October 30, 2025

RE: Solar PV System

Luis Lugo

164 Blanchard Rd

Sanford, NC 27322

To Whom it may concern,

Consider this as a statement by Rafael Gonzalez Soto, P.E, regarding the project referenced above.

The proposed solar installation for this project will add approximately 3 PSF of additional deadload. This includes the solar modules & microinverters, racking, and all other accessories. Based on my evaluation of the building, the existing roof structure can support the additional load of the proposed PV system. The proposed solar system is designed and complies with the 2018 North Carolina Building Code structural requirements. The contractor is responsible for installing the solar system according to the manufacturer's recommendations and instructions.

I Rafael Gonzalez Soto, P.E, certify that the PV electrical system and electrical components are designed and approved using the standards contained in the most recent version of the North Carolina Building Code.

Please feel free to contact me at 786-393-4740 if you have any questions or require any further information.

Regards,

Rafael A Gonzalez Soto
2025.10.31 10:54:18
-05'00'

Rafael Gonzalez Soto, P.E

237 S Dixie Hwy, 4th Floor, Suite 13,

Coral Gables, FL 33133

786-393-4740

Structural Calculations

1. Site & Wind Data

Parameter	Value
Snow Load (Psf)	30
Basic Wind Speed (V_{ase})	120
Exposure Category	C
Mean Roof Height	15.00
Roof Angle (Deg)	8° to 20°

2. Structural Framing Information

Component	Specification
Rafter/Truss Size	24” OC
Rafter/Truss Spacing	2" x 4"
Roof Sheathing	Plywood

3. Solar Array Wind Load Details

GCp – Net Pressure Coefficients (ASCE 7-16 / NCBC 2018)

Zone	GCp (Uplift)	GCp (Downward)
Zone 1	-1.68	0.53
Zone 2	-2.28	0.53
Zone 3	-3.0	0.53

Wind Pressure (p) – psf

Condition	Zone 1	Zone 2	Zone 3
Exposed	-24.0	-33.7	-45.6
Non-Exposed	-16.0	-21.5	-29.4

Point Loads (PL) – lbs per attachment

Condition	Zone 1	Zone 2	Zone 3
Exposed	-407	-381	-515
Non-Exposed	-271.2	-364.2	-498.4

I hereby certify that the above structural framing and load assumptions are consistent with standard engineering practices, and the design complies with the governing building code requirements.

Rafael Gonzalez Soto, P.E

237 S Dixie Hwy, 4th Floor, Suite 13,

Coral Gables, FL 33133

786-393-4740

Rafael A
Gonzalez Soto
2025.10.31
10:54:38 -05'00'

PHOTOVOLTAIC SYSTEM SPECIFICATIONS:

SYSTEM SIZE:	5,340W DC 7,600W AC
MODULE TYPE & AMOUNT:	(12) CANADIAN CS6.1-54TM-445H
MODULE DIMENSIONS:	(L/W/H) 70.9"/44.6"/1.38"
INVERTER:	(1) TESLA SOLAR INVERTER
INTERCONNECTION METHOD:	SOLAR BREAKER
AHJ:	COUNTY OF HARNETT

GOVERNING CODES

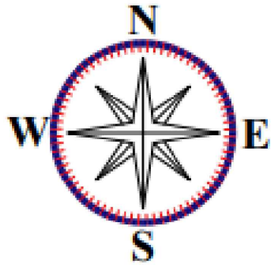
ALL WORK SHALL CONFORM TO THE FOLLOWING CODES

a. 2020 NATIONAL ELECTRICAL CODE
b. 2018 NC BUILDING CODE
c. 2018 NC RESIDENTIAL CODE
d. 2015 INTERNATIONAL RESIDENTIAL CODE
e. 2018 NC PLUMBING CODE
f. 2018 NC MECHANICAL CODE
g. 2018 NC FIRE CODE
h. COUNTY OF HARNETT CODE
i. ANY OTHER LOCAL AMENDMENTS

GENERAL NOTES:

1. APPLICABLE CODE: 2018 NC BUILDING CODE & ASCE 7-16 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.
2. LAG SCREW DIAMETER AND EMBEDMENT LENGTHS ARE DESIGNED PER 2018 NC BUILDING CODE REQUIREMENTS. ALL BOLT CAPACITIES ARE BASED ON A SOUTHER YELLOW PINE (SYP) RESIDENTIAL WOOD ROOF RAFTERS AS EMBEDMENT MATERIAL.
3. ROOF SEALANTS SHALL CONFORM TO ASTM C920 AND ASTM 6511, AND IS THE RESPONSIBILITY OF THE CONTRACTOR TO PILOT DRILL AND FILL ALL HOLES.
4. ALL DISSIMILAR MATERIALS SHALL BE SEPARATED WITH NEOPRENE WASHERS, PADS, ETC OR SIMILAR.
5. ALL ALUMINIUM COMPONENTS SHALL BE ANODIZED ALUMINIUM 6105-T5 UNLESS OTHERWISE NOTED.
6. ALL LAG SCREW SHALL BE ASTM A276 STAINLESS STEEL UNLESS OTHERWISE NOTED.
7. ALL SOLAR RAILING AND MODULES SHALL BE INSTALLED PER MANUFACTURER INSTRUCTIONS.
8. CONTRACTOR SHALL ENSURE ALL ROOF PENETRATIONS TO BE INSTALLED AND SEALED PER 2018 NC BUILDING CODE OR LOCAL GOVERNING CODE.

1 A-00 PLOT PLAN



SHEET INDEX:

BILL OF MATERIALS

Group	QUANTITY	DESCRIPTION
MODULES	12	CANADIAN CS6.1-54TM-445H
INVERTER	1	TESLA SOLAR INVERTER
INVERTER	4	TESLA MCI/RSD GEN 2
RACKING	21	IRONRIDGE HUG
RACKING	8	IRONRIDGE XR-10 RAIL
RACKING	20	MID CLAMPS
RACKING	8	END CLAMPS
RACKING	4	RAIL SPLICE
RACKING	2	GROUND LUGS
RACKING	1	ROOFTOP JUNCTION BOX
ELECTRICAL	1	2P 40 A BREAKER
ELECTRICAL	1	60A NON FUSED DISCONNECT

PHOTOVOLTAIC ROOF MOUNT SYSTEM

12 MODULES-ROOF MOUNTED - 5,340W DC, 7,600W AC

EPC SOLAR
379 DOUGLAS RD E
OLDSMAR, FL 34677
PHONE: 727-267-4033

REVISIONS

DESCRIPTION	DATE	REV

PROJECT NAME: LUIS LUGO

PROJECT ADDRESS: 164 BLANCHARD RD, SANFORD, NC 27332

SHEET NAME: COVER SHEET

SHEET NUMBER: A-00

SHEET SIZE: ANSI B 11"x17"

NORTH CAROLINA PROFESSIONAL SEAL 051426 ENGINEER RAFAEL A. GONZALEZ SOTO

Rafael A Gonzalez Soto
2025.10.31 10:55:02
-05'00'

GENERAL INSTALLATION PLAN NOTES:

1. ROOF ATTACHMENTS SHALL BE INSTALLED AS SHOWN IN SHEET S-01 AND AS FOLLOWS FOR EACH WIND ZONE.

WIND ZONE 1: 6'-0" O.C.
WIND ZONE 2: 6'-0" O.C.
WIND ZONE 3: 6'-0" O.C.

THE PERIMETER WIDTH OF WIND UPLIFT ZONES IS 3 FT

SYSTEM LEGEND

- ◯ EXISTING UTILITY METER
- MP EXISTING MAIN SERVICE PANEL
- TI NEW TESLA 7.6KW SOLAR INVERTER
- JB NEW JUNCTION BOX. EXACT LOCATION TBD ON SITE
- AC NEW PHOTOVOLTAIC UTILITY DISCONNECT SWITCH. LOCATED WITHIN 10' OF METER.
- RA ROOF ACCESS POINT

