



CHNT

Empower the World

Technical Presentation Astronergy ExpoSolar 2019

Create Sustainable and Efficient Green Energy

2019.07.12

CHINT Overview – Introduction

CHINT

正泰新能源



Founded in **1984**

Assets: **¥65 Billion**

Employees: **>30,000**

Ranking among the top 100 private enterprises in China

● Wenzhou Headquarter

● 6 International Markets:

APAC、West Asia&Africa、Europe、North America、China

● 3 Global R&D Centers:
Prague、Los Angeles、Shanghai

● 22 Logistics Centers:
Abroad: Los Angeles、St. Paul、Prague
Madrid、Moscow
Inland: East China、North China、South China etc.

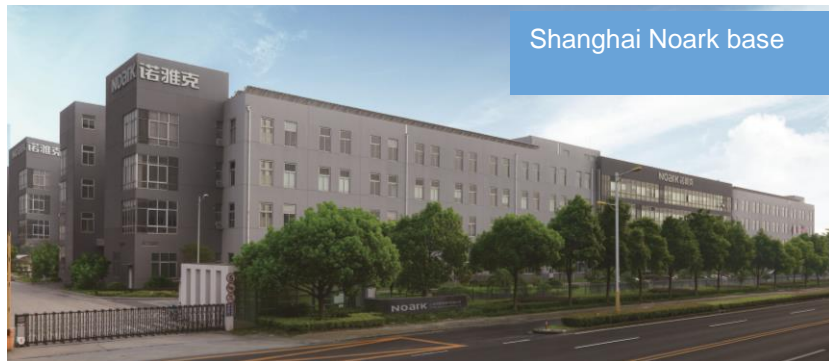
● 7 Production Sites:
Wenzhou、Hangzhou、Shanghai
Xianyang、Jiuquan、Cairo、Frankfurt

● 17 Marketing Offices
300+ Brand Flagship Stores
2300+ Sales companies

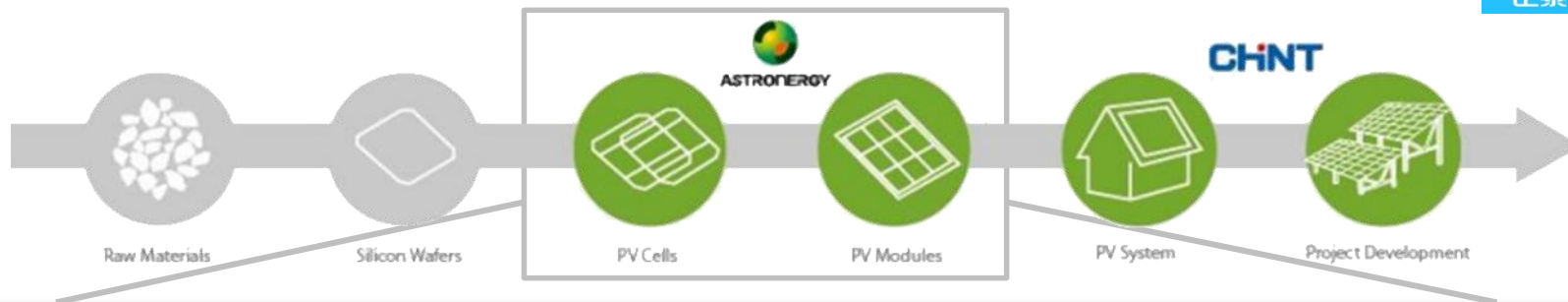
CHINT Overview- Domestic Industrial Layout

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Intelligent Manufacturing - Global Layout



[China]



Hangzhou (280MW)
Haining (2000MW)

[Asia]



South Korea, Thailand (500MW)
Japan, India, Vietnam (200MW)

[Europe]



Germany, Spain

[North America]



