Metal Oxide Varistor
Leaded Disk Type, 5~20mm

MVR-V Series

MERITEK

FEATURE

- Operating / Storage Temperature: -40°C ~ +105°C / -40°C +125°C
- Varistor Voltage: 200V to 1100V
- Withstanding Surge Current Rating Up to 10KA
- Fast Responding to Transient Over-voltage
- Low Clamping Ratio without Follow-on Current
- UL/cUL Safety Approved: Certification No: E326004

RoHS

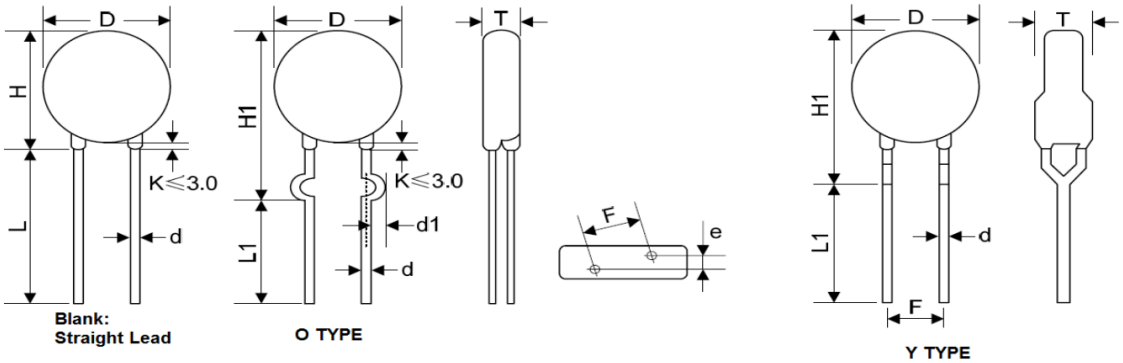
PART NUMBERING SYSTEM

MVR	20D	911K	O	V
(1)	(2)	(3)	(4)	(5)

No	Item	Digit	Description	
(1)	**Product Code**	MVR	Metal Oxide Varistor, Radial Leaded Type	
(2)	**Diameter**	20D	20mm	Disk Diameter, Round type
(3)	**Varistor DC Voltage**	911K	911: 910VDC 10%	First two digits: Significant, Third: Multiplier
(4)	**Lead Type**	O	O: Out kink	Blank: Straight, Y: Y Kink,
(5)	**Series Code**	V	V series	5, 7, 10, 14,18, 20 mm

DIMENSIONS

MVR Series	Varistor DC Voltage at 1mA	Maximum Energy 10/1Kμs	Disk Diameter	H Max	H1 Max	L Min	L1 Min	D ±0.05	d1 ±0.4	F ±1.0
MVR05-V	200~750V	17.5~48J	5.5~7.5	10.0	13.0	25.0	25.0	0.6	1.2	5.0
MVR07-V	200~820V	17.5~50J	7.5~9.0	12.0	15.0	25.0	25.0	0.6	1.2	5.0
MVR10-V	200~1.1KV	35~155J	10.5~14.0	17.0	20.5	25.0	25.0	0.8	1.4	7.5
MVR14-V	200~1.1KV	84~364J	13.5~17.5	20.5	23.5	25.0	25.0	0.8	1.4	7.5
MVR18-V	200~1.1KV	112~500J	18.5~23.0	26.0	27.0	25.0	25.0	0.8	1.4	7.5
MVR20-V	200~1.1KV	140~620J	19.5~25.0	28.0	31.0	25.0	25.0	1.0	1.4	10.0



ELECTRICAL CHARACTERISTICS – MVR05D-V SERIES

Part Number	Varistor DC Voltage	Max. Allowable Voltage		Max. Clamping Voltage		Surge Withstanding Current		Max. Energy	Rated Power	Typical Cap	Dimension	
	VDC@1mA	ACrms	VDC	Vc	IP	1 time	15 times	10/1Kμs	(W)	@1kHz	T Max	e ±1.0
	(V)	(V)	(V)	(V)	(A)	(A)	(A)	(J)		(pF)		
MVR05D201KV	200(180~220)	130	170	355	5	800	250	17.5	0.25	70	3.3	1.5
MVR05D221KV	220(198~242)	140	180	380	5	800	250	19	0.25	60	3.4	1.6
MVR05D241KV	240(216~264)	150	200	415	5	800	250	21	0.25	60	3.5	1.7
MVR05D271KV	270(243~297)	175	225	475	5	800	250	24	0.25	50	3.7	1.8
MVR05D301KV	300(270~330)	195	250	505	5	800	250	26	0.25	50	3.9	1.9
MVR05D331KV	330(297~363)	215	275	585	5	800	250	28	0.25	45	4.0	2.0
MVR05D361KV	360(324~396)	230	300	620	5	800	250	32	0.25	40	4.1	2.1
MVR05D391KV	390(351~429)	250	320	675	5	800	250	35	0.25	40	4.2	2.3
MVR05D431KV	430(387~473)	275	350	745	5	800	250	40	0.25	35	4.4	2.4
MVR05D471KV	470(423~517)	300	385	810	5	800	250	42	0.25	30	4.6	2.5
MVR05D511KV	510(459~561)	320	410	878	5	800	250	45	0.25	30	4.8	2.6
MVR05D561KV	560(504~616)	350	460	940	5	800	250	45	0.25	30	5.0	2.8
MVR05D621KV	620(558~682)	395	510	1050	5	800	250	45	0.25	26	5.3	3.1
MVR05D681KV	680(612~748)	420	560	1120	5	800	250	48	0.25	20	5.4	3.3
MVR05D751KV	750(675~825)	465	615	1240	5	800	250	48	0.25	20	5.6	3.6

