



High power heads to the rooftop: a technical perspective

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DESIGN AND ENGINEERING SERVICES FOR GREAT SOLAR PV PROJECTS

PARTNERSHIP
APPROACH

EFFICIENTLY
DESIGNED AND DELIVERED

HIGH
QUALITY

Subsidiary of  everoze

WHY SKYRAY

Address urgent need for capability to design and engineer the world's PV future

Apply lessons learned from GWs of projects delivered by Skyray shareholders

Better align incentives between owners with 30-year horizons and EPCs focused on 3-year PR figure

WHAT IS SKYRAY

Scalable, adaptable, **pureplay solar PV engineering company**, backed by Everoze

Experienced team who understand what can and has gone wrong

Focused design and construction management services for solar PV and new-build solar storage

CORE SERVICES



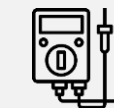
Design

- Developer services
- Detailed design



Owners engineering

- Procurement & tender support
- Design review
- OE services



Site & testing

- FAT
- PAC, IAC, FAC
- Operational testing, analysis, major refits

Agenda

How to implement larger new gen. modules on rooftops

- Layout & design
- Electrical diagram
- Mounting systems
- Summary

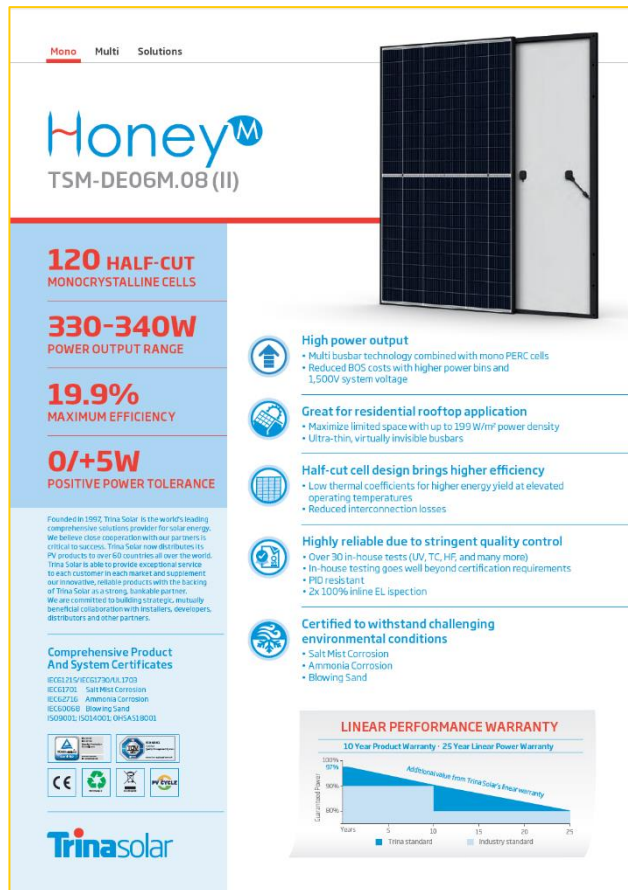




Layout & design

Trina 120c. - 340Wp module

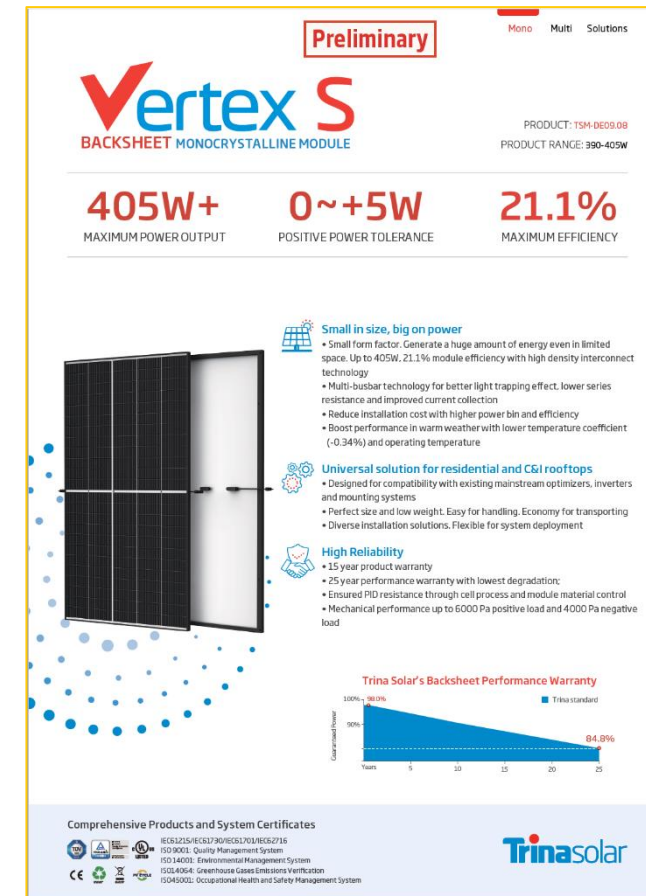
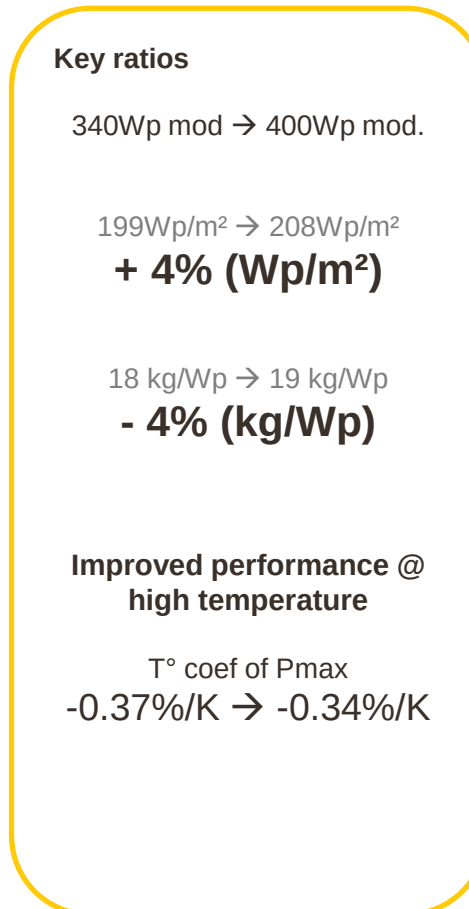
Trina 120c. - 340Wp module



