



TGD N-Channel Enhancement Mode Power MOSFET

Description

The TGD3050I uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

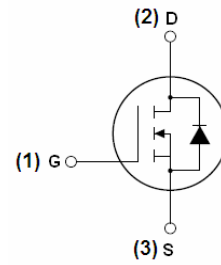
General Features

- $V_{DS} = 30V, I_D = 50A$
 $R_{DS(ON)} < 11m\Omega @ V_{GS} = 10V$
 $R_{DS(ON)} < 16m\Omega @ V_{GS} = 5V$
- High density cell design for ultra low R_{dson}
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation
- Special process technology for high ESD capability

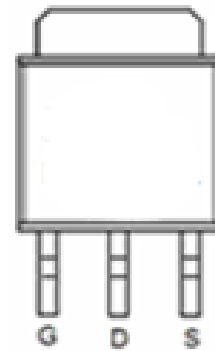
Application

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

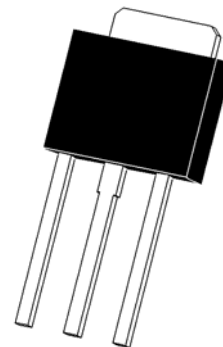
100% UIS TESTED!



Schematic diagram



pin assignment



TO-251 top view

Package Marking And Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity |
|----------------|----------|----------------|-----------|------------|----------|
| TGD3050I | TGD3050I | TO-251 | - | - | - |

Absolute Maximum Ratings ($T_A = 25^\circ C$ unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|---|---------------------|----------|---------------|
| Drain-Source Voltage | V_{DS} | 30 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Drain Current-Continuous | I_D | 50 | A |
| Drain Current-Continuous($T_C = 100^\circ C$) | $I_D (100^\circ C)$ | 35 | A |
| Pulsed Drain Current | I_{DM} | 140 | A |
| Maximum Power Dissipation | P_D | 60 | W |
| Derating factor | | 0.4 | W/ $^\circ C$ |



| | | | |
|---|----------------|------------|----|
| Single pulse avalanche energy ^(Note 5) | E_{AS} | 70 | mJ |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 To 175 | °C |

Thermal Characteristic

| | | | |
|--|-----------------|-----|------|
| Thermal Resistance, Junction-to-Case ^(Note 2) | $R_{\theta JC}$ | 2.5 | °C/W |
|--|-----------------|-----|------|

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

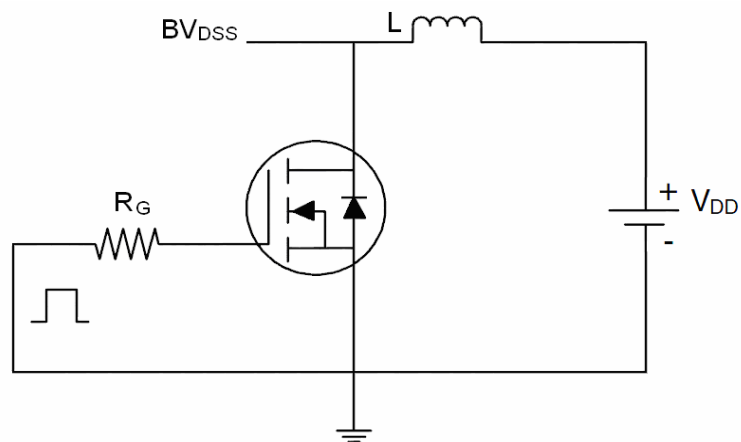
| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---------------------|---|-----|------|------|------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | V _{GS} =0V I _D =250μA | 30 | 33 | - | V |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} =30V, V _{GS} =0V | - | - | 1 | μA |
| Gate-Body Leakage Current | I _{GSS} | V _{GS} =±20V, V _{DS} =0V | - | - | ±100 | nA |
| On Characteristics ^(Note 3) | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} =V _{GS} , I _D =250μA | 1 | 1.6 | 3 | V |
| Drain-Source On-State Resistance | R _{DS(ON)} | V _{GS} =10V, I _D =25A | - | 8 | 11 | mΩ |
| | | V _{GS} =5V, I _D =20A | - | 10 | 16 | |
| Forward Transconductance | g _{FS} | V _{DS} =5V, I _D =20A | 15 | - | - | S |
| Dynamic Characteristics ^(Note4) | | | | | | |
| Input Capacitance | C _{iss} | V _{DS} =15V, V _{GS} =0V, F=1.0MHz | - | 2000 | - | PF |
| Output Capacitance | C _{oss} | | - | 280 | - | PF |
| Reverse Transfer Capacitance | C _{rss} | | - | 160 | - | PF |
| Switching Characteristics ^(Note 4) | | | | | | |
| Turn-on Delay Time | t _{d(on)} | V _{DD} =15V, I _D =20A V _{GS} =10V, R _{GEN} =1.8Ω | - | 10 | - | nS |
| Turn-on Rise Time | t _r | | - | 8 | - | nS |
| Turn-Off Delay Time | t _{d(off)} | | - | 30 | - | nS |
| Turn-Off Fall Time | t _f | | - | 5 | - | nS |
| Total Gate Charge | Q _g | V _{DS} =10V, I _D =25A, V _{GS} =10V | - | 23 | - | nC |
| Gate-Source Charge | Q _{gs} | | - | 7 | - | nC |
| Gate-Drain Charge | Q _{gd} | | - | 4.5 | - | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage ^(Note 3) | V _{SD} | V _{GS} =0V, I _S =25A | - | 0.85 | 1.2 | V |
| Diode Forward Current ^(Note 2) | I _S | | - | - | 50 | A |
| Reverse Recovery Time | t _{rr} | T _J = 25°C, I _F =50A di/dt = 100A/μs ^(Note3) | - | 22 | 35 | nS |
| Reverse Recovery Charge | Q _{rr} | | - | 11 | 18 | nC |
| Forward Turn-On Time | t _{on} | Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD) | | | | |

