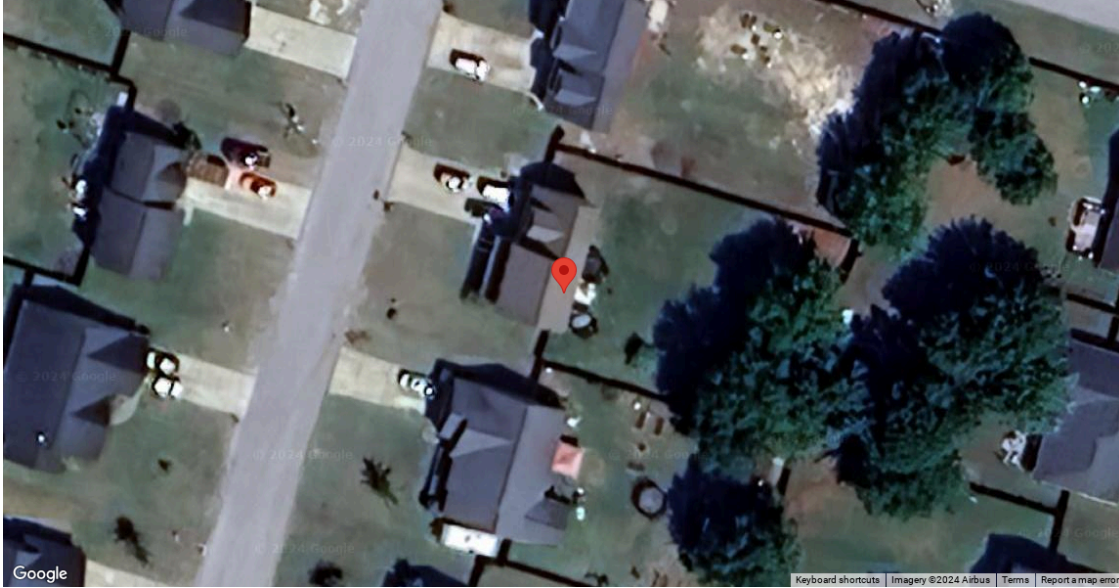


**Project Details**

|                   |  |                      |            |
|-------------------|--|----------------------|------------|
| <b>Name</b>       | Raymond Yuubei   | <b>Date</b>          | 07/31/2024 |
| <b>Location</b>   | 33 Lockwood Drive, Cameron, NC 28326                               | <b>Total modules</b> | 12         |
| <b>Module</b>     | Jinko: JKM390M-72HBL-V (40mm)                                      | <b>Total watts</b>   | 4,680      |
| <b>Dimensions</b> | Dimensions: 79.06" x 39.45" x 1.57" (2008.0mm x 1002.0mm x 40.0mm) | <b>Attachments</b>   | 26         |
| <b>ASCE</b>       | 7-10   | <b>Rails per row</b> | 2          |



| System Weight              |           |
|----------------------------|-----------|
| <b>Total system weight</b> | 666.8 lbs |
| <b>Weight/attachment</b>   | 25.6 lbs  |
| <b>Racking weight</b>      | 71.6 lbs  |
| <b>Distributed weight</b>  | 2.5 psf   |

| Load Assumptions                   |         |
|------------------------------------|---------|
| <b>Wind exposure</b>               | C       |
| <b>Wind speed</b>                  | 120 mph |
| <b>Ground snow load</b>            | 15 psf  |
| <b>Attachment spacing portrait</b> | 4.0'    |

| Roof Information            |              |                              |                                  |
|-----------------------------|--------------|------------------------------|----------------------------------|
| <b>Roof Material Family</b> | Comp Shingle | <b>Roof material</b>         | Comp Shingle                     |
| <b>Risk category</b>        | II           | <b>Roof attachment</b>       | Halo UltraGrip (Rafter attached) |
|                             |              | <b>Staggered attachments</b> | Yes                              |
| <b>Attachment hardware</b>  | T Bolt       |                              |                                  |
| <b>Specific gravity</b>     | 0.42         |                              |                                  |

