

GENERAL DESCRIPTION

The ROV10-XXX (Radial-leaded Metal Oxide Varistor) products are 10mm 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.

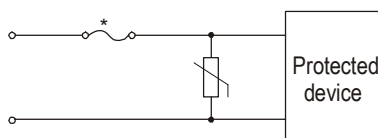
FEATURES

- Radial leaded
- Broad Varistor voltage and V_{rms} range
 - Varistor voltage : 18V - 1800V
 - V_{rms} voltage : 11V - 1000V
- Two surge capability series
 - Standard series, 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

ROV 10 - 241 K -S -2

Manufacturer series

Disk Diameter
10mm

Surge series

- : Standard Series
H : High Surge Series

Varistor Voltage

241 = $24 \times 10^{1} = 240V$

Packaging

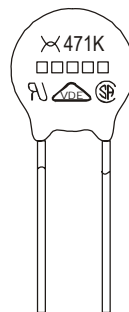
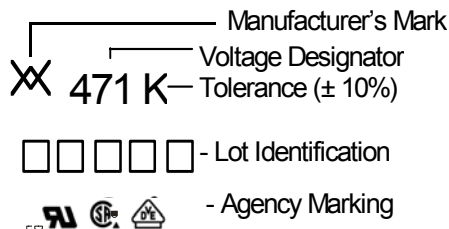
: Bulk
-2 : Tape & Reel
-AP : Ammo Pack

Lead Type

: Kinked Lead
-S : Straight Lead

Tolerance

K : $\pm 10\%$
L : $\pm 15\%$
M : $\pm 20\%$



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 (2nd Edition) | CSA | VDE |
| ◆ | ● | ▲ | ■ |

