

## 600W, 5V - 170V 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
- Typical  $I_R$  less than 1 $\mu$ A above 10V
- Compliant to RoHS Directive 2011/65/EU and in accordance to WEEE 2002/96/EC
- Halogen-free according to IEC 61249-2-21

| KEY PARAMETERS               |                |      |
|------------------------------|----------------|------|
| PARAMETER                    | VALUE          | UNIT |
| $V_{WM}$                     | 2              | V    |
| $V_{BR}$ (uni - directional) | 5 - 170        | V    |
| $V_{BR}$ (bi - directional)  | 5 - 170        | V    |
| $P_{PPSM}$                   | 600            | W    |
| $T_{J\ MAX}$                 | 150            | °C   |
| Package                      | DO-214AA (SMB) |      |
| Configuration                | Single Die     |      |

### APPLICATIONS

- Switching mode power supply (SMPS)



### MECHANICAL DATA

- Case: DO-214AA (SMB)
- Molding compound meets UL 94V-0 flammability rating
- Packing code with suffix "G" means green compound (halogen-free)
- Part no. with suffix "H" means AEC-Q101 qualified
- Terminal: Matte tin plated leads, solderable per J-STD-002
- Meet JESD 201 class 2 whisker test
- Polarity: As marked
- Weight: 0.09 g (approximately)



**DO-214AA (SMB)**

| ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)          |            |              |      |
|--|------------|--------------|------|
| PARAMETER  | SYMBOL     | Part Number  | UNIT |
| Non-repetitive peak impulse power dissipation with 10/1000us waveform <sup>(1)</sup> | $P_{PPSM}$ | 600          | W    |
| Steady state power dissipation at  | $P_{tot}$  | 3            | W    |
| Forward Voltage @ $I_F=50A$ for Uni-directional only <sup>(2)</sup>                  | $V_F$      | 3.5 / 5.0    | V    |
| Junction temperature   | $T_J$      | - 55 to +150 | °C   |
| Storage temperature  | $T_{STG}$  | - 55 to +150 | °C   |

#### Notes:

1. Non-repetitive Current Pulse Per Fig. 3 and derated above  $T_A=25^\circ\text{C}$  Per Fig. 2
2.  $V_F=3.5V$  on SMBJ5.0 - SMBJ90 Devices and  $V_F=5.0V$  on SMBJ100 - SMBJ170 Devices

#### Devices for Bipolar Applications

1. For Bidirectional Use C or CA Suffix for Types SMBJ5.0 - Types SMBJ170
2. Electrical Characteristics Apply in Both Directions

| THERMAL PERFORMANCE                    |                 |       |               |
|--|-----------------|-------|---------------|
| PARAMETER                              | SYMBOL          | LIMIT | UNIT          |
| Junction-to-Case Thermal Resistance    | $R_{\theta JC}$ | 10    | $^{\circ}C/W$ |
| Junction-to-Ambient Thermal Resistance | $R_{\theta JA}$ | 55    | $^{\circ}C/W$ |