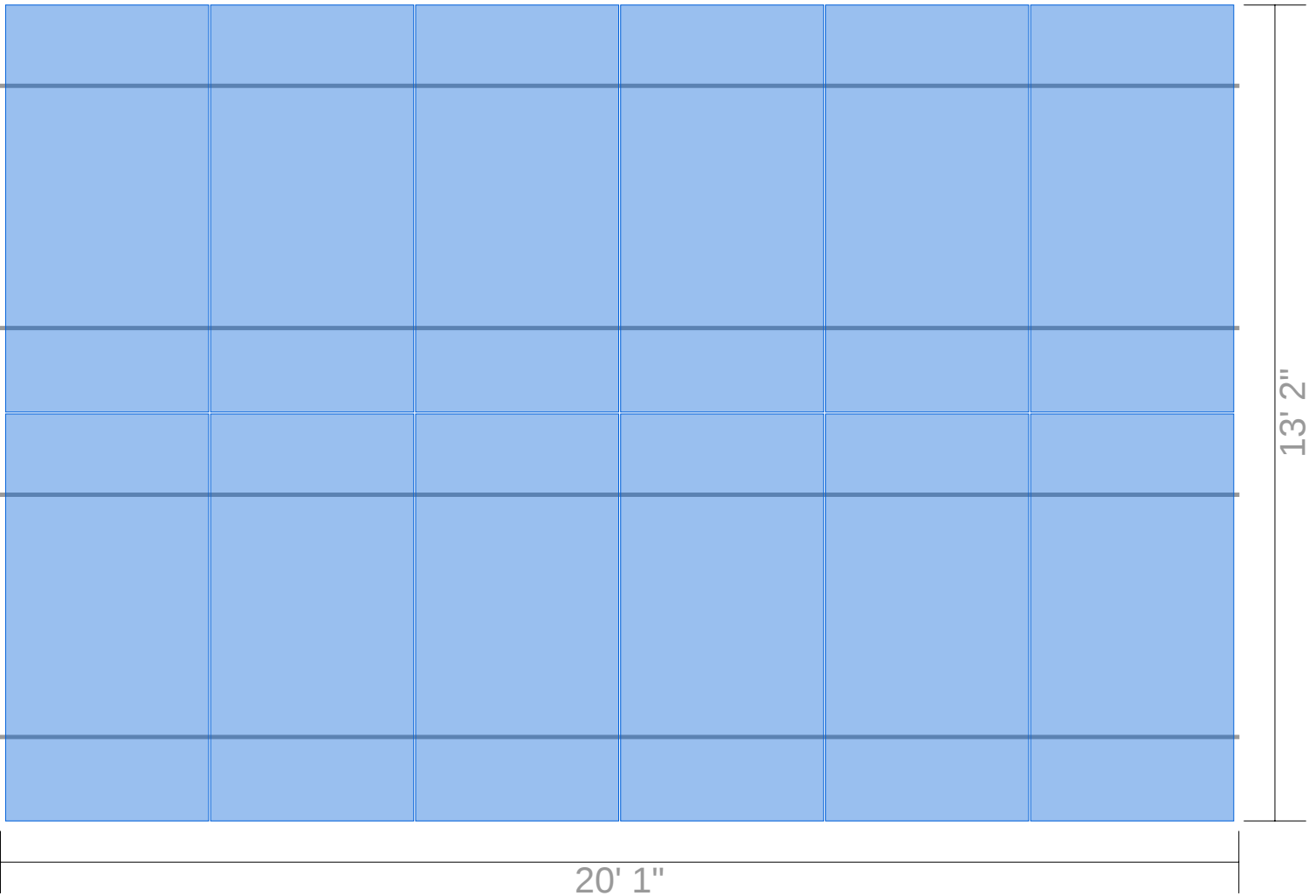
**Roof Plane A**

|               |       |              |      |                       |       |
|---------------|-------|--------------|------|-----------------------|-------|
| <b>Height</b> | 25 ft | <b>Slope</b> | 33 ° | <b>Rafter spacing</b> | 24 in |
|---------------|-------|--------------|------|-----------------------|-------|

**Roof Plane A: Roof Section 1**

| Details                     |                                | Weights                     |
|-----------------------------|--------------------------------|-----------------------------|
| Panels: 12                  | Provided rail: 112' [8 x 168"] | Total weight: 666.8 lbs     |
| Rail orientation: East-West | Attachments: 26                | Weight/attachment: 25.6 lbs |
| Panel orientation: Portrait | Splices: 4                     | Total Area: 264.8 sq ft     |
| Entry type: Graphical       | Clamps: 28                     | Distributed weight: 2.5 psf |

**Diagram**



**Segments**

| Identifier                        | Columns | Row length | Rail length | Cantilever | Rail                   | Attachments | Splices  | Clamps    |
|-----------------------------------|---------|------------|-------------|------------|------------------------|-------------|----------|-----------|
| A                                 | 6       | 20' 1"     | 20' 1"      | 0"         | 56' [4 x 168"]         | 13          | 2        | 14        |
| <b>Row segment totals (x 2) →</b> |         |            |             |            | <b>112' [8 x 168"]</b> | <b>26</b>   | <b>4</b> | <b>28</b> |

**Span Details XR10 - Portrait**

| Zone | Max span | Max cantilever |
|------|----------|----------------|
| 1    | 5' 4"    | 2' 2"          |
| 2    | 5' 4"    | 2' 2"          |
| 3    | 5' 4"    | 2' 2"          |

**Reaction Forces XR10 - Portrait**

| Zone | Uplift (PSF) | Down (lbs) | Uplift (lbs) | Lateral Par (lbs) | Lateral Perp (lbs) |
|------|--------------|------------|--------------|-------------------|--------------------|
| 1    | 17.2         | 251        | 209          | 74                | 4                  |
| 2    | 20.7         | 251        | 256          | 74                | 4                  |
| 3    | 20.7         | 251        | 256          | 74                | 4                  |

