Hulk Energy Technology Co., Ltd.

HULKet

HULKet , Cigs-3000 Series

THE WORLD'S HIGHEST-POWERED CIGS MODULES

CIGS competitive advantages

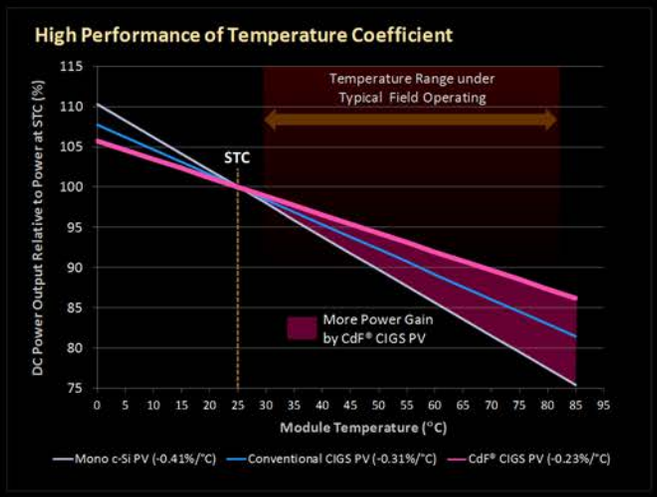
- No Potential Induced Degradation (PID- free)
- No Light Induced Degradation (LID-free)
- Absence of Hot Spot
- No Snail Track problem
- Rare existence of solder joint (as compared with hundreds of solder joints for c-Si)
- No glint/glare problem
- Low shadow effect (which affects electricity yield); does not induce hot spot issue
- Lead (Pb) free、Cadmium (Cd) free、RoHS compliant
- Royal Black Color
- Having positive light soaking effect

Power Gain Factor 1.3 (Output yield more)
High Powered Module (300W+/panel) (BOS 60% less)

IRR up
(Internal Return Rate)

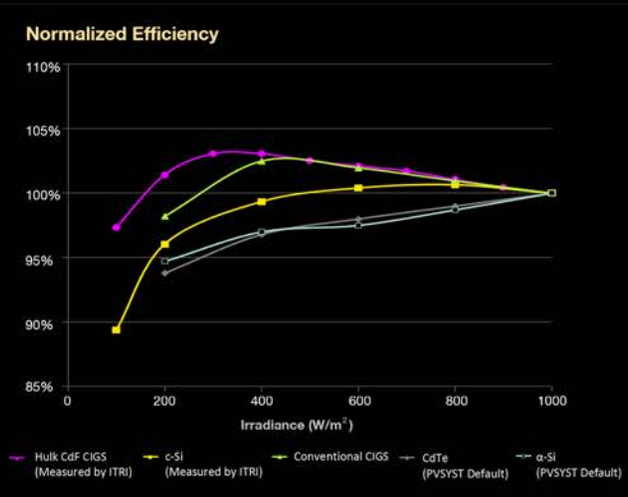
LCOE down
(Levelized Cost of Electricity)

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

High Performance Cd-Free CIGS PV Technology Comparison of normalized efficiency



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

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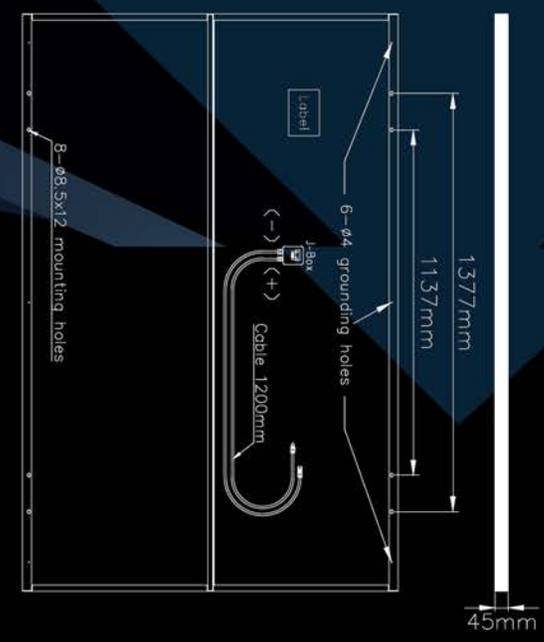
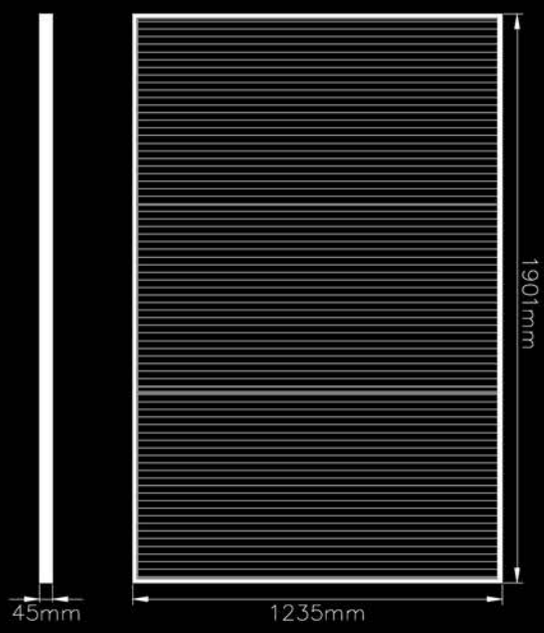
Mechanical Specification

