Las Brisas at Cottonwood HOA Policy on Solar Power

I. INTRODUCTION

The Las Brisas At Cottonwood Homeowners Association recognizes that there is likely to be Association member interest in installing solar paneled power systems. Because these systems must be installed on the exterior of our buildings, these installations affect the common areas, and therefore must be regulated by the Association. For that reason, the Association has developed this policy, to assist members in ensuring installation that is safe, efficient and compliant with the Association's architectural rules. The Board recognizes the benefits of solar energy but must preserve the values of the properties by ensuring the structural integrity and aesthetic beauty of our buildings. Thus, this policy will be strictly enforced.

The Association's Board of Directors recognizes the benefits of renewable energy sources, including solar, to overall energy programs within our society, and is committed to working effectively with owners proposing solar power projects.

Solar energy systems present a sustainable alternative to conventional energy technologies, with the potential to provide homeowners with a significant portion of their energy needs while safeguarding human health and environmental quality and enhancing property values and economic opportunities throughout the community. While Las Brisas at Cottonwood recognizes these benefits, it is important that these systems are installed in a manner that respects legitimate competing community interests. For purposes of these design guidelines, the phrase "solar energy system" includes both photovoltaic and solar heating and/or cooling technologies.

Based on Civil Code § 4746 and its provisions, and Civil Code § 714.1, the Homeowners Association has established the following policy elements regarding the installation of residential solar energy systems by members of its Association within the Las Brisas at Cottonwood development.

1. APPLICATION OF THIS POLICY

This policy applies to all solar energy devices including without limitation solar panels and their associated components, solar tubes, solar skylights, wind turbines or other solar energy devices (collectively referred to in this Rule as "devices" or "systems" or "equipment").

2. GOVERNING LAW

In California associations, the installation and operation of solar systems is governed by Civil Code Sections 714 and 714.1. This policy aims to be consistent with those code sections, and to supplement them by adding rules and regulations. To the extent this policy is in conflict with the Civil Code, the Civil Code will control. A copy of Sections 714 and 714.1 of the Civil Code are enclosed with this policy for your reference (Appendix D).

3. GOVERNING DOCUMENTS - AUTHORITY

Article IX, Section 15 of the CC&R's addresses solar power systems. The CC&R's generally allow members to install solar systems in accordance with the Civil Code. The CC&R's, however, require that installations comply with the architectural standards adopted by the association. This policy outlines these standards.

II. SYSTEM DESIGN AND PLACEMENT REQUIREMENTS

To the maximum extent possible, a roof-mounted solar energy system shall be installed so as to minimize its exposure when viewed from areas open to common or public access (e.g., public streets, neighboring lots, or association properties or common areas). Proposals to install solar panels on the ground surfaces or walls of the residence visible from the front of the residence are discouraged.

The Association requires that roof-mounted panel designs be intended to conform to existing roofline geometry. Solar panels on front-facing or side-facing roof surfaces visible from areas open to common or public access must be mounted in the plane of the roof surface minimizing stand-off distance from roof. Panels in other locations may be angled to achieve optimum solar gain provided the top edge of the panel does not extend above the roof peak. All panels must be located entirely within a boundary defined by the roof eaves and peak. Visibility of the underside of the panels shall be minimized from areas open to common or public access.

1. APPLICATION TO THE ARCHITECTURAL COMMITTEE OR BOARD

Prior to commencing any construction/installation activities whatsoever, a member must submit a written application to the Board or appointed Committee for review, consideration and approval. Applications must include the following (An example is provided in Appendix B):

(a) Detailed plans for the installation and placement of any system;

(b) A drawing showing the exact location where the system will be installed and the number of collectors/panels;

(c) A survey showing the placement of the system in comparison to the full usable area of location in which the system will be installed, reflecting an equitable usage that allows other members to install their own systems as well;

(d) An illustrated brochure of the proposed system, depicting the make, model, materials that will be used, and the warranty being provided;

(e) Copies of permits from the city/county when/if those are necessary for the installation;

(f) Detailed information about the contractor who will be installing the system, including copies of its contractor's license, proof of insurance, CV, the contract and warranties being proposed for the installation, and references from other residential homeowner associations;

(g) A document signed by all members owning units within the same building, where the system will be installed and any members owning units which the system will face or otherwise affect, indicating that each member has been notified of the proposed project;

(h) A written opinion from a structural engineer, obtained at the member's expense, clearly indicating that the structural integrity of the building and/or any of its components will not be affected by the installation and/or the continued maintenance of the system;

To be considered, applications must include all documents listed above. To be approved, applications must also comply with the standards provided herein.

2. STANDARDS FOR SYSTEMS

To be approved, applications must also comply with the following standards:

(a) Only commercially made and installed systems are allowed;

(b) Solar panels must conform to existing building geometry;

(c) Solar panel distances above existing building surfaces must be minimized;

(d) All exposed conduits and lines must be colored to match the exterior of the building;

(e) Make, model, and dimensions must comply with the specifications of those provided in Appendix C to this policy, which may be updated by the Board from time to time;

(f) The placement of the system must use the area of installation in an equitable manner that allows other members to install equally efficient systems should they wish to do so;

(g) The system must meet applicable health and safety standards and requirements imposed by state and local permitting authorities, consistent with Section 65850.5 of the Government Code;

(h) The system must meet all applicable safety and performance standards established by the California Electrical Code, the Institute of Electrical and Electronics Engineers, and accredited testing laboratories such as Underwriters Laboratories and, where applicable, rules of the Public Utilities Commission regarding safety and reliability; and

(i) The applying member must be current in the payment of assessments and must not have outstanding violations and/or fines.

3. REVIEW TIME

An application which is submitted without all the documents listed in Section 4 above shall be considered rejected immediately upon submission. Upon receipt of an application which contains all the documents listed in Section 4, the Board or Committee will review and respond to the application in writing within 45 days. Should the Board or Committee require additional time to review the application, the applicant will be notified in writing of the delay.

4. CONDITIONAL APPROVAL AND ADDITIONAL REQUIREMENTS

In the event an application contains the documents required in Section 4, meets the standards listed in Section 5, and is otherwise acceptable by the Board, it will be *conditionally* approved. Approval will be conditioned on compliance with the maintenance, insurance, and indemnity requirements provided for herein below. Only upon compliance with these requirements should an application be considered finally approved.

III. ADDITIONAL REQUIREMENTS

The installation of all solar heating and/or cooling systems shall only be done by a licensed installer.

Each applicant is to notify each owner in the building of the proposed solar energy system installation.

Each owner and successive owners must carry an additional insured policy for homeowner liability coverage naming the Association and must provide the Association with proof of insurance within fourteen (14) days of approval and annually thereafter.

Each owner and/or successive owner will be responsible for the costs for damage done to any common area resulting from the installation, maintenance, repair, removal, and replacement of solar energy system installation.

Each owner will also be responsible for restoration of all common area and separate interests after removal.

Each owner must disclose the solar energy system installation to prospective buyers and all related responsibilities.

1. ADDITIONAL REQUIREMENTS FOR MAINTENANCE, INSURANCE & INDEMNITY

In addition to the standards provided for in this policy, before commencing construction or installation of a conditionally approved solar system, a member must agree, in writing, to the following:

Maintenance: Upon the installation of a solar system on common area, including exclusive-use common area, the installing member shall assume full responsibility to maintain, repair, and replace the common area and/or exclusive-use common area components affected by the installation or maintenance of the system. The responsibility to maintain, repair, and replace provided for herein extends to the maintenance, repair and replacement of the roof when the system is installed thereon. The installing member shall also be solely and exclusively responsible for the maintenance, repair, replacement and removal of the solar system itself.

Insurance: The installing member shall obtain a liability insurance policy covering the system and its installation. The policy must name the Association as an additional named insured. A copy of the policy must be provided to the Association within 14 days of conditional approval of the application, and again annually on the anniversary of the approval.

Indemnity and Hold Harmless: The installing member shall agree to assume full liability and responsibility for any and all damages to the common areas, exclusive-use common areas, and separate interests, caused directly or indirectly by the installation or maintenance of the solar system. The installing member shall also agree to assume full liability and responsibility, hold the Association harmless from, and indemnity the Association for any damages, actions, lawsuits, injuries, and/or other claims, made by anyone, resulting directly or indirectly by the installation or maintenance of the solar system.

The agreement to assume maintenance, insurance and indemnity responsibilities as provided in this Section shall be recorded with the San Diego Recorder's Office. The member shall bear the recording costs associated with this recordation.

2. REVOCABLITY

A conditional approval and/or an approval of a solar system may be revoked at any time if the Association determines that the conditions provided for herein are not met on a continuous and consistent basis.

Additionally, a conditional approval and/or an approval of a solar system may be revoked if the Association adopts a community-wide re-roofing project that requires temporary removal of the system.

3. VIOLATIONS

In the event of a violation of this policy, the violating member may be subject to disciplinary action, including suspension of membership privileges and monetary fines, in accordance with the Association's violation and fine policy. Notwithstanding the Association's fine policy, the Board may impose daily fines for violations of this solar policy in the amount of $25-$100 per day, depending on the severity of the violation. Additionally, the Board, at its discretion, may initiate legal action to seek monetary, injunctive and declaratory relief as needed.

Systems installed without the Association's approval of the Board in accordance with this policy may be removed by the Association, after notice and disciplinary hearing, with the cost of removal charged to the violating owner. Such removal may be in addition to other disciplinary measures imposed in accordance with this policy.

Appendices

Appendix A – Solar Compatibility Report

Appendix B – Example Engineering and Architectural Report

Appendix C – Example Component Specifications

Appendix D – Sections 714 and 714.1 of the Civil Code

Appendix A

www.ChristianRoofing.com

SOLAR COMPATABILITY REPORT

CHRISTIAN ROOFING, INC.

8824 Winter Gardens Blvd., Lakeside, CA 92040
Office...**619.401.9607**
Fax.....**619.443.4521**
CSLB License No. 1002598
(C39) Roofing Contractor

Client/Realtor:		Address	
Charles Loach - Las Brisas HOA		1402 Katie Lane	
City	**Zip Code**	**Phone**	**Escrow Officer Phone**
Santee	92071	619-540-1139	

Project Address	Escrow No.
1402 Katie Lane, Santee, CA 92071	N/A

THIS is to certify that the roof at the property listed above (Project Address) has been inspected by a qualified inspector employed by Christian Roofing, Inc. This inspection was a visual inspection of the surface of the roof only. Some problems in a roofing system may be internal and may be hidden during a visual inspection of the roof surface. The statements and conclusions contained in this report are strictly the professional opinion of the inspector. There is no guarantee or warranty espressed or implied concerning the roof system in question, or the statements contained in this report. Based only upon our visual inspection of the roof surface, we offer the following professional opinion concerning the roof at the above project address. Please note that this report is not a Roof Certification.

DESCRIPTION OF ROOF:

Standard weight concrete tile roof.

FINDINGS:

Per email correspondence with NEM Team @ SDG&E:

"Whether or not you can install on a meter bank is up to the City/County. They may have issues with the amount of Amps available to the customer with solar. If they don't have a problem with it, we will comply."

Per conversation with City of Santee Inspector:

"If a permit is pulled for each unit installing solar & individual system is installed directly on said unit with properly labeled system/disconnect/breakers/meters, solar can be installed/approved on a meter bank system so long as each unit has its own individual meter."

Site Map Attached
Picture of Meters Attached

RECOMMENDATIONS:

Maximum number of solar panels is determined on a per unit basis dependant upon unit size & best solar placement for optimum power generation. Maximum number of panels per unit recommendation is 8-12 panels.

See attached "Exhibit A" for the following information:

1. Product Data Sheets
2. Nearmaps Proposed Placement Report with Estimated System Output/Savings
3. "Example" of Engineered Plans (engineered plans of your system will be provided upon request after acceptance of solar contract per unit)

ESTIMATED LIFE EXPECTANCY: Product warranty 25 years, Output warranty of Pmax Linear warranty** 1) First 5 years : 95%, 2) After 5th year : 0.4% annual degradation, 3) 25 years : 88.4%

Respectfully submitted by: _____ Date: _____
Company Representative

Solar Panel Report

1402 Katie Ln, Santee, CA 92071, USA

Proposed Solar Panel Placement

Image Date June 27, 2018

Report Date July 23, 2018

Total panels per unit maximum 8-12 panels.

Solar Panel Report

System Parameters

Manufacturer Power Rating for Array	8 - 2,880W /10 - 3600W / 12 – 4,320W
Manufacturer and Model	LG - LG360Q1C-A5
Number of Panels	Unit Specific
Total Panel Area	36.3 m^2
Panel Type	Monocrystalline
Panel Length	1,700 mm
Panel Width	1,016 mm
Panel Nominal Power (STC)	360 W
Nominal Operating Cell Temperature	44.0 °C
Temperature Coefficient for Power	-2.00 % / K
System Efficiency[1]	85 %
Electricity Price	$0.35 / kWh

Estimated Performance

Energy Output[2]	7,920 kWh / year (current layout only)
Greenhouse Gas Emission Reduction[3]	4,473 lbs CO_2 / year
Electricity Savings (maximum)[4]	8- $151/mo, 10- $189/mo, 12- $227/mo

Estimated Average Daily Energy Output by Month[2]

[1]System efficiency is estimated by the solar installer to account for losses that may include shading, inverter efficiency for DC to AC conversion battery efficiency, cable losses, dirt, manufacturer tolerances, grid-tie system outages, maintenance downtime, and other factors.

[2]Energy Output is calculated based on historical solar irradiance and temperature data at this location, factoring in panel tilt, orientation, and all of the System Parameters including System Efficiency.

