# -20V P-Channel Enhancement Mode MOSFET

## Description

The SX150P02NF uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

## General Features

$V_{DS}$ = -20V $I_D$ =-150A

$R_{DS(ON)}$ < 2.0mΩ @ $V_{GS}$=-10V

$R_{DS(ON)}$ < 2.2mΩ @ $V_{GS}$=-4.5V

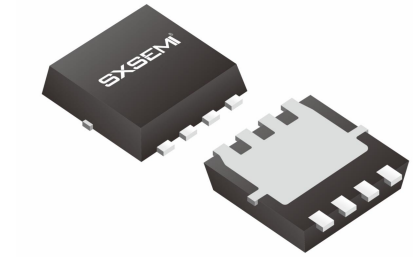
## Application

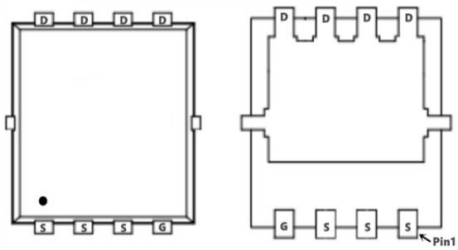
Battery protection

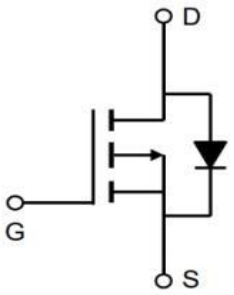
Load switch

Uninterruptible power supply

**PDFN5*6-8L**




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

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| VDS | Drain-Source Voltage | -20 | V |
| VGS | Gate-Source Voltage | ±12 | V |
| ID@TC=25℃ | Continuous Drain Current, VGS @ -10V1 | -150 | A |
| ID@TC=100℃ | Continuous Drain Current, VGS @ -10V1 | -76 | A |
| IDM | Pulsed Drain Current2 | 450 | A |
| EAS | Single Pulse Avalanche Energy3 | 450 | mJ |
| IAS | Avalanche Current | -50 | A |
| PD@TC=25℃ | Total Power Dissipation4 | 104 | W |
| TSTG | Storage Temperature Range | -55 to 150 | ℃ |
| TJ | Operating Junction Temperature Range | -55 to 150 | ℃ |
| RθJA | Thermal Resistance Junction-Ambient 1 | 15 | ℃/W |
| RθJC | Thermal Resistance Junction-Case1 | 0.9 | ℃/W |

