5

### REEVALUATION

In conjunction with our customers, we continually reevaluate design and production processes, to achieve better quality, higher yields, and shorter turn-around times.

## CO<sub>2</sub> Laser Processing

CO<sub>2</sub> laser processing is our largest department. We offer single head lasers for optical post processing and quad heads for high volume production runs. Each laser has been customized by our technicians to produce the best quality beam. With our current configuration, we have eliminated any deformities and inconsistencies that can occur with standard laser systems.

An advantage of using ALT is our ability to provide several support processes for CO<sub>2</sub> laser processing. These vital tools supplement and enhance the quality of products our customers receive. Such tools include:

- High powered optical alignment cameras capable of holding +/- .001" from the outside edge of any metallized circuit.
- For convenience, DWG/DXF files can easily be converted into machine code, eliminating possible errors and fees associated with programming.
- Protective coating is applied to incoming material, preventing surface abrasions, and laser generated residue on substrates.
- High temperature annealing is available to remove residue and material stress in alumina, allowing for better adhesion of conductor ink.
- Post process ball milling is also a support process ALT offers. Substrates of various materials can be safely milled to smooth outer edges, facilitating edge metallization.

### Standard Tolerance from Substrate Edge

From to	Scribe Line	Hole Center	Machine Feature
Scribed Edge	+/- 3 mils	+/- 3 mils	+/- 3 mils
Alignment Flat / Machined Edge	+/- 1 mil	+/- 1 mil	+/- 1 mil
As-Fired Edge	+/- 10 mils	+/- 10 mils	+/- 10 mils

### Standard Internal Location Tolerance

From to	Scribe Line Center	Hole Center	Machined Edge
Center of Scribe	+/- 1 mil	+/- 1 mil	+/- 1 mil
Hole Center	+/- 1 mil	+/- 1 mil	+/- 1 mil
Machined Edge	+/- 1 mil	+/- 1 mil	+/- 1 mil

