

NOISE ASSESSMENT

KIRKWOOD SOLAR PROJECT

Town of Kirkwood, Broome County, New York

Prepared by:



1241 University Avenue
Rochester, NY 14607

November 2025

TABLE OF CONTENTS

1.0	INTRODUCTION.....	1
1.1	Project Description	1
1.2	Existing Conditions and Methodology	1
2.0	CONSTRUCTION CONDITIONS.....	4
2.1	Potential Construction Noise Impacts	5
2.2	Construction Conclusions.....	6
3.0	SES OPERATION CONDITIONS	7
3.1	Potential SES Operation Noise Impacts	7
3.2	SES Conclusions.....	8
4.0	SUMMARY	9
4.1	Contact Information.....	9
4.2	Summary of Project Impacts, Mitigation, and Conclusions.....	9
5.0	CERTIFICATION.....	10
6.0	REFERENCES.....	11

FIGURES

Figure 1	Noise Assessment Map	
----------	----------------------------	--

APPENDICES

Appendix A	Equipment Specifications.....	
------------	-------------------------------	--

1.0 INTRODUCTION

The following Noise Assessment addresses the noise produced during and after development of the proposed solar energy system (SES) in the Town of Kirkwood (Town), Broome County (County), New York (NY). This Noise Assessment has been developed at the request of Norbut Solar Farms (Norbut) to address conditions during construction and while the solar photovoltaic (PV) system is in operation. This plan details the potential noise impacts of the project and was developed in accordance with the Town of Kirkwood Zoning Local Law, Supplementary Standards (Article V) for noise (Section 501.1).

1.1 Project Description

Norbut intends to construct an approximate fifteen (15) megawatt (MW) alternating current (AC) ground-mounted, single-axis tracker solar energy system. The project will include the solar farm installation, interconnection to an existing New York State Electric & Gas (NYSEG) circuit via an overhead extension, and construction of all associated site access roads, erosion and sediment control and stormwater management infrastructure, security fencing, electrical equipment, and equipment pads to suit the proposed solar facility.

The SES is located off of Interstate 86 (I-86) and adjacent to Foley Road, to the south of the project site, and Quilty Hill Road, to the east of the project site, at approximately N42.1101, W75.7999, in Kirkwood, NY, and consists of solar arrays, located on two (2) parcels. The proposed SES is located in both Agricultural/Rural Residence (A/R-R) and Residence (R) zoning districts. The preliminary solar layout is shown on the Noise Assessment included in **Figure 1**.

The proposed project site is approximately 150 acres total, which includes the interconnection to the existing electric transmission utilities. Installation of electrical equipment includes, but is not limited to, racking, modules (solar collectors/solar panels), inverters, wiring strings, transformers, security fencing, and the interconnection equipment. The project will not require a substation.

Norbut plans to begin project construction as early as possible following all necessary approvals. Noise generating construction is estimated to be four (4) to six (6) months.

1.2 Existing Conditions and Methodology

This Noise Assessment has been developed to investigate any potential noise impacts from the proposed construction and during long-term solar facility operations. This assessment intends to address any potential sound emissions generated during construction as to not cause disturbance to adjacent properties and to determine if any sound mitigation is required during solar facility operations.

The project site is located off of I-86 and adjacent to Foley Road and Quilty Hill Road, in the Town of Kirkwood, NY, on land currently used for agriculture fields, open meadows, and woodlands on topography less than twenty percent (20%) slopes. The surrounding land area also consists of woodlands with some adjacent topography greater than twenty percent (20%) slopes. The ambient noise levels to residences of the area mainly consists of vehicular traffic traveling on the adjacent roadways and nearby I-86. In addition, during seasonal months, sound emissions will include agricultural equipment in existing fields and various wildlife and insect noise. According to the U.S. Department of Transportation Federal Highway Administration (FHWA) Public Roads Publication, levels of highway traffic noise typically range from seventy (70) to eighty (80) dBA (decibels A) at fifteen (15) meters (50 feet) from the roadway. Generally, the SES is offset from the existing roadways so that sound from solar operations, if any noise impacts, is isolated and not predominant relative to the other ambient sounds encountered by the residences.

The Town of Kirkwood Zoning Local Law, Supplementary Standards (Article V), Noise (Section 501.1) states:

A. Measurement of Noise

1. The measurement of noise or sound shall be made by the town enforcement officer or his designee with a sound level meter meeting the standards prescribed by the American National Standards Institute S1.4
2. Except where otherwise prescribed, the slow meter response of the sound level meter shall be used in order to determine that the average of three readings taken over a 15-minute period does not exceed the limiting sound levels set forth in this section.
3. Measurement of noise levels shall be made at the prescribed locations and shall be taken at least four (4) feet from ground level.
4. Compliance with noise limits is to be maintained at all elevations at the boundary of the property.
5. For any source of sound which emits a pure tone or impulsive sound, the maximum sound level limits set forth in subparagraph B shall be reduced by five dBA.

