

PanelClaw®'s clawFR products have been tested in accordance with the *ANSI/UL 2703-2015 Standard for Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels*. The test program includes temperature and humidity cycling; electrical resistance and conductance testing; fire performance; manufacturing and operational quality reviews; and module-specific mechanical load testing and review. The ANSI/UL 2703 mechanical strength, electric bonding and grounding, and fire performance requirements closely mirror ANSI/UL 1703, the standard for flat-plate PV modules. [Appendix A: Bonding Testing, Mechanical Load Testing and Fire Testing](#), provides some details regarding the testing performed.



PanelClaw's clawFR systems are listed for their mechanical strength, ability to electrically bond and ground modules and for fire performance. Each PanelClaw product installation manual contains instructions for bonding and grounding listed modules and fire performance requirements.

PV system installers using clawFR can quickly and easily establish ANSI/UL 2703 certified electric bonds between all connected array components, including modules and mounting system components, without the use of dedicated grounding devices, e.g. ground lugs and copper wire. Multiple strings within an array having a fuse rating of up to 30 amps can be grounded via a single properly sized ground lug acting as a Grounding Electrode Conductor (GEC).

All clawFR module connections are certified as recognized components under ANSI/UL 2703 for module-to-module and module-to-mounting system electric bonding. For projects using modules not currently included in PanelClaw's UL Listing, additional approvals from the module manufacturer and the relevant permitting authority may be necessary to utilize the ANSI/UL 2703 electric bonding and grounding method described in the clawFR installation manual.

clawFR 5D, clawFR 10D, and clawFR DT are certified with a Class A fire rating. See [Appendix A: Bonding Testing, Mechanical Load Testing and Fire Testing](#) for more details.

PanelClaw's SolarPTL Partner Lab Test Program

In 2012, PanelClaw opened the mounting system industry's first Intertek® Satellite Test Laboratory in order to accelerate the company's product innovation cycle and develop close partnerships with Nationally Recognized Test Laboratories (NRTL's) in the United States. PanelClaw transitioned to Underwriters Laboratories under its *UL Client Test Data Program* (CTDP) in 2016. The company's commitment to the development of codes and standards for mounting systems, product testing and certification is unwavering, and our engineers have been active in the UL 2703 Technical Standards Committee since its inception.



Starting with clawFR, PanelClaw's innovation lab transitioned its certification to SolarPTL (formerly TUV Rheinland) under its Partner Lab Program (PLP).

Adding Modules to PanelClaw Product Listings

We regularly add new modules to the clawFR ANSI/UL 2703 listing. If you have specified or plan to specify a module not listed on this document, we can quickly and efficiently add it. We work closely with all module manufacturers in the industry and have developed a standard process for evaluating and adding new modules to our listing leveraging our Testing and Innovation Lab and its PLP designation. We can test modules within 24 hours of receiving them and can typically have them added to our listing within 2 weeks. We offer the most robust and expeditious process for addition of modules to a flat roof racking platform in the industry.

Helpful Links and Phone Numbers

UL provides a summary of requirements for the ANSI/UL2703 specification. This summary can be found by visiting the UL 2703 Guide Information web page. An excerpt can be found in Appendix B: UL 2703 of this document.

See [Appendix C: Module Listing](#) of this document for a list of photovoltaic modules which have been listed, as of the release of this document, for use with the clawFR mounting systems.

For additional information regarding PanelClaw's ANSI/UL 2703 listings, please contact Applications Engineering at +1 (978) 688-4900.



