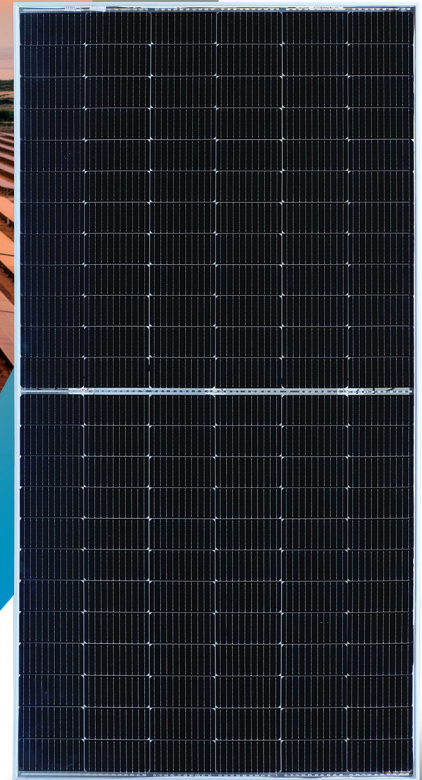




YOUR RELIABLE  
PARTNER FOR  
SOLAR ENERGY  
SINCE 1992



# EMMVEE CRAFTING SMART AND ADVANCED SOLAR ENERGY SOLUTIONS



## SAPPHIRE

Monoperc Bifacial Glass to Glass Module



Committed to Quality, Punctuality, and Customer Support since 1992.



Over 15 Years of Sustainable Power with Photovoltaic Modules, New High WP Modules United with Quality and Efficiency



With presence in Green Energy Projects Across the Globe.



Our Mission: Delivering Clean, Reliable Energy while Reducing Carbon Footprint through wide range of Residential and Commercial Solar Offerings.

# 144 HALF CUT CELL MONOPERC BI-FACIAL GLASS TO GLASS MODULE TECHNICAL SPECIFICATION

Electrical data at 1000W/m<sup>2</sup>, 25°C and A.M1.5 (STC in accordance with IEC 60904-3)

Model Name	E535HCBG144	E540HCBG144	E545HCBG144	E550HCBG144
Rated Power at STC	535	540	545	550
Power Tolerance	+5W	+5W	+5W	+5W
Module Efficiency at STC	20.71%	20.90%	21.10%	21.29%
Open Circuit Voltage-VOC(Volts)(±10%)	49.35	49.5	49.75	49.9
Short Circuit Current-ISC (AMPS)(±10%)	13.59	13.62	13.88	14.01
Max Power Voltage-VPM(Volts)	41.32	41.54	41.61	41.62
Max Power Current-IPM (AMPS)	12.95	13	13.1	13.22

At low irradiance (200W/M<sup>2</sup>, 25°C and AM1.5) the module yields at least 95% of the STC efficiency.

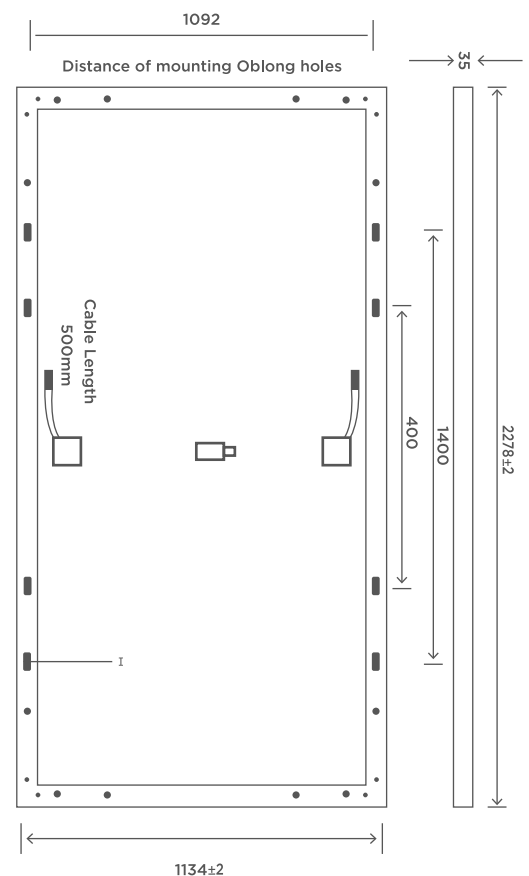
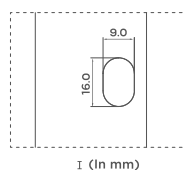
Test uncertainty for Pmax ±3%