**Attachment Span Details Halo UltraGrip (Rafter attached) - Portrait**

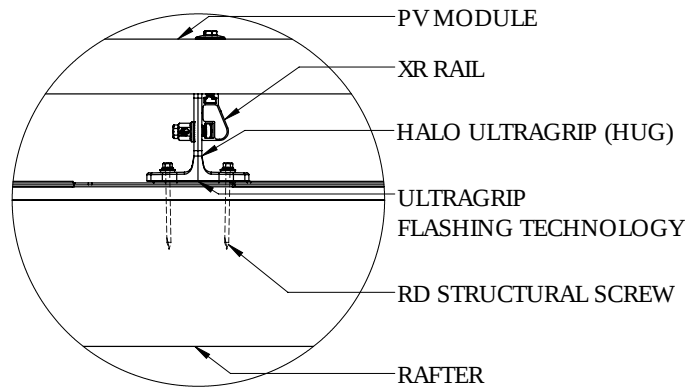
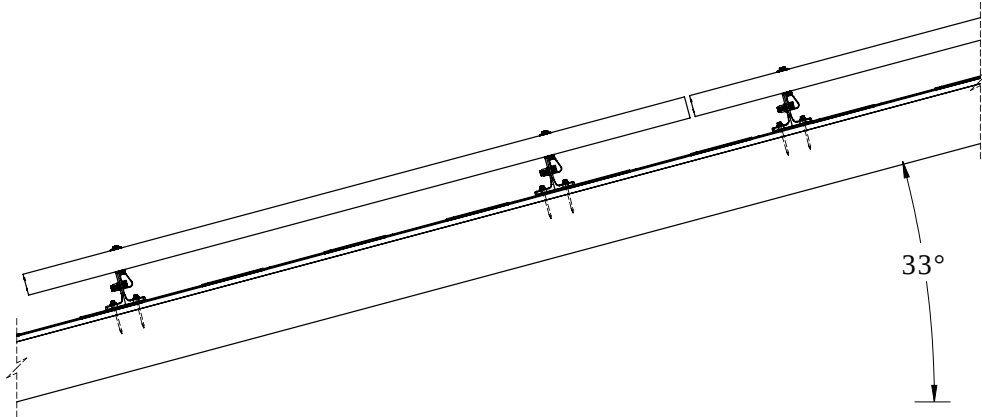
| Zone | Max attachment span |
|------|---------------------|
| 1    | 5' 4"               |
| 2    | 5' 4"               |
| 3    | 5' 4"               |

**\*Optional - Attachment Span Details Halo UltraGrip (Deck attached) - Portrait**

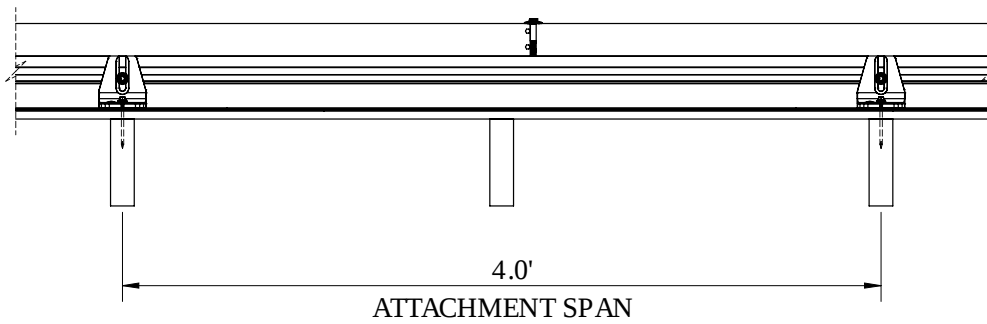
| Zone | Max attachment span |
|------|---------------------|
| 1    | 3' 7"               |
| 2    | 3'                  |
| 3    | 3'                  |

\* Based on minimum 7/16" sheathing thickness

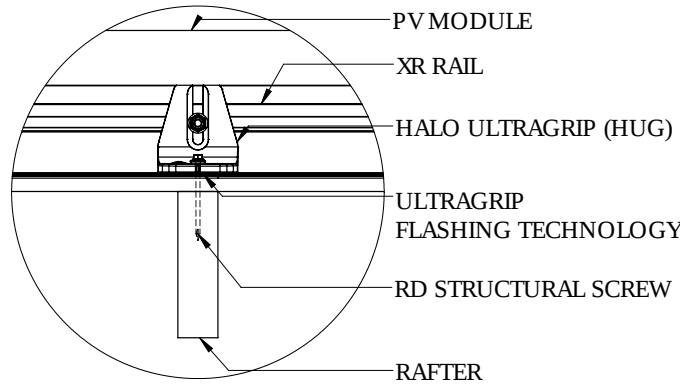
Side View (portrait)



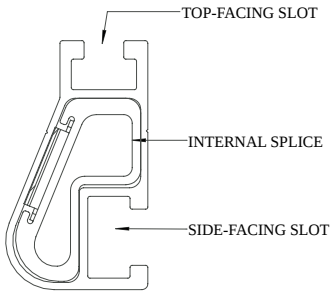
Front View (portrait)



