PV PRODUCTS · TECHNICAL DATA

ACE-HLITE
Heating-Integrated Module

A hybrid structure with an electric heating film laminated inside
Generation and snow removal in a single module

Winter Brings Two Problems at Once

Lost generation and retained structural load

Snow does more than stop generation.

A covered surface blocks transmission and halts output, while prolonged snow and ice raise the risk of condensation, leakage current and hot spots. At the same time the snow remains as load on the roof, threatening light structures. ACE-HLITE addresses both inside the module.

640 W
Maximum output (ACE-HLITE-640S)

20.09%
Efficiency · TOPCon M12, 132 half-cells

15.24 kg
Weight of the 640 W-class module (~4.8 kg/m²)

1,314×2,424
Large-format module size (mm)

Laminate Structure

The FRP lightweight structure with a heating layer and insulation added

1

Front film + first FRP layer

A transparent or semi-transparent polymer film with FRP reinforcement, prioritising transmission and flexibility in place of tempered glass.

2

Solar cell layer

Crystalline silicon cells in series and parallel. The 640 W-class prototype uses TOPCon M12 with 132 half-cells.

3

Conductive heating film

A polymer-based heating film below the cell layer. Linear, mesh and zigzag patterns are possible; large areas use gravure printing.

4

Backsheet + second FRP layer

Provides electrical insulation and thermal stability between cells and heating layer, while the rear FRP carries structural stiffness.

Heating and Snow Removal Sequence

Electrical energy becomes heat, melting the contact layer between snow and module

1

Detect

Snow, ice or frost conditions are identified; with a controller, sensors or operating rules set the trigger.

2

Energise

Mains power or power generated by the module is applied to the heating layer electrodes.

3

Resistive heating

Electrical resistance in the conductive pattern converts electrical energy into heat.

4

Heat transfer

Heat passes through backsheet and encapsulant and spreads across the module surface.

5

Shed and resume

The contact layer melts, snow slides off under gravity, transmission recovers and generation resumes.

Heating output and control thresholds are designed around ambient temperature, irradiance and snow depth at the site.

Operating Modes and Pattern Design

Balancing snow-clearing performance against power consumption

1

De-icing mode

Supplies relatively high output for a set period to clear accumulated snow or ice.

2

Anti-icing mode

Low or intermittent output holds the surface temperature to suppress frost and ice formation.

3

Zoned heating

Pattern density is increased over the upper 30–40% or the centre, concentrating energy where snow builds up.

ACE-HLITE Series Specifications

Electrical specifications match ACE-LITE; the heating layer adds weight · model prefix ACE-HLITE-

Item	171S	330S	430S	524S-1	228S	524S-2	640S
Power (W)	171	330	430	524	228	524	640
Voc (V)	17.75	34.02	44.5	53.25	17.81	40.07	48.94
Isc (A)	12.34	12.41	12.38	12.84	16.4	16.75	17.2
Vmp (V)	14.56	27.9	36.49	43.67	14.6	32.86	40.13
Imp (A)	11.75	11.83	11.79	12.0	15.62	15.95	15.95
Efficiency (%)	18.27	18.73	19.71	20.14	19.12	20.0	20.09
Size (mm)	784×1194	1134×1554	1134×1924	1134×2294	894×1334	1314×1994	1314×2424
Weight (kg)	4.48	8.43	10.43	12.45	5.71	12.54	15.24

At STC. Rated heating power, surface temperature rise and recommended operating conditions are issued separately once project conditions are confirmed.

Versus External De-icing

Bolting a function on, or solving it inside the module

EXTERNAL DEVICES

Cables, heaters, blowers

- Bound by the weight and shape of the base module
- Requires additional wiring and equipment
- Each device adds inspection and maintenance
- Managed separately from the PV module
- Space and appearance constraints apply

ACE-HLITE

Heating layer laminated inside

- 15.24 kg at 640 W-class, around 4.8 kg/m²
- Heating layer laminated with the module itself
- Simpler system with no added devices
- Generation and de-icing managed as one product
- Internal moisture dried, lowering PID and degradation risk

Where It Applies

Sites where snow and ice directly affect operation

1

Agriculture

Lowers collapse risk for greenhouses, tunnels and barns vulnerable to snow load.

2

Factories & warehouses

Reduces clearing work on sandwich-panel roofs and large warehouse roofs.

3

Roads & noise barriers

Applied as BIPV where ice prevention matters on infrastructure.

4

Cold regions

Secures winter yield in snow-heavy regions and export markets.

Development and Certification Status

Stated separately for what is complete and what is in progress

- Complete — 640 W-class FRP heating module prototype developed, physical product available
- Complete — new product exhibited at the 2026 International Green Energy Expo
- Held — company-level KS C 8577 BIPV certification (No. PV0726026) and ISO 9001/14001/45001
- In progress — product-level KS certification for the FRP heating module
- In progress — field validation with KICT during 2026

NOTICE

How we state it

Snow-clearing performance and operating conditions are still being validated in the field, and a structural review is required before installation.

CONTACT

Concerned about winter losses and snow load?

Tell us the site location and structure — we will advise on model, heating specification and current validation status.

Phone	**+82-2-6925-6916**
Factory	**+82-31-354-5862 (Hwaseong, Gyeonggi-do)**
E-mail	**info@aceivt.com**
Website	**www.aceivt.com**