

HISTORIC LANDMARK COMMISSION STAFF REPORT



Planning and Zoning Division
Department of Community and
Economic Development

Fern Street Solar Panels Minor Alterations PLNHLC2014-00396 210 W. Fern Street Meeting Date: August 7, 2014

Applicant: Garrett Jensen of Go Solar Group

Staff: Maryann Pickering at (801) 535-7660 or maryann.pickering@slcgov.com

Tax ID: 08-25-455-03

Current Zone: SR-1A (Special Development Pattern Residential District)

Master Plan Designation: Low Density Residential (5-15 dwelling units per acre)

Council District: District 3 represented by Stan Penfold

Lot Size: Approximately 3,485 square feet

Current Use: Single Family

Applicable Land Use Regulations:

- 21A.34.020
- 21A.40.190

Notification

- Notice mailed on July 25, 2014
- Agenda posted on the Planning Division and Utah Public Meeting Notice websites on July 25, 2014

Attachments

- A. Proposed Plans
- B. Photos

Request

Garrett Jensen of Go Solar, representing the property owner Brian Richards, is requesting approval from the City to locate a small solar energy collection system on the roof of the front gable of a single-family residence located in the Capitol Hill Historic District.

This type of project must be reviewed as Minor Alteration by the Historic Landmark Commission as is it for a photovoltaic system which may be visible from a public right of way.

Staff Recommendation

Staff recommends that the Historic Landmark Commission review the application, and approve the location of the proposed small solar energy collection system pursuant to the findings, analysis and conditions of approval in this staff report.

Potential Motions

Consistent with Staff Recommendation: Based on the analysis and findings listed in this staff report, testimony and the proposal presented, I move that the Commission approve the request for a minor alteration for the installation of a small solar energy collection system on the roof of the front gable and visible from the public right-of-way for the residence at 210 W. Fern Street. Specifically, the Commission finds that the proposed project complies with the review standards.

-or-

Not Consistent with Staff Recommendation: Based on the testimony and the proposal presented, I move that the Commission deny the request for a minor alteration for the installation of a small solar energy collection system on the roof of the front gable and visible from the public right-of-way the residence at 210 W. Fern Street based on the following findings (Commissioner then states findings based on the Standards to support the motion):

1. A property shall be used for its historic purpose or be used for a purpose that requires minimal change to the defining characteristics of the building and its site and environment;
2. The historic character of a property shall be retained and preserved. The removal of historic materials or alteration of features and spaces that characterize a property shall be avoided;

	<ol style="list-style-type: none">3. All sites, structures and objects shall be recognized as products of their own time. Alterations that have no historical basis and which seek to create a false sense of history or architecture are not allowed;4. Alterations or additions that have acquired historic significance in their own right shall be retained and preserved;5. Distinctive features, finishes and construction techniques or examples of craftsmanship that characterize a historic property shall be preserved;6. Deteriorated architectural features shall be repaired rather than replaced wherever feasible. In the event replacement is necessary, the new material should match the material being replaced in composition, design, texture and other visual qualities. Repair or replacement of missing architectural features should be based on accurate duplications of features, substantiated by historic, physical or pictorial evidence rather than on conjectural designs or the availability of different architectural elements from other structures or objects;7. Chemical or physical treatments, such as sandblasting, that cause damage to historic materials shall not be used. The surface cleaning of structures, if appropriate, shall be undertaken using the gentlest means possible;8. Contemporary design for alterations and additions to existing properties shall not be discouraged when such alterations and additions do not destroy significant cultural, historical, architectural or archaeological material, and such design is compatible with the size, scale, color, material and character of the property, neighborhood or environment;9. Additions or alterations to structures and objects shall be done in such a manner that if such additions or alterations were to be removed in the future, the essential form and integrity of the structure would be unimpaired. The new work shall be differentiated from the old and shall be compatible in massing, size, scale and architectural features to protect the historic integrity of the property and its environment;10. Certain building materials are prohibited including the following:<ol style="list-style-type: none">a. Aluminum, asbestos, or vinyl cladding when applied directly to an original or historic material.11. Any new sign and any change in the appearance of any existing sign located on a landmark site or within the H historic preservation overlay district, which is visible from any public way or open space shall be consistent with the historic character of the landmark site or H historic preservation overlay district and shall comply with the standards outlined in chapter 21A.46 of this title.
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Vicinity Map



Background and Project Description

The subject property located at 210 W. Fern Street and is considered a contributing historic property in the Capitol Hill Historic District. The residence is classified in the most recent survey as a Victorian Eclectic that was built in 1894. The house has a large gable at the front and is covered with asphalt shingles. This large gable at the front is the location where the small

solar energy collection system is proposed to be located. The proposed solar panels will be located on the east and west sides of the gable. They will also be located three feet back from the face of the gable roof feature.

The applicant is requesting to place a total of 11 solar panels on the roof. There would be four panels on the east side and seven on the west side. The panels are approximately 5½ feet long by 3½ feet wide. Each panel has an area of approximately 19¼ feet. The panels will be mounted in different directions on the roof in order to maximize the number the panels on the roof. The panels themselves are only about 1½ inches thick, but will project above the roof approximately 4½ inches with the mounting bracket. The panels will be black in color and the color of the roofing material is tan. The total area of all 11 solar panels is approximately 228 square feet.

This location was chosen as it gives the best east/west exposure for the small solar energy collection system. The remainder of the roof has very little area that would provide an east/west alignment for efficient sun exposure. In addition, the front of the residence gives a little more southern exposure in the morning or afternoon. The small portion of the roof that does have direct southern exposure will not have panels located on it. Staff discussed moving the location to the rear of the residence so they would not be as readily visible from the street, but the applicant stated that this was the most effective area for the small solar energy collection system.

Public Comments

Staff has received one telephone call regarding the proposed project. The caller who lives in the area stated that he supported the idea of solar panels, but was not in favor of the panels being located on the front side of a historic building in a historic district.

Any additional comments received prior to the meeting will be forwarded to the members of the Historic Landmark Commission.

Zoning Ordinance Standards and Priorities

21A.40.190.A – Small Solar Energy Collection Systems Standards

1. Setbacks, Location, and Height:
 - a. A small solar energy collection system shall be located a minimum of six feet from all property lines and other structures, except the structure on which it is mounted.

Analysis: The proposed small solar energy collection system is proposed to be located on the roof of the existing residence. The residence itself is located approximately three feet from the property line. The location of the system will not overhang the roof and will not encroach into any front, side or rear lot area. As long as the system is mounted on the main structure, it is allowed to be less than six feet from the property if it is determined by the Historic Landmark Commission to meet all other standards of the ordinance.

Finding: This standard will be met if the proposed small solar energy collection system is found to comply with other applicable sections of the Zoning Ordinance.

- b. A small solar energy collection system may be located on an accessory structure including legal accessory structures located less than six feet from a property line.

Analysis: The proposed small solar energy collection is located on the primary structure. The subject property does not have any accessory structures located on it where the small solar energy collection system could be located.

Finding: This standard is not applicable.

- c. A small solar energy collection system shall not exceed by more than three feet the maximum building height (based on the type of building – principal or accessory - the system is located on) permitted in the zoning district in which it is located or shall not extend more than 12 feet above the roofline of the structure upon which it is mounted, whichever is less.

Analysis: The proposed small solar energy collection system is proposed to be mounted as flush with the roof as possible, parallel to the roof plane, below the ridge of the roofline. The solar panels themselves will project approximately four inches above the roof, but not above the roof ridge. In addition, the existing one-story residence is well below the maximum height of 23 feet for the zoning district.

Finding: This standard is met.

- d. A development proposed to have a small solar energy collection system located on the roof or attached to a structure, or an application to establish a system on an existing structure, shall provide a structural certification as part of the building permit application.

Analysis: The applicant will need to submit all necessary documentation for the installation and structural details for the proposed small solar energy collection system.

Finding: This standard will need to be met should the request be approved and a building permit is applied for.

