PROJECT NAME: **COLE, ADAM AND SARAH**

01-1825-1

THIS DISTRIBUTED GENERATION FACILITY WAS INSTALLED IN ACCORDANCE WITH THE CURRENT STATE ADOPTED NATIONAL ELECTRICAL CODE

DESIGN SUMMARY

- **SIZE**: 6.00 kW PV Solar System (15 modules)
- **STYLE**: Residential, asphalt shingle roof, flush mount, grid tied, net-metered
- **LOCATION**: South facing roof of home
- **ORIENTATION:** Portrait, 30°pitch, 169°azimuth
- **MODULE:** Hanwha Q.PEAK DUO L-G5.2 400W, 79.3"x 39.4"x 1.38" thick, 51.8 lbs
- **RACKING:** SnapNRack Series UR-40 with asphalt shingle roof flashings
- **INVERTER:** SolarEdge String Inverter with Power Optimizers
- **VOLTAGE:** 120/240V, 1Φ
- **MONITORING:** SolarEdge Online Monitoring
- **ADDITIONAL WORK:** Hardwire inverter to router

** THIS DISTRIBUTED GENERATION FACILITY WAS INSTALLED IN ACCORDANCE WITH THE CURRENT STATE ADOPTED NATIONAL ELECTRICAL CODE

*Complies with 2018 IBC, 2017 NFPA 70/NEC

** **BLACK JACK® ALL-WEATHER ROOF Cement used as weatherproof sealant for Shingle Roof Flashing****

PV Solar Array
Roof of building

SolarEdge Inverter
Building Exterior

D **AC Solar Disconnect**
Building Exterior

P **Main Service Panel**
Building Interior

M **Utility Meter**
Building Exterior

VECTOR ENGINEERS

PROFESSIONAL ENGINEER
RUSSELL N. EMERY
IOWA

05/21/2020
VSE Project Number: U3340.0113.201

1 / 01 SITE MAP
NO SCALE

AMERICA'S SOLAR COMPANY

CONTRACTOR
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(855) 669-4387
INFO@MOXIESOLAR.COM
230 SUGAR CREEK LANE
NORTH LIBERTY, IA 52317

OWNER
ADAM COLE
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cole.adam.m@gmail.com
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AHJ
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1 QUAIL CREEK CIRCLE
NORTH LIBERTY, IA 52317

UTILITY
LINN COUNTY REC
(319) 377-1587

REVISIONS

5/15/20	PLAN SET
5/18/20	PLAN SET
5/19/20	PLAN SET

DESIGN SUMMARY

01

PROJECT NAME: **COLE, ADAM AND SARAH** **01-1825-1**

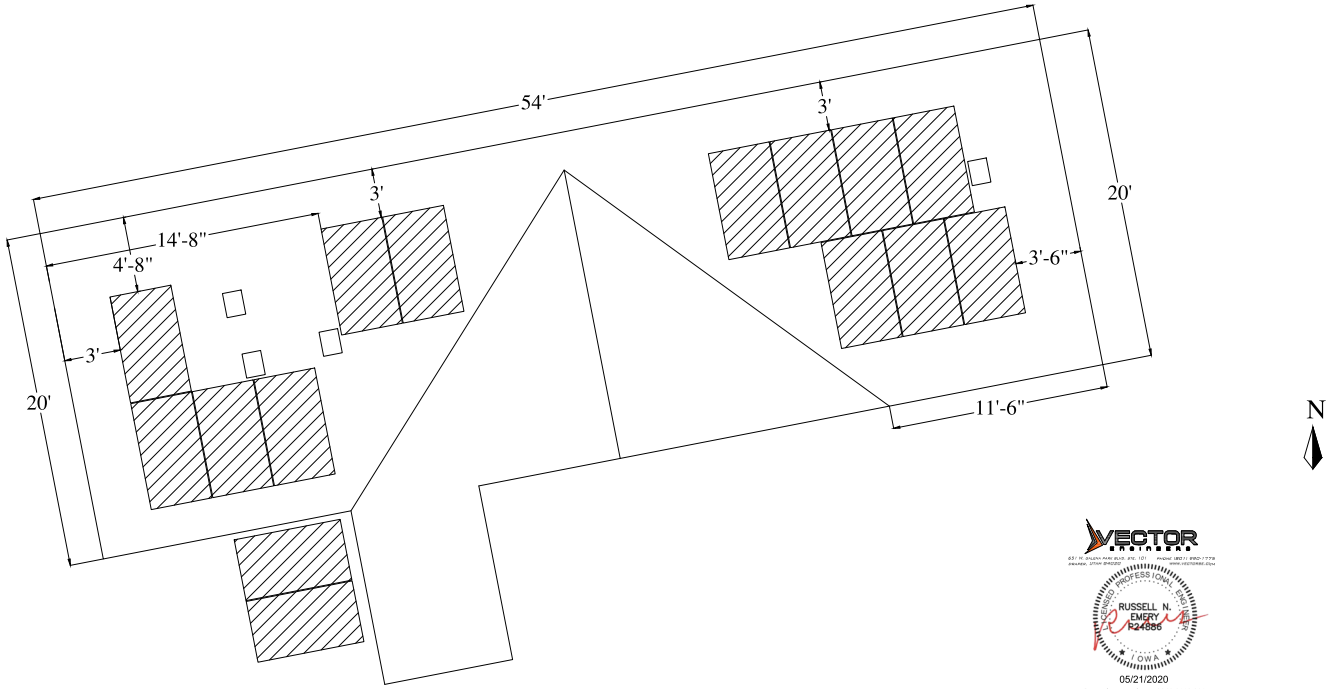
** THIS DISTRIBUTED GENERATION FACILITY WAS INSTALLED IN ACCORDANCE WITH THE CURRENT STATE ADOPTED NATIONAL ELECTRICAL CODE

*Complies with 2018 IBC, 2017 NFPA 70/NEC

BUILD SUMMARY

- **MODULE:** QTY (15) Q.PEAK DUO L-G5.2 400W, 79.3"x 39.4"x 1.38" thick, 51.8 lbs
- **STRUCTURE:** Wood Prefabricated 2"x 4" Trusses @ 24" OC
- **RACKING:** SnapNrack series UR-40 with asphalt shingle roof flashing. Run rails across the trusses. Stagger the penetrations per rail so all roof members are engaged. Penetrate every 4ft or less into trusses. Installer must verify all penetrations are secure and centered in wood members. Any damaged wood members must be repaired immediately by scab, sister, or full replacement. Max Rail Overhang = 19” from last attachment point. Module Overhang = 18” .
- **ACCESS:** 1-story residence.
- **INVERTERS:** Mount inverter at the exterior of the building adjacent to the Utility Meter.
- **MONITORING:** SolarEdge monitoring utilizing existing wireless router.
- **ADDITIONAL WORK:** Hardwire inverter to router

**** BLACK JACK® ALL-WEATHER ROOF Cement used as weatherproof sealant for Shingle Roof Flashing****



VECTOR STRUCTURAL ENGINEERING
RUSSELL N. EMERY
R24886
IOWA
05/21/2020
VSE Project Number: U3340.0113.201

Vector Structural Engineering has reviewed the existing structure with loading from the solar array. The design of the racking system, connections, and all other structure is by others. Electrical design is by others. Only the mechanical aspects of the design are by others. Electrical is by others, unless stamped by Dean Levorsen.