Permissible Operating Conditions	
Operating Temperature Range	-40° C TO 85° C
Max.system Voltage	1500V DC
Maximum Snow Load Capacity	5400PA
Maximum wind load capacity	2400PA
Resistance Against Hail	Max Ø24mm with Impact Speed of 83km/h
Protection Class Against Electrical Shock	II
Maximum Reverse Current	30 A
Bifaciality	70±5%

Thermal Data	
Temp. Coefficient Open-circuit Voltage	-0.28%/°C
Temp. Coefficient Short Circuit Current	0.05%/°C
Temp. Coefficient Rated Power	-0.35%/°C
NOCT (Normal operating cell temperature)	45° C ±2°C

Mechanical Data	
Number of Cells and Cell Type	144 Monoperc Bi-Facial Solar Cells (182mm X 91mm)
Dimensions: (L X W X H)	2278 mm X 1134 mm X 35 mm
Weight	30 Kg
Front Glass	2 mm High Transmission, Solar Glass
Embedding	Top EVA, Bottom 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
Connectors	MC4 Compatible
Application Class	A
Fire Class	C

Warranty	
Product Warranty	12 years
Performance Warranty	30 years



1ST YEAR DEGRADATION <2.0%

YEAR 2-30 POWER DEGRADATION <0.45%

END OF 30 YEARS <84.95%

# 132 HALF CUT CELL MONOPERC BI-FACIAL GLASS TO GLASS MODULE TECHNICAL SPECIFICATION

Electrical data at 1000W/m<sup>2</sup>, 25°C and A.M1.5 (STC in accordance with IEC 60904-3)

Model Name	E485HCBG132	E490HCBG132	E495HCBG132	E500HCBG132
Rated Power at STC	485	490	495	500
Power Tolerance	+5W	+5W	+5W	+5W
Model Efficiency at STC	20.40%	20.61%	20.82%	21.03%
Open Circuit Voltage - VOC (Volts) (±10%)	44.43	44.65	44.79	44.92
Short Circuit Current - ISC (Amps) (±10%)	13.00	13.09	13.15	13.24
Max Power Voltage - VPM (Volts)	38.81	38.94	39.14	39.27
Max Power Current - IPM (Amps)	12.50	12.59	12.65	12.74

At low irradiance (200W/M<sup>2</sup>, 25°C and AM1.5) the module yields at least 95% of the STC efficiency.

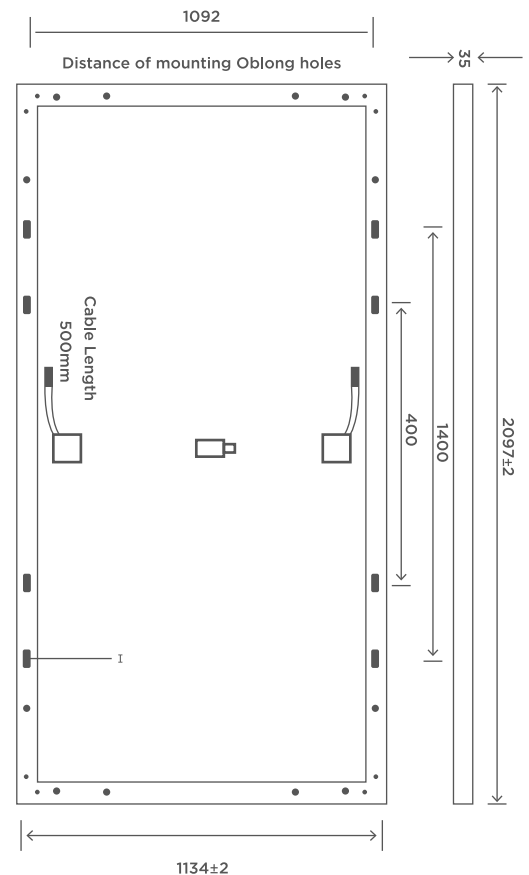
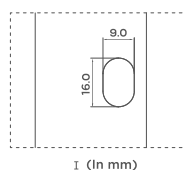
Test uncertainty for Pmax ±3%

