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Raychem
Overvoltage Devices

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ROV07, ROV07H
7mm Series Metal Oxide Varistors

Document: SCD 25481
Status: Released
Rev. A June 30, 2003

GENERAL DESCRIPTION

The ROV07-XXX (**R**adial-leaded Metal **O**xide **V**aristor) products are 7mm 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.

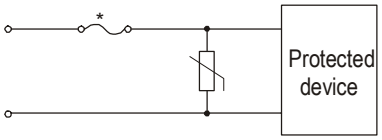
FEATURES

- Radial leaded
- Broad Varistor voltage and V_{rms} range
  - Varistor voltage : 18V - 820V
  - V_{rms} voltage : 11V - 510V
- 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.

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PART NUMBERING

ROV 07 – 241 K -S -2

Raychem ROV series

Disk Diameter
7mm

Surge series
- : Standard Series
H : High Surge Series

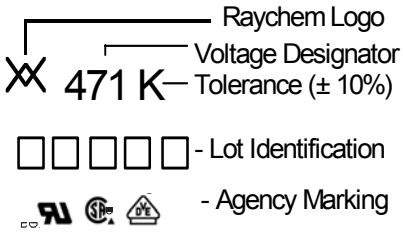
Varistor Voltage
241 = 24 x 10^1 = 240V

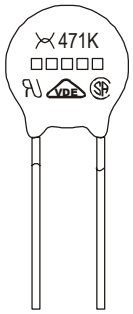
Packaging
: Bulk
-2 : Tape & Reel
-AP : Ammo Pack

Lead Type
: Kinked Lead
-S : Straight Lead

Tolerance
K : ±10%
L : ±15%
M : ±20%

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 VDC):	Over 1000MΩ
Maximum response time:	25ns
Lead Material:	22 AWG 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 (2nd Edition)	CSA	VDE
◆	●	▲	■

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DEVICE RATINGS AND CHARACTERISTICS

STANDARD SERIES

Part Number	Varistor Voltage V@1.0mA		Maximum Allowable Voltage		Maximum Clamping Voltage V@10A	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)	
ROV07-180M	18	± 20%	11	14	36[1)]	250	125	0.02	1.2	2918	●
ROV07-220L	22	± 15%	14	18	43[1)]				1.4	2933	●
ROV07-270K	27	± 10%	17	22	53[1)]				1.7	2344	●
ROV07-330K	33		20	26	65[1)]				2.2	1840	●
ROV07-390K	39		25	31	77[1)]				2.4	1817	●
ROV07-470K	47		30	38	93[1)]				3.0	1595	●
ROV07-560K	56		35	45	110[1)]				3.5	1333	●
ROV07-680K	68		40	56	135[1)]				4.3	1119	●
ROV07-820K	82		50	65	135	1200	600	0.25	5.5	643	● ■
ROV07-101K	100		60	85	165				7.0	535	● ■
ROV07-121K	120		75	100	200				8.0	457	● ■
ROV07-151K	150		95	125	250				11.0	371	● ■
ROV07-181K	180		115	150	300				13.0	215	● ■
ROV07-201K	200		130	170	340				14.3	224	♦ ● ▲ ■
ROV07-221K	220		140	180	360				15.5	190	♦ ● ▲ ■
ROV07-241K	240		150	200	395				16.8	185	♦ ● ▲ ■
ROV07-271K	270		175	225	455				19.8	161	♦ ● ▲ ■
ROV07-301K	300		195	250	505				21.0	135	♦ ● ▲ ■
ROV07-331K	330		210	275	550				23.0	141	♦ ● ▲ ■
ROV07-361K	360		230	300	595				26.0	117	♦ ● ▲ ■
ROV07-391K	390		250	320	650				30.0	110	♦ ● ▲ ■
ROV07-431K	430		275	350	710				33.0	111	♦ ● ▲ ■
ROV07-471K	470		300	385	775				35.0	102	♦ ● ▲ ■
ROV07-511K	510		320	418	842				37.0	100	♦ ● ▲
ROV07-561K	560		350	460	920				39.0	87	♦ ● ▲
ROV07-621K	620		385	505	1025				41.0	80	♦ ● ▲
ROV07-681K	680		420	560	1120				43.0	82	♦ ● ▲
ROV07-751K	750		460	615	1240				45.0	74	♦ ● ▲
ROV07-781K	780		485	640	1290				46.0	70	♦ ● ▲
ROV07-821K	820		510	670	1355				47.0	70	♦ ● ▲

1). The clamping voltage for devices ROV07-180M to ROV07-680K is tested with 2.5A current.

