

Metal Oxide Varistors KSE-20K Series

Features

- Wide operating voltage (V_{1mA}) range from 18V to 1800V.
- Fast responding to transient over-voltage.
- Large absorbing transient energy capability.
- Low clamping ratio and no following-on current.



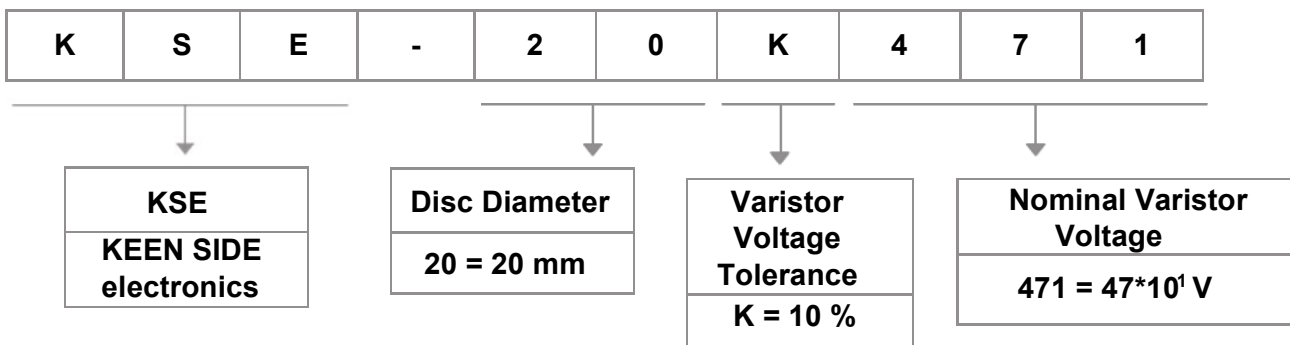
General Information

The KSE-20K Series of 20 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 1800 V and V_{rms} voltages from 11 V to 1100 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

- Storage Temperature: $-40^{\circ}\text{C} \sim +125^{\circ}\text{C}$
- Operating Temperature: $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$
- Coating: Epoxy resin
- Disk: Zinc Oxide
- Leads: Cp/Cu wire (tinned copper-clad steel wire)

Product name



1. OUTLINE

1.1 DIMENSIONS

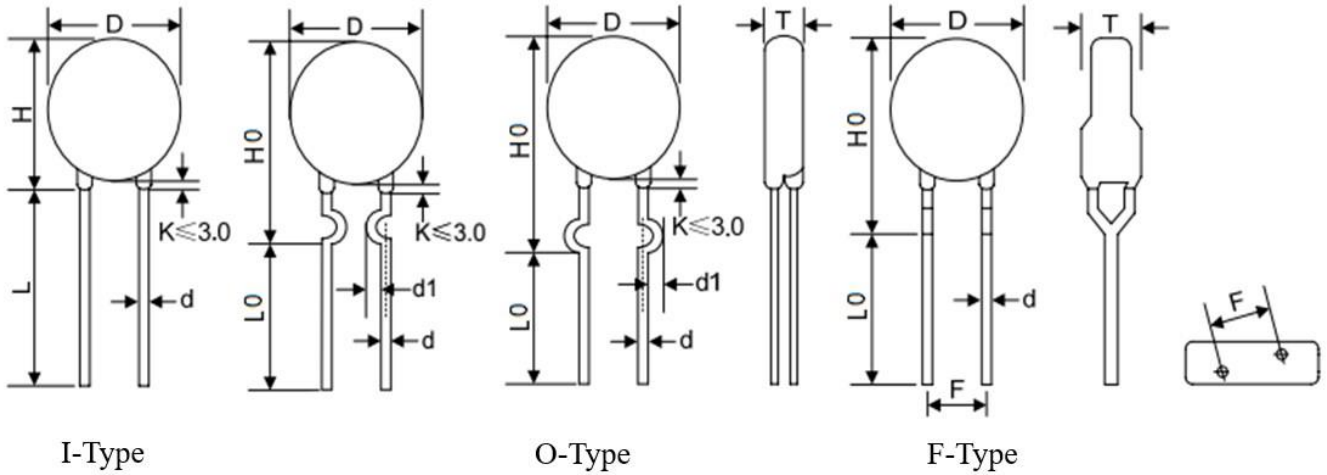


Table1	
Unit: mm	
Symbol	Dimension
D(max.)	23.0
H(max.)	26.5
H0(max.)	28.0
F(±0.8)	7.5/10.0
T	Table2
d(±0.05)	0.8/1.0
d1(±0.4)	1.4/1.6
L(min.)	20.0
L0(min.)	15.0
Epoxy Color: Blue	

