

WD-C-GF-090 Series Product Specifications

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1. Product Specifications

(1) WD-C-GF-090 Series Module Specifications

Table1. Physical Specifications

Property		Specification
Active Material of Cell		Amorphous silicon
Junction Type of Cell		Single-junction
Material for Encapsulation		Polyvinylbutyral (PVB), thickness: 0.76 mm
Front Cover		Float glass, thickness: 3.2 mm
Back Cover		Float glass, thickness: 3.2 mm
Wiring Material		Tin & silver coated copper ribbon, thickness: 0.1 mm
Junction Box	Bypass Diode	Yes
	IP Class	IP67
	Cable Length	Direction : Upward Length : 800 mm(+), 600 mm(-)
Connecting Cable/Plug		Rated voltage : 1000 V D.C. Temperature range : -40 to 85 °C Plug/Socket type : MC4 compatible, Ø 4 mm Cable cross section : 2.5 mm ²
Transparency		Semi-transparent, average transmittance (T%) at 400~800nm: 20±3.5%
Frame		No
Dimensions	Length	1300 mm +2/-1 mm
	Width	1100 mm +2/-1 mm
	Thickness	7.0 ± 0.5 mm (without junction box) 26.0 ± 1.0 mm (with junction box)
Weight		24.0 ± 1.0 Kg

Table 2. Certifications

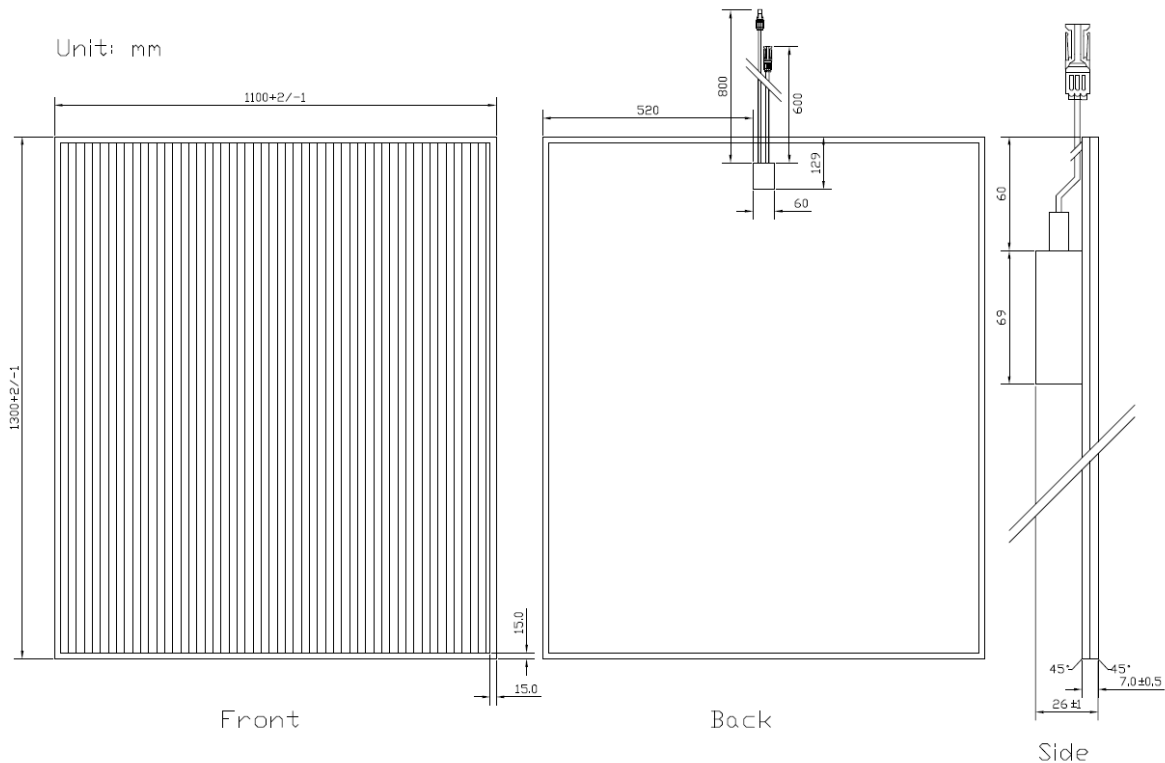
Certifications	
Certifications	EN/IEC 61646 EN/IEC 61730 application Class A
Remark: The module is tested under 2400 Pa (50 lb/ft ²) mechanical load or approximately to a wind speed of 130 km/h (80 mph) with certificated mounting solution. Other mounting solutions for higher mechanical loads tested in-house by SWS are also available and warranted.	

