

Metal Oxide Varistors (MOV) Datasheet

Features

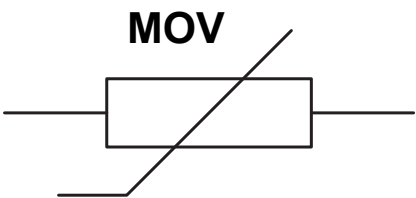
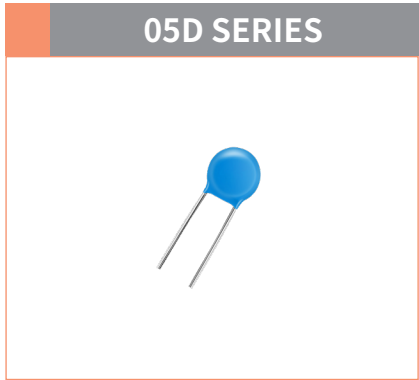
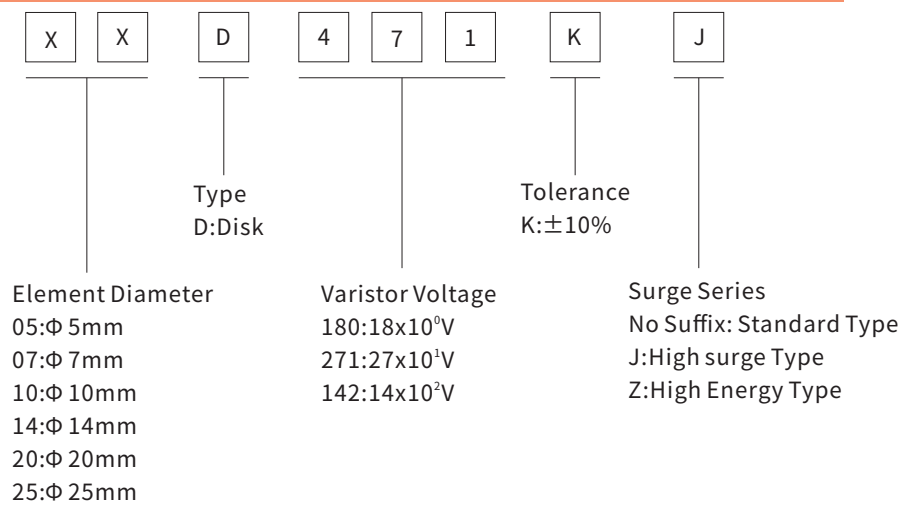
- Wide operating voltage(V1mA)range from 18V to 750V
- Fast responding to transient over-voltage.
- Large absorbing transient energy capability.
- Low clamping ratio and no following-on current.
- Coating (Epoxy Resin): Flame-Retardant to UL94 V-0
- Meets MSL level 1,per J-STD-020
- Operating Temperature: -40℃ ~+105℃
- Storage Temperature: -40℃ ~+125℃

Varistors
Voltage
18V to 750V

Applications

- Surge protection in electronic home appliances,gas and petroleum appliances
- Surge protection in industrial electronics
- Surge protection in consumer electronics
- Transistor,diode,IC,Thyristor or Triac semiconductor protection
- Relay and electromagnetic valve surge absorption

Part Number Code



Marking Code



● **Electrical Characteristics** (Ta=25°C Unless otherwise specified)

