

**DESCRIPTION**

This SMBJP6KE and SMBGP6KE series is an economical surface mount version of the popular P6KE axial-leaded series of 600 W Transient Voltage Suppressors (TVSs). It is available in both unidirectional and bi-directional configurations for protecting voltage-sensitive components from destruction or degradation. Response time of 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.

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

**APPEARANCE**



DO-215AA



DO-214AA

**NOTE:** All SMB series are equivalent to prior SMS package identifications.

**FEATURES**

- Economical TVS series for surface mount
- Available in both unidirectional and bidirectional (add C or CA suffix to part number for bidirectional)
- Selections for 6.8 to 200 volts breakdown ( $V_{BR}$ )
- Fast response
- Optional 100% **screening for avionics grade** is available by adding MA prefix to part number for added 100% temperature cycle -55°C to +125°C (10X) as well as surge (3X) and 24 hours HTRB with post test  $V_Z$  &  $I_R$  (in the operating direction for unidirectional or both directions for bidirectional)
- 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.
- Axial-lead (thru-hole) equivalents available as P6KE6.8 to P6KE200CA (consult factory for other options)
- Moisture classification is Level 1 with no dry pack required per IPC/JEDEC J-STD-020B

**MAXIMUM RATINGS**

- Peak Pulse Power dissipation at 25°C: 600 watts at 10/1000  $\mu$ s (also see Fig 1,2, and 3).
- Impulse repetition rate (duty factor): 0.01%
- $t_{clamping}$  (0 volts to  $V_{(BR)}$  min.): < 100 ps theoretical for unidirectional and < 5 ns for bidirectional
- Operating and Storage temperature: -65°C to +150°C
- Thermal resistance: 25 °C/W junction to lead, or 90 °C/W junction to ambient when mounted on FR4 PC board (1oz Cu) with recommended footprint (see last page)
- Steady-State Power dissipation: 5 watts at  $T_L = 25^\circ\text{C}$ , or 1.38 watts at  $T_A = 25^\circ\text{C}$  when mounted on FR4 PC board with recommended footprint
- Forward Voltage at 25°C: 3.5 Volts maximum @ 50 Amp peak impulse of 8.3 ms half-sine wave (unidirectional only)
- Solder temperatures: 260°C for 10 s (maximum)

**APPLICATIONS / BENEFITS**

- Suppresses transients up to 600 watts @ 10/1000  $\mu$ s (see Figure 1)
- Protects sensitive components such as IC's, CMOS, Bipolar, BiCMOS, ECL, DTL, T<sup>2</sup>L, 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: SMBJ(G)P6KE6.8 to 130A or CA
  - Class 2: SMBJ(G)P6KE6.8 to 68A or CA
  - Class 3: SMBJ(G)P6KE6.8 to 36A or CA
  - Class 4: SMBJ(G)P6KE6.8 to 18A or CA
- Secondary lightning protection per IEC61000-4-5 with 12 Ohms source impedance:
  - Class 1: SMBJ(G)P6KE6.8 to 43A or CA
  - Class 2: SMBJ(G)P6KE6.8 to 22A or CA

**MECHANICAL AND PACKAGING**

- CASE: 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 without SMBJ or SMBG part number prefix, e.g. P6KE6.8A, P6KE36, P6KE200CA, etc.
- POLARITY: Band denotes cathode. Bidirectional not marked
- WEIGHT: 0.1 grams (approximate)
- TAPE & REEL option: Standard per EIA-481-1-A with 12 mm tape, 750 per 7 inch reel or 2500 per 13 inch reel (add "TR" suffix to part number)
- See package dimensions on last page



