



Make your own Solar-Powered Portable Gen Set

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Agenda

- Why we need solar generator set?
- Basic Components
- Lithium Ion Batteries
- How to Solder and Assemble
- BMS
- Where do I buy parts?
- Sample Pictures and Demo

Why we need portable Solar Gen Set?

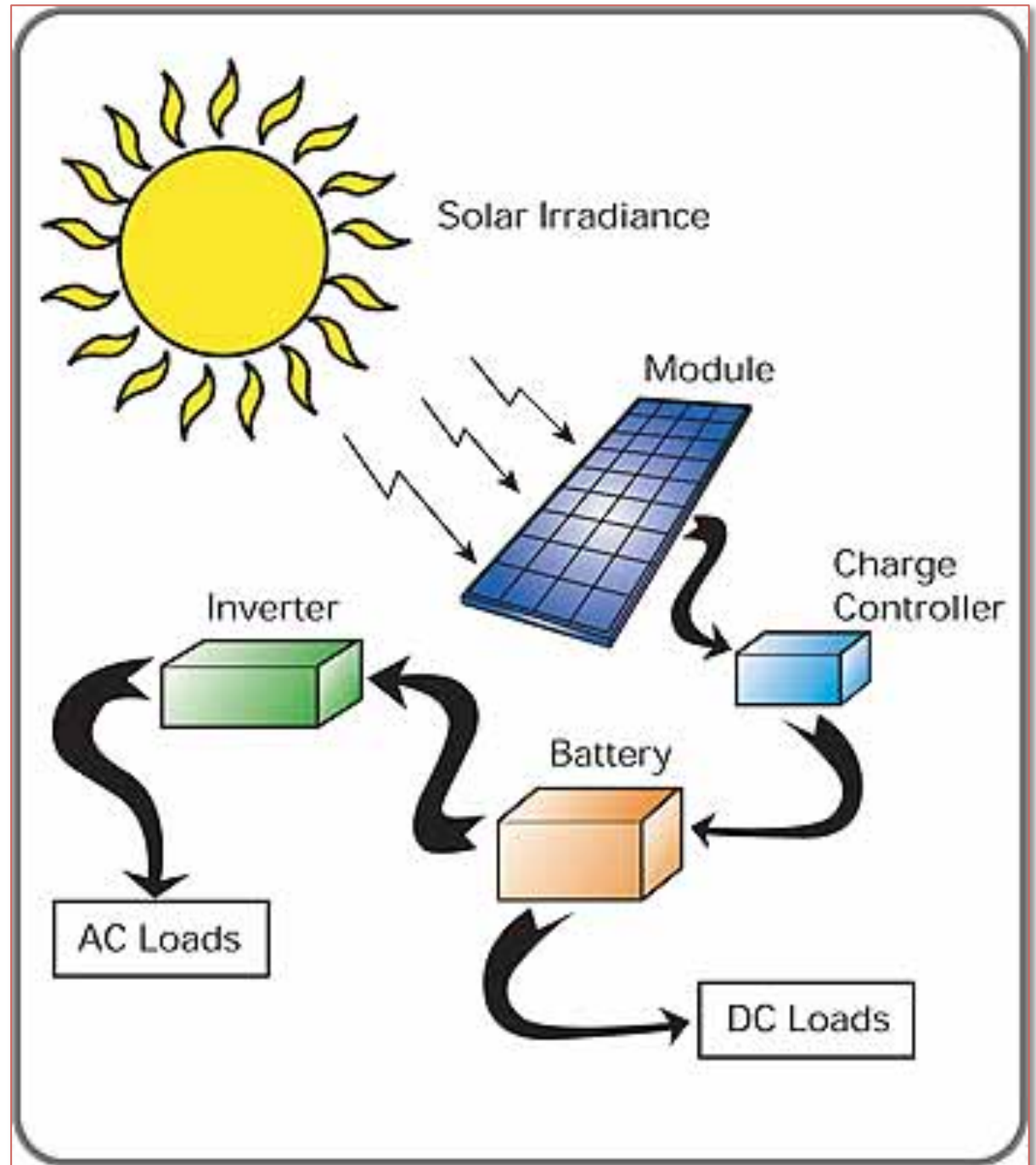
- Lightweight power source for emergency situations
- Power for remote sites
- Backup power
- Green Energy
- Renewable / Sustainable



