

14Φ Series

Data Sheet

Metal Oxide Varistors (MOV)

Features

- Fast responding to transient over-voltage
- Large absorbing transient energy capability
- Low clamping ratio and no follow-on current
- Meets MSL level 1, per J-STD-020
- Operating Temperature: -40°C ~ +105°C & -40°C ~ +125°C
- Storage Temperature: -40°C ~ +125°C
- Agency recognition: UL 1449 4th /cUL/TUV/VDE/CQC

Applications

- Power supply, Telecommunication, Smart meter, or PLC protection
- Surge protection in consumer electronics
- Surge protection in industrial electronics
- Surge protection in electronic home appliances, gas and petroleum appliances
- Relay and electromagnetic valve surge absorption

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Electrical Characteristics

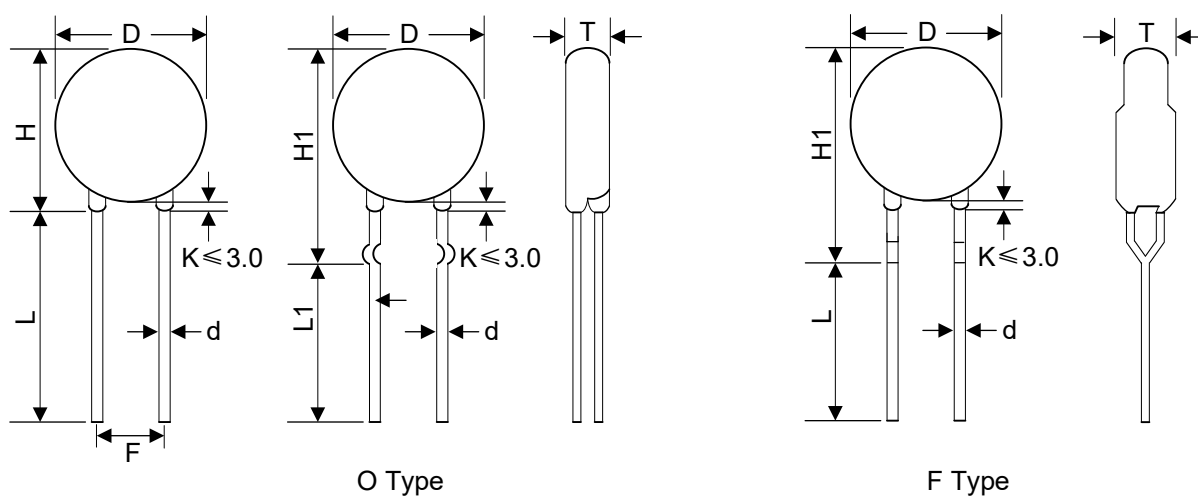
Part Number		Maximum Allowable Voltage		Varistor Voltage	Maximum Clamping Voltage		Withstanding Surge current		Maximum Energy (10/1000μs)		Rated Power	Dimension T _{max}
Standard	High Surge	V _{AC} (V)	V _{DC} (V)	V _{1mA} (V)	I _P (A)	V _C (V)	(A) Standard	(A) High Surge	(J) Standard	(J) High Surge	(W)	(mm)
WHM0018VAL	WHM0018VA	11	14	18(15~21.6)	10	36	1000	2000	4	7	0.1	5.0
WHM0022VAL	WHM0022VA	14	18	22(19.5~26)	10	43	1000	2000	5	8	0.1	5.0
WHM0027VAL	WHM0027VA	17	22	27(24~31)	10	53	1000	2000	6	10	0.1	5.0
WHM0033VAL	WHM0033VA	20	26	33(29.5~36.5)	10	65	1000	2000	7.5	12	0.1	5.0
WHM0039VAL	WHM0039VA	25	31	39(35~43)	10	77	1000	2000	8.6	13	0.1	5.0
WHM0047VAL	WHM0047VA	30	38	47(42~52)	10	93	1000	2000	10	17	0.1	5.0
WHM0056VAL	WHM0056VA	35	45	56(50~62)	10	110	1000	2000	11	20	0.1	5.0
WHM0068VAL	WHM0068VA	40	56	68(61~75)	10	135	1000	2000	14	24	0.1	5.0
WHM0082VAL	WHM0082VA	50	65	82(74~90)	50	135	4500	6000	22	27	0.6	5.0
WHM0100VAL	WHM0100VA	60	85	100(90~110)	50	165	4500	6000	28	33	0.6	4.2
WHM0120VAL	WHM0120VA	75	100	120(108~132)	50	200	4500	6000	32	40	0.6	4.4
WHM0150VAL	WHM0150VA	95	125	150(135~165)	50	250	4500	6000	40	53	0.6	4.0
WHM0180VAL	WHM0180VA	115	150	180(162~198)	50	300	4500	6000	50	60	0.6	4.1
WHM0200VAL	WHM0200VA	130	170	200(180~220)	50	340	4500	6000	57	70	0.6	4.2
WHM0220VAL	WHM0220VA	140	180	220(198~242)	50	360	4500	6000	60	78	0.6	4.3
WHM0240VAL	WHM0240VA	150	200	240(216~264)	50	395	4500	6000	63	84	0.6	4.4
WHM0270VAL	WHM0270VA	175	225	270(243~297)	50	455	4500	6000	70	99	0.6	4.6
WHM0300VAL	WHM0300VA	190	250	300(270~330)	50	500	4500	6000	77	108	0.6	4.7
WHM0330VAL	WHM0330VA	210	275	330(297~363)	50	550	4500	6000	85	115	0.6	4.7
WHM0360VAL	WHM0360VA	230	300	360(324~396)	50	595	4500	6000	93	130	0.6	4.9
WHM0390VAL	WHM0390VA	250	320	390(351~429)	50	650	4500	6000	100	140	0.6	5.0
WHM0430VAL	WHM0430VA	275	350	430(387~473)	50	710	4500	6000	115	155	0.6	5.2
WHM0470VAL	WHM0470VA	300	385	470(423~517)	50	775	4500	6000	118	175	0.6	5.4
WHM0510VAL	WHM0510VA	320	415	510(459~561)	50	845	4500	6000	121	180	0.6	5.6
WHM0560VAL	WHM0560VA	350	460	560(504~616)	50	925	4500	6000	125	185	0.6	5.8
WHM0620VAL	WHM0620VA	385	505	620(558~682)	50	1025	4500	6000	128	190	0.6	6.1
WHM0680VAL	WHM0680VA	420	560	680(612~748)	50	1120	4500	6000	130	200	0.6	6.4
WHM0750VAL	WHM0750VA	460	615	750(675~825)	50	1240	4500	6000	143	210	0.6	6.5
WHM0780VAL	WHM0780VA	485	640	780(702~858)	50	1290	4500	6000	148	220	0.6	6.6
WHM0820VAL	WHM0820VA	510	670	820(738~902)	50	1355	4500	6000	157	235	0.6	6.8
WHM0910VAL	WHM0910VA	550	745	910(819~1001)	50	1500	4500	6000	175	255	0.6	7.1
WHM1000VAL	WHM1000VA	625	825	1000(900~1100)	50	1650	4500	6000	190	280	0.6	7.1
WHM1100VAL	WHM1100VA	680	895	1100(990~1210)	50	1815	4500	6000	213	310	0.6	7.6
WHM1200VAL	WHM1200VA	750	990	1200(1080~1320)	50	1980	4500	6000	232	324	0.6	8.0
WHM1400VAL	WHM1400VA	880	1140	1400(1260~1540)	50	2310	4500	6000	238	327	0.6	8.6

