

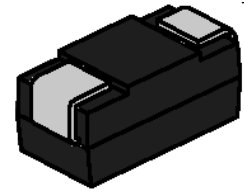


## SMCJ Series 1500W Transient Voltage Suppressor

Rev.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.



SMC



Bi-directional



Uni-direction

Symbol

### FEATURES:

- ✧ Low profile package.
- ✧ Low inductance.
- ✧ Excellent clamping capability.
- ✧ 1500W peak pulse power capability at 10×1000μs waveform.
- ✧ Typical I<sub>R</sub> less than 1μA above 12V.
- ✧ Fast response time: typically less than 1.0ps from 0V to V<sub>BR</sub> min.
- ✧ High temperature to reflow soldering: 260°C/40s at terminals.
- ✧ Plastic package has underwriters laboratory flammability 94V-0.
- ✧ Meets MSL level 1, per J-STD020, LF maximum peak of 260°C.
- ✧ For surface mounted applications in order to optimize board space.

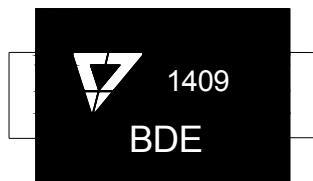
### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub>=25°C, RH=45%-75%, unless otherwise noted)

| Parameter  | Symbol                            | Value       | Unit |
|--|-----------------------------------|-------------|------|
| Operating junction and storage temperature range                 | T <sub>J</sub> / T <sub>STG</sub> | -55 to +150 | °C   |
| Steady state power dissipation at T <sub>L</sub> =75°C           | P <sub>M(AV)</sub>                | 6.5         | W    |
| Peak pulse power dissipation on 10/1000μs waveform               | P <sub>PP</sub>                   | 1500        | W    |
| Maximum instantaneous forward voltage at 100A for unidirectional | V <sub>F</sub>                    | 5.0         | V    |
| Peak forward surge current, 8.3ms single half sine wave (Note 1) | I <sub>FSM</sub>                  | 200         | A    |
| Typical thermal resistance junction to lead                      | R <sub>θJL</sub>                  | 15          | °C/W |
| Typical thermal resistance junction to ambient                   | R <sub>θJA</sub>                  | 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



