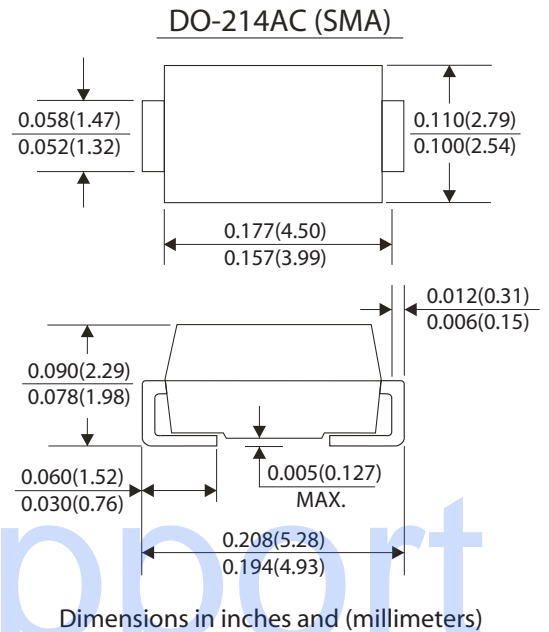


### Features

- Plastic package has Underwriters Laboratory flammability classification 94V-0
- Optimized for LAN protection applications
- Ideal for ESD protection of data lines in accordance with IEC 1000-4-2 (IEC801-2)
- Ideal for EFT protection of data lines in accordance with IEC 1000-4-4 (IEC801-4)
- Low profile package with built-in strain relief for surface mounted applications
- Glass passivated junction
- Low incremental surge resistance, excellent clamping capability
- 400W peak pulse power capability with a 10/1000 $\mu$ S waveform, repetition rate(duty cycle) : 0.01% (300W above 78V)
- Very fast response time
- High temperature soldering guaranteed : 250 °C /10 seconds at terminals

### Mechanical Data

- Case : JEDEC DO-214AC(SMA) molded plastic over passivated chip
- Terminals : Solder plated , solderable per MIL-STD-750, method 2026
- Polarity : For uni-directional types the band denotes the cathode, which is positive with respect to the anode under normal TVS operation
- Mounting Position : Any
- Weight : 0.002 ounce, 0.064 gram



### Devices For Bidirectional Applications

- For bi-directional devices, use suffix C or CA (e.g. SMAJ10C, SMAJ10CA). Electrical characteristics apply in both directions.

### Maximum Ratings And Electrical Characteristics

(Ratings at 25 °C ambient temperature unless otherwise specified)

|  | Symbols                          | Values         | Units |
|--|----------------------------------|----------------|-------|
| Peak pulse power dissipation with a 10/1000 $\mu$ S waveform (Note 1,2, Fig. 1)      | PPPM                             | 400            | Watts |
| Peak pulse current with a waveform (Note 1)  | IPPM                             | See next table | Amps  |
| Peak forward surge current, 8.3mm single half sine-wave unidirectional only (Note 2) | IFSM                             | 40             | Amps  |
| Typical thermal resistance, junction to ambient (Note 3)                             | R $\theta$ JA                    | 120            | °C/W  |
| Typical thermal resistance, junction to lead   | R $\theta$ JL                    | 30             | °C/W  |
| Operating junction and storage temperature range                                     | T <sub>J</sub> ,T <sub>STG</sub> | -55 to +150    | °C    |

#### Notes:

- (1) Non repetitive current pulse, per Fig.3 and derated above T<sub>A</sub>=25 °C per Fig.2 Rating is 300W above 78V
- (2) Mounted on 0.2×0.2"(5.0×5.0mm) copper pads to each terminal
- (3) Mounted on minimum recommended pad layout



## ELECTRICAL CHARACTERISTIC

Ratings at 25°C ambient temperature unless otherwise specified. VF=3.5V at IF=25A (uni-directional only)