Table3. Electrical Specifications ^{*1,2,4,5}

Property			Specification							
Max. System Voltage			1000 V D.C. (IEC) 600 V D.C. (UL)							
Temperature Coefficients			Isc: +0.09 %/K Voc: -0.34 %/K Pmpp: -0.20 %/K							
Maximum Over-current Protection Rating			2 A							
Maximum Series Fuse Rating			2 A							
Module Classification	Power Grade	Power Grade Tolerance	Stabilized Performance at STC ^{*3}				Initial Performance at STC ^{*3}			
			Vmpp [V]	Impp [A]	Voc [V]	Isc [A]	Vmpp [V]	Impp [A]	Voc [V]	Isc [A]
			Electrical Tolerance: ± 10% ^{*6}							
WD-C-GF-0901	90W	+4.99 / -0 Wp	103	0.90	137	1.15	111	1.06	140	1.20
WD-C-GF-0902	85 W		103	0.85	137	1.11	106	1.05	140	1.15
WD-C-GF-0903	80 W		99	0.83	136	1.09	105	0.99	139	1.13
WD-C-GF-0904	75 W		95	0.81	135	1.08	102	0.96	138	1.11
WD-C-GF-0905	70 W		93	0.78	134	1.06	99	0.93	137	1.09
Remarks: <ol style="list-style-type: none"> The modules electrical ratings are measured under Standard Test Conditions (STC) and have been delivered on the specific table of electrical characteristics as shown above. A photovoltaic module may produce more current and/or voltage than reported at STC. Sunny, cool weather and reflection from snow or water can increase current and power output. Therefore, the values of Isc and Voc marked on the modules should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor ampacities, fuse sizes, and size of controls connected to PV output. STC(Standard Test Condition): irradiation of 1000 W/m², spectrum AM 1.5 and a cell temperature of 25 °C. The exact measured electrical characteristics are shown on the label of the modules. All electrical data is average production data and is subjected to a measuring equipment tolerance of ± 3%. Electronic tolerance is ± 10% except power grade tolerance. 										

2. Dimensions and Drawing

Refer to the following diagram.



3. Packing Specifications

Table 4-1. Packing specifications for 30 modules*

Packing
30 modules vertically posited in a crate with pallet Box approx. dimension: 1420(L)×1130(W)×1260(H) mm Net weight : 710 Kg ± 2% Gross weight : 810 Kg ± 2%

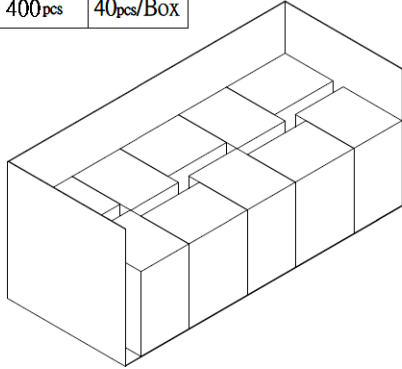
*The Packing specification is used in special case.

