

## 11.4 Dimensionnement d'un système PV pour camping car

### Travail personnel ou en équipe réduite (2-3)

Un couple de snow-birds (voyageurs saisonniers) à l'esprit indépendant, désire un camping-car (véhicule récréatif ou VR) autonome en électricité pour **deux** jours. Ils aimeraient s'affranchir de l'utilisation de propane et ne pas avoir à se connecter à un réseau plus de 2 ou trois fois par semaine (2 jours de batteries).

Ils estiment leur charge tel que rapporté dans le tableau suivant :

Charges	Qte	Volts	Amp	Puissance [W]		Usage	Usage	÷ 7	Énergie [Wh]	
				AC	DC	[hr/jour]	[jour/sem]		AC	DC
Lampes DEL	6	12	0,2		14,4	4	7	7		57,6
Frigo Novakool NKR 4500 4,5 12 V	1	12	4,4		52,8	12	7	7		633,6
Recharge Laptop	1	120	0,5	60		2	7	7	120	0
Recharge cellulaires	2	5	1		10	8	7	7		80
Recharge UE Boom	1	5	1		5	2,5	1	7		1,8
Plaque à induction	1	120	15	1800		0,5	7	7	900	
Micro-onde	1	120	10	1200		0,3	4	7	205,7	
Sèche cheveux	1	120	8	960		0,25	2	7	68,6	
Rasoir électrique	1	120	0,1	12		0,5	1	7	0,9	
Sèche cheveux	1	120	8	960		0,25	2	7	68,6	
Grille-pain	1	120	10	1200		0,15	7	7	180	
Chauffage air	1	120	20	2400		4	7	7	9600	
Chauffage de l'eau (avec la plaque)	1	120	15	1800		0,1	7	7	180	
Thermopompe	1	120	15	1800		4	7	7	7200	

L'exercice consiste à leur dimensionner le système solaire requis (employez des panneaux CS1U-420 de Canadian Solar). Utilisez des données solaires pour Montréal. Supposez que le camping-car est surtout employé au Québec d'avril à septembre, inclusivement. Les collecteurs seront situés sur le toit du véhicule. Les données suivantes sont aussi à considérer :

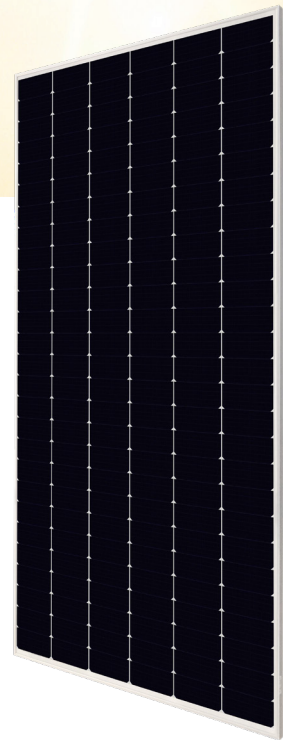
- Coefficient de perte est de 30% des besoins quotidiens
- Niveau de tension CC = 24 V
- Rendement général du système = 80% (incluant le rendement du régulateur et des batteries, valeur standard)
- Autonomie de stockage désirée = 2 jours
- Limite de décharge des batteries = 50%
- Facteur de simultanéité des charges = 70%

Est-il possible de s'affranchir des réservoirs de propane? Quelle solution proposez-vous?

### Partage

- Présentez à la classe le résultat de votre analyse.





# HiDM

High density MONO PERC module

400W~420W

CS1U-400 | 405 | 410 | 415 | 420MS

### MORE POWER



Maximize the light absorption area, module efficiency up to 20.4 %



Low temperature coefficient (Pmax): -0.37 % / °C



Better shading tolerance

### MORE RELIABLE



Lower internal current, lower hot spot temperature



Cell crack risk limited in small region, enhance the module reliability



Heavy snow load up to 5400 Pa, wind load up to 2400 Pa\*



**enhanced product warranty on materials and workmanship\***



**linear power output warranty\***

\*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

### PRODUCT CERTIFICATES\*

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

IEC 61701 ED2: VDE / IEC 62716: VDE

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



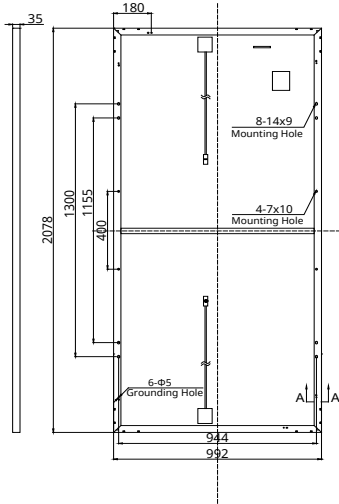
As there are different certification requirements in different markets, please contact your local Canadian Solar sales representative for the specific certificates applicable to the products in the region in which the products are to be used.