**SMBJP6KE6.8 thru SMBJP6KE200CA and  
SMBGP6KE6.8 thru SMBGP6KE200CA**

**600 Watt TRANSIENT VOLTAGE  
SUPPRESSOR**

**ELECTRICAL CHARACTERISTICS**

MICROSEMI PART NUMBER (add SMBJ or SMBG prefix)	BREAKDOWN VOLTAGE			TEST CURRENT	RATED STANDOFF VOLTAGE	MAX STANDBY CURRENT	MAX CLAMPING VOLTAGE	PEAK PULSE CURRENT	TEMPERATURE COEFFICIENT of $V_{(BR)}$
	Min.	$V_{(BR)}$ Nom.	Max.						
	$V_{DC}$	$V_{DC}$	$V_{DC}$	mA	V	$\mu A$	V	A	% / °C
P6KE6.8	6.12	6.8	7.48	10	5.5	1000	10.8	56	.057
P6KE6.8A	6.45	6.8	7.14	10	5.8	1000	10.5	57	.057
P6KE7.5	6.75	7.5	8.25	10	6.05	500	11.7	51	.061
P6KE7.5A	7.13	7.5	7.88	10	6.4	500	11.3	53	.061
P6KE8.2	7.38	8.2	9.02	10	6.63	200	12.5	48	.065
P6KE8.2A	7.79	8.2	8.61	10	7.02	200	12.1	50	.065
P6KE9.1	8.19	9.1	10	1	7.37	50	13.8	44	.068
P6KE9.1A	8.65	9.1	9.55	1	7.78	50	13.4	45	.068
P6KE10	9.0	10	11	1	8.1	10	15	40	.073
P6KE10A	9.5	10	10.5	1	8.55	10	14.5	41	.073
P6KE11	9.9	11	12.1	1	8.92	5	16.2	37	.075
P6KE11A	10.5	11	11.6	1	9.4	5	15.6	38	.075
P6KE12	10.8	12	13.2	1	9.72	5	17.3	35	.078
P6KE12A	11.4	12	12.6	1	10.2	5	16.7	36	.078
P6KE13	11.7	13	14.3	1	10.5	5	19	32	.081
P6KE13A	12.4	13	13.7	1	11.1	5	18.2	33	.081
P6KE15	13.5	15	16.5	1	12.1	1	22	27	.084
P6KE15A	14.3	15	15.8	1	12.8	1	21.2	28	.084
P6KE16	14.4	16	17.6	1	12.9	1	23.5	26	.086
P6KE16A	15.2	16	16.8	1	13.6	1	22.5	27	.086
P6KE18	16.2	18	19.8	1	14.5	1	26.5	23	.088
P6KE18A	17.1	18	18.9	1	15.3	1	25.2	24	.088
P6KE20	18	20	22	1	16.2	1	29.1	21	.090
P6KE20A	19	20	21	1	17.1	1	27.7	22	.090
P6KE22	19.8	22	24.2	1	17.8	1	31.9	19	.092
P6KE22A	20.9	22	23.1	1	18.8	1	30.6	20	.092
P6KE24	21.6	24	26.4	1	19.4	1	34.7	17	.094
P6KE24A	22.8	24	25.2	1	20.5	1	33.2	18	.094
P6KE27	24.3	27	29.7	1	21.8	1	39.1	15	.096
P6KE27A	25.7	27	28.4	1	23.1	1	37.5	16	.096
P6KE30	27	30	33	1	24.3	1	43.5	14	.097
P6KE30A	28.5	30	31.5	1	25.6	1	41.4	14.4	.097
P6KE33	29.7	33	36.3	1	26.8	1	47.7	12.6	.098
P6KE33A	31.4	33	34.7	1	28.2	1	45.7	13.2	.098
P6KE36	32.4	36	39.6	1	29.1	1	52	11.6	.099
P6KE36A	34.2	36	37.8	1	30.8	1	49.9	12	.099
P6KE39	35.1	39	42.9	1	31.6	1	56.4	10.6	.100
P6KE39A	37.1	39	41	1	33.3	1	53.9	11.2	.100
P6KE43	38.7	43	47.3	1	34.8	1	61.9	9.6	.101
P6KE43A	40.9	43	45.2	1	36.8	1	59.3	10.1	.101
P6KE47	42.3	47	51.7	1	38.1	1	67.8	8.8	.101
P6KE47A	44.7	47	49.4	1	40.2	1	64.8	9.3	.101
P6KE51	45.9	51	56.1	1	41.3	1	73.5	8.2	.102
P6KE51A	48.5	51	53.6	1	43.6	1	70.1	8.6	.102
P6KE56	50.4	56	61.6	1	45.4	1	80.5	7.4	.103
P6KE56A	53.2	56	58.8	1	47.8	1	77	7.8	.103
P6KE62	55.8	62	68.2	1	50.2	1	89	6.8	.104
P6KE62A	58.9	62	65.1	1	53	1	85	7.1	.104
P6KE68	61.2	68	74.8	1	55.1	1	98	6.1	.104
P6KE68A	64.6	68	71.4	1	58.1	1	92	6.5	.104
P6KE75	67.5	75	82.5	1	60.7	1	108	5.5	.105
P6KE75A	71.3	75	78.8	1	64.1	1	103	5.8	.105
P6KE82	73.8	82	90.2	1	66.4	1	118	5.1	.105
P6KE82A	77.9	82	86.1	1	70.1	1	113	5.3	.105
P6KE91	81.9	91	100	1	73.7	1	131	4.5	.106
P6KE91A	86.5	91	95.5	1	77.8	1	125	4.8	.106

