SOLAR PV INSTALLATION PROJECT

15613 Plum Tree Drive, Orland Park, IL 60462

PLAN AND CONSTRUCTION SET
08/04/2017

REFERENCED CODES AND ACTS

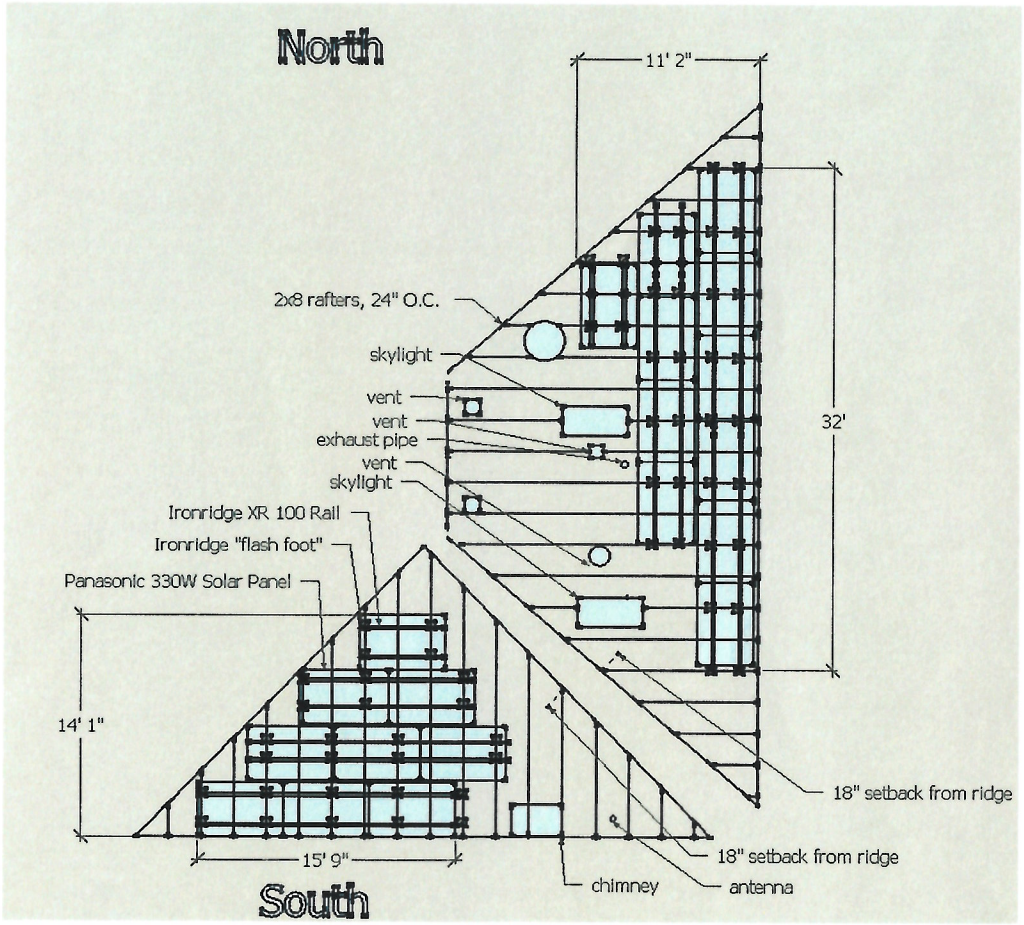
2015 IBC Building Code w/Village Amendments,Village Code, Title 5, Chapter 1
2015 IRC Building Code w/Village Amendments, Village Code, Title 5, Chapter 1
2015 International Mechanical Code w/Amendments, Village Code, Title 5, Chapter 6
2014 National Electrical Code w/Amendments, Village Code, Title 5, Chapter 3
2014 State of Illinois Plumbing Code w/Amendments, Village Code, Title 5, Chapter 4
2012 International Fire Code w/Amendments, Village Code, Title 5, Chapter s1 &5
2015 International Property Maintenance Code w/Amendments, Village Code, Title 5, Chapter 7
2015 Illinois Energy Conservation Code (IECC)

PROJECT SUMMARY:
6.6 kW Grid Interactive Solar Array
Panasonic (20) 330W Modules
(1) SolarEdge SE6000A-US Inverter, IEEE-1547 AND UL-1741 COMPLIANT
Ironridge XR-100 racking, ° azimuth
Inverter output: 240V, 1Φ, 3W
Building Service: 100A, 240V, 1Φ, 3W

SHEET INDEX:

Ailey Solar	PROJECT/ADDRESS: 15613 Plum Tree Drive, Orland Park, IL 60462 SHEET NUMBER: **1** VERSION: 8/8/2017 Drawn: JH Checked: DB *Ailey Solar: 1965 W. Pershing, Chicago, IL 60609 | (773) 245-3912 | info@aileysolar.com*

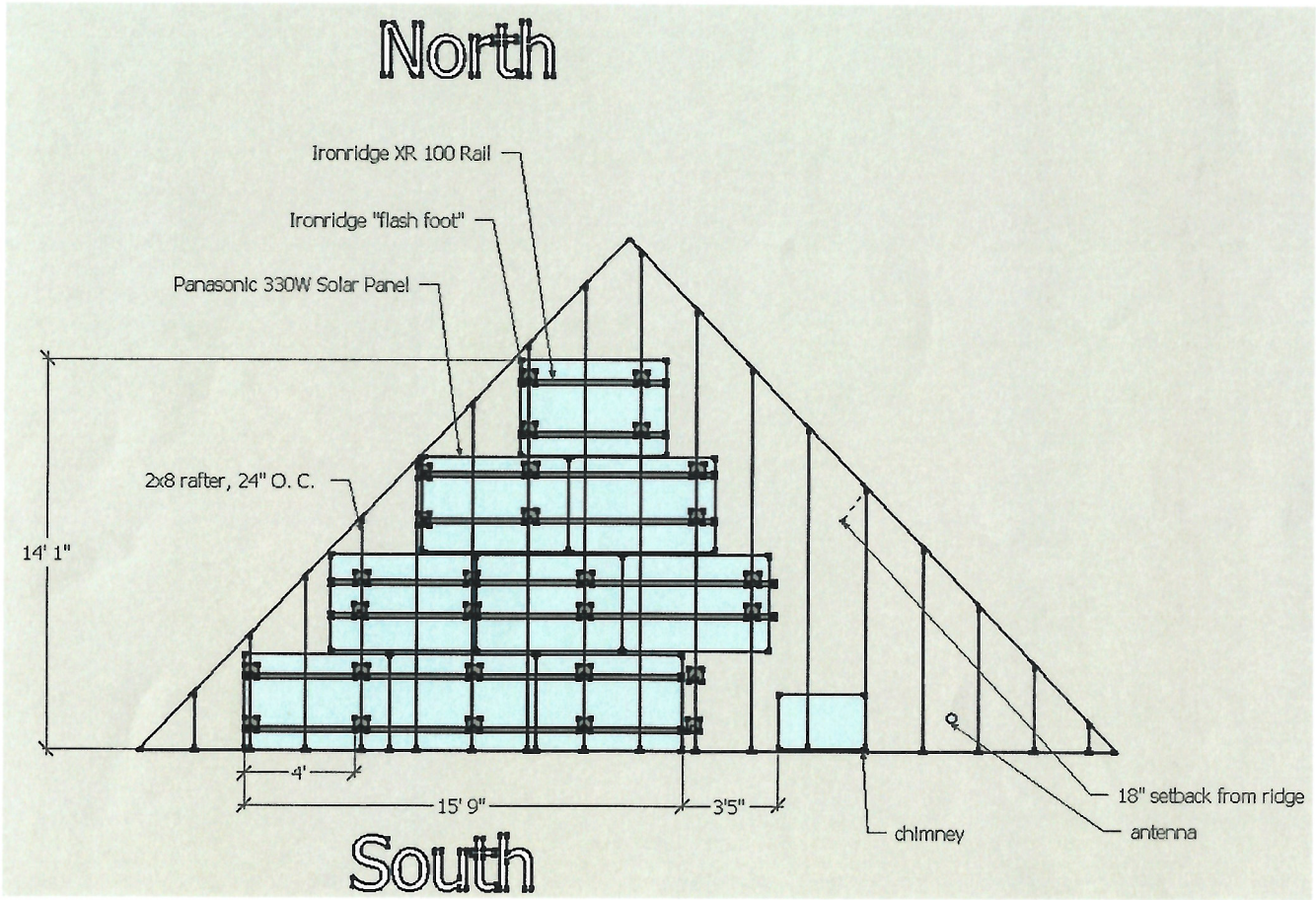
ARRAY AND RACKING PLAN - OVERVIEW



Ailey Solar

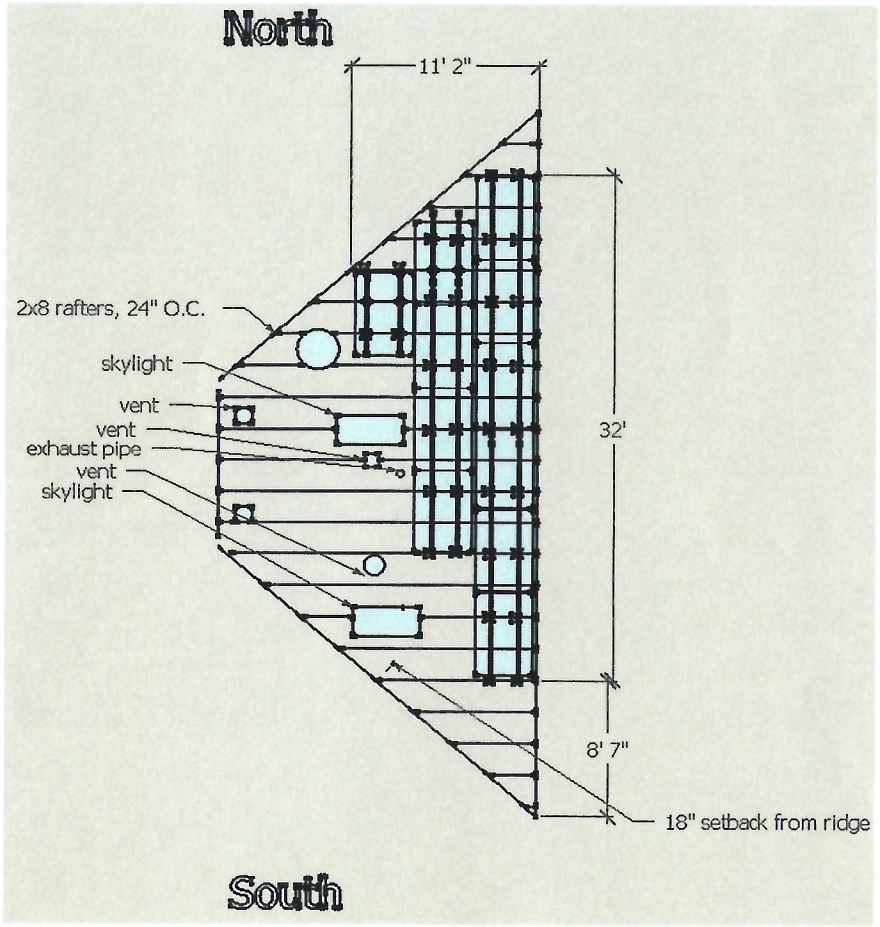
PROJECT/ADDRESS: 15613 Plum Tree Drive, Orland Park, IL 60462
SHEET NUMBER: 2 VERSION: 8/8/2017 Drawn: JH Checked: DB
Ailey Solar: 1965 W. Pershing, Chicago, IL 60609 | (773) 245-3912 | info@aileysolar.com

ARRAY AND RACKING PLAN - NORTH-SOUTH-FACING ROOF



Ailey Solar	PROJECT/ADDRESS: 15613 Plum Tree Drive, Orland Park, IL 60462 SHEET NUMBER: 3 VERSION: 8/8/2017 Drawn: JH Checked: DB *Ailey Solar: 1965 W. Pershing, Chicago, IL 60609 | (773) 245-3912 | info@aileysolar.com*

