

# THINKING ELECTRONIC INDUSTRIAL CO., LTD.

HEAD OFFICE: 12F, No.93, Dashun 1st Rd., Zuoying Dist., Kaohsiung, Taiwan  
 TEL: 886-7-5577660 FAX: 886-7-5570560

**MANUFACTURING SITE**

- KAOHSIUNG FACTORY 1: No. 51, Kaifa Rd., N.E.P.Z, Kaohsiung City 81170, Taiwan  
 TEL: 886-7-9616668 FAX: 886-7-9616698
- KAOHSIUNG FACTORY 2: No. 2-2, Xinjian S. Rd., N.E.P.Z., Kaohsiung City 81170, Taiwan  
 TEL: 886-7-9630001 FAX: 886-7-3635113
- CHANGZHOU FACTORY: No.6 Longmen Rd., Wujin High & New-Tech Industrial  
 Development Zone, Changzhou, Jiangsu, China 213161  
 TEL:86-519-86578999 FAX:86-519-86558643
- DONG GUAN FACTORY: No.45, East Rd., Sha-Tao Dist., Chang-An Town,  
 Dongguan City, Guangdong, China 523863  
 TEL:86-769-85542016 FAX:86-769-85546890
- YICHANG FACTORY: No. 283 Xiaoting Avenue, Xiaoting Dist., Yichang  
 City 443007, Hubei, China  
 TEL:86-717-6510010 FAX:86-717-6511430



## SPECIFICATION FOR APPROVAL

|                      |                    |
|----------------------|--------------------|
| CUSTOMER             | 立創電子               |
| CERTIFIED MODEL/TYPE | SMAJ200            |
| PART NO.             | SMAJ200A (RoHS+HF) |
| APPLICATION          |                    |
| CUSTOMER P/N         |                    |
| ISSUE DATE           | Dec.07,2020        |
| REV. NO.             |                    |
| REV. DATE            |                    |

|                              |                       |
|------------------------------|-----------------------|
| <b>FOR CUSTOMER APPROVAL</b> | <b>CHECKED BY</b>     |
|                              | <i>Dan Zhang</i>      |
|                              | <b>APPROVED BY</b>    |
|                              | <i>Huaifang Zhang</i> |





**REVISED RECORD SHEET**

| REV. NO | REV. DATE | REVISED CONTENT |
|---------|-----------|-----------------|
|         |           |                 |



| <b>INDEX</b>                                    | <b>Page</b> |
|---|-------------|
| ■ Part Number Code                              | 1           |
| ■ Structure and Dimensions                      | 2           |
| ■ Electrical Characteristics                    | 3 ~ 4       |
| ■ Reliability                                   | 5           |
| ■ Soldering Recommendation                      | 6           |
| ■ Packaging                                     | 7           |
| ■ Pulse Waveform                                | 8           |
| ■ Pulse Derating Curve                          | 8           |
| ■ Peak Pulse Power Rating Curve                 | 9           |
| ■ Steady State Power Derating Curve             | 10          |
| ■ Typical Junction Capacitance                  | 11          |
| ■ RoHS Compliant Declaration                    | 12          |
| ■ Warehouse Storage Conditions of Products      | 12          |
| ■ Safety Approvals & Certificates & Test Report | 13          |

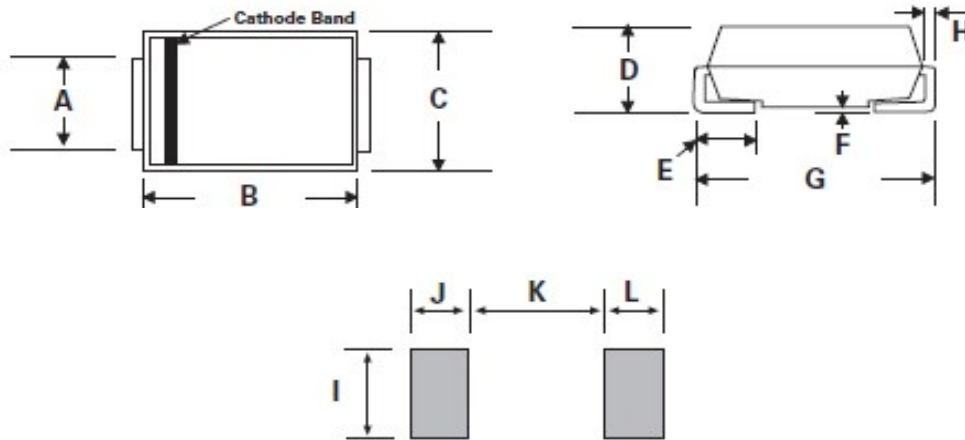
Part Number Code

Example :

