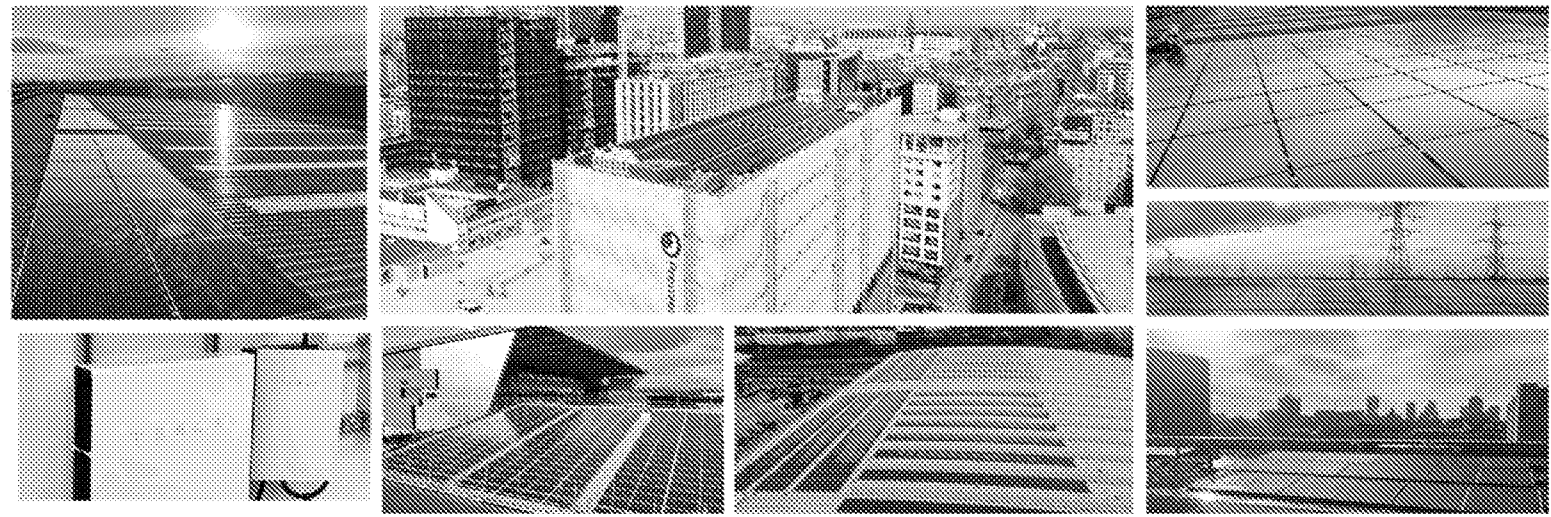
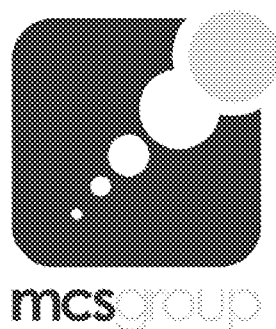




iGen

Solar PV

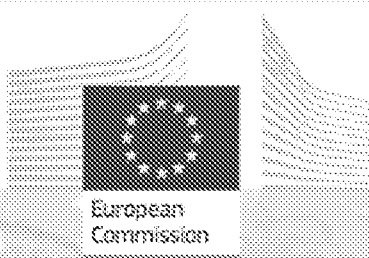
Richmond Motors Saltbox



Content

1. Solar PV Design
2. Panel Specifications
3. Inverter Specifications
4. Mounting Specifications





Performance of grid-connected PV - Richmond Motors

PVGIS-5 estimates of solar electricity generation:

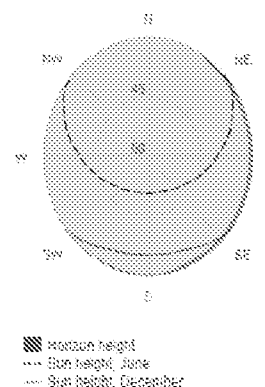
Provided inputs:

Latitude/Longitude: 50.748,-1.948
Horizon: Calculated
Database used: PVGIS-ERA5
PV technology: Crystalline silicon
PV installed: 156.4 kWp
System loss: 13 %

