



Descriptive Report and Test Results

MASTER CONTRACT: 266909

REPORT: 70131735

PROJECT: 80038806

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PRODUCTS

CLASS - C531302 - POWER SUPPLIES - PHOTOVOLTAICS-PV Racking and clamping systems
CLASS - C531382 - POWER SUPPLIES - PHOTOVOLTAICS-PV Racking and clamping systems -
Certified to US Standards

Models: SM SOLARMOUNT Flush-to-Roof is an extruded aluminum rail PV racking system that is installed parallel to the roof in landscape or portrait orientations.

ULA Unirac Large Array is a ground mount system using the SolarMount (SM) platform for the bonding and grounding of PV modules.

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Solarmount

The system listed is designed to provide bonding/grounding, and mechanical stability for photovoltaic modules. The system is secured to the roof with the L-Foot components through the roofing material to building structure. Modules are secured to the racking system with stainless steel or aluminum mid clamps and Aluminum end clamps. The modules are bonded to the racking system with the stainless steel bonding mid clamps with piercing points. The system is grounded with 10 AWG copper wire to bonding/grounding lugs. Fire ratings of Class A with Type 1, 2, 3, or 10 for steep slope. Tested at 5” interstitial gap which allows installation at any stand-off height.

The grounding of the system is intended to comply with the latest edition of the National Electrical Code, to include NEC 250 & 690. Local codes compliance is required, in addition to national codes. All grounding/bonding connections are to be torqued in accordance with the Installation Manual and the settings used during the certification testing for the current edition of the project report.

The system may employ optimizers/micro-inverters and used for grounding when installed per installation instructions.

Mechanical ratings:

Downward Design Load (lb/ft ²)	113.4
Upward Design Load (lb/ft ²)	50.4
Down-Slope Load (lb/ft ²)	14.7

Unirac Large Array

ULA is a ground mount system using the SolarMount (SM) platform for the bonding and grounding of PV modules. ULA aluminum components merge with SM rails and installer-supplied steel pipe. The SM rail system is secured to the horizontal Pipe using the Rail Bracket components. The Rear and Front cap secures the horizontal Pipe to the vertical Pipe. The Front cap is also used to secure the Cross brace. A Slider is attached to the vertical Pipe to secure the Cross brace. The SM rails, caps, slider, rail brackets, and cross braces materials are 6105-T5 aluminum extrusion. Fasteners materials are 304 stainless steel. Horizontal and vertical pipe materials meet the minimum requirements of ASTM A53 for galvanized steel pipe in 2” and 3” diameter.

The mechanical load ratings from the SM test data will be applied to the ULA model.

Fire Testing is not applicable due to being a ground mount system.

Conditions of Acceptability:

Installation is subject to acceptance of the local inspection authorities having jurisdiction. The certification of these products relates only to the methods of installation, bonding, and grounding as outlined in the Installation Manual for each product.

APPLICABLE REQUIREMENTS

- UL 2703-1st Edition - Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels.
- LTR AE-001-2012 - List of Technical Requirements for Photovoltaic Module and Panel racking Systems

MARKINGS

The manufacturer is required to apply the following markings:

- Products shall be marked with the markings specified by the particular product standard.
- Products certified for Canada shall have all Caution and Warning markings in both English and French.

Additional bilingual markings not covered by the product standard(s) may be required by the Authorities Having Jurisdiction. It is the responsibility of the manufacturer to provide and apply these additional markings, where applicable, in accordance with the requirements of those authorities.

The products listed are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US (indicating that products have been manufactured to the requirements of both Canadian and U.S. Standards) or with adjacent indicator 'US' for US only or without either indicator for Canada only.

The following markings appear on the rail by adhesive label:

1. Submitter's name and/or CSA Master Contract number "266909";
2. Model designation;
3. Manufacturing date;
4. System fire class rating/designation of information location in Installation Manual;
5. Design load rating/designation of information location in Installation Manual;

The following markings appear on the Mid clamp by stamping:

1. Submitter's name and/or CSA Master Contract number "266909";
2. CSA mark
3. Mil ID for factory location

Nameplate adhesive label material approval information:

SATO AMERICA INC, SF401 DuraMark Polyester, MH48415 - Printing Materials – Component, UL 969-Marking and Labeling Systems

ALTERATIONS

Not Applicable

FACTORY TESTS

Not Applicable

SPECIAL INSTRUCTIONS FOR FIELD SERVICES

1. Component descriptions marked with either the "(INT)" or "(INT*)" identifiers may be substituted with other components providing the requirements specified under the notes in the "Description" are complied with.

