



PVsyst V8.0.6

PVsyst - Simulation report

Grid-Connected System

Project: CASA-0001-OnGrid

Variant: New simulation variant

Tables on a building

System power: 1140 Wp

Poesía Mexicana - Mexico



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VCO, Simulation date:
18/02/25 15:10
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Project summary			
Geographical Site	Situation	Project settings	
Poesía Mexicana	Latitude	Albedo	0.20
Mexico	Longitude		
	Altitude		
	Time zone		
Weather data			
Poesía Mexicana			
Meteonorm 8.2 (2000-2009) - Synthetic			

System summary			
Grid-Connected System	Tables on a building	User's needs	
Simulation for year no 10	Near Shadings	Unlimited load (grid)	
Orientation #1	Linear shadings : Fast (table)		
Fixed plane			
Tilt/Azimuth			
21 / 0 °			
System information			
PV Array	Inverters		
Nb. of modules	Nb. of units	0.5 unit	
Pnom total	Pnom total	1000 W	
	Pnom ratio	1.140	

Results summary				
Produced Energy	1717.1 kWh/year	Specific production	1506 kWh/kWp/year	Perf. Ratio PR

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General parameters			
Grid-Connected System		Tables on a building	
Orientation #1			
Fixed plane		Sheds configuration	Sizes
Tilt/Azimuth	21 / 0 °	Nb. of sheds	Sheds spacing
		Single table	Collector width
		Shading limit angle	Average GCR %
		Limit profile angle	Top inactive band 0.02 m
		°	Bottom inactive band 0.02 m
Models used		Horizon	Near Shadings
Transposition	Perez	Free Horizon	Linear shadings : Fast (table)
Diffuse	Perez, Meteonorm		
Circumsolar	separate		
User's needs			
Unlimited load (grid)			

PV Array Characteristics			
PV module		Inverter	
Manufacturer	Generic	Manufacturer	Generic
Model	CS3U-380MS (Original PVsyst database)	Model	SUN2000-2KTL-L1 (Original PVsyst database)
Unit Nom. Power	380 Wp	Unit Nom. Power	2.00 kWac
Number of PV modules	3 units	Number of inverters	1 * MPPT 50% 0.5 unit
Nominal (STC)	1140 Wp	Total power	1.0 kWac
Modules	1 strings x 3 In series	Operating voltage	80-600 V
At operating cond. (50°C)		Pnom ratio (DC:AC)	1.14
Pmpp	1034 Wp	Total inverter power	
U mpp	108 V	Total power	1 kWac
I mpp	9.6 A	Nb. of inverters	1 unit
Total PV power		0.5 unused	
Nominal (STC)	1.14 kWp	Pnom ratio	1.14
Total	3 modules		
Module area	6.0 m²		
Cell area	5.3 m²		

Array losses			
Array Soiling Losses		Thermal Loss factor	DC wiring losses
Loss Fraction	3.0 %	Module temperature according to irradiance	Global array res.
		Uc (const)	189 mΩ
		Uv (wind)	1.5 % at STC
Module Quality Loss		Module mismatch losses	Module average degradation
Loss Fraction	-0.3 %	Loss Fraction	Year no
		1.0 % at MPP	10
			Loss factor
			0.4 %/year
			Imp / Vmp contributions
			80% / 20%
			Mismatch due to degradation
			Imp RMS dispersion
			0.4 %/year
			Vmp RMS dispersion
			0.4 %/year



