TESTING plan
PHOTOVOLTAIC SYSTEM

SYSTEM SIZE:
AC / DC kW STC: 6.089kW / 7.02kW

EQUIPMENT:
PV MODULES: (27) Tata TP260BZ
INVERTER(S): (1) SolarEdge SE6000A-US

SCOPE OF WORK:
INSTALLATION OF A SAFE AND CODE-COMPLIANT GRID-TIED SOLAR PV SYSTEM ON AN EXISTING RESIDENTIAL ROOF TOP.

2. ALL ROOF PENETRATIONS ARE REQUIRED TO BE FLASHED. ALL TILE ROOFS ARE REQUIRED TO BE DOUBLE-FLASHED.
3. ROOF DECK FLASHING IS REQUIRED TO BE INSPECTED PRIOR TO PANEL INSTALLATION.
4. CONTRACTOR IS REQUIRED TO HOLD A CURRENT AND VALID C-10 OR C-46 LICENSE.
5. DESIGNED TO 110MPH 3-SECOND PEAK GUST.

SITE PLAN
SCALE: N.T.S.

APPLICABLE CODES:
2016 CEC (BASED ON 2014 NEC)
2016 CBC
2016 CRC
2016 CPC
2016 CMC
2016 CFC
LOCAL AMENDMENTS TO CA CODES

FOR INSTALLER USE ONLY
POST INSTALL SURVEYS REQUIRED? NO
I CERTIFY THAT NO CHANGES HAVE BEEN MADE TO THE ARRAY LAYOUT:

CUSTOMER INFORMATION:
CUSTOMER NAME
4444 C STREET
ANYTOWN, CA 99999

DATE: 12/1/16

DESIGNED BY: 0
REV #: PV-0.0
GENERAL NOTES:

N1. Drawings are diagrammatic only. The location and routing of raceways shall be determined by the contractor unless otherwise noted or standardized.

N2. If a discrepancy in quantity or size of conduit, wire, equipment devices, overcurrent protection, grounding systems, etc. (all equipment and materials) the contractor shall be responsible for providing and installing all materials and services required by the strictest conditions in the specifications or noted on the plans to ensure complete compliance with all codes and to ensure the longevity and safety of the operable system.

N3. All outdoor equipment shall be min. NEMA 3R rated.

N4. Metal conduit and enclosures shall be used where PV source or output circuits are run inside a building.

N5. Modules shall not be placed over any plumbing vents and at least 6” above flush vents.

N6. The electrical contractor shall comply with any and all requirements given by utility companies.

N7. For additional equipment specifications, see provided cut sheets.

N8. All NEC references shall be directly interchangeable with CEC references.

N9. It is illegal for anyone unless acting under the direction of a licensed professional engineer or registered architect to alter any items on this plan.

N10. The engineer has not been retained for job supervision.

N11. All OSHA regulations and standards for safe and healthful working conditions to be followed.

N12. All contractors working on roofs to be insured as such.

STRUCTURAL NOTES:

S1. Mounts are diagrammatic and exact location may change, but shall be accurately spaced.

S2. Mounts shall be staggered when necessary to evenly distribute load amongst rafters.

S3. Do not splice rails in middle 50% of span between two mounts.

ELECTRICAL NOTES:

E1. Maximum voltage does not exceed 600VDC, and DC equipment shall be rated for at least 600VDC.

E2. Any equipment or electrical materials used for this installation shall be new and listed by a recognized electrical testing laboratory.

E3. An inverter in an interactive solar PV system shall automatically de-energize its output to the connected electrical production and distribution network upon loss of voltage in that system and shall remain in that state until the electrical production and distribution network voltage has been restored.

E4. All PV arrays shall be equipped with DC ground fault protection by inverter(s), and arc fault protection is inverter-integrated.

E5. Any AC component shall meet or exceed the available fault current calculated at that component.

E6. All modules and any related roof mounted metallic equipment shall be properly bonded and grounded.

E7. All wire, voltages, amperages and equipment is sized according to temperature derating and location.

E8. Only copper (Cu) conductors shall be used for new wiring. Conductors shall be stranded or solid with properly rated connectors.

E9. All modules and racking shall be grounded via UL2703-listed racking system’s integrated grounding (please see data sheet).
NOTE:
MODULES SHALL NOT BE GREATER THAN 8 INCHES ABOVE ROOF COVERING

MODULE SPECIFICATIONS
(27) TATA TP500B2
MODULE WEIGHT: 41
MODULE LENGTH: 66
MODULE WIDTH: 39.1
ROOF TIPS:
RAFTER SIZE: 2X4 NOMINAL
RAFTER SPACING: 24" R
RAFTER SPACING: 24" F
ROOF MATERIAL: COMPOSITE SHINGLE
ARRAY 1 SPEC:
NUMBER OF MODULES: 16
TOTAL MOD. WEIGHT (lbs): 738
MODULE WEIGHT (lbs): 63.4
ARRAY WEIGHT (lbs): 801.4
ARRAY AREA (sqft): 612.3
ARRAY DEAD LOAD (lbs/sqft): 2.5
NUMBER OF MOUNTS: 25
LOAD PER MOUNT (lbs): 30.6
ARRAY AZIMUTH (°): 25
ARRAY TILT (°): 32.1
NUMBER OF FLOORS: 1