USA

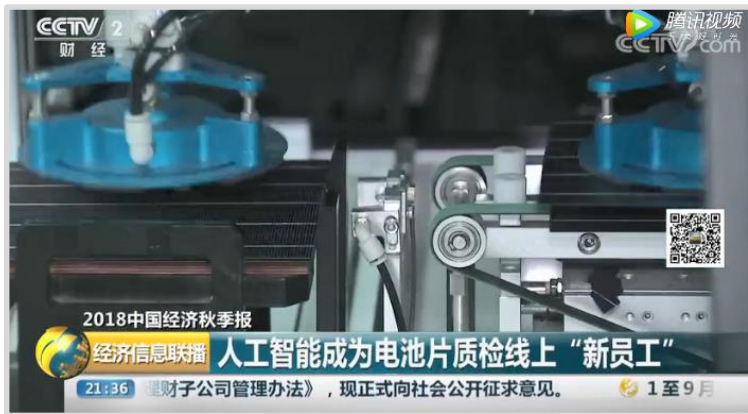
Intelligent Manufacturing - from German Industry 4.0

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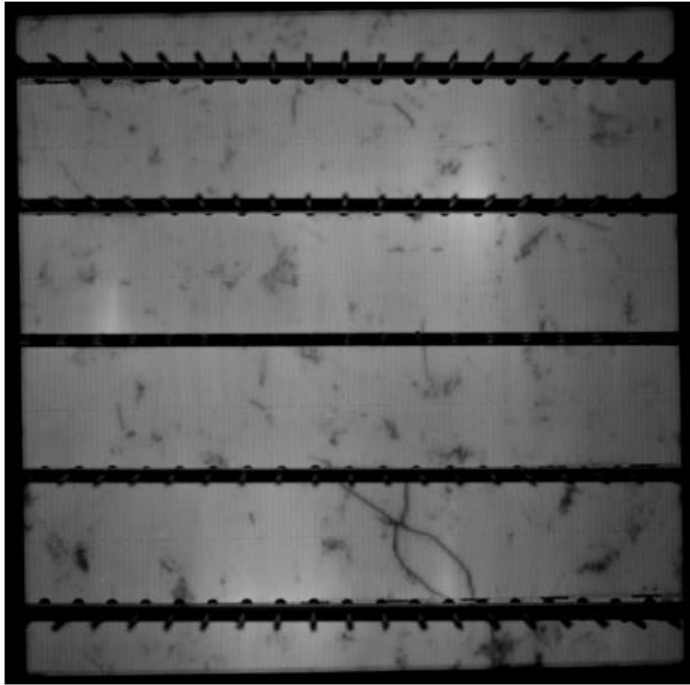
Intelligent Manufacturing Demonstration Factory - Hangzhou "Thinking" Factory

With its advantages in big data and information technology, CHINT is committed to building an intelligent manufacturing factory for PV modules. **Big data support, automatic monitoring of the whole process, full-automation of production unmanned car automatic batching, and AI quality inspection** represent the highest level of intelligent manufacturing innovation and development in China's industry.

