



# SMAJ SERIES

## 瞬变电压抑制二极管 Transient Voltage Suppressor Diodes

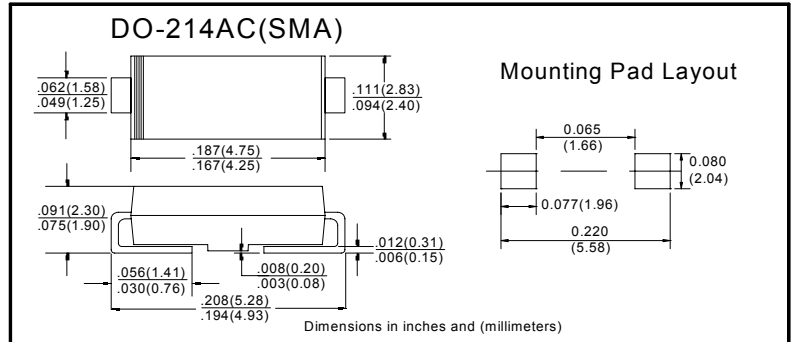
### ■特征 Features

- $P_{PP}$  400W
- $V_{BR}$  5.0V-188V

### ■用途 Applications

- 箝位电压用 Clamping Voltage

### ■外形尺寸和印记 Outline Dimensions and Mark



### ■极限值（绝对最大额定值）

#### Limiting Values (Absolute Maximum Rating)

| 参数名称<br>Item  | 符号<br>Symbol   | 单位<br>Unit | 条件<br>Conditions  | 最大值<br>Max              |
|---|----------------|------------|---|-------------------------|
| 最大损耗功率(1)(2)(Fig.1)<br>Peak power dissipation                   | $P_{PPM}$      | W          | 在10/1000us 波形下测试<br>with a 10/1000us waveform                       | 400                     |
| 最大脉冲电流(1)<br>Peak pulse current                                 | $I_{PPM}$      | A          | 在10/1000us 波形下测试<br>with a 10/1000us waveform                       | 见下面表格<br>See Next Table |
| 最大正向浪涌电流(2)<br>Peak forward surge current                       | $I_{FSM}$      | A          | 8.3ms正弦半波, 仅单向型<br>8.3 ms single half sine-wave unidirectional only | 40                      |
| 工作结温和存储温度范围<br>Operating junction and storage temperature range | $T_J, T_{STG}$ | °C         |   | -55 to +150             |

### ■电特性（ $T_a=25^\circ\text{C}$ 除非另有规定）

#### Electrical Characteristics ( $T_a=25^\circ\text{C}$ Unless otherwise specified)

| 参数名称<br>Item                                      | 符号<br>Symbol    | 单位<br>Unit | 条件<br>Conditions   | 最大值<br>Max |
|---|-----------------|------------|--|------------|
| 最大瞬间正向电压<br>Maximum instantaneous forward Voltage | $V_F$           | V          | 在25A下测试, 仅单向型<br>at 25A for unidirectional only                  | 3.5        |
| 典型热阻<br>Thermal resistance                        | $R_{\theta JL}$ | °C/W       | 结到引线<br>junction to lead   | 30         |
|   | $R_{\theta JA}$ | °C/W       | 结到环境, 均引线10mm处<br>junction to ambient, $L_{Lead} = 10\text{ mm}$ | 120        |

### 备注: Notes:

- (1) 不重复脉冲电流, 如图3, 在 $T_A = 25^\circ\text{C}$ 下功率降额曲线如图2。78V以上额定功率为300W  
Non-repetitive current pulse, per Fig. 3 and derated above  $T_A = 25^\circ\text{C}$  per Fig.2. Rating is 300 W above 78V
- (2) 每个端子安装在 0.2 x 0.2" (5.0 x 5.0 mm)铜焊盘上  
Mounted on 0.2 x 0.2" (5.0 x 5.0 mm) copper pads to each terminal