- 2. Coverage: A small solar energy collection system mounted to the roof of a building shall not exceed 90% of the total roof area of the building upon which it is installed. A system constructed as a separate accessory structure on the ground shall count toward the total building and yard coverage limits for the lot on which it is located.

Analysis: The proposed small solar energy collection system is proposed to be mounted on the main residence and not on an accessory building. The proposed size of the small solar energy collection system is approximately 228 square feet. The total area of the roof where it will be placed is approximately 750 square feet. This means that the proposed small solar energy collection system will only be about 30% of the roof area.

Finding: This standard has been met.

3. Code Compliance: Small solar energy collection systems shall comply with all applicable building and electrical codes contained in the international building code adopted by Salt Lake City.

Analysis: Should the proposed small solar energy collection system be approved, it will need to comply with all applicable codes adopted by Salt Lake City.

Finding: This standard will need to be met should the request be approved and a building permit is applied for.

4. Solar Easements: A property owner who has installed or intends to install a small solar energy collection system shall be responsible for negotiating with other property owners in the vicinity for any desired solar easement to protect solar access for the system and shall record the easement with the Salt Lake County Recorder.

Analysis: The applicant will be responsible for negotiating with other property owners for any desired solar easements.

Finding: This standard is not applicable to the approval of this project.

5. Off Street Parking and Loading Requirements: Small solar energy collection systems shall not remove or encroach upon required parking or loading areas for other uses on the site or access to such parking or loading areas.

Analysis: The proposed small solar energy collection system is located on the main residence and is not located upon any required parking area.

Finding: This standard has been met.

21A.4.0190.B.3 – Small Solar Collection Systems and Historic Preservation Overlay Districts or Landmark Sites: Small Solar Collection System Location Priorities

3. Small Solar Collection System Location Priorities: In approving appropriate locations and manner of installation, consideration shall include the following locations in the priority order they are set forth below. The method of installation approved shall be the least visible from a public right of way, not including alleys, and most compatible with the character defining features of the historic building, structure, or site. Systems proposed for locations in subsections B.3.a through B.3.d of this section, which are not

readily visible from a public right of way may be reviewed administratively as set forth in subsection 21A.34.020.F.1, “Administrative Decision”, of this title. Systems proposed for locations in subsections B.3.e and B.3.f of this section, which may be visible from a public right of way shall be reviewed by the Historic Landmark Commission in accordance with the procedures set forth in subsection 21A.34.020.F.2, “Historic Landmark Commission”, of this title.

- a. Rear yard in a location not readily visible from a public right of way.
- b. On accessory buildings or structures in a location not readily visible from a public right of way.
- c. In a side yard in a location not readily visible from a public right of way.
- d. On the principal building in a location not readily visible from a public right of way.
- e. On the principal building in a location that may be visible from a public right of way, but not on the structure’s front facade.

Analysis: The rear yard is not an option for installation as the yard area would not be large enough to place the system and also conform to all setbacks and distance requirements. In addition, vegetation that is present in the rear yard could prevent adequate exposure for the proposed solar panels.

There is no accessory building on this lot so the solar panels cannot be mounted on an accessory structure. An accessory structure mounting is not an option.

The existing residence has narrow side yard setbacks that would not accommodate the small solar energy collection system. Locating the proposed small solar energy collection system in the side yard is not feasible as there is not enough room in the side yard to locate the system.

Based on the shape of the roof, there is no other location where the panels could be located to meet the sun exposure requirements and not be visible from the public right-of-way. The only portion of the roof that faces north is on the backside of the residence and that location is not suitable for solar panels. There would be minimal solar exposure for the system.

Finding: This application cannot be administratively approved as the preferred locational priorities are not suitable based on the orientation, size and site features of this property as described above.

- f. On the front gable of the principal building in a location most compatible with the character defining features of the structure.

Analysis: The location of the proposed small solar collection system on the front gable roof is the most compatible location with the character defining features of the building. The front gable of the residence gives it a distinct character and is a prominent feature of the property. While the proposed small solar collection system is proposed to be located on this gable, which does not directly face the street, it will not be detrimental to the residence or its features. The proposed small solar collections system will be located as flush to the roof as possible and it not a feature that will permanently alter the historic structure. The proposed small solar collection system could easily be removed in the future with little to no damage to the historic structure.

Finding: The proposed location is the location that is most compatible with the existing roof form of the residence and the only location that would provide adequate exposure to the sun for the system to properly work. This standard has been met.

21A.4.0190.B.2 – Small Solar Collection Systems and Historic Preservation Overlay Districts or Landmark Sites

1. General: In addition to meeting the standards set forth in this section, all applications to install a small solar collection system within the historic preservation overlay district shall obtain a Certificate of Appropriateness prior to installation. Small solar collection systems shall be allowed in accordance with the location priorities detailed in subsection B.3 of this section. If there is any conflict between the provisions of this subsection B, and any other requirements of this section, the provisions of this subsection B shall take precedence.

Analysis: As noted above in the analysis of the locational priorities, there are some preferred locations for installation of the proposed small solar energy collection system that will not work on this particular property. Staff has noted that each of the priority locations and why each one of them will not work due to location on the property and maximum sun exposure, small side yards at the property and the lack of an accessory structure in the rear.

Finding: The proposed location, while it is not one of the priority locations, is the best possible location for the proposed small solar energy collection system, on the site. Should the application be approved by the Historic Landmark Commission, the applicant will need to obtain a Certificate of Appropriateness and this standard will be met.

2. Installation Standards: The small solar energy collection system shall be installed in a location and manner on the building or lot that is least visible and obtrusive and in such a way that causes the least impact to the historic integrity and character of the historic

building, structure, site or district while maintaining efficient operation of the solar device. The system must be installed in such a manner that it can be removed and not damage the historic building, structure, or site it is associated with.

Analysis: The proposed location for the small solar energy collection system has been chosen as it is the least visible or obtrusive on the property. While the proposed system is located at the front of the residence, it is not proposed to be located on the front façade that faces the public right-of-way. This is perpendicular to the public right-of-way and will not be as readily visible as if it was placed on the front façade facing south. In addition, the proposed system will be placed on the roof and will not damage the main components of the historic structure. The proposed system could be removed in the future with some damage to the roof, but the roof and its asphalt shingles are not original to the residence. The shape or character of the gable on which it will be placed will not be affected.

Finding: The proposed location of the small solar energy collection system will be the least obtrusive to the historic nature of the residence and property and can be easily removed in the future with minimal impact to the roof, not the roof structure. This location has also been chosen as it will be the most efficiently location for the system to operate.

21A.34.020.G – H Historic Preservation Overlay District – Standards for Certificate of Appropriateness for Altering of a Landmark Site or Contributing Structure

In considering an application for a Certificate of Appropriateness for alteration of a landmark site or contributing structure, the Historic Landmark Commission shall find that the project substantially complies with all of the general standards that pertain to the application and that the decision is in the best interest of the City.

Standard 1: A property shall be used for its historic purpose or be used for a purpose that requires minimal change to the defining characteristics of the building and its site and environment;

Analysis: The building was constructed in 1894 as a single family home. No change of use is proposed and very little, if any, impact will be made to the characteristics of the home. In the event the proposed small solar collection system damages the roof, it would most likely only damage the roofing material which is not original.

Finding: This standard is met.

Standard 2: The historic character of a property shall be retained and preserved. The removal of historic materials or alteration of features and spaces that characterize a property shall be avoided;

A Preservation Handbook for Historic Residential Properties & Districts in Salt Lake City
Design Objective 7.6

The visual impact of skylights and other rooftop devices should be minimized.

- Skylights or solar panels should be installed to reflect the plane of the historic roof.
- They should be lower than the ridgeline, when possible.
- Flat skylights and solar panels that are parallel with the roof plane may be appropriate on the rear and sides of the roof.
- Avoid locating a skylight or solar panel on a front roof plane wherever possible.

Analysis: No historic materials or features are proposed to be altered as part of this request. The proposed small solar collection system will be mounted on the roof and can easily be removed in the future with little to no impact on the structural integrity of the property. They will be placed parallel to the roof or approximately 4½ inches off the roof surface. They are designed to be as flush with the roof as possible. The solar panels will also be placed along the east and west roof planes and not along the south roof plane. Even though all the panels will be visible from the street on the east and west sides of the front gable, the options for where to place the panels are limited as previously discussed in order to efficiently produce energy.

