

ELECTRICAL PERMIT

City of Portland, Me.



To the Chief Electrical Inspector, Portland Maine:
 The undersigned hereby applies for a permit to make electrical installations
 in accordance with the laws of Maine, the City of Portland Electrical Ordinance,
 National Electrical Code and the following specifications:

Date 2/22/12
 Permit # 2012 02 3358
 CBL# 057 A016

LOCATION: 32 May St METER MAKE & # _____
 CMP ACCOUNT # _____ OWNER Peter Monroe
 TENANT _____ PHONE # _____

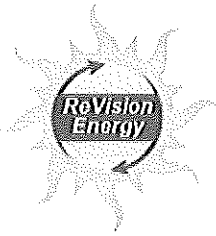
057 A 016

						TOTAL EACH FEE		
OUTLETS		Receptacles		Switches		Smoke Detector	.20	
FIXTURES		Incandescent		Fluorescent		Strips	.20	
SERVICES		Overhead		Underground		TTL AMPS <800	15.00	
		Overhead		Underground		>800	25.00	
Temporary Service		Overhead		Underground		TTL AMPS	25.00	
							25.00	
METERS		(number of)					1.00	
MOTORS		(number of)					2.00	
RESID/COM		Electric units					1.00	
HEATING		oil/gas units		Interior		Exterior	5.00	
APPLIANCES		Ranges		Cook Tops		Wall Ovens	2.00	
		Insta-Hot		Water heaters		Fans	2.00	
		Dryers		Disposals		Dishwasher	2.00	
		Compactors		Spa		Washing Machine	2.00	
		Others (denote)				<u>SCAR PANELS</u>	2.00	
	MISC. (number of)	1	Air Cond/win					3.00
			Air Cond/cent				Pools	10.00
		HVAC		EMS			Thermostat	5.00
	Signs						10.00	
	Alarms/res						5.00	
	Alarms/com						15.00	
	Heavy Duty(CRKT)						2.00	
	Circus/Carnv						25.00	
	Alterations						5.00	
	Fire Repairs						15.00	
	E Lights						1.00	
	E Generators						20.00	
PANELS		Service		Remote		Main	4.00	
TRANSFORMER		0-25 Kva					5.00	
		25-200 Kva					8.00	
		Over 200 Kva					10.00	
						TOTAL AMOUNT DUE		
						MINIMUM FEE/COMMERCIAL 55.00		
						MINIMUM FEE	45.00	
							<u>45.00</u>	

RECEIVED
 FEB 22 2012
 Dept. of Building Inspection
 City of Portland Maine

CONTRACTORS NAME Revision Energy MASTER LIC. # MSG0019303
 ADDRESS 142 Presumpscot St Portland ME LIMITED LIC. # _____
 TELEPHONE 221-6342

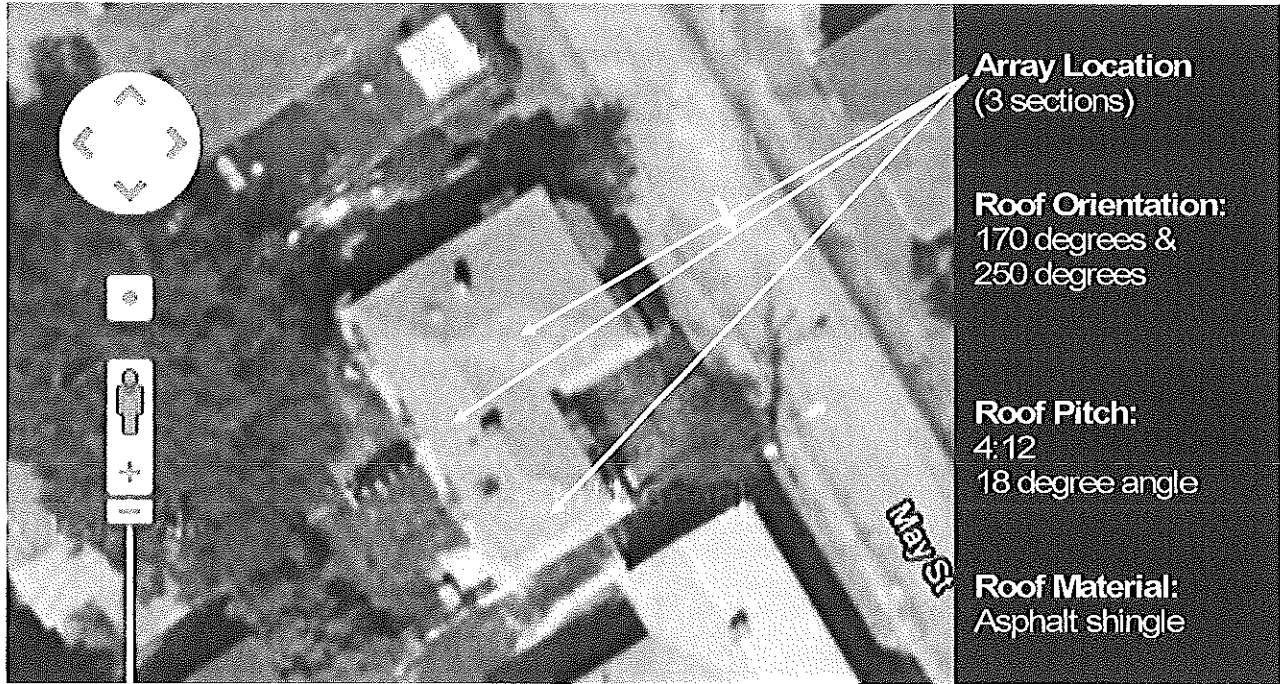
SIGNATURE OF CONTRACTOR [Signature]