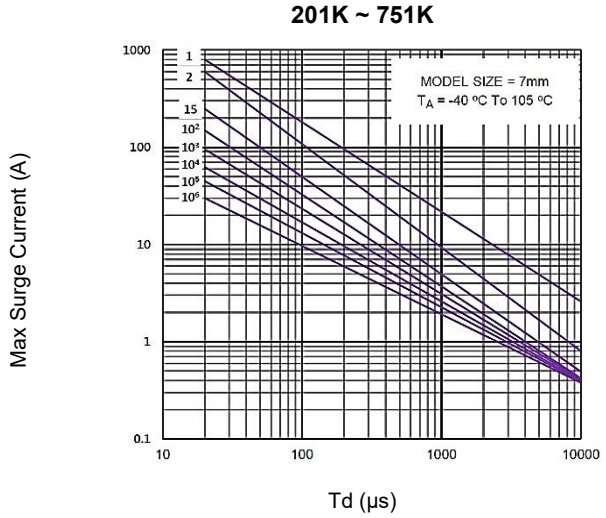
Notes: Leakage Current (@Max.Allowable V_{DC}):I_R≤20μA

ELECTRICAL CHARACTERISTICS –MVR07D-V SERIES

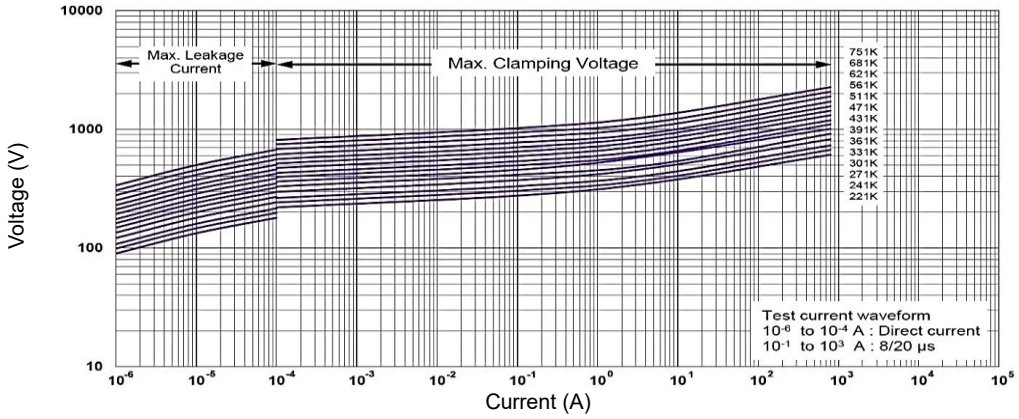
Part Number	Varistor DC Voltage	Max. Allowable Voltage		Max. Clamping Voltage		Surge Withstanding Current		Max. Energy	Rated Power	Typical Cap	Dimension	
	VDC@1mA	ACrms	VDC	Vc	IP	1 time	15 times	10/1Kμs	(W)	@1kHz	T Max	e ±1.0
	(V)	(V)	(V)	(V)	(A)	(A)	(A)	(J)		(pF)		
MVR07D201KV	200(180~220)	130	170	340	10	1800	500	17.5	0.25	200	3.5	1.5
MVR07D221KV	220(198~242)	140	180	360	10	1800	500	19	0.25	190	3.6	1.6
MVR07D241KV	240(216~264)	150	200	395	10	1800	500	21	0.25	170	3.7	1.7
MVR07D271KV	270(243~297)	175	225	455	10	1800	500	24	0.25	150	3.9	1.8
MVR07D301KV	300(270~330)	195	250	500	10	1800	500	26	0.25	140	4.1	1.9
MVR07D331KV	330(297~363)	215	275	550	10	1800	500	28	0.25	130	4.2	2.0
MVR07D361KV	360(324~396)	230	300	595	10	1800	500	32	0.25	130	4.3	2.1
MVR07D391KV	390(351~429)	250	320	650	10	1800	500	35	0.25	130	4.4	2.3
MVR07D431KV	430(387~473)	275	350	710	10	1800	500	40	0.25	120	4.6	2.4
MVR07D471KV	470(423~517)	300	385	775	10	1800	500	42	0.25	100	4.8	2.5
MVR07D511KV	510(459~561)	320	410	845	10	1800	500	45	0.25	90	5.0	2.6
MVR07D561KV	560(504~616)	350	460	915	10	1800	500	45	0.25	90	5.2	2.8
MVR07D621KV	620(558~682)	395	510	1020	10	1800	500	45	0.25	90	5.5	3.1
MVR07D681KV	680(612~748)	420	560	1120	10	1800	500	48	0.25	80	5.6	3.3
MVR07D751KV	750(675~825)	465	615	1235	10	1800	500	48	0.25	80	5.8	3.6
MVR07D781KV	780(702~858)	485	640	1290	10	1800	500	50	0.25	80	6.0	3.8
MVR07D821KV	820(738~902)	510	670	1355	10	1800	500	50	0.25	70	6.3	4.0

Notes: Leakage Current (@Max.Allowable V_{DC}):I_R≤20μA

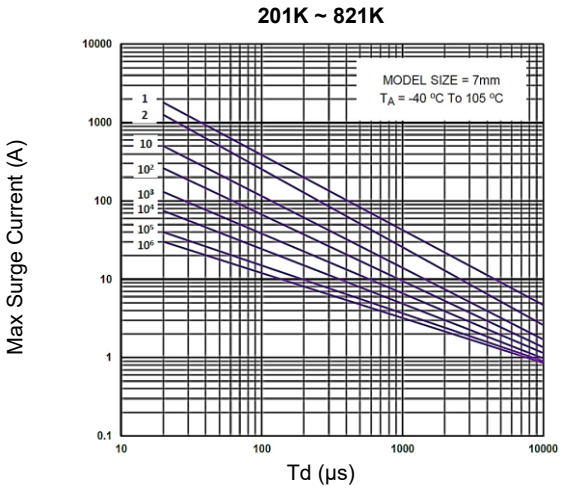
SURGE CURRENT DERATING CURVES - MVR05D-V SERIES



