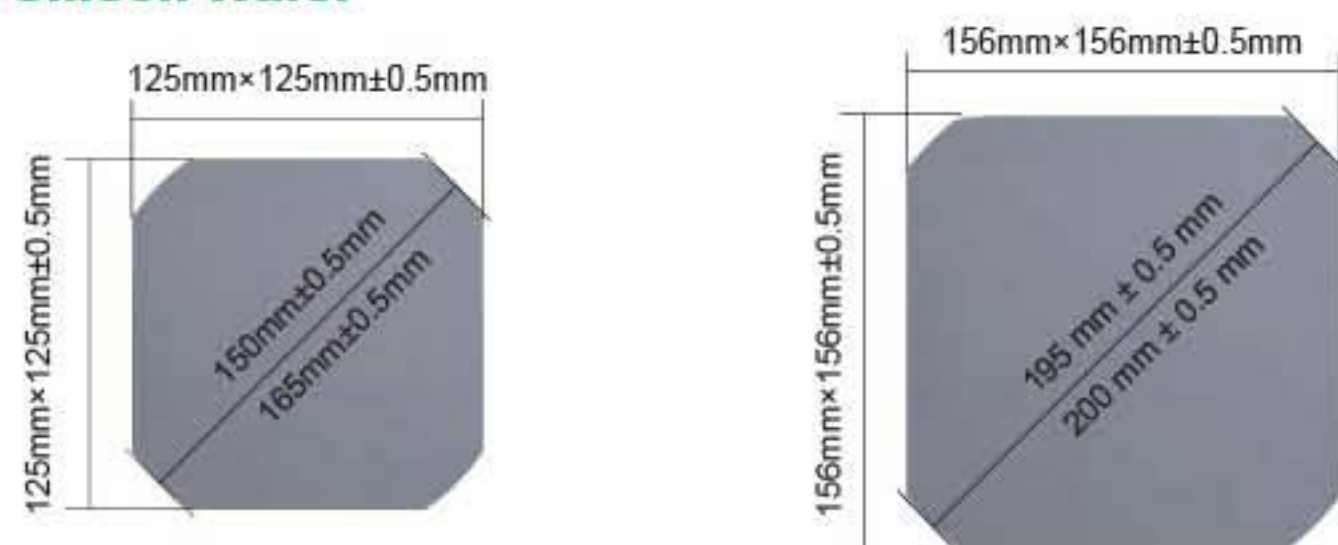


MULTICRYSTALLINE SILICON WAFER

MONOCRYSTALLINE SILICON WAFER

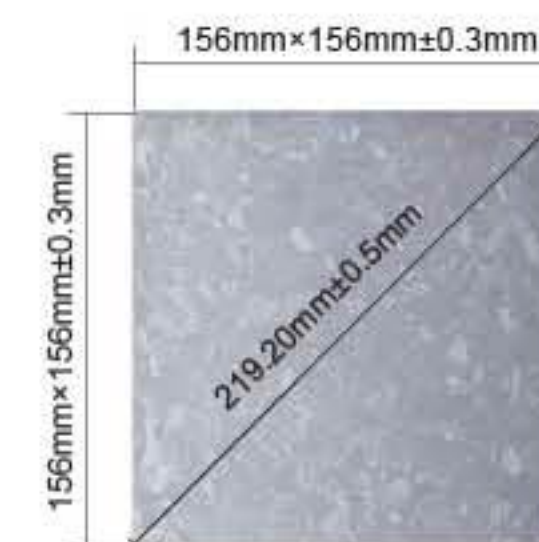
Monocrystalline Silicon Wafer



SPECIFICATIONS

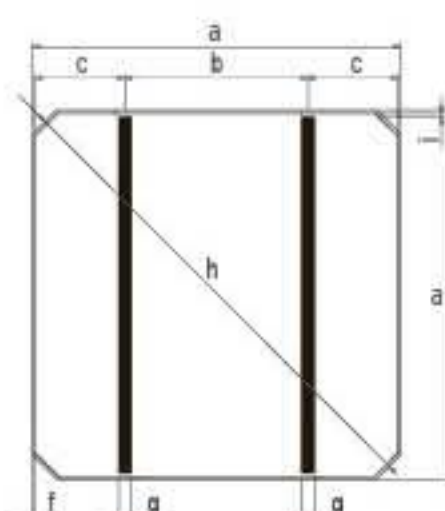
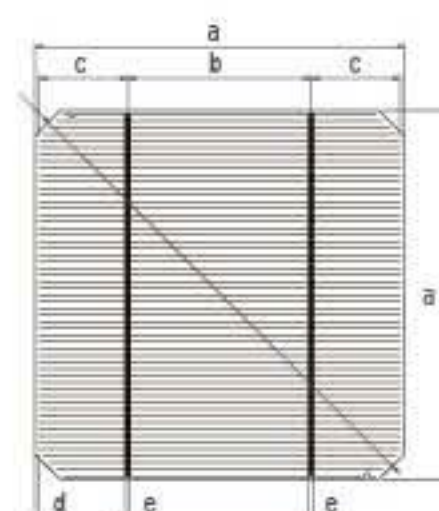
Product	Monocrystalline Silicon Wafer	
Conductivity Type	P-type	
Base Area	125.0mm x 125.0mm ± 0.5mm	156.0mm x 156.0mm ± 0.5mm
Diameter	150.0mm ± 0.5mm; 165.0mm ± 0.5mm	195.0mm ± 0.5mm; 200.0mm ± 0.5mm
Thickness	180 μm ± 20 μm; 200 μm ± 20 μm	
TTV	≤ 30 μm	
Resistivity	0.8-3.0 Ωcm; 3.0-6.0 Ωcm	
Dopant Species	Boron	
Orientation	(100) ± 1°	
Carbon Concentration	≤ 2.5 x 10 ¹⁷ at/cm ³	
Oxygen Concentration	≤ 1 x 10 ¹⁸ at/cm ³	
Dislocation Density	≤ 3,000 / cm ²	
Life Time	≥ 10 μs	
Wafer Surface	As cut and cleaned.No grease stains and pin holes.	
Warping	≤ 50 μm	
Corner Angle	90 ± 0.5 degree	
Edge Chips	Length ≤ 1.0mm,Depth < 0.5mm,No more than 2.	
Edge Cracks	Not allowed	
Saw Marks	Depth ≤ 15 μm	
Pin Holes	No visible pin holes with naked eyes.	

Multicrystalline Silicon Wafer



SPECIFICATIONS

Product	Multicrystalline Silicon Wafer
Conductivity Type	P-type
Base Area	156.0mm x 156.0mm ± 0.3mm
Diameter	219.20mm ± 0.5mm
Thickness	180 μm ± 20 μm; 200 μm ± 20 μm
TTV	≤ 30 μm
Resistivity	0.8-3.0 Ωcm
Dopant Species	Boron
Carbon Concentration	≤ 8 x 10 ¹⁷ at/cm ³
Oxygen Concentration	≤ 7 x 10 ¹⁷ at/cm ³
Life Time	≥ 2 μs
Wafer Surface	As cut and cleaned.No grease stains and pin holes.
Warping	≤ 50 μm
Corner Angle	90 ± 0.2 degree
Edge Chips	Length ≤ 1.0mm,Depth < 0.5mm,No more than 2.
Edge Cracks	Not allowed
Saw Marks	Depth ≤ 15 μm
Pin Holes	No visible pin holes with naked eyes.



TYPE OF CELL	a(mn)	b(mn)	c(mn)	d(mn)	e(mn)	f(mn)	g(mn)	h(mn)	i(mn)
WFMC125	125.0±0.5	62.5±0.05	31.25±0.5	1.8±0.25	1.8±0.05	1.0±0.25	3.0±0.05	165.0±1.0	5.5±0.5
WFMC156	156.0±0.5	78.0±0.05	39.0±0.5	1.8±0.25	1.8±0.05	1.0±0.25	3.0±0.05	200.0±1.0	5.5±0.5

comments:
a—Side length of the cell;
b—Center to center space for front busbars(backside electrodes);
c—Space from front busbars(backside electrode)centers to cell edge;
d—Space from front silver line edge to cell edge;
e—Width of front busbars width;
f—Space from Al edge to cell edge;
g—Width of backside electrode width;
h—Diagonal length of the cell;
i—Space from backside electrode end to cell edge.

Electrical parameters for monocrystalline silicon solar cells of WFMC125

WFMC125	Eff(%)	Pm(Wp)	Vm*(V)	Im*(A)	Voc*(V)	Isc*(A)
WFMC125180	18.00	2.67	0.53	5.04	0.63	5.35
WFMC125177	17.75	2.63	0.53	4.97	0.62	5.31
WFMC125175	17.50	2.60	0.53	4.95	0.62	5.28
WFMC125172	17.25	2.56	0.52	4.93	0.62	5.23
WFMC125170	17.00	2.52	0.52	4.86	0.62	5.19
WFMC125167	16.75	2.48	0.52	4.83	0.62	5.15
WFMC125165	16.50	2.45	0.51	4.81	0.62	5.11
WFMC125162	16.25	2.41	0.51	4.73	0.61	5.07
WFMC125160	16.00	2.38	0.51	4.67	0.61	5.03
WFMC125157	15.75	2.34	0.50	4.62	0.61	5.00
WFMC125155	15.50	2.30	0.50	4.60	0.61	4.95
WFMC125152	15.25	2.26	0.50	4.52	0.61	4.90
WFMC125150	15.00	2.23	0.50	4.46	0.61	4.84
WFMC125147	14.75	2.19	0.50	4.39	0.61	4.80
WFMC125145	14.50	2.15	0.49	4.37	0.60	4.77

Note: Test condition is STC 1000W/m² Irradiance of AM1.5 spectrum, at 25 °C cell temperature.
Test method is according to IEC904-1withTolerance Efficiency of 5% rel.
* These columns give typical value of production performance. It is for reference only.

