



CIGS Solar Module

CIGS

Solar Module

North America



Sunside Solar, Inc.
17890 Castleton Street, Suite 138
City of Industry, CA 91748
Tel: 626-965-4228 • Fax: 626-965-4912
www.sunside.com

Manufactured By



Taiwan Headquarter
No. 19, Lane 118, Sec.2, Min Tsu Road,
Ping Chang City, Taoyuan, Taiwan, R.O.C.
Tel : 886-3-490-4111 • Fax : 886-3-490-5910
www.jennfeng.com



www.sunside.com

JF New Energy and Sunside Solar in Brief

Joint ventured with Sunside Solar, Inc. in North America, JF New Energy team, includes experts in the photovoltaic technology and PV panel production, offers customers the convenience and top-quality turn key solutions ranging from the standard crystalline silicon (c-Si) solar modules to the cost-efficient, high performance thin film modules based on the advanced copper indium gallium (de) selenide (CIGS) technology.

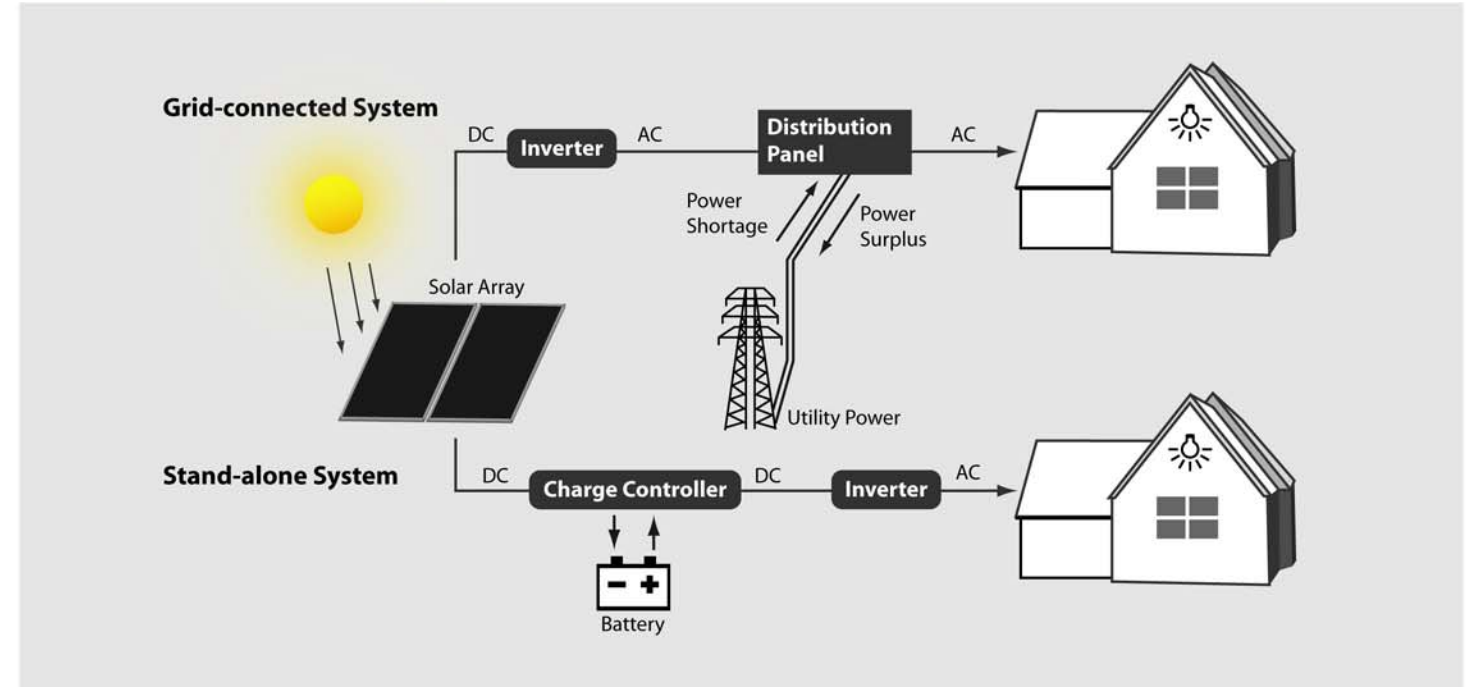
Together JF New Energy and Sunside Solar develop, manufacture and market high-quality solar modules, include our latest CIGS thin film modules, to suit all applications and preferences. From a single source provider, our products offer the top-quality, distinct advantages to residential owners, commercial building owners, real estate developers as well as utility-scale power stations.

