

### TRANSIENT VOLTAGE SUPPRESSOR

**BREAKDOWN VOLTAGE: 6.8 — 550 V**  
**PEAK PULSE POWER: 400 W**

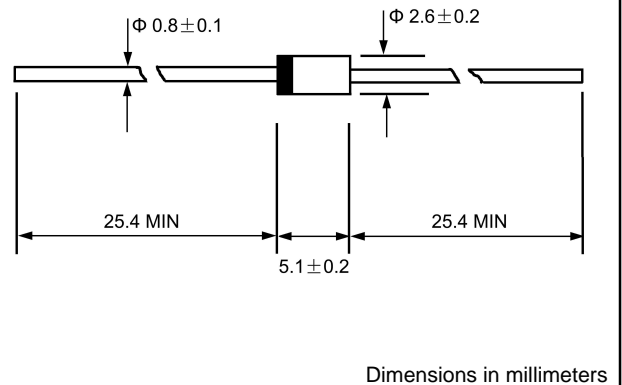
#### FEATURES

- ◇ Plastic package has Underwriters Laboratory Flammability Classification 94V-0
- ◇ Glass passivated junction
- ◇ 400W peak pulse power capability with a 10/1000 $\mu$ s waveform, repetition rate (duty cycle): 0.01%
- ◇ Excellent clamping capability
- ◇ Fast response time: typically less than 1.0ps from 0 Volts to  $V_{(BR)}$  for uni-directional and 5.0ns for bi-directional types
- ◇ Devices with  $V_{(BR)} \geq 10V_{ID}$  are typically  $I_D$  less than 1.0  $\mu$ A
- ◇ High temperature soldering guaranteed: 265  $^{\circ}$ C / 10 seconds, 0.375"(9.5mm) lead length, 5 lbs. (2.3kg) tension

#### MECHANICAL DATA

- ◇ Case: JEDEC DO-41, molded plastic body over passivated junction
- ◇ Terminals: Axial leads, solderable per MIL-STD-750, method 2026
- ◇ Polarity: For uni-directional types the color band denotes the cathode, which is positive with respect to the anode under normal TVS operation
- ◇ Weight: 0.012 ounces, 0.34 grams
- ◇ Mounting position: Any

#### DO - 41



### DEVICES FOR BIDIRECTIONAL APPLICATIONS

For bi-directional use C or CA suffix for types P4KE 7.5 thru types P4KE 440 (e.g. P4KE 7.5CA, P4KE 440CA).  
 Electrical characteristics apply in both directions.

### MAXIMUM RATINGS AND CHARACTERISTICS

Ratings at 25 $^{\circ}$ C ambient temperature unless otherwise specified.

	SYMBOL	VALUE	UNIT
Peak Power Dissipation with a 10/1000 $\mu$ s waveform (NOTE 1, FIG. 1)	$P_{PPM}$	Minimum 400	W
Peak Pulse Current with a 10/1000 $\mu$ s waveform (NOTE 1)	$I_{PPM}$	See table 1	A
Steady State Power Dissipation at $T_L=75^{\circ}$ C Lead Lengths 0.375"(9.5mm) (NOTE 2)	$P_{M(AV)}$	1.0	W
Peak Forward Surge Current, 8.3ms Single half Sine-Wave Superimposed on Rated Load (JEDEC Method) (NOTE 3)	$I_{FSM}$	40.0	A
Maximum Instantaneous Forward Voltage at 25A for unidirectional only (NOTE 4)	$V_F$	3.5/5.0	V
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-50—+175	$^{\circ}$ C

NOTES: (1) Non-repetitive current pulses, per Fig. 3 and derated above  $T_A=25^{\circ}$ C per Fig. 2

(2) Mounted on copper pad area of 1.6" x 1.6" (40 x 40mm $^2$ ) per Fig. 5

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

(4)  $V_F=3.5$  Volt max. for devices of  $V_{(BR)} \leq 220V$ , and  $V_F=5.0$  Volt max. for devices of  $V_{(BR)} > 220V$

