TILT MOUNT
This manual describes proper installation procedures and provides necessary standards required for product reliability. Warranty details are available on website. 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

Intertek

- Certified to CSA STD LTR AE-001-2012 Photovoltaic Module Racking Systems.
- Max Overcurrent Protective Device (OCPD) Rating: 25A
- Max Module Size: 24ft²
- Max Frameless Module Size for Canadian LTR-AE: 19.5 ft²
- Module Orientation: Portrait or Landscape
- CAMO Specific Allowable Design Load Rating: 50 PSF downward, 50 PSF upward, 15 PSF lateral
- LTR AE Canadian Load Rating: 2400 PA
- 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 2703

- Any System Tilt with Modules Types 1, 2, 3, 13, 19, 25 & 29 on Low Slope Roofs (< 9.5 degrees)
- Any System Tilt with Module Types 1 & 2 on Steep Slope Roofs (> 9.5 degrees)
- 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.

STRUCTURAL CERTIFICATION

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

MARKINGS

Product markings are located on the South Tilt Leg.
CHECKLIST

PRE-INSTALLATION

☐ Verify module compatibility. See Page 11 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
☐ 9/16" Socket (deep)
☐ String Line

TORQUE VALUES

☐ Tilt Leg Nuts (9/16" Socket): 250 in-lbs
☐ 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 Objects (7/16" Socket): 80 in-lbs
☐ Expansion Joint Nuts (7/16")': 80 in-lbs
☐ Microinverter Kit Nuts (7/16" Socket): 80 in-lbs
☐ Frameless Module Kit Nuts (7/16" Socket): 80 in-lbs

IRONRIDGE COMPONENTS

XR Rail
Tilt Leg Kit
Bonded Splice
UFO
Stopper Sleeve
CAMO
Grounding Lug
Expansion Joint
End Cap
Wire Clip
Microinverter Kit
Frameless Module Kit
Frameless End/Mid Clamp
Flat Roof Attachment
Membrane Flashing

If using previous version of: Integrated Grounding Mid Clamps, Grounding Lug, End Clamps, and Expansion Joints please refer to Alternate Components Addendum (Version 1.5).
1. ATTACH BASES

Mark locations for Flat Roof Attachment. Type, size, and quantity of roof screws to be specified by Structural Engineer. Fastener size not to exceed #15. 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. Ensure membrane flashing is compatible with existing roofing material.

- Additional 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 S-5! and S-5! Mini 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 180 in-lbs. Use the following fastening guidelines for other S-5! roof clamps: ProteaBracket™ - firmly seat roof screws and tighten hinge bolt to 225 in-lbs; RibBracket™ - firmly seat roof screws and tighten M8 bolt (M8-1.25 x 22mm sold separately) to 160 in-lbs; and SolarFoot™ - firmly seat roof screws and tighten M8 flange nut to 160 in-lbs.
  - QuickMount PV Tilt Standoffs - Qbase Mount, formerly referenced as QMLSH, and QMNC; Tighten 5/16" bolt on top of standoff to a minimum of 174 in-lbs.

2. ADD TILT LEGS

A. ASSEMBLE SOUTH LEGS

Mount South Tilt Leg Assembly to southern row of roof attachments. The IronRidge logo should face east to ensure proper South Leg orientation. Tighten Flat Roof Attachment hardware to 250 in-lbs. If using a third-party roof attachment refer to manufacturer’s instructions for proper tightening torque.

B. SET ANGLE

Set top pivot bracket of South Tilt Leg to the desired angle using the angle indicator on the face of the leg. Finger tighten bolts to allow for adjustment if necessary.

C. ASSEMBLE NORTH LEGS

Mount U-foot to northern row of roof attachments. Tighten Flat Roof Attachment hardware to 250 in-lbs. If using a third-party roof attachment refer to manufacturer’s instructions for proper tightening torque. Mount North Tilt Leg to northern row of U-feet and loosely secure hardware.
3. 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 about 1” apart and torquing to 20 in-lbs. Slide second rail over Bonded Splice and secure with two 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. ATTACH SOUTH RAILS

Slide 1” long bonding bolt into side-facing rail slot. Mount rail to pivot bracket of South Legs and loosely tighten nuts.

