# N-Channel Enhancement Mode Power MOSFET

## Description

The 18N10A uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. It can be used in a wide variety of applications.

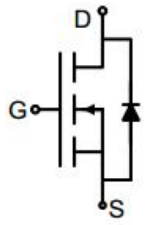
AEC-Q101 Qualified

## General Features

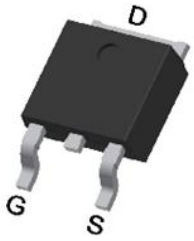
- $V_{DS}$ 100V
- $I_D$ (at $V_{GS}$ = 10V) 35A
- $R_{DS(ON)}$ (at $V_{GS}$ = 10V) < 53mΩ
- $R_{DS(ON)}$ (at $V_{GS}$ = 4.5V) < 63mΩ
- 100% Avalanche Tested
- RoHS Compliant

## Application

- Power switch
- DC/DC converters




Schematic diagram




TO-252

## Ordering Information

| Device | Package | Marking | Packaging |
|---|---|---|---|
| 18N10A | TO-252 | 18N10 | 2500pcs/Reel |

## Absolute Maximum Ratings $T_C$ = 25ºC, unless otherwise noted

| Parameter | | Symbol | Value | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 100 | V |
| Continuous Drain Current | $T_C$ = 25ºC | $I_D$ | 35 | A |
| | $T_C$ = 100ºC | | 22 | |
| Pulsed Drain Current (note1) | | $I_{DM}$ | 140 | A |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | V |
| Power Dissipation | | $P_D$ | 80 | W |
| Single pulse avalanche energy （note2） | | $E_{AS}$ | 30 | mJ |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{stg}$ | -55 To 150 | ºC |

## Thermal Resistance

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Thermal Resistance, Junction-to-Ambient | $R_{thJA}$ | 50 | ºC/W |
| Maximum Junction-to-Case | $R_{thJC}$ | 1.56 | ºC/W |

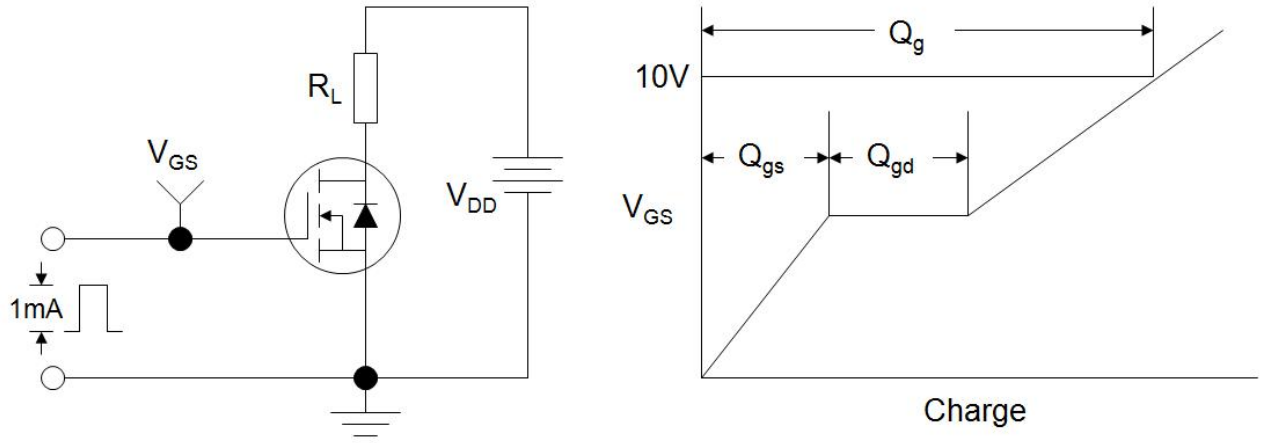
**Specifications** $T_J$ = 25ºC, unless otherwise noted