Professional design, installation and service of renewable energy systems

3 Kilowatt Grid-Tied Photovoltaic System Proposal

Client: Peter Monro
 Address: 32 May Street, Portland, ME 04102
 Date: 23 December 2011



Array Location:
 (3 sections)

Roof Orientation:
 170 degrees &
 250 degrees

Roof Pitch:
 4:12
 18 degree angle

Roof Material:
 Asphalt shingle

Project Summary

System	Performance	Cost	Incentives	Net Cost
2.76 kilowatt grid-tied photovoltaic array coupled with enphase energy microinverters. Includes real-time system monitoring.	<ul style="list-style-type: none"> Produce roughly 3,570 kilowatt hours of clean, renewable electricity annually. Offset roughly 4,784 lbs. of CO2 emissions annually. 	\$13,821 Installed	-(\$4,148) fed tax credit -(\$2,000) State rebate	\$7,673

System Overview

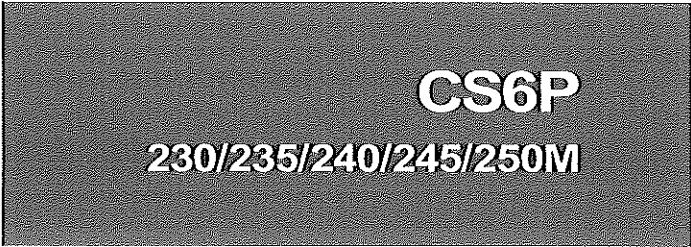
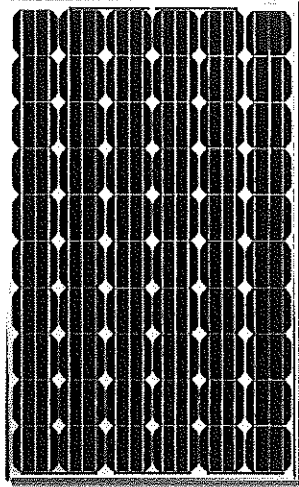
Based on an evaluation of your household electricity demand and rooftop solar gain, ReVision Energy proposes a roof-mounted photovoltaic array of 3 kilowatts (nominal). The system utilizes Canadian Solar 235-watt photovoltaic panels and Enphase Energy microinverters. The proposed array will consist of 13 panels distributed across the three roof sections indicated in the photo above.

Liberty
 207-589-4171

Portland
 207-221-6342

Exeter, NH
 603-501-1822

www.revisionenergy.com



CS6P

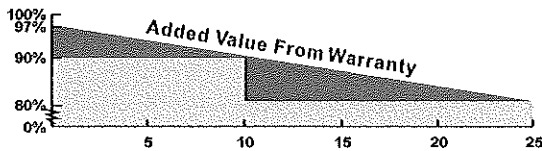
230/235/240/245/250M

On-grid Module

CS6P is a robust solar module with 60 solar cells. These modules can be used for on-grid solar applications. Our meticulous design and production techniques ensure a high-yield, long-term performance for every module produced. Our rigorous quality control and in-house testing facilities guarantee Canadian Solar's modules meet the highest quality standards possible.

