

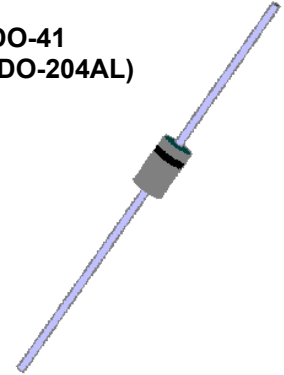
ALSO AVAILABLE IN SURFACE MOUNT

**DESCRIPTION**

This P5KE series is an economical 500 W Transient Voltage Suppressor (TVS) for protecting voltage-sensitive components from destruction or degradation. It is available in both unidirectional and bi-directional configurations. The response time of their clamping action is virtually instantaneous. As a result, they may also be used effectively for protection from ESD or EFT per IEC61000-4-2 and IEC61000-4-4 or for inductive switching environments and induced RF. They can also be used for protecting other sensitive components from secondary lightning effects per IEC61000-4-5 and class levels defined herein. Microsemi also offers numerous other TVS products to meet higher and lower power demands and special applications.

**APPEARANCE**

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



**IMPORTANT:** For the most current data, consult MICROSEMI's website: <http://www.microsemi.com>

**FEATURES**

- Economical series for thru-hole mounting
- Available in both unidirectional and bidirectional (add C or CA suffix to part number for bidirectional)
- Selections for 5.0 to 170 volts standoff voltage ( $V_{WM}$ )
- Suppresses transients up to 500 watts @ 10/1000  $\mu$ s (see Figure 1)
- Fast response
- Options for screening in accordance with MIL-PRF-19500 for JAN, JANTX, JANTXV, and JANS are available by adding MQ, MX, MV, or MSP prefixes respectively to part numbers.
- Surface mount equivalents available as SMAJ5.0 to SMAJ170CA (consult factory for other surface mount options)
- Moisture classification is Level 1 with no dry pack required per IPC/JEDEC J-STD-020B

**APPLICATIONS / BENEFITS**

- Protects sensitive components such as IC's, CMOS, Bipolar, BiCMOS, ECL, DTL,  $T^2L$ , etc.
- Protection from switching transients & induced RF
- Compliant to IEC61000-4-2 and IEC61000-4-4 for ESD and EFT protection respectively
- Secondary lightning protection per IEC61000-4-5 with 42 Ohms source impedance:
  - Class 1: P5KE5.0 to P5KE120A or CA
  - Class 2: P5KE5.0 to P5KE60A or CA
  - Class 3: P5KE5.0 to P5KE30A or CA
  - Class 4: P5KE5.0 to P5KE15A or CA
- Secondary lightning protection per IEC61000-4-5 with 12 Ohms source impedance:
  - Class 1: P5KE5.0 to P5KE36A or CA
  - Class 2: P5KE5.0 to P5KE18A or CA

**MAXIMUM RATINGS**

- Operating and Storage Temperature: -65°C to +150°C
- Peak Pulse Power: 500 Watts at 10/1000  $\mu$ s (see Figure 1, 2 and 3 for  $t_w$ , waveform and derating effects)
- Impulse repetition rate (duty factor): 0.01%
- Thermal Resistance: 45°C/W junction to leads @ 3/8 inch (10 mm) from body, or 105°C/W junction to ambient when mounted on FR4 PC board with 4 mm<sup>2</sup> copper pads (1 oz) and track width 1 mm, length 25 mm
- Steady-State Power: 2.77 Watts @  $T_L=25^\circ\text{C}$  at 3/8 inch (10 mm) from body, or 1.19 W at  $T_A=25^\circ\text{C}$  on FR4 PC board described for thermal resistance
- Forward Voltage at 25°C: 3.5 V @ 30 A with 8.3 ms half-sine wave (unidirectional only)
- Solder temperatures: 260 °C for 10 s (maximum)

**MECHANICAL AND PACKAGING**

- Void-free transfer molded thermosetting epoxy body meeting UL94V-0
- FINISH: Tin-Lead plated over copper and readily solderable per MIL-STD-750, method 2026
- MARKING: Body marked with part number
- POLARITY: Band denotes cathode. Bidirectional not marked
- WEIGHT: 0.3 grams (approximate)
- TAPE & REEL option: Standard per EIA-296 (add "TR" suffix to part number)
- See package dimensions on last page



