# N-Channel Enhancement Mode Power MOSFET

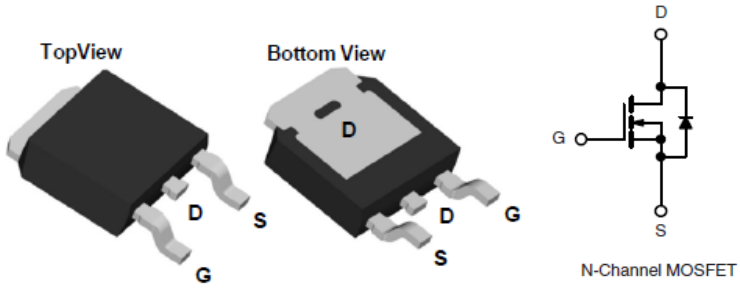
## Features

| $V_{DS}$ | $R_{DS(ON)TYP}$ | $I_D$ |
|---|---|---|
| 60V | 14 mΩ@10V | 50A |

## General Description

- Power Switching Application
- Hard Switched and High Frequency circuits
- Uninterruptible power supply

## Pin Configurations




TO-252-2L

## Absolute Maximum Ratings @$T_A$=25℃ unless otherwise noted

| Parameter | | Symbol | Ratings | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | 60 | V |
| Gate-Source Voltage | | $V_{GSS}$ | ±20 | V |
| Drain Current (Continuous) *AC | $T_C$=25°C | $I_D$ | 50 | A |
| | $T_C$=100°C | | 35 | |
| Drain Current (Pulse) *B | | $I_{DM}$ | 200 | A |
| Avalanche energy L=0.5mH | | $E_{AS}$ | 300 | mJ |
| Power Dissipation | $T_C$=25°C | $P_D$ | 85 | W |
| Operating Temperature/ Storage Temperature | | $T_J/T_{STG}$ | -55~150 | ℃ |

## Thermal Resistance Ratings

| Parameter | | Symbol | Maximum | Unit |
|---|---|---|---|---|
| Maximum Junction-to-Case (Drain) | Steady State | $R_{thJC}$ | 1.8 | °C/W |

## Electrical Characteristics

$T_A$=25℃ unless otherwise noted

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Static** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0V, $I_D$= 250μA | 60 | -- | -- | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 48V, $V_{GS}$ = 0V | -- | -- | 1 | μA |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS}$ = $V_{DS}$, $I_{DS}$= 250μA | 1 | -- | 3 | V |
| Gate Leakage Current | $I_{GSS}$ | $V_{GS}$= ±20V, $V_{DS}$=0V | -- | -- | ±100 | nA |
| Drain-Source On-state Resistance | $R_{DS(on)}$ | $V_{GS}$ = 10V, $I_D$ = 20A | -- | 14 | 20 | mΩ |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$= 5V, $I_D$= 20A | 18 | -- | -- | S |
| Diode Forward Voltage | $V_{SD}$ | $I_{SD}$= 20A , $V_{GS}$=0V | -- | -- | 1.2 | V |
| Diode Forward Current | $I_S$ | $T_C$ =25°C | -- | -- | 50 | A |
| **Switching** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$=30V,$I_D$=20A, $V_{GS}$=10V | -- | 50 | -- | nC |
| Gate-Source Charge | $Q_{gs}$ | | -- | 6 | -- | nC |
| Gate-Drain Charge | $Q_{gd}$ | | -- | 15 | -- | nC |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DS}$=30V, $R_G$=3Ω, $V_{GS}$=10V, $R_L$=6.7Ω | -- | 7.4 | -- | ns |
| Turn-on Rise Time | $t_r$ | | -- | 5.1 | -- | ns |
| Turn-off Delay Time | $t_{d(off)}$ | | -- | 28.2 | -- | ns |
| Turn-Off Fall Time | $t_f$ | | -- | 5.5 | -- | ns |
| **Dynamic** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=30V,$V_{GS}$=0V, f=1.0MHz | -- | 2050 | -- | pF |
| Output Capacitance | $C_{oss}$ | | -- | 158 | -- | pF |
| Reverse Transfer Capacitance | $C_{rss}$ | | -- | 120 | -- | pF |

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1in$^2$ FR-4 board with 2oz. Copper, in a still air environment with $T_A$=25°C. The value in any given application depends on the user's specific board design.