| Device Type                | Device Marking Code |    | Breakdown Voltage $V_{(BR)}$ at $I_T^{(1)}$ (V) |      | Test Current $I_T$ (mA) | Stand-off Voltage $V_{WM}$ (V) | Maximum Reverse Leakage at $V_{WM}$ $I_D$ ( $\mu$ A) <sup>(3)</sup> | Maximum Peak Pulse Surge Current $I_{PPM}$ (A) <sup>(2)</sup> | Maximum Clamping Voltage at $I_{PPM}$ $V_C$ (V) |
|----------------------------|---------------------|----|---|------|-------------------------|--------------------------------|---|---|---|
|                            | UNI                 | BI | Min   | Max  |                         |                                |   |   |   |
| SMAJ5.0(C)                 | AD                  | WD | 6.40  | 7.82 | 10                      | 5.0                            | 800   | 41.7  | 9.6   |
| SMAJ5.0(C)A <sup>(5)</sup> | AE                  | WE | 6.40  | 7.07 | 10                      | 5.0                            | 800   | 43.5  | 9.2   |
| SMAJ6.0(C)                 | AF                  | WF | 6.67  | 8.15 | 10                      | 6.0                            | 800   | 35.1  | 11.4  |
| SMAJ6.0(C)A                | AG                  | WG | 6.67  | 7.37 | 10                      | 6.0                            | 800   | 38.8  | 10.3  |
| SMAJ6.5(C)                 | AH                  | WH | 7.22  | 8.82 | 10                      | 6.5                            | 500   | 32.5  | 12.3  |
| SMAJ6.5(C)A                | AK                  | WK | 7.22  | 7.98 | 10                      | 6.5                            | 500   | 35.7  | 11.2  |
| SMAJ7.0(C)                 | AL                  | WL | 7.78  | 9.51 | 10                      | 7.0                            | 200   | 30.1  | 13.3  |
| SMAJ7.0(C)A                | AM                  | WM | 7.78  | 8.60 | 10                      | 7.0                            | 200   | 33.3  | 12.0  |
| SMAJ7.5(C)                 | AN                  | WN | 8.33  | 10.2 | 1.0                     | 7.5                            | 100   | 28.0  | 14.3  |
| SMAJ7.5(C)A                | AP                  | WP | 8.33  | 9.21 | 1.0                     | 7.5                            | 100   | 31.0  | 12.9  |
| SMAJ8.0(C)                 | AQ                  | WQ | 8.89  | 10.9 | 1.0                     | 8.0                            | 50  | 26.7  | 15.0  |
| SMAJ8.0(C)A                | AR                  | WR | 8.89  | 9.83 | 1.0                     | 8.0                            | 50  | 29.4  | 13.6  |
| SMAJ8.5(C)                 | AS                  | WS | 9.44  | 11.5 | 1.0                     | 8.5                            | 10  | 25.2  | 15.9  |
| SMAJ8.5(C)A                | AT                  | WT | 9.44  | 10.4 | 1.0                     | 8.5                            | 10  | 27.8  | 14.4  |
| SMAJ9.0(C)                 | AU                  | WU | 10.0  | 12.2 | 1.0                     | 9.0                            | 5.0   | 23.7  | 16.9  |
| SMAJ9.0(C)A                | AV                  | WV | 10.0  | 11.1 | 1.0                     | 9.0                            | 5.0   | 26.0  | 15.4  |
| SMAJ10(C)                  | AW                  | WW | 11.1  | 13.6 | 1.0                     | 10                             | 1.0   | 21.3  | 18.8  |
| SMAJ10(C)A                 | AX                  | WX | 11.1  | 12.3 | 1.0                     | 10                             | 1.0   | 23.5  | 17.0  |
| SMAJ11(C)                  | AY                  | WY | 12.2  | 14.9 | 1.0                     | 11                             | 1.0   | 19.9  | 20.1  |
| SMAJ11(C)A                 | AZ                  | WZ | 12.2  | 13.5 | 1.0                     | 11                             | 1.0   | 22.0  | 18.2  |
| SMAJ12(C)                  | BD                  | XD | 13.3  | 16.3 | 1.0                     | 12                             | 1.0   | 18.2  | 22.0  |