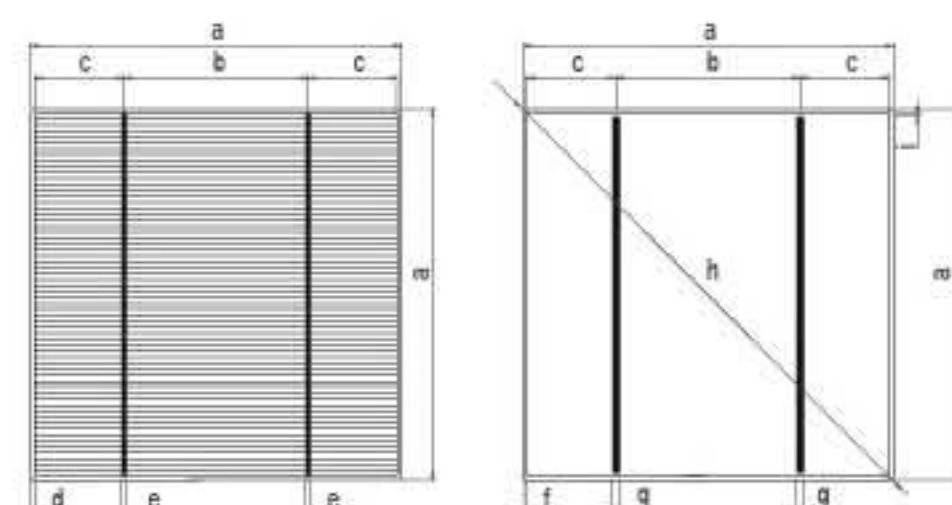
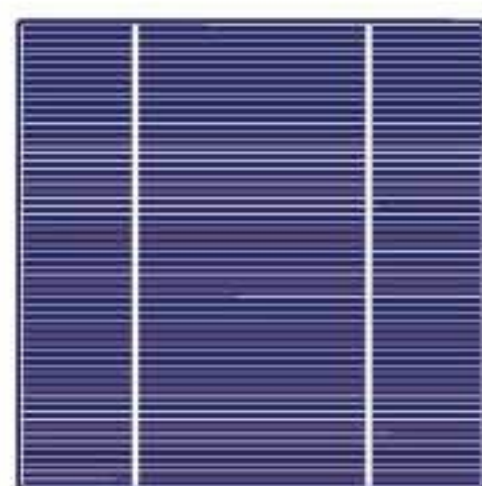
Electrical parameters for monocrystalline silicon solar cells of WFMC156

WFMC156	Eff(%)	Pm(Wp)	Vm*(V)	Im*(A)	Voc*(V)	Isc*(A)
WFMC156180	18.00	4.29	0.53	8.08	0.63	8.55
WFMC156177	17.75	4.23	0.53	7.98	0.62	8.52
WFMC156175	17.50	4.17	0.53	7.89	0.62	8.49
WFMC156172	17.25	4.12	0.52	7.87	0.62	8.46
WFMC156170	17.00	4.06	0.52	7.81	0.62	8.42
WFMC156167	16.75	4.00	0.51	7.75	0.62	8.39
WFMC156165	16.50	3.94	0.51	7.73	0.62	8.36
WFMC156162	16.25	3.88	0.51	7.63	0.62	8.33
WFMC156160	16.00	3.82	0.50	7.60	0.62	8.30
WFMC156157	15.75	3.76	0.50	7.55	0.62	8.27
WFMC156155	15.50	3.70	0.50	7.48	0.62	8.23
WFMC156152	15.25	3.64	0.49	7.42	0.61	8.20
WFMC156150	15.00	3.58	0.49	7.31	0.61	8.17
WFMC156147	14.75	3.52	0.48	7.30	0.61	8.14
WFMC156145	14.50	3.46	0.48	7.20	0.61	8.10

Note: Test condition is STC 1000W/m² Irradiance of AM1.5 spectrum, at 25 °C cell temperature.
Test method is according to IEC904-1withTolerance Efficiency of 5% rel.
* These columns give typical value of production performance. It is for reference only.

MONOCRYSTALLINE SILICON SOLAR CELLS

MULTICRYSTALLINE SILICON SOLAR CELLS

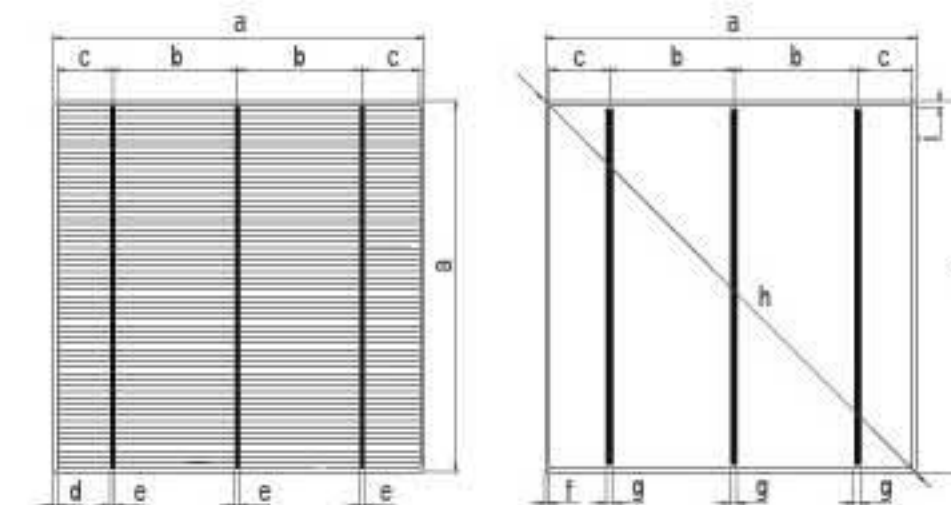
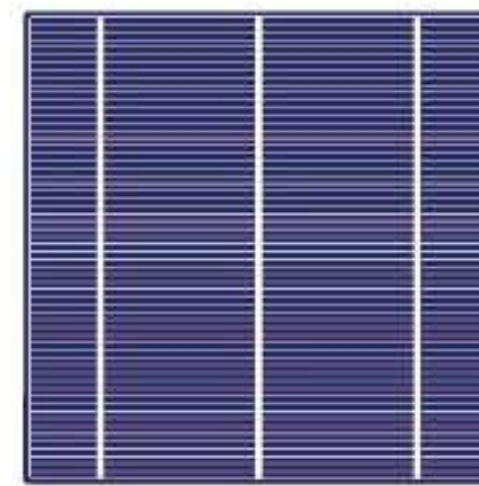


TYPE OF CELL	a(mm)	b(mm)	c(mm)	d(mm)	e(mm)	f(mm)	g(mm)	h(mm)	i(mm)
WFPC156	156.0±0.5	78.0±0.05	39.0±0.5	1.8±0.25	1.8±0.05	1.0±0.25	3.0±0.05	219.0±1.0	5.5±0.5

Electrical parameters for multicrystalline silicon solar cells of WFPC156

WFPC156	Eff(%)	Pm(Wp)	Vm*(V)	Im*(A)	Voc*(V)	Isc*(A)
WFPC156167	16.75	4.07	0.51	7.99	0.62	8.65
WFPC156165	16.50	4.01	0.51	7.87	0.62	8.55
WFPC156162	16.25	3.95	0.51	7.78	0.62	8.46
WFPC156160	16.00	3.89	0.50	7.72	0.62	8.33
WFPC156157	15.75	3.83	0.50	7.66	0.62	8.27
WFPC156155	15.50	3.77	0.50	7.58	0.61	8.17
WFPC156152	15.25	3.71	0.49	7.52	0.61	8.12
WFPC156150	15.00	3.65	0.49	7.45	0.61	8.04
WFPC156147	14.75	3.59	0.49	7.35	0.60	8.00
WFPC156145	14.50	3.53	0.49	7.24	0.60	7.86
WFPC156142	14.25	3.47	0.49	7.15	0.60	7.79
WFPC156140	14.00	3.41	0.48	7.08	0.60	7.73
WFPC156130	13.00	3.16	0.47	6.73	0.60	7.46
WFPC156120	12.00	2.87	0.47	6.17	0.59	7.39

Note: Test condition are STC Irradiance 1000W/m² with AM1.5 spectrum, cell temperature 25 °C,
Test method according to IEC904-1. Tolerance Efficiency 5% rel.
*These column gives typical value of production performance, Just for reference.