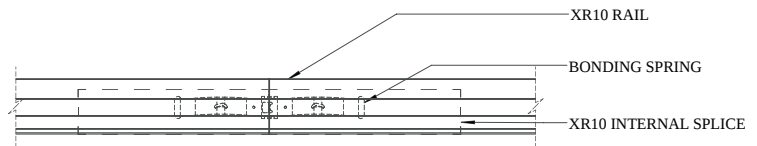
**Front View (portrait)**



**Splice Details**

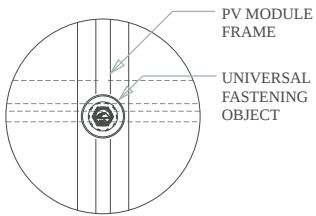


**XR10**

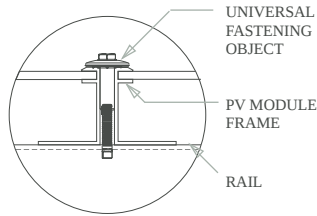


**Splice Connection**

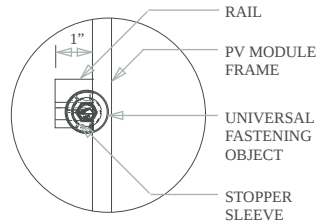
**Clamp Detail**



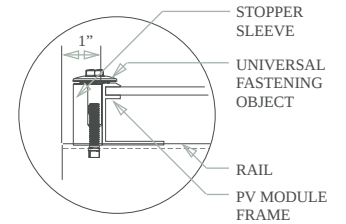
**Mid Clamp, Plan**



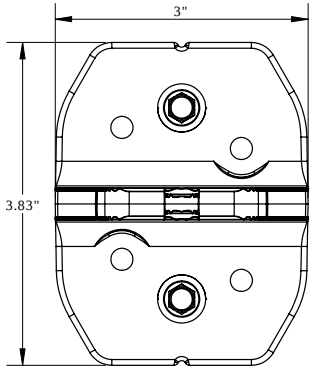
**Mid Clamp, Front**



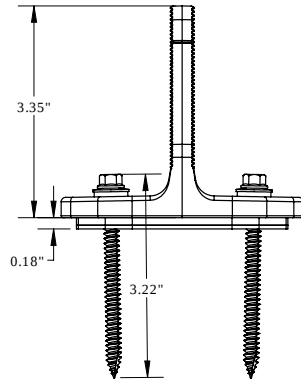
**End Clamp, Plan**



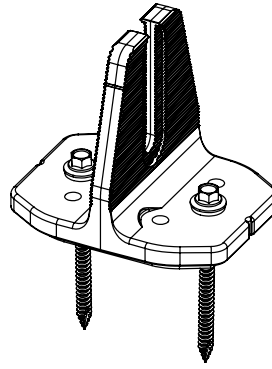
**End Clamp, Front**



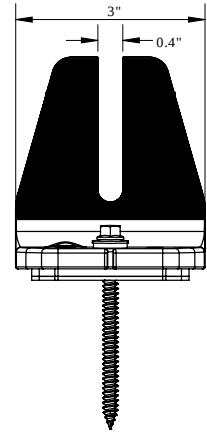
Plan View



Side View

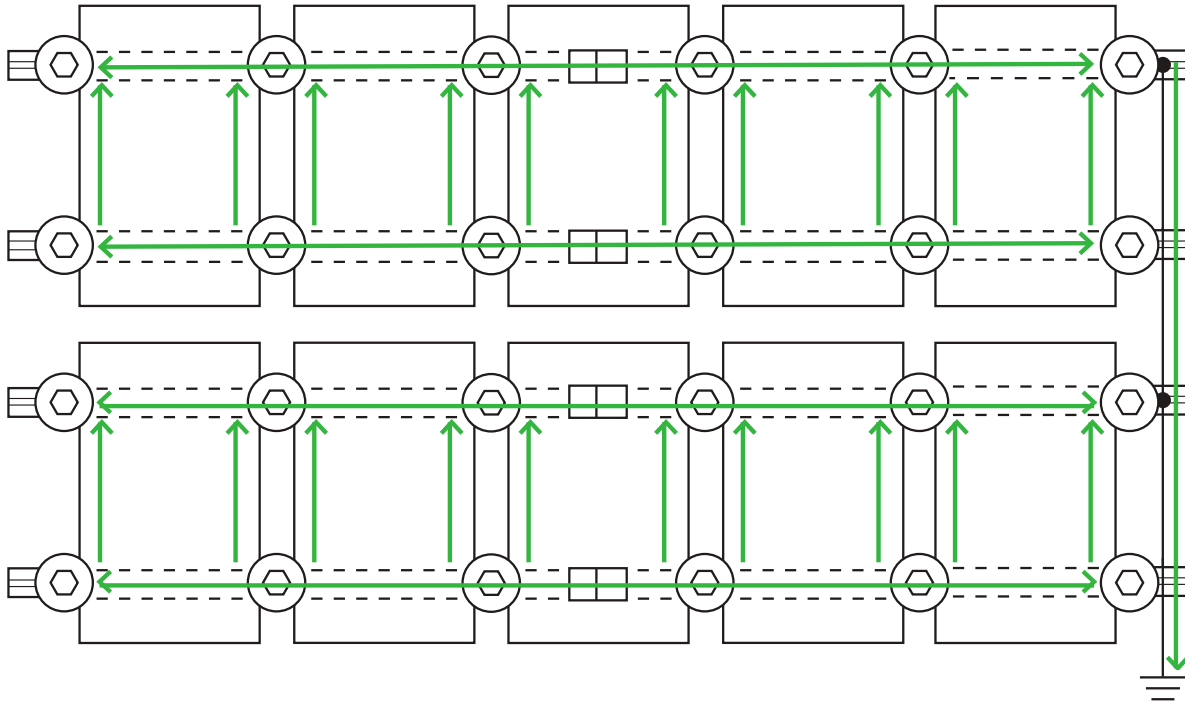


Perspective View




Front View

### Grounding Diagram



 UFO Clamp

 Fault Current Ground Path

 Grounding Lug \*

 Min 10 AWG Copper Wire \*

 Bonded Splice (Rail Connection)

\* Grounding Lugs and Wire are not required in systems using Enphase microinverters.

**Bill of Materials**

| Part | Spares | Total Qty |
|------|--------|-----------|
|------|--------|-----------|

**Rails & Splices**

|  |   |   |
|--|---|---|
| XR-10-168A<br>XR10, Rail 168" Clear    | 0 | 8 |
| XR10-BOSS-01-M1<br>Bonded Splice, XR10 | 0 | 4 |

**Clamps & Grounding**

|   |   |    |
|---|---|----|
| UFO-CL-01-A1<br>Universal Module Clamp, Clear | 0 | 28 |
| UFO-STP-40MM-M1<br>Stopper Sleeve, 40MM, Mill | 0 | 8  |
| XR-LUG-03-A1<br>Grounding Lug, Low Profile    | 0 | 2  |

**Attachments**

|  |   |    |
|--|---|----|
| QM-HUG-01-M1<br>Halo UltraGrip, Mill   | 0 | 26 |
| HW-RD1430-01-M1<br>RD Structural Screw, 3.0L<br><b>* Add desired additional screws by adjusting spares column.</b> | 0 | 52 |
| BHW-TB-02-A1<br>T-Bolt Bonding Hardware  | 0 | 26 |



