

Submittal Guidelines for Alternate Power Sources

The following items must be submitted with plans for solar PV permit applications and other alternate power sources. Please also read "Accessory Solar and Small Solar Facilities" for all other planning and building permit submittal requirements.

1. System type – Stand-alone, Multimode, or Interactive
2. Site/roof diagram identifying the location of all major system components (solar array/collectors, dedicated PV system meter, PV array DC disconnect switch, PV system utility AC disconnect switch, inverter), access pathways and roof ridge setbacks
3. One-line electric diagram showing the locations of all field-installed components:
 - Wire size, type, and number of wires per conduit (including grounds)
 - Grounding electrode conductor size and location
 - Conduit type and size
 - AC disconnect – amperage, voltage, fuse size/type
 - DC disconnect - amperage, voltage, fuse size/type
 - Rapid shutdown control in accordance with NEC Article 690.12
4. Busbar amperage rating for panel receiving power from photovoltaic inverter AC output.
5. Major component information: (Manufacturer's PDF product data sheets preferred)
 - Inverter make, model, AC/DC input/output amperages
 - Module make, model, Isc, Voc, coefficients of Voc, wattage
 - Combiner box make, model, breaker DC voltage rating
 - ❖ For multimode systems:
 - Charge controller make, model, voltage, amperage, wattage
 - Battery make, model, voltage and amp/hour rating
 - Lowest battery operating voltage, max cable length and size
 - Battery short-circuit current from the manufacturer
 - ❖ Generator make, model, voltage, amperage, wattage, circuit breaker size
 - ❖ Wind turbine make, model, voltage, amperage, and wattage
6. Array information: (Manufacturer's PDF product data sheets preferred)
 - Number of series panels and max Voc
 - Number of parallel panels and max Isc
7. Mounting information: Distance from roof to bottom of conduit
8. State of Colorado licensed Professional Engineer's letter addressing the roof or wall system's ability to withstand both gravity and uplift loads of the solar system. Site design snow and wind loads, and anchoring connections shall be outlined in the Engineer's letter as well. Provide footing/foundation design/details for ground-mounted systems.

NOTES

- All systems/equipment must be listed/labeled by a nationally recognized testing laboratory
- All equipment must be installed in accordance with the manufacturer's instructions, carefully observing operating temperature limitations for inverters installed outdoors
- Outdoor conductors and conduit fittings must be listed for wet locations
- Array grounding terminals and hardware must be suitable for use in wet locations
- Solar water heating equipment installation shall comply with the adopted plumbing code

Solar Panel/Module Arrays Plans Submittal Checklist

Installed in compliance with the adopted electrical code.

All Systems (Roof, Ground and Wall Mounted, Photovoltaic (PV), Solar Thermal)

- Panel/Module product cut sheet showing manufacturer, listing agency and size of panels or modules being used. Include cut sheets on all associated hardware, electrical or other. See sample cut sheet on pages 3-4.
- For roof mounted systems include layout plans delineating the location of the solar panel/module array and all related equipment on the roof system, including but not limited to dedicated PV system meter, PV array DC disconnect switch, PV system utility AC disconnect switch, inverter. (Liquid mix/water solar panel systems also need roof layout and associated equipment on roof shown). Include mounting system plans for panels/modules, along with any specifications including details of required attachment to roof system framing. Include labeling of all other mounted solar equipment (i.e. dedicated PV system meter, PV array DC disconnect switch, PV system utility AC disconnect switch, inverter, etc.)
- For ground mounted systems provide 5 site plans delineating the location of the solar panels/modules array, solar collectors, and the location and labeling of all other mounted solar equipment. Include labeling of all other mounted solar equipment (i.e. dedicated PV system meter, PV array DC disconnect switch, PV system utility AC disconnect switch, inverter, etc.)
- Construction plan notes: When installing a solar water heating system, a note shall be added to the plans to include the requirement that solar water heating equipment shall be installed in compliance with the adopted plumbing Code. PV system construction notes shall include the requirement that the systems comply with the adopted electrical Code. – All systems.

Please submit a minimum of two sets of complete plans when applying for permit.