Key Features

- Industry first comprehensive warranty insurance by AM Best rated leading insurance companies in the world
- Industry leading plus only power tolerance: 0 ~ +5W
- Strong framed module, passing mechanical load test of 5400Pa to withstand heavier snow load
- The 1st manufacturer in the PV industry certified for ISO:TS16949 (The automotive quality management system) in module production since 2003
- ISO17025 qualified manufacturer owned testing lab, fully complying to IEC, TUV, UL testing standards
- **Backed By Our New 10/25 Linear Power Warranty** Plus our added 25 year insurance coverage



- 10 year product warranty on materials and workmanship
- 25 year linear power output warranty

Applications

- On-grid residential roof-tops
- On-grid commercial/industrial roof-tops
- Solar power stations
- Other on-grid applications

Quality Certificates

- IEC 61215, IEC 61730, UL 1703, CEC Listed, MCS, CE
- ISO9001: 2008: Standards for quality management systems
- ISO/TS16949:2009: The automotive quality management system

Environmental Certificates

- ISO14001:2004: Standards for Environmental management systems
- QC080000 HSPM: The Certification for Hazardous Substances Regulations
- Reach Compliance



CS6P-230/235/240/245/250M

Electrical Data

STC	CS6P-230M	CS6P-235M	CS6P-240M	CS6P-245M	CS6P-250M
Nominal Maximum Power (Pmax)	230W	235W	240W	245W	250W
Optimum Operating Voltage (Vmp)	29.9V	30.1V	30.2V	30.3V	30.4V
Optimum Operating Current (Imp)	7.70A	7.82A	7.95A	8.09A	8.22A
Open Circuit Voltage (Voc)	37.1V	37.2V	37.3V	37.4V	37.5V
Short Circuit Current (Isc)	8.22A	8.34A	8.46A	8.61A	8.74A
Module Efficiency	14.30%	14.61%	14.92%	15.23%	15.54%
Operating Temperature	-40°C~+85°C				
Maximum System Voltage	1000V (IEC) /600V (UL)				
Maximum Series Fuse Rating	15A				
Application Classification	Class A				
Power Tolerance	0 ~ +5W				

Under Standard Test Conditions (STC) of irradiance of 1000W/m², spectrum AM 1.5 and cell temperature of 25°C

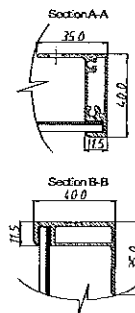
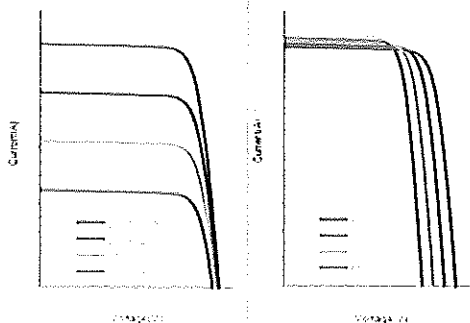
NOCT	CS6P-230M	CS6P-235M	CS6P-240M	CS6P-245M	CS6P-250M
Nominal Maximum Power (Pmax)	166W	170W	173W	177W	180W
Optimum Operating Voltage (Vmp)	27.3V	27.5V	27.5V	27.6V	27.7V
Optimum Operating Current (Imp)	6.09A	6.18A	6.29A	6.40A	6.51A
Open Circuit Voltage (Voc)	34.0V	34.1V	34.2V	34.3V	34.4V
Short Circuit Current (Isc)	6.65A	6.75A	6.85A	6.97A	7.08A

Under Normal Operating Cell Temperature, Irradiance of 800 W/m², spectrum AM 1.5, ambient temperature 20°C, wind speed 1 m/s

Mechanical Data

Cell Type	Mono-crystalline 156 x 156mm, 2 or 3 Busbars
Cell Arrangement	60 (6 x 10)
Dimensions	1638 x 982 x 40mm (64.5 x 38.7 x 1.57in)
Weight	20kg (44.1 lbs)
Front Cover	3.2mm Tempered glass
Frame Material	Anodized aluminium alloy
J-BOX	IP65, 3 diodes
Cable	4mm ² (IEC) /12AWG (UL), 1100mm
Connectors	MC4 or MC4 Comparable
Standard Packaging (Modules per Pallet)	24 pcs
Module Pieces per container (40 ft. Container)	672 pcs (40'HQ)

I-V Curves (CS6P-250M)



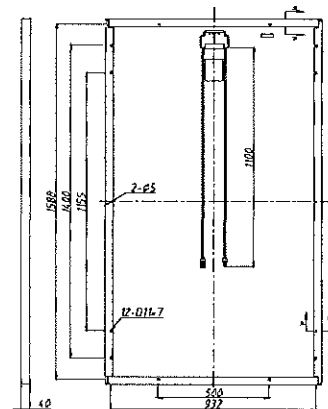
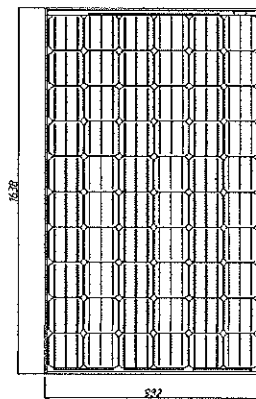
Temperature Characteristics