B: Repetitive rating, pulse width limited by junction temperature.

C: The current rating is based on the t≤ 10s junction to ambient thermal resistance rating.

## Typical Electrical and Thermal Characteristics

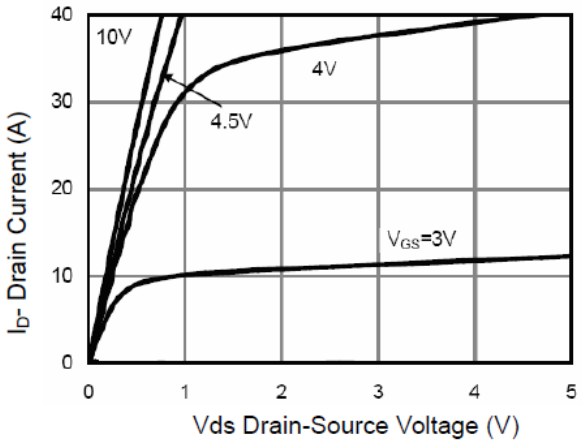



**Figure 1 Output Characteristics**

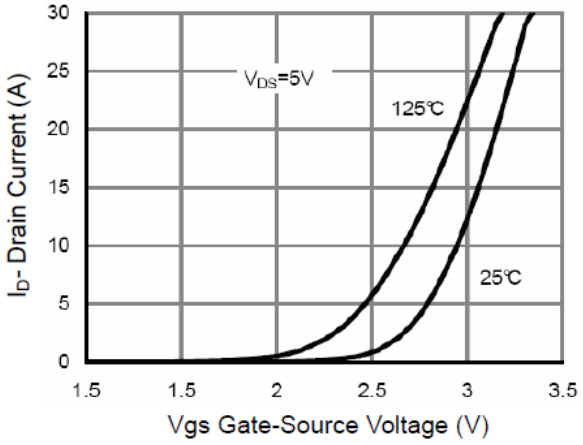



**Figure 2 Transfer Characteristics**

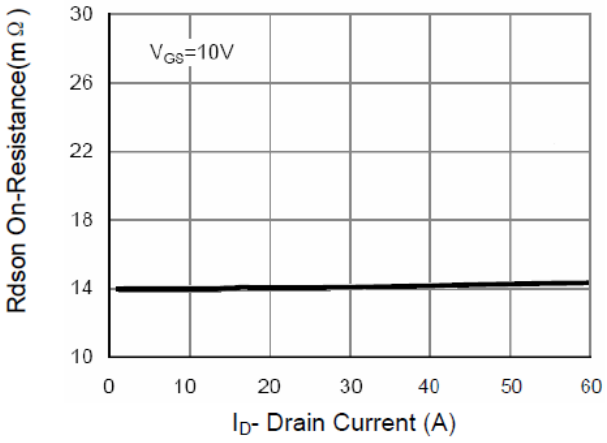