Finding: Although the proposed solar panels on the east and west sides of the gable roof placement of the panels will be visible from the street, staff finds that the visual impact of the solar panels will be minimized and the historic integrity of the property will not be compromised. The solar panels will be placed parallel to the roof, and no portion of the roof will be altered. Options for other locations are limited due to size or location relative to the sun. This standard is met.

Standard 3: All sites, structure and objects shall be recognized as products of their own time. Alterations that have no historical basis and which seek to create a false sense of history or architecture are not allowed.

Analysis: The small solar energy collection system is a utility feature and is not being installed in a manner to create a false sense of history or architecture.

Finding: This standard is met.

Standard 4: Alterations or additions that have acquired historic significance in their own right shall be retained and preserved.

Analysis: No significant historic features will be lost.

Finding: This standard is met.

Standard 5: Distinctive features, finishes and construction techniques or examples of craftsmanship that characterize a historic property shall be preserved.

Analysis: No significant historic features will be lost as the proposed small solar collection system will be located on the roof and will have very little impact to the roof or the character of the property. The property and the structure will continue to remain a historic property that can have the solar panels removed with little to no impact to the property or residence. The proposed small solar collection system will be flush mounted to the roof and will be required to be structurally safe per the building code requirements.

Finding: This standard is met.

Standard 6: Deteriorated architectural features shall be repaired rather than replaced wherever feasible. In the event replacement is necessary, the new material should match the material being replaced in composition, design, texture and other visual qualities. Repair or replacement of missing architectural features should be based on accurate duplications of features, substantiated by historic, physical or pictorial evidence rather than on conjectural designs or the availability of different architectural elements from other structures or objects.

Analysis: The subject proposal does not include repair or replacement of deteriorated architectural features.

Finding: This standard is not applicable.

Standard 7: Chemical or physical treatments, such as sandblasting, that cause damage to historic materials shall not be used. The surface cleaning of structures, if appropriate, shall be undertaken using the gentlest means possible.

Analysis: The proposed work does not include any treatments of historic materials.

Finding: This standard is not applicable.

Standard 8: Contemporary designs for alterations and additions to existing properties shall not be discouraged when such alterations and additions do not destroy significant cultural, historical, architectural or archaeological material, and such design is compatible with the size, scale, color, material and character of the property, neighborhood or environment.

Analysis: Although a minor feature will be added to the roof of the residence, the roof form itself will not be modified or altered. The proposed small solar energy collection system is designed to be flush mounted to have the least amount of visual and structural impact.

In addition, the color of the roof is tan and the panels of the proposed small solar collection system are black. It is entirely possible that the panels will be more visible due to the existing roof color and the color of the panels. However, solar panels typically are a dark color and being that this is the best location for the system based on maximum sun exposure, the proposal is as compatible as it can be.

Finding: This standard has been met.

Standard 9: Additions or alterations to structures and objects shall be done in such a manner that if such additions or alteration were to be removed in the future, the essential form and integrity of the structure would be unimpaired. The new work shall be differentiate from the old and shall be compatible in massing, size, scale and architectural features to protect the historic integrity of the property and its environment.

Analysis: The proposed small solar energy collection system can be easily removed without impairing any form and integrity of the structure other than possible damage to the asphalt shingle roof.

Finding: This standard is met.

Standard 10: Certain building materials are prohibited including the following: vinyl, asbestos, or aluminum cladding when applied directly to an original or historic material.

Analysis: Small solar energy collection systems are considered an accessory to the building and no original material will be affected.

Finding: This standard is not applicable.

Standard 11: Any new sign and any change in the appearance of any existing sign located on a landmark site or within the H historic preservation overlay district, which is visible from any public way or open space shall be consistent with the historic character of the landmark site or H historic preservation overlay district and shall comply with the standards outlined in part IV, Chapter 21A.46 of this title;

Analysis: No signs are proposed.

Finding: This standard is not applicable.

Attachment A
Proposed Plans

PV Project

2,805 Watt AC Roof Mounted Grid-Tied System

Array consists of 11 Canadian Solar 255 watts CS6P-255M Poly-crystalline modules. 255 watts at PTC, 227.6 watts at STC. 1 string of 11 modules with 11 Enphase M215 microinverters

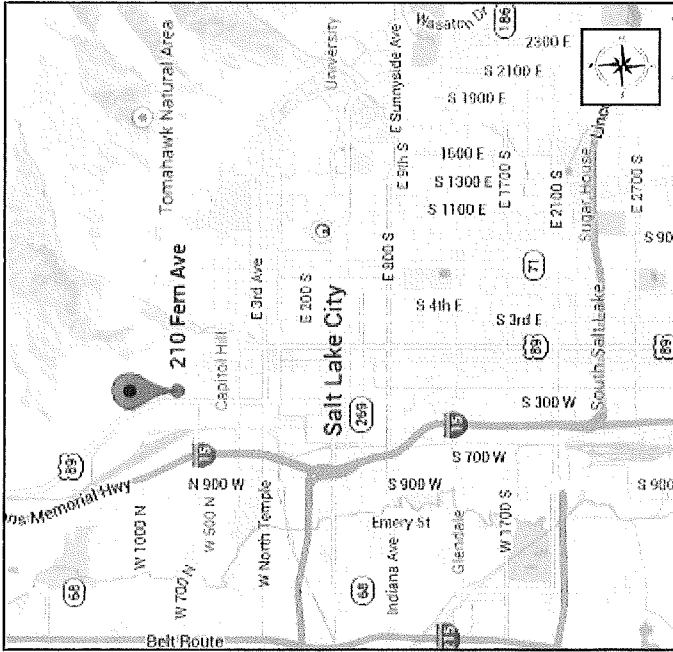
End User:
Brian Richards
210 West Fern Avenue
Salt Lake City, Utah
84103

Sheet Index

Page Information

- PV1 Cover Sheet
- PV2 Site Plan
- PV3 Electrical Diagram
- PV5 Warning Labels
- PV6 Module Data
- PV7 Inverter Data
- PV8 Racking Data

Vicinity Map



Abbreviation

VOC = Open Voltage Circuit GFDI = round Fault Detection Interrupter
 Vpmax = Max. Power Voltage USE-2 = Underground Service Entrance
 Isc = Short circuit current 90° max.. Temp
 Ipmax = Max. Power Current EMT = Electrical metallic tubing
 AWG = American Wire Gauge RHW-2 = Moisture & Heat Resistant
 STC = Standard Test Conditions Thermoplastic (trade name)
 PTC = PV/USA Test Conditions THHN-2 = Moisture & Heat Resistant
 E = Existing Thermoplastic (trade name)

General Notes:

1. All components are UL listed and CEC certified, are warranted.
2. The solar PV system will be installed in accordance with the 2011 Electrical Code, based on Article 690 of the 2010 NEC.
3. AC and DC disconnect intergraded.
4. A grounding electrode system in accordance with NEC 690-47 and 250-50 through 60 and 250-166 shall be provided. Grounded dc Photovoltaic arrays shall be ground-fault protection meeting the requirements of 690.5(A) through (C) to reduce fire hazards. Ungrounded arrays shall comply with 690.35 Per NEC, grounding electrode system of existing building may be used and bonded to at the service entrance. If existing system is inaccessible or inadequate, a supplemental grounding electrode will be used at the inverter location consisting of a UL listed 8 ft ground rod with acorn clamp. Grounding electrode conductors shall be no less than #8AWG and no greater than #6AWG copper and bonded to the existing grounding electrode to provide for a complete system.
5. Direct-Current Rating. Over current devices, either fuses or circuit breakers, used if any dc portion of a photovoltaic power system shall be listed for use in dc circuits and shall have appropriate voltage, current, and interrupt ratings.
6. The Photovoltaic disconnecting means shall be installed at a readily accessible location either on the outside of the building or structure or inside nearest the point of entrance of the system conductors.
7. Provide insulate connector fittings for raceways containing underground conductors #4 AWG or larger enter a cabinet, box enclosure, or raceway. Connector fittings should be smoothly rounded insulating surface in compliance with 300.4(F).
8. All wire shall be copper OAN (or as noted). All wire shall be listed, rated for 600 volts, type THHN/THWN insulated OAN, and #12 minimum size expect for controls.
9. The Program Administrator will be notified prior to use and activation of any solar installation. System will be commissioned by owner per utility interconnection agreement.



