

## N-Channel Enhancement Mode Power MOSFET

## Description

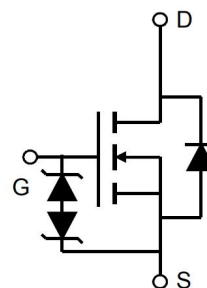
The G1003A uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge. It can be used in a wide variety of applications.

## General Features

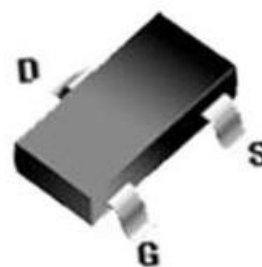
- $V_{DS}$  100V
- $I_D$  (at  $V_{GS} = 10V$ ) 3A
- $R_{DS(ON)}$  (at  $V_{GS} = 10V$ ) < 120m $\Omega$
- $R_{DS(ON)}$  (at  $V_{GS} = 4.5V$ ) < 130m $\Omega$
- 100% Avalanche Tested
- RoHS Compliant
- ESD (HBM) : 5KV

## Application

- Power switch
- DC/DC converters



Schematic diagram



SOT-23-3

## Ordering Information

| Device | Package  | Marking | Packaging    |
|--------|----------|---------|--------------|
| G1003A | SOT-23-3 | G1003A  | 3000pcs/Reel |

Absolute Maximum Ratings  $T_C = 25^\circ\text{C}$ , unless otherwise noted

| Parameter                                        | Symbol         | Value      | Unit             |
|--------------------------------------------------|----------------|------------|------------------|
| Drain-Source Voltage                             | $V_{DS}$       | 100        | V                |
| Continuous Drain Current                         | $I_D$          | 3          | A                |
| Pulsed Drain Current (note1)                     | $I_{DM}$       | 12         | A                |
| Gate-Source Voltage                              | $V_{GS}$       | $\pm 20$   | V                |
| Power Dissipation                                | $P_D$          | 1.5        | W                |
| Single pulse avalanche energy (note2)            | $E_{AS}$       | 7          | mJ               |
| Operating Junction and Storage Temperature Range | $T_J, T_{stg}$ | -55 To 150 | $^\circ\text{C}$ |

## Thermal Resistance

| Parameter                                             | Symbol     | Value | Unit               |
|-------------------------------------------------------|------------|-------|--------------------|
| Thermal Resistance, Junction-to-Ambient, $t \leq 10s$ | $R_{thJA}$ | 83.3  | $^\circ\text{C/W}$ |

**Specifications**  $T_J = 25^\circ\text{C}$ , unless otherwise noted

| Parameter                               | Symbol        | Test Conditions                                   | Value |      |          | Unit       |
|-----------------------------------------|---------------|---------------------------------------------------|-------|------|----------|------------|
|                                         |               |                                                   | Min.  | Typ. | Max.     |            |
| Static Parameters                       |               |                                                   |       |      |          |            |
| Drain-Source Breakdown Voltage          | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = 250\mu A$                     | 100   | --   | --       | V          |
| Zero Gate Voltage Drain Current         | $I_{DSS}$     | $V_{DS} = 100V, V_{GS} = 0V$                      | --    | --   | 1        | $\mu A$    |
| Gate-Source Leakage                     | $I_{GSS}$     | $V_{GS} = \pm 20V$                                | --    | --   | $\pm 30$ | $\mu A$    |
| Gate-Source Threshold Voltage           | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = 250\mu A$                 | 1.0   | 1.7  | 2.5      | V          |
| Drain-Source On-Resistance              | $R_{DS(on)}$  | $V_{GS} = 10V, I_D = 3A$                          | --    | 96   | 120      | m $\Omega$ |
|                                         |               | $V_{GS} = 4.5V, I_D = 3A$                         | --    | 105  | 130      |            |
| Forward Transconductance                | $g_{FS}$      | $V_{GS} = 5V, I_D = 3A$                           | --    | 5    | --       | S          |
| Dynamic Parameters                      |               |                                                   |       |      |          |            |
| Input Capacitance                       | $C_{iss}$     | $V_{GS} = 0V,$<br>$V_{DS} = 50V,$<br>$f = 1.0MHz$ | --    | 532  | --       | pF         |
| Output Capacitance                      | $C_{oss}$     |                                                   | --    | 30   | --       |            |
| Reverse Transfer Capacitance            | $C_{rss}$     |                                                   | --    | 22   | --       |            |
| Total Gate Charge                       | $Q_g$         | $V_{DD} = 50V,$<br>$I_D = 3A,$<br>$V_{GS} = 10V$  | --    | 17   | --       | nC         |
| Gate-Source Charge                      | $Q_{gs}$      |                                                   | --    | 2    | --       |            |
| Gate-Drain Charge                       | $Q_{gd}$      |                                                   | --    | 3    | --       |            |
| Turn-on Delay Time                      | $t_{d(on)}$   | $V_{DD} = 50V,$<br>$I_D = 3A,$<br>$R_G = 3\Omega$ | --    | 5    | --       | ns         |
| Turn-on Rise Time                       | $t_r$         |                                                   | --    | 4    | --       |            |
| Turn-off Delay Time                     | $t_{d(off)}$  |                                                   | --    | 17   | --       |            |
| Turn-off Fall Time                      | $t_f$         |                                                   | --    | 4    | --       |            |
| Drain-Source Body Diode Characteristics |               |                                                   |       |      |          |            |
| Continuous Body Diode Current           | $I_S$         | $T_C = 25^{\circ}C$                               | --    | --   | 3        | A          |
| Body Diode Voltage                      | $V_{SD}$      | $T_J = 25^{\circ}C, I_{SD} = 3A, V_{GS} = 0V$     | --    | --   | 1.2      | V          |
| Reverse Recovery Charge                 | $Q_{rr}$      | $I_F = 3A, V_{GS} = 0V$<br>$di/dt=100A/us$        | --    | 12   | --       | nC         |
| Reverse Recovery Time                   | $T_{rr}$      |                                                   | --    | 17   | --       | ns         |