Part Number		Max. Allowable Voltage		Varistor Voltage	Max. Clamping Voltage 8/20μs		Withstanding Surge Current 8/20μs		Max. Energy 10/1000μs		Rated Power	Typical Capacitance (Reference)
Standard	High Surge	V _{AC} (V)	V _{DC} (V)	V _{1mA} (V)	I _P (A)	V _C (V)	Standard (A)	High Surge(A)	Standard (J)	High Surge(J)	(W)	@1KHz(pF)
05D180K	05D180KJ	11	14	18(15-21.6)	1	40	100	250	0.4	0.6	0.01	1400
05D220K	05D220KJ	14	18	22(19.5-26)	1	48	100	250	0.5	0.7	0.01	1150
05D270K	05D270KJ	17	22	27(24-31)	1	60	100	250	0.6	0.9	0.01	930
05D330K	05D330KJ	20	26	33(29.5-36.5)	1	73	100	250	0.8	1.1	0.01	760
05D390K	05D390KJ	25	31	39(35-43)	1	80	100	250	0.9	1.2	0.01	640
05D470K	05D470KJ	30	38	47(42-52)	1	104	100	250	1.1	1.5	0.01	530
05D560K	05D560KJ	35	45	56(50-62)	1	123	100	250	1.3	1.8	0.01	450
05D680K	05D680KJ	40	56	68(61-75)	1	145	100	250	1.6	2.2	0.01	370
05D820K	05D820KJ	50	65	82(74-90)	5	150	400	800	2.5	4	0.1	300
05D101K	05D101KJ	60	85	100(90-110)	5	177	400	800	3	4.1	0.1	250
05D121K	05D121KJ	75	100	120(108-132)	5	210	400	800	4	4.9	0.1	210
05D151K	05D151KJ	95	125	150(135-165)	5	260	400	800	4.1	6.5	0.1	165
05D181K	05D181KJ	115	150	180(162-198)	5	320	400	800	4.9	7.5	0.1	140
05D201K	05D201KJ	130	170	200(180-220)	5	355	400	800	6.5	8.5	0.1	125
05D221K	05D221KJ	140	180	220(198-242)	5	380	400	800	7.5	9	0.1	110
05D241K	05D241KJ	150	200	240(216-264)	5	415	400	800	8	10.5	0.1	100
05D271K	05D271KJ	175	225	270(243-297)	5	475	400	800	8.5	11	0.1	95
05D301K	05D301KJ	190	250	300(270-330)	5	520	400	800	9	12	0.1	85
05D331K	05D331KJ	210	275	330(297-363)	5	570	400	800	9.5	13	0.1	75
05D361K	05D361KJ	230	300	360(324-396)	5	620	400	800	10	16	0.1	70
05D391K	05D391KJ	250	320	390(351-429)	5	675	400	800	12	17	0.1	65
05D431K	05D431KJ	275	350	430(387-473)	5	745	400	800	13	20	0.1	60
05D471K	05D471KJ	300	385	470(423-517)	5	810	400	800	15	21	0.1	55
05D511K	05D511KJ	320	415	510(459-561)	5	845	400	800	16	22.5	0.1	50
05D561K	05D561KJ	350	460	560(504-616)	5	920	400	800	16.8	24	0.1	45
05D621K	05D621KJ	385	505	620(558-682)	5	1025	400	800	17.7	25	0.1	40
05D681K	05D681KJ	420	560	680(612-748)	5	1120	400	800	21	29	0.1	38
05D751K	05D751KJ	460	615	750(675-825)	5	1240	400	800	22.4	32	0.1	35

Note: 1.The tolerance of varistor voltage between 18V and 27V is more than 10%.

2.Leakage Current @83%V_{1mA}: IR ≤ 50μA (180K~680K,) ; IR ≤ 25μA (820K~751K)

