

SPECIFICATION

No: WM-S08-010

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DIVISION	DATE ISSUED	SPEC.NO.
TECHNOLOGY. DERT	JUNE, 01,2011	WM-S08-010B01

Leaded Varistors Standar D Type

Construction

- Round varistor element, leaded
- Coating: epoxy resin, flame-retardant to UL 94 V-0
- Terminals : tinned copper wire

Features

- Wide operating voltage range 11... 1100Vrms
- Coating: epoxy resin, flame-retardant to UL 94 V-0
- Terminals : tinned copper wire

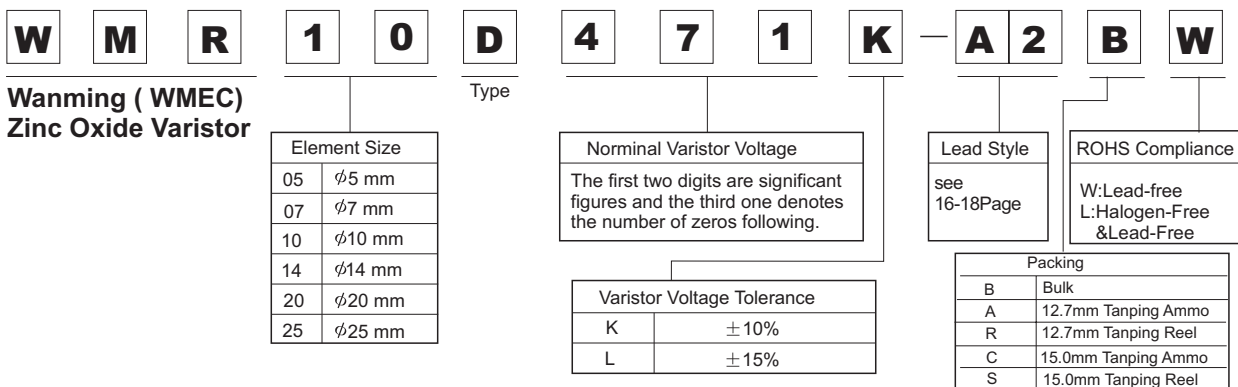
Recommended Applications

- Transistor, diode, IC, thyristor or triac semiconductor protection
- Surge protection in industrial power plant operations
- Relay or electromagnetic valve surge absorption
- Surge absorption applications in broadcasting, communications devices, traffic/railroad, agricultural facilities, waterworks
- Surge protection of automatic control devices for power distribution line

Applicable Standard

Certificated Body	Standard No.	Recognition No	Marking
VDE(Germany)	IEC 61051-1:2007-04	40026612	
UL(USA)	UL1449	E324781	
UL(USA)	UI1414	E221839	
CSA(Canada)	CAN/CSA-CSS.2	2143044	


Explanation of part Number



05D Series

■ Ratings and Characteristics

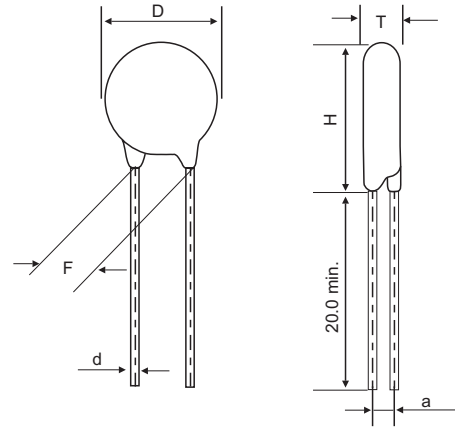
- Operating Temperature Range : -40 to 85°C
- Storage Temperature Range : -40 to 125°C
- Temperature Coefficient Of Varistor Voltage : 0 to - 0.05%/°C

Part No.	Varistor Voltage	Maximum Allowable Voltage		Clamping Voltage (max.)	Maximun Peak Current (8/20us)		Rated Power (W)	Maximun Energy (Joule)		Typical Capacitance (Reference)	
	V _{1.0mA} (V)	AC rms (V)	DC (V)	V _{5A} (V)	1time (A)	2times (A)		10/1000 us	2ms	@1KHz(pF)	
WMR05D180L	18 (15.5-21)	11	14	• 40	100	50	0.01	0.4	0.3	1400	
WMR05D220K	22 (20-24)	14	18	• 48	100	50	0.01	0.5	0.4	1150	
WMR05D270K	27 (24-30)	17	22	• 60	100	50	0.01	0.6	0.5	930	
WMR05D330K	33 (30-36)	20	26	• 73	100	50	0.01	0.8	0.6	760	
WMR05D390K	39 (35-43)	25	31	• 86	100	50	0.01	0.9	0.8	640	
WMR05D470K	47 (42-52)	30	38	•104	100	50	0.01	1.1	1.0	530	
WMR05D560K	56 (50-62)	35	45	•123	100	50	0.01	1.3	1.0	450	
WMR05D680K	68 (61-75)	40	56	•150	100	50	0.01	1.6	1.2	370	
WMR05D820K	82 (74-90)	50	65	145	400	200	0.10	2.5	1.7	300	
WMR05D101K	100 (90-110)	60	85	175	400	200	0.10	3.0	2.0	250	
WMR05D121K	120 (108-132)	75	100	210	400	200	0.10	4.0	2.5	210	
WMR05D151K	150 (135-165)	95	125	260	400	200	0.10	4.8	3.0	165	
WMR05D181K	180 (162-198)	115	150	320	400	200	0.10	5.9	3.6	140	
WMR05D201K	200 (185-225)	130	170	355	400	200	0.10	6.5	4.0	125	
WMR05D221K	220 (198-242)	140	180	380	400	200	0.10	7.0	4.5	110	
WMR05D241K	240 (216-264)	150	200	415	400	200	0.10	8.0	5.0	100	
WMR05D271K	270 (243-297)	175	225	475	400	200	0.10	8.5	6.0	95	
WMR05D301K	300 (270-330)	190	250	520	400	200	0.10	9.0	6.5	85	
WMR05D331K	330 (297-363)	210	275	570	400	200	0.10	9.5	7.0	75	
WMR05D361K	360 (324-396)	230	300	620	400	200	0.10	10.0	7.5	70	
WMR05D391K	390 (351-429)	250	320	675	400	200	0.10	12.0	8.0	65	
WMR05D431K	430 (387-473)	275	350	745	400	200	0.10	13.0	9.0	60	
WMR05D471K	470 (423-517)	300	385	810	400	200	0.10	15.0	10	55	
WMR05D511K	510 (459-561)	320	415	845	400	200	0.10	16.0	11	50	
WMR05D561K	560 (504-616)	350	460	920	400	200	0.10	16.0	11	45	

- The clamping voltage from 180L to 680K is tested with current 1A.

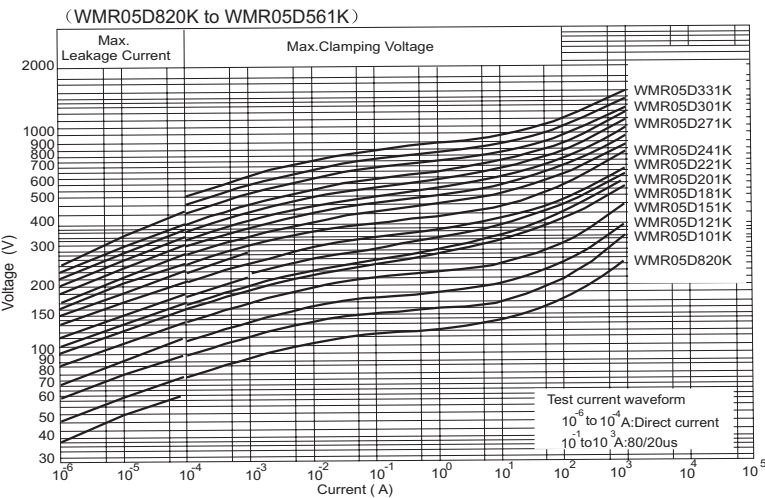
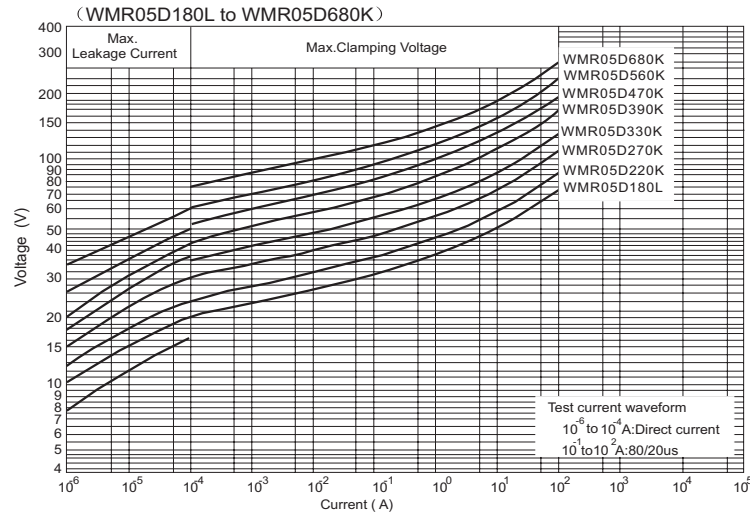
■ Dimensions in mm

Part No.	D max.	T max.	F	H max.	a	d
WMR05D180L	7.5	4.5	5.0±1.0	10.0	1.5±1.0	0.55±0.05
WMR05D220K	7.5	4.5	5.0±1.0	10.0	1.5±1.0	0.55±0.05
WMR05D270K	7.5	4.5	5.0±1.0	10.0	1.5±1.0	0.55±0.05
WMR05D330K	7.5	4.5	5.0±1.0	10.0	1.5±1.0	0.55±0.05
WMR05D390K	7.5	4.5	5.0±1.0	10.0	1.5±1.0	0.55±0.05
WMR05D470K	7.5	4.5	5.0±1.0	10.0	1.5±1.0	0.55±0.05
WMR05D560K	7.5	5.0	5.0±1.0	10.0	1.8±1.0	0.55±0.05
WMR05D680K	7.5	5.2	5.0±1.0	10.0	2.3±1.0	0.55±0.05
WMR05D820K	7.5	4.1	5.0±1.0	10.0	1.5±1.0	0.55±0.05
WMR05D101K	7.5	4.3	5.0±1.0	10.0	1.5±1.0	0.55±0.05
WMR05D121K	7.5	4.5	5.0±1.0	10.0	1.8±1.0	0.55±0.05
WMR05D151K	7.5	4.8	5.0±1.0	10.0	1.6±1.0	0.55±0.05
WMR05D181K	7.5	4.3	5.0±1.0	10.0	1.6±1.0	0.55±0.05
WMR05D201K	7.5	4.4	5.0±1.0	10.0	1.6±1.0	0.55±0.05
WMR05D221K	7.5	4.5	5.0±1.0	10.0	1.7±1.0	0.55±0.05
WMR05D241K	7.5	4.6	5.0±1.0	10.0	1.7±1.0	0.55±0.05
WMR05D271K	7.5	4.9	5.0±1.0	10.0	1.9±1.0	0.55±0.05
WMR05D301K	7.5	5.0	5.0±1.0	10.0	1.9±1.0	0.55±0.05
WMR05D331K	7.5	5.1	5.0±1.0	10.0	1.9±1.0	0.55±0.05
WMR05D361K	7.5	5.2	5.0±1.0	10.0	2.4±1.0	0.55±0.05
WMR05D391K	7.5	5.4	5.0±1.0	10.0	2.6±1.0	0.55±0.05
WMR05D431K	7.5	5.7	5.0±1.0	10.0	2.7±1.0	0.55±0.05
WMR05D471K	7.5	6.0	5.0±1.0	10.0	2.8±1.0	0.55±0.05
WMR05D511K	7.5	6.0	5.0±1.0	10.0	3.0±1.0	0.55±0.05
WMR05D561K	7.5	6.0	5.0±1.0	10.0	3.2±1.0	0.55±0.05

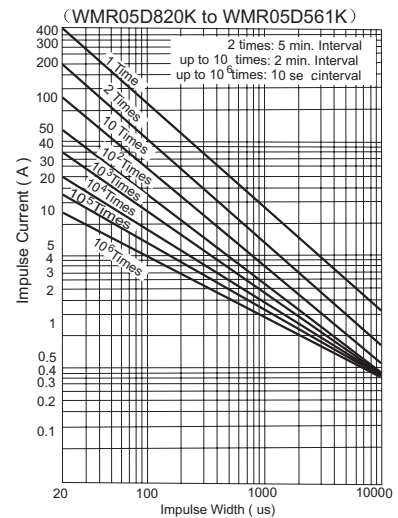
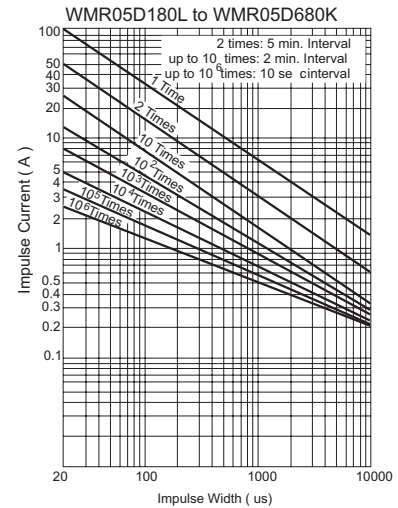


■ Typical Characteristics

● Voltage vs. Current




● Impulse Lifetime Ratings



07D Series

■ Ratings and Characteristics

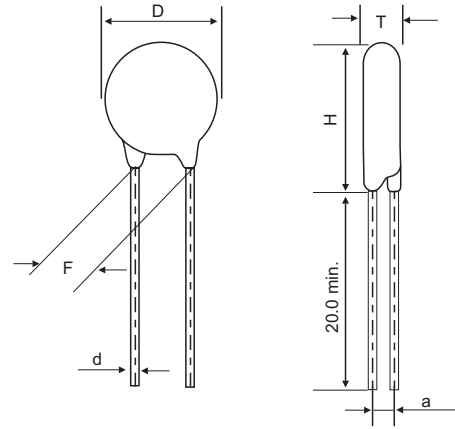
- Operating Temperature Range : -40 to 85°C
- Storage Temperature Range : -40 to 125°C
- Temperature Coefficient Of Varistor Voltage : 0 to -0.05%/°C