Notes:

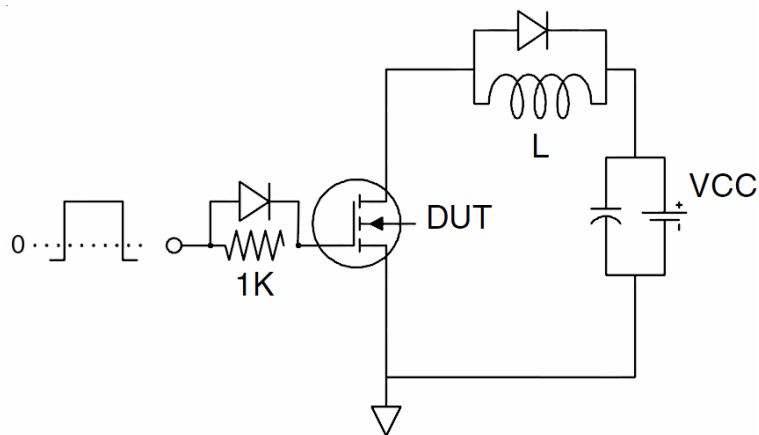
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. EAS condition: $T_J=25^\circ\text{C}, V_{DD}=15V, V_G=10V, L=0.5mH, R_g=25\Omega$