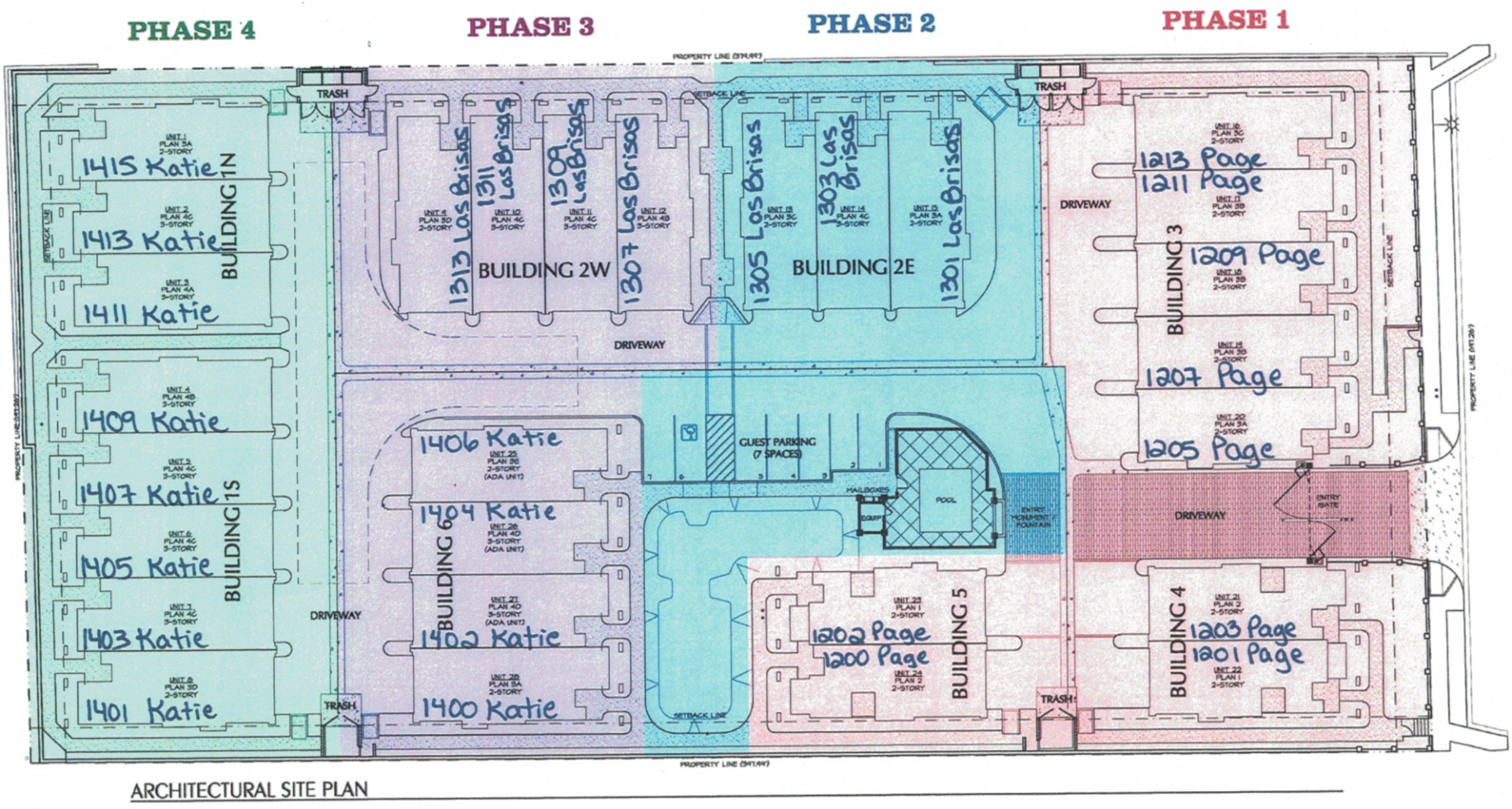
[3]Emission reduction assumes full output usage and 0.51 lbs CO_2 / kWh based on California average (US EPA eGRID 9th edition Version 1.0 Year 2010).

[4]Assumes full year-round utilisation of generated electricity, and will change based on usage and feed-in tariffs.

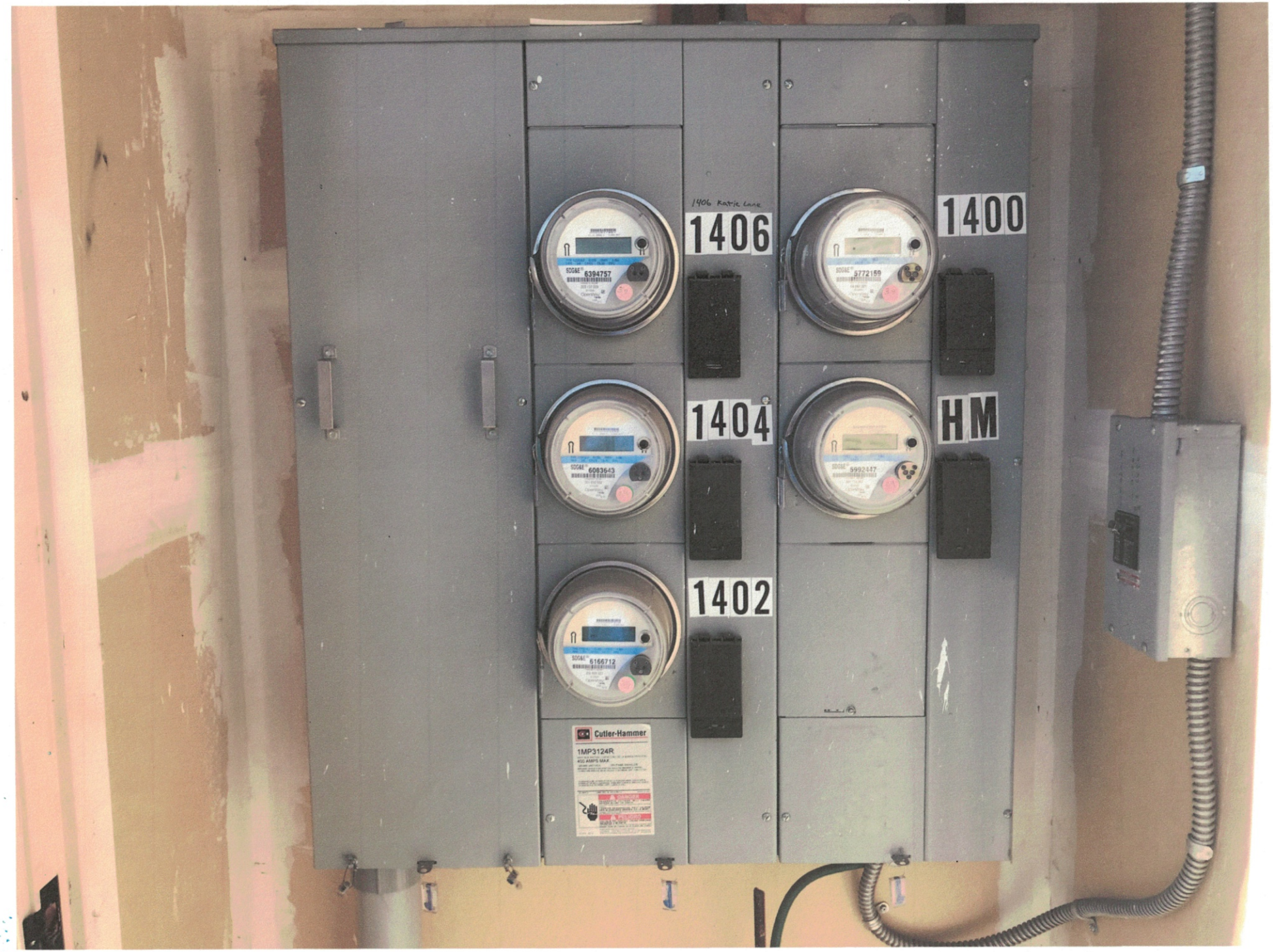
Solar Panel Report

Panel Orientation and Tilt

Panel Type Name	Panels	Tilt	Orientation
LG - LG360Q1C-A5	20	22.5°	



ARCHITECTURAL SITE PLAN


1406 Katie Lane
1406
1400
1404
HM
1402
SDGAE 6394757
SDGAE 5772159
SDGAE 6083643
SDGAE 5992447
SDGAE 6166712
Cutler-Hammer
1MP3124R

Appendix B

NEW PV SYSTEM: 7.680 kWp
RESIDENCE NAME

PROPERTY ADDRESS

ASSESSOR'S #: 11111111111

GENERAL NOTES

1.1.1 **PROJECT NOTES:**

1.1.2 THIS PHOTOVOLTAIC (PV) SYSTEM SHALL COMPLY WITH THE NATIONAL ELECTRIC CODE (NEC) ARTICLE 690, ALL MANUFACTURER'S LISTING AND INSTALLATION INSTRUCTIONS, AND THE RELEVANT CODES AS SPECIFIED BY THE AUTHORITY HAVING JURISDICTION'S (AHJ) APPLICABLE CODES.

1.1.3 THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION

1.1.4 GROUND FAULT DETECTION AND INTERRUPTION (GFDI) DEVICE IS INTEGRATED WITH THE MICROINVERTER IN ACCORDANCE WITH NEC 690.5(A)

1.1.5 ALL PV SYSTEM COMPONENTS; MODULES, UTILITY-INTERACTIVE INVERTERS, AND SOURCE CIRCUIT COMBINER BOXES ARE IDENTIFIED AND LISTED FOR USE IN PHOTOVOLTAIC SYSTEMS AS REQUIRED BY NEC 690.4 & NEC 690.60.
PV MODULES: UL1703, IEC61730, AND IEC61215, AND NFPA 70 CLASS C FIRE
INVERTERS: UL 1741 CERTIFIED, IEEE 1547, 929, 519
COMBINER BOX(ES): UL 1703 OR UL 1741 ACCESSORY

1.1.6 MAX DC VOLTAGE CALCULATED USING MANUFACTURER PROVIDED TEMP COEFFICIENT FOR VOC. IF UNAVAILABLE, MAX DC VOLTAGE CALCULATED ACCORDING TO NEC 690.7.

1.1.7 ALL INVERTERS, PHOTOVOLTAIC MODULES, PHOTOVOLTAIC PANELS, AND SOURCE CIRCUIT COMBINERS INTENDED FOR USE IN A PHOTOVOLTAIC POWER SYSTEM WILL BE IDENTIFIED AND LISTED FOR THE APPLICATION PER 690.4 (D). SHALL BE INSTALLED ACCORDING TO ANY INSTRUCTIONS FROM LISTING OR LABELING [NEC 110.3].

1.1.8 ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE. IF EXPOSED TO SUNLIGHT, IT SHALL BE UV RESISTANT. ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS REQUIRED BY THE NEC AND AHJ.

1.2.1 **SCOPE OF WORK:**

1.2.2 PRIME CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND SPECIFICATIONS OF THE GRID-TIED PHOTOVOLTAIC SYSTEM RETROFIT. PRIME CONTRACTOR WILL BE RESPONSIBLE FOR COLLECTING EXISTING ONSITE REQUIREMENTS TO DESIGN, SPECIFY, AND INSTALL THE EXTERIOR ROOF-MOUNTED PORTION OF THE PHOTOVOLTAIC SYSTEMS DETAILED IN THIS DOCUMENT.

1.3.1 **WORK INCLUDES:**

1.3.2 PV ROOF ATTACHMENTS - S5! CORRUBRACKET

1.3.3 PV RACKING SYSTEM INSTALLATION - IRONRIDGE XR10

1.3.4 PV MODULE AND INVERTER INSTALLATION - (24) LG ELECTRONICS LG320N1K-A5 / (24) ENPHASE I6Q - 60 - 2 - US

1.3.5 PV EQUIPMENT GROUNDING

1.3.6 PV SYSTEM WIRING TO A ROOF-MOUNTED SOLADECK ROOFTOP

1.3.7 PV LOAD CENTERS (IF INCLUDED)

1.3.8 PV METERING/MONITORING (IF INCLUDED)

1.3.9 PV DISCONNECTS

1.3.10 PV GROUNDING ELECTRODE & BONDING TO (E) GEC

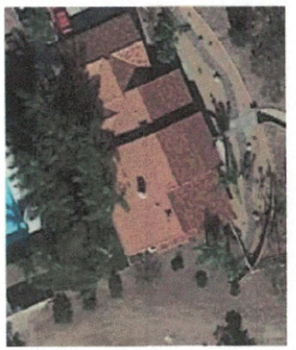
1.3.11 PV FINAL COMMISSIONING

1.3.12 (E) ELECTRICAL EQUIPMENT RETROFIT FOR PV

1.3.13 SIGNAGE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE

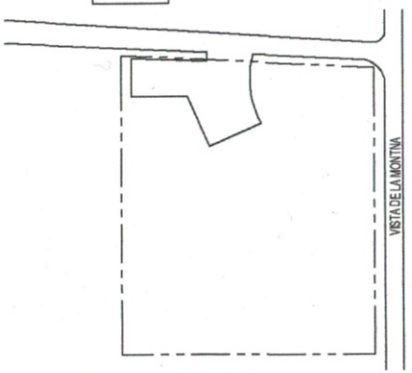
SCOPE OF WORK

SYSTEM SIZE:	STC: 24 x 320 = 7.680kW PTC: 24 x 294.7 = 7.073kW DC (24) LG ELECTRONICS LG320N1K-A4/5 (24) ENPHASE I6Q - 60 - 2 - US
ATTACHMENT TYPE:	S5! CORRUBRACKET
MSP UPGRADE:	NO



01 AERIAL PHOTO

NOT TO SCALE



02 PLAT MAP

NOT TO SCALE

SHEET LIST TABLE

PROJECT INFORMATION

OWNER
NAME:

PROJECT MANAGER
NAME:
PHONE:

CONTRACTOR
NAME:
PHONE:

AUTHORITIES HAVING JURISDICTION

BUILDING:	CITY OF SAN DIEGO
ZONING:	CITY OF SAN DIEGO
UTILITY:	SDG&E

DESIGN SPECIFICATIONS

OCCUPANCY:	II
CONSTRUCTION:	SINGLE-FAMILY
ZONING:	RESIDENTIAL
GROUND SNOW LOAD:	0 PSF
WIND EXPOSURE:	C
WIND SPEED:	115 MPH

APPLICABLE CODES & STANDARDS

BUILDING:	CBC 2016 CRC 2016
ELECTRICAL:	NEC 2014 CEC 2016
FIRE:	CFC 2016

EXAMPLE OF ENGINEERED PLANS - W/LG320 PLANS DRAWN W/ACCEPTANCE OF CONTRACT

CONTRACTOR

LIC. NO.:
HIC. NO.:
ELE. NO.:

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

COVER PAGE

DATE: 05.31.2018

DESIGN BY: A.L.

CHECKED BY: M.M.

REVISIONS

T-001.00

(SHEET 1)

2.1.1 **SITE NOTES:**

2.1.2 A LADDER WILL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS.

2.1.3 THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE AND THIS SYSTEM IS A UTILITY INTERACTIVE SYSTEM WITH NO STORAGE BATTERIES.

2.1.4 THE SOLAR PV INSTALLATION WILL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.

2.1.5 PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL BE PROVIDED AS PER SECTION NEC 110.26.

2.1.6 ROOF COVERINGS SHALL BE DESIGNED, INSTALLED, AND MAINTAINED IN ACCORDANCE WITH THIS CODE AND THE APPROVED MANUFACTURER'S INSTRUCTIONS SUCH THAT THE ROOF COVERING SERVES TO PROTECT THE BUILDING OR STRUCTURE.

2.2.1 **EQUIPMENT LOCATIONS:**

2.2.2 ALL EQUIPMENT SHALL MEET MINIMUM SETBACKS AS REQUIRED BY NEC 110.26.

2.2.3 WIRING SYSTEMS INSTALLED IN DIRECT SUNLIGHT MUST BE RATED FOR EXPECTED OPERATING TEMPERATURE AS SPECIFIED BY NEC 690.31 (A),(C) AND NEC TABLES 310.15 (B)(2)(A) AND 310.15 (B)(3)(C).

2.2.4 JUNCTION AND PULL BOXES PERMITTED INSTALLED UNDER PV MODULES ACCORDING TO NEC 690.34.

2.2.5 ADDITIONAL AC DISCONNECT(S) SHALL BE PROVIDED WHERE THE INVERTER IS NOT WITHIN SIGHT OF THE AC SERVICING DISCONNECT.

