

EnerCaps is a lithium-ion capacitor with an energy density close to that of a lithium-ion battery. The best feature is safety. The existing lithium-ion batteries not only have high ignition and explosiveness due to over-charging, but also have a fast degradation due to swelling caused by over-discharge. On the other hand, EnerCaps has an excellent safety effect, so a protection circuit for over-charging and over-discharging is not required. In other words, it has a non-incendive feature, so it is a battery solution that is in the spotlight in applications requiring safety.

Compared to existing lithium-ion batteries, its main characteristics include a longer lifetime, high-speed charging and high power, industrial-level endurance, and a wide operating temperature range. At the same time, it has price competitiveness because it does not require a protection circuit, and the degree of freedom in charging circuit configuration is high.

✦GCX Series Features

- Rated Voltage: 2.6V [Charging voltage: 3.6V]
- C-rate: 5C (charge rate)/10C (discharge rate)
- Lifetime: 5,000 cycles
- Charging method: CC-CV method, CV method (including USB, LDO)
- Application :
 - Input devices: Eco-friendly remote control, gamepad, wireless mouse, wireless keyboard, smart pen.
 - Wearable device: TWS, wireless headphones, smart watches, and electronic cigarettes.
 - Electric appliances and beauty appliances: electric drivers, beauty appliances
 - Electric vehicles: EVs(EV/HEV/PHEV), AVM, Stop & Go
 - Mobility: Electric mobility, drones, robot vacuum cleaners, logistics robots
 - IoT : GPS tracking device, IoT sensor, security
 - Energy: ESS, Energy Rehabilitation System



