

# S-ENERGY

High-efficiency photovoltaic module using silicon nitride polycrystalline cells.

## SM-XXXPNO Series

195 ~ 235 Watt Photovoltaic Module

### Performance

Rated power ( $P_{max}$ )	195~235W
Power tolerance	$\pm 3\%$
Limited Warranty	30 years



### Electrical Characteristics

Model	235PNO	230PNO	225PNO	220PNO	215PNO	210PNO	205PNO	200PNO	195PNO
Maximum power ( $P_{max}$ ), W	235	230	225	220	215	210	205	200	195
Voltage at $P_{max}$ ( $V_{mp}$ ), V	30.5	30.2	29.9	29.7	29.2	27.2	27.1	26.8	26.5
Current at $P_{max}$ ( $I_{mp}$ ), A	7.71	7.63	7.53	7.43	7.37	7.74	7.58	7.48	7.37
Warranted minimum $P_{max}$ , W	228	223	218	213	208	203	198	194	189
Short-circuit current ( $I_{sc}$ ), A	8.26	8.16	8.08	8.00	7.96	8.33	8.12	8.03	7.96
Open-circuit voltage ( $V_{oc}$ ), V	37.7	37.5	37.3	37.1	37.0	34.0	33.6	33.5	33.3
Temperature coefficient of $I_{sc}$	3.69mA/°C	3.69mA/°C	3.69mA/°C	3.69mA/°C	3.69mA/°C	3.69mA/°C	3.69mA/°C	3.69mA/°C	3.69mA/°C
Temperature coefficient of $V_{oc}$	-133.8mV/°C	-133.8mV/°C	-133.8mV/°C	-133.8mV/°C	-133.8mV/°C	-120.42mV/°C	-120.42mV/°C	-120.42mV/°C	-120.42mV/°C
Temperature coefficient of power	-0.46%/°C	-0.46%/°C	-0.46%/°C	-0.46%/°C	-0.46%/°C	-0.46%/°C	-0.46%/°C	-0.46%/°C	-0.46%/°C
NOCT (Air 20°C; Sun 0.8kW/m²; Wind 1m/s)	47±2°C	47±2°C	47±2°C	47±2°C	47±2°C	47±2°C	47±2°C	47±2°C	47±2°C
Maximum series fuse rating, A	10	10	10	10	10	10	10	10	10
Maximum system voltage, V	1000	1000	1000	1000	1000	1000	1000	1000	1000
Module efficiency	14.80%	14.48	14.17%	13.86%	13.54%	14.67%	14.32%	13.97%	13.62%
Dimensions	1620mm x 980mm Depth:50mm					1460mm x 980mm Depth:50mm			
Weight	19Kg					19Kg			
Solar cells	60 cells (6 x 10 matrix)					54 cells (6 x 9 matrix)			

### Mechanical Characteristics

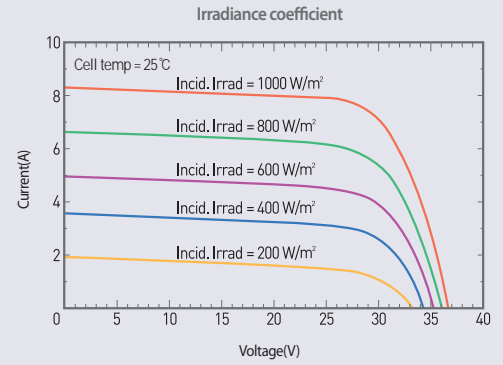
Frame	Anodized aluminum frame; Color: silver or Black
Output Cables	RHW-2, 12AWG (4mm²) cable with polarized weatherproof DC rated connectors; Cable length-1000mm (+ -)
Construction	Front : High-transmission 3.2mm low iron tempered glass; White back sheet Encapsulant; EVA

- Warrant : Power output for 30 years (90% of minimum output power for 10 years, 80% of minimum output power for 30 years).  
Freedom from defects in materials and workmanship for 10 years.
- These data represent the performance of typical SM-XXXPNO Series products, and are based on measurements made in accordance with ASTM E1038 corrected to SRC (STC)
- During the stabilization process that occurs during the first few months of deployments, module power may decrease by up to 3% from typical  $P_{max}$

## Quality Assurance

S-Energy photovoltaic modules have passed the following tests.

