PVH Series

Plastic Encapsulated High Energy SMD Varistor

Stackpole Electronics, Inc.
Resistive Product Solutions

Features:

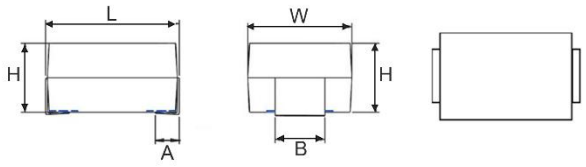
- Advanced packaging technology
- Compact structure, small size, and space saving
- Superior high-temperature and high humidity performance, suitable for in vehicle systems
- Designed for high energy handling
- RoHS compliant, REACH compliant, and halogen free

Electrical Specifications										
Part Number	V_{RMS} (volts)	V_{DC} (volts)	Vn (@ 1mA) (volts)	V_C (volts)	I_C (amps)	Max. Energy (10/1000 µs) (joules)	C_{TYP} (@ 1 kHz) (pF)	Leakage Current (µA) (Max.)	Max. Peak Current (A)	
									1 time	2 times
PVH18M3225T	11	14	18	36	2.5	0.6	2800	20	250	100
PVH22M3225T	14	18	22	43	2.5	0.7	2300	20	250	100
PVH27M3225T	17	22	27	53	2.5	0.9	1800	20	250	100
PVH33L3225T	20	26	33	65	2.5	1.1	1500	20	250	100
PVH39L3225T	25	31	39	77	2.5	1.2	1300	20	250	100
PVH47L3225T	30	38	47	93	2.5	1.5	1100	20	250	100
PVH56K3225T	35	45	56	110	2.5	1.8	890	20	250	100
PVH68K3225T	40	56	68	135	2.5	2.2	740	20	250	100
PVH82K3225T	50	65	82	135	10	4.0	600	20	1000	800
PVH100K3225T	60	85	100	165	10	4.1	500	20	1000	800
PVH120K3225T	75	100	120	200	10	4.9	420	20	1000	800
PVH150K3225T	95	125	150	250	10	6.5	330	20	1000	800
PVH180K3225T	115	150	180	300	10	7.5	280	20	1000	800
PVH200K3225T	130	170	200	340	10	17.0	250	20	1750	1200
PVH220K3225T	140	180	220	360	10	20.0	230	20	1750	1200
PVH240K3225T	150	200	240	395	10	21.0	210	20	1750	1200
PVH270K3225T	175	225	270	455	10	24.0	185	20	1750	1200
PVH300K3225T	190	250	300	500	10	26.0	165	20	1750	1200
PVH330K3225T	210	275	330	550	10	28.0	150	20	1750	1200
PVH360K3225T	230	300	360	595	10	32.0	140	20	1750	1200
PVH390K3225T	250	320	390	650	10	35.0	130	20	1750	1200
PVH430K3225T	275	350	430	710	10	40.0	115	20	1750	1200
PVH470K3225T	300	385	470	775	10	42.0	105	20	1750	1200
PVH510K3225T	320	415	510	845	10	45.0	100	20	1750	1200
PVH560K3225T	350	460	560	925	10	50.0	90	20	1750	1200

