

**Mysolar**



New Energy, Smart Living

## Shingled Solar Panel Introduction

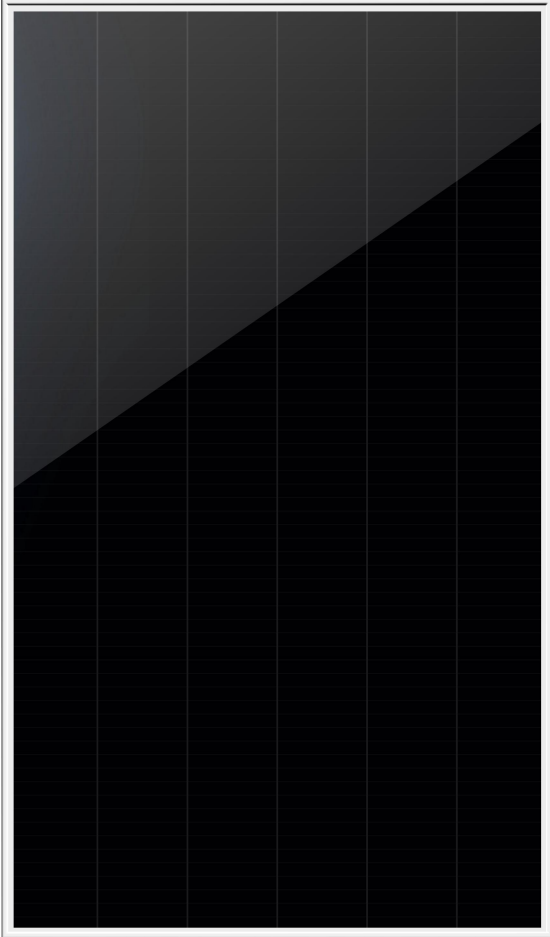
**Mysolar Manufacturing (Shanghai) Co.,Ltd.**

Edition: 2022. Apr



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**Mysolar Shingled Solar Panel Advantages**



Higher Power output: up to **670W**

Higher Efficiency: up to **21.6%**

Much Lower Bos: saves up to **9.7%**

More electricity gain: up to **1.08%**

Less Micro-crack risks

Better hot-spot resistance

Better PID performance and Lower LID

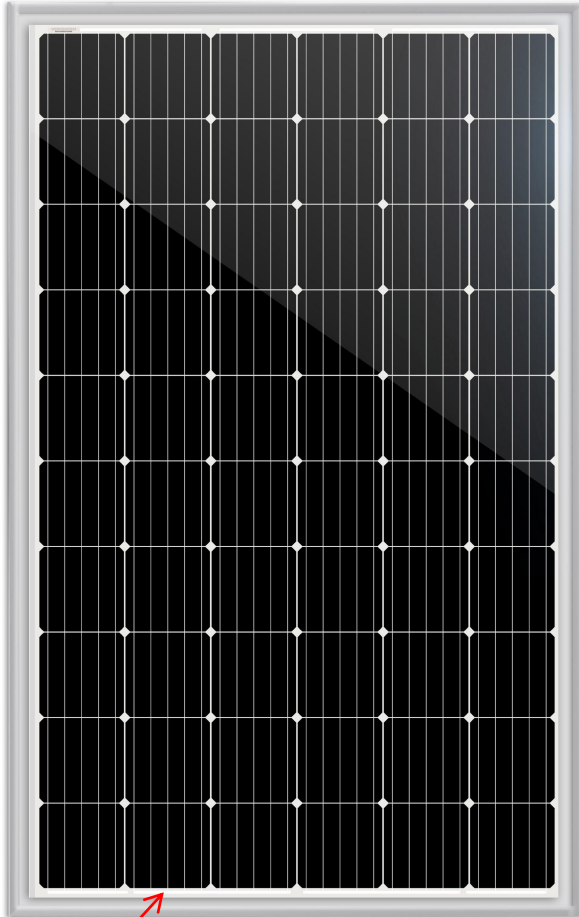
Low Temperature Production procedure

Longer Warranty with less degradation

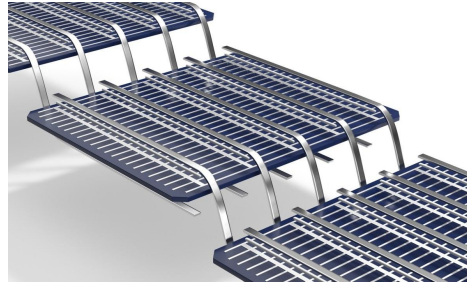
Elegant and attractive design for installations

More Flexible and stronger mechanical performance

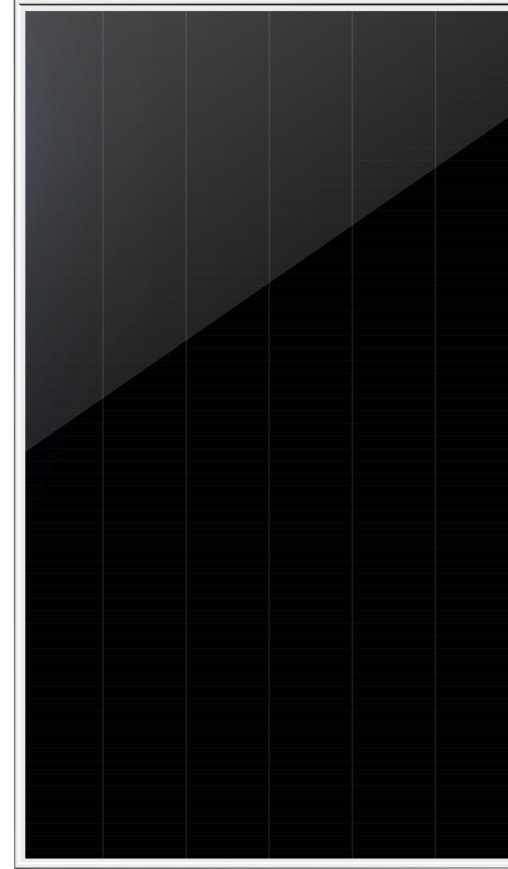
**Differences between Shingled panel and conventional solar panels**