■ 电性参数 ( $T_A=25^{\circ}\text{C}$  除非另有规定)

Electrical Characteristics ( $T_A=25^{\circ}\text{C}$  unless otherwise noted)

| 产品型号 (单向)<br>Part Number(Uni) | 产品型号 (双向)<br>Part Number(Bi) | 击穿电压 $V_{BR}@I_T$<br>Breakdown Voltage $V_{BR}@I_T$ |            |                       | 最大反向漏电流 $I_R@V_{RWM}$<br>Maximum Reverse Leakage $I_R^{(3)}$<br>( $\mu\text{A}$ ) | 最大工作电压<br>$V_{RWM}$<br>Working Peak Reverse Voltage<br>$V_{RWM}$ (V) | 最大反向浪涌电流 IPP<br>Maximum Reverse Surge Current IPP <sup>(2)</sup><br>(A) | 最大箝位电压<br>Maximum Clamping Voltage $V_c$<br>@ $I_{PP}$<br>(V) |
|-------------------------------|------------------------------|---|------------|-----------------------|---|--|---|---|
|                               |                              | 最小 Min(V)   | 最大 Max (V) | 测试电流 $I_T^{(1)}$ (mA) |   |  |   |   |
| SMAJ5.0                       | SMAJ5.0C                     | 6.40  | 7.82       | 10                    | 800   | 5.0  | 41.7  | 9.6   |
| SMAJ5.0A                      | SMAJ5.0CA <sup>(4)</sup>     | 6.40  | 7.07       | 10                    | 800   | 5.0  | 43.5  | 9.2   |
| SMAJ6.0                       | SMAJ6.0C                     | 6.67  | 8.15       | 10                    | 800   | 6.0  | 35.1  | 11.4  |
| SMAJ6.0A                      | SMAJ6.0CA                    | 6.67  | 7.37       | 10                    | 800   | 6.0  | 38.8  | 10.3  |
| SMAJ6.5                       | SMAJ6.5C                     | 7.22  | 8.82       | 10                    | 500   | 6.5  | 32.5  | 12.3  |
| SMAJ6.5A                      | SMAJ6.5CA                    | 7.22  | 7.98       | 10                    | 500   | 6.5  | 35.7  | 11.2  |
| SMAJ7.0                       | SMAJ7.0C                     | 7.78  | 9.51       | 10                    | 200   | 7.0  | 30.1  | 13.3  |
| SMAJ7.0A                      | SMAJ7.0CA                    | 7.78  | 8.60       | 10                    | 200   | 7.0  | 33.3  | 12.0  |
| SMAJ7.5                       | SMAJ7.5C                     | 8.33  | 10.2       | 1.0                   | 100   | 7.5  | 28.0  | 14.3  |
| SMAJ7.5A                      | SMAJ7.5CA                    | 8.33  | 9.21       | 1.0                   | 100   | 7.5  | 31.0  | 12.9  |
| SMAJ8.0                       | SMAJ8.0C                     | 8.89  | 10.9       | 1.0                   | 50  | 8.0  | 26.7  | 15.0  |
| SMAJ8.0A                      | SMAJ8.0CA                    | 8.89  | 9.83       | 1.0                   | 50  | 8.0  | 29.4  | 13.6  |
| SMAJ8.5                       | SMAJ8.5C                     | 9.44  | 11.5       | 1.0                   | 10  | 8.5  | 25.2  | 15.9  |
| SMAJ8.5A                      | SMAJ8.5CA                    | 9.44  | 10.4       | 1.0                   | 10  | 8.5  | 27.8  | 14.4  |
| SMAJ9.0                       | SMAJ9.0C                     | 10.0  | 12.2       | 1.0                   | 5.0   | 9.0  | 23.7  | 16.9  |
