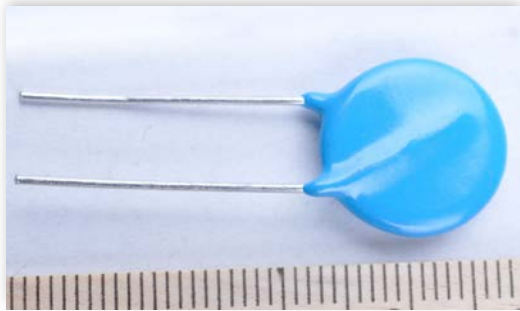


## Metal Oxide Varistors - 05K Series



### Features

1. Wide operating voltage ( $V_{1mA}$ ) 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-05Kxxx Series of 5 mm radial leaded varistor devices protects against overvoltage transients such as lightning, powercontact and power induction. The metal oxide varistors offer a choice of varistor voltages from 18 V to 750 V and  $V_{rms}$  voltages from 11 V to 460 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:  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$

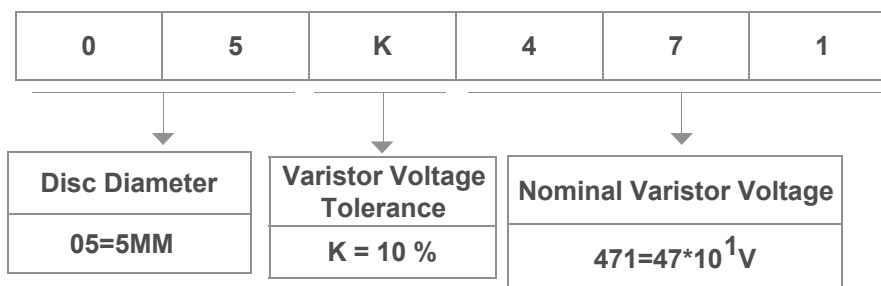
Operating Temperature:  $-55^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$

Body: Nickel Plated

Leads: Surface-mount, Axial Devices: Tin Plated

Devices with No Leads: Nickel Plated

### Product Name



## Metal Oxide Varistors - 05K Series

### Electrical Characteristics

Type Number	Maximum Allowable Voltage		Varistor Voltage V <sub>1mA</sub> (V)	Maximum Clamping Voltage		Withstanding Surge Current		Maximum Energy (10/1000µs)		Rated Power (W)	Typical Capacitance (Reference) @1kHz(pf)
	V <sub>AC</sub> (V)	V <sub>DC</sub> (V)		I <sub>P</sub> (A)	V <sub>C</sub> (V)	I(A) Standard	I(A) High Surge	(J) Standard	(J) High Surge		
KSE-05K180	11	14	18(15~21.6)	1	40	100	250	0.4	0.6	0.01	1400
KSE-05K220	14	18	22(19.5~26)	1	48	100	250	0.5	0.7	0.01	1150
KSE-05K270	17	22	27(24~31)	1	60	100	250	0.6	0.9	0.01	930
KSE-05K330	20	26	33(29.5~36.5)	1	73	100	250	0.8	1.1	0.01	760
KSE-05K390	25	31	39(35~43)	1	80	100	250	0.9	1.2	0.01	640
KSE-05K470	30	38	47(42~54)	1	104	100	250	1.1	1.5	0.01	530
KSE-05K560	35	45	56(50~62)	1	123	100	250	1.3	1.8	0.01	450
KSE-05K680	40	56	68(61~75)	1	150	100	250	1.6	2.2	0.01	370
KSE-05K820	50	65	82(74~90)	5	145	400	800	2.5	4.0	0.1	300
KSE-05K101	60	85	100(90~110)	5	177	400	800	3.0	4.1	0.1	250
KSE-05K121	75	100	120(108~132)	5	210	400	800	4.0	4.9	0.1	210
KSE-05K151	95	125	150(135~165)	5	260	400	800	4.1	6.5	0.1	165
KSE-05K181	115	150	180(162~198)	5	320	400	800	4.9	7.5	0.1	140
KSE-05K201	130	170	200(180~220)	5	355	400	800	6.5	8.5	0.1	125
KSE-05K221	140	180	220(198~242)	5	380	400	800	7.5	9.0	0.1	110
KSE-05K241	150	200	240(216~264)	5	415	400	800	8.0	10.5	0.1	100
KSE-05K271	175	225	270(243~297)	5	475	400	800	8.5	11.0	0.1	95
KSE-05K301	190	250	300(270~330)	5	520	400	800	9.0	12.0	0.1	85
KSE-05K331	210	275	330(297~363)	5	570	400	800	9.5	13.0	0.1	75
KSE-05K361	230	300	360(324~396)	5	620	400	800	10.0	16.0	0.1	70
KSE-05K391	250	320	390(351~429)	5	675	400	800	12.0	17.0	0.1	65
KSE-05K431	275	350	430(387~473)	5	745	400	800	13.0	20.0	0.1	60
KSE-05K471	300	385	470(423~517)	5	810	400	800	15.0	21.0	0.1	55
KSE-05K511	320	415	510(459~561)	5	845	400	800	16.0	22.5	0.1	50
KSE-05K561	350	460	560(504~616)	5	920	400	800	16.0	24.0	0.1	50
KSE-05K621	385	505	620(558~682)	5	1025	400	800	21.0	25.0	0.1	40
KSE-05K681	420	560	680(612~748)	5	1120	400	800	21.0	29.0	0.1	35
KSE-05K751	460	615	750(675~825)	5	1240	400	800	22.4	32.0	0.1	30