C. ATTACH NORTH RAILS

Slide 2.25” bonding bolt into side-facing rail slot. Mount rail to top of North Legs. Tighten all 3/8” hardware to 250 in-lbs once rails are square.

- Use a straight edge to ensure South and North rails are on the same plane. An extra section of rail works well.
- Rails can mount on either north or south side of North Tilt Leg.

4. 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 10).
- If using Enphase microinverters or Sunpower AC modules, Grounding Lugs may not be needed. See Page 10 for more info.
- Grounding Lugs can be installed anywhere along the rail and in either orientation shown.
- Grounding Lugs are intended for use with one solid or stranded copper wire, conductor size 10-4AWG.
5. 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 the module to the rail with 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 7 for CAMO installation procedure.

B. SECURE NEXT MODULES

Place UFO into each rail, placing them flush against first module. Slide second module against the 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 on rail, ensuring it is hooked over the top of the 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 7 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).
- CAMO is not compatible with Canadian Solar modules.
EXPANSION JOINTS

GROUNDING STRAP EXPANSION JOINT

Grounding Strap Expansion Joints are required every 100' of continuous rail to allow for thermal expansion and contraction of the system.

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**. Assemble and secure Grounding Strap 3/8" from rail end. Slide second rail over Bonded Splice leaving 1" gap between rails. Attach other end of Grounding Strap with hardware and torque hex nuts to **80 in-lbs**.

- Remaining Bonded Splice screws are not used with Expansion.
- Only one Grounding Strap is required per break in row of modules.
- Do not install modules over expansion joints.

![Diagram showing installation of Grounding Strap Expansion Joint](image-url)
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.
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.
- For open-structure installations, you can use adhesive to secure the End Caps.

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.

SYSTEMS USING MICROSTORAGE PRODUCTS

Use IronRidge’s Microinverter Kit to bond compatible microstorage devices to the racking system. Insert Microinverter Kit T-bolt into top rail slot. Place compatible microstorage into position and tighten hex nut to 80 in-lbs.

COMPATIBLE PRODUCTS

PHAZR
PHAZR Devices PHAZR-X, where X is 6-12.

- 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.
- Use the number of IronRidge Microinverter kits allowed by the MLPE mounting flange. Some will require 1 kit and others 2 kits.
**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**.

 갖고, 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
  - IQ7, IQ 7A, IQ 7+, IQ 7X, Q Aggregator

**Darfon**
- MIG240, MIG300, G320, G640

**Solar Edge**
- P300, P320, P340, P370, P400, P405, P485, P505, P600, P700, P730, P800p, P800s, P850, P860

**SMA**
- RoofCommKit-P2-US, TS4-R Module Retrofit Kits (TS4-R-S, TS4-R-O, TS4-R-F)

**Tigo**
- Tigo Access Point (TAP)
  - TS4-R-X (where X can be F, M, O, or S)
  - TS4-R-X-DUO (where X can be M, O, or S)
  - TS4-A-X (where X can be F, 2F, O, O-DUO, or S)

**AP Systems**
- QS1, YC600

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

**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.

**COMPATIBLE PRODUCTS**

**Sunpower**
- 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.

**Enphase**

>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.
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**.

**COMPATIBLE PRODUCTS**

*_Sunforsorn_*
Sunforsorn silver or black SFS-UTMC-200(B) mid and SFS-UTEC-200(B) end clamps.

*_Sunpreme_*
Sunpreme silver or black mid and end clamps with part numbers 7500105X where “X” is 1, 5, 6 or 7.

*_Ironridge_*
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 module 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).
The Tilt Mount System may be used to ground and/or mount a PV module complying with UL 2703 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.