| SMAJ9.0A                      | SMAJ9.0CA                    | 10.0  | 11.1       | 1.0                   | 5.0   | 9.0  | 26.0  | 15.4  |
| SMAJ10                        | SMAJ10C                      | 11.1  | 13.6       | 1.0                   | 1.0   | 10   | 21.3  | 18.8  |
| SMAJ10A                       | SMAJ10CA                     | 11.1  | 12.3       | 1.0                   | 1.0   | 10   | 23.5  | 17.0  |
| SMAJ11                        | SMAJ11C                      | 12.2  | 14.9       | 1.0                   | 1.0   | 11   | 19.9  | 20.1  |
| SMAJ11A                       | SMAJ11CA                     | 12.2  | 13.5       | 1.0                   | 1.0   | 11   | 22.0  | 18.2  |
| SMAJ12                        | SMAJ12C                      | 13.3  | 16.3       | 1.0                   | 1.0   | 12   | 18.2  | 22.0  |
| SMAJ12A                       | SMAJ12CA                     | 13.3  | 14.7       | 1.0                   | 1.0   | 12   | 20.1  | 19.9  |
| SMAJ13                        | SMAJ13C                      | 14.4  | 17.6       | 1.0                   | 1.0   | 13   | 16.8  | 23.8  |
| SMAJ13A                       | SMAJ13CA                     | 14.4  | 15.9       | 1.0                   | 1.0   | 13   | 18.6  | 21.5  |
| SMAJ14                        | SMAJ14C                      | 15.6  | 19.1       | 1.0                   | 1.0   | 14   | 15.5  | 25.8  |
| SMAJ14A                       | SMAJ14CA                     | 15.6  | 17.2       | 1.0                   | 1.0   | 14   | 17.2  | 23.2  |
| SMAJ15                        | SMAJ15C                      | 16.7  | 20.4       | 1.0                   | 1.0   | 15   | 14.9  | 26.9  |
| SMAJ15A                       | SMAJ15CA                     | 16.7  | 18.5       | 1.0                   | 1.0   | 15   | 16.4  | 24.4  |
| SMAJ16                        | SMAJ16C                      | 17.8  | 21.8       | 1.0                   | 1.0   | 16   | 13.9  | 28.8  |
| SMAJ16A                       | SMAJ16CA                     | 17.8  | 19.7       | 1.0                   | 1.0   | 16   | 15.4  | 26.0  |
| SMAJ17                        | SMAJ17C                      | 18.9  | 23.1       | 1.0                   | 1.0   | 17   | 13.1  | 30.5  |
| SMAJ17A                       | SMAJ17CA                     | 18.9  | 20.9       | 1.0                   | 1.0   | 17   | 14.5  | 27.6  |
| SMAJ18                        | SMAJ18C                      | 20.0  | 24.4       | 1.0                   | 1.0   | 18   | 12.4  | 32.2  |
| SMAJ18A                       | SMAJ18CA                     | 20.0  | 22.1       | 1.0                   | 1.0   | 18   | 13.7  | 29.2  |
| SMAJ20                        | SMAJ20C                      | 22.2  | 27.1       | 1.0                   | 1.0   | 20   | 11.2  | 35.8  |
| SMAJ20A                       | SMAJ20CA                     | 22.2  | 24.5       | 1.0                   | 1.0   | 20   | 12.3  | 32.4  |