B. Maximum Permissible Sound Levels by Receiving Land Use

1. No person shall operate or cause to be operated on private property any source of sound in such a manner as to create a sound level which exceeds the limits set forth for the receiving land use category below when measured at or within the property boundary of the receiving land use.

Receiving Land Use District	Time of Day	Sound Level Limit dBA
Agricultural/Rural Residence (A/R-R) Residence (R) Residence (R-1) Residence Multi (R-M) Planned Unit Development	{ { 7:00a.m. -9:00p.m. { 9:00p.m. -7:00a.m.	60 50
Business One (B-1) Business Two (B-2) Industrial Development	} } All Hours	60

Based on desktop research, there are no other local, state, or federal noise regulations that apply to solar energy systems in the Town of Kirkwood, Broome County, NY. To address any potential noise impacts from the proposed solar facility operations, the project has been analyzed to comply with the Town noise ordinance for facility sound levels.

Ultimately, the SES will be nonoperational during nighttime hours (defined as dusk to dawn or 9:00p.m. thru 7:00a.m.) due to absence of a PV source. The sound emissions during nighttime are negligible and the anticipated noise generated from the SES during this time will not exceed ambient conditions. Potential noise impacts are anticipated during daytime hours (defined as dawn to dusk, or 7:00a.m. thru 9:00p.m.) after development of the proposed SES; therefore, a maximum limit of sixty (60) dBA measured at the property boundary line on a non-participating landowner’s property will be used as the design requirement for the solar facility sound emissions.

2.0 CONSTRUCTION CONDITIONS

The project consists of the construction of an approximate fifteen (15) MW AC ground-mounted, single-axis tracker SES. The work associated with construction of the solar facility will include, but is not limited to, installation of the PV arrays and associated site preparation, interconnection to an existing electric circuit via an overhead extension, minimal site earthwork to construct site access roads, stormwater infrastructure, security fencing, and installation of electrical equipment and concrete pads to suit the proposed facility.

The following is a typical sequence of construction for a SES project:

1. Identify and delineate the limits of disturbance (LOD) prior to site construction.
2. Install the compost filter sock and other proposed perimeter erosion and sedimentation (E&S) controls and best management practices (BMPs) in all locations shown on the E&S Control Plans and/or Stormwater Pollution Prevention Plan (SWPPP).
3. Install the rock construction entrances for all site access roads. Some site grading will be associated with the construction of the rock construction entrances to provide adequate grades from the existing road elevations to the proposed access drives and pad areas in the existing fields.
4. Demarcate the equipment and storage laydown areas.
5. Perform minimal site grading for the construction of the site access drives and equipment pads.
6. Install and compact subbase material for the access drives and equipment pads.
7. Install equipment pads in preparation for electrical equipment installation.
8. Install permanent perimeter security fencing.
9. Install solar array racking.
10. Install solar panels, inverters, electrical strings, transformer, and the remainder of the electrical systems and trenching associated with the solar arrays.
11. Installation of the proposed security fencing, racking, and all non-permanent equipment associated with the solar arrays.
12. Complete site stabilization and restoration in accordance with the E&S Control Plans.

2.1 Potential Construction Noise Impacts

To determine any potential noise impacts from the proposed construction conditions, sound emissions produced from construction equipment operation during typical SES development was investigated. According to the FHWA Highway Construction Noise Handbook, noise levels generated by typical heavy construction equipment can range from approximately fifty-five (55) to ninety-five (95) dBA at fifteen (15) meters (approximately 50 feet) from the source, and doubling the distance from the source decreases the noise level at a rate of approximately six (6) dBA.

Construction equipment relative to the site is expected to include, but not be limited to, the following, and this list includes the approximate noise emission at fifteen (15) meters (50 feet) per the FHWA Highway Construction Noise Handbook.

- Tri-axle dump trucks for aggregate or soil removal and deliveries (84 dBA).
- Tri-axle flatbed truck for PV and electrical equipment deliveries (84 dBA).
- Tri-axle crane truck for electrical equipment lifting and placement (85 dBA).
- Mixer truck for concrete deliveries (85 dBA).
- Small earth moving equipment (i.e., tracked skid steer, tracked mini-dozer, and tracked mini-excavator) with pile driver and various attachments for PV array and electrical utility installations (85 to 95 dBA).
- All-terrain forklift or material handler equipment to transport PV panels and equipment from layout area to placement (85 dBA).
- Pneumatic or battery powered hand tools, generators or air compressors used for PV array and electrical utility installations (70 to 85 dBA).
- Pickup trucks or all-terrain vehicles (ATV) for various site access (55 dBA).

Construction activities for this equipment will be strictly limited to within the proposed security fencing and project area limits. See location and proposed limits on the Noise Assessment included in **Figure 1**.

2.2 Construction Conclusions

The construction equipment listed in **Section 2.1** is expected to have minimal noise impact on the project as the SES development is performed through phased construction, as described in the typical sequence of construction. In addition to phasing, operation of the construction equipment will occur in only short durations at a given location as the solar array installations will be constantly varying by location due to the solar array locations.