12 NEW CANADIAN CS6.1-54TM-445H MODULES WITH NEW TESLA MCI RSDS, MOUNTED ON THE BACK OF THE MODULES

□◯ = ROOF OBSTRUCTIONS

= 36" FIRE PATHWAY

= 18" FIRE PATHWAY

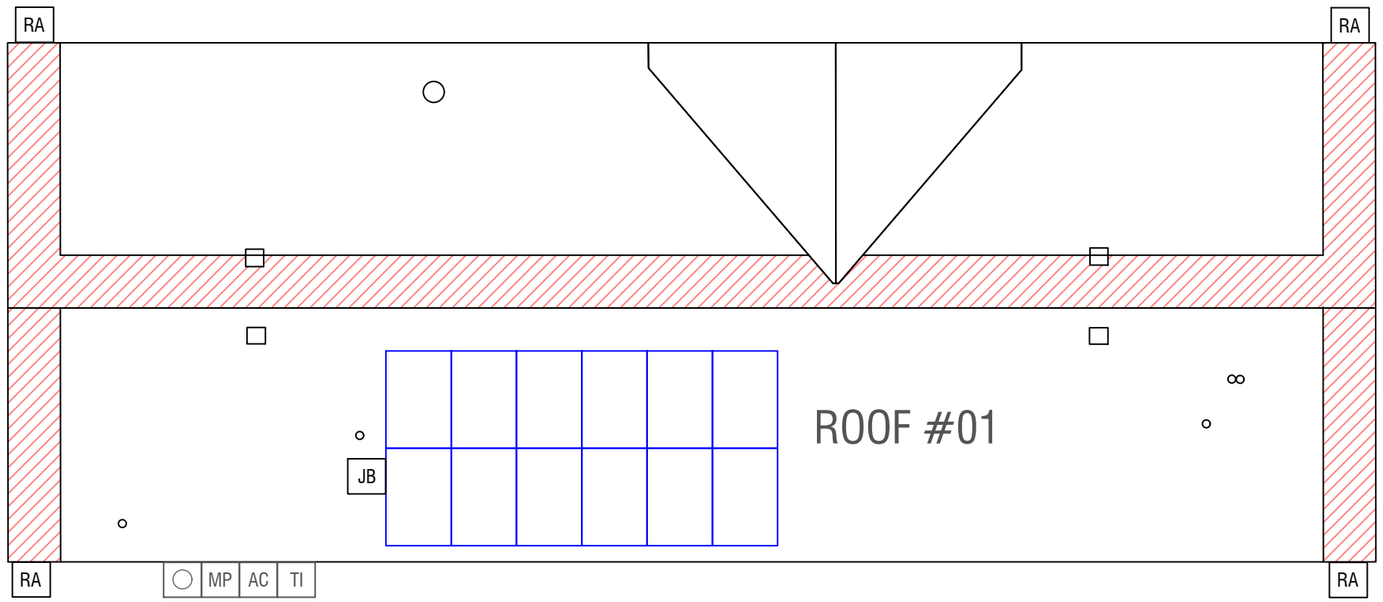
ROOF SECTIONS

ROOF #01

MODULE: 12
SLOPE: 20°
AZIMUTH: 187°
MATERIAL: COMPOSITION SHINGLES
RAFTER SIZE: 2"X4" @ 24 O.C.

BLANCHARD RD

FRONT OF HOME



GENERAL NOTES FIRE SAFETY NOTES:

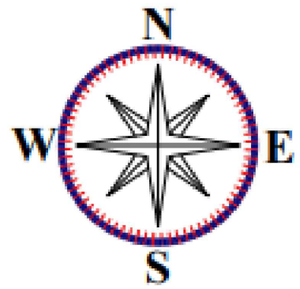
ROOF ACCESS POINTS SHALL BE DEFINED AS AREAS WHERE FIRE DEPARTMENT LADDERS ARE NOT PLACED OVER OPENINGS (WINDOWS OR DOORS), ARE LOCATED AT STRONG POINTS OF BUILDING CONSTRUCTION, AND ARE IN LOCATIONS WHERE THEY WILL NOT CONFLICT WITH OVERHEAD OBSTRUCTIONS (TREE LIMBS, WIRES, OR SIGNS). (NFPA 1 11.12.2.2.1.3)

· PHOTOVOLTAIC MODULES SHALL BE LOCATED IN A MANNER THAT PROVIDES TWO 3 FT WIDE ACCESS PATHWAYS FROM THE EAVE TO THE RIDGE ON EACH ROOF SLOPE WHERE THE MODULES ARE LOCATED. (NFPA 1 11.10.2.2.2.1.2)

· FIRST RESPONDER ACCESS WILL BE A MINIMUM OF 36" UNOBSTRUCTED

· CABLES, WHEN RUN BETWEEN ARRAYS, SHALL BE ENCLOSED IN CONDUIT.

TOTAL PLAN AREA OF ROOF: 2,457.97 FT^2
TOTAL AREA OF MODULES: 263.66 FT^2
MODULE COVERAGE: 10.73%



EPC SOLAR
379 DOUGLAS RD E
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PHONE: 727-267-4033

REVISIONS

DESCRIPTION	DATE	REV

PROJECT NAME: LUIS LUGO

PROJECT ADDRESS: 164 BLANCHARD RD, SANFORD, NC 27332

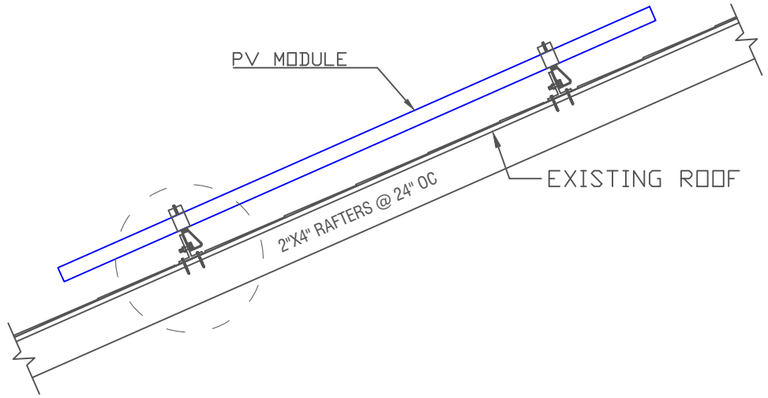
SHEET NAME: SITE PLAN

SHEET NUMBER: A-01

SHEET SIZE: ANSI B 11"x17"

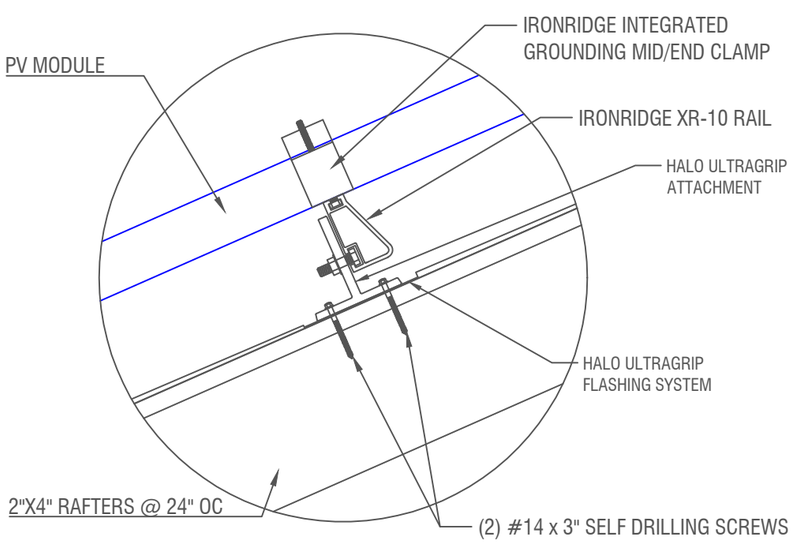
Rafael A Gonzalez Soto
2025.10.31 10:55:24
-05'00'

ROOF MATERIAL: COMPOSITION SHINGLES

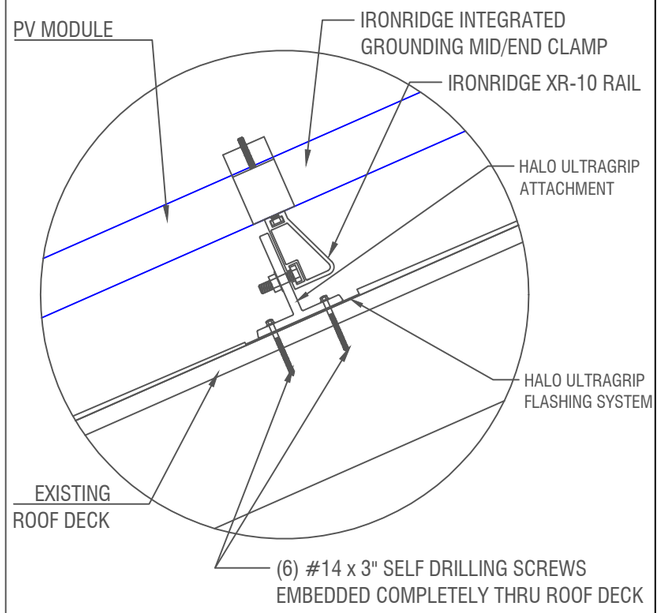


1 S-01 ATTACHMENT DETAIL (SIDE VIEW)

IRONRIDGE XR-10 RAIL



2 S-01 ATTACHMENT DETAIL ENLARGED VIEW



3 S-01 OPTIONAL DECK ATTACHMENT

QUICKMOUNT HALO ULTRAGRIP

MOUNTING PLAN NOTES:

1. DESIGNED AS PER ASCE7-16, 2018 NCBC
2. MEAN ROOF HEIGHT IS 15 FEET
3. EXPOSURE CATEGORY: C
4. DESIGN WIND SPEED: 120 MPH
5. DESIGN SNOW LOAD: 30 PSF
6. EXISTING ROOF HAS ONE LAYER
7. ANCHORAGE OF SOLAR PANELS WILL BE TO EXISTING ROOF SUPPORTING MEMBERS
8. INSTALLATION IS IN COMPLIANCE WITH 15.14.2.5.2, RAS111, & RAS120.10
9. PENETRATIONS WILL BE FLASHED AND SEALED WITH ULTRAGRIP FLASHING SYSTEM.

