

## References

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## Appendix A- Sample Data Collection

Capacity of the Solar System: 6.11 kW

| Jul-12     |             | Aug-12     |             | Sep-12    |             | Oct-12     |             | Nov-12     |             | Dec-12     |             |
|------------|-------------|------------|-------------|-----------|-------------|------------|-------------|------------|-------------|------------|-------------|
| Date       | Energy (Wh) | Date       | Energy (Wh) | Date      | Energy (Wh) | Date       | Energy (Wh) | Date       | Energy (Wh) | Date       | Energy (Wh) |
| 9/7/2012   | 5,471.17    | 18/08/2012 | 12,606.88   | 1/9/2012  | 27,504.91   | 1/10/2012  | 26,702.89   | 1/12/2012  | 8,427.86    | 1/12/2012  | 25,080.03   |
| 10/7/2012  | 21,087.80   | 19/08/2012 | 29,677.33   | 2/9/2012  | 23,128.75   | 2/10/2012  | 27,478.54   | 2/12/2012  | 15,029.56   | 2/12/2012  | 16,857.43   |
| 12/7/2012  | 24,033.69   | 20/08/2012 | 25,530.18   | 3/9/2012  | 14,354.21   | 3/10/2012  | 28,080.65   | 3/12/2012  | 18,102.12   | 3/12/2012  | 24,351.69   |
| 12/7/2012  | 21,833.12   | 21/08/2012 | 26,335.37   | 4/9/2012  | 25,616.04   | 4/10/2012  | 28,586.75   | 4/12/2012  | 27,516.50   | 4/12/2012  | 25,180.90   |
| 13/07/2012 | 17,318.05   | 22/08/2012 | 8,979.56    | 5/9/2012  | 27,690.68   | 5/10/2012  | 27,944.28   | 5/12/2012  | 21,205.10   | 5/12/2012  | 25,240.51   |
| 14/07/2012 | 20,512.65   | 23/08/2012 | 28,812.48   | 6/9/2012  | 19,339.73   | 6/10/2012  | 30,863.98   | 6/12/2012  | 22,459.51   | 6/12/2012  | 25,353.70   |
| 15/07/2012 | 25,614.94   | 24/08/2012 | 6,919.07    | 7/9/2012  | 22,371.63   | 7/10/2012  | 31,601.93   | 7/12/2012  | 25,231.35   | 7/12/2012  | 26,742.28   |
| 16/07/2012 | 7,079.20    | 25/08/2012 | 23,705.38   | 8/9/2012  | 28,249.70   | 8/10/2012  | 30,790.60   | 8/12/2012  | 24,902.08   | 8/12/2012  | 26,698.83   |
| 18/07/2012 | 20,406.24   | 26/08/2012 | 26,552.48   | 9/9/2012  | 26,207.84   | 9/10/2012  | 29,901.85   | 9/12/2012  | 28,851.22   | 9/12/2012  | 25,879.02   |
| 19/07/2012 | 25,306.16   | 27/08/2012 | 27,697.21   | 10/9/2012 | 884.8404    | 10/10/2012 | 22,266.13   | 10/12/2012 | 26,621.92   | 10/12/2012 | 22,208.65   |
| 20/07/2012 | 2,292.17    | 28/08/2012 | 27,654.19   | 12/9/2012 | 25,452.90   | 12/10/2012 | 25,341.84   | 12/12/2012 | 27,741.56   | 12/12/2012 | 21,682.83   |
| 22/07/2012 | 17,887.50   | 29/08/2012 | 29,850.92   | 12/9/2012 | 17,467.69   | 12/10/2012 | 19,947.60   | 12/12/2012 | 26,329.78   | 12/12/2012 | 19,634.64   |

