# 150V N-Channel Enhancement Mode MOSFET

## Description

The SX190N15T uses advanced technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 10V. This device is suitable for use as a Battery protection or in other Switching application.

## General Features

$V_{DS}$ = 150V $I_D$ =190A

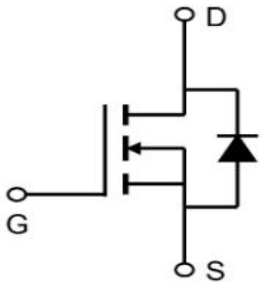
$R_{DS(ON)}$ < 7.5mΩ @ $V_{GS}$=10V

## Application

DC/DC Converter

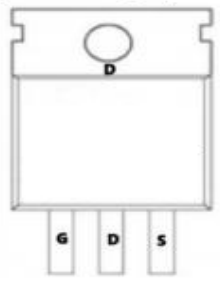
LED Backlighting

Power Management Switches




TO-263-3L




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

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| VDS | Drain-Source Voltage | 150 | V |
| VGS | Gate-Source Voltage | ±20 | V |
| $I_D$@$T_C$=25℃ | Continuous Drain Current, $V_{GS}$ @ 10V | 190 | A |
| $I_D$@$T_C$=100℃ | Continuous Drain Current, $V_{GS}$ @ 10V | 140 | A |
| IDM | Pulsed Drain Current | 550 | A |
| EAS | Single Pulse Avalanche Energy | 506 | mJ |
| IAS | Avalanche Current | 53.4 | A |
| $P_D$@$T_C$=25℃ | Total Power Dissipation[4] | 210 | W |
| TSTG | Storage Temperature Range | -55 to 150 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | ℃ |
| $R_{\theta}$JA | Thermal Resistance Junction-Ambient | 0.84 | ℃/W |
| $R_{\theta}$JC | Thermal Resistance Junction-Case | 62 | ℃/W |

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

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| VDSS | Drain-Source Breakdown Voltage | $V_{GS}$ = 0V, $I_D$ = 250μA | 150 | - | - | V |
| IGSS | Gate-body Leakage current | $V_{DS}$ = 0V, $V_{GS}$ = ±20V | - | - | ±100 | nA |
| IDSS | Zero Gate Voltage Drain Current $T_J$=25°C | $V_{DS}$ =100V, $V_{GS}$ = 0V | - | - | 1 | μA |
| IDSS | Zero Gate Voltage Drain Current $T_J$=100°C | | - | - | 100 | |
| VGS(th) | Gate-Threshold Voltage | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA | 2.0 | 2.9 | 4.0 | V |
| RDS(on) | Drain-Source on-Resistance[2] | $V_{GS}$ = 10V, $I_D$ = 20A | - | 6.6 | 7.5 | mΩ |
| Ciss | Input Capacitance | $V_{DS}$ = 50V, $V_{GS}$ =0V, f =1MHz | - | 5240 | - | pF |
| Coss | Output Capacitance | | - | 412 | - | |
| Crss | Reverse Transfer Capacitance | | - | 10 | - | |
| $R_g$ | Gate Resistance | $V_{GS}$ = 0V, $V_{DS}$ = 0V, f =1MHz | - | 1.7 | - | Ω |
| $Q_g$ | Total Gate Charge | $V_{GS}$ = 10V, $V_{DS}$ = 50V, $I_D$=20A | - | 18 | - | nC |
| Qgs | Gate-Source Charge | | - | 10 | - | |
| Qgd | Gate-Drain Charge | | - | 72 | - | |
| td(on) | Turn-on Delay Time | $V_{GS}$ =10V, $V_{DS}$ =50V, $R_G$ = 3Ω, $I_D$= 20A | - | 22 | - | ns |
| $t_r$ | Rise Time | | - | 115 | - | |
| td(off) | Turn-off Delay Time | | - | 44 | - | |
| $t_f$ | Fall Time | | - | 105 | - | |
| VSD | Diode Forward Voltage[2] | $I_F$ = 20A, $V_{GS}$ = 0V | - | - | 1.2 | V |
| IS | Continuous Source Current[1,5] | $V_G$=$V_D$=0V , Force Current | - | - | 190 | A |
| trr | Body Diode Reverse Recovery Time | $I_F$ = 20A, dI/dt=100A/μs | - | 45 | - | ns |
| $Q_{rr}$ | Body Diode Reverse Recovery Charge | | - | 12 | - | nC |

**Notes:**

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 $V_{DD}$=50V, $V_{GS}$=10V, L=0.5mH, $I_{AS}$=45A

4、The power dissipation is limited by 150°Cjunction temperature

5、The data is theoretically the same as $I_D$ and $I_{DM}$ , in real applications , should be limited by total power dissipation.

