Electrical Design Checklist Example 1 KEY

Power Management:

Over-voltage protection
- Typically reverse bias Zener diode rated several volts above supply (e.g. 18V for nominally 12V supply)

Error: The Zener diode is rated for 13V for the nominal input of 15V. The Zener diode is biased the incorrect way

Reverse-voltage protection
- Our normal Zener setup satisfies this to some extent, forward voltage is 1.2V, check that -1.2V isn't outside component absolute maximum ratings of your components, should be placed in series with fuse
- Schottky diode is another simple solution

Error: The Zener diode is biased the incorrect way

Overcurrent protection
- Properly spec'd fuse in series with supply before any components

Error: The fuse is specified for a 3A interrupt rating, higher than the expected current draw of the system. The fuse should be placed pre-zener diode for proper overcurrent protection.

Switching regulator considerations
- Appropriate current supply capability (also applicable to linear regulators)
- Switching frequency not close to crystal or serial bus frequencies
- Appropriate input and output filtering

Error: The output current is rated for 500mA (data sheet). The peripherals are

rated for a combined load current of over 1A.

Bypass capacitors near all power input pins of ICs
- 0.1uF is usually good

Error: Bypass cap on ATmega is in series between +5V and the VCC pin. IC will not get current after some time.

Bulk capacitance on power input and any high inrush current components such as relays

Error: None - N/A

Consistent Net Labels for Power
- Eliminate inconsistencies (12V, +12, 5V, +5V, VCC, etc.)

Error: Inconsistent use of VCC and +5V all across schematic.

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Pull-up on reset line

Error: Resistor in incorrect configuration.

Proper programming connection

Error: Programming connections (MOSI, MISO, and SCK) are on the wrong pins. See ATmega8 data sheet.

Proper crystal connection

Error: None.

All signals routed to appropriate pins
- ADC
- Communications busses
- Interrupt pins (PCINT for 16M1)
- PWM

Error: THERMOSTAT_DIAL_SENSE does not route to an ADC pin (see ATmega 8 data sheet). THERMOSTAT_BTN_+ Does not route to an interrupt pin (see ATmega 8 data sheet).

Series resistors (500Ohm to limit to 10mA for 5V) on ISP pins if connected to other components

Error: None.