

St Paul's Greenhouse Gas Reduction Project

- Presented by:
 - Rick Mickelson, P.Eng-building committee chairman-St Paul's Anglican Parish
-
- SYSTEM
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SYSTEM

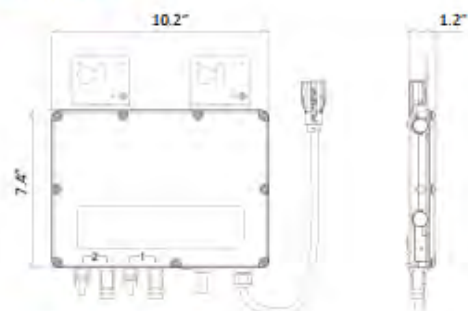
- 20 KW ROOF MOUNTED PV PANELS
- INTEGRAL 240 VOLT INVERTERS-2-255 w/35.6 v/7.17 a modules per inverter---inverter output-240 vac/2.28 a
- BI-DIRECTIONAL POWER METER-by utility-EPCOR
- Micro-gen contract with our power provider-Spot Power
- Turnkey contractor-Great Canadian Solar-Andrew Lundell



YC600 Microinverter

- Dual-module microinverter with independent MPPT
- Utility-Interactive with Reactive Power Control (RPC)
- CA Rule 21 compliant
- Continuous power of 274VA per channel, 300VA peak
- Accommodates modules from 230-365W+
- Wide MPPT voltage range (22V-45V)
- Meets NEC 2014/2017 690.12 Rapid Shutdown requirements
- ZigBee communication & free monitoring

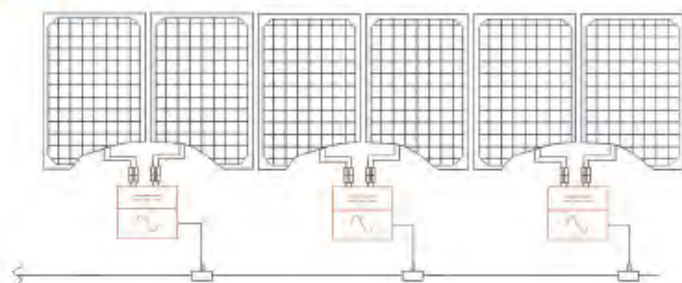
DIMENSIONS



With its groundbreaking design and features, the YC600 is the pinnacle of microinverter technology. A single-phase, smart grid-compliant microinverter, the YC600 serves two modules with dual, independent MPPT. ZigBee wireless communication over a mesh network offers faster data speeds than PLC and a wider MPPT voltage range results in a greater energy harvest for homeowners.

A true utility-interactive microinverter with Reactive Power Control (RPC) technology, the YC600 meets CA Rule 21 requirements and is inherently NEC 2014/2017 Rapid Shutdown compliant. The unit also builds on the successful APsystems line of multi-module microinverters, simplifying installation and reducing logistics costs.

WIRING SCHEMATIC



APsystems YC600 Microinverter Datasheet

INPUT DATA (DC)

Module Compatibility	60 & 72 Cell PV Modules
MPPT Voltage Range	22-45V
Operation Voltage Range	16-55V
Maximum Input Voltage	55V
Startup Voltage	20V
Maximum Input Current	12A X 2
Maximum Total PV Array Short Circuit Current	15A
Maximum Inverter Backfeed Current to the Array	0A

OUTPUT DATA (AC)

	240V	208V
Maximum Continuous Output Power	548VA	548VA
Peak Output Power	600VA	600VA
Nominal Output Voltage	240V	208V
Nominal Output Current	2.28A	2.63A
Nominal Output Frequency	60Hz	60Hz
Adjustable Output Voltage Range	211V-264V	183-229V
Adjustable Output Frequency Range	59.3 - 60.5Hz	59.3 - 60.5Hz
Power Factor	> 0.99	> 0.99
Total Harmonic Distortion	<3%	<3%
Maximum Units per Branch	7 (14 PV modules)	6 (12 PV modules)

EFFICIENCY

Peak Efficiency	96.7%
CEC Weighted Efficiency	96.5%
Nominal MPPT Efficiency	99.5%
Night Power Consumption	60mW