### MODULE COMPATIBILITY

<table>
<thead>
<tr>
<th>MAKE</th>
<th>MODELS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adani</td>
<td>Adani modules with 40mm frames</td>
</tr>
<tr>
<td></td>
<td>ASX-Y-ZZ-xxx</td>
</tr>
<tr>
<td></td>
<td>Where &quot;X&quot; can be M or P, &quot;Y&quot; can be 6 or 7, and &quot;ZZ&quot; can be blank, PERC,</td>
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<tr>
<td></td>
<td>B-PERC, or AB-PERC</td>
</tr>
<tr>
<td>Amerisolar</td>
<td>Amerisolar modules with 35, 40 and 50 mm frames</td>
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<td></td>
<td>AS-bYxxxZ</td>
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<tr>
<td></td>
<td>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;</td>
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<td>can be blank, W or WB</td>
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<td>Aptos Solar</td>
<td>Aptos modules with 35 and 40 mm frames</td>
</tr>
<tr>
<td></td>
<td>DNA-yy-zz23-xxx</td>
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<tr>
<td></td>
<td>Where &quot;yy&quot; can be 120 or 144; and &quot;zz&quot; can be MF or BF</td>
</tr>
<tr>
<td>Astronergy Solar</td>
<td>Astronergy modules with 30, 35, 40, and 45 mm frames</td>
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<tr>
<td></td>
<td>aaSmbbyCy/zz-xxx</td>
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<tr>
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<td>10 or 12; &quot;C&quot; can M, P, M(BL), M-HC, M(BL)-HC, P-HC, M(DG), or M(DGT);</td>
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<td>ASUN</td>
<td>ASUN modules with 35 and 40 mm frames</td>
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<td></td>
<td>ASUN-xxx-YYZZ-aa</td>
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<td>Where &quot;YY&quot; can be 60 or 72; &quot;ZZ&quot; can be M, or MH5; and &quot;aa&quot; can be blank</td>
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<tr>
<td></td>
<td>or BB</td>
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<tr>
<td>Auxin</td>
<td>Auxin modules with 40 mm frames</td>
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<tr>
<td></td>
<td>AXN6y6zAxxxx</td>
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<td></td>
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<tr>
<td>Axitec</td>
<td>Axitec Modules with 35 and 40 mm frames</td>
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<td></td>
<td>AC-xxxY/aaZZb</td>
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<td></td>
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<td>can be 54, 60, 72, 120, or 144; &quot;b&quot; can be S</td>
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<td>BYD modules with 35 mm frames</td>
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<td>BYDxxxAY-ZZ</td>
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<td>CSbY-xxxZ</td>
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<td>Where &quot;b&quot; can be 1, 3 or 6; &quot;Y&quot; can be H, K, P, U, V, W, or X; and &quot;Z&quot;</td>
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<td>can be M, P, MS, PX , M-SD, P-AG, P-SD, MB-AG, PB-AG, MS-AG, or MS-SD</td>
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<td>CertainTeed</td>
<td>CertainTeed modules with 35 and 40 frames</td>
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<td>CTxxxYZZ-AA</td>
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<td></td>
<td>Where &quot;Y&quot; can be M, P, or HC; &quot;ZZ&quot; can be 00, 01, 10, or 11; and &quot;AA&quot;</td>
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<td></td>
<td>can be 01, 02, 03, or 04</td>
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<td>CSUN</td>
<td>CSun modules with 35 and 40 mm frames</td>
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<tr>
<td></td>
<td>YYxxx-zzAbb</td>
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<td></td>