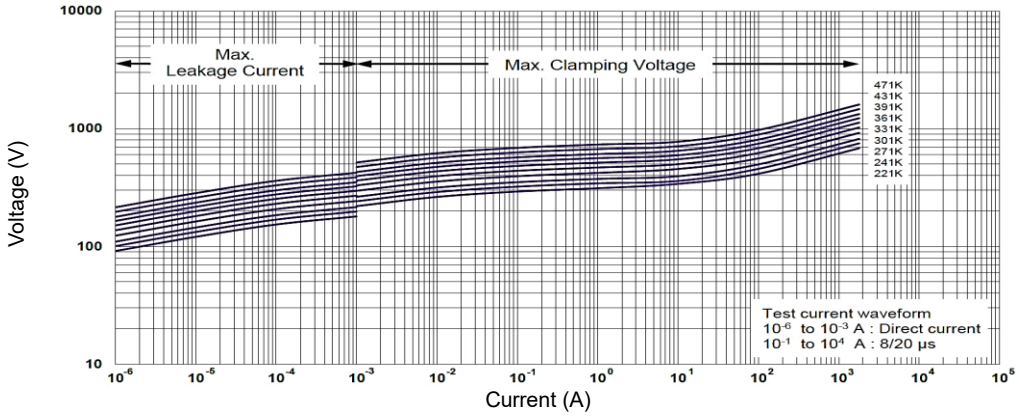
LEAKAGE CURRENT & CLAMPING VOLTAGE CURVES - MVR05D-V SERIES

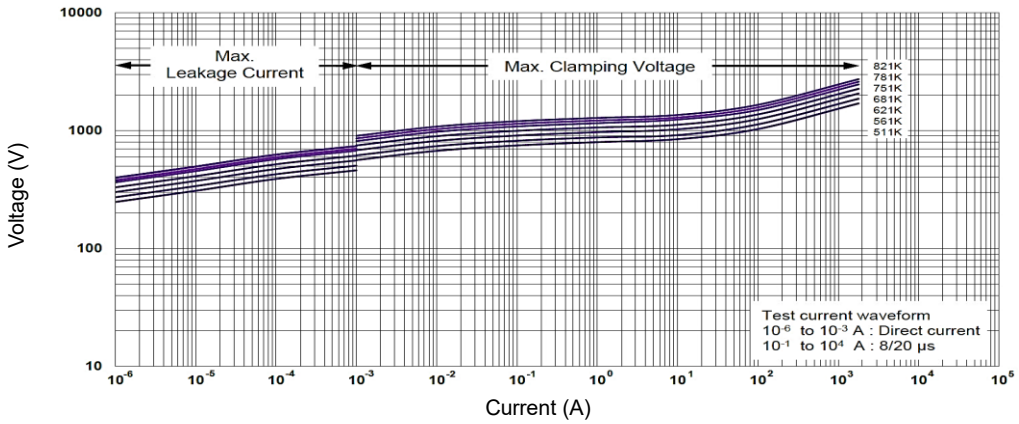


SURGE CURRENT DERATING CURVES - MVR07D-V SERIES



LEAKAGE CURRENT & CLAMPING VOLTAGE CURVES - MVR07D-V SERIES





ELECTRICAL CHARACTERISTICS - MVR10D-V SERIES

Part Number	Varistor DC Voltage	Max. Allowable Voltage		Max. Clamping Voltage		Surge Withstanding Current		Max. Energy	Rated Power	Typical Cap	Dimension	
	VDC@1mA	ACrms	VDC	Vc	IP	1 time	15 times	10/1Kμs	(W)	@1kHz	T Max	e ±1.0
	(V)	(V)	(V)	(V)	(A)	(A)	(A)	(J)		(pF)		
MVR10D201KV	200(180~220)	130	170	340	25	3500	2000	35	0.4	430	3.9	1.5
MVR10D221KV	220(198~242)	140	180	360	25	3500	2000	39	0.4	410	4.0	1.6
MVR10D241KV	240(216~264)	150	200	395	25	3500	2000	42	0.4	380	4.1	1.7
MVR10D271KV	270(243~297)	175	225	455	25	3500	2000	49	0.4	350	4.2	1.8
MVR10D301KV	300(270~330)	195	250	500	25	3500	2000	55	0.4	330	4.3	1.9
MVR10D331KV	330(297~363)	215	275	550	25	3500	2000	58	0.4	300	4.5	2.0
MVR10D361KV	360(324~396)	230	300	595	25	3500	2000	65	0.4	300	4.7	2.1
MVR10D391KV	390(351~429)	250	320	650	25	3500	2000	70	0.4	300	4.8	2.3
MVR10D431KV	430(387~473)	275	350	710	25	3500	2000	80	0.4	270	5.0	2.4
MVR10D471KV	470(423~517)	300	385	775	25	3500	2000	85	0.4	230	5.2	2.5
MVR10D511KV	510(459~561)	320	410	845	25	3500	2000	92	0.4	210	5.3	2.6
MVR10D561KV	560(504~616)	350	460	915	25	3500	2000	92	0.4	200	5.5	2.8
MVR10D621KV	620(558~682)	395	510	1020	25	3500	2000	95	0.4	180	5.7	3.1
MVR10D681KV	680(612~748)	420	560	1120	25	3500	2000	98	0.4	150	5.8	3.3
MVR10D751KV	750(675~825)	465	615	1235	25	3500	2000	100	0.4	140	6.0	3.6
MVR10D781KV	780(702~858)	485	540	1290	25	3500	2000	100	0.4	140	6.3	3.8
MVR10D821KV	820(738~902)	510	670	1355	25	3500	2000	110	0.4	140	6.5	4.0
MVR10D911KV	910(819~1001)	550	745	1500	25	3500	2000	130	0.4	130	6.6	4.3
MVR10D102KV	1000(900~1100)	625	825	1650	25	3500	2000	140	0.4	130	7.0	4.6
MVR10D112KV	1100(990~1210)	680	895	1815	25	3500	2000	155	0.4	120	7.4	5.2

