



27KW in the Netherlands



ENERGYKA - PV Plant  
20KW in Asolo, Italy



ENERGYKA - PV Plant  
33KW in Vicenza, Italy



ENERGYKA - PV Plant  
115KW in Udine, Italy



Denna serie av CIGS solpaneler finns i 3 format med mellan 100W och 360W effekt. Panelerna har 100-120W ur den minsta panelen och 215-240W ur den mellan stora och en största med hela 335-360W uteffekt. Skillnaden är dimensionerna på panelerna.

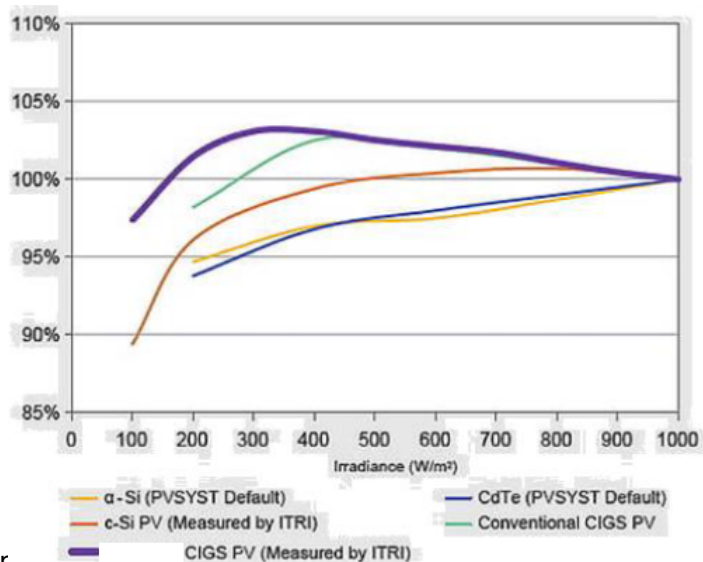
CIGS panelerna har brett optiskt spektra och samlar in energi när de kristallina ej fungerar. Dåliga väderdagar ger dessa paneler klart mer energi än de vanliga kristallina panelerna som för mest vanliga i Sverige. Dessa ger sett över året klart mer energi i KWH är motsvarande andra paneler. Ca 10% mer kan vara ett bra typvärde. De sämsta dagarna kan de vara 30% bättre.

### Features of CIGS solar panels.

- \* PID fri LID fri funktion
- \* Inga problem med mikro sprickor då de har en aluminiumram
- \* Bästa temperatur koefficienten vid varmt väder ( bra vid takmontage)
- \* Bra känslighet upp i nära IR området där kisel teknik ej fungerar
- \* Inga löddskarvar inne i panelen mellan en massa wafers
- \* Inga glint och glare problem
- \* Låga problem med partiell skuggning av löv mm
- \* Snyggare utseende tycker de flesta
- \* 3 storlekar från 100W till 360W
- \* ROHS certifierad och EU testad på alla sätt
- \* Helt fri från Bly cadmium tellurium och arsenik.
- \* Dubblas laminerade glas och 25 års garanti
- \* Taiwan fabrik och ingen China fabrik
- \* 1000 VDC isolations spänning och 1500Volt i special modeller

Till höger jämförelse mellan denna CIGS panel och andra solpaneler vid olika intensitet från solen. Sverige är inte alltid soligt och här syns tydligt fördelarna med denna solpanel.

Partiell skuggning är ett problem speciellt på vintern när solen står lågt. Här är då denna paneltyp klart bättre än de kristallina panelerna.





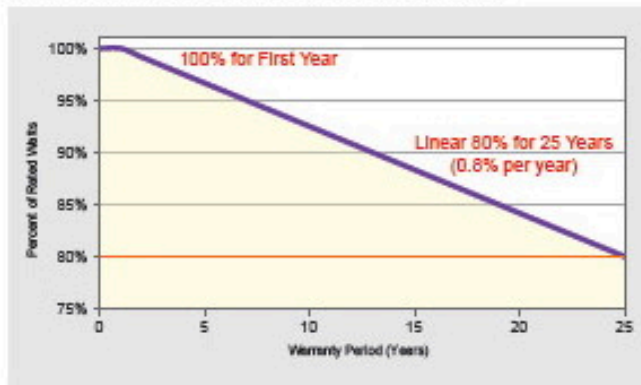
# High Performance Cd-Free CIGS Thin Film Modules