| ELECTRICAL SPECIFICATIONS ( $T_A = 25^{\circ}C$ unless otherwise noted) |              |  |      |                               |  |  |   |   |
|---|--------------|--|------|-------------------------------|--|--|---|---|
| Part number   | Marking code | Breakdown voltage<br>$V_{BR}@I_T$<br>(V)<br>(Note 1) |      | Test current<br>$I_T$<br>(mA) | Working stand-off voltage<br>$V_{WM}$<br>(V) | Maximum blocking leakage current<br>$I_{IB}@V_{WM}$<br>( $\mu A$ ) | Maximum peak impulse current<br>$I_{PP}$<br>(A)<br>(Note 2) | Maximum clamping voltage<br>$V_C@I_{PP}$<br>(V) |
|   |              | Min.   | Max. |                               |  |  |   |   |
| SMBJ5.0   | KD           | 6.40   | 7.30 | 10                            | 5.0  | 800  | 65.0  | 9.6   |
| SMBJ5.0A  | KE           | 6.40   | 7.00 | 10                            | 5.0  | 800  | 68.0  | 9.2   |
| SMBJ6.0   | KF           | 6.67   | 8.15 | 10                            | 6.0  | 800  | 55.0  | 11.4  |
| SMBJ6.0A  | KG           | 6.67   | 7.37 | 10                            | 6.0  | 800  | 61.0  | 10.3  |
| SMBJ6.5   | KH           | 7.22   | 8.82 | 10                            | 6.5  | 500  | 51.0  | 12.3  |
| SMBJ6.5A  | KK           | 7.22   | 7.98 | 10                            | 6.5  | 500  | 56.0  | 11.2  |
| SMBJ7.0   | KL           | 7.78   | 9.51 | 10                            | 7.0  | 200  | 47.0  | 13.3  |
| SMBJ7.0A  | KM           | 7.78   | 8.60 | 10                            | 7.0  | 200  | 52.0  | 12.0  |
| SMBJ7.5   | KN           | 8.33   | 10.3 | 1                             | 7.5  | 100  | 44.0  | 14.3  |
| SMBJ7.5A  | KP           | 8.33   | 9.21 | 1                             | 7.5  | 100  | 48.0  | 12.9  |
| SMBJ8.0   | KQ           | 8.89   | 10.9 | 1                             | 8.0  | 50   | 42.0  | 15.0  |
| SMBJ8.0A  | KR           | 8.89   | 9.83 | 1                             | 8.0  | 50   | 46.0  | 13.6  |
| SMBJ8.5   | KS           | 9.44   | 11.5 | 1                             | 8.5  | 10   | 39.0  | 15.9  |
| SMBJ8.5A  | KT           | 9.44   | 10.4 | 1                             | 8.5  | 10   | 43.0  | 14.4  |
| SMBJ9.0   | KU           | 10.0   | 12.2 | 1                             | 9.0  | 5  | 37.0  | 16.9  |
| SMBJ9.0A  | KV           | 10.0   | 11.1 | 1                             | 9.0  | 5  | 40.0  | 15.4  |
| SMBJ10  | KW           | 11.1   | 13.6 | 1                             | 10   | 5  | 33.0  | 18.8  |
| SMBJ10A   | KX           | 11.1   | 12.3 | 1                             | 10   | 5  | 37.0  | 17.0  |
| SMBJ11  | KY           | 12.2   | 14.9 | 1                             | 11   | 1  | 31.0  | 20.1  |
| SMBJ11A   | KZ           | 12.2   | 13.5 | 1                             | 11   | 1  | 34.0  | 18.2  |
| SMBJ12  | LD           | 13.3   | 16.3 | 1                             | 12   | 1  | 28.0  | 22.0  |
| SMBJ12A   | LE           | 13.3   | 14.7 | 1                             | 12   | 1  | 31.0  | 19.9  |
| SMBJ13  | LF           | 14.4   | 17.6 | 1                             | 13   | 1  | 26.0  | 23.8  |
| SMBJ13A   | LG           | 14.4   | 15.9 | 1                             | 13   | 1  | 29.0  | 21.5  |
| SMBJ14  | LH           | 15.6   | 19.1 | 1                             | 14   | 1  | 24.4  | 25.8  |
| SMBJ14A   | LK           | 15.6   | 17.2 | 1                             | 14   | 1  | 27.0  | 23.2  |
| SMBJ15  | LL           | 16.7   | 20.4 | 1                             | 15   | 1  | 23.1  | 26.9  |
| SMBJ15A   | LM           | 16.7   | 18.5 | 1                             | 15   | 1  | 25.1  | 24.4  |
| SMBJ16  | LN           | 17.8   | 21.8 | 1                             | 16   | 1  | 21.8  | 28.8  |
| SMBJ16A   | LP           | 17.8   | 19.7 | 1                             | 16   | 1  | 24.2  | 26.0  |
| SMBJ17  | LQ           | 18.9   | 23.1 | 1                             | 17   | 1  | 20.0  | 30.5  |
| SMBJ17A   | LR           | 18.9   | 20.9 | 1                             | 17   | 1  | 22.8  | 27.6  |
| SMBJ18  | LS           | 20.0   | 24.4 | 1                             | 18   | 1  | 19.5  | 32.2  |
| SMBJ18A   | LT           | 20.0   | 22.1 | 1                             | 18   | 1  | 21.5  | 29.2  |
| SMBJ20  | LU           | 22.2   | 27.1 | 1                             | 20   | 1  | 17.6  | 35.8  |
| SMBJ20A   | LV           | 22.2   | 24.5 | 1                             | 20   | 1  | 19.4  | 32.4  |
| SMBJ22  | LW           | 24.4   | 29.8 | 1                             | 22   | 1  | 15.0  | 39.4  |
| SMBJ22A   | LX           | 24.4   | 26.9 | 1                             | 22   | 1  | 17.7  | 35.5  |
| SMBJ24  | LY           | 26.7   | 32.6 | 1                             | 24   | 1  | 14.6  | 43.0  |
| SMBJ24A   | LZ           | 26.7   | 29.5 | 1                             | 24   | 1  | 16.0  | 38.9  |
| SMBJ26  | MD           | 28.9   | 35.3 | 1                             | 26   | 1  | 13.5  | 46.6  |
| SMBJ26A   | ME           | 28.9   | 31.9 | 1                             | 26   | 1  | 14.9  | 42.1  |