|            |           |            |           |            |           |            |           |            |           |            |           |
|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|
| 23/07/2012 | 14,398.35 | 30/08/2012 | 28,083.48 | 13/09/2012 | 21,879.04 | 13/10/2012 | 28,583.40 | 13/12/2012 | 26,317.59 | 13/12/2012 | 16,925.91 |
| 24/07/2012 | 23,173.98 | 31/08/2012 | 24,454.45 | 14/09/2012 | 20,741.87 | 14/10/2012 | 20,449.14 | 14/12/2012 | 25,961.35 | 14/12/2012 | 12,312.26 |
| 25/07/2012 | 22,326.57 |            |           | 15/09/2012 | 18,512.33 | 15/10/2012 | 31,079.15 | 15/12/2012 | 26,745.71 | 15/12/2012 | 9,703.45  |
| 26/07/2012 | 21,250.30 |            |           | 16/09/2012 | 18,910.46 | 16/10/2012 | 31,969.40 | 16/12/2012 | 27,679.81 | 16/12/2012 | 20,924.15 |
| 27/07/2012 | 24,513.82 |            |           | 17/09/2012 | 30,467.73 | 17/10/2012 | 26,608.60 | 17/12/2012 | 27,671.55 | 17/12/2012 | 22,816.60 |
| 28/07/2012 | 3,936.75  |            |           | 18/09/2012 | 29,815.81 | 18/10/2012 | 30,597.62 | 18/12/2012 | 26,202.31 | 18/12/2012 | 24,007.22 |
|            |           |            |           | 19/09/2012 | 29,998.45 | 19/10/2012 | 32,257.08 | 19/12/2012 | 20,926.32 | 19/12/2012 | 16,098.58 |
|            |           |            |           | 20/09/2012 | 29,330.04 | 20/10/2012 | 23,697.79 | 20/12/2012 | 16,234.73 | 20/12/2012 | 9,317.68  |
|            |           |            |           | 21/09/2012 | 17,123.87 | 21/10/2012 | 25,122.45 | 21/12/2012 | 12,976.91 | 21/12/2012 | 14,076.78 |
|            |           |            |           | 22/09/2012 | 26,337.32 | 22/10/2012 | 20,996.03 | 22/12/2012 | 22,813.29 | 22/12/2012 | 12,852.13 |
|            |           |            |           | 23/09/2012 | 29,964.82 | 23/10/2012 | 22,843.23 | 23/12/2012 | 21,360.72 | 23/12/2012 | 9,033.52  |
|            |           |            |           | 24/09/2012 | 29,539.63 | 24/10/2012 | 26,875.64 | 24/12/2012 | 16,192.06 | 24/12/2012 | 22,799.93 |
|            |           |            |           | 25/09/2012 | 30,747.90 | 25/10/2012 | 19,480.18 | 25/12/2012 | 7,636.51  | 25/12/2012 | 23,145.63 |
|            |           |            |           | 26/09/2012 | 27,614    | 26/10/2012 | 28,496.20 | 26/12/2012 | 21,336.96 | 26/12/2012 | 22,289.71 |
|            |           |            |           | 27/09/2012 | 20,592.05 | 27/10/2012 | 24,651.84 | 27/12/2012 | 21,887.48 | 27/12/2012 | 18,173.26 |
|            |           |            |           | 28/09/2012 | 30,638.88 | 28/10/2012 | 22,463.52 | 28/12/2012 | 14,613.39 | 28/12/2012 | 21,398.69 |
|            |           |            |           | 29/09/2012 | 30,184.43 | 29/10/2012 | 20,604.61 | 29/12/2012 | 27,374.29 | 29/12/2012 | 23,741.05 |