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Array losses

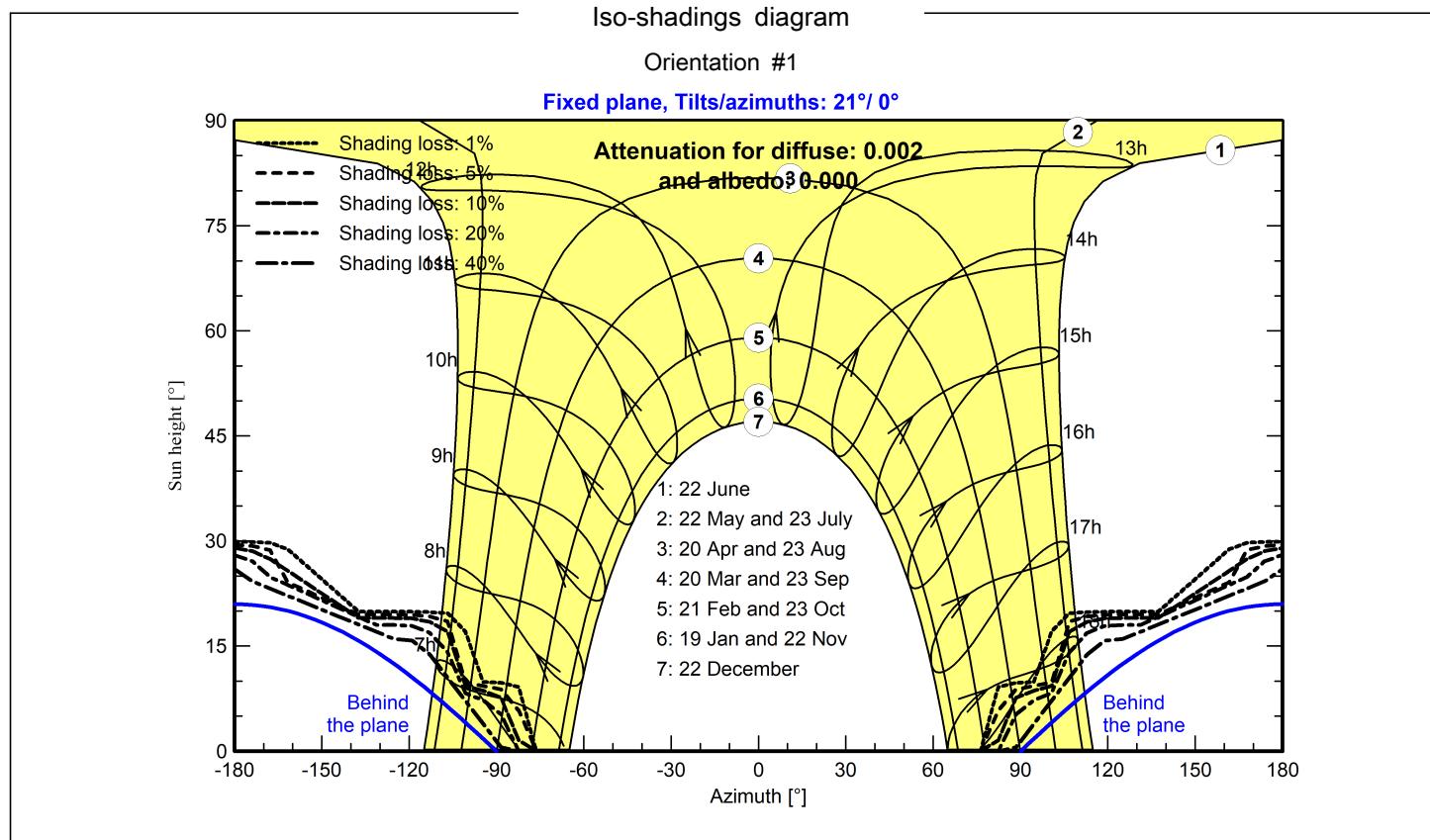
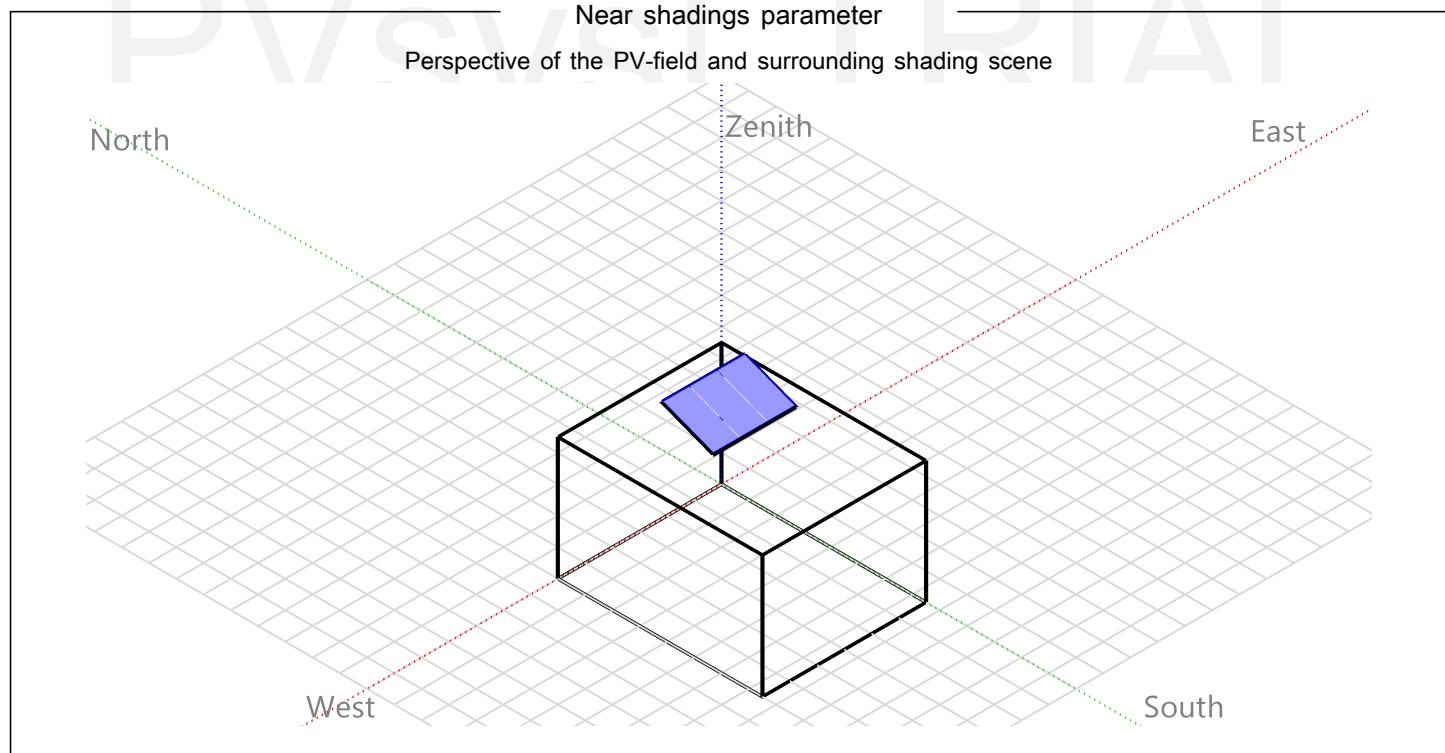
IAM loss factor

Incidence effect (IAM): User defined profile

10°	20°	30°	40°	50°	60°	70°	80°	90°
0.998	0.998	0.995	0.992	0.986	0.970	0.917	0.763	0.000



