



**THE DATASHEET OF  
P4KE24A-E3/54**



# TRANSZORB® Transient Voltage Suppressors


**DO-41 (DO-204AL)**

PRIMARY CHARACTERISTICS	
$V_{WM}$	5.8 V to 459 V
$V_{BR}$ uni-directional	6.8 V to 540 V
$V_{BR}$ bi-directional	6.8 V to 440 V
$P_{PPM}$	400 W
$P_D$	1.5 W
$I_{FSM}$ (uni-directional only)	40 A
$T_J$ max.	175 °C
Polarity	Uni-directional, bi-directional
Package	DO-41 (DO-204AL)

## DEVICES FOR BI-DIRECTION APPLICATIONS

For bi-directional types, use CA suffix (e.g. P4KE440CA).  
Electrical characteristics apply in both directions.

## FEATURES

- Glass passivated chip junction
- Available in uni-directional and bi-directional
- 400 W peak pulse power capability with a 10/1000  $\mu$ s waveform, repetitive rate (duty cycle): 0.01 %
- Excellent clamping capability
- Very fast response time
- Low incremental surge resistance
- Solder dip 275 °C max. 10 s, per JESD 22-B106
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

## TYPICAL APPLICATIONS

Use in sensitive electronics protection against voltage transients induced by inductive load switching and lighting on ICs, MOSFET, signal lines of sensor units for consumer, computer, industrial, automotive, and telecommunication.

## MECHANICAL DATA

**Case:** DO-41 (DO-204AL), molded epoxy body over passivated chip

Molding compound meets UL 94 V-0 flammability rating  
Base P/N-E3 - RoHS-compliant, commercial grade  
Base P/NHE3 - RoHS-compliant, AEC-Q101 qualified

**Terminals:** matte tin plated leads, solderable per J-STD-002 and JESD 22-B102

E3 suffix meets JESD 201 class 1A whisker test, HE3 suffix meets JESD 201 class 2 whisker test

### Note

- P4KE250CA to P4KE540A and P4KE250A to P4KE440CA for commercial grade only

**Polarity:** for uni-directional types the color band denotes cathode end, no marking on bi-directional types

MAXIMUM RATINGS ( $T_A = 25$ °C unless otherwise noted)			
PARAMETER	SYMBOL	LIMIT	UNIT
Peak pulse power dissipation with a 10/1000 $\mu$ s waveform <sup>(1)</sup> (fig.1)	$P_{PPM}$	400	W
Peak pulse current with a 10/1000 $\mu$ s waveform <sup>(1)</sup>	$I_{PPM}$	See next table	A
Power dissipation on infinite heatsink at $T_L = 75$ °C (fig. 5)	$P_D$	1.5	W
Peak forward surge current 8.3 ms single half-sine wave uni-directional only <sup>(2)</sup>	$I_{FSM}$	40	A
Maximum instantaneous forward voltage at 25 A for uni-directional only <sup>(3)</sup>	$V_F$	3.5/5.0	V
Operating junction and storage temperature range	$T_J, T_{STG}$	- 55 to + 175	°C

### Notes

- <sup>(1)</sup> Non-repetitive current pulse, per fig. 3 and derated above  $T_A = 25$  °C per fig. 2
- <sup>(2)</sup> 8.3 ms single half-sine wave or equivalent square wave, duty cycle = 4 pulses per minute maximum
- <sup>(3)</sup>  $V_F = 3.5$  V for P4KE220A and below;  $V_F = 5.0$  V for P4KE250A and above