DEVICE RATINGS AND CHARACTERISTICS

STANDARD SERIES

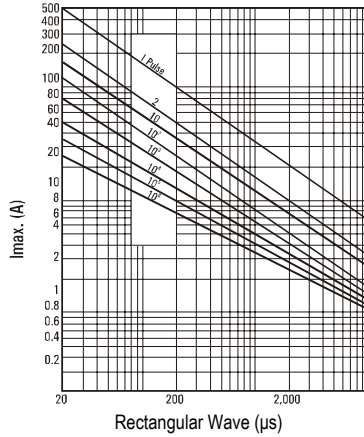
| Part Number | Varistor Voltage V@1.0mA | | Maximum Allowable Voltage | | Maximum Clamping Voltage V@25A | Maximum Surge Current (8x20us) | | Rated Wattage | Energy (10x1000us) | Capacitance (Typical) | Certifications |
|-------------|-----------------------------|-----------|--|--------------------|-----------------------------------|-----------------------------------|-------------------|---------------|-----------------------|--------------------------|----------------|
| | (V _{DC}) | Tolerance | V _{rms} (V _{AC}) | (V _{DC}) | (V _{DC}) | 1 Time (A) | 2 Times (A) | (W) | (J) | @1kHz (pF) | |
| ROV10-180M | 18 | ± 20% | 11 | 14 | 36 ¹⁾ | 500 | 250 | 0.05 | 2.4 | 6500 | ● ■ |
| ROV10-220L | 22 | ± 15% | 14 | 18 | 43 ¹⁾ | | | | 2.7 | 5521 | ● ■ |
| ROV10-270K | 27 | ± 10% | 17 | 22 | 53 ¹⁾ | | | | 3.5 | 4742 | ● ■ |
| ROV10-330K | 33 | | 20 | 26 | 65 ¹⁾ | | | | 4.4 | 4247 | ● ■ |
| ROV10-390K | 39 | | 25 | 31 | 77 ¹⁾ | | | | 4.7 | 3658 | ● ■ |
| ROV10-470K | 47 | | 30 | 38 | 93 ¹⁾ | | | | 6.0 | 3137 | ● ■ |
| ROV10-560K | 56 | | 35 | 45 | 110 ¹⁾ | | | | 7.0 | 2900 | ● ■ |
| ROV10-680K | 68 | | 40 | 56 | 135 ¹⁾ | | | | 8.5 | 2230 | ● ■ |
| ROV10-820K | 82 | | 50 | 65 | 135 | | | | 11.0 | 1261 | ● ■ |
| ROV10-101K | 100 | | 60 | 85 | 165 | | | | 14.0 | 1021 | ● ■ |
| ROV10-121K | 120 | | 75 | 100 | 200 | 16.0 | 946 | ● ■ | | | |
| ROV10-151K | 150 | | 95 | 125 | 250 | 22.0 | 733 | ● ■ | | | |
| ROV10-181K | 180 | 115 | 150 | 300 | 26.0 | 483 | ● ■ | | | | |
| ROV10-201K | 200 | 130 | 170 | 340 | 28.5 | 400 | ◆ ● ▲ ■ | | | | |
| ROV10-221K | 220 | 140 | 180 | 360 | 31.0 | 393 | ◆ ● ▲ ■ | | | | |
| ROV10-241K | 240 | 150 | 200 | 395 | 33.5 | 325 | ◆ ● ▲ ■ | | | | |
| ROV10-271K | 270 | 175 | 225 | 455 | 39.5 | 334 | ◆ ● ▲ ■ | | | | |
| ROV10-301K | 300 | 195 | 250 | 505 | 42.0 | 278 | ◆ ● ▲ ■ | | | | |
| ROV10-331K | 330 | 210 | 275 | 550 | 46.0 | 275 | ◆ ● ▲ ■ | | | | |
| ROV10-361K | 360 | 230 | 300 | 595 | 52.0 | 231 | ◆ ● ▲ ■ | | | | |
| ROV10-391K | 390 | 250 | 320 | 650 | 60.0 | 247 | ◆ ● ▲ ■ | | | | |
| ROV10-431K | 430 | 275 | 350 | 710 | 66.0 | 216 | ◆ ● ▲ ■ | | | | |
| ROV10-471K | 470 | 300 | 385 | 775 | 70.0 | 210 | ◆ ● ▲ ■ | | | | |
| ROV10-511K | 510 | 320 | 418 | 842 | 74.0 | 187 | ◆ ● ▲ ■ | | | | |
| ROV10-561K | 560 | 350 | 460 | 920 | 78.0 | 186 | ◆ ● ▲ ■ | | | | |
| ROV10-621K | 620 | 385 | 505 | 1025 | 82.0 | 160 | ◆ ● ▲ ■ | | | | |
| ROV10-681K | 680 | 420 | 560 | 1120 | 86.0 | 156 | ◆ ● ▲ ■ | | | | |
| ROV10-751K | 750 | 460 | 615 | 1240 | 90.0 | 133 | ◆ ● ▲ ■ | | | | |
| ROV10-781K | 780 | 485 | 640 | 1290 | 92.0 | 117 | ◆ ● ▲ ■ | | | | |
| ROV10-821K | 820 | 510 | 670 | 1355 | 94.0 | 130 | ◆ ● ▲ ■ | | | | |
| ROV10-911K | 910 | 550 | 745 | 1500 | 102.0 | 111 | ◆ ● ▲ ■ | | | | |
| ROV10-102K | 1000 | 625 | 825 | 1650 | 112.0 | 96 | ◆ ● ▲ ■ | | | | |
| ROV10-112K | 1100 | 680 | 895 | 1815 | 124.0 | 88 | ◆ ● ▲ ■ | | | | |
| ROV10-182K | 1800 | 1000 | 1465 | 2970 | 174.0 | 65 | ◆ ● ▲ ■* | | | | |

* Pending VDE Recognition

1) The clamping voltage for devices ROV10-180M to ROV10-680K is tested with 5A current.

