

## N-Channel Enhancement Mode Power MOSFET

## Description

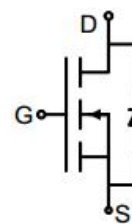
The G070N06TH uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge. It can be used in a wide variety of applications.

## General Features

- $V_{DS}$  60V
- $I_D$  (at  $V_{GS} = 10V$ ) 110A
- $R_{DS(ON)}$  (at  $V_{GS} = 10V$ ) < 6.4m $\Omega$
- 100% Avalanche Tested
- RoHS Compliant

## Application

- Power switch
- DC/DC converters



Schematic diagram



TO-220

## Ordering Information

| Device    | Package | Marking  | Packaging  |
|-----------|---------|----------|------------|
| G070N06TH | TO-220  | G070N06H | 50pcs/Tube |

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

| Parameter                                        | Symbol         | Value      | Unit             |
|--------------------------------------------------|----------------|------------|------------------|
| Drain-Source Voltage                             | $V_{DS}$       | 60         | V                |
| Continuous Drain Current                         | $I_D$          | 110        | A                |
|                                                  |                | 75         |                  |
| Pulsed Drain Current (note1)                     | $I_{DM}$       | 440        | A                |
| Gate-Source Voltage                              | $V_{GS}$       | $\pm 20$   | V                |
| Power Dissipation                                | $P_D$          | 160        | W                |
| Single pulse avalanche energy (note2)            | $E_{AS}$       | 702        | mJ               |
| Operating Junction and Storage Temperature Range | $T_J, T_{stg}$ | -55 To 150 | $^\circ\text{C}$ |

## Thermal Resistance

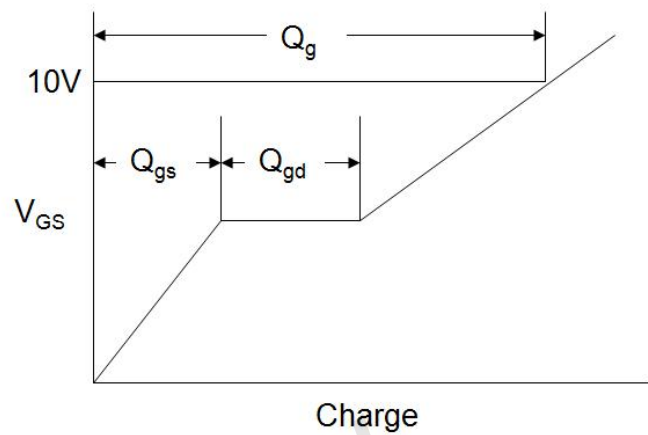
| Parameter                               | Symbol     | Value | Unit               |
|-----------------------------------------|------------|-------|--------------------|
| Thermal Resistance, Junction-to-Ambient | $R_{thJA}$ | 60    | $^\circ\text{C/W}$ |
| Maximum Junction-to-Case                | $R_{thJC}$ | 0.78  | $^\circ\text{C/W}$ |

