

# IsoMOV™

## Hybrid Protection Component

## New Surge Protective Device Solves Circuit Protection Design Issues

### WHITE PAPER



Bourns® IsoMOV™ Hybrid Protector

### INTRODUCTION

While there is no one-size-fits-all circuit protection solution for all applications, reliable and robust overvoltage protection remains a necessity in virtually any application that connects to a power line. Selecting the right protection solution is more difficult today because varying application requirements coupled with higher density and performance design goals often force designers to make compromises in finding a robust solution to meet an ever-evolving set of size, thermal and surge protection performance design goals.

Designers typically have specified [Metal Oxide Varistors \(MOVs\)](#) as the transient overvoltage solution of choice. Over the years, however, there have been quite a few documented instances of MOVs degrading over time from exposure to line voltage transients. Degradation can cause a variety of problems from minor equipment downtime to catastrophic failures that not only damage equipment, but can also damage a supplier's reputation for quality and reliability.

To keep up with next-generation application requirements and help solve the problems associated with MOV-only design limitations, a new approach to circuit protection is needed. This white paper introduces a breakthrough hybrid solution that provides an elevated level of surge protection in terms of performance, operational life and enhanced device reliability. This paper will highlight the innovative design and construction advantages achieved in a new Bourns® surge protective device (SPD) that offers an unprecedented range of protection capabilities.

### BACKGROUND

MOVs are voltage limiting or clamping devices capable of high current handling, high current absorption and fast reaction times. They provide protection against transient faults by clamping the voltage on the power line when the transient voltage reaches a set limit level until the fault extinguishes. Once the transient voltage has passed, the line returns to normal operation.

An MOV is a well-regarded transient overvoltage solution on its own, but it will in most instances degrade over time due to a number of conditions that are commonly experienced in many applications. Causes of MOV degradation and failure include constant line voltage stresses, lightning, switching transients, repeated temporary overvoltage conditions, and leakage current that can be exacerbated by surge history, time and temperature.



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#### AN INNOVATIVE SOLUTION TO MOV DEGRADATION

Giving developers a space-saving and reliable replacement that solves the most common MOV issues, Bourns has designed a new hybrid surge protection solution: **The IsoMOV™ Protector**. Its innovative design delivers improved surge density capabilities in a smaller package and features enhanced reliability, voltage protection and surge ratings.

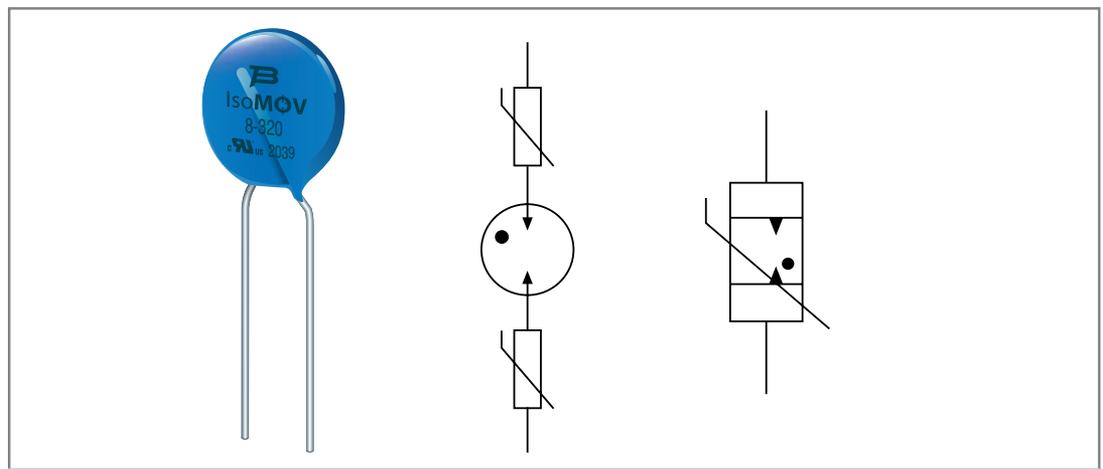


Figure 1 - The fully integrated IsoMOV™ protector offers a robust, space-saving design.

