



5.0SMDJ Series 5000W Transient Voltage Suppressor

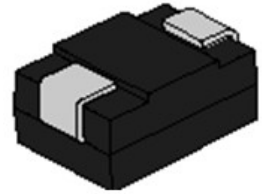
Rev.4.5

DESCRIPTION

TVS diodes can be used in a wide range of applications which like consumer electronic products, automotive industries, munitions, telecommunications, aerospace industries, and intelligent control systems.

FEATURES

- ✧ Low profile package.
- ✧ Low inductance.
- ✧ Excellent clamping capability.
- ✧ 5000W peak pulse power capability at 10/1000 μ s waveform.
- ✧ Typical I_R less than 1 μ A above 30V.
- ✧ Fast response time: typically less than 1.0ps from 0V to V_{BR} min.
- ✧ High temperature to reflow soldering: 260 $^{\circ}$ C/40s at terminals.
- ✧ Plastic package has under writers laboratory flammability 94V-0.
- ✧ Meets MSL level 1, per J-STD-020, LF maximum peak of 260 $^{\circ}$ C.
- ✧ Terminal: solder plated, solderable per J-STD-002.
- ✧ IEC61000-4-2 (ESD) \pm 30kV (air), \pm 30kV (contact).
- ✧ UL 497B item recognized. (File No.:E480698).
- ✧ For surface mounted applications in order to optimize board space.



SMC



Bi-directional



Uni-directional

Symbol

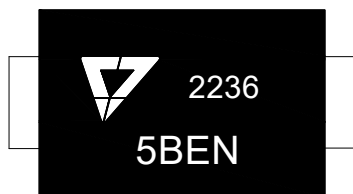
ABSOLUTE MAXIMUM RATINGS ($T_A=25^{\circ}$ C, RH=45%-75%, unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|---|-----------------|-------------|----------------|
| Operating junction and storage temperature range | T_J/T_{STG} | -55 to +150 | $^{\circ}$ C |
| Steady state power dissipation at $T_L=75^{\circ}$ C | $P_{M(AV)}$ | 6.5 | W |
| Peak pulse power dissipation at 10/1000 μ s waveform | P_{PP} | 5000 | W |
| Maximum instantaneous forward voltage at 100A for unidirectional only | V_F | 5.0 | V |
| Peak forward surge current, 8.3ms single half sine wave(Note 1) | I_{FSM} | 300 | A |
| Typical thermal resistance junction to lead | $R_{\theta JL}$ | 15 | $^{\circ}$ C/W |
| Typical thermal resistance junction to ambient | $R_{\theta JA}$ | 75 | $^{\circ}$ C/W |

Notes:

1. Measured on 8.3ms single half sine wave or equivalent square wave for unidirectional device only, duty cycle=4 per minute maximum

MARKING



5BEN: Device Marking Code
2236: the 36th week, 2022

ELECTRICAL CHARACTERISTICS (T_A=25°C)