**ELECTRICAL CHARACTERISTICS** ( $T_A = 25\text{ }^\circ\text{C}$  unless otherwise noted)

DEVICE TYPE	BREAKDOWN VOLTAGE $V_{BR}$ AT $I_T$ <sup>(1)</sup> (V)		TEST CURRENT $I_T$ (mA)	STAND-OFF VOLTAGE $V_{WM}$ (V)	MAXIMUM REVERSE LEAKAGE AT $V_{WM}$ $I_D$ <sup>(3)</sup> ( $\mu$ A)	MAXIMUM PEAK PULSE CURRENT $I_{PPM}$ <sup>(2)</sup> (A)	MAXIMUM CLAMPING VOLTAGE AT $I_{PPM}$ $V_C$ (V)	MAXIMUM TEMPERATURE COEFFICIENT AT $V_{BR}$ ( $\%/^\circ\text{C}$ )
	MIN.	MAX.						
P4KE6.8A	6.45	7.14	10	5.80	1000	38.1	10.5	0.057
P4KE7.5A	7.13	7.88	10	6.40	500	35.4	11.3	0.061
P4KE8.2A	7.79	8.61	10	7.02	200	33.1	12.1	0.060
P4KE9.1A	8.65	9.55	1.0	7.78	50	29.9	13.4	0.068
P4KE10A	9.5	10.5	1.0	8.55	10	27.6	14.5	0.073
P4KE11A	10.5	11.6	1.0	9.40	5.0	25.6	15.6	0.075
P4KE12A	11.4	12.6	1.0	10.2	1.0	24.0	16.7	0.078
P4KE13A	12.4	13.7	1.0	11.1	1.0	22.0	18.2	0.081
P4KE15A	14.3	15.8	1.0	12.8	1.0	18.9	21.2	0.084
P4KE16A	15.2	16.8	1.0	13.6	1.0	17.8	22.5	0.086
P4KE18A	17.1	18.9	1.0	15.3	1.0	15.9	25.2	0.088
P4KE20A	19.0	21.0	1.0	17.1	1.0	14.4	27.7	0.090
P4KE22A	20.9	23.1	1.0	18.8	1.0	13.1	30.6	0.092
P4KE24A	22.8	25.2	1.0	20.5	1.0	12.0	33.2	0.094
P4KE27A	25.7	28.4	1.0	23.1	1.0	10.7	37.5	0.096
P4KE30A	28.5	31.5	1.0	25.6	1.0	9.7	41.4	0.097
P4KE33A	31.4	34.7	1.0	28.2	1.0	8.8	45.7	0.098
P4KE36A	34.2	37.8	1.0	30.8	1.0	8.0	49.9	0.099
P4KE39A	37.1	41.0	1.0	33.3	1.0	7.4	53.9	0.100
P4KE43A	40.9	45.2	1.0	36.8	1.0	6.7	59.3	0.101
P4KE47A	44.7	49.4	1.0	40.2	1.0	6.2	64.8	0.101
P4KE51A	48.5	53.6	1.0	43.6	1.0	5.7	70.1	0.102
P4KE56A	53.2	58.8	1.0	47.8	1.0	5.2	77.0	0.103
P4KE62A	58.9	65.1	1.0	53.0	1.0	4.7	85.0	0.104
P4KE68A	64.6	71.4	1.0	58.1	1.0	4.3	92.0	0.104
P4KE75A	71.3	78.8	1.0	64.1	1.0	3.9	103	0.105
P4KE82A	77.9	86.1	1.0	70.1	1.0	3.5	113	0.105
P4KE91A	86.5	95.5	1.0	77.8	1.0	3.2	125	0.106
P4KE100A	95.0	105	1.0	85.5	1.0	2.9	137	0.106
P4KE110A	105	116	1.0	94.0	1.0	2.6	152	0.107
P4KE120A	114	126	1.0	102	1.0	2.4	165	0.107
P4KE130A	124	137	1.0	111	1.0	2.2	179	0.107
P4KE150A	143	158	1.0	128	1.0	1.9	207	0.108
P4KE160A	152	168	1.0	136	1.0	1.8	219	0.108
P4KE170A	162	179	1.0	145	1.0	1.7	234	0.108
P4KE180A	171	189	1.0	154	1.0	1.6	246	0.108
P4KE200A	190	210	1.0	171	1.0	1.5	274	0.108
P4KE220A	209	231	1.0	185	1.0	1.2	328	0.108
P4KE250A	237	263	1.0	214	1.0	1.2	344	0.110
P4KE300A	285	315	1.0	256	1.0	1.00	414	0.110
P4KE350A	333	368	1.0	300	1.0	0.83	482	0.110
P4KE400A	380	420	1.0	342	1.0	0.73	548	0.110
P4KE440A	418	462	1.0	376	1.0	0.66	602	0.110
P4KE480A	456	504	1.0	408	1.0	0.61	658	0.110
P4KE510A	485	535	1.0	434	1.0	0.57	698	0.110
P4KE540A	513	567	1.0	459	1.0	0.54	740	0.110

**Notes**

- (1) Pulse test:  $t_p \leq 50\text{ ms}$
- (2) Surge current waveform per fig. 3 and derate per fig. 2
- (3) For bi-directional types with  $V_{WM}$  of 10 V and less the  $I_D$  limit is doubled
- (4) All terms and symbols are consistent with ANSI/IEEE CA62.35



THERMAL CHARACTERISTICS ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)			
PARAMETER	SYMBOL	VALUE	UNIT
Typical thermal resistance, junction to lead	$R_{\theta JL}$	66	$^\circ\text{C}/\text{W}$
Typical thermal resistance, junction to ambient $L_{\text{Lead}} = 10\text{ mm}$	$R_{\theta JA}$	100	

ORDERING INFORMATION (Example)				
PREFERRED PIN	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
P4KE6.8A-E3/54	0.350	54	5500	13" diameter paper tape and reel
P4KE6.8AHE3/54 <sup>(1)</sup>	0.350	54	5500	13" diameter paper tape and reel

**Note**

<sup>(1)</sup> AEC-Q101 qualified

**RATINGS AND CHARACTERISTICS CURVES ( $T_A = 25\text{ }^\circ\text{C}$  unless otherwise noted)**



Fig. 1 - Peak Pulse Power Rating Curve



Fig. 3 - Pulse Waveform



Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature



Fig. 4 - Typical Junction Capacitance Uni-Directional



Fig. 5 - Power Derating Curve



Fig. 7 - Typical Transient Thermal Impedance



Fig. 6 - Maximum Non-Repetitive Forward Surge Current  
Uni-Directional Only



### PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

#### DO-41 (DO-204AL)





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