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Main results

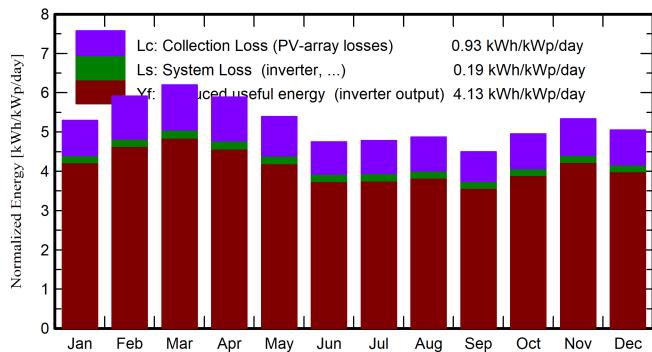
System Production
Produced Energy

1717.1 kWh/year

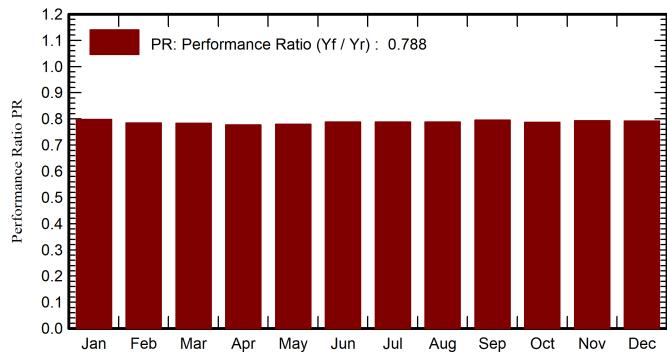
Specific production
Perf. Ratio PR

1506 kWh/kWp/year
78.76 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

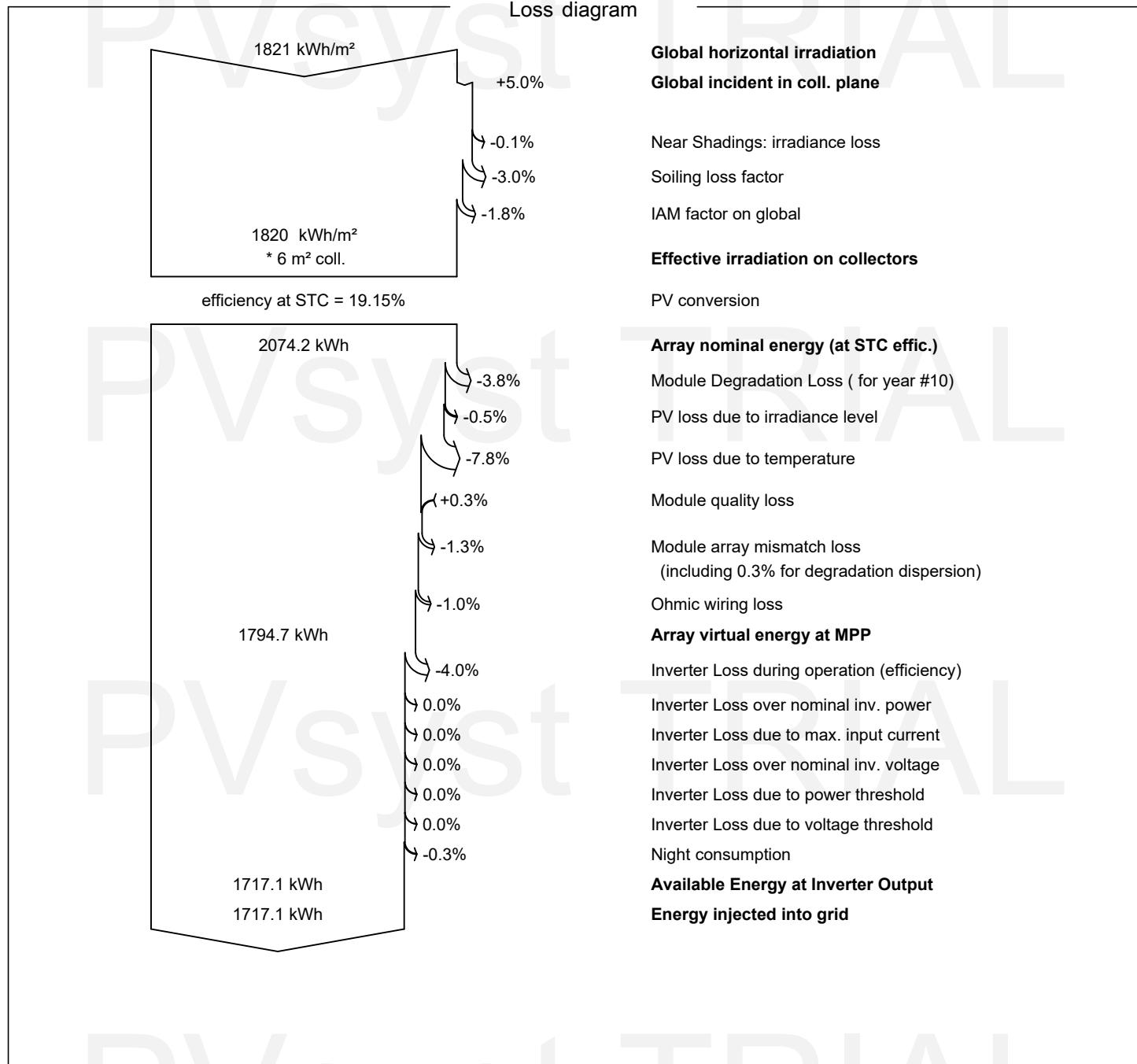
	GlobHor kWh/m ²	DiffHor kWh/m ²	T_Amb °C	GlobInc kWh/m ²	GlobEff kWh/m ²	EArray kWh	E_Grid kWh	PR ratio
January	132.8	51.65	13.89	164.2	156.7	155.7	149.3	0.798
February	142.9	45.68	15.96	165.6	158.3	154.3	148.2	0.785
March	180.0	70.45	17.82	192.3	183.1	178.7	171.6	0.783
April	179.6	71.14	19.24	176.7	168.2	163.5	156.7	0.778
May	179.5	78.19	19.83	167.1	158.7	155.4	148.4	0.779
June	157.3	79.54	18.49	142.5	134.8	134.5	128.1	0.788
July	161.3	76.54	17.96	148.1	140.1	139.8	133.1	0.788
August	156.4	72.11	18.03	150.9	143.3	142.0	135.5	0.788
September	133.8	76.05	17.52	134.9	128.0	128.2	122.3	0.795
October	139.5	63.43	16.88	153.5	146.2	144.1	137.8	0.788
November	133.1	52.38	15.14	160.1	152.7	151.0	144.8	0.793
December	125.0	44.75	14.45	156.5	149.5	147.5	141.3	0.792
Year	1821.2	781.91	17.11	1912.4	1819.5	1794.6	1717.1	0.788

Legends

GlobHor	Global horizontal irradiation	EArray	Effective energy at the output of the array
DiffHor	Horizontal diffuse irradiation	E_Grid	Energy injected into grid
T_Amb	Ambient Temperature	PR	Performance Ratio
GlobInc	Global incident in coll. plane		
GlobEff	Effective Global, corr. for IAM and shadings		