<td>Where &quot;YY&quot; is CSUN or SST; &quot;zz&quot; is blank, 60, or 72; and &quot;A&quot; is blank,</td>
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<td>P or M; &quot;bb&quot; is blank, BB, BW, or ROOF</td>
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<td>Ecosolargy</td>
<td>Ecosolargy modules with 35, 40, and 50 mm frames</td>
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<tr>
<td></td>
<td>ECOxxxYzzA-bbD</td>
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<td>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</td>
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<td></td>
<td>P; &quot;bb&quot; can be 60 or 72; and &quot;D&quot; can be blank or B</td>
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<td>ET Solar</td>
<td>ET Solar modules with 35, 40, and 50 mm frames</td>
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<td></td>
<td>ET-Y6ZZxxAAA</td>
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<tr>
<td></td>
<td>WB, WW, BB, WBG, WWG, WBAC, WBCO, WWCO, WWBCO or BBAC</td>
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<tr>
<td>Module Type</td>
<td>Compatibility Details</td>
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| Flex        | Flex modules with 35, 40, and 50 mm frames  
FS-xxxyY-ZZ;  
Where "YY" can be BB or BC; and "ZZ" can be MAA1B, MAA1W, MAB1W, SAA1B, SAA1W, SAC1B, SAC1W, SAD1W, SBA1B, SBA1W, SBC1B, or SBC1W |
| GCL         | GCL modules with 35 mm and 40 mm frames  
GCL-ab/YY xxx  
Where "a" can be M or P; "b" can be 3 or 6; and "YY" can be 60, 72, 72H, or 72DH |
| GigaWatt Solar | Gigawatt modules with 40 mm frames  
GWxxxxYY  
Where "YY" can be either PB or MB |
| Hansol      | Hansol modules with 35 and 40 frames  
HSxxxYY-zz  
Where "YY" can be PB, PD, PE, TB, UD, or UE; and "zz" can be AH2, AN1, AN3, AN4, HV1, or JH2 |
| Hanwha Solar | Hanwha Solar modules with 40, 45, and 50 mm frames  
HSLaaP-YY-1-xxxZ  
Where "aa" can be either 60 or 72; "YY" can be PA or PB; and "Z" can be blank or B |
| Hanwha Q CELLS | Hanwha Q CELLS Modules with 32, 35, 40, and 42mm frames  
aaYY-ZZ-xxx  
| Heliene     | Heliene modules with 40 mm frames  
YYZZxxxA  
Where "YY" can be 36, 60, 72, or 96; "ZZ" can be M, P, or MBLK; and "A" can be blank, HomePV, or Bifacial |
| HT-SAAE     | HT-SAAE modules with 35 and 40 mm frames  
HTyy-156Z-xxx  
Where "yy" can be 60 or 72, "Z" can be M, P, C, M(S), M(VS), M(V), P(V), M(V)-C, P(V)-C |
| Hyundai     | Hyundai modules with 35, 35, 40 and 50 mm frames  
HIY-SxxxZZ  
Where "YY" can be A, D, M or S; and "ZZ" can be HG, HI, M, MI, MF, MG, RI, RG, RG(BF), RG(BK), SG, TI, or TG |
| Itek        | Itek Modules with 40 and 50 mm frames  
IT-xxx-YY  
Where "YY" can be blank, HE, or SE, or SE72 |
| JA Solar    | JA Solar modules with 30, 35, 40 and 45 mm frames  
JAYyyz-bbw-xxx/aa  
Where "yyz" can be M, P, M6 or P6; "bw" can be blank, (K), (L), (R), (V), (BK), (FA), (TG), (FA)(R), (L)(BK), (L) (TG), (R)(BK), (R)(TG), (V)(BK), (BK)(TG), or (L)(BK)(TG); "bb" can be 48, 60, or 72; "ww" can be D09, S01, S02, S03, S06, S09, S10, or S12; and "aa" can be BP, MP, SI, SC, PR, 3BB, 4BB, 4BB/RE, or 5BB |
| Jinko       | Jinko modules with 35 and 40 mm frames  
JKMYxxxxZ-aa  
Where "YY" can either be blank or S; "ZZ" can be M, P, or PP; and "aa" can be blank, 60, 60B, 60H, 60L, 60BL, 60HBL, 60-J4, 60B-J4, 60B-EP, 60(Plus), 60-V, 60-MX, 72, 72-V, 72H-V, 72L-V, 72H-L-V, 72-MX, 72H-BDV, or 72H-L-TV |
| Kyocera     | Kyocera Modules with 46mm frames  
KYxxxxZ-aa  
Where "YY" can be D or U; "ZZ" can be blank, GX, or SX; and "AA" can be LPU, LFU, UPU, LPS, LPB, LFB, LFBS, LFB2, LPB2, 3AC, 3BC, 3FC, 4AC, 4BC, 4FC, 4UC, 5AC, 5BC, 5FC, 5UC, 6BC, 6FC, 8BC, 6MCA, or 6MPA |
| LG          | LG modules with 35, 40, and 46 mm frames  
LGxxxYaZ-bb  
Where "YY" can be A, E, N, Q, S; "a" can be 1 or 2; "Z" can be C, K, T, or W; and "bb" can be A3, A5, B3, G3, G4, J5, K4, or V5 |
## Module Compatibility