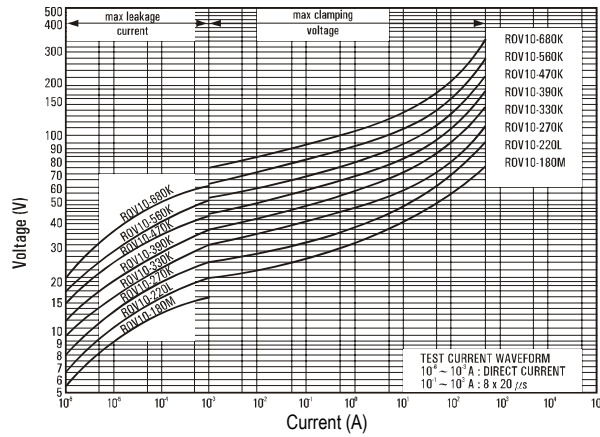
PULSE LIFETIME RATING CURVES

STANDARD SERIES
ROV10-180M – ROV10-680K

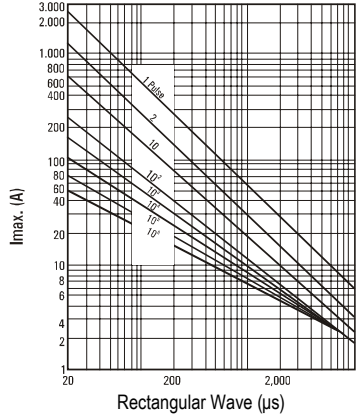


V-I CHARACTERISTIC CURVES

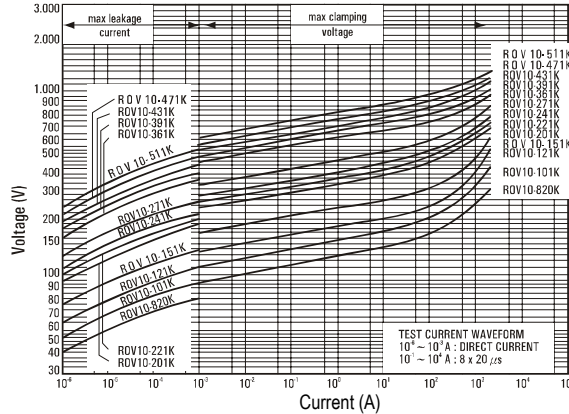
STANDARD SERIES
ROV10-180M – ROV10-680K



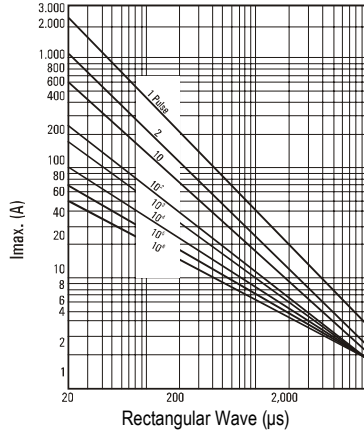
ROV10-820K – ROV10-511K



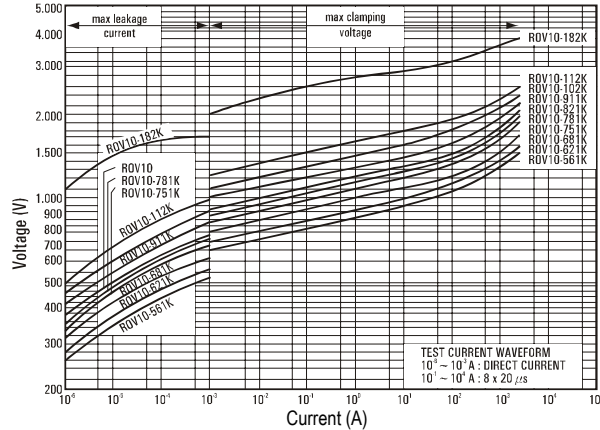
ROV10-820K – ROV10-511K



ROV10-561K – ROV10-182K




ROV10-561K – ROV10-182K



DEVICE RATINGS AND CHARACTERISTICS

HIGH SURGE SERIES

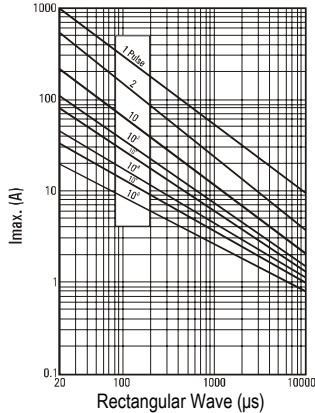
| Part Number | Varistor Voltage V@1.0mA | | Maximum Allowable Voltage | | Maximum Clamping Voltage V@25A | Maximum Surge Current (8x20us) | | Rated Wattage (W) | Energy (10x1000us) (J) | Capacitance (Typical) @1kHz (pF) | Certifications  | | | |
|-------------|-----------------------------|-----------|--|--------------------|-----------------------------------|-----------------------------------|-------------------|----------------------|------------------------------|---|---|------|------|-----|
| | (V _{DC}) | Tolerance | V _{rms} (V _{AC}) | (V _{DC}) | (V _{DC}) | 1 Time (A) | 2 Times (A) | | | | | | | |
| ROV10H180M | 18 | ± 20% | 11 | 14 | 36 ¹⁾ | 1000 | 500 | 0.05 | 2.6 | 6500 | ● ■ | | | |
| ROV10H220L | 22 | ± 15% | 14 | 18 | 43 ¹⁾ | | | | 3.2 | 5520 | ● ■ | | | |
| ROV10H270K | 27 | | 17 | 22 | 53 ¹⁾ | | | | 3.9 | 4740 | ● ■ | | | |
| ROV10H330K | 33 | 20 | 26 | 65 ¹⁾ | 4.8 | | | | 4250 | ● ■ | | | | |
| ROV10H390K | 39 | 25 | 31 | 77 ¹⁾ | 5.6 | | | | 3660 | ● ■ | | | | |
| ROV10H470K | 47 | 30 | 38 | 93 ¹⁾ | 6.8 | | | | 3140 | ● ■ | | | | |
| ROV10H560K | 56 | 35 | 45 | 110 ¹⁾ | 8.1 | | | | 2900 | ● ■ | | | | |
| ROV10H680K | 68 | 40 | 56 | 135 ¹⁾ | 9.8 | | | | 2230 | ● ■ | | | | |
| ROV10H820K | 82 | ± 10% | 50 | 65 | 135 | | | | 3500 | 2500 | 0.40 | 14.0 | 1260 | ● ■ |