ARRAY AND RACKING PLAN - EAST-WEST-FACING ROOF



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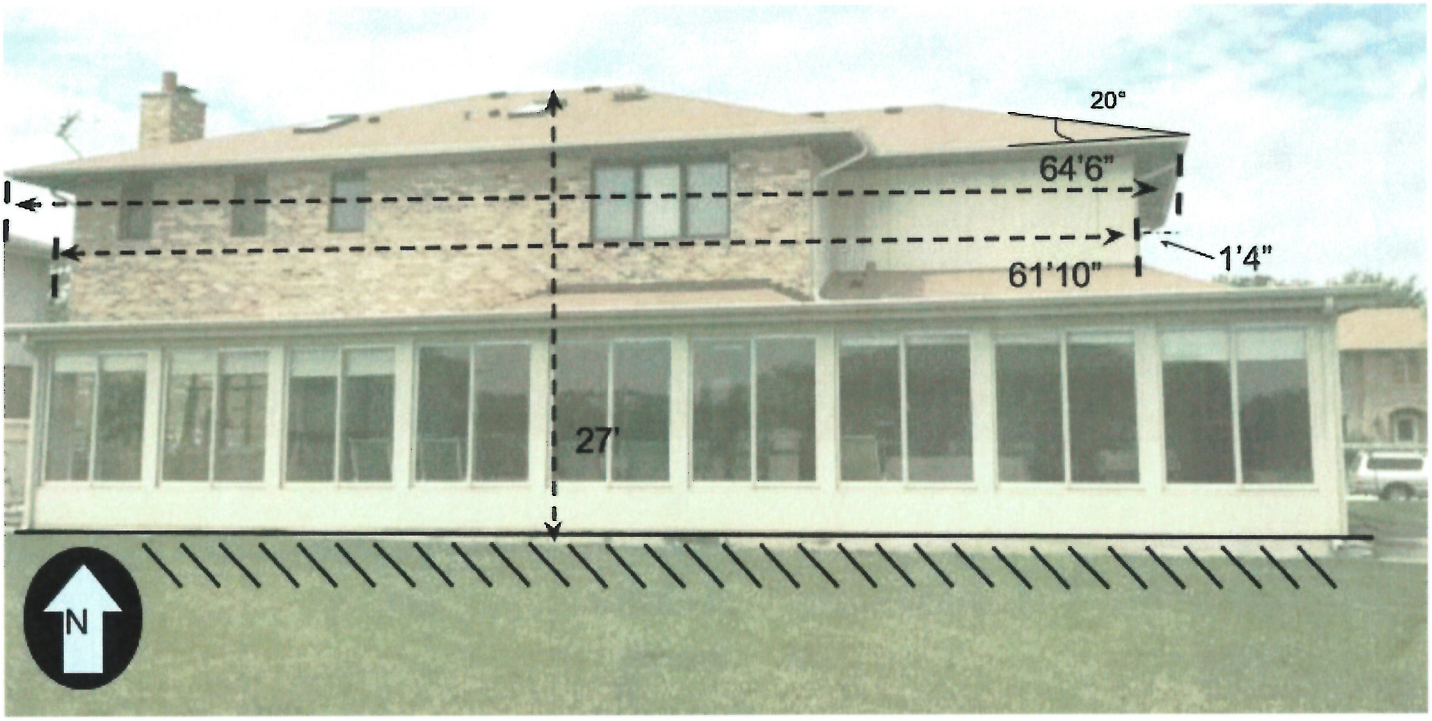
ELEVATION

Ailey Solar	PROJECT/ADDRESS: 15613 Plum Tree Drive, Orland Park, IL 60462 SHEET NUMBER: 6 VERSION: 8/8/2017 Drawn: JH Checked: DB *Ailey Solar: 1965 W. Pershing, Chicago, IL 60609 | (773) 245-3912 | info@aileysolar.com*

ELEVATION



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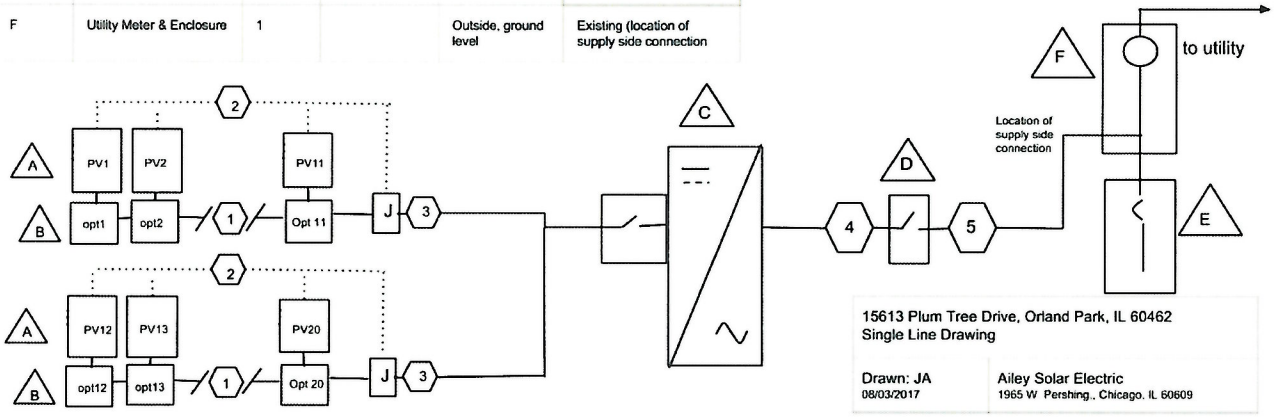
SINGLE LINE - DIAGRAM