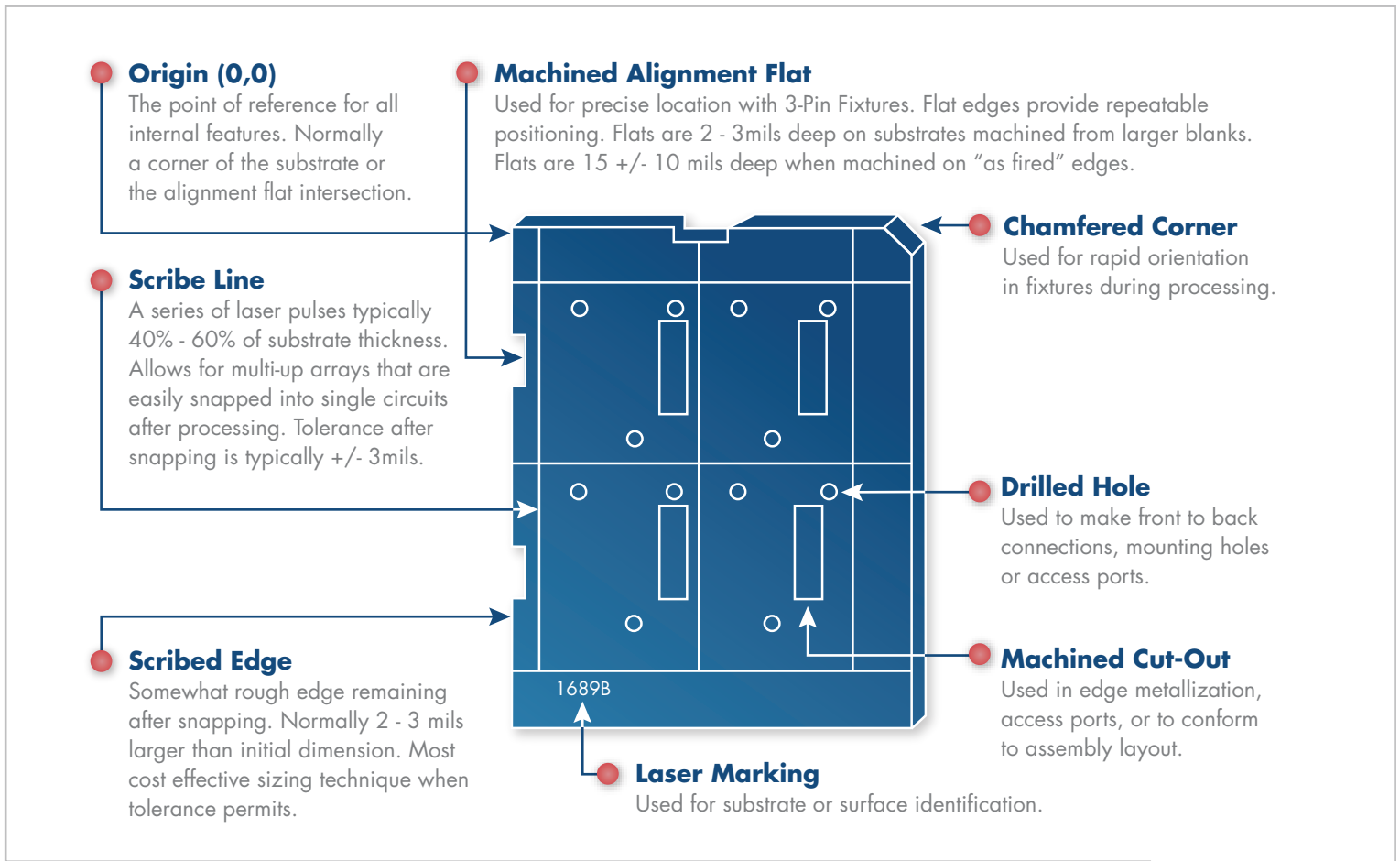
### Standard Hole Tolerance and Taper

Material Thickness	Tolerance	Maximum Taper
5 - 30 mils	+/- 1 mils	2 mils
31 - 60 mils	+/- 2 mils	3 mils
60 - 100 mils	+/- 3 mils	4 mils