| Part Number | | Marking | | V _R | I _R @ V _R | V _{BR} @ I _T | | I _T | V _C @ I _{PP} | I _{PP} [®] |
|-------------|-------------|---------|------|----------------|---------------------------------|----------------------------------|---------|----------------|----------------------------------|------------------------------|
| Uni-Polar | Bi-Polar | Uni | Bi | V | Max (μA) | Min (V) | Max (V) | mA | Max (V) | A |
| 5.0SMDJ11A | 5.0SMDJ11CA | 5PEN | 5BEN | 11 | 5 | 12.20 | 13.50 | 10 | 18.2 | 275.0 |
| 5.0SMDJ12A | 5.0SMDJ12CA | 5PEP | 5BEP | 12 | 5 | 13.30 | 14.70 | 10 | 19.9 | 252.0 |
| 5.0SMDJ13A | 5.0SMDJ13CA | 5PEQ | 5BEQ | 13 | 5 | 14.40 | 15.90 | 10 | 21.5 | 233.0 |
| 5.0SMDJ14A | 5.0SMDJ14CA | 5PER | 5BER | 14 | 5 | 15.60 | 17.20 | 10 | 23.2 | 216.0 |
| 5.0SMDJ15A | 5.0SMDJ15CA | 5PES | 5BES | 15 | 5 | 16.70 | 18.50 | 1 | 24.4 | 205.0 |
| 5.0SMDJ16A | 5.0SMDJ16CA | 5PET | 5BET | 16 | 5 | 17.80 | 19.70 | 1 | 26.0 | 193.0 |
| 5.0SMDJ17A | 5.0SMDJ17CA | 5PEU | 5BEU | 17 | 5 | 18.90 | 20.90 | 1 | 27.6 | 181.0 |
| 5.0SMDJ18A | 5.0SMDJ18CA | 5PEV | 5BEV | 18 | 5 | 20.00 | 22.10 | 1 | 29.2 | 172.0 |
| 5.0SMDJ20A | 5.0SMDJ20CA | 5PEW | 5BEW | 20 | 5 | 22.20 | 24.50 | 1 | 32.4 | 155.0 |
| 5.0SMDJ22A | 5.0SMDJ22CA | 5PEX | 5BEX | 22 | 5 | 24.40 | 26.90 | 1 | 35.5 | 141.0 |
| 5.0SMDJ24A | 5.0SMDJ24CA | 5PEZ | 5BEZ | 24 | 5 | 26.70 | 29.50 | 1 | 38.9 | 129.0 |
| 5.0SMDJ26A | 5.0SMDJ26CA | 5PFE | 5BFE | 26 | 5 | 28.90 | 31.90 | 1 | 42.1 | 119.0 |
| 5.0SMDJ28A | 5.0SMDJ28CA | 5PFG | 5BFG | 28 | 5 | 31.10 | 34.40 | 1 | 45.4 | 110.0 |
| 5.0SMDJ30A | 5.0SMDJ30CA | 5PFK | 5BFK | 30 | 5 | 33.30 | 36.80 | 1 | 48.4 | 103.0 |
| 5.0SMDJ33A | 5.0SMDJ33CA | 5PFM | 5BFM | 33 | 1 | 36.70 | 40.60 | 1 | 53.3 | 93.9 |
| 5.0SMDJ36A | 5.0SMDJ36CA | 5PFP | 5BFP | 36 | 1 | 40.00 | 44.20 | 1 | 58.1 | 86.1 |
| 5.0SMDJ40A | 5.0SMDJ40CA | 5PFR | 5BFR | 40 | 1 | 44.40 | 49.10 | 1 | 64.5 | 77.6 |
| 5.0SMDJ43A | 5.0SMDJ43CA | 5PFT | 5BFT | 43 | 1 | 47.80 | 52.80 | 1 | 69.4 | 72.1 |
| 5.0SMDJ45A | 5.0SMDJ45CA | 5PFV | 5BFV | 45 | 1 | 50.00 | 55.30 | 1 | 72.7 | 68.8 |
| 5.0SMDJ48A | 5.0SMDJ48CA | 5PFX | 5BFX | 48 | 1 | 53.30 | 58.90 | 1 | 77.4 | 64.7 |
| 5.0SMDJ51A | 5.0SMDJ51CA | 5PFZ | 5BFZ | 51 | 1 | 56.70 | 62.70 | 1 | 82.4 | 60.7 |
| 5.0SMDJ54A | 5.0SMDJ54CA | 5PGE | 5BGE | 54 | 1 | 60.00 | 66.30 | 1 | 87.1 | 57.5 |
| 5.0SMDJ58A | 5.0SMDJ58CA | 5PGG | 5BGG | 58 | 1 | 64.40 | 71.20 | 1 | 93.6 | 53.5 |

ELECTRICAL CHARACTERISTICS ($T_A=25^{\circ}\text{C}$, continued)