**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.

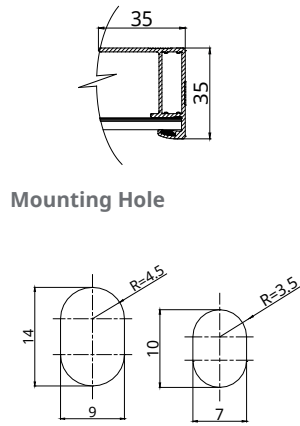
\* For detail information, please refer to Installation Manual.

## ENGINEERING DRAWING (mm)

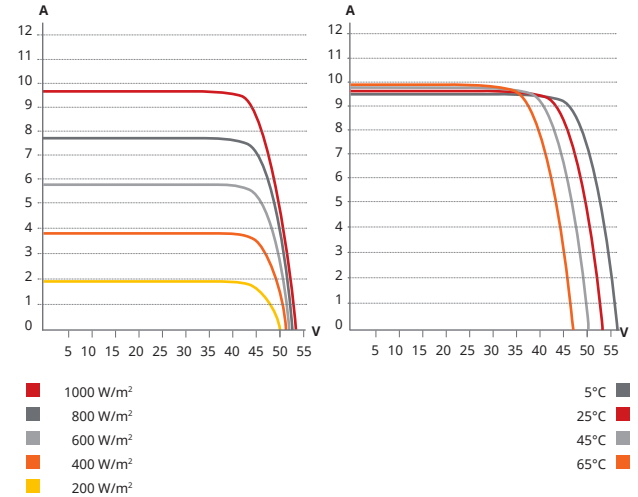
### Rear View



### Frame Cross Section A-A



## CS1U-405MS / I-V CURVES



## ELECTRICAL DATA | STC\*

CS1U	400MS	405MS	410MS	415MS	420MS
Nominal Max. Power (Pmax)	400 W	405 W	410 W	415 W	420 W
Opt. Operating Voltage (Vmp)	44.1 V	44.3 V	44.5 V	44.7 V	44.9 V
Opt. Operating Current (Imp)	9.08 A	9.16 A	9.23 A	9.30 A	9.37 A
Open Circuit Voltage (Voc)	53.4 V	53.5 V	53.6 V	53.7 V	53.8 V
Short Circuit Current (Isc)	9.60 A	9.65 A	9.70 A	9.75 A	9.80 A
Module Efficiency	19.4%	19.6%	19.9%	20.1%	20.4%
Operating Temperature	-40°C ~ +85°C				
Max. System Voltage	1500V (IEC) or 1000V (IEC)				
Module Fire Performance	CLASS C (IEC 61730)				
Max. Series Fuse Rating	15 A				
Application Classification	Class A				
Power Tolerance	0 ~ + 10 W				

\* Under Standard Test Conditions (STC) of irradiance of 1000 W/m<sup>2</sup>, spectrum AM 1.5 and cell temperature of 25°C.

## ELECTRICAL DATA | NMOT\*

CS1U	400MS	405MS	410MS	415MS	420MS
Nominal Max. Power (Pmax)	296 W	300 W	304 W	307 W	311 W
Opt. Operating Voltage (Vmp)	40.8 V	41.0 V	41.2 V	41.4 V	41.5 V
Opt. Operating Current (Imp)	7.26 A	7.32 A	7.37 A	7.43 A	7.48 A
Open Circuit Voltage (Voc)	49.9 V	50.0 V	50.1 V	50.2 V	50.3 V
Short Circuit Current (Isc)	7.75 A	7.79 A	7.83 A	7.87 A	7.91 A

\* Under Nominal Module Operating Temperature (NMOT), irradiance of 800 W/m<sup>2</sup> spectrum AM 1.5, ambient temperature 20°C, wind speed 1 m/s.

## MECHANICAL DATA

Specification	Data
Cell Type	Mono-crystalline
Dimensions	2078 × 992 × 35 mm (81.8 × 39.1 × 1.38 in)
Weight	23.4 kg (51.6 lbs)
Front Cover	3.2 mm tempered glass
Frame	Anodized aluminium alloy
J-Box	IP68, 4 bypass diodes
Cable	4.0 mm <sup>2</sup> (IEC)
Cable length (Including connector)	1000 mm (39.4 in) (+) and 640 mm (25.2 in) (-) *; leap-frog connection: 1780 mm (70.1 in)**
Connector	T4 series or H4 UTX or MC4-EVO2
Per Pallet	30 pieces
Per Container (40' HQ)	660 pieces

\* Adjacent two modules (portrait: left and right modules, landscape: up and down modules) need to be rotated 180 degrees.

\*\* Need to confirm with the tracker suppliers there are no mounting or operation risks when cables go across the torque tube and bearing house.

## TEMPERATURE CHARACTERISTICS

Specification	Data
Temperature Coefficient (Pmax)	-0.37 % / °C
Temperature Coefficient (Voc)	-0.29 % / °C
Temperature Coefficient (Isc)	0.05 % / °C
Nominal Module Operating Temperature	43±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 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.

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