



## 420-440W Residential AC Module

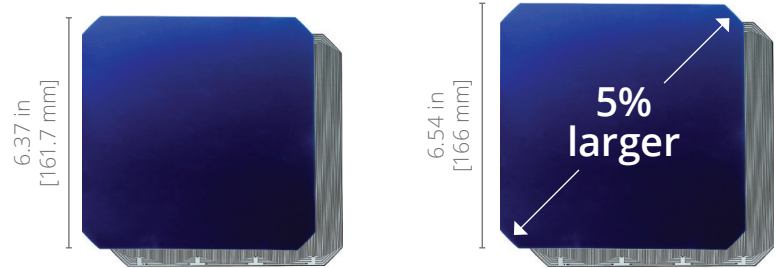
### SunPower® Maxeon® Technology

Built specifically for use with the SunPower Equinox® system, the only fully integrated solar solution designed, engineered, and warranted by one company.



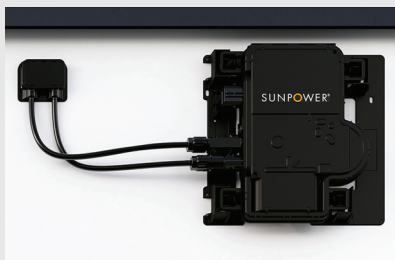
### Highest Power AC Density Available.

The patented, solid-copper foundation Maxeon Gen 6 cell is over 5% larger than prior generations, delivering the highest efficiency AC solar panel available.\*



### Part of the SunPower Equinox® Solar System

- Compatible with mySunPower™ monitoring
- Seamless aesthetics



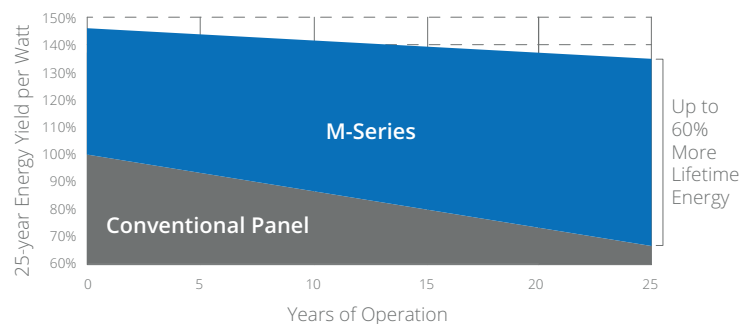
### Factory-integrated Microinverter

- Highest-power integrated AC module in solar
- Engineered and calibrated by SunPower for SunPower AC modules



### Highest Lifetime Energy and Savings

Designed to deliver 60% more energy over 25 years in real-world conditions like partial shade and high temperatures.<sup>1</sup>



### Best Reliability, Best Warranty

With more than 42.6 million and 15 GW modules deployed around the world, SunPower technology is proven to last. That's why we stand behind our module and microinverter with the industry's best 25-year Combined Power and Product Warranty.

# M-Series: M440 | M435 | M430 | M425 | M420 SunPower® Residential AC

AC Electrical Data		
Inverter Model: Type H (Enphase IQ7HS)	@240 VAC	@208 VAC
Max. Continuous Output Power (VA)	384	369
Nom. (L-L) Voltage/Range <sup>2</sup> (V)	240 / 211–264	208 / 183–229
Max. Continuous Output Current (Arms)	1.60	1.77
Max. Units per 20 A (L-L) Branch Circuit <sup>3</sup>	10	9
CEC Weighted Efficiency	97.0%	96.5%
Nom. Frequency	60 Hz	
Extended Frequency Range	47–68 Hz	
AC Short Circuit Fault Current Over 3 Cycles	4.82 A rms	
Overvoltage Class AC Port	III	
AC Port Backfeed Current	18 mA	
Power Factor Setting	1.0	
Power Factor (adjustable)	0.85 (inductive) / 0.85 (capacitive)	