**Notes**

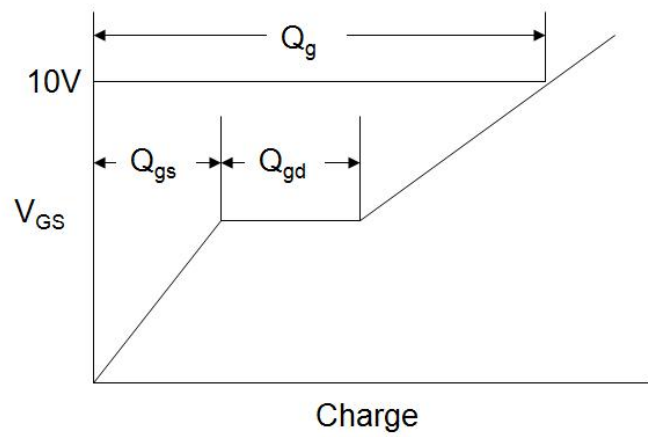
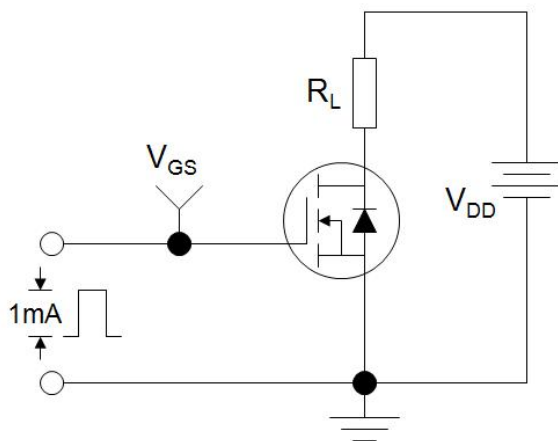
1. Repetitive Rating: Pulse width limited by maximum junction temperature