Electrical Specifications

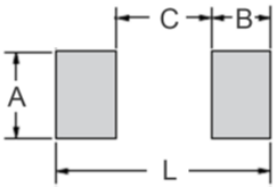
Part Number	V_{RMS} (volts)	V_{DC} (volts)	Vn (@ 1mA) (volts)	V_C (volts)	I_C (amps)	Max. Energy (10/1000 µs) (joules)	C_{TYP} (@ 1 kHz) (pF)	Leakage Current (µA) (Max.)	Max. Peak Current (A)	
									1 time	2 times
PVH18M4032T	11	14	18	36	5	3.0	2800	20	500	250
PVH22M4032T	14	18	22	43	5	5.0	2300	20	500	250
PVH27M4032T	17	22	27	53	5	6.0	1800	20	500	250
PVH33L4032T	20	26	33	65	5	7.0	1500	20	500	250
PVH39L4032T	25	31	39	77	5	9.0	1300	20	500	250
PVH47L4032T	30	38	47	93	5	11.0	1100	20	500	250
PVH56K4032T	35	45	56	110	5	13.0	890	20	500	250
PVH68K4032T	40	56	68	135	5	15.0	740	20	500	250
PVH82K4032T	50	65	82	135	25	17.0	600	20	2000	1500
PVH100K4032T	60	85	100	165	25	18.0	500	20	2000	1500
PVH120K4032T	75	100	120	200	25	21.0	420	20	2000	1500
PVH150K4032T	95	125	150	250	25	25.0	330	20	2000	1500
PVH180K4032T	115	150	180	300	25	30.0	280	20	2000	1500
PVH200K4032T	130	170	200	340	25	35.0	250	20	3500	2500
PVH220K4032T	140	180	220	360	25	39.0	230	20	3500	2500
PVH240K4032T	150	200	240	395	25	42.0	210	20	3500	2500
PVH270K4032T	175	225	270	455	25	50.0	185	20	3500	2500
PVH300K4032T	190	250	300	500	25	55.0	165	20	3500	2500
PVH330K4032T	210	275	330	550	25	58.0	150	20	3500	2500
PVH360K4032T	230	300	360	595	25	65.0	140	20	3500	2500
PVH390K4032T	250	320	390	650	25	70.0	130	20	3500	2500
PVH430K4032T	275	350	430	710	25	80.0	115	20	3500	2500
PVH470K4032T	300	385	470	775	25	85.0	105	20	3500	2500
PVH510K4032T	320	415	510	845	25	90.0	100	20	3500	2500
PVH560K4032T	350	460	560	925	25	92.0	90	20	3500	2500
PVH620K4032T	385	505	620	1025	25	95.0	80	20	3500	2500
PVH680K4032T	420	560	680	1120	25	100.0	70	20	3500	2500
PVH750K4032T	460	615	750	1240	25	100.0	68	20	3500	2500
PVH820K4032T	510	670	820	1355	25	110.0	65	20	3500	2500

Mechanical Specifications



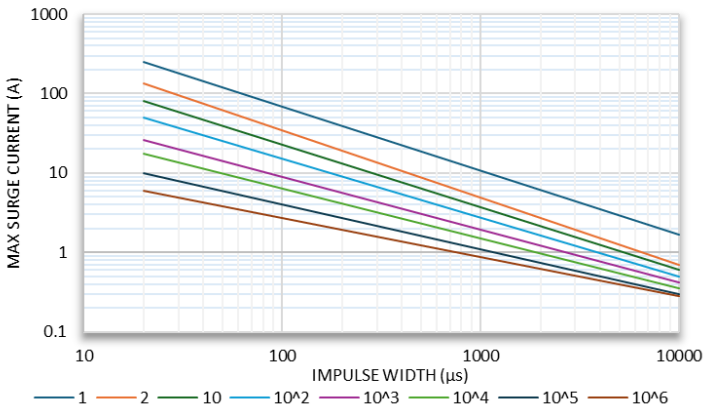
Size	H	L	W	A	B	Unit
PVH3225	0.150 ± 0.012 3.80 ± 0.30	0.315 ± 0.012 8.00 ± 0.30	0.248 ± 0.012 6.30 ± 0.30	0.059 ± 0.012 1.50 ± 0.30	0.118 ± 0.012 3.00 ± 0.30	inches mm
PVH4032 (Nominal Voltage < 680 V)	0.189 ± 0.012 4.80 ± 0.30	0.441 ± 0.012 11.20 ± 0.30	0.323 ± 0.012 8.20 ± 0.30	0.059 ± 0.012 1.50 ± 0.30	0.118 ± 0.012 3.00 ± 0.30	inches mm
PVH4032 (Nominal Voltage ≥ 680 V)	0.217 ± 0.012 5.50 ± 0.30	0.441 ± 0.012 11.20 ± 0.30	0.323 ± 0.012 8.20 ± 0.30	0.059 ± 0.012 1.50 ± 0.30	0.118 ± 0.012 3.00 ± 0.30	inches mm