2.2.6 ALL EQUIPMENT SHALL BE INSTALLED ACCESSIBLE TO QUALIFIED PERSONNEL ACCORDING TO NEC APPLICABLE CODES.

2.2.7 ALL COMPONENTS ARE LISTED FOR THEIR PURPOSE AND RATED FOR OUTDOOR USAGE WHEN APPROPRIATE.

2.3.1 **STRUCTURAL NOTES:**

2.3.2 RACKING SYSTEM & PV ARRAY WILL BE INSTALLED ACCORDING TO CODE-COMPLIANT INSTALLATION MANUAL. TOP CLAMPS REQUIRE A DESIGNATED SPACE BETWEEN MODULES, AND RAILS MUST ALSO EXTEND A MINIMUM DISTANCE BEYOND EITHER EDGE OF THE ARRAY/SUBARRAY, ACCORDING TO RAI MANUFACTURER'S INSTRUCTIONS.

2.3.3 JUNCTION BOX WILL BE INSTALLED PER MANUFACTURERS' SPECIFICATIONS. IF ROOF-PENETRATING TYPE, IT SHALL BE FLASHED & SEALED PER LOCAL REQUIREMENTS.

2.3.4 ROOFTOP PENETRATIONS FOR PV RACEWAY WILL BE COMPLETED AND SEALED W/ APPROVED CHEMICAL SEALANT PER CODE BY A LICENSED CONTRACTOR.

2.3.5 ALL PV RELATED ROOF ATTACHMENTS TO BE SPACED NO GREATER THAN THE SPAN DISTANCE SPECIFIED BY THE RACKING MANUFACTURER.

2.3.6 WHEN POSSIBLE, ALL PV RELATED RACKING ATTACHMENTS WILL BE STAGGERED AMONGST THE ROOF FRAMING MEMBERS.

2.4.1 **WIRING & CONDUIT NOTES:**

2.4.2 ALL CONDUIT AND WIRE WILL BE LISTED AND APPROVED FOR THEIR PURPOSE. CONDUIT AND WIRE SPECIFICATIONS ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING.

2.4.3 CONDUCTORS SIZED ACCORDING TO NEC 690.8, NEC 690.7.

2.4.4 VOLTAGE DROP LIMITED TO 1.5%.

2.4.5 DC WIRING LIMITED TO MODULE FOOTPRINT. MICROINVERTER WIRING SYSTEMS SHALL BE LOCATED AND SECURED UNDER THE ARRAY W/ SUITABLE WIRING CLIPS.

2.4.6 AC CONDUCTORS COLORED OR MARKED AS FOLLOWS:

PHASE A OR L1- BLACK

PHASE B OR L2- RED, OR OTHER CONVENTION IF THREE PHASE

PHASE C OR L3- BLUE, YELLOW, ORANGE**, OR OTHER CONVENTION

NEUTRAL- WHITE OR GREY

IN 4-WIRE DELTA CONNECTED SYSTEMS THE PHASE WITH HIGHER VOLTAGE TO BE MARKED ORANGE [NEC 110.15].

4.5.1 **GROUNDING NOTES:**

2.5.2 GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, AND GROUNDING DEVISES EXPOSED TO THE ELEMENTS SHALL BE RATED FOR SUCH USE.

2.5.3 PV EQUIPMENT SHALL BE GROUNDED ACCORDING TO NEC 690.43 AND MINIMUM NEC TABLE 250.122.

2.5.4 METAL PARTS OF MODULE FRAMES, MODULE RACKING, AND ENCLOSURES CONSIDERED GROUNDED IN ACCORD WITH 250.134 AND 250.136(A).

2.5.5 EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZED ACCORDING TO NEC 690.45 AND MICROINVERTER MANUFACTORERS' INSTRUCTIONS.

2.5.6 EACH MODULE WILL BE GROUNDED USING WEEB GROUNDING CLIPS AS SHOWN IN MANUFACTURER DOCUMENTATION AND APPROVED BY THE AHJ. IF WEEBS ARE NOT USED, MODULE GROUNDING LUGS MUST BE INSTALLED AT THE SPECIFIED GROUNDING LUG HOLES PER THE MANUFACTURERS' INSTALLATION REQUIREMENTS.

2.5.7 THE GROUNDING CONNECTION TO A MODULE SHALL BE ARRANGED SUCH THAT THE REMOVAL OF A MODULE DOES NOT INTERRUPT A GROUNDING CONDUCTOR TO ANOTHER MODULE.

2.5.8 GROUNDING AND BONDING CONDUCTORS, IF INSULATED, SHALL BE COLORED GREEN OR MARKED GREEN IF #4 AWG OR LARGER [NEC 250.119]

2.5.9 THE GROUNDING ELECTRODE SYSTEM COMPLIES WITH NEC 690.47 AND NEC 250.50 THROUGH 250.106. IF EXISTING SYSTEM IS INACCESSIBLE, OR INADEQUATE, A GROUNDING ELECTRODE SYSTEM PROVIDED ACCORDING TO NEC 250, NEC 690.47 AND AHJ.

2.5.10 GROUND-FAULT DETECTION SHALL COMPLY WITH NEC 690.5 IN GENERAL AND NEC 690.5 (A)(1) SPECIFICALLY.

2.6.1 **DISCONNECTION AND OVER-CURRENT PROTECTION NOTES:**

2.6.2 DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING ENERGIZED ARE CONNECTED TO THE TERMINALS MARKED "LINE SIDE" (TYPICALLY THE UPPER TERMINALS).

2.6.3 DISCONNECTS TO BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH

2.6.4 RAPID SHUTDOWN OF ENERGIZED CONDUCTORS BEYOND 10 FT OF PV ARRAY OR 5 FT INSIDE A BUILDING WITHIN 10 SECONDS. CONTROLLED CONDUCTORS ≤30V AND ≤240VA [NEC 690.12]. LOCATION OF LABEL ACCORDING TO AHJ.

2.6.5 ALL OCPD RATINGS AND TYPES SPECIFIED ACCORDING TO NEC 690.8, 690.9, AND 240.

2.6.6 MICROINVERTER BRANCHES CONNECTED TO A SINGLE BREAKER OR GROUPED FUSES IN ACCORDANCE WITH NEC 110.3(B).

2.6.7 IF REQUIRED BY AHJ, SYSTEM WILL INCLUDE ARC-FAULT CIRCUIT PROTECTION ACCORDING TO NEC 690.11 AND UL1699B.

2.7.1 **INTERCONNECTION NOTES:**

2.7.2 LOAD-SIDE INTERCONNECTION SHALL BE IN ACCORDANCE WITH [NEC 690.64 (B)]

2.7.3 THE SUM OF THE UTILITY OCPD AND INVERTER CONTINUOUS INPUT MAY NOT EXCEED 120% OF BUSBAR RATING [NEC 705.12(D)(2)(3)].

2.7.4 WHEN SUM OF THE PV SOURCES EQUALS >100% OF BUSBAR RATING, PV DEDICATED BACKFFED BREAKERS MUST BE LOCATED OPPOSITE END OF THE BUS FROM THE UTILITY SOURCE OCPD [NEC 705.12(D)(2)(3)].

2.7.5 AT MULTIPLE PV OUTPUT COMBINER PANEL, TOTAL RATING OF ALL OVERCURRENT DEVICES SHALL NOT EXCEED AMPACITY OF BUSBAR. HOWEVER, THE COMBINED OVERCURRENT DEVICE MAY BE EXCLUDED ACCORDING TO NEC 705.12 (D)(2)(3)(C).

2.7.6 FEEDER TAP INTERCONECTION (LOAD SIDE) ACCORDING TO NEC 705.12 (D)(2)(1)

2.7.7 SUPPLY SIDE TAP INTERCONNECTION ACCORDING TO NEC 705.12 (A) WITH SERVICE ENTRANCE CONDUCTORS IN ACCORDANCE WITH NEC 230.42

2.7.8 BACKFEEDING BREAKER FOR UTILITY-INTERACTIVE INVERTER OUTPUT IS EXEMPT FROM ADDITIONAL FASTENING [NEC 705.12 (D)(5)].

CONTRACTOR

LIC. NO.:
HIC. NO.:
ELE. NO.:

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

NOTES

DATE: 05.31.2018

DESIGN BY: A.L.

CHECKED BY: M.M.

REVISIONS

G-001.00

(SHEET 2)

01 SITE PLAN

1/32" = 1'-0"

0 16'-1" 32'-2"

N W E S

GENERAL NOTES

1. FIELD VERIFY ALL MEASUREMENTS
2. ITEMS BELOW MAY NOT BE ON THIS PAGE

PROPERTY LINE

CONSTRUCTION NOTES

1. SOLAR PHOTOVOLTAIC SYSTEM TO BE INSTALLED ON RESIDENTIAL STRUCTURE.
2. THIS PROJECT HAS BEEN DESIGNED IN COMPLIANCE WITH THE CBC SECTION 1609 TO WITHSTAND A BASIC WIND SPEED OF 115 MPH (3 SECOND GUST), WIND EXPOSURE C.
3. THE ROOF MEMBERS ARE 2X4 TRUSS AT 5' ON CENTER. CONNECTION TO STRUCTURE SHALL NOT BE WITHIN 6" OF NAILING PLATES.
4. THE SOLAR PHOTOVOLTAIC INSTALLATION SHALL NOT OBSTRUCT ANY PLUMBING, MECHANICAL OR BUILDING ROOF VENTS.
5. ALL CONDUCTORS AND CONDUITS MOUNTED ON ROOF SHALL BE MINIMUM 3 3/4" ABOVE ROOF SURFACE (INCLUDING CABLES UNDERNEATH MODULES AND RACKING).
6. ROOF ACCESS POINTS SHALL BE PROVIDED PER THE FOLLOWING (CRC R324.7.1, CBC 3111.2.1):

   LOCATED IN AREAS NOT REQUIRING PLACEMENT OF GROUND LADDERS OVER OPENINGS SUCH AS DOORS OR WINDOWS.

   LOCATED AT STRONG POINTS OF BUILDING CONSTRUCTION IN LOCATIONS WHERE ACCESS POINT DOES NOT CONFLICT WITH OVERHEAD OBSTRUCTIONS SUCH AS: TREE LIMBS, WIRES, OR SIGNS

CONTRACTOR

LIC. NO.:
HIC. NO.:
ELE. NO.:

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

SITE PLAN

DATE: 05.31.2018

DESIGN BY: A.L.

CHECKED BY: M.M

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(SHEET 3)

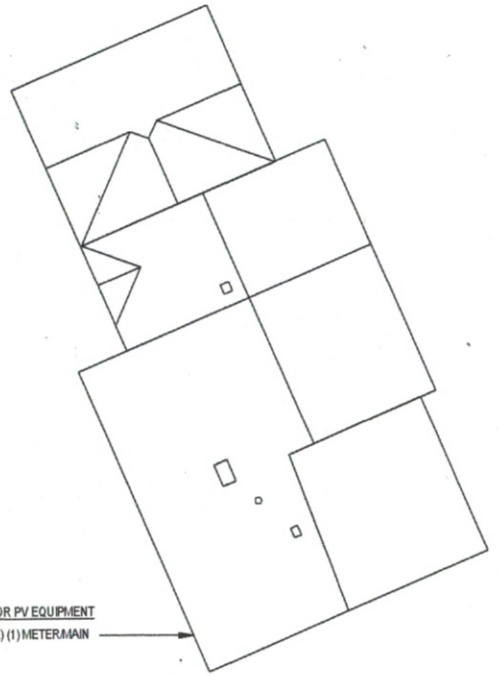
GENERAL NOTES

1. FIELD VERIFY ALL MEASUREMENTS
2. ITEMS BELOW MAY NOT BE ON THIS PAGE

FIRE CLEARANCE

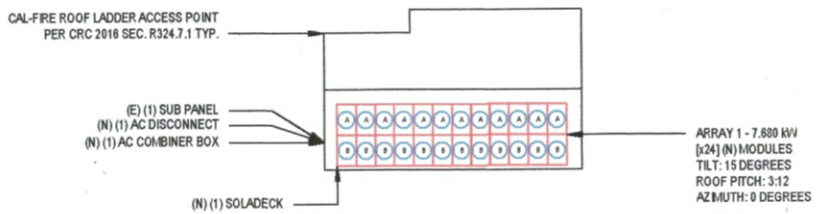
(A) MODULE STRINGING

(B) MODULE STRINGING



EXTERIOR PV EQUIPMENT

(E) (1) METER/MAIN



01 ELECTRICAL PLAN

3/64" = 1'

0 10'-8" 21'-4"

N

W E

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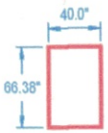

MODULE:
LG ELECTRONICS
LG320N1K-A5
320 WATTS

CONTRACTOR

LIC. NO.:
HIC. NO.:
ELE. NO.:

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

ELECTRICAL PLAN

DATE: 05.31.2018

DESIGN BY: A.L.

CHECKED BY: M.M

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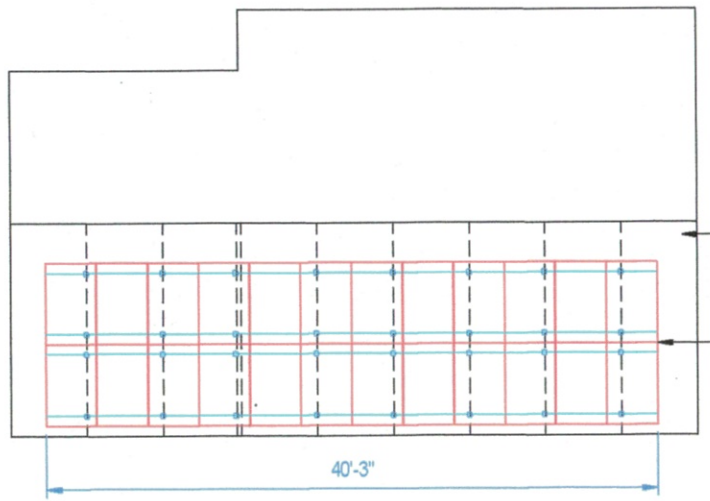
(SHEET 4)

GENERAL NOTES

1. FIELD VERIFY ALL MEASUREMENTS
2. ITEMS BELOW MAY NOT BE ON THIS PAGE

– – – – ROOF TRUSSES



01 SOLAR ATTACHMENT PLAN

1/8" = 1'

0 4' 8'

N

W E

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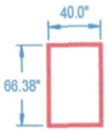

MODULE:
LG ELECTRONICS
LG320N1K-A5
320 WATTS

CONTRACTOR

LIC. NO.:
HIC. NO.:
ELE. NO.:

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

SOLAR ATTACHMENT PLAN

DATE: 05.31.2018

DESIGN BY: A.L.