Temperature Coefficient	Pmax	-0.45%/C
	Voc	-0.35%/C
	Isc	0.060%/C
Normal Operating Cell Temperature	45 ± 2°C	

Performance at Low Irradiance

Industry leading performance at low irradiation environment, +95.5% module efficiency from an irradiance of 1000w/m² to 200w/m² (AM 1.5, 25 °C)

Engineering Drawings



*Specifications included in this datasheet are subject to change without prior notice.

About Canadian Solar

Canadian Solar Inc. is one of the world's largest solar companies. As a leading vertically-integrated manufacturer of ingots, wafers, cells, solar modules and solar systems. Canadian Solar delivers solar power products of uncompromising quality to worldwide customers. Canadian Solar's world class team of professionals works closely with our customers to provide them with solutions for all their solar needs.

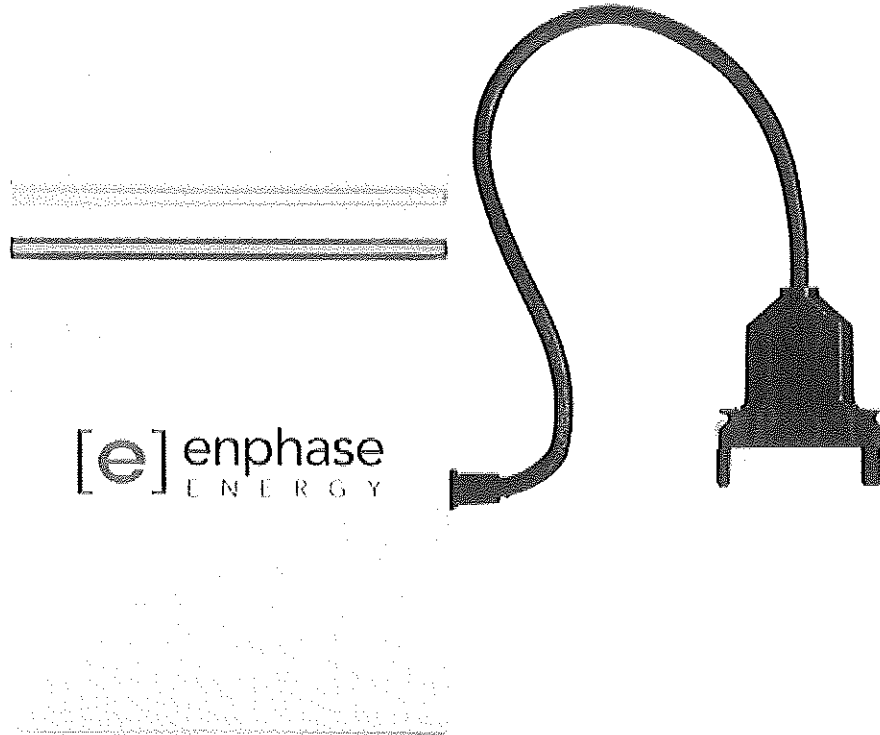
Canadian Solar was founded in Canada in 2001 and was successfully listed on NASDAQ Exchange (symbol: CSIQ) in November 2006. Canadian Solar has already expanded its module manufacturing capacity to 2.05GW and cell manufacturing capacity to 1.3GW in 2011.

Headquarters | 650 Riverbend Drive, Suite B
 Kitchener, Ontario | Canada N2K 3S2
 Tel: +1-519-954-2057
 Fax: +1-519-578-2097
 Inquire.ca@canadiansolar.com
 www.canadiansolar.com



ENPHASE MICROINVERTER

M215



The Enphase Energy Microinverter System improves energy harvest, increases reliability, and dramatically simplifies design, installation and management of solar power systems. The Enphase System includes the microinverter, the Envoy Communications Gateway, and Enlighten, Enphase's monitoring and analysis website.