With over 30 years of industrial manufacturing experience, JF New Energy stands for high quality products. Our reliable, industry-leading technology is based on highly modernized soldering, vacuuming, and laminating processes, precise output measurements and the stinging quality control management. Take the latest CIGS thin film module as an example. Our CIGS modules are manufactured in ISO 9001:2000 certified automatic production facilities which reassure customers top quality solar modules. As our management also says -- We never compromise.

JF/Sunside solar modules are a worthwhile investment. Cost-effective, High efficiency, superior power generation and guaranteed durability are the key factors for a profitable venture in PV systems. This is the reason why we are your ideal partner in the photovoltaic industry worldwide.



Solar Power System



CIGS Solar Module Features

- Thin Absorption Layer - Requires Less Raw Material
- High Energy Generation and Transfer Efficiency
- Long Life Expectancy
- Low Power Production Lost due to Thermo Effect
- Excellent Energy Generation in Low Light Condition

Applications

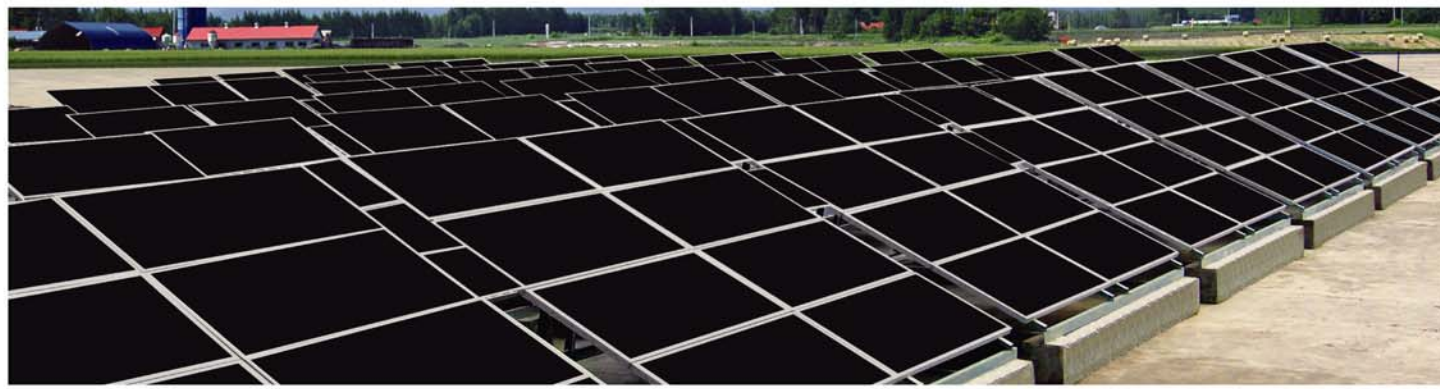
- Grid-tie Residential, Commercial & Industrial Rooftop
- Remote Area Cellular Towers & Residential Homes
- Utility-scale Solar Farm
- Building Integrated Photovoltaic (BIPV)
- RV & Marine Application
- Traffic Control & Portable Application

Quality Assurance

- 2 years Product Warranty on Material and Workmanship
- 10 years Performance Guarantee for 90% power output
- 20 years Performance Guarantee for 80% power output

Certificate

- IEC 62730 - Pending, ETA : May 2010
- IEC 61646 - Pending, ETA : May 2010
- ANSI/UL 1703 - Pending, ETA : March 2010

