

Sierra Proto Express

Q U A L I T Y

T E C H N O L O G Y



D E L I V E R Y

S E R V I C E

A Premiere Full Service PCB Company



1108 West Evelyn Avenue
Sunnyvale, CA 94086
Tel: 800-763-7503
Fax: 408-735-1408
www.protoexpress.com
files@protoexpress.com

Dear Customers:

Here is our new vision to service you better.

Our new campaign

Welcome to the Future of PCBs

may be considered a big statement for a small company. But remember that every big company was once a small entity with a big idea. Our vision is to identify the big challenges that our PCB customers foresee and create innovative and cost effective solutions for them. Four outstanding results of our customer focused R&D effort are on the next page.

We found our most forward-looking customers were seeking solutions to these daunting technical challenges. Over the last two years we invested heavily in equipment, people and processes to successfully find those solutions. Now we are offering them to the rest of the design community to improve the electronic industry for everyone.

We realize we don't control the whole PCB Universe, but we definitely own a small part of it and our wish is to service our part of that Universe and grow it with the customers with similar needs. If you have the same need, we invite you to become our partners in success.

I have one more request. If you have ideas that can help us service you better, please list them on our web site. We will work on them in priority of their popular demand. So go ahead make yourself heard!

Thank you for your business and your interest in Sierra Proto Express. Together, let's make our Universe better.

Best Regards,

Ken Bahl
President, Sierra Proto Express

COMPANY HISTORY

Sierra Proto Express was founded by Ken Bahl in 1986 with the vision to become the premier full service prototype PCB manufacturer in the United States.

An Unwavering Commitment to service excellence over the last 18 years has enabled us to fulfill that vision. We knew that service excellence is never an accident. It is always the result of high intentions, sincere effort, intelligent direction and skillful execution. With these thoughts we set out to create a growth organization and the result was Sierra Circuits, Inc., dba *Sierra Proto Express*.

A business idea is worthwhile only if it provides value for its customers. We believe that our success is tied simply to **making our customers successful—whatever it takes**. For example, we continuously work with our best customers to identify future trends and then we set out to build the capabilities to meet those needs. So, when our customers are ready for their technological leap, so are we.

Through the various cycles of the PCB Industry, *Sierra Proto Express* has been able to consistently provide unparalleled Quality, Technology, Delivery and Price by following three overarching principles, they are:

1. Continuous Investment in Equipment, People and Process.

- In the last 5 years we invested over \$15 million in new equipment
- In 2004 we spent \$1 million in R&D
- Doubled our team of account managers to better serve our customers

2. Focus on Financial Stability.

- We have never had an unprofitable year in our existence
- In 2004 we profitably increased our sales by over 40%

3. Unwavering Commitment to Our Customers.

- In 2004 we increased our on-time performance to 99%+
- Developed new technologies based on our customers' needs today and in the future

We fully intend to continue this effort to service you.



4 INDUSTRY PROBLEMS OUR R&D TEAM HAS SOLVED

1

High Reliability Boards

There are a lot of applications in the world today which require that the boards must not fail under use. Some of the applications in which this need exists are in space, aeronautical, military, transportation, and medical businesses.

To meet this need our R&D department created a "Hi Rel" printed circuit board which is unsurpassed in its reliability. This board is capable of withstanding up to 2000 cycles from -40°C to 145°C (normal board may withstand 120-300 cycles) and withhold up to 30 cycles at 570°F (three times that of the new Lead Free T288 Test requirements.)

Even low Tg 135°C FR-4 sample boards survived 1800 cycles far beyond the 120 cycles typical in the industry. Such a product has never been available in the market. The current failure rates experienced in such applications are unacceptable and losses are astronomical. Sierra Proto Express has solved this problem and is offering this opportunity to businesses to increase their profitability.



2

High Reliability Lead Free Boards

We all know that the European initiative for Lead Free boards is about to shake up the electronics industry. There will be a global impact on potential reliability problems because of the significant increase in the temperature of the Lead Free soldering process.



The new Lead Free process is significantly hotter (300°C) and 25 seconds overall longer (counting extended cool down time) than the normal lead solder cycle.

