

### GENERAL DESCRIPTION

The ROV14-XXX (Radial-leaded Metal Oxide Varistor) products are 14mm 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.

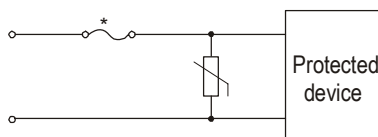
### FEATURES

- 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.

### MATERIALS INFORMATION

RoHS Compliant

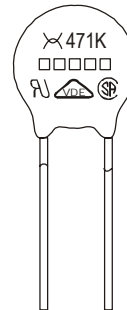
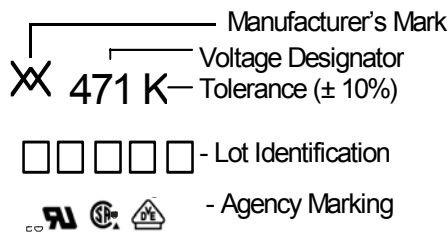
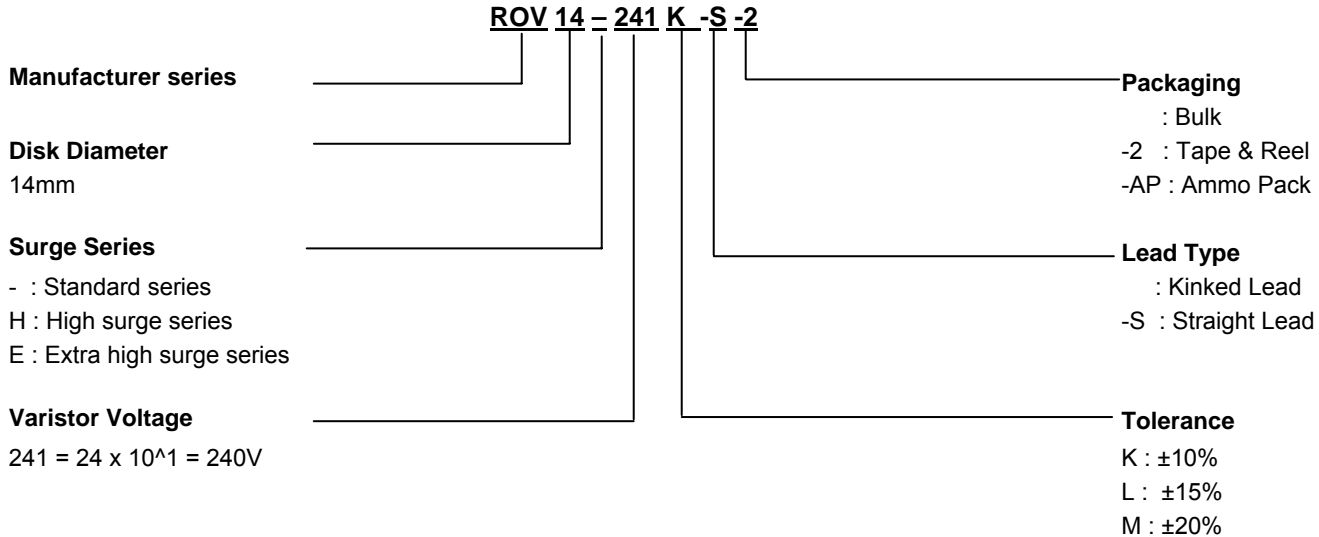
Directive 2002/95/EC  
Compliant

ELV Compliant

Directive 2000/53/EC  
Compliant

\*After May 1, 2005 all ROV devices will be produced as RoHS compliant devices.

## PART NUMBERING



**Lot Identification**  
RoHS compliant devices: 4 characters  
Non RoHS compliant devices: 5 characters with M at the end.