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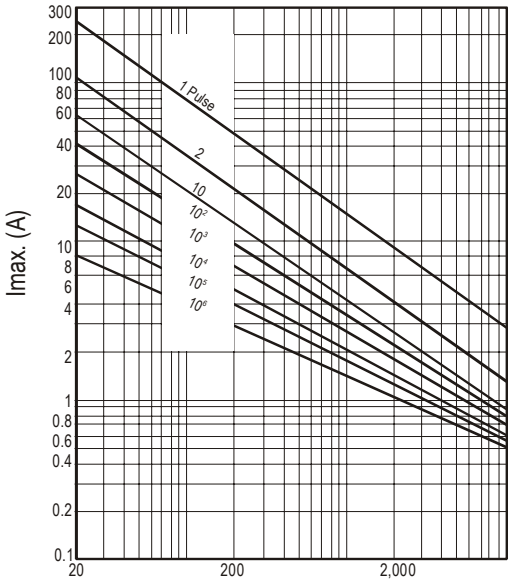
PULSE LIFETIME RATING CURVES

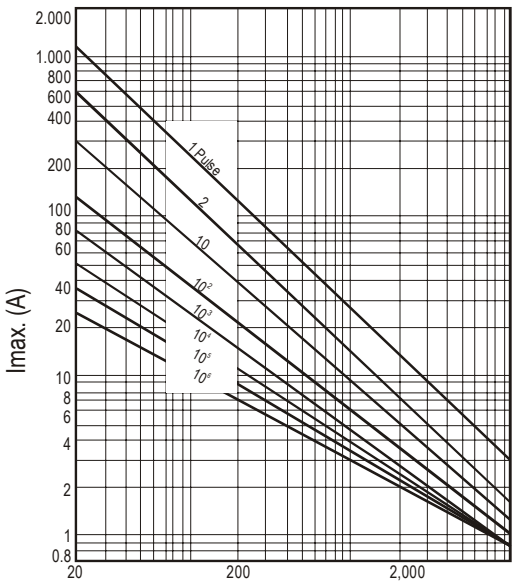
STANDARD SERIES

ROV07-180M – ROV07-680K



Rectangular Wave (µs)

