

# ROV20, ROV20H, ROV20E

## 20mm Series Metal Oxide Varistors

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Document: SCD 25484  
Status: Released  
Rev. A June 30, 2003

### GENERAL DESCRIPTION

The ROV20-XXX (**R**adial-leaded Metal **O**xide **V**aristor) products are 20mm radial leaded varistor devices suitable for protection of overvoltage transients.

ROV devices can provide protection for a wide variety of power systems against overvoltage faults such as lightning, power contact and power induction. Suitable for a broad range of applications including, but not limited to security, power supplies, surge strips, etc., the ROV device helps to protect valuable equipment from potential power surge damage by clamping high energy, short duration impulses. The ROV devices have high current handling and energy absorption capability and fast response times to help protect against transient faults.

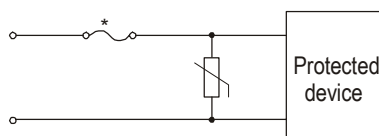
### FEATURES

- Radial leaded
- Broad Varistor voltage and  $V_{rms}$  range
  - Varistor voltage : 18V - 1800V
  - $V_{rms}$  voltage : 11V - 1000V
- Three surge capability series
  - Standard series, High surge series, Extra high surge series
- Various lead types
  - Straight, Kinked, Other
- Various packaging options
  - Bulk, Tape & Reel, Ammo Pack
- Helps designers meet the following standards
  - UL, CSA, VDE
- Fast response time
- High current and energy absorption capability

### APPLICATIONS

- Power supplies and power systems
- Line voltage
- Telecommunications systems
- Automotive systems
- Appliances

### TYPICAL APPLICATION SCHEMATIC



\*In some applications, a polymeric PTC device such as a Tyco Electronics PolySwitch device may be used instead of a fuse to provide a preferred solution.

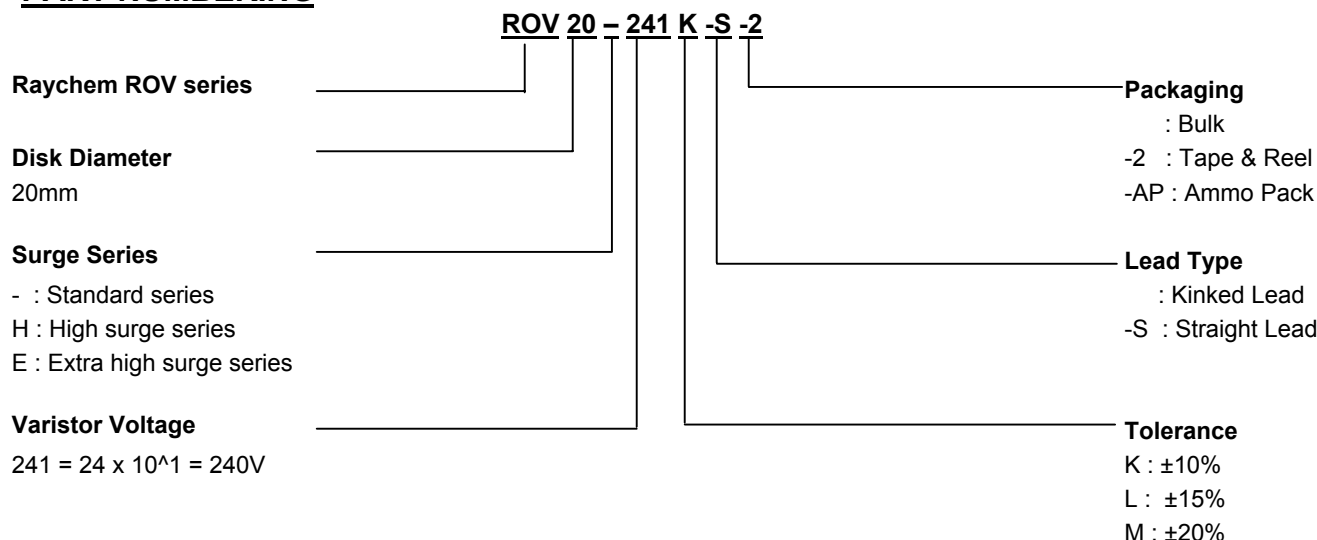
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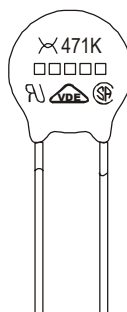
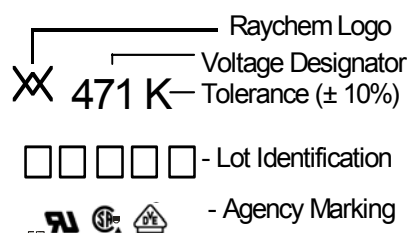
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### PART NUMBERING



### DEVICE MARKING



### GENERAL CHARACTERISTICS

|                                                            |                           |
|------------------------------------------------------------|---------------------------|
| Storage temperature:                                       | -40°C ... +125°C          |
| Maximum operating temperature:                             | -40°C ... +125°C          |
| Maximum working surface temperature:                       | +115°C                    |
| Temperature coefficient of voltage:                        | 0 ... +0.05% / °C max.    |
| Insulation resistance of coating (@ 500 V <sub>DC</sub> ): | Over 1000MΩ               |
| Maximum response time:                                     | 25ns                      |
| Lead Material:                                             | 22AWG Sn/Pb Plated Copper |

