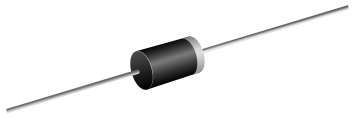
TRANSZORB® Transient Voltage Suppressors



DO-204AL (DO-41)

FEATURES

- Glass passivated chip junction
- Available in uni-directional and bi-directional
- 400 W peak pulse power capability with a 10/1000 µs waveform, repetitive rate (duty cycle): 0.01 %
- Excellent clamping capability
- Very fast response time
- Low incremental surge resistance
- Solder dip 260 °C, 40 s
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

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.

PRIMARY CHARACTERISTICS	
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

DEVICES FOR BI-DIRECTION APPLICATIONS

For bi-direction use C or CA suffix (e.g. P4KE440CA).
Electrical characteristics apply in both directions.

MECHANICAL DATA

Case: DO-204AL, molded epoxy 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, high reliability/ automotive grade (AEC Q101 qualified)

Terminals: Matte tin plated leads, solderable per J-STD-002 and JESD22-B102

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

Note: P4KE250 ~ P4KE540A and P4KE250C ~ 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 power dissipation with a 10/1000 µs waveform (1) (Fig. 1)	P_{PPM}	400	W
Peak pulse current with a 10/1000 µs waveform (1)	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 (2)	I_{FSM}	40	A
Maximum instantaneous forward voltage at 25 A for uni-directional only (3)	V_F	3.5/5.0	V
Operating junction and storage temperature range	T_J, T_{STG}	- 55 to + 175	°C

Notes:

(1) Non-repetitive current pulse, per Fig. 3 and derated above T_A = 25 °C per Fig. 2

(2) Measured on 8.3 ms single half sine-wave or equivalent square wave, duty cycle = 4 pulses per minute maximum