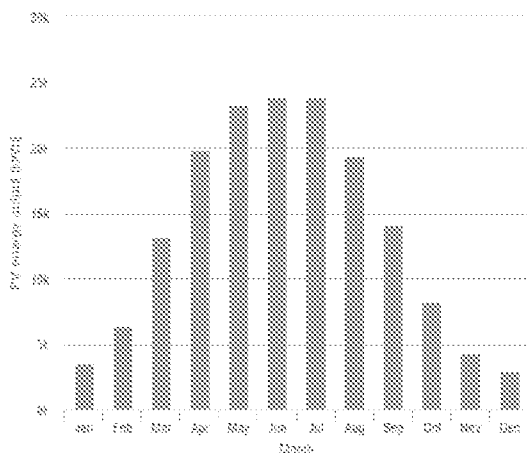
Simulation outputs

Slope angle: 10 °
Azimuth angle: 90 °
Yearly PV energy production: 162760.47 kWh
Yearly in-plane irradiation: 1279.93 kWh/m²
Year-to-year variability: 3740.82 kWh
Changes in output due to:
Angle of incidence: -4.5 %
Spectral effects: 1.47 %
Temperature and low irradiance: -3.56 %
Total loss: -18.69 %

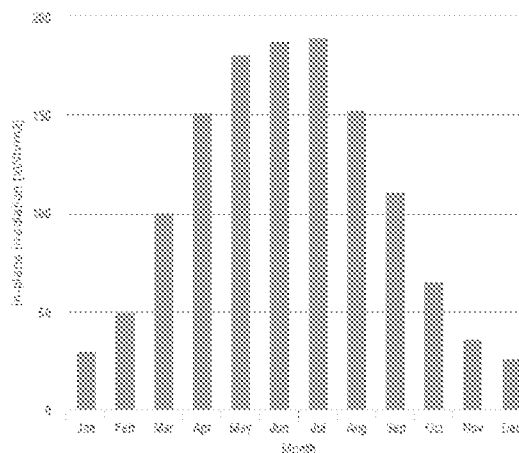
Outline of horizon at chosen location:



Monthly energy output from fix-angle PV system:



Monthly in-plane irradiation for fixed-angle:



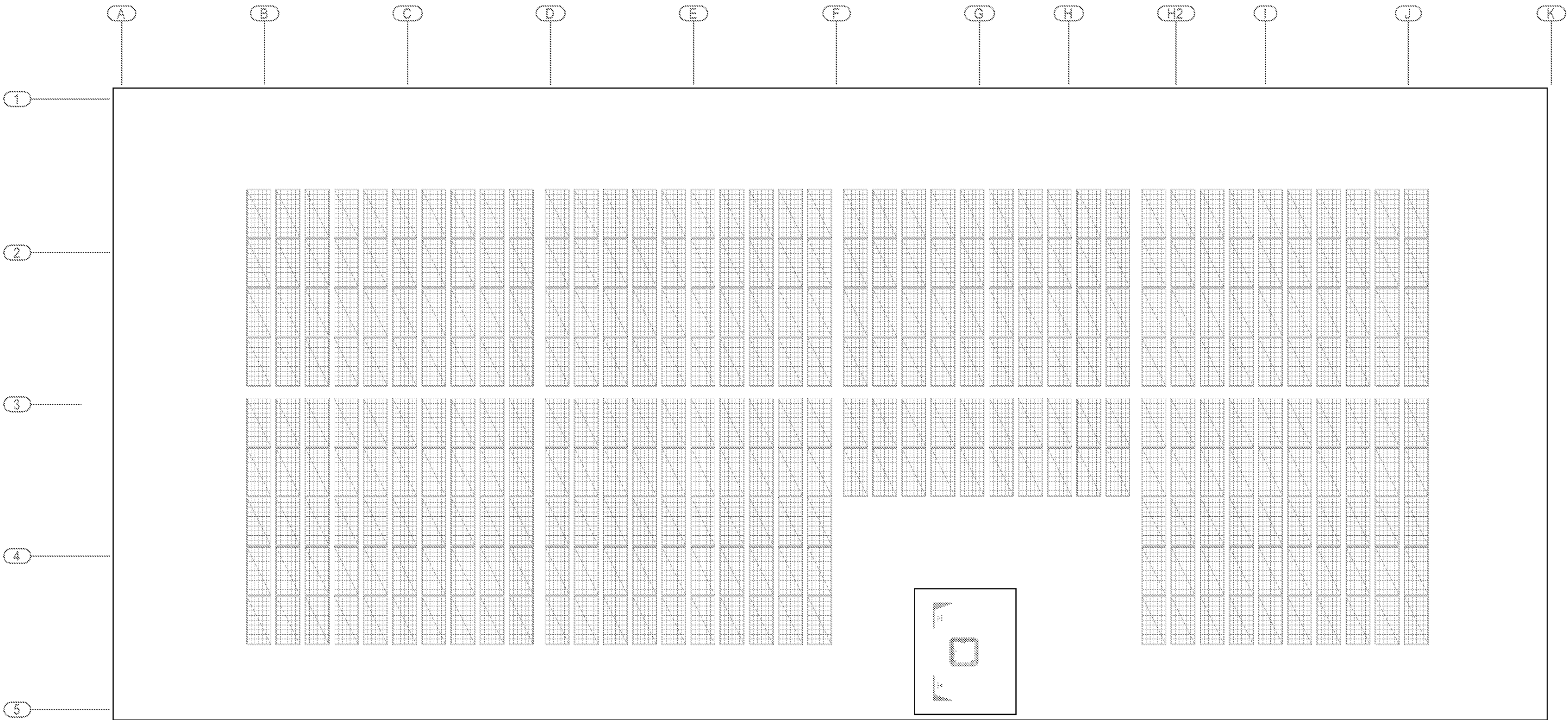
Monthly PV energy and solar irradiation

Month	E_m	H(i)_m	SD_m
January	3528.4	29.8	280.2
February	6380.9	49.9	701.6
March	13215.4	100.1	1483.3
April	19790.1	151.6	1617.5
May	23261.4	180.4	1823.9
June	23848.8	187.5	1733.7
July	23785.2	189.4	1770.5
August	19373.2	152.9	1448.3
September	14152.0	111.2	897.2
October	8201.9	65.3	834.1
November	4304.1	35.9	448.6
December	2919.0	25.9	267.6

E_m: Average monthly electricity production from the defined system [kWh].

H(i)_m: Average monthly sum of global irradiation per square meter received by the modules of the given system [kWh/m²].

SD_m: Standard deviation of the monthly electricity production due to year-to-year variation [kWh].



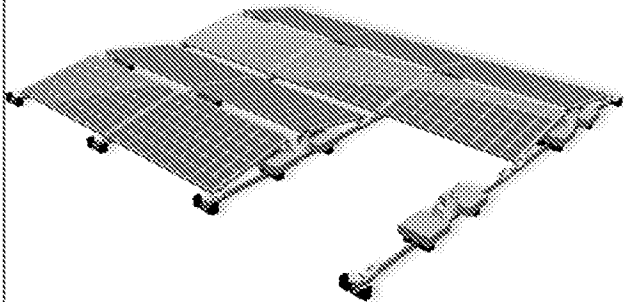
Notes:

MODULE = 460WP

SIZE = 1048mm x 2018mm

340 MODULES = 156.4KWP

EAST/WEST BALLASTED MOUNTING SYSTEM



REV	DESCRIPTION	BY	DATE
1	PROPOSAL		

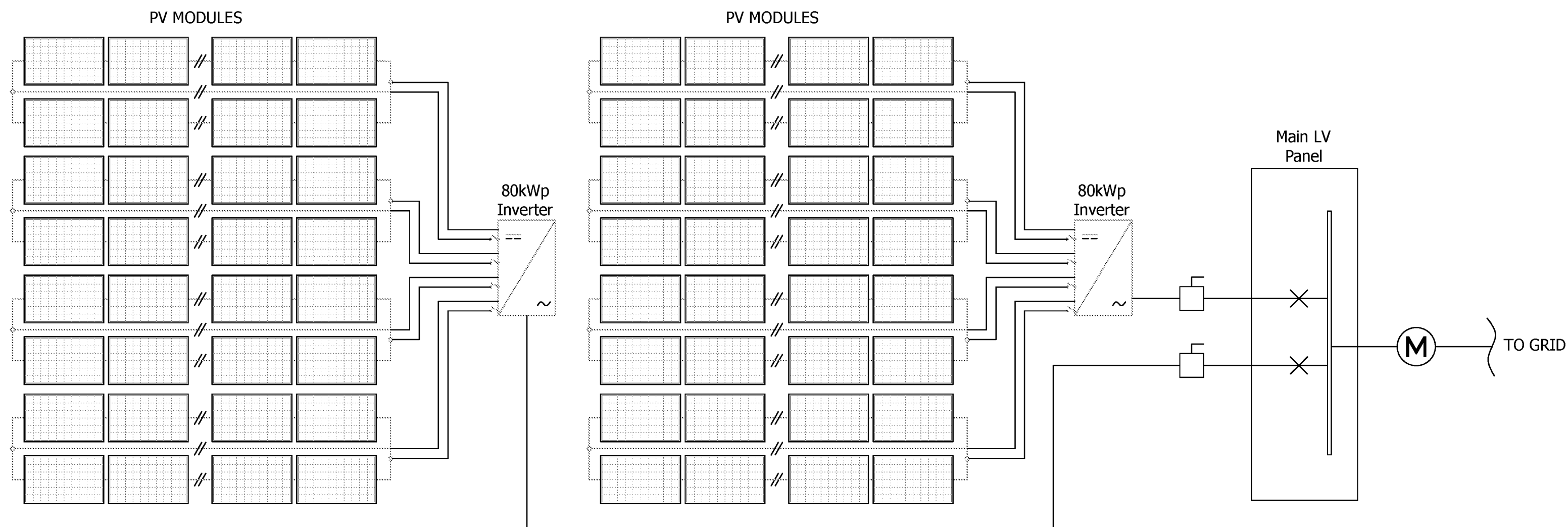
iGen

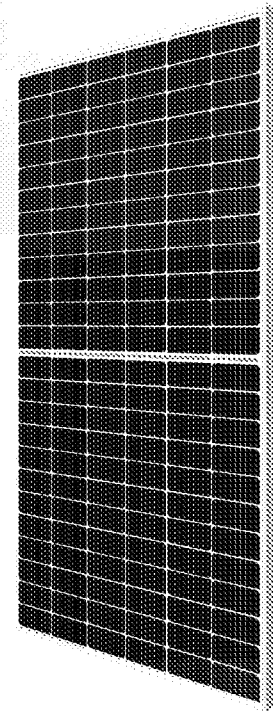
IGEN ENERGY
FLOOR 3, BROADSTONE MILL,
PEDDISH, STOCKPORT,
CH5 7DL
0161 507 1593
www.igen-energy.com

CLIENT:
MCS
HAYWOOD ROAD
WARWICK
CV34 5AH

ARCHITECT:

SITE:	RICHMOND MOTORS SALTBOX		
TITLE:	ROOF MOUNTED PV LAYOUT 156.4KWP		
SCALE AT A2:	DATE:	DRAWN:	CHECKED:
1:200	05/11/21	AH	PH
PROJECT NO:	DRAWING NO:	REVISION:	
153	A2/153	A	





HiKu

HIGH POWER MONO PERC MODULE

435 W ~ 465W

CS3W-460MS

MORE POWER



26 % more power than conventional modules



Up to 4.5 % lower LCOE
Up to 2.7 % lower system cost



Low NMOT: 41 ± 3 °C
Low temperature coefficient (Pmax):
-0.34 % / °C



Better shading tolerance

MORE RELIABLE



Lower internal current,
lower hot spot temperature



Minimizes micro-crack impacts



Heavy snow load up to 5400 Pa,
wind load up to 3600 Pa*



Enhanced Product Warranty on Materials and Workmanship*



Linear Power Performance Warranty*

1* year power degradation no more than 2%

Subsequent annual power degradation no more than 0.55%

*According to the applicable Canadian Solar Limited Warranty Statement.