**P5KE5.0 thru P5KE170CA**

**500 W TRANSIENT VOLTAGE SUPPRESSOR**

**ELECTRICAL CHARACTERISTICS @ 25°C**

PART NUMBER	BREAKDOWN VOLTAGE V <sub>(BR)</sub>		TEST CURRENT I <sub>(BR)</sub>	RATED STANDOFF VOLTAGE V <sub>WM</sub>	MAX STANDBY CURRENT I <sub>D</sub> @ V <sub>WM</sub>	MAX CLAMPING VOLTAGE V <sub>C</sub> @ I <sub>PP</sub>	MAX PEAK PULSE CURRENT I <sub>PP</sub>	MAX TEMP COEFFICIENT OF V <sub>(BR)</sub> α <sub>V(BR)</sub>
	Min.	Max.						
	V	V	mA	V	μA	V	A	% / °C
P5KE5.0	6.4	7.3	10	5.0	600	9.6	52	.057
P5KE5.0A	6.4	7.0	10	5.0	600	9.2	54.3	.057
P5KE6.0	6.67	8.15	10	6.0	600	11.4	43.9	.059
P5KE6.0A	6.67	7.37	10	6.0	600	10.3	48.5	.059
P5KE6.5	7.22	8.82	10	6.5	400	12.3	40.7	.061
P5KE6.5A	7.22	7.98	10	6.5	400	11.2	44.7	.061
P5KE7.0	7.78	9.51	10	7.0	150	13.3	37.8	.065
P5KE7.0A	7.78	8.60	10	7.0	150	12.0	41.7	.065
P5KE7.5	8.33	10.2	1	7.5	50	14.3	35.0	.067
P5KE7.5A	8.33	9.21	1	7.5	50	12.9	38.8	.067
P5KE8.0	8.89	10.9	1	8.0	25	15.0	33.3	.070
P5KE8.0A	8.89	9.83	1	8.0	25	13.6	36.7	.070
P5KE8.5	9.44	11.5	1	8.5	5	15.9	31.4	.073
P5KE8.5A	9.44	10.4	1	8.5	5	14.4	34.7	.073
P5KE9.0	10.0	12.2	1	9.0	1	16.9	29.5	.076
P5KE9.0A	10.0	11.1	1	9.0	1	15.4	32.5	.076
P5KE10	11.1	13.6	1	10	1	18.8	26.6	.078
P5KE10A	11.1	12.3	1	10	1	17.0	29.4	.078
P5KE11	12.2	14.9	1	11	1	20.1	24.9	.081
P5KE11A	12.2	13.5	1	11	1	18.2	27.4	.081
P5KE12	13.3	16.3	1	12	1	22.0	22.7	.082
P5KE12A	13.3	14.7	1	12	1	19.9	25.1	.082
P5KE13	14.4	17.6	1	13	1	23.8	21.0	.084
P5KE13A	14.4	15.9	1	13	1	21.5	23.2	.084
P5KE14	15.6	19.1	1	14	1	25.8	19.4	.086
P5KE14A	15.6	17.2	1	14	1	23.2	21.5	.086
P5KE15	16.7	20.4	1	15	1	26.9	18.8	.087
P5KE15A	16.7	18.5	1	15	1	24.4	20.6	.087
P5KE16	17.8	21.8	1	16	1	28.8	17.6	.088
P5KE16A	17.8	19.7	1	16	1	26.0	19.2	.088
P5KE17	18.9	23.1	1	17	1	30.5	16.4	.090
P5KE17A	18.9	20.9	1	17	1	27.6	18.1	.090
P5KE18	20.0	24.4	1	18	1	32.2	15.5	.092
P5KE18A	20.0	22.1	1	18	1	29.2	17.2	.092
P5KE20	22.2	27.1	1	20	1	35.8	13.9	.093
P5KE20A	22.2	24.5	1	20	1	32.4	15.4	.093
P5KE22	24.4	29.8	1	22	1	39.4	12.7	.094
P5KE22A	24.4	26.9	1	22	1	35.5	14.1	.094
P5KE24	26.7	32.6	1	24	1	43.0	11.6	.096
P5KE24A	26.7	29.5	1	24	1	38.9	12.8	.096
P5KE26	28.9	35.3	1	26	1	46.6	10.7	.097
P5KE26A	28.9	31.9	1	26	1	42.1	11.9	.097
P5KE28	31.1	38.0	1	28	1	50.0	9.9	.098
P5KE28A	31.1	84.4	1	28	1	45.4	11.0	.098
P5KE30	33.3	40.7	1	30	1	53.5	9.3	.099
P5KE30A	33.3	36.8	1	30	1	48.4	10.3	.099
P5KE33	36.7	44.9	1	33	1	59.0	8.5	.100
P5KE33A	36.7	40.6	1	33	1	53.3	9.4	.100
P5KE36	40.0	48.9	1	36	1	64.3	7.8	.101
P5KE36A	40.0	44.2	1	36	1	58.1	8.6	.101
P5KE40	44.4	54.3	1	40	1	71.4	7.0	.101
P5KE40A	44.4	49.1	1	40	1	64.5	7.8	.101
P5KE43	47.8	58.4	1	43	1	76.7	6.5	.102
P5KE43A	47.8	52.8	1	43	1	69.4	7.2	.102
P5KE45	50.0	61.1	1	45	1	80.3	6.2	.102
P5KE45A	50.0	55.3	1	45	1	72.7	6.9	.102
P5KE48	53.3	65.1	1	48	1	85.5	5.8	.103
P5KE48A	53.3	58.9	1	48	1	77.4	6.5	.103
P5KE51	56.7	69.3	1	51	1	91.1	5.5	.103
P5KE51A	56.7	62.7	1	51	1	82.4	6.1	.103
P5KE54	60.0	73.3	1	54	1	96.3	5.2	.104
P5KE54A	60.0	66.3	1	54	1	87.1	5.7	.104
P5KE58	64.4	78.7	1	58	1	103.0	4.9	.104
P5KE58A	64.4	71.2	1	58	1	93.6	5.3	.104