| Parameter | Symbol | Test Conditions | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| **Static Parameters** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0V, $I_D$ = 250μA | 100 | -- | -- | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 100V, $V_{GS}$ = 0V | -- | -- | 1 | μA |
| Gate-Source Leakage | $I_{GSS}$ | $V_{GS}$ = ±20V | -- | -- | ±100 | nA |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA | 1.5 | 2.0 | 2.5 | V |
| Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}$ = 10V, $I_D$ = 10A | -- | 36 | 53 | mΩ |
| | | $V_{GS}$ = 4.5V, $I_D$ = 8A | -- | 39 | 63 | |
| Forward Transconductance | $g_{FS}$ | $V_{GS}$ = 5V, $I_D$ = 10A | -- | 18 | -- | S |
| **Dynamic Parameters** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{GS}$ = 0V, $V_{DS}$ = 50V, f = 1.0MHz | -- | 2161 | -- | pF |
| Output Capacitance | $C_{oss}$ | | -- | 54 | -- | |
| Reverse Transfer Capacitance | $C_{rss}$ | | -- | 53 | -- | |
| Total Gate Charge | $Q_g$ | $V_{DD}$ = 50V, $I_D$ = 10A, $V_{GS}$ = 10V | -- | 26 | -- | nC |
| Gate-Source Charge | $Q_{gs}$ | | -- | 7.4 | -- | |
| Gate-Drain Charge | $Q_{gd}$ | | -- | 3.8 | -- | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$ = 50V, $I_D$ = 10A, $R_G$ = 1.6Ω | -- | 6 | -- | ns |
| Turn-on Rise Time | $t_r$ | | -- | 2 | -- | |
| Turn-off Delay Time | $t_{d(off)}$ | | -- | 18 | -- | |
| Turn-off Fall Time | $t_f$ | | -- | 2 | -- | |
| **Drain-Source Body Diode Characteristics** | | | | | | |
| Continuous Body Diode Current | $I_S$ | $T_C$ = 25ºC | -- | -- | 35 | A |
| Body Diode Voltage | $V_{SD}$ | $T_J$ = 25ºC, $I_{SD}$ = 10A, $V_{GS}$ = 0V | -- | -- | 1.2 | V |
| Reverse Recovery Charge | Qrr | $I_F$ = 10A, $V_{GS}$ = 0V di/dt=500A/us | -- | 98 | -- | nC |
| Reverse Recovery Time | Trr | | -- | 26 | -- | ns |