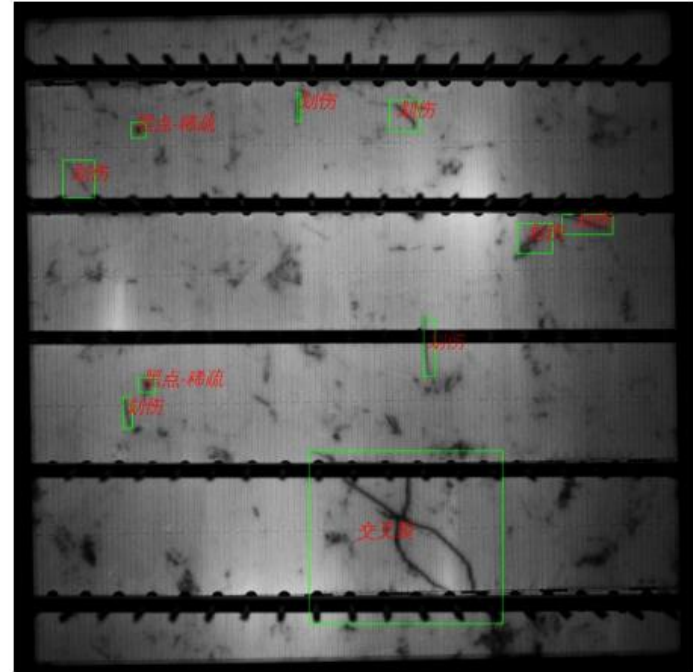


The AI tech helps to improve the Quality Inspection Process

The Automatic Inspection of EL defect of Poly Cells



Original Photo

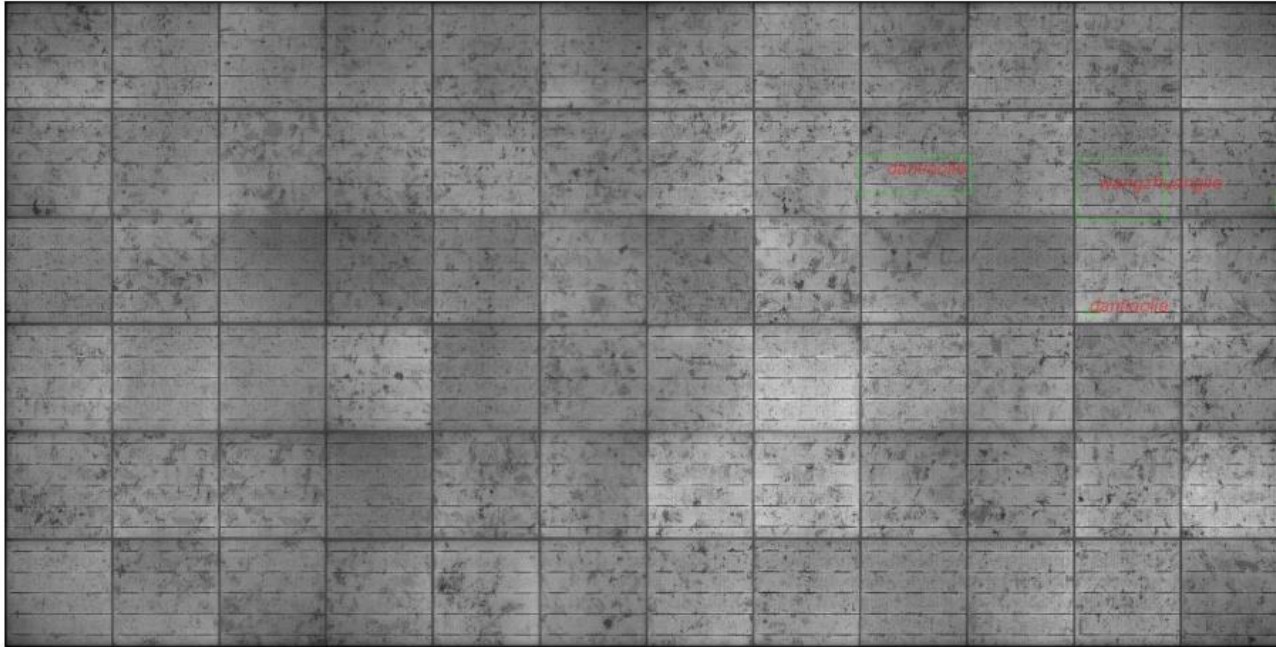


After the AI Inspection

Smart Manufacturing: The capability of Complete Inspection

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Astronergy is the first company in the industry to deploy the AI Complete Inspection



Labor
Reduction

50%

Complete
Inspection

100%

Inspection
Speed

200%

With the AI tech and limited labor, we can realize a speed of **0.5s/pc**, with the accuracy of **96%**

