# N-Channel and P-Channel Enhancement Mode Power MOSFET

## Features

- N-Channel: 30V, 10A

  $R_{DS(ON)}$< 15 mΩ @ $V_{GS}$ = 10V
  $R_{DS(ON)}$ <23 mΩ @ $V_{GS}$ = 4.5V

- P-Channel: -30V, -12A

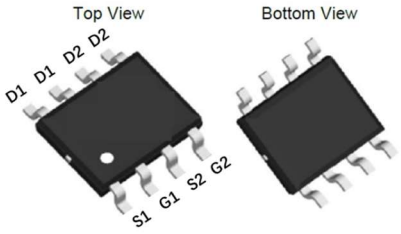
  $R_{DS(ON)}$< 34 mΩ@ $V_{GS}$ = -10V
  $R_{DS(ON)}$ < 49 mΩ @ $V_{GS}$ = -4.5V

## General Features

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

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

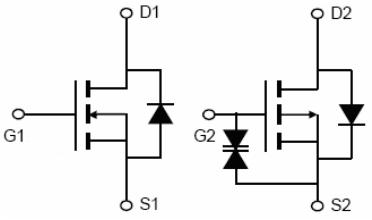
RoHS




SOP-8 Dual




Pin Assignment




Schematic diagram

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

| Parameter | | Symbol | NMOS | PMOS | Unit |
|---|---|---|---|---|---|
| Drain-source Voltage | | $V_{DS}$ | 30 | -30 | V |
| Gate-source Voltage | | $V_{GS}$ | ±20 | ±20 | V |
| Drain Current | $T_A$=25℃ | $I_D$ | 7 | -5 | A |
| | $T_A$=100℃ | | 4.4 | -3 | |
| Pulsed Drain Current [A] | | $I_{DM}$ | 60 | -40 | A |
| Total Power Dissipation [B] | $T_A$=25℃ | $P_D$ | 2 | 2 | W |
| | $T_A$=100℃ | | 0.8 | 0.8 | |
| Junction and Storage Temperature Range | | $T_J$ ,$T_{STG}$ | -55～+150 | -55～+150 | ℃ |

## ■Thermal resistance

| Parameter | | Symbol | NMOS | | PMOS | | Units |
|---|---|---|---|---|---|---|---|
| | | | Typ | Max | Typ | Max | |
| Thermal Resistance Junction-to-Ambient [C] | Steady-State | $R_{\theta JA}$ | 50 | 60 | 50 | 60 | ℃/W |

## ■ NMOS Electrical Characteristics ($T_J$=25℃ unless otherwise noted)

| Parameter | Symbol | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **Static Parameter** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$= 0V, $I_D$=250μA | 30 | - | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=30V, $V_{GS}$=0V | - | - | 1 | μA |
| | | $V_{DS}$=30V, $V_{GS}$=0V, Tj=150℃ | - | - | 100 | |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$= ±20V, $V_{DS}$=0V | - | - | ±100 | nA |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$= $V_{GS}$, $I_D$=250μA | 1.0 | | 2.5 | V |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}$=10V, $I_D$=7A | - | | 15 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=5A | - | | 23 | |
| Diode Forward Voltage | $V_{SD}$ | $I_S$=7A, $V_{GS}$=0V | - | - | 1.2 | V |
| Gate resistance | $R_G$ | f=1MHz | - | 2 | - | Ω |
| Maximum Body-Diode Continuous Current | $I_S$ | | - | - | 7 | A |
| **Dynamic Parameters** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=15V, $V_{GS}$=0V, f=1MHz | - | 380 | - | pF |
| Output Capacitance | $C_{oss}$ | | - | 75 | - | |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 60 | - | |
| **Switching Parameters** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{GS}$=10V, $V_{DS}$=15V, $I_D$=7A | - | 12.5 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 2.5 | - | |
| Gate-Drain Charge | $Q_{gd}$ | | - | 2.5 | - | |
| Reverse Recovery Charge | $Q_{rr}$ | $I_F$=7A, di/dt=100A/us | - | 1.5 | - | nC |
| Reverse Recovery Time | $t_{rr}$ | | - | 16 | - | ns |
| Turn-on Delay Time | $t_{D(on)}$ | $V_{GS}$=10V, $V_{DD}$=15V, $I_D$=7A $R_{GEN}$=3Ω | - | 5 | - | ns |
| Turn-on Rise Time | $t_r$ | | - | 30 | - | |
| Turn-off Delay Time | $t_{D(off)}$ | | - | 15 | - | |
| Turn-off fall Time | $t_f$ | | - | 20 | - | |