# SMAJ SERIES

■ 电性参数 ( $T_A = 25^\circ\text{C}$  除非另有规定)

## Electrical Characteristics ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

| 产品型号<br>(单向)<br>Part<br>Number(Uni) | 产品型号<br>(双向)<br>Part<br>Number(Bi) | 击穿电压 $V_{BR}@I_T$<br>Breakdown Voltage $V_{BR}@I_T$ |               |                              | 最大反向漏电<br>流 $I_R@V_{WM}$<br>Maximum<br>Reverse<br>Leakage $I_R^{(3)}$<br>( $\mu\text{A}$ ) | 最大工作电压<br>$V_{RWM}$<br>Working Peak<br>Reverse<br>Voltage<br>$V_{RWM}$ (V) | 最大反向浪涌<br>电流 IPP<br>Maximum<br>Reverse Surge<br>Current IPP <sup>(2)</sup><br>(A) | 最大箝位电压<br>Maximum<br>Clamping<br>Voltage Vc<br>@ IPP<br>(V) |
|-------------------------------------|------------------------------------|---|---------------|------------------------------|--|--|---|---|
|                                     |                                    | 最小<br>Min(V)  | 最大<br>Max (V) | 测试电<br>流<br>$I_T^{(1)}$ (mA) |  |  |   |   |
| SMAJ22                              | SMAJ22C                            | 24.4  | 29.8          | 1.0                          | 1.0  | 22   | 10.2  | 39.4  |
| SMAJ22A                             | SMAJ22CA                           | 24.4  | 26.9          | 1.0                          | 1.0  | 22   | 11.3  | 35.5  |
| SMAJ24                              | SMAJ24C                            | 26.7  | 32.6          | 1.0                          | 1.0  | 24   | 9.3   | 43.0  |
| SMAJ24A                             | SMAJ24CA                           | 26.7  | 29.5          | 1.0                          | 1.0  | 24   | 10.3  | 38.9  |
| SMAJ26                              | SMAJ26C                            | 28.9  | 35.3          | 1.0                          | 1.0  | 26   | 8.6   | 46.6  |
| SMAJ26A                             | SMAJ26CA                           | 28.9  | 31.9          | 1.0                          | 1.0  | 26   | 9.5   | 42.1  |
| SMAJ28                              | SMAJ28C                            | 31.1  | 38.0          | 1.0                          | 1.0  | 28   | 8.0   | 50.0  |
| SMAJ28A                             | SMAJ28CA                           | 31.1  | 34.4          | 1.0                          | 1.0  | 28   | 8.8   | 45.4  |
| SMAJ30                              | SMAJ30C                            | 33.3  | 40.7          | 1.0                          | 1.0  | 30   | 7.5   | 53.5  |
| SMAJ30A                             | SMAJ30CA                           | 33.3  | 36.8          | 1.0                          | 1.0  | 30   | 8.3   | 48.4  |
| SMAJ33                              | SMAJ33C                            | 36.7  | 44.9          | 1.0                          | 1.0  | 33   | 6.8   | 59.0  |
| SMAJ33A                             | SMAJ33CA                           | 36.7  | 40.6          | 1.0                          | 1.0  | 33   | 7.5   | 53.3  |
| SMAJ36                              | SMAJ36C                            | 40.0  | 48.9          | 1.0                          | 1.0  | 36   | 6.2   | 64.3  |
| SMAJ36A                             | SMAJ36CA                           | 40.0  | 44.2          | 1.0                          | 1.0  | 36   | 6.9   | 58.1  |
| SMAJ40                              | SMAJ40C                            | 44.4  | 54.3          | 1.0                          | 1.0  | 40   | 5.6   | 71.4  |