Part No.	Varistor Voltage	Maximum Allowable Voltage		Clamping Voltage (max.)	Maximum Peak Current (8/20us)		Rated Power (W)	Maximum Energy (Joule)		Typical Capacitance (Reference)	
	V _{1mA} (V)	AC rms (V)	DC (V)	V _{10A} (V)	1time (A)	2times (A)		10/1000 us	2ms	@1KHz(pF)	
WMR07D180L	18 (16-21)	11	14	• 36	250	125	0.02	0.9	0.8	2800	
WMR07D220K	22 (20-24)	14	18	• 43	250	125	0.02	1.1	0.9	2300	
WMR07D270K	27 (24-30)	17	22	• 53	250	125	0.02	1.4	1.0	1800	
WMR07D330K	33 (30-36)	20	26	• 65	250	125	0.02	1.7	1.2	1500	
WMR07D390K	39 (35-43)	25	31	• 77	250	125	0.02	2.1	1.5	1300	
WMR07D470K	47 (42-52)	30	38	• 93	250	125	0.02	2.5	1.8	1100	
WMR07D560K	56 (50-62)	35	45	•110	250	125	0.02	3.1	2.2	890	
WMR07D680K	68 (61-75)	40	56	•135	250	125	0.02	3.6	2.5	740	
WMR07D820K	82 (74-90)	50	65	135	1200	600	0.25	5.5	3.5	600	
WMR07D101K	100 (90-110)	60	85	165	1200	600	0.25	6.5	4.0	500	
WMR07D121K	120 (108-132)	75	100	200	1200	600	0.25	7.8	5.0	420	
WMR07D151K	150 (135-165)	95	125	250	1200	600	0.25	9.7	6.0	330	
WMR07D181K	180 (162-198)	115	150	300	1200	600	0.25	11.7	8.5	280	
WMR07D201K	200 (185-225)	130	170	340	1200	600	0.25	13.0	10.0	250	
WMR07D221K	220 (198-242)	140	180	360	1200	600	0.25	14.0	10.0	230	
WMR07D241K	240 (216-264)	150	200	395	1200	600	0.25	15.0	10.0	210	
WMR07D271K	270 (243-297)	175	225	455	1200	600	0.25	18.0	12.0	185	
WMR07D301K	300 (270-330)	190	250	500	1200	600	0.25	20.0	13.0	165	
WMR07D331K	330 (297-363)	210	275	550	1200	600	0.25	23.0	14.0	150	
WMR07D361K	360 (324-396)	230	300	595	1200	600	0.25	25.0	15.0	140	
WMR07D391K	390 (351-429)	250	320	650	1200	600	0.25	25.0	17.0	130	
WMR07D431K	430 (387-473)	275	350	710	1200	600	0.25	28.0	20.0	115	
WMR07D471K	470 (423-517)	300	385	775	1200	600	0.25	30.0	20.0	105	
WMR07D511K	510 (459-561)	320	415	845	1200	600	0.25	30.0	20.0	100	
WMR07D561K	560 (504-616)	350	460	930	1200	600	0.25	30.0	20.0	90	
WMR07D621K	620 (558-682)	385	505	1025	1200	600	0.25	33.0	22.0	80	
WMR07D681K	680 (612-748)	420	560	1120	1200	600	0.25	33.0	22.0	75	

● The clamping voltage from 180K to 680K is tested with current 2.5A.

■ Dimensions in mm

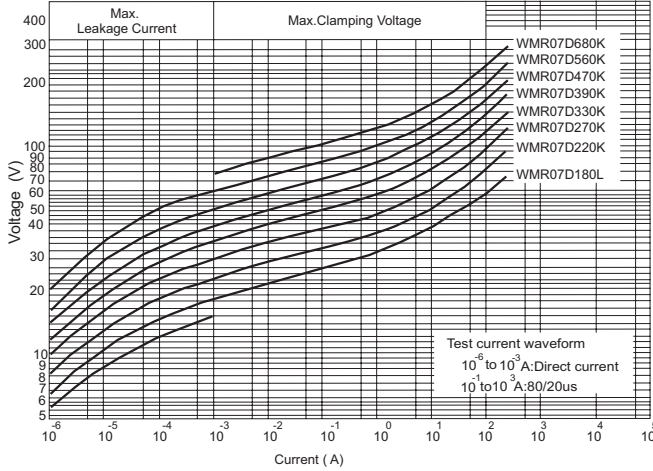
Part No.	D max.	T max.	F	H max.	a	d
WMR07D180L	9.0	4.5	5.0±1.0	13.0	1.5±1.0	0.55±0.05
WMR07D220K	9.0	4.6	5.0±1.0	13.0	1.5±1.0	0.55±0.05
WMR07D270K	9.0	4.7	5.0±1.0	13.0	1.5±1.0	0.55±0.05
WMR07D330K	9.0	4.9	5.0±1.0	13.0	1.6±1.0	0.55±0.05
WMR07D390K	9.0	4.8	5.0±1.0	13.0	1.8±1.0	0.55±0.05
WMR07D470K	9.0	4.9	5.0±1.0	13.0	1.8±1.0	0.55±0.05
WMR07D560K	9.0	5.0	5.0±1.0	13.0	2.0±1.0	0.55±0.05
WMR07D680K	9.0	5.2	5.0±1.0	13.0	2.3±1.0	0.55±0.05
WMR07D820K	9.0	4.1	5.0±1.0	13.0	1.5±1.0	0.55±0.05
WMR07D101K	9.0	4.3	5.0±1.0	13.0	1.5±1.0	0.55±0.05
WMR07D121K	9.0	4.5	5.0±1.0	13.0	1.5±1.0	0.55±0.05
WMR07D151K	9.0	4.8	5.0±1.0	13.0	1.8±1.0	0.55±0.05
WMR07D181K	9.0	4.3	5.0±1.0	13.0	1.6±1.0	0.55±0.05
WMR07D201K	9.0	4.4	5.0±1.0	13.0	1.6±1.0	0.55±0.05
WMR07D221K	9.0	4.5	5.0±1.0	13.0	1.7±1.0	0.55±0.05
WMR07D241K	9.0	4.6	5.0±1.0	13.0	1.9±1.0	0.55±0.05
WMR07D271K	9.0	4.9	5.0±1.0	13.0	2.0±1.0	0.55±0.05
WMR07D301K	9.0	5.0	5.0±1.0	13.0	2.1±1.0	0.55±0.05
WMR07D331K	9.0	5.1	5.0±1.0	13.0	2.1±1.0	0.55±0.05
WMR07D361K	9.0	5.2	5.0±1.0	13.0	2.5±1.0	0.55±0.05
WMR07D391K	9.0	5.4	5.0±1.0	13.0	2.6±1.0	0.55±0.05
WMR07D431K	9.0	5.7	5.0±1.0	13.0	2.9±1.0	0.55±0.05
WMR07D471K	9.0	6.0	5.0±1.0	13.0	2.9±1.0	0.55±0.05
WMR07D511K	9.0	6.0	5.0±1.0	13.0	3.0±1.0	0.55±0.05
WMR07D561K	9.0	6.0	5.0±1.0	13.0	3.2±1.0	0.55±0.05
WMR07D621K	9.0	7.1	5.0±1.0	13.0	3.3±1.0	0.55±0.05
WMR07D681K	9.0	7.3	5.0±1.0	13.0	3.4±1.0	0.55±0.05



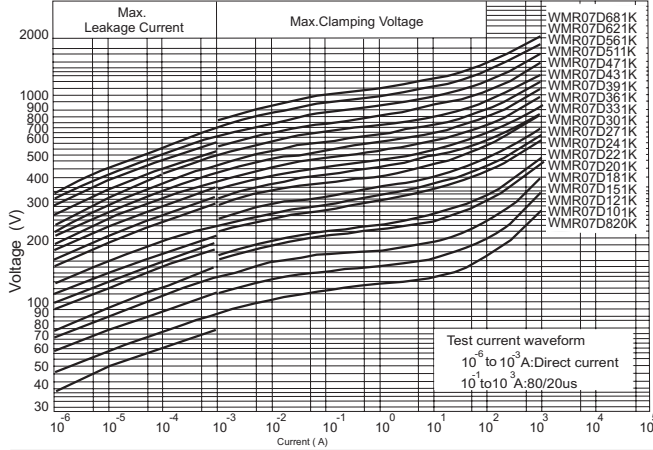
■ Typical Characteristics

● Voltage vs. Current

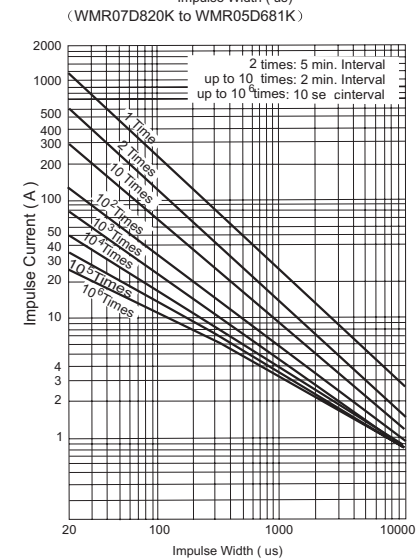
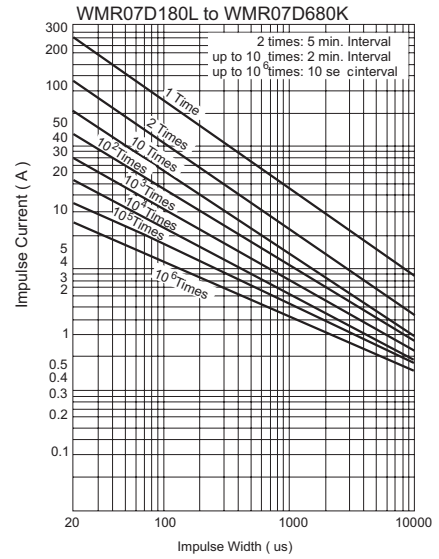
(WMR07D180L to WMR07D680K)



(WMR07D820K to WMR05D681K)




● Impulse Lifetime Ratings



10D Series

■ Ratings and Characteristics

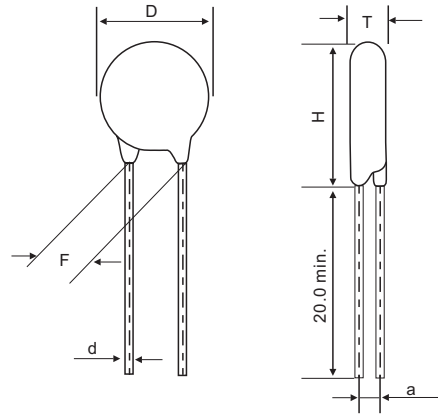
- Operating Temperature Range : -40 to 85°C
- Storage Temperature Range : -40 to 125°C
- Temperature Coefficient Of Varistor Voltage : 0 to -0.05%/°C

Part No.	Varistor Voltage	Maximum Allowable Voltage		Clamping Voltage (max.)	Maximum Peak Current (8/20us)		Rated Power (W)	Maximum Energy (Joule)		Typical Capacitance (Reference) @1KHz(pF)	
	V _{1mA} (V)	AC rms (V)	DC (V)	V _{25A} (V)	1time (A)	2times (A)		10/1000 us	2ms		
WMR10D180L	18 (16-21)	11	14	• 36	500	250	0.05	2.1	1.5	5600	
WMR10D220K	22 (20-24)	14	18	• 43	500	250	0.05	2.5	2.0	4500	
WMR10D270K	27 (24-30)	17	22	• 53	500	250	0.05	3.0	2.5	3700	
WMR10D330K	33 (30-36)	20	26	• 65	500	250	0.05	4.0	3.0	3000	
WMR10D390K	39 (35-43)	25	31	• 77	500	250	0.05	4.6	3.5	2400	
WMR10D470K	47 (42-52)	30	38	• 93	500	250	0.05	5.5	4.5	2100	
WMR10D560K	56 (50-62)	35	45	• 110	500	250	0.05	7.0	5.5	1800	
WMR10D680K	68 (61-75)	40	56	• 135	500	250	0.05	8.2	6.5	1500	
WMR10D820K	82 (74-90)	50	65	135	2500	1250	0.4	12.0	8.0	1200	
WMR10D101K	100 (90-110)	60	85	165	2500	1250	0.4	15.0	10.0	1000	
WMR10D121K	120 (108-132)	75	100	200	2500	1250	0.4	18.0	12.0	830	
WMR10D151K	150 (135-165)	95	125	250	2500	1250	0.4	22.0	16.0	670	
WMR10D181K	180 (162-198)	115	150	300	2500	1250	0.4	27.0	18.5	560	
WMR10D201K	200 (185-225)	130	170	340	2500	1250	0.4	30.0	20.0	500	
WMR10D221K	220 (198-242)	140	180	360	2500	1250	0.4	32.0	23.0	450	
WMR10D241K	240 (216-264)	150	200	395	2500	1250	0.4	35.0	25.0	420	
WMR10D271K	270 (243-297)	175	225	455	2500	1250	0.4	40.0	30.0	370	
WMR10D301K	300 (270-330)	190	250	500	2500	1250	0.4	40.0	32.0	330	
WMR10D331K	330 (297-363)	210	275	550	2500	1250	0.4	43.0	34.0	300	
WMR10D361K	360 (324-396)	230	300	595	2500	1250	0.4	47.0	35.0	280	
WMR10D391K	390 (351-429)	250	320	650	2500	1250	0.4	60.0	40.0	260	
WMR10D431K	430 (387-473)	275	350	710	2500	1250	0.4	65.0	45.0	230	
WMR10D471K	470 (423-517)	300	385	775	2500	1250	0.4	70.0	45.0	210	
WMR10D511K	510 (459-561)	320	415	845	2500	1250	0.4	70.0	45.0	200	
WMR10D561K	560 (504-616)	350	460	925	2500	1250	0.4	70.0	45.0	180	
WMR10D621K	620 (558-682)	385	505	1025	2500	1250	0.4	70.0	45.0	160	
WMR10D681K	680 (612-748)	420	560	1120	2500	1250	0.4	70.0	45.0	150	
WMR10D751K	750 (675-825)	460	615	1240	2500	1250	0.4	75.0	50.0	130	
WMR10D781K	780 (702-858)	485	640	1290	2500	1250	0.4	80.0	50.0	130	
WMR10D821K	820 (738-902)	510	670	1355	2500	1250	0.4	85.0	55.0	120	
WMR10D911K	910 (819-1001)	550	745	1500	2500	1250	0.4	93.0	60.0	110	
WMR10D102K	1000 (900-1100)	625	825	1650	2500	1250	0.4	102.0	65.0	100	
WMR10D112K	1100 (990-1210)	680	895	1815	2500	1250	0.4	115.0	70.0	90	

● The clamping voltage from 180K to 680K is tested with current 5A.