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PHONE: 727-267-4033

REVISIONS

DESCRIPTION	DATE	REV

PROJECT NAME: LUIS LUGO

PROJECT ADDRESS: 164 BLANCHARD RD, SANFORD, NC 27332

SHEET NAME: MOUNTING DETAILS

SHEET NUMBER: S-01

SHEET SIZE: ANSI B 11"x17"

NORTH CAROLINA PROFESSIONAL SEAL 051426 ENGINEER RAFAEL A. GONZALEZ SOTO

Rafael A Gonzalez Soto
2025.10.31 10:55:39
-05'00'

SYSTEM LEGEND

12 NEW CANADIAN CS6.1-54TM-445H MODULES WITH NEW TESLA MCI RSDS, MOUNTED ON THE BACK OF THE MODULES

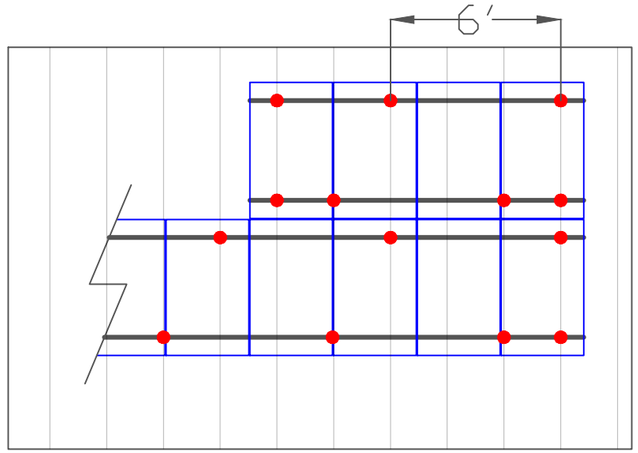
□○ = ROOF OBSTRUCTIONS
● = ATTACHMENT POINTS
= RAFTER
= RAIL

GENERAL INSTALLATION PLAN NOTES:

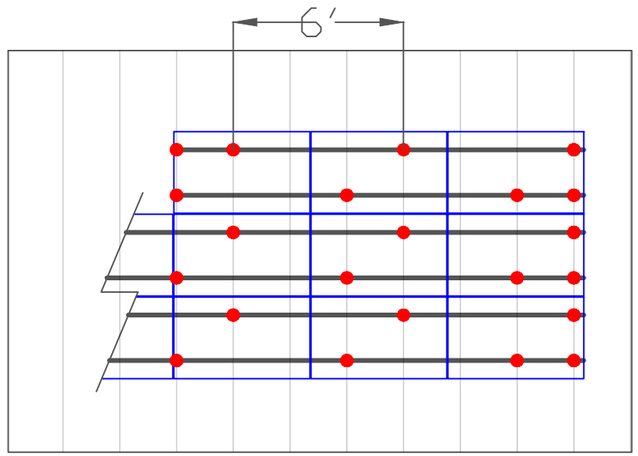
1. ROOF ATTACHMENTS SHALL BE INSTALLED AS SHOWN IN SHEET S-01 AND AS FOLLOWS FOR EACH WIND ZONE.
WIND ZONE 1: 6'-0" O.C.
WIND ZONE 2: 6'-0" O.C.
WIND ZONE 3: 6'-0" O.C.
MAXIMUM CANTILEVER SPAN = $\frac{1}{3}$ *MOUNT SPANS
2. THE PERIMETER WIDTH OF WIND UPLIFT ZONES IS 3 FT
3. THE VERTICAL DISTANCE BETWEEN ROOF SURFACE AND PV MODULES IS 6 INCHES PER ASCE7-16 SECT 29.4.4.
4. SOLAR RAIL TO BE INSTALLED TO SOLAR PANEL MANUFACTURER'S SPECIFICATION.
5. INSTALLATION IS IN COMPLIANCE WITH THE FOLLOWING: NCBC RESIDENTIAL 903.2, NCBC RESIDENTIAL TABLE R301.2(7), 15.14.2.5.2, 301.2 & RAS111.
6. MEETS THE REQUIREMENTS OF SECTION 1512 THROUGH 1525 & NCBC 1510.7.1
7. PLANS SATISFY ZONES PER NCBC 1510.7.1

TYPICAL ATTACHMENT SPACING

ESTIMATED MOUNT QUANTITY: 21



6'-0" ATTACHMENT SPACING (24" RAFTERS)



6'-0" ATTACHMENT SPACING (24" RAFTERS)

MODULE, ARRAY WEIGHT (LOAD CALCS)		
NUMBER OF MODULES	12	
MODULE WEIGHT	50.7	LBS
TOTAL MODULE WEIGHT	608.4	LBS
TOTAL MICROINVERTER WEIGHT	48	LBS
NUMBER OF ATTACHMENT POINTS	21	
TOTAL RAIL LENGTH	44.64	FT
MOUNTING SYSTEM WEIGHT	44.64	LBS
TOTAL SYSTEM WEIGHT	701.04	LBS
WEIGHT AT EACH ATTACHMENT POINT (ARRAY WEIGHT/NUMBER OF ATTACHMENT POINTS)	33.38	LBS
MODULE AREA	21.99	SQFT
TOTAL ARRAY AREA	263.82	SQFT
DISTRIBUTED LOAD (TOTAL SYSTEM WEIGHT/TOTAL ARRAY AREA)	2.66	PER SQFT
PULLOUT VALUE PER MOUNT	1004	LBS

DESIGN CRITERIA	
GROUND SNOW LOAD (PSF)	30
WIND SPEED (MPH)	120
EXPOSURE CATEGORY	C
MEAN ROOF HEIGHT (FT.)	15

DESIGN CALCULATIONS		
ASCE 29.4-7	PRESSURE COEFFICIENT GC_p	$p = q_h \cdot K_d \cdot GC_p \cdot \gamma_E \cdot \gamma_a$ (PSF)
ZONE 1:	-1.21	-23.5
ZONE 2:	-1.68	-33.8
ZONE 3:	-1.70	-33.8

POINT LOAD CALCULATIONS		
ASCE 29.4-7	$p = q_h \cdot K_d \cdot GC_p \cdot \gamma_E \cdot \gamma_a$ (PSF)	$PL = p * A_e$ (LBS)
ZONE 1:	-23.5	-178.6
ZONE 2:	-33.8	-240.8
ZONE 3:	-33.8	-240.8

WIND LOAD PARAMETERS		
WIND SPEED	V = 135.5 MPH	FRC R301.2.1.3
EFFECTIVE WIND AREA	A_e = 21.67 ft^2	26.2
WIND DIRECTIONALITY	K_d = 0.85	TABLE 26.6-1
GROUND ELEVATION FACTOR	K_e = 1.0	TABLE 26.9-1
TOPOGRAPHIC FACTOR	K_{zt} = 1.0	26.8, 26.8.2
VELOCITY EXPOSURE COEFFICIENT	K_z = 0.85	TABLE 26.10-1
ARRAY EDGE FACTOR	γ_E = 1.5	29.4.4
SOLAR PANEL EQUALIZATION FACTOR	γ_a = 0.67	FIGURE 29.4-8
VELOCITY PRESSURE	q_h = 39.98 PSF	$q_h = 0.00256 \cdot K_z \cdot K_{zt} \cdot K_e \cdot V^2$

ALL MODULES ARE ASSUMED TO BE EXPOSED

REFER TO SHEET S-01 FOR ROOF, MOUNT, & RAIL DETAILS

EPC SOLAR
379 DOUGLAS RD E
OLDSMAR, FL 34677
PHONE: 727-267-4033

REVISIONS		
DESCRIPTION	DATE	REV

PROJECT NAME: LUIS LUGO

PROJECT ADDRESS: 164 BLANCHARD RD, SANFORD, NC 27332

SHEET NAME: MOUNTING PLAN

SHEET NUMBER: S-02

SHEET SIZE: ANSI B 11"x17"

NORTH CAROLINA PROFESSIONAL SEAL 051426 ENGINEER RAFAEL A. GONZALEZ SOTO

Rafael A Gonzalez Soto
2025.10.31 10:56:07
-05'00'

WIRE TAG #	WIRE FROM --	CONDUIT (TBD ON SITE)	WIRE QTY	WIRE GAUGE	WIRE RATING	GRND SIZE	GRND WIRE TYPE
1	ARRAY TO JUNCTION BOX	EMT CONDUIT	2	#10	PV CABLE	#8	THWN-2
2	JUNCTION BOX TO INVERTER	MIN 3/4" CONDUIT	2	#10	THHN	#10	THWN-2
3	INVERTER TO ACD	MIN 3/4" CONDUIT	3	#8	THHN	#10	THWN-2
4	ACD TO MAIN SERVICE PANEL	MIN 3/4" CONDUIT	3	#8	THHN	#10	THWN-2
5	SERVICE WIRES	N/A	3	#2/0	THHN	N/A	N/A

