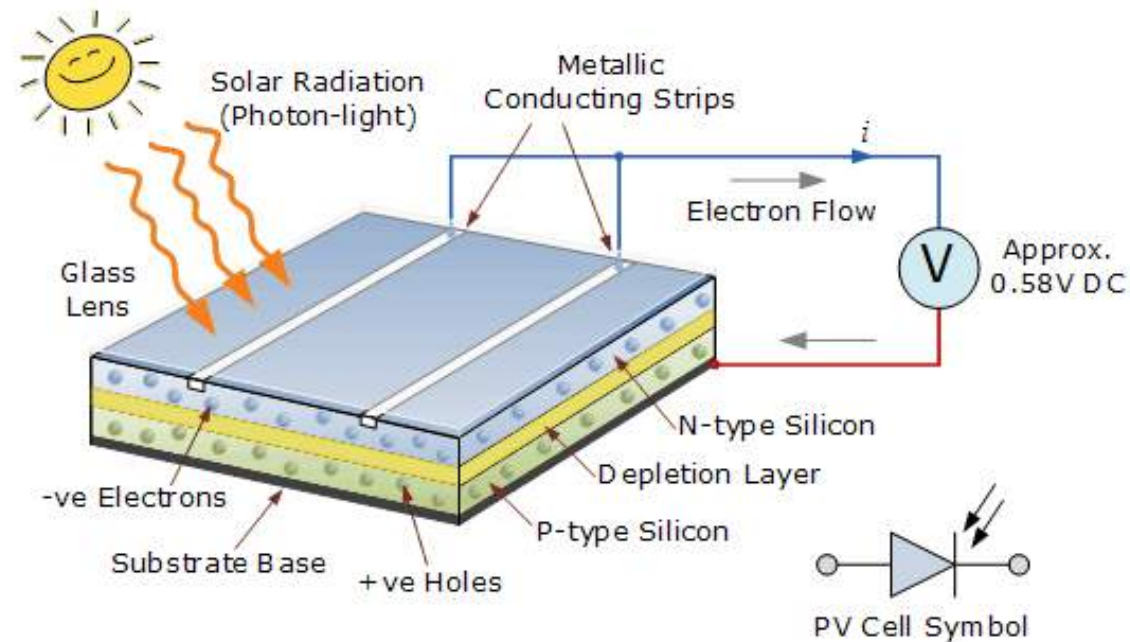


Solar PV for the Amateur Radio Addict / Enthusiast

Robin Greig VE6 RBN

How do PV Modules (Solar Panels) produce electricity?

Photovoltaics Solar Cell Construction



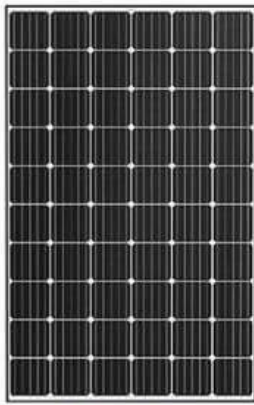
<https://www.alternative-energy-tutorials.com/photovoltaics/photovoltaics.html>