See the following code sections for further information:

- Section R324 and Chapter 23 - 2018 International Residential Code
- Sections 1505.8, 1505.9, 1510.7, 1512.1, 1607.13.5, 3111 - 2018 International Building Code
- Chapter 14 – 2018 International Mechanical Code
- Section 1204.2 - 2018 International Fire Code
- 2020 National Electrical Code

ESTES VALLEY Information:

- If your service provider is Estes Park, you must apply with Estes Park Utilities as well. Please visit estespark.colorado.gov/solarpower.
- There may be additional requirements from the Estes Valley Fire Protection District. Please contact them directly at ksullivan@estesvalleyfire.org or call 577-3689 for additional information.

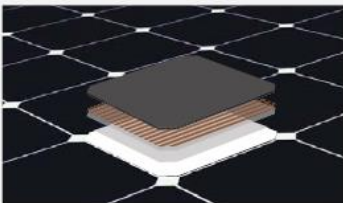
SUNPOWER

MORE ENERGY. FOR LIFE.™

E-SERIES SOLAR PANELS



- 20.4% efficiency**
 Ideal for roofs where space is at a premium or where future expansion might be needed.
- High performance**
 Delivers excellent performance in real world conditions, such as high temperatures, clouds and low light.^{1,2,3}
- Proven value**
 Designed for residential rooftops, E-Series panels deliver the features, value and performance for any home.



Moxeon™ Solar Cells: Fundamentally better.
 Engineered for performance, designed for durability.

Engineered for peace of mind
 Designed to deliver consistent, trouble-free energy over a very long lifetime.^{4,5}

Designed for durability
 The SunPower Moxeon Solar Cell is the only cell built on a solid copper foundation. Virtually impervious to the corrosion and cracking that degrade Conventional Panels.^{4,5}

#1 Ranked in Fraunhofer durability test.¹⁰
 100% power maintained in Atlas 25+ comprehensive PVDI Durability test.¹¹

HIGH PERFORMANCE & EXCELLENT DURABILITY



E20 - 327 PANEL



HIGH EFFICIENCY⁶

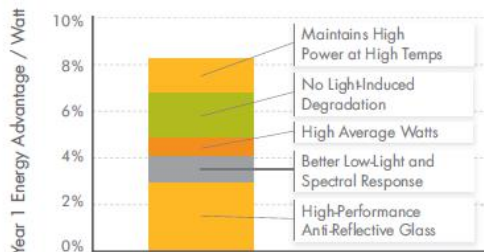
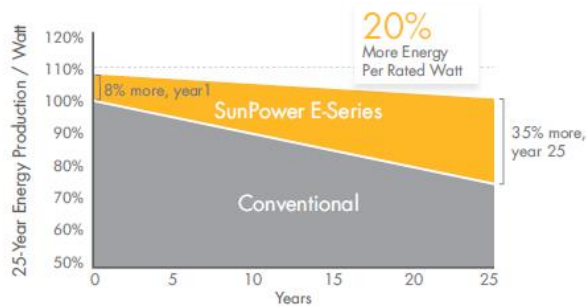
Generate more energy per square meter

E-Series residential panels convert more sunlight to electricity producing 36% more power per panel,¹ and 60% more energy per square meter over 25 years.^{3,4}

HIGH ENERGY PRODUCTION⁷

Produce more energy per rated watt

High year one performance delivers 7-9% more energy per rated watt.³ This advantage increases over time, producing 20% more energy over the first 25 years to meet your needs.⁴



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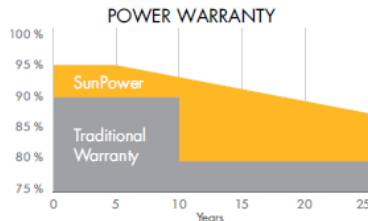
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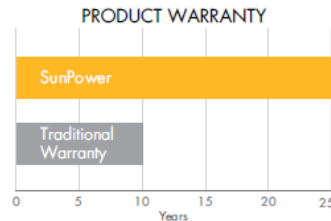
MORE ENERGY. FOR LIFE.™

E-SERIES SOLAR PANELS

SUNPOWER OFFERS THE BEST COMBINED POWER AND PRODUCT WARRANTY



More guaranteed power: 95% for first 5 years, -0.4%/yr. to year 25.⁸



Combined Power and Product defect 25 year coverage that includes panel replacement costs.⁹

