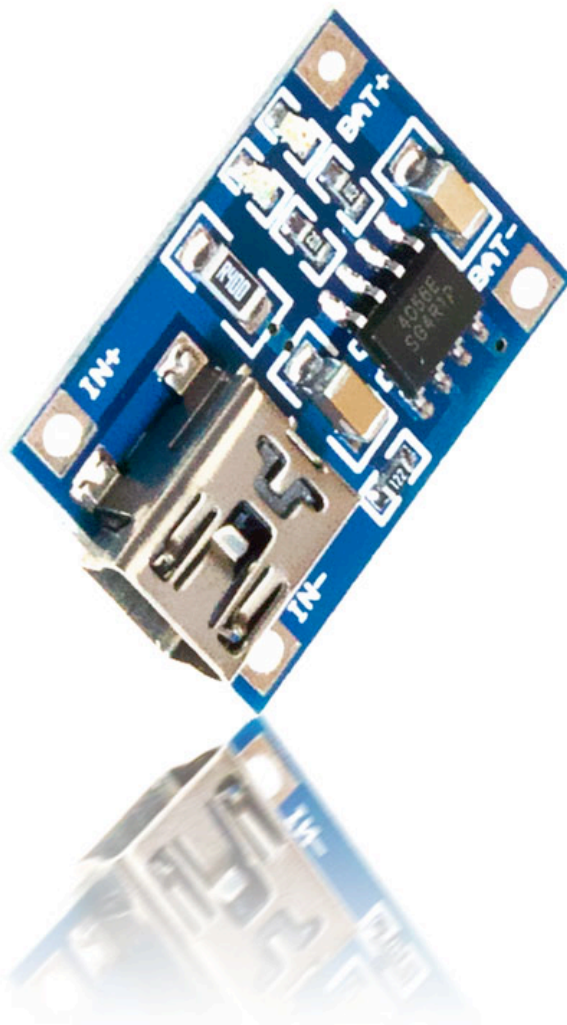




## 1A Linear Li-Ion Battery Charger with Thermal Control

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## Technical Informations:

The TP4056 is a complete constant-current/constant-voltage linear charger for single cell lithium-ion batteries

## Features:

- ✓ Programmable Charge Current Up to 1000mA
- ✓ No MOSFET, Sense Resistor or Blocking
- ✓ Diode Required
- ✓ Complete Linear Charger
- ✓ Package for Single Cell Lithium-Ion Batteries
- ✓ Constant-Current/Constant-Voltage
- ✓ Charges Single Cell Li-Ion Batteries Directly from USB Port
- ✓ Preset 4.2V Charge Voltage with 1.5% Accuracy
- ✓ Automatic Recharge
- ✓ Charge Status Output Pin
- ✓ C/10 Charge Termination
- ✓ 2.9V Trickle Charge Threshold
- ✓ Soft-Start Limits Inrush Current

## Dimensions:

| Dimension |        |
|-----------|--------|
| length    | 23 mm  |
| width     | 17 mm  |
| height    | 4.5 mm |
| weight    | 5 gr.  |

## Specifications:

| Specification                       | Value          |
|-------------------------------------|----------------|
| Input Supply Voltage                | -0.3 ~ 8 V     |
| Temperature Voltage Range           | -0.3 ~ 10 V    |
| CE                                  | -0.3 ~ 10 V    |
| Battery Short Circuit Duration      | Continuous     |
| Battery Pin Current                 | 1200 mA        |
| Program Pin Current                 | 1200 $\mu$ A   |
| Maximum Junction Temperature        | 145 °C         |
| Operating Ambient Temperature Range | -40 °C ~ 85 °C |

## Indicator LED State:

| Specification      |                        | Charge LED | Stand By LED      |
|--------------------|------------------------|------------|-------------------|
| Color              |                        | Red        | Green             |
| charging           |                        | bright     | off               |
| Charge Termination |                        | off        | bright            |
| Charging Errors    | Supply Voltage too low | off        | off               |
|                    | Battery Temp. too high | off        | off               |
|                    | Battery Temp. too low  | off        | off               |
|                    | wrong connection       | on         | blinking 1-2 sec. |
|                    | no output / Battery    | on         | blinking 4 sec.   |

