ASPEN WOODS
GROUP INC.

The Rob Rockefeller S.C.

HCPV SOLAR MODULE

HIGH CONCENTRATION PHOTOVOLTAIC SYSTEM

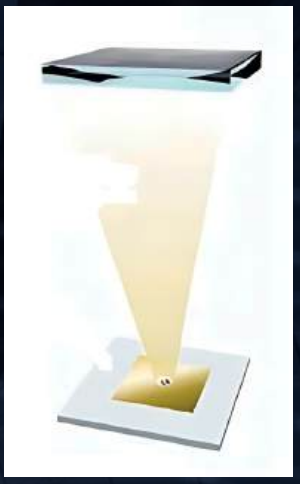
14,400W

Max Power Output

27.8%

Max Module Efficiency

HCPV PROFILE



High Concentration Photovoltaic (HCPV) systems are distinguished by their concentration ratio, which exceeds 300. This ratio measures the lens area to the photovoltaic cell area, enabling efficient energy capture and conversion.

HCPV technology uses optical components, such as lenses, to focus a large area of sunlight onto a small, heat-resistant, high-efficiency photovoltaic cell. By applying the photovoltaic principle, light energy is directly converted into electricity. The system's optical requirements demand precise alignment with incoming sunlight, necessitating the use of a solar tracking system to keep the module's surface perpendicular to sunlight throughout operation.

KEY FEATURES OF THE AWG HCPV SYSTEM

Aspen Woods Group Inc.'s HCPV system is designed with cutting-edge technology, incorporating multi-junction gallium arsenide compound semiconductor cells, originally developed for aerospace applications. Using Fresnel lenses for solar concentration, the system evenly distributes luminous power onto the chip through advanced micro-prism technology.

The system integrates a highly accurate solar tracking mechanism, ensuring optimal alignment under varying conditions. This design delivers multiple advantages:

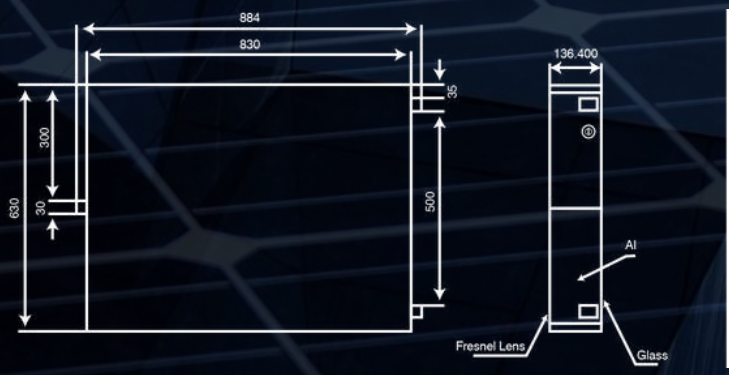
- High Efficiency: The conversion efficiency of battery chips exceeds 40%.
- Enhanced Module Efficiency: Static conversion efficiency (CSTC) is over 32%, with maximum efficiency reaching 36%, and dynamic conversion efficiency (CSOC) surpassing 28%.
- Sustainability: Low energy consumption during production, reduced environmental impact during installation, and lower electricity costs in large-scale operations.
- Reliability: Robust design for consistent performance and high power generation capacity.

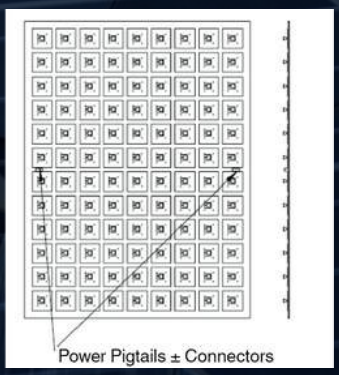
Aspen Woods Group Inc.'s HCPV system stands out for its advanced technology, reliability, and environmentally sustainable approach to high-efficiency solar energy production.