| Specifications T <sub>J</sub> = 25°C, unless otherwise noted |                      |                                                                          |       |      |      |      |
|--------------------------------------------------------------|----------------------|--------------------------------------------------------------------------|-------|------|------|------|
| Parameter                                                    | Symbol               | Test Conditions                                                          | Value |      |      | Unit |
|                                                              |                      |                                                                          | Min.  | Typ. | Max. |      |
| Static Parameters                                            |                      |                                                                          |       |      |      |      |
| Drain-Source Breakdown Voltage                               | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA                             | 60    | --   | --   | V    |
| Zero Gate Voltage Drain Current                              | I <sub>DSS</sub>     | V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0V                              | --    | --   | 1    | μA   |
| Gate-Source Leakage                                          | I <sub>GSS</sub>     | V <sub>GS</sub> = ±20V                                                   | --    | --   | ±100 | nA   |
| Gate-Source Threshold Voltage                                | V <sub>GS(th)</sub>  | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA               | 2.0   | 3.0  | 4.0  | V    |
| Drain-Source On-Resistance                                   | R <sub>DS(on)</sub>  | V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A                              | --    | 5.1  | 6.4  | mΩ   |
| Forward Transconductance                                     | g <sub>FS</sub>      | V <sub>GS</sub> = 5V, I <sub>D</sub> = 20A                               | --    | 20   | --   | S    |
| Dynamic Parameters                                           |                      |                                                                          |       |      |      |      |
| Input Capacitance                                            | C <sub>iss</sub>     | V <sub>GS</sub> = 0V,<br>V <sub>DS</sub> = 30V,<br>f = 1.0MHz            | --    | 6512 | --   | pF   |
| Output Capacitance                                           | C <sub>oss</sub>     |                                                                          | --    | 360  | --   |      |
| Reverse Transfer Capacitance                                 | C <sub>rss</sub>     |                                                                          | --    | 310  | --   |      |
| Total Gate Charge                                            | Q <sub>g</sub>       | V <sub>DD</sub> = 30V,<br>I <sub>D</sub> = 20A,<br>V <sub>GS</sub> = 10V | --    | 74   | --   | nC   |
| Gate-Source Charge                                           | Q <sub>gs</sub>      |                                                                          | --    | 13   | --   |      |
| Gate-Drain Charge                                            | Q <sub>gd</sub>      |                                                                          | --    | 33   | --   |      |
| Turn-on Delay Time                                           | t <sub>d(on)</sub>   | V <sub>DD</sub> = 30V,<br>I <sub>D</sub> = 20A,<br>R <sub>G</sub> = 6Ω   | --    | 22   | --   | ns   |
| Turn-on Rise Time                                            | t <sub>r</sub>       |                                                                          | --    | 18   | --   |      |
| Turn-off Delay Time                                          | t <sub>d(off)</sub>  |                                                                          | --    | 54   | --   |      |
| Turn-off Fall Time                                           | t <sub>f</sub>       |                                                                          | --    | 23   | --   |      |
| Drain-Source Body Diode Characteristics                      |                      |                                                                          |       |      |      |      |
| Continuous Body Diode Current                                | I <sub>S</sub>       | T <sub>C</sub> = 25°C                                                    | --    | --   | 110  | A    |
| Body Diode Voltage                                           | V <sub>SD</sub>      | T <sub>J</sub> = 25°C, I <sub>SD</sub> = 20A, V <sub>GS</sub> = 0V       | --    | --   | 1.2  | V    |
| Reverse Recovery Charge                                      | Q <sub>rr</sub>      | I <sub>F</sub> = 20A, V <sub>GS</sub> = 0V<br>di/dt=100A/us              | --    | 40   | --   | nC   |
| Reverse Recovery Time                                        | T <sub>rr</sub>      |                                                                          | --    | 33   | --   | ns   |

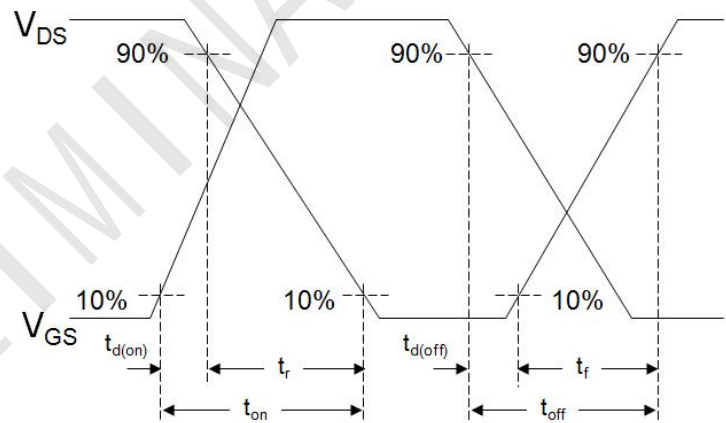
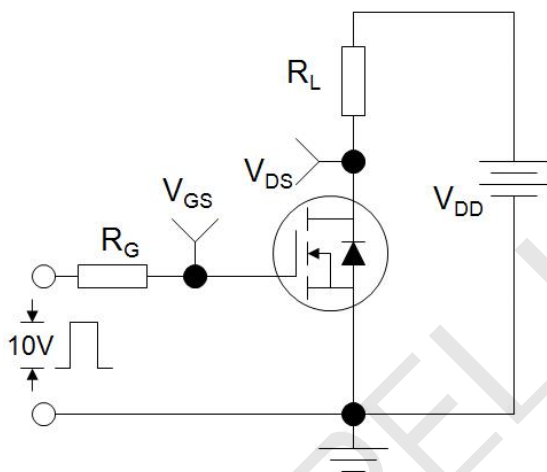
## Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. EAS condition :  $T_J = 25^\circ\text{C}$ ,  $V_{DD} = 50V$ ,  $V_{GS} = 10V$ ,  $L = 0.5mH$ ,  $R_G = 25\Omega$
3. Identical low side and high side switch with identical  $R_G$