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Electrical Characteristics

Part Number		Maximum Allowable Voltage		Varistor Voltage	Maximum Clamping Voltage		Withstanding Surge current		Maximum Energy (10/1000μs)		Rated Power	Dimension T _{max}
Standard	High Surge	V _{AC} (V)	V _{DC} (V)	V _{1mA} (V)	I _P (A)	V _C (V)	(A) Standard	(A) High Surge	(J) Standard	(J) High Surge	(W)	(mm)
WHM1600VAL	WHM1600VA	1000	1280	1600(1440~1760)	50	2640	4500	6000	243	331	0.6	9.3
WHM1800VAL	WHM1800VA	1100	1465	1800(1620~1980)	50	2970	4500	6000	250	335	0.6	10.1

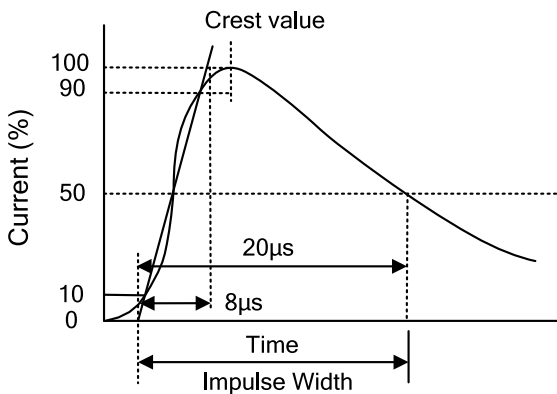
- Notes: 1. The tolerance of varistor voltage between 18V and 27V is more than 10%.
 2. Varistor voltage $\geq 1200V$, structure diagram is F type.
 3. Leakage Current (@83% of V_{1mA}): IR $\leq 50\mu A$ (180K~680K) ; IR $\leq 25\mu A$ (820K~182K)



Symbol	H(max.)	H1(max.)	L(min.)	L1(min.)	D (max.)	F(±0.8)	d(±0.05)	Tmax
Dimension(mm)	19	21	20	15	16	7.5	0.8	Please refer to the Electrical Characteristics Table

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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) or the 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.						
Varistor Voltage Temp. Coefficient	$\left \frac{V_{1mA@85^{\circ}C} - V_{1mA@25^{\circ}C}}{V_{1mA@25^{\circ}C}} \times \frac{1}{60} \times 100\% (\%/^{\circ}C) \right $	≤0.05%/°C					
	$\left \frac{V_{1mA@-40^{\circ}C} - V_{1mA@25^{\circ}C}}{V_{1mA@25^{\circ}C}} \times \frac{1}{65} \times 100\% (\%/^{\circ}C) \right $						
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 border="1" data-bbox="438 1904 1204 2027"> <tr> <td rowspan="2">14Φ series</td><td>180K to 680K</td><td>75A (8/20μs)</td></tr> <tr> <td>820K to 182K</td><td>150A (8/20μs)</td></tr> </table>	14Φ series	180K to 680K	75A (8/20μs)	820K to 182K	150A (8/20μs)	$\frac{\Delta V_b}{V_b} \leq \pm 10\%$
14Φ series	180K to 680K		75A (8/20μs)				
	820K to 182K	150A (8/20μs)					