Characteristic data of the chip (750 times concentrated):
Size of the chip: 2.7X2.7X0.2mm;
Isc=0.43A Voc=3.15V FF=89%
Pm=1.2W

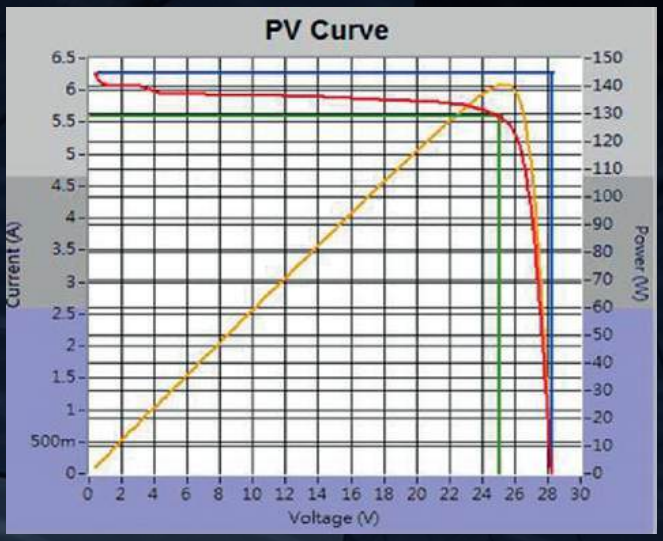
Characteristic data of the module (850DNI, AM1.5D):
Size of the module: 884X630X136.4mm
Effective lighted area: 0.48m2;
Isc=4.5A Voc=37.3V Pm=120W

AWG-HCPV120W-750X MODULE DIAGRAM

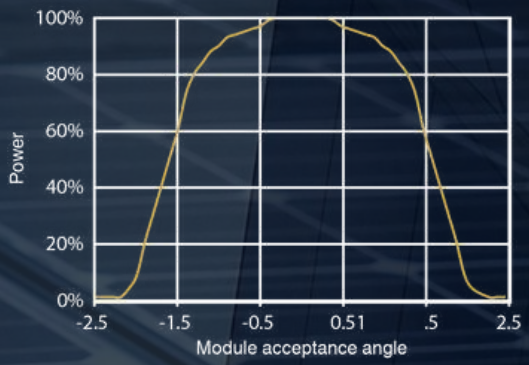




PERFORMANCE CHARACTERISTICS (CSTC: TCELL=25, DNI=1000W/ M)	
Power(Pmax)	120W
Max Power Voltage (Vmp)	24.5V
Max Power Current (Imp)	4.9A
Open Circuit Voltage (Voc)	26.5V
Short Circuit Current (Isc)	5.7A
Module Efficiency	27.8%
Acceptance Angle	0.9 (Power drop less than 10%.)
Optimized Work Temperature	-40 to 50
TEMPERATURE COEFFICIENT	
Power	-0.2%
Voltage	49mV/°C
Current	0.98mA/°C
MECHANICAL SPECIFICATION	
Dimensions (L x W x D)	884mm x 630mm x 136.4mm
Weight	13KG
Connector Termination	4mm2 Plug & MC4 photovoltaic connector
Material	Al + Glass
Fresnel lens	Silicone on Glass (SOG)
STANDARD	
Qualification	IEC 62108
Safety	IEC 62688
Electrical	IEC 62670



I-V CHARACTERISTICS OF AWG HCPV120-750X



WIDE ACCEPTANCE ANGLE RESULTS FROM MULTI-LEVEL OPTICS DESIGN

TECHNICAL HIGHLIGHTS THE SOLAR HCPV SYSTEM

Aspen Woods Group Inc.'s Solar HCPV system showcases groundbreaking advancements across the entire industry chain, achieving significant innovations in several key areas:

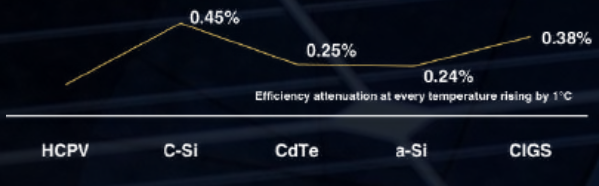
Advanced Chips

Aspen Woods Group Inc. has successfully scaled the application of HCPV technology for ground-based systems, leveraging expertise in the design and production of multi-junction gallium arsenide compound semiconductor battery chips originally developed for aerospace applications.

