



Staff Report - Certificate of Appropriateness Application

Knoxville Historic Zoning Commission

File Number: 3-J-20-HZ

PROPERTY LOCATION: 831 Deery St. / Parcel ID 94 D E 034

DISTRICT: Fourth and Gill H-1

MEETING DATE: 3/19/2020

APPLICANT: Marian Sing

LEVEL OF WORK: Level II. Major repair or replacement of materials or architectural elements

PROPERTY DESCRIPTION: Queen Anne, c.1900

One story frame with vertical grooved wooden sheet siding (T-111). Hip roof with lower cross gables and asphalt shingle roof covering, diamond shaped attic vents. Two over two double hung replacement windows with one over one double hung tripartite window on gabled pediment on front elevation. One story front porch with replacement wood columns, and one original chamfered wood post on a weatherboarded truncated pier. Interior offset brick chimney. Added exterior side brick chimney filling one side of projecting bay window. Brick foundation. Irregular plan. Chimney on south elevation projecting bay has a cast head of Robert E. Lee on a plaque, in bas relief, facing south.

► **DESCRIPTION OF WORK:**

Proposed installation of solar panels on a southwest roof slope of the house. Solar panels will be one array of eight panels, two panels wide by four panels long. Panels are proposed to be installed on a low-slope roof on the southwest corner of the house (the house's rear left corner). Panels are approximately 66" long by 39" wide by 1.38" tall and will be attached to the roof via a metal racking. Solar contractor has stated that metal racking will be between 1.3" to 3" tall, depending on the job. At maximum, the panels would project 4.38" above the roof slope.

Inverter and meter to be installed adjacent to current utility box near the house's rear entry on the west elevation.

► **APPLICABLE DESIGN GUIDELINES:**

Fourth and Gill Design Guidelines, adopted by the Knoxville City Council on April 20, 1999 and June 29, 1999.

Roofs

5. Do not use solar collectors, modern skylights, or inappropriate structures on roof planes that are visible from the street. Do not install them where they interfere with decorative roof elements. If they are installed, they should not comprise more than 3% of the total roof surface.

Mechanical Systems

3. If used, solar collectors should not be visible from public streets.

PROPOSED SOLAR PANEL GUIDELINES FOR FOURTH & GILL (see Comments):



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Contemporary solar additions to building roofs have no historic counterpart and make a strong impact of the visual character of existing buildings. While both goals of historic preservation and energy conservation are important, care must be taken that one is not achieved at the expense of the other.

In designing and obtaining permission to install solar technology on a historic home, applicant is to consider the following preferences and requirements for design and placement of solar devices. These provisions are designed to minimize irreversible visual and structural impact of the devices on the historic appearance of the building.

Historic Zoning Commission is under no obligation to approve projects that do not adhere strictly to these guidelines, and may require that more preferred alternatives be pursued as a condition of project approval.

Requirements:

Solar technology should not be visible from public streets or, if visible, should be installed on an accessory building, a rear facing elevation, or a side elevation that does not face onto a public street.

Exception:

In the event that street-facing elevations are the only reasonable placement possible, the solar installation should be non-reflective and fully integrated with the building envelope or cladding.

In all cases, regardless of the location of the solar installation -

1. Solar collectors and mounting systems should be compatible in color to the property's roof materials.
2. Framing equipment associated with the installation of solar technology, including brackets, edging around solar collectors, and other metal features, should be treated, color clad, or covered to be made as unobtrusive as possible and to minimize contrast between the solar collectors and equipment and any roofing materials.
3. Slope, elevation and position relative to existing architectural features should be minimally visible from public streets.
4. Historic roofing materials or features, including dormers and chimneys, may not be irrevocably altered or removed for the solar installation.
6. For roof-mounted solar installations:
 - a. On a sloped roof:

The solar equipment should be mounted parallel to the roof slope and not more than six inches above the roof, as measured vertically from the top of the equipment to the roof surface. With the provided exception of building-integrated solar technologies, solar equipment should not be located forward of any point of a roof slope facing a public street or closer than 1/3 the depth of the main body of the roof if there is no slope toward the street (see diagrams)



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b. On a flat roof:

The equipment should be set back from the roof edge, and visibility from ground level should be minimal.

COMMENTS:

The proposed guidelines for solar panels date to 2012 and were reviewed and accepted by the Fourth and Gill Neighborhood Organization Board of Directors at that time, but they were not officially approved and adopted by City Council. It is anticipated that these guidelines will be included in the next Design Guidelines update effort to be approved by City Council. They have been applied in other evaluations of solar panels in Fourth and Gill, including the August 2016 review of panels at 813 Deery St (8-K-16-HZ).

STAFF FINDINGS:

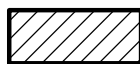
1. The house is a contributing structure to the Fourth and Gill H Overlay and National Register Historic District.
2. The proposed location for installation is the rear (southwest) corner. The house is uniquely sited with a rear (west) elevation facing Gratz Street and the north elevation facing a parking lot, so most roof slopes on the one-story house can be viewed from the public right-of-way. However, the proposed roof slope for the panels is a rear-facing roof slope, and is not located forward of any roof point fronting the primary street (Deery Street). The rear roof slope to receive the solar panels is approximately 77' away from Gratz Street. It is also a low-slope roof, which is not visible from Deery Street due to a projecting bay and chimney on the south elevation.
3. The panels will be somewhat visible from Gratz Street. The existing roof is currently dark gray asphalt shingles. The proposed panels are black and would benefit aesthetically from an anti-reflective coating to minimize visibility, if possible.
3. The solar panels and racking will be mounted parallel to the roof slope and will project approximately 2-4" inches high above the roof, including the racking system. The utility meter will be installed on the rear (west) elevation of the building, on a non-character-defining elevation of the house.
4. No historic roofing material or features will be altered or removed for installation of the solar panels or associated equipment. No changes to the existing roof or siding of the house will be necessary to support the installation of the panels.

► STAFF RECOMMENDATION:

Staff recommends approval of the work as proposed, with the condition that the panels receive non-reflective coating (if possible) to minimize visibility from Gratz Street.



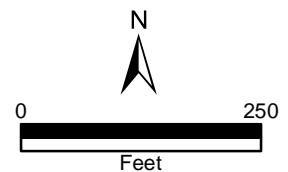
3-J-20-HZ
APPLICATION FOR CERTIFICATE OF APPROPRIATENESS



831 Deery St. 37917
Fourth and Gill H-1

Original Print Date: 3/3/2020
 Knoxville/Knox County Planning -- Historic Zoning Commission

Petitioner: Marian Sing





DESIGN REVIEW REQUEST

- ☒ DOWNTOWN DESIGN (DK)
- ☒ HISTORIC ZONING (H)
- ☒ INFILL HOUSING (IH)

Marian Sing

Applicant

3/2/2020

Date Filed

March 19, 2020

Meeting Date (if applicable)

3-J-20-HZ

File Number(s)

CORRESPONDENCE

All correspondence related to this application should be directed to the approved contact listed below.