Recommended Pad Layout

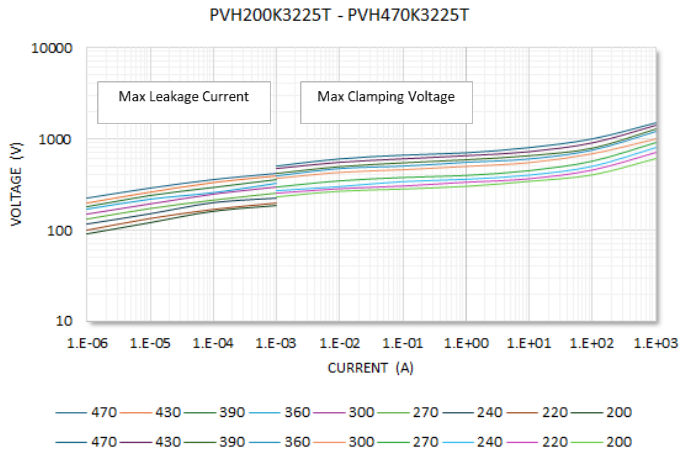


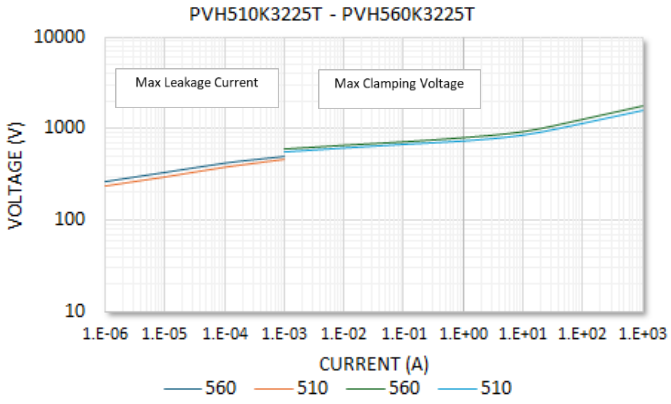
Type/Code	A	B	C	L	Unit
PVH3225	0.138 3.50	0.110 2.80	0.177 4.50	0.398 10.10	inches mm
PVH4032	0.138 3.50	0.110 2.80	0.256 6.50	0.476 12.10	inches mm