Appendix A: Bonding Testing, Mechanical Load Testing and Fire Testing

Bonding Testing

Bonding testing has been performed on all connections within the clawFR system. Samples were assembled representing system connections and bonding path resistance testing was performed on non-conditioned and conditioned samples. ANSI/UL 2703 requires the following conditioning to be performed on the samples:

- Bonding Conductor 135%
- Bonding Conductor 200%
- Bonding Conductor Limited Short Circuit
- Thermal Cycling test, 200 cycles
- Humidity Cycling test, 10 cycles

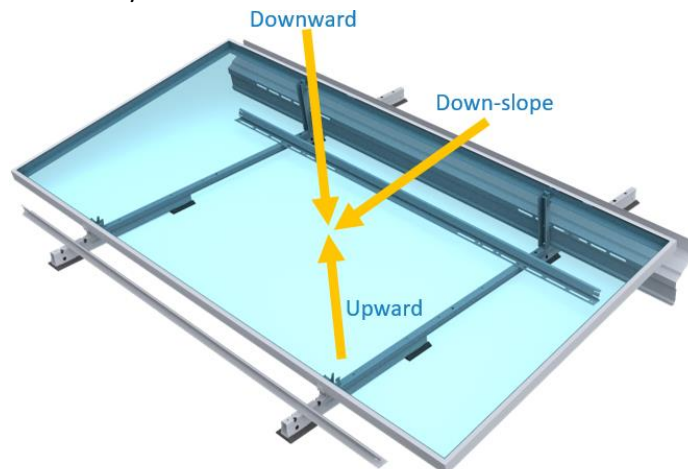
Bonding Path Resistance testing was performed on these samples after conditioning to ensure that the fidelity of the connection is within allowable safe limits established by the ANSI/UL 2703 safety standard.

Mechanical Load Testing

Mechanical load testing has been performed on production grade components paired with UL 1703 listed modules. Mechanical test loads, per the ANSI/UL 2703 standard, are applied at 1.5 times the desired design load. The load was uniformly applied until test load was achieved and allowed to stand for a minimum of 30 minutes. The load was then removed, and the module and components were inspected for permanent deformation which would adversely affect system safety or compliance.

The following load directions and ANSI/UL 2703 minimum design load ratings are:

- Downward pressure: 10lb/ft²
- Upward pressure: 5lb/ft²
- Down-slope Pressure: 5lb/ft²





PanelClaw has determined these minimum load ratings often do not satisfy the various environmental conditions in regions of clawFR deployment. The ratings listed in [Appendix C: Module Listing](#) supersede the minimums. [Appendix C: Module Listing](#) contains the design load ratings resulting from actual Mechanical Load Tests performed on the modules listed therein.

Fire Testing

ANSI/UL 2703 system fire class rating of mounting systems with modules in combinations with roof coverings certifies the entire system (module, mounting product, and roof covering) performs in accordance with a specific fire class rating. clawFR 5D, 10D, and DT meet the rigorous performance requirements for a Class A fire rating when paired with Class A components (roof covering, and module with a Type I or Type II classification). Class A is the highest performance rating possible for low slope roof mounting systems; it requires a flame spread of less than or equal to six feet in ten minutes. The testing verified clawFR does not adversely affect the spread of flame performance of a Class A rated roof covering.

clawFR was tested on a representative roof construction with a Class A fire rating on a test apparatus as described in UL 790, Standard Test Methods for Fire Tests of Roof Coverings. Three baseline tests were performed without the presence of a mounting system or module. After baseline testing was completed, a leading edge was calculated by taking the average of the three qualifying baseline tests minus 12 inches ensuring the system was within the affected area of the roof. See Figure 1 for an example of a baseline test.



Figure 1 Example of baseline test (before/after)

Full scale fire testing of clawFR 5D and clawFR 10D included tests from three asymmetrical directions, fire approaching from the South, North and East/West edges. clawFR DT required testing from two asymmetrical directions, fire approaching from the East/West and North/South edge. The maximum burn distance for each system, direction and module type is shown in Table 1 and Table 2 respectively. In each case, clawFR met the test requirement of 6 feet max with ample margin.

