



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 PID (potential induced degradation).



Excellent Performance in every test






**PV Module Reliability Scorecard*

Key findings of the 2016 scorecard

- Two manufacturers performed in the top group on **every** test: Kyocera and **Phono Solar**.
- DNV-GL test to higher than Standard Certification (UL & IEC). The manufacturer is free to select the modules for Standard Certification. DNV-GL **randomly select** modules.
- Industry concerns over cost reductions at the expense of module quality have persisted as panel pricing has reduced. The DNV-GL Scorecard can help investors and developers generate quality-backed procurement strategies to ensure long-term project viability.

Manufacturers tested

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

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%
 PID (-1kV)	0.47	-58.27