## ■ PMOS Electrical Characteristics ($T_J$=25℃ unless otherwise noted)

| Parameter | Symbol | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **Static Parameter** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$= 0V, $I_D$=-250μA | -30 | - | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=-30V, $V_{GS}$=0V | - | - | -1 | μA |
| | | $V_{DS}$=-30V, $V_{GS}$=0V, Tj=150℃ | - | - | -100 | |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$= ±20V, $V_{DS}$=0V | - | - | ±100 | nA |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$= $V_{GS}$, $I_D$=-250μA | -1.0 | | -2.5 | V |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}$=-10V, $I_D$=-5A | - | | 34 | mΩ |
| | | $V_{GS}$=-4.5V, $I_D$=-3.5A | - | | 49 | |
| Diode Forward Voltage | $V_{SD}$ | $I_S$=-5A, $V_{GS}$=0V | - | - | -1.2 | V |
| Gate resistance | $R_G$ | f=1MHz | - | 15 | - | Ω |
| Maximum Body-Diode Continuous Current | $I_S$ | | - | - | -5 | A |
| **Dynamic Parameters** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=-15V, $V_{GS}$=0V, f=1MHz | - | 490 | - | pF |
| Output Capacitance | $C_{oss}$ | | - | 75 | - | |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 60 | - | |
| **Switching Parameters** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{GS}$=-10V, $V_{DS}$=-15V, $I_D$=-5A | - | 9 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 1.5 | - | |
| Gate-Drain Charge | $Q_{gd}$ | | - | 2.3 | - | |
| Reverse Recovery Charge | $Q_{rr}$ | $I_F$=-5A, di/dt=100A/us | - | 12 | - | nC |
| Reverse Recovery Time | $t_{rr}$ | | - | 32 | - | ns |
| Turn-on Delay Time | $t_{D(on)}$ | $V_{GS}$=-10V, $V_{DD}$=-15V, ID=-5A $R_{GEN}$=2.5Ω | - | 9 | - | ns |
| Turn-on Rise Time | $t_r$ | | - | 3 | - | |
| Turn-off Delay Time | $t_{D(off)}$ | | - | 29 | - | |
| Turn-off fall Time | $t_f$ | | - | 15 | - | |

A. Repetitive rating; pulse width limited by max. junction temperature.
B. $P_d$ is based on max. junction temperature, using junction-case thermal resistance.
C. The value of $R_{\theta JA}$ is measured with the device mounted on 1 $in^2$ FR-4 board with 2oz. Copper, in the still air environment with $T_A$ =25℃. The maximum allowed junction temperature of 150℃. The value in any given application depends on the user's specific board design.

