

## Surface Mount Transient Voltage Suppressor

### FEATURES

- Low profile package
- Ideal for automated placement
- Glass passivated junction
- Built-in strain relief
- Excellent clamping capability
- Fast response time: Typically less than 1.0ps from 0 volt to BV min
- Typical IR less than 1μA above 10V
- Moisture sensitivity level: level 1, per J-STD-020
- Compliant to RoHS Directive 2011/65/EU and in accordance to WEEE 2002/96/EC
- Halogen-free according to IEC 61249-2-21 definition



**DO-214AA (SMB)**

### MECHANICAL DATA

**Case:** DO-214AA (SMB)

Molding compound, UL flammability classification rating 94V-0

Base P/N with suffix "G" on packing code - green compound (halogen-free)

Base P/N with prefix "H" on packing code - AEC-Q101 qualified

**Terminal:** Matte tin plated leads, solderable per JESD22-B102

Meet JESD 201 class 1A whisker test

with prefix "H" on packing code meet JESD 201 class 2 whisker test

**Polarity:** Indicated by cathode band

**Weight:** 0.09 g (approximately)

| MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS (T <sub>A</sub> =25°C unless otherwise noted) |                  |              |       |
|----------------------------------------------------------------------------------------------|------------------|--------------|-------|
| PARAMETER                                                                                    | SYMBOL           | VALUE        | UNIT  |
| Peak power dissipation at T <sub>A</sub> =25°C, tp=1ms (Note 1)                              | P <sub>PK</sub>  | 600          | Watts |
| Steady state power dissipation                                                               | P <sub>D</sub>   | 3            | Watts |
| Peak forward surge current, 8.3 ms single half sine-wave superimposed on rated load          | I <sub>FSM</sub> | 100          | A     |
| Maximum instantaneous forward voltage at 50 A for Unidirectional only (Note 2)               | V <sub>F</sub>   | 3.5 / 5.0    | Volts |
| Typical thermal resistance                                                                   | R <sub>θJC</sub> | 10           | °C/W  |
|                                                                                              | R <sub>θJA</sub> | 55           |       |
| Operating junction temperature range                                                         | T <sub>J</sub>   | - 55 to +150 | °C    |
| Storage temperature range                                                                    | T <sub>STG</sub> | - 55 to +150 | °C    |

Note 1: Non-repetitive Current Pulse Per Fig. 3 and Derated above T<sub>A</sub>=25°C Per Fig. 2

Note 2: V<sub>F</sub>=3.5V on P6SMB6.8 thru P6SMB91 Devices and V<sub>F</sub>=5.0V on P6SMB100 thru P6SMB220 Device.

### Devices for Bipolar Applications

1. For Bidirectional Use C or CA Suffix for Types P6SMB6.8 thru Types P6SMB220A
2. Electrical Characteristics Apply in Both Directions

| ORDERING INFORMATION  |                    |              |                     |         |                          |
|-----------------------|--------------------|--------------|---------------------|---------|--------------------------|
| PART NO.              | AEC-Q101 QUALIFIED | PACKING CODE | GREEN COMPOUND CODE | PACKAGE | PACKING                  |
| P6SMBxxxx<br>(Note 1) | Prefix "H"         | R5           | Suffix "G"          | SMB     | 850 / 7" Plastic reel    |
|                       |                    | R4           |                     | SMB     | 3,000 / 13" Paper reel   |
|                       |                    | M4           |                     | SMB     | 3,000 / 13" Plastic reel |

Note 1: "xxxx" defines voltage from 6.8V (P6SMB6.8) to 220V (P6SMB220A)

| EXAMPLE       |          |                    |              |                |                    |
|---------------|----------|--------------------|--------------|----------------|--------------------|
| PREFERRED P/N | PART NO. | AEC-Q101 QUALIFIED | PACKING CODE | GREEN COMPOUND | DESCRIPTION        |
| P6SMB20A R5   | P6SMB20A |                    | R5           |                |                    |
| P6SMB20A R5G  | P6SMB20A |                    | R5           | G              | Green compound     |
| P6SMB20AHR5   | P6SMB20A | H                  | R5           |                | AEC-Q101 qualified |