Table2			
Unit: mm			
Model	T	Model	T
180K	4.0	361K	5.3
220K	4.1	391K	5.4
270K	4.3	431K	5.6
330K	4.2	471K	5.8
390K	4.4	511K	6.0
470K	4.5	561K	6.4
560K	4.7	621K	6.7
680K	5.0	681K	7.0
820K	4.4	751K	7.1
101K	4.6	781K	7.2
121K	4.8	821K	7.4
151K	4.4	911K	7.8
181K	4.5	102K	7.8
201K	4.6	112K	8.2
221K	4.7	122K	8.6
241K	4.8	142K	9.4
271K	5.0	162K	9.8
301K	5.0	182K	10.2
331K	5.1		

I-Type varistors - typical, other types – on demand.

2. ELECTRICAL PARAMETERS

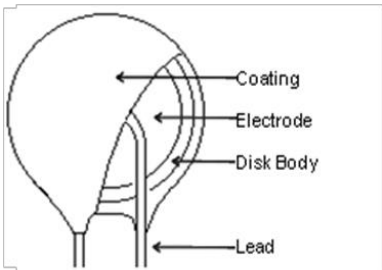
Model (Standard)	Maximum Allowable Voltage		Varistor voltage	IR3	@	Clamping voltage		Maximum Peak Current (8/20 μ s)		Maximum Energy 10/1000 μ s		Rated Power (w)	Typical Capacitance (Reference) @ 1KHz (pf)
	AC rms	DC	V _{1.0mA}	μ A		VC	IP	Standard	High Surge	Standard	High Surge		
	(V)	(V)				(V)	(V)						
KSE-20K180	11	14	18(15-21.6)	50	10	36	20	2000/ 1000*2	3000/ 2000*2	11	13	0.2	28500
KSE-20K220	14	18	22(19.5-26)		10	43				14	16		18500
KSE-20K270	17	22	27(24-31)		10	53				16	19		13000
KSE-20K330	20	26	33(29.5-36.5)		10	65				23	24		11500
KSE-20K390	25	31	39(35-43)		10	77				26	28		8500
KSE-20K470	30	38	47(42-52)		10	93				30	34		7400
KSE-20K560	35	45	56(50-62)		10	110				38	44		6500
KSE-20K680	40	56	68(61-75)		10	135				41	49		5800
KSE-20K820	50	65	82(74-90)	30	20	135	100	6500/ 4500*2	10000/ 6500*2	45	56	1	4900
KSE-20K101	60	85	100(90-110)		20	165				50	70		4000
KSE-20K121	75	100	120(108-132)		20	200				55	85		3300
KSE-20K151	95	125	150(135-165)		20	250				70	106		2700
KSE-20K181	115	150	180(162-198)		20	300				85	130		2200
KSE-20K201	130	170	200(185-225)		20	340				95	140		2000
KSE-20K221	140	180	220(198-242)		20	360				100	155		1800
KSE-20K241	150	200	240(216-264)		20	395				108	168		1650
KSE-20K271	175	225	270(243-297)		20	455				127	190		1500
KSE-20K301	190	250	300(270-330)		20	500				136	210		1300
KSE-20K331	210	275	330(297-363)		20	550				150	228		1200
KSE-20K361	230	300	360(324-396)		20	595				163	255		1100
KSE-20K391	250	320	390(351-429)		20	650				180	275		1000
KSE-20K431	275	350	430(387-473)		20	710				190	305		930
KSE-20K471	300	385	470(423-517)		20	775				204	350		850
KSE-20K511	320	415	510(459-561)		20	845				210	360		780
KSE-20K561	350	460	560(504-616)		20	925				215	380		710
KSE-20K621	385	505	620(558-682)		20	1025				224	390		650
KSE-20K681	420	560	680(612-748)		20	1120				230	400		600
KSE-20K751	460	615	750(675-825)		20	1240				255	420		530
KSE-20K781	485	640	780(702-858)		20	1290				265	440		510
KSE-20K821	510	670	820(738-902)		20	1355				282	460		500
KSE-20K911	550	745	910(819-1001)		20	1500				310	510		440
KSE-20K102	625	825	1000(900-1100)		20	1650				342	565		400
KSE-20K112	680	895	1100(990-1210)	20	1815	383	620	360					
KSE-20K122	750	990	1200(1080-1320)	20	1980	408	660	350					
KSE-20K142	880	1140	1400(1260-1540)	20	2310	532	784	340					
KSE-20K162	1000	1280	1600(1440-1760)	20	2640	606	896	330					
KSE-20K182	1100	1465	1800(1620-1980)	20	2970	625	990	320					

High Surge Type Varistors – available on demand.