## ■ NMOS Typical Electrical and Thermal Characteristics Diagrams

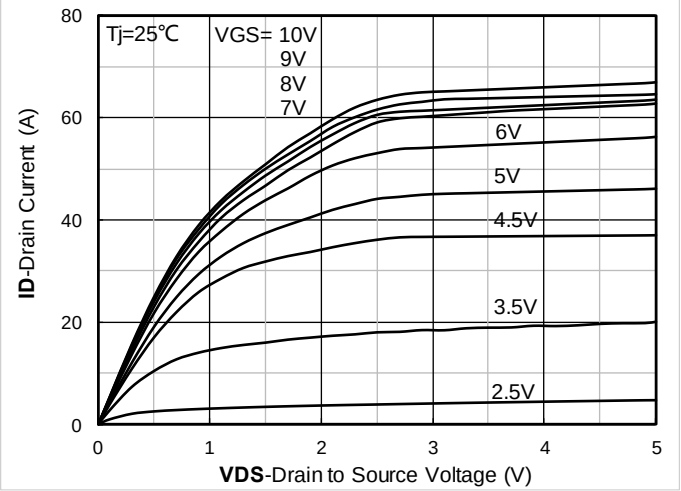



Figure 1. Output Characteristics

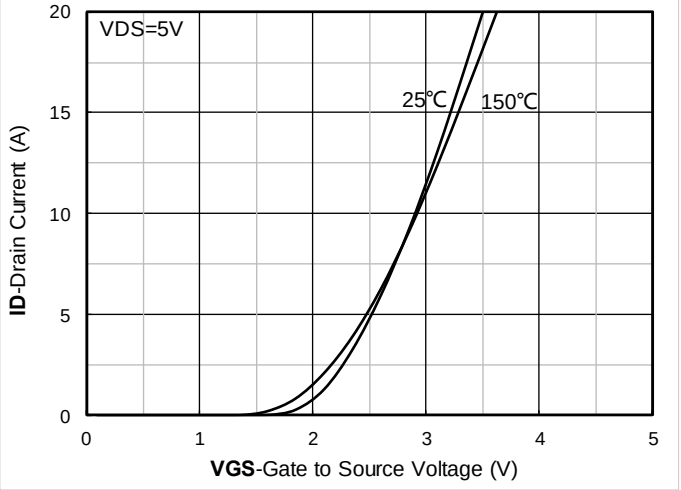



Figure 2. Transfer Characteristics

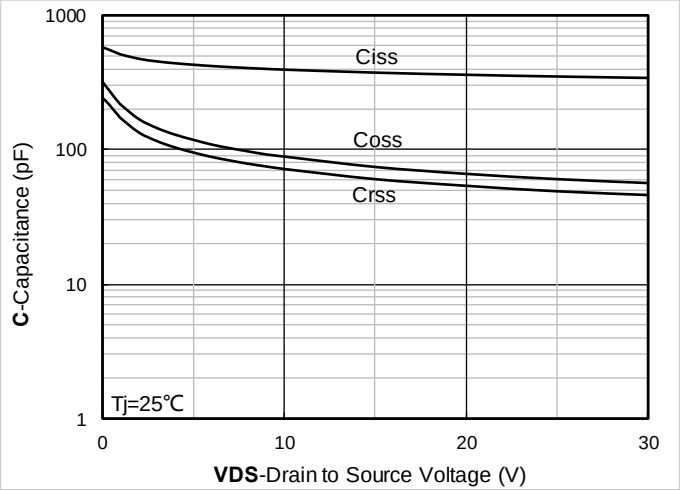



Figure 3. Capacitance Characteristics

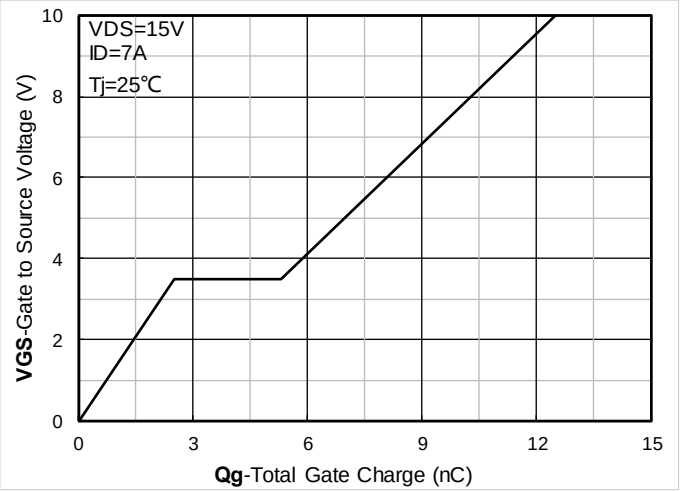



Figure 4. Gate Charge

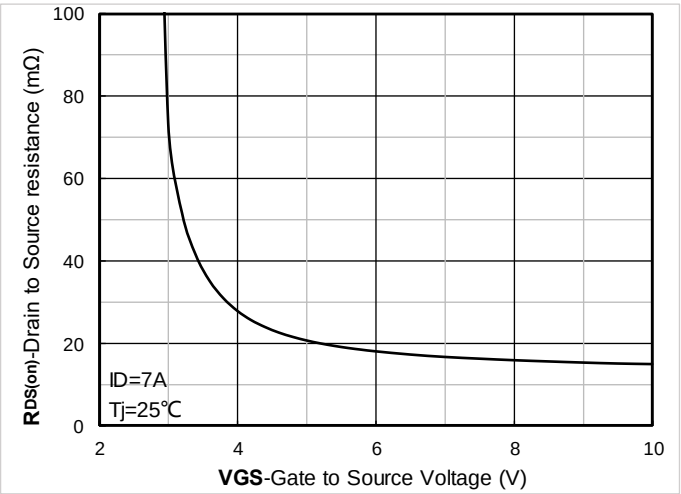