MECHANICAL DATA

Operating Ambient Temperature Range	-40°F to +149°F (-40°C to +65°C)
Storage Temperature Range	-40°F to +185°F (-40°C to +85°C)
Dimensions (WxHxD) inches	10.24" x 7.4" x 1.24"
Dimensions (WxHxD) mm	260mm x 188mm x 31.5mm
Weight	21 lbs (3.22kg)
AC BUS Maximum Current	20A
Enclosure Rating	NEMA 6 (IP67)
Cooling	Natural Convection - No Fans

FEATURES & COMPLIANCE

Communication	ZigBee
Transformer Design	High Frequency Transformers, Galvanic Isolation
Monitoring	Via EMA**Online Portal
Emissions & Immunity (EMC) Compliance	FCC PART 15, ANSI C63.4, IEC 5-003
Safety & Grid Connection Compliance	UL 1741, UL 1741 SA, IEEE1547, CSA C22.2 No. 1071-01, NEC 2017 690.12

* Depending on the local regulations.

**APsystems online Energy Management Analysis (EMA) platform

Specifications subject to change without notice - please ensure you are using the most recent version found at APsystems.com

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KuMax (1000 V / 1500 V)

SUPER HIGH EFFICIENCY POLY^{GEN4} MODULE

CS3U-345|350|355|360P

With Canadian Solar's industry leading black silicon cell technology and the innovative LIC (Low Internal Current) module technology, we are now able to offer our global customers high power poly modules up to 360 W.

The KuMax poly modules with a dimension of 2000 × 992 mm, close to our 72 cell MaxPower modules, have the following unique features:

- Higher power classes for equivalent module sizes
- High module efficiency up to 18.15 %
- LOW hot spot temperature risk
- LOW temperature coefficient (P_{max}): -0.38 % / °C
- LOW NMOT (Nominal Module Operating Temperature): 43 ± 2 °C



More power output thanks to
low NMOT: 43 ± 2 °C



Low power loss in cell
connection



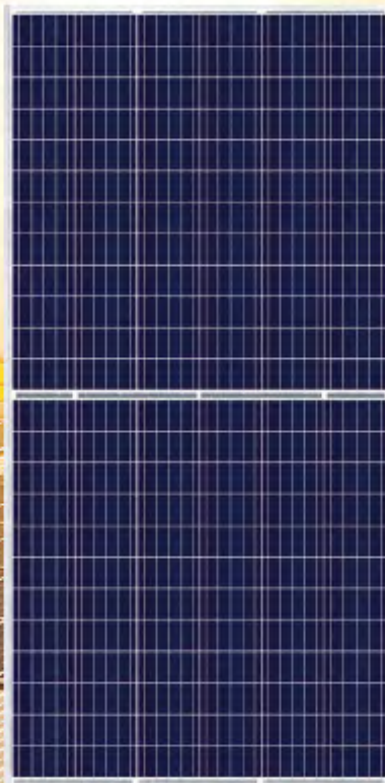
Safer: lower hot spot
temperature



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

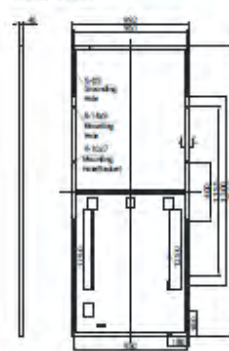


Low BoS cost with
1500 V_{oc} system voltage



ENGINEERING DRAWING (mm)

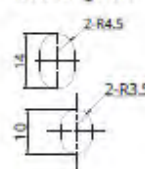
Rear View



Frame Cross Section A-A



Mounting Hole



ELECTRICAL DATA | STC*

CS3U	345P	350P	355P	360P
Nominal Max. Power (P _{max})	345 W	350 W	355 W	360 W
Opt. Operating Voltage (V _{mp})	39.0 V	39.2 V	39.4 V	39.6 V
Opt. Operating Current (I _{mp})	8.86 A	8.94 A	9.02 A	9.10 A
Open Circuit Voltage (V _{oc})	46.4 V	46.6 V	46.8 V	47.0 V
Short Circuit Current (I _{sc})	9.43 A	9.51 A	9.59 A	9.67 A
Module Efficiency	17.39%	17.64%	17.89%	18.15%
Operating Temperature	-40°C ~ +85°C			
Max. System Voltage	1000 V (IEC / UL) or 1500 V (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 ~ +5 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*