The most potential for noise impacts during construction conditions may occur while equipment is in operation adjacent to a property lines (within the proposed fence line) for solar array installations. Note that the distance from the solar array (solar collectors) to a non-participating residential landowner's property line is greater than 100 feet at any given adjacent location. Furthermore, the distance from the modules to a non-participating, habitable residential structure is greater than 270 feet at any given location. As stated above, the solar array installation in this scenario will occur over a short duration and the distance to the property line will increase for subsequent panel installations; this will result in decreased sound levels as the installations move from exterior to interior locations to produce minimal sound impacts to adjacent properties.

As indicated in the Town's Zoning Local Law, the audible sound level requirement applies to permanent SES operations, and the intent to mitigate construction conditions and heavy equipment operation will be achieved by workday and workhour limitations as to not impose a nuisance to adjacent properties.

To moderate any potential noise impacts during construction, except as otherwise required for the safety or protection of the workers or adjacent residences or property sites or adjacent thereto, all construction work at the site shall be performed during regular working hours (defined as 7:00a.m. thru 5:00p.m.), Monday through Friday. The contractor or subcontractors will not perform work outside regular working hours or on a Saturday, Sunday, or any legal holiday. No noise impacts are anticipated at any adjacent non-participating landowner's properties from the site work or construction operations related to installation of PV and utility equipment; therefore, no additional mitigation practices or analysis is expected to be warranted.

3.0 SES OPERATION CONDITIONS

Once construction of the proposed SES is complete, the facility will primarily consist of solar modules and racking, which includes single-axis tracking motors, inverters, wiring strings, transformers, and other utility infrastructure to suit the overhead transmission line interconnection.

This Noise Assessment and associated **Figure 1** were developed using the manufacturer's sound data for proposed equipment, or equivalent, to determine noise levels at the closest property boundary lines. Additional system details and datasheets for the proposed solar equipment are included in **Appendix A**.

3.1 Potential SES Operation Noise Impacts

The proposed solar facility is expected to utilize Sungrow SG3425UD-MV-US (derated to 2500 kW) central inverters (or equivalent). The inverters will be fully enclosed, and the audible sound is estimated to be sixty-seven (67) dBA at ten (10) meters (approximately 33 feet) according to equivalent manufacturer's specifications and/or industry standards. Inverters and transformers will be centrally located on combined equipment pads to limit potential noise impacts. The proposed equipment pad locations are shown on **Figure 1**.

The proposed solar arrays are expected to utilize all-terrain trackers (ATT) (or equivalent). The trackers will be horizontal single-axis, with self-powered motor and control systems, and the audible sound is estimated to be less than seventy-nine (79) dBA at one (1) meter (approximately 3.3 feet) according to equivalent manufacturer's specifications and/or industry standards. As indicated in **Section 2.2**, trackers will be more than 100 feet from any given non-participating, residential landowner's property line. Based on the sound attenuation principal referenced in **Section 2.1**, at 100 feet from any adjacent property boundary, trackers are expected to produce an audible sound of forty-nine (49) dBA or less during SES daytime (defined as 7:00a.m. thru 9:00p.m.), operational hours.

Based on review of the proposed equipment and the potential sound emissions generated over the long-term operation of the facility; the proposed inverters were determined to have the most potential for noise production during SES operation. In comparison to the inverters, trackers are expected to have a lower sound emission and the remaining electrical components can be considered negligible, as measured at a distance to an adjacent non-participating landowner's property line, since they contribute significantly less or no additional sound emissions when relative to ambient noise conditions.

Generally, to achieve an inverter audible sound within the maximum limit of sixty (60) dBA, a buffer distance of at least seventy-five (75) feet must be maintained to the property line of an adjacent, non-participating landowner; this distance was determined using the sound attenuation principal referenced in **Section 2.1**. The closest property line to the equipment pads is 140 feet. At distances from the noise source of approximately 140 feet, the audible sound is reduced to fifty-seven (55) dBA. Given the spatial separation of the proposed equipment pads over the site area and multiple, centralized locations, the sound emissions from long-term SES operations are anticipated to comply with the Town Zoning ordinance. A conservative approach was utilized for this investigation as this does not account for landcover type, foliage, topography, or proposed screening, which would also contribute to noise emission reduction due to the physical characteristics of the project site.

3.2 SES Conclusions

Based on the empirical data, the equivalent manufacturer's specifications and/or industry standards, and estimated distances from the proposed equipment pads, anticipated sound emissions were found to be below the maximum limit of sixty (60) dBA at the property line of an adjacent property line; no potential noise impacts are anticipated during daytime SES operation (system to be nonoperational during nighttime hours) and therefore the proposed SES is in compliance with the Town of Kirkwood Zoning Local Law, Supplementary Standards (Article V), for noise (Section 501.1) in Agricultural/Rural Residence (A/R-R) and Residence (R) districts.