● Electrical Ratings

Items	Test Condition/Description	Requirement							
Varistor Voltage	The voltage between two terminals with the specified measuring current 1mA.DC applied is called Vb.	To meet the specified value							
Maximum Allowable Voltage	The recommended maximum sine wave voltage(RMS)orthe Maximum DC voltage can be applied continuously.								
Maximum Clamping Voltage	The maximum voltage between two terminals with the specification standard impulse current. Applied waveform:8/20μs								
Rated Wattage	The maximum average power that can be applied within the specified ambient temperature.								
Energy	The maximum energy within the varistor voltage change of ±10% when one impulse of 10/1000μs or 2ms is applied.								
Withstanding Surge Current	The maximum current within the varistor voltage change of ±10% with the standard impulse current(8/20μs)applied one time.	$\frac{\Delta V_b}{V_b} \leq 10\%$							
Surge Life	The change of Vb shall be measured after the impulse listed below which is applied 10,000 times continuously with the interval of ten seconds at room temperature. <table><tr><th>Series</th><th>Varistor Voltage</th><th>Surge Current(8/20μs)</th></tr><tr><td rowspan="2">05D Series</td><td>180K to 680K</td><td>10A</td></tr><tr><td>820K to 751K</td><td>20A</td></tr></table>		Series	Varistor Voltage	Surge Current(8/20μs)	05D Series	180K to 680K	10A	820K to 751K
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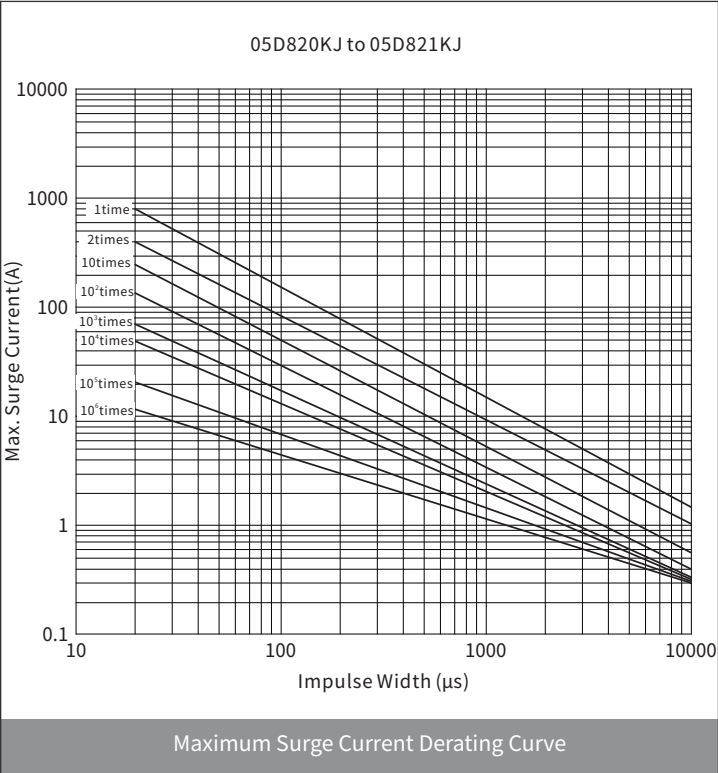
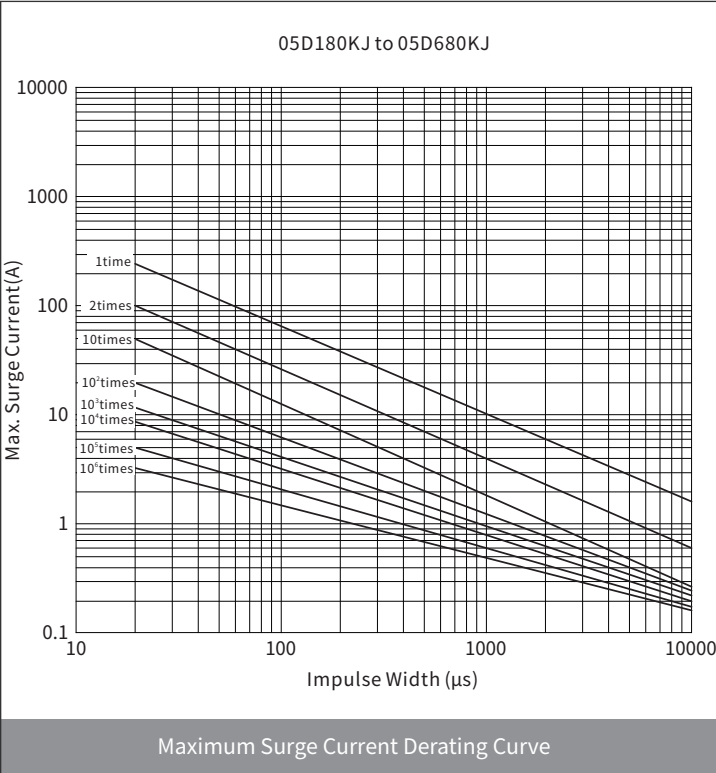
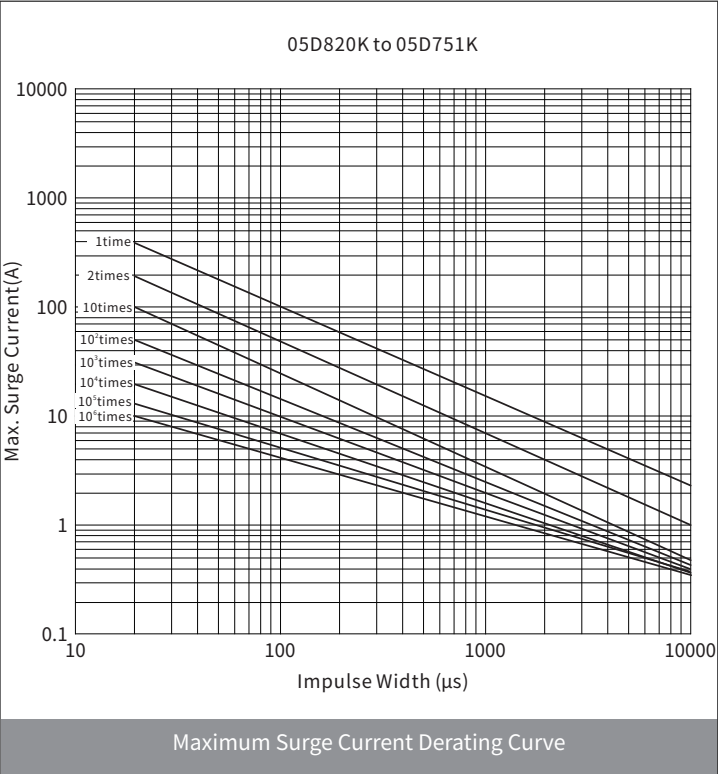
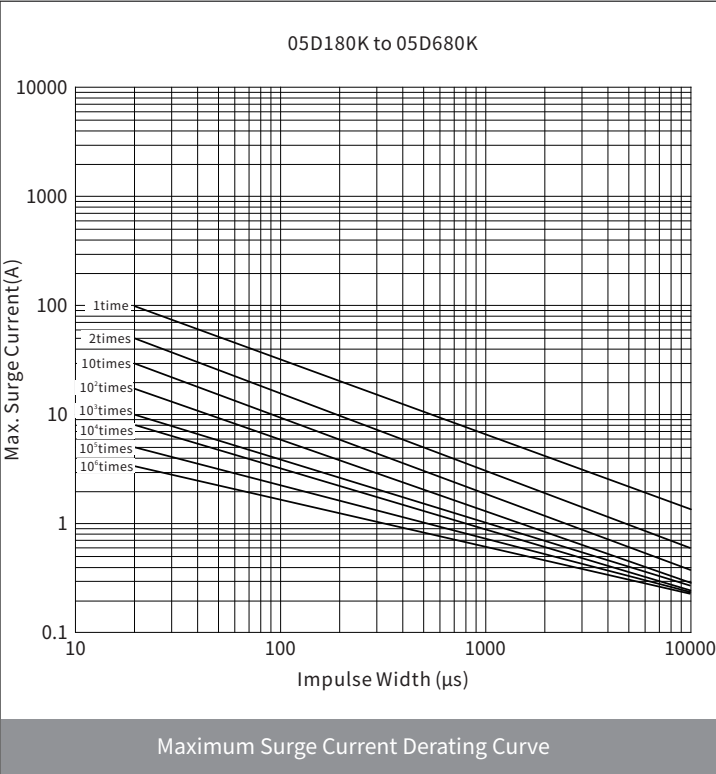
● Electrical Ratings