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

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

| Part Number |           | Marking |     | $V_R$ | $I_R@V_R$     | $V_{BR}@I_T$ |        | $I_T$ | $V_C@I_{PP}$ | $I_{PP}^{\text{①}}$ |
|-------------|-----------|---------|-----|-------|---------------|--------------|--------|-------|--------------|---------------------|
| Uni-Polar   | Bi-Polar  | Uni     | Bi  | V     | $\mu\text{A}$ | min(V)       | max(V) | mA    | max(V)       | A                   |
| SMCJ5.0A    | SMCJ5.0CA | GDE     | BDE | 5.0   | 300           | 6.40         | 7.00   | 10    | 9.2          | 163.0               |
| SMCJ6.0A    | SMCJ6.0CA | GDG     | BDG | 6.0   | 250           | 6.67         | 7.37   | 10    | 10.3         | 145.6               |
| SMCJ6.5A    | SMCJ6.5CA | GDK     | BDK | 6.5   | 150           | 7.22         | 7.98   | 10    | 11.2         | 134.0               |
| SMCJ7.0A    | SMCJ7.0CA | GDM     | BDM | 7.0   | 100           | 7.78         | 8.60   | 10    | 12.0         | 125.0               |
| SMCJ7.5A    | SMCJ7.5CA | GDP     | BDP | 7.5   | 50            | 8.33         | 9.21   | 1     | 12.9         | 116.3               |
| SMCJ8.0A    | SMCJ8.0CA | GDR     | BDR | 8.0   | 30            | 8.89         | 9.83   | 1     | 13.6         | 110.3               |
| SMCJ8.5A    | SMCJ8.5CA | GDT     | BDT | 8.5   | 20            | 9.44         | 10.40  | 1     | 14.4         | 104.2               |
| SMCJ9.0A    | SMCJ9.0CA | GDV     | BDV | 9.0   | 10            | 10.00        | 11.10  | 1     | 15.4         | 97.4                |
| SMCJ10A     | SMCJ10CA  | GDX     | BDX | 10    | 5             | 11.10        | 12.30  | 1     | 17.0         | 88.2                |
| SMCJ11A     | SMCJ11CA  | GDZ     | BDZ | 11    | 2             | 12.20        | 13.50  | 1     | 18.2         | 82.4                |
| SMCJ12A     | SMCJ12CA  | GEE     | BEE | 12    | 1             | 13.30        | 14.70  | 1     | 19.9         | 75.4                |
| SMCJ13A     | SMCJ13CA  | GEG     | BEG | 13    | 1             | 14.40        | 15.90  | 1     | 21.5         | 69.8                |
| SMCJ14A     | SMCJ14CA  | GEK     | BEK | 14    | 1             | 15.60        | 17.20  | 1     | 23.2         | 64.7                |
| SMCJ15A     | SMCJ15CA  | GEM     | BEM | 15    | 1             | 16.70        | 18.50  | 1     | 24.4         | 61.5                |
| SMCJ16A     | SMCJ16CA  | GEP     | BEP | 16    | 1             | 17.80        | 19.70  | 1     | 26.0         | 57.7                |
| SMCJ17A     | SMCJ17CA  | GER     | BER | 17    | 1             | 18.90        | 20.90  | 1     | 27.6         | 54.4                |
| SMCJ18A     | SMCJ18CA  | GET     | BET | 18    | 1             | 20.00        | 22.10  | 1     | 29.2         | 51.4                |
| SMCJ20A     | SMCJ20CA  | GEV     | BEV | 20    | 1             | 22.20        | 24.50  | 1     | 32.4         | 46.3                |
| SMCJ22A     | SMCJ22CA  | GEX     | BEX | 22    | 1             | 24.40        | 26.90  | 1     | 35.5         | 42.3                |
| SMCJ24A     | SMCJ24CA  | GEZ     | BEZ | 24    | 1             | 26.70        | 29.50  | 1     | 38.9         | 38.6                |
| SMCJ26A     | SMCJ26CA  | GFE     | BFE | 26    | 1             | 28.90        | 31.90  | 1     | 42.1         | 35.6                |
| SMCJ28A     | SMCJ28CA  | GFG     | BFG | 28    | 1             | 31.10        | 34.40  | 1     | 45.4         | 33.1                |
| SMCJ30A     | SMCJ30CA  | GFK     | BFK | 30    | 1             | 33.30        | 36.80  | 1     | 48.4         | 31.0                |