☒ Owner ☐ Contractor ☐ Engineer ☐ Architect/Landscape Architect

Marian Sing

Name

Company

831 deery street

Knoxville

TN

37917

Address

City

State

Zip

865-924-1379

Mariansing@hotmail.com

Phone

Email

CURRENT PROPERTY INFO

Marian Sing

831 Deery Street

865-924-1379

Owner Name (if different from applicant)

Owner Address

Owner Phone

831 Deery Street

094DE034

Property Address

Parcel ID

4th And Gill

Neighborhood

Zoning

AUTHORIZATION

Lindsay Crockett

Staff Signature

Lindsay Crockett

Please Print

3/2/20

Date

M. Sing

Marian Sing

Please Print

Date

REQUEST

DOWNTOWN DESIGN

Level 1:

- ☐ Signs ☐ Alteration of an existing building/structure

Level 2:

- ☒ Addition to an existing building/structure

Level 3:

- ☐ Construction of new building/structure ☐ Site design, parking, plazas, landscape

See required Downtown Design attachment for more details.

- ☐ Brief description of work:

Installation of solar panels on non-visible surfaces of roof to any elevation on the street, as well as a utility box adjacent to the current utility service box.

HISTORIC ZONING

Level 1:

- ☐ Signs ☐ Routine repair of siding, windows, roof, or other features, in-kind; Installation of gutters, storm windows/doors

Level 2:

- ☐ Major repair, removal, or replacement of architectural elements or materials ☒ Additions and accessory structures

Level 3:

- ☐ Construction of a new primary building

Level 4:

- ☐ Relocation of a contributing structure ☐ Demolition of a contributing structure

See required Historic Zoning attachment for more details.

- ☒ Brief description of work:

Installation of solar panels on roof services not visible by any elevation on Front Street. Installation of utility box for solar panels adjacent to current utility box at the back door of the house not visible by the street

INFILL HOUSING

Level 1:

- ☐ Driveways, parking pads, access point, garages or similar facilities ☐ Subdivisions

Level 2:

- ☐ Additions visible from the primary street ☐ Changes to porches visible from the primary street

Level 3:

- ☐ New primary structure
☐ Site built ☐ Modular ☐ Multi-Sectional

See required Infill Housing attachment for more details.

- ☐ Brief description of work:

STAFF USE ONLY

ATTACHMENTS

- ☐ Downtown Design Checklist
☐ Historic Zoning Design Checklist
☐ Infill Housing Design Checklist

ADDITIONAL REQUIREMENTS

- ☐ Property Owners / Option Holders

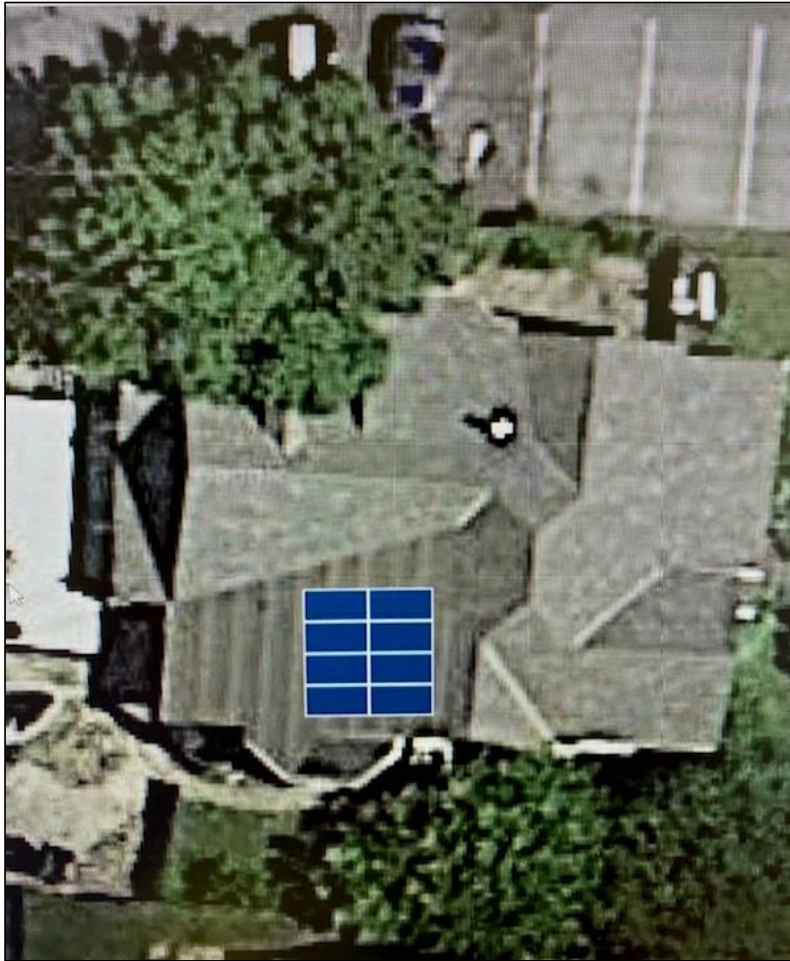
Level 1: \$50 • Level 2: \$100 • Level 3: \$250 • Level 4: \$500

FEE 1:

FEE 2:

FEE 3:

TOTAL:



Proposed location of solar panels



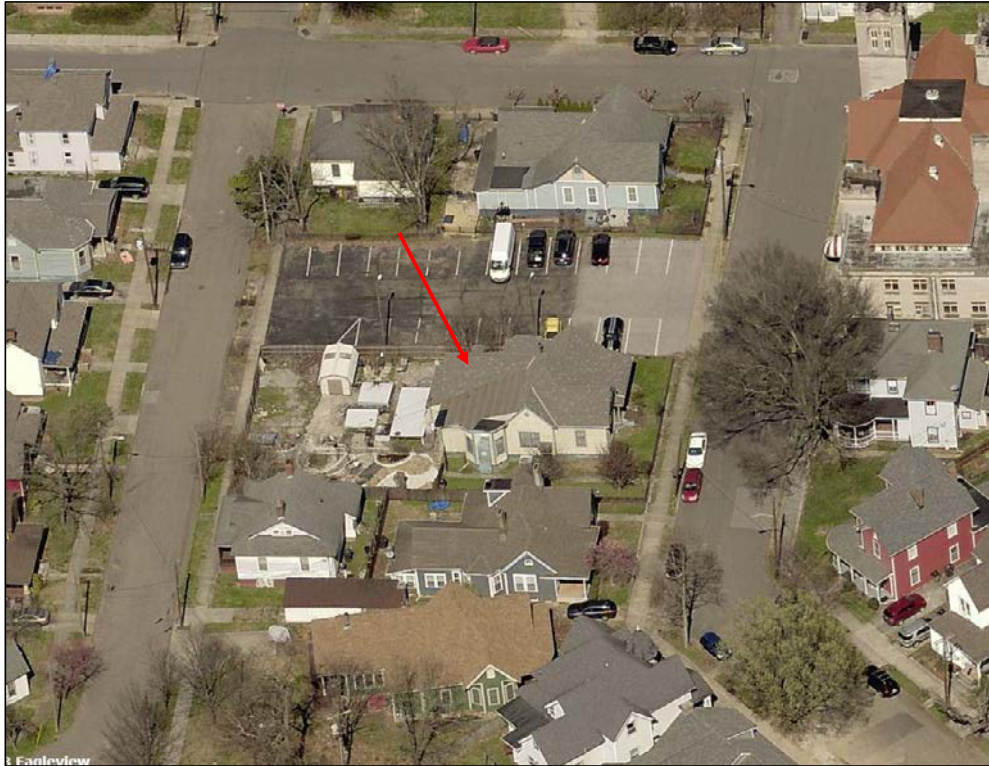
View from Deery St. sidewalk, photographer facing northeast