## CIGS Competitive Advantages

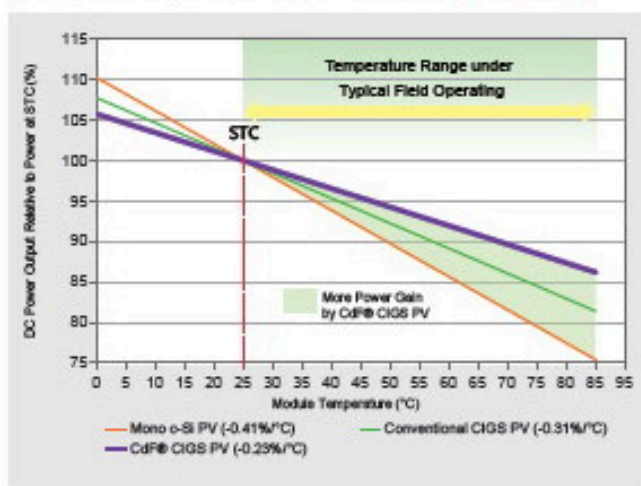
- PID- free, LID-free
- No microcrack problem
- Less solder joints than C-Si
- No glint/glare problem
- Low shadow impact
- RoHs compliant
- Free of Lead, Cadmium, Tellurium, Arsenic



## Linear Pmax. Performance Warranty

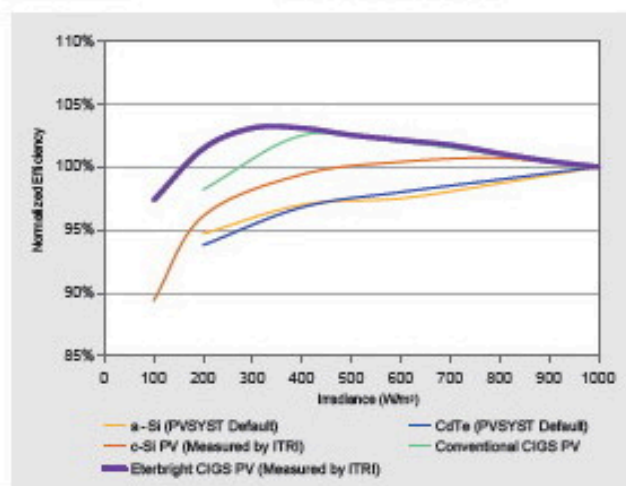


## Lowest Temperature Coefficient (-0.23%/°C)



In tropical areas i.e. desert regions, equatorial regions, subtropical regions or high temperature areas. CIGS module will be the only choice.

## The Comparison of Normalized Efficiency between CIGS and Others



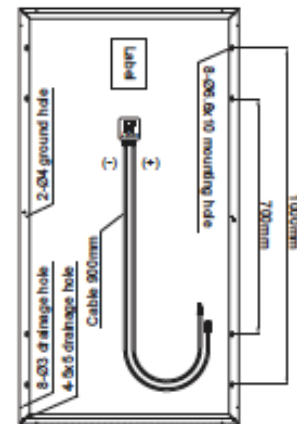
Cd-Free CIGS PV performs better normalized efficiency under lower irradiance.



### Mechanical Specification

Dimensions	1234mm x 652mm x 35mm (48.6 inches x 25.7 inches x 1.38 inches)
Weight	12.9 kg (28.44lbs)
Cell type	CIGS thin film
Front cover	3.2mm tempered glass with ARC
Cell substrates	1.8mm ultra-thin soda lime glass
Back cover	Al back sheet
Encapsulant	EVA
Frame	Anodized Al frame (black) with L-Key mounting
Junction Box	IP67 rated with bypass diode
Connectors	MC4 compatible
Cable length	900mm (35.4 inches)

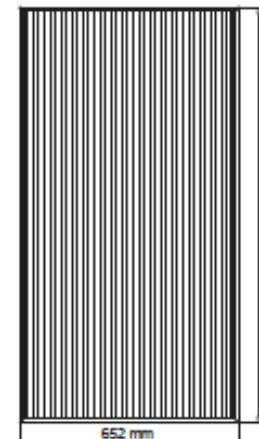
### Module Drawing



### Electrical Specification

Power performance at STC (STC: 1000W/m<sup>2</sup>, 25°C/77°F, AM 1.5)\*

Module Models	CdF-	1000A1	1050A1	1100A1	1150A1	1200A1
Nominal power	P <sub>MPP</sub> [W]	100	105	110	115	120
Power tolerance	[W]	0~+5	0~+5	0~+5	0~+5	0~+5
Open circuit voltage	V <sub>OC</sub> [V]	75.2	75.3	75.4	75.5	75.6
Short circuit current	I <sub>SC</sub> [A]	2.16	2.18	2.20	2.21	2.23
Voltage at P <sub>MPP</sub>	V <sub>MPP</sub> [V]	54.7	55.6	56.5	57.4	58.3
Current at P <sub>MPP</sub>	I <sub>MPP</sub> [A]	1.82	1.88	1.94	2.00	2.05
Module efficiency	[%]	≈ 12.4	≈ 13.1	≈ 13.7	≈ 14.3	≈ 14.9



