

600W, 6.8V - 220V Surface Mount Transient Voltage Suppressor

FEATURES

- Low profile package
- Ideal for automated placement
- Glass passivated junction
- Excellent clamping capability
- Typical I_R less than $1\mu A$ above 10V
- Fast response time: Typically less than 1.0ps from 0 volt to BV min
- Moisture sensitivity level: level 1, per J-STD-020
- RoHS Compliant
- Halogen-free according to IEC 61249-2-21

| KEY PARAMETERS | | |
|----------------|----------------|------|
| PARAMETER | VALUE | UNIT |
| V_{WM} | 5.5 - 185 | V |
| V_{BR} | 6.8 - 220 | V |
| P_{PPSM} | 600 | W |
| T_{JMAX} | 150 | °C |
| Package | DO-214AA (SMB) | |
| Configuration | Single die | |

APPLICATIONS

- Switching mode power supply (SMPS)
- Adapters
- TV
- Monitor



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: 0.090 g (approximately)



DO-214AA (SMB)

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ C$ unless otherwise noted)

| PARAMETER | SYMBOL | VALUE | UNIT |
|--|------------|-------------|------|
| Non-repetitive peak impulse power dissipation with 10/1000 μs waveform ⁽¹⁾ | P_{PPSM} | 600 | W |
| Steady state power dissipation at $T_A = 25^\circ C$ | P_{tot} | 3 | W |
| Peak forward surge current, 8.3 ms single half sine-wave superimposed on rated load | I_{FSM} | 100 | A |
| Forward Voltage @ $I_F = 50A$ for Uni-directional only ⁽²⁾ | 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 $T_A = 25^\circ C$ per Fig. 2
2. $V_F = 3.5V$ on P6SMB6.8 - P6SMB91 device and $V_F = 5.0V$ on P6SMB100 - P6SMB220 device.

Devices for Bipolar Applications

1. For bidirectional use C or CA suffix for types P6SMB6.8 - types P6SMB220A
2. Electrical characteristics apply in both directions

THERMAL PERFORMANCE

| PARAMETER | SYMBOL | TYP | 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)

| Device | Device Marking Code | Breakdown Voltage V_{BR} (V) (Note 1) | | Test Current I_T (mA) | Stand-Off Voltage V_{WM} (V) | Maximum Reverse Leakage @ V_{WM} I_D (μA) | Maximum Peak Pulse Current I_{PPM} (A) (Note 2) | Maximum clamping voltage V_C @ I_{PPM} (V) | Maximum Temperature Coefficient of V_{BR} (%/ $^{\circ}C$) |
|-----------|---------------------|--|-------|-------------------------|--------------------------------|--|--|--|---|
| | | 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 |

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

| Device | Device Marking Code | Breakdown Voltage V_{BR} (V) (Note 1) | | Test Current I_T (mA) | Stand-Off Voltage V_{WM} (V) | Maximum Reverse Leakage @ V_{WM} I_D (μA) | Maximum Peak Pulse Current I_{PPM} (A) (Note 2) | Maximum clamping voltage $V_C @ I_{PPM}$ (V) | Maximum Temperature Coefficient of V_{BR} (%/ $^\circ\text{C}$) |
|-----------|---------------------|--|------|-------------------------|--------------------------------|--|--|--|--|
| | | Min | Max | | | | | | |
| P6SMB51A | MGJ | 48.5 | 53.6 | 1.0 | 43.6 | 1 | 8.9 | 70.1 | 0.102 |
| 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 300 μs , 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 V and under, the I_D limit is doubled.
4. For bidirectional use C or CA suffix for types P6SMB6.8 - P6SMB220A.
5. All terms and symbols are consistent with ANSI/IEEE C62.35.

| ORDERING INFORMATION | | |
|--------------------------------------|----------------|------------------|
| ORDERING CODE (Note 1,2,3) | PACKAGE | PACKING |
| P6SMBxxxxHR5G | SMB | 850 / 7" reel |
| P6SMBxxxxHM4G | SMB | 3,000 / 13" reel |
| P6SMBxxxxHR5 | SMB | 850 / 7" reel |
| P6SMBxxxxHM4 | SMB | 3,000 / 13" reel |
| P6SMBxxxx R5G | SMB | 850 / 7" reel |
| P6SMBxxxx M4G | SMB | 3,000 / 13" reel |
| P6SMBxxxx R5 | SMB | 850 / 7" reel |
| P6SMBxxxx M4 | SMB | 3,000 / 13" reel |