## RATINGS AND CHARACTERISTICS CURVES

( $T_A=25^{\circ}\text{C}$  unless otherwise noted)

FIG. 1 PEAK PULSE POWER RATING CURVE

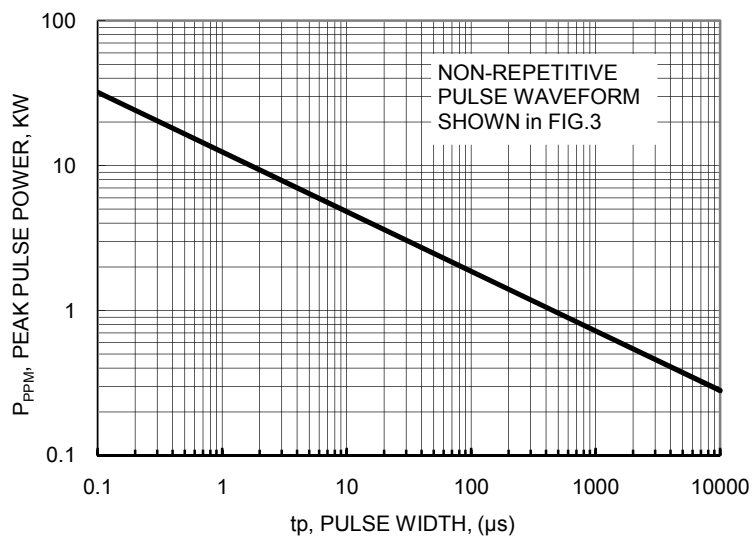


FIG.2 PULSE DERATING CURVE

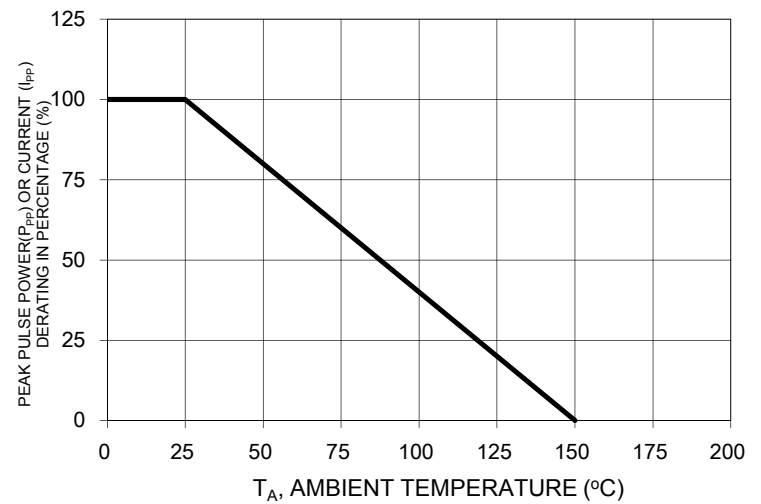