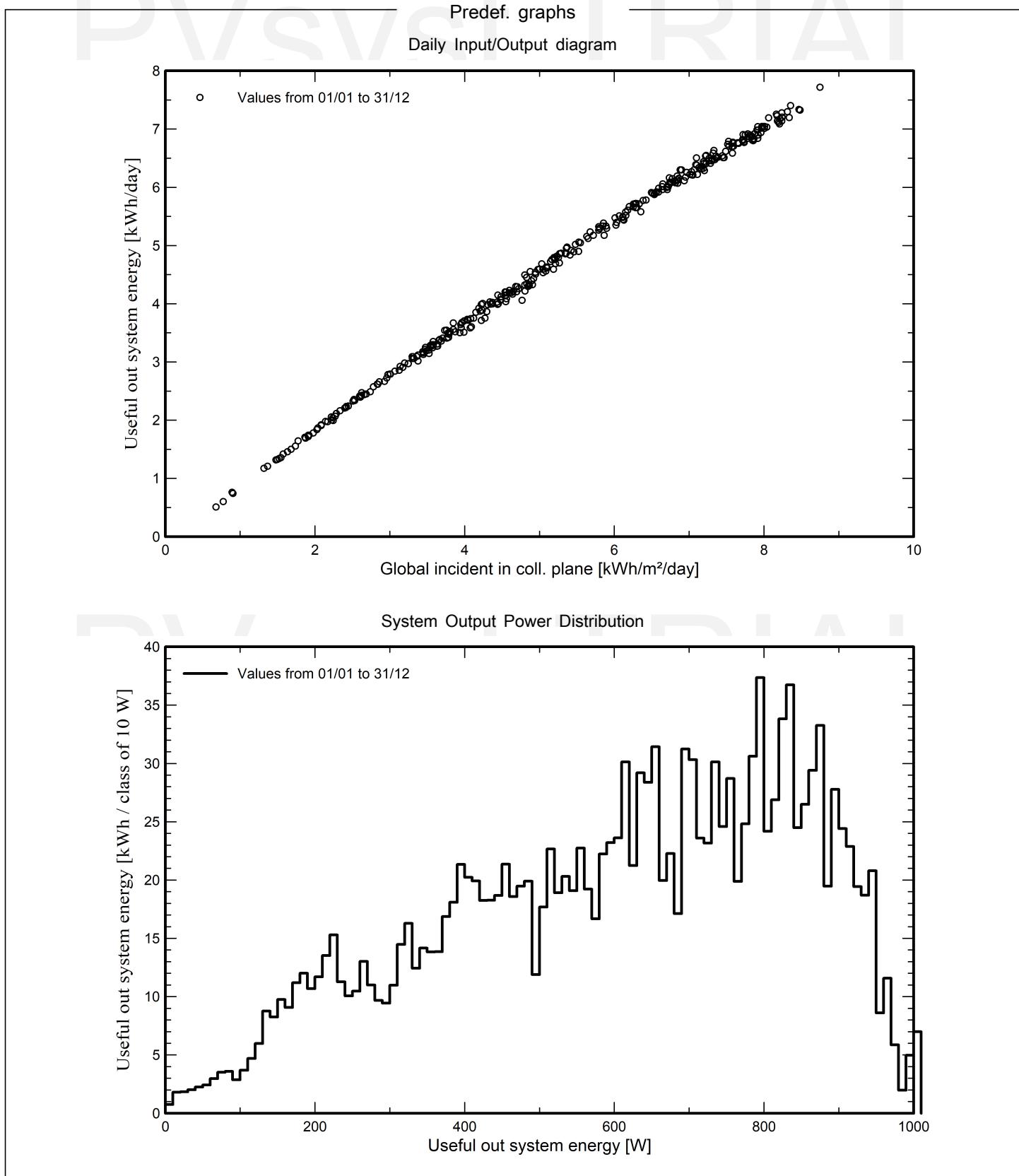


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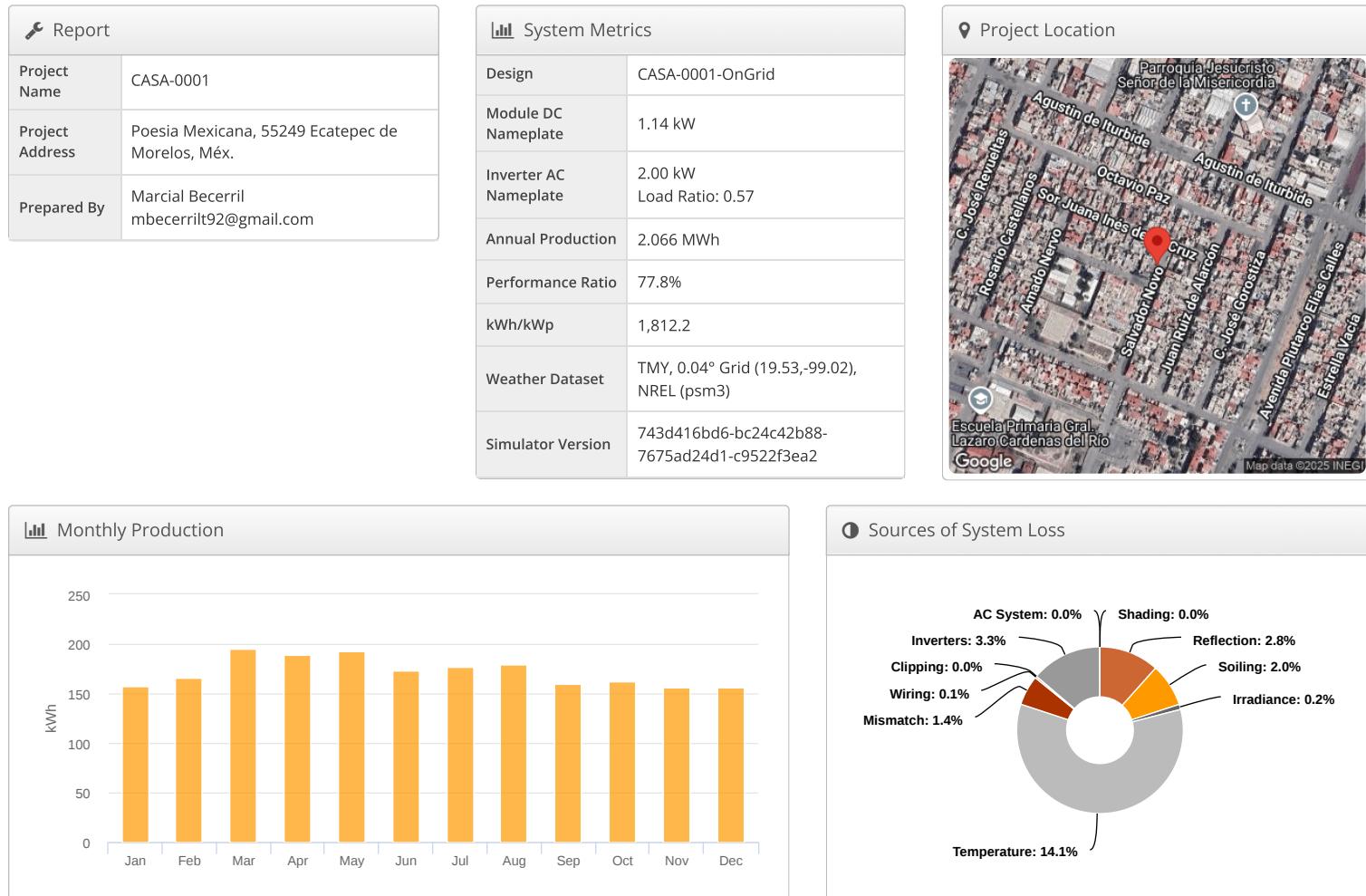


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CASA-0001-OnGrid

CASA-0001, Poesia Mexicana, 55249 Ecatepec de Morelos, Méx.



