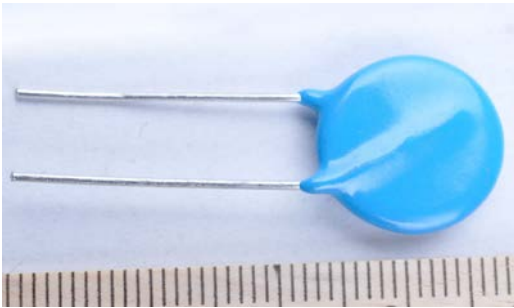


## Metal Oxide Varistors - 10K Series



### Features

1. Wide operating voltage (V1mA) range from 18V to 1800V.
2. Fast responding to transient over-voltage.
3. Large absorbing transient energy capability.
4. Low clamping ratio and no following-on current.

### General Information

The KSE-10Kxxx Series of 10 mm radial leaded varistor devices protects against overvoltage transients such as lightning, power contact and power induction. The metal oxide varistors offer a choice of varistor voltages from 18 V to 820 V and Vrms voltages from 11 V to 510 V. The devices have a high current handling, high energy absorption capability and fast response times to protect against transient faults up to rated limits.

### General Characteristics

No Radioactive Material Storage Temperature: -55°C to +125°C

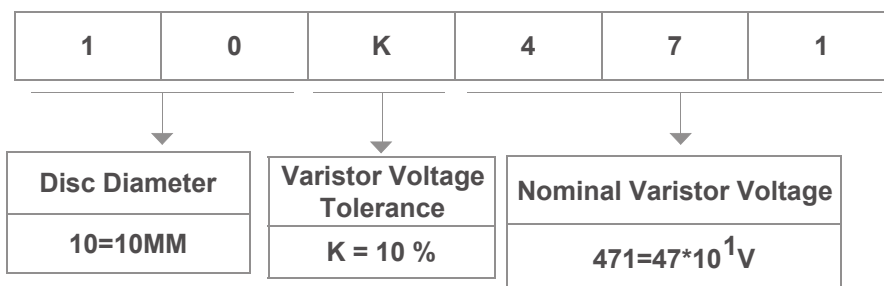
Operating Temperature: -55°C to +85°C

Body: Nickel Plated

Leads: Surface-mount, Axial Devices: Tin Plated

Devices with No Leads: Nickel Plated

### Product Name



## Metal Oxide Varistors - 10K Series

### Electrical Characteristics

Type Number	Maximum Allowable Voltage		Varistor Voltage $V_{1mA}(V)$	Maximum Clamping Voltage		Withstanding Surge Current		Maximum Energy (10/1000 $\mu$ s)		Rated Power (W)	Typical Capacitance (Reference) @1KHz(pf)
	$V_{AC}(V)$	$V_{DC}(V)$		$I_P(A)$	$V_C(V)$	I(A) Standard	I(A) High Surge	(J) Standard	(J) High Surge		
KSE-10K180	11	14	18(15~21.6)	5	36	500	1000	2.1	3.0	0.05	5600
KSE-10K220	14	18	22(19.5~26)	5	43	500	1000	2.5	5.0	0.05	4500
KSE-10K270	17	22	27(24~30)	5	53	500	1000	3.0	6.0	0.05	3700
KSE-10K330	20	26	33(29.5~36.5)	5	66	500	1000	4.0	7.0	0.05	3000
KSE-10K390	25	31	39(35~43)	5	77	500	1000	4.6	9.0	0.05	2400
KSE-10K470	30	38	47(42~54)	5	93	500	1000	5.5	11.0	0.05	2100
KSE-10K560	35	45	56(50~62)	5	100	500	1000	7.0	13.0	0.05	1800
KSE-10K680	40	56	68(61~75)	5	135	500	1000	8.2	15.0	0.05	1500
KSE-10K820	50	65	82(74~90)	25	135	2500	3500	12.0	17.0	0.4	1200
KSE-10K101	60	85	100(90~110)	25	165	2500	3500	15.0	18.0	0.4	1000
KSE-10K121	75	100	120(108~132)	25	200	2500	3500	18.0	21.0	0.4	830
KSE-10K151	95	125	150(135~165)	25	250	2500	3500	22.0	25.0	0.4	670
KSE-10K181	115	150	180(162~198)	25	300	2500	3500	27.0	30.0	0.4	560
KSE-10K201	130	170	200(180~220)	25	340	2500	3500	30.0	35.0	0.4	500
KSE-10K221	140	180	220(198~242)	25	360	2500	3500	32.0	39.0	0.4	450
KSE-10K241	150	200	240(216~264)	25	395	2500	3500	35.0	42.0	0.4	420
KSE-10K271	175	225	270(243~297)	25	455	2500	3500	40.0	49.0	0.4	370
KSE-10K301	190	250	300(270~330)	25	500	2500	3500	40.0	54.0	0.4	330
KSE-10K331	210	275	330(297~363)	25	550	2500	3500	40.0	58.0	0.4	300
KSE-10K361	230	300	360(324~396)	25	595	2500	3500	43.0	65.0	0.4	280
KSE-10K391	250	320	390(351~429)	25	650	2500	3500	47.0	70.0	0.4	260
KSE-10K431	275	350	430(387~473)	25	710	2500	3500	60.0	80.0	0.4	230