Table 1 Maximum burn distance in feet, Type 1 Module (Type 2 Module)

System	South	North	East/West
clawFR 5D	4.0 (4.0)	3.5 (3.5)	4.0 (3.5)
clawFR 10D	4.0 (4.0)	3.0 (3.5)	4.0 (4.5)

Table 2 Maximum burn distance in feet, Type 1 Module (Type 2 Module)

System	East/West	North/South
clawFR DT	4.0 (4.0)	4.0 (4.0)



Figure 2 Typical result from fire testing (South direction shown of clawFR 5D, before/after)

System installation must be in accordance with the product installation manuals to achieve a Class A fire rating for low slope roofs with Type I and Type II modules.

Please consult the ANSI/UL 2703 safety standard for additional details related to the testing performed.



Appendix B: UL 2703

ANSI/UL 2703 Guide Information – QIMS Guide Information: The data below is taken from UL's website and represents the most current information as of January 18, 2019.



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Mounting Systems, Mounting Devices, Clamping Devices and Ground Lugs for Use with Photovoltaic Modules and Panels

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[Distributed Generation Power Systems Equipment] Mounting Systems, Mounting Devices, Clamping Devices and Ground Lugs for Use with Photovoltaic Modules and Panels

[See General Information for Distributed Generation Power Systems Equipment](#)

USE AND INSTALLATION

This category covers photovoltaic (PV) mounting systems, mounting devices, clamping devices (which may be for bonding and/or mechanical loading) and ground lugs tested in combination with specific PV modules and panels and specified module frames and mounting structures as identified in the individual certifications. These systems and devices are investigated for one of two installation types: (1) ground mounted, or (2) intended to serve as part of a nonstructural component of a building, such as a stand-alone system on a building, curtain wall, facade, atrium, skylight, etc., which is applied extant to the primary building structure. Both mounting systems and clamping devices may be investigated for mechanical mounting alone, or mechanical mounting and ground bonding as identified in the individual certifications. Ground lugs may be tested in combination with specific PV modules, specific PV module frames, or specific mounting-system rails as identified in the individual certifications.

Only those features noted in the individual certifications and/or the Reports for specific products have been investigated by UL.

The installation of these mounting systems, clamping devices or bonding devices is intended to be in accordance with ANSI/NFPA 70, "National Electrical Code," in addition to any applicable building codes.

Authorities Having Jurisdiction should be consulted as to conformance with applicable building codes, including the class of roof covering, and any additional safety investigations that may be required.

FLAME CLASSES

When applicable, PV mounting systems are marked "Class A," "Class B" or "Class C" to denote their resistance to external fire exposure when installed in combination with specific PV modules and according to the PV mounting system installation instructions.

PRODUCT IDENTITY

One of the following product identities appears on the product:

Photovoltaic Bonding Device

Photovoltaic Ground Lug

Photovoltaic Module Clamping Device

Photovoltaic Mounting and Bonding Device

Photovoltaic Mounting Device

Photovoltaic Mounting System

The word "Photovoltaic" may be abbreviated "PV."

RELATED PRODUCTS

PV modules and panels are covered under Photovoltaic Modules and Panels ([QIGU](#)).

Low-concentration flat-plate modules are covered under Flat-plate, Low-concentration Photovoltaic Modules and Panels ([QHZU](#)).

PV concentrators are covered under Concentrator Photovoltaic Modules and Assemblies ([QICP](#)).

AC modules are covered under AC Modules and Photovoltaic Modules with Integrated Electronics ([QHYZ](#)).



ADDITIONAL INFORMATION

For additional information, see Electrical Equipment for Use in Ordinary Locations ([AALZ](#)).

REQUIREMENTS

The basic standard used to investigate products in this category is [ANSI/UL 2703](#), "Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels."

The System Fire Test Requirement in [ANSI/UL 1703](#), "Flat-Plate Photovoltaic Modules and Panels," or in [ANSI/UL 61730-1](#), "Photovoltaic (PV) Module Safety Qualification - Part 1: Requirements for Construction," and [ANSI/UL 61730-2](#), "Photovoltaic (PV) Module Safety Qualification - Part 2: Requirements for Testing," may be utilized in lieu of the [ANSI/UL 2703](#) Fire Test.