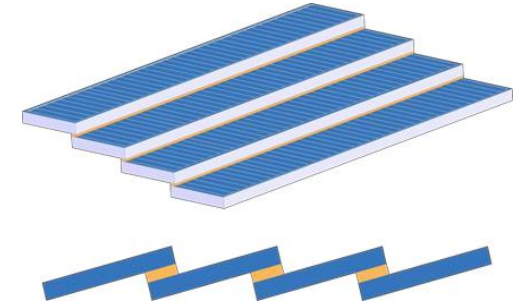
Inactive area losses, string losses and busbar losses



Solar cells are laid out across the panel with spaces, and are electrically connected together by copper busbars (ribbons) by means of high temperature soldering processes. The more copper busbars used the less resistance losses and hence the more efficient the electrical connection.

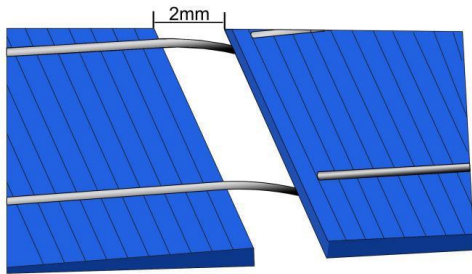


No busbar, no inactive area and parallel substrings



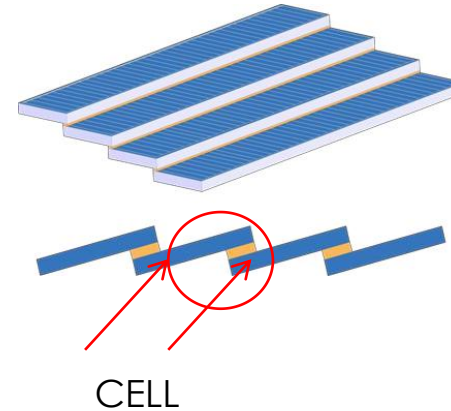
Shingle solar cells are solar cells which are cut into typically 5/6/7/8 strips which can be overlaid, to form the electrical connections. The strips of solar cells are joined together using an electrically conductive adhesive (ECA) that allows for conductivity and flexibility.

## Electrically Conductive Adhesive Method (ECA) in Low Temperature



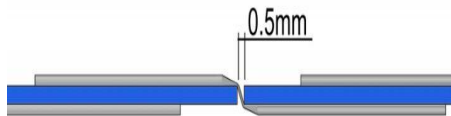
### Conventional Panel:

250-300°C Temperature  
Big gap between cells, lower efficiency and possible micro-cracks



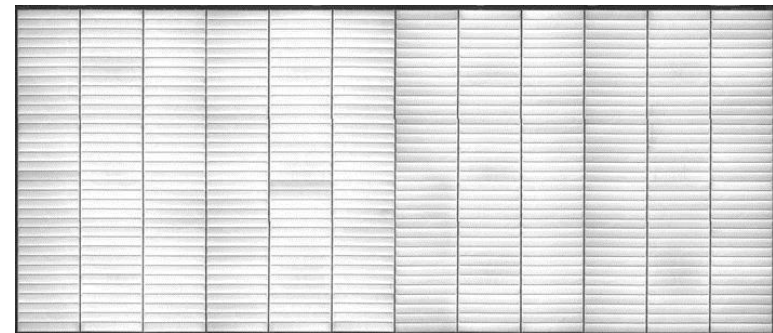
### Mysolar Shingled Panel:

≤150°C Temperature  
Overlaid cells, no gap, no busbar, no metal thermal effect, no micro-crack by high temperature soldering

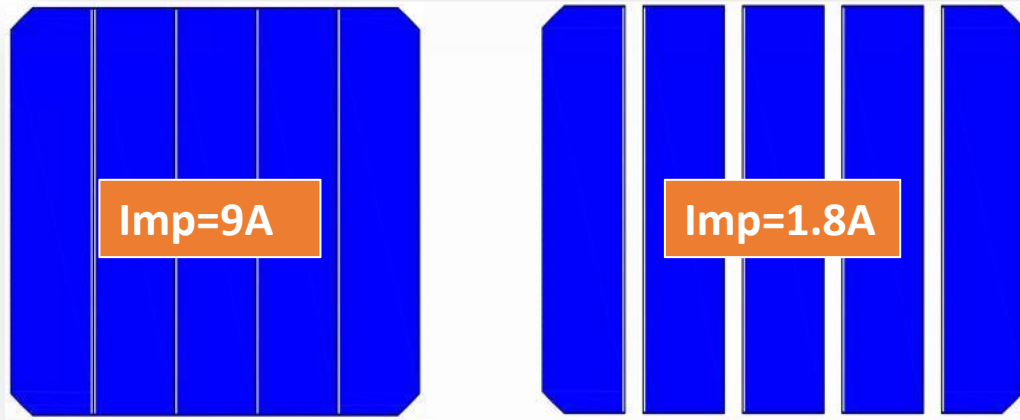


### Half-cut MBB Panel:

250-300°C Temperature  
Small gap between cells, higher metal thermal effect with possible micro-cracks



