January 17, 2023

OpAmp Version Revisited - rev2

Another modification may be needed to prevent load current from flowing through the charger during intermediate panel illumination. This won't happen in the dark, or in full sun, but might on a cloudy day when the panel voltage is near the battery voltage when contributing some current to the load.

The TP4056 only needs about 30mV input headroom above the battery voltage for charging. But the alternate path for panel current - through the schottky diode - has a 300mV drop. So if the panel is able to provide some of the load current, but not all, that current will flow through the charger.

Since the reason for incorporating a load sharing circuit in the first place is to allow input current, when available, to directly power the load rather than do so through the charger, a modification is needed to get to that result. The modification is simply to add another schottky diode at the input of the TP4056. That will make the voltage drops of the two paths roughly equal, or slightly favor the direct path since it doesn't have the 30mV headroom requirement.

This isn't a perfect solution because the Vf of the diodes varies with the current going through them, so some load current may still get through the charger. But it will be substantially less than without the extra diode.