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Murray, UT 84123
801.938.8805
License #: 8543016-5501

SITE LOCATION:
Brian Richards
210 West Fern Avenue
Salt Lake City, Utah

Signature and Stamp

DRAWN BY
SC | GJ

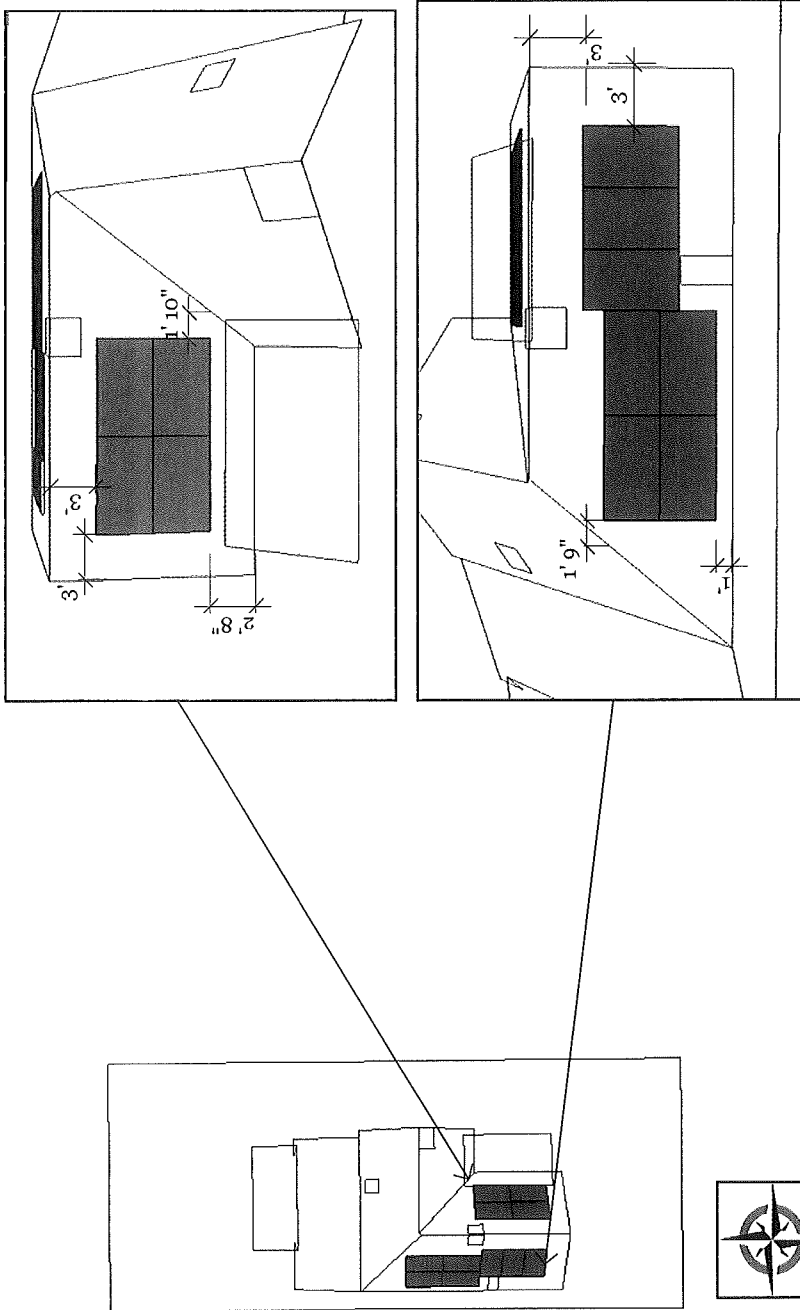
ISSUE
5/27/14

RE-ISSUE

DESCRIPTION
Cover Page

PV1

Site Plan



PV System Design

Project: Brian Richards Residence 2.8 kWDC (2,805 W AC) Roof Mounted PV System

- System Specifications:
- (11) Canadian Solar 255 Watt Solar Modules (CS6P-255W) with 11 Enphase M215 micro-inverters
 - (1) branch of 11 modules protected by (1) min. 15A 2-pole breaker
 - Modules grounded to racking system inverter integrated WEBS clips
 - AC outputs are paralleled through inverter integrated AWG# 12 tray cable wiring harness. 1 string of 11 modules to THHN-2 to a 15A 2-pole breaker per circuit
 - The point of connection will be with a 15A 2-Pole breaker at the existing 200A Service Panel

Distributed Load: • 2.96 lbs/ft²

Designer/Contractor: • Go Solar
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 L.I.C.# 8543016-5591
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SITE LOCATION:
 Brian Richards
 210 West Fern Avenue
 Salt lake City, Utah

Signature and Stamp

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RE-ISSUE

DESCRIPTION
 Site Plan

PV²



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DESCRIPTION
 One-Line Diagram Data

PV⁴

SIGN FOR DC DISCONNECT	
No sign necessary since 680 51 marking on PV module covers needed information	
SIGN FOR INVERTER, OCPD AND AC DISCONNECT (IF USED)	
SOLAR PV SYSTEM	
AC POINT OF CONNECTION	
AC OUTPUT CURRENT	1.29
NOMINAL AC VOLTAGE	208V
THIS PANEL FED BY MULTIPLE SOURCES (UTILITY AND SOLAR)	

INVERTER RATINGS (Guide Section 4)

INVERTER MAKE	Enphase
INVERTER MODEL	M215
MAX DC VOLT RATING	45 V
MAX POWER @ 40°C	215W
NOMINAL AC VOLTAGE	208V
MAX AC CURRENT	1.05
MAX OCPD RATING	12.31

NOTES FOR ARRAY CIRCUIT WIRING (Guide Section 6 and 8 and Appendix E):

- 1) LOWEST EXPECT AMBIENT TEMPERATURE BASED ON ASHRAE MINIMUM MEAN EXTREME DRY BULB TEMPERATURE FOR ASHRAE LOCATION MOST SIMILAR TO INSTALLATION LOCATION. LOWEST EXPECTED AMBIENT TEMP -16 °C
- 2) HIGHEST CONTINUOUS AMBIENT TEMPERATURE BASED ON ASHRAE HIGHEST MONTH 2% DRY BULB TEMPERATURE FOR ASHRAE LOCATION MOST SIMILAR TO INSTALLATION LOCATION. HIGHEST CONTINUOUS TEMPERATURE 36 °C
- 2) 2009 ASHRAE FUNDAMENTALS 2% DESIGN TEMPERATURES DO NOT EXCEED 47°C IN THE UNITED STATES (PALM SPRINGS, CA IS 44.1°C). FOR LESS THAN 9 CURRENT-CARRYING CONDUCTORS IN ROOF-MOUNTED SUNLIT CONDUIT AT LEAST 0.5" ABOVE ROOF AND USING THE OUTDOOR DESIGN TEMPERATURE OF 47°C OR LESS (ALL OF UNITED STATES).
 - a) 12 AWG, 90°C CONDUCTORS ARE GENERALLY ACCEPTABLE FOR MODULES WITH I_{sc} OF 7.68 AMPS OR LESS WHEN PROTECTED BY A 12-AMP OR SMALLER FUSE.
 - b) 10 AWG, 90°C CONDUCTORS ARE GENERALLY ACCEPTABLE FOR MODULES WITH I_{sc} OF 9.6 AMPS OR LESS WHEN PROTECTED BY A 15-AMP OR SMALLER FUSE.