Table 4-2. Packing specifications for 40 modules

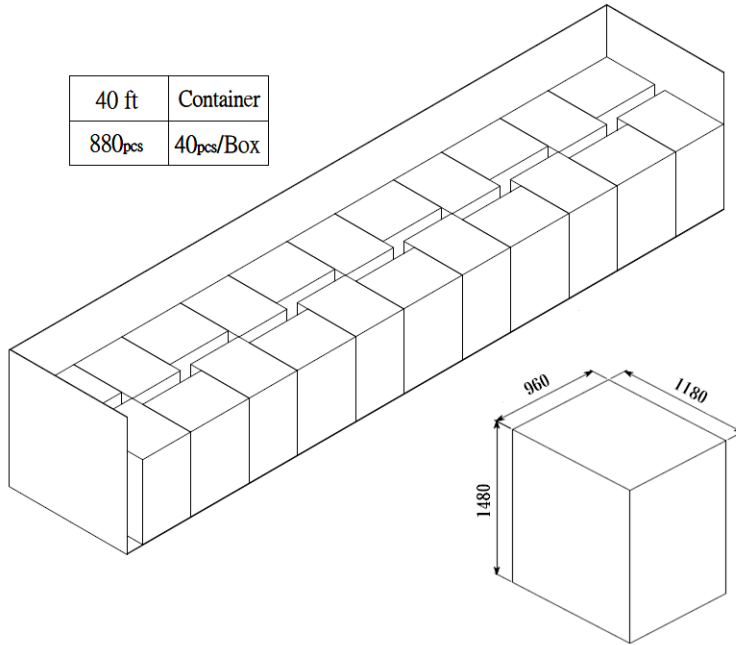
Packing
40 modules vertically posited in a crate with pallet Box approx. dimension: 1180(L)×960(W)×1480(H) mm Net weight : 947 Kg ± 2% Gross weight : 1010 Kg ± 2%

Container capacity : 10 boxes (20 feet standard container)
22 boxes (40 feet standard container)

20 ft	Container
400 pcs	40 pcs/BOX



40 ft	Container
880 pcs	40 pcs/BOX



4. Operating conditions

- (1) The modules should be operated under sufficient sunlight and subjected to seawater or snowfall (1 m or more) should be avoided. Ambient temperature should be in the range between -20 °C and 50 °C. Module operating temperature should be in the range between -20 °C and 85 °C. The vertical installation (ie. the laser lines on the panel point to ground) of the PV modules is recommended. Shadow on modules should be prevented otherwise shading shall cause power output decline and even fire hazard. Water accumulating on the junction box or junction box being immersed in water should be avoided.
- (2) **The modules must only be used in configurations where the negative polarity of the PV module is connected to ground. Fail to comply with this requirement will invalidate warranty for the modules.** Details for the grounding should refer to the applicable local codes for electrical system on specific requirements. Contact your sales agent or SWS if any questions about grounding remained.

