

## Strong R&D Capability and Engineering Excellence

Morningstar Corporation is a **world-leading supplier** of solar charge controllers & inverters—with over 2 million units installed, in over 112 countries around the world.

Morningstar is renowned for delivering the industry's best overall customer value. Our controllers & inverters have **set new standards in performance, innovative features, quality & reliability**. Our products are manufactured in a fully automated world-class ISO 9001 facility. Our Quality Control includes 100% functional testing on every product, using the latest computerized test equipment and processes.



Morningstar is continuously striving to maintain a high-level of innovation, R&D and engineering excellence. As part of our commitment to designing and building the industry's best-in-class products, **we have consistently invested in strengthening our R&D capabilities and staffing**. Furthermore, we hold several **advanced technology & manufacturing process patents** that set our products apart from the competition in quality, reliability, performance and above industry average operating life.

Our **World-Class Engineering** facility in Jessup, Maryland (USA) is home to our R&D lab. There we have a 30kW Grid-tied and a 5kW Off-grid PV system that we use for powering our building operations and for testing of our power electronics' components & products.

By leveraging **advanced tools, software & testing environments**, we are able to quickly and cost-effectively model, plan, construct and build Morningstar's cutting-edge products. Our team of engineers are able to work through mechanical & thermal designs and simulations, build advanced prototypes (using metals & plastics), and design on-site printed circuit board layouts. Our Engineering facility includes:

- An **Advanced Test Lab** – that includes scopes, analyzers and an extensive collection of diagnostic equipment for the development of our next-generation power electronics solutions. It also includes on-site printed circuit board layout facilities to expedite the development time of our products.
- A **State-of-the-Art Testing Area** – that includes the following testing tools:
  - EMI Chamber – completely isolated from exterior sources of noise, Morningstar's anechoic chamber is designed to completely absorb reflections of both sound and electromagnetic waves. The chamber simulates a quiet open-space of infinite dimension and enables us to run our products through a number of tests including, but not limited to, that which is required to be FCC Part 15 Subpart B / ICES-003 compliant.
  - Environmental Chamber – a stand-alone enclosure environment that our team uses to test the effects of various environmental parameters including, but not limited to: extreme temperatures, sudden & extreme temperature variations, moisture or relative humidity, vibrations, weathering, exposure to sunlight & salt spray.
  - Thermal Modeling Tools (including 3D CAD Software for mechanical & thermal design and product simulation) – to enhance Morningstar's prototyping design and tool creation processes.
  - Testing Center – that is equipped with an array of industry hardware (inverters, batteries, power supplies, etc.) used to optimize the operational performance of Morningstar's products.
- An **On-site Machine Shop** – which houses soldering, stripping and reflow equipment to further bolster Morningstar's advanced circuit board prototyping capabilities. We have a variety of tools and machines for prototype enclosure fabrication.

For over 20 years Morningstar's products have been recognized in international solar markets as the most advanced and highest-quality products available. Every year we invest 9% of our annual revenues towards strengthening our R&D capabilities. We will continue to invest in our people, processes, tools and R&D capabilities to maintain our high-quality reputation and technology leadership.