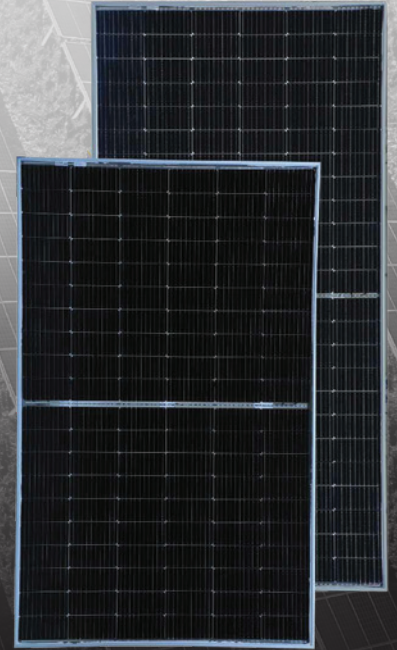




YOUR RELIABLE  
PARTNER FOR  
SOLAR ENERGY  
SINCE 1992



# SAPPHIRE

## N-TYPE TOPCON SOLAR MODULE

### DESIGNED TO DELIVER MAXIMUM POWER OUTPUT

EMMVEE IS INDIA'S FIRST INTEGRATED SOLAR SOLUTIONS COMPANY, WITH 30 YEARS OF EXPERTISE IN DEVISING HIGHLY INNOVATIVE AND EFFICIENT SOLAR POWER SOLUTIONS, FROM SOLAR WATER HEATING SYSTEMS TO PHOTOVOLTAIC MODULES AND SOLAR WATER PUMPS.

Since our inception in 1992, we have dedicated ourselves to developing smart and innovative solar energy solutions using cutting edge technology. As always, our promise is to maintain enviable standards of excellent quality, timely delivery and reliable support to our customers as they explore and adopt environmentally friendly solar power solutions.

Today, we are proud of our robust presence in some of the most pioneering green energy projects across India and Europe. Our path-breaking photovoltaic modules have provided valuable and sustainable alternative power solutions in the field for over 15 years, and we continue to innovate with our new range of higher WP modules that combine exceptional quality and unbeatable efficiency.

Our goal is simple: to provide clean and reliable energy that saves our natural resources and reduces our carbon footprint, while ensuring that our diverse range of domestic and commercial solar power-related products and services always keep the needs of our customers at the forefront.

## FEATURES



AR COATED HIGH  
TRANSMISSION GLASS



MC4 COMPATIBLE  
CONNECTORS



PID  
RESISTANCE



ANODISED  
ALUMINIUM FRAME



MECHANICAL  
LOAD OF 5400 Pa

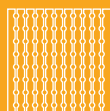
## BENEFITS



LOW LCOE,  
FASTER  
PAYBACK PERIOD



30% MORE POWER  
BEST IN CLASS  
EFFICIENCY  
UPTO 22.5%



MULTI-BUS BAR  
TECHNOLOGY FOR  
BETTER CURRENT  
COLLECTION



LOWEST  
GUARANTEED FIRST  
YEAR AND ANNUAL  
DEGRADATION



WELL-COMPOSED  
COMPONENTS  
STRESS TO REDUCE  
MICRO CRACKS

# TECHNICAL SPECIFICATION

## 144 CUT CELL N-TYPE TOPCON MODULE

Electrical data at 1000W/m<sup>2</sup>, 25°C and A.M 1.5 (STC in accordance with IEC 60904-3)

| MODEL NAME   | E560HCBG144-T | E565HCBG144-T | E570HCBG144-T | E575HCBG144-T | E580HCBG144-T |
|--|---------------|---------------|---------------|---------------|---------------|
| RATED POWER AT STC   | 560           | 565           | 570           | 575           | 580           |
| POWER TOLERANCE  | +5W           | +5W           | +5W           | +5W           | +5W           |
| MODULE EFFICIENCY AT STC   | 21.68%        | 21.87%        | 22.07%        | 22.26%        | 22.45%        |
| OPEN CIRCUIT VOLTAGE - VOC(VOLTS) (±10%)   | 50.67         | 50.87         | 51.07         | 51.27         | 51.47         |
| SHORT CIRCUIT CURRENT - ISC (AMPS) (± 10%)   | 14.13         | 14.19         | 14.25         | 14.31         | 14.37         |
| MAX POWER VOLTAGE - VPM (VOLTS)  | 41.95         | 42.14         | 42.29         | 42.44         | 42.59         |
| MAX POWER CURRENT - IPM (AMPS)   | 13.35         | 13.41         | 13.48         | 13.55         | 13.62         |
| AT LOW IRRADIANCE (200W/M <sup>2</sup> , 25°C AND AM1.5) THE MODULE YIELDS AT LEAST 95% OF THE STC EFFICIENCY. |               |               |               |               |               |