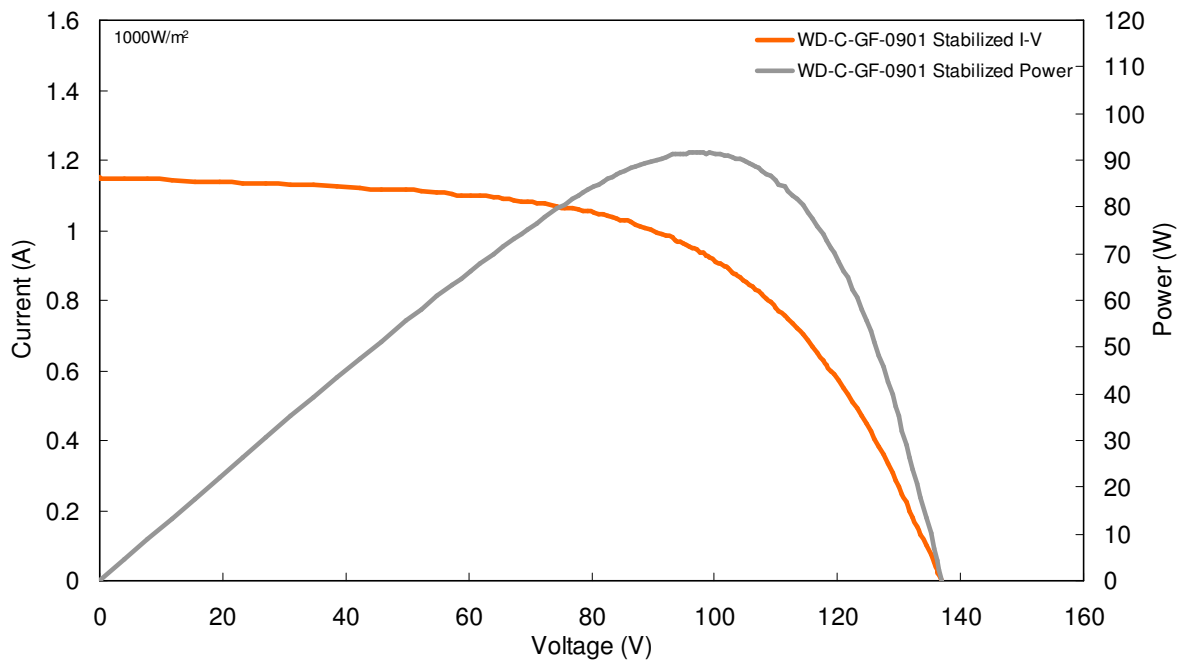


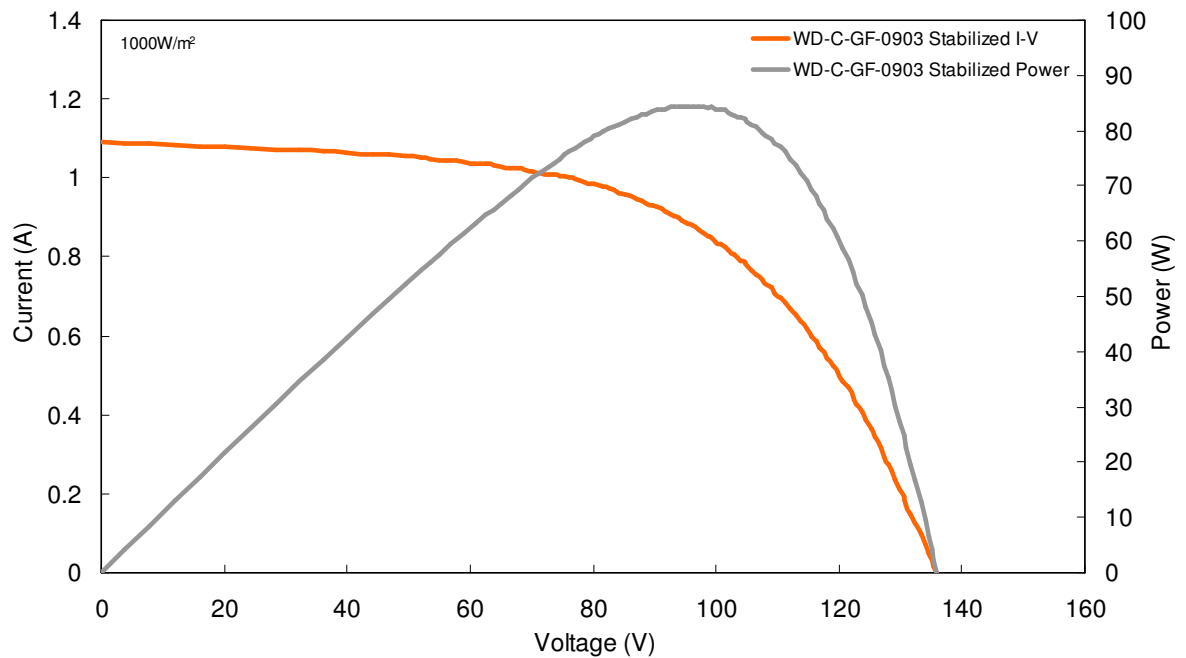
