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Precision Driven Performance

(BJG 52134



# Through The Years 234







#### Customers





#### Testimonials

"Green Circuits has been a critical supplier and innovator, delivering with speed and quality on short notice"

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Christopher Williams, Chairman & CEO

**Counter Drone Protection** 





#### GreenCircuits Precision Driven Performance

#### **About Our Facility**

60k ft<sup>2</sup> Facility with High-End Machines

170+ Employees with 2 Flexible Shifts

Full Turnkey Solutions

### Manufacturing Facility & Equipment

- 5 Full SMT Lines (Juki 2080/2060)
  + SPI (Solder Paste Inspection)
- 5 Reflow Machines with Nitrogen Capability
- Full Functional Testing Area Includes
  - 3 Flying Probe Machines,
  - 2 Burn-In Chambers (Walk-In)
  - AOI machines

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• Temperature Cycling Chambers (-70 to +200C)

- 3D Nikon X-ray with 2,400x Magnification & Analysis Capabilities
- 3 Selective Solder Machines
- 2 BGA Rework Stations
- Dedicated Program Manager/ Engineering Support

## Core Strengths

- Quick-Turn PCB Assemblies
  - Rapid Process Engineering
  - Automated Product Assembly at the Board & System Level
- Accelerating Time to Market
  - Quotes as fast as 2 hours
  - Board Level Assembly on 1-3 Day Turns
  - 24/7 Service and Support
- Scalability
  - Flexible Production Capability
  - Capacity to Ramp from Small Prototype to Full-Scale Production
- Quality & Certifications
  - Proven Quality Management System



## Design Services

Capable of flex cable, flex circuit, digital and analog design, Green Circuits provides a modular PCB design to meet your specific PCB layout requirements. From circuit board layout to documentation and verification, Green Circuits utilizes state-of-the-art technology for testing. Services Include:

- PCB layout
- Schematic capture
- Netlist transaction
- Interactive/auto-routing
- EMC consulting

#### Capabilities

• Hand Assembly for Small/Prototype Volume

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- Automated Pick-N-Place
- SMT, Thru-hole, & Mixed Technology
- BGAs, Micro-BGA, QFN, Fine Pitch Devices
- BGA 3D X-Ray & BGA Rework Station
- 0.30mm BGA, 01005 Size, PoP Packaging

- Flex & Rigid-Flex assembly
- Cable Assembly (Cable Harness)
- Press-Fit Connectors, EMI Shields, Cages
- ROHS Compliant
- Conformal Coating/BGA Underfill
- Barcode/Labeling/Board Serialization

## Nitrogen Reflow

**Improved Solder Quality:** Higher surface tension as well as less reoxidation of IC terminals will increase the wetted surface by 20% to 30%, resulting in increasing solder joint strength. Higher surface tension minimizes solder balling when using fine pitch solder paste. Less oxidation also improves the wetting on NiAu and bare copper solder lands.

**Enlarged Process Window:** The soldering process will be less sensitive to poor solderability and solder lands and component terminals, thereby improving the soldering BGA and CSP/LGA devices. This is more applicable for Pb-Free Assemblies that would be RoHS compliant.

## Hidden Benefits



Compared to air convection reflow, we discovered an additional benefit of void reduction when using nitrogen reflow.





Although utilizing nitrogen is an additional cost to Green, there is no extra cost to the customer as we believe the higher quality benefit to our process and customer's produce is worth it.



#### **Flying Probe Test**

Provides component/pcb level feedback before reaching the customer

#### **3D X-ray**

Ability to scan components that cannot be checked with visual inspection (BGA, LGA, QFN, leadless, ground pad, etc.)



Tests 100% for short and open

Find failure of components, incorrect components, wrong polarity

- Real time X-ray inspection
- Image analysis / enhancement
- Integrated CT acquisition

### Full Turnkey Assembly



### Integrated Assembly



### Flex and Rigid-Flex









### Rework (QFN, BGA, Cuts, Jumpers, etc.)

### Box Build



### Test Development/ Test Fixtures

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### Final Product



### Supply Chain & Logistics

**Custom Fabricated Part Procurement** 

Material Management

Smart Sourcing Techniques

**Order Fulfillment In & Out Logistics** 

ERP Systems (MRP)

Material Traceability

Just In Time (JIT)

Kanban

### Medical Device Case Study



The Plié 2.0 Experience

In 2005, this case came to Power Design Services (PDS) to help design and manufacture the bionic knee. PDS worked with their engineering to design and manufacture several revisions of the circuitry that would eventually power and control the bionic knee, now known as Plie 2.0.

The Plie 2.0 has been in production since 2008 and PDS is proud to continue to supply this company with the main PCBA monthly.

### **GPS for Wildlife Case Study**





This case came to Power Design Services in 2009 with a manufacturing issue. This company could not find a reliable, local printed circuit assembly partner to meet their small volume, high mix technology and short lead time requirements. Power Design Services (PDS) was able to meet the demands, take on the business and has since been a perfect solution.

This company is a leading electronics design and manufacturing company in northern California, specializing in miniature <u>GPS</u> tracking devices for wildlife research and management. Their product lines includes <u>GPS collars for small to large mammals</u>, solar powered miniature GPS for <u>birds</u>, reptiles and <u>mammals</u> and <u>automatic data acquisition systems</u>.

#### Wearable Devices Case Study

In the past few years, wearable devices have dominated the consumer electronic market. Items such as smart watches, wrist bands, hearing devices, mounted cameras, etc. have become very popular. The challenge with designing and manufacturing these products is SPACE. Everything is very compact, making it a challenge to fit components in a small working space. With our advanced technology and capabilities, Power Design Services and Green Circuits have been able to dominate this niche market and support the continued innovation of these product types.

Power Design Services can handle BGA's down to 0.30mm, 0201 component size, flex and rigid-flex circuit boards. We have worked with some major companies in this industry such as Fitbit, Harman, GoPro, Apple, Striiv and Intel.

### **Full Turnkey Solutions Case Study**

Power Design Services (PDS) helped Hiku launch its new wireless product. Hiku approached Power Design Services to help build the initial Beta units. The build was a success so Hiku came back to Power Design Services to help build the preproduction volume. With Power Design Services' rapid turn around time, local manufacturing site, and **full turnkey service**, it was an easy decision for Hiku to make.



Hiku is a start-up company based in San Jose, CA and was started by ex-Palm employees. According to Hiku founder, Rob Katcher, the basic use case is simple: if you're running low on something, hit the single button on the device to scan a barcode and the Hiku will send the data to the company's backend, where it will be parsed into the details of what it is you've scanned and then synced to your smart phone. In addition to the barcode scanning, there is a microphone whose data is parsed in the cloud.

### **Counter Drone Protection Case Study**



As a specialist in counter drone protection solutions for the military, government and commercial organizations, this Counter Drone solution provider relies on precise and timely PCB assembly services provided by Green Circuits.

Green Circuits has provided fast, quality, and high-volume manufacturing and assembly of complex circuit board development for system-critical components. Green Circuits delivered custom-orders in 5 business days or less. The Counter Drone Company's PCB project utilized Green Circuits' full turnkey design and engineering services, including PCB prototype development and assembly. Green Circuits is proud and honored to solve the CUAS mission.

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#### **Build In Quality**





We deliver trust, reliability, quality and service. Choosing Green Circuits as your EMS partner will get your product to market faster, scale to production volumes and allow you to focus on the core competencies of your business.





### THANK YOU! Are There Any Questions?

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