CUSTOMER INFORMATION:
CUSTOMER NAME
4444 C STREET
ANYTOWN, CA 99999

REV #: DATE: PV - 2.0
DESIGNED BY:
0 12/1/16
ARRAY 2 SPECS
NUMBER OF MODULES: 9
TOTAL MOD. WEIGHT (lbs): 366
MODULE WEIGHT (lbs): 41
MODULE LENGTH: 65
MODULE WIDTH: 39.1
ARRAY WEIGHT (lbs): 156.6
ARRAY AREA (sqft): 406.6
ARRAY DEAD LOAD (lbs/sqft): 2.6
NUMBER OF MOUNTS: 14
NUMBER OF MOUNTS (lbs): 29
ARRAY AZIMUTH (°): 21
ARRAY TILT (°): 21
NUMBER OF FLOORS: 1

ROOF 2 SPECS
RAFTER SIZE: 2X4 DORMER
RAFTER SPAN: 6'-6"
RAFTER SPACING: 24"
ROOF MATERIAL: COMPOSITE SHINGLE

CUSTOMER INFORMATION:
CUSTOMER NAME: 4444 C STREET
ANITYOWN, CA 99999

DESIGNED BY: REV #: DATE: PV-2.1 12/1/16
### Electrical Net

- **Breaker**
- **Switch**
- **Screw Terminal**
- **Fuse**
- **Splice**
- **Earth Ground**
- **Chassis Ground**
- **GEC**
- **EGC**

### Module Electrical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short Circuit Current (Isc)</td>
<td>8.80</td>
</tr>
<tr>
<td>Open Circuit Voltage (Voc)</td>
<td>37.9</td>
</tr>
<tr>
<td>Operating Current (Imp)</td>
<td>8.49</td>
</tr>
<tr>
<td>Operating Voltage (Vmp)</td>
<td>30.8</td>
</tr>
<tr>
<td>Max Series Fuse Rating</td>
<td>15</td>
</tr>
<tr>
<td>Stc Rating</td>
<td>260</td>
</tr>
<tr>
<td>Ptc Rating</td>
<td>231.3</td>
</tr>
</tbody>
</table>

### Design Conditions
- Highest 2% DB Design Temp (°C): 25
- Min. Mean Extreme Annual DB (°C): 1
- Inverter 1 Specifications
  - SolarEdge SE6000A-US
  - Rated Watts (Each): 3000
  - Ac Operating Voltage (V): 300
  - Ac Operating Current (A): 25
  - Number of Mppt Channels: 0
  - Inverter Efficiency: 0.975
- Integrated DC Disconnect
- Inverter 1 Input Specifications
  - Nominal Current Per String (Inom): 13.4A
  - Nominal Voltage (Vnom): 500V
  - Max System Voltage (Vmax): 1000V
  - Max Current Per String (Imax): 25A
  - Max Input Circuit Current (Imax): 15A
  - Inverter Size = 25A x 1.25 = 31.25A –» 35A

### Module Specifications

- **Tata TP260BZ**
  - Short Circuit Current (Isc): 8.80
  - Open Circuit Voltage (Voc): 37.9
  - Operating Current (Imp): 8.49
  - Operating Voltage (Vmp): 30.6

### System Calculations

- \( I_{nom} = \frac{(18 \times 260W)}{350V} = 13.1A \)
- Operating Voltage = 350VDC (Regulated)
- Max Power Per String = 5250W
- Max DC Input Power = 3000W
- Max Input Circuit Current = 22.87A
- Condition of Use = \( I_{max} / T_{corr} / C_{fill} = 15A / 0.82 / 0.8 = 22.87A \)
- Conductor Size for 22.87A

### Installation

- Conduit Elevation: 1/2 to 3-1/2" = 22°C
- High Ambient Temperature: 25°C
- Roof Top Ambient Temp (Tcorr): 47°C = 0.82
- Conduit Fill (Cfill) = 0.8
- Continuous Use = \( I_{max} * 1.25 = 18.75A \)
- Conditions of Use = \( I_{max} / T_{corr} / C_{fill} = 15A / 0.82 / 0.8 = 22.87A \)
- Conductor Size for 22.87A
- Installation Shall Use Min. #10 AWG

### SolarEdge P300 DC Optimizer

- One SolarEdge P300 DC Optimizer per Module.