| <b>ELECTRICAL SPECIFICATIONS</b> ( $T_A = 25^\circ\text{C}$ unless otherwise noted) |              |  |      |                               |  |   |   |   |
|---|--------------|--|------|-------------------------------|--|---|---|---|
| Part number   | Marking code | Breakdown voltage<br>$V_{BR}@I_T$<br>(V)<br>(Note 1) |      | Test current<br>$I_T$<br>(mA) | Working stand-off voltage<br>$V_{WM}$<br>(V) | Maximum blocking leakage current<br>$I_{B}@V_{WM}$<br>( $\mu\text{A}$ ) | Maximum peak impulse current<br>$I_{PP}$<br>(A)<br>(Note 2) | Maximum clamping voltage<br>$V_C@I_{PP}$<br>(V) |
|   |              | Min.   | Max. |                               |  |   |   |   |
| SMBJ28  | MF           | 31.1   | 38.0 | 1                             | 28   | 1   | 12.6  | 50.0  |
| SMBJ28A   | MG           | 31.1   | 34.4 | 1                             | 28   | 1   | 13.8  | 45.4  |
| SMBJ30  | MH           | 33.3   | 40.7 | 1                             | 30   | 1   | 11.7  | 53.5  |
| SMBJ30A   | MK           | 33.3   | 36.8 | 1                             | 30   | 1   | 13.0  | 48.4  |
| SMBJ33  | ML           | 36.7   | 44.9 | 1                             | 33   | 1   | 10.6  | 59.0  |
| SMBJ33A   | MM           | 36.7   | 40.6 | 1                             | 33   | 1   | 11.8  | 53.3  |
| SMBJ36  | MN           | 40.0   | 48.9 | 1                             | 36   | 1   | 9.8   | 64.3  |
| SMBJ36A   | MP           | 40.0   | 44.2 | 1                             | 36   | 1   | 10.8  | 58.1  |
| SMBJ40  | MQ           | 44.4   | 54.3 | 1                             | 40   | 1   | 8.8   | 71.4  |
| SMBJ40A   | MR           | 44.4   | 49.1 | 1                             | 40   | 1   | 9.7   | 64.5  |
| SMBJ43  | MS           | 47.8   | 58.4 | 1                             | 43   | 1   | 8.2   | 76.7  |
| SMBJ43A   | MT           | 47.8   | 52.8 | 1                             | 43   | 1   | 9.0   | 69.4  |
| SMBJ45  | MU           | 50.0   | 61.1 | 1                             | 45   | 1   | 7.8   | 80.3  |
| SMBJ45A   | MV           | 50.0   | 55.3 | 1                             | 45   | 1   | 8.6   | 72.7  |
| SMBJ48  | MW           | 53.3   | 65.1 | 1                             | 48   | 1   | 7.3   | 85.5  |
| SMBJ48A   | MX           | 53.3   | 58.9 | 1                             | 48   | 1   | 8.1   | 77.4  |
| SMBJ51  | MY           | 56.7   | 69.3 | 1                             | 51   | 1   | 6.9   | 91.1  |
| SMBJ51A   | MZ           | 56.7   | 62.7 | 1                             | 51   | 1   | 7.6   | 82.4  |
| SMBJ54  | ND           | 60.0   | 73.3 | 1                             | 54   | 1   | 6.5   | 96.3  |
| SMBJ54A   | NE           | 60.0   | 66.3 | 1                             | 54   | 1   | 7.2   | 87.1  |
| SMBJ58  | NF           | 64.4   | 78.7 | 1                             | 58   | 1   | 6.1   | 103   |