1/02 ARRAY DESIGN
NO SCALE

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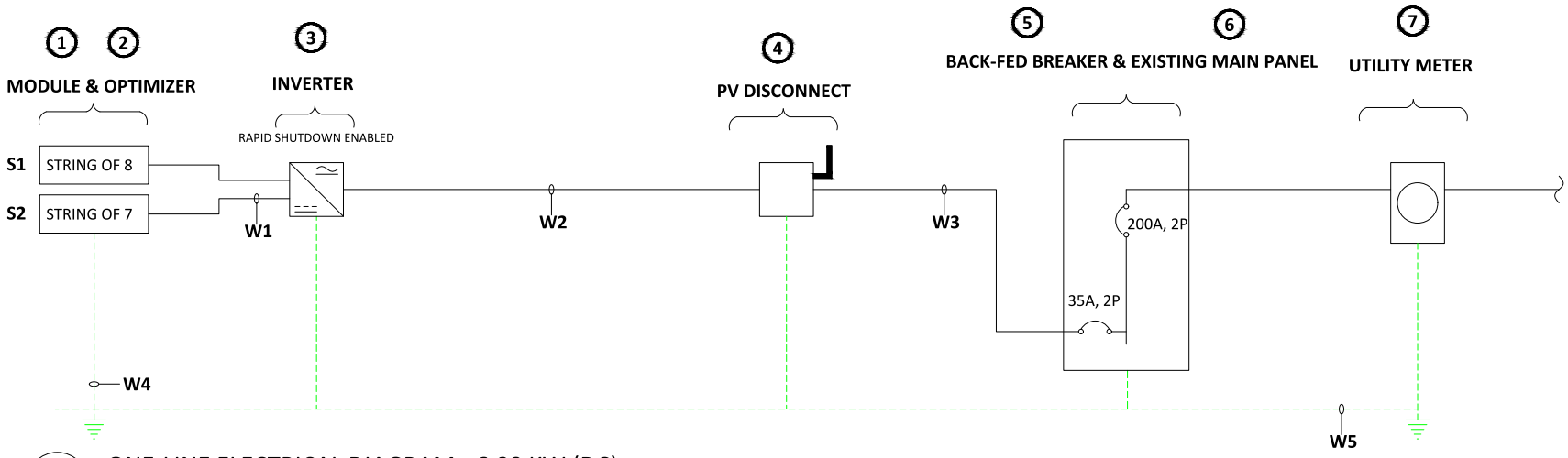
5/15/20	PLAN SET
5/18/20	PLAN SET
5/19/20	PLAN SET

BUILD SUMMARY

02

PROJECT NAME: **COLE, ADAM AND SARAH**

01-1825-1

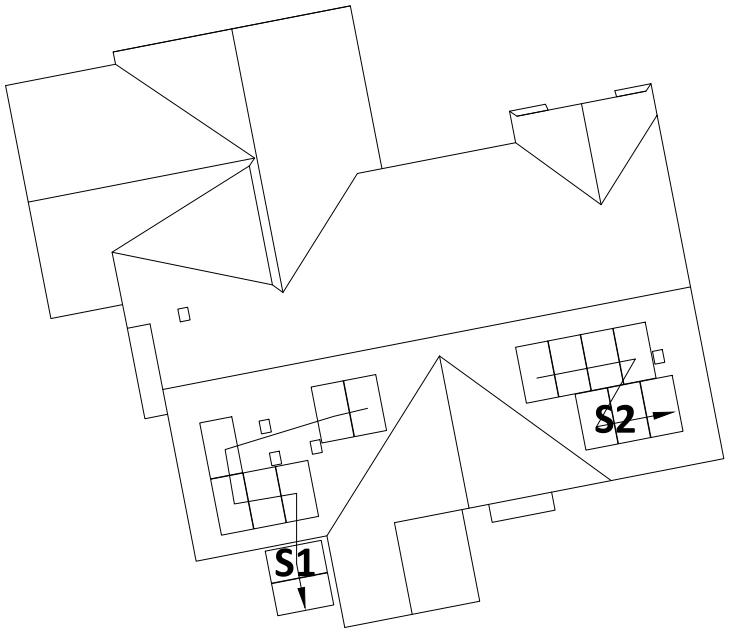


1/03 ONE-LINE ELECTRICAL DIAGRAM - 6.00 KW (DC)

NO SCALE

EQUIPMENT SCHEDULE							
TAG	ITEM	TAG	MAKE	MODEL	VOLTAGE	QTY	LOCATION
1	MODULE		HANWHA	Q.PEAK DUO L-G5.2 400W	DC	15	ROOF TOP
2	OPTIMIZER		SOLAREDGE	P505	DC	15	ROOF TOP
3	INVERTER	I1	SOLAREDGE	SE6000H-US	120/240V, 1Φ	1	BLD EXTERIOR
4	DISCONNECT		EATON	60A ENCLOSURE NON FUSED	120/240V, 1Φ	1	BLD EXTERIOR
5	BACK-FED BREAKER		SQUARE D	35A, 2-POLE QO235	120/240V, 1Φ	1	MAIN PANEL
6	MAIN PANEL		SQUARE D	200A ENCLOSURE 200A MAIN	120/240V, 1Φ	1	BLD INTERIOR
7	UTILITY METER		HONEYWELL	CL200	120/240V, 1Φ	1	BLD EXTERIOR

WIRE SCHEDULE					
TAG	RUN	CONDUCTOR TYPE	GAUGE	CONDUIT	RUN LENGTH
W1	PV HOMERUNS	SUN-GEN XLPE 2K RHW-2 THHN, CU	#10	¾"	60 FT
W2	INVERTER TO DISCONNECT	THWN-2, Cu	#8	1"	5 FT
W3	DISCONNECT TO BACK-FED	THWN-2, Cu	#8	1"	5 FT
W4	GROUND ELECTRODE	BARE, Cu	#6	-	-
W5	EQUIPMENT GROUND	THWN-2, Cu	#6 (MIN)	-	70 FT