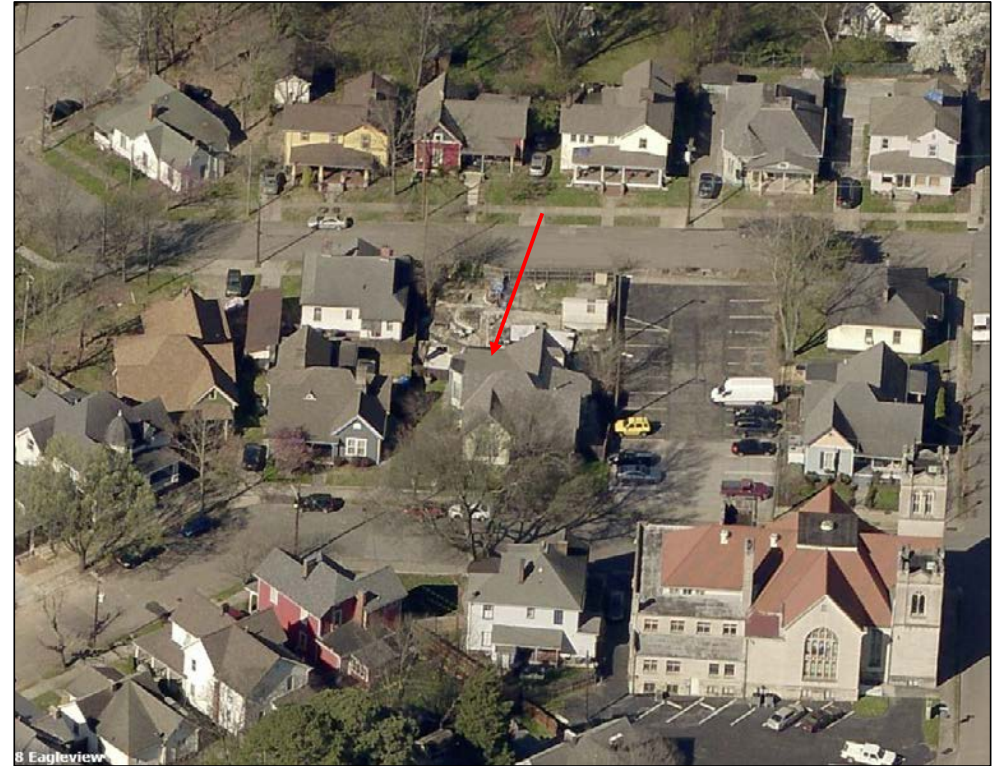
Rear view of house from public right-of-way



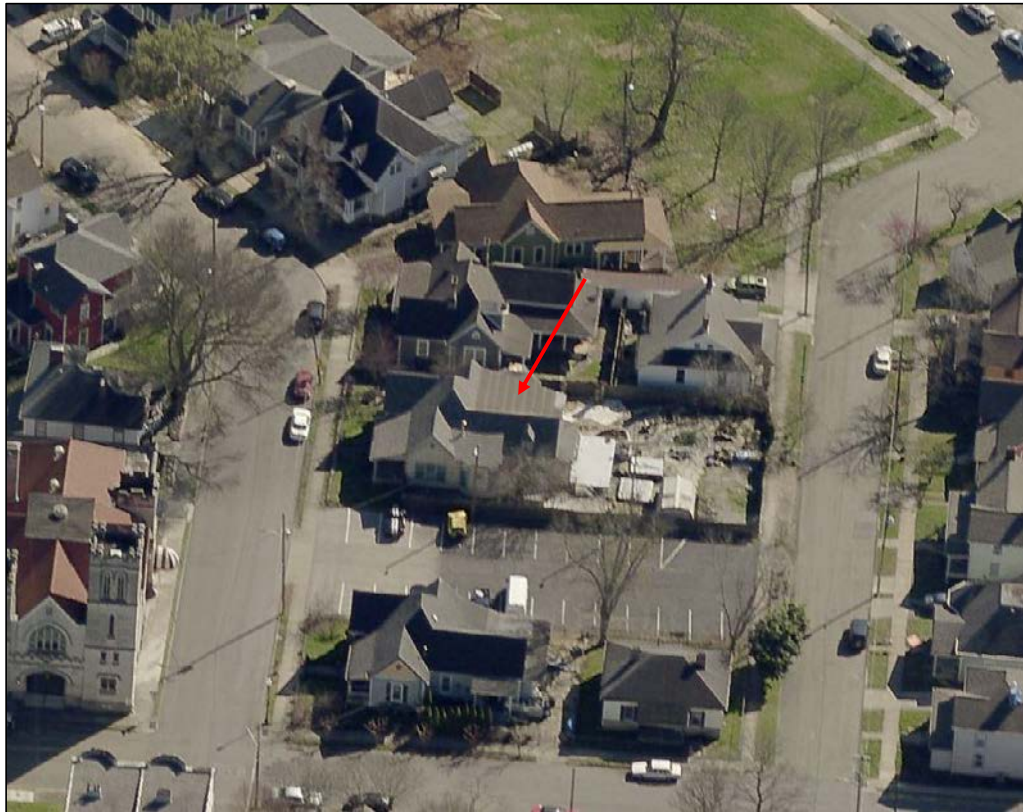
View from Deery St. sidewalk,
photographer facing southwest



Pictometry view facing north



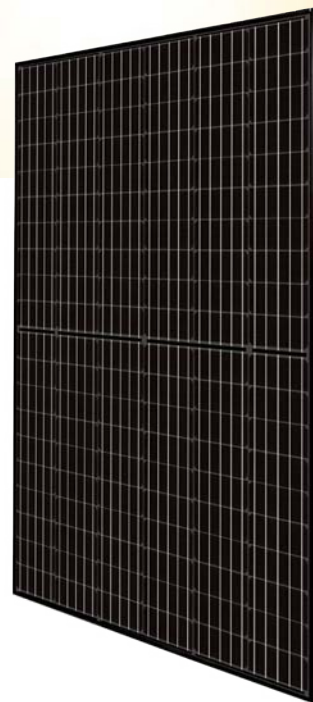
Pictometry view facing east



Pictometry view facing south



Pictometry view facing west



KuBlack

HIGH EFFICIENCY MONO PERC MODULE

CS3K-295 | 300 | 305 | 310MS

(1000 V / 1500 V)

MORE POWER



Low power loss in cell connection



Low NMOT: 42 ± 3 °C
Low temperature coefficient (Pmax): -0.37 % / °C



Better shading tolerance

MORE RELIABLE



Minimizes micro-cracks



Lower hot spot temperature



Heavy snow load up to 6000 Pa,
wind load up to 4000 Pa*



linear power output warranty



product warranty on materials
and workmanship

MANAGEMENT SYSTEM CERTIFICATES

ISO 9001:2008 / Quality management system
ISO 14001:2004 / Standards for environmental management system
OHSAS 18001:2007 / International standards for occupational health & safety

PRODUCT CERTIFICATES*

IEC 61215 / IEC 61730: VDE / CE / MCS / CEC AU
UL 1703 / IEC 61215 performance: CEC listed (US) / FSEC (US Florida)
UL 1703: CSA / IEC61701 ED2: VDE / IEC62716: VDE
Take-e-way



*We can provide this product with special BOM specifically certified with salt mist and ammonia tests. Please talk to our local technical sales representatives to get your customized solutions.