FIG. 3 CLAMPING POWER PULSE WAVEFORM

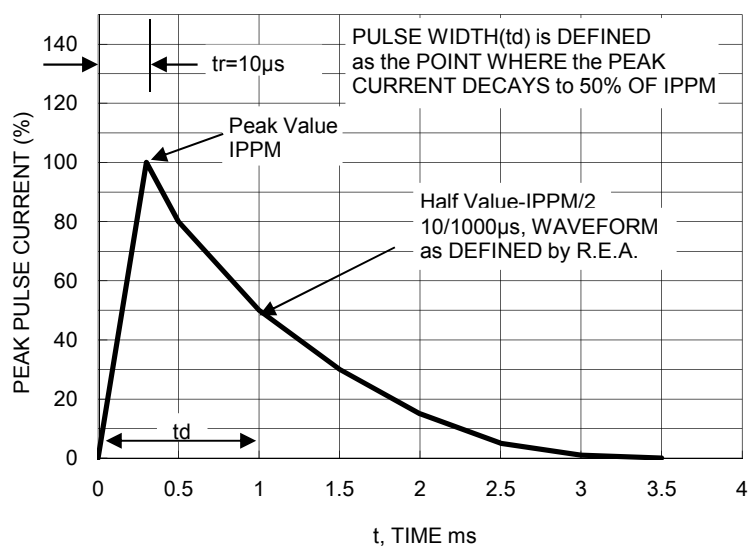


FIG. 4 MAXIMUM NON-REPETITIVE FORWARD SURGE CURRENT UNIDIRECTIONAL ONLY

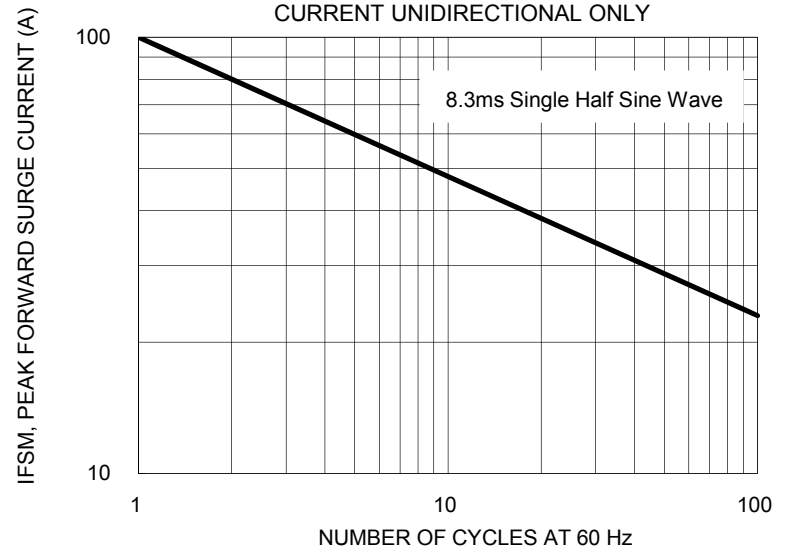
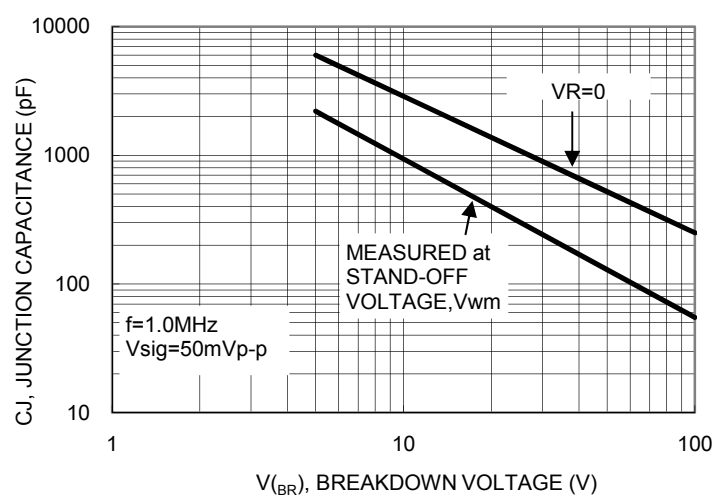


