



# Enphase Solar. Maximum reliability.

Enphase microinverters shine in all kinds of weather. Enphase Solar is IP67 rated, meaning it can endure just about anything Mother Nature sends its way.





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# Solar inverters heat up from the inside out

There is a common misconception that inverters heat up from the outside in rather than the inside out. Solar inverters typically run at around 97% efficiency, which means that 3% of the power is converted to heat.



## **Thermal transfer: microinverters vs string inverters**

For a string inverter running at 5000W, 150W of heat must be dissipated to avoid thermal runaway. In contrast, for a microinverter running at 300W only 9W of heat needs to be dissipated.



## **Enphase microinverters shine in extreme conditions**

Due to low heat dissipation to surface area ratio, along with elegant mechanical design and distributed architecture, Enphase microinverters can withstand up to 65°C ambient temperature and 85°C internal operating temperature.



## **No heat-related failures**

For solar inverters that use cooling fans for internal temperature control, extreme heat introduces service disruption and failure risks. Microinverters are different, as long as world heat records don't get broken, they will consistently deliver high performance.



## **Enphase microinverters have world record heat covered**

According to the World Meteorological Organization, the highest temperature ever recorded was 56.7°C on 10 July 1913 in Death Valley, California, USA. Still a long way short of the 65°C that Enphase microinverters are engineered to withstand.



## **Fully potted with no moving parts**

In addition to standout thermal transfer, Enphase microinverters are protected by a double-insulated, corrosion resistant enclosure made of Noryl V0150B, a modified polymeric resin that meets the same performance standards as a genuine Multi Contact MC4 solar connector.



## **One million hours of reliability testing**

The highest level of environmental resilience is made possible because Enphase microinverter design incorporates more than one million hours of performance testing, and 15-years of applied reliability lessons learned from more than 34 million shipments.

# Evidence from the field

We leveraged data from the Bureau of Meteorology and our Enlighten servers to identify both the hottest days in Australian capital cities in 2020<sup>1</sup> and the corresponding maximum internal temperature of Enphase microinverters<sup>2</sup> in those locations.

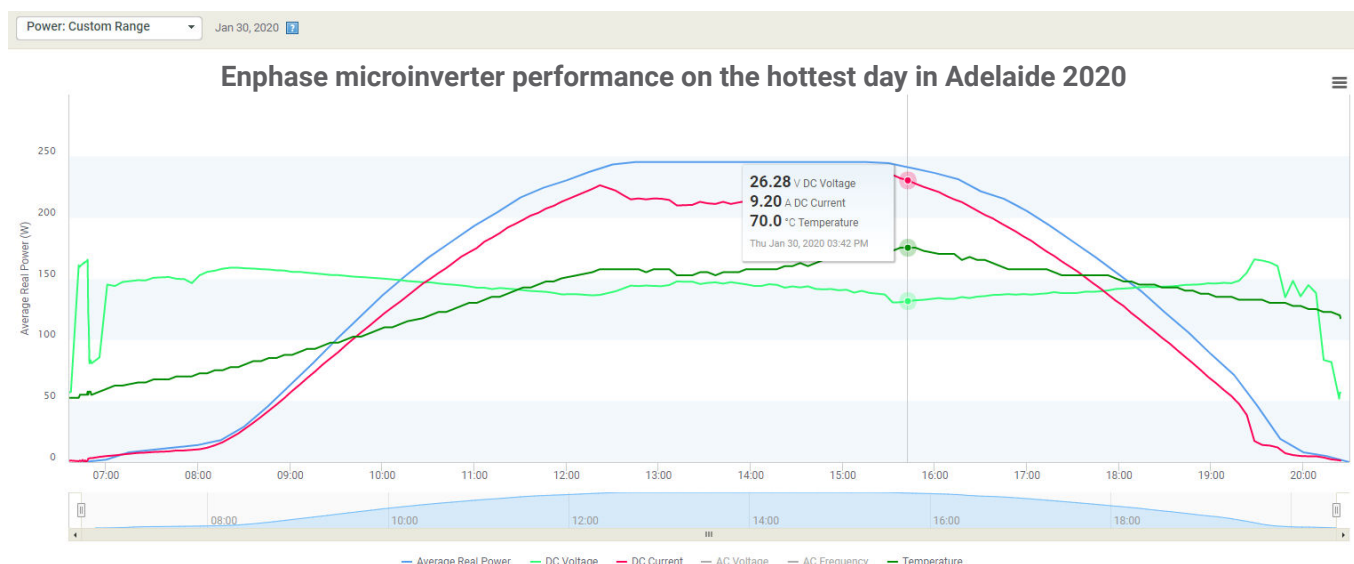
Date	Location	Max ambient temp <sup>1</sup>	Max microinverter temp <sup>2</sup>
4 Jan 2020	Penrith	48.9°C	63°C
31 Jan 2020	Melbourne	42.9°C	64°C
30 Jan 2020	Adelaide	43.9°C	70°C
4 Feb 2020	Perth	42.7°C	68°C
6 Dec 2020	Brisbane	43.5°C	52°C

## What the data shows

Hot ambient temperatures have less influence on the internal operating temperature of microinverters than cloud cover and wind speed. Hot days are often cloudy and windy, which means less power generation, better cooling, and lower internal temperatures. Sunny and still days have the biggest impact.