| ROV10H101K | 100 | | 60 | 85 | 165 | | | | | | | 18.0 | 1020 | ● ■ |
| ROV10H121K | 120 | | 75 | 100 | 200 | 22.0 | 950 | ● ■ | | | | | | |
| ROV10H151K | 150 | | 95 | 125 | 250 | 25.0 | 730 | ● ■ | | | | | | |
| ROV10H181K | 180 | | 115 | 150 | 300 | 32.0 | 480 | ● ■ | | | | | | |
| ROV10H201K | 200 | | 130 | 170 | 340 | 35.0 | 400 | ◆ ● ▲ ■ | | | | | | |
| ROV10H221K | 220 | | 140 | 180 | 360 | 39.0 | 390 | ◆ ● ▲ ■ | | | | | | |
| ROV10H241K | 240 | | 150 | 200 | 395 | 42.0 | 330 | ◆ ● ▲ ■ | | | | | | |
| ROV10H271K | 270 | | 175 | 225 | 455 | 49.0 | 330 | ◆ ● ▲ ■ | | | | | | |
| ROV10H301K | 300 | | 195 | 250 | 505 | 52.0 | 280 | ◆ ● ▲ ■ | | | | | | |
| ROV10H331K | 330 | 210 | 275 | 550 | 58.0 | 280 | ◆ ● ▲ ■ | | | | | | | |
| ROV10H361K | 360 | 230 | 300 | 595 | 65.0 | 230 | ◆ ● ▲ ■ | | | | | | | |
| ROV10H391K | 390 | 250 | 320 | 650 | 70.0 | 250 | ◆ ● ▲ ■ | | | | | | | |
| ROV10H431K | 430 | 275 | 350 | 710 | 80.0 | 220 | ◆ ● ▲ ■ | | | | | | | |
| ROV10H471K | 470 | 300 | 385 | 775 | 85.0 | 210 | ◆ ● ▲ ■ | | | | | | | |
| ROV10H511K | 510 | 320 | 418 | 842 | 92.0 | 190 | ◆ ● ▲ ■ | | | | | | | |
| ROV10H561K | 560 | 350 | 460 | 920 | 102.0 | 190 | ◆ ● ▲ ■ | | | | | | | |
| ROV10H621K | 620 | 385 | 505 | 1025 | 107.0 | 160 | ◆ ● ▲ ■ | | | | | | | |
| ROV10H681K | 680 | 420 | 560 | 1120 | 112.0 | 160 | ◆ ● ▲ ■ | | | | | | | |
| ROV10H751K | 750 | 460 | 615 | 1240 | 115.0 | 130 | ◆ ● ▲ ■ | | | | | | | |
| ROV10H781K | 780 | 485 | 640 | 1290 | 116.0 | 120 | ◆ ● ▲ ■ | | | | | | | |
| ROV10H821K | 820 | 510 | 670 | 1355 | 118.0 | 130 | ◆ ● ▲ ■ | | | | | | | |
| ROV10H911K | 910 | 550 | 745 | 1500 | 127.0 | 110 | ◆ ● ▲ ■ | | | | | | | |
| ROV10H102K | 1000 | 625 | 825 | 1650 | 140.0 | 95 | ◆ ● ▲ ■ | | | | | | | |
| ROV10H112K | 1100 | 680 | 895 | 1815 | 155.0 | 90 | ◆ ● ▲ ■ | | | | | | | |

