



## SMDJ Series 3000W Transient Voltage Suppressor

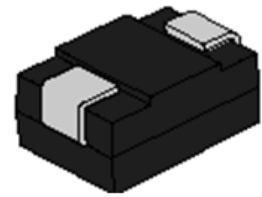
Rev.3.4

### 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.
- ✧ 3000W peak pulse power capability at 10/1000μs waveform.
- ✧ Typical  $I_R$  less than 1μA above 14V.
- ✧ Fast response time: typically less than 1.0ps from 0V to  $V_{BR}$  min.
- ✧ High temperature to reflow soldering: 260°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°C.
- ✧ Terminal: solder plated, solderable per J-STD-002.
- ✧ For surface mounted applications in order to optimize board space.
- ✧ UL 497B item recognized. (File No.:E480698).
- ✧ IEC61000-4-2 (ESD) ±30kV (air), ±30kV (contact).



SMC



Bi-directional



Uni-directional

Symbol

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

| Parameter   | Symbol          | Value       | Unit |
|---|-----------------|-------------|------|
| Storage and operating junction temperature range                      | $T_{STG}/T_J$   | -55 to +150 | °C   |
| Peak pulse power dissipation at 10/1000μs waveform                    | $P_{PP}$        | 3000        | W    |
| Steady state power dissipation at $T_L=75^\circ\text{C}$              | $P_{M(AV)}$     | 6.5         | 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          | °C/W |
| Typical thermal resistance junction to ambient                        | $R_{\theta JA}$ | 75          | °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



IDE: Device Marking Code  
1409: In ninth week, 2014

ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C)

| Part Number |           | Marking |     | V <sub>R</sub> | I <sub>R@V<sub>R</sub></sub> | V <sub>BR@I<sub>T</sub></sub> |        | I <sub>T</sub> | V <sub>C@I<sub>PP</sub></sub> | I <sub>PP</sub> <sup>①</sup> |
|-------------|-----------|---------|-----|----------------|------------------------------|-------------------------------|--------|----------------|-------------------------------|------------------------------|
| Uni-Polar   | Bi-Polar  | Uni     | Bi  | V              | max(μA)                      | min(V)                        | max(V) | mA             | max(V)                        | A                            |
| SMDJ5.0A    | SMDJ5.0CA | HDE     | IDE | 5.0            | 800                          | 6.40                          | 7.00   | 10             | 9.2                           | 326.1                        |
| SMDJ6.0A    | SMDJ6.0CA | HDG     | IDG | 6.0            | 800                          | 6.67                          | 7.37   | 10             | 10.3                          | 291.3                        |
| SMDJ6.5A    | SMDJ6.5CA | HDK     | IDK | 6.5            | 500                          | 7.22                          | 7.98   | 10             | 11.2                          | 267.9                        |
| SMDJ7.0A    | SMDJ7.0CA | HDM     | IDM | 7.0            | 200                          | 7.78                          | 8.60   | 10             | 12.0                          | 250.0                        |
| SMDJ7.5A    | SMDJ7.5CA | HDP     | IDP | 7.5            | 100                          | 8.33                          | 9.21   | 1              | 12.9                          | 232.6                        |
| SMDJ8.0A    | SMDJ8.0CA | HDR     | IDR | 8.0            | 50                           | 8.89                          | 9.83   | 1              | 13.6                          | 220.6                        |
| SMDJ8.5A    | SMDJ8.5CA | HDT     | IDT | 8.5            | 20                           | 9.44                          | 10.40  | 1              | 14.4                          | 208.3                        |
