

PROJECT DESCRIPTION:

20 x 390 MITREX SOLAR BLACK HP M390-A1F (390W) MODULES
ROOF MOUNTED SOLAR PHOTOVOLTAIC MODULES
SYSTEM SIZE: 7.8 kW DC STC

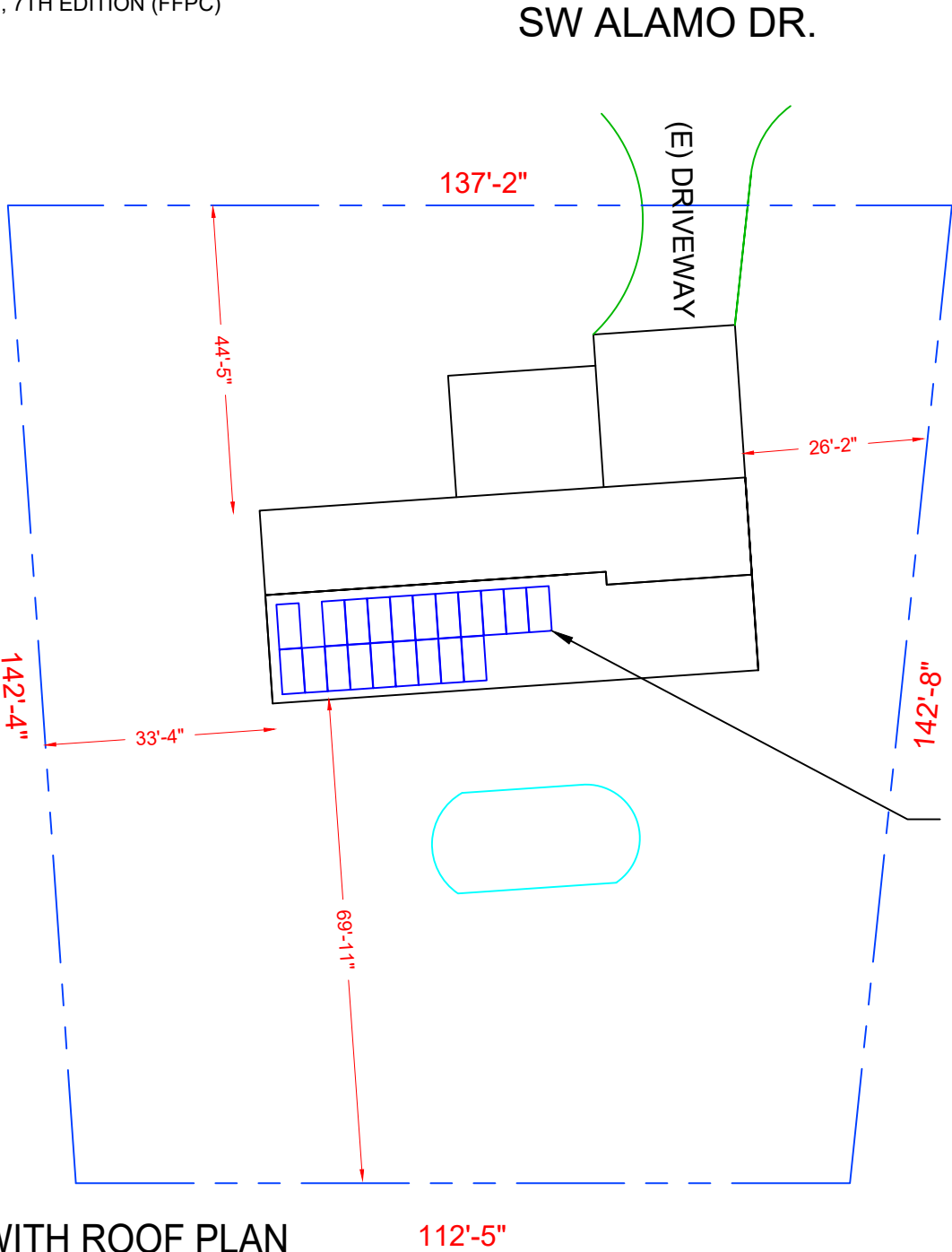
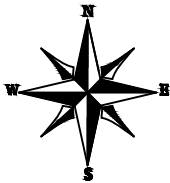
EQUIPMENT SUMMARY
20 MITREX SOLAR BLACK HP M390-A1F MODULES
20 ENPHASE IQ8PLUS-72-2-US MICRO-INVERTERS

GOVERNING CODES :
FLORIDA RESIDENTIAL CODE, 7TH EDITION 2020 (FRC)
FLORIDA PLUMBING CODE, 7TH EDITION 2020 (FPC)
FLORIDA BUILDING CODE, 7TH EDITION 2020 EDITION (FBC)
FLORIDA MECHANICAL CODE, 7TH EDITION 2020 (FMC)
2017 NATIONAL ELECTRICAL CODE
FLORIDA FIRE PREVENTION CODE, 7TH EDITION (FFPC)

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A-00	PLOT PLAN & VICINITY MAP
S-01	ROOF PLAN & MODULES
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E-02	ELECTRICAL LINE DIAGRAM & WIRING CALCULATIONS
E-03	SYSTEM LABELING
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DS-02	MICRO INVERTER DATA SHEET
DS-03	COMBINER DATA SHEET
DS-04	RAIL DATA SHEET
DS-05	ATTACHMENT DATA SHEET

DISCLAIMER :
THE SET OF PLANS FOR THIS PROJECT IS FOR DESIGNING THE PROJECT FOR BUILDING CODE COMPLIANCE. THIS DOES NOT EXPRESS OR IMPLY A PERFORMANCE GUARANTEE OF ANY KIND. CONTRACTOR RESPONSIBLE TO REVIEW AND APPROVE THE LAYOUT WITH THE END USER PRIOR TO INSTALLATION.

ALL DIMENSION AND CONDITION SHOWN ON THE SET OF PLANS IS BASED ON THE INFORMATION GIVEN. CONTRACTOR RESPONSIBLE TO FIELD VERIFY ALL CONDITION IN THE FIELD PRIOR TO INSTALLATION OR ACCEPTS FULL RESPONSIBILITY.



ASCE 7-16 WIND DESIGN CRITERIA
ULTIMATE WIND SPEED: 120 MPH
NOMINAL WIND SPEED: 93 MPH
WIND EXPOSURE: B
RISK CATEGORY: II



2 HOUSE PHOTO
A-00 SCALE: NTS



3 VICINITY MAP
A-00 SCALE: NTS



SOLARWISE ENERGY SOLUTIONS, LLC
4020 W CAYUGA STREET
TAMPA, FL 33614

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL	06-27-2023	01

PROJECT NAME

DEANNA LAW

657 SW ALAMO DR
LAKE CITY, FL 32025

SHEET NAME
PLOT PLAN & VICINITY MAP

SHEET SIZE
ANSI B
11" X 17"

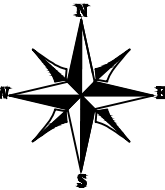
SHEET NUMBER
A-00

Signature with Seal
Digitally signed by Jeffrey A Torres
Date: 2023.06.30 10:15:53 -04'00'
JEFFREY A. TORRES, PE
FL PE #80379
SUNSMART ENGINEERING LLC
FL COA #35170
925 SUNSHINE LANE, STE 1010
ALTAMONTE SPRINGS, FL 32714
(407) 710-1147

MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 20 MODULES
MODULE TYPE = MITREX SOLAR BLACK HP M390-A1F (390W) MODULES
WEIGHT = 48.5 LBS / 22.0 KG.
MODULE DIMENSIONS = 80.2" x 39.2" = 21.83 SF

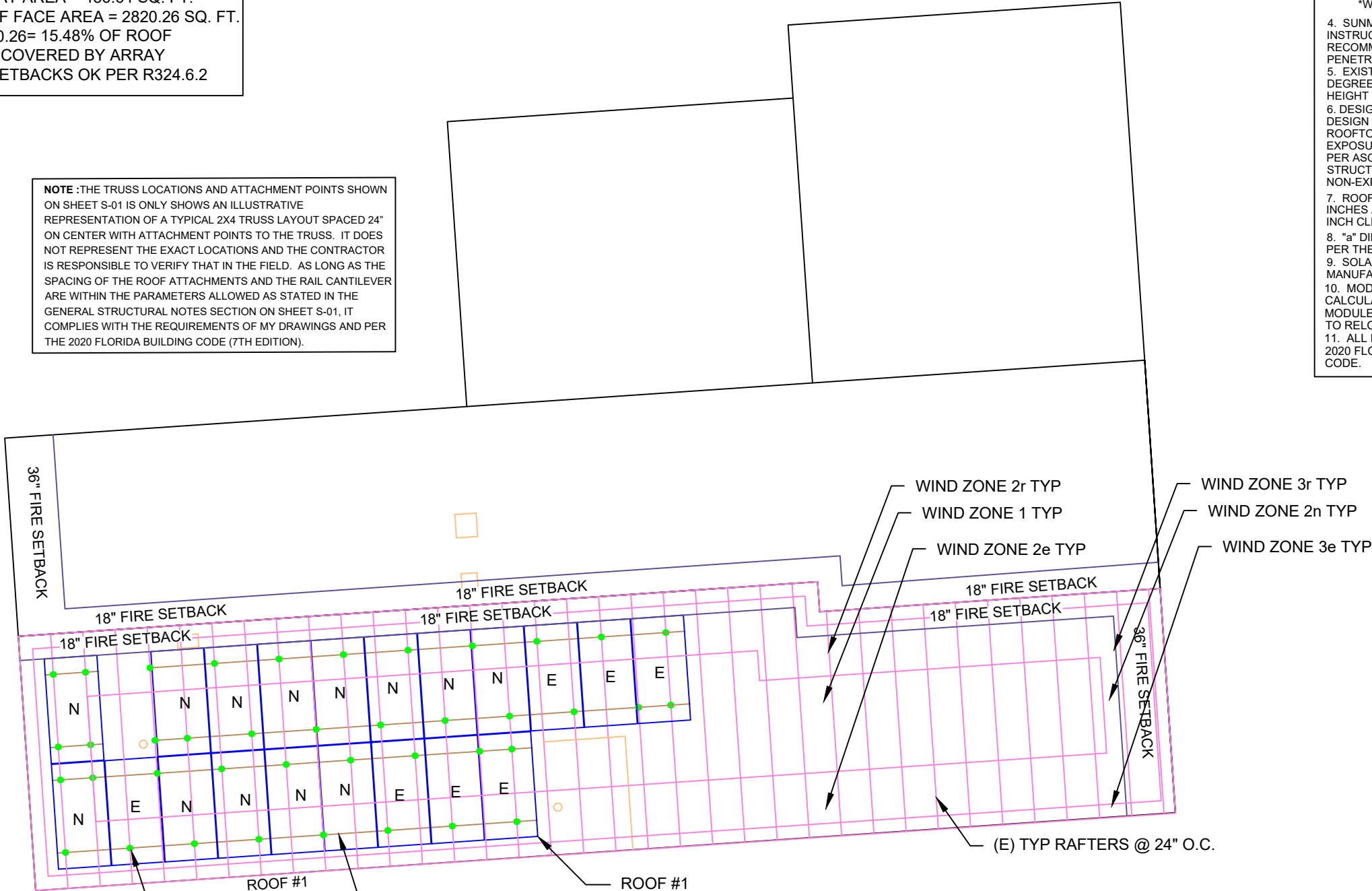
TOTAL ARRAY AREA = 436.64 SQ. FT.
TOTAL ROOF FACE AREA = 2820.26 SQ. FT.
436.64 / 2820.26= 15.48% OF ROOF
FACE AREA COVERED BY ARRAY
18" RIDGE SETBACKS OK PER R324.6.2