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
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</thead>
</table>
| Longi | Longi modules with 30, 35 and 40 mm frames  
LRa-YYZZ-xxxM  
Where "a" can be 4 or 6; "YY" can be blank, 60 or 72; and "ZZ" can be blank, BK, BP, PE, PH, HBD, HPB, or HPH |
| Mission Solar | Mission Solar modules with 33 and 40 mm frames  
MSEbxxxZZaa  
Where "bb" can be blank or 60A; "ZZ" can be blank, MM, SE, SO, SQ, SR, or TS; and "aa" can be blank, 1J, 4J, 4S, 5K, 5T, 60, 6J, 6S, 6W, 8K, 8T, or 9S |
| Mitsubishi | Mitsubishi modules with 46 mm frames  
PV-MYYxxxZZ  
Where "YY" can be LE or JE; and "ZZ" can be either HD, HD2, or FB |
| Motech | IM and XS series modules with 40, 45, and 50 mm frames |
| Next Energy Alliance | Next Energy Alliance modules with 35 and 40mm frames  
yyNEA-xxxZZ  
where "yy" can be blank or US; "ZZ" can be M, MB or M-60 |
| Neo Solar Power | Neo Solar Power modules with 35 mm frames  
D6YxxxZZaa  
Where "Y" can be M or P; "ZZ" can be B3A, B4A, E3A, E4A, H3A, H4A; and "aa" can be blank, (TF), ME or ME (TF) |
| Panasonic | Panasonic modules with 35 and 40 mm frames  
VBHNxxxYYzzA  
Where "YY" can be either KA, RA, SA or ZA; "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, G, or N |
| Peimar | Peimar modules with 40 mm frames  
SbxxxYzz  
Where "b" can be G, M or P; "Y" can be M or P; and "zz" can be blank, (BF) or (FB) |
| Philadelphia Solar | Philadelphia modules with 35 and 40 mm frames  
PS-YzzAa-xxx  
Where "Y" can be M or P; "zz" can be 60 or 72; and "AA" can be blank or (BF) |
| Phono Solar | Phono Solar modules with 35, 40, and 45 mm frames  
PSxxxY-ZZ/A  
Where "Y" can be M, M1, MH, or M1H or P; "ZZ" can be 20 or 24; and "A" can be F, T, U, or TH |
| Recom | Recom modules with 35 and 40 mm frames  
RCM-xxx-6yy  
Where "yy" can be MA or MB |
| REC Solar | REC modules with 30, 38 and 45 mm frames  
RECXxxYYZZ  
Where "YY" can be AA, M, NP, PE, PE72, TP, TP2, TP2M, TP2SM, or TP2S; and "ZZ" can be blank, Black, BLK, BLK2, SLV, or 72 |
| Renesola | ReneSola modules with 35, 40 and 50 mm frames  
AAXxY-ZZ  
Where "AA" can be SPM(SLP) or JC; "Y" can be blank, F, M or S; and "ZZ" can be blank, Ab, Ab-b, Abh, Abh-b, Abv, Abv-b, Bb, Bb-b, Bbh, Bbh-b, Bbv, Bbv-b, Db, Db-b, or 24/Bb |
| Renogy | Renogy Modules with 40 and 50 mm frames  
RNG-xxxY  
Where "xxx" is the module power rating; and "Y" can be D or P |
| Risen | Risen Modules with 30, 35 and 40 mm frames  
RSMyy-6-xxxZZ  
Where "yy" can be 60, 72, 120, 132 or 144; and "ZZ" can be M, P or BMDG |
| S-Energy | S-Energy modules with 40 frames  
SNNxxY-ZZ  
Where "Y" can be M or P; and "ZZ" can be 10, or 15 |
| Seraphim Energy Group | Seraphim modules with 35 and 40 mm frames  
SEG-aYY-xxxZZ  
Where "a" can be blank, 6 or B; "YY" can be blank, MA, MB, PA, or PB; and "ZZ" can be blank, BB, BG, BW, HV, WB, WW, BMB, BMB-HV |
<table>
<thead>
<tr>
<th>Module Type</th>
<th>Modules Description</th>
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</thead>
<tbody>
<tr>
<td>Seraphim USA</td>
<td>Seraphim modules with 40 and 50 mm frames&lt;br&gt;SRP-xxx-6YY&lt;br&gt;Where &quot;xxx&quot; is the module power rating; and &quot;YY&quot; can be MA, MB, PA, PB, QA-XX-XX, and QB-XX-XX</td>
</tr>
<tr>
<td>Sharp</td>
<td>Sharp modules with 35 and 40 mm frames&lt;br&gt;NUYYxxx&lt;br&gt;Where “YY” can be SA or SC</td>
</tr>
<tr>
<td>Silfab</td>