COMPONENT SPECIAL PICKUP

1. Component descriptions marked with the identifier "(CT)" are subject to annual pickup and Conformity Testing.

DESCRIPTION

Notes:

1. Component Substitution
 - a) Critical components (those identified by mfr name, cat no), which are NOT identified with either "INT" or "INT*" are not eligible for substitution without evaluation and report updating
 - b) The term "INT" means a "Certified" and/or "Listed" (or a "Recognized" and/or "Accepted") component may be replaced by one "Certified" and/or "Listed" by another certification organization accredited by the appropriate accreditation body or scheme requirements to the correct standard, for the same application; providing the applicable country identifiers are included and requirements in item "d" below are complied with.
 - c) The Term "(INT*)" means a "Recognized" and/or "Accepted" component may be replaced by a component that is CSA Certified. The applicable country identifiers shall be included, the requirements in item "d" below as well as any "conditions of suitability" for the component (as recorded in this descriptive report) shall be complied with;
 - d) Components which have been substituted, must be of an equivalent rating, configuration (size, orientation, mounting) and the applicable minimum creepage and clearance distances are to be maintained from live parts to bonded metal parts and secondary parts.
 - e) Substitution of a "Certified" and/or "Listed" component with a component that is "Recognized" or "Accepted" is not permitted without evaluation and report updating.
 - f) Substitution of a "Recognized" and/or "Accepted" component by one that is not CSA Certified is not permitted without a proper evaluation as well as a report update because the Conditions of Acceptance of the original component may be different than the Conditions of Acceptance of the substitute component.
1. The system does not employ a maximum number of modules that can be installed per system.
2. Module Orientation: Portrait or Landscape
3. The system was evaluated for use with modules up to 21.06 sqft.
4. See Tables 1 and 2 for customer supplied information
5. See Table 3 for the compatible module list.
6. See the attached installation manual for each model installation instructions, and system drawings.

Table 1

Type/Model	SM/ULA
Max branch circuit overcurrent-protection device (A)	30
Max fuse rating if using Enphase or SolarEdge components (A)	20
M101XX End clamp torque with anti-seize (ft-lbs)	10
M6065X mid clamp torque with anti-seize (ft-lbs)	10
M60640 mid clamp torque (ft-lbs)	11
M60630 end clamp torque (ft-lbs)	5
L-Foot to rail (ft-lbs)	30

Table 3

Module Manufacturer	Model/Series Below models can be used together with racking system in this report to be a Class A fire system, only when they are rated for Fire Type 1, 2, 3, or 10 for steep slope applications.	
AU Optronics (BenQ Solar)	PM Series	
Aleo	P18, P19, S18, S19, S59, S79	
Aptos Solar	DNA-144 & DNA 120 Series	
Astronergy	CHSM6612 M, M/HV CHSM72M-HC, CHSM6612P Series CHSM6612P/HV Series	
Auxin	AXN6M610Txxx, AXN6P610Txxx, AXN6M612Txxx, AXN6P612Txxx	
Axitec	AC-XXXM/60S, AC-XXXP/60S, AC-XXXM/72S, AC-XXXP/156-60S, AC-XXXP/72S	
Boviet	BVM6610P-XXX, BVM6610M-XXX, BVM6612M-XXX, BVM6612P-XXX	
BYD	P6K Series MHK-36	
Canadian Solar	CS6P-M, CS6P-P, CSX-P, CS6X-P CS5A-M, CS6U-P, CS6U-M, CS6K-MS, CS6K-M, CS6K-P, ELPS CS6A-MM, ELPS CS6P-MM CS3U-P CS3U-MS, CS3K-P, CS3K-MS, CS1K-MS CS3K-MB, CS3K-PB, CS3U-MB, CS3W-P, CS3L-P, CS3U-PB, CS1H-MS, CS3U-MS	CS3U-xxxPB-AG, CS3U-xxxMB-AG, CS3KxxxPB-AG, CS3KxxxMB-AG, CS3WxxxP-PB-AG, CS1HxxxMS, CS1UxxxMS, CS3UxxxP HighEfficiency, CS3KxxxP HighEfficiency, CS6UxxxP High Efficiency, CS6KxxxP HighEfficiency, CS6KxxxMS AllBlack, ELPS CS6P-MM, ELPS CS6A-MM