**The above is best evidenced in Adelaide, where the hottest day in 2020 happened to have clear skies:**

- You can see in the graph below that the internal temperature is more sensitive to the power being generated (internal heat) than the ambient temperature (external heat). This is particularly noticeable between 12:00 and 14:00, where the internal temperature actually decreases.
- The decrease in internal temperature is because the inverter is “clipping” and therefore operates at a lower DC current (higher DC voltage), which results in less heat being generated internally.



# Exceeding environmental testing requirements



**Power**



**Thermal cycling**



**Submersion time**

NEMA<sup>1</sup> | IP<sup>2</sup>

0% power on

No thermal cycling

30 mins of submersion

**Enphase**

**100% power on**

**Cycling between  
-30°C and +65°C**

**21 days of submersion**

<sup>1</sup>NEMA is a USA rating system that signifies a fixed enclosure's ability to withstand certain environmental conditions.

<sup>2</sup>IP is an international standard that classifies and rates the degree of protection provided by electrical enclosures.

# Global research and development in New Zealand



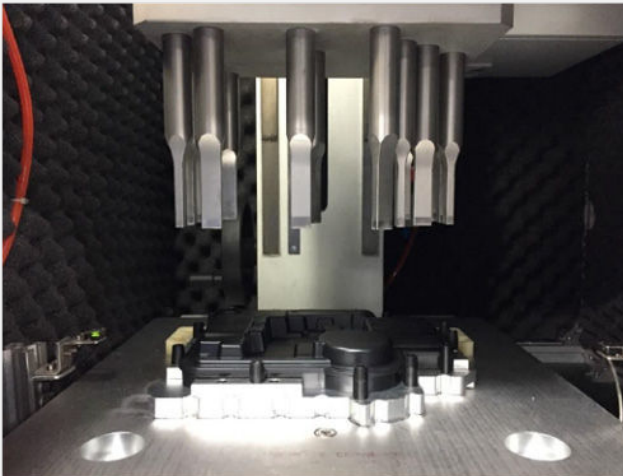
Based in Christchurch, New Zealand, our global R&D Centre has a team of 80+ engineers and support staff all focused on maximising the performance and reliability of Enphase solar and storage technology.

## Designing, building, and testing for quality



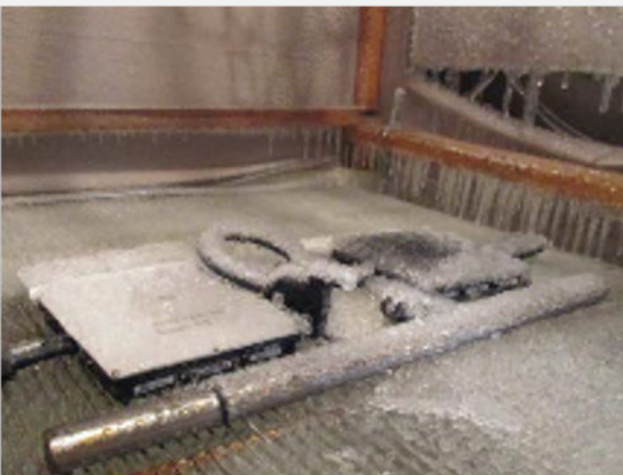
### Approved vendor list control

We source materials directly from the best suppliers – creating the best output for our customers around the world.



### Testing for a perfect score

All our products must score a 100% on in-circuit, functional, hipot, and burn-in tests to leave the factory.



### Ongoing reliability testing

Tests include thermal cycling (between  $-45^{\circ}\text{C}$  and  $+90^{\circ}\text{C}$  for over 1000 hours) and damp heat testing (in  $+85^{\circ}\text{C}$  and 85% relative humidity for 400 cycles).





## Enphase microinverter advantage

No fans. No moving parts. No high-voltage DC. Solid state solar.

Defect rate is just 0.05%, meaning only one microinverter will need to be replaced out of a batch of 2,000.

IP67 certified, microinverters can endure just about anything Mother Nature sends their way.

Meet even the strictest government safety requirements. Commonly chosen for daycares and schools, public spaces, and fire stations.

## Get more with Enphase



### Less than one minute wait time

We know how valuable your time is – that's why our technical support teams measure wait times in seconds – not minutes or hours.



### Self-service warranty claims

Save time and get reimbursed faster with self-service warranty claims and quick labour reimbursement payments.



### Engineering design review

Our engineers are readily available to assist you at the design stage to ensure a smooth installation and commissioning process.



### Additional sales and marketing resources

For the full Enphase Sales Playbook Series and a range of other marketing and sales resources, visit [go.enphase.com/winthejob](https://go.enphase.com/winthejob)

## We are here to help

Whatever your need, from technical or service assistance to sales and marketing strategy, Team Enphase is here to help where we can. Speak with your Regional Sales Manager to be connected with the rest of the Team.

Alternatively, feel free to reach out to [marketing\\_au@enphaseenergy.com](mailto:marketing_au@enphaseenergy.com)  
New to Enphase? Learn more at [enphase.com/au](https://enphase.com/au)

