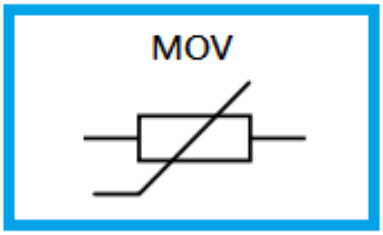
PVR14D Series MOV Devices

Features

- Wide operating voltages ranging from 10 V_{RMS} to 1000 V_{RMS} (14 V_{DC} to 1465 V_{DC}).
- Fast response time of less than 25 ns, instantly clamping the transient over voltage.
- High surge current handling capability.
- High energy absorption capability.
- Low clamping voltages, providing better surge protection.
- Low capacitance values, providing digital switching circuitry protection.
- High insulation resistance, preventing electric arcing to the adjacent devices or circuits.



Applications

- Transistor, diode, IC, thyristor or triac semiconductor 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.

Agency Approval

- UL file no.: E475869
- VDE file no.: 40042411

General Characteristics Definition

- Operating temperature: -40 ~ 125°C
- Storage temperature: -40 ~ 125°C
- Working surface temperature: 115°C
- Insulation resistance: >100 MΩ
- Coating (Epoxy resin): Flame-Retardant to UL 94 V-0

Material

- Coating: Epoxy resin
- Lead wire: Tin plated copper
- Electrode: Silver solder
- Disk: Zinc oxide

Part Number Code

PVR 14 D □□□ □ □ - □ □

- Bulk or taping (B: Bulk; A: Ammo; R: Reel)
- Lead Form (S: Straight; C: Crimped)
- High surge & high energy (J: High surge; Blank: Standard)
- Tolerance of varistor voltage (K: ±10%; L: ±15%; M: ±20%)
- Varistor voltage
- Disc type device
- Chip Diameter (14: 14 mm)
- PolyTrans Varistor

PVR14D Series MOV Devices

Electrical Characteristics (Standard Product)

Part Number	Max Allowable Voltage		Varistor Voltage V_b @ 1 mA	Energy 10/1000 μs	Withstand Surge Current 8/20 μs	Rated Power	Max Leakage Current @ V_{DC}	Max Clamping Voltage		Typical Capacitance
	V_{RMS}	V_{DC}						V	I	
	(V)	(V)	(V)	(J)	(A)	(W)	(μA)	(V)	(A)	(pF)
PVR14D180L	10	14	18	6.6	1000	0.1	30	38	10.0	11100
PVR14D220K	14	18	22	7.6	1000	0.1	30	43	10.0	9100
PVR14D270K	17	22	27	9.7	1000	0.1	30	53	10.0	7400
PVR14D330K	20	26	33	12.3	1000	0.1	30	65	10.0	6100
PVR14D390K	25	31	39	13.0	1000	0.1	30	77	10.0	5100
PVR14D470K	30	38	47	16.8	1000	0.1	30	93	10.0	4300
PVR14D560K	35	45	56	19.6	1000	0.1	30	110	10.0	3600
PVR14D680K	40	56	68	23.8	1000	0.1	30	135	10.0	2900
PVR14D820K	50	65	82	29.4	4500	0.6	20	135	50.0	2400
PVR14D101K	60	85	100	33.6	4500	0.6	20	165	50.0	2000
PVR14D121K	75	100	120	40.6	4500	0.6	20	200	50.0	1700
PVR14D151K	95	125	150	51.8	4500	0.6	20	250	50.0	1300
PVR14D181K	115	150	180	58.8	4500	0.6	20	300	50.0	1100
PVR14D201K	130	170	200	75.2	4500	0.6	20	330	50.0	1000
PVR14D221K	140	180	220	79.8	4500	0.6	20	360	50.0	900
PVR14D241K	150	200	240	82.6	4500	0.6	20	395	50.0	830
PVR14D271K	175	225	270	84.0	4500	0.6	20	455	50.0	740
PVR14D301K	190	250	300	103.0	4500	0.6	20	505	50.0	670
PVR14D331K	210	275	330	112.0	4500	0.6	20	550	50.0	610
PVR14D361K	230	300	360	123.0	4500	0.6	20	595	50.0	560
PVR14D391K	250	320	390	135.0	4500	0.6	20	650	50.0	510
PVR14D431K	275	350	430	145.0	4500	0.6	20	710	50.0	460
PVR14D471K	300	385	470	147.0	4500	0.6	20	775	50.0	430
PVR14D511K	320	415	510	148.0	4500	0.6	20	845	50.0	390
PVR14D561K	350	460	560	150.0	4500	0.6	20	920	50.0	360
PVR14D621K	385	505	620	155.0	4500	0.6	20	1025	50.0	320
PVR14D681K	420	560	680	160.0	4500	0.6	20	1120	50.0	290
PVR14D751K	460	615	750	180.0	4500	0.6	20	1240	50.0	270
PVR14D781K	485	640	780	190.0	4500	0.6	20	1290	50.0	260
PVR14D821K	510	670	820	203.0	4500	0.6	20	1355	50.0	230
PVR14D911K	550	745	910	208.0	4500	0.6	20	1500	50.0	220
PVR14D102K	625	825	1000	212.0	4500	0.6	20	1650	50.0	200
PVR14D112K	680	895	1100	217.0	4500	0.6	20	1815	50.0	180
PVR14D152K	900	1200	1500	266.0	4500	0.6	20	2475	50.0	130
PVR14D182K	1000	1465	1800	336.0	4500	0.6	20	2970	50.0	110