### Inverter

- SolarEdge SE6000A-US
- Inverter with Integrated DC Disconnects
- Mppt 1 and Mppt 2
- Ac Output
- Inverter Efficiency: 0.975
- Number of Mppt Channels: 0
- Ac Operating Voltage (V): 240V
- Ac Operating Current (A): 35A

### Electrical Box

- Min. Nema 3R UL Listed Junction Box with 90°C Terminal Ratings Located on Roof

### Customer Information

- **Customer Name**: Anytown, CA 99999
- **Customer Information**: 4444 C Street
- **Date**: 12/2016
- **Designed By**: PV 3.0
POWER TO THIS BUILDING IS SUPPLIED FROM THE FOLLOWING SOURCES WITH DISCONNECTS LOCATED AS SHOWN

LOCATION OF MAIN SERVICE ENTRANCE AND UTILITY METER

LOCATION OF INVERTERS WITH INTEGRATED DC DISCONNECT
TP250 series

60-cell multi-crystalline solar photovoltaic modules

Product Features
- 60 cell configuration with wattage ranging from 240 to 260W
- High Fill Factor for improved energy conversion efficiency
- Cells sorted by power and current to minimize mismatch losses in the field
- Electroluminescence tested for micro-cracks
- Highly reliable IP67 rated junction box
- MC4 compatible cable connectors

Certifications
- Certified to IEC 61215, IEC 61701, IEC 61646, UL 1703 and PV Module standards

Warranty
Product warranty: 10 year warranty on material and workmanship
Power warranty: 25 year linear power output warranty

About Tata Power Solar
Tier 1* bankable module manufacturer** with 25 year history
Backed by S100B Tata Group; eliminates need for expensive 3rd party insurance
BP Solar heritage of state-of-the-art technology and stringent quality processes
Over 500 MW of modules shipped globally
Highest standards of quality and management (ISO 9001: 14001)

Modules in the TP250 series

TP240 | TP245 | TP250 | TP255 | TP260

Technical Drawing

Technical parameters at standard test conditions (STC)*

Nominal power output (W) 240 245 250 255 260
Power tolerance (W) 0 – 5 0 – 5 0 – 5 0 – 5 0 – 5
Module efficiency (%) 14.40 14.70 15.00 15.30 15.60
Voltage at Pmpp (V) 34.7 34.9 35.2 35.5 35.8
Current at Pmpp (A) 8.93 8.98 9.03 9.08 9.13
Open-circuit voltage Voc (V) 36.6 36.7 37.3 37.7 38.5
Short-circuit current (Isc) 8.46 8.70 8.97 9.13 9.30

Electrical parameters at NOCT

Power output (W) 172.8 176.4 180.0 183.6 187.2
Voltage at Pmpp (V) 28.3 28.6 28.7 28.8 28.9
Current at Pmpp (A) 6.56 6.67 6.75 6.85 6.95
Open-circuit voltage Voc (V) 32.5 32.7 32.9 33.0 33.2
Short-circuit current (Isc) 7.87 7.97 8.07 8.15 8.25

Temperature coefficient characteristics

- MPPV (%) 0.47 ± 2
- Module efficiency (°C) -0.06 ± 0.01
- Temperature coefficient of Voc (°C) -0.418
- Temperature coefficient of Isc (°C) -0.3305
- Temperature coefficient of Isc (°C) 0.6626

Operating conditions

- Maximum power voltage (SL & SC) (V) 600 & 1000
- Maximum series fuse rating (A) 20
- Limiting reverse current (A) 20
- Operating temperature range (°C) 0°F to 104°F
- Maximum static load (rope or wire) 113 psi (5400 Pa)

Module general characteristics

- Module dimensions (L x W x H) (mm) 1660 x 1060 x 40
- Module weight (approx) (kg/floor) 18.4 ± 2
- Number of cells & size 60 cells 65 x 65mm
- Frame material Anodized aluminium
- Frame thickness 2.3mm (FRP)
- Junction box IP67 rated
- Cable connector MC4 compatible (4mm²)

Packaging details

- Number of modules per pallet 26
- Number of pallets per 40ft container 28
- Box weight (kg) 465
- Box dimensions L x W x H (mm) 1700 x 1635 x 1300

* Based on 8000 hours, spectrum AM 1.5G, UL and IEC standard conditions (25°C).
** 25 year linear power warranty. 
*** Bankable, verifiable third party laboratory (IEC 61215, IEC 61701)

Tata Power Solar is committed to enabling solar everywhere and bringing the power of the sun to people in the most efficient and cost effective way possible.