⚡ Annual Production			
	Description	Output	% Delta
Irradiance (kWh/m ²)	Annual Global Horizontal Irradiance	2,241.4	
	POA Irradiance	2,330.7	4.0%
	Shaded Irradiance	2,330.7	0.0%
	Irradiance after Reflection	2,265.9	-2.8%
	Irradiance after Soiling	2,220.5	-2.0%
Total Collector Irradiance		2,220.5	0.0%
Energy (kWh)	Nameplate	2,531.2	
	Output at Irradiance Levels	2,525.1	-0.2%
	Output at Cell Temperature Derate	2,168.2	-14.1%
	Output After Mismatch	2,138.3	-1.4%
	Optimal DC Output	2,136.4	-0.1%
	Constrained DC Output	2,136.4	0.0%
	Inverter Output	2,065.9	-3.3%
	Energy to Grid	2,065.9	0.0%
Temperature Metrics			
Avg. Operating Ambient Temp		19.3 °C	
Avg. Operating Cell Temp		47.4 °C	
Simulation Metrics			
Operating Hours		4367	
Solved Hours		4367	

☁ Condition Set											
Description		Condition Set 1									
Weather Dataset		TMY, 0.04° Grid (19.53,-99.02), NREL (psm3)									
Solar Angle Location		Meteo Lat/Lng									
Transposition Model		Perez Model									
Temperature Model		Sandia Model									
Temperature Model Parameters	Rack Type			a		b		Temperature Delta			
	Fixed Tilt			-3.56		-0.075		3°C			
	Flush Mount			-2.81		-0.0455		0°C			
	East-West			-3.56		-0.075		3°C			
Soiling (%)	Carport			-3.56		-0.075		3°C			
	J	F	M	A	M	J	J	A	S	O	N
Soiling (%)											
2 2 2 2 2 2 2 2 2 2 2 2											
Irradiation Variance		5%									
Cell Temperature Spread		4° C									
Module Binning Range		-2.5% to 2.5%									
AC System Derate		0.50%									
Module Characterizations	Module			Uploaded By		Characterization					
	CS3U-380MS (1000V) (Canadian Solar)			HelioScope		Spec Sheet Characterization, PAN					
Component Characterizations	Device			Uploaded By		Characterization					
	SUN2000-2KTL-L1 (Huawei)			HelioScope		Spec Sheet					

📁 Components		
Component	Name	Count
Inverters	SUN2000-2KTL-L1 (Huawei)	1 (2.00 kW)
AC Home Runs	1000 MCM (Aluminum)	1 (8.5 m)
Module	Canadian Solar, CS3U-380MS (1000V) (380W)	3 (1.14 kW)

🔌 Wiring Zones												
Description		Combiner Poles		String Size		Stringing Strategy						
Wiring Zone		-		3-10		Along Racking						
\Field Segments												
Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules	Power			
Field Segment 1	Flush Mount	Portrait (Vertical)	21°	113°	0.0 m	1x1	3	3	1.14 kW			

 Detailed Layout2

CASA-0001-OnGrid

CASA-0001, Poesia Mexicana, 55249 Ecatepec de Morelos, Méx.

Shading Heatmap



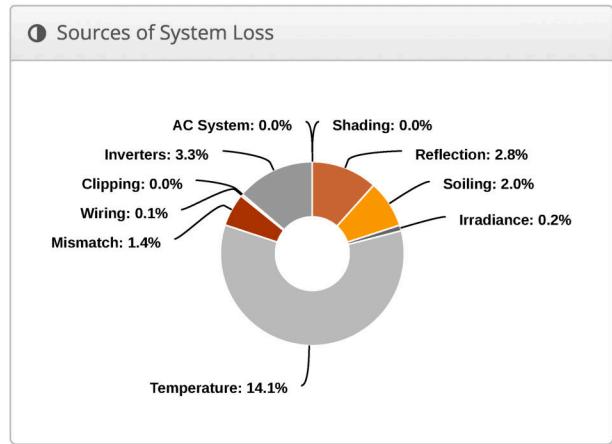
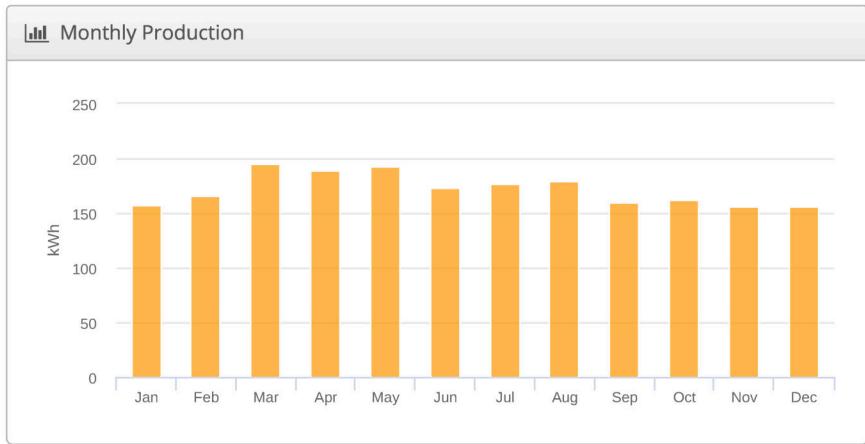
Shading by Field Segment

Description	Tilt	Azimuth	Modules	Nameplate	Shaded Irradiance	AC Energy	TOF ²	Solar Access	Avg TSRF ²
Field Segment 1	21.0°	113.0°	3	1.14 kWp	2,330.7 kWh/m ²	2.07 MWh ¹	97.4%	100.0%	97.4%
Totals, weighted by kWp			3	1.14 kWp	2,330.7 kWh/m²	2.07 MWh	97.4%	100.0%	97.4%

¹ approximate, varies based on inverter performance
² based on location Optimal POA Irradiance of 2,393.2 kWh/m² at 27.0° tilt and 175.0° azimuth

Solar Access by Month

Description	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
Field Segment 1	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Solar Access, weighted by kWp	100.0%											
AC Power (kWh)	157.5	166.4	195.1	189.4	193.2	173.5	176.8	179.6	159.2	162.2	156.3	156.5