NOTES FOR INVERTER CIRCUITS (Guide Section 8 and 9):

- 1) IF UTILITY REQUIRES A VISIBLE-BREAK SWITCH, DOES THIS SWITCH MEET THE REQUIREMENT? YES NO N/A
- 2) IF GENERATION METER REQUIRED, DOES THIS METER SOCKET MEET THE REQUIREMENT? YES NO N/A
- 3) SIZE PHOTOVOLTAIC POWER SOURCE (DC) CONDUCTORS BASED ON MAX CURRENT ON NEC 690.53 SIGN OR OCPD RATING AT DISCONNECT
- 4) SIZE INVERTER OUTPUT CIRCUIT (AC) CONDUCTORS ACCORDING TO INVERTER OCPD AMPERE RATING. (See Guide Section 9)
- 5) TOTAL OF _____ INVERTER OUTPUT CIRCUIT (OCPD)(s). ONE FOR EACH MICRO-INVERTER CIRCUIT. DOES TOTAL SUPPLY BREAKERS COMPLY WITH 120% BUSBAR EXCEPTION IN 690.64(B)(2)(a)? YES NO



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SITE LOCATION:
 Brian Richards
 210 West Fern Avenue
 Salt Lake City, Utah

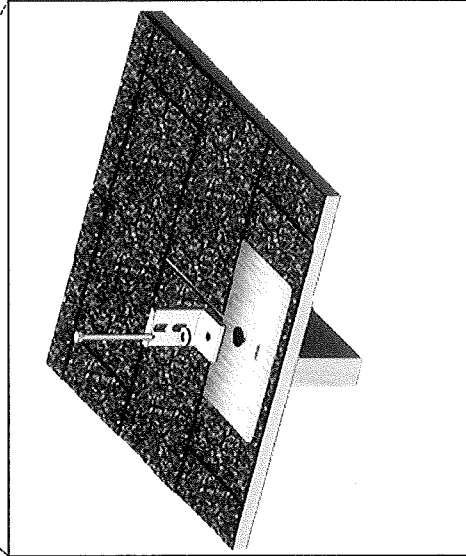
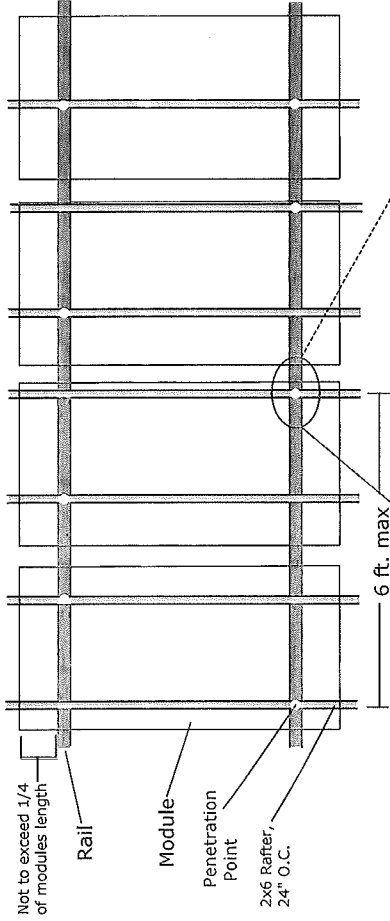
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ISSUE
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Scale 1" = 2'



The GreenFasten™ GF1 bracket system is designed to be installed on most new or existing (retrofit) composition shingle roofs for solar panel applications, and is accepted by most major roofing material manufacturers without voiding warranties. The GreenFasten GF1 system features a patented, watertight seal compatible with a variety of bracket options. Ease of installation makes this one of the fastest attachment points to install in the industry. Customized solutions are available to match any proprietary hardware on the market. GreenFasten GF1 meets or exceeds all known building codes and has been tested for pullout and shear.

Materials Needed for Assembly	
Item No.	Description of Material/Part
1	GF-1 Flashing
2	L-102-3" Bracket * (other options available)
3	5/16" EPDM Bonded 304-18.8 SS Washer
4	Lag Bolt 5/16"

Array and roof notes:

Solar Module: Candian Solar (CS6P 255M)
 Layout Orientation: Flush - Portrait
 Truss/Rafter: 2x6 Manuf. Truss
 Spacing: 24" O.C.
 Roof Type: Pitched
 Roof Material: Composition Shingle Type

Solar Panel Dead Weight Calculation	
System:	
Solar Array Consists of:	11 ea. Solar Modules
Mounting system has	22 Points of Connection With Roof
Panel Weight Calculation:	
Solar Module Weight:	44.1 lbs.
Mounting System Weight:	126 lbs.
Total Array Weight =	$(\# \text{ of Modules}) \times (\text{module wt.}) + [\text{Mounting system wt.}]$
Point Load Calculation =	$13.23 \text{ lbs.} \times [\text{total panel wt.}]$
	# of point of connection
Distributed Load Calculation:	
Module Length =	64.5 in.
Module Width =	38.7 in.
Solar Module Area =	17.33 ft^2
	Length x Width
	144
Total Solar Modular Area =	207.3 ft^2
Inter-Module Spacing =	9.6 in/2
# of Spaces bet. Modules	10
Total Spacing Area =	20.64 ft^2
	$\# \text{ of spaces bet. Modules} \times [\text{inter-mod. Spacing}] \times [\text{panel length or width}]$
	144
Total Array Area =	228 ft^2
Distributed Load	2.96 lbs/ft^2
	$[\text{total solar modular area}] + [\text{total spacing area}]$
	$[\text{total array wt.}]$
	$[\text{total array area}]$



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 Murray, UT 84123
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 License #: 8543016-5501

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DESCRIPTION
 Warning Labels

PV⁵

NEC 900.31 (E), 900.32, 900.11, 17.2
 ALL PHOTOVOLTAIC WIRING SYSTEMS THAT IS
 SEPARATED BY ENCLOSURES, WALLS, PARTITIONS, CEILINGS OR FLOORS. SPACING
 BETWEEN LABELS NOT TO EXCEED 10 FEET (3M).

NEC 900.32(B)
 ALL PHOTOVOLTAGE SOURCE SHALL BE LABELED EACH JUNCTION BOX, COMBINER BOX OR
 DISCONNECT AND DEVICE WHERE ENERGIZED. UNGROUNDING CIRCUITS MAY BE
 EXPOSED DURING SERVICE.

NEC 900.34(F)
 WHERE CIRCUITS ARE ENERGIZED IN FIELD UP, A WARNING OR MESSAGE READING
 "TURN OFF PHOTOVOLTAGE AC DISCONNECT PRIOR TO WORKING INSIDE PANEL"
 LOCATION OF THE CIRCUIT SHALL BE CLEARLY MARKED.

NEC 900.34(G)
 ALL LABELS SHALL APPEAR ON THE UTILITY INTERACTIVE INVERTER OR BE APPLIED BY
 THE INSTALLER NEAR THE GROUND FAULT INDICATOR AT A VISIBLE LOCATION.

NEC 900.31(A)
 WHERE ALL TERMINALS OF THE DISCONNECTING MEANS MAY BE ENERGIZED IN
 THE OPEN POSITION, A WARNING LABEL SHALL BE MOUNTED ON OR ADJACENT TO
 THE DISCONNECTING MEANS.

NEC 110.12(D)
 EXPANDED TO ROOMS OR OTHER GUARDED LOCATIONS THAT COULD BE EXPOSED
 TO ELECTRICAL ENERGY. THESE LOCATIONS SHALL BE MARKED WITH CONSPICUOUS WARNING SIGNS FORBIDDING
 UNQUALIFIED PERSONS TO ENTER.

NEC 110.12(E)
 THESE SIGNS SHALL BE USED TO REPRESENT A HAZARD LEVEL BETWEEN "CAUTION"
 AND "DANGER".

NEC 110.12(F)
 IF THE EQUIPMENT IS ENERGIZED FROM MORE THAN ONE SOURCE, THE
 DISCONNECTING MEANS MUST BE GROUPED AND IDENTIFIED.

NEC 900.14(D)
 EACH PHOTOVOLTAGE SYSTEM DISCONNECTING MEANS SHALL BE PERMANENTLY
 MARKED TO IDENTIFY IT AS A PHOTOVOLTAGE SYSTEM DISCONNECT.