For sales, service and other enquiries, email us modules@tatapowersolar.com

www.tatapowersolar.com
SolarEdge Single Phase Inverters
For North America

The best choice for SolarEdge enabled systems
- Integrated arc fault protection for NEC 2011 690.11 compliance
- Rapid shutdown for NEC 2014 690.12
- Superior efficiency (89%)
- Small, lightweight and easy to install on provided bracket
- Built-in module-level monitoring
- Internet connection through Ethernet or Wireless
- Outdoor and indoor installation
- Fixed voltage inverter, DC/AC conversion only
- Pre-assembled Safety Switch for faster installation
- Optional – revenue grade data, ANSI C12.1

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal AC Power Output</td>
<td>3000 VA</td>
<td>3800 VA</td>
<td>5000 VA</td>
<td>6000 VA</td>
<td>7600 VA</td>
<td>11400 VA</td>
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<tr>
<td>Max. AC Power Output</td>
<td>3300 VA</td>
<td>4150 VA</td>
<td>5400 VA</td>
<td>6000 VA</td>
<td>8350 VA</td>
<td>12000 VA</td>
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</tr>
<tr>
<td>AC Output Voltage Min.-Nom.-Max.</td>
<td>183 - 210 Vac</td>
<td>230 - 240 Vac</td>
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<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>AC Output Voltage Max.-Nom.-Max.</td>
<td>231 - 240 - 264 Vac</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC Frequency Min.-Nom.-Max.</td>
<td>50 - 60 Hz</td>
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<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Max. Continuous Output Current</td>
<td>12.8 A</td>
<td>16 A</td>
<td>24 @ 208V, 21 @ 240V</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power Range</td>
<td>3000 VA - 11400 VA</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

| Utility Monitoring, Islanding Protection, Country Configurable Thresholds | Yes |

| INPUT | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|
| Maximum DC Power (VDC) | 4050 V | 5000 V | 6750 V | 8100 V | 10250 V | 15350 V |
| Nom. DC Input Voltage | 500 V |
| Max. Input Current | 9.5 A | 13 A | 16.1 @ 208V, 15.5 @ 240V |
| Max. Input Short Circuit Current | 40 A |
| Ground-Fault Isolation Detection | Yes |
| Maximum Inverter Efficiency | 97.7% | 98.2% | 98.3% |
| CEC Weighted Efficiency | 97.5% | 98% |
| Nighttime Power Consumption | < 2.5 W |

| ADDITIONAL FEATURES | | | | | | | |
|--------------------|-------|-------|-------|-------|-------|-------|
| Supported Communication Interfaces | RS485, RS232, Ethernet, Zigbee [optional] |
| Revenue Grade Data, ANSI C12.1 | Optional* |
| Rapid Shutdown – NEC 2014 690.12 | Yes |

| STANDARD COMPLIANCE | | | | | | | |
|---------------------|-------|-------|-------|-------|-------|-------|
| Safety | UL1741, UL1003F, UL1998, CSA 22.2 |
| Grid Connection Standards | IEEE1147 |
| Emissions | FCC part15 class B |

| INSTALLATION SPECIFICATIONS | | | | | | | |
|-------------------------------|-------|-------|-------|-------|-------|-------|
| AC output conductor size / AWG range | 3/8" minimum / 16-6 AWG |
| DC input conduct size / # of strings / AWG range | 3/8" minimum / 3-2 strings / 16-6 AWG |
| Dimensions with Safety Switch (In/Out) | 30.5 x 12.5 x 7.2 / 775 x 315 x 184 |
| Weight with Safety Switch | 51.2 / 22.2 |
| Cooling | Natural Connection |
| Natural connection and internal fan (user replaceable) | Fans (user replaceable) |
| Noise | < 25 dB |
| Min. - Max. Operating Temperature Range | -13 to +140 °C -25 to +60 °C (40 to 400 version available*) |
| Protection Rating | NEMA 3R |

*For other regional settings please contact SolarEdge support


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C10

www.solaredge.us
This authorizes the application of the Certification Mark(s) shown below to the models described in the Product(s) Covered section when made in accordance with the conditions set forth in the Certification Agreement and Listing Report. This authorization also applies to multiple listee model(s) identified on the correlation page of the Listing Report.

This document is the property of Intertek Testing Services and is not transferable. The certification mark(s) may be applied only at the location of the Party Authorized To Apply Mark.

Applicant: SolarEdge Technologies Ltd
Address: 6 HaHarash Street 45240 Hod Hasharon
Country: Israel
Contact: Mr. Oren Bachar or Mr. Meir Adest
Phone: +972 9 957 6620 #293 or +972 9 957 6620 #131
FAX: +972 9 957 6591
Email: OREN.B@SOLAREEDGE.COM

Control Number: 4004590

Authorized by: Thomas J. Patterson, Certification Manager

This document supersedes all previous Authorizations to Mark for the noted Report Number.

