Inst. Number: 202412004103 Book: 1509 Page: 431 Page 1 of 1 Date: 2/29/2024 Time: 9:14 AM
James M Swisher Jr Clerk of Courts, Columbia County, Florida Doc Mort: 0.00 Int Tax: 0.00 Doc Deed: 0.00

NOTICE OF COMMENCEMENT

Clerk's Office Stamp

Tax Parcel Identification Number:

15-4S-16-03023-249 (13839)

THE UNDERSIGNED hereby gives notice that improvements will be made to certain real property, and in accordance with Section 713.13 of the Florida Statutes, the following information is provided in this **NOTICE OF COMMENCEMENT**.

1. Description of property *(legal description)*: LOT 49 CALLAWAY S/D PHASE 2. 927-1529, 942-1641,QC 1371- 2613
   a) Street *(job)* Address: 356 SW Callaway Dr , Lake City, FL 32024
2. General description of improvements: INSTALLATION OF ROOF MOUNTED SOLAR PANELS
3. Owner Information or Lessee information if the Lessee contracted for the improvements:
   a) Name and address: Sidney Thompson
   b) Name and address of fee simple titleholder (if other than owner)
   c) Interest in property OWNER
4. Contractor Information 1250 IMESON PARK BLVD- STE 301 JACKSONVILLE FL 32218
   a) Name and address: FREEDOM FOREVER
   b) Telephone No.: 407 795 8231
5. Surety Information (if applicable, a copy of the payment bond is attached):
   a) Name and address:
   b) Amount of Bond:
   c) Telephone No.:
6. Lender
   a) Name and address:
   b) Phone No.
7. Person within the State of Florida designated by Owner upon whom notices or other documents may be served as provided by Section 713.13(1)(a)7., Florida Statutes:
   a) Name and address:
   b) Telephone No.:
8. In addition to himself or herself, Owner designates the following person to receive a copy of the Lienor's Notice as provided in Section 713.13(l)(b), Florida Statutes:
   a) Name: OF
   b) Telephone No.:
9. Expiration date of Notice of Commencement **(the expiration date will be 1 year from the date of recording unless a different date is specified)**:

WARNING TO OWNER: ANY PAYMENTS MADE BY THE OWNER AFTER THE EXPIRATION OF THE NOTICE OF COMMENCEMENT ARE CONSIDERED IMPROPER PAYMENTS UNDER CHAPTER 713, PART I, SECTION 713.13, FLORIDA STATUTES, AND CAN RESULT IN YOUR PAYING TWICE FOR IMPROVEMENTS TO YOUR PROPERTY; A NOTICE OF COMMENCEMENT MUST BE RECORDED AND POSTED ON THE JOB SITE BEFORE THE FIRST INSPECTION. IF YOU INTEND TO OBTAIN FINANCING, CONSULT YOUR LENDER OR AN ATTORNEY BEFORE COMMENCING WORK OR RECORDING YOUR NOTICE OF COMMENCEMENT.

STATE OF FLORIDA
COUNTY OF ~~COLUMBIA~~ Miami Dade

Sidney Thompson
10. _____
Signature of Owner or Lessee, or Owner's or Lessee's Authorized Office/Director/Partner/Manager

Sidney Thompson
Printed Name **and** Signatory's Title/Office

The foregoing instrument was acknowledged before me, by means of ☐ physical presence or ☑ online notarization, a Florida Notary,

this 27th day of February, 20 24, by: Sidney Thompson (Name of Person) as Lessee, or Owner (Type of Authority)

for N/A (name of party on behalf of whom instrument was executed) who is personally known ☐ OR produced identification ☑

Type ID DRIVER LICENSE

Notarized remotely online using communication technology via Proof.

Notary Signature _____ Mario Luis Heredia (Notary Stamp or Seal)

MARIO LUIS HEREDIA
Notary Public - State of Florida
Commission # HH61204
Expires on November 8, 2024

11/08/2024 HH61204

BARUN CORP

March 5, 2024

Dear Whom It May Concern,

Project Name : SIDNEY THOMPSON, 356 SW CALLAWAY DR, LAKE CITY, FL 32024

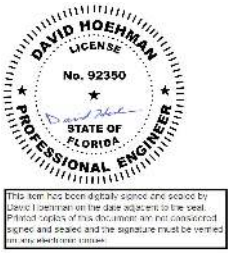
Installation of a 16.8 kW (DC) Rooftop PV Solar System

Per Florida Statute 377-705 (revised 7/01/2017), I, David Hoehman, P.E., a licensed engineer pursuant to Chapter 471, certify that the PV electrical system and electrical components are designed and approved using the code requirements and standards contained in the Florida Building Code.

If you have any questions regarding this project, please feel free to contact me.

Sincerely,

David Hoehman, P.E.
dxh1172@yahoo.com



Digitally signed by David Hoehman
Date: 2024.03.05 06:46:23 -05'00'

Freedom Forever
Planset Revision Letter

3/1/2024
REV #1

Attn. County of Columbia (FL):

The changes outlined in Revision Details have been applied to the plans corresponding to the following customer:

SIDNEY THOMPSON
356 SW CALLAWAY DR , LAKE CITY, FL 32024

Revision Details:
Codes and labels updated to reflect 2020 NEC.

All corresponding changes are notated on the plans by revision clouds.

Thank you for your time in reviewing these plans. Please reach out if you have any additional questions or concerns.

Construction Engineering
Freedom Forever
engineering@freedomforever.com

ROOF MOUNT PHOTOVOLTAIC SYSTEM

CODES:

THIS PROJECT COMPLIES WITH THE FOLLOWING:
2023 8TH EDITION FLORIDA BUILDING CODE: BUILDING
2023 8TH EDITION FLORIDA BUILDING CODE: RESIDENTIAL
2023 8TH EDITION FLORIDA BUILDING CODE: MECHANICAL
2023 8TH EDITION FLORIDA BUILDING CODE: PLUMBING
2023 8TH EDITION FLORIDA BUILDING CODE: FUEL GAS
2023 8TH EDITION FLORIDA BUILDING CODE: ENERGY CONSERVATION
2023 8TH EDITION FLORIDA BUILDING CODE: EXISTING BUILDING
2023 8TH EDITION FLORIDA BUILDING CODE: ACCESSIBILITY
2023 8TH EDITION FLORIDA FIRE PREVENTION CODE (NFPA)
2020 NATIONAL ELECTRIC CODE (NEC)
AS ADOPTED BY COUNTY OF COLUMBIA

VICINITY MAP:

SITE LOCATION

TABLE OF CONTENTS:

CONSTRUCTION NOTES:

CONDUIT AND CONDUCTOR SPECIFICATIONS ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING AS REQUIRED BY FIELD CONDITIONS.
ALL SOLAR ENERGY SYSTEM EQUIPMENT SHALL BE SCREENED TO THE MAXIMUM EXTENT POSSIBLE AND SHALL BE PAINTED A COLOR SIMILAR TO THE SURFACE UPON WHICH THEY ARE MOUNTED.
MODULES SHALL BE TESTED , LISTED AND INDENTIFIED WITH FIRE CLASSIFICATION IN ACCORDANCE WITH UL 2703. SMOKE AND CARBON MONOXIDE ALARMS ARE REQUIRED PER SECTION R314 AND 315 TO BE VERIFIED AND INSPECTED BY INSPECTOR IN THE FIELD.
DIG ALERT (811) TO BE CONTACTED AND COMPLIANCE WITH EXCAVATION SAFETY PRIOR TO ANY EXCAVATION TAKING PLACE
PHOTOVOLTAIC SYSTEM GROUND WILL BE TIED INTO EXISTING GROUND AT MAIN SERVICE FROM DC DISCONNECT/INVERTER AS PER 2017 NEC SEC 250.166(A).
SOLAR PHOTOVOLTAIC SYSTEM EQUIPMENT WILL BE INSTALLED IN ACCORDANCE WITH REQUIREMENTS OF ART. 690 OF THE 2017 NEC
THE MAIN SERVICE PANEL WILL BE EQUIPPED WITH A GROUND ROD OR UFER
UTILITY COMPANY WILL BE NOTIFIED PRIOR TO ACTIVATION OF THE SOLAR PV SYSTEM
INSTALL CREW TO VERIFY ROOF STRUCTURE PRIOR TO COMMENCING WORK. EMT CONDUIT ATTACHED TO THE ROOF USING CONDUIT MOUNT.

DAVID HOEHMAN LICENSE No. 92350 STATE OF FLORIDA PROFESSIONAL ENGINEER

This item has been digitally signed and sealed David Hoehman on the date adjacent to the sea Printed copies of this document are not consid signed and sealed and the signature must be v on any electronic copies.

Digitally signed by David

Columbia County Building Department Plans Reviewed for Code Compliance State of Florida

10'

CLIENT:
SIDNEY THOMPSON
356 SW CALLAWAY DR, LAKE CITY, FL 32024
AHJ: COUNTY OF COLUMBIA
UTILITY: "CLAY ELECTRIC COOPERATIVE, INC. "
METER: 154740121
APN: 15-4S-16-03023-249
PHONE: (386) 344-3095
EMAIL: COLLSID@COMCAST.NET

SYSTEM:
SYSTEM SIZE (DC): 42 X 400 = 16.800 kW
SYSTEM SIZE (AC): 12.180 kW @ 240V
MODULES: 42 X FREEDOM FOREVER: FF-MP-BBB-400
MICROINVERTERS: 42 X ENPHASE IQ8PLUS-72-2-US

	REVISIONS	
NO.	REVISED BY	DATE
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-	-	-

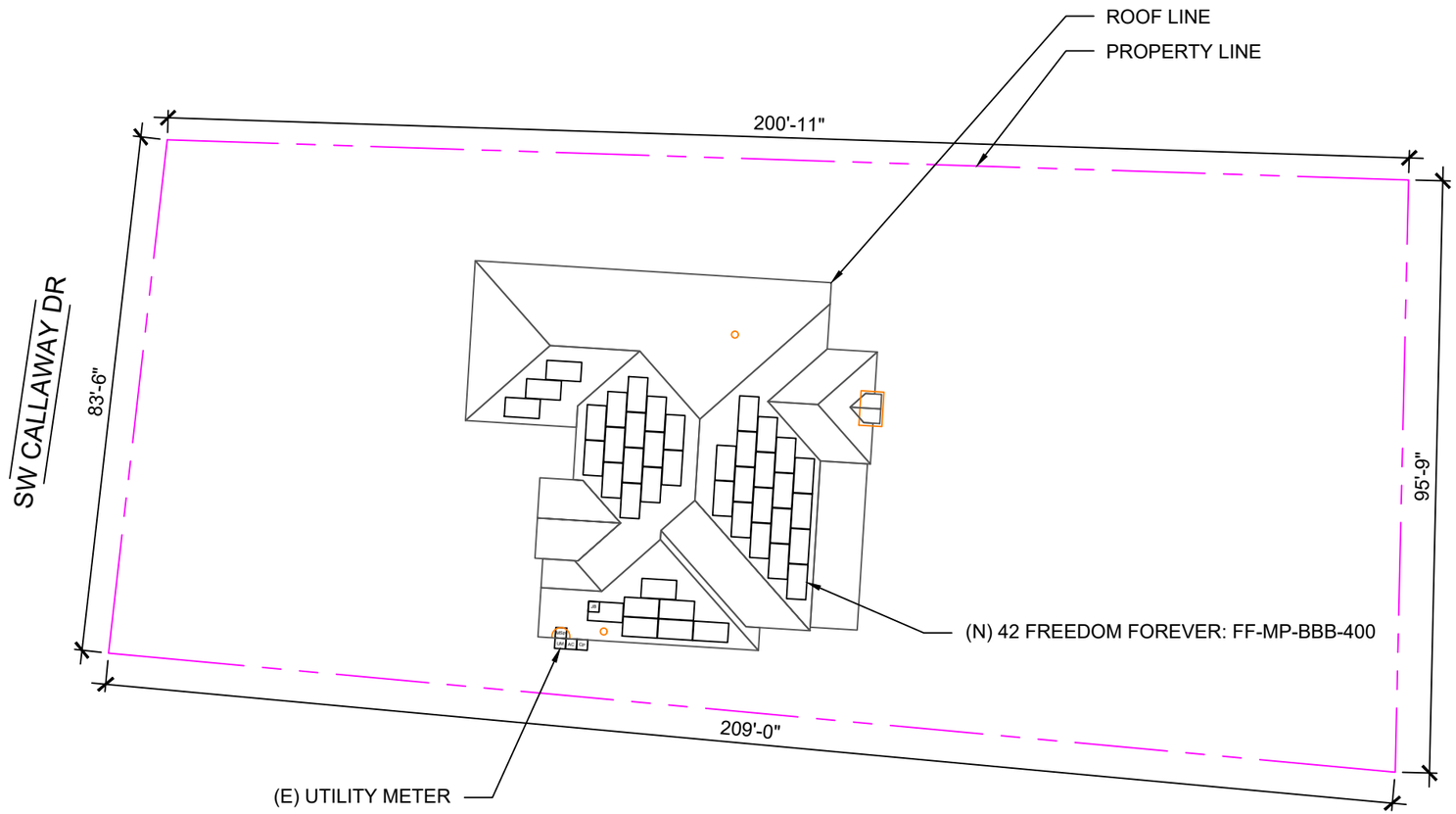
freedom FOREVER
FREEDOM FOREVER LLC
2619 CONSULATE DR SUITE 800, ORLANDO, FL 32819
Tel: (800) 385-1075
GREG ALBRIGHT

CONTRACTOR LICENSE:
CERTIFIED ELECTRICAL CONTRACTOR
EC13008056

JOB NO:	DATE:	DESIGNED BY:	SHEET:
404444	2/1/2024	A.W.	PV-1

LEGEND:

- CHIMNEY
- PIPE VENT
- ATTACHMENTS
- MODULES
- RAFTERS
- RAIL
- SETBACK
- AC — AC DISCONNECT
- MSP — MSP
- JB — JUNCTION BOX
- PM — PRODUCTION METER
- DC / AC — MICRO INVERTER
- CP — COMBINER PANEL



SITE PLAN
SCALE: 1/24" = 1'-0"

1

RYAN NGO LICENSE No. 96636 STATE OF FLORIDA PROFESSIONAL ENGINEER

Ryan Ngo
Digitally signed by Ryan Ngo
Date: 2024.03.05 11:23:13-08'00'

This item has been digitally signed and sealed by Ryan Ngo, PE. on the date and/or time stamp shown using a digital signature. Printed copies of this document are not considered signed and sealed and the signature must be verified by a 3rd Party Certificate Authority on any electronic copy.

ROOF AREA: 3947 SQ FT

CLIENT:
SIDNEY THOMPSON
356 SW CALLAWAY DR, LAKE CITY, FL 32024
AHJ: COUNTY OF COLUMBIA
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freedom FOREVER

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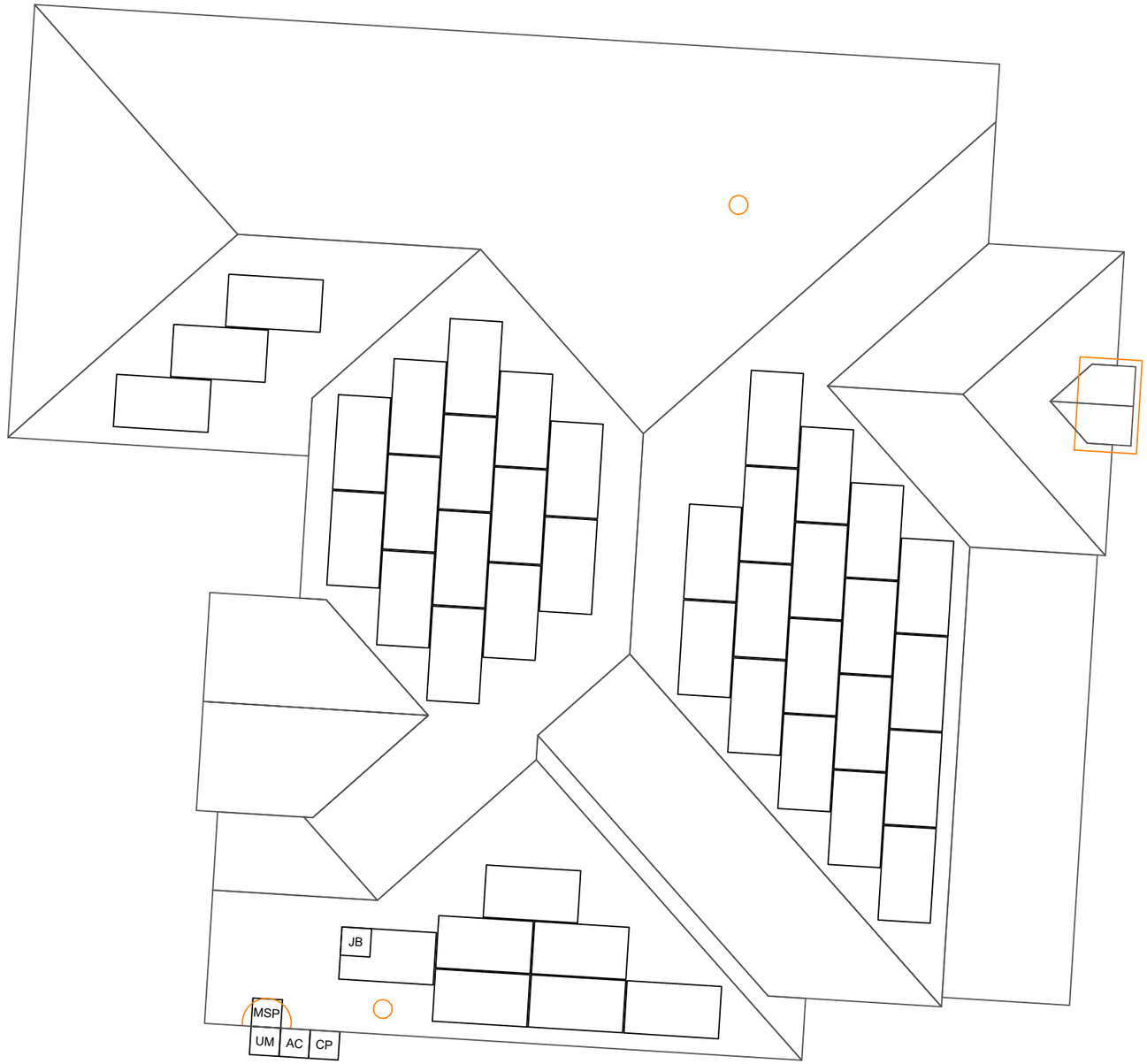
EC13008056

SITE PLAN

JOB NO:	DATE:	DESIGNED BY:	SHEET:
404444	2/1/2024	A.W.	PV-2

LEGEND:

- CHIMNEY
- PIPE VENT
- ATTACHMENTS
- MODULES
- RAFTERS
- RAIL
- SETBACK
- AC — AC DISCONNECT
- MSP — MSP
- JB — JUNCTION BOX
- PM — PRODUCTION METER
- DC / AC — MICRO INVERTER
- CP — COMBINER PANEL



TOTAL ROOF AREA: 3947 SQ FT
TOTAL ARRAY AREA: 882.81 SQ FT
ARRAY COVERAGE: 22.37%
SYSTEM DISTRIBUTED WEIGHT: 2.32 LBS
UNIRAC: FLASHLOC DUO POINT-LOAD: 26.23 LBS
ROCKIT SMART SLIDE POINT-LOAD: 27.95 LBS

ROOF PLAN
SCALE: 1/8" = 1'-0"

1

NOTES:
1. EMT CONDUIT ATTACHED TO THE ROOF USING CONDUIT MOUNTS
2. ATTACHED CLAMPS AT 25% FROM THE EDGE AND 50% FROM THE CENTER OF THE MODULES
3. JUNCTION BOX IS MOUNTED TO THE RAIL.