Power performance at NOCT (NOCT: 800W/m<sup>2</sup>, 20°C/68°F, AM1.5)\*

Module Models	CdF-	1000A1	1050A1	1100A1	1150A1	1200A1
Nominal power	P <sub>MPP</sub> [W]	77.1	81.0	84.9	88.7	95.2
Open circuit voltage	V <sub>OC</sub> [V]	72.3	72.5	72.6	72.6	72.7
Short circuit current	I <sub>SC</sub> [A]	1.73	1.75	1.76	1.77	1.79
Voltage at P <sub>max</sub>	V <sub>MPP</sub> [V]	51.7	52.8	54.0	55.2	56.4
Current at P <sub>max</sub>	I <sub>MPP</sub> [A]	1.49	1.53	1.57	1.60	1.68

\*All STC characteristics are measured after pre-treatment of 43kWh/m<sup>2</sup> light soaking. Measurement uncertainty: (P<sub>MPP</sub>: +5%/−3%; I<sub>SC</sub>, V<sub>OC</sub>, I<sub>MPP</sub>, V<sub>MPP</sub>: ±10%)

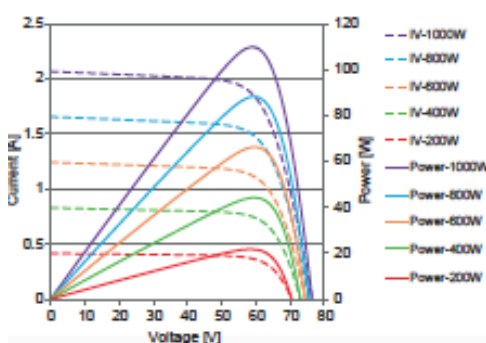
#### Temperature coefficients

NOCT	TC I <sub>sc</sub> (α)	TC V <sub>oc</sub> (β)	TC P <sub>MPP</sub> (δ)
46°C	+0.01%/°C	-0.31%/°C	-0.23%/°C

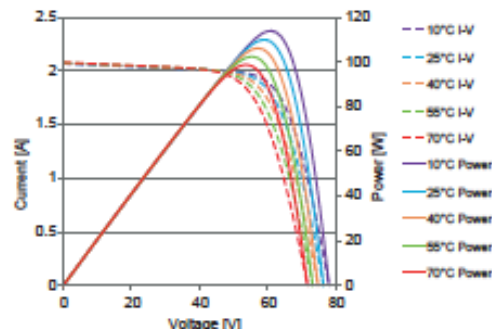
#### Properties for solar system construction design

Max. system voltage (V <sub>sys</sub> )	Max. series overcurrent protective devices	Mechanical load	Safety class	Fire rating	Operating temperature
1000V	5A	2400Pa	II	Class C(IEC)	-40 ~ 85°C

I-V curves at various irradiation



I-V curves at various temperature



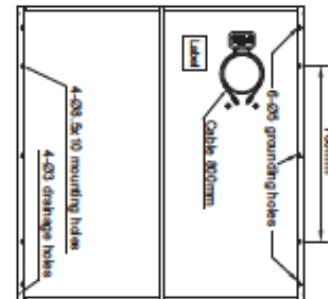
\*This datasheet is for informational purposes only. No rights can be derived from the information contained herein.



### Mechanical Specification

Dimensions	1279mm x 1240mm x 45mm (50.4 inches x 48.8 inches x 1.77 inches)
Weight	23 kg (50.71lbs)
Cell type	CIGS thin film
Front cover	2.5mm tempered glass with ARC
Cell substrates	1.8mm ultra-thin soda lime glass x 2
Back cover	Al back sheet
Encapsulant	EVA
Frame	Anodized Al frame (black) with screw mounting
Junction Box	IP67 rated with bypass diode
Connectors	MC4 compatible
Cable length	800mm (31.5 inches)

