FLUSH MOUNT
DISCLAIMER

This manual describes proper installation procedures and provides necessary standards required for product reliability. Warranty details are available online. All installers must thoroughly read this manual and have a clear understanding of the installation procedures prior to installation. Failure to follow these guidelines may result in property damage, bodily injury or even death.

IT IS THE INSTALLER’S RESPONSIBILITY TO:

- Ensure safe installation of all electrical aspects of the array. All electrical installation and procedures should be conducted by a licensed and bonded electrician or solar contractor. Routine maintenance of a module or panel shall not involve breaking or disturbing the bonding path of the system. All work must comply with national, state and local installation procedures, product and safety standards.
- Comply with all applicable local or national building and fire codes, including any that may supersede this manual.
- Ensure all products are appropriate for the installation, environment, and array under the site's loading conditions.
- Use only IronRidge parts or parts recommended by IronRidge; substituting parts may void any applicable warranty.
- Review the Design Assistant and Certification Letters to confirm design specifications.
- Ensure provided information is accurate. Issues resulting from inaccurate information are the installer’s responsibility.
- Ensure bare copper grounding wire does not contact aluminum and zinc-plated steel components, to prevent risk of galvanic corrosion.
- If loose components or loose fasteners are found during periodic inspection, re-tighten immediately. If corrosion is found, replace affected components immediately.
- Provide an appropriate method of direct-to-earth grounding according to the latest edition of the National Electrical Code, including NEC 250: Grounding and Bonding, and NEC 690: Solar Photovoltaic Systems.
- Disconnect AC power before servicing or removing modules, AC modules, microinverters and power optimizers.
- Review module manufacturer’s documentation for compatibility and compliance with warranty terms and conditions.
RATINGS

UL 2703 LISTED

- Max Overcurrent Protective Device (OCPD) Rating: 25A
- Max Module Size: 24ft²
- Module Orientation: Portrait or Landscape
- CAMO Specific Allowable Design Load Rating: 50 PSF downward, 50 PSF upward, 15 PSF lateral
- System Level Allowable Design 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.

WATER SEAL RATINGS: UL 441 & TAS 100(A)-95 (FLASHFOOT2, ALL TILE HOOK, KNOCKOUT TILE)

- Tested and evaluated without sealant.
- Any roofing manufacturer approved sealant is allowed. Ratings applicable for roof slopes between 2:12 and 12:12

STRUCTURAL CERTIFICATION

- Designed and Certified for Compliance with the International Building Code & ASCE/SEI-7

MARKINGS

Product markings are located on the 3/8" flange hex nut or Grounding Lug bolt head.
CHECKLIST

PRE-INSTALLATION

☐ Verify module compatibility. See Page 10 for info.

TOOLS REQUIRED

☐ Cordless Drill (non-impact)
☐ Impact Driver (for lag bolts)
☐ Torque Wrench (0-250 in-lbs)
☐ 5/16” Socket
☐ 7/16” Socket
☐ 1/2” Socket
☐ String Line

TORQUE VALUES

☐ FlashFoot2 Lag Bolts (7/16” Socket): Fully Seat
☐ Bonded Splice Screws (5/16” Socket): 20 in-lbs
☐ Grounding Lug Nuts (7/16” Socket): 80 in-lbs
☐ Grounding Lug Terminal Screws (7/16” Socket): 20 in-lbs
☐ Universal Fastening Object (7/16” Socket): 80 in-lbs
☐ Expansion Joint Nuts (7/16” Socket): 80 in-lbs
☐ Flush Standoffs (1/2” Socket): 132 in-lbs
☐ Microinverter Kit Nuts (7/16” Socket): 80 in-lbs
☐ Frameless Module Kit Nuts (7/16” Socket): 80 in-lbs
☐ 3/8” Bonding Hardware Nuts (7/16” Socket): 250 in-lbs
☐ All Tile Hook Lags (7/16” Socket): Fully Seat
☐ All Tile Hook Carriage Bolts (7/16” Socket): 132 in-lbs
☐ Knockout Tile Lags (1/2” Socket): Fully Seat
☐ Knockout Tile Nuts (1/2” Socket): 132 in-lbs
☐ Flat Roof Attachment Nuts (9/16” Socket): 250 in-lbs

If using previous version of: FlashFoot, Integrated Grounding Mid Clamps, Grounding Lug, End Clamps, and Expansion Joints please refer to Alternate Components Addendum (Version 1.20).
1. ATTACH BASES

For composition roofs, refer to FlashFoot2 install instructions on page 8. For tile roofs, refer to All Tile Hook and Knockout Tile install instructions on page 8 and 9. For flat roofs, refer to Flat Roof Attachment install instructions on page 9. When using approved third party attachments listed below, refer to manufacturer's install instructions.

