# N-Channel Enhancement Mode Power MOSFET

## Features

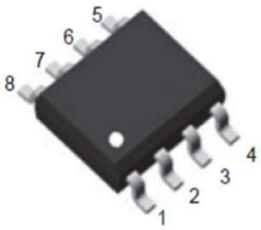
- $V_{DS}$= 40V, $I_D$= 14 A
  $R_{DS(ON)}$ < 10 mΩ @ $V_{GS}$ = 10V
  $R_{DS(ON)}$ < 17 mΩ @ $V_{GS}$ = 4.5V

## General Features

- Advanced Trench Technology
- Provide Excellent RDS(ON) and Low Gate Charge
- Lead Free and Green Available

*100% UIS TESTED!*
*100% ΔVds TESTED!*

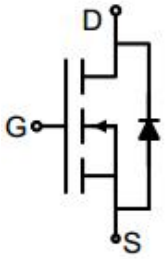
RoHS




SOP-8




pin assignment




Schematic diagram

## Maximum ratings, at $T_A$ =25°C, unless otherwise specified

| Symbol | Parameter | | Rating | Unit |
|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-Source breakdown voltage | | 40 | V |
| $V_{GS}$ | Gate-Source voltage | | ±20 | V |
| $I_S$ | Diode continuous forward current | $T_A$ =25°C | 3.8 | A |
| $I_D$ | Continuous drain current @VGS=10V | $T_A$ =25°C | 14 | A |
| | | $T_A$ =100°C | 9 | A |
| $I_{DM}$ | Pulse drain current tested ① | $T_A$ =25°C | 56 | A |
| $P_D$ | Maximum power dissipation | $T_A$ =25°C | 3.1 | W |
| MSL | | | Level 3 | |
| $T_{STG}$, $T_J$ | Storage and junction temperature range | | -55 to 150 | °C |

## Thermal Characteristics

| Symbol | Parameter | Typical | Unit |
|---|---|---|---|
| $R_{\theta JL}$ | Thermal Resistance, Junction-to-Lead | 24 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 40 | °C/W |

## Electrical Characteristics

| Symbol | Parameter | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Static Electrical Characteristics @ $T_j$=25°C (unless otherwise stated)** | | | | | | |
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=250μA | 40 | -- | -- | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=40V,$V_{GS}$=0V | -- | -- | 1 | uA |
| | Zero Gate Voltage Drain Current($T_j$=125℃) | $V_{DS}$=40V,$V_{GS}$=0V | -- | -- | 100 | uA |
| $I_{GSS}$ | Gate-Body Leakage Current | $V_{GS}$=±20V,$V_{DS}$=0V | -- | -- | ±100 | nA |
| $V_{GS(TH)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$,$I_D$=250μA | 1.0 | | 3.0 | V |
| $R_{DS(ON)}$ | Drain-Source On-State Resistance② | $V_{GS}$=10V, $I_D$=10A | -- | | 10 | mΩ |
| $R_{DS(ON)}$ | Drain-Source On-State Resistance② | $V_{GS}$=4.5V, $I_D$=6A | -- | | 17 | mΩ |
| **Dynamic Electrical Characteristics @ $T_j$ = 25°C (unless otherwise stated)** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=20V,$V_{GS}$=0V, f=1MHz | 1115 | 1315 | 1515 | pF |
| $C_{oss}$ | Output Capacitance | | 85 | 100 | 115 | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | 65 | 80 | 95 | pF |
| $R_g$ | Gate Resistance | f=1MHz | -- | 1.7 | -- | Ω |
| $Q_g$ (10V) | Total Gate Charge | $V_{DS}$=20V,$I_D$=10A, $V_{GS}$=10V | -- | 22 | -- | nC |
| $Q_g$ (4.5V) | Total Gate Charge | | -- | 12 | -- | nC |
| $Q_{gs}$ | Gate-Source Charge | | -- | 4.5 | -- | nC |
| $Q_{gd}$ | Gate-Drain Charge | | -- | 4.2 | -- | nC |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DD}$=20V, $I_D$=10A, $R_G$=3.0Ω, $V_{GS}$=10V | -- | 7.5 | -- | ns |
| $t_r$ | Turn-on Rise Time | | -- | 3.8 | -- | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | -- | 24 | -- | ns |
| $t_f$ | Turn-Off Fall Time | | -- | 5.5 | -- | ns |
| **Source- Drain Diode Characteristics@ $T_j$= 25°C (unless otherwise stated)** | | | | | | |
| $V_{SD}$ | Forward on voltage | $I_{SD}$=10A,$V_{GS}$=0V | -- | 0.8 | 1.2 | V |
| $t_{rr}$ | Reverse Recovery Time | $T_j$=25℃,$I_{sd}$=10A, $V_{GS}$=0V di/dt=500A/μs | -- | 8.5 | -- | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | -- | 8 | -- | nC |

NOTE:

① Repetitive rating; pulse width limited by max junction temperature.