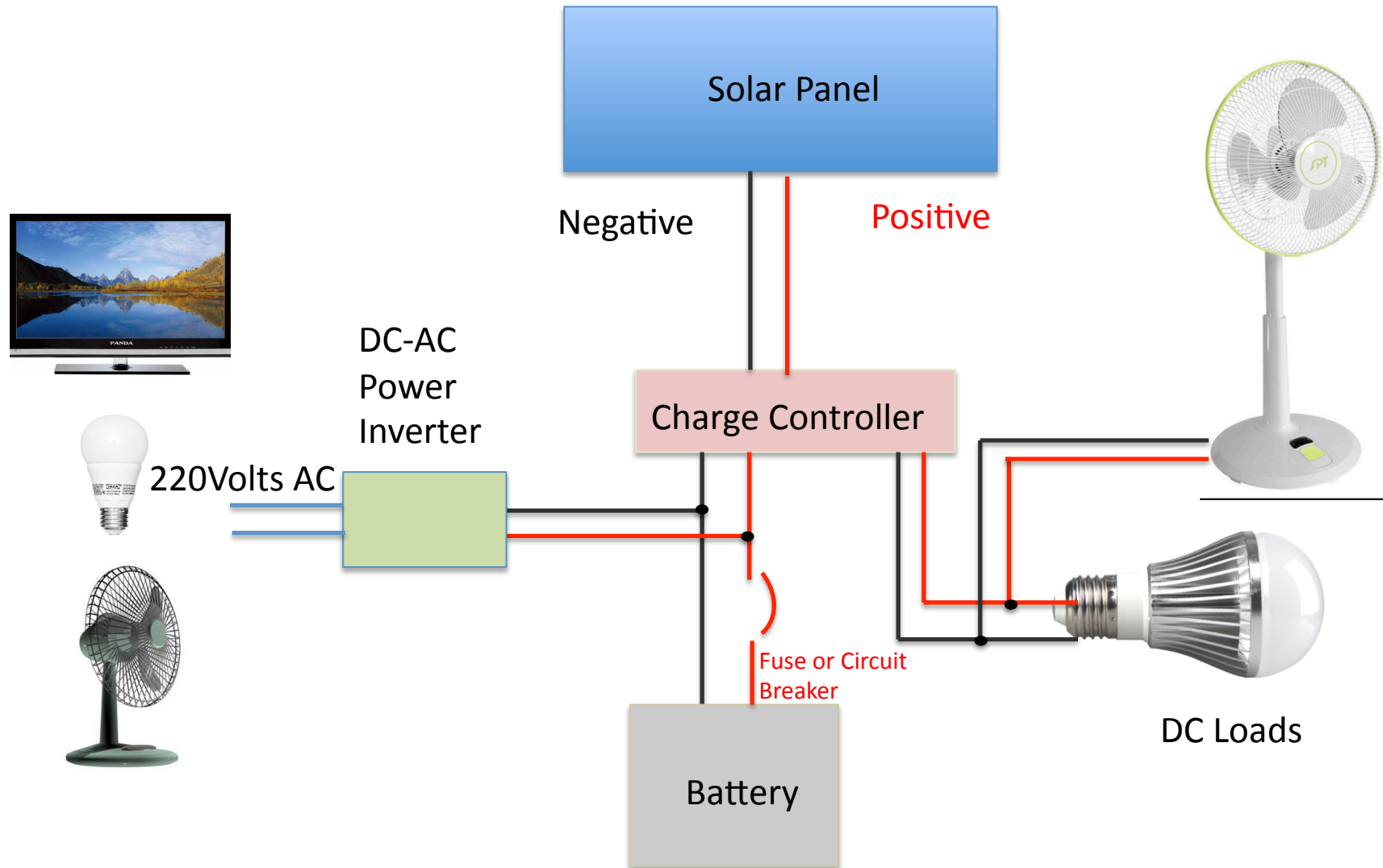
Solar Off-Grid

Basic Diagram

- Sun
- Solar Panel
- Charge Controller
- Battery
- Inverter
(connecting 220V Appliances)
- Wires
- Fuse / Breaker



Basic Diagram of Solar Off-Grid Setup



Common Batteries used for renewable energy

Flooded Lead Acid Battery



VRLA Batteries



Common Batteries used for renewable energy

Flooded Lead Acid Battery



Introducing Lithium Ion Batteries



Advantages of using Lithium Ion batteries

Weight – 1/3 compared with Lead Acid

Efficiency – 99% efficient compared with Lead Acid Batt

Discharge – can be discharged 100% while lead acid only 50%

Cycle Life- can be charge / discharge 3000 – 5000 times while lead acid 600 – 800 times only

Total Cost of Ownership – Despite the higher upfront cost of lithium-ion batteries, the true cost of ownership is far less than lead acid when considering life span and performance.

More Clean and Green than Lead Acid Batteries



Characteristics of Lithium Ion Batteries

Nominal voltage @ 3.7V

Fully charged @ 4.2V

Low voltage @ 2.8V



Rated in mAh = milli Ampere-hour

1000mAh = 1Ah

Sensitive to being drained and overcharged

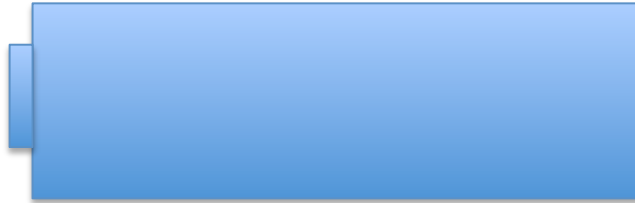
Protective circuit is a must!!!

Connecting Lithium Ion batts

18650 type batteries

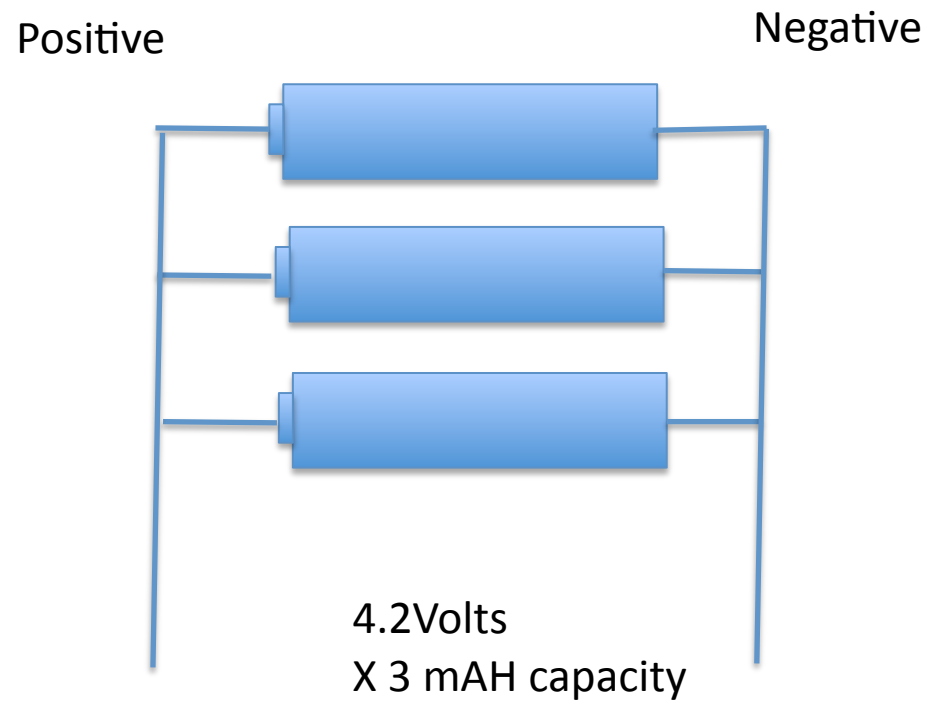
Positive

Negative



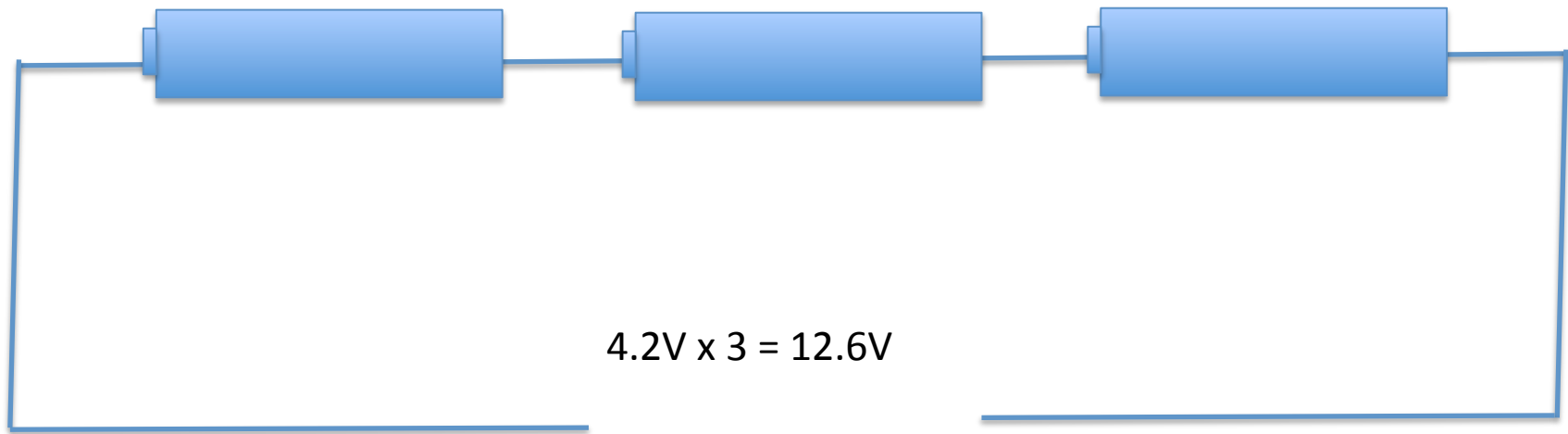
Connecting Lithium Ion batts (Parallel)