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

| Symbol | Parameter | Test Condition | Min | Type | Max | Units |
|---|---|---|---|---|---|---|
| VDS | Drain-source breakdown voltage | $V_{GS}$=0V, $I_D$ = -250μA | -20 | - | - | V |
| VDS/TJ | $V_{DS}$ temperature coefficient | $I_D$ = -250μA | - | -14.5 | - | mV/°C |
| VGS(th)/TJ | $V_{GS(th)}$ temperature coefficient | | - | 4.1 | - | |
| VGS(th) | Gate-source threshold voltage | $V_{DS}$=$V_{GS}$, $I_D$=-250μA | -0.5 | - | -1.4 | V |
| IGSS | Gate-source leakage | $V_{DS}$=0V, $V_{GS}$=±12V | - | - | ± 100 | nA |
| IDSS | Zero gate voltage drain current | $V_{DS}$=-20V, $V_{GS}$=0V | - | - | -1 | μA |
| | | $V_{DS}$=-20V, $V_{GS}$ =0V, $T_J$ =55 °C | - | - | -5 | |
| RDS(on) | Drain-source on-state resistance | $V_{GS}$=-10V, $I_D$=-25A | - | 1.6 | 2.0 | mΩ |
| | | $V_{GS}$=-4.5V, $I_D$=-20A | - | 1.9 | 2.2 | |
| | | $V_{GS}$=-2.5V, $I_D$=-15A | - | 2.6 | 3.2 | |
| gfs | Forward transconductance [a] | $V_{DS}$=-10V, $I_D$=-25A | - | 120 | - | S |
| Ciss | Input capacitance | $V_{DS}$=-10V, $V_{GS}$=0V, f=1MHz | - | 22000 | - | pF |
| Coss | Output capacitance | | - | 2470 | - | |
| Crss | Reverse transfer capacitance | | - | 2515 | - | |
| $Q_g$ | Total gate charge | $V_{DS}$=-10V, $V_{GS}$=-10V, $I_D$=20A | - | 415 | 625 | nC |
| | | $V_{DS}$=-10V, $V_{GS}$=-4.5V, $I_D$ =-20A | - | 202.5 | 305 | |
| Qgs | Gate-source charge | | - | 32.5 | - | |
| $Q_{gd}$ | Gate-drain charge | | - | 51.5 | - | |
| $R_g$ | Gate resistance | f=1MHz | 0.8 | 1.5 | 2.5 | Ω |
| td(on) | Turn-on delay time | VDD=-10V, RL=1Ω ID=-10A,VGEN=-10V, Rg=1Ω | - | 20 | 40 | ns |
| $t_r$ | Rise time | | - | 14 | 28 | |
| td(on) | Turn-on delay time | $V_{DD}$=-10V, $R_L$=1Ω,$I_D$=-10 A, $V_{GEN}$=-4.5V, $R_g$=1Ω | - | 115 | 200 | |
| td(off) | Turn-off delay time | | - | 230 | 390 | |
| IS | Continuous source-drain diode current | $T_C$ = 25 °C | - | - | -150 | A |
| ISM | Pulse diode forward current | | - | - | -450 | |
| VSD | Body diode voltage | $I_S$ = -5 A, $V_{GS}$ = 0 V | - | -0.64 | -1.1 | V |
| trr | Body diode reverse recovery time | $I_F$=-10A, di/dt=100A/μs, $T_J$ =25°C | - | 88 | 140 | ns |
| $Q_{rr}$ | Body diode reverse recovery charge | | - | 120 | 200 | nC |
| ta | Reverse recovery fall time | | - | 31 | - | ns |
| tb | Reverse recovery rise time | | - | 57 | - | |

**Note：**

1、The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper.

2、The data tested by pulsed , pulse width ≦300us , duty cycle ≦2%

3、The EAS data shows Max. rating . The test condition is VDD=-16V,VGS=-4.5V,L=0.1mH,IAS=-50A

4、The power dissipation is limited by 150℃junction temperature

5、The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

## Typical Characteristics

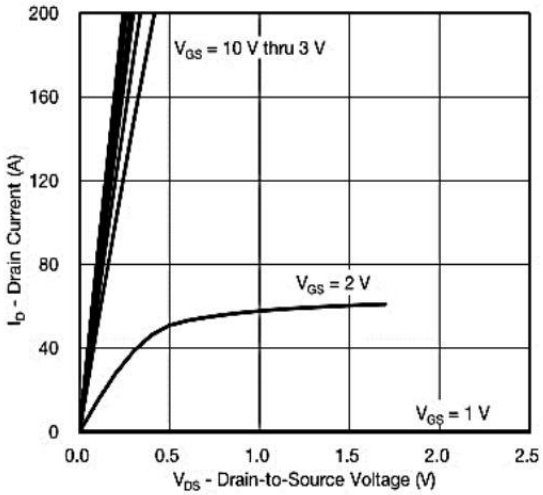
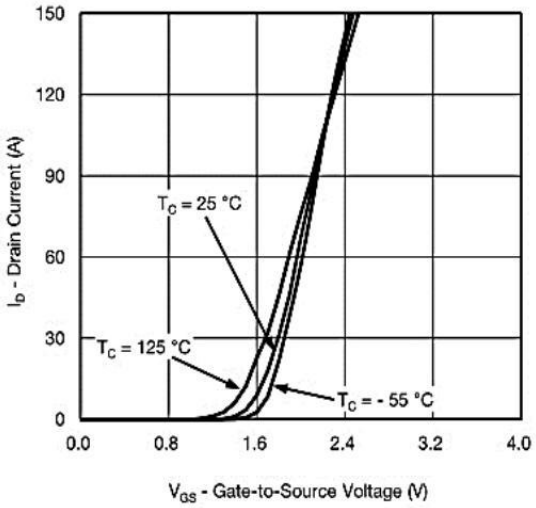