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**ELECTRICAL CHARACTERISTICS at(T<sub>A</sub>=25 °C unless otherwise noted)**

**TABLE 1**

Device type	Breakdown voltage V <sub>(BR)</sub> (V)(NOTE1)		Test current at I <sub>T</sub> (mA)	Stand-off voltage V <sub>WM</sub> (V)	Maximum reverse leakage at V <sub>WM</sub> I <sub>D</sub> (NOTE3)(μA)	Maximum peak pulse I <sub>PPM</sub> (NOTE2) (A)	Maximum clamping voltage at I <sub>PPM</sub> V <sub>C</sub> (V)	Maximum temperature coefficient of V <sub>(BR)</sub> (%/°C)
	Min	Max						
P4KE 6.8	6.12	7.48	10	5.50	1000	37.0	10.8	0.057
P4KE 6.8A	6.45	7.14	10	5.80	1000	38.1	10.5	0.057
P4KE 7.5	6.75	8.25	10	6.05	500	34.2	11.7	0.061
P4KE 7.5A	7.13	7.88	10	6.40	500	35.4	11.3	0.061
P4KE 8.2	7.38	9.02	10	6.63	200	32.0	12.5	0.065
P4KE 8.2A	7.79	8.61	10	7.02	200	33.1	12.1	0.065
P4KE 9.1	8.19	10.0	1.0	7.37	50	29.0	13.8	0.068
P4KE 9.1A	8.65	9.55	1.0	7.78	50	29.9	13.4	0.068
P4KE 10	9.00	11.0	1.0	8.10	10	26.7	15.0	0.073
P4KE 10A	9.50	10.5	1.0	8.55	10	27.6	14.5	0.073
P4KE 11	9.90	12.1	1.0	8.92	5.0	24.7	16.2	0.075
P4KE 11A	10.5	11.6	1.0	9.40	5.0	25.6	15.6	0.075
P4KE 12	10.8	13.2	1.0	9.72	5.0	23.1	17.3	0.076
P4KE 12A	11.4	12.6	1.0	10.2	5.0	24.0	16.7	0.078
P4KE 13	11.7	14.3	1.0	10.5	5.0	21.1	19.0	0.081
P4KE 13A	12.4	13.7	1.0	11.1	5.0	22.0	18.2	0.081
P4KE 15	13.5	16.5	1.0	12.1	5.0	18.2	22.0	0.084
P4KE 15A	14.3	15.8	1.0	12.8	5.0	18.9	21.2	0.084
P4KE 16	14.4	17.6	1.0	12.9	5.0	17.0	23.5	0.086
P4KE 16A	15.2	16.8	1.0	13.6	5.0	17.8	22.5	0.086
P4KE 18	16.2	19.8	1.0	14.5	5.0	15.1	26.5	0.088
P4KE 18A	17.1	18.9	1.0	15.3	5.0	15.9	25.2	0.088
P4KE 20	18.0	22.0	1.0	16.2	5.0	13.7	29.1	0.090
P4KE 20A	19.0	21.0	1.0	17.1	5.0	14.4	27.7	0.090
P4KE 22	19.8	24.2	1.0	17.8	5.0	12.5	31.9	0.092
P4KE 22A	20.9	23.1	1.0	18.8	5.0	13.1	30.6	0.092
P4KE 24	21.6	26.4	1.0	19.4	5.0	11.5	34.7	0.094
P4KE 24A	22.8	25.2	1.0	20.5	5.0	12.0	33.2	0.094
P4KE 27	24.3	29.7	1.0	21.8	5.0	10.2	39.1	0.096
P4KE 27A	25.7	28.4	1.0	23.1	5.0	10.7	37.5	0.096
P4KE 30	27.0	33.0	1.0	24.3	5.0	9.2	43.5	0.097
P4KE 30A	28.5	31.5	1.0	25.6	5.0	9.7	41.4	0.097
P4KE 33	29.7	36.3	1.0	26.8	5.0	8.4	47.7	0.098
P4KE 33A	31.4	34.7	1.0	28.2	5.0	8.8	45.7	0.098
P4KE 36	32.4	39.6	1.0	29.1	5.0	7.7	52.0	0.099
P4KE 36A	34.2	37.8	1.0	30.8	5.0	8.0	49.9	0.099
P4KE 39	35.1	42.9	1.0	31.6	5.0	7.1	56.4	0.100
P4KE 39A	37.1	41.0	1.0	33.3	5.0	7.4	53.9	0.100
P4KE 43	38.7	47.3	1.0	34.8	5.0	6.5	61.9	0.101
P4KE 43A	40.9	45.2	1.0	36.8	5.0	6.7	59.3	0.101
P4KE 47	42.3	51.7	1.0	38.1	5.0	5.9	67.8	0.101
P4KE 47A	44.7	49.4	1.0	40.2	5.0	6.2	64.8	0.101
P4KE 51	45.9	56.1	1.0	41.3	5.0	5.4	73.5	0.102
P4KE 51A	48.5	53.6	1.0	43.6	5.0	5.7	70.1	0.102
P4KE 56	50.4	61.6	1.0	45.4	5.0	5.0	80.5	0.103
P4KE 56A	53.2	58.8	1.0	47.8	5.0	5.2	77.0	0.103

