Power Supply Solutions

Power Supplies up to 100W
Fast Charging Impacting Many Design Parameters

Market Changes

- Faster Charging
- Higher Efficiency
- Higher Power
- Smaller Connectors
- USB Type-C

Impact On Designs

- New power electronics
- Circuit protection review
- Thermal management
- Contamination risks
- Mechanical damage risks

Redesign of power electronics and circuit protection stages required
Increasing Efficiency Requirements and Increasing Power Needs are Driving New Generation of Chargers

- Higher power chargers require higher efficiencies
- Each update to standard requires higher efficiency
- Resistances causes efficiency loss
Consumer Electronics Power Supply

**AC Input:**
- Fuse for Overcurrent Protection
- MOV for Surge Protection
- NTC for In-rush Current Limiters

**Cable Plug:**
- setP™ Digital Temperature Indicator

**Feedback:**
- Optically Isolated Error Amplifier

**DC Output:**
- TVS Diode Array: ESD And Surge Protection
- Resettable PPTC: Over-temperature Protection
Consumer Electronics Power Supply Block Diagram

Table Notes:
I. Many different fuse options available based on current, voltage, mounting method, and surge withstand required
II. P6KE TVS Diodes provide alternative solution depending on surge clamping performance needed
III. SP11xx are uni-directional. For bi-directional protection, consider SMBJ TVS Diode
IV. setP digital temperature indicators for USB Type-C Plugs
Industrial Power Supply

AC Input:
- Fuse for Overcurrent Protection
- MOV for Surge Protection
- NTC for In-rush Current Limiters

Feedback:
- Optically Isolated Error Amplifier

Filter & Regulator:
- MOSFET for filtering
- Rectifier diodes

Line Rectifier:
- Hybrid voltage suppression

DC Output:
- TVS Diode Array: ESD And Surge Protection
- Resettable PPTC: Over-temperature Protection

Protect  Control  Sense
Industrial Power Supply Block Diagram

Table Notes:
I. Many different fuse options available based on current, voltage, mounting method, and surge withstand required
II. P6KE TVS Diodes provide alternative solution depending on surge clamping performance needed
III. For protection in more harsh environments and when enhanced reliability is critical
IV. SP11xx are uni-directional. For bi-directional protection, consider SMBJ TVS Diode
Power Supplies – Bringing Life To Everyday Devices
Compliance and Standards for Power Supplies

- UL 1310 Standard for Class 2 Power Units
- IEC 60950-1 Information Technology Equipment Safety
- IEC 62368-1 Audio/video, information and communication technology equipment – Part 1: Safety requirements
- Mandatory efficiency requirements for supplies sold into various regions around the world
  - Europe: Code of Conduct version 5
  - USA: Department of Energy version VI
  - China: National Development and Reform Commissions, “NDRC”
  - Korea: Minimum Energy Performance Standards
  - Israel: SI-4664.2
  - India: Bureau of Energy Efficiency
- Electrostatic discharges to IEC 61000-4-2
- Fast Transient Burst Test to IEC 61000-4-4
- Fast Transient Surge Test to IEC 61000-4-5
Littelfuse Provides Critical, Energy-efficient, Functional Components For Power Supplies

- Reference solutions to help meet global safety requirements
- System-level design compliance support
- Components designed to help meet energy efficiency
- High-volume manufacturing with highest quality standards