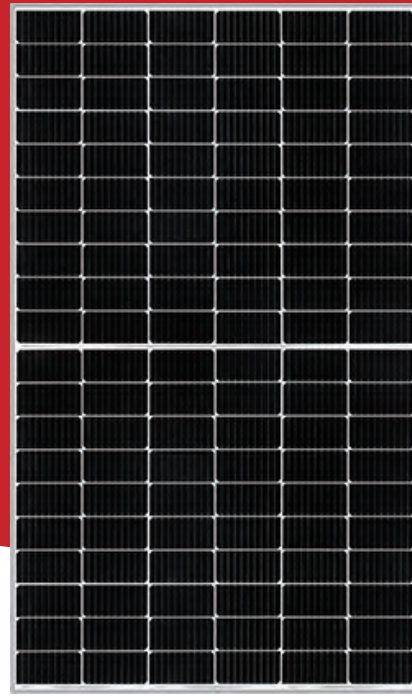


ONYX

440-460W

High Efficiency PERC Monofacial Module



Excellent low irradiance performance.



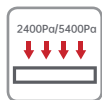
Better light trapping and current collection to improve module power output and reliability.



Industry leading lowest thermal co-efficient of power.



Optimized electrical design and lower operating current for reduced hot spot loss and better temperature coefficient.

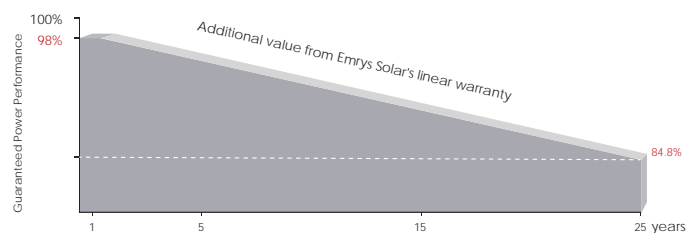


Certified to withstand: wind load (2400 Pa) and snow load (5400 Pa).



100% triple EL test enabling remarkable reduction of hidden crack rate of modules

### LINEAR PERFORMANCE WARRANTY



**25** years

Product Workmanship Warranty

**25** years

Output Power Warranty

### COMPREHENSIVE CERTIFICATES



## ELECTRICAL DATA(STC)

| Model Number                        | ES440M60-S2 | ES445M60-S2 | ES450M60-S2 | ES455M60-S2 | ES460M60-S2 |
|-------------------------------------|-------------|-------------|-------------|-------------|-------------|
| Peak Power Watts- $P_{MAX}(Wp)^*$   | 440         | 445         | 450         | 455         | 460         |
| Power Output Tolerance              | 0~5W        |             |             |             |             |
| Open Circuit Voltage- $V_{oc}(V)$   | 41.02       | 41.10       | 41.18       | 41.33       | 41.48       |
| Short Circuit Current- $I_{sc}(A)$  | 13.73       | 13.79       | 13.85       | 13.93       | 14.01       |
| Maximum Power Voltage- $V_{MPP}(V)$ | 33.72       | 33.82       | 33.92       | 34.06       | 34.20       |
| Maximum Power Current- $I_{MPP}(A)$ | 13.05       | 13.16       | 13.27       | 13.36       | 13.45       |
| Efficiency(%)                       | 20.39       | 20.62       | 20.85       | 21.08       | 21.32       |

STC :Irradiance 1000w/m<sup>2</sup>,Cell Temperature 25°C,Measure Tolerance : +/- 3%

## ELECTRICAL DATA(NOCT)

| Maximum Power- $P_{MAX}(Wp)^*$      | 327   | 331   | 335   | 339   | 342   |
|-------------------------------------|-------|-------|-------|-------|-------|
| Open Circuit Voltage- $V_{oc}(V)$   | 38.72 | 38.79 | 38.87 | 39.01 | 39.15 |
| Short Circuit Current- $I_{sc}(A)$  | 11.09 | 11.14 | 11.19 | 11.25 | 11.32 |
| Maximum Power Voltage- $V_{MPP}(V)$ | 31.39 | 31.56 | 31.73 | 31.91 | 32.07 |
| Maximum Power Current- $I_{MPP}(A)$ | 10.46 | 10.49 | 10.55 | 10.61 | 10.67 |