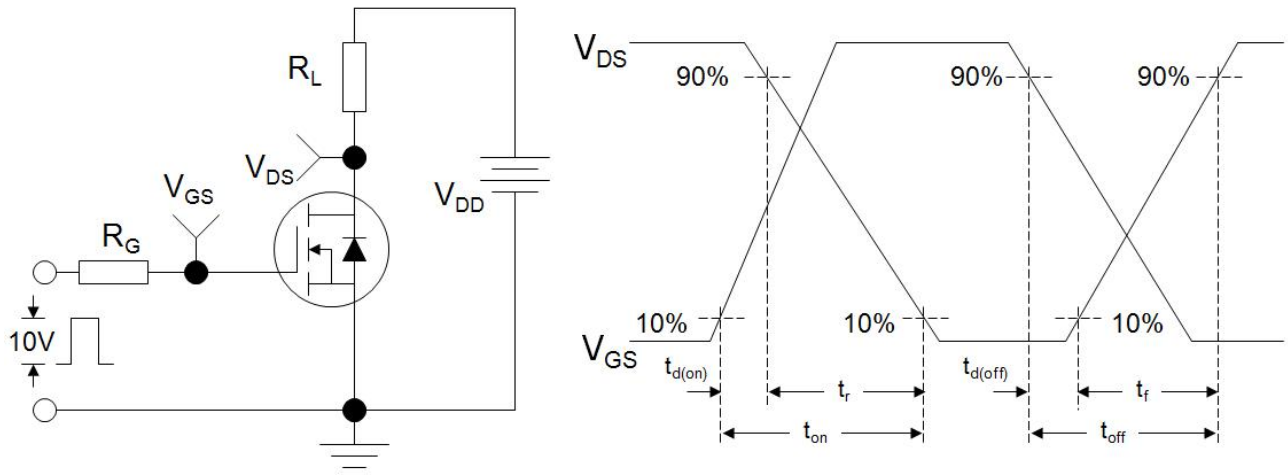
**Notes**

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. EAS condition : Tj=25℃ ,VDD=50V,VGS=10V,L=0.5mH,Rg=25Ω
   The table shows the minimum avalanche energy, which is 81mJ when the device is tested until failure
3. Identical low side and high side switch with identical $R_G$