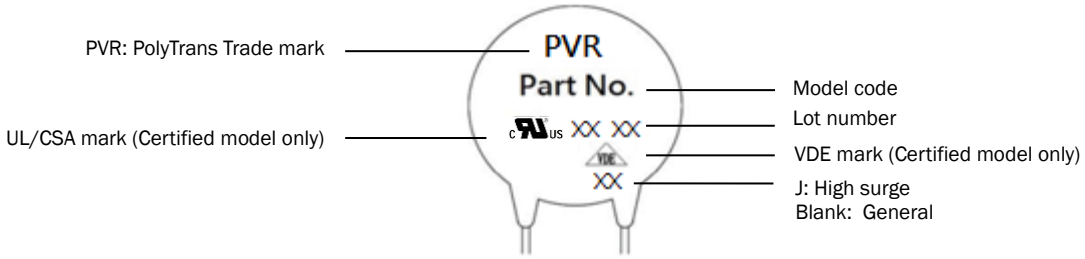
PVR14D Series MOV Devices

Electrical Characteristics (High Surge Product)

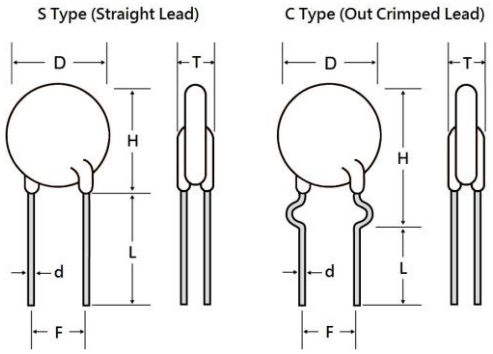
Part Number	Max Allowable Voltage		Varistor Voltage V_b @ 1 mA	Energy 10/1000 μs	Withstand Surge Current 8/20 μs	Rated Power	Max Leakage Current @ V_{DC}	Max Clamping Voltage		Typical Capacitance
	V_{RMS}	V_{DC}						V	I	
	(V)	(V)	(V)	(J)	(A)	(W)	(μA)	(V)	(A)	(pF)
PVR14D180LJ	10	14	18	7.0	2000	0.1	30	38	10.0	11100
PVR14D220KJ	14	18	22	8.0	2000	0.1	30	43	10.0	9100
PVR14D270KJ	17	22	27	10.0	2000	0.1	30	53	10.0	7400
PVR14D330KJ	20	26	33	12.5	2000	0.1	30	65	10.0	6100
PVR14D390KJ	25	31	39	13.2	2000	0.1	30	77	10.0	5100
PVR14D470KJ	30	38	47	17.0	2000	0.1	30	93	10.0	4300
PVR14D560KJ	35	45	56	20.0	2000	0.1	30	110	10.0	3600
PVR14D680KJ	40	56	68	24.0	2000	0.1	30	135	10.0	2900
PVR14D820KJ	50	65	82	30.0	6000	0.6	20	135	50.0	2400
PVR14D101KJ	60	85	100	35.0	6000	0.6	20	165	50.0	2000
PVR14D121KJ	75	100	120	42.0	6000	0.6	20	200	50.0	1700
PVR14D151KJ	95	125	150	53.0	6000	0.6	20	250	50.0	1300
PVR14D181KJ	115	150	180	74.0	6000	0.6	20	300	50.0	1100
PVR14D201KJ	130	170	200	78.6	6000	0.6	20	330	50.0	1000
PVR14D221KJ	140	180	220	80.5	6000	0.6	20	360	50.0	900
PVR14D241KJ	150	200	240	86.0	6000	0.6	20	395	50.0	830
PVR14D271KJ	175	225	270	94.0	6000	0.6	20	455	50.0	740
PVR14D301KJ	190	250	300	105.0	6000	0.6	20	505	50.0	670
PVR14D331KJ	210	275	330	115.0	6000	0.6	20	550	50.0	610
PVR14D361KJ	230	300	360	130.0	6000	0.6	20	595	50.0	560