Intertek Testing Services NA Inc.
545 East Algonquin Road, Arlington Heights, IL 60005
Telephone 800-345-3851 or 847-439-5667  Fax 312-283-1672


CSA C22.2 107.1 Issue:2001/09/01 Ed:3 General Use Power Supplies - (R2011)

Standard(s): UL SUBJECT 1699B, Outline of Investigation for Photovoltaic (PV) DC Arc-Fault Circuit Protection - Issue No.2, 2013/01/14
CSA TIL M-07, Interim Certification Requirements for Photovoltaic (PV) DC Arc-Fault Protection - Issue No. 1, 2013/03/11
June 20, 2014

Mr. Meir Adest
SolarEdge Technologies Ltd
6 Ha’Harash St.
HOD HASHARON, ISRAEL

Subject: ETL Evaluation of SolarEdge Products to NEC Rapid Shutdown Requirements

Dear Mr. Meir Adest,

This letter represents the testing results of the below listed products to the requirements contained in the following standards:


This investigation was authorized by signed Quote 500534459 dated 06/10/2014. Rapid shutdown test were perform at SolarEdge Technologies Ltd, 6 Ha’Harash St  HOD HASHARON, ISRAEL and witness by Intertek personal on 06/17/2014.

The evaluation covers installations consisting of optimizers and inverters with part numbers listed below. The testing done has verified that controlled conductors are limited to not more than 30 volts and 240 volt-amperes within 10 seconds of rapid shutdown initiation.

Applicable products:

- Power optimizers:
  - PBlue-yyyy-zzzz; where xxx is any number, 0-9, up to a maximum value where xxx = 350; yyy could be AOB or TFI; and zzzz is any combination of four letters and numbers.
  - OP-XXX-LV, OP-XXX-MV, OP-XXX-IV, OP-XXX-EV; where xxx is any number, 0-9.
  - Paaa, Pbbb, Pccc, Pddd, Peee; where aaa, bbb, ccc, ddd, eee is any number, 0-9 to a maximum upto aaaa=300, bbb=350 cccc=500, ddd=600, eee=700.
  - Pxxxx, Pyyyy, Pzzz, Pmmmm, Pnnn and Ppppp; where xxx, yyy, zzz is any number, 0-9 to a maximum up to xxx=300, yyy=350, zzz=500; where mmm, nnn, ooo is any number, 0-9 to a maximum up to mmmm=405, nnnn=300, oooo=350

- 3-ph Inverters:
  - SE9KUS / SE10KUS / SE20KUS when the SolarEdge rapid shutdown cable labeled “MCI-CB-xxxx-x” which is part of kit SE1000-RSD-xx is installed in the inverter Safety Switch where xxxx-xx is any number; inverter part number may be followed by a suffix

This letter report completes this portion of the evaluation covered by Intertek Project No.G101703554.

If there are any questions regarding the results contained in this report, or any of the other services offered by Intertek, please do not hesitate to contact the undersigned.

Please note, this Letter Report does not represent authorization for the use of any Intertek certification marks.

Completed by: Radhe Patel
Reviewed by: Howard Liu
Title: Engineering Team Lead
Title: Staff Engineer
Signature: 
Signature: 
Date: June 20th, 2014
Date: June 20th, 2014
The UFO family of components eliminates the need for separate grounding hardware by bonding solar modules directly to IronRidge XR Rails. All system types that feature the UFO family—Flush Mount, Tilt Mount and Ground Mount—are fully listed to the UL 2703 standard.

UFO hardware forms secure electrical bonds with both the module and the rail, resulting in many parallel grounding paths throughout the system. This leads to safer and more reliable installations.

**Simplified Grounding for Every Application**

The UFO family of components eliminates the need for separate grounding hardware by bonding solar modules directly to IronRidge XR Rails. All system types that feature the UFO family—Flush Mount, Tilt Mount and Ground Mount—are fully listed to the UL 2703 standard.

UFO hardware forms secure electrical bonds with both the module and the rail, resulting in many parallel grounding paths throughout the system. This leads to safer and more reliable installations.

**UFO Family of Components**

**Stopper Sleeve**
The Stopper Sleeve snaps onto the UFO, converting it into a bonded end clamp.

**Universal Fastening Object (UFO)**
The UFO securely bonds solar modules to XR Rails. It comes assembled and lubricated, and can fit a wide range of module heights.

**Bonded Splice**
Each Bonded Splice uses self-drilling screws to form a secure connection. No bonding strap needed.

**Grounding Lug**
A single Grounding Lug connects an entire row of PV modules to the grounding conductor.

**Bonded Attachments**
The bonding bolt attaches and bonds the L-foot to the rail. It is installed with the same socket as the rest of the system.

**Approved Enphase microinverters can provide equipment grounding of IronRidge systems, eliminating the need for ground lugs and field installed equipment ground conductors (EGC). A minimum of two microinverters mounted to the same rail and connected to the same Engage cable is required. Refer to installation manuals for additional details.**

**UL Certification**
The IronRidge Flush Mount, Tilt Mount, and Ground Mount Systems have been listed to UL 2703 by Intertek Group plc.

UL 2703 is the standard for evaluating solar mounting systems. It ensures these devices will maintain strong electrical and mechanical connections over an extended period of time in extreme outdoor environments.