1) The clamping voltage for devices ROV10H180M to ROV10H680K is tested with 5A current.

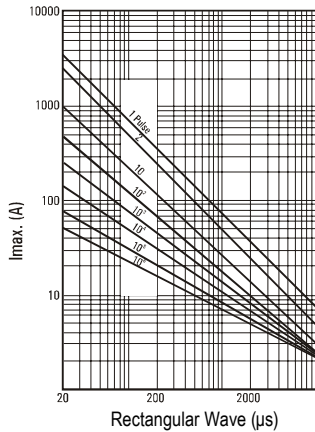
PULSE LIFETIME RATING CURVES

HIGH SURGE SERIES

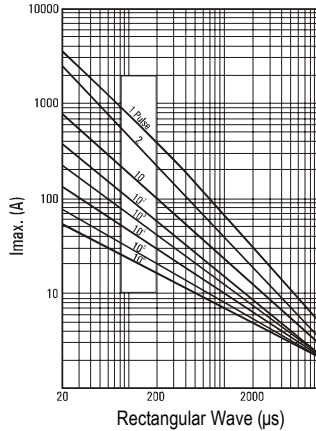
ROV10H180M – ROV10H680K



ROV10H820K – ROV10H511K



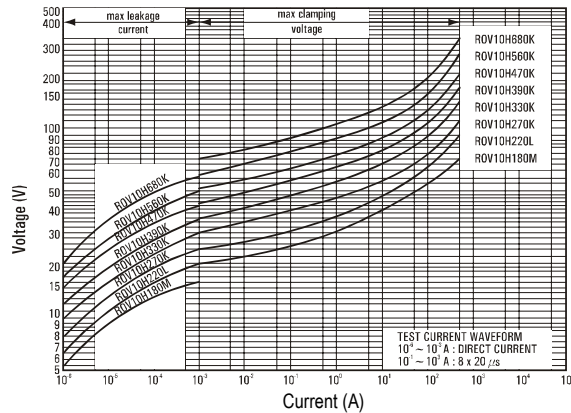
ROV10H561K – ROV10H182K



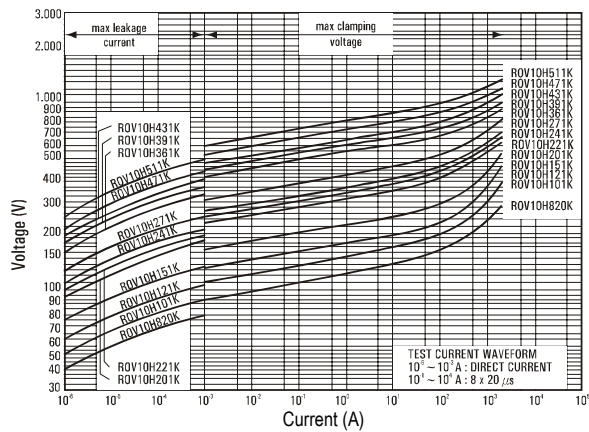
V-I CHARACTERISTIC CURVES

HIGH SURGE SERIES

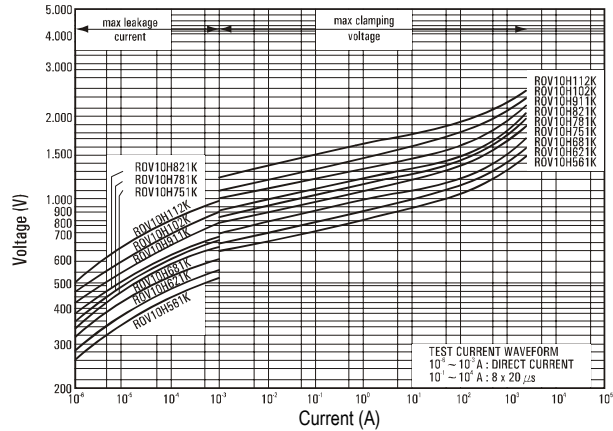
ROV10H180M – ROV10H680K



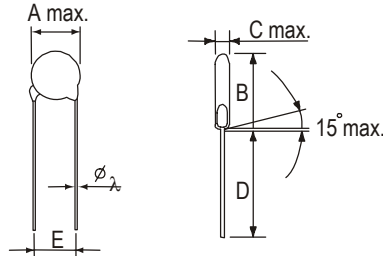
ROV10H820K – ROV10H511K



ROV10H561K – ROV10H182K

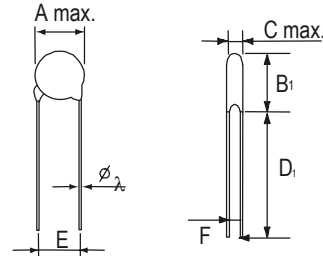


DIMENSIONS



KINKED LEAD TYPE
Dimension Table

| | |
|--------------------|------|
| A max. | 12.5 |
| $\lambda \pm 0.05$ | 0.8 |
| $E \pm 1.0$ | 7.5 |
| B max. | 18.0 |
| D_1 min. | 25.0 |
| D min. | 24.0 |