\*Measurements at laser exit using optical comparator or pin guage

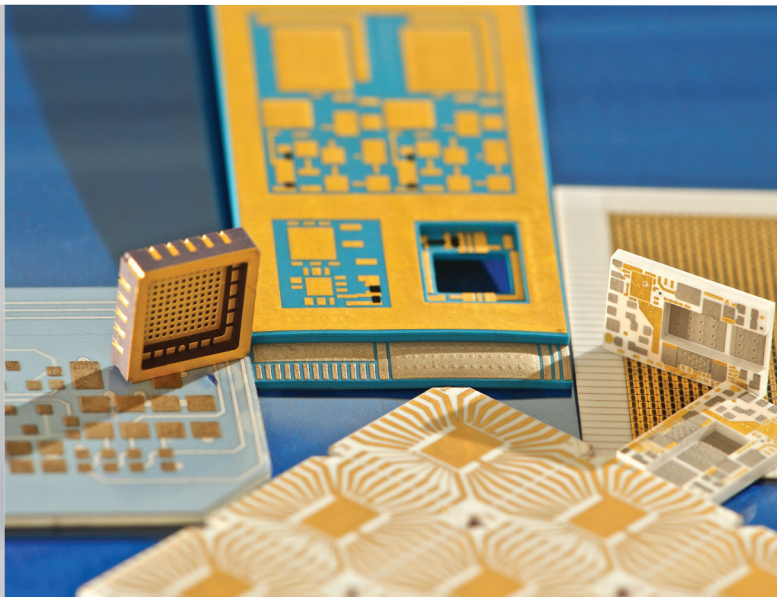
\*Dependent on material types

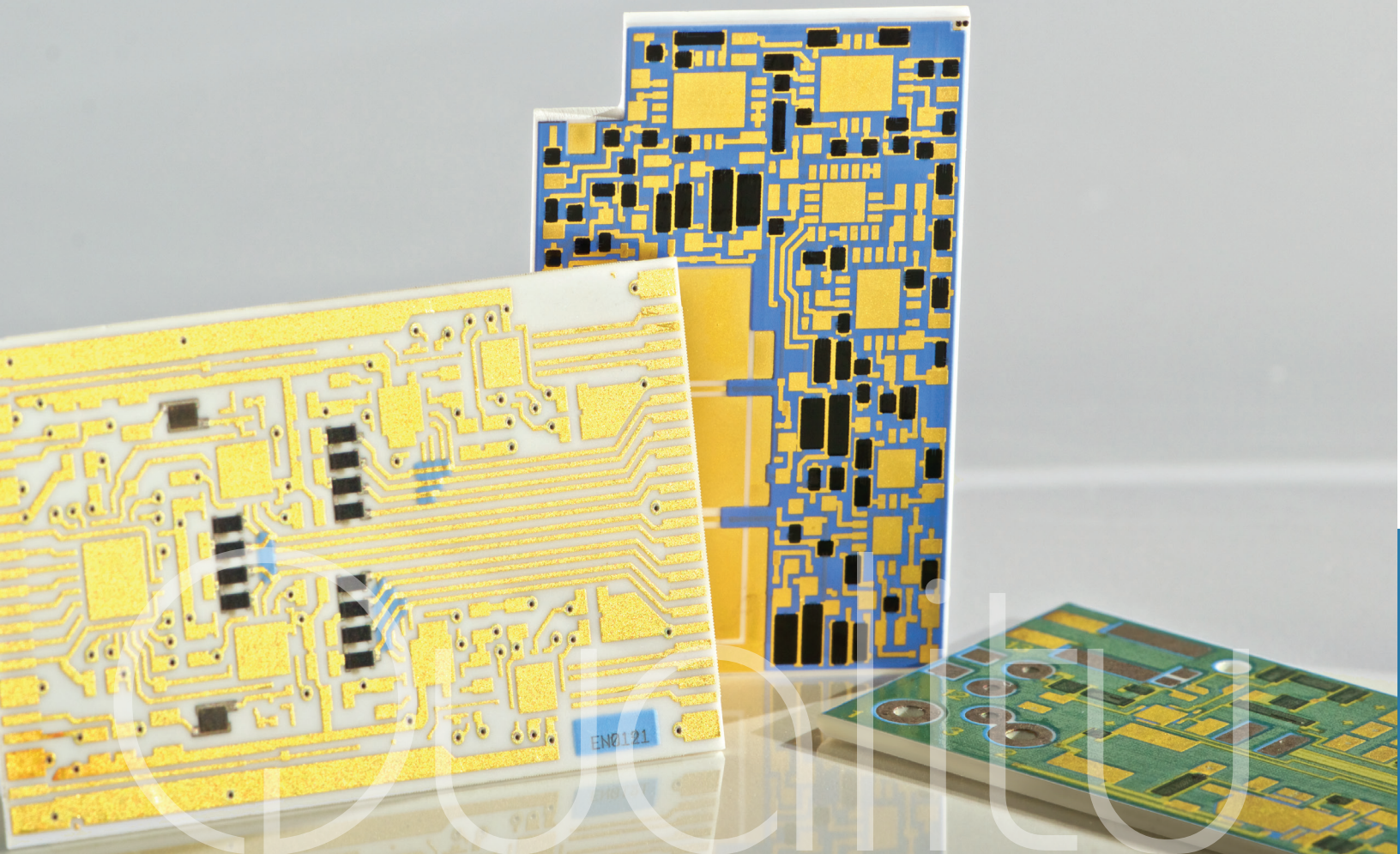




## CO<sub>2</sub> Laser Processing Materials

- Alumina based ceramics – 91% opaque, 96% and 99.6%
- High & Low transfer tape
- High thermally conductive compositions of Beryllium Oxide and Aluminum Nitride
- High dielectric constant materials: Sapphire, Quartz and Fused Silica
- Soft materials used for gaskets and insulators: Rubber, Vinyl, Teflon, Polyimide, Duroid
- Flex Circuit industry materials: "Kapton", Adhesives
- Epoxy preform materials
- Plastics and Polycarbonates
- Printed circuit board materials: FR-4, G-10
- Metals: Stainless Steel, Cold Rolled Steel, Soft Steel, HYMU 80, Kovar





## YAG Laser Trimming

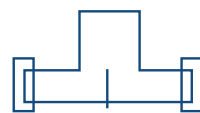
ALT's low power YAG trimmers are capable of active and passive trimming of thick and thin film resistors. Ranges include 1 Milliohm to 1 Gigohm with an accuracy of  $\pm 0.05\%$ .