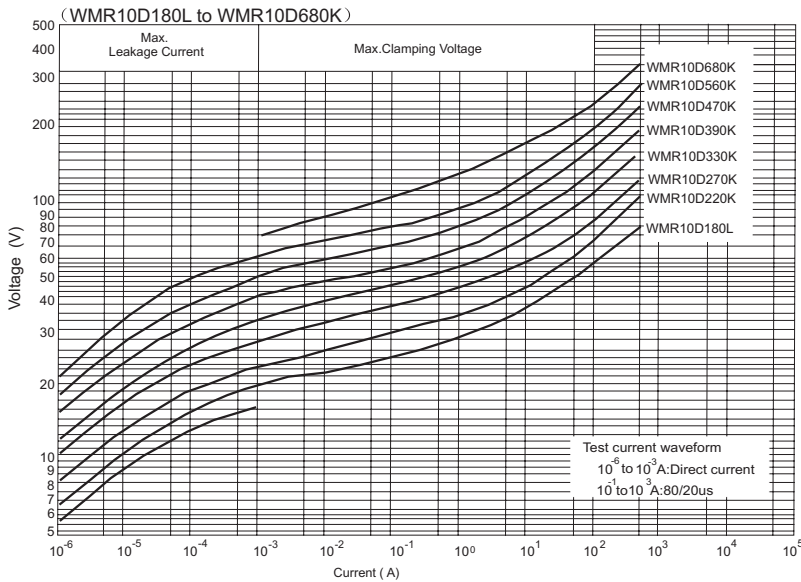
■ Dimensions in mm

Part No.	D max.	T max.	F	H max.	a	d
WMR10D180L	12.5	4.6	7.5±1.0	17.0	1.4±1.0	0.8±0.05
WMR10D220K	12.5	4.7	7.5±1.0	17.0	1.5±1.0	0.8±0.05
WMR10D270K	12.5	4.8	7.5±1.0	17.0	1.5±1.0	0.8±0.05
WMR10D330K	12.5	5.0	7.5±1.0	17.0	1.6±1.0	0.8±0.05
WMR10D390K	12.5	5.3	7.5±1.0	17.0	1.8±1.0	0.8±0.05
WMR10D470K	12.5	5.4	7.5±1.0	17.0	1.8±1.0	0.8±0.05
WMR10D560K	12.5	5.5	7.5±1.0	17.0	2.0±1.0	0.8±0.05
WMR10D680K	12.5	5.6	7.5±1.0	17.0	2.3±1.0	0.8±0.05
WMR10D820K	12.5	4.7	7.5±1.0	17.0	1.5±1.0	0.8±0.05
WMR10D101K	12.5	4.9	7.5±1.0	17.0	1.5±1.0	0.8±0.05
WMR10D121K	12.5	5.1	7.5±1.0	17.0	1.5±1.0	0.8±0.05
WMR10D151K	12.5	5.4	7.5±1.0	17.0	1.8±1.0	0.8±0.05
WMR10D181K	12.5	5.0	7.5±1.0	17.0	1.6±1.0	0.8±0.05
WMR10D201K	12.5	5.0	7.5±1.0	17.0	1.6±1.0	0.8±0.05
WMR10D221K	12.5	5.0	7.5±1.0	17.0	1.7±1.0	0.8±0.05
WMR10D241K	12.5	5.2	7.5±1.0	17.0	1.9±1.0	0.8±0.05
WMR10D271K	12.5	5.4	7.5±1.0	17.0	2.0±1.0	0.8±0.05
WMR10D301K	12.5	5.5	7.5±1.0	17.0	2.2±1.0	0.8±0.05
WMR10D331K	12.5	5.8	7.5±1.0	17.0	2.2±1.0	0.8±0.05
WMR10D361K	12.5	6.0	7.5±1.0	17.0	2.5±1.0	0.8±0.05
WMR10D391K	12.5	6.2	7.5±1.0	17.0	2.8±1.0	0.8±0.05
WMR10D431K	12.5	6.5	7.5±1.0	17.0	3.1±1.0	0.8±0.05
WMR10D471K	12.5	6.8	7.5±1.0	17.0	3.2±1.0	0.8±0.05
WMR10D511K	12.5	6.8	7.5±1.0	17.0	3.7±1.0	0.8±0.05
WMR10D561K	12.5	6.8	7.5±1.0	17.0	4.0±1.0	0.8±0.05
WMR10D621K	12.5	7.3	7.5±1.0	17.0	4.6±1.0	0.8±0.05
WMR10D681K	12.5	7.6	7.5±1.0	17.0	5.0±1.0	0.8±0.05
WMR10D751K	12.5	8.0	7.5±1.0	17.0	5.0±1.0	0.8±0.05
WMR10D781K	12.5	8.1	7.5±1.0	17.0	5.2±1.0	0.8±0.05
WMR10D821K	12.5	8.3	7.5±1.0	17.0	5.2±1.0	0.8±0.05
WMR10D911K	12.5	8.8	7.5±1.0	17.0	6.0±1.0	0.8±0.05
WMR10D102K	12.5	9.3	7.5±1.0	17.0	6.0±1.0	0.8±0.05
WMR10D112K	12.5	9.9	7.5±1.0	17.0	6.3±1.0	0.8±0.05

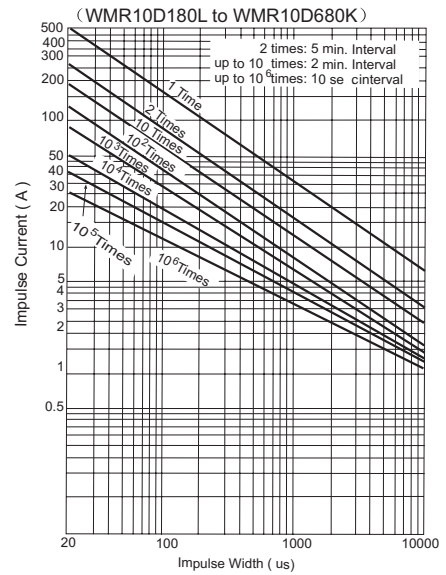


■ Typical Characteristics

● Voltage vs. Current

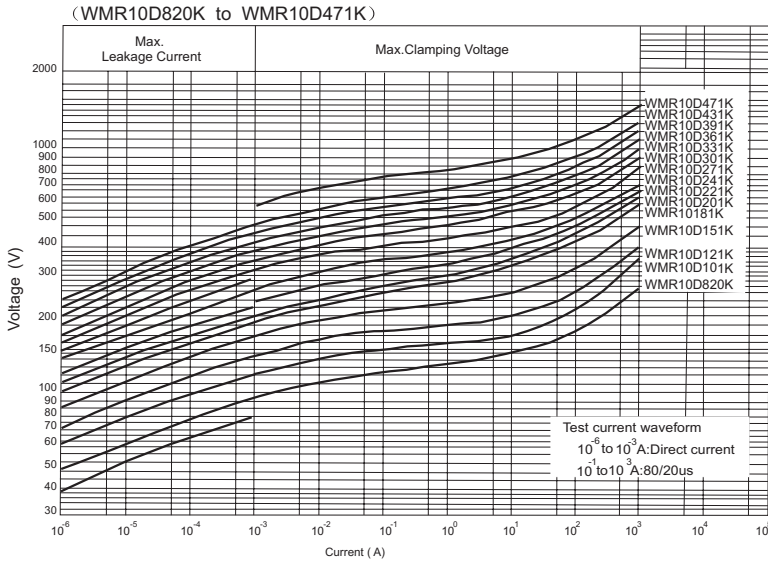


● Impulse Lifetime Ratings

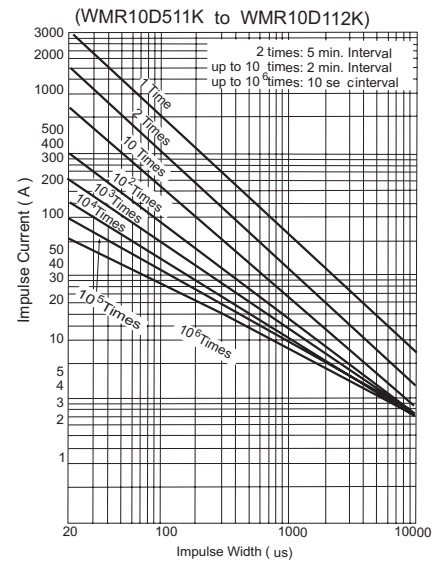
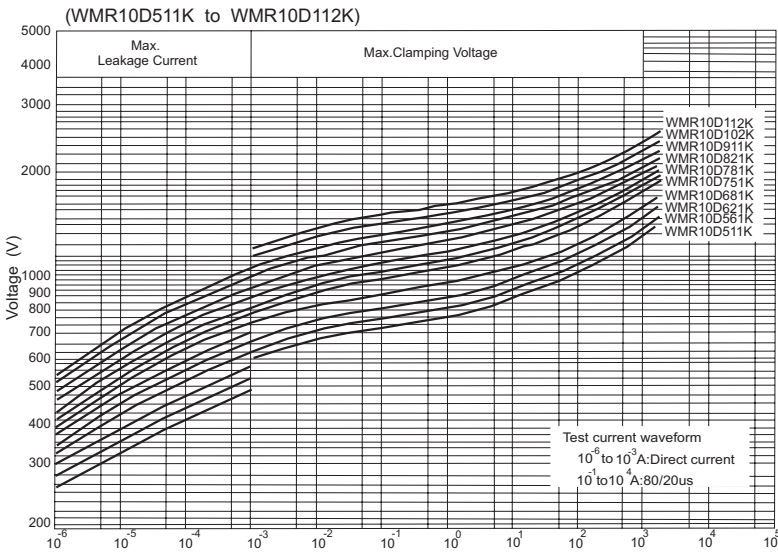
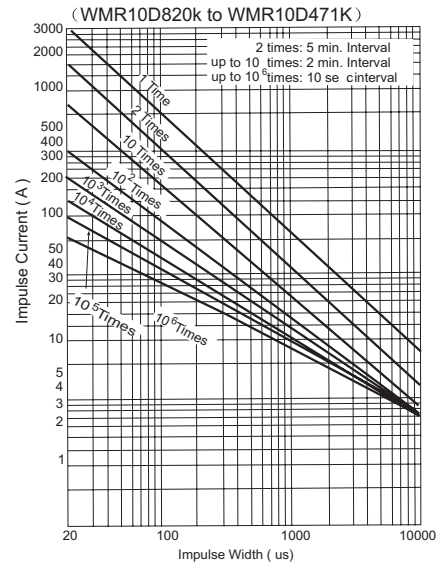


■ Typical Characteristics

● Voltage vs. Current




● Impulse Lifetime Ratings



14D Series

■ Ratings and Characteristics

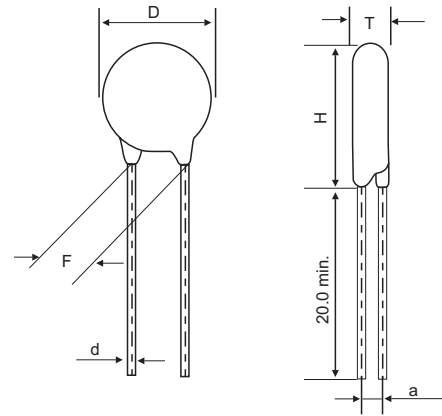
- Operating Temperature Range : -40 to 85°C
- Storage Temperature Range : -40 to 125°C
- Temperature Coefficient Of Varistor Voltage : 0 to -0.05%/°C

Part No.	Varistor Voltage	Maximum Allowable Voltage		Clamping Voltage (max.)	Maximun Peak Current (8/20us)		Rated Power (W)	Maximun Energy (Joule)		Typical Capacitance (Reference) @1KHz(pF)	
	V _{1mA} (V)	AC rms (V)	DC (V)	V _{50A} (V)	1time (A)	2times (A)		10/1000 us	2ms		
WMR14D180L	18 (16-21)	11	14	• 36	1000	500	0.10	4.0	3.5	11100	
WMR14D220K	22 (20-24)	14	18	• 43	1000	500	0.10	5.0	4.0	9100	
WMR14D270K	27 (24-30)	17	22	• 53	1000	500	0.10	6.0	5.0	7400	
WMR14D330K	33 (30-36)	20	26	• 65	1000	500	0.10	7.5	6.0	6100	
WMR14D390K	39 (35-43)	25	31	• 77	1000	500	0.10	8.6	7.0	5100	
WMR14D470K	47 (42-52)	30	38	• 93	1000	500	0.10	10.0	8.5	4300	
WMR14D560K	56 (50-62)	35	45	•110	1000	500	0.10	11.0	10.0	3600	
WMR14D680K	68 (61-75)	40	56	•135	1000	500	0.10	14.0	12.0	2900	
WMR14D820K	82 (74-90)	50	65	135	4500	2500	0.60	22.0	14.0	2400	
WMR14D101K	100 (90-110)	60	85	165	4500	2500	0.60	28.0	18.0	2000	
WMR14D121K	120 (108-132)	75	100	200	4500	2500	0.60	32.0	20.0	1700	
WMR14D151K	150 (135-165)	95	125	250	4500	2500	0.60	40.0	25.0	1300	
WMR14D181K	180 (162-198)	115	150	300	4500	2500	0.60	50.0	30.5	1100	
WMR14D201K	200 (185-225)	130	170	340	4500	2500	0.60	57.0	35.0	1000	
WMR14D221K	220 (198-242)	140	180	360	4500	2500	0.60	60.0	40.0	900	
WMR14D241K	240 (216-264)	150	200	395	4500	2500	0.60	63.0	40.0	830	
WMR14D271K	270 (243-297)	175	225	455	4500	2500	0.60	70.0	50.0	740	
WMR14D301K	300 (270-330)	190	250	500	4500	2500	0.60	77.0	52.0	670	
WMR14D331K	330 (297-363)	210	275	550	4500	2500	0.60	85.0	64.0	610	
WMR14D361K	360 (324-396)	230	300	595	4500	2500	0.60	93.0	65.0	560	
WMR14D391K	390 (351-429)	250	320	650	4500	2500	0.60	100.0	70.0	510	
WMR14D431K	430 (387-473)	275	350	710	4500	2500	0.60	115.0	75.0	460	
WMR14D471K	470 (423-517)	300	385	775	4500	2500	0.60	125.0	80.0	430	
WMR14D511K	510 (459-561)	320	415	845	4500	2500	0.60	125.0	80.0	390	
WMR14D561K	560 (504-616)	350	460	925	4500	2500	0.60	125.0	85.0	360	
WMR14D621K	620 (558-682)	385	505	1025	4500	2500	0.60	125.0	85.0	320	
WMR14D681K	680 (612-748)	420	560	1120	4500	2500	0.60	130.0	90.0	290	
WMR14D751K	750 (675-825)	460	615	1240	4500	2500	0.60	143.0	100.0	270	
WMR14D781K	780 (702-858)	485	640	1290	4500	2500	0.60	148.0	105.0	260	
WMR14D821K	820 (738-902)	510	670	1355	4500	2500	0.60	157.0	110.0	240	
WMR14D911K	910 (819-1001)	550	745	1500	4500	2500	0.60	175.0	120.0	220	
WMR14D102K	1000 (900-1100)	625	825	1650	4500	2500	0.60	190.0	130.0	200	
WMR14D112K	1100 (990-1210)	680	895	1815	4500	2500	0.60	213.0	140.0	180	
WMR14D182K	1800(1620-1980)	1000	1465	2970	4500	2500	0.60	337.0	240.0	130	

● The clamping voltage from 180K to 680K is tested with current 10A.