## Typical Characteristics

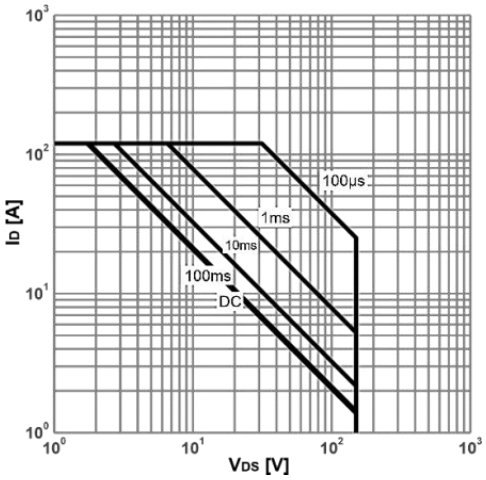



Figure 1. Power dissipation

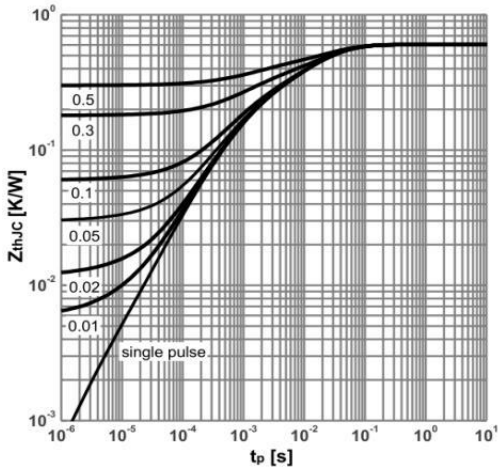



Figure 2. Max. transient thermal impedance

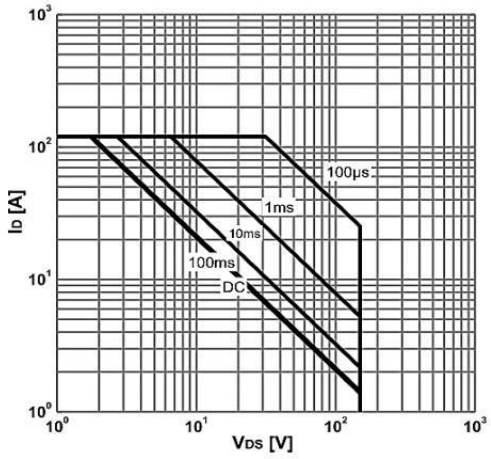



Figure 3. Safe operating area

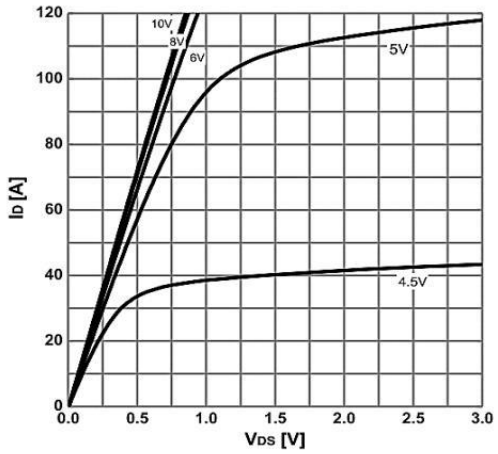



Figure 4. Typ. output characteristics

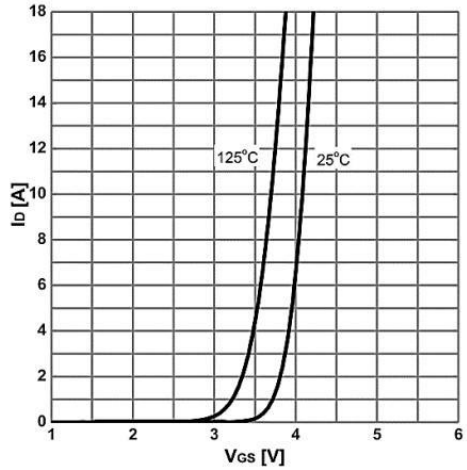



Figure 5. Typ. transfer characteristics

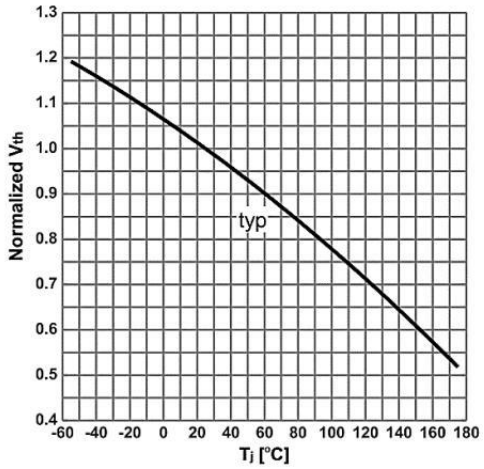



Figure 6. Gate threshold voltage vs. Junction Temperature

## Typical Characteristics

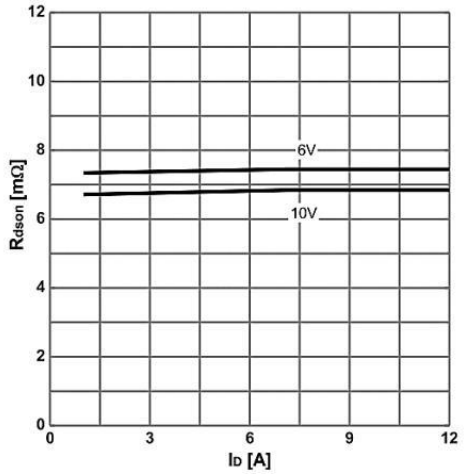



Figure 7. On-state resistance vs. Drain current