NOTE :THE TRUSS LOCATIONS AND ATTACHMENT POINTS SHOWN ON SHEET S-01 IS ONLY SHOWS AN ILLUSTRATIVE REPRESENTATION OF A TYPICAL 2X4 TRUSS LAYOUT SPACED 24" ON CENTER WITH ATTACHMENT POINTS TO THE TRUSS. IT DOES NOT REPRESENT THE EXACT LOCATIONS AND THE CONTRACTOR IS RESPONSIBLE TO VERIFY THAT IN THE FIELD. AS LONG AS THE SPACING OF THE ROOF ATTACHMENTS AND THE RAIL CANTILEVER ARE WITHIN THE PARAMETERS ALLOWED AS STATED IN THE GENERAL STRUCTURAL NOTES SECTION ON SHEET S-01, IT COMPLIES WITH THE REQUIREMENTS OF MY DRAWINGS AND PER THE 2020 FLORIDA BUILDING CODE (7TH EDITION).

SW ALAMO DR.
(E) FRONT YARD

1. APPLICABLE CODE: 2020 FLORIDA RESIDENTIAL CODE (7TH EDITION) & ASCE 7-16 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.
2. ATTACHMENT STRENGTH OF SUNMODO'S ATTACHMENTS ARE BASED OFF SUNMODO'S TESTING DATA AND IT IS ASSUMED THE EXISTING WOOD TRUSSES ARE SOUTHERN YELLOW PINE.
3. SPACING OF THE SUNMODO ATTACHMENTS SHALL BE AS FOLLOWS:
GABLE NON-EXPOSED
*WIND ZONE 1, 2e, 2r, 2n, 3e, 3r = 4'-0" ON CENTER, 1'-7" CANTILEVER
GABLE EXPOSED
*WIND ZONE 1, 2e, 2r, 2n, 3e = 4'-0" ON CENTER, 1'-7" CANTILEVER
4. SUNMODO ATTACHMENT SHALL BE INSTALLED PER MANUFACTURER'S INSTRUCTIONS AND CONTRACTOR SHALL FOLLOW MANUFACTURER'S RECOMMENDATIONS TO WEATHER PROOF AND SEAL ALL ROOF PENETRATIONS.
5. EXISTING ROOF IS A TYPICAL GABLE ROOF FROM 7 DEGREES TO 20 DEGREES WITH A ROOF COVERING OF ASPHALT SHINGLES. MEAN ROOF HEIGHT = 15 FT WHERE THE MODULES ARE.
6. DESIGN PARAMETERS SHOWN ARE BASED ON ALLOWABLE STRESS DESIGN (ASD) NOMINAL WIND SPEED PRESSURES PER SECTION 29.4.4 FOR ROOFTOP SOLAR PANELS PARALLEL TO THE ROOF SURFACE WITH EXPOSURE "B", RISK CATEGORY II, ENCLOSED BUILDING AND h < 60'-0" PER ASCE 7-16 "MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES" AND 2020 F.B.C. (7TH EDITION). EXPOSED AND NON-EXPOSED MODULES ARE LABELED AS SHOWN.
7. ROOF SURFACE TO UNDERSIDE OF PANEL HEIGHT IS APPROXIMATELY 5 INCHES AND INCREASED UPLIFT ON THE PORTION OF MODULES WITHIN A 10 INCH CLEARANCE OF THE ROOF EDGES HAS BEEN CONSIDERED.
8. "a" DIMENSION AS DEFINED PER ASCE 7-16 SHALL BE 4 FT REGARDLESS PER THE 2020 FLORIDA RESIDENTIAL CODE (7TH EDITION).
9. SOLAR PANELS AND MOUNTING SYSTEM SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.
10. MODULES SHALL BE LOCATED AS SHOWN FOR THE WIND LOAD CALCULATIONS ON SHEET S-03 TO BE VALID. ANY RELOCATION OF MODULES SHALL BE REVIEWED AND APPROVED BY THE ENGINEER PRIOR TO RELOCATION OF MODULES.
11. ALL FIRE SETBACKS SHOWN COMPLY WITH THE REQUIREMENTS OF THE 2020 FLORIDA RESIDENTIAL CODE AND 2020 FLORIDA FIRE PREVENTION CODE.



I CERTIFY THAT THE INSTALLATION OF THE MODULES IS IN COMPLIANCE WITH FBC: RESIDENTIAL CHAPTER 3. THE ADDITION OF THE SOLAR MODULES AND ALL ACCESSORIES TO THE EXISTING BUILDING WILL NOT ADVERSELY AFFECT THE STRUCTURAL INTEGRITY OF THE BUILDING AND CAN SAFELY ACCOMMODATE THE NEW IMPOSED LOADS OF THE SOLAR SYSTEM.

LEGEND

- ED - EDGE MODULE
- E - EXPOSED MODULE
- N - NON-EXPOSED MODULE
- □ - ROOF OBSTRUCTION
- - PV ROOF ATTACHMENT
- - RAFTERS



REVISIONS

DESCRIPTION	DATE	REV
INITIAL	06-27-2023	01

PROJECT NAME

DEANNA LAW

657 SW ALAMO DR
LAKE CITY, FL 32025

SHEET NAME
ROOF PLAN & MODULES

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
S-01

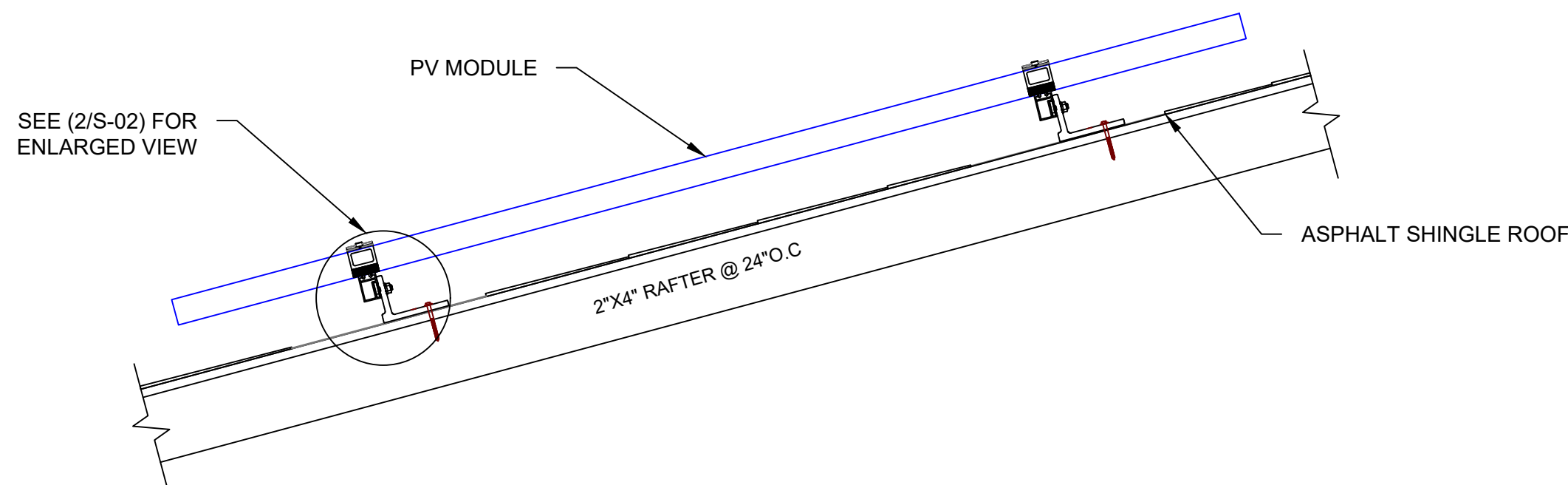
Signature with Seal

Digitally signed
by Jeffrey A
Torres
Date:
2023.06.30
10:16:12 -04'00'