**Lower Current in Strings**



**Conventional Panel:**  
Full cell  $I_{mp}=9A$

**Half-cut MBB Panel:**  
Cut cell  $I_{mp}=1.8A$



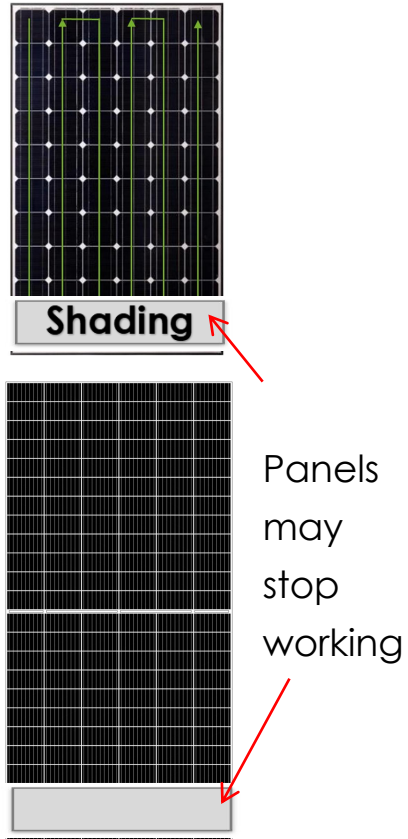
**Mysolar Shingled Panel:**

Shingled cell connected in series,  $I_{mp}=1.8A$  without change, voltage changes, series current decreased from 9A to 1.8A.

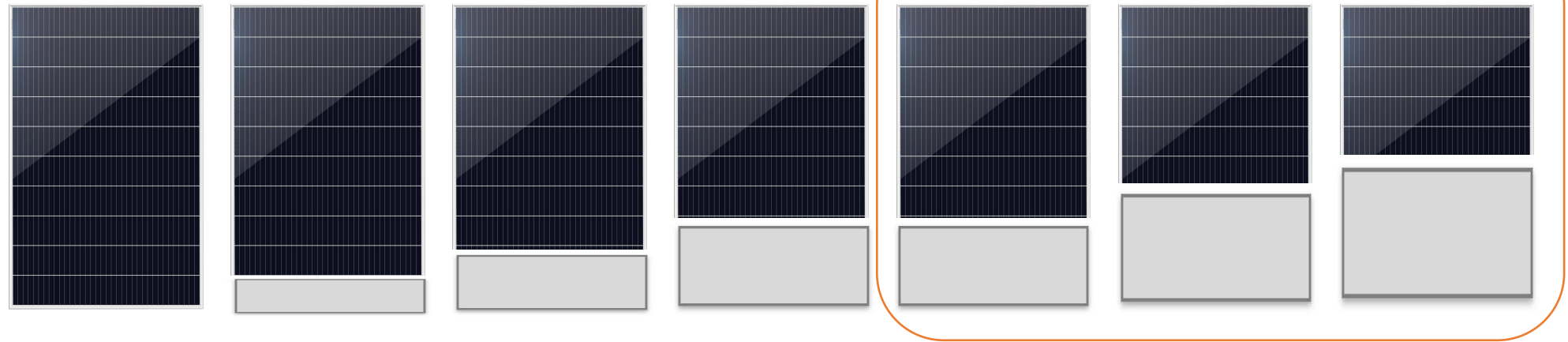
$$P_{Loss}=I^2 \times R$$

**Current loss decreased dramatically**

## Less Energy Loss due to Shading



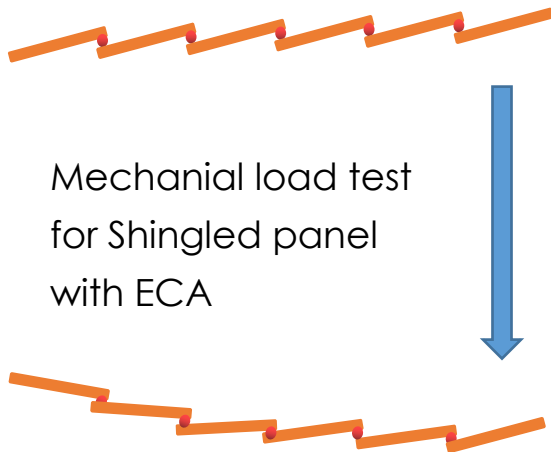
Mysolar Shingled solar panels can be wired in groups and configured in parallel which significantly reduces the losses caused by shading. They have the best performance in condition of part being shaded.



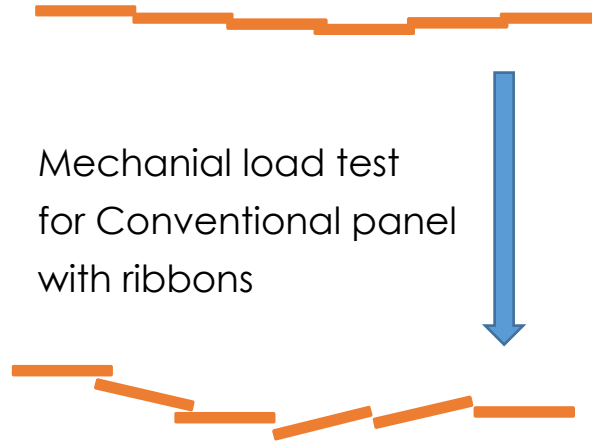
Conventional solar panels have the individual cells wired in series so when a part of the solar panel is shaded it can have a significant effect on the level of power output, with result that panels may stop working.

