

600W, 5V - 170V Surface Mount Transient Voltage Suppressor

FEATURES

- Ideal for automated placement
- Glass passivated junction
- Excellent clamping capability
- Fast response time: Typically less than 1.0ps
- Typical I_R less than 1 μ A above 10V
- Meets ISO 7637-2 (Pulse 1/2a/2b/3a/3b)
- Moisture sensitivity level: level 1, per J-STD-020
- RoHS Compliant
- Halogen-free according to IEC 61249-2-21

APPLICATIONS

- Protect sensitive circuit from damage by high voltage transients
- Lighting, ESD transient voltage protection of IC, system
- Inductive switching load protection of IC, system
- Electrical Fast Transient Immunity protection of IC, system

MECHANICAL DATA

- Case: DO-214AA (SMB)
- Molding compound meets UL 94V-0 flammability rating
- Terminal: Matte tin plated leads, solderable per J-STD-002
- Meet JESD 201 class 2 whisker test
- Polarity: As marked
- Weight: 0.090g (approximately)

| KEY PARAMETERS | | |
|------------------------------|----------------|------|
| PARAMETER | VALUE | UNIT |
| V_{WM} | 5 - 170 | V |
| V_{BR} (uni - directional) | 6.4 - 231 | V |
| V_{BR} (bi - directional) | 6.4 - 231 | V |
| P_{PK} | 600 | W |
| T_{JMAX} | 150 | |
| Package | DO-214AA (SMB) | |
| Configuration | Single die | |



DO-214AA (SMB)

| ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted) | | | |
|---|-----------|--------------|------------------|
| PARAMETER | SYMBOL | VALUE | UNIT |
| Non-repetitive peak impulse power dissipation with 10/1000 μ s waveform ⁽¹⁾ | P_{PK} | 600 | W |
| Steady state power dissipation at $T_A = 25^\circ\text{C}$ | P_D | 3 | W |
| Peak forward surge current, 8.3ms single half sine-wave superimposed on rated load for Uni-directional only | I_{FSM} | 100 | A |
| Forward Voltage @ $I_F = 50\text{A}$ for Uni-directional only ⁽²⁾ | V_F | 3.5 / 5.0 | V |
| Junction temperature | T_J | - 55 to +150 | $^\circ\text{C}$ |
| Storage temperature | T_{STG} | - 55 to +150 | $^\circ\text{C}$ |

Notes:

1. Non-repetitive current pulse per Fig.3 and derated above $T_A = 25^\circ\text{C}$ per Fig.2
2. $V_F = 3.5\text{V}$ on SMBJ5.0 - SMBJ90 devices and $V_F = 5.0\text{V}$ 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 | TYP | UNIT |
| Junction-to-case thermal resistance | $R_{\theta JC}$ | 10 | °C/W |
| Junction-to-ambient thermal resistance | $R_{\theta JA}$ | 55 | °C/W |

| ELECTRICAL SPECIFICATIONS ($T_A = 25^\circ\text{C}$ unless otherwise noted) | | | | | | | | |
|---|--------------|--|------|-------------------------------|--|---|---|---|
| Part number | Marking code | Breakdown voltage $V_{BR}@I_T$ (V) (Note 1) | | Test current I_T (mA) | Working stand-off voltage V_{WM} (V) | Maximum blocking leakage current $I_D@V_{WM}$ (μA) | Maximum peak impulse current I_{PP} (A) (Note 2) | Maximum clamping voltage $V_C@I_{PP}$ (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 |
| SMBJ5V0A | | | | | | | | |
| 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 |
| SMBJ6V0A | | | | | | | | |
| 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 |
| SMBJ6V5A | | | | | | | | |
| 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 |
| SMBJ7V0A | | | | | | | | |
| 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 |
| SMBJ7V5A | | | | | | | | |
| 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 |
| SMBJ8V0A | | | | | | | | |
| 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 |
| SMBJ8V5A | | | | | | | | |
| 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 |
| SMBJ9V0A | | | | | | | | |
| 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 |

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

| Part number | Marking code | Breakdown voltage $V_{BR}@I_T$ (V) (Note 1) | | Test current I_T (mA) | Working stand-off voltage V_{WM} (V) | Maximum blocking leakage current $I_D@V_{WM}$ (μA) | Maximum peak impulse current I_{PP} (A) (Note 2) | Maximum clamping voltage $V_C@I_{PP}$ (V) |
|-------------|--------------|---|------|-------------------------|--|---|--|---|
| | | Min | Max | | | | | |
| 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 |
| 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 ($T_A = 25^\circ\text{C}$ unless otherwise noted) | | | | | | | | |
|---|--------------|--|-----|-------------------------------|--|---|---|---|
| Part number | Marking code | Breakdown voltage $V_{BR}@I_T$ (V) (Note 1) | | Test current I_T (mA) | Working stand-off voltage V_{WM} (V) | Maximum blocking leakage current $I_D@V_{WM}$ (μA) | Maximum peak impulse current I_{PP} (A) (Note 2) | Maximum clamping voltage $V_C@I_{PP}$ (V) |
| | | Min | Max | | | | | |
| SMBJ170A | PR | 189 | 209 | 1 | 170 | 1 | 2.2 | 275 |