Permissible Operating Conditions	
Operating Temperature Range	-40° C TO 85° C
Max.system Voltage	1500V DC
Maximum Snow Load Capacity	5400PA
Maximum wind load capacity	2400PA
Resistance Against Hail	Max Ø24mm with Impact Speed of 83km/h
Protection Class Against Electrical Shock	II
Maximum Reverse Current	30 A
Bifaciality	70±5%

Thermal Data	
Temp. Coefficient Open-circuit Voltage	-0.28%/°C
Temp. Coefficient Short Circuit Current	0.05%/°C
Temp. Coefficient Rated Power	-0.35%/°C
NOCT (Normal operating cell temperature)	45° C ±2°C

Mechanical Data	
Number of Cells and Cell Type	132 Monoperc Bi-Facial Solar Cells(182mm X 91mm)
Dimensions: (L X W X H)	2097 mm X 1134 mm X 35 mm
Weight	28 Kg
Front Glass	2 mm High Transmission, Solar Glass
Embedding	Top EVA, Bottom 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
Connectors	MC4 Compatible
Application Class	A
Fire Class	C

Warranty	
Product Warranty	12 years
Performance Warranty	30 years



1ST YEAR DEGRADATION <2.0%

YEAR 2-30 POWER DEGRADATION <0.45%

END OF 30 YEARS <84.95%

# 120 HALF CUT CELL MONOPERC BI-FACIAL GLASS TO GLASS MODULE TECHNICAL SPECIFICATION

Electrical data at 1000W/m<sup>2</sup>, 25°C and A.M1.5 (STC in accordance with IEC 60904-3)

Model Name	E440HCBG120	E445HCBG120	E450HCBG120
Rated Power at STC	440	445	450
Power Tolerance	+5W	+5W	+5W
Model Efficiency at STC	20.28%	20.51%	20.74%
Open Circuit Voltage - VOC (Volts) (±10%)	41.44	41.46	41.56
Short Circuit Current - ISC (Amps) (±10%)	13.55	13.75	13.81
Max Power Voltage - VPM (Volts)	34.21	34.28	34.31
Max Power Current - IPM (Amps)	12.87	12.99	13.12

At low irradiance (200W/M<sup>2</sup>, 25°C and AM1.5) the module yields at least 95% of the STC efficiency.

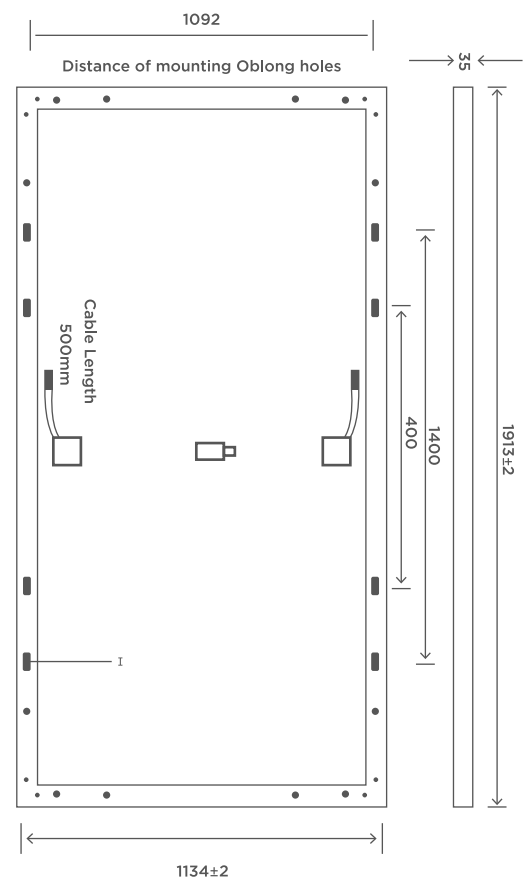
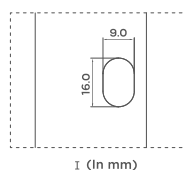
Test uncertainty for Pmax ±3%