**Better Reliability**

Mysolar Shingled solar panels are more resistant to failures due to external forces applied to the surface of panels comparing with Conventional panels

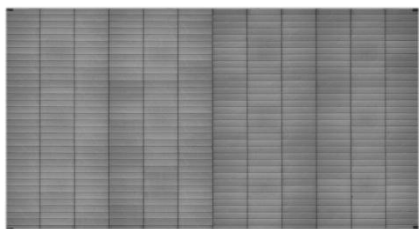


Mechanical load test for Shingled panel with ECA

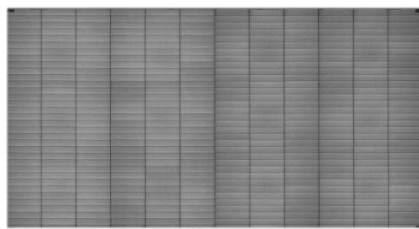


Mechanical load test for Conventional panel with ribbons

**\* Better performance in Mechanical load test**

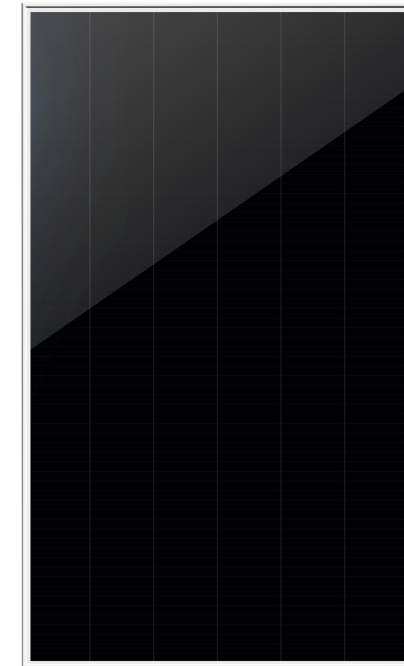


Before test



After test

Also Mysolar Shingled panels cancelled over 30 meters busbar, so busbar failures are reduced



**\* Reduced busbar failures**

**More elegant and attractive**



SHINGLED 670W for ground-mounting systems - Silver Frames

Mysolar Shingled panels are suitable for both residential and big commercial solar systems.



SHINGLED 670W for roof-top systems - Silver frames



**More elegant and attractive**



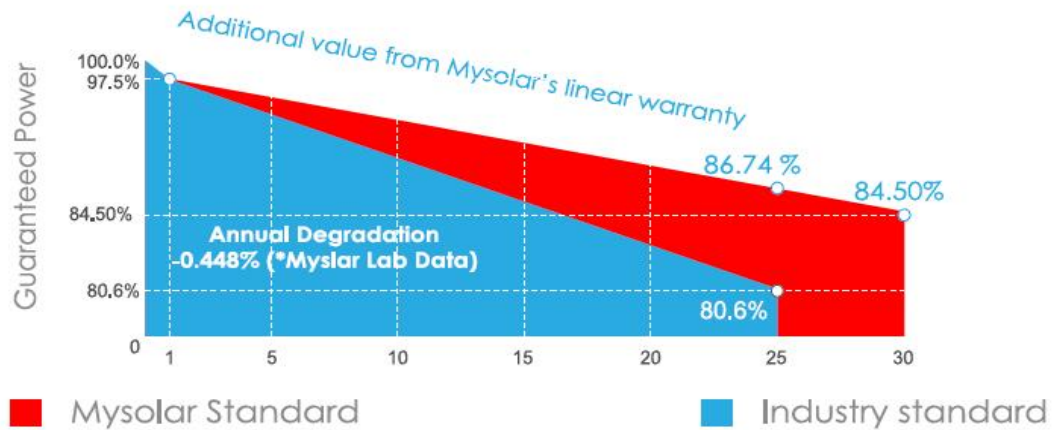
Mysolar Shingled panels are suitable for both residential and big commercial solar systems.

