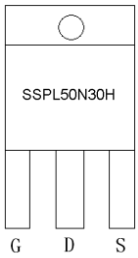
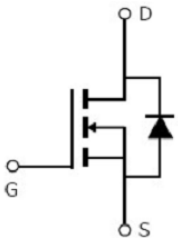
## Main Product Characteristics:

| | |
|---|---|
| $V_{DSS}$ | 300V |
| $R_{DS}$(on) | 45mΩ(typ.) |
| $I_D$ | 50A ① |

TO-247




Marking and Pin Assignment




Schematic Diagram

## Features and Benefits:

- Advanced MOSFET process technology
- Special designed for PWM, load switching and general purpose applications
- Ultra low on-resistance with low gate charge
- Fast switching and reverse body recovery
- 150℃ operating temperature

## Description:

It utilizes the latest processing techniques to achieve the high cell density and reduces the on-resistance with high repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in power switching application and a wide variety of other applications.

## Absolute Max Rating:

| Symbol | Parameter | Max. | Units |
|---|---|---|---|
| $I_D$ @ TC = 25°C | Continuous Drain Current, $V_{GS}$ @ 10V ① | 50 | A |
| $I_D$ @ TC = 100°C | Continuous Drain Current, $V_{GS}$ @ 10V ① | 31 | |
| $I_{DM}$ | Pulsed Drain Current ② | 192 | |
| $P_D$ @TC = 25°C | Power Dissipation ③ | 390 | W |
| | Linear Derating Factor | 3.12 | W/°C |
| $V_{DS}$ | Drain-Source Voltage | 300 | V |
| $V_{GS}$ | Gate-to-Source Voltage | ± 30 | V |
| $E_{AS}$ | Single Pulse Avalanche Energy @ L=60mH | 4465 | mJ |
| $I_{AS}$ | Avalanche Current @ L=60mH | 12.2 | A |
| $T_J$ $T_{STG}$ | Operating Junction and Storage Temperature Range | -55 to +150 | °C |

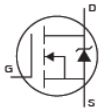
## Thermal Resistance

| Symbol | Characteristics | Typ. | Max. | Units |
|---|---|---|---|---|
| $R_{\theta JC}$ | Junction-to-case ③ | — | 0.32 | ℃/W |
| $R_{\theta JA}$ | Junction-to-ambient (t ≤ 10s)④ | — | 62 | ℃/W |
| | Junction-to-Ambient (PCB mounted, steady-state) ④ | — | 40 | ℃/W |

## Electrical Characteristics @$T_A$=25℃ unless otherwise specified

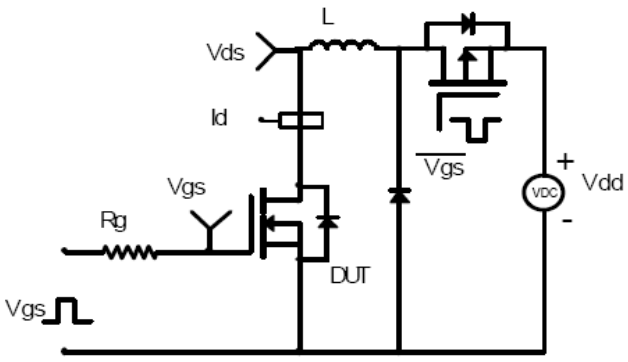
| Symbol | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-to-Source breakdown voltage | 300 | — | — | V | $V_{GS}$ = 0V, $I_D$ = 250μA |
| $R_{DS(on)}$ | Static Drain-to-Source on-resistance | — | 45 | 65 | mΩ | $V_{GS}$=10V,$I_D$ = 25A |
| $V_{GS(th)}$ | Gate threshold voltage | 2 | — | 4 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA |
| $I_{DSS}$ | Drain-to-Source leakage current | — | — | 1 | μA | $V_{DS}$ =300V,$V_{GS}$ = 0V |
| | | — | — | 50 | | $T_J$ = 125°C |
| $I_{GSS}$ | Gate-to-Source forward leakage | — | — | 100 | nA | $V_{GS}$ =30V |
| | | — | — | -100 | | $V_{GS}$ = -30V |
| $Q_g$ | Total gate charge | — | 124 | — | nC | $I_D$ = 40A, $V_{DS}$=240V, $V_{GS}$ = 10V |
| $Q_{gs}$ | Gate-to-Source charge | — | 28 | — | | |
| $Q_{gd}$ | Gate-to-Drain("Miller") charge | — | 50 | — | | |
| $t_{d(on)}$ | Turn-on delay time | — | 62 | — | nS | $V_{GS}$=10V, $V_{DS}$ =150V, $R_{GEN}$=25Ω $I_D$ =40A |
| $t_r$ | Rise time | — | 165 | — | | |
| $t_{d(off)}$ | Turn-Off delay time | — | 303 | — | | |
| $t_f$ | Fall time | — | 144 | — | | |
| $C_{iss}$ | Input capacitance | — | 5723 | — | pF | $V_{GS}$ = 0V $V_{DS}$ = 25V $f$ = 800kHz |
| $C_{oss}$ | Output capacitance | — | 725 | — | | |
| $C_{rss}$ | Reverse transfer capacitance | — | 32 | — | | |