DC Power Data					
	SPR-M440-H-AC	SPR-M435-H-AC	SPR-M430-H-AC	SPR-M425-H-AC	SPR-M420-H-AC
Nom. Power <sup>5</sup> (P <sub>nom</sub> ) W	440	435	430	425	420
Power Tolerance	+5/-0%				
Module Efficiency	22.8%	22.5%	22.3%	22.0%	21.7%
Temp. Coef. (Power)	-0.29%/°C				
Shade Tolerance	Integrated module-level max. power point tracking				

Tested Operating Conditions	
Operating Temp.	-40° F to +185° F (-40° C to +85° C)
Max. Ambient Temp.	122° F (50° C)
Max. Test Load <sup>7</sup>	Wind: 125 psf, 6000 Pa, 611 kg/m <sup>2</sup> back Snow: 187 psf, 9000 Pa, 917 kg/m <sup>2</sup> front
Max. Design Load	Wind: 75 psf, 3600 Pa, 367 kg/m <sup>2</sup> back Snow: 125 psf, 6000 Pa, 611 kg/m <sup>2</sup> front
Impact Resistance	1 inch (25 mm) diameter hail at 52 mph (23 m/s)

Mechanical Data	
Solar Cells	66 Maxison Gen 6
Front Glass	High-transmission tempered glass with anti-reflective coating
Environmental Rating	Outdoor rated
Frame	Class 1 black anodized (highest AAMA rating)
Weight	48 lbs (21.8 kg)
Recommended Max. Module Spacing	1.3 in. (33 mm)

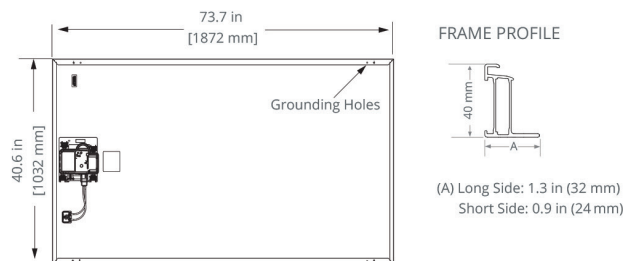
\* Based on datasheet review of websites of top 20 manufacturers per Wood Mackenzie US PV Leaderboard Q3 2021.  
 1 Maxison 435 W, 22.5% efficient, compared to a Conventional Panel on same-sized arrays (260 W, 16% efficient, approx. 1.6 m<sup>2</sup>), 7.9% more energy per watt (based on PVsyst pan files for avg. US climate), 0.5%/yr slower degradation rate (Jordan, et. al. "Robust PV Degradation Methodology and Application."PVSC 2018).  
 2 Voltage range can be extended beyond nominal if required by the utility.  
 3 Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.  
 4 Factory set to IEEE 1547a-2014 default settings. CA Rule 21 default settings profile set during commissioning.  
 5 Standard Test Conditions (1000 W/m<sup>2</sup> irradiance, AM 1.5, 25°C). All DC voltage is fully contained within the module.  
 6 UL Listed as PVRSE and conforms with NEC 2014 and NEC 2017 690.12; and C22.1-2015 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors; when installed according to manufacturer's instructions.  
 7 Please read the safety and installation instructions for more information regarding load ratings and mounting configurations.

See [www.sunpower.com/company](http://www.sunpower.com/company) for more reference information. Specifications included in this datasheet are subject to change without notice.

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Warranties, Certifications, and Compliance	
Warranties	<ul style="list-style-type: none"> <li>• 25-year limited power warranty</li> <li>• 25-year limited product warranty</li> </ul>
Certifications and Compliance	<ul style="list-style-type: none"> <li>• UL 1741 / IEEE-1547</li> <li>• UL 1741 AC Module (Type 2 fire rated)</li> <li>• UL 62109-1 / IEC 62109-2</li> <li>• FCC Part 15 Class B</li> <li>• ICES-0003 Class B</li> <li>• CAN/CSA-C22.2 NO. 107.1-01</li> <li>• CA Rule 21 (UL 1741 SA)<sup>4</sup> (includes Volt/Var and Reactive Power Priority)</li> <li>• UL Listed PV Rapid Shutdown Equipment<sup>6</sup></li> </ul> <p>Enables installation in accordance with:</p> <ul style="list-style-type: none"> <li>• NEC 690.6 (AC module)</li> <li>• NEC 690.12 Rapid Shutdown (inside and outside the array)</li> <li>• NEC 690.15 AC Connectors, 690.33(A)-(E)(1)</li> </ul> <p>When used with AC module Q Cables and accessories (UL 6703 and UL 2238)<sup>6</sup>:</p> <ul style="list-style-type: none"> <li>• Rated for load break disconnect</li> </ul>
PID Test	1000 V: IEC 62804

Packaging Configuration	
Modules per pallet	25
Packaging box dimensions	1915 * 1072 * 1220 mm
Pallet gross weight	590 kg
Pallets per container	32
Net weight per container	18,880 kg



Please read the safety and installation instructions for details.



