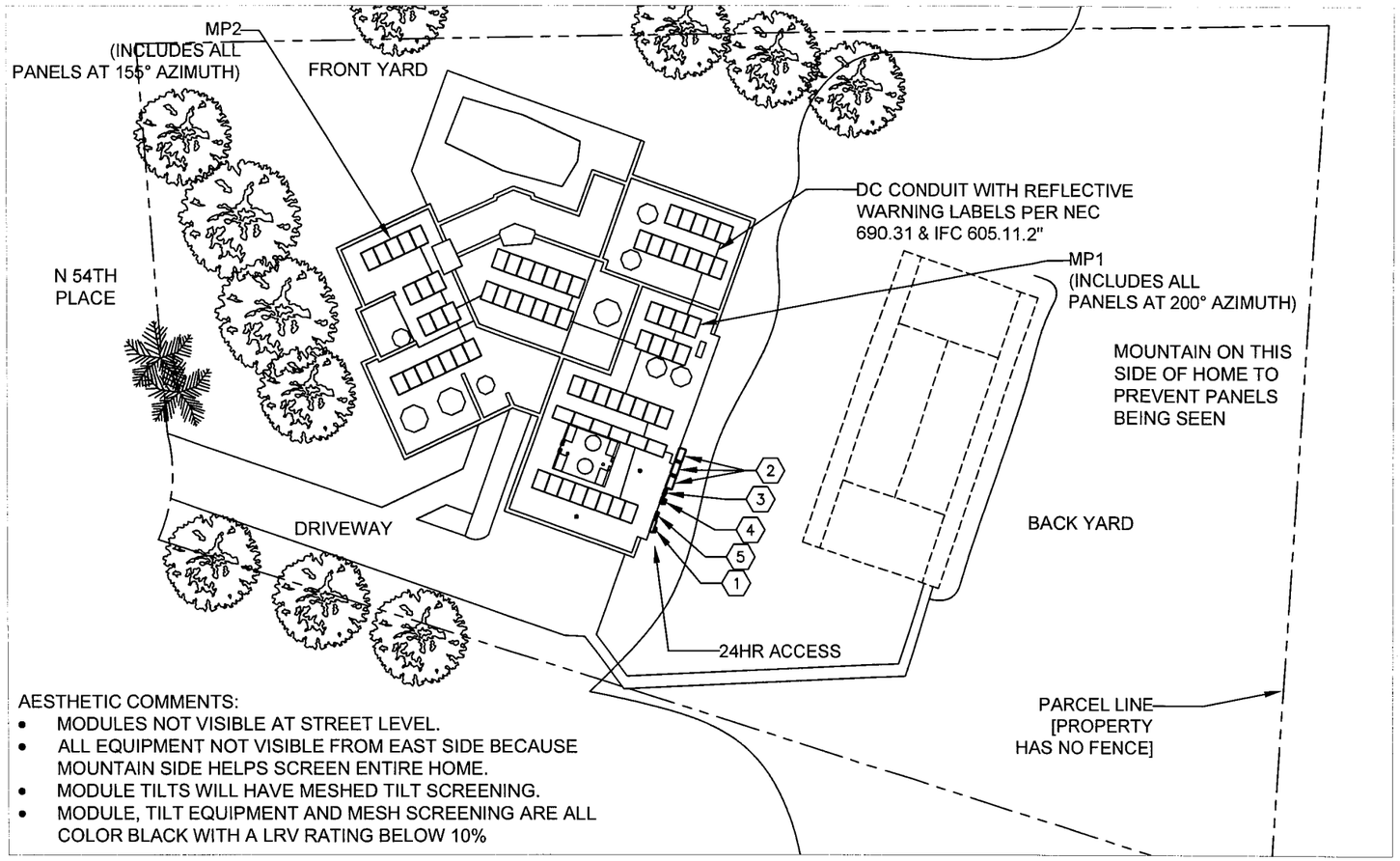
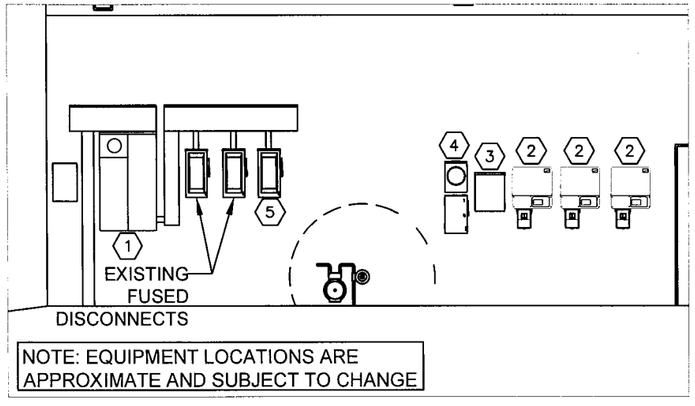


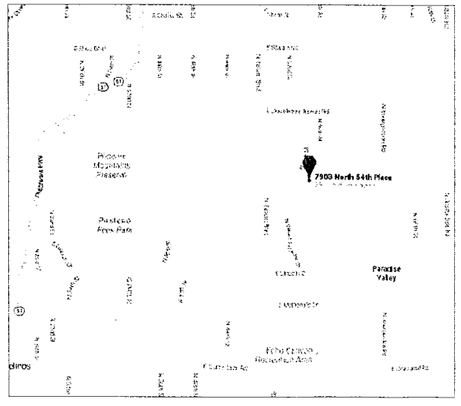
SITE PLAN

NOTE:

1. UTILITY HAS 24-HR UNRESTRICTED ACCESS TO ALL PHOTOVOLTAIC SYSTEM COMPONENTS LOCATED AT THE SERVICE ENTRANCE.
2. WORKSPACE IN FRONT OF THE AC ELECTRICAL SYSTEM COMPONENTS SHALL BE IN ACCORDANCE WITH APS & NEC REQUIREMENTS. FOR APS REQUIREMENTS, REFERENCE SECTION 300 OF THE APS ESRM & SECTION 8.2 OF THE APS INTERCONNECTION REQUIREMENTS.
3. REFERENCE SECTION 301.15 OF THE APS ESRM FOR ELECTRIC METER SEPARATION BETWEEN WATER & GAS.



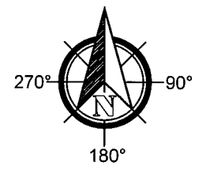
EQUIPMENT LAYOUT



SITE LOCATION

PARCEL INFO
PARCEL #: 169-06-071
SQUARE FOOTAGE: 5,920
CONST. YEAR: 1979

MP1	PITCH: 18	AZIMUTH: 200
	MATERIAL: Existing Foam	
	MOUNTING: Tilt Structure	
MP2	PITCH: 18	AZIMUTH: 155
	MATERIAL: Existing Foam	
	MOUNTING: Tilt Structure	



SCALE: 1/16" = 1'

SCOPE OF WORK

TO INSTALL A PHOTOVOLTAIC (PV) SYSTEM AT THE
Lodato Residence
LOCATED AT
7903 N. 54th place
Paradise Valley , AZ 85253

THE POWER GENERATED BY THE PV SYSTEM WILL BE INTERCONNECTED WITH THE UTILITY GRID THROUGH THE EXISTING ELECTRICAL SERVICE EQUIPMENT.

SHEET INDEX

GOVERNING CODES

LOCAL JURISDICTION - Paradise Valley
UTILITY - APS
2011 NATIONAL ELECTRICAL CODE
2012 INTERNATIONAL BUILDING CODE
2012 INTERNATIONAL RESIDENTIAL CODE
CITY AMMENDMENTS

SITE PLAN NOTES

1. (EXISTING) ELECTRICAL SERVICE ENTRANCE 400A MAIN SERVICE PANEL and UTILITY REVENUE METER
2. (NEW) INVERTER WITH INTEGRATED DC DISCONNECT COVERED WITH SCREEN
3. (NEW) COMBINER PANEL PAINTED TO MATCH HOUSE
4. (NEW) DEDICATED PV SYSTEM KWH METER and UTILITY DISCONNECT SWITCH PAINTED TO MATCH HOUSE
5. (NEW) FUSED DISCONNECT

EQUIPMENT SUMMARY

74	SunPower SPR-E20-327
01	Sunny Boy SB7000TL-US-22
01	Sunny Boy SB7000TL-US-22
01	Sunny Boy SB6000TL-US-22
01	Cutler Hammer, 200A, DH364URKLLV
01	MILBANK 125A Meter Base
01	EATON BR816L125RP (4 BREAKERS)

SHEET: PV1

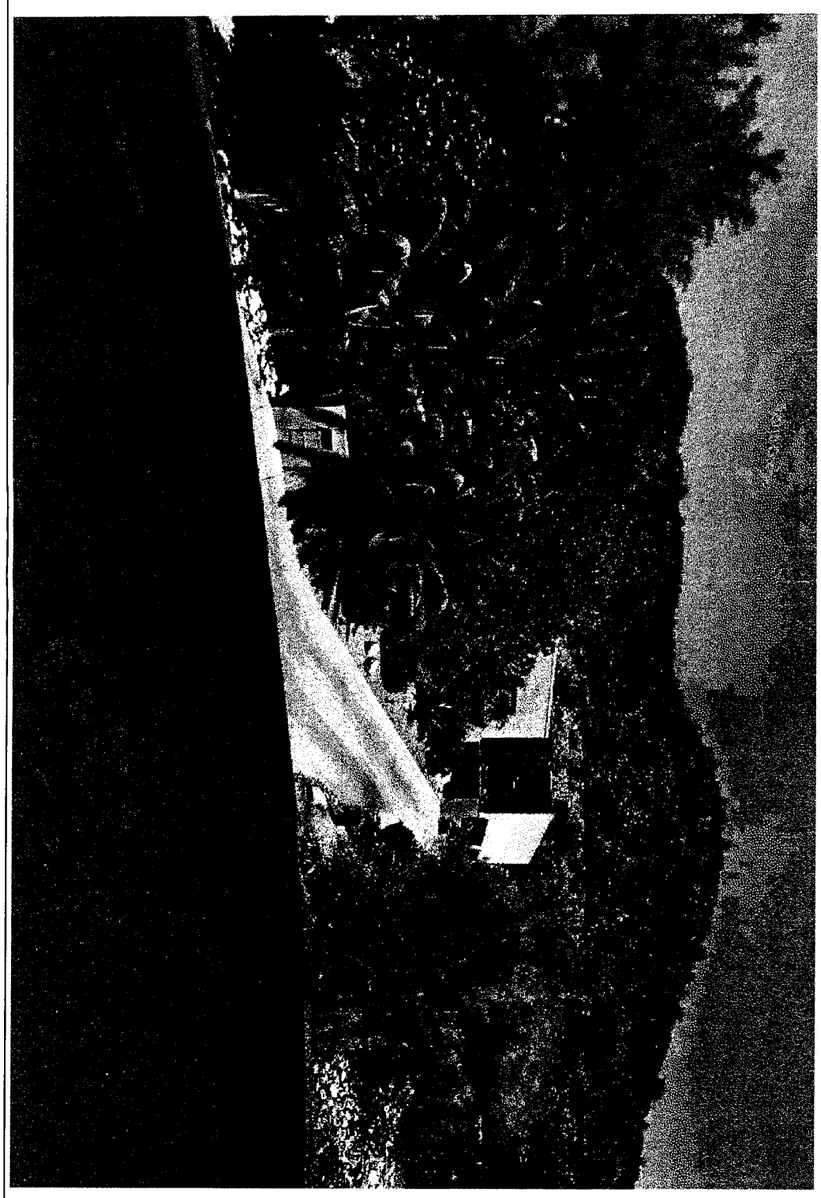
DATE: 2/1/2017

Revision: 0

Designer: Alex Meehl

20.000kW-AC
24.198W-DC
TITLE: SITE PLAN
Lodato Residence
7903 N. 54th place, Paradise Valley , AZ 85253

Sun Valley Solar Solutions LLC
3225 N Colorado St. Chandler, AZ 85225
T: (480) 699-5000 / F: (480) 659-3429
www.svssolutions.com