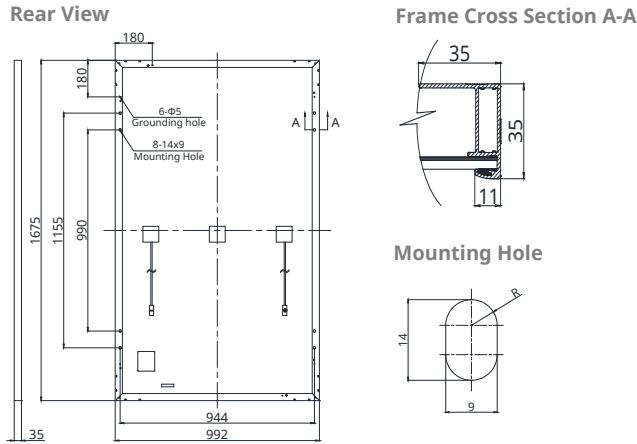
CANADIAN SOLAR INC. is committed to providing high quality solar products, solar system solutions and services to customers around the world. No. 1 module supplier for quality and performance/price ratio in IHS Module Customer Insight Survey. As a leading PV project developer and manufacturer of solar modules with over 30 GW deployed around the world since 2001.

* For detailed information, please refer to Installation Manual.

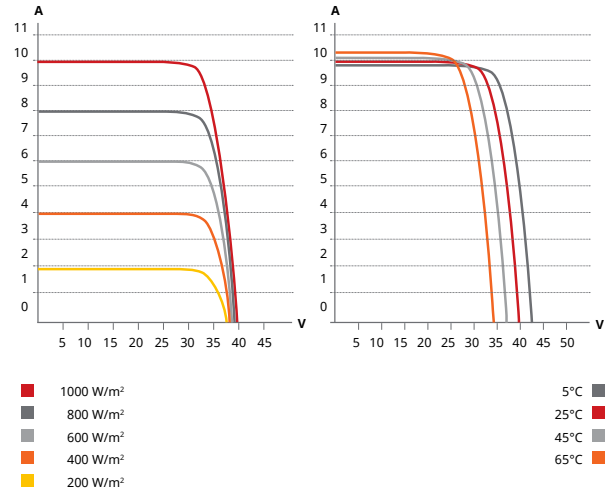
CANADIAN SOLAR INC.

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

ENGINEERING DRAWING (mm)



KuBlack CS3K-305MS / I-V CURVES



ELECTRICAL DATA | STC*

| KuBlack CS3K | 295MS | 300MS | 305MS | 310MS |
|---|---|--------|--------|--------|
| Nominal Max. Power (P _{max}) | 295 W | 300 W | 305 W | 310 W |
| Opt. Operating Voltage (V _{mp}) | 32.3 V | 32.5 V | 32.7 V | 32.9 V |
| Opt. Operating Current (I _{mp}) | 9.14 A | 9.24 A | 9.33 A | 9.43 A |
| Open Circuit Voltage (V _{oc}) | 39.1 V | 39.3 V | 39.5 V | 39.7 V |
| Short Circuit Current (I _{sc}) | 9.73 A | 9.82 A | 9.90 A | 9.98 A |
| Module Efficiency | 17.75% | 18.05% | 18.36% | 18.66% |
| Operating Temperature | -40°C ~ +85°C | | | |
| Max. System Voltage | 1500V (IEC/UL) or 1000V (IEC/UL) | | | |
| Module Fire Performance | TYPE 3 / Type 13 (UL 1703) or CLASS A (IEC61730) | | | |
| 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.

MECHANICAL DATA

| Specification | Data |
|------------------------------------|--|
| Cell Type | Mono-crystalline |
| Cell Arrangement | 120 [2 X (10 X 6)] |
| Dimensions | 1675 X 992 X 35 mm (65.9 X 39.1 X 1.38 in) |
| Weight | 18.5 kg (40.8 lbs) |
| Front Cover | 3.2 mm tempered glass |
| Frame | Anodized aluminium alloy |
| J-Box | IP68, 3 bypass diodes |
| Cable | 4.0 mm² (IEC), 12 AWG (UL), |
| Cable Length (Including Connector) | Portrait: 400 mm (15.7 in) (+) / 280 mm (11.0 in) (-); landscape: 1160 mm (45.7 in)* |
| Connector | T4 series |
| Per Pallet | 30 pieces |
| Per Container (40' HQ) | 840 pieces |

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

ELECTRICAL DATA | NMOT*

| KuBlack CS3K | 295MS | 300MS | 305MS | 310MS |
|---|--------|--------|--------|--------|
| Nominal Max. Power (P _{max}) | 219 W | 223 W | 227 W | 230 W |
| Opt. Operating Voltage (V _{mp}) | 29.8 V | 30.0 V | 30.2 V | 30.4 V |
| Opt. Operating Current (I _{mp}) | 7.35 A | 7.43 A | 7.50 A | 7.58 A |
| Open Circuit Voltage (V _{oc}) | 36.7 V | 36.8 V | 37.0 V | 37.2 V |
| Short Circuit Current (I _{sc}) | 7.85 A | 7.92 A | 7.99 A | 8.05 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.

TEMPERATURE CHARACTERISTICS

| Specification | Data |
|---|--------------|
| Temperature Coefficient (P _{max}) | -0.37 % / °C |
| Temperature Coefficient (V _{oc}) | -0.29 % / °C |
| Temperature Coefficient (I _{sc}) | 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 adjustment to the information described herein at any time without further notice.

CANADIAN SOLAR INC.

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SOLARMOUNT



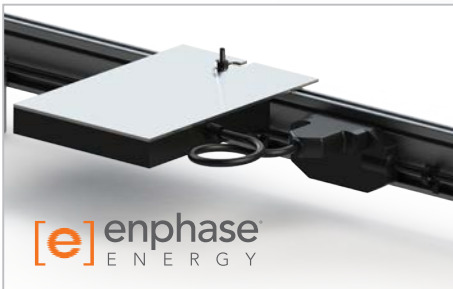
SOLARMOUNT defined the standard in solar racking. Features are designed to get installers off the roof faster. Our grounding & bonding process eliminates copper wire and grounding straps to reduce costs. Systems can be configured with standard or light rail to meet your design requirements at the lowest cost possible. The superior aesthetics package provides a streamlined clean edge for enhanced curb appeal, with no special brackets required for installation.



Now Featuring:

THE NEW FACE OF SOLAR RACKING

Superior Aesthetics Package



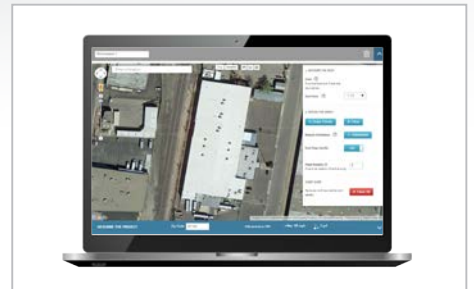
LOSE ALL OF THE COPPER & LUGS

System grounding through Enphase microinverters and trunk cables



SMALL IS THE NEXT NEW BIG THING

Light Rail is Fully Compatible with all SM Components



ENHANCED DESIGN & LAYOUT TOOLS

Featuring Google Map Capabilities within U-Builder

FAST INSTALLATION. SUPERIOR AESTHETICS

OPTIMIZED COMPONENTS • VERSATILITY • DESIGN TOOLS • QUALITY PROVIDER

SOLARMOUNT

UNIRAC

OPTIMIZED COMPONENTS

INTEGRATED BONDING & PRE-ASSEMBLED PARTS

Components are pre-assembled and optimized to reduce installation steps and save labor time. Our new grounding & bonding process eliminates copper wire and grounding straps or bonding jumpers to reduce costs. Utilize the microinverter mount with a wire management clip for an easier installation.