ROV07-820K – ROV07-821K

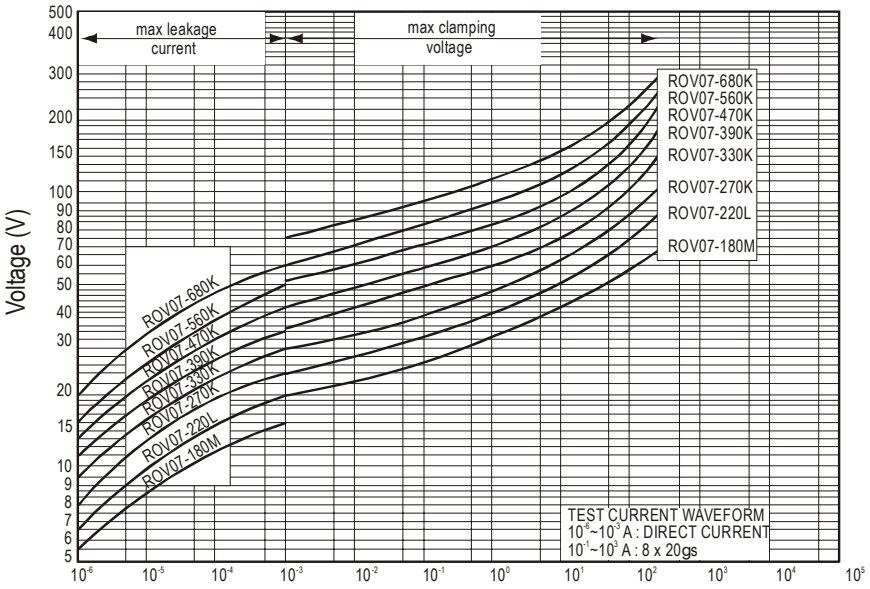


Rectangular Wave (µs)

V-I CHARACTERISTIC CURVES

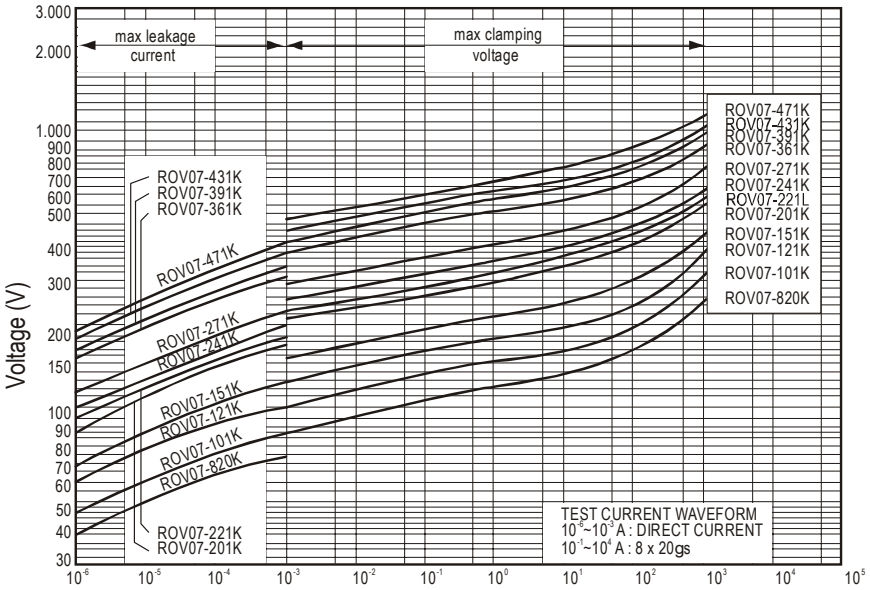
STANDARD SERIES

ROV07-180M – ROV07-680K



Current (A)

ROV07-820K – ROV07-821K



Current (A)

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DEVICE RATINGS AND CHARACTERISTICS

HIGH SURGE SERIES

Part Number	Varistor Voltage V@1.0mA		Maximum Allowable Voltage		Maximum Clamping Voltage V@10A	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)	
ROV07H180M	18	± 20%	11	14	36[1)]	500	250	0.02	1.5	2920	●
ROV07H220L	22	± 15%	14	18	43[1)]				1.7	2930	●
ROV07H270K	27	± 10%	17	22	53[1)]				2.1	2340	●
ROV07H330K	33		20	26	65[1)]				2.8	1840	●
ROV07H390K	39		25	31	77[1)]				3.0	1820	●
ROV07H470K	47		30	38	93[1)]				3.8	1600	●
ROV07H560K	56		35	45	110[1)]				4.4	1330	●
ROV07H680K	68		40	56	135[1)]				5.4	1120	●
ROV07H820K	82		50	65	135	1750	1250	0.25	7.0	640	●
ROV07H101K	100		60	85	165				9.0	540	●
ROV07H121K	120		75	100	200				11.0	460	●
ROV07H151K	150		95	125	250				13.0	370	●
ROV07H181K	180		115	150	300				16.0	220	●
ROV07H201K	200		130	170	340				17.5	220	♦ ● ▲
ROV07H221K	220		140	180	360				19.0	190	♦ ● ▲
ROV07H241K	240		150	200	395				21.0	190	♦ ● ▲
ROV07H271K	270		175	225	455				24.0	160	♦ ● ▲
ROV07H301K	300		195	250	505				26.0	140	♦ ● ▲
ROV07H331K	330		210	275	550				28.0	140	♦ ● ▲
ROV07H361K	360		230	300	595				32.0	120	♦ ● ▲
ROV07H391K	390		250	320	650				35.0	110	♦ ● ▲
ROV07H431K	430		275	350	710				40.0	110	♦ ● ▲
ROV07H471K	470		300	385	775				42.0	100	♦ ● ▲
ROV07H511K	510		320	418	842				45.0	100	♦ ● ▲
ROV07H561K	560		350	460	920				51.0	85	♦ ● ▲
ROV07H621K	620		385	505	1025				54.0	80	♦ ● ▲
ROV07H681K	680		420	560	1120				56.0	80	♦ ● ▲
ROV07H751K	750		460	615	1240				58.0	75	♦ ● ▲
ROV07H781K	780		485	640	1290				59.0	70	♦ ● ▲
ROV07H821K	820		510	670	1355				60.0	70	♦ ● ▲