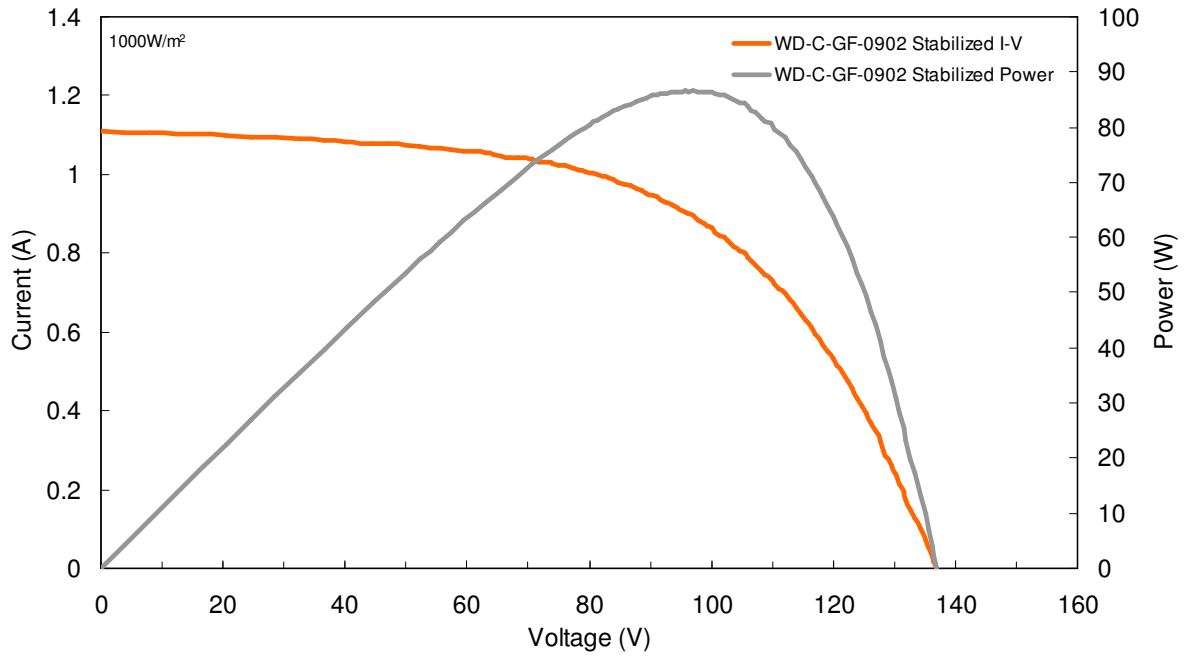
5. Warranty