**SMAJ**    **200**    **A**  
 (1)            (2)            (3)

| No. | Item                                    | Digit | Specification                               |
|-----|---|-------|---|
| (1) | Product Type                            | SMAJ  | Thinking Power TVS SMD Type                 |
| (2) | Reverse Stand off Voltage ( $V_{RWM}$ ) | 200   | 200=200 $V_{RWM}$                           |
| (3) | Type Code                               | A     | Uni-directional<br>5% VBR Voltage Tolerance |

Structure and Dimensions



\* The Cathode bend for Uni-directional product only.

| Item | Millimeters |       | Inches |       |
|------|-------------|-------|--------|-------|
|      | Min.        | Max.  | Min.   | Max.  |
| A    | 1.25        | 1.65  | 0.049  | 0.065 |
| B    | 3.99        | 4.6   | 0.157  | 0.181 |
| C    | 2.4         | 2.8   | 0.094  | 0.11  |
| D    | 1.9         | 2.3   | 0.074  | 0.09  |
| E    | 0.76        | 1.52  | 0.03   | 0.06  |
| F    | -           | 0.203 | -      | 0.008 |
| G    | 4.8         | 5.28  | 0.188  | 0.208 |
| H    | 0.152       | 0.305 | 0.006  | 0.012 |
| I    | 1.8         | -     | 0.07   | -     |
| J/L  | 2.1         | -     | 0.082  | -     |
| K    | -           | 2.3   | -      | 0.09  |