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

| Part Number |           | Marking |     | $V_R$ | $I_R@V_R$     | $V_{BR}@I_T$ |        | $I_T$ | $V_C@I_{PP}$ | $I_{PP}^{\text{①}}$ |
|-------------|-----------|---------|-----|-------|---------------|--------------|--------|-------|--------------|---------------------|
| Uni-Polar   | Bi-Polar  | Uni     | Bi  | V     | $\mu\text{A}$ | min(V)       | max(V) | mA    | max(V)       | A                   |
| SMCJ33A     | SMCJ33CA  | GFM     | BFM | 33    | 1             | 36.70        | 40.60  | 1     | 53.3         | 28.2                |
| SMCJ36A     | SMCJ36CA  | GFP     | BFP | 36    | 1             | 40.00        | 44.20  | 1     | 58.1         | 25.8                |
| SMCJ40A     | SMCJ40CA  | GFR     | BFR | 40    | 1             | 44.40        | 49.10  | 1     | 64.5         | 23.3                |
| SMCJ43A     | SMCJ43CA  | GFT     | BFT | 43    | 1             | 47.80        | 52.80  | 1     | 69.4         | 21.6                |
| SMCJ45A     | SMCJ45CA  | GFV     | BFV | 45    | 1             | 50.00        | 55.30  | 1     | 72.7         | 20.6                |
| SMCJ48A     | SMCJ48CA  | GFX     | BFX | 48    | 1             | 53.30        | 58.90  | 1     | 77.4         | 19.4                |
| SMCJ51A     | SMCJ51CA  | GFZ     | BFZ | 51    | 1             | 56.70        | 62.70  | 1     | 82.4         | 18.2                |
| SMCJ54A     | SMCJ54CA  | GGE     | BGE | 54    | 1             | 60.00        | 66.30  | 1     | 87.1         | 17.2                |
| SMCJ58A     | SMCJ58CA  | GGG     | BGG | 58    | 1             | 64.40        | 71.20  | 1     | 93.6         | 16.1                |
| SMCJ60A     | SMCJ60CA  | GGK     | BGK | 60    | 1             | 66.70        | 73.70  | 1     | 96.8         | 15.5                |
| SMCJ64A     | SMCJ64CA  | GGM     | BGM | 64    | 1             | 71.10        | 78.60  | 1     | 103.0        | 14.6                |
| SMCJ70A     | SMCJ70CA  | GGP     | BGP | 70    | 1             | 77.80        | 86.00  | 1     | 113.0        | 13.3                |
| SMCJ75A     | SMCJ75CA  | GGR     | BGR | 75    | 1             | 83.30        | 92.10  | 1     | 121.0        | 12.4                |
| SMCJ78A     | SMCJ78CA  | GGT     | BGT | 78    | 1             | 86.70        | 95.80  | 1     | 126.0        | 11.9                |
| SMCJ85A     | SMCJ85CA  | GGV     | BGV | 85    | 1             | 94.40        | 104.0  | 1     | 137.0        | 11.0                |
| SMCJ90A     | SMCJ90CA  | GGX     | BGX | 90    | 1             | 100.0        | 111.0  | 1     | 146.0        | 10.3                |
| SMCJ100A    | SMCJ100CA | GGZ     | BGZ | 100   | 1             | 111.0        | 123.0  | 1     | 162.0        | 9.3                 |
| SMCJ110A    | SMCJ110CA | GHE     | BHE | 110   | 1             | 122.0        | 135.0  | 1     | 177.0        | 8.5                 |
| SMCJ120A    | SMCJ120CA | GHG     | BHG | 120   | 1             | 133.0        | 147.0  | 1     | 193.0        | 7.8                 |
| SMCJ130A    | SMCJ130CA | GHK     | BHK | 130   | 1             | 144.0        | 159.0  | 1     | 209.0        | 7.2                 |
| SMCJ150A    | SMCJ150CA | GHM     | BHM | 150   | 1             | 167.0        | 185.0  | 1     | 243.0        | 6.2                 |
| SMCJ160A    | SMCJ160CA | GHP     | BHP | 160   | 1             | 178.0        | 197.0  | 1     | 259.0        | 5.8                 |
| SMCJ170A    | SMCJ170CA | GHR     | BHR | 170   | 1             | 189.0        | 209.0  | 1     | 275.0        | 5.5                 |
| SMCJ180A    | SMCJ180CA | GHT     | BHT | 180   | 1             | 201.0        | 222.0  | 1     | 292.0        | 5.2                 |
| SMCJ190A    | SMCJ190CA | GHU     | BHU | 190   | 1             | 211.0        | 234.0  | 1     | 307.0        | 4.9                 |
| SMCJ200A    | SMCJ200CA | GHV     | BHV | 200   | 1             | 224.0        | 247.0  | 1     | 324.0        | 4.7                 |
| SMCJ210A    | SMCJ210CA | GHW     | BHW | 210   | 1             | 233.0        | 258.0  | 1     | 337.0        | 4.5                 |
| SMCJ220A    | SMCJ220CA | GHX     | BHX | 220   | 1             | 246.0        | 272.0  | 1     | 356.0        | 4.2                 |
| SMCJ250A    | SMCJ250CA | GJG     | BJG | 250   | 1             | 279.0        | 309.0  | 1     | 405.0        | 3.7                 |
| SMCJ300A    | SMCJ300CA | GJK     | BJK | 300   | 1             | 335.0        | 371.0  | 1     | 486.0        | 3.1                 |

## 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              | μA                             | min(V)                          | max(V) | mA             | max(V)                          | A                            |
| SMCJ350A    | SMCJ350CA | GJM     | BJM | 350            | 1                              | 391.0                           | 432.0  | 1              | 567.0                           | 2.7                          |
| SMCJ400A    | SMCJ400CA | GJP     | BJP | 400            | 1                              | 447.0                           | 494.0  | 1              | 648.0                           | 2.3                          |
| SMCJ440A    | SMCJ440CA | GJR     | BJR | 440            | 1                              | 492.0                           | 543.0  | 1              | 713.0                           | 2.1                          |