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**ELECTRICAL CHARACTERISTICS at(T<sub>A</sub>=25 °C unless otherwise noted)**

**TABLE 1(Cont' d)**

Device type	Breakdown voltage V <sub>(BR)</sub> (V) <sub>(NOTE1)</sub>		Test current at I <sub>r</sub> (mA)	Stand-off voltage V <sub>WM</sub> (V)	Maximum reverse leakage at V <sub>WM</sub> I <sub>D</sub> (NOTE3)(μA)	Maximum peak pulse I <sub>PPM</sub> (NOTE2) (A)	Maximum damping voltage at I <sub>PPM</sub> V <sub>C</sub> (V)	Maximum temperature coefficient of V <sub>(BR)</sub> (%/°C)
	Min	Max						
P4KE 62	55.8	68.8	1.0	50.2	5.0	4.5	89.0	0.104
P4KE 62A	58.9	65.1	1.0	53.0	5.0	4.7	85.0	0.104
P4KE 68	61.2	74.8	1.0	55.1	5.0	4.1	98.0	0.104
P4KE 68A	64.6	71.4	1.0	58.1	5.0	4.3	92.0	0.104
P4KE 75	67.5	82.5	1.0	60.7	5.0	3.7	108	0.105
P4KE 75A	71.3	78.8	1.0	64.1	5.0	3.9	103	0.105
P4KE 82	73.8	90.2	1.0	66.4	5.0	3.4	118	0.105
P4KE 82A	77.9	86.1	1.0	70.1	5.0	3.5	113	0.105
P4KE 91	81.9	100	1.0	73.7	5.0	3.1	131	0.106
P4KE 91A	86.5	95.5	1.0	77.8	5.0	3.2	125	0.106
P4KE 100	90.0	110	1.0	81.0	5.0	2.8	144	0.106
P4KE 100A	95.0	105	1.0	85.5	5.0	2.9	137	0.106
P4KE 110	99.0	121	1.0	89.2	5.0	2.5	158	0.107
P4KE 110A	105	116	1.0	94.0	5.0	2.6	152	0.107
P4KE 120	108	132	1.0	97.2	5.0	2.3	173	0.107
P4KE 120A	114	126	1.0	102	5.0	2.4	165	0.107
P4KE 130	117	143	1.0	105	5.0	2.1	187	0.107
P4KE 130A	124	137	1.0	111	5.0	2.2	179	0.107
P4KE 150	135	165	1.0	121	5.0	1.9	215	0.108
P4KE 150A	143	158	1.0	128	5.0	1.9	207	0.108
P4KE 160	144	176	1.0	130	5.0	1.7	230	0.108
P4KE 160A	152	168	1.0	136	5.0	1.8	219	0.108
P4KE 170	153	187	1.0	138	5.0	1.6	244	0.108
P4KE 170A	162	179	1.0	145	5.0	1.7	234	0.108
P4KE 180	162	198	1.0	146	5.0	1.6	258	0.108
P4KE 180A	171	189	1.0	154	5.0	1.6	246	0.108
P4KE 200	180	220	1.0	162	5.0	1.4	287	0.108
P4KE 200A	190	210	1.0	171	5.0	1.5	274	0.108
P4KE 220	198	242	1.0	175	5.0	1.2	344	0.108
P4KE 220A	209	231	1.0	185	5.0	1.2	328	0.108
P4KE 250	225	275	1.0	202	5.0	1.1	360	0.110
P4KE 250A	237	267	1.0	214	5.0	1.2	344	0.110
P4KE 300	270	330	1.0	243	5.0	0.93	430	0.110
P4KE 300A	285	315	1.0	256	5.0	1.0	414	0.110
P4KE 350	315	385	1.0	284	5.0	0.79	504	0.110
P4KE 350A	332	368	1.0	300	5.0	0.83	482	0.110
P4KE 400	360	440	1.0	324	5.0	0.70	574	0.110
P4KE 400A	380	420	1.0	342	5.0	0.73	548	0.110
P4KE 440	396	484	1.0	356	5.0	0.63	631	0.110
P4KE 440A	418	462	1.0	376	5.0	0.66	602	0.110