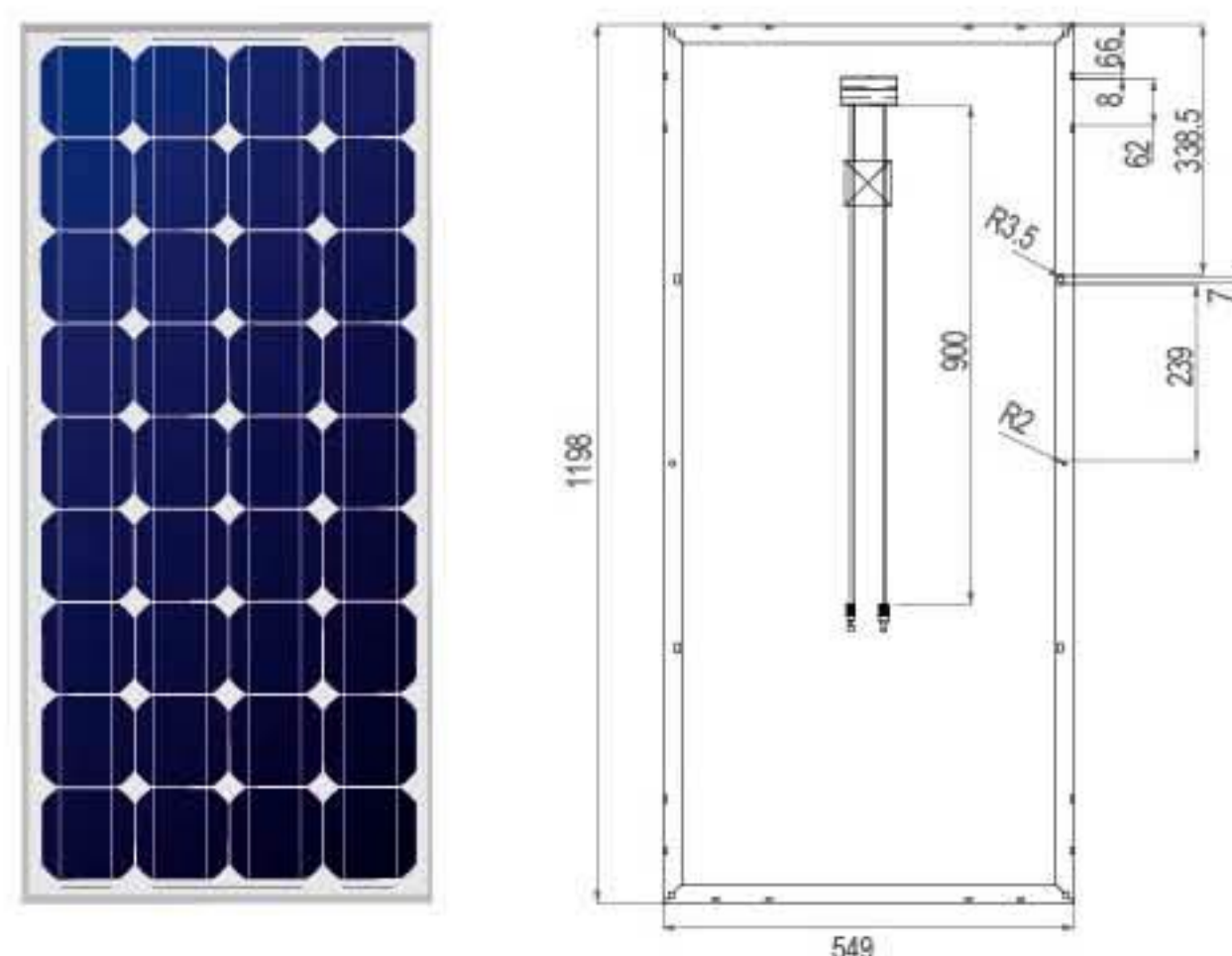
TYPE OF CELL	a(mm)	b(mm)	c(mm)	d(mm)	e(mm)	f(mm)	g(mm)	h(mm)	i(mm)
WFPCGX156	156.0±0.5	52.0±0.2	26.0±0.2	1.5±0.2	1.6±0.2	1.0±0.2	3.0±0.2	219.0±0.2	5.5±0.5

Electrical parameters for multicrystalline silicon solar cells of WFPC156

WFPCGX156	Eff(%)	Pm(Wp)	Vm*(V)	Im*(A)	Voc*(V)	Isc*(A)
WFPCGX156169	16.80-17.00	4.09	0.527	7.760	0.627	8.243
WFPCGX156167	16.60-16.80	4.04	0.542	7.702	0.625	8.207
WFPCGX156165	16.40-16.60	3.99	0.522	7.647	0.623	8.155
WFPCGX156162	16.20-16.40	3.94	0.519	7.600	0.620	8.111
WFPCGX156161	16.00-16.20	3.90	0.516	7.556	0.617	8.067
WFPCGX156159	15.80-16.00	3.85	0.513	7.505	0.615	8.022
WFPCGX156157	15.60-15.80	3.80	0.510	7.454	0.612	7.978
WFPCGX156155	15.40-15.60	3.75	0.508	7.376	0.611	7.956
WFPCGX156153	15.20-15.40	3.70	0.505	7.331	0.608	7.915
WFPCGX156151	15.00-15.20	3.65	0.503	7.264	0.607	7.875

Note: Test condition are STC Irradiance 1000W/m² with AM1.5 spectrum, cell temperature 25 °C,
Test method according to IEC904-1. Tolerance Efficiency 5% rel.
*These column gives typical value of production performance, Just for reference.

PHYSICAL CHARACTERISTICS Unit:mm(inch)



ELECTRICAL CHARACTERISTICS

Module type	Unit	WF80M-01F					
Power range	W	70-95					
Open-circuit voltage (Voc)	V	21.01	21.38	21.63	21.74	22.00	22.25
Short-Circuit Current (Isc)	A	4.67	4.92	5.17	5.48	5.72	5.98
Max-power voltage (Vmp)	V	16.80	17.10	17.30	17.40	17.60	17.80
Max-power current (Imp)	A	4.17	4.39	4.62	4.89	5.11	5.34
Maximum power (Pmax)	W	70.00	75.00	80.00	85.00	90.00	95.00
Cell Efficiency	%	13.50	14.50	15.00	16.00	17.00	17.75
Number, Type and arrangement of Cell		36pcs Monocrystalline silicon (9×4)					
Cell size	mm	125×125					
Power temperature coefficient	%/°C	-0.48					
Current temperature coefficient	%/°C	0.02					
Voltage temperature coefficient	%/°C	-0.33					
NOCT-Nominal operating cell temperature	°C	47±2					
Operating temperature	°C	-40~+85					
Max-System Voltage	VDC	715					

STC:1000W/m²,AM1.5and25°C cell temperature; NOCT:Nominal Operating Cell Temperature

Warranty:

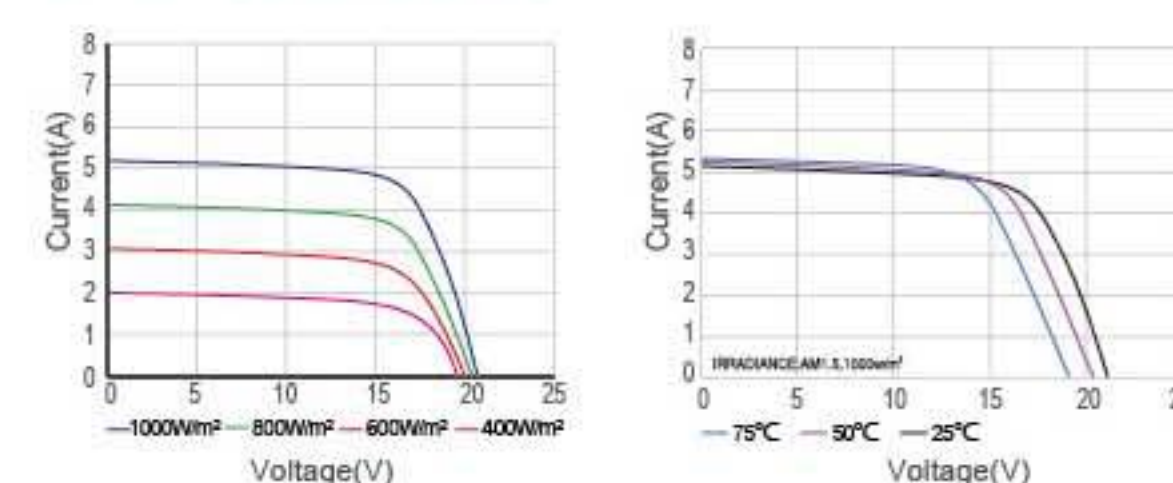
- >Peak power of single module is guaranteed in ±3% power tolerance;
- >Average power of each order is guaranteed not less than the peak power;
- >5 years limited warranty on material and workmanship;
- >Limited warranty for 90% performance assurance on 10 years, 80% performance assurance on 25 years.