### Module Drawing



### Electrical Specification

Power performance at STC (STC: 1000W/m<sup>2</sup>, 25°C/77°F, AM 1.5)\*

Module Models	Cigs-	2150A1	2200A1	2250A1	2300A1	2350A1	2400A1
Nominal power	P <sub>MPP</sub> [W]	215	220	225	230	235	240
Power tolerance	[W]	0~+5	0~+5	0~+5	0~+5	0~+5	0~+5
Open circuit voltage	V <sub>OC</sub> [V]	75.4	75.4	75.5	75.5	75.6	75.6
Short circuit current	I <sub>SC</sub> [A]	4.38	4.40	4.42	4.43	4.45	4.47
Voltage at P <sub>MPP</sub>	V <sub>MPP</sub> [V]	56.1	56.5	57.0	57.4	57.9	58.3
Current at P <sub>MPP</sub>	I <sub>MPP</sub> [A]	3.83	3.88	3.94	4.00	4.05	4.11
Module efficiency	[%]	≥ 13.5	≥ 13.8	≥ 14.1	≥ 14.5	≥ 14.8	≥ 15.1

Power performance at NOCT (NOCT: 800W/m<sup>2</sup>, 20°C/68°F, AM1.5)\*

Module Models	Cigs-	2150A1	2200A1	2250A1	2300A1	2350A1	2400A1
Nominal power	P <sub>MPP</sub> [W]	164.3	168.1	169.8	175.6	179.3	183.1
Open circuit voltage	V <sub>OC</sub> [V]	71.8	71.9	71.9	71.9	72.0	72.0
Short circuit current	I <sub>SC</sub> [A]	3.52	3.53	3.54	3.56	3.57	3.58
Voltage at P <sub>max</sub>	V <sub>MPP</sub> [V]	52.8	53.4	54.0	54.6	55.2	55.8
Current at P <sub>max</sub>	I <sub>MPP</sub> [A]	3.11	3.14	3.14	3.21	3.24	3.28

\*All STC characteristics are measured after pre-treatment of 43kWh/m<sup>2</sup> light soaking. Measurement uncertainty: (P<sub>MPP</sub>: +5%/-3% ; I<sub>SC</sub>, V<sub>OC</sub>, I<sub>MPP</sub>, V<sub>MPP</sub>: ±10%)

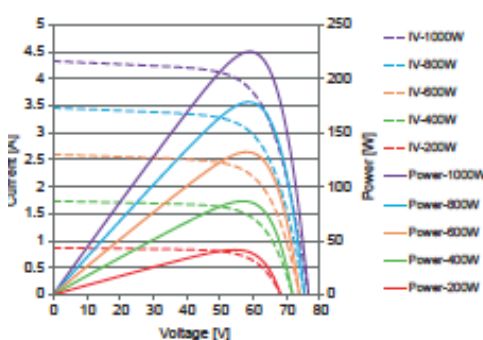
### Temperature coefficients

NOCT	TC I <sub>SC</sub> (α)	TC V <sub>OC</sub> (β)	TC P <sub>MPP</sub> (δ)
46°C	+0.01%/°C	-0.27%/°C	-0.28%/°C

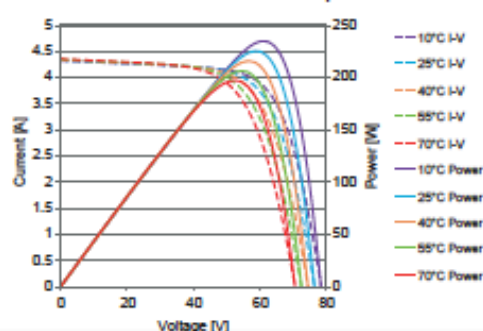
### Properties for solar system construction design

Max. system voltage (V <sub>sys</sub> )	Max. series overcurrent protective devices	Mechanical load	Safety class	Fire rating	Operating temperature
1000V	15A	5400Pa	II	Class C(IEC) Type 1(UL)	-40 ~ 85°C

I-V curves at various irradiation



I-V curves at various temperature



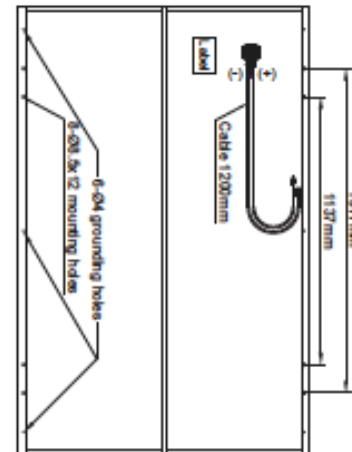
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### Mechanical Specification

Dimensions	1900mm x 1235mm x 45mm (74.8 inches x 48.8 inches x 1.8 inches)
Weight	33.3 kg (73.41lbs)
Cell type	CIGS thin film
Front cover	2.5mm tempered glass with ARC
Cell substrates	1.8mm ultra-thin soda lime glass x 3
Back cover	Al back sheet
Encapsulant	EVA
Frame	Anodized Al frame (black) with screw mounting
Junction Box	IP67 rated with bypass diode
Connectors	MC4 compatible
Cable length	1200mm (47.2 inches)