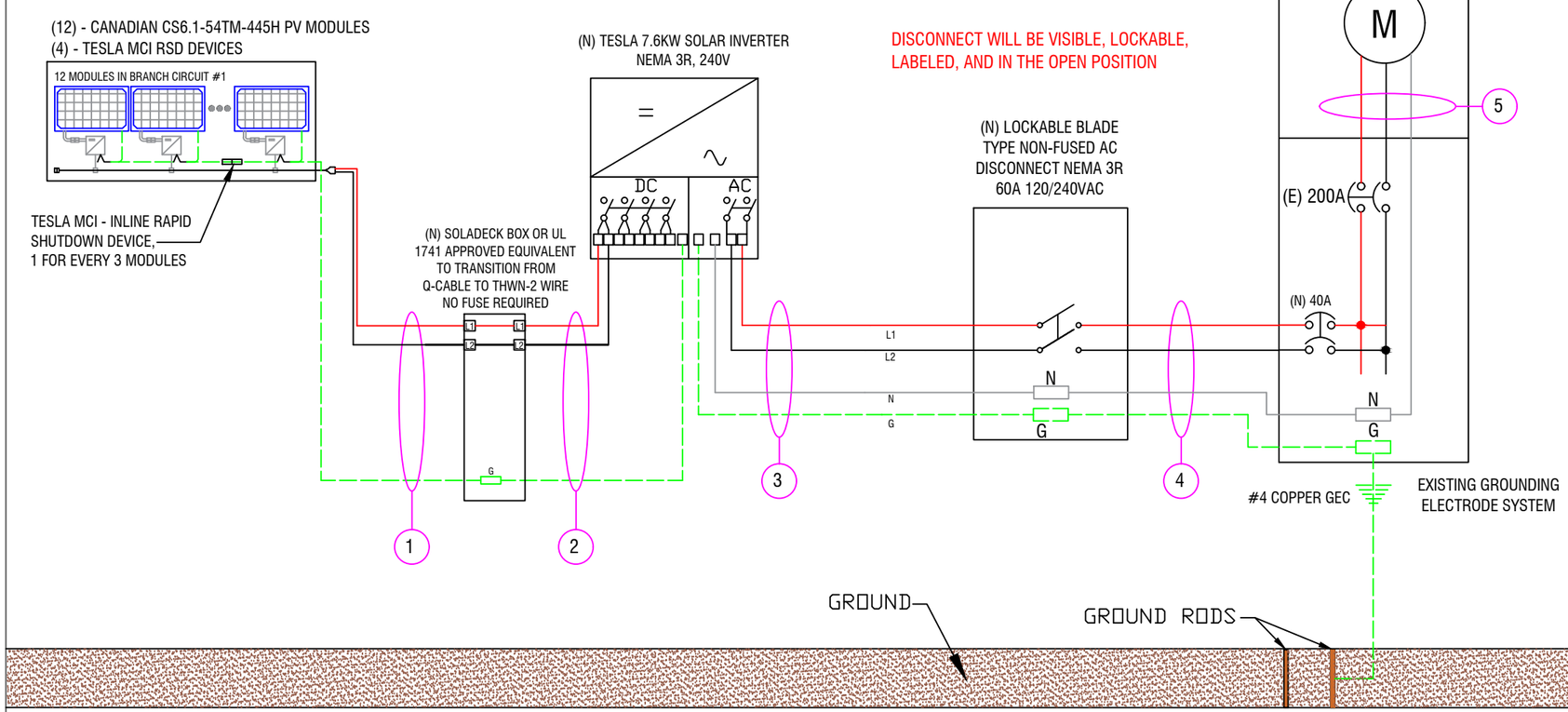
SYSTEM DATA	
# STRINGS:	1
LARGEST STRING:	12
TOTAL MODULES:	12
TOTAL INVERTERS:	1
SYSTEM RATINGS:	5,340W DC STC 7,600W AC STC
TOTAL AC OUPUT:	32A

INVERTER OUTPUT	INVERTER QTY		NOC		NECS		AMPS	OCP	WIRE GAUGE
TOTAL OUTPUT	1	x	32	x	1.25	=	40A	40A	#8

METAL CONDUIT IS REQUIRED FOR DC CONDUCTORS
THAT ARE RUN INTERIOR OF BUILDING

LOAD SIDE CONNECTION CALCULATIONS (120% RULE) PER NEC 705.12(B)(2)(3)(b)	
BUSBAR RATING	200A
MAIN BREAKER RATING	200A
[BUSBAR RATING * 1.2] - MAIN BREAKER RATING	40A
MAXIMUM PV BREAKER SIZE	40A

THE SOLAR BREAKER FOR THIS SYSTEM IS 40A
WHICH IS LESS THAN OR EQUAL TO THE MAXIMUM
ALLOWABLE PV BREAKER SIZE.



EPC SOLAR
379 DOUGLAS RD E
OLDSMAR, FL 34677
PHONE: 727-267-4033

REVISIONS		
DESCRIPTION	DATE	REV

PROJECT NAME: LUIS LUGO

PROJECT ADDRESS: 164 BLANCHARD RD, SANFORD, NC 27332

SHEET NAME: 3-LINE DIAGRAM

SHEET NUMBER: E-01

SHEET SIZE: ANSI B 11"x17"

NORTH CAROLINA PROFESSIONAL SEAL 051426 ENGINEER RAFAEL A. GONZALEZ SOTO

Rafael A Gonzalez Soto
2025.10.31 10:56:28
-05'00'

ELECTRICAL NOTES:

1. ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.
2. ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 V AND 90 DEGREE C WET ENVIRONMENT.
3. WIRING, CONDUIT, AND RACEWAYS MOUNTED ON ROOFTOPS SHALL BE ROUTED DIRECTLY TO, AND LOCATED AS CLOSE AS POSSIBLE TO THE NEARES RIDGE, HIP, OR VALLEY.
4. WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.
5. DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACCESSORIES TO FULFILL APPLICABLE CODES AND STANDARDS.
6. WHERE SIZES OF JUNCTION BOXES, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
7. ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
8. MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURER'S INSTRUCTION.
9. MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER G.E.C. VIA WEEB LUG OR ILSCO GBL-4DBT LAY-IN LUG.
10. UTILITY HAS 24-HR UNRESTRICTED ACCESS TO ALL PHOTOVOLTAIC SYSTEM COMPONENTS LOCATED AT THE SERVICE ENTRANCE.
11. WORKING CLEARANCES AROUND THE EXISTING AND NEW ELECTRICAL EQUIPMENT WILL BE MAINTAINED IN ACCORDANCE WITH NEC ARTICLE 110.26.
12. ALL EQUIPMENT INSTALLED SHALL BE LISTED BY A NATIONALLY RECOGNIZED TESTING LABORATORY (NRTL) PER NEC ARTICLE 110.3.
13. RACKING CONFORMS TO AND IS LISTED UNDER UL 2703.
14. ALL LABELS OR MARKINGS SHALL BE VISIBLE AFTER INSTALLATION. THE LABELS SHALL BE REFLECTIVE, AND ALL LETTERS SHALL BE CAPITALIZED AND SHALL BE A MINIMUM HEIGHT OF 9.5 MM (3/8 IN) IN WHITE ON A RED BACKGROUND.
15. CONDUCTORS EXPOSED TO SUNLIGHT SHALL BE LISTED AS SUNLIGHT RESISTANT PER NEC ARTICLE 310.10.
16. CONDUCTORS EXPOSED TO WET LOCATIONS SHALL BE SUITABLE FOR USE I WET LOCATIONS PER NEC ARTICLE 310.10.
17. ALL EXTERIOR EQUIPMENT IS A MINIMUM OF NEMA-R3 RATED.
18. ALL ELECTRICAL EQUIPMENT WILL BE LOCATED AT OR ABOVE BFE+1' OR 8.00' NAVD.
19. SMOKE ALARMS PER F.S. 553.883.
20. GROUNDING WILL BE IN COMPLIANCE WITH NEC 2020.
21. SYSTEM MEETS THE GROUNDING REQUIREMENTS OF NEC 2020
22. GROUND RODS WILL BE AT LEAST 8' LONG AND 5/18" IN DIAMETER (NEC 250.52(A)(5).
23. SYSTEM MEETS THE REQUIREMENTS OF NEC 2020.
24. SUPPLEMENTAL ELECTRODES WILL BE ADDED IF REQUIRED.

INVERTER OUTPUT CIRCUIT		
TO OVERCURRENT PROTECTION DEVICE		
DESIGN TEMPERATURE (°F)	94	
MAXIMUM AMBIENT TEMPERATURE RANGE (°F)	87-95	310.15(B)
TEMPERATURE RATING OF CONDUCTOR	75°C	
# OF CARRYING CONDUCTORS	<4	310.15(C)(1)
AC MAX OUTPUT CURRENT	32A	690.8(A)(3)
AC MAX OUTPUT CURRENT * 1.25%	40.00A	690.8(B)
OVERCURRENT PROTECTION (A)	40A	
AMBIENT TEMPERATURE CORRECTION FACTOR	0.94	310.15(B)
CONDUCTOR ADJUSTMENT FACTOR	100%	310.15(B)
CONDUCTOR GAUGE (AWG)	8	310.16
CONDUCTOR ALLOWABLE AMPACITY (AMPS)	50	
CONDUCTOR ADJUSTED AMPACITY (AMPS)	47	50*.94*1=47

PHOTOVOLTAIC OUTPUT	
AC OUTPUT CURRENT	32 A
NOMINAL AC VOLTAGE	240V

EPC SOLAR
379 DOUGLAS RD E
OLDSMAR, FL 34677
PHONE: 727-267-4033

REVISIONS

DESCRIPTION	DATE	REV

PROJECT NAME: LUIS LUGO

PROJECT ADDRESS: 164 BLANCHARD RD, SANFORD, NC 27332

SHEET NAME: ELECTRICAL NOTES

SHEET NUMBER: E-02

SHEET SIZE: ANSI B 11"x17"

NORTH CAROLINA PROFESSIONAL SEAL 051426 ENGINEER RAFAEL A. GONZALEZ SOTO

Rafael A Gonzalez Soto
2025.10.31 10:56:44
-05'00'

⚠ WARNING

ELECTRICAL SHOCK HAZARD

DO NOT TOUCH TERMINALS. TERMINALS ON LINE AND LOAD MAY BE ENERGIZED IN THE OPEN POSITION

LABEL LOCATION:
INVERTER(S), AC DISCONNECT(S), AC COMBINER PANEL (IF APPLICABLE).