# ATTACHMENTS

## PRE-INSTALLATION

- Verify module compatibility. See [Page 21](#) for info.

## TOOLS REQUIRED

- |                                 |                       |
|---------------------------------|-----------------------|
| □ Cordless Drill (non-impact)   | □ 3/8" Socket         |
| □ Impact Driver (for lag bolts) | □ 1/8" Drill Bit      |
| □ Torque Wrench (0-250 in-lbs)  | □ 1/4" Drill Bit      |
| □ 7/16" Socket                  | □ T30 Bit             |
| □ 1/2" Socket                   | □ Channel Lock Pliers |
| □ 9/16" Socket                  | □ #3 Phillips Bit     |
| □ 7/32" Drill Bit               | □ 3/16" Hex Bit       |

## BONDING HARDWARE TORQUE VALUES

Please refer to each attachment's individual section for full details on all torque values and instructions.

- 3/8" Bonding Hardware Nuts (7/16" Socket): 250 in-lbs
- All Tile Hook Carriage Bolts (7/16" Socket): 132 in-lbs
- Flat Roof Attachment Nuts (9/16" Socket): 250 in-lbs
- Lynx Set Screw (3/16" Hex Drive): 150 in-lbs
- Lynx Flange Nut (1/2" Socket): 150 in-lbs

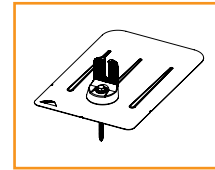
➤ If using previous version of Integrated Grounding Mid Clamps, End Clamps, Expansion Joints and for a list of approved 3rd party components please refer to Alternate Components Addendum (Version 1.9)

## ATTACHMENTS

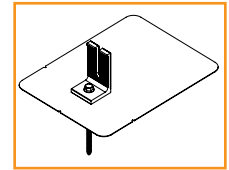
### COMPOSITION SHINGLE



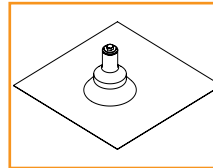
FlashFoot2



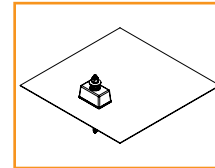
FlashVue



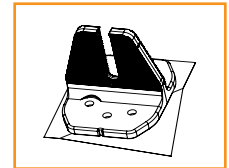
QM L-Mount



QM QBase

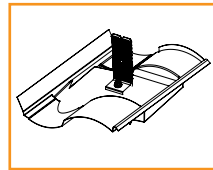


QM Classic Comp Mount

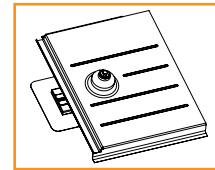


HUG (Halo UltraGrip)