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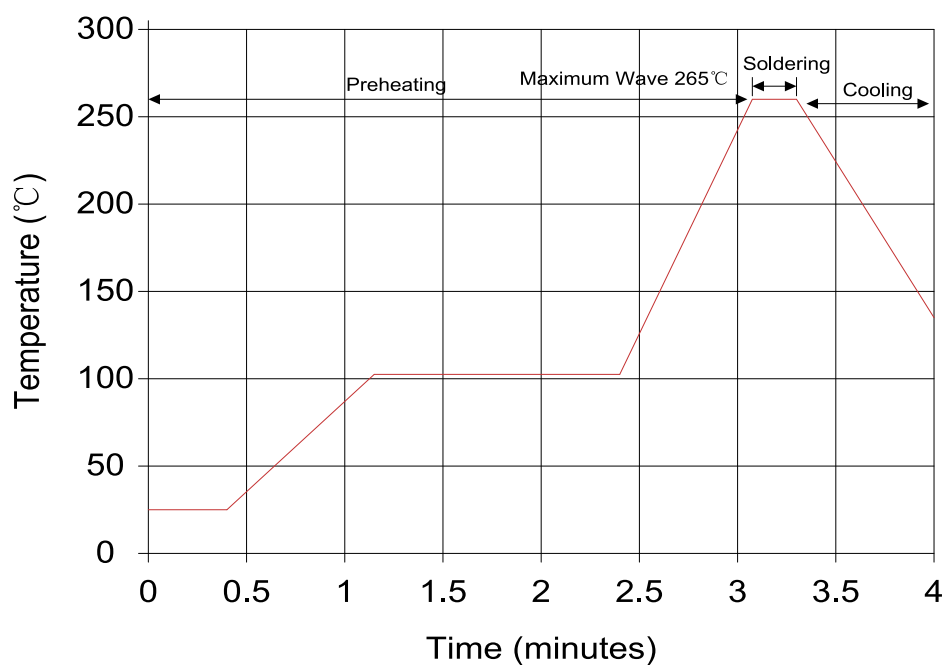
Mechanical Characteristics & Reliability

Items	Test conditions / Methods			Specifications
Tensile Strength of Terminals	Gradually applying the force specified and keeping the unit fixed for 10±1 sec.			NO Visible damage Δ V1mA/V1mA ≤5%
	Terminal diameter (mm)	Froce(kg)		
	0.5<d≤0.8	1.0		
	0.8<d≤1.25	2.0		
	1.25<d	4.0		
Bending Strength of Terminals	Hold specimen and apply the force specified below to each lead. Bend the specimen to 90°, then return to the original position. Repeat the procedure in the opposite direction.			NO Visible damage Δ V1mA/V1mA ≤5%
	Terminal diameter (mm)	Froce(kg)		
	0.5<d≤0.8	0.5		
	0.8<d≤1.25	1.0		
	1.25<d	2.0		
Vibration	Frequency range: 10~55 Hz Amplitude: 0.75mm or 98m/s2 Direction: 3 mutually perpendicular directions, 2hrs each.			NO Visible damage Δ V1mA/V1mA ≤5%
Solder ability	Solder Temp: 245±5℃ Dipping Time: 2±0.5 sec			At least 95% of terminal electrode is covered by new solder
Resistanceto Soldering Heat	Solder Temp: 260±5℃ Dipping Time: 10±1 sec			NO Visible damage Δ V1mA/V1mA ≤5%
Items	Test conditions / Methods			Specifications
High Temperature Storage	Ambient Temp: 125±2℃ Duration: 1000hrs			Δ V1mA/V1mA ≤5%
Low Temperature Storage	Ambient Temp: -40±2℃ Duration: 1000hrs			Δ V1mA/V1mA ≤5%
Humidity	Ambient Temp: 40±2℃, 90~95% R.H. Duration: 1000hrs			Δ V1mA/V1mA ≤5%
Temperature Cycle	The conditions shown below shall be repeated 5 cycles			No visible damage ΔV1mA/V1mA ≤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: 105±2℃ Duration: 1000hrs Load: Max. Allowable Voltage In AC eara.			ΔV1mA/V1mA ≤5%
Damp Heat Load	Ambient Temp: 40±2℃, 90~95% R.H. Duration: 1000hrs Load: Max. Allowable Voltage			No visible damage ΔV1mA/V1mA ≤5%
Voltage Proof	Metal balls method, 2500Vac 1 min.			No visible damage

