

### DA/DB Varistor Series



#### Description


The DA and DB Series transient surge suppressors are heavy-duty industrial Metal-Oxide Varistors (MOVs) designed to provide surge protection for motor controls and power supplies used in oil-drilling, mining, and transportation equipment.

These UL recognized varistors have identical ratings and specifications but differ in case construction to provide flexibility in equipment designs.

DA Series devices feature rigid terminals to ensure secure wire contacts. Both the DA and DB Series feature improved creep and strike distance capability to minimize breakdown along the package surface design that provides complete electrical isolation of the disc subassembly.

See DA/DB Series Device Ratings and Specifications table for part number and brand information.

#### Agency Approvals

| Agency  | Agency Approval | Agency File Number |
|---|-----------------|--------------------|
|  | UL1449          | E320116            |

#### Additional Information



Datasheet  
DA



Resources  
DA



Samples  
DA



Datasheet  
DB



Resources  
DB



Samples  
DB

#### Features

- High energy absorption capability  $W_{TM}$  up to 1050J
- Wide operating voltage range  $V_{MIACIRMS}$  130V to 750V
- Screw terminals (DA Series), quick connect push-on connectors (DB Series)
- Case design provides complete electrical isolation of disc subassembly
- 40mm diameter disc
- No derating up to 85°C ambient
- RoHS compliant

#### Absolute Maximum Ratings

• For ratings of individual members of a series, see Device Ratings and Specifications chart

| Continuous   | DA/DB Series | Units      |
|--|--------------|------------|
| Steady State Applied Voltage:  |              |            |
| AC Voltage Range ( $V_{MIACIRMS}$ )  | 130 to 750   | V          |
| DC Voltage Range ( $V_{MDC}$ )   | 175 to 970   | V          |
| Transients:  |              |            |
| Peak Pulse Current ( $I_{TM}$ )  |              |            |
| For 8/20 $\mu$ s Current Wave (See Figure 2)   | 40,000       | A          |
| Single Pulse Energy Range  |              |            |
| For 2ms Current Squarewave ( $W_{TM}$ )  | 270 to 1050  | J          |
| Operating Ambient Temperature Range ( $T_A$ )  | -55 to +85   | °C         |
| Storage Temperature Range ( $T_{STG}$ )  | -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)<br>(Dielectric must withstand indicated DC voltage for one minute per MIL-STD 202, Method 301) | 5000         | V          |
| COATING Insulation Resistance  | 1000         | M $\Omega$ |

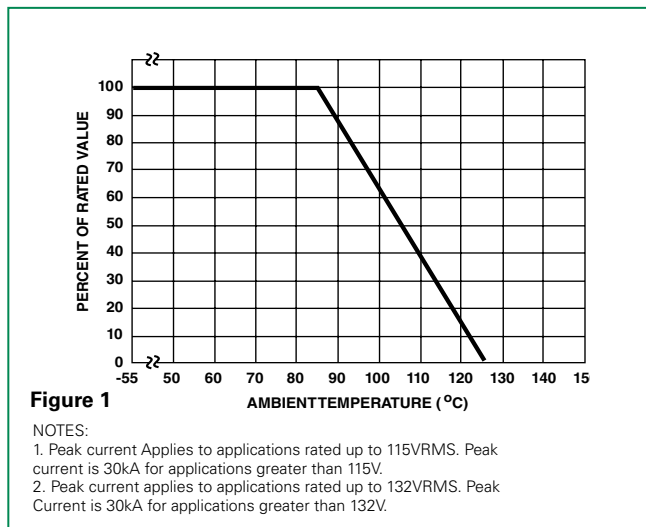
CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