**Figure 3 Rdson- Drain Current**

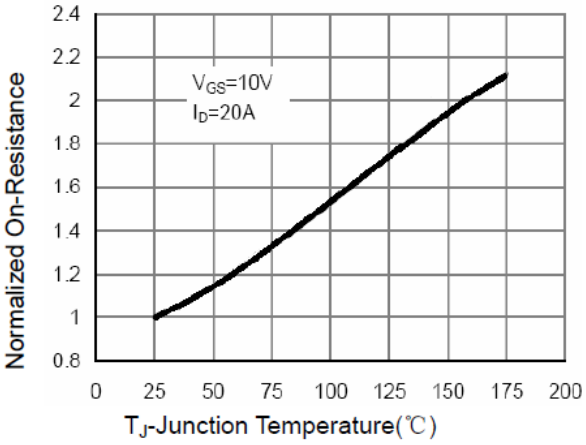



**Figure 4 Rdson-Junction Temperature**

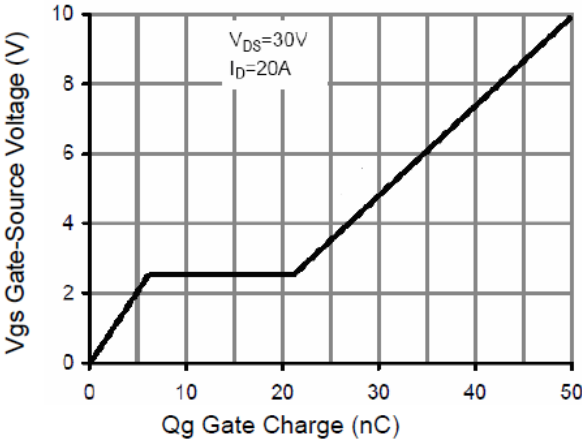



**Figure 5 Gate Charge**

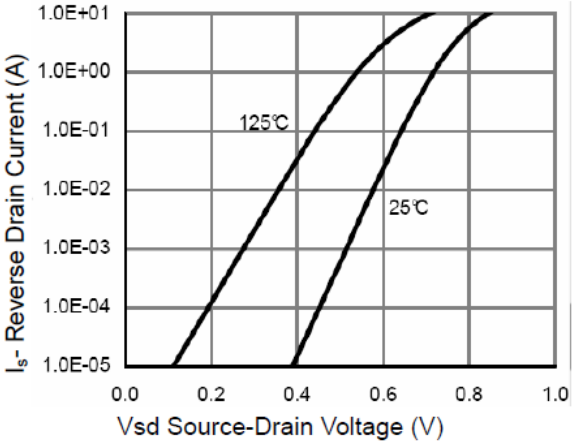



**Figure 6 Source- Drain Diode Forward**

## Typical Electrical and Thermal Characteristics

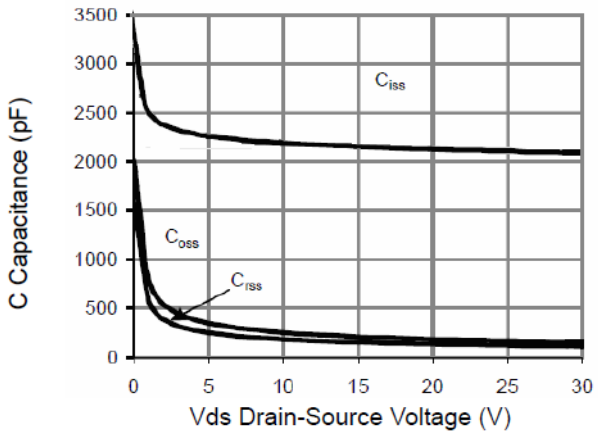