18650 type batteries

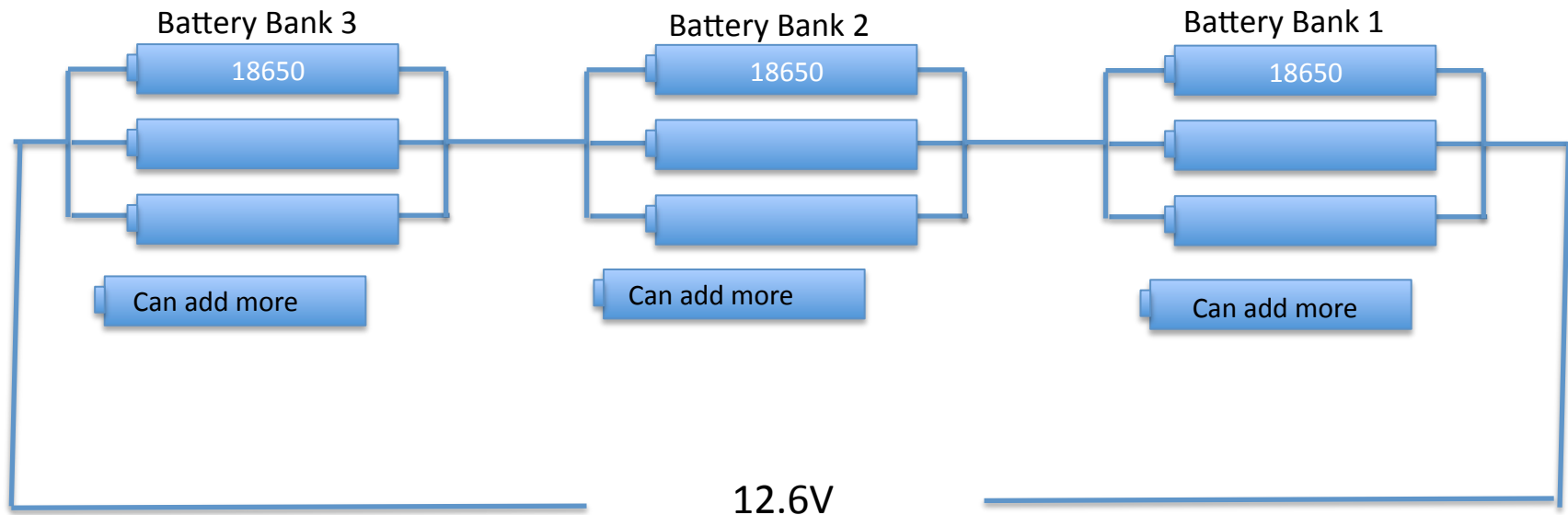


Connecting Lithium Ion batts (Series)

18650 type batteries



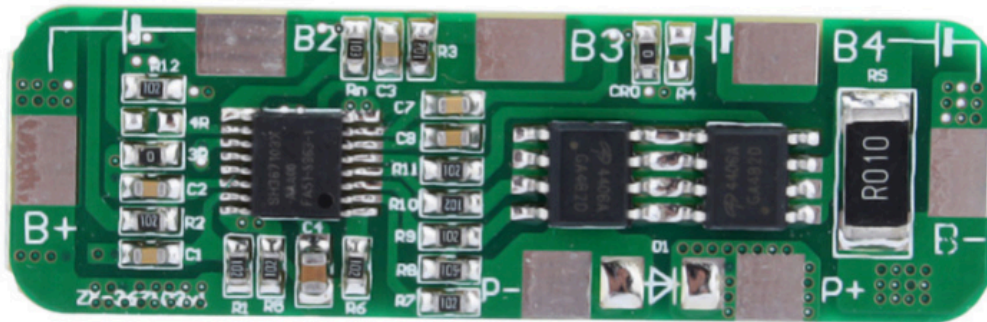
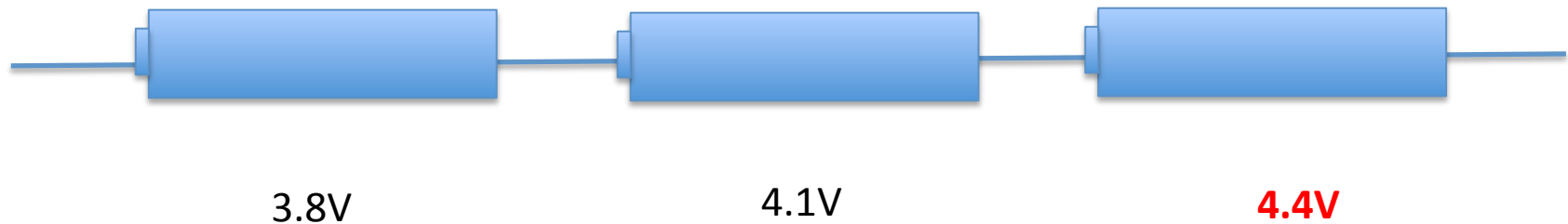
Connecting Lithium Ion batts (Parallel –Series)