| SMBJ58A   | NG           | 64.4   | 71.2 | 1                             | 58   | 1   | 6.7   | 93.6  |
| SMBJ60  | NH           | 66.7   | 81.5 | 1                             | 60   | 1   | 5.8   | 107   |
| SMBJ60A   | NK           | 66.7   | 73.7 | 1                             | 60   | 1   | 6.5   | 96.8  |
| SMBJ64  | NL           | 71.1   | 86.9 | 1                             | 64   | 1   | 5.5   | 114   |
| SMBJ64A   | NM           | 71.1   | 78.6 | 1                             | 64   | 1   | 6.1   | 103   |
| SMBJ70  | NN           | 77.8   | 95.1 | 1                             | 70   | 1   | 5.0   | 125   |
| SMBJ70A   | NP           | 77.8   | 86   | 1                             | 70   | 1   | 5.5   | 113   |
| SMBJ75  | NQ           | 83.3   | 102  | 1                             | 75   | 1   | 4.7   | 134   |
| SMBJ75A   | NR           | 83.3   | 92.1 | 1                             | 75   | 1   | 5.2   | 121   |
| SMBJ78  | NS           | 86.7   | 106  | 1                             | 78   | 1   | 4.5   | 139   |
| SMBJ78A   | NT           | 86.7   | 95.8 | 1                             | 78   | 1   | 5.0   | 126   |
| SMBJ85  | NU           | 94.4   | 115  | 1                             | 85   | 1   | 4.1   | 151   |
| SMBJ85A   | NV           | 94.4   | 104  | 1                             | 85   | 1   | 4.6   | 137   |
| SMBJ90  | NW           | 100  | 122  | 1                             | 90   | 1   | 3.9   | 160   |
| SMBJ90A   | NX           | 100  | 111  | 1                             | 90   | 1   | 4.3   | 146   |
| SMBJ100   | NY           | 111  | 136  | 1                             | 100  | 1   | 3.5   | 179   |
| SMBJ100A  | NZ           | 111  | 123  | 1                             | 100  | 1   | 3.8   | 162   |
| SMBJ110   | PD           | 122  | 149  | 1                             | 110  | 1   | 3.2   | 196   |
| SMBJ110A  | PE           | 122  | 135  | 1                             | 110  | 1   | 3.5   | 177   |
| SMBJ120   | PF           | 133  | 163  | 1                             | 120  | 1   | 2.9   | 214   |
| SMBJ120A  | PG           | 133  | 147  | 1                             | 120  | 1   | 3.2   | 193   |
| SMBJ130   | PH           | 144  | 176  | 1                             | 130  | 1   | 2.7   | 231   |
| SMBJ130A  | PK           | 144  | 159  | 1                             | 130  | 1   | 3.0   | 209   |
| SMBJ150   | PL           | 167  | 204  | 1                             | 150  | 1   | 2.3   | 266   |
| SMBJ150A  | PM           | 167  | 185  | 1                             | 150  | 1   | 2.5   | 243   |
| SMBJ160   | PN           | 178  | 218  | 1                             | 160  | 1   | 2.2   | 287   |
| SMBJ160A  | PP           | 178  | 197  | 1                             | 160  | 1   | 2.4   | 259   |
| SMBJ170   | PQ           | 189  | 231  | 1                             | 170  | 1   | 2.0   | 304   |