Ground lugs are additionally investigated to [ANSI/UL 467](#), "Grounding and Bonding Equipment."

Constructions that penetrate roofing may be investigated utilizing the Wind-Driven Rain Test in [UL 2582](#), "Outline of Investigation for Hip and Ridge Vents."

UL MARK

The Certification Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Certification and Follow-Up Service. The [Certification Mark](#) for these products includes the UL symbol, the words "CERTIFIED" and "SAFETY," the geographic identifier(s), and a file number.

Alternate UL Mark

The Listing Mark of UL on the product or on the smallest unit container in which the product is packaged is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number, and one of the following product names: "Photovoltaic Mounting System," "Photovoltaic Module Clamping Device," "Photovoltaic Mounting Device," "Photovoltaic Bonding Device," "Photovoltaic Mounting and Bonding Device" or "Photovoltaic Ground Lug." The word "Photovoltaic" may be abbreviated "PV."

For PV mounting systems additionally investigated for resistance to external fire exposure, the Listing Mark includes the words **CLASS A**, **CLASS B** or **CLASS C**, as appropriate.

UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental or consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Guide Information.

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Appendix C: Module Listing

The following tables define the listed modules and their respective load ratings which can be used with the clawFR mounting system. All modules listed have been evaluated for mechanical loading and grounding and bonding.

Table 1: Modules Qualified for use with ClawFR

Module Manufacturer	Model Type	Downward Pressure Design Load (psf)	Upward Pressure Design Load (psf)	Down-slope Design Load (psf)
Adani	ASM-7-PERC-XXX	55	45	9
	ASP-7-XXX	55	45	9
	ASB-7-XXX	44	40	7
Astronergy	CHSM6612M-XXX	60	50	10
	CHSM6612M/HV-XXX	60	50	10
	CHSM6612P-XXX	60	50	10
	CHSM6612P/HV-XXX	60	50	10
	CHSM72M(DG)/F-BH-XXX	50	40	8
	CHSM72M(DG)/F-B-XXX	60	27	10
	CHSM72M-HC Series 158.75	36	27	6
	CHSM72M-HC Series 166	33	25	5
Axitec	AC-XXXMH/144S	40	33	6
Boviet	BVM6612M-XXX	60	50	10
	BVM6612P-XXX	60	50	10
	BVM6612M-XXX-L-H-HC-BF-DG	34	25	5
	BVM6612M-XXX-L-H	30	25	5
	BVM6612M(S)-XXX-H-HC-BF-DG	31	28	5
	BVM6612M-XXXL-H-HC	37	33	6
	BVM6612M(S)-XXX-H-HC-BF	30	25	5
	BVM6612M(S)-XXX-H-HC	30	25	5
Canadian Solar	CS6U-XXXP	30	30	5
	CS3U-XXXP	30	30	5
	CS3U-XXXMS	30	30	5
	CS6K-XXXP	35	30	6
	CS6K-XXXMS	35	30	6
	CS3K-XXXP	35	30	6
	CS3K-XXXMS	35	30	6
	CS1H-XXXMS	35	30	6
	CS1Y-XXXMS	55	40	9
	CS3U-XXXMB-AG	33	25	7.5
	CS3U-XXXPB-AG	33	25	7.5
	CS3W-XXXMB-AG	25	25	5
	CS3W-XXXPB-AG	25	25	5
	CS3W-XXXP (40X30)	40	27	6
	CS3W-XXXMS (40X30)	40	27	6
	CS3N-XXX-MS	55	40	9
	CS3W-XXXP (35X35)	27	27	4
	CS3W-XXXMS (35X35)	27	27	4

We Regularly add modules to this listing. If the module you're using is not shown here, contact us so we can evaluate it for addition to our listing