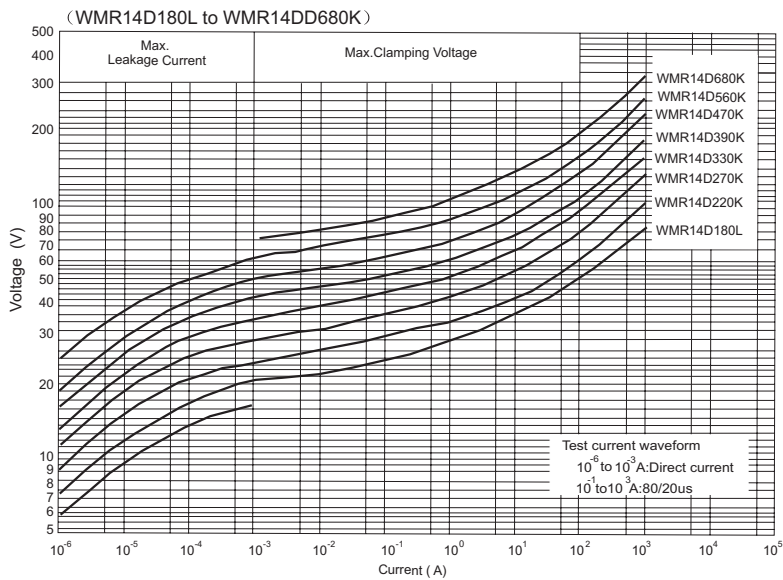
■ Dimensions in mm

Part No.	D max.	T max.	F	H max.	a	d
WMR14D180L	16.5	4.6	7.5±1.0	21.5	1.5±1.0	0.8±0.05
WMR14D220K	16.5	4.7	7.5±1.0	21.5	1.6±1.0	0.8±0.05
WMR14D270K	16.5	4.8	7.5±1.0	21.5	1.7±1.0	0.8±0.05
WMR14D330K	16.5	5.0	7.5±1.0	21.5	1.8±1.0	0.8±0.05
WMR14D390K	16.5	5.3	7.5±1.0	21.5	2.0±1.0	0.8±0.05
WMR14D470K	16.5	5.4	7.5±1.0	21.5	2.2±1.0	0.8±0.05
WMR14D560K	16.5	5.5	7.5±1.0	21.5	2.5±1.0	0.8±0.05
WMR14D680K	16.5	5.6	7.5±1.0	21.5	1.6±1.0	0.8±0.05
WMR14D820K	16.5	4.7	7.5±1.0	21.5	1.6±1.0	0.8±0.05
WMR14D101K	16.5	4.9	7.5±1.0	21.5	1.7±1.0	0.8±0.05
WMR14D121K	16.5	5.1	7.5±1.0	21.5	2.0±1.0	0.8±0.05
WMR14D151K	16.5	5.4	7.5±1.0	21.5	1.8±1.0	0.8±0.05
WMR14D181K	16.5	5.0	7.5±1.0	21.5	1.8±1.0	0.8±0.05
WMR14D201K	16.5	5.0	7.5±1.0	21.5	1.8±1.0	0.8±0.05
WMR14D221K	16.5	5.0	7.5±1.0	21.5	2.1±1.0	0.8±0.05
WMR14D241K	16.5	5.2	7.5±1.0	21.5	2.1±1.0	0.8±0.05
WMR14D271K	16.5	5.4	7.5±1.0	21.5	2.3±1.0	0.8±0.05
WMR14D301K	16.5	5.5	7.5±1.0	21.5	2.3±1.0	0.8±0.05
WMR14D331K	16.5	5.8	7.5±1.0	21.5	2.7±1.0	0.8±0.05
WMR14D361K	16.5	6.0	7.5±1.0	21.5	2.8±1.0	0.8±0.05
WMR14D391K	16.5	6.2	7.5±1.0	21.5	3.1±1.0	0.8±0.05
WMR14D431K	16.5	6.5	7.5±1.0	21.5	3.3±1.0	0.8±0.05
WMR14D471K	16.5	6.8	7.5±1.0	21.5	3.7±1.0	0.8±0.05
WMR14D511K	16.5	6.8	7.5±1.0	21.5	4.0±1.0	0.8±0.05
WMR14D561K	16.5	6.8	7.5±1.0	21.5	4.4±1.0	0.8±0.05
WMR14D621K	16.5	7.3	7.5±1.0	21.5	4.7±1.0	0.8±0.05
WMR14D681K	16.5	7.6	7.5±1.0	21.5	5.0±1.0	0.8±0.05
WMR14D751K	16.5	8.0	7.5±1.0	21.5	5.0±1.0	0.8±0.05
WMR14D781K	16.5	8.1	7.5±1.0	21.5	5.2±1.0	0.8±0.05
WMR14D821K	16.5	8.3	7.5±1.0	21.5	5.2±1.0	0.8±0.05
WMR14D911K	16.5	8.8	7.5±1.0	21.5	6.0±1.0	0.8±0.05
WMR14D102K	16.5	9.3	7.5±1.0	21.5	6.2±1.0	0.8±0.05
WMR14D112K	16.5	9.9	7.5±1.0	21.5	6.8±1.0	0.8±0.05
WMR14D182K	16.5	14.4	7.5 ±1.0	22.5	10.5±2.0	0.8±0.05

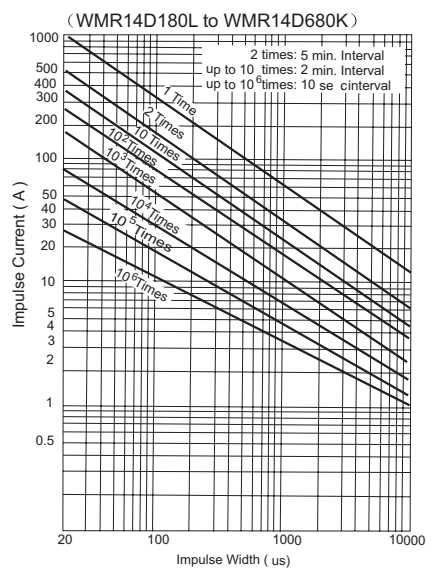


■ Typical Characteristics

● Voltage vs. Current

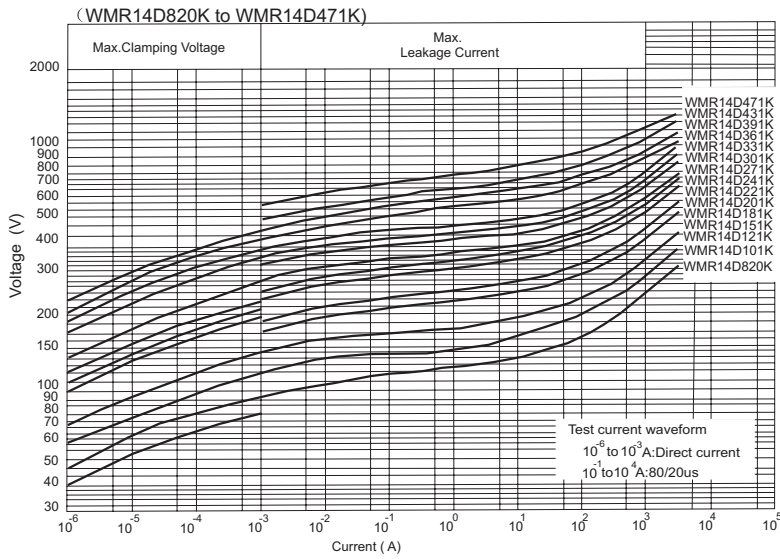


● Impulse Lifetime Ratings

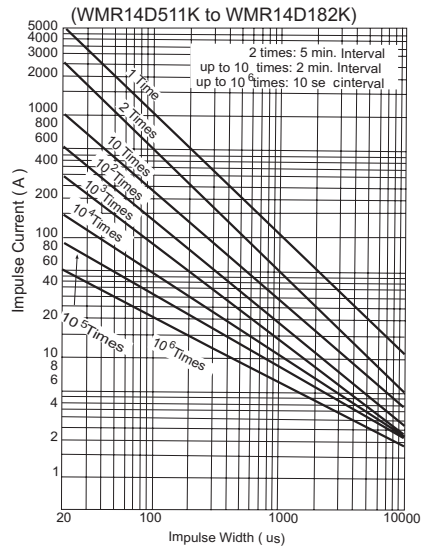
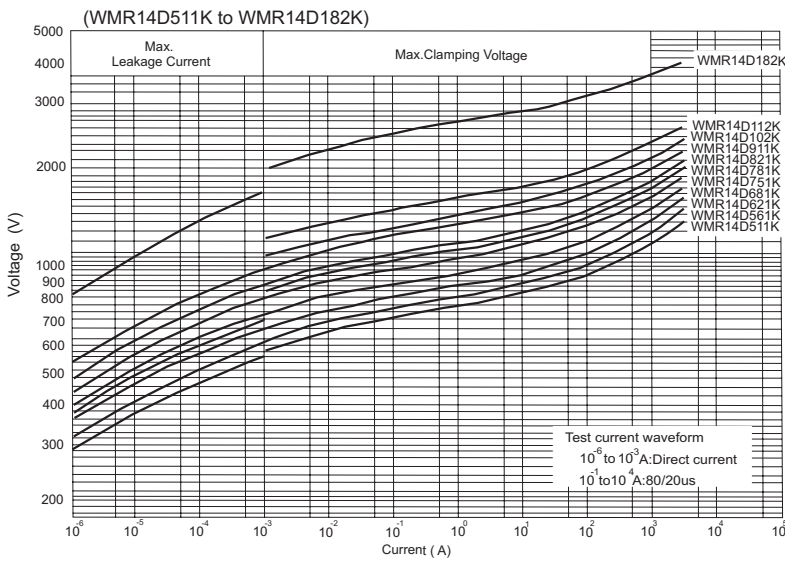
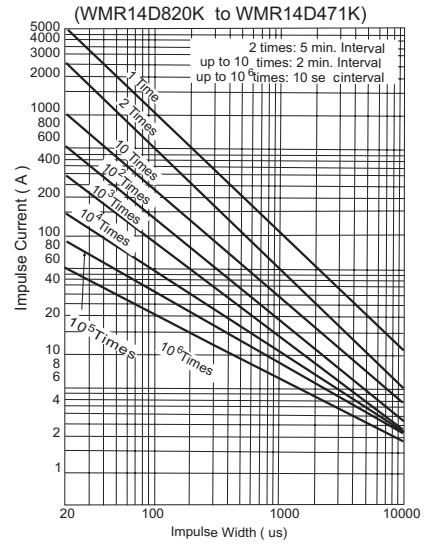


■ Typical Characteristics

● Voltage vs. Current






● Impulse Lifetime Ratings



20D Series

■ Ratings and Characteristics

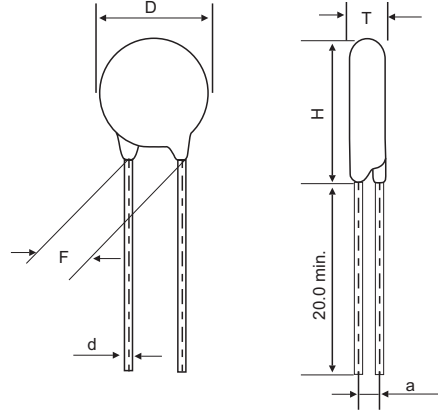
- Operating Temperature Range : -40 to 85°C
- Storage Temperature Range : -40 to 125°C
- Temperature Coefficient Of Varistor Voltage : 0 to -0.05%/°C

Part No.	Varistor Voltage	Maximum Allowable Voltage		Clamping Voltage (max.)	Maximum Peak Current (8/20us)		Rated Power (W)	Maximum Energy (Joule)		Typical Capacitance (Reference)	  
	V _{1mA} (V)	AC rms (V)	DC (V)	V _{100A} (V)	1time (A)	2times (A)		10/1000 us	2ms	@1KHz(pF)	
WMR20D180L	18(16-21)	11	14	• 36	2000	1000	0.20	11.0	10.0	28500	
WMR20D220K	22(20-24)	14	18	• 43	2000	1000	0.20	14.0	13.0	18500	
WMR20D270K	27(24-30)	17	22	• 53	2000	1000	0.20	18.0	15.0	13000	
WMR20D330K	33(30-36)	20	26	• 65	2000	1000	0.20	23.0	20.0	11500	
WMR20D390K	39(35-43)	25	31	• 77	2000	1000	0.20	26.0	24.0	8500	
WMR20D470K	47(42-52)	30	38	• 93	2000	1000	0.20	33.0	30.0	7400	
WMR20D560K	56(50-62)	35	45	• 110	2000	1000	0.20	41.0	35.0	6500	
WMR20D680K	68(61-75)	40	56	• 135	2000	1000	0.20	46.0	40.0	5800	
WMR20D820K	82(74-90)	50	65	135	6500	4500	1.00	38.0	27.0	4900	
WMR20D101K	100(90-110)	60	85	165	6500	4500	1.00	45.0	30.0	4000	
WMR20D121K	120(108-132)	75	100	200	6500	4500	1.00	55.0	40.0	3300	
WMR20D151K	150(135-165)	95	125	250	6500	4500	1.00	70.0	50.0	2700	
WMR20D181K	180(162-198)	115	150	300	6500	4500	1.00	85.0	60.0	2200	
WMR20D201K	200(185-225)	130	170	340	6500	4500	1.00	95.0	70.0	2000	
WMR20D221K	220(198-242)	140	180	360	6500	4500	1.00	100.0	75.0	1800	
WMR20D241K	240(216-264)	150	200	395	6500	4500	1.00	108.0	80.0	1650	
WMR20D271K	270(243-297)	175	225	455	6500	4500	1.00	127.0	90.0	1500	
WMR20D301K	300(270-330)	190	250	500	6500	4500	1.00	136.0	100.0	1300	
WMR20D331K	330(297-363)	210	275	550	6500	4500	1.00	150.0	110.0	1200	
WMR20D361K	360(324-396)	230	300	595	6500	4500	1.00	163.0	120.0	1100	
WMR20D391K	390(351-429)	250	320	650	6500	4500	1.00	180.0	130.0	1000	
WMR20D431K	430(387-473)	275	350	710	6500	4500	1.00	190.0	140.0	930	
WMR20D471K	470(423-517)	300	385	775	6500	4500	1.00	220.0	150.0	850	
WMR20D511K	510(459-561)	320	415	845	6500	4500	1.00	220.0	150.0	780	
WMR20D561K	560(504-616)	350	460	925	6500	4500	1.00	220.0	150.0	710	
WMR20D621K	620(558-682)	385	505	1025	6500	4500	1.00	220.0	150.0	650	
WMR20D681K	680(612-748)	420	560	1120	6500	4500	1.00	230.0	160.0	600	
WMR20D751K	750 (675-825)	460	615	1240	6500	4500	1.00	255.0	175.0	530	
WMR20D781K	780(702-858)	485	640	1290	6500	4500	1.00	265.0	180.0	510	
WMR20D821K	820(738-902)	510	670	1355	6500	4500	1.00	282.0	190.0	500	
WMR20D911K	910(819-1001)	550	745	1500	6500	4500	1.00	310.0	215.0	440	
WMR20D102K	1000(900-1100)	625	825	1650	6500	4500	1.00	342.0	230.0	400	
WMR20D112K	1100(990-1210)	680	895	1815	6500	4500	1.00	383.0	250.0	360	
WMR20D182K	1800(1620-1980)	1000	1465	2970	6500	4500	1.00	625.0	400.0	260	

● The clamping voltage from 180K to 680K is tested with current 20A.