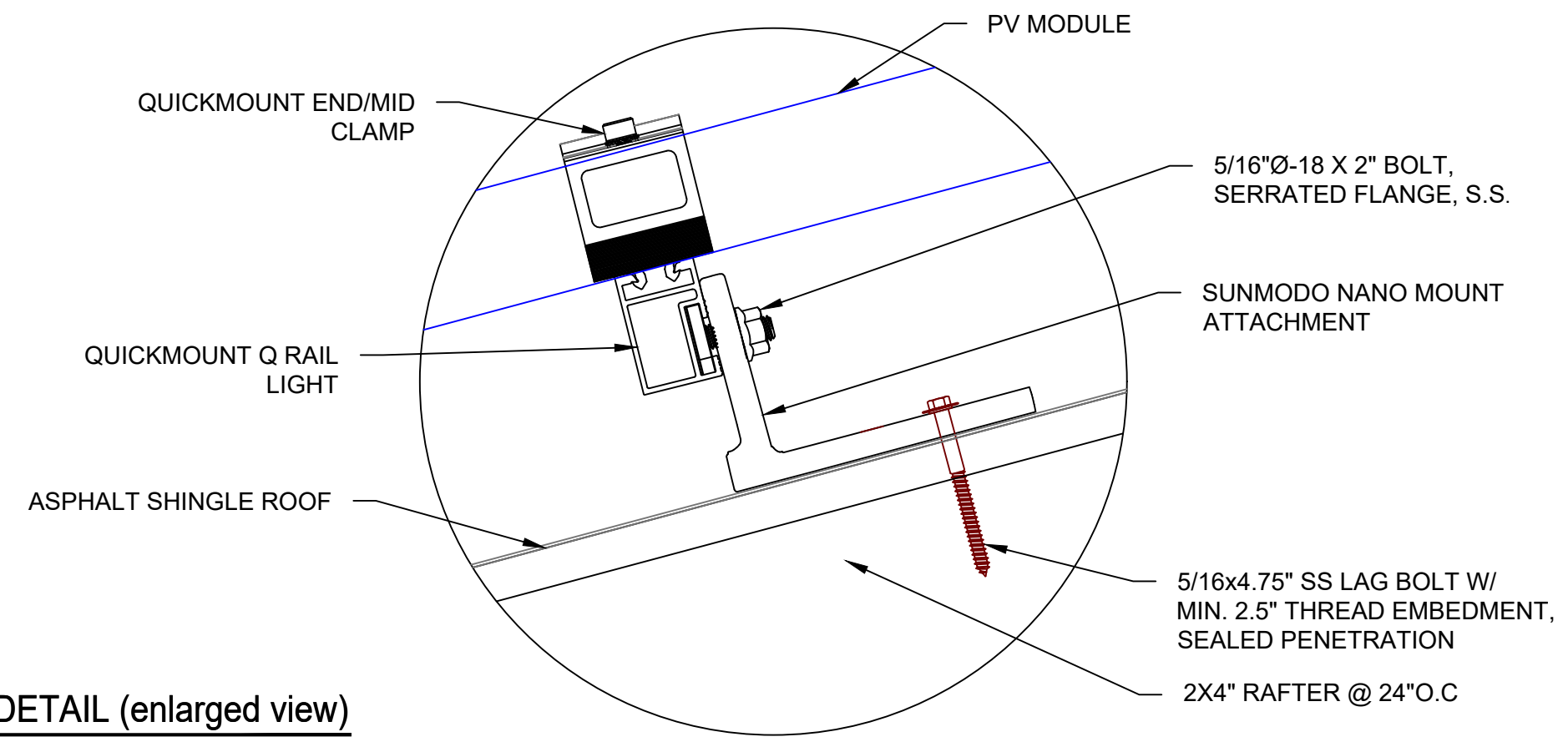
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(407) 710-1147

(E) BACK YARD


MITREX SOLAR BLACK HP
M390-A1F (390W) MODULES



1 | ATTACHMENT DETAIL
S-02 | SCALE: NTS



2 | ATTACHMENT DETAIL (enlarged view)
S-02 | SCALE: NTS



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4020 W CAYUGA STREET
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DEANNA LAW

657 SW ALAMO DR
LAKE CITY, FL 32025

SHEET NAME

ATTACHMENT DETAILS

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

S-02



Signature with Seal

Digitally signed by Jeffrey A Torres

Date: 2023.06.30 10:16:19 -04'00'

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BASE WIND LOAD CALCULATION

Engineering Calculations			
120 MPH Solar Panel Flush Mount Wind Pressure Calculations for Residential and Low Rise Commercial Buildings			
Wind Velocity Pressure Calculation per ASCE 7-16			
$q_h = 0.00256 * K_z * K_{zt} * K_d * K_e * V^2$			
Ultimate Wind Speed - V (MPH)	=		120
ASD Wind Speed - V (MPH)	=		93.0
Mean roof height of where modules are located (ft)	=		15
Velocity Pressure Coefficient for Wind Exposure B - K_z	=		0.57
Topographic Factor - K_{zt}	=		1
Ground Elevation Factor - K_e	=		1
Wind Directionality Factor - K_d	=		0.85
Length of a single solar module (inches)	=		80.2
Width of a single solar module (inches)	=		39.2
Center to Center Spacing of Roof Attachment (ft)	=		4
Effective Wind Area of a Single Module (sf)	=		21.83
Effective Wind Area of a roof connection tributary area (sf)	=		13.37
ASD Wind Velocity Pressure (psf)	=		10.73

MODULE CAPACITY CHECK

Uplift Capacity of Solar Module		
Test Capacity of Module (PSF) (Portrait)	=	112.5
Minimum Factor of Safety Required	=	1.5
Design Capacity of Module (PSF)	=	75.0
Module with worst case partial pressure loading (PSF)	=	27
		THEREFORE OK

NON-EXPOSED CALCULATION

Uplift Pressures on Solar Panels - Gable Roof 7 to 20 degrees			Overhang Uplift Pressures (Edge Modules)	
$P = q_h * (G C_p)(Y_e)(Y_a) (lb/ft^2)$ - Per Chapter 29.4			Module	Roof Connection
GCP - Wind Zone Group 1 (WZ1, WZ2e)	=	-2.0	-2.0	-2.5
GCP - Wind Zone Group 2 (WZ2n, WZ2r, WZ3e)	=	-2.53	-2.82	-3.31
GCP - Wind Zone Group 3 (WZ3r)	=	-2.99	-3.37	-4.40
Effective Wind Area of structural element considered (sf)	=	21.83	13.37	13.37
Array Edge Factor (1.0 if modules are not exposed - 1.5 if modules are exposed)	=	1	1	1
Pressure Equalization Factor	=	0.664	0.750	0.750
Wind Zone Group 1 Worst Case Scenario Pressure (psf)	=	-14.24	-16.07	-20.08
Wind Zone Group 2 Worst Case Scenario Pressure (psf)	=	-17.98	-22.68	-26.60
Wind Zone Group 3 Worst Case Scenario Pressure (psf)	=	-21.28	-27.10	-35.32

EXPOSED CALCULATION

Uplift Pressures on Solar Panels - Gable Roof 7 to 20 degrees			Overhang Uplift Pressures (Edge Modules)	
$P = q_h * (G C_p)(Y_e)(Y_a) (lb/ft^2)$ - Per Chapter 29.4			Module	Roof Connection
GCP - Wind Zone Group 1 (WZ1, WZ2e)	=	-2.0	-2.0	-2.5
GCP - Wind Zone Group 2 (WZ2n, WZ2r, WZ3e)	=	-2.53	-2.82	-3.31
GCP - Wind Zone Group 3 (WZ3r)	=	-2.99	-3.37	-4.40
Effective Wind Area of structural element considered (sf)	=	21.83	13.37	13.37
Array Edge Factor (1.0 if modules are not exposed - 1.5 if modules are exposed)	=	1.5	1.5	1.5
Pressure Equalization Factor	=	0.664	0.750	0.750
Wind Zone Group 1 Worst Case Scenario Pressure (psf)	=	-21.36	-24.10	-30.12
Wind Zone Group 2 Worst Case Scenario Pressure (psf)	=	-26.97	-34.02	-39.89
Wind Zone Group 3 Worst Case Scenario Pressure (psf)	=	-31.93	-40.64	-52.99

NON-EXPOSED CONNECTION CALCULATION

Required Lag Bolt Size and Length to Wood Truss		
Per 2018 Edition ASD NDS for Wood Construction		
$W' = W * (C_d) * (C_m) * (C_t)$		
Southern Pine Wood Truss Specific Gravity - G	=	0.55
Withdraw Value for 5/16" Lag Bolt (lbs/in) and specified Specific Gravity	=	307
Embedment Depth (in)	=	2.5
Allowable Embedment Withdraw Design Value - W (lbs)	=	767.5
Load Duration Factor (C_d) for Wind Load (Ten Minute Intervals)	=	1.6
Wet Service Factor (C_m) in areas < 19% moisture content in-service conditions (relatively dry attic space)	=	1
Temperature Factor (C_t) in areas with experience sustained exposed to elevated temperatures 125 °F < T < 150 °F	=	0.7
Adjusted Allowable Embedment Withdraw Design Value - W' (lbs)	=	859.6
Lag Screw Center to Center Spacing (ft)	=	4
Approximate Module Length (ft)	=	6.683333333
Effective Wind Area of Attachment Spacing	=	13.37
Worst Case Scenario Partial Pressure Considered (psf)	=	27
Tributary Area pullout load onto roof anchor (wind only) (lbs)	=	360.9
Tributary Area pullout load (dead load consideration - ASD design)	=	348.87
Acceptable Design Value Check	=	OK