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Soldering Recommendation

Wave Lead Free Soldering Recommendation



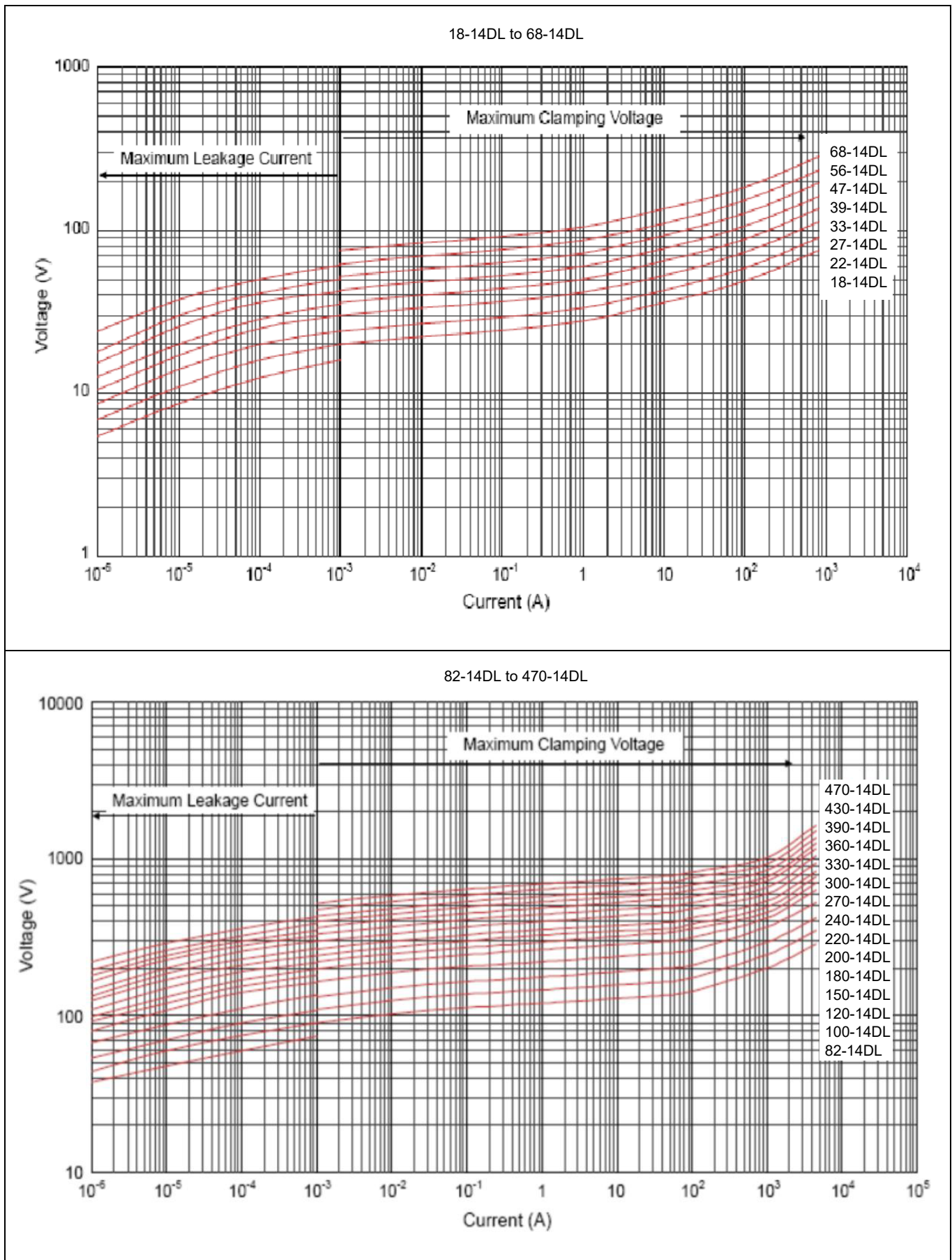
Item	Conditions
Peak Temperature	265°C
Dipping Time	10 seconds(max.)
Soldering	1 time

Recommendation Reworking Conditions with Soldering Iron

Item	Conditions
Temperature of Soldering Iron-tip	360°C(max.)
Soldering Time	3 seconds(max.)
Distance from Varistor	2mm (min.)