Permissible Operating Conditions	
Operating Temperature Range	-40° C TO 85° C
Max.system Voltage	1500V DC
Maximum Snow Load Capacity	5400PA
Maximum wind load capacity	2400PA
Resistance Against Hail	Max Ø24mm with Impact Speed of 83km/h
Protection Class Against Electrical Shock	II
Maximum Reverse Current	30 A
Bifaciality	70±5%

Thermal Data	
Temp. Coefficient Open-circuit Voltage	-0.28%/°C
Temp. Coefficient Short Circuit Current	0.05%/°C
Temp. Coefficient Rated Power	-0.35%/°C
NOCT (Normal operating cell temperature)	45° C ±2°C

Mechanical Data	
Number of Cells and Cell Type	120 Monoperc Bi-Facial Solar Cells(182mm X 91mm)
Dimensions: (L X W X H)	1913 mm X 1134 mm X 35 mm
Weight	26 Kg
Front Glass	2 mm High Transmission, Solar Galss
Embedding	Top EVA, Bottom POE
Back Glass	2 mm High Transmission, Solar Galss
Junction Box	3 Split Junction Box IP68
Number of Bypass Diodes	3
Cables	4mm <sup>2</sup> Solar Cables, Length 500±10mm
Connectors	MC4 Compatible
Application Class	A
Fire Class	C

Warranty	
Product Warranty	12 years
Performance Warranty	30 years



1ST YEAR DEGRADATION <2.0%

YEAR 2-30 POWER DEGRADATION <0.45%

END OF 30 YEARS <84.95%

# 108 HALF CUT CELL MONOPERC BI-FACIAL GLASS TO GLASS MODULE TECHNICAL SPECIFICATION

Electrical data at 1000W/m<sup>2</sup>, 25°C and A.M1.5 (STC in accordance with IEC 60904-3)

Model Name	E395HCBG108	E400HCBG108	E405HCBG108
Rated Power at STC	395	400	405
Power Tolerance	+5W	+5W	+5W
Model Efficiency at STC	20.25%	20.51%	20.76%
Open Circuit Voltage - VOC (Volts) (±10%)	36.34	36.61	36.77
Short Circuit Current - ISC (Amps) (±10%)	13.15	13.21	13.24
Max Power Voltage - VPM (Volts)	31.54	31.81	32.13
Max Power Current - IPM (Amps)	12.53	12.58	12.61

At low irradiance (200W/M<sup>2</sup>, 25°C and AM1.5) the module yields at least 95% of the STC efficiency.

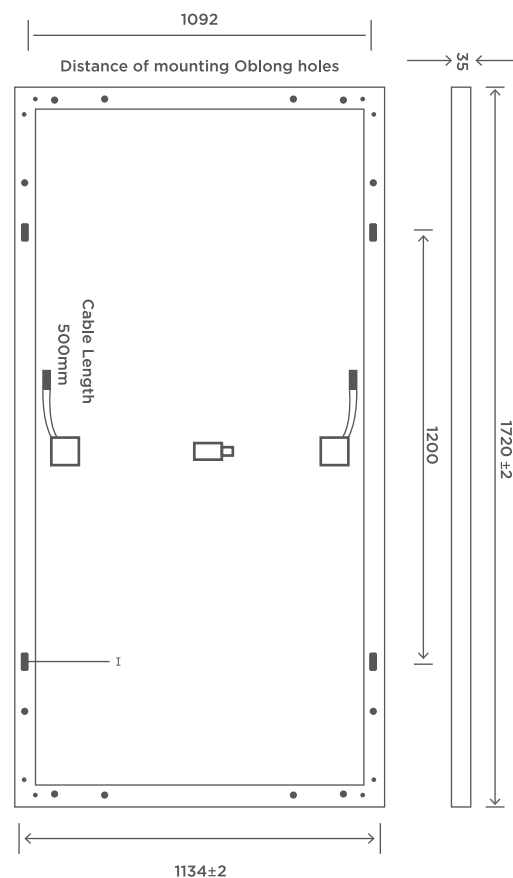
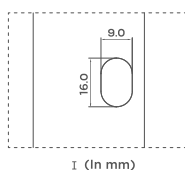
Test uncertainty for Pmax ±3%