Figure 5. On-Resistance vs Gate to Source Voltage

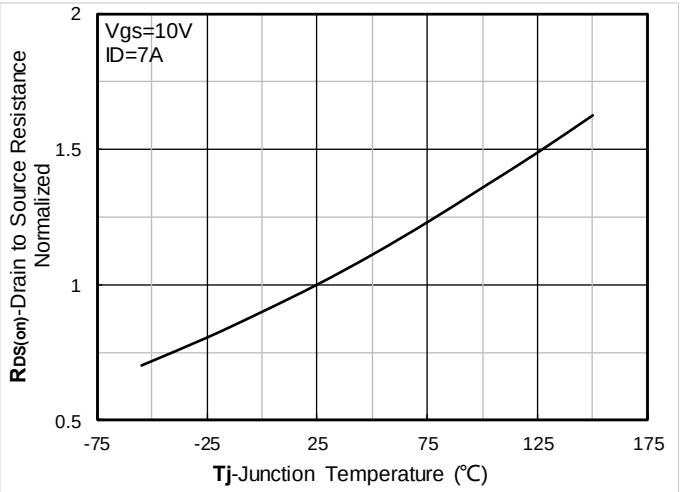



Figure 6. Normalized On- Resistance

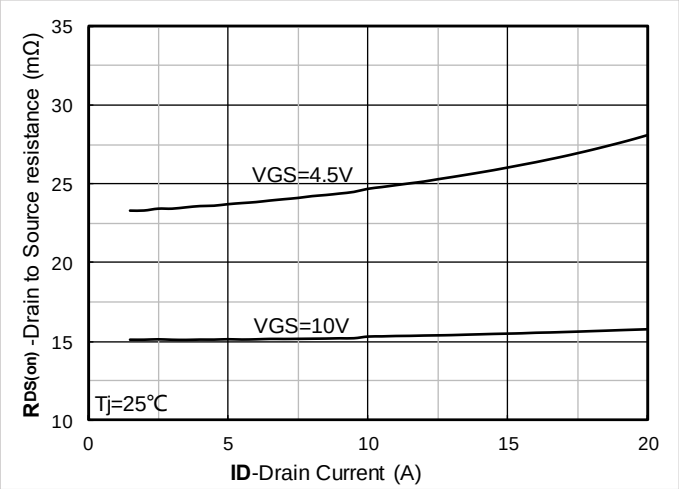



Figure 7. $R_{DS(on)}$ VS Drain Current

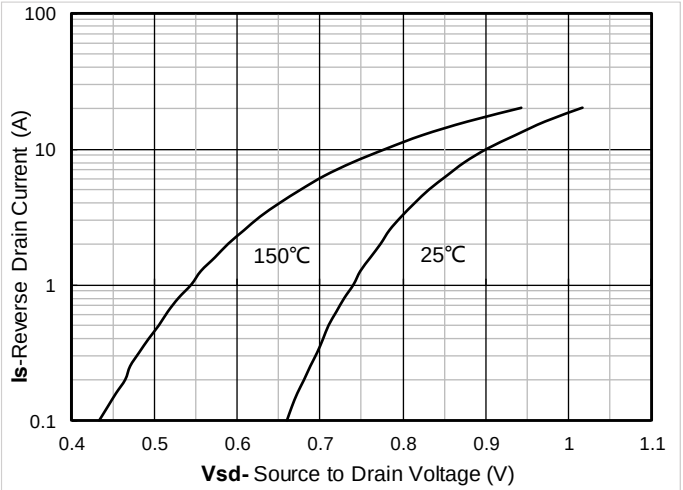



Figure 8. Forward characteristics of reverse diode

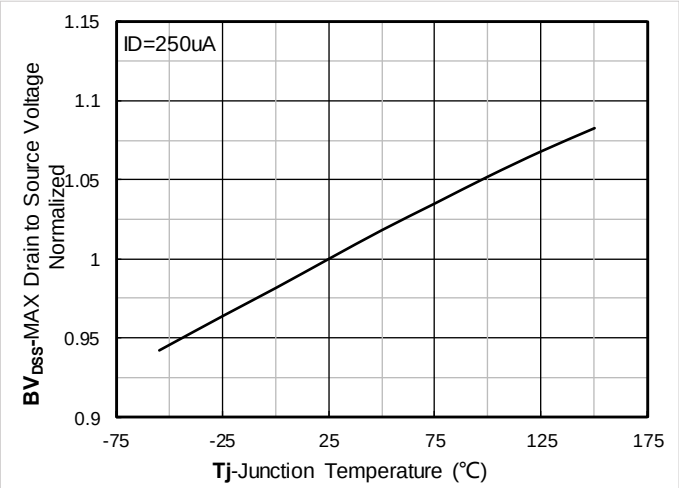



Figure 9. Normalized breakdown voltage