EQUIPMENT SCHEDULE

Tag	Description	Qty.	Part #	Location	notes
A	PV Module	20	VBHN330SA15 Panasonic	Roof	330W
B	SolarEdge optimizer	20	P400	Under each PV module	
C	DC disconnect, SolarEdge inverter	1	SE6000A-US	Ground level, outside near utility meter	DC disconnect is built into inverter, max. Output current 25A
D	AC Disconnect	1		Outside next to meter	NEMA 3R 30A rated, 30A fuses
E	Service Panel	1	100A	Basement	existing
F	Utility Meter & Enclosure	1		Outside, ground level	Existing (location of supply side connection

CONDUCTOR-CONDUIT SCHEDULE

Tag	Conductor type	Temp	Quantity and gauge	Conduit
1	PV wire	55°C	2 #10C	none
2	Green EGC	55°C	1-#8	none
3	THWN-2	55°C	2 #10C, 1#10EGC	3/4" EMT
4	THWN-2	35°C	2 #10C,1#10N, 1#10EGC	3/4" EMT
5	THWN-2	35°C	2 #6C, 1#6N, 1#6EGC	3/4" EMT



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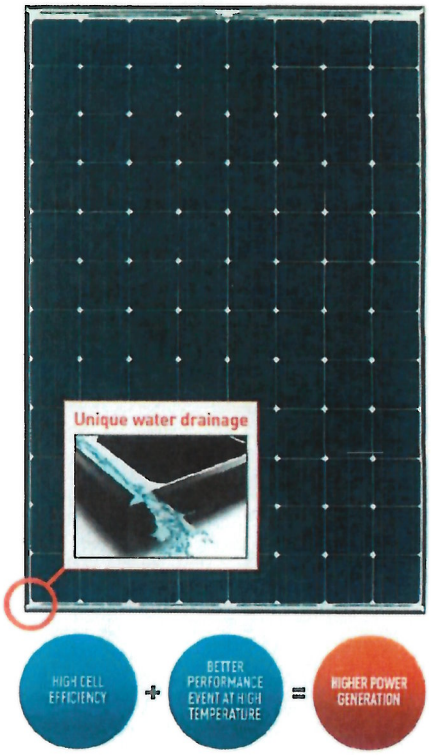
Panasonic

HIT Photovoltaic Module

Photovoltaic Module HIT® N330, N325 | VBHN330SA15, VBHN325SA15

Panasonic solar technology

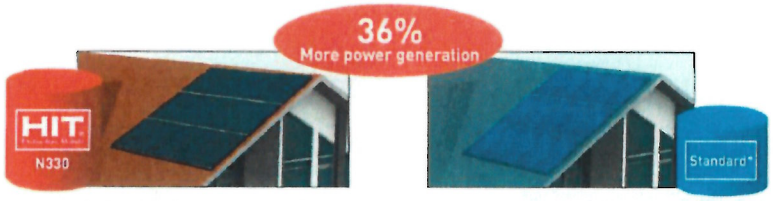
Panasonic photovoltaic modules HIT® feature an innovative hetero-junction cell structure made of mono-crystalline and amorphous silicon layers. Ultra-thin amorphous silicon layers prevent recombinations of electrons, keeping carrier loss to an absolute minimum. As a result, HIT® conversion efficiency ratings are among the highest available today.



19.7% module efficiency

Employing 96 cells in the same size footprint, N330 and N325 HIT® produce up to 36% more free electricity compared to conventional 60-cell panels.

- More solar power output per square foot
- Fewer panels to install, faster installations
- Ideal for small roof areas
- Greater cost savings for homeowners over a 25-year lifecycle



HIT®: 9,167kWh/year (15pcs x 330W = 4.95kW) **VS** Standard*: 6,716kWh/year (15pcs x 260W = 3.90kW)

NOTE: Panasonic's simulation in CA, USA

*Conventional crystalline module

Quality you can trust

100% Panasonic HIT®

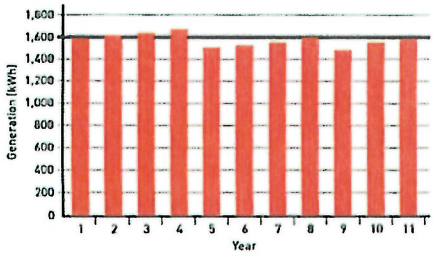
Starting over 40 years ago with the research and development of photovoltaic cells in 1975, Panasonic has been a solar pioneer since the beginning of the green revolution. In 1997, the HIT® set the industry standard for high conversion efficiency. Satisfied customers worldwide have come to trust and rely on Panasonic quality ever since.

