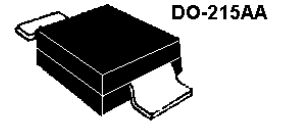


DESCRIPTION

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 μ 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 μ s (see Figure 1)
- Protects sensitive components such as IC's, CMOS, Bipolar, BiCMOS, ECL, DTL, T²L, 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 | 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 PART NUMBER (add SMBJ or SMBG prefix) | BREAKDOWN VOLTAGE | | | TEST CURRENT $I_{(BR)}$ mA | RATED STANDOFF VOLTAGE V_{WM} V | MAX STANDBY CURRENT $I_D @ V_{WM}$ μA | 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

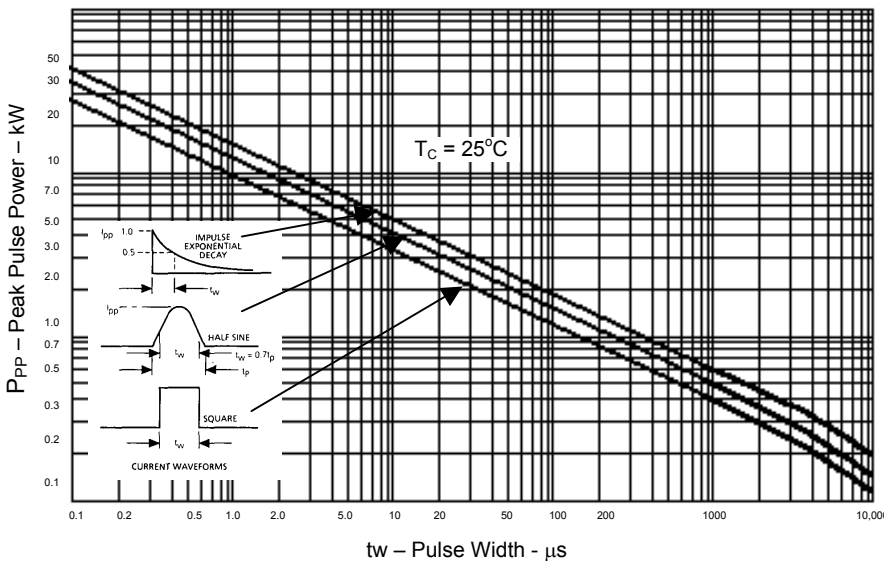
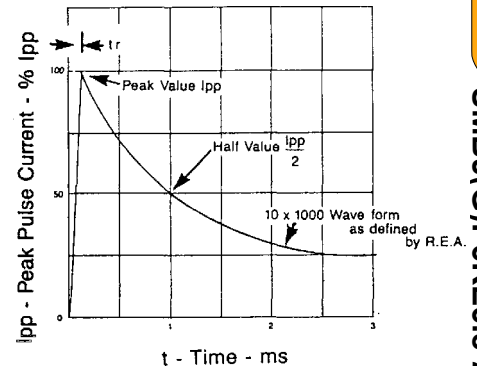


FIGURE 1
Peak Pulse Power vs. Pulse Time



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

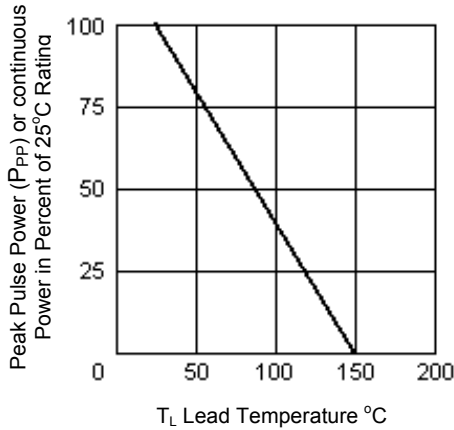


FIGURE 3 - Derating Curve

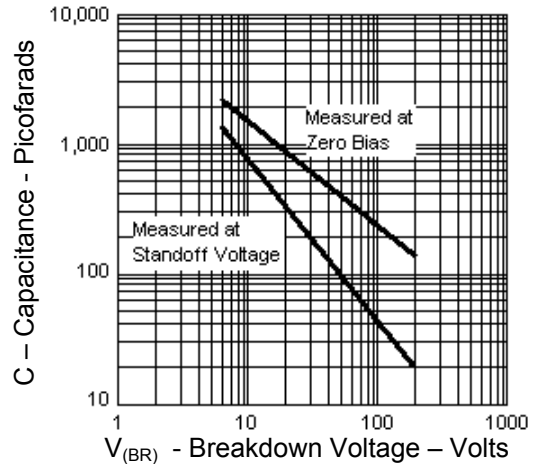


FIGURE 4 - SMBJ(G)P6KE series Typical Capacitance vs. Breakdown Voltage

PACKAGE DIMENSIONS



| | A | B | C | D | E | F | K | L |
|---------------------------|------|------|------|------|------|------|------|-------|
| 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 |