MANAGEMENT SYSTEM CERTIFICATES*

ISO 9001:2015 / Quality management system

ISO 14001:2015 / Standards for environmental management system

ISO 45001: 2018 / International standards for occupational health & safety

PRODUCT CERTIFICATES*

IEC 61215 / IEC 61730 / CE / MCS / INMETRO / UKCA

FSEC (US Florida) / UL 61730 / IEC 61701 / IEC 62716

UNI 9177 Reaction to Fire: Class 1 / Take-e-way

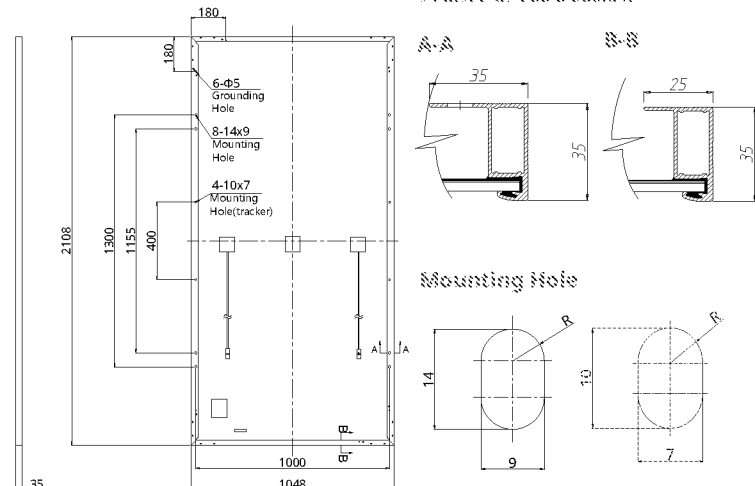


* The specific certificates applicable to different module types and markets will vary, and therefore not all of the certifications listed herein will simultaneously apply to the products you order or use. Please contact your local Canadian Solar sales representative to confirm the specific certificates available for your product and applicable in the regions in which the products will be used.

CSI Solar Co., Ltd. is committed to providing high quality solar products, solar system solutions and services to customers around the world. Canadian Solar was recognized as the No. 1 module supplier for quality and performance/price ratio in the IHS Module Customer Insight Survey, and is a leading PV project developer and manufacturer of solar modules, with over 55 GW deployed around the world since 2001.

* For detailed information, please refer to Installation Manual.

~~Dear Mom~~

[illegible]

ELECTRICAL DATA | NIMOT®

CS3W	435MS	440MS	445MS	450MS	455MS	460MS	465MS
Nominal Max. Power (Pmax)	326 W	330 W	334 W	338 W	341 W	345 W	349 W
Opt. Operating Voltage (Vmp)	38.0 V	38.2 V	38.3 V	38.5 V	38.7 V	38.9 V	39.1 V
Opt. Operating Current (Imp)	8.59 A	8.65 A	8.71 A	8.76 A	8.82 A	8.87 A	8.92 A
Open Circuit Voltage (Voc)	45.8 V	46.0 V	46.2 V	46.4 V	46.6 V	46.8 V	47.0 V
Short Circuit Current (Isc)	9.21 A	9.26 A	9.31 A	9.35 A	9.40 A	9.45 A	9.50 A

* The specifications and key features contained in this datasheet may deviate slightly from our actual products due to the on-going innovation and product enhancement. CSI Solar Co., Ltd. reserves the right to make necessary adjustment to the information described herein at any time without further notice.

Please be kindly advised that PV modules should be handled and installed by qualified people who have professional skills and please carefully read the safety and installation instructions before using our PV modules.

CSI Solar Co., Ltd.
199 Lushan Road, SND, Suzhou, Jiangsu, China, 215121

Figure 1 consists of two graphs, (a) and (b), showing the dependence of current density A (Y-axis, 0 to 12) on voltage V (X-axis, 0 to 50). Both graphs show a sharp increase in current density as voltage increases, followed by a plateau and then a sharp drop-off at higher voltages. The legend indicates power densities of 1000 W/m², 800 W/m², 600 W/m², 400 W/m², and 200 W/m². Graph (a) shows data for 5°C, 25°C, 45°C, and 65°C. Graph (b) shows data for 5°C, 25°C, 45°C, and 65°C.