2. EAS condition :  $T_J = 25^\circ\text{C}, V_{DD} = 50V, V_{GS} = 10V, L = 0.5mH, R_G = 25\Omega$

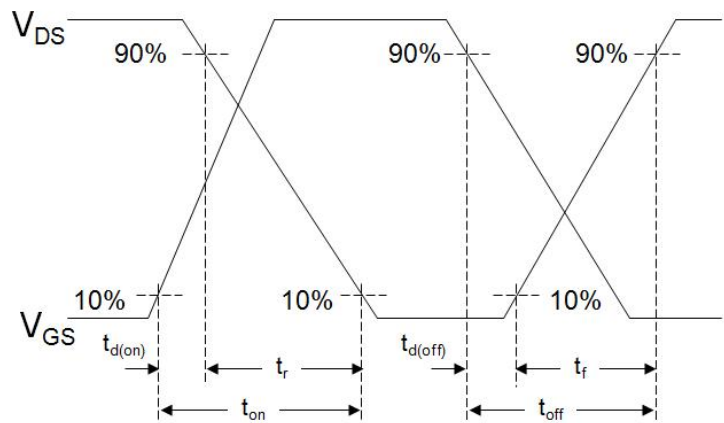
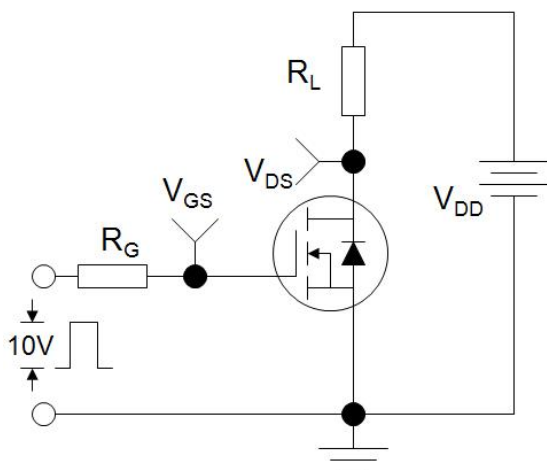
The table shows the minimum avalanche energy, which is 20mJ when the device is tested until failure

3. Identical low side and high side switch with identical  $R_G$

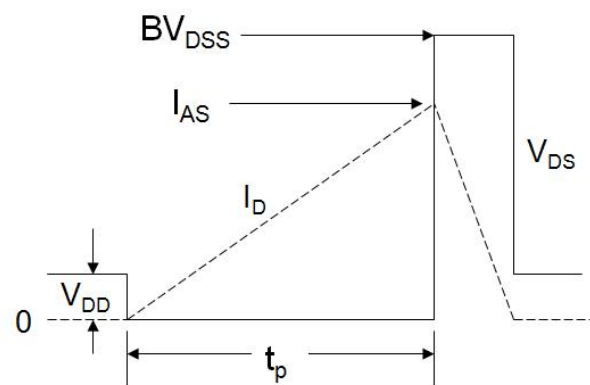
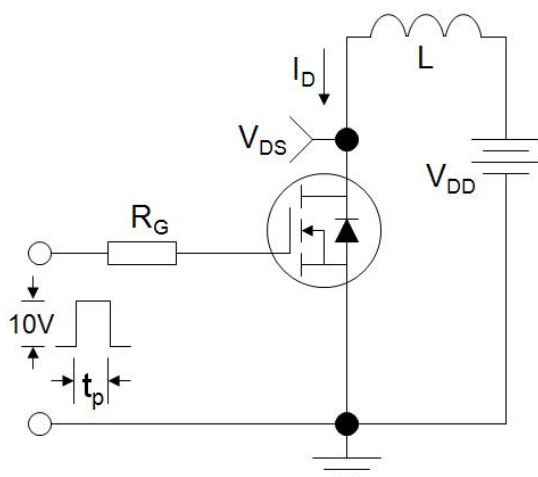
### Gate Charge Test Circuit