EXPOSED CONNECTION CALCULATION

Required Lag Bolt Size and Length to Wood Truss		
Per 2018 Edition ASD NDS for Wood Construction		
$W' = W * (C_d) * (C_m) * (C_t)$		
Southern Pine Wood Truss Specific Gravity - G	=	0.55
Withdraw Value for 5/16" Lag Bolt (lbs/in) and specified Specific Gravity	=	307
Embedment Depth (in)	=	2.5
Allowable Embedment Withdraw Design Value - W (lbs)	=	767.5
Load Duration Factor (C_d) for Wind Load (Ten Minute Intervals)	=	1.6
Wet Service Factor (C_m) in areas < 19% moisture content in-service conditions (relatively dry attic space)	=	1
Temperature Factor (C_t) in areas with experience sustained exposed to elevated temperatures 125 °F < T < 150 °F	=	0.7
Adjusted Allowable Embedment Withdraw Design Value - W' (lbs)	=	859.6
Lag Screw Center to Center Spacing (ft)	=	4
Approximate Module Length (ft)	=	6.683333333
Effective Wind Area of Attachment Spacing	=	13.37
Worst Case Scenario Partial Pressure Considered (psf)	=	35
Tributary Area pullout load onto roof anchor (wind only) (lbs)	=	467.8333333
Tributary Area pullout load (dead load consideration - ASD design)	=	455.8033333
Acceptable Design Value Check	=	OK



SOLARWISE ENERGY SOLUTIONS, LLC
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REVISIONS

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PROJECT NAME

DEANNA LAW
657 SW ALAMO DR
LAKE CITY, FL 32025

SHEET NAME

STRUCTURAL
CALCULATIONS

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

S-03

Signature with Seal

Digitally signed
by Jeffrey A
Torres
Date:
2023.06.30
10:16:26 -04'00'

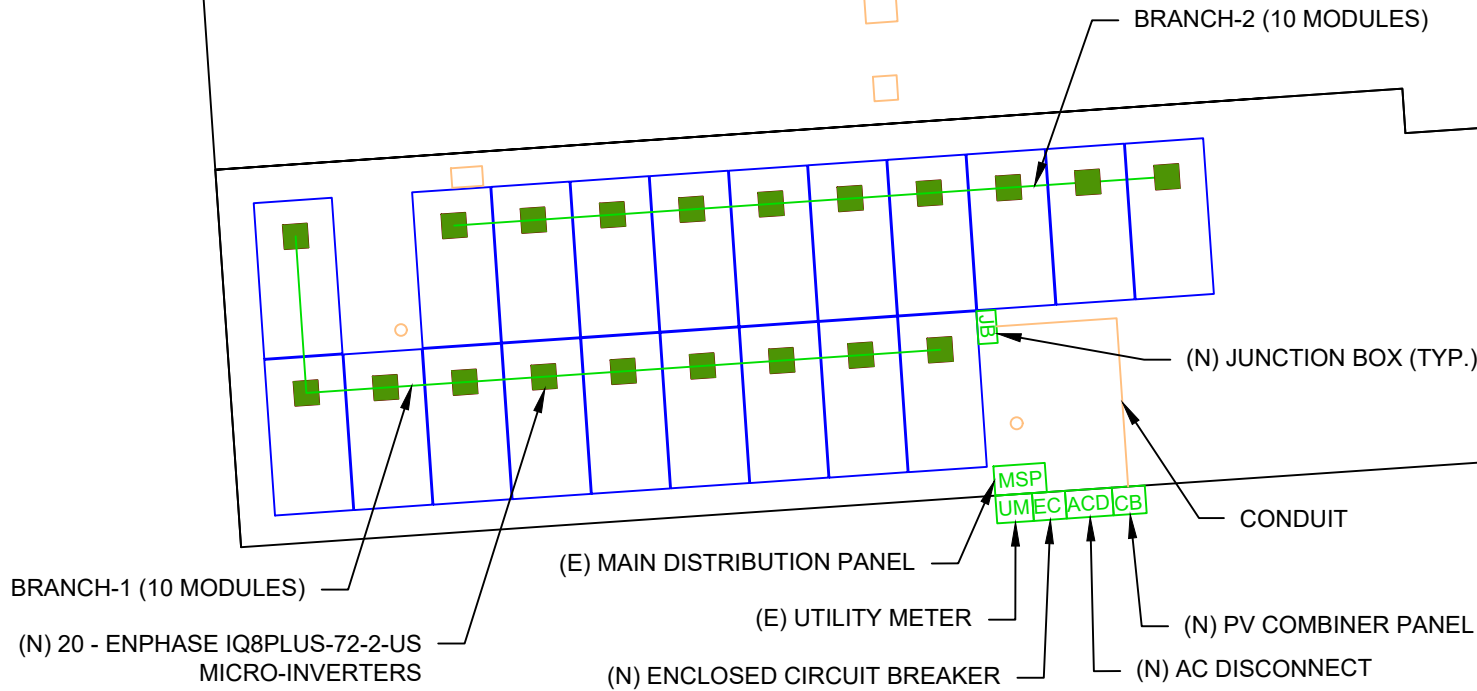
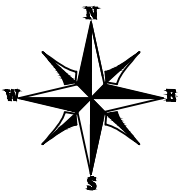


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sealed this document is the
owner or authorized person
to sign on behalf of the
firm and is not a copy.
The use of this seal is the
responsibility of the signatory.
It is not to be used as a
signature or seal of the
firm or as a seal of the
state.

JEFFREY A. TORRES, PE
FL PE #80379
SUNSMART ENGINEERING LLC
FL COA #35170
925 SUNSHINE LANE, STE 1010
ALTAMONTE SPRINGS, FL 32714
(407) 710-1147

SOLAR ARRAY 7.8 kW-DC STC
(20) MITREX SOLAR BLACK HP M390-A1F (390W) MODULES
(02) BRANCHES OF 10 MODULES

SW ALAMO DR.
(E) FRONT YARD



(E) BACK YARD

LEGEND

- EC - ENCLOSED CIRCUIT BREAKER
- ACD - AC DISCONNECT
- UM - UTILITY METER
- CB - PV COMBINER PANEL
- JB - JUNCTION BOX
- MSP - MAIN DISTRIBUTION PANEL
- Orange square - ROOF OBSTRUCTION
- Dashed line - CONDUIT



Signature with Seal
Digitally
signed by
Jeffrey A
Torres
Date:
2023.06.30
10:16:34
-04'00'

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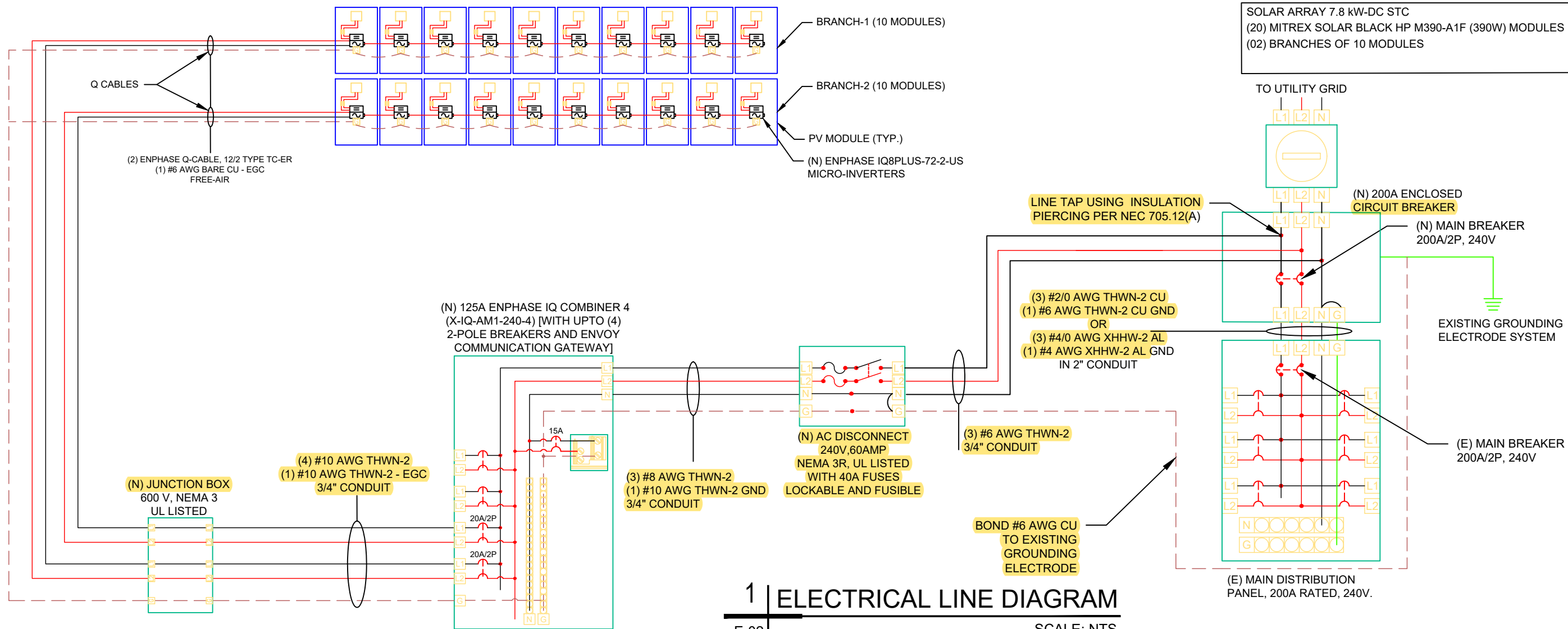
DEANNA LAW

657 SW ALAMO DR
LAKE CITY, FL 32025

SHEET NAME
ELECTRICAL
SITE PLAN

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
E-01



AC CONDUCTOR AMPACITY CALCULATIONS:
ARRAY TO JUNCTION BOX

EXPECTED WIRE TEMP (In Celsius)	34°
TEMP. CORRECTION PER TABLE (310.15)(B)(2)(a)	1.00
# OF CURRENT CARRYING CONDUCTORS	N/A
# OF C.C. CONDUCTORS CORRECTION PER NEC 310.15(B)(3)(a)	0.96
CIRCUIT CONDUCTOR SIZE	12 AWG
CIRCUIT CONDUCTOR AMPACITY	30A
REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A) & (B)	
1.25 x MAX AC OUTPUT x MAX # OF MICROINVERTERS/CIRCUIT	15.13A
DERATED CIRCUIT CONDUCTOR AMPACITY	28.80A
Result should be greater than (15.13A)	