View From Street

Sun Valley Solar Solutions LLC 3225 N Colorado St. Chandler, AZ 85225 T: (480) 689-5000 / F: (480) 659-3429 www.svssolutions.com	TITLE: SITE PLAN 20.000kW-AC Lodato Residence 24,198W-DC 7903 N. 54th place, Paradise Valley , AZ 85253	Revision: 0 Designer: Alex Meehl	DATE: 1/10/2017	SHEET: PV3

VIEW OF WALL WHERE
EQUIPMENT WILL BE INSTALLED

VIEW OF WALL WHERE
EQUIPMENT WILL BE INSTALLED

AERIAL VIEW

AERIAL VIEW

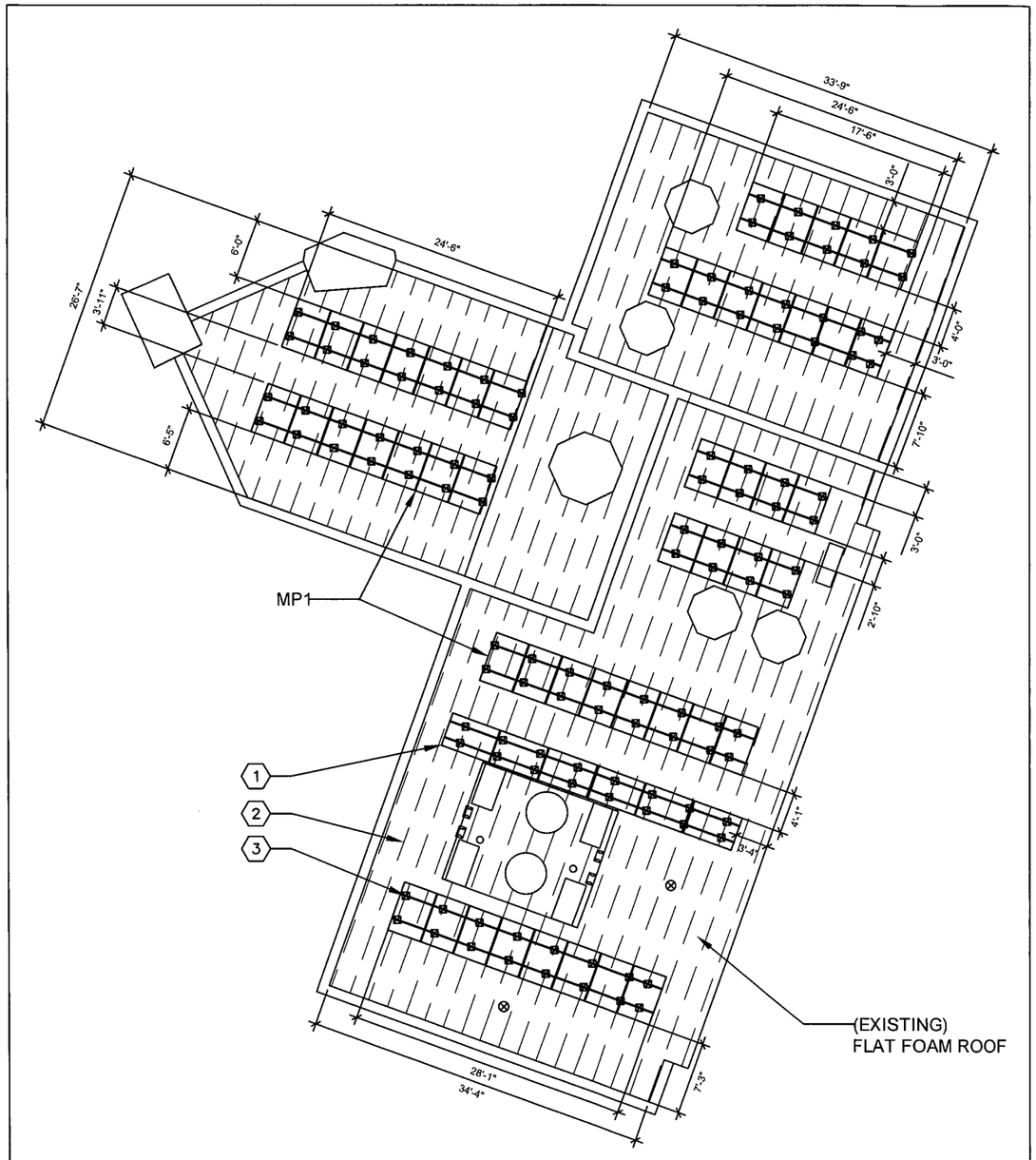
TITLE: SITE PLAN	20.000kW-AC
Lodato Residence	24.198W-DC
7903 N. 54th place, Paradise Valley , AZ 85253	

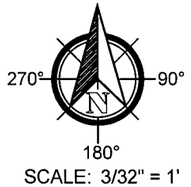
Revision: 0 | DATE: 1/18/2017

Designer: Alex Meehl | SHEET: PV3

Sun Valley Solar Solutions LLC
3225 N Colorado St. Chandler, AZ 85225
T: (480) 689-5000 / F: (480) 659-3429
www.svssolutions.com

ROOF PLAN





SCALE: 3/32" = 1'

ROOF LEGEND

- ⊗ GAS VENT
- T-TOP VENT
- DORMER VENT

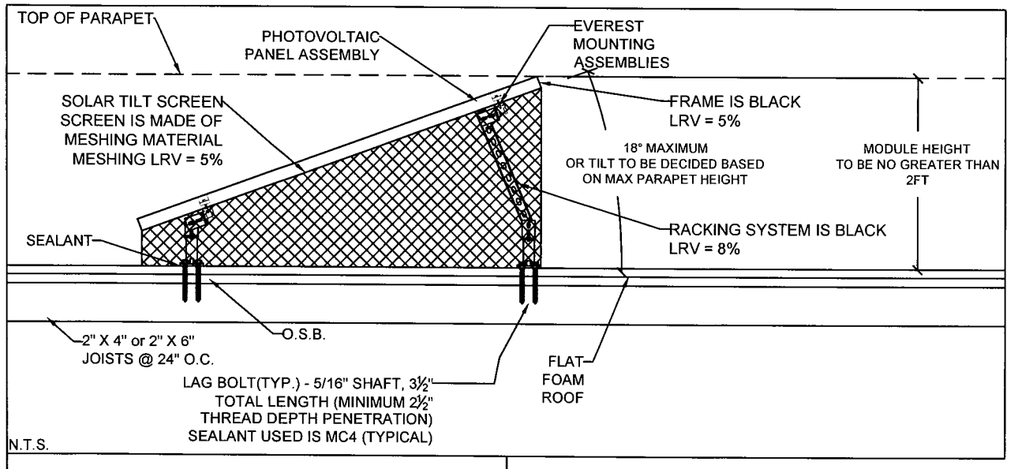
ROOF PLAN NOTES:

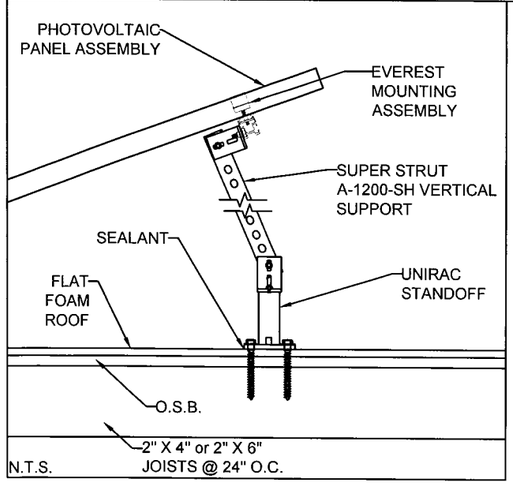
1. (NEW) PHOTOVOLTAIC PANEL ARRAY TILTED TO ROOF WITH 18DEG TILT
2. 2" x 4" TRUSS @ 24" O.C.
3. RACKING INFORMATION
   - EVEREST MOUNTING RAIL
   - UNIRAC STANDOFF – 4"
   - SUPERSTRUT A1200–SH–SUPPORT LEGS
   - TRUSS SPACING = 24" O.C.
   - PENETRATION POINTS = 4' SPACING
   - MOUNTING DETAIL

ROOF LOAD CALCULATIONS:

STRUCTURAL NOTES:
1) TOTAL ASSEMBLY WEIGHT: 2711.8 LBS
2) TOTAL AREA COVERED BY MODULES: 1030.6 FT2
3) DEAD LOAD = 2711.8 / 1030.6 = 2.6 LBS/FT2
4) POINT LOAD CALCULATIONS [# OF POINTS (116)] - 23.4 PSF
5) TOTAL DESIGN LOAD (DOWNFORCE) = 14.1 psf
6) TOTAL DESIGN LOAD (UPFORCE) = -28.5 psf

RAILS TO BE BONDED TO GROUND (EGC)
RAIL SPLICES TO BE ELECTRICALLY BONDED
FLASHING REQUIRED FOR STANDOFF PENETRATIONS
FOLLOW MODULE INSTRUCTION ON FRAME MOUNTING POINT





SHEET: PV2

DATE: 2/1/2017

Revision: 0

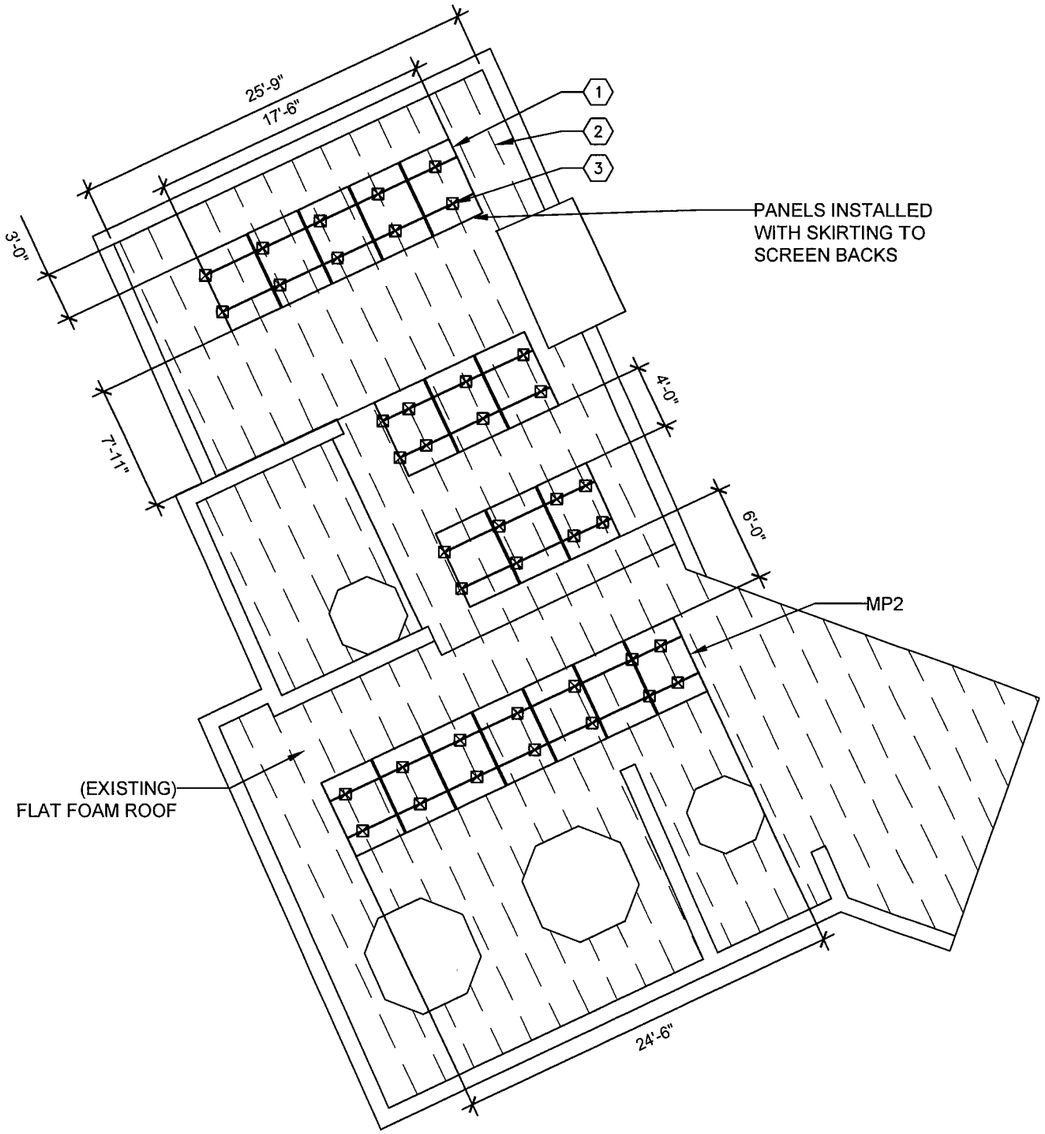
Designer: Alex Meehl

TITLE: ROOF PLAN
Lodato Residence
7903 N. 54th place, Paradise Valley, AZ 85253

20.000kW-AC
24,198W-DC

Sun Valley Solar Solutions LLC
3225 N Colorado St. Chandler, AZ 85225
T: (480) 688-5000 / F: (480) 659-3429
www.svssolutions.com