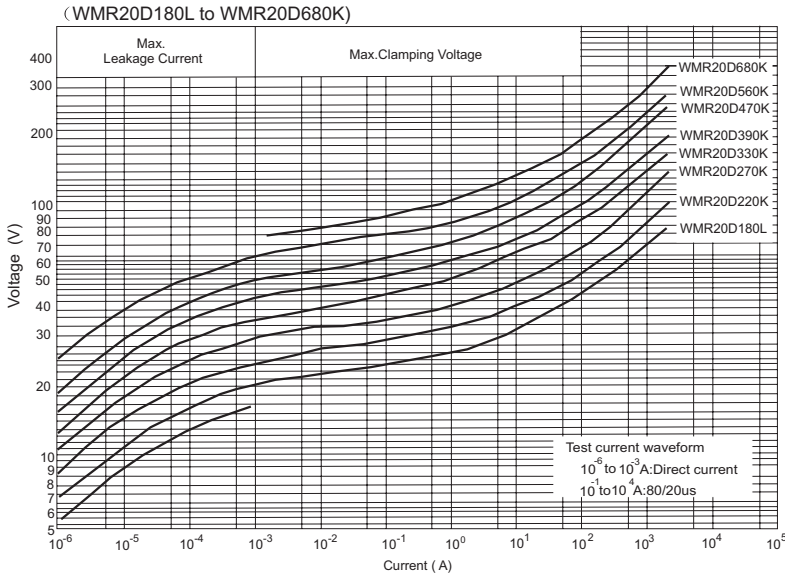
■ Dimensions in mm

Part No.	D max.	T max.	F	H max.	a	d
WMR20D180L	23.0	4.8	10.0±1.0	28.0	1.5±1.0	1.0±0.05
WMR20D220K	23.0	4.9	10.0±1.0	28.0	1.6±1.0	1.0±0.05
WMR20D270K	23.0	5.0	10.0±1.0	28.0	1.7±1.0	1.0±0.05
WMR20D330K	23.0	5.2	10.0±1.0	28.0	1.8±1.0	1.0±0.05
WMR20D390K	23.0	5.5	10.0±1.0	28.0	2.0±1.0	1.0±0.05
WMR20D470K	23.0	5.6	10.0±1.0	28.0	2.2±1.0	1.0±0.05
WMR20D560K	23.0	5.7	10.0±1.0	28.0	2.5±1.0	1.0±0.05
WMR20D680K	23.0	5.8	10.0±1.0	28.0	1.6±1.0	1.0±0.05
WMR20D820K	23.0	4.9	10.0±1.0	28.0	1.6±1.0	1.0±0.05
WMR20D101K	23.0	5.1	10.0±1.0	28.0	1.7±1.0	1.0±0.05
WMR20D121K	23.0	5.3	10.0±1.0	28.0	2.0±1.0	1.0±0.05
WMR20D151K	23.0	5.6	10.0±1.0	28.0	1.8±1.0	1.0±0.05
WMR20D181K	23.0	5.2	10.0±1.0	28.0	1.8±1.0	1.0±0.05
WMR20D201K	23.0	5.2	10.0±1.0	28.0	1.8±1.0	1.0±0.05
WMR20D221K	23.0	5.3	10.0±1.0	28.0	2.1±1.0	1.0±0.05
WMR20D241K	23.0	5.4	10.0±1.0	28.0	2.1±1.0	1.0±0.05
WMR20D271K	23.0	5.6	10.0±1.0	28.0	2.3±1.0	1.0±0.05
WMR20D301K	23.0	5.7	10.0±1.0	28.0	2.3±1.0	1.0±0.05
WMR20D331K	23.0	6.0	10.0±1.0	28.0	2.7±1.0	1.0±0.05
WMR20D361K	23.0	6.2	10.0±1.0	28.0	2.8±1.0	1.0±0.05
WMR20D391K	23.0	6.4	10.0±1.0	28.0	3.1±1.0	1.0±0.05
WMR20D431K	23.0	6.7	10.0±1.0	28.0	3.3±1.0	1.0±0.05
WMR20D471K	23.0	7.0	10.0±1.0	28.0	3.7±1.0	1.0±0.05
WMR20D511K	23.0	7.0	10.0±1.0	28.0	4.0±1.0	1.0±0.05
WMR20D561K	23.0	7.0	10.0±1.0	28.0	4.4±1.0	1.0±0.05
WMR20D621K	23.0	7.5	10.0±1.0	28.0	4.7±1.0	1.0±0.05
WMR20D681K	23.0	7.8	10.0±1.0	28.0	5.0±1.0	1.0±0.05
WMR20D751K	23.0	8.2	10.0±1.0	28.0	5.0±1.0	1.0±0.05
WMR20D781K	23.0	8.3	10.0±1.0	28.0	5.2±1.0	1.0±0.05
WMR20D821K	23.0	8.5	10.0±1.0	28.0	5.2±1.0	1.0±0.05
WMR20D911K	23.0	9.0	10.0±1.0	28.0	6.0±1.0	1.0±0.05
WMR20D102K	23.0	9.5	10.0±1.0	28.0	6.4±1.0	1.0±0.05
WMR20D112K	23.0	10.3	10.0±1.0	28.0	7.0±1.0	1.0±0.05
WMR20D182K	23.0	14.4	10.0±1.0	28.0	10.7±2.0	1.0±0.05

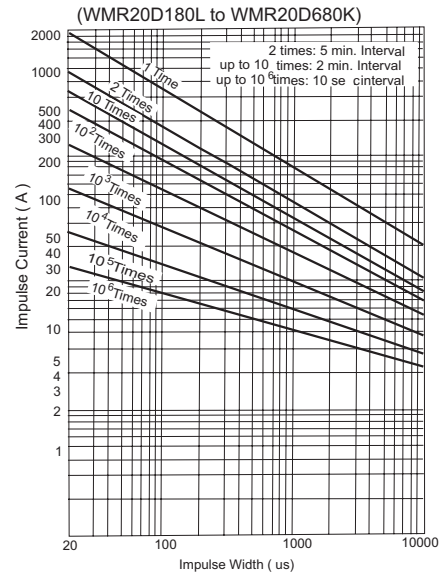


■ Typical Characteristics

● Voltage vs. Current

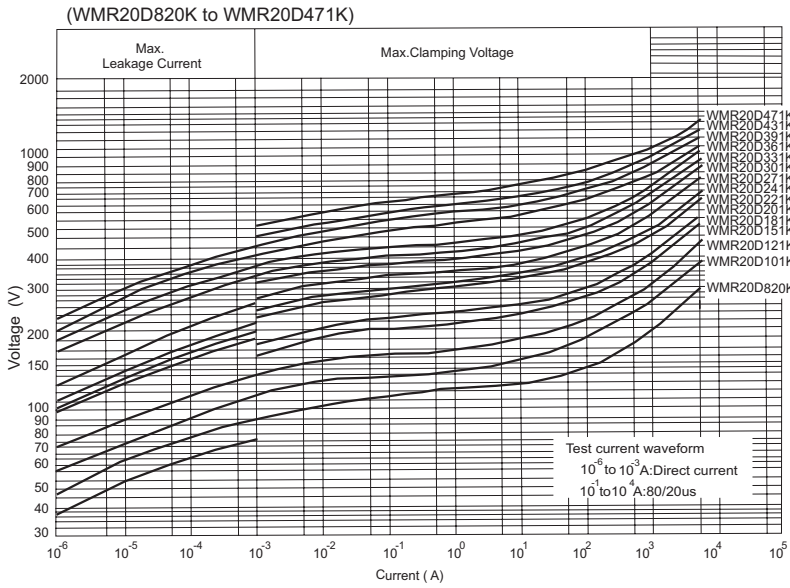


● Impulse Lifetime Ratings

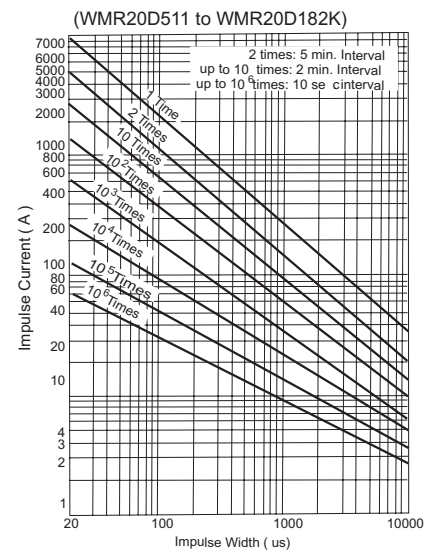
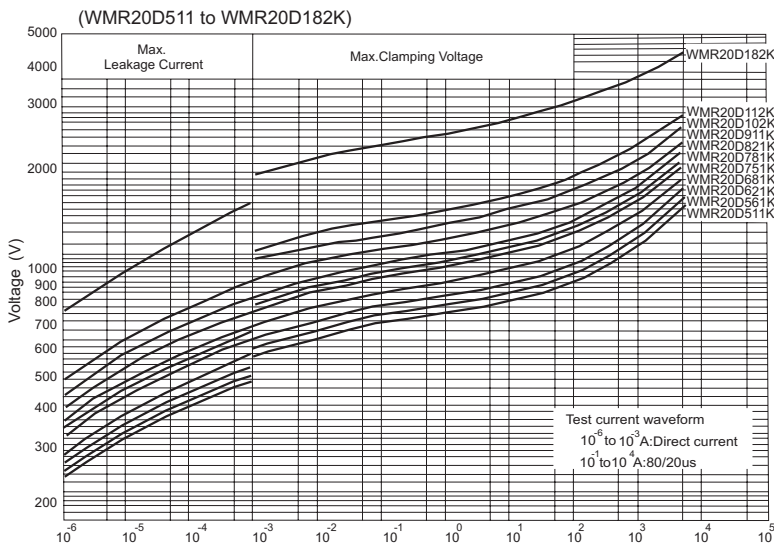
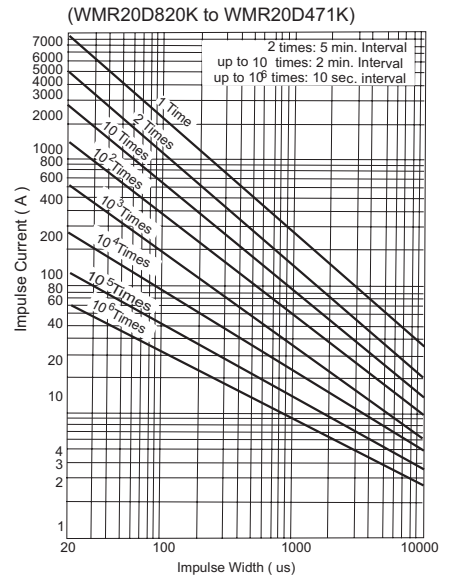


■ Typical Characteristics

● Voltage vs. Current



● Impulse Lifetime Ratings



25D Series

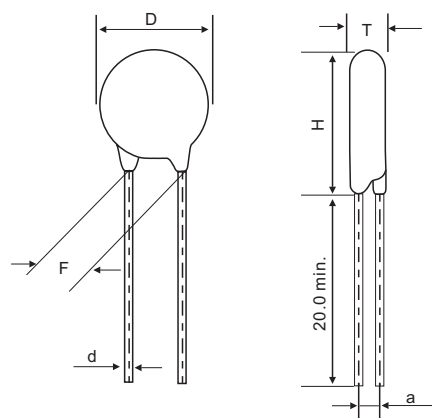
■ Ratings and Characteristics

- Operating Temperature Range : -40 to 85°C
- Storage Temperature Range : -40 to 125°C
- Temperature Coefficient Of Varistor Voltage : 0 to -0.05%/°C