- Tested or evaluated third-party roof attachments:
  - Anchor Products - U-Anchor
  - S-5! Standing Seam Metal Roof Clamps - Certification of metal roof clamps includes bonding to both painted and galvalume metal roofs. Tighten clamp set screws to 130-150 in-lbs (≥ 24 gauge) or 160-180 in-lbs (22 gauge) roofs. Tighten S-5! M10 bolt to 240 in-lbs or S-5! Mini M8 bolt to 156 in-lbs.
  - EcoFasten Green Fasten GF-1 Anchors
  - QuickMount PV Roof Mounts and Tile Hooks - Tile Hook attaches to XR Rail using 3/8" Bonding Hardware Kit torqued to 250 in-lbs.
  - Quickscrews Solar Roof Hooks, Ejoit Aluminum Roof Hooks, Unirac Creotec Tile Hooks, or Solarhooks - Attach to XR Rails with L-Foot or 3/8" Bonding Hardware Kit torqued to 250 in-lbs.

2. PLACE RAILS

A. CONNECT SPLICES

Use Bonded Splices, when needed, to join multiple sections of rail. Insert Bonded Splice 6" into first rail and secure with two self-drilling screws, spacing them approximately 1" apart and tightening to 20 in-lbs. Slide second rail over Bonded Splice and secure with two more self-drilling screws.

- Rows exceeding 100 feet of rail must use Expansion Joints.
- For XR10 and XR100 rails, insert screws along the provided lines.
- Refer to Structural Certification letters for rail splice location requirements.
- Screws can be inserted on front or back of rails.

B. PREPARE HARDWARE

Slide square-headed bolts into side-facing rail slot. Space out bolts to match attachment spacing.

- Tape ends of rail, to keep bolts from sliding out while moving.
- If using T-bolts, carry hardware onto roof and proceed.

C. ATTACH RAILS

Drop rail with hardware into roof attachment. Level rail at desired height, then torque to 250 in-lbs.

- Rail can face either upslope or downslope on roof.
3. SECURE LUGS

Insert T-bolt in top rail slot and torque hex nut to **80 in-lbs**. Install a minimum 10 AWG solid copper or stranded grounding wire. Torque terminal screw to **20 in-lbs**.

- Ground Lugs are only needed on one rail per continuous row of modules, regardless of row length (unless frameless modules are being used, see Page 9).
- If using Enphase microinverters or Sunpower AC modules, Grounding Lugs may not be needed. See Page 9 for more info.
- Grounding Lugs can be installed anywhere along the rail and in either orientation shown. If installing lug underneath modules in areas with ground snow loads greater than 40 psf, place lug within 4 inches module frame edge.

4. SECURE MODULES

A. SECURE FIRST END

Place first module in position on rails, a minimum of 1” from rail ends. Snap Stopper Sleeves onto UFO. Fasten module to rail using the UFO, ensuring that the UFO is hooked over the top of the module. Torque to **80 in-lbs**.

- Ensure rails are square before placing modules.
- Hold Stopper Sleeves on end while torquing to prevent rotation.
- If using CAMO instead of UFO + Stopper Sleeve, refer to Page 6 for CAMO installation procedure.

B. SECURE NEXT MODULES

Place UFO into each rail, placing them flush against first module. Slide second module against UFO. Torque to **80 in-lbs**. Repeat for each following module.

- When reinstalling UFO, move modules a minimum of 1/16” so UFOs are in contact with a new section of module frame.
- When UFOs are loosened and re-tightened, ensure UFO T-bolt bottoms out in rail channel before re-torquing UFO to achieve full engagement between T-bolt and rail.
- If using Wire Clips, refer to Page 9.

C. SECURE LAST END

Place last module in position on rails, a minimum of 1” from rail ends. Snap Stopper Sleeves onto UFO. Secure UFO Clamps on rails, ensuring they are hooked over top of module. Torque to **80 in-lbs**.

- Hold Stopper Sleeves on end while torquing to prevent rotation.
- Repeat all steps for each following row of modules, leaving a minimum 3/8” gap between rows.
- If using CAMO instead of UFO + Stopper Sleeve, refer to Page 6 for CAMO installation procedure.
A. SLIDE INTO RAIL

Slide CAMO into rail channel far enough to clear the module frame. CAMO requires 6" of clearance from end of rail.