<td>Silfab Modules with 38 mm frames&lt;br&gt;SYY-Z-xxxAb&lt;br&gt;Where &quot;YY&quot; can be IL, SA, LA, SG or LG; &quot;Z&quot; can be blank, M, P, or X; &quot;A&quot; can be blank, B, H, M, or N; and &quot;b&quot; can be A, L, G, or T</td>
</tr>
<tr>
<td>Solaria</td>
<td>Solaria modules with 40 mm frames&lt;br&gt;PowerXT xxxY-ZZ&lt;br&gt;Where &quot;YY&quot; can be R or C; and &quot;ZZ&quot; can be AC, BD, BX, BY, PD, PM, PM-AC, PX, PZ, WX or WZ</td>
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<tr>
<td>Solarcity (Tesla)</td>
<td>Solarcity modules with 40 mm frames&lt;br&gt;SCxxxYY&lt;br&gt;Where &quot;YY&quot; can be blank, B1 or B2</td>
</tr>
<tr>
<td>SolarTech</td>
<td>SolarTech modules with 42 mm frames&lt;br&gt;STU-xxxYY&lt;br&gt;Where &quot;YY&quot; can be PERC or HJT</td>
</tr>
<tr>
<td>SolarWorld AG</td>
<td>SolarWorld Sunmodule Plus, Protect, Bisun, XL, Bisun XL, may be followed by mono, poly, duo, black, bk, or clear; modules with 31, 33 or 46 mm frames&lt;br&gt;SW-xxx</td>
</tr>
<tr>
<td>SolarWorld Americas</td>
<td>SolarWorld Sunmodule Plus, Protect, Bisun, XL, Bisun XL, may be followed by mono, poly, duo, black, bk, or clear; modules with 33 mm frames&lt;br&gt;SWA-xxx</td>
</tr>
<tr>
<td>Stion</td>
<td>Stion Thin film modules with 35 mm frames&lt;br&gt;STO-xxx or STO-xxxA</td>
</tr>
<tr>
<td>SunEdison</td>
<td>SunEdison Modules with 35, 40 &amp; 50 mm frames&lt;br&gt;SE-YxxxZABCDE&lt;br&gt;Where &quot;Y&quot; can be B, F, H, P, R, or Z; &quot;Z&quot; can be 0 or 4; &quot;A&quot; can be B,C,D,E,H,I,J,K,L,M, or N ; &quot;B&quot; can be B or W; &quot;C&quot; can be A or C; &quot;D&quot; can be 3, 7, 8, or 9; and &quot;E&quot; can be 0, 1 or 2</td>
</tr>
<tr>
<td>Suniva</td>
<td>Suniva modules with 35, 38, 40, 46, and 50 mm frames&lt;br&gt;OPTxxx-AA-B-YYY-Z&lt;br&gt;Where &quot;AA&quot; is either 60 or 72;  &quot;B&quot; is either 4 or 5;  &quot;YYY&quot; is either 100,101,700,1B0, or 1B1; and &quot;Z&quot; is blank or B</td>
</tr>
<tr>
<td>Sunpower</td>
<td>Sunpower standard (G3 or G4) or InvisiMount (G5) 40 and 46 mm frames&lt;br&gt;SPR-Zb-xxx-YY&lt;br&gt;Where &quot;Z&quot; is either A, E, P or X; &quot;b&quot; can be blank, 17, 18, 19, 20, 21, or 22; and “YY” can be blank, BLK, COM, C-AC, D-AC, E-AC, G-AC, BLK-C-AC, or BLK-D-AC</td>
</tr>
<tr>
<td>Sunspark</td>
<td>Sunspark modules with 40 mm frames&lt;br&gt;SYY-xxxZ&lt;br&gt;Where “YY” can be MX or ST; and “Z” can be M, MB, P or W</td>
</tr>
<tr>
<td>Suntech</td>
<td>Suntech Modules with 35, 40 and 50mm frames&lt;br&gt;STPxxxy-xx/aa&lt;br&gt;Where &quot;y&quot; is blank or S; and &quot;zz&quot; can be 20, 24; and &quot;aa&quot; can be Vd, Vem, Vfw, Wdb, Wde or Wd</td>
</tr>
<tr>
<td>Talesun</td>
<td>Talesun modules with 35 and 40 frames&lt;br&gt;TP6yZZaaxx-b&lt;br&gt;Where &quot;yy&quot; can be blank, F or H; &quot;ZZ&quot; can be 60 or 72; &quot;aa&quot; can be M or P; and &quot;b&quot; can be blank, B, T, or (H)</td>
</tr>
<tr>
<td>Trina</td>
<td>Trina Modules with 30, 35, 40 and 46mm frames&lt;br&gt;TSN-xxxYYZZ&lt;br&gt;Where &quot;YY&quot; can be DD05, DD06, DD14, DE14, DE15, DEG15, PA05, PC05, PD05, PD06, PA14, PC14, PD14, PE14, or PE15 ; and &quot;ZZ&quot; can be blank, .05, .08, .10, .18, .08D, .18D, 0.82, .002, .00S, 0S5, 08S, A, A.05, A.08, A.10, A.18, A(H), A.05(H), A.08(II), A.082(II), A.10(II), A.18(II), H, H(II), H.05(II), H.08(II), HC.20(II), HC.20(II), or M</td>
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</table>
## Module Compatibility