RYAN NGO
LICENSE
No. 96636
STATE OF FLORIDA
PROFESSIONAL ENGINEER

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ROOF AREA: 3947 SQ FT

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EC13008056

ROOF PLAN WITH MODULES LAYOUT

JOB NO:	DATE:	DESIGNED BY:	SHEET:
404444	2/1/2024	A.W.	PV-2A

ROOF DETAILS:

TOTAL ROOF AREA: 3947 SQ FT
TOTAL ARRAY AREA: 882.81 SQFT
ARRAY COVERAGE: 22.37%
SYSTEM DISTRIBUTED WEIGHT: 2.32 LBS
UNIRAC: FLASHLOC DUO POINT-LOAD: 26.23 LBS
ROCKIT SMART SLIDE POINT-LOAD: 27.95 LBS

ROOF AREA STATEMENT						
ROOF	MODULE QUANTITY	ROOF PITCH	ARRAY PITCH	AZIMUTH	ROOF AREA	ARRAY AREA
ROOF 1	7	33	33	183.53	397.12 SQ FT	147.14 SQ FT
ROOF 2	18	33	33	93.53	684.74 SQ FT	378.35 SQ FT
ROOF 3	14	33	33	273.53	587.4 SQ FT	294.27 SQ FT
ROOF 4	3	33	33	183.53	231.21 SQ FT	63.06 SQ FT
----	----	----	----	----	SQ FT	SQ FT
----	----	----	----	----	SQ FT	SQ FT
----	----	----	----	----	SQ FT	SQ FT
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----	----	----	----	----	SQ FT	SQ FT
----	----	----	----	----	SQ FT	SQ FT

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EC13008056

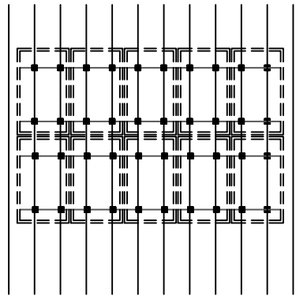
ARRAY DETAILS

JOB NO:	DATE:	DESIGNED BY:	SHEET:
404444	2/1/2024	A.W.	PV-2B

TABLE 1 - ARRAY INSTALLATION

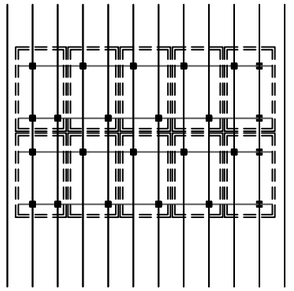
	ROOF PITCH	ROOFING TYPE	ATTACHMENT TYPE	FRAMING TYPE	MAX UNBRACED LENGTH(FT.)	STRUCTURAL ANALYSIS RESULT	PENETRATION PATTERN	MAX ATTACHMENT SPACING (IN.)	MAX RAIL OVERHANG(IN.)
ROOF 1	33	Comp Shingle	Unirac Flashloc Duo	2x4 @ 24" O.C.	7	PASS	STACKED	36	12
ROOF 2	33	Comp Shingle	Ecofasten RockIt Smart Slide	2x4 @ 24" O.C.	7	PASS	STACKED	72	24
ROOF 3	33	Comp Shingle	Ecofasten RockIt Smart Slide	2x4 @ 24" O.C.	7	PASS	STACKED	72	24
ROOF 4	33	Comp Shingle	Ecofasten RockIt Smart Slide	2x4 @ 24" O.C.	7	PASS	STACKED	72	24

1. CONTRACTOR TO VERIFY FRAMING TYPE AND MAX UNBRACED LENGTH PRIOR TO INSTALLATION. IF THE ABOVE INFORMATION DOES NOT MATCH FIELD CONDITIONS, NOTIFY ENGINEER OF RECORD IMMEDIATELY.
2. WHERE COLLAR TIES OR RAFTER SUPPORTS EXIST, CONTRACTOR SHALL USE RAFTERS WITH COLLAR TIES AS ATTACHMENT POINTS.
3. MAX RAIL OVERHANG APPLICABLE FOR RAILED ATTACHMENT INSTALLATIONS.



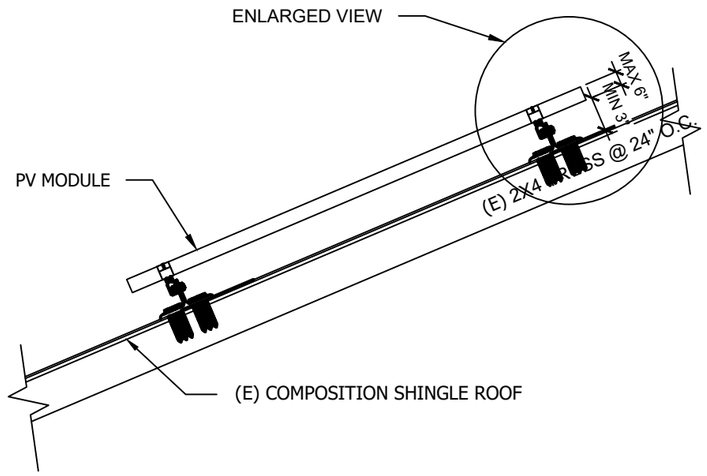
STACKED DETAIL

For Illustration purposes only



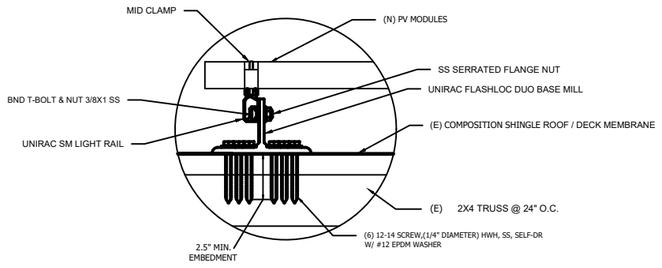
STAGGERED DETAIL

For Illustration purposes only



SOLAR PV ARRAY SECTION VIEW

Scale: NTS



ATTACHMENT DETAIL

Scale: NTS

RYAN NGO
LICENSE
No. 96636
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

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356 SW CALLAWAY DR, LAKE CITY, FL 32024
AHJ: COUNTY OF COLUMBIA
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METER: 154740121
APN: 15-4S-16-03023-249
PHONE: (386) 344-3095
EMAIL: COLLSID@COMCAST.NET

SYSTEM:
SYSTEM SIZE (DC): 42 X 400 = 16.800 kW
SYSTEM SIZE (AC): 12.180 kW @ 240V
MODULES: 42 X FREEDOM FOREVER: FF-MP-BBB-400
MICROINVERTERS: 42 X ENPHASE IQ8PLUS-72-2-US

	REVISIONS	
NO.	REVISED BY	DATE
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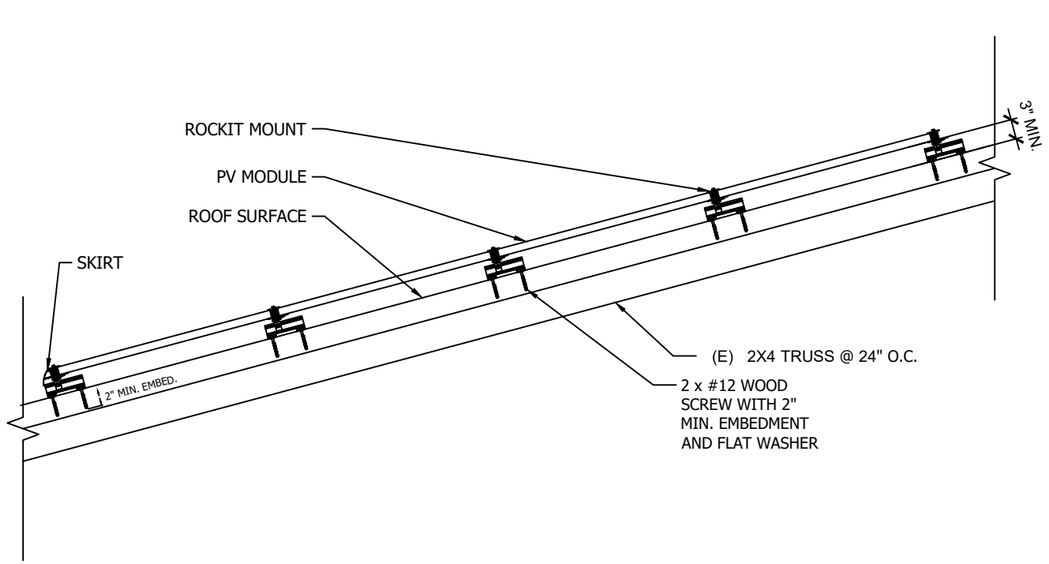
-	-	-

FREEDOM FOREVER LLC
2619 CONSULATE DR SUITE 800, ORLANDO, FL 32819
Tel: (800) 385-1075
GREG ALBRIGHT

CONTRACTOR LICENSE:
CERTIFIED ELECTRICAL CONTRACTOR
EC13008056

MOUNTING DETAILS

JOB NO:	DATE:	DESIGNED BY:	SHEET:
404444	2/1/2024	A.W.	PV-3



SOLAR PV ARRAY SECTION VIEW

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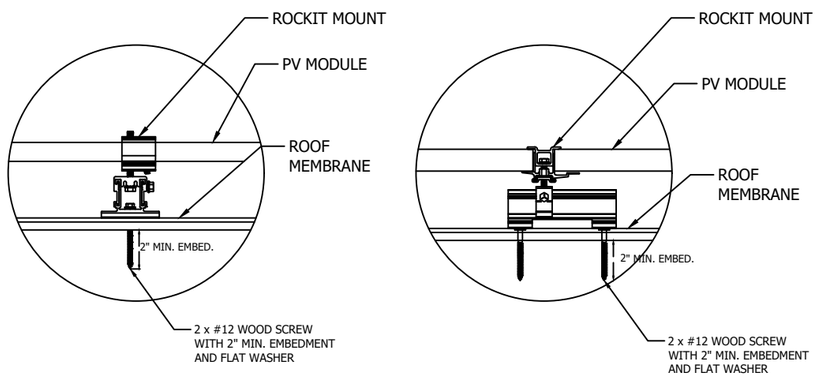

ATTACHMENT DETAIL

Scale: NTS

RYAN NGO
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-	-	-

freedom FOREVER
FREEDOM FOREVER LLC
2619 CONSULATE DR SUITE 800, ORLANDO, FL 32819
Tel: (800) 385-1075
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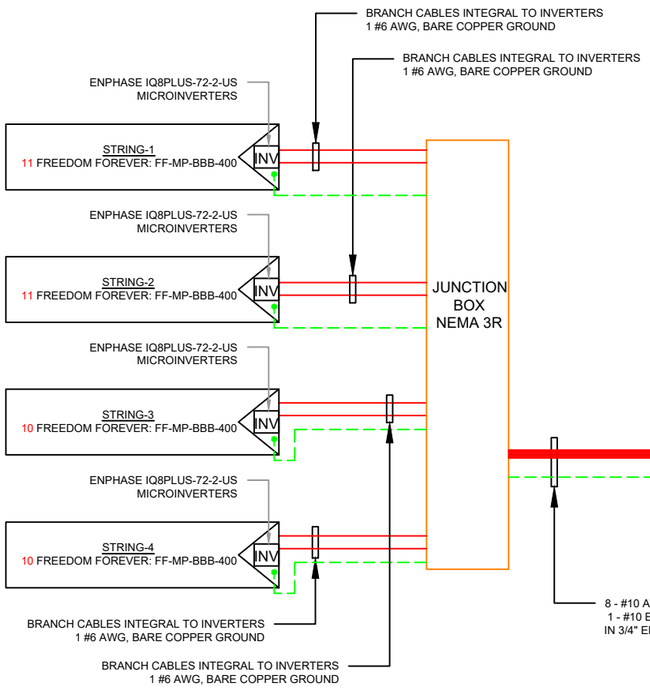
EC13008056

MOUNTING DETAILS

JOB NO:	DATE:	DESIGNED BY:	SHEET:
404444	2/1/2024	A.W.	PV-3A

BACKFEED FUSE SIZING					
MAX. CONTINUOUS OUTPUT 50.82A @ 240V					
50.82	X	1.25	=	64AMPS	70A FUSES - OK



NOTE:
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DAVID HOEHMAN
LICENSE
No. 92350
STATE OF FLORIDA
PROFESSIONAL ENGINEER

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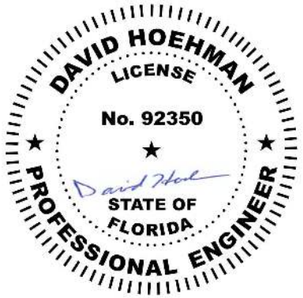
THREE LINE DIAGRAM

JOB NO:	DATE:	DESIGNED BY:	SHEET:
404444	2/1/2024	A.W.	PV-4



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WIRE SCHEDULE

RACEWAY #	EQUIPMENT				CONDUCTOR QTY.	AWG WIRE SIZE	STARTING ALLOWABLE AMPACITY @ 90°C 310.15(B)(16)	STARTING CURRENT APPLIED TO CONDUCTORS IN RACEWAY	TEMPERATURE CORRECTION FACTOR 310.15(B)(2)(a)	ADJUSTMENT FACTOR FOR MORE THAN 3 CONDUCTORS 310.15(B)(3)(a)	ADJUSTED CONDUCTOR AMPACITY @ 90°C	MAXIMUM CURRENT APPLIED TO CONDUCTORS IN RACEWAY
1	DC	MODULE	TO	MICROINVERTER	2	10	40	17.24	0.96	1	38.40	21.55
2	AC	MICROINVERTER	TO	JUNCTION BOX	2	10	40	13.31	0.96	1	38.40	16.64
3	AC	JUNCTION BOX	TO	ENPHASE COMBINER PANEL	8	10	40	13.31	0.96	0.7	26.88	16.64
4	AC	ENPHASE COMBINER PANEL	TO	AC DISCONNECT	3	6	75	50.82	0.96	1	72.00	63.53
5	AC	AC DISCONNECT	TO	POI	3	6	75	50.82	0.96	1	72.00	63.53

CONDUCTOR AMPACITY CALCULATIONS IN ACCORDANCE WITH NEC 690.8.

CLIENT:
SIDNEY THOMPSON
356 SW CALLAWAY DR, LAKE CITY, FL 32024
AHJ: COUNTY OF COLUMBIA
UTILITY: "CLAY ELECTRIC COOPERATIVE, INC. "
METER: 154740121
APN: 15-4S-16-03023-249
PHONE: (386) 344-3095
EMAIL: COLLSID@COMCAST.NET

SYSTEM:
SYSTEM SIZE (DC): 42 X 400 = 16.800 kW
SYSTEM SIZE (AC): 12.180 kW @ 240V
MODULES: 42 X FREEDOM FOREVER: FF-MP-BBB-400
MICROINVERTERS: 42 X ENPHASE IQ8PLUS-72-2-US

NO.	REVISIONS REVISED BY	DATE
-	-	-
-	-	-
-	-	-

FREEDOM FOREVER LLC
2619 CONSULATE DR SUITE 800, ORLANDO, FL 32819
Tel: (800) 385-1075
GREG ALBRIGHT

CONTRACTOR LICENSE:
CERTIFIED ELECTRICAL CONTRACTOR
EC13008056

CONDUCTOR CALCULATIONS

JOB NO:	DATE:	DESIGNED BY:	SHEET:
404444	2/1/2024	A.W.	PV-5

OCPD SIZES:

20A BREAKER
20A BREAKER
20A BREAKER
20A BREAKER
70A FUSES
3A BREAKER

SERVICE LIST:

NONE

MATERIAL LIST:

QTY.	PART	PART #	DESCRIPTION
42	MODULES	PV-110-400	FREEDOM FOREVER: FF-MP-BBB-400
1	JUNCTION BOX	RAC-261-527	600VDC NEMA 3R UL LISTED JUNCTION BOX
1	MOUNTING BRACKET	RAC-211-201	UNIRAC E-BOSS J-BOX MOUNTING BRACKET
4	ELECTRICAL ACCESSORIES	EA-350-326	STAUBLI / MULTI-CONTACT MC4 CONNECTORS (FEMALE)
4	EQUIPMENT ACCESSORIES	EA-350-327	STAUBLI / MULTI-CONTACT MC4 CONNECTORS (MALE)
42	INVERTERS	INV-120-015	ENPHASE IQ8PLUS-72-2-US
1	MONITORING EQUIPMENT	ME-180-201-4C	ENPHASE: COMBINER PANEL 4C
49	ELECTRICAL ACCESSORIES	EA-160-106	"ENPHASE, Q CABLE PORTRAIT FOR 60/72 CELL"
49	ELECTRICAL ACCESSORIES	EA-160-105	"ENPHASE, Q CABLE LANDSCAPE 60 CELL"
1	MONITORING EQUIPMENT	ME-180-201	"ENPHASE, AC COMBINER W/ IQ GATEWAY PCBA, 80A, 240V"
1	WIRE	WR-310-300	"ENPHASE, RAW TRUCK CABLE (300 FT. ROLL)"
336	ELECTRICAL ACCESSORIES	EA-160-110	ENPHASE TIE WRAPS / CABLE CLIPS
11	ELECTRICAL ACCESSORIES	EA-160-107	ENPHASE SEALING CAPS FOR Q CABLE
5	ELECTRICAL ACCESSORIES	EA-160-109	ENPHASE TERMINATOR
1	DISCONNECTS	EE-321-101	100A RATED 240VAC NEMA 3R UL LISTED
2	FUSES	BR-330-070	70A FUSE 1 PH 240VAC
3	ELECTRICAL ACCESSORIES	EA-350-113	IDEAL B-TAP 4/0-10 AWG
13	FITTINGS/ANCHORS	RAC-241-263	UNIRAC: FLASHLOC DUO
61	FITTINGS/ANCHORS	RAC-265-034	ROCKIT SMART SLIDE
6	RAILS	RAC-211-100	UNIRAC SM LIGHT RAIL 168 INCH (TOTAL 80 FEET NEEDED)
13	FITTINGS/ANCHORS	RAC-261-517	BND T-BOLT AND NUT SS
8	ENDS/MIDS	RAC-221-101	SM MIDCLAMP PRO DRK
8	ENDS/MIDS	RAC-221-209	SM ENDCLAMP PRO W/ END CLAMP
3	FITTINGS/ANCHORS	RAC-261-600	BND SPLICE BAR PRO SERIES MILL
8	FITTINGS/ANCHORS	RAC-261-510	MICRO MNT BND TBOLT SS
2	RAILS	RAC-211-209-NS	E-BOSS CONDUIT MOUNT COMP KIT
4	RAILS	RAC-211-200	E-BOSS RAIL TRAY
2	RAILS	RAC-211-206	E-BOSS BRIDGE TRAY
3	RAILS	RAC-211-207	E-BOSS BRIDGE CLIPS
12	FITTINGS/ANCHORS	RAC-260-300	BURNDY GROUND WEEB-LUG
12	FOOTINGS	RAC-241-100	UNIRAC L-FOOT SERRATED W/T-BOLT CLEAR (KIT)
61	FITTINGS/ANCHORS	RAC-261-517	BND T-BOLT AND NUT SS
37	ENDS/MIDS	RAC-221-101	SM MIDCLAMP PRO DRK
37	ENDS/MIDS	RAC-221-202-NA	SM ENDCLAMP PRO W/ END CLAMP
12	FITTINGS/ANCHORS	FITTINGS/ANCHORS	BND SPLICE BAR PRO SERIES MILL
10	FITTINGS/ANCHORS	RAC-261-510	MICRO MNT BND TBOLT SS
10	RAILS	RAC-211-209-NS	E-BOSS CONDUIT MOUNT COMP KIT
20	RAILS	RAC-211-206	E-BOSS RAIL TRAY
7	RAILS	RAC-211-206	E-BOSS BRIDGE TRAY
11	RAILS	RAC-211-207	E-BOSS BRIDGE CLIPS
80	FITTINGS/ANCHORS	RAC-260-300	E-BOSS BRIDGE CLIPS
60	FOOTINGS	RAC-241-100	UNIRAC L-FOOT SERRATED W/T-BOLT CLEAR (KIT)