**More elegant and attractive**

Mysolar Shingled panels with silver frames installed on roofs

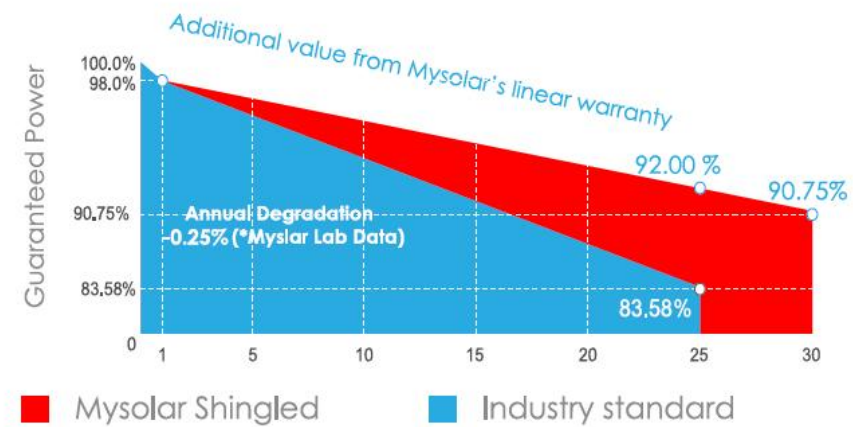


**Less Degradation and Longer Warranty**



**Mysolar General Mono Perc Panels:**

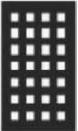






- 25 years Product Warranty
- 25 years Linear Warranty
- 25th year 86.74%



**Mysolar Shingled Solar Panels:**

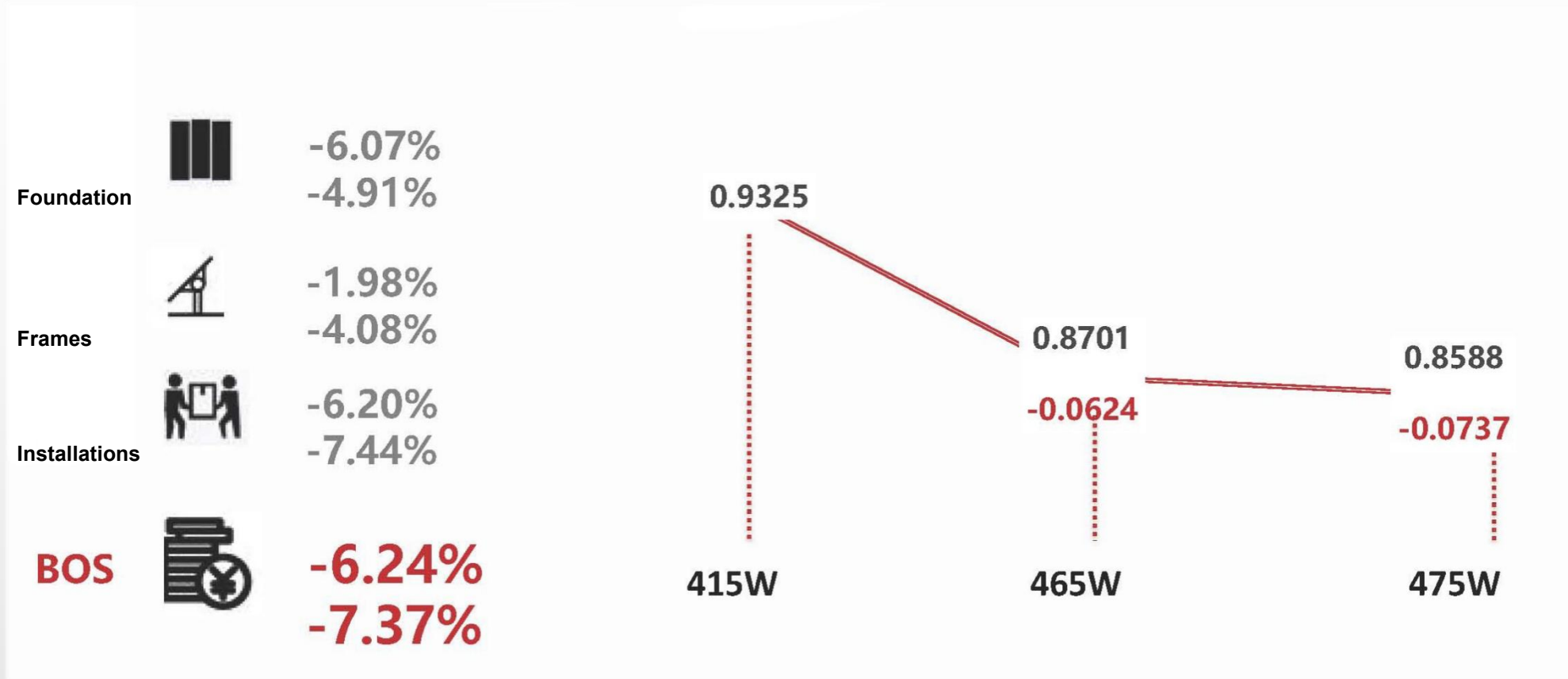
- 30 years Product Warranty
- 30 years Linear Warranty
- 30th year 90.75%

## BOS Comparison with other modules

Module Types		Shingled 415W (Reference module)	Shingled 465W (158.75Cell)	Shingled 475W (166Cell)	Risen 440W (166Cell)	GCL 440W (166 Bifacial Cell)	LONGI 450W (166Cell)	JINKO 465W (166Cell)	SUNPORT 450W (MWTI)	SUNPORT 445W (MWTI)
Modules	 Power	↔ 415	465	475	440	440	450	465	450	445
	No./String	↔ 28	28	28	28	29	29	27	27	27
	Capacity	↔ 200	207.2	203	199	199	205	207.1	203	201
	Difference of Volume Ratio	↔ 0.1952	0.3392	0.3680	0.2672	0.3125	0.3274	0.2914	0.2497	0.2358
BOS	 Foundation	↔ 0.1394	0.1310	0.1326	0.1270	0.1270	0.1255	0.1290	0.1333	0.1348
	 Frames	↔ 0.3131	0.3069	0.3003	0.2945	0.2943	0.2966	0.2956	0.3010	0.3044
	 Cables	↔ 0.0660	0.0637	0.0650	0.0736	0.0736	0.0715	0.0705	0.0725	0.0733
	 Installation	↔ 0.1951	0.1830	0.1806	0.1824	0.1823	0.1816	0.1796	0.1846	0.1866
	Extra Cost of Volume Ratio	↔ 0.2189	0.1874	0.1811	0.2031	0.1932	0.1900	0.1979	0.2070	0.2100
	 Extra Land cost	↔ 0.0000	-0.0019	-0.0008	0.0003	0.0003	-0.0013	-0.0018	-0.0008	-0.0003
	Cost on Extra Power Gain	↔ 0.0000	0.0000	0.0000	0.0000	0.0384	0.0000	0.0000	0.0000	0.0000
	Total Bos	↔ 0.9325	0.8701	0.8588	0.8809	0.9091	0.8639	0.8708	0.8976	0.9089
	 Bos Difference	↔ 0 (基准)	<b>-0.0624</b>	<b>-0.0737</b>	-0.0517	-0.0234	-0.0686	-0.0617	-0.0349	-0.0236

