

How to charge CT04120 / Caution when charging

1. Overview

The CT04120 is capable of constant voltage charging (CV charging) and does not require IC to monitor and control the charging current and charging voltage or protection IC.

The feature is that the charging circuit can be simplified compared to conventional lithium-ion rechargeable batteries. We introduce examples of how to charge the CT04120 (input: 5V system, 1.5V system) and caution when charging.

2. Explanation

Figure 1 shows an example of a conventional lithium-ion rechargeable battery charging circuit, Figure 2 shows an example of a CT04120 LDO charging circuit (5V system), and Figure 3 shows an example of a boost charging circuit (1.5V system). Compared with conventional lithium-ion rechargeable batteries, CT04120 does not require charging IC or protection IC, can be charged from USB or dry batteries with a simple circuit configuration, and is easy to use.

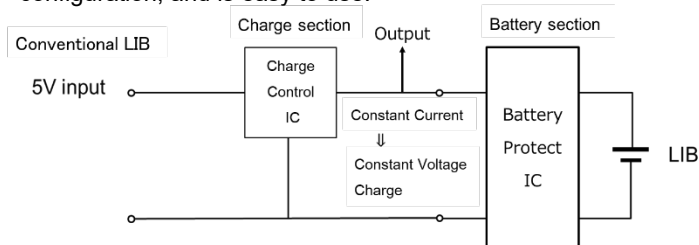


Figure.1 Conventional lithium-ion rechargeable battery charging circuit example. Exclusive charge control IC and protection IC are required.

CT04120

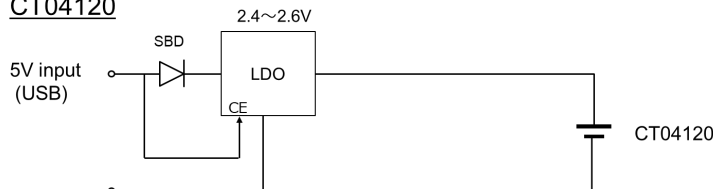


Figure.2 CT04120 LDO charging circuit
Low power consumption: Easy to charge with LDO. By connecting the enable terminal (CE) of the LDO and SBD as shown below, CT04120 is prevented from discharging.

CT04120

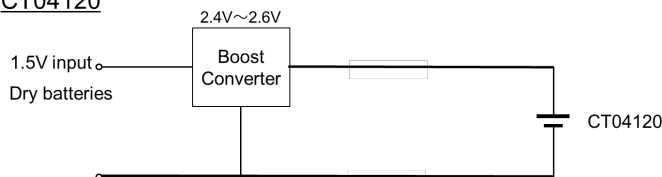


Figure3. CT04120 boost charging circuit
A boost DC/DC (boost converter) with a backflow prevention function is suitable.

※Cautions when charging the CT04120

Use CT04120 less than the charge upper limit voltage (2.70V). If the voltage exceeding the upper limit of charging voltage (2.7V) is applied, it does not ignite. But in some cases, gas may generate suddenly inside CT04120 and the internal pressure may rise, causing bursting from the sealed part. From the viewpoint of batteries deterioration, we recommend an output setting voltage of 2.4 to 2.6V for LDO and boost DC/DC in consideration of temperature characteristics and variations.

3. Introduction of LDO and booster DC/DC

Introducing LDO and boost DC/DC manufactured by TOREX Co., Ltd., boost DC/DC manufactured by Nisshinbo Micro Devices Co., Ltd. and LDO and boost DC/DC manufactured by ABLIC inc.,

Please refer to the following URL for detailed specifications.

| Maker | TOREX | |
|-------------------------|------------------------------------|--------------------------------|
| IC P/N | XC9142C | XC6215 |
| Circuit system | PWM/PFM Boost | LDO |
| Quiescent Current | 17μA | 0.8μA |
| Stand-by Current | 1μA | 0.01μA |
| VOUT Pin Sink Current * | 0.45 μ A | 0.24μA |
| Output Current | 350mA (VOUT=3.3V, VBAT=1.8V) | 200mA (VOUT=3.0V, VIN=4.0V) |
| Input Voltage | 0.65~6.0V | 1.5~6.0V |
| Output Voltage | 1.8~5.5V (0.1V step) | 0.9~5.0V (0.1V step) |

Figure.4 Overview of LDO and boost DC/DC by TOREX

*Vout Pin sink current is the discharge current value from CT04120 to output voltage pin of Power IC in case of no input voltage in Fig.2,3.

URL:

https://www.torexsemi.com/?_ga=2.149233334.1812936938.1598862987-2057381411.1569815613

| Maker | Nisshinbo Micro devices | |
|-------------------|---|---------------------------------|
| IC P/N | RP402X series | R1810 series |
| Circuit system | Boost Voltage | Boost Voltage |
| Coil | external | external |
| Quiescent Current | 21uA (Vin=Vset-0.4V, Vout=Vset+0.2V) | 0.6 μ A (Vout=4.5V Vin=0.5V) |
| Input Voltage | 0.6~4.8V | 0.35~2.1V |
| Output Voltage | 1.8~5.5V (Fixed) + Adjustable (0.1V step@Fixed) | 2.3~4.5V (0.1V step) |

Figure.5 Overview of boost DC/DC by Nisshinbo Micro Devices.

URL:<https://www.nisshinbo-microdevices.co.jp/en/products/dc-dc-switching-regulator/spec/?product=rp402>

<https://www.nisshinbo-microdevices.co.jp/en/products/dc-dc-switching-regulator/spec/?product=r1810>

| Maker | ABLIC | |
|-------------------|-------------------------------|-------------------------------------|
| IC P/N | S-8353H/J | S-13R1 |
| Circuit system | Boost DC/DC | LDO with reverse current protection |
| Quiescent Current | 48.3 μ A | 5.0 μ A |
| Stand-by Current | 0.5 μ A (Only H type) | 0.1 μ A |
| Output Current | 300mA | 150mA |
| Input Voltage | 0.9 V to 10 V | 2.0 V to 5.5 V |
| Output Voltage | 1.5 V to 6.5 V (0.1V step) | 1.2 V to 4.0 V (0.05V step) |

Figure.6 Overview of LDO and boost DC/DC by ABLIC.

URL:<https://www.ablic.com/en/semicon/>

* When charging CT04120 with S-8353, the limited resistance will be required according to connection order.

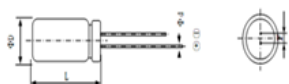
Case1: Limited resistance: 100Ω or more, when connecting CT04120 to S-8353 after applying the input voltage.

Case2: Limited resistance: 240Ω or more, when charging CT04120 without connection order.

When there is no input voltage to S-8353, the H type with ON/OFF pin is effective to reduce the consumption of CT04120. SBD is not needed with the S-13R1 series due to the built-in reverse current protection function.

4. Lineup

| Product name | CT04120 | Dimensions | |
|--------------------------|----------------|----------------|----------|
| Nominal Voltage | 2.3V | ΦD | 4mm |
| Charge Voltage | 2.7V | L | 12mm |
| End of Discharge Voltage | 1.8V | Φd | 0.45mm |
| Discharge capacity | 3mAh | F | 1.5mm |
| ESR | 1000m Ω | Operating temp | -20~70°C |



5. Support

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