This extra heat and dwell time of Lead Free assembly process will delaminate (destroy) a normal FR-4 175 Tg circuit board. It is also well documented and known that the extra thermal stress imposed on the via will cause premature cracking, opens and intermittent failures in copper hole wall.

The future of the businesses which serve European and Asian markets is at risk.

Sierra Proto Express has a solution in its high reliability plating process combined with high Td Lead Free laminate.

3

Super Burn-in Boards for All Applications

Manufacturers of Burn-in Boards struggle with many issues. Some of the issues are: small pitch copper wicking, high current distribution problems, maximum finger insertion thickness of .062", longevity at elevated temperatures, thermal cycle cracking of the vias and CAF shorting problems.

Sierra Proto Express has a new approach to Burn-in Boards. Through extensive R&D, we now offer a super Burn-in Board service. This new technology features a very high maximum operating temperature of 180°C with a Td of 364°C, and extremely low CAF growth. The super Burn-in Board also has a higher resistance to copper wicking from the drilled hole to the copper traces allowing fine pitch sockets and very low moisture absorption.

Utilizing our new high reliability technology our Burn-in Boards exhibit superior thermal-via cycle

life, utilizing the HATS thermal cycle testers of over 2000 cycles from -45°C to 145°C. Compare that to 300 test cycles for a normal polyimide laminate!

Sierra Proto Express has also added heavy copper technology to Burn-in Boards with copper thickness of up to 8 oz inner layers and 12 oz outer layers.

For more advanced boards we also offer multilevel copper. The copper can be 8 oz for the power section and 1 oz for the signal traces all on the same layer. Now a single 6 oz copper layer can replace the three and four normal redundant 1 oz layers used to distribute power.

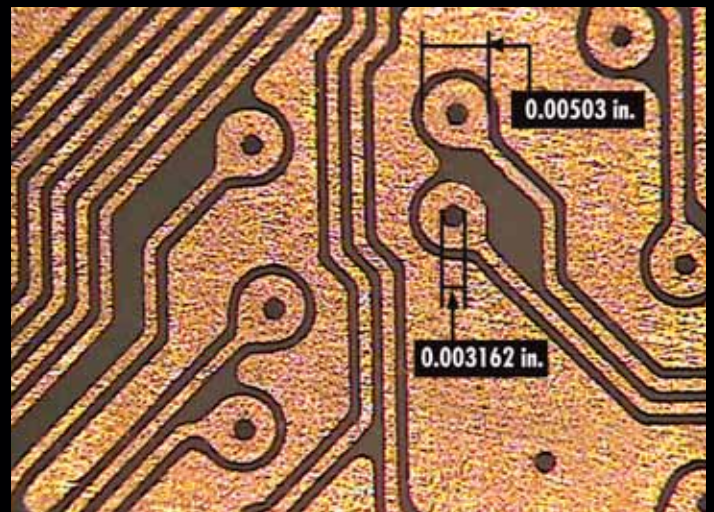
Let Sierra Proto Express help you improve your next Burn-in Board design.



4

New Micro Circuit Board Technology and Micro HDI

Sierra Proto Express has invested in a Micro Electronics R&D facility and has established processes for doing 1 mil (25 microns) line and space on different rigid and flex materials. These processes have been achieved on various Lead-free substrates and finishes, including RoHS and WEEE compliant wire bondable products. SPE has produced 1 mil line and space on single sided, double sided and multi-layer designs. Typical markets for these technologies are Chip Carrier Packages, Micro HDI Circuits and Micro Flex Circuits, as well as any other HDI designs with Blind and Buried vias in sub 2 mil line spacing requirements. Sierra is currently accepting projects for this technology and has the capability to produce 2 mil finished holes in 12 layer PCB's which do not exceed 35 mils overall thickness.



1 mil lines and space, 2 mil via in 1/2 oz. copper.

MARKETS WE SERVE

High Reliability PCBs

Boards which must not fail under extreme environment & critical applications.

Hi Tech Burn-in Boards

Burn-in boards for .5mm pitch sockets and boards with high current carrying capacity and very high CAF resistance.

Micro Circuits & HDI High Density Chip Carriers

Very fine traces of 1 mil & very small vias of 2 mils for high density, high tech products.

Quick-Turn Standard Technology PCBs

Quick-turn/same-day to 10 day service, medium volume orders and full service tooling and testing, 1-10 layers.