| SMAJ40A                             | SMAJ40CA                           | 44.4  | 49.1          | 1.0                          | 1.0  | 40   | 6.2   | 64.5  |
| SMAJ43                              | SMAJ43C                            | 47.8  | 58.4          | 1.0                          | 1.0  | 43   | 5.2   | 76.7  |
| SMAJ43A                             | SMAJ43CA                           | 47.8  | 52.8          | 1.0                          | 1.0  | 43   | 5.8   | 69.4  |
| SMAJ45                              | SMAJ45C                            | 50.0  | 61.1          | 1.0                          | 1.0  | 45   | 5.0   | 80.3  |
| SMAJ45A                             | SMAJ45CA                           | 50.0  | 55.3          | 1.0                          | 1.0  | 45   | 5.5   | 72.7  |
| SMAJ48                              | SMAJ48C                            | 53.3  | 65.1          | 1.0                          | 1.0  | 48   | 4.7   | 85.5  |
| SMAJ48A                             | SMAJ48CA                           | 53.3  | 58.9          | 1.0                          | 1.0  | 48   | 5.2   | 77.4  |
| SMAJ51                              | SMAJ51C                            | 56.7  | 69.3          | 1.0                          | 1.0  | 51   | 4.4   | 91.1  |
| SMAJ51A                             | SMAJ51CA                           | 56.7  | 62.7          | 1.0                          | 1.0  | 51   | 4.9   | 82.4  |
| SMAJ54                              | SMAJ54C                            | 60.0  | 73.3          | 1.0                          | 1.0  | 54   | 4.2   | 96.3  |
| SMAJ54A                             | SMAJ54CA                           | 60.0  | 66.3          | 1.0                          | 1.0  | 54   | 4.6   | 87.1  |
| SMAJ58                              | SMAJ58C                            | 64.4  | 78.7          | 1.0                          | 1.0  | 58   | 3.9   | 103   |
| SMAJ58A                             | SMAJ58CA                           | 64.4  | 71.2          | 1.0                          | 1.0  | 58   | 4.3   | 93.6  |
| SMAJ60                              | SMAJ60C                            | 66.7  | 81.5          | 1.0                          | 1.0  | 60   | 3.7   | 107   |
| SMAJ60A                             | SMAJ60CA                           | 66.7  | 73.7          | 1.0                          | 1.0  | 60   | 4.1   | 96.8  |
| SMAJ64                              | SMAJ64C                            | 71.1  | 86.9          | 1.0                          | 1.0  | 64   | 3.5   | 114   |
| SMAJ64A                             | SMAJ64CA                           | 71.1  | 78.6          | 1.0                          | 1.0  | 64   | 3.9   | 103   |
| SMAJ70                              | SMAJ70C                            | 77.8  | 95.1          | 1.0                          | 1.0  | 70   | 3.2   | 125   |
| SMAJ70A                             | SMAJ70CA                           | 77.8  | 86.0          | 1.0                          | 1.0  | 70   | 3.5   | 113   |
| SMAJ75                              | SMAJ75C                            | 83.3  | 102           | 1.0                          | 1.0  | 75   | 3.0   | 134   |
| SMAJ75A                             | SMAJ75CA                           | 83.3  | 92.1          | 1.0                          | 1.0  | 75   | 3.3   | 121   |