### Switch Time Test Circuit

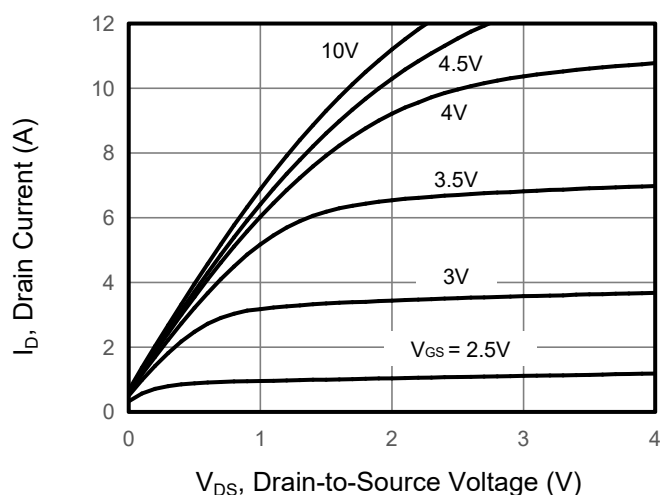


### EAS Test Circuit

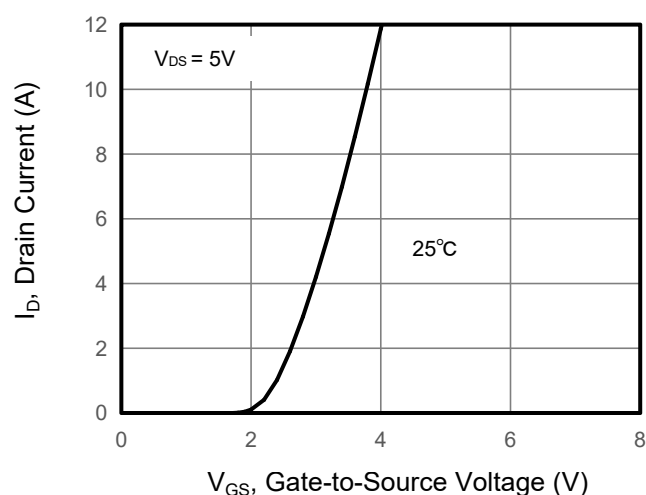


**Typical Characteristics**  $T_J = 25^\circ\text{C}$ , unless otherwise noted

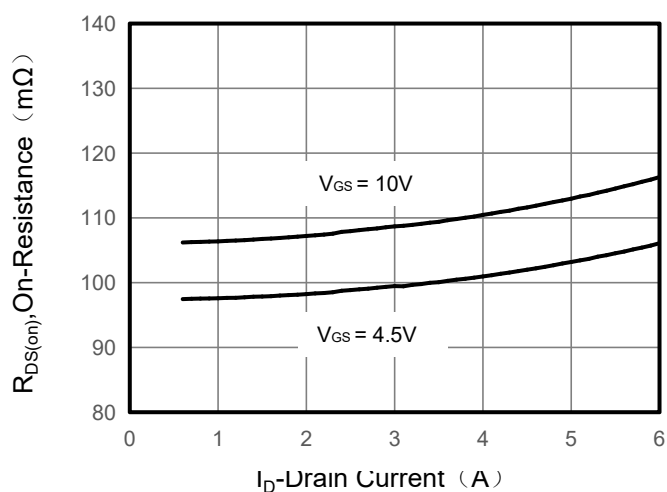
**Figure 1. Output Characteristics**



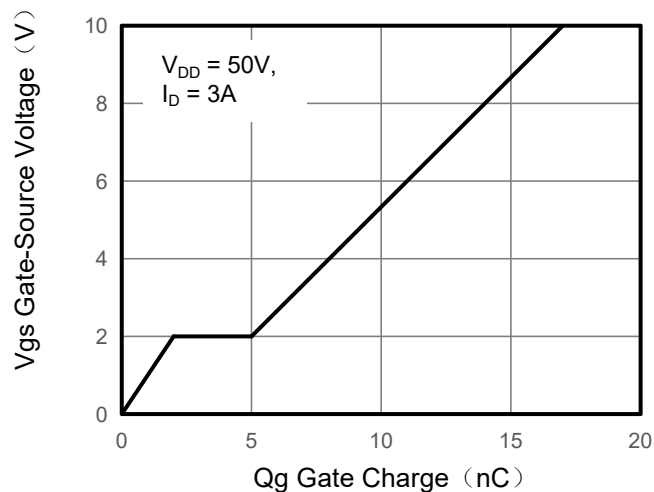
**Figure 2. Transfer Characteristics**



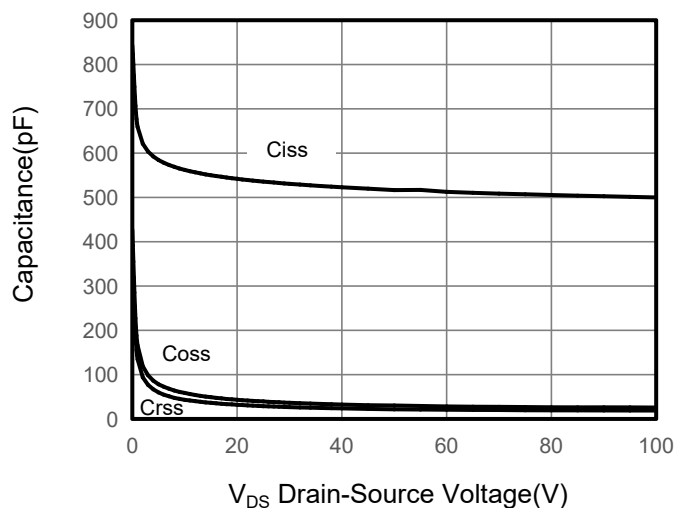
**Figure 3. Drain Source On Resistance**