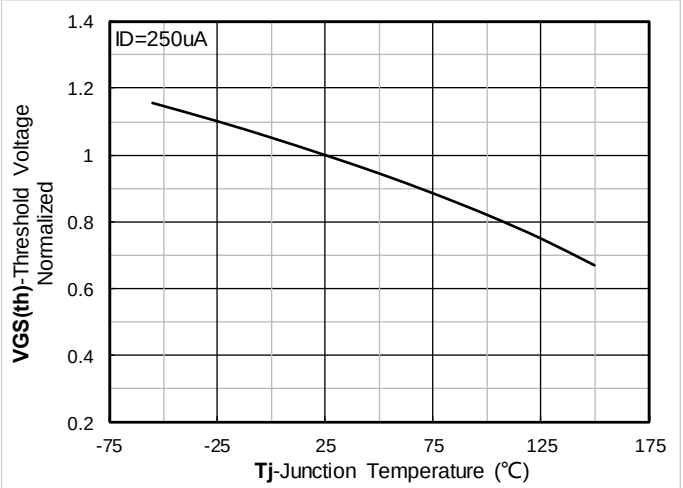



Figure 10. Normalized Threshold voltage

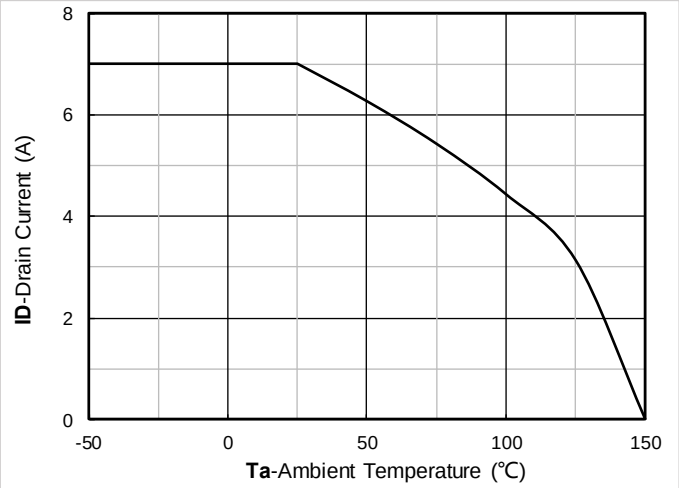



Figure 11. Current dissipation

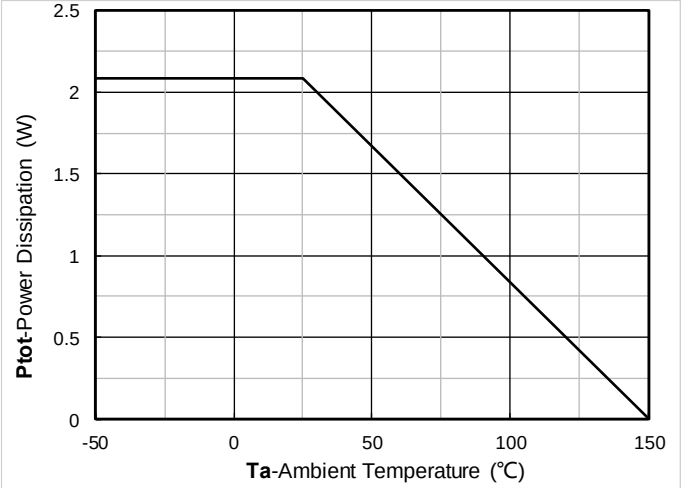



Figure 12. Power dissipation

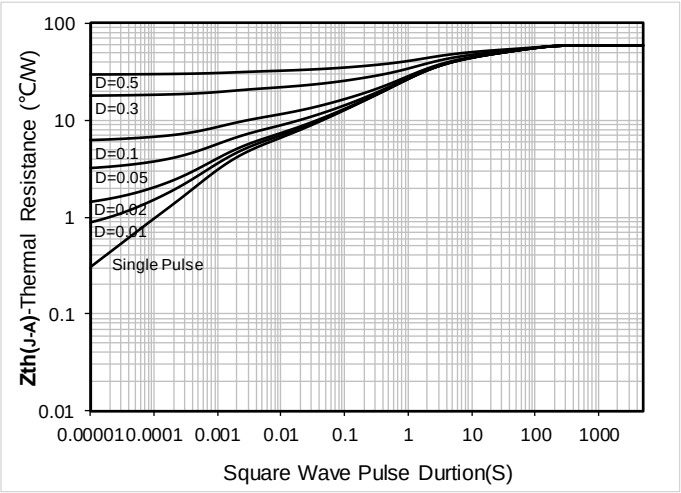



Figure 13. Maximum Transient Thermal Impedance

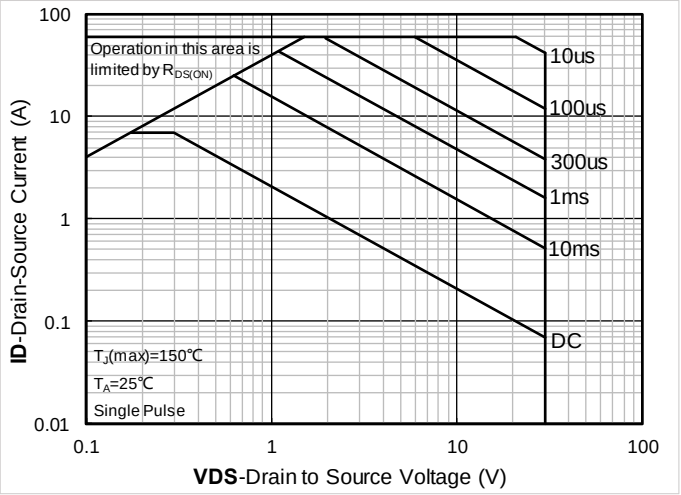



Figure 14. Safe Operation Area