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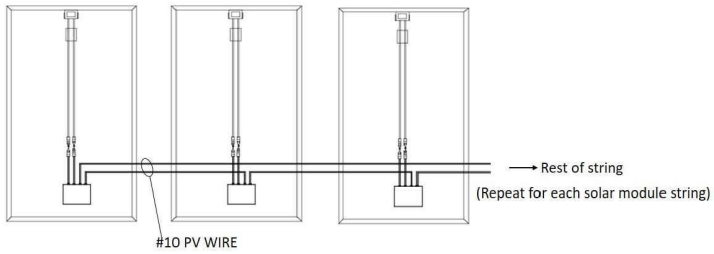
ELECTRICAL

03

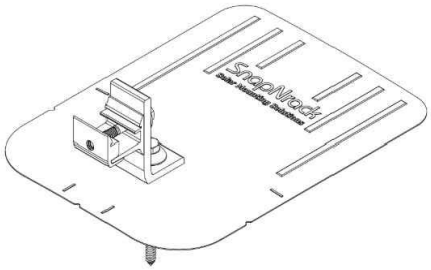
PROJECT NAME: **COLE, ADAM AND SARAH**

01-1825-1



1/04 MODULE AND POWER OPTIMIZER CONNECTION DETAIL

NO SCALE



2/04 SNAPNRACK ASPHALT SHINGLE ROOF DETAIL

NO SCALE

SOLAR EDGE 6000H INVERTER

PHOTOVOLTAIC SYSTEM DC DISCONNECT	
MAXIMUM VOLTAGE:	480V
MAXIMUM CIRCUIT CURRENT:	16.5 AMPS
MAX RATED OUTPUT CURRENT OF THE CHARGE CONTROLLER OR DC-TO-DC CONVERTER (IN INSTALLED):	N/A

SYSTEM AC DISCONNECT AT SERVICE

PHOTOVOLTAIC SYSTEM AC DISCONNECT	
MAXIMIM OPERATING AC CURRENT:	25 AMPS
NOMINAL OPERATING AC VOLTAGE:	120/240 VAC

3/04 PHOTOVOLTAIC MARKING AND LABELING

NO SCALE

CODE REVIEW & CALCULATIONS

SOLAR PHOTOVOLTAIC (PV) SYSTEM WITH SOLAREDGE

Inverter Type: String Inverter with P505 Panel Optimizers
Minimum String Length: 6 Panels
Maximum String Length: 25 Panels
Maximum Power Per String: 5,250W (DC)
Nominal String Voltage: 350V (DC) @ 240V (AC)
Maximum System Voltage: 500V (DC) @ 240V (AC)

HANWHA Q.PEAK DUO L-G5.2 400W

NEC 690.7 MAXIMUM VOLTAGE

690.7(A): Maximum Photovoltaic System Voltage
Q.PEAK DUO L-G5.2 400W Module Voc = 49.00V
Module V_{max} = (25°C - (-40°C))(-0.0027V/°C)(49.00V)+(49.00V) = 57.60V (DC)
**Each module is connected to Power Optimizer (DC-to-DC Converter)*
Module V_{max} Output = 57.60V (DC) < P505 Optimizer Vmax Input = 83V (DC)
Optimizer Safety Mode Voc: 1V (DC)

NEC 690.8 CIRCUIT SIZING AND CURRENT

690.8(A)(3): Inverter Output Circuit Current.
Inverter I-1 Max Continuous Output Current: 25 Amps (AC)

690.8(A)(5): DC-to-DC Converter Output Current.
Inverter I-1 Maximum Input Current: 16.5 Amps (DC)
**Higher current source may be used, the inverter will limit its input current to the value stated above.*

NEC 690.9 OVERCURRENT PROTECTION

690.9(B): Overcurrent Device Ratings
Disconnect Fuse: 25A x 125% = 31.25A -> 35 Amp OCPD

NEC 690.12 RAPID SHUTDOWN OF PV SYSTEMS ON BUILDINGS

PLAN: SolarEdge String Inverters with Rapid Shutdown enabled disconnect shall be located next to the service and be labeled in accordance with 690.56(B) and (C).

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5/18/20	PLAN SET
5/19/20	PLAN SET

DETAILS & CALCULATIONS

04

VSE Project Number: U3340.0113.201

May 21, 2020

Moxie Solar
230 Sugar Creek Lane
North Liberty, IA 52317

REFERENCE: Adam Cole Residence (01-1825-1): 1655 Stone Creek Circle, North Liberty, IA 52317
Solar Array Installation

To Whom It May Concern:

Per your request, we have reviewed the existing structure at the above referenced site. The purpose of our review was to determine the adequacy of the existing structure to support the proposed installation of solar panels on the roof as shown on the panel layout plan.

Based upon our review, we conclude that the existing structure is adequate to support the proposed solar panel installation.

Design Parameters

Code: International Building Code, 2018 Edition
Risk Category: II
Design wind speed: 115 mph (3-sec gust) per ASCE 7-16
Wind exposure category: C
Ground snow load: 25 psf

Existing Roof Structure

Roof structure: 2x4 manufactured trusses @ 24" O.C.
Roofing material: composite shingles
Roof slope: 30°

Connection to Roof

Mounting connection: (1) 5/16" lag screw w/ min. 2.5" embedment into framing

Maximum mounting spacing along rails:

Zone 1, 2e, 2r: 48" O.C. (Beyond 3' from roof edge, within 3' of roof edge perpendicular to slope, or within 3' of ridge)
Zone 2n, 3r: 48" O.C. (Within 3' of roof edge parallel w/ slope or 3' of roof ridge-eave corner)
Zone 3e: 24" O.C. (Within 3' of roof eave-eave corner)

(2) rails per row of panels, evenly spaced; panel length perpendicular to the rails not to exceed 67 in

Conclusions

Based upon our review, we conclude that the existing structure is adequate to support the proposed solar panel installation. In the area of the solar array, other live loads will not be present or will be greatly reduced (2018 IBC, Section 1607.13.5). The glass surface of the solar panels allows for a lower slope factor per ASCE 7, resulting in reduced design snow load on the panels. The gravity loads and; thus, the stresses of the structural elements, in the area of the solar array are either decreased or increased by no more than 5%. Therefore, the requirements of Section 806.2 of the 2018 IEBC are met and the structure is permitted to remain unaltered.