Take Note: Connect batteries in parallel first before connecting in series

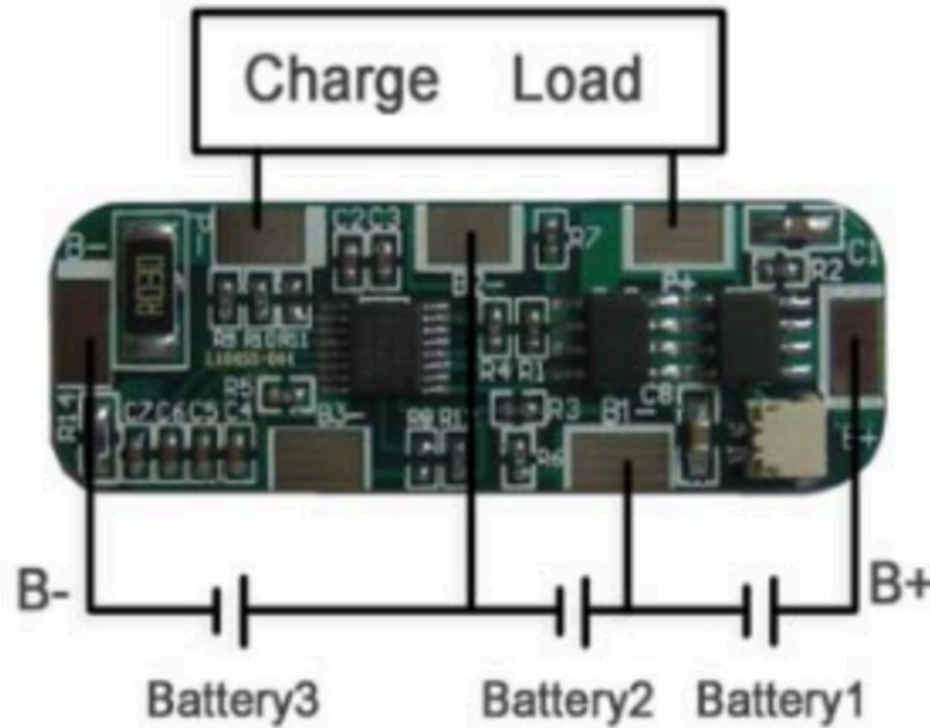
Battery Management System

Lithium ion batteries in series may pose some problems
- Charging and discharging will not be the same



Battery Management System is the solution

Battery Management System



Protects the batteries from being drained or overcharged

Short circuit / high current

No need additional Charge Controller

Soldering a Lithium Ion Battery (18650)

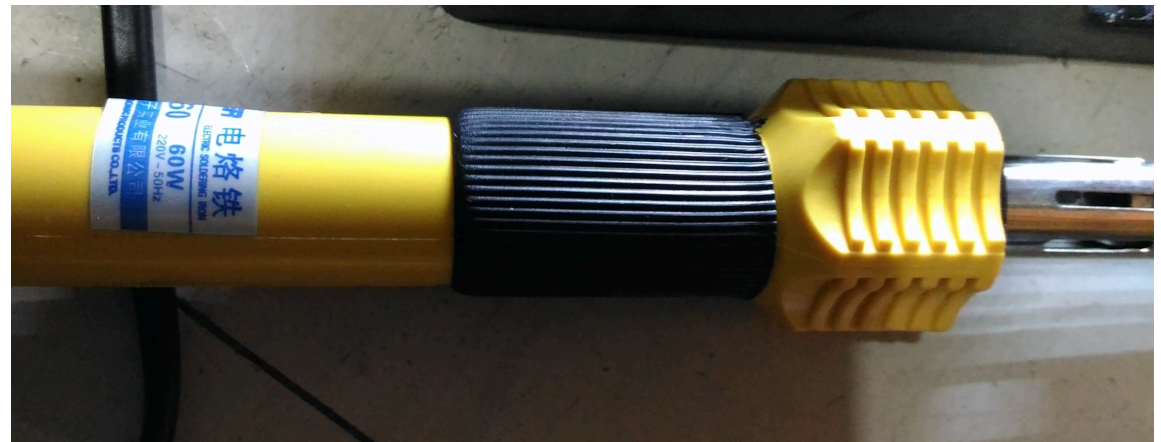


Sandpaper

60Watts
Soldering Iron
Or higher

Don't use lower than 60Watts

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Soldering a Lithium Ion Battery (18650) Step 1

Prepare the wire



Sandpaper the metal contact
Of the battery



Soldering a Lithium Ion Battery (18650)

Step 2

- Heat the Soldering Iron
 - Tin the tip with Soldering Lead
 - Keep it silver shiny but not yellowish
- While the Iron is hot, use any metal object to scrape excess “dull” soldering lead on the tip
 - Tin the tip thinly prior using it



Soldering a Lithium Ion Battery (18650) Step 3

- Tin the wire
- Soldering tip and wire must touch first for few seconds before applying soldering lead
- The soldering lead must touch on the tip and on the wire at the same time so the lead will flow on the wire evenly



Soldering a Lithium Ion Battery (18650) Step 3 (cont'd)

- The way I hold the wire, soldering lead and soldering iron
- I am left handed 😊
- If you cant do it, use “Helping Hand”



