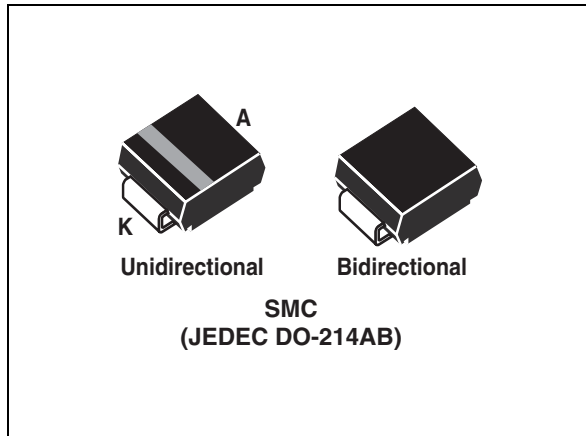




THE DATASHEET OF SMC30J24A





Description

The SMC30J Transil series has been designed to protect sensitive equipment against surges below 3000 W (10/1000 μ s) and against electro-static discharges according to IEC 61000-4-2, and MIL STD 883, method 3015.

The Planar technology makes it compatible with high-end equipment and SMPS where low leakage current and high junction temperature are required to provide reliability and stability over time. SMC30J are packaged in SMC (SMC footprint in accordance with IPC 7531 standard).

Features

- Peak pulse power:
 - 3000 W (10/1000 μ s)
- Stand off voltage range: from 5 V to 48 V
- Unidirectional and bidirectional types
- Low leakage current: 0.2 μ A
- Operating $T_{j\max}$: 175 °C
- JEDEC registered package outline

Complies with the following standards

- IEC 61000-4-2 exceeds level 4
 - 30 kV (air discharge)
 - 30 kV (contact discharge)
- **MIL STD 883G, method 3015-7 Class 3B**
 - 25 kV HBM (human body model)
- Resin meets UL 94, V0
- MIL-STD-750, method 2026 solderability
- EIA STD RS-481 and IEC 60286-3 packing
- IPC 7531 footprint

TM: Transil is a trademark of STMicroelectronics

1 Characteristics

Table 1. Absolute maximum ratings ($T_{amb} = 25\text{ }^{\circ}\text{C}$)

| Symbol | Parameter | Value | Unit |
|-----------|---|-----------------------------------|--------------------|
| P_{PP} | Peak pulse power dissipation | T_j initial = T_{amb} 3000 | W |
| T_{stg} | Storage temperature range | -65 to +175 | $^{\circ}\text{C}$ |
| T_j | Operating junction temperature range | -55 to +175 | $^{\circ}\text{C}$ |
| T_L | Maximum lead temperature for soldering during 10 s. | 260 | $^{\circ}\text{C}$ |

Table 2. Thermal resistances

| Symbol | Parameter | Value | Unit |
|---------------|-------------------|-------|----------------------|
| $R_{th(j-l)}$ | Junction to leads | 15 | $^{\circ}\text{C/W}$ |