Test uncertainty for Pmax ±3%

### Electrical data at NOCT

|                                    |       |       |       |       |       |
|------------------------------------|-------|-------|-------|-------|-------|
| Rated power at NOCT                | 421   | 425   | 429   | 432   | 436   |
| Open circuit voltage - Voc(Volts)  | 48.13 | 48.32 | 48.51 | 48.7  | 48.89 |
| Short circuit current - Isc (Amps) | 11.41 | 11.46 | 11.5  | 11.55 | 11.6  |
| Max power voltage - Vpm (Volts)    | 39.39 | 39.52 | 39.65 | 39.78 | 39.87 |
| Max power current - Ipm (Amps)     | 10.69 | 10.75 | 10.81 | 10.87 | 10.94 |

### Thermal data

|  |            |
|--|------------|
| TEMP. COEFFICIENT OPEN-CIRCUIT VOLTAGE   | -0.25%/°C  |
| TEMP. COEFFICIENT SHORT CIRCUIT CURRENT  | 0.045%/°C  |
| TEMP. COEFFICIENT RATED POWER            | -0.29%/°C  |
| NOCT (NORMAL OPERATING CELL TEMPERATURE) | 45°C ± 2°C |

### Mechanical data

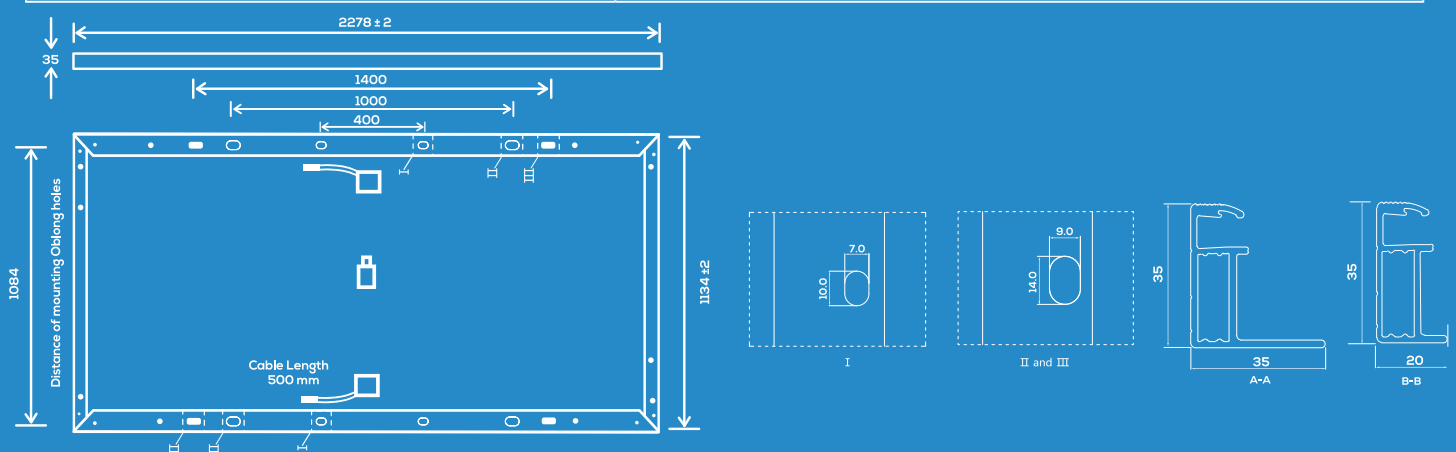
|                               |  |
|-------------------------------|--|
| NUMBER OF CELLS AND CELL TYPE | 144 TOPCON SOLAR CELLS (182mm X 91mm)            |
| DIMENSIONS (L X W X H)        | 2278 mm X 1134 mm X 35 mm                        |
| WEIGHT                        | 32 kg  |
| FRONT GLASS                   | 2 mm HIGH TRANSMISSION, SOLAR GLASS              |
| EMBEDDING                     | EVA/POE  |
| BACK GLASS                    | 2 mm HIGH TRANSMISSION, SOLAR GLASS              |
| JUNCTION BOX                  | 3 SPLIT JUNCTION BOX IP68                        |
| NUMBER OF BYPASS DIODES       | 3  |
| CABLES                        | 4mm <sup>2</sup> SOLAR CABLES, LENGTH 500 ± 10mm |
| BIFACIALITY FACTOR            | 80±5%  |