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SMBJ(G)P6KE6.8-200A

MICROSEMI PART NUMBER (add SMBJ or SMBG prefix)	BREAKDOWN VOLTAGE			TEST CURRENT  $I_{(BR)}$ mA	RATED STANDOFF VOLTAGE  $V_{WM}$ V	MAX STANDBY CURRENT  $I_D @ V_{WM}$ $\mu A$	MAX CLAMPING VOLTAGE  $V_C @ I_{PP}$ V	PEAK PULSE CURRENT  $I_{PP}$ A	TEMPERATURE COEFFICIENT of $V_{(BR)}$  $\alpha_{V(BR)}$ % / °C
	Min.	$V_{(BR)}$ Nom.	Max.						
	$V_{DC}$	$V_{DC}$	$V_{DC}$						
P6KE100	90	100	110	1	81	1	144	4.2	.106
P6KE100A	95	100	105	1	85.5	1	137	4.4	.106
P6KE110	99	110	121	1	89.2	1	158	3.8	.107
P6KE110A	105	110	116	1	94	1	152	3.4	.107
P6KE120	108	120	132	1	97.2	1	173	3.5	.107
P6KE120A	114	120	126	1	102	1	165	3.6	.107
P6KE130	117	130	143	1	105	1	187	3.2	.107
P6KE130A	124	130	137	1	111	1	179	3.3	.107
P6KE150	135	150	165	1	121	1	215	2.8	.108
P6KE150A	143	150	158	1	128	1	207	2.9	.108
P6KE160	144	160	176	1	130	1	230	2.6	.108
P6KE160A	152	160	168	1	136	1	219	2.7	.108
P6KE170	153	170	187	1	138	1	244	2.5	.108
P6KE170A	161	170	179	1	145	1	234	2.6	.108
P6KE180	162	180	198	1	146	1	258	2.3	.108
P6KE180A	171	180	189	1	154	1	246	2.4	.108
P6KE200	180	200	220	1	162	1	287	2.1	.108
P6KE200A	190	200	210	1	171	1	274	2.2	.108

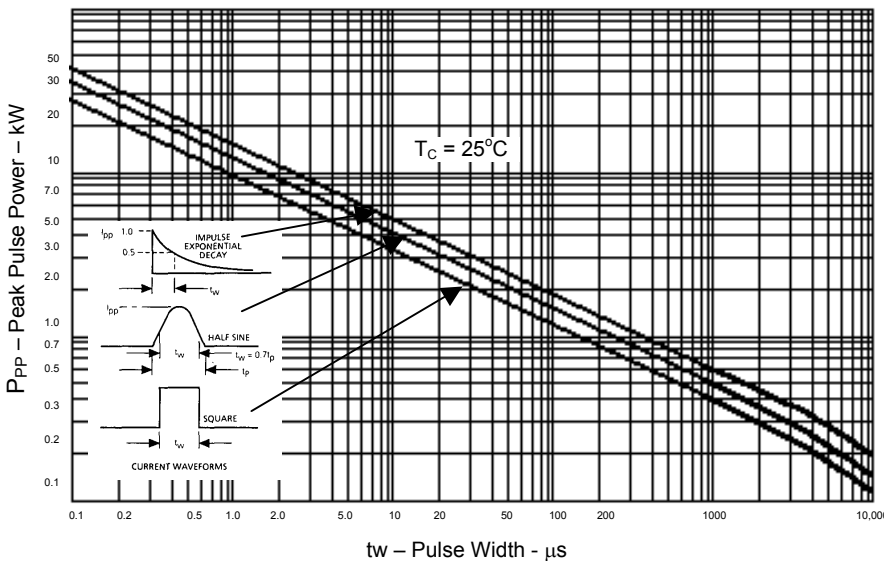
Consult factory for higher voltages.