DNV GL Top Performance Module

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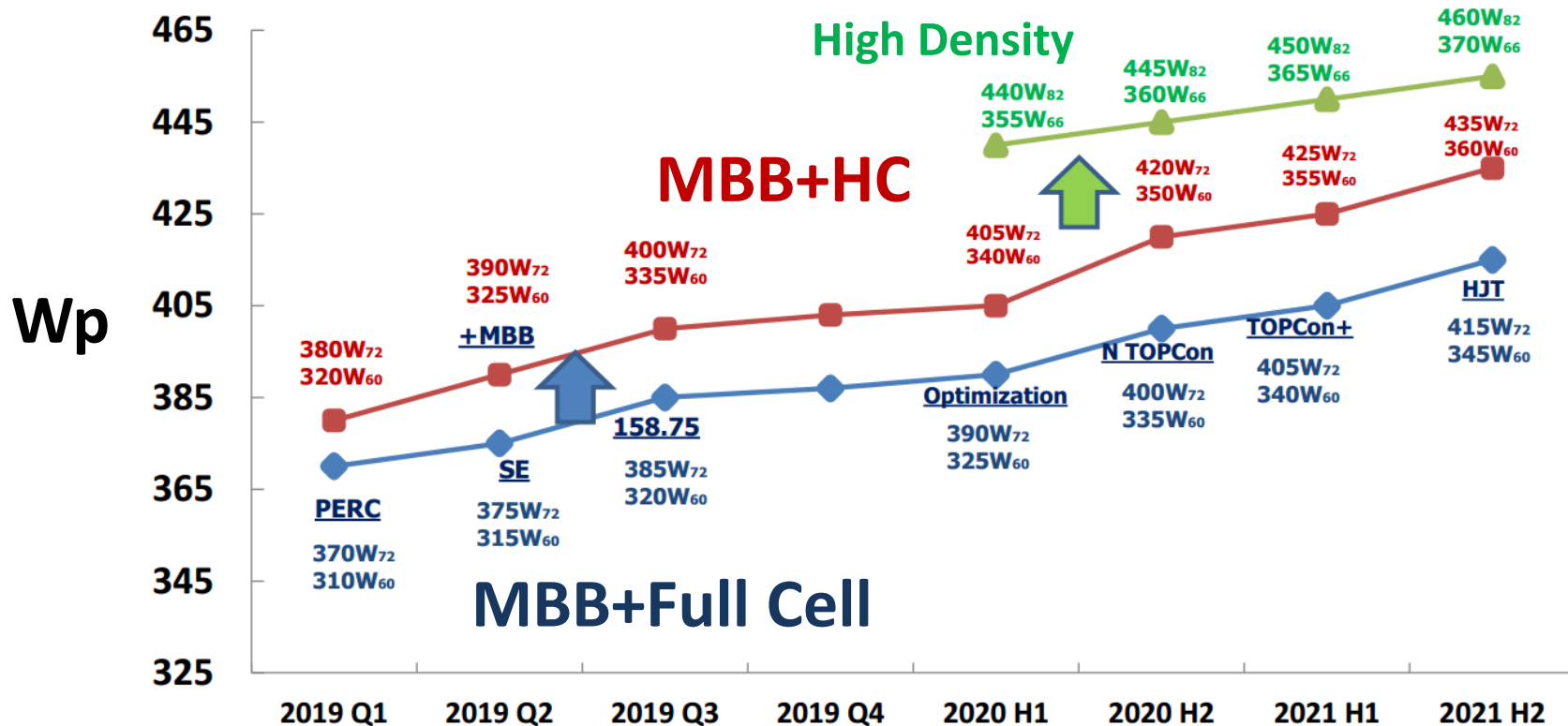