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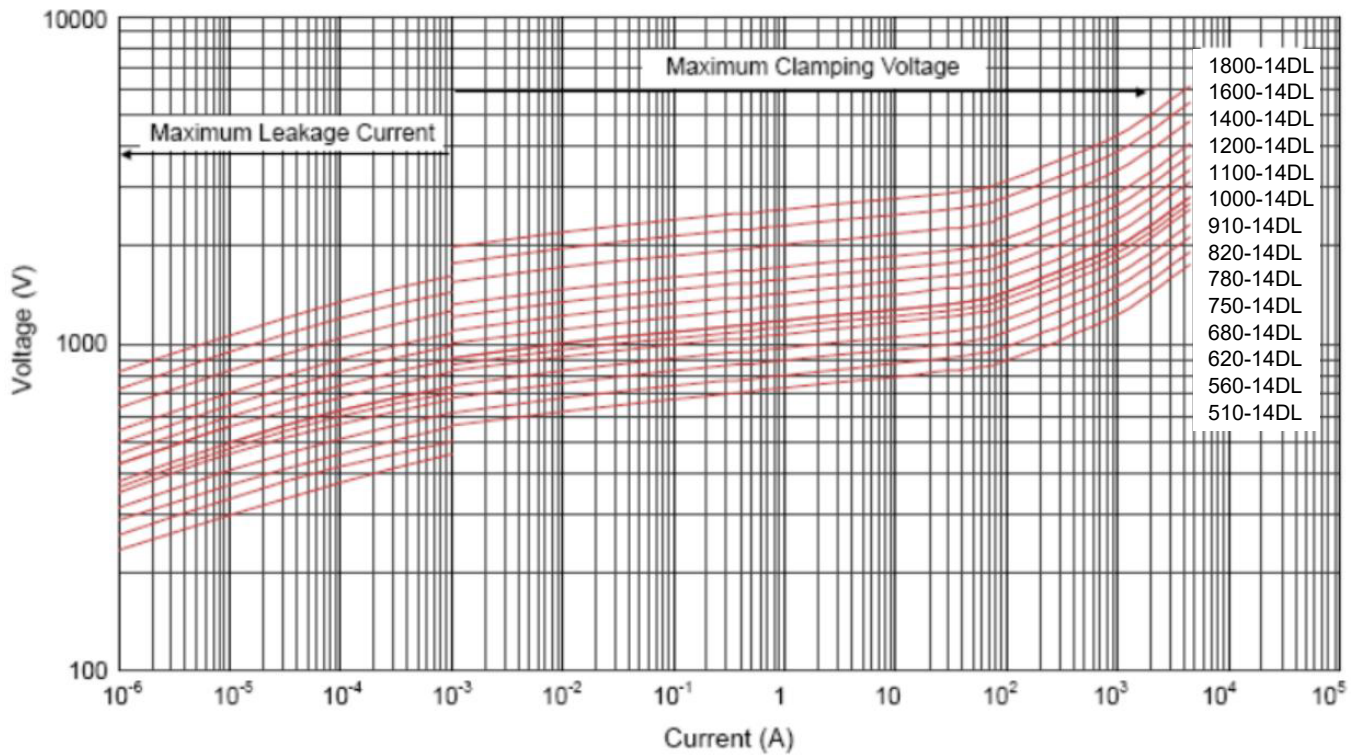
Maximum Leakage Current and Maximum Clamping Voltage Curve



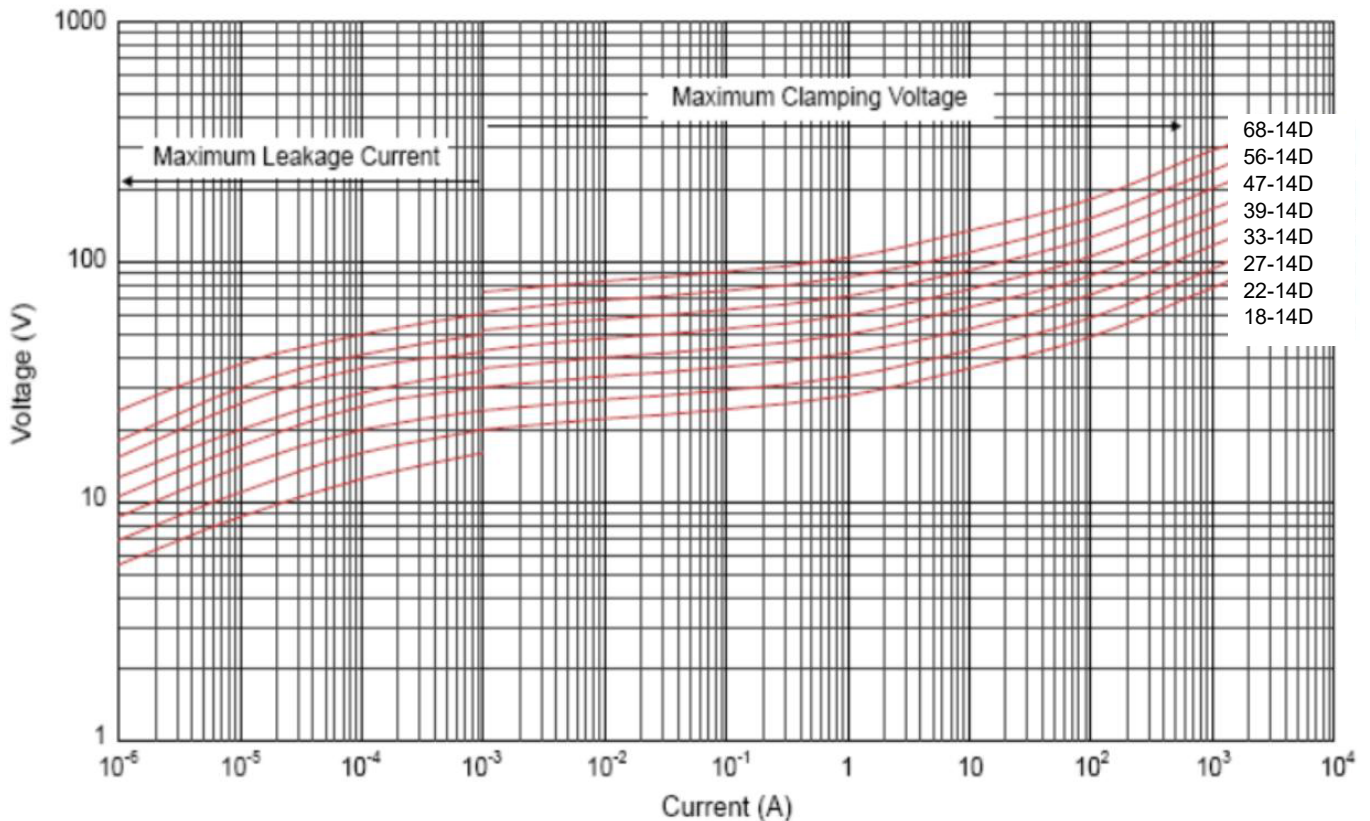
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Maximum Leakage Current and Maximum Clamping Voltage Curve