- Exceptional Conversion Efficiency: The chip achieves a conversion efficiency of over 40%, with peak production efficiency reaching up to 44%. This performance far surpasses traditional photovoltaic technologies such as crystalline silicon and thin-film products. Continued advancements in multi-junction designs are pushing efficiency levels even higher, exceeding 44%.
- Superior Heat Adaptability: The chip maintains stable performance under high-temperature conditions. Its conversion efficiency declines at a significantly slower rate as temperatures rise, with a temperature coefficient approximately half that of crystalline silicon. This ensures consistent performance and reliability in diverse environments.

Low Efficiency Attenuation of the Chip

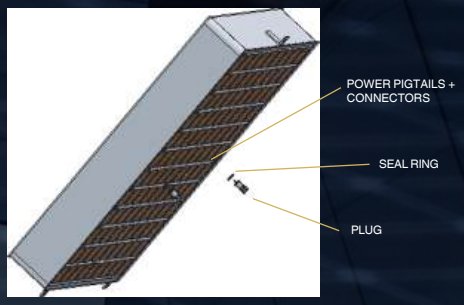
Thanks to advanced nanometer film-forming technology, the efficiency attenuation of the chip is remarkably low. After 25 years of use, the chip's efficiency declines by less than 8%, significantly outperforming other types of batteries in terms of long-term durability and sustained performance.



THE MODULE

Aspen Woods Group Inc.'s HCPV system achieves exceptional efficiency in solar radiation energy harvesting and conversion while enhancing environmental adaptability through the innovative design of Fresnel lenses and the precise structure of secondary optical devices.

- Light Concentration Efficiency: Utilizing proprietary lens designs, the Fresnel lenses achieve an average light concentration efficiency exceeding 85%, with maximum levels reaching 89%. This significantly outperforms comparable products in the market.
- Radiation Distribution Performance: By integrating secondary optical elements, the system achieves a more uniform distribution of radiation energy across the chip surface. This reduces localized stress on the chip, enhances its overall conversion efficiency, and extends its operational lifespan.
- Temperature Adaptability: The combination of Fresnel lenses and secondary optical devices minimizes the impact of temperature fluctuations on laser efficiency. This optimization ensures stable conversion efficiency under both high and low-temperature conditions.
- Module Thickness: Through advanced optical design, the module thickness has been reduced to approximately 100mm. This slimmer design lowers transportation costs and simplifies installation.
- Light Transmittance Performance: With glass construction on both the front and back of the module, scattered light can pass through the module. This feature enhances light penetration in shaded areas beneath the module, supporting plant growth and benefiting the surrounding environment.

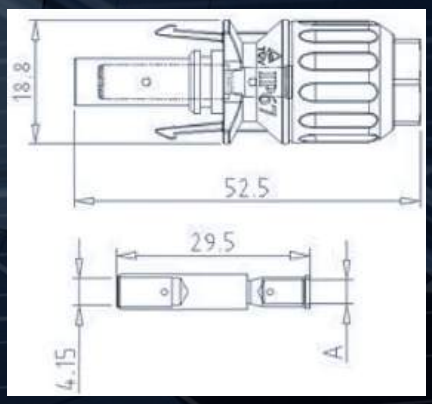


MODULE PLUG INSTALLATION

THE SOLAR TRACKING SYSTEM

Aspen Woods Group Inc.'s HCPV system delivers exceptional solar tracking precision and optimized power generation through its independently developed tracking system.

- High Solar Tracking Accuracy: The system ensures tracking accuracy of 0.1° through precise bracket machining, advanced installation techniques for brackets and modules, and integrated solar tracking strategies.
- Robust Wind Resistance: Designed for durability, the system withstands survival wind speeds of 40 m/s or higher. This resilience is achieved through the use of high-strength brackets and an optimized status control mode tailored to field conditions.
- Efficient Installation: The installation process is streamlined by optimizing the integration of modules and brackets, significantly improving on-site efficiency.
- Enhanced Power Generation: On sunny days, Aspen Woods Group Inc.'s HCPV system generates up to 30% more electricity than traditional crystalline silicon systems in power stations located near electricity load centers.
- Minimal Land Impact: The HCPV modules are installed at a height of over 0.5m above the ground, with customizable elevation options to reduce environmental impact on crops. This design maximizes land utility and benefits, supporting sustainable land use.