B. PLACE MODULE

Place module on rails (module cells not shown for clarity). When installing CAMO the module can overhang the rail no more than 1/4”.

C. PULL TOWARDS END

Pull CAMO towards rail ends, at 45 degree angle, so the bonding bolt contacts the module flange edge.

D. SECURE TO FRAME

Rotate handle with an upwards motion until CAMO snaps into rail channel. Ensure CAMO bonding pins are fully seated on top of module frame.

FRAME COMPATIBILITY

CAMO has been tested or evaluated with all modules listed in the Module Compatibility section having frames within the referenced dimensions. Be sure the specific module being used meets the dimension requirements.

For installations with Hanwha Q CELLS modules with 32 mm frame heights, the maximum ground snow is 45 PSF (33 PSF module pressure).
EXPANSION JOINTS

GROUNDING STRAP EXPANSION JOINT

Grounding Strap Expansion Joints are required for thermal expansion of rows exceeding 100 feet of rail.

Insert Internal Splice into first rail and secure with screw. Assemble and secure Grounding Strap 3/8” from rail end. Slide second rail over Internal Splice leaving 1” gap between rails. Attach other end of Grounding Strap with hardware, and torque hex nuts to 80 in-lbs.

- Second Bonded Splice screw is not used with Expansion Joints.
- Do not install module over top of expansion joint location.

ELECTRICAL DIAGRAM

*Grounding Lugs and wire are not required in systems using certain Enphase microinverters or certain Sunpower modules. Equipment grounding is achieved with the Engage cable for Enphase or the AC module cable system for Sunpower via their integrated EGC.
**FLASHFOOT2**

Locate roof rafters and mark locations on roof. Drill 1/4” pilot holes and backfill with approved sealant. Slide flashing between 1st and 2nd course of shingles, ensuring flashing doesn’t overhang the downhill shingle. Line up with pilot hole and insert supplied lag bolt with washer through flashing. Fully seat lag bolt. Place Cap onto flashing in desired orientation for E/W or N/S rails and rotate 180 degrees until it locks into place.

- Rail can be installed on either side of FlashFoot2 Cap.
- Standalone FlashFoot2 manual available on website.

**ALL TILE HOOK**

Remove tile and mark rafter. Position base over rafter, adjust arm if necessary and torque hardware to 132 in-lbs (11 ft-lbs). Use base as guide to drill 1/4” pilot holes, back fill with roofing manufacturer’s approved sealant, then insert lag bolts and tighten until fully seated. Replace tiles and notch as necessary to ensure proper fit. Attach rails to either side of slot using bonding hardware and torque to 250 in-lbs (21-ft-lbs).

- Position arm near the center of valley for curved tiles.
- Position arm away from seam of joining flat tiles.
- Ensure top of hook does not extend above rail.
- IronRidge offers an optional aluminum deck flashing. Refer to All Tile Hook Flashing Installation Manual. Other approved flashing methods include user supplied adhesive backed flexible flashing.
- Standalone All Tile Hook manual available on website.

**KNOCKOUT TILE**

Remove tile and mark rafter. Use base as guide to drill 1/4” pilot hole and fill with roofing manufacturer’s approved sealant. Insert lag bolt with bonded washer through base and drive until fully seated. Insert Tile Replacement Flashing, lower onto base and apply pressure over the threaded post until it dimples the flashing. Place L-Foot over dimple and tap with hammer to punch threaded post through the flashing. Ensure punched pieces of flashing are cleared away. Form flashing as needed to sit flush with surrounding tiles, position L-Foot in desired orientation and torque hardware to 132 in-lbs (11 ft-lbs). Attach rail to either side of L-Foot with bonding hardware and torque to 250 in-lbs (21 ft-lbs).

- Base can be installed parallel or perpendicular to rafter.
- L-foot can be installed facing any direction.
- Ensure L-Foot does not extend above rail.
- If deck level flashing is required, approved flashing methods include user supplied adhesive backed flexible flashing.
- Standalone Knockout Tile manual available on website.
**FLAT ROOF ATTACHMENT**

Flat Roof Attachment can be used with an L-foot for flush mounting modules on low sloped roofs. Mark locations for Flat Roof Attachment. Screws should be installed symmetrically to each other. If using a membrane flashing, remove the silicone washer's protective liner prior to attaching the membrane. Attach L-foot with washers and 3/8" hardware torqued to **250 in-lbs (21 ft-lbs)**. Seal attachment and/or membrane per roofing manufacturer's requirements.