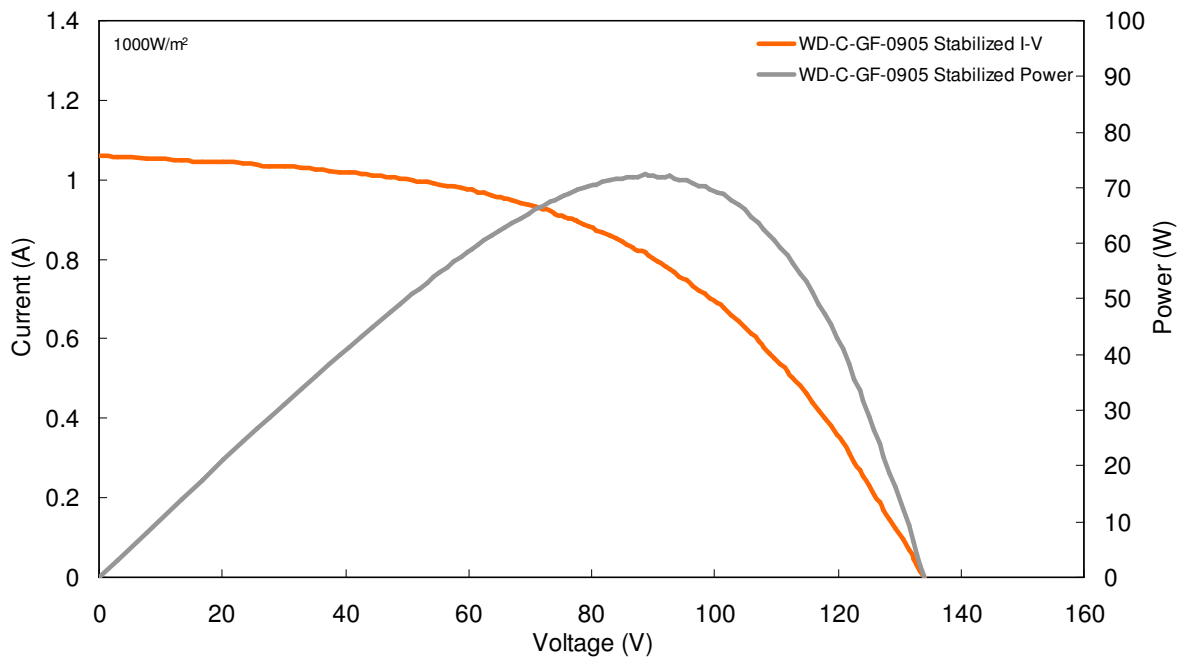
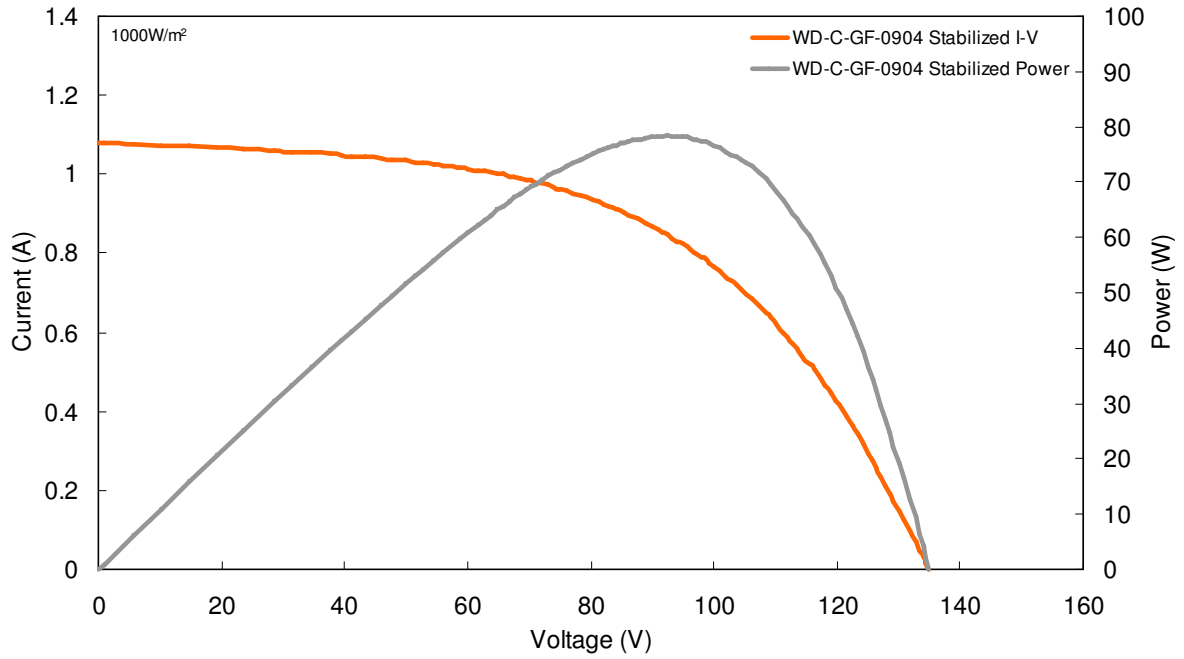
Warranty on Product (Workmanship / Material)	Warranty on Power Grade Output
5 years from the date of shipment from SWS.	90% of the power grade output of the module for a 10-year period, 80% of the power grade output of the module for a 25-year period from the date of shipment from SWS.