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P5KE5.0 thru 170CA

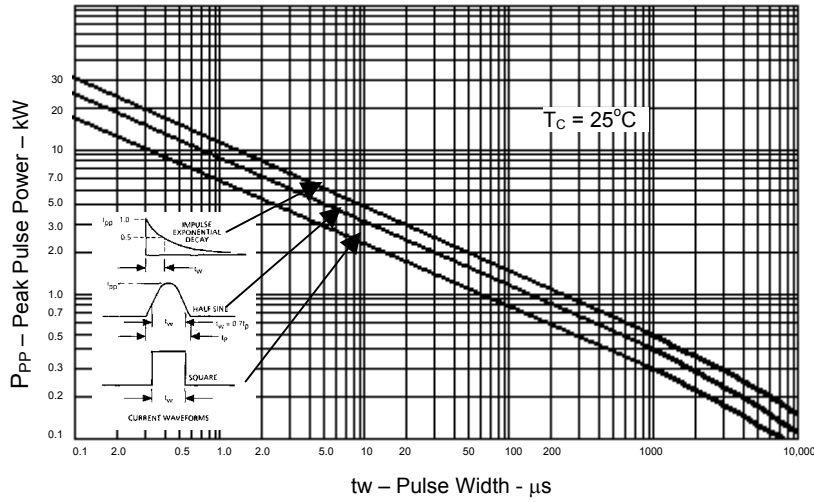
PART NUMBER	BREAKDOWN VOLTAGE $V_{(BR)}$		TEST CURRENT $I_{(BR)}$	RATED STANDOFF VOLTAGE $V_{WM}$	MAX STANDBY CURRENT $I_D @ V_{WM}$	MAX CLAMPING VOLTAGE $V_C @ I_{PP}$	MAX PEAK PULSE CURRENT $I_{PP}$	MAX TEMP COEFFICIENT OF $V_{(BR)}$ $\alpha_{V(BR)}$
	Min.	Max.						
	V	V						
P5KE60	66.7	81.5	1	60	1	107.0	4.7	.104
P5KE60A	66.7	73.7	1	60	1	96.8	5.2	.104
P5KE64	71.1	86.9	1	64	1	114.0	4.4	.105
P5KE64A	71.1	78.6	1	64	1	103.0	4.9	.105
P5KE70	77.8	95.1	1	70	1	125.0	4.0	.105
P5KE70A	77.8	86.0	1	70	1	113.0	4.4	.105
P5KE75	83.3	102.0	1	75	1	134.0	3.7	.105
P5KE75A	83.3	92.1	1	75	1	121.0	4.1	.105
P5KE78	86.7	106.0	1	78	1	139.0	3.6	.106
P5KE78A	86.7	95.8	1	78	1	126.0	4.0	.106
P5KE85	94.4	115.0	1	85	1	151.0	3.3	.106
P5KE85A	94.4	104.0	1	85	1	137.0	3.6	.106
P5KE90	100.0	122.0	1	90	1	160.0	3.1	.107
P5KE90A	100.0	111.0	1	90	1	146.0	3.4	.107
P5KE100	111.0	136.0	1	100	1	179.0	2.8	.107
P5KE100A	111.0	123.0	1	100	1	162.0	3.1	.107
P5KE110	122.0	149.0	1	110	1	196.0	2.6	.107
P5KE110A	122.0	135.0	1	110	1	177.0	2.8	.107
P5KE120	133.0	163.0	1	120	1	214.0	2.3	.107
P5KE120A	133.0	147.0	1	120	1	193.0	2.0	.107
P5KE130	144.0	176.0	1	130	1	231.0	2.2	.108
P5KE130A	144.0	159.0	1	130	1	209.0	2.4	.108
P5KE150	167.0	204.0	1	150	1	268.0	1.9	.108
P5KE150A	167.0	185.0	1	150	1	243.0	2.1	.108
P5KE160	178.0	218.0	1	160	1	287.0	1.7	.108
P5KE160A	178.0	197.0	1	160	1	259.0	1.9	.108
P5KE170	189.0	231.0	1	170	1	304.0	1.6	.108
P5KE170A	189.0	209.0	1	170	1	275.0	1.8	.108

