University of Illinois
6.55 kW DC / 5.32 kW AC Roof Mount Solar Array

515 EAST GREGORY DRIVE
CHAMPAIGN, IL, USA 61820
40°06'12.1"N 88°13'52.0"W

SCOPE OF WORK

THE PROJECT IS TO INSTALL A NEW PHOTOVOLTAIC SYSTEM AND ASSOCIATED POWER CONDITIONING EQUIPMENT

SYSTEM WILL BE INTERCONNECTED TO THE ELECTRICAL UTILITY GRID PER THE REQUIREMENTTS OF THE ELECTRICAL UTILITY COMPANY AND ALL APPLICABLE LOCAL CODES

PROJECT DEVELOPER

TICK TOCK ENERGY, INC.
702 N. KELLER DRIVE, STE B
EFFINGHAM, IL 62401
(217) 994-9020
WWW.TICKTOCKENERGY.COM

ELECTRICAL/CONSTRUCTION CONTRACTOR

PALS ELECTRIC, INC.
12900 N. 1775TH ROAD
TEUTOPOLIS, IL 62467
(217) 857-3683
WWW.PALSELECTRICINC.COM

SYSTEM SPECIFICATIONS

Module
SolarWorld Sunmodule 345W XL
MONO (33mm frame) 1000V
Qty: Nineteen (19)

Inverter
Enphase IQ 6+ Microinverter
IQ6PLUS-72-2-US
Qty: Nineteen (19)

Racking
Mfg: Advanced Racking
Qty: Nineteen (19)
Type: Custom Mounts
Tilt Angle: 20

Temperature
Max: 33 C / 91.4 F
Min: -23 C / -9.4 F

Applicable Codes
National Electric Code
(NEC) 2017
International Building Code
(IBC) 2012

SHEET INDEX

PV-01	SITE RENDERING	PV-06	INVERTER CUT SHEET
PV-02	SITE PLAN	PV-07	INVERTER CUT SHEET
PV-03	ONE LINE DIAGRAM	PV-08	RACKING CUT SHEET
PV-04	COMMUNICATION PLAN	PV-09	DISCONNECTING/COMBINER CUT SHEET
PV-05	MODULE CUT SHEET	PV-10	SAFTEY LABELS

System Designer
James Deskins
PV Installation Professional
PV-041115-001609

September 7, 2018

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6.55 kW DC / 5.32 kW AC
Roof Mount Solar Array

Sunmodule
SW 340-350 XL MONO (33mm frame)

SOLARWORLD
REAL VALUE

TÜV Power controlled:
Lowest measuring tolerance in industry

Every component is tested to meet 3 times IEC requirements

Designed to withstand heavy accumulations of snow and ice

Sunmodule
Positive performance tolerance

25 year
25-year linear performance warranty and 10-year product warranty

Glass with anti-reflective coating

World-class quality
Fully automated production lines and seamless monitoring of the process and material ensure the quality that the company sets as its benchmark for its sites worldwide.

SolarWorld Plus-Sorting
Plus-Sorting guarantees highest system efficiency. SolarWorld only delivers modules that have greater than or equal to the nameplate rated power.

25 year linear performance guarantee and extension of product warranty to 10 years
SolarWorld guarantees a maximum performance digression of 0.7% p.a. in the course of 25 years, a significant added value compared to the two-phase warranties common in the industry, along with our industry-first 10-year product warranty.*

*In accordance with the applicable SolarWorld Limited Warranty at purchase.
www.solarworld.com/warranty

UL 1703

ISO 9001
ISO 14001
Certified

MADE IN USA OF US AND IMPORTED PARTS

solarworld.com

Sunmodule
SW 340-350 XL MONO (33mm frame)

SOLARWORLD
REAL VALUE

PERFORMANCE UNDER STANDARD TEST CONDITIONS (STC)*

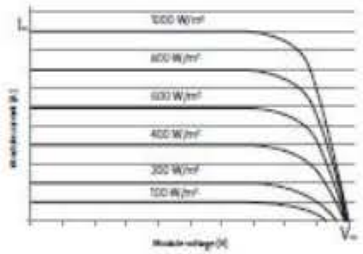
		SW 340	SW 345	SW 350
Maximum power	P_{max}	340 Wp	345 Wp	350 Wp
Open circuit voltage	V_{oc}	47.6 V	47.8 V	48.0 V
Maximum power point voltage	V_{mpp}	38.0 V	38.2 V	38.4 V
Short circuit current	I_{sc}	9.69 A	9.75 A	9.82 A
Maximum power point current	I_{mpp}	9.05 A	9.10 A	9.17 A
Module efficiency	η_m	17.04 %	17.29 %	17.54 %