Panasonic manufactured and guaranteed

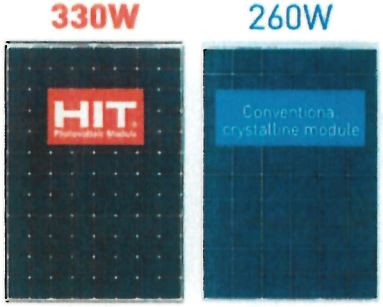
- 25-year power output warranty and 15-year workmanship warranty
- Vertically integrated in-house manufacturing of wafer, cell, and module
- State-of-the-art production facilities and manufacturing processes
- Industry's most stringent independent testing and quality control standards
- IEC and 20+ internal tests

Minimal field degradation

Actual recorded data proves reliable, stable performance over 11 years.



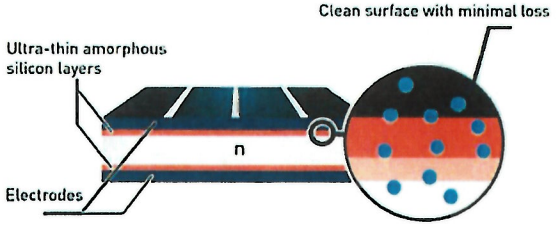
Simply powerful



Panel size (1.6m²) Panel size (1.6m²)

With the same dimension, HIT® N330 produces more power than conventional crystalline modules

Cell structure of HIT®



Electrical and Mechanical Characteristics | N330, N325

HIT® Photovoltaic Module

Electrical Specifications (TENTATIVE)

Model	VBHN330SA15	VBHN325SA15
Rated Power (Pmax)[1]	330W	325W
Maximum Power Voltage (Vpm)	58.0V	57.6V
Maximum Power Current (Ipm)	5.70A	5.65A
Open Circuit Voltage (Voc)	69.7V	69.6V
Short Circuit Current (Isc)	6.07A	6.03A
Temperature Coefficient (Pmax)	-0.30%/°C	-0.30%/°C
Temperature Coefficient (Voc)	-0.174V/°C	-0.174V/°C
Temperature Coefficient (Isc)	1.82mA/°C	1.82mA/°C
NOCT	44.0°C	44.0°C
CEC PTS Rating	TBD	TBD
Cell Efficiency	22.09%	21.76%
Module Efficiency	19.7%	19.4%
Watts per Ft.²	18.3W	18.0W
Maximum System Voltage	600V	600V
Series Fuse Rating	15A	15A
Warranted Tolerance (-/+)	+10%/-0%*	+10%/-0%*

Mechanical Specifications (TENTATIVE)

Model	VBHN330SA15, VBHN325SA15
Internal Bypass Diodes	4 Bypass Diodes
Module Area	18.02 Ft.² (1.67m²)
Weight	40.81 Lbs. (18.5kg)
Dimensions LxWxH	62.6x41.5x1.4 in. (1590x1053x35 mm)
Cable Length +Male/-Female	40.2/40.2 in. (1020/1020 mm)
Cable Size / Type	No. 12 AWG / PV Cable
Connector Type[3]	Multi-Contact® Type IV (MC4™)
Static Wind / Snow Load	50 PSF (2400 Pa)
Pallet Dimensions LxWxH	63.7x42.2x5.5 in. (1618x1071x140 mm)
Quantity per Pallet / Pallet Weight	40 pcs. /1719 Lbs. (780 kg)
Quantity per 40' Container	560 pcs.
Quantity per 20' Container	240 pcs.

Operating Conditions & Safety Ratings (TENTATIVE)