## Source-Drain Ratings and Characteristics

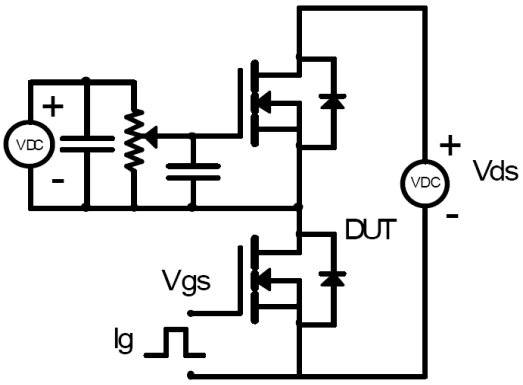
| Symbol | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current (Body Diode) | — | — | 50 ① | A | MOSFET symbol showing the integral reverse p-n junction diode.  |
| $I_{SM}$ | Pulsed Source Current (Body Diode) | — | — | 192 | A | |
| $V_{sd}$ | Diode Forward Voltage | — | 0.66 | 1.5 | V | $I_S$=1A, $V_{GS}$=0V |
| $t_{rr}$ | Reverse Recovery Time | — | 333 | — | nS | $T_J$ = 25°C, $I_F$ =38.5A, di/dt = 100A/μs |
| $Q_{rr}$ | Reverse Recovery Charge | — | 2.5 | — | μC | |

## Test circuits and Waveforms

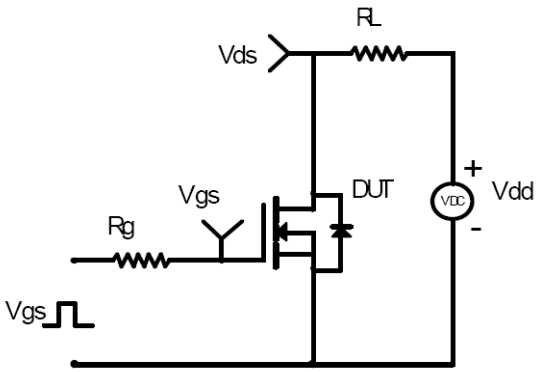
**EAS Test Circuit:**



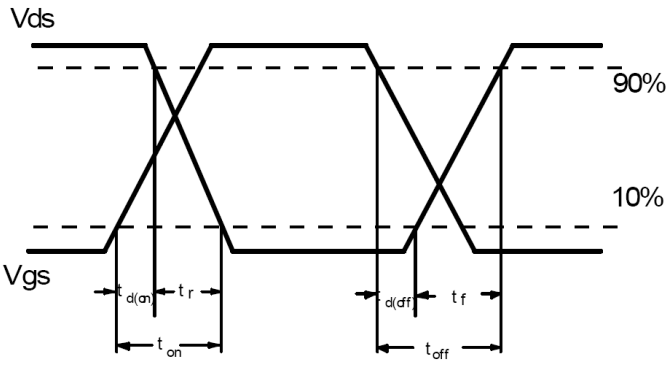

**Gate charge test circuit:**




**Switching Time Test Circuit:**




**Switching Waveforms:**




## Notes:

①Calculated continuous current based on maximum allowable junction temperature.