Test circuit

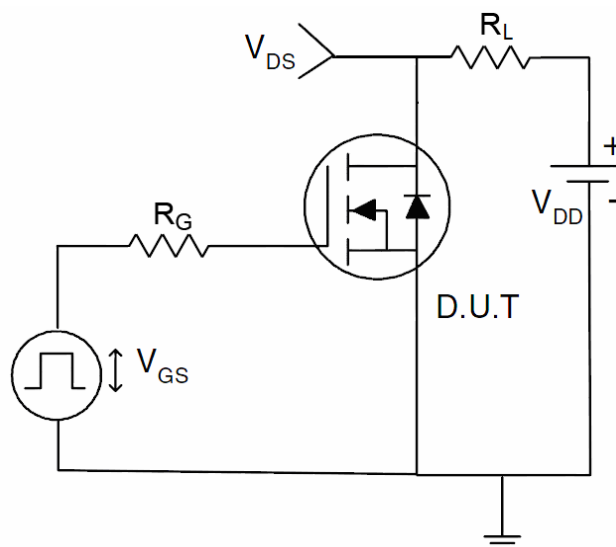
1) E_{AS} test Circuits



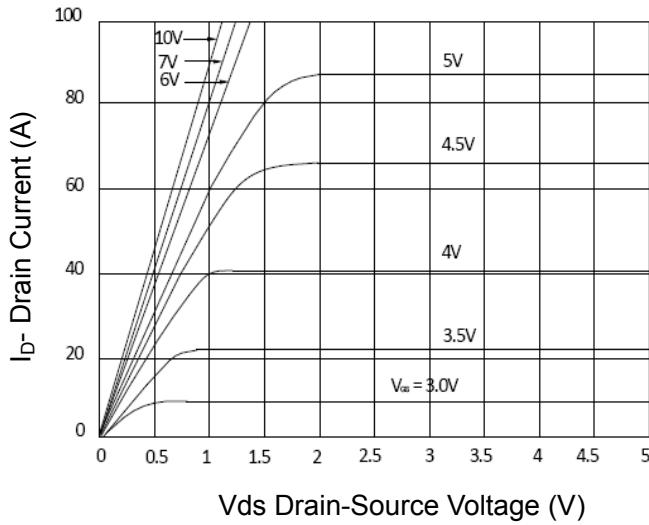
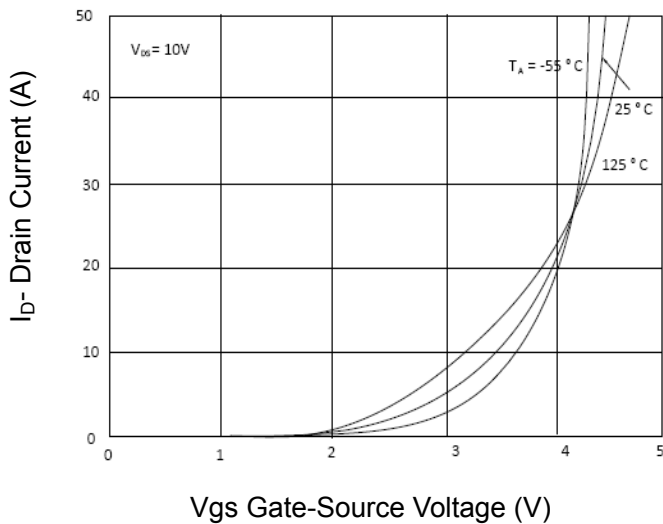