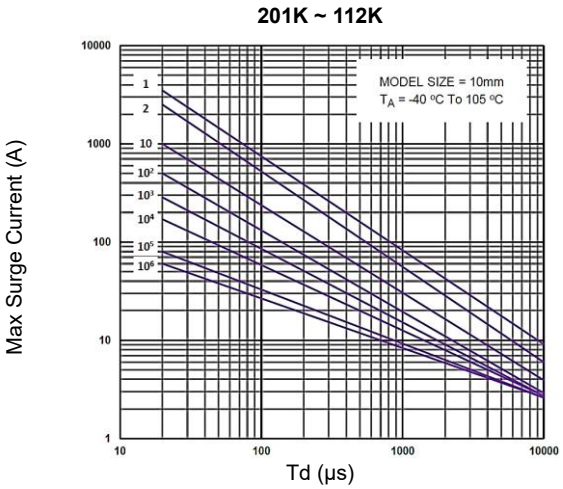
Notes: Leakage Current (@Max.Allowable V_{DC}):I_R≤20μA

ELECTRICAL CHARACTERISTICS - MVR14D-V SERIES

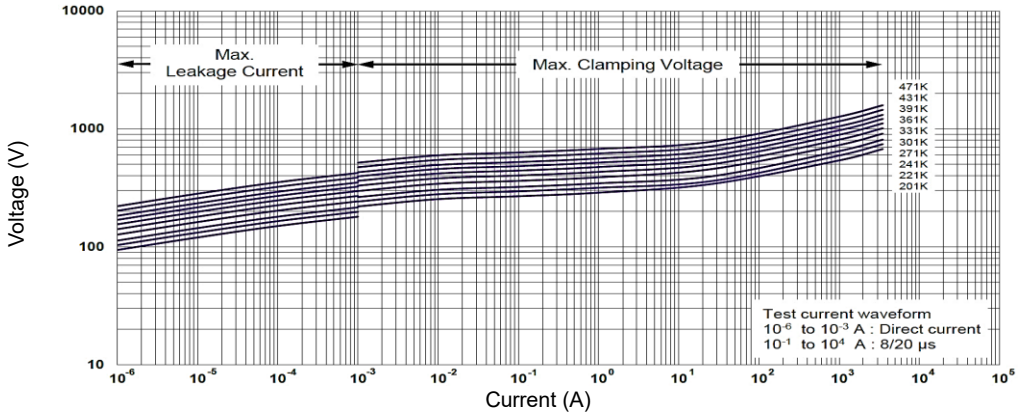
Part Number	Varistor DC Voltage	Max. Allowable Voltage		Max. Clamping Voltage		Surge Withstanding Current		Max. Energy	Rated Power	Typical Cap	Dimension	
	VDC@1mA	ACrms	VDC	Vc	IP	1 time	15 times	10/1Kμs	(W)	@1kHz	T Max	e ±1.0
	(V)	(V)	(V)	(V)	(A)	(A)	(A)	(J)		(pF)		
MVR14D201KV	200(180~220)	130	170	340	50	6000	3000	84	0.6	770	4.0	1.5
MVR14D221KV	220(198~242)	140	180	360	50	6000	3000	91	0.6	740	4.1	1.6
MVR14D241KV	240(216~264)	150	200	395	50	6000	3000	98	0.6	700	4.2	1.7
MVR14D271KV	270(243~297)	175	225	455	50	6000	3000	112	0.6	640	4.3	1.8
MVR14D301KV	300(270~330)	195	250	500	50	6000	3000	123	0.6	600	4.4	1.9
MVR14D331KV	330(297~363)	215	275	550	50	6000	3000	133	0.6	580	4.6	2.0
MVR14D361KV	360(324~396)	230	300	595	50	6000	3000	147	0.6	540	4.8	2.1
MVR14D391KV	390(351~429)	250	320	650	50	6000	3000	161	0.6	500	4.9	2.3
MVR14D431KV	430(387~473)	275	350	710	50	6000	3000	182	0.6	450	5.1	2.4
MVR14D471KV	470(423~517)	300	385	775	50	6000	3000	196	0.6	400	5.3	2.5
MVR14D511KV	510(459~561)	320	410	845	50	6000	3000	210	0.6	350	5.4	2.6
MVR14D561KV	560(504~616)	350	460	915	50	6000	3000	231	0.6	350	5.6	2.8
MVR14D621KV	620(558~682)	395	510	1020	50	6000	3000	252	0.6	330	5.8	3.1
MVR14D681KV	680(612~748)	420	560	1120	50	6000	3000	266	0.6	310	5.9	3.3
MVR14D751KV	750(675~825)	465	615	1235	50	6000	3000	280	0.6	300	6.1	3.6
MVR14D781KV	780(702~858)	485	640	1290	50	6000	3000	280	0.6	300	6.4	3.8
MVR14D821KV	820(738~902)	510	670	1355	50	6000	3000	280	0.6	270	6.6	4.0
MVR14D911KV	910(819~1001)	550	745	1500	50	6000	3000	308	0.6	260	6.7	4.3
MVR14D102KV	1000(900~1100)	625	825	1650	50	6000	3000	336	0.6	250	7.1	4.6
MVR14D112KV	1100(990~1210)	680	895	1815	50	6000	3000	364	0.6	240	7.5	5.2