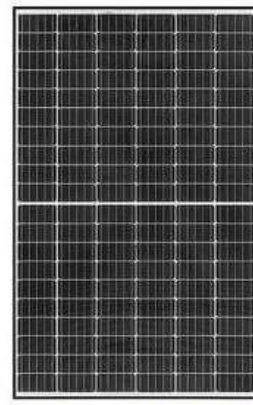
Solar Cell Type and Panel Efficiency



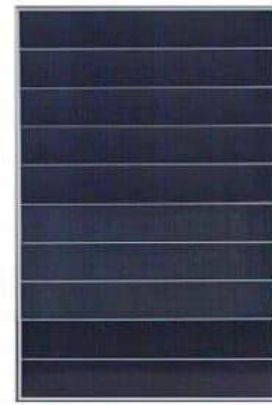
Poly PERC
16 - 17%



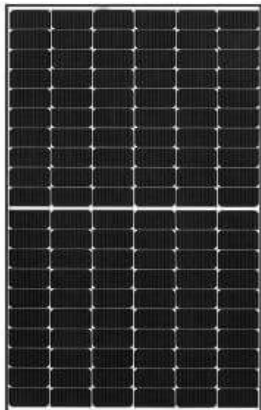
Mono PERC
17 - 19%



Half-cut mono PERC
18 - 20%



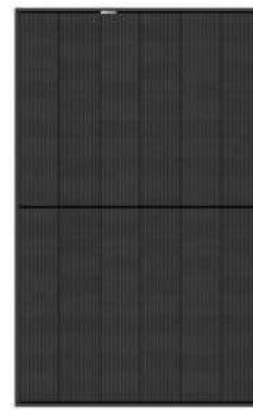
Shingled mono cells
19 - 21.5%



Half-cut mono PERC MBB
20 - 22%



Half-cut N-Type TOPcon