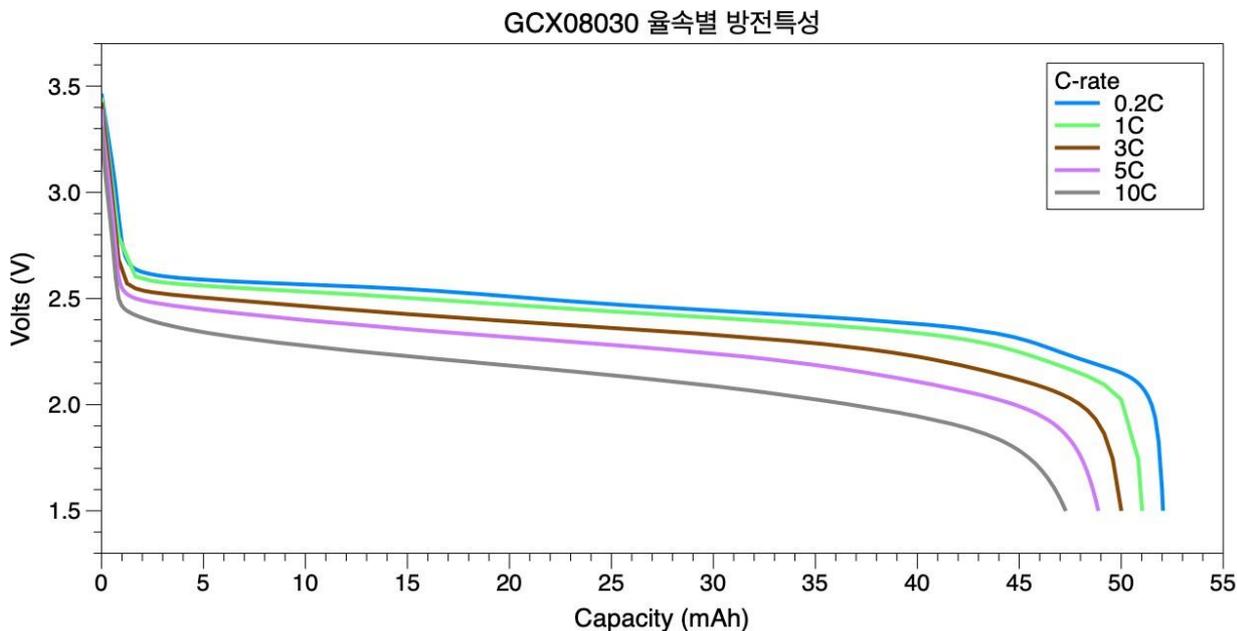
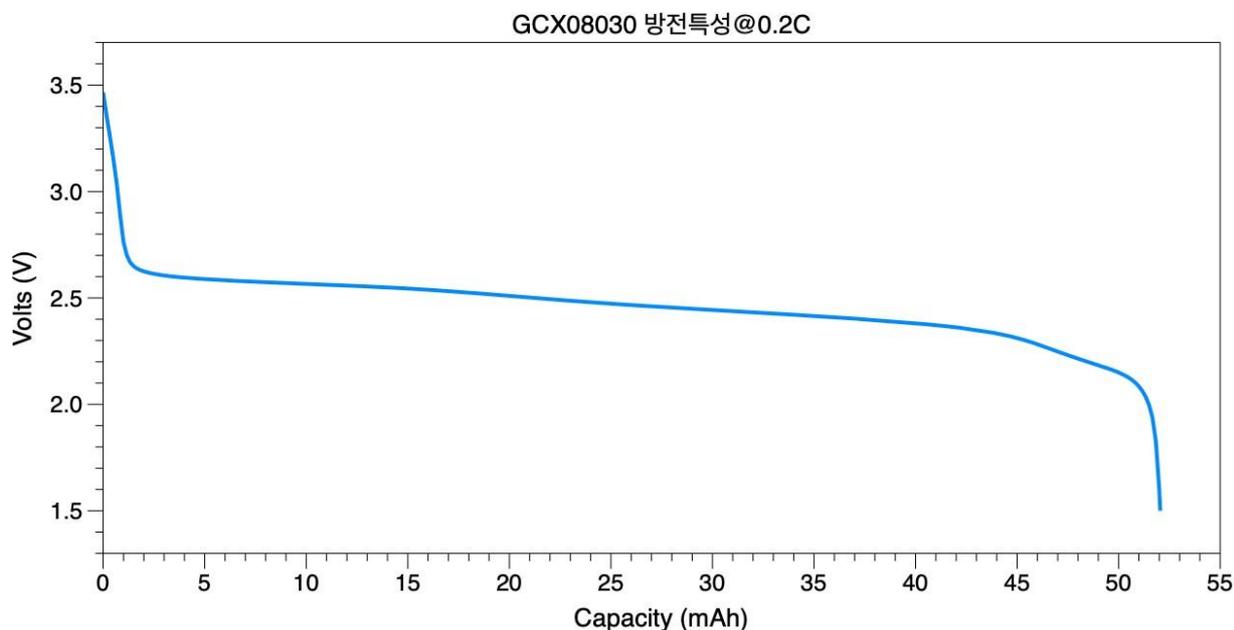
✦Specifications

Models	GCX16040	GCX10030	GCX08030	GCX08025	GCX08020
Type of packaging	Radial	Radial	Radial	Radial	Radial
Size (mm)	φ16x40	φ10x30	φ8x30	φ8x25	φ8x20
Capacity	430mAh(1,420F)	100mAh(330F)	50mAh(170F)	40mAh(130F)	30mAh(100F)
Energy	1,110mWh	260mWh	130mWh	104mWh	78mWh
Nominal voltage	2.6V	2.6V	2.6V	2.6V	2.6V
Charge voltage	3.6V	3.6V	3.6V	3.6V	3.6V
Max. Discharge current	4.3A(10C)	1,000mA(10C)	500mA(10C)	400mA(10C)	300mA(10C)
Max. Charge current	2.15A(5C)	500mA(5C)	250mA(5C)	200mA(5C)	150mA(5C)
Lifecycle	5,000 cycles	5,000 cycles	5,000 cycles	5,000 cycles	5,000 cycles
Operating temp. (Discharge)	-30°C~85°C	-30°C~85°C	-30°C~85°C	-30°C~85°C	-30°C~85°C
Operating temp. (Charge)	0°C~60°C	0°C~60°C	0°C~60°C	0°C~60°C	0°C~60°C
Charging time@DoC80	12 min.	12 min.	12 min.	12 min.	12 min.
Internal resistance	mΩ	100mΩ	mΩ	mΩ	mΩ
Safety(Fire/Explosion)	Best(No)	Best(No)	Best(No)	Best(No)	Best(No)