Part No.	Varistor Voltage	Maximum Allowable Voltage		Clamping Voltage (max.)	Maximum Peak Current (8/20us)		Rated Power (W)	Maximum Energy (Joule)		Typical Capacitance (Reference) @1KHz(pF)
	V _{1mA} (V)	AC rms (V)	DC (V)	V _{150A} (V)	1time (A)	2times (A)		10/1000 us	2ms	
WMR25D201K	200 (185-225)	130	170	340	15000	10000	1.0	190.0	140.0	3200
WMR25D221K	220 (198-242)	140	180	360	15000	10000	1.0	200.0	150.0	2900
WMR25D241K	240 (216-264)	150	200	395	15000	10000	1.0	220.0	160.0	2650
WMR25D271K	270 (243-297)	175	225	455	15000	10000	1.0	255.0	180.0	2400
WMR25D301K	300 (270-330)	190	250	500	15000	10000	1.0	275.0	200.0	2100
WMR25D331K	330 (297-363)	210	275	550	15000	10000	1.0	300.0	220.0	1900
WMR25D361K	360 (324-396)	230	300	595	15000	10000	1.0	330.0	240.0	1750
WMR25D391K	390 (351-429)	250	320	650	15000	10000	1.0	360.0	260.0	1600
WMR25D431K	430 (387-473)	275	350	710	15000	10000	1.0	380.0	280.0	1500
WMR25D471K	470 (423-517)	300	385	775	15000	10000	1.0	440.0	300.0	1400
WMR25D511K	510 (459-561)	320	415	845	15000	10000	1.0	440.0	300.0	1250
WMR25D561K	560 (504-616)	350	460	925	15000	10000	1.0	440.0	300.0	1150
WMR25D621K	620 (558-682)	385	505	1025	15000	10000	1.0	440.0	300.0	1050
WMR25D681K	680 (612-748)	420	560	1120	15000	10000	1.0	460.0	320.0	950
WMR25D751K	750 (675-825)	460	615	1240	15000	10000	1.0	510.0	350.0	850
WMR25D781K	780 (702-858)	485	640	1290	15000	10000	1.0	530.0	360.0	850
WMR25D821K	820 (738-902)	510	670	1355	15000	10000	1.0	570.0	380.0	800
WMR25D911K	910 (819-1001)	550	745	1500	15000	10000	1.0	620.0	430.0	700
WMR25D102K	1000 (900-1100)	625	825	1650	15000	10000	1.0	685.0	460.0	650
WMR25D112K	1100 (990-1210)	680	895	1815	15000	10000	1.0	770.0	500.0	600

Dimensions in mm

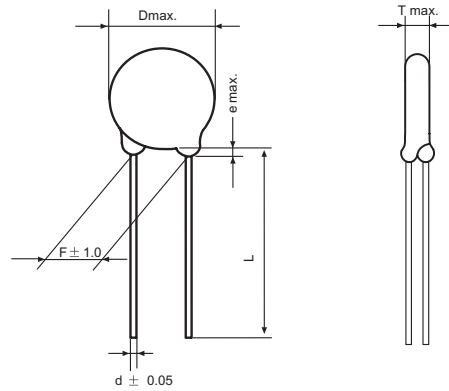
Part No.	D max.	T max.	F	H max.	a	d
WMR-25D201K	30.0	5.4	10.0±1.0	33.0	1.9±1.0	1.0±0.05
WMR-25D221K	30.0	5.5	10.0±1.0	33.0	2.2±1.0	1.0±0.05
WMR-25D241K	30.0	5.6	10.0±1.0	33.0	2.2±1.0	1.0±0.05
WMR-25D271K	30.0	5.8	10.0±1.0	33.0	2.4±1.0	1.0±0.05
WMR-25D301K	30.0	5.9	10.0±1.0	33.0	2.4±1.0	1.0±0.05
WMR-25D331K	30.0	6.1	10.0±1.0	33.0	2.7±1.0	1.0±0.05
WMR-25D361K	30.0	6.4	10.0±1.0	33.0	2.9±1.0	1.0±0.05
WMR-25D391K	30.0	6.6	10.0±1.0	33.0	3.2±1.0	1.0±0.05
WMR-25D431K	30.0	9.9	10.0±1.0	33.0	3.4±1.0	1.0±0.05
WMR-25D471K	30.0	7.2	10.0±1.0	33.0	3.9±1.0	1.0±0.05
WMR-25D511K	30.0	7.2	10.0±1.0	33.0	4.0±1.0	1.0±0.05
WMR-25D561K	30.0	7.2	10.0±1.0	33.0	4.4±1.0	1.0±0.05
WMR-25D621K	30.0	7.7	10.0±1.0	33.0	4.9±1.0	1.0±0.05
WMR-25D681K	30.0	8.0	10.0±1.0	33.0	5.2±1.0	1.0±0.05
WMR-25D751K	30.0	8.4	10.0±1.0	33.0	5.2±1.0	1.0±0.05
WMR-25D781K	30.0	8.5	10.0±1.0	33.0	5.3±1.0	1.0±0.05
WMR-25D821K	30.0	8.7	10.0±1.0	33.0	5.6±1.0	1.0±0.05
WMR-25D911K	30.0	9.2	10.0±1.0	33.0	6.2±1.0	1.0±0.05
WMR-25D102K	30.0	9.7	10.0±1.0	33.0	6.8±1.0	1.0±0.05
WMR-25D112K	30.0	10.3	10.0±1.0	33.0	7.9±1.0	1.0±0.05



■ Available Standard Lead Configurations

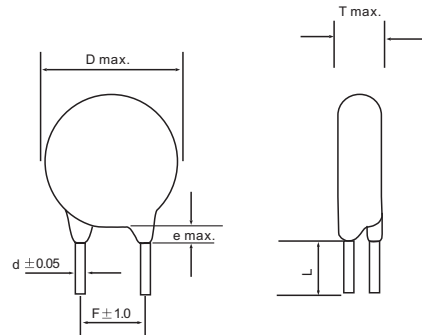
Type 1- Straight long leads (Lead style code : A)

Lead code	A1	A2	A3	A4	A5
F	2.5	5	7.5	10	12.5
L	20 mm min				
d	0.55 or 0.8 or 1.0				
e	Max. 4.0mm				



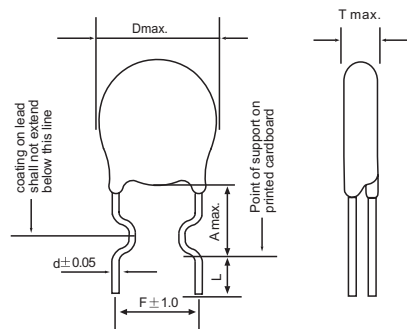
Type 2- Straight short leads (Lead style code : B)

Lead code	B1	B2	B3	B4	B5
F	2.5	5	7.5	10	12.5
L	5 ± 1 mm				
d	0.55 or 0.8 or 1.0				
e	Max. 4.0mm				



Type 3 - inside crimped short lead (Lead style code : C)

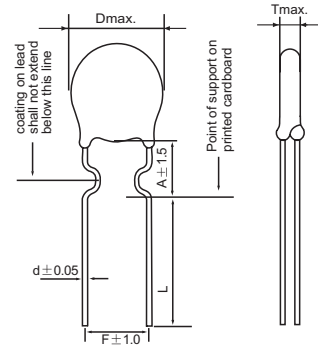
Lead code	C2	C3	C4	C5
F	5	7.5	10	12.5
A	5	5	6.5	6.5
L	5 ± 1 mm			
d	0.55 or 0.8 or 1.0			



■ Available Standard Lead Configurations

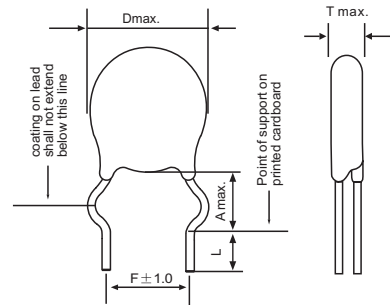
Type 4 - inside crimped long lead (Lead style code : D)

Lead code	D2	D3	D4	D5
F	5	7.5	10	12.5
A	5	5	6.5	6.5
L	20 mm min			
d	0.55 or 0.8 or 1.0			



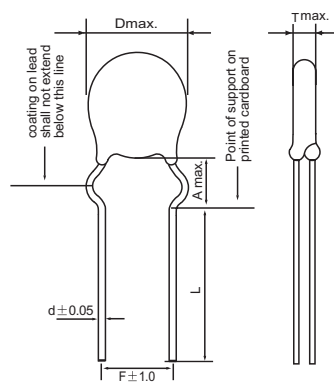
Type 5- Outside crimped short lead (Lead style code : E)

Lead code	E2	E3	E4	E5
F	5	7.5	10	12.5
A	5	5	6.5	6.5
L	5 ± 1 mm			
d	0.55 or 0.8 or 1.0			



Type 6- Outside crimped Long lead (Lead style code : F)

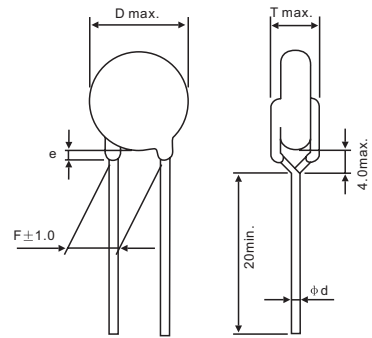
Lead code	D2	D3	D4	D5
F	5	7.5	10	12.5
A	5	5	6.5	6.5
L	20 mm min			
d	0.55 or 0.8 or 1.0			



Available Standard Lead Configurations

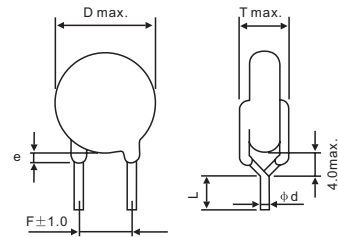
Type 7- Vertical crimped long lead (Lead style code : G)

Lead code	G2	G3	G4	G5
F	5	7.5	10	12.5
L	20 mm min			
d	0.55 or 0.8 or 1.0			
e	Max. 4.0mm			



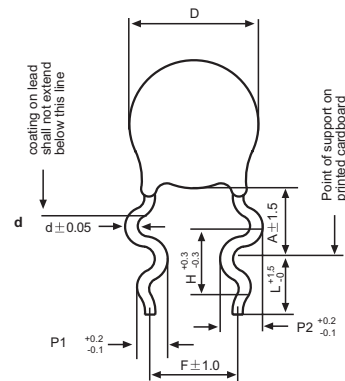
Type 8- Vertical crimped short lead (Lead style code : H)

Lead code	H2	H3	H4	H5
F	5	7.5	10	12.5
L	$5 \pm 1 \text{ mm}$			
d	0.55 or 0.8 or 1.0			
e	Max. 4.0mm			



Type 9- Double crimped snap lead (Lead style code : M)

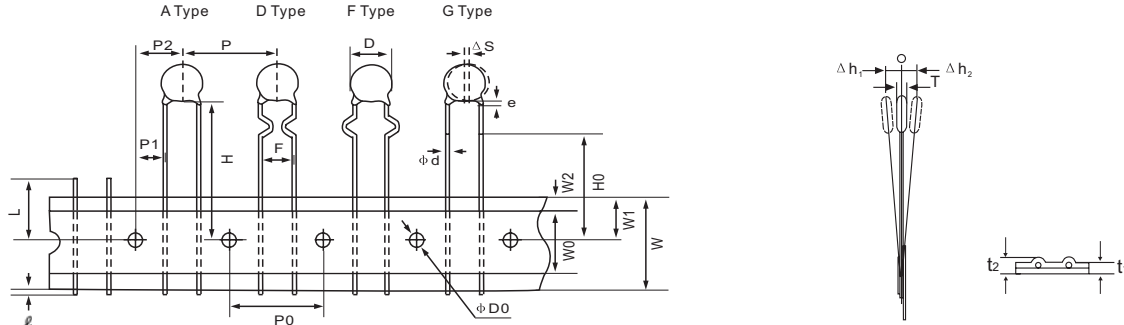
Lead code	M2	M3	M4	M5
F	5	7.5	10	12.5
H	2.6	2.6	3.3	3.3
P1	1.25	1.25	1.65	1.65
P2	1.65	1.65	1.95	1.95
A	$D < 8: 6.0 \pm 1.5, D > 8: 7.0 \pm 1.5$			
L	3 to 30 mm			
d	0.55 or 0.8			



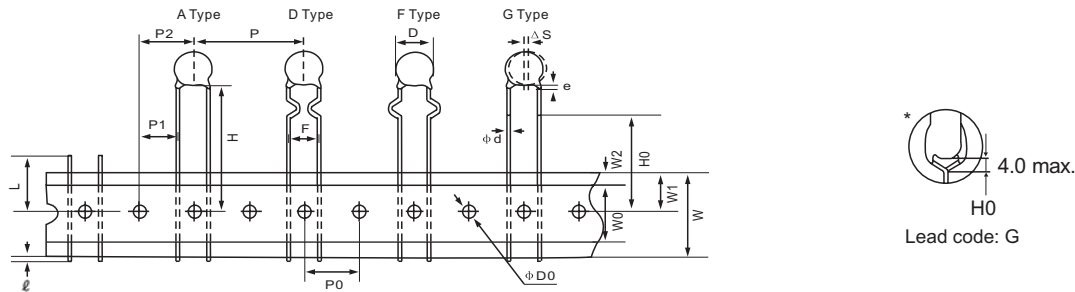
General Information: PCB max. thickness 1.6mm

■ Taping Specification

- 12.7mm pitch/ lead spacing 5.0/7.5 mm taping (Lead Code:A2,A3,D2,D3,F2,F3,G2,G3)



- 12.7mm pitch/ lead spacing 7.5/10.0mm taping (Lead Code:A3,A4,D3,D4,F3,F4,G3,G4)

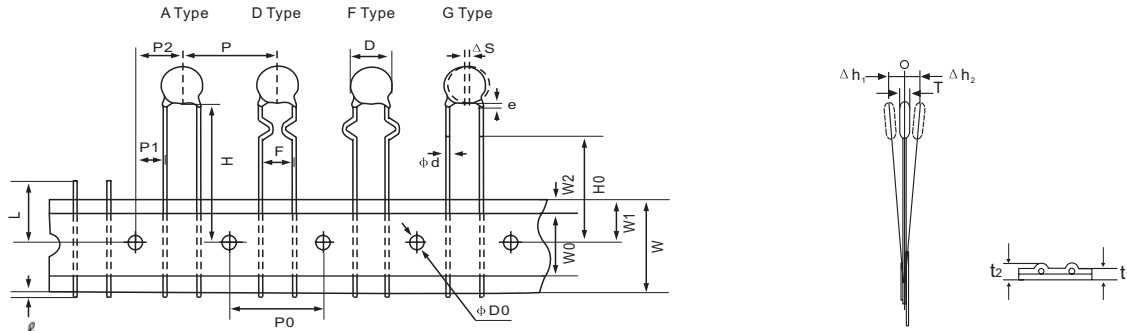


Item	Code	A2/D2/F2/G2	A3/D3/F3/G3	A3/D3/F3/G3	A4/D4/F4/G4
Pitch of component	P	12.7	12.7	25.4	25.4
Pitch of sprocket hole	P ₀	12.7±0.3	12.7±0.3	12.7±0.3	12.7±0.3
Lead spacing	F	5.0±1.0	7.5±1.0	7.5±1.0	10.0±1.0
Length from hole center to component center	P ₂	6.35±1.3	6.35±1.3	12.7±1.3	12.7±1.3
Length from hole center to lead	P ₁	3.85±0.7	2.6±0.7	8.95±1.0	7.7±1.0
Body diameter	D	See the individual product specification			
Deviation along tape, left or right	ΔS	0±2.0			
Carrier tape width	W	18.0±0.5			
Position of sprocket hole	W ₁	9.0±0.5			
Lead distance between reference and bottom planes	H	20.0±1.5 (Lead Code:A2/A3/A4)			
	H ₀	18.0 ^{+1.5} / _{-0.5} (Crimp type)			
Diameter of sprocket hole	φD ₀	4.0±0.2			
Lead diameter	φd	See the individual product specification			
Total tape thickness	t ₁	0.6±0.3			
Total thickness, tape and lead wire	t ₂	2.0 max.			
Body thickness	T	See the individual product specification			
Portion to cut in case of defect	L	11.0 max.			
Hold down tape width	W ₀	10±2mm			
Hold down tape position	W ₂	1.5±1.5			
Coating extension on lead	e	3.0 max. (Crimp type:Up to the end of crimp)			
Deviation across tape	Δh ₁	2.0 max.			
	Δh ₂	2.0 max.			
Protrusion length	ℓ	±1.0			