Items	Test Condition/Methods	Specifications															
High Temperature Storage	Ambient Temp: 125±2℃ Duration: 1000hrs	$ \Delta V_{1mA}/V_{1mA} \leq 5\%$															
Low Temperature Storage	Ambient Temp: -40±2℃ Duration: 1000hrs	$ \Delta V_{1mA}/V_{1mA} \leq 5\%$															
Humidity	Ambient Temp: 40±2℃ , 90~95% R.H. Duration: 1000hrs	$ \Delta V_{1mA}/V_{1mA} \leq 5\%$															
Temperature Cycle	The conditions shown below shall be repeated 5 cycles <table><tr><th>Step</th><th>Temperature(℃)</th><th>Period(minutes)</th></tr><tr><td>1</td><td>-40±3</td><td>30±3</td></tr><tr><td>2</td><td>Room temperature</td><td>15±3</td></tr><tr><td>3</td><td>125±3</td><td>30±3</td></tr><tr><td>4</td><td>Room temperature</td><td>15±3</td></tr></table>	Step	Temperature(℃)	Period(minutes)	1	-40±3	30±3	2	Room temperature	15±3	3	125±3	30±3	4	Room temperature	15±3	No visible damage $ \Delta V_{1mA}/V_{1mA} \leq 5\%$
Step	Temperature(℃)	Period(minutes)															
1	-40±3	30±3															
2	Room temperature	15±3															
3	125±3	30±3															
4	Room temperature	15±3															
High Temperature Load	Ambient Temp: 125±2℃ Duration: 1000hrs Load: Max. Allowable Voltage In AC eara.	$ \Delta V_{1mA}/V_{1mA} \leq 5\%$															
Damp Heat Load	Ambient Temp: 40±2℃ , 90~95% R.H. Duration: 1000hrs Load: Max. Allowable Voltage	No visible damage $ \Delta V_{1mA}/V_{1mA} \leq 5\%$															
Voltage Proof	Metal balls method, 2500Vac 1 min.	No visible damage															