The above specifications are subject to change without notice. If you have any questions about other specifications, please feel free to contact us.

✦ Discharge Characteristics (GCX08030)

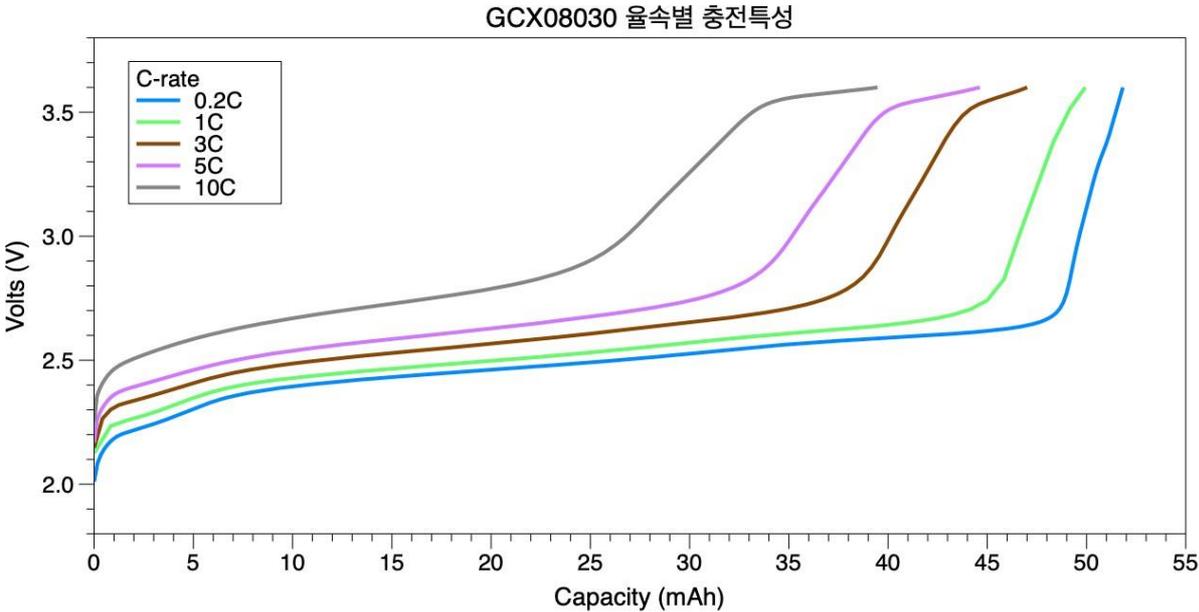
- Charging condition: Charge up to 3.6V with a constant current of 0.2C (10mA) and stop charging when it reaches 0.02C (1mA) while charging at a constant voltage of 3.6V. (Full charge)
- Discharge conditions: Discharge with constant current until reaching 1.5V at rates of 0.2C, 1C, 3C, 5C and 10C. When discharging at 0.2C (10mA) constant current, about 95% or more of the charged capacity can be used, and when discharging at a high rate and high output, the usable amount is reduced rather than the charged capacity.