<table>
<thead>
<tr>
<th>Make</th>
<th>Modules</th>
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<tbody>
<tr>
<td>URE</td>
<td>URE modules with 35 mm frames</td>
</tr>
<tr>
<td></td>
<td>DyZxxxxHaa</td>
</tr>
<tr>
<td></td>
<td>Where &quot;y&quot; can be 6 or 7; &quot;Z&quot; can be K or M; and &quot;aa&quot; can be H3A, H4A, or H8A</td>
</tr>
<tr>
<td>Vikram</td>
<td>Vikram solar modules with 40 mm frames</td>
</tr>
<tr>
<td></td>
<td>VSyzz.ZZZ.AAA.bbb</td>
</tr>
<tr>
<td></td>
<td>Where &quot;yy&quot; can be M, P, MBB, MH, MS, MHBB, or PBB; &quot;ZZ&quot; can be 60 or 72; &quot;AAA&quot; is the module power rating; and &quot;bb&quot; can be 03.04 or 05</td>
</tr>
<tr>
<td>VSUN</td>
<td>VSUN modules with 35 and 40 mm frames</td>
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<tr>
<td></td>
<td>VSUNxxx-YYZ-aa</td>
</tr>
<tr>
<td></td>
<td>Where &quot;YY&quot; can be 60, 72, 120, or 144; &quot;Z&quot; can be M, P, MH, PH, or BMH; and &quot;aa&quot; can be blank, BB, or DG</td>
</tr>
<tr>
<td>Waaree</td>
<td>Waaree modules with 40 mm frames</td>
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<tr>
<td></td>
<td>WSyy-xx</td>
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<tr>
<td></td>
<td>Where &quot;yy&quot; can be blank, M, or MB</td>
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<tr>
<td>Winaico</td>
<td>Winaico modules with 35 and 40 mm frames</td>
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<tr>
<td></td>
<td>Wsy-xxZa</td>
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<tr>
<td></td>
<td>Where &quot;y&quot; can be either P or T; &quot;Z&quot; can be either M, P, or MX; and &quot;a&quot; can be blank or 6</td>
</tr>
<tr>
<td>Yingli</td>
<td>Panda, YGE, YGE-U, and YLM series modules with 35, 40, and 50 mm frames</td>
</tr>
<tr>
<td>ZNSHINE</td>
<td>ZNSHINE modules with 30, 35, and 40 mm frames</td>
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<td></td>
<td>ZXy6-ZZZaa-xxxx/b</td>
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<tr>
<td></td>
<td>Where &quot;y&quot; can be M or P; &quot;ZZ&quot; can be blank, H, HLD, HLDD, LD, LDD, NH, NHL or NHLDD; &quot;aa&quot; can be 60, 72, 120 or 144; and &quot;b&quot; can be M or P</td>
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</tbody>
</table>