The solar array will be flush-mounted (no more than 6" above the roof surface) and parallel to the roof surface. Thus, we conclude that any additional wind loading on the structure related to the addition of the proposed solar array is negligible. The attached calculations verify the capacity of the connections of the solar array to the existing roof against wind (uplift), the governing load case. Because the increase in lateral forces is less than 10%, this addition meets the requirements of the exception in Section 806.3 of the 2018 IEBC. Thus the existing lateral force resisting system is permitted to remain unaltered.

Limitations

Installation of the solar panels must be performed in accordance with manufacturer recommendations. All work performed must be in accordance with accepted industry-wide methods and applicable safety standards. The contractor must notify Vector Structural Engineering, LLC should any damage, deterioration or discrepancies between the as-built condition of the structure and the condition described in this letter be found. Connections to existing roof framing must be staggered, except at array ends, so as not to overload any existing structural member. The use of solar panel support span tables provided by others is allowed only where the building type, site conditions, site-specific design parameters, and solar panel configuration match the description of the span tables. The design of the solar panel racking (mounts, rails, etc.) and electrical engineering is the responsibility of others. Waterproofing around the roof penetrations is the responsibility of others. Vector Structural Engineering assumes no responsibility for improper installation of the solar array.

VECTOR STRUCTURAL ENGINEERING, LLC

05/21/2020

_____

Russell Emery, P.E.
IA License: P24886 - Expires: 12/31/2021
Project Engineer

Enclosures

RNE/ard

JOB NO.: U3340.0113.201
SUBJECT: WIND PRESSURE

PROJECT: Adam Cole Residence

Components and Cladding Wind Calculations

Label: Solar Panel Array

Note: Calculations per ASCE 7-16

SITE-SPECIFIC WIND PARAMETERS:

Basic Wind Speed [mph]:	115
Exposure Category:	C
Risk Category:	II

Notes:

ADDITIONAL INPUT & CALCULATIONS:

Height of Roof, h [ft]:	15	(Approximate)
Comp/Cladding Location:	Gable Roofs 27° < θ ≤ 45°	
Enclosure Classification:	Enclosed Buildings	
Zone 1, 2e, 2r GCp:	1.8	Figure 30.3-2D (enter negative pressure coefficients)
Zone 2n, 3r GCp:	2.0	
Zone 3e GCp:	3.2	

α:	9.5	Table 26.11-1
z_g [ft]:	900	Table 26.11-1
K_h:	0.85	Table 26.10-1
K_e:	0.97	Table 26.9-1
K_{zt}:	1	Equation 26.8-1
K_d:	0.85	Table 26.6-1
Velocity Pressure, q_h [psf]:	23.8	Equation 26.10-1

PRESSURES:

$$p = qh\,(GCp)(\gamma E)(\gamma a)$$ Equation 29.4-5

Zone 1, 2e, 2r, p [psf]:	51.3	psf (1.0 W)
Zone 2n, 3r, p [psf]:	57.0	psf (1.0 W)
Zone 3e, p [psf]:	91.2	psf (1.0 W)

(a = 3 ft)

JOB NO.: U3340.0113.201
SUBJECT: CONNECTION

PROJECT: Adam Cole Residence

Calculate Uplift Forces on Connection

	Pressure (0.6 Wind) (psf)	Max Connection Spacing[1] (ft)	Max Trib. Area[2] (ft^2)	Max Uplift Force (lbs)
Zone 1, 2e, 2r	30.8	4.0	11.2	344
Zone 2n, 3r	34.2	4.0	11.2	382
Zone 3e	54.7	2.0	5.6	306

Calculate Connection Capacity

Lag Screw Size [in]:	5/16	
C_d:	1.6	NDS Table 2.3.2
Embedment[3] [in]:	2.5	
Grade:	SPF (G = 0.42)	
Nominal Capacity [lbs/in]:	205	NDS Table 12.2A
Number of Screws:	1	
Prying Coefficient:	1.4	
Total Capacity [lbs]:	586	

Determine Result

Maximum Demand [lbs]:	382
Lag Screw Capacity [lbs]:	586

Result: **Capacity > Demand, Connection is adequate.**

Quantity per Connection: 1

Notes

1. 'Max Connection Spacing' is the spacing between connections along the rails.
2. 'Max Trib Area' is the product of the 'Max Connection Spacing' and 1/2 the panel width/height perpendicular to the rails. (2) rails per row of panels. Length or panels perpindicular to the rails shall not exceed 67".
3. Embedment is measured from the top of the framing member to the beginning of the tapered tip of the lag screw. Embedment in sheathing or other material is not effective. The length of the tapered tip is not part of the embedment length.

JOB NO.: U3340.0113.201
SUBJECT: GRAVITY LOADS

PROJECT: Adam Cole Residence

CALCULATE ESTIMATED GRAVITY LOADS

ROOF DEAD LOAD (D)				Increase due to pitch	Original loading	
Roof Pitch/12		6.9				
Composite Shingles		2.3		1.15	2.0	psf
1/2" Plywood		1.2		1.15	1.0	psf
Framing		3.0	psf			
Insulation		0.5	psf			
1/2" Gypsum Clg.		2.0	psf			
M, E & Misc		1.5	psf			
	DL	10	psf			
	PV Array DL	3	psf			

ROOF LIVE LOAD (Lr)

Existing Design Roof Live Load [psf]	20	ASCE 7-16, Table 4-1
Roof Live Load With PV Array [psf]	0	2018 IBC, Section 1607.13.5

SNOW LOAD (S):	Existing	w/ Solar Panel Array	
Roof Slope [x:12]:	6.9	6.9	
Roof Slope [°]:	30	30	
Snow Ground Load, p_g [psf]:	25	25	ASCE 7-16, Section 7.2
Terrain Category:	C	C	ASCE 7-16, Table 7-2
Exposure of Roof:	Fully Exposed	Fully Exposed	ASCE 7-16, Table 7-2
Exposure Factor, C_e:	0.9	0.9	ASCE 7-16, Table 7-2
Thermal Factor, C_t:	1.1	1.1	ASCE 7-16, Table 7-3
Risk Category:	II	II	ASCE 7-16, Table 1-1
Importance Factor, I_s:	1.0	1.0	ASCE 7-16, Table 7-4
Flat Roof Snow Load, p_f [psf]:	17	17	ASCE 7-16, Equation 7-1
Minimum Roof Snow Load, p_m [psf]:	0	0	ASCE 7-16, Section 7.3.4
Unobstructed Slippery Surface?	No	Yes	ASCE 7-16, Section 7.4
Slope Factor Figure:	Figure 7-2b	Figure 7-2b	ASCE 7-16, Section 7.4
Roof Slope Factor, C_s:	1.00	0.67	ASCE 7-16, Figure 7-2
Sloped Roof Snow Load, p_s [psf]:	17	12	ASCE 7-16, Equation 7-2
Design Snow Load, S [psf]:	17	12	