Ultra Energy Capacitor

Rate Charging Characteristics (GCX08030)

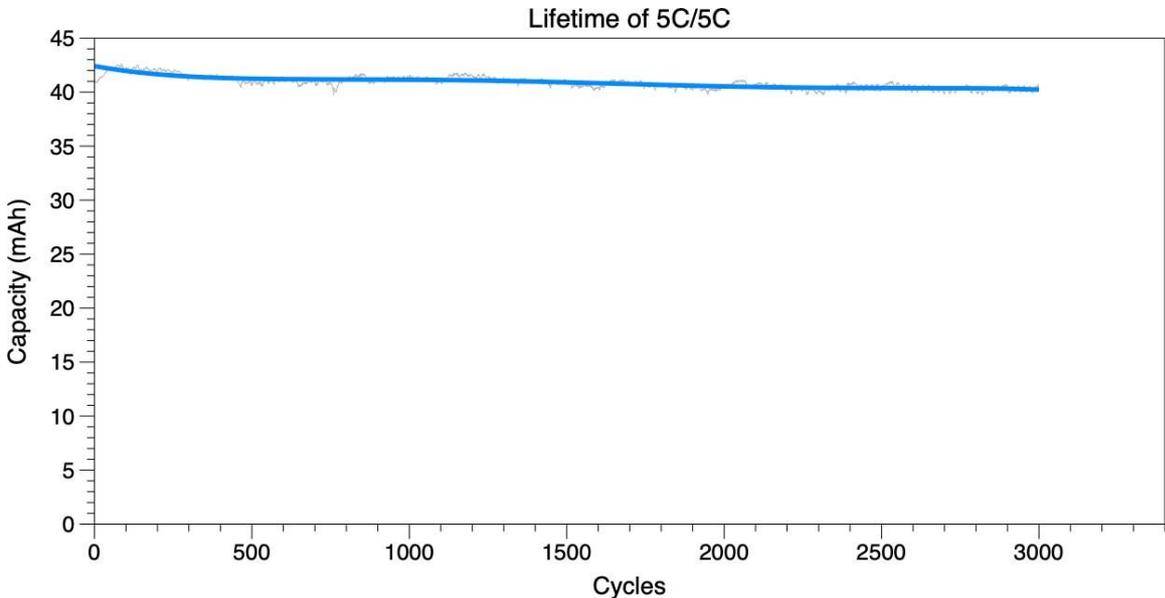
- Charging conditions: 0.2C, 1C, 3C, 5C and 10C
- As a characteristic of charging with constant current for each rate, the constant voltage section is not included.



Ultra Energy Capacitor

✚ Cycle Lifetime (GCX08030)

- Basic Cycle: Charge up to 3.6V with 5C (250mA) constant current, charge with 3.6V constant voltage for 5 minutes, and then discharge to 1.5V with 5C (250mA) constant current
- Lifetime Maintenance Rate: 95% of the initial capacity is maintained up to 3,000 cycles, and more than 80% of the initial capacity is expected until 5,000 cycles



✦ Considerations when designing a charging circuit

The charging method can use the charger IC, LDO, and voltage regulator as follows. When charging with CC-CV using a charging IC, EnerCaps can be used in super-fast charging mode and normal charging mode. In super-fast charging mode, it is recommended to use a charging current of 5C (for GCX08030, 250mA) or less and an applied voltage of 3.6V. Charge capacity can be reduced by up to 20% in this mode. On the other hand, when used in normal charging mode, it exhibits higher lifetime and performance.

When charging with CV using LDO and voltage regulator, EnerCaps can be used in super-fast charging mode and normal charging mode. It is recommended to use the maximum applied voltage in the super-fast charging mode of 3.6V and the charging current of 5C (in case of GCX08030, 250mA) or less.

✦ Considerations when designing a discharge circuit

Discharge characteristics are available from 3.6V to 1.5V when fully charged.