Centrosolar America	C-Series, E-Series
CertainTeed	CT2xxMxx-01, CT2xxPxx-01, CTxxxMxx-01, CTxxxPxx-01, CTxxxMxx-02, CTxxxMxx-03 CTxxxMxx-04, CTxxxHC11-04
Eco Solargy	ORION 1000 ECOxxxH156P-60, APOLLO 1000 ECOXXXT156M-60, APOLLO 1000 ECOXXXA156M-60
ET Solar	ET AC Module, ET Module
Flextronics	FXS-xxxBB
GCL	GCL-P6 series, GCL-M6 series
Hanwha SolarOne	HSL 60
Heliene	72Mxxx, 72Pxxx, 72M-BLK, 60Mxxx, 60Pxxx, 60M-BLK, 36Mxxx, 36Pxxx
Hansol	TD-AN3, TD-AN4, UB-AN1, UD-AN1
HT Solar	HT72-156(M/P), HT72-156P-C, HT72-156P(V)-C HT72-156M(PDV)-BF, HT72-156M(PD)-BF HT60-156M-C, HT60-156M(V)-C
Hyundai	MG Series, RG Series, RW Series, KG series, TG series, KI, series, RI series, TI series, HiA-SxxxHI
ITEK	iT-xxx-SE, iT-xxx-SE-72
Japan Solar	JPS-60 series, JPS-72 series
JA Solar	JAP6(K)-72-xxx/4BB, JAP72SYY-xxx/ZZ, JAP6(k)-60-xxx/4BB, JAP60SYY-xxx/ZZ, JAM6(k)-72-xxx/ZZ, JAM72SYY-xxx/ZZ, JAM6(k)-60-xxx/ZZ,

	<p>JAM60SYY-xxx/ZZ JAM72S09 JAP6 60-xxx, JAM6(K)-60/xxx JAM60SYY xxx/PR, JAM72SYY xxx/PR, JAP72SYY xxx/SC Note: i. YY: 01, 02, 03, 09, 10 ii. ZZ: SC, PR, BP, HiT, IB, MW</p>
Jinko	<p>Jinko 60 JKMxxxP-60, Jinko Eagle 60 JKMxxxPP-60, Jinko Eagle MX60 JKMSxxxPP-60, Jinko MX60 JKMSxxxP-60, Jinko Black 60 JKMxxxPP-60B-J4, Jinko 60 JKMxxxPP-60, Jinko 72 JKMxxxP-72, Jinko 72 Eagle JKMxxxPP-72, Jinko Eagle MX72 JKMxxxPP-72, JKM xxx M-60, JKM xxx M-60B, JKMSxxx-72, JKMSxxxP-72, JK07A (JKMSxxxPP-60 & JKMSxxxPP-72), JKMxxxM-72, JK07B (JKMSxxxPP-60), JKMxxx PP-60(Plus), JKMxxx PP-60B, JKMxxxM-72-V, JKMxxxM-60BL JKMxxxM-72L-V, JKMxxxM-72HL-V, JKMxxxM-60HL, JKMxxxM-60L, JKMxxxM-60LV, JKMxxx-72L-V, JKMxxxPP-72-V, JKMxxxPP-72(Plus), JKMxxxPP-72B, JKMxxxP-72B, JKMSxxxM-60, JKMxxxM-60, JKMxxxPP-60B, JKMxxxM-60-V, JKMSxxxPP-60B-J4</p>
Kyocera	<p>KD-F Series, KU-60</p>
LG Electronics	<p>LGxxxN1C-G4, LGxxxN1K-G4, LGxxxN2W-G4, LGxxxN1C-A5, LGxxxN1K-A5, LGxxxN2W-A5, LGxxxN2T-A5, LGxxxE1C-A5, LGxxxQ1C-A5, LGxxxQ1K-A5,</p>