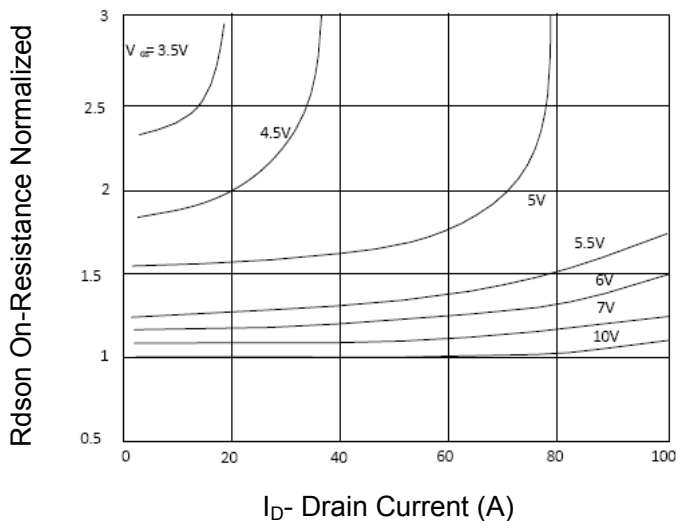
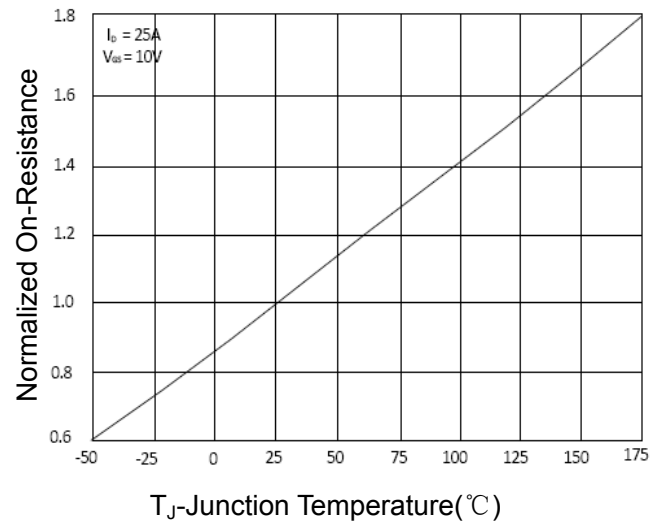
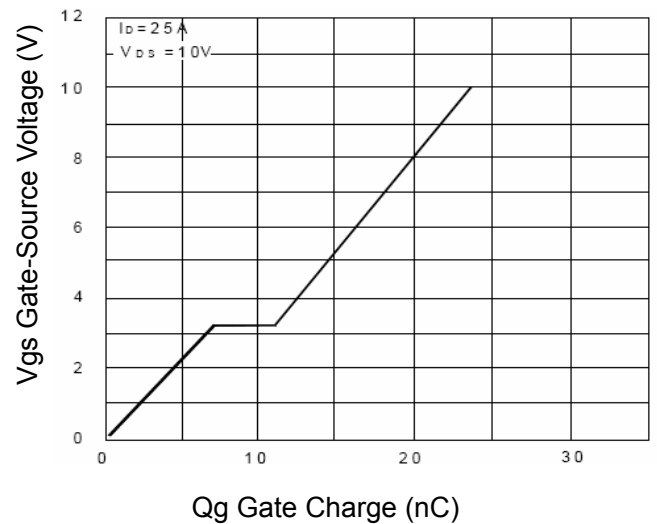
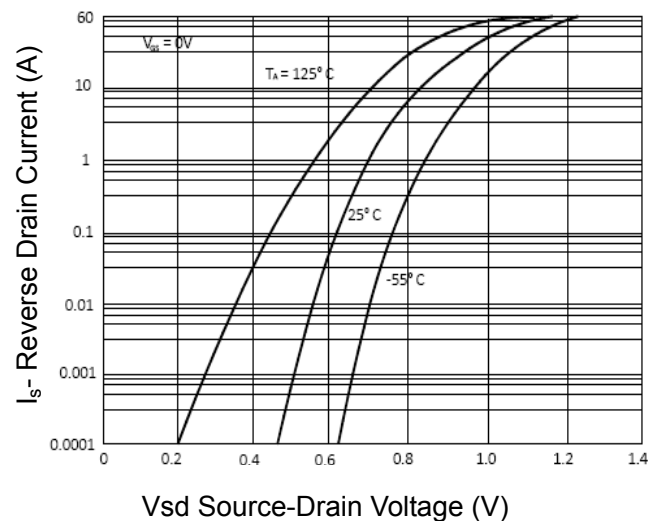
2) Gate charge test Circuit:



3) Switch Time Test Circuit:



Typical Electrical and Thermal Characteristics (Curves)


Figure 1 Output Characteristics

Figure 2 Transfer Characteristics

Figure 3 Rdson- Drain Current

Figure 4 Rdson-Junction Temperature

Figure 5 Gate Charge

Figure 6 Source- Drain Diode Forward

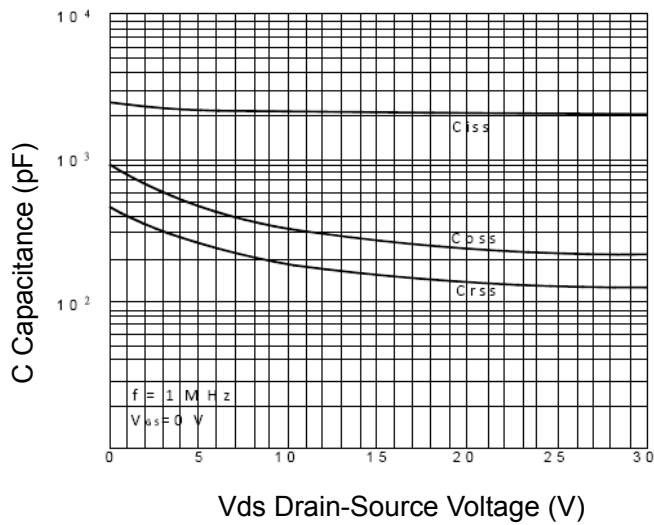


Figure 7 Capacitance vs Vds

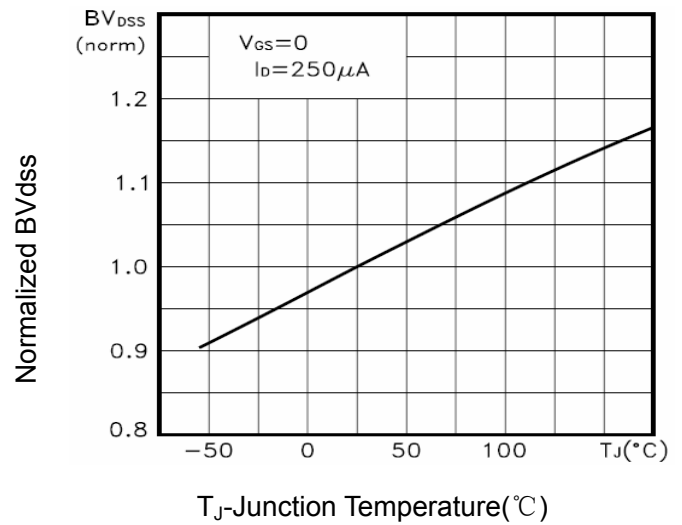


Figure 9 BV_{DSS} vs Junction Temperature

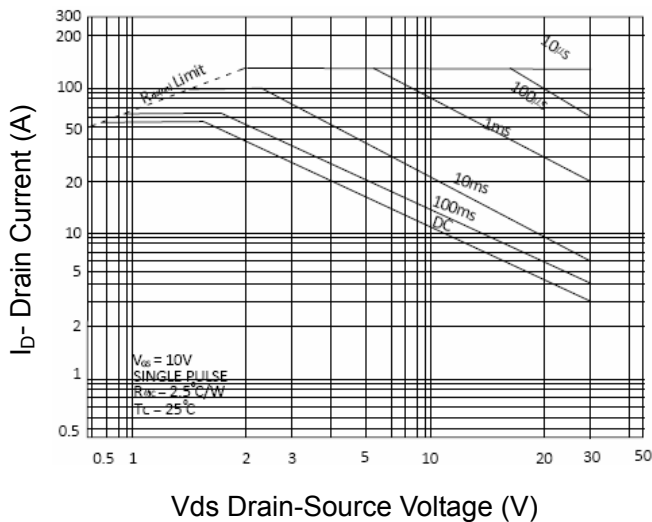


Figure 8 Safe Operation Area

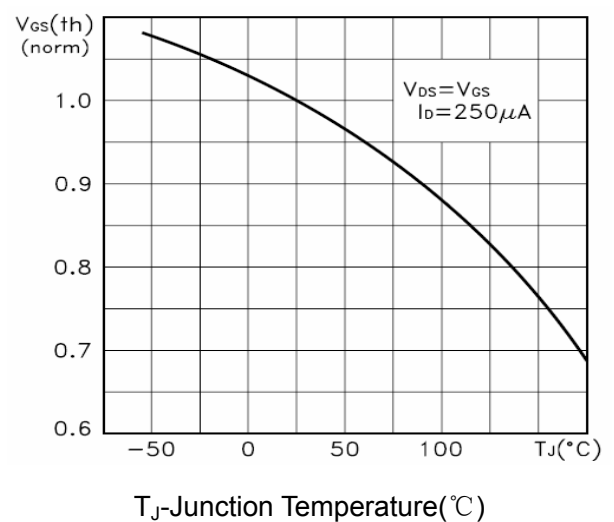


Figure 10 $V_{GS(th)}$ vs Junction Temperature

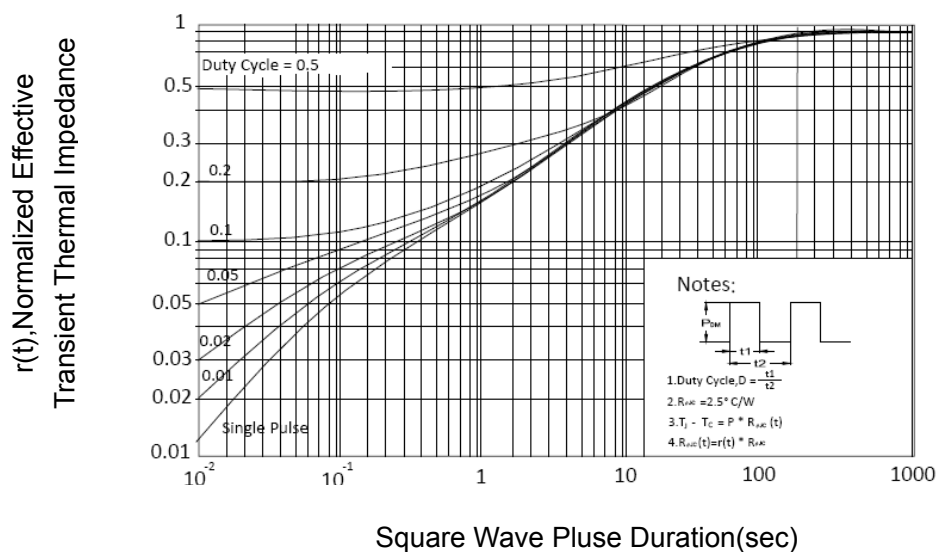