The IsoMOV™ protector features a fully integrated GDT and MOV hybrid design. Combining the functions of these two devices into a single package allows the GDT to block leakage currents through the MOV that may lead to premature failure while making the MOV more robust. By integrating an MOV with a GDT, the hybrid device is tolerant of AC line voltage swells, and also offers low capacitance for low insertion loss, which is a clear advantage in power line communication applications. Plus, the low capacitance of the GDT assures that the IsoMOV™ surge protector will not impede AC or DC power line high-speed data rates.

In addition, the Bourns® IsoMOV™ hybrid protectors feature much lower leakage across their extended temperature range than conventional MOV devices alone. This means that the device can have a much longer product life as leakage currents are known to shorten the effective life of an MOV device.



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#### DESIGNED FOR LONG LIFE AND RELIABLE PERFORMANCE

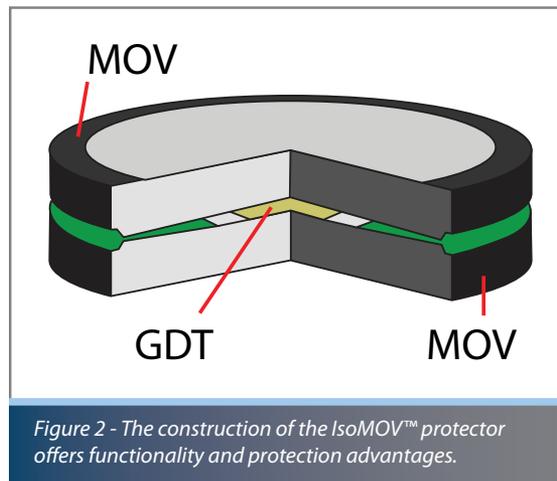


Figure 2 - The construction of the IsoMOV™ protector offers functionality and protection advantages.

#### FEATURES

- AC voltage ratings: 175 V - 555 V
- Nominal surge ratings: 3 kA – 5 kA – 8 kA
- -40 °C to +125 °C operation
- Low leakage current
- Low capacitance
- Stable performance over life
- UL Listed UL 1449 Type 4 CA
- RoHS compliant\*

Using proprietary computer-aided design techniques, Bourns engineers were able to enhance the IsoMOV™ device's performance with a totally new device construction that provides multiple design benefits. The device's unique integrated structure delivers two main advantages. First, it offers the equivalent functionality of a discrete MOV and GDT in series. Second, the IsoMOV™ component design utilizes Bourns' revolutionary EdgMOV™ technology, which greatly enhances MOV robustness. MOV failures are commonly characterized by a "surge hole" at the edge of the metallized area, typically caused by an elevated temperature inside the MOV at that edge during a surge. Bourns' EdgMOV™ technology is designed to substantially reduce or eliminate this failure mode.

Available in the familiar radial disk MOV package that has a substantially smaller diameter and is only slightly thicker, the Bourns® IsoMOV™ hybrid protection components line is offered in three model series: Models IsoM3, IsoM5 and IsoM8 that have nominal surge ratings of 3 kA, 5 kA and 8 kA, respectively. Bourns' new protectors feature performance specifications usually found in larger traditional MOV devices. This enables designers to select an IsoMOV™ protector that is physically smaller than the traditional MOV option. Designers also have the flexibility to enhance their protection scheme's surge capability by selecting an IsoMOV™ protector that is the same size as their previously specified MOV.

While suitable as an upgrade to nearly any MOV-based protection design, the IsoMOV™ protector's extended temperature range and low leakage are especially well-suited for industrial, power line communications, high-speed information and communication technology (ICT) equipment, as well as certain other harsh environment or remote, exposed applications.



\*RoHS Directive 2015/863, Mar 31, 2015 and Annex.

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#### TAKING SURGE PROTECTION TO THE NEXT LEVEL

With Bourns' breakthrough IsoMOV™ protector design, applications can now get a new level of surge protection reliability. Delivering enhanced surge ratings and voltage protection while also being ring wave tolerant, the new Bourns® IsoMOV™ protector series solves many MOV failure issues to provide longer service life application protection. Its features also make it an ideal solution for exposed circuits in certain harsh environments, while its performance and small size provide cost-effective protection that can also contribute to lower BOM costs.

There is a new and better approach to circuit protection with Bourns® IsoMOV™ hybrid overvoltage surge protectors. Designers now have a flexible and robust solution specifically designed to solve the most common failure modes experienced with MOV circuit protection designs.



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