## Frameless Module List

### MAKE

<table>
<thead>
<tr>
<th>Make</th>
<th>Models</th>
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<tbody>
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<td>Astronergy Solar</td>
<td>Astronergy frameless modules</td>
</tr>
<tr>
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<td>CHSM6610P(DG)-xxx</td>
</tr>
<tr>
<td>Canadian Solar</td>
<td>Canadian Solar frameless modules</td>
</tr>
<tr>
<td></td>
<td>CSbY-xxx-Z</td>
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<tr>
<td></td>
<td>Where &quot;b&quot; can be 3 or 6; &quot;Y&quot; is 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>Jinko</td>
<td>Jinko frameless modules</td>
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<td>JKMxxxPP-DV</td>
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<td>Prism Solar</td>
<td>Prism Solar frameless modules</td>
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<td>BiYY-xxxBSTC</td>
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<td></td>
<td>Where &quot;YY&quot; can be 48, 60, 60S, 72 or 72S</td>
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<tr>
<td>Risen</td>
<td>Risen frameless modules</td>
</tr>
<tr>
<td></td>
<td>RSMyy-6-xxxxZZ</td>
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<tr>
<td></td>
<td>Where &quot;yy&quot; can be 60, 72, 120 or 144; and &quot;ZZ&quot; can be MDG or PDG</td>
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<tr>
<td>Stion</td>
<td>Stion frameless modules</td>
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<td></td>
<td>STL-xxx or STL-xxxxA</td>
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<td>Sunpreme</td>
<td>Sunpreme frameless modules</td>
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<td>GXB-xxxYY</td>
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<tr>
<td></td>
<td>Where &quot;YY&quot; can be blank or SL</td>
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<tr>
<td>Trina</td>
<td>Trina frameless modules</td>
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<tr>
<td></td>
<td>TSM-xxxxYY</td>
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<tr>
<td></td>
<td>Where &quot;YY&quot; can be either DEG5(II), DEG5.07(II), DEG5.40(II), DEG5.47(II), DEG14(II), DEG14C(II), DEG14C.07(II), DEG14.40(II), PEG5, PEG5.07, PEG5.40, PEG5.47, PEG14, or PEG14.40</td>
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</tbody>
</table>