| Part Number | | Marking | | V_R | $I_R @ V_R$ | $V_{BR} @ I_T$ | | I_T | $V_C @ I_{PP}$ | I_{PP}° |
|-------------|--------------|---------|------|-------|-----------------------|----------------|---------|-------|----------------|------------------|
| Uni-Polar | Bi-Polar | Uni | Bi | V | Max (μA) | Min (V) | Max (V) | mA | Max (V) | A |
| 5.0SMDJ60A | 5.0SMDJ60CA | 5PGK | 5BGK | 60 | 1 | 66.70 | 73.70 | 1 | 96.8 | 51.7 |
| 5.0SMDJ64A | 5.0SMDJ64CA | 5PGM | 5BGM | 64 | 1 | 71.10 | 78.60 | 1 | 103.0 | 48.6 |
| 5.0SMDJ70A | 5.0SMDJ70CA | 5PGP | 5BGP | 70 | 1 | 77.80 | 86.00 | 1 | 113.0 | 44.3 |
| 5.0SMDJ75A | 5.0SMDJ75CA | 5PGR | 5BGR | 75 | 1 | 83.30 | 92.10 | 1 | 121.0 | 41.4 |
| 5.0SMDJ78A | 5.0SMDJ78CA | 5PGT | 5BGT | 78 | 1 | 86.70 | 95.80 | 1 | 126.0 | 39.7 |
| 5.0SMDJ85A | 5.0SMDJ85CA | 5PGV | 5BGV | 85 | 1 | 94.40 | 104.0 | 1 | 137.0 | 36.5 |
| 5.0SMDJ90A | 5.0SMDJ90CA | 5PGX | 5BGX | 90 | 1 | 100.0 | 111.0 | 1 | 146.0 | 34.3 |
| 5.0SMDJ100A | 5.0SMDJ100CA | 5PGZ | 5BGZ | 100 | 1 | 111.0 | 123.0 | 1 | 162.0 | 30.9 |
| 5.0SMDJ110A | 5.0SMDJ110CA | 5PHE | 5BHE | 110 | 1 | 122.0 | 135.0 | 1 | 177.0 | 28.3 |
| 5.0SMDJ120A | 5.0SMDJ120CA | 5PHG | 5BHG | 120 | 1 | 133.0 | 147.0 | 1 | 193.0 | 26.0 |
| 5.0SMDJ130A | 5.0SMDJ130CA | 5PHK | 5BHK | 130 | 1 | 144.0 | 159.0 | 1 | 209.0 | 24.0 |
| 5.0SMDJ150A | 5.0SMDJ150CA | 5PHM | 5BHM | 150 | 1 | 167.0 | 185.0 | 1 | 243.0 | 20.6 |
| 5.0SMDJ160A | 5.0SMDJ160CA | 5PHP | 5BHP | 160 | 1 | 178.0 | 197.0 | 1 | 259.0 | 19.3 |
| 5.0SMDJ170A | 5.0SMDJ170CA | 5PHR | 5BHR | 170 | 1 | 189.0 | 209.0 | 1 | 275.0 | 18.2 |
| 5.0SMDJ180A | 5.0SMDJ180CA | 5PHT | 5BHT | 180 | 1 | 201.0 | 222.0 | 1 | 292.0 | 17.1 |
| 5.0SMDJ190A | 5.0SMDJ190CA | 5PHU | 5BHU | 190 | 1 | 211.0 | 234.0 | 1 | 307.0 | 16.3 |
| 5.0SMDJ200A | 5.0SMDJ200CA | 5PHV | 5BHV | 200 | 1 | 224.0 | 247.0 | 1 | 324.0 | 15.4 |
| 5.0SMDJ210A | 5.0SMDJ210CA | 5PHW | 5BHW | 210 | 1 | 233.0 | 258.0 | 1 | 337.0 | 14.8 |
| 5.0SMDJ220A | 5.0SMDJ220CA | 5PHX | 5BHX | 220 | 1 | 246.0 | 272.0 | 1 | 356.0 | 14.0 |
| 5.0SMDJ250A | 5.0SMDJ250CA | 5PHZ | 5BHZ | 250 | 1 | 279.0 | 309.0 | 1 | 405.0 | 12.3 |
| 5.0SMDJ300A | 5.0SMDJ300CA | 5PJK | 5BJK | 300 | 1 | 335.0 | 371.0 | 1 | 486.0 | 10.3 |
| 5.0SMDJ350A | 5.0SMDJ350CA | 5PJM | 5BJM | 350 | 1 | 391.0 | 432.0 | 1 | 567.0 | 8.8 |
| 5.0SMDJ400A | 5.0SMDJ400CA | 5PJP | 5BJP | 400 | 1 | 447.0 | 494.0 | 1 | 648.0 | 7.72 |
| 5.0SMDJ440A | 5.0SMDJ440CA | 5PJR | 5BJR | 440 | 1 | 492.0 | 543.0 | 1 | 713.0 | 7.02 |