MECHANICAL CHARACTERISTICS

Dimension	1198mm×549mm×35/35mm
Weight	8kg
Cable Length	900mm
Bypass Diodes	2pcs
Junction Box	TL-BOX010
Front Glass	3.2mm
Frame	Gush arenaceous oxidation

Specifications are subjected to change without further notice

I-V CURVES



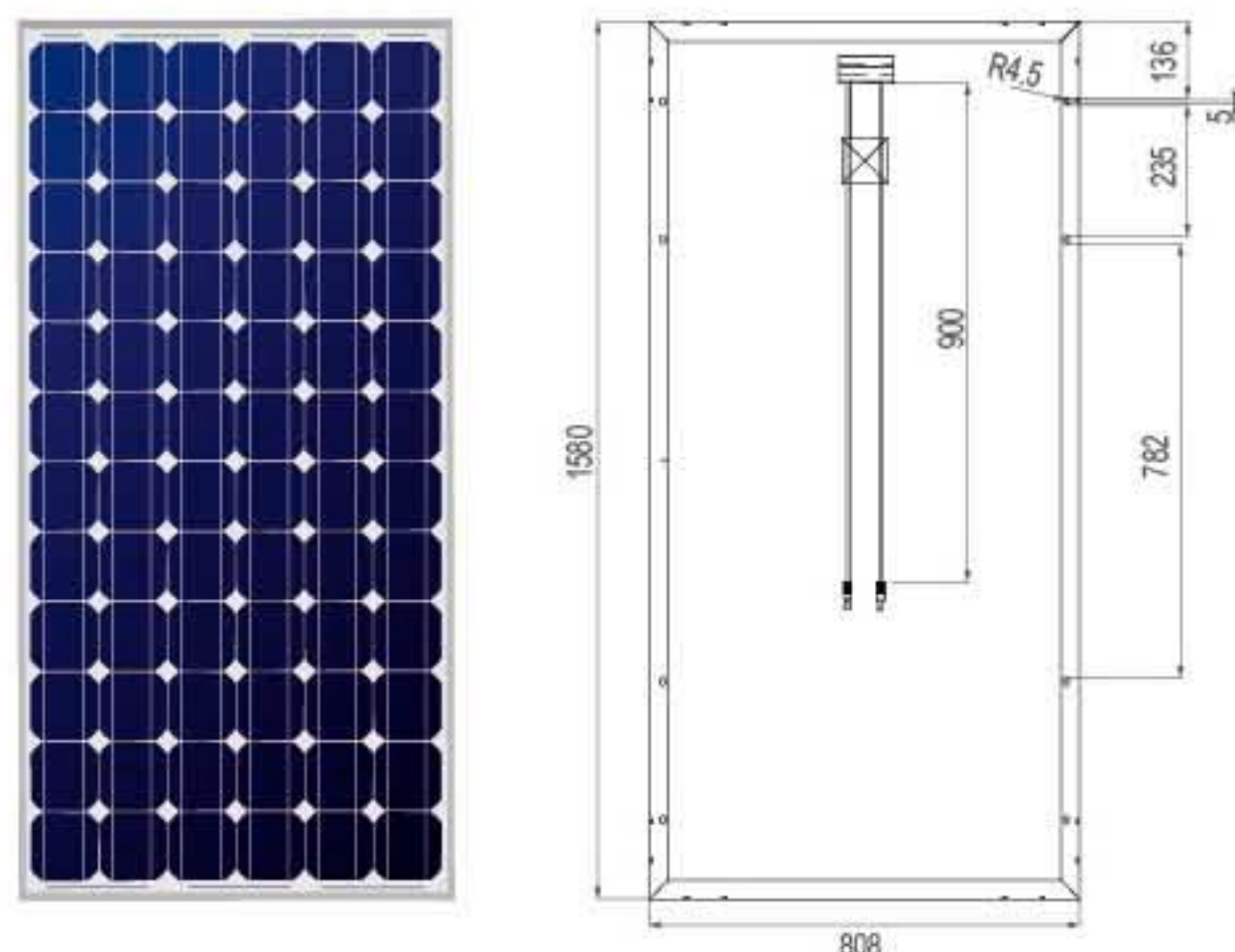
WF-M95 WF-M90 WF-M85 WF-M80 WF-M75 WF-M70
Monocrystalline Photovoltaic Modules

WF-M190 WF-M185 WF-M180 WF-M170 WF-M160

Monocrystalline Photovoltaic Modules



PHYSICAL CHARACTERISTICS Unit:mm(inch)



Warranty:

- >Peak power of single module is guaranteed in $\pm 3\%$ power tolerance;
- >Average power of each order is guaranteed not less than the peak power;
- >5 years limited warranty on material and workmanship;
- >Limited warranty for 90% performance assurance on 10 years, 80% performance assurance on 25 years.

ELECTRICAL CHARACTERISTICS

Module type	Unit	WF180M-01E				
Power range	W	160-190				
Open-circuit voltage (Voc)	V	42.00	42.60	43.20	43.20	43.80
Short-Circuit Current (Isc)	A	5.12	5.52	5.60	5.76	5.83
Max-power voltage (Vmp)	V	35.00	35.80	36.00	36.00	36.50
Max-power current (Imp)	A	4.57	4.75	5.00	5.14	5.20
Maximum power(Pmax)	W	160.00	170.00	180.00	185.00	190.00
Cell Efficiency	%	15.00	16.00	17.00	17.50	18.00
Number, Type and arrangement of Cell		72pcs Monocrystalline silicon (12×6)				
Cell size	mm	125×125				
Power temperature coefficient	%/°C	-0.48				
Current temperature coefficient	%/°C	0.02				
Voltage temperature coefficient	%/°C	-0.33				
NOCT-Nominal operating cell temperature	°C	50				
Operating temperature	°C	-40~+85				
Max-System Voltage	VDC	1000				

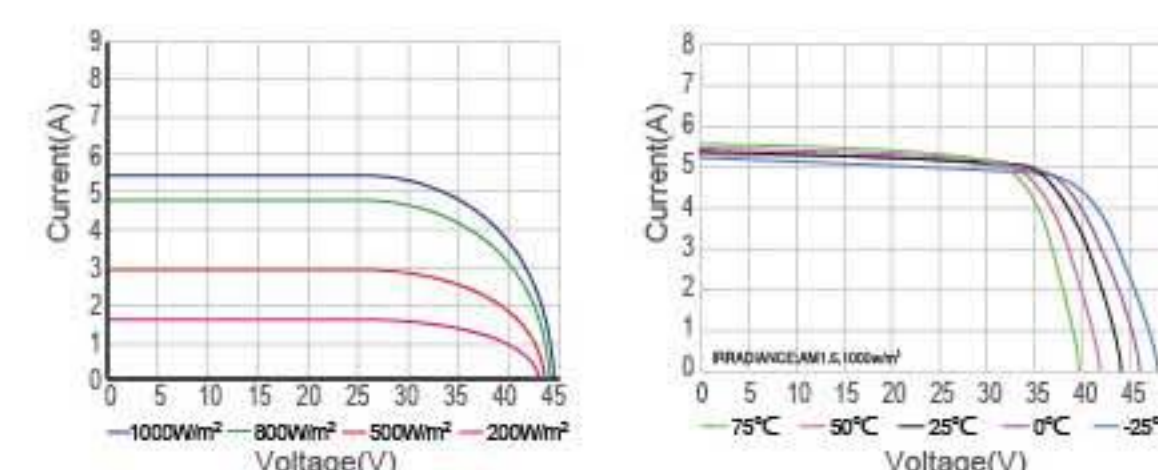
STC:1000W/m²,AM1.5and25°C cell temperature; NOCT:Nominal Operating Cell Temperature