- Type, size, and quantity of roof screws to be specified by Structural Engineer. Fastener size not to exceed #15.
- Membrane flashing available for TPO, PVC, and KEE roofs. Ensure membrane flashing is compatible with existing roofing material.
- If membrane flashing is not used, only washer on top of L-Foot is required.
- Standalone Flat Roof Attachment manual available on website.

**END CAPS**

End Caps add a completed look and keep debris and pests from collecting inside rail.

Firmly press End Cap onto rail end.

- End Caps come in sets of left and right. Check that the proper amount of each has been provided.

**WIRE CLIPS**

Wire Clips offer a simple wire management solution.

Firmly press Wire Clip into top rail slot. Run electrical wire through open clip. Snap closed once all wires have been placed.

**FLUSH STANDOFFS**

Attach Standoffs to roof locations with lag bolts (not included). Place flashing over Standoff. Attach L-Foot on Standoff washer with hardware. Torque to **132 in-lbs (11 ft-lbs)**.
MICROINVERTER KITS

Use IronRidge's Microinverter Kit to bond compatible microinverters and power optimizers to the racking system.

Insert Microinverter Kit T-bolt into top rail slot. Place compatible microinverter or power optimizer into position and tighten hex nut to 80 in-lbs.

If installing in areas with ground snow loads greater than 40 psf, install MLPE devices directly next to module frame edge.

COMPATIBLE PRODUCTS

- **Enphase**
  - M250-72, 250-60, M215-60, C250-72, S230, S280, IQ 6, IQ 6+, IQ 7, IQ 7+, IQ 7X, Q Aggregator
- **Darfon**
  - MIG240, MIG300, G320, G640
- **Solar Edge**
  - P300, P320, P370, P400, P405, P505, P600, P700, P730, P800p, P800s, P850

SYSTEMS USING ENPHASE MICROINVERTERS OR SUNPOWER AC MODULES

IronRidge systems using approved Enphase products or SunPower modules eliminate the need for lay-in lugs and field installed equipment grounding conductors (EGC). This solution meets the requirements of UL 2703 for bonding and grounding and is included in this listing.

The following Sunpower modules are included in this listing: Modules with model identifier Ab-xxx-YY and InvisiMount (G5) 46mm frame; where "A" is either E, or X; “b” can be 17, 18, 19, 20, 21, or 22; and “YY” can be C-AC, D-AC, BLK-C-AC, or BLK-D-AC.

The following Enphase products are included in this listing: Microinverters M250-72, M250-60, M215-60, C250-72, and Engage cables ETXX-240, ETXX-208, ETXX-277.

- A minimum of two inverters mounted to the same rail and connected to the same Engage cable are required.
- The microinverters or Sunpower AC modules must be used with a maximum 20 A branch rated overcurrent protection device (OCPD).
- If an AC module is removed from a circuit for maintenance, you must first disconnect AC power and then install a temporary EGC to bridge the gap by inserting an AC extension cable (or via other NEC-compliant means), in order to maintain effective ground continuity to subsequent modules.

SYSTEMS USING PHAZR MICROSTORAGE PRODUCTS

Bonding and grounding is achieved via the IronRidge system when using the Microinverter Kit. Running a separate equipment grounding conductor to the PHAZRs is not required.

If installing in areas with ground snow loads greater than 40 psf and underneath a module, install PHAZR devices as close as possible to module frame edge.
**FRAMELESS MODULE KITS**

Insert Frameless Kit T-bolt in top rail slot. Place star washer over T-bolt, allowing it to rest on top of rail. Secure module clamps with a hex nut and torque to **80 in-lbs**.

- Tested or evaluated module clamps:
  - Sunforson silver or black SFS-UTMC-200(B) mid and SFS-UTEC-200(B) end clamps.
  - Sunpreme silver or black mid and end clamps with part numbers 7500105X where "X" is 1, 5, 6 or 7.
  - IronRidge silver or black mid and end clamps with part numbers FMLS-XC-001-Y where "X" is E or M and "Y" is B or blank.

- Follow manufacturer’s installation instructions to install the module clamps.
- Frameless modules require using a Grounding Lug on every rail.
- For Sunpreme Modules Only: If required to use slide prevention hardware, see Module Slide Prevention Addendum (Version 1.10).