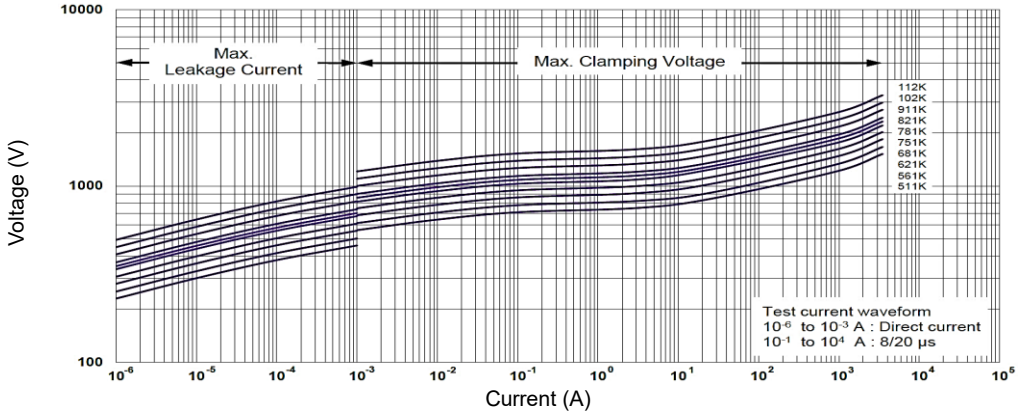
Notes: Leakage Current (@Max.Allowable V_{DC}):I_R≤20μA

SURGE CURRENT DERATING CURVES – MVR10D-V SERIES



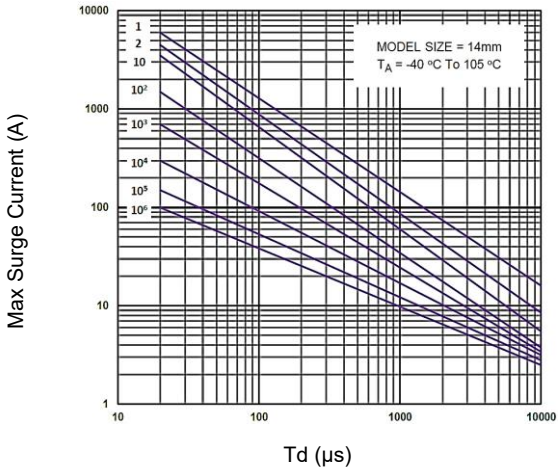
LEAKAGE CURRENT & CLAMPING VOLTAGE CURVES– MVR10D-V SERIES



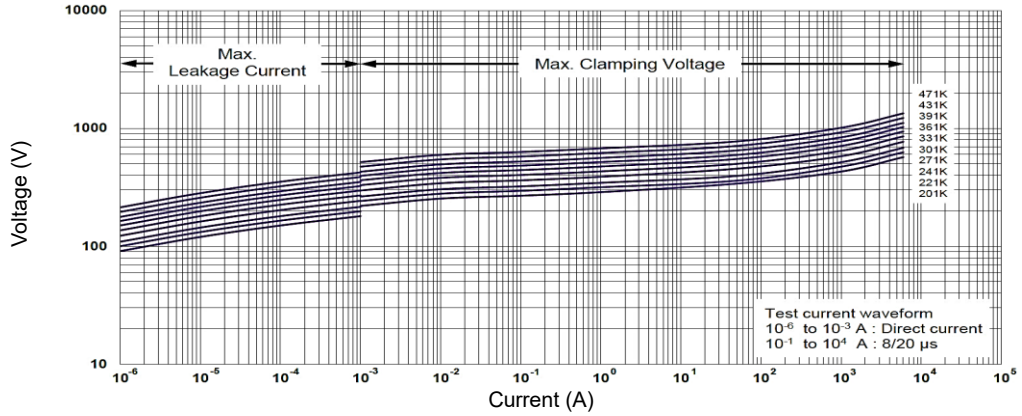


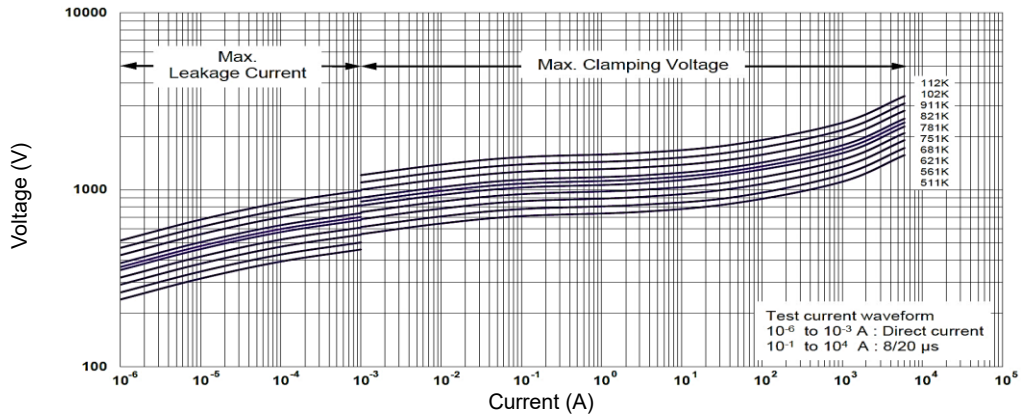
SURGE CURRENT DERATING CURVES –MVR14D-V SERIES