Note 1:

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

Note 2:

"H" means AEC-Q101 qualified

Note 3:

"G" means green compound (halogen free)

CHARACTERISTICS CURVES

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

Fig1. Peak Pulse Power Rating Curve

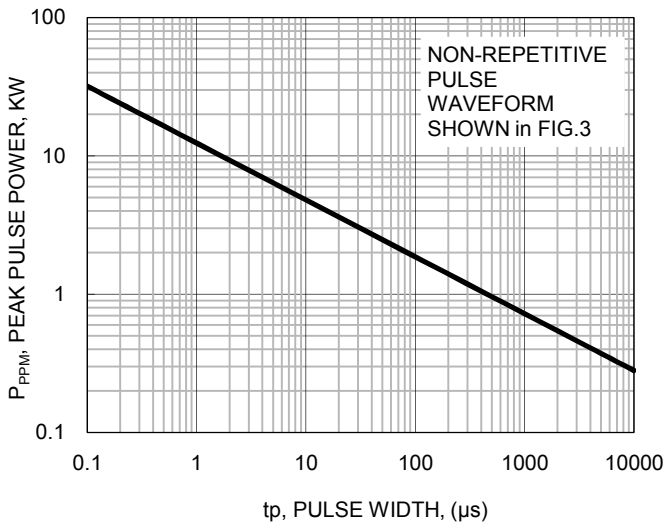


Fig2. Pulse Derating Curve

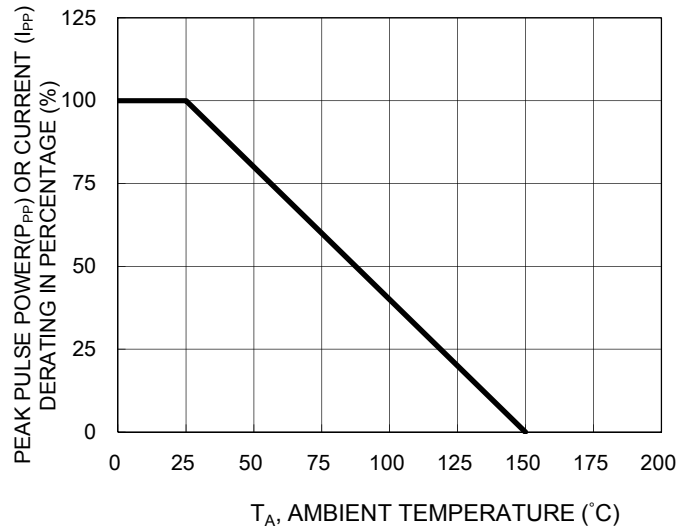


Fig3. Clamping Power Pulse Waveform

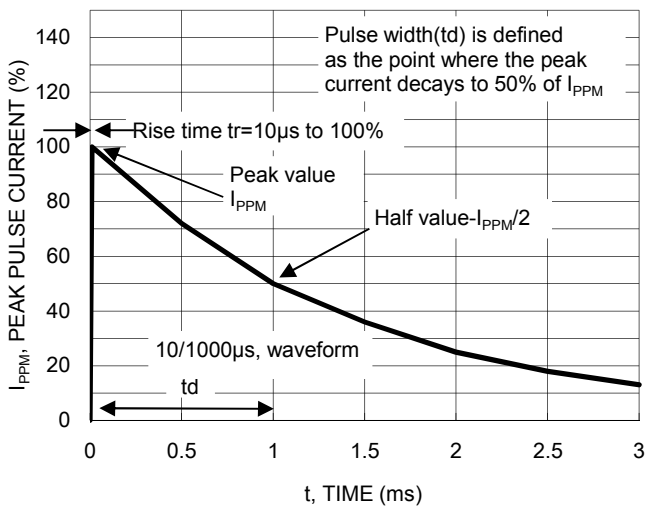