| SMDJ9.0A    | SMDJ9.0CA | HDV     | IDV | 9.0            | 10                           | 10.00                         | 11.10  | 1              | 15.4                          | 194.8                        |
| SMDJ10A     | SMDJ10CA  | HDX     | IDX | 10             | 5                            | 11.10                         | 12.30  | 1              | 17.0                          | 176.5                        |
| SMDJ11A     | SMDJ11CA  | HDZ     | IDZ | 11             | 2                            | 12.20                         | 13.50  | 1              | 18.2                          | 164.8                        |
| SMDJ12A     | SMDJ12CA  | HEE     | IEE | 12             | 2                            | 13.30                         | 14.70  | 1              | 19.9                          | 150.8                        |
| SMDJ13A     | SMDJ13CA  | HEG     | IEG | 13             | 2                            | 14.40                         | 15.90  | 1              | 21.5                          | 139.5                        |
| SMDJ14A     | SMDJ14CA  | HEK     | IEK | 14             | 2                            | 15.60                         | 17.20  | 1              | 23.2                          | 129.3                        |
| SMDJ15A     | SMDJ15CA  | HEM     | IEM | 15             | 1                            | 16.70                         | 18.50  | 1              | 24.4                          | 123.0                        |
| SMDJ16A     | SMDJ16CA  | HEP     | IEP | 16             | 1                            | 17.80                         | 19.70  | 1              | 26.0                          | 115.4                        |
| SMDJ17A     | SMDJ17CA  | HER     | IER | 17             | 1                            | 18.90                         | 20.90  | 1              | 27.6                          | 108.7                        |
| SMDJ18A     | SMDJ18CA  | HET     | IET | 18             | 1                            | 20.00                         | 22.10  | 1              | 29.2                          | 102.7                        |
| SMDJ20A     | SMDJ20CA  | HEV     | IEV | 20             | 1                            | 22.20                         | 24.50  | 1              | 32.4                          | 92.6                         |
| SMDJ22A     | SMDJ22CA  | HEX     | IEX | 22             | 1                            | 24.40                         | 26.90  | 1              | 35.5                          | 84.5                         |
| SMDJ24A     | SMDJ24CA  | HEZ     | IEZ | 24             | 1                            | 26.70                         | 29.50  | 1              | 38.9                          | 77.1                         |
| SMDJ26A     | SMDJ26CA  | HFE     | IFE | 26             | 1                            | 28.90                         | 31.90  | 1              | 42.1                          | 71.3                         |
| SMDJ28A     | SMDJ28CA  | HFG     | IFG | 28             | 1                            | 31.10                         | 34.40  | 1              | 45.4                          | 66.1                         |
| SMDJ30A     | SMDJ30CA  | HFK     | IFK | 30             | 1                            | 33.30                         | 36.80  | 1              | 48.4                          | 62.0                         |
| SMDJ33A     | SMDJ33CA  | HFM     | IFM | 33             | 1                            | 36.70                         | 40.60  | 1              | 53.3                          | 56.3                         |

ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C, continued)

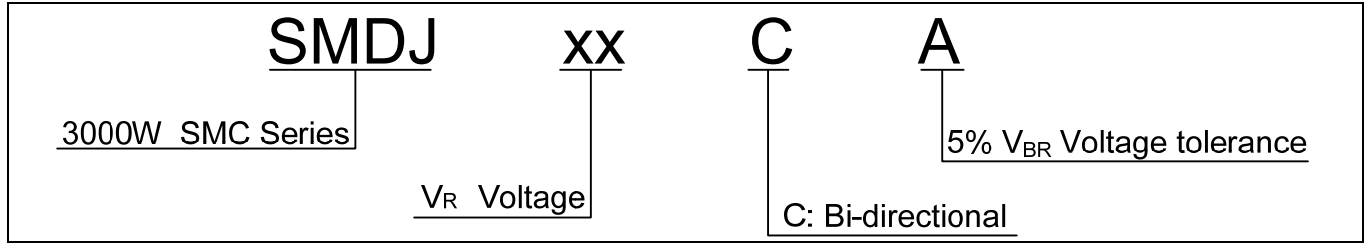
| Part Number |           | Marking |     | V <sub>R</sub> | I <sub>R</sub> @V <sub>R</sub> | V <sub>BR</sub> @I <sub>T</sub> |        | I <sub>T</sub> | V <sub>C</sub> @I <sub>PP</sub> | I <sub>PP</sub> <sup>①</sup> |
|-------------|-----------|---------|-----|----------------|--------------------------------|---------------------------------|--------|----------------|---------------------------------|------------------------------|
| Uni-Polar   | Bi-Polar  | Uni     | Bi  | V              | max(μA)                        | min(V)                          | max(V) | mA             | max(V)                          | A                            |
| SMDJ36A     | SMDJ36CA  | HFP     | IFP | 36             | 1                              | 40.00                           | 44.20  | 1              | 58.1                            | 51.6                         |
| SMDJ40A     | SMDJ40CA  | HFR     | IFR | 40             | 1                              | 44.40                           | 49.10  | 1              | 64.5                            | 46.5                         |
| SMDJ43A     | SMDJ43CA  | HFT     | IFT | 43             | 1                              | 47.80                           | 52.80  | 1              | 69.4                            | 43.2                         |
| SMDJ45A     | SMDJ45CA  | HFV     | IFV | 45             | 1                              | 50.00                           | 55.30  | 1              | 72.7                            | 41.3                         |
| SMDJ48A     | SMDJ48CA  | HFX     | IFX | 48             | 1                              | 53.30                           | 58.90  | 1              | 77.4                            | 38.8                         |
| SMDJ51A     | SMDJ51CA  | HFZ     | IFZ | 51             | 1                              | 56.70                           | 62.70  | 1              | 82.4                            | 36.4                         |
| SMDJ54A     | SMDJ54CA  | HGE     | IGE | 54             | 1                              | 60.00                           | 66.30  | 1              | 87.1                            | 34.4                         |
| SMDJ58A     | SMDJ58CA  | HGG     | IGG | 58             | 1                              | 64.40                           | 71.20  | 1              | 93.6                            | 32.1                         |
| SMDJ60A     | SMDJ60CA  | HGK     | IGK | 60             | 1                              | 66.70                           | 73.70  | 1              | 96.8                            | 31.0                         |
| SMDJ64A     | SMDJ64CA  | HGM     | IGM | 64             | 1                              | 71.10                           | 78.60  | 1              | 103.0                           | 29.1                         |
| SMDJ70A     | SMDJ70CA  | HGP     | IGP | 70             | 1                              | 77.80                           | 86.00  | 1              | 113.0                           | 26.5                         |
| SMDJ75A     | SMDJ75CA  | HGR     | IGR | 75             | 1                              | 83.30                           | 92.10  | 1              | 121.0                           | 24.8                         |
| SMDJ78A     | SMDJ78CA  | HGT     | IGT | 78             | 1                              | 86.70                           | 95.80  | 1              | 126.0                           | 23.8                         |
| SMDJ85A     | SMDJ85CA  | HGV     | IGV | 85             | 1                              | 94.40                           | 104.0  | 1              | 137.0                           | 21.9                         |
| SMDJ90A     | SMDJ90CA  | HGX     | IGX | 90             | 1                              | 100.0                           | 111.0  | 1              | 146.0                           | 20.5                         |
| SMDJ100A    | SMDJ100CA | HGZ     | IGZ | 100            | 1                              | 111.0                           | 123.0  | 1              | 162.0                           | 18.5                         |
| SMDJ110A    | SMDJ110CA | HHE     | IHE | 110            | 1                              | 122.0                           | 135.0  | 1              | 177.0                           | 16.9                         |
| SMDJ120A    | SMDJ120CA | HHG     | IHG | 120            | 1                              | 133.0                           | 147.0  | 1              | 193.0                           | 15.5                         |
| SMDJ130A    | SMDJ130CA | HHK     | IHK | 130            | 1                              | 144.0                           | 159.0  | 1              | 209.0                           | 14.4                         |
| SMDJ150A    | SMDJ150CA | HHM     | IHM | 150            | 1                              | 167.0                           | 185.0  | 1              | 243.0                           | 12.3                         |
| SMDJ160A    | SMDJ160CA | HHP     | IHP | 160            | 1                              | 178.0                           | 197.0  | 1              | 259.0                           | 11.6                         |
| SMDJ170A    | SMDJ170CA | HHR     | IHR | 170            | 1                              | 189.0                           | 209.0  | 1              | 275.0                           | 10.9                         |
| SMDJ180A    | SMDJ180CA | HHT     | IHT | 180            | 1                              | 201.0                           | 222.0  | 1              | 292.0                           | 10.3                         |
| SMDJ190A    | SMDJ190CA | HHV     | IHV | 190            | 1                              | 211.0                           | 234.0  | 1              | 307.0                           | 9.7                          |
| SMDJ200A    | SMDJ200CA | HHX     | IHX | 200            | 1                              | 224.0                           | 247.0  | 1              | 324.0                           | 9.3                          |
| SMDJ210A    | SMDJ210CA | HHZ     | IHZ | 210            | 1                              | 233.0                           | 258.0  | 1              | 337.0                           | 8.8                          |
| SMDJ220A    | SMDJ220CA | HIE     | IIE | 220            | 1                              | 244.0                           | 270.0  | 1              | 356.0                           | 8.4                          |