MECHANICAL CHARACTERISTICS

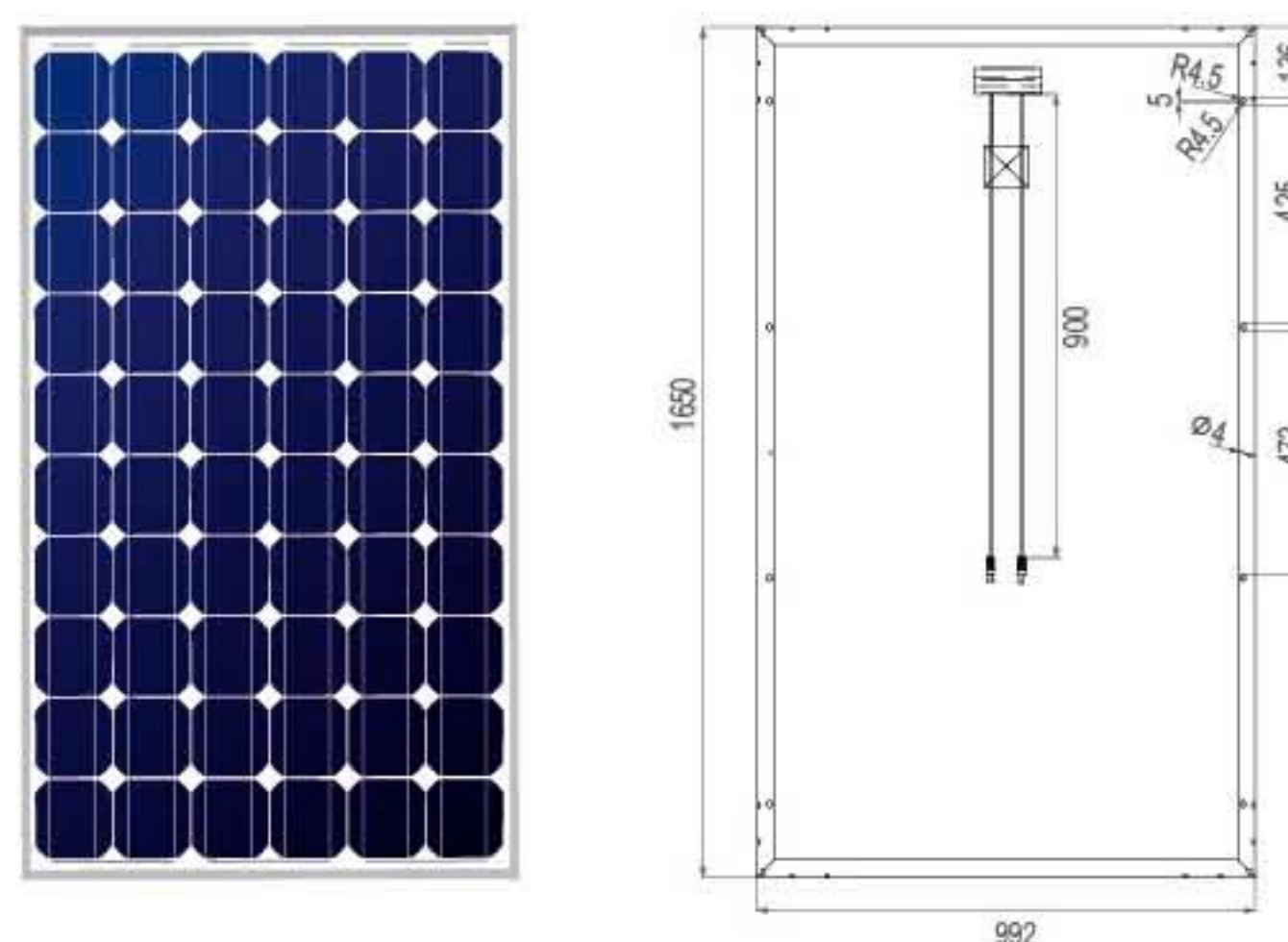
Dimension	1580mm×808mm×46/35mm
Weight	15.5kg
Cable Length	900mm
Bypass Diodes	3pcs
Junction Box	PVRH0502B
Front Glass	3.2mm
Frame	Electrophoresis silvery white

Specifications are subjected to change without further notice

I-V CURVES



PHYSICAL CHARACTERISTICS Unit:mm(inch)



Warranty:

- >Peak power of single module is guaranteed in $\pm 3\%$ power tolerance;
- >Average power of each order is guaranteed not less than the peak power;
- >5 years limited warranty on material and workmanship;
- >Limited warranty for 90% performance assurance on 10 years, 80% performance assurance on 25 years.

ELECTRICAL CHARACTERISTICS

Module type	Unit	WF220M-02B				
Power range	W	200-240				
Open-circuit voltage (Voc)	V	36.38	36.50	36.75	37.13	37.38
Short-Circuit Current (Isc)	A	7.70	8.05	8.38	8.67	8.99
Max-power voltage (Vmp)	V	29.10	29.20	29.40	29.70	29.90
Max-power current (Imp)	A	6.87	7.19	7.48	7.74	8.03
Maximum power(Pmax)	W	200.00	210.00	220.00	230.00	240.00
Cell Efficiency	%	14.00	14.75	15.50	16.00	16.75
Number, Type and arrangement of Cell		60pcs Monocrystalline silicon (10×6)				
Cell size	mm	156×156				
Power temperature coefficient	%/°C	-0.43				
Current temperature coefficient	%/°C	0.02				
Voltage temperature coefficient	%/°C	-0.34				
NOCT-Nominal operating cell temperature	°C	47±2				
Operating temperature	°C	-40~+85				
Max-System Voltage	VDC	1000				

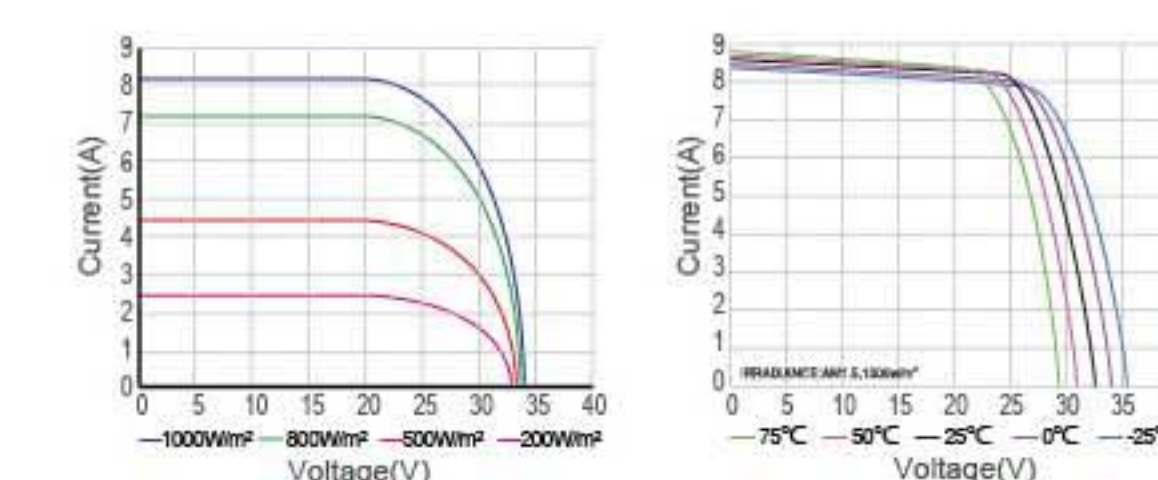
STC:1000W/m²,AM1.5and25°C cell temperature; NOCT:Nominal Operating Cell Temperature

MECHANICAL CHARACTERISTICS

Dimension	1650mm×992mm×50/35mm
Weight	21.5kg
Cable Length	900mm
Bypass Diodes	6pcs
Junction Box	TL-BOX007B
Front Glass	3.2mm
Frame	Gush arenaceous oxidation

Specifications are subjected to change without further notice

I-V CURVES



WF-M240 WF-M230 WF-M220 WF-M210 WF-M200

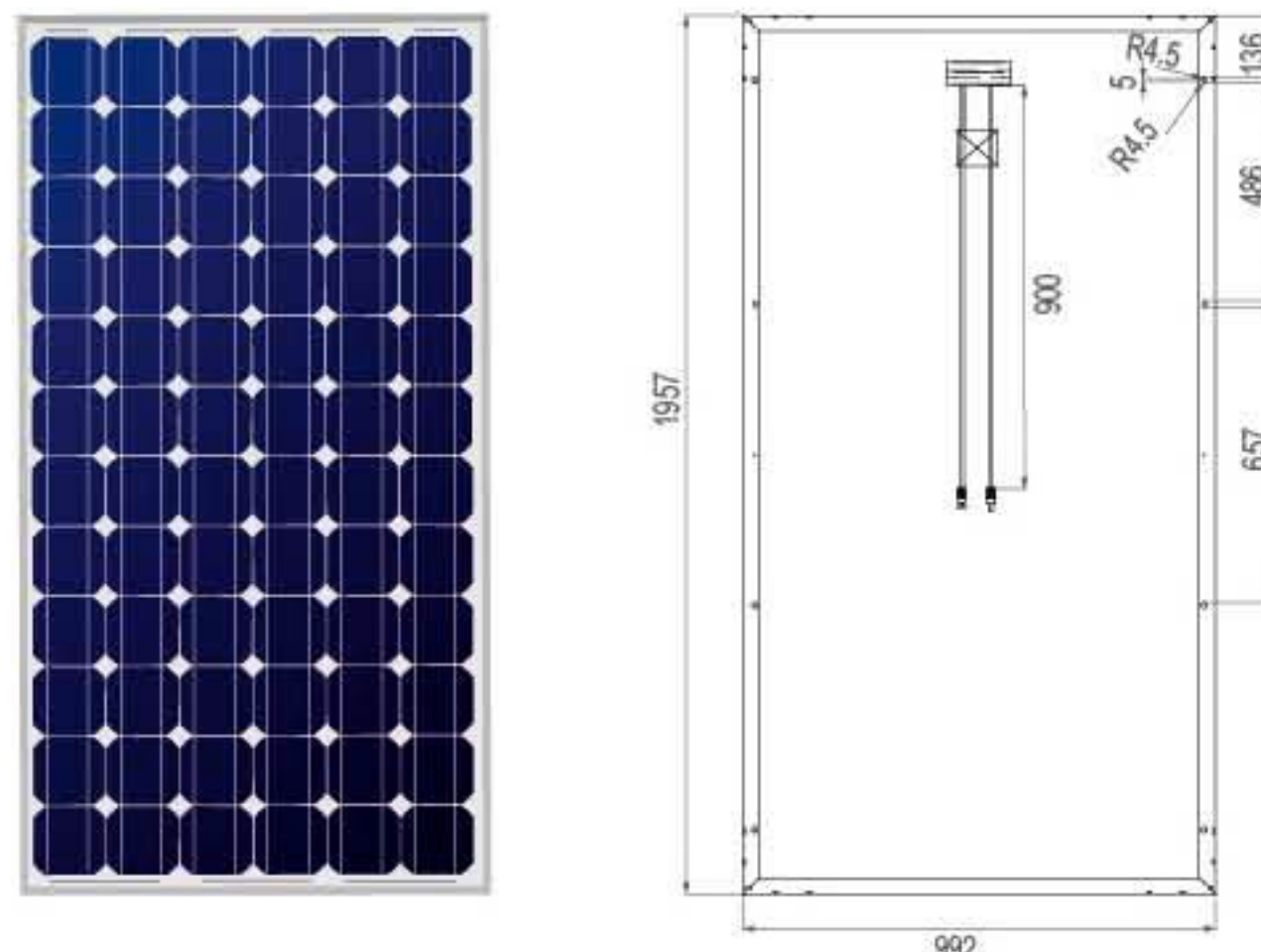
Monocrystalline Photovoltaic Modules

WF-M280 WF-M270 WF-M260 WF-M250 WF-M240

Monocrystalline Photovoltaic Modules



PHYSICAL CHARACTERISTICS Unit:mm(inch)



Warranty:

- >Peak power of single module is guaranteed in $\pm 3\%$ power tolerance;
- >Average power of each order is guaranteed not less than the peak power;
- >5 years limited warranty on material and workmanship;
- >Limited warranty for 90% performance assurance on 10 years, 80% performance assurance on 25 years.