3225 - Max Surge Current Derating Curve

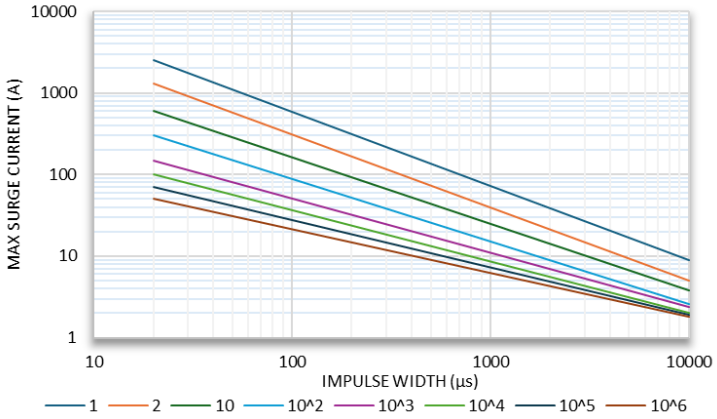


3225 - Max Leakage Current & Max Clamping Voltage Curve

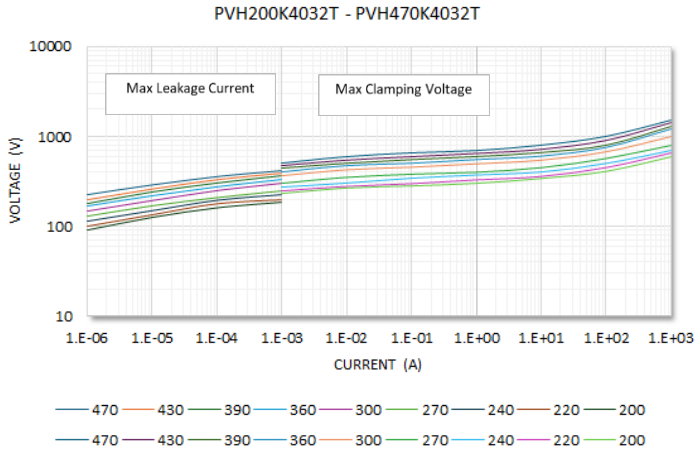


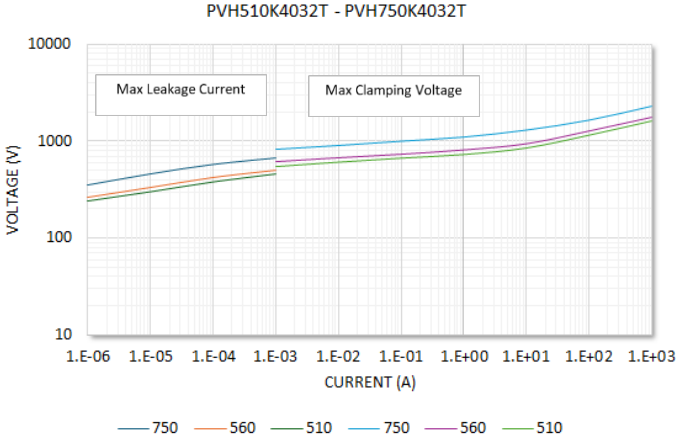


4032 - Max Surge Current Derating Curve



4032 - Max Leakage Current & Max Clamping Voltage Curve





Reliability Test

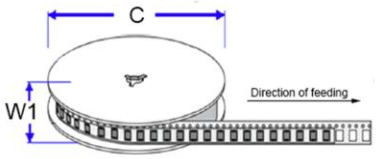
Item	Test Method	Specification
Solderability	After dipping the terminals to a depth of approximately 3 mm from the body in a soldering bath of 235 ± 5°C for 3 ± 0.3 seconds, the terminal shall be visually examined.	Approximately 95% of the terminals shall be covered with solder uniformly.
Resistance to Soldering Heat	After each lead shall be dipped into a solder bath having a temperature of 260 ± 5°C. It should be held there for specified time of 10 ± 1 seconds and then be stored at room temperature and humidity for 1 to 2 hours.	No outstanding damage. $\Delta V_{CMA} / V_{CMA} \leq \pm 5\%$
Vibration Resistance	The varistor should be soldered to the supporting lead wire and vibrated at a frequency range of 10 to 55 Hz, 15 mm in total amplitude, with about 1 minute rate of vibration charge from 10 to 55 Hz and back to 10 Hz. Apply for a total of 6 hours, 2 hours each, in 3 mutually perpendicular directions.	No outstanding damage. $\Delta V_{CMA} / V_{CMA} \leq \pm 5\%$
Temperature Coefficient of Varistor Voltage	Temperature Coefficient of Varistor Voltage $\frac{V_{C1} - V_{C2}}{V_{C2}} \times \frac{1}{60} \times 100\%$ Vc1 = 85°C Vc2 = 25°C	± 0.05%/°C max
Temperature Cycle	The temperature cycle shown below shall be repeated five times and then stored at room temperature and humidity for 1 to 2 hours. The change of Vc and mechanical damage shall be examined.	No outstanding damage. $\Delta V_{CMA} / V_{CMA} \leq \pm 5\%$
Damp Heat/Humidity	The specimen shall be subject to 85 ± 2°C, 85% R.H. and the Maximum Allowable Voltage for 1000 hours and then stored at room temperature and humidity for 1 to 2 hours. Thereafter, the change of Vc shall be measured.	No outstanding damage. $\Delta V_{CMA} / V_{CMA} \leq \pm 10\%$
High Temperature Storage / Dry Heat	The specimen shall be subject to 125 ± 2°C for 1000 + 48/-0 hours in a thermostatic bath without load and then stored at room temperature and humidity for 1 to 2 hours. Thereafter, the change of Vc shall be measured.	No outstanding damage. $\Delta V_{CMA} / V_{CMA} \leq \pm 10\%$
High Temperature Load / Dry Heat Load	After being continuously applied the Maximum Allowable Voltage at 125 ± 2°C for 1000 hours. The specimen shall be stored at room temperature and humidity for 1 to 2 hours. Thereafter, the change of Vc shall be examined.	No outstanding damage. $\Delta V_{CMA} / V_{CMA} \leq \pm 10\%$
Withstanding Voltage (Body Insulation)	The specified voltage shall be applied both terminals of the specimen connected together and metal foil closely wrapped around its body for 1 minute. Electrical breakdown shall be examined. Test Voltage: 2500 AC.	No breakdown.
8/20 µs Impulse Current Lifespan	8/20 µs Current waveform, with a maximum impulse current of 10 times in the same direction (corresponding to 10 times of derating value), with an interval of 30 seconds.	No outstanding damage. $\Delta V_{CMA} / V_{CMA} \leq \pm 10\%$
10/1000 µs Current Impulse Test	10/1000 µs current waveform, with a maximum impulse current of 10 times in the same direction (corresponding to 10 times of derating value), with an interval of 2 minutes.	No outstanding damage. $\Delta V_{CMA} / V_{CMA} \leq \pm 10\%$

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

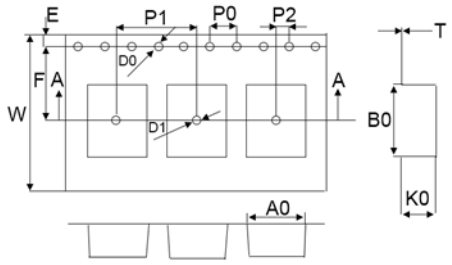
Recommended storage temperature is -10 to +40°C. R.H. is ≤ 75%

Reel Specifications

Type/Code	C	W1	Unit
PVH3225	12.992 ± 0.079 330.00 ± 2.00	0.815 20.70	Inches mm
PVH4032	12.992 ± 0.079 330.00 ± 2.00	0.961 24.40	Inches mm



