Metal-Oxide Varistors (MOVs)
Axial Lead / Application Specific Varistors > MA Series

Description
The MA Series of transient surge suppressors are axial lead Metal Oxide Varistors (MOVs) for use in a wide variety of board level industrial and commercial electronic equipment. They are intended to protect components and signal/data lines from low energy transients where the small axial lead package is required.

The MA Series is offered with standard ('S' suffix) or tightened ('B' suffix) clamping voltage.

See MA Series Device Ratings and Specifications Table for part number and brand information.

Features
- Lead-free, Halogen-Free and RoHS compliant.
- 3mm diameter disc size
- Small axial lead package
- Wide operating voltage range:
  - $V_{\text{MAX} \text{RMS}}$: 9V to 264V
  - $V_{\text{MAX} \text{DC}}$: 13V to 365V
- Available in tape and reel or bulk packaging
- No derating up to 85°C ambient
- New black epoxy offers improved performance for high temperature Lead-free wave soldering process.

Agency Approvals

<table>
<thead>
<tr>
<th>Agency</th>
<th>Agency File Number</th>
</tr>
</thead>
<tbody>
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Additional Information

Datasheet Resources Samples

Absolute Maximum Ratings
- For ratings of individual members of a series, see Device Ratings and Specifications chart

<table>
<thead>
<tr>
<th>Continuous</th>
<th>MA Series</th>
<th>Units</th>
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<tr>
<td>Steady State Applied Voltage:</td>
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<tr>
<td>AC Voltage Range ($V_{\text{MAX} \text{RMS}}$)</td>
<td>9 to 264</td>
<td>V</td>
</tr>
<tr>
<td>DC Voltage Range ($V_{\text{MAX} \text{DC}}$)</td>
<td>13 to 365</td>
<td>V</td>
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</table>

| Transient: | | |
| Peak Pulse Current ($I_{\text{PP}}$) | For 8/20µs Current Wave (See Figure 2) | 40 to 100 | A |
| Single-Pulse Energy Range | For 2ms Current Square Wave ($W_{\text{PP}}$) | 0.06 to 1.7 | J |
| Operating Ambient Temperature Range ($T_{\text{a}}$) | -55 to +85 | °C |
| Storage Temperature Range ($T_{\text{st}}$) | -55 to +125 | °C |
| Temperature Coefficient ($\alpha$) of Clamping Voltage ($V_c$) at Specified Test Current | <0.01 | %/°C |
| Hi-Pot Encapsulation (COATING Isolation Voltage Capability) | 1000 | V |
| COATING Insulation Resistance | 1000 | MΩ |

CAUTION: Stresses above those listed in “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

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# MA Series Ratings & Specifications

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Brand (mm)</th>
<th>Maximum Rating (85°C)</th>
<th>Specifications (25°C)</th>
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<td></td>
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<td>V&lt;sub&gt;D&lt;/sub&gt;</td>
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<td></td>
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**NOTE:** Average power dissipation of transients not to exceed 200mW.
Should transients occur in rapid succession, the average power dissipation required is simply the energy (watt-seconds) per pulse times the number of pulses per second. The power so developed must be within the specifications shown on the Device Ratings and Specifications table for the specific device. Furthermore, the operating values need to be derated at high temperatures as shown above. Because varistors can only dissipate a relatively small amount of average power they are, therefore, not suitable for repetitive applications that involve substantial amounts of average power dissipation.

**Repetitive Surge Capability**

V18MA - V100MA

V120MA1A/S - V430MA3A

NOTE: If pulse ratings are exceeded, a shift of $V_{N(DC)}$ (at specified current) of more than +/-10% could result. This type of shift, which normally results in a decrease of $V_{N(DC)}$, may result in the device not meeting the original published specifications, but it does not prevent the device from continuing to function, and to provide ample protection.
**Product Dimensions**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Inches</th>
<th>Millimeters</th>
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<td>Max</td>
<td>Min</td>
<td>Max</td>
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<td>L</td>
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Typical Weight = 0.5g

**Physical Specifications**

<table>
<thead>
<tr>
<th>Lead Material</th>
<th>Tin–plated Copper clad steel</th>
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<tbody>
<tr>
<td>Soldering Characteristics</td>
<td>Solderability per MIL–STD–202, Method 208</td>
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<tr>
<td>Insulating Material</td>
<td>Cured, flame retardant epoxy polymer meets UL94V-0 requirements</td>
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<tr>
<td>Device Labeling</td>
<td>Marked with LF, voltage and date code</td>
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</table>

**Environmental Specifications**

<table>
<thead>
<tr>
<th>Operating/Storage Temperature</th>
<th>-40°C to +85°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passive Aging</td>
<td>+85°C, 1000 hours +/-10% typical voltage change</td>
</tr>
<tr>
<td>Humidity Aging</td>
<td>+85°C, 85% RH, 1000 hours +/-10% typical voltage change</td>
</tr>
<tr>
<td>Thermal Shock</td>
<td>+85°C to -40°C 5 times +/-10% typical voltage change</td>
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<tr>
<td>Solvent Resistance</td>
<td>MIL–STD–202, Method 215</td>
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<tr>
<td>Moisture Sensitivity</td>
<td>Level 1, J-STD-020</td>
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**Part Numbering System**

VARISTOR XXX MA XX

- V
- XXX
- MA
- XX

ENERGY/CLAMPING VOLTAGE VARIANT

SERIES DESIGNATOR

MA: Bulk Pack
MT: Tape and Reel

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