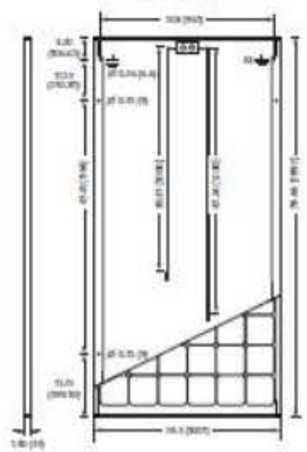
*STC: 1000W/m², 25°C, AM 1.5

PERFORMANCE AT 800 W/M², NOCT, AM 1.5

		SW 340	SW 345	SW 350
Maximum power	P_{max}	259.5 Wp	263.3 Wp	267.2 Wp
Open circuit voltage	V_{oc}	43.5 V	43.8 V	44.0 V
Maximum power point voltage	V_{mpp}	34.9 V	35.2 V	35.4 V
Short circuit current	I_{sc}	8.05 A	8.10 A	8.16 A
Maximum power point current	I_{mpp}	7.42 A	7.50 A	7.56 A

Minor reduction in efficiency under partial load conditions at 25° C: at 200 W/m², 100% of the STC efficiency (1000 W/m²) is achieved.





COMPONENT MATERIALS

Cells per module	72	Front	low-iron tempered glass with AR-C (EN 12150)
Cell type	Mono crystalline	Frame	Clear anodized aluminum
Cell dimensions	6.17 in x 6.17 in (156.75 x 156.75 mm)	Weight	47.5 lbs (21.6 kg)

THERMAL CHARACTERISTICS

NOCT	46°C
$TC_{I_{sc}}$	0.042 %/K
$TC_{V_{oc}}$	-0.304 %/K
$TC_{P_{mpp}}$	-0.43 %/K
Operating temp.	-40° C to +85° C

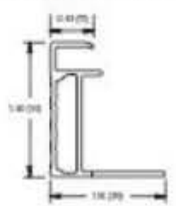
ADDITIONAL DATA

Power sorting	-0 Wp/+5 Wp
J-Box	IP65
Connector	PV wire per UL4703 with H4 connectors
Module fire performance	(UL 1703) Type 1

PARAMETERS FOR OPTIMAL SYSTEM INTEGRATION

Maximum system voltage SC II / NEC		1000 V
Maximum reverse current		25 A
Number of bypass diodes		3
Design loads*	Two rail system	113 psf downward, 64 psf upward
Design loads*	Edge mounting	178 psf downward, 23 psf upward

*Please refer to the Sunmodule installation instructions for the details associated with these load cases.



- Compatible with both "Top-Down" and "Bottom" mounting methods.
- Grounding Locations:
  - 4 locations along the length of the module in the extended flange.

All units provided are imperial. SI units provided in parentheses.
SolarWorld AG reserves the right to make specification changes without notice.

SW-01 7540US 09-2015

REVISIONS		
	MM/DD/YY	REMARKS
1	05/17/18	COVER PAGE, PV-03, PV-04.5, PV-09
2	9/4/18	added disconnect for each branch circuit
3	9/7/18	Added Emergency stop button
4	__/__/__	--
5	__/__/__	--

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6.5 kW DC / 5.3 kW AC

Module Cut Sheet

PV 05

Enphase IQ 6 and IQ 6+ Microinverters

The high-powered smart grid-ready Enphase IQ 6 Micro™ and Enphase IQ 6+ Micro™ dramatically simplify the installation process while achieving the highest efficiency for module-level power electronics.

Part of the Enphase IQ System, the IQ 6 and IQ 6+ Micro integrate seamlessly with the Enphase IQ Envoy™, Enphase Q Aggregator™, Enphase IQ Battery™, and the Enphase Enlighten™ monitoring and analysis software.