### AGENCY RECOGNITION

Device Ratings and Characteristics Tables contain specific recognition information for each individual part. The table below details marking symbols for each agency recognition type.

|        |                         |     |     |
|--------|-------------------------|-----|-----|
| UL1414 | UL1449<br>(2nd Edition) | CSA | VDE |
| ◆      | ●                       | ▲   | ■   |

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### DEVICE RATINGS AND CHARACTERISTICS

#### STANDARD SERIES

| Part Number | Varistor Voltage<br>V@1.0mA |           | Maximum Allowable Voltage              |                    | Maximum Clamping Voltage<br>V@100A | Maximum Surge Current<br>(8x20us) |                | Rated Wattage | Energy<br>(10x1000us) | Capacitance<br>(Typical) | Certifications                                                                      |
|-------------|-----------------------------|-----------|----------------------------------------|--------------------|------------------------------------|-----------------------------------|----------------|---------------|-----------------------|--------------------------|-------------------------------------------------------------------------------------|
|             | (V <sub>DC</sub> )          | Tolerance | V <sub>rms</sub><br>(V <sub>AC</sub> ) | (V <sub>DC</sub> ) | (V <sub>DC</sub> )                 | 1 Time<br>(A)                     | 2 Times<br>(A) | (W)           | (J)                   | @1kHz<br>(pF)            |  |
| ROV20-180M  | 18                          | ± 20%     | 11                                     | 14                 | 36 <sup>1)</sup>                   | 2000                              | 1000           | 0.20          | 7.0                   | 27100                    | ● ■                                                                                 |
| ROV20-220M  | 22                          |           | 14                                     | 18                 | 43 <sup>1)</sup>                   |                                   |                |               | 8.0                   | 21200                    | ● ■                                                                                 |
| ROV20-270M  | 27                          |           | 17                                     | 22                 | 53 <sup>1)</sup>                   |                                   |                |               | 10.0                  | 20000                    | ● ■                                                                                 |
| ROV20-330M  | 33                          |           | 20                                     | 26                 | 65 <sup>1)</sup>                   |                                   |                |               | 12.0                  | 17200                    | ● ■                                                                                 |
| ROV20-390L  | 39                          | ± 15%     | 25                                     | 31                 | 77 <sup>1)</sup>                   | 2000                              | 1000           | 0.20          | 14.0                  | 15003                    | ● ■                                                                                 |
| ROV20-470L  | 47                          |           | 30                                     | 38                 | 93 <sup>1)</sup>                   |                                   |                |               | 17.0                  | 12080                    | ● ■                                                                                 |
| ROV20-560L  | 56                          |           | 35                                     | 45                 | 110 <sup>1)</sup>                  |                                   |                |               | 20.0                  | 11600                    | ● ■                                                                                 |
| ROV20-680L  | 68                          |           | 40                                     | 56                 | 135 <sup>1)</sup>                  |                                   |                |               | 24.0                  | 9600                     | ● ■                                                                                 |
| ROV20-820K  | 82                          | ± 10%     | 50                                     | 65                 | 135                                | 6500                              | 4000           | 1.00          | 44.0                  | 5200                     | ● ■                                                                                 |
| ROV20-101K  | 100                         |           | 60                                     | 85                 | 165                                |                                   |                |               | 56.0                  | 4000                     | ● ■                                                                                 |
| ROV20-121K  | 120                         |           | 75                                     | 100                | 200                                |                                   |                |               | 64.0                  | 3800                     | ● ■                                                                                 |
| ROV20-151K  | 150                         |           | 95                                     | 125                | 250                                |                                   |                |               | 88.0                  | 3000                     | ● ■                                                                                 |
| ROV20-181K  | 180                         |           | 115                                    | 150                | 300                                |                                   |                |               | 104.0                 | 2400                     | ● ■                                                                                 |
| ROV20-201K  | 200                         |           | 130                                    | 170                | 340                                |                                   |                |               | 114.0                 | 1829                     | ◆ ● ▲ ■                                                                             |
| ROV20-221K  | 220                         |           | 140                                    | 180                | 360                                |                                   |                |               | 124.0                 | 1600                     | ◆ ● ▲ ■                                                                             |
| ROV20-241K  | 240                         |           | 150                                    | 200                | 395                                |                                   |                |               | 134.0                 | 1422                     | ◆ ● ▲ ■                                                                             |
| ROV20-271K  | 270                         |           | 175                                    | 225                | 455                                |                                   |                |               | 158.0                 | 1261                     | ◆ ● ▲ ■                                                                             |
| ROV20-301K  | 300                         |           | 195                                    | 250                | 505                                |                                   |                |               | 168.0                 | 1100                     | ◆ ● ▲ ■                                                                             |
| ROV20-331K  | 330                         |           | 210                                    | 275                | 550                                |                                   |                |               | 184.0                 | 1106                     | ◆ ● ▲ ■                                                                             |
| ROV20-361K  | 360                         |           | 230                                    | 300                | 595                                |                                   |                |               | 208.0                 | 987                      | ◆ ● ▲ ■                                                                             |
| ROV20-391K  | 390                         |           | 250                                    | 320                | 650                                |                                   |                |               | 240.0                 | 975                      | ◆ ● ▲ ■                                                                             |
| ROV20-431K  | 430                         |           | 275                                    | 350                | 710                                |                                   |                |               | 264.0                 | 858                      | ◆ ● ▲ ■                                                                             |
| ROV20-471K  | 470                         |           | 300                                    | 385                | 775                                |                                   |                |               | 280.0                 | 761                      | ◆ ● ▲ ■                                                                             |
| ROV20-511K  | 510                         |           | 320                                    | 418                | 842                                |                                   |                |               | 296.0                 | 792                      | ◆ ● ▲ ■                                                                             |
| ROV20-561K  | 560                         |           | 350                                    | 460                | 920                                |                                   |                |               | 312.0                 | 679                      | ◆ ● ▲ ■                                                                             |
| ROV20-621K  | 620                         |           | 385                                    | 505                | 1025                               |                                   |                |               | 328.0                 | 605                      | ◆ ● ▲ ■                                                                             |
| ROV20-681K  | 680                         |           | 420                                    | 560                | 1120                               |                                   |                |               | 344.0                 | 553                      | ◆ ● ▲ ■                                                                             |
| ROV20-751K  | 750                         |           | 460                                    | 615                | 1240                               |                                   |                |               | 360.0                 | 554                      | ◆ ● ▲ ■                                                                             |
| ROV20-781K  | 780                         |           | 485                                    | 640                | 1290                               |                                   |                |               | 368.0                 | 481                      | ◆ ● ▲ ■                                                                             |
| ROV20-821K  | 820                         |           | 510                                    | 670                | 1355                               |                                   |                |               | 376.0                 | 519                      | ◆ ● ▲ ■                                                                             |
| ROV20-911K  | 910                         |           | 550                                    | 745                | 1500                               |                                   |                |               | 408.0                 | 444                      | ◆ ● ▲ ■                                                                             |
| ROV20-102K  | 1000                        |           | 625                                    | 825                | 1650                               |                                   |                |               | 448.0                 | 400                      | ◆ ● ▲ ■                                                                             |
| ROV20-112K  | 1100                        |           | 680                                    | 895                | 1815                               |                                   |                |               | 496.0                 | 360                      | ◆ ● ▲ ■                                                                             |
| ROV20-182K  | 1800                        |           | 1000                                   | 1465               | 2970                               |                                   |                |               | 695.0                 | 260                      |                                                                                     |