## Electrical Characteristics

Peak power dissipation with a 10/1000 $\mu$ s waveform : 400W

Operating junction and storage temperature range : -55~+150 °C

| Part No.<br>(Uni) | Part No.<br>(Bi) | Reverse<br>Stand off<br>Voltage | Breakage<br>Voltage<br>VBR @ IT |          | Test<br>Current | Maximum<br>Clamping<br>Voltage<br>VC @ Ipp | Maximum<br>Peak Pulse<br>Current | Maximum<br>Reverse<br>Leakage<br>IR<br>@VRWM | Marking<br>Code |          |
|-------------------|------------------|---------------------------------|---------------------------------|----------|-----------------|--|----------------------------------|--|-----------------|----------|
|                   |                  |                                 | VRWM ( V )                      | Min( V ) |                 |  |                                  |  | Max( V )        | IT( mA ) |
| SMAJ5.0A          | SMAJ5.0CA        | 5                               | 6.4                             | 7        | 10              | 9.2  | 43.5                             | 800  | AE.             | WE.      |
| SMAJ6.0A          | SMAJ6.0CA        | 6                               | 6.67                            | 7.37     | 10              | 10.3                                       | 38.8                             | 800  | AG.             | WG.      |
| SMAJ6.5A          | SMAJ6.5CA        | 6.5                             | 7.22                            | 7.98     | 10              | 11.2                                       | 35.7                             | 500  | AK.             | WK.      |
| SMAJ7.0A          | SMAJ7.0CA        | 7                               | 7.78                            | 8.6      | 10              | 12   | 33.3                             | 200  | AM.             | WM.      |
| SMAJ7.5A          | SMAJ7.5CA        | 7.5                             | 8.33                            | 9.21     | 1               | 12.9                                       | 31                               | 100  | AP.             | WP.      |
| SMAJ8.0A          | SMAJ8.0CA        | 8                               | 8.89                            | 9.83     | 1               | 13.6                                       | 29.4                             | 50   | AR.             | WR.      |
| SMAJ8.5A          | SMAJ8.5CA        | 8.5                             | 9.44                            | 10.4     | 1               | 14.4                                       | 27.8                             | 20   | AT.             | WT.      |
| SMAJ9.0A          | SMAJ9.0CA        | 9                               | 10                              | 11.1     | 1               | 15.4                                       | 26                               | 10   | AV.             | WV.      |
| SMAJ10A           | SMAJ10CA         | 10                              | 11.1                            | 12.3     | 1               | 17   | 23.5                             | 5  | AX.             | WX.      |
| SMAJ11A           | SMAJ11CA         | 11                              | 12.2                            | 13.5     | 1               | 18.2                                       | 22                               | 1  | AZ.             | WZ.      |
| SMAJ12A           | SMAJ12CA         | 12                              | 13.3                            | 14.7     | 1               | 19.9                                       | 20.1                             | 1  | BE.             | XE.      |
| SMAJ13A           | SMAJ13CA         | 13                              | 14.4                            | 15.9     | 1               | 21.5                                       | 18.6                             | 1  | BG.             | XG.      |
| SMAJ14A           | SMAJ14CA         | 14                              | 15.6                            | 17.2     | 1               | 23.2                                       | 17.2                             | 1  | BK.             | XK.      |
| SMAJ15A           | SMAJ15CA         | 15                              | 16.7                            | 18.5     | 1               | 24.4                                       | 16.4                             | 1  | BM.             | XM.      |
| SMAJ16A           | SMAJ16CA         | 16                              | 17.8                            | 19.7     | 1               | 26   | 15.4                             | 1  | BP.             | XP.      |
| SMAJ17A           | SMAJ17CA         | 17                              | 18.9                            | 20.9     | 1               | 27.6                                       | 14.5                             | 1  | BR.             | XR.      |
| SMAJ18A           | SMAJ18CA         | 18                              | 20                              | 22.1     | 1               | 29.2                                       | 13.7                             | 1  | BT.             | XT.      |
| SMAJ20A           | SMAJ20CA         | 20                              | 22.2                            | 24.5     | 1               | 32.4                                       | 12.3                             | 1  | BV.             | XV.      |
| SMAJ22A           | SMAJ22CA         | 22                              | 24.4                            | 26.9     | 1               | 35.5                                       | 11.3                             | 1  | BX.             | XX.      |
| SMAJ24A           | SMAJ24CA         | 24                              | 26.7                            | 29.5     | 1               | 38.9                                       | 10.3                             | 1  | BZ.             | XZ.      |
| SMAJ26A           | SMAJ26CA         | 26                              | 28.9                            | 31.9     | 1               | 42.1                                       | 9.5                              | 1  | CE.             | YE.      |
| SMAJ28A           | SMAJ28CA         | 28                              | 31.1                            | 34.4     | 1               | 45.4                                       | 8.8                              | 1  | CG.             | YG.      |
| SMAJ30A           | SMAJ30CA         | 30                              | 33.3                            | 36.8     | 1               | 48.4                                       | 8.3                              | 1  | CK.             | YK.      |
| SMAJ33A           | SMAJ33CA         | 33                              | 36.7                            | 40.6     | 1               | 53.3                                       | 7.5                              | 1  | CM.             | YM.      |
| SMAJ36A           | SMAJ36CA         | 36                              | 40                              | 44.2     | 1               | 58.1                                       | 6.9                              | 1  | CP.             | YP.      |
| SMAJ40A           | SMAJ40CA         | 40                              | 44.4                            | 49.1     | 1               | 64.5                                       | 6.2                              | 1  | CR.             | YR.      |
| SMAJ43A           | SMAJ43CA         | 43                              | 47.8                            | 52.8     | 1               | 69.4                                       | 5.8                              | 1  | CT.             | YT.      |
| SMAJ45A           | SMAJ45CA         | 45                              | 50                              | 55.3     | 1               | 72.7                                       | 5.5                              | 1  | CV.             | YV.      |
| SMAJ48A           | SMAJ48CA         | 48                              | 53.3                            | 58.9     | 1               | 77.4                                       | 5.2                              | 1  | CX.             | YX.      |
| SMAJ51A           | SMAJ51CA         | 51                              | 56.7                            | 62.7     | 1               | 82.4                                       | 4.9                              | 1  | CZ.             | YZ.      |
| SMAJ54A           | SMAJ54CA         | 54                              | 60                              | 66.3     | 1               | 87.1                                       | 4.6                              | 1  | RE.             | ZE.      |
| SMAJ58A           | SMAJ58CA         | 58                              | 64.4                            | 71.2     | 1               | 93.6                                       | 4.3                              | 1  | RG.             | ZG.      |
| SMAJ60A           | SMAJ60CA         | 60                              | 66.7                            | 73.7     | 1               | 96.8                                       | 4.1                              | 1  | RK.             | ZK.      |