● Recommended Soldering Conditions

Wave Lead Free Soldering Recommendation		
The graph shows a temperature profile over 4 minutes. It starts at 25°C, preheats to 100°C at 1 minute, holds at 100°C until 2.5 minutes, then rises to a peak of 265°C at 3.2 minutes, and finally cools down to 150°C at 4 minutes. Key points are labeled: Preheating, Maximum Wave 265℃, Soldering, and Cooling.	Item	Conditions
	Peak Temperature	265℃
	Dipping Time	10 secs. Max
	Soldering	1 time
Recommendation Reworking Conditions with Soldering Iron		
Item		Conditions
Temperature of Soldering Iron-tip		360℃ Max
Soldering Time		3 secs. Max
Distance from Varistor		2 mm Min

● Maximum Surge Current Derating Curve (Ta=25°C Unless otherwise specified)



● Dimensions

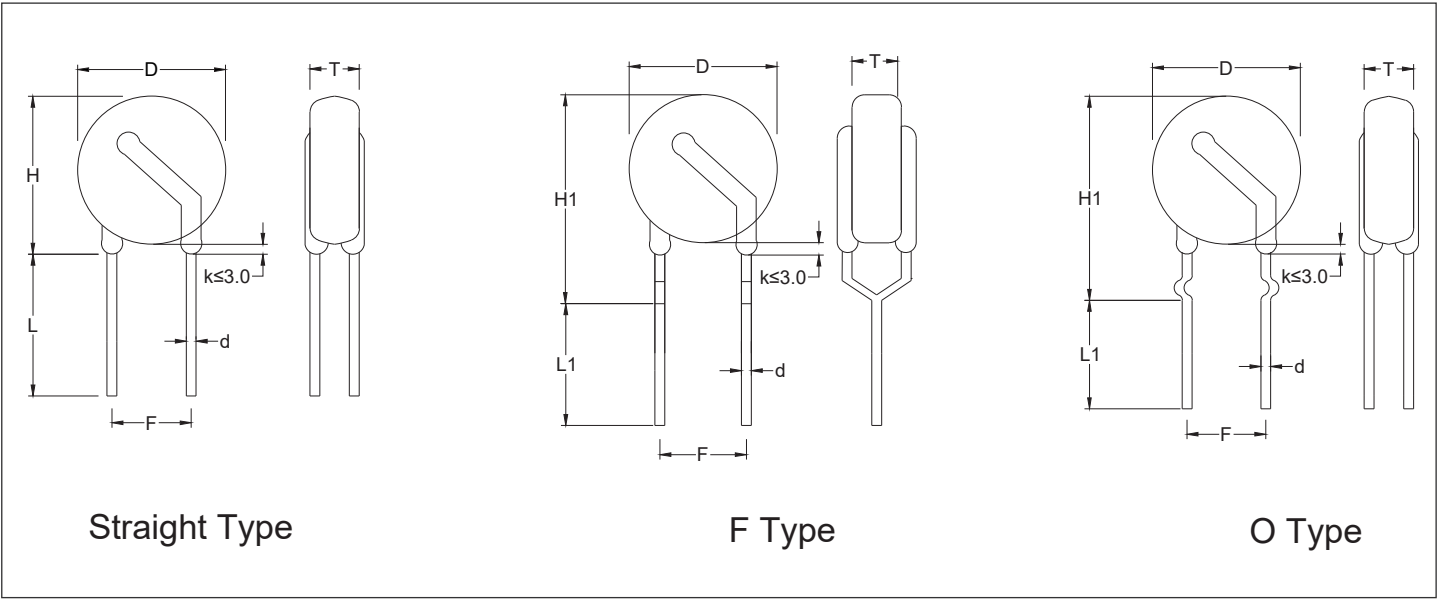


TABLE 1								
Symbol	D(max.)	H(max.)	H1(max.)	L(min.)	L1(min.)	F	d	T (max.)
Dimension(mm)	7.0	9.5	11.5	15	15	5.0±1	0.6±0.1	refer to table 2
Dimension(In)	0.276	0.374	0.453	0.591	0.591	0.197±0.04	0.024±0.004	

TABLE 2 T(max.)					
Voltage	180K~820K	101K~241K	271K~471K	511K~681K	751K
Dimension(mm)	5.0	4.0	5.0	6.0	6.2
Dimension(In)	0.197	0.157	0.197	0.236	0.244

Note: 05D Series default Straight Type

● Ordering Information

SERIES	DELIVERY MODE	MPQ(PCS)
05D SERIES	Bulk	1,000