ROOF PLAN



270° 90° 180°

SCALE: 3/32" = 1'

MP2	PITCH: 18 AZIMUTH: 155 MATERIAL: Existing Foam MOUNTING: Tilt Structure

ROOF LEGEND

- ⊗ GAS VENT
- T-TOP VENT
- DORMER VENT

ROOF PLAN NOTES:

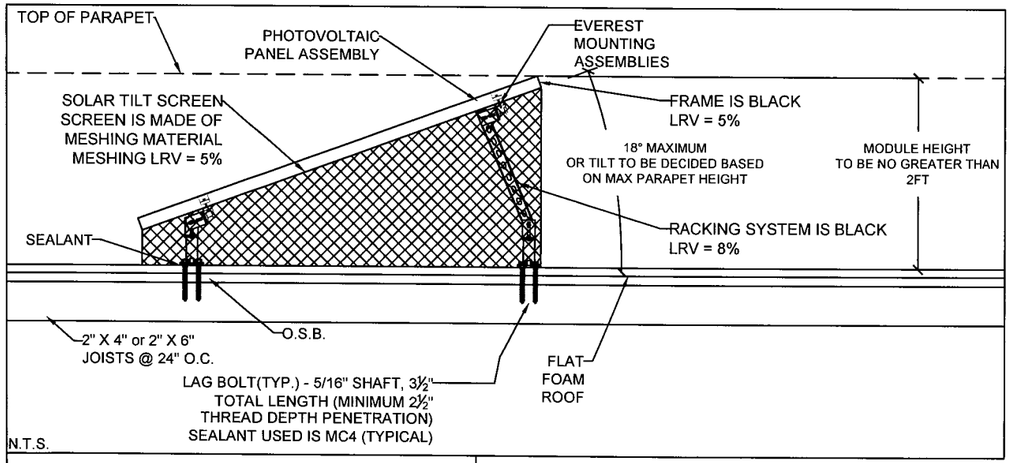
1. (NEW) PHOTOVOLTAIC PANEL ARRAY TILTED TO ROOF WITH 18DEG TILT
2. 2" x 4" TRUSS @ 24" O.C.
3. RACKING INFORMATION
   - EVEREST MOUNTING RAIL
   - UNIRAC STANDOFF – 4"
   - SUPERSTRUT A1200–SH–SUPPORT LEGS
   - TRUSS SPACING = 24" O.C.
   - PENETRATION POINTS = 4' SPACING
   - MOUNTING DETAIL

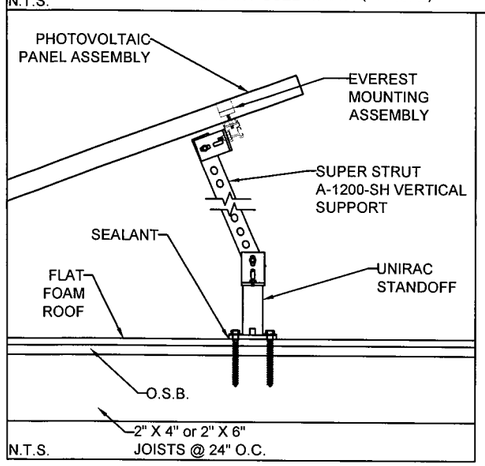
ROOF LOAD CALCULATIONS:

DESIGN PER ASCE 7-10 2.4.1 & IBC 2012
SOLAR MODULE WEIGHT = 41 LBS.
EXPOSURE CATEGORY = B
BASIC WIND SPEED = 115 MPH

STRUCTURAL NOTES:
1) TOTAL ASSEMBLY WEIGHT: 865.2 LBS
2) TOTAL AREA COVERED BY MODULES: 331.3 FT2
3) DEAD LOAD = 865.2 / 331.3 = 2.6 LBS/FT2
4) POINT LOAD CALCULATIONS [# OF POINTS (40)] - 21.6 PSF
5) TOTAL DESIGN LOAD (DOWNFORCE) = 14.0 psf
6) TOTAL DESIGN LOAD (UPFORCE) = -28.5 psf

RAILS TO BE BONDED TO GROUND (EGC)
RAIL SPLICES TO BE ELECTRICALLY BONDED
FLASHING REQUIRED FOR STANDOFF PENETRATIONS
FOLLOW MODULE INSTRUCTION ON FRAME MOUNTING POINT





SHEET: PV2.2

DATE: 2/1/2017

Revision: 0

Designer: Alex Meehl

TITLE: ROOF PLAN
Lodato Residence
7903 N. 54th place, Paradise Valley, AZ 85253

20.000kW-AC
24,198W-DC

Sun Valley Solar Solutions LLC
3225 N Colorado St. Chandler, AZ 85225
T: (480) 699-5000 / F: (480) 699-3429
www.svssolutions.com

ARRAY #1
Module: SunPower SPR-E20-327
Configuration: 2 strings of 8
Voc (string): 519.2 VDC
Isc (string): 6.46 X 1.25 = 8.08 A
Vmp (string): 437.6 VDC
Imp (string): 5.98 A
Max PV Current: 16.15 A
Max System Voltage: 581.50 VDC

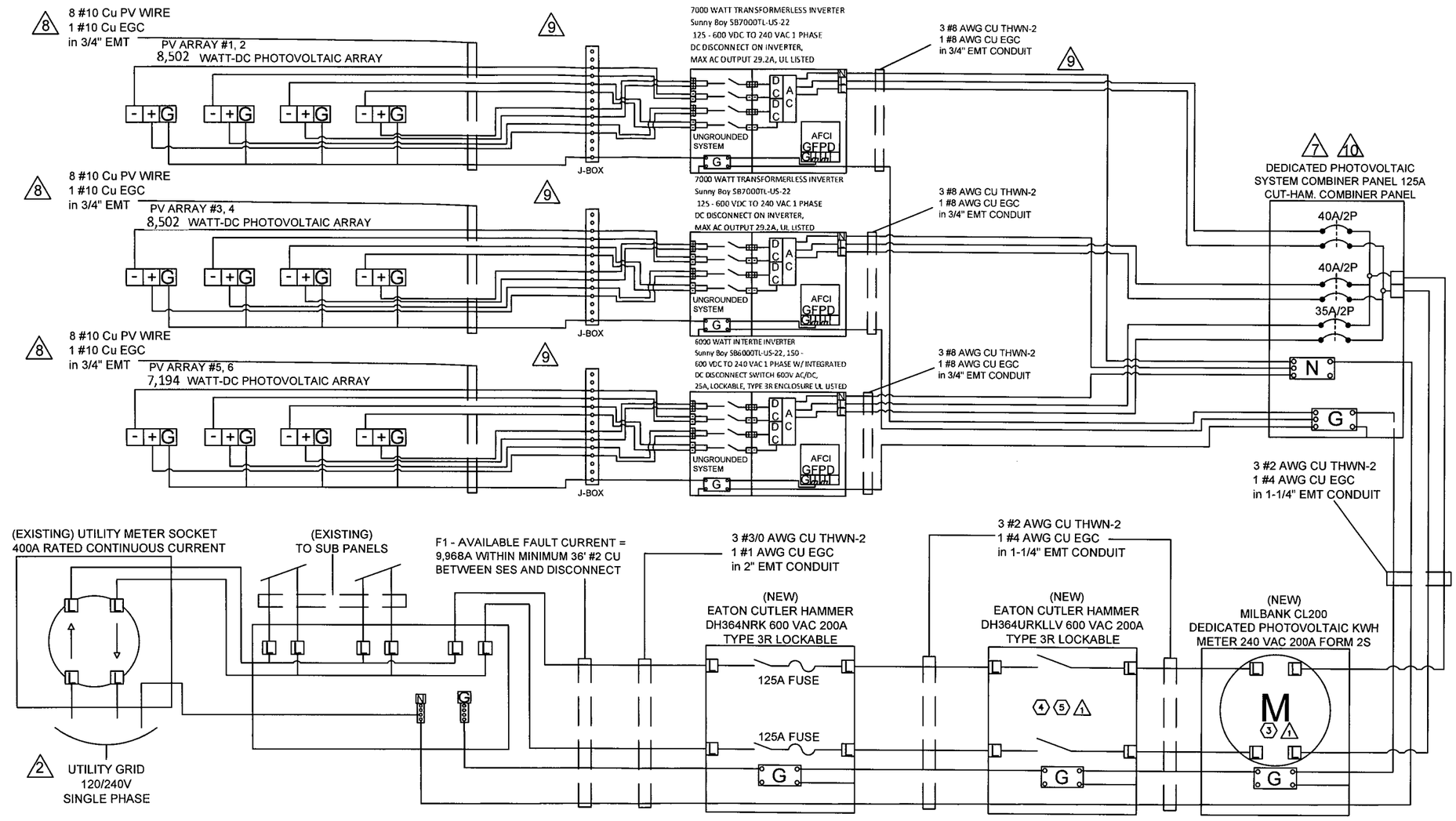
ARRAY #2
Module: SunPower SPR-E20-327
Configuration: 2 strings of 5
Voc (string): 324.5 VDC
Isc (string): 6.46 X 1.25 = 8.08 A
Vmp (string): 273.5 VDC
Imp (string): 5.98 A
Max PV Current: 16.15 A
Max System Voltage:581.50 VDC

ARRAY #3
Module: SunPower SPR-E20-327
Configuration: 2 strings of 8
Voc (string): 519.2 VDC
Isc (string): 6.46 X 1.25 = 8.08 A
Vmp (string): 437.6 VDC
Imp (string): 5.98 A
Max PV Current: 16.15 A
Max System Voltage: 581.50 VDC

ARRAY #4
Module:
Configuration: 2 strings of 5
Voc (string): 324.5 VDC
Isc (string): 6.46 X 1.25 = 8.08 A
Vmp (string): 273.5 VDC
Imp (string): 5.98 A
Max PV Current: 16.15 A
Max System Voltage:581.50 VDC

ARRAY #5
Module: SunPower SPR-E20-327
Configuration: 2 strings of 7 modules
Voc (string): 454.3 VDC
Isc (string): 6.46 X 1.25 = 8.08 A
Vmp (string): 382.9 VDC
Imp (string): 5.98 A
Max PV Current: 16.15 A
Max System Voltage: 454.30 VDC

ARRAY #6
Module: SunPower SPR-E20-327
Configuration: 2 strings of 4 modules
Voc (string): 259.6 VDC
Isc (string): 6.46 X 1.25 = 8.08 A
Vmp (string): 218.8 VDC
Imp (string): 5.98 A
Max PV Current: 16.15 A
Max System Voltage: 454.30 VDC



SYSTEM REQUIREMENTS

1. -EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE NEC 2011 690 AND ALL APPLICABLE REQUIREMENTS OF THE SERVING ELECTRIC UTILITY COMPANY AND OF THE LOCAL AUTHORITY HAVING JURISDICTION
2. -LISTING AGENCY NAME AND NUMBERS TO BE INDICATED ON POWER INVERTER AND SOLAR MODULES PER NEC 110.3(B).
3. -METALLIC CONDUIT SHALL BE USED WITHIN BUILDINGS PER NEC 690.31(E). EMT BONDED PER NEC 110.3(B).
4. -GEC TO BE INSTALLED AS REQUIRED BY MANUFACTURER AND NEC 690.47
5. -BI-DIRECTIONAL UTILITY METER TO BE INSTALLED BY UTILITY COMPANY