Electrical CharacteristicsPeak power dissipation with a 10/1000 $\mu$ s waveform : 400W

Operating junction and storage temperature range : -55~+150 °C

| Part No.<br>(Uni) | Part No.<br>(Bi) | Reverse<br>Stand off<br>Voltage | Breakage<br>Voltage<br>VBR @ IT |          | Test<br>Current | Maximum<br>Clamping<br>Voltage<br>VC @ Ipp | Maximum<br>Peak Pulse<br>Current | Maximum<br>Reverse<br>Leakage<br>IR<br>@VRWM | Marking<br>Code |          |
|-------------------|------------------|---------------------------------|---------------------------------|----------|-----------------|--|----------------------------------|--|-----------------|----------|
|                   |                  |                                 | VRWM ( V )                      | Min( V ) |                 |  |                                  |  | Max( V )        | IT( mA ) |
| SMAJ64A           | SMAJ64CA         | 64                              | 71.1                            | 78.6     | 1               | 103  | 3.9                              | 1  | RM.             | ZM.      |
| SMAJ70A           | SMAJ70CA         | 70                              | 77.8                            | 86       | 1               | 113  | 3.5                              | 1  | RP.             | ZP.      |
| SMAJ75A           | SMAJ75CA         | 75                              | 83.3                            | 92.1     | 1               | 121  | 3.3                              | 1  | RR.             | ZR.      |
| SMAJ78A           | SMAJ78CA         | 78                              | 86.7                            | 95.8     | 1               | 126  | 3.2                              | 1  | RT.             | ZT.      |
| SMAJ85A           | SMAJ85CA         | 85                              | 94.4                            | 104      | 1               | 137  | 2.9                              | 1  | RV.             | ZV.      |
| SMAJ90A           | SMAJ90CA         | 90                              | 100                             | 111      | 1               | 146  | 2.7                              | 1  | RX.             | ZX.      |
| SMAJ100A          | SMAJ100CA        | 100                             | 111                             | 123      | 1               | 162  | 2.5                              | 1  | RZ.             | ZZ.      |
| SMAJ110A          | SMAJ110CA        | 110                             | 122                             | 135      | 1               | 177  | 2.3                              | 1  | SE.             | VE.      |
| SMAJ120A          | SMAJ120CA        | 120                             | 133                             | 147      | 1               | 193  | 2.1                              | 1  | SG.             | VG.      |
| SMAJ130A          | SMAJ130CA        | 130                             | 144                             | 159      | 1               | 209  | 1.9                              | 1  | SK.             | VK.      |
| SMAJ150A          | SMAJ150CA        | 150                             | 167                             | 185      | 1               | 243  | 1.6                              | 1  | SM.             | VM.      |
| SMAJ160A          | SMAJ160CA        | 160                             | 178                             | 197      | 1               | 259  | 1.5                              | 1  | SP.             | VP.      |
| SMAJ170A          | SMAJ170CA        | 170                             | 189                             | 209      | 1               | 275  | 1.5                              | 1  | SR.             | VR.      |
| SMAJ180A          | SMAJ180CA        | 180                             | 201                             | 222      | 1               | 292  | 1.4                              | 1  | ST.             | VT.      |
| SMAJ190A          | SMAJ190CA        | 190                             | 209                             | 243      | 1               | 308  | 1.3                              | 1  | SV.             | VV.      |
| SMAJ200A          | SMAJ200CA        | 200                             | 224                             | 247      | 1               | 324  | 1.2                              | 1  | SW.             | VW.      |
| SMAJ220A          | SMAJ220CA        | 220                             | 246                             | 272      | 1               | 356  | 1.1                              | 1  | SX.             | VX.      |
| SMAJ250A          | SMAJ250CA        | 250                             | 279                             | 309      | 1               | 405  | 1                                | 1  | SZ.             | VZ.      |
| SMAJ300A          | SMAJ300CA        | 300                             | 335                             | 371      | 1               | 486  | 0.8                              | 1  | DE.             | HE.      |
| SMAJ350A          | SMAJ350CA        | 350                             | 391                             | 432      | 1               | 567  | 0.7                              | 1  | DG.             | HG.      |
| SMAJ400A          | SMAJ400CA        | 400                             | 447                             | 494      | 1               | 648  | 0.6                              | 1  | DK.             | HK.      |
| SMAJ440A          | SMAJ440CA        | 440                             | 492                             | 543      | 1               | 713  | 0.6                              | 1  | DM.             | HM.      |