FIG. 5 TYPICAL JUNCTION CAPACITANCE



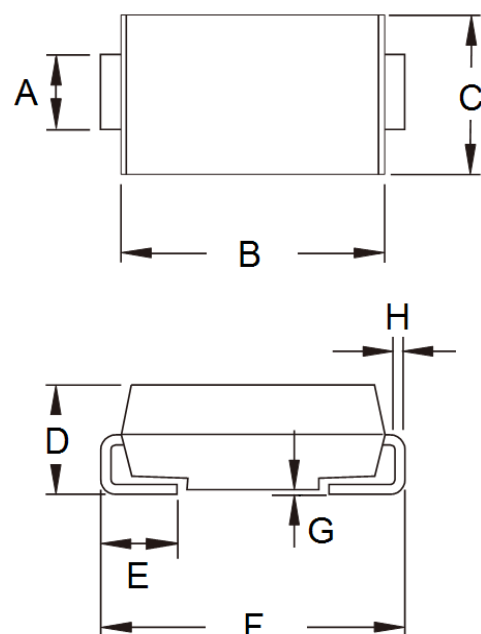
| Device    | Device Marking Code | Breakdown Voltage<br>$V_{BR}$ (V)<br>(Note 1) |       | Test Current<br>$I_T$<br>(mA) | Stand-Off Voltage<br>$V_{WM}$<br>(V) | Maximum Reverse Leakage<br>@ $V_{WM}$<br>$I_D$ (uA) | Maximum Peak Pulse Current $I_{RSM}$<br>(A) (Note 2) | Maximum Clamping Voltage<br>@ $I_{PPM}$<br>$V_C$ (V) | Maximum Temperature Coefficient<br>of $V_{BR}$ (%/°C) |
|-----------|---------------------|-----------------------------------------------|-------|-------------------------------|--------------------------------------|-----------------------------------------------------|------------------------------------------------------|------------------------------------------------------|-------------------------------------------------------|
|           |                     | Min                                           | Max   |                               |                                      |                                                     |                                                      |                                                      |                                                       |
| P6SMB6.8  | KDJ                 | 6.12                                          | 7.48  | 10                            | 5.50                                 | 1000                                                | 58                                                   | 10.8                                                 | 0.057                                                 |
| P6SMB6.8A | KEJ                 | 6.46                                          | 7.14  | 10                            | 5.80                                 | 1000                                                | 60                                                   | 10.5                                                 | 0.057                                                 |
| P6SMB7.5  | KFJ                 | 6.75                                          | 8.25  | 10                            | 6.05                                 | 500                                                 | 53                                                   | 11.7                                                 | 0.061                                                 |
| P6SMB7.5A | KGJ                 | 7.13                                          | 7.88  | 10                            | 6.40                                 | 500                                                 | 55                                                   | 11.3                                                 | 0.061                                                 |
| P6SMB8.2  | KHJ                 | 7.38                                          | 9.02  | 10                            | 6.63                                 | 200                                                 | 50                                                   | 12.5                                                 | 0.065                                                 |
| P6SMB8.2A | KKJ                 | 7.79                                          | 8.61  | 10                            | 7.02                                 | 200                                                 | 52                                                   | 12.1                                                 | 0.065                                                 |
| P6SMB9.1  | KLJ                 | 8.19                                          | 10.00 | 1.0                           | 7.37                                 | 50                                                  | 45                                                   | 13.8                                                 | 0.068                                                 |
| P6SMB9.1A | KMJ                 | 8.65                                          | 9.55  | 1.0                           | 7.78                                 | 50                                                  | 47                                                   | 13.4                                                 | 0.068                                                 |
| P6SMB10   | KNJ                 | 9.00                                          | 11.00 | 1.0                           | 8.10                                 | 10                                                  | 42                                                   | 15.0                                                 | 0.073                                                 |
| P6SMB10A  | KPJ                 | 9.50                                          | 10.5  | 1.0                           | 8.55                                 | 10                                                  | 43                                                   | 14.5                                                 | 0.073                                                 |
| P6SMB11   | KQJ                 | 9.90                                          | 12.1  | 1.0                           | 8.92                                 | 1                                                   | 38                                                   | 16.2                                                 | 0.075                                                 |
| P6SMB11A  | KRJ                 | 10.5                                          | 11.6  | 1.0                           | 9.40                                 | 1                                                   | 40                                                   | 15.6                                                 | 0.075                                                 |
| P6SMB12   | KSJ                 | 10.8                                          | 13.2  | 1.0                           | 9.72                                 | 1                                                   | 36                                                   | 17.3                                                 | 0.078                                                 |
| P6SMB12A  | KTJ                 | 11.4                                          | 12.6  | 1.0                           | 10.2                                 | 1                                                   | 37                                                   | 16.7                                                 | 0.078                                                 |
| P6SMB13   | KUJ                 | 11.7                                          | 14.3  | 1.0                           | 10.5                                 | 1                                                   | 33                                                   | 19.0                                                 | 0.081                                                 |
| P6SMB13A  | KVJ                 | 12.4                                          | 13.7  | 1.0                           | 11.1                                 | 1                                                   | 34                                                   | 18.2                                                 | 0.081                                                 |
| P6SMB15   | KWJ                 | 13.5                                          | 16.5  | 1.0                           | 12.1                                 | 1                                                   | 28                                                   | 22.0                                                 | 0.084                                                 |
| P6SMB15A  | KXJ                 | 14.3                                          | 15.8  | 1.0                           | 12.8                                 | 1                                                   | 29                                                   | 21.2                                                 | 0.084                                                 |
| P6SMB16   | KYJ                 | 14.4                                          | 17.6  | 1.0                           | 12.9                                 | 1                                                   | 26                                                   | 23.5                                                 | 0.086                                                 |
| P6SMB16A  | KZJ                 | 15.2                                          | 16.8  | 1.0                           | 13.6                                 | 1                                                   | 28                                                   | 22.5                                                 | 0.086                                                 |