VERSATILITY

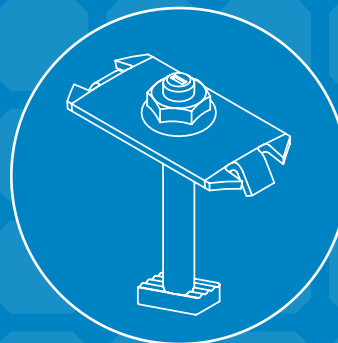
ONE PRODUCT - MANY APPLICATIONS

Quickly set modules flush to the roof or at a desired tilt angle. Change module orientation to portrait or landscape while securing a large variety of framed modules on flat, low slope or steep pitched roofs. Available in mill, clear and dark anodized finishes to outperform your projects financial and aesthetic aspirations.

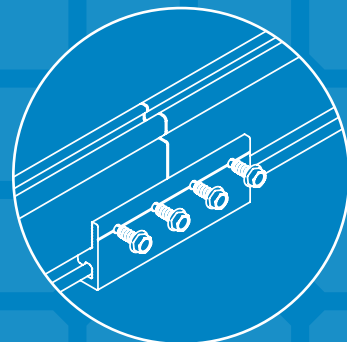
AUTOMATED DESIGN TOOL

DESIGN PLATFORM AT YOUR SERVICE

Creating a bill of materials is just a few clicks away with U-Builder, a powerful online tool that streamlines the process of designing a code compliant solar mounting system. Save time by creating a user profile, and recall preferences and projects automatically when you log in. You will enjoy the ability to share projects with customers: there's no need to print results and send to a distributor, just click and share.



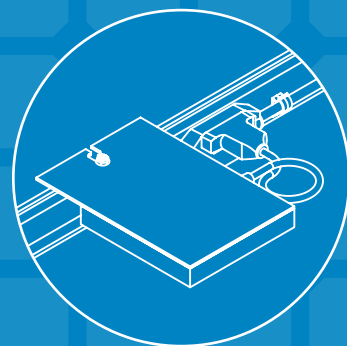
INTEGRATED BONDING
MIDCLAMP



INTEGRATED BONDING
SPLICE BAR



INTEGRATED BONDING
L-FOOT w/ T-BOLT



INTEGRATED BONDING
MICROINVERTER MOUNT w/
WIRE MANAGEMENT



LISTED

UL2703

BONDING & GROUNDING
MECHANICAL LOADING
SYSTEM FIRE CLASSIFICATION

UNIRAC CUSTOMER SERVICE MEANS THE HIGHEST LEVEL OF PRODUCT SUPPORT



UNMATCHED
EXPERIENCE



CERTIFIED
QUALITY



ENGINEERING
EXCELLENCE



BANKABLE
WARRANTY



DESIGN
TOOLS



PERMIT
DOCUMENTATION

TECHNICAL SUPPORT

Unirac's technical support team is dedicated to answering questions & addressing issues in real time. An online library of documents including engineering reports, stamped letters and technical data sheets greatly simplifies your permitting and project planning process.

CERTIFIED QUALITY PROVIDER

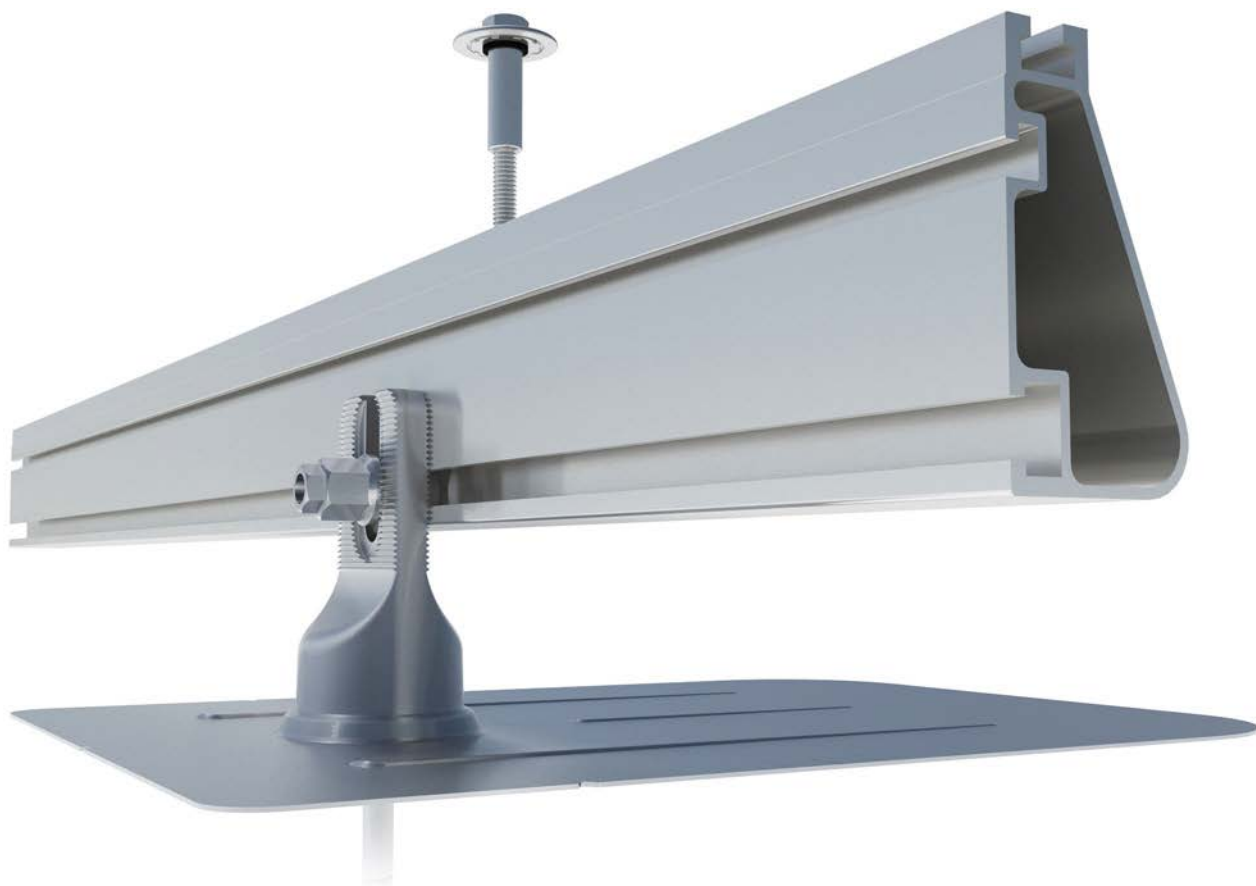
Unirac is the only PV mounting vendor with ISO certifications for 9001:2015, 14001:2015 and OHSAS 18001:2007, which means we deliver the highest standards for fit, form, and function. These certifications demonstrate our excellence and commitment to first class business practices.

BANKABLE WARRANTY

Don't leave your project to chance, Unirac has the financial strength to back our products and reduce your risk. Have peace of mind knowing you are receiving products of exceptional quality. SOLARMOUNT is covered by a twenty five (25) year limited product warranty and a five (5) year limited finish warranty.