LABEL REQUIREMENTS

1. -LABEL "PHOTOVOLTAIC ARRAY DC DISCONNECT SWITCH" PER NEC 690.14(C)(2). LABEL WITH OPERATING CURRENT, OPERATING VOLTAGE, MAX SYSTEM VOLTAGE AND SHORT CIRCUIT CURRENT PER NEC 690.53.
2. -LABEL WARNING SIGN PER NEC 690.35 READING "WARNING - ELECTRIC SHOCK HAZARD - THE DC CONDUCTORS OF THIS PHOTOVOLTAIC SYSTEM ARE UNGROUNDED AND MAY BE ENERGIZED"
3. -LABEL "PHOTOVOLTAIC POWER SYSTEM DEDICATED KWH METER"
4. -LABEL "PHOTOVOLTAIC SYSTEM AC UTILITY DISCONNECT SWITCH". SWITCH COVER TO BE LOCKABLE. SWITCH TO BE VISIBLE BLADE AND ACCESSIBLE PER UTILITY REQUIREMENTS AND CONFORM TO NEC 705.22.
5. -LABEL WARNING SIGN PER NEC 690.17 READING "WARNING - ELECTRIC SHOCK HAZARD - DO NOT TOUCH TERMINALS. TERMINAL ON BOTH THE LINE AND LOAD SIDE MAY BE ENERGIZED IN THE OPEN POSITION".
6. -LABEL WARNING SIGN PER NEC 690.64(B)(7) & NEC 705.12(D)(7) READING "WARNING INVERTER OUTPUT CONNECTION DO NOT RELOCATE THIS OVERCORRECT PROTECTION DEVICE". LOCATE AT OPPOSITE END OF BUS FROM MAIN BREAKER LOCATION
7. -LABEL BREAKER "PHOTOVOLTAIC ELECTRIC POWER SOURCE" PER NEC 705.10, AND "BREAKERS ARE BACKFED" PER NEC690-64(B)(5). LABEL WITH THE MAX AC OUTPUT OPERATION CURRENT AND THE OPERATING VOLTAGE PER NEC 690.54.
8. -LABEL COMBINER PANEL "DEDICATED PHOTOVOLATIC SYSTEM COMBINER PANEL" AND "LOADS NOT TO BE ADDED TO THIS PANEL"
9. -LABEL "BREAKER HAS BEEN DE-RATED PER NEC 690.64(B)(2)"

ELECTRICAL CALCULATIONS

COMBINER PANEL CALCULATIONS
Wire Size: 2 AWG
# of Wires: 0-3
Wire Amp @ 75 deg: 115 Amp
Wire Amp @ 90 deg: 130 Amp
Conduit Fill Adjustment: 1
Ambient Temp (C)*: 41-45
*Temp Adjustment: 0.87 VDC

AC Comb Current 104.25 Amp (Inverter 1 + Inverter 2 + Inverter 3)*1.25
Conductor Ampacity 113.1 Amp (Temp. and Fill Adjusted)
OCPD = 125 Amp

Sunny Boy SB7000TL-US-22
Max PV Power: 9125 Watt
DC Max Voltage: 600 VDC
DC Max Input Current: 30 Amp
AC Nom Power: 7000 Watt
AC Max Output Current: 29.2 Amp
AC OCPD Required 36.5 Amp
OCPD = 40 Amp

DC Wire Size: 10 AWG
# of Wires: 7-9
Wire Amp @ 75 deg: 35 Amp
Wire Amp @ 90 deg: 40 Amp
Conduit Fill Adjustment: 0.7
Ambient Temp (C)*: 51-55
Temp Adjustment: 0.76
Resistance: 1.21 Ohm/1000ft
Adj. DC Wire Ampacity 21.28 A

AC Wire Size: 8 AWG
# of Wires: 0-3
Wire Amp @ 75 deg: 50 Amp
Wire Amp @ 90 deg: 55 Amp
Conduit Fill Adjustment: 1
Ambient Temp (C)*: 41-45
*Temp Adjustment: 0.87
Resistance: 0.764 Ohm/1000ft
Adj. AC Conductor Ampacity 47.85 A

Inverter: Sunny Boy SB7000TL-US-22
Max PV Power: 8760 Watt
DC Max Voltage: 600 VDC
DC Max Input Current: 30 Amp
AC Nom Power: 7000 Watt
AC Max Output Current: 29.2 Amp
Minimum Start Voltage: 150 VDC
Minimum Op. Voltage: 125 VDC
AC OCPD Required 36.5 Amp
OCPD = 40 Amp

DC Wire Size: 10 AWG
# of Wires: 7-9
Wire Amp @ 75 deg: 35 Amp
Wire Amp @ 90 deg: 40 Amp
Conduit Fill Adjustment: 0.7
Ambient Temp (C)*: 41-45
Temp Adjustment: 0.87
Resistance: 1.21 Ohm/1000ft
Adj. DC Wire Ampacity 24.36 A

AC Wire Size: 8 AWG
# of Wires: 0-3
Wire Amp @ 75 deg: 50 Amp
Wire Amp @ 90 deg: 55 Amp
Conduit Fill Adjustment: 1
Ambient Temp (C)*: 41-45
*Temp Adjustment: 0.87
Resistance: 0.764 Ohm/1000ft
Adj. AC Conductor Ampacity 40 A

Inverter: Sunny Boy SB6000TL-US-22
Max PV Power: 7560 Watt
DC Max Voltage: 600 VDC
DC Max Input Current: 30 Amp
AC Nom Power: 6000 Watt
AC Max Output Current: 25 Amp
Minimum Start Voltage: 150 VDC
Minimum Op. Voltage: 210 VDC
AC OCPD Required. 31.25 Amp
OCPD = 35 Amp

DC Wire Size: 10 AWG
# of Wires: 0-3
Wire Amp @ 75 deg: 35 Amp
Wire Amp @ 90 deg: 40 Amp
Conduit Fill Adjustment: 1
Ambient Temp (C)*: 41-45
Temp Adjustment: 0.87
Resistance: 1.21 Ohm/1000ft
Adj. DC Wire Ampacity 34.8 A

AC Wire Size: 8 AWG
# of Wires: 0-3
Wire Amp @ 75 deg: 50 Amp
Wire Amp @ 90 deg: 55 Amp
Conduit Fill Adjustment: 1
Ambient Temp (C)*: 41-45
*Temp Adjustment: 0.87
Resistance: 0.764 Ohm/1000ft
Adj. AC Conductor Ampacity 35 A

SHEET: E1
DATE: 10/5/2016
Revision: 0
Designer: Alex Meehl
Title: 3-LINE
20.000kW-AC
24,198W-DC
Lodato Residence
7903 N. 54th place, Paradise Valley , AZ 85253

Sun Valley Solar Solutions LLC
3225 N Colorado St. Chandler, AZ 85225
T: (480) 659-5000 / F: (480) 659-3429
www.svssolutions.com

SYSTEM EQUIPMENT TAG LIST

1 REQ'D BY: NEC 690.5 (C)
APPLY TO: TRANSFORMERLESS INVERTERS / DC J-BOX / DC DISCONNECTS

WARNING
ELECTRIC SHOCK HAZARD.
THE DC CONDUCTORS OF THIS PHOTOVOLTAIC SYSTEM ARE UNGROUNDED AND MAY BE ENERGIZED

2 REQ'D BY: NEC 690.54
APPLY TO: AC PANEL

PHOTOVOLTAIC POWER SOURCE
BREAKERS ARE BACKFED
MAX AC CURRENT: ___ A
OPERATING VOLTAGE: 240 VAC

3 REQ'D BY:
APPLY TO: PV KWH METER

PHOTOVOLTAIC SYSTEM METER

4 REQ'D BY: NEC 690.14(C)(2)
APPLY TO: AC DISCONNECT

PHOTOVOLTAIC SYSTEM
AC UTILITY DISCONNECT SWITCH

5 REQ'D BY: NEC 690.17
APPLY TO: DISCONNECT, COMBINER PANELS

WARNING - ELECTRIC SHOCK HAZARD
DO NOT TOUCH TERMINALS - TERMINALS ON BOTH THE LINE AND LOAD MAY BE ENERGIZED IN THE OFF POSITION

PHOTOVOLTAIC POWER SOURCE
BREAKERS ARE BACKFEEDING

6 REQ'D BY:
APPLY TO: DEAD FRONT

7 REQ'D BY: NEC 690.53
APPLY TO: DC DISCONNECT

8 REQ'D BY: 2012 IFC 605.11.1.1 -605.11.1.4
2012 NEC 690.31 (E)(3)

- LABEL WITH CAPITALIZED LETTERS MINIMUM HEIGHT 3/8 INCH WHITE LETTERS ON RED BACKGROUND
- LABEL MUST BE REFLECTIVE AND WEATHER RESISTANT
- LABEL PLACED ON INTERIOR AND EXTERIOR DC CONDUIT, RACEWAYS, ENCLOSURES AND CABLE ASSEMBLIES EVERY 10 FEET, WITHIN 1 FOOT OF TURNS OR BENDS AND WITHIN 1 FOOT ABOVE AND BELOW PENETRATIONS OF ROOF/CELINGS ASSEMBLIES, WALL OR BARRIERS.

9 REQ'D BY: NEC 690.64(B)(2)
APPLY TO: ABOVE MAIN BREAKER

BREAKER HAS BEEN DE-RATED PER NEC 690.64(B)(2)

10 REQ'D BY: UTILITY
APPLY TO:

WARNING
OTHER POWER SOURCE CONNECTED IS A PHOTOVOLTAIC SYSTEM
UTILITY DISCONNECT SWITCH FOR THIS SOURCE IS LOCATED APPROX.

11 REQ'D BY:
APPLY TO: FRONT COMBINER PANEL

DEDICATED PHOTOVOLTAIC SYSTEM COMBINER PANEL
LOADS NOT TO BE ADDED TO THIS PANEL

12 REQ'D BY: SUN VALLEY SOLAR
APPLY TO: INVERTERS

QUALITY INSTALLATION BY:
SUN VALLEY SOLAR SOLUTIONS
3225 N Colorado St
Chandler, AZ 85225
PHONE: 1 888 5 SOLAR UP

INVERTER 1	PHOTOVOLTAIC ARRAY DC DISCONNECT SWITCH Voc: 519.2 VDC Isc: 8.08 A Vop: 437.6 VDC Iop: 5.98 A Max System Voltage: 581.50 VDC MPPT 1	PHOTOVOLTAIC ARRAY DC DISCONNECT SWITCH Voc: 324.5 VDC Isc: 8.08 A Vop: 273.5 VDC Iop: 5.98 A Max System Voltage: 363.44 VDC MPPT 2
INVERTER 2	PHOTOVOLTAIC ARRAY DC DISCONNECT SWITCH Voc: 519.2 VDC Isc: 8.08 A Vop: 437.6 VDC Iop: 5.98 A Max System Voltage: 581.50 VDC MPPT 1	PHOTOVOLTAIC ARRAY DC DISCONNECT SWITCH Voc: 324.5 VDC Isc: 8.08 A Vop: 273.5 VDC Iop: 5.98 A Max System Voltage: 363.44 VDC MPPT 2
INVERTER 3	PHOTOVOLTAIC ARRAY DC DISCONNECT SWITCH Voc: 454.3 VDC Isc: 8.08A Vop: 382.9 VDC Iop: 5.98A Max System Voltage: 508.82 VDC MPPT 1	PHOTOVOLTAIC ARRAY DC DISCONNECT SWITCH Voc: 324.5 VDC Isc: 8.08A Vop: 273.5 VDC Iop: 5.98A Max System Voltage: 363.44 VDC MPPT 2