4.0 SUMMARY

4.1 Contact Information

Norbut intends to implement and ensure compliance with this Noise Assessment both during construction and SES operations. An individual will be identified prior to the pre-construction meeting to serve as the primary point of contact to address noise emissions and any neighboring landowner's concerns.

In the event that impacts beyond the residential landowner's property line are identified, an accessory report memo will be developed to accompany this Assessment. This memo shall identify and develop specific mitigation scenarios for any permanent PV-related equipment, or temporary equipment, which has the potential to project noise beyond the permissible levels to adjacent properties.

4.2 Summary of Project Impacts, Mitigation, and Conclusions

Norbut intends to construct an approximate fifteen (15) MW AC solar energy system in Town of Kirkwood, Broome County, NY. This Noise Assessment has been developed following investigation of the proposed equipment expected to be utilized during construction of the SES and the proposed electrical equipment to be used during long-term SES operation.

To address any potential sound emissions during temporary construction conditions, heavy equipment operation and solar array and equipment installations will be mitigated by workday and workhour limitations as to not impose a nuisance to adjacent properties.

As stated in the Town of Kirkwood, Supplementary Standards, SES operation is limited to maximum audible sound of sixty (60) dBA and fifty (50) dBA for daytime and nighttime hours, respectively. These requirements are measured at the property line of an adjacent landowner. Noise impacts for normal SES operation during nighttime (defined as 9:00p.m. thru 7:00a.m.) hours are considered negligible as the solar facility will be nonoperational status and relative to existing, ambient conditions. Additionally, by centrally locating inverters on equipment pads away from the adjoining property lines, the investigation shows that sound attributable to the solar project does not exceed the daytime (defined as 7:00a.m. thru 9:00p.m.) hours noise limitation as required by the Town of Kirkwood Zoning Local Law.

5.0 CERTIFICATION

Norbut Solar Farms has prepared this Noise Assessment, and I certify to the best of my knowledge, information, and belief that the material and data contained in the accompanying engineered narrative, specifications, and design drawings for the Kirkwood Solar Project have been prepared in accordance with accepted engineering practice and are true and correct.



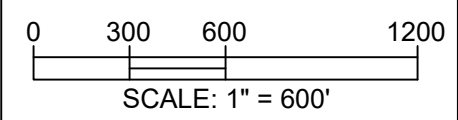
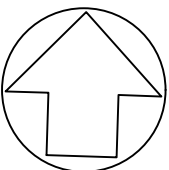
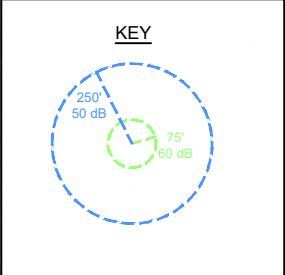
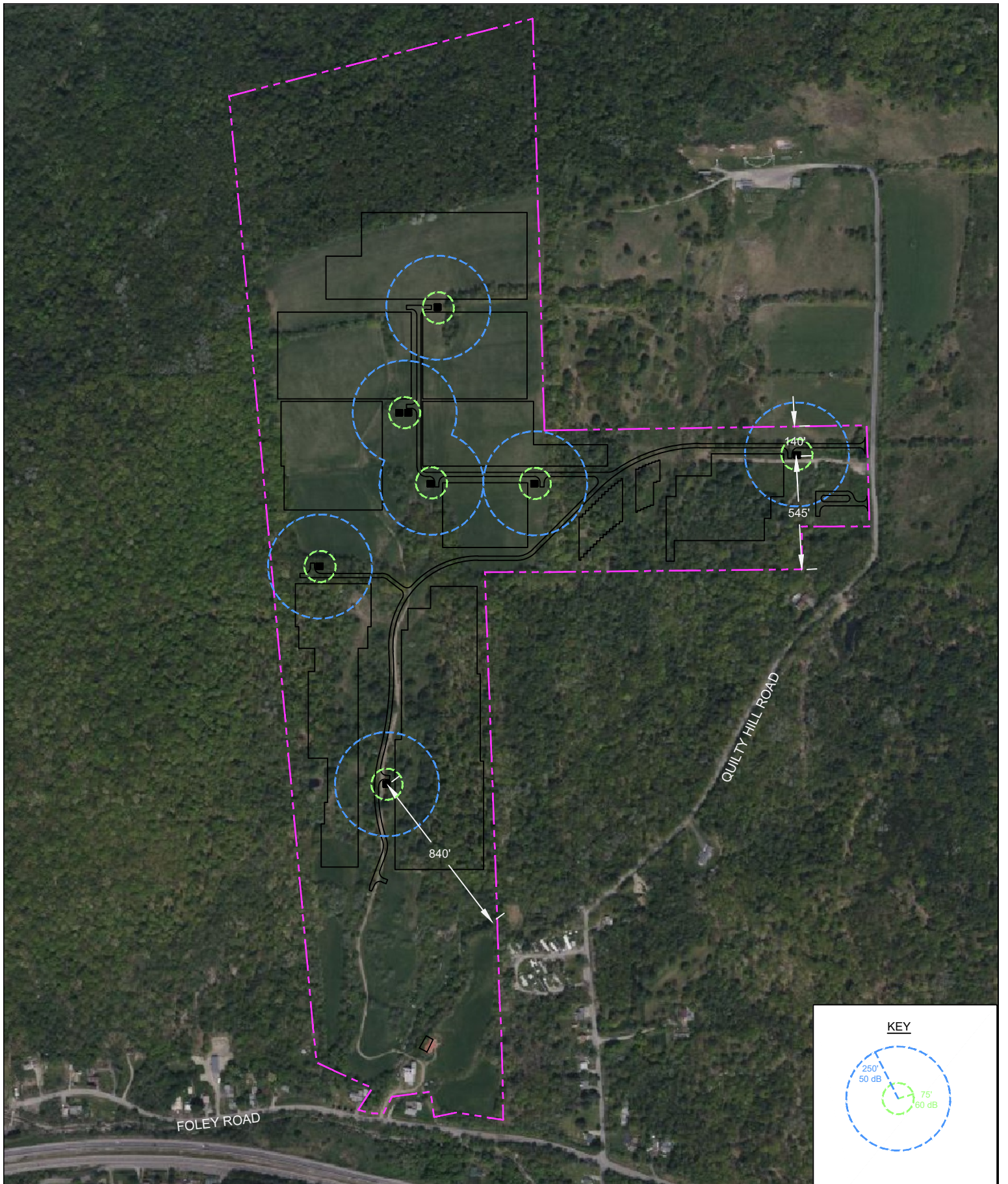
Paul Congdon, PE