Trina 120c. - 400Wp module

Vertex S - 1754 x 1087 x 30 mm

Vertex S - 1754 x 1087 x 30 mm



Layout & design

Trina 120c. - 340Wp module
833 modules - 283 kWp

Power
+1%

Trina 120c. - 400Wp module
716 modules - 286 kWp



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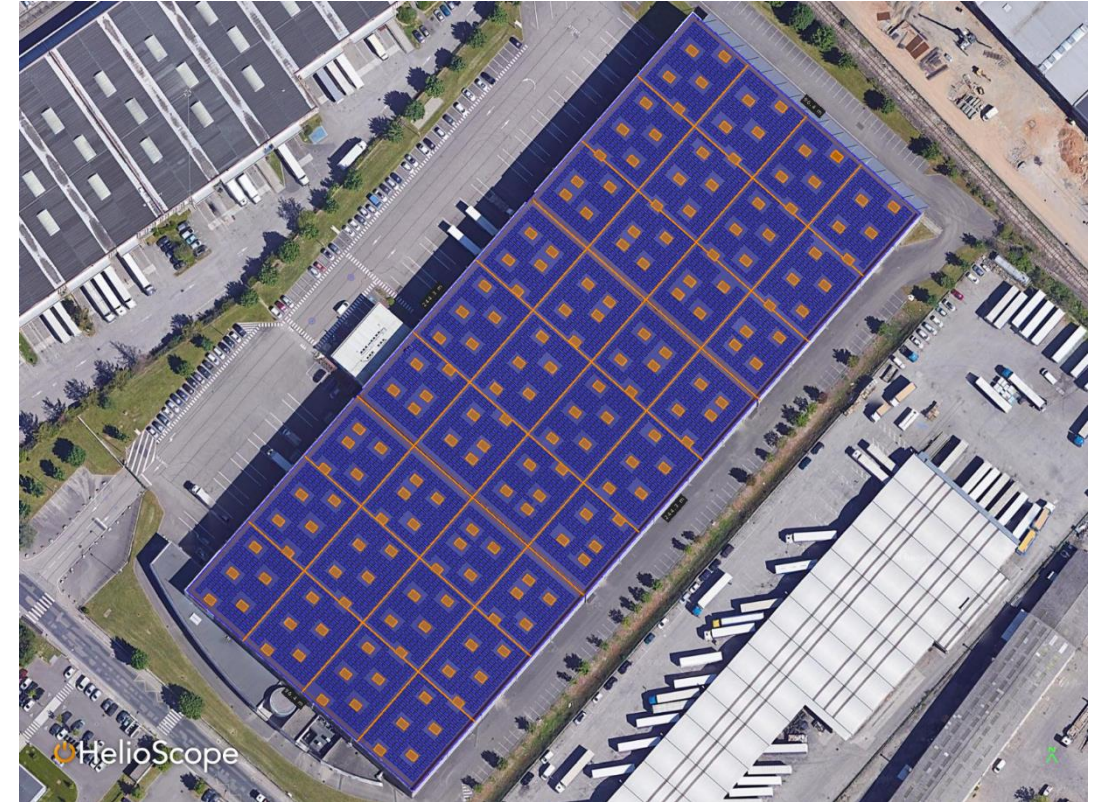
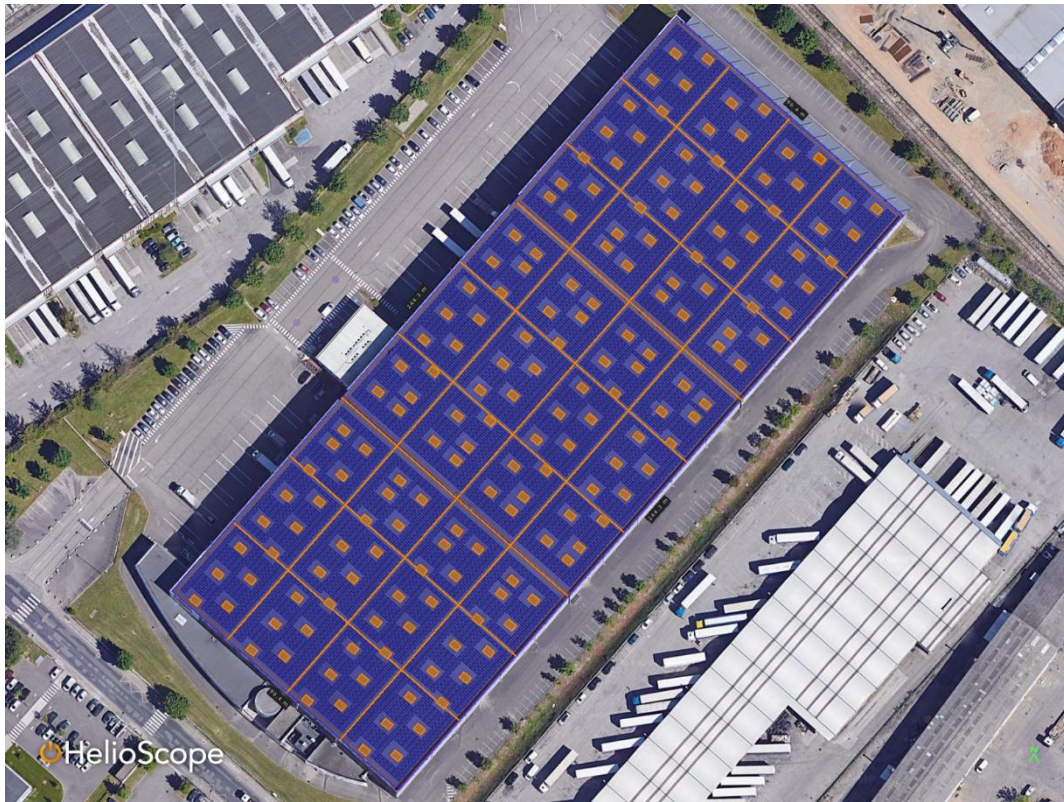