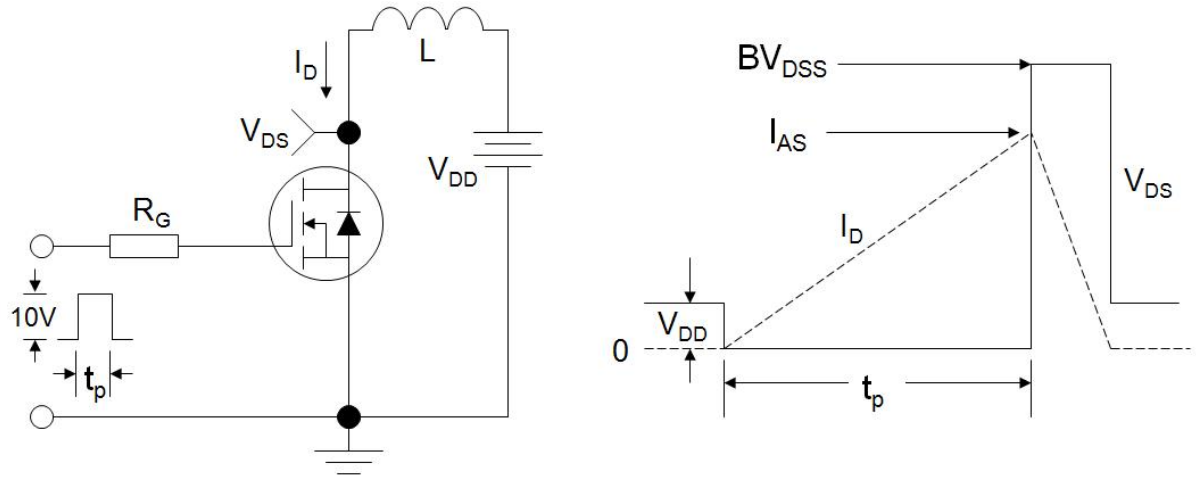
**Gate Charge Test Circuit**




**Switch Time Test Circuit**




**EAS Test Circuit**



## Typical Characteristics $T_J$ = 25ºC, unless otherwise noted

**Figure 1. Output Characteristics**

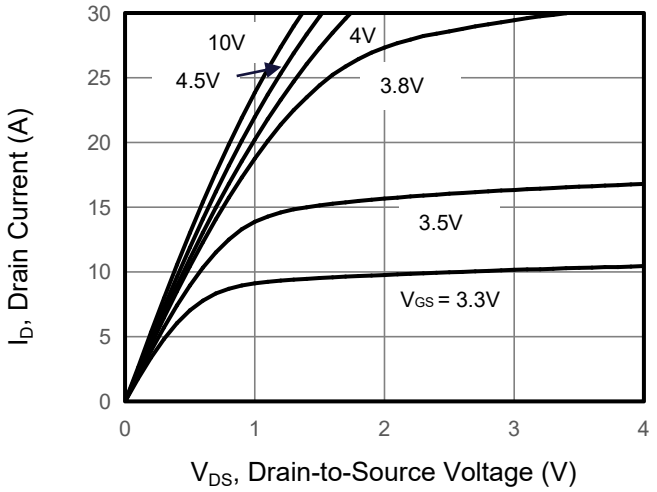