(3) V_F = 3.5 V for P4KE220(A) and below; V_F = 5.0 V for P4KE250(A) and above

ELECTRICAL CHARACTERISTICS (T_A = 25 °C unless otherwise noted)								
DEVICE TYPE	**BREAKDOWN VOLTAGE V_{BR} AT I_T[1] (V)**		**TEST CURRENT I_T (mA)**	**STAND-OFF VOLTAGE V_{WM} (V)**	**MAXIMUM REVERSE LEAKAGE AT V_{WM} I_D[3] (µA)**	**MAXIMUM PEAK PULSE CURRENT I_{PPM}[2] (A)**	**MAXIMUM CLAMPING VOLTAGE AT I_{PPM} V_C (V)**	**MAXIMUM TEMPERATURE COEFFICIENT OF V_{BR} (%/°C)**
	MIN.	**MAX.**						
P4KE6.8	6.12	7.48	10	5.50	1000	37.0	10.8	0.057
P4KE6.8A	6.45	7.14	10	5.80	1000	38.1	10.5	0.057
P4KE7.5	6.75	8.25	10	6.05	500	34.2	11.7	0.061
P4KE7.5A	7.13	7.88	10	6.40	500	35.4	11.3	0.061
P4KE8.2	7.38	9.02	10	6.63	200	32.0	12.5	0.065
P4KE8.2A	7.79	8.61	10	7.02	200	33.1	12.1	0.06
P4KE9.1	8.19	10.0	1.0	7.37	50	29.0	13.8	0.068
P4KE9.1A	8.65	9.55	1.0	7.78	50	29.9	13.4	0.068
P4KE10	9.00	11.0	1.0	8.10	10	26.7	15.0	0.073
P4KE10A	9.50	10.5	1.0	8.55	10	27.6	14.5	0.073
P4KE11	9.90	12.1	1.0	8.92	5.0	24.7	16.2	0.075
P4KE11A	10.5	11.6	1.0	9.40	5.0	25.6	15.6	0.075
P4KE12	10.8	13.2	1.0	9.72	1.0	23.1	17.3	0.076
P4KE12A	11.4	12.6	1.0	10.2	1.0	24.0	16.7	0.078
P4KE13	11.7	14.3	1.0	10.5	1.0	21.1	19.0	0.081
P4KE13A	12.4	13.7	1.0	11.1	1.0	22.0	18.2	0.081
P4KE15	13.5	16.5	1.0	12.1	1.0	18.2	22.0	0.084
P4KE15A	14.3	15.8	1.0	12.8	1.0	18.9	21.2	0.084
P4KE16	14.4	17.6	1.0	12.9	1.0	17.0	23.5	0.086
P4KE16A	15.2	16.8	1.0	13.6	1.0	17.8	22.5	0.086
P4KE18	16.2	19.8	1.0	14.5	1.0	15.1	26.5	0.088
P4KE18A	17.1	18.9	1.0	15.3	1.0	15.9	25.2	0.088
P4KE20	18.0	22.0	1.0	16.2	1.0	13.7	29.1	0.090
P4KE20A	19.0	21.0	1.0	17.1	1.0	14.4	27.7	0.090
P4KE22	19.8	24.2	1.0	17.8	1.0	12.5	31.9	0.092
P4KE22A	20.9	23.1	1.0	18.8	1.0	13.1	30.6	0.092
P4KE24	21.6	26.4	1.0	19.4	1.0	11.5	34.7	0.094
P4KE24A	22.8	25.2	1.0	20.5	1.0	12.0	33.2	0.094
P4KE27	24.3	29.7	1.0	21.8	1.0	10.2	39.1	0.096
P4KE27A	25.7	28.4	1.0	23.1	1.0	10.7	37.5	0.096
P4KE30	27.0	33.0	1.0	24.3	1.0	9.2	43.5	0.097
P4KE30A	28.5	31.5	1.0	25.6	1.0	9.7	41.4	0.097
P4KE33	29.7	36.3	1.0	26.8	1.0	8.4	47.7	0.098
P4KE33A	31.4	34.7	1.0	28.2	1.0	8.8	45.7	0.098
P4KE36	32.4	39.6	1.0	29.1	1.0	7.7	52.0	0.099
P4KE36A	34.2	37.8	1.0	30.8	1.0	8.0	49.9	0.099
P4KE39	35.1	42.9	1.0	31.6	1.0	7.1	56.4	0.100
P4KE39A	37.1	41.0	1.0	33.3	1.0	7.4	53.9	0.100
P4KE43	38.7	47.3	1.0	34.8	1.0	6.5	61.9	0.101
P4KE43A	40.9	45.2	1.0	36.8	1.0	6.7	59.3	0.101
P4KE47	42.3	51.7	1.0	38.1	1.0	5.9	67.8	0.101
P4KE47A	44.7	49.4	1.0	40.2	1.0	6.2	64.8	0.101
P4KE51	45.9	56.1	1.0	41.3	1.0	5.4	73.5	0.102
P4KE51A	48.5	53.6	1.0	43.6	1.0	5.7	70.1	0.102
P4KE56	50.4	61.6	1.0	45.4	1.0	5.0	80.5	0.103
P4KE56A	53.2	58.8	1.0	47.8	1.0	5.2	77.0	0.103
P4KE62	55.8	68.2	1.0	50.2	1.0	4.5	89.0	0.104
P4KE62A	58.9	65.1	1.0	53.0	1.0	4.7	85.0	0.104
P4KE68	61.2	74.8	1.0	55.1	1.0	4.1	98.0	0.104
P4KE68A	64.6	71.4	1.0	58.1	1.0	4.3	92.0	0.104
P4KE75	67.5	82.5	1.0	60.7	1.0	3.7	108	0.105
P4KE75A	71.3	78.8	1.0	64.1	1.0	3.9	103	0.105