Figure 1. Electrical characteristics - definitions

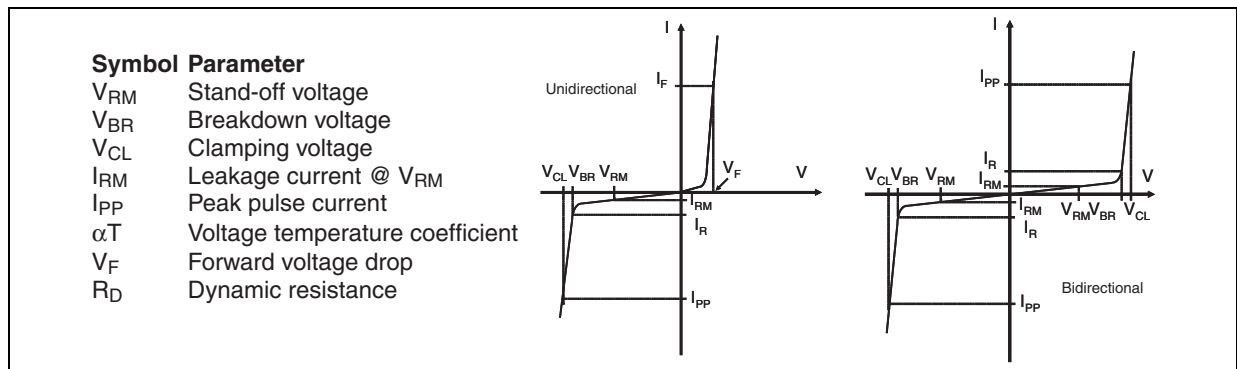


Figure 2. Pulse definition for electrical characteristics

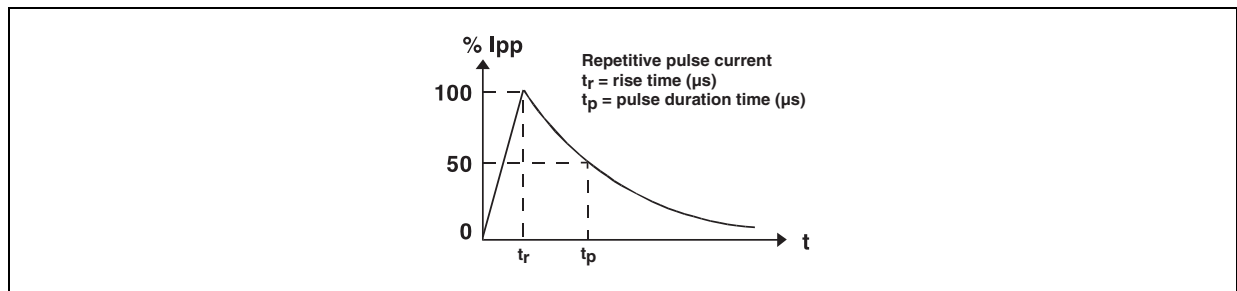


Table 3. Electrical characteristics - parameter values ($T_{amb} = 25\text{ }^{\circ}\text{C}$)