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**ELECTRICAL CHARACTERISTICS at(T<sub>A</sub>=25 °C unless otherwise noted)**

**TABLE 1(Cont' d)**

Device type	Breakdown voltage V <sub>(BR)</sub> (V) <sub>(NOTE1)</sub>		Test current at I <sub>r</sub> (mA)	Stand-off voltage V <sub>WM</sub> (V)	Maximum reverse leakage at V <sub>WM</sub> I <sub>D</sub> (NOTE3)(μA)	Maximum peak pulse I <sub>PPM</sub> (NOTE2) (A)	Maximum clamping voltage at I <sub>PPM</sub> V <sub>C</sub> (V)	Maximum temperature coefficient of V <sub>(BR)</sub> (%/°C)
	Min	Max						
P4KE480	432	528	1.0	389	5.0	0.58	686	0.110
P4KE480A	456	504	1.0	408	5.0	0.61	658	0.110
P4KE510	459	561	1.0	413	5.0	0.55	729	0.110
P4KE510A	485	535	1.0	434	5.0	0.57	698	0.110
P4KE540	486	594	1.0	437	5.0	0.52	772	0.110
P4KE540A	513	567	1.0	459	5.0	0.54	740	0.110
P4KE550	495	605	1.0	470	5.0	0.51	786	0.110
P4KE550A	522	577	1.0	467	5.0	0.53	760	0.110

NOTE: (1) V<sub>(BR)</sub> measured after I<sub>r</sub> applied for 300 μs, I<sub>r</sub>=square wave pulse or equivalent

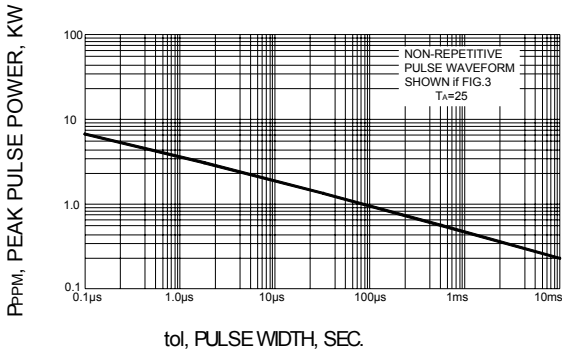
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(2) Surge current wave form per Fig. 3 and derated Fig. 2

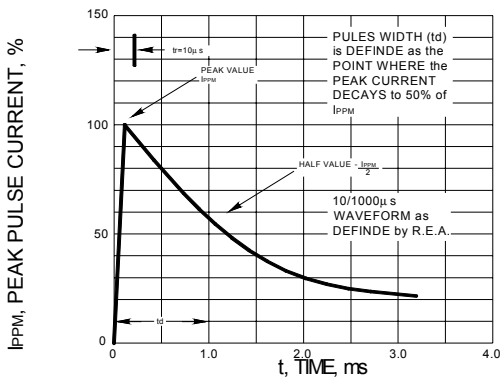
(3) For bidirectional types having V<sub>WM</sub> of 10 volts and less, the I<sub>D</sub> limit is doubled