Forward Voltage ( $V_f$ ) @ 35 amps peak, 8.3 ms sine wave equal to 3.5 volts max. (Excluding Bidirectional).  
For Bidirectional Construction, indicate a C or CA suffix after part number, i.e. P5KE170CA. Capacitance will be one-half that shown in figure 3.

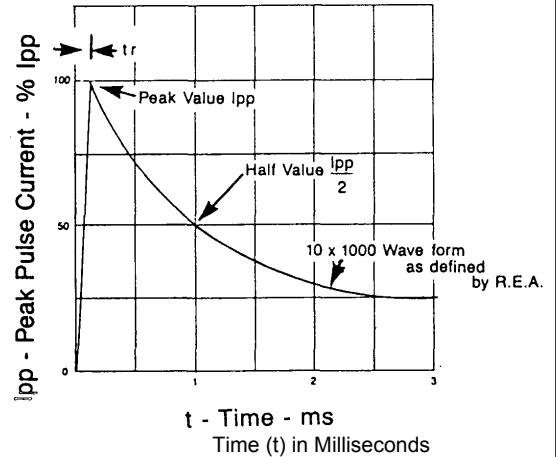
**SYMBOLS & DEFINITIONS**

Symbol	Definition	Symbol	Definition
$V_{WM}$	Working Peak (Standoff) Voltage	$I_{PP}$	Peak Pulse Current
$P_{PP}$	Peak Pulse Power	$V_C$	Clamping Voltage
$V_{(BR)}$	Breakdown Voltage	$I_{(BR)}$	Breakdown Current for $V_{(BR)}$
$I_D$	Standby Current		

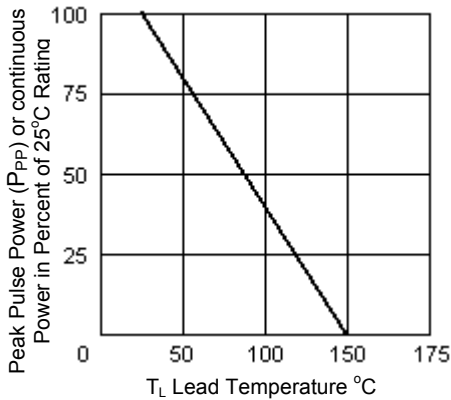
**OUTLINE AND CIRCUIT**



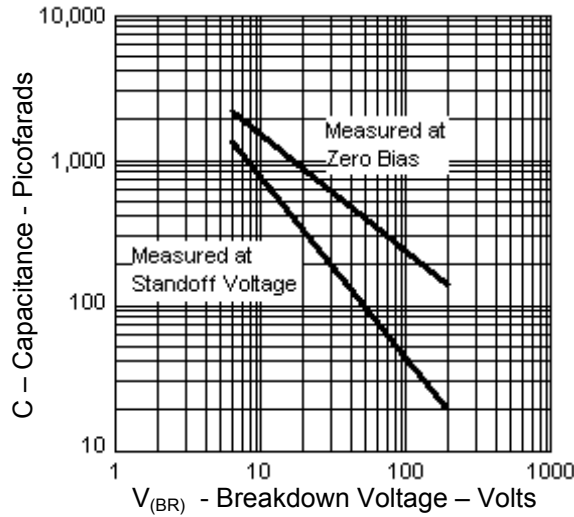
**FIGURE 1**  
Peak Pulse Power vs. Pulse Time



**FIGURE 2**  
Pulse Waveform for Exponential Surge

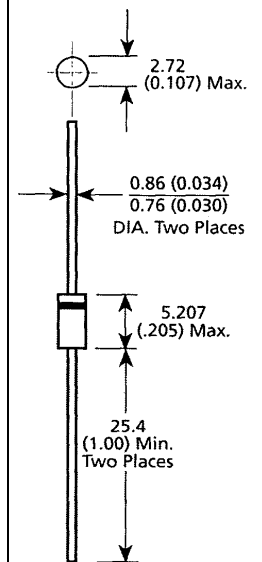


**FIGURE 3**  
Derating Curve



**FIGURE 4**  
P5KE Typical Capacitance vs. Breakdown Voltage

**PACKAGE DIMENSIONS**



Cathode indicated by Band.  
All Dimensions in Millimeters (Inches)