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| Jan-13     |             | Feb-13     |             | Mar-13     |             | Apr-13     |             | May-13     |             |
|------------|-------------|------------|-------------|------------|-------------|------------|-------------|------------|-------------|
| Date       | Energy (Wh) | Date       | Energy (Wh) | Date       | Energy (Wh) | Date       | Energy (Wh) | Date       | Energy (Wh) |
| 1/1/2013   | 24,721.52   | 1/2/2013   | 26,545.97   | 1/3/2013   | 27,296.36   | 1/4/2013   | 27,440.67   | 1/5/2013   | 23,803.38   |
| 2/1/2013   | 24,101.18   | 2/2/2013   | 25,577.65   | 2/3/2013   | 29,000.48   | 2/4/2013   | 28,595.23   | 2/5/2013   | 25,884.46   |
| 3/1/2013   | 23,772.31   | 3/2/2013   | 26,753.65   | 3/3/2013   | 28,980.03   | 3/4/2013   | 29,186.99   | 3/5/2013   | 28,264.28   |
| 4/1/2013   | 18,470.42   | 4/2/2013   | 24,987.37   | 4/3/2013   | 25,456.25   | 4/4/2013   | 28,322.90   | 4/5/2013   | 28,250.83   |
| 5/1/2013   | 10,777.68   | 5/2/2013   | 26,662.39   | 5/3/2013   | 28,620.49   | 5/4/2013   | 29,417.13   | 5/5/2013   | 26,483.58   |
| 6/1/2013   | 21,067.75   | 6/2/2013   | 22,487.32   | 6/3/2013   | 27,460.79   | 6/4/2013   | 28,543.80   | 6/5/2013   | 23,922.37   |
| 7/1/2013   | 27,089.07   | 7/2/2013   | 18,303.72   | 7/3/2013   | 25,560.66   | 7/4/2013   | 27,226.06   | 7/5/2013   | 25,646.18   |
| 8/1/2013   | 26,372.83   | 8/2/2013   | 22,082.28   | 8/3/2013   | 25,219.23   | 8/4/2013   | 27,949.07   | 8/5/2013   | 26,625.28   |
| 9/1/2013   | 24,966.71   | 9/2/2013   | 22,819.48   | 9/3/2013   | 26,163.04   | 9/4/2013   | 29,389.36   | 9/5/2013   | 26,085.66   |
| 10/1/2013  | 26,557.09   | 10/2/2013  | 6,854.45    | 10/3/2013  | 23,970.27   | 10/4/2013  | 25,919.78   | 10/5/2013  | 26,735.42   |
| 11/1/2013  | 25,033.99   | 11/2/2013  | 23,138.35   | 11/3/2013  | 24,762.33   | 11/4/2013  | 26,528.66   | 11/5/2013  | 25,066.88   |
| 12/1/2013  | 26,346.50   | 12/2/2013  | 30,638.06   | 12/3/2013  | 25,611.49   | 12/4/2013  | 10,826.21   | 12/5/2013  | 25,389.80   |
| 13/01/2013 | 28,014.19   | 13/02/2013 | 29,115.69   | 13/03/2013 | 18,770.55   | 13/04/2013 | 30,260.13   | 13/05/2013 | 24,257.17   |
| 14/01/2013 | 26,651.17   | 14/02/2013 | 22,302.73   | 14/03/2013 | 28,377.73   | 14/04/2013 | 30,328.21   | 14/05/2013 | 26,424.59   |
| 15/01/2013 | 29,679.49   | 15/02/2013 | 11,794.55   | 15/03/2013 | 21,934.25   | 15/04/2013 | 26,242.85   | 15/05/2013 | 25,098.91   |
| 16/01/2013 | 27,927.18   | 16/02/2013 | 24,027.04   | 16/03/2013 | 27,185.23   | 16/04/2013 | 25,991.95   | 16/05/2013 | 25,613.32   |
| 17/01/2013 | 23,132.69   | 17/02/2013 | 25,206.83   | 17/03/2013 | 26,819.18   | 17/04/2013 | 28,435.90   | 17/05/2013 | 25,482.65   |
| 18/01/2013 | 26,765.93   | 18/02/2013 | 26,713.93   | 18/03/2013 | 29,580.61   | 18/04/2013 | 18,287.60   | 18/05/2013 | 22,193.39   |
| 19/01/2013 | 27,412.14   | 19/02/2013 | 25,319.23   | 19/03/2013 | 29,830.52   | 19/04/2013 | 27,346.48   | 19/05/2013 | 21,588.91   |
| 20/01/2013 | 26,711.18   | 20/02/2013 | 26,714.24   | 20/03/2013 | 28,866.85   | 20/04/2013 | 12,980.40   | 20/05/2013 | 23,598.23   |