Reliability

| Item   | Standard                                    | Test conditions / Methods   | Specifications                                  |
|--|---|---|---|
| HTRB<br>(High Temp.<br>Reverse Bias<br>Test) | MIL-STD-750D<br>METHOD 1038.3<br>Method 103 | Test Temp. : 150°C<br>Duration 168 hrs with rated VRWM  | Electrical<br>properties meet<br>Specifications |
| PCT<br>(Pressure<br>Cooker Test)             | MIL-STD-19500<br>EAPPENDIX C                | Test Temp. : 121 °C<br>Pressure:1.2Kg<br>Duration: 96 hrs   | Electrical<br>properties meet<br>Specifications |
| TCT  | MIL-STD-750D<br>METHOD 1051.5               | Test Temp. : -55°C ~+150°C<br>20 cycles   | Electrical<br>properties meet<br>Specifications |
| Forward<br>Surge                             | MIL-STD-750D<br>METHOD 4066.3               | Sine half wave 8.3mS 1 shot<br>IFSM:20A forSMF<br>40A for SMA/ P4SMA & SMAF<br>100A for SMB/P6SMB<br>200A for SMC/1.5SMC<br>For Uni-directional product only. | Electrical<br>properties meet<br>Specifications |
| Soldering<br>Heat                            | MIL-STD-750D<br>METHOD 2031.2               | Test Temp. : 260°C<br>Duration:10 sec<br>1cycle   | Electrical<br>properties meet<br>Specifications |