| P6SMB18   | LDJ                 | 16.2                                          | 19.8  | 1.0                           | 14.5                                 | 1                                                   | 23                                                   | 26.5                                                 | 0.088                                                 |
| P6SMB18A  | LEJ                 | 17.1                                          | 18.9  | 1.0                           | 15.3                                 | 1                                                   | 25                                                   | 25.5                                                 | 0.088                                                 |
| P6SMB20   | LFJ                 | 18.0                                          | 22.0  | 1.0                           | 16.2                                 | 1                                                   | 21                                                   | 29.1                                                 | 0.090                                                 |
| P6SMB20A  | LGJ                 | 19.0                                          | 21.0  | 1.0                           | 17.1                                 | 1                                                   | 22                                                   | 27.7                                                 | 0.090                                                 |
| P6SMB22   | LHJ                 | 19.8                                          | 24.2  | 1.0                           | 17.8                                 | 1                                                   | 19                                                   | 31.9                                                 | 0.092                                                 |
| P6SMB22A  | LKJ                 | 20.9                                          | 23.1  | 1.0                           | 18.8                                 | 1                                                   | 20                                                   | 30.6                                                 | 0.092                                                 |
| P6SMB24   | LLJ                 | 21.6                                          | 26.4  | 1.0                           | 19.4                                 | 1                                                   | 18                                                   | 34.7                                                 | 0.094                                                 |
| P6SMB24A  | LMJ                 | 22.8                                          | 25.2  | 1.0                           | 20.5                                 | 1                                                   | 19                                                   | 33.2                                                 | 0.094                                                 |
| P6SMB27   | LNJ                 | 24.3                                          | 29.7  | 1.0                           | 21.8                                 | 1                                                   | 16                                                   | 39.1                                                 | 0.096                                                 |
| P6SMB27A  | LPJ                 | 25.7                                          | 28.4  | 1.0                           | 23.1                                 | 1                                                   | 16.8                                                 | 37.5                                                 | 0.096                                                 |
| P6SMB30   | LQJ                 | 27.0                                          | 33.0  | 1.0                           | 24.3                                 | 1                                                   | 14.0                                                 | 43.5                                                 | 0.097                                                 |
| P6SMB30A  | LRJ                 | 28.5                                          | 31.5  | 1.0                           | 25.6                                 | 1                                                   | 15.0                                                 | 41.4                                                 | 0.097                                                 |
| P6SMB33   | LSJ                 | 29.7                                          | 36.3  | 1.0                           | 26.8                                 | 1                                                   | 13.0                                                 | 47.7                                                 | 0.098                                                 |
| P6SMB33A  | LTJ                 | 31.4                                          | 34.7  | 1.0                           | 28.2                                 | 1                                                   | 13.8                                                 | 45.7                                                 | 0.098                                                 |
| P6SMB36   | LUJ                 | 32.4                                          | 39.6  | 1.0                           | 29.1                                 | 1                                                   | 12.0                                                 | 52.0                                                 | 0.099                                                 |
| P6SMB36A  | LVJ                 | 34.2                                          | 37.8  | 1.0                           | 30.8                                 | 1                                                   | 12.6                                                 | 49.9                                                 | 0.099                                                 |
| P6SMB39   | LWJ                 | 35.1                                          | 42.9  | 1.0                           | 31.6                                 | 1                                                   | 11.1                                                 | 56.4                                                 | 0.100                                                 |
| P6SMB39A  | LXJ                 | 37.1                                          | 41.0  | 1.0                           | 33.3                                 | 1                                                   | 11.6                                                 | 53.9                                                 | 0.100                                                 |
| P6SMB43   | LYJ                 | 38.7                                          | 47.3  | 1.0                           | 34.8                                 | 1                                                   | 10.0                                                 | 61.9                                                 | 0.101                                                 |
| P6SMB43A  | LZJ                 | 40.9                                          | 45.2  | 1.0                           | 36.8                                 | 1                                                   | 10.6                                                 | 59.3                                                 | 0.101                                                 |
| P6SMB47   | MDJ                 | 42.3                                          | 51.7  | 1.0                           | 38.1                                 | 1                                                   | 9.2                                                  | 67.8                                                 | 0.101                                                 |
| P6SMB47A  | MEJ                 | 44.7                                          | 49.4  | 1.0                           | 40.2                                 | 1                                                   | 9.7                                                  | 64.8                                                 | 0.101                                                 |
| P6SMB51   | MFJ                 | 45.9                                          | 56.1  | 1.0                           | 41.3                                 | 1                                                   | 8.5                                                  | 73.5                                                 | 0.102                                                 |
| P6SMB51A  | MGJ                 | 48.5                                          | 53.6  | 1.0                           | 43.6                                 | 1                                                   | 8.9                                                  | 70.1                                                 | 0.102                                                 |