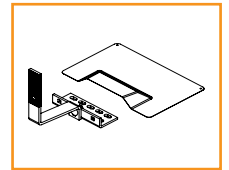
### TILE



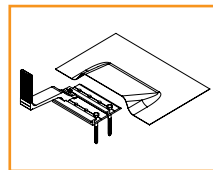
Knockout Tile



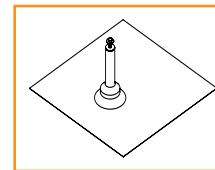
QM Tile Replacement



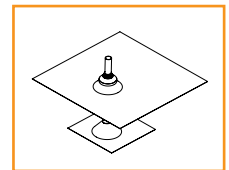
All Tile Hook and Flashing (optional)



QM Quick Hook and Flashing (optional)

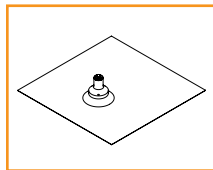


QM QBase Tile

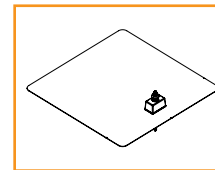


QM Tile Conduit Penetration

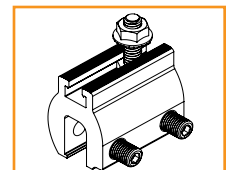
### ADDITIONAL ROOF TYPES



QM Qbase Shake - Slate - Metal Shingle

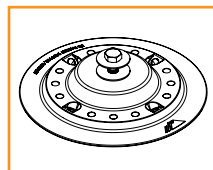


QM Classic Mount Shake

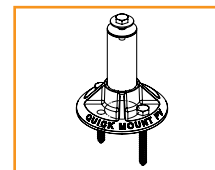


QM Lynx Metal Roof Attachment

### LOW SLOPE ROOF



Flat Roof Attachment



QM QBase Mount

# COMPONENTS

## PRE-INSTALLATION

- Verify module compatibility. See [Page 21](#) for info.

## TOOLS REQUIRED

- Cordless Drill (non-impact)
- Impact Driver (for lag bolts)
- Torque Wrench (0-250 in-lbs)
- 7/16" Socket
- 1/2" Socket
- 9/16" Socket
- 7/32" Drill bit
- 1/8" Drill bit
- 1/4" Drill bit
- T30 Torx Bit
- Channel Lock Pliers
- #3 Phillips Bit
- Paddle Bit

## BONDING HARDWARE TORQUE VALUES

Please refer to each attachment's individual section for full details on all torque values and instructions.

- Universal Fastening Object (7/16" Socket): 80 in-lbs
- Rail Grounding Lug Nut (7/16" Socket): 80 in-lbs
- Module Grounding Lug
  - Grounding Nut (7/16" Socket): 60 in-lbs
  - Grounding Lug Terminal Screws (7/16" Socket): 20 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
- Contour Clamp (T-30 Torx Bit): 80 in-lbs

➤ Unless otherwise noted, all components have been evaluated for multiple use. They can be uninstalled and reinstalled in the same or new location.

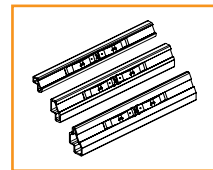
## COMPONENTS



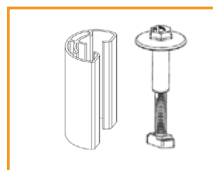
XR Rail



Wire Clip



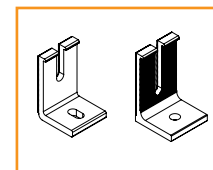
BOSS



UFO and Stopper Sleeve (30-46MM)