Table 1: Modules Qualified for use with ClawFR

Module Manufacturer	Model Type	Downward Pressure Design Load (psf)	Upward Pressure Design Load (psf)	Down-slope Design Load (psf)
Caterpillar	PVCXXXM	50	50	8
	PVCXXXMP	50	50	8
	PVCXXX-MP03-H	40	30	6
CSUN	CSUNXXX-72P	50	30	8
	CSUNXXX-72M	50	30	8
	CSUNXXX-72PH	50	30	8
	CSUNXXX-72MH	50	30	8
ET Solar	ET-M672BHXXXTW	30	25	5
	ET-M672BHXXXGL	30	30	5
GCL	GCL-P6/72	60	50	10
	GCL-P6/60	60	50	10
	GCL-M6/72	60	50	10
	GCL-M6/60	60	50	10
	GCL-M3/72	60	50	10
	GCL-M3/60	60	50	10
Q Cells (Hanwha)	Q.PEAK DUO-G5 XXX	60	50	10
	Q.PEAK DUO BLK-G5 XXX	60	50	10
	Q.PEAK-G4.1 XXX	60	50	10
	Q.PEAK BLK G4.1 XXX	60	50	10
	Q.PEAK-G4.1/TAA XXX	60	50	10
	Q.PEAK BLK G4.1/TAA XXX	60	50	10
	Q.PEAK-G4.1/MAX XXX	60	50	10
	Q.PLUS G4 XXX	60	50	10
	Q.PLUS BFR G4.1 XXX	60	50	10
	Q.PLUS BFR G4.1/TAA XXX	60	50	10
	B.LINE PLUS BFR G4.1 XXX	60	50	10
	B.LINE PRO BFR G4.1 XXX	60	50	10
	Q.PRO EC-G4.4 XXX	60	50	10
	Q.PRO BFR G4 XXX	60	50	10
	Q.PRO BFR G4.1 XXX	60	50	10
	Q.PRO BFR G4.3 XXX	60	50	10
	Q.PRO G4 XXX	60	50	10
	Q.PEAK DUO L-G5.2 XXX	60	50	10
	Q.PEAK DUO L-G5.3 XXX	60	50	10
	Q.PEAK L G4.2 XXX	60	50	10
	Q.PEAK L G4.1 XXX	60	50	10
	Q.PLUS L G4.2 XXX	60	50	10
	Q.PLUS L G4.1 XXX	60	50	10
Q.PLUS L G4 XXX	60	50	10	
Q.PRO L G4 XXX	60	50	10	