1) The clamping voltage for devices ROV20-180M to ROV20-680L is tested with 20A current.

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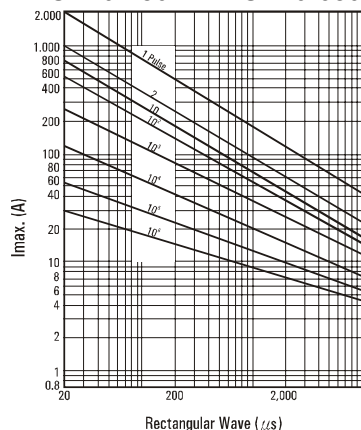
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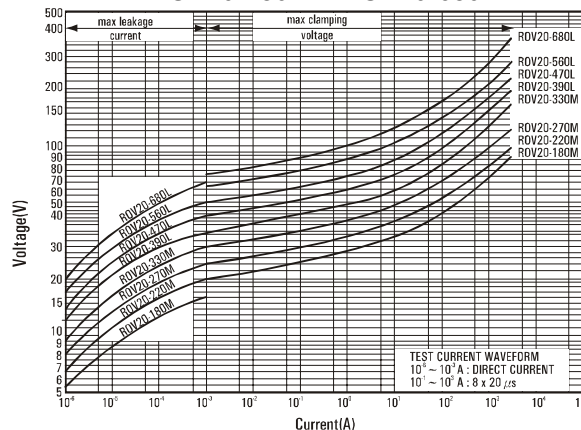
### PULSE LIFETIME RATING CURVES STANDARD SERIES