**Figure 7 Capacitance vs Vds**

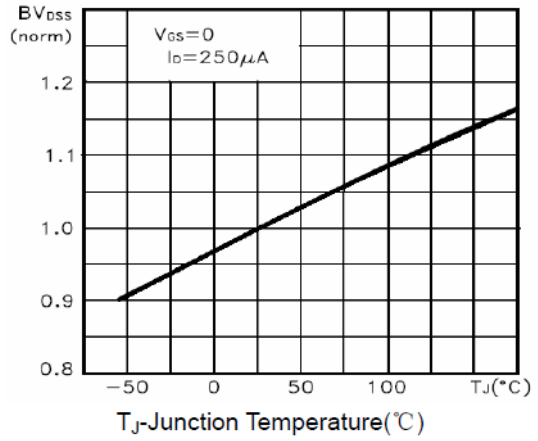



**Figure 9 $BV_{DSS}$ vs Junction Temperature**

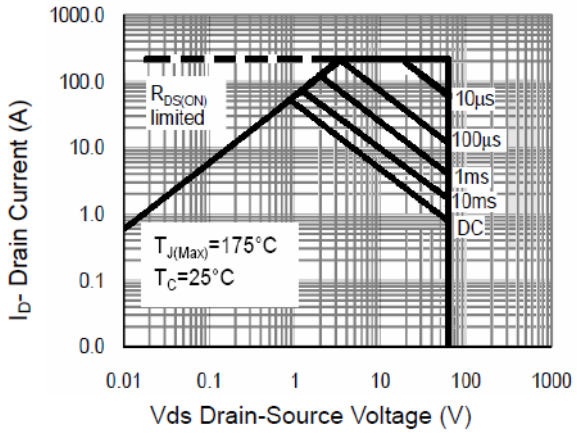



**Figure 8 Safe Operation Area**

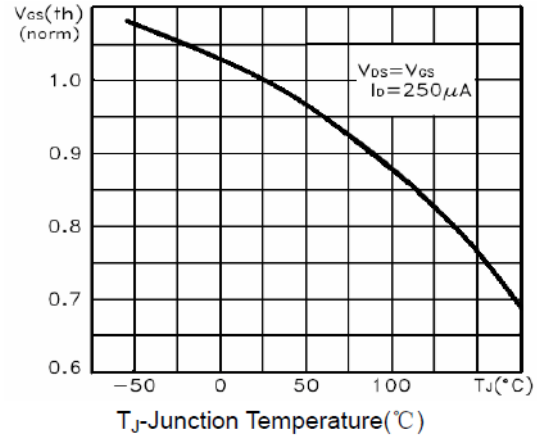



**Figure 10 $V_{GS(th)}$ vs Junction Temperature**

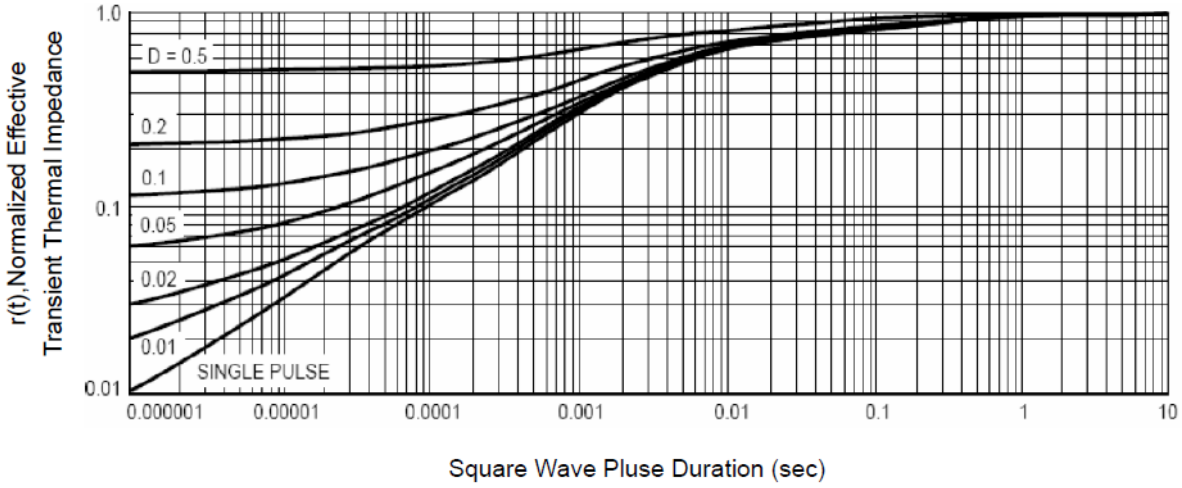
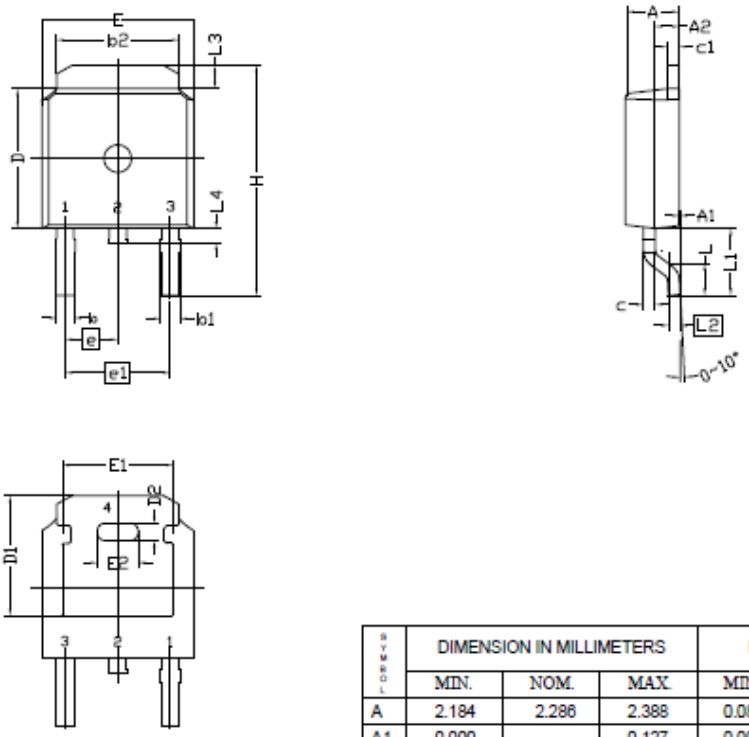