Table 1: Modules Qualified for use with ClawFR

Module Manufacturer	Model Type	Downward Pressure Design Load (psf)	Upward Pressure Design Load (psf)	Down-slope Design Load (psf)
Q Cells (Hanwha)	Q.PRO L G4.1 XXX	60	50	10
	Q.PRO L G4.2 XXX	60	50	10
	B.LINE PLUS L G4.2 XXX	60	50	10
	B.LINE PRO L G4.1 XXX	60	50	10
	B.LINE PRO L G4.2 XXX	60	50	10
	Q.PLUS L-G4.2/TAA XXX	60	50	10
	Q.PEAK DUO L-G6.2 XXX	55	50	9
	Q.PEAK DUO L-G6.3 XXX	55	50	9
	Q.PEAK DUO L-G6.3 /BFG XXX	55	50	9
	Q.PEAK DUO L-G7 XXX	60	50	10
	Q.PEAK DUO L-G7.2 XXX	60	50	10
	Q.PEAK DUO L-G8.2 XXX	55	50	9
	Q.PEAK DUO L-G8.3 XXX	55	50	9
	Q.PEAK DUO L-G8.3/BFG XXX	55	50	9
	Q.PLUS DUO L-G5.2 XXX	60	50	10
	Q.Peak Duo L-G8.3/BGT	55	50	9
	Q.Peak Duo XL-G10.2	50	50	8
	Q.Peak Duo XL-G10.3	50	50	8
	Q.Peak Duo XL-G10.C	50	50	8
Q.Peak Duo XL-G10.D	50	50	8	
Heliene	HELIENE72M-XXX	40	30	6
	HELIENE72P-XXX	40	30	6
	HELIENE 72MBLK G1 XXX	40	30	6
	HELIENE 72SLV G1 XXX	40	30	6
	HELIENE 72M-XXX-G1	45	34	7
	HELIENE 72M-XXX-G1 Bifacial	45	34	7
	144HC-XXX-Bifacial	36	36	6
	144HC-XXX	36	36	6
HT SAAE	HT72-156M-C XXX	50	30	8
	HT72-156M(V)-C XXX	50	30	8
	HT72-XXX-156M	50	30	8
	HT72-XXX-156M(V)	50	30	8
	HT72-XXX-156M(V)-C	35	26	6
	HT72-XXX-156M-C	35	26	6
	HT72-166M-XXX	30	23	5
Hyundai	HiS-SXXXKI	40	33	6
	HiA-SXXXHI	40	33	6
	HiS-SXXXRI	50	35	8
	HiS-SXXXTI	50	40	8
	HiS-SXXXPI	40	37	6
JA Solar	JAM60S01/PR	60	50	10
	JAM72S01/PR	60	50	10
	JAP60S01/SC	60	50	10
	JAP72S01/SC	60	50	10
	JAM72S09/PR	60	50	10
	JAP72S09/SC	60	50	10
	JAM60S09/PR	60	50	10
	JAP60S09/SC	60	50	10
	JAM72S10/MR	60	50	10
	JAM72S10/PR	60	50	10
	JAM78S10-XXX/MR	40	34	6



Table 1: Modules Qualified for use with ClawFR

Module Manufacturer	Model Type	Downward Pressure Design Load (psf)	Upward Pressure Design Load (psf)	Down-slope Design Load (psf)	
Jinko	JKMxxxP-72	60	50	10	
	JKMxxxPP-72	60	50	10	
	JKMxxxPP-72-V	60	50	10	
	JKMxxxM-72	60	50	10	
	JKM450M-7RL3-TV	45	35	7	
	JKMXXXM-72HL-TV	40	30	6	
	JKMxxxM-72-V	60	50	10	
	JKMXXXM-72L-V	50	30	8	
	JKMXXXM-72HL-V	50	30	8	
	JKMXXXM-60L	35	35	6	
	JKMXXXM-72H-V	60	50	10	
	JKMXXXM-72H	60	50	10	
	JKM-M-7RL3-V	66	44	7	
	JKMXXXM-72HL4-V	38	25	6	
	JKMXXXM-72HL4-TV	46	30	8	
LG	LGXXXQ1C-A5	60	50	10	
	LGXXXN1C-A5	60	50	10	
	LGXXXN2W-A5	60	50	10	
	LGXXXQ1C-V5	60	50	10	
	LGXXXN1C-V5	60	50	10	
	LGXXXN2W-V5	60	50	10	
	LGXXXN1K-A5	60	50	10	
	LGXXXN1K-V5	60	50	10	
	LGXXXS2W-A5	60	50	10	
	LGXXXN2W-L5	60	50	10	
	LGXXXN2W-E6	30	26	5	
	LGXXXN2T-E6	30	26	5	
	LONGI	LR6-72HPH-XXXM	50	50	8
		LR6-72-xxxM	60	50	10
		LR6-72PE-xxxM	60	50	10
LR6-72PH-xxxM		60	50	10	
LR6-72HV-xxxM		60	50	10	
LR6-72HBD-XXXM		40	35	6	
LR4-72HPH-XXXM		40	30	6	
LR4-72HIBD-XXXM		40	30	6	
LR4-72HBD-XXXM		42	30	7	
MAXEON	SPR-P5-XXX-UPP	30	30	5	
Panasonic	VBHNXXXSA17	60	40	10	
	VBHNXXXKA03	60	40	10	
	VBHNXXXKA03E	60	40	10	
	VBHXXXRA18N	60	40	10	
Phono Solar	PSXXXM1H-24/TH	45	35	7	
	PSXXXM4H-24/TH	43.4	32	7	
	PSXXXM4-24	43.4	32	7	
	PSXXXM-24/TH	45	35	7	
	PSXXXMH-24/TH	45	35	7	
	PSXXXM-24/T	45	35	7	
	PSXXXMH-24/T	45	35	7	