⚠ WARNING

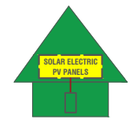
PHOTOVOLTAIC SYSTEM COMBINER PANEL

DO NOT ADD LOADS

LABEL LOCATION:
PHOTOVOLTAIC AC COMBINER (IF APPLICABLE).

EMERGENCY RESPONDER
THIS SOLAR PV SYSTEM IS EQUIPPED WITH RAPID SHUTDOWN

TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUTDOWN ENTIRE PV SYSTEM



NOTES AND SPECIFICATIONS:

- SIGNS AND LABELS SHALL MEET THE REQUIREMENTS OF THE NEC 2020, UNLESS SPECIFIC INSTRUCTIONS ARE REQUIRED, OR IF REQUESTED BY THE LOCAL AHJ.
- SIGNS AND LABELS SHALL ADEQUATELY WARN OF HAZARDS USING EFFECTIVE WORDS, COLORS AND SYMBOLS.
- LABELS SHALL BE PERMANENTLY AFFIXED TO THE EQUIPMENT OR WIRING METHOD AND SHALL NOT BE HAND WRITTEN.
- LABEL SHALL BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED.
- SIGNS AND LABELS SHALL COMPLY WITH ANSI Z535.4-2011, PRODUCT SAFETY SIGNS AND LABELS, UNLESS OTHERWISE SPECIFIED.
- DO NOT COVER EXISTING MANUFACTURER LABELS.

⚠ WARNING

DUAL POWER SUPPLY

SOURCES: UTILITY GRID AND PV SOLAR ELECTRIC SYSTEM

LABEL LOCATION:
UTILITY SERVICE METER AND MAIN SERVICE PANEL.

⚠ WARNING

INVERTER OUTPUT CONNECTION

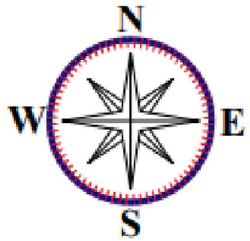
DO NOT RELOCATE THIS OVERCURRENT DEVICE

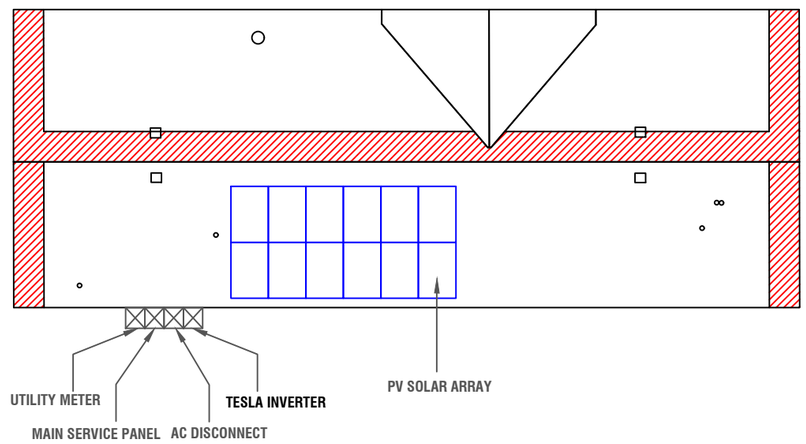
LABEL LOCATION:
ADJACENT TO PV BREAKER (IF APPLICABLE).

CAUTION

MULTIPLE SOURCES OF POWER

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





WARNING: PHOTOVOLTAIC POWER SOURCE

LABEL LOCATION:
INTERIOR AND EXTERIOR DC CONDUIT EVERY 10 FT, AT EACH TURN, ABOVE AND BELOW PENETRATIONS, ON EVERY JB/PULL BOX CONTAINING DC CIRCUITS.

ON-SITE GENERATION UTILITY DISCONNECT SWITCH

LABEL LOCATION:
AC DISCONNECT

WARNING
IN CASE OF EMERGENCY, CONTACT:
EPC SOLAR
PH. NO. 727-267-4033

LABEL LOCATION:
MAIN DISCONNECT

PHOTOVOLTAIC AC DISCONNECT
MAXIMUM AC OPERATING CURRENT: 32 AMPS
NOMINAL OPERATING AC VOLTAGE: 240 VAC

LABEL LOCATION:
AC DISCONNECT(S), PHOTOVOLTAIC SYSTEM POINT OF INTERCONNECTION.

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL LOCATION:
RSD SWITCH

EPC SOLAR
379 DOUGLAS RD E
OLDSMAR, FL 34677
PHONE: 727-267-4033

REVISIONS

DESCRIPTION	DATE	REV

PROJECT NAME: LUIS LUGO

PROJECT ADDRESS: 164 BLANCHARD RD, SANFORD, NC 27332

SHEET NAME: WARNING LABELS

SHEET NUMBER: E-03

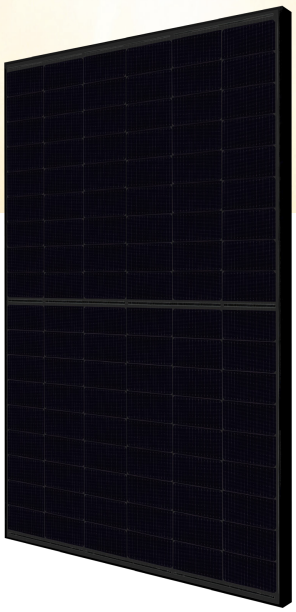
SHEET SIZE: ANSI B 11"x17"

NORTH CAROLINA PROFESSIONAL SEAL 051426 ENGINEER RAFAEL A. GONZALEZ SOTO

Rafael A Gonzalez Soto
2025.10.31 10:57:01
-05'00'

NEW

CanadianSolar



TOPHiKu6 (All-Black)

N-type TOPCon Technology

445 W ~ 470 W

CS6.1-54TM-445|450|455|460|465|470H

MORE POWER

- Module power up to 470 W
  Module efficiency up to 23.0 %
- Excellent anti-LeTID & anti-PID performance.
  Low power degradation, high energy yield
- Lower temperature coefficient (Pmax): -0.29%/°C,
  increases energy yield in hot climate
- Lower LCOE & system cost

MORE RELIABLE

- Minimizes micro-crack impacts
- Heavy snow load up to 8100 Pa,
  wind load up to 6000 Pa*

25 Years **Industry Leading Product Warranty on Materials and Workmanship***

30 Years **Linear Power Performance Warranty***

1st year power degradation no more than 1%
Subsequent annual power degradation no more than 0.4%

*Subject to the terms and conditions contained in the applicable Canadian Solar Limited Warranty Statement. Also this 25-year limited product warranty is available only for products installed and operating on rooftops in certain regions.

MANAGEMENT SYSTEM CERTIFICATES*

ISO 9001:2015 / Quality management system
ISO 14001:2015 / Standards for environmental management system
ISO 45001: 2018 / International standards for occupational health & safety
IEC62941: 2019 / Photovoltaic module manufacturing quality system

PRODUCT CERTIFICATES*

IEC 61215 / IEC 61730
IEC 61701 / IEC 62716 / IEC 60068-2-68
Take-e-way

* The specific certificates applicable to different module types and markets will vary, and therefore not all of the certifications listed herein will simultaneously apply to the products you order or use. Please contact your local Canadian Solar sales representative to confirm the specific certificates available for your Product and applicable in the regions in which the products will be used.

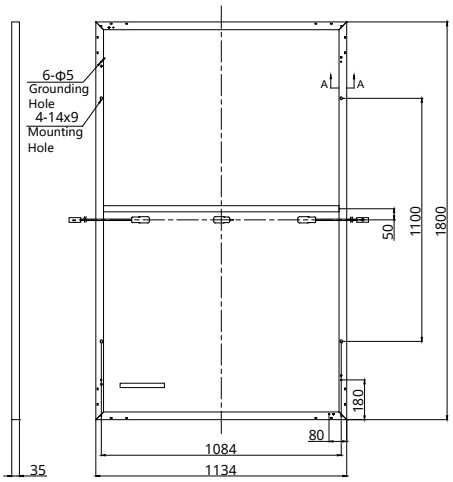
CSI Solar Co., Ltd. is committed to providing high quality solar photovoltaic modules, solar energy and battery storage solutions to customers. The company was recognized as the No. 1 module supplier for quality and performance/price ratio in the IHS Module Customer Insight Survey. Over the past 22 years, it has successfully delivered over 100 GW of premium-quality solar modules across the world.

* For detailed information, please refer to the Installation Manual.