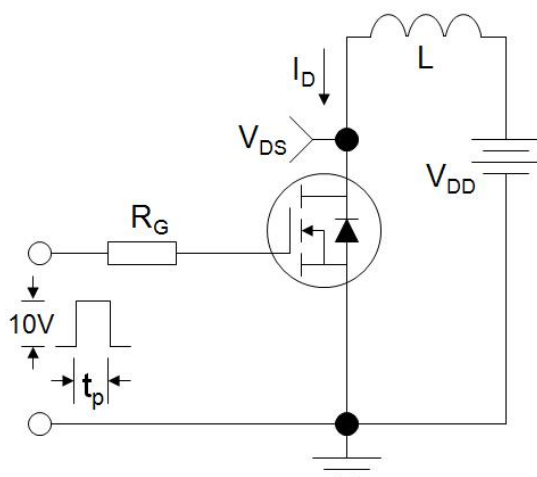
### Gate Charge Test Circuit



### Switch Time Test Circuit



### EAS Test Circuit



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

Figure 1. Output Characteristics

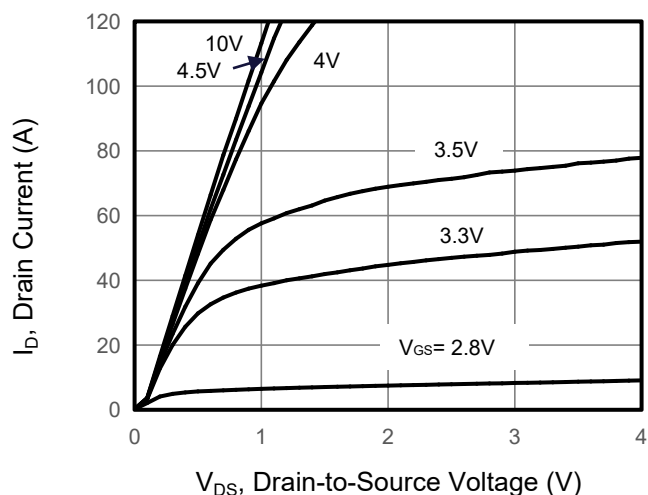


Figure 2. Transfer Characteristics