PROTECT YOUR REPUTATION WITH QUALITY RACKING SOLUTIONS BACKED BY ENGINEERING EXCELLENCE AND A SUPERIOR SUPPLY CHAIN

PUB2017FEB28 - PRINTED



Built for solar's toughest roofs.

IronRidge builds the strongest mounting system for pitched roofs in solar. Every component has been tested to the limit and proven in extreme environments.

Our rigorous approach has led to unique structural features, such as curved rails and reinforced flashings, and is also why our products are fully certified, code compliant and backed by a 25-year warranty.



Strength Tested

All components evaluated for superior structural performance.



PE Certified

Pre-stamped engineering letters available in most states.



Class A Fire Rating

Certified to maintain the fire resistance rating of the existing roof.



Design Assistant

Online software makes it simple to create, share, and price projects.



UL 2703 Listed System

Entire system and components meet newest effective UL 2703 standard.



25-Year Warranty

Products guaranteed to be free of impairing defects.

XR Rails ☺

XR10 Rail



A low-profile mounting rail for regions with light snow.

- 6' spanning capability
- Moderate load capability
- Clear and black finish

XR100 Rail



The ultimate residential solar mounting rail.

- 8' spanning capability
- Heavy load capability
- Clear and black finish

XR1000 Rail



A heavyweight mounting rail for commercial projects.

- 12' spanning capability
- Extreme load capability
- Clear anodized finish

Bonded Splices



All rails use internal splices for seamless connections.

- Self-drilling screws
- Varying versions for rails
- Forms secure bonding

Clamps & Grounding ☺

UFOs



Universal Fastening Objects bond modules to rails.

- Fully assembled & lubed
- Single, universal size
- Clear and black finish

Stopper Sleeves



Snap onto the UFO to turn into a bonded end clamp.

- Bonds modules to rails
- Sized to match modules
- Clear and black finish

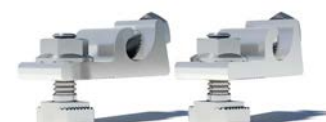
CAMO



Bond modules to rails while staying completely hidden.

- Universal end-cam clamp
- Tool-less installation
- Fully assembled

Grounding Lugs



Connect arrays to equipment ground.

- Low profile
- Single tool installation
- Mounts in any direction

Attachments ☺

FlashFoot2



Flash and mount XR Rails with superior waterproofing.

- Twist-on Cap eases install
- Wind-driven rain tested
- Mill and black finish

Conduit Mount



Flash and mount conduit, strut, or junction boxes.

- Twist-on Cap eases install
- Wind-driven rain tested
- Secures 3/4" or 1" conduit

Slotted L-Feet



Drop-in design for rapid rail attachment.

- Secure rail connections
- Slot for vertical adjusting
- Clear and black finish

Bonding Hardware



Bond and attach XR Rails to roof attachments.

- T & Square Bolt options
- Nut uses 7/16" socket
- Assembled and lubricated

Resources



Design Assistant

Go from rough layout to fully engineered system. For free.

[Go to IronRidge.com/design](https://IronRidge.com/design)



NABCEP Certified Training

Earn free continuing education credits, while learning more about our systems.

[Go to IronRidge.com/training](https://IronRidge.com/training)

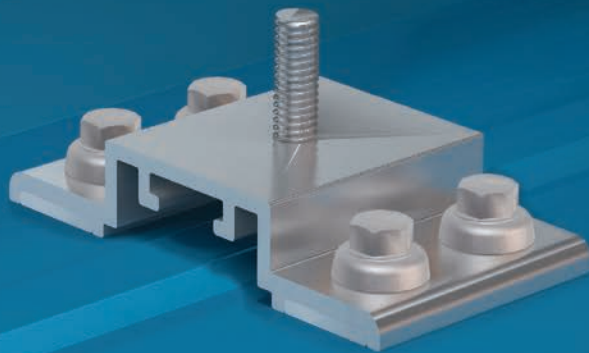
S-5!®

The Right Way!

NEW PRODUCT
SolarFoot™

Introducing the new SolarFoot™ for exposed fastener metal roofing with the strength, testing, quality, and time-proven integrity you expect from S-5!. The SolarFoot provides an ideal mounting platform to attach the L-Foot (not included) of a rail-mounted PV system to the roof. This solution is The Right Way to secure rail-mounted solar systems to exposed fastener metal such as AG-Panel or R-Panel.

The right way to attach almost anything to metal roofs!



SolarFoot Features:

Manufactured in the U.S.A. from certified raw material

Fabricated in our own ISO 9001:2015 certified factory

All aluminum and stainless components
25yr limited warranty

Compatible with all commercial L-Foot products on the market

Factory applied 40-year isobutylene/isoprene crosslink polymer sealant for reliable weathertightness

Sealant reservoir to prevent over-compression of sealant

Load-to-failure tested Normal to Seam by a nationally accredited laboratory on numerous metal roof materials and substrates

Four points of attachment into structure or deck with tested holding strength for engineered applications

Integrated M8-1.25x17mm stud and M8-1.25 stainless steel hex flange nut included

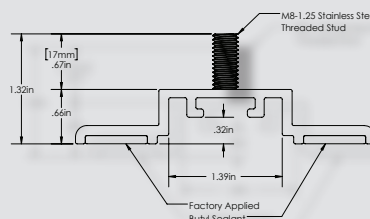
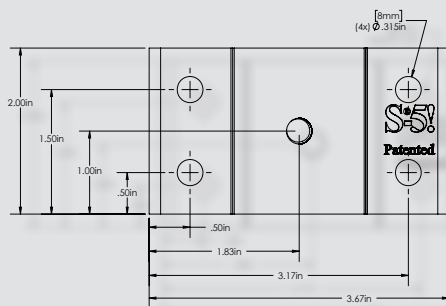


888-825-3432 | www.S-5.com



SolarFoot™ Mounting for Exposed Fastener Roofing

The SolarFoot is a simple, cost-effective pedestal for L-Foot (not included) attachment of rail-mounted solar PV. The unique design is compatible with all rail producer L-Foot components. The new SolarFoot assembly ensures a durable weathertight solution for the life of the roof. Special factory applied butyl co-polymeric sealant contained in a reservoir is The Right Way, allowing a water-tested seal. Stainless integrated stud and hex flange lock-nut secure the L-Foot into position. A low center of gravity reduces the moment arm commonly associated with L-Foot attachments. Direct attachment of the SolarFoot to the structural member or deck provides unparalleled holding strength.



**Fasteners sold separately. Fastener type varies with substrate. Contact S-5! on how to purchase fasteners and obtain our test results. L-Foot also sold separately.*

Fastener Selection



Metal to Metal:
1/4-14 Self Drilling Screw
1-1/2" to 2-1/2"



Metal to Wood:
1/4-14 Type 17 AB Milled Point
1-1/2" to 2-1/2"

To source fasteners for your projects, contact S-5!

When other brands claim to be "just as good as S-5!", tell them to PROVE IT.

SolarFoot Advantages:

Exposed fastener mounting platform for solar arrays attached via L-Foot and Rails

Weatherproof attachment to exposed fastener roofing

Butyl sealant reservoir provides long-term waterproof seal

M8-1.25x17mm stud with M8 hex flange nut for attachment of all popular L-Foot/rail combinations

Tool: 13 mm Hex Socket or 1/2" Hex Socket

Tool Required: Electric screw gun with hex drive socket for self-tapping screws.