PVR14D391KJ	250	320	390	140.0	6000	0.6	20	650	50.0	510
PVR14D431KJ	275	350	430	155.0	6000	0.6	20	710	50.0	460
PVR14D471KJ	300	385	470	175.0	6000	0.6	20	775	50.0	430
PVR14D511KJ	320	415	510	180.0	6000	0.6	20	845	50.0	390
PVR14D561KJ	350	460	560	186.0	6000	0.6	20	920	50.0	360
PVR14D621KJ	385	505	620	188.0	6000	0.6	20	1025	50.0	320
PVR14D681KJ	420	560	680	190.0	6000	0.6	20	1120	50.0	290
PVR14D751KJ	460	615	750	210.0	6000	0.6	20	1240	50.0	270
PVR14D781KJ	485	640	780	211.0	6000	0.6	20	1290	50.0	260
PVR14D821KJ	510	670	820	235.0	6000	0.6	20	1355	50.0	230
PVR14D911KJ	550	745	910	255.0	6000	0.6	20	1500	50.0	220
PVR14D102KJ	625	825	1000	280.0	6000	0.6	20	1650	50.0	200
PVR14D112KJ	680	895	1100	310.0	6000	0.6	20	1815	50.0	180
PVR14D152KJ	900	1200	1500	420.0	6000	0.6	20	2475	50.0	130
PVR14D182KJ	1000	1465	1800	510.0	6000	0.6	20	2970	50.0	110

PVR14D Series MOV Devices

Marking Definitions



Physical Dimensions



Symbol		Dimension (mm)
D		17.0 max.
H	S type	19.0 max.
	C type	22.0 max.
L		15.0 min.
F		7.5±0.8
d		0.8±0.05

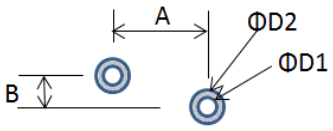
Part Number	T (Max) (mm)
PVR14D180L	4.0
PVR14D220K	4.0
PVR14D270K	4.0
PVR14D330K	4.2
PVR14D390K	4.5
PVR14D470K	4.5
PVR14D560K	4.1
PVR14D680K	4.1
PVR14D820K	4.1
PVR14D101K	4.3
PVR14D121K	4.5
PVR14D151K	4.8

Part Number	T (Max) (mm)
PVR14D181K	4.1
PVR14D201K	4.1
PVR14D221K	4.2
PVR14D241K	4.3
PVR14D271K	4.5
PVR14D301K	4.7
PVR14D331K	4.8
PVR14D361K	5.0
PVR14D391K	5.1
PVR14D431K	5.3
PVR14D471K	5.6
PVR14D511K	5.8