## GENERAL CHARACTERISTICS

|                                               |                         |
|-----------------------------------------------|-------------------------|
| Storage temperature:                          | -40°C ... +125°C        |
| Maximum operating temperature:                | -40°C ... + 85°C        |
| Maximum working surface temperature:          | +115°C                  |
| Temperature coefficient of voltage:           | 0....+0.05% / °C max.   |
| Insulation resistance of coating (@ 500 VDC): | Over 1000MΩ             |
| Maximum response time:                        | 25ns                    |
| Lead Material:                                | 22 AWG Sn 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 |
|--------|-------------------------|-----|-----|
| ◆      | ●                       | ▲   | ■   |

### DEVICE RATINGS AND CHARACTERISTICS

#### STANDARD SERIES

| Part Number | Varistor Voltage<br>V@1.0mA |           | Maximum Allowable Voltage              |                    | Maximum Clamping Voltage<br>V@50A | 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)            |  |
| ROV14-180M  | 18                          | ± 20%     | 11                                     | 14                 | 36 <sup>1)</sup>                  | 1000                              | 500               | 0.10          | 4.7                   | 14898                    | ● ■                                                                                 |
| ROV14-220L  | 22                          | ± 15%     | 14                                     | 18                 | 43 <sup>1)</sup>                  |                                   |                   |               | 5.4                   | 11957                    | ● ■                                                                                 |
| ROV14-270K  | 27                          | ± 10%     | 17                                     | 22                 | 53 <sup>1)</sup>                  |                                   |                   |               | 6.9                   | 9731                     | ● ■                                                                                 |
| ROV14-330K  | 33                          |           | 20                                     | 26                 | 65 <sup>1)</sup>                  |                                   |                   |               | 8.8                   | 7704                     | ● ■                                                                                 |
| ROV14-390K  | 39                          |           | 25                                     | 31                 | 77 <sup>1)</sup>                  |                                   |                   |               | 9.4                   | 7622                     | ● ■                                                                                 |
| ROV14-470K  | 47                          |           | 30                                     | 38                 | 93 <sup>1)</sup>                  |                                   |                   |               | 12.0                  | 6417                     | ● ■                                                                                 |
| ROV14-560K  | 56                          |           | 35                                     | 45                 | 110 <sup>1)</sup>                 |                                   |                   |               | 14.0                  | 5184                     | ● ■                                                                                 |
| ROV14-680K  | 68                          |           | 40                                     | 56                 | 135 <sup>1)</sup>                 |                                   |                   |               | 17.0                  | 5099                     | ● ■                                                                                 |
| ROV14-820K  | 82                          |           | 50                                     | 65                 | 135                               | 22.0                              | 2965              | ● ■           |                       |                          |                                                                                     |
| ROV14-101K  | 100                         |           | 60                                     | 85                 | 165                               | 28.0                              | 2221              | ● ■           |                       |                          |                                                                                     |
| ROV14-121K  | 120                         |           | 75                                     | 100                | 200                               | 32.0                              | 1742              | ● ■           |                       |                          |                                                                                     |
| ROV14-151K  | 150                         |           | 95                                     | 125                | 250                               | 44.0                              | 1510              | ● ■           |                       |                          |                                                                                     |
| ROV14-181K  | 180                         |           | 115                                    | 150                | 300                               | 52.0                              | 922               | ● ■           |                       |                          |                                                                                     |
| ROV14-201K  | 200                         |           | 130                                    | 170                | 340                               | 57.0                              | 845               | ◆ ● ▲ ■       |                       |                          |                                                                                     |
| ROV14-221K  | 220                         |           | 140                                    | 180                | 360                               | 62.0                              | 713               | ◆ ● ▲ ■       |                       |                          |                                                                                     |