201K ~ 821K



LEAKAGE CURRENT & CLAMPING VOLTAGE CURVES– MVR14D-V SERIES





ELECTRICAL CHARACTERISTICS - MVR18D-V SERIES

Part Number	Varistor DC Voltage	Max. Allowable Voltage		Max. Clamping Voltage		Surge Withstanding Current		Max. Energy	Rated Power	Typical Cap	Dimension	
	VDC@1mA	ACrms	VDC	Vc	IP	1 time	15 times	10/1Kμs	(W)	@1kHz	T Max	e ±1.0
	(V)	(V)	(V)	(V)	(A)	(A)	(A)	(J)		(pF)		
MVR18D201KV	200(180~220)	130	170	340	75	9000	5000	112	1	1350	4.2	1.5
MVR18D221KV	220(198~242)	140	180	360	75	9000	5000	124	1	1290	4.3	1.6
MVR18D241KV	240(216~264)	150	200	395	75	9000	5000	136	1	1200	4.4	1.7
MVR18D271KV	270(243~297)	175	225	455	75	9000	5000	152	1	1100	4.5	1.8
MVR18D301KV	300(270~330)	195	250	500	75	9000	5000	172	1	1030	4.6	1.9
MVR18D331KV	330(297~363)	215	275	550	75	9000	5000	182	1	1000	4.8	2.0
MVR18D361KV	360(324~396)	230	300	595	75	9000	5000	204	1	930	5.0	2.1
MVR18D391KV	390(351~429)	250	320	650	75	9000	5000	220	1	870	5.1	2.3
MVR18D431KV	430(387~473)	275	350	710	75	9000	5000	242	1	780	5.3	2.4
MVR18D471KV	470(423~517)	300	385	775	75	9000	5000	280	1	710	5.5	2.5
MVR18D511KV	510(459~561)	320	410	845	75	9000	5000	305	1	630	5.6	2.6
MVR18D561KV	560(504~616)	350	460	915	75	9000	5000	305	1	620	5.8	2.8
MVR18D621KV	620(558~682)	395	510	1020	75	9000	5000	320	1	600	6.0	3.1
MVR18D681KV	680(612~748)	420	560	1120	75	9000	5000	360	1	580	6.1	3.3
MVR18D751KV	750(675~825)	465	615	1235	75	9000	5000	360	1	550	6.3	3.6
MVR18D781KV	780(702~858)	485	640	1290	75	9000	5000	450	1	480	6.6	3.8
MVR18D821KV	820(738~902)	510	670	1355	75	9000	5000	450	1	460	6.8	4.0
MVR18D911KV	910(819~1001)	550	745	1500	75	9000	5000	480	1	450	6.9	4.3
MVR18D102KV	1000(900~1100)	625	825	1650	75	9000	5000	480	1	430	7.3	4.6
MVR18D112KV	1100(990~1210)	680	895	1815	75	9000	5000	500	1	410	7.7	5.2

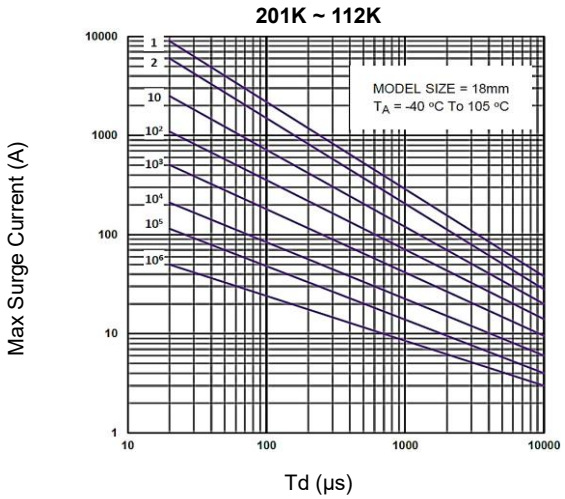
Notes: Leakage Current (@Max.Allowable V_{DC}):I_R≤20μA