Permissible Operating Conditions	
Operating Temperature Range	-40° C TO 85° C
Max.system Voltage	1500V DC
Maximum Snow Load Capacity	5400PA
Maximum wind load capacity	2400PA
Resistance Against Hail	Max Ø24mm with Impact Speed of 83km/h
Protection Class Against Electrical Shock	II
Maximum Reverse Current	30 A
Bifacialit	70±5%

Thermal Data	
Temp. Coefficient Open-circuit Voltage	-0.28%/°C
Temp. Coefficient Short Circuit Current	0.05%/°C
Temp. Coefficient Rated Power	-0.35%/°C
NOCT (Normal operating cell temperature)	45° C ±2°C

Mechanical Data	
Number of Cells and Cell Type	108 Monoperc Bi-Facial Solar Cells(182mm X 91mm)
Dimensions: (L X W X H)	1720 mm X 1134 mm X 35 mm
Weight	22 kg
Front Glass	2 mm High Transmission, Solar Galss
Embedding	Top EVA, Bottom POE
Back Glass	2 mm High Transmission, Solar Galss
Junction Box	3 Split Junction Box IP68
Number of Bypass Diodes	3
Cables	4mm <sup>2</sup> Solar Cables, Length 500±10mm
Connectors	MC4 Compatible
Application Class	A
Fire Class	C

Warranty	
Product Warranty	12 years
Performance Warranty	30 years

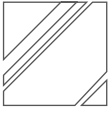


1ST YEAR DEGRADATION <2.0%

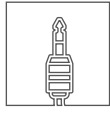
YEAR 2-30 POWER DEGRADATION <0.45%

END OF 30 YEARS <84.95%

# FEATURES



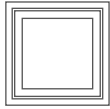
AR Coated High Transmission Glass



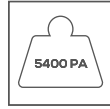
MC4 Compatible Connectors



PID Resistance



Anodised Aluminium Frame

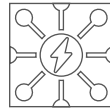


Snow Load Resistance upto 5400 Pa

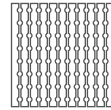
# BENEFITS



Low LCOE, Faster Payback Period



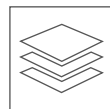
30% More Power Best In Class Efficiency upto 21.5%



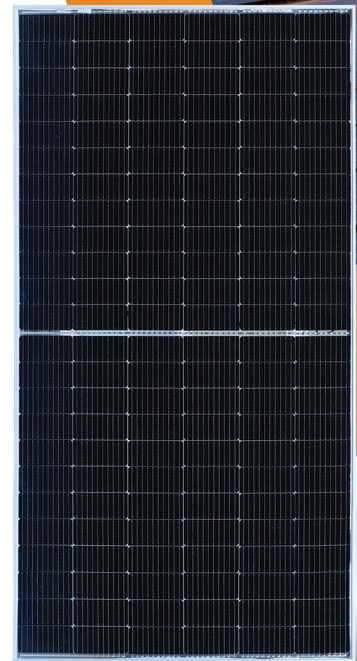
Multi-Bus Bar Technology for Better Current Collection



Lowest Guaranteed First Year and Annual Degradation



Well-Composed Components Stress to Reduce Micro Cracks



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