- PRODUCTIVE
 - Maximum energy production
 - Resilient to dust, debris and shading
 - Performance monitoring per module
- RELIABLE
 - System availability greater than 99.8%
 - No single point of system failure
- SMART
 - Quick & simple design, installation and management
 - 24/7 monitoring and analysis
- SAFE
 - Low voltage DC
 - Reduced fire risk



MICROINVERTER TECHNICAL DATA

Input Data (DC)		
	M215-60-2LL-S22/S23 M215-60-2LL-S22-NA/S23-NA (Ontario)	
Recommended maximum input power (STC)	260W	
Maximum input DC voltage	45V	
Peak power tracking range	22V – 36V	
Operating range	16V – 36V	
Min./Max. start voltage	26.4V/45V	
Max. DC short circuit current	15A	
Max. input current	10.5A	
Output Data (AC)		
	@208 Vac	@240 Vac
Maximum output power	215W	215W
Nominal output current	1.0 A*	0.9 A*
Nominal voltage/range	208V/183V-229V	240V/211V-264V
Extended voltage/range	208V/179V-232V	240V/206V-269V
Nominal frequency/range	60.0/59.3-60.5	60.0/59.3-60.5
Extended frequency/range	60.0/59.2-60.6	60.0/59.2-60.6
Power factor	>0.95	>0.95
Maximum units per 20A branch circuit	26 (three phase)	17 (single phase)
Maximum output fault current	1.05 Arms, over 3 cycles; 25.2 Apeak, 1.74ms duration	
		*Arms at nominal voltage
Efficiency		
CEC weighted efficiency	96.0%	
Peak inverter efficiency	96.3%	
Static MPPT efficiency (weighted, reference EN 50530)	99.8%	
Dynamic MPPT efficiency (fast irradiation changes, reference EN 50530)	99.9%	
Night time power consumption	46mW	
Mechanical Data		
Operating temperature range	-40°C to +65°C	
Dimensions (WxHxD)	17.3 cm x 16.4 cm x 2.5 cm (6.8" x 6.45" x 1.0")*	
Weight	1.6 kg (3.5 lbs)	
Cooling	Natural convection – no fans	
Enclosure environmental rating	Outdoor – NEMA 6	
		*without mounting bracket
Features		
Compatibility	Pairs with most 60-cell PV modules	
Communication	Power line	
Warranty	25 years, limited	
Compliance	UL1741/IEEE1547, FCC Part 15 Class B CAN/CSA-C22.2 NO. 0-M91, 0.4-04, and 107.1-01	

Enphase Energy, Inc.

201 1st Street, Petaluma, CA 94952
877 797 4743 www.enphase.com

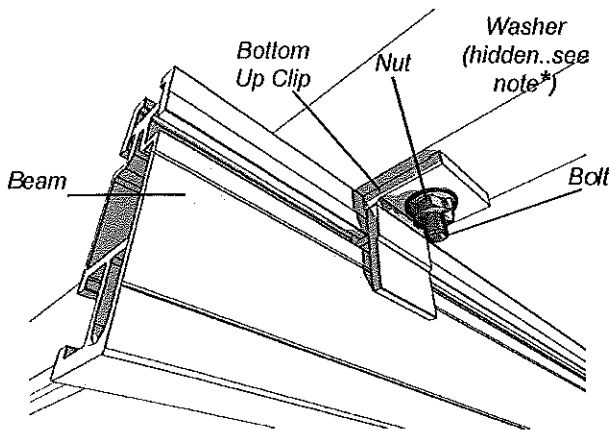
SolarMount Technical Datasheet

Pub 100602-1td V1.0 June 2010

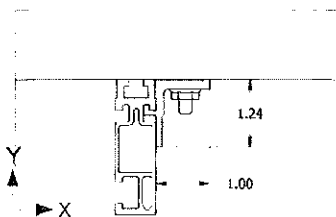
SolarMount Module Connection Hardware	1
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SolarMount Module Connection Hardware

SolarMount Bottom Up Module Clip Part No. 321001, 321002



- **Bottom Up Clip material:** One of the following extruded aluminum alloys: 6005-T5, 6105-T5, 6061-T6
 - **Ultimate tensile:** 38ksi, Yield: 35 ksi
 - **Finish:** Clear Anodized
 - **Bottom Up Clip weight:** ~0.031 lbs (14g)
 - Allowable and design loads are valid when components are assembled with SolarMount series beams according to authorized UNIRAC documents
 - Assemble with one 1/4"-20 ASTM F593 bolt, one 1/4"-20 ASTM F594 serrated flange nut, and one 1/4" flat washer
 - Use anti-seize and tighten to 10 ft-lbs of torque
 - Resistance factors and safety factors are determined according to part 1 section 9 of the 2005 Aluminum Design Manual and third-party test results from an IAS accredited laboratory
 - Module edge must be fully supported by the beam
- * **NOTE ON WASHER:** Install washer on bolt head side of assembly. **DO NOT** install washer under serrated flange nut