PLANO DE LOCALIZACIÓN GENERAL Y NÚMEROS DE SERIE

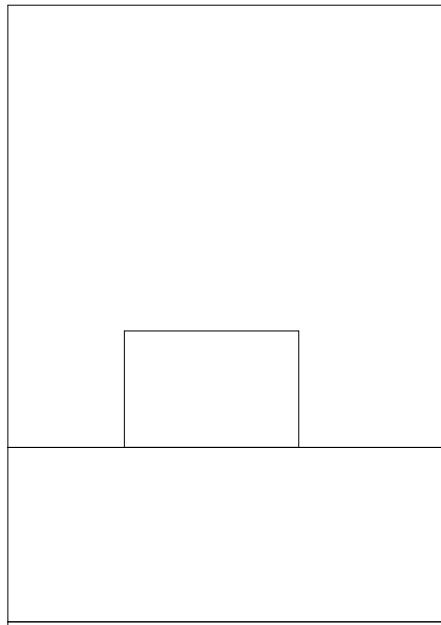
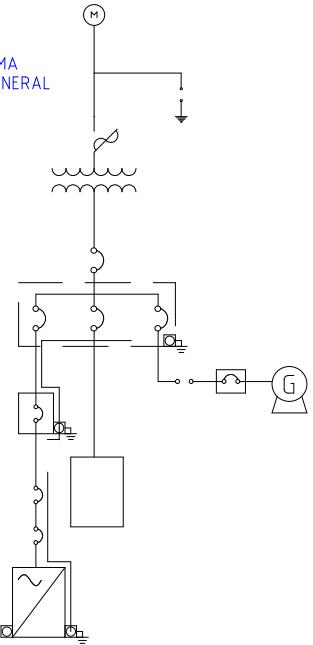


DIAGRAMA UNIFILAR GENERAL

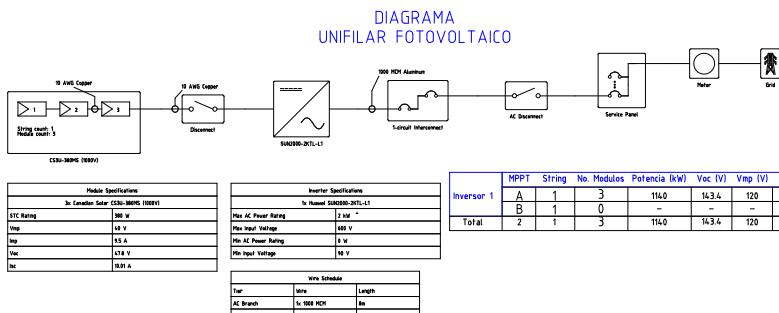


Calibre AWG o kcmil	Área de la sección transversal nominal
14	2.08
12	3.31
10	5.26
8	8.37
6	13.3
4	21.2
2	33.6
1/0	53.5
2/0	67.4
3/0	85
4/0	107
250	127
300	152
350	177
400	203
500	253
600	304
750	380
1000	507

Lista de Materiales y Equipos	
No. Descripción	
1	MÓDULO FOTOVOLTAICO 380W MONOCRISTALINO MARCA CANADIAN SOLAR CS3U-380MS
2	INVÉRSOR DE CA MARCA SUN2000-2KL-L1
3	CABLE DC (paneles + inversor) MARCA Prymex Top Cable
4	CABLE AC (inversor + tablero) MARCA Viakon
5	DISYUNTOR DE TIERRA MARCA Stabli
6	SECCIONADORES DC, MODELO 01/0/25A, MARCA ABB
7	FUSIBLES DC, MODELO Eaton gP 15A, MARCA Eaton
8	BREAKER AC, MODELO 63A, MARCA ABB
9	SUPRESOR DE SOBRETENSIÓN AC, MODELO VAL-M5 275AC, MARCA Schneider
10	INTERRUPTOR DIFERENCIAL (RCD), MODELO ID 25A, MARCA ABB
11	CABLE DE TIERRA, MARCA Viakon

Tubería	Designación métrica mm.	Tamaño comercial in.
12	3/8	
16	1/2	
21	3/4	
27	1	
35	1 1/4	
41	1 1/2	
23	2	
63	2 1/2	
78	3	
91	3 1/2	
103	4	
129	5	
155	6	

DIAGRAMA UNIFILAR FOTOVOLTAICO



IDENTIFICACIÓN INVERSORES, SIMBOLOGÍA Y CÉDULAS

SIMBOLOGÍA
EQUIPO VS INCENDIO
APARTARRAYOS
CORTA CIRCUITO FUSIBLE
TRANSFORMADOR
INTERRUPTOR TERMOMAGNETICO
INVERSOR
GENERADOR ELÉCTRICO
PUESTA A TIERRA

FORMATO DE CÉDULAS

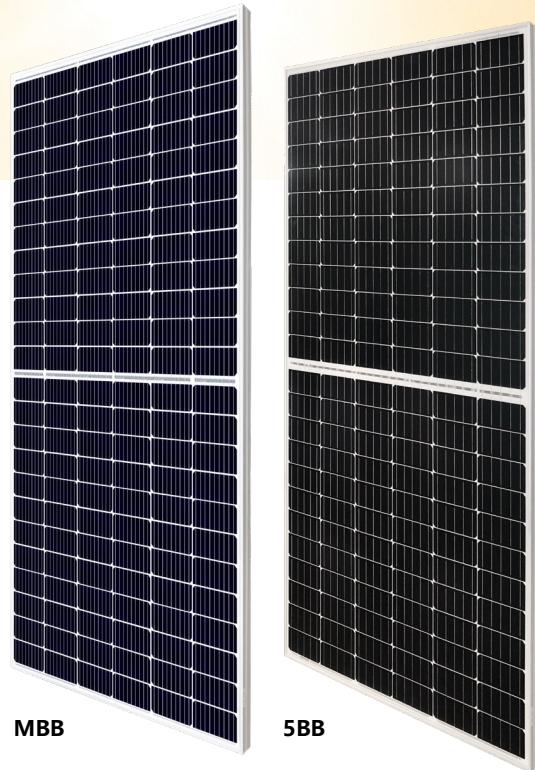
3-3/0 (F)
F=Fases
Calibre de cable utilizado
Cantidad total de cables