## Soldering Recommendation

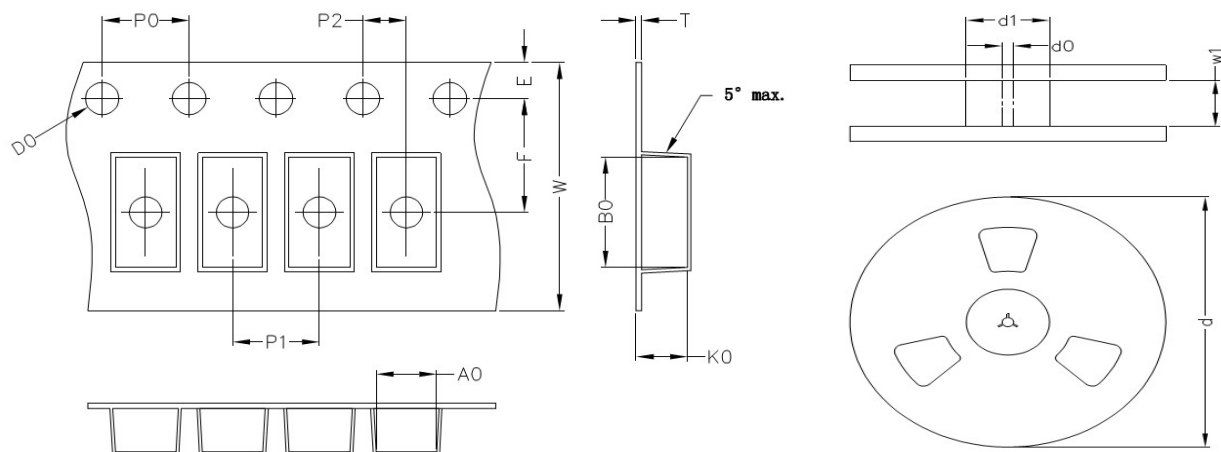
### ■ IR-reflow soldering profile



| Reflow Condition  | Lead-free assembly                 |
|---|------------------------------------|
| <b>Preheat</b><br>-Temperature Min(Ts min)<br>-Temperature Min(Ts max)<br>-Time (min to max) (ts) | 150°C<br>200°C<br>60 – 180 seconds |
| <b>Average ramp up rate</b><br>-Temperature Liquidus (TL) to peak                                 | 3°C/second max                     |
| <b>Ts(max) to TL</b><br>-Ramp-up Rate   | 3°C/second max.                    |
| <b>Reflow</b><br>-Temperature Liquidus (TL)<br>-Time (tL)   | 217°C<br>60 – 150 seconds          |
| <b>Peak Temperature (TP)</b>  | 260°C                              |
| <b>Time within 5°C of actual peak Temperature(tp)</b>   | 20 – 40 seconds                    |
| <b>Ramp-down Rate</b>   | 6°C/second max.                    |
| <b>Time 25°C to peak Temperature(TP)</b>  | 8 minutes max.                     |
| <b>Do not exceed</b>  | 260°C                              |

## Packaging

### ■ Taping Specification



(Unit : mm)

| Index | A0  | B0   | K0   | D0   | E    | F   | P0 | P1 | P2 | T         | W  | d(13") | d1 | d0   | w1   |
|-------|-----|------|------|------|------|-----|----|----|----|-----------|----|--------|----|------|------|
| SMAJ  | 2.8 | 5.33 | 2.36 | 1.55 | 1.75 | 5.5 | 4  | 4  | 2  | 0.22±0.05 | 12 | 330    | 75 | 13.5 | 13.5 |

Notes: The tolerance of carrier tape and top cover is  $\pm 0.1$ mm, the tolerance of reel is  $\pm 2$ mm

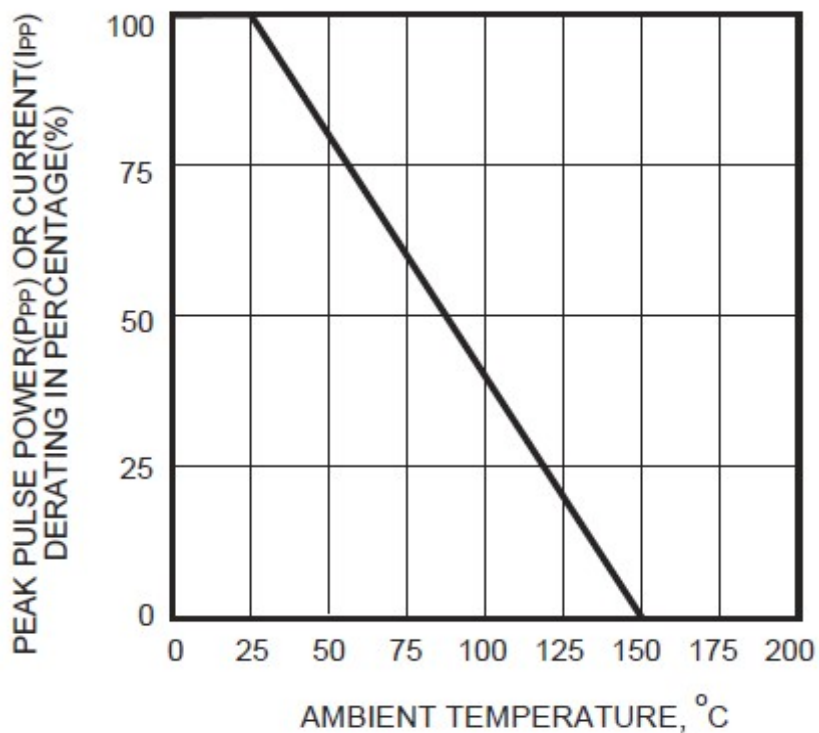
### ■ Quantity

| Series Type | Reel size | Quantity (pcs/reel) |
|-------------|-----------|---------------------|
| SMAJ        | 13"       | 5,000               |