ELECTRICAL CHARACTERISTICS - MVR20D-V SERIES

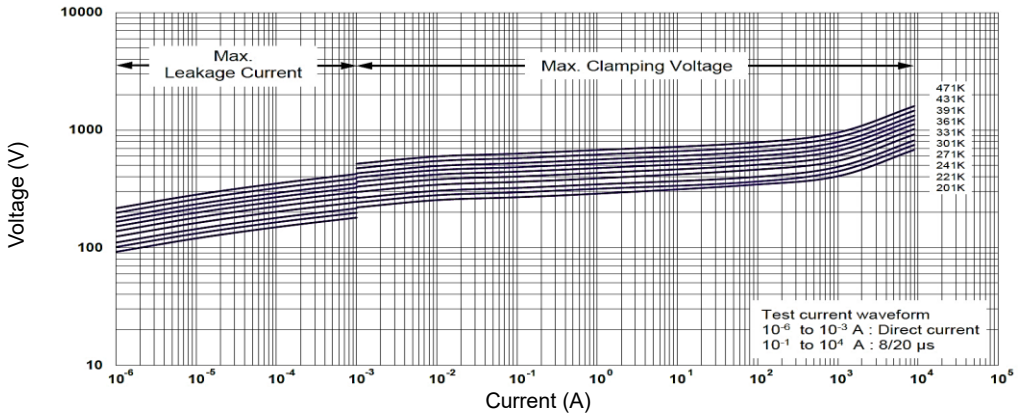
Part Number	Varistor DC Voltage	Max. Allowable Voltage		Max. Clamping Voltage		Surge Withstanding Current		Max. Energy	Rated Power	Typical Cap	Dimension	
	VDC@1mA	ACrms	VDC	Vc	IP	1 time	15 times	10/1Kμs	(W)	@1kHz	T Max	e ±1.0
	(V)	(V)	(V)	(V)	(A)	(A)	(A)	(J)		(pF)		
MVR20D201KV	200(180~220)	130	170	340	100	10000	5000	140	1	1700	4.3	1.5
MVR20D221KV	220(198~242)	140	180	360	100	10000	5000	155	1	1600	4.4	1.6
MVR20D241KV	240(216~264)	150	200	395	100	10000	5000	170	1	1500	4.5	1.7
MVR20D271KV	270(243~297)	175	225	455	100	10000	5000	190	1	1300	4.6	1.8
MVR20D301KV	300(270~330)	195	250	500	100	10000	5000	215	1	1200	4.7	1.9
MVR20D331KV	330(297~363)	215	275	550	100	10000	5000	228	1	1100	4.9	2.0
MVR20D361KV	360(324~396)	230	300	595	100	10000	5000	255	1	1100	5.1	2.1
MVR20D391KV	390(351~429)	250	320	650	100	10000	5000	275	1	1100	5.2	2.3
MVR20D431KV	430(387~473)	275	350	710	100	10000	5000	303	1	1000	5.4	2.4
MVR20D471KV	470(423~517)	300	385	775	100	10000	5000	350	1	900	5.6	2.5
MVR20D511KV	510(459~561)	320	410	845	100	10000	5000	382	1	800	5.7	2.6
MVR20D561KV	560(504~616)	350	460	915	100	10000	5000	382	1	750	5.9	2.8
MVR20D621KV	620(558~682)	395	510	1020	100	10000	5000	400	1	570	6.1	3.1
MVR20D681KV	680(612~748)	420	560	1120	100	10000	5000	420	1	550	6.2	3.3
MVR20D751KV	750(675~825)	465	615	1235	100	10000	5000	420	1	530	6.4	3.6
MVR20D781KV	780(702~858)	485	640	1290	100	10000	5000	440	1	500	6.7	3.8
MVR20D821KV	820(738~902)	510	670	1355	100	10000	5000	460	1	500	6.9	4.0
MVR20D911KV	910(819~1001)	550	745	1500	100	10000	5000	510	1	480	7.0	4.3
MVR20D102KV	1000(900~1100)	625	825	1650	100	10000	5000	565	1	460	7.4	4.6
MVR20D112KV	1100(990~1210)	680	895	1815	100	10000	5000	620	1	400	7.9	5.2

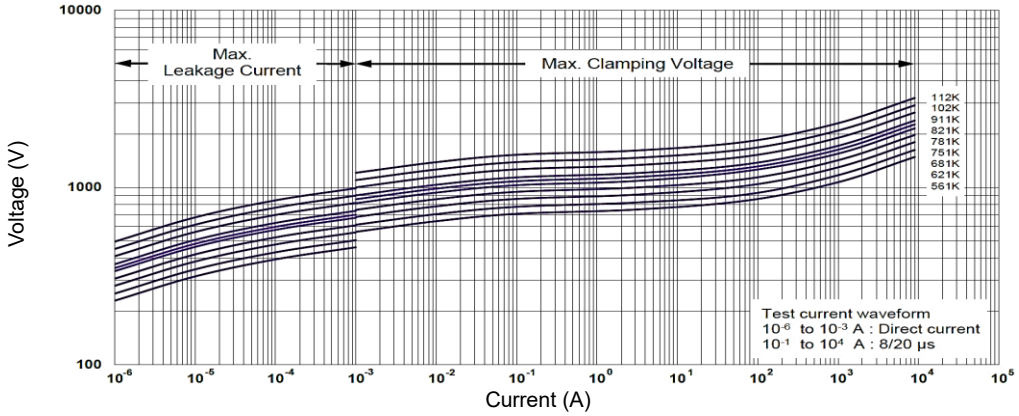
Notes: Leakage Current (@Max.Allowable V_{DC}):I_R≤20μA

SURGE CURRENT DERATING CURVES – MVR18D-V SERIES



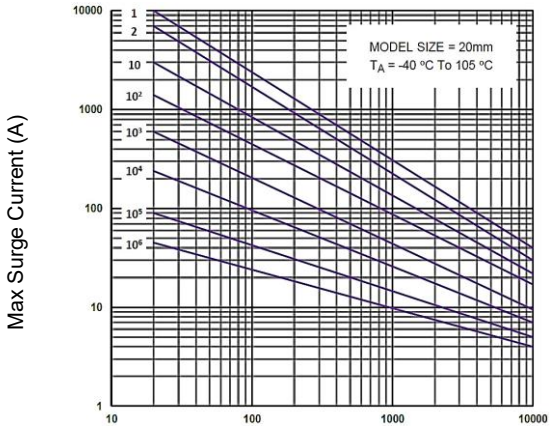
LEAKAGE CURRENT & CLAMPING VOLTAGE CURVES– MVR18D-V SERIES