6.0 REFERENCES

- FHWA Report No. FHWA-HEP-06-015 “FWHA Highway Construction Noise Handbook,” August 2006.
- FHWA Publication Vol. 67 No. 1 “Public Roads,” July/August 2003.

FIGURE 1

Noise Assessment Map



BY: PEC
REV:

NOISE ASSESMENT MAP

NSF KIRKWOOD

149 QUILTY HILL ROAD, KIRKWOOD, NY 13795

APPENDIX A

Equipment Specifications

SG3425UD/SG3600UD

Central Inverter for 1500 Vdc System



HIGH YIELD

- Advanced three-level technology, max. efficiency 98.9%
- Inverter full power operation up to 45 °C (113 °F)
- Max. DC/AC ratio up to 2.0

Saved Investment

- Low transportation and installation cost due to outdoor design
- DC-coupled storage interface and charging power from the grid, low system cost
- Q at night optional

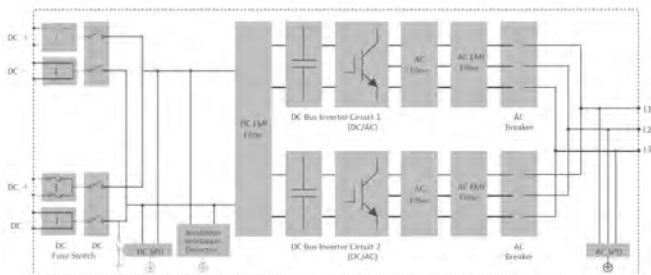
SMART O&M

- Integrated monitoring function for online analysis and trouble shooting
- Modular design, easy for maintenance

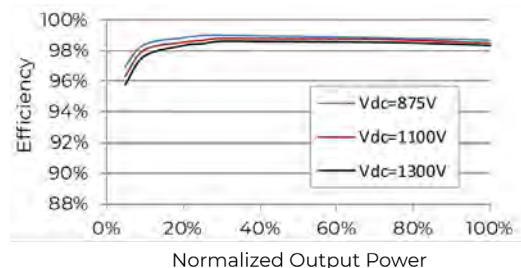
GRID SUPPORT

- Compliance with standards: UL 1741, UL 1741 SA, IEEE 1547, Rule 21 and NEC code
- Low / High voltage ride through (L/HVRT), L/HFRT, soft start/stop
- Active & reactive power control and power ramp rate control