| Order code | $I_{RM\ max}@V_{RM}$ | | $V_{BR}\ @I_R^{(1)}$ | | | $V_{CL}\ @I_{PP}\ 10/1000\ \mu s$ | | $R_D^{(2)}\ 10/1000\ \mu s$ | $\alpha T^{(3)}$ |
|---------------|----------------------|-----|----------------------|------|----|-----------------------------------|------------------|-----------------------------|--------------------------|
| | | | min | typ | | max | | | |
| | μA | V | V | | mA | V | A ⁽⁴⁾ | Ω | 10-4/ $^{\circ}\text{C}$ |
| SMC30J5.0A/CA | 500 | 5 | 6.4 | 6.74 | 10 | 9.2 | 327 | 0.008 | 5.7 |
| SMC30J6.0A/CA | 500 | 6 | 6.7 | 7.05 | 10 | 10.3 | 291 | 0.011 | 5.9 |
| SMC30J6.5A/CA | 250 | 6.5 | 7.2 | 7.58 | 10 | 11.2 | 268 | 0.014 | 6.1 |
| SMC30J8.5A/CA | 10 | 8.5 | 9.4 | 9.9 | 1 | 14.4 | 208 | 0.022 | 7.3 |
| SMC30J10A/CA | 0.2 | 10 | 11.1 | 11.7 | 1 | 17 | 176 | 0.030 | 7.8 |
| SMC30J12A/CA | 0.2 | 12 | 13.3 | 14 | 1 | 19.9 | 151 | 0.039 | 8.3 |
| SMC30J13A/CA | 0.2 | 13 | 14.4 | 15.2 | 1 | 21.5 | 140 | 0.045 | 8.4 |
| SMC30J15A/CA | 0.2 | 15 | 16.7 | 17.6 | 1 | 24.4 | 123 | 0.055 | 8.8 |
| SMC30J16A/CA | 0.2 | 16 | 17.8 | 18.7 | 1 | 26 | 115 | 0.063 | 8.8 |
| SMC30J18A/CA | 0.2 | 18 | 20 | 21.1 | 1 | 29.2 | 103 | 0.079 | 9.2 |
| SMC30J20A/CA | 0.2 | 20 | 22.2 | 23.4 | 1 | 32.4 | 93 | 0.097 | 9.4 |
| SMC30J22A/CA | 0.2 | 22 | 24.4 | 25.7 | 1 | 35.5 | 85 | 0.115 | 9.6 |
| SMC30J24A/CA | 0.2 | 24 | 26.7 | 28.1 | 1 | 38.9 | 77 | 0.140 | 9.6 |
| SMC30J26A/CA | 0.2 | 26 | 28.9 | 30.4 | 1 | 42.1 | 71 | 0.165 | 9.7 |
| SMC30J28A/CA | 0.2 | 28 | 31.1 | 32.7 | 1 | 45.4 | 66 | 0.192 | 9.8 |
| SMC30J30A/CA | 0.2 | 30 | 33.3 | 35.1 | 1 | 48.4 | 62 | 0.215 | 9.9 |
| SMC30J33A/CA | 0.2 | 33 | 36.7 | 38.6 | 1 | 53.3 | 56 | 0.261 | 10.0 |
| SMC30J36A/CA | 0.2 | 36 | 40.0 | 42.1 | 1 | 58.1 | 48.41 | 0.331 | 10.0 |
| SMC30J40A/CA | 0.2 | 40 | 44.4 | 46.7 | 1 | 64.5 | 43.5 | 0.409 | 10.1 |
| SMC30J48A/CA | 0.2 | 48 | 53.2 | 56.0 | 1 | 76.6 | 38.0 | 0.542 | 10.3 |

1. Pulse test: $t_p < 50\text{ ms}$

2. To calculate maximum clamping voltage at other surge level, use the following formula: $V_{CLmax} = V_{CL} - R_D \times (I_{PP} - I_{PPappli})$
where $I_{PPappli}$ is the surge current in the application

3. To calculate V_{BR} or V_{CL} versus junction temperature, use the following formulas:

$$V_{BR} @ T_J = V_{BR} @ 25^{\circ}\text{C} \times (1 + \alpha T \times (T_J - 25))$$

$$V_{CL} @ T_J = V_{CL} @ 25^{\circ}\text{C} \times (1 + \alpha T \times (T_J - 25))$$

4. Surge capability given for both directions for unidirectional and bidirectional types.

Figure 3. Peak pulse power dissipation versus initial junction temperature

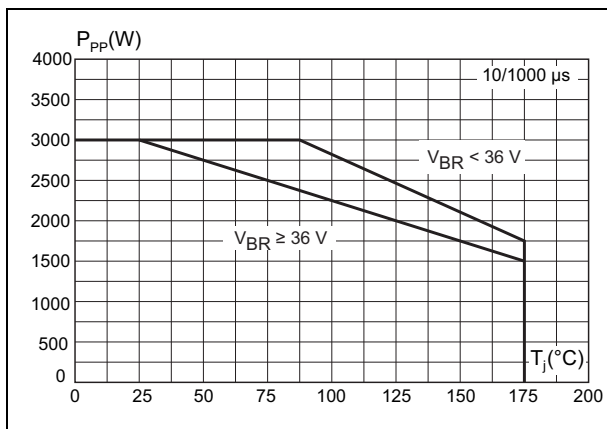


Figure 4. Peak pulse power versus exponential pulse duration (T_j initial = 25 °C)