1). The clamping voltage for devices ROV07H180M to ROV07H680K is tested with 2.5A current.

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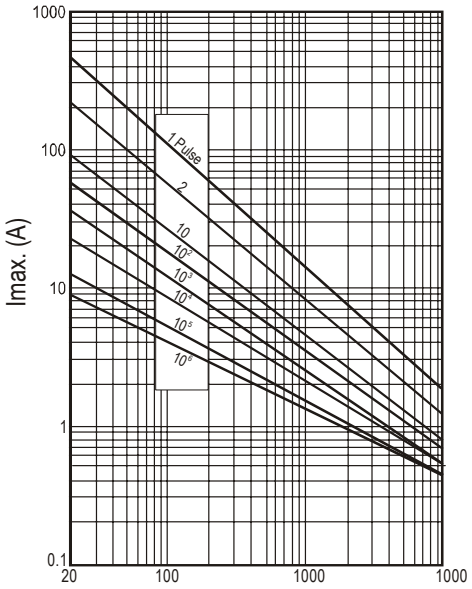
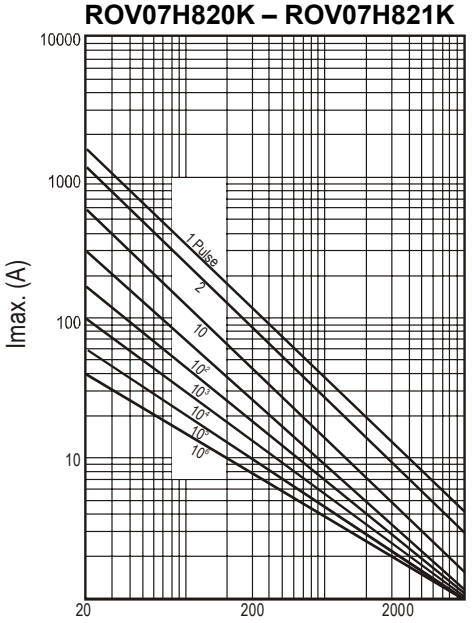
PULSE LIFETIME RATING CURVES