### Permissible operating conditions

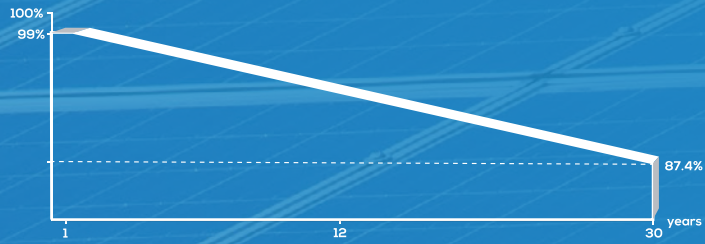
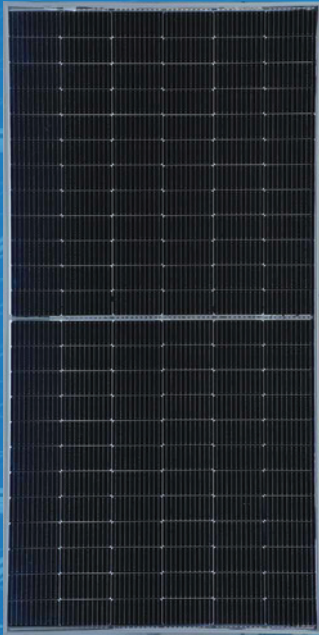
|   |  |
|---|--|
| OPERATING TEMPERATURE RANGE               | -40°C TO 85°C                          |
| MAX. SYSTEM VOLTAGE                       | 1500V DC                               |
| MAXIMUM SNOW LOAD CAPACITY                | 5400PA                                 |
| RESISTANCE AGAINST HAIL                   | MAX Ø24 MM WITH IMPACT SPEED OF 83KM/H |
| PROTECTION CLASS AGAINST ELECTRICAL SHOCK | II                                     |
| MAXIMUM REVERSE CURRENT                   | 30 A                                   |

### Warranty

|                      |  |
|----------------------|--|
| PRODUCT WARRANTY     | 12 YEARS   |
| PERFORMANCE WARRANTY | 30 YEARS   |
| ANNUAL DEGRADATION   | 1ST YEAR DEGRADATION 1%, FROM 2ND YEAR 0.40% ANNUAL DEGRADATION AND 87.40% AT THE END OF 30 YEARS. |



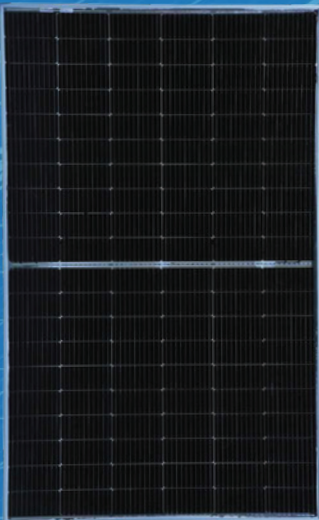
## LINEAR PERFORMANCE WARRANTY



## N-TYPE TOPCON BI-FACIAL MODULE

Positive power tolerance +5W

- Glass to Glass Composition
- Half Cut Cell Technology
- Best Warranty
- Enhanced Mechanical Load
- Higher lifetime Power Yield
- Multi Busbar Technology
- Longer Life-time Power Yield
- PID Resistance
- Excellent Low-light Performance
- Higher Power Output



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\* Product under testing at TUV for IEC standards.

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(An ISO 9001:2015, ISO 14001:2015 & OHSAS 45000:2018 Certified Company)