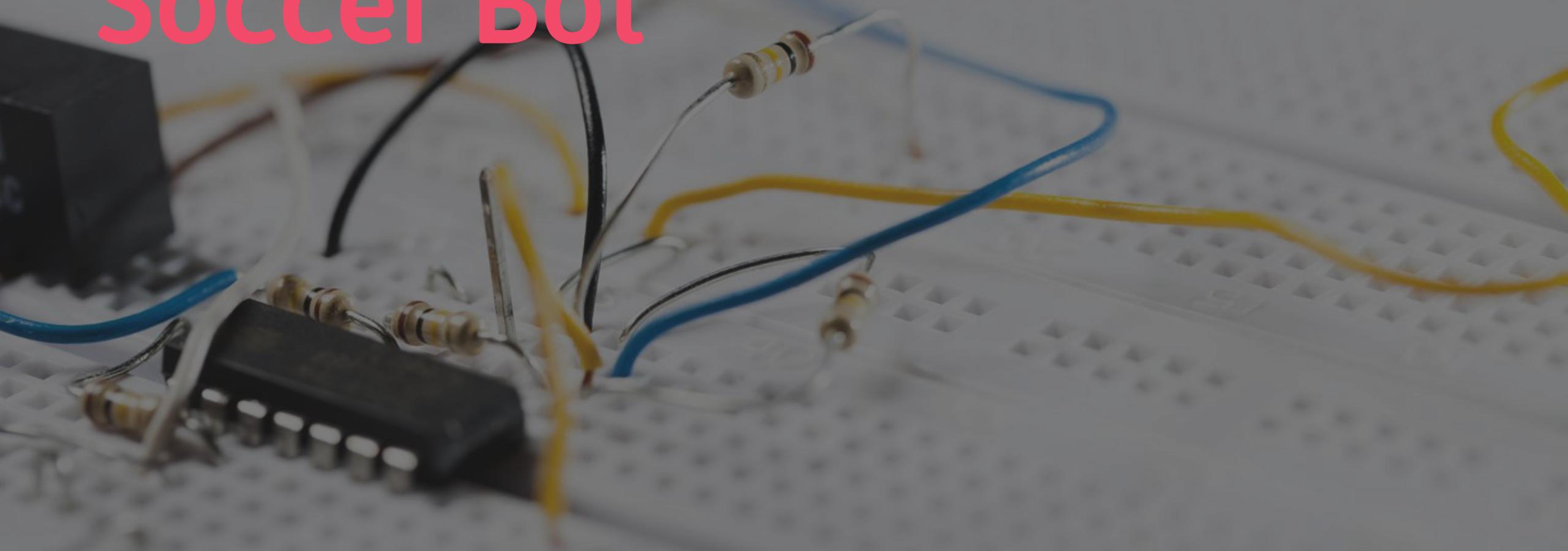


Power System of Soccer Bot



Different Types of Batteries



Different Types of Batteries

1. Non – Rechargeable batteries (Alkaline batteries)



2. Non – Rechargeable batteries (lithium batteries)



Different Types of Batteries

3. Rechargeable batteries (Lithium-polymer battery or li-po battery)



4. Rechargeable batteries (lithium-ion batteries)



Some “Code-Words” about Batteries

CELL →

একটি সিংগেল ব্যাটারি ইউনিট। বিভিন্ন প্রকার ব্যাটারির সেল
এর জন্য বিভিন্ন ভোল্টেজ থাকতে পারে।



Code-Words about Batteries

mAh → এটির পূর্ণরূপ হলো **milli Ampire hour**
এটি ব্যাটারির ধারনক্ষমতা সম্পর্কে ধারণা দেয়।



2200 mAh = যদি এই ব্যাটারি কোন ডিভাইসে 1 Ampire (1000 mA) হারে তড়িৎ
প্রবাহ চালাতে থাকে, তবে এই ব্যাটারির চার্জ 2.2 ঘন্টা টিকবে।

Some “Code-Words” about Batteries

mAh কি আসলেই ব্যটারির আসল পাওয়ার দেখাতে পারে?



