

**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**



**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,  $T^2L$ , 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: 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



SCOTTSDALE DIVISION

SMBJP6KE6.8 thru SMBJP6KE200CA and  
SMBGP6KE6.8 thru SMBGP6KE200CA

600 Watt TRANSIENT VOLTAGE  
SUPPRESSOR

**ELECTRICAL CHARACTERISTICS**

| MICROSEMI<br>PART<br>NUMBER<br>(add SMBJ or<br>SMBG prefix) | BREAKDOWN VOLTAGE |                           |                 | TEST<br>CURRENT | RATED<br>STANDOFF<br>VOLTAGE | MAX<br>STANDBY<br>CURRENT | MAX<br>CLAMPING<br>VOLTAGE | PEAK PULSE<br>CURRENT | TEMPERATURE<br>COEFFICIENT<br>of V <sub>(BR)</sub> |
|---|-------------------|---------------------------|-----------------|-----------------|------------------------------|---------------------------|----------------------------|-----------------------|--|
|   | Min.              | V <sub>(BR)</sub><br>Nom. | Max.            |                 |                              |                           |                            |                       |  |
|   | V <sub>DC</sub>   | V <sub>DC</sub>           | V <sub>DC</sub> | mA              | V                            | μA                        | 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<br>PART<br>NUMBER<br>(add SMBJ or<br>SMBG prefix) | BREAKDOWN VOLTAGE |                    |          | TEST<br>CURRENT<br><br>$I_{(BR)}$<br>mA | RATED<br>STANDOFF<br>VOLTAGE<br><br>$V_{WM}$<br>V | MAX<br>STANDBY<br>CURRENT<br><br>$I_D @ V_{WM}$<br>$\mu A$ | MAX<br>CLAMPING<br>VOLTAGE<br><br>$V_C @ I_{PP}$<br>V | PEAK PULSE<br>CURRENT<br><br>$I_{PP}$<br>A | TEMPERATURE<br>COEFFICIENT<br>of $V_{(BR)}$<br><br>$\alpha_{V(BR)}$<br>% / °C |
|---|-------------------|--------------------|----------|---|---|--|---|--|---|
|   | Min.              | $V_{(BR)}$<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  |

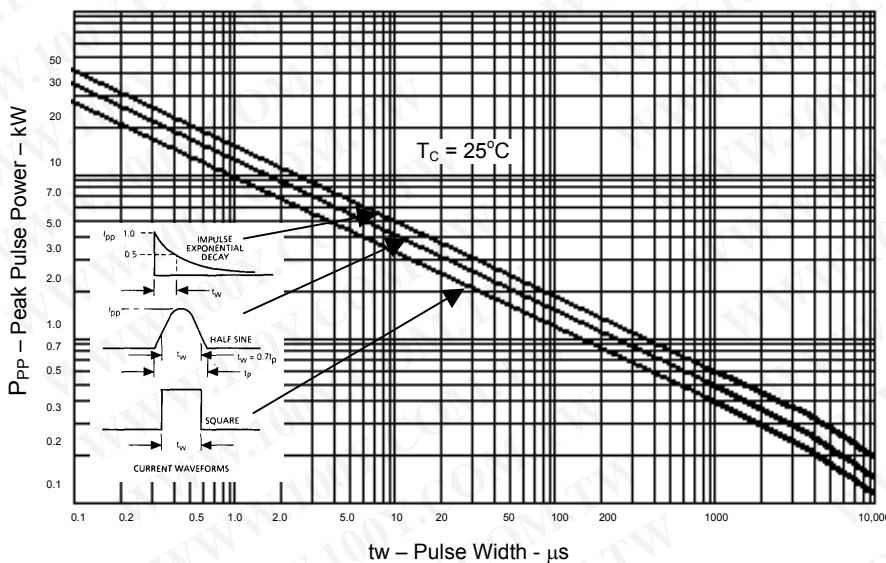
Consult factory for higher voltages.

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.

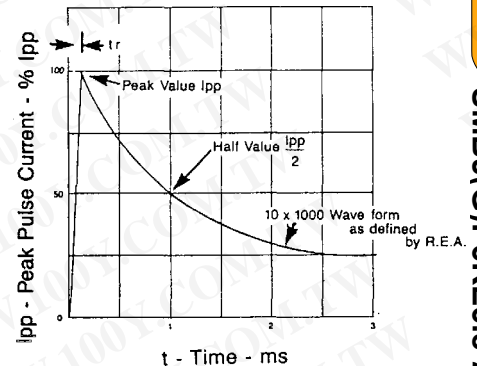
**SYMBOLS & DEFINITIONS**

| 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



SCOTTSDALE DIVISION

SMBJP6KE6.8 thru SMBJP6KE200CA and  
SMBGP6KE6.8 thru SMBGP6KE200CA

600 Watt TRANSIENT VOLTAGE  
SUPPRESSOR

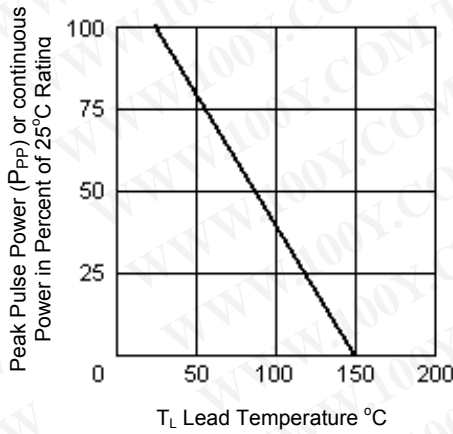


FIGURE 3 - Derating Curve

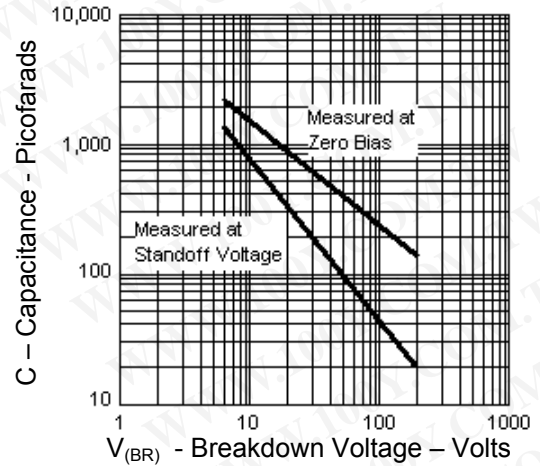
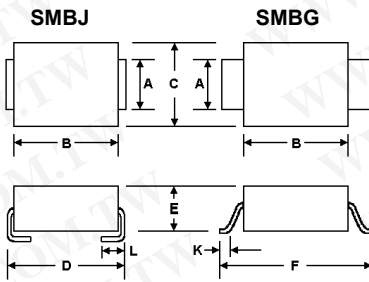


FIGURE 4 - SMBJ(G)P6KE series Typical Capacitance vs. Breakdown Voltage

PACKAGE DIMENSIONS



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

| SMBJ |        |      |
|------|--------|------|
|      | INCHES | mm   |
| A    | .260   | 6.60 |
| B    | .085   | 2.16 |
| C    | .110   | 2.79 |

| SMBG |        |      |
|------|--------|------|
|      | INCHES | mm   |
| A    | 0.320  | 8.13 |
| B    | 0.085  | 2.16 |
| C    | 0.110  | 2.79 |