Refer to installation manuals for a detailed list.

**Cross-System Compatibility**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Flush Mount</th>
<th>Tilt Mount</th>
<th>Ground Mount</th>
</tr>
</thead>
<tbody>
<tr>
<td>XR Rails</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>UFO/Stopper</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Bonded Splice</td>
<td>✓</td>
<td>✓</td>
<td>N/A</td>
</tr>
<tr>
<td>Grounding Lugs</td>
<td>1 per Row</td>
<td>1 per Row</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Microinverters**

<table>
<thead>
<tr>
<th>Microinverters &amp; Power Optimizers</th>
<th>Enphase - M250-72, M250-60, M215-60, C250-72</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Darfon - MIG240, MIG300, G320, G640</td>
</tr>
<tr>
<td></td>
<td>SolarEdge - P300, P320, P400, P405, P600, P700, P730</td>
</tr>
</tbody>
</table>

**Fire Rating**

<table>
<thead>
<tr>
<th>Modules</th>
<th>Class A</th>
<th>Class A</th>
<th>N/A</th>
</tr>
</thead>
</table>

**Modules**

Tested or Evaluated with over 400 Framed Modules

Refer to installation manuals for a detailed list.
**RATINGS**

UL 2703 LISTED
- Max Overcurrent Protective Device (OCSPD) Rating: 25A
- Max Module Size: 249W
- Module Orientation: Portrait or Landscape
- Mechanical Load Rating: meets minimum requirements of the standard (10 PSF downward, 5 PSF upward, 5 PSF lateral). Actual system structural capacity is defined by PE stamped certification letters.

**CLASS A SYSTEM FIRE RATING PER UL 1703**
- Any Roof Slope with Module Types 1, 2, and 3
- Any module-to-roof gap is permitted, with no perimeter guarding required. This rating is applicable with any third-party attachment.
- Class A rated PV systems can be installed on Class A, B, and C roofs without affecting the roof fire rating.

**MARKINGS**

Product markings are located on the 3/8” flange hex nut.

**MODULE COMPATIBILITY**

The Flush Mount System may be used to ground and/or mount a PV module complying with UL 1703 only when the specific module has been evaluated for grounding and/or mounting in compliance with the included instructions. Unless otherwise noted, “xxx” refers to the module power rating and both black and silver frames are included in the certification.

**MARKINGS**

Product markings are located on the 3/8” flange hex nut.

**MODELS**

**MAKE**

- Astronergy Solar
- Aviko
- ET Solar
- Flex
- Gigavolt Solar
- Hanwha Solar
- Hybrid Solar
- JA Solar
- Kyocera
- LG
- Mitsubishi
- Motech
- Panasonic
- Phono Solar
- Phononic Solar
- REC Solar
- Renesola
- SunEdison
- Suniva
- Sunpreme
- Suntech
- Trina
- Winecon
- Yingli

**MARKINGS**

Product markings are located on the 3/8” flange hex nut.

**FLUSH MOUNT INSTALLATION MANUAL - 2**

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FLUSH MOUNT INSTALLATION MANUAL - 3

© 2015 IRONRIDGE, INC. VERSION 1.20
IronRidge
Mr. David F. Taggart
IronRidge XR10 Rail, Roof Flush Mounting System – Structural Analysis

| Table 4A - MAXIMUM SPANS (in) - Roof Slope 7° to 27° - Wind Zone 1 (67.5” Max Module Length) |
|---------------------------------|---------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| X10 Rail                        | Wind Speed | Ground Snow Load |
| Exposure  | mph | 0 psf | 10 psf | 20 psf | 30 psf | 40 psf | 50 psf | 60 psf | 70 psf | 80 psf | 90 psf |
| Category B | 100 | 75 | 65 | 55 | 49 | 43 | 39 | 35 | 33 | 31 | 29 |
| Category C | 105 | 75 | 65 | 55 | 49 | 43 | 39 | 35 | 33 | 31 | 29 |
| Category D | 110 | 75 | 65 | 55 | 49 | 43 | 39 | 35 | 33 | 31 | 29 |

Notes – see page 20
### Table 5A - MAXIMUM SPANS (in) - Roof Slope 7° to 27° - Wind Zone 2 (67.5" Max Module Length)