AC CONDUCTOR AMPACITY CALCULATIONS:
FROM JUNCTION BOX TO PV COMBINER PANEL

EXPECTED WIRE TEMP (In Celsius)	34°
TEMP. CORRECTION PER TABLE (310.15)(B)(2)(a)	0.96
# OF CURRENT CARRYING CONDUCTORS	4
# OF C.C. CONDUCTORS CORRECTION PER NEC 310.15(B)(3)(a)	0.80
CIRCUIT CONDUCTOR SIZE	10 AWG
CIRCUIT CONDUCTOR AMPACITY	40A
REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A) & (B)	
1.25 x MAX AC OUTPUT x MAX # OF MICROINVERTERS/CIRCUIT	15.13A
DERATED CIRCUIT CONDUCTOR AMPACITY	30.72A
Result should be greater than (15.13A)	

AC CONDUCTOR AMPACITY CALCULATIONS:
FROM PV COMBINER PANEL TO ACDS

EXPECTED WIRE TEMP (In Celsius)	34°
TEMP. CORRECTION PER TABLE (310.15)(B)(2)(a)	0.96
# OF CURRENT CARRYING CONDUCTORS	3
# OF C.C. CONDUCTORS CORRECTION PER NEC 310.15(B)(3)(a)	1.00
CIRCUIT CONDUCTOR SIZE	6 AWG
CIRCUIT CONDUCTOR AMPACITY	75A
REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A) & (B)	
1.25 x MAX AC OUTPUT x TOTAL # OF MICROINVERTERS	30.25A
DERATED CIRCUIT CONDUCTOR AMPACITY	72.00A
Result should be greater than (30.25A)	

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL #	MITREX SOLAR BLACK HP M390-A1F (390W) MODULES
VMP	41.9V
IMP	9.31A
VOC	48.2V
ISC	9.97A
MODULE DIMENSION	80.2"L x 39.2"W x 1.6"D (In Inch)

INVERTER SPECIFICATIONS	
MANUFACTURER / MODEL #	ENPHASE IQ8PLUS-72-2-US MICRO-INVERTERS
MPPT VOLTAGE RANGE	29-45V
MAXIMUM INPUT VOLTAGE	60V
MAXIMUM UNIT PER BRANCH	13
MAXIMUM OUTPUT CURRENT	1.21A
CEC WEIGHTED EFFICIENCY	97%

AMBIENT TEMPERATURE SPECS	
RECORD LOW TEMP	-5°
AMBIENT TEMP (HIGH TEMP 2%)	34°
CONDUIT MINIMUM HEIGHT FROM ROOF	0.5'
CONDUCTOR TEMPERATURE RATING	90°
MODULE TEMPERATURE COEFFICIENT OF Voc	-0.27%/°C

ELECTRICAL NOTES

- 1.) ALL EQUIPMENT SHALL BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.
- 2.) ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 V AND 90°C WET ENVIRONMENT.
- 3.) WIRING, CONDUIT, AND RACEWAYS MOUNTED ON ROOFTOPS SHALL BE ROUTED DIRECTLY TO, AND LOCATED AS CLOSE AS POSSIBLE TO THE NEAREST RIDGE, HIP, OR VALLEY.
- 4.) WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.
- 5.) DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEM. CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS, AND ACCESSORIES TO MEET APPLICABLE CODES AND STANDARDS.
- 6.) WHERE SIZES OF JUNCTION BOXES, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
- 7.) ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND ACCESSIBLE.
- 8.) INSTALL MODULE AND RACKING GROUNDING HARDWARE PER MANUFACTURER'S INSTRUCTION.

2 | WIRING CALCULATIONS

E-02 | SCALE: NTS



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REVISIONS

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SHEET NAME
ELECTRICAL
LINE DIAGRAM &
WIRING CALCULATIONS

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

E-02

Signature with Seal

Digitally signed
by Jeffrey A
Torres

Date:
2023.06.30
10:16:42 -04'00'



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electronically signed and
sealed by Jeffrey A. Torres
PE, using a digital
signature and data shown
to the left of seal. Printed
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and sealed and the
signature must be verified
on any electronic copies.

JEFFREY A. TORRES, PE
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PHOTOVOLTAIC SYSTEM AC DISCONNECT
MAXIMUM AC OPERATING CURRENT 24.20 AMPS
MAXIMUM AC OPERATING VOLTAGE 240 VOLTS

LABEL LOCATION:
AC DISCONNECT(S)
PER NEC 690.54

**RAPID SHUTDOWN SWITCH
FOR SOLAR PV SYSTEM**

LABEL LOCATION:
RAPID SHUTDOWN INITIATION DEVICE
PER NEC 690.56(C)(3)

!

WARNING

POWER SOURCE OUTPUT CONNECTION

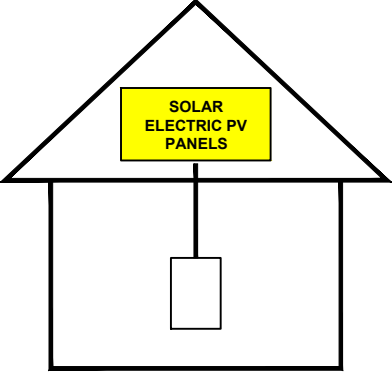
DO NOT RELOCATE THIS
OVERCURRENT DEVICE

LABEL LOCATION:
POINT OF INTERCONNECTION (WHEN APPLICABLE)
PER NEC 705.12(B)(2)(3)(b)

SOLAR PV SYSTEM
EQUIPPED WITH RAPID
SHUTDOWN

TURN RAPID SHUTDOWN
SWITCH TO THE "OFF"
POSITION TO SHUT DOWN
PV SYSTEM AND REDUCE
SHOCK HAZARD IN THE
ARRAY.

SOLAR
ELECTRIC PV
PANELS



LABEL LOCATION:
AT SERVICE DISCONNECTING MEANS
PER NEC 690.56(C)(1)(a)



SOLARWISE

ENERGY SOLUTIONS

License # ECL3009594

SOLARWISE ENERGY SOLUTIONS, LLC
4020 W CAYUGA STREET
TAMPA, FL 33614

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL	06-27-2023	01

PROJECT NAME

DEANNA LAW

657 SW ALAMO DR
LAKE CITY, FL 32025

SHEET NAME
SYSTEM
LABELING

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
E-03

Signature with Seal

Digitally signed
by Jeffrey A
Torres
Date:
2023.06.30
10:16:52 -04'00'

JEFFREY A. TORRES, PE
FL PE #80379
SUNSMART ENGINEERING LLC
FL COA #35170
925 SUNSHINE LANE, STE 1010
ALTAMONTE SPRINGS, FL 32714
(407) 710-1147

HIGH EFFICIENCY
MONO PV MODULE


**NORTH AMERICAN
MANUFACTURER**

Mitrex is a world-leading manufacturer of standard solar and BIPV products based in Canada. With over 20 years of experience, Mitrex guarantees high-quality, fully-automated manufacturing and continuous innovation in solar technology.


**QUALITY, DURABILITY &
PERFORMANCE**

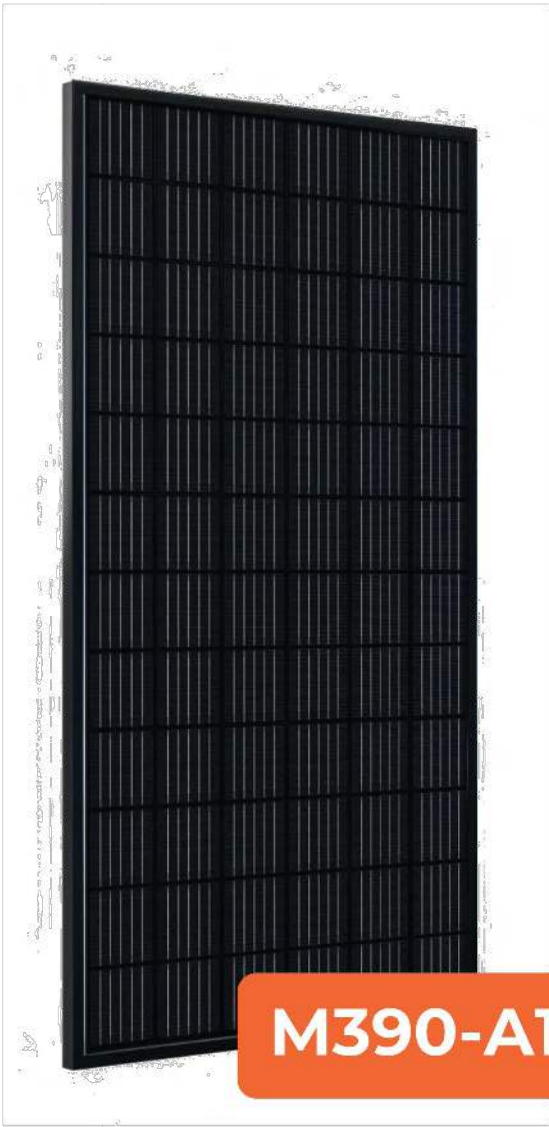
Mitrex panels are engineered with the highest quality- featuring wide-ranging compatibility with racking and electrical components, advanced cell technology, ability to withstand high snow/wind load conditions, and high performing modules.


**25-YEAR PRODUCT &
PERFORMANCE WARRANTY**

All our products come with an industry leading 25-year warranty for products and performance, ensuring the quality of the hardware, energy generation, and aesthetics are maintained.