WARNING:
PHOTOVOLTAIC
POWER SOURCE

WARNING: PHOTOVOLTAIC POWER SOURCE

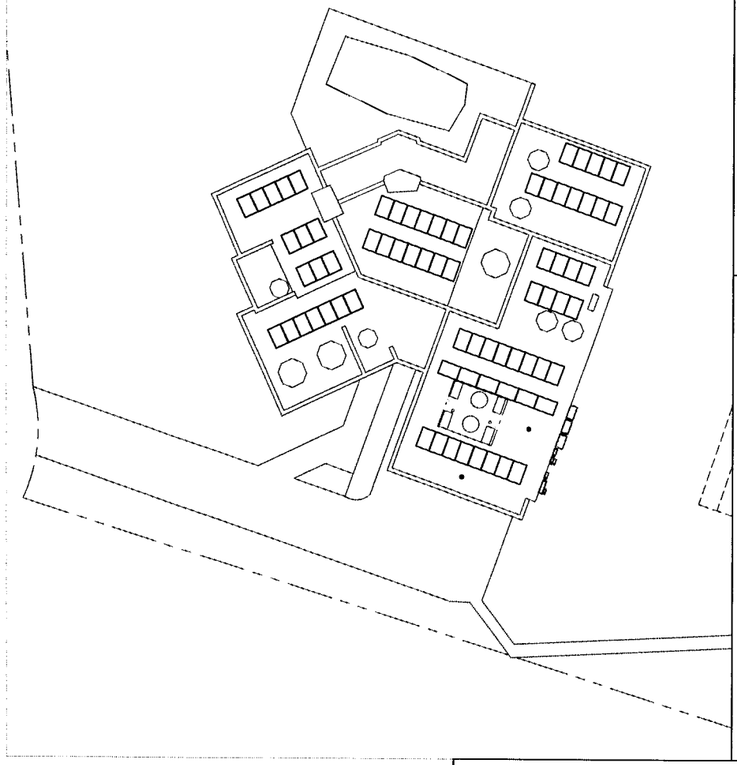
Notes:
-
-
-

Competent Person: _____

Crew Lead: _____

Emergency Center

N



REQUIRED PPE

- ☐ STEEL TOE BOOTS
- ☐ HARD HAT
- ☐ HARNESS/FALL PROTECTION
- ☐ SAFTEY GLASSES
- ☐ GLOVES
- ☐ HIGH VOLTAGE GLOVES

ELECTRICAL PPE CAT

- ☐ -0
- ☐ -1
- ☐ -2
- ☐ -3
- ☐ -4

SPECIALTY

Mark Up Key

- (P) Permanent Anchor
- (T) Temporary Anchor
- (D) Warning Line Delineator
- (G) Guard Rail Stanchon
- (IL) Installer Ladder
- (AL) Auditor Ladder
- (CB) Combiner Box
- (SO) Stubout
- ☒ SkyLight
- No Ladder Access
- ☐ Restricted Area
- Conduit

OSHA SECTIONS PURSUANT TO JOB TASKS:

Ladders-1926 Subpart X	☐ PPE & Life Saving Equip-1926 Subpart E
Fall Protection-1926 Subpart M	☐ Lifelines & Lanyards-1926.104
Electrical-1926 Subpart K	☐ Tools-Hand and Power-1926-Subpart I
Excavation-1926 Subpart P	☐ Toxic Substances-1926 Subpart Z
First Aid & Medical-1926.23	☐ Steel Erection- 1926 Subpart R

Installer Signatures:

1._____ 5._____
2._____ 6._____
3._____ 7._____
4._____ 8._____

SHEET: L1

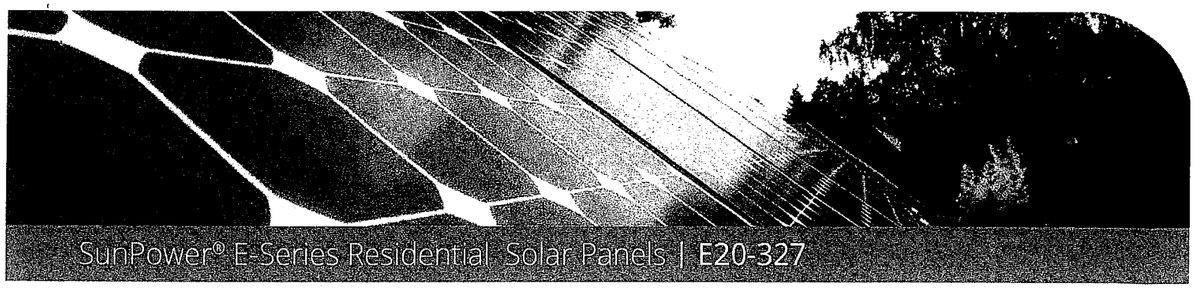
DATE: 10/5/2016

Revision: 0

Designer: Alex Meehl

TITLE: LABELS - SAFETY20.000kW-AC
Lodato Residence 24,198W-DC
7903 N. 54th place, Paradise Valley, AZ 85253

Sun Valley Solar Solutions LLC
3225 N Colorado St, Chandler, AZ 85225
T: (480) 659-5000 / F: (480) 659-3429
www.svssolutions.com



SunPower® E-Series Residential Solar Panels | E20-327

More than 20% Efficiency

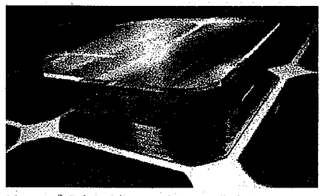
Ideal for roofs where space is at a premium or where future expansion might be needed.

High Performance

Delivers excellent performance in real world conditions, such as high temperatures, clouds and low light.[1,2,4]

Proven Value

Designed for residential rooftops, E-Series panels deliver the features, value and performance for any home.



Maxeon® Solar Cells: Fundamentally better.
Engineered for performance, designed for durability.

Engineered for Peace of Mind

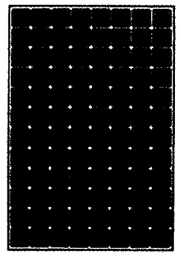
Designed to deliver consistent, trouble-free energy over a very long lifetime.[3,4]

Designed for Durability

The SunPower Maxeon Solar Cell is the only cell built on a solid copper foundation. Virtually impervious to the corrosion and cracking that degrade Conventional Panels.[3]

#1 Rank in Fraunhofer durability test.[9]
100% power maintained in Atlas 25+ comprehensive Durability test.[10]

High Performance & Excellent Durability



SPR-E20-327

E20 SERIES

High Efficiency[5]

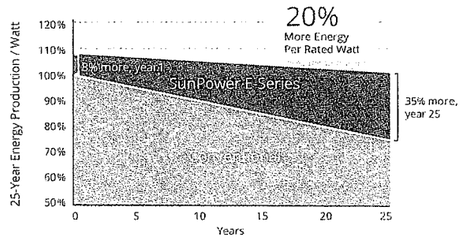
Generate more energy per square foot

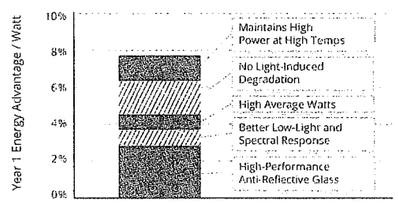
E-Series residential panels convert more sunlight to electricity producing 31% more power per panel,[1] and 60% more energy per square foot over 25 years.[1,2,3]

High Energy Production[7]

Produce more energy per rated watt

High year one performance delivers 7-9% more energy per rated watt.[2] This advantage increases over time, producing 20% more energy over the first 25 years to meet your needs.[3]

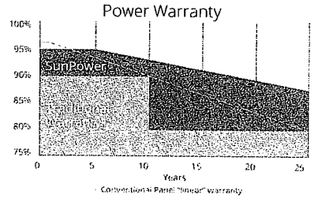




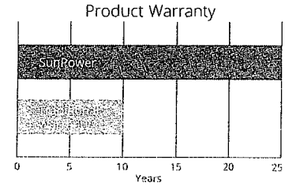
SUNPOWER®

SunPower® E-Series Residential Solar Panels | E20-327

Sunpower Offers The Best Combined Power And Product Warranty



More guaranteed power: 95% for first 5 years, -0.4%/yr. to year 25.[7]



Combined Power and Product defect 25 year coverage that includes panel replacement costs.[8]

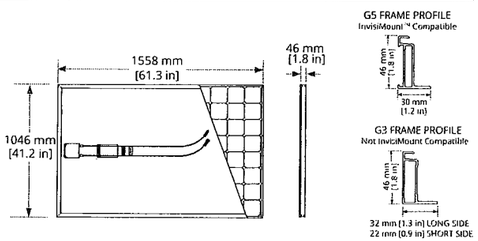
Electrical Data	SPR-E20-327	SPR-E19-320
Nominal Power (Pnom)[11]	327 W	320 W
Power Tolerance	+5/–0%	+5/–0%
Avg. Panel Efficiency[12]	20.4%	19.9%
Rated Voltage (Vmpp)	54.7 V	54.7 V
Rated Current (Impp)	5.98 A	5.86 A
Open-Circuit Voltage (Voc)	64.9 V	64.8 V
Short-Circuit Current (Isc)	6.46 A	6.24 A
Max. System Voltage	600 V UL & 1000 V IEC	
Maximum Series Fuse	15 A	
Power Temp Coef.	–0.38% / °C	
Voltage Temp Coef.	–176.6 mV / °C	
Current Temp Coef.	3.5 mA / °C	

Tests And Certifications	
Standard tests[13]	UL1703 (Type 2 Fire Rating), IEC 61215, IEC 61730
Quality Certs	ISO 9001:2008, ISO 14001:2004
EHS Compliance	RoHS, OHSAS 18001:2007, lead free, REACH SVHC-155, PV Cycle
Sustainability	Cradle to Cradle (eligible for LEED points)[14]
Ammonia test	IEC 62716
Desert test	10.1109/PVSC.2013.6744437
Salt Spray test	IEC 61701 (maximum severity)
PID test	Potential-Induced Degradation free: 1000V[9]
Available listings	UL, CEC, CSA, TUV, JET, MCS, FSEC

Operating Condition And Mechanical Data	
Temperature	– 40°F to +185°F (– 40°C to +85°C)
Impact resistance	1 inch (25mm) diameter hail at 52 mph (23 m/s)
Appearance	Class A
Solar Cells	96 Monocrystalline Maxeon Gen II
Tempered Glass	High transmission tempered Anti-Reflective
Junction Box	IP-65, MC4 Compatible
Weight	41 lbs (18.6 kg)
Max load	G5 Frame: Wind: 62 psf, 3000 Pa, 305 kg/m² front & back Snow: 125 psf, 6000 Pa, 611 kg/m² front G3 Frame: Wind: 50 psf, 2400 Pa, 244 kg/m² front & back Snow: 112 psf, 5400 Pa, 550 kg/m² front
Frame	Class 1 black anodized (highest AAMA rating)

REFERENCES:
1 All comparisons are SPR-E20-327 vs. a representative conventional panel: 250W, approx. 1.6 m², 15.3% efficiency.
2 Typically 7-9% more energy per watt, BEW/DNV Engineering "SunPower Yield Report," Jan 2013.
3 SunPower 0.25%/yr degradation vs. 1.0%/yr conv. panel. Campeau, Z. et al. "SunPower Module Degradation Rate," SunPower white paper, Feb 2013; Jordan, Dirk "SunPower Test Report," NREL, Q1-2015.
4 "SunPower Module 40-Year Useful Life" SunPower white paper, May 2015. Useful life is 99 out of 100 panels operating at more than 70% of rated power.
5 Second highest, after SunPower X-Series, of over 3,200 silicon solar panels. Photon Module Survey, Feb 2014.
6 8% more energy than the average of the top 10 panel companies tested in 2012 (151 panels, 102 companies), Photon International, Feb 2013.
7 Compared with the top 15 manufacturers. SunPower Warranty Review, May 2015.
8 Some restrictions and exclusions may apply. See warranty for details.
9 5 of top 8 panel manufacturers tested in 2013 report, 3 additional panels in 2014. Ferrara, C., et al. "Fraunhofer PV Durability Initiative for Solar Modules: Part 2". Photovoltaics International, 2014.
10 Compared with the non-stress-tested control panel. Atlas 25+ Durability test report, Feb 2013.
11 Standard Test Conditions (1000 W/m² irradiance, AM 1.5, 25° C). NREL calibration Standard: SOMS current, LACCS FF and Voltage.
12 Based on average of measured power values during production.
13 Type 2 fire rating per UL1703:2013, Class C fire rating per UL1703:2002.
14 See sales person for details.