HIGH SURGE SERIES

ROV07H180M – ROV07H680K



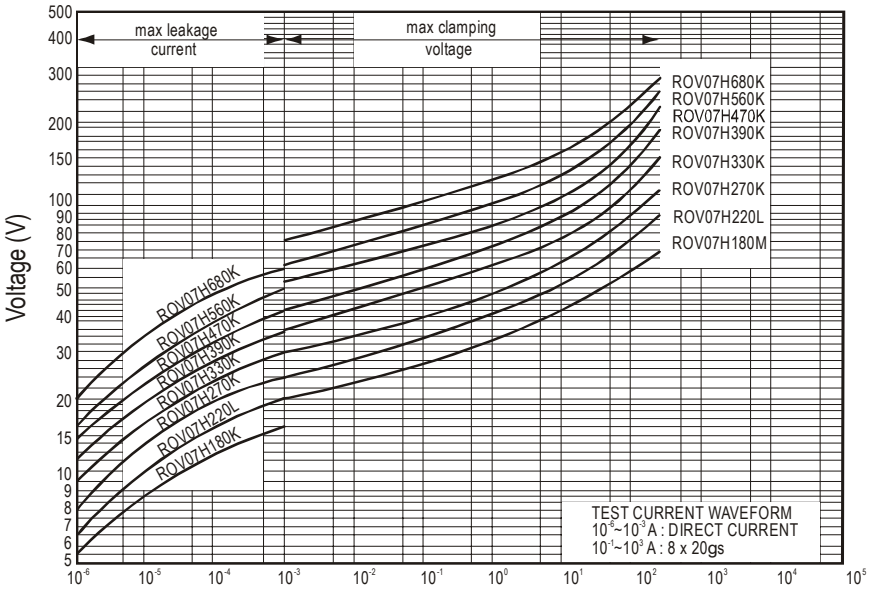
ROV07H820K – ROV07H821K



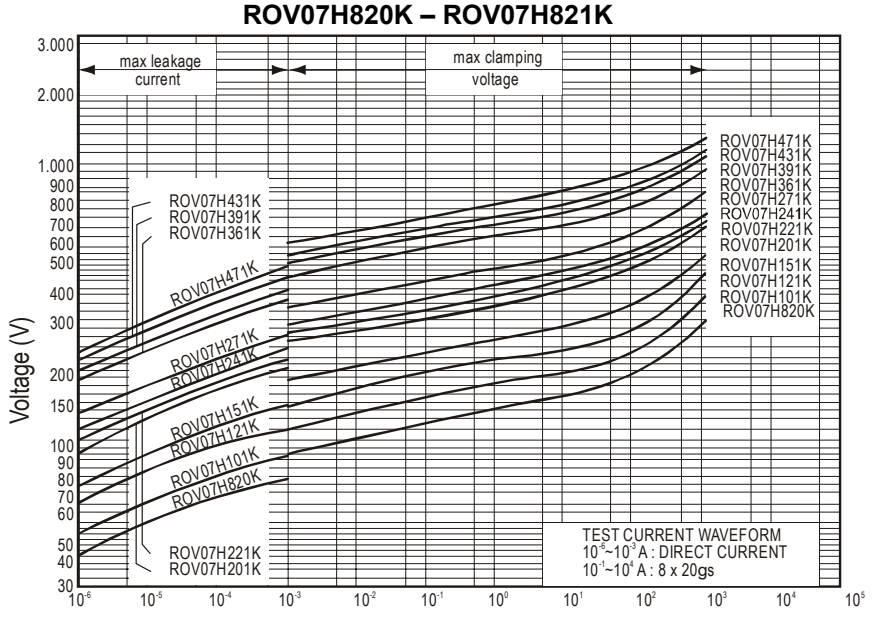
V-I CHARACTERISTIC CURVES

HIGH SURGE SERIES

ROV07H180M – ROV07H680K



ROV07H820K – ROV07H821K



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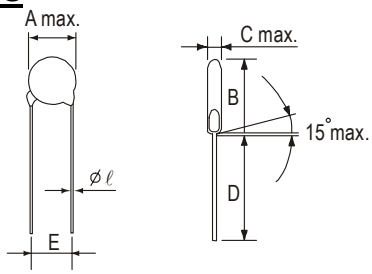
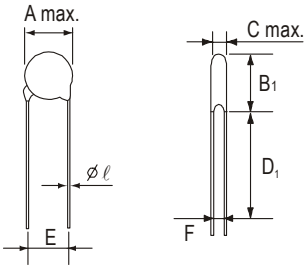
DIMENSIONS