6. Performance characteristics

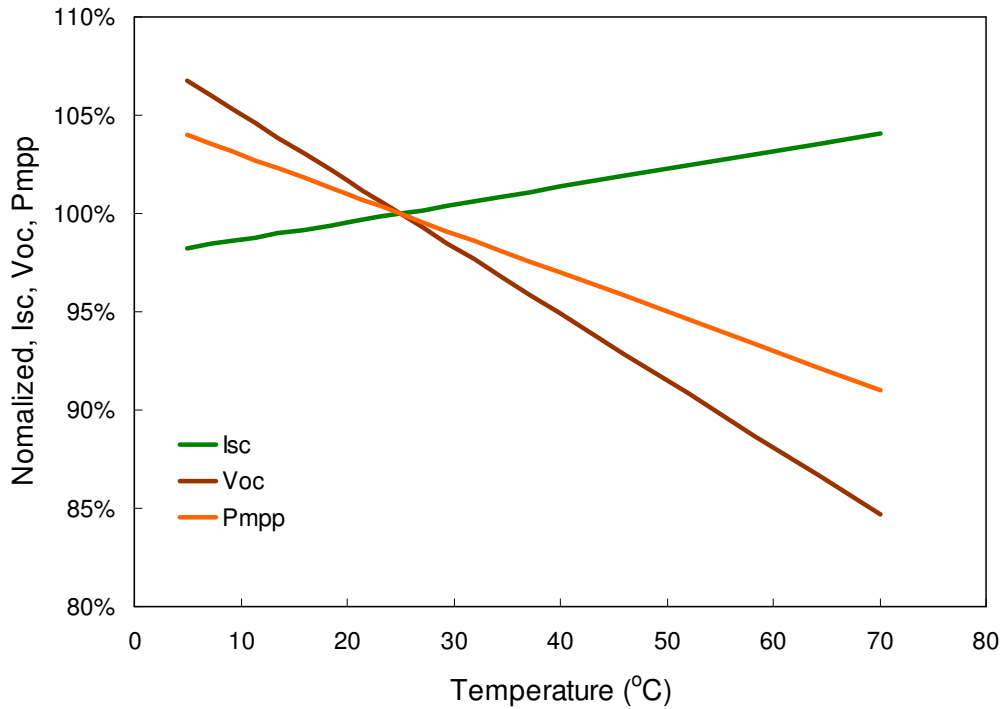
(1) I-V performance







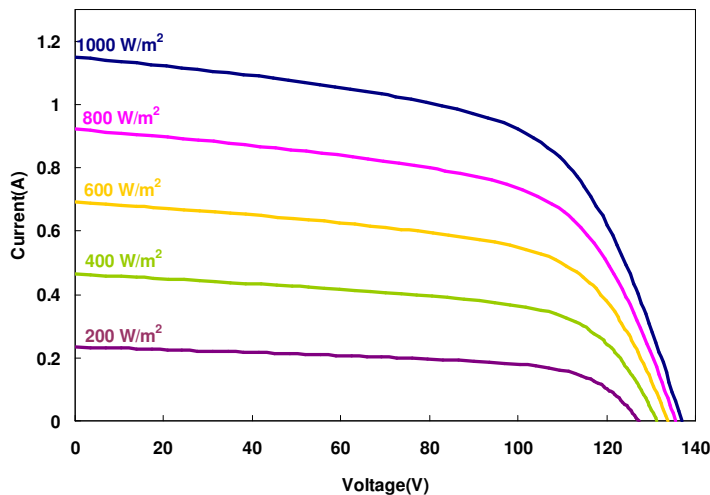
(2) Temperature coefficients



(3) Module performance under different irradiances
(At AM 1.5 and 25°C cell temperature)

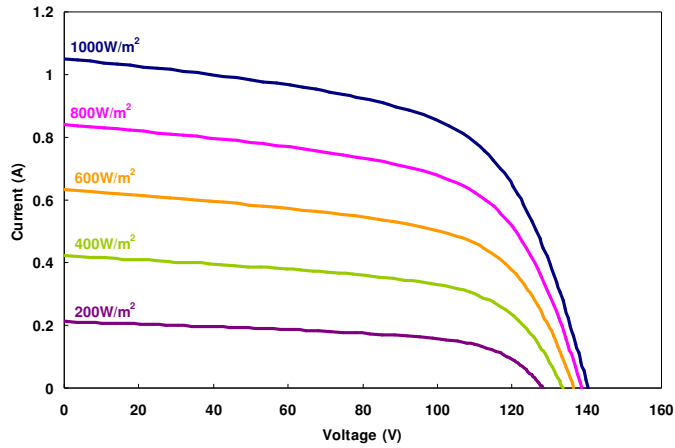
Note: All electrical data below is subject to a measuring equipment tolerance of $\pm 3\%$. Electronic tolerance is $\pm 10\%$ except Pmpp.

● Model: WD-C-GF-0901 (90 Wp)



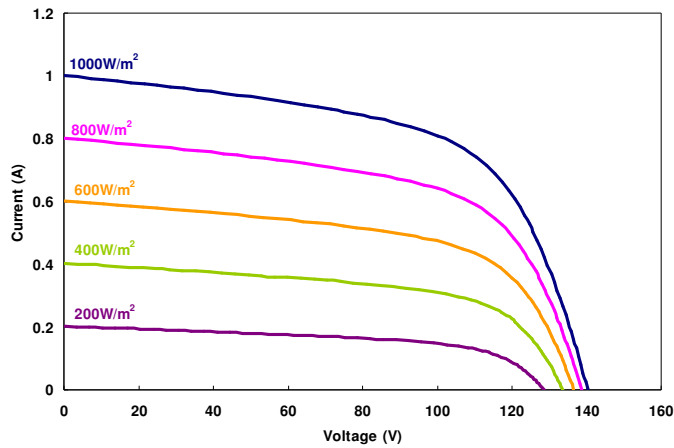
Irradiance [W/m ²]	P _{mpp} [W]	V _{mpp} [V]	I _{mpp} [A]	V _{oc} [V]	I _{sc} [A]
1000	93	104	0.90	137	1.15
800	74	105	0.71	136	0.92
600	55	105	0.53	134	0.69
400	37	105	0.35	131	0.46
200	18	104	0.17	127	0.23