ELECTRICAL CHARACTERISTICS (T_A = 25 °C unless otherwise noted)								
DEVICE TYPE	**BREAKDOWN VOLTAGE V_{BR} AT I_T[1] (V)**		**TEST CURRENT I_T (mA)**	**STAND-OFF VOLTAGE V_{WM} (V)**	**MAXIMUM REVERSE LEAKAGE AT V_{WM} I_D[3] (µA)**	**MAXIMUM PEAK PULSE CURRENT I_{PPM}[2] (A)**	**MAXIMUM CLAMPING VOLTAGE AT I_{PPM} V_C (V)**	**MAXIMUM TEMPERATURE COEFFICIENT OF V_{BR} (%/°C)**
	MIN.	**MAX.**						
P4KE82	73.8	90.2	1.0	66.4	1.0	3.4	118	0.105
P4KE82A	77.9	86.1	1.0	70.1	1.0	3.5	113	0.105
P4KE91	81.9	100	1.0	73.7	1.0	3.1	131	0.106
P4KE91A	86.5	95.5	1.0	77.8	1.0	3.2	125	0.106
P4KE100	90.0	110	1.0	81.0	1.0	2.8	144	0.106
P4KE100A	95.0	105	1.0	85.5	1.0	2.9	137	0.106
P4KE110	99.0	121	1.0	89.2	1.0	2.5	158	0.107
P4KE110A	105	116	1.0	94.0	1.0	2.6	152	0.107
P4KE120	108	132	1.0	97.2	1.0	2.3	173	0.107
P4KE120A	114	126	1.0	102	1.0	2.4	165	0.107
P4KE130	117	143	1.0	105	1.0	2.1	187	0.107
P4KE130A	124	137	1.0	111	1.0	2.2	179	0.107
P4KE150	135	165	1.0	121	1.0	1.9	215	0.108
P4KE150A	143	158	1.0	128	1.0	1.9	207	0.108
P4KE160	144	176	1.0	130	1.0	1.7	230	0.108
P4KE160A	152	168	1.0	136	1.0	1.8	219	0.108
P4KE170	153	187	1.0	138	1.0	1.6	244	0.108
P4KE170A	162	179	1.0	145	1.0	1.7	234	0.108
P4KE180	162	198	1.0	146	1.0	1.6	258	0.108
P4KE180A	171	189	1.0	154	1.0	1.6	246	0.108
P4KE200	180	220	1.0	162	1.0	1.4	287	0.108
P4KE200A	190	210	1.0	171	1.0	1.5	274	0.108
P4KE220	198	242	1.0	175	1.0	1.2	344	0.108
P4KE220A	209	231	1.0	185	1.0	1.2	328	0.108
P4KE250	225	275	1.0	202	1.0	1.1	360	0.110
P4KE250A	237	263	1.0	214	1.0	1.2	344	0.110
P4KE300	270	330	1.0	243	1.0	0.93	430	0.110
P4KE300A	285	315	1.0	256	1.0	1.0	414	0.110
P4KE350	315	385	1.0	284	1.0	0.79	504	0.110
P4KE350A	333	368	1.0	300	1.0	0.83	482	0.110
P4KE400	360	440	1.0	324	1.0	0.70	574	0.110
P4KE400A	380	420	1.0	342	1.0	0.73	548	0.110
P4KE440	396	484	1.0	356	1.0	0.63	631	0.110
P4KE440A	418	462	1.0	376	1.0	0.66	602	0.110
P4KE480	432	528	1.0	389	1.0	0.58	686	0.110
P4KE480A	456	504	1.0	408	1.0	0.61	658	0.110
P4KE510	459	561	1.0	413	1.0	0.55	729	0.110
P4KE510A	485	535	1.0	434	1.0	0.57	698	0.110
P4KE540	486	594	1.0	437	1.0	0.52	772	0.110
P4KE540A	513	567	1.0	459	1.0	0.54	740	0.110

Notes:

(1) Pulse test: $t_p \leq 50$ ms

(2) Surge current waveform per Fig. 3 and derated per Fig. 2

(3) For bi-directional types having V_{WM} of 10 V and less, the I_D limit is doubled

(4) All terms and symbols are consistent with ANSI/IEEE C62.35

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

ORDERING INFORMATION (Example)				
PREFERRED P/N	**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 (1)	0.350	54	5500	13" diameter paper tape and reel

Note:

(1) Automotive grade AEC Q101 qualified

RATINGS AND CHARACTERISTICS CURVES

(T_A = 25 °C unless otherwise noted)