See http://www.sunpower.com/facts for more reference information.
For more details, see extended datasheet: www.sunpower.com/datasheets.

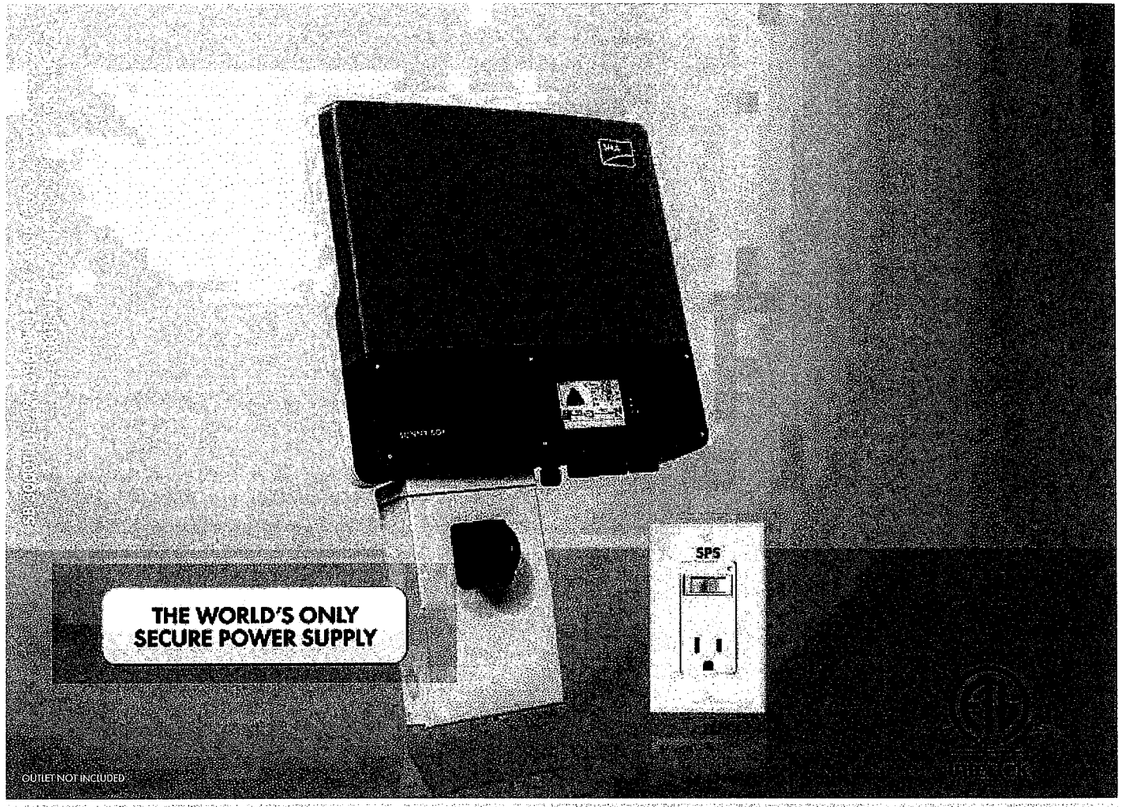


G5 frames have no mounting holes. Please read the safety and installation guide.

Document # 504860 Rev E /LTR_US

SUNPOWER®

SUNNY BOY 3000TL-US / 3800TL-US / 4000TL-US / 5000TL-US / 6000TL-US / 7000TL-US / 7700TL-US



Certified
- UL 1741 and 1699B compliant
- Integrated AFCI meets the requirements of NEC 2011 690.11

Innovative
- Secure Power Supply provides daytime power during grid outages

Powerful
- 97.6% maximum efficiency
- Wide input voltage range
- Shade management with OptiTrac Global Peak MPP tracking

Flexible
- Two MPP trackers provide numerous design options
- Extended operating temperature range

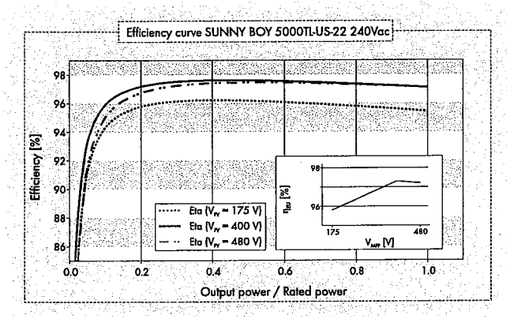
SUNNY BOY 3000TL-US / 3800TL-US /4000TL-US / 5000TL-US / 6000TL-US / 7000TL-US / 7700TL-US

Setting new heights in residential inverter performance

The Sunny Boy 3000TL-US/3800TL-US/4000TL-US/5000TL-US/6000TL-US/7000TL-US/7700TL-US represents the next step in performance for UL certified inverters. Its transformerless design means high efficiency and reduced weight. Maximum power production is derived from wide input voltage and operating temperature ranges. Multiple MPP trackers and OptiTrac™ Global Peak mitigate the effect of shade and allow for installation at challenging sites. The unique Secure Power Supply feature provides daytime power in the event of a grid outage. High performance, flexible design and innovative features make the Sunny Boy TL-US series the first choice among solar professionals.

MADE IN THE USA OF U.S. AND IMPORTED PARTS

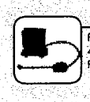
Technical data	Sunny Boy 3000TL-US		Sunny Boy 3800TL-US		Sunny Boy 4000TL-US	
	208 V AC	240 V AC	208 V AC	240 V AC	208 V AC	240 V AC
Input (DC)						
Max. usable DC power (@ cos φ = 1)	3200 W		4200 W		4200 W	
Max. DC voltage	600 V		600 V		600 V	
Rated MPPT voltage range	175 - 480 V		175 - 480 V		175 - 480 V	
MPPT operating voltage range	125 - 500 V		125 - 500 V		125 - 500 V	
Min. DC voltage / start voltage	125 V / 150 V		125 V / 150 V		125 V / 150 V	
Max. operating input current / per MPP tracker	18 A / 15 A		24 A / 15 A		24 A / 15 A	
Number of MPP trackers / strings per MPP tracker			2 / 2			
Output (AC)						
AC nominal power	3000 W		3330 W	3840 W	4000 W	
Max. AC apparent power	3000 VA		3330 VA	3840 VA	4000 VA	
Nominal AC voltage / adjustable	208 V / ●	240 V / ●	208 V / ●	240 V / ●	208 V / ●	240 V / ●
AC voltage range	183 - 229 V	211 - 264 V	183 - 229 V	211 - 264 V	183 - 229 V	211 - 264 V
AC grid frequency; range	60 Hz / 59.3 - 60.5 Hz		60 Hz / 59.3 - 60.5 Hz		60 Hz / 59.3 - 60.5 Hz	
Max. output current	15 A		16 A		20 A	
Power factor (cos φ)	1		1		1	
Output phases / line connections	1 / 2		1 / 2		1 / 2	
Harmonics	< 4%		< 4%		< 4%	
Efficiency						
Max. efficiency	97.2%	97.6%	97.2%	97.5%	97.2%	97.5%
CEC efficiency	96.5%	96.5%	96.5%	97.0%	96.5%	97.0%
Protection devices						
DC disconnection device			●			
DC reverse-polarity protection			●			
Ground fault monitoring / Grid monitoring			● / ●			
AC short circuit protection			●			
All-pole sensitive residual current monitoring unit			●			
Arc fault circuit interrupter (AFCI) compliant to UL 1699B			●			
Protection class / overvoltage category			I / IV			
General data						
Dimensions (W / H / D) in mm (in)			490 / 519 / 185 (19.3 / 20.5 / 7.3)			
DC Disconnect dimensions (W / H / D) in mm (in)			187 / 297 / 190 (7.4 / 11.7 / 7.5)			
Packing dimensions (W / H / D) in mm (in)			617 / 597 / 266 (24.3 / 23.5 / 10.5)			
DC Disconnect packing dimensions (W / H / D) in mm (in)			370 / 240 / 280 (14.6 / 9.4 / 11.0)			
Weight / DC Disconnect weight			24 kg (53 lb) / 3.5 kg (8 lb)			
Packing weight / DC Disconnect packing weight			27 kg (60 lb) / 3.5 kg (8 lb)			
Operating temperature range			-40 °C ... +60 °C (-40 °F ... +140 °F)			
Noise emission (typical)	≤ 25 dB(A)		< 25 dB(A)		< 25 dB(A)	
Internal consumption at night	< 1 W		< 1 W		< 1 W	
Topology	Transformerless		Transformerless		Transformerless	
Cooling	Convection		Convection		Convection	
Electronics protection rating	NEMA 3R		NEMA 3R		NEMA 3R	
Features						
Secure Power Supply	●		●		●	
Display: graphic	●		●		●	
Interfaces: RS485 / Speedwire/Webconnect	o/o		o/o		o/o	
Warranty: 10 / 15 / 20 years	●/o/o		●/o/o		●/o/o	
Certificates and permits (more available on request)	UL 1741, UL 1998, UL 1699B, IEEE1547, FCC Part 15 (Class A & B), CAN/CSA C22.2 107.1-1					
NOTE: US inverters ship with gray lids						
Type designation	SB 3000TL-US-22		SB 3800TL-US-22		SB 4000TL-US-22	



Accessories

Speedwire/Webconnect Interface
SWDM-US-10

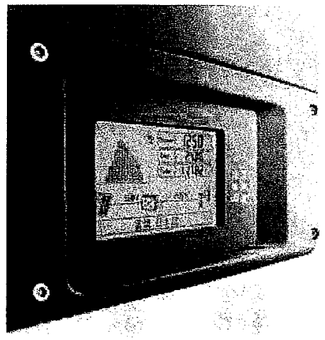
RS485 interface
DM-485CB-US-10

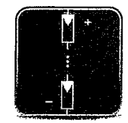


Fan kit for SB 3000/3800/ 4000/5000TL-US-22
FANKIT02-10

● Standard feature ○ Optional feature – Not available
Data at nominal conditions

Sunny Boy 5000TL-US		Sunny Boy 6000TL-US		Sunny Boy 7000TL-US		Sunny Boy 7700TL-US	
208 V AC	**240 V AC**	**208 V AC**	**240 V AC**	**208 V AC**	**240 V AC**	**208 V AC**	**240 V AC**
5300 W		6300 W		7300 W		8000 W	
600 V		600 V		600 V		600 V	
175 - 480 V		210 - 480 V		245 - 480 V		270 - 480 V	
125 - 500 V		125 - 500 V		125 - 500 V		125 - 500 V	
125 V / 150 V		125 V / 150 V		125 V / 150 V		125 V / 150 V	
30 A / 15 A		30 A / 15 A		30 A / 18 A		30 A / 18 A	
4550 W	5000 W	5200 W	6000 W	6000 W	7000 W	6650 W	7680 W
4550 VA	5000 VA	5200 VA	6000 VA	6000 VA	7000 VA	6650 VA	7680 VA
208 V / ●	240 V / ●	208 V / ●	240 V / ●	208 V / ●	240 V / ●	208 V / ●	240 V / ●
183 - 229 V	211 - 264 V	183 - 229 V	211 - 264 V	183 - 229 V	211 - 264 V	183 - 229 V	211 - 264 V
60 Hz / 59.3 - 60.5 Hz		60 Hz / 59.3 - 60.5 Hz		60 Hz / 59.3 - 60.5 Hz		60 Hz / 59.3 - 60.5 Hz	
22 A		25 A		29.2 A		32 A	
1		1		1		1	
1 / 2		1 / 2		1 / 2		1 / 2	
< 4%		< 4%		< 4%		< 4%	
97.2%	97.6%	97.0%	97.4%	96.8%	96.8%	96.8%	97.3%
96.5%	97.0%	96.5%	97.0%	96.5%	96.5%	96.5%	96.5%
● / ●		● / ●		● / ●		● / ●	
●		●		●		●	
●		●		●		●	
●		●		●		●	
●		●		●		●	
I / IV		I / IV		I / IV		I / IV	
490 / 519 / 185 (19.3 / 20.5 / 7.3)							
187 / 297 / 190 (7.4 / 11.7 / 7.5)							
617 / 597 / 266 (24.3 / 23.5 / 10.5)							
370 / 240 / 280 (14.6 / 9.4 / 11.0)							
24 kg (53 lb) / 3.5 kg (8 lb)							
27 kg (60 lb) / 3.5 kg (8 lb)							
-40 °C ... +60 °C (-40 °F ... +140 °F)							
< 29 dB(A)		< 29 dB(A)		< 29 dB(A)		< 29 dB(A)	
< 1 W		< 1 W		< 1 W		< 1 W	
Transformerless		Transformerless		Transformerless		Transformerless	
Convection		Fan		Fan		Fan	
NEMA 3R		NEMA 3R		NEMA 3R		NEMA 3R	
●		●		●		●	
●		●		●		●	
○/○		○/○		○/○		○/○	
●/○/○		●/○/○		●/○/○		●/○/○	
UL 1741, UL 1998, UL 1699B, IEEE1547, FCC Part 15 (Class A & B), CAN/CSA C22.2 107.1-1							
SB 5000TL-US-22		SB 6000TL-US-22		SB 7000TL-US-22		SB 7700TL-US-22	



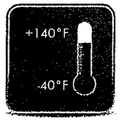


More efficient

Shade management

Easier

Secure Power Supply



Broad temperature range

Flexible communications

A NEW GENERATION OF INNOVATION

THE SUNNY BOY TL-US RESIDENTIAL SERIES HAS YET AGAIN REDEFINED THE CATEGORY.