Pulse Waveform



Pulse Derating Curve



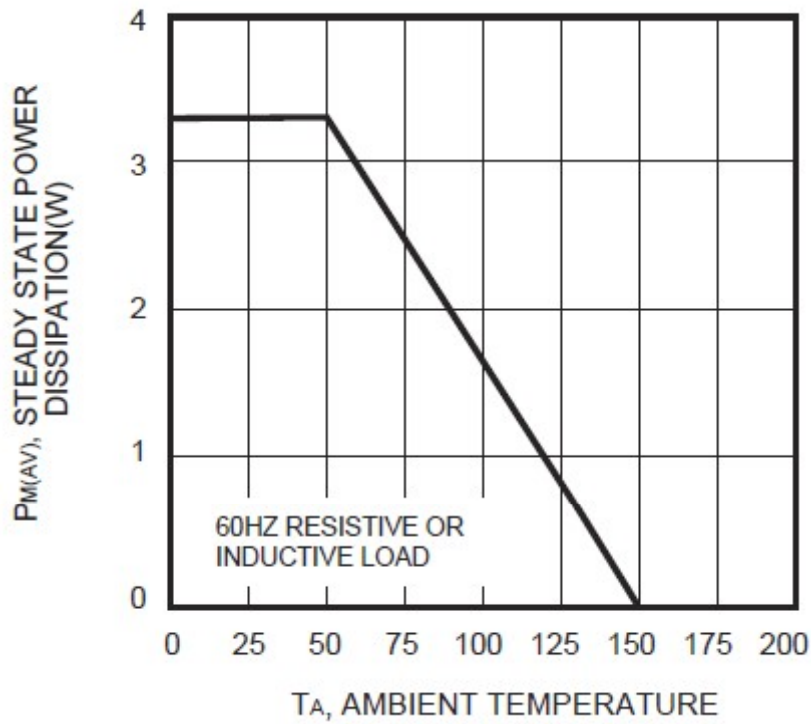
Peak Pulse Power Rating Curve

SMAJ series



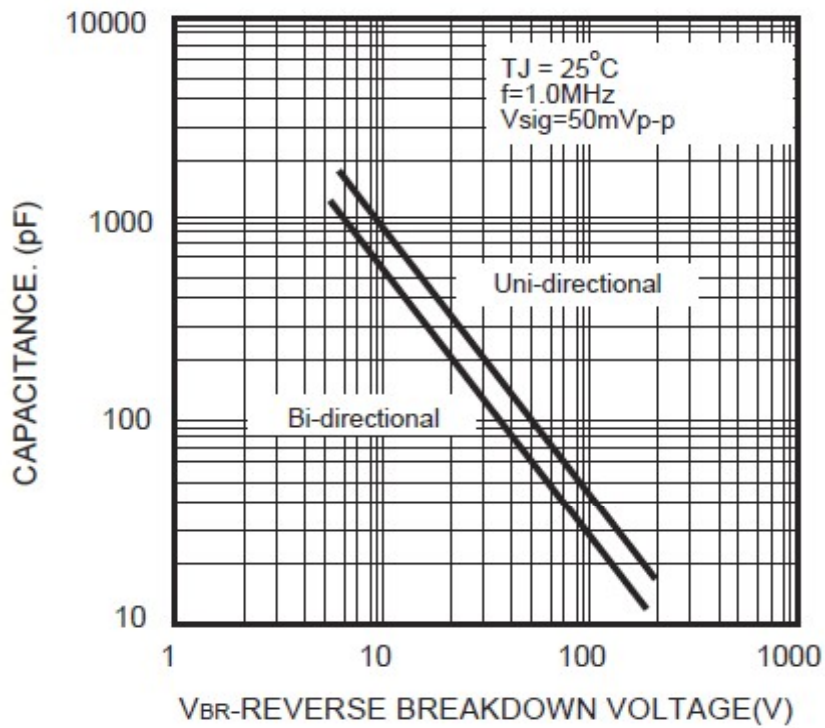
Steady State Power Derating Curve

SMAJ series



Typical Junction Capacitance

SMAJ series



### RoHS Compliant Declaration

We hereby declare that the components delivered to your company are compliant with RoHS directive 2015/863/EU.

### Warehouse Storage Conditions of Products

(I) Storage Conditions :

- 1.Storage Temperature :  $-10^{\circ}\text{C} \sim +40^{\circ}\text{C}$
- 2.Relative Humidity :  $\leq 75\%RH$
- 3.Keep away from corrosive atmosphere and sunlight.

(II) Period of Storage : 1 year

## Safety Approvals



\* UL 497B recognized (File # E229991)

## Certificates

- (1) IATF 16949 certificate
- (2) ISO 9001 certificate

## Test Report

- (1) RoHS test report
- (2) Halogen-free test report