

## UL RECOGNISED FUSIBLE RESISTORS EMC AND ULW SERIES - Application Note

### Power Supply Application

EMC and ULW are aimed chiefly at mains input protection for small power supplies and battery chargers. Here it performs three circuit protection functions:

1. Providing protection against supply line voltage transients, often in conjunction with a shunt element such as a Varistor or Transient Voltage Suppressor (TVS). This enables the designer to achieve the required level of immunity to conducted lightning induced surges.

2. Restricting the peak inrush current at switch-on to levels suitable for the rectifier bridge and consistent with good EMC design.

3. Preventing fire by fusing safely under fault conditions such as rectifier or capacitor breakdown.

Figure 1 shows a typical application in which the input resistor and mains fuse may be replaced by a single component.

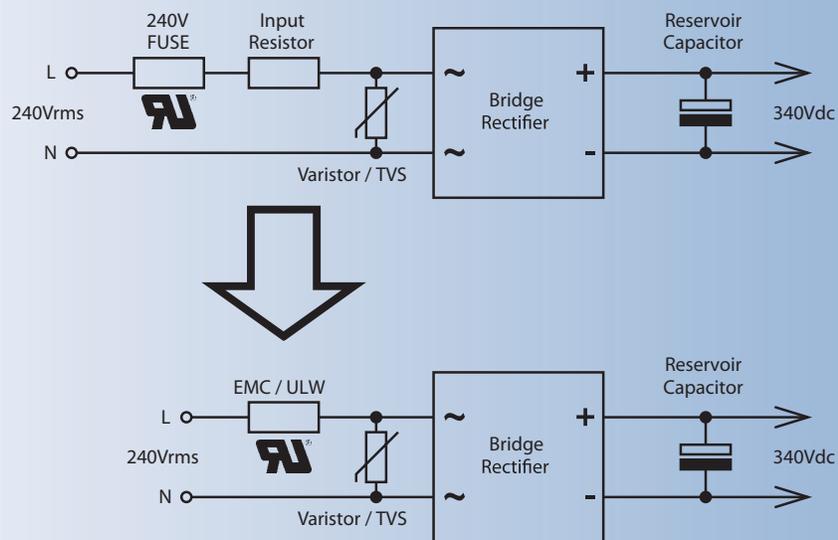


Figure 1

The three protection functions are considered in detail below.

### Lightning Strike Pulse Performance

This type of supply line disturbance arises when a lightning strike occurs close to power lines and a transient high voltage is induced in the power system. A common standard for simulating the resulting surge is IEC61000-4-5, which describes a 1.2/50µs pulse, is illustrated in Figure 2. The maximum permissible peak voltage across a resistor is limited by pulse energy considerations, and so is dependent on resistance value. The performance characteristics are shown in Figure 3.

When calculating the peak voltage across the resistor, allowance should be made for varistor clamping voltage and, for low resistance values, the circuit and source impedance. The first of these is defined on the varistor / TVS datasheet, and should be subtracted from the peak voltage appearing at the supply line terminals. The second is the combined resistance of the supply source and, if significant, the rest of the circuit. The standard value usually used for supply source impedance is 2 ohms.