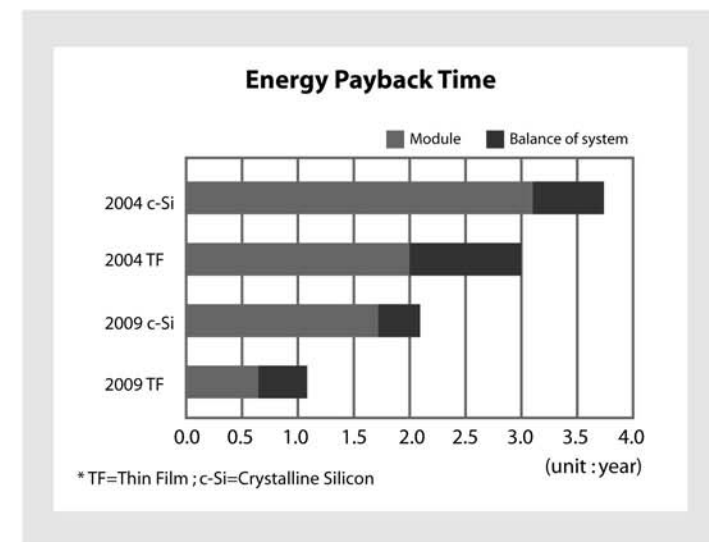
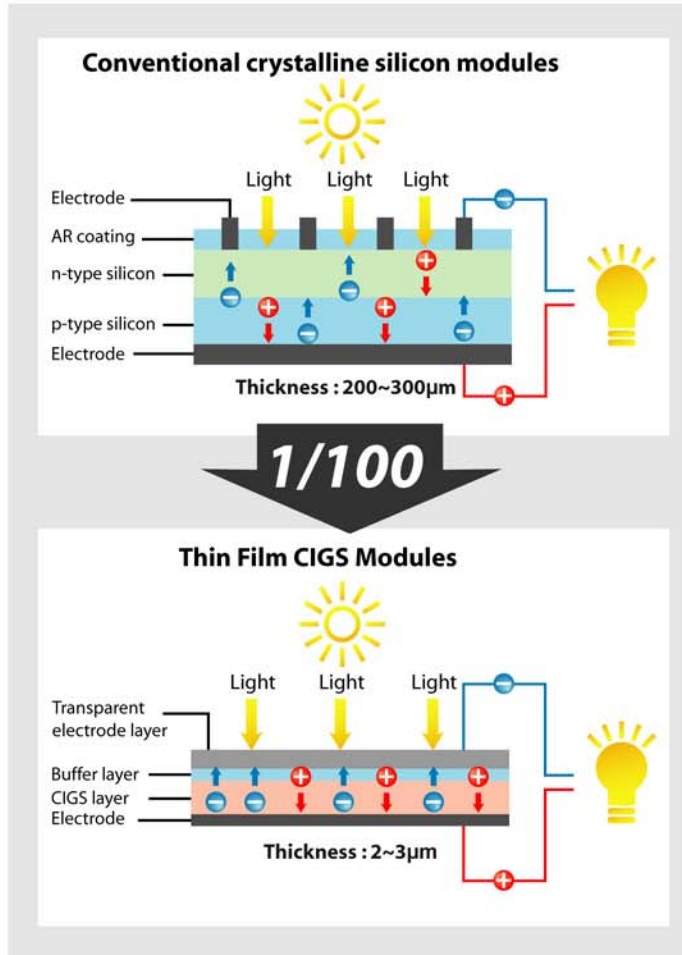


Environment-Friendly Product

With only 2~3 μm thickness at the absorption layer, JF/Sunside's CIGS thin film modules employ 98~99% less raw materials than the traditional c-Si solar cells (200~300 μm). In addition, due to the natural characteristics of CIGS, even with the low cost materials (such as the aluminum foil) as the substrate, our advanced thin film modules yield higher optical absorption coefficient than amorphous-silicon (a-Si) modules.

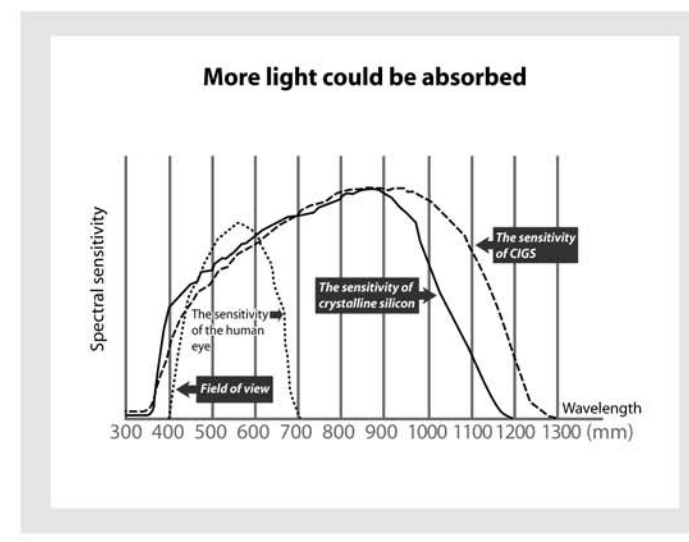
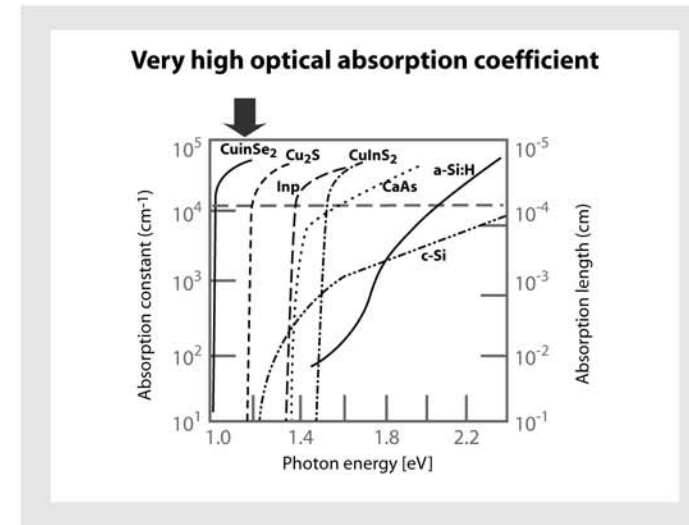
Shorter Energy Payback Time