20 - 22.5%



Half-cut N-Type HJT
21 - 22.5%



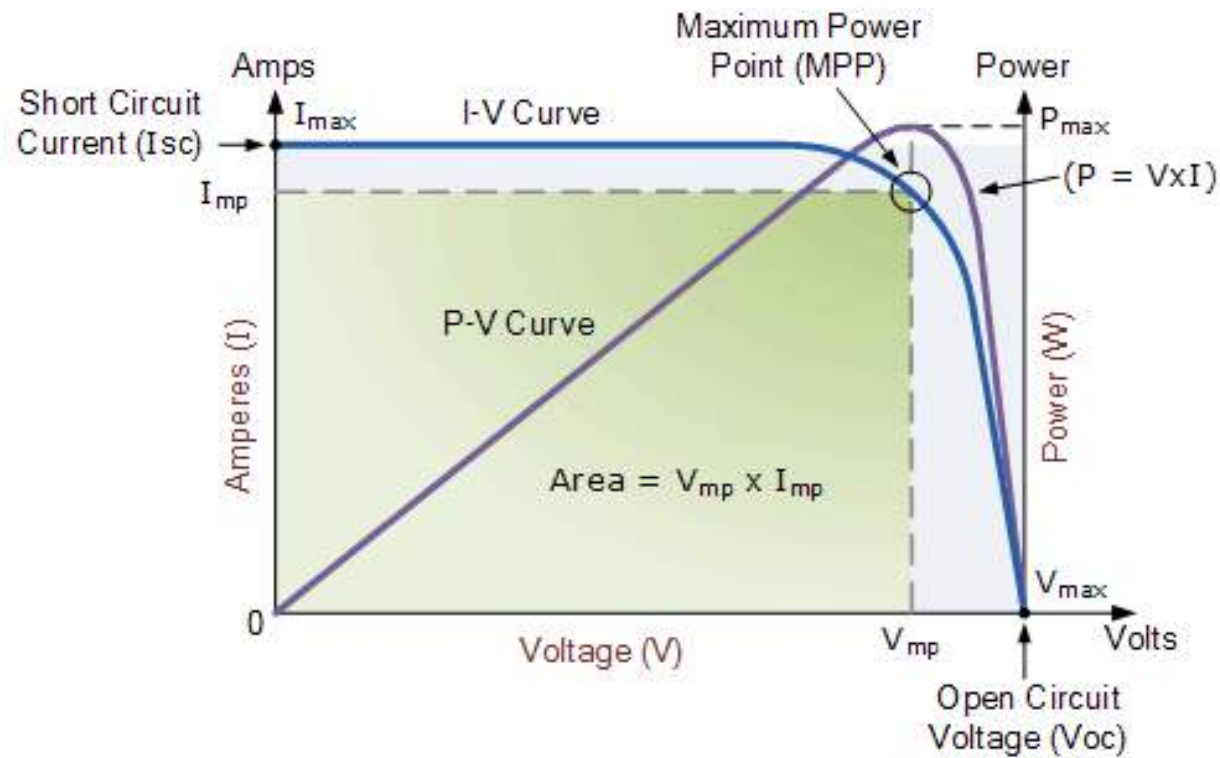
N-Type IBC
21 - 23%

www.cleanenergyreviews.info

<https://www.cleanenergyreviews.info/blog/most-efficient-solar-panels>

PV I-V Curve

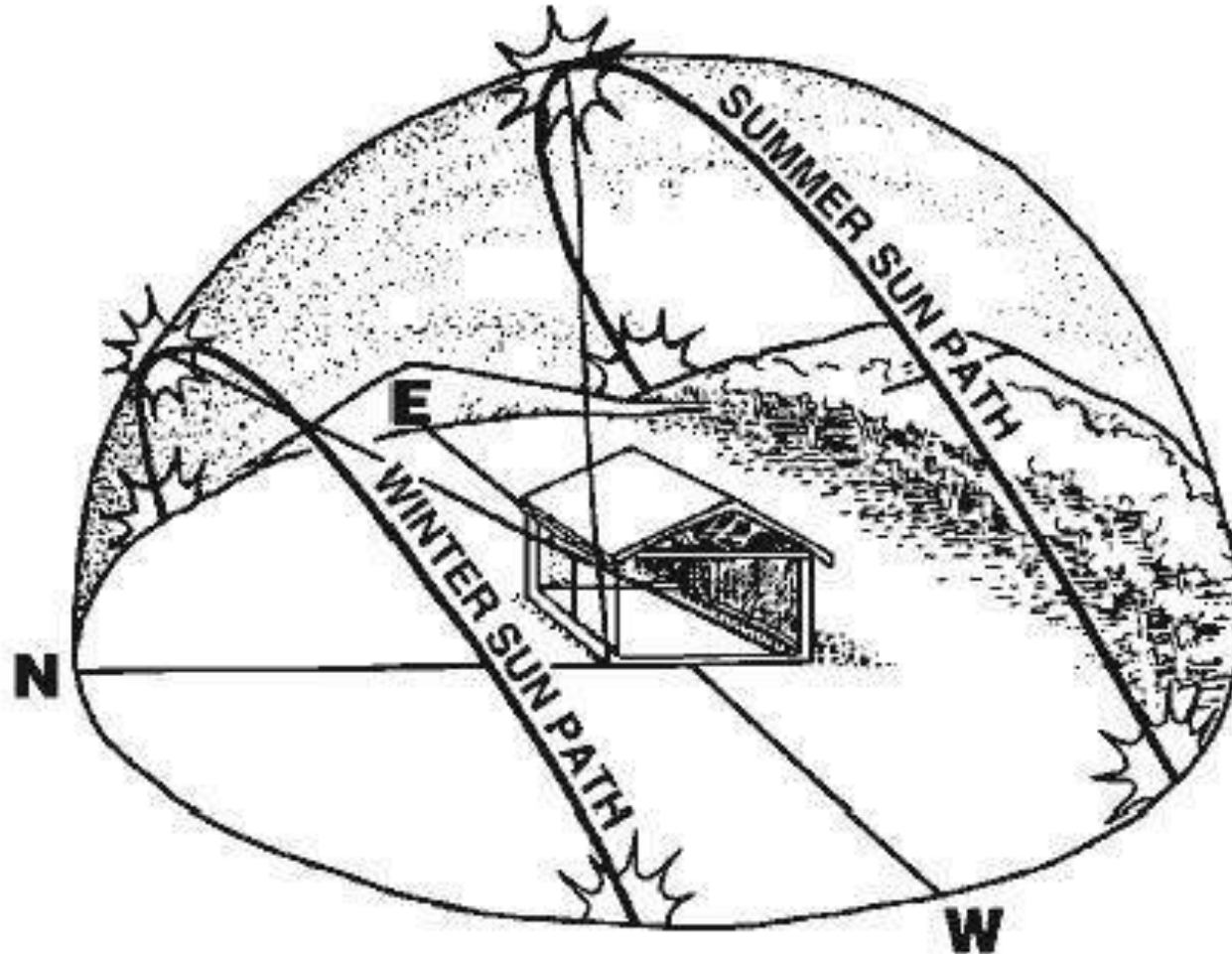
Solar Cell I-V Characteristic Curve



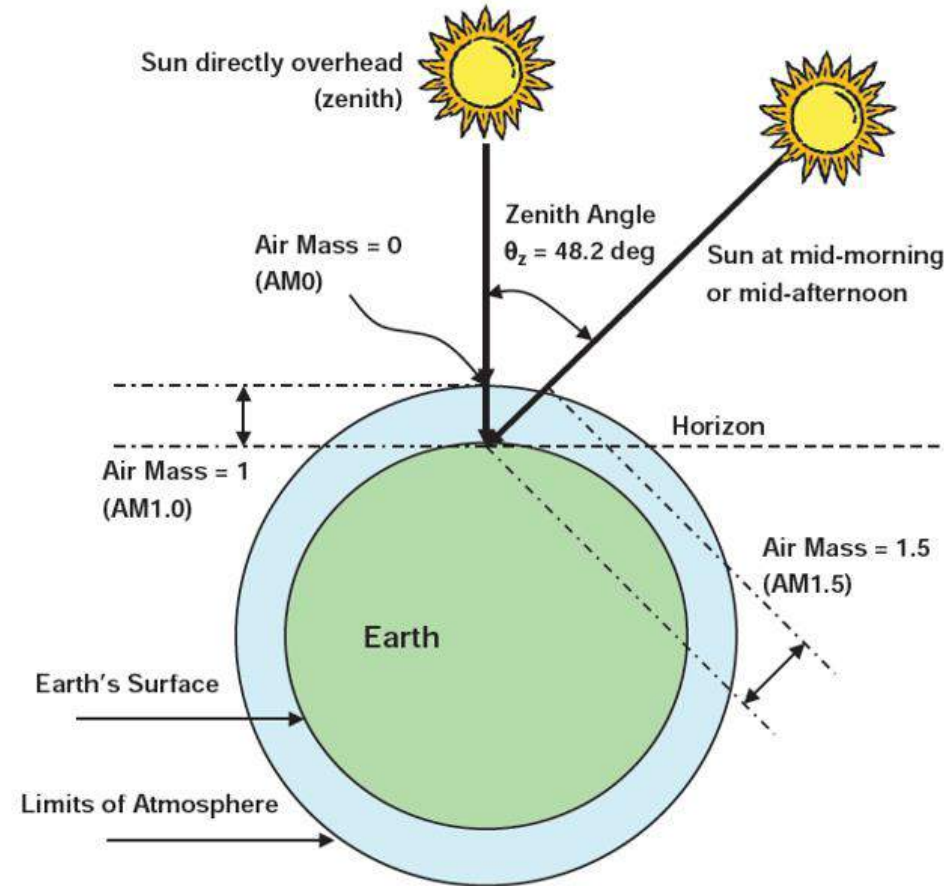
Factors affecting Solar PV

- Irradiance: The intensity of the sunlight
- Insolation: The duration of the sunlight
- Azimuth: The angle of the sunlight (which will affect intensity)
- Atmosphere: The distance the light must travel through our atmosphere to reach the PV module (affects intensity)
- Temperature (the colder the better)
- Shading = Lower intensity