ASTRONERGY

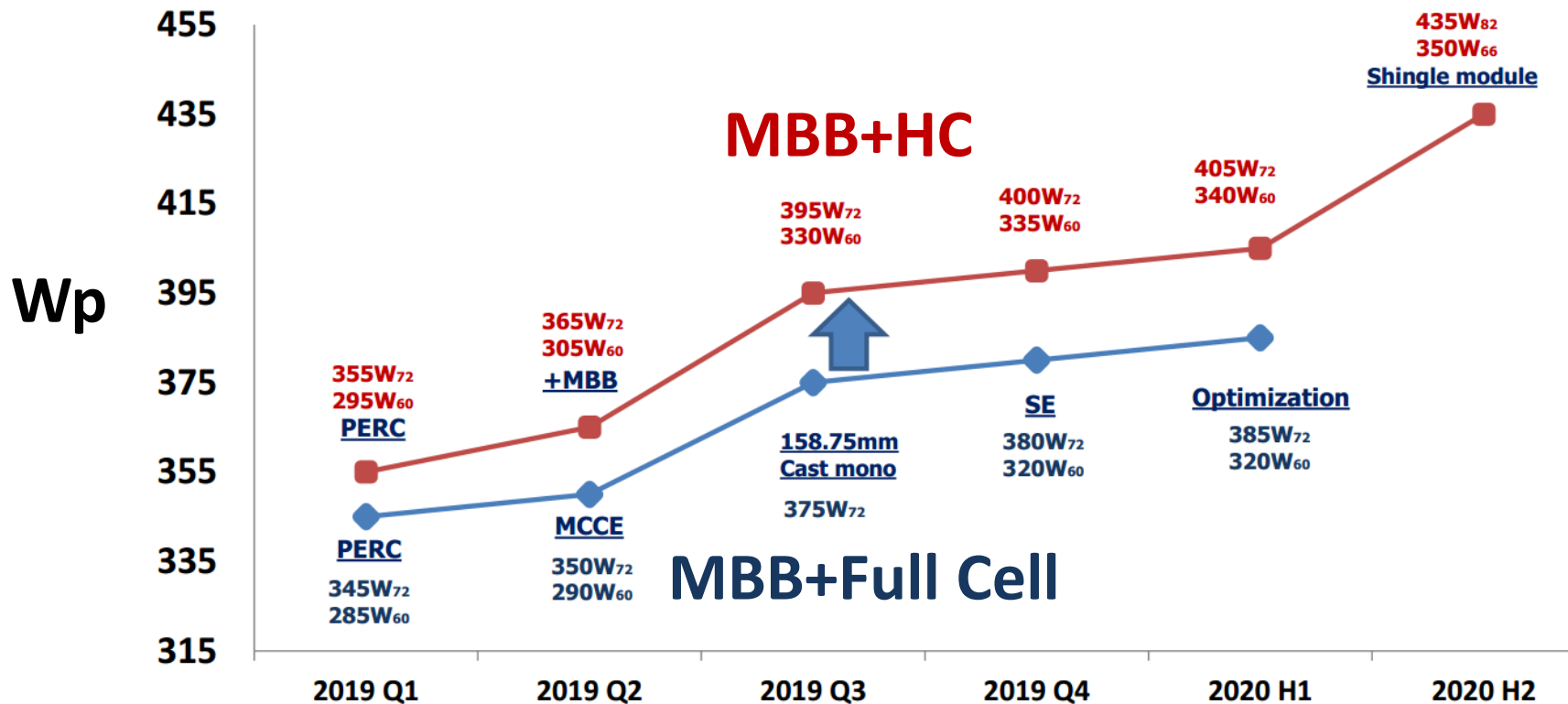
	TOP PERFORMER 2018 DNV-GL PV MODULE RELIABILITY SCORECARD	TOP PERFORMER 2017 DNV-GL PV MODULE RELIABILITY SCORECARD	TOP PERFORMER 2016 DNV-GL PV MODULE RELIABILITY SCORECARD	TOP PERFORMER 2014 DNV-GL PV MODULE RELIABILITY SCORECARD
Jinko Solar	✓	✓	✓	✓
Trina Solar	✓	✓	✓	✓
Yingli Solar	✓	✓	✓	✓
Astronergy Solar	✓	✓	✓	✓
Hanwha Q CELLS Co., Ltd	✓	✓	✓	
JA Solar Holdings	✓		✓	✓
REC Solar	✓	✓	✓	
BYD Co, Ltd	✓	✓		
Flex Ltd	✓	✓		
GCL Solar Energy, Inc	✓	✓		
LONGi Solar Technology Co, Ltd	✓	✓		
Neo Solar Power Corporation (NSP)	✓	✓		

Astronergy is the Top Performance in 2014, 2017 & 2018

Roadmap for Mono 2019-2021



Roadmap for Poly 2019-2021



2.1 Intelligent Manufacturing - ASTRO Series module

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Create lasting and efficient green energy