② Pulse width ≤ 300μs; duty cycle≤ 2%.

## Typical Characteristics

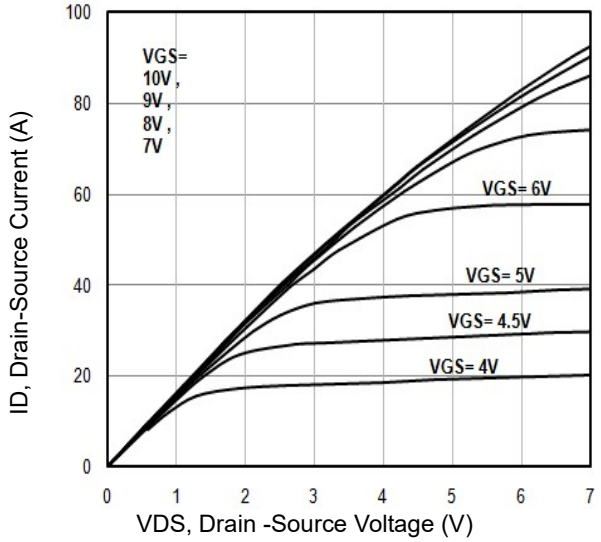



**Fig1.** Typical Output Characteristics

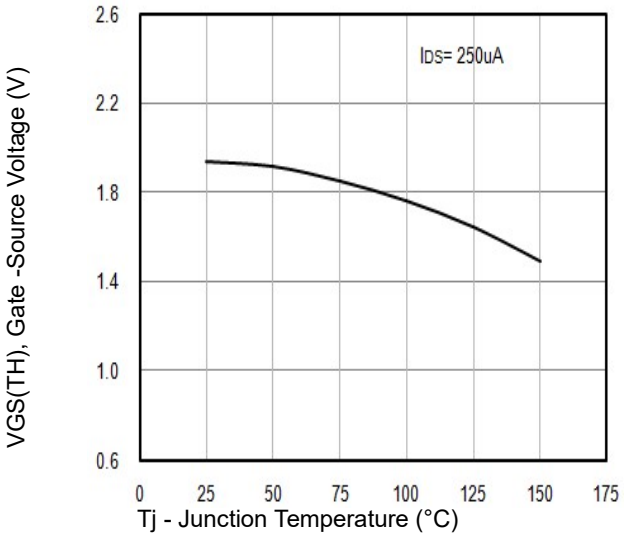



**Fig2.** $V_{GS(TH)}$ Gate -Source Voltage Vs. Tj

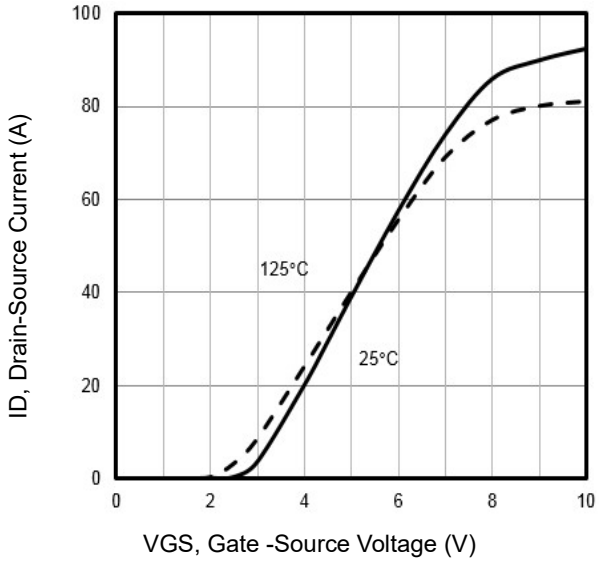



**Fig3.** Typical Transfer Characteristics

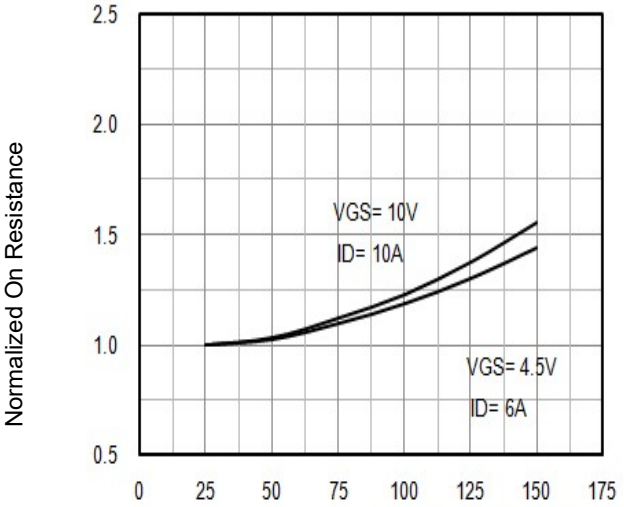