CIRCUIT DIAGRAM



EFFICIENCY CURVE



Type designation	SG3425UD	SG3600UD
Input (DC)		
Max. PV input voltage	1500 V	
Min. PV input voltage / Startup input voltage	875 V / 915 V	915 V / 955 V
Available DC fuse sizes	250 V / 630 V	
MPP voltage range	875 V - 1500 V	915 V - 1500 V
Full Power MPP Voltage Range@ 45 °C	875 V - 1300 V *	915 V - 1300 V *
No. of independent MPP inputs	1	
No. of DC inputs	24 (optional:28)	
Max. PV input current	4000 A	4015 A
Max. DC short-circuit current	2 Switches/5000A(Optional:4 Switches/10000A)	
PV array configuration	Negative grounding or floating	
Output (AC)		
AC output power	3425 kVA @ 45 °C (113 °F) 3083 kVA @ 50 °C (122 °F)	3600 kVA @ 45 °C (113 °F) 3240 kVA @ 50 °C (122 °F)
Max. AC output current	3296 V	3300 V
Nominal AC voltage	600 V	630 V
AC voltage range	528 V - 660 V	554 V - 690 V
Nominal grid frequency / Grid frequency range	50 Hz / 45 Hz - 55 Hz , 60 Hz / 50 Hz - 65 Hz	
THD	< 3 % (at nominal power)	
DC current injection	< 0.5 % In	
Power factor at nominal power / Adjustable power factor	> 0.99 / 0.8 leading - 0.8 lagging	
Feed-in phases /AC connection	3 / 3 -PE	
Efficiency		
Inverter max. efficiency	98.9 %	
Inverter CEC efficiency	98.5 %	
Protection		
DC input protection	Load switch + fuse	
Inverter output protection	Circuit breaker	
Overvoltage protection	DC Type II / AC Type II	
Grid monitoring / Ground fault monitoring	DC Type I + II / AC Type II	
Zone monitoring	Yes	
Insulation monitoring	Yes	
Overheat protection	Yes	
Q at night function	Optional	
General Data		
Dimensions (W * H * D)	2280 mm * 2280 mm * 1600 mm 89.8" * 89.8" * 63"	
Weight	3200 kg 7055 lbs	
Topology	Transformerless	
Degree of protection	NEMA 4X (Electronic for Inverter) / NEMA 3R (Others)	
Night power consumption	< 200 W	
Operating ambient temperature range(it refers to the ambient temperature of 1m around the inverter.)	-35 °C - 60 °C (> 45 °C derating) / optional: -40 °C - 60 °C (> 45 °C derating) -31 °C - 140 °C (> 113 °F derating) / optional: -40 °C - 140 °C (> 113 °F derating)	
Allowable relative humidity range	0 % - 100 %	
Cooling method	Temperature controlled forced air cooling	
Max. operating altitude	Optional	
DC-Coupled storage interface	Optional	
Charging power from the grid	Standard: RS485, Ethernet;	
Communication	UL 1741, IEEE 1547, UL1741 SA, NEC 2017, CSA C22.2 No.107.1-01	
Compliance	Q at night function (optional), L/HVRT, L/HFRT, Active & reactive power control and power ramp rate control, Volt-var, Frequency-watt	
Grid support		

*Full power MPP range is temperature dependent, check the characteristic curve of the inverter for more information.





ALL TERRAIN TRACKER

BECAUSE THE WORLD IS NOT FLAT

The Nevados ATT changes the way solar developers look at the world by allowing solar power plants to fit to the land rather than forcing the land to accept solar power plants. Avoid engineering and construction costs, eliminate costly labor activities, and install a single product on flat, sloped, and rolling terrain with equal ease.

1 UNDERSTAND THE WIND

- Wind tunnel studies on variable terrain provide clear answers on complex forces.
- Inherent resistance to wind dynamics eliminate the need for external dampers.

2 INCREASE SITE OPTIONS

- Access overlooked land
- Source lower-cost land
- Revisit sites previously disqualified due to grading

3 FOLLOW THE LAND

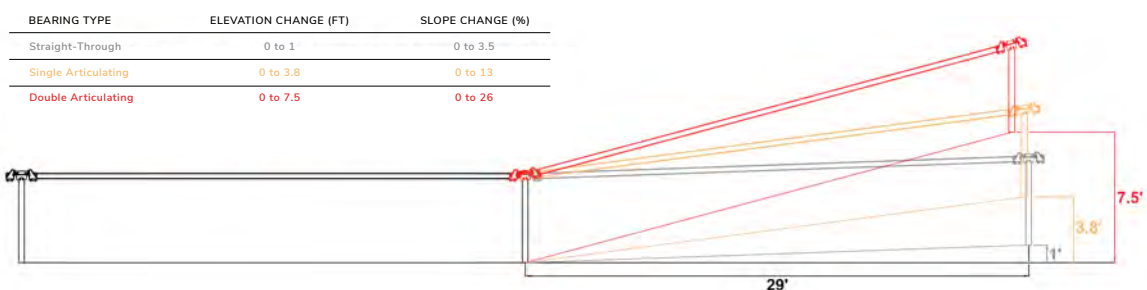
- Eliminate grading and ease permitting
- Reduce the need for environmental remediation
- Shorten construction schedules

4 SAFELY ACCELERATE CONSTRUCTION

- Assemble equipment at chest height on flat, sloped, and rolling terrain
- Eliminate bearing and module alignment labor
- Lift and set torque tubes in one motion
- Rotate any row to horizontal or full tilt with the press of a button

5 MAXIMIZE RETURNS WITH HD MODELER

- Eliminate inter-row shadows for all terrains while maximizing light capture
- Row-level tilt optimization
- Jumpstart power generation in the morning and maintain it until late in the evening