| SMAJ12(C)A                 | BE                  | XE | 13.3  | 14.7 | 1.0                     | 12                             | 1.0   | 20.1  | 19.9  |
| SMAJ13(C)                  | BF                  | XF | 14.4  | 17.6 | 1.0                     | 13                             | 1.0   | 16.8  | 23.8  |
| SMAJ13(C)A                 | BG                  | XG | 14.4  | 15.9 | 1.0                     | 13                             | 1.0   | 18.6  | 21.5  |
| SMAJ14(C)                  | BH                  | XH | 15.6  | 19.1 | 1.0                     | 14                             | 1.0   | 15.5  | 25.8  |
| SMAJ14(C)A                 | BK                  | XK | 15.6  | 17.2 | 1.0                     | 14                             | 1.0   | 17.2  | 23.2  |
| SMAJ15(C)                  | BL                  | XL | 16.7  | 20.4 | 1.0                     | 15                             | 1.0   | 14.9  | 26.9  |
| SMAJ15(C)A                 | BM                  | XM | 16.7  | 18.5 | 1.0                     | 15                             | 1.0   | 16.4  | 24.4  |
| SMAJ16(C)                  | BN                  | XN | 17.8  | 21.8 | 1.0                     | 16                             | 1.0   | 13.9  | 28.8  |
| SMAJ16(C)A                 | BP                  | XP | 17.8  | 19.7 | 1.0                     | 16                             | 1.0   | 15.4  | 26.0  |
| SMAJ17(C)                  | BQ                  | XQ | 18.9  | 23.1 | 1.0                     | 17                             | 1.0   | 13.1  | 30.5  |
| SMAJ17(C)A                 | BR                  | XR | 18.9  | 20.9 | 1.0                     | 17                             | 1.0   | 14.5  | 27.6  |
| SMAJ18(C)                  | BS                  | XS | 20.0  | 24.4 | 1.0                     | 18                             | 1.0   | 12.4  | 32.2  |
| SMAJ18(C)A                 | BT                  | XT | 20.0  | 22.1 | 1.0                     | 18                             | 1.0   | 13.7  | 29.2  |
| SMAJ20(C)                  | BU                  | XU | 22.2  | 27.1 | 1.0                     | 20                             | 1.0   | 11.2  | 35.8  |
| SMAJ20(C)A                 | BV                  | XV | 22.2  | 24.5 | 1.0                     | 20                             | 1.0   | 12.3  | 32.4  |
| SMAJ22(C)                  | BW                  | XW | 24.4  | 29.8 | 1.0                     | 22                             | 1.0   | 10.2  | 39.4  |
| SMAJ22(C)A                 | BX                  | XX | 24.4  | 26.9 | 1.0                     | 22                             | 1.0   | 11.3  | 35.5  |
| SMAJ24(C)                  | BY                  | XY | 26.7  | 32.6 | 1.0                     | 24                             | 1.0   | 9.3   | 43.0  |
| SMAJ24(C)A                 | BZ                  | XZ | 26.7  | 29.5 | 1.0                     | 24                             | 1.0   | 10.3  | 38.9  |
| SMAJ26(C)                  | CD                  | YD | 28.9  | 35.3 | 1.0                     | 26                             | 1.0   | 8.6   | 46.6  |
| SMAJ26(C)A                 | CE                  | YE | 28.9  | 31.9 | 1.0                     | 26                             | 1.0   | 9.5   | 42.1  |
| SMAJ28(C)                  | CF                  | YF | 31.1  | 38.0 | 1.0                     | 28                             | 1.0   | 8.0   | 50.0  |
| SMAJ28(C)A                 | CG                  | YF | 31.1  | 34.4 | 1.0                     | 28                             | 1.0   | 8.8   | 45.4  |
| SMAJ30(C)                  | CH                  | YH | 33.3  | 40.7 | 1.0                     | 30                             | 1.0   | 7.5   | 53.5  |
| SMAJ30(C)A                 | CK                  | YK | 33.3  | 36.8 | 1.0                     | 30                             | 1.0   | 8.3   | 48.4  |