| ROV14-241K  | 240                         |           | 150                                    | 200                | 395                               | 67.0                              | 769               | ◆ ● ▲ ■       |                       |                          |                                                                                     |
| ROV14-271K  | 270                         |           | 175                                    | 225                | 455                               | 79.0                              | 655               | ◆ ● ▲ ■       |                       |                          |                                                                                     |
| ROV14-301K  | 300                         |           | 195                                    | 250                | 505                               | 84.0                              | 650               | ◆ ● ▲ ■       |                       |                          |                                                                                     |
| ROV14-331K  | 330                         | 210       | 275                                    | 550                | 92.0                              | 613                               | ◆ ● ▲ ■           |               |                       |                          |                                                                                     |
| ROV14-361K  | 360                         | 230       | 300                                    | 595                | 104.0                             | 465                               | ◆ ● ▲ ■           |               |                       |                          |                                                                                     |
| ROV14-391K  | 390                         | 250       | 320                                    | 650                | 120.0                             | 458                               | ◆ ● ▲ ■           |               |                       |                          |                                                                                     |
| ROV14-431K  | 430                         | 275       | 350                                    | 710                | 132.0                             | 454                               | ◆ ● ▲ ■           |               |                       |                          |                                                                                     |
| ROV14-471K  | 470                         | 300       | 385                                    | 775                | 140.0                             | 413                               | ◆ ● ▲ ■           |               |                       |                          |                                                                                     |
| ROV14-511K  | 510                         | 320       | 418                                    | 842                | 148.0                             | 374                               | ◆ ● ▲ ■           |               |                       |                          |                                                                                     |
| ROV14-561K  | 560                         | 350       | 460                                    | 920                | 156.0                             | 398                               | ◆ ● ▲ ■           |               |                       |                          |                                                                                     |
| ROV14-621K  | 620                         | 385       | 505                                    | 1025               | 164.0                             | 305                               | ◆ ● ▲ ■           |               |                       |                          |                                                                                     |
| ROV14-681K  | 680                         | 420       | 560                                    | 1120               | 172.0                             | 312                               | ◆ ● ▲ ■           |               |                       |                          |                                                                                     |
| ROV14-751K  | 750                         | 460       | 615                                    | 1240               | 180.0                             | 270                               | ◆ ● ▲ ■           |               |                       |                          |                                                                                     |
| ROV14-781K  | 780                         | 485       | 640                                    | 1290               | 184.0                             | 252                               | ◆ ● ▲ ■           |               |                       |                          |                                                                                     |
| ROV14-821K  | 820                         | 510       | 670                                    | 1355               | 188.0                             | 265                               | ◆ ● ▲ ■           |               |                       |                          |                                                                                     |
| ROV14-911K  | 910                         | 550       | 745                                    | 1500               | 204.0                             | 240                               | ◆ ● ▲ ■           |               |                       |                          |                                                                                     |
| ROV14-102K  | 1000                        | 625       | 825                                    | 1650               | 224.0                             | 200                               | ◆ ● ▲ ■           |               |                       |                          |                                                                                     |
| ROV14-112K  | 1100                        | 680       | 895                                    | 1815               | 248.0                             | 180                               | ◆ ● ▲ ■           |               |                       |                          |                                                                                     |
| ROV14-182K  | 1800                        | 1000      | 1465                                   | 2970               | 348.0                             | 118                               | ◆ ● ▲ ■*          |               |                       |                          |                                                                                     |