JOB NO.: U3340.0113.201
SUBJECT: LOAD COMPARISON

PROJECT: Adam Cole Residence

Summary of Loads

	Existing	With PV Array
D [psf]	10	13
Lr [psf]	20	0
S [psf]	17	12

Maximum Gravity Loads:

	Existing	With PV Array	
(D + Lr) / Cd [psf]	24	15	ASCE 7-16, Section 2.4.1
(D + S) / Cd [psf]	24	22	ASCE 7-16, Section 2.4.1

(Cd = Load Duration Factor = 0.9 for D, 1.15 for S, and 1.25 for Lr)

Maximum Gravity Load [psf]:	24	22

Ratio Proposed Loading to Current Loading: **89%** **OK**

The gravity loads and; thus, the stresses of the structural elements, in the area of the solar array are either decreased or increased by no more than 5%. Therefore, the requirements of Section 806.2 of the 2018 IEBC are met and the structure is permitted to remain unaltered.

powered by Q.ANTUM DUO

Q.PEAK DUO L-G5.2
380-400

AWARD-WINNING
HIGH PERFORMANCE

EUPD RESEARCH TOP BRAND PV MODULES AUSTRALIA 2016 2017 2018 2019

Photon
Q.PRO-G2 235
Best polycrystalline solar module 2014
Q CELLS
174 modules tested

CYCLONE TESTING STATION
JAMES COOK UNIVERSITY AUSTRALIA

pv magazine award 2017 top innovation

Q CELLS
YIELD SECURITY
- ANTI PID TECHNOLOGY (APT)
- HOT-SPOT PROTECT (HSP)
- TRACEABLE QUALITY (TRA.Q™)
- ANTI LID TECHNOLOGY (ALT)

LOW ELECTRICITY GENERATION COSTS
Higher yield per surface area, lower BOS costs, higher power classes, and an efficiency rate of up to 20.1%.

INNOVATIVE ALL-WEATHER TECHNOLOGY
Optimal yields, whatever the weather with excellent low-light and temperature behaviour.

ENDURING HIGH PERFORMANCE
Long-term yield security with Anti LID Technology, Anti PID Technology[1], Hot-Spot Protect and Traceable Quality Tra.Q™.

EXTREME WEATHER RATING
High-tech aluminum alloy frame, tested to the extreme in Australia for Australian Conditions at James Cook University Cyclone Testing Station.

A RELIABLE INVESTMENT
Inclusive 12-year product warranty and 25-year linear performance warranty[2].

STATE OF THE ART MODULE TECHNOLOGY
Q.ANTUM DUO combines cutting edge cell separation and innovative wiring with Q.ANTUM Technology.

[1] APT test conditions according to IEC/TS 62804-1:2015, method B (–1500 V, 168 h)
[2] See data sheet on rear for further information.

THE IDEAL SOLUTION FOR:

Rooftop arrays on commercial / industrial buildings

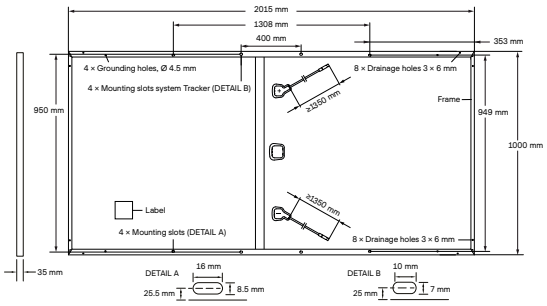
Ground-mounted solar power plants

Engineered in Germany

Q CELLS

MECHANICAL SPECIFICATION

Format	2015 mm × 1000 mm × 35 mm (including frame)
Weight	23.5 kg
Front Cover	3.2 mm thermally pre-stressed glass with anti-reflection technology
Back Cover	Composite film
Frame	Anodised aluminium
Cell	6 × 24 monocrystalline Q.ANTUM solar half cells
Junction box	70-85 mm × 50-70 mm × 13-21 mm Protection class IP67, with bypass diodes
Cable	4 mm² Solar cable; (+) ≥1350 mm, (–) ≥1350 mm
Connector	Stäubli MC4-Evo2; IP67

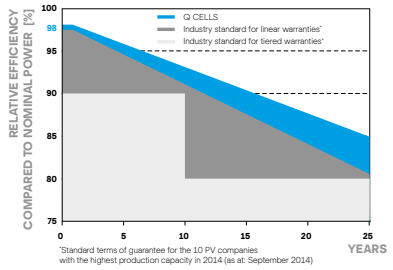


ELECTRICAL CHARACTERISTICS

POWER CLASS				380	385	390	395	400
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC[1] (POWER TOLERANCE +5 W / –0 W)								
Minimum	Power at MPP[1]	P_{MPP}	[W]	380	385	390	395	400
	Short Circuit Current[1]	I_{SC}	[A]	10.05	10.10	10.14	10.19	10.24
	Open Circuit Voltage[1]	V_{OC}	[V]	47.95	48.21	48.48	48.74	49.00
	Current at MPP	I_{MPP}	[A]	9.57	9.61	9.66	9.70	9.75
	Voltage at MPP	V_{MPP}	[V]	39.71	40.05	40.38	40.71	41.04
	Efficiency[1]	η	[%]	≥18.9	≥19.1	≥19.4	≥19.6	≥19.9
MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT[2]								
Minimum	Power at MPP	P_{MPP}	[W]	284.4	288.2	291.9	295.6	299.4
	Short Circuit Current	I_{SC}	[A]	8.10	8.14	8.17	8.21	8.25
	Open Circuit Voltage	V_{OC}	[V]	45.21	45.46	45.71	45.96	46.21
	Current at MPP	I_{MPP}	[A]	7.53	7.57	7.60	7.64	7.67
	Voltage at MPP	V_{MPP}	[V]	37.77	38.08	38.40	38.71	39.02

[1]Measurement tolerances P_{MPP} ±3%; I_{SC}; V_{OC} ±5% at STC: 1000 W/m², 25±2°C, AM 1.5G according to IEC 60904-3 • [2]800 W/m², NMOT, spectrum AM 1.5G

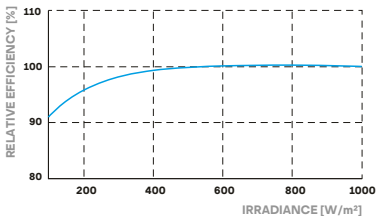
Q CELLS PERFORMANCE WARRANTY



At least 98% of nominal power during first year. Thereafter max. 0.54% degradation per year. At least 93.1% of nominal power up to 10 years. At least 85% of nominal power up to 25 years.