Notes: (1) Pulse test:  $t_p \leq 50$ ms

(2) Surge current waveform per Fig. 3 and derate per Fig. 2

(3) For bi-directional types having  $V_{WM}$  of 10 Volts and less, the  $I_D$  limit is doubled

(4) All terms and symbols are consistent with ANSI/IEEE C62.35

(5) For the bidirectional SMAJ5.0CA, the maximum  $V_{(BR)}$  is 7.25V.



## ELECTRICAL CHARACTERISTIC

Ratings at 25 °C ambient temperature unless otherwise specified. VF=3.5V at IF=25A (uni-directional only)

| Device Type | Device Marking Code |    | Breakdown Voltage $V_{(BR)}$ at $I_T^{(1)}$ (V) |      | Test Current $I_T$ (mA) | Stand-off Voltage $V_{WM}$ (V) | Maximum Reverse Leakage at $V_{WM}$ $I_D$ (µA) <sup>(3)</sup> | Maximum Peak Pulse Surge Current $I_{PPM}$ (A) <sup>(2)</sup> | Maximum Clamping Voltage at $I_{PPM}$ $V_C$ (V) |
|-------------|---------------------|----|---|------|-------------------------|--------------------------------|---|---|---|
|             | UNI                 | BI | Min   | Max  |                         |                                |   |   |   |
| SMAJ33(C)   | CL                  | YL | 36.7  | 44.9 | 1.0                     | 33                             | 1.0   | 6.8   | 59.0  |
| SMAJ33(C)A  | CM                  | YM | 36.7  | 40.6 | 1.0                     | 33                             | 1.0   | 7.5   | 53.3  |
| SMAJ36(C)   | CN                  | YN | 40.0  | 48.9 | 1.0                     | 36                             | 1.0   | 6.2   | 64.3  |
| SMAJ36(C)A  | CP                  | YP | 40.0  | 44.2 | 1.0                     | 36                             | 1.0   | 6.9   | 58.1  |
| SMAJ40(C)   | CQ                  | YQ | 44.4  | 54.3 | 1.0                     | 40                             | 1.0   | 5.6   | 71.4  |
| SMAJ40(C)A  | CR                  | YR | 44.4  | 49.1 | 1.0                     | 40                             | 1.0   | 6.2   | 64.5  |
| SMAJ43(C)   | CS                  | YS | 47.8  | 58.4 | 1.0                     | 43                             | 1.0   | 5.2   | 76.7  |
| SMAJ43(C)A  | CT                  | YT | 47.8  | 52.8 | 1.0                     | 43                             | 1.0   | 5.8   | 69.4  |
| SMAJ45(C)   | CU                  | YU | 50.0  | 61.1 | 1.0                     | 45                             | 1.0   | 5.0   | 80.3  |
| SMAJ45(C)A  | CV                  | YV | 50.0  | 55.3 | 1.0                     | 45                             | 1.0   | 5.5   | 72.7  |
| SMAJ48(C)   | CW                  | YW | 53.3  | 65.1 | 1.0                     | 48                             | 1.0   | 4.7   | 85.5  |
| SMAJ48(C)A  | CX                  | YX | 53.3  | 58.9 | 1.0                     | 48                             | 1.0   | 5.2   | 77.4  |
| SMAJ51(C)   | CY                  | YY | 56.7  | 69.3 | 1.0                     | 51                             | 1.0   | 4.4   | 91.1  |
| SMAJ51(C)A  | CZ                  | YZ | 56.7  | 62.7 | 1.0                     | 51                             | 1.0   | 4.9   | 82.4  |
| SMAJ54(C)   | RD                  | ZD | 60.0  | 73.3 | 1.0                     | 54                             | 1.0   | 4.2   | 96.3  |
| SMAJ54(C)A  | RE                  | ZE | 60.0  | 66.3 | 1.0                     | 54                             | 1.0   | 4.6   | 87.1  |
| SMAJ58(C)   | RF                  | ZF | 64.4  | 78.7 | 1.0                     | 58                             | 1.0   | 3.9   | 103   |
| SMAJ58(C)A  | RG                  | ZG | 64.4  | 71.2 | 1.0                     | 58                             | 1.0   | 4.3   | 93.6  |
| SMAJ60(C)   | RH                  | ZH | 66.7  | 81.5 | 1.0                     | 60                             | 1.0   | 3.7   | 107   |
| SMAJ60(C)A  | RK                  | ZK | 66.7  | 73.7 | 1.0                     | 60                             | 1.0   | 4.1   | 96.8  |