**DA/DB Series Ratings & Specifications**

| Part Number<br>Device Branding |          | Maximum Rating (85°C) |             |                 |                                   | Specifications (25°C)                      |           |       |  |                                      |
|--------------------------------|----------|-----------------------|-------------|-----------------|-----------------------------------|--|-----------|-------|--|--------------------------------------|
|                                |          | Continuous            |             | Transient       |                                   | Varistor Voltage at 1mA<br>DC Test Current |           |       | Maximum<br>Clamping<br>Volt $V_C$ at<br>200A Current<br>(8/20 $\mu$ s) | Typical<br>Capacitance $f =$<br>1MHz |
|                                |          | $V_{RMS}$             | $V_{DC}$    | Energy<br>(2ms) | Peak<br>Current<br>8 x 20 $\mu$ s |  |           |       |  |                                      |
|                                |          | $V_{M(AC)}$           | $V_{M(DC)}$ | $W_{TM}$        | $I_{TM}$                          | Min  | $V_{NOM}$ | Max   | $V_C$  | C                                    |
| DA                             | DB       | (V)                   | (V)         | (J)             | (A)                               | (V)  | (V)       | (V)   | (A)  | (pF)                                 |
| V131DA40                       | V131DB40 | 130                   | 175         | 270             | 40000 <sup>1</sup>                | 184.5                                      | 205       | 225.5 | 345  | 10000                                |
| V151DA40                       | V151DB40 | 150                   | 200         | 300             | 40000 <sup>2</sup>                | 216  | 240       | 264   | 405  | 8000                                 |
| V251DA40                       | V251DB40 | 250                   | 330         | 370             | 40000                             | 351  | 390       | 429   | 650  | 5000                                 |
| V271DA40                       | V271DB40 | 275                   | 369         | 400             | 40000                             | 387  | 430       | 473   | 730  | 4500                                 |
| V321DA40                       | V321DB40 | 320                   | 420         | 460             | 40000                             | 459  | 510       | 561   | 830  | 3800                                 |
| V421DA40                       | V421DB40 | 420                   | 560         | 600             | 40000                             | 612  | 680       | 748   | 1130   | 3000                                 |
| V481DA40                       | V481DB40 | 480                   | 640         | 650             | 40000                             | 675  | 750       | 825   | 1240   | 2700                                 |
| V511DA40                       | V511DB40 | 510                   | 675         | 700             | 40000                             | 738  | 820       | 902   | 1350   | 2500                                 |
| V571DA40                       | V571DB40 | 575                   | 730         | 770             | 40000                             | 819  | 910       | 1001  | 1480   | 2200                                 |
| V661DA40                       | V661DB40 | 660                   | 850         | 900             | 40000                             | 945  | 1050      | 1155  | 1720   | 2000                                 |
| V751DA40                       | V751DB40 | 750                   | 970         | 1050            | 40000                             | 1080                                       | 1200      | 1320  | 2000   | 1800                                 |

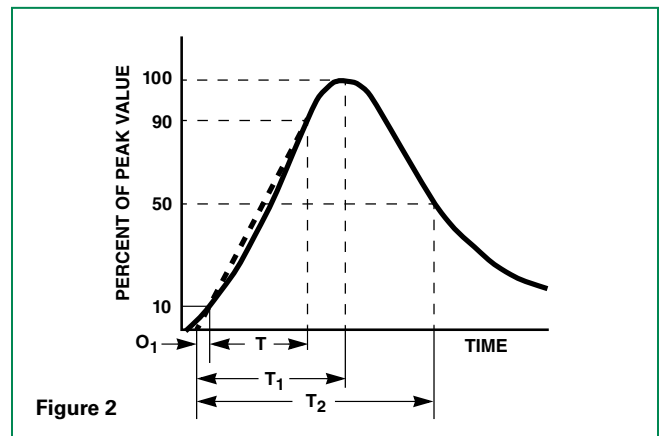
Note : Average power dissipation of transients not to exceed 2.0W.

**Power Dissipation Ratings**



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.

**Peak Pulse Current Test Waveform**



$O_1$  = Virtual Origin of Wave  
 $T$  = Time from 10% to 90% of Peak  
 $T_1$  = Rise Time = 1.25 x  $T$   
 $T_2$  = Decay Time  
**Example** - For an 8/20  $\mu$ s Current Waveform:  
 $8\mu s = T_1 =$  Rise Time  
 $20\mu s = T_2 =$  Decay Time

**Maximum Clamping Voltage**

V131DA40 - V751DA40 and V131DB40 - V751DB40

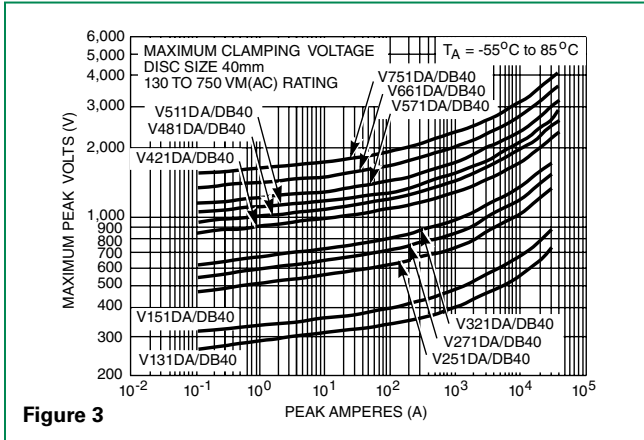


Figure 3

NOTE: If pulse ratings are exceeded, a shift of  $V_{NDCI}$  (at specified current) of more than +/-10% could result. This type of shift, which normally results in a decrease of  $V_{NDCI}$ , 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.

**Physical Specifications**

|                            |  |
|----------------------------|--|
| <b>Lead Material</b>       | DA - Copper, Tin-plated<br>DB - Brass, Tin-plated                |
| <b>Insulating Material</b> | Cured, flame retardant epoxy polymer meets UL94V-0 requirements. |
| <b>Device Labeling</b>     | Marked with LF, part number and date code                        |