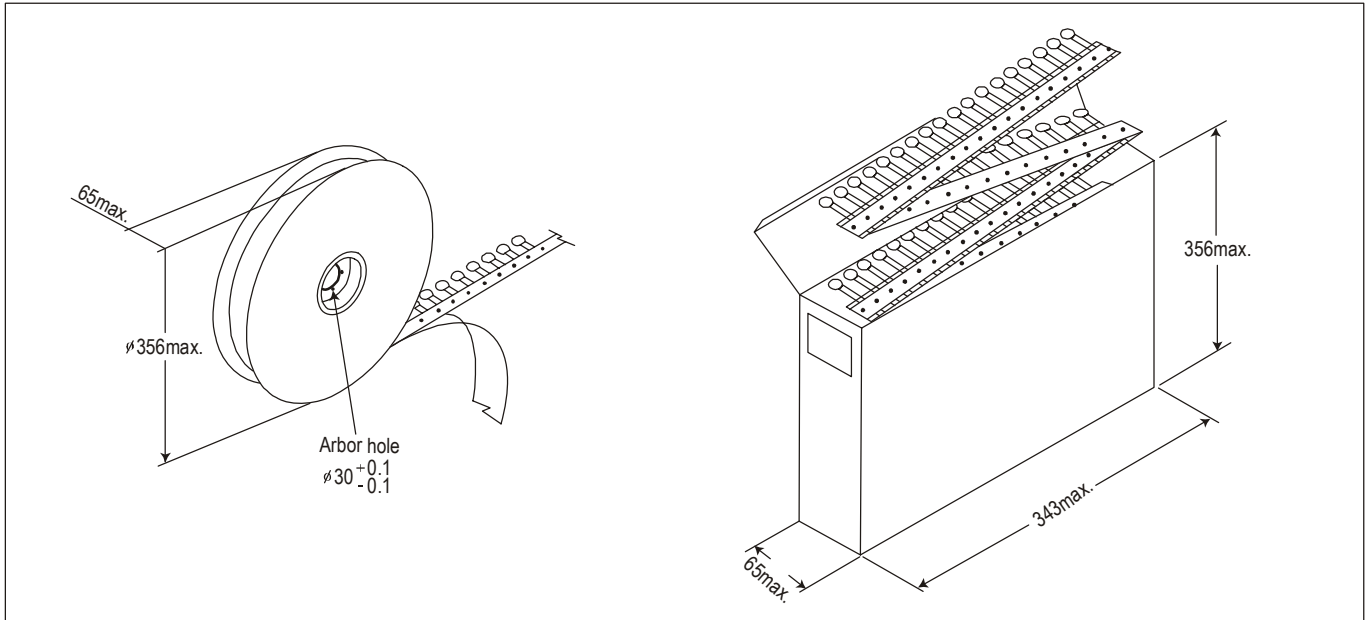


STRAIGHT LEAD TYPE (-S)
Table of C max., F, and B_1 max.

| Type No. | C max. | $F \pm 0.8$ | B_1 max. |
|----------|--------|-------------|------------|
| 180M | 4.9 | 0.8 | 15.5 |
| 220L | 4.9 | 0.9 | 15.5 |
| 270K | 5.1 | 0.9 | 15.5 |
| 330K | 5.1 | 1.0 | 15.5 |
| 390K | 5.1 | 1.2 | 15.5 |
| 470K | 5.5 | 1.2 | 15.5 |
| 560K | 5.5 | 1.4 | 15.5 |
| 680K | 6.0 | 1.7 | 15.5 |
| 820K | 4.3 | 0.8 | 15.5 |
| 101K | 4.4 | 0.8 | 15.5 |
| 121K | 4.5 | 0.9 | 15.5 |
| 151K | 4.9 | 1.2 | 15.5 |
| 181K | 4.5 | 1.0 | 15.5 |
| 201K | 4.6 | 1.0 | 15.5 |
| 221K | 4.7 | 1.1 | 15.5 |
| 241K | 4.8 | 1.3 | 15.5 |
| 271K | 5.0 | 1.4 | 15.5 |
| 301K | 5.2 | 1.6 | 15.5 |
| 331K | 5.3 | 1.6 | 15.5 |
| 361K | 5.5 | 1.9 | 15.5 |