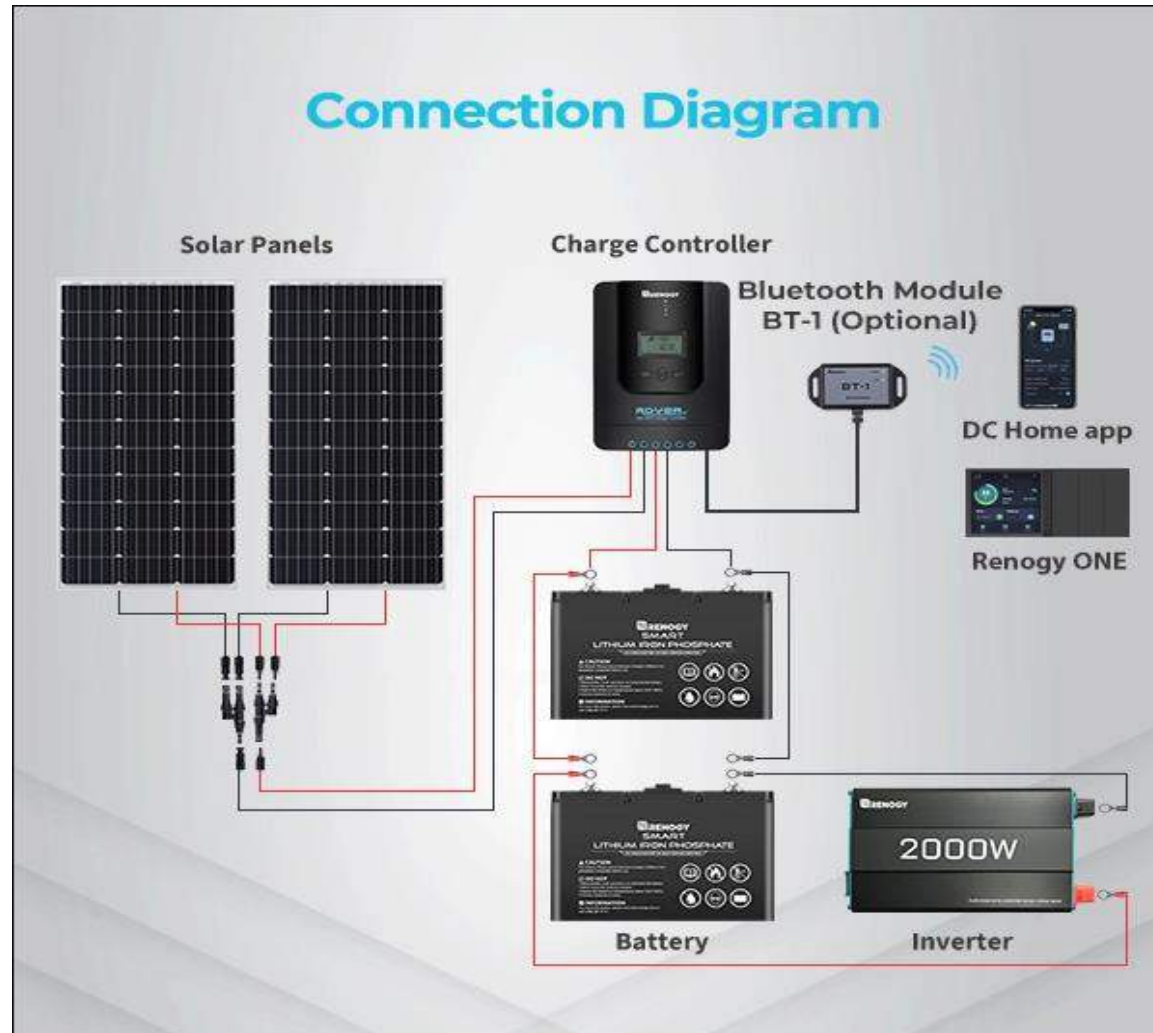
Sun's path across the sky (summer vs winter)



How much atmosphere do the photons travel



How to connect a PV system



Morningstar SunSaver



PWM vs MPPT Charge Controllers



36V / 10A =
360 Watts



14V / 10A =
140 Watts



36V / 10A =
360 Watts



14V / 25A =
350 Watts



What about batteries?

 24V 50Ah Lithium Iron Phosphate Battery Compare ★★★★★ 0.0 (0) \$685.99 Add to Cart	 12V 100Ah Smart Lithium Iron Phosphate Battery Compare ★★★★★ 4.8 (50) \$639.99 - \$1,259.99 Choose Options	 12V 100Ah Lithium Iron Phosphate Battery w/ Bluetooth Compare ★★★★★ 4.7 (65) \$499.99 609.99 Add to Cart	 Deep Cycle Hybrid GEL Battery 12 Volt 200Ah Compare ★★★★★ 4.9 (26) \$449.99 609.99 Add to Cart
 Deep Cycle AGM Battery 12 Volt 200Ah Compare ★★★★★ 4.9 (63) \$369.99 - \$932.99 Choose Options	 24V 25Ah Lithium Iron Phosphate Battery Compare ★★★★★ 5.0 (1) \$379.99 Add to Cart	 Deep Cycle Hybrid GEL Battery 12 Volt 100Ah Compare ★★★★★ 4.8 (45) \$255.99 - \$279.99 Choose Options	 Lithium Iron Phosphate Battery 12 Volt 50 Ah Compare ★★★★★ 4.9 (19) \$299.99 609.99 Add to Cart

[lithium solar batteries, deep cycle marine battery, 12v solar battery \(renogy.com\)](https://www.renogy.com)

Safety Considerations

- Weight of components (batteries)
- Mounting of PV modules
- Fusing of components (batteries)

Resources

- [NABCEP PV Resource Guide](#)
- [Renogy® Canada-Solar Off-grid Products](#)
- [Alternative Energy Tutorials is Clean and Green Energy \(alternative-energy-tutorials.com\)](#)
- [PVEducation](#)