EnerCaps can be used in the voltage range from 3.6V to 1.5V, and outputs up to 10C (500mA for GCX08030) are supported. In the section below 1.5V, the residual capacity is less than 5%, so its use is not efficient. The average voltage at 0.2C is 2.5~2.6V, and the higher the output rate, the lower the average voltage and capacity. EnerCaps does not need an over-discharge protection circuit because its performance is not affected even under 1.5V.

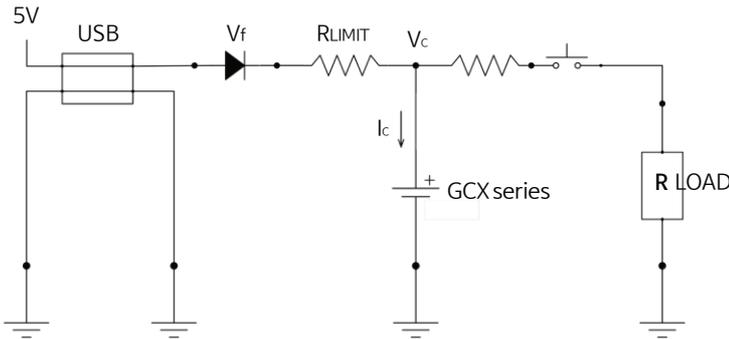
✦ Precautions for handling

- When mounting the PCB, be careful not to expose the EnerCaps to high temperature soldering over 100°C.
- Performance may deteriorate. When mounting the PCB, be careful not to bend or apply external force to the EnerCaps lead wire. If careless, there may be a gap between the rubber pad and the contact area of the lead wire, which may result in electrolyte leakage or deterioration of performance.
- Be careful not to apply impacts such as dents or presses on the exterior of EnerCaps. It may damage performance.
- Please do not short-circuit the EnerCaps terminal. It may damage performance.
- Please do not throw EnerCaps into the fire.

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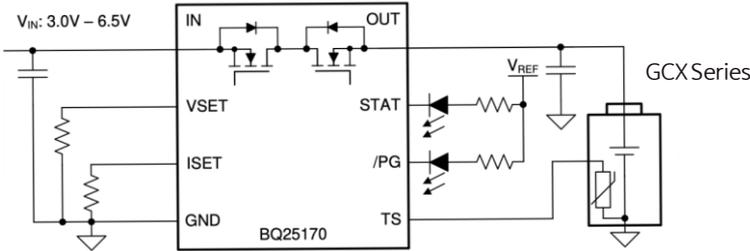
⚡Charging Circuit

- USB Charging



- V_c (Charge voltage applied to GC) : 2.65V~2.75V(up to 3.8V for USB)
- I_c (Charge current applied to GC) : max 30C
- R_{LIMIT} (Current limit resistor): 5~20 Ω
- V_f (Forward voltage drop) : Over 1.2V

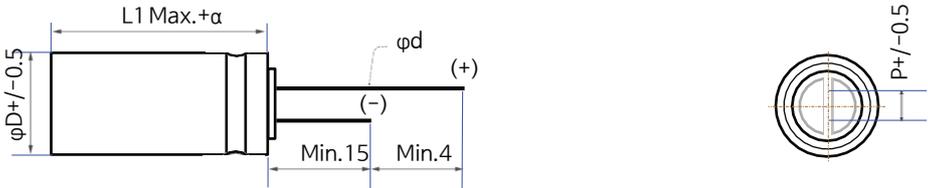
- USB Charging using charging IC (LDO can be used instead of charging IC)



- Charge voltage : 3.5V, 3.6V, 3.7V

Ultra Energy Capacitor

✚ Dimensions (unit: mm)



Model	ϕD	L1	ϕd	P	α
GCX08020	8	20	0.6	3.5	1.5
GCX08025	8	25	0.6	3.5	1.5
GCX08030	8	30	0.6	3.5	1.5
GCX10030	10	30	0.6	5.0	2.0
GCX16040	16	40	0.8	7.5	2.0

• Effective diameter is $\phi D + 0.3$ mm based on actual measurement including tolerance

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