"Energy Payback Time" refers to the time required for any energy producing system or device to produce as much energy as was required to manufacture. Take the production process of a c-Si module as an example. To make ingots used to produce solar wafers, the factory has to melt high-purity silicon at over 1,000C. This is not to mention the energy needed to process the silicon ingot into wafers, wafers into solar cells, and then combining solar cells into c-Si solar modules. In comparison, the crystallization process of CIGS module only requires a temperature of 600C. As a result, the overall energy consumption of manufacturing process is reduced greatly. Our study indicates, in general, the energy payback time of a CIGS module is approximately 50% less than a c-Si module.



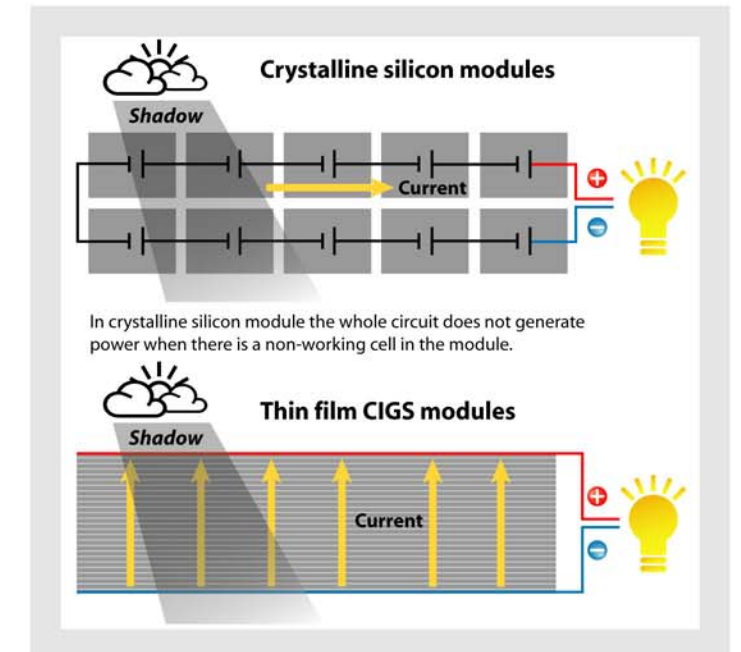
Generate More Power

In comparison to c-Si and a-Si modules, JF/Sunside CIGS module offers wider absorbency range with outstanding sensitivity in the low light condition. Thus, our CIGS module often produces more power than the comparable c-Si and a-Si panels under the same weather condition.



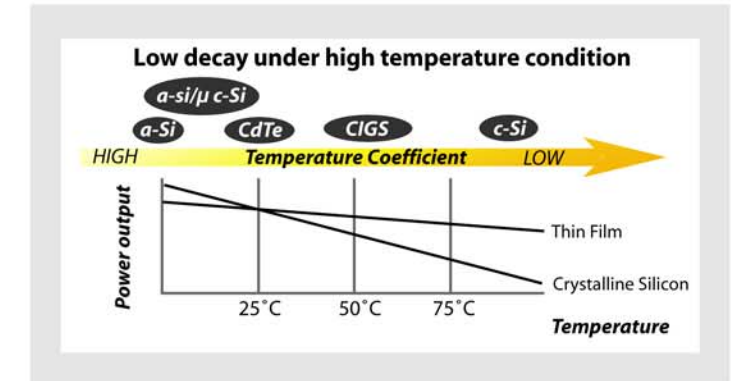
Power Generation under Shades

Unlike the series of parallel buses design of c-Si modules, JF/Sunside's CIGS thin film modules have the ability to generate electricity even when a module is partially shaded and/or under the low light condition. As a result, our CIGS module offers better sunlight-to-electricity generation throughout the day.