① Surge waveform: 10/1000 μs

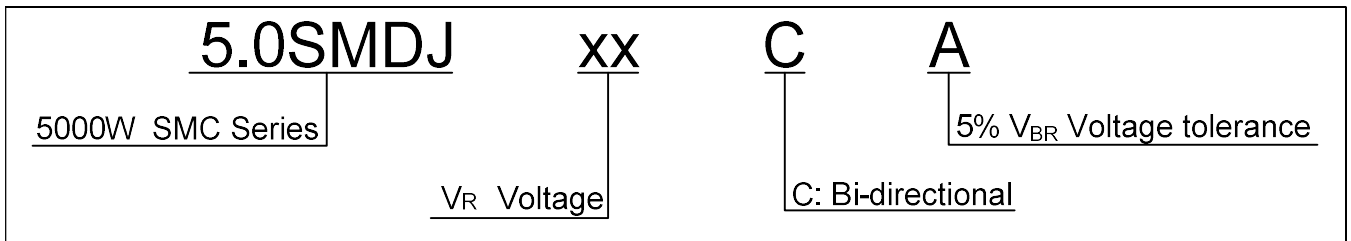
V_R : Stand-off voltage -- Maximum voltage that can be applied

V_{BR} : Breakdown voltage

V_C : Clamping voltage -- Peak voltage measured across the suppressor at a specified I_{PP}

I_R : Reverse leakage current

ORDERING INFORMATION



RATINGS AND V-I CHARACTERISTICS CURVES (T_A=25°C, unless otherwise noted)

FIG.1:V- I curve characteristics (Uni-directional)

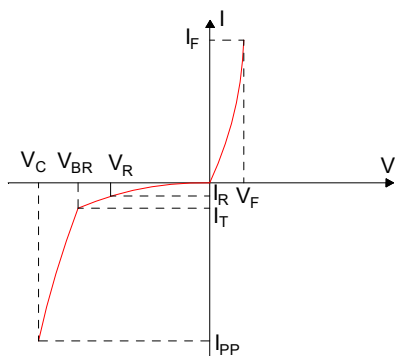


FIG.2:V- I curve characteristics (Bi-directional)