Part Number	T (Max) (mm)
PVR14D561K	6.2
PVR14D621K	6.4
PVR14D681K	6.4
PVR14D751K	6.5
PVR14D781K	6.8
PVR14D821K	7.2
PVR14D911K	7.6
PVR14D102K	7.8
PVR14D112K	8.5
PVR14D152K	11.0
PVR14D182K	12.5

PVR14D Series MOV Devices

Recommended Pad Layout



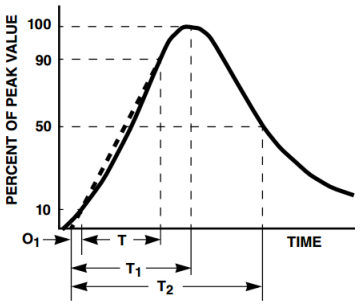
Symbol	Dimension (mm)
A	7.5 typ.
ΦD1	1.3 typ.
ΦD2	2.8 typ.

Part Number	B (Typ) (mm)
PVR14D180L	1.5
PVR14D220K	1.6
PVR14D270K	1.8
PVR14D330K	2.0
PVR14D390K	2.2
PVR14D470K	2.3
PVR14D560K	2.4
PVR14D680K	1.7
PVR14D820K	1.8
PVR14D101K	1.8
PVR14D121K	1.9
PVR14D151K	2.0

Part Number	B (Typ) (mm)
PVR14D181K	1.8
PVR14D201K	1.8
PVR14D221K	1.9
PVR14D241K	2.0
PVR14D271K	2.0
PVR14D301K	2.0
PVR14D331K	2.1
PVR14D361K	2.3
PVR14D391K	2.4
PVR14D431K	2.6
PVR14D471K	2.7
PVR14D511K	2.9

Part Number	B (Typ) (mm)
PVR14D561K	3.1
PVR14D621K	3.4
PVR14D681K	3.6
PVR14D751K	3.9
PVR14D781K	4.0
PVR14D821K	4.2
PVR14D911K	4.5
PVR14D102K	4.8
PVR14D112K	5.2
PVR14D152K	6.2
PVR14D182K	6.5

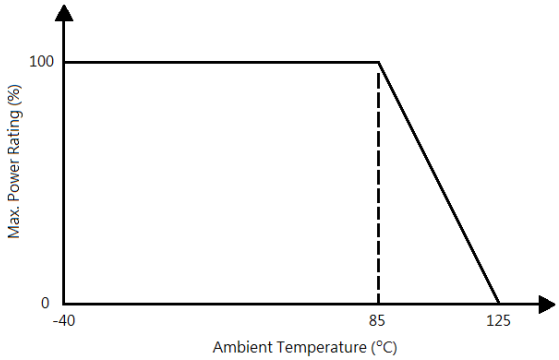
Peak Pulse Current Test Waveform



O_1 = Virtual Origin of Wave
T = Time from 10% to 90% of Peak
T1 = Rise Time = 1.25 x T
T2 = Decay Time

Example – For an 8/20 μs current waveform
8 μs = T1 = Rise Time
20 μs = T2 = Decay Time