2 cell 5000 mAh

$$7.4 \text{ V} * 5 \text{ Ah} = 37\text{Wh}$$



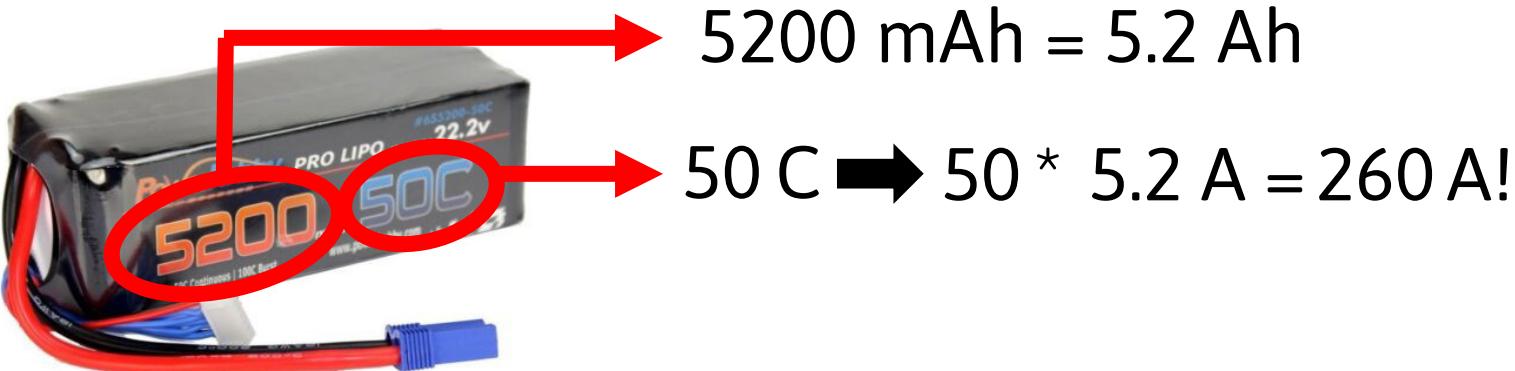
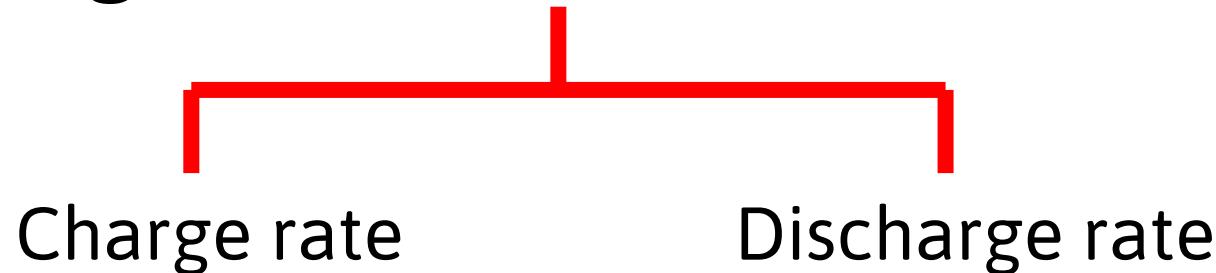
4 cell 5000 mAh

$$14.4 \text{ V} * 5 \text{ Ah} = 52\text{Wh}$$

Watt hour : Voltage * current to finish battery in 1 hour

Some “Code-Words” about Batteries

C Rating → Coulomb rating



Non – Rechargeable Batteries:



- Relatively cheap and easy to use
- Less hazardous
- Low capacity (400-600 mAh)
- Low Discharge rate (60 A in short circuit)
- Would be thrown out after 1 use.

Rechargeable Batteries (li-ion):



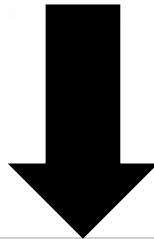
- Expensive but easy to use
- Might cause explosion
- High capacity (2000-3000 mAh)
- High Discharge rate
- Recyclable

Rechargeable Batteries (li-po):

- Very expensive and should be dealt with extreme caution
- Might cause explosion if punctured
- Very High capacity (500 - 5000 mAh)
- High Discharge rate (upto 100C)
- Recyclable



Rechargeable Batteries (li-po):



EC3
Connector



HXT
Connector



Dean/T
Connector



XT30
Connector



XT60
Connector



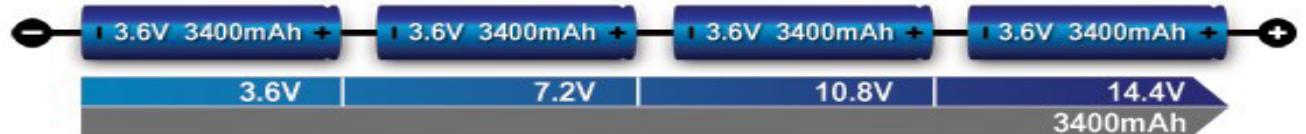
JST
Connector

Some facts about rechargeable batteries

- Operates in a voltage range (3V – 4.2V)