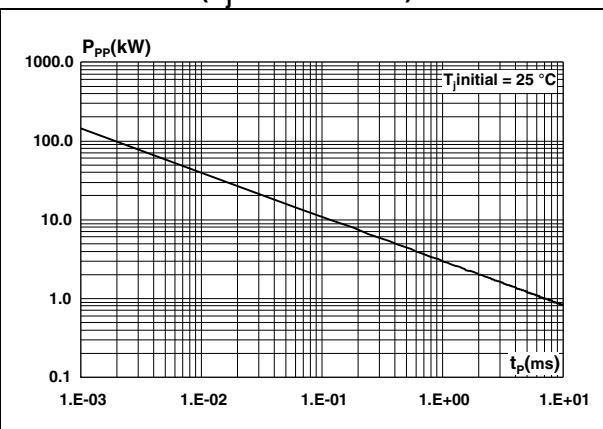


Figure 5. Clamping voltage versus peak pulse current (exponential waveform, maximum values)

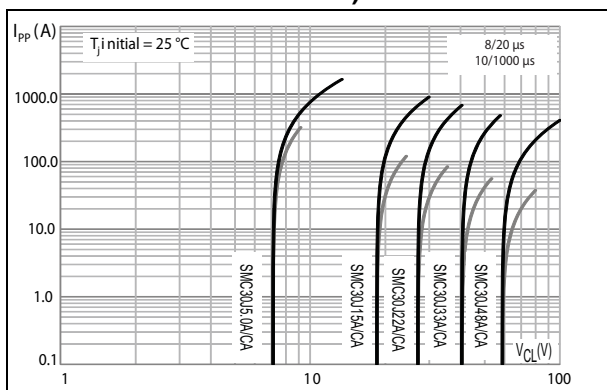


Figure 6. Junction capacitance versus reverse applied voltage for unidirectional types

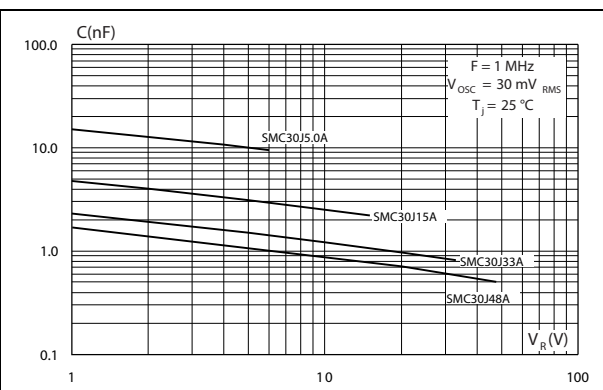


Figure 7. Junction capacitance versus reverse applied voltage for bidirectional types