### V-I CHARACTERISTIC CURVES STANDARD SERIES

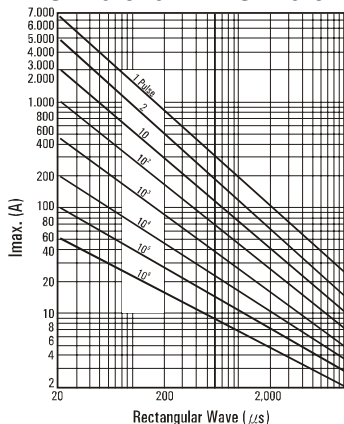
ROV20-180M – ROV20-680K



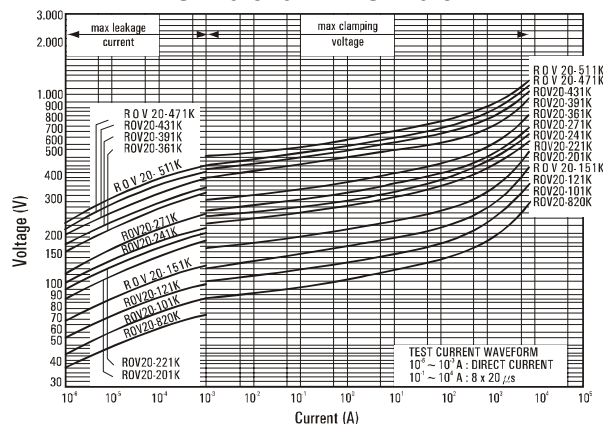
ROV20-180M – ROV20-680K



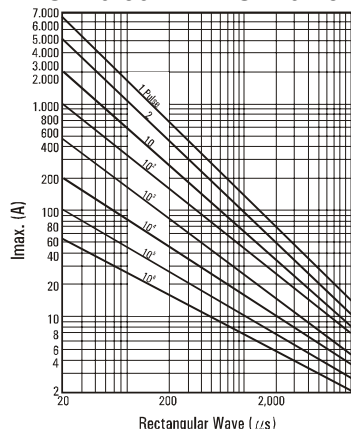
ROV20-820K – ROV20-511K



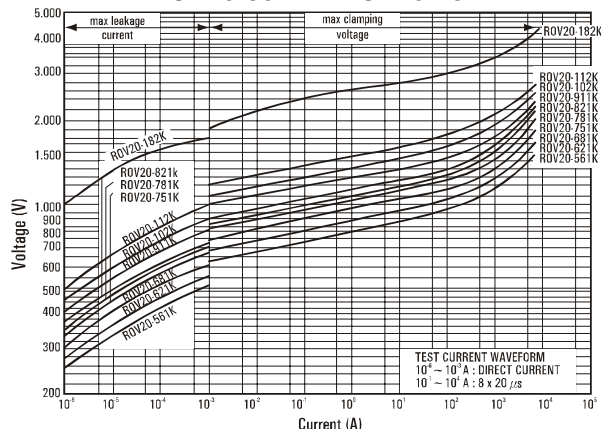
ROV20-820K – ROV20-511K



ROV20-561K – ROV20-182K



ROV20-561K – ROV20-182K



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### DEVICE RATINGS AND CHARACTERISTICS

#### HIGH SURGE SERIES

| Part Number | Varistor Voltage<br>V@1.0mA |           | Maximum Allowable Voltage              |                    | Maximum Clamping Voltage<br>V@100A | Maximum Surge Current<br>(8x20us) |                | Rated Wattage | Energy<br>(10x1000us) | Capacitance<br>(Typical) | Certifications                                                                      |
|-------------|-----------------------------|-----------|----------------------------------------|--------------------|------------------------------------|-----------------------------------|----------------|---------------|-----------------------|--------------------------|-------------------------------------------------------------------------------------|
|             | (V <sub>DC</sub> )          | Tolerance | V <sub>rms</sub><br>(V <sub>AC</sub> ) | (V <sub>DC</sub> ) | (V <sub>DC</sub> )                 | 1 Time<br>(A)                     | 2 Times<br>(A) | (W)           | (J)                   | @1kHz<br>(pF)            |  |
| ROV20H180M  | 18                          | ± 20%     | 11                                     | 14                 | 36 <sup>1)</sup>                   | 3000                              | 2000           | 0.20          | 13.0                  | 27100                    | ● ■                                                                                 |
| ROV20H220M  | 22                          |           | 14                                     | 18                 | 43 <sup>1)</sup>                   |                                   |                |               | 16.0                  | 21200                    | ● ■                                                                                 |
| ROV20H270M  | 27                          |           | 17                                     | 22                 | 53 <sup>1)</sup>                   |                                   |                |               | 19.0                  | 20000                    | ● ■                                                                                 |
| ROV20H330M  | 33                          |           | 20                                     | 26                 | 65 <sup>1)</sup>                   |                                   |                |               | 24.0                  | 17200                    | ● ■                                                                                 |
| ROV20H390L  | 39                          | ± 15%     | 25                                     | 31                 | 77 <sup>1)</sup>                   | 3000                              | 2000           | 0.20          | 28.0                  | 15000                    | ● ■                                                                                 |
| ROV20H470L  | 47                          |           | 30                                     | 38                 | 93 <sup>1)</sup>                   |                                   |                |               | 34.0                  | 12100                    | ● ■                                                                                 |
| ROV20H560L  | 56                          |           | 35                                     | 45                 | 110 <sup>1)</sup>                  |                                   |                |               | 41.0                  | 11600                    | ● ■                                                                                 |
| ROV20H680L  | 68                          |           | 40                                     | 56                 | 135 <sup>1)</sup>                  |                                   |                |               | 49.0                  | 9600                     | ● ■                                                                                 |
| ROV20H820K  | 82                          | ± 10%     | 50                                     | 65                 | 135                                | 10000                             | 6500           | 1.00          | 56.0                  | 5200                     | ● ■                                                                                 |
| ROV20H101K  | 100                         |           | 60                                     | 85                 | 165                                |                                   |                |               | 72.0                  | 4000                     | ● ■                                                                                 |
| ROV20H121K  | 120                         |           | 75                                     | 100                | 200                                |                                   |                |               | 88.0                  | 3800                     | ● ■                                                                                 |
| ROV20H151K  | 150                         |           | 95                                     | 125                | 250                                |                                   |                |               | 106.0                 | 3000                     | ● ■                                                                                 |
| ROV20H181K  | 180                         |           | 115                                    | 150                | 300                                |                                   |                |               | 130.0                 | 2400                     | ● ■                                                                                 |
| ROV20H201K  | 200                         |           | 130                                    | 170                | 340                                |                                   |                |               | 140.0                 | 1830                     | ◆ ● ▲ ■                                                                             |