KINKED LEAD TYPE
Dimension Table

A max.	**9.0**
ℓ ± 0.05	0.6
E ± 1.0	5.0
B max.	13.0
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±0.8	B_1 max.
180M	4.5	0.8	12.0
220L	4.5	0.9	12.0
270K	4.7	0.9	12.0
330K	4.7	1.0	12.0
390K	4.7	1.2	12.0
470K	5.0	1.2	12.0
560K	5.0	1.4	12.0
680K	5.5	1.7	12.0
820K	3.8	0.8	12.0
101K	3.9	0.8	12.0
121K	4.1	0.9	12.0
151K	4.5	1.2	12.0
181K	4.1	1.0	12.0
201K	4.2	1.0	12.0
221K	4.3	1.1	12.0
241K	4.4	1.3	12.0
271K	4.6	1.4	12.0
301K	4.8	1.5	12.0
331K	4.9	1.5	12.0
361K	5.1	1.9	12.0
391K	5.3	2.0	12.5
431K	6.1	2.3	12.5
471K	6.4	2.3	12.5
511K	6.6	2.5	13.0
561K	6.9	2.8	13.0
621K	7.2	3.1	13.0
681K	7.5	3.4	13.0
751K	7.9	3.7	13.0
781K	8.1	3.9	13.0
821K	8.3	4.1	13.0

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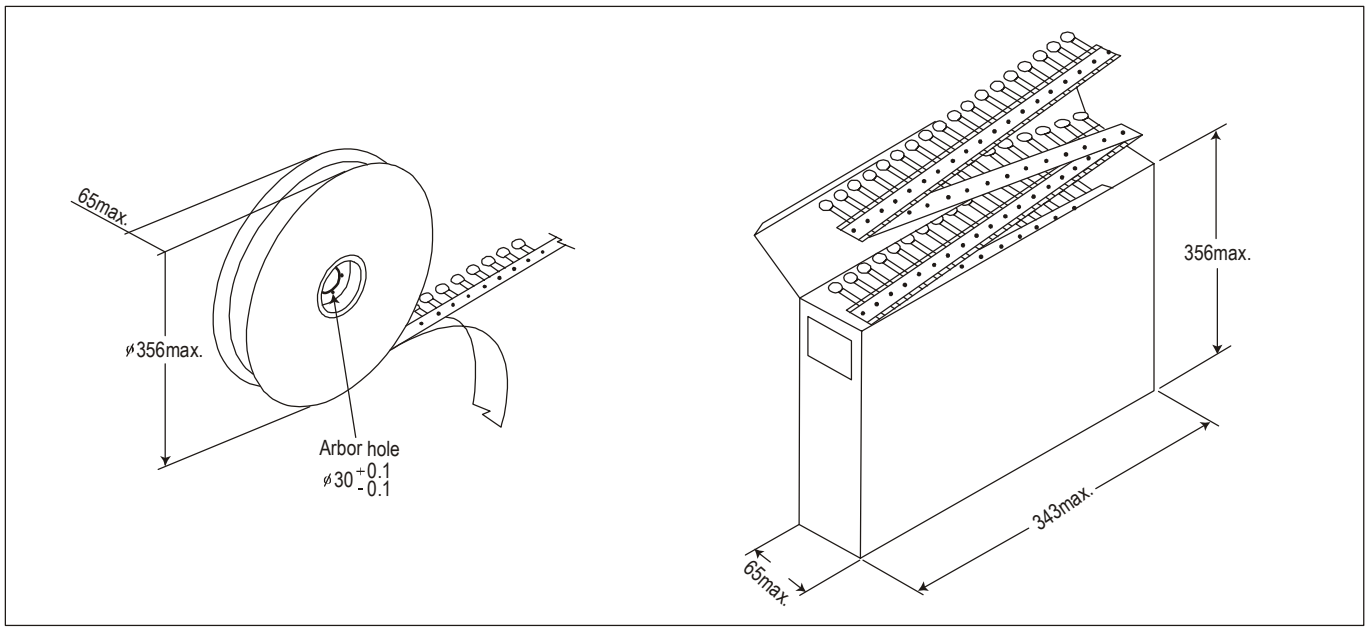
PACKAGING

in mm



Packaging	Bulk (box)	Reel	Ammo
Box size (mm)	290 x 155 x 110	350 x 350 x 108	330 x 240 x 45
Carton size (mm)	310 x 328 x 250	371 x 371 x 590	354 x 515 x 258
One carton with	4 Boxes	5 Boxes (10 reels)	10 Boxes