All data within measurement tolerances. Full warranties in accordance with the warranty terms of the Q CELLS sales organisation of your respective country.

PERFORMANCE AT LOW IRRADIANCE



Typical module performance under low irradiance conditions in comparison to STC conditions (25 °C, 1000 W/m²).

TEMPERATURE COEFFICIENTS							
Temperature Coefficient of I_{SC}	α	[%/K]	+0.04	Temperature Coefficient of V_{OC}	β	[%/K]	–0.27
Temperature Coefficient of P_{MPP}	γ	[%/K]	–0.36	Normal Module Operating Temperature	NMOT	[°C]	43±3

PROPERTIES FOR SYSTEM DESIGN

Maximum System Voltage	V_{SYS}	[V]	1500 (IEC) / 1500 (UL)	Safety Class	II
Maximum Reverse Current	I_R	[A]	20	Fire Rating	C / TYPE 1
Max. Design Load, Push / Pull		[Pa]	3600 / 1600	Permitted Module Temperature on Continuous Duty	–40 °C - +85 °C
Max. Test Load, Push / Pull		[Pa]	5400 / 2400		

QUALIFICATIONS AND CERTIFICATES

IEC 61215:2016; IEC 61730:2016, Application Class II;
This data sheet complies with DIN EN 50380.

PACKAGING INFORMATION

Number of Modules per Pallet	29
Number of Pallets per Trailer (24 t)	24
Number of Pallets per 40' HC-Container (26 t)	22
Pallet Dimensions (L × W × H)	2080 × 1150 × 1190 mm
Pallet Weight	742 kg

Note: Installation instructions must be followed. See the installation and operating manual or contact our technical service department for further information on approved installation and use of this product.

Made in Korea

Hanwha Q CELLS Australia Pty Ltd
Suite 1, Level 1, 15 Blue Street, Sydney, NSW 2060, Australia | **TEL** +61 (0)2 9016 3033 | **FAX** +61 (0)2 9016 3032 | **EMAIL** q-cells-australia@q-cells.com | **WEB** www.q-cells.com/au

Engineered in Germany

Power Optimizer

P370 / P401 / P404 / P405 / P485 / P500 / P505

POWER OPTIMIZER

PV power optimization at the module level

- Specifically designed to work with SolarEdge inverters
- Up to 25% more energy
- Next generation maintenance with module-level monitoring
- Mitigates all types of modules mismatch-loss, from manufacturing tolerance to partial shading
- Superior efficiency (99.5%)
- Flexible system design for maximum space utilization
- Module-level voltage shutdown for installer and firefighter safety
- Fast installation with a single bolt

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/ Power Optimizer

P370 / P401 / P404 / P405 / P485 / P500 / P505

OPTIMIZER MODEL (typical module compatibilty)	P370 (60&70 Cell modules)	P401 (For high power 60/72-cell modules)	P404 (for 60/72-cell short strings)	P405 (for high-voltage modules)	P485 (for high-voltage modules)	P500 (for 96-cell modules)	P505 (for higher current modules)	UNIT
INPUT								
Rated Input DC Power[1]	370	400	405	405	485	500	505	W
Absolute Maximum Input Voltage (Voc at lowest temperature)	60		80	125		80	83	Vdc
MPPT Operating Range	8 - 60		12.5 - 80	12.5 - 105		8 - 80	12.5-83	Vdc
Maximum Short Circuit Current (Isc)	11	11.75	11			10.1	14	Adc
Maximum Efficiency	99.5							%
Weighted Efficiency	98.8							%
Overvoltage Category	II							
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREDGE INVERTER)								
Maximum Output Current	15							Adc
Maximum Output Voltage	60		85			60	85	Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREDGE INVERTER OR SOLAREDGE INVERTER OFF)								
Safety Output Voltage per Power Optimizer	1 ± 0.1							Vdc
STANDARD COMPLIANCE								
EMC	FCC Part15 Class B, IEC61000-6-2, IEC61000-6-3							
Safety	IEC62109-1 (class II safety), UL1741							
RoHS	Yes							
Fire Safety	VDE-AR-E 2100-712:2013-05							
INSTALLATION SPECIFICATIONS								
Maximum Allowed System Voltage	1000							Vdc
Dimensions (W x L x H)	129 x 153 x 27.5 / 5.1 x 6 x 1.1	129 x 153 x29.5 / 5.08 x6.02 x 1.16	129 x 89 x 42.5 / 5.1 x 3.5 x 1.7	129 x 90 x 49.5 / 5.1 x 3.5 x 1.9		129 x 153 x 33.5 / 5.1 x 6 x 1.3	129 x 162 x 59 / 5.1 x 6.4 x 2.3	mm / in
Weight (including cables)	655 / 1.5		775 / 1.7	845 / 1.9		750 / 1.7	1064 / 2.3	gr / lb
Input Connector	MC4[2]				Single or Dual MC4[2][3]	MC4[2]		
Input Wire Length	0.16 / 0.52	0.16 or 0.9 /0.52 or 2.95[4]	0.16 / 0.52					m / ft
Output Connector	MC4							
Output Wire Length	1.2 / 3.9							m / ft
Operating Temperature Range	-40 - +85 / -40 - +185							˚C / ˚F
Protection Rating	IP68							
Relative Humidity	0 - 100							%

[1] Rated power of the module at STC will not exceed the optimizer "Rated Input DC Power". Modules with up to +5% power tolerance are allowed.
[2] For other connector types please contact SolarEdge.
[3] For dual version for parallel connection of two modules use the P485. In the case of an odd number of PV modules in one string, installing one P485 dual version power optimizer connected to one PV module is supported. When connecting a single module, seal the unused input connectors using the supplied pair of seals.
[4] Longer inputs wire length are available for use. For 0.9m input wire length order P401-xxxLxxx.