| Device    | Device Marking Code | Breakdown Voltage<br>$V_{BR}$ (V)<br>(Note 1) |      | Test Current<br>$I_T$<br>(mA) | Stand-Off Voltage<br>$V_{WM}$<br>(V) | Maximum Reverse Leakage<br>@ $V_{WM}$<br>$I_D$ (uA) | Maximum Peak Pulse Current $I_{RSM}$<br>(A) (Note 2) | Maximum Clamping Voltage<br>@ $I_{PPM}$<br>$V_C$ (V) | Maximum Temperature Coefficient<br>of $V_{BR}$ (%/°C) |
|-----------|---------------------|-----------------------------------------------|------|-------------------------------|--------------------------------------|-----------------------------------------------------|------------------------------------------------------|------------------------------------------------------|-------------------------------------------------------|
|           |                     | Min                                           | Max  |                               |                                      |                                                     |                                                      |                                                      |                                                       |
| P6SMB56   | MHJ                 | 50.4                                          | 61.6 | 1.0                           | 45.4                                 | 1                                                   | 7.8                                                  | 80.5                                                 | 0.103                                                 |
| P6SMB56A  | MKJ                 | 53.2                                          | 58.8 | 1.0                           | 47.8                                 | 1                                                   | 8.1                                                  | 77.0                                                 | 0.103                                                 |
| P6SMB62   | MLJ                 | 55.8                                          | 68.2 | 1.0                           | 50.2                                 | 1                                                   | 7.0                                                  | 89.0                                                 | 0.104                                                 |
| P6SMB62A  | MMJ                 | 58.9                                          | 65.1 | 1.0                           | 53.0                                 | 1                                                   | 7.4                                                  | 85.0                                                 | 0.104                                                 |
| P6SMB68   | MNJ                 | 61.2                                          | 74.8 | 1.0                           | 55.1                                 | 1                                                   | 6.4                                                  | 98.0                                                 | 0.104                                                 |
| P6SMB68A  | MPJ                 | 64.6                                          | 71.4 | 1.0                           | 58.1                                 | 1                                                   | 6.8                                                  | 92.0                                                 | 0.104                                                 |
| P6SMB75   | MQJ                 | 67.5                                          | 82.5 | 1.0                           | 60.7                                 | 1                                                   | 5.8                                                  | 108                                                  | 0.105                                                 |
| P6SMB75A  | MRJ                 | 71.3                                          | 78.8 | 1.0                           | 64.1                                 | 1                                                   | 6.1                                                  | 103                                                  | 0.105                                                 |
| P6SMB82   | MSJ                 | 73.8                                          | 90.2 | 1.0                           | 66.4                                 | 1                                                   | 5.3                                                  | 118                                                  | 0.105                                                 |
| P6SMB82A  | MTJ                 | 77.9                                          | 86.1 | 1.0                           | 70.1                                 | 1                                                   | 5.5                                                  | 113                                                  | 0.105                                                 |
| P6SMB91   | MUJ                 | 81.9                                          | 100  | 1.0                           | 73.7                                 | 1                                                   | 4.8                                                  | 131                                                  | 0.106                                                 |
| P6SMB91A  | MVJ                 | 86.5                                          | 95.5 | 1.0                           | 77.8                                 | 1                                                   | 5.0                                                  | 125                                                  | 0.106                                                 |
| P6SMB100  | MWJ                 | 90                                            | 110  | 1.0                           | 81.0                                 | 1                                                   | 4.3                                                  | 144                                                  | 0.106                                                 |
| P6SMB100A | MXJ                 | 95                                            | 105  | 1.0                           | 85.5                                 | 1                                                   | 4.5                                                  | 137                                                  | 0.106                                                 |
| P6SMB110  | MYJ                 | 99                                            | 121  | 1.0                           | 89.2                                 | 1                                                   | 3.9                                                  | 158                                                  | 0.107                                                 |