Part Number	Bulk (box)	Reel	Ammo
ROV07-180M to ROV07-470K ROV07H180M to ROV07H470K	5000	1500	1500
ROV07-560K to ROV07-680K ROV07H560K to ROV07H680K	5000	1500	1000
ROV07-820K to ROV07-331K ROV07H820K to ROV07H331K	5000	1500	1500
ROV07-361K to ROV07-391K ROV07H361K to ROV07H391K	5000	1500	1000
ROV07-431K to ROV07-471K ROV07H431K to ROV07H471K	5000	1000	1000
ROV07-511K to ROV07-751K ROV07H511K to ROV07H751K	4000	1000	1000
ROV07-781K to ROV07-821K ROV07H781K to ROV07H821K	4000	1000	1000

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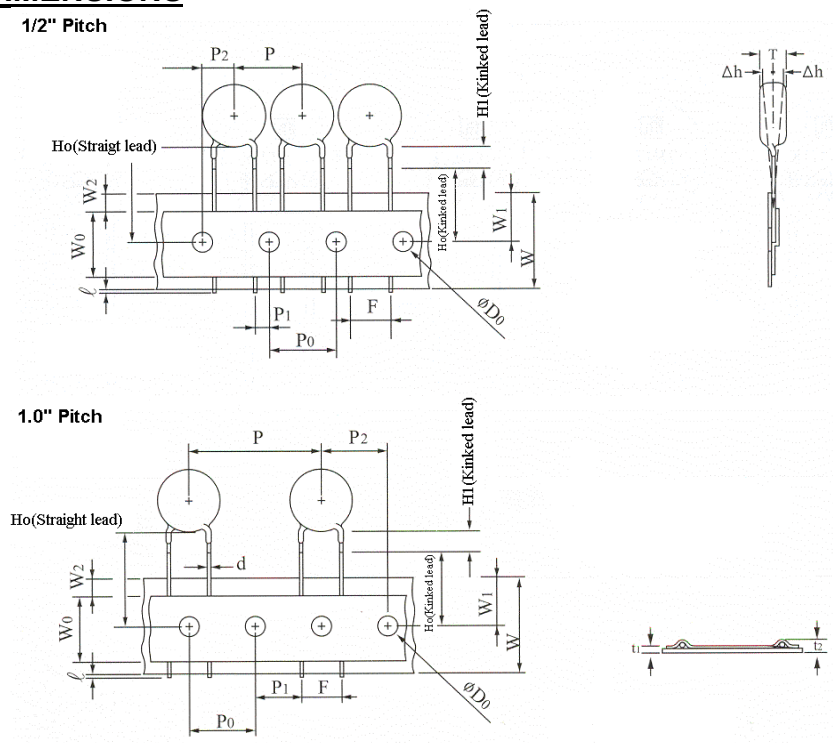
TAPE AND REEL DIMENSIONS



Symbols	Item	Value
ℓ	Cut out length	1.1mm max.
H_1 (Kinked lead)	Height of kink	3.5mm 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
W_1	Sprocket hole position	$9.0^{+0.75}_{-0.5}$ mm
W_2	Adhesive tape position	3.0mm max.
F	Component lead spacing	$5.0^{+0.8}_{-0.2}$ mm
P	Pitch of component	12.7 ± 1.0mm
P_0	Sprocket hole pitch	12.7 ± 0.3mm
P_1	Lead length from hole center to lead	3.85 ± 0.7mm
P_2	Length from hole center to disk center	6.35 ± 1.3mm
D_0	Sprocket hole diameter	4.0 ± 0.2mm
d	Lead wire diameter	0.6 ± 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.

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