Specification	Data
Cell Type	Mono-crystalline
Cell Arrangement	144 [2 X (12 X 6)]
Dimensions	2108 X 1048 X 35 mm (83.0 X 41.3 X 1.38 in)
Weight	24.3 kg (53.6 lbs)
Front Cover	3.2 mm tempered glass
Frame	Anodized aluminium alloy
J-Box	IP68, 3 bypass diodes
Cable	4 mm ² (IEC), 12 AWG (UL)
Cable Length (Including Connector)	500 mm (19.7 in) (+) / 350 mm (13.8 in) (-) (supply additional cable jumper; 2 lines/pallet) or customized length*
Connector	T4 series or MC4-EVO2
Per Pallet	30 pieces
Per Container (40' HQ)	660 pieces

TEMPERATURE CHARACTERISTICS

Specification	Data
Temperature Coefficient (Pmax)	-0.34 % / °C
Temperature Coefficient (Voc)	-0.26 % / °C
Temperature Coefficient (Isc)	0.05 % / °C
Nominal Module Operating Temperature	41 ± 3°C

PARTNER SECTION



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Solis-80K-5G

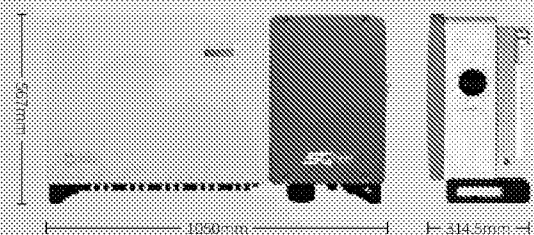
Solis 5G Three Phase Inverters



360 degree

Features:

- » Over 98.7% Max. efficiency
- » Wide voltage range and low startup voltage
- » 9 MPPT design with precise MPPT algorithm
- » THDI<3%, low harmonic distortion against grid
- » Anti-resonance, supporting over 6MW paralleled in one transformer
- » Perfect commercial site monitoring solution
- » Intelligent redundant fan-cooling
- » Strings intelligent monitoring, Smart I-V Curve Diagnosis supported
- » Fuse free design to avoid fire hazard
- » Type II surge arrester for both DC and AC, type I surge arrester optional
- » Leakage current repression technology
- » Volt-watt work mode integrated
- » DC input reverse alarm
- » Optional anti-PID function integrated
- » Integrated DC switches, AC switch optional



Model:

400V Solis-80K-5G

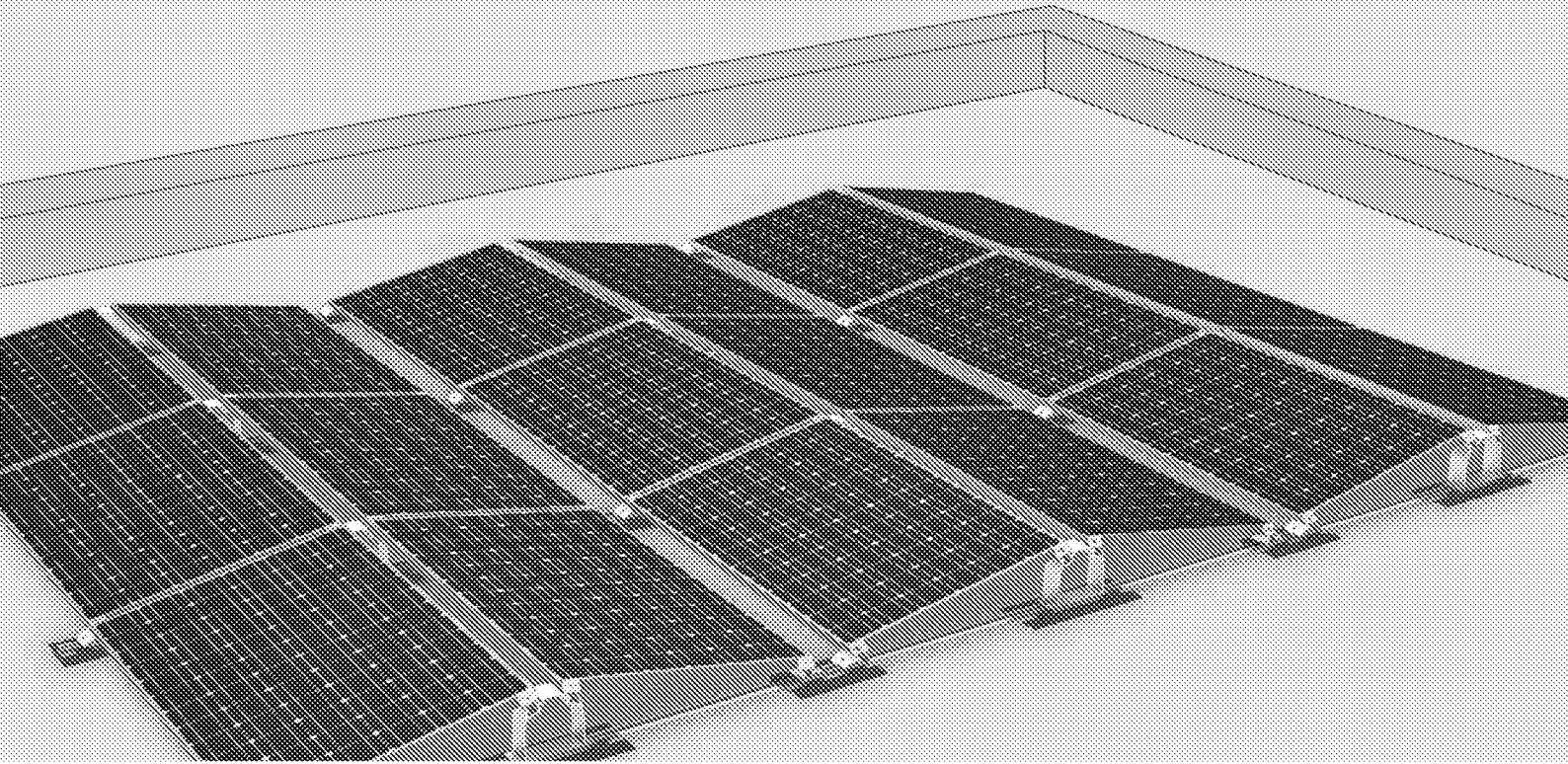
Datasheet

Input AC	
input L ¹	
Max. input voltage	1100V
Rated voltage	600V
Start-up voltage	195V
MPPT voltage range	180-1000V
Max. input current	9*26A
Max. short circuit current	9*40A
MPPT number/Max. input strings number	9/18
Output AC	
Rated output power	80kW
Max. apparent output power	88kVA
Max. output power	88kW
Rated grid voltage	3/N/PE, 220/380 V, 230/400 V
Rated grid frequency	50/60Hz
Rated grid output current	121.6A
Max. output current	133.7A
Power Factor	>0.99 (0.8 leading - 0.8 lagging)
THDi	<3%
Efficiency	
Max. efficiency	98.7%
EU efficiency	98.3%
Protection	
DC reverse-polarity protection	Yes
Short circuit protection	Yes
Output over current protection	Yes
Surge protection	DC Type II / AC Type II (AC Type I optional)
Grid monitoring	Yes
Anti-islanding protection	Yes
Temperature protection	Yes
Strings monitoring	Yes
I/V Curve scanning	Yes
Anti-PID function	Optional
Integrated AFCI (DC arc-fault circuit protection)	Optional
Integrated DC switch	Yes
Integrated AC switch	Optional
General Data	
Dimensions (W*H*D)	1050*567*314.5 mm (with AC switch)
Weight	82kg
Topology	Transformerless
Self consumption	<2W (night)
Operating ambient temperature range	-25 ~ +60°C
Relative humidity	0-100%
ingress protection	IP66
Cooling concept	Intelligent redundant fan-cooling
Max. operation altitude	4000m
Grid connection standard	VDE-AR-N 4105, VDE V 0124, VDE V 0126-1-1, UTE C15-712-1, NRS 097-1-2, G98, G99, EN 50549-1/-2, RD 1699, UNE 206006, UNE 206007-1, IEC 61727, DEWA
Safety/EMC standard	IEC 62109-1/-2, IEC 62116, EN 61000-6-2/-4
Features	
DC connection	MC4 connector
AC connection	OT terminal (max. 185 mm ²)
Display	LCD, 2*20 Z
Communication	RS485, Optional: Wi-Fi, GPRS, Ethernet, PLC