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<thead>
<tr>
<th>XR10 Rail</th>
<th>Wind Speed</th>
<th>Ground Snow Load</th>
</tr>
</thead>
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<tr>
<td></td>
<td>mph 0 psf</td>
<td>10 psf 20 psf 30 psf 40 psf 50 psf 60 psf 70 psf 80 psf 90 psf</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>100 72</td>
<td>65 55 49 43 39 35 33 31 29</td>
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<tr>
<td>Category B</td>
<td>105 69</td>
<td>65 55 49 43 39 35 33 31 29</td>
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<td>52 55 49 43 39 35 33 31 29</td>
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<td>150 49</td>
<td>49 49 43 39 35 33 31 29</td>
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<td>160 46</td>
<td>46 46 43 39 35 33 31 29</td>
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<td>170 43</td>
<td>43 43 43 39 35 33 31 29</td>
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<tr>
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<td>58 55 49 43 39 35 33 31 29</td>
</tr>
<tr>
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<td>110 56</td>
<td>56 55 49 43 39 35 33 31 29</td>
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<td>120 51</td>
<td>51 49 43 39 35 33 31 29</td>
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<td>130 48</td>
<td>48 48 43 39 35 33 31 29</td>
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<td>140 44</td>
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<tr>
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<tr>
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<td>170 33</td>
<td>33 33 33 33 33 33 31 29</td>
</tr>
</tbody>
</table>

Notes – see page 20

### Table 6A - MAXIMUM SPANS (in) - Roof Slope 7° to 27° - Wind Zone 3 (67.5" Max Module Length)

<table>
<thead>
<tr>
<th>XR10 Rail</th>
<th>Wind Speed</th>
<th>Ground Snow Load</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mph 0 psf</td>
<td>10 psf 20 psf 30 psf 40 psf 50 psf 60 psf 70 psf 80 psf 90 psf</td>
</tr>
<tr>
<td>Exposure</td>
<td></td>
<td></td>
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<td></td>
<td>100 59</td>
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<td>Category B</td>
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<td>56 55 49 43 39 35 33 31 29</td>
</tr>
<tr>
<td></td>
<td>110 54</td>
<td>54 54 49 43 39 35 33 31 29</td>
</tr>
<tr>
<td></td>
<td>120 49</td>
<td>49 49 49 43 39 35 33 31 29</td>
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<td>130 46</td>
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<td>170 29</td>
<td>29 29 29 29 29 29 29 29 29</td>
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<tr>
<td>Category D</td>
<td>100 46</td>
<td>46 46 46 46 43 39 35 33 29</td>
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<tr>
<td></td>
<td>105 44</td>
<td>44 44 44 44 43 39 35 33 29</td>
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<tr>
<td></td>
<td>170 27</td>
<td>27 27 27 27 27 27 27 27 27</td>
</tr>
</tbody>
</table>

Notes – see page 20
Test Verification of Conformity

In the basis of the tests undertaken, the sample(s) of the below product have been found to comply with the requirements of the referenced specifications at the time the tests were carried out.

Applicant Name & Address: IronRidge, Inc.
1495 Zephyr Ave.
Hayward, CA 95444
USA

Product Description: Flush Mount System with XR Rails.

Ratings & Principle Characteristics:
- Fire Class Resistance Rating:
  - Flush Mount (Symmetrical). Class A Fire Rated for Low Slope applications when using Type 1, 2 and 3, listed photovoltaic modules. Class A Fire Rated for Steep Slope applications with Type 1, 2 and 3, listed photovoltaic modules. Tested with a 5° gap (distance between the bottom of the module frame and the roof covering), per the standard this system can be installed at any gap allowed by the manufacturer’s installation instructions. No perimeter guarding is required. This rating is applicable with any IronRidge or 3rd party roof anchor.

Models: IronRidge Flush Mount with XR Rails

Brand Name: IronRidge Flush Mount


Verification Issuing Office: Intertek Testing Services NA, Inc.
8431 Murphy Drive
Middleton, WI 53562

Date of Tests: 08/27/2014 to 03/17/2015

Test Report Number(s): 101769343MD-001a, 101769343MD-001b, 101915978MD-001 & 101999423MD-001ar1-c1.1

This verification is part of the full test report(s) and should be read in conjunction with them. This report does not automatically imply product certification.

Completed by: Chris Zimbich
Title: Technician II, Fire Resistance
Date: 05/25/2016

Reviewed by: Chad Nags
Title: Technician I, Fire Resistance
Date: 05/25/2016

Notes – Tabulated values are based on the following criteria:

1. Building mean roof height = 30 ft
2. Risk Category I
3. Solar maximum module long dimension is 67.5 inches for Tables 1A-9A and 78.5 inches for Tables 1B-9B.
4. Provide 2 in. clear between roof and rail
5. End cantilever span (max) = 0.40 x maximum span from above tables
6. No rail splices in end spans
7. No rail splices in middle 1/3 of interior spans
8. Single simple span(s). Spans listed in the tables above may be multiplied by 1.08 for continuous rails of 3 or more spans.

Our analysis assumes that the rails, including the connections and associated hardware, are installed in a workmanship-like manner in accordance with the "IronRidge Roof Mount Installation Manual" by IronRidge and generally accepted standards of construction practice. Additional information is available at the IronRidge web site, IronRidge.com. Verification of PV Module capacity to support the loads associated with the given array shall be the responsibility of the Contractor or Owner and not IronRidge or Sterling Madison Lofquist.

The adequacy of the supporting roof framing is to be determined by others.