Packaging Specifications - Plastic Tape



Type/Code	A0	B0	K0	P0	P1	P2	Unit
PVH3225	0.260 ± 0.004 6.60 ± 0.10	0.343 ± 0.004 8.70 ± 0.10	0.177 ± 0.004 4.50 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.472 ± 0.004 12.00 ± 0.10	0.079 ± 0.004 2.00 ± 0.10	Inches mm
PVH4032 (Nominal Voltage <680 V)	0.339 ± 0.004 8.60 ± 0.10	0.457 ± 0.004 11.60 ± 0.10	0.205 ± 0.004 5.20 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.472 ± 0.004 12.00 ± 0.10	0.079 ± 0.004 2.00 ± 0.10	Inches mm
PVH4032 (Nominal Voltage ≥680 V)	0.339 ± 0.004 8.60 ± 0.10	0.457 ± 0.004 11.60 ± 0.10	0.232 ± 0.004 5.90 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.472 ± 0.004 12.00 ± 0.10	0.079 ± 0.004 2.00 ± 0.10	Inches mm
Type/Code	W	T	E	F	D0	D1	Unit
PVH3225	0.630 ± 0.012 16.00 ± 0.30	0.016 ± 0.002 0.40 ± 0.05	0.069 ± 0.004 1.75 ± 0.10	0.295 ± 0.004 7.50 ± 0.10	0.059 -0/+0.004 1.50 -0/+0.10	0.059 ± 0.004 1.50 ± 0.10	Inches mm
PVH4032 (All Nominal Voltages)	0.945 ± 0.012 24.00 ± 0.30	0.016 ± 0.002 0.40 ± 0.05	0.069 ± 0.004 1.75 ± 0.10	0.453 ± 0.004 11.50 ± 0.10	0.059 -0/+0.004 1.50 -0/+0.10	0.061 ± 0.004 1.55 ± 0.10	Inches mm

RoHS Compliance

Stackpole Electronics has joined the worldwide effort to reduce the amount of lead in electronic components and to meet the various regulatory requirements now prevalent, such as the European Union's directive regarding "Restrictions on Hazardous Substances" (RoHS 3). As part of this ongoing program, we periodically update this document with the status regarding the availability of our compliant components. All our standard part numbers are compliant to EU Directive 2011/65/EU of the European Parliament as amended by Directive (EU) 2015/863/EU as regards the list of restricted substances.

RoHS Compliance Status

Standard Product Series	Description	Package / Termination Type	Standard Series RoHS Compliant	Lead-Free Termination Composition	Lead-Free Mfg. Effective Date (Std Product Series)	Lead-Free Effective Date Code (YY/WW)
PVH	Plastic Encapsulated High Energy SMD Varistor	SMD	YES(1)	100% Matte Sn	Always	Always

Note (1): RoHS Compliant by means of exemption 7(a).

"Conflict Metals" Commitment

We at Stackpole Electronics, Inc. are joined with our industry in opposing the use of metals mined in the "conflict region" of the eastern Democratic Republic of the Congo (DRC) in our products. Recognizing that the supply chain for metals used in the electronics industry is very complex, we work closely with our own suppliers to verify to the extent possible that the materials and products we supply do not contain metals sourced from this conflict region. As such, we are in compliance with the requirements of Dodd-Frank Act regarding Conflict Minerals.

Compliance to "REACH"

We certify that all passive components supplied by Stackpole Electronics, Inc. are SVHC (Substances of Very High Concern) free and compliant with the requirements of EU Directive 1907/2006/EC, "The Registration, Evaluation, Authorization and Restriction of Chemicals", otherwise referred to as REACH. Contact us for complete list of REACH Substance Candidate List.

Environmental Policy

It is the policy of Stackpole Electronics, Inc. (SEI) to protect the environment in all localities in which we operate. We continually strive to improve our effect on the environment. We observe all applicable laws and regulations regarding the protection of our environment and all requests related to the environment to which we have agreed. We are committed to the prevention of all forms of pollution.

How to Order

P	V	H	8	2	0	K	4	0	3	2	T

Product Series

Code	Description
PVH	Plastic Encapsulated High Energy SMD Varistor

Vn Nominal Voltage

Code	V
18	18
27	27
100	100
560	560
820	820

Tolerance

Code	Tol
K	10%
L	15%
M	20%

Chip Size

Code
3225
4032

Packaging

Code	Description	Quantity
T	Tape and Reel	1000