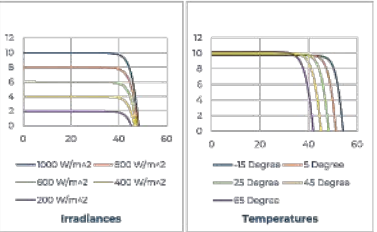


THE WORLD'S LARGEST BIPV MANUFACTURER



M390-A1F

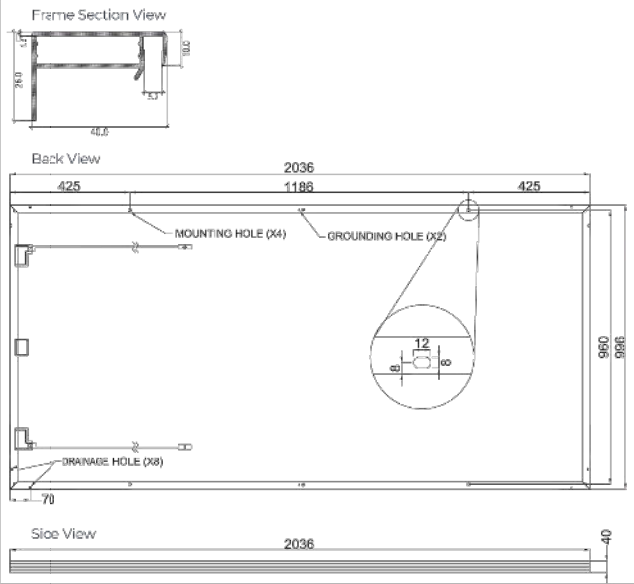
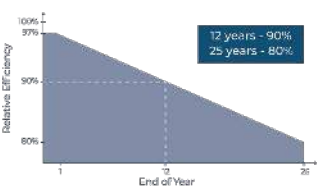


ELECTRICAL SPECIFICATIONS	SOLAR PANEL M390-A1F	I-V CURVES
Test Conditions	STC	
Module Power (Pmax)	390W	
Maximum Power Voltage (Vpmax)	41.9V	
Maximum Power Current (Ipmx)	9.31A	
Open Circuit Voltage (Voc)	48.2V	
Short Circuit Current (Isc)	9.97A	
Module Efficiency	19.2%	
Maximum System Voltage (VDC)	1000V (IEC/UL)	
Series Fuse Rating	20A	
Power & Other Electrical Specification Tolerance	5%	
Application Classification	Class A	

Measurement Conditions: STC 1000 W/m² - AM1.5 - Temperature 25°C

MECHANICAL PROPERTIES	METRIC	IMPERIAL
Module Weight	22 kg	48.5 lbs
Dimensions (H x L x D)	2036 x 996 x 40mm	80.2 x 39.2 x 1.6in
Mechanical Test Load (Snow/Wind)	5400Pa front load / 5400Pa rear load	112.8psf front load / 112.8psf rear load
Hail Impact Resistance	ø 25mm at 83 km/h	ø 1in at 51.6 mph
Cells	72 [12x6] Mono-crystalline (158.75 x 158.75mm)	72 [12x6] Mono-crystalline (6.25 x 6.25in)
Glass	3.2mm tempered glass, high transmittance, anti-reflective coating	0.126in tempered glass, high transmittance, anti-reflective coating
Cables & Connectors (Refer to Installation Manual)	300mm, 1000mm, 1200mm - 4mm², 12 AWG (UL) MC4 from Staubli	11.8in, 39.4in, 47.2in - 0.16in², 12 AWG (UL) MC4 from Staubli
Backsheet	High durability, UV resistant, PV backsheet	
Frame	Anodized aluminum alloy black frame	
Bypass Diodes	3 diodes- 30SQ045T (45V max DC blocking voltage, 30A max forward rectified current)	
Junction Box	IP68 rated, TUV and UL certified	
Fire Rating	Type II	

TEMPERATURE RATINGS	SHIPPING
Temperature Coefficient Isc	Modules Per Pallet
Temperature Coefficient Voc	Modules Per Truck
Temperature Coefficient Pmax	Modules Per Truck
Nominal Module Operating Temperature	
Operating Temperature	

ENGINEERING DRAWING	WARRANTY
	<p>Product Warranty: 25 years Performance Warranty:</p> <ul style="list-style-type: none"> ≥ 97% end of 1st year ≥ 90% end of 12th year ≥ 80% end of 25th year 
	<p>CERTIFICATIONS</p> <p>UL 61730-1/-2, CSA C22.2 #61730-1/-2, IEC 61730-1/-2, UL 61215-1/-2, IEC 61215-1/-2, CSA 61215-1/-2, CEC Listed</p> <p>- Datasheet is subjected to change without prior notice, always obtain the most recent version of the datasheet.</p> <p>- Caution: For professional use only, the installation, handling, and cleaning of PV modules should only be performed by qualified professionals. Read the installation Manual for mounting specifications before handling, installing and operating modules.</p>
	<p>Learn More:</p> <p>mitrex.com info@mitrex.com</p> <p>Headquarters: 41 Racine Rd., Toronto, ON M9W 2Z4, Canada +1 (855) 254-0214 (Toll Free)</p> <p>West USA Location: 10880 Wilshire Blvd Suite 1101, Los Angeles, CA 90024, USA +1 (323) 301-7978</p> <p>East USA Location: 1 Rockefeller Plaza Fl 11, New York, NY 10020, USA +1 (646) 583-4486</p>



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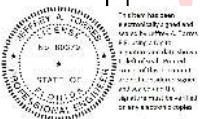
SHEET NAME
MODULE
DATA SHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
DS-01

Signature with Seal

Digitally signed
by Jeffrey A
Torres
Date:
2023.06.30
10:17:02 -04'00'



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(407) 710-1147



DATA SHEET



IQ8 Series Microinverters

Our newest IQ8 Microinverters are the industry's first microgrid-forming, software-defined microinverters with split-phase power conversion capability to convert DC power to AC power efficiently. The brain of the semiconductor-based microinverter is our proprietary application-specific integrated circuit (ASIC) which enables the microinverter to operate in grid-tied or off-grid modes. This chip is built in advanced 55nm technology with high speed digital logic and has super-fast response times to changing loads and grid events, alleviating constraints on battery sizing for home energy systems.



Part of the Enphase Energy System, IQ8 Series Microinverters integrate with the Enphase IQ Battery, Enphase IQ Gateway, and the Enphase App monitoring and analysis software.



IQ8 Series Microinverters redefine reliability standards with more than one million cumulative hours of power-on testing, enabling an industry-leading limited warranty of up to 25 years.



Connect PV modules quickly and easily to IQ8 Series Microinverters using the included Q-DCC-2 adapter cable with plug-n-play MC4 connectors.



IQ8 Series Microinverters are UL Listed as PV Rapid Shut Down Equipment and conform with various regulations, when installed according to manufacturer's instructions.

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IQ8SE-DS-0001-01-EN-US-2022-03-17

Easy to install

- Lightweight and compact with plug-n-play connectors
- Power Line Communication (PLC) between components
- Faster installation with simple two-wire cabling

High productivity and reliability

- Produce power even when the grid is down*
- More than one million cumulative hours of testing
- Class II double-insulated enclosure
- Optimized for the latest high-powered PV modules

Microgrid-forming

- Complies with the latest advanced grid support**
- Remote automatic updates for the latest grid requirements
- Configurable to support a wide range of grid profiles
- Meets CA Rule 21 (UL 1741-SA) requirements

* Only when installed with IQ System Controller 2, meets UL 1741. IQ8H-208V operates only in grid-tied mode.

** IQ8 Series Microinverters supports split phase, 240V. IQ8H-208 supports split phase, 208V only.

IQ8 Series Microinverters

INPUT DATA [DC]		IQ8-60-2-US	IQ8PLUS-72-2-US	IQ8M-72-2-US	IQ8A-72-2-US	IQ8H-240-72-2-US	IQ8H-208-72-2-US ¹
Commonly used module pairings ²	W	235 – 350	235 – 440	260 – 460	295 – 500	320 – 540+	295 – 500+
Module compatibility		60-cell/120 half-cell	60-cell/120 half-cell, 66-cell/132 half-cell and 72-cell/144 half-cell				
MPPT voltage range	V	27 – 37	29 – 45	33 – 45	36 – 45	38 – 45	38 – 45
Operating range	V	25 – 48			25 – 58		
Min/max start voltage	V	30 / 48			30 / 58		
Max input DC voltage	V	50			60		
Max DC current ³ [module Isc]	A			15			
Overtoltage class DC port				II			
DC port backfeed current	mA			0			
PV array configuration		1x1 Ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit					
OUTPUT DATA [AC]		IQ8-60-2-US	IQ8PLUS-72-2-US	IQ8M-72-2-US	IQ8A-72-2-US	IQ8H-240-72-2-US	IQ8H-208-72-2-US ¹
Peak output power	VA	245	300	330	366	384	366
Max continuous output power	VA	240	290	325	349	380	360
Nominal (L-L) voltage/range ⁴	V			240 / 211 – 264			208 / 183 – 250
Max continuous output current	A	1.0	1.21	1.35	1.45	1.58	1.73
Nominal frequency	Hz			60			
Extended frequency range	Hz			50 – 68			
AC short circuit fault current over 3 cycles	Arms			2			4.4
Max units per 20 A (L-L) branch circuit ⁵		16	13	11	11	10	9
Total harmonic distortion				<5%			
Overtoltage class AC port				III			
AC port backfeed current	mA			30			
Power factor setting				1.0			
Grid-tied power factor (adjustable)				0.85 leading – 0.85 lagging			
Peak efficiency	%	97.5	97.6	97.6	97.6	97.6	97.4
CEC weighted efficiency	%	97	97	97	97.5	97	97
Night-time power consumption	mW			60			
MECHANICAL DATA							
Ambient temperature range		-40°C to +60°C (-40°F to +140°F)					
Relative humidity range		4% to 100% (condensing)					
DC Connector type		MC4					
Dimensions (HxWxD)		212 mm (8.3") x 175 mm (6.9") x 30.2 mm (1.2")					
Weight		1.08 kg (2.38 lbs)					
Cooling		Natural convection – no fans					
Approved for wet locations		Yes					
Pollution degree		PD3					
Enclosure		Class II double-insulated, corrosion resistant polymeric enclosure					
Environ. category / UV exposure rating		NEMA Type 6 / outdoor					
COMPLIANCE							
Certifications		CA Rule 21 (UL 1741-SA), UL 62109-1, UL1741/IEEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01					
		This product is UL Listed as PV Rapid Shut Down Equipment and conforms with NEC 2014, NEC 2017, and NEC 2020 section 690.12 and C22.1-2018 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according to manufacturer's instructions.					