All of these can be suitable for the Lead Free mandate.



Capabilities

CAPABILITIES

Capabilities By Market:

1 High Reliability

- Most materials
- Thermal cycles up to 2000
- Boards that must not fail

2 Burn-in Boards

- 14 Layers - .062" thick
- .5 mm pitch
- Step-down connectors
- Special materials
- Large sizes up to 24" x 28"
- High Reliability

3 High Technology Boards

- Differential Impedance
- Up to 30 Layers
- Lead Free process
- Most materials
- Sequential lamination
- Blind and buried vias
- Filled vias
- Holes in pads
- Milspec
- Metal core
- Carbon paste
- Plated edges
- Plated edge holes
- Milled edges
- Heavy Copper

4 Standard Technology Boards

- 1 to 10 Layers
- Trace/Space 5/5
- Same day for 2 Layers
- 24 hours to 10 Days
- Lead Free process

5 Micro Circuits

- Lines to 1 mil
- Vias to 2 mils
- Stacked via
- Blind & Buried micro vias
- Rigid Materials
- High frequency materials
- Flex materials
- HDI build
- Post pad technology

Capabilities By Process:

Front-end CAM

- Fully automated Tooling System

Imaging—Laser Direct Imaging

- Trace/Space 2/2

Multilayer Lamination

- Up to 30 Layers
- Sequential lamination
- Automated registration

Drilling

- Smart drilling, .006 mil holes

Etching

- Trace/Space 2/2

Plating

- Aspect ratio 10+

Soldermask

- LPI, Dry Film

Silkscreen

- Automated
- 5 mil lines

Fabrication

- Route and retain
- Scoring

Electrical Test

- .5mm pitch, Flying probe and High Density grid

Quality and Production Control Information System

- Pro-CIM

Materials

- Lead Free FR-4
- Polyimides
- Rogers 4003 & 4350
- Most rigid materials



1 2 REASONS FOR CHOOSING SIERRA AS YOUR PARTNER IN PCBs

Our Attributes

Your Benefit

1. An obsessive attention to detail, and a Culture of Quality. A 99% acceptance rate.	<i>You can be assured of getting what you want, when you want it.</i>
2. Evidence of Quality documents sent with every order.	<i>You can ship your product to your customers with confidence.</i>
3. ISO, MilSpec, and NASA Certified.	<i>You can be sure, and assure your customers, that you are dealing with a quality vendor.</i>
4. Ability to manufacture a full range of PCB Technologies. Recently invested \$15 Million in high tech manufacturing equipment and process technology.	<i>You can satisfy your complete competitive and technical needs with one PCB Vendor.</i>
5. Culture of Accuracy and Speed. 99%+ On-Time Delivery.	<i>You will meet your schedule.</i>
6. Aggressive, competitive pricing and a commitment to cost reduction through innovation.	<i>You will stay within your budget and receive value for your money.</i>
7. A full range of products and pricing from \$34 No Touch to Custom Pricing High Technology.	<i>You can select the level of service that matches your technology and pricing needs.</i>
8. An Account Executive assigned for every account, who is available 24 hours a day.	<i>Whether you are a large or small customer you have someone assigned to service your needs.</i>
9. You have access to our technical support staff 24 hours a day. Web quotes and order placement is available 24 hours a day. Sales office is open 7 A.M. to 6 P.M. PST.	<i>You can place an order and get around the clock technical help at your convenience.</i>
10. 500 years of collective PCB Manufacturing management experience. Technical support reviews every design.	<i>Your designs will be more manufacturable and cost effective after our engineers work with you.</i>
11. Same Ownership for 19 years.	<i>You can count on us through thick & thin.</i>
12. An Unconditional Guarantee.	<i>We are committed to your total satisfaction. If there is ever any issue with our product or delivery — WE WILL MAKE IT RIGHT. No excuses. No hassles.</i>

Continuous Improvement Is In Our DNA



TESTIMONIALS

Feedback

Our customer feedback is a great testimonial to the outstanding service we provide.

Dear Sierra Proto Express,

Silver Engineering Inc. has almost exclusively been working with Sierra Proto Express for the last 5 years. Sierra Proto Express has produced many designs for us. The team at Sierra Proto Express, has been great to work with, from sales to engineering, the entire staff has been helpful and informative. Your staff has treated our company as an extension of their company, which is a nice working relationship. The printed circuit boards that we have received have been good quality boards. We are very pleased to be working with Sierra Proto Express.