## ■ PMOS Typical Electrical and Thermal Characteristics Diagrams

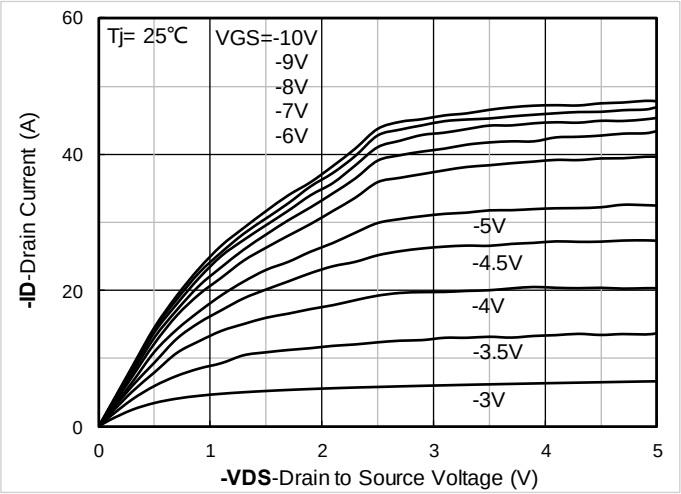



Figure 1. Output Characteristics

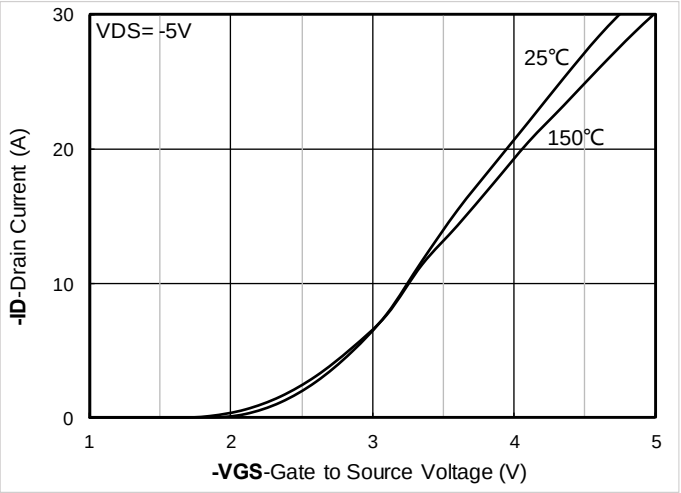



Figure 2. Transfer Characteristics

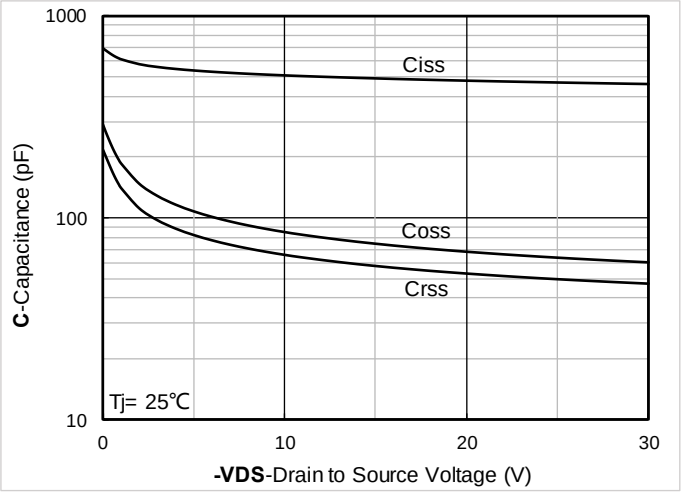



Figure 3. Capacitance Characteristics

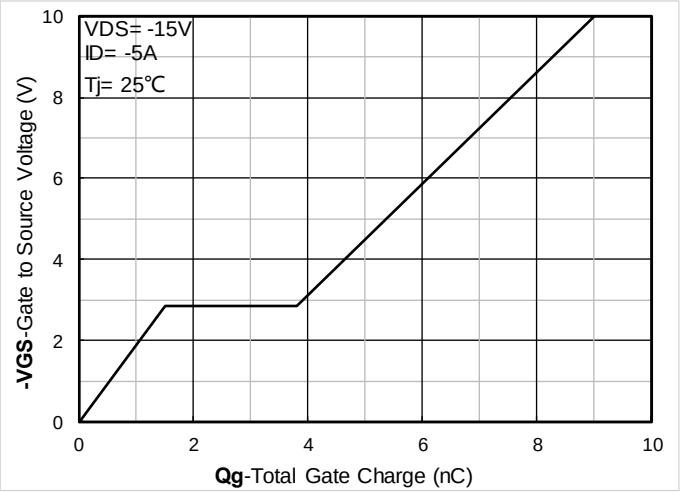



Figure 4. Gate Charge

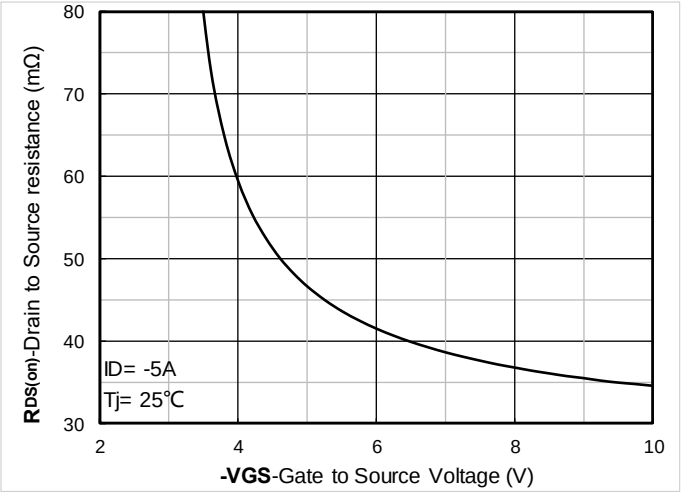