PARAMETERS DESCRIPTION

2.1	Max. Allowable Voltage	Reference p2*	At 1.0mA DC	
2.2	Varistor Voltage(Test Time For 30ms)		V0.1mA □ V1mA ■	
2.3	Rated Wattage		Test Current Waveform 8/20μs	
2.4	Max. Clamping Voltage		Test Current Waveform 8/20μs	
2.5	Withstanding Surge Current		Test Current Waveform 10/1000μs	
2.6	Max. Energy		@1KHz	
2.7	Typical Capacitance		At 80% of Varistor Voltage	
2.8	Leakage Current		$\alpha = \log \frac{I_1}{I_2} / \log \frac{V_1}{V_2}$	
2.9	Nonlinear Exponent (α)		$\frac{V_C@85^\circ\text{C} - V_C@25^\circ\text{C}}{V_{cat25^\circ\text{C}}} \times \frac{1}{60} \times 100(\%/^\circ\text{C})$	
2.10	Temperature Coefficient of Varistor Voltage		$-0.05 \leq T_c \leq 0.05$ (% / °C)	$\left \frac{V_{1mA@-40^\circ\text{C}} - V_{1mA@25^\circ\text{C}}}{V_{1mA@25^\circ\text{C}}} \times \frac{1}{65} \times 100(\%/^\circ\text{C}) \right $
2.11	Impulse Life		$\cong \pm 10\%(V1mA)$	Test Current Waveform 8/20μs

3. MATERIAL LIST

3.1	Drawing			
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3.2	Material Chart RoHs	Item	Composition	Manufacturer
		Coating	Epoxy Resin	Made in China, and in line with the UL 94-V0 testing, meet the environmental requirements
		Lead	Cp/Cu wire	Made in China, meet the environmental requirements
		Electrode	Silver	Made in China, meet the environmental requirements
		Disk	Zinc Oxide	Made in China, meet the environmental requirements
		Solder	Sn:96.5%CU 0.5%Ag3.0%	Made in China, meet the environmental requirements

4. MECHANICAL REQUIREMENTS

4.1	Tensile of Terminations	No Outstanding Damage	2.0 Kgf; 10 Sec.
4.2	Bending of Terminations	No Outstanding Damage	1.0/0.5 Kgf; 90°, 3 Times
4.3	Vibration	No Outstanding Damage	Freq: 10-55Hz; Amp:0.75mm,1Min.
4.4	Solderability	Min. 95% of The Terminal Should Be Covered With Solder Uniformly	Solder Temp:245±5°C Immersed Time: ≤5Sec.
4.5	Resistance of soldering heat	$\Delta V1mA/V1mA$ ≤ ±5%	Solder Temp: 260±5°C Immersed Time: 10±1Sec.

