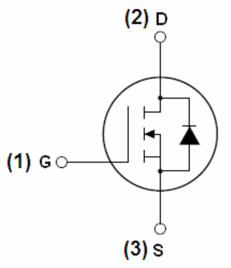
# FNK N-Channel Enhancement Mode Power MOSFET

## Description

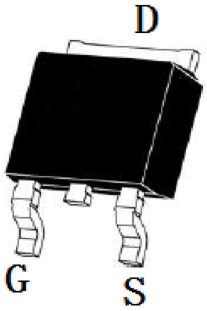
The FNK80N08K uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.



**Schematic diagram**

## General Features

- $V_{DS}$ = 80V,$I_D$ =70A
  $R_{DS(ON)}$ < 11.5mΩ @ $V_{GS}$=10V (Typ:9.5mΩ)
- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high $E_{AS}$
- Excellent package for good heat dissipation



**TO-252 top view**

## Application

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

## Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity |
|---|---|---|---|---|---|
| FNK80N08K | FNK80N08K | TO-252 | - | - | - |

## Absolute Maximum Ratings ($T_C$=25℃unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 80 | V |
| Gate-Source Voltage | $V_{GS}$ | ±25 | V |
| Drain Current-Continuous | $I_D$ | 70 | A |
| Drain Current-Continuous($T_C$=100℃) | $I_D$ (100℃) | 58 | A |
| Pulsed Drain Current | $I_{DM}$ | 280 | A |
| Maximum Power Dissipation | $P_D$ | 170 | W |

| | | | |
|---|---|---|---|
| Derating factor | | 1.13 | W/℃ |
| Single pulse avalanche energy (Note 5) | $E_{AS}$ | 120 | mJ |
| Operating Junction and Storage Temperature Range | $T_J$,$T_{STG}$ | -55 To 175 | ℃ |

## Thermal Characteristic

| | | | |
|---|---|---|---|
| Thermal Resistance,Junction-to-Case (Note 2) | $R_{θJc}$ | 0.88 | ℃/W |

## Electrical Characteristics ($T_C$=25℃unless otherwise noted)

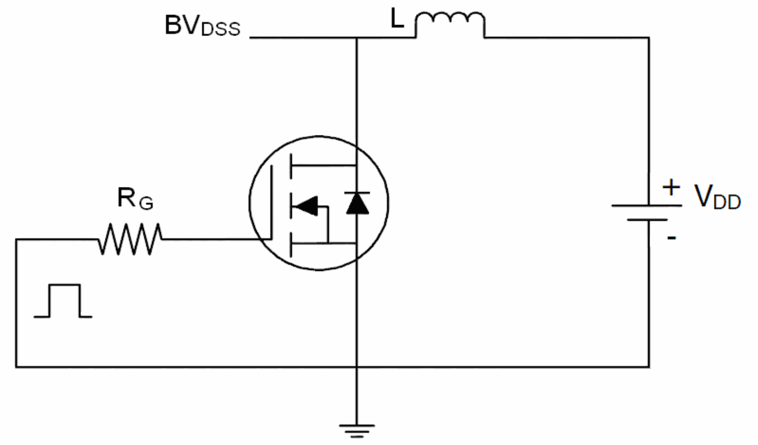
| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V $I_D$=250μA | 80 | 86 | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=80V,$V_{GS}$=0V | - | - | 1 | μA |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$=±25V,$V_{DS}$=0V | - | - | ±100 | nA |
| **On Characteristics** (Note 3) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$,$I_D$=250μA | 2.3 | 2.9 | 3.5 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$=40A | - | 9.5 | 11.5 | mΩ |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$=10V,$I_D$=40A | - | 50 | - | S |
| **Dynamic Characteristics** (Note4) | | | | | | |
| Gate resistance | Rg | $V_{DS}$=0V,$V_{GS}$=0V,F=1.0MHz | - | 2 | - | Ω |
| Input Capacitance | $C_{lss}$ | $V_{DS}$=40V,$V_{GS}$=0V,<br>F=1.0MHz | - | 3615 | - | PF |
| Output Capacitance | $C_{oss}$ | | - | 235 | - | PF |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 160 | - | PF |
| **Switching Characteristics** (Note 4) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$=30V,$I_D$=42A<br>$V_{GS}$=10V,$R_{GEN}$=10Ω | - | 36.1 | - | nS |
| Turn-on Rise Time | $t_r$ | | - | 54.3 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 85.2 | - | nS |
| Turn-Off Fall Time | $t_f$ | | - | 37.3 | - | nS |
| Total Gate Charge | $Q_g$ | $V_{DS}$=48V,$I_D$=84A,<br>$V_{GS}$=10V | - | 85.7 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 23.2 | - | nC |
| Gate-Drain Charge | $Q_{gd}$ | | - | 31.2 | - | nC |
| **Drain-Source Diode Characteristics** | | | | | | |
| Diode Forward Voltage (Note 3) | $V_{SD}$ | $V_{GS}$=0V,$I_S$=20A | - | - | 1.2 | V |
| Diode Forward Current (Note 2) | $I_S$ | - | - | - | 90 | A |
| Reverse Recovery Time | $t_{rr}$ | TJ = 25°C, IF =84A<br>di/dt = 100A/μs(Note3) | - | 88.3 | - | nS |
| Reverse Recovery Charge | Qrr | | - | 65.9 | - | nC |