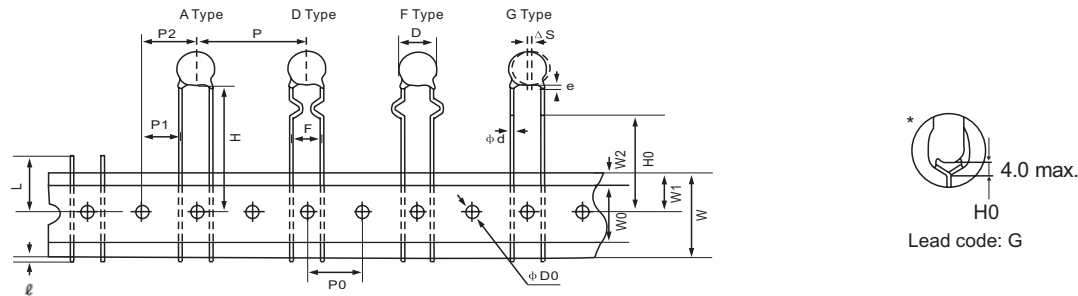
(in mm)

■ Taping Specification

- 15.0mm pitch/ lead spacing 5.0/7.5 mm taping (Lead Code:A2,A3,D2,D3,F2,F3,G2,G3)



- 15.0mm pitch/ lead spacing 7.5/10.0mm taping (Lead Code:A3,A4,D3,D4,F3,F4,G3,G4)

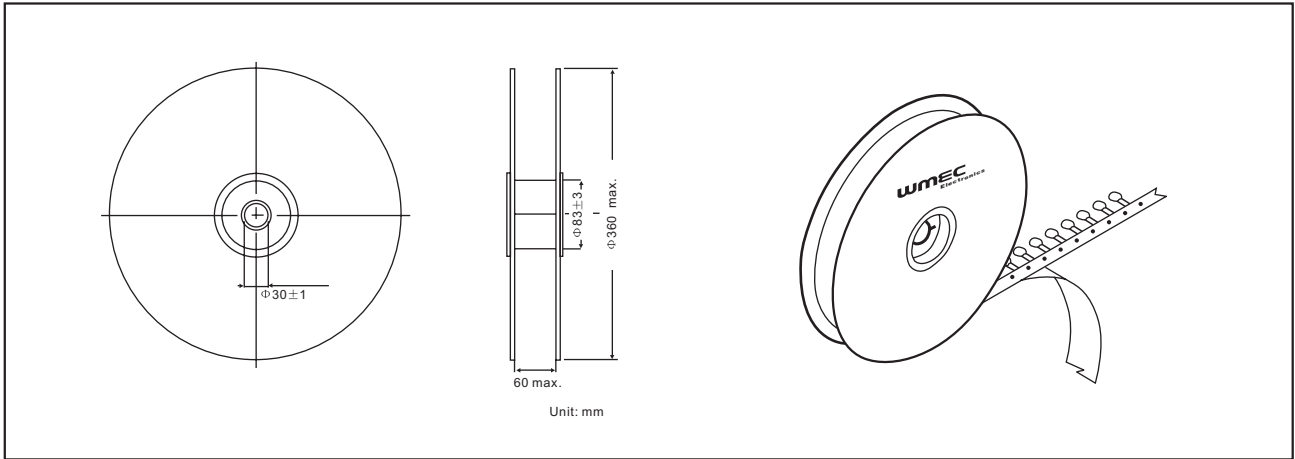


Item	Code	A2/D2/F2/G2	A3/D3/F3/G3	A3/D3/F3/G3	A4/D4/F4/G4
Pitch of component	P	15.0	15.0	30.0	30.0
Pitch of sprocket hole	P ₀	15.0±0.3	15.0±0.3	15.0±0.3	15.0±0.3
Lead spacing	F	5.0±1.0	7.5±1.0	7.5±1.0	10.0±1.0
Length from hole center to component center	P ₂	7.5±1.3	7.5±1.3	15.0±1.3	15.0±1.3
Length from hole center to lead	P ₁	5.0±0.7	3.75±0.7	11.25±1.0	10.0±1.0
Body diameter	D	See the individual product specification			
Deviation along tape, left or right	ΔS	0±2.0			
Carrier tape width	W	18.0±0.5			
Position of sprocket hole	W ₁	9.0±0.5			
Lead distance between reference and bottom planes	H	20.0±1.5 (Lead Code:A2/A3/A4)			
	H ₀	18.0 ^{+1.5} _{-0.5} (Crimp type)			
Diameter of sprocket hole	φD ₀	4.0±0.2			
Lead diameter	φd	See the individual product specification			
Total tape thickness	t ₁	0.6±0.3			
Total thickness, tape and lead wire	t ₂	2.0 max.			
Body thickness	T	See the individual product specification			
Portion to cut in case of defect	L	11.0 max.			
Hold down tape width	W ₀	10±2mm.			
Hold down tape position	W ₂	1.5±1.5			
Coating extension on lead	e	3.0 max. (Crimp type:Up to the end of crimp)			
Deviation across tape	Δh ₁	2.0 max.			
	Δh ₂				
Protrusion length	ℓ	±1.0			

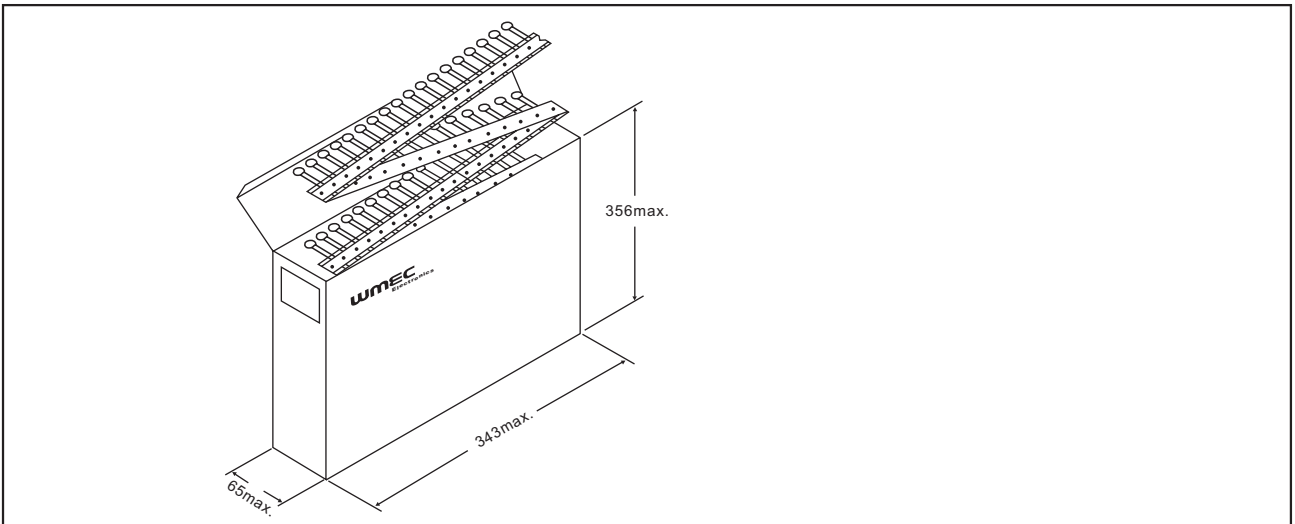
(in mm)

■ Packaging Styles

● Taping: Reel Packaging



● Taping: Ammo Packaging



● Bulk

Polyethylene Bag

■ Minimum Quantity (Order in sets Only)

Series Part Number	05D		07D		10D		14D		20D	
	Bulk(bag)	Ammo/Reel	Bulk(bag)	Ammo/Reel	Bulk(bag)	Ammo/Reel	Bulk(bag)	Ammo/Reel	Bulk(bag)	Ammo/Reel
180L~ 221K	1000	2000	1000	2000	500	1000	250	500	250	—
241K~ 471K	1000	2000	1000	2000	500	1000	250	500	250	—
511K~ 751K	1000	2000	1000	2000	500	1000	250	500	100	—
781K~ 182K	—	—	—	—	500	1000	250	500	100	—

Packing unit in pcs.

■ Label

- 1)Our Part No
- 2)Lot No
- 3)Quantity
- 4)Inside No

PART NO :WMR05D561KA2BL ITEM NO :2360050




LOT NO : YM0904F05D-001-A



QTY: 500PCS



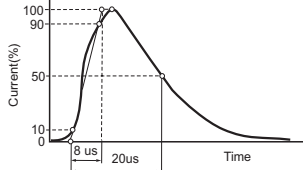
Green Product





wmec
Electronics

Performance Characteristics

Characteristics		Test Methods/Description	Specifications																																									
Standard Test Condition		Environmental conditions under which every measuring is done without doubt on the measuring results. Unless specified, the temperature, and relative humidity should be 5 to 35 and 45 to 85% RH.	_____																																									
Varistor Voltage		The voltage between two terminals with the specified measuring current I_{mA} DC applied is called V_c or $V_{c mA}$, the measurements shall be made as fast as possible to avoid heat affection.	To meet the specified value																																									
Maximum Allowable Voltage		The maximum sinusoidal RMS voltage or maximum DC voltage that can be applied continuously in the specified environmental temperature range.																																										
Clamping Voltage		The maximum clamping voltage two terminals with the specified standard impulse current I_p (8/20us) illustrated below applied 																																										
Rated Power		The maximum power that can be applied within the specified ambient temperature.																																										
Maximum Energy		The maximum current within the varistor voltage change of $\pm 10\%$ when one impulse of 10/1000us msec is applied.																																										
Maximum Peak Current (Withstanding Surge Current)	2 times	The maximum current within the varistor voltage change of $\pm 10\%$ with a standard impulse current of $8 \times 20us$ is applied two times with an interval of 5 minutes.																																										
	1 time	The maximum current within the varistor voltage change of $\pm 10\%$ with a single standard impulse current of $8 \times 20us$ is applied.																																										
Electrical	Temperature Coefficient of Varistor Voltage	$\frac{V_{c mA} \text{ at } 85^\circ C - V_{c mA} \text{ at } 25^\circ C}{V_{c mA} \text{ at } 25^\circ C} \times \frac{1}{60} \times 100 (\%/^\circ C)$	0 to -0.05%/°C max.																																									
	Capacitance	Capacitance shall be measured at 1kHz $\pm 10\%$, 1Vrms max. (1MHz $\pm 10\%$ below 100pF), 0V bias and $20 \pm 2^\circ C$.	To meet the specified value																																									
Withstanding Voltage (Body Insulation)		The specified voltage shall be applied between both terminals of the specimen connected together and metal foil closely wrapped round its body for 1 minute. <table border="1" data-bbox="422 1355 1101 1478"> <thead> <tr> <th>Classification (Nominal varistor voltage)</th> <th>Test Voltage (AC)</th> </tr> </thead> <tbody> <tr> <td>$V_{0.1mA}, V_{1mA} \leq 330V$</td> <td>1000 Vrms.</td> </tr> <tr> <td>$V_{0.1mA}, V_{1mA} > 330V$</td> <td>1500 Vrms.</td> </tr> </tbody> </table>	Classification (Nominal varistor voltage)	Test Voltage (AC)	$V_{0.1mA}, V_{1mA} \leq 330V$	1000 Vrms.	$V_{0.1mA}, V_{1mA} > 330V$	1500 Vrms.	No breakdown																																			
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Impulse Life		The change of V_c shall be measured after the impulse current listed below is applied 10000 or 100000 times continuously with the interval of 10 seconds at room temperature. <table border="1" data-bbox="422 1568 1109 1948"> <thead> <tr> <th rowspan="2">Item</th> <th colspan="2">Impulse Life</th> </tr> <tr> <th>(I)</th> <th>(II)</th> </tr> <tr> <th>Times</th> <td>10^4 Times</td> <td>10^5 Times</td> </tr> <tr> <th>Current</th> <th colspan="2">Impulse Current</th> </tr> </thead> <tbody> <tr> <td>WMR05D180L to WMR05D680K</td> <td>0.5A (2ms)</td> <td>0.45A (2ms)</td> </tr> <tr> <td>WMR05D820K to WMR05D561K</td> <td>20A (8/20us)</td> <td>14A (8/20us)</td> </tr> <tr> <td>WMR07D180L to WMR05D680K</td> <td>18A (8/20us)</td> <td>12A (8/20us)</td> </tr> <tr> <td>WMR07D820K to WMR07D681K</td> <td>50A (8/20us)</td> <td>35A (8/20us)</td> </tr> <tr> <td>WMR10D180L to WMR10D680K</td> <td>50A (8/20us)</td> <td>35A (8/20us)</td> </tr> <tr> <td>WMR10D820K to WMR10D112K</td> <td>100A (8/20us)</td> <td>70A (8/20us)</td> </tr> <tr> <td>WMR14D180L to WMR14D680K</td> <td>75A (8/20us)</td> <td>45A (8/20us)</td> </tr> <tr> <td>WMR14D820K to WMR14D182K</td> <td>150A (8/20us)</td> <td>90A (8/20us)</td> </tr> <tr> <td>WMR20D180L to WMR20D680K</td> <td>120A (8/20us)</td> <td>55A (8/20us)</td> </tr> <tr> <td>WMR20D820K to WMR20D182K</td> <td>200A (8/20us)</td> <td>100A (8/20us)</td> </tr> </tbody> </table>	Item	Impulse Life		(I)	(II)	Times	10^4 Times	10^5 Times	Current	Impulse Current		WMR05D180L to WMR05D680K	0.5A (2ms)	0.45A (2ms)	WMR05D820K to WMR05D561K	20A (8/20us)	14A (8/20us)	WMR07D180L to WMR05D680K	18A (8/20us)	12A (8/20us)	WMR07D820K to WMR07D681K	50A (8/20us)	35A (8/20us)	WMR10D180L to WMR10D680K	50A (8/20us)	35A (8/20us)	WMR10D820K to WMR10D112K	100A (8/20us)	70A (8/20us)	WMR14D180L to WMR14D680K	75A (8/20us)	45A (8/20us)	WMR14D820K to WMR14D182K	150A (8/20us)	90A (8/20us)	WMR20D180L to WMR20D680K	120A (8/20us)	55A (8/20us)	WMR20D820K to WMR20D182K	200A (8/20us)	100A (8/20us)	$\Delta V_{c mA} / V_{c mA} \leq \pm 10\%$
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Performance Characteristics