ELECTRICAL CHARACTERISTICS

Module type	Unit	WF280M-02A				
Power range	W	240-280				
Open-circuit voltage (Voc)	V	43.16	43.50	44.25	44.86	45.50
Short-Circuit Current (Isc)	A	7.79	8.05	8.22	8.42	8.60
Max-power voltage (Vmp)	V	34.50	34.80	35.40	35.90	36.60
Max-power current (Imp)	A	6.95	7.18	7.34	7.52	7.65
Maximum power(Pmax)	W	240.00	250.00	260.00	270.00	280.00
Cell Efficiency	%	14.00	14.50	15.25	15.75	16.25
Number, Type and arrangement of Cell		72pcs Monocrystalline silicon (12×6)				
Cell size	mm	156×156				
Power temperature coefficient	%/°C	-0.43				
Current temperature coefficient	%/°C	0.02				
Voltage temperature coefficient	%/°C	-0.34				
NOCT-Nominal operating cell temperature	°C	47±2				
Operating temperature	°C	-40~+85				
Max-System Voltage	VDC	1000				

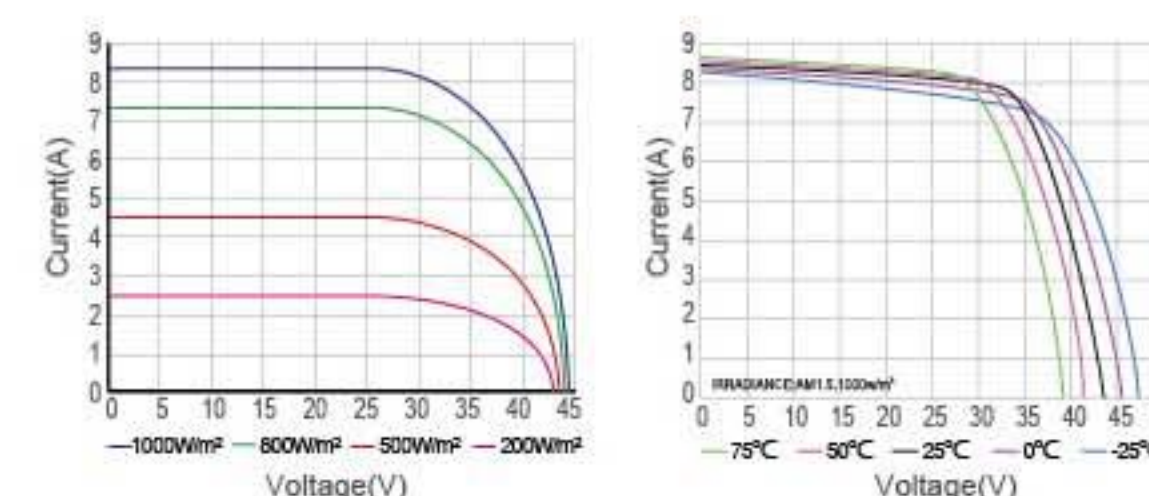
STC:1000W/m²,AM1.5and25°C cell temperature; NOCT:Nominal Operating Cell Temperature

MECHANICAL CHARACTERISTICS

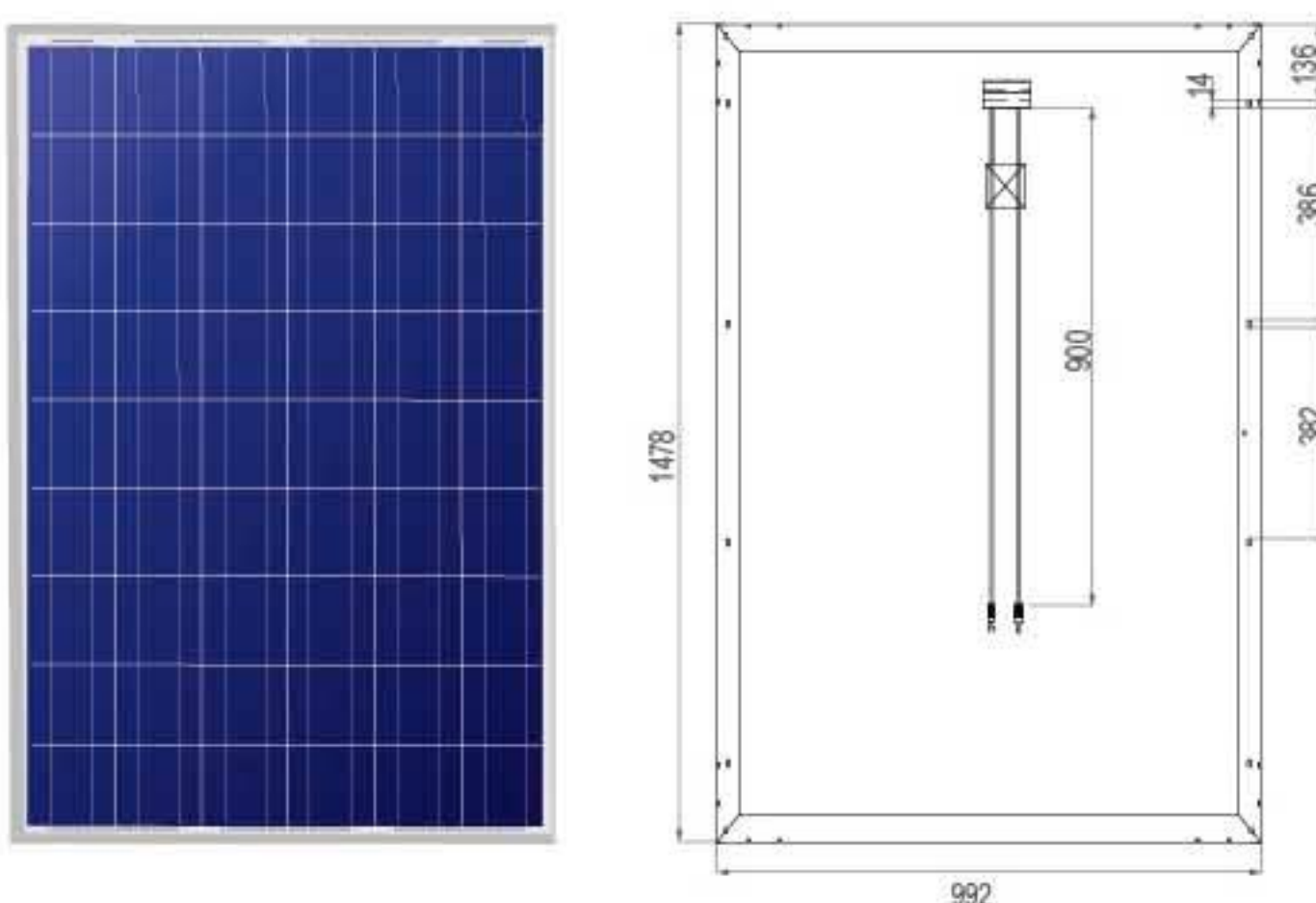
Dimension	1957mm×992mm×50/35mm
Weight	28kg
Cable Length	900mm
Bypass Diodes	6pcs
Junction Box	TL-BOX007B
Front Glass	3.2mm
Frame	Gush arenaceous oxidation

Specifications are subjected to change without further notice

I-V CURVES



PHYSICAL CHARACTERISTICS Unit:mm(inch)



Warranty:

- >Peak power of single module is guaranteed in $\pm 3\%$ power tolerance;
- >Average power of each order is guaranteed not less than the peak power;
- >5 years limited warranty on material and workmanship;
- >Limited warranty for 90% performance assurance on 10 years, 80% performance assurance on 25 years.