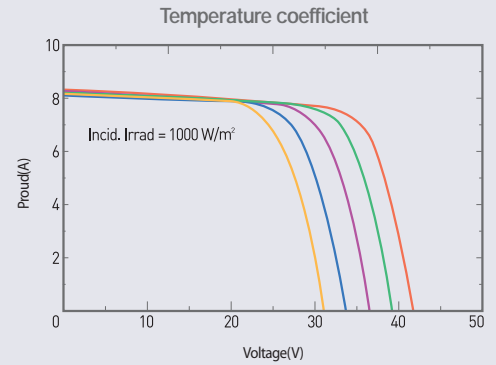
Thermal shock / cycling test	Mechanical loading test
UV preconditioning test	Hot-spot endurance test
Humidity -Freeze test	Water proof test
Electrical insulation test	Outdoor exposure test
Damp-heat test	Hail impact test



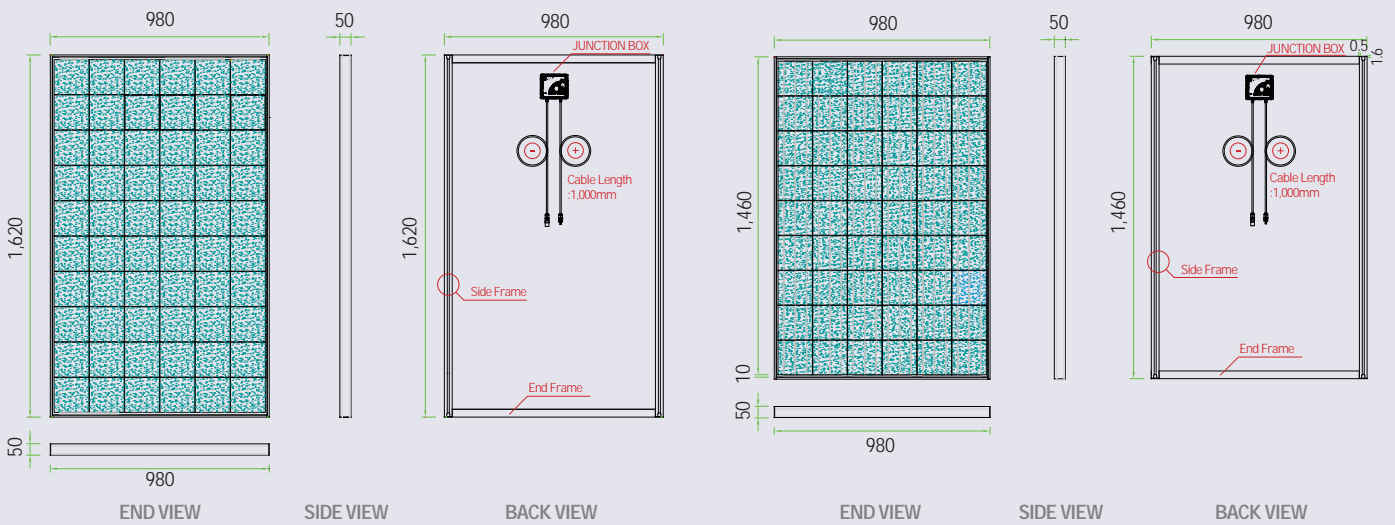
## Qualification Test Parameters

Tests are proceeded by IEC 61215 standard.

Thermal cycling Range	-40°C to +85°C
Humidity Freeze, damp heat	-40°C to +85°C (85% RH), 85°C (85% RH)
Static load front and back	816kg/m²
Hailstone impact	25mm at 23 m/s
STC	1000W/m² ; 25°C ; AM 1.5



## Module Diagram



Module : SM-235PN0, SM-230PN0, SM-225PN0,  
SM-220PN0, SM-215PN0

Module : SM-210PN0, SM-205PN0, SM-200PN0, SM-195PN0

NOTE : This publication summarizes product warranty and specification, which are subject to change without notice



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