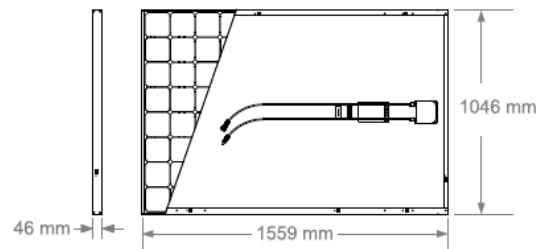
| ELECTRICAL DATA | | |
|-------------------------------------|-----------------------|---------|
| | E20-327 | E19-320 |
| Nominal Power ¹² (Pnom) | 327 W | 320 W |
| Power Tolerance | +5/-0% | +5/-0% |
| Avg. Panel Efficiency ¹³ | 20.4% | 19.8% |
| Rated Voltage (Vmpp) | 54.7 V | 54.7 V |
| Rated Current (Impp) | 5.98 A | 5.86 A |
| Open-Circuit Voltage (Voc) | 64.9 V | 64.8 V |
| Short-Circuit Current (Isc) | 6.46 A | 6.24 A |
| Max. System Voltage | 1000 V IEC & 600 V UL | |
| Maximum Series Fuse | 20 A | |
| Power Temp Coef. | -0.38% / °C | |
| Voltage Temp Coef. | -176.6 mV / °C | |
| Current Temp Coef. | 3.5 mA / °C | |

| OPERATING CONDITION AND MECHANICAL DATA | |
|---|---|
| Temperature | - 40°C to +85°C |
| Max load | Wind: 2400 Pa, 245 kg/m ² front & back Snow: 5400 Pa, 550 kg/m ² front |
| Impact resistance | 25mm diameter hail at 23 m/s |
| Appearance | Class A |
| Solar Cells | 96 Monocrystalline Maxeon Gen II |
| Tempered Glass | High transmission tempered Anti-Reflective |
| Junction Box | IP-65 Rated |
| Connectors | MC4 |
| Frame | Class 1 black anodized (highest AAMA rating) |
| Weight | 18,6 kg |

| TESTS AND CERTIFICATIONS | |
|--------------------------|---|
| Standard tests | IEC 61215, IEC 61730, UL1703 |
| Quality tests | ISO 9001:2008, ISO 14001:2004 |
| EHS Compliance | RoHS, OHSAS 18001:2007, lead free, PV Cycle |
| Ammonia test | IEC 62716 |
| Salt Spray test | IEC 61701 (passed maximum severity) |
| PID test | Potential-Induced Degradation free: 1000V ¹⁰ |
| Available listings | TUV, MCS, UL, JET, KEMCO, CSA, CEC, FSEC |

REFERENCES:

- All comparisons are SPR-E20-327 vs. a representative conventional panel: 240W, approx. 1.6 m², 15% efficiency.
- PVEvolution Labs "SunPower Shading Study," Feb 2013.
- Typically 7-9% more energy per watt, BEW/DNV Engineering "SunPower Yield Report," Jan 2013.
- SunPower 0.25%/yr degradation vs. 1.0%/yr conv. panel. Campeau, Z. et al. "SunPower Module Degradation Rate," SunPower white paper, Feb 2013; Jordan, Dirk "SunPower Test Report," NREL, Oct 2012.
- "SunPower Module 40-Year Useful Life" SunPower white paper, Feb 2013. Useful life is 99 out of 100 panels operating at more than 70% of rated power.
- Out of all 2600 panels listed in Photon International, Feb 2012.
- 8% more energy than the average of the top 10 panel companies tested in 2012 (151 panels, 102 companies). Photon International, March 2013.
- Compared with the top 15 manufacturers. SunPower Warranty Review, Feb 2013.
- Some exclusions apply. See warranty for details.
- 5 of top 8 panel manufacturers were tested by Fraunhofer ISE, "PV Module Durability Initiative Public Report," Feb 2013.
- Compared with the non-stress-tested control panel. Atlas 25+ Durability test report, Feb 2013.
- Standard Test Conditions (1000 W/m² irradiance, AM 1.5, 25° C).
- Based on average of measured power values during production



See <http://www.sunpowercorp.com/facts> for more reference information.
 For more details, see extended datasheet: www.sunpowercorp.com/datasheets. Read safety and installation instructions before using this product.
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