ELECTRICAL CHARACTERISTICS

Module type	Unit	WF190P-02C				
Power range	W	170-215				
Open-circuit voltage (Voc)	V	31.75	32.25	32.63	32.88	33.75
Short-Circuit Current (Isc)	A	7.50	7.81	8.15	8.52	8.95
Max-power voltage (Vmp)	V	25.40	25.80	26.10	26.30	26.90
Max-power current (Imp)	A	6.69	6.98	7.30	7.60	8.00
Maximum power(Pmax)	W	170.00	180.00	190.00	200.00	215.00
Cell Efficiency	%	13.00	14.00	14.75	15.50	16.75
Number, Type and arrangement of Cell		54pcs multicrystalline silicon (9×6)				
Cell size	mm	156×156				
Power temperature coefficient	%/°C	-0.48				
Current temperature coefficient	%/°C	0.02				
Voltage temperature coefficient	%/°C	-0.33				
NOCT-Nominal operating cell temperature	°C	47±2				
Operating temperature	°C	-40~+85				
Max-System Voltage	VDC	1000				

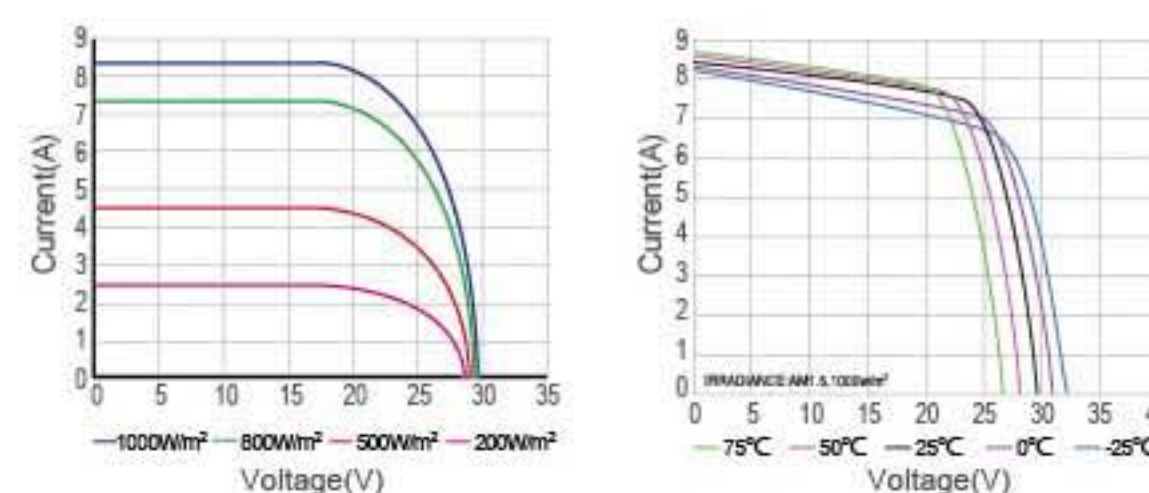
STC:1000W/m²,AM1.5and25°C cell temperature; NOCT:Nominal Operating Cell Temperature

MECHANICAL CHARACTERISTICS

Dimension	1478mm×992mm×45/35mm
Weight	17kg
Cable Length	900mm
Bypass Diodes	6pcs
Junction Box	TL-BOX007B
Front Glass	3.2mm
Frame	Gush arenaceous oxidation

Specifications are subjected to change without further notice

I-V CURVES



WF-P215 WF-P200 WF-P190 WF-P180 WF-P170

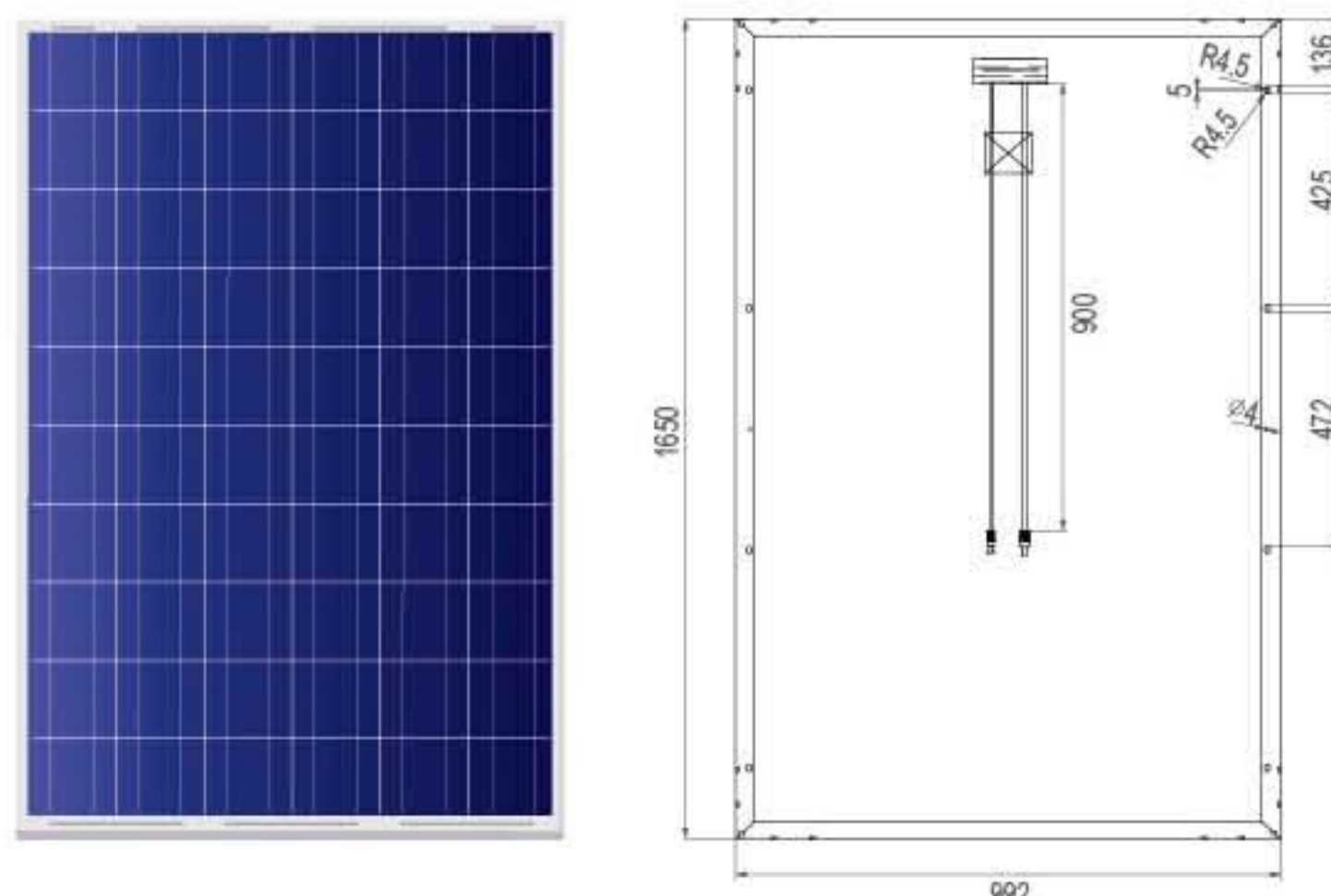
Multicrystalline Photovoltaic Modules

WF-P240 WF-P220 WF-P215 WF-P210 WF-P200

Multicrystalline Photovoltaic Modules



PHYSICAL CHARACTERISTICS Unit:mm(inch)



Warranty:

- >Peak power of single module is guaranteed in $\pm 3\%$ power tolerance;
- >Average power of each order is guaranteed not less than the peak power;
- >5 years limited warranty on material and workmanship;
- >Limited warranty for 90% performance assurance on 10 years, 80% performance assurance on 25 years.

ELECTRICAL CHARACTERISTICS

Module type	Unit	WF220P-02B				
Power range	W	200-240				
Open-circuit voltage (Voc)	V	34.20	34.80	35.40	36.00	36.00
Short-Circuit Current (Isc)	A	7.86	8.11	8.36	8.59	8.96
Max-power voltage (Vmp)	V	28.50	29.00	29.50	30.00	30.00
Max-power current (Imp)	A	7.02	7.24	7.46	7.67	8.00
Maximum power(Pmax)	W	200.00	210.00	220.00	230.00	240.00
Cell Efficiency	%	13.75	14.50	15.25	15.75	16.50
Number, Type and arrangement of Cell		60pcs multicrystalline silicon (10×6)				
Cell size	mm	156×156				
Power temperature coefficient	%/°C	-0.48				
Current temperature coefficient	%/°C	0.02				
Voltage temperature coefficient	%/°C	-0.33				
NOCT-Nominal operating cell temperature	°C	47±2				
Operating temperature	°C	-40~+85				
Max-System Voltage	VDC	1000				