① Surge waveform: 10/1000μs

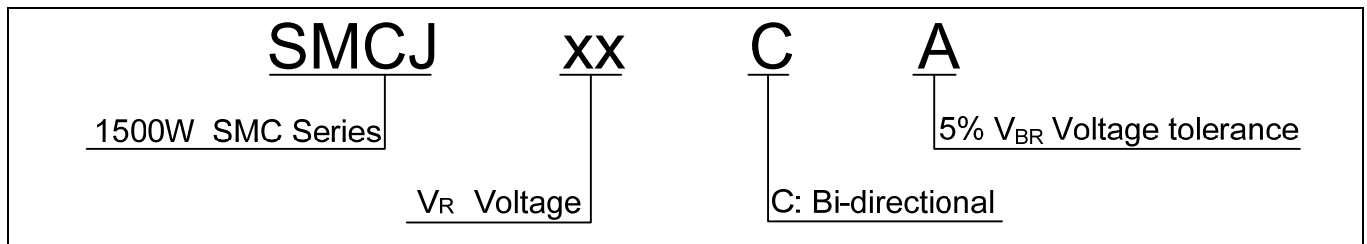
V<sub>R</sub>: Stand-off voltage -- maximum voltage that can be applied

V<sub>BR</sub>: Breakdown voltage

V<sub>C</sub>: Clamping voltage -- peak voltage measured across the suppressor at a specified I<sub>PP</sub>

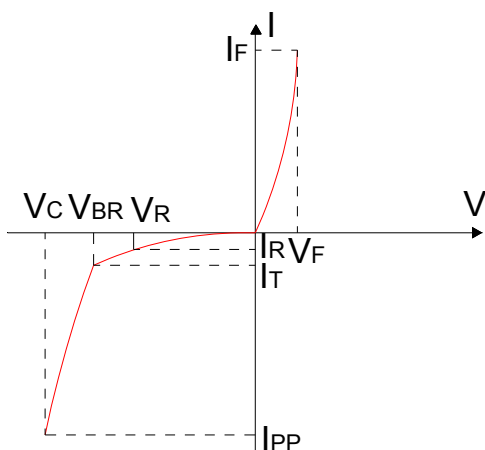
I<sub>R</sub>: Reverse leakage current

## ORDERING INFORMATION



## RATINGS AND V-I CHARACTERISTICS CURVES (T<sub>A</sub>=25°C, unless otherwise noted)

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



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

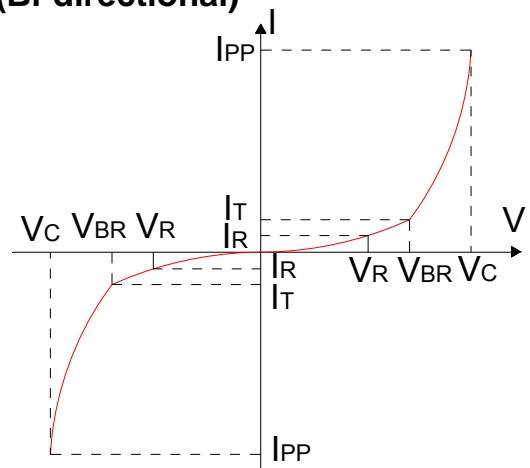


FIG.3: Pulse waveform

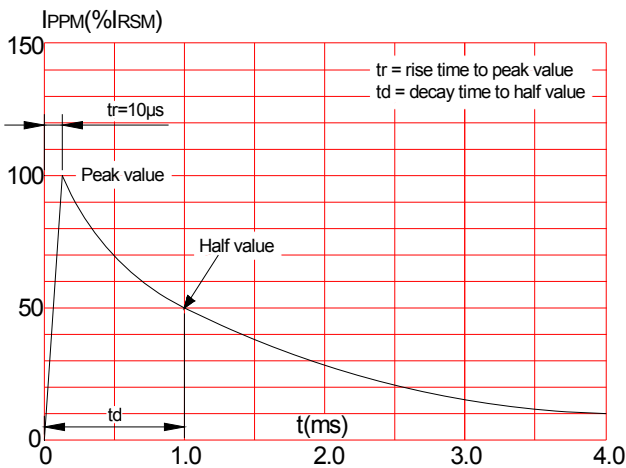
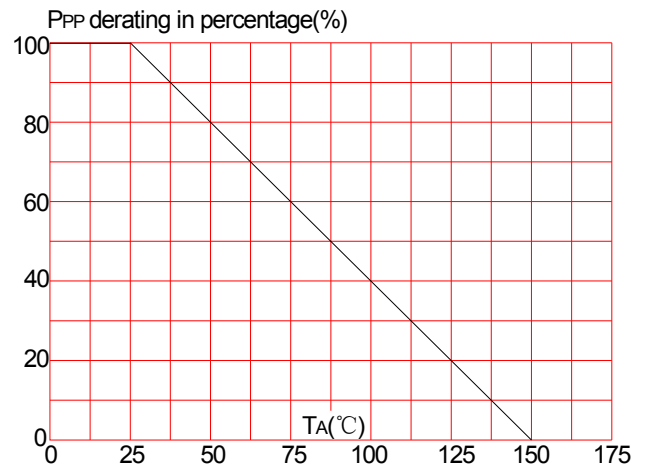
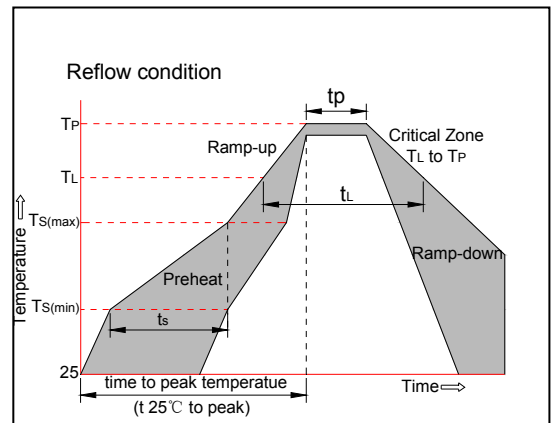