Our laser trimmers come complete with a read and write system that monitors accuracy, percent yield, and final trim values. Final trim values can be provided upon customer request. Other trimming processes include: scan trimming, plated tie bar removal, serializing, marking, and cutting thin metals.

## YAG Laser Trimming Materials

- 96% Alumina
- 99.6% Alumina
- Aluminum Nitride
- Beryllium Oxide
- FR-4
- FR-4: Prepreg Materials

## YAG Laser Trimming Process



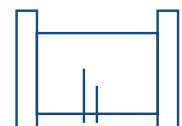
PLUNGE



L-TRIM



SERPENTINE



DOUBLE PLUNGE



MEASURE-PREDICT  
L-TRIM



MEASURE-PREDICT  
PLUNGE



## Diamond Sawing

The superior edge quality a diamond saw provides is no comparison to the standard laser pulsed edges from scribing. This process induces no stress on substrates and provides a high-quality edge, free of particles. Using the latest state-of-the-art diamond saws, ALT is capable of dicing dimensions as small as .015" x .015" x .005".

### Diamond Sawing Materials

- Advanced Ceramics (green and fired)
- Aluminum Nitride
- Beryllium Oxide
- Copper
- Quartz / Optical Glass
- Ferrite
- Lithium Niobate
- Aluminum Nitride
- Sapphire
- Silicon
- Piezoceramic & Piezoelectric Materials (PZT)
- Polyurethane
- Gallium Arsenide (GaAs)

## Excimer Laser Processing

With current advances in medical technology, the need for micro-laser processing has risen dramatically. ALT's Excimer lasers provide the best method for controlled depth ablation of polymers and plastics. The ability to control depth in microns provides an easy and cost effective method for removing excess material, exposing leads, pads, and removing oxide coatings.

An Excimer Laser generates nanosecond pulses, and is nearly always operated in the UV spectral region. The UV light from this laser is well absorbed by biological matter and organic compounds. Rather than burning or cutting material, the Excimer Laser adds enough energy to disrupt the molecular bonds of the surface and effectively disintegrates it in a tightly controlled manner.

### Excimer Laser Processing Materials

- Adhesives
- Kaptons
- Mylar
- Nylon
- Parylene
- Polyimide
- Polyurethane
- Aluminum Nitride .005" thick

If you have a material not listed, please let us know and we'll be happy to process a sample for your evaluation.



# Satisfaction

## Comments from Our Customers

ALT is the best supplier on my approved vendor list. I've worked with ALT for over 20 years and I can always count on quick response and A+ quality.

— Ben

I would like to thank your company and staff for your exceptional efforts with our ongoing operations. Your team provides immediate response to inquiries and quick turn which have been critical to our growth.

ALT's Quality and consistency of workmanship allows us to confidently take on new projects and opportunities.

We consider ALT to be an integral part of our business model and look forward to continued success in the future.

— Mark

The service at ALT is consistently dependable. Fast and accurate quoting combined with on-time deliveries makes for a combination that is second to none.

— Dale



APPLIED LASER TECHNOLOGY, INC.

Tel 503.641.4400

Fax 503.641.6696

sales@altinc.com

www.altinc.com

14155 SW Brigadoon Ct. Beaverton, OR 97005

ALT is an outstanding example of what customer service providers should be. You have expedited our products daily for the last 15 years and we are very lucky to call you one of our Key Suppliers. We truly appreciate your expertise. We thank you for all your efforts and look forward to another 15 years of great products and service.

— Glynis

I can always count on ALT – their willingness to help, along with their excellent quality is why I have been a loyal customer for the past 20 years!

— Jeanie

My preferred provider for ceramic substrates is Applied Laser Technology due to their excellent technical expertise and customer service that goes well beyond the norm.

— Scott

Applied Laser Technology has gone far and above our expectations, always doing their best to meet our needs and requirements. ALT is easy to work with and will do what it takes to keep their customers happy.

— Saul