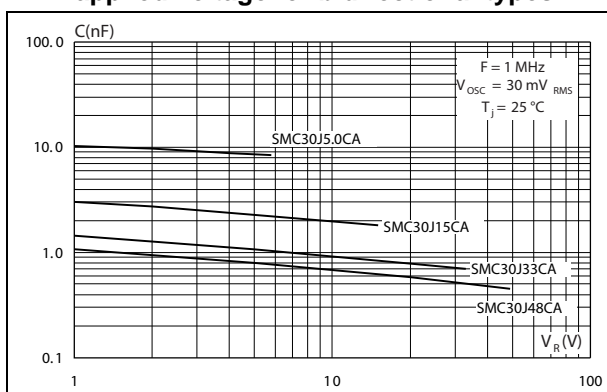


Figure 8. Peak forward voltage drop versus peak forward current

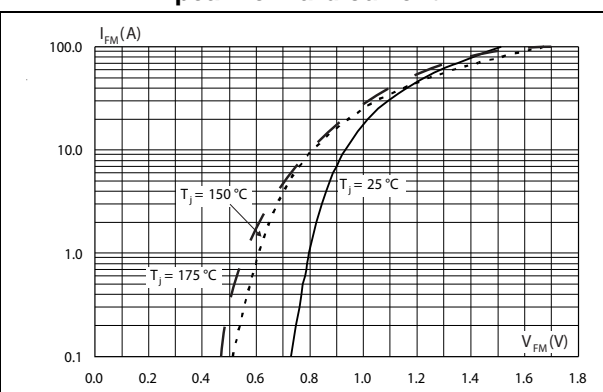


Figure 9. Relative variation of thermal impedance versus pulse duration

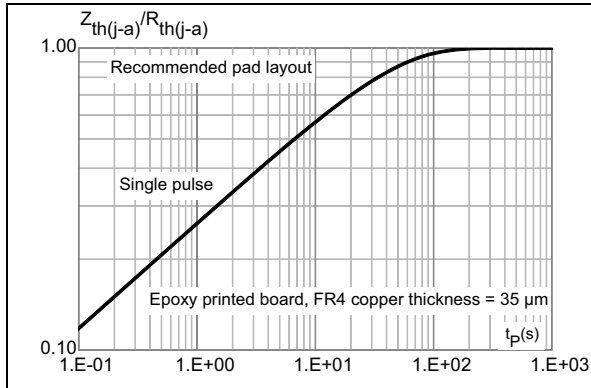


Figure 10. Thermal resistance junction to ambient versus copper surface under each lead

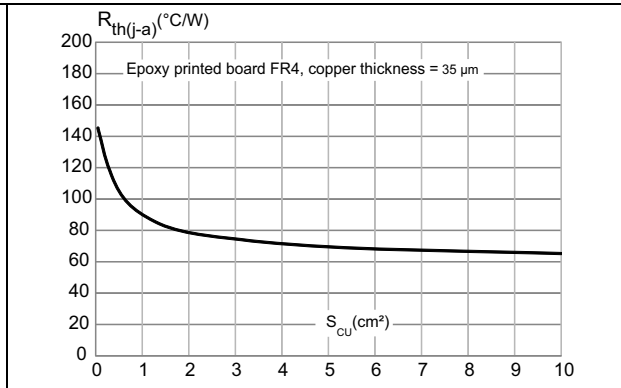
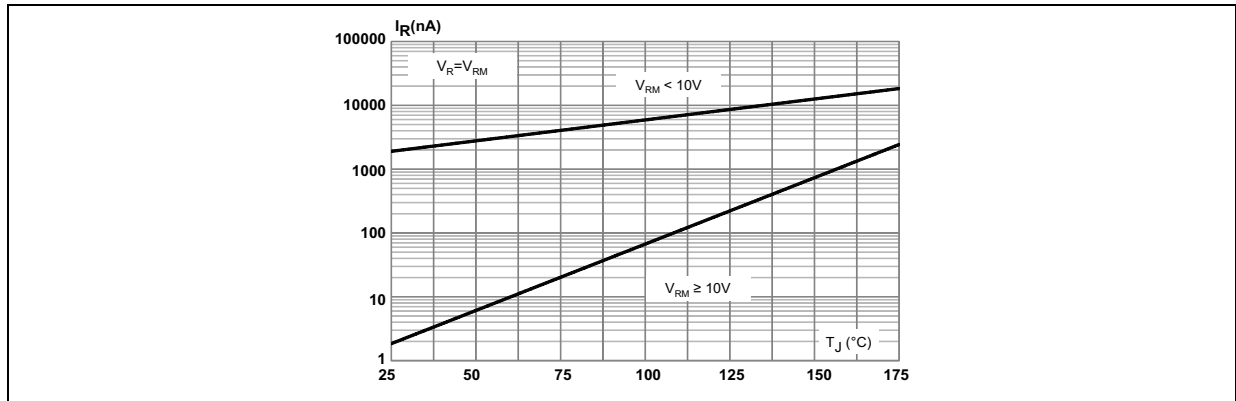
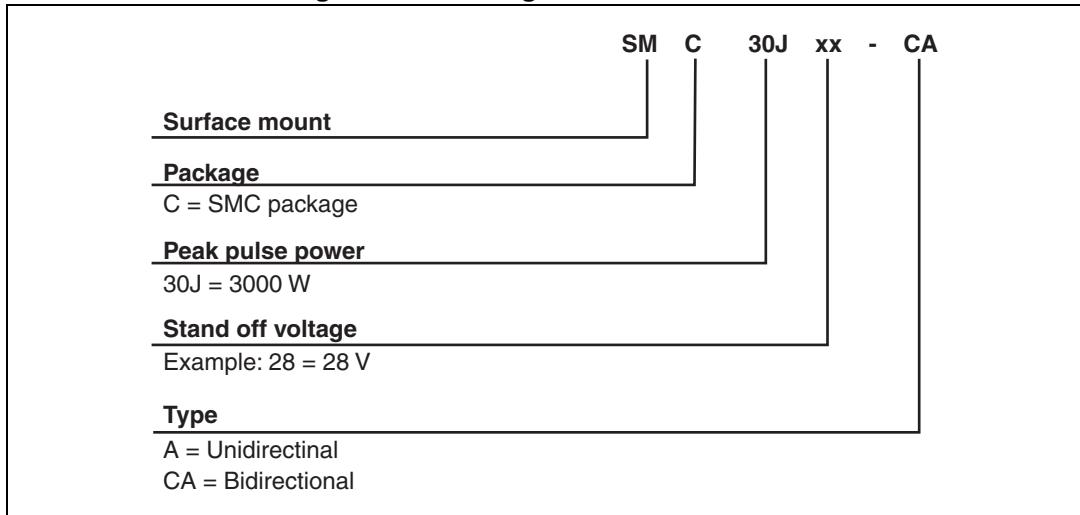