- In series configuration, every cell should be properly balanced



Voltage Converter

AC to AC



AC to DC



DC to DC



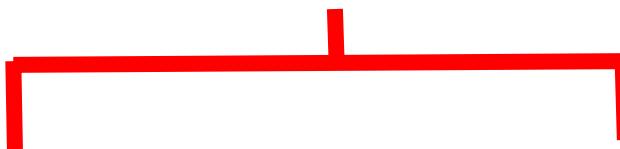
DC to AC



Different Types of Converter Modules

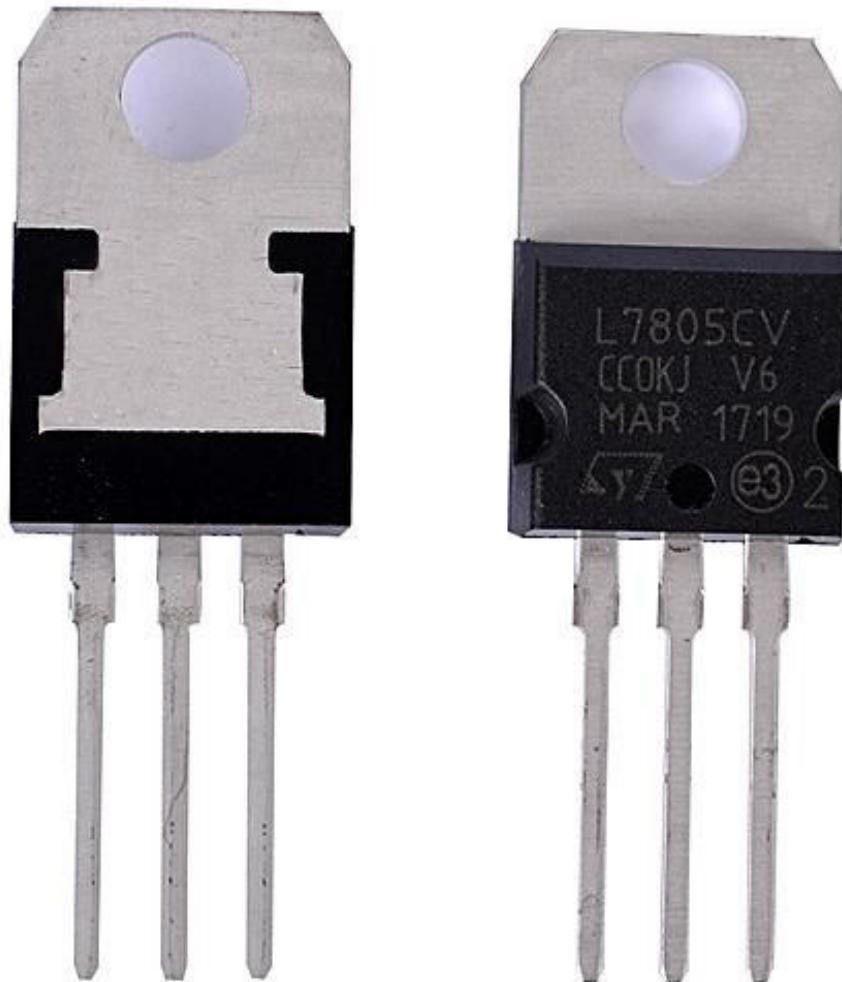


VOLTAGE REGULATOR



STEP UP BOOST
CONVERTER

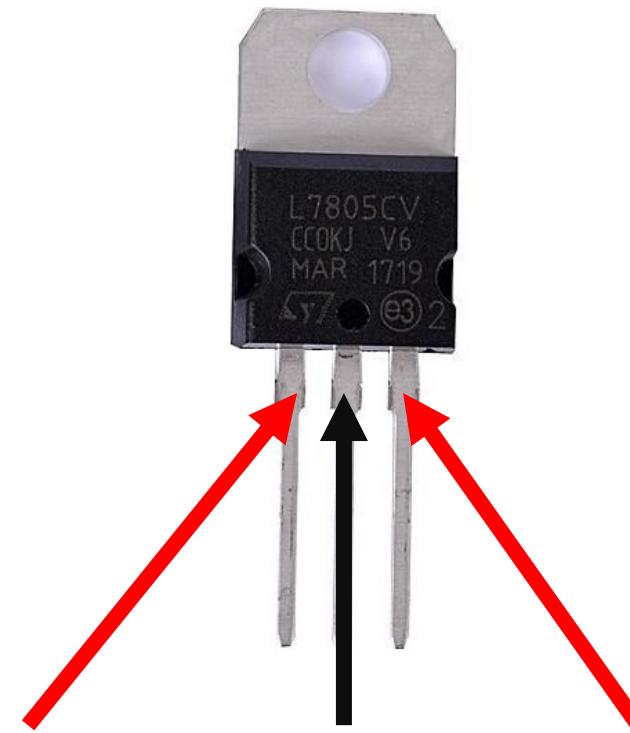
STEP DOWN
BUCK
CONVERTER



LM7805 Voltage Regulator

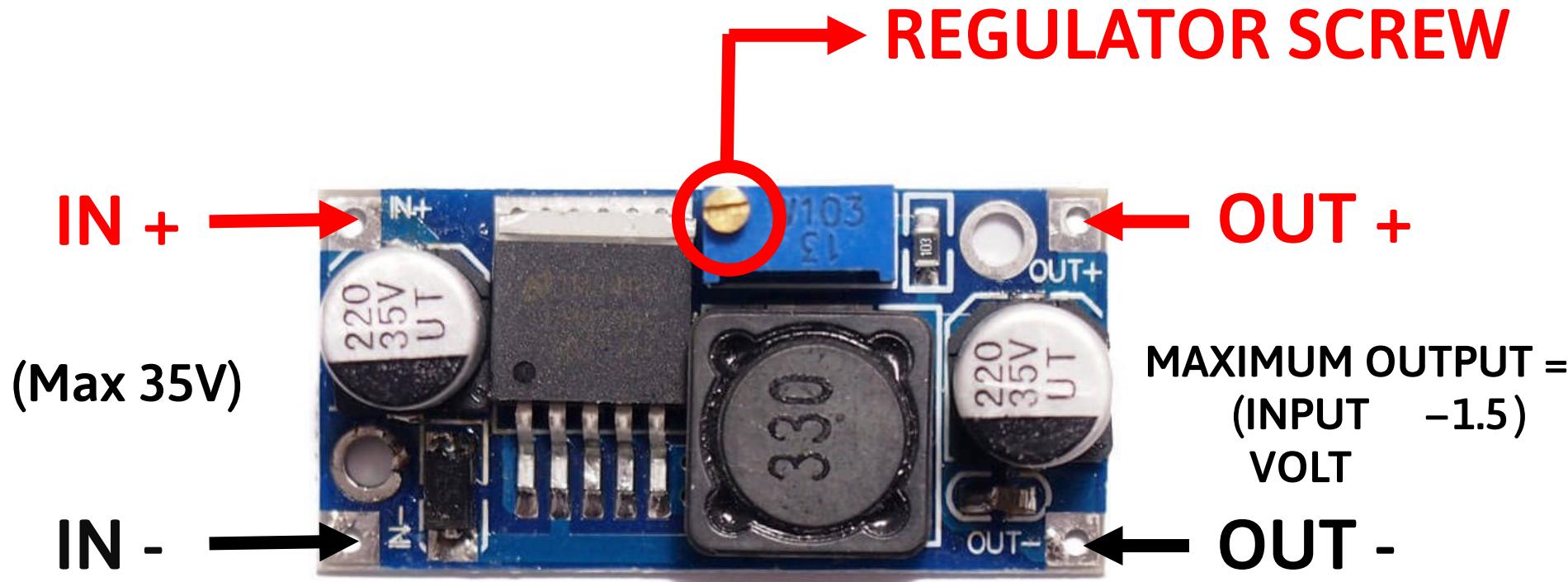