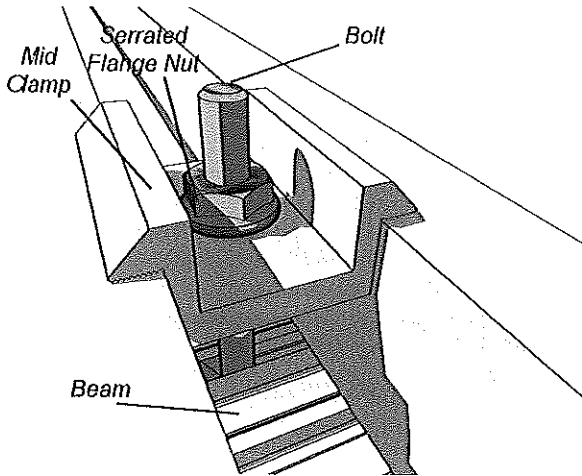


Applied Load Direction	Average Ultimate lbs (N)	Allowable Load lbs (N)	Safety Factor, FS	Design Load lbs (N)	Resistance Factor, ϕ
Tension, Y+	1566 (6967)	686 (3052)	2.28	1038 (4615)	0.662
Transverse, X±	1128 (5019)	329 (1463)	3.43	497 (2213)	0.441
Sliding, Z±	66 (292)	27 (119)	2.44	41 (181)	0.619

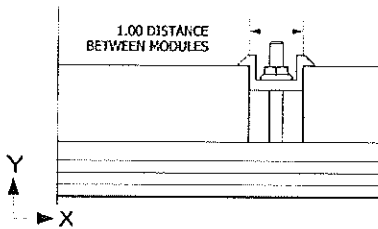
Dimensions specified in inches unless noted

SolarMount Mid Clamp

Part No. 320008, 320009, 320019, 320020, 320021, 320084, 320085, 320086, 320087, 320120, 320122



- **Mid clamp material:** One of the following extruded aluminum alloys: 6005-T5, 6105-T5, 6061-T6
- **Ultimate tensile:** 38ksi, Yield: 35 ksi
- **Finish:** Clear or Dark Anodized
- **Mid clamp weight:** 0.050 lbs (23g)
- Allowable and design loads are valid when components are assembled according to authorized UNIRAC documents
- Values represent the allowable and design load capacity of a single mid clamp assembly when used with a SolarMount series beam to retain a module in the direction indicated
- Assemble mid clamp with one Unirac 1/4"-20 T-bolt and one 1/4"-20 ASTM F594 serrated flange nut
- Use anti-seize and tighten to 10 ft-lbs of torque
- Resistance factors and safety factors are determined according to part 1 section 9 of the 2005 Aluminum Design Manual and third-party test results from an IAS accredited laboratory

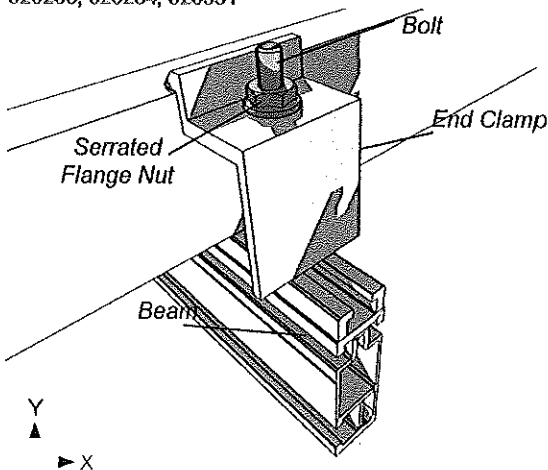


Dimensions specified in inches unless noted

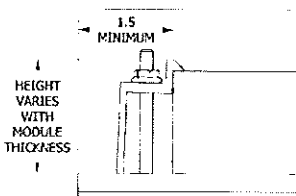
Applied Load Direction	Average Ultimate lbs (N)	Allowable Load lbs (N)	Safety Factor, FS	Design Load lbs (N)	Resistance Factor, ϕ
Tension, Y+	2020 (8987)	891 (3963)	2.27	1348 (5994)	0.667
Transverse, Z±	520 (2313)	229 (1017)	2.27	346 (1539)	0.665
Sliding, X±	1194 (5312)	490 (2179)	2.44	741 (3295)	0.620

SolarMount End Clamp

Part No. 320002, 320003, 320004, 320005, 320006, 320012, 320013, 320014, 320015, 320016, 320017, 320079, 320080, 320081, 320082, 320083, 320117, 320118, 320123, 320124, 320173, 320185, 320220, 320233, 320234, 320331