PV SYSTEM DESIGN USING A SOLAREDGE INVERTER[4][5]		SINGLE PHASE HD-WAVE	SINGLE PHASE	THREE PHASE	THREE PHASE FOR 277/480V GRID	
Minimum String Length (Power Optimizers)	P370, P401, P500[6]	8		16	18	
	P404, P405, P485, P505	6		14 (13 with SE3K[7])	14	
Maximum String Length (Power Optimizers)		25		50	50	
Maximum Power per String		5700	5250	11250[8]	12750[9]	W
Parallel Strings of Different Lengths or Orientations		Yes				

[4] It is not allowed to mix P404/P405/P485/P505 with P370/P401/P500/P600/P650/P730/P801/P800p/P850/P950 in one string.
[5] For SE15k and above, the minimum DC power should be 11KW.
[6] The P370/P401/P500 cannot be used with the SE3K three phase inverter (available in some countries; refer to the three phase inverter SE3K-SE10K datasheet).
[7] Exactly 10 when using SE3K-RW010BNN4
[8] For the 230/400V grid: it is allowed to install up to 13,500W per string when the maximum power difference between each string is 2,000W.
[9] For the 277/480V grid: it is allowed to install up to 15,000W per string when the maximum power difference between each string is 2,000W

CE

INVERTERS

Single Phase Inverter with HD-Wave Technology

for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US /
SE7600H-US / SE10000H-US / SE11400H-US

12-25 YEAR WARRANTY

Optimized installation with HD-Wave technology

- Specifically designed to work with power optimizers
- Record-breaking 99% weighted efficiency
- Quick and easy inverter commissioning directly from a smartphone using the SolarEdge SetApp
- Fixed voltage inverter for longer strings
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Small, lightweight, and easy to install both outdoors or indoors
- Built-in module-level monitoring
- Optional: Faster installations with built-in consumption metering (1% accuracy) and production revenue grade metering (0.5% accuracy, ANSI C12.20)

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Single Phase Inverter with HD-Wave Technology for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US/ SE7600H-US / SE10000H-US / SE11400H-US

MODEL NUMBER	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	
APPLICABLE TO INVERTERS WITH PART NUMBER	SEXXXXH-XXXXXBXX4							
OUTPUT								
Rated AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA
Maximum AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA
AC Output Voltage Min.-Nom.-Max. (211 - 240 - 264)	✓	✓	✓	✓	✓	✓	✓	Vac
AC Output Voltage Min.-Nom.-Max. (183 - 208 - 229)	-	✓	-	✓	-	-	✓	Vac
AC Frequency (Nominal)	59.3 - 60 - 60.5[1]							Hz
Maximum Continuous Output Current @240V	12.5	16	21	25	32	42	47.5	A
Maximum Continuous Output Current @208V	-	16	-	24	-	-	48.5	A
Power Factor	1, Adjustable - 0.85 to 0.85							
GFDI Threshold	1							A
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes							
INPUT								
Maximum DC Power @240V	4650	5900	7750	9300	11800	15500	17650	W
Maximum DC Power @208V	-	5100	-	7750	-	-	15500	W
Transformer-less, Ungrounded	Yes							
Maximum Input Voltage	480							Vdc
Nominal DC Input Voltage	380				400			Vdc
Maximum Input Current @240V[2]	8.5	10.5	13.5	16.5	20	27	30.5	Adc
Maximum Input Current @208V[2]	-	9	-	13.5	-	-	27	Adc
Max. Input Short Circuit Current	45							Adc
Reverse-Polarity Protection	Yes							
Ground-Fault Isolation Detection	600kΩ Sensitivity							
Maximum Inverter Efficiency	99	99.2						%
CEC Weighted Efficiency	99						99 @ 240V 98.5 @ 208V	%
Nighttime Power Consumption	< 2.5							W

[1] For other regional settings please contact SolarEdge support
[2] A higher current source may be used; the inverter will limit its input current to the values stated

Single Phase Inverter with HD-Wave Technology for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US/ SE7600H-US / SE10000H-US / SE11400H-US

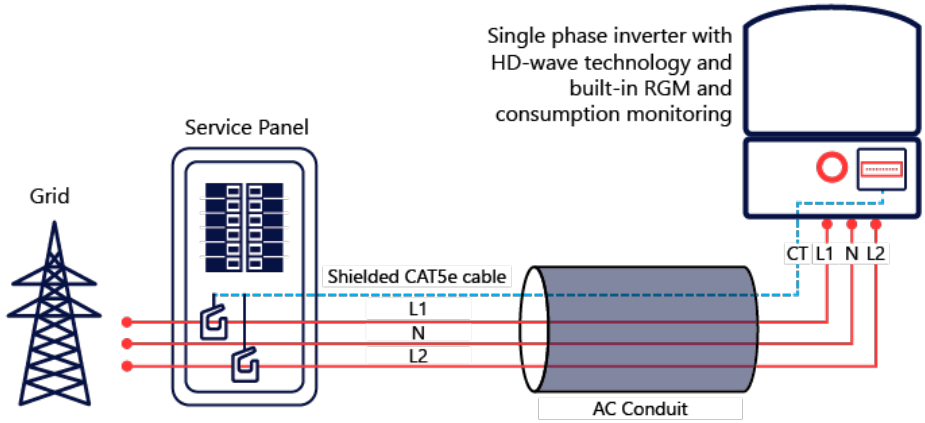
MODEL NUMBER	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	
ADDITIONAL FEATURES								
Supported Communication Interfaces	RS485, Ethernet, ZigBee (optional), Cellular (optional)							
Revenue Grade Metering, ANSI C12.20	Optional[3]							
Consumption metering								
Inverter Commissioning	With the SetApp mobile application using Built-in Wi-Fi Access Point for Local Connection							
Rapid Shutdown - NEC 2014 and 2017 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect							
STANDARD COMPLIANCE								
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07							
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (HI)							
Emissions	FCC Part 15 Class B							
INSTALLATION SPECIFICATIONS								
AC Output Conduit Size / AWG Range	1" Maximum / 14-6 AWG					1" Maximum /14-4 AWG		
DC Input Conduit Size / # of Strings / AWG Range	1" Maximum / 1-2 strings / 14-6 AWG					1" Maximum / 1-3 strings / 14-6 AWG		
Dimensions with Safety Switch (HxWxD)	17.7 x 14.6 x 6.8 / 450 x 370 x 174					21.3 x 14.6 x 7.3 / 540 x 370 x 185		in / mm
Weight with Safety Switch	22 / 10		25.1 / 11.4	26.2 / 11.9		38.8 / 17.6		lb / kg
Noise	< 25				<50			dBA
Cooling	Natural Convection							
Operating Temperature Range	-40 to +140 / -40 to +60[4]							°F / °C
Protection Rating	NEMA 4X (Inverter with Safety Switch)							