Helping Hand

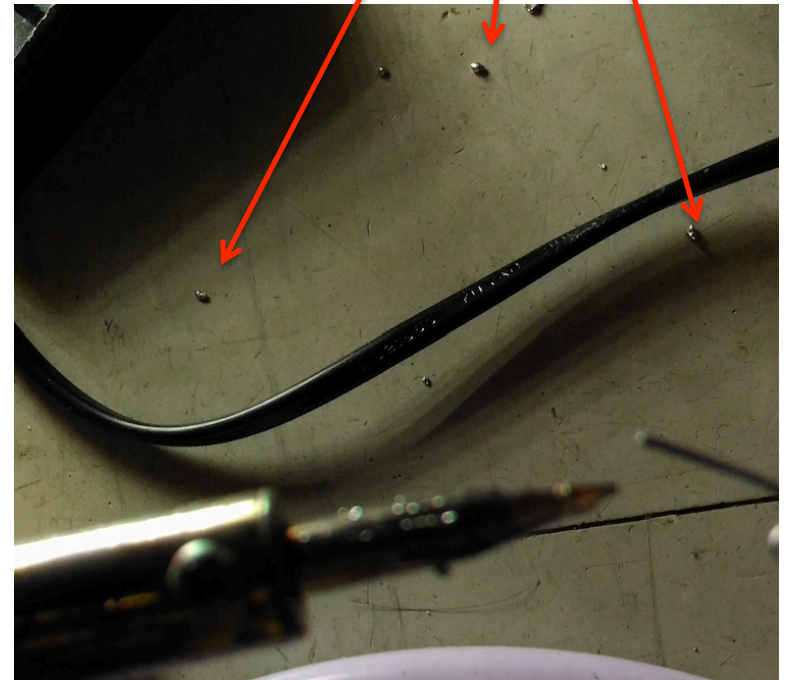
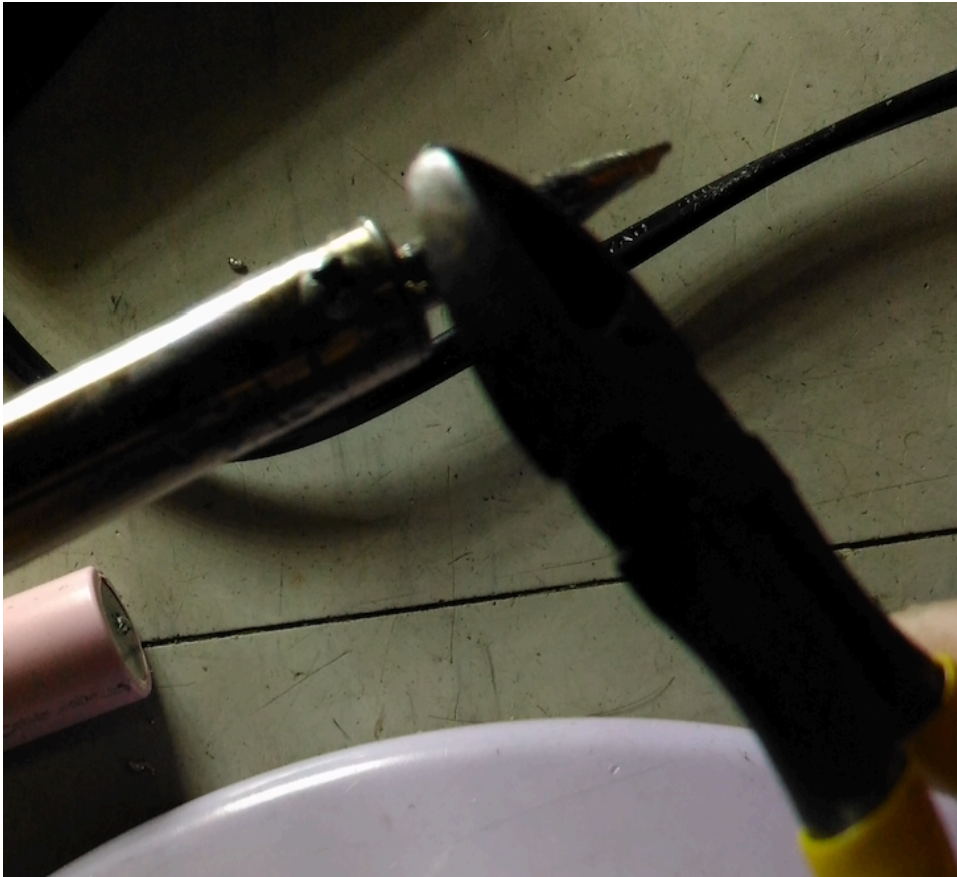


Soldering a Lithium Ion Battery (18650)

Step 4

- **Clean the tip after each soldering job**
- Tin the tip
- This will make the soldering tip always clean before the next soldering job

Lead Drippings due to
cleaning of the tip 😊
Clean it later
DO NOT re-use



Soldering a Lithium Ion Battery (18650) Step 5

- Solder the metal contact of the battery
- Soldering tip and the metal contact must be touching for few seconds before applying soldering lead
- This will ensure that the metal contact is hot so that soldering lead will flow evenly
- Apply the soldering lead, touching both the metal contact and the soldering tip



Use Helping Hand if you can't do the above

Soldering a Lithium Ion Battery (18650)

- Once soldered, the soldering lead on the metal should be shiny

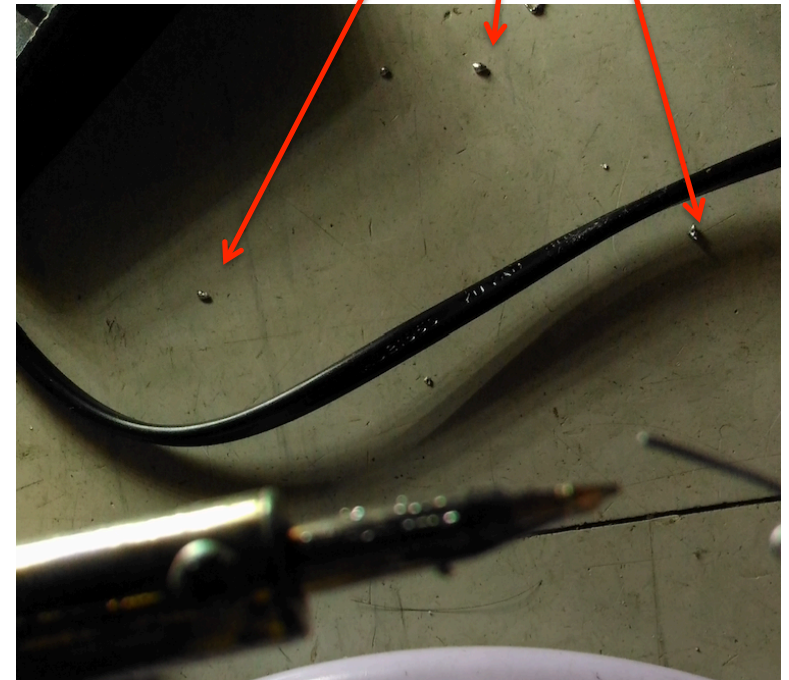
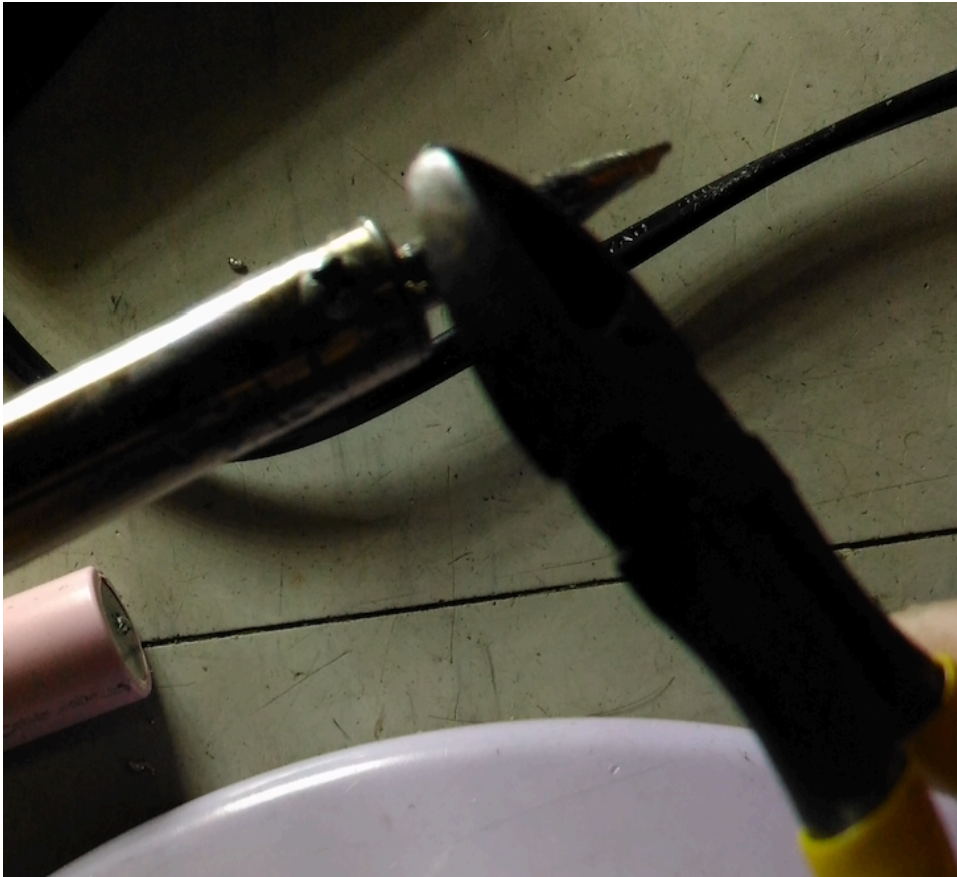