| P6SMB110A | MZJ                 | 105                                           | 116  | 1.0                           | 94.0                                 | 1                                                   | 4.1                                                  | 152                                                  | 0.107                                                 |
| P6SMB120  | NDJ                 | 108                                           | 132  | 1.0                           | 97.2                                 | 1                                                   | 3.6                                                  | 173                                                  | 0.107                                                 |
| P6SMB120A | NEJ                 | 114                                           | 126  | 1.0                           | 102.0                                | 1                                                   | 3.8                                                  | 165                                                  | 0.107                                                 |
| P6SMB130  | NFJ                 | 117                                           | 143  | 1.0                           | 105.0                                | 1                                                   | 3.3                                                  | 187                                                  | 0.107                                                 |
| P6SMB130A | NGJ                 | 124                                           | 137  | 1.0                           | 111.0                                | 1                                                   | 3.5                                                  | 179                                                  | 0.107                                                 |
| P6SMB150  | NHJ                 | 135                                           | 165  | 1.0                           | 121.0                                | 1                                                   | 2.9                                                  | 215                                                  | 0.108                                                 |
| P6SMB150A | NKJ                 | 143                                           | 158  | 1.0                           | 128.0                                | 1                                                   | 3.0                                                  | 207                                                  | 0.108                                                 |
| P6SMB160  | NLJ                 | 144                                           | 176  | 1.0                           | 130.0                                | 1                                                   | 2.7                                                  | 230                                                  | 0.108                                                 |
| P6SMB160A | NMJ                 | 152                                           | 168  | 1.0                           | 136.0                                | 1                                                   | 2.8                                                  | 219                                                  | 0.108                                                 |
| P6SMB170  | NNJ                 | 153                                           | 187  | 1.0                           | 138.0                                | 1                                                   | 2.5                                                  | 244                                                  | 0.108                                                 |
| P6SMB170A | NPJ                 | 162                                           | 179  | 1.0                           | 145.0                                | 1                                                   | 2.6                                                  | 234                                                  | 0.108                                                 |
| P6SMB180  | NQJ                 | 162                                           | 198  | 1.0                           | 146.0                                | 1                                                   | 2.4                                                  | 258                                                  | 0.108                                                 |
| P6SMB180A | NRJ                 | 171                                           | 189  | 1.0                           | 154.0                                | 1                                                   | 2.5                                                  | 246                                                  | 0.108                                                 |
| P6SMB200  | NSJ                 | 180                                           | 220  | 1.0                           | 162.0                                | 1                                                   | 2.1                                                  | 287                                                  | 0.108                                                 |
| P6SMB200A | NTJ                 | 190                                           | 210  | 1.0                           | 171.0                                | 1                                                   | 2.2                                                  | 274                                                  | 0.108                                                 |
| P6SMB220  | NUJ                 | 198                                           | 242  | 1.0                           | 175.0                                | 1                                                   | 1.8                                                  | 342                                                  | 0.108                                                 |
| P6SMB220A | NVJ                 | 209                                           | 231  | 1.0                           | 185.0                                | 1                                                   | 1.9                                                  | 328                                                  | 0.108                                                 |