Figure1: Output Characteristics




Figu re 2 : T ra nsfe r Characte ristics

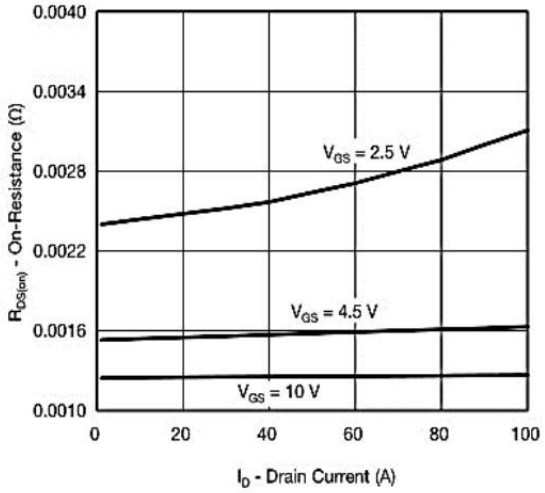



Figure 3: On-Resistance vs. Drain Current

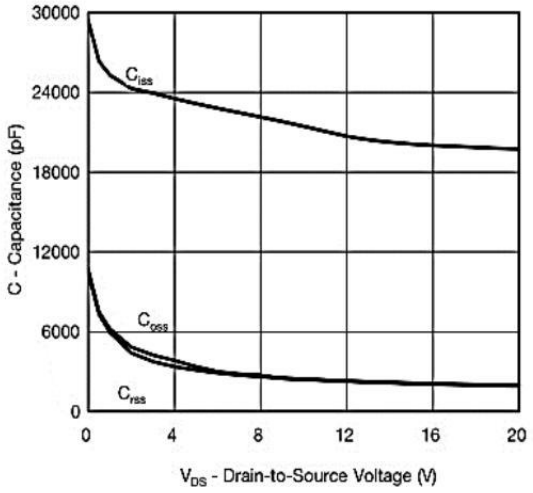



Figure 4: Capacitance

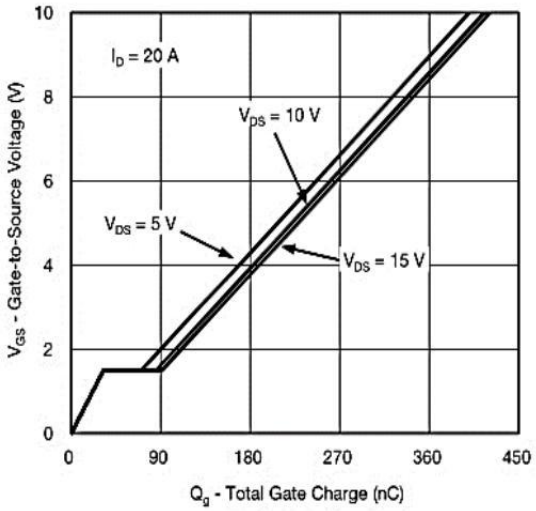



Figure 5: Gate Charge

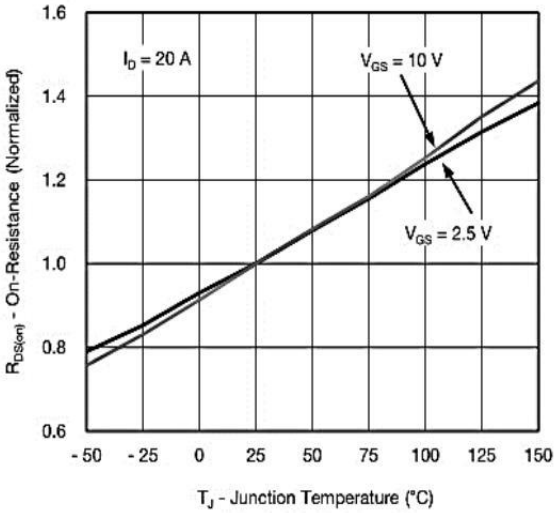



Figure 6: On-Resistance vs. Junction Temperature

## Typical Characteristics

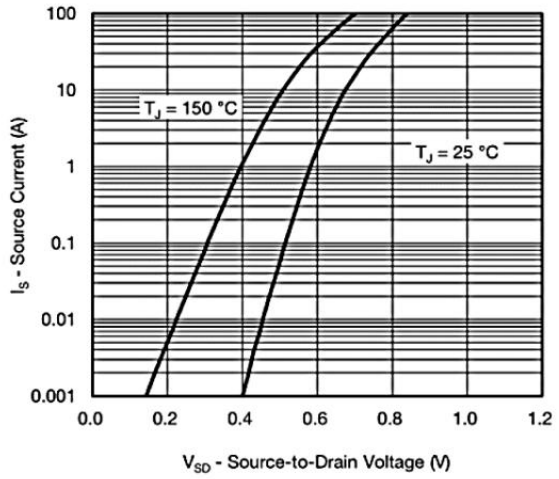