1 - 6 (IT)
T= Tierra
Calibre de cable utilizado
Cantidad total de cables

5 mts
Distancia

Abreviatura	Descripción
I/A/AMPS	Corriente por Circuito
Isc	Corriente Mínima
imax	Corriente Nominal
kA	Kilo Amperio
kVA	Kilo Volt-Amperio
V	Voltaje
Voc	Voltaje Circuito Abierto
Voc	Voltaje Circuito Alarma
Vmp	Voltaje de Máxima Potencia
P/W	Potencia
kW	Potencia Nominal
kWp	Potencia Pico
SFV	Sistema Fotovoltaico
MPV	Módulo Fotovoltaico
INV	Inversor de Corriente
ITM	Interruptor Termomagnético
TAB	Tablero Eléctrico
TC	Transformador de Corriente
TR	Transformador Principal
TG	Tablero General
TCD	Tubería Conducto Pared Delgada
TCP.G	Tubería Conducto Pared Gruesa
MPPT	Seguidor de Máxima Potencia
F.S.D.	Factor de Sobre Dimensionamiento
F.F.D.	Tierra Física Desnudo

PLFIT-0001, ECATEPEC
Potencia pico:1380 W.
Potencia nominal: 1140 Wp.
DIAGRAMA UNIFILAR
FOTOVOLTAICO
Liliana Becerra
Tapia



KuMax

HIGH EFFICIENCY MONO PERC MODULE CS3U-380|385|390|395|400MS (1000 V / 1500 V)

MORE POWER



Low power loss in cell connection

MBB



Low NMOT: $42 \pm 3^\circ\text{C}$
Low temperature coefficient (Pmax): $-0.36\% / ^\circ\text{C}$

25
years

linear power output warranty*



Better shading tolerance

12
years

enhanced product warranty on materials
and workmanship*



High PTC rating of up to: 93.24 %

*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

OHSAS 18001:2007 / International standards for occupational health & safety

MORE RELIABLE



Lower hot spot temperature



Minimizes micro-crack impacts



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

PRODUCT CERTIFICATES*

IEC 61215 / IEC 61730: VDE / CE / CQC / MCS / KS / INMETRO

UL 1703 / IEC 61215 performance: CEC listed (US) / FSEC (US Florida)

UL 1703: CSA / IEC 61701 ED2: VDE / IEC 62716: VDE / IEC 60068-2-68: SGS Take-e-way



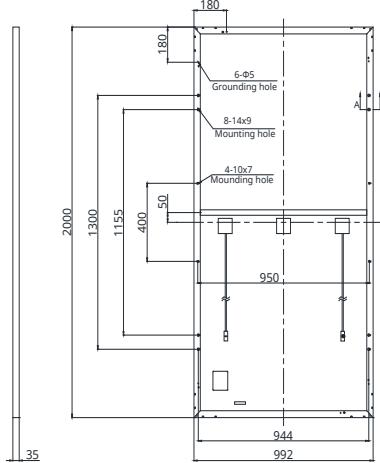
* As there are different certification requirements in different markets, please contact your local Canadian Solar sales representative for the specific certificates applicable to the products in the region in which the products are to be used.

CANADIAN SOLAR INC. is committed to providing high quality solar products, solar system solutions and services to customers around the world. No. 1 module supplier for quality and performance / price ratio in IHS Module Customer Insight Survey. As a leading PV project developer and manufacturer of solar modules with over 40 GW deployed around the world since 2001.

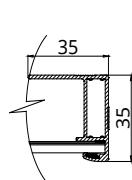
* For detailed information, please refer to the Installation Manual.

ENGINEERING DRAWING (mm)

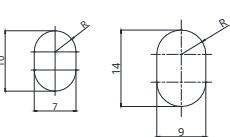
Rear View



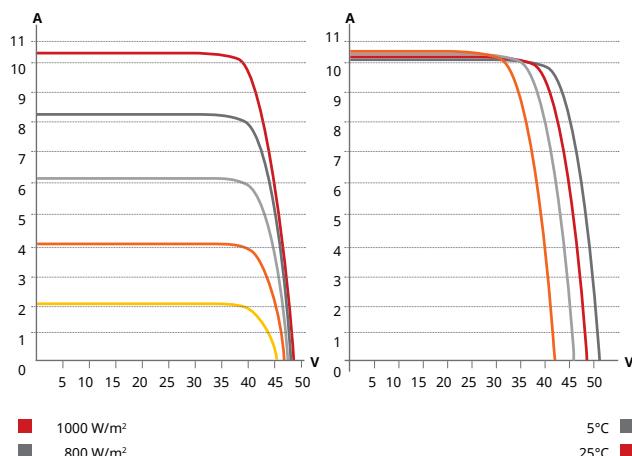
Frame Cross Section A-A



Mounting Hole



CS3U-400MS / I-V CURVES



ELECTRICAL DATA | STC*

CS3U	380MS	385MS	390MS	395MS	400MS
Nominal Max. Power (Pmax)	380 W	385 W	390 W	395 W	400 W
Opt. Operating Voltage (Vmp)	40.0 V	40.2 V	40.4 V	40.6 V	40.8 V
Opt. Operating Current (Imp)	9.50 A	9.58 A	9.66 A	9.73 A	9.81 A
Open Circuit Voltage (Voc)	47.8 V	48.0 V	48.2 V	48.4 V	48.6 V
Short Circuit Current (Isc)	10.01 A	10.09 A	10.17 A	10.25 A	10.33 A
Module Efficiency	19.2%	19.4%	19.7%	19.9%	20.2%
Operating Temperature	-40°C ~ +85°C				
Max. System Voltage	1500V (IEC/UL) or 1000V (IEC/UL)				
Module Fire Performance	TYPE 1 (UL 1703) or Class C (IEC 61730)				
Max. Series Fuse Rating	30 A				
Application Classification	Class A				
Power Tolerance	0 ~ + 10 W				

* Under Standard Test Conditions (STC) of irradiance of 1000 W/m², spectrum AM 1.5 and cell temperature of 25°C.

ELECTRICAL DATA | NMOT*

CS3U	380MS	385MS	390MS	395MS	400MS
Nominal Max. Power (Pmax)	283 W	287 W	290 W	294 W	298 W
Opt. Operating Voltage (Vmp)	37.2 V	37.4 V	37.6 V	37.8 V	38.0 V
Opt. Operating Current (Imp)	7.60 A	7.66 A	7.72 A	7.78 A	7.84 A
Open Circuit Voltage (Voc)	44.8 V	45.0 V	45.2 V	45.4 V	45.6 V
Short Circuit Current (Isc)	8.08 A	8.14 A	8.20 A	8.27 A	8.33 A

* Under Nominal Module Operating Temperature (NMOT), irradiance of 800 W/m², spectrum AM 1.5, ambient temperature 20°C, wind speed 1 m/s.