539973 Rev B / LTR\_EN  
 Publication Date: October 2021

# SunPower® InvisiMount™ | Residential Mounting System

## Simple and Fast Installation

- Integrated module-to-rail grounding
- Pre-assembled mid and end clamps
- Levitating mid clamp for easy placement
- Mid clamp width facilitates consistent, even module spacing
- UL 2703 Listed integrated grounding

## Flexible Design

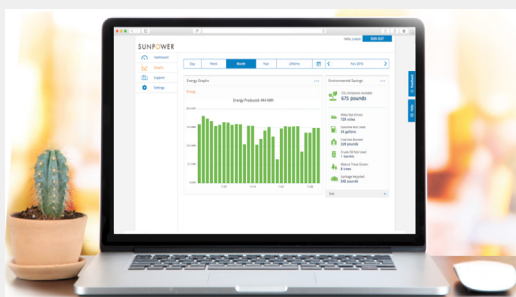
- Addresses nearly all sloped residential roofs
- Design in landscape and portrait with up to 8' rail span
- Pre-drilled rails and rail splice
- Rails enable easy obstacle management

## Customer-Preferred Aesthetics

- #1 module and #1 mounting aesthetics
- Best-in-class system aesthetics
- Premium, low-profile design
- Black anodized components
- Hidden mid clamps and capped, flush end clamps

## Part of Superior System

- Built for use with SunPower DC and AC modules
- Best-in-class system reliability and aesthetics
- Optional rooftop transition flashing, rail-mounted J-box, and wire management rail clips
- Combine with SunPower modules and SunPower EnergyLink® monitoring app



## Elegant Simplicity

SunPower® InvisiMount™ is a SunPower-designed rail-based mounting system. The InvisiMount system addresses residential sloped roofs and combines faster installation time, design flexibility, and superior aesthetics. The InvisiMount product was specifically envisioned and engineered to pair with SunPower modules. The resulting system-level approach amplifies the aesthetic and installation benefits—for homeowners and for installers.

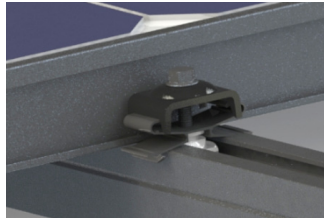
[sunpower.com](https://sunpower.com)



# SunPower® InvisiMount™ | Residential Mounting System

## InvisiMount Components

Module<sup>1</sup> / Mid Clamp and Rail



Module<sup>1</sup> / End Clamp and Rail



Ground Lug Assembly



Row-to-Row Spacer



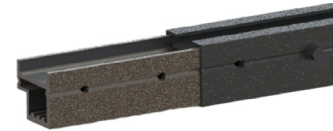
End Clamp



Mid Clamp



Row-to-Row Grounding Clip



Rail and Rail Splice

InvisiMount Component Details		
Mid clamp	Black oxide stainless steel 300 series	63 g (2.2 oz)
End clamp	Black anodized aluminum 6000 series	110 g (3.88 oz)
Rail	Black anodized aluminum 6000 series	830 g/m (9 oz/ft)
Rail splice	Aluminum alloy 6000 series	830 g/m (9 oz/ft)
Rail bolt	M10-1.5 x 25 mm; custom T-head SS304	18 g (0.63 oz)
Rail nut	M10-1.5; DIN 6923 SS304	nominal
Ground lug assembly	SS304; A2-70 bolt; tin-plated copper lug	106.5 g (3.75 oz)
Row-to-row grounding clip	SS 301 with SS 304 M6 bolts	75 g (2.6 oz)
Row-to-row spacer	Black POM-grade plastic	5 g (0.18 oz)