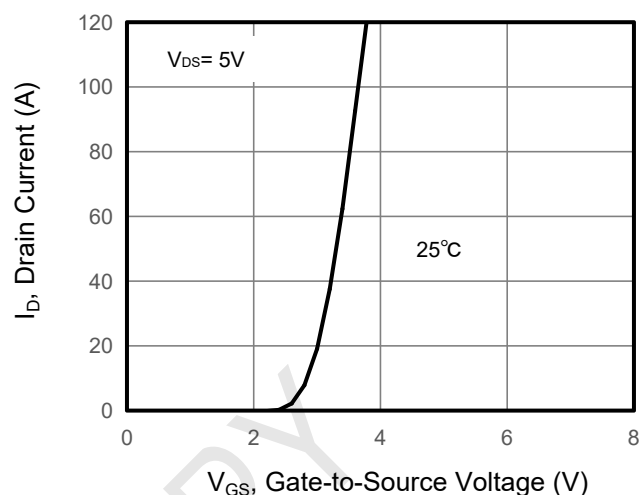


Figure 3. Drain Source On Resistance

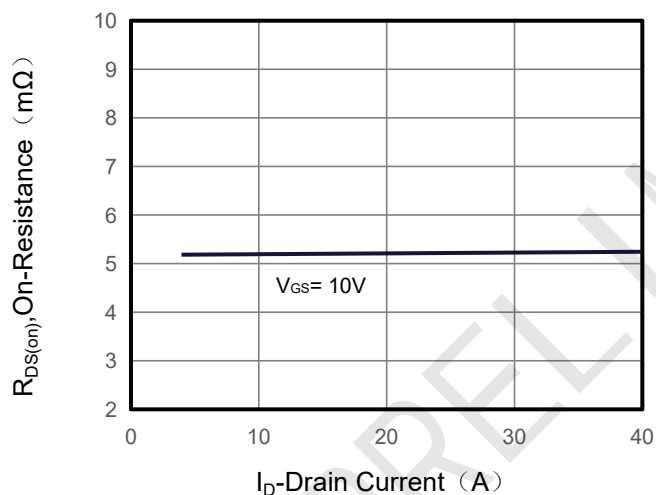


Figure 4. Gate Charge

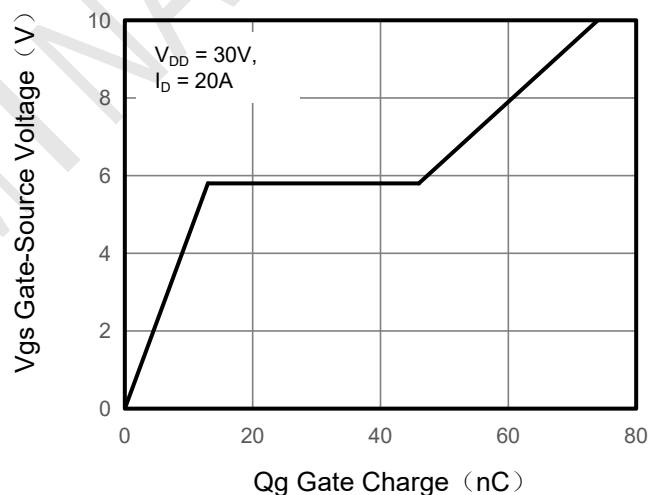


Figure 5. Capacitance

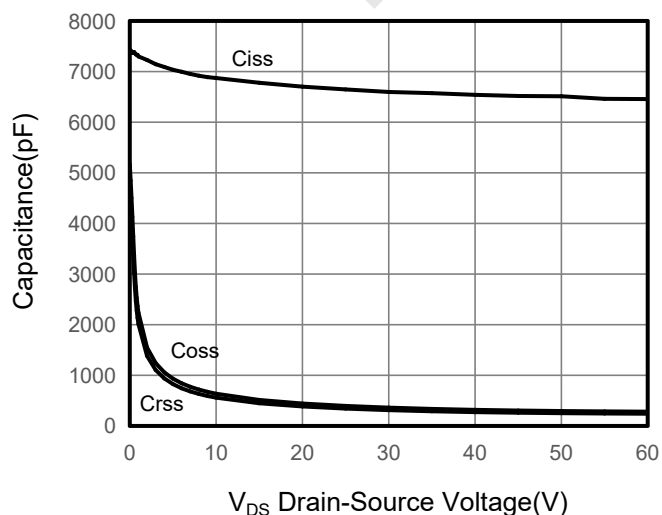
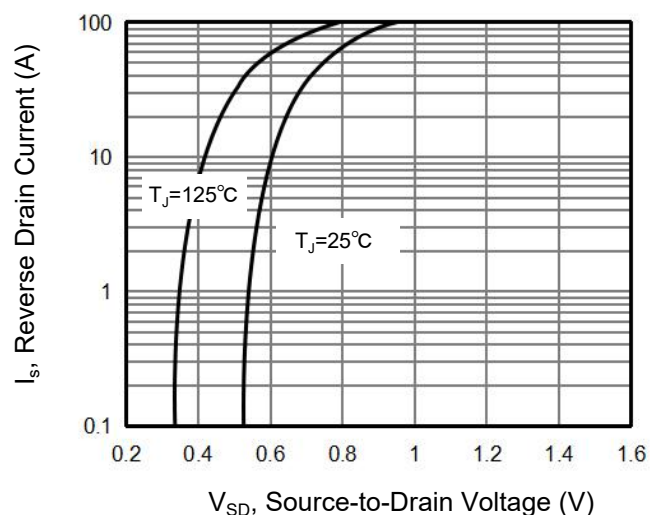
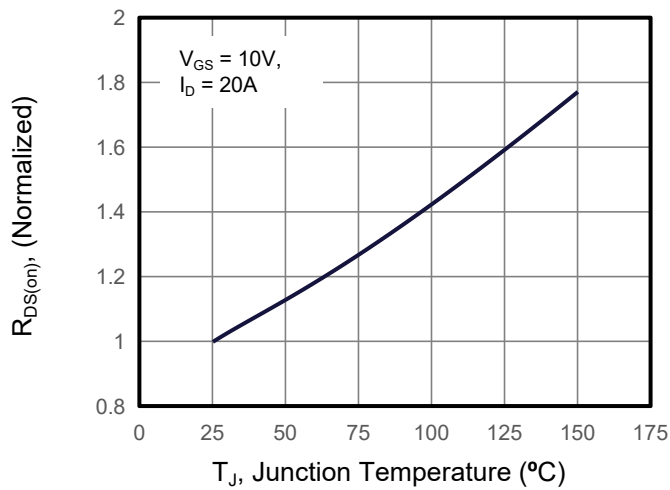