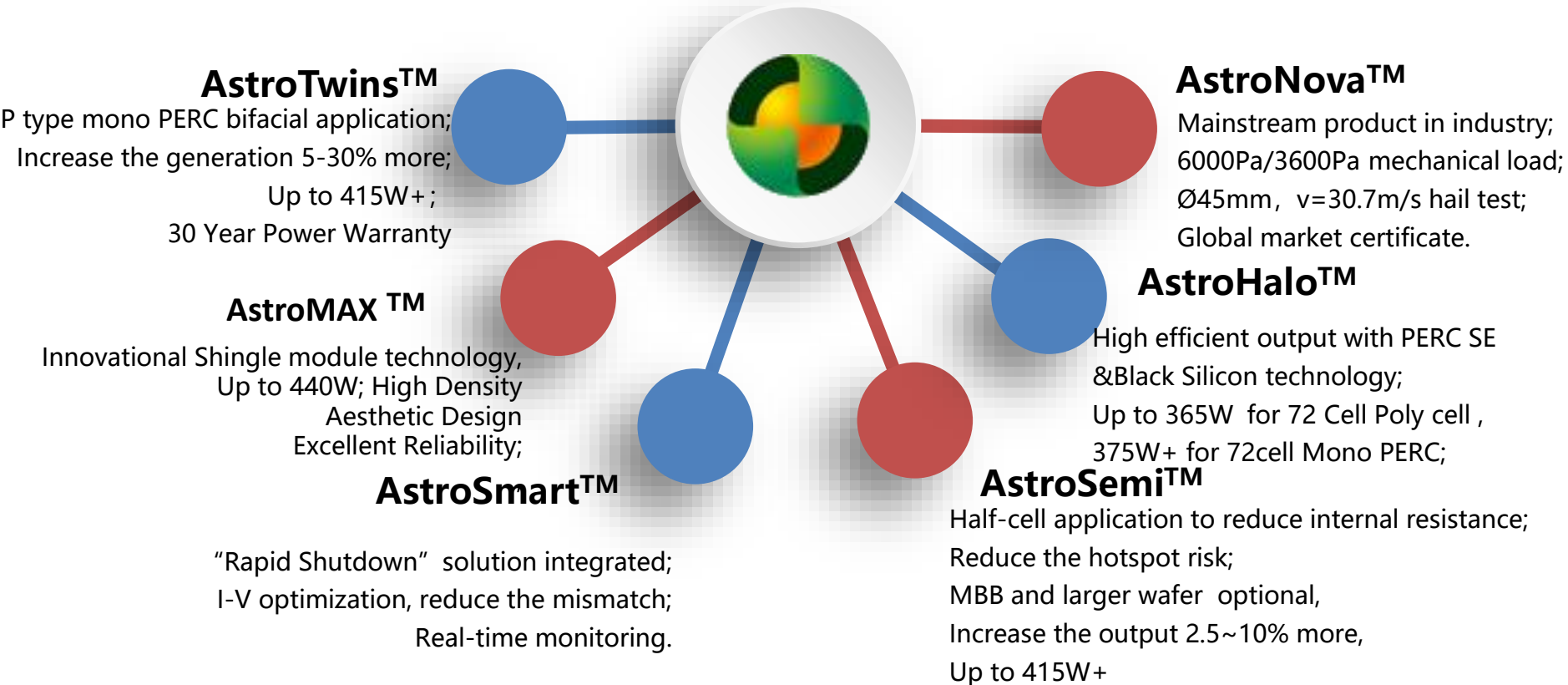
AstroNova AstroHalo AstroSmart AstroSemi AstroDual AstroTwins

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ASTRO brand-new series Module
Empower the world



"Astro" Product Series



CHSM72M-HC

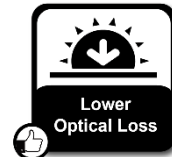
Incredible Power For Small Body



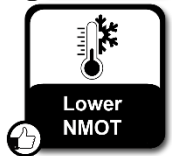
- **INNOVATIVE HALF-CELL TECHNOLOGY:** Lower current reduces internal resistance. HC design decreases the micro-crack risk, and increases light absorption, and improves module output 5~8W+.