**Figure 2. Transfer Characteristics**

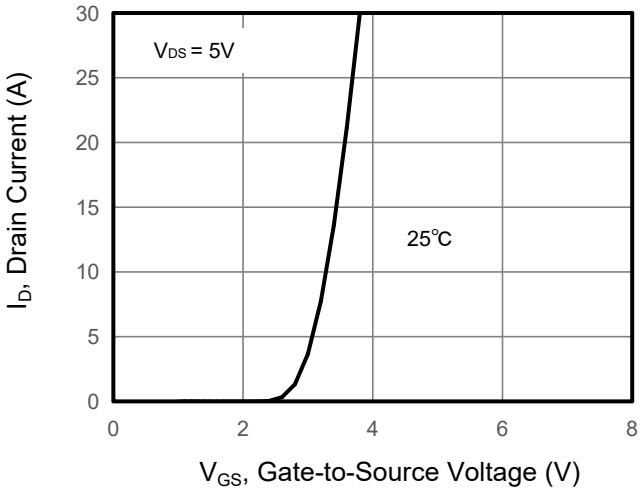



**Figure 3. Drain Source On Resistance**

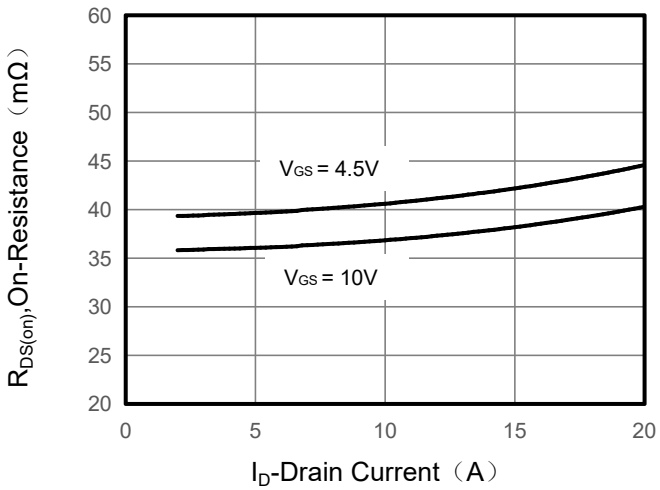



**Figure 4. Gate Charge**

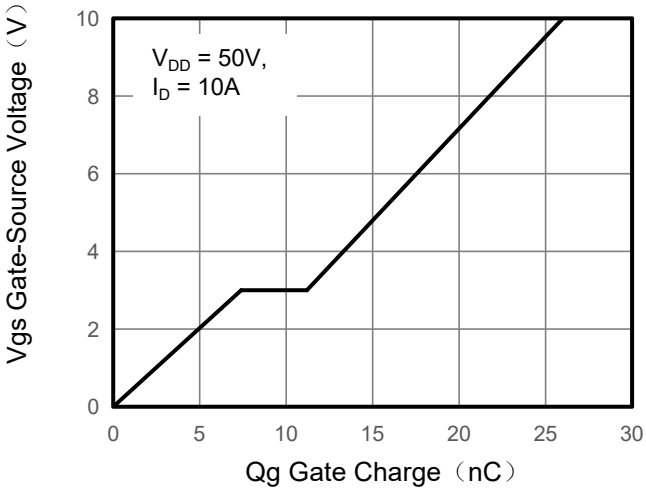



**Figure 5. Capacitance**

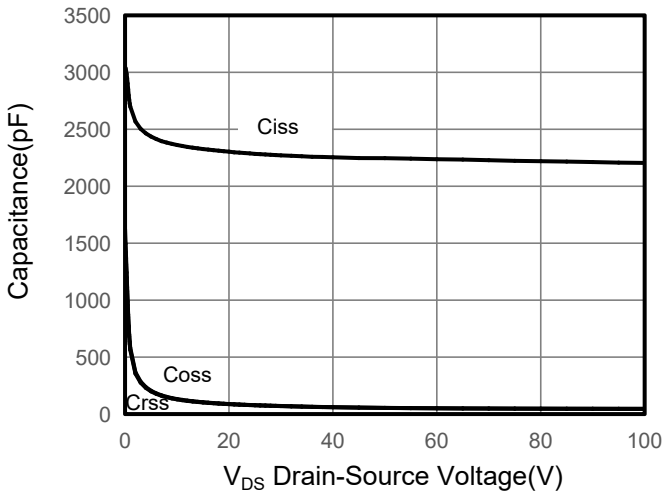
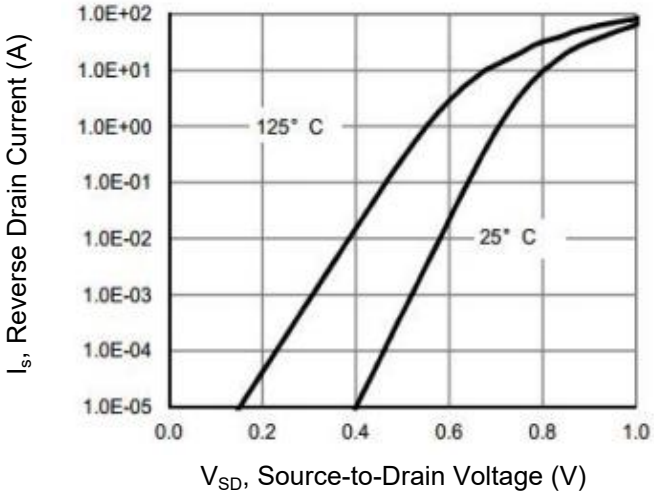