Layout & design

Trina 120c. - 340Wp module
5.500 modules – 1.9 MWp

Power
+5%

Trina 120c. - 400Wp module
5.000 modules - 2 MWp



Layout & design

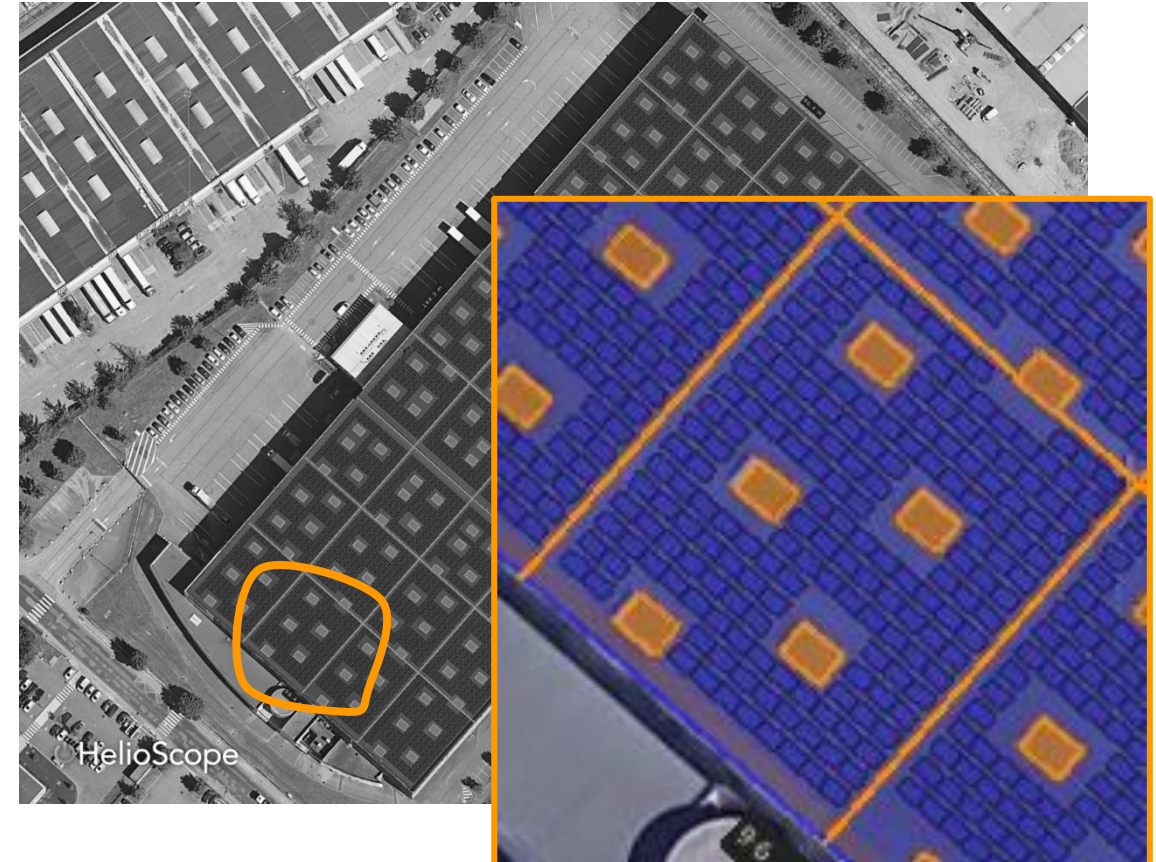
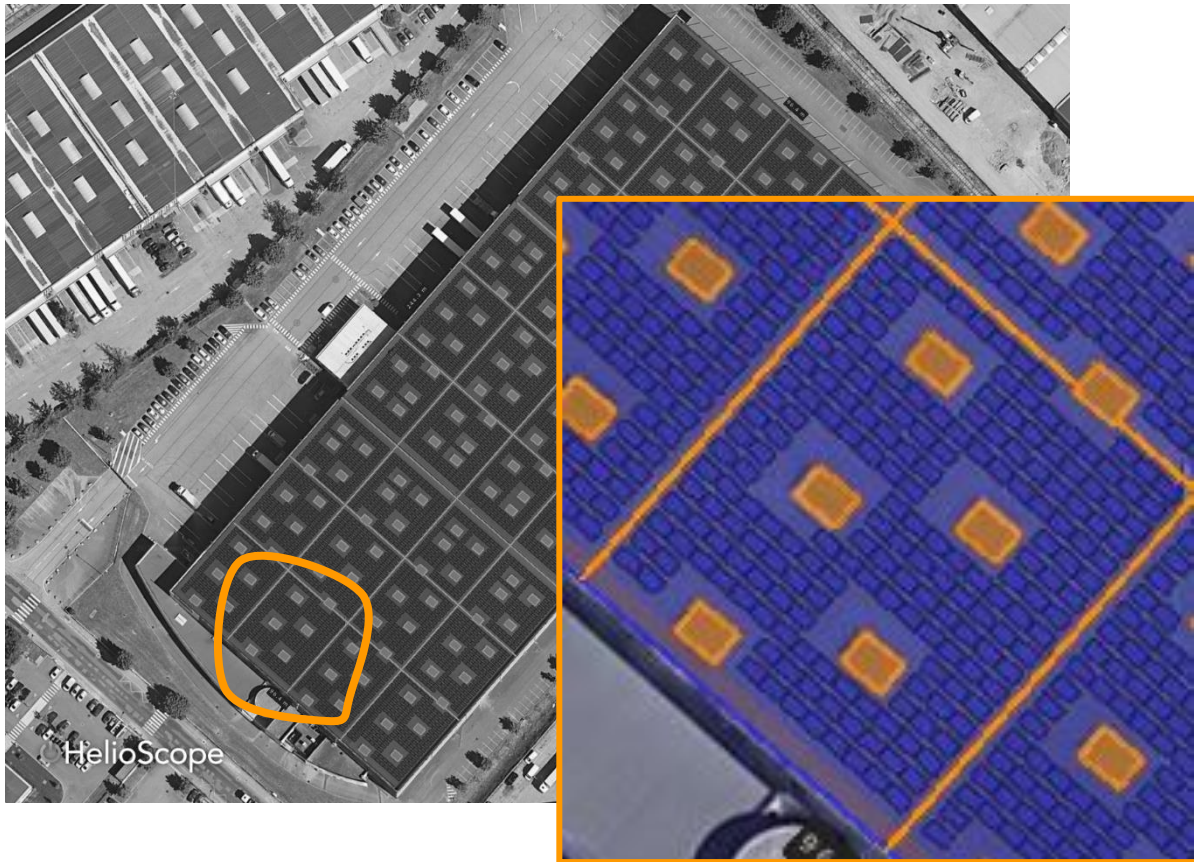
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Electrical configuration