- **SMALL RESISTANCE LOSS:** Reduce internal resistance loss by using half-cut cell.



- **LOW OPTICAL LOSS:** Half-cell lay out design, more space, more light reflection.



- **LOW NMOT:** Lower current lead to lower operating temperature, reduce the Hotspot risk.



- **HIGH RELIABILITY :** lower Hotspot risk, and lower micro-crack risk.

CHSM72P-HC

Incredible Power For Small Body



- **CAST MONO:** High power output, 20W+ than standard Poly. Similar efficiency as Mono, and price as Poly.



- **INNOVATIVE HALF-CELL TECHNOLOGY:** HC design decreases the micro-crack risk, and increases light absorption, and Improves module output 5~8W+.



- **HIGH RELIABILITY :** Lower NMOT, lower Hotspot risk, and lower micro-crack risk.



- **SMALL RESISTANCE LOSS:** Reduce internal resistance loss by using half-cut cell design.



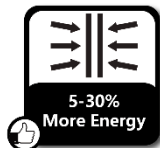
- **LOW BOS COST**

CHSM72M(DG)/F-BH

Enjoy The Energy Of Heaven and Earth



- **30 YEAR POWER WARRANTY**, 0.5% linear degradation.



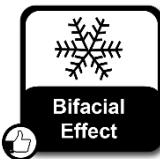
- **BIFACIAL POWER** :Yield up to 5%~30% power more depending on the albedo



- **INNOVATIVE HALF-CELL TECHNOLOGY**: Lower current reduces internal resistance. HC design decreases the micro-crack risk, and increases light absorption, and Improves module output 5~8W+.



- **EXCELLENT RELIABILITY**: Double glass design, better water resistance, PID free, snail free, can be suitable for more stringent environment.



- **BETTER YIELD UNDER SNOW**:
Bifacial effect, accelerates snow melting.

Shingle HD



Excellent Power Output with Aesthetics



- **HIGH DENSITY**, High efficiency :increase the module output 12%+



- **ECA CONNECTION DESIGN**;
No welding, reduce the internal resistance.



- **AESTHETIC APPEARANCE :**
Conducive to cooperate with the architectural design

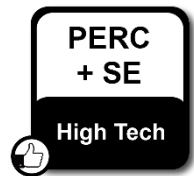


- **HIGHTER RELIABILITY :**
Effectively deals with environments, such as sand , salt mist and ammonia resistance;

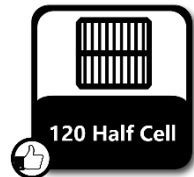
CHSM60M(BL)-HC



Incredible Power For Small Body



- **Innovational PERC +SE technology:** Increase cell efficiency by reducing the contact resistance and reducing the back surface recombination;



- **INNOVATIVE HALF-CELL TECHNOLOGY:** Improve the module output 5~10W+, decrease mirco-crack risk, excellent reliability.



- **HIGH RELIABILITY :** Lower NMOT, lower Hotspot risk, and lower micro-crack risk.







- **THE-STATE-OF-THE-ART APPEARANCE:** Full black designed for a better aesthetic appearance and building integration.

CHSM6610P



High Tech Leads Industry

- **Black Silicon**
Improve The Power
 - **BLACK SILLION CELL TECHNOLOGY:** Reduce light refecton and improve power;
- **PERC Technology**
High Tech
 - **INNOVATIVE PERC CELL TECHNOLOGY:** Back Passivation layer increases the internal reflection of infrared light and reduces cell back surface recombination , thus improve the cell efficiency.
- **Safety**
Rapid Shutdown
 - **RAPID SHUTDOWN SOLUTION:** Tigo J-box integrated, and meets NEC 690.12 rapid shutdown requirements.
- **SunSpec Signaling**
Meets NEC 690.12 Requirements
 - **SUNSPEC SIGNALING :**Shutdown can be activated by any signaling device compliant with the SunSpec specifcation.