Figure 5. On-Resistance vs Gate to Source Voltage

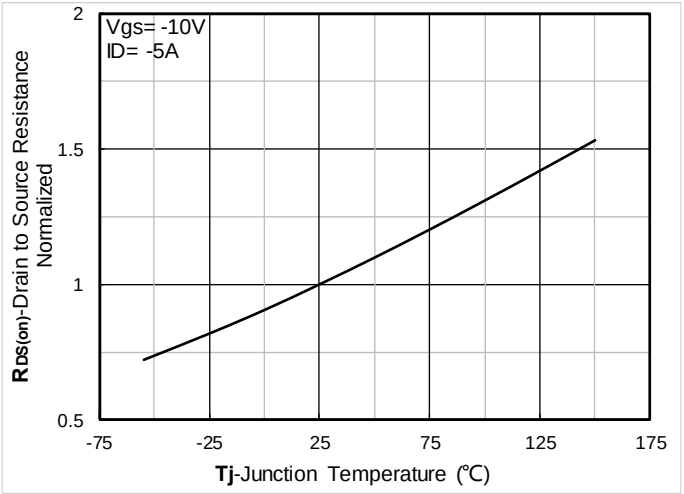



Figure 6. Normalized On-Resistance

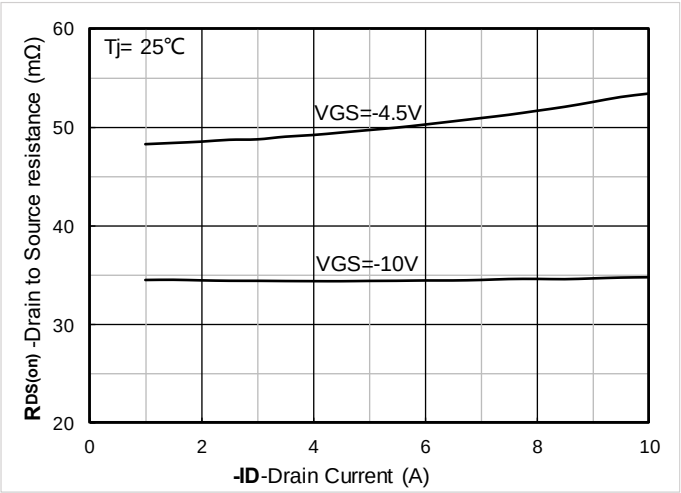



Figure 7. $R_{DS(on)}$ VS Drain Current

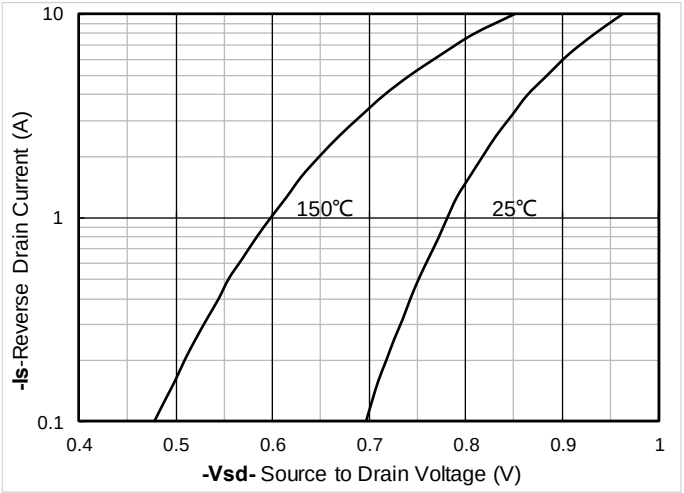



Figure 8. Forward characteristics of reverse diode

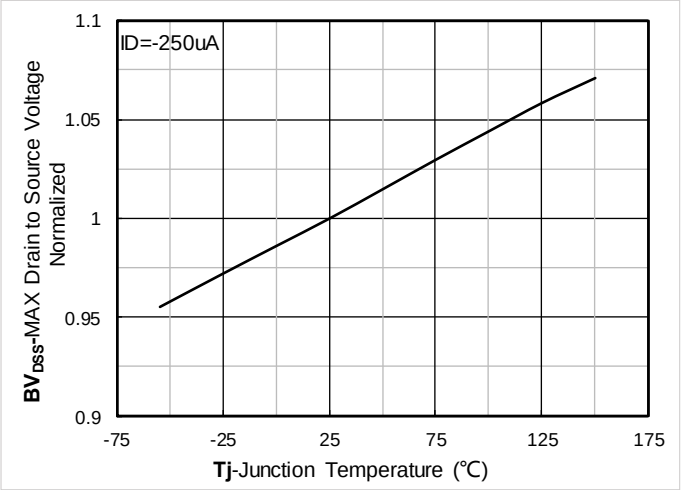



Figure 9. Normalized breakdown voltage