DAVID HOEHMAN
LICENSE
No. 92350
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

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EC13008056

EQUIPMENT & SERVICE LIST

JOB NO:	DATE:	DESIGNED BY:	SHEET:
404444	2/1/2024	A.W.	PV-6

MAIN PHOTOVOLTAIC SYSTEM DISCONNECT

690.13(B)

DO NOT DISCONNECT UNDER LOAD

NEC 690.15 (B) & NEC 690.33(D)(2)

⚠ WARNING

SINGLE 120-VOLT SUPPLY
DO NOT CONNECT
MULTIWIRE BRANCH CIRCUITS

NEC 710.15(C) & 692.9 (C)

⚠ WARNING DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

NEC 705.12(D) & NEC 690.59

⚠ WARNING

TURN OFF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKING INSIDE PANEL

NEC 110.27(C) & OSHA 1910.145(F)(7)

⚠ WARNING

ELECTRICAL SHOCK HAZARD

TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

706.15(C)(4) & 690.13(B)

⚠ WARNING

THIS EQUIPMENT FED BY MULTIPLE SOURCES:
TOTAL RATING OF ALL OVERCURRENT DEVICES EXCLUDING MAIN POWER SUPPLY SHALL NOT EXCEED AMPACITY OF BUSBAR

NEC 705.12(B)(3)(3)

⚠ WARNING

THE DISCONNECTION OF THE GROUNDED CONDUCTOR(S) MAY RESULT IN OVERVOLTAGE ON THE EQUIPMENT

NEC 690.31(E)

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

690.56(C)(3)

OPTIONAL SOLAR LOAD CENTER

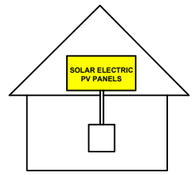
M

AC

PM

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



IFC 605.11.3.1(1) & 690.56(C)

⚠ CAUTION
PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED

NEC 705.12(D) & NEC 690.59

⚠ WARNING
POWER SOURCE OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE.

NEC 705.12(C) & NEC 690.59

⚠ WARNING
ARC FLASH AND SHOCK HAZARD
APPROPRIATE PPE REQUIRED

24 INCH FLASH HAZARD BOUNDARY
3 CAL/CM^2 FLASH HAZARD AT 18 INCHES
480 VAC SHOCK HAZARD WHEN COVER IS REMOVED
42 INCH LIMITED APPROACH
12 INCH RESTRICTED APPROACH - 500 V CLASS 00 GLOVES
1 INCH PROHIBITED APPROACH - 500 V CLASS 00 GLOVES

LOCATION: 356 SW CALLAWAY DR LAKE CITY, FL 32024

NEC 706.15(C) AND NEC 110.16

PHOTOVOLTAIC AC DISCONNECT

NEC 690.13(B)

PHOTOVOLTAIC AC DISCONNECT

RATED AC OUTPUT CURRENT:	50.82A
NOMINAL OPERATING AC VOLTAGE:	240V

NEC 690.54

⚠ WARNING DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

NEC 705.12(D) & NEC 690.59

PHOTOVOLTAIC POWER SOURCE

EVERY 10' ON CONDUIT AND ENCLOSURES
NEC 690.31(D)(2)

MAXIMUM VOLTAGE	60	V
MAXIMUM CIRCUIT CURRENT	N/A	A
MAX DC-DC CONVERTER OUTPUT CURRENT	15	A

J/B

⚠ WARNING

ELECTRICAL SHOCK HAZARD

TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

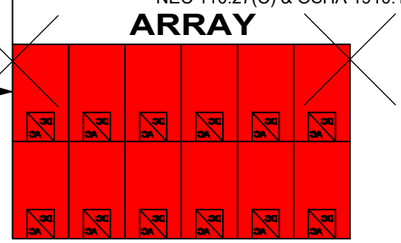
706.15(C)(4) & 690.13(B)

⚠ WARNING

TURN OFF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKING INSIDE PANEL

NEC 110.27(C) & OSHA 1910.145(F)(7)

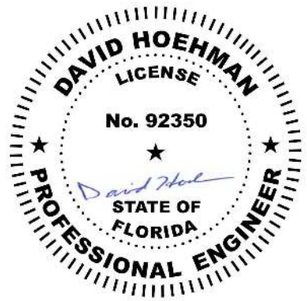
ARRAY



NEC 690.31(G)(3) & (4)

NOTES:

1. NEC ARTICLES 690 AND 705 AND IRC SECTION R324 MARKINGS SHOWN HEREON.
2. ALL MARKING SHALL CONSIST OF THE FOLLOWING:
   - A. UV RESISTANT SIGN MATERIAL WITH ENGRAVED OR MACHINE PRINTED LETTERS OR ELECTRO-PLATING.
   - B. RED BACKGROUND COLOR WHITE TEXT AND LINE WORK.
   - C. ARIAL FONT.
3. ALL SIGNS SHALL BE SIZED APPROPRIATELY AND PLACED IN THE LOCATIONS SPECIFIED. SIGNAGE CANNOT BE HAND-WRITTEN.
4. SIGNS SHALL BE ATTACHED TO THE SERVICE EQUIPMENT WITH POP-RIVETS OR SCREWS



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PHONE: (386) 344-3095
EMAIL: COLLSID@COMCAST.NET

SYSTEM:
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SYSTEM SIZE (AC): 12.180 kW @ 240V
MODULES: 42 X FREEDOM FOREVER: FF-MP-BBB-400
MICROINVERTERS: 42 X ENPHASE IQ8PLUS-72-2-US

REVISIONS		
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-	-	-
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freedom FOREVER

FREEDOM FOREVER LLC
2619 CONSULATE DR SUITE 800, ORLANDO, FL 32819
Tel: (800) 385-1075

GREG ALBRIGHT

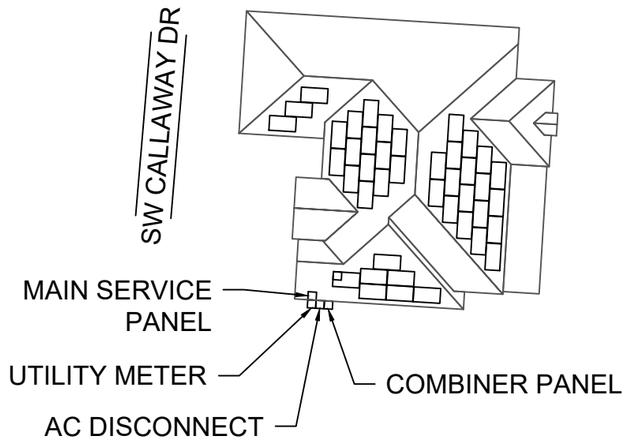
CONTRACTOR LICENSE:
CERTIFIED ELECTRICAL CONTRACTOR
EC13008056

LABELS

JOB NO:	DATE:	DESIGNED BY:	SHEET:
404444	2/1/2024	A.W.	PV-7

CAUTION:

POWER TO THIS BUILDING IS ALSO SUPPLIED FROM THE FOLLOWING SOURCES WITH DISCONNECTS AS SHOWN



WARNING

TURN OFF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKING INSIDE PANEL

N

NOTES:

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   - C. AERIAL FONT.
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4. SIGNS SHALL BE ATTACHED TO THE SERVICE EQUIPMENT WITH POP-RIVETS OR SCREWS.

DAVID HOEHMAN
LICENSE
No. 92350
STATE OF FLORIDA
PROFESSIONAL ENGINEER

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EC13008056

SITE PLACARD

JOB NO:	DATE:	DESIGNED BY:	SHEET:
404444	2/1/2024	A.W.	PV-7A

	1-20	21-40	41-60
1			
2			
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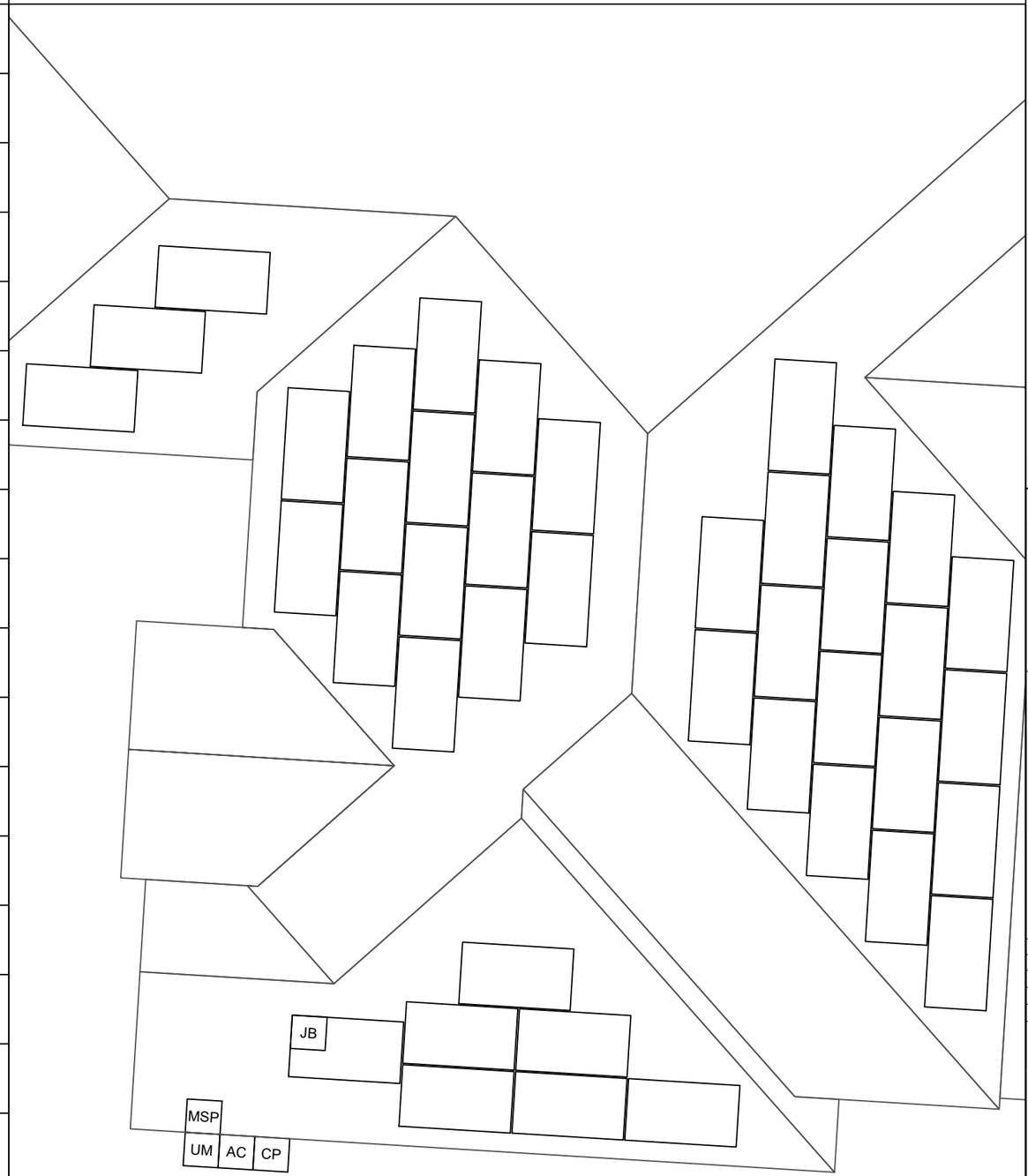
ENPHASE MICROINVERTER CHART



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MICROINVERTER CHART

JOB NO:	DATE:	DESIGNED BY:	SHEET:
404444	2/1/2024	A.W.	PV-8

SAFETY PLAN

INSTRUCTIONS:

1. USE SYMBOLS IN KEY TO MARK UP THIS SHEET.
2. SAFETY PLAN MUST BE MARKED BEFORE JOB STARTS AS PART OF THE PRE-PLAN
3. DOCUMENT ALL ADDITIONAL HAZARDS ON THIS PAGE & MAKE NOTES ON THE JHA SHEET

INCIDENT REPORTING:

INJURIES - CALL INJURY HOTLINE

(855) 400-7233

**If injury is life threatening, call 911 first THEN the Injury Hotline*

NON-INJURIES - USE MOBILE INCIDENT REPORTING
(Auto, Property Damage, Near Miss)

NEAREST OCCUPATIONAL/INDUSTRIAL CLINIC:

NAME: _____

ADDRESS: _____

NEAREST HOSPITAL:

NAME: _____

ADDRESS: _____

SAFETY COACH CONTACT INFORMATION:

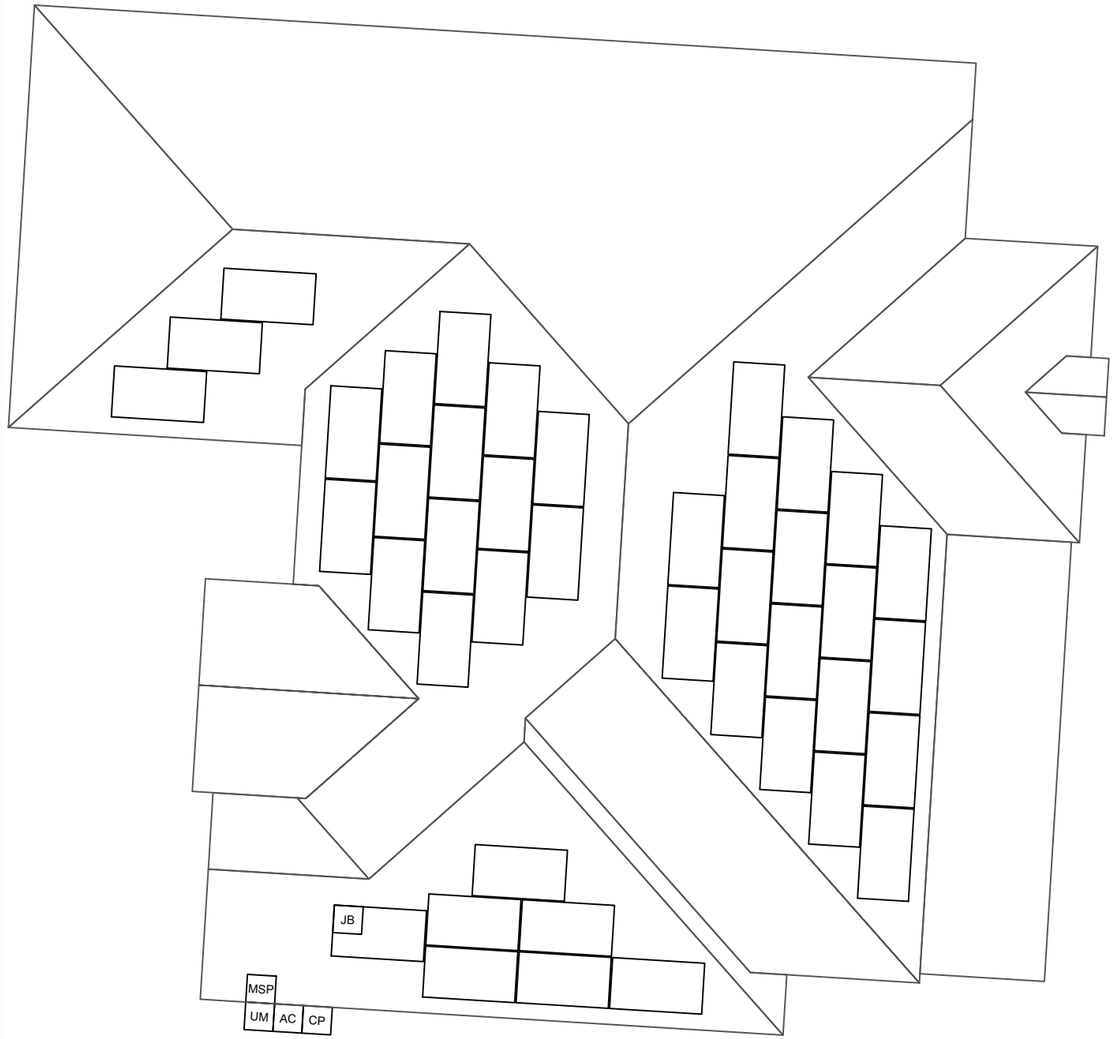
NAME: _____

PHONE NUMBER: _____

ALL EMPLOYEES ON SITE SHALL BE MADE AWARE OF THE SAFETY PLAN AND SIGN INDICATING THAT THEY ARE AWARE OF THE HAZARDS ON-SITE AND THE PLAN FOR WORKING SAFELY.