CHECKED BY: M.M

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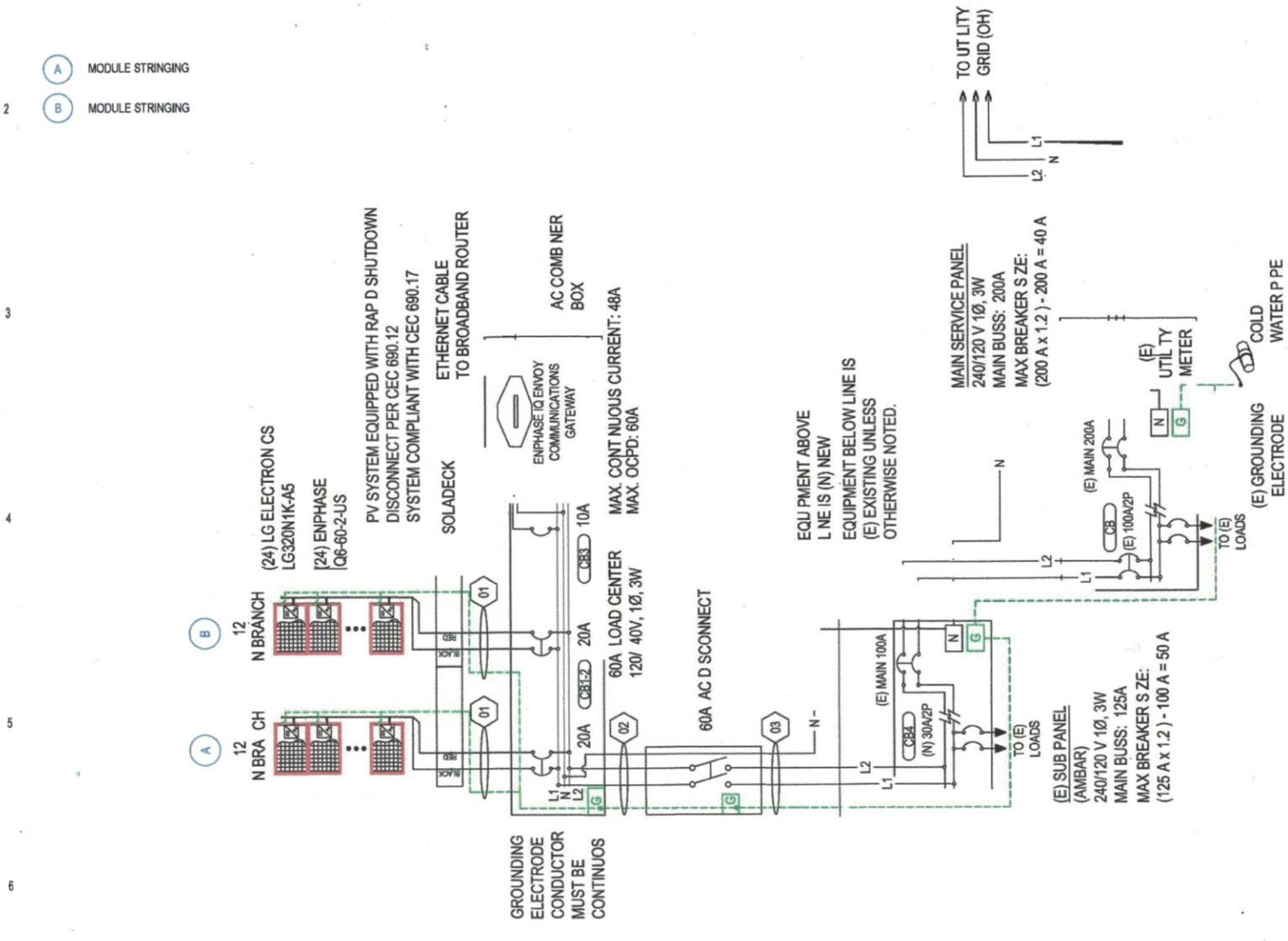
(SHEET 5)

CONDUCTOR AND CONDUIT SCHEDULE W/ELECTRICAL CALCULATIONS

ID	TYPICAL	CONDUCTOR	CONDUIT	CURRENT-CARRYING CONDUCTORS IN CONDUIT	OCPD	EGC	TEMP. CORR. FACTOR	CONDUIT FILL FACTOR	CONT. CURRENT	MAX. CURRENT (125%)	BASE AMP.	DERATED AMP.	TERM. TEMP. RATING	AMP. @ TERMINAL
01		10 AWG THWN-2, COPPER	0.75" DIA. EMT	4	20A	10 AWG THWN-2, COPPER	0.76 (52.9°C)	0.8	11.52A	14.4A	40A	24.32A	75°C	35A
02		10 AWG THWN-2, COPPER	0.75" DIA. EMT	2	N/A	10 AWG THWN-2, COPPER	0.96 (30.9°C)	1.0	23.04A	28.8A	40A	38.4A	75°C	35A
03		10 AWG THWN-2, COPPER	0.75" DIA. EMT	2	30A	10 AWG THWN-2, COPPER	0.96 (30.9°C)	1.0	23.04A	28.8A	40A	38.4A	75°C	35A



CONTRACTOR

NEW PV SYSTEM: 7.680 kWp

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

LINE DIAGRAM

DATE: 05.31.2018

DESIGN BY: A.L.

CHECKED BY: M.M.

REVISIONS

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(SHEET 6)

SYSTEM SUMMARY

	BRANCH #1	BRANCH #2
INVERTERS PER BRANCH	12	12
MAX AC CURRENT	12.52A	12.52A
MAX AC OUTPUT POWER	2,880W	2,880W
ARRAY STC POWER	7,680W	
ARRAY PTC POWER	7,169W	
MAX AC CURRENT	23.04A	
MAX AC POWER	5,760W	
DERATED (CEC) AC POWER	5,760W	

DESIGN TEMPERATURES

ASHRAE EXTREME LOW	-0.3°C (31.5°F), SOURCE: BROWN FLD MUNI 32.57°, -116.98°
ASHRAE 2%HIGH	30.9°C (87.6°F), SOURCE: BROWN FLD MUNI 32.57°, -116.98°

MODULES

REF.	QTY.	MAKE AND MODEL	PMAX	PTC	ISC	IMP	VOC	VMP	TEMP. COEFF. OF VOC	FUSE RATING
PM1-24	24	LG ELECTRONICS LG320N1K-A5	320W	294.7W	10.19A	9.62A	40.8V	33.3V	-0.11V/°C (-0.27%/°C)	20A

INVERTERS

REF.	QTY.	MAKE AND MODEL	AC VOLTAGE	GROUND	MAX OCPD RATING	RATED POWER	MAX OUTPUT CURRENT	MAX INPUT CURRENT	MAX INPUT VOLTAGE	CEC WEIGHTED EFFICIENCY
I1-24	24	ENPHASE IQ6-60-2-US	240V	FLOATING	20A	240W	0.96A	15A	48V	97%

DISCONNECTS

REF.	QTY.	MAKE AND MODEL	RATED CURRENT	MAX RATED VOLTAGE
SW1	1	SQUARE D DU221RB OR EQUIV.	30A	240VAC

OCPDS

REF.	QTY.	RATED CURRENT	MAX VOLTAGE
CB1-2	2	20A	240VAC
CB3	1	10A	240VAC
CB4	1	30A	240VAC

BILL OF MATERIALS

CATEGORY	MAKE	MODEL NUMBER	REF	QTY	UNIT	QTY/UNIT	DESCRIPTION
MODULE	LG ELECTRONICS	LG320N1K-A5	PM1-24	24	PIECES	1	LG ELECTRONICS LG320N1K-A5 320W, 60 CELLS, MONOCRYSTALLINE SILICON
INVERTER	ENPHASE	IQ6-60-2-US	I1-24	24	PIECES	1	ENPHASE IQ6-60-2-US 240W MICROINVERTER
DISCONNECT	SQUARE D	DU221RB	SW1	1	PIECE	1	SQUARE D DU221RB, 2-POLE, 30A, 240VAC OR EQUIVALENT
MISC ELECTRICAL EQUIPMENT		GEN-CABLE-CLIP	HDWR27-147	120	PIECES	1	GENERIC CABLE CLIP
AC COMBINER BOX		GEN-AC-PANEL	EP1	1	PIECE	1	AC SUBPANEL
WIRING	ENPHASE	ET12-10-240 BULK	EN1-24	24	PIECES	1	ENPHASE IQCABLE BULK PACK PORTRAIT
WIRING	ENPHASE	Q-TERM-10	EN25	1	BUNDLE	10	ENPHASE IQ TERMINATOR CAP
WIRING	ENPHASE	Q-SEAL-10	EN26	1	BUNDLE	10	ENPHASE IQ SEALING CAP
WIRING		GEN-10-AWG-THWN-2-CU-RD	WR1-2	110	FEET	1	10 AWG THWN-2, COPPER, RED (LINE 2)
WIRING		GEN-10-AWG-THWN-2-CU-GR	WR1-2	110	FEET	1	10 AWG THWN-2, COPPER, GREEN (GROUND)
WIRING		GEN-10-AWG-THWN-2-CU-BLK	WR1-2	110	FEET	1	10 AWG THWN-2, COPPER, BLACK (LINE 1)
WIRING		GEN-10-AWG-THWN-2-CU-WH	WR2	20	FEET	1	10 AWG THWN-2, COPPER, WHITE (NEUTRAL)
WIREWAY	ENPHASE	ET-SPLK-05	E27	1	BUNDLE	5	ENPHASE ENGAGE (TM) ENGAGE COUPLER
WIREWAY		GEN-EMT-0_75DIA	WW1-2	65	FEET	1	EMT CONDUIT, 0.75 DIA.
OCPD	GENERIC MANUFACTURER	GEN-CB-20A-240VAC	CB1-2	2	PIECES	1	CIRCUIT BREAKER, 20A, 240VAC
OCPD	GENERIC MANUFACTURER	GEN-CB-10A-240VAC	CB3	1	PIECE	1	CIRCUIT BREAKER, 10A, 240VAC
OCPD	GENERIC MANUFACTURER	GEN-CB-30A-240VAC	CB4	1	PIECE	1	CIRCUIT BREAKER, 30A, 240VAC
TRANSITION BOX	GENERIC MANUFACTURER	GEN-AWB-TB-4-4X	JB1	1	PIECE	1	TRANSITION/PASS-THROUGH BOX, WITH 4 TERMINAL BLOCKS

CONTRACTOR

LIC. NO.:
HIC. NO.:
ELE. NO.:

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

DESIGN TABLES

DATE: 05.31.2018

DESIGN BY: A.L.

CHECKED BY: M.M.

REVISIONS

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(SHEET 7)

PERMANENT SIGNAGE NOTES:

1. NOT ALL PLACARDS SHOWN MAY BE REQUIRED BY LOCAL AHJ. CONTRACTOR TO VERIFY PLACARD REQUIREMENTS WITH LOCAL AHJ BEFORE INSTALLATION.
2. ALL PLAQUES AND SIGNAGE REQUIRED BY THE LATEST EDITION OF THE CALIFORNIA ELECTRICAL CODE AND THE SAN DIEGO AREA ELECTRICAL NEWSLETTER WILL BE INSTALLED AS REQUIRED.
3. ALTERNATE POWER SOURCE PLACARD SHALL BE METALLIC OR PLASTIC, ENGRAVED OR MACHINE PRINTED LETTERS IN A CONTRASTING COLOR TO THE PLAQUE. THIS PLAQUE WILL BE ATTCHED BY POP RIVETS OR SCREWS OR OTHER APPROVED METHOD.
4. DIRECTORY PLACARD MARKING CONTENT AND FORMAT: RED BACKGROUND, WHITE LETTERING, MINIMUM 3/8" LETTER HIEGHT, ALL CAPITAL LETTERS, ARIAL OR SIMILAR FONT, NON BOLD, REFLECTIVE WEATHER RESISTANT MATERIAL SUITABLE FOR THE ENVIRONMENT.

! WARNING !
ELECTRIC SHOCK HAZARD
IF A GROUND FAULT IS INDICATED, NORMALLY GROUNDED CONDUCTORS MAY BE UNGROUNDED AND ENERGIZED.

LABEL 1
AT EACH INVERTER
[NEC 690.5]

! WARNING !
ELECTRIC SHOCK HAZARD
DO NOT TOUCH TERMINALS.
TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION.

LABEL 2
AT EACH DISCONNECTING MEANS FOR PHOTOVOLTAIC EQUIPMENT
[NEC 690.17]

PHOTOVOLTAIC AC DISCONNECT
OPERATING CURRENT: 23.04 A AC
OPERATING VOLTAGE: 240 V AC

LABEL 4
AT POINT OF INTERCONNECTION, MARKED AT DISCONNECTING MEANS
[NEC 690.54]

PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN

LABEL 9
AT RAPID SHUTDOWN SWITCH [NEC 690.56(B)]. LETTERS AT LEAST 3/8 INCH; WHITE ON RED BACKGROUND; REFLECTIVE [IFC 605.11.1.1]

! WARNING !
DUAL POWER SOURCES.
SECOND SOURCE IS PV SYSTEM

! CAUTION !
PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED

LABEL 5
LABEL 6
AT POINT OF INTERCONNECTION; LABEL, SUCH AS LABEL 5 OR LABEL 6 MUST IDENTIFY PHOTOVOLTAIC SYSTEM
[NEC 705.12(D)(4)]

INTERACTIVE PHOTOVOLTAIC SYSTEM CONNECTED

LABEL 7
AT UTILITY METER
[NEC 690.56(B)]

DIRECTORY
PERMANENT PLAQUE OR DIRECTORY PROVIDING THE LOCATION OF THE SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC SYSTEM DISCONNECTING MEANS IF NOT IN THE SAME LOCATION
[NEC 690.56(B)]
WHERE THE INVERTERS ARE REMOTELY LOCATED FROM EACH OTHER, A DIRECTORY IN ACCORDANCE WITH 705.10 SHALL BE INSTALLED AT EACH DC PV SYSTEM DISCONNECTING MEANS, AT EACH AC DISCONNECTING MEANS, AND AT THE MAIN SERVICE DISCONNECTING MEANS SHOWING THE LOCATION OF ALL AC AND DC PV SYSTEM DISCONNECTING MEANS IN THE BUILDING.
[NEC 690.4(H)]

WARNING: PHOTOVOLTAIC POWER SOURCE

LABEL 10
AT EXPOSED RACEWAYS, CABLE TRAYS, AND OTHER WIRING METHODS; SPACED AT MAXIMUM 10 FT SECTION OR WHERE SEPARATED BY ENCLOSURES, WALLS, PARTITIONS, CEILINGS, OR FLOORS.
[NEC 690.31(G)]
LETTERS AT LEAST 3/8 INCH; WHITE ON RED BACKGROUND; REFLECTIVE
[IFC 605.11.1.1]

PHOTOVOLTAIC AC DISCONNECT

LABEL 11
AT EACH AC DISCONNECTING MEANS
[NEC 690.13(B)]

! WARNING !
INVERTER OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL 12
AT POINT OF INTERCONNECTION OVERCURRENT DEVICE
[NEC 705.12(D)(7)]

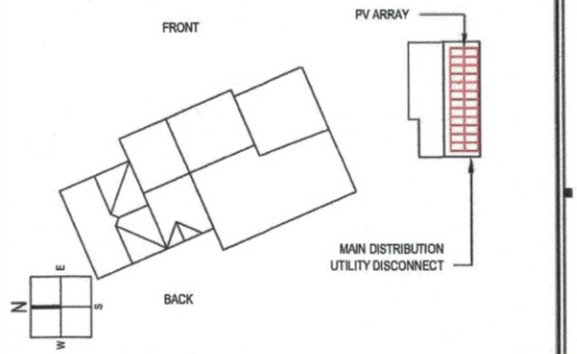
INTERACTIVE PHOTOVOLTAIC SYSTEM CONNECTED
PHOTOVOLTAIC SYSTEM DISCONNECT LOCATED WEST SIDE OF THE GARAGE

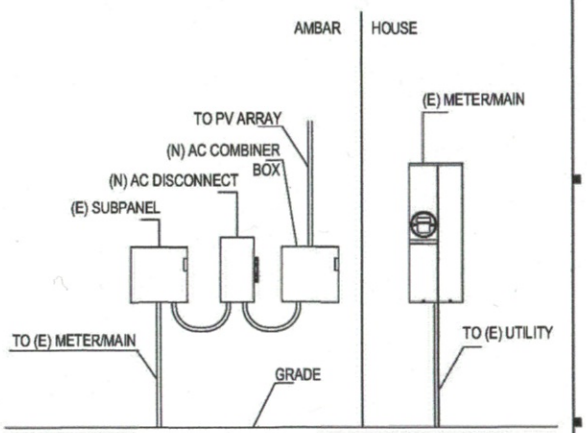
PLAQUE

LABELING NOTES:
1.1 LABELING REQUIREMENTS BASED ON THE 2014 NATIONAL ELECTRICAL CODE, INTERNATIONAL FIRE CODE 605.11, OSHA STANDARD 1910.145, ANSI Z535
1.2 MATERIAL BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
1.3 LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED.
1.4 LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8" AND PERMANENTLY AFFIXED.
1.5 ALERTING WORDS TO BE COLOR CODED. "DANGER" WILL HAVE RED BACKGROUND; "WARNING" WILL HAVE ORANGE BACKGROUND; "CAUTION" WILL HAVE YELLOW BACKGROUND. [ANSI Z535]

!CAUTION!