| SMAJ64(C)   | RL                  | ZL | 71.1  | 86.9 | 1.0                     | 64                             | 1.0   | 3.5   | 114   |
| SMAJ64(C)A  | RM                  | ZM | 71.1  | 78.6 | 1.0                     | 64                             | 1.0   | 3.9   | 103   |
| SMAJ70(C)   | RN                  | ZN | 77.8  | 95.1 | 1.0                     | 70                             | 1.0   | 3.2   | 125   |
| SMAJ70(C)A  | RP                  | ZP | 77.8  | 86.0 | 1.0                     | 70                             | 1.0   | 3.5   | 113   |
| SMAJ75(C)   | RQ                  | ZQ | 83.3  | 102  | 1.0                     | 75                             | 1.0   | 3.0   | 134   |
| SMAJ75(C)A  | RR                  | ZR | 83.3  | 92.1 | 1.0                     | 75                             | 1.0   | 3.3   | 121   |
| SMAJ78(C)   | RS                  | ZS | 86.7  | 106  | 1.0                     | 78                             | 1.0   | 2.9   | 139   |
| SMAJ78(C)A  | RT                  | ZT | 86.7  | 95.8 | 1.0                     | 78                             | 1.0   | 3.2   | 126   |
| SMAJ85(C)   | RU                  | ZU | 94.4  | 115  | 1.0                     | 85                             | 1.0   | 2.0   | 151   |
| SMAJ85(C)A  | RV                  | ZV | 94.4  | 104  | 1.0                     | 85                             | 1.0   | 2.2   | 137   |
| SMAJ90(C)   | RW                  | ZW | 100   | 122  | 1.0                     | 90                             | 1.0   | 1.9   | 160   |
| SMAJ90(C)A  | RX                  | ZX | 100   | 111  | 1.0                     | 90                             | 1.0   | 2.1   | 146   |
| SMAJ100(C)  | RY                  | ZY | 111   | 136  | 1.0                     | 100                            | 1.0   | 1.7   | 179   |
| SMAJ100(C)A | RZ                  | ZZ | 111   | 123  | 1.0                     | 100                            | 1.0   | 1.9   | 162   |
| SMAJ110(C)  | VD                  | VD | 122   | 149  | 1.0                     | 110                            | 1.0   | 1.5   | 196   |
| SMAJ110(C)A | SE                  | VE | 122   | 135  | 1.0                     | 110                            | 1.0   | 1.7   | 177   |
| SMAJ120(C)  | SF                  | VF | 133   | 163  | 1.0                     | 120                            | 1.0   | 1.4   | 214   |
| SMAJ120(C)A | VG                  | VG | 133   | 147  | 1.0                     | 120                            | 1.0   | 1.6   | 193   |
| SMAJ130(C)  | SH                  | VH | 144   | 176  | 1.0                     | 130                            | 1.0   | 1.3   | 231   |
| SMAJ130(C)A | VK                  | VK | 144   | 159  | 1.0                     | 130                            | 1.0   | 1.4   | 209   |
| SMAJ150(C)  | SL                  | VL | 167   | 204  | 1.0                     | 150                            | 1.0   | 1.1   | 268   |
| SMAJ150(C)A | VM                  | VM | 167   | 185  | 1.0                     | 150                            | 1.0   | 1.2   | 243   |
| SMAJ160(C)  | SN                  | VN | 178   | 218  | 1.0                     | 160                            | 1.0   | 1.0   | 287   |
| SMAJ160(C)A | SP                  | VP | 178   | 197  | 1.0                     | 160                            | 1.0   | 1.2   | 259   |
| SMAJ170(C)  | SQ                  | VQ | 189   | 231  | 1.0                     | 170                            | 1.0   | 0.99  | 304   |
| SMAJ170(C)A | SR                  | VR | 189   | 209  | 1.0                     | 170                            | 1.0   | 1.09  | 275   |
| SMAJ188(C)  | ST                  | VT | 209   | 255  | 1.0                     | 188                            | 1.0   | 0.9   | 344   |
| SMAJ188(C)A | SS                  | VS | 209   | 231  | 1.0                     | 188                            | 1.0   | 0.91  | 328   |

