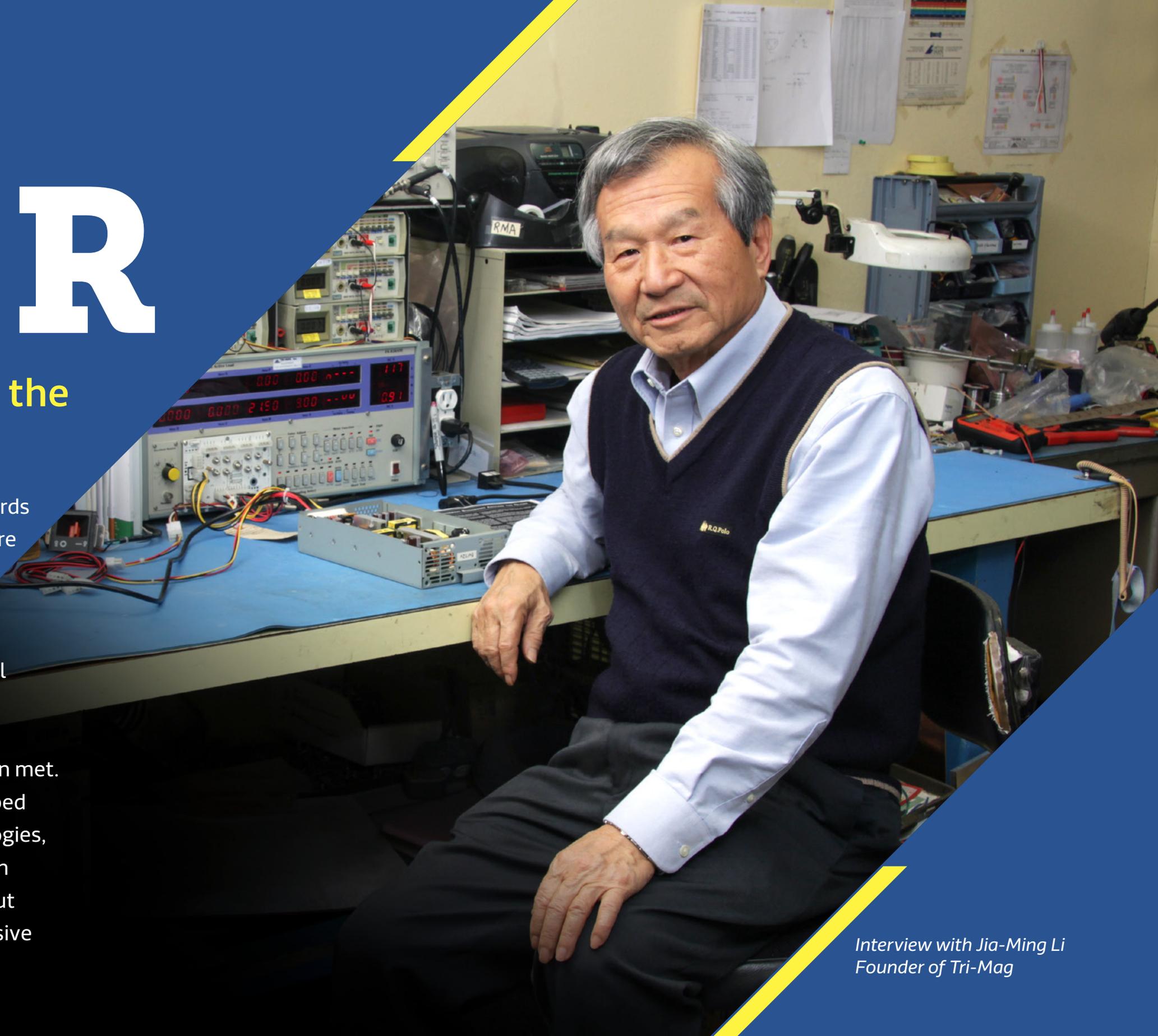


Customized POWER

Tri-Mag's Power Products Address the Industry's Toughest Challenges

The predominant trend across the tech industry is the move towards ever-shrinking form factors. With wearable devices becoming more popular and the IoT deployment underway, the need for small, seamlessly integrated devices has become a requirement. This poses a difficult set of challenges to all aspects of the industry, especially for power supplies; many of these small IoT devices will need to be continuously powered in order to be readily available for interconnectivity. For Tri-Mag, a leading power components manufacturer, these new, rigid power standards have already been met. The company's innovative power technologies have been developed to meet this specific set of challenges, from their patented topologies, to their proprietary components in their assemblies to ensure high reliability. EEWeb spoke with Jia-Ming Li, founder of Tri-Mag, about the company's unique product warranty, and some of the impressive performance stats for their power supplies.