|            |           |            |           |            |           |            |           |            |           |
|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|
| 21/01/2013 | 25,428.41 | 21/02/2013 | 26,123.93 | 21/03/2013 | 27,321.70 | 21/04/2013 | 22,723.23 | 21/05/2013 | 22,186.78 |
| 22/01/2013 | 21,279.73 | 22/02/2013 | 22,103.58 | 22/03/2013 | 28,544.47 | 22/04/2013 | 26,026.23 | 22/05/2013 | 23,458.54 |
| 23/01/2013 | 25,625.89 | 23/02/2013 | 23,155.54 | 23/03/2013 | 27,534.91 | 23/04/2013 | 4,672.73  | 23/05/2013 | 24,425.45 |
| 24/01/2013 | 24,398.61 | 24/02/2013 | 26,355.66 | 24/03/2013 | 27,069.56 | 24/04/2013 | 11,163.10 | 24/05/2013 | 23,622.56 |
| 25/01/2013 | 27,372.18 | 25/02/2013 | 26,598.48 | 25/03/2013 | 29,118.59 | 25/04/2013 | 18,427.21 | 25/05/2013 | 15,166.08 |
| 26/01/2013 | 27,939.06 | 26/02/2013 | 25,138.20 | 26/03/2013 | 28,007.21 | 26/04/2013 | 13,645.22 | 26/05/2013 | 17,211.27 |
| 27/01/2013 | 23,078.85 | 27/02/2013 | 19,202.83 | 27/03/2013 | 29,925.11 | 27/04/2013 | 28,480.08 | 27/05/2013 | 22,693.03 |
| 28/01/2013 | 27,003.29 | 28/02/2013 | 20,114.12 | 28/03/2013 | 29,265.55 | 28/04/2013 | 26,557.04 | 28/05/2013 | 65.7952   |
| 29/01/2013 | 24,483.60 | 29/02/2013 | 18,499.94 | 29/03/2013 | 28,921.22 | 29/04/2013 | 19,281.36 |            |           |
| 30/01/2013 | 26,543.95 |            |           | 30/03/2013 | 28,070.64 | 30/04/2013 | 6,788.45  |            |           |
| 31/01/2013 | 26,404.34 |            |           | 31/03/2013 | 26,717.72 |            |           |            |           |



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### HIGH PERFORMANCE & EXCELLENT DURABILITY

- **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.<sup>1,2,3</sup>

- **Proven value**

Designed for residential rooftops, E-Series panels deliver the features, value and performance for any home.



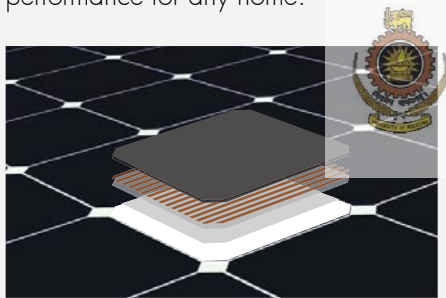
E20 - 327 PANEL



### HIGH EFFICIENCY<sup>6</sup>

#### Generate more energy per square meter

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



#### Maxeon™ 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.<sup>4,5</sup>

#### Designed for durability

The SunPower Maxeon Solar Cell is the only cell built on a solid copper foundation. Virtually impervious to the corrosion and cracking that degrade Conventional Panels.<sup>4,5</sup>

#### #1 Ranked in Fraunhofer durability test.<sup>10</sup>

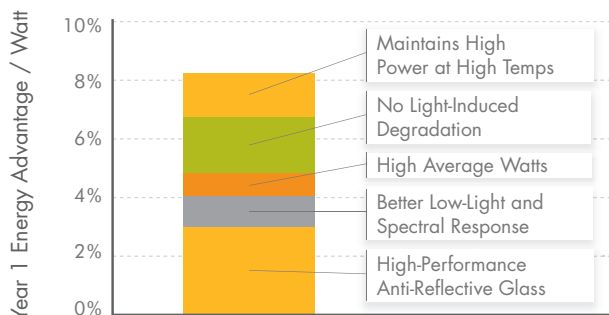
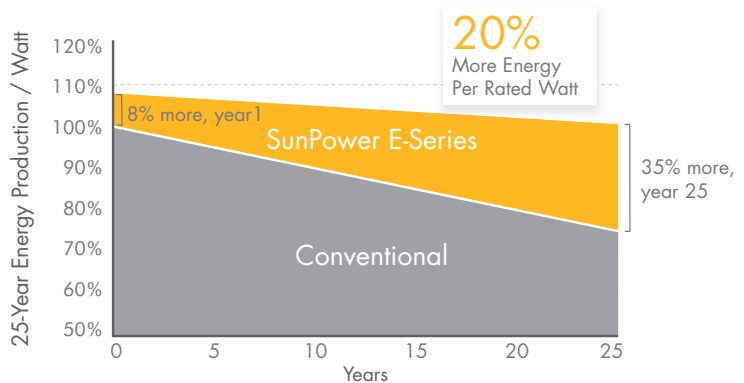
100% power maintained in Atlas 25+ comprehensive PVDI Durability test.<sup>11</sup>