Transformerless design

The Sunny Boy 3000TL-US / 3800TL-US / 4000TL-US / 5000TL-US / 6000TL-US / 7000TL-US / 7700TL-US are transformerless inverters, which means owners and installers benefit from high efficiency and lower weight. A wide input voltage range also means the inverters will produce high amounts of power under a number of conditions.

Additionally, transformerless inverters have been shown to be among the safest string inverters on the market. An industry first, the TL-US series has been tested to UL 1741 and UL 1699B and is in compliance with the arc fault requirements of NEC 2011.

Increased energy production

OptiTrac™ Global Peak, SMA's shade-tolerant MPP tracking algorithm, quickly adjusts to changes in solar irradiation, which mitigates the effects of shade and results in higher total power output. And, with two MPP trackers, the TL-US series can ably handle complex roofs with multiple orientations or string lengths.

An extended operating temperature range of -40 °F to +140 °F ensures power is produced in all types of climates and for longer periods of time than with most traditional string inverters.

Secure Power Supply

One of many unique features of the TL-US residential series is its innovative Secure Power Supply. With most grid-tied inverters, when the grid goes down, so does the solar-powered home. SMA's solution provides daytime energy to a dedicated power outlet during prolonged grid outages, providing homeowners with access to power as long as the sun shines.

Simple installation

As a transformerless inverter, the TL-US residential series is lighter in weight than its transformer-based counterparts, making it easier to lift and transport. A new wall mounting plate features anti-theft security and makes hanging the inverter quick and easy. A simplified DC wiring concept allows the DC disconnect to be used as a wire raceway, saving labor and materials.

The 3800TL-US and 7700TL-US models allow installers to maximize system size and energy production for customers with 100 A and 200 A service panels.

Leading monitoring and control solutions

The new TL-US residential line features more than high performance and a large graphic display. The monitoring and control options provide users with an outstanding degree of flexibility. Multiple communication options allow for a highly controllable inverter and one that can be monitored on Sunny Portal from anywhere on the planet via an Internet connection. Whether communicating through RS485, or SMA's new plug-and-play WebConnect, installers can find an optimal solution to their monitoring needs.

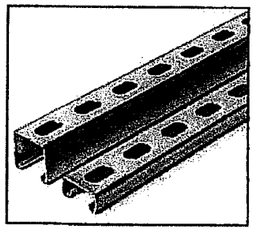
Wide power class range

Whether you're looking for a model to maximize a 100 A service panel or trying to meet the needs of a larger residential PV system, the Sunny Boy TL-US with Secure Power Supply has you covered. Its wide range of power classes—from 3 to 7.7 kW—offers customers the right size for virtually any residential application. The TL-US series is not only the smartest inverter on the planet, it's also the most flexible.

Toll Free +1 888 4 SMA USA
www.SMA-America.com

SMA America, LLC

Standard Channels



Material

Channels are cold formed from hot rolled pickled and oiled strip steel.

Material Thickness

All series 1200	12 gauge material
All series 1400	14 gauge material

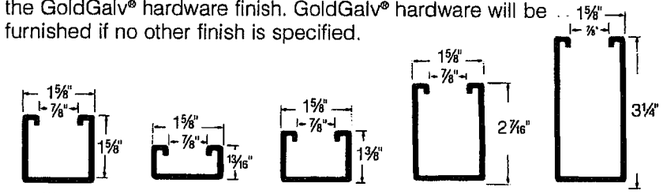
Standard Lengths

Standard lengths for channel are 10 ft. and 20 ft.

Standard length tolerance ± 1/8".

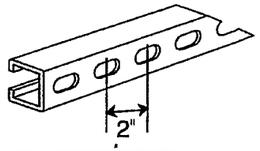
Shorter lengths are available at a small cutting charge.

GoldGalv® hardware finish is standard for all Superstrut products. This is a multi-process finish of electro-plated zinc, followed by gold colored zinc dichromate to give excellent corrosion resistance and superior paint base. See pages B2–B3 for a complete description of the GoldGalv® hardware finish. GoldGalv® hardware will be furnished if no other finish is specified.



A SERIES B SERIES C SERIES E SERIES H SERIES

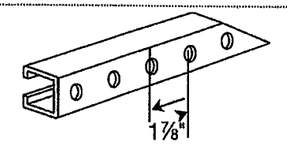
Hole Configurations



Half Slot Channel

Cat. No.	Dim.	Ga.	Std. Ctn.
A-1200-HS	1⅝ x 1⅝	12	*
B-1200-HS	1⅝ x 13/16	12	*
C-1200-HS	1⅝ x 1⅜	12	500
E-1200-HS	1⅝ x 2 7/16	12	500
H-1200-HS	1⅝ x 3¼	12	*
A-1400-HS	1⅝ x 1⅝	14	*
B-1400-HS	1⅝ x 13/16	14	500

9/16" x 1⅛" slots on 2" centers.
* Standard lengths 10 ft. and 20 ft. for standard cartons. Please consult your local T&B representative.



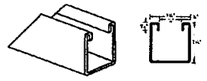
Punched Channel

Cat. No.	Dim.	Ga.	Std. Ctn.
A-1200-P	1⅝ x 1⅝	12	500
B-1200-P	1⅝ x 13/16	12	500
H-1200-P	1⅝ x 13/16	12	500
A-1400-P	1⅝ x 1½	14	500
B-1400-P	1⅝ x 13/16	14	500

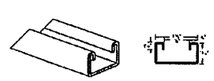
1" holes on 1⅞" centers.
Avail. in 10 & 20 ft. lengths.

Thomas&Betts
www.tnb.com
United States Tel: 901.252.8000 Fax: 901.252.1354
Canada Tel: 450.347.5318 Fax: 450.347.1976
Technical Services Tel: 888.862.3289

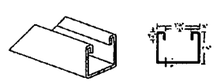
Standard Channels



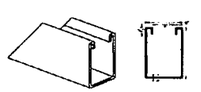
A-1200
Channel available in Solid, Half Slot, Punched, Slotted and Knockout configurations.
Wt./Ft. 1.90 lbs.



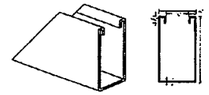
B-1200
Channel available in Solid, Half Slot, Punched and Slotted configurations.
Wt./Ft. 1.28 lbs.



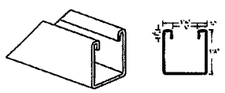
C-1200
Channel available in Solid, Half Slot and Punched configurations.
Wt./Ft. 1.70 lbs.



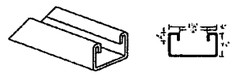
E-1200
Channel available in Solid, Half Slot and Punched configurations.
Wt./Ft. 2.47 lbs.



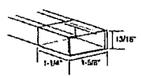
H-1200
Channel available in Solid, Half Slot and Punched configurations.
Wt./Ft. 3.05 lbs.



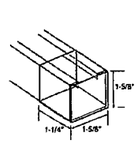
A-1400
Channel available in Solid, Half Slot, Punched, Slotted and Knockout configurations.
Wt./Ft. 1.40 lbs.



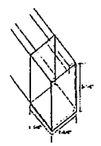
B-1400
Channel available in Solid, Half Slot, Punched and Slotted configurations.
Wt./Ft. 0.90 lbs.



B804 NEOP WH
1⅝" x 13/16" White Plastisol Safety End Cap.

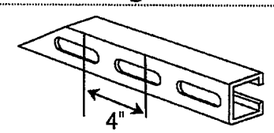


A804 NEOP WH
1⅝" x 1⅝" White Plastisol Safety End Cap.



H804 NEOP WH
1⅝" x 3¼" White Plastisol Safety End Cap.

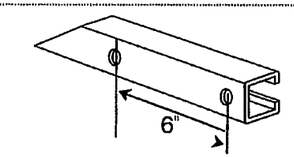
Hole Configurations



Slotted Channel

Cat. No.	Dim.	Ga.	Std. Ctn.
A-1200-S	1⅝ x 1⅝	12	*
B-1200-S	1⅝ x 13/16	12	*
A-1400-S	1⅝ x 1⅝	14	*
B-1400-S	1⅝ x 13/16	14	*

7/16" x 3" slots on 4" centers.
* Standard lengths 10 ft. and 20 ft. for standard carton.
Please consult your local T&B representative.



Channel with Knockouts

Cat. No.	Dim.	Ga.	Std. Ctn.
A-1200-KO	1⅝ x 1⅝	12	*
A-1400-KO	1⅝ x 1⅝	14	*

KO for ½" conduit.
Please consult your local T&B representative.
Standard Finish – GoldGalv® brand.

United States Tel: 901.252.8000 Fax: 901.252.1354
Canada Tel: 450.347.5318 Fax: 450.347.1976
Technical Services Tel: 888.862.3289
Thomas&Betts
www.tnb.com

Metal Framing Channels (Series 1000)

Superstrut Channels-Welding Combinations

All Superstrut Channels are available in a variety of combinations – some are shown here.

Multiple channels are spot welded on 3" centers.

B

How to Order

10 and 20 ft. lengths – steel.

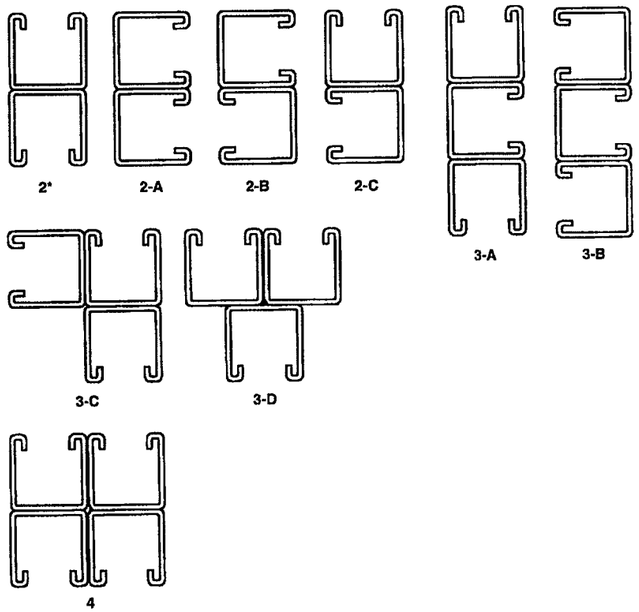
Special lengths may be ordered.

Replace the 3 last digits of the regular channel catalog number with the designation of the desired combination.