Canadian Solar (USA) Inc.
1350 Treat Blvd. Suite 500, Walnut Creek, CA 94597 | www.csisolar.com/na | service.ca@csisolar.com

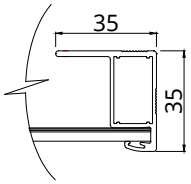
ENGINEERING DRAWING (mm)

Rear View

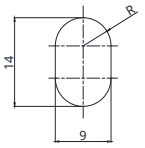


Frame Cross Section

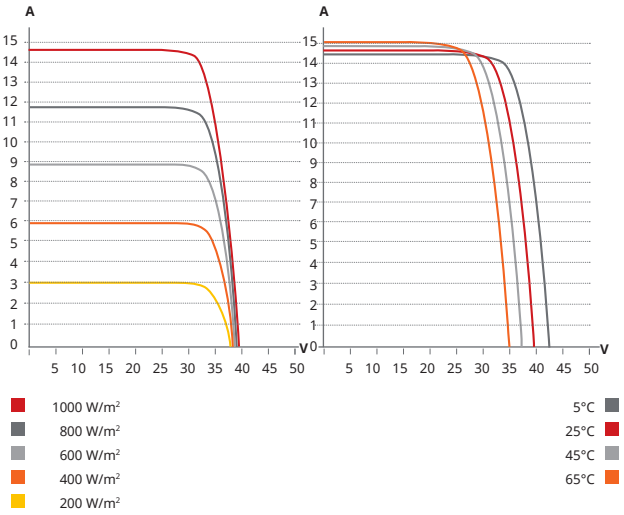
A - A



Mounting Hole



CS6.1-54TM-455H / I-V CURVES



ELECTRICAL DATA | STC*

CS6.1-54TM	445H	450H	455H	460H	465H	470H
Nominal Max. Power (Pmax)	445 W	450 W	455 W	460 W	465 W	470 W
Opt. Operating Voltage (Vmp)	32.8 V	33.0 V	33.2 V	33.4 V	33.6 V	33.8 V
Opt. Operating Current (Imp)	13.59 A	13.66 A	13.72 A	13.78 A	13.85 A	13.91 A
Open Circuit Voltage (Voc)	38.7 V	38.9 V	39.1 V	39.3 V	39.5 V	39.7 V
Short Circuit Current (Isc)	14.48 A	14.55 A	14.61 A	14.69 A	14.77 A	14.86 A
Module Efficiency	21.8%	22.0%	22.3%	22.5%	22.8%	23.0%
Operating Temperature	-40°C ~ +85°C					
Max. System Voltage	1500V (IEC/UL) or 1000V (IEC/UL)					
Module Fire Performance	TYPE 1 (UL 61730 1500V) or TYPE 2 (UL 61730 1000V) or CLASS C (IEC 61730)					
Max. Series Fuse Rating	25 A					
Application Classification	Class A					
Power Tolerance	0 ~ + 10 W					

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

MECHANICAL DATA

Specification	Data
Cell Type	TOPCon cells
Cell Arrangement	108 [2 X (9 X 6)]
Dimensions	1800 × 1134 × 35 mm (70.9 × 44.6 × 1.38 in)
Weight	23 kg (50.7 lbs)
Front Cover	3.2 mm tempered glass with anti-reflective coating
Frame	Anodized aluminium alloy
J-Box	IP68, 3 bypass diodes
Cable	4 mm² (IEC), 12 AWG (UL)
Connector	T6, MC4, MC4-EVO2 or MC4- EVO2A
Cable Length (Including Connector)	1550 mm (61.0 in) (+) / 1100 mm (43.3 in) (-)
Per Pallet	31 pieces
Per Container (40' HQ)	744 pieces

ELECTRICAL DATA | NMOT*

CS6.1-54TM	445H	450H	455H	460H	465H	470H
Nominal Max. Power (Pmax)	335 W	339 W	343 W	347 W	351 W	354 W
Opt. Operating Voltage (Vmp)	30.9 V	31.1 V	31.3 V	31.5 V	31.7 V	31.9 V
Opt. Operating Current (Imp)	10.85 A	10.91 A	10.96 A	11.02 A	11.07 A	11.12 A
Open Circuit Voltage (Voc)	36.5 V	36.7 V	36.9 V	37.1 V	37.3 V	37.5 V
Short Circuit Current (Isc)	11.68 A	11.74 A	11.79 A	11.85 A	11.92 A	11.99 A

* Under Nominal Module Operating Temperature (NMOT), irradiance of 800 W/m², spectrum AM 1.5, ambient temperature 20°C, wind speed 1 m/s.

TEMPERATURE CHARACTERISTICS

Specification	Data
Temperature Coefficient (Pmax)	-0.29 % / °C
Temperature Coefficient (Voc)	-0.25 % / °C
Temperature Coefficient (Isc)	0.05 % / °C
Nominal Module Operating Temperature	42 ± 3°C

PARTNER SECTION

* The specifications and key features contained in this datasheet may deviate slightly from our actual products due to the on-going innovation and product enhancement. CSI Solar Co., Ltd. reserves the right to make necessary adjustment to the information described herein at any time without further notice. Please be kindly advised that PV modules should be handled and installed by qualified people who have professional skills and please carefully read the safety and installation instructions before using our PV modules.

Tesla Solar Inverter
with Site Controller

—

Tesla Solar Inverter completes the Tesla home solar system, converting DC power from solar to AC power for home consumption. Tesla's renowned expertise in power electronics has been combined with robust safety features and a simple installation process to produce an outstanding solar inverter that is compatible with both Solar Roof and traditional solar panels. Once installed, homeowners use the Tesla mobile app to manage their solar system and monitor energy consumption, resulting in a truly unique ecosystem experience.

KEY FEATURES

- Built on Powerwall technology for exceptional efficiency and reliability
- Wi-Fi, Ethernet, and cellular connectivity with easy over-the-air updates
- Designed to integrate with Tesla Powerwall and Tesla App
- 0.5% revenue-grade metering for Solar Renewable Energy Credit (SREC) programs included

October 25, 2024

Tesla Solar Inverter Technical Specifications

Electrical Specifications: Output (AC)

Model Number	1538000-xx-y			
Output (AC) [1]	3.8 kW	5 kW	5.7 kW	7.6 kW
Nominal Power	3,800 W	5,000 W	5,700 W	7,600 W
Maximum Apparent Power	3,840 VA	5,040 VA	6,000 VA	7,680 VA
Maximum Continuous Current	16 A	21 A	24 A	32 A
Breaker (Overcurrent Protection)	20 A	30 A	30 A	40 A
Nominal Power Factor	1 - 0.9 (leading / lagging			
THD (at Nominal Power)	<5%			

Electrical Specifications: Input (DC)

MPPT	4
Input Connectors per MPPT	1-2-1-2
Maximum Input Voltage	600 VDC
DC Input Voltage Range	60 - 550 VDC
DC MPPT Voltage Range	60 - 480 VDC [1]
Maximum Current per MPPT (I_{MP})	13 A [2]
Maximum Short Circuit Current per MPPT (I_{SC})	17 A [2]

[1] Maximum current.

[2] Where the DC input current exceeds an MPPT rating, jumpers can be used to allow a single MPPT to intake additional DC current up to 26 A IMP / 34 A ISC.

Performance Specifications

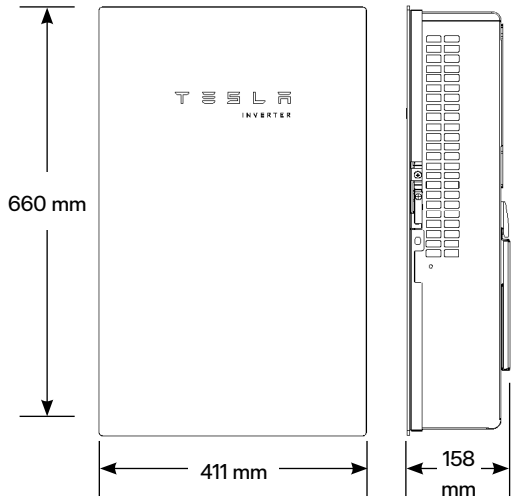
Peak Efficiency	98.6% at 240 V
CEC Efficiency	98.0% at 240 V
Allowable DC/AC Ratio	1.7
Customer Interface	Tesla Mobile App
Internet Connectivity	Wi-Fi (2.4 GHz, 802.11 b/g/n), Ethernet, Cellular (LTE/4G) [3]
Revenue Grade Meter	Revenue Accurate (+/- 0.5%)
AC Remote Metering Support	Wi-Fi (2.4 GHz, 802.11 b/g/n)
Protections	Integrated arc fault circuit interrupter (AFCI), Rapid Shutdown
Supported Grid Types	60 Hz, 240 V Split Phase
Warranty	12.5 years

[3] Cellular connectivity subject to network operator service coverage and signal strength.

Tesla Solar Inverter Technical Specifications

Mechanical Specifications

Dimensions	660 mm x 411 mm x 158 mm (26 in x 16 in x 6 in)



Weight	52 lb [4]
Mounting Options	Wall mount (bracket)

[4] Door and bracket can be removed for a mounting weight of 37 lb.

Environmental Specifications

Operating Temperature	–30°C to 45°C (–22°F to 113°F) [5]
Operating Humidity (RH)	Up to 100%, condensing
Storage Temperature	–30°C to 70°C (–22°F to 158°F)
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Rating	Type 3R
Ingress Rating	IP55 (Wiring compartment)
Pollution Rating	PD2 for power electronics and terminal wiring compartment, PD3 for all other components
Operating Noise @ 1 m	< 40 db(A) nominal, < 50 db(A) maximum

[5] Performance may be de-rated to 6.2 kW at 240 V when operating at temperatures greater than 45°C.