■ 电性参数 ( $T_A = 25^\circ\text{C}$  除非另有规定)

Electrical Characteristics ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

| 产品型号 (单向)<br>Part Number(Uni) | 产品型号 (双向)<br>Part Number(Bi) | 击穿电压 $V_{BR}@I_T$<br>Breakdown Voltage $V_{BR}@I_T$ |               |                          | 最大反向漏电流 $I_R@V_{WM}$<br>Maximum Reverse Leakage $I_R^{(3)}$<br>( $\mu\text{A}$ ) | 最大工作电压<br>$V_{RWM}$<br>Working Peak Reverse Voltage<br>$V_{RWM}$ (V) | 最大反向浪涌电流 IPP<br>Maximum Reverse Surge Current IPP <sup>(2)</sup><br>(A) | 最大箝位电压<br>Maximum Clamping Voltage Vc<br>@ $I_{PP}$<br>(V) |
|-------------------------------|------------------------------|---|---------------|--------------------------|--|--|---|--|
|                               |                              | 最小<br>Min(V)  | 最大<br>Max (V) | 测试电流<br>$I_T^{(1)}$ (mA) |  |  |   |  |
| SMAJ78                        | SMAJ78C                      | 86.7  | 106           | 1.0                      | 1.0  | 78   | 2.9   | 139  |
| SMAJ78A                       | SMAJ78CA                     | 86.7  | 95.8          | 1.0                      | 1.0  | 78   | 3.2   | 126  |
| SMAJ85                        | SMAJ85C                      | 94.4  | 115           | 1.0                      | 1.0  | 85   | 2.0   | 151  |
| SMAJ85A                       | SMAJ85CA                     | 94.4  | 104           | 1.0                      | 1.0  | 85   | 2.2   | 137  |
| SMAJ90                        | SMAJ90C                      | 100   | 122           | 1.0                      | 1.0  | 90   | 1.9   | 160  |
| SMAJ90A                       | SMAJ90CA                     | 100   | 111           | 1.0                      | 1.0  | 90   | 2.1   | 146  |
| SMAJ100                       | SMAJ100C                     | 111   | 136           | 1.0                      | 1.0  | 100  | 1.7   | 179  |
| SMAJ100A                      | SMAJ100CA                    | 111   | 123           | 1.0                      | 1.0  | 100  | 1.9   | 162  |
| SMAJ110                       | SMAJ110C                     | 122   | 149           | 1.0                      | 1.0  | 110  | 1.5   | 196  |
| SMAJ110A                      | SMAJ110CA                    | 122   | 135           | 1.0                      | 1.0  | 110  | 1.7   | 177  |
| SMAJ120                       | SMAJ120C                     | 133   | 163           | 1.0                      | 1.0  | 120  | 1.4   | 214  |
| SMAJ120A                      | SMAJ120CA                    | 133   | 147           | 1.0                      | 1.0  | 120  | 1.6   | 193  |
| SMAJ130                       | SMAJ130C                     | 144   | 176           | 1.0                      | 1.0  | 130  | 1.3   | 231  |
| SMAJ130A                      | SMAJ130CA                    | 144   | 159           | 1.0                      | 1.0  | 130  | 1.4   | 209  |
| SMAJ150                       | SMAJ150C                     | 167   | 204           | 1.0                      | 1.0  | 150  | 1.1   | 268  |
| SMAJ150A                      | SMAJ150CA                    | 167   | 185           | 1.0                      | 1.0  | 150  | 1.2   | 243  |
| SMAJ160                       | SMAJ160C                     | 178   | 218           | 1.0                      | 1.0  | 160  | 1.0   | 287  |
| SMAJ160A                      | SMAJ160CA                    | 178   | 197           | 1.0                      | 1.0  | 160  | 1.2   | 259  |
| SMAJ170                       | SMAJ170C                     | 189   | 231           | 1.0                      | 1.0  | 170  | 0.99  | 304  |
| SMAJ170A                      | SMAJ170CA                    | 189   | 209           | 1.0                      | 1.0  | 170  | 1.09  | 275  |
| SMAJ188                       | SMAJ188C                     | 209   | 255           | 1.0                      | 1.0  | 188  | 0.90  | 344  |
| SMAJ188A                      | SMAJ188CA                    | 209   | 231           | 1.0                      | 1.0  | 188  | 0.91  | 328  |

备注: Notes:

(1) 脉冲测试:  $t_p \leq 50\text{ms}$  Pulse test:  $t_p \leq 50\text{ms}$

(2) 浪涌电流波形, 如图3, 功率降额曲线如图2.

Surge current waveform per Fig. 3 and derated per Fig.2.

(3) 对于双向型,  $V_{WM}$ 在10V及10V以下,  $I_R$ 值加倍

For bi-directional types having  $V_{WM}$  of 10 V and less, the  $I_R$  limit is doubled