NAME	SIGNATURE

DATE: _____ TIME: _____



MARK UP KEY

- (P) PERMANENT ANCHOR
- (T) TEMPORARY ANCHOR
- (IL) INSTALLER LADDER
- (B) JUNCTION / COMBINER BOX
- (S) STUB-OUT
- SKYLIGHT
- NO LADDER ACCESS (STEEP GRADE OR GROUND LEVEL OBSTRUCTIONS)
- RESTRICTED ACCESS
- CONDUIT
- (GAS) GAS SHUT OFF
- (H_2O) WATER SHUT OFF
- (7) SERVICE DROP
- (Z) POWER LINES

BREAK AND WATER LOG

THIS LOG IS TO BE FILLED OUT ANY TIME THE TEMP EXCEEDS **90** DEGREES. THE CREW LEAD AND ROOF LEAD ARE RESPONSIBLE FOR ENSURING THIS IS COMPLETED AND UPLOADED AT THE END OF EVERYDAY WHEN TEMPS EXCEED **90** DEGREES

NAME	0800HRS	0900HRS	1000HRS	1100HRS	1200HRS	1300HRS	1400HRS	1500HRS	1600HRS

POLICIES

INSTRUCTIONS:

1. SCAN QR LINK BELOW TO ACCESS ALL FREEDOM FOREVER SAFETY POLICIES AND PROGRAMS.

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SAFETY PLAN

JOB NO:	DATE:	DESIGNED BY:	SHEET:
404444	2/1/2024	A.W.	PV-9

JOB HAZARD ANALYSIS

Crew leader to fill out all sections below, hold a pre-job safety meeting with all personnel, and upload this completed document and the Safety Plan to Site Capture

Ladder Access
- Ladders must be inspected before each use.
- Extension ladders must be set up on a firm and level surface at a 4-to-1 rise to run angle (or 75 degrees) and the top must be secured to the structure. Extension style ladders placed on uneven, loose or slippery surfaces must additionally have the base firmly anchored or lashed so the base will not slip out.
- Extension ladders must be used with walk-through devices or the ladder must extend 36" above the stepping off point.
- A-frame ladders must only be climbed with the ladder spreader bars locked in the open position; A-frame ladders shall not be climbed while in the closed position (ex, closed and used while leaned against a structure).
- Additional notes:

Mobile Equipment
- Only Qualified operators will operate equipment; operators must maintain a certification on their person for the equipment being operated.
- Type(s) of mobile equipment (Type/Make/Model):
- Qualified operator(s):

Material Handling and Storage
- Materials will be staged/stored in a way that does not present a hazard to client, personnel or public. Materials stored on the roof will be physically protect from failing or sliding off.

Fall Protection
- A site-specific plan for fall prevention and protection is required prior to starting work and must remain onsite at all times until work is complete; a fall rescue plan must be outlined and discussed among the crew prior to work start.
- First-person-Up (FPU) must install their anchor and connect before any other task, including installing other anchors. The Last-Person-Down (LPD) must be the only person on a roof uninstalling fall protection.
- FPCP (name and title):
- FPU and LPD (name and title):

Electrical Safety
- The Electrical Qualified Person (EQP) is required onsite to perform electrical work.
- All electrical work will be performed with equipment in an electrically safe condition (de-energized) unless approval has been granted prior to work.
- Service drops and overhead electrical hazards will be indentified and protected from contact, as neccessary.
- EQP (name and tile):

Public Protection
- The safety of the Client and Public must be maintained at all times.
- The Client and the Public shall be prevented from entering the work zone through the use of barriers and/or signage, as required.
- Company, Client and Public property shall be protected from falling objects.
- Pets (including dogs) shall be secured by their owners prior to work start.
- The Client should not leave pets, family members, or others in charge or care of Employees, Contractors, or Temporary Workers.

- Crew leader responsible for communication with the client:
- Client and public is excluded from work area by barricades (N/A, Yes, No):

Training and Pre-Job Safety Briefing
- All employees onsite shall be made aware of the specific hazards of this project and review this HJA during a pre-job briefing, and their signature indicates awareness of site conditions and the plan to eliminate any hazards identified prior to and during the project.

- Crew leader (name/title):
- Crew member (name/title):
- Crew member (name/title):
- Crew member (name/title):
- Crew member (name/title):
- Crew member (name/title):

Airborne Contaminants:
- Asbestos-containing (Transite) piping (ACP) - Do not disturb (move, drill, cut fracture, etc.)
- Asbestos-containing thermal insulation (ACI) and Asbestos-containing duct wrapping (ACW) - do not disturb, no attic or crawlspace access is allowed if work to be performed could cause exposure to personnel, client or public.

- If yes, list specific tasks and protection in place:

Weather and Environment
- The site supervisor shall forecast the weather conditions at the job site, prior to crew arrival, in order to mitigate any hazards associated with inclement weather (heat, cold, wind, rain, etc.)
- The site supervisor will utilized a portable wind meter (anemometer) to verify actual onsite wind conditions, by checking at the ground and on any elevated work surface (ex, rooftop) prior to work start, at midday and prior to solar panel staging on a roof.
- Elevated work involving the moving or maneuvering of solar panels shall cease at 25mph (sustained wind) until wind subsides.
- Forecasted weather maximum temp (degrees f):

Heat Related Illness Prevention
- Employees shall have access to potable drinking water that is fresh, pure, and suitably cool. The water shall be located as close as practicable to the areas where employees are working. Water shall be supplied in sufficient quantity at the beginning of the work shift to provide at least one quart per employee per hour for drinking for the entire shift. Employees may begin the shift with smaller quantities of water if they identify the location and have effective means for replenishment during the shift to allow employees to drink on quart or more per hour. The frequent drinking of water shall be encouraged.
- Shade shall be present when temperature exceeds 80 degrees Fahrenheit. When the outdoor temperature in the work exceeds 80 degrees Fahrenheit, employees shall have and maintain one or more areas with shade at all times.
- New employees must be acclimatized. New employees will be monitored by their Crew Leader (site supervisor) for the first two (2) weeks of employment or longer when necessary.
- Employees will be allowed and encouraged to implement scheduled breaks during each shift. Employees must take cool-down breaks in the shade any time they feel the need to do so to protect them from overheating. Supervisors are REQUIRED to allow employees any break period they need during high heat conditions.
- Cool Vests are encouraged for all employees at all times during periods of high heat.
- Identify the location of the closet Occupational/Industrial Clinic or Hospital in case a crew member becomes ill.

What is the specific plan to provide and replenish sufficient water for all employees on site?
- If offsite replenish is necessary, where will you go to replenish water (location/address):
- Who will replenish the drinking water (name):

Restroom facilities
- Employees shall have access to restroom facilities with hand-washing stations. Use of onsite restroom is at the client's discretion (location is annotated below). If client does not give permission, location of suitable restroom facilities with hand-washing stations offsite will be provided. The onsite supervisor will identify location and make arrangements to ensure all employees have access at any point.
- Restroom facilities will be (circle one): Onsite - Offsite
- If Offsite, add location name and address:

Incident Reporting Procedure
- Contact your Site Supervisor
  - Name:
  - Phone:
- Contact your Manager
  - Name:
  - Phone:
- Contact your Site Supervisor
  - Name:
  - Phone:

With: Your full name, phone number, office location, brief description of what happen and when.

NOTE ADDITIONAL HAZARDS NOT ADDRESSED ABOVE
(add as many as necessary by using additional sheets)

Define the Hazard:	Method/steps to prevent incident:
Define the Hazard:	Method/steps to prevent incident:
Define the Hazard:	Method/steps to prevent incident:
Define the Hazard:	Method/steps to prevent incident:

CLIENT:
SIDNEY THOMPSON
356 SW CALLAWAY DR, LAKE CITY, FL 32024
AHJ: COUNTY OF COLUMBIA
UTILITY: "CLAY ELECTRIC COOPERATIVE, INC. "
METER: 154740121
APN: 15-4S-16-03023-249
PHONE: (386) 344-3095
EMAIL: COLLSID@COMCAST.NET

SYSTEM:
SYSTEM SIZE (DC): 42 X 400 = 16.800 kW
SYSTEM SIZE (AC): 12.180 kW @ 240V
MODULES: 42 X FREEDOM FOREVER: FF-MP-BBB-400
MICROINVERTERS: 42 X ENPHASE IQ8PLUS-72-2-US

	REVISIONS	
NO.	REVISED BY	DATE
-	-	-
-	-	-
-	-	-

FREEDOM FOREVER LLC
2619 CONSULATE DR SUITE 800, ORLANDO, FL 32819
Tel: (800) 385-1075
GREG ALBRIGHT
CONTRACTOR LICENSE:
CERTIFIED ELECTRICAL CONTRACTOR
EC13008056

SAFETY PLAN

JOB NO:	DATE:	DESIGNED BY:	SHEET:
404444	2/1/2024	A.W.	PV-10

FOR INSTALLATION REFERENCE ONLY

SCAN QR CODE TO ACCESS REFERENCE LINK

FREEDOM REFERENCES

INSTALL HOTLINE

PV INSTALLATION REFERENCES

ENPHASE

SOLAREDGE

TESLA

BATTERY INSTALLATION REFERENCES

Enphase Storage Systems

SOLAREDGE Storage Systems

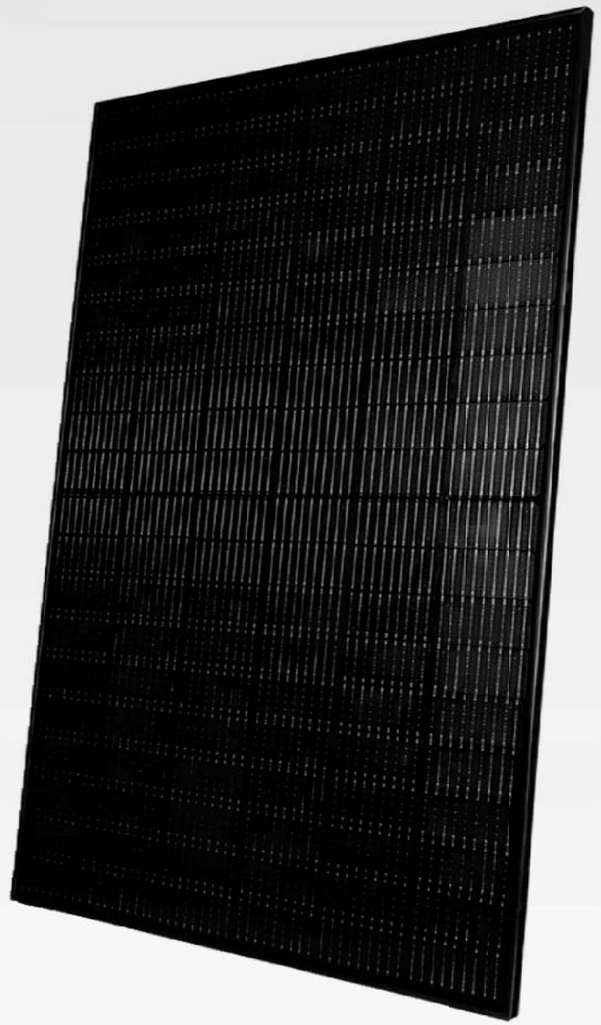
TESLA Storage Systems

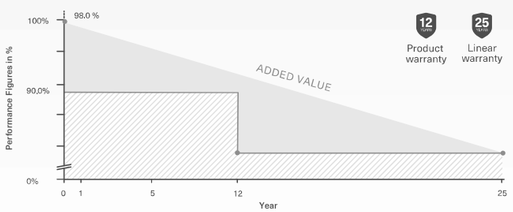
NON-BACKUP Battery Systems

Misc. Quick Guide

V1.4

400W MODULE





MODULE SPECIFICATIONS

ELECTRICAL CHARACTERISTICS

Characteristics	FF-MP-BBB-400
Maximum Power (Pmax)	400W
Maximum Power Voltage (Vmp)	31.01V
Maximum Power Current (Imp)[A]	12.90A
Open Circuit Voltage (Voc)[V]	37.04V
Short Circuit Current (Isc)[A]	13.79A
Module Efficiency	20.48%
Power Tolerance	0/+5W
STC	Irradiance of 1000W/m², AM1.5, Cell Temperature 25°C

MECHANICAL CHARACTERISTICS

Cell Type	Mono perc, 182 mm-half cells, 108 (6x9+6x9)
Weight	22.1 kgs (48.7 lbs)
Dimension	1722 x 1134 x 35 mm (67.80 x 44.65 x 1.38 in)
Front Glass	3.2 mm (.13 in)
Junction Box	IP68 (3 Bypass Diodes)
Output Cables	1200 mm (47.24 in)
Connector	Staubli MC4
Frame & Installation	Anodized aluminum profile

OPERATIONS CHARACTERISTICS

Operational Temperature	-40°C~+85°
Max System Voltage	1500V
Max Series Fuse Rating	25A
Safety Class	Class II
Fire Rating	Type 1

MECHANICAL LOADING

Snow Load	5,400Pa (113lb/ft2)
Rear Side Design Load	2,400Pa (50lb/ft2)

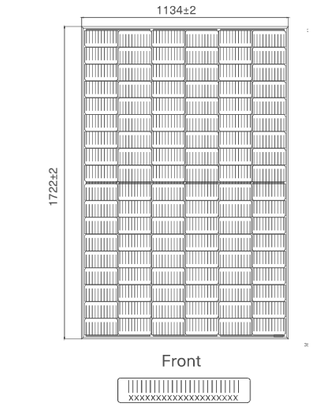
PACKAGING INFORMATION

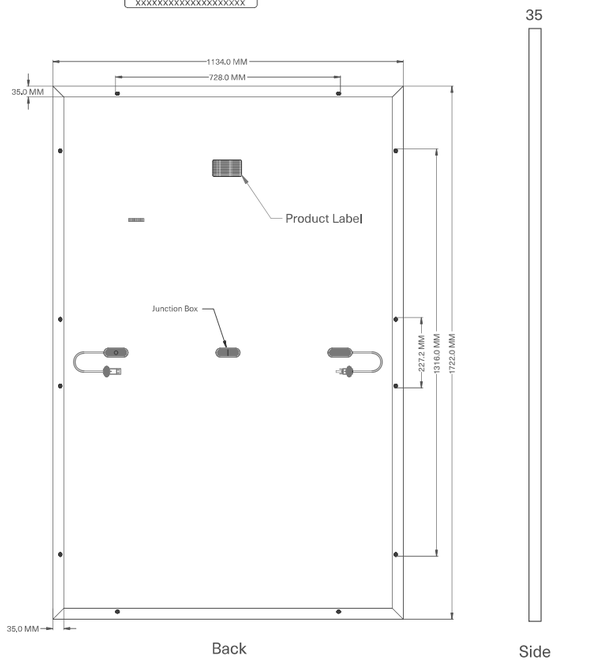
Container	20' GP	40' HC
Pallets per Container	6	26
Panels per Container	186	806
Panels per Pallet	31	31
Packaging Bon Weight	679 kg (1497 lbs)	
Panels per Pallet	1785 x 1130 x 1180 mm (70.28 x 44.49 x 46.46 in)	

TEMPERATURE RATINGS

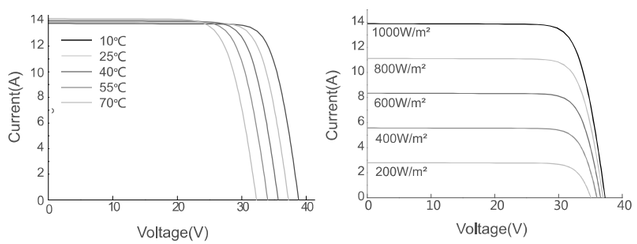
Temperature Coefficient of P_{max}	-0.350%/°C
Temperature Coefficient of V_{oc}	-0.275%/°C
Temperature Coefficient of I_{sc}	+0.045%/°C
Nominal Operating cell Temperature (NOCT)	42°C±2°C

UL 61730 | UL 61215 | ISO 9001 | ISO 14001





CURRENT-VOLTAGE CURVE



CERTIFICATE
OF COMPLIANCE

This certificate confirms the model(s) for the product listed are in compliance and authorized to bear the Certification Mark(s) shown below when made in accordance with the conditions set forth in the Certification Agreement and Listing Report. This document is for use with the Design Light Consortium or California Energy Commission application only.

Basic Listee:	PT IDN SOLAR TECH	**Multiple Listee:**	Freedom Forever Procurement LLC
Address:	KOMPLEK KABIL INDONUSA ESTATE, BLOK A NOMOR 19B, BATU BESAR, Batam	**Address:**	43445 Business Park Drive, Suite 110, Temecula, CA 92590
Country:	Indonesia	**Country:**	USA

Party Authorized to Apply Label: PT IDN SOLAR TECH
Report Issuing Office: Intertek Testing Services Shanghai Limited

Control Number: 5019087 **Authorized by:** Jordan Holbert
for L. Matthew Snyder, Certification Manager

VALID LISTING MARKS

This Certificate of Compliance is for the exclusive use of Intertek's Client and is provided pursuant to the Certification Agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the Agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the Agreement, for any loss, expense or damage occasioned by the use of this Certificate. Only the Client is authorized to permit copying or distribution of this Certificate and then only in its entirety. Use of Intertek's Certification mark is restricted to the conditions laid out in the Agreement and in this Certificate. Any further use of the Intertek name for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. Initial Factory Assessments and Follow up Services are for the purpose of assuring appropriate usage of the Certification mark in accordance with the Agreement, they are not for the purposes of production quality control and do not relieve the Client of their obligations in this respect.

Intertek Testing Services NA Inc.
545 East Algonquin Road, Arlington Heights, IL 60005
Telephone 800-345-3851 or 847-439-5667

Standard(s):	Photovoltaic (PV) Module Safety Qualification - Part 1: Requirements for Construction [UL 61730-1:2017 Ed.1+R:30Apr2020] Photovoltaic (PV) Module Safety Qualification - Part 1: Requirements for Construction [CSA C22.2#61730-1:2019 Ed.2] Photovoltaic (PV) Module Safety Qualification - Part 2: Requirements for Testing [UL 61730-2:2017 Ed.1+R:30Apr2020]

CERTIFICATE
OF COMPLIANCE

	Photovoltaic (PV) Module Safety Qualification - Part 2: Requirements for Testing [CSA C22.2#61730-2:2019 Ed.2] Terrestrial Photovoltaic (Pv) Modules - Design Qualification And Type Approval - Part 1: Test Requirements [UL 61215-1:2017 Ed.1] Terrestrial Photovoltaic (PV) Modules - Design Qualification And Type Approval - Part 1-1: Special Requirements For Testing of Crystalline Silicon Photovoltaic (PV) Modules [UL 61215-1-1:2017 Ed.1] Terrestrial Photovoltaic (Pv) Modules - Design Qualification And Type Approval - Part 2: Test Procedures[UL 61215-2:2017 Ed.1]
Product:	Crystalline Silicon Photovoltaic (PV) Modules
Brand Name:	Freedom Forever
Models:	MULTIPLE LISTEE 12 MODELS: FF-MP-BBB- followed by 365, 370, 375 or 380. FF-MP-BBB- followed by 395, 400, 405 or 410. BASIC LISTEE MODELS: NUSA120H- followed by 365, 370, 375 or 380; followed by MB. NUSA108H- followed by 395, 400, 405 or 410; followed by MB.

ENPHASE

DATA SHEET

IQ8 and IQ8+ 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 superfast 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 IQ Battery, IQ Gateway, and the Enphase App monitoring and analysis software.

Enphase 25 year limited warranty

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.

UL CERTIFIED SAFETY

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

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) and IEEE 1547:2018 (UL 1741-SB 3rd Ed.)