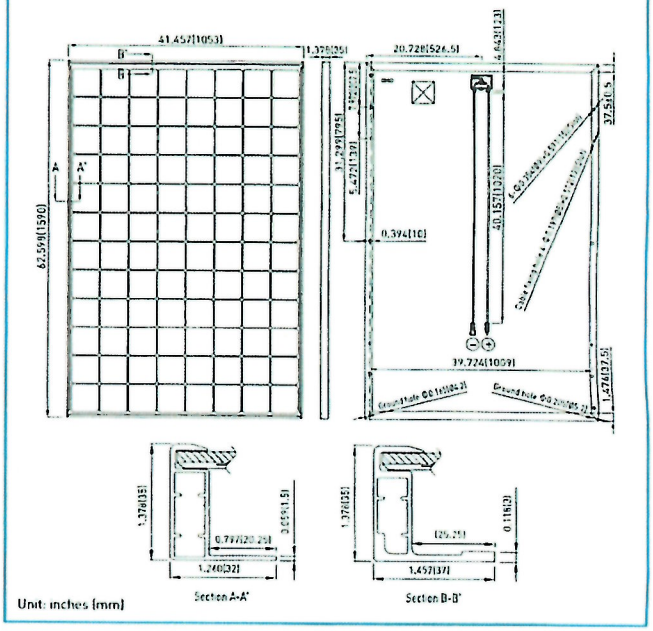
Model	VBHN330SA15, VBHN325SA15
Ambient Operating Temperature[2]	-4°F to 104°F (-20°C to 40°C)
Hail Safety Impact Velocity	1" hailstone (25mm) at 52 mph (23m/s)
Safety & Rating Certifications	UL 1703, cUL, CEC
UL 1703 Fire Classification	Type 2
Limited Warranty	15 Years Workmanship, 25 Years Power Output

Note: Standard Test Conditions: Air mass 1.5; irradiance = 1000W/m²; cell temp. 25°C
*Maximum power at delivery. For guarantee conditions, please check our guarantee document.

[1]STC: Cell temp. 25°C, AM1.5, 1000W/m²
[2]Monthly average low and high of the installation site
[3]Safety locking clip (PV-SSH4) is not supplied with the module.

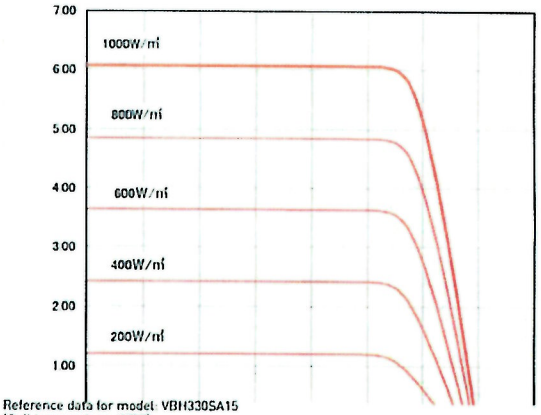
Note: Specifications and information above may change without notice.

Dimensions



Unit: inches [mm]

Dependence on Irradiance



Reference data for model: VBH330SA15
(Cell temperature: 25°C)

⚠CAUTION! Please read the installation manual carefully before using the products.

Used electrical and electronic products must not be mixed with general household waste. For proper treatment, recovery and recycling of old products, please take them to applicable collection points in accordance with your national legislation.

Panasonic

Panasonic Eco Solutions of North America
Two Riverfront Plaza, 5th Floor, Newark, NJ 07102
panasonicHIT@us.panasonic.com
business.panasonic.com/solarpanels

RS151248SS

AL-IMAN Group, LLC
Engineering • Construction • Management

Mr. Dorian Breuer
Ailey Solar
1965 W. Pershing
Chicago, IL 60609
O: 773-809-3817
dorian@aileysolarelectric.com

June 23, 2017

RE: 15613 Plum Tree Drive, Orland Park, IL 60462
AIG# 17.717

Mr. Breuer:

We have reviewed the proposed solar array drawings and the structure(s) at the above referenced address. The array consists of (19) Panasonic modules (or equal) on the structure mounted on an Iron Ridge racking system, with a maximum attachment spacing in accordance with the recommendations of Iron Ridge.

We hereby certify that the existing structure, with the addition of the proposed solar energy devices, is capable of supporting the design load referenced in the 2012 International Residential Code and ASCE 7-10.

We have attached the calculation for the critical roof member – a 2x4 truss top chord, checked for bending stress and deflection in accordance with ASCE 7-10.

Please feel free to contact us should you have any comments or questions

6/23/17

LICENSED STRUCTURAL ENGINEER
MOHAMED THABET AL HARASH
081-006694
STATE OF ILLINOIS

Respectfully yours,

Mohamed T. AL HARASH

Dr. Mohamed T. AL HARASH, Sc.D., P.E., S.E. - NCEES
Director of Operations

2318 Woodson Road, # 140007 Saint Louis, MO 63114
Tel: 314.739.0515 Fax: 253.369.0377
al_imangroup@yahoo.com www.al-imangroup.com

15613 Plum Tree Dr
Critical Roof Member
2x4 Truss Top Chord
Dead Load 13psf with solar
Ground Snow 25 psf

Title :
Dsgnr:
Description :

Scope :