Soldering a Lithium Ion Battery (18650)

Step 6

- **Clean the tip after each soldering job**
- Tin the tip
- This will make the soldering tip always clean before the next soldering job

Lead Drippings due to
cleaning of the tip 😊
Clean it later



Soldering a Lithium Ion Battery (18650) Step 7

- Join the metal contact and the wire
- Soldering tip and the metal contact must be touching for few seconds before joining the wire.
- This will ensure that the metal contact is hot and the soldering lead applied is already melted
- Join the wire on the metal and let the soldering leads fused on metal and on wire



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Use Helping Hand if you can't do the above

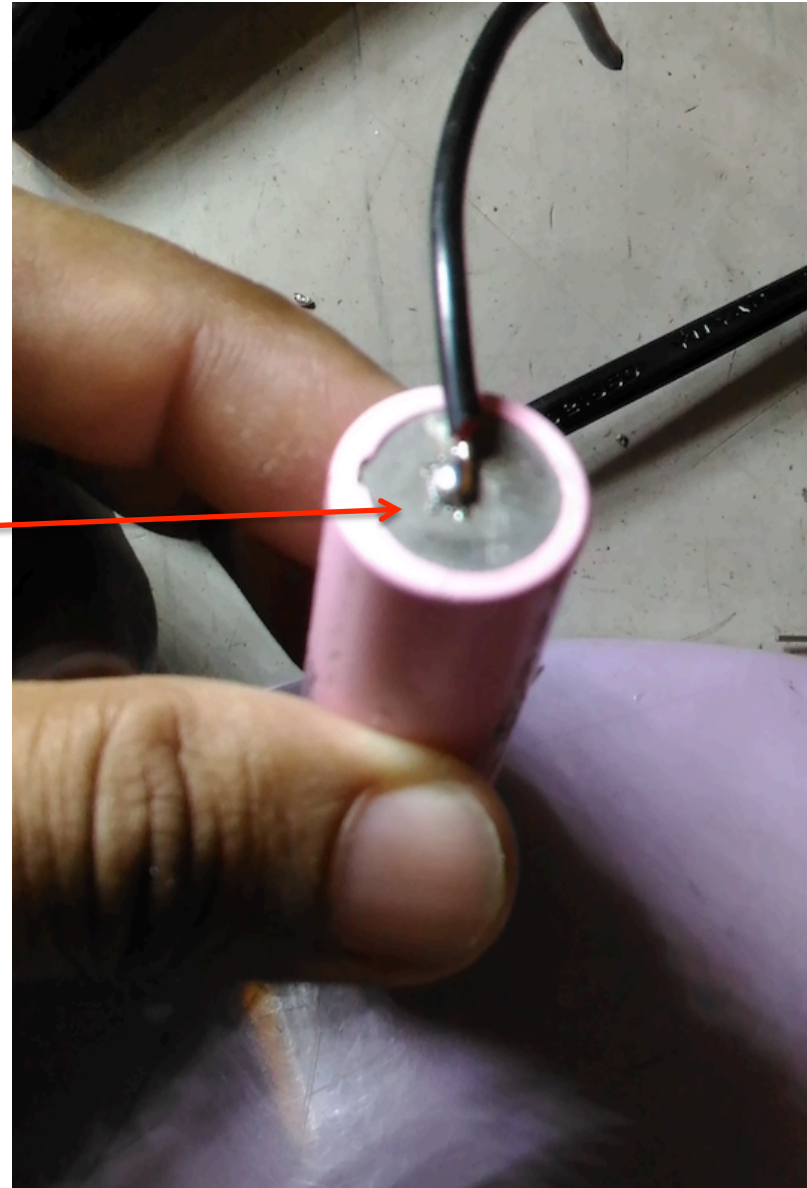
Soldering a Lithium Ion Battery (18650)

The solder must be shiny

This ensure the wire bonded to metal contact strong

Repeat it with other contacts and batteries

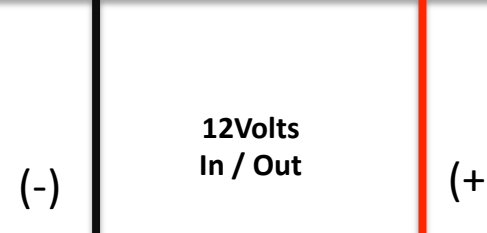
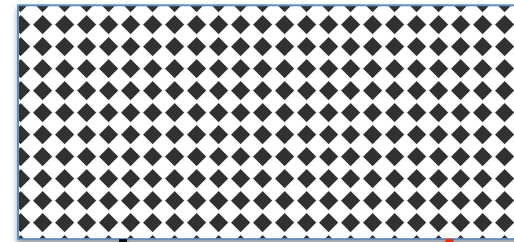
Happy DIY