POWER TO THIS BUILDING IS ALSO SUPPLIED FROM ROOF MOUNTED SOLAR ARRAYS WITH SAFETY DISCONNECTS AS SHOWN:





01 **EQUIPMENT ELEVATION**
NOT TO SCALE

CONTRACTOR

NEW PV SYSTEM: 7.680 kWp

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

PLACARDS

DATE: 05.31.2018
DESIGN BY: A.L.
CHECKED BY: M.M.
REVISIONS

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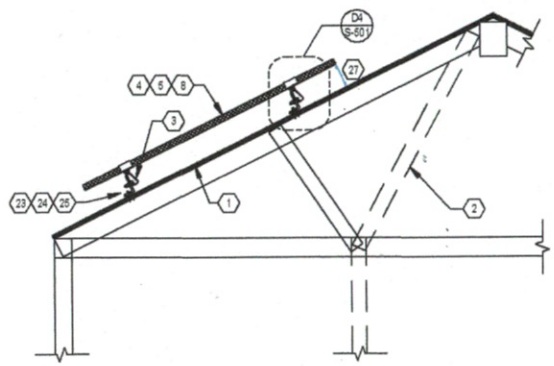
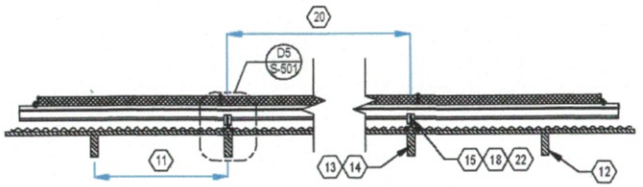
(SHEET 6)



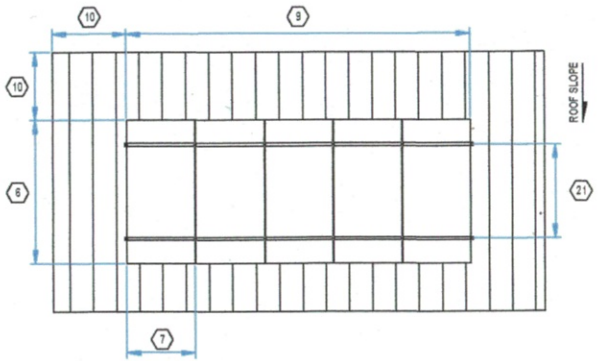
D1 RACKING DETAIL (TRANSVERSE)

NOT TO SCALE



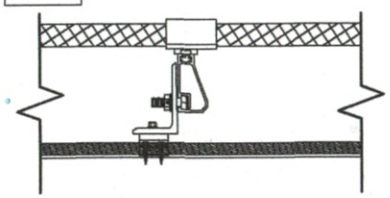
D2 RACKING DETAIL (LONGITUDINAL)

NOT TO SCALE



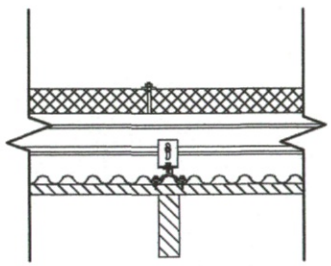
D3 RACKING DETAIL (TOP)

NOT TO SCALE



D4 DETAIL (TRANSVERSE)

NOT TO SCALE



D5 DETAIL (LONGITUDINAL)

NOT TO SCALE

GENERAL NOTES

1. FIELD VERIFY ALL MEASUREMENTS

SHEET KEYNOTES

1. ROOF MATERIAL: CORRUGATED METAL
2. ROOF STRUCTURE: TRUSS
3. ATTACHMENT TYPE: S5! CORRUBRACKET
4. MODULE MANUFACTURER: LG ELECTRONICS
5. MODULE MODEL: LG320N1K-A5
6. MODULE LENGTH: 66.38"
7. MODULE WIDTH: 40.0"
8. MODULE WEIGHT: 39.68 LBS.
9. SEE SHEET A-103 FOR DIMENSION(S)
10. MIN. FIRE OFFSET: NO FIRE CODE ENFORCED
11. TRUSS SPACING: 5'
12. TRUSS SIZE: 2X2 STEEL
13. LAG BOLT DIAMETER: 5/16 IN.
14. LAG BOLT EMBEDMENT: 2-1/2 IN.
15. TOTAL # OF ATTACHMENTS: 32
16. TOTAL AREA: 442.53 SQ. FT.
17. TOTAL WEIGHT: 1101.28 LBS.
18. WEIGHT PER ATTACHMENT: 34.42 LBS.
19. DISTRIBUTED LOAD: 2.49 PSF.
20. MAX. HORIZONTAL STANDOFF: 44.5 IN.
21. MAX. VERTICAL STANDOFF: LANDSCAPE: 26 IN., PORTRAIT: 33 IN.
22. STANDOFF STAGGERING: YES
23. RAIL MANUFACTURER (OR EQUIV.): IRINRIDGE
24. RAIL MODEL (OR EQUIVALENT): XR-10-168A
25. RAIL WEIGHT: 0.436 PLF.
26. MAX. TRUSS SPAN: 10 FT.
27. MODULE CLEARANCE: 3 IN. MIN., 6 IN. MAX.

CONTRACTOR

LIC. NO.:
HIC. NO.:
ELE. NO.:

NEW PV SYSTEM: 7.680 kWp

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

ASSEMBLY DETAILS

DATE: 05.31.2018
DESIGN BY: A.L.
CHECKED BY: M.M.

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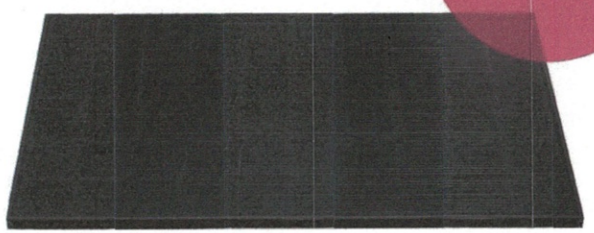
(SHEET #)

LG
Life's Good

Innovation for a Better Life



LG NeON® 2 Black LG320N1K-A5

60 cell

LG's new module, LG NeON® 2, adopts Cello technology. Cello technology replaces 3 busbars with 12 thin wires to enhance power output and reliability. LG NeON® 2 demonstrates LG's efforts to increase customer's values beycnd efficiency. It features enhanced warranty, durability, performance under real environment, and aesthetic design suitable for roofs.

Enhanced Performance Warranty

LG NeON® 2 Black has an enhanced performance warranty. The annual degradation has fallen from -0.6%/yr to -0.5%/yr. Even after 25 years, the cell guarantees 2.4% more output than the previous LG NeON® 2 modules.

Roof Aesthetics

LG NeON® 2 Black has been designed with aesthetics in mind, using thinner wires that appear all black at a distance.

Improved Performance on Sunny Days

LG NeON® 2 Black now performs better on sunny days, thanks to its improved temperature coefficient.

High Power Output

Compared with previous models, the LG NeON® 2 Black has been designed to significantly enhance its output efficiency, thereby making it efficient even in limited space.

Outstanding Durability

With its newly reinforced frame design, LG has extended the warranty of the LG NeON® 2 Black for an additional 3 years. Additionally, LG NeON® 2 Black can endure a front load up to 6000 Pa, and a rear load up to 5400 Pa.

Double-Sided Cell Structure

The rear of the cell used in the LG NeON® 2 Black contributes to generation just like the front; the light beam reflected from the rear of the module is reabsorbed to generate additional power.

About LG Electronics

LG Electronics is a global player who has been committed to expanding its operations with the solar market. The company first embarked on a solar energy source research programs in 1985, supported by LG Group's vast experience in the semi-conductor, LCD, chemistry, and materials industries. In 2010, LG Solar successfully released its first Mono X® series to the market, which is now available in 32 countries. The LG NeON® (previously known as Mono X® NeON) and the LG NeON® 2 won the "Intersolar Award" in 2013 and 2015,which demonstrates LG Solar's lead, innovations and commitment to the industry.

LG NeON® 2 Black LG320N1K-A5

Mechanical Properties

Cells	6 x 10
Cell Vendor	LG
Cell Type	Monocrystalline / N-type
Cell Dimensions	161.7 x 161.7 mm / 6 inches
# of Busbar	12 (Multi Wire Busbar)
Dimensions (L x W x H)	1686 x 1016 x 40 mm 66.38 x 40 x 1.57 inch
Front Load	6000 Pa
Rear Load	5400 Pa
Weight	18 kg
Connector Type	MC4
Junction Box	IP68 with 3 Bypass Diodes
Length of Cables	1000 mm x 2 ea
Glass	Tempered Glass with AR Coating
Frame	Anodized Aluminum

Certifications and Warranty

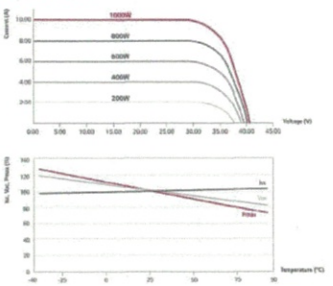
Certifications	IEC 61215, IEC 61730-1/-2
	UL 1703
	IEC 61701 (Salt mist corrosion test)
	IEC 62716 (Ammonia corrosion test)
	ISO 9001
Module Fire Performance (USA)	Type 2
Fire Rating (for CANADA)	Class C
Product Warranty	25 years
Output Warranty of Pmax	Linear warranty**

** 1) 1st year : 98%, 2) After 1st year : 0.5% annual degradation, 3) 25 years : 86.1%

Temperature Characteristics

NOCT	45 ± 3 °C
Pmpp	-0.37 %/°C
Voc	-0.27 %/°C
Isc	0.03 %/°C

Characteristic Curves



Electrical Properties (STC *)

Module	LG320N1K-A5
Maximum Power (Pmax)	320
MPP Voltage (Vmpp)	33.3
MPP Current (Impp)	9.62
Open Circuit Voltage (Voc)	40.8
Short Circuit Current (Isc)	10.19
Module Efficiency	18.7
Operating Temperature	-40 ~ +90
Maximum System Voltage	1,000
Maximum Series Fuse Rating	20
Power Tolerance (%)	0 ~ +3

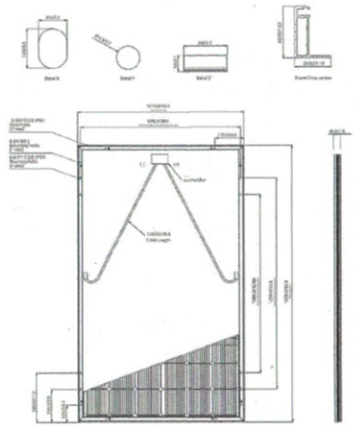
* STC (Standard Test Condition) Irradiance 1,000 W/m², Ambient Temperature 25 °C, AM 1.5
* The nameplate power output is measured and determined by LG Electronics at its sole and absolute discretion.
* The typical change in module efficiency at 200 W/m² in relation to 1000 W/m² is -2.0%.

Electrical Properties (NOCT*)

Module	LG320N1K-A5
Maximum Power (Pmax)	236
MPP Voltage (Vmpp)	30.8
MPP Current (Impp)	7.67
Open Circuit Voltage (Voc)	38.0
Short Circuit Current (Isc)	8.20

* NOCT (Nominal Operating Cell Temperature) Irradiance 800W/m², ambient temperature 20 °C, wind speed 1m/s.

Dimensions (mm/in)



LG
Life's Good

North America Solar Business Team
LG Electronics U.S.A. Inc
1000 Sylvan Ave, Englewood Cliffs, NJ 07632

Contact: lgsolar@lge.com
www.lgsolarusa.com

Innovation for a Better Life

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LIC. NO.:
HIC. NO.:
ELE. NO.:

NEW PV SYSTEM: 7.680 kWp

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

RESOURCE DOCUMENT

DATE: 05.31.2018

DESIGN BY: A.L.

CHECKED BY: M.M.

REVISIONS

R-001.00

SHEET 10

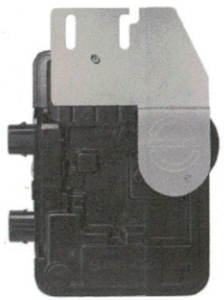
Data Sheet
Enphase Microinverters

Enphase IQ 6 and IQ 6+ Microinverters

The high-powered smart grid-ready Enphase IQ 6 Micro™ and Enphase IQ 6+ Micro™ dramatically simplify the installation process while achieving the highest efficiency for module-level power electronics.

Part of the Enphase IQ System, the IQ 6 and IQ 6+ Micro integrate seamlessly with the Enphase IQ Envoy™, Enphase Q Aggregator™, Enphase IQ Battery™, and the Enphase Enlighten™ monitoring and analysis software.

The IQ 6 and IQ 6+ Micro extend the reliability standards set forth by previous generations and undergo over a million hours of power-on testing. Enabling Enphase to provide an industry-leading warranty of up to 25 years.