## Notes:

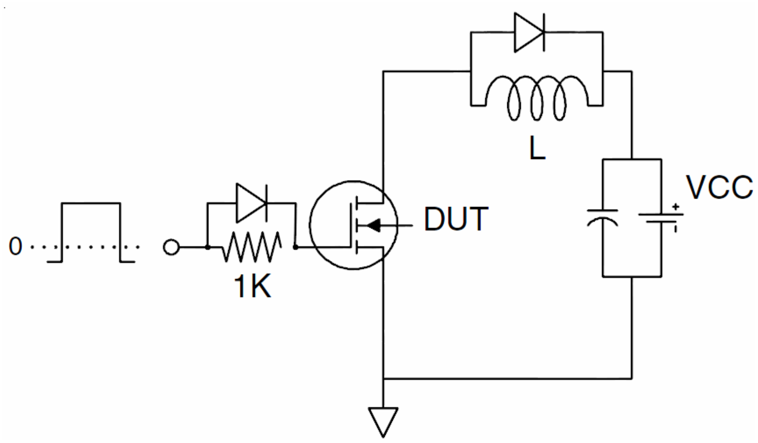
**1.** Repetitive Rating: Pulse width limited by maximum junction temperature.
**2.** Surface Mounted on FR4 Board, t ≤ 10 sec.
**3.** Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
**4.** Guaranteed by design, not subject to production
**5.** EAS condition：Tj=25℃,$V_{DD}$=40V,$V_G$=10V,L=0.5mH,Rg=25Ω