Notes: (1) Pulse test:  $t_p \approx 50ms$

(2) Surge current waveform per Fig. 3 and derate per Fig. 2

(3) For bi-directional types having  $V_{WM}$  of 10 Volts and less, the  $I_D$  limit is doubled

(4) All terms and symbols are consistent with ANSI/IEEE C62.35

## RATINGS AND CHARACTERISTIC CURVES SMAJ5.0 THRU SMAJ188CA

Fig. 1 Peak Pulse Power Rating Curve

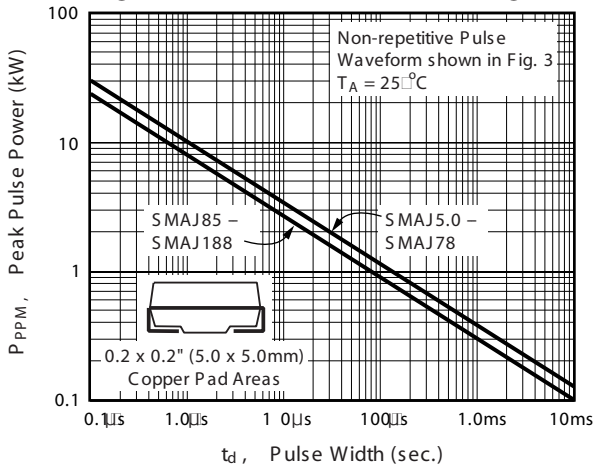


Fig. 2 Pulse Derating Curve

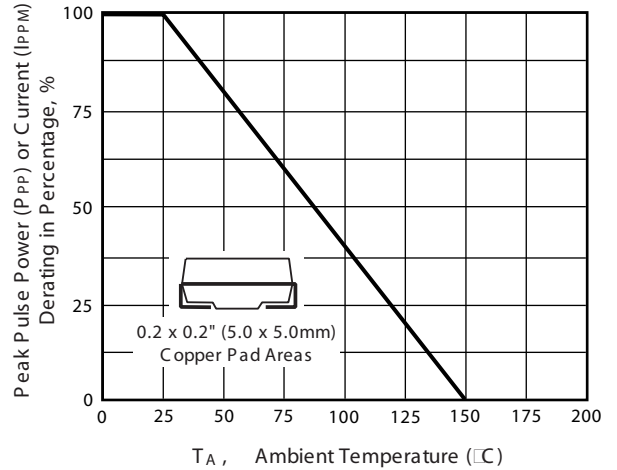


Fig. 3 Pulse Waveform

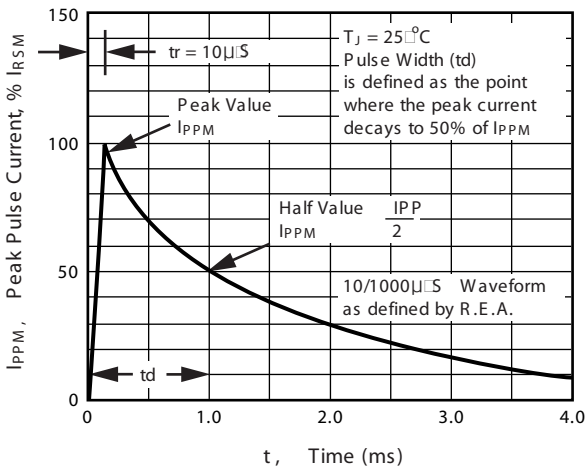


Fig. 4 Typical Junction Capacitance

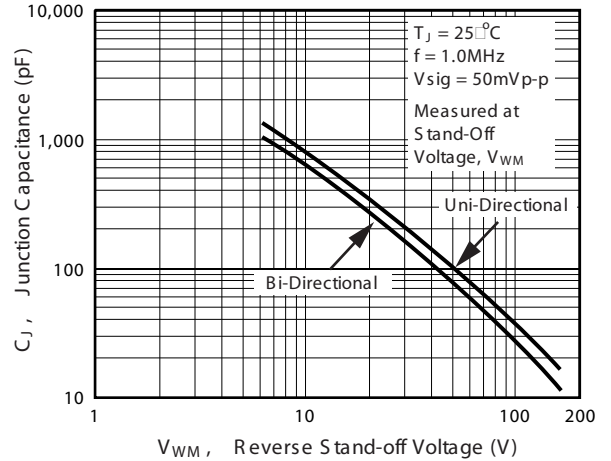


Fig. 5 Typical Transient Thermal Impedance

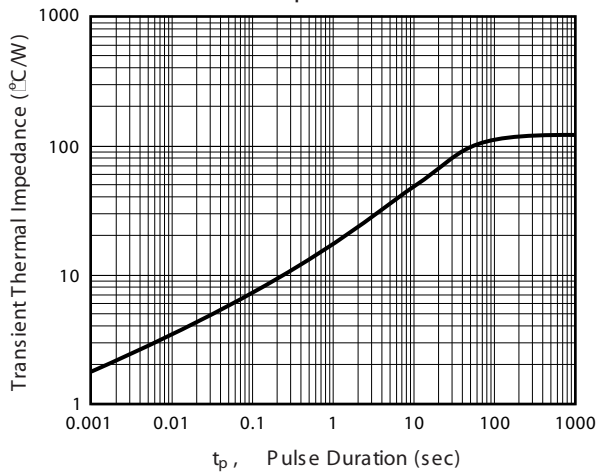


Fig. 6 - Maximum Non-Repetitive Forward Surge Current Uni-Directional Only