## Electrical Characteristics:

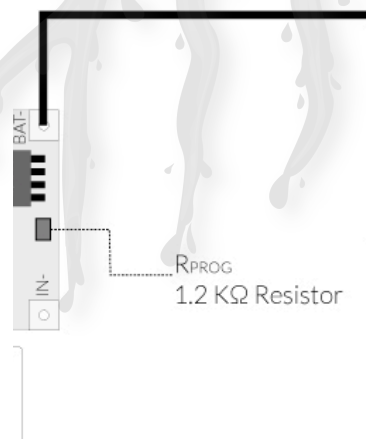
| Symbol             | Parameter                                  | Conditions                                                                                          | Min   | Typ   | Max   | Units |
|--------------------|--------------------------------------------|-----------------------------------------------------------------------------------------------------|-------|-------|-------|-------|
| VCC                | Input Supply Voltage                       |                                                                                                     | 4.0   | 5.0   | 8.0   | V     |
| I <sub>CC</sub>    | Input Supply Current                       | Charge Mode, R <sub>PROG</sub> = 1.2k                                                               |       | 150   | 500   | μA    |
|                    |                                            | Standby Mode (Charge Terminated)                                                                    |       | 55    | 100   | μA    |
|                    |                                            | Shutdown Mode (R <sub>PROG</sub> Not Connected, VCC < V <sub>BAT</sub> , or VCC < V <sub>UV</sub> ) |       | 55    | 100   | μA    |
| V <sub>FLOAT</sub> | Regulated Output (Float) Voltage           | 0°C ≤ T <sub>A</sub> ≤ 85°C I <sub>BAT</sub> = 40mA                                                 | 4.137 | 4.2   | 4.236 | V     |
| I <sub>BAT</sub>   | BAT Pin Current<br>V <sub>BAT</sub> = 4.0V | R <sub>PROG</sub> = 2.4k, Current Mode                                                              | 450   | 500   | 550   | mA    |
|                    |                                            | R <sub>PROG</sub> = 1.2k, Current Mode                                                              | 950   | 1000  | 1050  | mA    |
|                    |                                            | Standby Mode, V <sub>BAT</sub> = 4.2V                                                               | 0     | - 2.5 | - 6.0 | μA    |
| I <sub>TRIKL</sub> | Trickle Charge Current                     | V <sub>BAT</sub> < V <sub>TRIKL</sub> , R <sub>PROG</sub> = 1.2K                                    | 120   | 130   | 140   | mA    |
| V <sub>TRIKL</sub> | Trickle Charge Threshold Voltage           | R <sub>PROG</sub> = 1.2K, V <sub>BAT</sub> Rising                                                   | 2.8   | 2.9   | 3.0   | mV    |
| V <sub>TRHYS</sub> | Trickle Charge Hysteresis Voltage          | R <sub>PROG</sub> = 1.2K                                                                            | 60    | 80    | 100   | mV    |
| T <sub>LIM</sub>   | Junction Temperature in const. Temp. Mode  |                                                                                                     |       | 145   |       | °C    |