②Repetitive rating; pulse width limited by max. junction temperature.

③The power dissipation PD is based on max. junction temperature, using junction-to-case thermal resistance.

④The value of $R_{\theta JA}$ is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with TA =25°C

## Typical electrical and thermal characteristics

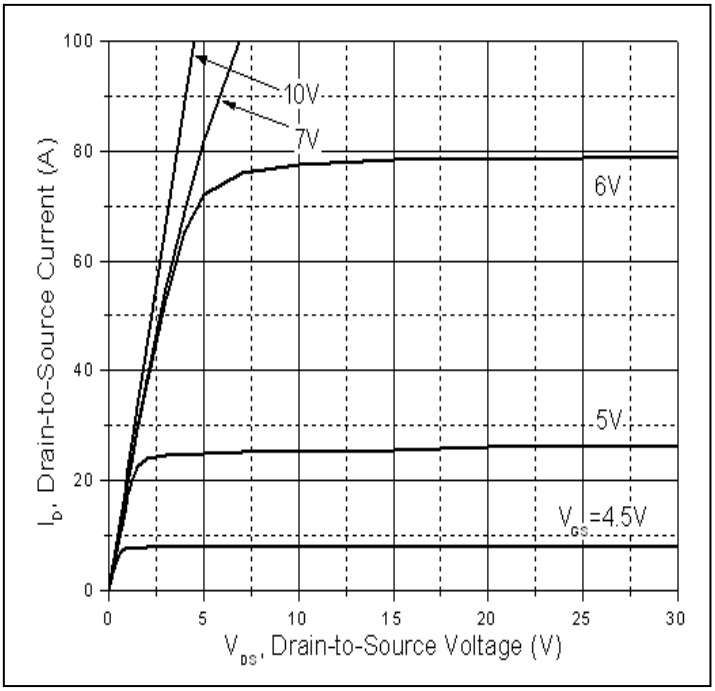



Figure 1.Typical Output Characteristics

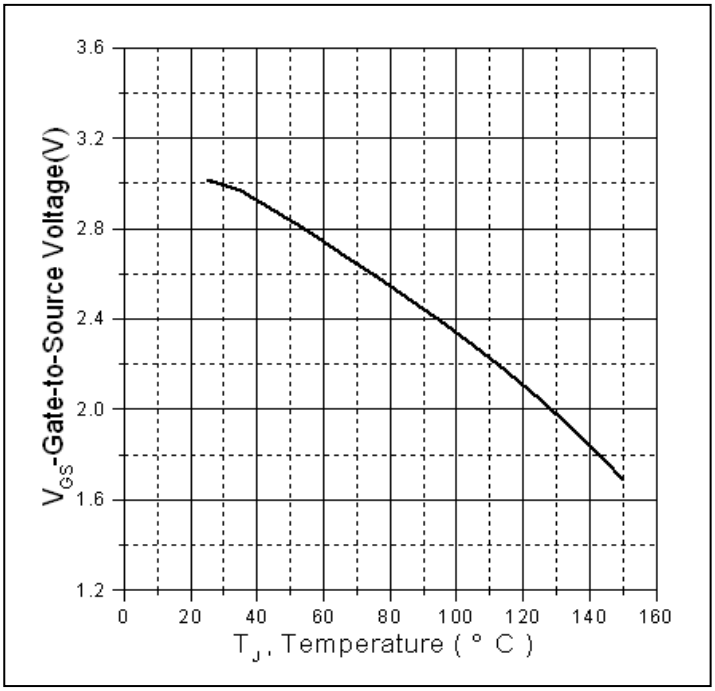



Figure 2. Gate to source cut-off voltage

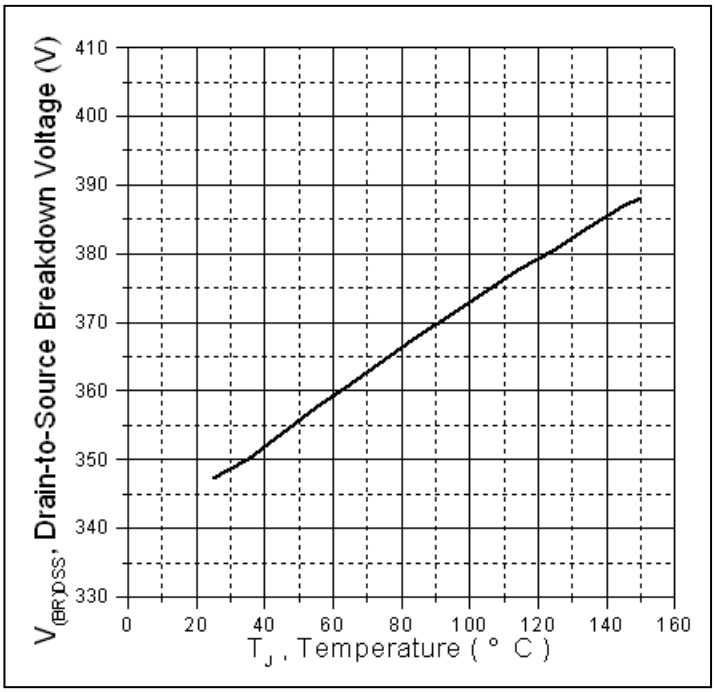



Figure 3. Drain-to-Source Breakdown Voltage Vs. Case Temperature