FIG.4: Pulse derating curve

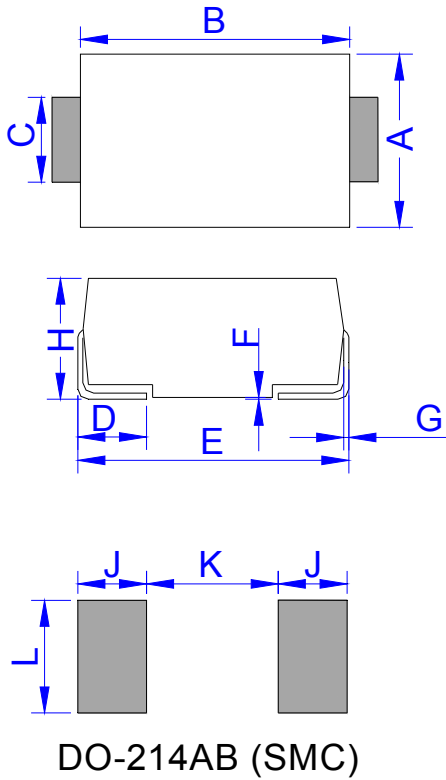


SOLDERING PARAMETERS

|  |                                   |   |
|--|-----------------------------------|---|
| 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) (ts)           | 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                                    |

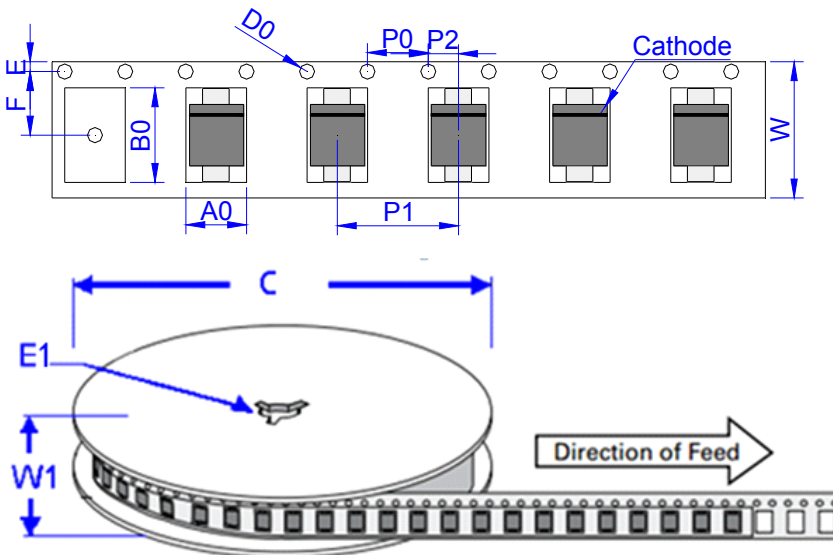


PACKAGE MECHANICAL DATA



| 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. | PACKAGE       | QUANTITY | TAPE & REEL |
|------------|--------------------------|---------------|----------|-------------|
| SMCJxxA/CA | 0.262                    | SMC(DO-214AB) | 3,000    | 13inch      |

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