

1.0 Reference and Address		
Report Number	102393982LAX-002	Original 11-Apr-2016 Revised: 2-Jan-2022
Standard(s)	Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels [UL 2703:2015 Ed.1+R:29May2019] PV Module and Panel Racking Mounting System and Accessories [CSA TIL No. A-40:2020]	
Applicant	Unirac, Inc	Manufacturer 2
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Country		
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Email			

<b>2.0 Product Description</b>	
Product	Photovoltaic Mounting System, Sun Frame Microrail Installation Guide, PUB2021NOV29
Brand name	Unirac
Description	<p>The product covered by this report is the Sun Frame Micro Rail roof mounted Photovoltaic Rack Mounting System. This system is designed to provide bonding and grounding to photovoltaic modules. The mounting system employs anodized or mill finish aluminum brackets that are roof mounted using the slider, outlined in section 4 of this report. There are no rails within this product, whereas the 3" Micro Rail, Floating Splice, and 9" Attached Splice electrically bond the modules together forming the path to ground.</p> <p>The Micro Rails are installed onto the module frame by using a stainless steel bolt anodized with black oxide with a stainless type 300 bonding pin, torqued to 20 ft-lbs, retaining the modules to the bracket. The bonding pin of the Micro Rail when bolted and torqued, penetrate the anodized coating of the photovoltaic module frame (at bottom flange) to contact the metal, creating a bonded connection from module to module.</p> <p>The grounding of the entire system is intended to be in accordance with the latest edition of the National Electrical Code, including NEC 250: Grounding and Bonding, and NEC 690: Solar Photovoltaic Systems or the Canadian Electrical Code, CSA C22.1 Part 1 in accordance to the revision in effect in the jurisdiction in which the project resides. Any local electrical codes must be adhered in addition to the national electrical codes. The Grounding Lug is secured to the photovoltaic module, torqued in accordance with the installation manual provided in this document.</p> <p>Other optional grounding includes the use of the Enphase UL2703 certified grounding system, which requires a minimum of 2 micro-inverters mounted to the same rail, and using the same engage cable.</p>

2.0 Product Description	
Models	Unirac SFM
Model Similarity	NA
Ratings	<p>Fuse Rating: 30A</p> <p>Module Orientation: Portrait or Landscape                      Maximum Module Size: 17.98 ft<sup>2</sup>                      UL2703 Design Load Rating: 33 PSF Downward, 33 PSF Upward, 10 PSF Down-Slope                      Tested Loads - 50 psf/2400Pa Downward, 50psf/2400Pa Uplift, 15psf/720Pa Down Slope                      Trina TSM-255PD05.08 and Sunpower SPR-E20-327 used for Mechanical Loading</p> <p>Increased size ML test:                      Maximum Module Size: 22.3 ft<sup>2</sup>                      UL2703 Design Load Rating: 113 PSF Downward, 50 PSF Upward, 30 PSF Down-Slope                      LG355S2W-A5                      used for Mechanical Loading test.                      Mounting configuration: Four mountings on each long side of panel with the longest span of 24"                      UL2703 Design Load Rating: 46.9 PSF Downward, 40 PSF Upward, 10 PSF Down-Slope                      LG395N2W-A5,                      LG360S2W-A5 and LG355S2W-A5 used for used for Mechanical Loading test.                      Mounting configuration: Six mountings for two modules used with the maximum span of 74.5"                      IEC 61646 Test Loads - 112.78 psf/5400Pa Downward, 50psf/2400Pa Uplift</p> <p>Mechanical Load test to add FlashLoc Slider and Trim Assemblies to UL2703 and IEC 61646                      Certifications, &amp; Increase SFM System UL2703 Module Size:                      Maximum Module Size: 27.76 ft<sup>2</sup>                      UL2703 Design Load Rating: 113 PSF Downward, 50 PSF Upward, 21.6 PSF Down-Slope                      Jinko Eagle 72HM G5 used for Mechanical Loading test.                      Mounting configuration: Four mountings on each long side of panel with the longest span of 24"                      Mamzimum module size: 21.86 ft<sup>2</sup>                      IEC 61646 Test Loads - 112.78 psf/5400Pa Downward, 75psf/3600Pa Uplift                      SunPower model SPR-A430-COM-MLSD used for Mechanical Loading</p> <p>Fire Class Resistance Rating:                      - Class A for Steep Slope Applications when using Type 1 Modules. Can be installed at any                      interstitial gap. Installations must include Trim Rail.                      - Class A for Steep Slope Applications when using Type 2 Modules. Can be installed at any                      interstitial gap. Installations must include Trim Rail.                      - Class A Fire Rated for Low Slope applications with Type 1 or 2 listed photovoltaic modules.                      This system was evaluated with a 5" gap between the bottom of the module and the roof's                      surface</p> <p>See section 7.0 illustrations # 1, 1a, 1b, and 1c for a complete list of PV modules evaluated                      with these racking systems</p>
Other Ratings	NA