Notes:

1. V_{BR} measure after I_T applied for 30ms, $I_T =$ square wave pulse or equivalent.
2. Surge current waveform per Fig.3 and derate per Fig.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 V_{WM} of 10V (SMBJ10C) and under, the I_D limit is doubled.

| ORDERING INFORMATION | | |
|------------------------------|----------------|---------------------|
| ORDERING CODE ⁽¹⁾ | PACKAGE | PACKING |
| SMBJx | DO-214AA (SMB) | 3,000 / Tape & Reel |

Notes:

1. "x" defines voltage from 5V(SMBJ5.0) to 170V(SMBJ170A)

CHARACTERISTICS CURVES

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

Fig.1 Peak Pulse Power Rating Curve

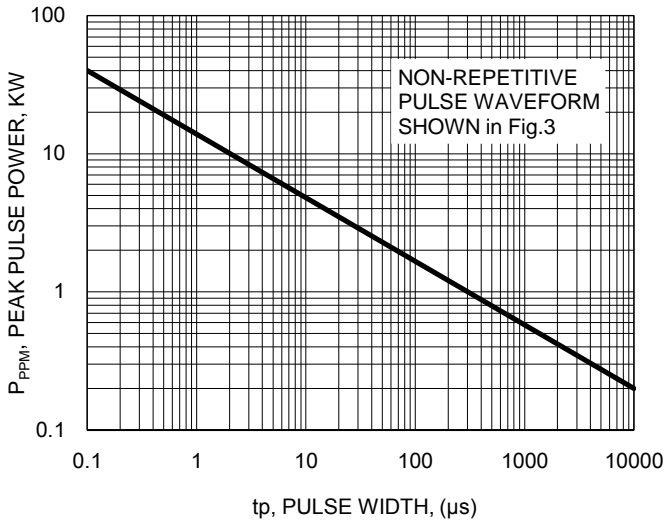


Fig.2 Pulse Derating Curve

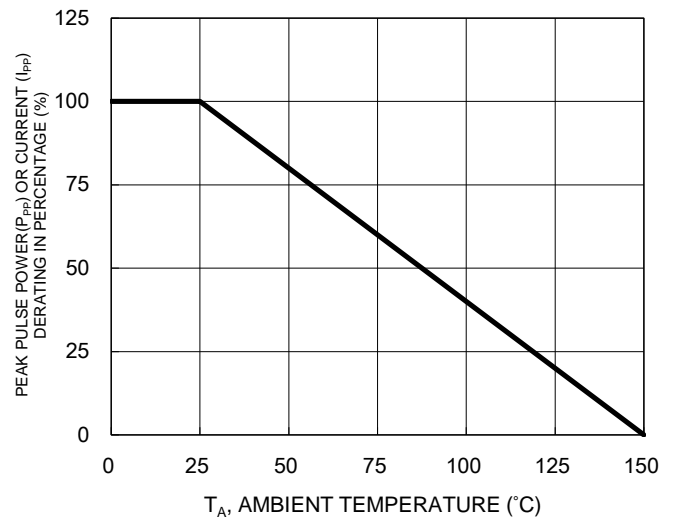
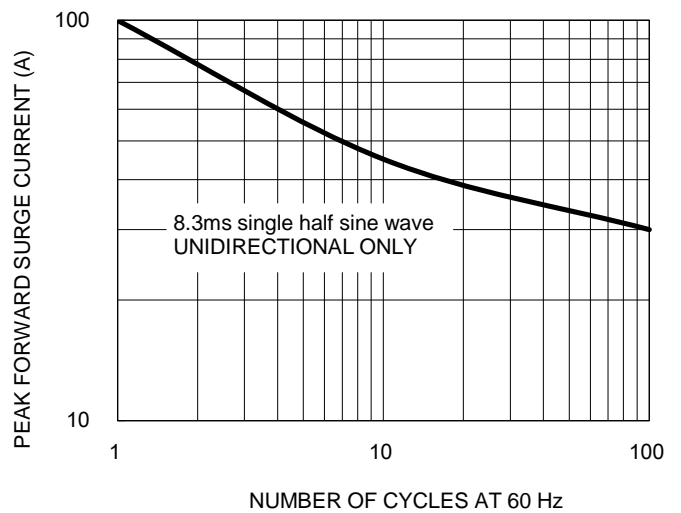


