

Green-Cap(EDLC)

How to calculate characteristic

SAMWHA ELECTRIC

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1. Energy Density

$$E_{\max} (\text{Wh}) = \frac{1}{2} CV^2 \times \frac{1}{3600}$$

$$E_{\text{usable}} (\text{Wh}) = \frac{1}{2} C(V_{\max}^2 - V_{\min}^2) \times \frac{1}{3600}$$

$$E_{\max} (\text{Wh/L or Wh/kg}) = \frac{1}{2} CV^2 \times \frac{1}{3600} \times \frac{1}{\text{volume or mass}}$$

$$E_{\text{usable}} (\text{Wh/L or Wh/kg}) = \frac{1}{2} C(V_{\max}^2 - V_{\min}^2) \times \frac{1}{3600} \times \frac{1}{\text{volume or mass}}$$

- C : Capacitance(F)
- V : Voltage(V)
- $V_{\max}$: Max operating voltage(V)
- $V_{\min}$: Min operating voltage (V)

2. Power Density

$$P_d (\text{W/L or W/kg}) = \frac{\frac{0.12V^2}{\text{ESR}_{\text{DC}}}}{M(\text{volume or mass})}$$

$$P_{\max} (\text{W/L or W/kg}) = \frac{\frac{V^2}{4 \times \text{ESR}_{\text{DC}}}}{M(\text{volume or mass})}$$

- V : Voltage(V)
- ESR_{DC} : Resistance(Ω)

3. Max Continuous Current

- Maximum current that can be used continuously (20 seconds)
- Maximum current that can be used during charge/discharge cycle

► Calculation Formula

$$\text{Max Continuous Current (A)} = 0.5 \times V \times C / (20 + \text{ESR DC} \times C)$$

- C : Capacitance(F)
- V : Voltage(V)
- ESR DC : Resistance(Ω)

4. Max Peak Current

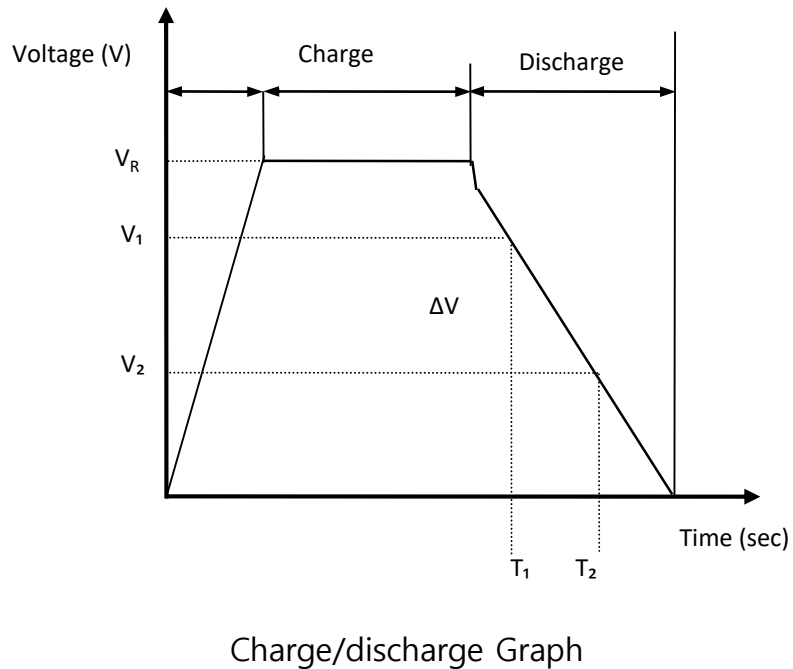
- Maximum current that can be used instantaneously (1 second)

► Calculation Formula

$$\text{Max Peak Current (A)} = 0.5 \times V \times C / (1 + \text{ESR DC} \times C)$$

- C : Capacitance(F)
- V : Voltage(V)
- ESR DC : Resistance(Ω)

5. Calculation Discharge time



► Calculation Formula

$$\text{Discharge time (t)} = \frac{C}{I} \times (dV - IR)$$

- I : Current(A)
- C : Capacitance(F)
- dV : $V_1 - V_2$
- R : Resistance(Ω)