Table 1: Modules Qualified for use with ClawFR

Module Manufacturer	Model Type	Downward Pressure Design Load (psf)	Upward Pressure Design Load (psf)	Down-slope Design Load (psf)
REC	RECXXTP2S72	60	30	10
	RECXXTP2SM72	60	30	10
	RECXXTP2	60	50	10
	RECXXTP2M	60	50	10
	RECXXTP2 BLK2	60	50	10
	RECXXNP	60	30	10
	RECXXNP BLK	60	50	10
	RECXXAA	60	30	10
	RECXXAA BLACK	60	30	10
Risen	RSM144-6-XXXM	50	50	8
	RSM72-6-XXXP	50	50	8
Seraphim	SRP-XXX-6MA	30	25	5
	SRP-XXX-6PA	30	25	5
	SEG-6MA-XXX-WW	30	25	5
	SEG-6MA-XXX-BB	30	25	5
	SEG-6PA-XXX-WW	30	25	5
	SEG-BMA-XXX-WW	30	25	5
	SEG-BMA-XXX-WB	30	25	5
	SEG-BPA-XXX-WW	30	25	5
	SRP-XXX-6MA-HV	30	25	5
	SEG-BMA-XXXBB	30	25	5
	SEG-BMA-XXXBW	30	25	5
	SEG-BMA-XXXBB	30	25	5
	SEG-BMA-XXXWB	30	25	5
Seraphim	SEG-XXX-BMA-HV	22	22	3
	SEG-XXX-BMA-BG	25	21	4
Sharp Electronics	NU-SA445; NU-SA450	40	27	6
SolarTech Universal	EPIQ	35	25	6
SunPower	SPR-P17-XXX-COM	60	30	10
	SPR-P19-XXX-COM	60	30	10
	SPR-P19-XXX-MLSD	60	50	10
	SPR-AXXX-COM	60	50	10
	SPR-AXXX-COM-MLSD	60	50	10
	SPR-E18-XXX-COM (410-515)	60	50	10
	SPR-E19-XXX-COM (410-515)	60	50	10
	SPR-E20-XXX-COM (410-515)	60	50	10
	SPR-E21-XXX-COM (410-515)	60	50	10
	SPR-E22-XXX-COM (410-515)	60	50	10
	SPR-E23-XXX-COM (410-515)	60	50	10
	SPR-X18-XXX-COM (410-515)	60	50	10
	SPR-X19-XXX-COM (410-515)	60	50	10
	SPR-X20-XXX-COM (410-515)	60	50	10
	SPR-X21-XXX-COM (410-515)	60	50	10
	SPR-X22-XXX-COM (410-515)	60	50	10
	SPR-X23-XXX-COM (410-515)	60	50	10
	SPR-E18-XXX-COM (290-385)	60	30	10
	SPR-E19-XXX-COM (290-385)	60	30	10
	SPR-E20-XXX-COM (290-385)	60	30	10
SPR-E21-XXX-COM (290-385)	60	30	10	