MECHANICAL DATA

Specification	Data
Cell Type	Mono-crystalline
Cell Arrangement	144 [2 X (12 X 6)]
Dimensions	2000 X 992 X 35 mm (78.7 X 39.1 X 1.38 in)
Weight	22.5 kg (49.6 lbs)
Front Cover	3.2 mm tempered glass
Frame	Anodized aluminium alloy, crossbar enhanced
J-Box	IP68, 3 bypass diodes
Cable	4 mm ² (IEC), 12 AWG (UL)
Cable Length (Including Connector)	Portrait: 400 mm (15.7 in) (+) / 280 mm (11.0 in) (-); landscape: 1250 mm (49.2 in); leap-frog connection: 1670 mm (65.7 in)*
Connector	T4 series or H4 UTX or MC4-EVO2
Per Pallet	30 pieces
Per Container (40' HQ)	660 pieces

* For detailed information, please contact your local Canadian Solar sales and technical representatives.

TEMPERATURE CHARACTERISTICS

Specification	Data
Temperature Coefficient (Pmax)	-0.36 % / °C
Temperature Coefficient (Voc)	-0.29 % / °C
Temperature Coefficient (Isc)	0.05 % / °C
Nominal Module Operating Temperature	42 ± 3°C

PARTNER SECTION



* 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. Canadian Solar Inc. reserves the right to make necessary adjustments 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.

CANADIAN SOLAR INC.

545 Speedvale Avenue West, Guelph, Ontario N1K 1E6, Canada, www.canadiansolar.com, support@canadiansolar.com



SMART ENERGY CONTROLLER

SUN2000-2/3/3.68/4/4.6/5/6KTL-L1
(High Current Version)



*Only launched in UK & Latin America & Middle East & Africa & APAC



Active Safety
Active Arcing Protection



Higher Yields
Up to 30% More Energy
with Optimizer



Battery Ready
Plug & Play, Whole-house
power backup

Technical Specification

Technical Specification	SUN2000 -2KTL-L1	SUN2000 -3KTL-L1	SUN2000 -3.68KTL-L1	SUN2000 -4KTL-L1	SUN2000 -4.6KTL-L1	SUN2000 -5KTL-L1	SUN2000 -6KTL-L1
Efficiency							
Max. efficiency	98.2%	98.3%	98.4%	98.4%	98.4%	98.4%	98.4%
European weighted efficiency	96.7%	97.3%	97.3%	97.5%	97.7%	97.8%	97.8%
Input (PV)							
Recommended max. PV power ¹	3,000 Wp	4,500 Wp	5,520 Wp	6,000 Wp	6,900 Wp	7,500 Wp	9,000 Wp
Max. input voltage ²				600 V			
Startup voltage				100 V			
MPPT operating voltage range				90 ~ 530 V			
Rated input voltage				360 V			
Max. input current per MPPT				13.5 A			
Max. short-circuit current				20 A			
Number of MPP trackers				2			
Max. inputs per MPP tracker				1			
Input (DC Battery)							
Compatible battery				LUNA2000-5/10/15-S0			
Operating voltage range				350 ~ 560 Vdc			
Max. operating current				15 A			
Max. charge power				5,000 W			
Max. discharge power	2,200 W	3,300 W	3,680 W	4,400 W	4,600 W	5,000 W	5,000 W
Output (On Grid)							
Grid connection				Single phase			
Rated output power	2,000 W	3,000 W	3,680 W	4,000 W	4,600 W	5,000 W	6,000 W
Max. apparent power	2,200 VA	3,300 W	3,680 W	4,400 VA	5,000 VA	5,500 W	6,000 VA
Rated output voltage				220 Vac / 230 Vac / 240 Vac			
Rated AC grid frequency				50 Hz/60 Hz			
Max. output current	10 A	15 A	16 A	20 A	23 A	25 A	27.3 A
Adjustable power factor				0.8 leading ... 0.8 lagging			
Max. total harmonic distortion				≤ 3%			
Backup power output				Yes (via Backup Box - B0, SmartGuard 63A S0)			
Protection Feature							
Anti-islanding protection				Yes			
DC reverse polarity protection				Yes			
Insulation monitoring				Yes			
DC surge protection				Yes, compatible with TYPE II protection class according to EN/IEC 61643-11			
AC surge protection				Yes, compatible with TYPE II protection class according to EN/IEC 61643-11			
Residual current monitoring				Yes			
AC overcurrent protection				Yes			
AC short-circuit protection				Yes			
AC overvoltage protection				Yes			
Over-heat protection				Yes			
Arc fault protection				Yes			
Battery charging from grid				Yes			
General Specification							
Operating temperature range				- 25 ~ +60 °C			
Relative operating humidity				0%-100% RH			
Operating altitude				0-4,000 m (Derating above 2,000 m)			
Cooling				Natural convection			
Display				LED indicators; integrated WLAN + FusionSolar app			
Communication				RS485, WLAN via inverter built in WLAN module Ethernet via Smart Dongle-WLAN FE (Optional); 4G / 3G / 2G via Smart Dongle-4G (Optional); EMMA			
Weight (incl. mounting brackets)				12.0 kg (26.5 lb)			
Dimensions (incl. mounting brackets)				365 mm x 375 mm x 156 mm			
IP rating				IP65			
Nighttime power				< 2.5 W			
Optimizer Compatibility							
DC MBUS compatible optimizer				SUN2000-450W-P2, SUN2000-600W-P			
Standards Compliance (More Available Upon Request)							
Safety				EN/IEC 62109-1, EN/IEC 62109-2			
Grid connection standards				G98, G99, G100, EN 50549-1, CEI 0-21, VDE-AR-N-4105, AS 4777.2, C10/11, ABNT, UTE C15-712, RD 1699, TOR D4, IEC61727, IEC62116			

*1 Inverter single MPPT max. input power is 6,000 Wp when long strings are designed and fully connected with SUN2000-450W-P2, SUN2000-600W-P optimizers.

*2 The maximum input voltage is the upper limit of the DC voltage. Any higher input DC voltage would probably damage inverter.

Disclaimer: the preceding values are measured by an internal laboratory of Huawei in a specific environment. The actual values may vary with products, software versions, usage conditions, and environmental factors.