510-14DL to 1800-14DL



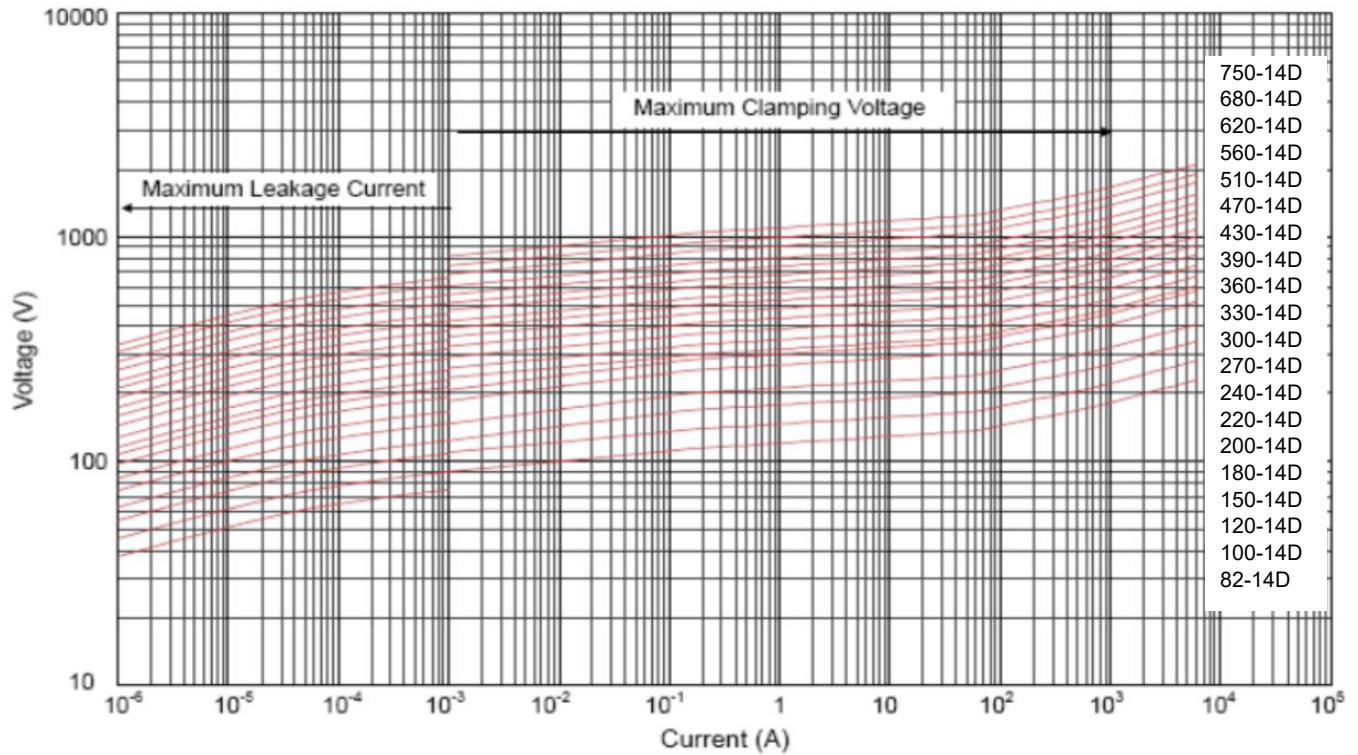
18-14D to 68-14D



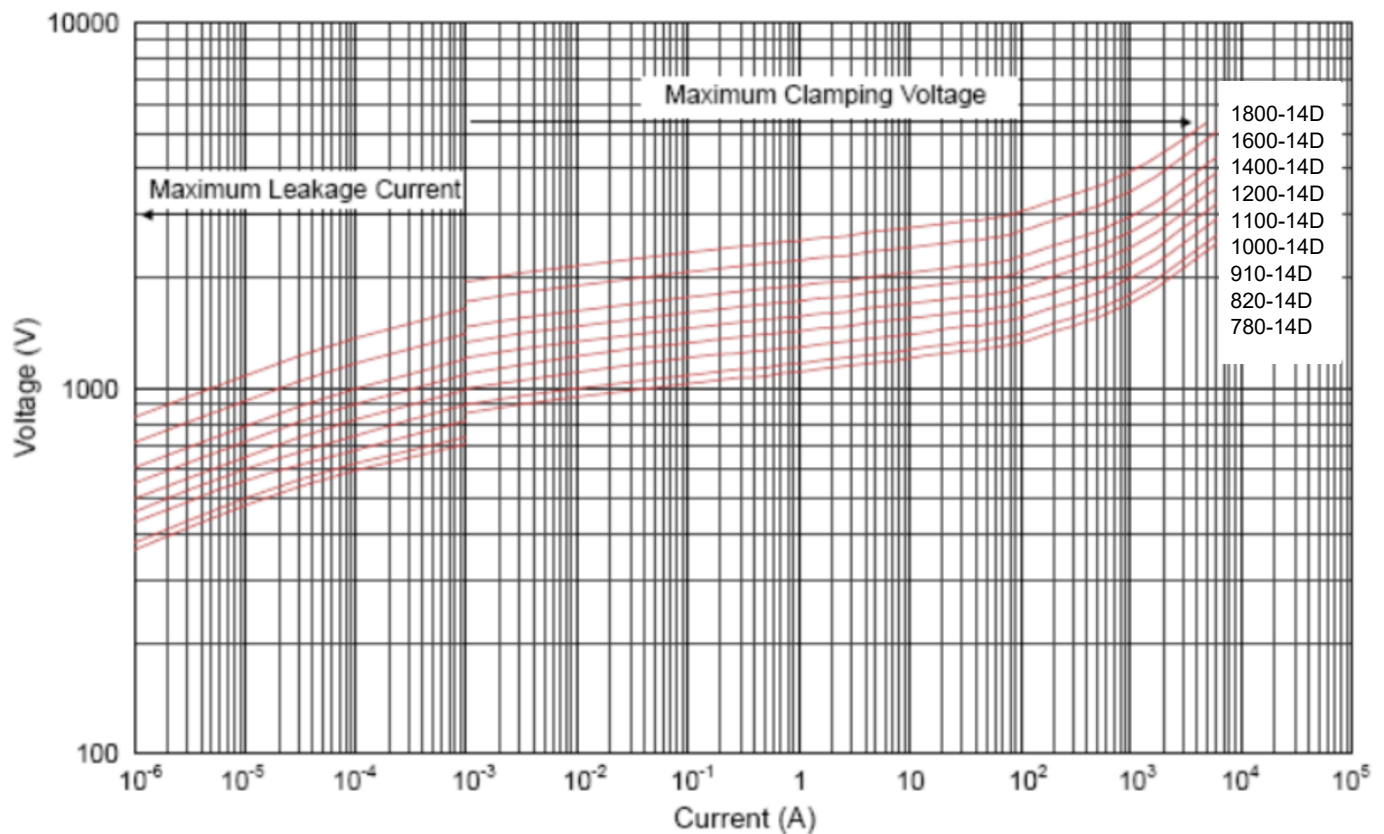
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Maximum Leakage Current and Maximum Clamping Voltage Curve