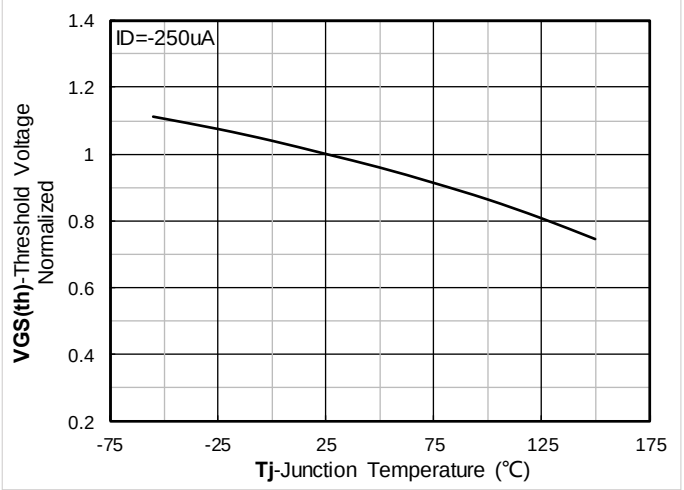



Figure 10. Normalized Threshold voltage

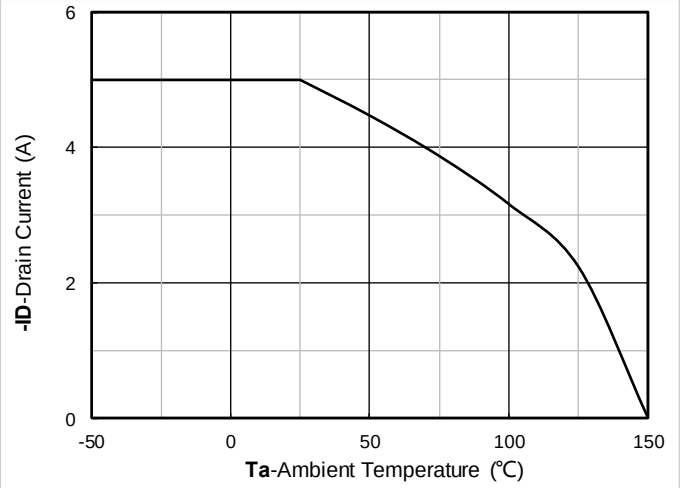



Figure 11. Current dissipation

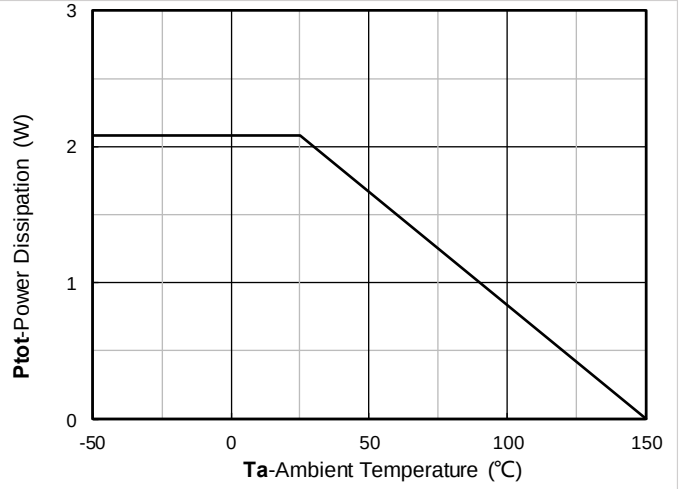



Figure 12. Power dissipation

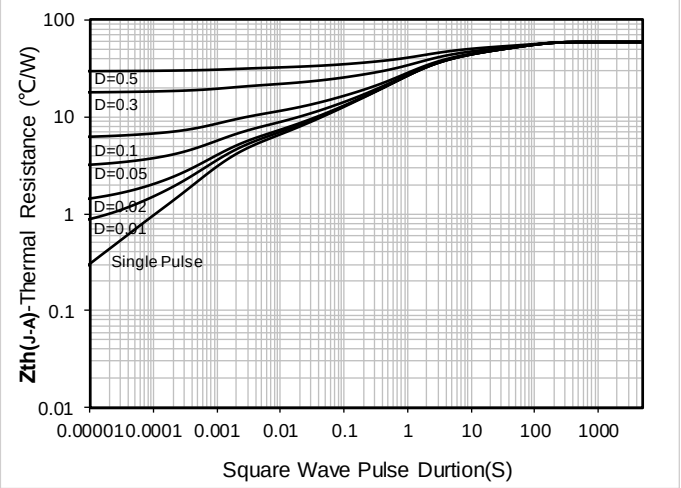



Figure 13. Maximum Transient Thermal Impedance

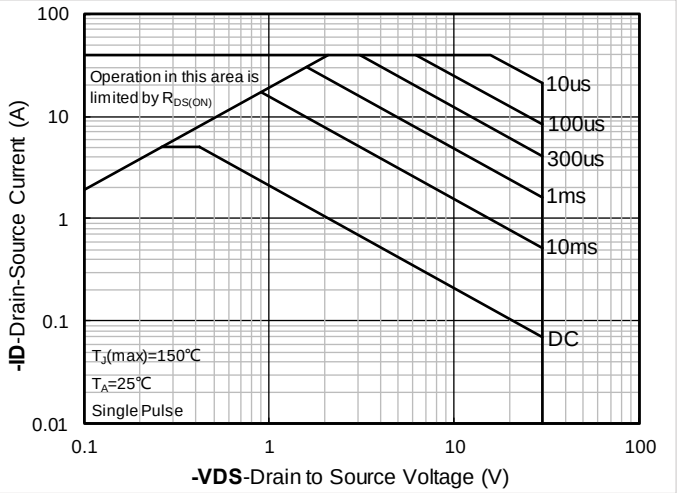



Figure 14. Safe Operation Area