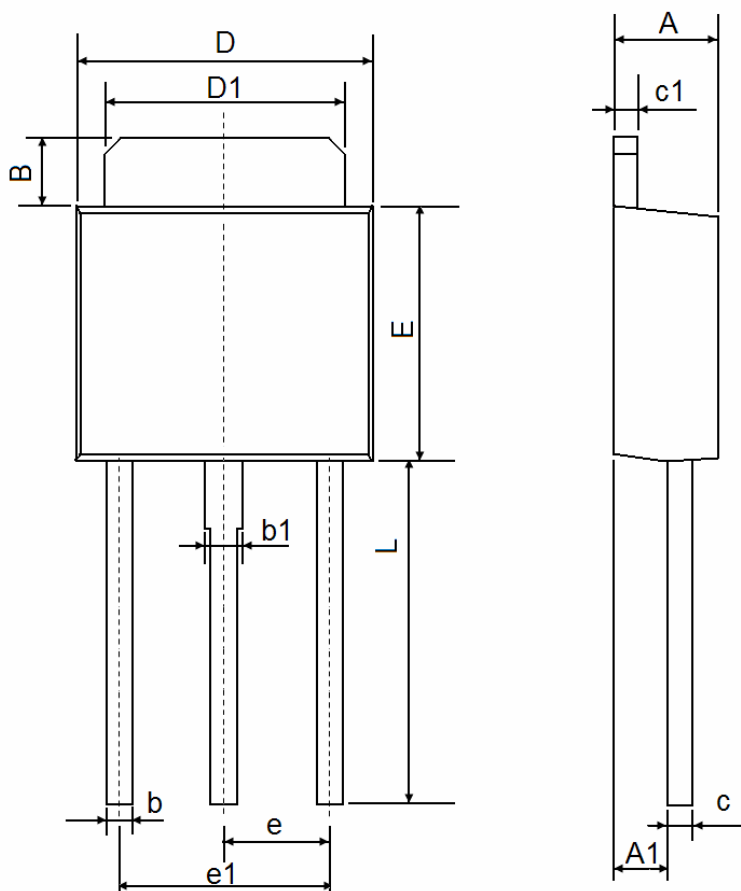


Figure 11 Normalized Maximum Transient Thermal Impedance



TO-251 Package Information



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 2.200 | 2.400 | 0.087 | 0.094 |
| A1 | 1.050 | 1.350 | 0.042 | 0.054 |
| B | 1.350 | 1.650 | 0.053 | 0.065 |
| b | 0.500 | 0.700 | 0.020 | 0.028 |
| b1 | 0.700 | 0.900 | 0.028 | 0.035 |
| c | 0.430 | 0.580 | 0.017 | 0.023 |
| c1 | 0.430 | 0.580 | 0.017 | 0.023 |
| D | 6.350 | 6.650 | 0.250 | 0.262 |
| D1 | 5.200 | 5.400 | 0.205 | 0.213 |
| E | 5.400 | 5.700 | 0.213 | 0.224 |
| e | 2.300 TYP. | | 0.091 TYP. | |
| e1 | 4.500 | 4.700 | 0.177 | 0.185 |
| L | 7.500 | 7.900 | 0.295 | 0.311 |