Please feel free to contact me at your convenience if you have any questions.

Respectfully yours,

Tres Warner, P.E.
Design Division Manager

C17

GFT-GP-11a (24-MAR-2014)
### E-Mount Lag Installation Instructions

**Installation Tools Required:**
- tape measure
- roofing bar
- chalk line
- stud finder
- caulking gun
- sealant compatible with roofing materials
- drill with 7/32” long-style bit
- drill or impact gun with 1/2” socket

**WARNING:** Quick Mount PV products are NOT designed for and should NOT be used to anchor fall protection equipment.

---

**Lag Pull-out (withdrawal) capacities (lbs) in typical lumber:**

<table>
<thead>
<tr>
<th>Lag Bolt Specifications</th>
<th>Specific Gravity</th>
<th>S/16” shld per 2” threaded depth</th>
<th>S/16” shld per 1” threaded depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Douglas Fir, Larch</td>
<td>.50</td>
<td>758</td>
<td>269</td>
</tr>
<tr>
<td>Douglas Fir, Redwood</td>
<td>.40</td>
<td>758</td>
<td>235</td>
</tr>
<tr>
<td>Engelmann Spruce, Lodgepole Pine (NDS 1600T or higher)</td>
<td>60</td>
<td>758</td>
<td>235</td>
</tr>
<tr>
<td>Hem. Fir (Red)</td>
<td>.45</td>
<td>938</td>
<td>212</td>
</tr>
<tr>
<td>Western Pines</td>
<td>.50</td>
<td>938</td>
<td>235</td>
</tr>
<tr>
<td>Spruce, Pines</td>
<td>50</td>
<td>915</td>
<td>255</td>
</tr>
<tr>
<td>Spruce, Fir (Suitable for 2 million psi and higher grades of NDS and NDS)</td>
<td>.50</td>
<td>798</td>
<td>284</td>
</tr>
</tbody>
</table>

**Sources:**
- American Wood Council, NDS 2005, Table 11.2 A, 11.2 A
- Note: Thread must be embedded in a rafter or other structural roof member.
- See NDS Table 11.3, 11.6 for required edge distances

---

**RACKING COMPONENTS NOT INCLUDED**

1. QBlock Classic: A360.1 Cast Al. Mill
2. Plug, Sealing, 1/16” x 7/9”ERM / 18-8 SS
3. Lag Screw, Hex Head, 5/16” x 5-1/2” 18-8 SS
4. Washer, Fender, 5/16” ID x 1-1/4” OD, 18-8 SS
5. Washer, Fender, 5/16” OD x 1-1/4” OD, 18-8 SS
6. Washer, Fender, 5/16” ID x 1-1/4” OD, 18-8 SS

---

**Notes:**
- Thread must be embedded in a rafter or other structural roof member.
- See NDS Table 11.2 A for required edge distances

**Sources:**
- American Wood Council, NDS 2005, Table 11.2 A, 11.2 A
- Note: Thread must be embedded in a rafter or other structural roof member.
- See NDS Table 11.3, 11.6 for required edge distances

---

**Important:**

- All roof shopping manufacturers’ written instructions must also be followed by anyone modifying a roof system. Consult the roof manufacturer’s specs and instructions prior to touching the roof.

---

**You are now ready for the rack of your choice. Follow all the directions of the rack manufacturer as well as the module manufacturer.**

---

**Installation: per NDS:**

1. Locate, choose, and mark centers of rafters to be mounted. Select the courses of shingles where mounts will be placed.
2. Carefully lift composition roof shingle with roofing bar, just above placement of mount. Remove nails as required. See “Proper Flashing Placement” on next page.
3. Insert flashing between 1st and 2nd course. Slide up to top edge of flashing at least 3/4” higher than the drip edge of the 3rd course and lower flashing edge is above the drip edge of 1st course. Mark center for drilling.
4. Using drill with 7/32” bit, drill pilot hole into rafter and rafter, taking care to drill square to the roof. Do not use mount as a drill guide. Drill should be 1 ¾” deep hole into rafter.
5. Clean off any sawdust, and fill hole with sealant compatible with roofing materials.
6. Slide the flashing into position. Insert the rubber plug into the QBlock cavity.
7. Using a 1/2 inch socket on an impact gun drive the lag screw until the QBlock stops rotating easily.
8. DO NOT over-torque.

---

**E-Mount Lag Installation Instructions**

**AVAILABE IN MILL AND BRONZE ANODIZED FINISHES**

<table>
<thead>
<tr>
<th>STYLE</th>
<th>QMMP E-MOUNT WITH LAG BOLT</th>
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</thead>
<tbody>
<tr>
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</table>

---

**Quick Mount PV**

**RESPECT THE ROOF**

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**C18**

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**Sep-2014, Rev 1**

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**BI 7.2.3-31**

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**BI 7.2.3-31**

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**Sep-2014, Rev 1**