COMMUNICATIONS

<p>ROW CONFIGURATION</p>	<ul style="list-style-type: none"> • Up to 96 modules per row • 6 to 8 modules per bay
<p>TRACKING CAPABILITIES</p>	<ul style="list-style-type: none"> • $\pm 60^\circ$ tracking with primary and secondary over-rotation limits in slew drive and structure • Single row actuation with 24VDC slew drive
<p>TERRAIN FOLLOWING</p>	<ul style="list-style-type: none"> • “Standard” equipment accommodates up to $\pm 3.5\%$ slope change at each foundation (12” foundation deflection) • “Articulating” solution accommodates up to $\pm 26\%$ slope change at each foundation (90” foundation deflection) • 37% max N-S and E-W slope
<p>FOUNDATION</p>	<ul style="list-style-type: none"> • C-Channel or I-Beam foundations installed at consistent reveal throughout site
<p>GROUND COVERAGE RATIO</p>	<ul style="list-style-type: none"> • Greater than or equal to 0.25
<p>DESIGN LOADS</p>	<ul style="list-style-type: none"> • Designed to applicable ASCE • Configurable to 135+MPH • Configurable to 50PSF snow load • Loads studied in wind tunnels for variable terrain; no external dampers required for wind dynamics
<p>STOW STRATEGY</p>	<ul style="list-style-type: none"> • Wind stow at 45MPH, and proven stability at non-stow wind speeds exceeding 80MPH • Same tilt angle for snow, wind, and hail stow, as well as evening stow • Row-by-row flood stow option
<p>OPERATING TEMPERATURE</p>	<ul style="list-style-type: none"> • $-20^\circ\text{C} - 55^\circ\text{C}$
<p>MODULE CONNECTION/GROUNDING:</p>	<ul style="list-style-type: none"> • Self-grounding module clips • UL2703 and UL3703
<p>TOLERANCES</p>	<ul style="list-style-type: none"> • Flat-land: $\pm 12"$ vertical and E-W, $\pm 1.5"$ N-S (expandable), 2° vertical plumb, 9° twist • Variable-terrain: vertical tolerances may increase or decrease based on neighboring foundations
<p>CONTROLS</p>	<ul style="list-style-type: none"> • Zone controller web dashboard for zone monitoring & management, with row-level control • SCADA integration via Modbus TCP/IP for zone monitoring & management, with row-level control • Fully wireless and self-powered row controllers • Wired and line-powered zone controllers
<p>WARRANTY</p>	<ul style="list-style-type: none"> • 10-year extendable structural warranty, 5-year drive and controls warranty (extendable)

ZXM7-SPLDD144 Series



Znshinesolar 10BB HALF-CELL Bifacial Light-Weight Double Glass Monocrystalline PERC PV Module

520W | 525W | 530W | 535W | 540W | 545W



Excellent cells efficiency

MBB technology decreases the distance between bus bars and finger grid line which is benefit to power increase.



Better Weak Illumination Response

More power output in weak light condition, such as haze, cloudy, and morning



Anti PID

Limited power degradation caused by PID effect is guaranteed under strict testing condition for mass production



High wind and snow resistance

■ 5400 Pa snow load ■ 2400 Pa wind load



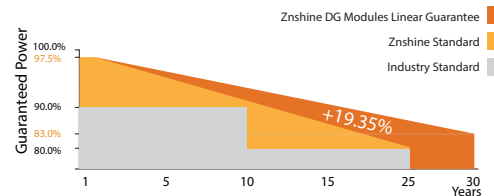
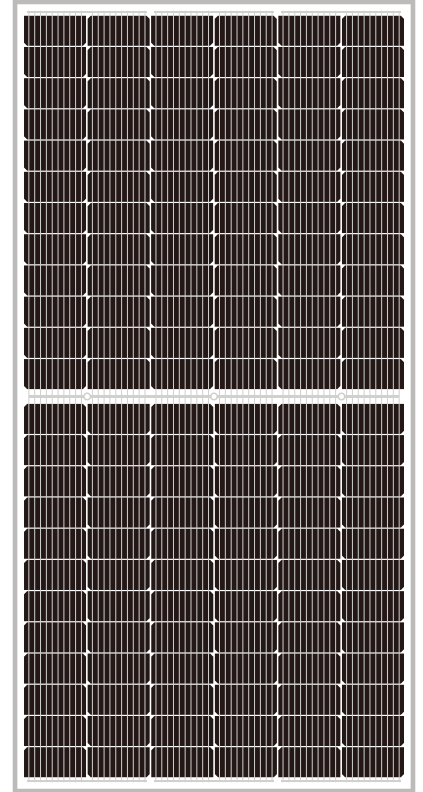
30 years power warranty

After 30 years our solar panel keeps at least 80% of its initial power output



Bifacial technology

Enables additional energy harvesting from rear side(up to 25%)



12 years product guarantee
30 years output guarantee



0.5% annual degradation
over 30 years



Founded in 1988, ZNShine solar is a world's leading high-tech PV module manufacturer. With the state-of-the-art production lines, the company boasts module capacity of 6GW. Bloomberg has listed ZNShine as a global Tier 1 PV module maker. Today Znshine has distributed its sales to more than 60 countries around the globe.