KSE-10K471	300	385	470(423~517)	25	775	2500	3500	65.0	85.0	0.4	210
KSE-10K511	320	415	510(459~561)	25	845	2500	3500	70.0	90.0	0.4	200
KSE-10K561	350	460	560(504~616)	25	925	2500	3500	70.0	92.0	0.4	180
KSE-10K621	385	505	620(558~682)	25	1025	2500	3500	70.0	95.0	0.4	160
KSE-10K681	420	560	680(612~748)	25	1120	2500	3500	70.0	98.0	0.4	150
KSE-10K751	460	615	750(675~825)	25	1240	2500	3500	70.0	100.0	0.4	130
KSE-10K781	485	640	780(702~858)	25	1290	2500	3500	80.0	105.0	0.4	130
KSE-10K821	510	670	820(738~902)	25	1355	2500	3500	85.0	110.0	0.4	120
KSE-10K911	550	745	910(819~1001)	25	1500	2500	3500	93.0	130.0	0.4	110
KSE-10K102	625	825	1000(900~1100)	25	1650	2500	3500	102.0	140.0	0.4	100
KSE-10K112	680	895	1100(990~1210)	25	1815	2500	3500	115.0	155.0	0.4	90
KSE-10K182	1000	1465	1800(1620~1980)	25	2970	2500	3500	133.0	250.0	0.4	70

## Metal Oxide Varistors - 10K Series

Electrical Rating				
Item	Test Condition / Description			Requirement
Varistor Voltage	The voltage between two terminals with the specified measuring current 1mA. DC applied is call Vb.			To meet the specified value
Maximum Allowable Voltage	The recommended maximum sine wave voltage (RMS) or the maximum DC voltage can be applied continuously.			
Rated Wattaget	The maximum average power that can be applied within the specified ambient temperature.			
IEnergy	The maximum energy within the varistor voltage change of $\pm 10\%$ when one impulse of 10/1000 $\mu$ sec. or 2 msec. is applied.			
Withstanding Surge Current	The maximum current within the varistor voltage change of $\pm 10\%$ with the standard impulse current (8/20 $\mu$ sec.) applied one time.			$\frac{\Delta V_b}{V_b} \leq \pm 10\%$
Surge Life	The change of Vb shall be measured after the impulse listed below is applied 10,000 times continuously with the interval of ten seconds at room temperature.			
	5K series	180K to 680K	10A (8/20 $\mu$ sec.)	
		820K to 751K	20A (8/20 $\mu$ sec.)	
	7K series	180K to 680K	25A (8/20 $\mu$ sec.)	
		820K to 821K	50A (8/20 $\mu$ sec.)	
	10K series	180K to 680K	50A (8/20 $\mu$ sec.)	
		820K to 182K	100A (8/20 $\mu$ sec.)	
	14K series	180K to 680K	75A (8/20 $\mu$ sec.)	
		820K to 182K	150A (8/20 $\mu$ sec.)	
	20K series	180K to 680K	100A (8/20 $\mu$ sec.)	
820K to 182K		200A (8/20 $\mu$ sec.)		

## Metal Oxide Varistors - 10K Series

### Current Energy and Power Dissipation Ratings

Should transients occur in rapid succession, the average power dissipation is the energy (watt-seconds) per pulse times the number of pulses per second. The power so developed must be within the specifications shown on the Device Ratings and Specifications Table for the specific device. The operating values of a MOV need to be derated at high temperatures as shown above. Because varistors only dissipate a relatively small amount of average power they are not suitable for repetitive applications that involve substantial amounts of average power dissipation.