**Figure 11 Normalized Maximum Transient Thermal Impedance**

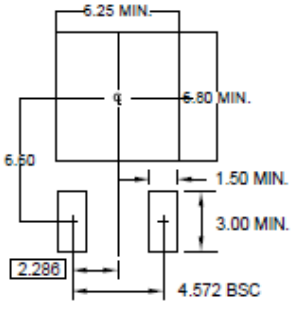
## Package Information

TO252(DPAK) PACKAGE OUTLINE




| SYMBOL | DIMENSION IN MILLIMETERS | | | DIMENSIONS IN INCHES | | |
|---|---|---|---|---|---|---|
| | MIN. | NOM. | MAX. | MIN. | NOM. | MAX. |
| A | 2.184 | 2.286 | 2.388 | 0.086 | 0.090 | 0.094 |
| A1 | 0.000 | --- | 0.127 | 0.000 | --- | 0.005 |
| A2 | 0.889 | 1.041 | 1.143 | 0.035 | 0.041 | 0.045 |
| b | 0.635 | 0.762 | 0.889 | 0.025 | 0.030 | 0.035 |
| b1 | 0.762 | 0.840 | 1.143 | 0.030 | 0.033 | 0.045 |
| b2 | 4.953 | 5.340 | 5.461 | 0.195 | 0.210 | 0.215 |
| c | 0.450 | 0.508 | 0.610 | 0.018 | 0.020 | 0.024 |
| c1 | 0.450 | 0.508 | 0.610 | 0.018 | 0.020 | 0.024 |
| D | 5.969 | 6.096 | 6.223 | 0.235 | 0.240 | 0.245 |
| D1 | 5.210 | 5.249 | 5.380 | 0.205 | 0.207 | 0.212 |
| D2 | 0.662 | 0.762 | 0.862 | 0.026 | 0.030 | 0.034 |
| E | 6.350 | 6.604 | 6.731 | 0.250 | 0.260 | 0.265 |
| E1 | 4.318 | 4.826 | 4.901 | 0.170 | 0.190 | 0.193 |
| E2 | 1.678 | 1.778 | 1.878 | 0.066 | 0.070 | 0.074 |
| e | 2.286 BSC | | | 0.090 BSC | | |
| e1 | 4.572 BSC | | | 0.180 BSC | | |
| H | 9.398 | 10.033 | 10.414 | 0.370 | 0.395 | 0.410 |
| L | 1.270 | 1.520 | 2.032 | 0.050 | 0.060 | 0.080 |
| L1 | 2.921 REF. | | | 0.115REF. | | |
| L2 | 0.408 | 0.508 | 0.608 | 0.016 | 0.020 | 0.024 |
| L3 | 0.889 | 1.016 | 1.270 | 0.035 | 0.040 | 0.050 |
| L4 | 0.635 | --- | 1.016 | 0.025 | --- | 0.040 |

RECOMMENDED LAND PATTERN




UNIT: mm

NOTE
1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS. MOLD FLASH SHOULD BE LESS THAN 6 MILS.
2. DIMENSION L IS MEASURED IN GAUGE PLANE
3. TOLERANCE 0.10 mm UNLESS OTHERWISE SPECIFIED
4. CONTROLLING DIMENSION IS MILLIMETER. CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.
5. REFER TO JEDEC TO-252 (AA)