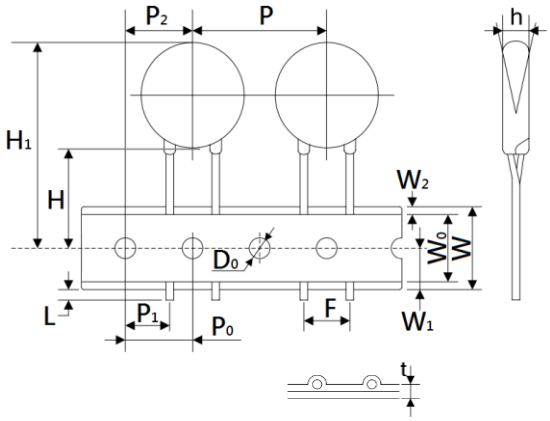
Power Derating Curve



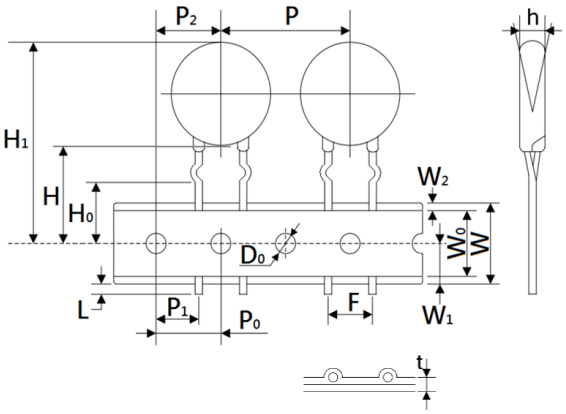
PVR14D Series MOV Devices

Taping Dimensions

S Type

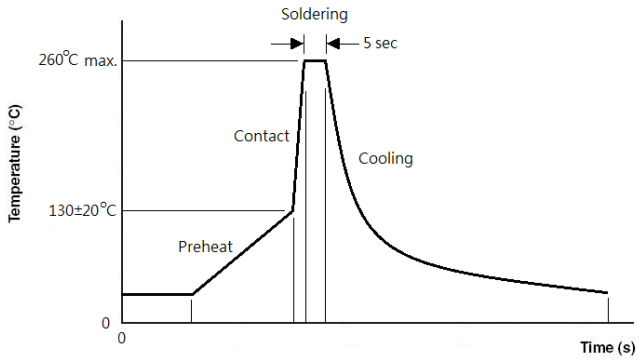


C Type



Symbol	Dimension (mm)	Symbol	Dimension (mm)
P	25.4±1.0	W_2	3.0 max.
P_0	12.7±0.3	H	20.0±2.0
P_1	8.95±0.7	H_0	16.0±1.0
P_2	12.7±1.3	H_1	36.0 max.
F	7.5±0.8	h	0±0.2
W	18.0±1.0	L	1.0 max.
W_0	12.5 max.	D_0	4.0±0.2
W_1	9.0±0.5	t	0.6±0.3

Lead Free Wave Soldering Recommendations

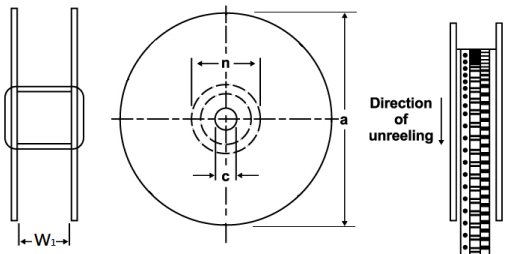


Preheat - Temperature Min (T_{s_min}) - Temperature Max (T_{s_max}) - Time (T_{s_min} to T_{s_max}) - Average Ramp-Up Rate	 110°C 150°C 30-90 seconds 1~3°C/second
Peak Temperature	260°C
Max Time at Peak Temperature	5 seconds
Ramp-Down Rate	5 °C /second max.

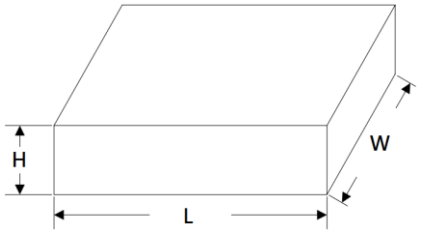
Note: If the wave soldering temperatures exceed the recommended profile, devices may not meet the performance requirements.