Dimensions	1901mm x 1235mm x 45mm
	(74.8inches x 48.6inches x 1.8 inches)
Weight	33.3kg (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 (47.2inches)

Module Drawing





Electrical Specification

Power performance at STC (STC: 1000W/cm², 25°C/77°F, AM1.5)*

Module models		Cigs-	3100A1	3150A1	3200A1	3250A1
Maximum power	P_{MPP} [W]		310	315	320	325
Power tolerance	[W]		+5.0/-0	+5.0/-0	+5.0/-0	+5.0/-0
Open circuit voltage	V_{OC} [V]		75.3	75.4	75.6	75.7
Short circuit current	I_{SC} [A]		6.08	6.10	6.12	6.15
Voltage at Pmax	V_{MMP} [V]		58.5	58.7	59.0	59.3
Current at Pmax	I_{MMP} [A]		5.30	5.36	5.42	5.48
Module efficiency	[%]		≧13.2	≧13.4	≧13.6	≧13.8

Power performance at NOCT (NOCT: 800W/cm². 20°C/68°F, AM1.5)*

Module models		Cigs-	3100A1	3150A1	3200A1	3250A1
Maximum power	P_{MPP} [W]		251.9	255.7	259.6	264.1
Open circuit voltage	V_{OC} [V]		74.9	75.0	75.2	75.4
Short circuit current	I_{SC} [A]		4.87	4.88	4.90	4.92
Voltage at Pmax	V_{MMP} [V]		59.2	59.5	59.7	60.2
Current at Pmax	I_{MMP} [A]		4.26	4.30	4.35	4.39

*All STC characteristics are measured after pre-treatment of 43kWh/m² light soaking.
Accuracy:(P_{MPP}: ±5%; I_{SC}, V_{OC},I_{MPP}, V_{MPP}: ±10%)

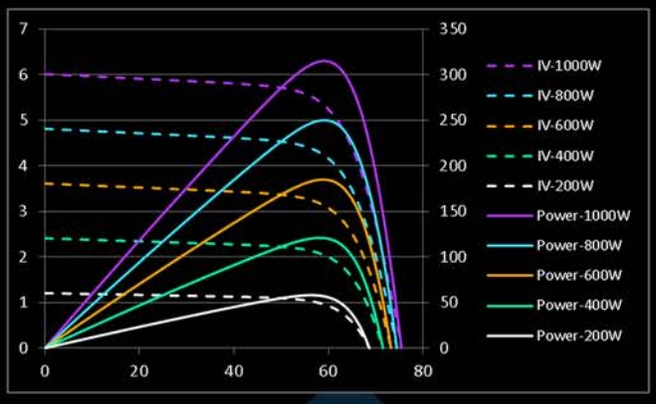
Temperature coefficients (At 1000W/m², AM1.5)

Temp. coefficient of short circuit current		Temp. coefficient of open circuit voltage		Temp. coefficient of maximum power	
α	+0.01%/°C	β	-0.31%/°C	δ	-0.23%/°C

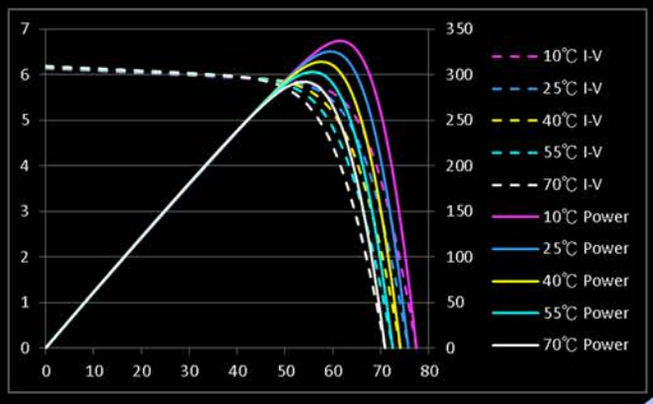
Properties for solar system construction design

Max. system voltage (V_{SYS})	Max. series overcurrent protective devices	Mechanical load	Safety class	Fire rating	Operating temperature
1000V	8A	5400Pa	II	C	-40 ~ 85°C

I-V curves at various irradiation



I-V curves at various temperature



TEL: +886-37-627668
FAX: +886-37-627778
E-mail: service@hulket.com
Website: www.hulket.com
No.442-1, Zhonghua Rd., Toufen
Township, Miaoli County 351, Taiwan