Fig4. Maximum Non-Repetitive Forward Surge Current Unidirectional Only

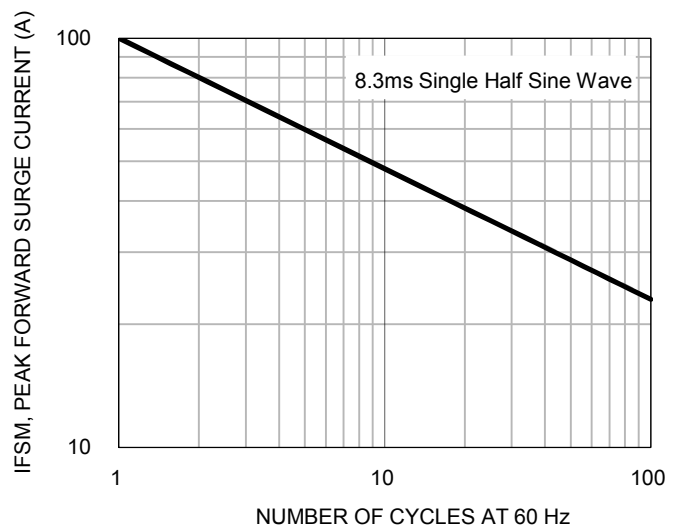
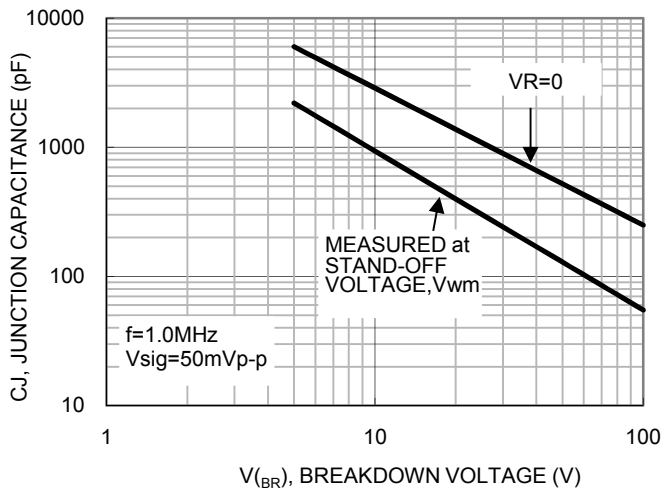
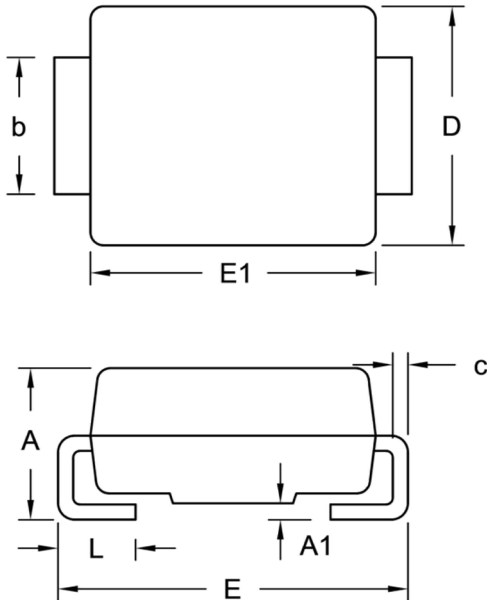


Fig5. Typical Junction Capacitance



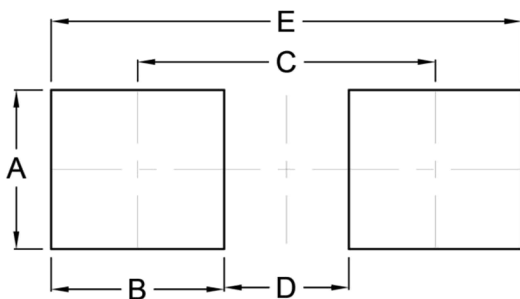
PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

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

Note(1): Cathode band for uni-directional products only

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