

Universal AC Power (UACP) Protection

Overvoltage and Overcurrent Protection for Sensitive AC-Powered Equipment

Solution Products



[TISP4200H3BJR-S](#)



[TBU-CA085-500-WH](#)



[PTVS6-430C-TH](#)



[SV320K23](#)



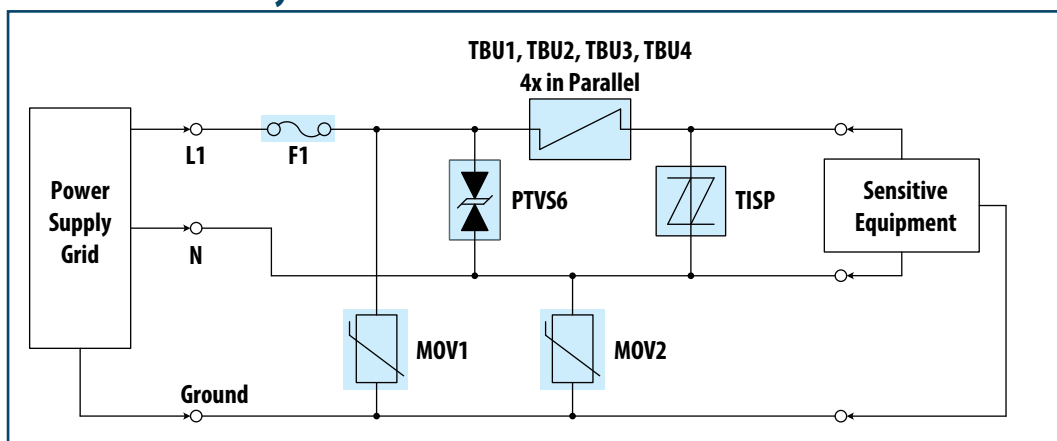
[Bourns® SinglFuse™ SMD Fuses](#)

Situation

Today's increasingly sensitive and exposed AC-powered systems and equipment are more susceptible to damage from lightning and power switching events if not properly protected. To help maximize uptime and avoid costly maintenance calls or warranty issues, these designs require robust, reliable overvoltage and overcurrent protection. An effective approach that takes into consideration multiple types of overvoltage threats is for the protection solution to be able to handle AC voltages from 85 V up to 277 V_{rms} while offering protection that is capable of withstanding up to 5 kA 8/20 μs surges.

Bourns has developed a multi-component Universal AC Power (UACP) input protection solution to protect against typical threats. This PowerPlay™ Solution provides a robust, on-demand protection circuit offering minimal interference during normal operation without degrading its components over time and helps meet equipment safety requirements and extend the operational life of the equipment.

Bourns® PowerPlay™ Solution



| Qty | Component Description | Part Number & Data Sheet Link | Distributor Inventory |
|-----|---------------------------------|--|--------------------------------|
| 1 | TISP® Thyristor Surge Protector | TISP4200H3BJR-S | Buy now |
| 4 | TBU® High-Speed Protector | TBU-CA085-500-WH | Buy now |
| 1 | Power TVS | PTVS6-430C-TH | Buy now |
| 2 | Metal Oxide Varistor (MOV) | SV320K23 | Buy now |
| 1 | Fuse (optional) | Bourns® SinglFuse™ SMD Fuses | Select and buy |

The schematic above illustrates the application protection and does not constitute the complete circuit design. Customers should verify actual device performance in their specific applications.

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SMD Fuses](#)

Coordinated Protection

The combination of Bourns® components employed in the Bourns UACP solution supports protection of AC input voltage from 85 V to 277 V_{rms} while the thyristor limits the output voltage to the equipment. If the swell voltage exceeds the thyristor's voltage rating, it will begin to conduct. Once conducting, the four parallel Bourns® TBU® High-Speed Protectors (HSPs) allow a maximum pass-through current of 2 A. If the current flow starts to exceed 2 A, the TBU® HSPs will enter their high-impedance mode, thereby protecting against any further overcurrent threats to the equipment.

Design Benefit

Typical surge protection solutions are designed for either overvoltage or overcurrent events and do not address the swell voltage. In an overvoltage event, if the swell voltage is higher than the surge suppression component, then the surge suppression component can go into a catastrophic failure. Designing-in the higher voltage surge suppression solution will allow any swell voltage to pass through to the equipment.

The Power TVS device helps to ensure the clamping voltage will not exceed the breakdown voltage of the TBU® HSPs while also providing protection for differential-mode transients. Finally, the MOVs protect against common-mode transients by returning the transient current to ground, while the optional fuse will protect the entire circuit in the event that the surge current exceeds the intended design, thus providing additional peace of mind to the system designer. For example, in addition to the equipment fuse, a 16 A slow-blow fuse will open when the surge current exceeds 5 kA.

The benefit of Bourns' UACP coordinated approach is that even if the swell voltage increases from 120 V to 277 V_{rms}, the equipment will not experience any voltage higher than 150 V_{rms}. The closest alternative solution to this design is the use of a power conditioner, which generally costs in the hundreds of dollars and also requires a large space for implementation.

Additional Resources

Readers may also be interested in the following resources from Bourns:

- [White Paper: A New Universal AC Power Protection Approach](#)
- [Parametric Search Product Selection Tool](#)
- [Authorized Distributor Inventory Search](#)

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