Figure 11. Leakage current versus junction temperature (typical values)



2 Ordering information scheme

Figure 12. Ordering information scheme



3 Package information

- Case: JEDEC DO-214AB molded plastic over planar junction
- Terminals: solder plated, solderable per MIL-STD-750, Method 2026
- Polarity: for unidirectional types the band indicates cathode
- Flammability: epoxy is rated UL94V-0
- RoHS package

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

Table 4. SMC package dimensions

| Ref. | Dimensions | | | |
|------|-------------|------|--------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A1 | 1.90 | 2.45 | 0.075 | 0.096 |
| A2 | 0.05 | 0.20 | 0.002 | 0.008 |
| b | 2.90 | 3.2 | 0.114 | 0.126 |
| c | 0.15 | 0.41 | 0.006 | 0.016 |
| E | 7.75 | 8.15 | 0.305 | 0.321 |
| E1 | 6.60 | 7.15 | 0.260 | 0.281 |
| E2 | 4.40 | 4.70 | 0.173 | 0.185 |
| D | 5.55 | 6.25 | 0.218 | 0.246 |
| L | 0.75 | 1.60 | 0.030 | 0.063 |

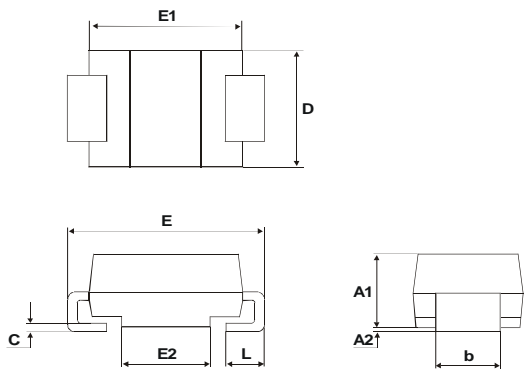


Figure 13. Footprint dimensions mm (inches)