\* Pending VDE Recognition

1). The clamping voltage for devices ROV14-180M to ROV14-680K is tested with 10A current



### DEVICE RATINGS AND CHARACTERISTICS

#### HIGH SURGE SERIES

| Part Number | Varistor Voltage<br>V@1.0mA |           | Maximum Allowable Voltage              |                    | Maximum Clamping Voltage<br>V@50A | 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)            |                |
| ROV14H180M  | 18                          | ± 20%     | 11                                     | 14                 | 36 <sup>1)</sup>                  | 2000                              | 1000              | 0.10          | 5.2                   | 14890                    | ● ■            |
| ROV14H220L  | 22                          | ± 15%     | 14                                     | 18                 | 43 <sup>1)</sup>                  |                                   |                   |               | 6.3                   | 11960                    | ● ■            |
| ROV14H270K  | 27                          | ± 10%     | 17                                     | 22                 | 53 <sup>1)</sup>                  |                                   |                   |               | 7.8                   | 9730                     | ● ■            |
| ROV14H330K  | 33                          |           | 20                                     | 26                 | 65 <sup>1)</sup>                  |                                   |                   |               | 9.5                   | 7700                     | ● ■            |
| ROV14H390K  | 39                          |           | 25                                     | 31                 | 77 <sup>1)</sup>                  |                                   |                   |               | 11.0                  | 7620                     | ● ■            |
| ROV14H470K  | 47                          |           | 30                                     | 38                 | 93 <sup>1)</sup>                  |                                   |                   |               | 14.0                  | 6420                     | ● ■            |
| ROV14H560K  | 56                          |           | 35                                     | 45                 | 110 <sup>1)</sup>                 |                                   |                   |               | 16.0                  | 5180                     | ● ■            |
| ROV14H680K  | 68                          |           | 40                                     | 56                 | 135 <sup>1)</sup>                 |                                   |                   |               | 20.0                  | 5100                     | ● ■            |
| ROV14H820K  | 82                          |           | 50                                     | 65                 | 135                               |                                   |                   |               | 28.0                  | 2970                     | ● ■            |
| ROV14H101K  | 100                         |           | 60                                     | 85                 | 165                               |                                   |                   |               | 36.0                  | 2220                     | ● ■            |
| ROV14H121K  | 120                         |           | 75                                     | 100                | 200                               | 44.0                              | 1740              | ● ■           |                       |                          |                |
| ROV14H151K  | 150                         |           | 95                                     | 125                | 250                               | 53.0                              | 1510              | ● ■           |                       |                          |                |
| ROV14H181K  | 180                         | 115       | 150                                    | 300                | 65.0                              | 920                               | ● ■               |               |                       |                          |                |
| ROV14H201K  | 200                         | 130       | 170                                    | 340                | 70.0                              | 840                               | ◆ ● ▲ ■           |               |                       |                          |                |
| ROV14H221K  | 220                         | 140       | 180                                    | 360                | 78.0                              | 710                               | ◆ ● ▲ ■           |               |                       |                          |                |
| ROV14H241K  | 240                         | 150       | 200                                    | 395                | 84.0                              | 770                               | ◆ ● ▲ ■           |               |                       |                          |                |
| ROV14H271K  | 270                         | 175       | 225                                    | 455                | 99.0                              | 650                               | ◆ ● ▲ ■           |               |                       |                          |                |
| ROV14H301K  | 300                         | 195       | 250                                    | 505                | 105.0                             | 650                               | ◆ ● ▲ ■           |               |                       |                          |                |
| ROV14H331K  | 330                         | 210       | 275                                    | 550                | 115.0                             | 610                               | ◆ ● ▲ ■           |               |                       |                          |                |
| ROV14H361K  | 360                         | 230       | 300                                    | 595                | 130.0                             | 470                               | ◆ ● ▲ ■           |               |                       |                          |                |
| ROV14H391K  | 390                         | 250       | 320                                    | 650                | 140.0                             | 460                               | ◆ ● ▲ ■           |               |                       |                          |                |
| ROV14H431K  | 430                         | 275       | 350                                    | 710                | 155.0                             | 450                               | ◆ ● ▲ ■           |               |                       |                          |                |
| ROV14H471K  | 470                         | 300       | 385                                    | 775                | 175.0                             | 420                               | ◆ ● ▲ ■           |               |                       |                          |                |
| ROV14H511K  | 510                         | 320       | 418                                    | 842                | 190.0                             | 370                               | ◆ ● ▲ ■           |               |                       |                          |                |
| ROV14H561K  | 560                         | 350       | 460                                    | 920                | 205.0                             | 400                               | ◆ ● ▲ ■           |               |                       |                          |                |
| ROV14H621K  | 620                         | 385       | 505                                    | 1025               | 215.0                             | 300                               | ◆ ● ▲ ■           |               |                       |                          |                |
| ROV14H681K  | 680                         | 420       | 560                                    | 1120               | 225.0                             | 310                               | ◆ ● ▲ ■           |               |                       |                          |                |
| ROV14H751K  | 750                         | 460       | 615                                    | 1240               | 230.0                             | 270                               | ◆ ● ▲ ■           |               |                       |                          |                |
| ROV14H781K  | 780                         | 485       | 640                                    | 1290               | 233.0                             | 250                               | ◆ ● ▲ ■           |               |                       |                          |                |
| ROV14H821K  | 820                         | 510       | 670                                    | 1355               | 235.0                             | 260                               | ◆ ● ▲ ■           |               |                       |                          |                |
| ROV14H911K  | 910                         | 550       | 745                                    | 1500               | 255.0                             | 240                               | ◆ ● ▲ ■           |               |                       |                          |                |
| ROV14H102K  | 1000                        | 625       | 825                                    | 1650               | 283.0                             | 200                               | ◆ ● ▲ ■           |               |                       |                          |                |
| ROV14H112K  | 1100                        | 680       | 895                                    | 1815               | 310.0                             | 180                               | ◆ ● ▲ ■           |               |                       |                          |                |

1). The clamping voltage for devices ROV14H180M to ROV14H680K is tested with 10A current.