PVR14D Series MOV Devices

Reel and Ammo Packing Dimensions/Quantity



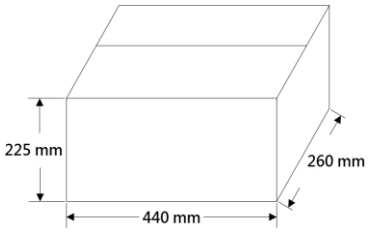
Symbol	Dimension (mm)
W_1	46±1
a	340±10
c	31±1



Symbol	Dimension (mm)
W	348±5
L	275±5
H	60±5

Part Number	Reel pack		Ammo pack	
	Box	Carton	Box	Carton
180L – 561K	500	2000	500	5000
621K – 821K	400	1200	400	4000

Bulk Packing Quantity



Part Number	Bulk pack			
	Type	Bag	Small Carton	Carton
180L – 182K	Long leg (Thin)	500	3000	6000
	Long leg (Thick)	500	3500	5000
	Short leg (Thin)	500	4000	8000
	Short leg (Thick)	500	3000	6000

PVR14D Series MOV Devices

Reliability Test

Mechanical Ratings		
Test Parameter	**Test Condition / Description**	**Performance Requirements**
Terminal Pull Strength	After gradually applying the load specified bellow and keeping the unit fixed for ten seconds, the terminal shall be visually examined for any damage. Diameter: Loading 0.6 mm: 1.0 kg 0.8 mm: 1.0 kg 1.0 mm: 2.0 kg	No visible damage
Terminal Bending Strength	The unit shall be secured with its terminal kept vertical and the weight specified below be applied in 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. Diameter: Loading 0.6 mm: 0.5 kg 0.8 mm: 0.5 kg 1.0 mm: 1.0 kg	No visible damage
Vibration	The specimen shall be vibrated by its lead wires with a total amplitude of 1.5 mm and a varying frequency of 10~55~10Hz (each minutes) for a period of 2 hours respectively in each X, Y and Z directions.	No Visible damage $\Delta V_b/V_b \leqq 5\%$
Solderability	After dipping the terminal the depth of approximately 3 mm from the specimen in a soldering bath of 260°C for 10±1 (D5: 5±1) seconds. Thereafter the terminal shall be visually examined.	Terminations shall be uniformly covered by solder
Resistance to solder heat	After preheating the specimen, the specimen shall be completely immersed into a soldering bath having a temperature of 260±5°C for 10±1 (D5: 5±1) seconds or iron of 400±5°C for 3±0.5 seconds. Thereafter the change of V_b and mechanical damage shall be examined.	No Visible damage $\Delta V_b/V_b \leqq 5\%$
Environmental Ratings		
Test Parameter	**Test Condition / Description**	**Performance Requirements**
Dry Heat Loading	The specimen shall be applied continuously the maximum allowable voltage at the specified conditions for specified period and then stored at room temperature and normal humidity over 2 hours. Thereafter, the change of V_b and mechanical damage shall be examined. Ambient temp: 125±2°C / Period: 1000±24hours	$\Delta V_b/V_b \leqq 10\%$
High Temp Storage	In a dry oven without load. Ambient temp: 125±2°C / Period: 1000±24hours	$\Delta V_b/V_b \leqq 5\%$
Damp Heat Loading	The specimen shall be applied continuously the maximum allowable voltage at the specified conditions for specified period and then stored at room temperature and normal humidity over 2 hours. Thereafter, the change of V_b and mechanical damage shall be examined. Ambient temp: 40±2°C, 90~95%RH / Period: 1000±24hours	$\Delta V_b/V_b \leqq 10\%$
Temperature Cycle	Condition the specimen to each temperature from step 1 to step 4 in this order for the period shown in the table of specifications. The change of V_b and mechanical damage shall be examined after 2 hours. Step 1: -40±3°C / 30min. Step 2: Room temp / 15min. Step 3: 85±2°C / 30min. Step 4: Room temp / 15min.	No Visible damage $\Delta V_b/V_b \leqq 10\%$
Surge Lifetime Rating	The change of Vb shall be measured after the impulse listed below is applied 10,000 times continuously with the interval of ten seconds at room temperature.	No Visible damage $\Delta V_b/V_b \leqq 10\%$
Voltage Proof	Voltage: 2500 Vac / Leakage current≦0.5 mA / Time: 60 seconds	No Breakdown