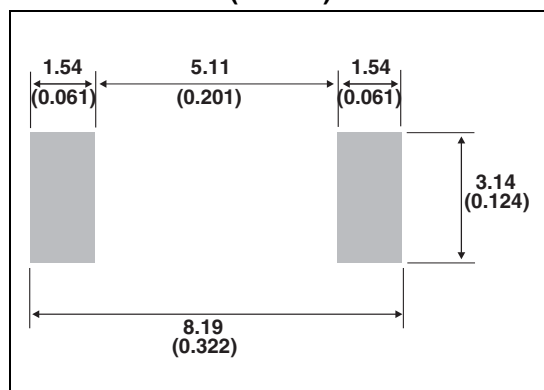
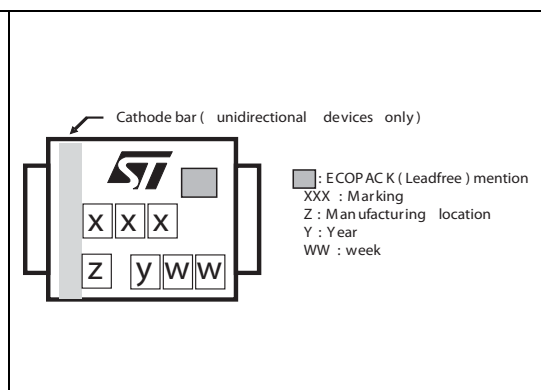


Figure 14. Marking layout⁽¹⁾



1. Marking layout can vary according to assembly location.

Table 5. Marking

| Order code | Marking | Order code | Marking |
|------------|---------|-------------|---------|
| SMC30J5.0A | 3AAA | SMC30J5.0CA | 3BAA |
| SMC30J6.0A | 3AAB | SMC30J6.0CA | 3BAB |
| SMC30J6.5A | 3AAC | SMC30J6.5CA | 3BAC |
| SMC30J8.5A | 3AAD | SMC30J8.5CA | 3BAD |
| SMC30J10A | 3AAW | SMC30J10CA | 3BAW |
| SMC30J12A | 3AAF | SMC30J12CA | 3BAF |
| SMC30J13A | 3AAG | SMC30J13CA | 3BAG |
| SMC30J15A | 3AAH | SMC30J15CA | 3BAH |
| SMC30J16A | 3AAI | SMC30J16CA | 3BAI |
| SMC30J18A | 3AAJ | SMC30J18CA | 3BAJ |
| SMC30J20A | 3AAK | SMC30J20CA | 3BAK |
| SMC30J22A | 3AAL | SMC30J22CA | 3BAL |
| SMC30J24A | 3AAE | SMC30J24CA | 3BAE |
| SMC30J26A | 3AAM | SMC30J26CA | 3BAM |
| SMC30J28A | 3AAN | SMC30J28CA | 3BAN |
| SMC30J30A | 3AAO | SMC30J30CA | 3BAO |
| SMC30J33A | 3AAP | SMC30J33CA | 3BAP |
| SMC30J36A | 3AAQ | SMC30J36CA | 3BAQ |
| SMC30J40A | 3AAR | SMC30J40CA | 3BAR |
| SMC30J48A | 3AAS | SMC30J48CA | 3BAS |

4 Ordering information

Table 6. Ordering information

Table 7.

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|------------------------------|---------------------------------------|---------|--------|----------|---------------|
| SMC30JxxxA/CA ⁽¹⁾ | See Table 5 on page 8 | SMC | 0.25 g | 2500 | Tape and reel |

1. Where xxx is nominal value of V_{BR} and A or CA indicates unidirectional or bidirectional version. See [Table 3](#) for list of available devices and their order codes

5 Revision history

Table 8. Document revision history

| Date | Revision | Changes |
|-------------|----------|--|
| 28-Jul-2011 | 1 | Initial release. |
| 15-Jul-2015 | 2 | Updated features on cover page. Updated Table 1 , Figure 3 , Figure 5 , Figure 6 , Figure 7 , Figure 8 , Figure 10 and Figure 11 . Updated Table 5 . |
| 22-Jul-2015 | 3 | Updated Figure 9 . |

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