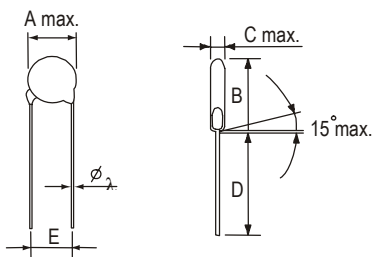
### DEVICE RATINGS AND CHARACTERISTICS

#### EXTRA HIGH SURGE SERIES

| Part Number | Varistor Voltage<br>V@1.0mA |           | Maximum Allowable Voltage              |                    | Maximum Clamping Voltage<br>V@50A | 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)            |                |
| ROV14E201K  | 200                         | ± 10%     | 130                                    | 170                | 340                               | 6500                              | 6000              | 0.60          | 84.0                  | 840                      | ● ▲            |
| ROV14E221K  | 220                         |           | 140                                    | 180                | 360                               |                                   |                   |               | 93.0                  | 710                      | ● ▲            |
| ROV14E241K  | 240                         |           | 150                                    | 200                | 395                               |                                   |                   |               | 101.0                 | 770                      | ● ▲            |
| ROV14E271K  | 270                         |           | 175                                    | 225                | 455                               |                                   |                   |               | 113.0                 | -----                    |                |
| ROV14E301K  | 300                         |           | 195                                    | 250                | 505                               |                                   |                   |               | 126.0                 | -----                    |                |
| ROV14E331K  | 330                         |           | 210                                    | 275                | 550                               |                                   |                   |               | 138.0                 | -----                    |                |
| ROV14E361K  | 360                         |           | 230                                    | 300                | 595                               |                                   |                   |               | 151.0                 | -----                    |                |



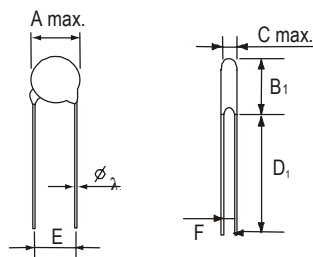
### DIMENSIONS



#### **KINKED LEAD TYPE**

##### Dimension Table

|                    |      |
|--------------------|------|
| A max.             | 16.5 |
| $\lambda \pm 0.05$ | 0.8  |
| $E \pm 1.0$        | 7.5  |
| B max.             | 22.0 |
| $D_1$ min.         | 25.0 |
| D min.             | 24.0 |



#### **STRAIGHT LEAD TYPE (-S)**

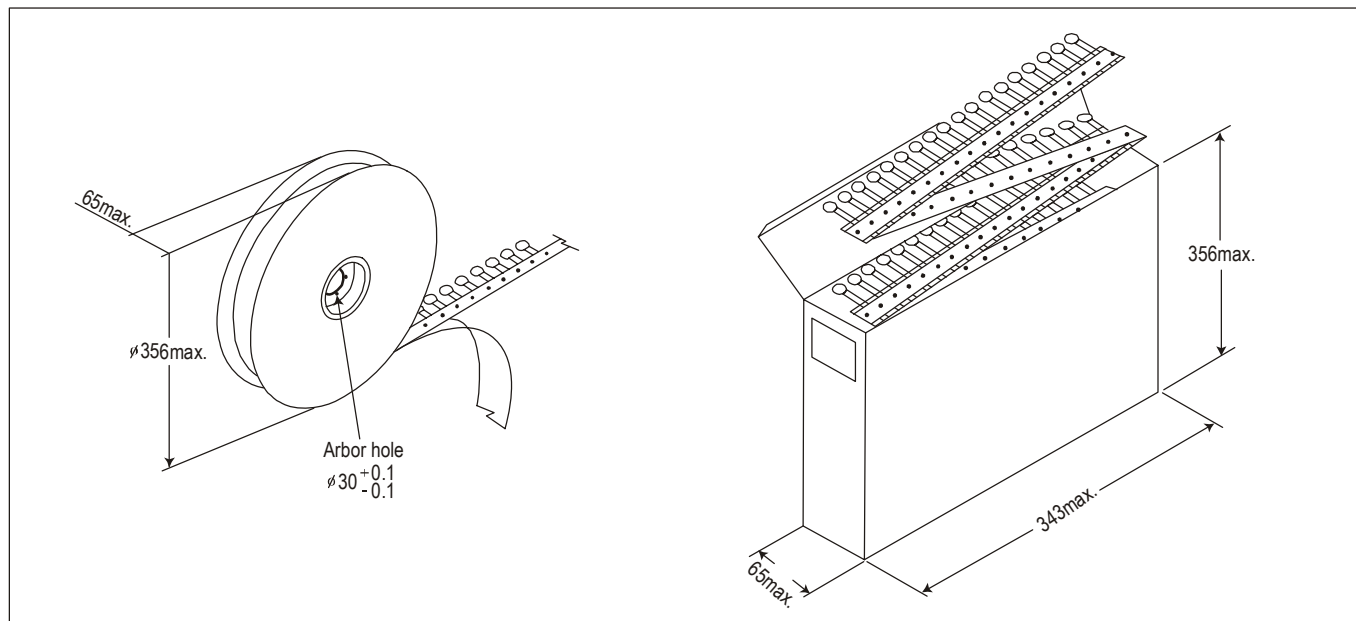
##### Table of C max., F, and B<sub>1</sub> max.