**Fig4.** Normalized On-Resistance Vs. Tj

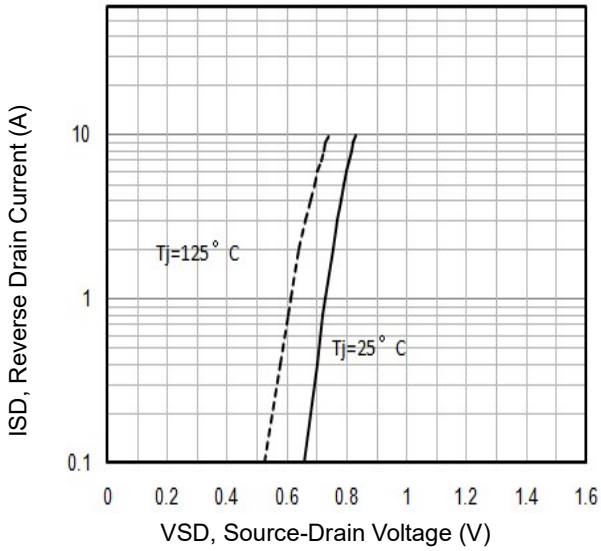



**Fig5.** Typical Source-Drain Diode Forward Voltage

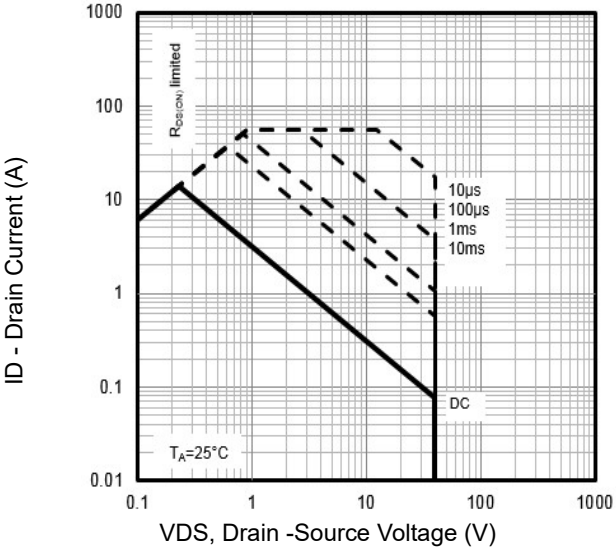



**Fig6.** Maximum Safe Operating Area

## Typical Characteristics

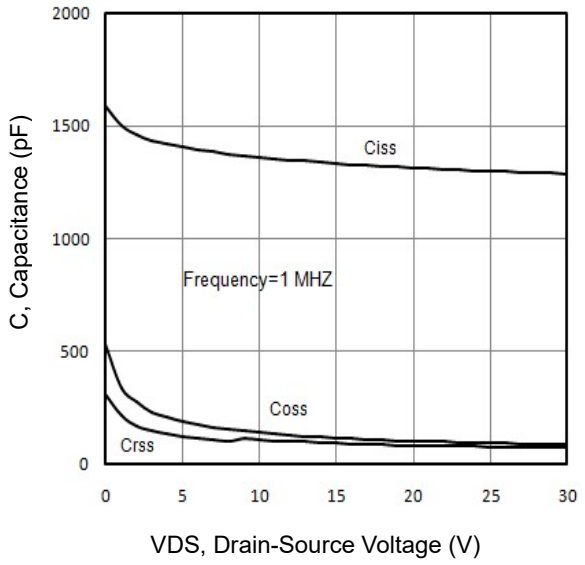



**Fig7.** Typical Capacitance Vs. Drain-Source Voltage

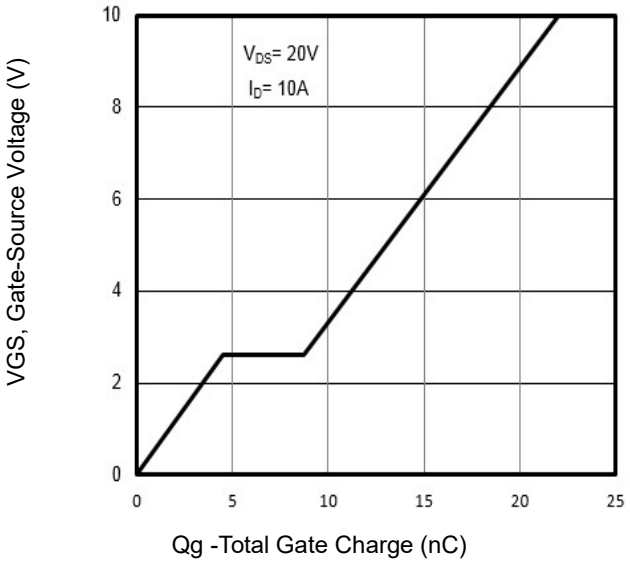