NOCT:Irradiance at 800W/m<sup>2</sup>,Ambient Temperature 20°C,Wind Speed 1m/s

## MECHANICAL DATA

|                               |   |
|-------------------------------|---|
| Dimensions                    | 1903x1134x30mm  |
| Weight                        | 24.2kg  |
| Cell Type                     | P type Mono-crystalline   |
| Cell Number                   | 120   |
| Glass Type                    | 3.2mm,High Transmission tempering Glass                           |
| Front Glass                   | Anti-Reflection Coating,High Transmission,Low Iron,Tempered Glass |
| Encapsulant Type              | EVA   |
| Frame Type                    | Anodized Aluminium Alloy  |
| Junction Box Protection Class | IP 68   |
| Connector Type                | MC4 or MC 4 Compatible  |
| Cables                        | 1x4mm <sup>2</sup> ,(+):350mm ,(-):350mm or Customized Length     |

## TEMPERATURE RATINGS

|                                      |            |
|--------------------------------------|------------|
| NOCT                                 | 45°C(±2°C) |
| Temperature Coefficient of $P_{MAX}$ | -0.35%/°C  |
| Temperature Coefficient of $V_{oc}$  | -0.28%/°C  |
| Temperature Coefficient of $I_{sc}$  | +0.048%/°C |

(Do not connect Fuse in Combiner Box with two or more strings in parallel connection)

## MAXIMUM RATINGS

|                         |             |
|-------------------------|-------------|
| Operational Temperature | -40~+85 °C  |
| Front/Rear Side Load    | 5400/2400pa |
| Max Series Fuse Rating  | 25A         |
| Max System Voltage      | 1500V (IEC) |
| Fire Rating             | Class C     |

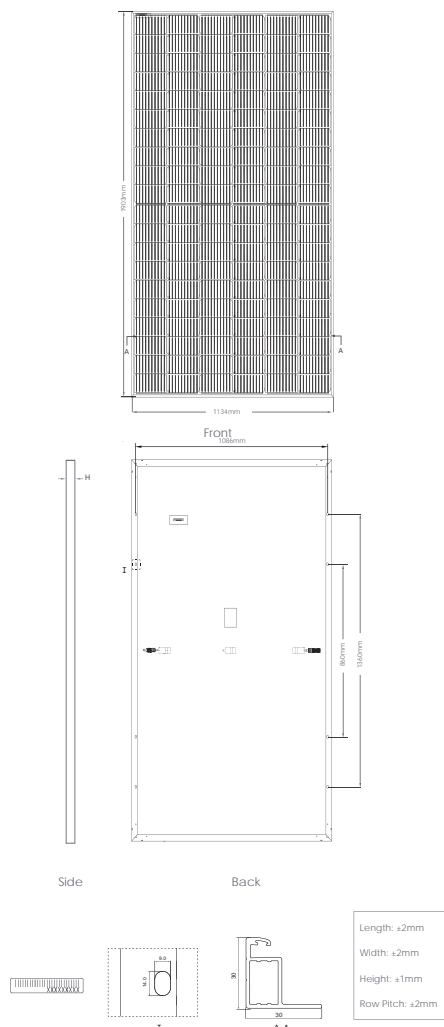
## WARRANTY

|                                       |
|---------------------------------------|
| 25 years Product Workmanship Warranty |
| 25 years Output Power Warranty        |

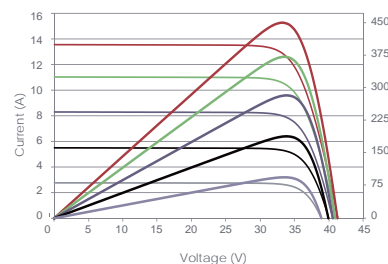
## PACKAGING CONFIGURATION

|                                     |
|-------------------------------------|
| Modules per box:36 pieces           |
| Modules per 40'container:864 pieces |

## DIMENSIONS OF PV MODULE(mm)



## Current-Voltage & Power-Voltage Curves



## Temperature Dependence of $I_{sc}$ , $V_{oc}$ , $P_{max}$