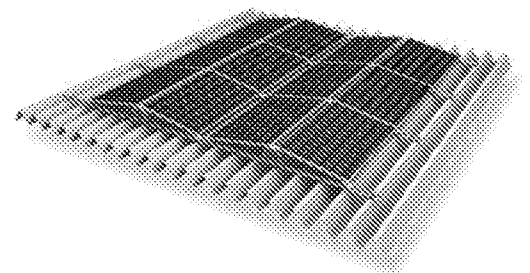


D-Dome 10° System

The solution for
double-sided elevation

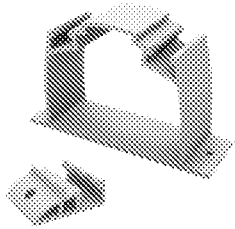


- › A system which provides optimal surface utilisation and yields for roofs with limited ballasting options
- › Aerodynamically optimised as a result of wind tunnel testing
- › Quick and easy handling
- › Also available as a short rail system



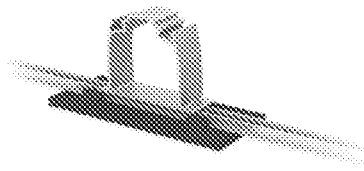
D-Dome can also be mounted on
trapezoidal sheet metal roofs.

DOME 10° SYSTEM COMPONENTS



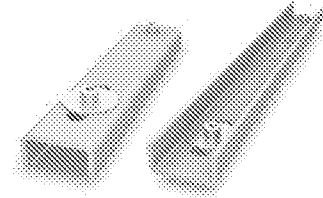
Dome D1000 and Dome SD

Narrow elevation module support element for two-sided elevations



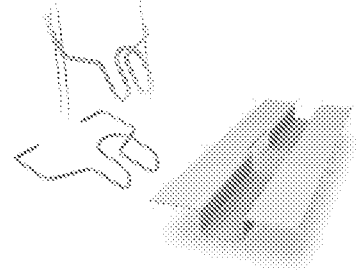
SpeedRail with building protection mats

- SpeedRail available as short or long rails
- Building protection mats also laminated with aluminium



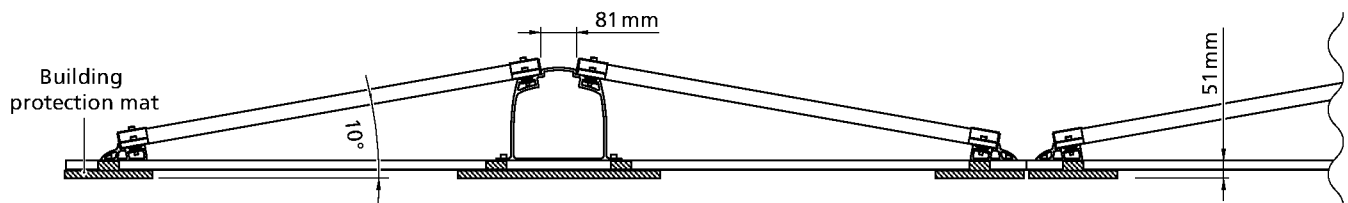
Block Connector RW/CW

- Connection between module arrays in x- and y-direction
- Ballast reduction in the complete system



Ballast and Cable Management

- SpeedPorter: For quick and easy ballasting
- Dome Wire Hanger for module cables



TECHNICAL DATA

	D-Dome
Scope of application	Flat roofs <5° with membrane, bitumen and concrete or gravel roofs, also trapezoidal sheet metal roofs with continuous mounting rails
Fastening type/roof fixture	Stable, with ballasting if necessary, no roof penetration
Requirements	- Permissible module dimensions (L x W x H): 1550-2000 x 950-1100 x 30-50 mm - Minimum system size: one row x 3 modules - Roof inclination of up to 5°
Technical specifications	- Thermal separation after max. 11 m (trapezoidal sheet metal & 4 m): min. 30 mm to max. 150 mm - Minimum clearance to roof edge 500 mm (350 mm to other obstructions)
Inclination angle	10°
Material	- Mounting rails, D-Dome, Dome SD, Module Clamps, Rail Connectors: Aluminium EN AW-6063 T66 - Building protection mat with or without aluminium lining (PUR-bound rubber granules) - Small parts: Stainless steel (1.4301) A2-70