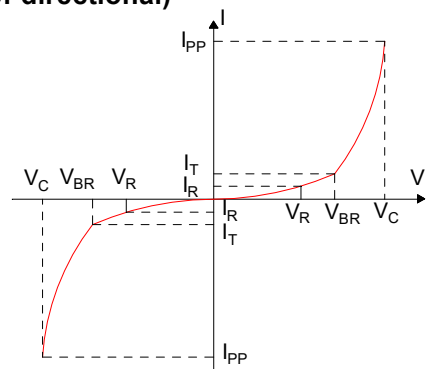


FIG.3: Pulse waveform

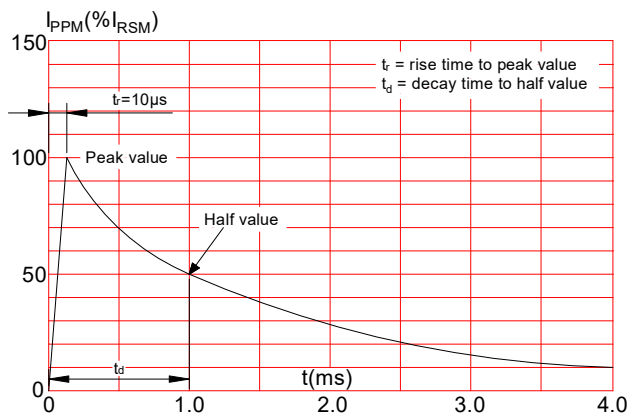


FIG.4: Pulse derating curve

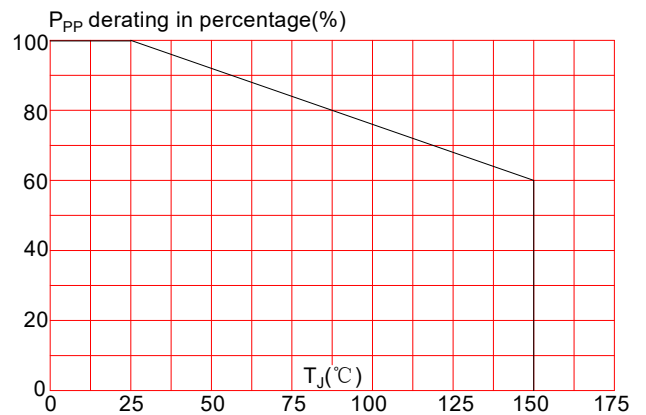


FIG.5: Typical junction capacitance

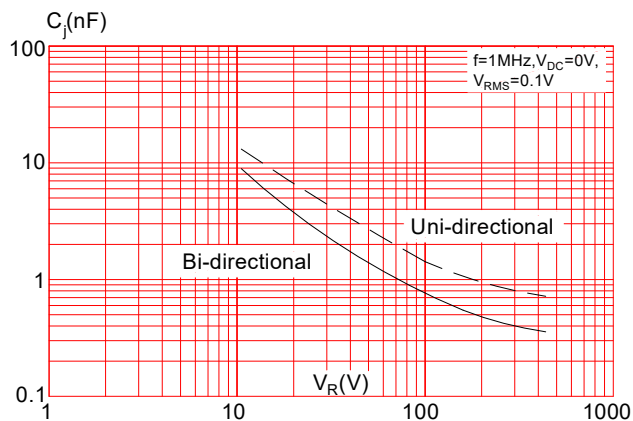
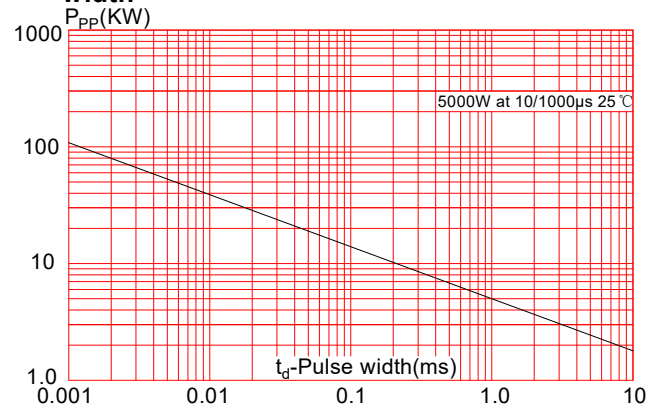
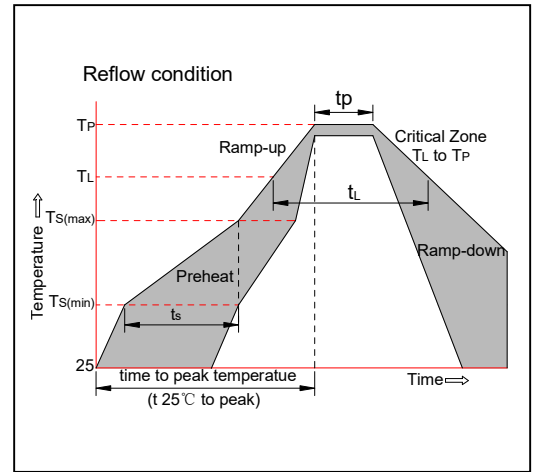


FIG.6:Peak pulse power dissipation vs. pulse width

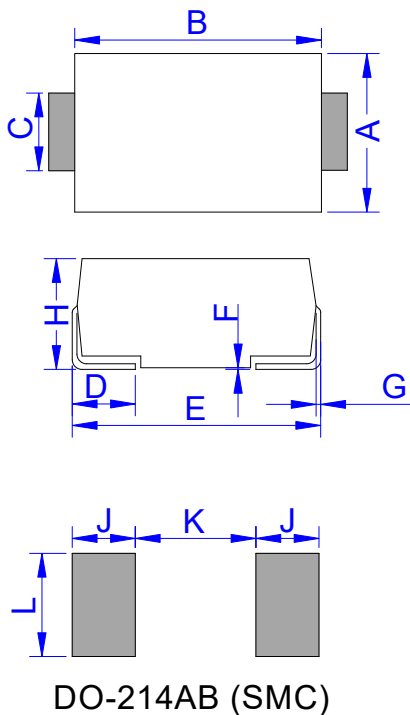


SOLDERING PARAMETERS

| | | |
|--|-----------------------------------|---|
| Reflow Condition | | Pb-Free assembly (see figure at right) |
| Pre Heat | -Temperature Min ($T_{s(min)}$) | +150°C |
| | -Temperature Max($T_{s(max)}$) | +200°C |
| | -Time (Min to Max) (t_s) | 60-180 secs. |
| Average ramp up rate (Liquidus Temp (T_L) to peak) | | 3°C/sec. Max |
| $T_{s(max)}$ to T_L - Ramp-up Rate | | 3°C/sec. Max |
| Reflow | -Temperature(T_L)(Liquidus) | +217°C |
| | -Temperature(t_L) | 60-150 secs. |
| Peak Temp (T_p) | | +260(+0/-5)°C |
| Time within 5°C of actual Peak Temp (t_p) | | 20-40secs. |
| Ramp-down Rate | | 6°C/sec. Max |
| Time 25°C to Peak Temp (T_p) | | 8 min. Max |
| Do not exceed | | +260°C |