**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.

<table>
<thead>
<tr>
<th>MAKE</th>
<th>MODELS</th>
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<tbody>
<tr>
<td>Amerisolar</td>
<td>Modules with 35, 40 and 50mm frames and model identifier ASbYxxxZ; where &quot;b&quot; can be 5 or 6; &quot;Y&quot; can be M, P, M27, P27, M30, or P30; and &quot;Z&quot; can be blank, W or WB.</td>
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<tr>
<td>Astronergy Solar</td>
<td>Modules with 35, 40, and 45mm frames and model identifier aaSM66yyPzz-xxx; where &quot;aa&quot; can be CH or A; &quot;yy&quot; can be either 10 or 12; and &quot;zz&quot; can be blank, HV, (BF) or (BL). Frameless modules with model identifier CHSM6610P(DG)-xxx.</td>
</tr>
<tr>
<td>Auxin</td>
<td>Modules with 40mm frames and model identifier AXN6y6zAxxx; where &quot;y&quot; can be M or P; &quot;z&quot; can be 08, 09, 10, 11, or 12; and &quot;A&quot; can be F or T.</td>
</tr>
<tr>
<td>Axitec</td>
<td>Modules with 35 or 40mm frames and model identifier AC-xxxY/aa-ZZ; where “Y” is M or P; “aa” is 125 or 156; and “ZZ” is 54S, 60S or 72S.</td>
</tr>
<tr>
<td>Boviet</td>
<td>Modules with 40mm frames and model identifier BVM66aaYY-xxx; where &quot;aa&quot; can be 9, 10 or 12; and &quot;YY&quot; is M or P.</td>
</tr>
<tr>
<td>BYD</td>
<td>Modules with 35mm frames and model identifier BYDxxxAY-ZZ; where &quot;A&quot; can be M6, P6, or PH; &quot;Y&quot; can be C or K; and &quot;ZZ&quot; can be 30 or 36.</td>
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<tr>
<td>Canadian Solar</td>
<td>Modules with 35 and 40mm frames and model identifier CSbY-xxxZ; where &quot;b&quot; can be 1, 3 or 6; &quot;Y&quot; can be H, K, P, U, V, or X; and &quot;Z&quot; can be M, P, MS, PX, M-SD, P-AG, P-SD, MB-AG, PB-AG, MS-AG, or MS-SD. Frameless modules with model identifier CSbY-xxx-Z; where &quot;b&quot; can be 3 or 6; &quot;Y&quot; can be K, P, U, or X; and &quot;Z&quot; can be M-FG, MS-FG, P-FG, MB-FG, or PB-FG.</td>
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<tr>
<td>CertainTeed</td>
<td>Modules with 35 and 40mm frames and model identifier CTxxxYZZ-AA; where &quot;Y&quot; can be M or P; &quot;ZZ&quot; can be 00,01, 10, or 11; and &quot;AA&quot; can be 01, 02 or 03.</td>
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<tr>
<td>CSUN</td>
<td>Modules with 35 and 40mm frames and model identifier YYxxx-zzAbb; where &quot;YY&quot; is CSUN or SST; &quot;zz&quot; is blank, 60, or 72; &quot;A&quot; is blank, P or M; and &quot;bb&quot; is blank, BB, BW, or ROOF.</td>
</tr>
<tr>
<td>Ecosolargy</td>
<td>Modules with 35, 40, and 50mm frames and model identifier ECOxxxYzzA-bbD; where &quot;Y&quot; can be A, H, S, or T; &quot;zz&quot; can be 125 or 156; &quot;A&quot; can be M or P; &quot;bb&quot; can be 60 or 72; and &quot;D&quot; can be blank or B.</td>
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<tr>
<td>ET Solar</td>
<td>Modules with 35, 40, or 50mm frames and model identifier ET-Y6ZxxxAa; where &quot;Y&quot; is P, L, or M; &quot;Z&quot; is 60 or 72; and &quot;AA&quot; is WB, WW, BB, WBG, WWG, WBAC, WBCO, WWCO, WWBCO or BBAC.</td>
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<td>MAKE</td>
<td>MODELS</td>
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<tr>
<td>Flex</td>
<td>Modules with 35, 40, or 50mm frames and model identifier FXS-xxYY-ZZ; where &quot;xx&quot; is the module power rating; &quot;YY&quot; is BB or BC; and &quot;ZZ&quot; is MAA1B, MAB1W, SAA1B, SAA1W, SAC1B, SAC1W, SAD1W, SBA1B, SBA1W, SBC1B, or SBC1W.</td>
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<tr>
<td>GCL</td>
<td>Modules with 35 and 40mm frames and model identifier GCL-a6/YY xxx; where &quot;a&quot; can be M or P; and &quot;YY&quot; can be 60, 72, or 72H.</td>
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<tr>
<td>GigaWatt Solar</td>
<td>Modules with 40mm frames and model identifier GWxxxxY; where &quot;Y&quot; is either PB or MB.</td>
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<tr>
<td>Hansol</td>
<td>Modules with 35 and 40 mm frames and model identifier HSSxxY-zz; where &quot;YY&quot; can be TB, TD, UB or UD; and &quot;zz&quot; can be AN1, AN3, AN4.</td>
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<tr>