- Step down
- Fixed output
- 5V (LM7805 or LM1117S)
9V (LM7809)
12V (LM7812)
3.3V(LD33CV or AMS1117)
- Maximum Current 1.5A

LM7805 Voltage Regulator



INPUT (7V – 36V) OUTPUT (5V)

LM2596 Buck Converter



↻ COUNTER CLOCKWISE = BRING DOWN VOLTAGE

↻ CLOCKWISE = BRING UP VOLTAGE

Buck Converter

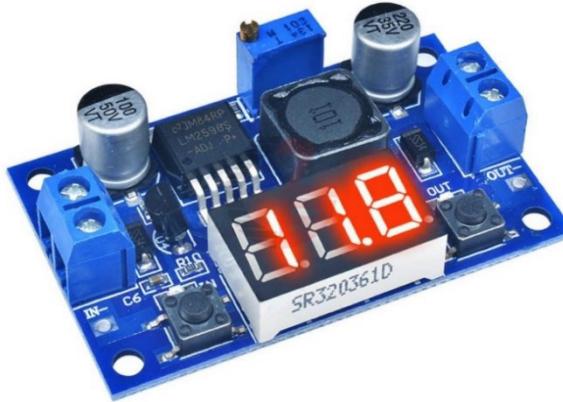


- Step Down Converter
- Adjustable
- Maximum Input voltage = 35V
- Maximum Output Current = 3A