Fixed Land Area - 1MW BOS (location, Dongying, Shandong Province, 2020-2021)

## BOS Comparison with other modules



Fixed Land Area - 1MW BOS (location, Dongying, Shandong Province, 2020-2021)

## BOS Comparison with other modules

Module Types		LONGI LR4-72HPH 445W (166CELL) Reference	MYSOLAR SHINGLED 650W (210CELL)	CSI HIKU6 590W (182CELL)	LR5-72HPH 540W (182CELL)	HSM-BN635- WFK 635W (210CELL)	TRINA TSM- DE20 600W (210CELL)
Modules	 Power	↔ 445	650	590	540	635	600
	No./String	↔ 30	23	25	27	23	25
	Power of a string	↔ 13350	14950	14750	14580	14605	15000
BOS	 Frames	↔ 0.3284	-0.1016	-0.1153	-0.0802	-0.0906	-0.0342
	 Foundation	↔ 0.3102	-0.1067	-0.0967	-0.0867	-0.0867	0.0000
	 String Inverter	↔ 0.1305	-0.1070	-0.0946	-0.0841	-0.0857	-0.1098
	 Central Inverter	↔ 0.0709	-0.1026	-0.0897	-0.0897	-0.0897	-0.1154
	 Cables	↔ 0.0566	-0.1054	-0.1143	-0.0825	-0.0920	-0.0812
	 Installation	↔ 0.2003	-0.1742	-0.1543	-0.1141	-0.1598	-0.1006
	 Land Cost	↔ 0.3558	-0.0325	-0.0342	-0.0382	-0.0393	-0.0445
	 Total Bos	↔ 1.4526 (基准)	<b>-0.0965</b>	-0.0937	-0.0769	-0.0863	-0.0512

### 300MW BOS (location, Guangdong Province, 2020-2021)





First year illumination: 1264 hours; Single glass mono modules were installed in two arrays vertically with 196KW string inverter; Project is 70% financed with annual interest rate 4.9%; Loan time: 15 years; Power system calculated running time: 25 years; On-grid electricity price: 0.453CNY/KWH, maintenance cost: 0.046CNY/W/Year.

## IRR Comparison with other modules

**BOS -9.65%**

**IRR% +0.71%**

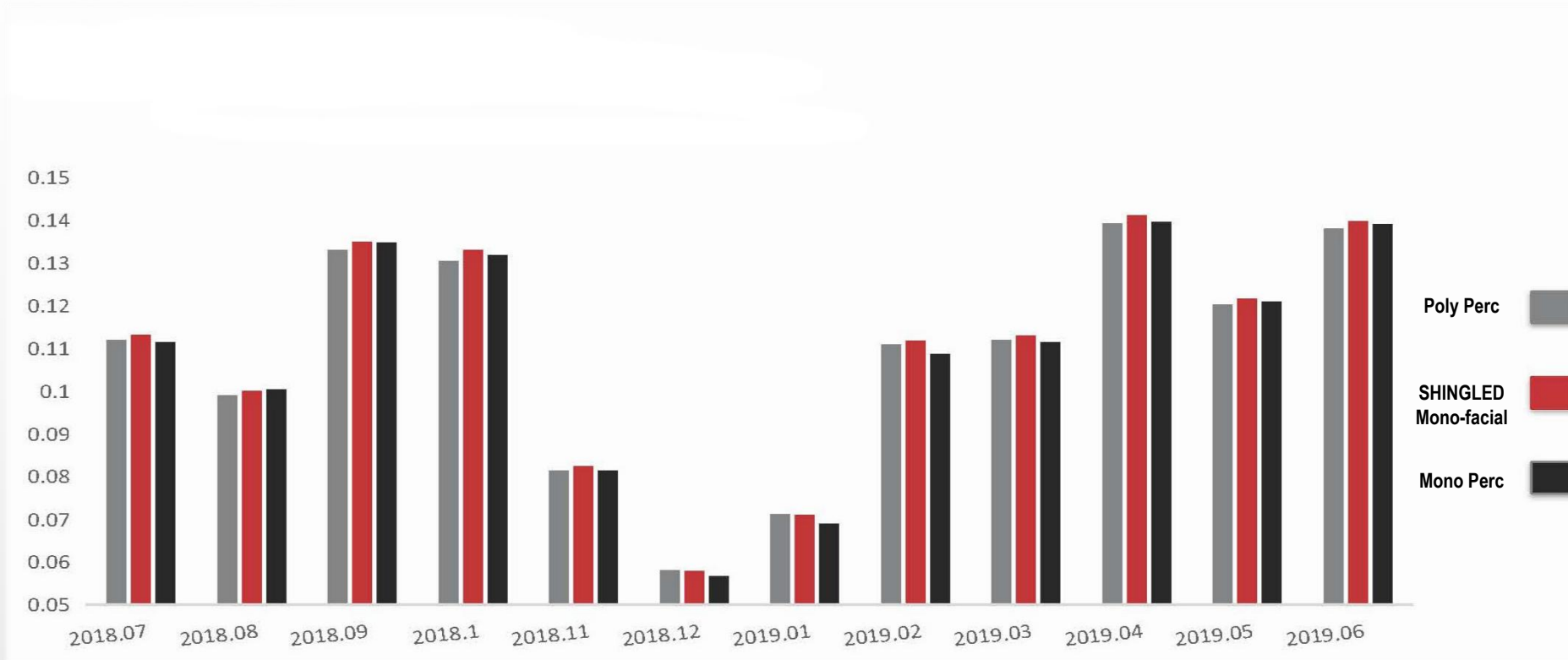
You save up to  
 $9.65\% + 0.71\% = 10.36\%$   
 with Mysolar Shingled  
 bifacial modules