| ELECTRICAL SPECIFICATIONS (T <sub>A</sub> = 25°C unless otherwise noted) |              |   |      |  |   |   |  |  |
|--|--------------|---|------|--|---|---|--|--|
| Part number  | Marking code | Breakdown voltage<br>V <sub>BR</sub> @I <sub>T</sub><br>(V)<br>(Note 1) |      | Test current<br>I <sub>T</sub><br>(mA) | Working stand-off voltage<br>V <sub>WM</sub><br>(V) | Maximum blocking leakage current<br>I <sub>B</sub> @V <sub>WM</sub><br>(μA) | Maximum peak impulse current<br>I <sub>PP</sub><br>(A)<br>(Note 2) | Maximum clamping voltage<br>V <sub>C</sub> @I <sub>PP</sub><br>(V) |
|  |              | Min.  | Max. |  |   |   |  |  |
| SMBJ170A   | PR           | 189   | 209  | 1                                      | 170   | 1   | 2.2  | 275  |

**Notes:**

1. VBR measure after IT applied for 300μs, IT=square wave pulse or equivalent.
2. Surge current waveform per Figure. 3 and derate per Figure. 2.
3. All terms and symbols are consistent with ANSI/IEEE C62.35.
4. For bidirectional use C or CA suffix for types SMBJ5.0 - SMBJ170
5. For bipolar types having VWM of 10 volts (SMBJ8.0C) and under, the ID limit is doubled.

| ORDERING INFORMATION |                 |              |                        |         |                          |
|----------------------|-----------------|--------------|------------------------|---------|--------------------------|
| PART NO.             | PART NO. SUFFIX | PACKING CODE | PACKING CODE SUFFIX(*) | PACKAGE | PACKING                  |
| SMBJxxxx<br>(Note 1) | H               | R5           | G                      | SMB     | 850 / 7" Plastic reel    |
|                      |                 | R4           |                        | SMB     | 3,000 / 13" Paper reel   |
|                      |                 | M4           |                        | SMB     | 3,000 / 13" Plastic reel |

**Note:**

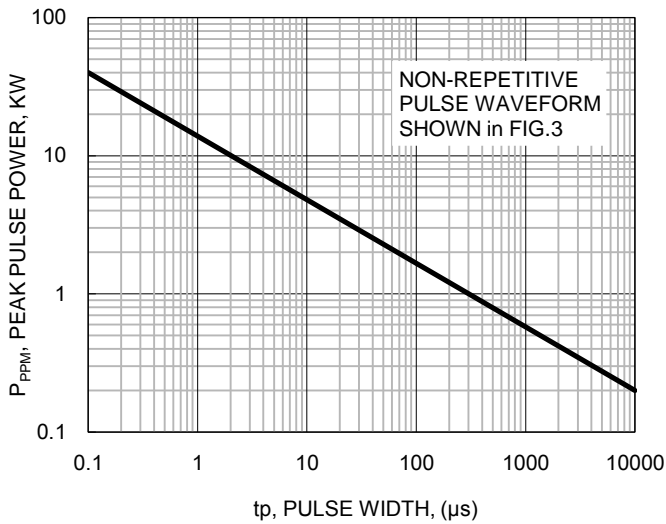
1. "xxxx" defines voltage from 5.0V (SMBJ5.0) to 170V (SMBJ170A)
- \*: Optional available

| EXAMPLE P/N |          |                 |              |                     |                                      |
|-------------|----------|-----------------|--------------|---------------------|--------------------------------------|
| EXAMPLE P/N | PART NO. | PART NO. SUFFIX | PACKING CODE | PACKING CODE SUFFIX | DESCRIPTION                          |
| SMBJ20AHR5G | SMBJ20A  | H               | R5           | G                   | AEC-Q101 qualified<br>Green compound |