CHSM72P-HC



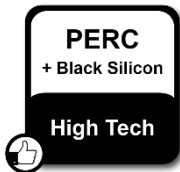
Incredible Power For Small Body



- **INNOVATIVE HALF-CELL TECHNOLOGY:** Lower current reduces internal resistance. HC design increases light absorption, and improves module output 5~8W+.



- **MBB CELL TECHNOLOGY (OPTIONAL) :** Reduce the series resistance, and improve 5~10W+;



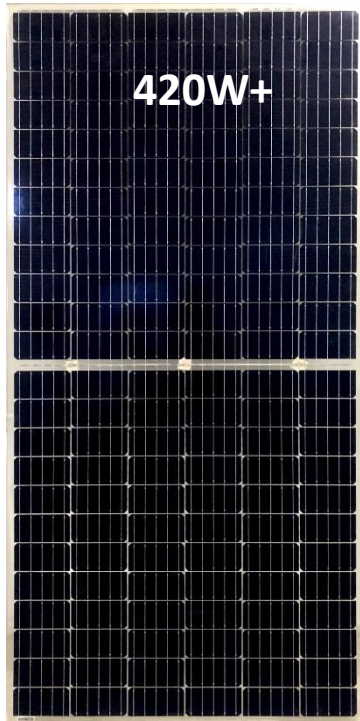
- **INNOVATIVE PERC+BLACK SILLION CELL TECHNOLOGY:** Reduce light refecton and reduce the back surface recombination , improve power;



- **HIGHER RELIABILITY**
Lower NMOT, lower Hotspot risk, and lower micro-crack risk.

CHSM72M(DGT)/F-BH

Enjoy The Energy Of Heaven and Earth



➤ **HIGHT POWER OUTPUT:** HJT cell and half-cell technology, comprehensive power generation is 20% more than normal modules.



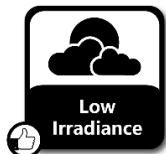
➤ **HIGHER BIFACIALITY:** The backside makes use of the reflected and scattered light from the surroundings, and the bifi can be up to 95%.



➤ **LOWER DEGRADATION:** Special cell structure and material, Double glass and HJT cell, and no LID and PID.



➤ **LOWER TEMPERATURE COEFF:** Improved temperature coefficient decreases power loss in the high temperature application



➤ **APPLICABLE FOR MULTI DIFFERENT ENVIRONMENTS:**Excellent low irradiance performance, achieve the excellent performance at the haze, cloudy days and other low light conditions. And can better adapt to a variety of distributed application environment.

Information of Exhibition Samples


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Product Series	Product model	Samples	Estimated time of IEC certification	Estimated time Of mass production
AstroSmart	CHSM6610P	60cell Poly, Tigo J-box integrated	CSA available	June
AstroSemi	CHSM72P-HC	72cell Poly +HC + Normal wafer +5BB	HC+ Normal wafer+5BB: Available 9BB: In 4~5 months (test time 3.5months)	HC+ Normal wafer+5BB: Available HC+ Normal wafer+9BB: July, 2019
AstroSemi	CHSM60M(BL)-HC	60 cell Mono +HC+9BB	HC+ Normal wafer+5BB: Available HC+ Large wafer+9BB: July, 2019	HC+ Normal wafer+5BB: Available HC+ Large wafer+9BB: July, 2019
AstroTwins	CHSM72M(DG)/F-BH	Mono Bifacial HC+ Large wafer+9BB	In August,2019	HC+ Large wafer+9BB: July, 2019
AstroMAX	Shingle HD	Shingle HD, 82cell, bifacial	Application for certification to be submitted	2020H1
AstroSemi	CHSM72P-HC	72cell Cost mono, HC+ Large wafer+9BB	In 4~5 months (test time 3.5months)	HC+ Large wafer+9BB: 2019Q3
AstroSemi	CHSM72M-HC	72cell Mono, HC+ Large wafer+9BB	HC+ Normal wafer+5BB: Available HC+ Large wafer+9BB: in June.	HC+ Normal wafer+5BB: Available HC+ Large wafer+9BB: July, 2019



ASTRO brand-new series Module Empower the world



AstroNova AstroHalo AstroSmart AstroSemi AstroTwins AstroMAX