## Metal Oxide Varistors - 05K 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.)	
	7Kseries	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 - 05K 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

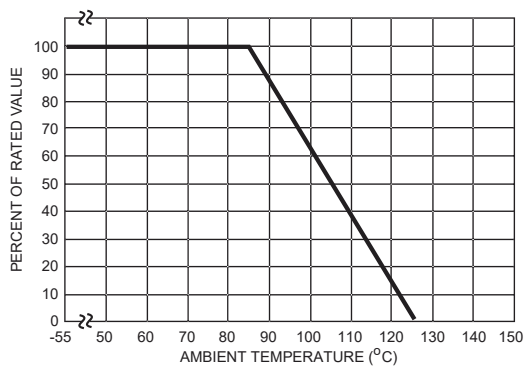
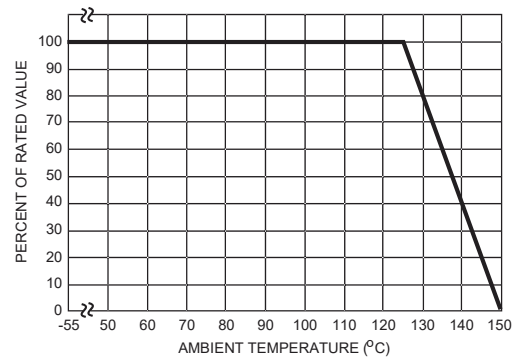
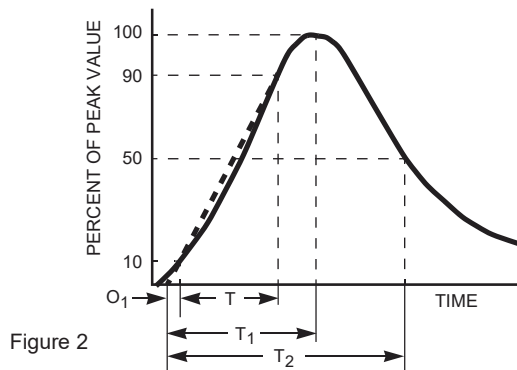


Figure 1B - Power Derating for Pholenic Coated



### 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

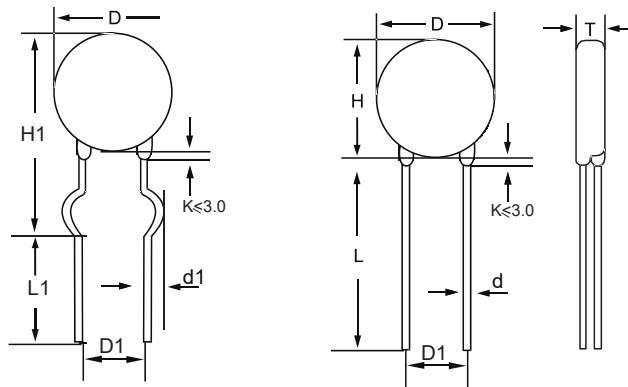
### Packaging

Part Number	Component Package	Quantity	Packaging Option	Packaging Specification
5K	5.0	1000	BOX	2000

## Metal Oxide Varistors - 05K Series

### Package Dimensions

Unit:mm



**TABLE 1**

Symbol	Dimensions
H(max.)	10.5
H1(max.)	13.0
L(min.)	20.0
L1(min.)	15.0
D(max.)	7.5
D1(±0.8)	5.0
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