<td>Hanwha Solar</td>
<td>Modules with 40, 45, or 50mm frames and model identifier HSLaaP6-YY-1-xxxZ; where &quot;aa&quot; is either 60 or 72; &quot;YY&quot; is PA or PB; and &quot;Z&quot; is blank or B.</td>
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<tr>
<td>Heliene</td>
<td>Modules with 40mm frames and model identifier YYZZxxx; where &quot;YY&quot; is 36, 60, 72, or 96; and &quot;ZZ&quot; is M, P, or MBLK.</td>
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<tr>
<td>Hyundai</td>
<td>Modules with 35, 40 and 50mm frames and model identifier HiS-YYxxxZZ; where &quot;Y&quot; can be M or S; and &quot;ZZ&quot; can be KI, MI, MF, MG, SG, RI, RG(BF), RG(BK), TI, or TG.</td>
</tr>
<tr>
<td>Itek</td>
<td>Modules with 40 or 50mm frames and model identifier IT-xxx-YY; where &quot;YY&quot; is blank, HE, or SE, or SE72.</td>
</tr>
<tr>
<td>JA Solar</td>
<td>Modules with 35, 40, 45mm frames and model identifier JAAyyzz-bb-xxx/aa; where &quot;yy&quot; can be M, P, M6 or P6; &quot;zz&quot; can be blank, (K), (L), (R), (V), (BK), (FA), (AF), (FA)(R), (L)(BK), (L)(TG), (R)(BK), (R)(TG), (V)(BK), (BK)(TG), or (L)(BK)(TG); &quot;bb&quot; can be 48, 60, 72, 60S01, 60S02, 60S03, 72S01, 72S02, 72S03; and “aa” can be MP, SI, SC, PR, PR/1500V, 3BB, 4BB, 4BB/RE, 4BB/1500V, 5BB.</td>
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<tr>
<td>Jinko</td>
<td>Modules with 35 and 40mm frames and model identifier JKMYYxxx-ZZaa; where &quot;Y&quot; can either be blank or S; &quot;ZZ&quot; can be P, PP, M; and &quot;aa&quot; can be blank, 60, 60B, 60H, 60-J4, 60B-J4, 60B-EP, 60(Plus), 60-V, 60-MX, 72, 72-V, 72H-V, 72L-V, 72-MX. Frameless modules with model identifier JKMxxxPP-DV.</td>
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<tr>
<td>Kyocera</td>
<td>Modules with 46mm frames and model identifier KYxxxZZ-AA; where &quot;Y&quot; is D or U; “ZZ” is blank, GX, or SX; and “AA” is LPU, LFU, UP, UPS, LPB, LFB, LFS, LFB2, 3AC, 3BC, 3FC, 4AC, 4BC, 4FC, 4UC, 5AC, 5BC, 5FC, 5UC, 6BC, 6FC, 8BC, 6MCA, or 6MPA.</td>
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<tr>
<td>LG</td>
<td>Modules with 35, 40, 46mm frames and model identifier LGxxxxYaZ-bb; where &quot;Y&quot; is A, E, N, Q, S; &quot;a&quot; is 1 or 2; &quot;Z&quot; is C, K, T, or W; and &quot;bb&quot; can be A3, A5, B3, G3, G4, or K4.</td>
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<tr>
<td>Longi</td>
<td>Modules with 40 and 45mm frames and model identifier LR6-YZZ-xxxM; where &quot;YY&quot; can be 60 or 72; and &quot;ZZ&quot; can be BK, BP, HV, PB, PE, or PH.</td>
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<tr>
<td>Mission Solar</td>
<td>Modules with 40mm frames and model identifier MSExxxZZaa; where &quot;ZZ&quot; can be MM, SE, SO or SQ; and &quot;aa&quot; can be 1J, 4J, 4S, 5K, 5T, 6J, 6S, or 6W.</td>
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<tr>
<td>Mitsubishi</td>
<td>Modules with 46mm frames and model identifier PV-MYYxxxZZ; where &quot;YY&quot; is LE or JE; and &quot;ZZ&quot; is either HD, HD2, or FB.</td>
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<tr>
<td>Motech</td>
<td>Modules with 40, 45, or 50mm frames.</td>
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<tr>
<td>Neo Solar Power</td>
<td>Modules with 35mm frames and model identifier D6YxxxZZaa; where &quot;Y&quot; can be M or P; &quot;ZZ&quot; can be B3A, B4A, E3A, E4A, H3A, H4A; and &quot;aa&quot; can be blank, (TF), ME or ME (TF).</td>
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<tr>
<td>Panasonic</td>
<td>Modules with 35 and 40mm frames and model identifier VBHNxxxYYzzA; where “YY” can be either SA or KA; “zz” can be either 01, 02, 03, 04, 06, 06B, 11, 11B, 15, 15B, 16, 16B, 17, or 18; and “A” can be blank, E or G.</td>
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<tr>
<td>Peimar</td>
<td>Modules with 40mm frames and model identifier SGxxxYzz; where &quot;Y&quot; can be M or P; and &quot;zz&quot; can be blank, (BF), or (FB).</td>
</tr>
<tr>
<td>Phono Solar</td>
<td>Modules with 35, 40, or 45mm frames and model identifier PSxxxY-ZZ/A; where &quot;Y&quot; is M or P; &quot;ZZ&quot; is 20 or 24; and &quot;A&quot; is F, T or U.</td>
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</tbody>
</table>
## Module Compatibility