EXAMPLES: Two A-1200 channels back to back are ordered as A-1202. Two A-1200 channels back to side are orders as A-1202-C.

Specify desired finish or material.

*"A" and "B" Series back-to-back combinations are joined using Thomas & Betts' steel rivet joining process. The riveted channel is offered in standard GoldGalv®, stainless steel, painted, pre-galvanized, and hot-dip galvanized finishes.



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Technical Services Tel: 888.862.3289

UNIRAC
A HILTI GROUP COMPANY

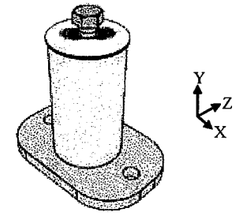
2-Piece Standoff Technical Datasheet

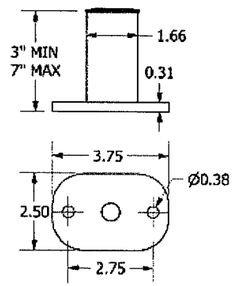
Pub 101026-1td V1.0 October 2010

Standoffs

2-Piece Aluminum Standoffs

Part No. 310503, 310504, 310506, 310507, 310553, 310554, 310556, 310557, 310603, 310604, 310606, 310607, 310653, 310654, 310656, 310657





Dimensions specified in inches unless noted

Standoff and Base Material:

- One of the following extruded aluminum alloys: 6005-T5, 6105-T5, 6061-T6
- Ultimate tensile: 38 ksi; Yeild: 35 ksi
- Clear or Dark anodized

Weight:

- 3" Standoff (as shown): 0.522 pounds (237 g)
- Add 0.086 pounds per inch (39 g/ inch)

Allowable and design loads are valid for a Unirac 2-piece aluminum standoff

Attach with zinc plated carbon steel or stainless steel fasteners

Resistance and safety factors are determined according to Part 1A section 9 of the 2005 Aluminum Design Manual

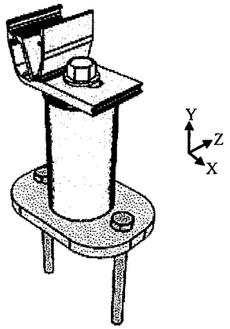
NOTE: Loads are given for the standoff only. Check load limits for lag screw or other attachment method.

Applied Load Direction	Average Ultimate Load lbs (N)	Allowable Load lbs (N)	Safety Factor, W	Design Load lbs (N)	Resistance Factor, F
Tension/ Compression, Y±	3266 (14528)	1089 (4844)	3.00	1633 (7264)	0.500
↻Z Bending, Applied Moment*	559 ft lbs (758 Nm)	250 ft lbs (339 Nm)	2.24	378 ft lbs (512 Nm)	0.676

*Example: If the module is mounted 6" (0.5 ft) from the base of the standoff, the allowable side load is 250 ft*lbs/ 0.5 ft = 500 lbs

2-Piece Aluminum Standoff with SolarMount-I 1-flange connection

Part No. 05013C, 05014C, 05016C, 05017C



Reference the SolarMount-I series datasheet for 1-flange connection specifications.

For the 1-flange connection to standoff:

- Use included 1 ¾" EPDM washer between the 1-flange connection and standoff
- Assemble with included 300 series stainless steel ⅜"-16 flanged hex head screw
- Use anti-seize and tighten to 30 ft-lbs of torque

Allowable and design loads are valid when components are assembled according to authorized Unirac documents.

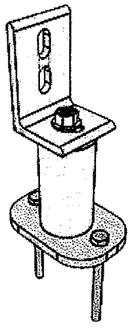
1-Flange connections are compatible with SolarMount-I series beams.

Resistance factors and allowable loads are determined according to part 1A section 9 of the 2005 Aluminum Design Manual.

NOTE: Loads are for the connection and standoff only. Check load limits for the lag screw or other attachment method.

Applied Load Direction	Average Ultimate lbs (N)	Allowable Load lbs (N)	Safety Factor, FS	Design Loads lbs (N)	Resistance Factor, Φ
Tension, Y+	1415 (6294)	635 (2825)	2.23	960 (4270)	0.679
Compression, Y-	1949 (8670)	873 (3883)	2.23	1320 (5872)	0.677
Transverse, X-, downhill	635 (2825)	313 (1392)	2.03	473 (2104)	0.745
Transverse, X+, uphill	42 (187)	20 (89)	2.15	30 (133)	0.705
↻Z Bending, Applied Moment	559 ft lbs (758 Nm)	250 ft lbs (339 Nm)	2.24	378 ft lbs (512 Nm)	0.676

2-Piece Aluminum Standoff with L-foot connection



Reference the SolarMount datasheet for L-foot specifications.

For the L- foot to standoff connection:

- Use included 1 ¾" EPDM washer between the L-foot and standoff
- Assemble with included 300 series stainless steel ⅜"-16 flanged hex head screw
- Use anti-seize and tighten to 30 ft-lbs of torque

Allowable and design loads are valid when components are assembled according to authorized Unirac documents.

L-feet are compatible with SolarMount, SolarMount Heavy Duty, and SunFrame rails.

Resistance factors and allowable loads are determined according to part 1A section 9 of the 2005 Aluminum Design Manual.

NOTE: Loads are for the connection and standoff only. Check load limits for the lag screw or other attachment method.

Applied Load Direction	Average Ultimate lbs (N)	Allowable Load lbs (N)	Safety Factor, FS	Design Loads lbs (N)	Resistance Factor, Φ
Tension, Y+	1859 (8269)	707 (3144)	2.63	1069 (4755)	0.575
Compression, Y-	3258 (14492)	1325 (5893)	2.46	2004 (8913)	0.615
Sliding, Z±	1766 (7856)	755 (3356)	2.34	1141 (5077)	0.646
Transverse, X±	486 (2162)	213 (949)	2.28	323 (1436)	0.664
↻Z Bending, Applied Moment	559 ft lbs (758 Nm)	250 ft lbs (339 Nm)	2.24	378 ft lbs (512 Nm)	0.676

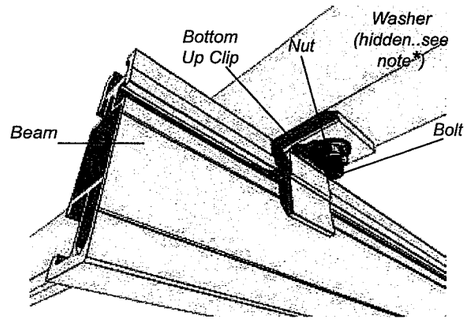
SolarMount Technical Datasheet

Pub 110818-1td V1.0 August 2011

SolarMount Module Connection Hardware

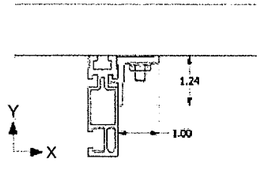
SolarMount Bottom Up Module Clip

Part No. 302000C



- **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 ¼"-20 ASTM F593 bolt, one ¼"-20 ASTM F594 serrated flange nut, and one ¼" 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

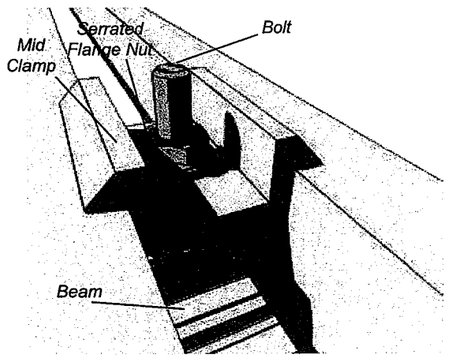


Dimensions specified in inches unless noted

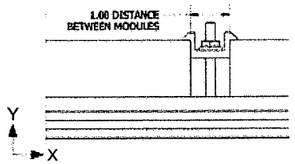
Applied Load Direction	Average Ultimate lbs (N)	Allowable Load lbs (N)	Safety Factor, FS	Design Load lbs (N)	Resistance Factor, Φ
Tension, Y+	1566 (6967)	686 (3052)	2.28	1038 (4615)	0.662
Transverse, X±	1128 (5019)	329 (1463)	3.43	497 (2213)	0.441
Sliding, Z±	66 (292)	27 (119)	2.44	41 (181)	0.619

SolarMount Mid Clamp

Part No. 302101C, 302101D, 302103C, 302104D, 302105D, 302106D



- **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 ¼"-20 T-bolt and one ¼"-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

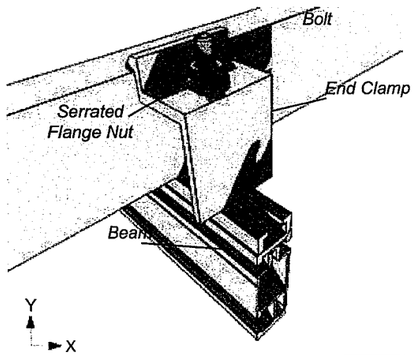


Applied Load Direction	Average Ultimate lbs (N)	Allowable Load lbs (N)	Safety Factor, FS	Design Load lbs (N)	Resistance Factor, Φ
Tension, Y+	2020 (8987)	891 (3963)	2.27	1348 (5994)	0.667
Transverse, Z±	520 (2313)	229 (1017)	2.27	346 (1539)	0.665
Sliding, X±	1194 (5312)	490 (2179)	2.44	741 (3295)	0.620

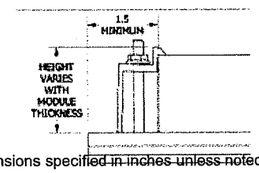
Dimensions specified in inches unless noted

SolarMount End Clamp

Part No. 302001C, 302002C, 302002D, 302003C, 302003D, 302004C, 302004D, 302005C, 302005D, 302006C, 302006D, 302007D, 302008C, 302008D, 302009C, 302009D, 302010C, 302011C, 302012C



- **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 ¼"-20 T-bolt and one ¼"-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



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

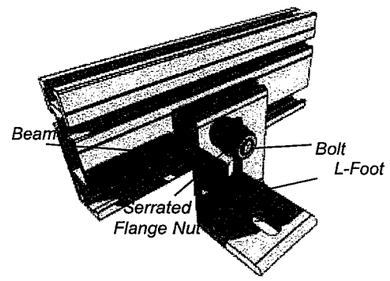
Dimensions specified in inches unless noted

SOLARMOUNT Technical Datasheets

SolarMount Beam Connection Hardware

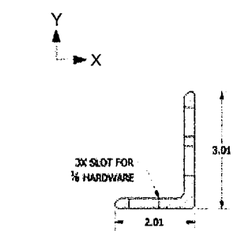
SolarMount L-Foot

Part No. 304000C, 304000D



- **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 ⅜"-16 hex head screw and one ASTM F594 ⅜"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±	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±	486 (2162)	213 (949)	2.28	323 (1436)	0.664

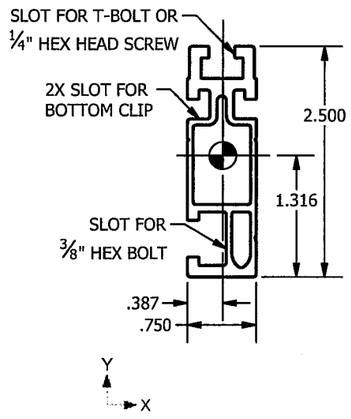
Dimensions specified in inches unless noted

UNIRAC
A HILTI GROUP COMPANY

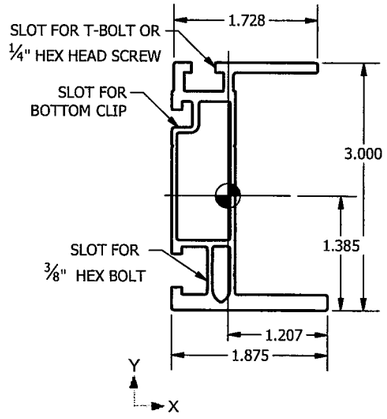
SolarMount Beams

Part No. 310132C, 310132C-B, 310168C, 310168C-B, 310168D
310208C, 310208C-B, 310240C, 310240C-B, 310240D,
410144M, 410168M, 410204M, 410240M

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



SolarMount Beam



SolarMount HD Beam

Dimensions specified in inches unless noted