① Surge waveform: 10/1000μs

V<sub>R</sub>: Stand-off voltage -- Maximum voltage that can be appliedV<sub>BR</sub>: Breakdown voltageV<sub>C</sub>: Clamping voltage -- Peak voltage measured across the suppressor at a specified I<sub>PP</sub>

$I_R$ : Reverse leakage current

ORDERING INFORMATION



RATINGS AND V-I CHARACTERISTICS CURVES ( $T_A=25^\circ C$ , unless otherwise noted)

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

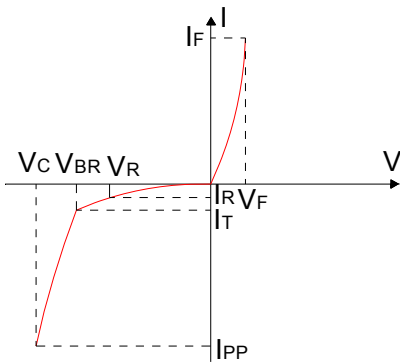


FIG.2: V- I curve characteristics (Bi-directional)

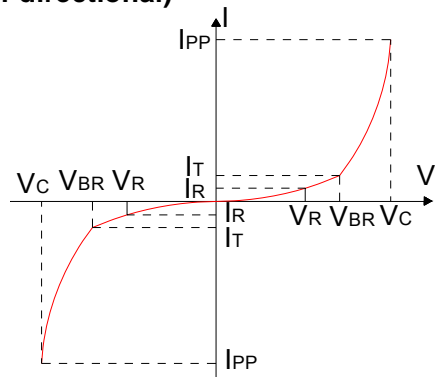


FIG.3: Pulse waveform

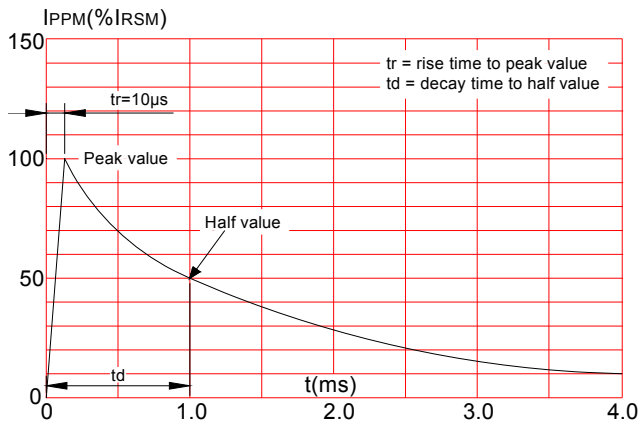


FIG.4: Pulse derating curve

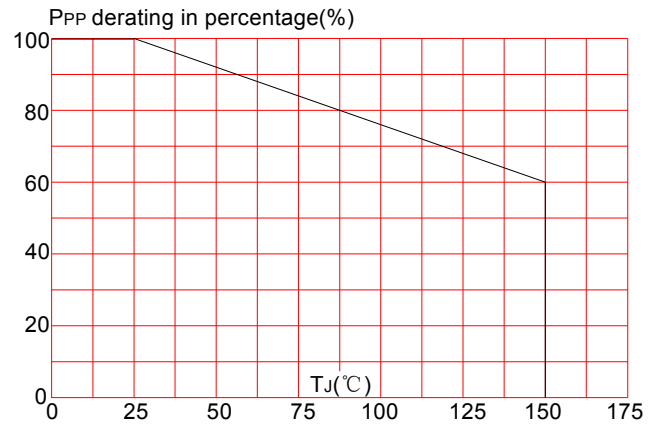
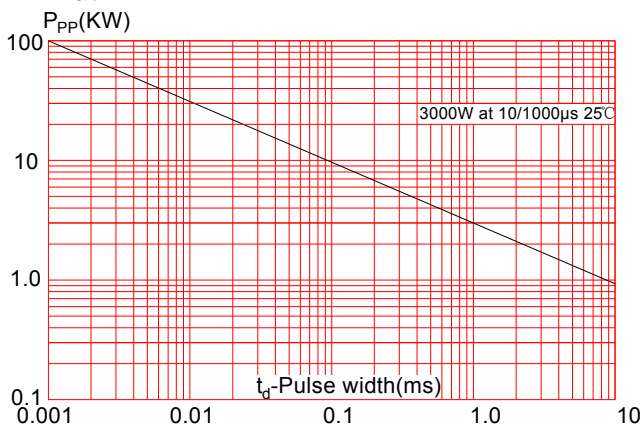
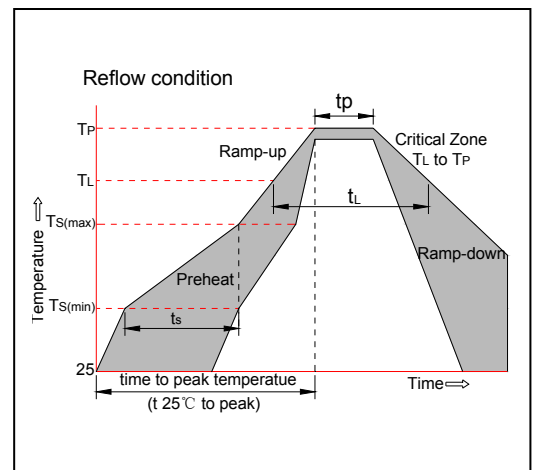