- **End clamp material:** One of the following extruded aluminum alloys: 6005-T5, 6105-T5, 6061-T6
- **Ultimate tensile:** 38ksi, Yield: 35 ksi
- **Finish:** Clear or Dark Anodized
- **End clamp weight:** varies based on height: ~0.058 lbs (26g)
- Allowable and design loads are valid when components are assembled according to authorized UNIRAC documents
- Values represent the allowable and design load capacity of a single end clamp assembly when used with a SolarMount series beam to retain a module in the direction indicated
- Assemble with one Unirac 1/4"-20 T-bolt and one 1/4"-20 ASTM F594 serrated flange nut
- Use anti-seize and tighten to 10 ft-lbs of torque
- Resistance factors and safety factors are determined according to part 1 section 9 of the 2005 Aluminum Design Manual and third-party test results from an IAS accredited laboratory
- Modules must be installed at least 1.5 in from either end of a beam



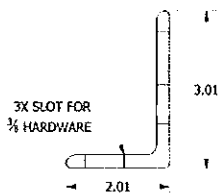
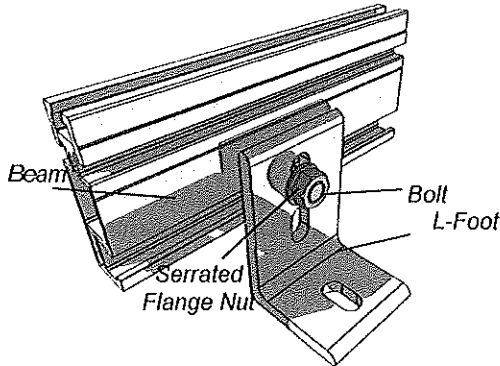
Dimensions specified in inches unless noted

Applied Load Direction	Average Ultimate lbs (N)	Allowable Load lbs (N)	Safety Factor, FS	Design Loads lbs (N)	Resistance Factor, ϕ
Tension, Y+	1321 (5876)	529 (2352)	2.50	800 (3557)	0.605
Transverse, Z±	63 (279)	14 (61)	4.58	21 (92)	0.330
Sliding, X±	142 (630)	52 (231)	2.72	79 (349)	0.555

SolarMount Beam Connection Hardware

SolarMount L-Foot

Part No. 310065, 310066, 310067, 310068



Dimensions specified in inches unless noted

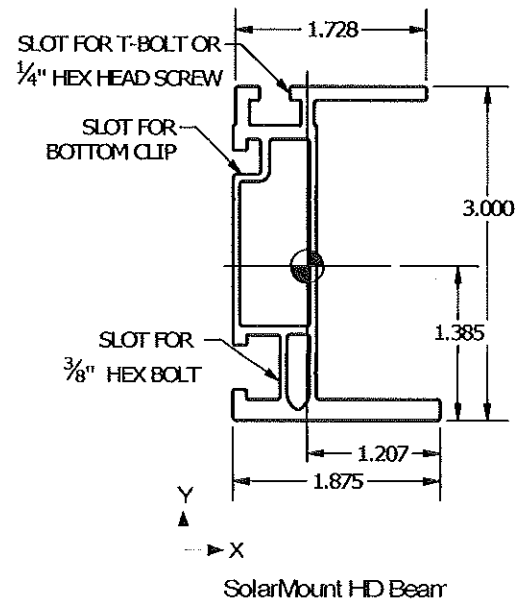
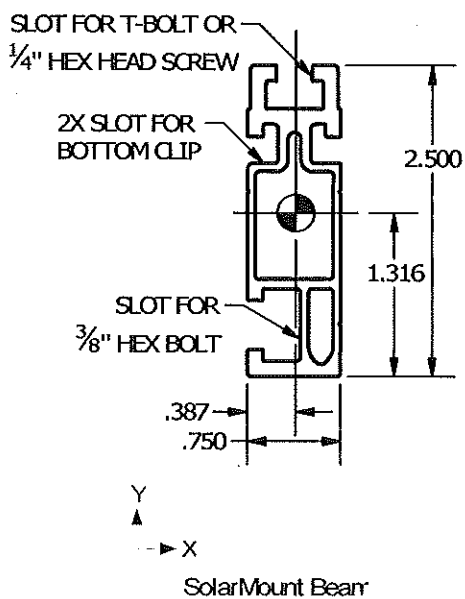
- **L-Foot material:** One of the following extruded aluminum alloys: 6005-T5, 6105-T5, 6061-T6
- **Ultimate tensile:** 38ksi, Yield: 35 ksi
- **Finish:** Clear or Dark Anodized
- **L-Foot weight:** varies based on height: ~0.215 lbs (98g)
- Allowable and design loads are valid when components are assembled with SolarMount series beams according to authorized UNIRAC documents
- **For the beam to L-Foot connection:**
 - Assemble with one ASTM F593 3/8"-16 hex head screw and one ASTM F594 3/8" serrated flange nut
 - Use anti-seize and tighten to 30 ft-lbs of torque
- Resistance factors and safety factors are determined according to part 1 section 9 of the 2005 Aluminum Design Manual and third-party test results from an IAS accredited laboratory