## Test circuit

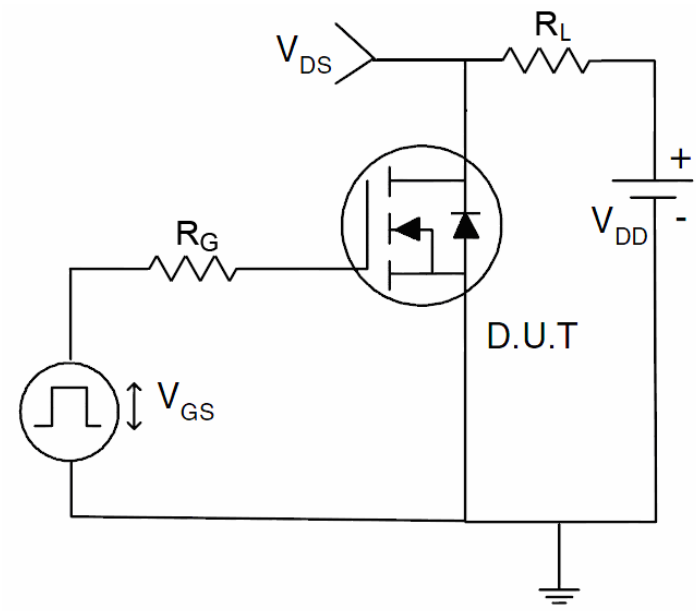
**1）$E_{AS}$ test Circuits**



**2）Gate charge test Circuit:**



**3）Switch Time Test Circuit：**



## Typical Electrical and Thermal Characteristics (Curves)

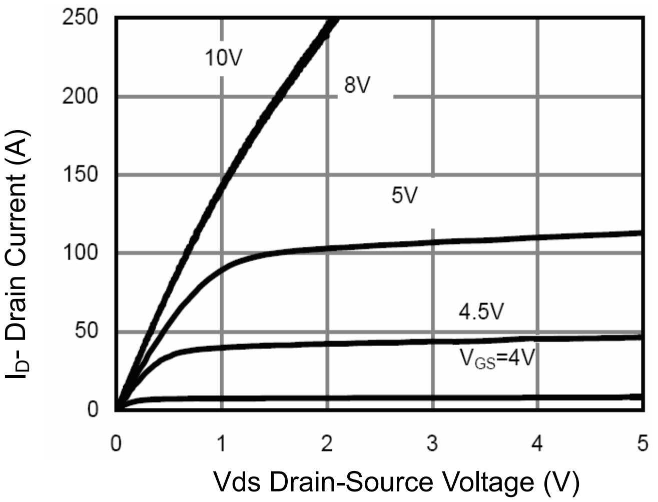


Figure 1 Output Characteristics

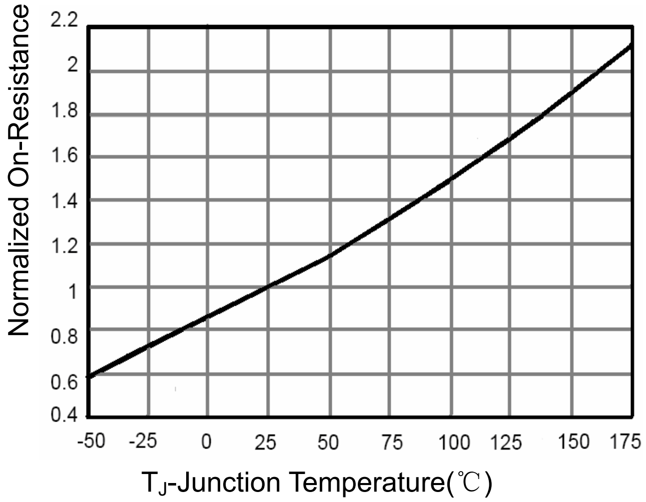


Figure 4 Rdson-JunctionTemperature

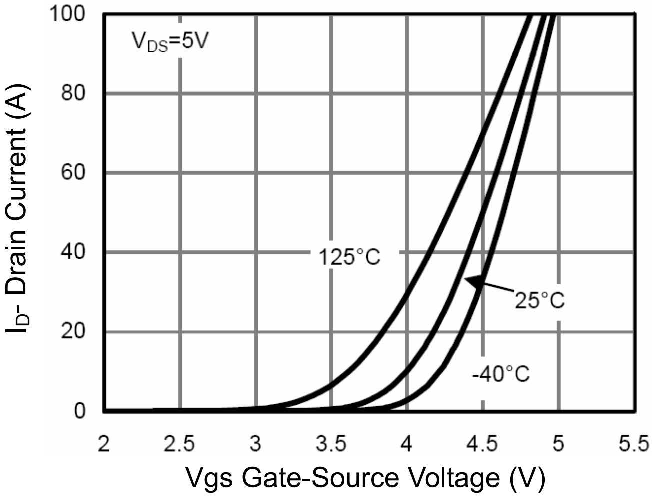


Figure 2 Transfer Characteristics

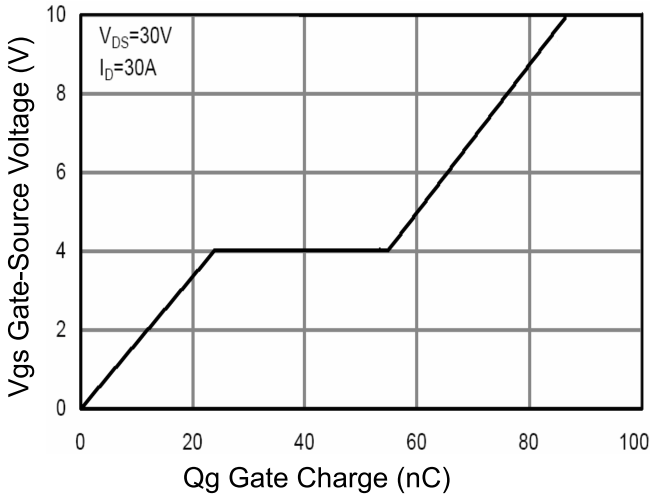