NEC 900.13
 A PERMANENT LABEL FOR THE DIRECT-CURRENT PV POWER SOURCE SHALL BE
 PROVIDED BY THE INSTALLER AT THE PV DISCONNECTING MEANS.

NEC 900.13(B)
 NON-LOAD BREAK RATED DISCONNECT MEANS SHALL BE MARKED:

NEC 900.13(B)(2)
 INTERRUPTION CURRENT: BE A TYPE THAT REQUIRES THE USE OF A TOOL TO OPEN
 WILL BE MARKED "DO NOT DISCONNECT UNDER LOAD"

NEC 900.14
 ALL INTERACTIVE SYSTEM POINTS OF INTERCONNECTION WITH OTHER SOURCES
 SHALL BE IDENTIFIED AS SUCH AND MARKED WITH THE RATED AC OUTPUT CURRENT AND THE
 NORMAL OPERATING AC VOLTAGE.

NEC 900.15
 PV POWER SYSTEMS EMPLOYING ENERGY STORAGE SHALL ALSO BE MARKED WITH
 THE MAXIMUM OPERATING VOLTAGE, INCLUDING ANY EQUALIZATION VOLTAGE AND
 POLARITY OF THE GROUNDING CIRCUIT CONDUCTION.

GENERAL NOTES FOR LABELS AND MARKINGS:

1. LABELS AND MARKINGS SHALL BE APPLIED TO THE APPROPRIATE COMPONENTS IN
 ACCORDANCE WITH THE IEC 60445.
2. SOLAR MODULES ARE SUPPLIED FROM THE MANUFACTURER WITH MARKINGS PRE-APPLIED
 TO MEET THE REQUIREMENTS OF THE NEC.
3. ALL PHOTOVOLTAGE SYSTEMS SHALL BE IDENTIFIED FROM THE MANUFACTURER WITH THE APPROPRIATE LABELS
 AND MARKINGS TO MEET THE NEC.
4. THE LABELS WILL BE PROVIDED WITH THE PHOTOVOLTAGE SOURCE, KIT AND PLATE PACKAGES.
 THE LABELS WILL BE AFFIXED TO THE PHOTOVOLTAGE SOURCE OR THE PHOTOVOLTAGE SYSTEM DISCONNECTING
 MEANS. THE LABELS WILL BE IDENTIFIED WITH THE RATED AC OUTPUT CURRENT AND THE
 NORMAL OPERATING AC VOLTAGE.
5. THE LABELS WILL BE IDENTIFIED WITH THE RATED AC OUTPUT CURRENT AND THE
 NORMAL OPERATING AC VOLTAGE.
6. THE LABELS WILL BE IDENTIFIED WITH THE RATED AC OUTPUT CURRENT AND THE
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9. THE LABELS WILL BE IDENTIFIED WITH THE RATED AC OUTPUT CURRENT AND THE
 NORMAL OPERATING AC VOLTAGE.
10. THE LABELS WILL BE IDENTIFIED WITH THE RATED AC OUTPUT CURRENT AND THE
 NORMAL OPERATING AC VOLTAGE.

PHOTOVOLTAGE AC DISCONNECT
 MAXIMUM AC OPERATING CURRENT:
 MAXIMUM AC OPERATING VOLTAGE:
PER NEC 900.14(C)

WARNING:
 ELECTRICAL SHOCK HAZARD
 IF A GROUND FAULT IS INDICATED
 NORMALLY GROUNDED CONDUCTORS
 MAY BE ENERGIZED AND
 UNGROUNDING CIRCUITS MAY BE
 ENERGIZED.
PER NEC 900.34(F)

5 AC DISCONNECT/BREAKER/ POINTS OF CONNECTION

PHOTOVOLTAGE AC DISCONNECT
 DO NOT TOUCH TERMINALS TERMINALS
 ON BOTH LINE AND LOAD SIDES MAY BE
 ENERGIZED IN THE OPEN POSITION
PER NEC 900.14(D)

WARNING:
 ELECTRICAL SHOCK HAZARD
 IF A GROUND FAULT IS INDICATED
 NORMALLY GROUNDED CONDUCTORS
 MAY BE ENERGIZED AND
 UNGROUNDING CIRCUITS MAY BE
 ENERGIZED.
PER NEC 900.34(F)

NOMINAL OPERATING AC VOLTAGE: 240V
NOMINAL OPERATING AC FREQUENCY: 60 Hz
MAXIMUM AC POWER:
MAXIMUM AC CURRENT:
MAX OVERCURRENT DEVICE RATING
 FOR AC MODULE PROTECTION:
PER NEC 900.13(B)

PHOTOVOLTAGE AC DISCONNECT
 MAXIMUM AC OPERATING CURRENT:
 MAXIMUM AC OPERATING VOLTAGE:
PER NEC 900.14(C)

6 INVERTER

WARNING:
 ELECTRICAL SHOCK HAZARD
 IF A GROUND FAULT IS INDICATED
 NORMALLY GROUNDED CONDUCTORS
 MAY BE ENERGIZED AND
 UNGROUNDING CIRCUITS MAY BE
 ENERGIZED.
PER NEC 900.34(F)

PHOTOVOLTAGE AC DISCONNECT
 MAXIMUM AC OPERATING CURRENT:
 MAXIMUM AC OPERATING VOLTAGE:
PER NEC 900.14(C)

4 MAIN SERVICE DISCONNECT
CAUTION: MAIN PV SYSTEM AC DISCONNECT
PER NEC 900.14(C)

CAUTION: SOLAR SYSTEM CONNECTED
PER NEC 900.14(C)

WARNING:
 TURN OFF PHOTOVOLTAGE AC
 DISCONNECT PRIOR TO WORKING
 INSIDE PANEL.
PER NEC 900.34(F)

WARNING: ELECTRICAL SHOCK HAZARD
 DO NOT TOUCH TERMINALS TERMINALS
 ON BOTH LINE AND LOAD SIDES MAY BE
 ENERGIZED IN THE OPEN POSITION
PER NEC 900.14(D)

SOLAR DISCONNECT
PER NEC 900.14(D)

4 BREAKER PANEL/PULL BOXES

WARNING:
 ELECTRICAL SHOCK HAZARD
 IF A GROUND FAULT IS INDICATED
 NORMALLY GROUNDED CONDUCTORS
 MAY BE ENERGIZED AND
 UNGROUNDING CIRCUITS MAY BE
 ENERGIZED.
PER NEC 900.34(F)

WARNING: ELECTRICAL SHOCK HAZARD
 DO NOT TOUCH TERMINALS TERMINALS
 ON BOTH LINE AND LOAD SIDES MAY BE
 ENERGIZED IN THE OPEN POSITION
PER NEC 900.14(D)

WARNING:
 TURN OFF PHOTOVOLTAGE AC
 DISCONNECT PRIOR TO WORKING INSIDE
 PANEL.
PER NEC 900.34(F)

WARNING: DUAL POWER SOURCE
 SECOND SOURCE IS PV SYSTEM
PER NEC 900.14(C)

CAUTION:
 PV SYSTEM CIRCUIT BREAKER IS
 BACKFED
PER NEC 900.14(C)

DO NOT DISCONNECT UNDER LOAD
PER NEC 900.13(B)

**1 COMBINER BOX, CIRCUITS/EMT/ CONDUIT
 COMBINER BOX/ENCLOSURES/RACEWAYS**
WARNING: ELECTRICAL SHOCK HAZARD
 DO NOT TOUCH TERMINALS TERMINALS
 ON BOTH LINE AND LOAD SIDES MAY BE
 ENERGIZED IN THE OPEN POSITION
PER NEC 900.14(D)

WARNING:
 TURN OFF PHOTOVOLTAGE AC
 DISCONNECT PRIOR TO WORKING
 INSIDE PANEL.
PER NEC 900.34(F)

CAUTION: SOLAR CIRCUIT
PER NEC 900.14(C)

WARNING: ELECTRICAL SHOCK HAZARD
 DO NOT TOUCH TERMINALS TERMINALS
 ON BOTH LINE AND LOAD SIDES MAY BE
 ENERGIZED IN THE OPEN POSITION
PER NEC 900.14(D)

PHOTOVOLTAGE POWER SOURCE
PER NEC 900.13(B)

2 NET METER

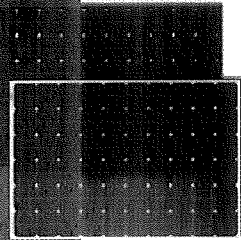
WARNING:
 ELECTRICAL SHOCK HAZARD
 IF A GROUND FAULT IS INDICATED
 NORMALLY GROUNDED CONDUCTORS
 MAY BE ENERGIZED AND
 UNGROUNDING CIRCUITS MAY BE
 ENERGIZED.
PER NEC 900.34(F)

BUILDING STRUCTURE

CS6P-255 | 260M

THE BEST IN CLASS

Canadian Solar's modules are the best in class in terms of power output and long term reliability. Our meticulous product design and stringent quality control ensure our modules deliver a higher PV energy yield in live PV systems as well as in PVEL's system simulation. Our in-house PV testing facilities guarantee all module component materials meet the highest quality standards possible.