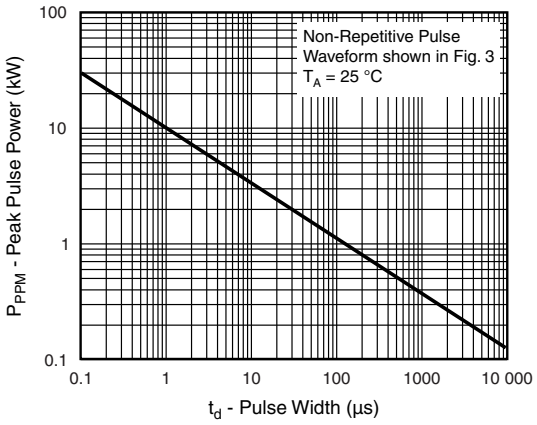


Figure 1. Peak Pulse Power Rating Curve

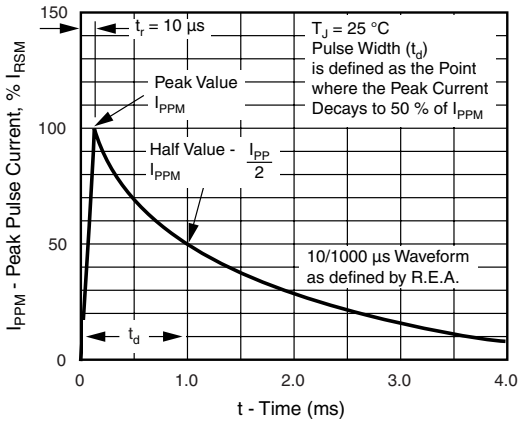


Figure 3. Pulse Waveform

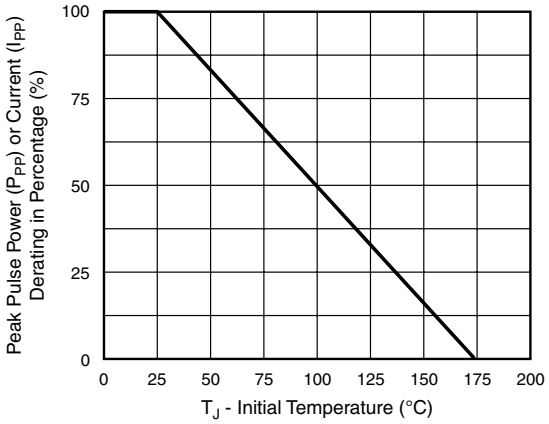


Figure 2. Pulse Power or Current vs. Initial Junction Temperature

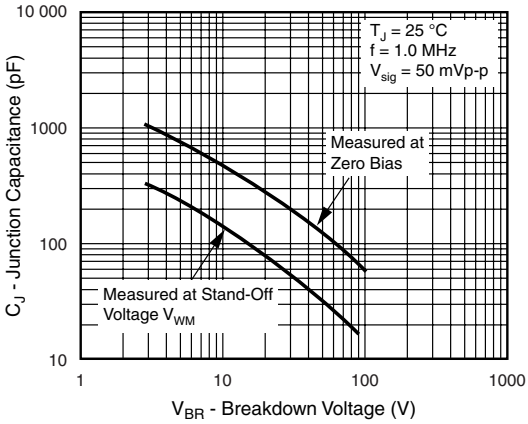


Figure 4. Typical Junction Capacitance Uni-Directional

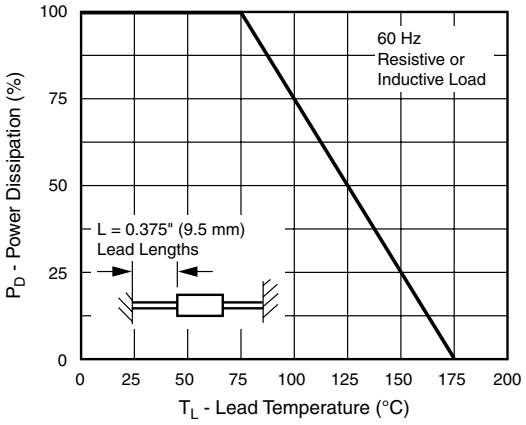


Figure 5. Power Derating Curve

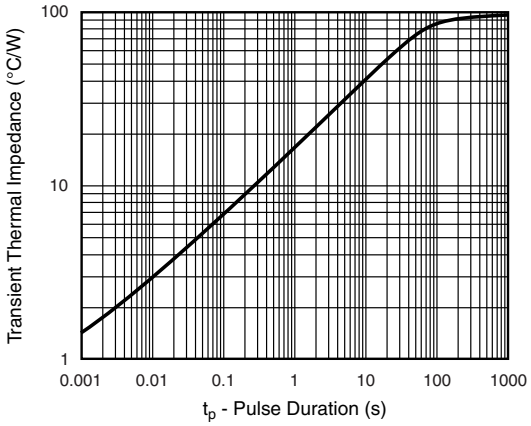


Figure 7. Typical Transient Thermal Impedance

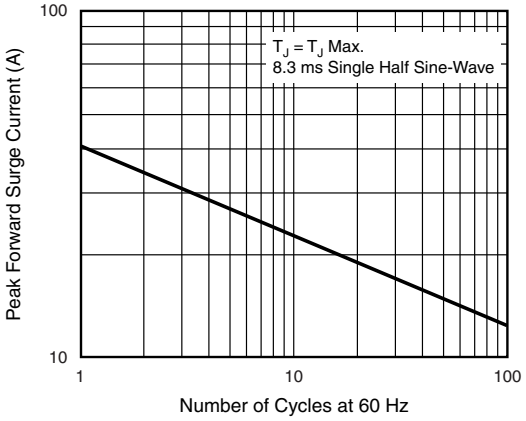
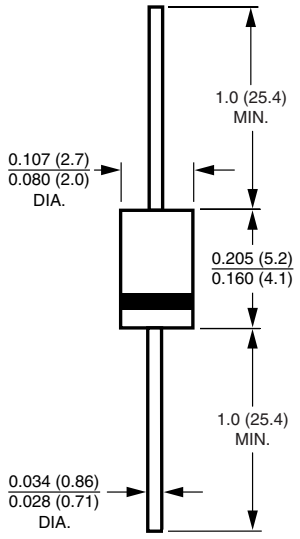


Figure 6. Max. Non-Repetitive Forward Surge Current
Uni-Directional Only

PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

DO-204AL (DO-41)



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