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

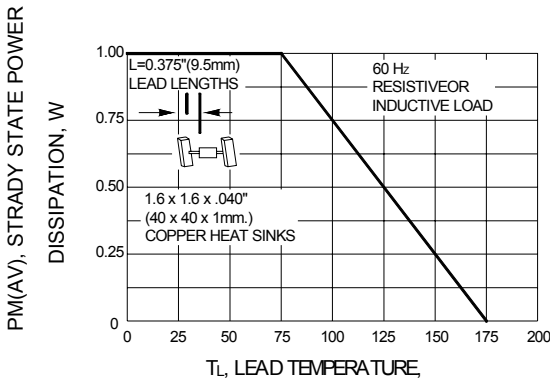
**FIG.1 – PEAK PULSE POWER RATING CURVE**



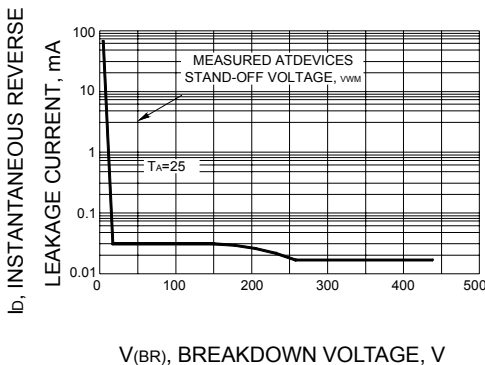
**FIG.3 – PULSE WAVEFORM**



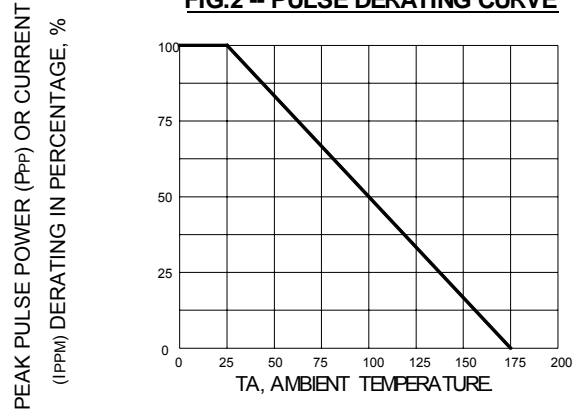
**FIG.5 – STEADY STATE POWER DERATING CURVE**



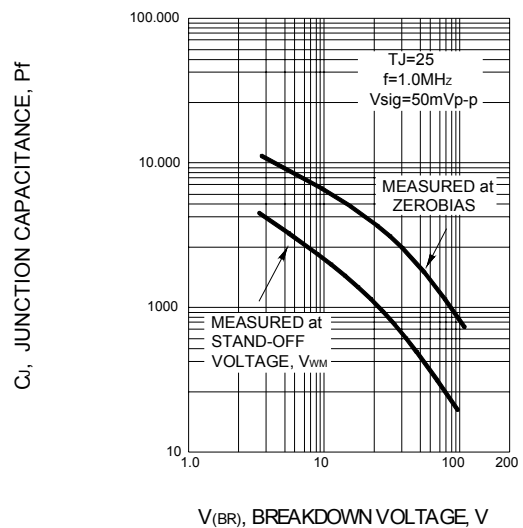
**FIG.7 – TYPICAL REVERSE LEAKAGE CHARACTERISTICS**



**FIG.2 – PULSE DERATING CURVE**



**FIG.4 – TYPICAL JUNCTION CAPACITANCE UNIDIRECTIONAL**



**FIG.6 – MAXIMUM NON-REPETITIVE FORWARD SURGE CURRENT UNIDIRECTIONAL ONLY**