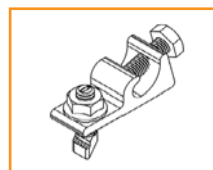
CAMO



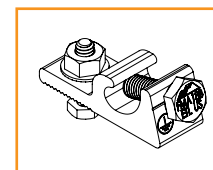
Ironridge L-Foot and QM L-Foot



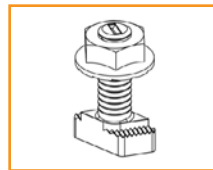
End Cap



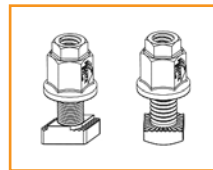
Rail Grounding Lug



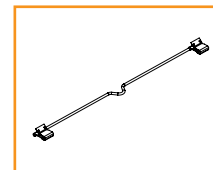
Module Grounding Lug



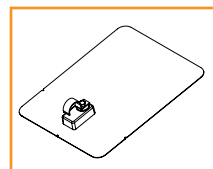
Microinverter Kit



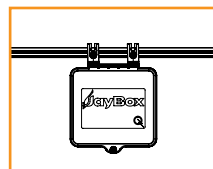
3/8" Bonding Hardware



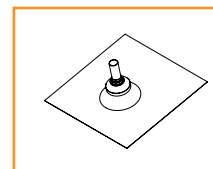
8" Bonding Jumper Single Use Only



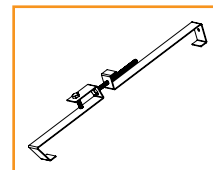
QM Classic Conduit Comp Mount



JAYBOX



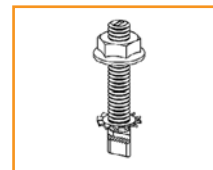
QM Composition Conduit Penetration



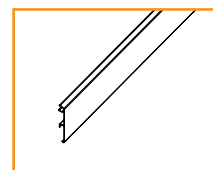
QM Tile Conduit Mount



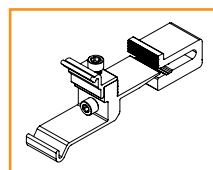
Frameless End/Mid Clamp



Frameless Module Kit



Contour Trim



Contour Clamp

**Rail:  
XR10**

**Flush Mount System Span Table (inches) - Portrait or Landscape Installation**  
 Max Module Length: 86", Max Module SF: 24.5 SF  
 Exposure C

