



Thermophotovoltaic Cells

TPV CELLS | DIRECT HEAT-TO-ELECTRICITY CONVERSION

1 Product Overview

Direct conversion of high-temperature thermal radiation into DC electricity

FULLSUNS thermophotovoltaic cells absorb infrared radiation from a high-temperature heat source or thermal emitter and convert bandgap-matched photons directly into DC power. The solid-state platform supports engineering evaluation for thermal storage, industrial waste-heat recovery and modular heat-to-power systems.

Solid-State Conversion

No rotating machinery
Direct heat-to-DC conversion

Infrared Power Generation

Matched to source and emitter spectra
Spectral management and photon recycling

Engineering Integration

Cell → Array → Module
Packaging, cooling and interconnect evaluation

2 FULLSUNS TPV Sample

Product sample photograph / 产品实物图



Product sample photograph. Dimensions, packaging and electrical performance are subject to the confirmed specification.



How TPV Works

Thermal radiation matched to semiconductor conversion

1 How TPV Works

System pathway from thermal input to DC output



Unused radiation can be returned to the hot side through reflectors, spectral management or photon-recycling structures to improve system-level energy use.

Cells require thermal isolation and cooling to remain within a safe operating range.

2 Product Platforms

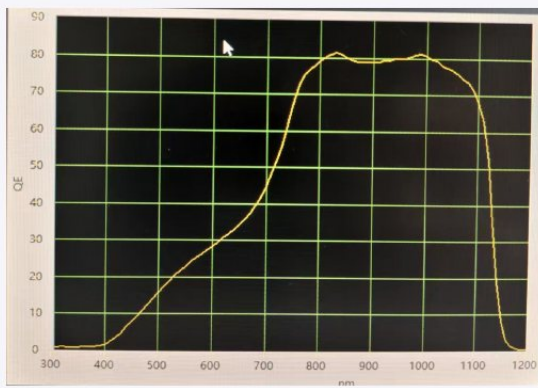
Matched to source temperature, emitter spectrum and system objectives

Item	High-Temperature TPV	Medium-Temperature TPV
Target source/emitter	Approx. 1500-2000° C and above	Approx. 700-1000° C
Technology route	GaAs/InP dual-junction TPV	Ge-containing single-junction TPV
Typical applications	Steel, power plants and ultra-high-temperature heat	Thermal storage, solid media and lower-temperature emitters
Note: temperatures refer to the heat source/emitter, not allowable semiconductor cell temperature.		
Product status	Existing route with project applications	Under engineering validation; data after testing

1 Spectral Characteristics

Provided measurement curves: quantum efficiency and reflectance

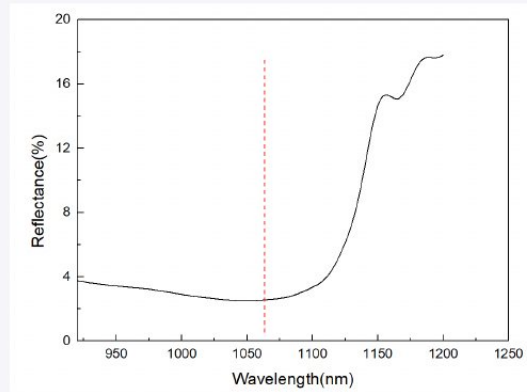
Quantum Efficiency Spectral Response



X-axis: wavelength (nm); Y-axis: QE.

Relative response across approximately 300-1200 nm.

Reflectance Curve



X-axis: wavelength (nm); Y-axis: reflectance (%).

Red dashed line at approximately 1065 nm retained from supplied plot.

2 Curve Use Notes

Data basis and application boundary

Curves are reproduced from the supplied measurement plots; the original traces and axis information are retained.

Test conditions, sample structure, temperature and instrument settings were not identified in the supplied plots. They are not guaranteed performance or final acceptance criteria.

Use the curves for preliminary spectral matching of the emitter, filter and cell. Confirm release values with a defined test plan and approved sample.



Engineering Scope

Engineering boundaries and delivery configuration

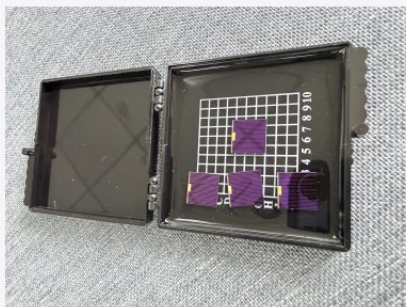
1 Engineering Scope

Custom engineering against project boundary conditions

Parameter	Engineering scope	Notes
Semiconductor architecture	GaAs/InP dual-junction; Ge single-junction	Source temperature / spectrum
Cell size	Project-specific assessment	Layout, power density and cooling
Array / module	Interconnect, substrate and DC output	Cell-to-module integration
Spectral management	Filters, reflectors and photon recycling	Efficiency, cost and reliability
Thermal management	Thermal isolation and cooling interfaces	Critical for continuous operation
Packaging	Bare cell, array or engineering module	Sealed modules available

2 FULLSUNS TPV Sample

Raw sample photograph / 原始实物照片



Engineering note

The Ge-containing single-junction TPV route is under engineering validation. Formal electrical parameters will be released after test completion.

Final product requirements are defined by agreed test conditions, drawings and project design.



Typical Applications

Application context and engineering inputs

1 Typical Applications

Direct power-generation evaluation for high-temperature heat, storage and waste heat



Technical application reference image; it does not represent a specific FULLSUNS product specification.

Industrial Waste-Heat Recovery

Radiative heat recovery and power-generation evaluation
for high-temperature furnaces, reactors and continuous processes.

Thermal Storage to Power

Store electrical or renewable energy as heat
and recover electricity through TPV modules when required.

Modular Solid-State Power

Compact, low-maintenance heat-to-power
systems without rotating components.

2 Inputs for Project Evaluation

Used to define material route, dimensions, packaging and thermal management

Customer Input	Used To Determine
Source/emitter temperature and profile	Material route, bandgap and hot-side architecture
Emitter material, area, spectrum/emissivity	Radiative coupling and spectral management
Target electrical power and voltage	Cell area, series/parallel configuration and module count
Module size, mass and cooling constraints	Packaging, substrate and cooling design

Data and engineering notice: FULLSUNS TPV platform; not a guarantee under arbitrary source conditions.

Output depends on source/emitter temperature, spectrum, radiative coupling, cell temperature, cooling and packaging.

Final specifications are subject to agreed test conditions and engineering design.