— **Janet Clifford, Sr. Engineering Technician,**
PCB Designer

“...Outstanding! ...I got a great quote from your website...I showed your boards to some PCB Designers and they were very impressed with the quality and the 3 day turn price.

So I rate Sierra as
Quality: A+
Accuracy: A+
Delivery: A+
Cost: A+

You will always have my business if you maintain this level of service.”

— **Consultant, Milwaukee, WI**

“The prototypes were great. They are production quality product. Excellent work!”

— **Director Engineering, Rohnert Park, CA**

“...your whole process is fantastic. From ordering the boards, submitting the Gerber files, tracking the progress of the order, shipping, delivery, packaging and all the way through to product quality, I must say you folks are first rate!”

— **Vice President/COO, New Hartford, NY**

“...in the past with other vendors the issues would get bogged down in the emails. However with your live support all my apprehensions have been laid to rest. I would most certainly recommend your service to my friends, ex colleagues in the industry whenever I get a chance to do so.”

— **Embedded Systems Engineer, Jackson, MS**

“...you guys do great work. Excellent quality, reasonable cost and always on-time delivery. Keep it up.”

— **President, Aspen, CO**

“..Thank you and your team. I appreciate your boards and service and we will have another design for you in the next couple of weeks...”

— **CEO, United Kingdom**

Sierra Proto Express has been servicing companies like these since 1986:

Lockheed Martin
Apple Computer
Power Design Services
The Boeing Company
National Semiconductor
ICE Circuit Connections
Battelle Laboratories
GE-Intelogix
Silver Engineering
Naval Undersea Warfare
Hewlett Packard
Liberty Laboratories
University of Texas
at Austin
Kyocera Wireless
Vision Research
Massachusetts Institute
of Technology
Marvell Semiconductor
Arichell Technologies
Stanford University
Fairchild Semiconductor
Formfactor

Texas Instruments
Pole Zero Corporation
XM Satellite Radio
Circuit Shop
Rockwell Automation
Logic Product
Development
NASA
Transwitch
Brandt Electronics
Rice University
Aeroastro
Global Payment Systems
Meade Instruments
Motorola
Orbital Sciences
UC Berkeley
United Defense
Vishay Siliconix
Microsoft
Colorado VNET
Honeywell

OUR TAG LINE

Quality

Creation of Our Tag Line

When we set out to create our tag line, our first choice was:

"Quality On-Time"

A few of us said that similar tag lines are "dime a dozen," and that surely customers would be numb to it. Then we looked back and saw our on-time delivery record of 99.5% and our customer returns <.5% and decided that we DESERVE to use this as our tag line. The customers who are already working with us know that this tag line is true and new customers can verify it within their first or second order.

We also spoke with a few customers to confirm if we were justified in using this tag line and they agreed with us.

We cannot think of any three words that can describe us better. Our company is built for quality and organized for speed. Each day we manufacture dozens of highly complex designs on 24 hour turns.

Quality On-Time is our culture, it is our DNA. We believe a company cannot produce quality on-time year after year unless those values have been programmed from its inception, like they have at Sierra Proto Express.



OUR MISSION

To meet and exceed our customers' expectations for Quality¹, Technology², Delivery³ and Price⁴ while achieving the highest levels of customer service⁵ and satisfaction⁶.

- 1** Anyone can say "Quality," but we know how to back it up. Its not just that we are ISO 9001:2000 certified, Mil-Spec certified, or NASA flight board certified. Every PCB we make comes with an Evidence of Quality report showing exactly what we mean when we say "Quality."
- 2** Direct imaging, smart drilling and reverse pulse plating are a few reasons our technology is both cutting-edge and cost effective for our customers.
- 3** We have a documented on-time delivery of 99%+.
- 4** Starting from \$32 for a 2-layer No Touch board all the way to a custom priced special technology board, all our products are competitively priced.
- 5** From the moment you call us, we will assign you a Personal Service Representative to ensure you always receive reliable service.
- 6** Your unquestionable satisfaction is our goal, backed by our guarantee.



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