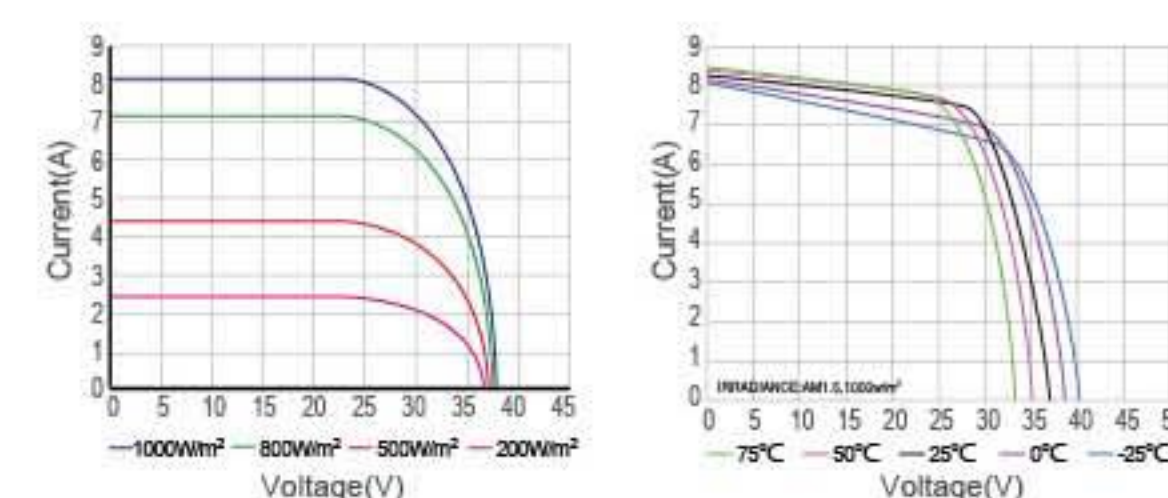
STC:1000W/m²,AM1.5and25°C cell temperature; NOCT:Nominal Operating Cell Temperature

MECHANICAL CHARACTERISTICS

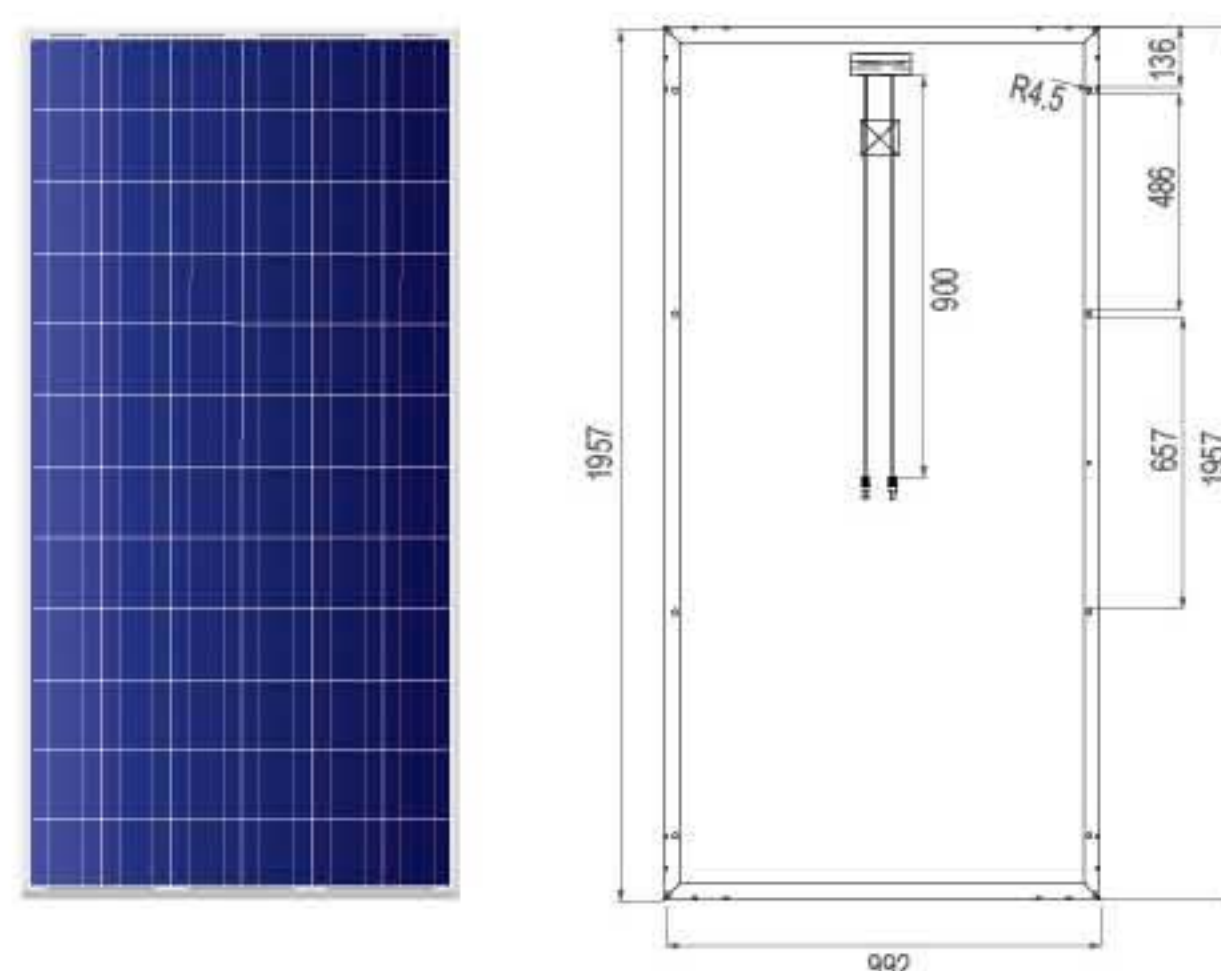
Dimension	1650mm×992mm×50/35mm
Weight	21.5kg
Cable Length	900mm
Bypass Diodes	6pcs
Junction Box	PVRH0502B
Front Glass	3.2mm
Frame	Gush arenaceous oxidation

Specifications are subjected to change without further notice

I-V CURVES



PHYSICAL CHARACTERISTICS Unit:mm(inch)



Warranty:

- >Peak power of single module is guaranteed in $\pm 3\%$ power tolerance;
- >Average power of each order is guaranteed not less than the peak power;
- >5 years limited warranty on material and workmanship;
- >Limited warranty for 90% performance assurance on 10 years, 80% performance assurance on 25 years.

ELECTRICAL CHARACTERISTICS

Module type	Unit	WF280P-02A				
Power range	W	240-280				
Open-circuit voltage (Voc)	V	41.40	42.00	42.60	43.20	43.20
Short-Circuit Current (Isc)	A	8.01	8.11	8.21	8.31	8.41
Max-power voltage (Vmp)	V	35.00	35.50	35.50	36.00	36.00
Max-power current (Imp)	A	6.86	7.04	7.33	7.50	7.78
Maximum power(Pmax)	W	240.00	250.00	260.00	270.00	280.00
Cell Efficiency	%	13.75	14.25	15.00	15.50	16.00
Number, Type and arrangement of Cell		72pcs multicrystalline silicon (12×6)				
Cell size	mm	156×156				
Power temperature coefficient	%/°C	-0.48				
Current temperature coefficient	%/°C	0.02				
Voltage temperature coefficient	%/°C	-0.33				
NOCT-Nominal operating cell temperature	°C	47±2				
Operating temperature	°C	-40~+85				
Max-System Voltage	VDC	1000				

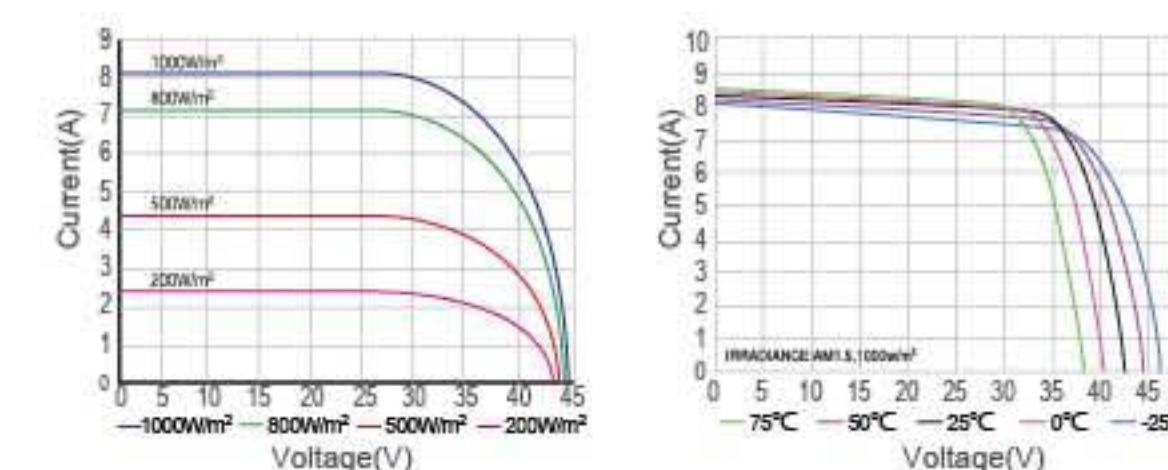
STC:1000W/m²,AM1.5and25°C cell temperature; NOCT:Nominal Operating Cell Temperature

MECHANICAL CHARACTERISTICS

Dimension	1957mm×992mm×50/35mm
Weight	28kg
Cable Length	900mm
Bypass Diodes	6pcs
Junction Box	PVRH0502B
Front Glass	3.2mm
Frame	Gush arenaceous oxidation

Specifications are subjected to change without further notice

I-V CURVES



WF-P280 WF-P270 WF-P260 WF-P250 WF-P240

Multicrystalline Photovoltaic Modules