Low Center of Gravity reduces moment arm commonly associated with L-Foot/Rail solar mounting scenarios

Attaches directly to structure or deck for optimal holding strength

S-5! Recommended substrate-specific (e.g. steel purlin, wood 2x4, OSB, etc.) fasteners provide excellent waterproofing and pull-out strength

Fastener through-hole locations comply with NDS (National Design Specification) for Wood Construction

S-5!® Warning! Please use this product responsibly!

The independent lab test data found at www.S-5.com can be used for load-critical designs and applications.

Products are protected by multiple U.S. and foreign patents. For published data regarding holding strength, fastener torque, patents, and trademarks, visit the S-5! website at www.S-5.com. Copyright 2017, Metal Roof Innovations, Ltd. S-5! products are patent protected.

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Distributed by:

Power Optimizer

For North America

P320 / P340 / P370 / P400 / P405 / P505



POWER OPTIMIZER

PV power optimization at the module-level

- Specifically designed to work with SolarEdge inverters
- Up to 25% more energy
- Superior efficiency (99.5%)
- Mitigates all types of module mismatch losses, from manufacturing tolerance to partial shading
- Flexible system design for maximum space utilization
- Fast installation with a single bolt
- Next generation maintenance with module-level monitoring
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)
- Module-level voltage shutdown for installer and firefighter safety

/ Power Optimizer

For North America

P320 / P340 / P370 / P400 / P405 / P505

| Optimizer model (typical module compatibility) | P320 (for 60-cell modules) | P340 (for high-power 60-cell modules) | P370 (for higher-power 60 and 72-cell modules) | P400 (for 72 & 96-cell modules) | P405 (for thin film modules) | P505 (for higher current modules) | |
|--|--|--|---|------------------------------------|--------------------------------------|--------------------------------------|---------|
| INPUT | | | | | | | |
| Rated Input DC Power ⁽¹⁾ | 320 | 340 | 370 | 400 | 405 | 505 | W |
| Absolute Maximum Input Voltage (Voc at lowest temperature) | 48 | | 60 | 80 | 125 ⁽²⁾ | 87 ⁽²⁾ | Vdc |
| MPPT Operating Range | 8 - 48 | | 8 - 60 | 8 - 80 | 12.5 - 105 | 12.5 - 87 | Vdc |
| Maximum Short Circuit Current (Isc) | 11 | | | 10.1 | | 14 | Adc |
| Maximum DC Input Current | 13.75 | | | 12.5 | | 17.5 | Adc |
| Maximum Efficiency | 99.5 | | | | | | % |
| Weighted Efficiency | 98.8 | | | | | 98.6 | % |
| Overvoltage Category | II | | | | | | |
| OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREEDGE INVERTER) | | | | | | | |
| Maximum Output Current | 15 | | | | | | Adc |
| Maximum Output Voltage | 60 | | | | 85 | | Vdc |
| OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREEDGE INVERTER OR SOLAREEDGE 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 | | | | | | |
| Material | UL94 V-0 , UV Resistant | | | | | | |
| RoHS | Yes | | | | | | |
| INSTALLATION SPECIFICATIONS | | | | | | | |
| Maximum Allowed System Voltage | 1000 | | | | | | Vdc |
| Compatible inverters | All SolarEdge Single Phase and Three Phase inverters | | | | | | |
| Dimensions (W x L x H) | 129 x 153 x 27.5 / 5.1 x 6 x 1.1 | | | 129 x 153 x 33.5 / 5.1 x 6 x 1.3 | 129 x 159 x 49.5 / 5.1 x 6.3 x 1.9 | 129 x 162 x 59 / 5.1 x 6.4 x 2.3 | mm / in |
| Weight (including cables) | 630 / 1.4 | | | 750 / 1.7 | 845 / 1.9 | 1064 / 2.3 | gr / lb |
| Input Connector | MC4 ⁽³⁾ | | | | Single or dual MC4 ⁽³⁾⁽⁴⁾ | MC4 ⁽³⁾ | |
| Input Wire Length | 0.16 / 0.52 | | | | | | m / ft |
| Output Wire Type / Connector | Double Insulated / MC4 | | | | | | |
| Output Wire Length | 0.9 / 2.95 | | 1.2 / 3.9 | | | | m / ft |
| Operating Temperature Range ⁽⁵⁾ | -40 - +85 / -40 - +185 | | | | | | °C / °F |
| Protection Rating | IP68 / NEMA6P | | | | | | |
| 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⁾ NEC 2017 requires max input voltage be not more than 80V

⁽³⁾ For other connector types please contact SolarEdge

⁽⁴⁾ For dual version for parallel connection of two modules use the P405. In the case of an odd number of PV modules in one string, installing one P405 dual version power optimizer

⁽⁵⁾ For ambient temperature above +85°C / +185°F power de-rating is applied. Refer to Power Optimizers Temperature De-Rating Technical Note for more details.

| PV System Design Using a SolarEdge Inverter ⁽⁶⁾⁽⁷⁾ | | Single Phase HD-Wave | Single phase | Three Phase 208V | Three Phase 480V | |
|---|------------------------|---|--------------|---------------------|-----------------------|---|
| Minimum String Length (Power Optimizers) | P320, P340, P370, P400 | 8 | | 10 | 18 | |
| | P405 / P505 | 6 | | 8 | 14 | |
| Maximum String Length (Power Optimizers) | | 25 | | 25 | 50 ⁽⁸⁾ | |
| Maximum Power per String | | 5700 (6000 with SE7600-US - SE11400-US) | 5250 | 6000 ⁽⁹⁾ | 12750 ⁽¹⁰⁾ | W |
| Parallel Strings of Different Lengths or Orientations | | Yes | | | | |

⁽⁶⁾ For detailed string sizing information refer to: http://www.solaredge.com/sites/default/files/string_sizing_na.pdf

⁽⁷⁾ It is not allowed to mix P405/P505 with P320/P340/P370/P400 in one string

⁽⁸⁾ A string with more than 30 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement

⁽⁹⁾ For SE14.4KUS/SE43.2KUS: It is allowed to install up to 6,500W per string when 3 strings are connected to the inverter (3 strings per unit for SE43.2KUS) and when the maximum power difference between the strings is up to 1,000W

⁽¹⁰⁾ For SE30KUS/SE33.3KUS/SE66.6KUS/SE100KUS: It is allowed to install up to 15,000W per string when 3 strings are connected to the inverter (3 strings per unit for SE66.6KUS/SE100KUS) and when the maximum power difference between the strings is up to 2,000W



Single Phase Inverter with HD-Wave Technology for North America

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

INVERTERS



Optimized installation with HD-Wave technology

- Specifically designed to work with power optimizers
- Record-breaking efficiency
- 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
- Extremely small
- High reliability without any electrolytic capacitors
- Built-in module-level monitoring
- Outdoor and indoor installation
- Optional: Revenue grade data, ANSI C12.20 Class 0.5 (0.5% accuracy)