82-14D to 750-14D

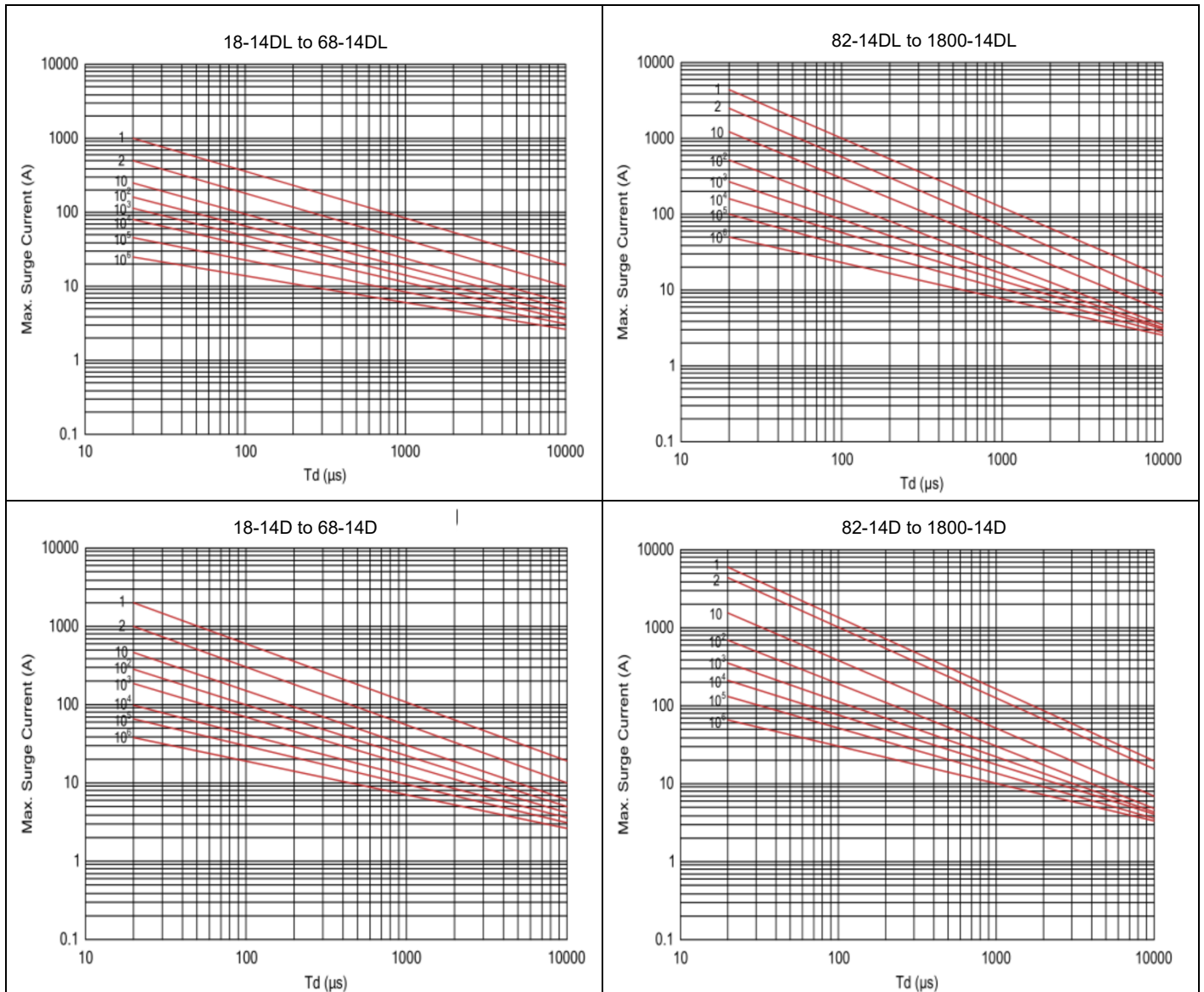


780-14D to 1800-14D

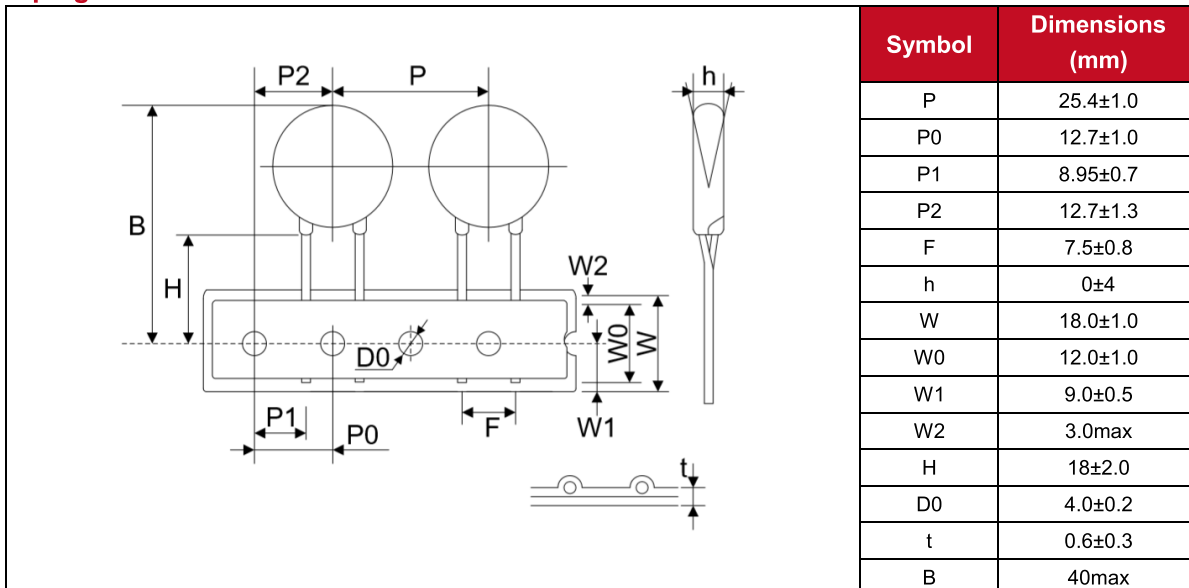


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Maximum Leakage Current and Maximum Clamping Voltage Curve

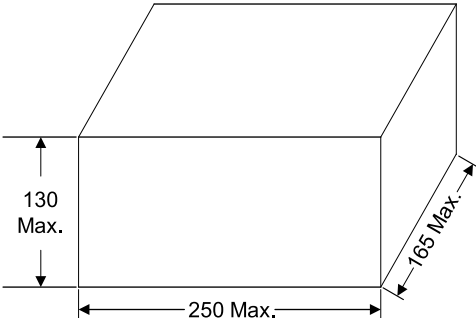
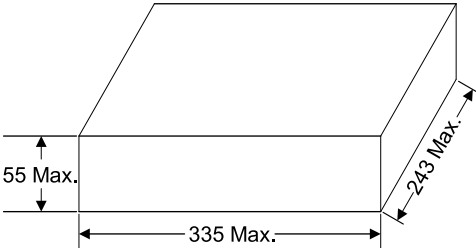
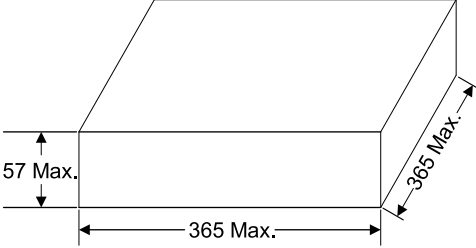


Taping Dimensions



14Φ Series

Quantity

Packaging Dimensions (Unit: mm)	Quantity	
In bulk for Terminals Untrimmed Products 	400pcs/bag 18~330	4bags/box
	300pcs/bag 360~620	
	250pcs/bag 680~1100	
	150pcs/bag 1200~1800	
In bulk for Terminals Trimmed Products 	400pcs/bag 18~330	4bags/box
	300pcs/bag 360~620	
	250pcs/bag 680~1100	
	150pcs/bag 1200~1800	
Tape & Box 	750pcs/bag 18~330	6bags/box
	500pcs/bag 360~620	
	400pcs/bag 680~750	
	350pcs/bag 780~1100	
	300pcs/bag 1200~1800	
Tape & Reel 	750pcs/bag 18~330	6bags/box
	500pcs/bag 360~620	
	400pcs/bag 680~1100	
	300pcs/bag 1200~1800	