| Type No. | C max. | F±0.8 | B <sub>1</sub> max. |
|----------|--------|-------|---------------------|
| 180M     | 5.0    | 0.9   | 19.5                |
| 220L     | 5.0    | 1.0   | 19.5                |
| 270K     | 5.2    | 1.1   | 19.5                |
| 330K     | 5.2    | 1.2   | 19.5                |
| 390K     | 5.2    | 1.4   | 19.5                |
| 470K     | 5.6    | 1.4   | 19.5                |
| 560K     | 5.6    | 1.6   | 19.5                |
| 680K     | 6.1    | 1.9   | 19.5                |
| 820K     | 4.4    | 1.0   | 19.5                |
| 101K     | 4.5    | 1.0   | 19.5                |
| 121K     | 4.6    | 1.1   | 19.5                |
| 151K     | 5.1    | 1.4   | 19.5                |
| 181K     | 4.7    | 1.2   | 19.5                |
| 201K     | 4.8    | 1.2   | 19.5                |
| 221K     | 4.9    | 1.3   | 19.5                |
| 241K     | 5.0    | 1.5   | 19.5                |
| 271K     | 5.2    | 1.5   | 19.5                |
| 301K     | 5.4    | 1.7   | 19.5                |
| 331K     | 5.5    | 1.7   | 19.5                |
| 361K     | 5.7    | 2.1   | 19.5                |
| 391K     | 5.9    | 2.2   | 20.0                |
| 431K     | 6.7    | 2.5   | 20.0                |
| 471K     | 7.0    | 2.7   | 20.0                |
| 511K     | 7.2    | 3.1   | 20.5                |
| 561K     | 7.5    | 3.4   | 20.5                |
| 621K     | 7.8    | 3.8   | 20.5                |
| 681K     | 8.2    | 4.1   | 20.5                |
| 751K     | 8.6    | 4.3   | 20.5                |
| 781K     | 8.8    | 4.6   | 20.5                |
| 821K     | 9.0    | 4.6   | 20.5                |
| 911K     | 9.6    | 5.4   | 20.5                |
| 102K     | 10.1   | 5.6   | 20.5                |
| 112K     | 10.7   | 6.1   | 20.5                |
| 182K     | 12.8   | 10.2  | 22.5                |



### PACKAGING

in mm

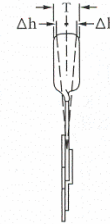
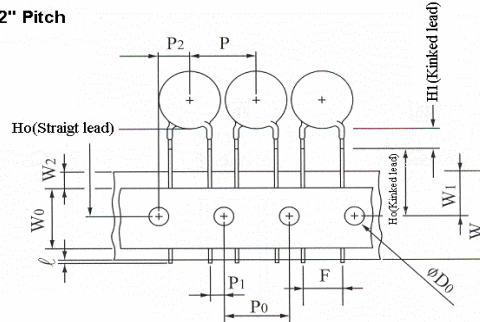


| Packaging        | Bulk (box)      | Reel              | Ammo            |
|------------------|-----------------|-------------------|-----------------|
| Box size (mm)    | 290 x 155 x 110 | 350 x 350 x 74    | 343 x 260 x 52  |
| Carton size (mm) | 310 x 328 x 250 | 370 x 370 x 468   | 363 x 540 x 250 |
| One carton with  | 4 Boxes         | 6 Boxes (6 reels) | 8 Boxes         |