Figure 6. Source-Drain Diode Forward

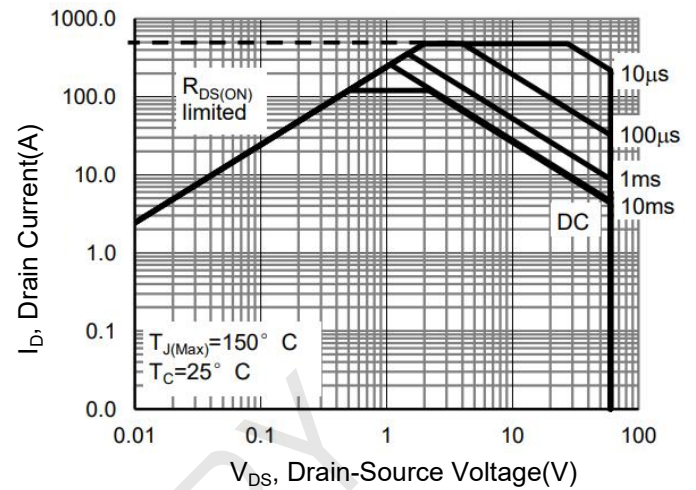


**Typical Characteristics**  $T_J = 25^\circ\text{C}$ , unless otherwise noted

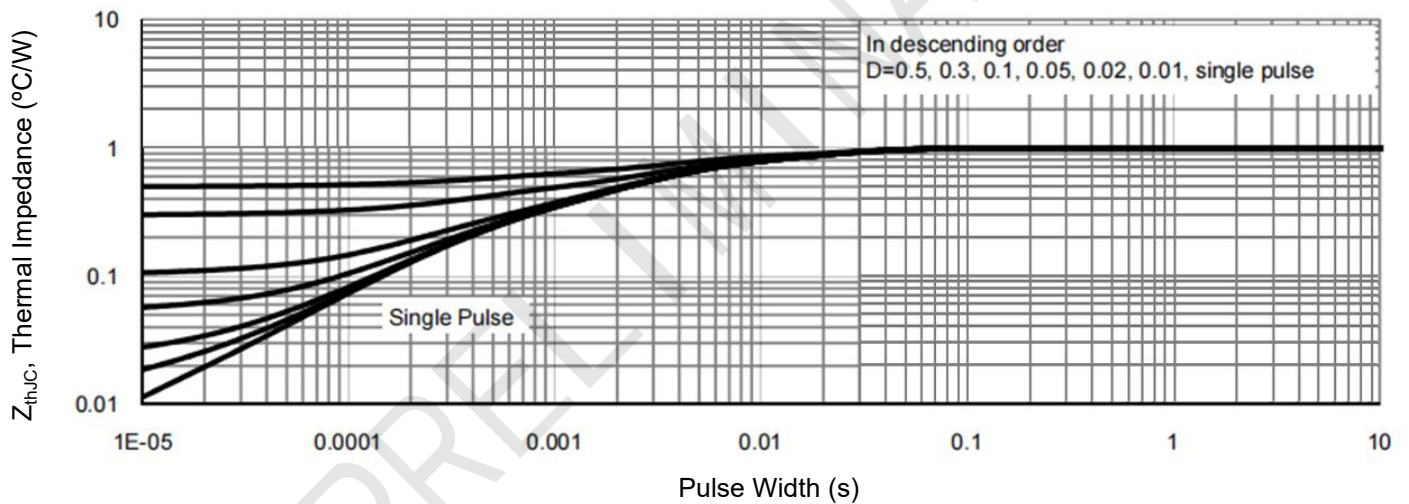
**Figure 7. Drain-Source On-Resistance**