Single Phase Inverter

with HD-Wave Technology for North America

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

| | SE3000H-US | SE3800H-US | SE5000H-US | SE6000H-US | SE7600H-US | SE10000H-US | SE11400H-US | |
|--|------------|----------------------------|---|---|------------|-------------|--|---------|
| OUTPUT | | | | | | | | |
| Rated AC Power Output | 3000 | 3800 @ 240V 3300 @ 208V | 5000 | 6000 @ 240V 5000 @ 208V | 7600 | 10000 | 11400 | VA |
| Max. AC Power Output | 3000 | 3800 @ 240V 3300 @ 208V | 5000 | 6000 @ 240V 5000 @ 208V | 7600 | 10000 | 11400 | VA |
| AC Output Voltage Min.-Nom.-Max. (183 - 208 - 229) | - | | - | | - | - | - | Vac |
| AC Output Voltage Min.-Nom.-Max. (211 - 240 - 264) | | | | | | | | Vac |
| AC Frequency (Nominal) | | | | 59.3 - 60 - 60.5 ⁽¹⁾ | | | | Hz |
| Maximum Continuous Output Current 208V | - | 16 | - | 24 | - | - | - | A |
| Maximum Continuous Output Current @240V | 12.5 | 16 | 21 | 25 | 32 | 42 | 47.5 | A |
| 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 | - | - | - | |
| Transformer-less, Ungrounded | | | | Yes | | | | |
| Maximum Input Voltage | | | | 480 | | | | Vdc |
| Nominal DC Input Voltage | | 380 | | | | 400 | | Vdc |
| Maximum Input Current 208V | - | 9 | - | 13.5 | - | - | - | |
| Maximum Input Current @240V | 8.5 | 10.5 | 13.5 | 16.5 | 20 | 27 | 30.5 | Adc |
| Max. Input Short Circuit Current | | | | 45 | | | | Adc |
| Reverse-Polarity Protection | | | | Yes | | | | |
| Ground-Fault Isolation Detection | | | | 600k Ω Sensitivity | | | | |
| Maximum Inverter Efficiency | 99 | | | 99.2 | | | | % |
| CEC Weighted Efficiency | | | | 99 | | | | % |
| Nighttime Power Consumption | | | | < 2.5 | | | | W |
| ADDITIONAL FEATURES | | | | | | | | |
| Supported Communication Interfaces | | | | RS485, Ethernet, ZigBee (optional), Cellular (optional) | | | | |
| Revenue Grade Data, ANSI C12.20 | | | | Optional ⁽²⁾ | | | | |
| 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 AFCL according to T.I.L. M-07 | | | | |
| Grid Connection Standards | | | | IEEE1547, Rule 21, Rule 14 (H) | | | | |
| Emissions | | | | FCC Part 15 Class B | | | | |
| INSTALLATION SPECIFICATIONS | | | | | | | | |
| AC Output Conduit Size / AWG Range | | | | 3/4" minimum / 14-6 AWG | | | 3/4" minimum / 14-4 AWG | |
| DC Input Conduit Size / # of Strings / AWG Range | | | | 3/4" minimum / 1-2 strings / 14-6 AWG | | | 3/4" minimum / 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 | | | | Natural convection | |
| Operating Temperature Range | | | -13 to +140 / -25 to +60 ⁽³⁾ (-40°F / -40°C option) ⁽⁴⁾ | | | | | °F / °C |
| Protection Rating | | | | NEMA 3R (Inverter with Safety Switch) | | | | |

⁽¹⁾ For other regional settings please contact SolarEdge support

⁽²⁾ Revenue grade inverter P/N: SExxxxH-US000NCC2

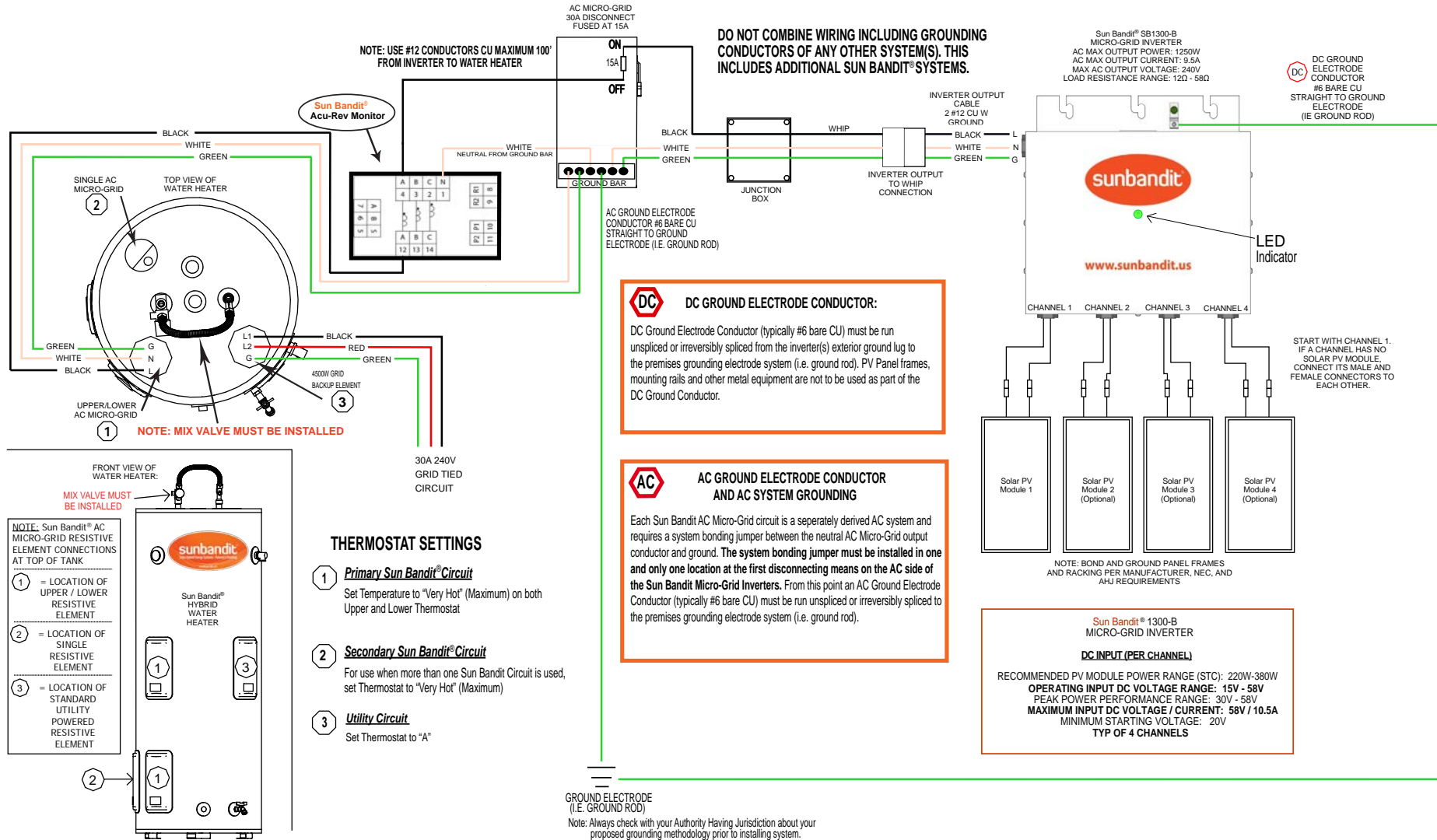
⁽³⁾ For power de-rating information refer to: <https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf>

⁽⁴⁾ -40 version P/N: SExxxxH-US000NNU4



RoHS

SERIES 1300-B THREE-LINE



NOTE: ALL WORK TO BE PERFORMED BY QUALIFIED PERSONNEL. ALL WORK TO BE DONE PER AHJ AND UTILITY REQUIREMENTS. ALL INSTALLATION CONDITIONS TO BE FIELD VERIFIED FOR APPROPRIATENESS.

Series 1300-B THREE-LINE

Version 1309