(4) 对于双向SMAJ5.0CA,  $V_{BR}$ 最大值为7.25V

For the bi-directional SMAJ5.0CA, the maximum  $V_{BR}$  is 7.25 V



## ■特性曲线（典型） Characteristics(Typical)

图1：最大脉冲功率曲线

FIG1: Peak Pulse Power Rating Curve

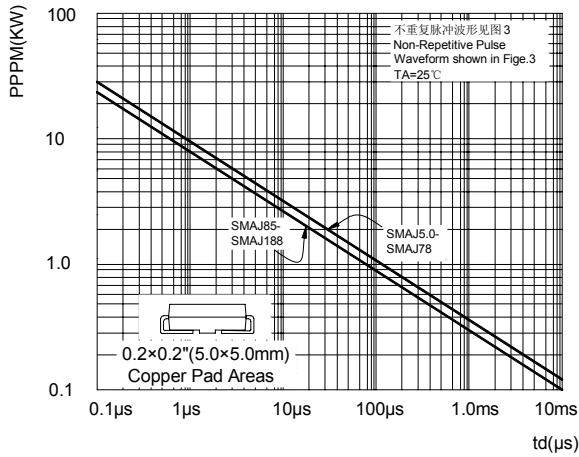


图2：脉冲功率或电流与结温关系

FIG2: Pulse Power or Current vs. Initial Junction Temperature

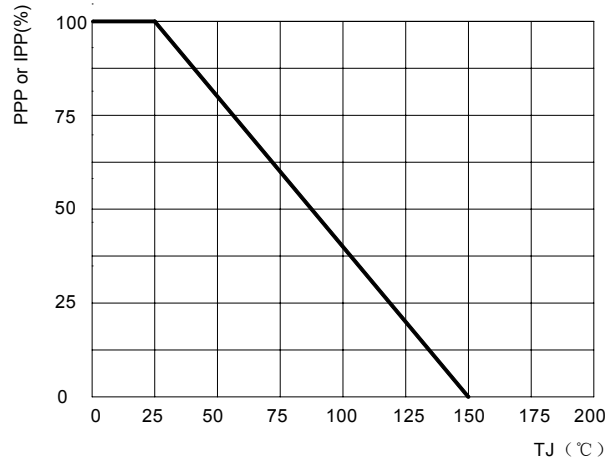


图3：脉冲波形

FIG3: Pulse Waveform

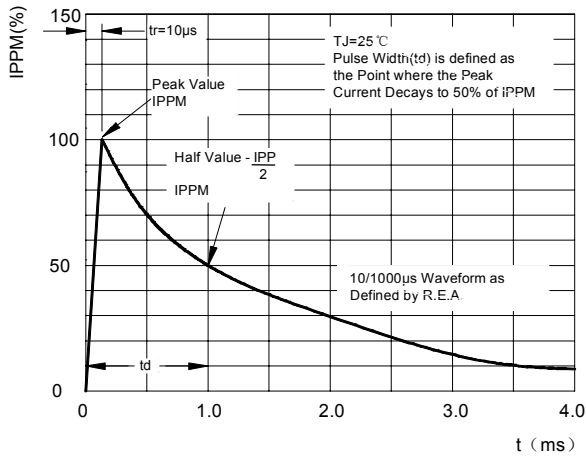


图4：典型瞬态热阻

FIG4: Typical Transient Thermal Impedance

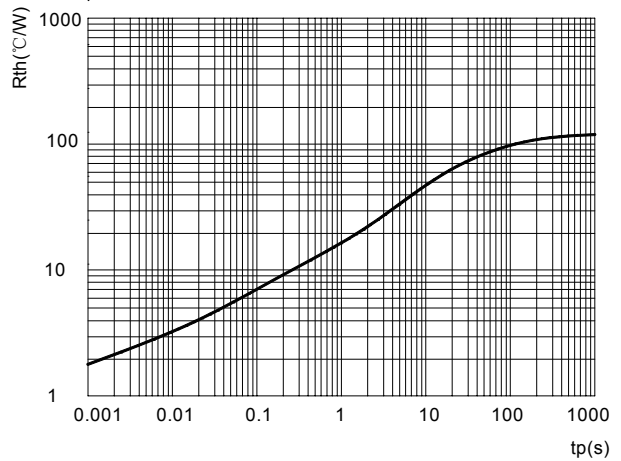


图5：最大不重复浪涌电流

FIG5: Maximum Non-Repetitive Surge Current