**7.0 Illustrations**

**Illustration 1 - Approved PV Modules**

Manufacture	Module Model / Series	Manufacture	Module Model / Series
Aleo	P-Series	Eco Solargy	Orion 1000 & Apollo 1000
Astronergy	CH5M6612P, CH5M6612P/HV, CH5M6612M, CH5M6612M/HV, CH5M6610M (BL)(BF)(HF), CH5M72M-HC	ET Solar	ET-M672BHxxxTW
Auxin	AXN6M610T, AXN6P610T, AXN6M612T & AXN6P612T	FreeVolt	Mono PERC
Axitec	AXIblackpremium 60 (35mm), AXIpower 60 (35mm), AXIpower 72 (40mm), AXIpremium 60 (35mm), AXIpremium 72 (40mm).	GCL	GCL-P6 & GCL-M6 Series
Aptos	DNA-120-(BF/MF)26 DNA-144-(BF/MF)26	Hansol	TD-AN3, TD-AN4, UB-AN1, UD-AN1
Boviet	BVM6610, BVM6612	Heliene	36M, 60M, 60P, 72M & 72P Series
BYD	P6K & MHK-36 Series	HT Solar	HT60-156(M) (NDV) (-F), HT 72-156(M/P)
Canadian Solar	CS1(H/K/U/Y)-MS CS3(K/L/U), CS3K-MB-AG, CS3K-(MS/P) CS3N-MS, CS3U-MB-AG, CS3U-(MS/P), CS3W CS5A-M, CS6(K/U), CS6K-(M/P), CS6K-MS CS6P-(M/P), CS6U-(M/P), CS6V-M, CS6X-P	Hyundai	KG, MG, TG, RI, RG, TI, MI, HI & KI Series HiA-SxxxHG
Centrosolar America	C-Series & E-Series	ITEK	iT, iT-HE & iT-SE Series
CertainTeed	CT2xxMxx-01, CT2xxPxx-01, CTxxxMxx-02, CTxxxM-03, CTxxxMxx-04, CTxxxHC11-04	Japan Solar	JPS-60 & JPS-72 Series
Dehui	DH-60M	JA Solar	JAP6 60-xxx, JAM6-60-xxx/SI, JAM6(K)-60/xxx, JAP6(k)-72-xxx/4BB, JAP72SY-xxx/ZZ, JAP6(k)-60-xxx/4BB, JAP60SY-xxx/ZZ, JAM6(k)-72-xxx/ZZ, JAM72SY-xxx/ZZ, JAM6(k)-60-xxx/ZZ, JAM60SY-xxx/ZZ. i. YY: 01, 02, 03, 09, 10 ii. ZZ: SC, PR, BP, HiT, IB, MW, MR
		Jinko	JKM & JKMS Series Eagle JKMxxxM JKMxxxM-72HL-V
		Kyocera	KU Series