**Notes:**

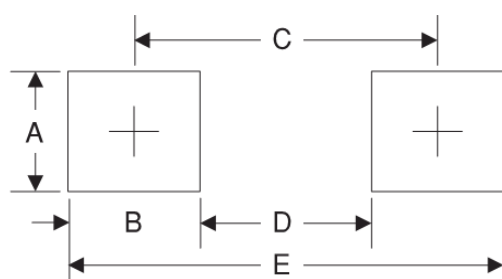
1.  $V_{BR}$  measure after  $I_T$  applied for 300us,  $I_T$ =square wave pulse or equivalent.
2. Surge current waveform per Figure. 3 and derate per Figure. 2.
3. For bipolar types having  $V_{WM}$  of 10 volts and under, the  $I_D$  limit is doubled.
4. For bidirectional use C or CA suffix for types P6SMB6.8 through P6SMB220A.
5. All terms and symbols are consistent with ANSI/IEEE C62.35.

# PACKAGE OUTLINE DIMENSIONS



| DIM. | Unit (mm) |      | Unit (inch) |       |
|------|-----------|------|-------------|-------|
|      | Min       | Max  | Min         | Max   |
| A    | 1.95      | 2.10 | 0.077       | 0.083 |
| B    | 4.25      | 4.75 | 0.167       | 0.187 |
| C    | 3.48      | 3.73 | 0.137       | 0.147 |
| D    | 1.99      | 2.61 | 0.078       | 0.103 |
| E    | 0.90      | 1.41 | 0.035       | 0.056 |
| F    | 5.10      | 5.30 | 0.201       | 0.209 |
| G    | 0.10      | 0.20 | 0.004       | 0.008 |
| H    | 0.15      | 0.31 | 0.006       | 0.012 |

# SUGGESTED PAD LAYOUT



| Symbol | Unit (mm) | Unit (inch) |
|--------|-----------|-------------|
| A      | 2.3       | 0.091       |
| B      | 2.5       | 0.098       |
| C      | 4.3       | 0.169       |
| D      | 1.8       | 0.071       |
| E      | 6.8       | 0.268       |

# MARKING DIAGRAM



P/N = Device Marking Code  
G = Green Compound  
YW = Date Code  
F = Factory Code

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