NOTE: Loads are given for the L-Foot to beam connection only; be sure to check load limits for standoff, lag screw, or other attachment method

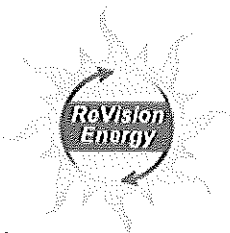
Applied Load Direction	Average Ultimate lbs (N)	Allowable Load lbs (N)	Safety Factor, FS	Design Load lbs (N)	Resistance Factor, ϕ
Sliding, Z \pm	1766 (7856)	755 (3356)	2.34	1141 (5077)	0.646
Tension, Y+	1859 (8269)	707 (3144)	2.63	1069 (4755)	0.575
Compression, Y-	3258 (14492)	1325 (5893)	2.46	2004 (8913)	0.615
Traverse, X \pm	486 (2162)	213 (949)	2.28	323 (1436)	0.664

SolarMount Beams

Properties	Units	SolarMount	SolarMount HD
Beam Height	in	2.5	3.0
Approximate Weight (per linear ft)	plf	0.811	1.271
Total Cross Sectional Area	in ²	0.676	1.059
Section Modulus (X-Axis)	in ³	0.353	0.898
Section Modulus (Y-Axis)	in ³	0.113	0.221
Moment of Inertia (X-Axis)	in ⁴	0.464	1.450
Moment of Inertia (Y-Axis)	in ⁴	0.044	0.267
Radius of Gyration (X-Axis)	in	0.289	1.170
Radius of Gyration (Y-Axis)	in	0.254	0.502



Dimensions specified in inches unless noted



Professional design, installation and service of renewable energy systems

February 22, 2011

City of Portland
389 Congress Street
Portland, ME 04101

RE: ReVision Energy Solar Installation at the Monro Residence
Address: 32 May Street

Dear Code Enforcement,

ReVision Energy has been contracted to design and install a solar electric (PV) system at the Monro residence at the above address in Portland. This letter is to confirm that all work will be performed by licensed and qualified installers, expert in the field and in compliance with both manufacturer's recommendations and all applicable local and state codes and standards. This also confirms that the roof structure can handle the weight of the panel load.

ReVision Energy employs licensed engineers, plumbers, and electricians and carries the solar industries highest certifications (NABCEP) in both solar thermal and photovoltaic installation. We're committed to high quality, code compliant work and look forward to working together with the city and the CEO to ensure that all your requirements and needs are met and that our customer ends up with a system that is beautiful, functional and safe.

Electrical and grounding:

All electrical work to be performed by a licensed ME electrician and will conform to NEC 2011 revision as well as NABCEP standards. Specifically, wiring and grounding of the photovoltaic system will be governed by manufacturer's recommendations and article 690. All installed metal components are grounded via the grounding electrode conductor.

If you have any questions or concerns, we'd like to address them as quickly and completely as possible. Please don't hesitate to call or e mail anytime.

Respectfully,

Fortunat Mueller, P.E.
Co-owner
ReVision Energy
(207) 752-6358
fortunat@revisionenergy.com

Bangor
207-570-4222

Liberty
207-589-4171

Portland
207-221-6342

Portsmouth
603-486-7170

www.revisionenergy.com



PORTLAND MAINE

Strengthening a Remarkable City, Building a Community for Life • www.portlandmaine.gov

Receipts Details:

Tender Information: Check , BusinessName: Visa, Check Number: 76085

Tender Amount: 45.00

Receipt Header:

Cashier Id: gguertin

Receipt Date: 2/22/2012

Receipt Number: 41145

Receipt Details:

Referance ID:	5329	Fee Type:	BP Elec Res
Receipt Number:	0	Payment Date:	
Transaction Amount:	45.00	Charge Amount:	45.00
Job ID: Job ID: 2012-02-3358-ELEC-RR - solar panel			
Additional Comments:			

Thank You for your Payment!