MC4 PHOTOVOLTAIC CONNECTOR

INSTALLATION OF QINGHAI 50MW PV POWER STATION IN LANZHOU CITY, GANSU PROVINCE

HIGH POWER CONCENTRATING POWER GENERATION SYSTEM

Gallium arsenide CPV (Concentrated Photovoltaic) power generation is emerging as a focal point in the solar energy industry. Solar power generation has evolved through three generations: the 1st generation of crystalline silicon cells, the 2nd generation of thin-film cells, and now the high-efficiency gallium arsenide CPV systems, which are gaining prominence in industrial applications.

Advantages of Gallium Arsenide CPV Systems

Compared to earlier generations, gallium arsenide CPV systems utilize multijunction III-V compound cells, offering several distinct advantages:

- High Photoelectric Conversion Efficiency: Gallium arsenide CPV systems exhibit significantly higher efficiency than 1st and 2nd-generation technologies. The theoretical conversion efficiency of multijunction gallium arsenide cells reaches 68%. Current mass-produced modules achieve a static conversion efficiency of up to 32%.
- Wide Spectrum Absorption Range: These systems capture a broader range of the solar spectrum, maximizing energy conversion.
- High Land Utilization Rate: The compact and efficient design minimizes the land area required for installations.
- Stable Electricity Generation: Gallium arsenide CPV systems maintain consistent power output, even under varying environmental conditions.
- Minimal Temperature Impact: Rising temperatures have a negligible effect on efficiency, ensuring reliable performance in diverse climates.
- Low Lifecycle Attenuation: The systems experience minimal efficiency degradation over their operational lifespan, ensuring long-term reliability.

Gallium arsenide CPV technology is leading the next wave of solar power innovation, delivering unmatched efficiency and reliability for sustainable energy production.

COMPARISON OF CONVERSION EFFICIENCY OF DIFFERENT MODULES

PHOTOVOLTAIC TYPE	HCPV	MONOCRYSTALLINE SILICON SI	FILM (A-SI)	PHOTOTHERMAL CSP
Module conversion efficiency	32%	19%	12%	13%
Theoretical conversion rate of chip	68%	29%	20%	≤35%

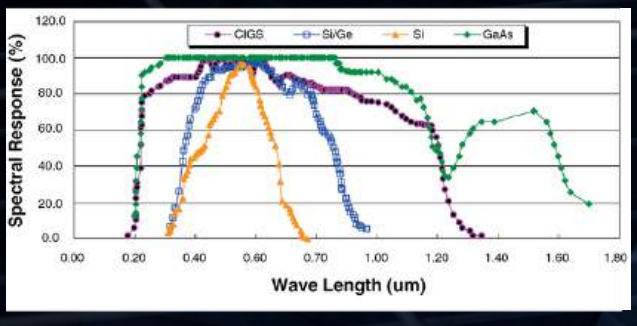
Gallium arsenide (GaAs), a III-V family compound semiconductor material, offers a distinct advantage in solar power generation due to its superior absorption range.

- Optimal Energy Gap: GaAs has an energy gap that aligns exceptionally well with the solar spectrum, enabling it to achieve a broader spectral response compared to other solar cell technologies.
- Wide Spectral Response: This characteristic allows GaAs cells to capture and convert a wider range of solar wavelengths into electricity, maximizing energy utilization.
- High-Temperature Resistance: GaAs cells maintain their performance under high-temperature conditions, making them ideal for environments with extreme heat and prolonged sunlight exposure.

These features make GaAs-based CPV systems a robust and efficient choice for next-generation solar power technology.

The gallium arsenide CPV power generation system maximizes land efficiency with dual-axis tracking, making it adaptable to various terrains. Its point-based installation requires minimal floor space, leaving most of the land available for other uses, such as planting crops or breeding livestock, ensuring sustainable and multifunctional land utilization.