[3] Inverter with Revenue Grade Meter P/N: SExxxxH-US000BNC4; Inverter with Revenue Grade Production and Consumption Meter P/N: SExxxxH-US000BNI4 . For consumption metering, current transformers should be ordered separately: SEACT0750-200NA-20 or SEACT0750-400NA-20. 20 units per box

[4] Full power up to at least 50°C / 122°F; for power de-rating information refer to: https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf

How to Enable Consumption Monitoring

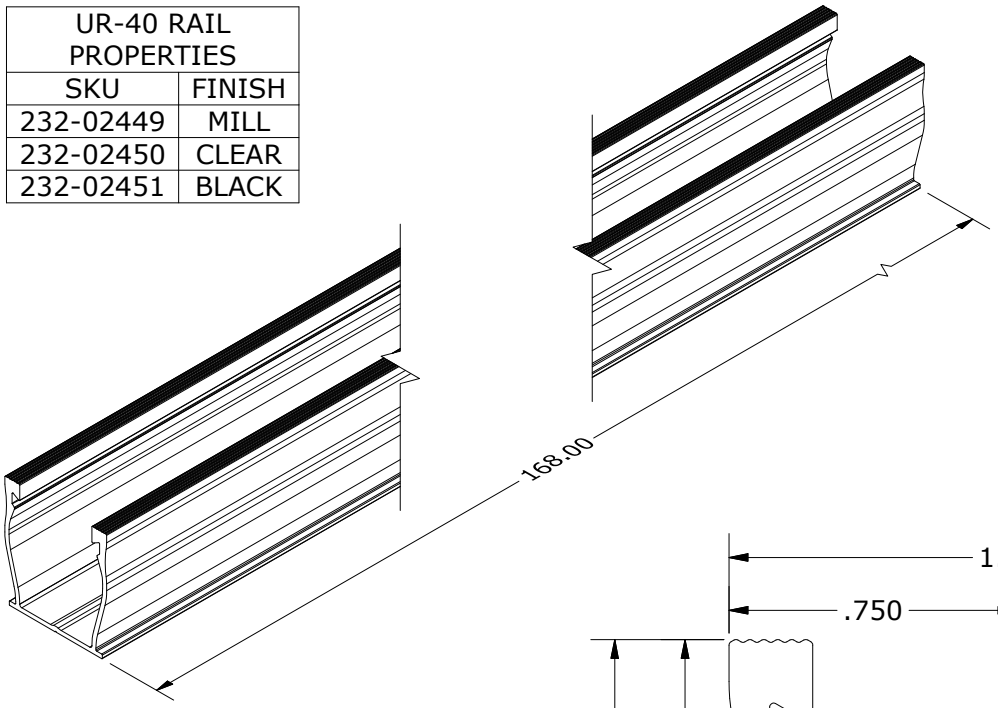
By simply wiring current transformers through the inverter's existing AC conduits and connecting them to the service panel, homeowners will gain full insight into their household energy usage helping them to avoid high electricity bills

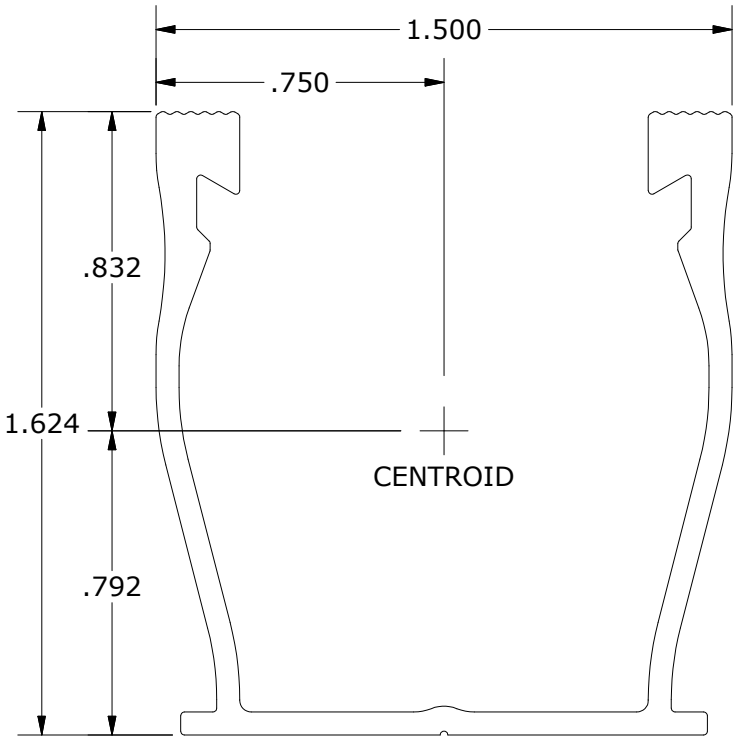


RoHS

DESCRIPTION:	DRAWN BY:	SnapNrack™ Solar Mounting Solutions
SNAPNRACK, UR-40 RAIL	mwatkins	
PART NUMBER(S):	REVISION:	595 MARKET STREET, 29TH FLOOR • SAN FRANCISCO, CA 94105 USA PHONE (415) 580-6900 • FAX (415) 580-6902
232-02449, 232-02450, 232-02451	B	THE INFORMATION IN THIS DRAWING IS CONFIDENTIAL AND PROPRIETARY. ANY REPRODUCTION, DISCLOSURE, OR USE THEREOF IS PROHIBITED WITHOUT THE WRITTEN CONSENT OF SUNRUN SOUTH LLC.

UR-40 RAIL PROPERTIES	
SKU	FINISH
232-02449	MILL
232-02450	CLEAR
232-02451	BLACK





EQUIVALENT PROPERTIES	
A	0.357 in²
Ixx	0.125 in⁴
Iyy	0.132 in⁴
Sx (TOP)	0.150 in³
Sx (BOT)	0.158 in³
Sy (LEFT)	0.175 in³
Sy (RIGHT)	0.175 in³

ALL DIMENSIONS IN INCHES

MATERIALS:	6000 SERIES ALUMINUM	OPTIONS:
DESIGN LOAD (LBS):	N/A	CLEAR / BLACK ANODIZED
ULTIMATE LOAD (LBS):	N/A	MILL FINISH
TORQUE SPECIFICATION:	N/A LB-FT	BUNDLES OF 144
CERTIFICATION:	UL 2703, FILE E359313	BOXES OF 8
WEIGHT (LBS):	5.85	