Figure 1A - Power Derating for Epoxy Coated

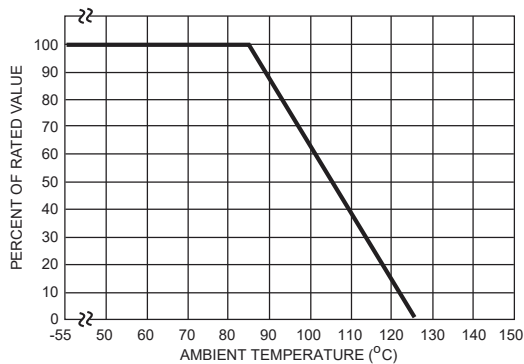
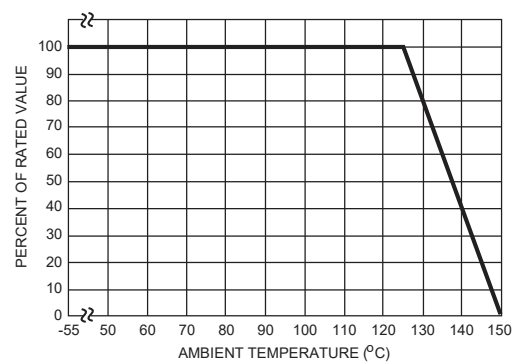
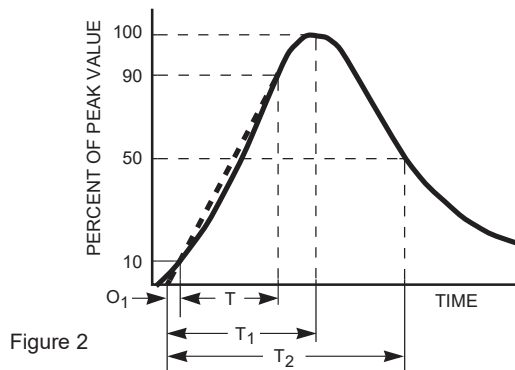


Figure 1B - Power Derating for Pholenic Coated



### Peak Pulse Current Test Waveform



$O_1$  = Virtual Origin of Wave  
 $T$  = Time from 10% to 90% of Peak  
 $T_1$  = Rise Time =  $1.25 \times T$   
 $T_2$  = Decay Time

Example - For an 8/20  $\mu$ s Current Waveform:

$8\mu$ s =  $T_1$  = Rise Time

$20\mu$ s =  $T_2$  = Decay Time

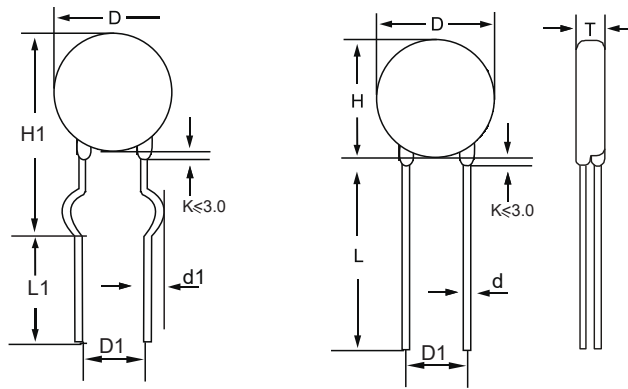
### Packaging

Part Number	Component Package	Quantity	Packaging Option	Packaging Specification
10K	10.0	500	BOX	1000

## Metal Oxide Varistors - 10K Series

### Package Dimensions

Unit:mm



**TABLE 1**

Symbol	Dimensions
H(max.)	12.0
H1(max.)	13.5
L(min.)	20.0
L1(min.)	15.0
D(max.)	9.0
D1(±0.8)	7.5
T(max.)	TABLE 2
d(±0.05)	0.6
d1(±0.4)	1.2

**TABLE 2**

Model	T(max.)	Model	T(max.)
180K	4.5	221K	4.5
220K	4.6	241K	4.6
270K	4.7	271K	4.9
330K	4.9	301K	5.0
390K	4.8	331K	5.1
470K	4.9	361K	5.2
560K	5.0	391K	5.4
680K	5.2	431K	5.7
820K	4.1	471K	6.0
101K	4.3	511K	6.2
121K	4.5	561K	6.5
151K	4.8	621K	6.4
181K	4.3	681K	6.5
201K	4.4	751K	6.5

### Warehouse Storage Conditions of Products

• Storage Conditions:

1. Storage Temperature: -10°C~+40°C
2. Relative Humidity: ≤75%RH
3. Keep away from corrosive atmosphere and sunlight.

• Period of Storage: 1 year