Various Buck Converter



**MINI BUCK
MODULE**
MAXIMUM
**(
16V , 1A
)**



**BUCK MODULE WITH
VOLTMETER**
(Same as regular)

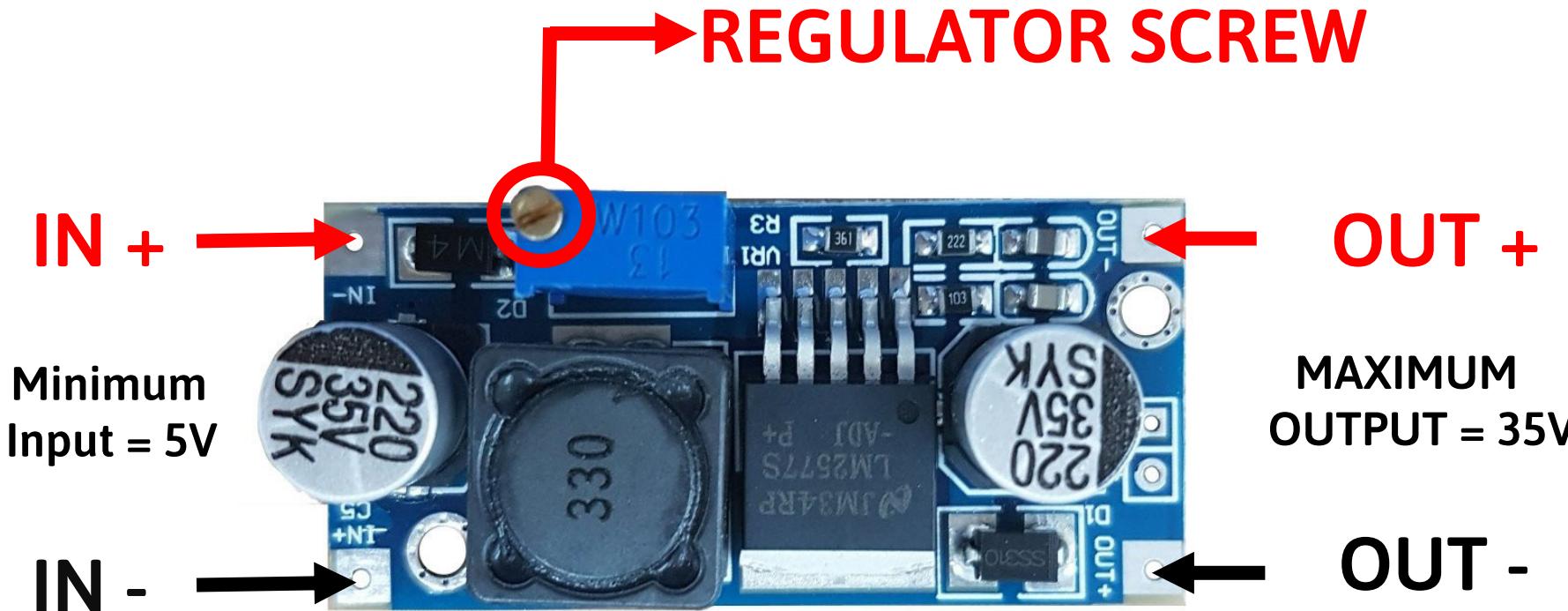


**HIGH POWER
BUCK MODULE**
(MAXIMUM 40V , 12A)

Boost Converter (XL6009)



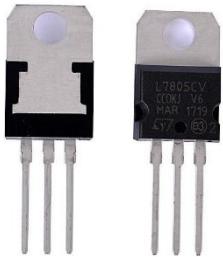
Boost Converter



↷ COUNTER CLOCKWISE = BRING UP VOLTAGE

↷ CLOCKWISE = BRING DOWN VOLTAGE

Comparison



Voltage Regulator

- Very cheap
- No hassle for Adjustment. Readymade 5V
- Small in size
- Heats up easily [heat = $(\text{in-out}) * \text{current}$]
- Can handle only 1.5A



Buck Converter

- Slightly expensive
- Adjustable in any voltage
- Slightly larger in size
- Very power efficient (85%)
- Can handle 3A or more

Power Circuit (Most Basic)