For Bidirectional construction, indicate a C or CA suffix after part number, i.e. SMBJP6KE200CA. Capacitance will be one-half that shown in Figure 4.

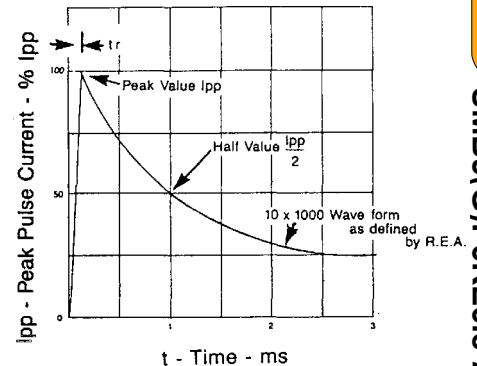
**SYMBOLS & DEFINITIONS**

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		

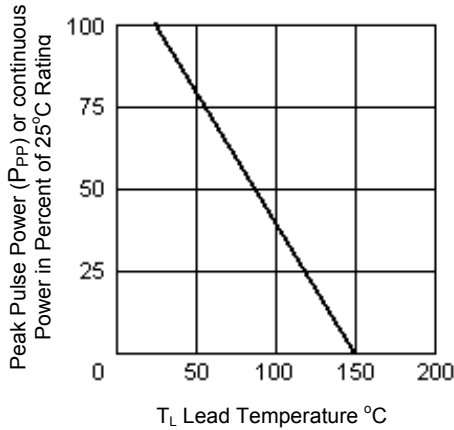
**GRAPHS**



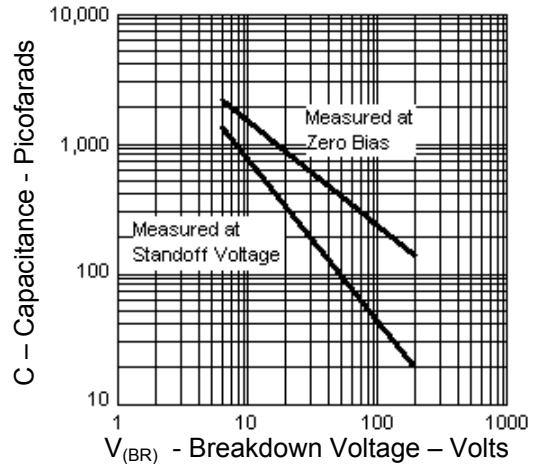
**FIGURE 1**  
Peak Pulse Power vs. Pulse Time



Test waveform parameters:  $t_r = 10 \mu s$ ,  $t_p = 1000 \mu s$   
**FIGURE 2**  
Pulse Waveform for Exponential Surge

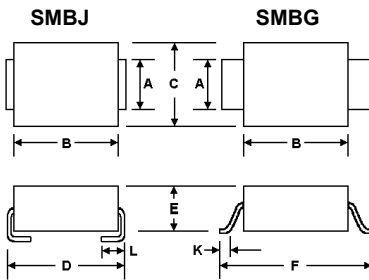


**FIGURE 3 - Derating Curve**

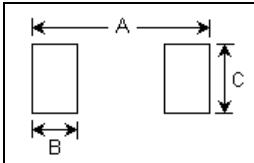


**FIGURE 4 - SMBJ(G)P6KE series Typical Capacitance vs. Breakdown Voltage**

**PACKAGE DIMENSIONS**



	A	B	C	D	E	F	K	L
<b>MIN</b>	.077	.160	.130	.205	.075	.235	.015	.030
<b>MAX</b>	.083	.180	.155	.220	.095	.255	.030	.060
<b>DIMENSIONS IN MILLIMETERS</b>								
<b>MIN</b>	1.96	4.06	3.30	5.21	1.90	5.97	.381	.760
<b>MAX</b>	2.10	4.57	3.94	5.59	2.41	6.48	.762	1.520



<b>SMBJ</b>		
	<b>INCHES</b>	<b>mm</b>
<b>A</b>	.260	6.60
<b>B</b>	.085	2.16
<b>C</b>	.110	2.79

<b>SMBG</b>		
	<b>INCHES</b>	<b>mm</b>
<b>A</b>	0.320	8.13
<b>B</b>	0.085	2.16
<b>C</b>	0.110	2.79