| ROV20H221K  | 220                         |           | 140                                    | 180                | 360                                |                                   |                |               | 155.0                 | 1600                     | ◆ ● ▲ ■                                                                             |
| ROV20H241K  | 240                         |           | 150                                    | 200                | 395                                |                                   |                |               | 168.0                 | 1420                     | ◆ ● ▲ ■                                                                             |
| ROV20H271K  | 270                         |           | 175                                    | 225                | 455                                |                                   |                |               | 190.0                 | 1260                     | ◆ ● ▲ ■                                                                             |
| ROV20H301K  | 300                         |           | 195                                    | 250                | 505                                |                                   |                |               | 210.0                 | 1100                     | ◆ ● ▲ ■                                                                             |
| ROV20H331K  | 330                         |           | 210                                    | 275                | 550                                |                                   |                |               | 228.0                 | 1110                     | ◆ ● ▲ ■                                                                             |
| ROV20H361K  | 360                         |           | 230                                    | 300                | 595                                |                                   |                |               | 255.0                 | 990                      | ◆ ● ▲ ■                                                                             |
| ROV20H391K  | 390                         |           | 250                                    | 320                | 650                                |                                   |                |               | 275.0                 | 980                      | ◆ ● ▲ ■                                                                             |
| ROV20H431K  | 430                         |           | 275                                    | 350                | 710                                |                                   |                |               | 303.0                 | 860                      | ◆ ● ▲ ■                                                                             |
| ROV20H471K  | 470                         |           | 300                                    | 385                | 775                                |                                   |                |               | 350.0                 | 760                      | ◆ ● ▲ ■                                                                             |
| ROV20H511K  | 510                         |           | 320                                    | 418                | 842                                |                                   |                |               | 382.0                 | 790                      | ◆ ● ▲ ■                                                                             |
| ROV20H561K  | 560                         |           | 350                                    | 460                | 920                                |                                   |                |               | 410.0                 | 680                      | ◆ ● ▲ ■                                                                             |
| ROV20H621K  | 620                         |           | 385                                    | 505                | 1025                               |                                   |                |               | 420.0                 | 600                      | ◆ ● ▲ ■                                                                             |
| ROV20H681K  | 680                         |           | 420                                    | 560                | 1120                               |                                   |                |               | 430.0                 | 550                      | ◆ ● ▲ ■                                                                             |
| ROV20H751K  | 750                         |           | 460                                    | 615                | 1240                               |                                   |                |               | 440.0                 | 550                      | ◆ ● ▲ ■                                                                             |
| ROV20H781K  | 780                         |           | 485                                    | 640                | 1290                               |                                   |                |               | 450.0                 | 480                      | ◆ ● ▲ ■                                                                             |
| ROV20H821K  | 820                         |           | 510                                    | 670                | 1355                               |                                   |                |               | 460.0                 | 520                      | ◆ ● ▲ ■                                                                             |
| ROV20H911K  | 910                         |           | 550                                    | 745                | 1500                               |                                   |                |               | 510.0                 | 440                      | ◆ ● ▲ ■                                                                             |
| ROV20H102K  | 1000                        |           | 625                                    | 825                | 1650                               |                                   |                |               | 566.0                 | 400                      | ◆ ● ▲ ■                                                                             |
| ROV20H112K  | 1100                        |           | 680                                    | 895                | 1815                               |                                   |                |               | 620.0                 | 360                      | ◆ ● ▲ ■                                                                             |