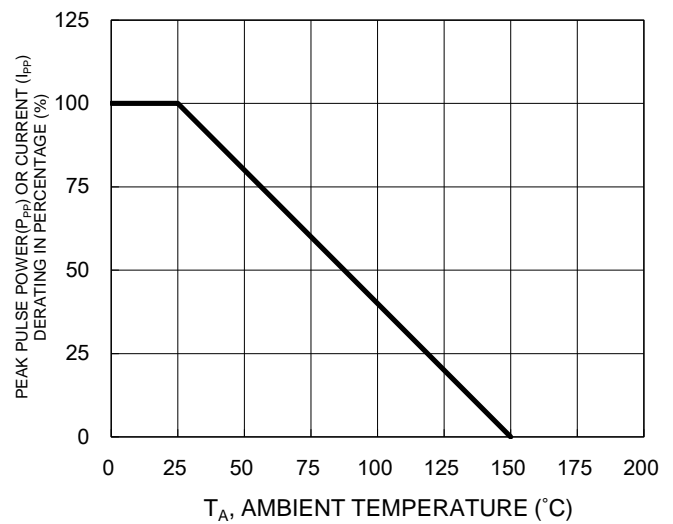
**CHARACTERISTICS CURVES**

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

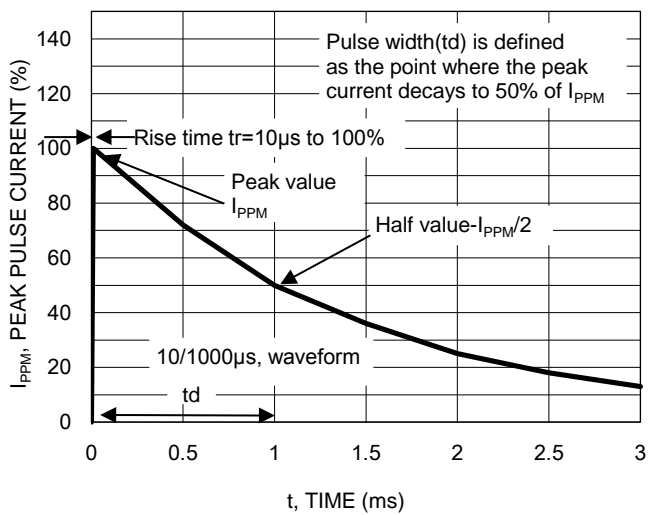
**Fig.1 Peak Pulse Power rating Curve**



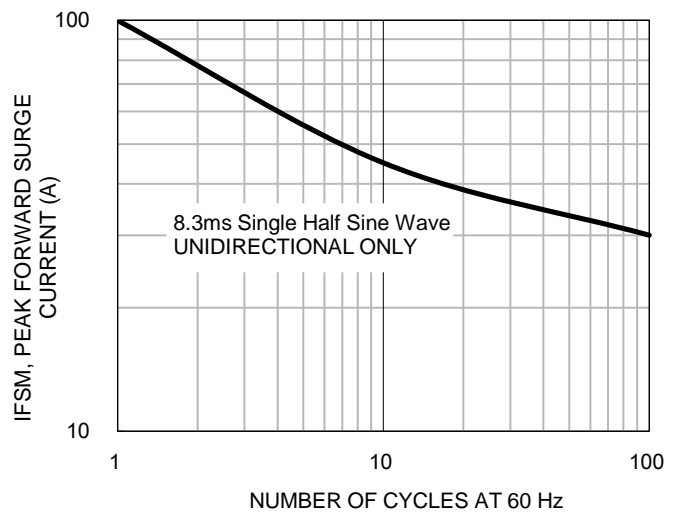
**Fig.2 Pulse Derating Curve**



**Fig.3 Clamping Power Pulse Waveform**



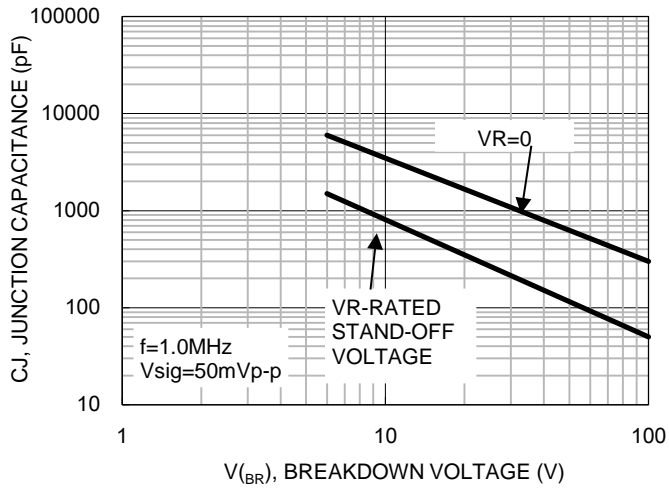
**Fig.4 Maximum Non-Repetitive Forward Surge Current**