**7.0 Illustrations**

**Illustration 1a - Approved PV Modules Continue**

Manufacture	Module Model / Series	Manufacture	Module Model / Series		
LG Electronics	LGxxxN2T-A4	Panasonic	VBHNxxxSA15 & SA16, VBHNxxxSA17 & SA18, VBHNxxxSA17(E/G) & SA18E, VBHNxxxKA01 & KA03 & KA04, VBHNxxxZA01, VBHNxxxZA02, VBHNxxxZA03, VBHNxxxZA04		
	LGxxx(A1C/E1C/E1K/N1C/N1K/N2T/N2W/ Q1C/Q1K/S1C/S2W)-A5				
	LGxxxN2T-B5				
	LGxxxN1K-B6				
	LGxxx(A1C/M1C/M1K/N1C/N1K/Q1C/Q1K/ QAC/QAK)-A6	Peimar	SGxxxM (FB/BF)		
	LGxxx(N1C/N1K/N2T/N2W)-E6	Phono Solar	PS-60, PS-72		
	LGxxx(N1C/N1K/N2W/S1C/S2W)-G4	Prism Solar	P72 Series		
	LGxxxN2T-J5	Q_Cells	Plus, Pro, Peak, G3, G4, G5, G6(+), G7, G8(+) Pro, Peak L-G2, L-G4, L-G5, L-G6, L-G7 Q_PEAK DUO BLK-G6+ Q_PEAK DUO BLK-G6+/TS Q_PEAK DUO (BLK)-G8(+) Q_PEAK DUO L-G8.3/BFF Q_PEAK DUO (BLK) ML-G9(+) Q_PEAK DUO XL-G9/G9.2/G9.3 Q_PEAK DUO (BLK) ML-G10(+) Q_PEAK DUO XL-G(10/10.2/10.3/10.c/10.d)		
	LGxxx(N1K/N1W/N2T/N2W)-L5				
	LGxxx(N1C/Q1C/Q1K)-N5				
LGxxx (N1C/N1K/N2W/Q1C/Q1K)-V5					
LONGi	LR4-60(HIB/HIH/HPB/HPH)-xxxM			REC	Alpha (72) (Black) (Pure) N-Peak (Black) N-Peak 2 (Black) PEAK Energy Series PEAK Energy BLK2 Series PEAK Energy 72 Series
	LR4-72(HIH/HPH)-xxxM				
	LR6-60(BP/HBD/HIBD)-xxxM (30mm)				
	LR6-60(BK)(PE)(HPB)(HPH)-xxxM (35mm)				
	LR6-60(BK)(PE)(PB)(PH)-xxxM (40mm)				
LR6-72(BP)(HBD)(HIBD)-xxxM (30mm)					
LR6-72(HV)(BK)(PE)(PH)(PB)(HPH)-xxxM (35mm)					
LR6-72(BK)(HV)(PE)(PB)(PH)-xxxM (40mm)					
Mission Solar Energy	MSE Series				
Mitsubishi	MJE & MLE Series				
Neo Solar Power Co.	D6M & D6P Series				

**7.0 Illustrations**

**Illustration 1b - Approved PV Modules Continue**

Manufacture	Module Model / Series
REC (cont.)	TwinPeak Series TwinPeak 2 Series TwinPeak 2 BLK2 Series TwinPeak 2S(M)72(XV) TwinPeak 3 Series (38mm) TP4 (Black)
Renesola	Vitrus2 Series & 156 Series
Risen	RSM72-6 (MDG) (M), RSM60-6
S-Energy	SN72 & SN60 Series (40mm)
Seraphim	SEG-6 & SRP-6 Series
Sharp	NU-SA & NU-SC Series
Silfab	SLA, SLG, BC Series & SILxxx(BL/NL/NT/HL/ML/BK/NX/NU/HC)
Solaria	PowerXT-xxxR-(AC/PD/BD) PowerXT-xxxC-PD PowerXT-xxxR-PM (AC)
SolarWorld	Sunmodule Protect, Sunmodule Plus
Sonali	SS 230 - 265
Suntech	STP
Suniva	MV Series & Optimus Series
Sun Edison/Flextronics	F-Series, R-Series & FLEX FXS Series
SunPower	X-Series, E-Series & P-Series
Talesun	TP572, TP596, TP654, TP660, TP672, Hipor M, Smart

Manufacture	Module Model / Series
Tesla	SC, SC B, SC B1, SC B2 TxxxS
Trina	PA05, PD05, DD05, DE06, DD06, PE06, PD14, PE14, DD14, DE09.05, DE14, DE15, PE15H
Upsolar	UP-MxxxP(-B), UP-MxxxM(-B)
URE	D7MxxxH7A, D7(M/K)xxxH8A FAKxxx(C8G/E8G), FAMxxxE7G-BB FAMxxxE8G(-BB)
Vikram	Eldora, Solivo, Somera
Waaree	AC & Adiya Series
Winaico	WST & WSP Series
Yingli	YGE & YLM Series
ZN Shine	ZXM6-72