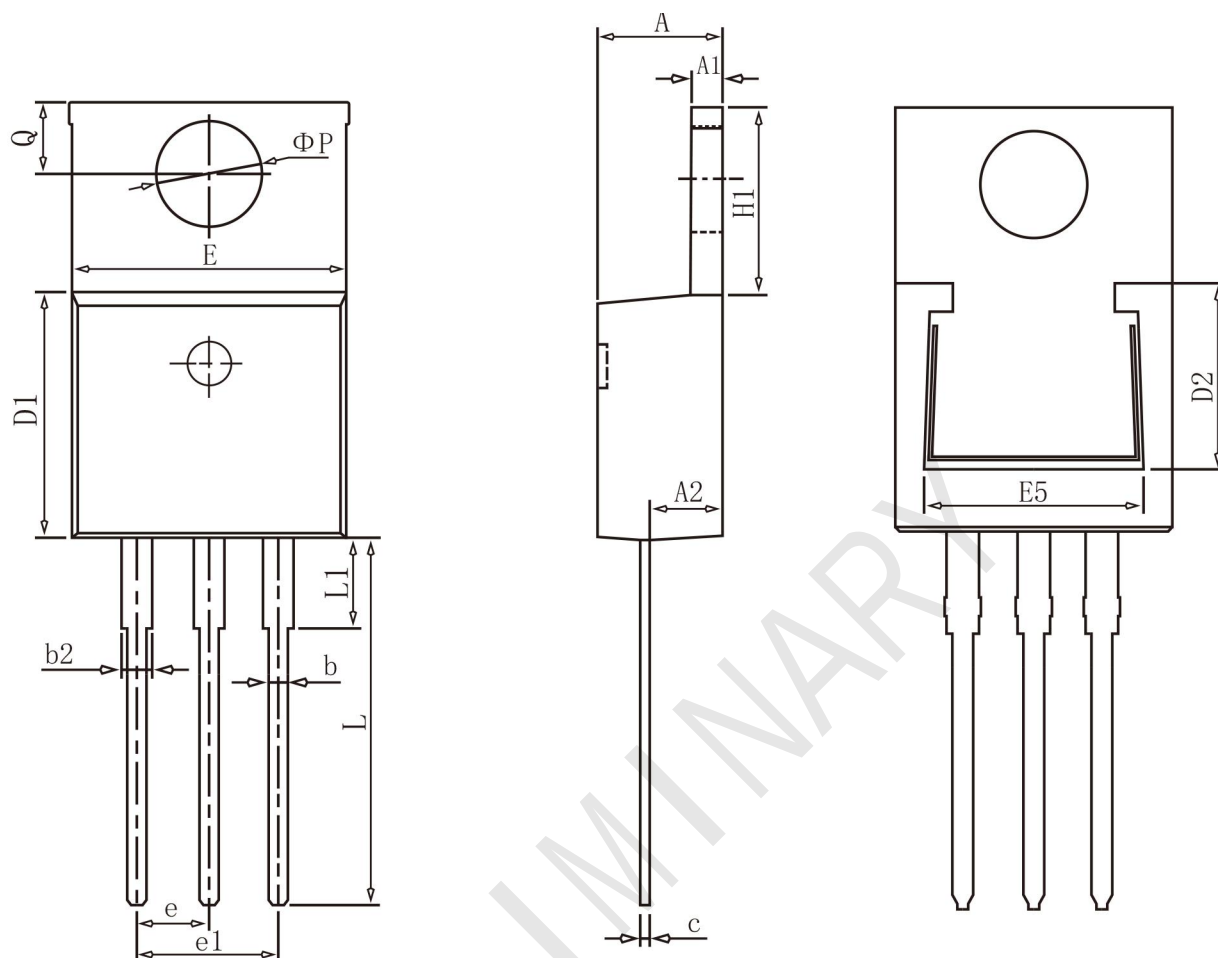
**Figure 8. Safe Operation Area**



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



## TO-220 Package Information



### COMMON DIMENSIONS

| SYMBOL   | mm      |       |       |
|----------|---------|-------|-------|
|          | MIN     | NOM   | MAX   |
| A        | 4.37    | 4.57  | 4.77  |
| A1       | 1.22    | 1.27  | 1.42  |
| A2       | 2.49    | 2.69  | 2.89  |
| b        | 0.75    | 0.81  | 0.96  |
| b2       | 1.22    | 1.27  | 1.47  |
| c        | 0.30    | 0.38  | 0.48  |
| D1       | 8.50    | 8.70  | 8.90  |
| D2       | 5.20    | —     | —     |
| E        | 9.86    | 10.16 | 10.36 |
| E5       | 7.06    | —     | —     |
| e        | 2.54BSC |       |       |
| e1       | 5.08BSC |       |       |
| H1       | 6.10    | 6.30  | 6.50  |
| L        | 13.10   | 13.40 | 13.70 |
| L1       | —       | 3.75  | 4.10  |
| $\Phi P$ | 3.70    | 3.84  | 3.99  |
| Q        | 2.54    | 2.74  | 2.94  |