Easy to Install

- Lightweight and simple
- Faster installation with improved two-wire cabling
- Built-in rapid shutdown compliant (NEC 2014)

Productive and Reliable

- Optimized for high powered 60-cell and 72-cell* modules
- More than a million hours of testing
- Class II double-insulated enclosure

Smart Grid Ready

- Complies with fixed power factor, voltage and frequency ride-through requirements
- Remotely updates to respond to changing grid requirements
- Configurable for varying grid profiles

* The IQ 6+ Micro is required to support 72-cell modules

To learn more about Enphase offerings, visit **enphase.com**

ENPHASE

Enphase IQ 6 and IQ 6+ Microinverters

INPUT DATA (DC)	IQ6-60-2-US AND IQ6-60-5-US		IQ6PLUS-72-2-US AND IQ6PLUS-72-5-US	
Commonly used module pairings[1]	195 W - 330 W +		235 W - 400 W +	
Module compatibility	60-cell PV modules only		60-cell and 72-cell PV modules	
Maximum input DC voltage	48 V		62 V	
Peak power tracking voltage	27 V - 37 V		27 V - 45 V	
Operating range	16 V - 48 V		16 V - 62 V	
Min/Max start voltage	22 V / 48 V		22 V / 62 V	
Max DC short circuit current (module Isc)	15 A		15 A	
Overvoltage class DC port	II		II	
DC port backfeed under single fault	0 A		0 A	
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)	**IQ6-60-2-US AND IQ6-60-5-US**		**IQ6PLUS-72-2-US AND IQ6PLUS-72-5-US**	
Peak output power	240 VA		290 VA	
Maximum continuous output power	230 VA		280 VA	
Nominal voltage/range[2]	240 V / 211-264 V	208 V (1Φ) / 183-229 V	240 V / 211-264 V	208 V (1Φ) / 183-229 V
Nominal output current	0.96 A	1.11 A	1.17 A	1.35 A
Nominal frequency	60 Hz		60 Hz	
Extended frequency range	47 - 68 Hz		47 - 68 Hz	
Power factor at rated power	1.0		1.0	
Maximum units per 20 A branch circuit	16 (240 VAC) 14 (single-phase 208 VAC)		13 (240 VAC) 11 (single-phase 208 VAC)	
Overvoltage class AC port	III		III	
AC port backfeed under single fault	0 A		0 A	
Power factor (adjustable)	0.7 leading ... 0.7 lagging		0.7 leading ... 0.7 lagging	
EFFICIENCY	**@240 V**	**@208 V (1Φ)**	**@240 V**	**@208 V (1Φ)**
CEC weighted efficiency	97.0 %	96.5 %	97.0 %	96.5 %
MECHANICAL DATA				
Ambient temperature range	-40°C to +65°C			
Relative humidity range	4% to 100% (condensing)			
Connector type	MC4 or Amphenol H4 UTX			
Dimensions (WxHxD)	219 mm x 191 mm x 37.9 mm (without bracket)			
Weight	1.5 kg (3.3 lbs)			
Cooling	Natural convection - No fans			
Approved for wet locations	Yes			
Pollution degree	PD3			
Environmental category / UV exposure rating	Outdoor - NEMA 250, type 6 (IP67)			
FEATURES				
Communication	Power line			
Monitoring	Enlighten Manager and MyEnlighten monitoring options Compatible with Enphase IQ Envoy			
Compliance	UL 62109-1, UL1741/IEEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01 This product is UL Listed as PV Rapid Shut Down Equipment and conforms with NEC-2014 and NEC-2017 section 690.12 and C22.1-2015 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according manufacturer's instructions.			

1. No enforced DC/AC ratio. See the compatibility calculator at enphase.com/en-us/support/module-compatibility.
2. Nominal voltage range can be extended beyond nominal if required by the utility.

To learn more about Enphase offerings, visit **enphase.com**

2017-05-01

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HIC. NO.:
ELE. NO.:

NEW PV SYSTEM: 7.680 kWp

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

RESOURCE DOCUMENT

DATE: 05.31.2018
DESIGN BY: A.L.
CHECKED BY: M.M.

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SHEET 11

Enphase® Energy // Rapid Shutdown

Rapid shutdown is built-in

The 2014 edition of the National Electrical Code (NEC 2014) added new rapid shutdown requirements for PV systems installed on buildings. Enphase Microinverters fully meet rapid shutdown requirements in the new code without the need to install any additional electrical equipment.

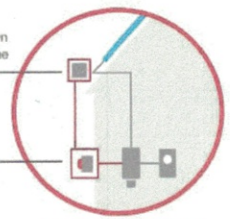
What's new in NEC 2014?
NEC 2014, Section 690.12 applies to PV conductors over 10 feet from the PV array and requires that the conductors power down to 30 volts and 240 volt-amperes within 10 seconds of rapid shutdown initiation.

String inverters require work arounds for rapid shutdown

Work around.
Specialized Rapid Shutdown electrical box installed on the roof within 10 feet of array.

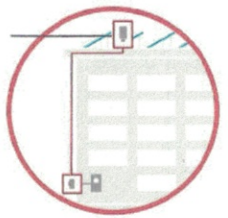
Work around.
Shutoff switch that is easily accessible to first responders on the ground.

Work around.
Extra conduit in installation.



Residential String Inverter

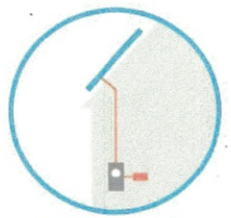
Work around.
String inverter installed on roof, a hostile environment that string inverters are not built to live in.



Commercial String Inverter

Enphase comes standard with rapid shutdown capability

All Enphase microinverters, even those that were previously installed, inherently meet rapid shutdown requirements, no additional equipment or workarounds needed



Residential Microinverter

Enphase microinverters can safely shut down automatically, leaving only low-voltage DC electricity isolated to the PV module

Commercial Microinverter

To learn more, visit enphase.com

[e] enphase® ENERGY

31.01.2018 QIJW.E341165 - Photovoltaic Rapid Shutdown System Equipment

UL ONLINE CERTIFICATIONS DIRECTORY

QIJW.E341165
Photovoltaic Rapid Shutdown System Equipment

Page Bottom

Photovoltaic Rapid Shutdown System Equipment

See General Information for Photovoltaic Rapid Shutdown System Equipment

ENPHASE ENERGY INC E341165
1420 N McDowell Blvd
Petaluma, CA 94954-6515 USA

Cat. No.	Function	Ratings
Photovoltaic rapid shutdown system equipment		
M190-60, -72	Inverter/AC Attenuator	Input: 16-48VDC Output: 128/208 or 120/240, 190W
M210-84	Inverter/AC Attenuator	Input: 16-48VDC Output: 128/208 or 120/240, 210 W
M215-60	Inverter/AC Attenuator	Input: 16-48VDC Output: 128/208 or 120/240, 215W
M250-60, -72	Inverter/AC Attenuator	Input: 16-48VDC Output: 128/208 or 120/240, 250W
S230-60-LL-X-US	Inverter/AC Attenuator	Input: 22-48VDC Output: 208 or 240, 220W
S280-60-LL-X-US	Inverter/AC Attenuator	Input: 22-48VDC Output: 208 or 240, 270W
IQ6PLUS-72-X-US*(a)(b) IQ6PLUS-72-ACM*(b)	Inverter/AC Attenuator	Input: 16-62VDC Output: 208 or 240, 280W
IQ6-60-X-US*(a)(b) IQ6-60-ACM-US*(b)	Inverter/AC Attenuator	Input: 16-62VDC Output: 208 or 240, 230W
IQ7PLUS-72-X-US*(a)(b) IQ7PLUS-72-ACM*(b)	Inverter/AC Attenuator	Input: 16-62VDC Output: 208 or 240, 290W
IQ7-60-X-US*(a)(b) IQ7-60-ACM-US*(b)	Inverter/AC Attenuator	Input: 16-48VDC Output: 208 or 240, 240W

(a) - Where X may be 2 or S

(b) - Where * may be any combination of letters or numbers or hypen or none

Last Updated on 2017-12-28

Questions? Print this page Terms of Use Page Top

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LIC. NO.:
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NEW PV SYSTEM: 7.680 kWp

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

RESOURCE DOCUMENT

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DESIGN BY: A.L.
CHECKED BY: M.M.

REVISIONS

R-003.00
SHEET 12

Tech Brief

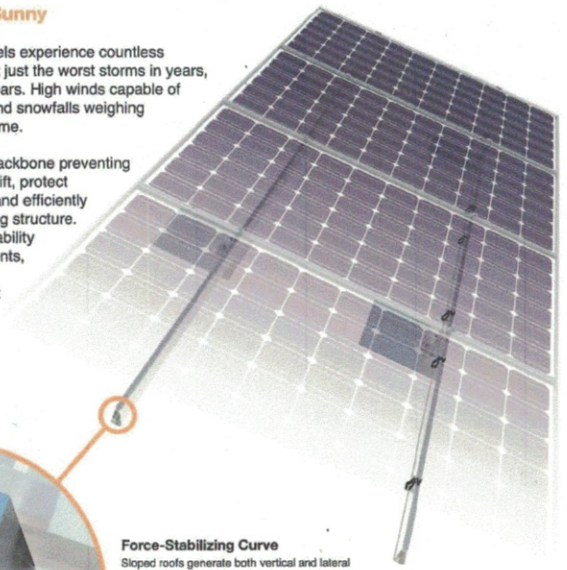
IRONRIDGE

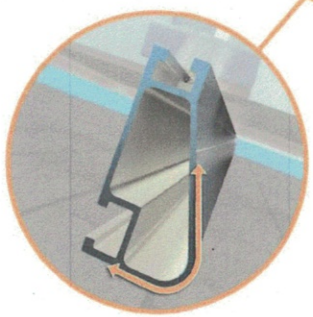
XR Rail Family

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 marine-grade aluminum alloy, then protected with an anodized finish. Anodizing prevents surface and structural corrosion, while also providing a more attractive appearance.

Tech Brief

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 6 foot spans, while remaining light and economical.

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

XR100

XR100 is the ultimate residential mounting rail. It supports a range of wind and snow conditions, while also maximizing spans up to 8 feet.

- 8' 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 12 feet or more for commercial applications.

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

Rail Selection

The following table was prepared in compliance with applicable engineering codes and standards. Values are based on the following criteria: ASCE 7-10, Roof Zone 1, Exposure B, Roof Slope of 7 to 27 degrees and Mean Building Height of 30 ft. Visit IronRidge.com for detailed span tables and certifications.

Load		Rail Span					
Snow (PSF)	Wind (MPH)	4'	5' 4"	6'	8'	10'	12'
None	100	XR10		XR100		XR1000	
	120						
	140						
	160						
10-20	100						
	120						
	140						
	160						
30	100						
	160						
40	100						
	160						
50-70	160						
80-90	160						

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DESIGN BY: A.L.
CHECKED BY: M.M.

REVISIONS

R-004.00

SHEET 13

S-5!®

The Right Way!

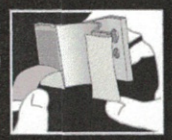
CorruBracket™

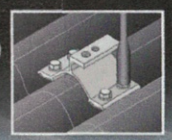
CorruBracket™ can be used to mount almost anything to corrugated metal roofing and is compatible with 7/8" and 3/4" corrugated roofing. No messy sealants to apply! No chance for leaks! The CorruBracket comes with factory-applied butyl sealant already in the base, and the S-5!® patented reservoir conceals the sealant, preventing UV degredation.

Installation is simple! CorruBracket is mounted directly into the supporting structure of the roof, i.e. roof decking, wood or steel purlins, or trusses. No surface preparation is necessary; simply wipe away excess oils and debris, peel the release paper, align, and apply. Secure through the pre-punched holes using the appropriate screws for the supporting structure.

CorruBracket is so strong, it will even support heavy-duty applications like snow retention. For corrugated profiles, the CorruBracket is the perfect match for our ColorGard® snow retention system. CorruBracket is economical and facilitates quick and easy installation.

The right way to attach almost anything to metal roofs!





CorruBracket™

S-5!® CorruBracket™ is the right way to attach almost anything to 7/8" and 3/4" corrugated roofing, including PV via DirectAttached™ or rail methods.

888-825-3432 | www.S-5.com

S-5!®

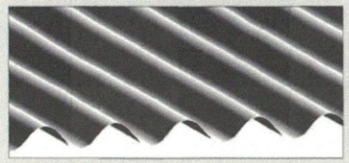
The Right Way!

CorruBracket™ is extremely versatile. It can be used for almost any attachment need on 7/8" and 3/4" corrugated metal roofing. No messy sealants to apply. The factory-applied butyl sealant waterproofs and makes installation a snap!

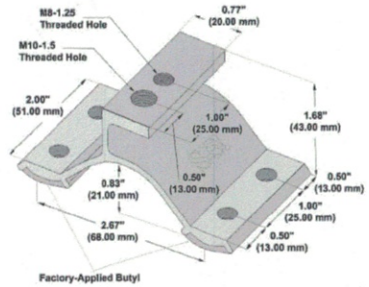
Each **CorruBracket™** comes with factory-applied butyl sealant in the base. CorruBracket is compatible with most common metal roofing materials. For design assistance, ask your distributor, or use our web-based calculator at **www.S-5.com** for job-specific system engineering and design of your next snow retention project. Also, please visit our website for more information including CAD details, metallurgical compatibilities and specifications.

The CorruBracket has been tested for load-to-failure results on wood decking, and metal and wood purlins. The independent lab test data found at www.S-5.com can be used for load-critical designs and applications. S-5!® holding strength is unmatched in the industry.

Example Profile



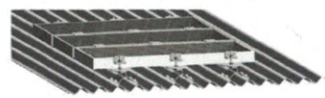
CorruBracket™



Please note: All measurements are rounded to the second decimal place. Contact your distributor for information about hardware requirements.

Example Applications

S-5-PV Kit (DirectAttached™ or Rail)



ColorGard®

S-5!® Warning! Please use this product responsibly!

Products are protected by multiple U.S. and foreign patents. For published data regarding holding strength, bolt torque, patents and trademarks visit the S-5! website at www.S-5.com.

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NEW PV SYSTEM: 7.680 kWp

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DESIGN BY: A.L.
CHECKED BY: M.M.

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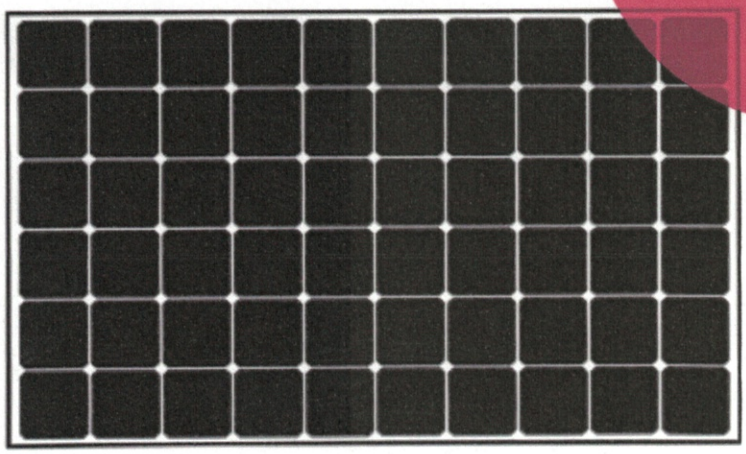
SHEET 14

Appendix C

LG
Life's Good

Innovation for a Better Life



LG NeON® R

LG365Q1C-A5 | LG360Q1C-A5 | LG355Q1C-A5 | LG350Q1C-A5

60 cell

The LG NeON® R is a powerful solar module that provides world-class performance. A new cell structure that eliminates electrodes on the front maximizes the utilization of light and enhances reliability. The LG NeON® R is a result of LG's efforts to increase customer value beyond basic efficiency. The NeON® R features enhanced durability and performance under real-world conditions, an enhanced warranty and an aesthetic design suitable for roofs.