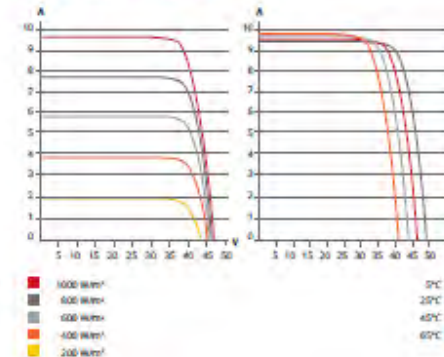
CS3U	345P	350P	355P	360P
Nominal Max. Power (P _{max})	255 W	259 W	263 W	266 W
Opt. Operating Voltage (V _{mp})	35.6 V	35.8 V	36.0 V	36.1 V
Opt. Operating Current (I _{mp})	7.17 A	7.24 A	7.29 A	7.37 A
Open Circuit Voltage (V _{oc})	43.3 V	43.5 V	43.7 V	43.9 V
Short Circuit Current (I _{sc})	7.61 A	7.68 A	7.74 A	7.80 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.

The aforesaid datasheet only provides the general information on Canadian Solar products and, due to the on-going innovation and improvement, please always contact your local Canadian Solar sales representative for the updated information on specifications, key features and certification requirements of Canadian Solar products in your region.

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.

CS3U-355P / I-V CURVES



MECHANICAL DATA

Specification	Data
Cell Type	Poly-crystalline, 156.75 × 78.38 mm
Cell Arrangement	144 (2 × (12 × 6))
Dimensions	2000 × 992 × 40 mm (78.7 × 39.1 × 1.57 in)
Weight	22.6 kg (49.8 lbs)
Front Cover	3.2 mm tempered glass
Frame	Anodized aluminium alloy, crossbar enhanced
J-Box	IP68, 3 diodes
Cable	4.0 mm ² & 12 AWG
Cable Length	1670 mm (65.7 in)
Connector	T4 (IEC / UL)
Per Pallet	27 pieces
Per Container (40' HQ)	594 pieces

TEMPERATURE CHARACTERISTICS

Specification	Data
Temperature Coefficient (P _{max})	-0.38 % / °C
Temperature Coefficient (V _{oc})	-0.29 % / °C
Temperature Coefficient (I _{sc})	0.05 % / °C
Nominal Module Operating Temperature	43 ± 2 °C

PARTNER SECTION



linear power output warranty



product warranty on materials
and workmanship

PRODUCT CERTIFICATES*

IEC 61215 / IEC 61730: 2005 & 2016: VDE / CE / UL 1703: CSA



* Please contact your local Canadian solar sales representative for the specific product certificates applicable in your market.

GRANT APPLICATION

- BACKGROUND RESEARCH-City of Edmonton Energy Transition Strategy Document-61 pages:

Framework for reducing greenhouse gas emissions, increasing energy efficiency and promoting a resilient energy system

- energy conservation lifestyle
- increase energy efficiency in buildings and industrial processes
- increase public transportation
- electrify public and private transportation
- increase the use of renewable energy sources including solar pv systems

It was stated in this document that if solar pv systems were to be feasible, the users would require financial assistance from the city or other organizations

GRANT APPLICATION

- Our St Paul's Parish was advised of a grant opportunity by Alan Perry of the Anglican Diocese of Edmonton— Alan gave valuable advice on calculation methods required for the application
 - We applied for an Energy Transition Acceleration Grant – to Eco City Edmonton
- We outlined St Paul's already ongoing energy reduction projects of converting to LED lighting, and updating inefficient equipment
- We outlined St Paul's commitment to the common goal of:
being better stewards of our planet – which is God's creation
reducing greenhouse gas emissions
reducing overall energy use
helping Edmonton's power utilities be more energy resilient
- We also committed to do outreach to parishioners and the surrounding community to create a greater awareness of climate change and educate on strategies to reduce the sources that cause Climate Change

Grant Awards-2018

St Paul's was the only church to receive a grant

Other organizations receiving 2018 grants – all other solar projects included public education as a piece of their project.



RESULTS

November, 2018 to October 2019 (approximate)

KEY METRICS	
PV Generation (kWh)	23,323.48
PV Export (kWh)	9756.00
PV Onsite Consumption (kWh)	13567.48
Export Savings (\$)	-\$717.25
Consumption Savings (\$)	-\$1,932.24
Total Savings (\$)	-\$2,649.49