Compliance Information

Grid Certifications	UL 1741, UL 1741 SA, UL 1741 SB, UL 1741 PCS, IEEE 1547-2018, IEEE 1547.1
Safety Certifications	UL 1741 PVRSS, UL 1699B, UL 1998 (US), UL 3741
Emissions	EN 61000-6-3 (Residential), FCC 47CFR15.109 (a)

Solar Shutdown Device Technical Specifications

The Solar Shutdown Device is a Mid-Circuit Interrupter (MCI) and is part of the PV system rapid shutdown (RSD) function in accordance with Article 690 of the applicable NEC. When paired with Tesla Solar Inverter, solar array shutdown is initiated by any loss of AC power.

Electrical Specifications

Model	MCI-1	MCI-2	MCI-2 High Current
Nominal Input DC Current Rating (I_{MP})	13 A	13 A	15 A
Maximum Input Short Circuit Current (I_{SC})	19 A	17 A	19 A
Maximum System Voltage (PVHCS)	600 V DC	1000 V DC [6]	1000 V DC [6]
Maximum Disconnect Voltage [7]	600 V DC	165 V DC	165 V DC

[6] Maximum System Voltage is limited by Tesla Solar Inverter to 600 V DC.

[7] Maximum Disconnect Voltage is the maximum voltage allowed across each MCI in the open position (Rapid Shutdown Initiated). An individual MCI-2 has a voltage rating of 165V but in combination (connected in the same string) their voltage ratings are additive.

RSD Module Performance

Maximum Number of Devices per String	5
Control	Power Line Excitation
Passive State	Normally Open
Maximum Power Consumption	7 W
Warranty	25 years

Environmental Specifications

Operating Temperature	-40°C to 50°C (-40°F to 122°F)	-45°C to 70°C (-49°F to 158°F)
Storage Temperature	–30°C to 70°C (–22°F to 158°F)	–30°C to 70°C (–22°F to 158°F)
Enclosure Rating	NEMA 4X / IP65	NEMA 4X / IP65

Mechanical Specifications

Electrical Connections	MC4 Connector	MC4 Connector
Housing	Plastic	Plastic
Dimensions	125 x 150 x 22 mm (5 x 6 x 1 in)	173 x 45 x 22 mm (6.8 x 1.8 x 1 in)
Weight	350 g (0.77 lb)	120 g (0.26 lb)
Mounting Options	ZEP Home Run Clip M4 Screw (#10) M8 Bolt (5/16") Nail / Wood screw	Wire Clip

Compliance Information

Certifications	UL 1741 PVRSE, UL 3741, PVRSA (Photovoltaic Rapid Shutdown Array)
RSD Initiation Method	PV System AC Breaker or Switch

UL 3741 PV Hazard Control (and PVRSA) Compatibility

See UL 3741 Application Addendum

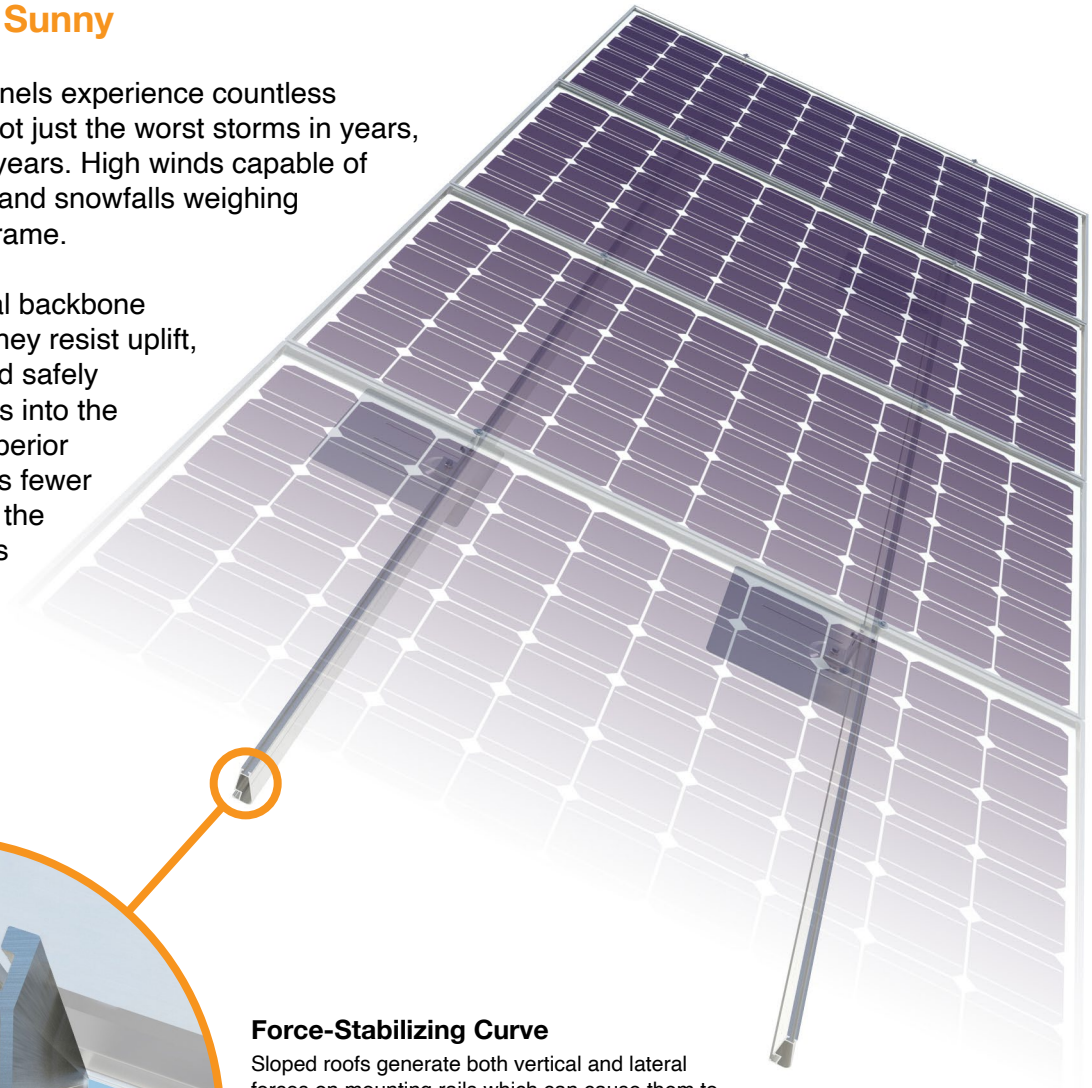
IRONRIDGE

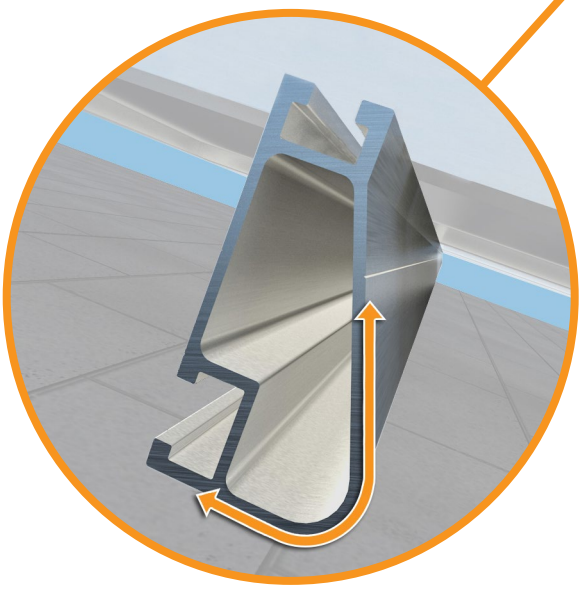
XR Rail® Family

Solar Is Not Always Sunny

Over their lifetime, solar panels experience countless extreme weather events. Not just the worst storms in years, but the worst storms in 40 years. High winds capable of ripping panels from a roof, and snowfalls weighing enough to buckle a panel frame.

XR Rails® are the structural backbone preventing these results. They resist uplift, protect against buckling and safely and efficiently transfer loads into the building structure. Their superior spanning capability requires fewer roof attachments, reducing the number of roof penetrations and the amount of installation time.





Force-Stabilizing Curve

Sloped roofs generate both vertical and lateral forces on mounting rails which can cause them to bend and twist. The curved shape of XR Rails® is specially designed to increase strength in both directions while resisting the twisting. This unique feature ensures greater security during extreme weather and a longer system lifetime.

Compatible with Flat & Pitched Roofs

XR Rails® are compatible with FlashFoot® and other pitched roof attachments.

IronRidge® offers a range of tilt leg options for flat roof mounting applications.

Corrosion-Resistant Materials

All XR Rails® are made of 6000-series aluminum alloy, then protected with an anodized finish. Anodizing prevents surface and structural corrosion, while also providing a more attractive appearance.

XR Rail® Family

The XR Rail® Family offers the strength of a curved rail in three targeted sizes. Each size supports specific design loads, while minimizing material costs. Depending on your location, there is an XR Rail® to match.

XR10

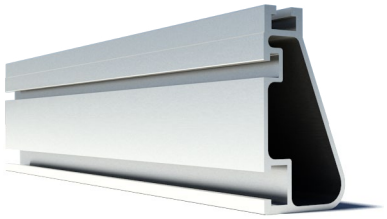
XR10 is a sleek, low-profile mounting rail, designed for regions with light or no snow. It achieves spans up to 6 feet, while remaining light and economical.