<table>
<thead>
<tr>
<th>Make</th>
<th>Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prism Solar</td>
<td>Frameless modules with model identifier BiYY-xxxxBSTC; where &quot;YY&quot; can be 48, 60, 60S, 72 or 72S.</td>
</tr>
<tr>
<td>REC Solar</td>
<td>Modules with 30, 38 and 45mm frames and model identifier RECxxxYYZZ; where &quot;YY&quot; can be M, NP, PE, TP, TP2, TP2M, TP 2S, TP 2SM, or XP; and &quot;ZZ&quot; can be blank, BLK, BLK2, SLV, or 72.</td>
</tr>
<tr>
<td>Renesola</td>
<td>Modules with 35, 40 or 50mm frames and model identifier JCxxxY-ZZ; where &quot;Y&quot; is F, M or S; and &quot;ZZ&quot; is Ab, Ab-b, Abh, Abh-b, Abv, Abv-b, Bb, Bb-b, Bbh, Bbh-b, Bbv, Bbv-b, Db, or Db-b.</td>
</tr>
<tr>
<td>Renogy</td>
<td>Modules with 40 or 50mm frames and model identifier RNG-xxxxY; where &quot;Y&quot; is D or P.</td>
</tr>
<tr>
<td>S-Energy</td>
<td>Modules with 40mm frames and model identifier SNxxxY-ZZ; where &quot;Y&quot; is M or P; and &quot;ZZ&quot; is 10, or 15.</td>
</tr>
<tr>
<td>Seraphim Energy Group</td>
<td>Modules with 40mm frames and model identifier SEG-6YY-xxxxZZ; where &quot;YY&quot; can be MA, MB, PA, PB; and &quot;ZZ&quot; can be BB, WB, or WW.</td>
</tr>
<tr>
<td>Seraphim USA</td>
<td>Modules with 40 and 50mm frames and model identifier SRP-66Y-YY; where &quot;YY&quot; can be MA, MB, PA, PB, QA-XX-XX, and QB-XX-XX.</td>
</tr>
<tr>
<td>Sharp</td>
<td>Modules with 35 or 40mm frames and model identifier NUYYxxxx; where &quot;YY&quot; is SA or SC.</td>
</tr>
<tr>
<td>Silfab</td>
<td>Modules with 38mm frames and model identifier SYY-Z-xxx; where &quot;YY&quot; is SA or LA; SG or LG; and &quot;Z&quot; is M, P, or X.</td>
</tr>
<tr>
<td>Solaria</td>
<td>Modules with 40mm frames and model identifier PowerXT xxxY-ZZ; where &quot;YY&quot; can be R or C; and &quot;ZZ&quot; can be AC, BD, BX, BY, PD, PX, PZ, WX or WZ.</td>
</tr>
<tr>
<td>SolarTech</td>
<td>Modules with 42mm frames and model identifier STU-xxxxYY; where &quot;YY&quot; can be PERC or HJT.</td>
</tr>
<tr>
<td>SolarWorld AG /</td>
<td>SolarWorld Sunmodule Plus, Protect, Bsun, XL, Bsun XL, may be followed by mono, poly, duo, black, bk, or clear; modules with 31, 33 or 46mm frames and model identifier SW-xxx.</td>
</tr>
<tr>
<td>Industries GmbH</td>
<td>SolarWorld Americas Inc. SolarWorld Sunmodule Plus, Protect, Bsun, XL, Bsun XL, may be followed by mono, poly, duo, black, bk, or clear; modules with 33mm frames and model identifier SWA-xxx.</td>
</tr>
<tr>
<td>Stion</td>
<td>Thin film modules with 35mm frames and model identifier STO-xxx or STO-xxxA. Thin film frameless modules with model identifier STL-xxx or STL-xxxxA.</td>
</tr>