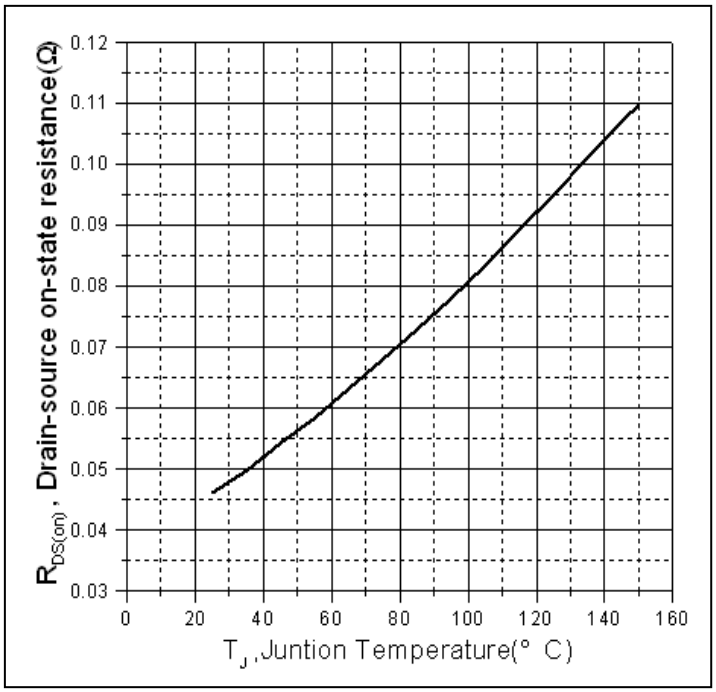



Figure 4.Normalized On-Resistance Vs. Case Temperature

## Typical electrical and thermal characteristics

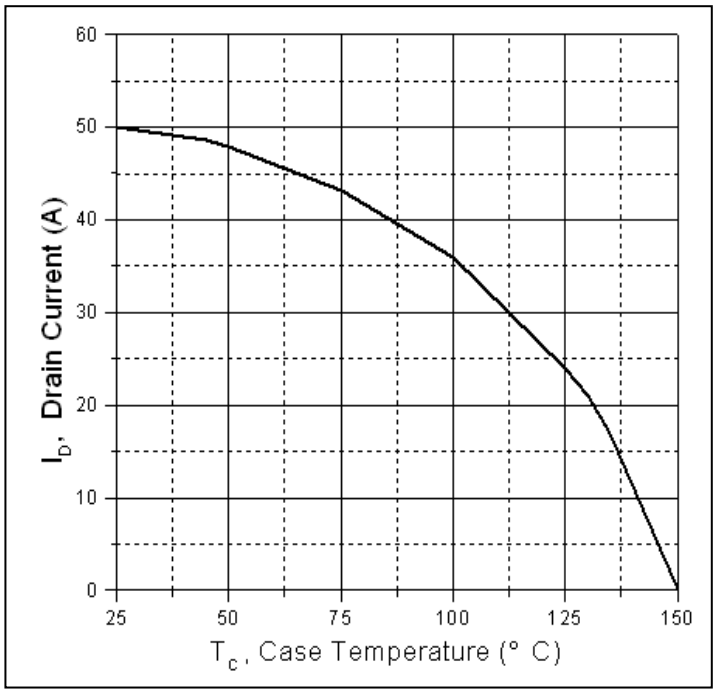



**Figure 5. Maximum Drain Current Vs. Case Temperature**

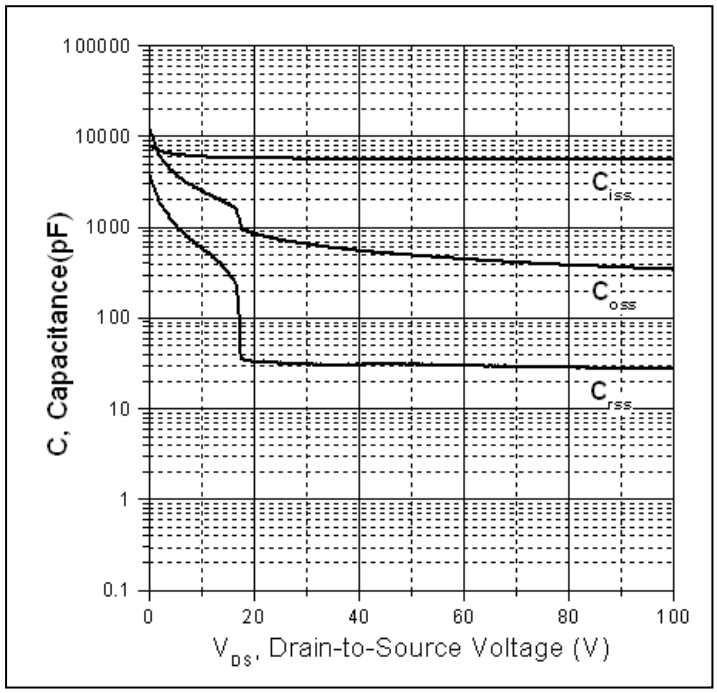
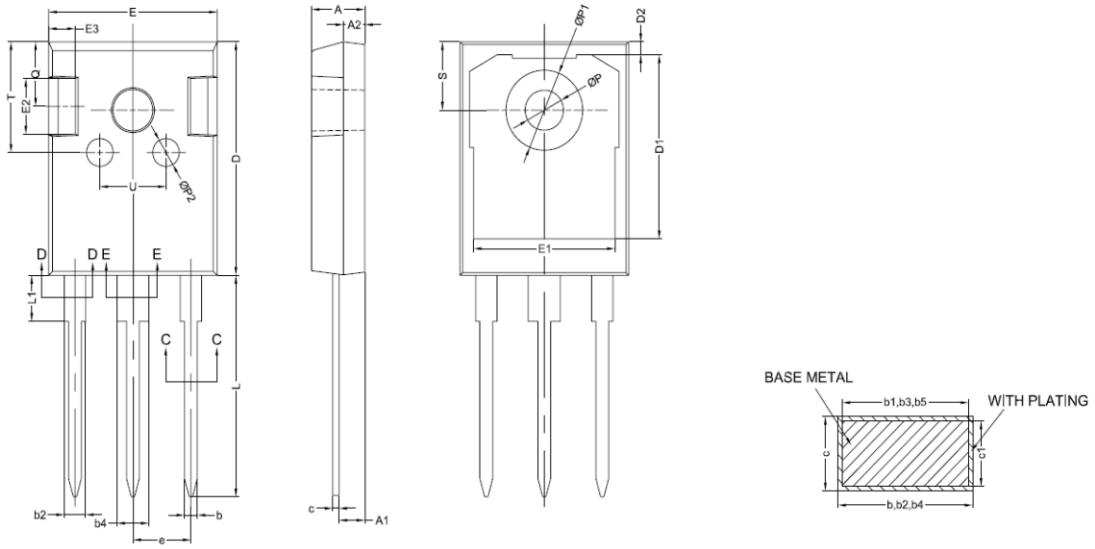