● Model: WD-C-GF-0902 (85 Wp)



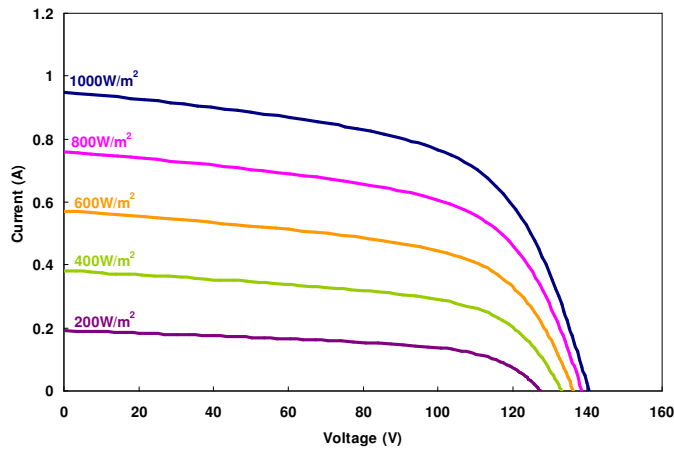
Irradiance [W/m ²]	P _{mpp} [W]	V _{mpp} [V]	I _{mpp} [A]	V _{oc} [V]	I _{sc} [A]
1000	87	107	0.81	140	1.05
800	69	107	0.65	139	0.84
600	51	106	0.48	137	0.63
400	33	105	0.32	134	0.42
200	16	102	0.15	128	0.21

● Model: WD-C-GF-0903 (80 Wp)



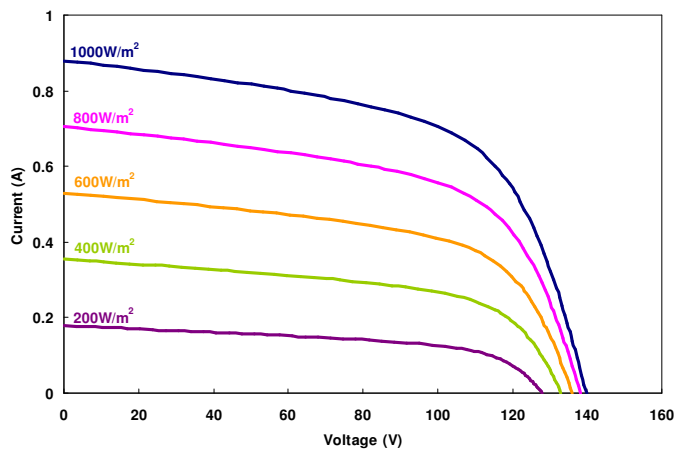
Irradiance [W/m ²]	P _{mpp} [W]	V _{mpp} [V]	I _{mpp} [A]	V _{oc} [V]	I _{sc} [A]
1000	82	107	0.77	140	1.00
800	65	107	0.61	139	0.80
600	48	107	0.45	137	0.60
400	31	106	0.30	134	0.40
200	15	103	0.14	129	0.20

● Model: WD-C-GF-0904 (75 Wp)



Irradiance [W/m ²]	P _{mpp} [W]	V _{mpp} [V]	I _{mpp} [A]	V _{oc} [V]	I _{sc} [A]
1000	78	107	0.73	140	0.95
800	61	107	0.58	139	0.76
600	45	106	0.43	136	0.57
400	29	105	0.28	133	0.38
200	14	101	0.14	128	0.19

● Model: WD-C-GF-0905 (70 Wp)



Irradiance [W/m ²]	P _{mpp} [W]	V _{mpp} [V]	I _{mpp} [A]	V _{oc} [V]	I _{sc} [A]
1000	72	107	0.67	140	0.88
800	57	107	0.53	138	0.70
600	42	107	0.39	136	0.53
400	27	105	0.26	133	0.35
200	13	102	0.12	128	0.18