Third party product is optional

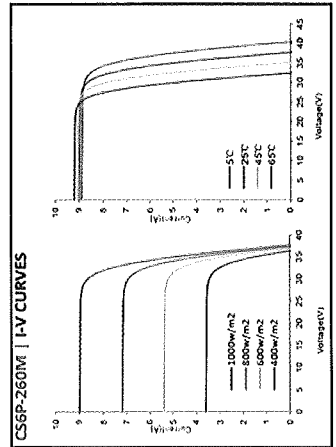
ELECTRICAL DATA | NOCT

Electrical Data	CS6P-255M	CS6P-260M
Nominal Maximum Power (Pmax)	184W	188W
Optimum Operating Voltage (Vmp)	27.8V	28.0V
Optimum Operating Current (Imp)	6.62A	6.70A
Open Circuit Voltage (Voc)	34.6V	34.7V
Short Circuit Current (Isc)	7.18A	7.28A

*Under Nominal Operating Cell temperature (NOCT), irradiance of 800 W/m², spectrum AM 1.5, ambient temperature 20°C.

MODULE | MECHANICAL DATA

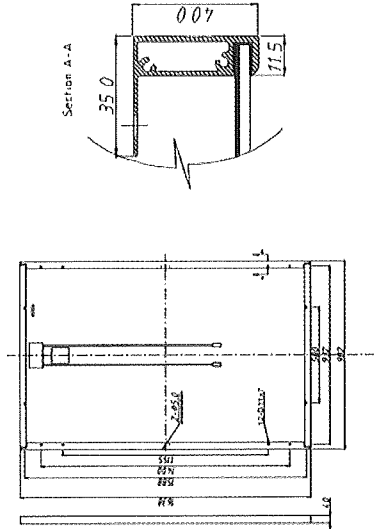
Specification	Data
Cell Type	Mono-crystalline 156 x 156mm
Cell Arrangement	60 (6 x 10)
Dimensions	1638 x 982 x 40mm (64.5 x 38.7 x 1.57in)
Weight	18.5kg (40.8 lbs)
Front Cover	3.2mm tempered glass
Frame Material	Anodized aluminum alloy
J-BOX	IP65 or IP67, 3 diodes
Cable	4mm ² (IEC)/4mm ² &12AWG 1000V(UL1000V)/12AWG(UL600V), 1000mm
Connectors	MC4 or MC4 comparable
Standard Packaging	24pcs, 504kg (quantity and weight per pallet)
Module Pieces per Container	672pcs (40'HQ)



MODULE | ENGINEERING DRAWING

Frame Cross Section

Rear View



TEMPERATURE CHARACTERISTICS

Specification	Data
Temperature Coefficient (Pmax)	-0.45%/°C
Temperature Coefficient (Voc)	-0.35%/°C
Temperature Coefficient (Isc)	0.060%/°C
Nominal Operating Cell Temperature	45±2°C

PERFORMANCE AT LOW IRRADIANCE

Industry leading performance at low irradiation environment, +96.5% module efficiency from an irradiance of 100W/m² to 200W/m² (AM 1.5, 25 °C)

ELECTRICAL DATA | STC

Electrical Data	CS6P-255M	CS6P-260M
Nominal Maximum Power (Pmax)	255W	260W
Optimum Operating Voltage (Vmp)	30.5V	30.7V
Optimum Operating Current (Imp)	8.35A	8.48A
Open Circuit Voltage (Voc)	37.7V	37.8V
Short Circuit Current (Isc)	8.87A	8.99A
Module Efficiency	15.85%	16.16%
Operating Temperature	-40°C~+85°C	
Maximum System Voltage	1000V (IEC) / 1000V (UL) / 600V (UL)	
Maximum Series Fuse Rating	15A	
Application Classification	Class A	
Power Tolerance	0 ~ +5W	

*Under Standard Test Conditions (STC) of irradiance of 1000W/m², spectrum AM 1.5 and cell temperature of 25°C.



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SITE LOCATION:
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Signature and Stamp

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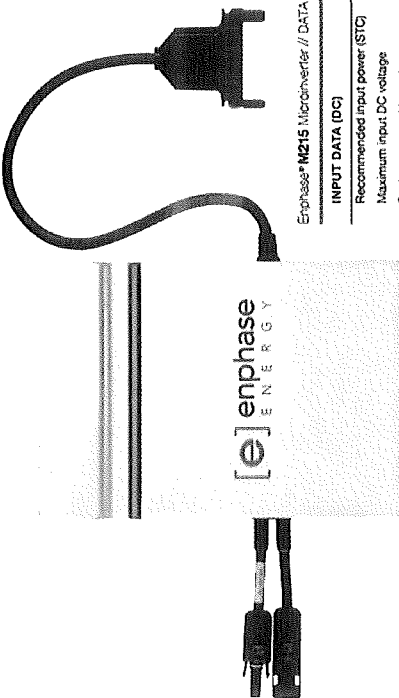
ISSUE
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DESCRIPTION
Modules

PV⁶

Enphase M215



Enphase M215 Microinverter // DATA

INPUT DATA (DC) M215-60-2LL-S22/S23 and M215-60-2LL-S22-NA/S23-NA (Ontario)

Recommended input power (STC)	190 - 270 W
Maximum input DC voltage	45 V
Peak power tracking voltage	22 - 36 V
Operating range	16 - 36 V
Min./Max. start voltage	22 V / 45 V
Max. DC short circuit current	15 A
Max. input current	10.5 A

OUTPUT DATA (AC) M215-60-2LL-S22/S23 and M215-60-2LL-S22-NA/S23-NA (Ontario)

	0208 VAC	0240 VAC
Rated (continuous) output power	215 W	215 W
Rated output current	1.0 A (Arms at nominal duration)	0.9 A (Arms at nominal duration)
Normal voltage/range	206 / 183-229 V	240 / 211-264 V
Extended voltage/range	179-232 V	206-269 V
Normal frequency/range	60.0 / 59.3-60.5 Hz	60.0 / 59.3-60.5 Hz
Extended frequency range	57-60.5 Hz	57-60.5 Hz
Power factor	>0.95	>0.95
Maximum units per 20 A branch circuit	25 (three phase)	17 (single phase)
Maximum output fault current	1.05 Arms over 3 cycles; 1.04 Arms over 5 cycles	

EFFICIENCY

CEC weighted efficiency	96.0%
Peak inverter efficiency	96.3%
Static MPPT efficiency (weighted, reference EN50530)	99.6%
Dynamic MPPT efficiency (fast irradiation changes, reference EN50530)	99.3%
Night time power consumption	46 mW

MECHANICAL DATA

Ambient temperature range	-40°C to + 65°C
Operating temperature range (internal)	-40°C to + 85°C
Dimensions (WxHxD)	17.3 cm x 16.4 cm x 2.5 cm (6.8" x 6.45" x 1.0") without mounting bracket
Weight	1.6 kg (3.5 lbs)
Cooling	Natural convection - No fans
Enclosure environmental rating	Outdoor - NEMA 6

FEATURES

- Compatibility: Pairs with most 60-cell PV modules
- Communication: Power line
- Monitoring: Free lifetime monitoring via Enlighten software
- Compliance: UL1741/IEEE1547, FCC Part 15 Class B, CAN/CSA-C22.2 NO. 0-M91, 0-4-04, and 1071-01

Solar
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DESCRIPTION
 Inverter

PV⁷

Wiley Electronics LLC
Washer, Electrical Equipment Bond

WEEB
Paint Finishing

INSTALLATION INSTRUCTIONS

For IronRidge

Please read carefully before installing.



