The GE-MOV Saga
Retrospective 1970-2004

The GE-MOV saga was made possible when General Electric (GE) acquired a license for patents such as the one on the next page (filed in 1970 and issued in 1972) and cited here as an acknowledgment to the origins of the technology. GE then launched the “GE-MOV”® varistors in 1972, blossoming into a full line of two-terminal devices for low-voltage applications and recognized by an IR 100 Award. The saga then begins with an excerpt from a product specification bulletin listing the wide range of ratings available by the mid-seventies. On the occasion of its Centennial, GE seemed determined to stay in the business of transient protection, as claimed by an advertisement citing its deep roots in the field of lightning research and transients surveys. However, while expansion of the variety of MOV structures continued, as shown by the covers of successive editions (avatars) of the Transient Voltage Suppression Manual, GE eventually did exit the business of low-voltage MOVs, with Harris Semiconductor taking over. That exit was later followed by yet another divestiture, now apparent as the latest MOV avatar when browsing the Internet for present MOV manufacturers – a long way from the 1970s GE-MOVs.

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1 Then a trademark of the General Electric Company.

2 The MOV applications to high-voltage surge arresters were also developed during that period, but are not covered in this Anthology, except for the seminal Shakshaug et al. paper which is included as an annex of this Part 7.
VOLTAGE DEPENDENT RESISTORS IN A BULK TYPE

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U.S. Cl. 252—518

5 Claims

ABSTRACT OF THE DISCLOSURE

A voltage dependent resistor of the bulk type. The resistor has a sintered body consisting essentially of, as a major part, zinc oxide (ZnO) and, as an additive, 0.05 to 10.0 mole percent of beryllium oxide (BeO) and 0.05 to 10.0 mole percent, in total, of at least one member selected from the group consisting of bismuth oxide (Bi₂O₃), cobalt oxide (CoO), manganese oxide (MnO), barium oxide (BaO), strontium oxide (SrO) and lead oxide (PbO). Electrodes are provided which are in contact with said body.

This invention relates to voltage dependent resistors having non-ohmic resistance due to the bulk thereof and being characterized by a high n-value, without using non-oxidizing atmosphere.

References cited in this description: 3,618,284

Prior art references cited in this description: 3,335,859

The present invention relates to voltage dependent resistors of the bulk type. The resistor has a sintered body consisting essentially of, as a major part, zinc oxide (ZnO) and, as an additive, 0.05 to 10.0 mole percent of beryllium oxide (BeO) and 0.05 to 10.0 mole percent, in total, of at least one member selected from the group consisting of bismuth oxide (Bi₂O₃), cobalt oxide (CoO), manganese oxide (MnO), barium oxide (BaO), strontium oxide (SrO) and lead oxide (PbO). Electrodes are provided which are in contact with said body.

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These objects are achieved by providing a voltage dependent resistor of the bulk type comprising a sintered body consisting of at least one member selected from the group consisting of bismuth oxide (Bi₂O₃), cobalt oxide (CoO), manganese oxide (MnO), barium oxide (BaO), strontium oxide (SrO) and lead oxide (PbO), and electrodes in contact with said body.

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Just one of the IR plaques awarded to the GE team members after formal introduction of the GE-MOV varistors

Let the saga begin ...
GE has been helping customers solve transient voltage problems since the introduction of GE-MOV® varistors in 1972. The GE-MOV® team is constantly researching the causes and effects of transients and developing new solutions to meet all types of transient suppression needs; committed to innovation beyond today's technology.

As the field of electronics has grown rapidly through the use of solid-state components, so have the applications for surge suppressors to protect these transient-sensitive devices. Innovations such as surface-mount technology have also altered the demand profile by adding packaging considerations to functional ones.

As a result of innovation and research, the GE-MOV® line of metal-oxide varistors has expanded to include surface-mount devices, new high-energy packages, connector-pin varistors, and high-temperature, low-profile varistors. These new products supplement the GE-MOV® line of radial, axial, and high-energy packaged varistors, already the broadest in the industry.

### GE-MOV® Specification Guide

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### GE-MOV® Features

#### FAMILY FEATURES:
- Wide Voltage/Energy Range
- Excellent Clamp Ratio
- Power
- No Follow-On Current
- Fast Response Time
- Low Standby
- UL Recognized

#### TYPE FEATURES:

**CH/SM Series**
- Surface Mount Varistors
  - Better Performance
  - Higher Reliability
  - Lower Equipment Cost
  - Saves on Board Height/Bulk/Weight

**CP Series**
- Connector Pin Varistors
  - Provides transient protection in connectors
  - Available in 22, 20, and 16 gauge sizes

**MA Series**
- Axial Package
- Wide Voltage Range
- Automatic Insertion

**ZA Series**
- Radial Package
- Low Voltage Operation

**LA Series**
- Radial Package
- Line Voltage Operation
- UL Recognized

**RA Series**
- Low Profile
- High Temperature Capability
- Precise Seating Plane
- In-Line Leads

**DA,DB,BA,BB Series**
- High Energy Capability
- Rigid Terminals
- Isolated
- Low Inductance
- Improved Creep and Strike
- UL Recognized

**CA Series**
- Industrial Discs

**Hi Reliability Series**
- 100% Prescreened
- 100% Process Conditioning
- Meets Military Specifications

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*GE-MOV® Metal-Oxide Varistors*
Most people recognize GE-MOV® varistors as the ultimate in system transient protection. With good reason. These metal oxide varistors, or movistors, are the result of research and experience that stems from the early years of General Electric, celebrating in 1978 its 100th birthday.

You may have shared our excitement along the GE path to leadership. Steinmetz’ lightning generator demonstration in 1922. Anderson’s lightning measurements on the Empire State Building in the 1930’s. The definitive study of surge voltages in residential and industrial circuits formulated by Martzloff and Hahn of GE’s Corporate R&D Center in 1970. And, of course, GE’s $10 million investment relating to the introduction of GE-MOV® varistors six years ago.

But in our view, the best is yet to come. GE’s R&D work on transient protection continues to find more sophisticated materials, better measurements and standardization. Soon, you’ll be able to put the resulting new products and new ideas to work for you.

Experience, Innovation. Staying power. It’s what you’ve come to expect, and can expect from GE when you need transient protection.

For the full story on GE-MOV® varistors, call your local authorized GE semiconductor distributor, or write General Electric Co., Electronics Park 7-49, Syracuse, N.Y. 13221.

® Registered Trademark of General Electric Co.

There’s more to GE semiconductors than meets the eye
Browsing the Web in 2004 for varistor vendors delivers the following message:

**Divested Product Family**

The product you’re searching for is part of a family that is no longer in the Intersil Corporation product portfolio.

**TRANSIENT VOLTAGE PRODUCTS**

The former Harris Semiconductor and RCA Solid State family of transient voltage products (Radial Varistors, Multi-Layer Varistors, Industrial MOVs, Diode Arrays and Surgector TVS Thyristors) were sold to Littlefuse, Inc. These include products with prefixes of LA, ZA, CIII, MLA, MLE, AUML, RA, BB, MA, HA, NA and SP.