**Repetitive Surge Capability**

V131DA40 - V751DA40 and V131DB40 - V751DB40

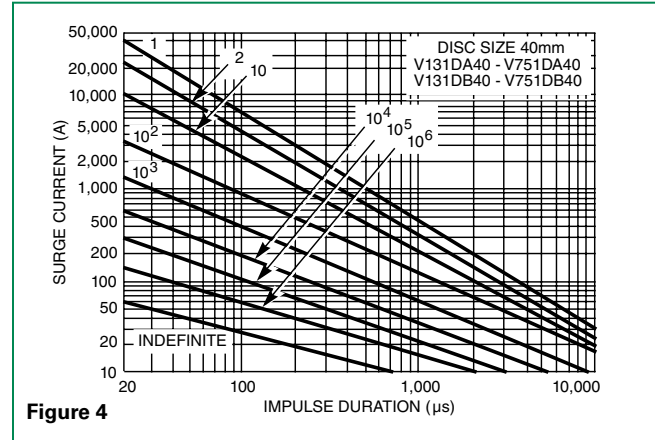
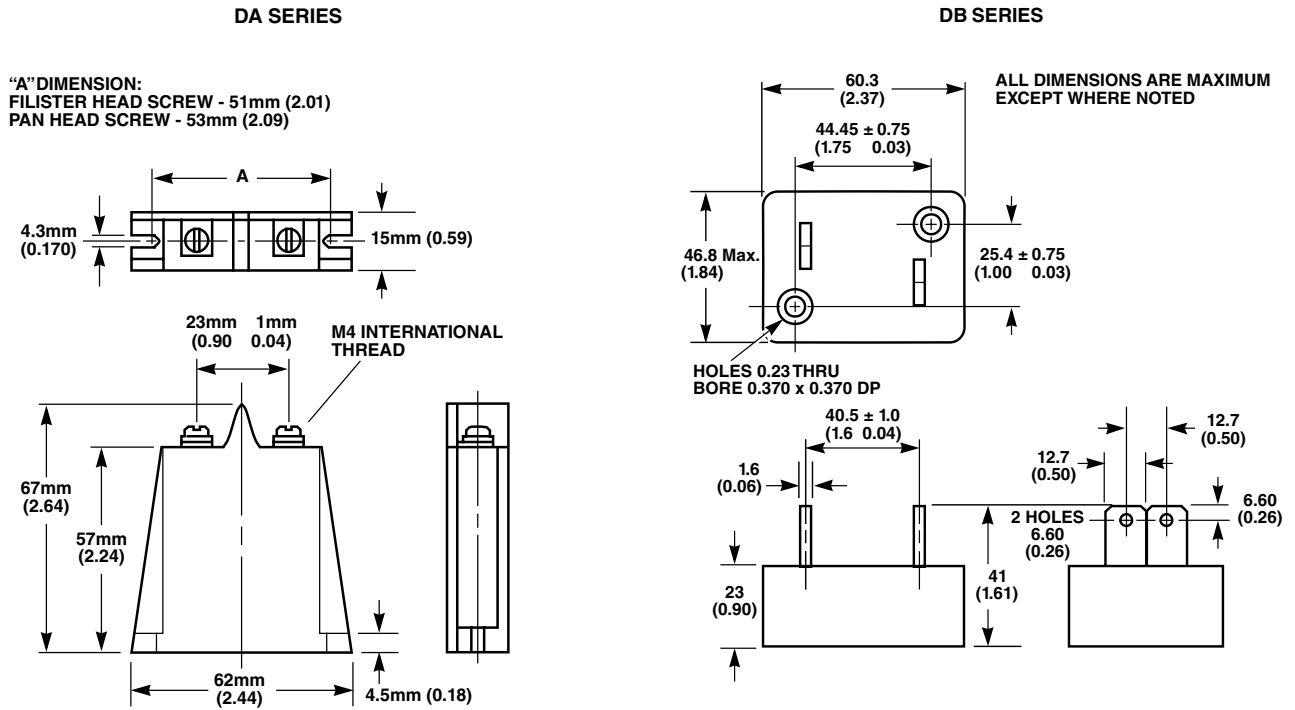


Figure 4

**Environmental Specifications**

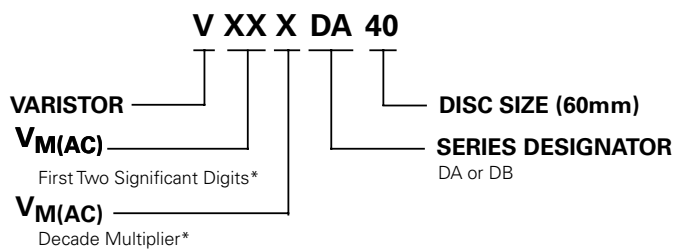
|                              |   |
|------------------------------|---|
| <b>Operating Temperature</b> | -55°C to +85°C  |
| <b>Storage Temperature</b>   | -55°C to +125°C   |
| <b>Humidity Aging</b>        | +85°C, 85% RH, 1000 hours<br>+/- 5% typical resistance change |
| <b>Thermal Shock</b>         | +85°C to -40°C 10 times<br>+/- 5% typical resistance change   |
| <b>Solvent Resistance</b>    | MIL-STD-202, Method 215                                       |
| <b>Moisture Sensitivity</b>  | Level 1, J-STD-020  |

**Product Dimensions (mm)**



Dimensions in millimeters and (inches).

**Part Numbering System**



\*Refer to Rating & Specifications table  
 Example:  
 130 V<sub>M(AC)</sub> = 131

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