Characteristics		Test Methods/Description	Specifications															
Mechanical	Robustness of Terminations (Tensile)	After gradually applying the force specified below and keeping the unit fixed for 10 seconds, the terminal shall be visually examined for any damage. <table border="1"> <thead> <tr> <th>Terminal diameter</th> <th>Force</th> </tr> </thead> <tbody> <tr> <td>φ 0.6mm</td> <td>9.8N (1.0kgf)</td> </tr> <tr> <td>φ 0.8mm</td> <td>9.8N (1.0kgf)</td> </tr> <tr> <td>φ 1.0mm</td> <td>19.6N(2.0kgf)</td> </tr> </tbody> </table>	Terminal diameter	Force	φ 0.6mm	9.8N (1.0kgf)	φ 0.8mm	9.8N (1.0kgf)	φ 1.0mm	19.6N(2.0kgf)	No remarkable mechanical damage							
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Robustness of Terminations (Bending)	The unit shall be secured with its terminal kept vertical and the force specified below be shall applied in the axial direction. The terminal shall gradually be bent by 90° in one direction, then 90° in the opposite direction, and again back to the original position. The damage of the terminal shall be visually examined. <table border="1"> <thead> <tr> <th>Terminal diameter</th> <th>Force</th> </tr> </thead> <tbody> <tr> <td>φ 0.6mm</td> <td>4.9N (0.5kgf)</td> </tr> <tr> <td>φ 0.8mm</td> <td>4.9N (0.5kgf)</td> </tr> <tr> <td>φ 1.0mm</td> <td>9.8N(1.0kgf)</td> </tr> </tbody> </table>	Terminal diameter	Force	φ 0.6mm	4.9N (0.5kgf)	φ 0.8mm	4.9N (0.5kgf)	φ 1.0mm	9.8N(1.0kgf)									
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Vibration	After repeatedly applying a single harmonic vibration (amplitude:0.75mm) double amplitude: 1.5mm with 1 minute vibration frequency cycles (10Hz to 55Hz to 10Hz) to each of three perpendicular directions for 2 hours Thereafter. the unit shall be visually examined.																	
Solderability	After dipping the terminals to a depth of approximately 3 mm from the body in a soldering bath of 235±5°C for 2±0.5 seconds, the terminal shall be visually examined.	Approximately 95% of the terminals shall be covered with new solder uniformly.																
Resistance to Soldering Heat	After each lead shall be dipped into a solder bath having a temperature 260±5°C to a point 2.0 to 2.5 mm from the body of the unit, using shielding board(t=1.5mm), be held there for specified time (05D series:5±1 s and others : 10±1s), and then be stored at room temperature and normal humidity for 1 to 2 hours, The change of V _{cmA} and mechanical damages are examined.	ΔV _{cmA} /V _{cmA} ≤ ±5% No remarkable mechanical damage																
Environmental	High Temperature Storage/ Dry Heat	The specimen shall be subjected to 125±2°C for 1000 hours in a thermostatic bath without load and then stored at room temperature and normal humidity for 1 to 2 hours. Thereafter, the change of V _{cmA} shall be measured.	ΔV _{cmA} /V _{cmA} ≤ ±5%															
	Humidity (Steady State)	The specimen shall be subjected to 40±2°C 90 to 95% RH for 1000 hours without load and then stored at room temperature and normal humidity for 1 to 2 hours. Thereafter, the change of V _{cmA} shall be measured.	ΔV _{cmA} /V _{cmA} ≤ ±5%															
	Temperature Cycle	The temperature cycle shown below shall be repeated five cycles and then stored at room temperature and normal humidity for 1 to 2 hours. The change of V _{cmA} and mechanical damage shall be examined. <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature(°C)</th> <th>Period (minutes)</th> </tr> </thead> <tbody> <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>85 ±2</td> <td>30±3</td> </tr> <tr> <td>4</td> <td>Room temperature</td> <td>15±3</td> </tr> </tbody> </table>	Step	Temperature(°C)	Period (minutes)	1	-40±3	30±3	2	Room temperature	15±3	3	85 ±2	30±3	4	Room temperature	15±3	ΔV _{cmA} /V _{cmA} ≤ ±5% No remarkable mechanical damage
	Step	Temperature(°C)	Period (minutes)															
	1	-40±3	30±3															
	2	Room temperature	15±3															
3	85 ±2	30±3																
4	Room temperature	15±3																
High Temperature Load/ Dry Heat Load	After being continuously applied the Maximum Allowable Voltage at 85±2°C for 1000 hours, the specimen shall be stored at room temperature and normal humidity for 1 to 2 hours. Thereafter, the change of V _{cmA} shall be measured.	ΔV _{cmA} / V _{cmA} ≤ ±10%																
Damp Heat Load/ Humidity Load	The specimen shall be subjected to 40±2°C, 90 to 95% RH and the Maximum Allowable Voltage for 1000 hours and then stored at room temperature and normal humidity for 1 to 2 hours. Thereafter, the change of V _{cmA} shall be measured.	ΔV _{cmA} / V _{cmA} ≤ ±10%																
Low Temperature Storage/Cold	The specimen shall be subjected to -40±2°C without load for 1000 hours and then stored at room temperature and normal humidity for 1 to 2 hours. Thereafter, the change of V _{cmA} shall be measured.	ΔV _{cmA} / V _{cmA} ≤ ±5%																

WMR Varistor , Standar D Type

Precautions for Handling

1. ⚠️ Precautions for Safety

In the case that a WMR varistor (Type D) (hereafter referred to as the WMR, or product name) is used in mounted condition, if an abnormality takes place because of peripheral conditions of the WMR(material,environments, power source conditions, circuit conditions, etc. In equipment design), fire, electric shock, burn, or product failure may be caused. Since the precautions for this product are described below, understand the content thoroughly before use. If questions are raised about matters not covered, contact us.

1. Matters to be strictly observed

1.1 Confirmation of performance ratings

Use the WMR within its rated range of performance such as the withstanding surge current, withstanding energy, impulse life(surge life), average pluse power, and operating temperature range. If used outside the range, the WMR causes degradation and element fracture, which may result in smoking and ignition.

1.2 To avoid accidents due to unexpected phenomena, take the following measures

- 1) In the event of fracture of the WMR, its pieces may scatter; hence, put the case or cover of the set product in place.
- 2) Do not install the WMR near combustible substances(polyvinyl chloride wires, resin moldings, etc.). If it is difficult to do, install a nonflammable cover.
- 3) Across-the-line use
When the WMR is used across a line, put a normal-acting current fuse in series with the WMR (Refer to Item 2.1.1). (4)
- 4) Use between line to ground
 - (1) In the case that the WMR is used between a line to the ground, the short-circuit of the WMR may not blow the current fuse because of grounding resistance,which may cause smoking and ignition of the WMR' s exterior resin. As the measure against it, install an earth leakage breaker on the power supply side of the WMR positon. If no earth leakage breaker is installed, use a thermal fuse together with a current fuse in series.(Refer to Table 1.)
 - (2) In the case that the WMR is used between a live part to metal case, a electric shock may develop at a shortcircuit of the WMR; hence, ground the metal case to the ground or keep it from the human body.

2. Application notes

2.1 Pay attention to the following items to avoid the shortened life and failure of the WMR

- 1) Circuit conditions
 - (1) Select a WMR of which the maximum voltage including fluctuations in source voltage allows for the maximum permissible circuit voltage.(Refer to Table 1.)
 - (2) In cases that surges are intermittently applied at short intervals(for example, in the case that the voltage of the noise simulator test is impressed), do not cause them to exceed the WMR' s rated pluse power.
 - (3) Select a WMR recommended in Table 1.
 - <1>Across-the-line use
If possible, use a part No.marked with * for 100VAC and 120VAC incase of voltage temporarily rises load unbalance of separately-wired loads, short between hot and neutral-line, open of neutral line in single-phase-three-wired system, and due to resonance at switching for a capacitive, inductive load.
 - <2>Used between line to ground
Use a different Part No.from “ Across-the-line use ” as table 1,because of rasing voltage in case of “ Line to Ground Fault ” .
Use a part No .marked with ** in table 1, in case of the insulation resistance test(500VDC) for equipment.
When using a part of the varistor voltage that the insulation efficiency examination can not be cleared, there is a case where the surge absorber can be done by removing it from the circuit depending on the circuit condition.
Use a part No . Marked with *** table 1, in case of the withstanding voltage test(1000VAC or 1200VAC)for equipment.

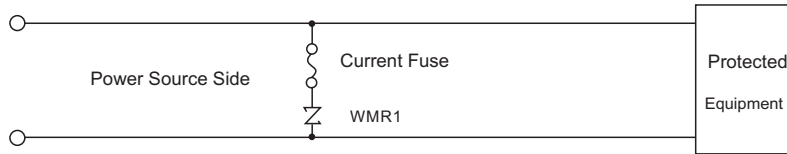
(4) Concerning current fuse

<1>It is recommended to select a WMR and the rated current of a current fuse as follows.
Finally, confirm that the secondary disaster does not occur even if the WMR mounted on equipment breaks.

Standard Part No .	WMR05D□□□	WMR07D□□□	WMR10D□□□	WMR14D□□□	WMR20D□□□
Fuse rated current	3 A max.	5 A max.	7 A max.	10 A max.	10 A max.

*Fuses shall use rated voltages appropriate for circuits.

<2>The recommended fuse position is shown in table 1, “Example of WMR application” , however, if the load current of protected equipment is larger than that of the above recommended fuse rated current, install a current fuse at the position shown below.



(5) Concerning thermal fuse

Set a thermal fuse to get high thermal conductivity with WMR.

Table 1 Example of WMR application

		Measure against across-the -line surge	Measure against surge across the line and between the line and ground
Connections example	DC/AC Single phase	<p>f : fuse</p>	<p>f : fuse</p>
	AC 3 phase	<p>f : fuse</p>	<p>f : fuse</p>
Example of rating selection	Across-the-Line use		Use between Line to ground
	WMR	Source voltage	Part No .
	WMR1	AC 100V	WMR □□D201 to WMR □□D361*
		AC 120V	WMR □□D241 to WMR □□D431*
	WMR2	AC 200V	WMR □□D471 to WMR □□D621*
		AC 220V	WMR □□D471 to WMR □□D621*
		AC 240V	WMR □□D511 WMR □□D621*
		AC 380V	WMR □□D821
WMR2	AC 100V AC 220V	WMR □□D471 WMR □□D511 WMR □□D621* WMR □□D821** and more WMR □□D182***	
		AC 230V AC 240V	WMR □□D511 WMR □□D621* WMR □□D821** and more WMR □□D182***
	AC 380V	WMR □□D112** and more WMR □□D182***	

2) Operating environments

- (1) The WMR is designed to use indoors. Do not use it exposed outdoors.
- (2) Do not use the WMR in places exposed to temperatures beyond the operating temperature range, such as places exposed to sunlight and vicinities of heating equipment.
- (3) Do not use the WMR in places exposed to high temperatures and high humidities, such as places exposed directly to rain, wind, and vapor.
- (4) Do not use the WMR in dusty and salty places and atmospheres polluted by corrosive gases.

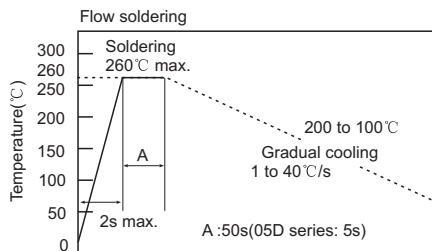
3) Processing conditions

- (1) DO not wash the WMR by such solvents(thinner, acetone, etc.)as deteriorate its exterior resin.
- (2) Do not apply to the WMR as strong vibration, shock(by falling,etc.),and pressure as crack its exterior resin and element.
- (3) When coating the WMR with resin(including molding), do not use such resin.
- (4) Do not bend the WMR type D lead wires at the position close to its WMR type D exterior resin, or apply external force to the position.
- (5) When soldering the WMR lead wires, do in the following recommendation condition and do not melt the solder and insulating materials constituting the WMR.

	Soldering Method	Recommended Condition	Attention Item
Type D	Flow soldering	260°C, within 10sec.	However; the 5 series parts is within 5 sec.
	Reflow soldering	—	Type D is not Reflow soldering object part.

*1 When using at the thing except the condition that it is possible to suggest to the above, confirm that there is not a problem.
 The limit of the repair be once and go in solder temperature within 350°C and moreover within 3 seconds.
 *2 Profile be careful because there is a margin of error in the way of measuring.
 *3 The temperature depend on the size and the package density of the substrate. Therefore, confirm every kind of the substrate.

● Soldering temperature-time profile to recommend



4) Long-term storage

- (1) Do not store the WMR under high temperature and high humidities. Store it at temperature from room temperature to 40°C and at humidity below 75%RH, and use it within two years.
- (2) Avoid atmospheres full of corrosive gases(hydrogen sulfide, sulfurous acid, chlorin, ammonia, etc.).
- (3) Avoid direct sunlight and dew condensation.

3. Notices

- 3.1 In cases that the WMR is used in equipment(aerospace equipment, medical equipment, etc.) requiring extremely high reliability, ask us for selection of part No., protection coordination, etc. In advance.
- 3.2 Note that we do not take any responsibility for faults and abnormalities resulting from the use not in conformity with the contents of entries in the delivery specification.
- 3.3 There is possibility that the WMR will unexpectedly smoke or ignite because of abnormal rise of the circuit voltage and invasion of excessive surge. To prevent that accident from spreading over the equipment and not to expand the damage, use multiplex protection such as the adoption of frame-retardant materials for housing parts and structural parts.