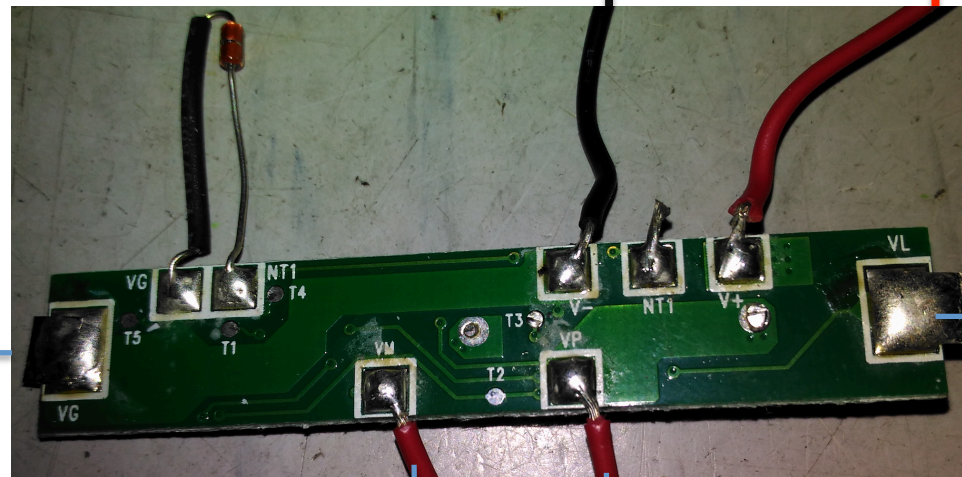
Budget Meal 12V Powerbank

With BMS Battery Protection Board

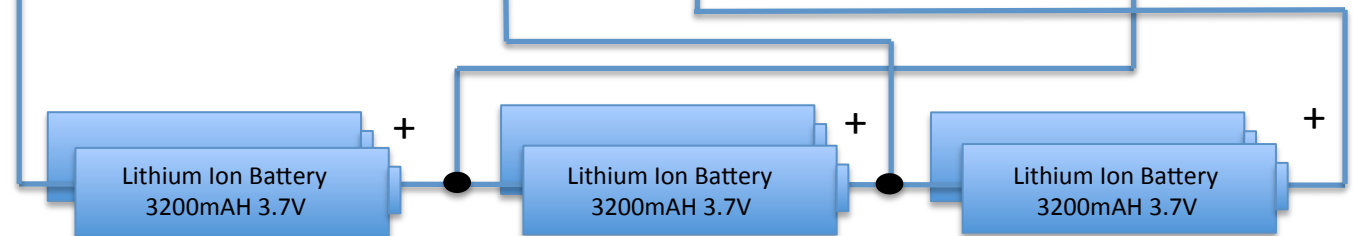
10W – 20W Solar Panel
Vmp 18Volts

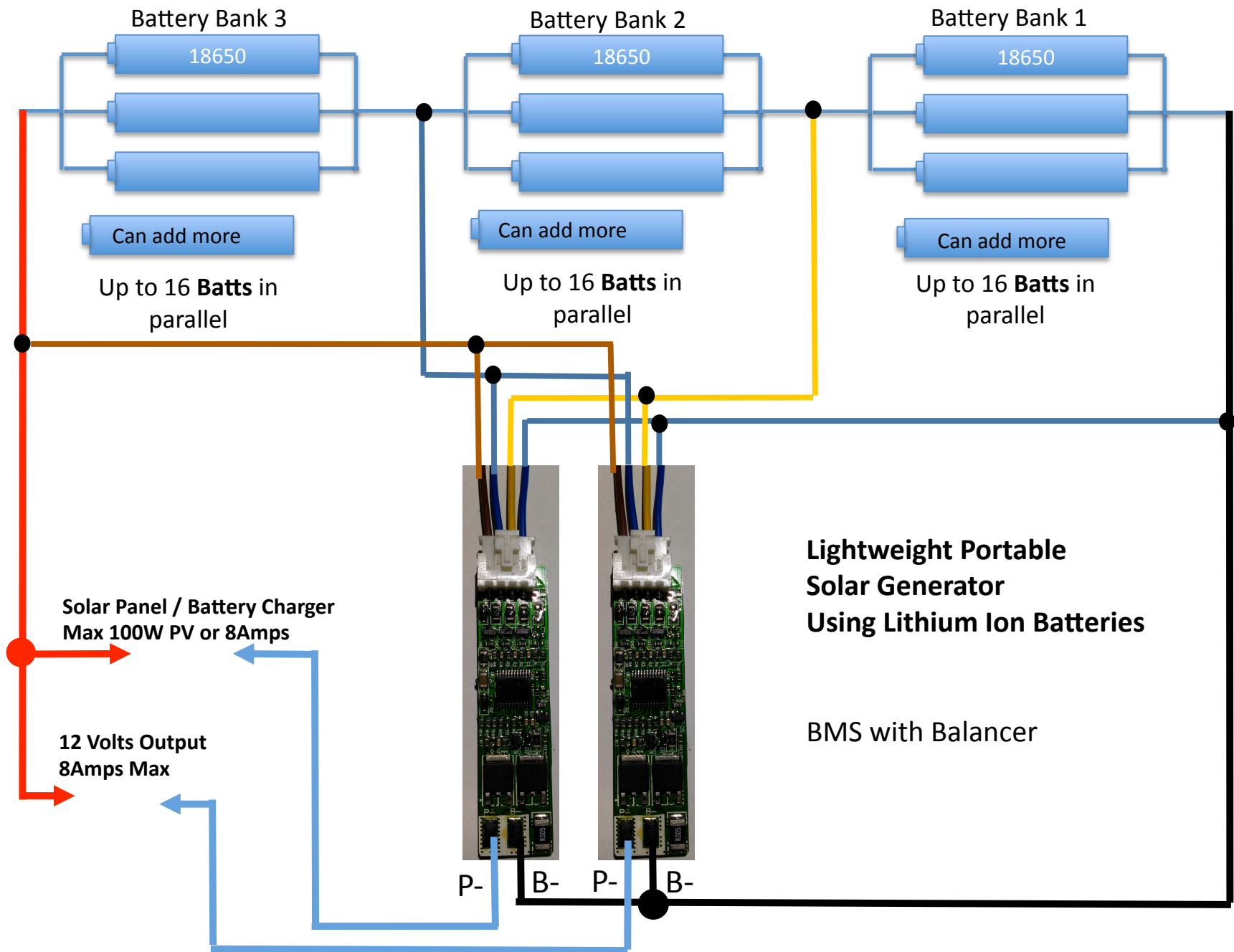


Lithium Ion
BMS Board 3S
2Amp

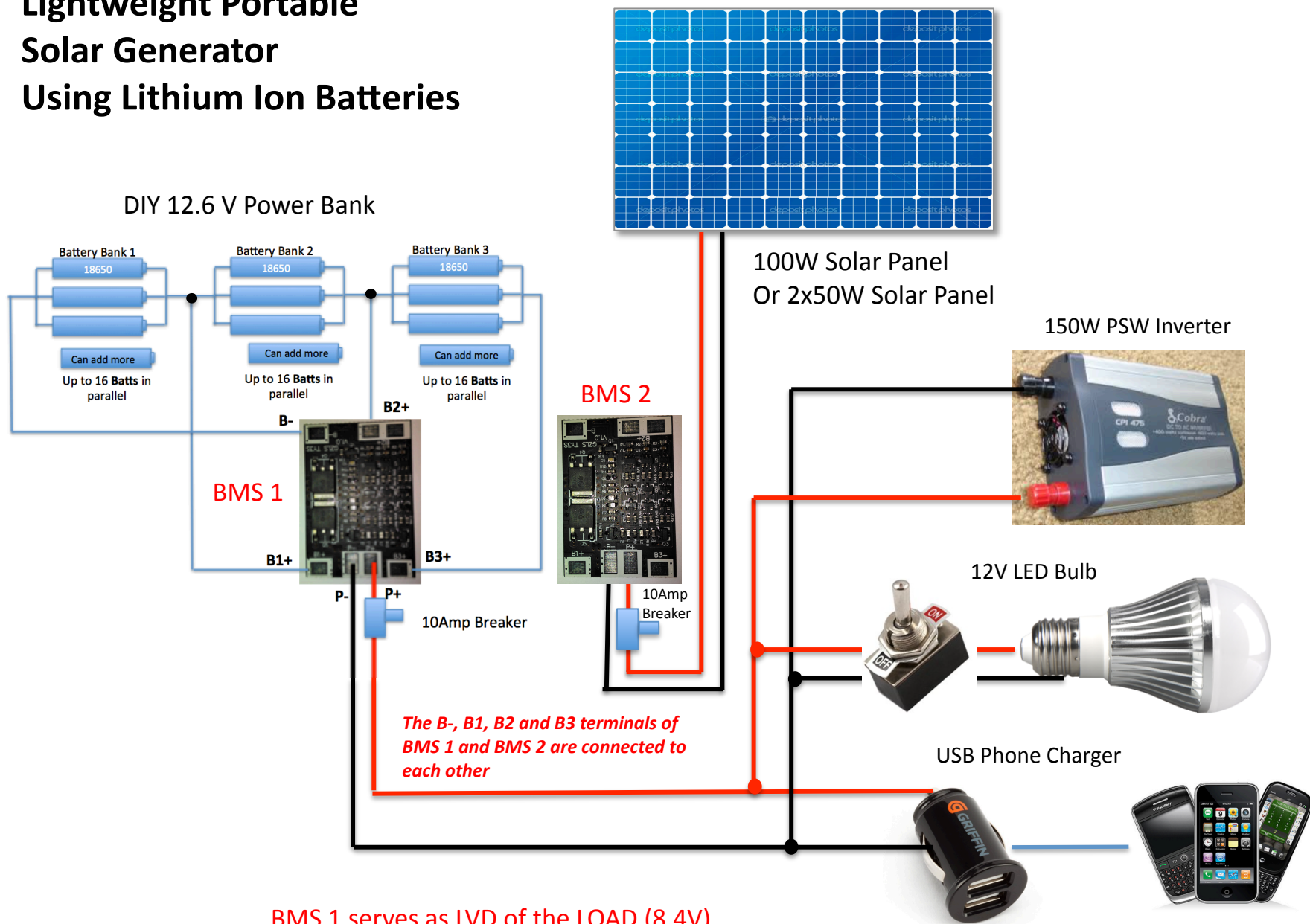


6 Pieces
18650 2400mAH or higher
Lithium Ion Batteries
2 Parallel – 3 Series





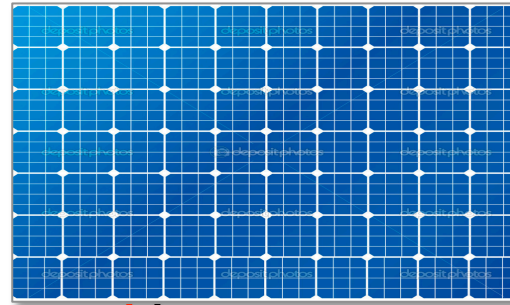
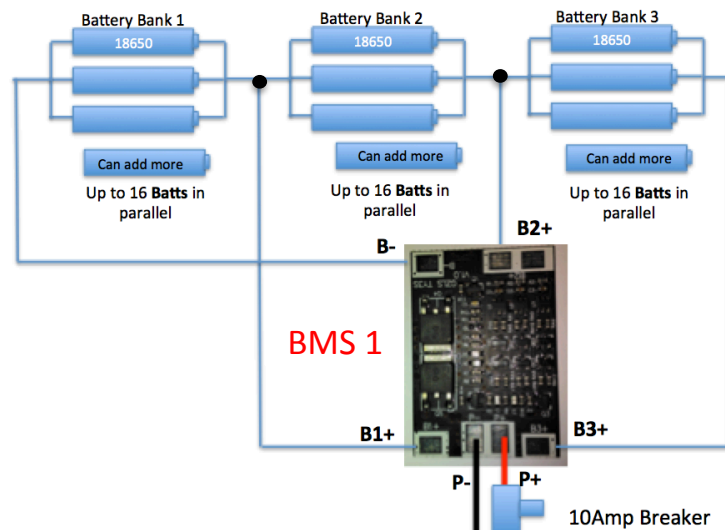
Lightweight Portable Solar Generator Using Lithium Ion Batteries



BMS 1 serves as LVD of the LOAD (8.4V)
