



Ranked top performer in every individual test

*This is why Phono Solar is the first choice
for Australian Engineers and
Project Developers.*

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**By choosing vendors
with lower degradation levels
the likelihood of technical and
financial success for your
project is increased.**

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DNV-GL, the world's largest resource of certification and energy expertise, has released the 2016 PV Module Scorecard. The study aims to address the lack of publicly available long-term data on the reliability of solar panels.

Publicly available and high quality field data on the long-term operating performance of PV systems is limited. Additionally, field data takes many years to accumulate and by that time the technology has evolved. Increasingly high quality, independent lab data serves a critical role in evaluating PV module quality and long-term reliability.

The 2016 Scorecard evaluated thirteen manufacturers, including more than half of the world's 10 largest makers of PV modules. All product used in the study are commercially available PV modules that have already demonstrated compliance with required international safety standards. DNV-GL tested five major factors affecting deterioration and reliability over time: thermal cycling; dynamic mechanical load; damp heat; humidity freeze and Potential Induced Degradation (PID).



Excellent Performance in every test






**PV Module Reliability Scorecard*

2016 Reliability Scorecard results

- Only two manufacturers performed in the top group on every test: Kyocera and **Phono Solar**.
- Neither price nor top-tier ranking have been proven to indicate module quality or performance and industry concerns over cost reductions at the expense of module quality have persisted.
- The IEC 61215 PV module standard tests only identify modules that would be likely to fail within the first years in the field (defect screening). Common causes of failure such as Potential Induced Degradation (PID) aren't tested at all.
- With the IEC 61215 standard the manufacturer is free to select the small number of modules sent for testing.
- DNV-GL test to a higher level than IEC 61215, also test for PID and use only independently selected modules.

Manufacturers tested

Kyocera	Phono Solar	Q Cells
Trina	Jinko	JA Solar
REC	Hanwha	Tenksolar
Recom	ZNShine	Yingli
CSUN		

Reliability Test	Top Performing Results	Bottom Performing Results
 Thermal Cycling	-1.07%	-34.59%
 Damp Heat	-0.57%	-58.77%
 Humidity-Freeze	-0.13%	-4.10%
 Dynamic Mechanical Load	-0.18%	-7.28%
 Potential Induced Degradation (PID) -1kV	-0.47	-58.27