Fig.3 Clamping Power Pulse Waveform



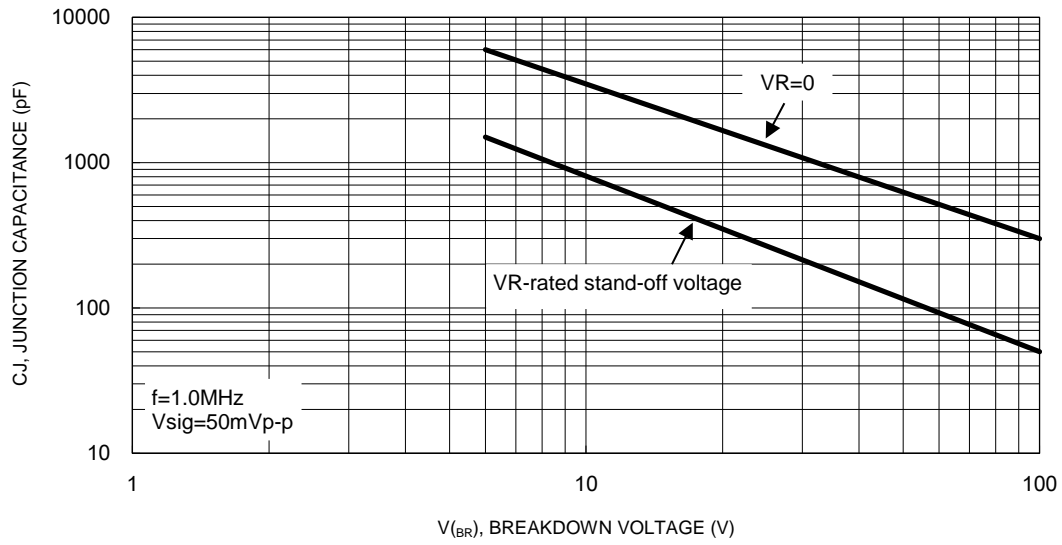
Fig.4 Maximum Non-Repetitive Forward Surge Current



CHARACTERISTICS CURVES

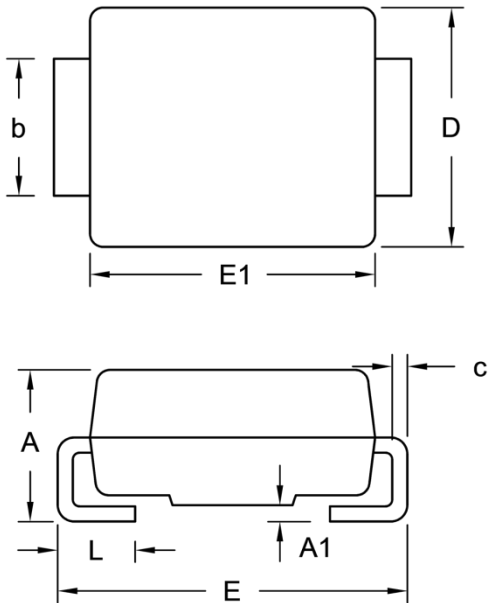
($T_A = 25^\circ\text{C}$ unless otherwise noted)

Fig.5 Typical Junction Capacitance



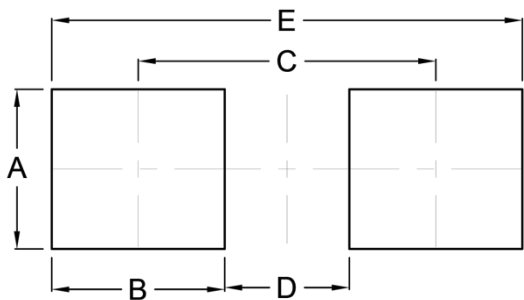
PACKAGE OUTLINE DIMENSIONS

DO-214AA (SMB)



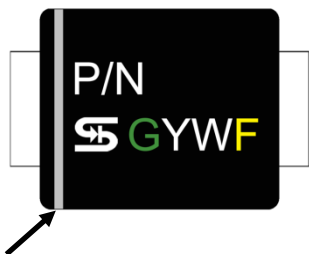
| DIM. | Unit (mm) | | Unit (inch) | |
|------|-----------|------|-------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 1.95 | 2.65 | 0.077 | 0.104 |
| A1 | 0.05 | 0.20 | 0.002 | 0.008 |
| b | 1.95 | 2.20 | 0.077 | 0.087 |
| c | 0.15 | 0.31 | 0.006 | 0.012 |
| D | 3.30 | 3.95 | 0.130 | 0.156 |
| E | 5.10 | 5.60 | 0.201 | 0.220 |
| E1 | 4.05 | 4.60 | 0.159 | 0.181 |
| L | 0.75 | 1.60 | 0.030 | 0.063 |

SUGGESTED PAD LAYOUT



| Symbol | Unit (mm) | Unit (inch) |
|--------|-----------|-------------|
| A | 2.30 | 0.091 |
| B | 2.50 | 0.098 |
| C | 4.30 | 0.169 |
| D | 1.80 | 0.071 |
| E | 6.80 | 0.268 |

MARKING DIAGRAM



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

Cathode band for uni-directional products only

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