1) The clamping voltage for devices ROV20H180M to ROV20H680L is tested with 20A current.

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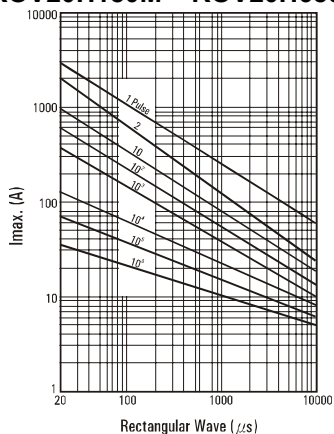
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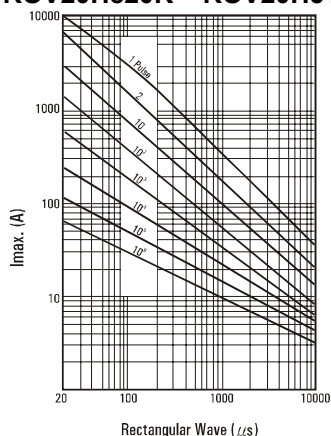
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### PULSE LIFETIME RATING CURVES HIGH SURGE SERIES

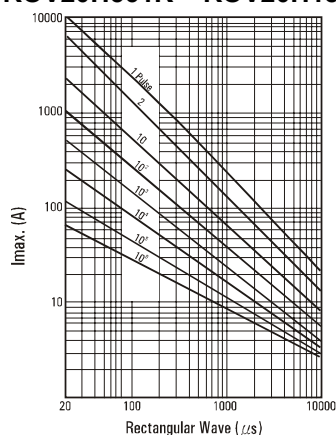
ROV20H180M – ROV20H680K



ROV20H820K – ROV20H511K

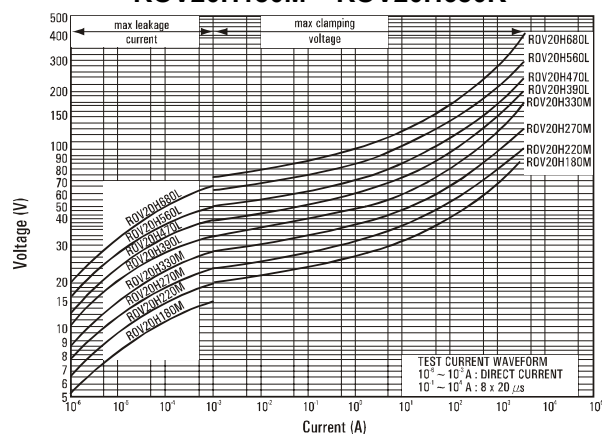


ROV20H561K – ROV20H182K

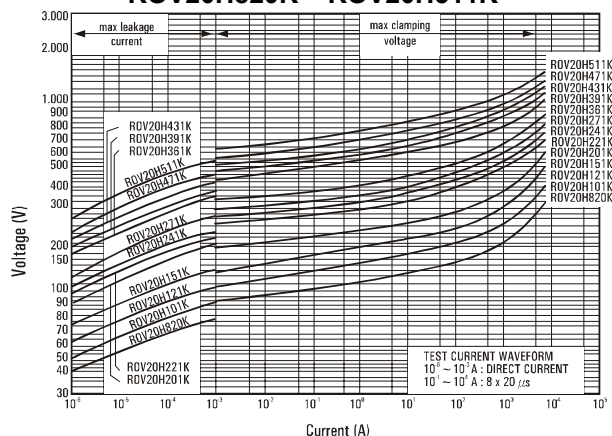


### V-I CHARACTERISTIC CURVES HIGH SURGE SERIES

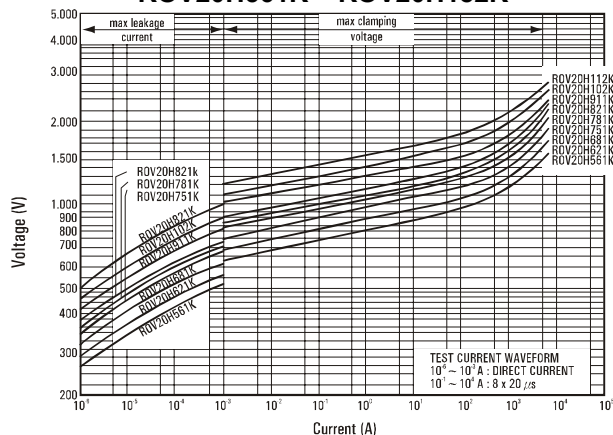
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### DEVICE RATINGS AND CHARACTERISTICS

#### EXTRA HIGH SURGE SERIES

| Part Number | Varistor Voltage<br>V@1.0mA |           | Maximum Allowable Voltage              |                    | Maximum Clamping Voltage<br>V@100A | Maximum Surge Current<br>(8x20us) |                   | Rated Wattage | Energy<br>(10x1000us) | Capacitance<br>(Typical) | Certifications                                                                      |
|-------------|-----------------------------|-----------|----------------------------------------|--------------------|------------------------------------|-----------------------------------|-------------------|---------------|-----------------------|--------------------------|-------------------------------------------------------------------------------------|
|             | (V <sub>DC</sub> )          | Tolerance | V <sub>rms</sub><br>(V <sub>AC</sub> ) | (V <sub>DC</sub> ) | (V <sub>DC</sub> )                 | 1<br>Time<br>(A)                  | 2<br>Times<br>(A) | (W)           | (J)                   | @1kHz<br>(pF)            |  |
| ROV20E201K  | 200                         | ± 10%     | 130                                    | 170                | 340                                | 12500                             | 10000             | 1.00          | 168.0                 | 1830                     | • ▲                                                                                 |
| ROV20E221K  | 220                         |           | 140                                    | 180                | 360                                |                                   |                   |               | 186.0                 | 1600                     | • ▲                                                                                 |
| ROV20E241K  | 240                         |           | 150                                    | 200                | 395                                |                                   |                   |               | 202.0                 | 1420                     | • ▲                                                                                 |
| ROV20E271K  | 270                         |           | 175                                    | 225                | 455                                |                                   |                   |               | 227.0                 | -----                    |                                                                                     |
| ROV20E301K  | 300                         |           | 195                                    | 250                | 505                                |                                   |                   |               | 252.0                 | -----                    |                                                                                     |
| ROV20E331K  | 330                         |           | 210                                    | 275                | 550                                |                                   |                   |               | 277.0                 | -----                    |                                                                                     |
| ROV20E361K  | 360                         |           | 230                                    | 300                | 595                                |                                   |                   |               | 302.0                 | -----                    |                                                                                     |



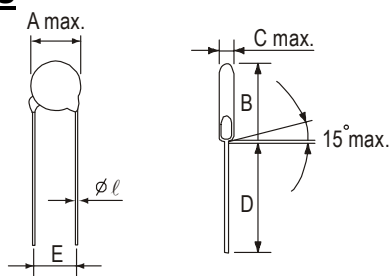
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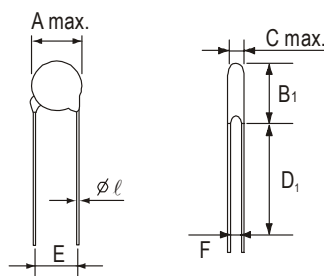
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### DIMENSIONS