Electrical configuration

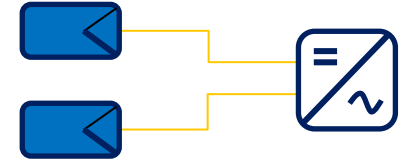


Module Datasheet

	340Wp module Honey M	400Wp module Vertex S
Peak power (Wp)	340	400
Maximum Power Voltage – Vmpp (V)	34.2	34.2
Maximum Power Current – Impp (A)	9.94	11.70
Open Circuit Voltage – Voc (V)	41.1	41.2
Short Circuit Current – Isc (A)	10.6	12.28
Module Efficiency η_m (%)	19.9	20.8

- Same Voltage (V) @ STC
 - Same Number of modules per string
- Higher Current (A) @ STC
 - Choice of inverter should be in line with current (A) specifications !

Electrical configuration



Example – **100kVA inverter** – Inputs : 10 MPPT with 2 strings/MPPT

Trina 120c. - 340Wp module

Honey M – 1698 x 1004 x 35 mm

Configuration

- 360 modules / inverters
- **122 kWp / inverter**

Stringing

- 20 modules/strings
- **18 strings**

Trina 120c. - 400Wp module

Vertex S - 1754 x 1087 x 30 mm

Configuration

- 300 modules / inverters
- **120 kWp / inverter**

Stringing

- 20 modules/strings
- **15 strings**

- Less modules, less cables & connectors
- Less time & optimized cost



Mounting systems

Mounting systems

Trina 120c. - 400Wp module

Vertex S - 1754 x 1087 x 30 mm

Check mounting systems specs with your supplier

	S-Dome
Scope of application	Flat roofs ≤ 5° with single ply membrane or bituminous roof covering, also on concrete, gravelled or green roofs; also trapezoidal sheet metal roofs with continuous mounting rails
Fastening type/roof fixture	Ballasted; no roof penetration for inclination ≤ 3°
Requirements	▶ Permissible module dimensions (L × W × H): 1386-2067 × 950-1100 × 30-50mm ▶ Minimum system size: 2 modules ▶ Module approved for corner clamping (see approved modules...)
Technical specifications	▶ Thermal separation after max. 11m (trapezoidal sheet metal 8.4m) ▶ Minimum clearance to roof edge 600 mm
Inclination angle	10°

Lenght : 1386-2067 mm

Width : 950-1100 mm

Height : 30-50 mm



Ok

	D-Dome 6.10 S-Dome 6.10
Scope of application	Flat roofs ≤ 10° with single ply membrane or bituminous roof covering, also on concrete, gravelled or green roofs
Fastening type/roof fixture	▪ Ballasted and no roof penetration for inclination: ≤ 3° ▪ With fixed connection at inclination with Dome FixPro Set: > 3°
Requirements	▪ Permissible module dimensions (L×W×H): 1448-2150×950-1060×30-50 mm ▪ Minimum system size D-Dome S-Dome: 2 supports (4 modules) 3 modules ▪ Clamping at the short module side permitted
Technical specifications	▪ Thermal separation after a maximum of D-Dome S-Dome 10/15m ▪ Minimum distance to the edge of the roof 600 mm
Inclination angle	10°

Lenght : 1448-2182 mm

Width : 950-1060 mm

Height : 30-50 mm



Not ready yet

W in progress



Summary

Summary // Memo

Technical validation

- Mounting systems - Check Mounting systems spec. – Mainly maximum module width admissible
- Inverter - Check inverter input current (A) specifications

Layout design & Electrical configuration

- No big difference for Layout rules & basic electrical configuration
- You'll improve number of modules, cables & connectors → Optimize construction cost & time
- Sweet spot - large scale rooftop

This technology seems to be a **good compromise** (dimension & weight), between 72c. and 60c. mainstream module

- Very complex or smaller roof → may not be as attractive

Conclusion

This new generation of modules brings advantages

Optimizing power, time & cost with keeping reasonable dimension & weight for rooftop work

Without bringing new big challenges for design and construction



THANKS FOR LISTENING!

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- <https://www.linkedin.com/company/skyray-engineering/>
- www.skyrayengineering.com (coming soon)