- 6' spanning capability
- Moderate load capability
- Clear & black anodized finish
- Internal splices available

XR100

XR100 is a residential and commercial mounting rail. It supports a range of wind and snow conditions, while also maximizing spans up to 10 feet.

- 10' spanning capability
- Heavy load capability
- Clear & black anodized finish
- Internal splices available



XR1000

XR1000 is a heavyweight among solar mounting rails. It's built to handle extreme climates and spans up to 12 feet for commercial applications.

- 12' spanning capability
- Extreme load capability
- Clear anodized finish
- Internal splices available

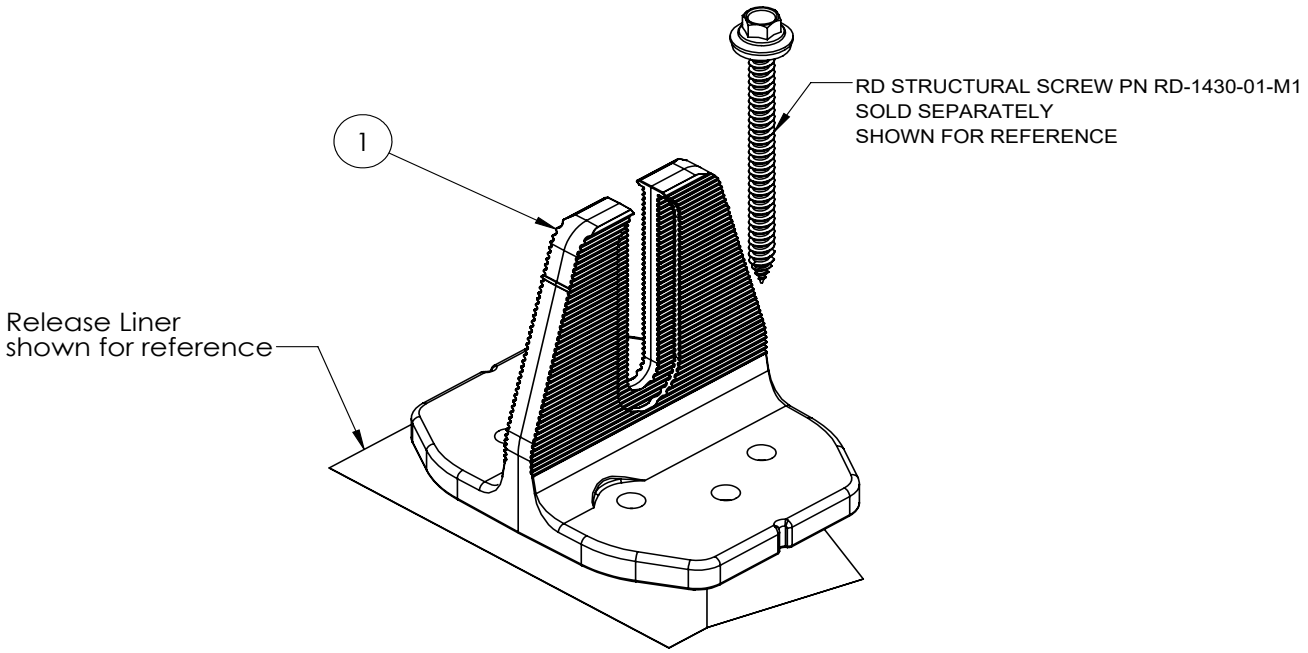
Rail Selection

The table below was prepared in compliance with applicable engineering codes and standards.* Values are based on the following criteria: ASCE 7-16, Gable Roof Flush Mount, Roof Zones 1 & 2e, Exposure B, Roof Slope of 8 to 20 degrees and Mean Building Height of 30 ft. Visit IronRidge.com for detailed certification letters.

Load		Rail Span					
Snow (PSF)	Wind (MPH)	4'	5' 4"	6'	8'	10'	12'
None	90	XR10		XR100		XR1000	
	120						
	140						
	160						
20	90						
	120						
	140						
	160						
30	90						
	160						
40	90						
	160						
80	160						
120	160						

*Table is meant to be a simplified span chart for conveying general rail capabilities. Use approved certification letters for actual design guidance.

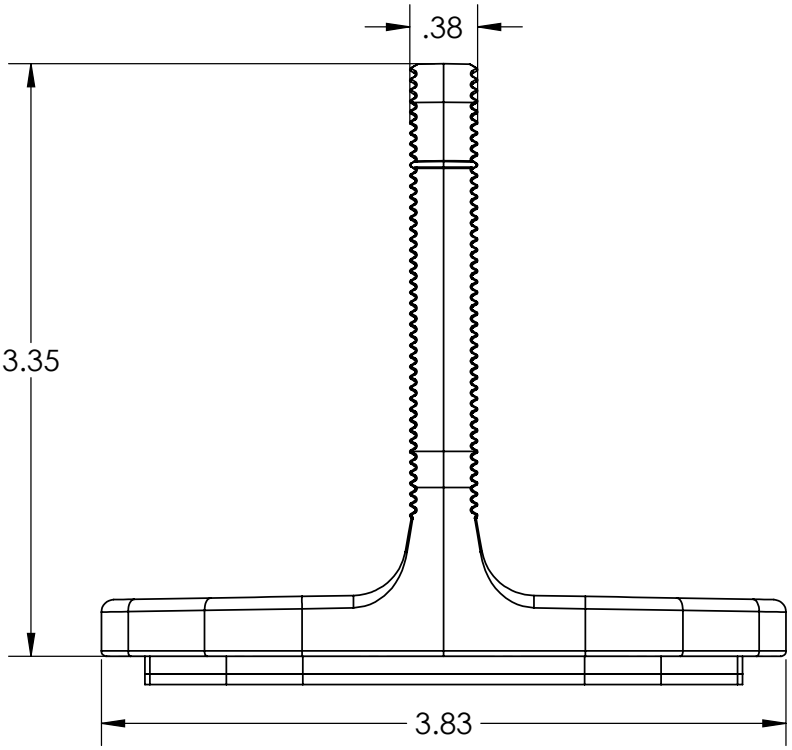
QuickMount® Halo UltraGrip®

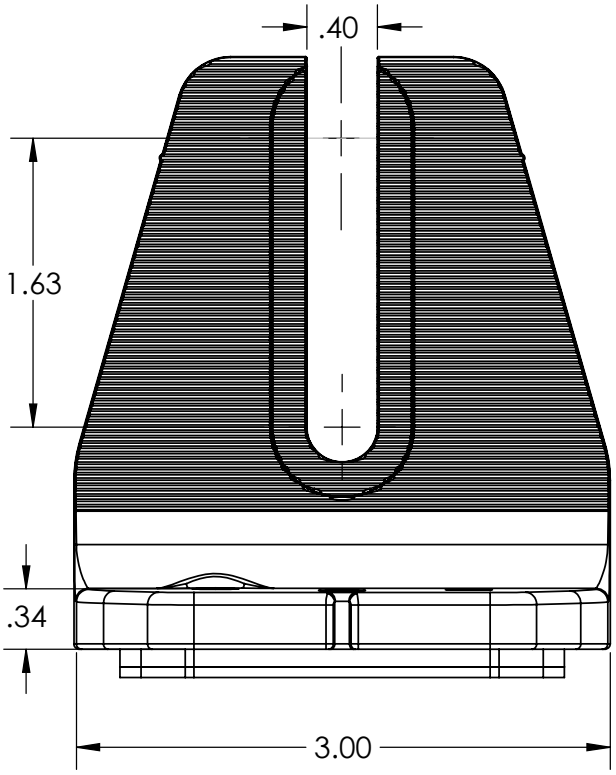


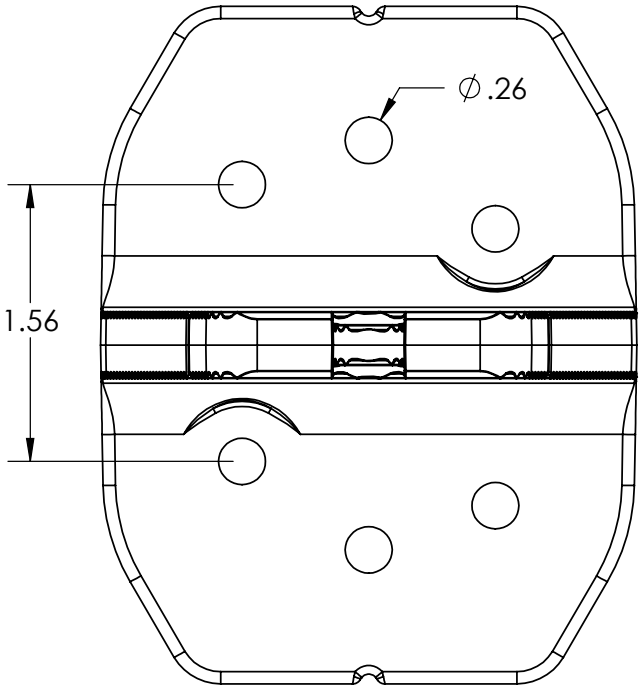
ITEM NO	DESCRIPTION	QTY IN KIT
1	QM Halo UltraGrip(Mill or Black)	1

PART NUMBER	DESCRIPTION
QM-HUG-01-M1	Halo UltraGrip - Mill
QM-HUG-01-B1	Halo UltraGrip - Black

1. Halo UltraGrip







Property	Value
Material	300 Series Aluminium
Finish	Mill or Black