ELECTRICAL CHARACTERISTICS | STC*

Nominal Power Watt Pmax(W)*	520	525	530	535	540	545
Power Output Tolerance Pmax(%)	0~+3	0~+3	0~+3	0~+3	0~+3	0~+3
Maximum Power Voltage Vmp(V)	40.70	40.90	41.10	41.30	41.50	41.70
Maximum Power Current Imp(A)	12.79	12.85	12.91	12.96	13.02	13.07
Open Circuit Voltage Voc(V)	49.00	49.20	49.40	49.60	49.80	50.00
Short Circuit Current Isc(A)	13.53	13.59	13.65	13.71	13.77	13.83
Module Efficiency (%)	20.34	20.54	20.74	20.93	21.13	21.32

*STC (Standard Test Condition): Irradiance 1000W/m², Module Temperature 25°C, AM 1.5

*Measuring tolerance: ±3%

ELECTRICAL CHARACTERISTICS | NMOT*

Maximum Power Pmax(Wp)	388.80	392.70	396.40	399.90	403.60	406.80
Maximum Power Voltage Vmp(V)	37.90	38.00	38.20	38.40	38.50	38.80
Maximum Power Current Imp(A)	10.26	10.33	10.38	10.42	10.47	10.49
Open Circuit Voltage Voc(V)	45.80	46.00	46.20	46.30	46.50	46.70
Short Circuit Current Isc(A)	10.93	10.98	11.02	11.07	11.12	11.17

*NMOT(Nominal module operating temperature):Irradiance 800W/m², Ambient Temperature 20°C,AM 1.5,Wind Speed 1m/s

ELECTRICAL CHARACTERISTICS WITH 25% REAR SIDE POWER GAIN

Front power Pmax/W	520	525	530	535	540	545
Total power Pmax/W	650	656	663	669	675	681
Vmp/V(Total)	40.80	41.00	41.20	41.40	41.60	41.80
Imp/A(Total)	15.93	16.01	16.08	16.15	16.23	16.30
Voc/V(Total)	49.10	49.30	49.50	49.70	49.90	50.10
Isc/A(Total)	16.87	16.95	17.02	17.10	17.17	17.25

MECHANICAL DATA

Solar cells	Mono PERC
Cells orientation	144 (6×24)
Module dimension	2256×1133×35 mm(With Frame)
Weight	33.5 kg
Glass	2.0 mm+2.0mm, High Transmission, AR Coated Heat Strengthened Glass
Junction box	IP 68, 3 diodes
Cables	4 mm ² , 350 mm
Connectors	MC4-compatible

TEMPERATURE RATINGS

NMOT	44°C ±2°C
Temperature coefficient of Pmax	-0.35%/°C
Temperature coefficient of Voc	-0.29%/°C
Temperature coefficient of Isc	0.05%/°C
Refer.Bifacial Factor	70±5%

WORKING CONDITIONS

Maximum system voltage	1500 V DC
Operating temperature	-40°C~+85°C
Maximum series fuse	30 A
Maximum load(snow/wind)	5400 Pa / 2400 Pa

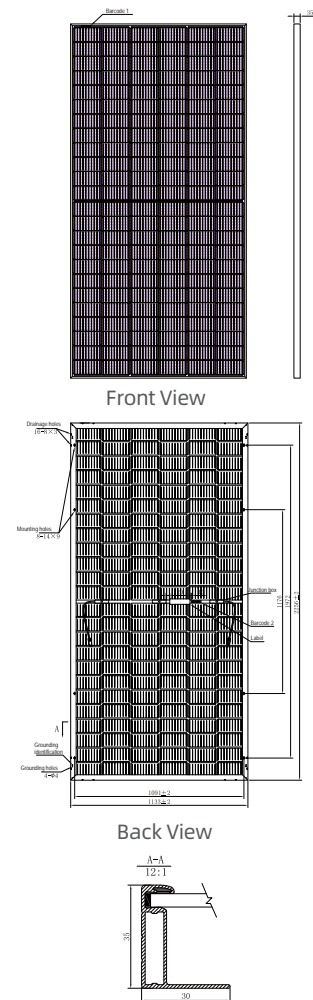
*Do not connect Fuse in Combiner Box with two or more strings in parallel connection

*Remark:Electrical data in this catalog do not refer to a single module and they are not part of the offer.They only serve for comparison among different module types.

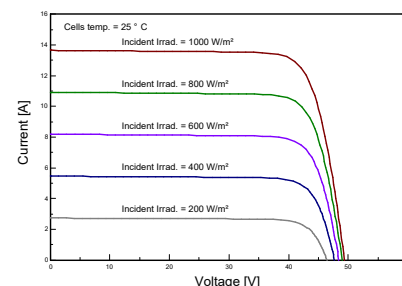
PACKAGING CONFIGURATION

Piece/Box	30
Piece/Container(40'HQ)	600
Piece/Container(with additional small package)	/

DIMENSIONS(MM)



I-V CURVES OF PV MODULE(530W)



P-V CURVES OF PV MODULE(530W)