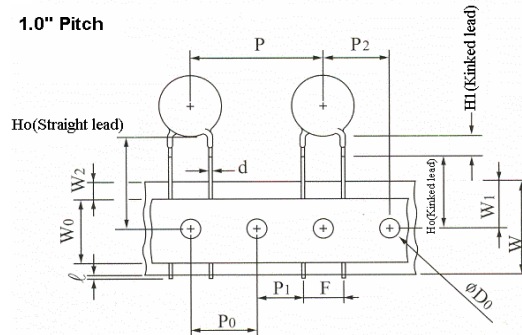
| Part Number                                           | Bulk (box) | Reel | Ammo |
|-------------------------------------------------------|------------|------|------|
| ROV14-180M to ROV14-470K,<br>ROV14H180M to ROV14H470K | 1500       | 750  | 500  |
| ROV14-560K to ROV14-680K,<br>ROV14H560K to ROV14H680K | 1500       | 750  | 500  |
| ROV14-820K to ROV14-331K,<br>ROV14H820K to ROV14H331K | 1500       | 750  | 500  |
| ROV14-361K to ROV14-391K,<br>ROV14H361K to ROV14H391K | 1500       | 750  | 500  |
| ROV14-431K to ROV14-471K,<br>ROV14H431K to ROV14H471K | 1500       | 750  | 500  |
| ROV14-511K to ROV14-751K,<br>ROV14H511K to ROV14H751K | 750        | 500  | 500  |
| ROV14-751K to ROV14-182K,<br>ROV14H751K to ROV14H112K | 750        | 500  | 500  |

### TAPE AND REEL DIMENSIONS

1/2" Pitch



1.0" Pitch



| Symbols               | Item                                   | Value                                |
|-----------------------|----------------------------------------|--------------------------------------|
| $\lambda$             | Cut out length                         | 1.1mm max.                           |
| $H_1$ (Kinked type)   | Height of kink                         | 5.0mm max.                           |
| $H_0$ (Kinked type)   | Height to seating plane                | $16.0 \pm 0.5$ mm                    |
| $H_0$ (Straight type) | Height of component from hole center   | 16.0-21.0mm                          |
| $\Delta h$            | Front to back deviation                | $0.0 \pm 2.0$ mm                     |
| W                     | Carrier tape width                     | $18.0^{+1.0}_{-0.5}$ mm              |
| $W_0$                 | Hold down tape width                   | 12.0mm                               |
| $W_1$                 | Sprocket hole position                 | $9.0^{+0.75}_{-0.5}$ mm              |
| $W_2$                 | Adhesive tape position                 | 3.0mm max.                           |
| F                     | Component lead spacing                 | $7.5^{+0.8}_{-0.2}$ mm               |
| P                     | Pitch of component                     | $25.4 \pm 1.0$ mm                    |
| $P_0$                 | Sprocket hole pitch                    | $12.7 \pm 0.3$ mm                    |
| $P_1$                 | Lead length from hole center to lead   | $7.7 \pm 0.7$ mm, $8.95 \pm 0.7$ mm  |
| $P_2$                 | Length from hole center to disk center | $12.7 \pm 1.3$ mm                    |
| $D_0$                 | Sprocket hole diameter                 | $4.0 \pm 0.2$ mm                     |
| d                     | Lead wire diameter                     | $0.8 \pm 0.05$ mm, $1.0 \pm 0.05$ mm |
| T                     | Disk thickness                         | See C. max table                     |
| $t_1$                 | Total thickness tape                   | $0.7 \pm 0.05$ mm                    |
| $t_2$                 | Total thickness                        | 1.8mm max.                           |

## Metal Oxide Varistors

Overvoltage Protection Device

*Raychem Circuit Protection Products*

**PRODUCT: ROV014, ROV014H**  
**14mm Series**

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