Note:

IQ8 Microinverters cannot be mixed together with previous generations of Enphase microinverters (IQ7 Series, IQ6 Series, etc) in the same system.

*Only when installed with IQ System Controller 2, meets UL 1741.
**IQ8 and IQ8Plus support split-phase, 240V installations only.

IQ8 and IQ8+ Microinverters

INPUT DATA (DC)		IQ8-60-2-US	IQ8PLUS-72-2-US
Commonly used module pairings[1]	W	235 – 350	235 – 440
Module compatibility		60-cell / 120 half-cell	54-cell / 108 half-cell, 60-cell / 120 half-cell, 66-cell / 132 half-cell and 72-cell / 144 half-cell
MPPT voltage range	V	27 – 37	27 – 45
Operating range	V	16 – 48	16 – 58
Min. / Max. start voltage	V	22 / 48	22 / 58
Max. input DC voltage	V	50	60
Max. continuous input DC current	A	10	12
Max. input DC short-circuit current	A	25	
Max. module I_{sc}	A	20	
Overvoltage class DC port		II	
DC port backfeed current	mA	0	
PV array configuration		1 x 1 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
Peak output power	VA	245	300
Max. continuous output power	VA	240	290
Nominal (L-L) voltage / range[2]	V	240 / 211 – 264	
Max. continuous output current	A	1.0	1.21
Nominal frequency	Hz	60	
Extended frequency range	Hz	47 – 68	
AC short circuit fault current over 3 cycles	Arms	2	
Max. units per 20 A (L-L) branch circuit[3]		16	13
Total harmonic distortion		<5%	
Overvoltage 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	%	97.7	
CEC weighted efficiency	%	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 (H x W x D)	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

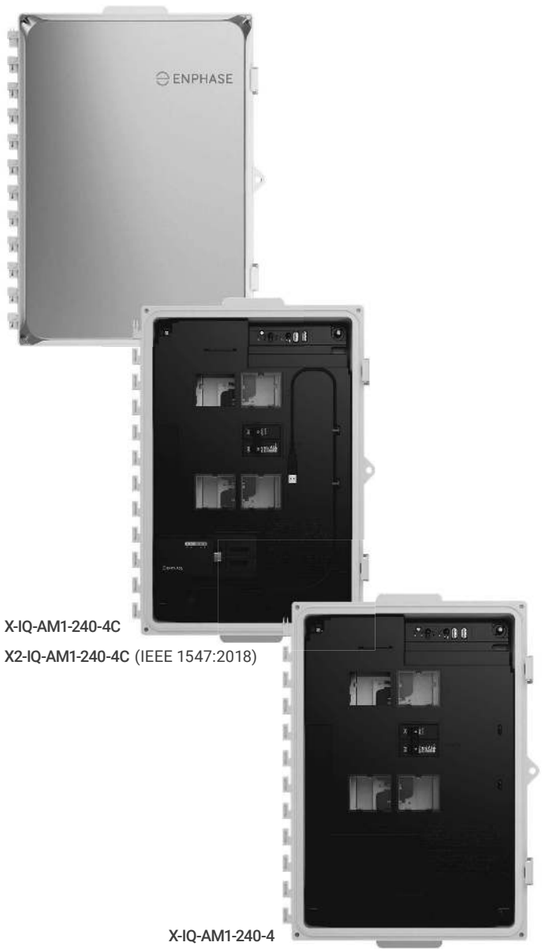
COMPLIANCE	
Certifications	CA Rule 21 (UL 1741-SA), UL 62109-1, IEEE 1547:2018 (UL 1741-SB 3rd Ed.), FCC Part 15 Class B, ICES-0003 Class B, CAN / CSA-C22.2 NO. 107.1-01 This product is UL Listed as PV Rapid Shutdown Equipment and conforms with NEC 2014, NEC 2017, and NEC 2020 section 690.12 and C22.1-2018 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according to manufacturer's instructions.

(1) Pairing PV modules with wattage above the limit may result in additional clipping losses. See the compatibility calculator at https://link.enphase.com/module-compatibility.
(2) Nominal voltage range can be extended beyond nominal if required by the utility. (3) Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

IQ8SP-12A-DS-0067-03-EN-US-2022-12-27

Data Sheet
Enphase Networking

IQ Combiner 4/4C



X-IQ-AM1-240-4C
X2-IQ-AM1-240-4C (IEEE 1547:2018)

X-IQ-AM1-240-4
X2-IQ-AM1-240-4 (IEEE 1547:2018)

The **IQ Combiner 4/4C** with IQ Gateway and integrated LTE-M1 cell modem (included only with IQ Combiner 4C) consolidates interconnection equipment into a single enclosure. It 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 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
- Supports Wi-Fi, Ethernet, or cellular connectivity
- Optional AC receptacle available for PLC bridge
- Provides production metering and consumption monitoring

Simple

- Mounts on single stud with centered brackets
- Supports bottom, back and side conduit entry
- Allows up to four 2-pole branch circuits for 240VAC 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
- X2-IQ-AM1-240-4 and X2-IQ-AM1-240-4C comply with IEEE 1547:2018 (UL 1741-SB, 3rd Ed.)

LISTED

To learn more about Enphase offerings, visit **enphase.com**
IQ-C-4-4C-DS-0103-EN-US-12-29-2022

ENPHASE

IQ Combiner 4/4C

MODEL NUMBER	
IQ Combiner 4 X-IQ-AM1-240-4 X2-IQ-AM1-240-4 (IEEE 1547:2018)	IQ Combiner 4 with 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 and IQ System Controller 2 and to deflect heat.
IQ Combiner 4C X-IQ-AM1-240-4C X2-IQ-AM1-240-4C (IEEE 1547:2018)	IQ Combiner 4C with IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 ± 0.5%) and consumption monitoring (± 2.5%). Includes 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)
Supported microinverters	IQ6, IQ7, and IQ8. (Do not mix IQ6/7 Microinverters with IQ8)
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 - 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
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)
X-IQ-NA-HD-125A	Hold-down kit for Eaton circuit breaker with screws
Consumption monitoring CT (CT-200-SPLIT/CT-200-CLAMP)	A pair of 200A split core current transformers
ELECTRICAL SPECIFICATIONS	
Rating	Continuous duty
System voltage	120/240VAC, 60 Hz
Eaton BR series busbar rating	125A
Max. continuous current rating	65A
Max. continuous current rating (input from PV/storage)	64A
Max. fuse/circuit rating (output)	90A
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
IQ Gateway breaker	10A or 15A rating GE/Siemens/Eaton included
Production metering CT	200A solid core pre-installed and wired to IQ Gateway
MECHANICAL DATA	
Dimensions (WxHxD)	37.5 cm x 49.5 cm x 16.8 cm (14.75 in x 19.5 in x 6.63 in). Height is 53.5 cm (21.06 in) with mounting brackets.
Weight	7.5 kg (16.5 lbs)
Ambient temperature range	-40°C to +46°C (-40°F to 115°F)
Cooling	Natural convection, plus heat shield
Enclosure environmental rating	Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction
Wire sizes	• 20A to 50A breaker inputs: 14 to 4 AWG copper conductors • 60A 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	Up to 3,000 meters (9,842 feet)
INTERNET CONNECTION OPTIONS	
Integrated Wi-Fi	IEEE 802.11b/g/n
Cellular	CELLMODEM-M1-06-SP-05, CELLMODEM-M1-06-AT-05 (4G based LTE-M1 cellular modem). Note that an Mobile Connect cellular modem is required for all Enphase Energy System installations.
Ethernet	Optional, IEEE 802.3, Cat5E (or Cat6) UTP Ethernet cable (not included)
COMPLIANCE	
Compliance, IQ Combiner	CA Rule 21 (UL 1741-SA) IEEE 1547:2018 - UL 1741-SB, 3rd Ed. (X2-IQ-AM1-240-4 and X2-IQ-AM1-240-4C) CAN/CSA C22.2 No. 107.1, Title 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

Product specifications

Eaton DG223NRB

Catalog Number: DG223NRB

Eaton General duty cartridge fuse safety switch, 100 A, NEMA 3R, Painted galvanized steel, Class H fuses, Fusible with neutral, Two-pole, Three-wire, Category: general duty safety switch, 240 V

General specifications

Product Name	Catalog Number
Eaton general duty cartridge fuse safety switch	DG223NRB
	UPC
	782113144252
Product Length/Depth	Product Height
7.38 in	19.25 in
Product Width	Product Weight
9.13 in	14 lb
Warranty	Certifications
Eaton Selling Policy 25-000, one (1) year from the date of installation of the Product or eighteen (18) months from the date of shipment of the Product, whichever occurs first.	UL Listed
	Catalog Notes
	Maximum hp ratings apply only when dual element fuses are used. 3-Phase hp rating shown is a grounded B phase rating, UL listed.

Physical Attributes

Enclosure
NEMA 3R

Enclosure material
Painted galvanized steel

Fuse configuration
Fusible with neutral

Number Of Poles
Two-pole

Number of wires
3

Type
General duty, cartridge fused

Performance Ratings

Amperage Rating
100A

Fuse class provision
Class H fuses

Voltage rating
240V

Miscellaneous

Product Category
General duty safety switch

Resources

Catalogs
Eaton's Volume 2—Commercial Distribution

Multimedia
Double Up on Safety
Switching Devices Flex Center

Specifications and datasheets
Eaton Specification Sheet - DG223NRB

Eaton Corporation plc
Eaton House
30 Pembroke Road
Dublin 4, Ireland
Eaton.com

Eaton.com/socialmedia

BUCHANAN CONSTRUCTION PRODUCTS

B-TAP®

Listed 486B

Pressure Cable Connectors
File No. E-5238
Suitable for use on the line side of the service equipment.

INSULATION-PIERCING TAP CONNECTORS
CONECTORES DE DERIVACIÓN QUE PERFORAN EL AISLAMIENTO

Installation Instructions:

⚠ Warning

Improperly installed electrical wiring can be dangerous and cause electrical fires. The connector chosen must be sized to the wires being used. Consult local building code before doing any electrical work. For assistance, refer to an instructional book or consult a qualified electrician.

⚠ Warning

Contact with electricity can cause serious injury or death. Use on insulated cable only. [RHH, RHW(-2), THHN, THHW, THW, THWN, USE, XHHW(-2). Consult factory for other insulation types]. If the installation is to be made on an energized run, the tap conductor must be under no load and must not be grounded. Use electrically insulated gloves. De-energize the run cable if there are any questions of these conditions being met.

1. Determine the direction for the tap conductor to exit and discard one end cap. **See figure 1.**
2. Position the main (or feeder) side of the connector around the run cable and tighten the bolt finger tight. **See figure 2.** If required, loosen the bolt slightly to allow the connector to open completely. **DISASSEMBLY NOT RECOMMENDED.** The plastic "Turbo" spacer holds the connector open which eases installation and ensures proper connections.
3. Cut the end of the tap cable squarely. **DO NOT STRIP CABLE INSULATION.**
4. Insert the tap cable into the tap side of the connector until it is seated in the remaining end cap. **See figure 3.**
5. Continue tightening the torque regulating bolt with a standard box or socket wrench until the torque regulating piece breaks away. If the connector has two (2) assembly bolts, alternately tighten until the hexagonal torque devices break away. **See figures 4a & 4b.** Note that the plastic "turbo" spacer on the side will also break. To make the installation even easier and to relieve torque from the cables, a second wrench can be used on the hexagonal piece on the bottom of the connector.

   DO NOT use gripping type pliers, pipe, open ended or adjustable wrenches as these may damage the hexagonal torque regulating device. A torque wrench is not required.

   MAKE SURE ONLY THE TOP HEXAGONAL TORQUE DEVICE OF THE BOLT HEAD IS USED FOR ASSEMBLY. THE SECOND HEX PIECE [CLOSER TO THE BODY OF THE CONNECTOR] IS USED FOR DISASSEMBLY.

Note: The torque regulating bolt ensures the correct torque is applied to the conductors without using a torque wrench. Important information such as run and tap ranges, voltage ratings and material/temperature ratings is marked on the connector.

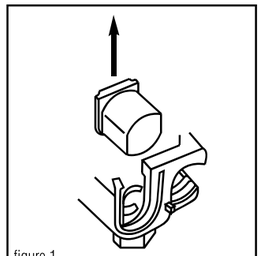


figure 1

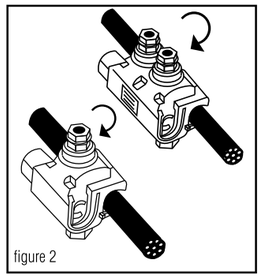


figure 2

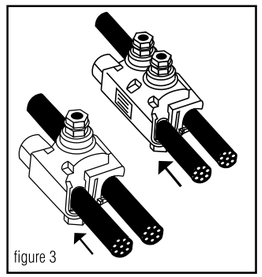


figure 3

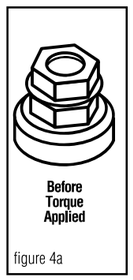


figure 4a

figure 4b

Instalación Instrucciones:

⚠ Advertencia

Los cables eléctricos mal instalados pueden ser peligrosos y provocar incendios. El conector escogido debe ser de un tamaño adecuado para los cables que se utilicen. Consulte los códigos de construcción locales antes de efectuar trabajos eléctricos. Si necesita ayuda, consulte un libro de instrucciones o consulte con un electricista capacitado.

⚠ Advertencia

Use sólo en cable aislado. [RHH, RHW(-2), THHN, THHW, THW, THWN, USE, XHHW(-2). Consulte con la fábrica para obtener información sobre otros tipos de aislamiento]. Si se va a hacer la instalación sobre un cable con corriente el conductor derivado debe estar libre de carga y no debe estar aterado. Use guantes con aislamiento eléctrico. Quite le la corriente al cable del cual se hace la derivación si no se pueden cumplir estas condiciones. El contacto con electricidad puede producir lesiones graves o mortales.

1. Determine la dirección en la que el conductor derivado saldrá y deseche la tapa terminal sobrante. **Vea la ilustración 1.**
2. Coloque el lado principal (o de alimentación) del conector alrededor del cual se hace la derivación y apriete firmemente el dedo del perno. **Vea la ilustración 2**. Si hace falta, afloje el perno ligeramente para permitir que el conector se abra completamente. **NO ES RECOMENDABLE DESARMAR EL CONECTOR.** El espaciador "Turbo" de plástico mantiene al conector abierto, lo cual facilita la instalación y asegura que las conexiones se hagan correctamente.
3. Corte el extremo del cable de derivación perpendicularmente a su eje. **NO PELE EL AISLAMIENTO DEL CABLE.**
4. Inserte el cable de derivación en el lado de derivación del conector hasta que tope contra la tapa terminal que queda. **Vea la ilustración 3.**
5. Continué apretando este perno que regula la torsión con una llave estándar o de cubo hasta que la pieza que regula la torsión se parta y se separe. Si el conector tiene dos (2) pernos de ensamblaje, apriételos alternativamente hasta que el dispositivo de regulación de torció se parta. **Vea la ilustración 4a y 4b**. Observe que el espaciador "turbo" de plástico en el costado también se fracturará. Para hacer esta instalación aún más fácil y para aliviar la torsión de los cables, se puede usar una segunda llave sobre la pieza hexagonal al fondo del conector.

   NO USE alicates de presión, llaves de turbo, llaves comunes o ajustables ya que éstas pueden dañar el dispositivo hexagonal que regula la torsión. No se requiere una llave de torsión.

   ASEGÚRESE QUE SE USE, PARA EL ENSAMBLADO, SÓLO EL DISPOSITIVO SUPERIOR DE REGULACIÓN DE TORSIÓN DE LA CABEZA DEL PERNO. LA SEGUNDA PIEZA HEXAGONAL (LA MÁS CERCANA AL CUERPO DEL CONECTOR) SE USA SÓLO PARA DESARMAR EL CONECTOR.

Nota: El perno regulador de torsión garantiza la aplicación de la torsión correcta a los conductores sin usar una llave de torsión. La información importante de longitud de cable pelado y de toma, las clasificaciones de materiales y temperatura está marcada en el conector.

B-TAP® INSULATION PIERCING TAP CONNECTORS TORQUE AND CURRENT RATINGS

(Solid and/or Stranded)

CATALOG#	MAIN	TAP	NOMINAL TORQUE	TAP CURRENT RATIING (IN AMPS)*
BTC2/0-14	2/0-4	10-14+	80 IN. LBS.	40
BTC1/0-10	1/0-8	2-10++	80 IN. LBS.	130
BTC4/0-10	4/0-3	2-10+++	125 IN. LBS.	130
BTC4/0-6	4/0-2	1/0-6	160 IN. LBS.	170
BTC4/0-2	4/0-2	4/0-2	160 IN. LBS.	260
BTC250-6	250-4	4/0-6	160 IN. LBS.	260
BTC250-4	250-1	3/0-4	160 IN. LBS.	225
BTC250-2	250-1/0	4/0-2	160 IN. LBS.	260
BTC350-1/0	350-1/0	350-1/0	330 IN. LBS.	350
BTC500-4	500-2/0	4/0-4	330 IN. LBS.	260
BTC500-1/0	500-4/0	350-1/0	330 IN. LBS.	350
BTC500-14	750-3/0	10-14 ++++	80 IN. LBS.	40
BTC750-250	750-250	500-250	330 IN. LBS.	430

+10-14 Cu SOLID/STRANDED; 10-12 Al SOLID/STRANDED
++2-10 Cu SOLID/STRANDED; 2-10 Al STRANDED
+++2-10 Cu SOLID/STRANDED; 2-8 Al STRANDED
++++10-14 Cu SOLID/STRANDED; 10-12 Al STRANDED

Full line is 600V dual-rated, 194°F(90°C)

* Based on NEC Table 310-16 1996 (Not more than 3 insulated conductors in a raceway at ambient temperature of 30° C) for the largest tap wire size.

WARNING: Cancer and Reproductive Harm - www.P65Warnings.ca.gov.

ADVERTENCIA: Cáncer y Daño Reproductivo - www.P65Warnings.ca.gov.

One year limited warranty. See idealind.com for more information.

Garantía limitada de un año. Visite www.idealind.com para obtener detalles de la garantía.

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1375 Park Avenue • Sycamore, Illinois 60178 • 815.895.5181 • www.idealind.com

ALL IDEAL Customers 2/9/23

Subject: **The Buchanan B-TAP® splice/tap connectors meet the 2020 NEC article 230.46 requirement for “line side applications”**

The Buchanan B-TAP® brand of insulation piercing connectors which correspond to part numbers beginning with “BTC” meet the requirements of article 230.46 of the 2020 NEC. These products have already been tested to the newer requirements. The installation instructions are in the process of being updated to show the required notation: “suitable for use on the line side of the service equipment”. This change will take a few weeks to get into our production.

In addition, the marking “SR” will be added to the product. That addition is in process and will take a few months to complete.

This notice will provide confirmation to the inspectors that B-TAP® products meet the requirements of the 2020 and 2023 NEC article 230.46 “Spliced and Tapped Conductors”.