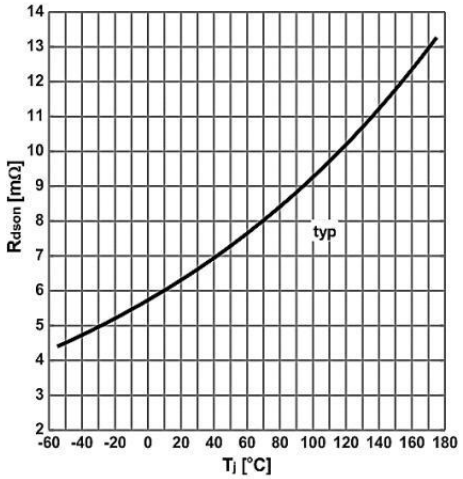



Figure 8. On-state resistance vs. Junction temperature

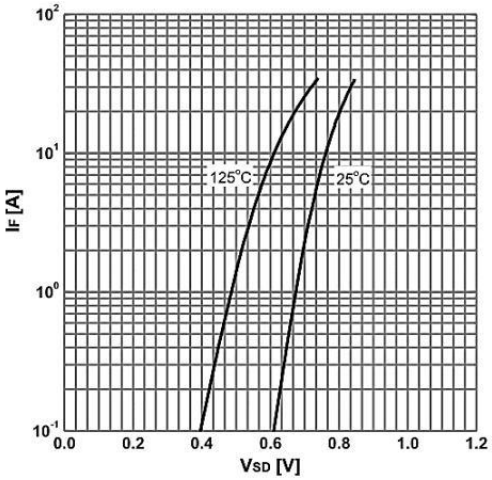



Figure 9. Forward characteristics of reverse diode

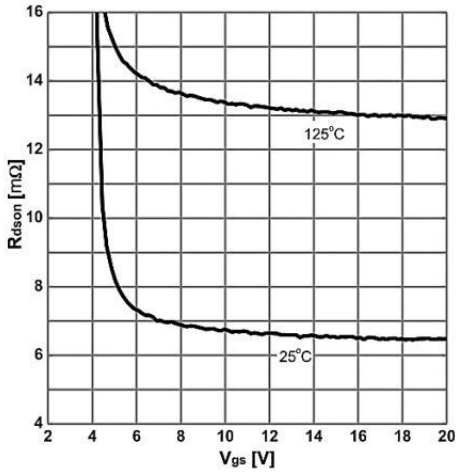



Figure10. On-state resistance vs. Vgs characteristics

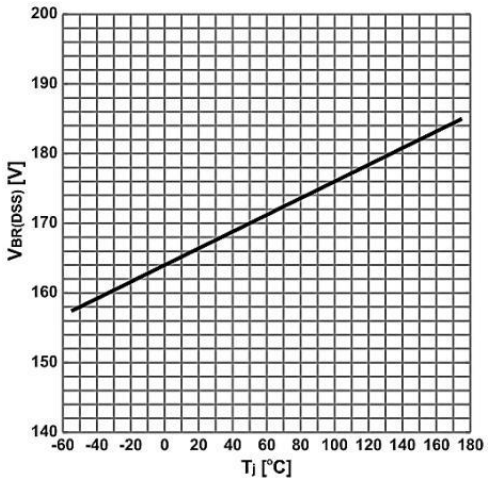



Figure 10：Breakdown Voltage Variation vs. Temperature

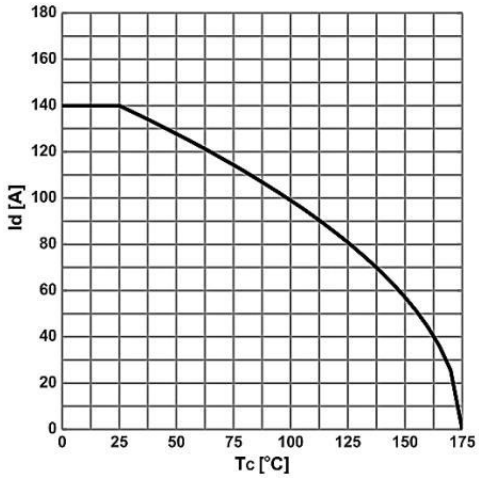
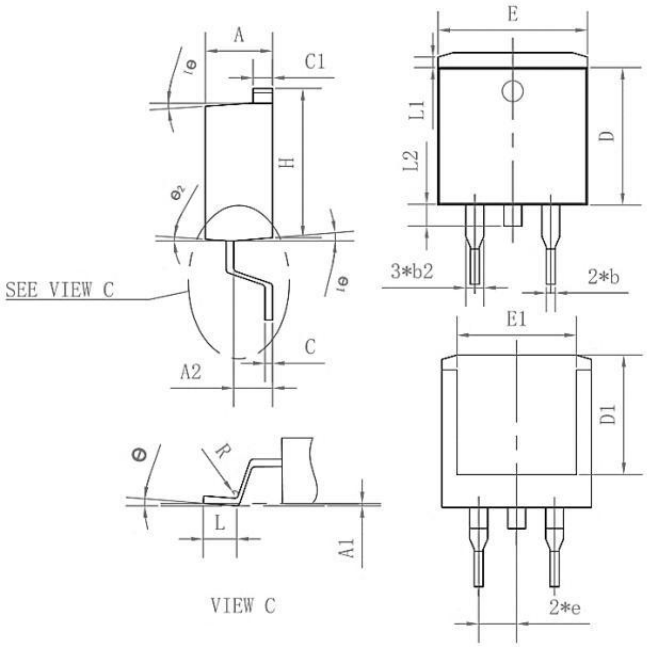



Figure 11：Maximum Drain Current

## Package Mechanical Data-TO-263-3L




| Symbol | Common | | |
|---|---|---|---|
| | mm | | |
| | Mim | Nom | Max |
| A | 4.35 | 4.47 | 4.60 |
| A1 | 0.09 | 0.10 | 0.11 |
| A2 | 2.30 | 2.40 | 2.70 |
| b | 0.70 | 0.80 | 1.00 |
| b2 | 1.25 | 1.36 | 1.50 |
| C | 0.45 | 0.50 | 0.65 |
| C1 | 1.29 | 1.30 | 9.40 |
| D | 9.10 | 9.20 | 9.30 |
| D1 | 7.90 | 8.00 | 8.10 |
| E | 9.85 | 10.00 | 10.20 |
| E1 | 7.90 | 8.00 | 8.10 |
| H | 15.30 | 15.50 | 15.70 |
| e | - | 2.54 | - |
| L | 2.34 | 2.54 | 2.74 |
| L1 | 1.00 | 1.10 | 1.20 |
| L2 | 1.30 | 1.40 | 1.50 |
| R | 0.24 | 0.25 | 0.26 |
| θ | 0° | 4° | 8° |
| Θ1 | 4° | 7° | 10° |
| Θ2 | 0° | 3° | 6° |

### Package Marking and Ordering Information

| Product ID | Pack | Marking | Qty(PCS) |
|---|---|---|---|
| TAPING | TO-263-3L | | 800 |