BMS 2 serves as HVD of the PV (12.6V)

UPS converted into Solar Portable Generator

18650 Lithium Ion Batteries

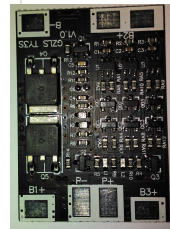


100W Solar Panel
Or 2 x 50W Solar Panel

220V AC Input



BMS 2



10Amp
Breaker

10Amp Breaker

Original battery connections



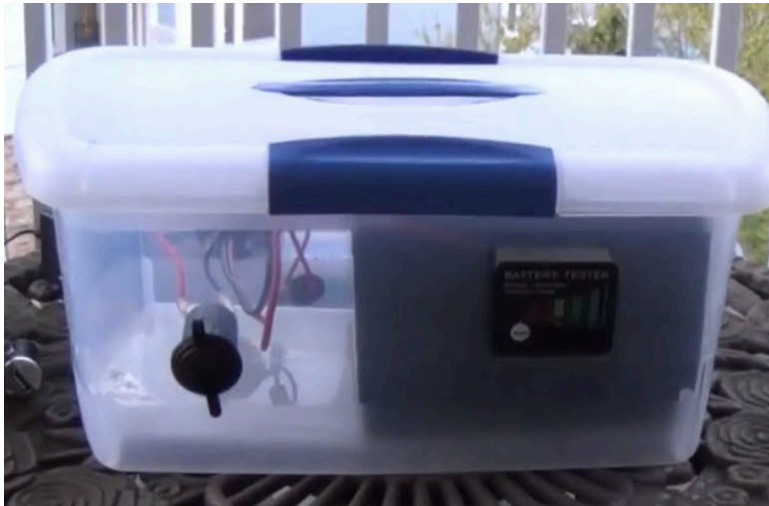
UPS

220V AC Output



*The B-, B1, B2 and B3 terminals
of BMS 1 and BMS 2 are
connected to each other*

Galleries sample Pics



11/28/16

Solar Power Philippines FB Group



Where to buy parts

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