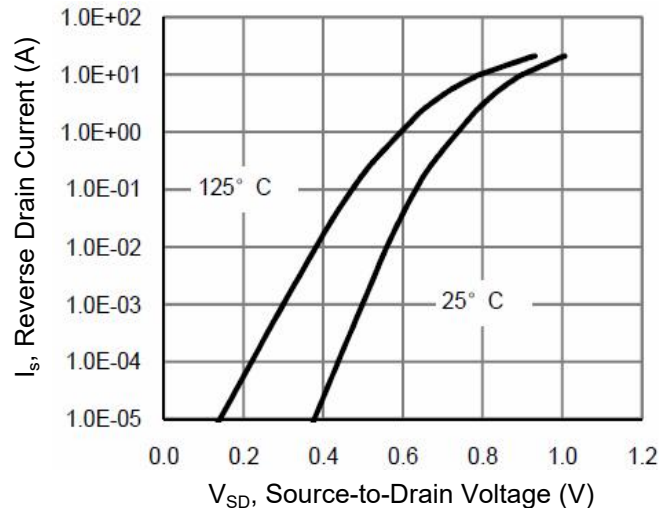
**Figure 4. Gate Charge**



**Figure 5. Capacitance**

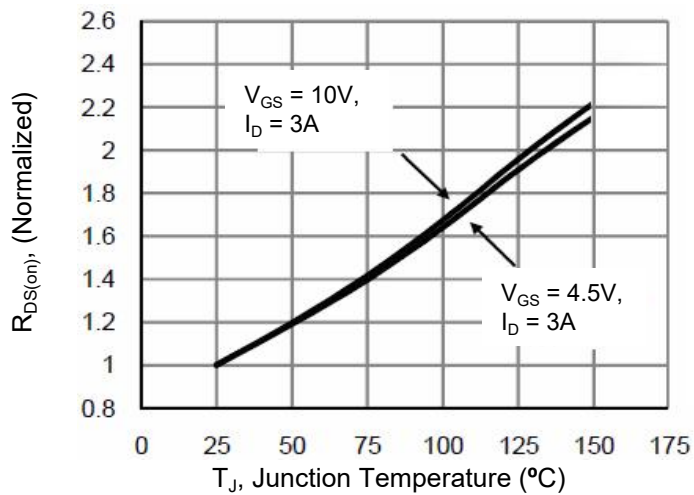


**Figure 6. Source-Drain Diode Forward**

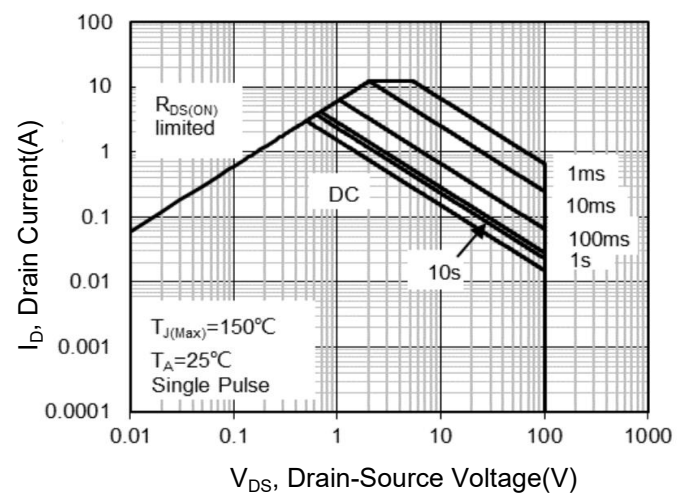


**Typical Characteristics**  $T_J = 25^\circ\text{C}$ , unless otherwise noted

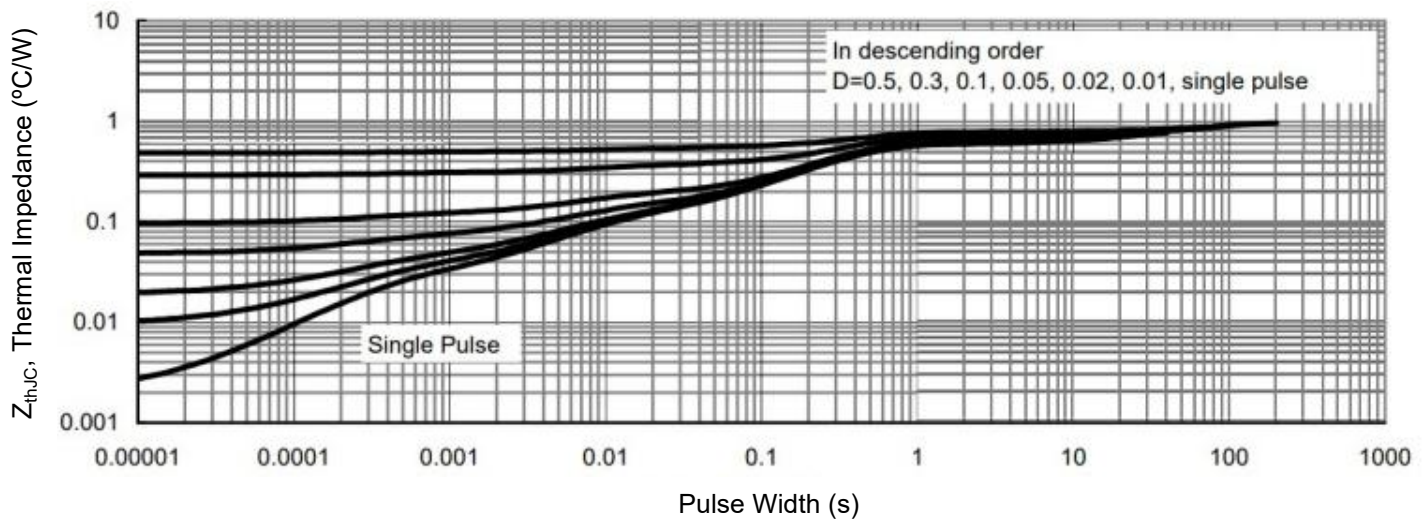
**Figure 7. Drain-Source On-Resistance**



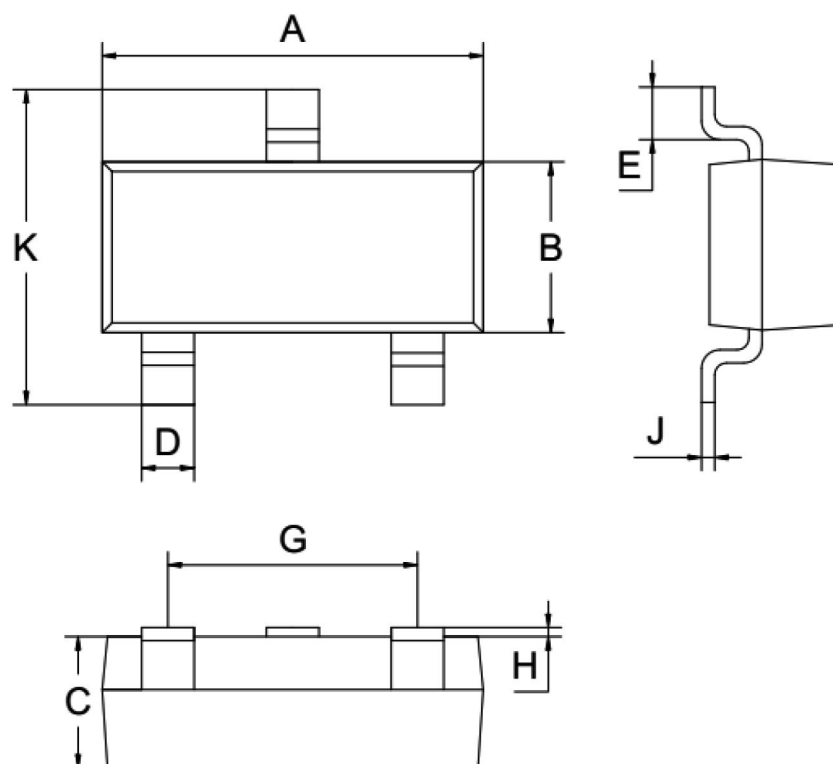
**Figure 8. Safe Operation Area**



**Figure 9. Normalized Maximum Transient Thermal Impedance**



## SOT-23-3 Package Information



| Symbol               | Dimensions in Millimeters |       |       |
|----------------------|---------------------------|-------|-------|
|                      | MIN.                      | NOM.  | MAX.  |
| A                    | 2.80                      | 2.90  | 3.00  |
| B                    | 1.50                      | 1.60  | 1.70  |
| C                    | 1.00                      | 1.10  | 1.20  |
| D                    | 0.30                      | 0.40  | 0.50  |
| E                    | 0.25                      | 0.40  | 0.55  |
| G                    | 1.90                      |       |       |
| H                    | 0.00                      | -     | 0.10  |
| J                    | 0.047                     | 0.127 | 0.207 |
| K                    | 2.60                      | 2.80  | 3.00  |
| All Dimensions in mm |                           |       |       |