5. ENVIRONMENTAL REQUIREMENTS

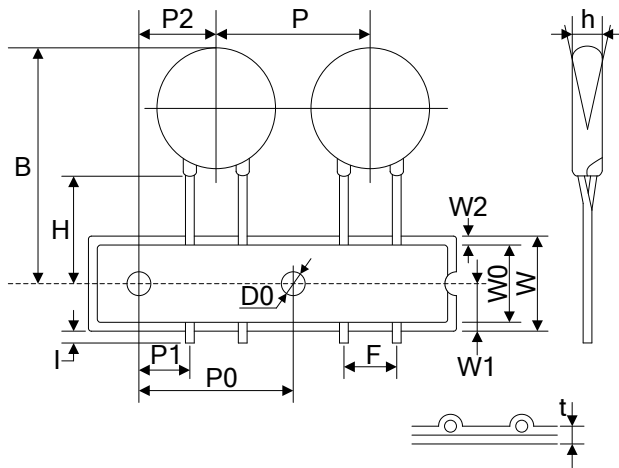
5.1	High Temperature Storage	$\Delta V1mA/V1mA$ $\leq \pm 5\%$	Ambient Temp: 125±2°C Duration:1000h		
5.2	Low Temperature Storage	$\Delta V1mA/V1mA$ $\leq \pm 5\%$	Ambient Temp: -40±2°C Duration:1000h		
5.3	High Humidity Storage/Damp Heat	$\Delta V1mA/V1mA$ $\leq \pm 5\%$	Ambient Temp: 40±2°C 90-95% R.H. Duration:1000h		
5.4	Temperature Cycle	$\Delta V1mA/V1mA$ $\leq \pm 5\%$	Step	Temperature (°C)	Period (min)
			1	-40±3	30 ±3
			2	Room Temp	15 ±3
			3	85±3	30 ±3
4	Room Temp	15 ±3			
5.5	High Temperature Load	$\Delta V1mA/V1mA$ $\leq \pm 10\%$	Ambient temp:85±2°C Duration:1000h Load: MAX. Allowable Voltage		
5.6	High Humidity Load	$\Delta V1mA/V1mA$ $\leq \pm 10\%$	Ambient Temp: 40±2°C 90-95%R.H.Duration:1000H Load: MAX. Allowable Voltage		
5.7	Operating Temperature Range	-40°C ~ +85 °C			
5.8	Storage Temperature Range	-40°C ~ +125°C			

6. Marking Code

20K471



7. Taping Dimensions



Symbol

Dimension (mm)

P

25.4 ± 1.0

P0

12.7 ± 1.0

P1

8.95 ± 0.7

P2

12.7 ± 1.3

F

$7.5/10.0 \pm 0.8$

h

0 ± 4

W

18.0 ± 1.0

W0

12.0 ± 1.0

W1

9.0 ± 0.5

W2

3.0max

H

20.0 ± 2.0

I

1.0max

D0

4.0 ± 0.2

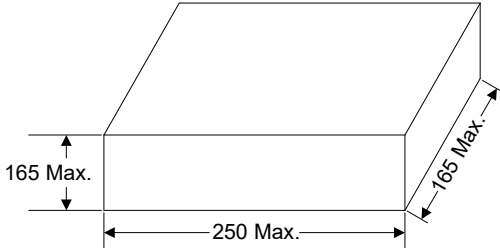
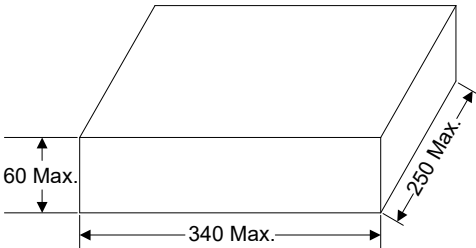
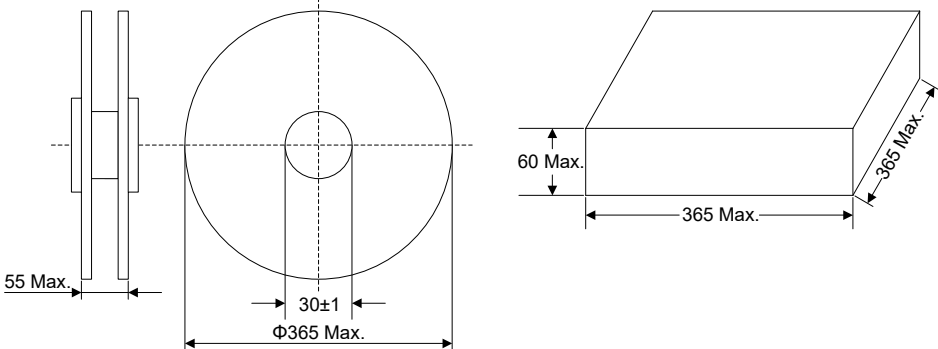
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0.6 ± 0.3

B

45max

8. Quantity

Packaging Dimensions (Unit: mm)	Quantity
Bulk (typ.) 	250pcs/bag 4bags/box (180K~301K)
	200pcs/bag 4bags/box (331K~561K)
	150pcs/bag 4bags/box (621K~112K)
	100pcs/bag 4bags/box (122K~182K)
Tape & Box 	400pcs/box (180K~301K)
	300pcs/box (331K~561K)
Tape & Reel 	400pcs/reel (180K~301K)
	300pcs/reel (331K~751K)