**Figure 6. Source-Drain Diode Forward**



**Typical Characteristics** $T_J$ = 25ºC, unless otherwise noted

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

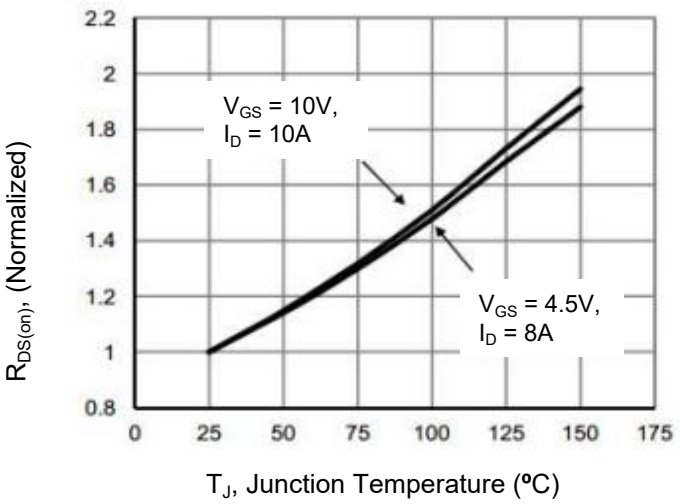



**Figure 8. Safe Operation Area**

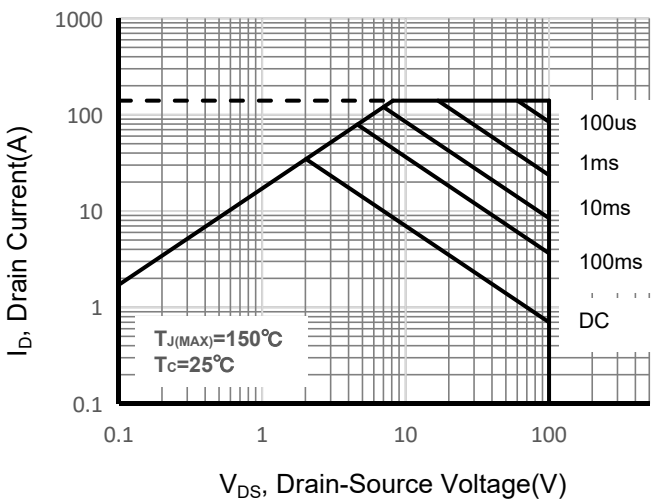



**Figure 9. Maximum Continuous Drain Current vs Case Temperature**

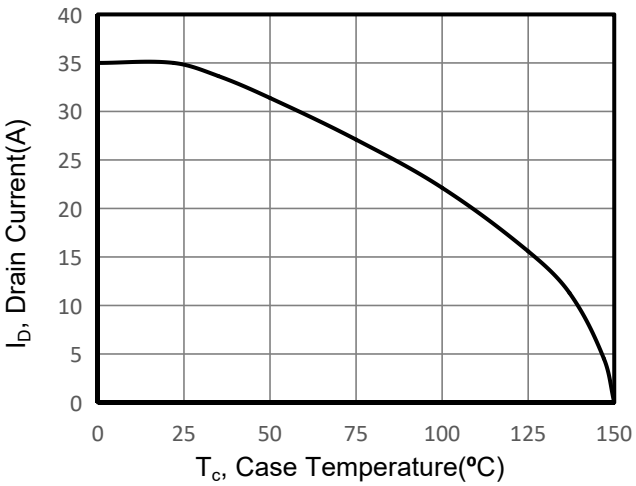
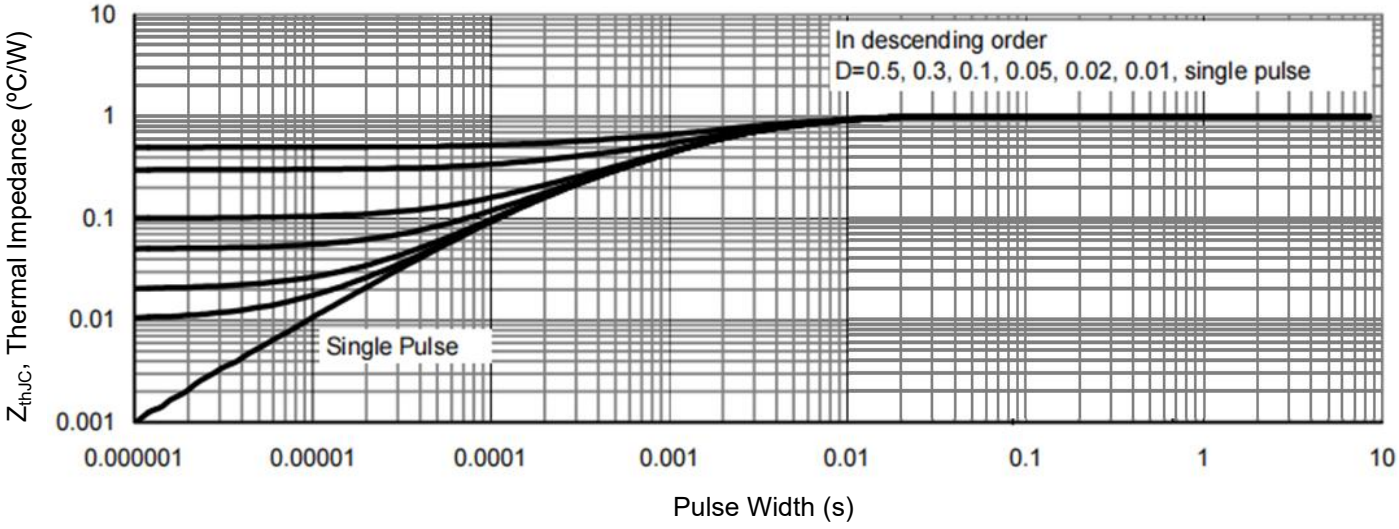
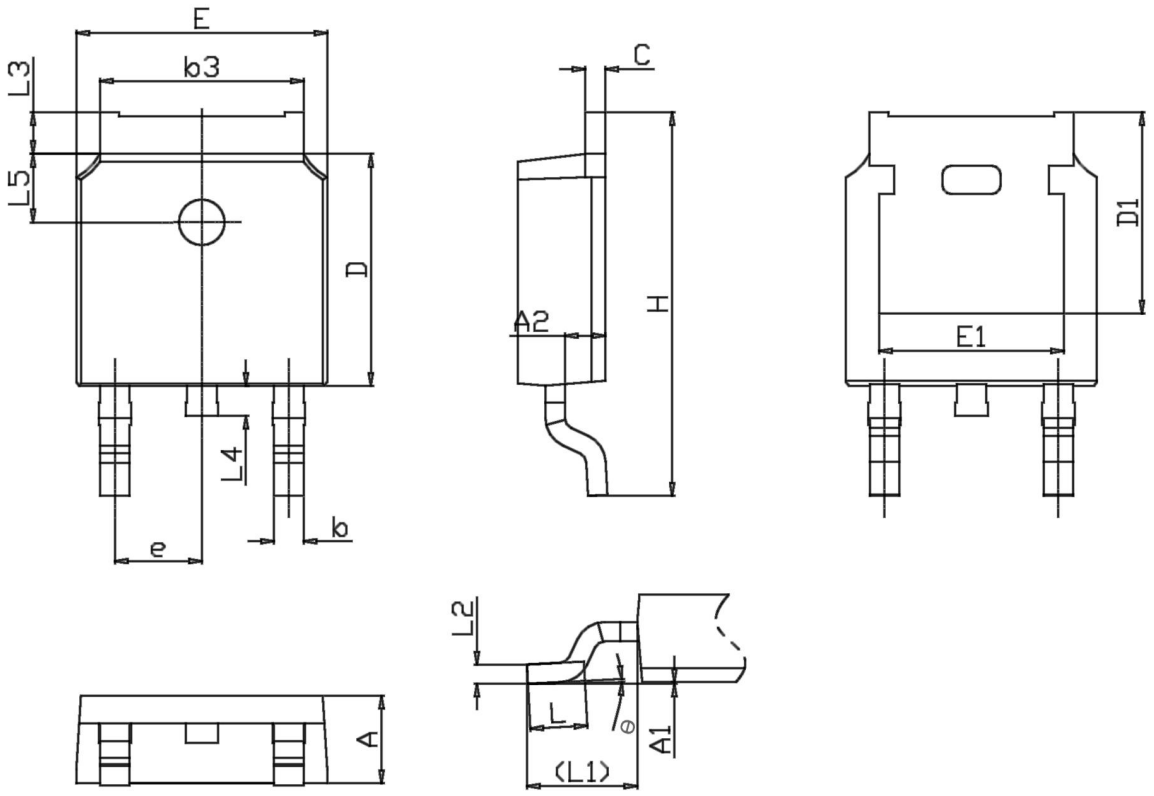



**Figure 10. Normalized Maximum Transient Thermal Impedance**



## TO-252 Package Information




| SYMBOL | mm | | |
|---|---|---|---|
| | MIN | NOM | MAX |
| A | 2.20 | 2.30 | 2.38 |
| A1 | 0.00 | - | 0.12 |
| A2 | 0.97 | 1.07 | 1.17 |
| b | 0.68 | 0.78 | 0.90 |
| b3 | 5.20 | 5.33 | 5.46 |
| c | 0.43 | 0.53 | 0.61 |
| D | 5.98 | 6.10 | 6.22 |
| D1 | | 5.30REF | |
| E | 6.40 | 6.60 | 6.73 |
| E1 | 4.63 | - | - |
| e | | 2.286BSC | |
| H | 9.40 | 10.10 | 10.50 |
| L | 1.38 | 1.50 | 1.75 |
| L1 | | 2.90REF | |
| L2 | | 0.51BSC | |
| L3 | 0.88 | - | 1.28 |
| L4 | 0.50 | - | 1.00 |
| L5 | 1.65 | 1.80 | 1.95 |
| θ | 0° | - | 8° |