Lower Temperature Coefficient

High temperature affects the power output of a solar system. JF/Sunside's CIGS module offers lower temperature coefficient which dramatically reduces the impact of harsh environment on the power output during high temperature seasons.





PV Technology Comparison

PV-Tech	Lab Efficiency	Advantages	Disadvantages
Single-Si	24.7	<ul style="list-style-type: none"> • Mature technology • Highest efficiency • Non-toxic • Abundant Silicon Resource 	<ul style="list-style-type: none"> • Thickness limitation and cutting loss • Batch production only • Difficulty in process and cost reduction • Constrain from global supply shortage of solar grade Si
Poly-Si	20.3		
a-Si	9.5	<ul style="list-style-type: none"> • Suitable to BIPV • Able to accumulate more power generation • Easy to scale up 	<ul style="list-style-type: none"> • Low performance • Degradation after light absorption • High equipment & process cost
a-Si / uc-Si	11.7		
CdTe	16.5	<ul style="list-style-type: none"> • Easy to scale up production • Low cost • Easy to duplicate process 	<ul style="list-style-type: none"> • Concern over the toxicity of CdTe • No clear pathway to increase efficiency • Requires professional recycling
CIGS	19.9	<ul style="list-style-type: none"> • Highest performance among thin-films • Able to apply to flexible substrates • High production throughout • Suitable to BIPV • Generates more power under the same condition 	<ul style="list-style-type: none"> • Relatively higher cost in commercial process • Possible indium shortage in the long run

JF's Core Technology & Competitive Advantages

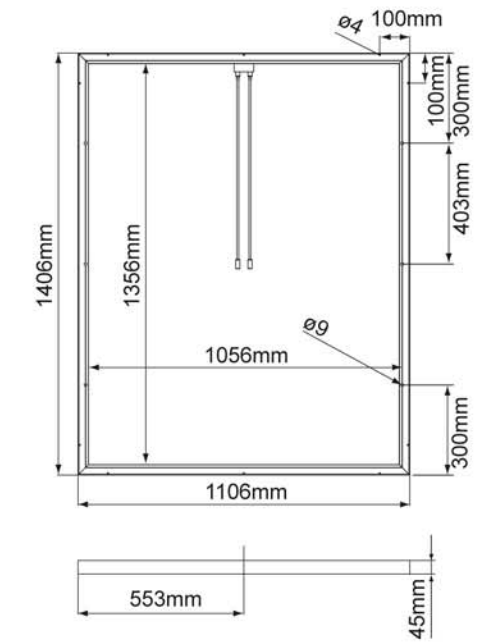
Core Technology

- Unique, Industry Leading Chemical Wet Process
- Cost Efficient Production Facility
- Extremely Low Material Usage in CIGS Layer
- Unique Nano-Particle and Formula Development
- Large Area Uniformity

Competitive advantages

- High Throughput and Yield Rate
- Ease of Production Expansion
- Low Temperature Coefficient of The Module
- Exceptionally Low Cost Per Watt (< \$1/Watt is expected in the near future)
- Great Energy Generation during Low Light Condition

PPF505 (145W CIGS Module)



Features :

- Thin Absorption Layer - Requires Less Raw Material
- High Energy Generation and Transfer Efficiency
- Long Life Expectancy
- Low Power Transmission Lost due to Thermo Effect
- Great Energy Generation during Low Light Condition
- Excellent Energy Generation in Low Light Condition

Specification :

Electrical Data	
Nominal peak power (Wp)	145 W
Nominal voltage (Vmp)	92.3 V
Nominal Current (Imp)	1.57 A
Open circuit voltage (Voc)	123 V
Short circuit current (Isc)	1.79 A
Max. system voltage for EU	1000 VDC
Max. system voltage for America	600 VDC
Storm resistance	Wind speed of 130km/h and safety factor of 3 (2400pa)
Operating temperature	- 40 to +80°C
Characteristics Data	
Frame	Silver anodized aluminum alloy
Glass	3.2mm tempered glass
Connection	IP65 Junction box with 2 terminals
Module size	1406 x 1106 x 45 mm
Weight	30 kg

STC:1000W/m², 25°C, AM1.5

IV-Curve :