Sushil Keswani
Director of Engineering
IDEAL Industries, Inc.,

ZMVV.E5238 - Wire Connectors and Soldering Lugs

Note: We are enhancing our systems and you may notice duplicate entries/missing/outdated data. During this interim period, please contact our Customer Service at https://www.ul.com/about/locations.

Wire Connectors and Soldering Lugs

IDEAL INDUSTRIES INC
1375 Park Ave
SYCAMORE, IL 60178 United States

E5238

View model for additional information

Insulated butt splice crimp type connectors, Model(s): BVS1, BVS2, BVS5

Insulated flange spade type crimp cconnectors, Model(s): SV5-3.7, SVL5-4, SVL5-6

Insulated flange spade type crimp connectors, Model(s): FSNYD1-3.7, FSNYD1-4, FSNYD1-5, FSNYD2-3.7, FSNYD2-4, FSNYD2-5, FSNYD5-3.7, FSNYD5-4, FSNYD5-5

Insulated hook type crimp connectors, Model(s): HNYD1-3.7, HNYD1-4, HNYD1-5, HNYD2-3.7, HNYD2-4, HNYD2-5, HNYD5-3.7, HNYD5-4, HNYD5-5, HVY1-3.7, HVY1-4, HVY1-5, HVY2-4, HVY2-5, HVY5-3.7, HVY5-4, HVY5-5

Insulated locking spade crimp connectors, Model(s): LSNYD1-3.7, LSNYD2-3.7, LSNYD5-3.7, LSNYD5-4, LSNYD5-5, LSNYDL1-4, LSNYDL1-5, LSNYDL2-4, LSNYDL2-5

Insulated multiple stud ring type crimp connectors, Model(s): MSRNYD1-3753, MSRNYD2-3753, MSRNYD5-3753

Insulated parallel connectors, Model(s): PVT1, PVT14, PVT2, PVT22, PVT5, PVT8

Insulated pin type connectors, Model(s): PTNYD1-12, PTNYD2-12, PTNYD5-13

Insulated ring type crimp connectors, Model(s): RNYB14-11, RNYB22-11, RNYD1-10, RNYD1-3.2, RNYD1-5, RNYD1-6, RNYD1-8, RNYD2-10, RNYD2-2, RNYD2-3.2, RNYD2-6, RNYD2-8, RNYD5-10, RNYD5-12, RNYD5-3.2, RNYD5-3.7, RNYD5-5, RNYD5-6, RNYD5-8, RNYDL1-3.7, RNYDL1-4, RNYDL2-3.7, RNYDL2-4, RNYDL5-3.7, RNYDL5-4, RNYDM2-3.7, RNYDS1-3.7, RNYDS1-4, RNYDS2-4, RNYDS2-5, RNYDS5-4, RV1-3.2, RV1-5, RV1-6, RV2-3.2, RV5-10, RV5-3.7, RV5-5, RV5-6, RV5-8, RVL1-4, RVL2-4, RVL5-4, RVM1-3.7, RVM2-3.7, RVY1-3.2

Insulated spade type crimp connectors, Model(s): SNYD1-3.2, SNYD5-3.7, SNYD5-5, SNYDL1-3.7, SNYDL1-4, SNYDL2-3.7, SNYDL2-4, SNYDL2-5, SNYDL5-4, SNYDLL1-3.7, SNYDLL2-3.7, SNYDM1-4, SNYDM2-4, SNYDS1-5, SNYDS2-5, SVL1-3.7, SVL1-5, SVL2-3.7, SVL2-5, SVM1-4, SVM2-4, SVY1-3.2, SVY2-3.2, SVY5-3.7, SVY5-5, SVYL1-3.7, SVYL1-4, SVYL2-3.7, SVYL2-4, SVYL2-5, SVYL5-4, SVYLL1-3.7, SVYLL2-3.7, SVYM1-4, SVYM2-4, SVYS1-5, SVYS2-5, SVYS5-4

Insulated splice connectors, Model(s): PB1-, PB2-, PB5-

Insulating caps or covers, for use on manufacturer`s splice caps, for 2006-S, 2008-S connectors, Model(s): 2007

Insulating caps or covers, for use on manufacturer`s splice caps, for 2011-S connector, Model(s): 2014

Listed pressure cable connectors, Model(s): BHT1, BHT2, BHT5, BN1, BN2, BN5, BNT1-16, BNT14, BNT2-16, BNT22, BNT5-20, BNT8, BNYDF1, BNYDF2, BNYDF5, BNYT1, BNYT2, BNYT5, BV1, BV2, BV5, BVT14, BVT22, BVT8

Listed pressure ring terminal connectors, Model(s): RNYB14-8, RNYB8-11, RNYBL22-5, RNYBL22-6

Listed splicing wire connectors, Model(s): L12, L13, L15

Non-insulated flange spade crimp connectors, Model(s): FSN1-3.7, FSN1-4, FSN1-5, FSN2-3.7, FSN2-4, FSN2-5, FSN5-3.7, FSN5-4, FSN5-5, FSNB1-3.7, FSNB1-4, FSNB1-5, FSNB2-3.7, FSNB2-4, FSNB2-5, FSNB5-3.7, FSNB5-4, FSNB5-5, FSNL1-3.7, FSNL2-5

Non-insulated hook crimp connectors, Model(s): HN1-4, HN1-5, HN2-3.7, HN2-4, HN2-5, HN5-3.7, HN5-4, HN5-5

Non-insulated locking type crimp connectors, Model(s): LSN1-3.7, LSN2-3.7, LSN5-3.7, LSN5-4, LSN5-5, LSN5-6, LSNL1-4, LSNL1-5, LSNL2-5

Non-insulated multiple stud ring type crimp connectors, Model(s): MSRNB1-3753

Non-insulated parallel crimp connectors, Model(s): PNT 1, PNT 14, PNT 2, PNT 22, PNT 5, PNT 8, PNT1, PNT2, PNT5

Non-insulated pin type crimp connectors, Model(s): PTN1-12, PTN2-12, PTN5-13

Non-insulated ring type crimp connector, Model(s): RNB1-10, RNB1-3.2, RNB14-11, RNB14-12, RNB14-16, RNB1-6, RNB1-8, RNB2-10, RNB2-2, RNB2-6, RNB5-12, RNB8-12, RNBL1-4

Non-insulated ring type crimp connectors, Model(s): RNB1-3.2, RNB14-10, RNB14-5, RNB14-8, RNB1-5, RNB2-10, RNB22-10, RNB22-12, RNB22-8, RNB2-3.2, RNB2-8, RNB5-10, RNB5-3.2, RNB5-3.7, RNB5-3.7, RNB5-5, RNB5-6, RNB5-8, RNB8-10, RNB8-11, RNB8-16, RNB8-8, RNBL1-3.7, RNBL22-5, RNBL22-6, RNBL2-3.7, RNBL2-5, RNBL38-10, RNBL5-3.7, RNBL5-4, RNBM1-3.7, RNBM1-3.7, RNBM2-3.7, RNBM2-3.7, RNBM8-5, RNBS1-4, RNBS14-5, RNBS2-4, RNBS2-5, RNBS5-4, RNBS8-6

Non-insulated spade type crimp connectors, Model(s): SN1-3.2, SN2-3.2, SN5-3.7, SN5-5, SNB1-3.2, SNB5-3.7, SNB5-5, SNBL1-3.7, SNBL1-4, SNBL2-4, SNBL2-5, SNBL5-4, SNBL5-6, SNBLL1-3.7, SNBLL2-3.7, SNBM1-4, SNBS1-5, SNBS5-4, SNL1-3.7, SNL1-4, SNL2-3.7, SNL2-4, SNL2-5, SNLL1-3.7, SNLL2-3.7, SNM1-4, SNM2-4, SNS1-5, SNS2-5, SNS5-4

Pressure cable connectors, Model(s): KB - 1000, KB - 2/0, KB - 350, KB - 4/0, KB - 500, KB - 800, KS - 1000, KS - 2/0, KS - 350, KS - 4/0, KS - 500, KS - 800

Pressure terminal connectors, Model(s): FSVY1-3.7, FSVY1-4, FSVY1-5, FSVY2-3.7, FSVY2-4, FSVY2-5, FSVY5-3.7, FSVY5-4, FSVY5-5, K-5655, K-5656, LSV1-3.7, LSV2-3.7, LSV5-4, LSV5-5, LSV5-6, LSVL2-4, LSVS1-4, LSVS1-5, LSVS2-5, LSVY1-3.7, LSVY2-3.7, LSVY5-3.7, LSVY5-4, LSVY5-5, LSVY5-6, LSVYL1-4, LSVYL1-5, LSVYL2-4, LSVYL2-5, MSRNB2-3753, MSRVY1-3753, MSRVY2-3753, MSRVY5-3753, PTVY1-12, PTVY2-12, PTVY5-13, RVY1-10, RVY1-5, RVY1-6, RVY1-8, RVY2-10, RVY2-2, RVY2-3.2, RVY2-6, RVY2-8, RVY5-10, RVY5-12, RVY5-3.2, RVY5-3.7, RVY5-5, RVY5-6, RVY5-8, RVYL1-3.7, RVYL1-4, RVYL2-3.7, RVYL2-4, RVYL2-5, RVYL5-3.7, RVYL5-4, RVYM2-3.7, RVYS1-3.7, RVYS1-4, RVYS2-3.7, RVYS2-4, RVYS2-5, RVYS5-4, SNBM2-4, SNYD2-3.2, TLK16-6, TLK25-10

Pressure Terminal Connectors, Model(s): RNYB14-10, RNYB14-12, RNYB14-5, RNYB22-12, RNYB22-8, RNYB8-10, RNYB8-12, RNYB8-8, RNYBM8-5, RNYBS14-6

Slicing wire connectors, Model(s): OK-2 (Pkg. cat No. 84), OK-3 (Pkg. cat No. 85), OK-4 (Pkg. cat No. 86), OK-5 (Pkg. cat No. 87), OK-6W (Pkg. cat No. 88), OK-8 (Pkg. cat No. 90), OK-8W (NA)

Splicing wire connectors, Model(s): 12, 13, 14, 14-6, 15, 199, 199S, 200, 2002, 2006-S, 2008-S, 2011-S, 22-10, 22-12, 29, 299, 299S, 30, 300, 32, 33, 34, 340, 36, 37, 38, 39, 399, 400, 400AL, 42, 50, 615069, 66, 70, 800, AS-1/0, AS-2, AS-2/0, AS-350, AS-4, AS-4/0, AS-500, AS-6, B1, B2, B4, BT-2, BTC 1/0-10, BTC 1/0-14, BTC 2/0-14, BTC 250-4, BTC 350-1/0, BTC 4/0-10, BTC 4/0-2, BTC 4/0-6, BTC 500-1/0, BTC 500-14, BTC 500-4, BTC1/0-10, BTC2/0-14, BTC250-4, BTC350-1/0, BTC4/0-10, BTC4/0-2, BTC4/0-6, BTC500-1/0, BTC500-14, BTC500-4, BV1, BV1, BV2, BV2, BV5, BV5, C-3, C-4, C-5, K1/0, K1000, K2, K2/0, K250, K3, K3/0, K350, K4, K500, K6, K750, K8, KS10, R1, S1/O, S2, S2/0, S250, S3, S3/0, S350, S4, S500, S6, TRQ1, TRQ2, W1, W2, W4, WT1, WT2, WT3, WT4, WT6, WTW51, WTW52, WTW53, WTW54

Splicing Wire Connectors, Model(s): BNT1, BNT2

Splicing Wire Connectors:, Model(s): 46-404, 46-405

Splicinig wire connectors, Model(s): H-1566, H-1567, H-1570, H-1571, H-1572, H-1591, H-1592, H-1594

Terminal connectors, Model(s): 10, 11, 22, 250, 300, 341, 342, 410 with insulating cap No. 415, 411 with insulating cap No. 417, 412 with insulating cap No. 417, 451, 452, 454, 48, 49, 49 Black, 53-B, 59B, 600, 71B#, 72B#, 73B#, 73B+, 74B, 76B, 76B+, 78B+, 82, K-5504, LSNL2-4, M-3, PV3-750, PV3-750, PV3-750, PV4-750, PV4-750, PV4-750, RNBL2-4, RNBS14-6, RNBS38-6, RNBS38-8, RNYB22-10, RNYBS8-6, RV2-6, RVL2-5, SV5-5, WT1, WT2, WT3, WT4, WT41, WT51, WT52, WT53, WT54, WT6

Terminal Connectors, Model(s): RNB22-11

Wire Connectors, Model(s): 65, 653

Wire Connectors and Soldering Lugs, Model(s): L22, L23, L25, PS10, PS12, PS2, PS3, PS4, PS4S, PS5, PS6, PS8

- The equipment (71B, 72B and 73B) were also evaluated to the requirements of UL 2043 and are suitable for use in air handling spaces.
* - May be followed by suffix B, J, T or X.
NOTE - All models may be provided with or without prefix "V" or suffix "MP" or "V" and prefix "BP". All models may be followed by suffixes BT, UB or UF with or without a two or four digit number, with or without suffixes B, LP, NP, PF, PH, SP and/or T. Die Series terminals may be followed by Suffixes UI, UT, UF, US, or UB, with or without a two to four digit number, with or without Suffix T or B, followed by Suffixes SP, LP, NP, PF, or and/or NM, by PH or BE, with or without Suffixes NT, BS, and /or G.

FLASHLOC™ DUO

THE MOST VERSATILE DIRECT TO DECK ATTACHMENT

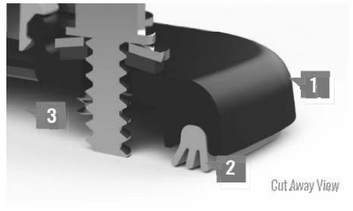
UNIRAC®

BETTER SOLAR STARTS HERE

FLASHLOC™ **DUO** is the most versatile direct to deck and rafter attachment for composition shingle and rolled comp roofs. The all-in-one mount installs fast — no kneeling on hot roofs to install flashing, no prying or cutting shingles, no pulling nails. Simply drive the required number of screws to secure the mount and inject sealant into the base. **FLASH**LOC's patented TRIPLE SEAL technology preserves the roof and protects the penetration with a permanent pressure seal. Kitted with two rafter screws, sealant and hardware for maximum convenience (deck screws sold separately). Don't just divert water, **LOC it out!**

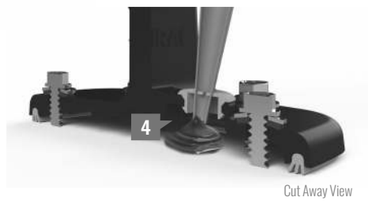
PROTECT THE ROOF

Install a high-strength waterproof attachment without lifting, prying or damaging shingles.



LOC OUT WATER

With an outer shield **1** contour-conforming gasket **2** and pressurized sealant chamber **3** the Triple Seal technology delivers a 100% waterproof connection.



HIGH-SPEED INSTALL

Simply drive the required number of screws and inject sealant into the port **4** to create a permanent pressure seal.

APRIL2021_FLASHLOCDUO_V1

FASTER INSTALLATION. 25-YEAR WARRANTY.

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FLASHLOC™ DUO

INSTALLATION GUIDE

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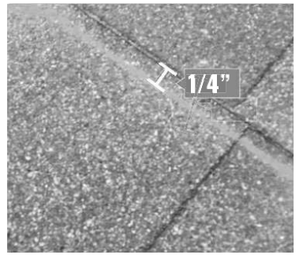
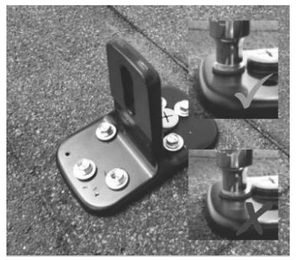
BETTER SOLAR STARTS HERE





PRE-INSTALL: CLEAN SURFACE AND MARK LOCATION

Ensure existing roof structure is capable of supporting the roof attachment point loads stated in the racking system engineering specifications. Clean roof surface of dirt, debris, snow and ice.

Snap chalk lines for attachment rows. On shingle roofs, snap lines 1/4" below upslope edge of shingle coarse. This line will be used to align the upper edge of the mount.

NOTE: Space mounts per racking system installation specifications.

STEP ONE: SECURE

ATTACHING TO A RAFTER: Place FLASHLOC DUO over rafter location with sealant port on up-slope side and align upper edge of mount with horizontal chalk line. Secure mount with the two (2) provided rafter screws. BACKFILL ALL PILOT HOLES WITH SEALANT.

ATTACHING TO SHEATHING: Place FLASHLOC DUO over desired location with sealant port on up-slope side and align upper edge of mount with horizontal chalk line. Secure mount with the two (2) provided rafter screws. Next, secure mount with four (4) deck screws by drilling through the FLASHLOC DUO deck mount hole locations. Unirac recommends using a drill as opposed to an impact gun to prevent over-tightening or stripping roof sheathing.

IMPORTANT: SECURELY ATTACH MOUNT BUT DO NOT OVERTIGHTEN SCREWS.

STEP TWO: SEAL

Insert tip of UNIRAC approved sealant into port and inject until sealant exits vent. Follow sealant manufacturer's instructions. Follow sealant manufacturer's cold weather application guidelines, if applicable.

NOTE: When FLASHLOC DUO is installed over gap between shingle tabs or vertical joints, fill gap/joint with sealant between mount and upslope edge of shingle course.

CUT SHINGLES AS REQUIRED: DO NOT INSTALL THE FLASHLOC SLIDER ACCROSS THICKNESS VARIATIONS GREATER THAN 1/8" SUCH AS THOSE FOUND IN HIGH DEFINITION SHINGLES.

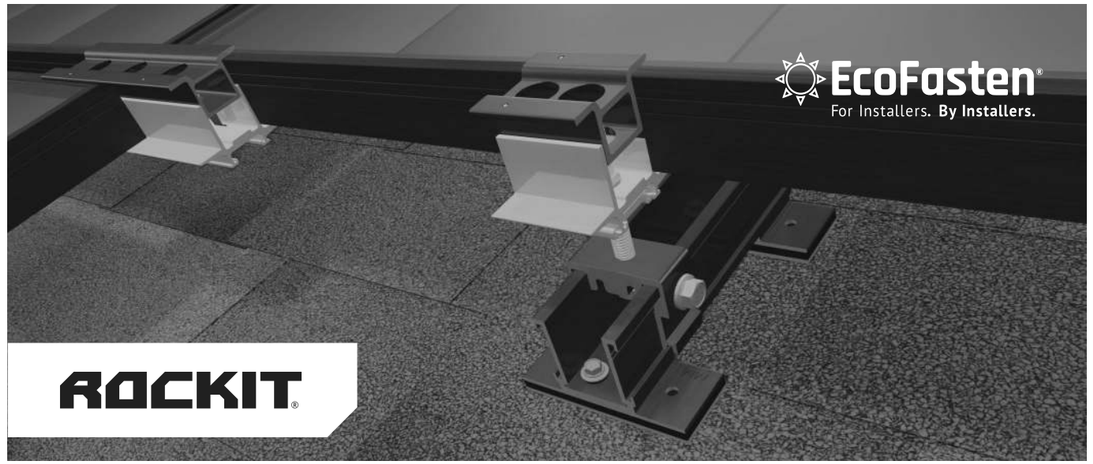
NOTE: If an exploratory hole falls outside of the area covered by the sealant, flash hole accordingly.
NOTE: Read and comply with the Flashloc Duo Design & Engineering Guide prior to design and installation of the system.