WEEB-DMC



WEEB-DMC



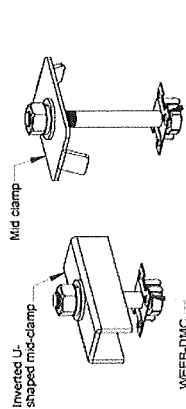
WEEB-Bonding Jumper-6.7



Products are listed to UL 487
UL standard for safety grounding and bonding equipment
Document number 144641-0002/002

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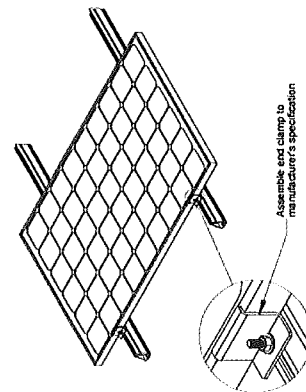
WEEB-DMC ASSEMBLY



WEEB-DMC

Pre-assemble WEEB-DMC to mid clamp assembly as shown. Pre-assembling WEEB-DMC to mid clamp assembly will contain the small individual parts, reducing the possibility of losing parts during installation.

②



Assemble and clamp to manufacturer's specification

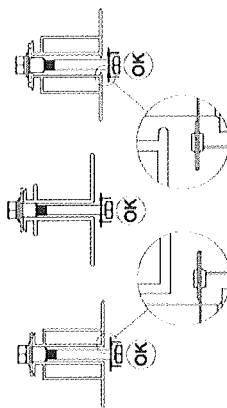
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WEEB COMPATIBILITY

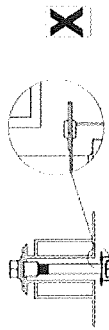
The WEEB family of products can be used to bond anodized aluminum, galvanized steel, steel and other electrically conductive metal structures.

Standard Top Down Clamps

The WEEBs used for bonding the PV modules to the mounting rails are compatible with the standard top down clamps. The following are examples of module frames that are compatible. Notice that the WEEB teeth are positioned completely under the edge of the module frame.



The following is an example of a module frame that is incompatible with the WEEB. The WEEB teeth are not positioned under the edge of the module due to the lip on the top edge of the module frame.

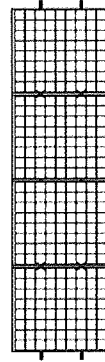


X

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WEEB-DMC LAYOUT

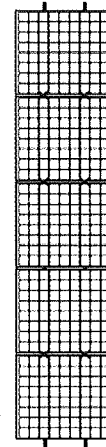
EVEN NUMBER OF MODULES IN ROW



X DENOTES PLACES TO INSTALL WEEB-DMC

C X R = 4 X 1
WEEB-DMC NEEDED = C X R = 4 X 1 = 4

ODD NUMBER OF MODULES IN ROW



X DENOTES PLACES TO INSTALL WEEB-DMC

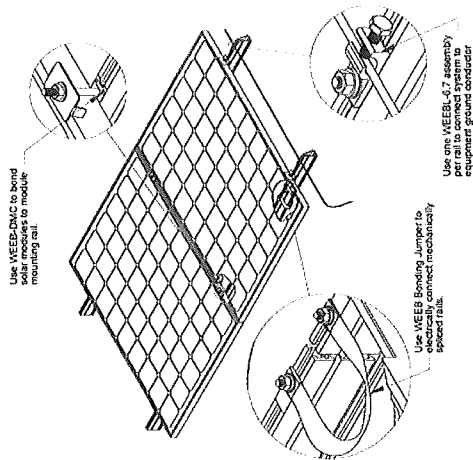
C X R = 5 X 1
WEEB-DMC NEEDED = (C-1) X R = (5-1) X 1 = 4

Note:

When replacing a single faulty module, also remove the adjacent module which contacts the same WEEBs as the faulty module. This will ensure that there are never ungrounded modules in the array.

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SYSTEM OVERVIEW



Use WEEB-DMC to bond solar modules to mounting rail.

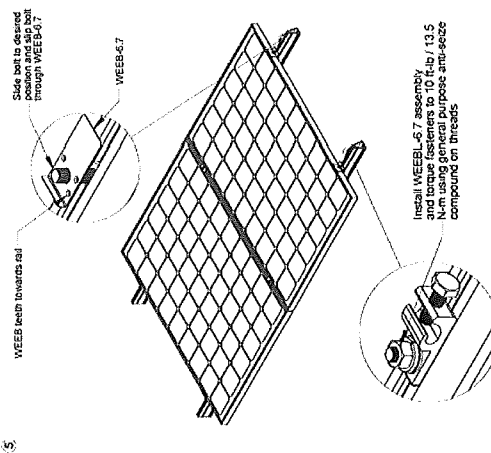
Use WEEB Bonding Jumper to connect mechanically.

Use only WEEB-6.7 assembly per rail to connect system to equipment ground conductor.

- Important notes:**
1. Use general purpose anti-seize compound on fastener threads when installing WEEBs.
 2. WEEBs are intended for SINGLE USE ONLY. Functionality will not be guaranteed if reused.

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WEEB LUG ASSEMBLY



Slide bolt to ensure proper contact through WEEB-6.7

Install WEEB-6.7 assembly and torque fasteners to 10 ft-lb / 13.5 Nm. Do not use any other type anti-seize compound on threads.

Important note:
WEEB-6.7 that sits under the WEEB Lug is for single use only. Ensure position is correct before tightening down.

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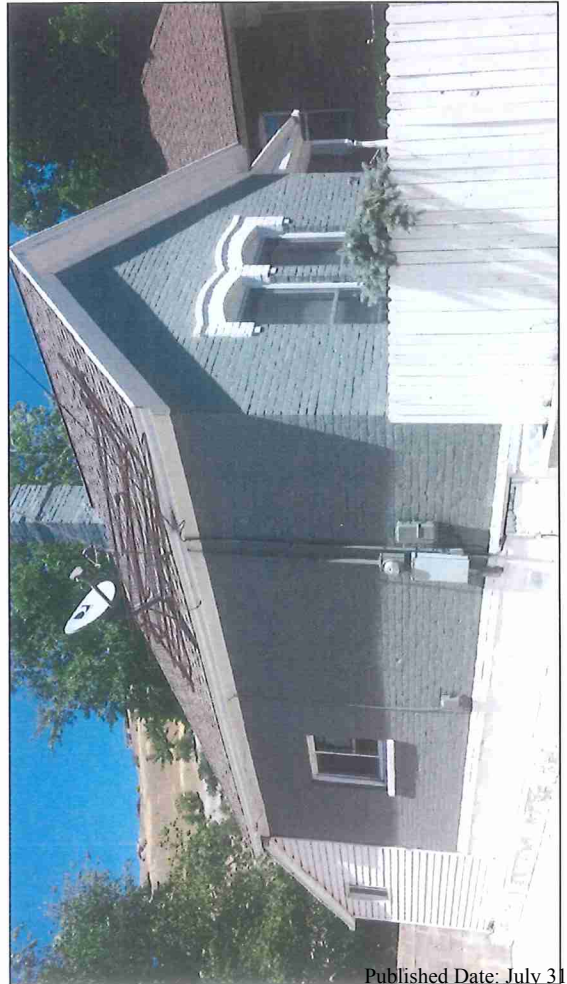
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DESCRIPTION
Grounding

PV⁹

Attachment B
Photos



solar panels