	LGxxxS1C-G4, LGxxxS1C-A5, LGxxxS2W-A5, LGxxxS2W-G4, LGxxxN2W-B3 LGxxxN1K-V5, LGxxxE1K-A5, LGxxxN1K-V5, LGxxxN1C-V5, LGxxxQ1C-V5, LGxxxN2W-V5, LGxxxN1K-V5, LGxxxN2T-J5
Longi	LR4-60HPH, LR4-72HPH, LR6 - 72HV, LR6 -60, LR6 -60HV, LR6 -60PH, LR6 -72, LR6 -72PH, LR6-60BK, LR6-60PB, LR6-60PE, LR6-72BK, LR6-72PB, LR6-72PE, RealBlack LR4-60HPB, RealBlack LR6-60HPB LR6-72HBD LR4-72HBD
Mission	MSE Mono, MSE Perc
Mitsubishi	MJE series MLE series
Neo Solar Power Corporation (NSP)	D6MXXXE4A D6MXXXB4A D6MXXXE4AME
Panasonic	VBHNxxxSA06/SA06B/SA11/SA11B VBHNxxxSA15, VBHNxxxSA15B, VBHNxxxSA16, VBHNxxxSA16B, VBHNxxxKA, VBHNxxxSA17/18, VBHNxxxKA03/04, VBHNxxxSA17G/17E, VBHNxxxSA18E, VBHNxxxZA01, VBHNxxxZA02, VBHNxxxZA03, VBHNxxxZA04
Peimar	SGXXXM (FB), SGXXXM (BF), SGXXXM
Phono Solar Technology	PSxxxM1-20/U PSxxxM1H-20/U

	PSxxxM1-20UH PSxxxM1H-20UH PSxxxM1-20/UH PSxxxM1H-20/UH PSxxxM-24/T PSxxxMH-24/T PSxxxM-24/TH PSxxxMH-24/TH
Q-Cells	Q.PEAK-G3.1 XXX, Q.PEAK BLK-G3.1 XXX, Q.PLUS BFR G3.1 XXX, Q.PLUS-G3 XXX, Q.PRO G3 XXX, Q.PRO BFR-G3 XXX, Q.PEAK-G3 XXX, Q.PEAK BLK-G3 XXX, Q.PLUS BFR G4.1 XXX, Q.PRO BFR G4 XXX, Q.PRO BFR G4.1 XXX, Q.PRO BFR G4.3 XXX, Q.PEAK-G4.1 XXX, Q.PEAK-G4.1/MAX XXX, Q.PEAK BLK G4.1 XXX, Q.PRO G4 XXX, Q.PLUS G4 XXX, Q.PEAK-G4.1/TAA XXX, Q.PEAK BLK G4.1/TAA XXX, Q.PLUS BFR G4.1/TAA XXX, Q.PLUS BFR G4.1/MAX XXX, B.LINE PLUS BFR G4.1 XXX, B.LINE PRO BFR G4.1 XXX, Q.PRO EC-G4.4 XXX, Q.PRO L-G2 XXX, Q.PEAK L G4.2 XXX, Q.PLUS L G4.2 XXX, Q.PLUS L G4.1 XXX, Q.PLUS L G4 XXX, Q.PRO L G4 XXX, Q.PRO L G4.1 XXX, Q.PRO L G4.2 XXX, B.LINE PLUS L G4.2 XXX, B.LINE PRO L G4.1 XXX, B.LINE PRO L G4.2 XXX, Q.PLUS L-G4.2/TAA, Q.PEAK DUO-G5, Q.PEAK DUO BLK-G5, Q.PEAK DUO L-G5.2, Q.PEAK DUO L-G5.3, Q.PEAK-G4.1 XXX, Q.PLUS L-G4.2/TZZ XXX, Q.Peak Duo L-G6 XXX, Q.Peak Duo L-G6.2 XXX, Q.Peak Duo L-G6.3 XXX, Q.Peak Duo G6 XXX, Q.Peak Duo BLK-G6 XXX, Q.PEAK DUO L - G5 Q.PEAK DUO L- G6 Q.PEAK DUO L- G6.2