Figure 5 Gate Charge

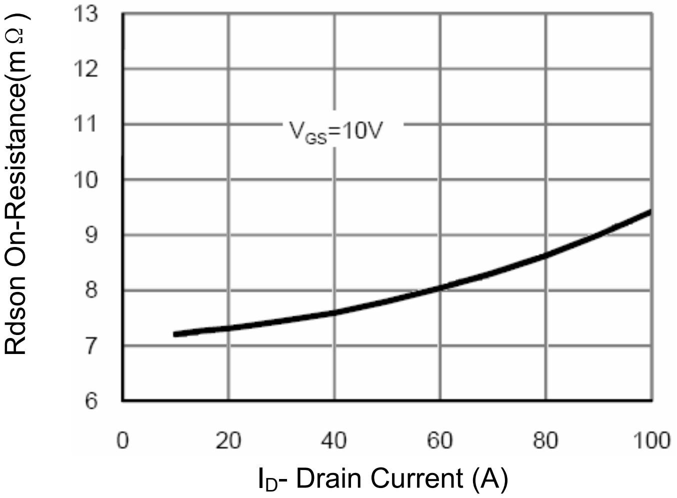


Figure 3 Rdson- Drain Current

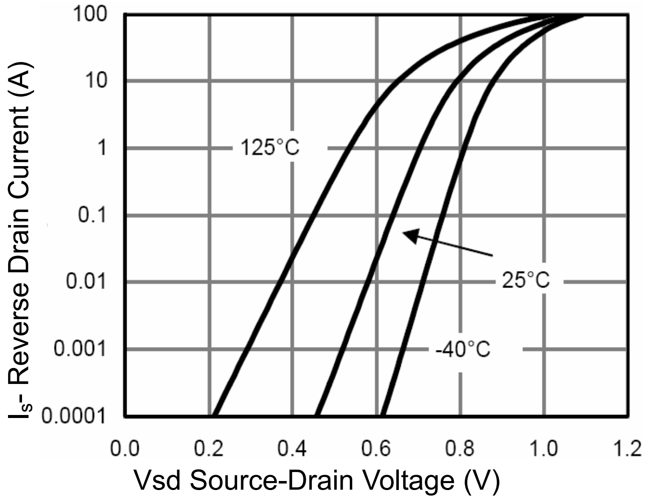


Figure 6 Source- Drain Diode Forward

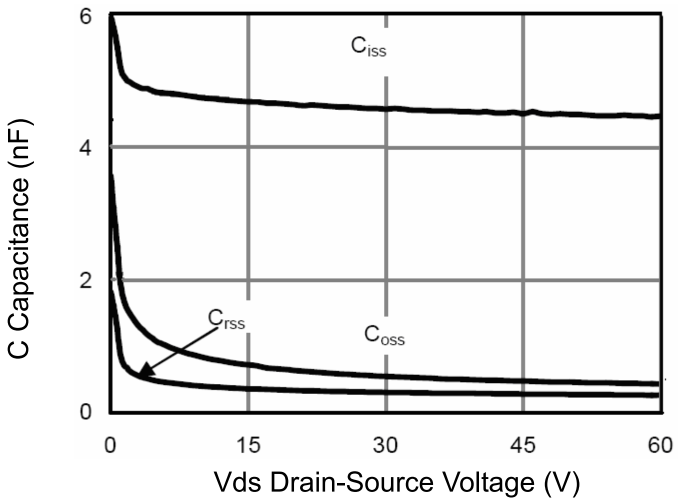


Figure 7 Capacitance vs Vds

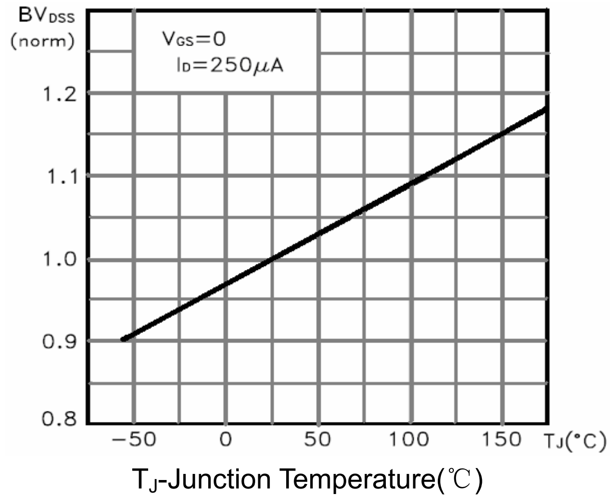


Figure 9 $BV_{DSS}$ vs Junction Temperature

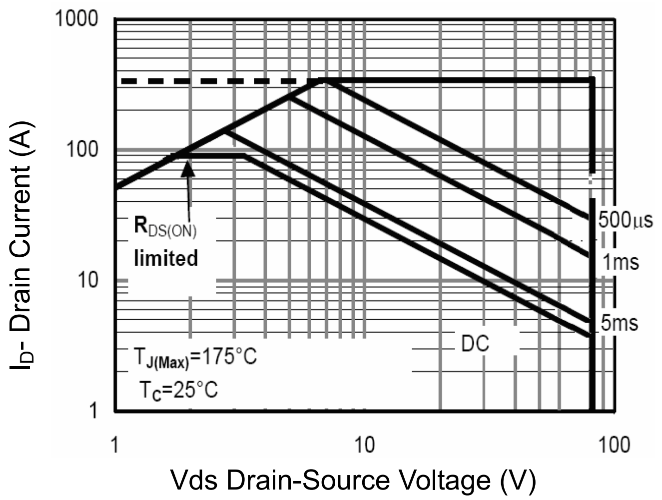


Figure 8 Safe Operation Area

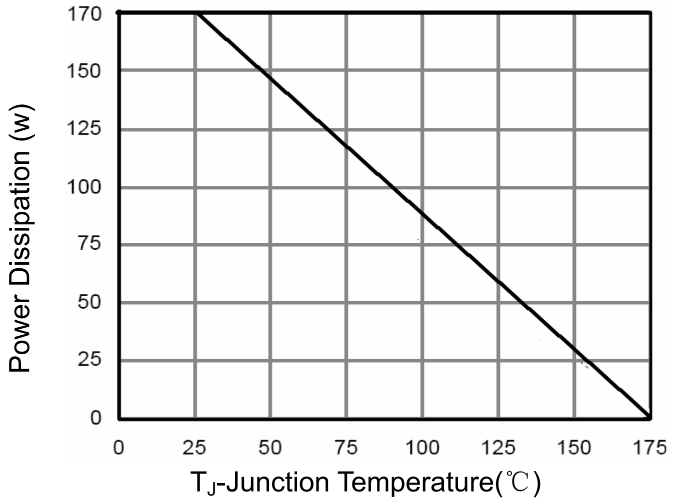