FIG.5: Peak pulse power dissipation vs. pulse width

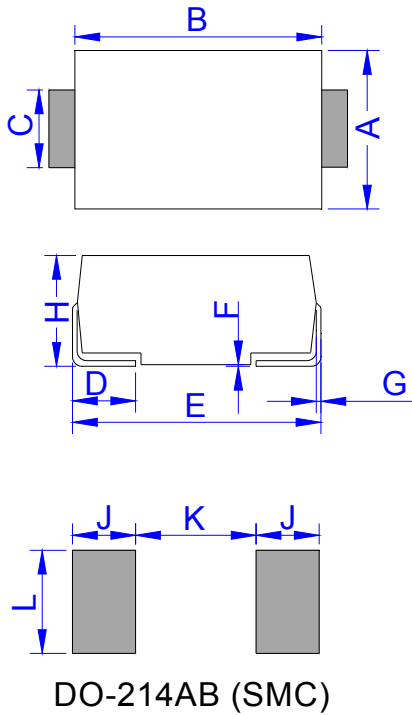


SOLDERING PARAMETERS

|  |                                   |   |
|--|-----------------------------------|---|
| Reflow Condition                                       |                                   | Pb-Free assembly<br>(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                                    |

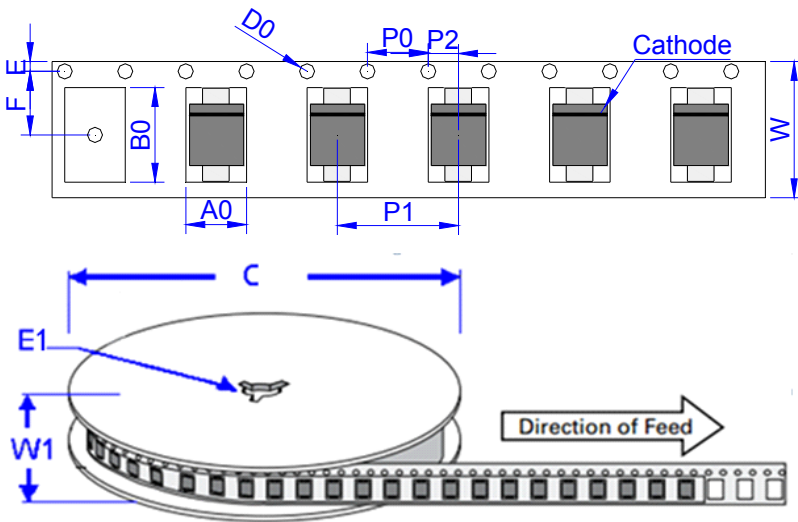


PACKAGE MECHANICAL DATA



| 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       |
|------------|--------------------------|------------|------------------|-------------------|
| SMDJxxA/CA | 0.262                    | 3,000      | 48,000           | 13 inch reel pack |

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