The IQ 6 and IQ 6+ Micro extend the reliability standards set forth by previous generations and undergo over a million hours of power-on testing, enabling Enphase to provide an industry-leading warranty of up to 25 years.

Easy to Install

- Lightweight and simple
- Faster installation with improved two-wire cabling
- Built-in rapid shutdown compliant (NEC 2014 & 2017)

Productive and Reliable

- Optimized for high powered 60-cell and 72-cell* modules
- More than a million hours of testing
- Class II double-insulated enclosure
- UL listed

Smart Grid Ready

- Complies with fixed power factor, voltage and frequency ride-through requirements
- Remotely updates to respond to changing grid requirements
- Configurable for varying grid profiles
- Meets CA Rule 21 (UL 1741-SA)

* The IQ 6+ Micro is required to support 72-cell modules

ENPHASE.

To learn more about Enphase offerings, visit **enphase.com**

Enphase IQ 6 and IQ 6+ Microinverters

INPUT DATA (DC)	IQ6-60-2-US		IQ6PLUS-72-2-US	
Commonly used module pairings[1]	195 W - 330 W +		235 W - 400 W +	
Module compatibility	60-cell PV modules only		60-cell and 72-cell PV modules	
Maximum input DC voltage	48 V		62 V	
Peak power tracking voltage	27 V - 37 V		27 V - 45 V	
Operating range	16 V - 48 V		16 V - 62 V	
Min/Max start voltage	22 V / 48 V		22 V / 62 V	
Max DC short circuit current (module Isc)	15 A		15 A	
Overvoltage class DC port	II		II	
DC port backfeed under single fault	0 A		0 A	
PV array configuration	1 x 1 ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit			
OUTPUT DATA (AC)	**IQ 6 Microinverter**		**IQ 6+ Microinverter**	
Peak output power	240 VA		290 VA	
Maximum continuous output power	230 VA		280 VA	
Nominal (L-L) voltage/range[2]	240 V / 211-264 V	208 V / 183-229 V	240 V / 211-264 V	208 V / 183-229 V
Maximum continuous output current	0.96 A	1.11 A	1.17 A	1.35 A
Nominal frequency	60 Hz		60 Hz	
Extended frequency range	47 - 68 Hz		47 - 68 Hz	
Power factor at rated power	1.0		1.0	
Maximum units per 20 A (L-L) branch circuit	16 (240 VAC) 14 (208 VAC)		13 (240 VAC) 11 (208 VAC)	
Overvoltage class AC port	III		III	
AC port backfeed under single fault	0 A		0 A	
Power factor (adjustable)	0.7 leading ... 0.7 lagging		0.7 leading ... 0.7 lagging	
EFFICIENCY	**@240 V**	**@208 V**	**@240 V**	**@208 V**
CEC weighted efficiency	97.0 %	97.0 %	97.0 %	97.0 %
MECHANICAL DATA				
Ambient temperature range	-40°C to +65°C			
Relative humidity range	4% to 100% (condensing)			
Connector type	MC4 locking type			
Dimensions (WxHxD)	219 mm x 191 mm x 37.9 mm (without bracket)			
Weight	1.29 kg (2.84 lbs)			
Cooling	Natural convection - No fans			
Approved for wet locations	Yes			
Pollution degree	PD3			
Enclosure	Class II double-insulated			
Environmental category / UV exposure rating	NEMA Type 6 / outdoor			
FEATURES				
Communication	Power line			
Monitoring	Enlighten Manager and MyEnlighten monitoring options Compatible with Enphase IQ Envoy			
Disconnecting means	The AC and DC connectors have been evaluated and approved by UL for use as the load-break disconnect required by NEC 690.			
Compliance	CA Rule 21 (UL 1741-SA) UL 62109-1, UL1741/IEEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01 This product is UL Listed as PV Rapid Shut Down Equipment and conforms with NEC-2014 and NEC-2017 section 690.12 and C22.1-2015 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according manufacturer's instructions.			

1. No enforced DC/AC ratio. See the compatibility calculator at https://enphase.com/en-us/support/module-compatibility
2. Nominal voltage range can be extended beyond nominal if required by the utility.

To learn more about Enphase offerings, visit **enphase.com**

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2018-01-25

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6.5 kW DC / 5.3 kW AC

Inverter Cut Sheet

PV 06