COMPARISON OF ABSORPTION WAVELENGTH OF DIFFERENT CELLS



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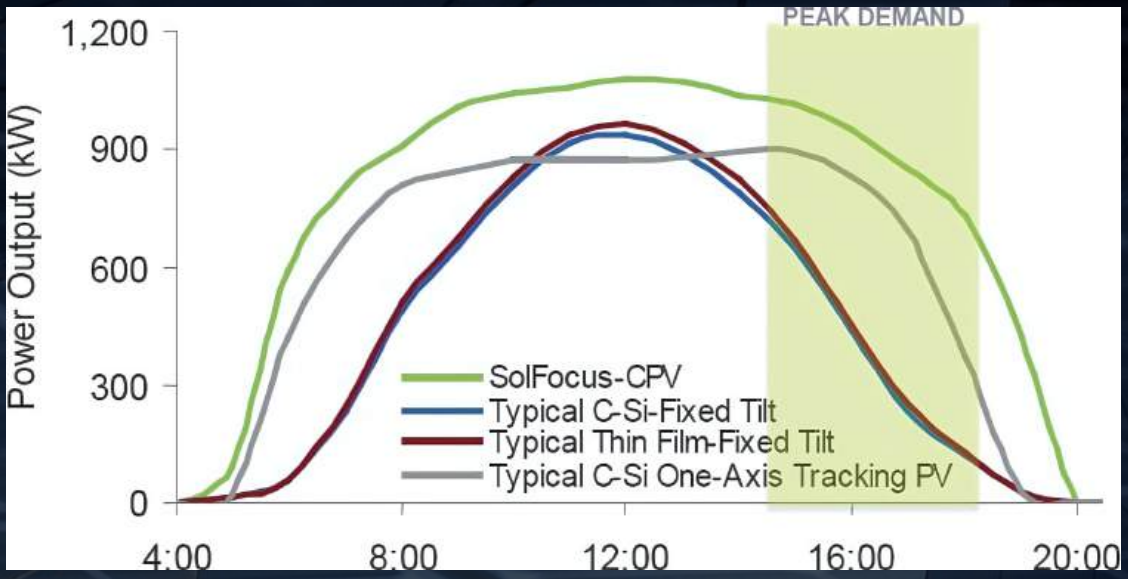
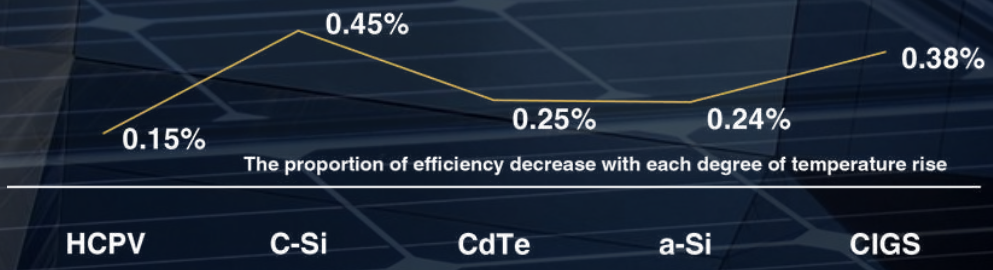
STABLE ELECTRICITY GENERATION

The gallium arsenide CPV power generation system ensures stable electricity output through dual-axis tracking, which keeps the modules aligned with the sun from sunrise to sunset. This consistent power generation throughout the day enhances grid compatibility and reliability.



Gallium arsenide CPV modules feature advanced gallium arsenide solar cells and an optimized structural design, resulting in a lower temperature coefficient compared to other solar modules. This makes them highly efficient and reliable in environments with large temperature variations or high temperatures.

ATTENUATION RATIO OF DIFFERENT MODULES



Gallium arsenide CPV modules exhibit minimal efficiency loss over their lifespan, with photoelectric conversion efficiency attenuation limited to ≤6%. This durability outperforms other types of solar modules, ensuring long-term reliability and consistent performance.

APPLICATION OF GALLIUM ARSENIDE CELL CPV TECHNOLOGY

Due to its complexity, gallium arsenide CPV systems are less economically efficient for small-scale or commercial PV projects. They are best suited for large-scale PV power stations with capacities ranging from 1MW to 1000MW in areas with abundant sunlight.

These high-efficiency systems, composed of Fresnel lens concentrators, triple-junction solar cells, polar or base-type tracking systems, and integrated control methods, offer robust power generation, simplified production, sealed moving parts for protection, and easy maintenance, making them ideal for large-scale deployments.

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