<tr>
<td>SunEdison</td>
<td>Modules with 35, 40, or 50mm frames and model identifier SE-YxxxZABCDCE; where &quot;Y&quot; is B, F, H, P, R, or Z; &quot;Z&quot; is 0 or 4; &quot;A&quot; is B, C, D, E, H, I, J, K, L, M, or N; &quot;B&quot; is B or W; &quot;C&quot; is A or C; &quot;D&quot; is 3, 7, 8, or 9; and &quot;E&quot; is 0, 1 or 2.</td>
</tr>
<tr>
<td>Suniva</td>
<td>Modules with 35, 38, 40, 46, or 50mm frames and model identifiers OPTxxx-AA-B-YYY-Z or MVXxxx-AA-B-YYY-Z; where &quot;AA&quot; is either 60 or 72; &quot;B&quot; is either 4 or 5; &quot;YYY&quot; is either 100,101,700,1BO, or 1B1; and &quot;Z&quot; is blank or B.</td>
</tr>
<tr>
<td>Sunpower</td>
<td>Modules with model identifier Ab-xxx-YY and standard (G3) or InvisiMount (G5) 46mm frame; where &quot;A&quot; is either E, P or X; &quot;b&quot; can be 17, 18, 19, 20, 21, or 22; and &quot;YY&quot; can be blank, NE, BLK, COM, C-AC, D-AC, BLK-C-AC, or BLK-D-AC.</td>
</tr>
<tr>
<td>Sunpreme</td>
<td>Sunpreme modules with 35 and 40mm frames and model identifier SNPM-AxB-xxxxYzz; where &quot;A&quot; can be G or H; &quot;Y&quot; can be blank or T; and &quot;zz&quot; can be blank, 4BB, SM or 4BB SM. Frameless modules with model identifier SNPM-GxB-xxxxYzz; where &quot;ZZ&quot; can be blank, 4BB, SM or 4BB SM.</td>
</tr>
<tr>
<td>Sunspark</td>
<td>Modules with 40mm frames and model identifier SYY-xxZ; where &quot;YY&quot; can be MX or ST; and &quot;Z&quot; can be P or W.</td>
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<tr>
<td>Suntech</td>
<td>Vd, Vem, Wdb, Wde, and Wd series modules with 35, 40, or 50mm frames.</td>
</tr>
<tr>
<td>Talesun</td>
<td>Modules with 35 and 40mm frames and model identifier TP6yyZxxx-A; where &quot;yy&quot; can be 60, 72, H60 or H72; &quot;Z&quot; can be M, or P; and &quot;A&quot; can be blank, B, or T.</td>
</tr>
<tr>
<td>Trina</td>
<td>Modules with 35, 40 or 46mm frames and model identifier TSM-xxxxYYZZ; where &quot;YY&quot; is PA05, PC05, PD05, PA14, PC14, PD14, PE14, or DD05; and &quot;ZZ&quot; is blank, A, A.05, A.08, A.10, A.18, .05, .08, .1, .18, .08D, .18D, 0.82, A.082(II), .002, .005, 05S, 05S, A(II), A.08(II), A.05(II), A.10(II), or A.18(II). Frameless modules with model identifier TSM-xxxxYY; and &quot;YY&quot; is either PEG5, PEG5.07, PEG14, DEG5(II), DEG5.07(II), or DEG14(II).</td>
</tr>
<tr>
<td>Winaico</td>
<td>Modules with 35 or 40mm frames and model identifier Wsy-xxxxz6; where &quot;y&quot; is either P or T; and &quot;z&quot; is either M or P.</td>
</tr>
<tr>
<td>Yingli</td>
<td>Panda, YGE, and YGE-U series modules with 35, 40, or 50 mm frames.</td>
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