Figure 10 Power De-rating

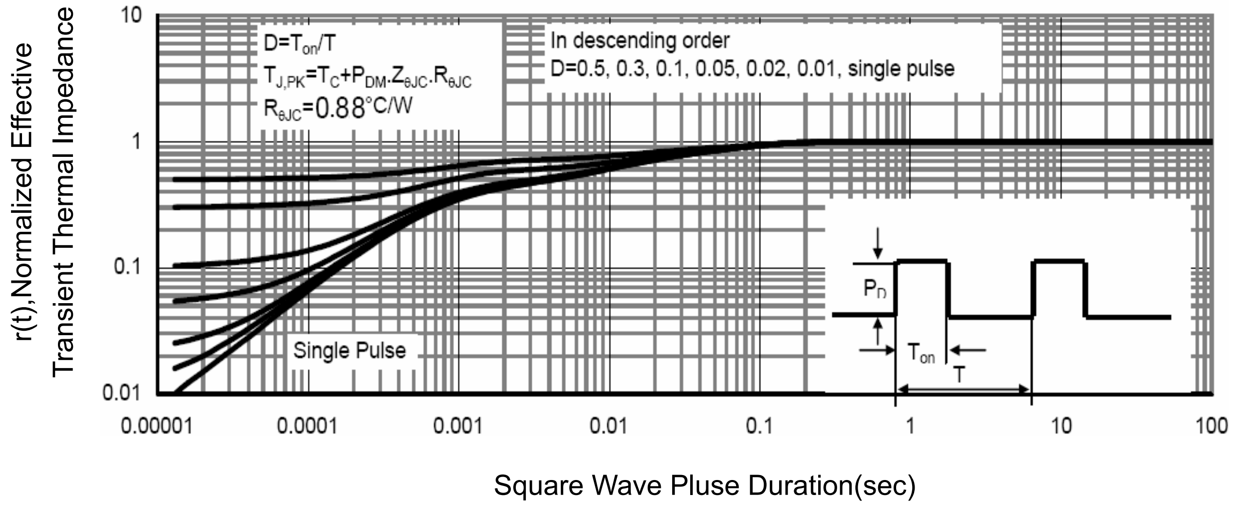
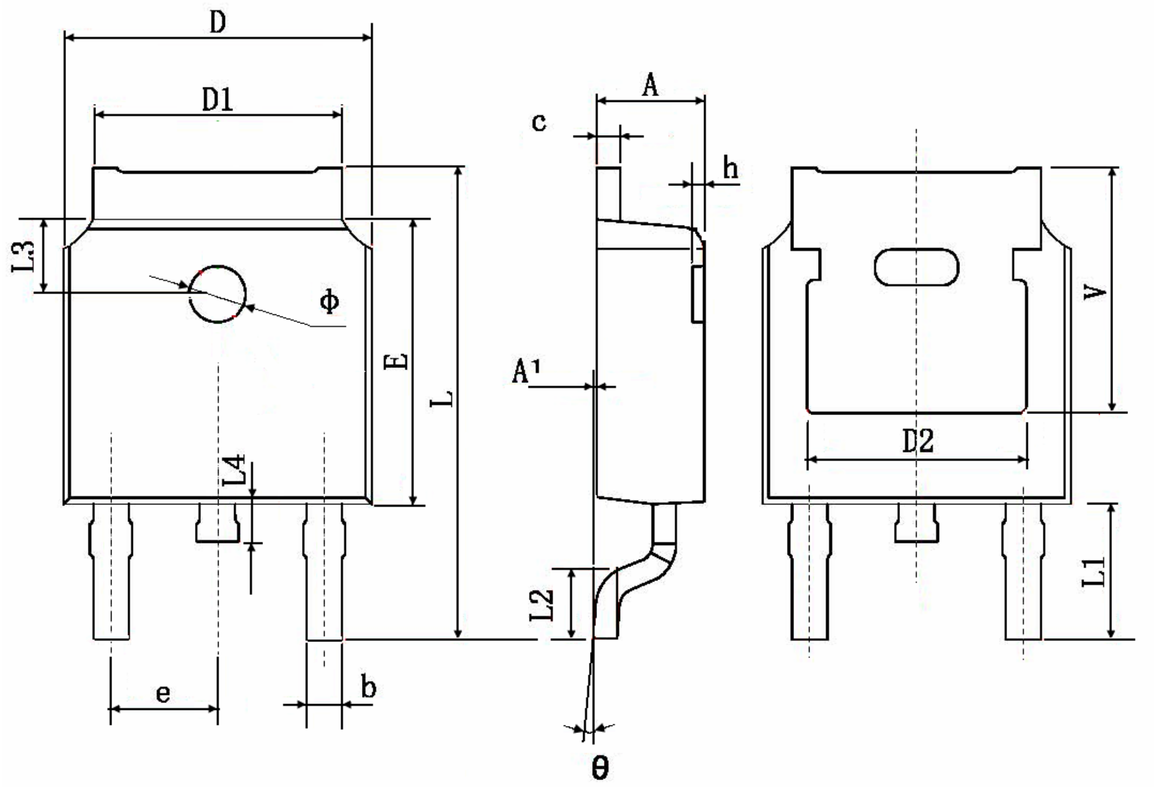


Figure 11 Normalized Maximum Transient Thermal Impedance

## TO-252 Package Information



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 2.200 | 2.400 | 0.087 | 0.094 |
| A1 | 0.000 | 0.127 | 0.000 | 0.005 |
| b | 0.660 | 0.860 | 0.026 | 0.034 |
| c | 0.460 | 0.580 | 0.018 | 0.023 |
| D | 6.500 | 6.700 | 0.256 | 0.264 |
| D1 | 5.100 | 5.460 | 0.201 | 0.215 |
| D2 | 4.830 TYP. | | 0.190 TYP. | |
| E | 6.000 | 6.200 | 0.236 | 0.244 |
| e | 2.186 | 2.386 | 0.086 | 0.094 |
| L | 9.800 | 10.400 | 0.386 | 0.409 |
| L1 | 2.900 TYP. | | 0.114 TYP. | |
| L2 | 1.400 | 1.700 | 0.055 | 0.067 |
| L3 | 1.600 TYP. | | 0.063 TYP. | |
| L4 | 0.600 | 1.000 | 0.024 | 0.039 |
| Φ | 1.100 | 1.300 | 0.043 | 0.051 |
| θ | 0° | 8° | 0° | 8° |
| h | 0.000 | 0.300 | 0.000 | 0.012 |
| V | 5.350 TYP. | | 0.211 TYP. | |

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