InvisiMount Component LRFD Capacities <sup>2</sup>		
Mid clamp	Uplift	664 lbf
	Shear	540 lbf
End clamp	Uplift	899 lbf
	Shear	220 lbf
Rail	Moment: upward	548 lbf-ft
	Moment: downward	580 lbf-ft
Rail splice	Moment: upward	548 lbf-ft
	Moment: downward	580 lbf-ft
L-foot	Uplift	1000 lbf
	Shear	390 lbf

InvisiMount Operating Conditions	
Temperature	-40° C to 90° C (-40° F to 194° F)
Max. Load (LRFD)	<ul style="list-style-type: none"> <li>• 3000 Pa uplift</li> <li>• 6000 Pa downforce</li> </ul>

Roof Attachment Hardware Supported by Design Tool	
Application	<ul style="list-style-type: none"> <li>• Composition Shingle Rafter Attachment</li> <li>• Composition Shingle Roof Decking Attachment</li> <li>• Curved and Flat Tile Roof Attachment</li> <li>• Universal interface for other roof attachments</li> </ul>

InvisiMount Warranties And Certifications	
Warranties	<ul style="list-style-type: none"> <li>• 25-year product warranty</li> <li>• 5-year finish warranty</li> </ul>
Certifications	<ul style="list-style-type: none"> <li>• UL 2703 Listed</li> <li>• Class A Fire Rated</li> </ul>

Roof Attachment Hardware Warranties	
Refer to roof attachment hardware manufacturer's documentation.	

<sup>1</sup> Module frame that is compatible with the InvisiMount system required for hardware interoperability.

<sup>2</sup> SunPower recommends that all Equinox™, InvisiMount™, and AC module systems always be designed using the InvisiMount Span Tables #524734. If a designer decides to instead use the component capacities listed in this document to design a system, note that the capacities shown are Load and Resistance Factor Design (LRFD) design loads, and are NOT to be used for Allowable Stress Design (ASD) calculations; and that a licensed Professional Engineer (PE) must then stamp all calculations. If you have any questions please contact SunPower Technical Support at 1-855-977-7867.

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sunpower.com  
509506 RevF



September 21, 2021

SunPower  
77 Rio Robles  
San Jose, CA 95134  
TEL: (408) 514-4063

Attn: Sunpower – Engineering Department

Re: Engineering Certification for the SunPower Corporation Invisimount Mounting System Span Tables and Design Methodology

PZSE, Inc.-Structural Engineers has reviewed the SunPower Invisimount Mounting System Span Tables Revision F published September 21, 2021 and their design methodology. This certification covers the module clamp, rail analysis, and attachment Tile hook/L bracket components. All information, data and analysis contained within are based on, and comply with, the following building codes and typical specifications:

**Building Codes:**

1. Minimum Design Loads for Buildings and other Structures, ASCE 7-10, & 7-16
2. 2015, & 2018 International Building Code, by International Code Council, Inc.
3. 2017 NY State Uniform Code Supplement
4. 2020 NY State Building Code
5. 2015 Aluminum Design Manual, by The Aluminum Association
6. CPP Wind Tunnel report number 9790, dated 16 February 2017.
7. SEAOC PV-2, 2017
8. 2015 NDS, by the American Wood Council
9. UL 2703 Testing report for PV solar panels.
10. AC428, Acceptance Criteria for Modular Framing Systems Used to Support Photovoltaic (PV) Panels, November 1, 2012 by ICC-ES

**Component and Cladding Roof Zones:**

The Components and Cladding Roof Zones shall be determined based on ASCE 7 Chapter 30, and CPP Wind Tunnel test number 9790, dated 16 February 2017.

**Notes:**

- 1) Racking system and panels shall be installed per manufacturer's specifications.
- 2) Design assumptions are specified in the Inputs pages of attached span tables.
- 3) Attachment design is based on 5/16" Dia. Lag Screw with 2.5" Embedment into SPF#2 or equivalent per NDS. Designer shall be responsible for verifying project specific site conditions.
- 4) Wind speeds are LRFD values.
- 5) Attachment spacing(s) apply to seismic design category E or less.