(1) The IQ8H-208 variant will be operating in grid-tied mode only at 208V AC. (2) No enforced DC/AC ratio. See the compatibility calculator at <https://link.enphase.com/module-compatibility> (3) Maximum continuous input DC current is 10.6A (4) Nominal voltage range can be extended beyond nominal if required by the utility. (5) Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

IQ8SE-DS-0001-01-EN-US-2022-03-17



SOLARWISE ENERGY SOLUTIONS, LLC
4020 W CAYUGA STREET
TAMPA, FL 33614

REVISIONS

DESCRIPTION	DATE	REV
INITIAL	06-27-2023	01

PROJECT NAME

DEANNA LAW

657 SW ALAMO DR
LAKE CITY, FL 32025

SHEET NAME

MICROINVERTER
DATA SHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

DS-02

Signature with Seal

Digitally signed
by Jeffrey A
Torres
Date:
2023.06.30
10:17:11 -04'00'



JEFFREY A. TORRES, PE
FL PE #80379
SUNSMART ENGINEERING LLC
FL COA #35170
925 SUNSHINE LANE, STE 1010
ALTAMONTE SPRINGS, FL 32714
(407) 710-1147

Enphase
IQ Combiner 4/4C
X-IQ-AM1-240-4
X-IQ-AM1-240-4C



To learn more about Enphase offerings, visit enphase.com

The **Enphase IQ Combiner 4/4C** with Enphase IQ Gateway and integrated LTE-M1 cell modem (included only with IQ Combiner 4C) consolidates interconnection equipment into a single enclosure and streamlines IQ microinverters and storage installations by providing a consistent, pre-wired solution for residential applications. It offers up to four 2-pole input circuits and Eaton BR series busbar assembly.

Smart

- Includes IQ Gateway for communication and control
- Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05), included only with IQ Combiner 4C
- Includes solar shield to match Enphase IQ Battery aesthetics and deflect heat
- Flexible networking supports Wi-Fi, Ethernet, or cellular
- Optional AC receptacle available for PLC bridge
- Provides production metering and consumption monitoring

Simple

- Centered mounting brackets support single stud mounting
- Supports bottom, back and side conduit entry
- Up to four 2-pole branch circuits for 240 VAC plug-in breakers (not included)
- 80A total PV or storage branch circuits

Reliable

- Durable NRTL-certified NEMA type 3R enclosure
- Five-year limited warranty
- Two years labor reimbursement program coverage included for both the IQ Combiner SKU's
- UL listed



Enphase IQ Combiner 4/4C

MODEL NUMBER	
IQ Combiner 4 (X-IQ-AM1-240-4)	IQ Combiner 4 with Enphase IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes a silver solar shield to match the IQ Battery system and IQ System Controller 2 and to deflect heat.
IQ Combiner 4C (X-IQ-AM1-240-4C)	IQ Combiner 4C with Enphase IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05), a plug-and-play industrial-grade cell modem for systems up to 60 microinverters. (Available in the US, Canada, Mexico, Puerto Rico, and the US Virgin Islands, where there is adequate cellular service in the installation area.) Includes a silver solar shield to match the IQ Battery and IQ System Controller and to deflect heat.
ACCESSORIES AND REPLACEMENT PARTS (not included, order separately)	
Ensemble Communications Kit COMMS-CELLMODEM-M1-06 CELLMODEM-M1-06-SP-05 CELLMODEM-M1-06-AT-05	- Includes COMMS-KIT-01 and CELLMODEM-M1-06-SP-05 with 5-year Sprint data plan for Ensemble sites - 4G based LTE-M1 cellular modem with 5-year Sprint data plan - 4G based LTE-M1 cellular modem with 5-year AT&T data plan
Circuit Breakers BRK-10A-2-240V BRK-15A-2-240V BRK-20A-2P-240V BRK-15A-2P-240V-B BRK-20A-2P-240V-B	Supports Eaton BR210, BR215, BR220, BR230, BR240, BR250, and BR260 circuit breakers. Circuit breaker, 2 pole, 10A, Eaton BR210 Circuit breaker, 2 pole, 15A, Eaton BR215 Circuit breaker, 2 pole, 20A, Eaton BR220 Circuit breaker, 2 pole, 15A, Eaton BR215B with hold down kit support Circuit breaker, 2 pole, 20A, Eaton BR220B with hold down kit support
EPLC-01	Power line carrier (communication bridge pair), quantity - one pair
XA-SOLARSHIELD-ES	Replacement solar shield for IQ Combiner 4/4C
XA-PLUG-120-3	Accessory receptacle for Power Line Carrier in IQ Combiner 4/4C (required for EPLC-01)
XA-ENV-PCBA-3	Replacement IQ Gateway printed circuit board (PCB) for Combiner 4/4C
X-IQ-NA-HD-125A	Hold down kit for Eaton circuit breaker with screws.
ELECTRICAL SPECIFICATIONS	
Rating	Continuous duty
System voltage	120/240 VAC, 60 Hz
Eaton BR series busbar rating	125 A
Max. continuous current rating	65 A
Max. continuous current rating (input from PV/storage)	64 A
Max. fuse/circuit rating (output)	90 A
Branch circuits (solar and/or storage)	Up to four 2-pole Eaton BR series Distributed Generation (DG) breakers only (not included)
Max. total branch circuit breaker rating (input)	80A of distributed generation / 95A with IQ Gateway breaker included
Production metering CT	200 A solid core pre-installed and wired to IQ Gateway
Consumption monitoring CT (CT-200-SPLIT)	A pair of 200 A split core current transformers
MECHANICAL DATA	
Dimensions (WxHxD)	37.5 x 49.5 x 16.8 cm (14.75" x 19.5" x 6.63"). Height is 21.06" (53.5 cm) with mounting brackets.
Weight	7.5 kg (16.5 lbs)
Ambient temperature range	-40° C to +46° C (-40° to 115° F)
Cooling	Natural convection, plus heat shield
Enclosure environmental rating	Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction
Wire sizes	• 20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors • 60 A breaker branch input: 4 to 1/0 AWG copper conductors • Main lug combined output: 10 to 2/0 AWG copper conductors • Neutral and ground: 14 to 1/0 copper conductors Always follow local code requirements for conductor sizing.
Altitude	To 2000 meters (6,560 feet)
INTERNET CONNECTION OPTIONS	
Integrated Wi-Fi	802.11b/g/n
Cellular	CELLMODEM-M1-06-SP-05, CELLMODEM-M1-06-AT-05 (4G based LTE-M1 cellular modem). Note that an Enphase Mobile Connect cellular modem is required for all Ensemble installations.
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included)
COMPLIANCE	
Compliance, IQ Combiner	UL 1741, CAN/CSA C22.2 No. 107.1, 47 CFR, Part 15, Class B, ICES 003 Production metering: ANSI C12.20 accuracy class 0.5 (PV production) Consumption metering: accuracy class 2.5
Compliance, IQ Gateway	UL 60601-1/CANCSA 22.2 No. 61010-1



To learn more about Enphase offerings, visit enphase.com

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4020 W CAYUGA STREET
TAMPA, FL 33614

REVISIONS

DESCRIPTION	DATE	REV
INITIAL	06-27-2023	01

PROJECT NAME

DEANNA LAW

657 SW ALAMO DR
LAKE CITY, FL 32025

SHEET NAME
COMBINER
DATA SHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
DS-03