**Figure 6. Typical Capacitance Vs. Drain-to-Source Voltage**

## Mechanical Data：

TO247 PACKAGE OUTLINE DIMENSION




| Symbol | Dimension In Millimeters | | | Dimension In Inches | | |
|---|---|---|---|---|---|---|
| | Min | Nom | Max | Min | Nom | Max |
| A | 4.900 | 5.000 | 5.100 | 0.193 | 0.197 | 0.201 |
| A1 | 2.300 | 2.405 | 2.510 | 0.091 | 0.095 | 0.099 |
| A2 | 1.900 | 2.000 | 2.100 | 0.075 | 0.079 | 0.083 |
| b | 1.160 | - | 1.260 | 0.046 | - | 0.050 |
| b1 | 1.150 | 1.185 | 1.220 | 0.045 | 0.047 | 0.048 |
| b2 | 1.960 | - | 2.060 | 0.077 | - | 0.081 |
| b3 | 1.950 | 1.985 | 2.020 | 0.077 | 0.078 | 0.080 |
| b4 | 2.960 | - | 3.060 | 0.117 | - | 0.120 |
| b5 | 2.950 | 2.985 | 3.020 | 0.116 | 0.118 | 0.119 |
| c | 0.590 | - | 0.660 | 0.023 | - | 0.026 |
| c1 | 0.580 | 0.600 | 0.620 | 0.023 | 0.024 | 0.024 |
| D | 20.900 | 21.000 | 21.100 | 0.823 | 0.827 | 0.831 |
| D1 | 16.250 | 16.550 | 16.850 | 0.640 | 0.652 | 0.663 |
| D2 | 1.050 | 1.200 | 1.350 | 0.041 | 0.047 | 0.053 |
| E | 15.700 | 15.800 | 15.900 | 0.618 | 0.622 | 0.626 |
| E1 | 13.100 | 13.300 | 13.500 | 0.516 | 0.524 | 0.531 |
| E2 | 4.900 | 5.000 | 5.100 | 0.193 | 0.197 | 0.201 |
| E3 | 2.400 | 2.500 | 2.600 | 0.094 | 0.098 | 0.102 |
| e | 5.44BSC | | | 0.214BSC | | |
| L | 19.800 | 19.950 | 20.100 | 0.780 | 0.785 | 0.791 |
| L1 | - | - | 4.300 | - | - | 0.169 |
| P | 3.500 | 3.600 | 3.700 | 0.138 | 0.142 | 0.146 |
| P1 | - | - | 7.400 | - | - | 0.291 |
| P2 | 2.400 | 2.500 | 2.600 | 0.094 | 0.098 | 0.102 |
| Q | 5.600 | - | 6.000 | 0.220 | - | 0.236 |
| S | 6.15BSC | | | 0.242BSC | | |
| T | 9.800 | - | 10.200 | 0.386 | - | 0.402 |
| U | 6.000 | - | 6.400 | 0.236 | - | 0.252 |

## Ordering and Marking Information

**Device Marking: SSPL50N30H**

**Package (Available)**

**TO-247**

**Operating Temperature Range**

**C : -55 to 150 ºC**

## Devices per Unit

| Package Type | Units/ Tube | Tubes/Inner Box | Units/Inner Box | Inner Boxes/Carton Box | Units/Carton Box |
|---|---|---|---|---|---|
| TO247 | 30 | 8 | 240 | 5 | 1200 |

## Reliability Test Program

| Test Item | Conditions | Duration | Sample Size |
|---|---|---|---|
| High Temperature Reverse Bias(HTRB) | $T_j$=150℃ @ 80% of Max $V_{DSS}$/$V_{CES}$/VR | 168 hours<br>500 hours<br>1000 hours | 3 lots x 77 devices |
| High Temperature Gate Bias(HTGB) | $T_j$=150℃ @ 100% of Max $V_{GSS}$ | 168 hours<br>500 hours<br>1000 hours | 3 lots x 77 devices |

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