USE ONLY UNIRAC APPROVED SEALANTS. PLEASE CONTACT UNIRAC FOR FULL LIST OF COMPATIBLE SEALANTS.

Continue array installation. Refer to SOLARMOUNT or NXT HORIZON Installation Guide for the remaining system installation.

FASTER INSTALLATION. 25-YEAR WARRANTY.

FOR QUESTIONS OR CUSTOMER SERVICE VISIT UNIRAC.COM OR CALL (505) 248-2702



INTRODUCING ROCKIT SMART SLIDE!

Introducing EcoFasten's patent pending RockIt Smart Slide, our simple solution for quickly installing the popular RockIt rail-less racking system to composition shingle roofs.

Features & Benefits

- Eliminates the need to pry up shingle courses and install a metal flashing
- Multiple opportunities to find the rafter
- No need for additional material when architectural shingles are not level
- Longer 6.75" slide avoids overlaps in shingle courses
- Integrated flashing utilizes UltraGrip Technology™ to create a watertight seal

ROCKIT SMART SLIDE

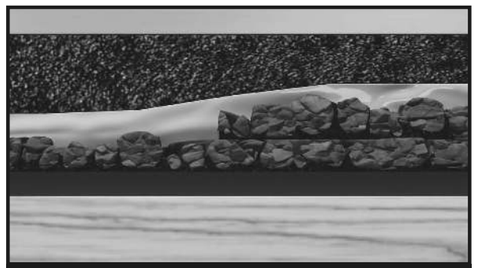
Required Components:

Part Number:	Description:
2011024	RI SMART SLIDE BLK 6.75"
2011025	RI SMART SCRW #12X3" W/BW

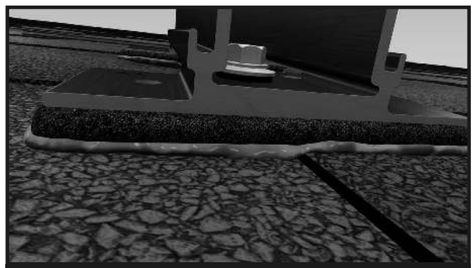
ROCKIT SMART SLIDE

Integrated UltraGrip Technology™

Pre-installed sealing pads are compatible with all composition shingle roofs. The compression achieved when fastened to the roof creates a super strong watertight seal. In most cases, the slide can be mounted to the deck without the need for sealant. A layer of flexible foam provides cushioning, which allows the waterproofing sealant to embed deep into the granules of the shingle as well as to flexibly conform over the steps found on architectural-style shingles.



A layer of flexible foam pushes the sealant deep into the shingle granules and around shingle steps



RockIt Smart Slide can be installed on top of architectural shingles steps

Testing & Documentation

- UL441 Rain Report
- TAS 100 (A)-95 Wind and Wind Driven Rain Resistance
- Mechanical Load Test/Structural Capacity Certification
- Florida Product Approval
- RockIt Installation Manual
- RockIt CutSheets

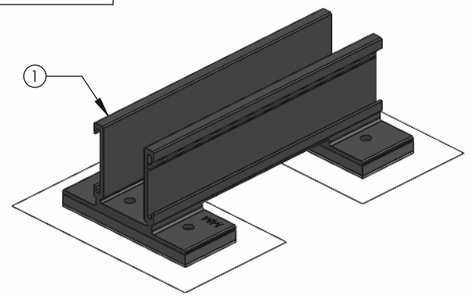
EcoFasten®
An Esdec Solar Group Company
4141 W. VAN BUREN ST, SUITE 2, PHOENIX AZ 85009
1-877-859-3947 | INFO@ECOFASTENSOLAR.COM

PRODUCT CUT SHEET

EcoFasten® For Installers. By Installers.

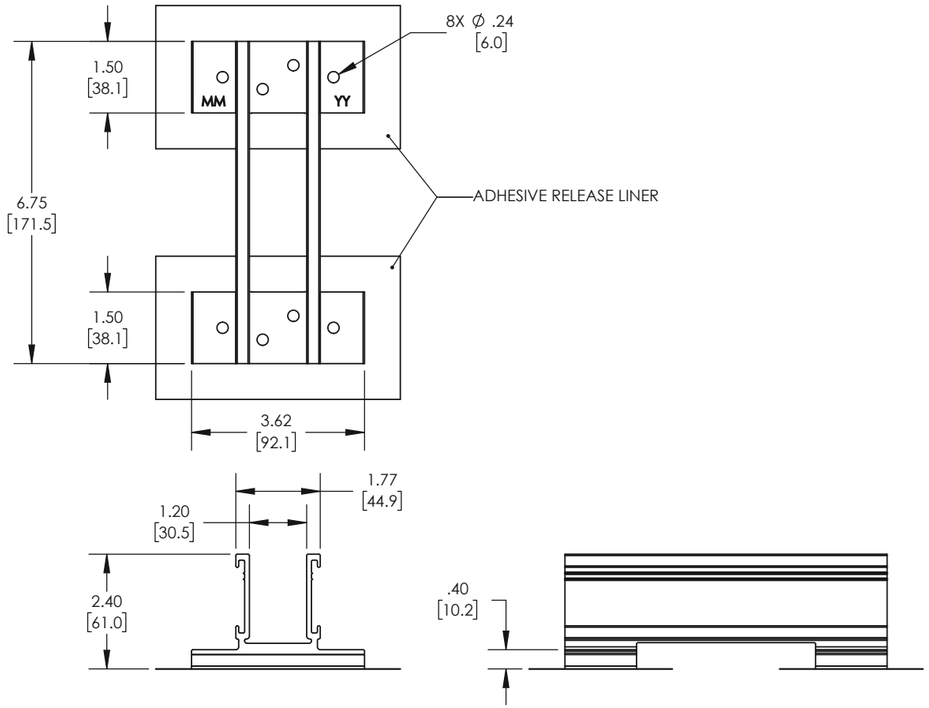
RI SMART SLIDE BLK 6.75"

PART NUMBER	DESCRIPTION
2011024	RI SMART SLIDE BLK 6.75"



ITEM NO.	DESCRIPTION
1	ROCKIT SMART SLIDE ASSEMBLY

1) ROCKIT FLASHLESS SLIDE ASSEMBLY



MATERIAL	ALUMINUM, EPDM, ADHESIVE, TREATED PAPER
FINISH	BLACK

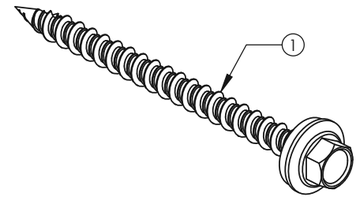
Rev: CS-3

PRODUCT CUT SHEET

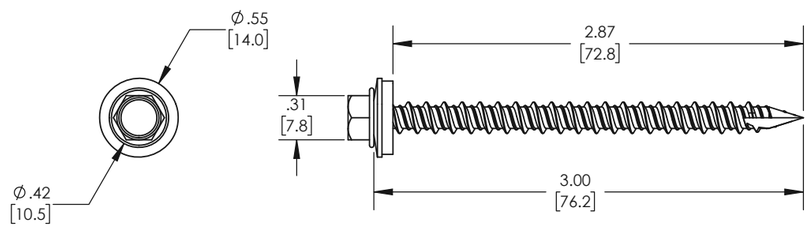
EcoFasten® For Installers. By Installers.

RI SMART SCREW #12X3" W/BW

PART NUMBER	DESCRIPTION
2011025	RI SMART SCREW #12X3" W/BW



ITEM NO.	DESCRIPTION
1	SELF TAPPING SCREW #12 WITH SEALING WASHER ASSEMBLY



MATERIAL	STAINLESS STEEL, EPDM RUBBER
FINISH	MILL, BLACK

Rev: CS-2

SOLARMOUNT

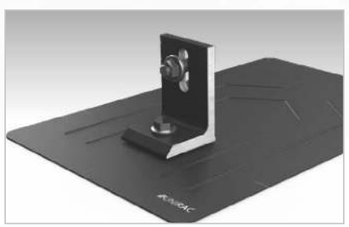
UNIRAC

SOLARMOUNT is the professionals' choice for residential PV mounting applications. Every aspect of the system is designed for an easier, faster installation experience. **SOLAR**MOUNT is a complete solution with revolutionary universal clamps, **FLASHKIT** PRO, full system UL 2703 certification and 25-year warranty. Not only is **SOLAR**MOUNT easy to install, but best-in-class aesthetics make it the most attractive on any block!

New & Improved:

THE PROFESSIONALS' CHOICE

With Superior Aesthetics



NOW FEATURING FLASHKIT PRO

The Complete Roof Attachment Solution

FEATURING SHED & SEAL TECHNOLOGY

NOW WITH UNIVERSAL MIDCLAMPS

Accommodates 30mm-51mm module frames

One tool, one-person installs are here!

REVOLUTIONARY NEW ENDCLAMPS

Concealed design and included End Caps

THE PROFESSIONALS' CHOICE FOR RESIDENTIAL RACKING

BEST INSTALLATION EXPERIENCE • CURB APPEAL • COMPLETE SOLUTION • UNIRAC SUPPORT

FOR QUESTIONS OR CUSTOMER SERVICE VISIT UNIRAC.COM OR CALL (505) 248-2702

SOLARMOUNT

UNIRAC

BETTER DESIGNS

TRUST THE INDUSTRY'S BEST DESIGN TOOL

Start the design process for every project in our U-Builder on-line design tool. It's a great way to save time and money.

BETTER SYSTEMS

ONE SYSTEM - MANY APPLICATIONS

Quickly set modules flush to the roof on steep pitched roofs. Orient a large variety of modules in Portrait or Landscape. Tilt the system up on flat or low slow roofs. Components available in mill, clear, and dark finishes to optimize your design financials and aesthetics.

BETTER RESULTS

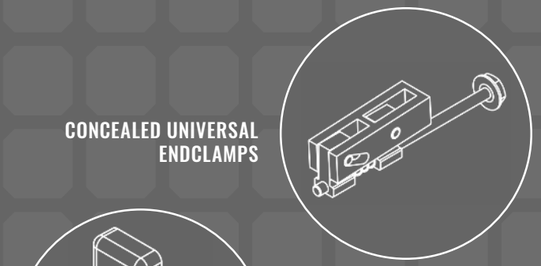
MAXIMIZE PROFITABILITY ON EVERY JOB

Trust Unirac to help you minimize both system and labor costs from the time the job is quoted to the time your teams get off the roof. Faster installs. Less Waste. More Profits.

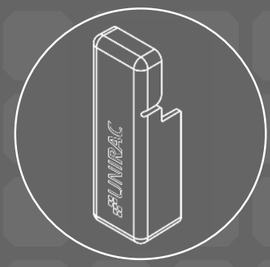
BETTER SUPPORT

WORK WITH THE INDUSTRIES MOST EXPERIENCED TEAM

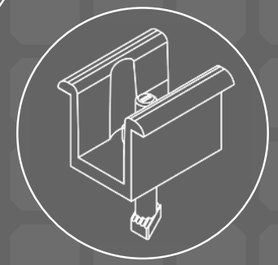
Professional support for professional installers and designers. You have access to our technical support and training groups. Whatever your support needs, we've got you covered. Visit Unirac.com/solarmount for more information.



CONCEALED UNIVERSAL ENDCLAMPS



END CAPS INCLUDED WITH EVERY ENDCLAMP



UNIVERSAL SELF STANDING MIDCLAMPS

U-BUILDER ONLINE DESIGN TOOL SAVES TIME & MONEY

Visit design.unirac.com

LISTED **UL2703**

BONDING & GROUNDING
MECHANICAL LOADING
SYSTEM FIRE CLASSIFICATION

UNIRAC CUSTOMER SERVICE MEANS THE HIGHEST LEVEL OF PRODUCT SUPPORT

UNMATCHED EXPERIENCE | CERTIFIED QUALITY | ENGINEERING EXCELLENCE | BANKABLE WARRANTY | DESIGN TOOLS | PERMIT DOCUMENTATION

TECHNICAL SUPPORT

Unirac's technical support team is dedicated to answering questions & addressing issues in real time. An online library of documents including engineering reports, stamped letters and technical data sheets greatly simplifies your permitting and project planning process.

CERTIFIED QUALITY PROVIDER

Unirac is the only PV mounting vendor with ISO certifications for 9001:2008, 14001:2004 and OHSAS 18001:2007, which means we deliver the highest standards for fit, form, and function. These certifications demonstrate our excellence and commitment to first class business practices.

BANKABLE WARRANTY

Don't leave your project to chance, Unirac has the financial strength to back our products and reduce your risk. Have peace of mind knowing you are providing products of exceptional quality. SOLARMOUNT is covered by a 25 year limited product warranty and a 5 year limited finish warranty.

ENHANCE YOUR REPUTATION WITH QUALITY RACKING SOLUTIONS BACKED BY ENGINEERING EXCELLENCE AND A SUPERIOR SUPPLY CHAIN

PUB2018AUG31 - PRINTED UPDATE

FOR QUESTIONS OR CUSTOMER SERVICE VISIT UNIRAC.COM OR CALL (505) 248-2702

Certificate of Compliance

Certificate: 70131735 **Master Contract:** 266909

Project: 80082031 **Date Issued:** 2021-06-02

Issued To: **Unirac**
1411 Broadway NE
Albuquerque, New Mexico, 87102
United States

Attention: Klaus Nicolaedis

The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only.

Issued by: Michael Hoffnagle
Michael Hoffnagle

C US

PRODUCTS

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

Models:	SM	-	SOLARMOUNT Flush-to-Roof is an extruded aluminum rail PV racking system that is installed parallel to the roof in landscape or portrait orientations.
	ULA	-	Unirac Large Array is a ground mount system using the SolarMount (SM) platform for the bonding and grounding of PV modules.

Solarmount

The system listed is designed to provide bonding/grounding, and mechanical stability for photovoltaic modules. The system is secured to the roof with the L-Foot components through the roofing material to building structure. Modules are secured to the racking system with stainless steel or aluminum mid clamps and Aluminum end clamps. The modules are bonded to the racking system with the stainless-steel bonding mid clamps with piercing points. The system is grounded with 10 AWG copper wire to bonding/grounding lugs. Fire ratings of Class A with Type 1, 2, 3, 10, 19, 22 or 25 for steep slope. Tested at 5" interstitial gap which allows installation at any stand-off height.

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

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

UL 2703 Mechanical Load ratings:

Downward Design Load (lb/ft²)	113.5
Upward Design Load (lb/ft²)	50.7
Down-Slope Load (lb/ft²)	16.13

Test Loads:

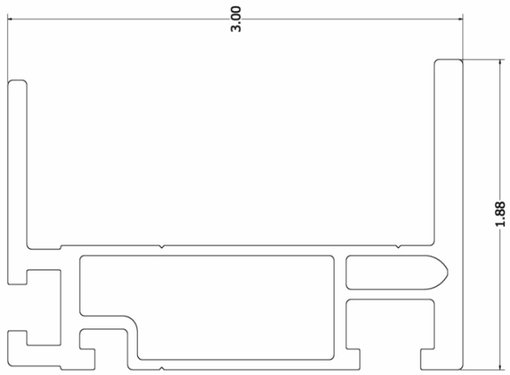
Downward Load (lb/ft²)	170.20
Upward Load (lb/ft²)	76.07
Down-Slope Load (lb/ft²)	24.2

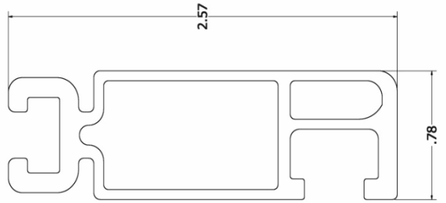
Unirac Large Array

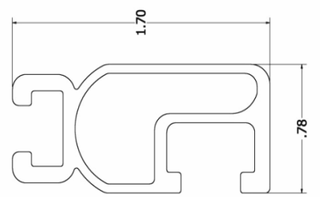
ULA is a ground mount system using the SolarMount (SM) platform for the bonding and grounding of PV modules. ULA aluminum components merge with SM rails and installer-supplied steel pipe. The SM rail system is secured to the horizontal Pipe using the Rail Bracket components. The Rear and Front cap secures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

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

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







Properties	SOLARMOUNT Light	SOLARMOUNT Rail Profile 2	Units
BEAM HEIGHT	1.70	2.57	in
APPROX WEIGHT	0.491	0.728	plf
CROSS SECTION AREA	0.409	0.625	in^2
SECTION MODULUS (X-AXIS)	0.15	0.363	in^3
SECTION MODULUS (Y-AXIS)	0.067	0.113	in^3
MOMENT OF INERTIA (X-AXIS)	0.13	0.467	in^4
MOMENT OF INERTIA (Y-AXIS)	0.026	0.045	in^4
RADIUS OF GYRATION (X-AXIS)	0.564	0.865	in
RADIUS OF GYRATION (Y-AXIS)	0.254	0.269	in

SOLARMOUNT HD: BEAM HEIGHT 3.00 in; APPROX WEIGHT 1.271 plf; CROSS SECTION AREA 1.059 in^2; SECTION MODULUS (X-AXIS) 0.898 in^3; SECTION MODULUS (Y-AXIS) 0.221 in^3; MOMENT OF INERTIA (X-AXIS) 1.45 in^4; MOMENT OF INERTIA (Y-AXIS) 0.267 in^4; RADIUS OF GYRATION (X-AXIS) 1.17 in; RADIUS OF GYRATION (Y-AXIS) 0.502 in

SM SOLAR MOUNT

TÜV Rheinland PTL

Certificate

Certificate no. US 82160015 01

License Holder:
Unirac Inc.
1411 Broadway NE
Albuquerque NM 87102
USA

Manufacturing Plant:
Unirac Inc.
1411 Broadway NE
Albuquerque NM 87102
USA

Test report no.: USA-31440029 005
Tested to: UL 2703:2015

Client Reference: Tom Young

Certified Product: Module Rack Mounting System — **License Fee - Units**

Model Designation: SolarMount (SM) — 7

Max System Voltage of PV Module: 1000 VDC
Max Size of PV Module: 20.8 sq.ft. surface area
Max Overcurrent Protection Rating of PV Module:
30 A when using the qualified grounding lugs;
20 A when using the Enphase micro inverter EGC.

Fire Rating: Class A when installed with
Type 1, Type 2, Type3, or Type 10 fire rated modules.

(continued)

7

Appendix: 1,1-5

Licensed Test mark:

TÜVRheinland US

Date of Issue (day/mo/yr)
27/07/2016

EcoFasten
AN ENSTALL COMPANY

ECOFASTEN SOLAR LLC
4141 W. VAN BUREN ST., SUITE 2
PHOENIX, AZ 85009

877-859-3947
INFO@ECOFASTENSOLAR.COM

February 16, 2024

EcoFasten
4141 West Van Buren St.
Phoenix, AZ 85009

Attn.: EcoFasten Solar Engineering Department

Re: Report # 7.22-RockIt_ CS-SS_FL: Engineering Certification for the EcoFasten RockIt System with Smart Slide and Comp Slide for Gable and Hip roofs.