**Figure 7: Source-Drain Diode Forward Voltage**

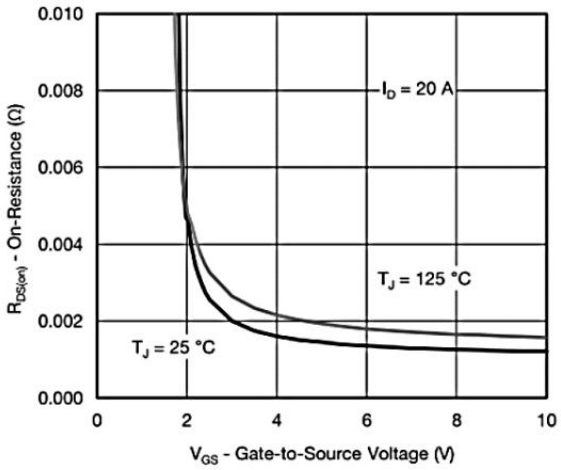



**Figure 8: On-Resistance vs. Gate-to-Source Voltage**

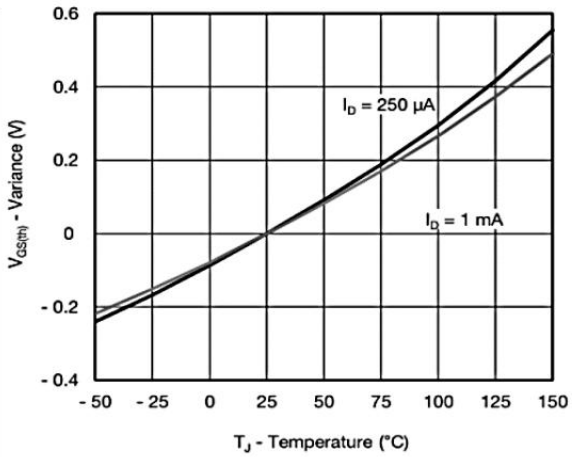



**Figure 9: Maximum Safe Operating Area**

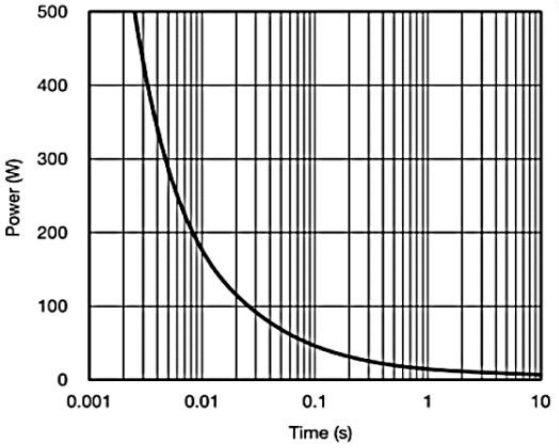



**Figure 10: Maximum Continuous Drain Current vs. Case Temperature**

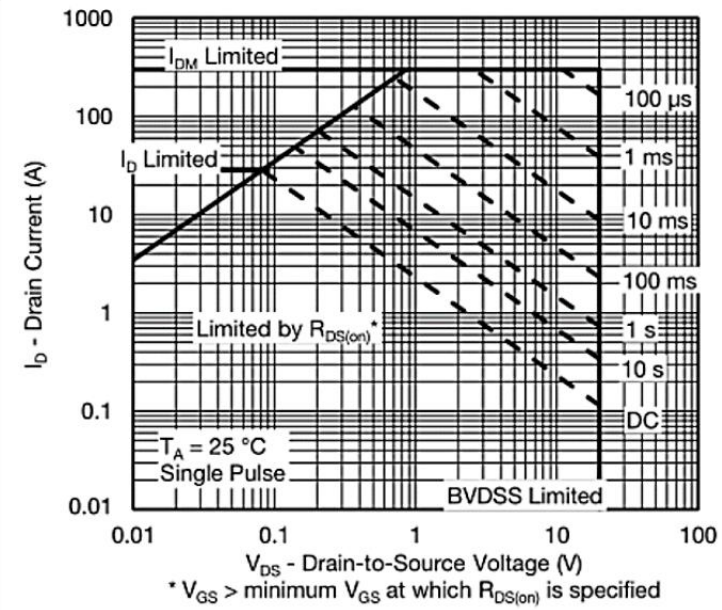
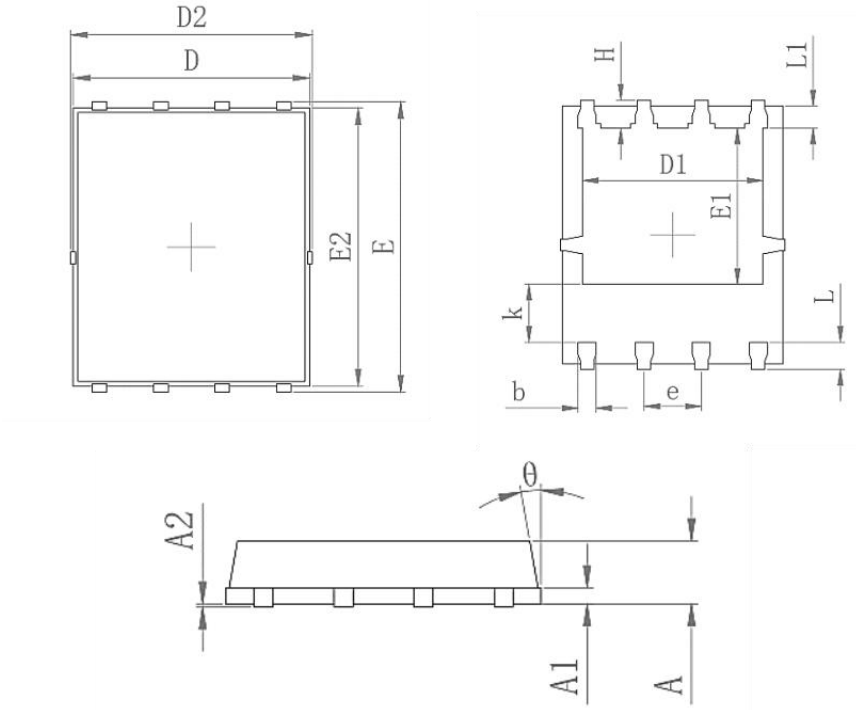



**Figure 11: Safe Operating Area**

## Package Mechanical Data-PDFN5X6-8L-XZT Single




| Symbol | Common | |
|---|---|---|
| | mm | |
| | Mim | Max |
| A | 0.90 | 1.10 |
| A1 | 0.254 REF | |
| A2 | 0-0.05 | |
| D | 4.824 | 4.976 |
| D1 | 3.910 | 4.110 |
| D2 | 4.944 | 5.076 |
| E | 5.924 | 6.076 |
| E1 | 3.375 | 3.575 |
| E2 | 5.674 | 5.826 |
| b | 0.350 | 0.450 |
| e | 1.270 | |
| L | 0.534 | 0.686 |
| L1 | 0.424 | 0.576 |
| K | 1.190 | 1.390 |
| H | 0.549 | 0.701 |
| Φ | 8° | 12° |

### Package Marking and Ordering Information

| Product ID | Pack | Marking | Qty(PCS) |
|---|---|---|---|
| TAPING | PDFN5*6-8L | | 5000 |