| 391K | 5.7 | 2.2 | 16.0 |
| 431K | 6.5 | 2.5 | 16.0 |
| 471K | 6.8 | 2.6 | 16.0 |
| 511K | 7.0 | 3.1 | 16.5 |
| 561K | 7.3 | 3.4 | 16.5 |
| 621K | 7.6 | 4.0 | 16.5 |
| 681K | 8.0 | 4.4 | 16.5 |
| 751K | 8.4 | 4.4 | 16.5 |
| 781K | 8.6 | 4.6 | 16.5 |
| 821K | 8.8 | 4.6 | 16.5 |
| 911K | 9.4 | 5.4 | 16.5 |
| 102K | 9.9 | 5.4 | 16.5 |
| 112K | 10.5 | 5.7 | 16.5 |
| 182K | 12.6 | 9.8 | 18.5 |

PACKAGING

in mm

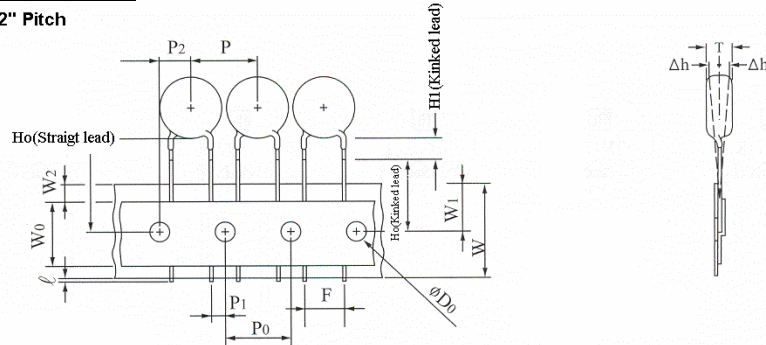


| Packaging | Bulk (box) | Reel | Ammo |
|------------------|-----------------|--------------------|-----------------|
| Box size (mm) | 290 x 155 x 110 | 350 x 350 x 108 | 343 x 260 x 52 |
| Carton size (mm) | 310 x 328 x 250 | 371 x 371 x 590 | 363 x 540 x 250 |
| One carton with | 4 Boxes | 5 Boxes (10 reels) | 8 Boxes |

