

How to Avoid the Wrong Power Supply



FOCUS:

LOAD CONDITIONS

1 RATE OF LOAD CHANGE

What to Remember

- Load change is determined based on application
- If load change is too slow, there can be a failure in power delivery
- Slower rate is needed in applications that perform more slowly
- If load change is too fast, it could result in unnecessary cost
- Required rate of load change cannot be changed, supply response can only be made faster or slower

2 LOAD TYPE

Capacitive vs. Inductive vs. Resonant

- Load will determine what kind of power supply you'll need
- **Capacitive Load:**
 - › Load is a voltage source
 - › Low rate of voltage change
 - › Huge overcurrent in short circuit at turn on
 - › Works with: Voltage controlled supply, switching power supply, battery, supplies that need open circuit protection
- **Inductive Load:**
 - › Load is inductive (battery charger, electrical motor, solenoid)
 - › Slow rate of current change, works well for short circuit
 - › High overvoltage in open circuit conditions
 - › Works with: Current controlled supply, short circuit protection
- **Resonant Load:**
 - › Resonant tank present
 - › Low current and voltage supply can be used
 - › Hard to work with open circuit and short circuit
 - › Works with: Supply with frequency modulation control

3 BACK EMF

Do I Need To Protect Against It?

- Inductive loads need protection against back EMF
- EMF occurs when mechanical energy turns to electrical energy & tries to return to supply
- Electrical energy needs to be stored by capacitor or inductor or dissipated by a resistor
- Stored energy means less loss & higher efficiency, but circuit will be more complicated
- Dissipating energy has simpler circuit but high loss & lower efficiency

4 OUTPUT CAPACITOR

Is Chosen External Capacitor Correct?

- Capacitors decrease voltage ripple of supply and help store output power
- **Electrolytic** and **Aluminum** capacitors are typically used in older, low switching frequency supplies
- **Ceramic** and **Polyester** capacitors are typically used in newer, high switching frequency supplies
- If capacitor is too big, supply could shut down at start up
- If capacitance is too low, excessive ripple can occur