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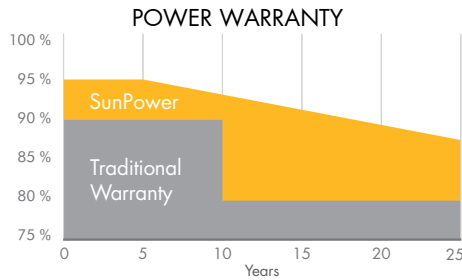
### HIGH ENERGY PRODUCTION

Produce more energy per rated watt

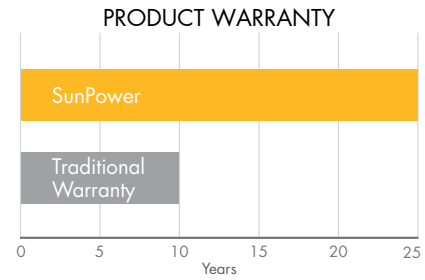
High year one performance delivers 7-9% more energy per rated watt.<sup>3</sup> This advantage increases over time, producing 20% more energy over the first 25 years to meet your needs.<sup>4</sup>



### SUNPOWER OFFERS THE BEST COMBINED POWER AND PRODUCT WARRANTY



More guaranteed power: 95% for first 5 years, -0.4%/yr. to year 25.<sup>8</sup>



Combined Power and Product defect 25 year coverage that includes panel replacement costs.<sup>9</sup>

| ELECTRICAL DATA                                 |                       |                |
|---|-----------------------|----------------|
|   | <b>E20-327</b>        | <b>E19-320</b> |
| Nominal Power <sup>12</sup> (P <sub>nom</sub> ) | 327 W                 | 320 W          |
| Power Tolerance                                 | +5/-0%                | +5/-0%         |
| Avg. Panel Efficiency <sup>13</sup>             | 20.4%                 | 19.8%          |
| Rated Voltage (V <sub>mpp</sub> )               | 54.7 V                | 54.7 V         |
| Rated Current (I <sub>mpp</sub> )               | 5.98 A                | 5.86 A         |
| Open-Circuit Voltage (V <sub>oc</sub> )         | 64.9 V                | 64.8 V         |
| Short-Circuit Current (I <sub>sc</sub> )        | 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.                              | 35 mA / °C            |                |



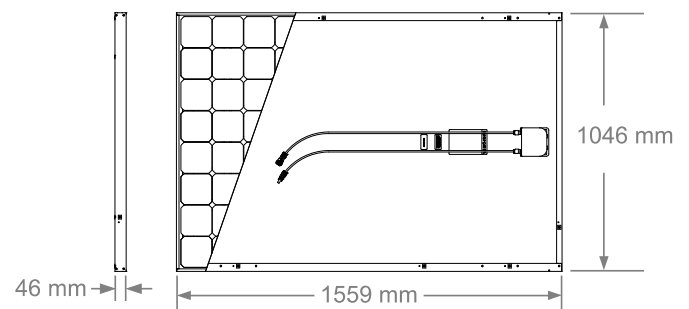
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| OPERATING CONDITION AND MECHANICAL DATA |   |
|---|---|
| Temperature                             | - 40°C to +85°C   |
| Max load                                | Wind: 2400 Pa, 245 kg/m <sup>2</sup> front & back<br>Snow: 5400 Pa, 550 kg/m <sup>2</sup> 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 <sup>10</sup> |
| 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 m<sup>2</sup>, 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/m<sup>2</sup> 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](http://www.sunpowercorp.com/datasheets). Read safety and installation instructions before using this product.

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