Job #
Date: 12:29PM, 23 JUN 17

Timber Beam & Joist

Description

Timber Member Information

Base allowables are user defined

Timber Section		
Beam Width	in	2.000
Beam Depth	in	4.000
Le: Unbraced Length	ft	2.00
Timber Grade		
Fb - Basic Allow	psi	1,000.0
Fv - Basic Allow	psi	95.0
Elastic Modulus	ksi	1,600.0
Load Duration Factor		1.000
Member Type		Sawn
Repetitive Status		Repetitive

Center Span Data

Span	ft	7.50
Dead Load	#/ft	26.00
Live Load	#/ft	35.00

Results

Ratio = 0.5633

Mmax @ Center	in-k	5.15
@ X =	ft	3.75
fb : Actual	psi	965.0
Fb : Allowable	psi	1,713.2
		Bending OK
fv : Actual	psi	39.1
Fv : Allowable	psi	95.0
		Shear OK

Reactions

@ Left End	DL	lbs	97.50
	LL	lbs	131.25
	Max. DL+LL	lbs	228.75
@ Right End	DL	lbs	97.50
	LL	lbs	131.25
	Max. DL+LL	lbs	228.75

Deflections

Ratio OK

Center DL Defl	in	-0.108
L/Defl Ratio		829.9
Center LL Defl	in	-0.146
L/Defl Ratio		616.5
Center Total Defl	in	-0.254
Location	ft	3.750
L/Defl Ratio		353.7

VILLAGE OF ORLAND PARK, DEVELOPMENT SERVICES DEPARTMENT

PETITION FOR APPEARANCE REVIEW

All information requested on this form MUST be provided. A petition will be considered incomplete if any information is missing. Following planning approval, a building permit is required.

PROJECT NAME	Solar Installation on 15613 Plum Tree Drive, Orland Park, IL 60462		
PETITIONER INFORMATION			
NAME	Ailey Solar Electric	**TITLE**	Solar/Electric/General Contractor
ADDRESS	1965 W. Pershing Rd	**CITY/STATE/ZIP**	Chicago, IL, 60609
PHONE	773-809-3817 **FAX**	**EMAIL**	info@aileysolarelectric.com
RELATIONSHIP TO OWNER			
PETITIONER'S CONTACT INFORMATION			
NAME	Ailey Solar Electric	**TITLE**	Solar Electric/General Contractor
ADDRESS	1965 W. Pershing Rd	**CITY/STATE/ZIP**	Chicago, IL, 60609
PHONE	773-809-3817 **FAX**	**EMAIL**	info@aileysolarelectric.com
RELATIONSHIP TO PETITIONER			
PROPERTY OWNER'S INFORMATION			
NAME	Vandna Shah	**PHONE**	708-333-3381
ADDRESS	15613 Plum Tree Drive	**CITY/STATE/ZIP**	Orland Park, IL 60462
PROJECT INFORMATION			
PROPERTY ADDRESS	15613 Plum Tree Drive, Orland Park, IL 60462		
P.I.N. NUMBER	27143080230000	**SIZE OF PARCEL**	sf 2 acres
SIZE OF BUILDING (OVERALL)	3,790 sf	**SIZE OF TENANT SPACE**	sf
PROPERTY TYPE (CHECK ONE)	☒ RESIDENTIAL($50)	☐ NON RESIDENTIAL($150)	
EXISTING ZONING/LAND USE	Residential		

SCOPE OF WORK:

Installation of a 6,600kW solar system. Comprised of 20 Panasonic panels, at 330 watts. One SE6000A-US inverter with SR(100 Iron Ridge.

RECEIVED
AUG 10 2017

PROPOSAL INCLUDES (CHECK ALL THAT APPLY):

☐ OUTDOOR SEATING ☐ CELL TOWERS ☒ EXTERIOR BUILDING ALTERATIONS

☐ LANDSCAPING ☐ SITE CONSTRUCTION (parking, sidewalks, fences, screening, etc)

Signature of Petitioner John S. Ailey **Date** 8-8-17

OFFICIAL SEAL
YOLANDA PEREZ
Notary Public - State of Illinois
My Commission Expires Sep. 20, 2017

Notary Signature [signature] **Date** 8-8-17

Notary Seal

Petition Must Be Notarized

For Village Use Only	**PROJECT NO.** 2017-0574/AR-17-00455	**ASSIGNED TO**	Mitch Corona
	DATE PETITION COMPLETED	**DEVELOPMENT SERVICES DEPARTMENT APPROVAL TO PROCEED**	KPITTOS

See Reverse Side for Submittal Requirements