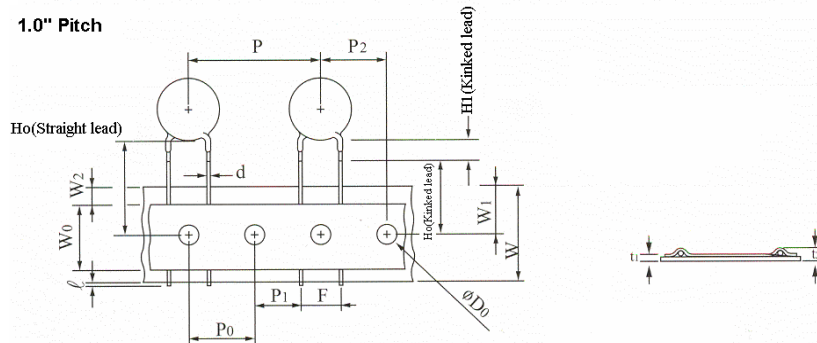
| Part Number | Bulk (box) | Reel | Ammo | |
|---|------------|------|-------|-------|
| | | | F=7.5 | F=5.0 |
| ROV10-180M to ROV10-470K, ROV10H180M to ROV10H470K | 2500 | 1000 | 500 | 1000 |
| ROV10-560K to ROV10-680K, ROV10H 560K to ROV10H 680K | 2500 | 1000 | 500 | 1000 |
| ROV10-820K to ROV10-331K, ROV10H820K to ROV10H331K | 2500 | 1000 | 500 | 1000 |
| ROV10-361K to ROV10-391K, ROV10H361K to ROV10H391K | 2500 | 1000 | 500 | 1000 |
| ROV10-431K to ROV10-471K, ROV10H431K to ROV10H471K | 2500 | 750 | 500 | 750 |
| ROV10-511K to ROV10- 751K, ROV10H511K to ROV10H751K | 1500 | 500 | 500 | 500 |
| ROV10-751K to ROV10-182K, ROV10H751K to ROV10H112K | 1500 | 500 | 500 | 500 |

TAPE AND REEL DIMENSIONS

1/2" Pitch



1.0" Pitch



| Symbols | Item | Value |
|-----------------------|--|---|
| λ | Cut out length | 1.1mm max. |
| H_1 (Kinked lead) | Height of kink | 5.0mm max. |
| H_o (Kinked lead) | Height to seating plane | 16.0 ± 0.5mm |
| H_o (Straight lead) | 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 $^{+1.0}_{-0.5}$ mm |
| W_0 | Hold down tape width | 10.0mm, 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 , 5.0 $^{+0.8}_{-0.2}$ mm |
| P | Pitch of component | 12.7 ± 1.0mm, 25.4 ± 1.0mm |
| P_0 | Sprocket hole pitch | 12.7 ± 0.3mm |
| P_1 | Lead length from hole center to lead | 3.85 ± 0.7mm, 8.95 ± 0.7mm |
| P_2 | Length from hole center to disk center | 6.35 ± 1.3mm, 12.7 ± 1.3mm |
| D_0 | Sprocket hole diameter | 4.0 ± 0.2mm |
| d | Lead wire diameter | 0.6 ± 0.05mm, 0.8 ± 0.05mm |
| T | Disk thickness | See C. max table |
| t_1 | Total thickness tape | 0.7 ± 0.05mm |
| t_2 | Total thickness | 1.6mm max. , 1.8mm max |



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Menlo Park, CA 94025-1164
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www.circuitprotection.com

Metal Oxide Varistors

Overvoltage Protection Device

Raychem Circuit Protection Products

PRODUCT: ROV10, ROV10H
10mm Series

DOCUMENT: SCD 25482
PCN:
REV LETTER: D
REV DATE: JULY 19, 2007
PAGE NO.: 10 of 10

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