## R<sub>PROG</sub> Output Current Setting

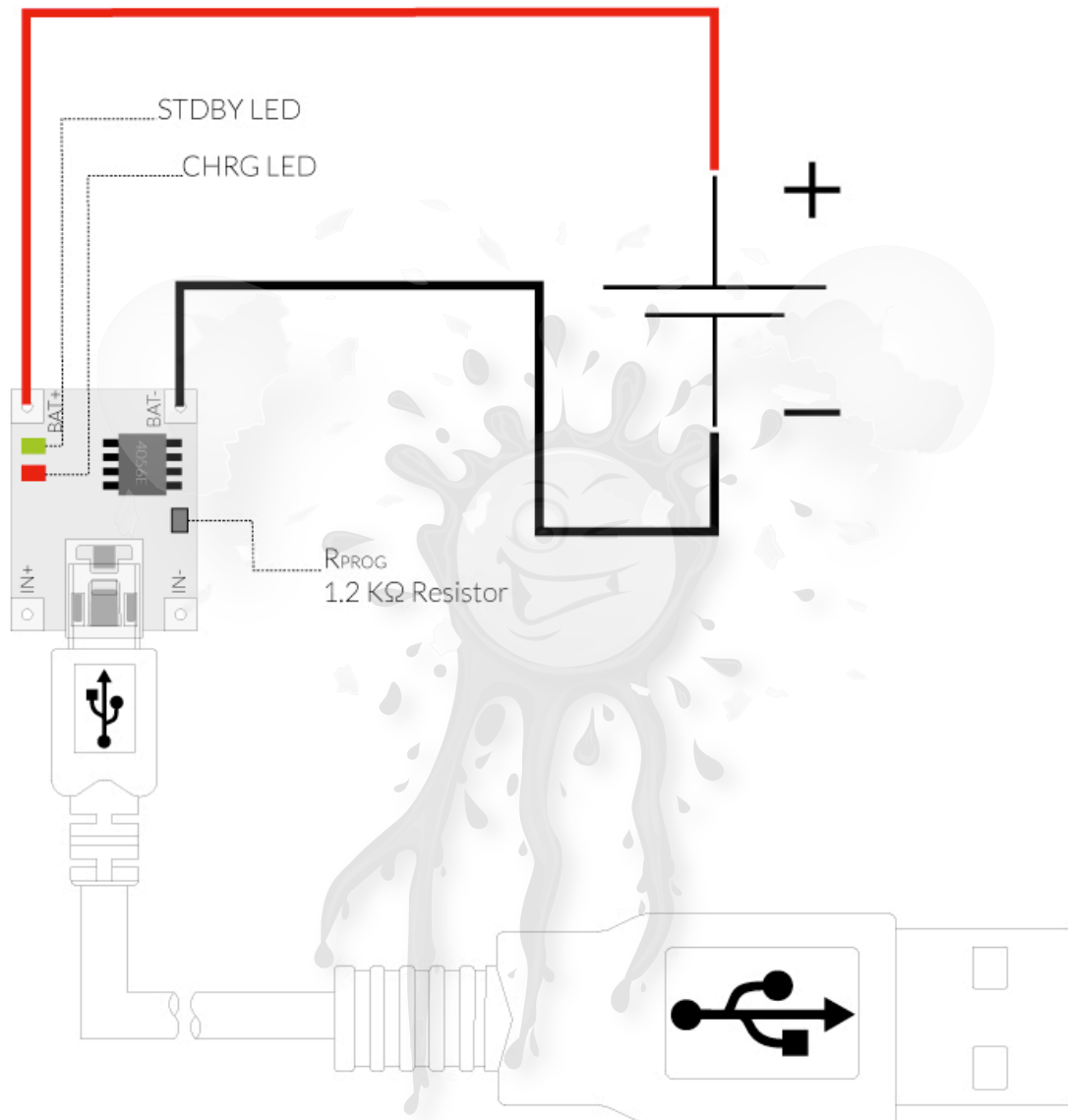
Basic configuration is based on 1.2 K R<sub>PROG</sub> (Resistor / 1000 mA).

| R <sub>PROG</sub> Setting k | I <sub>BAT</sub> in mA |
|-----------------------------|------------------------|
| 10                          | 130                    |
| 5                           | 250                    |
| 4                           | 300                    |
| 3                           | 400                    |
| 2                           | 580                    |
| 1.66                        | 690                    |
| 1.5                         | 780                    |
| 1.33                        | 900                    |
| 1.2                         | 1000                   |

For changing charge current change R<sub>PROG</sub> Resistor.



## Schematic



## TP 4056 Pinout