**Fig8.** Typical Gate Charge Vs. Gate-Source Voltage

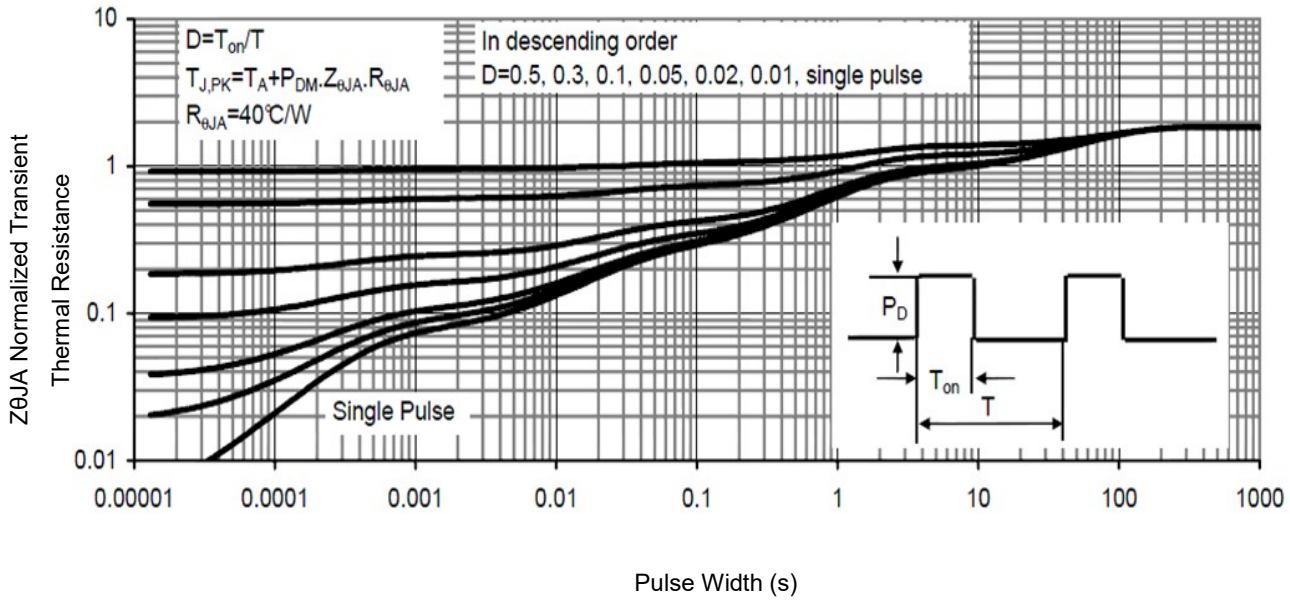



**Fig9.** Normalized Maximum Transient Thermal Impedance

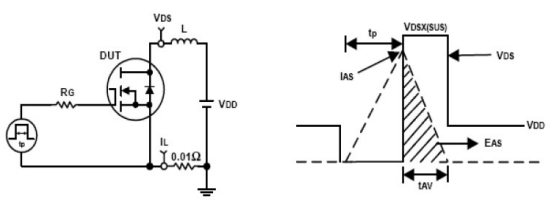



**Fig10.** Unclamped Inductive Test Circuit and waveforms

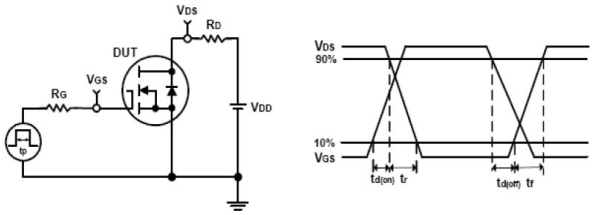



**Fig11.** Switching Time Test Circuit and waveforms