Enhanced Performance Warranty

LG offers a 25-year product warranty for LG NeON® R, including labor, in addition to an enhanced performance warranty. After 25 years, LG NeON® R is guaranteed to produce at least 88.4% of its initial power output.

High Power Output

The LG NeON® R has been designed to significantly enhance its output, making it efficient even in limited space.

Roof Aesthetics

LG NeON® R has been designed with aesthetics in mind: the lack of any electrodes on the front creates an improved, modern aesthetic.

Outstanding Durability

With its newly reinforced frame design, LG NeON® R can endure a front load up to 6000 Pa, and a rear load up to 5400 Pa.

Better Performance on a Sunny Day

LG NeON® R now performs better on sunny days, thanks to its improved temperature coefficient.

Near Zero LID (Light Induced Degradation)

The n-type cells used in LG NeON® R have almost no boron. This leads to less LID (Light Induced Degradation) right after installation.

About LG Electronics

LG Electronics is a global player who has been committed to expanding its capacity, based on solar energy business as its future growth engine. We embarked on a solar energy source research program in 1985, supported by LG Group's rich experience in semi-conductor, LCD, chemistry, and materials industry. We successfully released first Mono X® series to the market in 2010, which were exported to 32 countries in the following 2 years, thereafter. In 2013, NeON™ (previously known as Mono X® NeON) & 2015 NeON2 with CELLO technology won "Intersolar Award", which proved LG is the leader of innovation in the industry.

LG NeON® R

LG365Q1C-A5 | LG360Q1C-A5 | LG355Q1C-A5 | LG350Q1C-A5

Mechanical Properties

Cells	6 x 10
Cell Vendor	LG
Cell Type	Monocrystalline / N-type
Cell Dimensions	161.7 x 161.7 mm / 6 inches
Dimensions (L x W x H)	1700 x 1016 x 40 mm 66.93 x 40.0 x 1.57 inch
Front Load	6000Pa
Rear Load	5400Pa
Weight	18.5 kg
Connector Type	MC4
Junction Box	IP68 with 3 Bypass Diodes
Length of Cables	1000 mm x 2 ea
Glass	Tempered Glass with AR Coating
Frame	Anodized Aluminium

Certifications and Warranty

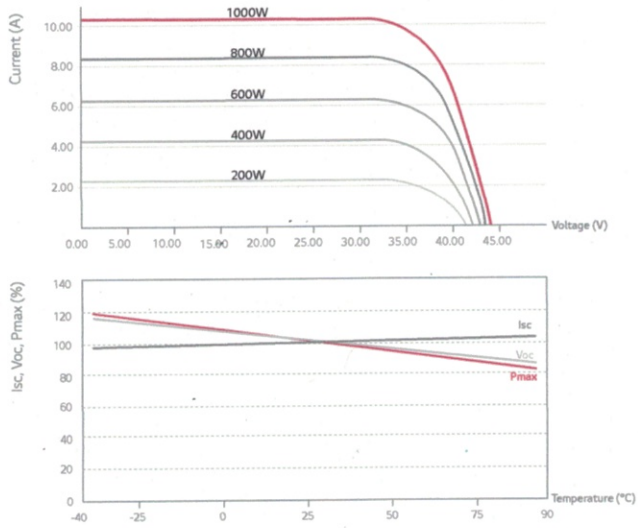
Certifications	IEC 61215, IEC 61730-1/-2
	UL 1703
	IEC 61701 (Salt mist corrosion test)
	IEC 62716 (Ammonia corrosion test)
	ISO 9001
Module Fire Performance (USA)	Type 1
Fire Resistance Class (CANADA)	Class C (ULC / ORD C1703)
Product Warranty	25 years
Output Warranty of Pmax	Linear warranty**

**1) First 5 years : 95%, 2) After 5th year : 0.4% annual degradation, 3) 25 years : 88.4%

Temperature Characteristics

NOCT	44 ± 3 °C
Pmpp	-0.30 %/°C
Voc	-0.24 %/°C
Isc	0.04 %/°C

Characteristic Curves



Electrical Properties (STC *)

Module	365	360	355	350
Maximum Power (Pmax)	365	360	355	350
MPP Voltage (Vmpp)	36.7	36.5	36.3	36.1
MPP Current (Impp)	9.95	9.87	9.79	9.70
Open Circuit Voltage (Voc)	42.8	42.7	42.7	42.7
Short Circuit Current (Isc)	10.8	10.79	10.78	10.77
Module Efficiency	21.1	20.8	20.6	20.3
Operating Temperature	-40 ~ +90			
Maximum System Voltage	1000			
Maximum Series Fuse Rating	20			
Power Tolerance (%)	0 ~ +3			

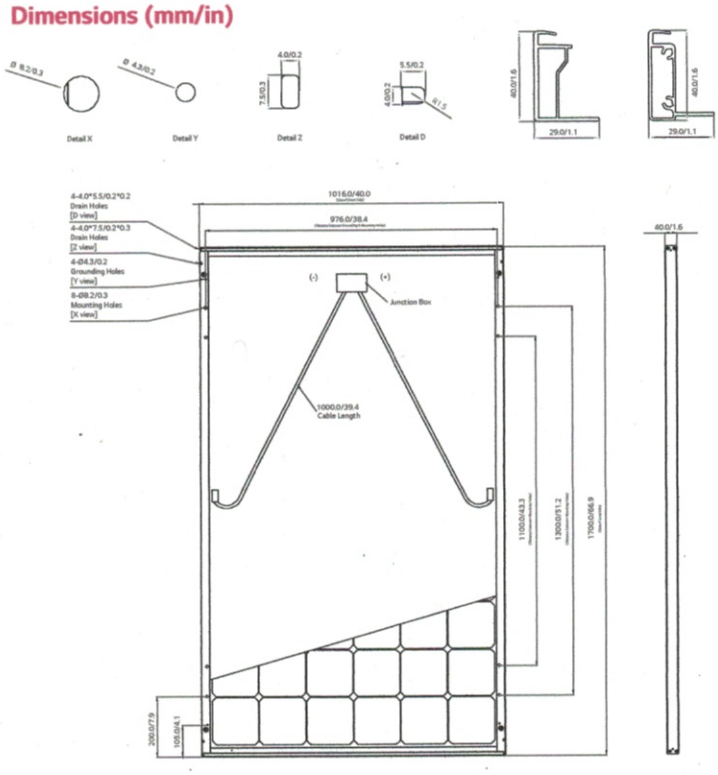
* STC (Standard Test Condition): Irradiance 1,000 W/m², Ambient Temperature 25 °C, AM 1.5
* The nameplate power output is measured and determined by LG Electronics at its sole and absolute discretion.
* The typical change in module efficiency at 200 W/m² in relation to 1000 W/m² is -2.0%.

Electrical Properties (NOCT*)

Module	365	360	355	350
Maximum Power (Pmax)	275	271	267	263
MPP Voltage (Vmpp)	36.6	36.4	36.2	36.0
MPP Current (Impp)	7.51	7.45	7.39	7.32
Open Circuit Voltage (Voc)	40.2	40.2	40.2	40.1
Short Circuit Current (Isc)	8.70	8.69	8.68	8.67

* NOCT (Nominal Operating Cell Temperature): Irradiance 800 W/m², ambient temperature 20 °C, wind speed 1 m/s

Dimensions (mm/in)



* The distance between the center of the mounting/grounding holes.

North America Solar Business Team
LG Electronics U.S.A. Inc
1000 Sylvan Ave, Englewood Cliffs, NJ 07632

Contact: lg.solar@lge.com
www.lgsolarusa.com

Product specifications are subject to change without notice.
DS-T1-72-W-G-P-EN-60630

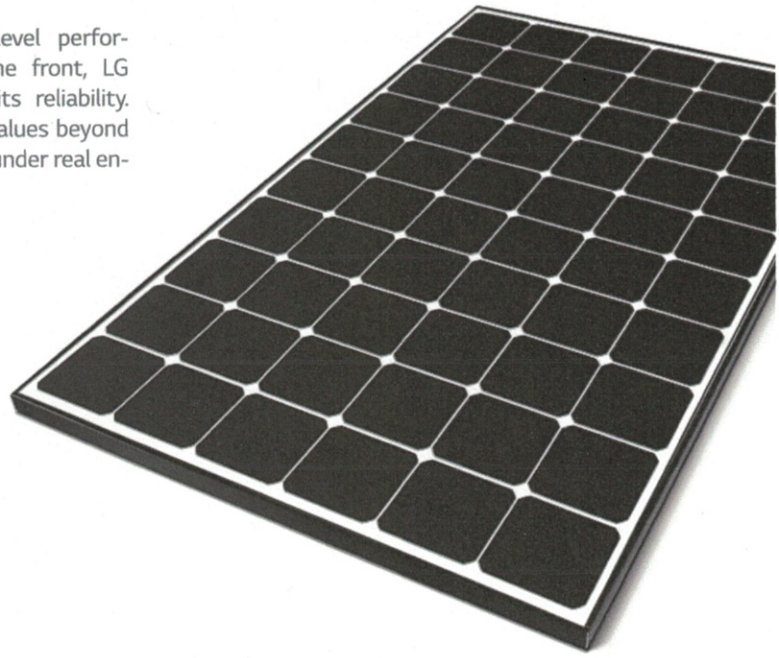
Innovation for a Better Life

LG NeON® R

LG365Q1C-A5 | LG360Q1C-A5 | LG355Q1C-A5 | LG350Q1C-A5

365W | 360W | 355W | 350W

LG NeON® R is new powerful product with global top level performance. Applied new cell structure without electrodes on the front, LG NeON® R maximized the utilization of light and enhanced its reliability. LG NeON® R demonstrates LG's efforts to increase customer's values beyond efficiency. It features enhanced warranty, durability, performance under real environment, and aesthetic design suitable for roofs.



In progress | In progress | In progress | In progress

Feature

Enhanced Performance Warranty

LG NeON® R has an enhanced performance warranty.
After 25 years, LG NeON® R is guaranteed at least 87.6% of initial performance.

Extended Product Warranty

LG has extended the product warranty of the LG NeON® R to 25 years which is top level of the industry.

Aesthetic Roof

LG NeON® R has been designed with aesthetics in mind: no electrode on the front that makes new product more aesthetic. LG NeON® R can increase the value of a property with its modern design.

High Power Output

The LG NeON® R has been designed to significantly enhance its output making it efficient even in limited space.

Better Performance on a Sunny Day

LG NeON® R now performs better on a sunny days thanks to its improved temperature coefficient.

Outstanding Durability

With its newly reinforced frame design, LG NeON® R can endure a front load up to 6000 Pa, and a rear load up to 5400 Pa.

About LG Electronics

LG Electronics is a global big player, committed to expanding its operations with the solar market. The company first embarked on a solar energy source research program in 1985, supported by LG Group's vast experience in the semi-conductor, LCD, chemistry and materials industries. In 2010, LG Solar successfully released its first MonoX® series to the market, which is now available in 32 countries. The NeON® (previous. MonoX® NeON), NeON®2, NeON®2 BiFacial won the "Intersolar AWARD" in 2013, 2015 and 2016, which demonstrates LG Solar's lead, innovation and commitment to the industry.

LG NeON® R

Preliminary

LG365Q1C-A5 | LG360Q1C-A5 | LG355Q1C-A5 | LG350Q1C-A5

Mechanical Properties

Cells	6 x 10
Cell Vendor	LG
Cell Type	Monocrystalline / N-type
Cell Dimensions	161.7 x 161.7 mm / 6 inches
Dimensions (L x W x H)	1,700 x 1,016 x 40 mm
	66.93 x 40.0 x 1.57 in
Front Load	6,000Pa / 125 psf
Rear Load	5,400Pa / 113 psf
Weight	18.5 kg / 40.79 lb
Connector Type	MC4 (MC)
Junction Box	IP68 with 3 Bypass Diodes
Cables	1,000 mm x 2 ea / 39.37 in x 2 ea
Glass	High Transmission Tempered Glass
Frame	Anodized Aluminium

Certifications and Warranty

Certifications	IEC 61215, IEC 61730-1/-2
	UL 1703
	IEC 61701 (Salt mist corrosion test)
	IEC 62716 (Ammonia corrosion test)
	ISO 9001
Module Fire Performance	Type 1 (UL)
Fire Rating	Class C
Product Warranty	25 years
Output Warranty of Pmax	Linear Warranty*

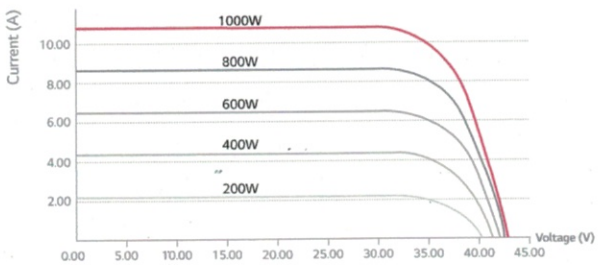
* 1) First 5 years : 95%, 2) After 5th year : 0.4%p annual degradation, 3) 25 years : 87.0%

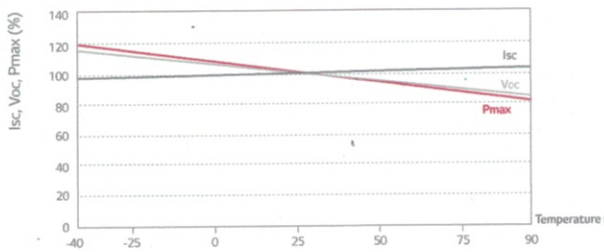
Temperature Characteristics

NOCT*	[°C]	44 ± 3
Pmax	[%/°C]	-0.30
Voc	[%/°C]	-0.24
Isc	[%/°C]	0.04

* NOCT (Nominal Operating Cell Temperature): Irradiance 800 W/m², ambient temperature 20 °C, wind speed 1 m/s

Characteristic Curves





Electrical Properties (STC*)

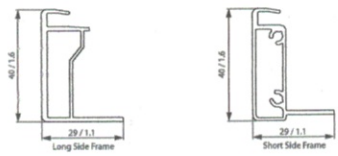
Model		LG365Q1C-A5	LG360Q1C-A5	LG355Q1C-A5	LG350Q1C-A5
Maximum Power (Pmax)	[W]	365	360	355	350
MPP Voltage (Vmpp)	[V]	36.7	36.5	36.3	36.1
MPP Current (Impp)	[A]	9.95	9.87	9.79	9.70
Open Circuit Voltage (Voc)	[V]	42.8	42.7	42.7	42.7
Short Circuit Current (Isc)	[A]	10.80	10.79	10.78	10.77
Module Efficiency	[%]	21.1	20.8	20.6	20.3
Operating Temperature	[°C]	-40 ~ +90			
Maximum System Voltage	[V]	1,000 (UL / IEC)			
Maximum Series Fuse Rating	[A]	20			
Power Tolerance	[%]	0 ~ +3			

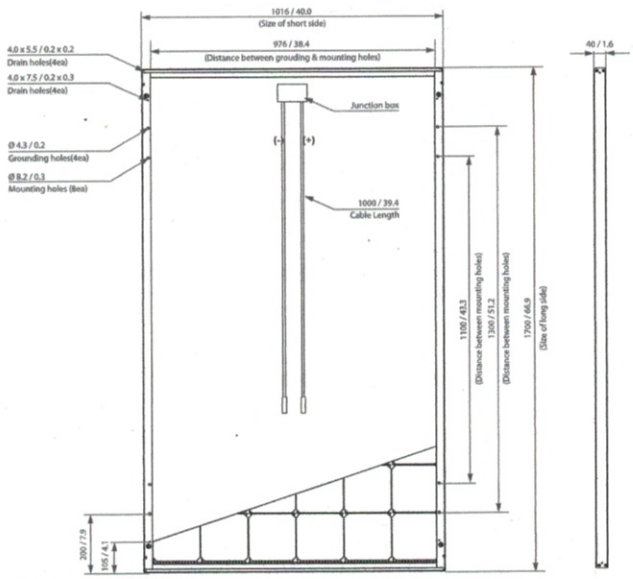
* STC (Standard Test Condition): Irradiance 1000 W/m², Module Temperature 25 °C, AM 1.5
* The nameplate power output is measured and determined by LG Electronics at its sole and absolute discretion.