Table 1: Modules Qualified for use with ClawFR

Module Manufacturer	Model Type	Downward Pressure Design Load (psf)	Upward Pressure Design Load (psf)	Down-slope Design Load (psf)
SunPower	SPR-E22-XXX-COM (290-385)	60	30	10
	SPR-E23-XXX-COM (290-385)	60	30	10
	SPR-X18-XXX-COM (290-385)	60	30	10
	SPR-X19-XXX-COM (290-385)	60	30	10
	SPR-X20-XXX-COM (290-385)	60	30	10
	SPR-X21-XXX-COM (290-385)	60	30	10
	SPR-X22-XXX-COM (290-385)	60	30	10
	SPR-X23-XXX-COM (290-385)	60	30	10
	SPR-E18-XXX-MLSD-COM	60	30	10
	SPR-E19-XXX-MLSD-COM	60	30	10
	SPR-E20-XXX-MLSD-COM	60	30	10
	SPR-E21-XXX-MLSD-COM	60	30	10
	SPR-E22-XXX-MLSD-COM	60	30	10
	SPR-E23-XXX-MLSD-COM	60	30	10
	SPR-X18-XXX-MLSD-COM	60	30	10
	SPR-X19-XXX-MLSD-COM	60	30	10
	SPR-X20-XXX-MLSD-COM	60	30	10
	SPR-X21-XXX-MLSD-COM	60	30	10
	SPR-X22-XXX-MLSD-COM	60	30	10
	SPR-X23-XXX-MLSD-COM	60	30	10
SPR-A-Series AXXX-G-AC	60	50	10	
Suntech	STPXXX-24/VFW	40	35	6
	STPXXS-24/VFW	40	35	6
	STPXXS-B72/Vnh	40	35	6
Talesun	TP672P	60	50	10
	TP672M	60	50	10
	HIPRO II TP672M	60	50	10
	TP6F72M-XXX	55	40	9
	TP6H72M-XXX	55	40	9
	TP6L72M-XXX	36	36	6
	TP6L72M(H)-XXX	36	36	6
	TP6G72M(H)-XXX	35	20	6
	TP6G72M-XXX	35	20	6
	TP6L72M(H)-XXX	30	30	5
	TP6L72M-XXX	30	30	5
Trina Solar	TSM-XXX-DE14A(II)	36	50	8
	TSM-XXX-DD14A(II)	50	50	8
	TSM-XXX-DE14H(II)	50	50	8
	TSM-XXX-DE14H.08(II)	50	50	8
	TSM-XXX-PE14	50	50	8
	TSM-XXX-PD14	50	50	8
	TSM-XXX-DE15H(II)	50	50	8
	TSM-XXX-DE15M(II)	50	50	8
	TSM-XXX-PE15H	50	50	8
	TSM-XXX-DEG15HC.20(II)	50	36	8
TSM-XXX-DEG15MC.20(II)	50	36	8	

**Table 1: Modules Qualified for use with ClawFR**

Module Manufacturer	Model Type	Downward Pressure Design Load (psf)	Upward Pressure Design Load (psf)	Down-slope Design Load (psf)
Trina Solar	TSM-XXXDD05A	30	28	5
	TSM-XXXDE15V(II)	35	35	6
	TSM-DEG19C.20	22	22	3
	TSM-DEG15VC.20(II)	35	35	6
	TSM-XXX-DE19	35	35	6
	TSM-XXX-DEG15MC.20(II)	34	34	5
Upsolar	UP-MXXXM	50	40	8
URE/NSP	D7M-XXX-H8A	37	30	6
	D7K-XXX-H8A	37	30	6
Vikram	VSM.72.XXX.05	35	26	6
	VSM.72.XXX.03.04	35	26	6
	VSMS.72.XXX.03.04	35	26	6
	VSMDT.72.XXX.05	30	30	5
	VSM DHT.72.XXX.05	30	30	5
	VSMH.72.XXX.05	27	27	4
VSUN	VSUN-144BMH-DG	33.6	25	5
Yingli	YGE-XXX-T	60	50	10
Znshine	ZXM6-72-XXX/M	30	25	5
	ZXP6-72-XXX/P	30	25	5
	ZXM6-NHLDD144	30	17	5
	ZXM6-NH144-XXX/M	25	30	4

We Regularly add modules to this listing. If the module you're using is not shown here, contact us so we can evaluate it for addition to our listing.