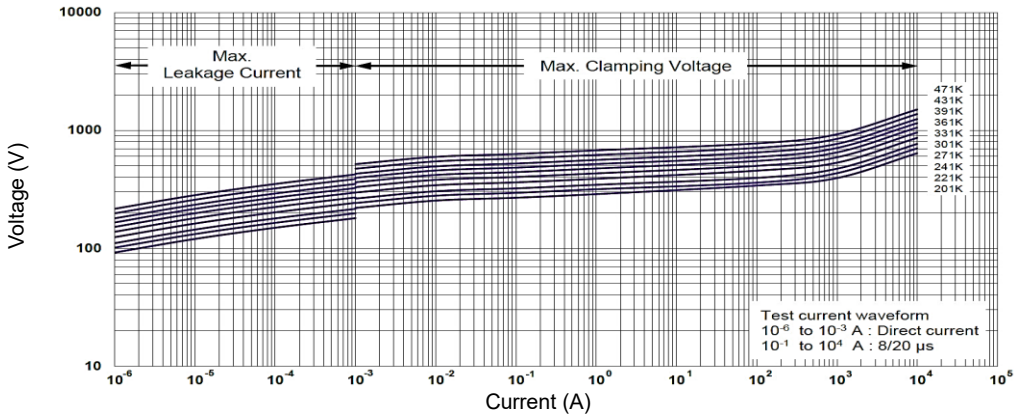


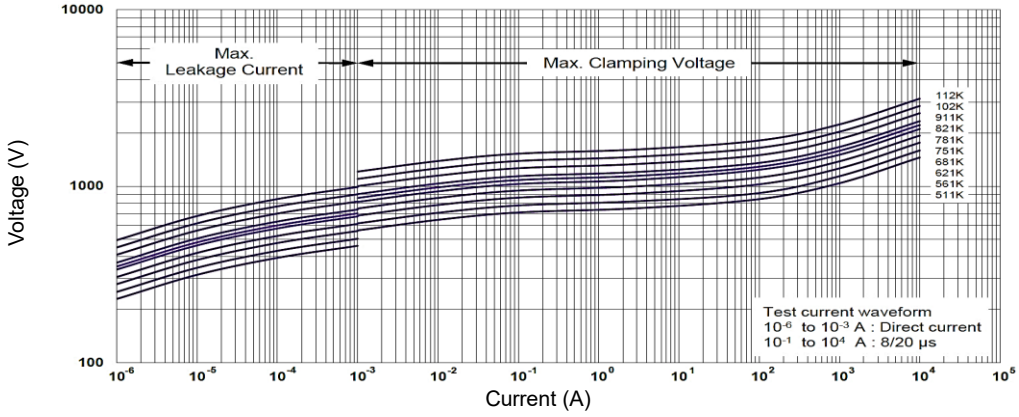
SURGE CURRENT DERATING CURVES –MVR20D-V SERIES

201K ~ 112K



LEAKAGE CURRENT & CLAMPING VOLTAGE CURVES– MVR20D-V SERIES





RELIABILITY TEST CONDITIONS AND REQUIREMENTS

Item	Standard	Test Conditions / Method	Specifications
Strength of Terminals Tensile	IEC 60068-2-21	Gradually apply the specified force and keep the unit fixed for 10±1s. Diameter (mm) | d≦0.8 | 0.8<d≦1.0 Force (Kg) | 1.0 | 2.0	|△V1mA /V1mA| ≦5% No visible damage
Strength of Terminals Bending	IEC 60068-2-21	Hold specimen and apply the force specified below to each lead. End the specimen to 90°, and then return to the original position. Repeat the procedure in the opposite direction. Diameter (mm) | d≦0.8 | 0.8<d≦1.0 Force (Kg) | 0.5 | 1.0	|△V1mA /V1mA| ≦5% No visible damage
Vibration	IEC 60068-2-6	Frequency range: 10 ~ 55 Hz, Amplitude: 0.75mm or 98 m/s2 Direction: 3 mutually perpendicular directions, 2 hrs. each.	|△V1mA /V1mA| ≦5% No visible damage
Solderability	IEC 60068-2-20	Temperature: 235±5°C, Duration: 2±0.5 sec	At least 95% of Coverage
Resistance to Soldering Heat	IEC 60068-2-20	Temperature: 260±5°C, Duration: 10±1 sec	|△V1mA /V1mA| ≦5% No visible damage
High Temperature Storage	IEC 60068-2-2	Temperature: 125±2°C, Duration: 1000 hrs.	
Low Temperature Storage	IEC 60068-2-1	Temperature: -40±2°C, Duration: 1000 hrs.	
Damp Heat, Steady State	IEC 60068-2-78	Temperature: 40±2°C, 90~95%RH, Duration: 1000 hrs at max. allowable voltage	|△V1mA /V1mA| ≦10% No visible damage
Rapid Change of Temperature	IEC 60068-2-14	The conditions shown below shall be repeated 5 cycles. Step | Temperature (°C) | Period (minutes) 1 | -40±3 | 30±3 2 | Room temperature | 5±3 3 | 125±3 | 30±3 4 | Room temperature | 5±3	|△V1mA /V1mA| ≦5% No visible damage
High Temperature Load Life	MIL-STD-202 Method 108	Temperature: 105±2°C Duration: 1000 hrs. at Max allowable AC Voltage	|△V1mA /V1mA| ≦10% No visible damage
Surge Life, 8/20μs	IEC 61051-1	8/20μS waveform,10 surge currents, unipolar, interval 30secs, amplitude corresponding to max. surge current derating curves for 20μS	|△V1mA /V1mA| ≦10% No visible damage
Surge Life, 10/1000μs	IEC 61051-1	10/1000μS waveform,10 surge currents, unipolar, interval 2mins, amplitude corresponding to max. surge current derating curves for 1000μS	|△V1mA /V1mA| ≦10% No visible damage
Voltage Proof	IEC 61051-1	Metal balls method, 2500 VAC 1 min	No visible damage
Varistor Voltage Temperature Coefficient	Specification Standard	$\frac{V_{1mA}\ at\ 85°C - V_{1mA}at\ 25°C}{V_{1mA}\ at\ 25°C} X \frac{1}{80} X\ 100(\%/°C)$ $\frac{V_{1mA}\ at - 40°C - V_{1mA}at\ 25°C}{V_{1mA}\ at\ 25°C} X \frac{1}{65} X\ 100(\%/°C)$	-0.05≤ TC ≤0.05(%/° C)

SOLDERING RECOMMENDATION

Wave Soldering Process	Condition
Peak Temperature	266°C (max.)
Dipping Time	10 sec. (max.)
Soldering	1 time

Soldering Iron Process	Condition
Temperature of Soldering Iron-tip	360°C (max.)
Soldering Time	3 sec. (max.)
Distance From Varistor	2 mm (min.)