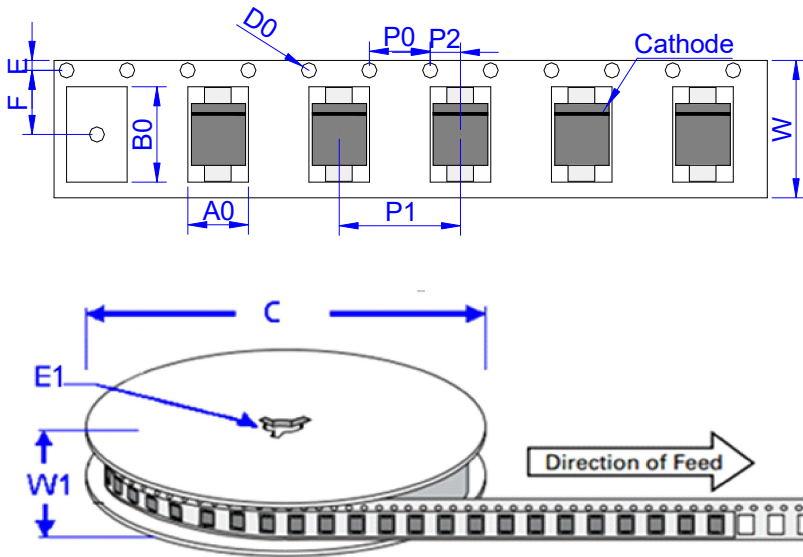


PACKAGE MECHANICAL DATA



| Ref. | Dimensions | | | |
|------|-------------|-------|--------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 5.75 | 6.25 | 0.226 | 0.246 |
| B | 6.90 | 7.40 | 0.272 | 0.291 |
| C | 2.75 | 3.25 | 0.108 | 0.128 |
| D | 0.95 | 1.52 | 0.037 | 0.060 |
| E | 7.70 | 8.20 | 0.303 | 0.323 |
| F | 0.051 | 0.203 | 0.002 | 0.008 |
| G | 0.15 | 0.31 | 0.006 | 0.012 |
| H | 2.15 | 2.62 | 0.085 | 0.103 |
| J | 2.40 | | 0.094 | |
| K | | 4.20 | | 0.165 |
| L | 3.30 | | 0.130 | |

TAPE AND REEL SPECIFICATION-SMC



| Ref. | Dimensions | |
|------|-------------|----------------|
| | Millimeters | Inches |
| A0 | 6.05 ± 0.3 | 0.238 ± 0.012 |
| B0 | 8.31 ± 0.3 | 0.327 ± 0.012 |
| C | 330.0 | 13.0 |
| D0 | 1.55 ± 0.1 | 0.061 ± 0.004 |
| E | 1.75 ± 0.2 | 0.069 ± 0.008 |
| E1 | 13.3 ± 0.3 | 0.524 ± 0.012 |
| F | 7.50 ± 0.2 | 0.295 ± 0.008 |
| P0 | 4.00 ± 0.2 | 0.157 ± 0.008 |
| P1 | 8.00 ± 0.2 | 0.3145 ± 0.008 |
| P2 | 2.00 ± 0.2 | 0.079 ± 0.008 |
| W | 16.0 ± 0.2 | 0.630 ± 0.008 |
| W1 | 19.7 ± 2.0 | 0.776 ± 0.079 |

| PART No. | UNIT WEIGHT (g/PCS) TYP | REEL (PCS) | PER CARTON (PCS) | DESCRIPTION |
|---------------|-------------------------|------------|------------------|-------------------|
| 5.0SMDJxxCA/A | 0.294/0.342 (NOTE) | 3,000 | 48,000 | 13 inch reel pack |

Notes: 0.342g/PCS for single die; 0.294g/PCS for stacked dies


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[P6KE13CA](#) [P6KE43CA](#) [P6KE6.8CA](#) [P6KE8.2](#) [P6SMBJ20CA](#) [JANTX1N6072A](#) [SR2835ESKG](#) [SA90CA](#)