*Interview with Jia-Ming Li
Founder of Tri-Mag*

Could you give us a little background about yourself and your role at Tri-Mag?

I started Tri-Mag Corporation in 1980. Before that, I worked for Sprague Electric Company, which was the largest component manufacturer in the world at the time. They were located in North Adams, Massachusetts. They have an operation in California and I was transferred to Visalia where I moved up to General Manager from a design engineer. In 1980, Sprague decided to move their operations to San Diego and I didn't want to move, so I stayed in Visalia and started Tri-Mag.

How did you come up with the name Tri-Mag?

I started the company with two other people from Sprague, and we wanted to specialize in magnetic products, so it felt appropriate to name it Tri-Mag.

What kind of industry trends have you noticed that you are trying to address with your product offering?

The overall industry trend is moving products towards smaller form factors

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with higher efficiency. The less power consumption the device uses and the less heat it generates, the more desirable it is nowadays. There is also a trend towards longer lifetime and warranty periods.

What are some of the challenges in providing solutions to meet these needs?

In order to meet these needs, you have to start with the design concept and topology. The topology is very important in this process; Tri-Mag has a patent on our topology because it reduces spikes and noise, which, in turn, decreases output filter components. It can reduce the component count, which reduces the size and power supply. The designs that produce fewer spikes exhibit less stress is placed on the MOSFET operation, which allows the use of low-voltage MOSFETs, meaning a higher reliability for the product.

Secondly, component selection is very important. You always have to use very good components—and some of them are quite small. We have selected the latest components that can be used for power supplies. This is directly related to the third important challenge, which is the PCB layout. The layout is crucial to solving the noise and EMI problems.

The fourth challenge is assembly technology. The assembly is important to achieve the goal of high reliability.

For example, through-hole component leads are bent/crimped on the solder-side of the board to ensure the highest quality (IPC-A-610 Class 3) soldered connection during the wave-soldering process. We also adhere very heavy components to the PCB to make sure it or nearby components are not damaged due to vibration. The heavy components are typically the transformers and electrolytic capacitor, so they must be bonded to the PCB and/or other components. After the assembly process, we make sure that we go through computer testing to test every component and function. The key components like transformers and magnetic inductors are made in-house so we can guarantee the required performance and quality specifications are met. We are also able to control the schedule for manufacturing and we applied a small, lean manufacturing style production line concept for more flexibility to adjust the production schedule, making it much easier to measure and control the quality and reliability.

We have quality control inspection as well that takes samples from the production line and they perform every test to compare to the original design detail to make sure the product meets the specifications of the original design. These processes are put in place to ensure that we achieve the required

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quality and performance standards that allow us to offer a ten-year warranty on many of our products. Proven design and manufacturing practices coupled with discerning component selection allow us to offer such a superior warranty over a standard two-year warranty.

You mentioned you had a patent on voltage spikes and noise—could you speak to how you were able to achieve this?

The goal was to reduce the spike because sometimes with the power supplies, the spikes can be quite high. They spike because of the transient response, which usually kills the MOSFET. In order to reduce these spikes, we implement capacitors and resistors in the circuit. However, this increases the amount of components on the board. If we can reduce the spike, then we can reduce the component count. Often, the spikes can be 800V, which is quite high. Our designs reduce these spikes to around 450V, which is a big difference.

Tri-Mag is the first power supply company to offer a ten-year warranty in the market.

In the world of power supplies, obviously LED lighting is quite popular now. Can you speak to some of the differences in designing a voltage source, which is what people typically look for, and a current source, which is what you typically look for in the LED market?

Most people use the LED driver as the constant current type power supply. The power supplies have two types: constant current and constant voltage. The smaller LEDs generally require constant current sources, while the larger LED arrays implement a constant voltage source.

For outdoor scoreboard displays, the power supplies must meet demanding temperature and humidity requirements. Tri-Mag provides power supplies for some of the scoreboard displays in the Chicago area. In the winter in Chicago, it can be negative 20 degrees and in the summer it can be upwards of 100 degrees. This is a big range in temperatures and the power supplies have to withstand this type of fluctuation. They must also be able to start in -20 degrees, or else it cannot power these displays. The humidity can also be an issue in the summertime in these urban areas, and the supplies must be able to withstand this type of humidity.

What is Tri-Mag's target market?

Tri-Mag does not target the low-cost market area. Our price is very competitive to the market, but we offer a much higher quality product, with a longer warranty period. Tri-Mag is the first power supply company to offer a ten-year warranty in the market.

There are new requirements from the US Department of Energy that states you have to meet Level 6 power supplies, and we are the first company to come out with these types of power supplies. The requirement to introduce the Level 6 status is February of 2016, but we have already met that. 

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