**KINKED LEAD TYPE**  
Dimension Table

|                 |      |
|-----------------|------|
| A max.          | 23.0 |
| $\ell \pm 0.05$ | 1.0  |
| $E \pm 1.0$     | 10.0 |
| B max.          | 28.0 |
| $D_1$ min.      | 25.0 |
| D min.          | 24.0 |



**STRAIGHT LEAD TYPE (-S)**  
Table of C max., F, and B<sub>1</sub> max.

| Type No. | C max. | F $\pm 0.8$ | B <sub>1</sub> max. |
|----------|--------|-------------|---------------------|
| 180M     | 5.2    | 0.9         | 26.5                |
| 220L     | 5.3    | 1.0         | 26.5                |
| 270K     | 5.4    | 1.1         | 26.5                |
| 330K     | 5.4    | 1.2         | 26.5                |
| 390K     | 5.4    | 1.4         | 26.5                |
| 470K     | 5.6    | 1.4         | 26.5                |
| 560K     | 5.6    | 1.6         | 26.5                |
| 680K     | 6.1    | 1.9         | 26.5                |
| 820K     | 4.9    | 1.2         | 26.5                |
| 101K     | 5.1    | 1.2         | 26.5                |
| 121K     | 5.3    | 1.3         | 26.5                |
| 151K     | 5.6    | 1.6         | 26.5                |
| 181K     | 5.2    | 1.4         | 26.5                |
| 201K     | 5.3    | 1.4         | 26.5                |
| 221K     | 5.4    | 1.5         | 26.5                |
| 241K     | 5.5    | 1.7         | 26.5                |
| 271K     | 5.7    | 1.9         | 26.5                |
| 301K     | 5.9    | 2.1         | 26.5                |
| 331K     | 6.0    | 2.1         | 26.5                |
| 361K     | 6.2    | 2.3         | 26.5                |
| 391K     | 6.4    | 2.4         | 26.5                |
| 431K     | 7.2    | 2.7         | 26.5                |
| 471K     | 7.5    | 2.9         | 27.0                |
| 511K     | 7.7    | 3.3         | 27.0                |
| 561K     | 8.0    | 3.6         | 27.0                |
| 621K     | 8.3    | 4.1         | 27.0                |
| 681K     | 8.7    | 4.4         | 27.0                |
| 751K     | 9.1    | 4.5         | 27.0                |
| 781K     | 9.3    | 4.8         | 27.0                |
| 821K     | 9.5    | 4.8         | 27.0                |
| 911K     | 10.1   | 5.7         | 27.0                |
| 102K     | 10.7   | 5.8         | 27.0                |
| 112K     | 11.2   | 6.3         | 27.0                |
| 182K     | 13.5   | 10.4        | 29.0                |



# ROV20, ROV20H, ROV20E

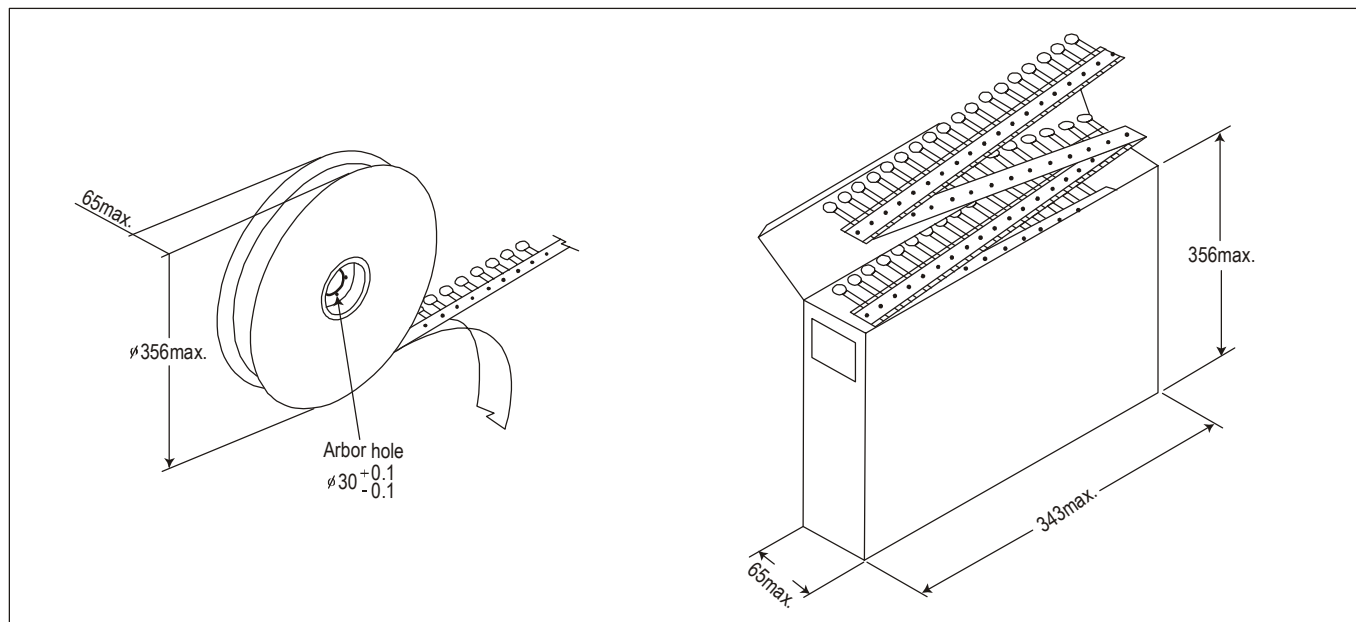
## 20mm Series Metal Oxide Varistors

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 Rev. A June 30, 2003

### PACKAGING

in mm



| Packaging        | Bulk (box)      | Reel              | Ammo            |
|------------------|-----------------|-------------------|-----------------|
| Box size (mm)    | 290 x 155 x 110 | 350 x 350 x 74    | 350 x 260 x 65  |
| Carton size (mm) | 310 x 328 x 250 | 370 x 370 x 468   | 365 x 535 x 275 |
| One carton with  | 4 Boxes         | 6 Boxes (6 reels) | 8 Boxes         |