| Wind Speed (mph) | Roof Slope (deg.) | Ground Snow: 0 psf |         |         | 10 psf  |         |         | 20 psf  |         |         | 30 psf  |         |         | 40 psf  |         |         | 50 psf  |         |         | 60 psf  |         |         | 70 psf* |         |         | 80 psf* |         |         | 90 psf* |         |         | 100 psf* |         |         | 110 psf* |         |         | 120 psf* |    |    |
|------------------|-------------------|--------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|---------|---------|----------|---------|---------|----------|----|----|
|                  |                   | Group 1            | Group 2 | Group 3 | Group 1 | Group 2 | Group 3 | Group 1 | Group 2 | Group 3 | Group 1 | Group 2 | Group 3 | Group 1 | Group 2 | Group 3 | Group 1 | Group 2 | Group 3 | Group 1 | Group 2 | Group 3 | Group 1 | Group 2 | Group 3 | Group 1 | Group 2 | Group 3 | Group 1 | Group 2 | Group 3 | Group 1  | Group 2 | Group 3 | Group 1  | Group 2 | Group 3 |          |    |    |
| 110 mph          | 8-20              | 81                 | 61      | 49      | 72      | 61      | 49      | 58      | 58      | 49      | 57      | 57      | 49      | 52      | 52      | 49      | 48      | 48      | 48      | 43      | 43      | 43      | 40      | 40      | 40      | 38      | 38      | 38      | 36      | 36      | 36      | 34       | 34      | 34      | 33       | 33      | 33      | 32       | 32 | 32 |
|                  | 28-45             | 72                 | 69      | 69      | 66      | 66      | 66      | 57      | 57      | 57      | 57      | 57      | 57      | 52      | 52      | 52      | 49      | 49      | 49      | 48      | 48      | 48      | 44      | 44      | 44      | 41      | 41      | 41      | 39      | 39      | 39      | 37       | 37      | 37      | 36       | 36      | 36      | 34       | 34 | 34 |
| 115 mph          | 8-20              | 79                 | 58      | 48      | 72      | 58      | 48      | 58      | 58      | 48      | 57      | 57      | 48      | 52      | 52      | 48      | 48      | 48      | 43      | 43      | 43      | 40      | 40      | 40      | 38      | 38      | 38      | 36      | 36      | 36      | 34      | 34       | 34      | 33      | 33       | 33      | 32      | 32       | 32 |    |
|                  | 28-45             | 68                 | 66      | 66      | 64      | 64      | 64      | 56      | 56      | 56      | 56      | 56      | 56      | 52      | 52      | 52      | 49      | 49      | 49      | 48      | 48      | 48      | 44      | 44      | 44      | 41      | 41      | 41      | 39      | 39      | 39      | 37       | 37      | 37      | 36       | 36      | 36      | 34       | 34 | 34 |
| 120 mph          | 8-20              | 76                 | 56      | 45      | 72      | 56      | 45      | 58      | 56      | 45      | 57      | 56      | 45      | 52      | 52      | 45      | 48      | 48      | 45      | 43      | 43      | 43      | 40      | 40      | 40      | 38      | 38      | 38      | 36      | 36      | 36      | 34       | 34      | 34      | 33       | 33      | 33      | 32       | 32 | 32 |
|                  | 28-45             | 66                 | 64      | 64      | 64      | 64      | 64      | 55      | 55      | 55      | 55      | 55      | 55      | 51      | 51      | 51      | 48      | 48      | 48      | 48      | 48      | 48      | 43      | 43      | 43      | 41      | 41      | 41      | 39      | 39      | 39      | 37       | 37      | 37      | 36       | 36      | 36      | 34       | 34 | 34 |
| 130 mph          | 8-20              | 72                 | 51      | 41      | 69      | 51      | 41      | 58      | 51      | 41      | 57      | 51      | 41      | 52      | 51      | 41      | 48      | 48      | 41      | 43      | 43      | 41      | 40      | 40      | 40      | 38      | 38      | 38      | 36      | 36      | 36      | 34       | 34      | 34      | 33       | 33      | 33      | 32       | 32 | 32 |
|                  | 28-45             | 64                 | 59      | 59      | 60      | 59      | 59      | 54      | 54      | 54      | 53      | 53      | 53      | 50      | 50      | 50      | 48      | 48      | 48      | 44      | 44      | 44      | 42      | 42      | 42      | 41      | 41      | 41      | 39      | 39      | 39      | 37       | 37      | 37      | 36       | 36      | 36      | 34       | 34 | 34 |
| 140 mph          | 8-20              | 65                 | 48      | 39      | 65      | 48      | 39      | 56      | 48      | 39      | 56      | 48      | 39      | 51      | 48      | 39      | 48      | 48      | 39      | 43      | 43      | 39      | 40      | 40      | 39      | 38      | 38      | 38      | 36      | 36      | 36      | 34       | 34      | 34      | 33       | 33      | 33      | 32       | 32 | 32 |
|                  | 28-45             | 58                 | 55      | 55      | 58      | 55      | 55      | 52      | 52      | 52      | 51      | 51      | 51      | 48      | 48      | 48      | 48      | 48      | 48      | 43      | 43      | 43      | 42      | 42      | 42      | 40      | 40      | 40      | 38      | 38      | 38      | 37       | 37      | 37      | 36       | 36      | 36      | 34       | 34 | 34 |
| 150 mph          | 8-20              | 61                 | 44      | 36      | 61      | 44      | 36      | 55      | 44      | 36      | 54      | 44      | 36      | 50      | 44      | 36      | 48      | 44      | 36      | 43      | 43      | 36      | 40      | 40      | 36      | 38      | 38      | 36      | 36      | 36      | 36      | 34       | 34      | 34      | 33       | 33      | 33      | 32       | 32 | 32 |
|                  | 28-45             | 55                 | 51      | 51      | 55      | 51      | 51      | 50      | 50      | 50      | 50      | 50      | 50      | 48      | 48      | 48      | 44      | 44      | 44      | 42      | 42      | 42      | 41      | 41      | 41      | 39      | 39      | 39      | 38      | 38      | 38      | 37       | 37      | 37      | 35       | 35      | 35      | 34       | 34 | 34 |
| 160 mph          | 8-20              | 57                 | 42      | 32      | 57      | 42      | 32      | 54      | 42      | 32      | 53      | 42      | 32      | 49      | 42      | 32      | 48      | 42      | 32      | 43      | 42      | 32      | 40      | 40      | 32      | 38      | 38      | 32      | 36      | 36      | 32      | 34       | 34      | 32      | 33       | 33      | 32      | 32       | 32 |    |
|                  | 28-45             | 52                 | 48      | 48      | 52      | 48      | 48      | 48      | 48      | 48      | 48      | 48      | 48      | 48      | 48      | 48      | 43      | 43      | 43      | 41      | 41      | 41      | 40      | 40      | 40      | 38      | 38      | 38      | 37      | 37      | 37      | 36       | 36      | 36      | 35       | 35      | 35      | 34       | 34 | 34 |
| 170 mph          | 8-20              | 54                 | 39      | 28      | 54      | 39      | 28      | 53      | 39      | 28      | 52      | 39      | 28      | 48      | 39      | 28      | 45      | 39      | 28      | 42      | 39      | 28      | 40      | 39      | 28      | 38      | 38      | 28      | 36      | 36      | 28      | 34       | 34      | 28      | 33       | 33      | 28      | 32       | 32 |    |
|                  | 28-45             | 50                 | 48      | 48      | 50      | 48      | 48      | 48      | 48      | 48      | 48      | 48      | 48      | 44      | 44      | 44      | 42      | 42      | 42      | 40      | 40      | 40      | 39      | 39      | 39      | 38      | 38      | 38      | 36      | 36      | 36      | 35       | 35      | 35      | 34       | 34      | 34      | 33       | 33 | 33 |
| 180 mph          | 8-20              | 51                 | 37      | 25      | 51      | 37      | 25      | 51      | 37      | 25      | 51      | 37      | 25      | 48      | 37      | 25      | 44      | 37      | 25      | 42      | 37      | 25      | 40      | 37      | 25      | 38      | 37      | 25      | 36      | 36      | 25      | 34       | 34      | 25      | 33       | 33      | 25      | 32       | 32 |    |
|                  | 28-45             | 48                 | 43      | 43      | 48      | 43      | 43      | 48      | 43      | 43      | 45      | 43      | 43      | 43      | 43      | 43      | 41      | 41      | 41      | 39      | 39      | 39      | 38      | 38      | 38      | 37      | 37      | 37      | 36      | 36      | 36      | 35       | 35      | 35      | 34       | 34      | 34      | 33       | 33 | 33 |

  = min 72" span     
   = min 64" span     
   = min 48" span  
  = Shaded cells indicate conditions in which UFO Mid Clamp connection capacity is exceeded. See Note 10 on page 2 for details.