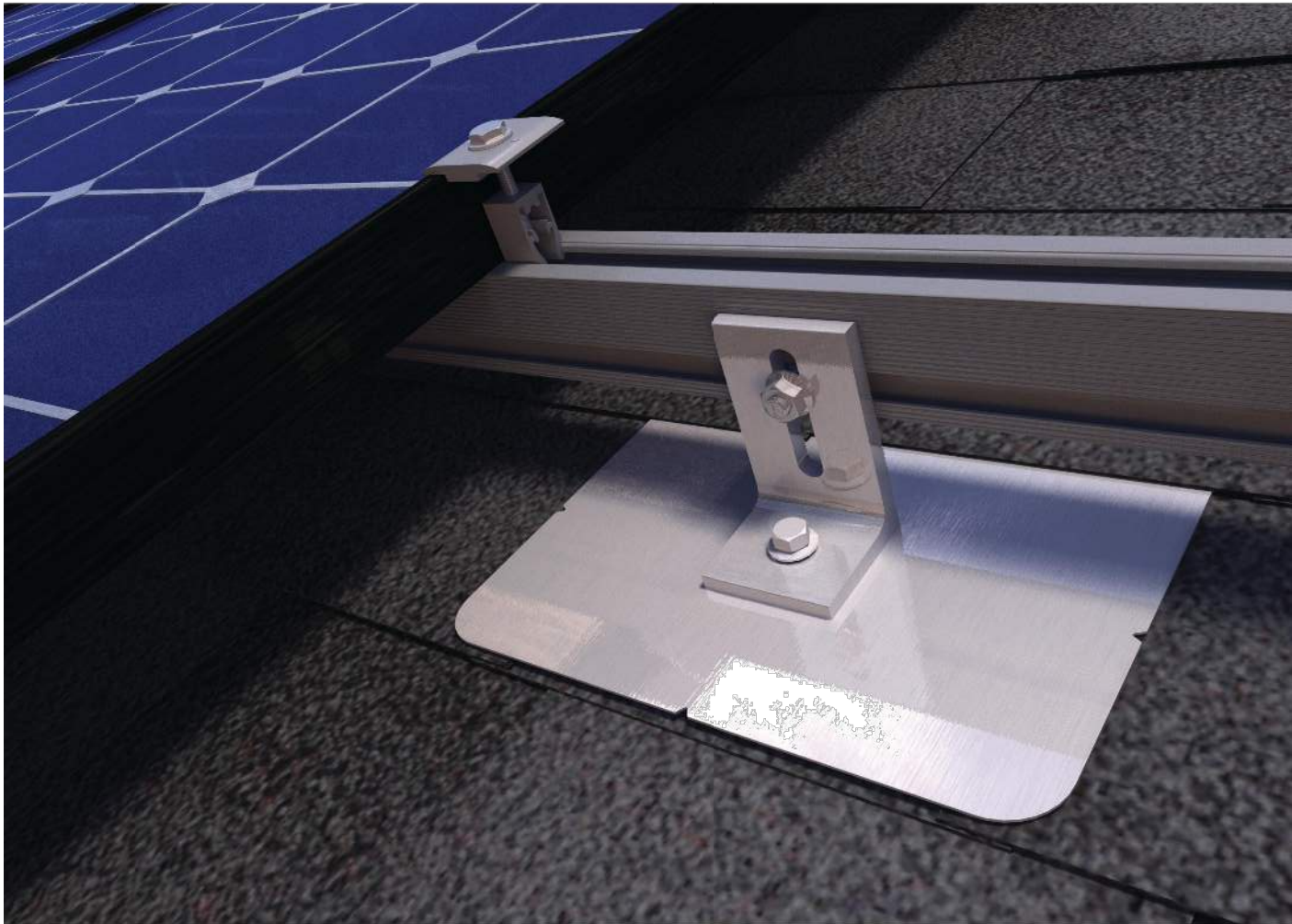
Signature with Seal

Digitally
signed by
Jeffrey A Torres
Date:
2023.06.30
10:17:20 -04'00'

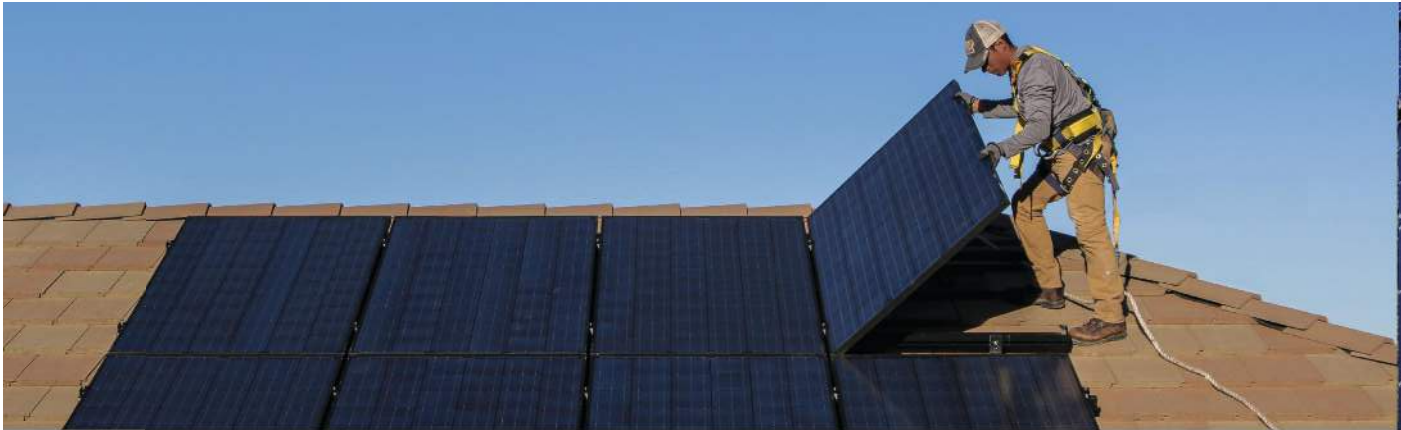
JEFFREY A. TORRES, PE
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FL COA #35170
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ALTAMONTE SPRINGS, FL 32714
(407) 710-1147

QRail™ Series

Rail System with QClick Technology™

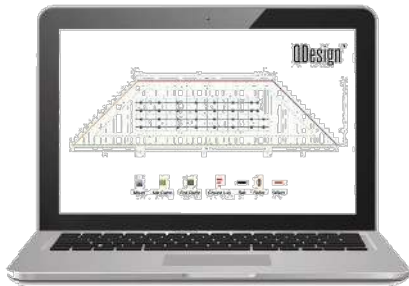


Cost-Effective Mounting and Racking For All Roofs



QRail™ — Single-Tool Mounting and Racking System

The QRail Series is a strong and versatile single-tool installation solar racking system that provides unrivaled benefits to solar designers and installers. Combined with Quick Mount PV's industry-leading weather-proof mounts, QRail offers a complete racking solution for mounting solar modules on any roof. An optional skirt is available.



QDesign.solar

Easily design array configurations with the QDesign software application. Generate complete engineering reports and calculate a precise bill of materials for all the mounting, racking and accessories needed for a complete solar array. Works 2-rail, 3-rail, shared-rail and fixed-tilt applications.

Comprehensive, One-Source Solution

QRail, together with Quick Mount PV's waterproof mounting products, provides the benefit of a single-sourced, seamlessly integrated rooftop installation that works with all roof types — composition/asphalt shingles, flat or curved tile, metal shingle, shake, slate and low slope roofs. The QRail system also works with any roof attachment system for maximum flexibility.

Superior Strength and Versatility

QRail is engineered for optimal structural performance. The system is certified to UL 2703, fully code compliant and backed by a 25-year warranty. QRail is available in Light and Standard versions and is compatible with virtually all modules and works on a wide range of pitched roof surfaces. Modules can be mounted in portrait or landscape orientation in standard or shared-rail configurations.



QRails come in two lengths —
168 inches (14 ft) and 208 inches (17.3 ft)
Mill and Black Finish



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DEANNA LAW
657 SW ALAMO DR
LAKE CITY, FL 32025

SHEET NAME

RAIL
DATA SHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

DS-04

Signature with Seal

Digitally signed
by Jeffrey A
Torres
Date:
2023.06.30
10:17:28 -04'00'

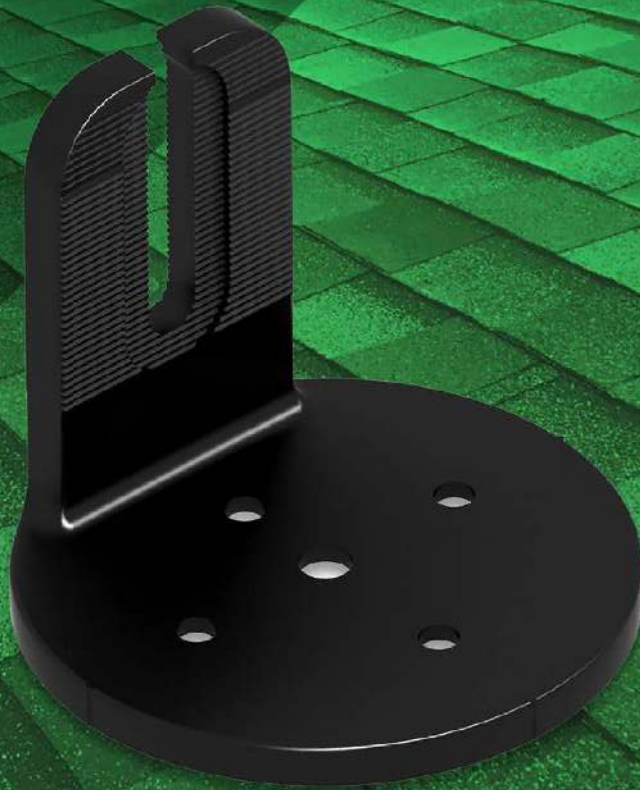
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SOLAR'S FASTEST ATTACHMENT

NanoMount®

Rafter or Deck Mount



Key Features of NanoMount®

5 levels of protection against water penetration

Open L-Foot for fast rail attachment

4 Deck Screws for Deck Mount or 1 Lag Bolt for Rafter Mount

360-degree positioning, serrated surface on both sides for rail mounting

Aesthetically pleasing unibody aluminum cast construction

Alignment markers enable easy installation

Integrated Ultra Soft Weather Resistant gasket

Technical Data

Application	Residential roof coverings, commercial single-ply roof membranes
Material	High grade aluminum, 304 stainless steel hardware
Finish	Black powder coating
Roof Attachment	Rafter and decking
Structural integrity	IBC and IRC Compliant
Warranty	25 years

SunModo, Corp. Vancouver, WA., USA • www.sunmodo.com • 360.844.0048 • info@sunmodo.com

Damaging roof shingles used to be one of a solar installers' worst challenges.

Now, the easy, affordable solution is NanoMount®, SunModo's patented solar mounting innovation.

The mount eliminates the need for lifting shingles and dramatically reduces the installation time.

The NanoMount® Advantage

- ✓ The fastest roof attachment in solar.
- ✓ Versatile mounting options including direct-to-decking.
- ✓ Eliminates the need to lift shingles and prevents damage to shingles.
- ✓ High-Velocity Hurricane Zone Approved - Passed TAS 100 (a) Wind-Driven Rain Test.
- ✓ All materials are compatible with asphalt shingles and single-ply roof membranes.



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657 SW ALAMO DR
LAKE CITY, FL 32025

SHEET NAME

ATTACHMENT
DATA SHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

DS-05

Signature with Seal

Digitally signed
by Jeffrey A
Torres
Date:
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10:17:39 -04'00'

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