	<p>Q.PEAK DUO L - G6.3 Q.PEAK DUO-G7 B.LINE PEAK DUO-G7 Q.PEAK DUO-G7.2 B.LINE PEAK DUO-G7.2 Q.PEAK DUO L-G7 Q.PEAK DUO L-G7.1 Q.PEAK DUO L-G7.2 Q.PEAK DUO L-G7.3 B.LINE PEAK DUO L-G7 B.LINE PEAK DUO L-G7.1 B.LINE PEAK DUO L-G7.2 B.LINE PEAK DUO L-G7.3 Q.PEAK DUO-G8 Q.PEAK DUO BLK-G6 Q.PEAK DUO BLK-G6+ Q.PEAK DUO-G6 Q.PEAK DUO-G6+ Q.PEAK DUO BLK-G8+ Q.PEAK DUO BLK-G8 Q.PEAK DUO-G8 Q.PEAK DUO-G8+ Q.PEAK DUO-G5/SC Q.PEAK DUO-G6+/SC Q.PEAK DUO BLK-G5/SC Q.PEAK DUO BLK-G6+/AC Q.PEAK DUO BLK-G6+/SC Q.PEAK DUO BLK-G7 Q.PEAK DUO G6+/AC Q.PEAK DUO L-G5.1 Q.PEAK DUO L-G6.1 Q.PEAK DUO L-G7.4 Q.PEAK DUO L-G7.7 Q.PEAK DUO L-G8 Q.PEAK DUO L-G8.1 Q.PEAK DUO L-G8.2 Q.PEAK DUO L-G8.3 Q.PEAK DUO L-G8.3/BFF Q.PLUS DUO L-G5 Q.PLUS DUO L-G5.1 Q.PLUS DUO L-G5.2 Q.PLUS DUO L-G5.3</p>
REC	<p>TwinPeak2S 72 RECxxxTP2S(M) 72, Peak Energy RECxxxPE, TwinPeak2 BLK2 RECxxxTP2 BLK2, TwinPeak2 RECxxxTP2(M), TwinPeak RECxxxTP, TwinPeak 72 RECxxxTP72, Peak Energy 72 RECxxxPE72 N-PEAK RECxxxAA(BLK)</p>
Renesola	All 60-cell modules
Risen	RSM144-6, RSM72-6 (MDG) (M), RSM60-6
Solaria	PowerXT-xxxR-PD/BD, PowerXT-xxxR-AC,

	PowerXT-xxxC
S-Energy	SN72 Series, SN60 Series
Seraphim	SEG-6PA, SEG-6PB, SEG-6MA, SEG-6MB, SEG-E01, SEG-E11, SRP-6QA, SRP-6QB
Sharp	ND-24CQCJ, ND-25CQCS, ND-Q235F4, NUSAXXX, NUSCXXX
Silfab	SLA-M, SLA-P, SLG-P, SLG-M BC Series (SIL-xxx BL) SIL - xxx - ML SIL - xxx - NL SIL - xxx - BL SIL - xxx - NT
Solartech	STU-XXX HJT, STU-XXX PERC, Quantum PERC
SolarWorld	SunModule Protect, SunModule Plus, Sunmodule Pro,
Sun Edison / MEMC	F-Series, R-Series
Suniva	MV Series (35mm), Optimus Series (35mm)
SunPower	AC, E-Series, Sig Black, X-Series P-Series
Suntech	STP XXX
Talesun	TP596, TP672, TP660, TP654, TP572, Smart, Hipor M350
Tesla	SCxxx SCxxxB SCxxxB1 SCxxxB2
Trina	PA05, PD05, DD05, DD14, PE14, PD 14, DE 14
TSMC	TS-150C2 CIGS

UpSolar	UP-MXXXM, UP-MXXXM-B, UP-MXXXP
URE	D7M_H7A and D7K_H7A, D7M_H8A and D7K_H8A
Vikram Solar	40 mm frame: Grand Ultima Silver 40mm, Ultima Silver 40mm, Grand Ultima 40mm, Grand Ultima Silver 40mm, Ultima Silver 40mm ELDORA VSP.60.AAA.03.04 ELDORA VSP.72.AAA.05 ELDORA VSP.72.AAA.03.04 ELDORA VSP.60.AAA.05 SOMERA VSM.72.AAA.03.04 SOMERA VSM.72.AAA.05 SOMERA VSMH.72.AAA.03.04 SOMERA VSM.60.AAA.03.04 SOMERA VSM.60.AAA.05 SOMERA VSM.72.AAA.03.04
	35 mm frame: ELDORA VSP.60 ELDORA VSP.72 ELDORA VSP.72 ELDORA VSP.60 SOMERA VSM.72 SOMERA VSM.72 SOMERA VSMH.72 SOMERA VSM.60 SOMERA VSM.60 SOMERA VSM.72
Vina	VNS-72M1-5-xxxW-1.5, VNS-72M3-5-xxxW-1.5, VNS-144M1-5-xxxW-1.5, VNS-144M3-5-xxxW-1.5, VNS-120M3-5-xxxW-1.0
Winaico	WST, WSP
Yingli	Panda 60, YGE 60, YGE-Z 60, YGE-U72, YLxxxD-30b, YLxxxD-36b, YLM 60, YLM 72, YLM-VG, YLM-Ti series (YLxxxD-30b)