Module Types	LONGI LR4-72HPH 445W (166CELL) Reference	MYSOLAR SHINGLED 650W (210CELL)	LR5-72HPH 540W (182CELL)	HSM-BN635- WFK 635W (210CELL)	TRINA TSM- DE20 600W (210CELL)
 System Cost CNY/Watt	3.6648	3.5961	3.6142	3.6100	3.6520
 Panel Cost CNY/Watt	1.65	1.65	1.65	1.65	1.65
 Variable BOS CNY/Watt	1.4402	1.3633	1.3909	1.3772	1.4282
 Investment Circle: 25 years	Total Investment (IRR%) 10.16%	Total Investment (IRR%) 10.42%	Total Investment (IRR%) 10.35%	Total Investment (IRR%) 10.36%	Total Investment (IRR%) 10.21%
	Capital Fund (IRR%) 17.60%	Capital Fund (IRR%) 18.30%	Capital Fund (IRR%) 18.12%	Capital Fund (IRR%) 18.17%	Capital Fund (IRR%) 17.73%

### 300MW BOS (location, Guangdong Province, 2020-2021)

First year illumination: 1264 hours; Average yearly yield in 1178 hours; Single glass mono modules were installed in two arrays vertically with 196KW string inverter; Project is 70% financed with an annual interest rate 4.9%; Loan time: 15 years; Power system calculated running time: 25 years; On-grid electricity price: 0.453CNY/KWH, maintenance cost: 0.046CNY/W/Year; First year degradation of power output is 2%, average degradation from second year to 25th is less than 0.5%.

**More Power Gain with Shingled modules**



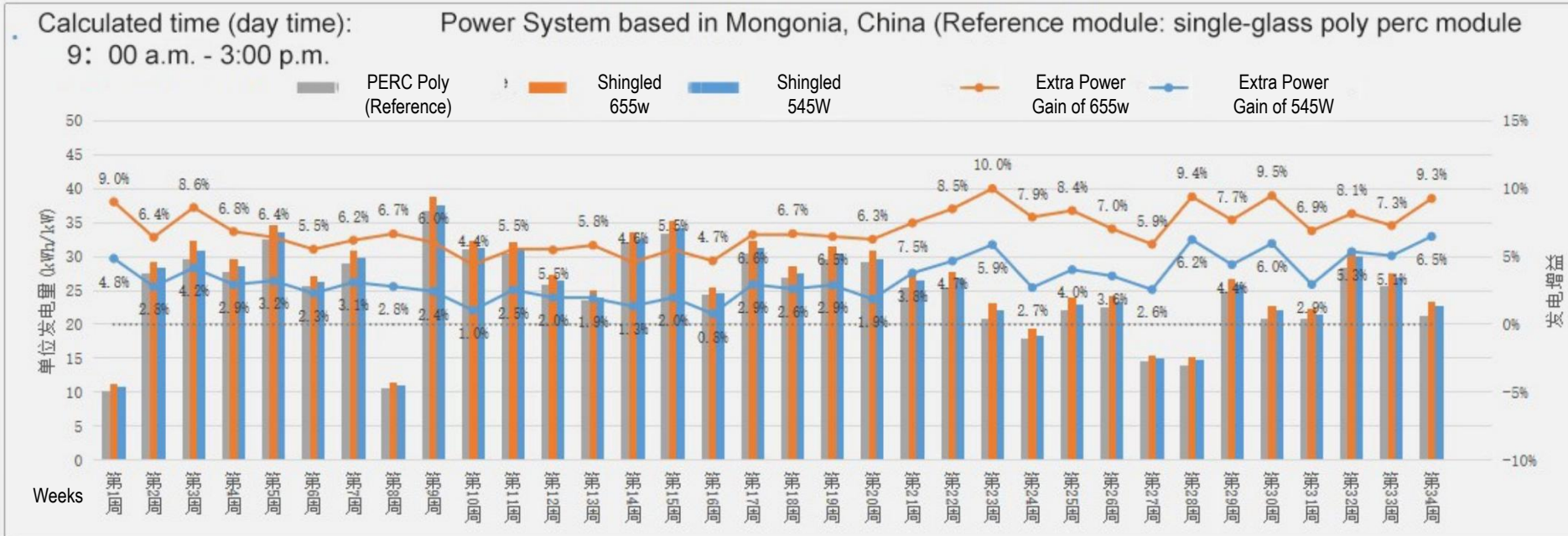
**Location: Sanya, Hainan Province, kWh/Wp, 2018-2019 sample project**

Extra Power Gain from Mysolar mono-facial SHINGLED module comparing to general poly perc modules: +1.1%  
Extra Power Gain from Mysolar mono-facial SHINGLED module comparing to general mono perc modules: +0.6%