| Part Number                                           | Bulk (box) | Reel | Ammo |
|-------------------------------------------------------|------------|------|------|
| ROV20-180M to ROV20-470K<br>ROV20H180M to ROV20H470K  | 750        | 500  | 500  |
| ROV20-560K to ROV20-680K,<br>ROV20H560K to ROV20H680K | 750        | 500  | 500  |
| ROV20-820K to ROV20-331K,<br>ROV20H820K to ROV20H331K | 750        | 500  | 500  |
| ROV20-361K to ROV20-391K,<br>ROV20H361K to ROV20H391K | 750        | 500  | 500  |
| ROV20-431K to ROV20-471K,<br>ROV20H431K to ROV20H471K | 750        | 500  | 500  |
| ROV20-511K to ROV20-751K,<br>ROV20H511K to ROV20H751K | 450        | 500  | 500  |
| ROV20-781K to ROV20-182K,<br>ROV20H781K to ROV20H112K | 450        | 500  | 500  |

# ROV20, ROV20H, ROV20E

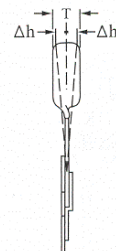
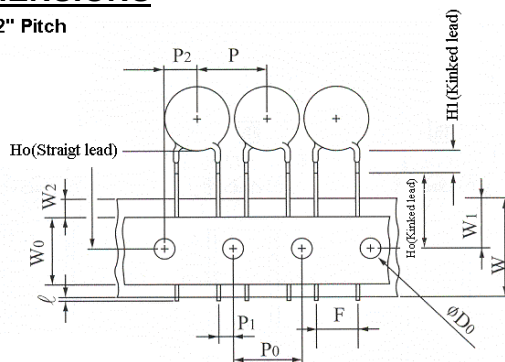
## 20mm Series Metal Oxide Varistors

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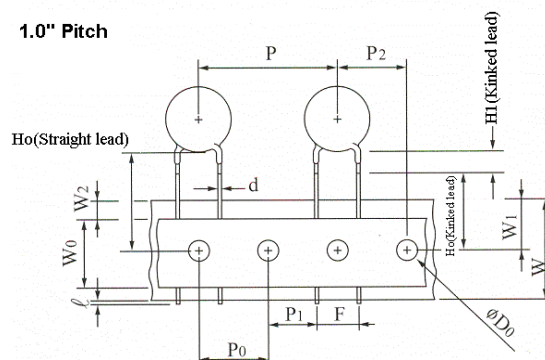
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### TAPE AND REEL DIMENSIONS

1/2" Pitch



1.0" Pitch



| Symbols                        | Item                                   | Value                                   |
|--------------------------------|----------------------------------------|-----------------------------------------|
| I                              | Cut out length                         | 1.1mm max.                              |
| H <sub>1</sub> (Kinked type)   | Height of kink                         | 3.5mm max.                              |
| H <sub>0</sub> (Kinked type)   | Height to seating plane                | 16.0 ± 0.5mm                            |
| H <sub>o</sub> (Straight type) | Height of component from hole center   | 16.0-21.0mm                             |
| Δh                             | Front to back deviation                | 0.0 ± 2.0mm                             |
| W                              | Carrier tape width                     | 18.0 <sup>+1.0</sup> <sub>-0.5</sub> mm |
| W <sub>0</sub>                 | Hold down tape width                   | 12.0mm                                  |
| W <sub>1</sub>                 | Sprocket hole position                 | 9.0 <sup>+0.75</sup> <sub>-0.5</sub> mm |
| W <sub>2</sub>                 | Adhesive tape position                 | 3.0mm max.                              |
| F                              | Component lead spacing                 | 10.0 <sup>+0.8</sup> <sub>-0.2</sub> mm |
| P                              | Pitch of component                     | 25.4 ± 1.0mm                            |
| P <sub>0</sub>                 | Sprocket hole pitch                    | 12.7 ± 0.3mm                            |
| P <sub>1</sub>                 | Lead length from hole center to lead   | 7.7 ± 0.7mm, 8.95 ± 0.7mm               |
| P <sub>2</sub>                 | Length from hole center to disk center | 12.7 ± 1.3mm                            |
| D <sub>0</sub>                 | Sprocket hole diameter                 | 4.0 ± 0.2mm                             |
| d                              | Lead wire diameter                     | 0.8 ± 0.05mm, 1.0 ± 0.05mm              |
| T                              | Disk thickness                         | See C. max table                        |
| t <sub>1</sub>                 | Total thickness tape                   | 0.7 ± 0.05mm                            |
| t <sub>2</sub>                 | Total thickness                        | 1.8mm max.                              |

## ROV20, ROV20H, ROV20E 20mm Series Metal Oxide Varistors

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