Electrical Properties (NOCT)

Model		LG365Q1C-A5	LG360Q1C-A5	LG355Q1C-A5	LG350Q1C-A5
Maximum Power (Pmax)	[W]	275	271	267	263
MPP Voltage (Vmpp)	[V]	36.6	36.4	36.2	36.0
MPP Current (Impp)	[A]	7.51	7.45	7.39	7.32
Open Circuit Voltage (Voc)	[V]	40.2	40.2	40.2	40.1
Short Circuit Current (Isc)	[A]	8.70	8.69	8.68	8.67

Dimensions (mm / inch)





* The distance between the center of the mounting/grounding holes.

LG Electronics Inc.
Solar Business Division
LG Twin Towers, 128 Yeoui-daero, Yeongdeungpo-gu, Seoul
07336, Korea

Life's Good

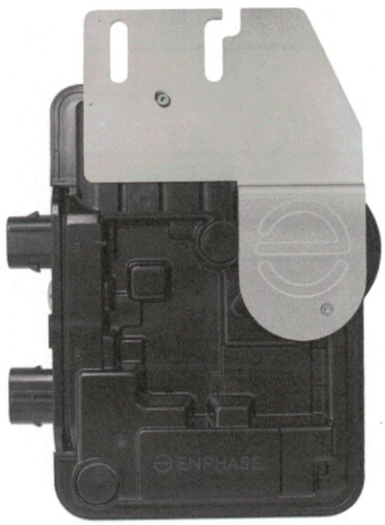
Product specifications are subject to change without notice.
DS-Q1-60-C-G-F-EN-70307

Enphase IQ 6 and IQ 6+ Microinverters

The high-powered smart grid-ready **Enphase IQ 6 Micro™** and **Enphase IQ 6+ Micro™** dramatically simplify the installation process while achieving the highest efficiency for module-level power electronics.

Part of the Enphase IQ System, the IQ 6 and IQ 6+ Micro integrate seamlessly with the Enphase IQ Envoy™, Enphase Q Aggregator™, Enphase IQ Battery™, and the Enphase Enlighten™ monitoring and analysis software.

The IQ 6 and IQ 6+ Micro extend the reliability standards set forth by previous generations and undergo over a million hours of power-on testing, enabling Enphase to provide an industry-leading warranty of up to 25 years.



Easy to Install

- Lightweight and simple
- Faster installation with improved two-wire cabling
- Built-in rapid shutdown compliant (NEC 2014 & 2017)

Productive and Reliable

- Optimized for high powered 60-cell and 72-cell* modules
- More than a million hours of testing
- Class II double-insulated enclosure
- UL listed

Smart Grid Ready

- Complies with fixed power factor, voltage and frequency ride-through requirements
- Remotely updates to respond to changing grid requirements
- Configurable for varying grid profiles
- Meets CA Rule 21 (UL 1741-SA)

* The IQ 6+ Micro is required to support 72-cell modules

UL CERTIFIED
SAFETY US-CA
E341165

To learn more about Enphase offerings, visit **enphase.com**

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Enphase IQ 6 and IQ 6+ Microinverters

INPUT DATA (DC)	IQ6-60-2-US		IQ6PLUS-72-2-US	
Commonly used module pairings[1]	195 W - 330 W +		235 W - 400 W +	
Module compatibility	60-cell PV modules only		60-cell and 72-cell PV modules	
Maximum input DC voltage	48 V		62 V	
Peak power tracking voltage	27 V - 37 V		27 V - 45 V	
Operating range	16 V - 48 V		16 V - 62 V	
Min/Max start voltage	22 V / 48 V		22 V / 62 V	
Max DC short circuit current (module Isc)	15 A		15 A	
Overvoltage class DC port	II		II	
DC port backfeed under single fault	0 A		0 A	
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)	**IQ 6 Microinverter**		**IQ 6+ Microinverter**	
Peak output power	240 VA		290 VA	
Maximum continuous output power	230 VA		280 VA	
Nominal (L-L) voltage/range[2]	240 V / 211-264 V	208 V / 183-229 V	240 V / 211-264 V	208 V / 183-229 V
Maximum continuous output current	0.96 A	1.11 A	1.17 A	1.35 A
Nominal frequency	60 Hz		60 Hz	
Extended frequency range	47 - 68 Hz		47 - 68 Hz	
Power factor at rated power	1.0		1.0	
Maximum units per 20 A (L-L) branch circuit	16 (240 VAC) 14 (208 VAC)		13 (240 VAC) 11 (208 VAC)	
Overvoltage class AC port	III		III	
AC port backfeed under single fault	0 A		0 A	
Power factor (adjustable)	0.7 leading ... 0.7 lagging		0.7 leading ... 0.7 lagging	
EFFICIENCY	**@240 V**	**@208 V**	**@240 V**	**@208 V**
CEC weighted efficiency	97.0 %	97.0 %	97.0 %	97.0 %
MECHANICAL DATA				
Ambient temperature range	-40°C to +65°C			
Relative humidity range	4% to 100% (condensing)			
Connector type	MC4 locking type			
Dimensions (WxHxD)	219 mm x 191 mm x 37.9 mm (without bracket)			
Weight	1.29 kg (2.84 lbs)			
Cooling	Natural convection - No fans			
Approved for wet locations	Yes			
Pollution degree	PD3			
Enclosure	Class II double-insulated			
Environmental category / UV exposure rating	NEMA Type 6 / outdoor			
FEATURES				
Communication	Power line			
Monitoring	Enlighten Manager and MyEnlighten monitoring options Compatible with Enphase IQ Envoy			
Disconnecting means	The AC and DC connectors have been evaluated and approved by UL for use as the load-break disconnect required by NEC 690.			
Compliance	CA Rule 21 (UL 1741-SA) UL 62109-1, UL1741/IEEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01 This product is UL Listed as PV Rapid Shut Down Equipment and conforms with NEC-2014 and NEC-2017 section 690.12 and C22.1-2015 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according manufacturer's instructions.			

1. No enforced DC/AC ratio. See the compatibility calculator at https://enphase.com/en-us/support/module-compatibility.
2. Nominal voltage range can be extended beyond nominal if required by the utility.

To learn more about Enphase offerings, visit **enphase.com**

2018-01-25

ENPHASE.

Enphase Envoy-S Series

The **Enphase Envoy-S™** communications gateway delivers solar production and energy consumption data to Enphase Enlighten™ monitoring and analysis software for comprehensive, remote maintenance and management of the Enphase Microinverter System.

With revenue grade production metering and consumption monitoring options, Envoy-S is the platform for total energy management and integrates with the Enphase AC Battery™.

Smart

- Enables web-based monitoring and control
- Bidirectional communications for remote upgrades

Simple

- Easy system configuration using Enphase Installer Toolkit™ mobile app
- Flexible networking with Wi-Fi, Ethernet, or cellular

Reliable

- Designed for installation indoors or outdoors
- Five-year warranty

UL LISTED

To learn more about Enphase offerings, visit **enphase.com**

ENPHASE.

Enphase Envoy-S

MODEL NUMBERS	
Enphase Envoy-S Standard™ ENV-S-AB-120-A	Enphase Envoy-S communications gateway with basic PV production monitoring (+/- 5%).
Enphase Envoy-S Metered™ ENV-S-AM1-120	Enphase Envoy-S communications gateway with integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and optional consumption monitoring (+/- 2.5%).
ACCESORIES (Order Seperately)	
Enphase Mobile Connect™ CELLMODEM-01	Plug and play industrial grade cellular modem with five-year data plan 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.)
Consumption Monitoring CT CT-200-SPLIT	For use with ENV-S-AM1-120, split-core current transformers enable whole home consumption metering (+/- 2.5%).
POWER REQUIREMENTS	
Cord connected	120 VAC, 60 Hz (ENV-S-AB-120-A) Max 15 A overcurrent protection required
Hardwired	120 VAC, 60 Hz (ENV-S-AB-120-A) 120/240 VAC split-phase (ENV-S-AM1-120) Max 15 A overcurrent protection required
CAPACITY	
Number of microinverters polled	Up to 600
MECHANICAL DATA	
Dimensions (WxHxD)	21.3 x 12.6 x 4.5 cm (8.4" x 5" x 1.8")
Weight	17.6 oz (498 g)
Ambient temperature range	-40° to 65° C (-40° to 149° F) -40° to 46° C (-40° to 115° F) if installed in an enclosure
Environmental rating	IP30. For installation indoors or in an NRTL-certified, NEMA type 3R enclosure.
Altitude	To 2000 meters (6,560 feet)
INTERNET CONNECTION OPTIONS	
Integrated Wi-Fi	802.11b/g/n
Ethernet	802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included)
Mobile	Optional, CELLMODEM-01 (not included)
COMPLIANCE	
Compliance	UL 916 CAN/CSA C22.2 No. 61010-1 47 CFR, Part 15, Class B, ICES 003 IEC/EN 61010-1:2010, EN50065-1, EN61000-4-5, EN61000-6-1, EN61000-6-2 Metering: ANSI C12.20 accuracy class 0.5 (ENV-S-AM1-120)

To learn more about Enphase offerings, visit **enphase.com**

04/18/2016

ENPHASE.

Appendix D

State of California

CIVIL CODE

Section 714

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714. (a) Any covenant, restriction, or condition contained in any deed, contract, security instrument, or other instrument affecting the transfer or sale of, or any interest in, real property, and any provision of a governing document, as defined in Section 4150 or 6552, that effectively prohibits or restricts the installation or use of a solar energy system is void and unenforceable.

(b) This section does not apply to provisions that impose reasonable restrictions on solar energy systems. However, it is the policy of the state to promote and encourage the use of solar energy systems and to remove obstacles thereto. Accordingly, reasonable restrictions on a solar energy system are those restrictions that do not significantly increase the cost of the system or significantly decrease its efficiency or specified performance, or that allow for an alternative system of comparable cost, efficiency, and energy conservation benefits.

(c) (1) A solar energy system shall meet applicable health and safety standards and requirements imposed by state and local permitting authorities, consistent with Section 65850.5 of the Government Code.

(2) Solar energy systems used for heating water in single family residences and solar collectors used for heating water in commercial or swimming pool applications shall be certified by an accredited listing agency as defined in the Plumbing and Mechanical Codes.

(3) A solar energy system for producing electricity shall also meet all applicable safety and performance standards established by the California Electrical Code, the Institute of Electrical and Electronics Engineers, and accredited testing laboratories such as Underwriters Laboratories and, where applicable, rules of the Public Utilities Commission regarding safety and reliability.

(d) For the purposes of this section:

(1) (A) For solar domestic water heating systems or solar swimming pool heating systems that comply with state and federal law, "significantly" means an amount exceeding 10 percent of the cost of the system, but in no case more than one thousand dollars ($1,000), or decreasing the efficiency of the solar energy system by an amount exceeding 10 percent, as originally specified and proposed.

(B) For photovoltaic systems that comply with state and federal law, "significantly" means an amount not to exceed one thousand dollars ($1,000) over the system cost as originally specified and proposed, or a decrease in system efficiency of an amount exceeding 10 percent as originally specified and proposed.

(2) "Solar energy system" has the same meaning as defined in paragraphs (1) and (2) of subdivision (a) of Section 801.5.

(e) (1) Whenever approval is required for the installation or use of a solar energy system, the application for approval shall be processed and approved by the appropriate approving entity in the same manner as an application for approval of an architectural modification to the property, and shall not be willfully avoided or delayed.

(2) For an approving entity that is an association, as defined in Section 4080 or 6528, and that is not a public entity, both of the following shall apply:

(A) The approval or denial of an application shall be in writing.

(B) If an application is not denied in writing within 45 days from the date of receipt of the application, the application shall be deemed approved, unless that delay is the result of a reasonable request for additional information.

(f) Any entity, other than a public entity, that willfully violates this section shall be liable to the applicant or other party for actual damages occasioned thereby, and shall pay a civil penalty to the applicant or other party in an amount not to exceed one thousand dollars ($1,000).

(g) In any action to enforce compliance with this section, the prevailing party shall be awarded reasonable attorney's fees.

(h) (1) A public entity that fails to comply with this section may not receive funds from a state-sponsored grant or loan program for solar energy. A public entity shall certify its compliance with the requirements of this section when applying for funds from a state-sponsored grant or loan program.

(2) A local public entity may not exempt residents in its jurisdiction from the requirements of this section.

(Amended by Stats. 2014, Ch. 521, Sec. 2. (AB 2188) Effective January 1, 2015.)

State of California

CIVIL CODE

Section 714.1

714.1. (a) Notwithstanding Section 714, an association may impose reasonable provisions that:

(1) Restrict the installation of solar energy systems in common areas to those systems approved by the association.

(2) Require the owner of a separate interest to obtain the approval of the association for the installation of a solar energy system in a separate interest owned by another.

(3) Provide for the maintenance, repair, or replacement of roofs or other building components.

(4) Require installers of solar energy systems to indemnify or reimburse the association or its members for loss or damage caused by the installation, maintenance, or use of the solar energy system.

(b) An association shall not:

(1) Establish a general policy prohibiting the installation or use of a rooftop solar energy system for household purposes on the roof of the building in which the owner resides, or a garage or carport adjacent to the building that has been assigned to the owner for exclusive use.

(2) Require approval by a vote of members owning separate interests in the common interest development, including that specified by Section 4600, for installation of a solar energy system for household purposes on the roof of the building in which the owner resides, or a garage or carport adjacent to the building that has been assigned to the owner for exclusive use.

An action by an association that contravenes paragraph (1) or (2) shall be void and unenforceable.

(c) For purposes of this section:

(1) "Association" has the same meaning as defined in Section 4080 or 6528.

(2) "Common area" has the same meaning as defined in Section 4095 or 6532.

(3) "Separate interest" has the same meaning as defined in Section 4185 or 6564.

(Amended by Stats. 2017, Ch. 818, Sec. 1. (AB 634) Effective January 1, 2018.)