More Power Gain with Shingled modules

Grid-connected time: Dec 24th, 2021, reported till Aug 20th, 2022

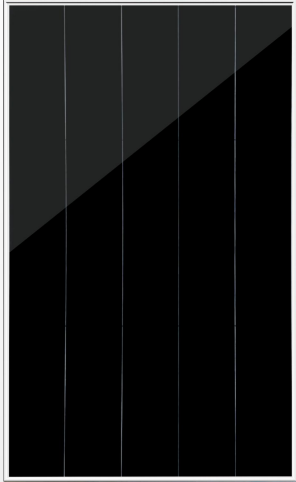


Extra Power Gain

日期 Weeks	1周	2周	3周	4周	5周	6周	7周	8周	9周	10周	11周	12周	13周	14周	15周	16周	17周	18周	19周	20周	21周	22周	23周	24周	25周	26周	27周	28周	29周	30周	31周	32周	33周	34周	35周	36周
累计辐照量 (kWh/m²)	34	37.7	34.9	33.4	38.9	37.1	28.7	18.9	48.8	40.6	39.6	35.3	40.8	44.6	47.3	34.4	42.4	38.0	42.1	42.6	41.5	32.9	33.3	26.6	30.8	32.4	30.6	16.6	39.2	29.5	33.1	43.0	39.5	33.3	26.3	
最高温度 (°C)	4	4	0	-3	-1	-1	0	-5	8	7	13	12	13	15	28	25	26	30	32	22	31	32	32	24	28	33	29	30	30	29	31	33	32	28	29	
最低温度 (°C)	-10	-10	-13	-16	-25	-20	-23	-20	-20	-14	-8	-15	-10	-10	-6	-2	2	-1	1	-1	8	6	6	6	13	15	16	17	16	13	17	20	15	12	11	
最高风级	4	3	4	4	3	5	3	4	4	6	3	3	4	5	5	5	6	6	6	5	3	4	5	5	5	4	4	4	4	3	4	4	3	4	4	
最低风级	1	2	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

1. Due to shades from trees, the tests are based on the time period of 9:00 a.m. to 3:00 p.m;
2. Sample quantity: 120pcs SHINGLED Mono-facial 550W, 108 pcs SHINGLED Bifacial 655W.
3. Due to limited types of reference modules with the similar-sized project on site, the reference modules on site are Poly perc modules.

## Mysolar Shingled Models



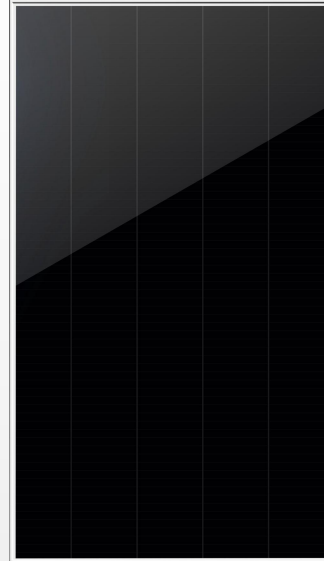
### **GOLD Series**

210\*210mm

420-425W

1819\*1096\*30MM

Efficiency up to 21.40%



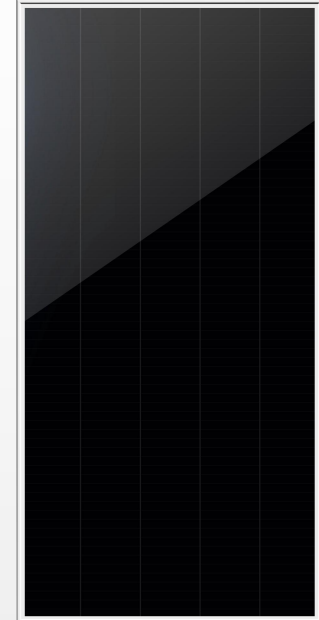
### **PLATI**

210\*210mm

440-445W

1899\*1096\*30MM

Efficiency up to 21.40%



### **Gold Series**

210\*210mm

545-555W

2384\*1096\*35MM

Efficiency up to 21.20%

## Mysolar Shingled Models



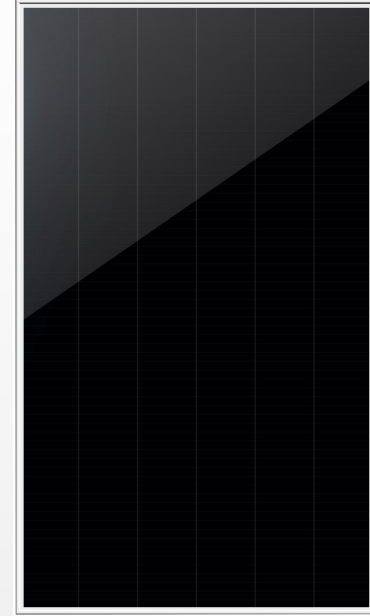
### **GOLD Series**

210\*210mm  
415-420W FullBlack  
1819\*1096\*30MM  
Efficiency up to 21.40%



### **PLATI**

210\*210mm  
435-440W FullBlack  
1899\*1096\*30MM  
Efficiency up to 21.40%



### **Gold Series**

210\*210mm Bifacial  
660-670W Dual-Glass  
2384\*1303\*35MM  
Efficiency up to 21.60%



**Contact us:**

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Mysolar Manufacturing (Shanghai) Co.,Ltd.  
Mamibot Manufacturing USA Inc.

# Thank you!