This letter certifies the loading criteria and design basis used for the structural analysis of the EcoFasten - RockIt System as shown in Report # 7.22-RockIt_CS-SS_FL "Engineering Certification for the EcoFasten - RockIt System for Gable and Hip Roofs". All information, data, and analysis therein are based on, and comply with, the following building codes and typical specifications. The Span Tables provided in the referenced report may be used when all conditions of the design criteria provided therein are met.

Building Codes:

1. ASCE/SEI 7-22, Minimum Design Loads for Buildings and Other Structures, by American Society of Civil Engineers
2. 2023 Florida Building Code, 8th edition
3. AC428, Acceptance Criteria for Modular Framing Systems Used to Support Photovoltaic (PV) Panels, November 1, 2012 by ICC-ES
4. Aluminum Design Manual 2020, by The Aluminum Association, Inc.
5. ANSI/AWC NDS-2018, National Design Specification for Wood Construction, by the American Wood Council

Please note our evaluation only applies to EcoFasten products and excludes the structural adequacy of the chosen roof attachments, PV modules, or underlying roof supporting members. It shall be the responsibility of the installer or system designer to verify the structural capacity and adequacy of the referenced system components with respect to the applied or resultant loads of the chosen array configuration.

Sincerely

MATTHEW STEVEN KUZILA
LICENSE
No. 94247
STATE OF FLORIDA
PROFESSIONAL ENGINEER

Matthew S Kuzila, P.E.

Sealed 02.16.2024
Expires 02.28.2025

This item has been electronically signed and sealed by Matthew S Kuzila on the date adjacent to the seal using a SHA authentication code. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Freedom Forever
Planset Revision Letter

3/1/2024
REV #1

Attn. County of Columbia (FL):

The changes outlined in Revision Details have been applied to the plans corresponding to the following customer:

SIDNEY THOMPSON
356 SW CALLAWAY DR , LAKE CITY, FL 32024

Revision Details:
Codes and labels updated to reflect 2020 NEC.

All corresponding changes are notated on the plans by revision clouds.

Thank you for your time in reviewing these plans. Please reach out if you have any additional questions or concerns.

Construction Engineering
Freedom Forever
engineering@freedomforever.com

BARUN CORP

February 1, 2024

RE: CERTIFICATION LETTER

Project Address: ***SIDNEY THOMPSON***
356 SW CALLAWAY DR
LAKE CITY, FL 32024

Design Criteria:

- Applicable Codes = 2023 FLBC/FLEBC 8th Edition, 2023 FLRC 8th Edition, 2021 IEBC/IBC, ASCE 7-22 and 2018 NDS
- Risk Category = II
- Wind Speed = 120 mph, Exposure Category C, Partially/Fully Enclosed Method
- Ground Snow Load = 0 psf
- Roof 1: 2 x 4 @ 24" OC, Roof DL = 7 psf, Roof LL/SL = 16 psf (Non-PV), Roof LL/SL = 0 psf (PV)
- Roof 2-4: 2 x 4 @ 24" OC, Roof DL = 7 psf, Roof LL/SL = 16 psf (Non-PV), Roof LL/SL = 0 psf (PV)

To Whom It May Concern,

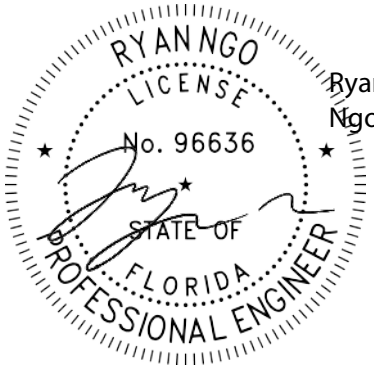
A structural evaluation of loading was conducted for the above address based on the design criteria listed above.

Existing roof structural framing has been reviewed for additional loading due to installation of Solar PV System on the roof. The structural review applies to the sections of roof that is directly supporting the Solar PV System.

Based on this evaluation, I certify that the alteration to the existing structure by installation of the Solar PV System meets the prescriptive compliance requirements of the applicable existing building and/or new building provisions adopted/referenced above.

Additionally, the Solar PV System assembly (including attachment hardware) has been reviewed to be in accordance with the manufacturer's specifications and to meet and/or exceed the requirements set forth by the referenced codes.

Sincerely,



Ryan Ngo

Digitally signed by Ryan Ngo
Date: 2024.02.02 01:21:50 -08'00'

This item has been digitally signed and sealed by Ryan Ngo, PE. on the date and/or time stamp shown using a digital signature. Printed copies of this document are not considered signed and sealed and the signature must be verified by a 3rd Party Certificate Authority on any electronic copy.

BARUN CORP	RESULTS SUMMARY
SIDNEY THOMPSON, 356 SW CALLAWAY DR, LAKE CITY, FL 32024	

MOUNTING PLANE STRUCTURAL EVALUATION			
MOUNTING PLANE	ROOF PITCH	RESULT	GOVERNING ANALYSIS
Roof 1	33°	OK	IEBC IMPACT CHECK
Roof 2-4	33°	OK	IEBC IMPACT CHECK

STANDOFF HARDWARE EVALUATION FOR WIND UPLIFT	
MOUNTING PLANE	WIND UPLIFT DCR
Roof 1	89.8%
Roof 2-4	62.2%

Limits of Scope of Work and Liability:

The existing structure has been reviewed based on the assumption that it has been originally designed and constructed per appropriate codes. The structural analysis of the subject property is based on the provided site survey data. The calculations produced for this structure's assessment are only for the roof framing supporting the proposed PV installation referenced in the stamped planset and were made according to generally recognized structural analysis standards and procedures. All PV modules, racking and attachment components shall be designed and installed per manufacturer's approved guidelines and specifications. These plans are not stamped for water leakage or existing damage to the structural component that was not accessed during the site survey. Prior to commencement of work, the PV system installer should verify that the existing roof and connections are in suitable condition and inspect framing noted on the certification letter and inform the Engineer of Record of any discrepancies prior to installation. The installer should also check for any damages such as water damage, cracked framing, etc. and inform the Engineer of Record of existing deficiencies which are unknown and/or were not observable during the time of survey and have not been included in this scope of work. Any change in the scope of the work shall not be accepted unless such change, addition, or deletion is approved in advance and in writing by the Engineer of Record.

BARUN CORP	LOAD CALCULATION
	Roof 1
SIDNEY THOMPSON, 356 SW CALLAWAY DR, LAKE CITY, FL 32024	

PV PANELS DEAD LOAD (PV-DL)	
PV Panels Weight	= 2.50 psf
Hardware Assembly Weight	= 0.50 psf
Total PV Panels Weight	**PV-DL = 3.00 psf**

ROOF DEAD LOAD (R-DL)			
Existing Roofing Material Weight	Composite Shingle Roof	1 Layer(s)	= 2.50 psf
Underlayment Weight			= 0.50 psf
Plywood/OSB Sheathing Weight			= 1.50 psf
Framing Weight	2 x 4 @ 24 in. O.C.		= 0.73 psf
No Vaulted Ceiling			= 0.00 psf
Miscellaneous			= 1.50 psf
Total Roof Dead Load			**R-DL = 6.70 psf**

REDUCED ROOF LIVE LOAD (Lr)	
Roof Live Load	Lo = 20.00 psf
Member Tributary Area	At < 200 ft^2
Roof 1 Pitch	33° or 8/12
Tributary Area Reduction Factor	R1 = 1.00
Roof Slope Reduction Factor	R2 = 0.80
Reduced Roof Live Load, Lr = Lo (R1) (R2)	**Lr = 16.00 psf**

SNOW LOAD	
Ground Snow Load	pg = 0.00 psf
Effective Roof Slope	33°
Snow Importance Factor	Is = 1.00
Snow Exposure Factor	Ce = 1.00
Snow Thermal Factor	Ct = 1.10
Minimum Flat Roof Snow Load	pf-min = 0.00 psf
Flat Roof Snow Load	**pf = 0.00 psf**

SLOPED ROOF SNOW LOAD ON ROOF (Non-Slippery Surfaces)	
Roof Slope Factor	Cs-roof = 1.00
Sloped Roof Snow Load on Roof	**ps-roof = 0.00 psf**

SLOPED ROOF SNOW LOAD ON PV PANELS (Unobstructed Slippery Surfaces)	
Roof Slope Factor	Cs-PV = 0.62
Sloped Roof Snow Load on PV Panels	**ps-PV = 0.00 psf**

BARUN CORP	IEBC IMPACT CHECK
	Roof 1
SIDNEY THOMPSON, 356 SW CALLAWAY DR, LAKE CITY, FL 32024	

	EXISTING	WITH PV PANELS	
Roof Dead Load (DL) =	6.70	9.70	psf
Roof Live Load (Lr) =	16.00	0.00	psf
Roof Snow Load (SL) =	0.00	0.00	psf

	EXISTING	WITH PV PANELS	
(DL + Lr)/Cd =	18.16	10.78	psf
(DL + SL)/Cd =	5.83	8.43	psf
Maximum Gravity Load =	18.16	10.78	psf

Load Increase (%) = -40.65% **OK**

The requirements of section 805.2 of 2021 IEBC are met and the structure is permitted to remain unaltered.

BARUN CORP

WIND UPLIFT CALCULATION

Roof 1

SIDNEY THOMPSON, 356 SW CALLAWAY DR, LAKE CITY, FL 32024

SITE INFORMATION			
Ultimate Wind Speed =	120.00 mph	Roof Pitch =	33°
Risk Category =	II	Roof Type =	Hip
Exposure Category =	C	Velocity Pressure Exposure Coefficient, Kz =	0.85
Mean Roof Height =	15.00 ft	Topographic Factor, Kzt =	1.00
Solar Array Dead Load =	3.00 psf	Wind Directionality Factor, Kd =	0.85
a =	3.00 ft	Ground Elevation Factor, Ke =	1.00

DESIGN CALCULATIONS			
Wind Velocity Pressure, qh =		31.38 psf	(0.00256*Kz*Kzt*Ke*(V^2))
Solar Array Pressure Equalization Factor, γa =		0.60	
Hardware Type =	Unirac Flashloc Duo		
Allowable Load =	166.00 lbs	OSB/Plywood, #14 Wood Screw x 6, 0.5" Embedment	
Array Edge Factor, γE =	1.50	Exposed Condition	
Max. X - Spacing (Zone 1) =	3.00 ft	Effective Wind Area	
Max. Y - Spacing (Zone 1) =	1.70 ft	5.10 ft²	
Max. X - Spacing (Zone 2) =	3.00 ft	Effective Wind Area	
Max. Y - Spacing (Zone 2) =	1.70 ft	5.10 ft²	
Max. X - Spacing (Zone 3) =	3.00 ft	Effective Wind Area	
Max. Y - Spacing (Zone 3) =	1.70 ft	5.10 ft²	

ROOF ZONE	GCp (-) UPLIFT	UPLIFT PRESSURE	PULLOUT FORCE
1	-1.43	-19.14 psf	97.59 lbs
2	-1.93	-26.34 psf	134.32 lbs
3	-2.13	-29.22 psf	149.01 lbs

NOTE:

- Wind calculation is based on ASCE 7-22, 29.4 - C&C, LC #7: 0.6DL + 0.6WL is used.

BARUN CORP	LOAD CALCULATION
	Roof 2-4
SIDNEY THOMPSON, 356 SW CALLAWAY DR, LAKE CITY, FL 32024	

PV PANELS DEAD LOAD (PV-DL)	
PV Panels Weight	= 2.50 psf
Hardware Assembly Weight	= 0.50 psf
Total PV Panels Weight	**PV-DL = 3.00 psf**

ROOF DEAD LOAD (R-DL)			
Existing Roofing Material Weight	Composite Shingle Roof	1 Layer(s)	= 2.50 psf
Underlayment Weight			= 0.50 psf
Plywood/OSB Sheathing Weight			= 1.50 psf
Framing Weight	2 x 4 @ 24 in. O.C.		= 0.73 psf
No Vaulted Ceiling			= 0.00 psf
Miscellaneous			= 1.50 psf
Total Roof Dead Load			**R-DL = 6.70 psf**

REDUCED ROOF LIVE LOAD (Lr)	
Roof Live Load	Lo = 20.00 psf
Member Tributary Area	At < 200 ft^2
Roof 2-4 Pitch	33° or 8/12
Tributary Area Reduction Factor	R1 = 1.00
Roof Slope Reduction Factor	R2 = 0.80
Reduced Roof Live Load, Lr = Lo (R1) (R2)	**Lr = 16.00 psf**

SNOW LOAD	
Ground Snow Load	pg = 0.00 psf
Effective Roof Slope	33°
Snow Importance Factor	Is = 1.00
Snow Exposure Factor	Ce = 1.00
Snow Thermal Factor	Ct = 1.10
Minimum Flat Roof Snow Load	pf-min = 0.00 psf
Flat Roof Snow Load	**pf = 0.00 psf**

.

SLOPED ROOF SNOW LOAD ON ROOF (Non-Slippery Surfaces)	
Roof Slope Factor	Cs-roof = 1.00
Sloped Roof Snow Load on Roof	**ps-roof = 0.00 psf**

SLOPED ROOF SNOW LOAD ON PV PANELS (Unobstructed Slippery Surfaces)	
Roof Slope Factor	Cs-PV = 0.62
Sloped Roof Snow Load on PV Panels	**ps-PV = 0.00 psf**

BARUN CORP

IEBC IMPACT CHECK

Roof 2-4

SIDNEY THOMPSON, 356 SW CALLAWAY DR, LAKE CITY, FL 32024

	EXISTING	WITH PV PANELS	
Roof Dead Load (DL) =	6.70	9.70	psf
Roof Live Load (Lr) =	16.00	0.00	psf
Roof Snow Load (SL) =	0.00	0.00	psf

	EXISTING	WITH PV PANELS	
(DL + Lr)/Cd =	18.16	10.78	psf
(DL + SL)/Cd =	5.83	8.43	psf
Maximum Gravity Load =	18.16	10.78	psf

Load Increase (%) = -40.65% **OK**

The requirements of section 805.2 of 2021 IEBC are met and the structure is permitted to remain unaltered.

BARUN CORP	WIND UPLIFT CALCULATION
	Roof 2-4
SIDNEY THOMPSON, 356 SW CALLAWAY DR, LAKE CITY, FL 32024	

SITE INFORMATION			
Ultimate Wind Speed =	120.00 mph	Roof Pitch =	33°
Risk Category =	II	Roof Type =	Hip
Exposure Category =	C	Velocity Pressure Exposure Coefficient, Kz =	0.85
Mean Roof Height =	15.00 ft	Topographic Factor, Kzt =	1.00
Solar Array Dead Load =	3.00 psf	Wind Directionality Factor, Kd =	0.85
a =	3.00 ft	Ground Elevation Factor, Ke =	1.00

DESIGN CALCULATIONS			
Wind Velocity Pressure, qh =		31.38 psf	(0.00256*Kz*Kzt*Ke*(V^2))
Solar Array Pressure Equalization Factor, γa =		0.60	
Hardware Type =	EcoFasten Rockit SmartSlide		
Allowable Load =	530.15 lbs	SPF, #12 Wood Screw x 2, 2" Embedment	
Array Edge Factor, γE =	1.50	Exposed Condition	
Max. X - Spacing (Zone 1) =	6.00 ft	Effective Wind Area	
Max. Y - Spacing (Zone 1) =	3.40 ft	20.40 ft²	
Max. X - Spacing (Zone 2) =	6.00 ft	Effective Wind Area	
Max. Y - Spacing (Zone 2) =	1.70 ft	10.20 ft²	
Max. X - Spacing (Zone 3) =	6.00 ft	Effective Wind Area	
Max. Y - Spacing (Zone 3) =	1.70 ft	10.20 ft²	

ROOF ZONE	GCp (-) UPLIFT	UPLIFT PRESSURE	PULLOUT FORCE
1	-1.23	-16.16 psf	329.71 lbs
2	-1.92	-26.21 psf	267.37 lbs
3	-2.12	-29.08 psf	296.59 lbs

NOTE:

• Wind calculation is based on ASCE 7-22, 29.4 - C&C, LC #7: 0.6DL + 0.6WL is used.

SUBCONTRACTOR VERIFICATION

APPLICATION/PERMIT # Application #64107 JOB NAME Sidney Thompson

THIS FORM MUST BE SUBMITTED BEFORE A PERMIT WILL BE ISSUED

Columbia County issues combination permits. One permit will cover all trades doing work at the permitted site. It is REQUIRED that we have records of the subcontractors who actually did the trade specific work under the general contractors permit.

NOTE: *It shall be the responsibility of the general contractor to make sure that all of the subcontractors are licensed with the Columbia County Building Department.*
Use website to confirm licenses: http://www.columbiacountyfla.com/PermitSearch/ContractorSearch.aspx

NOTE: If this should change prior to completion of the project, it is your responsibility to have a corrected form submitted to our office, before that work has begun.

Violations will result in stop work orders and/or fines.

ELECTRICAL ☑ CC#_____	Print Name GREG ALBRIGHT Signature _____ Company Name: FREEDOM FOREVER License #: EC13008056 Phone #: 407 795 8231	Need ☐ Lic ☐ Liab ☐ W/C ☐ EX ☐ DE
MECHANICAL/ A/C ☐ CC#_____	Print Name_____ Signature_____ Company Name:_____ License #: _____ Phone #:_____	Need ☐ Lic ☐ Liab ☐ W/C ☐ EX ☐ DE
PLUMBING/ GAS ☐ CC#_____	Print Name_____ Signature_____ Company Name:_____ License #: _____ Phone #:_____	Need ☐ Lic ☐ Liab ☐ W/C ☐ EX ☐ DE
ROOFING ☐ CC#_____	Print Name_____ Signature_____ Company Name:_____ License #: _____ Phone #:_____	Need ☐ Lic ☐ Liab ☐ W/C ☐ EX ☐ DE
SHEET METAL ☐ CC#_____	Print Name_____ Signature_____ Company Name: _____ License #: _____ Phone #:_____	Need ☐ Lic ☐ Liab ☐ W/C ☐ EX ☐ DE
FIRE SYSTEM/ SPRINKLER ☐ CC#_____	Print Name_____ Signature_____ Company Name:_____ License#: _____ Phone #:_____	Need ☐ Lic ☐ Liab ☐ W/C ☐ EX ☐ DE
SOLAR ☐ CC#_____	Print Name_____ Signature_____ Company Name: _____ License #: _____ Phone #: _____	Need ☐ Lic ☐ Liab ☐ W/C ☐ EX ☐ DE
STATE SPECIALTY ☐ CC#_____	Print Name_____ Signature_____ Company Name: _____ License #: _____ Phone #: _____	Need ☐ Lic ☐ Liab ☐ W/C ☐ EX ☐ DE

Ref: F.S. 440.103; ORD. 2016-30