**Design Responsibility:**

These tables are intended to be used under the responsible charge of a registered design professional where required by the authority having jurisdiction. In all cases, these tables should be used under the direction of a design professional with sufficient structural engineering knowledge and experience to be able to:

- Evaluate whether these tables are applicable to the project, and
- Understand and determine the appropriate values for all input parameters of these tables.

This letter certifies that the loading criteria and design basis SunPower Invisimount Mounting System Span Tables are in compliance with the Codes above.

This certification excludes the capacity check of the building structure to support the loads imposed on the building by the array, such as bending strength of roof rafters spanning between supports. This requires additional knowledge of the building and is outside the scope of the design tool and our review.

If you have any questions on the above, do not hesitate to call.

Prepared By:  
PZSE, Inc. - Structural Engineers  
Roseville, CA



09/23/2021

# SUNPOWER®

Exposure B  
 Ground Snow (psf) 20  
 Roof Height (ft) 20

INVISIMOUNT ALLOWABLE SPANS - ZONE 1 (IN)											
Slope →	9.46 °	14.04 °	18.43 °	22.62 °	26.57 °	30.26 °	33.69 °	36.87 °	39.81 °	42.51 °	45 °
Speed ↓	2:12	3:12	4:12	5:12	6:12	7:12	8:12	9:12	10:12	11:12	12:12
90	72	72	80	80	80	96	96	96	96	96	96
95	72	72	80	80	80	96	96	96	96	96	96
100	72	72	80	80	80	96	96	96	96	96	96
105	72	72	80	80	80	96	96	96	96	96	96
110	72	72	80	80	80	96	96	96	96	96	96
120	72	72	80	80	80	96	96	96	96	96	96
130	72	72	80	80	80	80	80	96	96	96	96

INVISIMOUNT ALLOWABLE SPANS - ZONE 2 (IN)											
Slope →	9.46 °	14.04 °	18.43 °	22.62 °	26.57 °	30.26 °	33.69 °	36.87 °	39.81 °	42.51 °	45 °
Speed ↓	2:12	3:12	4:12	5:12	6:12	7:12	8:12	9:12	10:12	11:12	12:12
90	72	72	80	80	80	96	96	96	96	96	96
95	72	72	80	80	80	96	96	96	96	96	96
100	72	72	80	80	80	96	96	96	96	96	96
105	72	72	80	80	80	96	96	96	96	96	96
110	72	72	80	80	80	96	96	96	96	96	96
120	72	72	80	80	80	96	96	96	96	96	96
130	72	72	72	80	80	80	80	96	96	96	96

INVISIMOUNT ALLOWABLE SPANS - ZONE 3 (IN)											
Slope →	9.46 °	14.04 °	18.43 °	22.62 °	26.57 °	30.26 °	33.69 °	36.87 °	39.81 °	42.51 °	45 °
Speed ↓	2:12	3:12	4:12	5:12	6:12	7:12	8:12	9:12	10:12	11:12	12:12
90	72	72	80	80	80	96	96	96	96	96	96
95	72	72	80	80	80	96	96	96	96	96	96
100	72	72	80	80	80	96	96	96	96	96	96
105	72	72	80	80	80	96	96	96	96	96	96
110	72	72	80	80	80	96	96	96	96	96	96
120	72	72	72	80	80	80	80	80	80	80	80
130	64	64	64	72	72	80	80	80	80	80	80

Notes:

- Tables are based on strength of the InvisiMount rail and approved roof attachment in the Engineering Summary Letter of this document, in conformance with IBC and referenced standards.
- The color of a given cell indicates the area on the module where clamps may be installed. Green cells allow clamps to be installed in Portrait or Landscape orientations; Orange allows clamps to be installed only in Portrait; Blue allows clamps to be installed only in Portrait within the given dimensions from the edge. Refer to the key at the beginning of this document for more details.
- Maximum allowable cantilever is equal to 1/3 of the allowable span.
- Wind speeds are ultimate values in mph, as defined in ASCE 7. Wind pressure coefficients are derived from ASCE 7 Chapter 30.
- User is responsible for verifying the strength of the roof.