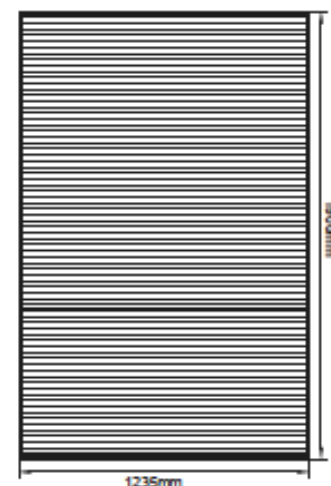
### Module Drawing



### Electrical Specification

Power performance at STC (STC: 1000W/m<sup>2</sup>, 25°C/77°F, AM 1.5)\*

Module Models	Cigs-	3350A1	3400A1	3450A1	3500A1	3550A1	3600A1
Nominal power	P <sub>MPP</sub> [W]	335	340	345	350	355	360
Power tolerance	[W]	0~+5	0~+5	0~+5	0~+5	0~+5	0~+5
Open circuit voltage	V <sub>OC</sub> [V]	75.3	75.6	75.8	76.1	76.4	76.6
Short circuit current	I <sub>SC</sub> [A]	6.44	6.44	6.44	6.44	6.44	6.44
Voltage at P <sub>MPP</sub>	V <sub>MPP</sub> [V]	56.8	57.4	58.1	58.7	59.3	60.0
Current at P <sub>MPP</sub>	I <sub>MPP</sub> [A]	5.89	5.91	5.93	5.95	5.97	5.99
Module efficiency	[%]	≥ 14.2	≥ 14.4	≥ 14.6	≥ 14.9	≥ 15.2	≥ 15.4



Power performance at NOCT (NOCT: 800W/m<sup>2</sup>, 20°C/68°F, AM1.5)\*

Module Models	Cigs-	3350A1	3400A1	3450A1	3500A1	3550A1	3600A1
Nominal power	P <sub>MPP</sub> [W]	256.1	259.8	263.6	267.4	271.4	275.2
Open circuit voltage	V <sub>OC</sub> [V]	71.8	72.0	72.2	72.5	72.7	73.0
Short circuit current	I <sub>SC</sub> [A]	5.16	5.16	5.16	5.16	5.17	5.17
Voltage at P <sub>max</sub>	V <sub>MPP</sub> [V]	54.7	55.3	55.8	56.4	56.7	57.4
Current at P <sub>max</sub>	I <sub>MPP</sub> [A]	4.68	4.69	4.72	4.74	4.79	4.81

\*All STC characteristics are measured after pre-treatment of 43kWh/m<sup>2</sup> light soaking.  
Measurement uncertainty: (P<sub>MPP</sub>: +5%/-3%; I<sub>SC</sub>, V<sub>OC</sub>, I<sub>MPP</sub>, V<sub>MPP</sub>: ±10%)

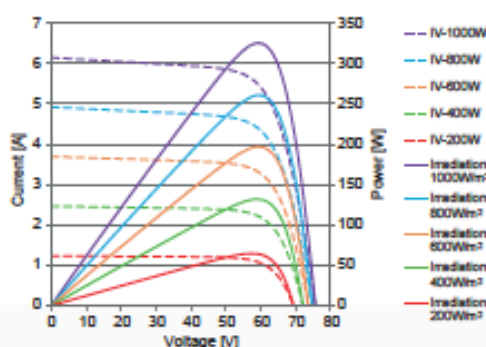
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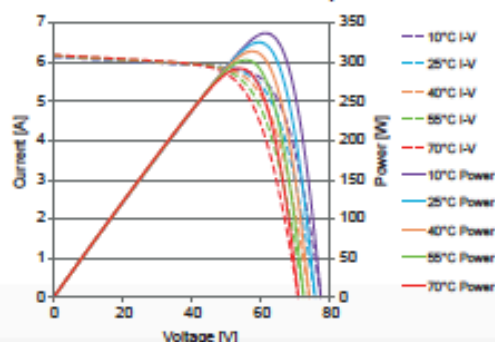
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### I-V curves at various irradiation



### I-V curves at various temperature





CIGS SOLUTIONS – ITALY (MEDITERRANEAN

CONDITIONS)



LOCATION: ITALY  
MODEL: CoF-1000E1 SERIES



Installation i Estland på industritak och som synes är solen skyddad denna dag.