**CHARACTERISTICS CURVES**

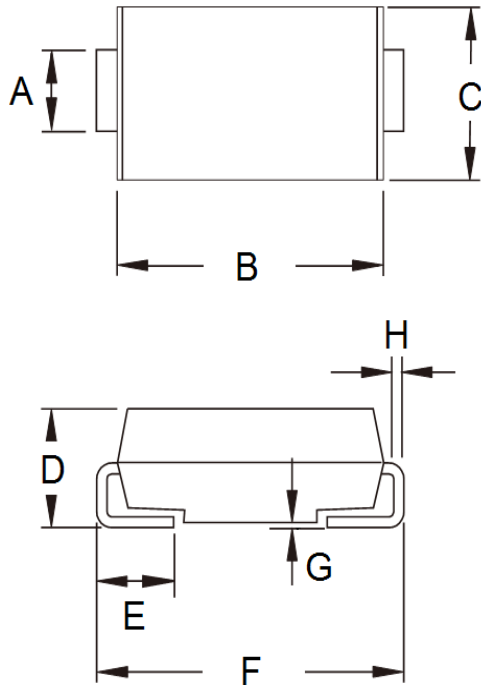
( $T_A = 25^\circ\text{C}$  unless otherwise noted)

**Fig.5 Typical Junction Capacitance**



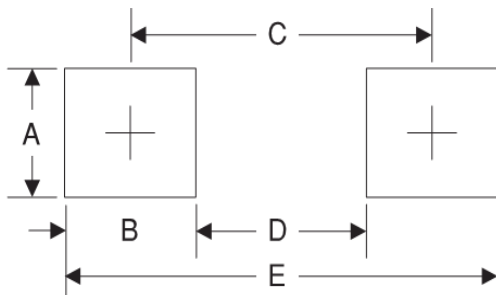
**PACKAGE OUTLINE DIMENSIONS**

DO-214AA (SMB)



| DIM. | Unit (mm) |      | Unit (inch) |       |
|------|-----------|------|-------------|-------|
|      | Min       | Max  | Min         | Max   |
| A    | 1.95      | 2.20 | 0.077       | 0.087 |
| B    | 4.05      | 4.60 | 0.159       | 0.181 |
| C    | 3.30      | 3.95 | 0.130       | 0.156 |
| D    | 1.95      | 2.65 | 0.077       | 0.104 |
| E    | 0.75      | 1.60 | 0.030       | 0.063 |
| F    | 5.10      | 5.60 | 0.201       | 0.220 |
| G    | 0.05      | 0.20 | 0.002       | 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 = Marking Code  
G = Green Compound  
YW = Date Code  
F = Factory Code

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[SMBJ54CA R4](#) [SMBJ58A R4](#) [SMBJ58CA R4](#) [SMBJ6.0A R4](#) [SMBJ6.0CA R4](#) [SMBJ6.5A R4](#) [SMBJ6.5CA R4](#)  
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[SMBJ7.5CA R4](#) [SMBJ70A R4](#) [SMBJ70CA R4](#) [SMBJ75A R4](#) [SMBJ75CA R4](#) [SMBJ78A R4](#) [SMBJ78CA R4](#)  
[SMBJ8.0A R4](#) [SMBJ8.0CA R4](#) [SMBJ8.5A R4](#) [SMBJ8.5CA R4](#) [SMBJ85A R4](#) [SMBJ85CA R4](#) [SMBJ9.0A R4](#)  
[SMBJ9.0CA R4](#) [SMBJ90A R4](#) [SMBJ90CA R4](#) [SMBJ188A](#) [SMBJ188CA](#) [SMBJ36CA](#) [SMBJ5.0A](#) [SMBJ5.0CA](#)  
[SMBJ6.0A](#)